City of Arvada
City Council Agenda
OCTOBER 21, 2025

Councilmembers:
Lauren Simpson, Mayor
Randy Moorman, Mayor Pro-Tem
Shawna Ambrose, District 2
Sharon Davis, At large
Bob Fifer, District 4
John Marriott, District 3
Brad Rupert, At large

Staff Members Usually Present:
Don Wick, City Manager
Linda Haley, Deputy City Manager
Allison Scheck, Deputy City Manager
Rachel Morris, City Attorney
Jacqueline Rhoades, Director of Infrastructure
Jessica Garner, Director of Community & Econ. Dev.
Bryan Archer, Chief Financial Officer
Gabriella Bommer, Director of Human Resources
Ryan Stevenson, Director of Vibrant Community & Neighborhoods
Rachael Kuroiwa, Director of Communications & Engagement
Ed Brady, Chief of Police
Kristen Rush, City Clerk

Info: 720-898-7550

THIRD FLOOR CONFERENCE ROOM
EXECUTIVE SESSION
5:00 P.M.

Legal Advice, Pursuant to CRS 24-6-402(4)(b) Relating to Development Application for 6800 Kilmer Street

REGULAR MEETING
CITY COUNCIL CHAMBERS
6:00 P.M.

1. Call to Order - 6:00 PM
2. Moment of Reflection and Pledge of Allegiance - Councilmember Ambrose
3. Roll Call of Councilmembers
4. Approval of Minutes - None
5. Recognitions and Communications
   - A. Proclamation for National Community Planning Month - Presented by Councilmember Davis
   - B. Proclamation for Law Enforcement Records Personnel Week - Presented by Councilmember Fifer
6. Presentations
   - A. 2024 Annual Comprehensive Financial Report & Audit Presentation
7. Public Comment on Issues not Scheduled on Agenda - Three Minute Limit
8. New Business
   - A. Consent Agenda
     1. R25-086, A Resolution Adopting the Amended Fee Schedule for Rights-of-Way Work

Permits and Services Pursuant to Chapter 78, Public Improvements, of the Arvada City Code

2. R25-094, A Resolution Adopting the Amended Administrative Fee Schedule for Building Safety Division Permits and Services Pursuant to Chapter 18, Buildings and Building Regulations, of the Arvada City Code
3. R25-095, A Resolution Adopting the Amended Fee Schedule for Land-Use Pursuant to Chapter 74, Planning and Development, of the Arvada City Code
4. R25-096 , A Resolution Authorizing a Third Amendment to the Lease Agreement Between the City of Arvada and T-Mobile West Tower, LLC., Formerly Voicestream PCS II Corporation
5. R25-097, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and MetroNet Fiber
6. R25-098, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and Intrepid Fiber

B. Resolutions

1. R25-099, A Resolution Authorizing an Intergovernmental Agreement Between the City of Arvada and the Church Ditch Water Authority Allowing the City to Place a Water Drainage Pipe and to Make Occasional Discharge of Dechlorinated Potable Water Into the Church Ditch (Presenter: Mary Stahl, Infrastructure (Public Works) Engineering Manager)
2. R25-100, A Resolution Adopting the 2026 Capital Improvement Fund Budget and Allocating for Specific Projects in 2026 (Presenter: Bryan Archer, Chief Financial Officer)
3. R25-101, A Resolution Adopting the Budget for Fiscal Year 2026 (Presenter: Bryan Archer, Chief Financial Officer)

C. Ordinances (First Reading)

1. CB25-026, An Ordinance Repealing and Reenacting Article XI (Micromobility Program) of Chapter 54, Motor Vehicles and Traffic, of the Arvada City Code (Public Hearing to be set for November 18, 2025 at 6:15 p.m.)

9. Other

10. Public Hearings - 6:15 PM

A. CB25-021, An Ordinance Amending Various Sections of Chapter 102, Utilities, of the Arvada City Code Pertaining to Water Users Rates and Bimonthly Service Charges (Ordinance No. 4907) (Presenter: Jacqueline Rhoades, Infrastructure Director)

B. CB25-022, An Ordinance Amending Section 102-206 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Wastewater Users Rates and Bimonthly Service Charges, and Section 102-355 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Stormwater User Rates (Ordinance No. 4908) (Presenter: Jacqueline Rhoades, Infrastructure Director)

C. CB25-023, An Ordinance Prohibiting the Installation of Graywater Treatment Works and the Use of Graywater Within the City of Arvada (Ordinance No. 4909) (Presenter: Jacqueline Rhoades, Infrastructure Director)

D. CB25-024, An Ordinance Appropriating Funds for Fiscal year 2026 (Ordinance No. 4910) (Presenter: Bryan Archer, Chief Financial Officer)

E. CB25-025, An Ordinance Certifying the City of Arvada Mill Levy for 2025 for the Board of County Commissioners for Jefferson and Adams Counties (Ordinance No. 4911) (Presenter: Bryan Archer, Chief Financial Officer)

F. R25-102, A Resolution by the City Council for the City of Arvada, Colorado to Amend the 2014 Arvada Comprehensive Plan Land Use Designation Pertaining to 6800 Kilmer Street from Mixed Use; Residential Emphasis to Industrial/Office (Presenter: Rob Smetana, Manager of Planning & Development)

11. Public Comment - Five Minute Limit

12. Reports from City Council
    A. Council Committee Reports

13. Reports from City Manager
    A. Review of Future Workshops and Presentations

14. Reports from City Attorney

15. Adjournment

CITY OF ARVADA

REPORT TO CITY COUNCIL

AGENDA ITEM 5.A.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: Proclamation for National Community Planning Month - Presented by Councilmember Davis

Report in Brief

City Council will designate October 2025 as National Community Planning Month.

Members of the City's Planning team will be present to accept the proclamation, along with CED Director Jessica Garner.

Prepared by:
Chris Koch, CCO Admin

Reviewed by:

Toni Riebschlager, Law Office Administrator	09/29/2025
Megan McCall, Assistant City Attorney II	09/29/2025

Approved by:

Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

WHEREAS, October is recognized as National Community Planning Month, a time to pause and consider the important role planning and development play in creating vibrant and sustainable communities for all; and

WHEREAS, the work of planners, local governments and community members contributes to the creation of well-designed public spaces, transportation systems and affordable housing, enhancing our quality of life; and

WHEREAS, community planning helps foster a sense of belonging and shared ownership for residents, businesses and organizations; and

WHEREAS, thoughtful, inclusive planning efforts are more important than ever as the City of Arvada and other communities along the Front Range endeavor to provide a broad range of housing and other public amenities suited to our diverse population; and

WHEREAS, the City of Arvada will soon launch a comprehensive planning process, inviting input from community members as we develop guidelines for land use, transportation, parks and open space, and more.

NOW, THEREFORE, BE IT PROCLAIMED by the Mayor and City Council of the City of Arvada, Colorado that the month of October 2025 be designated as National Community Planning Month. We encourage all Arvada community members to consider engaging in the process to plan and shape our future.

Dated this 21st day of October 2025.

_____
Lauren Simpson, Mayor

_____
Randy Moorman, Mayor Pro Tem

_____
Shawna Ambrose, Councilmember

_____
Sharon Davis, Councilmember

_____
Bob Fifer, Councilmember

_____
John Marriott, Councilmember

_____
Brad Rupert, Councilmember

CITY OF ARVADA

REPORT TO CITY COUNCIL

AGENDA ITEM 5.B.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: Proclamation for Law Enforcement Records Personnel Week - Presented by Councilmember Fifer

Report in Brief

City Council will designate November 9 - November 15, 2025, as Law Enforcement Records Personnel Week.

Police Operations Manager Paula Balafas will be present to accept the proclamation.

Prepared by:
Chris Koch, CCO Admin

Reviewed by:

Toni Riebschlager, Law Office Administrator	09/29/2025
Megan McCall, Assistant City Attorney II	09/29/2025

Approved by:

Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

WHEREAS, dedicated law enforcement records personnel serve to provide vital services and are crucial in assisting law enforcement agencies to identify, pursue, capture and process suspected criminals; and

WHEREAS, these professionals continually use their expertise and experience in maintaining criminal justice statistics and improving apprehension strategies; and

WHEREAS, the efficiency of the qualified and dedicated personnel who staff law enforcement records is materially influenced by the people's attitude and understanding of the importance of the work they perform; and

WHEREAS, law enforcement records personnel serving the City of Arvada have exhibited professionalism, efficiency and compassion during the performance of their essential duties; and

WHEREAS, the State of Colorado has designated the second week in November to recognize law enforcement records personnel.

NOW, THEREFORE, BE IT PROCLAIMED that the Mayor and City Council of the City of Arvada, Colorado, hereby recognize the period between November 9, 2025, and November 15, 2025, as **LAW ENFORCEMENT RECORDS PERSONNEL WEEK**.

Dated this 21st day of October, 2025

_____
Lauren Simpson, Mayor

_____
Randy Moorman, Mayor Pro Tem

_____
Shawna Ambrose, Councilmember

_____
Sharon Davis, Councilmember

_____
Bob Fifer, Councilmember

_____
John Marriott, Councilmember

_____
Brad Rupert, Councilmember

CITY OF ARVADA

REPORT TO CITY COUNCIL

AGENDA ITEM 6.A.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: 2024 Annual Comprehensive Financial Report & Audit Presentation

Report in Brief

BRYAN ARCHER — CHIEF FINANCIAL OFFICER

The independent annual audit required by the City Charter (Chapter X, section 10.9) was performed by Forvis Mazars, LLP (formally BKD, LLP) for the year ending December 31, 2024. Forvis is an independent national CPA with a local office. A detailed report of the audit and any findings was prepared and presented to the Audit Committee. In 2024, the audit committee included Council members Randy Moorman and Shawna Ambrose, City Manager Don Wick, Deputy City Managers Linda Haley and Alli Scheck, Chief Financial Officer Bryan Archer, Deputy Finance Director Debra Nielson and Controller Vesta Kruk.

Prepared by:
Bryan Archer, Chief Financial Officer

Reviewed by:

Approved by:

Enclosure, exhibits & attachments required to support the report

CITY OF ARVADA

REPORT TO CITY COUNCIL

AGENDA ITEM 8.A.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: Consent Agenda

Report in Brief

1. R25-086, A Resolution Adopting the Amended Fee Schedule for Rights-of-Way Work Permits and Services Pursuant to Chapter 78, Public Improvements, of the Arvada City Code

2. R25-094, A Resolution Adopting the Amended Administrative Fee Schedule for Building Safety Division Permits and Services Pursuant to Chapter 18, Buildings and Building Regulations, of the Arvada City Code

3. R25-095, A Resolution Adopting the Amended Fee Schedule for Land-Use Pursuant to Chapter 74, Planning and Development, of the Arvada City Code

4. R25-096 , A Resolution Authorizing a Third Amendment to the Lease Agreement Between the City of Arvada and T-Mobile West Tower, LLC., Formerly Voicestream PCS II Corporation

5. R25-097, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and MetroNet Fiber

6. R25-098, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and Intrepid Fiber

Suggested Motion: Moved by: _____ I move that the Consent Item(s), Number(s)_____
be
(Removed from the Consent Agenda and Heard Upon Item _____) (Referred to a Workshop) (Postponed Indefinitely).

YES _____ NO _____ ABSENT _____

That All/Remaining Consent Items be (Approved) (Rejected).

YES _____ NO _____ ABSENT _____

Prepared by:
Chris Koch, CCO Admin

Reviewed by:

Approved by:

Enclosure, exhibits & attachments required to support the report

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.A.1.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-086, A Resolution Adopting the Amended Fee Schedule for Rights-of-Way Work Permits and Services Pursuant to Chapter 78, Public Improvements, of the Arvada City Code

Report in Brief

PRESENTER: Chris Lisberg

The resolution updates the fee schedule for rights-of-way permits and services, effective January 1, 2026.

The Arvada team recommends that the City Council approve R25-086, A Resolution Adopting the Amended Fee Schedule for Rights-of-Way Work Permits and Services Pursuant to Chapter 78, Public Improvements, of the Arvada City Code.

Financial Impact

There is no cost to the City for this change.

Background

The Rights-of-Way Fees schedule is being updated, as required by Ordinance, including renaming of a permit type currently titled “Wet Tap” to “Utility Service Connection” for clarity.

Discussion

As in prior years, proposed changes to the Right-of-Way permit fees are guided by national valuation estimates for skilled labor, common labor, and construction cost indices, adjusted with Denver-area regional modifiers to reflect the local cost of providing these services. The most recent analysis of these indices recommends a near zero change to the fee structure are required for 2026 and thus no changes are being proposed. However, one administrative update is recommended: renaming the permit type currently titled “Wet Tap” to “Utility Service Connection” for clarity.

Additionally, Infrastructure teams are evaluating potential changes to the collection of Dry Utility Permits and Traffic Impact Fees. Any proposed changes will be brought to City Council for consideration in 2026, with the goal of aligning Arvada’s fee schedule and practices more closely with those of neighboring municipalities.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

This action aligns with the Infrastructure and Community and Economic Development Priority Areas of the City Council Strategic Plan.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve R25-086, A Resolution Adopting the Amended Fee Schedule for Rights-of-Way Work Permits and Services Pursuant to Chapter 78, Public Improvements, of the Arvada City Code.

Suggested Motion:

I move that R25-086, A Resolution Adopting the Amended Fee Schedule for Rights-of-Way Work Permits and Services Pursuant to Chapter 78, Public Improvements, of the Arvada City Code, be (approved) (rejected).

Prepared by:
Chris Lisberg, Assistant City Engineer

Reviewed by:

Approved by:

Claudia Vaughan, City Engineer	09/16/2025
Jacqueline Rhoades, Director of Infrastructure	09/26/2025
Bryan Archer, Chief Financial Officer	09/26/2025
Tammy Hedlund, Legal Specialist	10/03/2025
Zachary Woolweaver, Assistant City Attorney I	10/03/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. 25-086

A RESOLUTION ADOPTING THE AMENDED FEE SCHEDULE FOR RIGHTS-OF-WAY WORK PERMITS AND SERVICES PURSUANT TO CHAPTER 78, PUBLIC IMPROVEMENTS, OF THE ARVADA CITY CODE

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The City Council hereby adopts the Amended Fee Schedule for rights-of-way work permits and services pursuant to Chapter 78, Public Improvements, of the Arvada City Code as set forth below and any prior version of said administrative fee schedule inconsistent with that set forth below is amended to conform.

Section 2. The Fee Schedule set forth herein shall be effective January 1, 2026.

Section 3. This resolution shall be effective upon its approval by City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

Rachel A. Morris, City Attorney

By:

_____

FEE SCHEDULE*

FOR

RIGHTS OF WAY WORK PERMITS AND SERVICES AS PURSUANT TO CHAPTER 78, PUBLIC IMPROVEMENTS, OF THE ARVADA CITY CODE

EFFECTIVE JANUARY 1, 2026

Municipal General Contractor's License	$225.00
Sewer Main	$.67/LF ($67.00 min)
Water Main	$.67/LF ($67.00 min)
Fire line	$.67/LF ($67.00 min)
Wet Tap	$67.00/EA
Water Service	$67.00/EA
Sewer Service	$67.00/EA
Irrigation Service	$67.00/EA
Water Service Disconnect	$67.00/EA
Sewer Service Disconnect	$67.00/EA
Storm Sewer - Public	$.67/LF ($67.00 min)
Storm Sewer - Private	$.67/LF ($67.00 min)
Irrigation Main	$.67/LF ($67.00 min)
Combination Curb, Gutter, & Walk	$.55/LF ($67.00 min)
Bike Trail	$.55/LF ($67.00 min)
Detached Walk	$.55/LF ($67.00 min)
Vertical Curb & Gutter	$.55/LF ($67.00 min)
Structure (Surface Area - medians, pavers, retaining walls, etc.)	$1.60/SF ($67.00 min)
Crosspan/Curb Cut	$79.00/EA
Paving	$.20/SY ($67.00 min)
Asphalt Patch	$.20/SY ($67.00 min)
Street Subgrade	$.20/SY ($67.00 min)
Street Subbase	$.20/SY ($67.00 min)
ADA Ramps	$79.00/EA
Milling	$.20/SY ($67.00 min)
Inlets - Public	$67.00/EA
Inlets - Private	$67.00/EA
Vaults - Public	$67.00/EA
Manhole	$67.00/EA
Outlet Structures - Private	$67.00/EA
Minimum Permit Fee	$67.00/EA
Reinspection Fee	$77.00/EA
Overtime Fee	$114.00/hr. - 2 hours minimum
Fire Hydrant	$67.00/EA
Degradation Fee	$20.50/LF of trench (plus 20LF of required resurfacing)

Overhead Utility - Private	$.28/LF ($67.00 min)
Underground Utility - Private (gas mains, electrical, cable, telecom, etc.)	$.28/LF ($67.00 min)
Boring	$.28/LF ($67.00 min)
Coring	$67.00/EA
Test Hole (concrete)	$67.00/EA
Test Hole (street)	$67.00/EA
Test Hole (Landscaping)	$20.00/EA
Bore Pit	$20.00/EA
Signage	$14.25/EA ($67.00 min)
Street Light	$14.25/EA ($67.00 min)
Permanent Traffic Control Structures (i.e. Guardrail, sound wall, etc...)	$.27/LF ($67.00 min)
Permanent Traffic Control Structures (i.e. bollards, delineators, etc...)	$14.25/EA ($67.00 min)
Striping	$0.15/LF ($67.00 min)
Pavement Markings	$14.25/EA ($67.00 min)
Traffic Signal/Electronic Device Installation/Modification	0.65% of the cost of improvement
Traffic Control Plan Review - Single Service	$67.00/EA
Traffic Control Plan Review - Local Street**	$98.00/EA
Traffic Control Plan Review - Collector Street**	$135.00/EA
Traffic Control Plan Review - Arterial Street**	$325.00/EA
Additional review(s)	$33.50/EA

*Additional fees apply for work without permits pursuant to Section 78-294 of the Arvada City Code. **Roadway classification to be determined by City Traffic Engineer.

REDLINE/STRIKEOVER VERSION

FOR INFORMATION ONLY -- NOT PART OF THE ADMINISTRATIVE FEE SCHEDULE

Underlined indicates new material

~~**Strikeover**~~ indicates deleted material

FEE SCHEDULE*

FOR

RIGHTS OF WAY WORK PERMITS AND SERVICES AS PURSUANT TO CHAPTER 78, PUBLIC IMPROVEMENTS, OF THE ARVADA CITY CODE

EFFECTIVE JANUARY 1, 2026~~5~~

Municipal General Contractor's License	$225.00
Sewer Main	$.67/LF ($67.00 min)
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Fire line	$.67/LF ($67.00 min)
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Water Service	$67.00/EA
Sewer Service	$67.00/EA
Irrigation Service	$67.00/EA
Water Service Disconnect	$67.00/EA
Sewer Service Disconnect	$67.00/EA
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Detached Walk	$.55/LF ($67.00 min)
Vertical Curb & Gutter	$.55/LF ($67.00 min)
Structure (Surface Area - medians, pavers, retaining walls, etc.)	$1.60/SF ($67.00 min)
Crosspan/Curb Cut	$79.00/EA
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Asphalt Patch	$.20/SY ($67.00 min)
Street Subgrade	$.20/SY ($67.00 min)
Street Subbase	$.20/SY ($67.00 min)
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Milling	$.20/SY ($67.00 min)
Inlets - Public	$67.00/EA
Inlets - Private	$67.00/EA
Vaults - Public	$67.00/EA

Manhole	$67.00/EA
Outlet Structures - Private	$67.00/EA
Minimum Permit Fee	$67.00/EA
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Degradation Fee	$20.50/LF of trench (plus 20LF of required resurfacing)
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Underground Utility - Private (gas mains, electrical, cable, telecom, etc.)	$.28/LF ($67.00 min)
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Coring	$67.00/EA
Test Hole (concrete)	$67.00/EA
Test Hole (street)	$67.00/EA
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Bore Pit	$20.00/EA
Signage	$14.25/EA ($67.00 min)
Street Light	$14.25/EA ($67.00 min)
Permanent Traffic Control Structures (i.e. Guardrail, sound wall, etc...)	$.27/LF ($67.00 min)
Permanent Traffic Control Structures (i.e. bollards, delineators, etc...)	$14.25/EA ($67.00 min)
Striping	$0.15/LF ($67.00 min)
Pavement Markings	$14.25/EA ($67.00 min)
Traffic Signal/Electronic Device Installation/Modification	0.65% of the cost of improvement
Traffic Control Plan Review - Single Service	$67.00/EA
Traffic Control Plan Review - Local Street**	$98.00/EA
Traffic Control Plan Review - Collector Street**	$135.00/EA
Traffic Control Plan Review - Arterial Street**	$325.00/EA
Additional review(s)	$33.50/EA

*Additional fees apply for work without permits pursuant to Section 78-294 of the Arvada City Code. **Roadway classification to be determined by City Traffic Engineer.

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.A.2.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-094, A Resolution Adopting the Amended Administrative Fee Schedule for Building Safety Division Permits and Services Pursuant to Chapter 18, Buildings and Building Regulations, of the Arvada City Code

Report in Brief

PRESENTER: Jessica Garner, Director of CED

This is a resolution for the annual update to the Administrative Fee Schedule for Building Safety Division. The fee assessment follows the standard methodology established in 2016, using the International Code Council's August 2025 Valuation Table and the 2025 RS Means Building Construction Cost multiplier for the Denver area. In addition, miscellaneous permit fees that are collected are being modified to include a modest increase using the same methodology as the increases to the valuation table, slowly bringing these fees more in line with the cost of providing these inspections, plan review, and permitting services. Additionally, staff has reformatted the fee schedule to make this a customer-focused document with transparency of how fees are assessed, as well as to meet accessibility standards.

The Arvada team recommends that the City Council approve R25-094, A Resolution Adopting the Amended Administrative Fee Schedule for Building Safety Division Permits and Services Pursuant to Chapter 18, Buildings and Building Regulations, of the Arvada City Code.

Financial Impact

Depending on the number and types of permits processed in 2026, these changes should have an impact of approximately 3% increase in fees. Use tax collections would increase approximately 1-2% assuming permit activity remains the same.

Background

The Building Permit Fee Schedule is being updated, in accordance with Ordinance Chapter 18 requirements, following the standard methodology established in 2016, using national valuation estimates and regional modifiers for the Denver area. In addition, flat fees are being modified to include a modest increase using the same methodology as the increases to the valuation table, slowly bringing these fees more in line with the cost of providing these inspections, plan review, and permitting services.

Discussion

As part of the Building Division's standard annual update, the International Code Council's August 2025 Valuation Table has been adjusted using the 2025 RS Means Building Construction Cost multiplier for the Denver area. Additionally, staff has changed the format of the fee schedule to be a more customer-friendly and transparent format. Beginning in 2026, the Use Tax calculation will change, adjusting the material cost estimate to 58% of the total valuation, this is an increase from 57%. Table 18-1 of the Building Permit Fee Schedule, which was updated in 2021, will remain unchanged as the fees are already aligned with surrounding jurisdictions. Contractor license fees will also remain the same as in 2024; however, contractor license classifications will be updated to align with International Code Council licensing and testing requirements.

As a result of these updates, the per-square-foot costs listed in Table 18-2 of the Building Permit Fee Schedule will see a modest increase of 1% to 2% across all residential and commercial construction categories. Depending on the volume and types of permits processed in 2025, these changes are expected to have minimal impact on the overall fees and taxes collected for

building projects.

In addition to the changes in Table 18-2, the flat rate fees outlined in Tables 18-3 through 18-6 have been reviewed, with a proposed 3.5% increase (rounded) to these fees. This adjustment is intended to offset the rising costs of providing Building Division services and aligns with the updates made by the Planning and Engineering Divisions. The increase is moderate and designed to encourage customers to continue obtaining permits and inspections, ensuring safe installations for even the smallest projects. Despite these updates, the fees remain competitive and, in many cases, lower than those in other metro jurisdictions.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

The recommended action aligns with the Community and Economic Development Priority Area within the City Council Strategic Plan.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve R25-094, A Resolution Adopting the Amended Administrative Fee Schedule for Building Safety Division Permits and Services Pursuant to Chapter 18, Buildings and Building Regulations, of the Arvada City Code.

Suggested Motion:

I move that R25-094, A Resolution Adopting the Amended Administrative Fee Schedule for Building Safety Division Permits and Services Pursuant to Chapter 18, Buildings and Building Regulations, of the Arvada City Code, be (approved) (rejected).

Prepared by:
Josie Suk, Development Systems and Administrative Manager

Reviewed by:

Approved by:

Kyley Flynn, Chief Building Official	09/28/2025
Jessica Garner, Director of Community and Economic Development	09/29/2025
Gail Walker, Legal Specialist-Contracts	09/30/2025
Kelsy Sargent, Assistant City Attorney	10/03/2025
Rachel Morris, City Attorney	10/06/2025

Allison Scheck, Deputy City Manager	10/07/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-094

A RESOLUTION ADOPTING THE AMENDED ADMINISTRATIVE FEE SCHEDULE FOR BUILDING SAFETY DIVISION PERMITS AND SERVICES PURSUANT TO CHAPTER 18, BUILDINGS AND BUILDING REGULATIONS, OF THE ARVADA CITY CODE

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. Administrative Fee Schedule for Building Safety Division Permits and Services pursuant to Chapter 18, Buildings and Building Regulations of the Arvada City Code, which is in substantially the same form as that attached below, is hereby amended.

Section 2. Any prior version of said Fee Schedules inconsistent with that set forth below is amended to conform herewith.

Section 3. The Fee Schedules set forth herein shall be effective January 1, 2026.

Section 4. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By:_____

Building Permit Fee Guide and Administrative Fee Schedule

Overview

Most Permit fees are based on the project valuation; there are some fees that are a flat rate. Building Inspection calculates this based on the project's gross floor area (square feet) or scope of work multiplied by the applicable ICC "Building Valuation Data" or RS Means "Building Construction Cost Data." The ICC "Building Valuation Data" and RS Means "Building Construction Cost Data" are reviewed and adopted by the Arvada City Council annually. The "Building Valuation Data" is developed by the International Code Council (ICC), updated and published semiannually in their quarterly "Building Safety Journal." "Building Construction Cost Data" is updated and published annually by RS Means. Both ICC and RS Means provide "average" construction costs to assist jurisdictions in estimating the value of a project.

What is included in a permit job valuation?

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- Mechanical, Electrical, Plumbing
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As per Arvada Municipal Code Section 18-42(i) the Building Official will establish a policy. Please see Addendum A.

Payment of Fees

Fees are paid online, in-person or over the phone. We gladly accept cash, check or credit card (Visa, MasterCard, Discover or American Express).

Administrative Fee Schedule

For
Building Safety Division Permits and Services
As Referenced in Chapter 18 of the Arvada Municipal Code
Effective January 1, 2026

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$1,000,001.00 and up	$5,669.25 for the first $1,000,000.00 plus $3.45 for each additional $1,000.00 or fraction thereof.

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A-2 Assembly, nightclubs	$247,87	$240.60	$233.05	$224.16	$209.95	$204.25	$216.46	$190.92	$183.68
A-2 Assembly, restaurants, bars, banquet halls	$246.96	$239.69	$231.22	$223.25	$208.13	$203.33	$215.55	$189.10	$182.77
A-3 Assembly, churches	$289.33	$278.28	$269.44	$257.99	$240.02	$232.46	$248.45	$222.24	$212.94
A-3 Assembly, general, community halls, libraries, museums	$242.97	$231.93	$222.18	$211.63	$192.64	$185.99	$202.09	$174.86	$166.48
A-4 Assembly, arenas	$284.14	$273.10	$263.35	$252.80	$233.81	$227.16	$243.26	$216.03	$207.65
A-5 Assembly, amusement/stadiums	$284.14	$273.10	$263.35	$252.80	$233.81	$227.16	$243.26	$216.03	$207.65
B Business	$274.57	$264.82	$255.32	$244.51	$223.31	$215.35	$235.12	$199.57	$190.41
E Educational	$264.29	$254.87	$246.27	$235.92	$219.04	$207.88	$227.80	$191.72	$185.52
F-1 Factory and industrial, moderate hazard	$151.05	$143.77	$134.72	$129.64	$115.43	$109.82	$123.60	$95.72	$89.12
F-2 Factory and industrial, low hazard	$150.14	$142.86	$134.72	$128.73	$115.43	$108.91	$122.69	$95.72	$88.21
H-1 High Hazard, explosives	$140.92	$133.62	$125.50	$119.50	$106.50	$99.97	$113.46	$86.78	--
H234 High Hazard	$140.92	$133.63	$125.50	$119.50	$106.50	$99.97	$113.46	$86.78	$79.27
H-5 HPM	$274.57	$264.82	$255.32	$244.51	$223.31	$215.35	$235.12	$199.57	$190.41
I-1 Institutional, supervised environment	$253.01	$243.95	$235.24	$226.35	$207.18	$201.61	$225.87	$186.59	$179.93
I-2 Institutional, hospitals	$431.67	$421.92	$412.42	$401.61	$378.56		$392.22	$354.82	--

I-2 Institutional, nursing homes	$297.80	$288.04	$278.54	$267.74	$247.90		$258.34	$224.16	--
I-3 Institutional, restrained	$289.76	$280.00	$270.50	$259.70	$240.78	$231.91	$250.30	$235.12	$206.06
I-4 Institutional, day care facilities	$253.01	$243.95	$235.24	$226.35	$207.18	$201.61	$225.87	$186.59	$179.93
M Mercantile	$185.00	$177.73	$169.26	$161.29	$146.77	$141.97	$153.59	$127.74	$121.41
R-1 Residential, hotels	$255.93	$246.86	$238.15	$229.26	$209.64	$204.07	$228.79	$189.05	$182.39
R-2 Residential, multiple family	$213.70	$204.64	$195.93	$187.04	$168.55	$162.99	$186.56	$147.96	$141.30
R-3 Residential, one- and two-family	$198.67	$193.38	$188.74	$184.71	$178.53	$172.17	$188.44	$166.01	$155.59
R-4 Residential, care/assisted living facilities	$253.01	$243.95	$235.24	$226.35	$207.18	$201.61	$225.87	$186.59	$179.93
S-1 Storage, moderate hazard	$140.01	$132.72	$123.68	$118.59	$104.67	$99.06	$112.55	$84.96	$78.36
S-2 Storage, low hazard	$139.10	$131.81	$123.68	$117.68	$104.67	$98.15	$111.64	$84.96	$77.45
U Utility, miscellaneous	$111.73	$105.36	$97.58	$93.64	$83.41	$78.14	$89.16	$66.39	$63.43
Basement Finish – Added Cost	--	--	--	--	--	--	--	--	$31.50
Canopies (banks, gas stations)	--	--	--	--	--	--	--	--	$53.36
Carports	--	--	--	--	--	--	--	--	$23.05
Decks	--	--	--	--	--	--	--	--	$24.43
Deck (with patio cover)	--	--	--	--	--	--	--	--	$30.73
Sunspaces	--	--	--	--	--	--	--	--	$53.79
Offices (tenant finish)	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96
R-2, R-3 Detached Garage Monolithic Slab	--	--	--	--	--	--	--	--	$35.56

a. Private garages attached or with a full foundation- use Utility, miscellaneous
b. Commercial open or enclosed parking garages- use S-2 Storage, low hazard
c. Unfinished basements (all use groups) = $28.92 per SF
d. Add 0.5 percent to total cost for each story over three
e. Deduct 20 percent for shell-only buildings

Buildings or structures not listed above shall be valued at contract price submitted by the contractor, design professional, owner or applicant.

3. Use Tax Calculation

Use Tax calculations are based on the building valuation, using 58% materials and 42% labor. The source for the materials / labor split is RS Means Building Construction Cost Data 2025, City Cost Indexes for the Denver, Colorado area.

4. Miscellaneous Permits, Inspections and Other Fees Table 18-3

Type of Work	Permit Fee
Temporary Electric / Construction Power	$60.00
Sign-Attached	$30.00
Sign-Detached	$55.00
Sign - with electrical (excludes disconnect/reconnect)	$55.00
Fences exceeding 6' in height based on actual valuation	Use Table 18-1
Commercial cell sites based on actual valuation	Use Table 18-1
Retaining Walls Greater than 4' or Supporting a Surcharge	Use Table 18-1
Roofing	Use Table 18-1
Commercial Demolition - Minor Interior	$67.00
Commercial Demolition - Major Building	$136.000
Temporary Construction / Sales Trailer	$220.00
Temporary membrane structures, tents, and canopies	$ 80.00 per installation/event
Inspections outside of normal business hours (minimum charge - two (2) hours)	$ 80.00 per hour*
Reinspection fees assessed under provisions of Chapter 18 of the Arvada City Code	$ 125*
Inspections for which no fee is specifically indicated (minimum charge one hour)	$ 80.00 per hour*
Additional plan review required by changes, additions, revisions or deferred submittal to	$ 80.00 per hour*

plans (minimum charge - one hour).	
Issuance of new permit following suspension or abandonment of previously permitted work	One-half (1/2) the amount of the original permit fee**
Issuance of new permit for change of contractor on existing job	$ 100.00 per hour*
Use of outside consultants for plan checking and inspections, or both	Actual costs (including administrative and overhead costs)
Permit Reactivation Fee	$100.00 (must meet criteria stated in 18-42 (F) (Exception 1))
Temporary Certificate of Occupancy	$500.00**

*Or the total hourly cost to the city, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages, and benefits of the employees involved.

**$150.00 will be refunded if a certificate of occupancy (CO) is issued prior to the expiration of the temporary certificate of occupancy. Requests for extensions will be at the same rate as a regular temporary certificate of occupancy (TCO) cost.

Fees for plumbing permits, mechanical permits, electrical permits, and other miscellaneous permits and commercial work shall be based on actual contract value of the work as per Table 18-1.

5. Foundation Only Permits Table 18-4

Type	Fee
One- and two-family buildings	$285.00
Multifamily buildings	$425.00
Commercial buildings	$710.00

6. Residential Flat Rate Permit Fees Table 18-5

This fee table is used for permits where only the specified appliance, repair or replacement, is being completed and/or other specified permit types within the table. Projects like a basement finish or an interior remodel that include any of the following will be assessed

using the building permit fee using Table 18-1, based on the actual contract amount of the work.

Note: If project requires a plan review, plan review fees may be charged in addition to the flat fees in table 18-5, per table 18-3.

Type	Permit Fee
Air Conditioners*	$55.00
Awnings	$55.00
Backflow Preventer	$55.00
Residential Demolition - Minor Interior	$67.00
Residential Demolition - Major Building	$135.50
Evaporative Coolers*	$55.00
Furnace Replacement*	$55.00
Gas Logs / Inserts*	$55.00
Generator*	$55.00
Heat Pumps / Mini-Split*	$81.00
Hot Tubs & Above-Ground Pools (In-Ground Pools--use Table 18-1)	$55.00
House Moving	$226.00
Replacement Windows (no structural alterations) (if structural alterations use Table 18-1)	$55.00
Residential Electrical Service Change	$60.00
Residential Elevator or Dumbwaiter/Chairlift	$135.50
Residential Energy Storage System (ESS)	$55.00
Residential EV Charger	$55.00
Siding	$55.00
Solar Hot Water	$55.00
Solar Photovoltaic Panels	$55.00
Water Heaters*	$55.00
Wood Burning Stoves	$55.00
More than one appliance installed*	$82.50

Change of Use Permit	$150.00
Manufactured Homes and Modular Homes	$285.00

*Minor electric wiring is included, but a service change or upgrade is not included in this permit fee.

7. Roofing Valuation Table 18-6

Roof Type	Cost
3-tab	$ 187.50 per 100 sf (9.3 m2)
Shakes (untreated)	$ 439.00 per 100 sf (9.3 m2)
Light-weight tile roofs	$ 439.00 per 100 sf (9.3 m2)
Dimensional shingles	$ 252.00 per 100 sf (9.3 m2)
Other, special roofs and treated shakes	Use actual contract amount*

*The valuation used for calculating roofing permit fees shall be determined by the actual contract amount, excluding the tear-off, or if the amount is unknown, by applying the above estimated costs per 100 sf (9.3 m^2).

**If the contractor/ homeowner submits a copy of the contract or proof of actual material cost, with the material cost clearly identified, the contract amount used to calculate the permit fee will be calculated using 58% as the material cost and 42% as the labor cost.

8. Plan Review Table 18-7

The labor cost. The plan review fees specified in this section are separate fees from other permit fees assessed in this administrative fee schedule and are in addition to those other permit fees.

Type	Fee
Plan review fee (residential)	65% of building permit fee (Use Table 18-1 and 18-3)
Plan review fee (modifications to existing single-family dwellings)	$40.00

Electrical, plumbing, mechanical, fire protection or elevator permit (not part of combination permit)	50% of total permit fee (Use Table 18-1 and 18-3)
Commercial buildings	65% of building permit fee (Use Table 18-1 and 18-3)
Additional plan review required by changes, additions, revisions or deferred submittal to plans	Use Table 18-3
Mastered Permit Plan Review One- and two-family buildings	$211.00
Mastered Permit Plan Review – Multifamily buildings	$245.00

9. Contractor Licensing Fees 18-8

License Type	Fee
Class A General Contractor License	$150.00
Class B General Contractor License	$200.00
Class C General Contractor License	$100.00
Class D Builder's Subcontractor's License	$75.00
Class H Homeowner's "Limited" Building License	$75.00
Class P Plumbing License (Registration of CO State Licensed Plumbing Contractors)	No Fee
Class M Mechanical License	$75.00
Class D Building Moving License	$75.00
Class R Builders Roofing License	$75.00
Class L Limited License	50% of regular license fee
Class E Electrical License (Registration of CO State Licensed Electrical Contractors)	No Fee
Class RM Radon Mitigation Professional License (Registration of CO State Radon Mitigation Professional)	No Fee

Addendum A

ADMINISTRATIVE DECISION / CLARIFICATION & POLICY STATEMENT

TITLE: Refunds Effective date: 01/01/2026

PURPOSE: This policy is to establish when and what fees collected by the Building Inspection Division may be refunded per Chapter 18 of the City of Arvada City Code.

DEFINITIONS: Fees - Permit and plan review fees assessed in accordance with the Fee Schedule promulgated by the Building Inspection Division or the Planning Division and includes a Use Tax imposed under chapter 98 of the Arvada City Code.

POLICY / PROCEDURE

1) All requests for refunds must be made in writing (email, and fax are acceptable) within **six (6) months from the date of payment** as noted in the Building Inspection Division permitting system. The request must include who is requesting the refund an explanation of why the refund is being requested (cancellation of project, error, etc.)
2) Based on the information provided, the City will determine the refund amount due based on the following criteria:
    a) No plan review fees will be refunded if staff has commenced reviewing plans and other permit documents (typically immediately after the permit is submitted). If no review has commenced, 100% of the plan review fee will be refunded.
    b) Once a permit is issued, 80% of permit fees may be refunded if no work for which the permit was issued has commenced and no inspections have been performed. If work has commenced, no permit fees will be refunded.
    c) Once a permit is issued, 100% of use tax will be refunded if no work for which the permit was issued has commenced and no inspections have been performed. If work has commenced, refunds for use tax must be requested from the City of Arvada Finance Department in accordance with their use tax refund policy.
3) Upon determination of the City, fees paid on permits submitted or issued because of City error may be refunded at 100%.
4) Fees will only be refunded to the person, business, or company who paid the fees as recorded on the original receipt for payment(s). Refunds paid by one party will not be refunded to another party for any reason.

Approved: _____

CITY OF ARVADA

ADMINISTRATIVE FEE SCHEDULE
FOR
BUILDING SAFETY DIVIISION PERMITS AND SERVICIES AS REFERENCED IN CHAPTER 18 OF THE ARVADA CITY CODE
EFFECTIVE JANUARY 1, 2025

Building Permit Fee Guide and Administrative Fee Schedule

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Building Permits (Table 18-1) 1
Building Valuation (Table 18-2) 2
Miscellaneous Permits, Inspections and Other Fees (Table 18-3) 3
Foundation Only Permits (Table 18-4) 4
Residential Flat-Rate Permit Fees (Table 18-5) 4
Roofing Valuation – Estimated (Table 18-6) 5
Plan Review (Table 18-7) 6
Temporary Certificate of Occupancy (Table 18-8) 6
Contractor Licensing (Table 18-9) 7

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For
Building Safety Division Permits and Services
As Referenced in Chapter 18 of the Arvada Municipal Code
Effective January 1, 2026~~5~~

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$50,001.00 to $100,000.00	$654.25 for the first $50,000.00 plus $7.00 for each additional $1,000.00 or fraction thereof, to and including $100,000.00
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A-1 Assembly, theaters, with stage	$310.49 ~~306.60~~	$299.44 ~~295.69~~	$290.60 ~~263.43~~	$279.152 ~~75.65~~	$260.84 ~~257.58~~	$253.28 ~~250.11~~	$269.612 ~~66.23~~	$243.06 ~~240.03~~	$233.772 ~~30.84~~
A-1 Assembly, theaters, without stage	$285.06 ~~281.48~~	$274.012 ~~70.58~~	$265.172 ~~40.38~~	$253.712 ~~50.54~~	$235.63 ~~232.69~~	$228.07 ~~225.23~~	$244.172 ~~41.12~~	$217.862 ~~15.14~~	$208.56 ~~205.96~~
A-2 Assembly, nightclubs	$247.87 ~~242.42~~	$240.60 ~~235.31~~	$233.05 ~~209.23~~	$224.162 ~~19.23~~	$209.95 ~~205.34~~	$204.25 ~~199.78~~	$216.462 ~~11.71~~	$190.921 ~~86.74~~	$183.681 ~~79.66~~
A-2 Assembly, restaurants, bars, banquet halls	$246.96 ~~241.50~~	$239.69 ~~234.39~~	$231.222 ~~07.55~~	$223.25 ~~218.32~~	$208.13 ~~203.51~~	$203.33 ~~198.85~~	$215.552 ~~10.80~~	$189.101 ~~84.90~~	$182.771 ~~78.74~~
A-3 Assembly, churches	$289.33 ~~285.69~~	$278.28 ~~274.78~~	$269.44 ~~244.24~~	$257.99 ~~254.74~~	$240.02 ~~237.01~~	$232.46 ~~229.54~~	$248.45 ~~245.32~~	$222.24 ~~219.45~~	$212.942 ~~10.27~~
A-3 Assembly, general, community halls, libraries, museums	$242.97 ~~239.92~~	$231.932 ~~29.00~~	$222.182 ~~01.38~~	$211.632 ~~08.97~~	$192.641 ~~90.20~~	$185.991 ~~83.66~~	$202.09 ~~199.55~~	$174.861 ~~72.65~~	$166.481 ~~64.39~~
A-4 Assembly, arenas	$284.14 ~~280.57~~	$273.102 ~~69.66~~	$263.35 ~~238.69~~	$252.80 ~~249.62~~	$233.812 ~~30.85~~	$227.162 ~~24.31~~	$243.26 ~~240.20~~	$216.03 ~~213.30~~	$207.65 ~~205.04~~
A-5 Assembly, amusement/stadiums	$284.14 ~~280.57~~	$273.102 ~~69.66~~	$263.35 ~~238.69~~	$252.80 ~~249.62~~	$233.812 ~~30.85~~	$227.162 ~~24.31~~	$243.26 ~~240.20~~	$216.03 ~~213.30~~	$207.65 ~~205.04~~
B Business	$274.57 ~~268.50~~	$264.82 ~~258.69~~	$255.32 ~~229.20~~	$244.51 ~~239.11~~	$223.312 ~~18.34~~	$215.352 ~~10.59~~	$235.122 ~~29.92~~	$199.571 ~~95.14~~	$190.411 ~~86.21~~
E Educational	$264.29 ~~256.30~~	$254.87 ~~247.40~~	$246.27 ~~219.93~~	$235.92 ~~229.66~~	$219.04 ~~214.34~~	$207.88 ~~203.38~~	$227.80 ~~221.76~~	$191.721 ~~87.78~~	$185.521 ~~81.76~~
F-1 Factory and industrial, moderate hazard	$151.051 ~~49.20~~	$143.771 ~~42.00~~	$134.721 ~~22.14~~	$129.641 ~~28.05~~	$115.431 ~~14.00~~	$109.821 ~~08.48~~	$123.601 ~~22.08~~	$95.729 ~~4.53~~	$89.128 ~~8.04~~

F-2 Factory and industrial, low hazard	$150.141 48.28	$142.861 41.08	$134.721 22.14	$128.731 27.13	$115.431 14.00	$108.911 07.56	$122.691 21.16	$95.729 4.53	$88.2187 .12
H-1 High Hazard, explosives	$140.921 39.21	$133.621 32.01	$125.501 13.81	$119.501 18.06	$106.501 05.21	$99.979 8.77	$113.461 12.10	$86.788 5.75	--
H234 High Hazard	$140.921 39.21	$133.631 31.01	$125.501 13.81	$119.501 18.06	$106.501 05.21	$99.979 8.77	$113.461 12.10	$86.788 5.75	$79.2778 .33
H-5 HPM	$274.57 268.50	$264.82 258.69	$255.32 229.20	$244.51 239.11	$223.312 18.34	$215.352 10.59	$235.122 29.92	$199.571 95.13	$190.411 86.21
I-1 Institutional, supervised environment	$253.01 243.20	$243.95 234.61	$235.24 208.02	$226.35 218.58	$207.181 99.79	$201.611 94.27	$225.87 218.62	$186.591 79.76	$179.931 74.11
I-2 Institutional, hospitals	$431.674 22.13	$421.924 12.59	$412.42 370.23	$401.613 92.74	$378.56 370.19		$392.22 383.55	$354.82 346.98	--
I-2 Institutional, nursing homes	$297.80 293.03	$288.04 281.70	$278.54 250.07	$267.74 261.84	$247.90 242.45		$258.34 252.66	$224.162 19.23	--
I-3 Institutional, restrained	$289.76 313.48	$280.00 303.94	$270.50 270.49	$259.70 284.09	$240.78 264.69	$231.912 56.02	$250.30 274.90	$235.122 41.48	$206.06 230.72
I-4 Institutional, day care facilities	$253.01 243.20	$243.95 234.61	$235.24 208.02	$226.35 218.58	$207.181 99.79	$201.611 94.27	$225.87 218.62	$186.591 79.76	$179.931 74.11
M Mercantile	$185.001 80.92	$177.731 73.81	$169.261 49.83	$161.291 57.73	$146.771 43.51	$141.971 38.85	$153.591 50.21	$127.741 24.91	$121.4111 8.74
R-1 Residential, hotels	$255.93 245.49	$246.86 236.90	$238.152 10.12	$229.26 220.87	$209.64 202.53	$204.07 197.01	$228.79 220.91	$189.051 82.49	$182.391 76.85
R-2 Residential, multiple family	$213.702 05.27	$204.64 196.68	$195.931 73.20	$187.041 80.65	$168.551 63.20	$162.991 57.68	$186.561 80.68	$147.961 43.16	$141.301 37.52
R-3 Residential, one- and two-family	$198.671 94.40	$193.381 88.69	$188.741 69.38	$184.711 80.96	$178.531 74.75	$172.171 68.29	$188.441 77.86	$166.011 63.10	$155.591 53.65
R-4 Residential, care/assisted living facilities	$253.01 243.20	$243.95 234.61	$235.24 208.02	$226.35 218.58	$207.181 99.80	$201.611 94.27	$225.87 218.62	$186.591 79.76	$179.931 74.11
S-1 Storage, moderate hazard	$140.011 38.29	$132.721 31.10	$123.681 12.13	$118.591 17.42	$104.671 03.38	$99.069 7.85	$112.551 11.18	$84.968 3.91	$78.3677 .41
S-2 Storage, low hazard	$139.101 37.37	$131.811 30.18	$123.681 12.13	$117.681 16.22	$104.671 03.38	$98.1596 .94	$111.6411 0.26	$84.968 3.91	$77.4576 .50
U Utility, miscellaneous	$111.731 05.82	$105.36 99.59	$97.588 5.05	$93.648 8.67	$83.4178 .97	$78.1473 .77	$89.168 4.40	$66.396 2.51	$63.435 9.54
Basement Finish – Added Cost	--	--	--	--	--	--	--	--	$31.5027 .94
Canopies (banks, gas stations)	--	--	--	--	--	--	--	--	$53.36
Carports	--	--	--	--	--	--	--	--	$23.05
Decks	--	--	--	--	--	--	--	--	$24.43
Deck (with patio cover)	--	--	--	--	--	--	--	--	$30.73

Sunspaces	--	--	--	--	--	--	--	--	$53.79
Offices (tenant finish)	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96	$41.96
R-2, R-3 Detached Garage Monolithic Slab	--	--	--	--	--	--	--	--	$35.56

a. Private garages attached or with a full foundation- use Utility, miscellaneous
b. Commercial open or enclosed parking garages- use S-2 Storage, low hazard
c. Unfinished basements (all use groups) = $28.92 per SF
d. Add 0.5 percent to total cost for each story over three
e. Deduct 20 percent for shell-only buildings

Buildings or structures not listed above shall be valued at contract price submitted by the contractor, design professional, owner or applicant. ~~or actual value as submitted by the architect.~~

3. Use Tax Calculation

Use Tax calculations are based on the building valuation, using 587% materials and 423% labor. The source for the materials / labor split is RS Means Building Construction Cost Data 20254, City Cost Indexes for the Denver, Colorado area.

4. Miscellaneous Permits, Inspections and Other Fees Table 18-3

Type of Work	Permit Fee
Temporary Electric / Construction Power	$60.00~~58.50~~
Sign-Attached	$30.00~~29.00~~
Sign-Detached	$55.00~~54.00~~
Sign - with electrical (excludes disconnect/reconnect)	$55.00~~54.00~~
Fences exceeding 6' in height based on actual valuation	Use Table 18-1
Commercial cell sites based on actual valuation	Use Table 18-1

Retaining Walls Greater than 4' or Supporting a Surcharge	Use Table 18-1
Roofing	Use Table 18-1
Commercial Demolition - Minor Interior	$67.0066.00
Commercial Demolition - Major Building	$136.00133.00
Temporary Construction / Sales Trailer	$220.00216.00
Temporary membrane structures, tents, and canopies	$ 80.0078.00 per installation/event
Inspections outside of normal business hours (minimum charge - two (2) hours)	$ 80.0078.00 per hour*
Reinspection fees assessed under provisions of Chapter 18 of the Arvada City Code	$ 125*
Inspections for which no fee is specifically indicated (minimum charge one hour)	$ 80.0078.00 per hour*
Additional plan review required by changes, additions, revisions or deferred submittal to plans (minimum charge - one hour).	$ 80.0078.00 per hour*
Issuance of new permit following suspension or abandonment of previously permitted work	One-half (1/2) the amount of the original permit fee**
Issuance of new permit for change of contractor on existing job	$ 100.00 per hour*
Use of outside consultants for plan checking and inspections, or both	Actual costs (including administrative and overhead costs)
Permit Reactivation Fee	$100.00 (must meet criteria stated in 18-42 (F) (Exception 1))
Temporary Certificate of Occupancy	$500.00**

*Or the total hourly cost to the city, whichever is the greatest. This cost shall include supervision, overhead, equipment, hourly wages, and benefits of the employees involved.

~~**To renew action on a permit that has either been abandoned or expired for over one year, the permittee shall pay a new full permit fee.~~

**$150.00 will be refunded if a certificate of occupancy (CO) is issued prior to the expiration of the temporary certificate of occupancy. Requests for extensions will be at the same rate as a regular temporary certificate of occupancy (TCO) cost.

Fees for plumbing permits, mechanical permits, electrical permits, and other miscellaneous permits and commercial work shall be based on actual contract value of the work as per Table 18-1.

5. Foundation Only Permits Table 18-4

Type	Fee
One- and two-family buildings	$285.00~~279.00~~
Multifamily buildings	$425.00~~417.00~~
Commercial buildings	$710.00~~696.50~~

6. Residential Flat Rate Permit Fees* Table 18-5

This fee table is used for permits where only the specified appliance, repair or replacement, is being completed and/or other specified permit types within the table. Projects like a basement finish or an interior remodel that include any of the following will be assessed using the building permit fee using Table 18-1, based on the actual contract amount of the work.

Note: If project requires a plan review, plan review fees may be charged in addition to the flat fees in table 18-5, per table 18-3.

Type	Permit Fee
Air Conditioners*	$55.00~~54.00~~
Awnings	$55.00~~54.00~~
Backflow Preventer	$55.00~~54.00~~
Residential Demolition - Minor Interior	$67.00~~66.00~~
Residential Demolition - Major Building	$135.50~~133.00~~
Evaporative Coolers*	$55.00~~54.00~~
Furnace Replacement*	$55.00~~54.00~~
Gas Logs / Inserts*	$55.00~~54.00~~
Generator*	$55.00~~54.00~~
Heat Pumps / Mini-Split*	$81.00

Hot Tubs & Above-Ground Pools (In-Ground Pools--use Table 18-1)	$55.0054.00
House Moving	$226.00221.50
Replacement Windows (no structural alterations) (if structural alterations use Table 18-1)	$55.0054.00
Residential Electrical Service Change	$60.0058.50
Residential Elevator or Dumbwaiter/Chairlift	$135.50133.00
Residential Energy Storage System (ESS)	$55.0054.00
Residential EV Charger	$55.0054.00
Siding	$55.0054.00
Solar Hot Water	$55.0054.00
Solar Photovoltaic Panels	$55.0054.00
Water Heaters*	$55.0054.00
Wood Burning Stoves	$55.0054.00
More than one appliance installed*	$82.5081.00
Change of Use Permit	$150.00
Manufactured Homes and Modular Homes	$285.00

~~* The permit fees assessed under Table 18-1 cover the cost of all permit fees related to the specific permit type.~~

~~Exception: Minor electric wiring is included, but a service change or upgrade is not included in this permit fee.~~

~~** If permit application includes installation of more than one appliance listed in Table 18-5, the fee is $ 81.00.~~

~~Fees for plumbing permits, mechanical permits, electrical permits, and other miscellaneous permits and commercial work shall be based on actual contract amount of the work as determined by Table 18-1.~~

*Minor electric wiring is included, but a service change or upgrade is not included in this permit fee.

7. Roofing Valuation Table 18-6

Roof Type	Cost
3-tab	$ 187.50~~184.00~~ per 100 sf (9.3 m2)
Shakes (untreated)	$ 439.00~~430.50~~ per 100 sf (9.3 m2)
Light-weight tile roofs	$ 439.00~~430.50~~ per 100 sf (9.3 m2)
Dimensional shingles	$ 252.00~~247.00~~ per 100 sf (9.3 m2)
Other, special roofs and treated shakes	Use actual contract amount*

*The valuation used for calculating roofing permit fees shall be determined by the actual contract amount, excluding the tear-off, or if the amount is unknown, by applying the above estimated costs per 100 sf (9.3 m^2).

**If the contractor/ homeowner submits a copy of the contract or proof of actual material cost, with the material cost clearly identified, the contract amount used to calculate the permit fee will be calculated using 58~~7~~% as the material cost and 42~~3~~% as the labor cost.

8. Plan Review Table 18-7

The labor cost. The plan review fees specified in this section are separate fees from other permit fees assessed in this administrative fee schedule and are in addition to those other permit fees.

Type	Fee
Plan review fee (residential)	65% of building permit fee (Use Table 18-1 and 18-3)
Plan review fee (modifications to existing single-family dwellings)	$40.00~~39.00~~
Electrical, plumbing, mechanical, fire protection or elevator permit (not part of combination permit)	50% of total permit fee (Use Table 18-1 and 18-3)
Commercial buildings	65% of building permit fee (Use Table 18-1 and 18-3)
Additional plan review required by changes, additions, revisions or deferred submittal to	Use Table 18-3

plans	
Mastered Permit Plan Review One- and two-family buildings	$211.00~~207.00~~
Mastered Permit Plan Review – Multifamily buildings	$245.00~~240.00~~

~~Plan review fees for "stock" or "repeat" or "same-as" plans (stock or repeat or same-as plans are plans of buildings that have been reviewed and are subsequently built in multiple locations) shall be assessed as follows:~~

~~Temporary Certificate of Occupancy Fees Table 18-8~~

~~For all buildings or portions thereof- original TCO~~	~~$500.00*~~
~~For all buildings or portions thereof- extension TCO~~	~~$500.00~~

~~*$150.00 will be refunded if a certificate of occupancy is issued prior to the expiration of the temporary certificate of occupancy.~~

9. Contractor Licensing Fees 18-8~~9~~

License Type	Fee
Class A General Contractor License	$150.00
Class B General Contractor License	$200.00
Class C General Contractor License	$100.00
Class D Builder's Subcontractor's License	$75.00
Class H Homeowner's "Limited" Building License	$75.00
Class P Plumbing License (Registration of CO State Licensed Plumbing Contractors)	No Fee
Class M Mechanical License	$75.00
Class D Building Moving License	$75.00
Class R Builders Roofing License	$75.00
Class L Limited License	50% of regular license fee
Class E Electrical License (Registration of CO State Licensed Electrical Contractors)	No Fee

Class RM Radon Mitigation Professional License (Registration of CO State Radon Mitigation Professional)	No Fee

Addendum A

ADMINISTRATIVE DECISION / CLARIFICATION & POLICY STATEMENT

TITLE: Refunds Effective date: 01/01/2026

PURPOSE: This policy is to establish when and what fees collected by the Building Inspection Division may be refunded per Chapter 18 of the City of Arvada City Code.

DEFINITIONS: Fees - Permit and plan review fees assessed in accordance with the Fee Schedule promulgated by the Building Inspection Division or the Planning Division and includes a Use Tax imposed under chapter 98 of the Arvada City Code.

POLICY / PROCEDURE

1) All requests for refunds must be made in writing (email, and fax are acceptable) within **six (6) months from the date of payment** as noted in the Building Inspection Division permitting system. The request must include who is requesting the refund an explanation of why the refund is being requested (cancellation of project, error, etc.)
2) Based on the information provided, the City will determine the refund amount due based on the following criteria:
    a) No plan review fees will be refunded if staff has commenced reviewing plans and other permit documents (typically immediately after the permit is submitted). If no review has commenced, 100% of the plan review fee will be refunded.
    b) Once a permit is issued, 80% of permit fees may be refunded if no work for which the permit was issued has commenced and no inspections have been performed. If work has commenced, no permit fees will be refunded.
    c) Once a permit is issued, 100% of use tax will be refunded if no work for which the permit was issued has commenced and no inspections have been performed. If work has commenced, refunds for use tax must be requested from the City of Arvada Finance Department in accordance with their use tax refund policy.
3) Upon determination of the City, fees paid on permits submitted or issued because of City error may be refunded at 100%.
4) Fees will only be refunded to the person, business, or company who paid the fees as recorded on the original receipt for payment(s). Refunds paid by one party will not be refunded to another party for any reason.

Approved: _____

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.A.3.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-095, A Resolution Adopting the Amended Fee Schedule for Land-Use Pursuant to Chapter 74, Planning and Development, of the Arvada City Code

Report in Brief

The resolution updates the Administrative Schedules for Land-Use fees.

The Arvada team recommends that the City Council approve R25-095, A Resolution Adopting the Amended Fee Schedule for Land-Use Pursuant to Chapter 74, Planning and Development, of the Arvada City Code.

Financial Impact

Depending on the number and type of permits processed in 2026, these changes should have a proportional impact of an approximate 2.3 percent increase in fees collected assuming development review activity remains near 2025 levels.

Background

This action will set fees in accordance with the revised Section 74-31, Land-Use Fees, of the Arvada City Code.

Discussion

The proposal includes an approximately 2.3 percent increase in most of the fees in 2026 to address the increased labor cost, as well as moving closer to having the fees cover 100 percent of the cost of providing development and land use review services. This past year, the fees were increased by approximately 3.5 percent. A 2.3 percent increase is proposed for 2026, based on the local inflation rate.

The fee for Short Term Rentals was increased to $350.00 (approximately 50 percent increase) to cover the actual cost of processing the permits, based on past years' worth of data regarding the time spent on the applications, and the implementation cost of the new monitoring software.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

The recommended action aligns with the Community and Economic Development Priority Areas within the City Council Strategic Plan.

Alternative Courses of Action

N/A.

Recommendation for Action

The Arvada team recommends that the City Council approve R25-095, A Resolution Adopting the Amended Fee Schedule for Land-Use Pursuant to Chapter 74, Planning and Development, of the Arvada City Code.

Suggested Motion:

I move that R25-095, A Resolution Adopting the Amended Fee Schedule for Land-Use Pursuant to Chapter 74, Planning and Development, of the Arvada City Code, be (approved) (rejected).

Prepared by:
Josie Suk, Development Systems and Administrative Manager

Reviewed by:

Approved by:

Rob Smetana, Planning Manager	09/17/2025
Jessica Garner, Director of Community and Economic Development	09/17/2025
Gail Walker, Legal Specialist-Contracts	09/30/2025
Kelsy Sargent, Assistant City Attorney	09/30/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-095

A RESOLUTION ADOPTING THE AMENDED FEE SCHEDULE FOR LAND-USE PURSUANT TO CHAPTER 74, PLANNING AND DEVELOPMENT, OF THE ARVADA CITY CODE

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The City Council hereby adopts the Amended Fee Schedule for land-use pursuant to Chapter 74, Planning and Development, of the Arvada City Code as set forth in the attached fee schedule and any prior version of said administrative fee schedule inconsistent with the attached schedule is amended to conform herewith.

Section 2. The Fee Schedule set forth herein shall be effective January 1, 2026.

Section 3. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Additional Development Review	$3~~25~~35.00	$6~~05~~20.00	$~~690~~710.00	$8~~60~~85.00
Alternative Sign Program	$6~~25~~40.00	$9~~40~~65.00	$1,2~~55~~90.00	$1,2~~55~~90.00
Appeal	$~~395~~405.00 regardless of acreage			
Annexation or disconnection	$1,5~~15~~55.00	$~~1,980~~2,035.00	$2,~~640~~710.00	$3,~~275~~365.00
Certificate of Compliance (Design Review Committee Referral)	$3~~15~~25.00	$4~~40~~50.00	$4~~40~~50.00	$4~~40~~50.00
Certificate of Compliance (Administrative Review)	$10~~0~~5.00	$19~~0~~5.00	$19~~0~~5.00	$19~~0~~5.00
Code Compliance Administration	$100.00 Violation beyond first deadline			
	$200.00 Violation beyond second deadline			
	$300.00 Violation beyond third deadline			
	$300.00 Repeat offender summons			
	$300.00 Nuisance hearing			
Comprehensive Plan Amendment	$6~~25~~40.00	$1,2~~55~~90.00	$1,9~~00~~50.00	$2,5~~20~~90.00
Conditional Use Permit	$6~~25~~40.00	$9~~40~~65.00	$1,2~~55~~90.00	$1,2~~55~~90.00
Development Plan Inspection Fee (Re-Inspection fees are charged at the same rate)	$10~~0~~5.00 per single family regardless of acreage. $19~~0~~5.00 per multi-family, commercial or industrial regardless of acreage.			
Fence Review Fee	$3~~3~~4.00 regardless of acreage			
Filming Permit	$13~~0~~5.00			

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Floodplain Development Permit Fee	$50.00 Fence/shed/miscellaneous $10~~05~~.00 Garage, deck, or interior improvements less than 50% of existing building value $20~~05~~.00 Fill or grading only $20~~05~~.00 Building footprint expansion $20~~05~~.00 Any improvement greater than or equal to 50% of existing building value $5~~00~~15.00 New building construction $5~~00~~15.00 Floodplain analysis/CLOMR/LOMR			
Floodplain Variance	$4~~40~~50.00 regardless of acreage			
Food Truck Vending	$6~~0~~2.00 per year			
Height Exception	$~~975~~1,000.00 regardless of acreage			
Major Modification	$6~~25~~40.00	$9~~45~~70.00	$1,2~~55~~90.00	$1,2~~55~~90.00
Major Subdivision Concept Plan	$6~~55~~75.00	$1,3~~20~~55.00	$~~1,950~~2,005.00	$2,~~575~~645.00
Major Subdivision Final Plat or Amendment	$1,~~280~~315.00	$1,8~~20~~70.00 plus $~~290~~300.00 per acre	$~~1,985~~2,040.00 plus $2~~35~~40.00 per acre	$2,3~~25~~90.00 plus $2~~25~~30.00 per acre
Major Subdivision Preliminary Plat	$~~970~~1,000.00	$18~~20~~70.00 plus $3~~10~~20.00 per acre	$2,~~080~~140.00 plus $~~290~~300.00 per acre	$2,~~575~~650.00 plus $2~~70~~80.00 per acre
Master Development Plan	$~~970~~1,000.00	$~~1,950~~2,005.00	$2,~~270~~335.00	$2,~~575~~650.00 plus $~~19~~20.00 per acre
Minor Modification, Individual Standard	$~~195~~200.00 regardless of acreage			
Minor Modification - Site Plan, Final Development Plan or Final Plat	$3~~85~~95.00	$6~~50~~70.00	$~~970~~1,000.00	$1,3~~20~~60.00

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Minor Subdivision Plat	$~~970~~1,000.00	$1,4~~50~~90.00 plus $2~~85~~95.00 per acre	$1,5~~45~~90.00 plus $2~~40~~50.00 per acre	$2,~~545~~615.00 plus $2~~40~~50.00 per acre
Out of City Utility Request	$6~~25~~40.00	$9~~20~~45.00	$1,2~~55~~90.00	$1,6~~05~~50.00
PUD Development Plan or Amendment	$6~~45~~60.00	$1,8~~20~~70.00 plus $3~~10~~20.00 per acre	$2,~~080~~140.00 plus $2~~85~~95.00 per acre	$2,~~435~~500.00 plus $2~~50~~60.00 per acre
PUD Final Development Plan	$~~980~~1,010.00	$1,8~~20~~70.00 plus $3~~10~~20.00 per acre	$2,~~080~~140.00 plus $~~290~~300.00 per acre	$2,~~380~~445.00 plus $2~~40~~50.00 per acre
PUD Final Development Plan Amendment	$6~~25~~40.00	$9~~20~~45.00	$1,2~~55~~90.00	$1,~~575~~620.00
PUD Sketch Plan	$6~~45~~60.00	$1,3~~10~~50.00	$~~1,950~~2,005.00	$2,~~575~~650.00
Public Hearing Sign Deposit	$100.00 per sign			
Revocable Encroachment License or Permit	$4~~40~~50.00 regardless of acreage			
Short Term Rental	$~~175~~350.00 regardless or acreage			
Sign Review Fee	$6~~7~~9.00 regardless of acreage			
Site Plan	$~~970~~1,000.00	$1,8~~20~~70.00 plus $2~~85~~95.00 per acre	$2,~~080~~140.00 plus $2~~65~~75.00 per acre	$2,~~575~~650.00 plus $2~~50~~60.00 per acre
Site Plan Amendment	$6~~25~~40.00	$9~~20~~45.00	$1,2~~55~~90.00	$1,~~570~~615.00

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Special Event Permit (Non-Profit Agencies are Exempt)	$13~~05~~.00 regardless of acreage			
Special District	$4,~~400~~525.00 regardless of acreage			
Telecommunications Facility (Free-Standing)	$3,~~245~~335.00 regardless of acreage			
Telecommunications Facility (Administrative Review)	$9~~30~~55.00 regardless of acreage			
Transient Merchant Permit	Ambulatory: $15.00/day; $75.00/month; $250.00/year Entertainment: $15.00/day; $75.00/month Entertainment with Vending: $15.00/day; $75.00/month Food: $75.00/month; $250.00/year Merchandise (except ambulatory): $75.00/month; $250.00/year Personal services: $15.00/day; $75.00/month Regardless of acreage			
Vacation	$1,3~~10~~50.00 regardless of acreage			
Variance	$3~~85~~95.00	$6~~50~~70.00	$6~~50~~70.00	$6~~50~~70.00
Vested Right (Early Vested Right)	$1,3~~05~~40.00	$1,~~570~~615.00	$1,~~890~~940.00	$2,52~~0~~90.00
Vested Right (Statutory Vested Right)	$6~~25~~40.00 regardless of acreage			

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Zoning or Rezoning	$65~~50~~70.00	$1,60~~5~~50.00	$~~1,950~~2,005.00	$2,~~575~~645.00
Zoning Verification Letter	$6~~7~~9.00 regardless of acreage			

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Additional Development Review	$335.00	$620.00	$710.00	$885.00
Alternative Sign Program	$640.00	$965.00	$1,290.00	$1,290.00
Appeal	$405.00 regardless of acreage			
Annexation or disconnection	$1,555.00	$2,035.00	$2,710.00	$3,365.00
Certificate of Compliance (Design Review Committee Referral)	$325.00	$450.00	$450.00	$450.00
Certificate of Compliance (Administrative Review)	$105.00	$195.00	$195.00	$195.00
Code Compliance Administration	$100.00 Violation beyond first deadline			
	$200.00 Violation beyond second deadline			
	$300.00 Violation beyond third deadline			
	$300.00 Repeat offender summons			
	$300.00 Nuisance hearing			
Comprehensive Plan Amendment	$640.00	$1,290.00	$1,950.00	$2,590.00
Conditional Use Permit	$640.00	$965.00	$1,290.00	$1,290.00
Development Plan Inspection Fee (Re-Inspection fees are charged at the same rate)	$105.00 per single family regardless of acreage. $195.00 per multi-family, commercial or industrial regardless of acreage.			
Fence Review Fee	$34.00 regardless of acreage			
Filming Permit	$135.00			

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Floodplain Development Permit Fee	$50.00 Fence/shed/miscellaneous $105.00 Garage, deck, or interior improvements less than 50% of existing building value $205.00 Fill or grading only $205.00 Building footprint expansion $205.00 Any improvement greater than or equal to 50% of existing building value $515.00 New building construction $515.00 Floodplain analysis/CLOMR/LOMR			
Floodplain Variance	$450.00 regardless of acreage			
Food Truck Vending	$62.00 per year			
Height Exception	$1,000.00 regardless of acreage			
Major Modification	$640.00	$970.00	$1,290.00	$1,290.00
Major Subdivision Concept Plan	$675.00	$1,355.00	$2,005.00	$2,645.00
Major Subdivision Final Plat or Amendment	$1,315.00	$1,870.00 plus $300.00 per acre	$2,040.00 plus $240.00 per acre	$2,390.00 plus $230.00 per acre
Major Subdivision Preliminary Plat	$1,000.00	$1870.00 plus $320.00 per acre	$2,140.00 plus $300.00 per acre	$2,650.00 plus $280.00 per acre
Master Development Plan	$1,000.00	$2,005.00	$2,335.00	$2,650.00 plus $20.00 per acre
Minor Modification, Individual Standard	$200.00 regardless of acreage			
Minor Modification - Site Plan, Final Development Plan or Final Plat	$395.00	$670.00	$1,000.00	$1,360.00

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Minor Subdivision Plat	$1,000.00	$1,490.00 plus $295.00 per acre	$1,590.00 plus $250.00 per acre	$2,615.00 plus $250.00 per acre
Out of City Utility Request	$640.00	$945.00	$1,290.00	$1,650.00
PUD Development Plan or Amendment	$660.00	$1,870.00 plus $320.00 per acre	$2,140.00 plus $295.00 per acre	$2,500.00 plus $260.00 per acre
PUD Final Development Plan	$1,010.00	$1,870.00 plus $320.00 per acre	$2,140.00 plus $300.00 per acre	$2,445.00 plus $250.00 per acre
PUD Final Development Plan Amendment	$640.00	$945.00	$1,290.00	$1,620.00
PUD Sketch Plan	$660.00	$1,350.00	$2,005.00	$2,650.00
Public Hearing Sign Deposit	$100.00 per sign			
Revocable Encroachment License or Permit	$450.00 regardless of acreage			
Short Term Rental	$350.00 regardless of acreage			
Sign Review Fee	$69.00 regardless of acreage			
Site Plan	$1,000.00	$1,870.00 plus $295.00 per acre	$2,140.00 plus $275.00 per acre	$2,650.00 plus $260.00 per acre
Site Plan Amendment	$640.00	$945.00	$1,290.00	$1,615.00

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Special Event Permit (Non-Profit Agencies are Exempt)	$135.00 regardless of acreage			
Special District	$4,525.00 regardless of acreage			
Telecommunications Facility (Free-Standing)	$3,335.00 regardless of acreage			
Telecommunications Facility (Administrative Review)	$955.00 regardless of acreage			
Transient Merchant Permit	Ambulatory: $15.00/day; $75.00/month; $250.00/year Entertainment: $15.00/day; $75.00/month Entertainment with Vending: $15.00/day; $75.00/month Food: $75.00/month; $250.00/year Merchandise (except ambulatory): $75.00/month; $250.00/year Personal services: $15.00/day; $75.00/month Regardless of acreage			
Vacation	$1,350.00 regardless of acreage			
Variance	$395.00	$670.00	$670.00	$670.00
Vested Right (Early Vested Right)	$1,340.00	$1,615.00	$1,940.00	$2,590.00
Vested Right (Statutory Vested Right)	$640.00 regardless of acreage			

Application Type	Fees (Based on Development Size)			
	Less Than 1 Acre	1 to less than 5 Acres	5 to less than 30 Acres	30 Acres or More
Zoning or Rezoning	$670.00	$1,650.00	$2,005.00	$2,645.00
Zoning Verification Letter	$69.00 regardless of acreage			

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.A.4.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-096 , A Resolution Authorizing a Third Amendment to the Lease Agreement Between the City of Arvada and T-Mobile West Tower, LLC., Formerly Voicestream PCS II Corporation

Report in Brief

The twenty-year lease agreement between the City of Arvada and T-Mobile West Tower for an existing wireless communication site at 17850 West 64th Avenue Parkway ("Long Lake Park") was set to expire on May 5, 2023. That lease was extended for one year to allow time to address an open space reverter associated with the property and a new lease agreement. A second amendment to the lease was also approved on May 6, 2024 to allow time to complete an IGA with Jefferson County Open space to address the open space reverter issue. In addition, the Arvada Team is working with JeffCo schools on an agreement to allow continued access to the school stadium property that has recently come to light. While discussions have been ongoing, these items still need to be finalized. In the interim, the Third Amendment to the Lease Agreement will allow all parties involved to continue working toward completion.

The Arvada team recommends that the City Council approve R25-096, A Resolution Authorizing a Third Amendment to the Lease Agreement Between the City of Arvada and T-Mobile West Tower, LLC., Formerly Voicestream PCS II Corporation.

Financial Impact

When the revised lease terms are finalized, they will be included in a new lease that will then be presented to City Council for approval. Included in that lease will be new lease terms for the rent payments to be made by T-Mobile/Crown Castle to the City of Arvada. Until then, the rental payments shall continue at the existing rate on a short term basis as outlined in the Third Amendment to Lease Agreement. Once a new lease is approved, the revised rent payments shall commence upon execution of the new lease. Revenue generated by these leases will continue to go into the Parks Department funding. .

Background

T-Mobile and its predecessor (Voicestream PCSII Corporation) have had a wireless communication facility on the hillside at the western portion of Long Lake Park, near Highway 93, for quite some time. On May 5, 2003, a lease agreement was approved for T-Mobile's predecessor to utilize a portion of the City property for a period of 20 years. That lease agreement was set to terminate on May 5, 2023. A one-year lease extension was granted in 2023. Although this structure has been designed to appear as a shelter for trail users, it is nonetheless located within the park and encumbered by a Jefferson County Open Space (JCOS) reverter. While T-Mobile continues to operate the wireless facility on this structure, the structure is owned and maintained by Crown Castle and T-Mobile/Crown Castle desires to remain at this location. Our Arvada team has been working with T-Mobile/Crown Castle and JCOS to complete an IGA relative to the reverter. As such, a second amendment was approved on May 6, 2024 and is set to expire on November 5, 2025. In addition, the Arvada Team is working with JeffCo Schools on an access agreement to allow our Arvada Parks team and T-Mobile/Crown Castle continued access across the parking lot of the JeffCo stadium property. Discussions with both T-Mobile/Crown Castle, Jefferson County Open Space, and JeffCo Schools have occurred over the past year and will need to continue as the IGA and school access agreement will need to be fully addressed before Arvada can approve a new lease for this facility. In the interim, T-Mobile/Crown Castle continues to be bound by the terms of the existing lease agreement.

Discussion

As noted above, the City of Arvada and T-Mobile/Crown Castle have entered into discussions of the renewal terms for a new lease agreement; however, the new lease is not yet ready for approval. To allow adequate time to address the open space reverter/IGA, the school access agreement, and finalize the new lease, the Arvada Team has determined that the current lease extension should be further extended for six months at the current terms with the option to extend another six months if necessary. During this extension, the Third Amendment to the Lease Agreement shall also terminate upon the effective date of a new long-term lease agreement for this site.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

The Strategic Plan supports community safety as a City Council Priority Area. Providing good wireless communication networks will help to ensure quality communication services, thereby increasing community safety. In addition, the Strategic Plan identifies building and maintaining infrastructure networks as an important element in Arvada's future economic growth. While not specifically identified in the strategic plan, the wireless communications networks provide an added layer of infrastructure improvements that will provide increased opportunities for business and residents throughout the City.

Alternative Courses of Action

N/A

Recommendation for Action

Staff recommends that the City Council approve R25-096, A resolution authorizing a Third Amendment to the Lease Agreement Between the City of Arvada and T-Mobile West Tower, LLC., Formerly Voicestream PCS II Corporation.

Suggested Motion:

I move that R25-096, A Resolution Authorizing a Third Amendment to the Lease Agreement Between the City of Arvada and T-Mobile West Tower, LLC., Formerly Voicestream PCS II Corporation, be (approved) (rejected).

Prepared by:
Heidi Van Gieson, Administrative Specialist

Reviewed by:

Approved by:

Linda Hoover, Senior Planner	09/29/2025
Josie Suk, Development Systems and Administrative Manager	09/30/2025
Rob Smetana, Planning Manager	10/01/2025
Jessica Garner, Director of Community and Economic Development	10/01/2025
Gail Walker, Legal Specialist-Contracts	10/01/2025

Kelsy Sargent, Assistant City Attorney	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-096

A RESOLUTION AUTHORIZING A THIRD AMENDMENT TO THE LEASE AGREEMENT BETWEEN THE CITY OF ARVADA AND T-MOBILE WEST TOWER, LLC., FORMERLY VOICESTREAM PCS II CORPORATION

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The Mayor or Mayor Pro Tem is authorized to sign and the City Clerk to attest, in form approved by the City Attorney, a Third Amendment to a Communications Site Lease Agreement, which is in substantially the same form as that attached hereto, by and between the City of Arvada and T-Mobile West Tower, LLC., formerly Voicestream PCS II Corporation

Section 2. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

THIRD AMENDMENT TO LEASE AGREEMENT BETWEEN THE CITY OF ARVADA AND VOICESTREAM PCS II CORPORATION

THIS THIRD AMENDMENT TO LEASE AGREEMENT ("Third Amendment") is made and entered into as of the ____ day of _____, 2025, between the **THE CITY OF ARVADA,** a Colorado home rule municipal corporation ("Landlord") and **T-MOBILE WEST TOWER LLC,** a Delaware limited liability company, by and through CCTMO LLC, a Delaware limited liability company, its Attorney-in-Fact ("Tenant"). Landlord and Tenant may be referred to individually as a "Party" or collectively as the "Parties."

RECITALS

Landlord and Tenant are parties to that certain Lease Agreement dated May 5, 2003 (the "Original Agreement"), whereby Landlord leases a portion of the real property ("Premises") located at 17850 West 64th Avenue Parkway ("Long Lake Park"), City of Arvada, Colorado (the "Property") to Tenant as more specifically described in the Agreement; and

Subsequently the Original Agreement was amended by that certain First Amendment to Lease Agreement dated May 1, 2023 ("First Amendment") and by that certain Second Amendment to Lease Agreement dated May 6, 2024 ("Second Amendment") (hereinafter the Original Agreement, the First Amendment, and the Second Amendment are collectively referred to as the "Agreement"); and

T-Mobile West Tower LLC, a Delaware limited liability company, is successor in interest to Voicestream PCS II Corporation, and all references to "Tenant" are now T-Mobile West Tower LLC. T-Mobile West Tower LLC has granted CCTMO LLC a limited power of attorney (the "POA") to, among other things, prepare, negotiate, execute, deliver, record, and/or file certain documents on behalf of Tenant, all as more particularly set forth in the POA; and

Upon mutual agreement of the Parties, the Agreement is set to terminate on November 5, 2025, and Landlord and Tenant now desire to further amend the Agreement to extend the term of the Agreement, in order to provide sufficient time to address the Jefferson County Open Space reverter restriction, address site access across the Jefferson County School's stadium parking lot, and negotiate a new lease agreement for the Premises.

THIRD AMENDMENT

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are acknowledged, the Parties agree as follows:

1. Effective November 5, 2025, the Agreement shall automatically be extended for one additional six-month term with an option to extend the term for a second period of six months (the "Extension Term") upon mutual written agreement of the parties on or before May 5, 2026.

2. During the Extension Term, should the Parties agree to and approve a new long-term lease agreement for the Premises, this Agreement shall terminate upon the effective date of the new lease.

3. During the Extension Term, should the open space reverter issue and the access issue not be fully addressed, then this Third Amendment shall terminate. Upon termination of the Agreement, Tenant shall remove the wireless facility pursuant to Section 13 of the Agreement.

4. Except as specifically modified by this Third Amendment, all terms and conditions of the Agreement shall remain in full force and effect. To the best of each Party's knowledge without any independent investigation, as of the date of this Third Amendment, neither Party is in default of the Agreement. In the event of a conflict between any term or provision of the Agreement and this Third Amendment, the terms and provisions of this Third Amendment shall control. All captions are for reference purposes only and shall not be used in the construction or interpretation of this Amendment. All capitalized terms used but not defined in this Third Amendment have the meanings set forth in the Agreement.

This Third Amendment has been executed by each Party's duly authorized representative effective as of the date above written.

LANDLORD:

CITY OF ARVADA, a Colorado home rule municipal corporation

By: _____

Lauren Simpson, Mayor

Date: _____

ATTEST/WITNESS:

_____

Kristen R. Rush, City Clerk

APPROVED AS TO FORM:

For Rachel A Morris, City Attorney

By: _____

Kelsy Sargent, Sr. Assistant City Attorney

TENANT:

T-MOBILE WEST TOWER LLC, a Delaware limited liability company

By: CCTMO LLC, a Delaware limited liability company
Its: Attorney-in-Fact

By: _____

Name: Mandy Hebert

Title: Mgr Real Estate

Date: SEP 16 2025

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.A.5.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-097, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and MetroNet Fiber

Report in Brief

PRESENTER: Claudia Vaughan, City Engineer

This license agreement will allow utilities access to the public right-of-way, establish the specific terms and conditions for Metronet's fiber deployment, covering issues like right-of-way management, permitting, and construction standards. By granting this non-exclusive license, Council is furthering the goal of supporting improved technology systems for community members while ensuring City infrastructure is protected, consistent with the broader strategic results for the community.

The Arvada team recommends that the City Council approve R25-097, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and MetroNet Fiber.

Financial Impact

There is no financial impact.

Background

No previous City Council action has been taken related to this master license agreement between the City of Arvada and MetroNet Fiber and the agreement incorporates city engineering standards, as well as access policy and procedure.

Discussion

This non-exclusive agreement ensures that a private provider can legally and safely install a new fiber network, which provides competition and expanded high-speed internet access for community members and local institutions.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

This action aligns with the Infrastructure Priority Area and Service: INF5 Applies cost-effective and timely engineering, planning and design, construction practices, and established standards and specifications to align public infrastructure reinvestment capacity with community needs.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve R25-097, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and MetroNet Fiber.

Suggested Motion:

I move that R25-097, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and MetroNet Fiber, be (approved) (rejected).

Prepared by:
Claudia Vaughan, City Engineer

Reviewed by:

Approved by:

Claudia Vaughan, City Engineer	09/29/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Tammy Hedlund, Legal Specialist	10/03/2025
Kelsy Sargent, Assistant City Attorney	10/03/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/07/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-097

A RESOLUTION AUTHORIZING A MASTER LICENSE AGREEMENT BY AND BETWEEN THE CITY OF ARVADA AND METRONET FIBER

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The Mayor or Mayor Pro Tem is authorized to sign and the City Clerk to attest, in form approved by the City Attorney, a Master License Agreement that is in substantially the same form as that attached hereto, by and between the City of Arvada and Metronet Fiber.

Section 2. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

MASTER LICENSE AGREEMENT

This Non-Exclusive Master License Agreement ("**Agreement**") is entered into on this ____ day of _____ , 2025, by and between the City of Arvada, a Colorado home rule Municipality ("**the City**"), and Metro Fibernet, LLC, a Nevada limited liability company authorized to do business in the State of Colorado, and its subsidiaries, successors, or assigns ("**Licensee**").

RECITALS

A. The City has jurisdiction over the access to and use of the public rights-of-way located within the City ("**Public ROW**"). For purposes of this Agreement, "Public ROW" is defined as "each of the following which have been dedicated to the public or are hereafter dedicated to the public and maintained under public authority or by others and located within the City: streets, roadways, highways, avenues, lanes, alleys, bridges and sidewalks. Parks, trails, open space and ditch property are not right-of-way; provided however that Licensee may utilize any utility easements within such properties where the specific terms of such easements grant access to Grantee.

B. Licensee desires, and the City desires to authorize Licensee, to install, maintain, operate, and control a fiber optic infrastructure network in Public ROW (**"Network**") for the purpose of offering communications services ("**Services**"), including broadband Internet access service as defined in 47 C.F.R. § 8.1(b) ("**Broadband Internet Services**") and Voice over Internet Protocol services, but excluding wireless communications services which are subject to authorization and regulation under Chapter 7 of the City's Land Development Code, and multichannel video programming services that would be subject to a video services franchise and telecommunications services as defined in 47 C.F.R. § 153(53), to residents and businesses in the City ("**Customers**").

C. The Network consists of equipment and facilities that may include aerial or underground fiber optic cables, lines, wires, or strands; underground conduits, vaults, access manholes and handholes; electronic equipment; power generators; batteries; pedestals; boxes; cabinets; vaults; and other similar facilities, and except for fiber optic lines, excludes any equipment and facilities commonly considered as part of wireless communications facilities ("**Network Facilities**").

AGREEMENT

In consideration of the mutual promises made below, the City and Licensee agree as follows:

1. Permission to Use and Occupy.

1.1 Permission to Use and Occupy Public ROW. The City grants Licensee permission to use and occupy the Public ROW (the "**License**") for the purpose of constructing, installing, repairing, maintaining, operating, and if necessary, removing the Network and the related Network Facilities (the "**Work**"). This Agreement and the License do not authorize Licensee to use any property other than the Public ROW as agreed herein. The permission described herein is a general authorization to use the Public ROW and does not authorize, any site-specific use or occupation. Site-specific authorization shall be granted pursuant to the City's regular permitting process. Licensee's use of any other City property, including poles and conduits, which if granted, will be governed under a separate agreement regarding that use.

1.2 Scope of Agreement. All rights expressly granted to the Licensee under this Agreement, which shall be exercised at the Licensee's sole cost and expense, shall be subject to the exercise of the City's police powers. This Agreement is subject to the City's authority under Applicable Law as it

exists now or may be amended from time-to-time, and subject to the conditions set forth in this Agreement. For the purposes of this Agreement, "Applicable Law" means any statute, ordinance, judicial decision, executive order or regulation having the force and effect of law, that determines the legal standing of a case or issue, and includes, without limitation, Chapter 94 of the Arvada Municipal Code.

1.3 Subject to City's Right to Use Public ROW. This Agreement is subject and subordinate to the City's prior and continuing right to use the Public ROW, including constructing, installing, operating, maintaining, repairing, or removing sewers, water pipes, storm drains, gas pipes, utility poles, overhead and underground electric lines and related facilities, and other public utility and municipal uses.

1.4 Subject to Pre-Existing Property Interests. The authorization granted by the City herein is subject to all valid pre-existing easements, restrictions, conditions, covenants, encumbrances, claims of title or other property interests that may affect the Public ROW. Licensee will obtain at its own cost and expense any permission or rights as may be necessary to accommodate such pre-existing property interests.

1.5 No Grant of Property Interest. The License does not grant or convey any property interest.

1.6 Non-Exclusive. The License is not exclusive. The City expressly reserves the right to grant licenses, permits, franchises, privileges or other rights to any other individual, corporation, partnership, limited liability company, trust, joint stock company, business trust, unincorporated association, joint venture, governmental authority or other entity of any nature whatsoever ("**Person**"), as well as the right in its own name, to use Public ROW for similar or different purposes allowed Licensee under this Agreement.

1.7 Applicability of City Site Planning Process. Nothing in this Agreement shall waive or modify the Licensee's obligation to comply with the City's regular site plan process, in the placement of the Licensee's equipment. In addition, the Licensee shall comply with the City's most recent Engineering Code of Standards and Specifications (the "Standards") and with all requirements as stated in the applicable permits. Licensee understands and agrees that the City is in the process of developing and approving construction standards and engineering specifications governing fiber optic installation and maintenance in the Public ROW, and Licensee shall be bound to comply with any lawfully adopted and generally applicable construction standards and engineering specifications.

2. Licensee's Obligations.

2.1 Obtaining Required Permits. Licensee shall apply for and obtain all required Public ROW Permits and pay any associated review and inspection fees. The City shall respond to the Licensee's requests for permits in the ordinary course of its business to facilitate the deployment of the Network in the Public ROW in a reasonable and timely manner. Such review and inspection fees will be in accordance with the City's adopted fee schedule reflecting the City's costs in administering permits, plus any other documented expenses incurred by the City, including, without limitation, the cost of any dedicated staff, or outside consultants, to facilitate the coordination, permitting and inspection of this Work and to maintain the City's ability to respond in such reasonable and timely manner. Except for a non-refundable application fee, City will provide Licensee with an estimate of the fees associated with the Public ROW Permits prior to incurring the costs associated with the review and inspection. As a condition of obtaining any permit that involves digging or other excavation in the Public ROW, the Licensee shall provide plans in the specified format based on the method of

deployment and further explained in Exhibit B and in accordance with the City's Engineering Code of Standards and Specifications, as may be amended, including without limitation, any adopted fiber optic specifications. Such drawings and plans shall be provided to the City with each request for a construction permit. If the Licensee wishes to change the location or method of deployment of any of the equipment from what is indicated in the original permits, the Licensee shall apply for a new permit prior to changing any location; provided, however, that Licensee may make reasonable changes at the time of deployment depending on the conditions found at the permitted locations at the discretion of the Public Works Municipal Inspector. Review and approval of the construction plans is only for general compliance with the City Code and regulations. All responsibility for existing conditions, correctness of dimensions, details, concepts, quantities, and safety during construction shall remain with Licensee. Construction inspection by the City in no way reflects any responsibility on the part of the City for safety, quality, or quantity control, and in no way implies acceptance of the work, or any part thereof, by the City.

2.2 Obtaining Required Stormwater Management Plan Permits. Licensee shall obtain a State of Colorado Stormwater Discharge Permit prior to obtaining any permit from the City. A copy of the Stormwater Discharge Permit shall be provided to the City upon the City's request. Licensee will utilize best management practices as identified in the Stormwater Management Plan. The City is authorized to require additional Best Management Practices or erosion methods if the City determines they are necessary.

2.3 No Interference. Licensee, in the performance and exercise of its rights and obligations under this Agreement, shall not interfere in any manner with the existence and operation of all public and private rights of way (except in the case where the Licensee's rights are prior or superior to such private right of way), sanitary sewers, water mains, storm drains, gas mains, poles, aerial and underground electrical and telephone wires, cable television, and other communications, utility, or municipal or other government property, except as permitted by Applicable Law, this Agreement, or mutual agreement with any affected party.

2.4 Gas and Electric Facilities.

2.4.1 Licensee agrees and understands that if the City has permitted or allowed natural gas gathering, storage, transmission, distribution, or related facilities within the Public ROW, the Licensee has been fully advised by the City that such natural gas facilities may now transport and may continue to transport natural gas at significant pressures. Licensee shall advise all employees, agents, contractors, and other persons who enter upon the Public ROW of the existence and nature of such natural gas facilities and the potential danger and risk involved.

2.4.2 Licensee agrees and understands that any natural gas facilities, if located within the Public ROW, may be subject to cathodic protection by rectifier and related anode beds, and that Licensee shall not be liable for stray current or interfering signals induced in the Licensee's equipment as a result of the operating of the cathodic protection system.

2.4.3 Licensee agrees and understands that if the City has permitted and allowed to be constructed electric transmission, distribution, or related facilities within the Public ROW, Licensee has been fully advised by the City that such electric facilities may now transmit and may continue to transmit electric current at significant voltages, and that the conductors on electric lines may not be insulated. Licensee shall advise its employees, agents, contractors, and other persons who enter upon the Public ROW of the existence and nature of such electric facilities and the potential danger and risk involved.

2.5 Damage and Restoration. Whenever any Work is required or permitted under this Agreement and any applicable permit, and such Work shall cause the Public ROW or any City or other public or private property to be damaged, or whenever Licensee, in connection with any of its operations, causes damage to the Public ROW or any other public or private property, the Licensee, at its sole cost and expense, shall repair, or cause to be repaired, the damage and return the Public ROW and all affected property to a safe and satisfactory condition equal to or better than as existed prior to the damage. Further, if the City's Public Works Director determines that any damage poses a risk to the safety and/or health of the public, such damage shall be repaired within 24 hours; any damage to public infrastructure, including roadways, sidewalks, drainage or utility infrastructure, and associated items, or actively operating irrigation systems, shall be repaired within ten (10) days; any other damage to private property shall be repaired within thirty (30) days. If the Licensee does not repair the damage as described herein, then the City shall have the following options along with any other remedy available by law: (A) upon fifteen (15) days' prior written notice to the Licensee, to perform or cause to be performed such reasonable and necessary work on behalf of the Licensee and to (1) use the Licensee's Performance Bond, specified in Section 7 below, to fund such work and (2) charge the Licensee for the actual costs incurred by the City at City's standard rates, including administrative time; and (B) upon fifteen (15) days' prior written notice to the Licensee, to Stop Work on all other projects of Licensee within the City until repairs are made or reimbursement to City is paid. Upon receipt of a demand for payment by the City, the Licensee shall promptly reimburse the City for such costs. All restoration work undertaken or caused by Licensee within the Public ROW shall adhere to the standards listed in Chapter 95 of the Arvada Municipal Code and the City's Engineering Code of Standards and Specifications, as may be amended.

2.6 Fire, Disaster or Other Emergency. In the case of fire, disaster or other emergency, or when the City determines any part of the Network poses an immediate threat to the health and safety of the public, the City may relocate, remove, or disconnect the Licensee's Network facilities located in the Public ROW or on any other property of the City in accordance with Section 3.1. Any removal, disconnection, or relocation performed by the City under this provision and Section 3.1 shall be at the Licensee's sole cost and expense.

2.7 Licensee's Sole Cost and Expense. Licensee will perform the Work at its sole cost and expense. Licensee shall be solely responsible for all repairs, maintenance, and adjustments, and damage to the Network, excluding damage caused by third parties, and City shall have no obligation to repair such damage, except where the damage arises from the negligence or willful misconduct of City, its employees, agents, or contractors.

2.8 Reasonable Care. Licensee will exercise reasonable care when performing the Work and will use commonly accepted practices and equipment to minimize the risks of personal injury, property damage, soil erosion, and pollution of surface or groundwater.

2.9 No Nuisance. Licensee will maintain its Network Facilities in good and safe condition so that its Network Facilities do not cause a public nuisance.

2.10 As-Built Drawings and Maps. Licensee shall maintain accurate as-built drawings and maps of its Network located within the City and shall provide electronic or hard copies, as requested by the City, following the completion of construction for a permitted segment. Licensee shall cooperate with the City to furnish such information in an electronic mapping format compatible with the then-current City electronic mapping format.

2.11 Network Design. Nothing in this Agreement requires Licensee to build to all areas of the, and subject to Applicable Law, Licensee retains the discretion to determine the scope, location, and timing of the design and construction of the Network. Notwithstanding the foregoing,

the Licensee will consider community need and areas without significant access to alternative fiber optic communications systems in developing plans for the Network.

2.12 Construction Forecast. Following the Installation Date, the Licensee shall provide the City, on an annual basis, a construction forecast for the upcoming three-year period. The City recognizes that the Licensee cannot guarantee the construction forecast, but the Licensee agrees to keep the City informed of the progress of its schedule.

2.13 Authority of the City Public Works Director. The Public Works Director or designee is designated by the City Manager to exercise all authority on behalf of the City to ensure that the proposed design of facilities is in compliance with the City's Code and regulatory standards. The Public Works Director or designee shall have the authority to request additional information to be provided to resolve potential issues related to the interests of the Public and City infrastructure. The Public Works Director or designee may require certain improvements or repairs to be included when the proposed work directly affects public safety or the sustainability of City infrastructure or when otherwise authorized by Applicable Law; provided, however, that any such requirements will be included in the applicable approved permit. The Public Works Director, or their designee, must approve of all changes or field modifications that, in the opinion of the Public Works Director, affect public safety or the sustainability of City infrastructure.

2.14 Authority of the City Public Works Municipal Inspector. The Public Works Municipal Inspector is designated by the City Manager to exercise all authority on behalf of the City to ensure that the proposed construction of facilities is in general compliance with the City's Code and regulatory standards. Public Works Municipal Inspectors will observe work performed under the issued permit for construction, including all materials to be incorporated in the work, excavation, bedding, backfill, and all construction methods and practices. The Public Works Municipal Inspectors have the authority to request relevant additional information be provided to verify compliance with the City's Code and regulatory standards and approved construction plans when deemed necessary in the opinion of the Public Works Municipal Inspectors. The Licensee shall furnish all reasonable facilities and shall assist the Public Works Municipal Inspectors as necessary for the proper inspection of materials to be used and workmanship involved in the construction. The Public Works Municipal Inspectors have the authority to reject inferior materials or defective workmanship and to suspend work not in accordance with the City's Code and regulatory standards until such time as corrections are made and approved. The Public Works Municipal Inspectors, as designated field representatives of the Public Works Director, are authorized to make minor changes to approved drawings or require changes to be resubmitted to the Public Works Director for approval before proceeding with the work.

2.15 Work Hours. Licensee shall abide by all City requirements regarding authorized work hours. Licensee shall obtain any necessary nighttime work exemptions from the City Engineer for all work outside of those authorized work hours.

2.16 Hazardous Substances. Licensee agrees that Licensee, its contractors, subcontractors and agents, will not use, generate, store, produce, transport or dispose any Hazardous Substance on, under, about or within the area of the Public ROW in violation of Applicable Law. Except to the extent of the negligence or intentional misconduct of City, Licensee shall pay, indemnify, defend and hold City harmless against and to the extent of any loss or liability incurred by reason of any Hazardous Substance produced, disposed of, or used by Licensee, its contractors or subcontractors pursuant to this Agreement. Licensee shall ensure that any on-site or off-site storage, treatment, transportation, disposal or other handling of any Hazardous Substance will be performed by persons who are properly trained, authorized, licensed and otherwise permitted to perform those services.

2.17 Utility Notification Center. Prior to undertaking any work pursuant to this Agreement, the Licensee shall take all actions necessary to become a tier 1 member of the Utility Notification Center of Colorado, and comply with and adhere to local procedures, customs and practices relating to the one call locator service program established in C.R.S. Section 9-1.5-101, et seq., as such may be amended from time to time.

2.18 Post-Removal Restoration of Public ROW. When removal or relocation is required under this Agreement, Licensee will, after the removal or relocation of the Network Facilities, at its own cost, repair and return the Public ROW in which the facilities were located to a safe and satisfactory condition in accordance with the construction-related conditions and specifications as established by the City.

3. City's Obligations.

3.1 Emergency Removal or Relocation by City. In the event of a public emergency that creates an imminent threat to the health, safety, or property of the City or its residents as determined by the Public Works Director, the City may remove or relocate the applicable portions of the Network Facilities without prior notice to Licensee. The City will, however, make best efforts to provide prior notice to Licensee before making an emergency removal or relocation. In any event, the City will promptly provide to Licensee a written description of any emergency removals or relocations of Licensee's Network Facilities. Licensee will reimburse the City for its actual, reasonable, and documented costs or expenses incurred for any such work performed by the City, the direct cause of which was Licensee's construction, installation, operation, maintenance, repair, or removal of its Network Facilities. Upon receipt of a demand for payment by the City, the Licensee shall promptly reimburse the City for such costs. If payment is not received within forty (45) days, the City may draw on the Performance Bond, specified in Section 7 below, for the costs incurred and/or issue a Stop Work on all other projects of Licensee within the City.

3.2 Relocation to Accommodate Governmental Purposes. If Licensee's then-existing Network Facilities would interfere with the City's planned use of the Public ROW or other City property for a legitimate governmental purpose, such as the construction, installation, repair, maintenance, or operation of a new water, sewer, or storm drain line, or a public road, curb, gutter, sidewalk, park, or recreational facility, Licensee will, upon written notice from the City, relocate its Network Facilities at Licensee's own expense to such other location or locations in the Public ROW as may be mutually agreed by the parties, taking into account the needs of City's governmental purpose and Licensee's interest in maintaining the integrity and stability of its Network. Licensee will relocate its Network Facilities within a commercially reasonable period of time agreed to by the parties, but in no event later than 30 days after receipt of written notice from the City, taking into account the urgency of the need for relocation, the difficulty of the relocation, and other relevant facts and circumstances.

3.3 Relocation to Accommodate Non-Governmental Purposes. If Licensee's then-existing Network Facilities would interfere with a third-party's use of the Public ROW, Licensee will not be required to relocate its Network Facilities, unless another party incurs the cost of Licensee's relocation.

4. Contractors and Subcontractors.

4.1 Use of Contractors and Subcontractors. Licensee may retain contractors and subcontractors to perform the Work on Licensee's behalf. Licensee shall be responsible for ensuring a contractor's or subcontractor's compliance with all applicable provisions of this Agreement and shall be responsible to the City for all activities in which contractors or subcontractors are involved.

4.2 Contractors to be Licensed. Licensee's contractors and subcontractors used for the Work will be properly licensed under Applicable Law.

4.3 Authorized Individuals. Licensee's contractors and subcontractors may submit individual permit applications to the City on Licensee's behalf, so long as the permit applications are signed by individuals that Licensee has authorized to act on its behalf via a letter of authorization provided to the City in the form attached as **Exhibit A** ("**Authorized Individuals**"). The City will accept permit applications under this Agreement submitted and signed by Authorized Individuals, and will treat those applications as if they had been submitted by Licensee under this Agreement.

5. Defense and Indemnity.

5.1 Obligations. Licensee will defend, protect, indemnify and hold harmless the City, its officers, elected representatives, and employees, and indemnify them against all third party claims, demands, losses, damages, liabilities, fines, charges, penalties, administrative and judicial proceedings and orders, judgments, and all costs and expenses incurred in connection therewith, including reasonable attorney's fees and costs of defense (collectively, the "Losses") arising out of the Licensee's activities, actions and inactions, undertaken pursuant to this Agreement, except to the extent arising from or caused by the negligence or willful misconduct of the City, its elected officials, officers, employees, agents, or contractors.("**Third Party Legal Proceeding**").

5.2 Waiver of Claims. Licensee waives all claims, demands, causes of action, and rights it may assert against the City on account of any loss, damage, or injury to any Network Facilities or any loss or degradation of the Services as a result of any event or occurrence which is beyond the reasonable control of the City.

5.3 Conditions. Section 6.1 (Obligations) is conditioned on the following: (a) the City must promptly notify Licensee in writing of the Third Party Legal Proceeding and any allegation(s) that preceded the Third Party Legal Proceeding no later than fifteen (15) days after the City became aware of the Third Party Legal Proceeding; (b) the City must reasonably cooperate in the defense at Licensee's request and any reasonable costs incurred by the City in providing such cooperation shall be reimbursed by the Licensee; and (c) the City must tender sole control of the indemnified portion of the Third Party Legal Proceeding to Licensee, subject to the following: (i) the City may appoint its own non-controlling counsel, at its own expense; and (ii) any settlement requiring the City to admit liability, pay money, or take (or refrain from taking) any action, will require City's prior written consent, not to be unreasonably withheld, conditioned, or delayed, and the ultimate decision on settlement is in the City's sole discretion.

6. Limitation of City's Liability. To the extent permitted by law, the City shall be liable only for the cost of repair to damaged Network Facilities arising from the negligence or willful misconduct of City, its employees, agents, or contractors and shall in no event be liable for indirect or consequential damages. The City does not waive any of the benefits, coverages or protections of the Colorado Governmental Immunity Act.

7. Performance Bond. Licensee will, promptly after the Effective Date, provide the City with a performance bond in the amount of fifty thousand dollars ($50,000) naming the City as obligee and guaranteeing Licensee's faithful performance of its obligations under this Agreement. The performance bond will remain in full force during the Term of this Agreement. This performance bond may be used to cover actual costs incurred by the City as required by any provision of this Agreement including, without limitation, covering any costs incurred to repair any damage to the Public ROW not corrected by the Licensee.

8. Insurance.

8.1 Licensee will carry and maintain:

Commercial General Liability (CGL) insurance, with policy limits not less than $5,000,000 in aggregate and $5,000,000 for each occurrence covering bodily injury and property damage with the following features and including personal and advertising injury liability and products-completed operations : (a) CGL primary insurance endorsement; and (b) Commercial Automobile Liability covering all owned, hired, and non-owned autos in an amount of $5,000,000 combined single limit each accident for bodily injury and property damage; (c) all required insurance policies shall include the City, its council members, officers, and employees as additional insureds as their interest may appear under this Agreement for any covered liability arising out of the Licensee's performance of work under this Agreement: (d) coverage shall be in an occurrence form and in accordance with the limits and provisions specified herein. Claims-made policies are not acceptable; (e) upon receipt of notice from its insurer(s), the Licensee shall use commercially reasonable efforts to provide the City with thirty (30) days' advance written notice of cancellation, unless Licensee is not provided at least forty-five (45) days' advance notice of the cancellation from its insurer. In such case, the Licensee shall provide notice to the City of the cancellation within seven (7) days of receiving notice from its insurer.

8.2 All insurance certificates, endorsements, coverage verifications and other items required pursuant to this Agreement will be mailed directly to City's Risk Manager, which at a minimum, shall state the following: (a) The policy number; name of insurance company; name and address of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) that the Licensee's insurance policies are primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance; and (c) that the Licensee's insurance policies waive any right of recovery the insurance company may have against the City. The certificate(s) of insurance shall be mailed to the City at the address specified in Section 12 below and shall be updated annually within thirty (30) days of the anniversary of the Effective Date of this Agreement.

8.3 Workers' Compensation Insurance. Licensee shall obtain and maintain, at all times during the term of this Agreement statutory workers' compensation and employer's liability insurance in an amount of $1,000,000 each accident/disease/policy limit and shall furnish the City with a certificate showing proof of such coverage.

8.4 Insurer Criteria. Any insurance provider of the Licensee shall be admitted and authorized to do business in the State of Colorado and shall carry a minimum rating assigned by *A.M. Best & Company's Key Rating Guide* of "A-" Overall and a Financial Size Category of "VII". Insurance policies and certificates issued by non-admitted insurance companies are not acceptable.

8.5 Severability of Interest. "Severability of interest" or "separation of insureds" clauses shall be made a part of the Commercial General Liability and Commercial Automobile Liability policies.

9. Term. This Agreement is effective on the date the last party to sign executes this Agreement ("**Effective Date**"). The Agreement will expire automatically on the twentieth anniversary of the Effective Date ("**Original Term**"), unless earlier terminated in accordance with the provisions herein. Thereafter, the Agreement will automatically renew for successive 5-year

terms (each a "**Renewal Term**") unless a party provides at least six (6) months' prior written notice to the other party of its intent not to renew. Notwithstanding the foregoing, the Licensee must use commercially reasonable efforts to commence construction of its Network within the City within two (2) years of the Effective Date. If construction is not commenced in such time period, unless the City agrees to an extension, this Agreement may be terminated in the City's sole discretion.

10. Termination.

10.1 Termination by the City. The City may terminate this Agreement if Licensee is in default of any material provisions of the Agreement, provided that the City must first provide Licensee written notice of the default and forty-five (45) days to cure, unless the cure cannot reasonably be accomplished in that time period, in which case Licensee must commence its efforts to cure within that time period and diligently process such cure to completion. If the Licensee believes that a reason beyond its control has prevented or delayed its ability to cure the default, it shall provide documentation as reasonably required by the City to substantiate the Licensee's claim. If the Licensee has not yet cured the deficiency, it shall also provide the City with its proposed plan for remediation, including the timing for such cure.

10.2 Termination by Licensee. Licensee may terminate this Agreement for convenience upon one hundred eighty (180) days' written notice to the City. Upon termination under this clause, the Licensee shall follow the removal requirements under this Agreement and Applicable Law. The removal of the Network shall be at the Licensee's sole expense.

11. Assignment.

11.1 In this Section, the following words have the meanings indicated:

(a) "Control" means actual working control in whatever manner exercised. "Control" includes, but may not necessarily require, majority stock ownership.

(b) "Proposed Transferee" means a proposed purchaser, transferee, lessee, assignee, or person acquiring ownership or control of this Agreement or of the Licensee.

11.2 Except as set forth below, Licensee shall not sell, transfer, lease, assign, sublet or dispose of, in whole or in part, either by forced or involuntary sale, or by ordinary sale, contract, consolidation or otherwise, this Agreement or any of the rights or privileges therein granted, without the prior consent of the City, except that such consent shall not be required for sales, transfers, leases, assignments, subleases or disposals to any parent, subsidiary, affiliate or any person, firm or corporation that Controls, or is under common Control, with the Licensee. The Licensee shall provide no less than thirty (30) days written notice to the City of the details of any transaction described herein that requires City consent.

11.3 The requirements of Subsection 11.2 shall not, except as set forth below, apply to any surviving successor entity or newly created successor entity in the event of a merger, sale, reorganization or consolidation involving the Licensee, unless such merger, sale, reorganization or consolidation results in a change of control. The City reserves the right to be reimbursed for its reasonable costs relating to a transfer of ownership, including without limitation, attorneys' fees. The word "control" as used herein is not limited to majority stockholders but includes actual working control in whatever manner exercised.

11.4 Following any assignment of this Agreement to an Affiliate, Licensee will remain responsible for such Affiliate's performance under the terms of this Agreement. For purposes of this section, (a) "Affiliate" means any Person that now or in the future, directly or indirectly controls, is controlled with or by, or is under common control with Licensee; and (b) "control" means, with respect to: (i) a U.S. corporation, the ownership, directly or indirectly, of fifty percent (50%) or more of the voting power to elect directors thereof, or (ii) a non-U.S. corporation, if the voting power to elect directors thereof is less than fifty percent (50%), the maximum amount allowed by applicable law; and (iii) any other Person, fifty percent (50%) or more ownership interest in said Person, or the power to direct the management of such Person.

11.5 The consent or approval of the City to transfer by the Licensee does not constitute a waiver or release of the rights of the City in or to its Public ROW or easements and any transfer shall by its own terms be expressly subject to the terms and conditions of this Agreement.

11.6 Any sale, transfer or assignment of this Agreement will bind the successor in interest to the terms of this Agreement.

11.7 Notwithstanding anything contained in this Agreement, the Licensee may pledge the assets of the Network for the purpose of financing provided that such pledge of assets shall not impair the Licensee or mitigate the Licensee's responsibility and capability to meet all its obligations under the provisions of this Agreement.

12. Notice. All notices related to this Agreement will be in writing and sent, if to Licensee to the email addresses set forth below, and if to the City to the address set forth in the City's signature block to this Agreement. Notices are effective (a) when delivered in person, (b) upon confirmation of a receipt when transmitted by electronic mail, (c) on the next business day if transmitted by registered or certified mail, postage prepaid (with confirmation of delivery), (d) on the next business day if transmitted by overnight courier (with confirmation of delivery), or I three (3) days after the date of mailing, whichever is earlier.

Licensee's e-mail address for notice is: mfn-noc@metronet.com.

13. General Provisions.

13.1 Governing Law; Jurisdiction. This Agreement is governed by the laws of the state of Colorado, without reference to its conflicts of law principles. If suit is brought by a party to this Agreement, the parties agree that trial of such action shall be vested exclusively in the state courts of Colorado, County of Jefferson, or in the United States District Court for the District of Colorado.

13.2 Neither party will be liable for failure or delay in performance to the extent caused by circumstances beyond its reasonable control. If a party believes that a reason beyond its control has prevented or delayed its ability to perform, it shall provide documentation as reasonably required by the other party to substantiate its claim, and shall also provide the other party with its proposed plan for completing performance.

13.3 This Agreement sets out all terms agreed between the parties and supersedes all previous or contemporaneous agreements between the parties relating to its subject matter.

13.4 Entire Agreement. This Agreement, including any exhibits, constitutes the entire agreement between the parties related to this subject matter, and any change to its terms must be in writing and signed by the parties.

13.5 Non-exclusive Use. Licensee understands that this Agreement does not provide the Licensee with exclusive use of the Public ROW and that City shall have the right to permit other providers of communications services and other utilities to install equipment or devices in the Public ROW. Licensee and the City acknowledge that any agreement for placement of facilities or equipment in the Public ROW will be a public record, and will always be accessible to the Licensee, upon request.

13.6 Waiver of Breach. The waiver by either party of any breach or violation of any provision of this Agreement shall not be deemed to be a waiver or a continuing waiver of any subsequent breach or violation of the same or any other provision of this Agreement.

13.7 Severability of Provisions. If any one or more of the provisions of this Agreement shall be held by court of competent jurisdiction in a final judicial action to be void, voidable, or unenforceable, such provision(s) shall be deemed severable from the remaining provisions of this Agreement and shall not affect the legality, validity, or constitutionality of the remaining portions of this Agreement. Each party hereby declares that it would have entered into this Agreement and each provision hereof regardless of whether any one or more provisions may be declared illegal, invalid, or unconstitutional.

13.8 Contacting the Licensee. Licensee shall be available to the staff employees of any City department having jurisdiction over the Licensee's activities twenty-four (24) hours a day, seven (7) days a week, regarding problems or complaints resulting from the attachment, installation, operation, maintenance, or removal of the Network Facilities. The City may contact by telephone the 24-hour emergency operator at telephone number 833-266-5812 or by email to mfn-noc@metronet.com regarding such problems or complaints. The Licensee shall provide to the City a new 24-hour telephone number pursuant to Section 12 prior to changing telephone numbers.

13.9 Federal and State Authorizations. Licensee has obtained all government licenses, permits and authorizations by the Federal Communications Commission which are required in order to provide the Services.

13.10 Consent Criteria. In any case, where the approval or consent of one party hereto is required, requested or otherwise to be given under this Agreement, the approval or consent must be in writing and such party shall not unreasonably delay, condition, or withhold its approval or consent.

13.11 Representations and Warranties. Each of the parties to this Agreement represents and warrants that it has the full right, power, legal capacity, and authority to enter into and perform the parties' respective obligations hereunder and that such obligations shall be binding upon such party without the requirement of the approval or consent of any other person or entity in connection herewith.

13.12 Amendment of Agreement. This Agreement may not be amended except pursuant to a written instrument signed by both parties.

13.13 No Third-Party Beneficiaries. It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement and all rights of action relating to such enforcement shall be strictly reserved to the parties. It is the express intention of the parties that any person other than the City and the Licensee shall be deemed to be only an incidental beneficiary under this Agreement.

13.14 Governmental Immunity. No term or condition of this Agreement shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions of the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*.

13.15 Public Document. Licensee hereby acknowledges that the City is a public entity subject to the Colorado Open Records Act, C.R.S. § 24-72-201, *et seq.* (CORA), and as such, this Agreement may be subject to public disclosure thereunder. In the event the provisions of any exhibit or attachment hereto, or of any other document, including any electronic document, purport to require protection from public disclosure of any so-called "confidential" or "proprietary" information or data, such provisions shall be null and void to the extent inconsistent or in conflict with CORA, and the City's good faith disclosure of any such information or data pursuant to CORA shall not constitute a breach of this Agreement.

13.16 No Binding Dispute Resolution. Any exhibit or attachment hereto, or any other document, including any electronic document, governing the provision of the Services that requires binding arbitration, or any other binding extra-judicial dispute resolution process in which the final resolution is not determined by the City, shall be void and unenforceable. Those final resolutions determined by the City are subject to review by court action pursuant to City Code and Rule 106 of the Colorado Rules of Civil Procedure.

13.17 Headings. Paragraph headings used in this Agreement are for convenience of reference and shall in no way control or affect the meaning or interpretation of any provision of this Agreement.

13.18 Counterparts; Electronic Disposition. This Agreement may be executed in any number of counterparts, including facsimile, PDF, and other electronic copies, each of which shall be deemed to be an original and all such counterparts taken together shall be deemed to constitute one and the same instrument. Each party to this Agreement agrees that both parties may use electronic signatures. The parties acknowledge and agree that the original of this Agreement, including the signature page, may be scanned and stored in a computer database or similar device, and that any printout or other output readable by sight, the reproduction of which is shown to accurately represent the original of this Agreement, may be used for any purpose as if it were the original, including proof of the content of the original writing.

[*Signature page follows*]

Signed by authorized representatives of the parties on the dates written below.

Metro Fibernet, LLC	**Arvada, Colorado**
Daniel E. Neppl (Aug 19, 2025 10:01:56 MDT)	
(Authorized Signature)	(Authorized Signature)
Dan Neppl	
(Name)	(Name)
Senior Vice President of Construction Management	
(Title)	(Title)
Address:	Address:
3701 Communicationns Way, Evansville, IN 47715	
08/19/20	
Date:	Date:

REVIEWED
By Johnny Chuang at 8:56 am, 8/19/25

EXHIBIT A
FORM OF LETTER OF AUTHORIZATION

[LICENSEE LETTERHEAD]
[Date]
Via Email ([Email Address])

CITY OF ARVADA
8101 RALSTON ROAD
ARVADA, CO 80002

Re: [Amended] Letter of Authorization

Dear [Name],

In accordance with Section [4.3] of the Non-Exclusive Public ROW License Agreement dated _____between the City of Arvada ("City") and [_____] ("_____"), _____ hereby designates the following Authorized Individuals (as that term is defined in the Agreement), who may submit and sign permit applications and other submissions to Municipality on behalf of _____. [*If applicable:* This letter amends and supersedes the Letter of Authorization dated ____.]

[Insert name and title for each Authorized Individual, including any Authorized Individual previously named and whose authority continues. Strike through the names of any individuals who are no longer authorized, if any.]

1. Name, Title
2. Name, Title
3. Name, Title (previously authorized, authorization continues)
4. Name, Title (authorization withdrawn)

This authorization may be withdrawn or amended and superseded by a written amendment to this Letter of Authorization, which will be effective 24 hours after receipt by Municipality.
Kind regards,

[Name]
Manager,

Exhibit B

Plans submitted to the City by the Licensee for the purpose of obtaining Right of Way Permits shall follow the City of Arvada Engineering Code of Standards and Specifications and comply with the following general requirements for each method of deployment:

Micro-Trenching

a. RESERVED. Licensee will not use micro-trenching as a method of deployment.

Conventional Trenching below 24 inches

Refer to City of Arvada Engineering Code of Standards and Specifications, including but not limited to:

a. Base sheets need to include a readable (in focus) aerial photo with property lines, easements, address, and other basic information provided.
b. The plan must show existing utilities at a Quality Level B as defined by ASCE 3802. Additional potholing may be required to verify existing utilities in the area of work.
c. The proposed utility can be shown schematically with specific details indicated by legend and/or notes to show the intended installation location.

Conventional Boring

Refer to City of Arvada Engineering Code of Standards and Specifications, including but not limited to:

a. Base sheets need to include a readable (in focus) aerial photo with property lines, easements, address, and other basic information provided.
b. The plan must show existing utilities at a Quality Level B as defined by ASCE 3802. Additional potholing may be required to verify existing utilities in the area of work.
c. The proposed utility can be shown schematically with specific details indicated by legend and/or notes to show the intended installation location.
d. Pothole information is required for City of Arvada utilities, gas lines, and in some areas, sanitary sewer services.
e. A proposed profile will be shown for the bore as requested.
f. Municipal Inspectors or authorize representatives must be present for any and all bore crossings of Arvada owned infrastructure.

The above list of general requirements is not exhaustive. Additional information or steps will likely be requested during the permitting process.

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.A.6.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-098, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and Intrepid Fiber

Report in Brief

PRESENTER: Claudia Vaughan, City Engineer
This license agreement will allow utilities access to the public right-of-way, establish the specific terms and conditions for Intrepid fiber's deployment, covering issues like right-of-way management, permitting, and construction standards. By granting this non-exclusive license, Council is furthering the goal of supporting improved technology systems for community members while ensuring City infrastructure is protected, consistent with the broader strategic results for the community.

The Arvada team recommends that the City Council approve R25-098, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and Intrepid Fiber .

Financial Impact

No Fiscal Impact.

Background

No previous City Council action has been taken related to this master license agreement between the City of Arvada and Intrepid Fiber and the agreement incorporates city engineering standards, as well as access policy and procedure.

Discussion

This non-exclusive agreement ensures that a private provider can legally and safely install a new fiber network, which provides competition and expanded high-speed internet access for community members and local institutions.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

This action aligns with the Infrastructure Priority Area and Service: INF5 Applies cost-effective and timely engineering, planning and design, construction practices, and established standards and specifications to align public infrastructure reinvestment capacity with community needs.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve R25-098, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and Intrepid Fiber.

Suggested Motion:

I move that R25-098, A Resolution Authorizing A Master License Agreement By and Between the City of Arvada and Intrepid Fiber, be (approved) (rejected).

Prepared by:
Claudia Vaughan, City Engineer

Reviewed by:

Approved by:

Claudia Vaughan, City Engineer	09/29/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Tammy Hedlund, Legal Specialist	10/03/2025
Kelsy Sargent, Assistant City Attorney	10/03/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/07/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-098

A RESOLUTION AUTHORIZING A MASTER LICENSE AGREEMENT BY AND BETWEEN THE CITY OF ARVADA AND INTREPID FIBER

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The Mayor or Mayor Pro Tem is authorized to sign and the City Clerk to attest, in form approved by the City Attorney, a Master License Agreement that is in substantially the same form as that attached hereto, by and between the City of Arvada and BIF IV Intrepid OpCo, LLC, d/b/a Intrepid Fiber.

Section 2. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

MASTER LICENSE AGREEMENT

This Non-Exclusive Master License Agreement ("**Agreement**") is entered into on this 4th day of September, 2025, by and between the City of Arvada, a Colorado home rule municipality ("**the City**"), and BIF IV Intrepid OpCo, LLC, a Delaware limited liability company d/b/a Intrepid Fiber Networks and its subsidiaries, successors, or assigns ("**Licensee**").

RECITALS

A. The City has jurisdiction over the access to and use of the public rights-of-way located within the City ("**Public ROW**"). For purposes of this Agreement, "Public ROW" is defined as "each of the following which have been dedicated to the public or are hereafter dedicated to the public and maintained under public authority or by others and located within the City: streets, roadways, highways, avenues, lanes, alleys, bridges and sidewalks. Parks, trails, open space and ditch property are not right-of-way; provided however that Licensee may utilize any utility easements within such properties where the specific terms of such easements grant access to Grantee.

B. Licensee desires, and the City desires to authorize Licensee, to install, maintain, operate, and control a fiber optic infrastructure network in Public ROW (**"Network**") for the purpose of offering communications services ("**Services**"), including broadband Internet access service as defined in 47 C.F.R. § 8.1(b) ("**Broadband Internet Services**") and Voice over Internet Protocol services, but excluding wireless communications services which are subject to authorization and regulation under Chapter 7 of the City's Land Development Code, and multichannel video programming services that would be subject to a video services franchise and telecommunications services as defined in 47 C.F.R. § 153(53), to residents and businesses in the City ("**Customers**").

C. The Network consists of equipment and facilities that may include aerial or underground fiber optic cables, lines, wires, or strands; underground conduits, vaults, access manholes and handholes; electronic equipment; power generators; batteries; pedestals; boxes; cabinets; vaults; and other similar facilities, and except for fiber optic lines, excludes any equipment and facilities commonly considered as part of wireless communications facilities ("**Network Facilities**").

AGREEMENT

In consideration of the mutual promises made below, the City and Licensee agree as follows:

1. <u>Permission to Use and Occupy</u>.

1.1. <u>Permission to Use and Occupy Public ROW</u>. The City grants Licensee permission to use and occupy the Public ROW (the "**License**") for the purpose of constructing, installing, repairing, maintaining, operating, and if necessary, removing the Network and the related Network Facilities (the "**Work**"). This Agreement and the License do not authorize Licensee to use any property other than the Public ROW as agreed herein. The permission described herein is a general authorization to use the Public ROW and does not authorize, any site-specific use or occupation. Site-specific authorization shall be granted pursuant to the City's regular permitting process. Licensee's use of any other

City property, including poles and conduits, which if granted, will be governed under a separate agreement regarding that use.

1.2. Scope of Agreement. All rights expressly granted to the Licensee under this Agreement, which shall be exercised at the Licensee's sole cost and expense, shall be subject to the exercise of the City's police powers. This Agreement is subject to the City's authority under Applicable Law as it exists now or may be amended from time-to-time, and subject to the conditions set forth in this Agreement. For the purposes of this Agreement, "Applicable Law" means any statute, ordinance, judicial decision, executive order or regulation having the force and effect of law, that determines the legal standing of a case or issue, and includes, without limitation, Chapter 94 of the Arvada Municipal Code.

1.3. Subject to City's Right to Use Public ROW. This Agreement is subject and subordinate to the City's prior and continuing right to use the Public ROW, including constructing, installing, operating, maintaining, repairing, or removing sewers, water pipes, storm drains, gas pipes, utility poles, overhead and underground electric lines and related facilities, and other public utility and municipal uses.

1.4. Subject to Pre-Existing Property Interests. The authorization granted by the City herein is subject to all valid pre-existing easements, restrictions, conditions, covenants, encumbrances, claims of title or other property interests that may affect the Public ROW. Licensee will obtain at its own cost and expense any permission or rights as may be necessary to accommodate such pre-existing property interests.

1.5. No Grant of Property Interest. The License does not grant or convey any property interest.

1.6. Non-Exclusive. The License is not exclusive. The City expressly reserves the right to grant licenses, permits, franchises, privileges or other rights to any other individual, corporation, partnership, limited liability company, trust, joint stock company, business trust, unincorporated association, joint venture, governmental authority or other entity of any nature whatsoever ("**Person**"), as well as the right in its own name, to use Public ROW for similar or different purposes allowed Licensee under this Agreement.

1.7. Applicability of City Site Planning Process. Nothing in this Agreement shall waive or modify the Licensee's obligation to comply with the City's regular site plan process, in the placement of the Licensee's equipment. In addition, the Licensee shall comply with the City's most recent Engineering Code of Standards and Specifications (the "Standards") and with all requirements as stated in the applicable permits. Licensee understands and agrees that the City is in the process of developing and approving standards and specifications governing fiber optic installation and maintenance in the Public ROW, and Licensee shall be bound to comply with any generally applicable standards and specifications as and when they are adopted.

2. Licensee's Obligations.

2.1. Obtaining Required Permits. Licensee shall apply for and obtain all required Public ROW Permits and pay any associated review and inspection fees. The City shall respond to the Licensee's requests for permits in the ordinary course of its business to facilitate the deployment of the Network in the Public ROW in a reasonable and timely manner. Such review and inspection fees will be in accordance with the City's adopted fee schedule

reflecting the City's costs in administering permits, plus any other documented expenses incurred by the City, including, without limitation, the cost of any dedicated staff, or outside consultants, to facilitate the coordination, permitting and inspection of this Work and to maintain the City's ability to respond in such reasonable and timely manner. Except for a non-refundable application fee, City will provide Licensee with an estimate of the fees associated with the Public ROW Permits prior to incurring the costs associated with the review and inspection. As a condition of obtaining any permit that involves digging or other excavation in the Public ROW, the Licensee shall provide plans in the specified format based on the method of deployment and further explained in Exhibit B and in accordance with the City's Engineering Code of Standards and Specifications, as may be amended, including without limitation, any adopted fiber optic specifications. Such drawings and plans shall be provided to the City with each request for a construction permit. If the Licensee wishes to change the location or method of deployment of any of the equipment from what is indicated in the original permits, the Licensee shall apply for a new permit prior to changing any location; provided, however, that Licensee may make reasonable changes at the time of deployment depending on the conditions found at the permitted locations at the discretion of the Public Works Municipal Inspector. Review and approval of the construction plans is only for general compliance with the City Code and regulations. All responsibility for existing conditions, correctness of dimensions, details, concepts, quantities, and safety during construction shall remain with Licensee. Construction inspection by the City in no way reflects any responsibility on the part of the City for safety, quality, or quantity control, and in no way implies acceptance of the work, or any part thereof, by the City.

2.2. Obtaining Required Stormwater Management Plan Permits. Licensee shall obtain a State of Colorado Stormwater Discharge Permit prior to obtaining any permit from the City. A copy of the Stormwater Discharge Permit shall be provided to the City upon the City's request. Licensee will utilize best management practices as identified in the Stormwater Management Plan. The City is authorized to require additional Best Management Practices or erosion methods if the City determines they are necessary.

2.3. No Interference. Licensee, in the performance and exercise of its rights and obligations under this Agreement, shall not interfere in any manner with the existence and operation of all public and private rights of way (except in the case where the Licensee's rights are prior or superior to such private right of way), sanitary sewers, water mains, storm drains, gas mains, poles, aerial and underground electrical and telephone wires, cable television, and other communications, utility, or municipal or other government property, except as permitted by Applicable Law, this Agreement, or mutual agreement with any affected party.

2.4. Gas and Electric Facilities.

2.4.1 Licensee agrees and understands that if the City has permitted or allowed natural gas gathering, storage, transmission, distribution, or related facilities within the Public ROW, the Licensee has been fully advised by the City that such natural gas facilities may now transport and may continue to transport natural gas at significant pressures. Licensee shall advise all employees, agents, contractors, and other persons who enter upon the Public ROW of the existence and nature of such natural gas facilities and the potential danger and risk involved.

2.4.2 Licensee agrees and understands that any natural gas facilities, if located within the Public ROW, may be subject to cathodic protection by rectifier and related anode beds, and that Licensee shall not be liable for stray current or interfering signals induced in the Licensee's equipment as a result of the operating of the cathodic protection system.

2.4.3 Licensee agrees and understands that if the City has permitted and allowed to be constructed electric transmission, distribution, or related facilities within the Public ROW, Licensee has been fully advised by the City that such electric facilities may now transmit and may continue to transmit electric current at significant voltages, and that the conductors on electric lines may not be insulated. Licensee shall advise its employees, agents, contractors, and other persons who enter upon the Public ROW of the existence and nature of such electric facilities and the potential danger and risk involved.

2.5. Damage and Restoration. Whenever any Work is required or permitted under this Agreement and any applicable permit, and such Work shall cause the Public ROW or any City or other public or private property to be damaged, or whenever Licensee, in connection with any of its operations, causes damage to the Public ROW or any other public or private property, the Licensee, at its sole cost and expense, shall repair, or cause to be repaired, the damage and return the Public ROW and all affected property to a safe and satisfactory condition equal to or better than as existed prior to the damage. Further, if the City's Public Works Director determines that any damage poses a risk to the safety and/or health of the public, such damage shall be repaired within 24 hours; any damage to public infrastructure, including roadways, sidewalks, drainage or utility infrastructure, and associated items, or actively operating irrigation systems, shall be repaired within ten (10) days; any other damage to private property shall be repaired within thirty (30) days. If the Licensee does not repair the damage as described herein, then the City shall have the following options along with any other remedy available by law: (A) upon fifteen (15) days' prior written notice to the Licensee, to perform or cause to be performed such reasonable and necessary work on behalf of the Licensee and to (1) use the Licensee's Performance Bond, specified in Section 7 below, to fund such work and (2) charge the Licensee for the actual costs incurred by the City at City's standard rates, including administrative time; and (B) upon fifteen (15) days' prior written notice to the Licensee, to Stop Work on all other projects of Licensee within the City until repairs are made or reimbursement to City is paid. Upon receipt of a demand for payment by the City, the Licensee shall promptly reimburse the City for such costs. All restoration work undertaken or caused by Licensee within the Public ROW shall adhere to the standards listed in Chapter 95 of the Arvada Municipal Code and the City's Engineering Code of Standards and Specifications, as may be amended.

2.6. Fire, Disaster or Other Emergency. In the case of fire, disaster or other emergency, or when the City determines any part of the Network poses an immediate threat to the health and safety of the public, the City may relocate, remove, or disconnect the Licensee's Network facilities located in the Public ROW or on any other property of the City in accordance with Section 3.1. Any removal, disconnection, or relocation performed by the City under this provision and Section 3.1 shall be at the Licensee's sole cost and expense.

2.7. Licensee's Sole Cost and Expense. Licensee will perform the Work at its sole cost and expense. Licensee shall be solely responsible for all repairs, maintenance, and adjustments, and damage to the Network, excluding damage caused by third parties, and

City shall have no obligation to repair such damage, except where the damage arises from the negligence or willful misconduct of City, its employees, agents, or contractors.

2.8. Reasonable Care. Licensee will exercise reasonable care when performing the Work and will use commonly accepted practices and equipment to minimize the risks of personal injury, property damage, soil erosion, and pollution of surface or groundwater.

2.9. No Nuisance. Licensee will maintain its Network Facilities in good and safe condition so that its Network Facilities do not cause a public nuisance.

2.10. As-Built Drawings and Maps. Licensee shall maintain accurate as-built drawings and maps of its Network located within the City and shall provide electronic or hard copies, as requested by the City, following the completion of construction for a permitted segment. Licensee shall cooperate with the City to furnish such information in an electronic mapping format compatible with the then-current City electronic mapping format.

2.11. Network Design. Nothing in this Agreement requires Licensee to build to all areas of the, and subject to Applicable Law, Licensee retains the discretion to determine the scope, location, and timing of the design and construction of the Network. Notwithstanding the foregoing, the Licensee will consider community need and areas without significant access to alternative fiber optic communications systems in developing plans for the Network.

2.12. Construction Forecast. Following the Installation Date, the Licensee shall provide the City, on an annual basis, a construction forecast for the upcoming three-year period. The City recognizes that the Licensee cannot guarantee the construction forecast, but the Licensee agrees to keep the City informed of the progress of its schedule.

2.13. Authority of the City Public Works Director. The Public Works Director or designee is designated by the City Manager to exercise all authority on behalf of the City to ensure that the proposed design of facilities is in compliance with the City's Code and regulatory standards. The Public Works Director or designee shall have the authority to request additional information to be provided to resolve potential issues related to the interests of the Public and City infrastructure. The Public Works Director or designee may require certain improvements or repairs to be included when the proposed work directly affects public safety or the sustainability of City infrastructure or when otherwise authorized by Applicable Law; provided, however, that any such requirements will be included in the applicable approved permit. The Public Works Director, or their designee, must approve of all changes or field modifications that, in the opinion of the Public Works Director, affect public safety or the sustainability of City infrastructure.

2.14. Authority of the City Public Works Municipal Inspector. The Public Works Municipal Inspector is designated by the City Manager to exercise all authority on behalf of the City to ensure that the proposed construction of facilities is in general compliance with the City's Code and regulatory standards. Public Works Municipal Inspectors will observe work performed under the issued permit for construction, including all materials to be incorporated in the work, excavation, bedding, backfill, and all construction methods and practices. The Public Works Municipal Inspectors have the authority to request relevant additional information be provided to verify compliance with the City's Code and regulatory standards and approved construction plans when deemed necessary in the

opinion of the Public Works Municipal Inspectors. The Licensee shall furnish all reasonable facilities and shall assist the Public Works Municipal Inspectors as necessary for the proper inspection of materials to be used and workmanship involved in the construction. The Public Works Municipal Inspectors have the authority to reject inferior materials or defective workmanship and to suspend work not in accordance with the City's Code and regulatory standards until such time as corrections are made and approved. The Public Works Municipal Inspectors, as designated field representatives of the Public Works Director, are authorized to make minor changes to approved drawings or require changes to be resubmitted to the Public Works Director for approval before proceeding with the work.

2.15. Work Hours. Licensee shall abide by all City requirements regarding authorized work hours. Licensee shall obtain any necessary nighttime work exemptions from the City Engineer for all work outside of those authorized work hours.

2.16. Hazardous Substances. Licensee agrees that Licensee, its contractors, subcontractors and agents, will not use, generate, store, produce, transport or dispose any Hazardous Substance on, under, about or within the area of the Public ROW in violation of Applicable Law. Except to the extent of the negligence or intentional misconduct of City, Licensee shall pay, indemnify, defend and hold City harmless against and to the extent of any loss or liability incurred by reason of any Hazardous Substance produced, disposed of, or used by Licensee, its contractors or subcontractors pursuant to this Agreement. Licensee shall ensure that any on-site or off-site storage, treatment, transportation, disposal or other handling of any Hazardous Substance will be performed by persons who are properly trained, authorized, licensed and otherwise permitted to perform those services.

2.17. Utility Notification Center. Prior to undertaking any work pursuant to this Agreement, the Licensee shall take all actions necessary to become a tier 1 member of the Utility Notification Center of Colorado, and comply with and adhere to local procedures, customs and practices relating to the one call locator service program established in C.R.S. Section 9-1.5-101, et seq., as such may be amended from time to time.

2.18. Post-Removal Restoration of Public ROW. When removal or relocation is required under this Agreement, Licensee will, after the removal or relocation of the Network Facilities, at its own cost, repair and return the Public ROW in which the facilities were located to a safe and satisfactory condition in accordance with the construction-related conditions and specifications as established by the City.

3. City's Obligations.

3.1. Emergency Removal or Relocation by City. In the event of a public emergency that creates an imminent threat to the health, safety, or property of the City or its residents as determined by the Public Works Director, the City may remove or relocate the applicable portions of the Network Facilities without prior notice to Licensee. The City will, however, make best efforts to provide prior notice to Licensee before making an emergency removal or relocation. In any event, the City will promptly provide to Licensee a written description of any emergency removals or relocations of Licensee's Network Facilities. Licensee will reimburse the City for its actual, reasonable, and documented costs or expenses incurred for any such work performed by the City, the direct cause of

which was Licensee's construction, installation, operation, maintenance, repair, or removal of its Network Facilities. Upon receipt of a demand for payment by the City, the Licensee shall promptly reimburse the City for such costs. If payment is not received within forty (45) days, the City may draw on the Performance Bond, specified in Section 7 below, for the costs incurred and/or issue a Stop Work on all other projects of Licensee within the City.

3.2. Relocation to Accommodate Governmental Purposes. If Licensee's then-existing Network Facilities would interfere with the City's planned use of the Public ROW or other City property for a legitimate governmental purpose, such as the construction, installation, repair, maintenance, or operation of a new water, sewer, or storm drain line, or a public road, curb, gutter, sidewalk, park, or recreational facility, Licensee will, upon written notice from the City, relocate its Network Facilities at Licensee's own expense to such other location or locations in the Public ROW as may be mutually agreed by the parties, taking into account the needs of City's governmental purpose and Licensee's interest in maintaining the integrity and stability of its Network. Licensee will relocate its Network Facilities within a commercially reasonable period of time agreed to by the parties, but in no event later than 30 days after receipt of written notice from the City, taking into account the urgency of the need for relocation, the difficulty of the relocation, and other relevant facts and circumstances.

3.3. Relocation to Accommodate Non-Governmental Purposes. If Licensee's then-existing Network Facilities would interfere with a third-party's use of the Public ROW, Licensee will not be required to relocate its Network Facilities, unless another party incurs the cost of Licensee's relocation.

4. Contractors and Subcontractors.

4.1. Use of Contractors and Subcontractors. Licensee may retain contractors and subcontractors to perform the Work on Licensee's behalf. Licensee shall be responsible for ensuring a contractor's or subcontractor's compliance with all applicable provisions of this Agreement, and shall be responsible to the City for all activities in which contractors or subcontractors are involved.

4.2. Contractors to be Licensed. Licensee's contractors and subcontractors used for the Work will be properly licensed under Applicable Law.

4.3. Authorized Individuals. Licensee's contractors and subcontractors may submit individual permit applications to the City on Licensee's behalf, so long as the permit applications are signed by individuals that Licensee has authorized to act on its behalf via a letter of authorization provided to the City in the form attached as **Exhibit A** ("**Authorized Individuals**"). The City will accept permit applications under this Agreement submitted and signed by Authorized Individuals, and will treat those applications as if they had been submitted by Licensee under this Agreement.

5. Defense and Indemnity.

5.1. Obligations. Licensee will defend, protect, indemnify and hold harmless the City, its officers, elected representatives, and employees, and indemnify them against all third party claims, demands, losses, damages, liabilities, fines, charges, penalties, administrative and judicial proceedings and orders, judgments, and all costs and

expenses incurred in connection therewith, including reasonable attorney's fees and costs of defense (collectively, the "Losses") arising out of the Licensee's activities, actions and inactions, undertaken pursuant to this Agreement, except to the extent arising from or caused by the negligence or willful misconduct of the City, its elected officials, officers, employees, agents, or contractors.("**Third Party Legal Proceeding**").

5.2. Waiver of Claims. Licensee waives all claims, demands, causes of action, and rights it may assert against the City on account of any loss, damage, or injury to any Network Facilities or any loss or degradation of the Services as a result of any event or occurrence which is beyond the reasonable control of the City.

5.3. Conditions. Section 6.1 (Obligations) is conditioned on the following: (a) the City must promptly notify Licensee in writing of the Third Party Legal Proceeding and any allegation(s) that preceded the Third Party Legal Proceeding no later than fifteen (15) days after the City became aware of the Third Party Legal Proceeding; (b) the City must reasonably cooperate in the defense at Licensee's request and any reasonable costs incurred by the City in providing such cooperation shall be reimbursed by the Licensee; and (c) the City must tender sole control of the indemnified portion of the Third Party Legal Proceeding to Licensee, subject to the following: (i) the City may appoint its own non-controlling counsel, at its own expense; and (ii) any settlement requiring the City to admit liability, pay money, or take (or refrain from taking) any action, will require City's prior written consent, not to be unreasonably withheld, conditioned, or delayed, and the ultimate decision on settlement is in the City's sole discretion.

6. **Limitation of City's Liability.** To the extent permitted by law, the City shall be liable only for the cost of repair to damaged Network Facilities arising from the negligence or willful misconduct of City, its employees, agents, or contractors and shall in no event be liable for indirect or consequential damages. The City does not waive any of the benefits, coverages or protections of the Colorado Governmental Immunity Act.

7. **Performance Bond.** Licensee will, promptly after the Effective Date, provide the City with a performance bond in the amount of fifty thousand dollars ($50,000) naming the City as obligee and guaranteeing Licensee's faithful performance of its obligations under this Agreement. The performance bond will remain in full force during the Term of this Agreement. This performance bond may be used to cover actual costs incurred by the City as required by any provision of this Agreement including, without limitation, covering any costs incurred to repair any damage to the Public ROW not corrected by the Licensee.

8. **Insurance**.

8.1. Licensee will carry and maintain:

Commercial General Liability (CGL) insurance, with policy limits not less than $5,000,000 in aggregate and $5,000,000 for each occurrence covering bodily injury and property damage with the following features and including personal and advertising injury liability and products-completed operations : (a) CGL primary insurance endorsement; and (b) Commercial Automobile Liability covering all owned, hired, and non-owned autos in an amount of $5,000,000 combined single limit each accident for bodily injury and property damage; (c) all required insurance policies shall include the City, its council members, officers, and employees as additional insureds as their interest may appear under this Agreement for any

covered liability arising out of the Licensee's performance of work under this Agreement: (d) coverage shall be in an occurrence form and in accordance with the limits and provisions specified herein. Claims-made policies are not acceptable; (e) upon receipt of notice from its insurer(s), the Licensee shall use commercially reasonable efforts to provide the City with thirty (30) days' advance written notice of cancellation, unless Licensee is not provided at least forty-five (45) days' advance notice of the cancellation from its insurer. In such case, the Licensee shall provide notice to the City of the cancellation within seven (7) days of receiving notice from its insurer.

8.2. All insurance certificates, endorsements, coverage verifications and other items required pursuant to this Agreement will be mailed directly to City's Risk Manager, which at a minimum, shall state the following: (a) The policy number; name of insurance company; name and address of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) that the Licensee's insurance policies are primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance; and (c) that the Licensee's insurance policies waive any right of recovery the insurance company may have against the City.

The certificate(s) of insurance shall be mailed to the City at the address specified in Section 12 below and shall be updated annually within thirty (30) days of the anniversary of the Effective Date of this Agreement.

8.3 Workers' Compensation Insurance. Licensee shall obtain and maintain, at all times during the term of this Agreement statutory workers' compensation and employer's liability insurance in an amount of $1,000,000 each accident/disease/policy limit and shall furnish the City with a certificate showing proof of such coverage.

8.4 Insurer Criteria. Any insurance provider of the Licensee shall be admitted and authorized to do business in the State of Colorado and shall carry a minimum rating assigned by *A.M. Best & Company's Key Rating Guide* of "A-" Overall and a Financial Size Category of "VII". Insurance policies and certificates issued by non-admitted insurance companies are not acceptable.

8.5 Severability of Interest. "Severability of interest" or "separation of insureds" clauses shall be made a part of the Commercial General Liability and Commercial Automobile Liability policies.

9. Term. This Agreement is effective on the date the last party to sign executes this Agreement ("**Effective Date**"). The Agreement will expire automatically on the twentieth anniversary of the Effective Date ("**Original Term**"), unless earlier terminated in accordance with the provisions herein. Thereafter, the Agreement will automatically renew for successive 5-year terms (each a "**Renewal Term**") unless a party provides at least six (6) months' prior written notice to the other party of its intent not to renew. Notwithstanding the foregoing, the Licensee must use commercially reasonable efforts to commence construction of its Network within the City within two (2) years of the Effective Date. If construction is not commenced in such time period, unless the City agrees to an extension, this Agreement may be terminated in the City's sole discretion.

10. Termination.

10.1. Termination by the City. The City may terminate this Agreement if Licensee is in default of any material provisions of the Agreement, provided that the City must first provide Licensee written notice of the default and forty-five (45) days to cure, unless the cure cannot reasonably be accomplished in that time period, in which case Licensee must commence its efforts to cure within that time period and diligently process such cure to completion. If the Licensee believes that a reason beyond its control has prevented or delayed its ability to cure the default, it shall provide documentation as reasonably required by the City to substantiate the Licensee's claim. If the Licensee has not yet cured the deficiency, it shall also provide the City with its proposed plan for remediation, including the timing for such cure.

10.2. Termination by Licensee. Licensee may terminate this Agreement for convenience upon one hundred eighty (180) days' written notice to the City. Upon termination under this clause, the Licensee shall follow the removal requirements under this Agreement and Applicable Law. The removal of the Network shall be at the Licensee's sole expense.

11. Assignment.

11.1 In this Section, the following words have the meanings indicated:

(a) "Control" means actual working control in whatever manner exercised. "Control" includes, but may not necessarily require, majority stock ownership.

(b) "Proposed Transferee" means a proposed purchaser, transferee, lessee, assignee, or person acquiring ownership or control of this Agreement or of the Licensee.

11.2 Except as set forth below, Licensee shall not sell, transfer, lease, assign, sublet or dispose of, in whole or in part, either by forced or involuntary sale, or by ordinary sale, contract, consolidation or otherwise, this Agreement or any of the rights or privileges therein granted, without the prior consent of the City, except that such consent shall not be required for sales, transfers, leases, assignments, subleases or disposals to any parent, subsidiary, affiliate or any person, firm or corporation that Controls, or is under common Control, with the Licensee. The Licensee shall provide no less than thirty (30) days written notice to the City of the details of any transaction described herein that requires City consent.

11.3 The requirements of Subsection 11.2 shall not, except as set forth below, apply to any surviving successor entity or newly created successor entity in the event of a merger, sale, reorganization or consolidation involving the Licensee, unless such merger, sale, reorganization or consolidation results in a change of control. The City reserves the right to be reimbursed for its reasonable costs relating to a transfer of ownership, including without limitation, attorneys' fees. The word "control" as used herein is not limited to majority stockholders but includes actual working control in whatever manner exercised.

11.4 Following any assignment of this Agreement to an Affiliate, Licensee will remain responsible for such Affiliate's performance under the terms of this Agreement. For purposes of this section, (a) "Affiliate" means any Person that now or in the future, directly or indirectly controls, is controlled with or by, or is under common control with Licensee; and (b) "control"

means, with respect to: (i) a U.S. corporation, the ownership, directly or indirectly, of fifty percent (50%) or more of the voting power to elect directors thereof, or (ii) a non-U.S. corporation, if the voting power to elect directors thereof is less than fifty percent (50%), the maximum amount allowed by applicable law; and (iii) any other Person, fifty percent (50%) or more ownership interest in said Person, or the power to direct the management of such Person.

11.5 The consent or approval of the City to transfer by the Licensee does not constitute a waiver or release of the rights of the City in or to its Public ROW or easements and any transfer shall by its own terms be expressly subject to the terms and conditions of this Agreement.

11.6 Any sale, transfer or assignment of this Agreement will bind the successor in interest to the terms of this Agreement.

11.7 Notwithstanding anything contained in this Agreement, the Licensee may pledge the assets of the Network for the purpose of financing provided that such pledge of assets shall not impair the Licensee or mitigate the Licensee's responsibility and capability to meet all its obligations under the provisions of this Agreement.

12. Notice. All notices related to this Agreement will be in writing and sent, if to Licensee to the email addresses set forth below, and if to the City to the address set forth in the City's signature block to this Agreement. Notices are effective (a) when delivered in person, (b) upon confirmation of a receipt when transmitted by electronic mail, (c) on the next business day if transmitted by registered or certified mail, postage prepaid (with confirmation of delivery), (d) on the next business day if transmitted by overnight courier (with confirmation of delivery), or I three (3) days after the date of mailing, whichever is earlier.

Licensee's e-mail address for notice is jeff.polachek@intrepidfiber.com.

13. General Provisions.

13.1 Governing Law; Jurisdiction. This Agreement is governed by the laws of the state of Colorado, without reference to its conflicts of law principles. If suit is brought by a party to this Agreement, the parties agree that trial of such action shall be vested exclusively in the state courts of Colorado, County of Jefferson, or in the United States District Court for the District of Colorado.

13.2 Neither party will be liable for failure or delay in performance to the extent caused by circumstances beyond its reasonable control. If a party believes that a reason beyond its control has prevented or delayed its ability to perform, it shall provide documentation as reasonably required by the other party to substantiate its claim, and shall also provide the other party with its proposed plan for completing performance.

13.3 This Agreement sets out all terms agreed between the parties and supersedes all previous or contemporaneous agreements between the parties relating to its subject matter.

13.4 Entire Agreement. This Agreement, including any exhibits, constitutes the entire agreement between the parties related to this subject matter, and any change to its terms must be in writing and signed by the parties.

13.5 Non-exclusive Use. Licensee understands that this Agreement does not provide the Licensee with exclusive use of the Public ROW and that City shall have the right to permit other providers of communications services and other utilities to install equipment or devices in the Public ROW. Licensee and the City acknowledge that any agreement for placement of facilities or equipment in the Public ROW will be a public record, and will always be accessible to the Licensee, upon request.

13.6 Waiver of Breach. The waiver by either party of any breach or violation of any provision of this Agreement shall not be deemed to be a waiver or a continuing waiver of any subsequent breach or violation of the same or any other provision of this Agreement.

13.7 Severability of Provisions. If any one or more of the provisions of this Agreement shall be held by court of competent jurisdiction in a final judicial action to be void, voidable, or unenforceable, such provision(s) shall be deemed severable from the remaining provisions of this Agreement and shall not affect the legality, validity, or constitutionality of the remaining portions of this Agreement. Each party hereby declares that it would have entered into this Agreement and each provision hereof regardless of whether any one or more provisions may be declared illegal, invalid, or unconstitutional.

13.8 Contacting the Licensee. Licensee shall be available to the staff employees of any City department having jurisdiction over the Licensee's activities twenty-four (24) hours a day, seven (7) days a week, regarding problems or complaints resulting from the attachment, installation, operation, maintenance, or removal of the Network Facilities. The City may contact by telephone the 24-hour emergency operator at telephone number (844) 380-8090 or by email to construction@intrepidfiber.com regarding such problems or complaints. The Licensee shall provide to the City a new 24-hour telephone number pursuant to Section 12 prior to changing telephone numbers.

13.9 Federal and State Authorizations. Licensee has obtained all government licenses, permits and authorizations by the Federal Communications Commission which are required in order to provide the Services.

13.10 Consent Criteria. In any case, where the approval or consent of one party hereto is required, requested or otherwise to be given under this Agreement, the approval or consent must be in writing and such party shall not unreasonably delay, condition, or withhold its approval or consent.

13.11 Representations and Warranties. Each of the parties to this Agreement represents and warrants that it has the full right, power, legal capacity, and authority to enter into and perform the parties' respective obligations hereunder and that such obligations shall be binding upon such party without the requirement of the approval or consent of any other person or entity in connection herewith.

13.12 Amendment of Agreement. This Agreement may not be amended except pursuant to a written instrument signed by both parties.

13.13 No Third-Party Beneficiaries. It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement and all rights of action relating to such enforcement shall be strictly reserved to the parties. It is the express intention of

the parties that any person other than the City and the Licensee shall be deemed to be only an incidental beneficiary under this Agreement.

13.14 Governmental Immunity. No term or condition of this Agreement shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions of the Colorado Governmental Immunity Act, C.R.S. §§ 24-10-101, *et seq*.

13.15 Public Document. Licensee hereby acknowledges that the City is a public entity subject to the Colorado Open Records Act, C.R.S. § 24-72-201, *et seq.*(CORA), and as such, this Agreement may be subject to public disclosure thereunder. In the event the provisions of any exhibit or attachment hereto, or of any other document, including any electronic document, purport to require protection from public disclosure of any so-called "confidential" or "proprietary" information or data, such provisions shall be null and void to the extent inconsistent or in conflict with CORA, and the City's good faith disclosure of any such information or data pursuant to CORA shall not constitute a breach of this Agreement.

13.16 No Binding Dispute Resolution. Any exhibit or attachment hereto, or any other document, including any electronic document, governing the provision of the Services that requires binding arbitration, or any other binding extra-judicial dispute resolution process in which the final resolution is not determined by the City, shall be void and unenforceable. Those final resolutions determined by the City are subject to review by court action pursuant to City Code and Rule 106 of the Colorado Rules of Civil Procedure.

13.17 Headings. Paragraph headings used in this Agreement are for convenience of reference and shall in no way control or affect the meaning or interpretation of any provision of this Agreement.

13.18 Counterparts; Electronic Disposition. This Agreement may be executed in any number of counterparts, including facsimile, PDF, and other electronic copies, each of which shall be deemed to be an original and all such counterparts taken together shall be deemed to constitute one and the same instrument. Each party to this Agreement agrees that both parties may use electronic signatures. The parties acknowledge and agree that the original of this Agreement, including the signature page, may be scanned and stored in a computer database or similar device, and that any printout or other output readable by sight, the reproduction of which is shown to accurately represent the original of this Agreement, may be used for any purpose as if it were the original, including proof of the content of the original writing.

[*Signature page follows*]

Signed by authorized representatives of the parties on the dates written below.

BIF IV Intrepid OpCo, LLC	**Arvada, Colorado**
(Authorized Signature)	(Authorized Signature)
Shane Peverill	
(Name)	(Name)
VP, Business Development	
(Title)	(Title)
Address: 11002 W 120th Ave, #305 Broomfield, CO 80021	Address:
Date: September 4th, 2025	Date: _____

EXHIBIT A
FORM OF LETTER OF AUTHORIZATION

[LICENSEE LETTERHEAD]
[Date]
Via Email ([Email Address])

CITY OF ARVADA
8101 RALSTON ROAD
ARVADA, CO 80002

Re: [Amended] Letter of Authorization

Dear [Name],

In accordance with Section [4.3] of the Non-Exclusive Public ROW License Agreement dated _____ between the City of Arvada ("City") and [_____] ("_____"), _____ hereby designates the following Authorized Individuals (as that term is defined in the Agreement), who may submit and sign permit applications and other submissions to Municipality on behalf of _____.
[*If applicable:* This letter amends and supersedes the Letter of Authorization dated ____.]

[Insert name and title for each Authorized Individual, including any Authorized Individual previously named and whose authority continues. Strike through the names of any individuals who are no longer authorized, if any.]

1. Name, Title
2. Name, Title
3. Name, Title (previously authorized, authorization continues)
4. Name, Title (authorization withdrawn)

This authorization may be withdrawn or amended and superseded by a written amendment to this Letter of Authorization, which will be effective 24 hours after receipt by Municipality.

Kind regards,

[Name]
Manager, _____

Exhibit B

Plans submitted to the City by the Licensee for the purpose of obtaining Right of Way Permits shall follow the City of Arvada Engineering Code of Standards and Specifications and comply with the following general requirements for each method of deployment:

Micro-Trenching

a. RESERVED. Licensee will not use micro-trenching as a method of deployment.

Conventional Trenching below 24 inches

Refer to City of Arvada Engineering Code of Standards and Specifications, including but not limited to:

a. Base sheets need to include a readable (in focus) aerial photo with property lines, easements, address, and other basic information provided.
b. The plan must show existing utilities at a Quality Level B as defined by ASCE 38-02. Additional potholing may be required to verify existing utilities in the area of work.
c. The proposed utility can be shown schematically with specific details indicated by legend and/or notes to show the intended installation location.

Conventional Boring

Refer to City of Arvada Engineering Code of Standards and Specifications, including but not limited to:

a. Base sheets need to include a readable (in focus) aerial photo with property lines, easements, address, and other basic information provided.
b. The plan must show existing utilities at a Quality Level B as defined by ASCE 38-02. Additional potholing may be required to verify existing utilities in the area of work.
c. The proposed utility can be shown schematically with specific details indicated by legend and/or notes to show the intended installation location.
d. Pothole information is required for City of Arvada utilities, gas lines, and in some areas, sanitary sewer services.
e. A proposed profile will be shown for the bore as requested.
f. Municipal Inspectors or authorize representatives must be present for any and all bore crossings of Arvada owned infrastructure.

The above list of general requirements is not exhaustive. Additional information or steps will likely be requested during the permitting process.

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 8.B.1.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-099, A Resolution Authorizing an Intergovernmental Agreement Between the City of Arvada and the Church Ditch Water Authority Allowing the City to Place a Water Drainage Pipe and to Make Occasional Discharge of Dechlorinated Potable Water Into the Church Ditch (Presenter: Mary Stahl, Infrastructure (Public Works) Engineering Manager)

Report in Brief

PRESENTER: Mary Stahl, Infrastructure (Public Works) Engineering Manager

The Church Ditch is a water carrier ditch that runs across portions of Arvada. The City owns a water storage tank near the Ditch. The tank needs maintenance work. The tank must be emptied before the maintenance work can begin. The Church Ditch Water Authority has agreed to allow the City to discharge water from the tank into the Ditch and has also agreed to allow the City to place a drainage pipe and appurtenances thereto into the Ditch to facilitate the discharge of water into the Ditch. The Parties have also agreed to allow the drainage pipe and appurtenances thereto to remain in place to allow for the discharge of water into the Ditch as needed in the future.

The Arvada team recommends that the City Council approve R 25-099, A Resolution Authorizing an Intergovernmental Agreement Between the City of Arvada and the Church Ditch Water Authority Allowing the City to Place a Water Drainage Pipe and to Make Occasional Discharge of Dechlorinated Potable Water Into the Church Ditch.

Financial Impact

IGA Financial Impact: N/A
Funds for the infrastructure are budgeted for the CIP Project: 23WA12 - Simms Tank Vault & 80th Ave Valve Replacement
Funding Source: UT Water Capital Projects
CIP Account Number: PRJ25000021

Background

The Church Ditch has a prescriptive easement for certain real property located at the northeast corner of W. 80th Avenue and Newman Street in Arvada upon which the Church Ditch flows. The City is seeking an outlet into which treated potable water from the Simms tank may be drained while Arvada is undertaking maintenance activities and during maintenance and emergency construction activities.

Discussion

While maintenance work is expected to begin near the end of 2025, the term of this Agreement and license will be perpetual to allow Arvada to use the drainage pipe in connection with the maintenance, repair, upgrade, or replacement of its water storage tank.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

The recommended action aligns with the Infrastructure Priority Area within the City Council Strategic Plan. Specifically, the recommended action is consistent with the following Principle included in the Infrastructure Priority Area:

Provides the community with a safe, reliable high quality water supply, drainage system, and wastewater disposal services for full city build-out, as defined in the Comprehensive Plan. This includes maintaining utility rates at the lowest practical levels with accurate billing that supports replacement of aging infrastructure in order to maintain robust utility systems.

Alternative Courses of Action

No alternatives are proposed. The water storage tank needs maintenance that requires that it be emptied and the only practical option for emptying the tank is to drain the water into the Church Ditch.

Recommendation for Action

The Arvada team recommends that the City Council approve R25-099, A Resolution Authorizing an Intergovernmental Agreement Between the City of Arvada and the Church Ditch Water Authority Allowing the City to Place a Water Drainage Pipe and to Make Occasional Discharge of Dechlorinated Potable Water Into the Church Ditch.

Suggested Motion:

I move that R25-099, A Resolution Authorizing an Intergovernmental Agreement Between the City of Arvada and the Church Ditch Water Authority Allowing the City to Place a Water Drainage Pipe and to Make Occasional Discharge of Dechlorinated Potable Water Into the Church Ditch, be (approved) (rejected).

Prepared by:
Tammy Hedlund, Legal Specialist

Reviewed by:

Approved by:

Kelli Bradley, Civil Engineer III	09/29/2025
Mary Stahl, Senior Civil Engineer	09/29/2025
Claudia Vaughan, City Engineer	09/29/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Tammy Hedlund, Legal Specialist	10/03/2025
Nora Steenson, Deputy City Attorney	10/06/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/07/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R 25-099

A RESOLUTION AUTHORIZING AN INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITY OF ARVADA AND THE CHURCH DITCH WATER AUTHORITY ALLOWING THE CITY TO PLACE A WATER DRAINAGE PIPE AND TO MAKE OCCASIONAL DISCHARGE OF DECHLORINATED POTABLE WATER INTO THE CHURCH DITCH

WHEREAS, the Church Ditch is a water carrier ditch that runs across portions of Arvada; and

WHEREAS, the City owns a water storage tank near the Ditch; the tank needs maintenance services for which the tank must be emptied; and

WHEREAS, the Church Ditch Water Authority has agreed to allow the City to discharge water from the tank into the Ditch and has also agreed to allow the City to place a drainage pipe and appurtenances into the Ditch to facilitate the discharge of water into the Ditch; and

WHEREAS, the Parties have agreed to allow the drainage pipe and appurtenances thereto to remain in place to be used as needed to accommodate future water discharge activities.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The Mayor or Mayor Pro Tem is authorized to sign and the City Clerk to attest, in form approved by the City Attorney, an Intergovernmental Agreement Between the City of Arvada and the Church Ditch Water Authority Allowing the City to Place a Water Drainage Pipe and to make Occasional Discharge of Dechlorinated Potable Water into the Church Ditch that is in substantially the same form as that attached hereto.

Section 2. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

AN INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITY OF ARVADA AND THE CHURCH DITCH WATER AUTHORITY ALLOWING THE CITY TO PLACE A WATER DRAINAGE PIPE AND TO MAKE OCCASIONAL DISCHARGE OF DECHLORINATED POTABLE WATER INTO THE CHURCH DITCH

THIS AGREEMENT ("Agreement") is between the City of Arvada, a Colorado home rule municipal corporation located at 8101 Ralston Road, Arvada, CO 80002 ("the City" or "Arvada"), and the Church Ditch Water Authority, a political subdivision of the State ("the Authority"), whose usual place of business is located at 14025 W. 82nd Avenue, Arvada CO 80005. The City and the Authority may be referred to collectively as the "Parties" or individually as a "Party."

WITNESSETH

WHEREAS, C.R.S. § 29-1-203, as amended, permits and encourages local governments to make the most efficient and effective use of their powers and responsibilities by cooperating and contracting with other local governments in order to provide any lawfully authorized function, service, or facility;

WHEREAS, the City is a Colorado municipal corporation and the Church Ditch ("Church Ditch" or "Ditch") is a carrier ditch operated by the Authority that runs generally from west to east across portions of Arvada;

WHEREAS, the Authority has a prescriptive easement for certain real property located at the northeast corner of W. 80th Avenue and Newman Street in Arvada (the "Property") upon which the Church Ditch flows;

WHEREAS, one component of Arvada's water system is a water storage tank that sits near the Property;

WHEREAS, Arvada wishes to upgrade the tank and otherwise conduct maintenance or emergency services on it;

WHEREAS, the City must drain the tank to maintain and otherwise upgrade it;

WHEREAS, Arvada does not currently have a way to fully drain the tank while it is being upgraded or while maintenance or emergency services are being performed on it;

WHEREAS, Arvada is seeking an outlet into which treated potable water from the tank may be drained while Arvada is undertaking maintenance activities and during maintenance and emergency construction activities;

WHEREAS, Arvada has identified that portion of the Church Ditch located on the Property as being a suitable location for the discharge of water into the Church Ditch;

WHEREAS, the City wishes to install a drainage pipe from the City's water tank and system into the Ditch to drain water from the tank before the upgrade activities begin, and, in the future, to drain water from the tank during maintenance activities and during emergencies as the need arises;

WHEREAS, the Authority has agreed to allow Arvada to discharge water into the Ditch on the terms and conditions set forth herein;

WHEREAS, the Authority has agreed to allow Arvada and its contractors to perform work necessary to construct and install a pipe, concrete headwall, apron, riprap area, and appurtenances thereto, as well as to conduct future activities related to this installation including but not limited to maintaining, upgrading, or repairing the installation (the "Work") generally in accordance with the plans agreed upon by the Parties and as more fully set forth below;

WHEREAS, both Parties have an interest in ensuring the efficient use of water resources in Arvada and along the Front Range; and

WHEREAS, both Parties wish to memorialize this agreement in writing.

NOW, THEREFORE, in consideration of the above and the mutual covenants made herein, the Parties agree as follows:

1.0 CONTRACT DOCUMENTS.

1.1 Contract Documents. The Contract Documents shall consist of this Agreement together with the following:

Exhibit A: Document titled "Project No. 23-WA-12 - Simms Tank Vault Mods – W 80th Ave at Newman St – Water main improvements – Plan and Profile" dated 2/2/2025; and

Exhibit B: An undated document titled "Project No. 23-WA-12 – Simms Tank Vault Mods – W 80th Ave at Newman St – Water main improvements – Drain assembly and detail."

All exhibits referred to in this Agreement are attached hereto and are, by reference, incorporated herein for all purposes.

1.2 Interpretation of Contract Documents. In the event any matter, term, provision, or condition that is the subject of this Agreement requires clarification or is in dispute, or is the subject of a difference of opinion, then the terms of this Agreement shall control, and then the terms of **Exhibit A**, and then **Exhibit B**, in that order.

2.0 TERMS AND CONDITIONS.

2.1 Agreement to cooperate. It is understood and agreed that this Agreement is intended to facilitate cooperation between the Parties in the provision of the services provided herein but does not establish a separate legal entity to do so, and except as set forth herein, this Agreement does not authorize either Party to act for the other Party for any purpose whatsoever.

2.1.1 License. Pursuant to the terms of this Agreement, Arvada is granted a license to cross a portion of the Authority property or property to which it has an easement pursuant to the plans and specifications in **Exhibits A and B** and as otherwise set forth in this Agreement. The Authority agrees to permit the proposed installation subject to the terms, conditions, and covenants set forth in this Agreement.

2.2 Nature and location of the Work. Subject to the terms and conditions of this Agreement, the Authority hereby grants Arvada permission to place a water drainage pipe more fully described in **Exhibits A and B**. The drainage pipe will flow into the Ditch at approximately W. 80th Avenue and Newman Street in Arvada. The pipe will allow for the discharge of water from Arvada's storage tank into the Ditch. The Parties acknowledge that Arvada's water storage tank holds up to ten million gallons of water.

2.2.1 Generally. Work to install the drainage pipe is anticipated to occur between November 1, 2025, and March 31, 2026. The Work will occur in accordance with the design and plans set forth in **Exhibits A and B** and will generally consist of the construction of a 6-inch diameter pipe, concrete headwall, apron, and riprap area. The pipe will run from Arvada's water main along W. 80th Avenue in a northerly direction toward the concrete headwall placed near the top of the bank of the Ditch at approximately W. 80th Avenue and Newman Street. Once the construction is finished, water discharged from the tank will flow through the pipe past the headwall and down across the riprap area into the Ditch. Arvada shall provide notice to the Authority before discharging any water into the Ditch. If the Authority determines it cannot accept the water at a particular time, then the Parties shall work in good faith to determine an alternative time for the discharge of the water into the Ditch. Arvada shall measure the discharge into the Ditch and report the measurements for any such discharge to the Authority.

2.2.2 Purpose. Once the drainage pipe is installed, it will allow for the controlled discharge of water from the City's water tank into the Ditch. This will allow for mechanical upgrades to the tank.

2.2.3 Future Work. The Parties anticipate that Arvada will perform additional Work under this Agreement beyond March 31, 2026. This Work may include but is not limited to the inspection, maintenance, repair,

replacement, upgrade to, service, or removal of the pipe, concrete headwall, apron, and riprap area and appurtenances thereto. The City may be required to replace or reconstruct the pipe, concrete headwall, apron, and riprap area and appurtenances hereto upon a reasonable request from the Authority and if both Parties' engineers agree the pipe, concrete headwall, apron, or riprap area, or any appurtenance thereto have degraded or are degrading such that they are or will soon be structurally unsound and pose an imminent risk of inhibiting the flow of water through the Ditch. Any future construction activities, such as maintenance, replacement, upgrade to, or removal of the pipe, headwall, riprap area and appurtenances thereto will be conducted in accordance with this Agreement. Future work may be done in connection with drainage of the City's water tank or done for any other reason if Arvada performs the work in accordance with this Agreement. All Work will be conducted to the extent practicable during low water flow periods.

2.2.4 Anticipated discharge rate. Arvada anticipates that once the drainage pipe is installed, up to 10,000,000 gallons of water may be discharged into the Ditch at a rate of 0.67 cfs (300 gpm). Future discharge rates will be similar. All water discharged into the Ditch under this Agreement will be dechlorinated.

2.3 Coordination of construction activities. The project managers noted below will coordinate as needed as to the start and end date of Work and will continue to coordinate throughout this Agreement to ensure that all Work is completed in a timely and efficient manner. The Authority understands that time is of the essence in completing the Work and agrees to proceed with all due diligence in cooperating with Arvada and its contractors to ensure that work is done promptly and efficiently.

2.3.1 Pre-construction meeting – 2025 Work. The Parties' Project Owners or designees thereof will hold a pre-construction meeting at the job site before Work on the 2025 upgrade to the City's water storage tank begins.

2.3.2 Notice of construction; inspections. Except in the case of an emergency, Arvada will provide the Authority with seven days' notice of the beginning of any Work by Arvada or its contractors at the job site. Arvada's project manager will ensure that the Authority is allowed to inspect any of Arvada's Work at the job site in a timely manner. The Authority will notify Arvada of the date and time of any inspection by the Authority at least 48-hours before the inspection. Approval of the Work may not be unreasonably delayed or withheld. Any corrective action requested by the Authority must be transmitted to Arvada's project manager in writing within seven days of the Authority's inspection. Arvada will notify the Authority when the installation is completed and so that the Authority may conduct a final inspection of the work if it chooses.

2.3.3 Documentation. Records of any inspections or certificates of completion required by law will be kept on file by Arvada.

2.4 Ownership. Arvada will purchase or construct and retain title to and ownership of the pipe, the concrete headwall, apron, and any appurtenances related thereto.

2.5 Construction and maintenance. Arvada or its contractors may inspect, construct, maintain, upgrade, repair, replace, service, or remove the pipe, concrete headwall, apron, and riprap area and appurtenances thereto with seven days' prior notice to the Authority of these activities, except in the case of emergency repairs or services, in which case Arvada agrees to give the Authority notice as soon as practicable after the need for the emergency repairs or service arises. The Authority may also inspect, repair, or replace the pipe, concrete headwall, apron, and riprap area and appurtenances thereto at the expense of Arvada. Except in the case of emergency repairs or services, the Authority will give Arvada 48 hours' notice of any inspection, repair, or replacement of the pipe, concrete headwall, apron, riprap area, or other appurtenance thereto. The Authority will notify Arvada of any emergency repairs or services as soon as practicable after the need for the emergency repairs or services arise. Arvada will be solely responsible for the costs of construction, maintenance, repairs, replacement, service, operation, and removal of the pipe, concrete headwall, apron, riprap area, or any appurtenance thereto.

3.0 TERM AND TERMINATION.

3.1 Agreement. The term of this Agreement and license will be perpetual to allow Arvada to use the drainage pipe in connection with the maintenance, repair, upgrade, or replacement of its water storage tank and otherwise perform Work as described herein. Arvada may in its sole discretion decide to terminate this Agreement at any time for any or no reason with 90 days written notice to the Authority. Should Arvada terminate this Agreement, it will take all actions reasonably necessary to cap off the pipe no later than 90 days after it provides the notice of termination to the Authority. The Authority may also terminate this Agreement in its sole discretion if the State Engineer determines that the Authority cannot deliver and use the water Arvada discharges in the Ditch in a manner that is consistent with how other water is delivered in the Ditch with 90 days written notice to Arvada.

4.0 MISCELLANEOUS PROVISIONS.

4.1 Necessary personnel, equipment, and facilities. Each Party must maintain that level of personnel, insurance, equipment, and facilities necessary to meet its obligations under this Agreement. Nothing in this Agreement requires either Party to fund the activities of the other Party. Employees and contractors of each Party remain the employees and contractors of that Party.

4.2 Additional documents or action. The Parties agree to take any additional action and execute any additional documents that are necessary to carry out this Agreement.

4.3 Assignment**.** This Agreement will not be assigned by either Party without the prior written consent of the other Party.

4.4 Force majeure. Any delays in or failure of performance by any Party of its obligations under this Agreement will be excused if such delays or failure are a result of acts of God, fires, floods, strikes, labor disputes, accidents, regulations or orders of civil or military authorities, shortages of labor or materials, or other causes, similar or dissimilar, which are beyond the control and such Party.

4.5 Binding effect. This Agreement will inure to the benefit of, and be binding upon, the Parties, their respective legal representative, successors, heirs, and assigns; provided, however, that nothing in this paragraph will be construed to permit the assignment of this Agreement except as otherwise expressly authorized herein.

4.6 Notices. Any notice required or permitted by this Agreement must be in writing and must be given by certified mail or registered mail, postage and fees prepaid, to the Project Manager at the address set forth below, or at such other address as has been previously furnished in writing, to the other Party or Parties. The notice will be deemed to have been given when deposited in the United States mail.

4.7 Project managers. Each Party will designate in writing an employee to be responsible for the day-to-day management of this Agreement; each Party will use its continuing best efforts to communicate to the other the name and contact information of its designated Project Manager. The initial Project Manager for Arvada will be Kelli Bradley. The initial Project Manager for the Authority will be Nathan McCoy.

4.8 Paragraph captions. The captions of the paragraphs are set forth only for the convenience and reference of the Parties and are not intended in any way to define, limit or describe the scope or intent of this Agreement.

4.9 Integration and amendment. This Agreement represents the entire agreement between the Parties and there are no oral or collateral agreements or understandings. This Agreement may be amended only by an instrument in writing signed by the Parties. If any other provision of the Agreement is held invalid or unenforceable, no other provision shall be affected by such holding, and all the remaining provisions of this Agreement shall continue in full force and effect.

4.9.1 Arvada amendments. With respect to Arvada, amendments to this Agreement not involving the allocation or expenditure of funds may be authorized and signed by the City's Infrastructure Director. Amendments

involving the allocation or expenditure of funds may be authorized in accordance with the Arvada Purchasing Ordinance.

4.10 Waiver of breach. A waiver by any Party to the Agreement of the breach of any term or provision of this Agreement shall not operate or be construed as a waiver of any subsequent breach by either Party.

4.11 Governing law and venue. This Agreement shall be governed by the laws of the State of Colorado. Venue for any action arising under this Agreement or for the enforcement of this Agreement shall be in the appropriate court for Jefferson County, Colorado.

4.12 Governmental immunity.

4.12.1 Intentional acts or omissions. Each Party shall be responsible for its own negligent or intentional acts or omissions, and for those of its employees and agents.

4.12.2 Not a waiver. To the extent the Colorado Governmental Immunity Act applies to each Parties, the Parties intend that nothing herein shall be deemed or construed as a waiver by either Party of any rights or protections afforded to them under any federal, state, or local constitutional, statutory, or common law including but not limited to the Colorado Governmental Immunity Act (C.R.S. §24-10-101, *et seq.*).

4.12.3 Independent entities. The Parties enter this Agreement as separate, independent entities and maintain that status throughout.

4.13 Payments to constitute current expenditures. Financial obligations of the City, if any, after the current year are contingent on funds for that purpose being appropriated, budgeted, and otherwise made available by the governing body of either Party. The City's obligations under the Agreement shall be from year to year only and shall not constitute a multiple-fiscal year direct or indirect debt or other financial obligation of the City within the meaning of Article X, Section 20 of the Colorado Constitution.

4.14 No indemnification by Arvada. Arvada is prohibited under Article XI, Section 1 of the Colorado Constitution from indemnifying anyone. Despite any provision in any contract document to the contrary, Arvada does not indemnify the Authority or anyone else under the Agreement.

4.15 No third-party beneficiaries. It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement, and all rights of action relating to such enforcement, shall be strictly reserved to the Parties, and nothing contained in this Agreement shall give or allow any such claim or right of action to any other third party on this Agreement. It is the express intention of the Parties

that any person other than Arvada or Church Ditch receiving services or benefits under this Agreement shall be deemed to be an incidental beneficiary only.

4.16 Open records requests. Arvada is obligated to comply with the Colorado Open Records Act (C.R.S. §§24-72-200.1 *et seq.*) (CORA), which may require Arvada to disclose all or a portion of communications relating to the Agreement, any transaction under the Agreement, and other related matters.

4.17 Binding authority; counterpart execution. Both Parties represent and affirm that the signature page hereof accurately states its full legal name, contains all its requisite signature(s), and in all other respects is effective to bind that Party in accordance with all applicable statutes, regulations, resolutions, rules, bylaws, agreements, or similar sources of authority or limitation. This Agreement may be executed in several counterparts and by facsimile, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument.

4.18 Electronic signatures and electronic records. The Parties consent to the use of electronic signatures. The Agreement, and any other documents requiring a signature hereunder, may be signed electronically by either Party in the manner specified by that Party. The Parties agree not to deny the legal effect or enforceability of the Agreement solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

4.19 Binding effect. The Parties agree that this Agreement and all its terms and conditions are binding upon them, their successors, designees, and assigns.

4.20 Effective date. The Effective Date of this Agreement will be the date the second Party adopts a resolution approving this Agreement

DATED this_____day of_____, 20___.

CITY OF ARVADA,
a Colorado municipal corporation

By: _____
Lauren Simpson, Mayor
8101 Ralston Road
Arvada, Colorado 80002

ATTEST:

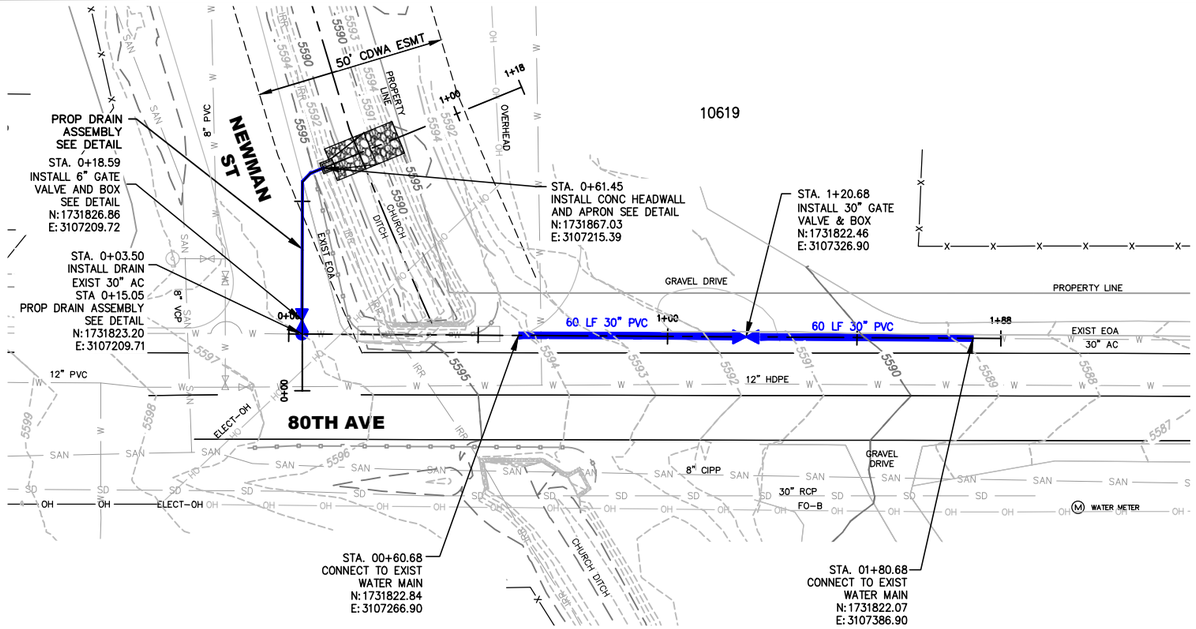
By:_____
City Clerk

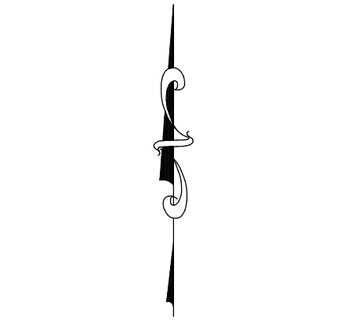
APPROVED AS TO FORM:

_____
Rachel A Morris, City Attorney

CHURCH DITCH WATER AUTHORITY

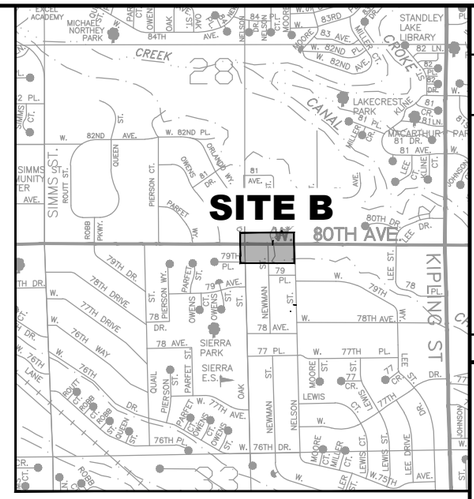
By: _____
Nathan McCoy, Manager
14025 W. 82nd Avenue
Arvada, Colorado 80005



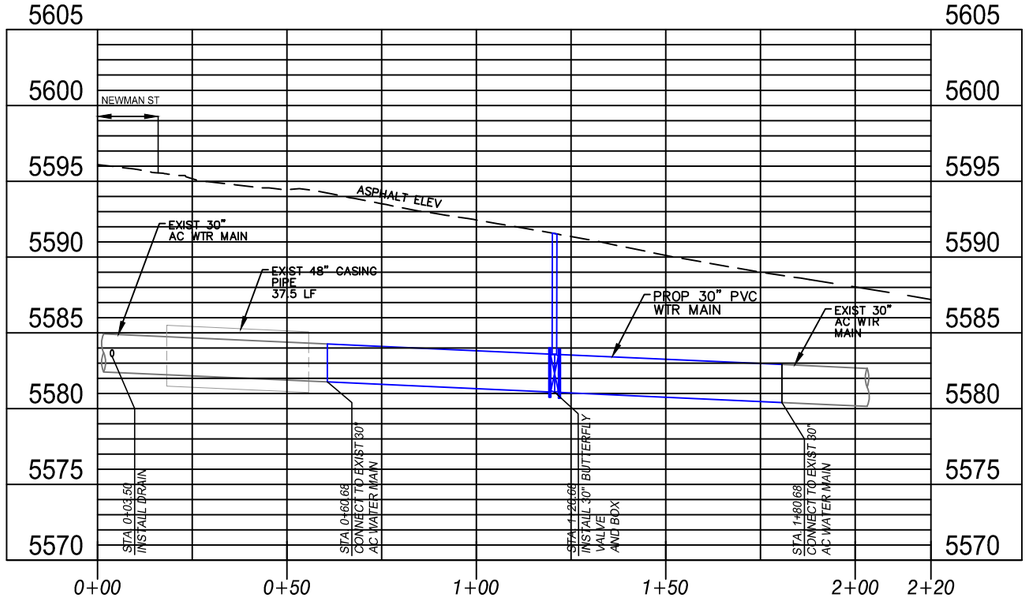


NOTE:

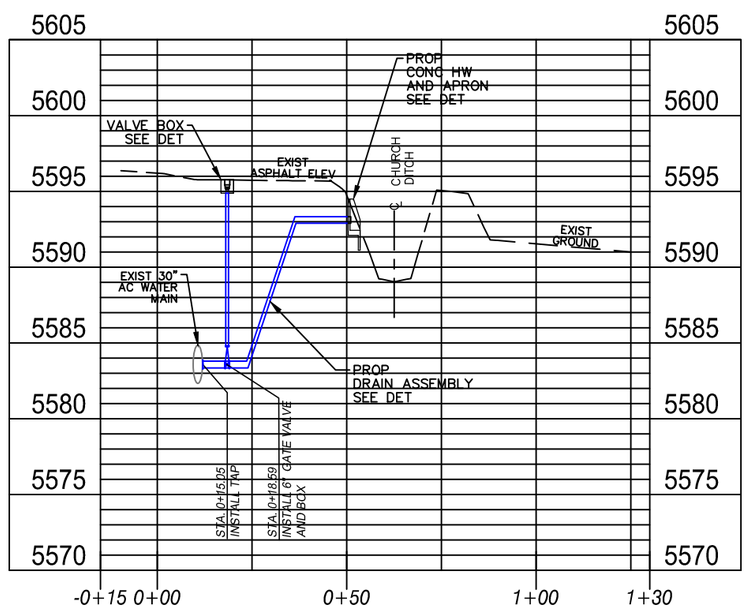
1. RESTRAIN PIPE WITHIN 60' OF VALVE.
2. DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.



KEY MAP
SCALE: N.T.S.



PROFILE: 80TH AND NEWMAN ST
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'



PROFILE: DRAIN ASSEMBLY
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'

EXHIBIT A

APPROVED:

City Engineer — 8/18/25 Date — 23WA12 Job Number

Review is for general compliance with the City of Arvada "Engineering Code of Standards and Specifications for the Design and Construction of Public Improvements", latest edition. Sole responsibility for completeness and/or accuracy of these Documents shall remain with the Registered Professional Engineer sealing these plans. The City does not accept liability for facilities designed by others.

NO.	REVISION	DATE	BY
1			
2			
3			
4			
5			

Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

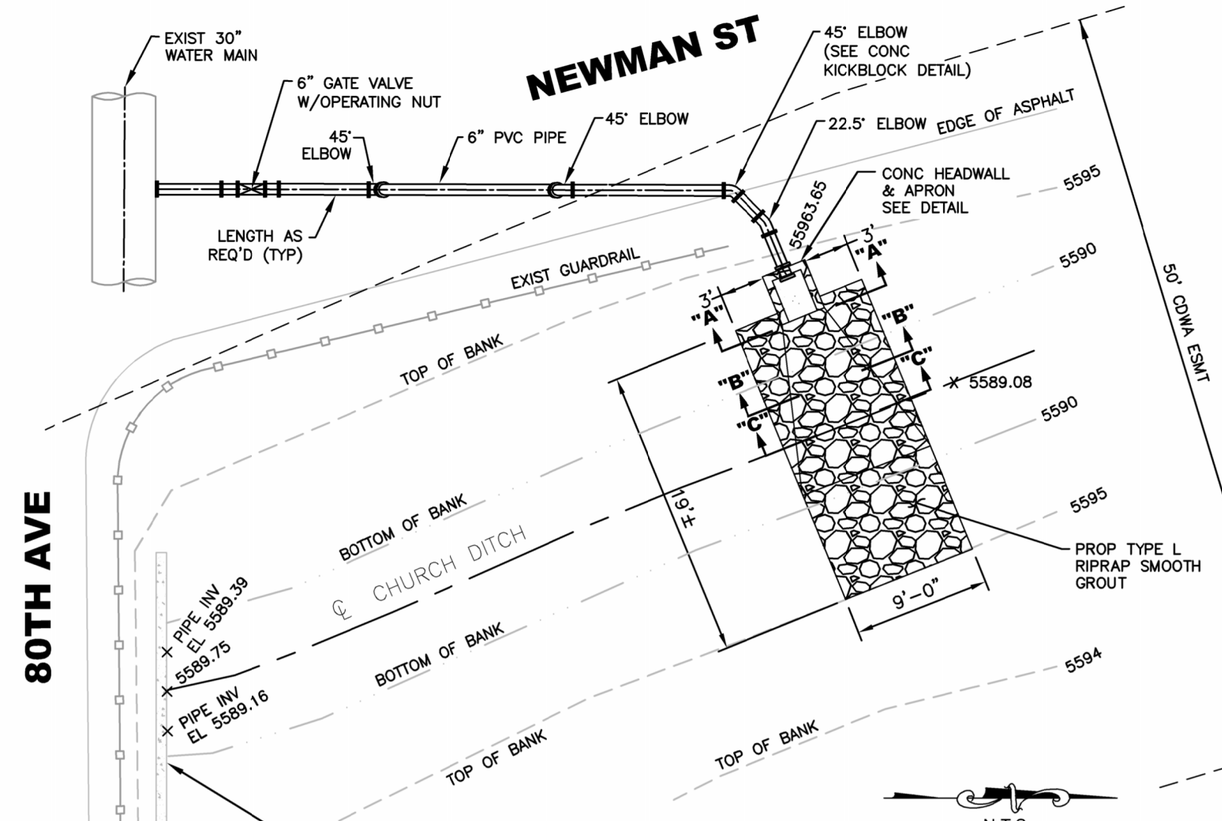
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
W 80TH AVE AT NEWMAN ST
WATERMAIN IMPROVEMENTS
PLAN AND PROFILE

ENGINEER
KB
CHECKED BY
KB
DESIGN BY
AS

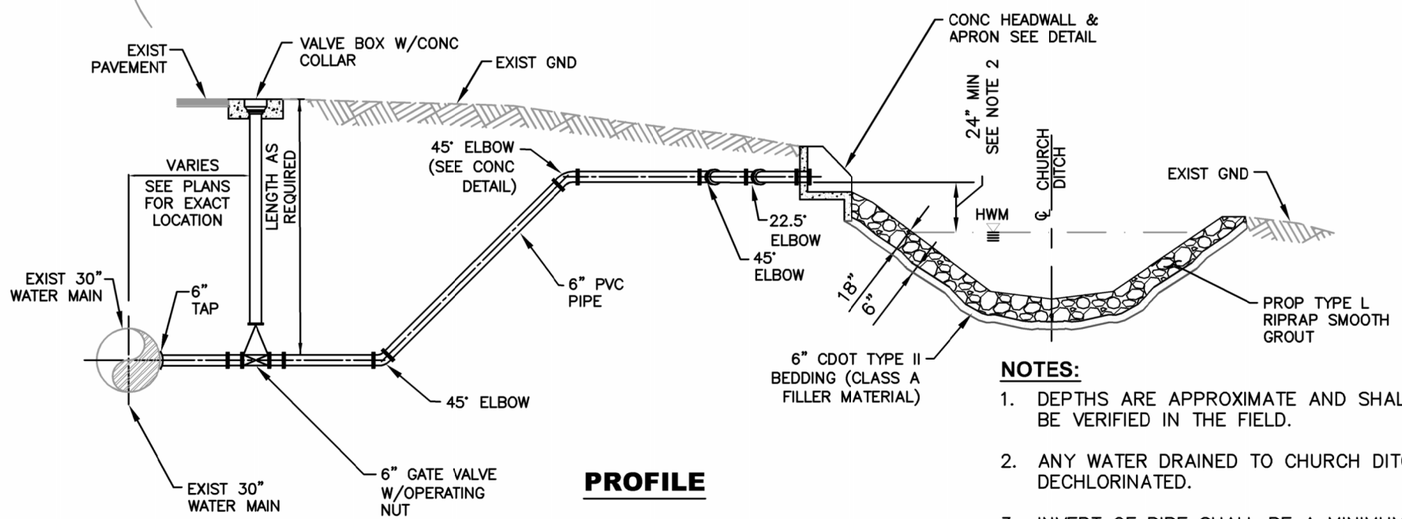
SHT **21**

G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Water Line Improvements (working) - 07-21-25.dwg , Plot Date: 8/4/2025



PLAN

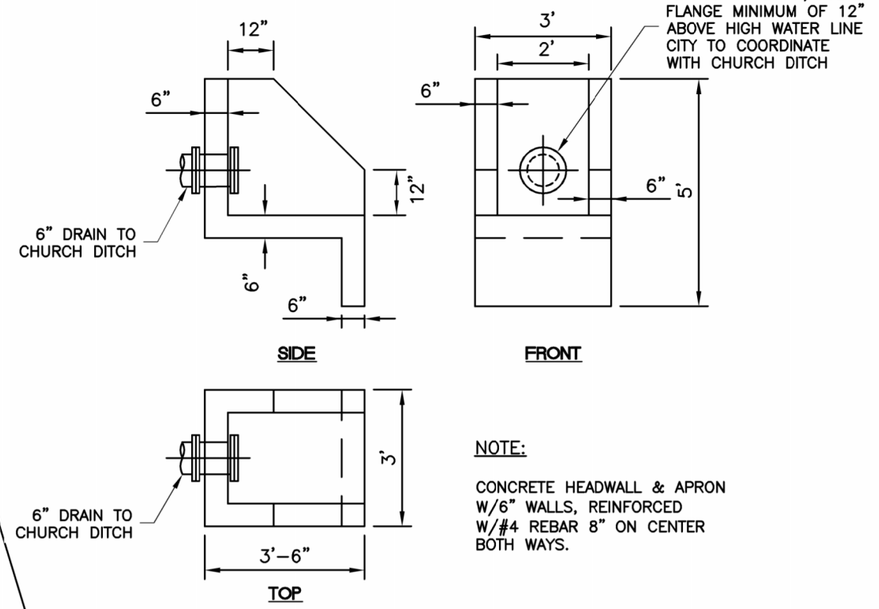
N.T.S



PROFILE

SITE B DRAIN ASSEMBLY

N.T.S

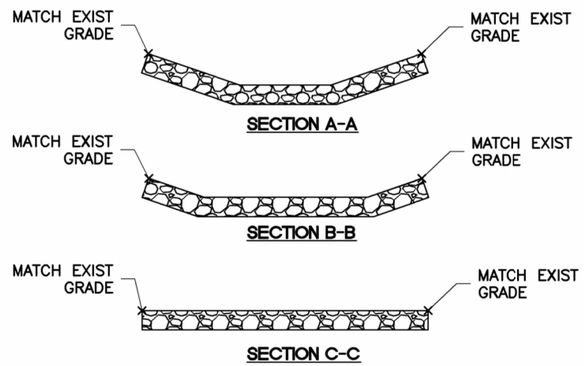


NOTE:

CONCRETE HEADWALL & APRON W/6" WALLS, REINFORCED W/#4 REBAR 8" ON CENTER BOTH WAYS.

CONCRETE HEADWALL AND APRON

N.T.S



SECTIONS

N.T.S

NOTES:

1. DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.
2. ANY WATER DRAINED TO CHURCH DITCH SHALL BE DECHLORINATED.
3. INVERT OF PIPE SHALL BE A MINIMUM OF 24 " ABOVE HIGH WATER LEVEL OR TOP OF BANK OF CHURCH DITCH. TO BE COORDINATED BY THE CITY OF ARVADA.
4. 6" PIPE SHALL BE FULLY RESTRAINED.

EXHIBIT B

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

Review is for general compliance with the City of Arvada "Engineering Code of Standards and Specifications for the Design and Construction of Public Improvements", latest edition. Sole responsibility for completeness and/or accuracy of these Documents shall remain with the Registered Professional Engineer sealing these plans. The City does not accept liability for facilities designed by others.

NO.	REVISION	DATE	BY
1			
2			
3			
4			
5			

Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
W 80TH AVE AT NEWMAN ST
WATER MAIN IMPROVEMENTS
DRAIN ASSEMBLY AND DETAIL

ENGINEER KB
CHECKED BY MS
DESIGN BY AS

SHT 22

G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Vault Modification And Details.dwg Plot Date: 8/14/2025

CHURCH DITCH WATER AUTHORITY
RESOLUTION NO. 11-2025

A RESOLUTION APPROVING AN INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITY OF ARVADA AND THE CHURCH DITCH WATER AUTHORITY ALLOWING THE CITY TO PLACE A WATER DRAINAGE PIPE AND TO MAKE OCCASIONAL DISCHARGE OF DECHLORINATED POTABLE WATER INTO THE CHURCH DITCH

BE IT RESOLVED BY THE CHURCH DITCH WATER AUTHORITY, THAT:

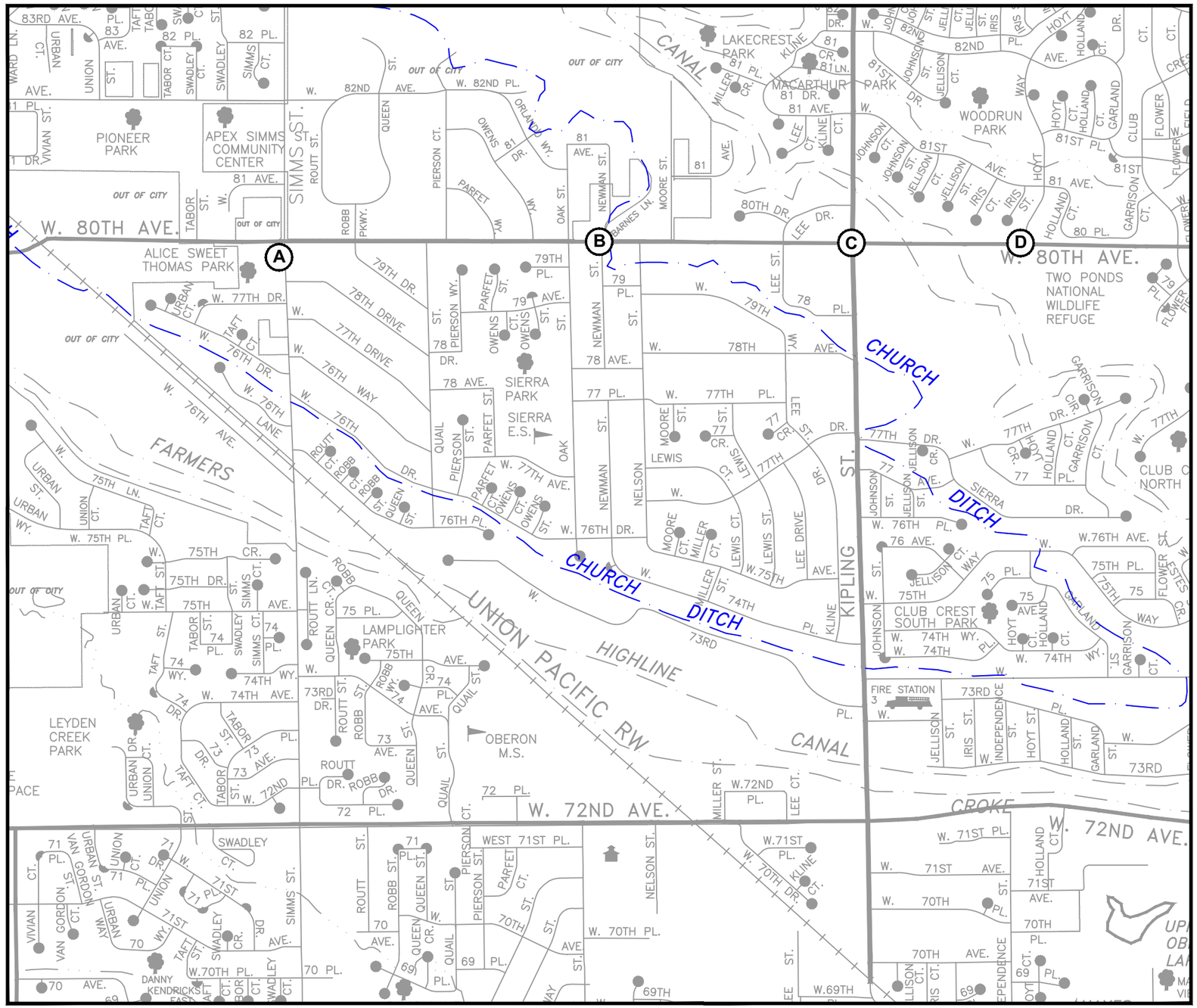
Section 1. The Intergovernmental Agreement attached hereto as **Exhibit A**, between the Church Ditch Water Authority and the City of Arvada is hereby approved, and the President of the Board of Directors of the Authority is authorized to execute the same on behalf of the Authority.

DATED this 13th day of October, 2025.

Tamara Moon, President

ATTEST:

Nathan McCoy, General Manager



CITY OF ARVADA

PROJECT 23-WA-12
SIMMS STREET TANK VAULT MODS
BID SET

INDEX

KEY	DESCRIPTION	ELECTRICAL SHT NUMBER	SHT.
	COVER SHEET		G1
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	GENERAL NOTES		GN2
	CHURCH DITCH REQUIRED NOTES		GN3
A	SIMMS TANK VAULT		4 - 8
E	SIMMS TANK VAULT ELECTRICAL GENERAL NOTES, SYMBOLS AND ABBREVIATIONS	OE-001 - OE-401	9 -14
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CDWA APPROVAL BLOCK

The signature of the General Manager of the Church Ditch Water Authority (CDWA) is for the purposes of acknowledging acceptance of the design of the Permitted Structures only. The signature shall not in any way change the rights and obligations of either party with respect to the [TITLE OF EASEMENT OR LICENSE AGREEMENT] to which these designs are attached. The CDWA is expressly relying upon the design standards and performance standards set forth in these drawings as presented by [NAME OF APPLICANT], and [NAME OF APPLICANT] shall be solely responsible that, as constructed, the Permitted Structures shall perform as specified herein.

General Manager, Church Ditch Water Authority

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

Review is for general compliance with the City of Arvada "Engineering Code of Standards and Specifications for the Design and Construction of Public Improvements", latest edition. Sole responsibility for completeness and/or accuracy of these Documents shall remain with the Registered Professional Engineer sealing these plans. The City does not accept liability for facilities designed by others.

LEGEND	
	WATER VALVE
	FIRE HYDRANT
	REDUCER
	PLUG
	BLOW OFF
M	WATER METER
C	CURB STOP
PRV	PRESSURE REDUCING VALVE ASSEMBLY
AV	AIR RELEASE & VACUUM VALVE
W	WATER MANHOLE
	IRRIGATION SPRINKLER
	IRRIGATION SYSTEM BOX
S	SANITARY MANHOLE
CO	CLEAN OUT
ST	STORM MANHOLE
	INLET
ST	TYPE R INLET
	FLARED END SECTION
IRR	IRRIGATION DITCH MANHOLE
	MISCELLANEOUS MANHOLE
T	TELEPHONE VAULT
U	UTILITY PEDESTAL
	UTILITY PULL BOX
	POWER POLE
	GUY WIRE
	LIGHT POLE
SP	SIGNAL POLE
CP	CATHODIC PROTECTION TEST STATION
	MONITER WELL
	TEST HOLE
	STREET SIGN
	MAILBOX
	POST
	SURVEY MONUMENT
	SURVEY CONTROL POINT
	SURVEY MARKER

GENERAL NOTES:

1. THE TYPE, SIZE, LOCATION, AND NUMBER OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THE DRAWINGS UNLESS INDICATED AS SUE LEVEL A. UTILITIES MARKED AS SUE LEVEL A HAVE BEEN VISUALLY IDENTIFIED AND SURVEYED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY SIZE, HORIZONTAL, AND VERTICAL LOCATIONS OF EXISTING FACILITIES ALONG THE ROUTE OF WORK PRIOR TO CONSTRUCTION AND NOTIFY THE CITY OF ANY DISCREPANCIES. IT IS ALSO THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ANY UTILITIES DURING CONSTRUCTION. FOR INFORMATION CONTACT: UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) – 1–800–922–1987. ANY DAMAGES TO UTILITIES CAUSED BY THE CONTRACTOR OR SUBCONTRACTOR SHALL BE REPAIRED IN A TIMELY MANNER AT NO COST TO THE OWNER.
2. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL CONTRACT DOCUMENTS AS WELL AS THE CITY OF ARVADA "ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS", LATEST EDITION.
3. ALL CONTRACTORS AND SUBCONTRACTORS SHALL BE LICENSED WITH THE CITY OF ARVADA PRIOR TO START OF CONSTRUCTION
4. ALL WORK WILL REQUIRE A CITY OF ARVADA ENGINEERING DIVISION CAPITAL IMPROVEMENT PERMIT PRIOR TO THE START OF CONSTRUCTION. ALL CONTRACTORS MUST OBTAIN A CAPITAL IMPROVEMENT PROJECT PERMIT PRIOR TO COMMENCING ANY CONSTRUCTION WORK.
5. ALL CONTRACTORS AND SUBCONTRACTORS SHALL HAVE A PRINTED SET OF APPROVED DRAWINGS SIGNED BY THE CITY ENGINEER OR DESIGNEE AND A COPY OF THE CURRENT CITY OF ARVADA "ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS", ON SITE AT ALL TIMES.
6. THE CITY OF ARVADA MUNICIPAL INSPECTOR SHALL BE NOTIFIED A MINIMUM OF 24 HOURS IN ADVANCE FOR EACH DAY THAT CREWS ARE WORKING BY SCHEDULING INSPECTIONS THROUGH THE CITY'S PERMITTING SYSTEM. FAILURE TO DO SO WILL RESULT IN A STOP WORK ORDER.
7. THE CONTRACTOR IS RESPONSIBLE FOR ALL PROJECT SAFETY INCLUDING, BUT NOT LIMITED TO, TRENCH EXCAVATION AND SHORING, TRAFFIC CONTROL, AND SECURITY.
8. CONTRACTOR SHALL OBTAIN A SITE DISTURBANCE PERMIT FROM THE CITY OF ARVADA PRIOR TO CLEARING, GRADING, OR EXCAVATING A SITE OVER 10,000 SQUARE FEET. ESTIMATED AREA OF DISTURBANCE FOR THIS PROJECT SITE WILL BE APPROXIMATELY 100,095 SQUARE FEET (2.29 ACRES).
9. THE CONTRACTOR SHALL OBTAIN A COLORADO STATE CONSTRUCTION DEWATERING DISCHARGE PERMIT FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT FOR ALL AREAS WHERE DEWATERING IS REQUIRED FROM AN EXCAVATION AND WATER IS DISCHARGED INTO A STORM SEWER, CHANNEL, IRRIGATION DITCH OR ANY WATERS OF THE UNITED STATES. A COPY OF THE APPROVED PERMIT MUST BE SUBMITTED TO THE CITY OF ARVADA ENGINEERING DIVISION PRIOR TO THE START OF ANY DEWATERING. A COPY OF THE APPROVED PERMIT MUST ALSO BE AVAILABLE ON THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION.
10. ALL CURB RAMPS SHALL COMPLY WITH THE LATEST CITY OF ARVADA AND ADA STANDARD. CONTRACTOR TO CHECK WITH THE CITY OF ARVADA ENGINEERING DIVISION TO VERIFY THE LATEST CURB RAMP STANDARD PRIOR TO CONSTRUCTION OF ANY RAMP.
11. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE CITY OF ARVADA ENGINEERING DIVISION. THE CITY RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS "ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS".
12. THE CONTRACTOR IS RESPONSIBLE FOR THE PREPARATION OF TRAFFIC CONTROL PLANS AND ITS SUBMITTAL SHALL BE SUBMITTED TO THE CITY OF ARVADA ENGINEERING DIVISION FOR ACCEPTANCE WITH THE CAPITAL IMPROVEMENTS PERMIT APPLICATION. A CAPITAL IMPROVEMENTS CONSTRUCTION PERMIT WILL NOT BE ISSUED WITHOUT AN APPROVED TRAFFIC CONTROL PLAN FOR TRAFFIC CONTROL ON EXISTING ROADS DURING CONSTRUCTION.
13. THE CONTRACTOR SHALL KEEP TRACK OF ALL CHANGES FROM THE APPROVED CONSTRUCTION DRAWINGS IN THE FORM OF REDLINES ON THE DRAWINGS. THESE REDLINES SHOULD BE MADE AVAILABLE TO THE CITY FOR REVIEW IN THE FIELD UPON REQUEST. REDLINES SHALL ALSO BE SUBMITTED TO THE CITY FOR REVIEW WITH EACH PAY APPLICATION. REDLINES SHALL INCLUDE STATIONING OF ALL FITTINGS, SERVICES, AND PERTINENT ELEVATIONS.
14. ALL WATERLINE FITTINGS AND VALVES SHALL BE FIELD MARKED IMMEDIATELY AFTER BACKFILLING. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN FIELD MARKINGS UNTIL THE CITY'S SURVEY TEAM RECORDS THE LOCATION OF EACH FITTING AND VALVE. IT SHALL BE EXPECTED THAT THE CITY SURVEY TEAM SHALL RECORD THE LOCATIONS AT A FREQUENCY NO SOONER THAN ONCE PER WEEK.
15. PERMANENT SURVEY MONUMENTS, INCLUDING THE REPLACEMENT OF MONUMENTS, RANGE POINTS AND LOT PINS SHALL BE SET IN ACCORDANCE WITH THE REQUIREMENTS OF ARTICLES 51 AND 53 OF TITLE 38, COLORADO REVISED STATUTES, AND AS REQUIRED BY THE BYLAWS AND RULES OF PROCEDURE OF THE COLORADO STATE BOARD OF LICENSURE FOR ARCHITECTS, LANDSCAPE ARCHITECTS, PROFESSIONAL ENGINEERS AND PROFESSIONAL LAND SURVEYORS. RANGE POINTS SHALL BE PROTECTED BY THE INSTALLATION OF A SURVEY RANGE BOX PER DETAIL DRAWINGS.
16. THE CONTRACTOR SHALL USE EVERY REASONABLE PRECAUTION TO PREVENT THE DAMAGE OR DESTRUCTION OF SURVEY MONUMENTS ADJACENT TO OR ON THE SITE. THE CONTRACTOR SHALL PROTECT AND CAREFULLY PRESERVE ALL ALIQUOT CORNERS, PROPERTY, NGS, AND ARVADA SURVEY CONTROL MONUMENTATION. ANY MONUMENT THAT MAY BE DISTURBED SHALL BE REFERENCED TO A MINIMUM OF TWO POINTS OUTSIDE THE LIMITS OF CONSTRUCTION AND REPLACED BY A COLORADO REGISTERED PROFESSIONAL LAND SURVEYOR. ALL MONUMENTS DISTURBED OR REMOVED BY THE CONTRACTOR, THROUGH NEGLIGENCE OR CARELESSNESS ON THEIR PART OR ON THE PART OF THEIR EMPLOYEES OR SUBCONTRACTORS, SHALL BE RESTORED PER SECTION 151.02 – SURVEY MONUMENTS OF THE CITY OF ARVADA ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS. A MONUMENT RECORD SHALL BE TURNED INTO THE CITY IMMEDIATELY AFTER RESTORATION OF THE MONUMENT.

GENERAL ABBREVIATIONS:

APPROX – APPROXIMATE
CONC – CONCRETE
CIPP – CURED IN PLACE PIPE
D= – DEPTH
EOA – EDGE OF ASPHALT
EXIST – EXISTING
FH – FIRE HYDRANT
FES – FLARED END SECTION
HWM – HIGH WATER MARK
PROP – PROPOSED
SD – STORM DRAIN
TELE–B – TELEPHONE BURIED
TELE–OH – TELEPHONE OVERHEAD
TEMP – TEMPORARY
T.O.P – TOP OF PIPE

CONSTRUCTION LEGEND:

W W	EXISTING WATER MAIN
	PROPOSED WATER MAIN
SAN	SANITARY SEWER MAIN
SD	STORM DRAIN
SS SS	SANITARY SEWER SERIVCE
X X X	EXISTING FENCE
	EXISTING EDGE OF ASHALT
	EXIST MAJOR CONTOUR
	EXIST MINOR CONTOUR
FO FO	EXIST FIBER OPTIC
GAS	EXIST GAS
OH OH	EXIST OVERHEAD ELECTRIC

(APPROX. LOCATION, EXTRACTED FROM GIS DATA)

APPROVED:
City Engineer — Date: 8/18/25 — Job Number: 23WA12

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NO.	REVISION	DATE	BY
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4			
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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
GENERAL NOTES

ENGINEER KB
CHECKED BY MS
DESIGN BY RN

SHT **GN1**

G:\PROJECTS\WATER\23WA12–Simms Tank Vault Mods\CAD\23WA12 – Cover & Notes.dwg , Plot Date: 2/5/2025

STREET NOTES:

1. ALL TRENCH BACKFILL AND SUBGRADE PREPARATION SHALL BE TESTED TO ENSURE COMPLIANCE WITH CITY OF ARVADA STANDARDS AND SHALL BE TESTED AT CITY REQUIRED FREQUENCIES BY A CITY APPROVED PRIVATE SOILS TESTING FIRM. TEST RESULTS SHALL BE SUBMITTED TO, REVIEWED, AND APPROVED BY, THE CITY OF ARVADA ENGINEERING DIVISION PRIOR TO INSTALLING BASE COURSE, ASPHALT OR CONCRETE ON PREPARED SUBGRADE. ALL BASE COURSE DENSITY SHALL ALSO BE TESTED BY THE PRIVATE SOILS FIRM AT CITY REQUIRED FREQUENCIES TO ENSURE COMPLIANCE WITH CITY OF ARVADA REQUIREMENTS. BASE COURSE TEST RESULTS SHALL ALSO BE APPROVED BY THE CITY OF ARVADA ENGINEERING DIVISION PRIOR TO INSTALLING PAVEMENT. ALL CONCRETE AND ASPHALT PLACED SHALL BE TESTED IN ACCORDANCE WITH CITY OF ARVADA MINIMUM MATERIALS TESTING STANDARDS. TEST RESULTS SHALL BE REVIEWED AND APPROVED BY THE CITY OF ARVADA ENGINEERING DIVISION PRIOR TO INITIATION OF THE REQUIRED TWO-YEAR WARRANTY PERIOD
2. A GEOTECHNICAL INVESTIGATION WAS NOT COMPLETED AS A PART OF THIS PROJECT NOR HAS ANY ADJACENT OR PREVIOUS GEOTECHNICAL INVESTIGATIONS BEEN RELIED UPON BY THE ENGINEER OF RECORD IN COMPLETING THE DESIGN. ANY SUCH INFORMATION PROVIDED MAY NOT NECESSARILY BE RELIED UPON AS IT RELATES TO THE DESIGN THAT HAS BEEN COMPLETED.
3. CONTRACTOR SHALL PROTECT IN PLACE ALL EXISTING CURB, GUTTER, SIDEWALK, LANDSCAPING, PAVEMENT AND OTHER SITE IMPROVEMENTS TO REMAIN. ANY DAMAGE TO EXISTING IMPROVEMENTS OUTSIDE OF THE LIMITS OF CONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR SOLE COST.
4. ALL CONCRETE CURB, GUTTER, SIDEWALK AND OTHER FLATWORK WITHIN THE CITY RIGHT OF WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST CITY OF ARVADA "ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS".
5. ALL FLATWORK CONCRETE SHALL BE MINIMUM 4000 PSI DESIGN STRENGTH REINFORCED WITH 1.5 LBS/CY FIBERMESH IN ACCORDANCE WITH THE CITY OF ARVADA "ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS".
6. WHEN EXCAVATING IN CONCRETE OR ASPHALT AREAS, ALL NATIVE SOILS SHALL BE CONSIDERED NOT SUITABLE FOR TRENCH BACKFILL. NATIVE SOILS SHALL BE HAULED OFFSITE AND REPLACED WITH CDOT CLASS 1 STRUCTURAL FILL MATERIAL .
7. THE CONTRACTOR SHALL PROOF ROLL ALL SUBGRADE AND BASE COURSE IN A MANNER ACCEPTABLE TO THE CITY OF ARVADA IN ACCORDANCE WITH THE CITY OF ARVADA "ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND CONSTRUCTION OF PUBLIC IMPROVEMENTS". PROOF ROLLING SHALL BE INSPECTED AND ACCEPTED BY THE CITY PRIOR TO INSTALLATION OF PAVEMENT AND/OR CONCRETE FLATWORK.

UTILITIES NOTES:

1. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PARTIES, CITY OF ARVADA UTILITY AND ENGINEERING DIVISIONS, A MINIMUM OF 48 HOURS PRIOR TO ANY WATER OR SEWER SERVICE INTERRUPTION.
2. THE CONTRACTOR SHALL NOT OPERATE ANY CITY OF ARVADA VALVES. CONTRACTOR IS TO COORDINATE THE OPERATION OF ALL WATER VALVES, FIRE HYDRANTS, AND OTHER APPURTENANCES WITH THE CITY'S WATER OPERATIONS DIVISION THROUGH THE CITY'S MUNICIPAL INSPECTOR.
3. UNLESS OTHERWISE NOTED, WATER MAINS SHALL BE INSTALLED AT A MINIMUM DEPTH OF 4 FEET TO TOP OF PIPE.
4. THE CITY WATER OPERATIONS STAFF WILL NOT BE AVAILABLE TO OPERATE WATER VALVES, FIRE HYDRANTS, AND OTHER APPURTENANCES ON FRIDAY AFTER 10AM.
5. ALL FIRE HYDRANT LATERAL PIPE SHALL BE INSTALLED AS PER THE CURRENT CITY OF ARVADA STANDARDS AND SPECIFICATIONS SECTION "420.01 – MATERIALS".
6. ALL METALLIC FITTINGS SHALL BE WRAPPED WITH MINIMUM 8 MIL THICKNESS POLYETHYLENE ENCASEMENT.
7. ALL PVC WATER MAINS SHALL BE INSTALLED WITH TRACER WIRE INSTALLED AS PER THE CURRENT CITY OF ARVADA STANDARDS AND SPECIFICATIONS SECTION "420.20 – TRACER WIRE, WARNING TAPE AND MARKER POSTS".
8. STORM, SANITARY AND WATER MAINTENANCE HOLE COVERS SHALL SAY "CITY OF ARVADA STORM, WATER OR SANITARY" WHERE APPLICABLE IN ACCORDANCE WITH THE CITY'S STANDARD LID DETAIL.
9. BLOW-OFFS, BOTH PERMANENT AND TEMPORARY, SHALL BE IN ACCORDANCE WITH CITY OF ARVADA STANDARD DETAIL DRAWING 400-11.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL CROSSING UTILITIES AND CONNECTION LOCATIONS PRIOR TO CONSTRUCTION.
11. THE CONTRACTOR SHALL SCHEDULE ALL WATERLINE TESTING WITH THE CITY'S MUNICIPAL INSPECTOR. THERE SHALL BE NO SHUTDOWNS OR TIE-INS ON FRIDAY. EXISTING TIE-IN LOCATIONS SHALL BE VISUALIZED BY TEST HOLING PRIOR TO THE SCHEDULED TIE-IN DATE. FLUSHING OPERATIONS SHALL ONLY TAKE PLACE ON FRIDAY IF THEY HAVE BEGUN PRIOR TO 8:00 AM. HIGH CHLORINE TESTS SHALL TAKE PLACE ON FRIDAY ONLY IF THEY HAVE BEGUN PRIOR TO 9:00 AM. PRESSURE TESTING ON FRIDAY REQUIRING WATER OPERATIONS STAFF SUPPORT SHALL BEGIN BEFORE 9:00 AM. PRESSURE TESTING NOT REQUIRING WATER OPERATIONS STAFF SUPPORT SHALL BE AT THE DISCRETION OF THE CITY'S INSPECTOR.
12. THE UTILITIES DIVISION WILL NOT SHUT DOWN WATER MAINS FOR TIE-INS AFTER 11:00 A.M. IN ORDER FOR WATER TO BE TURNED BACK ON BY 3:00 P.M. CONTRACTOR MUST BE WITHIN 60 MINUTES OF CUTTING INTO THE WATER MAIN BASED ON THE JUDGMENT OF THE CITY'S MUNICIPAL INSPECTOR AND/OR WATER UTILITY DIVISION PERSONNEL BEFORE EXISTING MAINS WILL BE ISOLATED. CONTRACTOR SHALL PROVIDE SUFFICIENT CUTS OR OPENINGS IN EXISTING PIPE TO ALLOW TIMELY DRAINAGE OF WATER FOR TIE-INS WHERE FIRE HYDRANTS OR BLOW OFFS ARE NOT AVAILABLE TO DRAIN THE LINE. SHOULD AN UNINTENDED SERVICE INTERRUPTION OCCUR AS A RESULT OF THE WORK, CONTRACTOR SHALL IMMEDIATELY NOTIFY ALL PARTIES NOT PREVIOUSLY NOTIFIED.
13. ANY NON-COPPER SERVICE LINES ENCOUNTERED DURING CONSTRUCTION SHALL BE REPLACED FROM THE METER TO THE MAIN WITH COPPER AND THE REPLACEMENT SHALL BE REPORTED TO THE CITY'S PROJECT ENGINEER.
14. ABANDONMENT OF WATER MAINS SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 332.00 OF THE CITY OF ARVADA'S ENGINEERING CODE OF STANDARDS AND SPECIFICATIONS.
15. CONTROLLED LOW-STRENGTH MATERIAL (CLSM) MIX DESIGNS USED FOR WATER LINE OR SEWER LINE ENCASEMENT SHALL BE FROM THE CITY AND COUNTY OF DENVER APPROVED CLSM LIST AND 28 DAY STRENGTH SHALL BE LESS THAN 250 PSI.

EROSION CONTROL NOTES:

1. **SITE DISTURBANCE PERMIT SHALL BE REQUIRED IF MORE THAN 0.5 ACRES IS DISTURBED.**
2. THE CITY OF ARVADA STORMWATER INSPECTOR MUST BE MET ON SITE AND PROVIDED WITH A STORMWATER MANAGEMENT PLAN AFTER INSTALLATION OF TEMPORARY BEST MANAGEMENT PRACTICES (BMPS), BUT BEFORE CONSTRUCTION OR GRADING BEGINS.
3. THERE SHALL BE NO EARTH-DISTURBING ACTIVITY OUTSIDE THE LIMITS DESIGNATED IN THE ACCEPTED PLANS.
4. ALL REQUIRED PERIMETER SILT AND CONSTRUCTION FENCING SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY (STOCKPILING, STRIPPING, GRADING, ETC). ALL OTHER REQUIRED EROSION CONTROL MEASURES SHALL BE INSTALLED AT THE APPROPRIATE TIME IN THE CONSTRUCTION SEQUENCE AS INDICATED IN THE APPROVED PROJECT SCHEDULE, CONSTRUCTION PLANS, AND STORMWATER MANAGEMENT PLAN.
5. AT ALL TIMES DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING AND CONTROLLING ON-SITE EROSION INCLUDING KEEPING THE PROPERTY SUFFICIENTLY WATERED SO AS TO MINIMIZE WINDBLOWN SEDIMENT. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR INSTALLING AND MAINTAINING ALL EROSION CONTROL FACILITIES SHOWN HEREIN.
6. PRE-DISTURBANCE VEGETATION SHALL BE PROTECTED AND RETAINED WHEREVER POSSIBLE. REMOVAL OR DISTURBANCE OF EXISTING VEGETATION SHALL BE LIMITED TO THE AREA(S) REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATIONS, AND FOR THE SHORTEST PRACTICAL PERIOD OF TIME.
7. ALL SOILS EXPOSED DURING LAND DISTURBING ACTIVITY (STRIPPING, GRADING, UTILITY INSTALLATIONS, STOCKPILING, FILLING, ETC.) SHALL BE KEPT IN A ROUGHENED CONDITION BY RIPPING OR DISKING ALONG LAND CONTOURS UNTIL MULCH, VEGETATION, OR OTHER PERMANENT EROSION CONTROL BMPS ARE INSTALLED. NO DISTURBED AREAS, EXCEPT THOSE WITHIN THE PROJECT STREET RIGHTS-OF-WAY, SHALL REMAIN EXPOSED FOR MORE THAN THIRTY (30) DAYS BEFORE TEMPORARY OR PERMANENT EROSION CONTROL (E.G. SEED/MULCH, LANDSCAPING, ETC.) IS INSTALLED, UNLESS OTHERWISE APPROVED BY THE CITY OF ARVADA STORMWATER INSPECTOR.
8. IN ORDER TO MINIMIZE EROSION POTENTIAL, ALL TEMPORARY (STRUCTURAL) EROSION CONTROL MEASURES SHALL: BE INSPECTED AT A MINIMUM OF ONCE EVERY FOURTEEN (14) DAYS AND AFTER EACH SIGNIFICANT STORM EVENT AND REPAIRED OR RECONSTRUCTED AS NECESSARY IN ORDER TO ENSURE THE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
9. REMAIN IN PLACE UNTIL SUCH TIME AS ALL THE SURROUNDING DISTURBED AREAS ARE SUFFICIENTLY STABILIZED. THE CITY OF ARVADA STORMWATER INSPECTOR MUST BE NOTIFIED PRIOR TO REMOVAL.
10. BE REMOVED WHEN THEY ARE NO LONGER FUNCTIONAL OR AFTER THE SITE HAS BEEN SUFFICIENTLY STABILIZED AS DETERMINED BY THE STORMWATER INSPECTOR. THE CITY OF ARVADA STORMWATER INSPECTOR MUST BE NOTIFIED PRIOR TO REMOVAL.
11. WHEN TEMPORARY EROSION CONTROL MEASURES ARE REMOVED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEAN UP AND REMOVAL OF ALL SEDIMENT AND DEBRIS FROM ALL DRAINAGE INFRASTRUCTURE AND OTHER PUBLIC FACILITIES.
12. THE CONTRACTOR SHALL IMMEDIATELY CLEAN UP ANY CONSTRUCTION MATERIALS INADVERTENTLY DEPOSITED ON EXISTING STREETS, SIDEWALKS, OR OTHER PUBLIC RIGHTS OF WAY, AND MAKE SURE STREETS AND WALKWAYS ARE CLEANED AT THE END OF EACH WORKING DAY.
13. ALL SOIL STOCKPILES SHALL NOT BE PLACED WITHIN ONE HUNDRED (100) FEET OF A DRAINAGEWAY, WHERE POSSIBLE, AND SHALL BE PROTECTED FROM SEDIMENT TRANSPORT BY APPROPRIATE EROSION CONTROL METHODS. ANY SOIL STOCKPILE THAT WILL BE DORMANT FOR OVER THIRTY (30) DAYS SHALL BE SEEDED.
14. THE STORMWATER VOLUME CAPACITY OF DETENTION PONDS WILL BE RESTORED AND STORM SEWER LINES WILL BE CLEANED UPON COMPLETION OF THE PROJECT AND BEFORE TURNING THE MAINTENANCE OVER TO THE PROPERTY OWNER OR HOMEOWNERS ASSOCIATION (HOA).
15. CITY ORDINANCE REQUIREMENTS MAKE IT UNLAWFUL TO DISCHARGE OR ALLOW THE DISCHARGE OF ANY POLLUTANT OR CONTAMINATED WATER FROM CONSTRUCTION SITES. POLLUTANTS INCLUDE, BUT ARE NOT LIMITED TO DISCARDED BUILDING MATERIALS, CONCRETE TRUCK WASHOUT, CHEMICALS, OIL AND GAS PRODUCTS, LITTER, AND SANITARY WASTE. THE CONTRACTOR SHALL AT ALL TIMES TAKE WHATEVER MEASURES ARE NECESSARY TO ASSURE THE PROPER CONTAINMENT AND DISPOSAL OF POLLUTANTS ON THE SITE IN ACCORDANCE WITH ANY AND ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.
16. A DESIGNATED AREA SHALL BE PROVIDED ON SITE FOR CONCRETE TRUCK CHUTE WASHOUT. THE AREA SHALL BE CONSTRUCTED SO AS TO CONTAIN WASHOUT MATERIAL AND LOCATED AT LEAST FIFTY (50) FEET AWAY FROM ANY WATERWAY DURING CONSTRUCTION. UPON COMPLETION OF CONSTRUCTION ACTIVITIES THE CONCRETE WASHOUT MATERIAL WILL BE REMOVED AND PROPERLY DISPOSED OF PRIOR TO THE AREA BEING RESTORED.
17. MASONRY ACTIVITIES WILL BE CONTAINED WITH APPROPRIATE LOT-SPECIFIC BMPS, SUCH AS STOCKPILE PERIMETER CONTROL AND BERMED WASHOUT PITS. ALL WASTE PRODUCTS FROM MASONRY ACTIVITIES WILL BE REMOVED AND DISPOSED OF PROPERLY.
18. TO ENSURE THAT SEDIMENT DOES NOT MOVE OFF OF INDIVIDUAL LOTS SEDIMENT/EROSION CONTROL BMPS SHALL BE INSTALLED AND MAINTAINED AT ONE OR MORE OF THE FOLLOWING LOCATIONS UNTIL THE LOTS ARE LANDSCAPED.
    BELOW ALL GUTTER DOWNSPOUTS.
    OUT TO DRAINAGE SWALES.
    ALONG LOT PERIMETER.
    OTHER LOCATIONS, IF NEEDED.
19. A VEHICLE TRACKING PAD SHALL BE INSTALLED WHEREVER IT IS NECESSARY FOR CONSTRUCTION EQUIPMENT INCLUDING BUT NOT LIMITED TO PERSONAL VEHICLES EXITING EXISTING UNPAVED AREAS ONTO ROADWAYS. NO EARTHEN MATERIALS, I.E., STONE, DIRT, ETC., SHALL BE PLACED IN THE CURB & GUTTER OR ROADWAY AS A RAMP TO ACCESS TEMPORARY STOCKPILES, CONSTRUCTION MATERIALS AND/OR BUILDING SITES.
20. CONDITIONS IN THE FIELD MAY WARRANT EROSION CONTROL MEASURES IN ADDITION TO WHAT IS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL IMPLEMENT WHATEVER MEASURES ARE DETERMINED NECESSARY, AS DIRECTED BY THE CITY OF ARVADA.

SURVEY CONTROL NOTE:

1. SURVEY CONTROL POINTS. COLORADO CENTRAL STATE PLANE NAVD88, GEOID 18 US FOOT.

APPROVED:

City Engineer _____ Date 8/18/25 Job Number 23WA12

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS

GENERAL NOTES

ENGINEER KB
CHECKED BY MS
DESIGN BY RN

SHT **GN2**

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CHURCH DITCH WATER AUTHORITY (CDWA) NOTES:

1. DEFINITIONS
   A. FACILITY OWNER – CDWA
   B. PROPERTY OWNER – City of Arvada
   C. CONTRACTOR – TBD
   D. ENGINEER – Claudia Vaughan (City Engineer)

2. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE "DESIGN CRITERIA FOR FACILITIES OF THE CHURCH DITCH WATER AUTHORITY," LATEST EDITION, EXCEPT AS SPECIFICALLY MODIFIED BY THESE PROJECT DRAWINGS.

3. CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD CDWA HARMLESS FROM ANY AND ALL LIABILITY, REAL AND ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT TO THE MAXIMUM EXTENT PERMITTED BY LAW.

4. CDWA AND ITS AGENTS OR CONSULTANTS DO NOT WARRANT OR GUARANTEE THE ADEQUACY OF DESIGNS REVIEWED AND APPROVED BY CDWA. CDWA'S REVIEW OF PROJECT REPORTS, PLANS, AND SPECIFICATIONS IS FOR THE SOLE BENEFIT OF CDWA TO DETERMINE IF PROJECT DETAILS CONFORM TO CDWA DESIGN GUIDELINES, WHICH ARE NECESSARY TO REASONABLY ASSURE THAT PROJECTS DO NOT ADVERSELY AFFECT THE FACILITIES OR OPERATIONS OF CDWA.

5. CONTRACTOR SHALL SCHEDULE A PRE–CONSTRUCTION MEETING WITH CDWA REPRESENTATIVES AND (CITY OF ARVADA) AT LEAST 72 HOURS PRIOR TO START OF CONSTRUCTION. THOSE IN ATTENDANCE SHALL INCLUDE OWNER'S REPRESENTATIVE, ENGINEER, CONTRACTOR, AND OTHER AFFECTED AGENCIES. CONSTRUCTION PLANS AND SCHEDULE WILL BE DISTRIBUTED AT THE PRE–CONSTRUCTION MEETING.

6. TECHNICAL APPROVAL BY CDWA OF THE DESIGN OF THE IMPROVEMENTS SPECIFIED HEREIN SHALL NOT CONSTITUTE AUTHORIZATION TO BEGIN WORK. AN EASEMENT OR LICENSE AGREEMENT, APPROVED TEMPORARY ACCESS AND CONSTRUCTION PERMIT (INCLUDING SCHEDULE THAT INCLUDES THE DAY, MONTH, AND YEAR WHEN WORK IS ALLOWED), AND WRITTEN NOTICE TO PROCEED FROM CDWA'S GENERAL MANAGER ARE ALSO REQUIRED PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. FOLLOWING THE APPROVAL OF THE DESIGN PLANS AND EASEMENT OR LICENSE AGREEMENT, AND PRIOR TO THE PRE–CONSTRUCTION MEETING, IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SUBMIT A CONSTRUCTION SCHEDULE TO CDWA FOR REVIEW AND APPROVAL. CDWA'S APPROVAL OF THE CONSTRUCTION SCHEDULE IS IN CDWA'S SOLE DISCRETION, AND CDWA MAY REFUSE TO APPROVE A SCHEDULE IF CDWA DETERMINES IT MAY IMPACT THE DITCH'S OPERATIONS OR CDWA'S ABILITY TO MAINTAIN OR ACCESS ITS FACILITIES.

7. CONTRACTOR SHALL RESTRICT CONSTRUCTION ACTIVITY TO AREAS DEFINED AS PERMANENT AND/OR TEMPORARY CONSTRUCTION EASEMENTS, UNLESS OTHERWISE AUTHORIZED BY CDWA AND PROPERTY OWNER.

8. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING CONTINUOUS ACCESS FOR CDWA PERSONNEL AND EQUIPMENT ALONG THE LENGTH OF THE EXISTING DITCH AND PRESCRIPTIVE EASEMENT THROUGHOUT THE COURSE OF THE PROJECT.

9. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY CDWA. CDWA RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DO NOT CONFORM TO STANDARDS AND SPECIFICATIONS. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO CDWA FOR ENGINEERING REVIEW AND APPROVAL PRIOR TO INSTALLATION OF MATERIALS OR FACILITIES FOR WHICH SHOP DRAWINGS ARE CREATED.

10. CONTRACTOR SHALL VERIFY ACCURACY BETWEEN WORK SET FORTH ON THESE PLANS AND WORK REQUIRED IN THE FIELD. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND CDWA REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.

11. IT IS THE ENGINEER'S RESPONSIBILITY TO RESOLVE CONSTRUCTION PROBLEMS WITH CDWA DUE TO CHANGED CONDITIONS ENCOUNTERED BY CONTRACTOR DURING THE PROGRESS OF ANY PORTION OF THE PROPOSED WORK. IF, IN THE SOLE OPINION OF CDWA, PROPOSED ALTERATIONS TO THE APPROVED CONSTRUCTION PLANS INVOLVES SIGNIFICANT CHANGES TO THE CHARACTER OF THE WORK, OR TO FUTURE CONTIGUOUS PUBLIC OR PRIVATE IMPROVEMENTS, THE ENGINEER SHALL BE RESPONSIBLE FOR SUBMITTING REVISED PLANS TO CDWA FOR REVIEW AND APPROVAL, PRIOR TO ANY FURTHER CONSTRUCTION RELATED TO THAT PORTION OF THE WORK.

12. GROUNDWATER ENCOUNTED DURING CONSTRUCTION SHALL NOT BE RELEASED TO THE DITCH OR OTHER FACILITIES WITHOUT WRITTEN APPROVAL FROM THE CDWA GENERAL MANAGER.

13. ALL CONCRETE USED FOR THE PROJECT SHALL CONFORM TO ACI 350. THE CONTRACTOR SHALL SUPPLY CDWA WITH SHOP DRAWINGS AND SPECIFICATIONS FOR ALL PRE–FABRICATED CONCRETE STRUCTURES TO ENSURE CONFORMANCE TO ACI 350.

14. WHERE THE EXISTING SIDES OR BOTTOM OF THE DITCH ARE DISTURBED AND ARE TO BE REPLACED, THE TOP TWO FEET OF BACKFILL MATERIAL SHALL BE CLAY CONTAINING AT LEAST 40 PERCENT BY DRY WEIGHT PASSING THE #200 SIEVE (FINES) AND A PLASTICITY INDEX OF 15 OR GREATER. AS AN ALTERNATIVE, THE EXISTING MATERIAL CAN BE MIXED WITH TWO PERCENT POWDERED DRY BENTONITE (BY DRY WEIGHT) PROVIDED THE EXISTING SOILS CONTAIN AT LEAST 25 PERCENT FINES. THE MATERIALS UPON COMPACTION SHALL HAVE A PERMEABILITY LESS THAN OR EQUAL TO 1X10–6 CM/SEC AS DETERMINED BY ASTM D 5084.

15. THE CHANNEL CLAY LINING SHALL BE COMPACTED TO 90% OF THE MODIFIED PROCTOR (ASTM D1557) AND WITHIN –2% TO +2% OF THE OPTIMUM MOISTURE CONTENT. FILL SHALL BE PLACED IN THIN LIFTS WITH MAXIMUM LOOSE LIFT THICKNESS OF 12 INCHES. PLACEMENT ON DITCH SLOPES MAY REQUIRE OVERBUILDING AND CUTTING BACK TO OBTAIN THE REQUIRED COMPACTION.

16. ALL PROPOSED MATERIAL TYPES TO BE USED AS BEDDING, CLAY LINING AND BACKFILL SHALL BE SUBMITTED TO CDWA FOR APPROVAL PRIOR TO PLACEMENT.

17. MATERIALS GRAIN SIZE ANALYSIS (ASTM D422), ATTERBERG LIMITS (ASTM D4318), AND MOISTURE–DENSITY RELATIONSHIP TESTS (ASTM D1557) SHALL BE COMPLETED, AS A MINIMUM, ON EACH SOIL TYPE OR AT A RATE OF 300 CY OF MATERIAL PLACED, WHICHEVER IS GREATER.

18. COMPACTION OF BEDDING, CLAY LINING AND ALL TYPES OF BACKFILL SHALL BE TESTED AT A RATE OF AT LEAST FOUR TESTS PER 1,000 SQUARE FEET OF FILL MATERIAL PER THIS FREQUENCY MAY BE ALTERED BY THE ENGINEER OR CDWA REPRESENTATIVE DEPENDING ON THE PROJECT, THE METHODS BY WHICH THE CONTRACTOR IS USING TO OBTAIN COMPACTION, OR IF CDWA DETERMINES CIRCUMSTANCES WARRANT ADDITIONAL TESTING. THE TESTING SHALL BE AT VARIOUS DEPTHS AND LOCATIONS. THE ENGINEER OR CDWA'S REPRESENTATIVE RESERVES THE RIGHT TO REQUEST ADDITIONAL TESTS AND DETERMINE THE LOCATION OF TESTING. THE TESTING MAY BE COMPLETED EITHER BY SAND CONE DENSITY TEST (ASTM D1556) OR BY THE NUCLEAR GAUGE (ASTM D6938) METHODS. TEST RESULTS SHALL BE SUBMITTED TO CDWA'S REPRESENTATIVE WITHIN 24 HOURS OF THE TEST OR ON THE NEXT WORKING DAY.

19. ON STEEP SIDE SLOPES, FILL MATERIALS, WHETHER CLAY LINING OR SUBGRADE SOILS, MAY BE REQUIRED TO BE PLACED IN HORIZONTAL LIFTS ALONG THE SLOPE TO ACHIEVE THE REQUIRED COMPACTION. THIS METHOD WILL CREATE AN OVERBUILT SECTION THAT WILL BE CUT BACK TO FORM THE DESIGN SLOPE.

20. CONTRACTOR SHALL MAINTAIN SILT FENCE AND OTHER EROSION AND SEDIMENT CONTROL BMPS ON A DAILY BASIS, AND SHALL PREVENT DEBRIS FROM ENTERING INTO THE DITCH. THE CONTRACTOR WILL BE RESPONSIBLE FOR DAILY CLEANING OF DEBRIS THAT ENTERS THE DITCH, IF BMPS FAIL. CONTRACTOR SHALL FULLY COMPLY WITH EROSION CONTROL REQUIREMENTS OF THE APPROPRIATE COUNTY OR MUNICIPALITY MS4.

21. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND REVEGETATION OF ANY AREAS IMPACTED BY CONSTRUCTION ACTIVITIES, WHETHER ON THE CONSTRUCTION SITE ITSELF OR ANY LAND WITHIN CDWA AUTHORITY, TO EXISTING PRIOR TO CONSTRUCTION OR BETTER.

22. UNLESS ANOTHER SPECIFIC MAINTENANCE AGREEMENT IS IN PLACE, CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER FUNCTIONING OF FACILITY IMPROVEMENTS FOR A MINIMUM OF TWO YEARS FROM THE DATE OF SUBSTANTIAL COMPLETION OR FINAL ACCEPTANCE OF THE IMPROVEMENTS BY CDWA, WHICHEVER IS LATER. ANY FAILURE DURING THIS PERIOD OF GUARANTEE SHALL BE REMEDIED BY CONTRACTOR TO THE SATISFACTION OF CDWA AT CONTRACTOR'S EXPENSE.

23. AS–BUILT DOCUMENTS ARE TO BE SUPPLIED TO CDWA PRIOR TO SUBSTANTIAL COMPLETION OR FINAL ACCEPTANCE OF THE IMPROVEMENTS. RECORD DOCUMENTS SHALL BE SUBMITTED ELECTRONICALLY IN BOTH PDF AND AUTOCAD FORMAT PRIOR TO CDWA ACCEPTANCE. AS–BUILT DRAWINGS SHALL BE SIGNED AND STAMPED BY A COLORADO–REGISTERED PROFESSIONAL ENGINEER.

CDWA CONTACT INFORMATION

Church Ditch Water Authority (CDWA)
Nathan McCoy
General Manager
14025 West 82nd Avenue
Arvada, Colorado 80005
(303) 423–6010

EASEMENT & LICENSE AGREEMENT

Long–term use or permanent modification of CDWA property by third–parties must be authorized by easement or license agreements, which are typically recorded. No permanent structures above or
below ground will be allowed in the right–of–way, and no grading, cut, or fill will be allowed, without approved construction drawings and an appropriate, executed easement or license agreement.

If the application is approved, CDWA shall authorize the applicant's request upon CDWA's License Agreement in the form attached in Appendix C. Additional provisions may be added to the standard agreement as warranted in the General Manager's discretion on a case–by–case basis. The License Agreement will be valid for a period of one year from the date of approval unless specified otherwise in the Agreement itself.

CDWA maintains ownership or easements along its ditch and other facilities. CDWA maintains at a minimum 50–foot prescriptive easement: 20 feet from the centerline of the ditch on the uphill side or 15 feet from the top of ditch bank, whichever is greater; and 30 feet from the centerline on the downhill (maintenance road) side or 5 feet from the toe of the ditch berm, whichever is greater. However, not all CDWA's property interests are recorded; and as a matter of Colorado law, CDWA's easements extend to the width that is necessary to maintain its ditches or other facilities using modern equipment. Where any development is proposed adjacent to CDWA facilities, CDWA may require a written easement of adequate width and dimension to accommodate the ditch and maintenance roads as specified in **Section 4.3**.

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
CHURCH DITCH REQUIRED NOTES

APPROVED:
City Engineer — 8/18/25 Date — 23WA12 Job Number

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ENGINEER KB
CHECKED BY MS
DESIGN BY RN

SHT **GN3**

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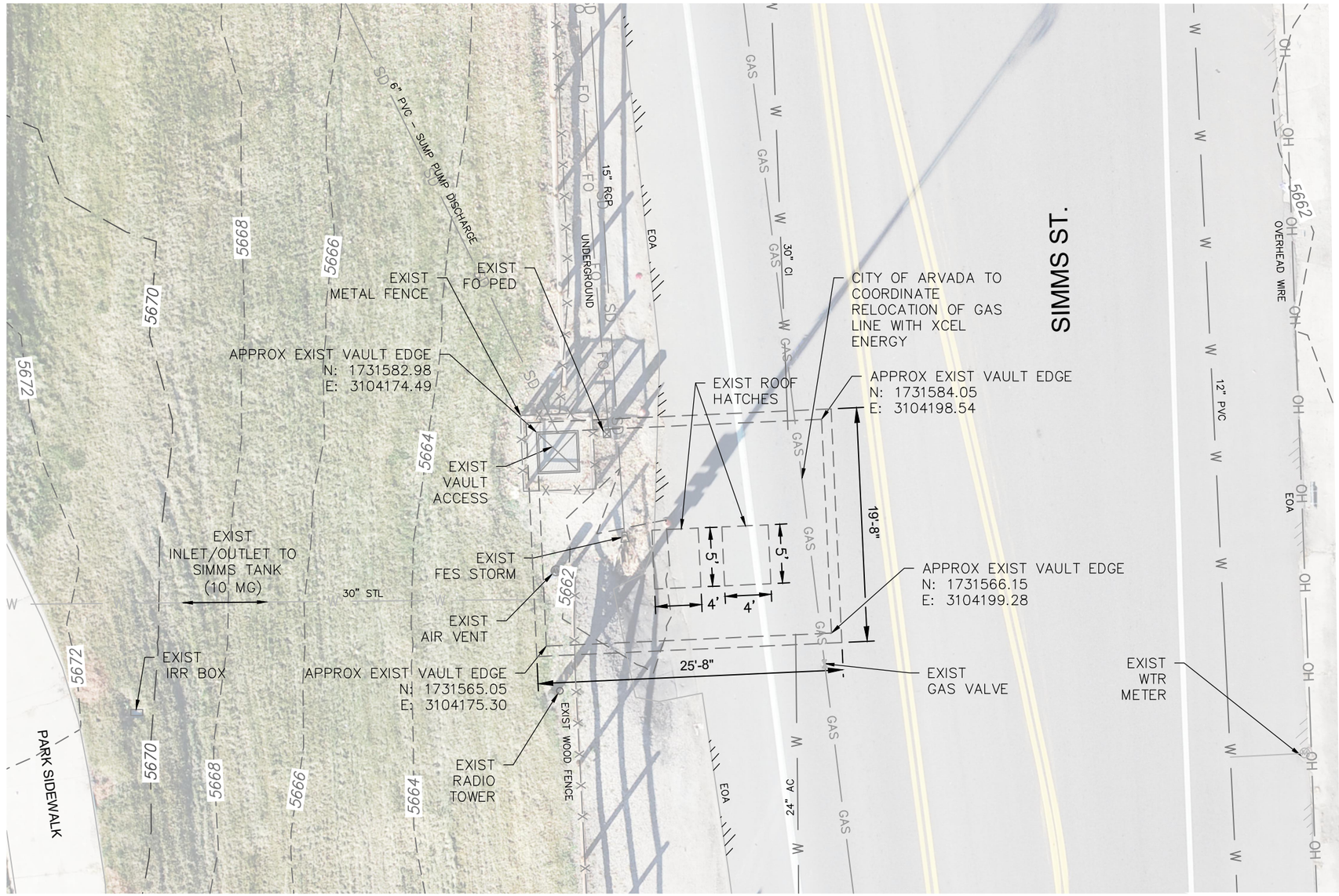
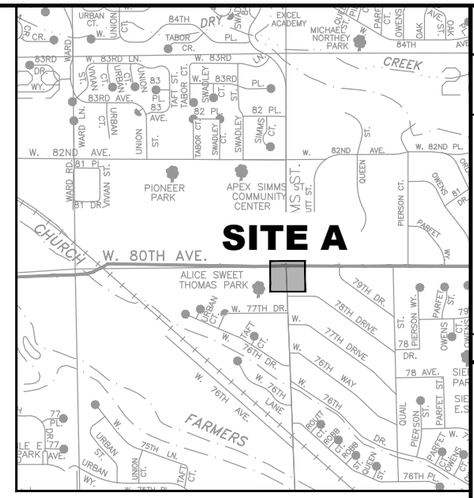
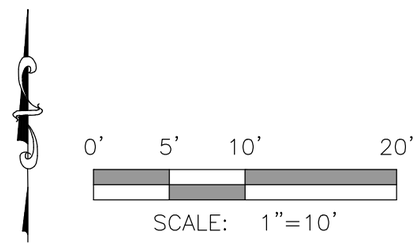


SITE A PLAN

SCALE: 1"=10'



KEY MAP
SCALE: N.T.S.



SCALE: 1"=10'

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

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Arvada, Colorado 80002
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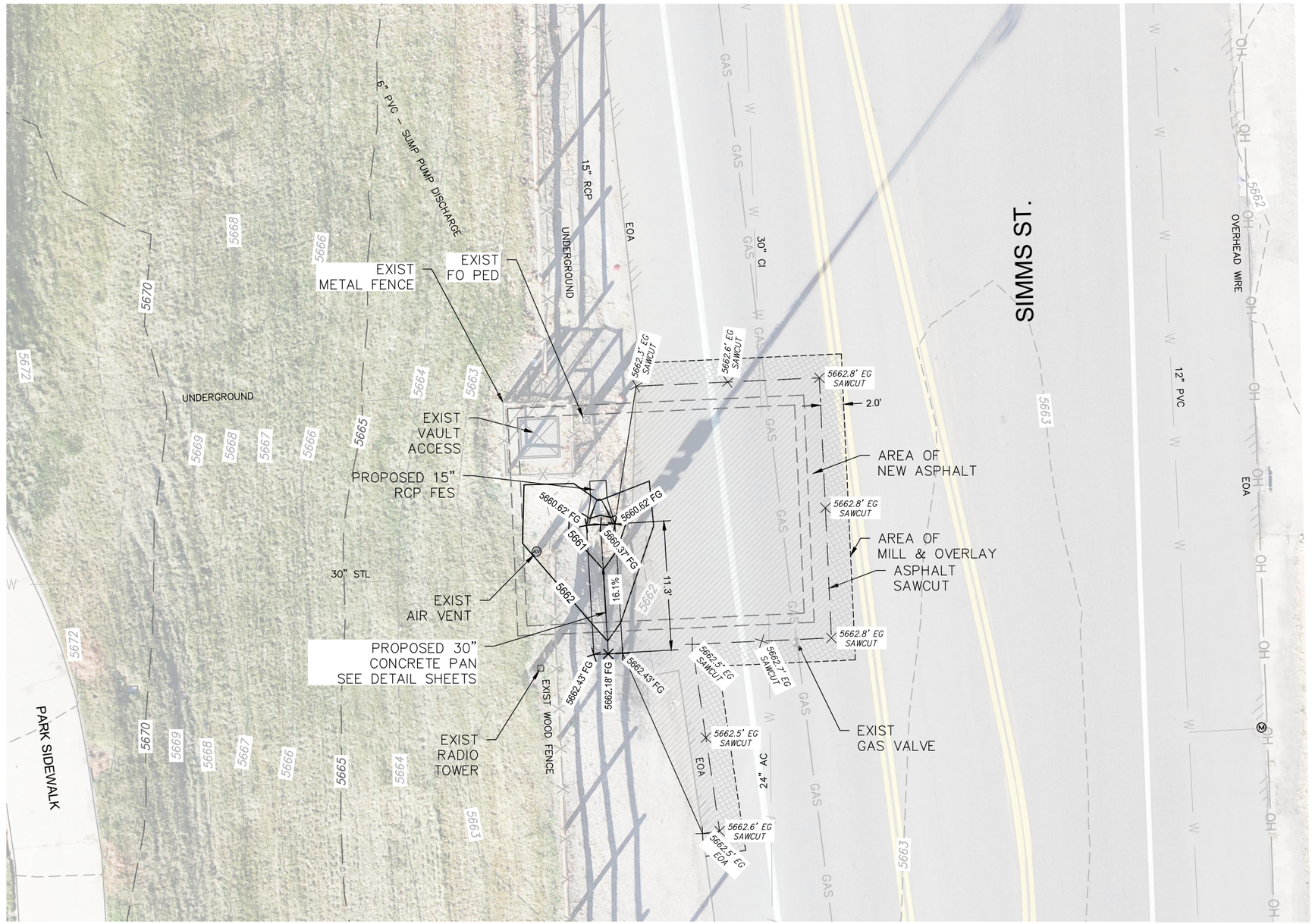
CITY OF ARVADA

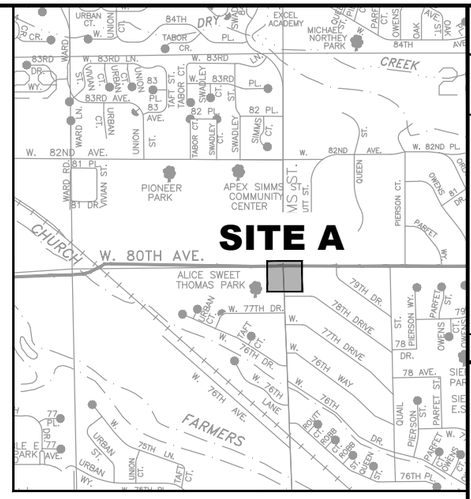
PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
EXIST SITE PLAN

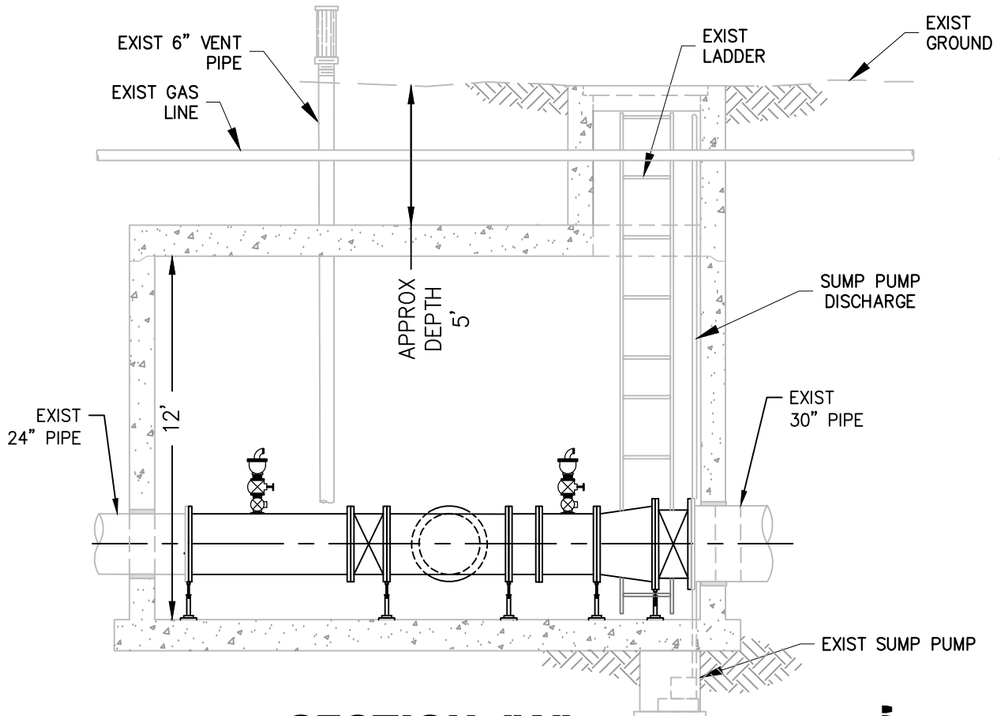
ENGINEER KB
CHECKED BY MS
DESIGN BY RN

SHT 4

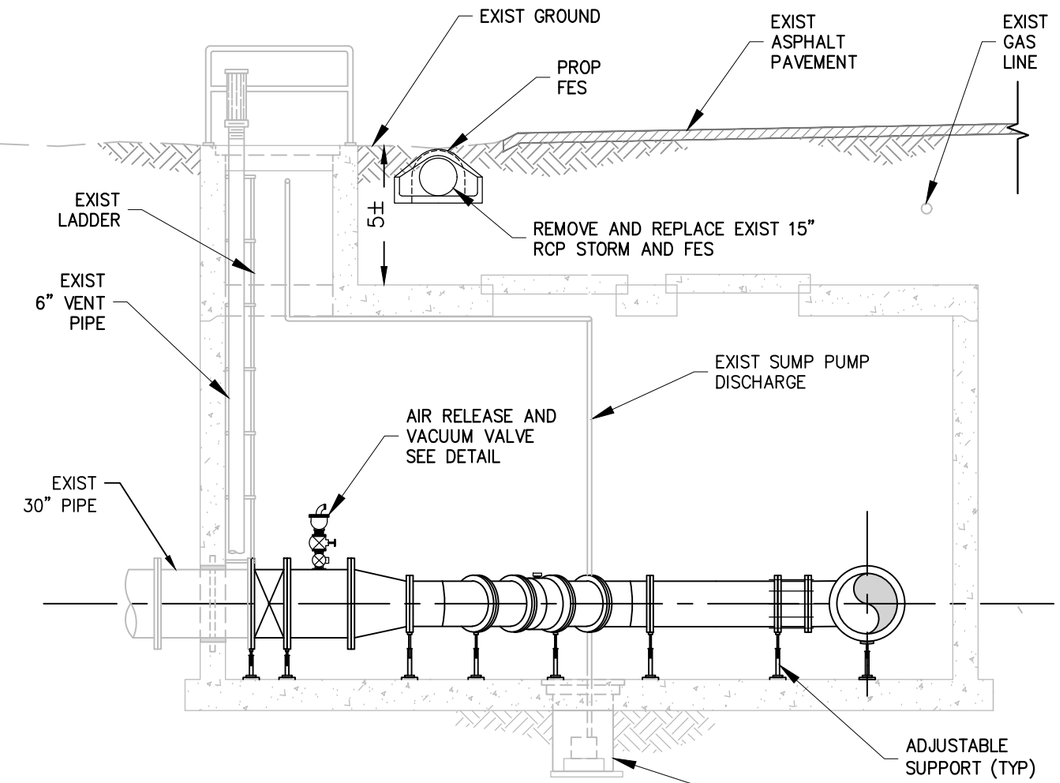
G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Vault Modification And Details.dwg , Plot Date: 2/5/2025




SITE A
W. 80TH AVE.
CHURCH
CREEK
PIONEER PARK
APEX SIMMS COMMUNITY CENTER
ALICE SWEET THOMAS PARK
FARMERS
W. 82ND AVE.
W. 77TH DR.
W. 76TH AVE.
84TH DR.
83RD DR.
83RD AVE.
82 PL.
81 PL.
77 PL.
76TH PL.
78 AVE.
76TH WAY
77TH DRIVE
78TH DRIVE
W. 82ND PL.
W. 83RD LN.
W. 83RD PL.
W. 76TH LANE
W. 75TH LN.
W. 76TH DR.
W. 78TH DR.
W. 79TH DR.
W. 78TH PL.
W. 77TH PL.
W. 76TH PL.
W. 75TH PL.
W. 76TH DR.
W. 76TH PL.
W. 76TH AVE



SECTION "A"



SECTION "B"

VAULT PLAN

NOTE:

DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.

0' 5' 10'

SCALE: 1"=5'

APPROVED:

City Engineer — 8/18/25 Date — 23WA12 Job Number

Review is for general compliance with the City of Arvada "Engineering Code of Standards and Specifications for the Design and Construction of Public Improvements", latest edition. Sole responsibility for completeness and/or accuracy of these Documents shall remain with the Registered Professional Engineer sealing these plans. The City does not accept liability for facilities designed by others.

NO.	REVISION	DATE	BY
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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

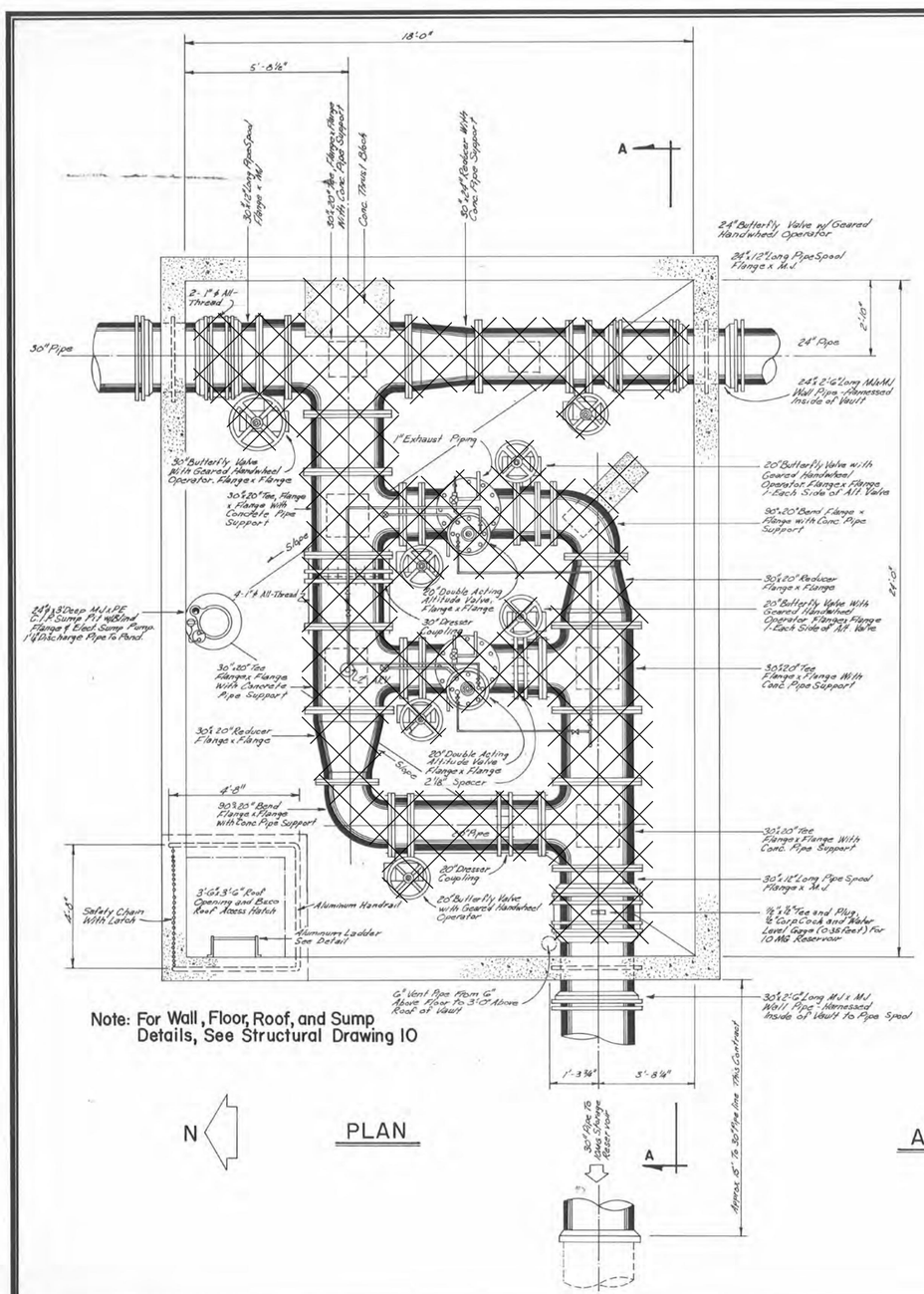
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT DETAIL
PROPOSED PIPING
PLAND AND ELEVATIONS
IN EXISTING VAUILT

ENGINEER KB
CHECKED BY MS
DESIGN BY RN

SHT 6

G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Vault Modification And Details.dwg , Plot Date: 2/3/2025



LEGEND:

DEMO

APPROVED:

City Engineer

8/18/25
Date

23WA12
Job Number

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

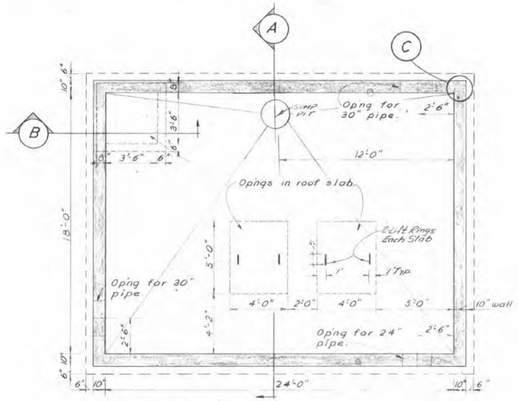
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
EXIST INFORMATION
ORIGINAL PLANS

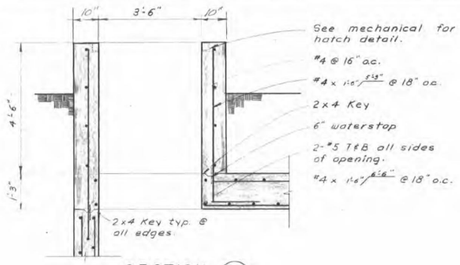
ENGINEER
KB
CHECKED BY
MS
DESIGN BY
RN

SHT 7

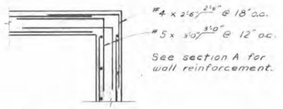
G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Vault Modification And Details.dwg , Plot Date: 2/5/2025



FOUNDATION PLAN
Scale: 1/4" = 1'-0"

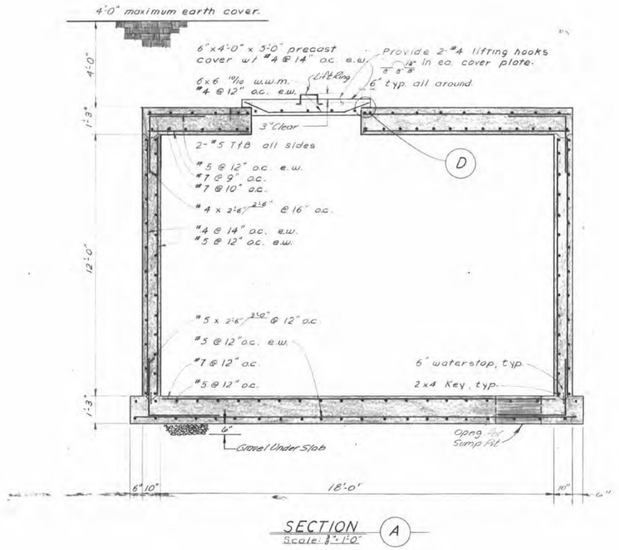


SECTION (B)
Scale: 1/2" = 1'-0"

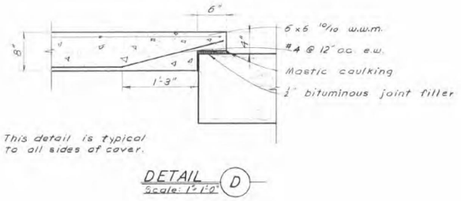


TYPICAL CORNER DETAIL

DETAIL (C)
Scale: 1" = 1'-0"



SECTION (A)
Scale: 1/2" = 1'-0"



DETAIL (D)
Scale: 1" = 1'-0"

GENERAL STRUCTURAL NOTES

Design Criteria:

Concrete: f'c = 4,000 psi.
Other stresses in accordance with the ACI Building Code (318-71).

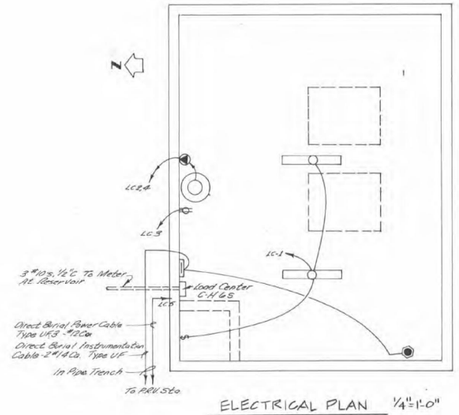
Reinforcement: fy = 40,000 psi, all #3 bars and smaller.
fy = 60,000 psi, all #4 bars and larger.

Live Loads: Roof - H-20 highway loading and 4'-0" maximum earth cover @ 100 pounds per cubic foot.

Foundation: Design based on Chen and Associates, Inc., Soil Report No. 10258 dated October 17, 1973.
Foundation design - 5,000 psf (Dead Load + Live Load)

LOAD CENTER					120/240 Volt
Circuit Description			3W		Circuit Description
Room Lights	1	20		2	Sump
Receptacle	3	20		4	Pump
To P.R.V. Sta.	5	20		6	Spare

ELECTRICAL LEGEND	
	Four-Foot, 2-Tube, Surface Mtd. Flourescent LPI #111401
	Receptacle, 240 Volt, Hubbell No. 2320, Mtd. in Cast RS Box. Cord Connection from Sump Pump to have molding Cap - Hubbel No. 2821
	Duplex Grounding Receptacle w/ HUBBELL No. 5205 Cover
	AC Switch, Hubbell "Pressmire" With N.P. "Arvada" Plate No. 1750
	Differential Pressure Transmitter - Honeywell Spec 5411-1
	Level Indicator - HONEYWELL
	Incandescent 300W Fixture - PERFECTUTE No. C-6



ELECTRICAL PLAN 1/4" = 1'-0"

75WA04

AS - BUILT JANUARY 1975 DLB

REGISTERED PROFESSIONAL ENGINEER — STATE OF COLORADO — B FALK JORGENSEN 1755 — FRED E. HENDRICKSON 3432

405 — STATE OF COLORADO

RONALD G. McLAUGHLIN 2871 — REGISTERED PROFESSIONAL ENGINEER — STATE OF COLORADO

CITY OF ARVADA

CONTRACT NO 2

WATER TRANSMISSION PIPELINE
ALTITUDE VALVE VAULT
STRUCTURAL — ELECTRICAL

PROJECT NO. 722-08.2

DESIGN L.L., T.W.
DETAIL L.L., T.S.
CHECK F.H., T.W.

WRIGHT-McLAUGHLIN ENGINEERS
2420 ALCOTT ST. DENVER, COLO. 80211

DATE NOVEMBER 1973

DRAWING NO. 10

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

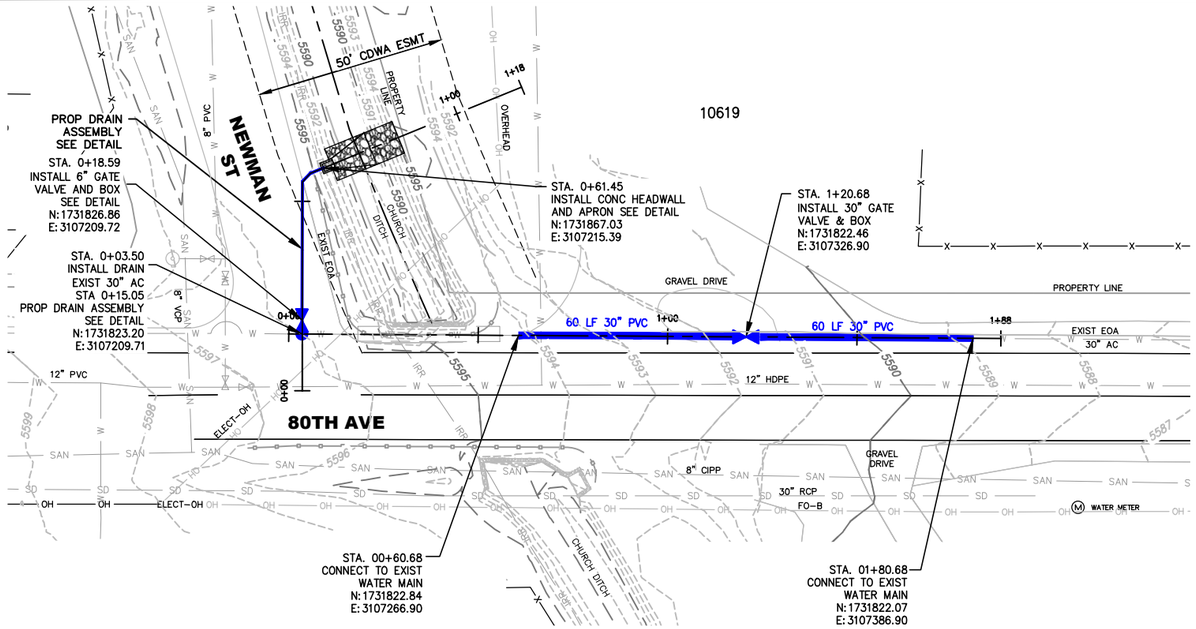
CITY OF ARVADA

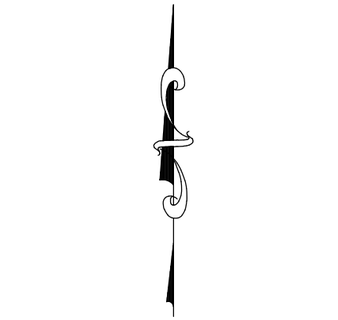
PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
EXIST INFORMATION
ORIGINAL PLANS

ENGINEER KB
CHECKED BY MS
DESIGN BY RN

SHT 8

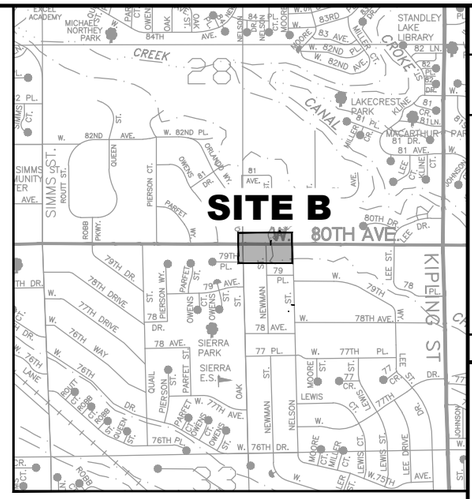
G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Vault Modification And Details.dwg , Plot Date: 2/3/2025



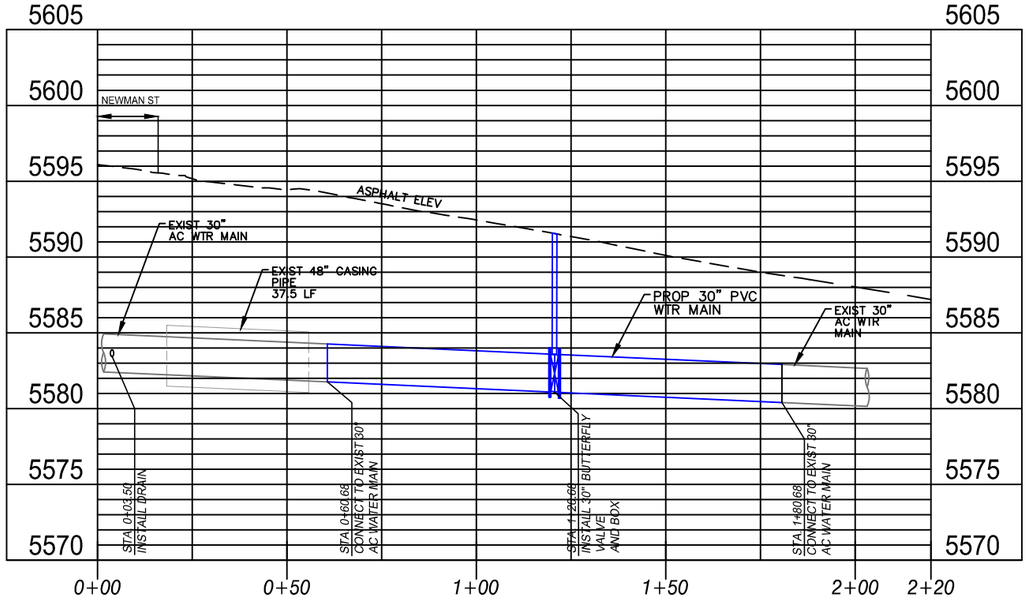


NOTE:

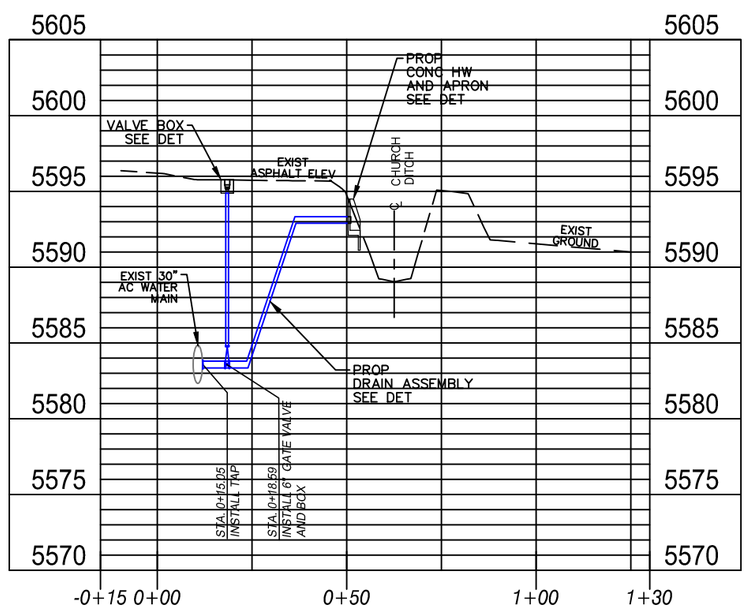
1. RESTRAIN PIPE WITHIN 60' OF VALVE.
2. DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.



KEY MAP
SCALE: N.T.S.



PROFILE: 80TH AND NEWMAN ST
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'



PROFILE: DRAIN ASSEMBLY
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

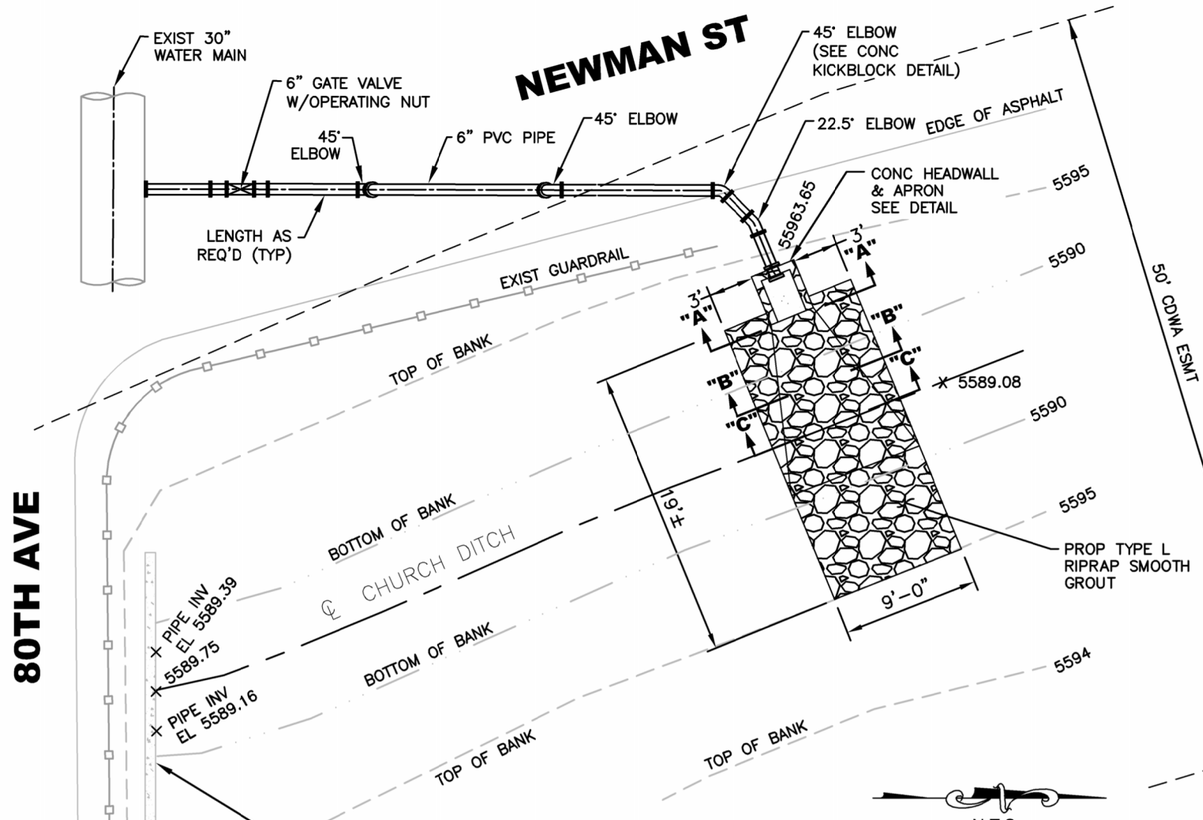
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
W 80TH AVE AT NEWMAN ST
WATERMAIN IMPROVEMENTS
PLAN AND PROFILE

ENGINEER
KB
CHECKED BY
KB
DESIGN BY
AS

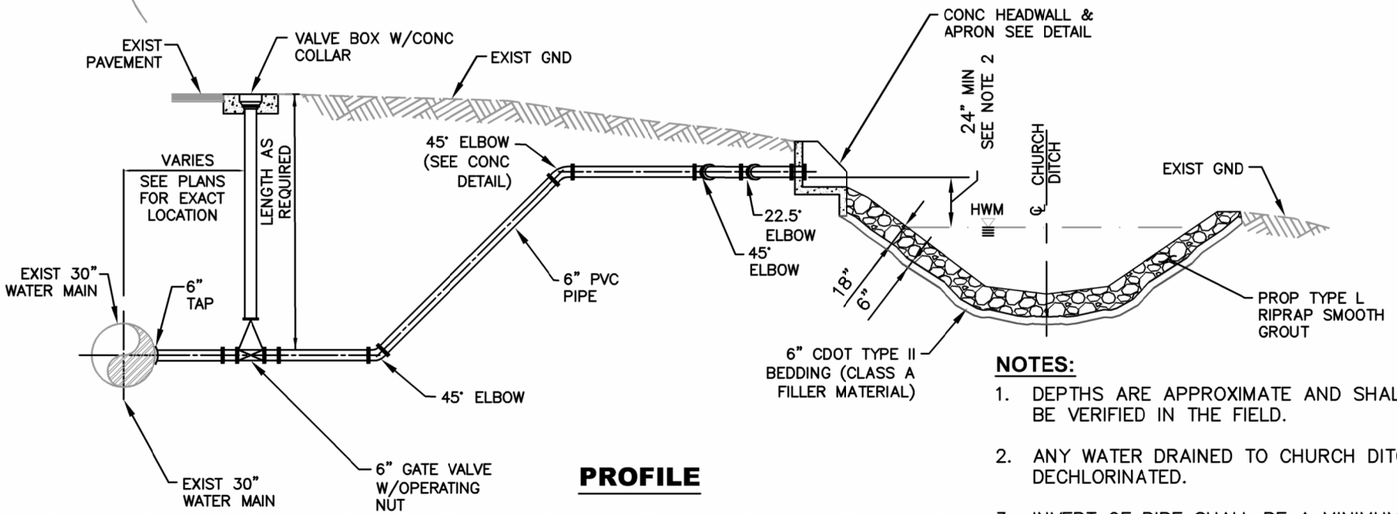
SHT **21**

G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Water Line Improvements (working) - 07-21-25.dwg , Plot Date: 8/4/2025



PLAN

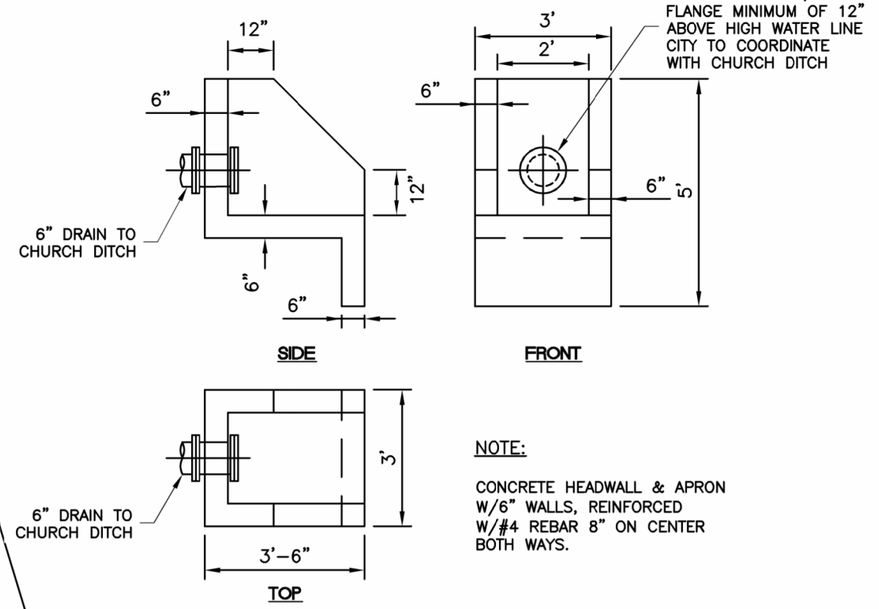
N.T.S



PROFILE

SITE B DRAIN ASSEMBLY

N.T.S

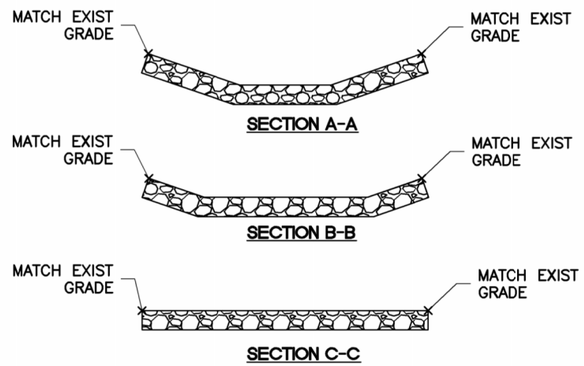


NOTE:

CONCRETE HEADWALL & APRON W/6" WALLS, REINFORCED W/#4 REBAR 8" ON CENTER BOTH WAYS.

CONCRETE HEADWALL AND APRON

N.T.S



SECTIONS

N.T.S

NOTES:

1. DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.
2. ANY WATER DRAINED TO CHURCH DITCH SHALL BE DECHLORINATED.
3. INVERT OF PIPE SHALL BE A MINIMUM OF 24 " ABOVE HIGH WATER LEVEL OR TOP OF BANK OF CHURCH DITCH. TO BE COORDINATED BY THE CITY OF ARVADA.
4. 6" PIPE SHALL BE FULLY RESTRAINED.

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

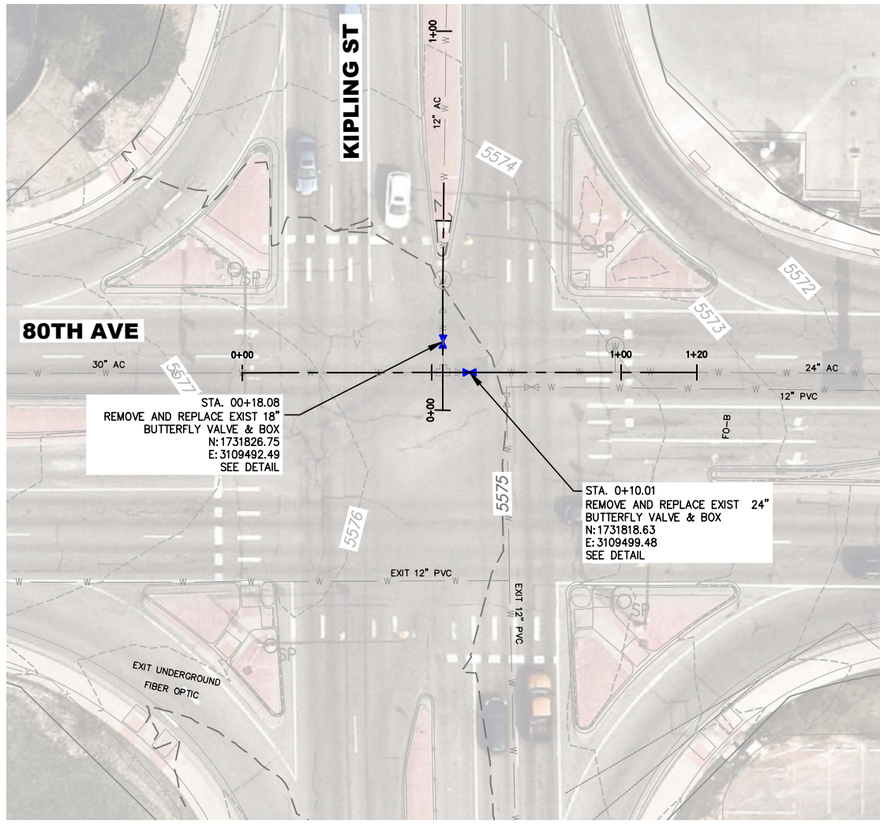
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
W 80TH AVE AT NEWMAN ST
WATER MAIN IMPROVEMENTS
DRAIN ASSEMBLY AND DETAIL

ENGINEER: KB
CHECKED BY: MS
DESIGN BY: AS

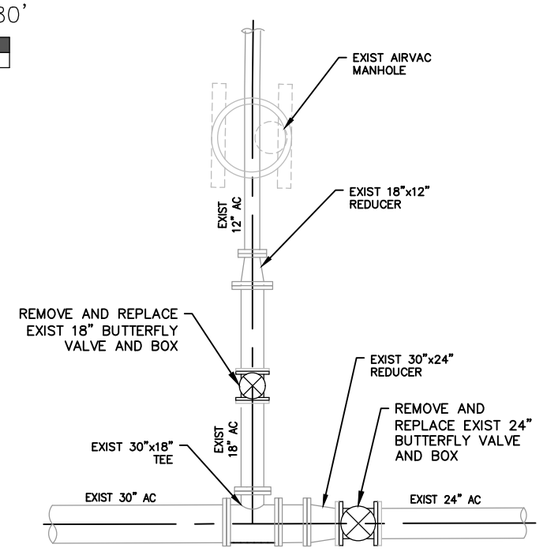
SHT 22

C:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 – Vault Modification And Details.dwg Plot Date: 8/14/2025

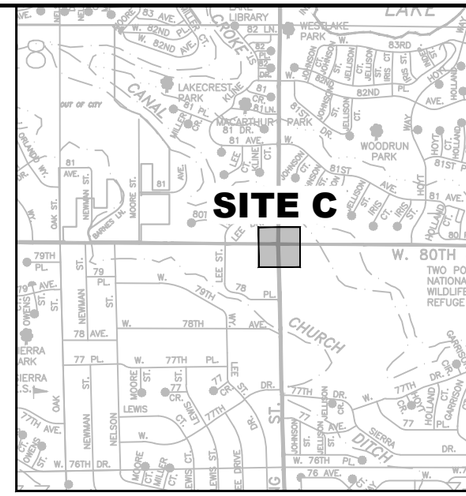


0' 20' 40' 80'

SCALE: 1"=40'



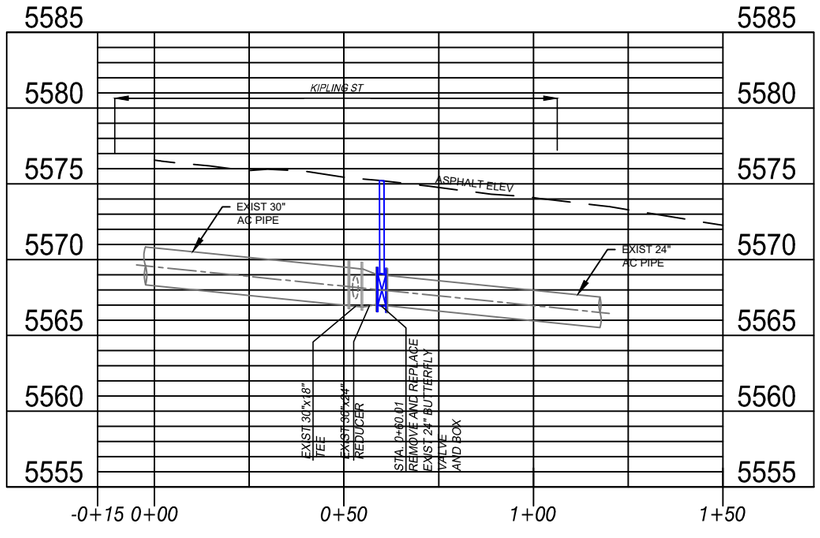
DETAIL
SCALE: 1"=10'



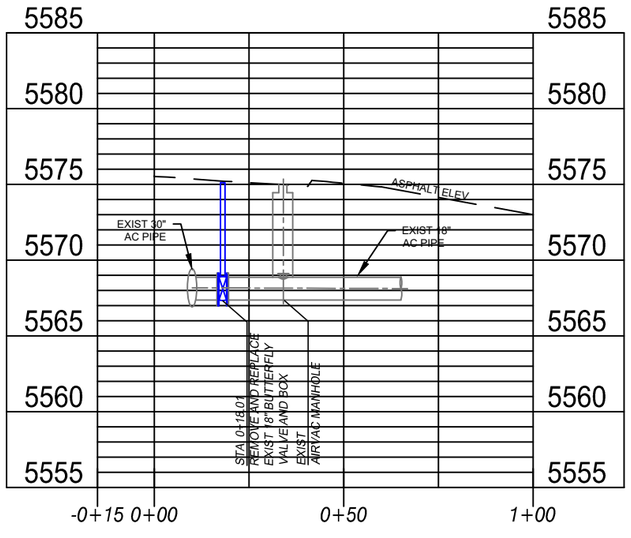
KEY MAP
SCALE: N.T.S.

0' 5' 10' 20'

SCALE: 1"=10'



PROFILE: 80TH AVE AND KIPLING ST
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'



PROFILE: KIPLING ST AND 80TH AVE
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'

NOTE:

DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

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Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

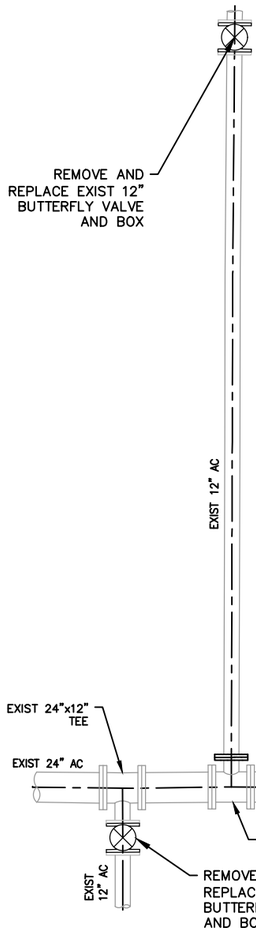
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
W 80TH AVE AT KIPLING ST
WATER MAIN IMPROVEMENTS
PLAN AND PROFILE

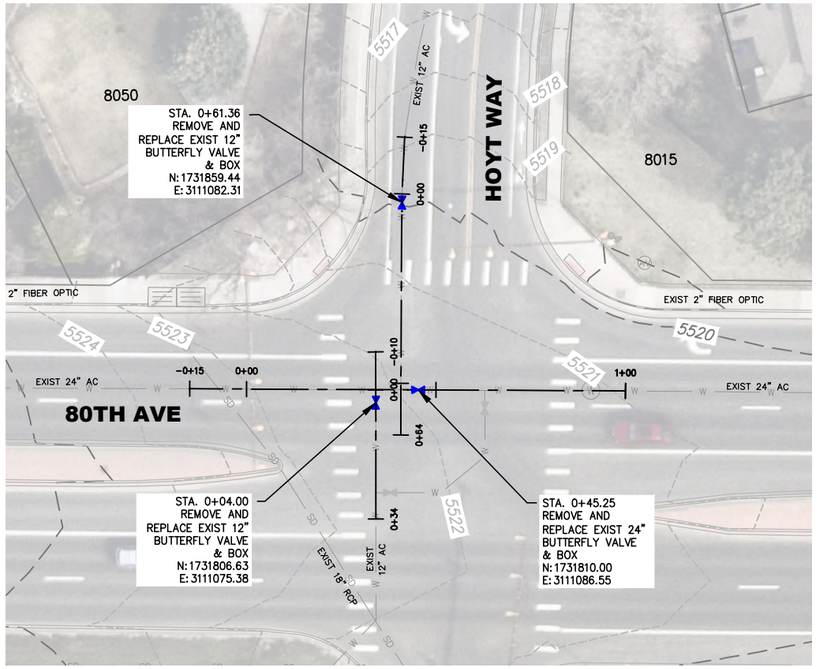
ENGINEER KB
CHECKED BY KB
DESIGN BY AS

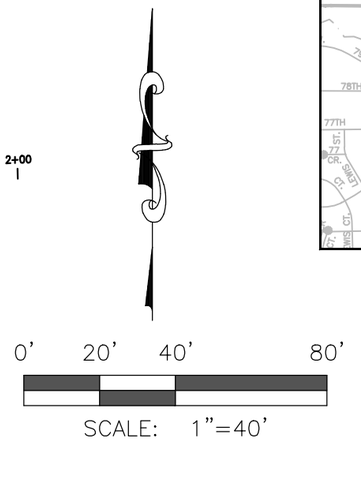
SHT **23**

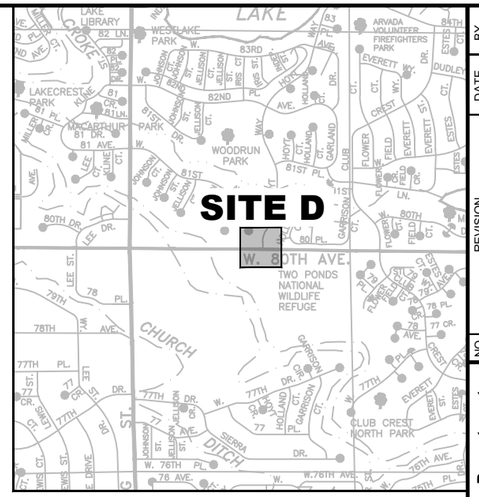
G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Water Line Improvements.dwg , Plot Date: 2/5/2025



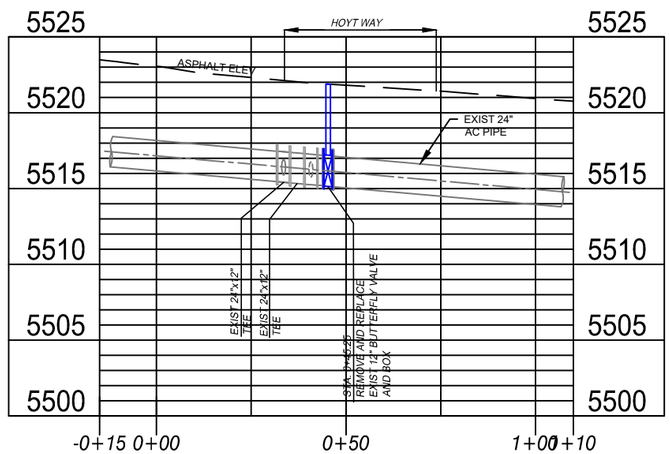
DETAIL
SCALE: 1"=10'



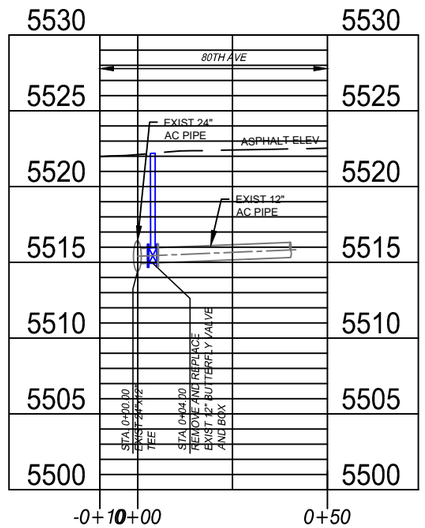




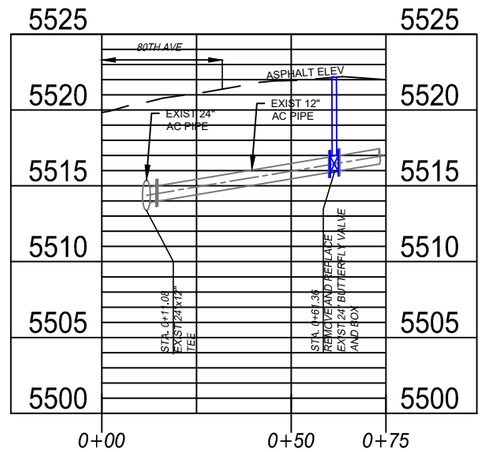
KEY MAP
SCALE: N.T.S.



PROFILE: 80TH AVE AND HOYT WAY
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'



PROFILE: HOYT WAY AND 80TH AVE (S)
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'



PROFILE: HOYT WAY AND 80TH AVE (N)
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=10'

NOTE:

DEPTHS ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD.

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

Review is for general compliance with the City of Arvada "Engineering Code of Standards and Specifications for the Design and Construction of Public Improvements", latest edition. Sole responsibility for completeness and/or accuracy of these Documents shall remain with the Registered Professional Engineer sealing these plans. The City does not accept liability for facilities designed by others.

NO.	REVISION	DATE	BY
1			
2			
3			
4			
5			

Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

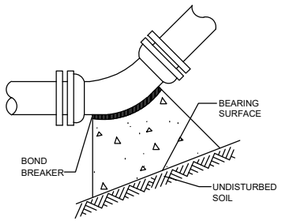
CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULTS MODS
W 80TH AVE AT HOYT WAY
WATER MAIN IMPROVEMENTS
PLAN AND PROFILE

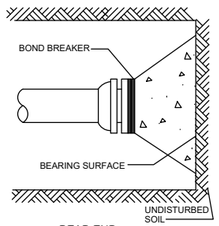
ENGINEER KB
CHECKED BY KB
DESIGN BY AS

SHT **24**

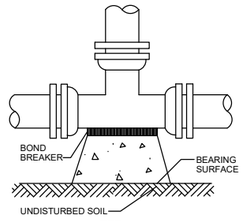
G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Water Line Improvements.dwg , Plot Date: 2/5/2025



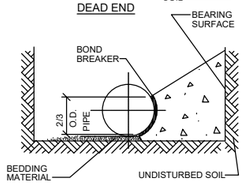
11¼°, 22½°, 45° AND 90° BENDS



DEAD END



TEE



TYPICAL CROSS SECTION

NOTE:

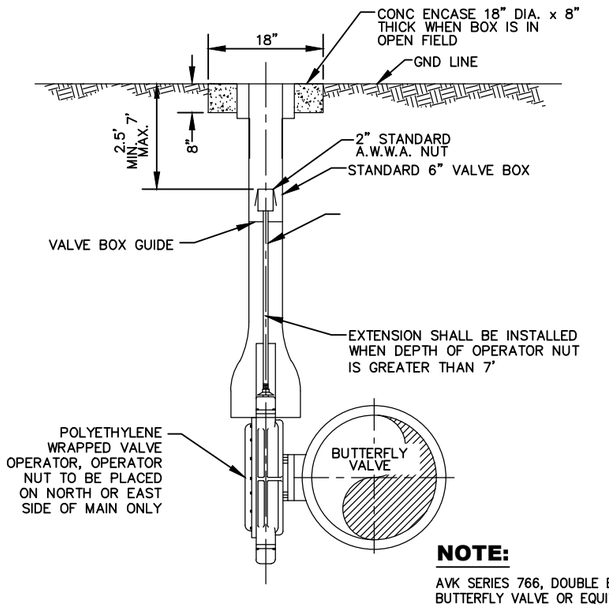
1. BEARING SURFACES SHOWN IN CHART ARE MINIMUM.
2. BASED ON 150 PSI INTERNAL PIPE PRESSURE PLUS WATER HAMMER. 3", 4", 6", 8" AND 12" WATER HAMMER = 110 P.S.I. 16", 20"AND 24" WATER HAMMER = 70 P.S.I.
3. BASED ON 3,000 psf SOIL BEARING CAPACITY.
4. ALL BENDS, TEE BRANCHES AND DEAD ENDS SHALL BE RESTRAINED AND KICK BLOCKED.

MINIMUM BEARING SURFACE AREA
(IN SQUARE FEET)

SIZE OF PIPE	BENDS				TEE OR DEAD END
	11 ¼ °	22 ½ °	45 °	90 °	
3"	1.00	1.00	1.00	1.00	1.00
4"	1.00	1.00	1.00	1.50	1.50
6"	1.00	1.25	2.25	3.00	3.00
8"	1.00	2.00	4.00	5.25	5.25
12"	2.25	4.50	8.75	11.25	11.25
16"	3.75	7.50	14.50	27.00	19.00
20"	5.00	10.00	19.50	35.50	25.00
24"	7.00	14.00	27.75	51.00	36.00

CONCRETE KICKBLOCKS BEARING SURFACES INSTALLATION

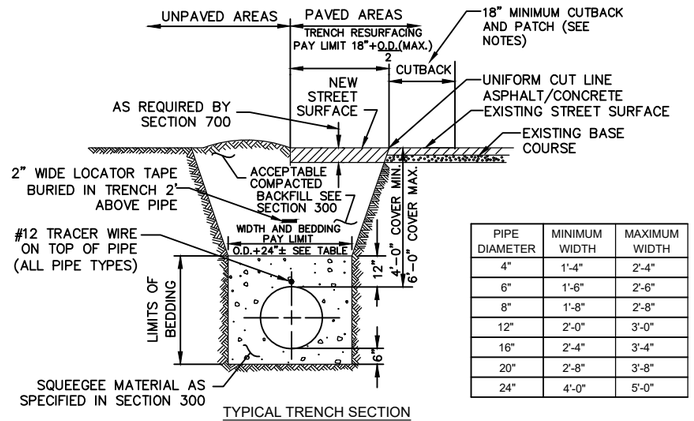
N.T.S



NOTE:

AVK SERIES 766, DOUBLE ECCENTRIC BUTTERFLY VALVE OR EQUIVALENT.

TRANSMISSION MAIN BUTTERFLY VALVE INSTALLATION



TYPICAL TRENCH SECTION
SEE DETAIL 400-1 IN ENGINEERING STANDARDS AND SPECIFICATIONS

PIPE DIAMETER	MINIMUM WIDTH	MAXIMUM WIDTH
4"	1'-4"	2'-4"
6"	1'-6"	2'-6"
8"	1'-8"	2'-8"
12"	2'-0"	3'-0"
16"	2'-4"	3'-4"
20"	2'-8"	3'-8"
24"	4'-0"	5'-0"

NOTES:

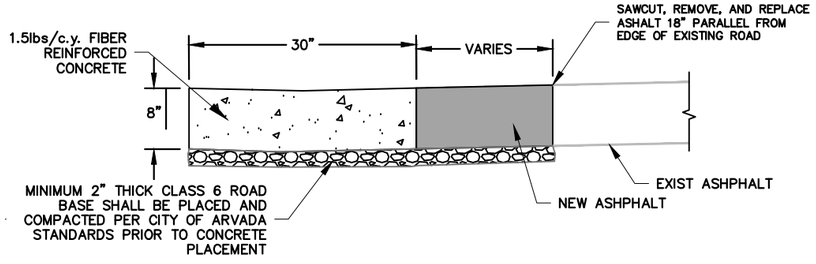
1. PAVING SHALL COMPLY WITH SECTION 700.
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.
3. MINIMUM COVER OVER PIPE TO BE BELOW OFFICIAL STREET GRADE.
4. FOR ASPHALT PATCH DEPTH REFER TO THE REQUIREMENTS IN SECTION 700 OF THE STANDARDS AND SPECIFICATIONS.
5. CUTBACK AS REQUIRED BY PROJECT ENGINEER.

PROJECT SPECIFIC NOTE:

ALL ASPHALT JOINTS SHALL BE INFRARED RADIATION TO ENSUE A SMOOTH JOINT IN ASPHALT

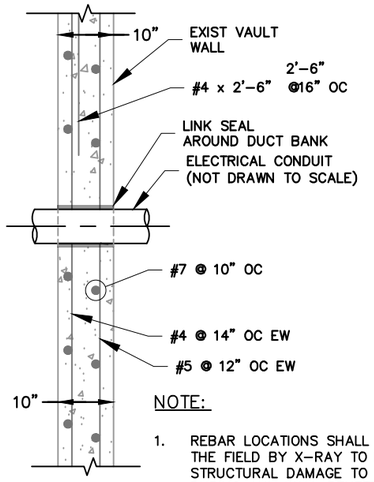
TYPICAL TRENCH SECTION PIPE PROTECTION WATER MAINS

(W 80TH AVE)
N.T.S



CONCRETE PAN TYPICAL SECTION (LOOKING NORTH)

(SIMMS TANK VAULT)
N.T.S

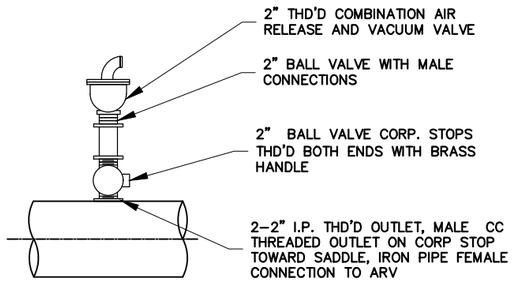


NOTE:

1. REBAR LOCATIONS SHALL BE VERIFIED IN THE FIELD BY X-RAY TO ENSURE NO STRUCTURAL DAMAGE TO VAULT OCCURS DURING ANY WALL PENETRATIONS.
2. LINK SEAL SHALL BE USED AROUND ALL WALL PENETRATIONS TO PREVENT ANYTHING FROM ENTERING THE VAULT.

VAULT/DUCT BANK ENTRANCE

(SIMMS TANK VAULT)
N.T.S



2" AIR RELEASE AND VACUUM VALVE

(SIMMS TANK VAULT)
N.T.S

APPROVED:

City Engineer — Date: 8/18/25 — Job Number: 23WA12

Review is for general compliance with the City of Arvada "Engineering Code of Standards and Specifications for the Design and Construction of Public Improvements", latest edition. Sole responsibility for completeness and/or accuracy of these Documents shall remain with the Registered Professional Engineer sealing these plans. The City does not accept liability for facilities designed by others.

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1			
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3			
4			
5			

Public Works Department
Engineering Division
8101 Ralston Road
Arvada, Colorado 80002
Phone 720-898-7640

CITY OF ARVADA

PROJECT NO. 23-WA-12
SIMMS TANK VAULT MODS
W 80TH AVE WATER MAIN IMPROVEMENTS
DETAILS

ENGINEER
KB
CHECKED BY
KB
DESIGN BY
AS

25
SHT

G:\PROJECTS\WATER\23WA12-Simms Tank Vault Mods\CAD\23WA12 - Water Line Improvements (working) - 07-21-25.dwg , Plot Date: 8/4/2025

Ecological Resource Consultants, LLC

12345 W Alameda Parkway Suite 206 ~ Lakewood, CO ~ 80228 ~ (303) 679-4820

September 26, 2025

Nathan McCoy
General Manager
Church Ditch Water Authority (CDWA)
14025 W. 82nd Ave.
Arvada, CO 80005

TECHNICAL REVIEW #2 – Technical Approval

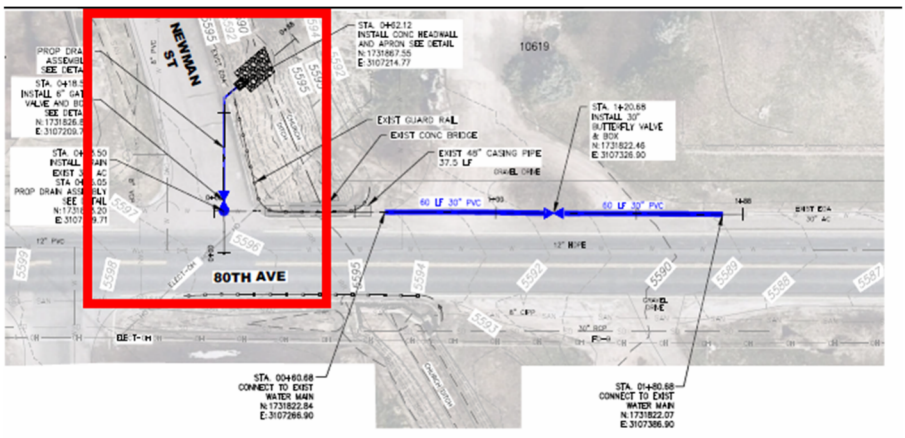
Applicant:	City of Arvada
Project:	Arvada Water Tank Drain
Affected Canal:	Church Ditch
ERC Project:	370-2504

Nathan,

Ecological Resource Consultants, LLC (ERC) has completed a 2nd review of the proposed water drainage work to the Church Ditch in Arvada. The project work within the CDWA ROW includes the removal and replacement of about 20 feet 30" inch dia pipe to install a new 30" valve and a 6" dia PVC drain pipe with outlet structure at the ditch. The location of the proposed project is shown in Figure 1 below.

City of Arvada is planning to upgrade its existing water storage tank and proposes to discharge dechlorinated potable water from the tank into the Church Ditch. During construction, the maximum anticipated flow rate is 300 gallons per minute (0.74 CFS), with a total estimated discharge volume of 2 million gallons. In the longer term, the maximum estimated total discharge volume is 10 million gallons.

Figure 1: Location of Proposed Construction



This review was conducted with respect to the proposed drainage structure to the ditch and the associated direct and indirect impacts. Specific attention was paid to the technical details of the proposed installation.

For this letter, we reviewed the following information:

1. A drawing set titled “City of Arvada, Project 23-WA-12, Simms Street Tank Vault Mods, Bid Set”, produced by the City of Arvada, dated 8/18/25 (14 pages)
2. A comment response letter.

General Comments:

1. CDWA expressly reserves the right to require projects to be constructed at a minimum in accordance with the guidelines set forth in the “Design Review Process and Design Criteria for Facilities” (Design Criteria), latest edition, in order to protect the integrity and value of the CDWA system.
2. Our understanding is a standard license agreement is not proposed.

Intergovernmental Agreement

1. ERC has provided comments to CDWA for their use. CDWA will provide IGA comments separately.

Variance

1. According to the comment response letter, Arvada does not sign and seal drawings produced by Arvada. CDWA would need to grant a variance to the requirement the drawings are signed and sealed by a Professional Engineer.

Drawings Comments

1. See variance above.
2. We do not see the drain detail referenced on the drawings. In ERC’s opinion, this could be resolved with the required construction submittal reviews.

Recommendations for the Notice to Proceed:

Based on ERC’s review of the documents provided, we recommend that CDWA provide technical approval of the project with the following conditions:

Prior to beginning construction within CDWA ROW:

1. The construction shall occur when the ditch is off: typically Nov. 1 – March 31st.
2. Schedule a pre-construction meeting with CDWA/ERC at least 72 hours prior to the commencement of construction activities. Provide a construction schedule prior to the Notice to Proceed and pre-construction meeting. Provide closed CO 811 ticket(s) at the pre-construction meeting.
3. Provide CDWA with 48 hours’ notice prior to beginning work.
4. Schedule inspections of the construction site with CDWA/ERC prior to work within the CDWA ROW to document pre-construction conditions. Note: coordinate with CDWA for dates when the ditch is not running water.

5. Provide submittals to CDWA for review and approval for materials and procedures, allowing sufficient time in the construction schedule for review and approval to include, but not necessarily limited to:
    a. A pre-construction survey check of the existing CDWA culvert inverts.
    b. All pipeline materials, included the referenced drain.
    c. Rebar shop drawings, which include continuous corner bars.
    d. Concrete and grout mixtures.

During construction:

1. Provide 48 hours notice for CDWA/ERC inspections to include, but not limited to the following activities:
    a. Excavation within CDWA's ROW
    b. Pipe installation
    c. Form and rebar
    d. Concrete placement
    e. Riprap placement
    f. Riprap grouting
    g. Pipeline pressure testing.
2. Provide regular test results showing that work meets project requirements.
3. Collect survey points for as-built drawings, to include any other existing utilities encountered within the CDWA ROW.
4. Water from stormwater and dewatering shall not be discharged into the canal.
5. Disturbed ditch access roads shall be restored with a minimum of 6-inches of Class 6 Roadbase.

After construction:

1. Scheule a post-construction inspection with CDWA/ERC.
2. Provide test results and inspection reports for work performed within CDWA ROW.
3. Provide project record drawings including cover sheet, sheets containing CDWA's notes and other relevant sheets, to include elevations and x-y coordinates (lat/long or northing/easting).
4. Provide a letter, sealed by the Geotechnical Engineer of Record, stating that inspections and test results conform to project drawings and specifications.
5. Provide a Certificate of Completion, sealed by the Engineer(s) of Record, stating that work was constructed in accordance with the approved drawings and specifications.

The recommendation of technical approval by ERC of this project does not constitute notice to proceed. An approved construction schedule and written notice to proceed from CDWA's General Manager are required prior to commencing construction activities.

Thank you for the opportunity to complete this service on behalf of CDWA. Please feel free to call ERC if you have any questions regarding the review of this project.

Sincerely,

ECOLOGICAL RESOURCE CONSULTANTS

Sharad Upadhyaya
Civil Engineer
303-679-4820 Ext. 113
supadhyaya@erccolorado.net

Jonathon Wulff
Sr. Construction Manager
303-679-4820 Ext107
jwulff@erccolorado.net

CITY OF ARVADA

REPORT TO CITY COUNCIL ORDINANCE FIRST READING

AGENDA ITEM 8.C.1.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: CB25-026, An Ordinance Repealing and Reenacting Article XI (Micromobility Program) of Chapter 54, Motor Vehicles and Traffic, of the Arvada City Code (Public Hearing to be set for November 18, 2025 at 6:15 p.m.)

Report in Brief

The Arvada Team is requesting an update of City Code (ACC) Article XI (of Chapter 54, Motor Vehicles and Traffic) which regulates the City's Micromobility Program.

On July 8, 2025, the Arvada Team presented a City Council Workshop to discuss the future of the Micromobility Program. Council provided direction to remove the 'pilot' language from the program's regulating documents and allow the program to continue to operate on an annually permitted basis, as well as to implement parking infrastructure and service area expansion.

The proposed updates will remove the 'pilot' language and add clarity around the Program's status as an annually permitted program and requirements for reference checks for new vendors. Language was also added to make it easier for staff to utilize maintenance bonds to pay unpaid invoices from vendors when a permit is suspended, revoked, or terminated.

The Arvada team recommends that the City Council approve CB25-026, An Ordinance Repealing and Reenacting Article XI (Micromobility Program) of Chapter 54, Motor Vehicles and Traffic, of the Arvada City Code.

Financial Impact

There is no financial impact to the City.

Background

In 2019, following the opening of the G Line stations in the City of Arvada, the City's Citizen Transportation Advisory Committee (TAC) initiated an evaluation process to consider "first and last mile" solutions to transit. While several solutions were considered, the TAC landed on a three-prong approach: 1) Focus on 1-Mile areas of the G Line Stations; 2) Encourage Private Sector Mobility Investments; and 3) Pilot a Traffic Calming Program for Neighborhoods.

As a result of extensive community outreach and planning, the Pilot Program was launched in September 2021. The program is designed to permit vendors where a limited number of Shared Micromobility devices are permitted to operate within a limited pilot project area. The program was launched in January 2022 during winter, with its first vendor, Bird. Bird left the Arvada market in September 2023 and Lime has been the City’s sole micromobility vendor since this time. An initial report to the City Manager was provided in February 2022 and there was a follow-up presentation to Council in October 2022 and at that time Council recommended program continuance under the pilot and service area expansion.

The Arvada team reported most recently to City Council at a workshop on July 8, 2025. The workshop offered an opportunity to consider four options: 1) Extend: Remove 'pilot' from the program name and continue the program on an annually permitted basis. 2) Educate: Staff continues and improves educational programming around micromobility rules and rules of the road. 3) Establish: Staff works with the vendor to establish parking locations for micromobility devices where rider density encourages

doing so. 4) Expand: Staff works with the vendor, the Arvada team, and regional partners to implement service area expansions. At this workshop, Council let the team know that all four recommendations should be implemented.

Discussion

Article XI of Chapter 54 was established in 2021 to provide for the management and creation of the pilot micromobility program. This section detailed the origins of the pilot program and established basic rules for its management. The updates proposed to Article XI are intended to reflect direction from Council to remove the 'pilot' language as well as to make it easier to manage. The specific updates include:

- Removal of the word 'pilot' and the removal of any out-of-date background information.
- Revision of 'Public Works' to 'Infrastructure' to reflect recent naming changes.
- Addition of language to allow staff to utilize the maintenance bond for unpaid invoices from vendors that have had their permits revoked, suspended, or terminated.
- Addition of language to require that new vendors submit three references upon requesting a permit.

Public Contact

The Arvada Team attended a City Council Workshop on July 8.

Commission Recommendation

N/A

Strategic Alignment

The Ordinance presented here will ensure the continued management of the Micromobility Program for Arvada residents and visitors, increasing transportation options and access to services, transit, and recreation. This aligns with City Council's Strategic Plan priority area and work system services of Infrastructure, including INF4 Innovates safe, accessible, and efficient connections to modes of transportation, including transit, streets, sidewalks, and bikeways, with a focus on enhanced technology at high-priority intersections improving safety, minimizing traffic congestion, and making first and last-mile connections.

Alternative Courses of Action

1. Approve the Ordinance as written.
2. Take no action.

Recommendation for Action

The Arvada team recommends City Council approve CB25-026, An Ordinance Repealing and Reenacting Article XI of Chapter 54, Motor Vehicles and Traffic, of the Arvada City Code.

Suggested Motion:

I move that CB25-026, An Ordinance Repealing and Reenacting Article XI of Chapter 54, Motor Vehicles and Traffic, of the Arvada City Code, be (approved on first reading, ordered published in full and a public hearing date be set for November 18, 2025 at 6:15 p.m.) (rejected).

Prepared by:
Aislinn Droski, Transportation Planner

Reviewed by:

Approved by:

Claudia Vaughan, City Engineer	09/29/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Tammy Hedlund, Legal Specialist	10/02/2025
Kelsy Sargent, Assistant City Attorney	10/02/2025
Rachel Morris, City Attorney	10/13/2025
Allison Scheck, Deputy City Manager	10/13/2025
Don Wick, City Manager	10/14/2025

Enclosure, exhibits & attachments required to support the report

COUNCIL BILL NO. 25-026
ORDINANCE NO.

AN ORDINANCE REPEALING AND REENACTING ARTICLE XI, MICROMOBILITY PROGRAM, OF CHAPTER 54, MOTOR VEHICLES AND TRAFFIC, OF THE ARVADA CITY CODE

WHEREAS, the City of Arvada, Colorado, ("City"), is a home rule municipality, organized and existing under Article XX, Section 6 of the Colorado Constitution; and

WHEREAS, on or about August 16, 2021, Article XI, Micromobility Program, of Chapter 54, Motor Vehicles and Traffic, of the Arvada City Code was enacted pursuant to CB 21-020; and

WHEREAS, the Micromobility as a Service Program ran initially as a pilot program in the City; and

WHEREAS, City Council has determined that it is in the best interest of the City to continue the program in a permanent capacity; and

WHEREAS, the City now wishes to amend Article XI, Micromobility Program, of Chapter 54, Motor Vehicles and Traffic to reflect the program's permanent status and to clarify, update, and correct obligations of the City and the operators.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. Article XI, Micromobility Program, of Chapter 54, Motor Vehicles and Traffic, is hereby repealed and reenacted to read as follows:

"**ARTICLE XI. MICROMOBILITY PROGRAM**

Sec. 54-301. Definitions.

For purposes of this article, the following words and phrases have the following meaning, unless otherwise indicated:

City means the City of Arvada.

Decommissioning means the process initiated by the City upon revocation or suspension of a micromobility permit, requiring the permit holder to cease all operations and withdraw all micromobility devices from service from all public rights-of-way and other publicly accessible areas within the City's jurisdiction.

Devices means bicycles, scooters, electrical assisted bicycles, electric scooters, and other small, wheeled vehicles designed specifically for shared-use and deployed by micromobility operators.

Director means the director of Infrastructure or his or her designee.

Micromobility means a network or system of devices, placed in the public right-of-way and for rent in short time increments, that provides increased mobility options over short distances in urban areas.

Mobility as a service permit program or program means a program allowing for the implementation and operation of micromobility within the city through annual permit applications.

Operator means a person or entity who offers devices to be used for micromobility.

Permit means a document issued by the director to an operator that allows the operator to offer micromobility devices and services in the city.

Sec. 54-302. Micromobility operator permit program.

To assist with the implementation and operation of micromobility within the city, the director shall create the "mobility as a service permit program." The director shall establish a permit application process, and develop program criteria and requirements for micromobility operation within the city's rights-of-way.

Sec. 54-303. Rules and regulations.

(a) The director may promulgate rules and regulations consistent with this chapter to govern the program, including, but not limited to, permitting obligations, the operation of devices, and rules necessary to enhance public safety.

(b) All persons must comply with the rules and regulations adopted pursuant to this chapter.

Sec. 54-304. Permit required.

No person or entity shall conduct or carry on the business of offering devices without first obtaining a permit from the director under this article.

Sec. 54-305. Permit application.

(a) An operator desiring a permit must submit a permit application and three references with current contact information to the director under the rules and regulations adopted pursuant to section 54-303 of this article, and must pay the fee(s) prescribed in section 54-306 of this article.

(b) In accordance with the program criteria established under this article, the director is authorized to review, approve, and issue a micromobility permit to an operator who applies for a permit.

Sec. 54-306. Permit fees.

(a) An operator must pay the initial, maintenance, and renewal fees associated with a program permit as prescribed in the rules and regulations adopted pursuant to section 54-303 of this article.

(b) Fees prescribed pursuant to this article are non-refundable.

Sec. 54-307. Denial, suspension, or revocation of permits.

(a) The director may deny an application for a permit under this chapter if the applicant fails to demonstrate that it meets all of the requirements for a permit as provided in the rules and regulations adopted pursuant to section 54-303.

(b) The director may suspend or revoke a permit issued under this chapter if the operator fails to comply with the requirements of this chapter. After receiving a notice of suspension or revocation, an operator may request an appeal to the director within seven calendar days of receipt of suspension or revocation. Appeals to the director must be in writing and sent via certified mail. An operator not satisfied with the director's decision may request a final appeal hearing with a hearing officer pursuant to chapter 2, article V, division 3 of this Code. Such hearing shall be set before the end of the 30-day decommissioning period set by Arvada in the original notice provided via certified mail. The decision made by the hearing officer is final.

(c) Any operator whose permit is suspended or revoked must reclaim and remove their entire fleet of devices within 30 days of notice of suspension or revocation.

(d) Any operator whose permit is suspended or revoked must pay all unpaid fees within 30 days of said suspension or revocation. Outstanding fees not paid within 30 days of said suspension or revocation may, at the Director's discretion, be withdrawn from the maintenance bonds provided by the operator."

Section 2. This repeal shall not affect or prevent the prosecution or punishment of any person for any act done or committed prior to the effective date of this ordinance and that is in violation of the section repealed by this ordinance.

Section 3**.** Severability. Should any provision of this ordinance be declared by a court to be unconstitutional or invalid, such decision shall not affect the validity of the ordinance as a whole, or any part thereof, other than the part so declared unconstitutional or invalid. The City Council declares it would have adopted this ordinance and each part or parts hereof irrespective of the fact that any one part or parts be declared unconstitutional or invalid.

Section 4. This ordinance shall be effective five days after publication following final passage.

INTRODUCED, READ, AND ORDERED PUBLISHED this 21st day of October, 2025.

PASSED, ADOPTED AND APPROVED this ____ day of _____, 2025.

Lauren Simpson, Mayor

ATTEST:

City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

BY: _____

Publication Dates: October 23, 2025

REDLINE/~~STRIKETHROUGH VERSION~~

FOR INFORMATION ONLY -- NOT PART OF THE ORDINANCE

Underlined indicates new material
~~Strikethrough~~ indicates deleted material

ARTICLE XI. MICROMOBILITY PROGRAM

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Mobility as a service permit program or program means a program allowing for the implementation and operation of micromobility within the city ~~for a prescribed period of time.~~ through annual permit applications.

Operator means a person or entity who offers devices to be used for micromobility.

Permit means a document issued by the director to an operator that allows the operator to offer micromobility devices and services in the city.

Sec. 54-302. Micromobility operator permit ~~and pilot~~ program.

To assist with the implementation and operation of micromobility within the city, the director shall create the "mobility as a service permit program." The director shall establish a permit application process, and develop program criteria and requirements for micromobility operation within the city's rights-of-way.

Sec. 54-303. Rules and regulations.

(a) The director may promulgate rules and regulations consistent with this chapter to govern the program, including, but not limited to, permitting obligations, the operation of devices, and rules necessary to enhance public safety.

(b) All persons must comply with the rules and regulations adopted pursuant to this chapter.

Sec. 54-304. Permit required.

No person or entity shall conduct or carry on the business of offering devices without first obtaining a permit from the director under this article.

Sec. 54-305. Permit application.

(a) An operator desiring a permit must submit a permit application and three references with current contact information to the director under the rules and regulations adopted pursuant to section 54-303 of this article, and must pay the fee(s) prescribed in section 54-306 of this article.

(b) In accordance with the program criteria established under this article, the director is authorized to review, approve, and issue a micromobility permit to an operator who applies for a permit.

Sec. 54-306. Permit fees.

(a) An operator must pay the initial, maintenance, and renewal fees associated with a program permit as prescribed in the rules and regulations adopted pursuant to section 54-303 of this article.

(b) Fees prescribed pursuant to this article are non-refundable.

Sec. 54-307. Denial, suspension, or revocation of permits.

(a) The director may deny an application for a permit under this chapter if the applicant fails to demonstrate that it meets all of the requirements for a permit as provided in the rules and regulations adopted pursuant to section 54-303.

(b) The director may suspend or revoke a permit issued under this chapter if the operator fails to comply with the requirements of this chapter. ~~A request for appeal must be provided in writing to the director no less than seven days after receiving the termination letter via certified mail~~. After receiving a notice of suspension or revocation, an operator may request an appeal to the director within seven calendar days of receipt of suspension or revocation. Appeals to the director must be in writing and sent via certified mail. An~~y~~ operator not satisfied with the director's decision may request a final appeal hearing with a hearing officer pursuant to chapter 2, article V, division 3 of this Code. Such hearing shall be set before the end of the 30 day decommissioning period set by Arvada in the original notice provided via certified mail. The decision made by the hearing officer is final.

(c) Any operator whose permit is suspended or revoked must reclaim and remove their entire fleet of devices within 30 days of notice of suspension or revocation.

(d) Any operator whose permit is suspended or revoked must pay all unpaid fees within 30 days of said suspension or revocation. Outstanding fees not paid within 30 days of said suspension or revocation may, at the director's discretion, be withdrawn from the maintenance bonds provided by the operator.

~~**Sec. 54-308. Status of program.**~~

~~The director will file with the city manager no later than January 31, 2022, a report assessing the program for city council's six month review. City council may terminate the pilot program on February 16, 2022 or allow the pilot program to continue. The program described herein will operate as a pilot program through and including September 13, 2022 with the possibility of extending to December 31, 2022. Unless terminated by city council action prior to that date, the micromobility program will operate as a city program on the same terms set forth in this article beginning on January 1, 2023.~~

CITY OF ARVADA

REPORT TO CITY COUNCIL PUBLIC HEARING

AGENDA ITEM 10.A.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: CB25-021, An Ordinance Amending Various Sections of Chapter 102, Utilities, of the Arvada City Code Pertaining to Water Users Rates and Bimonthly Service Charges (Ordinance No. 4907) (Presenter: Jacqueline Rhoades, Infrastructure Director)

Report in Brief

PRESENTER:Jacqueline Rhoades, Infrastructure Director
At the August 12, 2025 City Council workshop, the City team presented a series of revenue increase scenarios for updated water, sewer, and stormwater rates and bimonthly service fees for 2026 to support the delivery of the capital improvement plan. City Council directed the City team to return with the scenario that is reflected in the attached ordinance.

The ordinance before the City Council will adjust Water Rates and Bimonthly Service Fees for 2026. The attached ordinance will increase water volumetric rates by 5% and bimonthly service fees by 18.3% for an overall revenue increase of 6.9% for 2026. This will increase the typical in-city single-family water bill by $52.21 per year ($8.70 per bimonthly bill or $4.35 per month).

The City's Infrastructure Work System continues to prepare for investments in operations and infrastructure as part of our ongoing commitment to continue to provide reliable water, sewer, and stormwater drainage services to our community. This work aligns with the Infrastructure Priority Area of the City Council Strategic Plan, specifically Infrastructure Work System Service 1: Provides the community with a safe, resilient, high-quality water supply, drainage system, wastewater disposal, and solid waste management services for full city build-out, as defined by the Comprehensive Plan. This work also aligns with the principle that the City maintains utility rates at the lowest practical levels, with accurate billing that supports robust and reliable infrastructure.

The Arvada team recommends that the City Council approve CB25-021, An Ordinance Amending Various Sections of Chapter 102, Utilities, of the Arvada City Code Pertaining to Water Users Rates and Bimonthly Service Charges.

Financial Impact

The Water fund revenue scenario presented in this Ordinance will generate approximately $2,761,000 of new revenues, which will be used primarily towards paying for debt service and capital projects.

Background

In support of the City Council Strategic Plan and the Infrastructure Work System, the City team has been developing, implementing and refining a financial strategy to support reinvestment in aging water infrastructure and expansion of capacity to support planned development.

Over the course of three workshops in 2025, the City team presented City Council with foundational information about utility financial strategies, presented a series of revenue increase scenarios for the water fund, and requested direction about how best to provide assistance to customers who are struggling to pay their utility bill.

At the final workshop on August 12, 2025, the City team presented four revenue increase scenarios for the water fund for

updating water rates and bimonthly service fees for 2026. At that workshop, the City team received direction about which of these scenarios to bring back to City Council for adoption on October 7, 2025 for first reading. Additional revenue from these adjustments enables major water system reinvestments and capacity-building projects to proceed in accordance with a schedule laid out in the master planning work directed in the City Council Strategic Plan.

The 2026 budget for the Water Enterprise Fund includes new revenues of approximately $2,761,000, which will be used primarily towards paying for debt service and capital projects.

Discussion

The City's Infrastructure Department continues to prepare for investments in operations and infrastructure as part of our ongoing commitment to continue to provide reliable water, sewer, and stormwater drainage services to our community. This work supports the Infrastructure Priority Area of the City Council Strategic Plan, specifically Infrastructure Works System Service 1: Provides the community with a safe, resilient, high-quality water supply, drainage system, wastewater disposal and solid waste management services for full city build-out, as defined by the Comprehensive Plan. The City team's presentation of the requested revenue increase scenario for the 2026 adjustments to the water rate and fee schedule also aligns with the principle that the City maintains utility rates at the lowest practical levels.

On an annual basis, the City team provides City Council with foundational utility enterprise information and a series of revenue scenarios for adjusting volumetric rates and fixed bimonthly service fees. There continue to be pressures that are driving a water rate and fee increase for 2026. The primary cost driver for 2026 is the need for capital reinvestment projects that will replace or repair aging water treatment and distribution system infrastructure. These projects were identified as priorities in master planning conducted in recent years. While inflation is still a concern, the City team is also anticipating and managing the impact that current and potential future tariffs will have on project costs.

The City team is presenting a rate increase of 5% and a bimonthly service charge increase of 18.3%, for a total revenue increase of 6.9%. If approved, this rate and fee change will result in an additional $52.21 per year ($8.70 per bimonthly bill, or $4.35 per month) for a typical in-city single family owner. In accordance with past practice, the in-city rate and fee increases are used as an index to calculate all other customer categories. The complete updated rate schedule is in the proposed ordinance.

Based on the City Council's feedback, the City team will also investigate opportunities to provide an additional utility bill assistance program to our customers who are struggling to pay their utility bill. In addition to the hardship credits, bill equalizations and bill arrangements that we currently offer, we will work with the Colorado agency(ies) that offer LEAP (Low-income Energy Assistance Program) benefits to potentially gain access to their customer list. If implemented, Arvada utility customers who already qualify for the state's LEAP benefits would be automatically eligible to receive a $25 credit per bimonthly bill. While the LEAP program has been suspended for the remainder of 2025, the City team will continue to communicate with the appropriate agencies into 2026, with the intent to implement this program in 2026.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

Strategic Alignment

The recommended action aligns with the Infrastructure Work System Services within the City Council Strategic Plan. Specifically, the recommended action is consistent with the following work system service included in the Infrastructure Priority Area:

Provides the community with a safe, reliable high quality water supply, drainage system, and wastewater disposal services

for full city build-out, as defined in the Comprehensive Plan. This includes maintaining utility rates at the lowest practical levels with accurate billing that supports replacement of aging infrastructure in order to maintain robust utility systems.

Alternative Courses of Action

1. Approve this ordinance increasing the rates and fees for the Water Fund in 2026.
2. Direct staff to return with an alternate revenue increase.

Recommendation for Action

The Arvada team recommends that the City Council approve Alternative No. 1.

Suggested Motion:

I move that CB25-021, An Ordinance Amending Various Sections of Chapter 102, Utilities, of the Arvada City Code Pertaining to Water Users Rates and Bimonthly Service Charges, be (approved on final reading, numbered 4907 and ordered published by title only) (rejected).

Prepared by:
Christine Gray, Utilities Business Manager

Reviewed by:

Approved by:

Jessica Morales, Deputy City Attorney	10/01/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Tammy Hedlund, Legal Specialist	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

COUNCIL BILL NO. 25-021
ORDINANCE NO. 4907

AN ORDINANCE AMENDING VARIOUS SECTIONS OF CHAPTER 102, UTILITIES, OF THE ARVADA CITY CODE PERTAINING TO WATER USERS RATES AND BIMONTHLY SERVICE CHARGES

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. Section 102-170, Residential user charges – Within city, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-170. Residential user charges—Within city.**

Bimonthly user charges for residential class of service within the city shall be based upon the following service charges and usage rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

(1) Single-family or other individually connected units:

a. The bimonthly service charge is…… $25.83

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons, per 1,000.....$6.50

2. from 30,001 to 60,000 gallons, per 1,000…….....$8.13

3. from 60,001 to 90,000 gallons, per 1,000…….....$9.78

4. All above 90,000 gallons, per 1,000…….……..$13.02

(2) Duplex, multifamily, townhouse, or other units that are interconnected:

a. The total bimonthly service charge regardless of usage is as follows:

Number of Units	*Service Charge*
2—6	$40.54
7—18	$70.87
19—60	$96.19
61—144	$217.72
Over 144	$369.62

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons for the first unit plus 13,000 gallons for each additional unit at the rate of $6.50 per 1,000 gallons.

2. 30,001—60,000 gallons for the first unit plus 26,000 gallons for each additional unit at the rate of $8.13 per 1,000 gallons.

3. 60,001—90,000 gallons for the first unit plus 39,000 gallons for each additional unit at the rate of $9.78 per 1,000 gallons.

4. All remaining usage at the rate of $13.02 per 1,000 gallons

Section 2. Section 102-171, Residential user charges—Outside city, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-171. Residential user charges—Outside city.**

Bimonthly user charges for residential service outside the city shall be based upon the following service charges and user rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

(1) Single-family or other individually connected units:

a. The bimonthly service charge is……. …$51.66

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons per 1,000……$13.01

2. from 30,001 to 60,000 gallons, per 1,000…….…….…….$16.26

3. from 60,001 to 90,000 gallons, per 1,000……..……..$19.55

4. All over 90,000 gallons, per 1,000…….……..$26.05

(2) Duplex, multifamily, townhouse, or other units that are interconnected:

a. The total bimonthly service charge regardless of usage is as follows:

Number of Units	*Service Charge*
2—6	$81.07
7—18	$141.77
19—60	$192.41
61—144	$435.45
Over 144	$739.25

b. Plus, a bimonthly usage charge as follows:
   1. 0—30,000 gallons for the first unit plus 13,000 gallons for each additional unit at the rate of $13.01 per 1,000 gallons.
   2. 30,001—60,000 gallons for the first unit plus 26,000 gallons for each additional unit at the rate of $16.26 per 1,000 gallons.
   3. 60,001—90,000 gallons for the first unit plus 39,000 gallons for each additional unit at the rate of $19.55 per 1,000 gallons.
   4. All remaining usage at the rate of $26.05 per 1,000 gallons."

Section 3. Section 102-172. Nonresidential user charges--Within city, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-172. Nonresidential user charges—Within city.**

Bimonthly user charges for nonresidential class of service within the city is based upon the following service charges and user rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

Meter Size	*Service Charge*
⅝"× ¾"	$25.83
¾"	$30.79
1"	$40.54
1 ½"	$70.87
2"	$96.19
3"	$217.72
4"	$369.62

Meter Size	*Quantity (in 1,000 gallons) at a rate of* $6.50 *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $8.13 *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $9.78 *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $13.02 *per 1,000 gallons*
⅝" × ¾"	0 to 170	170 to 340	340 to 510	All over 510
¾"	0 to 170	170 to 340	340 to 510	All over 510
1"	0 to 280	280 to 560	560 to 840	All over 840
1 ½"	0 to 600	600 to 1,200	1,200 to 1,800	All over 1,800
2"	0 to 900	900 to 1,800	1,800 to 2,700	All over 2,700
3"	0 to 2,000	2,000 to 4,000	4,000 to 6,000	All over 6,000
4"	0 to 3,400	3,400 to 6,800	6,800 to 10,200	All over 10,200

"

Section 4. Section 102-173. Nonresidential user charges—outside city, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-173. Nonresidential user charges—outside city.**

Bimonthly user charges for nonresidential class of service outside the city is based upon the following service charges and user rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

Meter Size	*Service Charge*
⅝"× ¾	$51.66
¾"	$61.59
1"	$81.07
1 ½"	$141.77
2"	$192.41
3"	$435.45
4"	$739.25

Meter Size	*Quantity (in 1,000 gallons) at a rate of* $13.01 *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $16.26 *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $19.55 *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $26.05 *per 1,000 gallons*
⅝" × ¾"	0 to 170	170 to 340	340 to 510	All over 510
¾"	0 to 170	170 to 340	340 to 510	All over 510
1"	0 to 280	280 to 560	560 to 840	All over 840
1 ½"	0 to 600	600 to 1,200	1,200 to 1,800	All over 1,800
2"	0 to 900	900 to 1,800	1,800 to 2,700	All over 2,700
3"	0 to 2,000	2,000 to 4,000	4,000 to 6,000	All over 6,000
4"	0 to 3,400	3,400 to 6,800	6,800 to 10,200	All over 10,200

"

Section 5. Section 102-174. Distributor and institution user rates, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-174. Distributor and institution user rates.**

The following water user rates are applicable to contractual service in or out of the city accountable through master meter or meters to user-owned and user-maintained distribution systems:

(1) First 500,000 gallons per month, per 1,000 gallons…….$6.66

(2) Excess of 500,000 gallons per month, per 1,000 gallons……..…..$6.42

Section 6. Section 102-175. Fill station user rates, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-175. Fill station user rates.**

The water user rate applicable for fill station usage will be charged at $9.78 per 1,000 gallons."

Section 7. Section 102-176. Fire hydrant metered water user rates, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-176. Fire hydrant metered water user rates**.

(a) The water user rate applicable to permitted users of fire hydrant meters for measuring water supplied from a city fire hydrant is $9.78 per 1,000 gallons, plus a service charge as follows:

(1) 1 to 90 days:	$1.00 per day, minimum of 1 day
(2) 91 to 180 days:	$2.00 per day
(3) 181 days or more:	$3.00 per day

A damage deposit of $1,250.00 will be collected at the time of issuance of the fire hydrant permit. Upon return of the fire hydrant meter in condition acceptable to the city, the damage deposit will be returned.

(b) Tampering with, or in any manner altering the operation of the meter such that the register usage is less than the actual usage will result in an additional fee of $5.00 per day being charged retroactive to the date the hydrant meter permit was issued and ending on the date the meter is returned. The charges provided in this paragraph shall be in addition to the charges provided in paragraph (a) of this section.

(c) If the city cannot furnish a fire hydrant meter, the customer may use the customer's own meter upon obtaining a permit under provisions of this section. The customer may be required to submit written proof that the meter has been calibrated and reads accurately."

Section 8. Section 102-177. Municipal park rate, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-177. Municipal park rate.**

(a) Monthly user rate for the municipal park class is based upon the rate of $3.70 per 1,000 gallons.

(b) This service is interruptible to the extent the city may limit the times of irrigation and the amount of water used. The city and the Apex Park and Recreation District-owned properties, which have occupied structures located thereon, are excluded from this class of water service."

Section 9. Section 102-178. Unmetered standby fire protection service charge, of the Arvada

City Code, is hereby amended and shall read as follows:

"**Sec. 102-178. - Unmetered standby fire protection service charge.**

Bimonthly charges for unmetered standby fire protection service is as follows:

	In City	Out of City
a. Fire hydrants, each	$9.78	$14.67
b. Automatic sprinkler system:		
⅝″—¾″ service line	$9.78	$14.67
1″ service line	$9.78	$14.67
1¼″ service line	$19.57	$29.34
1½″ service line	$19.57	$29.34
2″ service line	$29.31	$43.96
3″ service line	$39.05	$58.57
4″ service line	$58.64	$87.97
6″ service line	$78.17	$117.27
8″ service line	$92.49	$138.77

"

Section 10. Section 102-179. Lost water rate, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-179. Lost water rate.**

Unmetered water lost or used due to activities such as, but not limited to, excavation, demolition, landscaping, or intentional acts of vandalism or theft will be billed to the responsible party at the rate of $9.78 per 1,000 gallons. The estimated volume of unmetered lost water will be based on main size, break size, water pressure, flow time, or other available data."

Section 11. Section 102-180. Special service fees and user rates, of the Arvada City Code, is hereby amended and shall read as follows:

"**Sec. 102-180. Special Service fees and user rates.**

Prior to use of the fire hydrant as a source of water for special short-term community activities, the applicant will obtain a hydrant permit and water meter from the utilities department at least 24 hours prior to the time of use. Charges for the service and the water used will be based only on the water user rate of $6.50 per 1,000 gallons."

Section 12. Severability. Should any provision of this ordinance be declared by a court to be unconstitutional or invalid, such decision shall not affect the validity of the ordinance as a whole, or any part thereof, other than the part so declared unconstitutional or invalid. The City Council declares it would have adopted this ordinance and each part or parts hereof irrespective of the fact that any one part or parts be declared unconstitutional or invalid.

Section 13. This ordinance shall take effect on January 1, 2026.

INTRODUCED, READ, AND ORDERED PUBLISHED this 7th day of October, 2025.

PASSED, ADOPTED AND APPROVED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney:

BY: _____

Publication Dates: October 9, 2025
October 23, 2025

~~***REDLINE/STRIKETHROUGH VERSION***~~

FOR INFORMATION ONLY -- NOT PART OF THE ORDINANCE

Underlined indicates new material
~~Strikethrough~~ indicates deleted material

Sec. 102-170. Residential user charges—Within city.

Bimonthly user charges for residential class of service within the city shall be based upon the following service charges and usage rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

(1) Single-family or other individually connected units:

a. The bimonthly service charge is…… $25.83 ~~$21.83~~

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons, per 1,000.....$6.50 ~~$6.19~~

2. from 30,001 to 60,000 gallons, per 1,000……...$8.13 ~~$7.74~~

3. from 60,001 to 90,000 gallons, per 1,000……...$9.78 ~~$9.31~~

4. All above 90,000 gallons, per 1,000……..……..$13.02 ~~$12.40~~

(2) Duplex, multifamily, townhouse, or other units that are interconnected:

a. The total bimonthly service charge regardless of usage is as follows:

Number of Units	*Service Charge*
2—6	$40.54 ~~$34.26~~
7—18	$70.87 ~~$59.90~~
19—60	$96.19 ~~$81.30~~
61—144	$217.72 ~~$184.01~~
Over 144	$369.62 ~~$312.39~~

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons for the first unit plus 13,000 gallons for each additional unit at the rate of $6.50 ~~$6.19~~ per 1,000 gallons.

2. 30,001—60,000 gallons for the first unit plus 26,000 gallons for each additional unit at the rate of $8.13 ~~$7.74~~ per 1,000 gallons.

3. 60,001—90,000 gallons for the first unit plus 39,000 gallons for each additional unit at the rate of $9.78 ~~$9.31~~ per 1,000 gallons.

4. All remaining usage at the rate of $13.02 ~~$12.40~~ per 1,000 gallons.

Sec. 102-171. Residential user charges—Outside city.

Bimonthly user charges for residential service outside the city shall be based upon the following service charges and user rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

(1) Single-family or other individually connected units:

a. The bimonthly service charge is…….$51.66 ~~$43.66~~

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons per 1,000……$13.01 ~~$12.39~~

2. from 30,001 to 60,000 gallons, per 1,000……..……..$16.26 ~~$15.49~~

3. from 60,001 to 90,000 gallons, per 1,000……..$19.55 ~~$18.62~~

4. All over 90,000 gallons, per 1,000……..$26.05 ~~$24.81~~

(2) Duplex, multifamily, townhouse, or other units that are interconnected:

a. The total bimonthly service charge regardless of usage is as follows:

Number of Units	*Service Charge*
2—6	$81.07 ~~$68.52~~
7—18	$141.77 ~~$119.82~~
19—60	$192.41 ~~$162.62~~
61—144	$435.45 ~~$368.01~~
Over 144	$739.25 ~~$624.79~~

b. Plus, a bimonthly usage charge as follows:

1. 0—30,000 gallons for the first unit plus 13,000 gallons for each additional unit at the rate of $13.01 ~~$12.39~~ per 1,000 gallons.
2. 30,001—60,000 gallons for the first unit plus 26,000 gallons for each additional unit at the rate of $16.26 ~~$15.49~~ per 1,000 gallons.
3. 60,001—90,000 gallons for the first unit plus 39,000 gallons for each additional unit at the rate of $19.55 ~~$18.62~~ per 1,000 gallons.
4. All remaining usage at the rate of $26.05 ~~$24.81~~ per 1,000 gallons.

Sec. 102-172. Nonresidential user charges—Within city.

Bimonthly user charges for nonresidential class of service within the city is based upon the following service charges and user rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

Meter Size	*Service Charge*
⅝"× ¾"	$25.83 ~~$21.83~~
¾"	$30.79 ~~$26.02~~
1"	$40.54 ~~$34.26~~
1 ½"	$70.87 ~~$59.91~~
2"	$96.19 ~~$81.31~~
3"	$217.72 ~~$184.02~~
4"	$369.62 ~~$312.42~~

Meter Size	*Quantity (in 1,000 gallons) at a rate of* $6.50 ~~$6.19~~ *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $8.13 ~~$7.74~~ *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $9.78 ~~$9.31~~ *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $13.02 ~~$12.40~~ *per 1,000 gallons*
⅝" × ¾"	0 to 170	170 to 340	340 to 510	All over 510
¾"	0 to 170	170 to 340	340 to 510	All over 510
1"	0 to 280	280 to 560	560 to 840	All over 840
1 ½"	0 to 600	600 to 1,200	1,200 to 1,800	All over 1,800
2"	0 to 900	900 to 1,800	1,800 to 2,700	All over 2,700
3"	0 to 2,000	2,000 to 4,000	4,000 to 6,000	All over 6,000
4"	0 to 3,400	3,400 to 6,800	6,800 to 10,200	All over 10,200

Sec. 102-173. Nonresidential user charges—outside city.

Bimonthly user charges for nonresidential class of service outside the city is based upon the following service charges and user rates; provided, however, there will be a bimonthly service charge regardless of usage as set forth in this section:

Meter Size	*Service Charge*
⅝"× ¾	$51.66 ~~$43.66~~
¾"	$61.59 ~~$52.05~~
1"	$81.07 ~~$68.53~~
1 ½"	$141.77 ~~$119.83~~
2"	$192.41 ~~$162.63~~
3"	$435.45 ~~$368.04~~
4"	$739.25 ~~$624.85~~

Meter Size	*Quantity (in 1,000 gallons) at a rate of* $13.01 ~~$12.39~~ *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $16.26 ~~$15.49~~ *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $19.55 ~~$18.62~~ *per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of* $26.05 ~~$24.87~~ *per 1,000 gallons*
⅝" × ¾"	0 to 170	170 to 340	340 to 510	All over 510
¾"	0 to 170	170 to 340	340 to 510	All over 510
1"	0 to 280	280 to 560	560 to 840	All over 840
1 ½"	0 to 600	600 to 1,200	1,200 to 1,800	All over 1,800
2"	0 to 900	900 to 1,800	1,800 to 2,700	All over 2,700
3"	0 to 2,000	2,000 to 4,000	4,000 to 6,000	All over 6,000
4"	0 to 3,400	3,400 to 6,800	6,800 to 10,200	All over 10,200

Sec. 102-174. Distributor and institution user rates.

The following water user rates are applicable to contractual service in or out of the city accountable through master meter or meters to user-owned and user-maintained distribution systems:

(1) First 500,000 gallons per month, per 1,000 gallons……$6.66 ~~$6.34~~

(2) Excess of 500,000 gallons per month, per 1,000 gallons……..…..$6.42 ~~$6.11~~

Sec. 102-175. Fill station user rates.

The water user rate applicable for fill station usage will be charged at $9.78 ~~$9.31~~ per 1,000 gallons.

Sec. 102-176. Fire hydrant metered water user rates.

(a) The water user rate applicable to permitted users of fire hydrant meters for measuring water supplied from a city fire hydrant is $9.78 ~~$9.31~~ per 1,000 gallons, plus a service charge as follows:

(1) 1 to 90 days: $1.00 per day, minimum of 1 day

(2) 91 to 180 days: $2.00 per day

(3) 181 days or more: $3.00 per day

A damage deposit of $1,250.00 will be collected at the time of issuance of the fire hydrant permit. Upon return of the fire hydrant meter in condition acceptable to the city, the damage deposit will be returned.

(b) Tampering with, or in any manner altering the operation of the meter such that the register usage is less than the actual usage will result in an additional fee of $5.00 per day being charged retroactive to the date the hydrant meter permit was issued and ending on the date the meter is returned. The charges provided in this paragraph shall be in addition to the charges provided in paragraph (a) of this section.

(c) If the city cannot furnish a fire hydrant meter, the customer may use the customer's own meter upon obtaining a permit under provisions of this section. The customer may be required to submit written proof that the meter has been calibrated and reads accurately.

Sec. 102-177. Municipal park rate.

(a) Monthly user rate for the municipal park class is based upon the rate of $3.70 ~~$3.52~~ per 1,000 gallons.

(b) This service is interruptible to the extent the city may limit the times of irrigation and the amount of water used. The city and the Apex Park and Recreation District-owned properties, which have occupied structures located thereon, are excluded from this class of water service.

Sec. 102-178. - Unmetered standby fire protection service charge.

Bimonthly charges for unmetered standby fire protection service is as follows:

	In City	Out of City
a. Fire hydrants, each	$9.78 ~~$9.31~~	$14.67 ~~$13.97~~
b. Automatic sprinkler system:		
⅝″—¾″ service line	$9.78 ~~$9.31~~	$14.67 ~~$13.97~~
1″ service line	$9.78 ~~$9.31~~	$14.67 ~~$13.97~~
1¼″ service line	$19.57 ~~$18.64~~	$29.34 ~~$27.94~~
1½″ service line	$19.57 ~~$18.64~~	$29.34 ~~$27.94~~
2″ service line	$29.31 ~~$27.91~~	$43.96 ~~$41.87~~
3″ service line	$39.05 ~~$37.19~~	$58.57 ~~$55.78~~
4″ service line	$58.64 ~~$55.85~~	$87.97 ~~$83.78~~
6″ service line	$78.17 ~~$74.45~~	$117.27 ~~$111.69~~
8″ service line	$92.49 ~~$88.09~~	$138.77 ~~$132.16~~

Sec. 102-179. Lost water rate.

Unmetered water lost or used due to activities such as, but not limited to, excavation, demolition, landscaping, or intentional acts of vandalism or theft will be billed to the responsible party at the rate of $9.78 ~~$9.31~~ per 1,000 gallons. The estimated volume of unmetered lost water will be based on main size, break size, water pressure, flow time, or other available data.

Sec. 102-180. Special service fees and user rates.

Prior to use of the fire hydrant as a source of water for special short-term community activities, the applicant will obtain a hydrant permit and water meter from the utilities department at least 24 hours prior to the time of use. Charges for the service and the water used will be based only on the water user rate of $6.50 ~~$6.19~~ per 1,000 gallons.

CITY OF ARVADA

REPORT TO CITY COUNCIL PUBLIC HEARING

AGENDA ITEM 10.B.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: CB25-022, An Ordinance Amending Section 102-206 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Wastewater Users Rates and Bimonthly Service Charges, and Section 102-355 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Stormwater User Rates (Ordinance No. 4908) (Presenter: Jacqueline Rhoades, Infrastructure Director)

Report in Brief

PRESENTER:Jacqueline Rhoades, Infrastructure Director

At the August 12, 2025 City Council meeting, the City team presented a workshop on revenue increase scenarios for updated water, sewer, and stormwater rates and bimonthly service fees for 2026. City Council directed the City team to return with the wastewater and stormwater fund scenarios that are reflected in the attached ordinance.

The ordinance before the City Council will adjust Wastewater and Stormwater Rates for 2026. The attached ordinance will increase wastewater rates by 12%, with no change to the bimonthly service fees. The overall revenue increase will be 10.5% for 2026. This will increase the typical in-city single-family wastewater bill by $43.20 per year ($7.20 per bimonthly bill or $3.60 per month). The Infrastructure Department is also presenting a stormwater rate increase of 6% in 2026. This will increase the typical in-city single-family wastewater bill by $4.05 per year ($0.68 per bimonthly bill or $0.34 per month).

The City's Infrastructure Department continues to prepare for investments in operations and infrastructure as part of our ongoing commitment to continue to provide reliable water, sewer, and stormwater drainage services to our community. This work aligns with the Infrastructure Priority Area of the City Council Strategic Plan, specifically Infrastructure Work System Service 1: Provides the community with a safe, resilient, high-quality water supply, drainage system, wastewater disposal, and solid waste management services for full city build-out, as defined by the Comprehensive Plan. This work also aligns with the principle that the City maintains utility rates at the lowest practical levels, with accurate billing that supports robust and reliable infrastructure.

The Arvada team recommends that the City Council approve CB25-022, An Ordinance Amending Section 102-206 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Wastewater Users Rates and Bimonthly Service Charges, and Section 102-355 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Stormwater User Rates.

Financial Impact

The Wastewater Fund revenue scenario presented in this Ordinance will generate approximately $1,966,000 of new revenues, which will be used primarily towards paying for debt service and capital projects. The Stormwater Fund revenue scenario presented in this Ordinance will generate approximately $293,228 of new revenues, which will be used primarily towards paying for capital projects.

Background

In support of the City Council Strategic Plan and the Infrastructure Work System, the City team has been developing, implementing and refining a financial strategy to support reinvestment in aging wastewater and stormwater infrastructure and expansion of capacity to support planned development.

Over the course of three workshops in 2025, the City team presented City Council with foundational information about utility financial strategies, presented a series of revenue increase scenarios for the wastewater fund, presented a single revenue scenario for the stormwater fund, and requested direction about how best to provide assistance to customers who are struggling to pay their utility bill.

At the final workshop on August 12, 2025, the City team presented four revenue increase scenarios for the wastewater fund for updating wastewater rates for 2026. No change in the bimonthly wastewater service fee was proposed for 2026. At the August workshop, the City team received direction about which of these scenarios to bring back to City Council for adoption on October 7, 2025 for first reading. Additional revenue from these adjustments enables major reinvestments and capacity building projects to proceed in accordance with a schedule laid out in the master planning work directed in the City Council Strategic Plan. The 2026 budget for the Wastewater Enterprise Fund includes new revenues of approximately $1,966,000, which will be used primarily towards paying for debt service and capital projects.

At the same workshop, the City team presented a Stormwater Fund scenario that would provide new revenues of approximately $293,000. These revenues will be used primarily for capital projects. The City team provided a single revenue increase scenario to City Council for 2026 while the City team assesses and refines the Stormwater Fund's capital project prioritization process. The intent is to return to City Council in early 2026 with a Stormwater 101 presentation and a discussion about establishing financial sustainability for this fund.

Discussion

The City’s Infrastructure Work System continues to prepare for investments in operations and infrastructure as part of our ongoing commitment to continue to provide reliable water, sewer, and stormwater drainage services to our community. This work supports the Infrastructure Priority Area of the City Council Strategic Plan, specifically Infrastructure Works System Service 1: Provides the community with a safe, resilient, high-quality water supply, drainage system, wastewater disposal and solid waste management services for full city build-out, as defined by the Comprehensive Plan. The City team's presentation of the requested revenue increase scenario for the 2026 adjustments to the wastewater rate and fee schedule and the stormwater rate schedule also aligns with the principle that the City maintains utility rates at the lowest practical levels.

On an annual basis, the City team provides City Council with foundational utility enterprise information and a series of revenue scenarios for adjusting wastewater volumetric rates and fixed bimonthly service fees. There continue to be pressures that are driving a significant wastewater rate increase for 2026. The primary cost driver for 2026 is the need for capital reinvestment projects that will replace or repair aging wastewater collection systems. These projects were identified as priorities in master planning conducted in recent years. While inflation is still a concern, the City team is also managing the impact that current and potential future tariffs will have on project costs. Also included in this increase is the 8% increase in Metro Water Recovery charges for the City's wastewater treatment.

The City team is presenting an in-city rate increase of 12% and a bimonthly service charge increase of 0%, for a total revenue increase of 6.9%. If approved, this rate change will result in an additional $43.20 per year ($7.20 per bimonthly bill, or $3.60 per month) for a typical in-city single family owner.

On an annual basis, the City team also makes a recommendation for adjusting stormwater revenues. The City team is presenting an increase of 6%. If approved, this rate change will result in an additional $4.05 per year ($0.68 per bimonthly bill, or $0.34 per month) for a typical in-city single family owner. In accordance with past practice, the in-city rate increases are used as an index to calculate all other customer categories.

The complete updated wastewater and stormwater rate schedules are in the proposed ordinance.

Based on the City Council's feedback, the City team will also investigate opportunities to provide an additional utility bill assistance program to our customers who are struggling to pay their utility bill. In addition to the hardship credits, bill

equalizations and bill arrangements that we currently offer, we will work with the Colorado agency(ies) that offer LEAP (Low-income Energy Assistance Program) benefits to potentially gain access to their customer list. If implemented, Arvada utility customers who already qualify for the state's LEAP benefits would be automatically eligible to receive a $25 credit per bimonthly bill. While the LEAP program has been suspended for the remainder of 2025, the City team will continue to communicate with the appropriate agencies into 2026, with the intent to implement this program in 2026.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

Strategic Alignment

The recommended action aligns with the Infrastructure Work System Services within the City Council Strategic Plan. Specifically, the recommended action is consistent with the following work system service included in the Infrastructure Priority Area:

Provides the community with a safe, reliable high quality water supply, drainage system, and wastewater disposal services for full city build-out, as defined in the Comprehensive Plan. This includes maintaining utility rates at the lowest practical levels with accurate billing that supports replacement of aging infrastructure in order to maintain robust utility systems.

Alternative Courses of Action

1. Approve this ordinance increasing the rates for the Wastewater and Stormwater Fund in 2026.
2. Direct staff to return with an alternate revenue increase.

Recommendation for Action

The Arvada team recommends that the City Council approve Alternative No. 1.

Suggested Motion:

I move that CB25-022, An Ordinance Amending Section 102-206 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Wastewater Users Rates and Bimonthly Service Charges, and Section 102-355 of Chapter 102, Utilities, of the Arvada City Code Pertaining to Stormwater User Rates, be (approved on final reading, numbered 4908 and ordered published by title only) (rejected).

Prepared by:
Christine Gray, Utilities Business Manager

Reviewed by:

Approved by:

Jessica Morales, Deputy City Attorney	10/01/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Tammy Hedlund, Legal Specialist	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

COUNCIL BILL NO. 25-022
ORDINANCE NO. 4908

AN ORDINANCE AMENDING SECTION 102-206 OF CHAPTER 102, UTILITIES, OF THE ARVADA CITY CODE PERTAINING TO WASTEWATER USERS RATES AND BIMONTHLY SERVICES CHARGES AND SECTION 102-355 OF CHAPTER 102, UTILITIES, OF THE ARVADA CITY CODE PERTAINING TO STORMWATER USERS RATES

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. Section 102-206, User charges, of Article II, Water and Sewer, of Chapter 102, Utilities, of the Arvada City Code is hereby amended to read as follows:

"**Sec. 102-206. User charges.**

Each connected property owner or user of the city sewer system is required to pay to the city a user charge based upon the following rate schedule according to the classified strength of sewage:

(1) Normal strength charges:

Bi-monthly usage (gallons)	Rate
a. Service charge, regardless of usage	$10.44
b. All usage, per 1,000 gallons	$8.36

(2) Plus, extra strength charges as follows:

	Per Pound
a. BOD in excess of 300 mg/l	$0.85
b. SS in excess of 330 mg/l	$0.92
c. TKN in excess of 35 mg/l	$1.78

"

Section 2. Section 102-355, Stormwater management utility service charge established, of Article VI, Arvada Stormwater Management Utility Ordinance, of Chapter 102, Utilities, of the Arvada City Code is hereby amended to read as follows:

"**Sec. 102-355. Stormwater management utility service charge established.**

(a) There is hereby imposed on the owner of each and every lot or parcel of land within the city containing an impervious surface, except as specifically provided in subsection (b) of this section, a stormwater management utility service charge. This service charge is deemed

reasonable and necessary to pay for the project costs of the existing city stormwater facilities and stormwater quality programs; and project costs of future city stormwater facilities and stormwater quality programs. The proceeds of said charge, upon collection, are made as payment for the use of the city's stormwater facilities by owners of real property upon which the service charge is imposed.

(b) All public and private highways, roadways, streets and alleys and associated sidewalks and bike paths shall be part of the stormwater facilities, and, therefore, shall be exempt from all charges imposed by this article. The exemption provided herein shall not apply to public or private parking lots, driveways, service drives, drive aisles or internal site roadways, beltways, access drives or lanes, and sidewalks.

(c) The charge provided herein shall be based upon the extent to which the city's stormwater facilities are used by persons within the city. Use of stormwater facilities shall be based upon a calculation of runoff from the impervious surfaces of parcels of land located within the city.

(d) The city shall bill, as part of its regular utility bill or as a separate bill in cases where a parcel of real property is not served or serviced by city water or sewer utilities, for the service charge provided in this article. The bill shall be made to the owner of record of the property as set forth in the records of the city, or to such other person as the owner may designate in writing to accept the bill and the recipient of the bill shall pay the bill upon receipt thereof. Nothing in this subsection shall serve to relieve the owner of responsibility for ensuring that payment of the service charge is made is the bill sent to some other person designated by the owner as recipient.

(e) The bimonthly service charge as provided in this article shall be $0.003978 per square foot of impervious surface located on the property. The charge described in this subsection is imposed on each and every improved lot and parcel of land within the city upon which an impervious surface exists. The service charge shall be billed by the city and shall be paid upon receipt thereof.

(f) In the calendar year 2001, to be effective in the calendar year 2002, the director shall determine or cause the determination to be made, of the estimated number of square feet of impervious surface in or on the real property of each owner within the city, using the definition of impervious surface set forth in this article. The director may make such measurement based upon any reasonable means, including, but not by way of limitation, aerial survey and statistical analysis of real property and impervious surfaces located thereon. The service charge for the stormwater management utility shall be calculated by dividing the estimated cost of providing stormwater facilities and project costs by the estimated square footage of impervious surface within the boundaries of the city, which product shall yield the per square footage cost of service. The director may update the measurement of impervious surface area at such times as the director deems reasonable and necessary to do so, but in any event, not less than once each ten years, with any change to be effective in the next calendar year. If, for any reason, a recalculation of the service charge does not occur, then the most recent rate charged shall continue until the recalculation is made. No failure to make a recalculation of the service charge shall repeal, amend, or suspend operation of this article.

(g) Each development occurring within the city after adoption of this article that results in an increase or decrease in impervious surface area shall be subject to the provisions of this article. The director shall be entitled to measure an increase or decrease to any impervious surface area resulting from a development, and add the resulting increase to or deduct the resulting decrease from, the service charge to the city utility bill for the property wherein the development occurred. The director shall establish such administrative rules in accordance with section 102-359 for determining when an increase or decrease to impervious surface areas has occurred as may be reasonable and necessary to give effect to this subsection.

(h) The service charge provided in this article shall be subject to additional fees for delinquent payment, uncollectible checks, liens and any other penalties which are the same as those imposed with city water or sewer utility charges as provided in this chapter, or pursuant to the provisions of chapter 59 entitled "municipal liens."

Section 3. Severability. Should any provision of this ordinance be declared by a court to be unconstitutional or invalid, such decision shall not affect the validity of the ordinance as a whole, or any part thereof, other than the part so declared unconstitutional or invalid. The City Council declares it would have adopted this ordinance and each part or parts hereof irrespective of the fact that any one part or parts be declared unconstitutional or invalid.

Section 4. This ordinance shall take effect on January 1, 2026.

INTRODUCED, READ, AND ORDERED PUBLISHED this 7th day of October, 2025.

PASSED, ADOPTED AND APPROVED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney:

BY: _____

Publication Dates: October 9, 2025
October 23, 2025

~~***REDLINE/STRIKETHROUGH VERSION***~~

FOR INFORMATION ONLY -- NOT PART OF THE ORDINANCE

Underlined indicates new material
~~Strikethrough~~ indicates deleted material

Sec. 102-206. User charges.

Each connected property owner or user of the city sewer system is required to pay to the city a user charge based upon the following rate schedule according to the classified strength of sewage:

(1) Normal strength charges:

Bi-monthly usage (gallons)	Rate
a. Service charge, regardless of usage	$10.44
b. All usage, per 1,000 gallons	$8.36 ~~$7.46~~

(2) Plus, extra strength charges as follows:

	Per Pound
a. BOD in excess of 300 mg/l	$0.85 ~~$0.76~~
b. SS in excess of 330 mg/l	$0.92 ~~$0.82~~
c. TKN in excess of 35 mg/l	$1.78 ~~$1.59~~

Sec. 102-355. Stormwater management utility service charge established.

(a) There is hereby imposed on the owner of each and every lot or parcel of land within the city containing an impervious surface, except as specifically provided in subsection (b) of this section, a stormwater management utility service charge. This service charge is deemed reasonable and necessary to pay for the project costs of the existing city stormwater facilities and stormwater quality programs; and project costs of future city stormwater facilities and stormwater quality programs. The proceeds of said charge, upon collection, are made as payment for the use of the city's stormwater facilities by owners of real property upon which the service charge is imposed.

(b) All public and private highways, roadways, streets and alleys and associated sidewalks and bike paths shall be part of the stormwater facilities, and, therefore, shall be exempt from all charges imposed by this article. The exemption provided herein shall not apply to public or

private parking lots, driveways, service drives, drive aisles or internal site roadways, beltways, access drives or lanes, and sidewalks.

(c) The charge provided herein shall be based upon the extent to which the city's stormwater facilities are used by persons within the city. Use of stormwater facilities shall be based upon a calculation of runoff from the impervious surfaces of parcels of land located within the city.

(d) The city shall bill, as part of its regular utility bill or as a separate bill in cases where a parcel of real property is not served or serviced by city water or sewer utilities, for the service charge provided in this article. The bill shall be made to the owner of record of the property as set forth in the records of the city, or to such other person as the owner may designate in writing to accept the bill and the recipient of the bill shall pay the bill upon receipt thereof. Nothing in this subsection shall serve to relieve the owner of responsibility for ensuring that payment of the service charge is made is the bill sent to some other person designated by the owner as recipient.

(e) The bimonthly service charge as provided in this article shall be $0.003978 ~~$0.003753~~ per square foot of impervious surface located on the property. The charge described in this subsection is imposed on each and every improved lot and parcel of land within the city upon which an impervious surface exists. The service charge shall be billed by the city and shall be paid upon receipt thereof.

(f) In the calendar year 2001, to be effective in the calendar year 2002, the director shall determine or cause the determination to be made, of the estimated number of square feet of impervious surface in or on the real property of each owner within the city, using the definition of impervious surface set forth in this article. The director may make such measurement based upon any reasonable means, including, but not by way of limitation, aerial survey and statistical analysis of real property and impervious surfaces located thereon. The service charge for the stormwater management utility shall be calculated by dividing the estimated cost of providing stormwater facilities and project costs by the estimated square footage of impervious surface within the boundaries of the city, which product shall yield the per square footage cost of service. The director may update the measurement of impervious surface area at such times as the director ~~he~~ deems reasonable and necessary to do so, but in any event, not less than once each ten years, with any change to be effective in the next calendar year. If, for any reason, a recalculation of the service charge does not occur, then the most recent rate charged shall continue until the recalculation is made. No failure to make a recalculation of the service charge shall repeal, amend, or suspend operation of this article.

(g) Each development occurring within the city after adoption of this article that results in an increase or decrease in impervious surface area shall be subject to the provisions of this article. The director shall be entitled to measure an increase or decrease to any impervious surface area resulting from a development, and add the resulting increase to or deduct the resulting decrease from, the service charge to the city utility bill for the property wherein the development occurred. The director shall establish such administrative rules in accordance with section 102-359 for determining when an increase or decrease to impervious surface areas has occurred as may be reasonable and necessary to give effect to this subsection.

(h) The service charge provided in this article shall be subject to additional fees for delinquent payment, uncollectible checks, liens and any other penalties which are the same as those imposed with city water or sewer utility charges as provided in this chapter, or pursuant to the provisions of chapter 59 entitled "municipal liens.

CITY OF ARVADA

REPORT TO CITY COUNCIL PUBLIC HEARING

AGENDA ITEM 10.C.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: CB25-023, An Ordinance Prohibiting the Installation of Graywater Treatment Works and the Use of Graywater Within the City of Arvada (Ordinance No. 4909) (Presenter: Jacqueline Rhoades, Infrastructure Director)

Report in Brief

PRESENTER:Jacqueline Rhoades

CB25-023, An Ordinance Prohibiting the Installation of Graywater Treatment Works and the Use of Graywater Within the City of Arvada, is a new ordinance to ensure compliance with state Regulation 86 and HB 24-1362. This ordinance prohibits the installation or use of graywater and graywater systems within the city and the city's water system boundaries.

The Arvada team recommends that the City Council approve CB25-023, An Ordinance Prohibiting the Installation of Graywater Treatment Works and the Use of Graywater Within the City of Arvada.

Financial Impact

If the ordinance is approved as is, there is no financial impact. If the council chooses to allow graywater treatment works or use of graywater, either partially or wholly, there would be financial requirements for the creation, establishment, and management of a new control program including staffing and training needs, a new permitting framework, inspections and enforcement, software integration, education and outreach materials, etc.

Background

Graywater is wastewater generated from bathroom sinks, bathtubs, showers, and laundry machines that can be reused for non-potable purposes, such as toilet flushing and subsurface irrigation. Graywater treatment works is an arrangement of devices and structures used to: (a) collect graywater from within a building or facility; and (b) treat, neutralize, or stabilize graywater within the same building or facility to the level necessary for safe use. Regulation 86, adopted by the Colorado Water Quality Control Commission, establishes the minimum standards for graywater treatment works and graywater use. HB 24-1362 transfers oversight of household graywater treatment works and graywater use to counties and municipalities and requires these jurisdictions to “opt-out” by January 1, 2026, if they do not wish to allow graywater treatment works or graywater use. Jurisdictions that do not "opt-out" must immediately establish and manage a full graywater control program with permitting, inspections, enforcement, staff training, public education, and interagency coordination.

Discussion

HB24-1362 requires the City to establish and manage a graywater control program. While water savings could be realized by the residents that install graywater treatment works, there are still regulatory and public health risks to be managed. Prohibiting graywater treatment works and graywater use at this time reduces the risk of cross-contamination, limits operational challenges, and minimizes legal and enforcement complexity. After careful evaluation, assessing resource capacity as well as uncertainties such as whether this use is allowable under the City’s 1965 contract with Denver Water that explicitly prohibits successive uses of water by Arvada or any customers of Arvada, the team is recommending to "opt-out" of HB 24-1362. If future conditions change, HB 24-1362 allows the City to partially or wholly allow the installation of graywater treatment works and graywater

use at any time by passing a new ordinance.
Should the City Council pass this Ordinance, the City team will propose amendments to Arvada's Building Code at a later date that will further codify the prohibition on installing graywater treatment works and using graywater within Arvada and Arvada's water system.

Public Contact

Posting of the City Council agenda

Commission Recommendation

n/a

Strategic Alignment

This action is in alignment with the Infrastructure Principles and Work System Services in the City Council Strategic Plan., including: INF1 Provides the community with a safe, resilient, high-quality water supply, drainage system, wastewater disposal, and solid waste management services for full city build-out; and INF7 Ensures compliance with federal and state regulations.

Alternative Courses of Action

1. Approve the Ordinance as written
2. Take no action and automatically be "opted-in" to allow the installation of graywater treatment works and use of graywater, either wholly or partially. Opting-in in any capacity requires the City to create, fund, manage, and enforce a new graywater control program.

Recommendation for Action

The Arvada team recommends that the City Council approve CB25-023, An Ordinance Prohibiting the Installation of Graywater Treatment Works and the Use of Graywater Within the City of Arvada.

Suggested Motion:

I move that CB25-023, An Ordinance Prohibiting the Installation of Graywater Treatment Works and the Use of Graywater Within the City of Arvada, be (approved on final reading, numbered 4909 and ordered published by title only) (rejected).

Prepared by:
Laura Hemler, Assistant City Attorney

Reviewed by:

Approved by:

Jessica Morales, Deputy City Attorney	10/01/2025
Jacqueline Rhoades, Director of Infrastructure	10/01/2025
Bryan Archer, Chief Financial Officer	10/02/2025

Tammy Hedlund, Legal Specialist	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

COUNCIL BILL NO. 25-023
ORDINANCE NO. 4909

AN ORDINANCE PROHIBITING THE INSTALLATION OF GRAYWATER TREATMENT WORKS AND THE USE OF GRAYWATER WITHIN THE CITY OF ARVADA

WHEREAS, graywater is wastewater collected specifically from bathroom and laundry room sinks, bathtubs, showers, and laundry machines; and

WHEREAS, graywater treatment works are an arrangement of devices and structures used to collect and lightly treat graywater within a building or facility, so that the graywater can be used for nondrinking water purposes, such as toilet flushing and outdoor subsurface irrigation; and

WHEREAS, despite treatment within graywater treatment works, graywater likely contains human pathogens that have the potential to be dangerous to public health; and

WHEREAS, Arvada's public water system has a statutory obligation to provide safe drinking water to all its customers, and to provide safeguards against cross connections that could introduce contamination to the water supply; and

WHEREAS, on May 29, 2024, the Colorado legislature passed HB 24-1362, which allows Colorado residents to install graywater treatment works in new construction projects and use the collected and treated graywater for toilet flushing and outdoor subsurface irrigation unless a local city adopts an ordinance prohibiting the installation of graywater treatment works and the use of all graywater in the municipality; and

WHEREAS, if the City of Arvada ("Arvada") does not prohibit the installation of graywater treatment works and use of graywater within Arvada and Arvada's water system, HB 24-1362 requires Arvada to implement a local graywater control program consistent with Regulation No. 86 – Graywater Control Regulation promulgated by Colorado's Department of Public Health and Environment's Water Quality Control Division (5 CCR 1002-86); and

WHEREAS, C.R.S. §31-15-601(1)(m), as amended by HB 24-1362, empowers the governing body of a municipality to adopt an ordinance prohibiting the installation of graywater treatment works and the use of all graywater; and

WHEREAS, implementing a local graywater control program would require extensive resources, and Arvada currently does not have the resources available to implement the required local graywater control program; and

WHEREAS, the Arvada City Council recognizes the importance of water conservation and supports many other impactful ways to advance water savings; and

WHEREAS, the Arvada City Council therefore wishes to prohibit the installation of graywater treatment works and the use of all graywater within the City's water system boundaries to comply

with HB 24-1362 and protect public health, safety, and welfare; and

WHEREAS, updates to the Arvada Building Code will be forthcoming following the passage of this prohibition.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARVADA COLORADO:

Section 1. The Arvada City Council hereby declares that the installation of graywater treatment works and the use of graywater in Arvada and Arvada's water system are prohibited.

Section 2. This ordinance shall be effective five days after publication following final passage.

INTRODUCED, READ, AND ORDERED PUBLISHED this 7th day of October, 2025.

PASSED, ADOPTED AND APPROVED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

Publication Dates: October 9, 2025
October 23, 2025

CITY OF ARVADA

REPORT TO CITY COUNCIL PUBLIC HEARING

AGENDA ITEM 10.D.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: CB25-024, An Ordinance Appropriating Funds for Fiscal year 2026 (Ordinance No. 4910) (Presenter: Bryan Archer, Chief Financial Officer)

Report in Brief

Pursuant to Section 10.4 of the Home Rule Charer, the Council shall adopt an ordinance for the annual appropriation.

The total ordinance is in the amount of $382,736,177.

The Arvada team recommends that the City Council approve CB25-024, An Ordinance Appropriating Funds for Fiscal Year 2026.

Financial Impact

The appropriating ordinance is in the amount of $382,736,177.

Background

The Arvada team's presentation of the budget started on June 10, 2025 when the Finance and CMO teams presented the revised l0-year models along with a detailed review of current and previous revenue estimates and updates to the l0-year CIP model.

In mid September, 2025, the budget document was provided to the Council and posted to the City's website. The budget document includes the City Manager's transmittal letter, which provides an overview of the budget document as well as the major changes and issues associated with the proposed expenditure of over $382 million of public funds.

On August 12, 2025, members of the Infrastructure Work System along with the Finance and CMO teams presented recommendations for funding the City's water, wastewater and stormwater infrastructure.

A budget workshop will be held on October 14, 2025, which will include: what is being proposed for funding, what was not funded and what areas need to be addressed in the upcoming years. The City Manager's Office and Finance teams will facilitate the presentation in collaboration with Work Systems Leaders, who will be available to provide additional details and information associated with the proposed changes.

Discussion

The 2025-2026 Proposed Revised Biennial Operating and Capital Budget was released to the City Council and the Arvada Communityin mid September. Information within the Proposed Revised Biennial Budget provides an excellent overview of proposed allocations of resources and priorities identified by the City Council and team members.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

The ordinance supports the following principle within the Organizational and Service Effectiveness Priority Area within the City Council Strategic Plan:

Provides a well-managed, fiscally responsible government that operates effectively and efficiently while identifying revenue requirements to sustain current service levels and achieve future requested levels of service.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve CB25-024, An Ordinance Appropriating Funds for Fiscal Year 2026.

Suggested Motion:

I move that CB25-024, An Ordinance Appropriating Funds for Fiscal Year 2026, be (approved on final reading, numbered 4910 and ordered published by title only) (rejected).

Prepared by:
Debra Nielson, Deputy Director of Finance

Reviewed by:

Approved by:

Jenna Belec, Executive Assistant	09/29/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Gail Walker, Legal Specialist-Contracts	10/02/2025
Laura Hemler, Assistant City Attorney	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

COUNCIL BILL NO. 25-024
ORDINANCE NO. 4910

AN ORDINANCE APPROPRIATING FUNDS FOR FISCAL YEAR 2026

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. Pursuant to the provisions of Section 10.4 of the Home Rule Charter, there is hereby appropriated money for fiscal year 2026 by fund in the following amounts:

Fund	Amount
General Fund	$144,116,026
Grants Fund	$1,811,588
Streets Maintenance Fund	$23,851,950
Community Development	$1,188,683
Arvada Housing Authority	$9,206,746
Parks	$16,229,628
Police Seizure	$33,123
COP Debt Service	$1,974,628
Police Tax Increment Fund .21	$7,763,014
Police Tax Increment Fund .25	$8,880,012
Debt Service	$5,804,032
Capital Projects Fund	$9,055,931
Water Fund	$80,716,889
Wastewater Fund	$31,283,503
Golf Course Fund	$10,719,120
Stormwater Fund	$4,214,429
Solid Waste	$4,847,211

Insurance Fund	$4,269,724
Computers	$7,840,268
Print Shop	$389,918
Vehicles	$5,878,253
Buildings	$2,661,501
TOTAL APPROPRIATION	**$382,736,177**

Section 2. This ordinance shall be effective five days after publication following final passage.

INTRODUCED, READ AND ORDERED PUBLISHED this7th day of October, 2025.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

Publication Dates: October 9, 2025
October 23, 2025

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 10.D.1.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-101, A Resolution Adopting the Budget for Fiscal Year 2026 (Presenter: Bryan Archer, Chief Financial Officer)

Report in Brief

The City's Charter provides that the annual budget must be adopted by the City Council 60 days prior to the first day of the next fiscal year. The budget must be adopted by both ordinance and resolution. Presented is the resolution for adoption of the 2026 budget.

The Arvada team recommends that the City Council approve R25-101, A Resolution Adopting the Budget for Fiscal Year 2026.

Financial Impact

The appropriation resolution is in the amount of $382,736,177.

Background

The Arvada team's presentation of the budget started on June 10, 2025, the Finance and CMO teams presented the revised 10-year models along with a detailed review of current and previous revenue and expenditure estimates. An update to the 10-year CIP model was also presented.

On August 12, 2025, members from the Infrastructure worksystem along with the Finance and CMO teams presented final recommendations for funding the City's water, wastewater and stormwater infrastructure. This was the last presentation in the series of presentations that have gone back over the past year.

In mid-September 2025, the budget document was provided to the Council and posted to the City's website. The budget document includes the City Manager's transmittal letter. The transmittal letter provides an overview of the budget as well as the major changes and issues associated with the proposed expenditure of over $382 million of public funds.

On October 14, 2025, a budget workshop was held which included: what is being proposed for funding, what was not funded and what areas need to be addressed in the upcoming years. The City Manager's Office and Finance team facilitated the representation in collaboration with Work System Leaders, who were available to provide additional details and information associated with the proposed changes.

Discussion

The 2025-2026 Proposed Revised Biennial Operating and Capital Budget was released to the City Council and the Arvada Community in mid-September. Information within the Proposed Revised Biennial Budget provides an excellent overview of proposed allocations of resources and priorities identified by the City Council and team members, as well as the relationship of each work system to the Strategic Plan.

2025-2026 Proposed Revised Biennial Operating and Capital Budget

The complete summary of the budget by section and funding priorities associated with the proposed revised budget is provided in the City Manager's Budget Transmittal Letter dated September 15.

Public Contact

Posting of the City Council agenda. The Proposed Revised Biennial Operating and Capital Budget has been available on the City website since mid-Setpember and a comprehensive review of the budget was presented during the October 14 workshop.

Commission Recommendation

N/A

Strategic Alignment

The resolution supports the following principle with the Organizational and Service Effectiveness Priority Area within the City Council Strategic Plan:

Provides a well-managed, fiscally responsible government that operates effectively and efficiently while identifying revenue requirements to sustain current service levels and achieve future requested levels of service.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve R25-101, a Resolution Adopting the Budget for Fiscal Year 2026.

Suggested Motion:

I move that R25-101, A Resolution Adopting the Budget for Fiscal Year 2026, be (approved) (rejected).

Prepared by:
Debra Nielson, Deputy Director of Finance

Reviewed by:

Approved by:

Jenna Belec, Executive Assistant	09/29/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Gail Walker, Legal Specialist-Contracts	10/02/2025
Megan McCall, Assistant City Attorney II	10/03/2025
Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-101

A RESOLUTION ADOPTING THE BUDGET FOR FISCAL YEAR 2026

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO

Section 1. Pursuant to the provision of Section 10.4 of the Home Rule Charter, there is hereby adopted a budget for fiscal year 2026 in both a fund and work system based format.

Section 2. This Resolution shall be effective upon its approval by the Arvada City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

CITY OF ARVADA

REPORT TO CITY COUNCIL RESOLUTION

AGENDA ITEM 10.D.2.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-100, A Resolution Adopting the 2026 Capital Improvement Fund Budget and Allocating for Specific Projects in 2026 (Presenter: Bryan Archer, Chief Financial Officer)

Report in Brief

In accordance with Chapter 2, Article 7, Section 2-295 of the City Code, the capital improvement plan shall be adopted by resolution.

The City of Arvada 2025-2034 ten-year Revised Capital Improvement Plan is primarily a management tool used for the purpose of planning the direction of the City relative to capital projects. The City Council, by adopting this resolution, is directing the City Manager and the Arvada team to begin the 2026 capital projects according to the priorities set forth by the City Council. Funding for the 2026 capital improvement budget is appropriated by Ordinance.

The Arvada team recommends that the City Council approve R25-100, A Resolution Adopting the 2026 Capital Improvement Fund Budget and Allocating for Specific Projects in 2026.

Financial Impact

The Capital Improvement Plan by major area is summarized as follows:

Debt Service	$	11,118,660
Personnel	$	175,055
General Administration	$	1,000,000
Pavement Program	$	13,250,171
Streets	$	1,603,770
Stormwater	$	600,000
Technology	$	268,783
Traffic	$	2,787,888
Vibrant Neighborhoods and Communities	$	3,440,435
Wastewater	$	9,561,363
Water	$	39,018,524
Grand Total	$	82,824,649

Background

The Capital Improvement Plan (CIP) is a ten-year road map for creating, maintaining and paying for Arvada's present and future infrastructure needs. The CIP outlines the project costs, funding sources and estimated future operating costs associated with each capital improvement. The CIP summarizes the City's focus on Taking Lasting Care (TLC) and implementing the priorities and projects identified by the Citizen's Capital Improvement Project committee (CCIPC), which was formed in 2015 at the direction of the City Council. The CIP also summarizes the Strategic Results included in the 2024-2030 City Council Strategic Plan that determines funding priorities within the 2025-2034 Capital Improvement Plan.

Discussion

The 2025-2034 Proposed Revised Biennial Operating and Capital Budget was released to the City Council in mid-September. Information within the Proposed Revised Biennial Operating and Capital Budget provides an excellent overview of proposed allocations of resources and priorities identified by the City Council and the Arvada team related to capital projects. More information regarding the Capital Budget is available through the following link:

2025-2026 Proposed Revised Biennial Operating and Capital Budget

Public Contact

Posting of the City Council Agenda.

Commission Recommendation

N/A

Strategic Alignment

The resolution supports the following Principle within the Organizational and Service Effectiveness Priority Area of the City Council Strategic Plan:

Provides a well-managed, fiscally responsible government that operates effectively and efficiently while identifying revenue requirements to sustain current service levels and achieve future requested levels of service.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve R25-100, a Resolution Adopting the 2026 Capital Improvement Fund Budget and Allocating for Specific Projects in 2026.

Suggested Motion:

I move that R25-100, A Resolution Adopting the 2026 Capital Improvement Fund Budget and Allocating for Specific Projects in 2026, be (approved) (rejected).

Prepared by:
Debra Nielson, Deputy Director of Finance

Reviewed by:

Approved by:

Jenna Belec, Executive Assistant	09/29/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Gail Walker, Legal Specialist-Contracts	10/02/2025
Megan McCall, Assistant City Attorney II	10/03/2025
Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-100

A RESOLUTION ADOPTING THE 2026 CAPITAL IMPROVEMENT FUND BUDGET AND ALLOCATING FOR SPECIFIC PROJECTS IN 2026

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO

Section 1. Pursuant to the provision of Chapter 2, Article 7, Section 2-295 of the Arvada City Code, the Council hereby adopts the Capital Improvement Fund Budget for 2026 and allocates for specific projects in 2026 in the areas and amounts set forth below:

Area	Amount
Debt Service	$11,118,660
Personnel	$175,055
General Administration	$1,000,000
Pavement Program	$13,250,171
Streets	$1,603,770
Stormwater	$600,000
Technology	$268,783
Traffic	$2,787,888
Vibrant Neighborhoods and Communities	$3,440,435
Wastewater	$9,561,363
Water	$39,018,524
Total	**$82,824,649**

Section 2. This Resolution shall be effective upon its approval by the Arvada City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____

Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

_____

CITY OF ARVADA

REPORT TO CITY COUNCIL PUBLIC HEARING

AGENDA ITEM 10.E.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: CB25-025, An Ordinance Certifying the City of Arvada Mill Levy for 2025 for the Board of County Commissioners for Jefferson and Adams Counties (Ordinance No. 4911) (Presenter: Bryan Archer, Chief Financial Officer)

Report in Brief

The purpose of this ordinance is to certify the City's Mill Levy for the valuation year 2025. The 2026 proposed budget estimates that $10,380,747 will be collected in 2026 based on a mill levy of 4.31 mills. There is no change in the mill levy from the previous year.

This mill levy will be used to assess all property within the City for taxes to be collected in 2026 for the valuation year of 2025.

The Arvada team recommends that the City Council approve CB25-025, An Ordinance Certifying the City of Arvada Mill Levy for 2025 for the Board of County Commissioners for Jefferson and Adams Counties.

Financial Impact

The proposed revised 2025-2026 budget estimates that $10,380,747 will be collected based on the proposed mill levy for 4.31 mills. This mill levy is part of the revenue sources that generate the estimated revenues for the General Fund in 2026.

Background

This action is associated with the adoption of the 2026 budget. Certification of the mill levy for the valuation year 2025 will enable the City to receive property tax in 2026.

Discussion

As described herein, the estimated property tax of $10,380,747 for 2026 represents approximately 9.6% of the estimated General Fund revenue. Without the mill levy, the City would not be able to fund several critical services.

Public Contact

Posting of the City Council agenda.

Commission Recommendation

N/A

Strategic Alignment

The ordinance supports the following Principle within the Organizational and Service Effectiveness Priority Area of the City Council Strategic Plan:

Provides a sustainable government that operates effectively and efficiently while identifying revenue requirements to sustain current service levels and achieve future requested levels of service.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada team recommends that the City Council approve CB25-025, An Ordinance Certifying the City of Arvada Mill Levy for 2025 for the Board of County Commissioners for Jefferson and Adams Counties.

Suggested Motion:

I move that CB25-025, An ordinance Certifying the City of Arvada Mill Levy for 2025 for the Board of County Commissioners for Jefferson and Adams Counties, be (approved on final reading, numbered 4911 and ordered published by title only) (rejected).

Prepared by:
Debra Nielson, Deputy Director of Finance

Reviewed by:

Approved by:

Jenna Belec, Executive Assistant	09/29/2025
Bryan Archer, Chief Financial Officer	10/02/2025
Gail Walker, Legal Specialist-Contracts	10/02/2025
Laura Hemler, Assistant City Attorney	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

COUNCIL BILL NO. 25-025
ORDINANCE NO. 4911

AN ORDINANCE CERTIFYING THE CITY OF ARVADA MILL LEVY FOR 2025 FOR THE BOARD OF COUNTY COMMISSIONERS FOR JEFFERSON AND ADAMS COUNTIES

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. Pursuant to the provisions of C.R.S. 39-5-128(1), the City of Arvada does hereby certify the levy at 4.31 mills to be assessed against all property within the City of Arvada for taxes to be collected in 2026 for the valuation year of 2025.

Section 2. This Ordinance shall be effective five days after publication, following final passage.

INTRODUCED, READ, AND ORDERED PUBLISHED IN FULL this 7th day of October, 2025.

PASSED, ADOPTED AND APPROVED this 21st day of October, 2025.

_____
Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

_____

Publication Dates: October 9, 2025
October 23, 2025

CITY OF ARVADA

REPORT TO CITY COUNCIL PUBLIC HEARING

AGENDA ITEM 10.F.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: R25-102, A Resolution by the City Council for the City of Arvada, Colorado to Amend the 2014 Arvada Comprehensive Plan Land Use Designation Pertaining to 6800 Kilmer Street from Mixed Use; Residential Emphasis to Industrial/Office (Presenter: Rob Smetana, Manager of Planning & Development)

Report in Brief

(Presenter: Rob Smetana, Planning Manager)

Norris Design on behalf of Chelton, LLC. is requesting approval of a Major Comprehensive Plan Amendment from Mixed Use - Residential Emphasis to Industrial/Office in order to properly align the Comprehensive Plan with the IL (Industrial, Light) zoning that is in place.

The applicant is concurrently processing a Site Plan and Minor Subdivision application for the future construction of an outdoor RV storage yard under the allowance of the IL zoning district.

The Arvada Team recommends that the City Council approve R25-102, A Resolution by the City Council for the City of Arvada, Colorado to Amend the 2014 Arvada Comprehensive Plan Land Use Designation Pertaining to 6800 Kilmer Street from Mixed Use; Residential Emphasis to Industrial/Office.

Financial Impact

There is no fiscal impact to the city.

Background

The undeveloped subject property is 14.01 acres in size and is located at the terminus of West 68th Avenue and Indiana Street.

Staff conducted historical research to understand the planned future land uses for the site based on past Comprehensive Plans. Arvada's first Comprehensive Plan, adopted in 1964, designated this site as Low-Density Residential. In 1973, the land use designation was changed to Industrial Office Park. The property was annexed into the City in 1982 with the Cottonwood West Office Park Annexation and was zoned to PUD-I (Planned Unit Development – Industrial), which conformed with the Comprehensive Plan designation of Industrial Office Park. Up until 2005, the property retained an Industrial land use designation. However, in 2005, the land use designation was changed to Mixed Use – Residential Emphasis and remains as such. In May 2020, the property was rezoned to IL as part of the larger Land Development Code (LDC) Update and citywide rezoning. Concurrently, a Comprehensive Plan update was approved in order to align the new zone districts with the Comprehensive Plan. The land use designation of the subject property was not revised as part of this update, which resulted in the continued conflict.

In December 2021, a similar application for an RV storage yard was submitted to the City, and staff completed two project reviews. At that time, the applicant was proposing a higher number of RV parking spaces and was also requesting two Major Modifications from the LDC. A neighborhood meeting for the Major Modification requests was held on March 16th, 2022. In March 2023, after granting an extension request, the application was considered withdrawn due to inactivity pursuant to LDC Subsection 8-2-3-14-D.

On January 24, 2024, a new neighborhood meeting was held to present the intended Comprehensive Plan Amendment as well as the changes to the site plan which negate the need for any Major Modifications. In March 2024, this current application was submitted which reduced the number of RV parking spaces and removed the need for any Major Modifications.

The case was heard before the Planning Commission on September 17, 2024. The Planning Commission voted 6 to 1 to recommend denial to the City Council. The City Council subsequently heard the request at the November 2, 2024, City Council public hearing. The City Council voted 6 to 1 to deny the request.

On August 12, 2025, Community and Economic Development staff received a letter on behalf of Chelton, LLC, requesting that the City Council reconsider its denial of Chelton, LLC's Application to amend the 2014 Arvada Comprehensive Plan Land Use from Mixed Use, Residential Emphasis to Industrial/Office. In support of reconsideration, Chelton, LLC plans to present additional details from its development plan that balance the unique complexities of the former landfill site, located next to existing industrial properties, with the concerns of the nearby residential neighbors.

On September 2, 2025, the Council moved, pursuant to City Council Rule of Procedure 9(B), that the requirements for reconsideration under City Council Rule of Procedure 4(L) be set aside, and that the Council rehear the application to amend the Comprehensive Plan for 6800 Kilmer Street, at public hearing at a future date and time. A super majority was required for the motion to pass. The Council approved the motion 4 to 1.

That hearing was scheduled and noticed for October 21, 2025.

Discussion

COMPREHENSIVE PLAN AMENDMENT CONSIDERATIONS	Finding	STAFF ASSESSMENT
1. The existing comprehensive plan and/or any related element thereof is in need of the proposed amendment.	Complies	The existing Comprehensive Plan designation of Mixed Use: Residential Emphasis does not align with the current realities of the site or the adopted IL zoning. The City regulations in place allow the applicant to develop the site under the IL standards. However, this amendment to Industrial/Office is necessary to comply with Site Plan approval criteria 2, which states: "The application is consistent with the Comprehensive Plan.
1. The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.	Complies	As detailed in the *Compliance with the Comprehensive Plan* section of the staff report and criterion one above, the amendment is necessary in order to align with the adopted zoning of the property. The amendment is compatible with the other land uses adjacent to the east which also retain the same designation and are both light industrial and heavy industrial uses. The other

		surrounding uses to the north, south, and west are separated by natural features.
1. The proposed amendment will have no major negative impacts on transportation, services, and facilities.	Complies	The proposed amendment will not have a major impact on transportation, services or facilities.
1. The proposed amendment will have minimal effect on service provision, including adequacy or availability of urban facilities and services, and is compatible with existing and planned service provisions.	Complies	The proposed amendment will not have a negative effect on existing or proposed service provisions.
1. The proposed amendment, if for an area outside of the City's current municipal boundaries, is consistent with the City's ability to annex property.	Complies	The proposed amendment does not pertain to an area outside of the City's municipal boundaries.
1. Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.	Complies	As detailed in the *Compliance with the Comprehensive Plan* section of the staff report strict adherence to the Comprehensive Plan designation of Mixed Use: Residential Emphasis has the potential to result in a future land use that are less compatible with the industrial uses in the area and directly adjacent to the property, and are not suitable for this site.
1. The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.	Complies	The amendment will promote the public welfare and is consistent with the goals and policies of the Comprehensive Plan. As detailed in the *Compliance with the Comprehensive Plan* section, the amendment will prevent residential land uses from being built in an area not suitable for residential development and is consistent with the IL zone district.

Public Contact

The required neighborhood meeting for this project took place on January 24th, 2024. The applicant, staff, and approximately 50 neighbors were in attendance.

The applicant gave a presentation to attendees explaining the proposal and detailing the adopted zoning and the conflict with the Comprehensive Plan Future Land Use map designation. They also detailed the RV storage proposal including: an explanation of the changes from the previous application, a wider and enhanced landscaped buffer around the site, removal of Major Modification requests, and changes to the lighting plan.

Concerns from the public were raised, including: opposition to the general land use as an RV storage facility, concerns of the environmental contamination, potential fire hazards from the presence of methane, wildlife impacts on the property and along the Ralston Creek, impacts to property values, and others.

Commission Recommendation

On September 17, 2024, the Planning Commission voted 6 to 1 to recommend denial to the City Council.

Strategic Alignment

The project is consistent with the City Council Strategic Plan principles for the Community and Economic Development work system.

Alternative Courses of Action

N/A

Recommendation for Action

The Arvada Team recommends that the City Council approve R25-102, A Resolution by the City Council for the City of Arvada, Colorado to Amend the 2014 Arvada Comprehensive Plan Land Use Designation Pertaining to 6800 Kilmer Street from Mixed Use; Residential Emphasis to Industrial/Office.

Suggested Motion:

I move that R25-102,A Resolution by the City Council for the City of Arvada, Colorado to Amend the 2014 Arvada Comprehensive Plan Land Use Designation Pertaining to 6800 Kilmer Street from Mixed Use; Residential Emphasis to Industrial/Office, be (approved) (rejected).

This motion is based on the findings of fact and approval criteria on Page(s) 8 & 9 of the Staff Report (if approved).

This motion is based on the findings of fact adopted by the Planning Commission (if denied).

Prepared by:
Dixielee Rodriguez, Administrative Specialist

Reviewed by:

Approved by:

Josie Suk, Development Systems and Administrative Manager	09/29/2025
Rob Smetana, Planning Manager	09/29/2025

Julia Duncan, Senior Planner	09/29/2025
Jessica Garner, Director of Community and Economic Development	09/30/2025
Gail Walker, Legal Specialist-Contracts	10/01/2025
Kelsy Sargent, Assistant City Attorney	10/02/2025
Rachel Morris, City Attorney	10/06/2025
Allison Scheck, Deputy City Manager	10/07/2025
Don Wick, City Manager	10/07/2025

Enclosure, exhibits & attachments required to support the report

RESOLUTION NO. R25-102

A RESOLUTION BY THE CITY COUNCIL FOR THE CITY OF ARVADA, COLORADO TO AMEND THE 2014 ARVADA COMPREHENSIVE PLAN LAND USE DESIGNATION PERTAINING TO 6800 KILMER STREET FROM MIXED USE; RESIDENTIAL EMPHASIS TO INDUSTRIAL/OFFICE

WHEREAS, Planning Commission, by Resolution No. CP2014-0003, adopted the 2014 Arvada Comprehensive Plan on September 19, 2014 and City Council ratified the resolution on October 6, 2014; and

WHEREAS, pursuant to § 8-1-2-1(E)(4) of the Land Development Code, City Council has final ratification and approval authority with respect to the Comprehensive Plan and any amendments thereto; and

WHEREAS, pursuant to Chapter 74, Article III, Section 74-64 of the code of the City of Arvada, the Planning Commission held a public hearing as required by law, notice thereof being duly published in the Wheat Ridge Transcript and Arvada Press on August 29, 2024, and said public hearing being held before the Planning Commission for the City of Arvada on September 17, 2024; and

WHEREAS, pursuant to § 8-1-2-1(E)(4) of the Land Development Code, on November 4, 2024, City Council considered the application for a Comprehensive Plan Amendment and voted to deny 6-1; and

WHEREAS, on September 2, 2025, pursuant to City Council Rule of Procedure 4(L), City Council voted to rehear an application for a Comprehensive Plan Amendment for 6800 Kilmer Street.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ARVADA, COLORADO:

Section 1. The 2014 Comprehensive Plan is hereby amended by changing the land use designation from Mixed Use; Residential Emphasis to Industrial/Office, generally located at 6800 Kilmer Street.

Section 2. This resolution shall be effective upon its approval by the City Council.

APPROVED AND ADOPTED this 21st day of October, 2025.

_____

Lauren Simpson, Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:
Rachel A. Morris, City Attorney

By: _____

City of Arvada
Community and Economic Development Department
PUBLIC HEARING STAFF REPORT

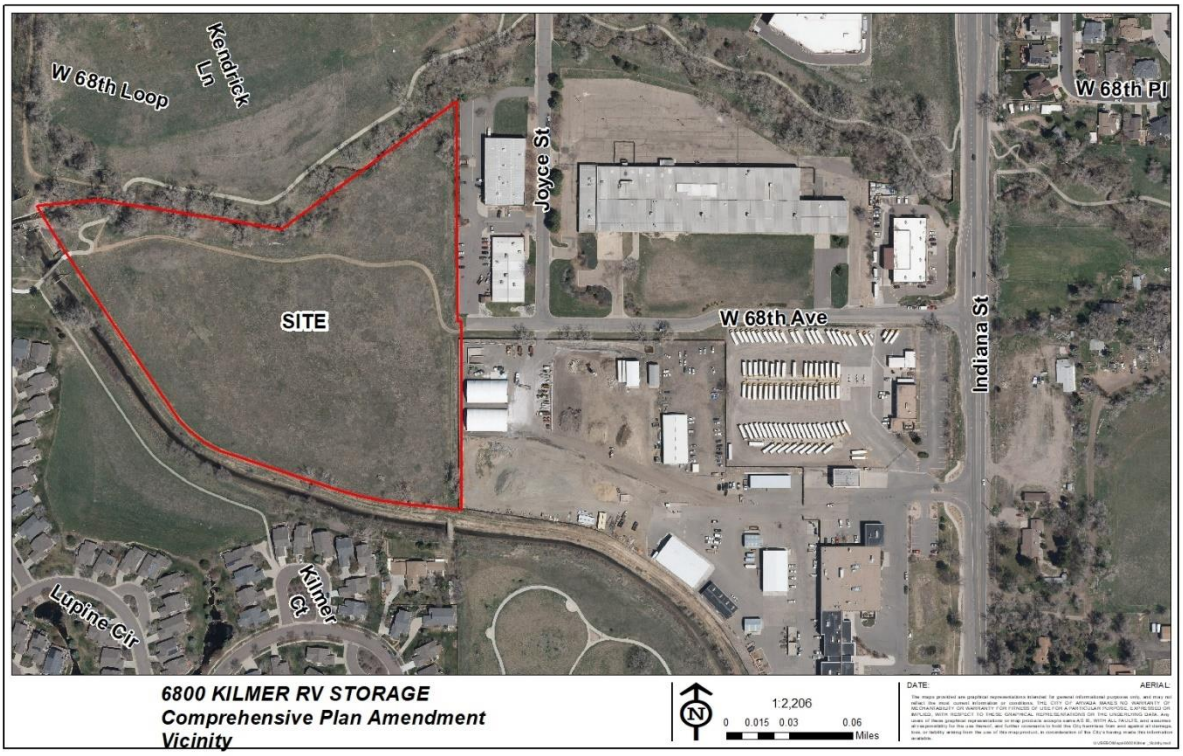
6800 Kilmer RV Storage
Major Comprehensive Plan Amendment
DA2024-0016

NATURE OF REQUEST

Norris Design on behalf of Chelton, LLC. is requesting approval of a Major Comprehensive Plan Amendment from Mixed Use – Residential Emphasis to Industrial/Office in order to properly align the Comprehensive Plan with the IL (Industrial, Light) zoning that is in place.

The applicant is concurrently processing a Site Plan and Minor Subdivision application for the future construction of an outdoor RV storage yard under the allowances of the IL zone district.

LOCATION AND HISTORY



The subject property is 14.01 acres in size and is located at the terminus of West 68th Avenue just west of Indiana Street and is currently undeveloped.

Staff conducted historical research to understand the planned future land uses for the site based on past Arvada Comprehensive Plans. Arvada's first Comprehensive Plan was adopted in 1964 and designated this site as Low-Density Residential. In 1973, the land use designation was changed to Industrial Office Park. The property was annexed into the City in 1982 with the Cottonwood West Office Park Annexation and was zoned to PUD-I (Planned Unit Development – Industrial) which was in conformance with the Comprehensive Plan designation of Industrial Office Park. Up until 2005, the property retained an Industrial land use designation. However, in 2005, the land use designation was changed to Mixed Use – Residential Emphasis and remains as such. In May of 2020, the property was rezoned to IL as part of the larger Arvada Land Development Code (LDC) Update and citywide rezoning. Concurrently, a Comprehensive Plan Update was approved in order to align the new zone districts with the Comprehensive Plan. The land use designation of the subject property was not revised as part of this update, which resulted in the continued conflict.

In December 2021, a similar application for an RV storage yard was submitted to the City, and staff completed two reviews of the project. At that time, the applicant was proposing a higher number of RV parking spaces and was also requesting two Major Modifications from the LDC. A neighborhood meeting for the Major Modification requests was held on March 16th, 2022. In March of 2023, after granting an extension request, the application was considered withdrawn due to inactivity pursuant to LDC Subsection 8-2-3-14-D.

On January 24th, 2024, a new neighborhood meeting was held to present the intended Comprehensive Plan Amendment as well as the changes to the site plan which would negate the need for any Major Modifications. In March of 2024, this current application was submitted which reduced the number of RV parking spaces and removed the need for any Major Modifications.

The project, DA2024-0016, was heard before the Planning Commission on September 17, 2024. The Planning Commission voted 6 to 1 to recommend denial to the City Council. The City Council subsequently heard the request at the November 2, 2024, City Council public hearing. The City Council voted 6 to 1 to deny the request.

On August 12, 2025, Community and Economic Development staff received a letter on behalf of Chelton, LLC, requesting that the City Council reconsider its denial of Chelton, LLC's Application to amend the 2014 Arvada Comprehensive Plan Land Use from Mixed Use, Residential Emphasis to Industrial/Office. In support of reconsideration, Chelton, LLC plans to present additional details from its development plan that balance the unique complexities of the former landfill site, located next to existing industrial properties, with the concerns of the nearby residential neighbors.

On September 2, 2025, the Council moved, pursuant to City Council Rule of Procedure 9(B), that the requirements for reconsideration under City Council Rule of Procedure 4(L) be set aside, and that the Council rehear the application to amend the comprehensive plan for 6800 Kilmer Street, at public hearing at a future date and time. A super majority was required for the motion to pass. The Council approved the motion four to one. That hearing was scheduled and noticed for October 21, 2025.

The applicant is presenting additional information about the development, specifically, modifications to the proposed site plan to address concerns raised by the community. The applicant is proposing additional landscaping to better screen the proposed RV storage. In addition to increased landscaping, the proposed berm is being increased from four feet to six feet.

MAJOR MODIFICATIONS REQUESTED

The Applicant is not requesting major modifications to the Arvada Land Development Code (LDC) standards as part of this project.

NEIGHBORHOOD MEETING

Division 8-2-2 of the Land Development Code requires that at least one neighborhood meeting be held for projects that require public hearings before the Planning Commission and City Council.

The required neighborhood meeting for this project took place on January 24th, 2024. The applicant, staff, and approximately 50 neighbors were in attendance.

The applicant gave a presentation to attendees explaining the proposal and detailing the adopted zoning and the conflict with the Comprehensive Plan Future Land Use map designation. They also detailed the RV storage proposal including: an explanation of the changes from the previous application, a wider and enhanced landscaped buffer around the site, removal of Major Modification requests, and changes to the lighting plan.

Concerns from the public were raised, including: opposition to the general land use as an RV storage facility, concerns of the environmental contamination, potential fire hazards from the presence of methane, wildlife impacts on the property and along the Ralston Creek, impacts to property values, and others.

The applicant prepared a summary of the meeting, which is attached.

PUBLIC NOTIFICATION

Division 8-2-4 of the Land Development Code requires public notification for all public hearings as follows:

Written Notice: At least 15 days prior to all public hearings, written notice must be mailed to all property owners within 1,500 feet of the subject property and to all homeowners' associations and neighborhood associations with a known interest in the subject property. The applicant will provide an affidavit of mailing verifying this requirement has been met prior to the public hearing.

Posted Notice: At least 15 days prior to all public hearings, signs notifying the public of the hearing must be posted on the subject property. The applicant will provide a posting log verifying that this requirement has been met prior to the public hearing.

Published Notice: At least 15 days prior to all public hearings, notice of the hearing must be published in a newspaper of general circulation in the City. The required notice has been published.

SEVERED MINERAL RIGHTS

At least 30 days prior to the public hearing, written notice of the application must be mailed to any owner of mineral rights associated with the subject property. The applicant has provided the required Certification of Notice pursuant to Colorado Revised Statute 24-65.5-103.

DEVELOPMENT REVIEW TIMELINE

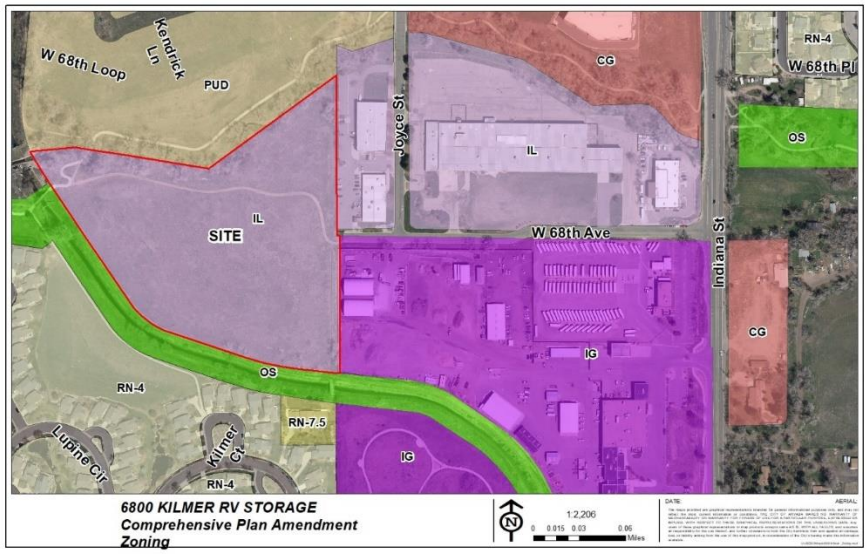
The application was submitted on March 3rd, 2024, and staff completed two reviews of the application before allowing the applicant to proceed with the Planning Commission and City Council public hearings for the Major Comprehensive Plan Amendment.

A Site Plan and Minor Subdivision application are being reviewed concurrently under the same development application (DA). Three reviews have been processed for those portions of the application.

ALIGNMENT WITH CITY COUNCIL STRATEGIC PLAN

The project is consistent with the City Council Strategic Plan principles for the Community and Economic Development work system.

ZONING AND LAND USE



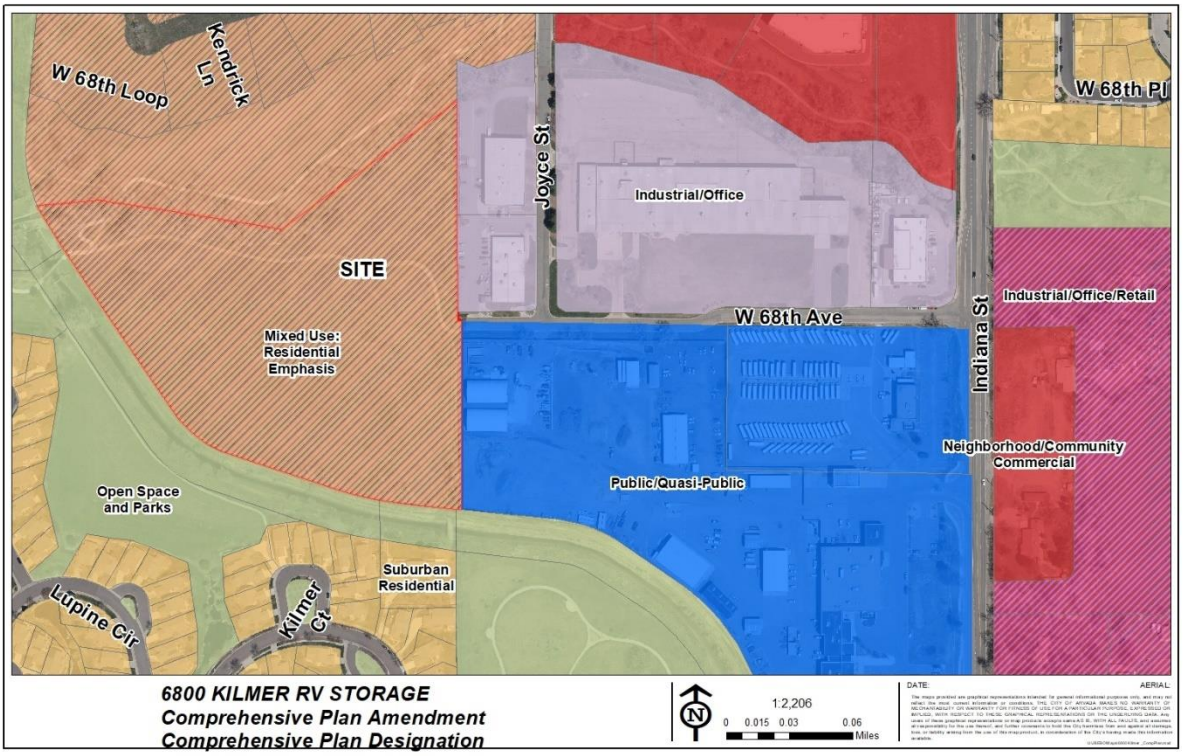
The subject property is currently zoned IL (Industrial, Light) and is approximately 14.01 acres in size.

Surrounding properties are zoned and utilized as follows:

Direction	Zoning	Actual Use
North	Planned Unit Development (PUD)	Ralston Creek and Trail/Future Townhomes/Undeveloped Lots
South	OS (Parks and Open Space)	Croke Canal
East	IL and IG (Industrial, General)	Industrial Office Park/City's Indiana Shops
West	OS	Croke Canal

PROJECT ANALYSIS

Compliance with the Comprehensive Plan



A Major Comprehensive Plan Amendment from Mixed Use: Residential Emphasis to Industrial/Office is being proposed.

The designation of Mixed Use: Residential Emphasis is intended to promote neighborhoods which contain housing predominantly, but that may also include retail, offices, and light trade. A range of residential housing types, such as single-family residences, duplexes, patio homes, townhomes, apartments, condominiums, and live-work units, should be built on a majority of any site within this category. This land use category is appropriate near commercial services, employment and near major arterial and collector streets. A minimum of 7 dwelling units per acre should be required here with no limit on maximum densities. The Mixed Use – Neighborhood (MX-N), Mixed Use – Suburban (MX-S), and Olde Town zone districts are used

to implement this land use designation. As well as Planned Unit Development (PUD) with a residential focus.

The proposed designation of Industrial/Office encourages development of industrial and office uses that will minimally affect surrounding properties. The Industrial/Office land use type is generally located along arterial or collector streets and has limited outdoor storage. The IL zone district is used to implement the Industrial/Office land use designation.

Staff analyzed the current land use designation and zoning of the subject property with the surrounding land uses, surrounding zoning, and the existing transportation network. In 2005, the City adopted a Comprehensive Plan Future Land Use map which changed the historical designation of Industrial Office Park to the current designation. Staff could not determine why this change was made to this property at that time, although other properties to the north of Ralston Creek also were given this designation at the time.

Since that change, nearby properties to the north of this site and across the Ralston Creek (now the Westwoods Mesa and GEOS neighborhoods) have rezoned and developed into medium to higher density residential neighborhoods which support the Mixed Use: Residential designation. These neighborhoods have multiple points of vehicular access onto Indiana Street which ensures adequate circulation and vehicular movements and emergency access to the neighborhoods. Additionally, they are well integrated with each other and surrounding land uses through additional local streets, pedestrian walkways, and connected open space areas.

The subject property is isolated and physically disconnected from the GEOS and Westwoods Mesa neighborhoods by Ralston Creek to the north and from the Forrest Springs neighborhood to the south by the Croke Canal, effectively making it an enclave. Additionally, only one point of vehicular access is provided from Indiana Street via West 68th Avenue which is not built to current City standards, contains no sidewalk network, and traverses through both light and heavy industrial uses with heavy truck and school bus traffic.

Finally, in 2020, the property was rezoned from PUD-I to IL as part of the larger citywide LDC update and legislative rezoning. Concurrently, the City also amended and adopted the Arvada Comprehensive Plan with the intention of aligning the plan with the newly established zoning. However, the pre-existing conflict between the Comprehensive Plan and the zoning was not addressed at the time. This request would align the plan and zoning and provide for a land use that is consistent with the other existing land uses directly to the east of the site.

Environmental Site Assessment and Voluntary Cleanup Plan Application
A Phase I Environmental Site Assessment (ESA) was submitted on behalf of the applicant and was developed by their consultant (Terracon). The ESA (along with previous reports) determined that the site had historically been used as an unpermitted landfill by Jefferson County from the 1930s through the 1970s. The report documented contaminants of concern (COCs) in the soil of arsenic, barium, mercury, and asbestos. COCs in fill included asbestos. And COCs in the groundwater included benzene, toluene and dissolve arsenic and selenium. COCs in the soil gas included benzene, chloroform, 1,4-dichlorobenzene, ethylbenzene, naphthalene, trichloroethene, and vinyl chloride (considered volatile organic compounds (VOCs)) and at levels that represent a vapor intrusion concern. Methane was also detected in several spots at the site.

Based on this ESA and other reports, the Colorado Department of Public Health and Environment (CDPHE) required the review and approval of a Voluntary Cleanup Plan (VCP) as regulated by Colorado Revised Statutes prior to the development of the site. The applicant hosted a separate neighborhood meeting, as required by CDPHE, to present the VCP application and the environmental conditions of the site to residents on July 25, 2023. That plan was approved by CDPHE on November 23, 2023, which includes cleanup and remediation procedures to be completed prior to development and once established. Additionally, an environmental covenant will be required by CDPHE to be recorded on the property.

Setbacks
The IL zone district requires that non-residential buildings be set back 20 feet from a front or street-side property line. And five feet from a rear or side property line. Additionally, outdoor storage is required to adhere to specific setback rules. Setbacks will be reviewed as part of the Site Plan application.

Building Height
The IL zone district limits building heights to 40 feet. Building height will be reviewed as part of the Site Plan application.

Open Space
The IL zoning district requires a minimum of 15 percent of the site be landscape surface area. Compliance with the landscaped surface area will be reviewed as part of the Site Plan application.

Outdoor Storage Allowance
In the IL zone district, 35 percent of the lot may be used for outdoor storage.

Landscaping, Buffering and Fencing
Landscaping for the site will be required to comply with the standards and regulations within LDC 4-6 and any others that may apply. A bufferyard is required along the north, south and west perimeter of the site and will include either a fence or wall. A landscape plan will be reviewed with the Site Plan application.

Building Design
Any building constructed will be required to adhere to Chapter 5 (Building Design) of the LDC. Design will be reviewed with the Site Plan application.

Circulation and Connectivity
One point of vehicular access will be provided onto West 68th Avenue which then connects to Indiana Street.

Grading and Drainage
Grading will generally slopes from the southwest to the northeast and direct flows to a future detention pond. A section of Ralston Creek adjacent to the northern perimeter of the project will require improvements in accordance with Mile High Flood District standards. A drainage report and grading plan will be reviewed with the Site Plan application.

Parking and Loading

Off-street parking requirements will be determined with the Site Plan application. The LDC requires 1 space per 1,000 square feet of building gross floor area.

Utility Services
Water and sanitary sewer service is provided by the City and capacity to service the site is available.

Police and Fire Protection
The proposal has been reviewed by the Arvada Fire and Protection District and is supportive of the request. The property is served by Arvada Police.

LAND DEVELOPMENT CODE APPROVAL CRITERIA

It is the responsibility of the applicant to justify the requested land use application. The Planning Commission should make a recommendation to the City Council based on its findings regarding the approval criteria shown in the table(s) below and upon testimony heard during the public hearing as it applied to the criteria.

Staff performed an analysis of the proposal, based on the approval criteria listed in Chapter 5 of the Arvada Comprehensive Pan, and presents the following findings:

COMPREHENSIVE PLAN AMENDMENT CONSIDERATIONS	Finding	STAFF ASSESSMENT
1. The existing comprehensive plan and/or any related element thereof is in need of the proposed amendment.	Complies	The existing Comprehensive Plan designation of Mixed Use: Residential Emphasis does not align with the current realities of the site or the adopted IL zoning. The City regulations in place allow the applicant to develop the site under the IL standards. However, this amendment to Industrial/Office is necessary to comply with Site Plan approval criteria 2, which states: "The application is consistent with the Comprehensive Plan.
2. The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.	Complies	As detailed in the *Compliance with the Comprehensive Plan* section of the staff report and criterion one above, the amendment is necessary in order to align with the adopted zoning of the property. The amendment is compatible with the other land uses adjacent to the east which also retain the same designation and are both light industrial and heavy industrial uses. The other surrounding uses to the north,

		south, and west are separated by natural features.
3. The proposed amendment will have no major negative impacts on transportation, services, and facilities.	Complies	The proposed amendment will not have a major impact on transportation, services or facilities.
4. The proposed amendment will have minimal effect on service provision, including adequacy or availability of urban facilities and services, and is compatible with existing and planned service provisions.	Complies	The proposed amendment will not have a negative effect on existing or proposed service provisions.
5. The proposed amendment, if for an area outside of the City's current municipal boundaries, is consistent with the City's ability to annex property.	Complies	The proposed amendment does not pertain to an area outside of the City's municipal boundaries.
6. Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.	Complies	As detailed in the *Compliance with the Comprehensive Plan* section of the staff report strict adherence to the Comprehensive Plan designation of Mixed Use: Residential Emphasis has the potential to result in a future land use that are less compatible with the industrial uses in the area and directly adjacent to the property, and are not suitable for this site.
7. The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.	Complies	The amendment will promote the public welfare and is consistent with the goals and policies of the Comprehensive Plan. As detailed in the *Compliance with the Comprehensive Plan* section, the amendment will prevent residential land uses from being built in an area not suitable for residential development and is consistent with the IL zone district.

STAFF RECOMMENDATION

Based upon project analysis and review of the Land Development Code approval criteria, staff recommends approval of the amendment.

The Planning Commission may recommend denial of the request(s) if it cannot make affirmative findings of the approval criteria stated above.

Neighborhood Meeting Summary

NORRIS DESIGN
PEOPLE + PLACEMAKING

1101 Bannock Street
Denver, Colorado 80204
303.892.1166

March 1, 2024

City of Arvada
Attn: Jeremiah Bebo, Planner II
Community and Economic Development
8101 Ralston Rd.
Arvada, CO 80002
Email: JBebo@Arvada.org

RE: 6800 Kilmer – Neighborhood Meeting Summary

On January 24, 2024, a neighborhood meeting was held at Arvada City Hall Council Chambers (8101 Ralston Rd.) from 6:00 PM until approximately 7:30 PM. All property owners within 1500' feet of the project site, appx. 580, were notified via a mailing, which was postmarked on January 5, 2024. The mailing contents, the list of notified property, and the mailing affidavit are included as an attachment at the end of this summary.

There were approximately 50 attendees at the meeting, although only 16 signed the sign-in sheet. Several members of the project team were in attendance. See list below for the names of the team members. Also in attendance from the City was Jerimiah Bebo and Rob Smetana.

Norris Design	Eva Mather Daniel Braswell Carl Runge
Chelton LLC.	David Schneider
HKS	Kevin Kennedy Charley Peoples
Terracon	Jeff Attig Kevin Saylor

The meeting involved a short presentation on the project by members of the development team, after which the team allowed time for questions from the community. The community members brought up several areas of concern including environmental issues, fire safety, crime, and fencing/visibility concerns. Also noted by City Staff Jerimiah Bebo is that this application is completely new to the City, and not related to any previous submittals associated with this land parcel.

Environmental issues focused on pollution, cleanup of the landfill, and wildlife. Our team takes environmental issues very seriously. We completed the CDPHE Voluntary Clean Up Program, which was approved on November 30, 2023. We are working with MHFD on restoring the stream bank. We are planning to disturb as little of the existing as possible, leaving in place the existing landscape to minimize the impact to wildlife in the area.

Fire Safety issues focused on evacuation and fire prevention. The Marshall Fire was mentioned a couple times. The concerns focused on how a fire will be prevented with gasoline and propane on site. Our team takes fire safety concerns seriously. While we cannot completely control fire, we have taken steps to mitigate fire concerns as much as possible. The extents of the storage area has been setback over 240' from the southern edge of the Croke Canal right-of-way. The drive aisles within the storage area provide fire emergency access, so a fire truck is able to fully access the site. Living plant material within the storage area will be limited to native grasses to reduce combustible material and minimize site disturbance.

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Fencing/Visibility concerns were focused on aesthetics and visibility. As required by code, the storage area will be enclosed by a 6' tall fence. The final fence design will color is still being determined, but will Along with fencing, we have set the site back further from the southern property, reduced the RV storage for 565 spaces to 355 spaces, and provided additional landscaping to buffer the site from the surrounding neighbors.

Our team takes the community's concerns seriously and is committed to cleaning up the site and minimizing the impact to the surrounding community.

Thank you,

Norris Design

Daniel Braswell
Associate

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Thank you,

Norris Design

Daniel Braswell
Associate

All Public Comments Received up to September 9, 2024

Gmail Brian Brian <[redacted]>

Proposed development at 6800 Kilmer -Arvada

3 messages

Brian Brian <[redacted]> Wed, Aug 28, 2024 at 10:52 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>
Bcc: Patti Glover <[redacted]>

Dear Planning Commission-

It's hard to comprehend that someone that lives near this proposed development isn't aware that it is up for review. With that in mind, let me give a thought that should warrant consideration.

According to the City of Arvada's Land Development Code (LDC), the very first part addresses development under consideration in Arvada.
Under this section, it states:

DIVISION 1-1-2. - MINIMUM STANDARDS AND COMPLIANCE
1-1-2-1. - Minimum standards
The provisions of this Code shall be considered the minimum requirements necessary for the promotion of the public health, safety, convenience, comfort, prosperity, and general welfare.
.Also according to LDC section 1-1-1-2:
2 Ensure that all development in the City is consistent with the spirit and intent of other plans and policies adopted by City Council; 3 Promote the public health, safety, convenience, comfort, prosperity, and general welfare; 4.Promote the creation of safe, unique, interesting, inclusive, and economically vibrant places throughout the City;5.Protect the quality and character of stable residential neighborhoods;

According to this statement, it is hard to imagine that an RV storage facility that is adjacent to a thriving creek and several housing developments can be considered a vehicle to promote public health, safety, comfort, prosperity and general welfare within the City and to protect the quality and character of stable residential neighborhoods. It also cannot possibly be a way to promote the creation of a safe, unique, interesting and inclusive place within the city. Economically vibrant is up for debate. In addition, the plan is to place this storage facility on top of a former unregulated land-fill that has been abandoned and unused for decades. Preparing the area for development may be an issue; disturbing the soil and what's beneath that has not been completely quantified.

The nature of the storage facility cannot logically promote safety, convenience, comfort and prosperity for the people who live nearby and the wildlife who share the area. Consider this: 200 to 300 RV vehicles stored here with their propane tanks,their waste discharge, their disruptive lighting (illumination) may certainly be considered potentially hazardous and unsafe. The shear volatility of the propane storage tanks is a red flag as a fire could rapidly spread through the area and into the nearby residential communities. Yes, that is a what if but please keep the Marschal fire from a few years ago in mind. It could happen again, here.

It would be wise to strongly consider development opportunities here that make sense and are a good fit with the surrounding area, and are in congruence with Arvada's LDC. This RV storage facility is not a good fit with the surrounding area. Ralston creek is too close to this proposed development. With its own ecosystem, it's too risky for this to be disturbed by this large-disturbing development. Large lighting, noise, run-off, and discharge are all things that detract from the positive nature of the creek environment.

Please vote against this proposal.
Your decision here will have a lasting impact on the area and the City. Current and future generations of residents will have to live with the decision made on the proposal. Development can be an asset as long as it exists in congruence with the surrounding area that is already established and complies with Arvada's LDC.

Thank you.

Brian Glover [redacted] - ARVADA 80007

Jeremiah Bebo <jbebo@arvada.org> Wed, Aug 28, 2024 at 10:55 AM

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Comment from Forest Springs

Sharon McCarthy <[redacted]> Fri, Jan 26, 2024 at 3:32 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Jeremiah,

A comment from Brian Glover from Forest Springs. Please add to our file.

> I think we need to continue to press that it is not a good fit and the ecosystem in the area will be negatively affected. The Tap House is also a gem and having the storage area nearby won't help that business and encourage any others to explore opening in the area.

Have a wonderful weekend!

Sharon

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV storage

Elaine Fitzgerald <[redacted]> Wed, Jan 24, 2024 at 7:49 PM
To: Bebo Jeremiah <jbebo@arvada.org>

Hi Jerimiah, here are pictures taken from 6762 Kilmer Ct

View from bedroom

View from deck

From deck

From deck

From deck

View from living room

View from trail

7 attachments

IMG_5840.jpg
197K

IMG_5841.GIF
10668K

IMG_5842.jpg
212K

IMG_5843.jpg
171K

IMG_5844.jpg
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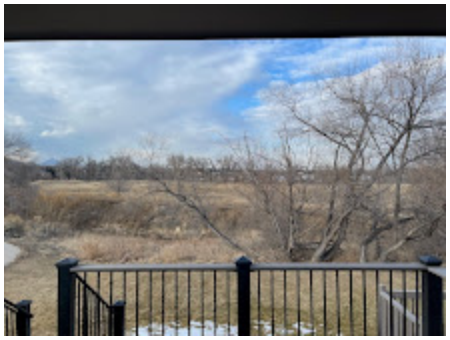

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CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storaage Proposal

Darlene EVANS <[redacted]> Tue, Jan 23, 2024 at 11:52 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Hi,

I am unable to attend the meeting on Wednesday, Jan. 24, but wanted to make sure you knew that I am not in favor of the RV Storage area that is being proposed. I think if would have an adverse effect on property values in our area as well as a lot more traffic. It would put a significantly more traffic on McIntyre as well as 64th. I think there would be safety concerns along with more noise, air quality, visual impacts to the neighborhoods. I will not list all my concerns as the above are the major issues, but the email provided by Sharon McCarthy certainly addresses my other concerns.

I personally do not think this is the good location in the middle of residential areas. I would think there would be more appropriate areas for this type of business than here in the Arvada area at 64th and McIntyre.

My answer is NO!

Darlene EvansF
Forest Springs residence

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Proposed RV Storage

Cecilia Hartsock <[redacted]> Tue, Jan 30, 2024 at 8:17 PM
To: jbebo@arvada.org
Cc: Sharon McCarthy <[redacted]>

Mr. Bebo,

We refer to the Land Development Code, 1-1-1-2. Purpose and intent.

#3 Promote the public health, safety, convenience, comfort, prosperity, and general welfare; and

#5 Protect the quality and character of **stable residential neighborhoods.**

To these statements we submit:

We are residents and owners in Forest Springs. We are deeply concerned about the proposed RV storage. This proposed storage is located between two well-kept, beautiful residential areas. Forest Springs' residents are mainly seniors who have invested much of their life savings into their homes and plan to live their lives out here. We're sure the residents of the GEO homes feel the same.

Safety. The proposed site is a landfill. The developers seem to agree that the weight of the RVs would cause the land to sink. They plan to refill the sunken areas, but what happens if the plastic shield is punctured when the land sinks. Could methane gas escape? Who would have to clean that up and pay for it? If the proposed storage goes through, it should be written into the contract that the developer would be responsible. What would the effect of escaping methane be on the people and animals in the surrounding area?

Safety. Possibility of fire. These RVs have one, maybe two propane tanks. If only one would explode, that would spread through the whole lot. Winds could spread those flames to our neighborhoods just like the Marshall fire. With only one way in and out of the site, this could cause problems for even the fire department to get there. Should it spread to the communities, there are only two ways in and out of Forest Springs and the GEO homes. The **safety of all** is a great concern.

Not only will this site be an eyesore to the surrounding area and all those who use the Ralston Creek Trail, but it will also cause problems with the environment and the wildlife that live there.

A **major concern** is that the owner of the land does not even live in the State of Colorado let alone Arvada. He has no stake in the welfare of our community or its residents. He is **only** interested in the money he can make with no concern for anyone or anything in Arvada.

These are some of our concerns. We do hope that the Land Development Department and City Council take into consideration those of us who vote for them and pay our taxes.

Dale and Cecilia Hartsock

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Fwd: Kilmer RV Storage

Jessica Garner <jegarner@arvada.org> Thu, May 2, 2024 at 12:48 PM
To: Jeremiah Bebo <jbebo@arvada.org>, Rob Smetana <rsmetana@arvada.org>

Hi, would one of you let me know what the status of the project is? I thought it was still under review, but please let me know if I'm mistaken.
Please see the message below.
Thanks,
Jessica

---------- Forwarded message ---------
From: **Lorie Gillis** <lgillis@arvada.org>
Date: Thu, May 2, 2024 at 12:39 PM
Subject: Fwd: Kilmer RV Storage
To: Jessica Garner <jegarner@arvada.org>, Linda Haley <lhaley@arvada.org>

Jessica, Can you provide a response to Sharon?

---------- Forwarded message ---------
From: **Sharon Davis** <sdavis@arvada.org>
Date: Thu, May 2, 2024 at 12:30 PM
Subject: Fwd: Kilmer RV Storage
To: Lorie Gillis <lgillis@arvada.org>

Hi Lorie,

Are you familiar with the “Call Up provision” that Mr. Yevak is referring? I would like to respond to his request, but I need context.

Sincerely,

Sharon Davis
Council Member, At Large
720-450-4825 (Cell)
SDavis@arvada.org

---------- Forwarded message ---------
From: **Edward Yevak** <[redacted]
Date: Tue, Apr 30, 2024 at 1:18 PM
Subject: Kilmer RV Storage
To: <sdavis@arvada.org>

> Hi Sharon, give the duration of illegal dumping at the site and with only limited knowledge of what was dumped, along with the location’s proximity to Ralston Creek and residential development it seems prudent to use the Call Up provision and allow input from the citizens of Arvada. Please do so.
>
> Thank You for your time,
>
> Ed Yevak
>
> Sent from my iPhone

--

Lorie B. Gillis
City Manager
Office: (720) 898-7512
Cell: (303) 668-8621
lgillis@arvada.org

--

Jessica Garner, AICP
Community and Economic Development Director
Desk: 720-898-7016
Mobile: 720-454-4117
E-Mail: jegarner@arvada.org

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Update of 1/24/24 Neighborhood Meeting - Arvada RV Storage Project Number: PA2023-0055

Karen Gerbatsch <[redacted]> Sun, Jan 28, 2024 at 6:14 PM
To: Bob Fifer <bfifer@arvada.org>, John Marriott <jmarriott@arvada.org>, Lauren Simpson <lsimpson@arvada.org>, Randy Moorman <rmoorman@arvada.org>, Sharon Davis <sdavis@arvada.org>, Shawna Ambrose <sambrose@arvada.org>, "lferet@arvada.org" <lferet@arvada.org>
Cc: Jeremiah Bebo <jbebo@arvada.org>, "jgarner@arvada.org" <jgarner@arvada.org>, "lgillis@arvada.org" <lgillis@arvada.org>, "rmorris@arvada.org" <rmorris@arvada.org>, "rsmetana@arvada.org" <rsmetana@arvada.org>

Dear Mayor and Members of the Arvada City Council:

The Neighborhood Meeting for the Arvada RV Storage facility was held last Wednesday, 1/24/24. Developer attendees were from Norris Design, Terracon and other engineering firms. The owner's rep, David Schneider from Chelton, LLC, attended as well. Friends of Ralston Creek Neighborhoods (FRCN) had spread the meeting notice and a full house of area residents attended, including the owner of the Colorado Tap House and our former Mayor, who lives in Forest Springs.

The applicant provided little new information and no copies of their presentation. The lack of information provided to the attending public suggests that their engineering has not advanced, in particular on critical aspects of the proposed development; including type/extent of creek stabilization, wetlands delineation and mitigation, detention pond design and runoff pollution treatment, the design of roadways and storage lot, or the office building, heat island, and light pollution.

Norris Design suggested that Chelton, LLC intends to submit an initial application in February, 2024. Terracon stated that they conducted further geo-technical work. To-date the only available geotechnical study is dated July 2007; the study is incomplete and contradicts a number of contemporary statements offered by Terracon, concerning applied loads on parking stalls and roadways.

To provide some history, in 1981 the previous owner purchased the 14 acres of landfill property for $1.5M and filed for bankruptcy sometime thereafter. In 2012, Chelton, LLC bought the land for $85K of back taxes. Owner's Representative indicated that Chelton LLC is shielded by many corporate layers, with diverse and unidentified ownership — not one individual. He is a civil engineer and is acting as Project Manager for the "owner". The "owner" intends to lease the site to a currently unspecified operator. There is growing concern regarding liability and transparency.

Jeremiah Bebo, Arvada Development Dept - Planning Division, indicated that the approval process is staff responsibility but that the Comp Plan and zoning coordination needs Planning Commission and City Council approvals and that either could question or deny the project during the respective hearings. The Pre-Application Summary dated 5/23/23 (attached) indicates NO on the rezoning question. Besides the 3 minute comments (attached) given on 1/22/24, FRCN members also listened to the updates by the various staff heads of departments and the question period thereafter which challenged staff on how to be more effective and efficient in preparing for the future. Using the guidance of the established LDC zoning correctly in the initial phase of the pre-application would certainly be more effective and efficient than continuing the time-consuming work of reviewing iteration after iteration. To-date, staff has spent over 2 years on this project that does not fit into the concept of the Comprehensive Plan and does not meet IL zoning requirements. The Workshop Agenda being held tomorrow, 1/29/24, includes a review of the Comprehensive Plan, LDC and will provide brief updates on projects and issues, per the website agenda; and FRCN asks you to consider this project in your discussion.

One of the primary purposes of the LDC is to protect residential areas and address potentially conflicting uses. We direct your attention to a quote from the Ireland Stapleton letter of April 6, 2023; the correspondence is addressed to Jeremiah Bebo with carbon copy to Mayor, City Council members, City Attorney, City Manager and Director of Community and Economic Development and is attached below:

"Under the LDC, the IL Zone is intended "to provide areas for light manufacturing, assembly, and fabrication uses, office, research, food and beverage processing, packaging, or bottling, and compatible recreational activities." LDC Div. 2-1-6-2(A). The LDC defines "Light Industry" as "[u]ses that involve research and development, assembly,

remanufacturing, compounding, packaging, testing, or treatment of products, generally from previously prepared material or components, with limited outside storage and limited external impacts or risks such that the use is not defined as heavy industry or heavy logistics center." LDC Div. 2-11-3-1. In order words, industrial use within the IL Zone is primarily intended to be confined to the inside of warehouses or other buildings so as to limit the impact of such uses on neighboring properties – especially those which are zoned for non-industrial uses.

Consistent with this, Division 2-1-6-2 (C) of the LDC limits outdoor storage within the IL Zone to no more than 35% of a parcel. Outdoor storage is defined as "[s]torage of materials, merchandise, stock supplies, machines, operable vehicles, equipment, manufacturing materials, or chattels of any nature that are not kept in a structure having at least four walls and a roof, regardless of how long such materials are kept on the premises." LDC Div. 11-3-3-1. Moreover, Division 4-3-3-5 (D) of the LDC expressly confirms that outdoor storage is not intended to be the primary use within the IL Zone as "[o]utdoor storage areas shall only be used for the storage of operable equipment or materials used for the conduct of an approved use located on the same lot." See also LDC Div. 3-1-3-8(D) (providing that "Motor Vehicle Storage" should be "located behind the principal building"."

There are just 3 RV lots in Arvada and all are zoned IG and are located south of 60th and east of Lamar. This is an industrial area and per the LDC does not require the 300 ft buffer from residential zoning. The buffer requirement does apply to the 14 acre landfill property which is zoned IL (Light Industrial/Office). It is significant, and moreover in compliance with the LDC zoning requirements, that currently there are no RV lots in Arvada with IL zoning. Attached are three aerial photos of these lots.

In a nutshell, the express intent and purpose of the LDC is, in part, to protect the environment, ecology, and surrounding residential communities. This is especially true when a proposed development (such as an RV lot in IL zoning) is incongruous with surrounding development and natural features (such as residential communities and Ralston Creek and Trail) while adding substantially to light-pollution, heat island, and potentially stream and wetland contamination. This is a very different situation than the three existing lots in east Arvada. The LDC IL zoning simply does not permit 100% outdoor vehicle storage as the sole business in the midst of substantial, established residential development.

Thank you for your consideration of this important matter and please let us know if you have any questions.

Karen Gerbatsch, FRCN President

Sharon McCarthy, FRCN VP/Secretary

Rick Simms, FRCN Treasurer

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6 attachments

2022.04.06 - FRCN Letter re Golden RV Storage Park.pdf
653K

Ridge Valley Storage.5300 Gray Ct.jmap.pdf
357K

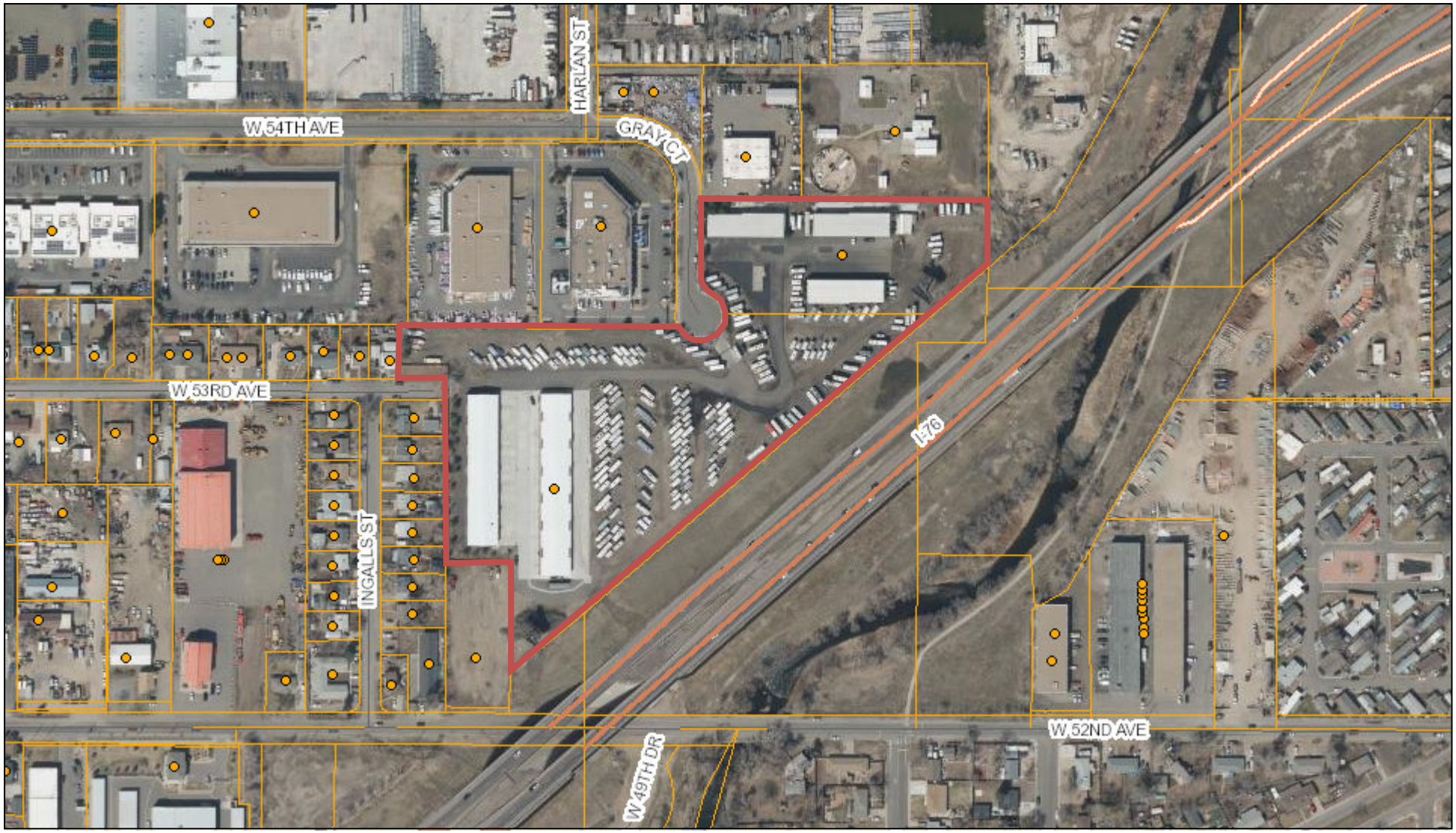
ATS RV Park.5650 W 60th.jmap.pdf
394K

DoDo's RV Storage_6325 W. 56th Ave.jmap.pdf
413K

Arvada Pre-App Summary (1)5.2023.pdf
99K

Comments Given City Council Meeting 1.22.24.docx
17K

Ridge Valley Storage



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0 0.1 0.2 mi

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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Author: ArcGIS Web AppBuilder
Date: 8/12/2023

ATS RV Park

0 0.055 0.11 mi

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Author: ArcGIS Web AppBuilder
Date: 8/12/2023

DoDo's RV Storage

0 0.055 0.11 mi

N

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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Author: ArcGIS Web AppBuilder
Date: 8/12/2023

Community Development Department - Planning Division
8101 Ralston Rd. Arvada, CO 80001
720-898-7435 Phone
www.arvada.org

Pre-Application Summary

DATE: 5/23/2023

PROJECT: Arvada RV Storage

PROJECT PLANNER: Jeremiah Bebo

PROJECT NUMBER: PA2023-0055

Dear Applicant,

I would like to take this opportunity to thank you for considering the City of Arvada for your project.

As your assigned Project Planner, I remain available as a resource as you initiate the review process in the City. Attached to this letter are the formal staff comments from your Pre-Application Meeting with the Development Review Team. The comments reflect information provided on your submittal materials as well as the discussion within the meeting and are meant to provide general direction to you in the preparation of the actual submittals. Additional comments may be provided following the first review of your formal submittal, based upon the more detailed documents provided with your application. If the plans change significantly for the project, another pre-application meeting would be advised. Please understand that the fees that you pay at the beginning of your project cover 3 reviews, if your project requires more than 3 reviews, additional fees will be assessed.

If you have any questions or require additional information, please do not hesitate to contact me.

Thank you.
Jeremiah Bebo

Application Details			
Annexation Required?	No	Rezoning Required?	No
f rezoning is required, what is the proposed district?		Proposed Use	Industrial
Is new subdivision proposed?	No	Number of lots:	0
Acres	14		

Community Development Department - Planning Division
8101 Ralston Rd. Arvada, CO 80001
720-898-7435 Phone
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PLANNER-PREAPP-Jeremiah Bebo-720-898-7438- jbebo@arvada.org

IL (Industrial, Light) zoning. See Table 2-1-6-1A for development standards.

Mixed Use - Residential Comprehensive Plan designation. Comprehensive Plan Amendment is required.

20’ front setbacks (taken from the east) which includes parking. 5' side and rear setbacks. 50% maximum lot coverage (buildings).

See LDC 3-1-3-8(D) for motor vehicle storage specific use regulations.

35% maximum outdoor storage allowed. Both RV parking stalls and drive aisles count towards that percentage. See LDC 4-3-3-5 for site design standards specific to outdoor storage. Please also note the restriction on hours of operation. Type C buffer required around the perimeter of the site. See LDC 4-6-5-3 for bufferyard requirements. Also see LDC 5-1-6-3 for additional outdoor storage regulations.

Recycled asphalt parking lot can be explored although Fire is most likely going to need their access road paved.

See LDC 5-1-6-5 for trash collection areas.

Outside referrals to Consolidated Water Mutual, Croke Canal, Mile High Flood District and CDPHE will occur during the review process.

A minor subdivision plat will be required as the land is not platted.

A neighborhood meeting will be required.

A Site Plan and Minor Subdivision will be reviewed administratively. Please note that the City will not be able to provide approvals until the State has approved the various permits/entitlements needed per Engineering.

Comprehensive Plan Amendment to Industrial/Office will require a Planning Commission public hearing and ratification by the City Council.

ENG-DEVEL-PREAPP-Kyle Gillitzer-(720)-898-7435- kgillitzer@arvada.org

1. Water: There is an existing 10” AC water main running under W 68th Ave that is stubbed to just before the property line. The city would prefer this line to be demolished and capped at the tee connection point in the intersection of Joyce St and W 68th Ave given that AC is not in conformance to current standards and to provide a buffer zone from the environmental concerns for city maintained infrastructure. The site could connect to the existing mains in W 68th Ave and Joyce St via service tap with a long service line if this route is pursued.

Please be advised of maximum fire hydrant lateral lengths outlined in section 400 of the Arvada Engineering Design Standards and Guidelines if your site requires a hydrant as this will affect the potential of the service connection plan outlined above.

Maps of existing public mains will be included in your Trakit file attachments. These are for general utility location use only - please conduct on site test hole core investigations to confirm exact utility locations.

2. Sanitary: The closest city sanitary infrastructure lays under Joyce St near the drive aisle for 6803 Joyce St.

This main will need to be extended to be able to be tapped. In the same line of thought as above, this main may be extended only to the intersection of Joyce St and W 68th Ave and then a long service line be used to service the property.

3. Storm: There is no existing storm infrastructure nearby to the project. As outlined in our returned review comments from the second review of DA2021-0146 the VCUP proposal only includes a geomembrane to ensure commingling of potentially contaminated water is prevented only in the area of the site where the EDB is located. This leaves the entirety of the rest of the site to collect potential surface runoff that is contaminated with hazardous materials from the site's previous use and spread the pollution. As you are proposing to outfall directly into Ralston Creek this could concentrate pollution flows and spread them over vast areas where the creek flows. Neighborhood comments and concerns to the city thus far have highlighted environmental issues as a primary topic for the site. For staff to be able to recommend approval for the major modifications we would need to see this hazard mitigated. There are potential options to mitigate the risk of polluted runoff pickup. Please explore using a geomembrane under the recycled asphalt surface to create a fully enclosed system from rain drop landing until EDB orifice plate exit.

Water Quality and detention will be required if ground disturbance is 1 acre or larger.

For development, expansion, and redevelopment in which ground disturbance is 10,000 sq ft or greater, but less than an acre LID design will be required. Certain LID practices may overlap to aid in meeting site landscaping requirements under the Land Development Code. LID shall be used to ensure the site’s proposed runoff volumes match historic hydrologic conditions. Proposed discharge points for a site shall be consistent with historic discharge points.

For projects 1 acre or larger, an O&M Manual is required for all water quality/detention facilities.

Owner/developer shall obtain a State General Permit for Stormwater Discharges Associated with Construction Activities from the Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division, prior to clearing, grading, or excavating on the site.

All onsite drainage facilities should be identified as privately owned and maintained and should be located within a drainage easement.

Foundation drains / private underdrains will need to be completely separate from public utilities.

Dedicate the 100 year floodplain limits as a drainage easement to the city.

You are proposing infilling portions of federally designated wetlands. You are also altering the hydrological conditions of those wetlands. Include a copy of your 404 permit from the U.S. Army Corps of Engineers with your next submittal. Please see the U.S. Wetlands Mapper tool for further on the extent of the wetlands. https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper

4. Public Improvements: All City right of way adjacent to development property is required to be brought up to current City of Arvada standards. There is a portion of W 68th Ave which will need to be extended to the property line.

Bring the entire site into ADA compliance - an ADA accessible route to and from the building and the right-of-way will need to be provided.

If any overhead utilities’ poles need to be moved, they must instead be undergrounded.

SUE requirements need to be met. All underground utilities need to be verified (location and depth) before final design is approved.

5. Traffic: Complete the Base Assumptions Form and submit to your review engineer. Base assumptions form must be signed by City staff prior to submittal. At a minimum, a trip generation letter will be required. A full Traffic Impact Analysis (TIA) shall be required with applications for development review and approval when the trip generation during any peak hour is expected to exceed more than 100 trips during any one-hour peak or to exceed 250 trips per day.

Include a turning analysis for the site showing adequate ability for the large anticipated vehicles to be able to turn and maneuverer throughout the site. Include an Autoturn program analysis showing vehicles can navigate proposed path including large trucks if necessary

6. Grading: A Site Disturbance Permit will be required if the ground disturbance is greater than 10,000 sf. https://arvada.org/business/permits-and-applications/site-disturbance-permit

Retaining walls more than 4’ tall (measured from top of wall to bottom of footer) require a special permit through the building department.

Maximum slope in a landscape area is 4:1.

All off site grading/construction of any kind will require signed permission from all applicable property owners.

7. LOC/Cash escrow: Developers are required to provide an escrow in the amount of 100% of the estimated cost of public improvements via cash or letter of credit. When the developer successfully completes the public improvements and warranty is initiated, the City will retain 20% of the certified construction costs and release the remaining 80% of the escrow back to the developer. The City will retain 20% of the certified construction cost of public improvements to ensure that the public improvement meets the City standards through the 2-year warranty period.

8. Environmental Site Assessment: Colorado Department of Public Health and Environment (CDPHE) approval of the Voluntary Clean Up (VCUP) application will be required prior to approval of the DA. CDPHE approval of the VCUP completion signified by the No Action Determination will be required prior to certificate of occupancy issuance for the site.

Please include the environmental site assessments and VCUP application with all submittals.

9. Applicants shall verify with Arvada Fire Protection District if fire access and circulation is sufficient and if the fire hydrant requirements have been met.

10. Standard checklists for CDs, Engineering Cost Estimate, Drainage Report, Utility Report, and Traffic Report must be followed. Checklists can be found on the Arvada website. https://arvada.org/business/permits-and-applications/documents-and-downloads

11. This list is NOT comprehensive. It is the responsibility of the design engineer and the

developer to know and comply with the Arvada Engineering Code of Standards and Specifications.

12. All construction drawings will need to comply with the City of Arvada 2022 Engineering Code Standards and Specifications.

Community Development Department - Planning Division
8101 Ralston Rd. Arvada, CO 80001
720-898-7435 Phone
www.arvada.org

BUILDING-PREAPP-Nate Romero-720-898-7615- nromero@arvada.org

The plans submitted at this stage of the proposed project are insufficient to complete a full plan review and provide additional feedback from the building department at this time.

AFPD-PREAPP-Scott Plumer-- scott.plumer@arvadafireco.gov

-This application will be reviewed for compliance with the 2018 International Fire Code (IFC) as adopted by the City of Arvada under Article II of Chapter 42 in the Arvada City Code. The comments provided in this review are preliminary in nature and do not consist of an all-inclusive list of needs or requirements for this proposal. Building construction plans will be reviewed for compliance with the adopted IFC at the time of submission. Many times, sufficient drawings or information are not provided, therefore the comments below are general in nature.

-Fire Lane and Fire Apparatus Access Roads shall be provided with a paved all-weather surface that can support an imposed load of 85,000 pounds. And provide access to within 150 feet of all portions of the exterior of the structure(s).

-The Fire Lane and Fire Apparatus Access Roads shall provide a minimum inside turning radius and an outside turning radius sufficient to allow navigation of AFPD apparatus and allow effective emergency operations. A turning analysis of the site shall be provided and indicate that access throughout the site will accommodate AFPD Tower 56. The developer or representative shall reference the AFPD website for specifications.

-The approved Fire Lane and Fire Apparatus Access Road(s) shall be provided during construction unless otherwise approved by the AFPD. The fire apparatus access roads shall consist of the first lift of asphalt or concrete and shall be paved prior to combustible materials being brought to the site and commencing vertical construction. Alternative temporary fire apparatus access road materials and/or designs shall be approved and permitted by the AFPD.

-Fire lane signage plan shall be provided.

-A 3-foot clear space shall be maintained around all fire hydrants. The space shall be measured from the top center of the hydrant and there shall be no obstruction directly in front of a hydrant. All the trees within this development shall provide an unobstructed vertical clearance of 13 feet 6 inches for the fire apparatus access road.

-Fire hydrants shall be provided so that all portions of buildings are within 400-feet of a fire hydrant. The proximity shall be measured along the Fire Apparatus Access Roads to the building and via an approved route around the exterior of the building(s) at grade level. The proximity may be increased to 600-feet with installation of an approved fire sprinkler system. Fire hydrants shall be spaced such that all points within the development are accessible to within 600 feet of a fire hydrant.

-The minimum fire-flow as determined by Arvada Fire shall be provided by the fixed-water distribution system. Fire-flow is calculated using the total floor area of all floors within the exterior walls of the largest building and the construction type. Reduction in required fire-flow is allowed with installation of an approved fire sprinkler system and as approved by Arvada Fire.

Community Development Department - Planning Division
8101 Ralston Rd. Arvada, CO 80001
720-898-7435 Phone
www.arvada.org

PLN LANDSCAPE-PREAPP-Shane Greenburg-- sgreenburg@arvada.org

Same comments as in previous submittals. Please focus tree placement on viewsheds from the Ralston Creek Trail and neighboring residential properties.

Comments Given at City Council Meeting 1/22/24

Good Evening Mayor and City Council –

My name is Karen Gerbatsch and I live at [redacted] Ct.

I speak tonight as a member of a group called Friends of Ralston Creek Neighborhoods which represents residents of Geos, Forest Springs, WestWood Mesa, and many enthusiasts of the Colorado Tap House and the Ralston Creek Trail. 2 years ago, we learned that the 14 acre former unregulated landfill capping methane and various other contaminants that sits undeveloped in the middle of all of us, was to be developed into an RV storage parking lot. This land is zoned Industrial Light which doesn't comply with the LDC since 100% of the business is outside storage of 330 RV's.

We expressed major concerns prior to the State approving the VCUP and believe that this does not relieve Arvada Staff from thoroughly investigating the environmental problems of the site.

There have been no recent geotechnical investigations. Therefore, we request that city engineering staff seriously review the designs and determine that there is good technical data to support the designs.

We cherish the Ralston Creek Trail and have kept tabs on the Ralston Creek at Croke Work Zone just west of the landfill since Arvada, Mile High Flood District and Army

Corp of Engineers are doing a lot of repair work there caused by the 2013 floods. Arvada has posted a video about the 2 year project on its website.

We are before City Council tonight to alert you to the complexities of this project requiring input and consideration from the Council and city staff, as well as communities surrounding this former landfill redevelopment. And we will attend the neighborhood meeting in these chambers Wednesday night.

Mr. Fifer, we hope to meet with you to share our concerns in more detail as our new council person.

Thank you for listening. You will receive an email explaining our position in more detail very soon.

July 15, 2024 Comments -Good Evening Mayor and City Council:

My name is Karen Gerbatsch and I live at [redacted] Ct.

I speak again as a member of Friends of Ralston Creek Neighborhoods which represents residents of Geos, Forest Springs, WestWoods Mesa, Westwoods Ranch, Maple Valley and many enthusiasts of the Ralston Creek Trail. I am notifying you that the developer is moving forward with building an RV Storage facility for 355 vehicles.

The application letter labels the site as blighted and that the land is unusable and not environmentally safe. The out-of-state LLC knew this when they bought the land in 2012 for $85K for back taxes. 100 ft away to the east is the MHFD and Arvada joint improvement project on the Ralston Creek costing $1.5M. Why spend tax payment money on creek improvements and beautification of the area but allow this “illegal landfill caused by others” (quote from developer application letter) to become the largest RV Storage Lot in Arvada nestled in the wrong place between many stable neighborhoods, the Colorado Tap House, and the Ralston Creek and Trail? The land is not blighted for those that have lived next to it for many years. It is a natural landscape along the creek and trail that provides a space for wildlife. There are approximately 600 homes and businesses that are located within 1000 feet of the property that will be impacted.

The Arvada Land Development Code has 12 objectives. I would like to highlight 3:

Implement the City of Arvada Comprehensive Plan, as that plan may be amended or replaced from time to time;

1---Ensure that all development in the City is consistent with the spirit and intent of other plans and policies adopted by City Council;

Promote the public health, safety, convenience, comfort, prosperity, and general welfare;

Promote the creation of safe, unique, interesting, inclusive, and economically vibrant places throughout the City;

2---Protect the quality and character of stable residential neighborhoods;

Promote the economic development and fiscal sustainability of the City;

Encourage efficient and connected multimodal transportation and circulation systems serving drivers, bicyclists, pedestrians, and transit riders;

Encourage the conservation and efficient use of water and other natural resources;

Ensure the provision of adequate public facilities and services for new development and redevelopment;

3---Provide for the consistent, predictable, and equitable administration of City land use and development regulations;

Implement a connected system of parks, trails, and open spaces that promote improved outdoor activity and public health; and

Provide protection from nuisances and hazards.

The developer's application letter includes phrases such as "provides a service to the surrounding neighborhood, utilizes an otherwise unusable plot of land, is compatible with the existing and planned service provision, will promote public welfare and will be consistent with the goals and policies by providing public enhancements and improvements to a blighted sight."

I have never heard an RV storage facility called anything but a blighted sight. If this project is approved administratively, we ask that the City Council call it up for a review of the planning department's decision.

Good Evening – I am Karen Gerbatsch living at [redacted] Ct. and represent the neighborhoods of Forest Springs, GEOS, Westwoods, Westwoods Mesa, and Maple Valley through Friends of Ralston Creek Neighborhoods.

Let me tell you about a decision made on another RV storage facility in Arvada. In March, 2024 the Arvada RV and Boat Storage facility at 8870 Indiana St. requested an additional 5 acres they owned to be rezoned from Agricultural to Planned Development to allow for expansion of their outdoor storage business. This business is family owned by Gerald Nunez and the land is located in Jefferson County surrounded by the Arvada neighborhood Whisper Creek, just before the Candelas light on the right when driving north.

The application was reviewed by the Jefferson County Planning Commission with Sara Hutchison, on the planning staff, taking the lead. They used rezoning criteria of:

Compatibility, Conformance to Comprehensive Master Plan, Mitigation of Impacts, Infrastructure and services, and health, safety and welfare.

They found that the application was out of conformance with the applicable goals and policies of the Jefferson County Comprehensive Master Plan in areas of:

Land use, Physical Constraints and Community Resources.

During the Referral process, the city of Arvada provided comment in opposition of the case. An email from Rob Smetana

stated “It is inconsistent with our land use designation” and recommended that the county not support the proposed use. The application was recommended to be denied for rezoning by staff.

The Planning Commission Chairperson also denied the rezoning and stated: “when I look at the influence of the Candelas Neighborhood, I can’t see the compatibility. A compatible zip code maybe, but, after that, RV storage doesn’t meet the expectations of the county or the city of Arvada.

And the land use decisions run with the land, not the owner. So, we have to look at what serves the public interest which is the entire northwest Arvada neighborhood. I am not able to support the land use.”

I hope the Arvada Planning Commission is as wise. All the neighborhoods represented are stable and established or rapidly growing with another 400 homes being planned right on the other side of Indiana. We need a southwest sub area plan similar to the Candelas northwest sub area plan to provide a vision for growth south of the railroad tracks along Indiana to Highway 93 while protecting the wildlife corridor of the Ralston Creek and Trail.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

FRCN Meeting

Linda Graham <[redacted] Wed, Jan 24, 2024 at 11:47 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>

I cannot attend the meeting because I had hip replacement surgery Friday. I have many concerns about this RV Storage project.

1. Air pollution
2. Pollution of Ralston Creek & Crock Canal
3. Noise pollution. This is bound to be a noisy project, both in the building phase & when the RVs are parked there.
4. What about pollution from the RVs when they are using the site for storage?

The whole project seems like a big mess in many ways.

Linda Graham
[redacted]
Arvada, CO 80007

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

FS RV Storage

Linda Graham <l[redacted] Sun, Jul 14, 2024 at 10:05 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Dear Jeremiah.
My husband & I live in FS at the end of Lupine Way, just south of the pump house on the Ralston Creek Trail. We have several concerns:

1. Contamination of the creek
2. Noise level of trailers going in & out
3. Lights being so high that they will probably shine into our windows on the back of our house.

It is a terrible place to put an RV Storage facility!
Thanks!
Linda & Mark Graham

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer - Public Comment 08.05.24

[redacted] > Tue, Aug 6, 2024 at 1:51 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Hello Jeremiah,

Enclosed for your information a copy of my public comment presented to City Council on 08.05.24.

The written comment includes links to YouTube Presentations that highlight the permeability of an RV underbody (ie the ability of methane to infiltrate), as well as excerpts from the Terracon Report of August 2023.

Reviewing the submittal comments, I am getting the sense that each department review is highly centered, but I do not see anyone person or department in taking the lead to paint an overall picture of this project. My last two comments are examples on design parcels that need to be integrated into the whole of the development design.

Example - I have not seen any comment that is focused on the proposed surfacing, the inconsistency in the proposed surfacing, and the inherent instability given the minimal attempt to landfill mitigation! Reading the Terracon report of August 2023, the direction is clear - the landfill material must be removed to create any sense of stability for the proposed storage facility.

Why then would the City even consider this development without full removal of the old landfill debris? Why is the City not focusing on aspects that will impact severely on the Ralston Creek via surface pollution run-off,

and the large potential of reopening pathways that, according to the limited investigations conducted, are currently closed?

CRS 25-16-308 requires an Environmental Assessment based on current and future of a development. The applicant has submitted neither.

Who or which department is coordinating all the responses to understand how this project can be build, maintained, operated, and its impact on residents, and the environment during construction, and operation of the storage yard?

Thank You.

Rainer W Gerbatsch – send from MacBookPro

[redacted]

[redacted]

Public Comment Surfacing - 08.05.24.docx
26K

RV Storage – City Council Public Comment – Road/Parking Area Surfacing

Proposed Comment 05. August 2024

Good evening – Ann Katzburg and Rainer Gerbatsch of GEOS are here to address the council on the 6800 Kilmer development.

The developer proposes the use of aggregate-surface pavements placed over nearly unmitigated landfill debris. The August 2023 Terracon report finds full removal of the landfill debris as cost prohibitive, and therefore recommends a surfacing scheme described as unstable, with inherent high risks, unpredictable movement of up to 2 ft, requiring frequent maintenance and periodic replacement.

The pavement scheme is presented without knowledge of structural loading, but offers general recommendations somehow based on

“experience with similar projects”. The applicant has been unable to identify any project that would even remotely qualify as a “similar project”.

AFPD will require an all-weather asphalt or concrete paved access road as well as hydrants through-out. Design and integration with the landfill at large are critical, considering the cited high risks during construction and operation of the storage yard.

The documents submitted to-date do not convey what exactly the applicant intends to build or whether any engineering has been performed to support the submittals by the applicant.

Current submissions have failed to address construction and operational risks, and do not present a comprehensive, and integrated

design concept. There is concern that the Applicant may not use the Arvada Code of Engineering Standards of 10.2.2023.

Here are several key take-aways:

-How can the interior drive lanes, parking surfaces, and fire access road be designed to any level of confidence without knowledge of basic vehicle loading information;

- Design for significant movement, and instability including collapse due to the “nature of the debris” even with adherence to a stringent yet undefined maintenance and replacement protocol;

-Ability to define, establish and maintain a currently “undefined optimum moisture content” during and post construction without exacerbating stability;

-A disconnect between the GeoTech Report requiring “new gravel surfacing” whereas drawings for site plans, erosion control and drainage plans require recycled asphalt;

-The GeoTech report highlights the unavoidable risk of deep, long-term movement of the existing fill and landfill debris, requiring periodic replacement. Frequent, likely year-round grading maintenance is critical for proper drainage, and therefore the strength and stability of surface materials, and underlying subgrade soils.

- The fire access road depending on design and construction may not be subject to the same instability and movement as the vast majority of the site. Anticipated erosive losses, subsidence, and instability will impact drainage, and the critical optimum moisture content with the following consequences:

-resurgence of methane production,

-reopening of pathways,

-increase in pavement instability,

-increased maintenance or replacement.

02:52

-Loss of aggregate surfacing via wind forces and rutting will result in loss of strength and poor drainage. The proposed cure: application of MgCL,

a palliative banned by several CO counties given is impact on water quality and aquatic benthic macro-organisms.

- Utilities outside of the office building constructed on or within the existing fill materials and landfill debris will experience long-term movement in the order of 2 feet or more.

-submittals do not include passive methane mitigation. Intrusion of methane into RVs was dismissed by the developer out of hand, without offering supportive modeling or testing.

The Terracon report of August 2023 is clear:

Long-term movement from unimproved landfill debris cannot be quantified due to the nature of the debris, and reduction of this type

of movement is only possible through complete removal of fill and debris.

This development is not just novel, it lacks code guidance, modeling and textbook support. There is simply no precedent of an RV storage facility of this magnitude placed over a legacy landfill with such minimal attention to risk assessment and mitigation, in the middle of established residential communities

This development received its lifeline thru a VCUP issued by CDPHE. VCUP's for legacy landfills are issued on a highly focused set of criteria: soil, ground water, air. VCUP's do not require an environmental assessment, fully ignore the impact of any development during and post construction, and the large potential of resuscitating previously dormant pathways.

Colorado Revised Statutes (25-16-308 – Environmental Assessment) requires an environmental assessment based on the current and proposed future use by the property owner.

The developer plans on leasing the site to an unknown operator! The developer is located in Florida and protected by at least one LLC.

One of the Public's key concerns is "will the Applicant or the choosen Operator conscientiously approve and finance any added costs of investigation, testing, over excavation and engineered backfill or will they walk away from the project potentially leaving open excavations that could cause health and or environmental problems." The number of caveats about the high cost of over excavation and engineered backfill only increases the concern that the Applicant will walk away if unforeseen problems arise.

It is incumbent on the City of Arvada to assure that any development on this site fits the comprehensive plan, protects bordering residential communities, and is safe and protective of the environment and established ecologies.

This development proposal as submitted has a single focus: reduce development cost while externalizing future costs.

Thank you for keeping the safety and well-being of residents of Arvada in the forefront when you make decisions for our community.

End of Public Comment.

The following information will be part of the copy of the public comment send to each City Council in a separate email.

The written version of this comment will include the following:

1. YouTube demonstrating RV underside permeability

https://www.youtube.com/watch?v=mOq81E8N5cI

https://www.youtube.com/watch?v=8cntsniagmc

2. Excerpts from the Terracon Report of Aug 24, 2023:
    1. *Aggregate-surfaced trailer areas will move significantly and will likely require frequent observation and maintenance;*
    2. *For stability of the drive lanes, it is imperative that the subgrade is protected from loss of moisture, as a significant loss of moisture of the pavement supporting materials could result in additional movement of the subgrade;*
    3. *Rutting of the aggregate surface layer and loss of surfacing materials will occur over the life of the drives/parking areas. Maintenance of the surfacing material and drainage are critical to performance of aggregate surfaces roads;*
    4. *Since the surface materials are unprotected, proper drainage is key against loss of strength and stability of the surface materials. Poor drainage allows water to remain on the surface*

and percolate into the aggregate base course section, reducing the strength of the underlying subgrade soils;

5. *Maintenance of the roadway shape and ditches or drains should be performed at least twice a year, particularly during wetter periods of the year and when snow removal is required, though more frequent maintenance may be required depending on actual traffic, drainage, and smoothness requirements. If unstable conditions develop during roadway usage, scarifying and drying of the subgrade, or placement of additional gravel material may be required."*
6. *Utility Recommendations. It has been our experience with other structures constructed on landfill debris that utilities constructed below or adjacent to structures on landfill debris will move significantly and will likely require excavation and full replacement multiple times over the life of the office building. Utilities outside of the office building constructed on or within the existing fill materials over the existing landfill debris will*

have a very high risk of movement. Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris. It is our opinion that movement on the order of 2 feet or more is possible.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV lot development-6800 Kilmer

Robert Smith <[redacted]> Thu, Jan 18, 2024 at 11:50 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Mr Bebo

I object to the above RV park Bases on the following reasons:

1. Incompatibility of an RV lot with surrounding residential and outdoor rec uses.
2. Environmental risk from an RV lot on top of an unregulated landfill and methane gas.
3. Adverse impact to property values.

Robert C. Smith

[redacted]

Arvada Co 80007

Sent from Mail for Windows

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 KILMER RV STORAGE - DA 2024-0016

Suzanne Grandchamp <[redacted]> Mon, Mar 18, 2024 at 10:49 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Good evening, Mr. Bebo.

My name is Suzanne Grandchamp. I reside at [redacted] Place, Arvada, CO, 80007.

I recently received a Notice of Administrative Application from the city regarding 6800 Kilmer RV Storage, DA2024-0016. I'm writing to let you know that *I am not* in favor of the development of this parcel into an RV storage facility. I'll make my reasoning known to my council members. I will also attend the future formal public hearing. I would also like to be kept informed about the progress of this application.

West Arvada already has several RV storage facilities, many of which are located off County Road 72 (Coal Creek Canyon Road) and one of which is located off Indiana, just north of 87th Parkway. None of these locations is situated next door to a residential development. In contrast, 6800 Kilmer RV Storage would be surrounded by residential developments (Forest Meadow, GEOs, Westwoods Mesa) and within 500' of Ralston Creek and its trail system. This isn't a good plan – either for the ecosystem of the creek or for the residential community.

Further, the application proposes no remediation of the city dump that used to be located at this site, including the methane bubble that resides underground. The best solution would be for the city to purchase this property from the applicant, and either 1) leave it as a green space buffer between the businesses on Joyce Street and the residential developments, or 2) remediate the environmental issues that have resulted from the city's decision to use these 14 acres as a dump historically.

Sincerely, Suzanne

Suzanne E. Grandchamp, Esq., NCG, CLFP

[redacted] Place

Arvada, CO 80007

[redacted]

[redacted]

IRELAND STAPLETON

JAMES R. SILVESTRO
ATTORNEY AT LAW
[redacted]

March 26, 2024

SENT VIA EMAIL

Jeremiah Bebo
City of Arvada, Planner II
8101 Ralston Road
Arvada, CO 80002
JBebo@Arvada.org

RE: Friends of Ralston Creek Neighborhoods – Opposition to Development Application No. DA2024-0016

Dear Mr. Bebo:

This law firm represents the Friends of Ralston Creek Neighborhoods ("FRCN") in connection with its opposition to the "RV Storage Arvada" project that has been proposed by Chelton, LLC to develop the property located at 6800 Kilmer St. (the "Site") and now designated by the City as Project No. DA2024-0016. FRCN previously opposed a similar land use application for this same Site, which the City previously designated Project No. DA2021-0146. FRCN continues to vehemently oppose this overly intensive land use at a former unregulated landfill site that remains heavily contaminated. The continued presence of environmental contamination at the Site[1] makes this proposed use especially inappropriate at this location and uniquely threatens the adjacent Ralston Creek waterway, recreational trail, and all surrounding land owners.

The purpose of this letter is to set forth the many reasons why the City must deny this unlawful land use application. First and foremost, this proposal violates the existing zoning at the Site and therefore any approval would be illegal. Second, the proposal violates the City's setback

[1] The Site was an unpermitted landfill for Jefferson County in the 1930's and 1940's and continued to serve as an illegal dumping ground for many years even after the landfill was officially closed in the 1940's. Although the historic contamination at the Site has mostly remained buried, it has at times nevertheless caused pollution to move off the Site, especially into Ralston Creek. For example, the 2013 floods and resulting erosion along the creek channel caused a portion of the historic landfill to be exposed and to dump unknown quantities of trash and other pollution into Ralston Creek.

rules for industrial storage near existing residential uses. Third, even if the proposed land use were an allowed use at the Site, the City should not bend its land use rules to permit the Site to be developed in violation of the City's maximum outdoor storage rules. Fourth, there is no basis to amend the Comprehensive Plan to facilitate this private development given the unique history of the Site and adjacent residential and recreational uses. Fifth, the current land use proposal is missing too many critical details to be considered complete and ripe for consideration by the City—including a number of still missing details which the City previously stated that the applicant must provide in connection with any application for this proposed use. Finally, given the legacy of environmental contamination at the Site, any proposed development at the Site should be considered by the full City Council as part of a public hearing and not primarily considered through an opaque administrative process by Staff. Each of these issues is addressed in turn below.

1. Outdoor Storage Is Not Allowed as a Primary Use within the IL Zone.

The Site is located in the City's IL Zone, which permits only light industrial uses. More specifically, the IL zone is intended "to provide areas for light manufacturing, assembly and fabrication uses, office, research, food and beverage processing, packaging, or bottling, and compatible recreational activities." LDC § 2-1-6-3. The LDC similarly defines "light industry" as "[u]ses that involve research and development, assembly, remanufacturing, compounding, packaging, testing, or treatment of products, generally from previously prepared materials or components, ***with limited outside storage and limited external impacts or risks*** such that the use is not defined as heavy industry or heavy logistics center." LDC § 11-3-3-1 (emphasis added).

Chelton's proposal for an RV storage yard does not fit within Arvada's definition of "light industry" and therefore is not a legal land use at the Site. The predominant land use proposed by Chelton is outdoor storage. While the LDC provides that limited outdoor storage (totaling no more than 35 percent of a property) may be an ***accessory*** use within the IL Zone, the LDC does not identify outdoor storage as a permissible ***primary*** use in the IL Zone. *See also* LDC § 4-3-3-5.D ("Outdoor storage areas shall only be used for the storage of operable equipment or materials ***used for the conduct of an approved use located on the same lot***." (Emphasis added)); LDC § 3-1-3-8.D (providing that "Motor Vehicle Storage" should be "located behind the ***principal*** building" (emphasis added)).

Chelton's current proposal fits squarely within Arvada's definition of a "storage yard" as "a location for outdoor storage of operable equipment." LDC § 11-3-3-1. Under the LDC, a "storage yard" is only allowed as a primary use within Arvada's IG (heavy industrial) Zone. LDC § 2-1-6-4.A. This reality is further confirmed by the fact that all three of Arvada's existing RV storage facilities are located in the City's IG (heavy industrial) Zone.[2]

Because Chelton's proposed land use is not permitted within the IL Zone, none of Chelton's land use requests can be approved without violating the LDC. If Chelton intends to operate a "storage yard" at the Site, then it must seek to rezone the Site to the IG Zone. Of course, given the existing surrounding uses in the vicinity of the Site, such a rezoning would not be

[2] All three of Arvada's existing RV storage facilities are located in the IG Zone located south of West 60th Avenue and east of North Lamar Street: (1) Dodo's RV Storage; (2) ATS RV Park; and (3) Ridge Valley Storage.

appropriate and there is no lawful way for Chelton to operate its proposed storage yard at this location.

2. The Proposal Violates the City's Setback Rules for Outdoor Storage.

Chelton's current land use application ignores its previous admission that this proposed RV storage facility requires a minor modification to the City's presumptive setback rules. (*See* Project No. PA2023-0055, May 2, 2023 Letter from K. Dean to J. Bebo.[3]) More specifically, LDC § 5-1-6-3.B.2 provides that outdoor storage shall not be located within 300 feet of adjacent residential zones. Here, Chelton's current proposal provides that industrial storage would be located less than 150 feet from the neighboring residential property located at [redacted] Kendrick Dr., Arvada, Colorado:

Unlike the other residential lots in the Forest Springs neighborhood, the residential lot for the home at [redacted] Kendrick Dr., Arvada, Colorado extends to the north side of the irrigation ditch. Accordingly, although Chelton previously admitted that it would need a minor modification to allow for a 240-foot setback from neighboring residential lots, the closest residential lot is actually much closer and this issue cannot be resolved through a minor modification. Perhaps that is why Chelton's current application ignores the issue altogether.

Regardless, the City cannot issue any of the approvals that Chelton is currently requesting for this illegal land use. Accordingly, the proposal must be denied.

3. The City Should Not Modify or Waive Its Maximum Outdoor Storage Rules.

Even if the City somehow determines that Chelton's proposal is not illegal for the reasons set forth above, the City should nevertheless deny the proposal because there is no basis for the City to waive its land use rules regarding the maximum amount of outdoor storage. As confirmed

[3] Please consider this to be a formal request to include all of the preapplication materials collected by the City in connection with this project (formerly known as Project No. PA2023-0055) as part of the administrative record for DA2024-0016.

by Chelton's application, its proposal will violate LDC § 2-1-6-3A, which provides that the maximum amount of outdoor storage within the IL Zone shall not exceed 35% of lot area. Here, Chelton seeks to exceed this standard by at least 20 percent by developing approximately 42 percent of the Site as its storage yard. Accordingly, Chelton's proposal cannot be approved without the City's approval of its requested modification of this rule.

As an initial matter, the City must deny this requested "minor modification" because LDC § 8-3-11-3.C.2 provides that modifications cannot be administratively approved as "minor modifications" when they would result in "[a]n increase in permitted maximum development density or intensity," "[a] change in permitted uses or mix of uses," or "[a] decrease in the amount of common or dedicated open space required." Here, Chelton's requested modification to the City's outdoor storage rules would violate all three of these principles by effectively allowing an unlawful "storage yard" in the IL Zone and without sufficient open space (i.e., setbacks) to protect surrounding residential uses.

Even if the City could administratively approve this requested modification as a "minor modification," the City should nevertheless deny this request pursuant to the approval criteria set forth in LDC § 8-3-11-3.D. By definition, Chelton's requested modification would increase the intensity of development and change the uses that are permitted in the IL Zone within the vicinity of adjacent residential uses. The expansion of Chelton's proposed use beyond what would otherwise be allowed under the LDC would result in a direct injury to neighboring land users, including a loss of property values and the loss of the quiet enjoyment of their properties. Expanded outdoor storage beyond what is presumptively allowed will result in additional traffic, surface water runoff, light pollution, and security concerns related to potential squatting, theft, and vandalism. The development rules in the LDC were put in place to protect neighbors' interests and should not be ignored to benefit Chelton and to the detriment of all surrounding land owners.

4. The Proposal Is Not Allowed under the Comprehensive Plan, and There Is No Basis to Amend the Comprehensive Plan to Accommodate this Non-Conforming Private Use.

Arvada's Comprehensive Plan designates the Site for use as "Mixed-Use: Residential Emphasis." This designation is consistent with the "Open Space and Parks," "Suburban Residential," and "Mixed-Use: Residential Emphasis" that the Comprehensive Plan also identifies for the residential and open space areas that already exist to the north, west, and south of the Site. The Comprehensive Plan provides that "Mixed-Use: Residential Emphasis" areas should be primarily developed "to promote neighborhoods which contain housing predominantly, but may also include retail, offices, and light trade." Non-residential uses in these areas must be complimentary to the primarily residential uses.

As part of the preapplication process for this proposal, the City previously confirmed that Chelton's application cannot be approved without the City first amending the Comprehensive Plan to allow for "Industrial" development at the Site. As relevant here, the "Industrial" designation under the Comprehensive Plan stands apart from the "Industrial/Office" designation because "outdoor storage is allowed" in the "Industrial" area whereas "outdoor storage is limited" in the "Industrial/Office" area. While the Comprehensive Plan does include a small area that has been

designated as "Industrial/Office" to the east of the Site, there are no "Industrial" areas anywhere near the Site.

Given this context, there is no basis for the City to amend the Comprehensive Plan to allow for this objectively non-conforming land use. Consistent with its designation as "Mixed-Use: Residential Emphasis" under the Comprehensive Plan, any development at the Site must complement surrounding residential uses.

5. This Land Use Application Is Incomplete and Cannot Be Evaluated In Its Current Form.

During the preapplication process, the City identified a number of critical details that Chelton would need to provide before the City could consider the merits of its application. Among other things, the City's May 23, 2023 "Pre-Application Summary" provided that Chelton's application would need to include: (1) hazard mitigation to prevent polluted runoff from the historic landfill, including potentially a geomembrane under the parking surface to prevent surface water from mixing with subsurface pollution; (2) an approved 404 permit from the U.S. Army Corps of Engineers to allow for the proposed infill of federally designated wetlands; (3) a complete copy of the Site's VCUP application with all submittals; and (4) a plan to pave all fire lands and fire apparatus access roads with an all-weather surface to support an imposed load of 85,000.[4] Chelton's current application does not address any of these issues, and is therefore incomplete.

Beyond these requirements that were previously flagged by the City, the application also fails to address critical issues related to wildlife impacts, needed streambank stabilization, and the potential that storing 355 recreational vehicles on a historic landfill could cause significant geotechnical issues.[5] Likewise, the application does not provide for any methane mitigation that might be needed once the historic landfill is sealed by a new parking surface. Chelton's current submission also does not contain any evidence that this incompatible land use will be fully screened from surrounding residential and recreational areas and will not result in a significant increase in light pollution within the area.

The Ralston Creek is a critical wildlife corridor and recreational trail that links communities throughout Arvada. The City should proactively work to protect this vital public amenity. A fenced parking lot on an unreclaimed landfill is fundamentally incompatible with all surrounding land uses and should be rejected.

6. Any Approvals Related to the Proposal Must Be Considered by the City Council as Part of a Public Hearing.

For all of the reasons set forth above, the City should deny Chelton's proposal to convert this former unpermitted landfill into a non-conforming RV storage facility. If, however, Staff

[4] The current proposal still provides that these emergency access routes will be unpaved.

[5] Although the application includes a geotechnical report, that report does not include any detailed analysis of what additional stabilization might be needed to prevent the subsurface historic landfill material from shifting or collapsing when placed under significant weight for a prolonged period of time.

decides to administratively approve Chelton's development application for a site plan and minor subdivision, the City Council should affirmatively "call up" this decision for a full public hearing before the full City Council. LDC § 8-2-3-11.J provides that any land use decision which might otherwise be permissibly made through administrative review by Staff can be brought before the full consideration of the City Council upon a motion and majority vote of Council. If an administrative decision is "called up" before City Council, the LDC provides that the development application shall then be processed through a public hearing before the City Council "as soon as practicable."

Here, a full public review is warranted to ensure that all affected members of the public have a full and fair opportunity to weigh in on Chelton's non-conforming land use proposal for the Site. Among other issues, Chelton's request that the City should waive its outdoor storage rules as well as its failure to comply with the City's setback rules should be considered by the City Council and not merely processed through a non-public administrative review. For obvious reasons, Chelton's controversial proposal has garnered significant public attention and neighborhood opposition. Both Staff and the City Council should welcome this public participation and ensure that all concerns are heard and resolved before any administrative approval might become final.

*** * ***

On behalf of FRCN, we thank you for your time and careful consideration of FRCN's significant objections to this proposal. **Please include a copy of this letter in the administrative land use file for Project No. DA2024-0016** and please let us know of any further developments related to Chelton's land development proposal, including but not limited to any subsequent submittals from Chelton, any responsive comments from the City to Chelton, any public meetings or hearings regarding any aspect of Project No. DA2024-0016, and/or any further opportunities for public comment or participation.

Please let me know if you have any questions regarding any of the foregoing. We thank the City and Staff for your time and careful consideration of these important issues.

Sincerely,

James Silvestro

Cc: Rob Smetana
Rachel Morris
Jessica Garner

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Possible RV storage development

salley smith <[redacted]> Tue, Jan 23, 2024 at 9:17 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Good morning,
I'm a resident of the Forest Springs community. I'm very opposed to this development at this location because it is too close to several residential communities, the Ralston Trail and on an old land dump with unknown contents. Also, the impact it would cause to our wildlife in that area. This belongs in an industrial area not in a residential neighborhood.
If this does get approved, there should be requirements that would completely hide what is parked on this land. Such as very mature trees, a very high attractive brick wall, sound restrictions and lighting restrictions.
It is a very poor site for RV storage and hopeful the city will recognize the bad impact it would have on the current and future residents of this community

Thank you
Salley Smith
[redacted]
Arvada 80007
[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Forest Springs Questions

Sharon McCarthy [redacted] Thu, Jan 18, 2024 at 9:58 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Good "windsday" (a day late for Wednesday-LOL!) Jeremiah,

There was a renovation project at City Hall that caused some confusion at the July meeting. What is the best entrance for the meeting next Wednesday?

I share the following email from a neighbor for your file.

Sharon -
Thanks for your note and continuing work.
I am not available the 24th, so am including my concerns about the RV park. I am sure many people have voiced these concerns already.

- security. I worry about attracting crime & (unfortunately) homeless.
- lighting impact on residential neighbors. If this development is approved I would like to see a required landscape solution to this.
- no night access, lowering impact of traffic noise at late hours.

Thanks again, Mary

Thanks.
Sharon

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer St Development

Sharon McCarthy [redacted]> Wed, Mar 13, 2024 at 8:55 AM
To: Bob Fifer <BFifer@arvada.org>
Cc: Jeremiah Bebo <jbebo@arvada.org>

Bob,

The developer for the proposed RV storage lot at 6800 Kilmer St submitted an application for development on March 3. It is a 680 page document and I'm on page 129 in researching the contents.

Since City Planning Staff is responsible for approving the Site Plan and Subdivision Adjustments, I will send the following information to the project manager for the Forest Springs document file. I don't know if you are ethically able to read my email and I understand if you are not. I'm taking a chance by sending you information from the application and specifically from the Terracon Engineering report. The numbers after the statements refer to pages from the online application that the public can access and review. Not a legal scholar, I understand there is no admission of hazardous material and wonder about the context of language "may contain contaminants" and "identification.....hazardous materials or conditions" and/if those terms relate to the LDC.

Respectfully,
Sharon McCarthy
Forest Springs Resident

Terracon Report
Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken. p 129

Materials from excavations within the existing soil fill and debris materials may contain contaminants which may prevent the material from being used as fill for the development of this site. Based on the variability of landfill debris content within the soil fill at this site, reuse of the soil fill will likely be difficult. Careful excavation and grading efforts, and full-time observations will be required to separate portions of the fill that are free of deleterious materials. p 117

LDC

Sec. 74-164. - Definitions. Wherever a more stringent or less stringent interpretation of the definition of "hazardous substance" is possible, the more stringent interpretation shall be applied. **Sec. 74-168. - Standards and administration.** (a) (2)Any determination that a Phase I or higher assessment is necessary shall, at a minimum, consider whether a hazardous substance may reasonably be believed to exist in the property; the planned or potential use of the property; the potential economic, health, or safety consequences of permitting a potentially hazardous waste to remain unidentified or unremediated on the property; proximity of the hazardous waste to contaminable sources such as groundwater; the proximity of the hazardous waste to adjacent property; the potential exposure of the general populace to hazardous substances by incidental	Anecdotal Information: **SMALL BUSINESS LIABILITY RELIEF AND BROWNFIELDS REVITALIZATION ACT** [[Page 115 STAT. 2356]] Public Law 107-118 107th Congress ``(C) Notices.--The person provides all legally required notices with respect to the discovery or release of any hazardous substances at the facility.  ``(D) Care.--The person exercises appropriate care with respect to hazardous substances found at The facility by taking reasonable steps to-- ``(i) stop any continuing release; ``(ii) prevent any threatened future release; ``(iii) prevent or limit human, environmental, or natural resource exposure to any previously released hazardous substance.

contact; as well as appropriate standards and requirements established by the Colorado Department of Public Health and Environment and the Environmental Protection Agency concerning lawful and/or hazardous contaminant levels regarding the nature and make up of the property in question. The city may further adopt, in the manner described in subsection (d) of this section, such other factors, criteria, standards, requirements, or procedures as may be reasonably necessary to implement the provisions of this article.	

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

PC Meeting September 17, 2024-Comments on proposed Amendment to Comp Plan for RV storage lot

Sharon McCarthy <[redacted]> Wed, Aug 21, 2024 at 4:28 PM
To: cedboardsandcommission@arvada.org, Jeremiah Bebo <jbebo@arvada.org>
Cc: Lauren Simpson <lsimpson@arvada.org>, sambrose@arvada.org, Sharon Davis <sdavis@arvada.org>, Lisa Feret <lferet@arvada.org>, Bob Fifer <BFifer@arvada.org>, JMarriott@arvada.org, Randy Moorman <rmoorman@arvada.org>

14-112094SR_exposed landfill near forest springs lan…

Members of the Planning Commission and City Council:

My name is Sharon McCarthy and I live at 6688 Kendrick Dr 80007.

Purpose
Comments on proposed RV storage lot on 6800 Kilmer St to be discussed at Planning Commission meeting scheduled for Tuesday, September 17, 2024.

To share research supporting environmentally responsible redevelopment of an unregulated landfill (dump by definition) and discuss challenges to the City's Comprehensive Plan. I apologize in advance for the email length.

- The proposed development (RV storage lot at 6800 Kilmer St) is subject to the terms of the Land Development Code. The stated purpose of the Code is, in part, to promote “the public health, safety, convenience, comfort, prosperity, and general welfare;” protect “the quality and character of stable residential developments;” and provide **“protection from nuisances and hazards.”**
- We question if the proposed RV storage lot meets LDC 1-1-1-2 to "Promote the creation of safe, unique, interesting, inclusive, and economically vibrant places throughout the City;
- As stated in Division 1-1-2 of the Code, the “provisions of this Code shall be considered the **minimum requirements** necessary for the promotion of the public health, safety, convenience, comfort, prosperity, and general welfare." (Emphasis added in both instances.)

Introduction

1. What is a brownfield? An old "eyesore" gasoline station is a brownfield as is the open space of an unregulated landfill. They don’t look alike---sorta like comparing two vegetables---a zucchini to iceberg lettuce. One researcher states “landfills are a particular subset of brownfields.” https://www.researchgate.net/publication/307436757_Landfill_Design_and_Operation (18.9 pp 602-603)

2. What is the significance of the layers of the landfill’s subsurface? Terracon’s 2023 GeoTechnical Report repeatedly describes the instability of the landfill’s subsurface. (see *Three Geotechnical Reports*)

3. We have documentation how subsurface instability caused landfill redevelopments to fail: Rooney Fields and a DPS bus storage lot.

4. I refer to the Colorado Department of Public Health and Environment as CDPHE and the Voluntary Cleanup Program as VCUP. The VCUP is the 1st step in redeveloping a brownfield.

    a. …contamination which predates the RCRA (1976 Resources Conservation and Recovery Act) statute would not be subject to RCRA authority.

b. The State's goals are to encourage as many voluntary clean-up proposals as possible and remove any barriers landowners might have in coming forward with a VCUP proposal.

c. The program is designed to operate expeditiously, with minimal administrative processes and costs. Accordingly, no regulations have been promulgated for the Voluntary Cleanup and Redevelopment Act.

d. The VCUP is designed to be a one-time interaction with the CDPHE.

e. There is no formal agreement that binds the parties under the Voluntary Cleanup Program, and the state has no enforcement authority under the Act. Assuming the site is eligible for the program, the statute does not require proposed cleanups to be completed. The applicant can "walk away" at any time, with the only consequence being that any approval received from the state would be void. However, if a cleanup had been started, the state can require the owner to properly manage any waste that had been generated from the incomplete cleanup. This authority would not be used to force completion of the cleanup.

f. Under the VCUP, the state provides no construction oversight or certification.

According to the 2022 CDPHE VCUP and Roadmap, guidelines appear to be "one size fits all". In my opinion, repurposing an old gas station for a trendy restaurant checks all the boxes for a brownfield redevelopment with easily identified hazardous materials. Walls, paint, pipes, and asbestos are replaced with safe, non-hazardous products. Applying similar methodology to the landfill might not be feasible "due to the depths of the fill and debris, complete removal of the landfill debris may be cost-prohibitive for the project"---- according to the 2023 Terracon Geotechnical Report "

https://cdphe.colorado.gov/hm/environ-cleanup-guidance-policy (click on VCUP Cleanup Roadmap) also see attached *Summary*

Challenges

Are you all familiar with a children's toy---a wood strip containing holes of different shapes with the object of fitting a peg into the correct shaped hole? That's how I feel about the RV application. There are the approvals of the comprehensive plan amendment, the site plan, and modifications. Add tons of research that doesn't align with any argument ---it's like trying to fit an oval shaped peg into a round hole.

- The amount of research surrounding this application may possibly be unlike any collected for other applications because it tells the real story of the landfill.

- The unregulated landfill open space is potentially unlike any other open space. It is adjacent to 2 bodies of water that eventually supply water to many communities downstream. It is a landfill closed prior to modern statutes and therefore not subject to those regulations. It is a gem of open space providing a buffer between industrial and expanding residential areas. This land compliments and extends the natural terrain and ambience of the Ralston Creek Trail---free recreational use for many neighbors and visitors.

- The opposition to the proposed RV storage lot is unlike most oppositions because the intrinsic character of the landfill affects the environment and all that inhabit the environment.

- At the July 15th City Council meeting, several Councilmembers remarked how certain outdoor design features of a proposed restaurant challenged a pleasant dining experience. I heard words such as "pedestrian friendly", "community gathering space", "look not inviting", "looks like a warehouse", "odd, awkward, dumpy". The words sounded similar to what Ralston Trail users say about the proposed RV storage lot. Might the same Councilmember observations be applied to how a RV storage lot affects the character of the natural recreational area along the Ralston Creek Trail?

- The zoning of this landfill is possibly unlike any other land meeting that zoning criteria.

- The land is not just the surface use but what lies beneath the surface.

  Visualize the subsurface area of the 14 acre landfill as a humongous Jenga. Jenga relies on skill, balance, understanding, strategy, displacement, or the structure collapses. In a landfill, organic matter decays and reduces in size leaving space for non-organic trash to occupy. As that takes place, the homeostasis of that environment changes and other contents shift, move, occupy other space. This is the ongoing, continuous movement that the Terracon Geotech Report refers to occurring at both subsurface and deep surface areas. The movement takes place throughout the 14 acres of landfill at different times---sorta like random break dancing vs graceful ballroom dancing.

- Two "pegs" of the application process fit the "LDC holes" with little question.

- The elements that question whether the RV development is in the best interest of the Comprehensive Plan are two examples of landfill redevelopment failures: DPS Bus Terminal and Golden Rooney Road Sports Complex. The 2023 Terracon Geotech Report provides insight to these redevelopment failures.

  "Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement. Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project." The report elaborates, "however, it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development."(see attachment *Three Examples*….)

  We recognize the Terracon Geotechnical Report does not specifically describe the effect of tons of RV's on landfill that could "collapse unpredictably". We ask the questions:

  - If there are two documented examples of landfill redevelopment failure, what evidence does the developer have suggesting the redevelopment plans for a RV storage lot will be more successful? What does the developer know that developers of failed redevelopments didn't know?
  - What if's" standing alone are not solid challenges to "safe, unique, interesting, inclusive, and economically vibrant places" as stated in LDC 1-1-1-2.

    However, the "what if's"might be considered with this application because they are:

    - suggested by data in the 2023 Geotechnical Report from the applicant's consultant
    - supported by research
    - demonstrated with two examples of failed landfill redevelopment in Denver area

- We know a RV storage lot is potentially an "economically vibrant" venture but will the project sustain a "safe, unique, interesting, and inclusive place" over time or be reduced to the fate of the DPS bus lot and Rooney Road Fields? If so, then the site becomes less "economically vibrant" and more of a blight to the City's Comprehensive Plan.

Research/Discussion

- LDC 1-1-2-1: “provisions of this Code shall be considered the **minimum requirements** necessary for the promotion of the public health, safety, convenience, comfort, prosperity, and general welfare."
  - Two examples of failed landfill redevelopment
    - Denver Public Schools Bus Terminal on Brighton Blvd in north Denver. See attached *DPS TBA*. Our focus is on the following pages:

- p 8 Site Characteristics
- pp 12-13 Previous Investigation
- p 12 mentions site listed as “No Further Action” per governing agency
- p 13 describes recommendations based on discovery of leaks of oil/gas in subsurface due to subsidence from shifting and settling of soils in landfill material beneath the site
- p 14 describes probable cause of settlement and recommended possible remediation methods
- p 18 Field Observations
- p 25 Risk Evaluation Limitation
- p 28 Historical Data Comparison--including quarterly data collection by Chen (consultant) (original Chen evaluation for Kilmer St landfill available upon request)
- p 30 mentions “...catastrophic failure from settling and decomposition of landfill material from beneath the site.”

- Rooney Road Sports Complex in Golden. The research we include about this project demonstrates the landfill reuse designed and initiated in 2007 was accomplished with the best of intentions. Decisions were based on information known at the time. The City designated a financial plan for future repair of the sports fields. Fast forward to 2022 and the City was faced with deteriorating surfaces of the playing fields, changing substructure, and an astronomical cost to amend the original plan. We include a Youtube recording of a Golden City Council meeting https://goldenco.granicus.com/player/clip/4207?view_id=2&meta_id=117828&redirect=true as well as a City Memo expressing concerns and discussing the logistics of refurbishing the sports fields. (see *Golden CC Agenda*)

- The application for the proposed RV storage lot might be a "square peg" trying to fit a "LDC round hole."

  - The entire environment is affected: surface water of Croke Canal and Ralston Creek, ecosystem supporting Ralston Creek, wildlife protection, recreational and social value of natural surfaces of Ralston Creek Trail.

  - Terracon's Site Assessment is under consideration by Mile High Flood District (MHFD)
    - The preliminary report identifies numerous areas of the creek under consideration for repair.
    - Report seems to lack correlation to findings in Terracon's Geotechnical Report.
    - Photos of bank erosion after the 2013 flood show landfill trash adjacent to the creek.
    - What happens if the "weight bearing" capacity of an unstable subsurface is challenged by tons of RVs?
    - Ralston Creek area adjacent to the landfills is greater than the $1.5M upstream creek remediation project.
    - Findings from the attached 1992 Ogden Report suggest that "the south bank of Ralston Creek appears to be polluted by discharges from the landfill. Visible hydrocarbons are on the water surface." Would increased weight of tons of heavy RV's cause dormant chemicals to escape to the Creek? (*Three Geotechnical...*)

  - The applicant's Terracon Geotechnical Report August 2023 suggests: "Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project.....**Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris**. **It is our opinion that movement on the order of 2 feet or more is possible.**" (Emphasis added)

  - What is the effect of tons of heavy equipment on unstable surfaces? Could there be a domino effect affecting ground water, surface waters of Ralston Creek and Croke Canal, and reopen critical pathways? The City of Golden planned for future repairs of the Rooney Road Sports fields. In 2022, the City realized the repairs for the field were more than anticipated in 2007. The City moved on and planned an alternate use for the Rooney Road fields.

- VCUP Application 7.5 Notice of Environmental Use Restriction and NAD Request
  "The proposed remedial actions identified are considered to be protective of human health and the environment as exposure to landfill materials, arsenic in soils, and VOCs and methane in soil gas will be mitigated either through the removal of landfill materials or through engineered controls. However, impacted landfill material will be left in place at concentrations that exceed EPA Industrial/Worker RSLs and vapor intrusion screening levels that predict indoor air quality exceedances."

- Sec. 74-164. - Definitions.

"Wherever a more stringent or less stringent interpretation of the definition of "hazardous substance" is possible, the more stringent interpretation shall be applied."

- LDC 11-3-3-1` Definitions
  - Light Industry is a defined term in the LDC. It also does not explicitly reference RV storage. In fact it states:
    - "Light Industry. Uses that involve research and development, assembly, remanufacturing, compounding, packaging, testing, or treatment of products, generally from previously prepared materials or components, **with limited outside storage and limited external impacts or risks such that the use is not defined as heavy industry or heavy logistic center.** Light industry also includes wholesaling, warehousing, and distribution uses that involve fewer than 76 heavy truck trips per day. For illustrative purposes, light industrial uses include...."

    - It might be argued that:
      - limited outside storage" is intended to be a secondary use to other uses and not a primary use, such as with an RV storage lot
      - an RV storage lot in this location has more than "limited external impacts" to surrounding homes and other uses and therefore is not "functionally comparable" to a bakery or other explicitly uses permitted in IL zoning
      - an RV storage lot is effectively a heavy industrial use the Planning Director should not allow in IL zoning
      - approving an RV lot in IL zoning is inconsistent with the "general requirements" of the LDC's purpose and intent as defined in Section 1-1-1-2:

- 1. Implement the City of Arvada Comprehensive Plan, as that plan may be amended or replaced from time to time;
  2. Ensure that all development in the City is consistent with the spirit and intent of other plans and policies adopted by City Council;
  3. Promote the public health, safety, convenience, comfort, prosperity, and general welfare;
  4. Promote the creation of safe, unique, interesting, inclusive, and economically vibrant places throughout the City;
  5. Protect the quality and character of stable residential neighborhoods;
  12. Provide protection from nuisances and hazards.

- LDC 4-2-1-3. - Protection of existing vegetation, wildlife areas and natural features.

  a. All subdivisions shall comply with the standards in Division 4-1-4, Natural Hazards and Environmentally-Sensitive Areas.

  b. All subdivision plats shall be laid out with due regard to geologic hazards, including but not limited to existing soils conditions and slope stability. All subdivisions shall evidence design and use compatibility with existing soils, particularly in regard to topography, drainage, bearing capacity, and erosion potential. All subdivision design shall ensure adequate protection from potentially hazardous or undesirable soils or geological conditions on the development site.

  3. No subdivision shall be approved where the design or related facilities clearly constitute the creation of a hazardous circumstance or lack of provision for the public safety.

In Health Care, practice standards are based on documented outcomes. I struggle to find research documenting outcomes of landfill redevelopment. I found examples of Superfund site redevelopment but no re-visits to those sites 5, 10, 15 years later to check how they are functioning. Some answers to our questions from the developing group are not based on documented outcomes but rather what textbooks state. Might we question if the plan and answers provided by the developing group are incomplete because there are few, if any (Golden and DPS are the exception), documented failed reuse of landfills? Answers take research and research takes money. I hope our amateur research helps to fill any "holes" in this argument.

In the City of Chicago, between 1887-1900, forward thinking civil engineers reversed the natural flow and outlet of the Chicago River to prevent contamination to Lake Michigan. With our current knowledge of environmental protection, should we stand back and do nothing to protect the waters of Ralston Creek, Croke Canal, and the ecosystem of the Ralston Creek recreational area?

Finally.....

My geologist neighbor casually mentioned the properties of different soils at various levels is being overlooked in this project----he suggested best to let "sleeping dragons, sleep."

A past development project generated the buzz term--- "lawyering up". My sincere focus is to share research without "lawyering up". (No offense to attorneys on the Planning Commission!)

I borrowed language from LDCs and applied to concerns about the proposed RV storage lot. I could not find LDC specific to redevelopment of a landfill or the ecological effect of development to water sources, heat islands, light pollution, or the effect of artificial lighting on wildlife behavior and landscape. I will continue to research and review the LDC.

I ask Jeremiah Bebo to forward this email to our Forest Springs file.

Respectfully,

Sharon McCarthy

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9 attachments

- **Three Geotechnical Reports.pdf**
  88K
- **Chicago River.pdf**
  52K
- **Unregulated Landfills_ Much to Learn.pdf**
  302K
- **Final Public comment Response 11-10-2023.pdf**
  292K
- **Summary of Colorado Department of Public Health and Environment (CDPHE).pdf**
  82K
- **Kilmer Streambank Memo - Preliminary (2).pdf**
  8520K
- **Reporting hazardous substance.pdf**
  66K
- **DPS TBA.pdf**
  7958K
- **Golden CC agenda item 8-23-2022.rooney landfill and fields (1) (1) (1) (1).pdf**
  8122K

14-112094SR
Investigation of Exposed Landfill

Approximately 500 feet west of Joyce Street and 250 feet north of W 68th Avenue, Arvada Colorado

June 6, 2014

Ogden Report-1992

9.0 SUMMARY

The following are pertinent data derived from the Ogden Phase I environmental assessment:
There is an inactive landfill on the LTMR site south of Ralston Creek.
The 25 acres of the LTMR site north of Ralston Creek does not appear to have been impacted by human activities.
The property that borders the south bank of Ralston Creek appears to be polluted by discharges from the landfill. Visible hydrocarbons are on the water surface.
Groundwater samples from the landfill contain lead at concentrations of .0065 mg/L, which is above the EPA drinking water standard of .0050 mg/L.
Soil samples from the landfill contain volatile organic compounds. Offending analytes are methylenechloride, acetone, tetrachloroethane, toluene, and total xylenes.
A composite soil sample demonstrated an excessive concentration of lead in the amount of 54 mg/kg

10.0 RECOMMENDATIONS

Based on the evaluation of prior data and data collected during the Preliminary Phase II site assessment, it is probable that contaminants are present on the site and that the potential for migration to offsite localities exists. Therefore, we would recommend the following activities to more clearly define the extent and nature of contamination on the LTMR site:

- Excavate spot locations of high magnetic response to determine if leaking drums are present.
- Design a statistically-based random soil sampling program.
- Design a statistically-based groundwater sampling program. Install deeper auger drilled monitoring wells at 30 to 50 ft depth.
- Case with large enough PVC for retrieving samples by bailing or the bladder pump method.
- Screen shallow groundwater monitoring wells in the landfill material and schedule sampling to be collected to allow for seasonal flux of contaminants.
- Determine perched water elevation. Selectively screen below landfill in permanent water table at low aquifer confining elevations to test for heavy compounds.
- Determining permanent water table and, if possible, the lower base confining depth.
- Schedule interval time sampling for surface water monitoring of Ralston Creek. Identify flora/fauna kill mechanisms.
- **Landfill area should not be developed for commercial or residential construction.** (Emphasis added)
- Monitor contemporary methane presence

Chen Report

Based on these readings, it appears that combustible gas is being generated within this landfill in quantities sufficient to be considered a hazard. The combustible range of methane gas is between 5% and 15% by volume in air. Concentrations above this range are too rich to burn.

However, gas migration or exposure to the atmosphere will result in dilution of the gas and result in a flammable condition. Care should be taken when excavating within or adjacent to the landfill mass. Venting of excavations will be required. Any C " J > "z /..J <1 structures built over the landfill will require special methane gas controls. There are 2 basic approaches to controlling the migration of methane into structures. These include barriers separating the proposed structure from the landfill and ventilation systems.

Access roads, parking areas, underground utilities and other facilities constructed on landfill materials will be subjected to large ... differential movements and a corrosive environment. Hie owner should be aware of the high risk of distress associated with construction on landfills.

CONCLUSIONS
(1) The proposed structure should be founded on piers drilled into bedrock and designed for maximum end bearing pressure of 40,000 psf, a skin friction of 4,000 psf and a minimum dead load pressure of 15,000 psf, with design and construction details as outlined.
(2) Alternate foundation systems consisting of steel H-piles and designed for a maximum stress of 12,000 psi with tip reinforcement or spread footings placed on the lower sand and gravel strata and designed for a maximum bearing pressure of 6,000 psf may be used.
(3) Trash fill varying in depth from 8 to 16 feet was encountered across the site south of Ralston Creek. **This landfill material is generating sufficient quantities of combustible methane gas to be hazardous**

Proposed RV Storage Yard Geotechnical Engineering Report 6800 Kilmer Street August 4, 2023 | Terracon Project No. 25235085

The Ralston Creek Trail is located adjacent to the northwest corner of the site between Ralston Creek and the Croke Canal. This trail is used for public recreation. There are no fences or other barriers to prevent access to the site. **The closest residence to the site is located within 200 feet of the southeast corner of the site across the Croke Canal**. P 551

Based upon the results of our field exploration and laboratory testing, it is our opinion the existing fill materials and landfill debris should not be used to support foundations, interior slabs, exterior slabs-on-grade construction without complete removal and modification. P 114

Existing Fill Materials and Landfill Debris About 9 to 14 feet of existing fill materials and landfill debris was encountered in the exploratory borings. The landfill debris primarily consisted of construction debris and domestic trash. We understand the site is within the boundaries of a pre-existing landfill. Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement. **Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project.** P 121

The stability of subgrade soils may be affected by precipitation, repetitive construction traffic, or other factors. If unstable conditions are encountered or develop during construction, workability may be improved by overexcavation of wet zones and mixing these soils with crushed gravel. Use of geotextiles could also be considered as a stabilization technique. Lightweight excavation equipment may be required to reduce subgrade pumping.

Engineered fill should consist of approved materials that are free of organic matter and debris. P 123

1. We recommend that engineered fill be tested for water content and compaction during placement. Should the results of the in-place density tests indicate the specified water or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified water and compaction requirements are achieved.
2. Water levels should be maintained low enough to allow for satisfactory compaction to be achieved without the compacted fill material pumping when proofrolled.
3. Moisture conditioned clay soils should not be allowed to dry out. A loss of moisture within these materials could result in an increase in the materials expansive potential. **Subsequent wetting of these materials could result in undesirable movement.** P 124-125

Utility Recommendations
It has been our experience with other structures constructed on landfill debris that utilities constructed below or adjacent to structures on landfill debris will move significantly and will likely require excavation and full replacement multiple times over the life of the office building. Utilities constructed below structurally-supported floor systems should not be supported on the subgrade, but should be suspended in crawlspace areas independent of the subgrade materials. Utilities outside of the office building constructed on or within the existing fill materials over the existing landfill debris will have a very high risk of movement. Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris. **It is our opinion that movement on the order of 2 feet or more is possible.** P 127

Structurally Supported Floor Recommendations
Based on the subsurface conditions, slabs-on-grade constructed on the landfill debris without any modification is not recommended, as the slabs will have a very high risk of movement. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below the office building may be cost-prohibitive for the project. On this basis, we recommend the interior floor system of the office building be designed as a structurally supported floor, supported independently of the of the subgrade materials. P 129

Exterior Flatwork
Exterior flatwork constructed over unimproved landfill debris will have a very high the risk of long-term movement. Long-term movement from unimproved landfill debris cannot be quantified due to the nature of the debris, and reduction of this type of movement is likely only possible through complete removal of the fill and debris. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below exterior flatwork may be cost-prohibitive for the project. Support of exterior flatwork on the existing fill and landfill debris can be considered; **however, it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development.** Frequent maintenance and full replacement of flatwork on unimproved landfill debris should be anticipated for this development. To reduce the risk of shallow, localized movement of exterior flatwork, we recommend that the subgrade materials are scarified or removed to a depth of at least 12 inches and properly moisture treating and compacting suitable on-site soils to grade. New fill materials beneath slabs-on-grade should be placed and compacted as outlined in the Earthwork section of this report. Again, t**his recommendation is intended to reduce the risk of shallow, localized movement but will not reduce the risk of deep, long-term movement of the existing fill and landfill debris.** P 130

For the proposed RV storage lot, Table 5.07.1.1 of the Standards states the minimum 20-year, 18-kip Equivalent Single Axle Load (ESAL) for Commercial and Business parking lots as 70,000. This ESAL value was utilized for our design. We anticipated a gravel fire access road may be planned at the site. We have assumed that the fire access road will experience a maximum of one trip per week of a fire truck with a maximum weight of 85,000 pounds and three axles. The traffic loading for the fire truck is included in our ESAL estimate for this project. P 131

It is imperative that the subgrade be protected from a loss of moisture. **A significant loss of moisture of the pavement supporting materials could result in additional movement of the subgrade.** P 132

Aggregate-Surfaced Roadways –
Maintenance Future performance of aggregate surface areas constructed at this site will be dependent upon several factors, including:
■ Maintaining stable moisture content of the subgrade soils both before and after roadway construction.
■ Providing for a planned program of preventative maintenance. Rutting of the aggregate surface layer and loss of surfacing materials will occur over the life of the drives/parking areas. Maintenance of the surface material and drainage are critical to the performance of aggregate surface roads. Since the surface materials are unprotected, proper drainage is key against loss of strength and stability of the surface materials. **Poor drainage allows water to remain on the surface and percolate into the aggregate base course section, reducing the strength of the underlying subgrade soils.** Well-shaped crowns with a slope of at least ½ inch per foot and adequate surface ditches or subsurface drains are essential to achieving rapid surface drainage.

Maintenance of the roadway shape and ditches or drains should be performed at least twice a year, particularly during wetter periods of the year and when snow removal is required, though more frequent maintenance may be required depending on actual traffic, drainage, and smoothness requirements. If unstable conditions develop during roadway usage, scarifying and drying of the subgrade, or placement of additional gravel material may be required. **Loss of surfacing materials from dust can be significant and may result in a roadway surface course that is several inches thinner within a few years. The reduced thickness will result in loss of strength and poor drainage.** P 133

Construction Considerations
Site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the subgrade may not be suitable for construction and corrective action will be required. The subgrade should be carefully evaluated at the time of construction for signs of disturbance or excessive rutting. **If disturbance has occurred, subgrade areas should be reworked, moisture conditioned, and properly compacted** to the recommendations in this report immediately prior to placing aggregate surface materials. P 132

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken. P 134

The **Chicago River** is a system of rivers and canals with a combined length of 156 miles (251 km)[1] that runs through the city of Chicago, including its center (the Chicago Loop).[2] Though not especially long, the river is notable because it is one of the reasons for Chicago's geographic importance: the related Chicago Portage is a link between the Great Lakes and the Mississippi River Basin, and ultimately the Gulf of Mexico.

The river is also noteworthy for its natural and human-engineered history. In 1887, the Illinois General Assembly decided to reverse the flow of the Chicago River through civil engineering by taking water from Lake Michigan and discharging it into the Mississippi River watershed, partly in response to concerns created by an extreme weather event in 1885 that threatened the city's water supply.[3][n 1] In 1889, the Illinois General Assembly created the Chicago Sanitary District (now the Metropolitan Water Reclamation District) to replace the Illinois and Michigan Canal with the Chicago Sanitary and Ship Canal, a much larger waterway, because the former had become inadequate to serve the city's increasing sewage and commercial navigation needs.[4] Completed by 1900,[5] the project reversed the flow of the main stem and South Branch of the Chicago River by using a series of canal locks and increasing the flow from Lake Michigan into the river, causing the river to empty into the new canal instead. In 1999, the system was named a "Civil Engineering Monument of the Millennium" by the American Society of Civil Engineers (ASCE).[6]

https://en.wikipedia.org/wiki/Chicago_River#:~:text=In%201887%2C%20the%20Illinois%20General%20Assembly%20decided%20to,in%201885%20that%20threatened%20the%20city%27s%20water%20supply.

Unregulated Landfills: Much to learn

In General, Landfills (waste dump areas) endure from a major post-closure settlement that takes place over a prolonged period of time. A huge differential settlement may deteriorate structures, foundations, and other related facilities that constructed atop of a landfill. **Hence, with the conjunction of that the landfills behavior is not fully understood;** (Ling et al. 1998)
https://www.researchgate.net/publication/306378961_LANDFILL_SETTLEMENT_ANALYSIS

Subsidence is the sinking or settling of the ground surface. It can occur by a number of processes. Ground subsidence may result from the settlement of native low density soils, or the caving in of natural or man-made underground voids. Subsidence may occur gradually over many years as sags or depressions form on the ground surface. More infrequent, subsidence may occur abruptly as dangerous ground openings that could swallow any part of a structure that happen to lie at that location, or leave a dangerous steep-sided hole. In Colorado, the types of subsidence of greatest concern are settlement related to collapsing soils, sinkholes in karst areas, and the ground subsidence over abandoned mine workings.

Legal definition

H.B. 1041, 106-7-103(10): *Ground subsidence* means a process characterized by downward displacement of surface material caused by natural phenomena such as removal of underground fluids, natural consolidation, or dissolution of underground minerals, or by man-made phenomena such as underground mining.

https://coloradogeologicalsurvey.org/hazards/ground-subsidence/

Another type of ground subsidence that commonly occurs in Colorado is the settlement and ground collapse that occurs in certain types of geologically recent, unconsolidated sediments — usually referred to as soils by engineers and contractors. This group of soils those that can rapidly settle or collapse the ground are known as *collapsible soils*.

Collapsible soils are a major geologic hazard for land development in many locations across the state. This particular hazard manifests itself as ground settlement, which can be damaging to overlying structures if the soil problems are not mitigated or if the structure is not engineered properly. Ground settlement can cause severe damage to man-made structures such as foundations, pavements, concrete slabs, utilities, and irrigation works. Although not of the severity of damage related to swelling soils and heaving claystone bedrock, ground settlement has resulted in hundreds of millions of dollars in damage. As growth pressure increases in many places in Colorado, more areas susceptible to soil collapse are considered for development. **The best illustration of this geologic hazard's potential liability was the case of townhomes damaged by collapsing soils in a Glenwood Springs development built in the early 2000s. The court case resulted in a $12 million payment by the developer and his engineering consultants to the townhome owners.**

https://coloradogeologicalsurvey.org/hazards/collapsible-soil/

Several noteworthy stability failures occurred at landfills in the United States in the 1980s and early 1990s, a timeframe coinciding with the promulgation of modern US environmental regulations. These failures were extensively studied, and lessons were learned..... However, a survey of landfill performance in the United States in the 2010–2019 timeframe shows that waste fill stability failures continue to occur.
https://ascelibrary.org/doi/10.1061/%28ASCE%29GT.1943-5606.0002291

1.0 INTRODUCTION

In General, **Landfills (waste dump areas) endure from a major post-closure settlement that takes place over a prolonged period of time**. A huge differential settlement may deteriorate structures, foundations, and other related facilities that constructed atop of a landfill. In addition, it may lead to shattering of the geomembrane and wastage of the cover system in the landfills. The refuse (waste) materials show diversified engineering properties that diverge over positions and time within the landfill. **Hence, with the conjunction of that the landfills behavior is not fully understood; recognize a conventional soil mechanics approach less appealing to predict the settlement. Instead, empirical and semi-empirical approaches of estimating the landfill settlement are commonly used side by side with field observations.** (Ling et al. 1998)

https://www.researchgate.net/publication/306378961_LANDFILL_SETTLEMENT_ANALYSIS to download full text

18.9 LANDFILL REDEVELOPMENT
The movement of brownfields redevelopment has helped invigorate existing slow process of remediation of contaminated sites. The use of risk based clean-up approaches now allowed in many states has facilitated brownfields redevelopment.
Landfills are a particular subset of brownfields, particularly older landfills in industrialized areas. Older landfills that were never properly closed are true brownfields with idle land from which pollutants are often discharged. With investigation and limited remediation, this subset of brownfields-like sites presents unique opportunities for redevelopment. Redeveloping landfills is particularly challenging not only due to clean-up issues, but also the geotechnical issues of building on waste. Most of the unregistered landfills were never properly closed.
Only a handful of unregistered landfills were properly closed and received a Closure and Post Closure Plan Approval pursuant to the Amended State Solid Waste Management Act of 1975 and/or the Sanitary Landfill Facility Closure and Contingency Fund Act of 1992. The few properly closed landfills were either large private commercial landfills, sole source industrial landfills owned by major corporations, or municipal landfills. Hundreds of registered landfills were never properly closed because the owners lacked the resources to comply with regulatory closure requirements. While the Sanitary Landfill Facility Closure and Contingency Fund Act provides a revenue source through a tax on operating landfills, the State has historically not utilized these funds for closure of abandoned landfills and reserved the public funds for emergency actions, such as extinguishing a landfill fire or remediating methane migration. A wide variety of remediation techniques can be utilized in landfill redevelopment. In the simplest case, waste can be capped in place with one foot of silty, clayey material and one and one-half feet soil cover. In the most complex case, a slurry wall/sheet pile wall can be used to contain leachate from outflow from the site and an interior leachate system can be installed. The degree of capping, containment and leachate collection depends on the underlying geology, leachate strength and site specific cap design.
https://www.researchgate.net/publication/307436757_Landfill_Design_and_Operation to download full text

Abstract

Several noteworthy stability failures occurred at landfills in the United States in the 1980s and early 1990s, a timeframe coinciding with the promulgation of modern US environmental regulations. These failures were extensively studied, and lessons were learned. A state-of-practice developed to enable the design of waste fills to be stable throughout their construction, operation, and closure periods. However, a survey of landfill performance in the United States in the 2010–2019 timeframe shows that waste fill stability failures continue to occur. This paper, an expansion of the 2018 Terzaghi Lecture given by the first author, presents a brief review of several waste fill failures from the 1980s and 1990s and the lessons learned during that period. Several more recent waste fill failures are then reviewed, from which it is concluded that 20–30 years after the earlier failures, facility operators and design engineers are relearning the earlier lessons, as well as new lessons related to evolving waste streams and operating practices. The paper concludes with a discussion of the current standard-of-care for the design of US waste fills and suggests that this standard can be improved through application of the lessons described herein.

https://ascelibrary.org/doi/10.1061/%28ASCE%29GT.1943-5606.0002291

Avoid Soft Soil Problems at Landfills

October 30, 2017

Discovering unexpected pockets of soft soils at the time of construction can delay your project and drive up costs for landfills, support features, and many other types of construction. If you don't find them, building over them can result in unexpected settlement affecting a structure or building, or cause a slope stability problem for a berm or stockpile. You can avoid both of these scenarios with early investigation and appropriate construction planning.

While landfill development investigations typically require numerous soil borings within the proposed waste limits of the landfill, it's common to overlook perimeter areas. Pockets of soft soil deposits can be associated with nearby existing wetlands, lakes, or rivers; with wind-blown silt or ancient lake deposits from periods of glaciation; or with fill placed during previous site uses.

The landfill perimeter areas may contain tanks for leachate or fuel, buildings, perimeter berms for screening or landscaping, stockpiles, and other features. A tank or building constructed over soft soils could experience unexpected settlement affecting the performance and value of the structure. The potential for a slope stability problem can increase for a large berm or stockpile built on soft soils.

The first step to avoid these problems and identify problem soils is to include perimeter areas in your subsurface investigation. Perform soil borings or test pit excavations at the locations of the proposed perimeter features such as tanks or berms. If you encounter soft soils, address them like this:

- If the deposits are relatively shallow, excavate the soft soils and replace them with compacted engineered fill.
- If the deposits are deeper and there is sufficient time in the project schedule, pre-load the soft soil area to reduce future settlement and increase soil strength before construction, and monitor the pre-loading with instrumentation such as vibrating wire piezometers and settlement platforms to confirm when the pre-loading design goals have been achieved. Preloading can be accomplished with temporary soil fill placement that is later removed when the pre-loading is completed or by staged placement of fill for a permanent fill feature such as a berm.
- If the project schedule doesn't allow for pre-loading and the soft deposits are deep, consider a ground improvement method such as GeopiersTM to improve soil strength and stiffness in place. You can then proceed with constructing tanks, buildings, berms, or other structures over the improved soil area without special foundations. You may also use a deep foundation system such as piles or drilled piers to build over a soft soil area.

https://www.scsengineers.com/15236-2/

Geotechnical aspects of landfill design and construction. Part 1: principles and requirements

H. L. Jessberger

Proc. Instn Civ. Engrs Geotech. Engng, 1994, **107**, Apr., 99–104

Ground Board

Geotechnical Engineering Advisory Panel Paper 10435

Written discussion closes 15 June 1994

■ **This Paper, the first in a series of three, presents the requirements of geotechnical landfill design including site assessment, safety considerations and quality assurance. It also introduces the following parts of the series.**

Geotechnical aspects are essential factors to be considered in the course of the design and construction of waste landfills which often constitute waste piles. Basic geotechnical aspects relate to, among other factors, slope stability, settlement or permeability, including those of the structural elements such as the stabilizing elements, anchors or sealing layers and drainage blankets. Within this context, particular attention must be given to the specific landfill problems caused by the properties of the waste, the contaminant content of the leachate, etc. Furthermore, the landfill design must take into account long-term considerations, because the function of the containment elements has to be effective as long as there remains a risk of pollution of the groundwater, soil or air from the landfill.

2. This series of papers discusses a number of geotechnical aspects which are essential for landfill design and construction, and takes into account the landfill as a system that includes the subsoil and waste as well as the landfill operation. It is intended to highlight the problems and to present solutions or engineering approaches which may be of benefit to the designer, construction team and the operator or owner of the landfill. The papers are based on research projects directed by the Author, on the experience of his consulting group and, not least, on the work of the International Society for Soil Mechanics and Foundation Engineering European Technical Committee 8 (ISSMFE ETC 8), 'Geotechnics of Landfills and Contaminated Land'.

3. The series comprises three parts. In this Paper, the principles and requirements of geotechnical landfill design are presented; the second deals with relevant material parameters and test methods; and in the last, selected calculation methods for specific geotechnical problems of waste landfills are discussed.

Waste management

4. Waste management is the objective of sanitary engineering. For a landfill design project it is necessary to know the design volume and nature of the waste. Therefore, the future development of waste production and disposal is an important consideration with respect to appropriate containment technology.

5. Table 1 shows that in 1990 in Germany only a small proportion of the waste produced was disposed of by incineration; most was placed in landfills and about one-quarter was recycled or reused. These figures show that a relatively small amount of hazardous waste was disposed of (by incineration) but that a huge amount of less dangerous waste—construction debris and excavated soil—was disposed of in landfills or was recycled or reused. The disposal of waste in landfills requires containment elements designed with regard to the particular waste type.

6. The situation will change within a decade due to the new Federal Legislation[1] which demands that municipal waste should be disposed of mainly by incineration. This will decrease the amount of waste disposed of in landfills. Further, it means that the constituents of waste will change from mainly organic to inorganic, and this development should be reflected in the technology used for landfill barriers. Added to this, the politics of this issue is focused on waste reduction in general and this will lead to another change in momentum.

7. We can draw four conclusions from the foregoing.

(*a*) There is a growing need for landfills.
(*b*) The nature of the waste will change and therefore so will the requirements for landfill containment elements.

Table 1. Some figures of waste production and disposal in Germany in 1990

Waste production: 10^6 t/year	
Municipal	40
Industrial including	244
Construction debris and excavated soil	126
Hazardous waste	15
Waste disposal: %	
Landfill	*c.* 90
By incineration	*c.* 8·5
Recycled or reused (e.g. construction debris): 10^6 t/year	69

Hans Ludwig Jessberger is Professor of Civil Engineering at Ruhr University, Bochum, in Germany. This series of papers results from his British Geotechnical Society touring lecture in 1993

See last sentence of 1st paragraph--".....must take into account long term considerations…..as long as there remains a risk of pollution of the groundwater, soil, or air from the landfill."
https://www.icevirtuallibrary.com/doi/10.1680/igeng.1994.26377

Building Foundation and Settlement Landfills are not ideal surfaces for building construction; **compacted wastes do not have the same strength as provided by soil**. Engineering and construction techniques are available, however, that allow buildings to be constructed on lower quality foundation materials. When designing a building foundation for landfill surface, **two issues that must be considered are the bearing capacity of the landfill surface and the potential for long term settlement. The bearing capacity describes a foundation's ability to support the loads applied to the ground surface by the placement of a structure.** When designing a building foundation, a geotechnical engineer will estimate the foundation's bearing capacity based on the properties of the underlying soil and design a suitable foundation. For construction projects on the top of closed landfills, depending on the thickness of type of soil overlying the waste, additional soil fill may be required. While bearing capacity addresses a near-term evaluation of whether the soil (landfill) surface can support the weight of a building, a longer-term and more problematic issue relates to landfill settlement. The surface of a landfill settles as a result of changes within the waste over time that produce a decrease in waste volume (and waste height). Settlement in an MSW landfill can be attributed to several processes: physical and mechanical (e.g., reorientation of particles, movement of fine materials into larger voids, and collapse of void space); chemical processes (e.g., oxidation); dissolution processes (dissolving soluble substances by percolating liquids and subsequent formation of leachate); and biological decomposition (organics in the waste degrade over time controlled by temperature, humidity, and percentage of organics and nutrients in the waste) (Sharma and Anirban 2007). Settlement typically occurs within two phases; the primary phase occurs as the initial settlement of the landfill due to physical and mechanical processes and typically occurs within the first few months after the waste is placed. Secondary settlement occurs over a much longer period of the time and results from physicochemical and biochemical decay and occurs under constant load after the completion of primary settlement. Different methods have been developed to predict MSW landfill settlement over time, which is an important consideration when determining the end use of the landfill property. Typically, an older landfill will have fewer issues with settlement than a newer landfill that may still be undergoing self-weight settlement. **When developing over a landfill, predicted settlement maps and a monitoring plan should be prepared to facilitate the design and create an effective operation and maintenance plan. Long-term settlement from self-weight and external loads can result in differential settlement that can result in tilting of building support system, ponding of water in parking lots, cracking of slabs supported on the ground, breakage in utility lines and down-drag forces on piles that support heavy building loads.** Figure 3-3 shows a parking lot constructed on a closed landfill and the resulting settlement that has caused water ponding.

Note: misplaced source but will keep looking

COLORADO
Department of Public Health & Environment

November 10, 2023

RE: Former Kilmer Landfill Redevelopment – VCP Public Comments

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As part of the Former Kilmer Landfill redevelopment project, Chelton, LLC and Terracon Consultants, Inc. facilitated public comment on the Voluntary Cleanup Program (VCP) application at the request of the Colorado Department of Public Health and Environment (CDPHE). This memorandum summarizes Terracon's review and responses to the public comments submitted during the comment period. Following Terracon's public meeting on July 25th, 2023, addressing the contents of the VCP application and related environmental investigations, a public comment period was established in coordination with CDPHE. A dedicated email address was provided to local residents to submit comments on the presentation and VCP application package. Comments were also compiled by the organizers of a local community organization and submitted to CDPHE and Terracon. This public comment period extended from August 2, 2023, to September 5, 2023. Upon completion of the comment period, Terracon compiled and reviewed the submitted comments, and provided responses as applicable. Following this initial response, Terracon provided the compiled comments and responses to CDPHE for their review and additional comment. All comments and responses were then jointly reviewed by Terracon and CDPHE for completeness and finalized for entry into the public record.

Comment and Response Summary

Comments Forwarded from Friends of Ralston Creek Community Group:

A. In the event CDPHE approved other VCUPs as described for 6800 Kilmer, is CDPHE aware of any shortcomings years after the redevelopment?

The Voluntary Cleanup application is based upon the current environmental conditions at the site. Currently there are no exceedances in the surface waters or groundwater. If environmental conditions change due to an environmental release in the environment, the owner of the property will be responsible for addressing the release and clean it up to regulatory standards

B. Please provide 5 locations where CDPHE had knowledge that the requested VCUP was for a redevelopment for RV storage or other heavy equipment over an existing unregulated, uncompacted landfill with minimal clean-up, minimal capping, and parking surfacing as is being proposed by Chelton LLC.

The purpose of the Voluntary Cleanup program is to determine if there are environmental concerns regarding the redevelopment of this site. With the approved Materials Management Plan, the proposed aggregate surface cover, the storm water detention pond, and lack of environmental releases/concerns, this site is suitable for an RV storage and heavy equipment. There are dozens of storage facilities placed on landfills throughout the state. There are two through VCUP (Sheridan Redevelopment Area and the Colfax Landfill II; 17999 E. Colfax Ave).

C. Terracon in report of 07.24.2007 (item 1. 4) references a prior ESA Phase I report. Terracon has not submitted this report – requested during the public meeting?

The Phase I ESA was prepared using an outdated ASTM standard. The completion of multiple ESAs (compliant with the most current ASTM standard) and investigations since 2007 serve as a more complete and up to date evaluation of site history and conditions.

D. The EPA with email of 12.04.22 stated "Please be assured that the CDPHE, as the lead regulatory agency will continue to provide programmatic oversight for any future VCUP applicant through-out the process of clean-up, in order to assure compliance with environmental laws, appropriate land use, and established environmental standards". (1) Please clarify the scope and extent of the programmatic oversight during construction, following construction and acceptance of the applicant's self-certification? (2) Please clarify how CDPHE will "assure compliance with environmental laws, appropriate land use, and established environmental standards?

The Voluntary Cleanup program is a self-certifying program where the environmental professional certifies the work. This property does not show any environmental contamination (soil, groundwater, surface water), and the Materials Management Plan (MMP) guides how any environmental contamination will be handled. The property will have an environmental covenant placed on the property and the MMP will be mandated for any future excavations in the property. Also as part of the environmental covenant, the owners will have to certify they are following the MMP, along with yearly CDPHE site inspections.

E. Quality Monitoring Program (QMP). (1) What will be the requirements for long-term monitoring of ground water, surface water, air and soil following completion of construction? (2) What is the scope of the QMP? (3) Who will design the QMP?

A CDPHE No Action Determination requires the landowner/operator to provide notice of changed conditions or planned changes in land use or disturbance. Based upon the current site conditions (there is no signs of groundwater or surface water contamination) there is no requirement for a QMP. If there were environmental concerns (groundwater or surface water exceedances), the applicant would be required to remediate any releases.

F. No Action Determination. (1) Will any conditions for approval of the VCUP such as long-term monitoring be recorded as part of the VCUP or No Action Determination (NAD)? (2) What will be the criteria and conditions for approval of NAD at the 6800 Kilmer site? (3) Since initiation of the VCUP program how many sites with approved VCUPs have developed problems requiring actions or posing risk to the public? (4) How many legacy or unregulated landfill sites with grading and surfacing proposed by Chelton LLC have been issued VCUPs and NADs by CDPHE, or other state environmental/health agencies?

1. Due to the lack of evidence of an environmental release, no long-term monitoring is required.
2. A No Action Determination is granted when there is no release to the environment and the site is protective of human health and the environment.
3. Of the current over 1,600 voluntary cleanup applications, I do not know of any releases to the public from sites issued a No Action Determination. I can't attest to sites which were turned into service stations or sites which deal with hazardous materials as their current operations. For such releases they will be addresses through the appropriate regulatory authority; i.e. Oil and Public Safety, Hazardous Waste Program, Solid Waste Program etc.
4. I do not know of any other Chelton LLC sites which may have come through CDPHE or another regulatory agency.

G. The Ogden investigation identified the presence of lead in concentrations above the drinking water standards (54 mg/kg). Ogden reported this to CDH and JeffCo Health Department. Neither CDH (now CDPHE) nor JeffCo Health responded. (1) CDPHE requested testing of additional water sample for lead; sample were below levels of concern. Why were Ralston Creek sediment samples not tested? (2) Why was the 1991 Ogden notification on the presence of lead not further investigated to understand why both CDH and JeffCo Public Health failed to respond?

Comparison of total metals concentrations in groundwater to groundwater standards is not appropriate. The 1991 groundwater sample with elevated lead concentrations was reported as total lead (not dissolved). Groundwater samples collected by Terracon in 2007 and 2022 do not indicate lead impacts to site groundwater. Soil samples were collected immediately from the creek bank immediately adjacent to the water levels in Ralston Creek by Terracon in 2022, and the reported analytical results did not indicate impacts to site soils. When looking at groundwater exceedances CDPHE looks for pathways which could reach the public. In this case, groundwater leaving the site did not exceed regulatory standards, thus eliminating the public consumption pathway.

H. Terracon states that all pathways are closed. As shown in the redevelopment of the Brighton Blvd, Denver, CO landfill, pathways do re-open based on the type of development. Why is CDPHE only concerned with current pathways but ignores how redevelopments if not planned/designed, and executed properly do have a role in re-opening or creating new pathways?

The Voluntary Cleanup program's role in the redevelopment of this property is to determine if the remediation plan for this site will be protective of human health and the environment at the time of construction. With the armoring of the stream embankments, the MMP, the environmental professional's oversight of the project, very limited exposure to the landfill contents during construction, and lack of environmental exposure to the public, we are not currently concerned of opening or creating new pathways. The site will be more protective to the environment after the development has been completed.

I. What obligation rest with the owner, developer, and/or consultant (Terracon) for full clean-up in the event unidentified and/or large quantities of COC's are encountered, and/or a significant hazard or problem is encountered or created during the development work, i.e., who is liable for the entire site if the owner/developer decides to walk away from the site> default based on Terracon's recommendations?

The Materials Management Plan (MMP) included as part of the VCP Application specifies that environmental impacts and/or changed conditions discovered during site development activities are to be documented and addressed based on applicable environmental regulations, and CDPHE will be notified. Unexpected environmental impacts or changed conditions will be summarized the Project Completion Report, which will be a public document. Any hazardous material excavated during the redevelopment of the site will need to be documented and disposed of properly. The site owner is responsible for issues arising from the property. Currently, there are no releases to the environment. If the developer decides to walk away, the landfill material will be placed under sufficient cover to eliminate pathways to the environment.

J. What is the chain of liability for the site should the applicant's project cause development of environmental issues and walk away from the site?

The states Solid Waste program, working in conjunction with the Voluntary Cleanup program, would have limited authority to force the owner to address any environmental issues. If the release were significant, then Federal CERCLA Liability might be an option.

K. The 07.18.2007 geotechnical report prepared by Terracon contains the following statements: "…. the presence of randomly placed and highly compressible landfill material will require complete removal, or considerable site modification, to construct a more stable subgrade for foundations, slabs and pavements….". "Significant additional movement will occur should the landfill materials not be completely removed and/or subsurface soils become elevated in moisture content". In 2023 Terracon proposes to construct roadways over the "highly compressible" land fill material. Provide an explanation of this dramatic change?

The 2007 geotechnical report provides recommendations for the construction of larger structures, utilities, and paved roadways. The currently proposed development is significantly different and less intrusive than that proposed in 2007, so recommendations are substantially changed. Planned roadways and parking areas are to be constructed with aggregate gravel materials. This material is easily regraded and refreshed as necessary, should settling occur.

L. Why is a suitable and functional Landfill Cap System not part of this redevelopment to prevent water infiltration into the old landfill, control gas flow from the waste to the atmosphere, and contain waste material under stresses/loading anticipated based on the development scheme. (1) Please explain how the proposed surfacing (gravel and asphalt millings) can perform as a functional cap system and for what period. (2) Will there be a separate cap system in addition to the proposed surfacing (gravel and asphalt millings)? (3) Please explain how the proposed surfacing will affect water percolation into the landfill and flushing out COCs from the landfill? (3) What are the projected or potential characteristics of the resulting increase in leachate (CECs = contaminants of emerging concern)?

No cap system is required as part of the VCUP, and no cap system is planned as part of site development. The proposed surface materials should slightly reduce infiltration into the landfill materials. Surface runoff will be diverted to the onsite lined stormwater detention basin. No significant changes to groundwater conditions are anticipated. There has been no evidence of COCs leaching from the landfill into Ralston Creek or offsite groundwater.

M. A functional cap system combined with proper drainage design is critical to prevent water infiltration in the landfill and/or prevent ponding. (1) What drainage provision are included to prevent water infiltration or ponding? What is the supplemental water percolation into the waste based on cap design and proposed surfacing?

The site will be graded to drain towards a stormwater detention basin, which will be lined with an impervious liner. This will eliminate ponding and reduce water infiltration into buried landfill debris. An engineered landfill cap is neither warranted or required.

N. What impact has the additional water percolation on leachate formation (water contaminated with various organic and inorganic substances)? What are possible characteristics of the leachate and associated threads to environment, ground water, surface waters, wildlife, and human health?

Site development should slightly reduce percolation into the landfill materials. Terracon notes that precipitation has infiltrated the landfill in its current state since the early 1970s. Contaminants of concern were not detected above applicable regulatory standards in site groundwater or in Ralston Creek during the most recent investigations, and site changes are not anticipated to alter groundwater conditions.

O. Groundwater sampling. Ogden suspected the presence of a "breached" water table and recommend drilling to a depth of 30-50ft BGS. (1) Why did Terracon limit drilling to 29ft BGS? (2) Why did CDPHE approve the limited drilling proposal by Terracon?

Terracon has not observed soil lithology that would indicate significant differences in bedrock or groundwater conditions below 30 feet bgs. Borings across the site are consistent in both type and depth of fill materials and native soils. Based on Terracon's boring logs, a clay confining layer above the bedrock is not apparent. Since there were no lines of evidence suggesting environmental contamination at the level above 30-35', CDPHE could not arbitrarily make the consultants to drill to a deeper level.

P. Groundwater sampling conducted at the site as reported in the various reports seem to have been conducted mostly in periods of where groundwater levels may have been low due to the time of the year of low precipitation periods. May and June 2023 were months of high precipitation following several years of below normal precipitation. (1) Why was ground water monitoring and sampling not conducted during or following this high precipitation period as ground water levels could have risen into the landfill material and mobilized soluble COCs or generated new COCs both in water and as volatile species such as methane?

Groundwater sampling has been conducted at different times of the year and results have been generally consistent during that time. Due to the porous nature of placed waste material, significant or sustained rises in groundwater elevation following precipitation events is not expected. Also during low groundwater levels, any possible contamination would be more likely to present itself due to concentrations in the groundwater being elevated vs high groundwater levels where the concentrations would be more dilute.

Q. The applicant intends to construct a Stormwater Detention Basin to collect and slowly discharge storm water from a precipitation event. The application has not provided details on how much stormwater and quality. The applicant states that the site will be "streetscaped and landscaped areas, with packed gravel of compacted asphalt millings as surfacing materials in in drive and parking areas". The applicant states that the surfacing is expected to reduce infiltration of water into the landfill. (1) How much will water infiltration be reduced? (2) How will potential spills of fluids from RVs such as gasoline, diesel fuel, oil, and antifreeze be disposed of? (3) What will be quantity and quality of storm water reporting to the detention pond? How much of any given fluid spill will infiltrate into the landfill and groundwater?

Infiltration reduction is not a specific remedial action to be quantified. Potential spills will be handled according to state/local regulations and are outside the purview of the VCUP. Standard operation procedures will be in place for any reportable spills of fluids from onsite activities. Stormwater drainage quality from the site is anticipated to be consistent with roadway and parking area drainage in the surrounding area.

R. The critical components of a landfill cap are the barrier layers that minimize water infiltration and the drainage layer that transmits water across the cover to the detention basin. (1) How will surface water, likely contaminated with various hydrocarbon fluids and other chemicals, reach the Detention Basin? (2) How will subsidence of the cap impact surface water (+contamination) flow to the detention basin?

1. A typical landfill cap design is not required for the site due to absence of an environmental release.
2. Maintaining the slope of the surface cover is part of maintenance of the site and will be part of ongoing operations at the site.

S. Explain why testing of the Ralston Creek was limited to surface waters? Why was sediment and eDNA testing omitted?

Surface water was sampled to evaluate if water quality was being impacted from onsite sources. Upstream, onsite, and downstream sample results were consistent. Soil sampling was also conducted along Ralston Creek, on the property side of the streambank, and no environmental impacts were observed. Sediments were not sampled based on the streambank and surface water sampling results. Analyzed contaminants of concern included those required by the VCP.

T. How will the Ralston Creek and the RC bank be protected during the development?

Streambank stabilization and armoring will take place as part of development. No significant construction activities are planned near the creek or floodplain.

U. Describe how the RC bank will be stabilized? What will be the goals of the RC bank stabilization? Erosion prevention? Prevention of groundwater seepage (leachate) from the landfill to RC?

Stabilization will occur under a plan approved by the Mile High Flood District. Erosion prevention is the main goal of the plan.

V. What is the extent of the Ralston Creek bank stabilization?

Stabilization details are to be outlined in the approved plan, and will occur on sections of the streambank deemed to be impaired according to field data collected as part of the stabilization plan.

W. Provide support for your claim that that methane will not infiltrate parked RVs with or without cover? Air modelling? Studies?

Soil vapor infiltration into parked RVs is not anticipated to be an issue. Terracon consulted with in-house remediation subject matter experts regarding this concern. The following factors were considered:

- Tarps are not sealed to the ground.
- Vents on tarps appear to be standard to avoid moisture buildup (https://www.nationalrvcovers.com/s/class-a-rv-covers.html).
- The distance between the ground and bottom of most RVs.
- There are few penetration points in the bottom of RVs.
- Pipes to discharge black and grey water are capped and discharge near the side of RVs.
- The rest of the underside of a RV is fairly secure to avoid water, snow, rodents, and insects to penetrate the bottom while traveling or being stored

X. How will deep-rooted vegetation be integrated so the performance of the cap is not impaired?

An engineered cap is not part of the VCP remedial action plan. (Deep-rooted vegetation will not be part of the surface parking area). Only plants approved as part of the Mile High Flood District erosion control plan will be allowed along Ralston Creek. Additional details on surface vegetation and landscaping are part of the design process handled through the City of Arvada. Annual maintenance of the landscaping will be part of the ongoing maintenance of the site.

Y. The EPA has proposed PFAS national primary drinking water regulation. The EPA expects that if fully implemented the rule will prevent thousands of deaths. Why did testing of groundwater, surface water and soils exclude testing for Per- and Polyfluoroalkyl Substances (PFAS)?

There is currently no enforceable level for PFAS in groundwater, and the onsite groundwater will not be utilized for any purposes.

Z. The IPCC reports that the global warming potential for methane is about 84 higher over a 20-year timeframe than CO_2, that means it traps 84 times more heat per mass unit than carbon dioxide (CO_2) and 105 times the effect when accounting for aerosol interactions. (1) How much methane does the site currently release (per month/per annum)? (2) How much methane is projected to escape the site during redevelopment? (3) What is the methane release projections post redevelopment? (4) Will there be methane monitoring stations for the entire site?

No methane modeling is required or planned for the site and it is outside the purview of the VCP. Ambient air/breathing zone methane monitoring will be conducted during subsurface construction activities for worker protection under applicable OSHA standards. Continued methane monitoring will only take place for the onsite building and associate vapor mitigation system (VMS). Outside of the one building (security/entry shed), methane monitoring is not a promulgated environmental regulation for this property.

AA. The EPA maintains a log of redeveloped superfund sites and brownfield redevelopments. Does CDPHE consider these examples in approving the VCUP for 6800 Kilmer? If so, please provide examples?

This property is not a Superfund site, but it is a Brownfield site. When the Voluntary Cleanup Program approves a redevelopment site, it's based upon the environmental characterization (soil, groundwater, surface water and in this case indoor air) of the site and the possible exposure pathways. In this situation there are no completed exposure pathways, except for methane in buildings. A state approved methane mitigation system will be part of the state's approval process.

BB. In the event there is little documentation of similar redevelopments (ref Questions A, B) is Kilmer Street a "experiment" without scientific or empiric backing?

There are dozens of instances where landfills are being used as open storage of vehicles and heavy equipment throughout the state. This project has been characterized multiple times and there is no sign of an environmental release of concern coming from this property.

CC. The Colorado Geological Survey (CGS) suggests that "Collapsible soils are a major geologic hazard for land development in many locations across the state. This hazard manifests itself as ground settlement, which can be damaging to overlying structures if the soil problems are not mitigated or if the structure is not engineered properly. (1) Is CGS incorrect in this case? (2) If CGS is correct has CDPHE anticipated soil properties in the event the VCUP is granted?

1. Terracon prepared a Geotechnical Engineering Report for the site in August 2023. Settlement of site soils was considered and addressed in the recommendations of the report.
2. The recent Terracon Geotechnical Engineering does not suggest that collapsible soils are a land hazard for this project. Based upon the well logs, test pits and condition of the existing surface cover on the property, CDPHE does not view this as an issue.

DD. The RVs proposed to be stored at the site will include a significant amount of fuel (diesel, unleaded, propane, etc.). What is the proposed vehicle evacuation plan in the event of a fire event, either at the RV storage site or moving toward the RV storage site?

This is an operational question not pertinent to the VCP application. There will be a loop road constructed onsite that is capable of supporting firefighting operations should a fire occur onsite.

Comments Received Via Public Email:

A. I am a concerned citizen of Arvada and worried about the proposed use of the land at this address along the Ralston Creek in Northwest Arvada. This area was previously a landfill and there are still many unanswered questions about letting a RV storage lot be placed on the property. Constructing this development so close to the river is of great concern. With three hundred gas guzzling RV's being parked by the river, how will runoff into the river be avoided? In a heavy rain the water washes into the creek. This location seems like a really bad idea. Besides possible water pollution, this seems like "development pollution". If you look at an overhead view of this area, you are approving a non-residential development being squeezed into an area with houses on three sides. This will impact the property values, as well as what the county collects from property taxes. In the long run a park or open space is a much better use of this land. Do not let a company from Florida come it and rape our land. Listen to the people who live here, work here, and pay taxes here!

Terracon believes this is an operational/City of Arvada question, outside the requirements of the CDPHE VCP program.

B. We were told the liner of the retention basin was impervious. What are the retention basin's liner age/rating specifications?

The detention basin liner will meet specifications required by state and local regulations, specifically the CDPHE Solid Waste division. Final design of the retention basin/liner will be approved by this division.

C. F/U questions: who monitors to identify any failure the retention liner may have? How is mitigation undertaken if any issues arrise with the liner?

Site operator is responsible for evaluating liner condition. If issues arise, they will be responsible for repair or replacement of damaged liner and any other necessary mitigation efforts. Quality assurance (QA) and quality control (QC) protocols will be followed during liner installation.

D. We heard at the meeting that health and safety of people is a primary focus for the area and the VCUP. However, there was no specific mention of protection of the health and safety of wildlife that live in and utilize the area. Why can't that become a part of the focus of the VCUP?

The Voluntary Cleanup Programs mission is to assist landowners in redeveloping their land in an environmentally safe manner, which is protective of human health and the environment. The State Voluntary Cleanup Bill (House Bill 94-1299) does not require an evaluation for safety of wildlife. As with almost all redevelopment plans of this size, I do not know of any other state or federal requirement to evaluate the safety of wildlife.

E. According to Terracon, no industrial/hazardous/medical waste was observed in samples taken. A point to stress may be that no one really knows all that was deposited in that

landfill. Disturbing the area to undertake development is not worth the risk to the health of the environment (people, wildlife and the creek). Samples taken do not represent the true findings of what is potentially buried there. It's like sampling 10 people out of 10,000 to determine if there is an active virus in a certain population. Inconclusive results at best.

Landfill waste has been observed in over 25 soil borings and multiple test pits across the site during prior investigations. The nature of the buried debris has consistently been in line with reported disposal of household/municipal waste. Should waste of unknown characteristics be discovered during site development, additional testing and evaluation is required as part of the Materials Management Plan under the VCP.

F. How will the area be policed regularly to ensure that users of the area are complying with laws and other requirements to safeguard the outlying environment? This was brought up at the meeting and once again brushed aside as an operational issue.

The site will be subject to applicable federal/state/local laws and regulations. Under the VCP and any No Action Determination, changes in environmental conditions are required to be reported to CDPHE.

G. Will water samples be taken regularly to ensure that the creek is not being used as a dumping ground purposely or accidentally? Where and how often?

Ralston Creek is a tributary to Clear Creek and sampled on a quarterly basis. If significant anomalous readings are reported, the state has protocols in place to try to pinpoint the origin of the release and go after the possible entity.

H. The Terracon presentation indicates that in two historical boring samples, arsenic levels are above Colorado background value. What is that value and how is it determined as safe/acceptable? Why can't more boring samplings be undertaken?

CDPHE has published a risk management guidance document relating to naturally occurring arsenic concentrations in Colorado soils. The document utilizes US EPA data to evaluate average naturally occurring arsenic values across the state. This background average for all land uses is 11 mg/kg. The average arsenic in soil samples analyzed for metals across the site is 9.18 mg/kg.

I. The Ralston Creek water sampling seems insufficient. According to Terracon, it's been discovered that there presently is no surface water contamination. However, how is the impact of development at the site considered as a viable consideration of potential creek contamination part of the VCUP approval process?

Sampling was conducted at the request of CDPHE and included the potential contaminants list required by CDPHE. Sampling of Ralston Creek and downstream waterways is conducted quarterly to evaluate water quality and evaluate potential impacts to surface water.

J. What does the vapor mitigation system installation entail? Who determines if this is adequate now and in future years?

The vapor mitigations system will include an impervious liner below the building foundation, with porous gravel and vapor collector pipes attached to a riser. The system will be "active", with a blower to extract air from the collector pipes and safely vent it to the outside. Additionally, there will be sensors designed to measure methane levels within the structure, tied into the fire alarm control panel. Should methane levels reach trigger values at or above 10 percent of the lower explosive limit, alarms will sound and appropriate

response personnel will be notified. The system design is in line with industry standards and is consistent with systems in use at numerous sites across Colorado. The full system design is performed and checked by Terracon's in-house vapor mitigation subject matter expert, and is signed and sealed by a professional engineer registered in the state of Colorado. Additionally, CDPHE has to approve of the methane mitigation system design plans as part of the VCP process.

K. What excavation and soil removal is planned? Once again, disturbing the area will cause increases in methane and other gas/materials emissions which can prove unsafe to the surrounding environment.

The overall site plan is still under development prior to review by the City of Arvada. Currently, limited excavation is planned for the stormwater detention basin, onsite office building, and utility areas as necessary. Excavation will be conducted so as to minimize the disturbance of landfill debris where possible. Excavation operations will be overseen and monitored by an environmental professional, and disturbed landfill debris will be characterized and disposed of in accordance with regulations. During the excavation process, once methane reaches the atmosphere it rapidly dissipates and breaks down.

L. What is the planned streambank stabilization plan? What impact when that is undertaken will this have to the surrounding environment? How will success in stabilization be determined?

The streambank stabilization efforts may include removal of some existing vegetation, regrading of the streambank elevations, placement of appropriate geotextile, natural fiber, or rock armoring erosion control systems, and planting of native plants suitable to revegetate the disturbed areas. The stabilization work is intended to protect Ralston Creek from impacts related to the adjacent buried landfill

Summary of Colorado Department of Public Health and Environment (CDPHE)

Program overview

Properties that sit untouched because of their real or perceived contamination can be rehabilitated using our Brownfields Program in conjunction with the Voluntary Cleanup and Redevelopment Program.

- These programs provide public and private property owners with the resources to facilitate cleanups, as well as assurances against regulatory enforcement.
- Because the Voluntary Cleanup and Redevelopment Program provides both federal and state remedial plan approval in one step, banks will accept a "No Action Determination" letter from the program as assurance that we or the U.S. Environmental Protection Agency won't order a costly, conventional cleanup. This eases concerns of environmental liability when involved in property transfers.
- Cleanup decisions are based on existing standards and the proposed use of the property, but we provide no construction or cleanup oversight. The actual cleanup and verification are the owner's responsibility.
- To receive the EPA's assurances that it won't take Superfund action as specified in the Memorandum of Agreement (MOA), the owner must submit a completion report as a new application for a No Action Determination so we can review and concur that the plan has been completed as approved.

Background and Purpose

There are many sites across Colorado where soils and groundwater have been contaminated by past uses. These sites range in size from small spills, involving a few square feet of surface contamination, to sites where large amounts of contaminants have impacted many square miles of land. In most cases, these sites fall within a regulatory framework which ensures appropriate cleanup and protection of human health and the environment. For example, a given manufacturing facility may have a Resource Conservation and Recovery Act (RCRA) permit to properly manage hazardous waste, or a facility with known contamination may be under a RCRA Corrective Action Order to ensure appropriate cleanup. Other sites across the state are being cleaned up under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

For some sites, however, an appropriate regulatory framework does not exist. For example, contamination which predates the RCRA statute would not be subject to RCRA authority.

As a result, several states have developed programs that provide alternate mechanisms for reviewing, approving, and overseeing these voluntary cleanup-up efforts. In 1994, the Colorado General Assembly passed the Voluntary Cleanup and Redevelopment Act, which formalized a non-regulatory process for cleaning up certain types of sites. This document provides a resource to landowners and their consultants who would like to propose a voluntary clean-up (VCUP) effort or receive a no-action determination (NAD).

The VCUP program operates under the Colorado Department of Public Health and Environment (CDPHE), Hazardous Materials and Waste Management Division. The VCUP program is very streamlined, such that VCUP staff handle all VCUP applications, regardless of the regulatory program(s), except those which involve regulated petroleum storage tanks, which are handled by the Colorado Department of Labor, Division of Oil and Public Safety (OPS). In evaluating each application, VCUP staff coordinate with the various regulatory programs within CDPHE, as appropriate, to ensure consistency.

The State's goals are to encourage as many voluntary clean-up proposals as possible and remove any barriers landowners might have in coming forward with a VCUP proposal. Traditionally, such barriers have included fear of prosecution or being forced to do more cleanup than necessary for the intended future use of a property. Such barriers hinder environmental cleanup and property redevelopment or reuse.

Authority for the Voluntary Clean-up Program is derived from the Voluntary Cleanup and Redevelopment Act (the Act) (C.R.S.25-16-301) passed in 1994. The purpose of the Act is to "Provide for the protection of human health and the environment and to foster the transfer, redevelopment and reuse of facilities that had been previously contaminated with hazardous substances or petroleum products." The program is designed to operate expeditiously, with minimal administrative processes and costs. Accordingly, no regulations have been promulgated for the Voluntary Cleanup and Redevelopment Act.

The Voluntary Cleanup and Redevelopment Act was enacted to address sites not covered by existing regulatory programs and to provide a mechanism for approving clean-up plans. The Act specifically recognizes existing regulatory programs and excludes sites covered by these programs from participation in the VCUP Program.

The VCUP Program is designed to be a one-time interaction with the CDPHE.

Each application should include a detailed site history, outlining past and present uses of the property and identifying conditions that might have contributed to potential or actual environmental contamination. In additional to a history of site uses, the application should also include a thorough discussion of site characterization activities. Site characterization efforts should be based on site history and demonstrate that environmental sampling included appropriate constituents, media, and locations on the property.

Most voluntary clean-up situations involve contamination that occurred in the past and do not trigger reporting requirements. An exception to this is past releases from underground storage tanks, which are subject to reporting requirements.

Legislative authority Authority for the Voluntary Clean-up Program is derived from the Voluntary Cleanup and Redevelopment Act (the Act) (C.R.S.25-16-301) passed in 1994. The purpose of the Act is to "Provide for the protection of human health and the environment and to foster the transfer, redevelopment and reuse of facilities that had been previously contaminated with hazardous substances or petroleum products." The program is designed to operate expeditiously, with minimal administrative processes and costs. Accordingly, no regulations have been promulgated for the Voluntary Cleanup and Redevelopment Act.

The Voluntary Cleanup and Redevelopment Act was enacted to address sites not covered by existing regulatory programs and to provide a mechanism for approving clean-up plans. The Act specifically recognizes existing regulatory programs and excludes sites covered by these programs from participation in the VCUP Program.

The VCUP program requires applicants to meet existing state surface water and ground water standards. The compliance point is the property boundary. For sites where a groundwater plume originates on the property and migrates off the property in excess of state standards, the applicant is encouraged to perform remedial actions to reduce contaminant levels to below state standards at the property line. The applicant may treat the entire plume, or may perform remedial actions only within the property boundary, and rely on monitored natural attenuation for the remainder of the plume. Active remediation should be based on source characterization, contaminant concentrations, and contaminant fate and transport, and groundwater depth and flow characteristics. Remedial actions may include source removal, mass reduction, or other treatment alternatives. If the entire plume is not treated, an evaluation of monitored natural attenuation must be made.

This evaluation should include the geochemical reactions that influence contaminant concentrations, the time expected to meet state standards, and the expected land uses and exposure pathways that may exist during the attenuation period. The applicant must show that the attenuation timeframe is reasonable, given the expected land use scenarios. The use of institutional controls may be considered in this evaluation. An additional important consideration will be whether a ground water plume may adversely impact the quality of hydrologically connected surface water. If the proposed clean-up is determined to be adequate, taking the above considerations into account, the CDPHE may approve the voluntary clean-up proposal, even though ground water standards may be exceeded at the property boundary at the conclusion of active clean-up.

For most sites, a narrative description of the exposure pathways (or lack of completed pathways) is sufficient. For example, an acceptable level of risk could be demonstrated, if the land use (e.g., a paved parking lot) will prevent human health or environmental exposure to contaminated soil, as long as that soil is not a source of ground water contamination. In determining appropriate health-based standards for workers, Occupational Exposure Limits for protecting the health of workers who are knowingly exposed to hazardous chemicals in their line of work should be used, rather than exposure through the general environmental pollution pathway.

Under the Voluntary Cleanup Program, the state provides no construction oversight or certification. The applicant is responsible for providing a self-certification that the remediation has been completed in accordance with the approved plan. This self-certification must be submitted to the State by a qualified environmental professional (as described in 40 C.F.R. § 312.10(b)) within 45 days after completion of the clean-up plan. This certification is required in order to receive assurances that EPA will not take Superfund action (as specified in the aforementioned Memorandum of Agreement)

There is no formal agreement that binds the parties under the Voluntary Cleanup Program, and the state has no enforcement authority under the Act. Assuming the site is eligible for the program, the statute does not require proposed cleanups to be completed. The applicant can "walk away" at any time, with the only consequence being that any approval received from the state would be void. However, if a cleanup had been started, the state can require the owner to properly manage any waste that had been generated from the incomplete cleanup. This authority would not be used to force completion of the cleanup. The owner/applicant would be responsible for closing up the site to protect public safety and ensuring that environmental problems were not exacerbated (i.e., leaving a dangerous hole that would collect surface runoff and contribute to ground water contamination).

The Act has no formal requirements for public participation or review of applications. However, all files are public documents, available for public review. Also, the Department routinely contacts the local county, to determine if there is any knowledge or interest in the site, and will make a copy of the application available for local review, if requested. In addition, CDPHE will appear at community meetings, if requested, to provide information to interested citizens. Information on applications is available to the public on the CDPHE web site at https://www.colorado.gov/pacific/cdphe/voluntary-cleanup.

In order to receive assurances that EPA will not take action under CERCLA (as per the Memorandum of Agreement), the applicant must provide public notice, within 30 days of the approval, that the clean-up plan or no action determination has been approved by the state. In some cases, where public interest in the property is high, CDPHE may require that the applicant provide additional public information. For large sites or sites where public interest is likely due to publicity or proximity to Superfund sites, CDPHE may request that the applicant hold a public meeting to explain its cleanup plan.

The state provides an approval letter upon completion of the application review. The letter generally states that, based on the information provided in the application about the contamination and the proposed land use, if the plan is completed as proposed (either cleanup or no action), no further action will be necessary on the site. This letter provides the state's assurance that as long as the land use stays the same (as stated in the application), the state will not require any additional cleanup. There is no covenant not to sue in the letter. If the property is subsequently sold, the approval runs with the land, provided the land use stays the same.

https://cdphe.colorado.gov/environmental-cleanup-guidance-and-policy Go to Voluntary Cleanup Roadmap

July 5, 2024

Chelton, LLC
PO Box 460010
Fort Lauderdale, Florida 33487

Attn: David Schneider
Email: [redacted]

Re: Former Kilmer Landfill Streambank Survey and Restoration
Technical Memorandum
Project Number 25237279

Dear Mr. Schneider:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Technical Memorandum for the above-referenced project. This report is in response to the Mile High Flood District's (MHFD)'s request that Terracon conduct a bank stability analysis study prior to implementation of new bank stabilization efforts. The Technical Memorandum documenting the outcome of the site visit is attached.

Based on conditions observed at the time of the site investigation, the banks are currently eroding.

It is Terracon's opinion that proposed bank stabilization efforts done without addressing the identified root causes identified within this Technical Memorandum will eventually fail or transfer energy to other sections of the reach causing further degradation of bank and channel. Additional observation is recommended to evaluate the long-term trend of the stability of this reach. Continued periodic monitoring of the reach is also a requirement of the Notice of Environmental Use Restriction associated with the site.

We appreciate the opportunity to be of service to you on this project. Please feel free to contact any of the undersigned if you have questions or require additional information.

Sincerely,

Terracon Consultants, Inc.

Matt Leisses
Senior Environmental Scientist

Michael E. Lower
Department Manager

Jeffrey Attig
Project Manager

Preliminary

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) was retained by Chelton LLC (client), to conduct a stability evaluation of the stream bank for a section of Ralston Creek. The study area stretches from the Croke Canal to approximately 300 feet upstream of the Joyce Street culvert. This effort is in response to a proposed recreational vehicle parking lot proposed south of Ralston Creek on the property formally known as the Kilmer Landfill located at latitude 39.819724 and longitude -105.170815 in the City of Arvada, Jefferson County, Colorado. Land use along the stream consists of a medium density residential development and a recreational trail to the north and a capped landfill consisting of a sparsely vegetated field to the south.

2.0 Methodology

Terracon staff conducted a stream bank evaluation using multiple assessment approaches. The stability of the banks was evaluated visually and through measurement. Data gathered was included in a Bank Assessment for Non-point source Consequences of Sediment (BANCS) model. This methodology generates predictions of bank sediment loss within the study area. A plant inventory was conducted to identify the plant community within the riparian area. Habitat was observed and recorded to estimate the existing biological function the reach currently supports.

The two tools used in the BANCS method are the Bank Erosion Hazard Index (BEHI) and the Near Bank Stress (NBS) assessments. Ratings determined from various parameters for these two assessments were used to calculate an average estimated erosion rate for each segment of the bank throughout the reach. The erosion rates are based on a combination of the United States Fish and Wildlife Service (USFWS) Bank Erosion Rates Curve and Rosgen's Colorado Bank Erosion Rates Curve. The study area began at the end of a section of riprap lined banks and ended prior to another section of rock lined banks. Rock protected banks are not evaluated for BANCS analysis as they are not considered sources of sediment within this methodology.

Visual observations and field measurements were taken to evaluate the general stability, general assessment of conditions, and habitat within the study reach.

The bankfull width and depth were estimated throughout the reach and were used in the BANCS evaluations. Bankfull is the incipient point of flooding based upon an approximate 1.5 year storm interval. The width of the channel at the bankfull elevation was used to estimate the width-to-depth ratio. This is estimated by dividing the bankfull width by the estimated mean bankfull depth. Width to depth ratios help identify stream type and stability when compared to other parameters such as slope, entrenchment, and sinuosity.

Preliminary

An entrenchment ratio was estimated at points through the site. This ratio is estimated by dividing the flood-prone width (the width at twice the maximum depth of bankfull) by the bankfull width. Incision ratios were estimated by dividing the bank height by the bankfull height. Entrenchment and incision ratios provide an indication of vertical channel stability.

The hydraulic flow of Ralston Creek is manipulated for flood mitigation and prevention. Therefore, regional curves for estimated predicted bankfull dimensions were not used due to the affected hydrology, and a stable reach upstream of the canal (upstream of the study reach) was measured for bankfull width and depth for reference.

3.0 Results

The stream reach was evaluated for general stability. A head cut was observed at the start of the reach and was arrested at approximately the limits of the riprap at the upstream terminus of the study reach. The observed vertical incision was surmised to be the result of excessive stream bed mobilization during storm events. Based on preliminary measurements and bankfull estimates, the reach had an overall low width to depth ratio (overall less than 10) and most of the banks have a high bank to height ratio and was estimated to be a Rosgen G stream type. This indicates vertical degeneration of the stream channel. High entrenchment and incision ratios were found throughout the study area confirming the vertical instability of the channel. The mobilization of streambed material is contributing to the vertical and horizontal instability within the study reach.

Ratings for the BEHI ranged from Low/Low to Very High/High (Appendix A). The dominate rating was Moderate/High. The substrate of the banks consisted primarily of highly erodible sand which contributed to the elevated erosion scores. The BANCS survey resulted in an estimate of 11.8 feet per year of predicted rate of bank erosion (for this site, that equates to 6726.9 cubic feet per year and 191.6 tons per year) and a predicted erosion rate of 3.0 tons per year per foot.

Measurements were taken to estimate fluvial geomorphological dimensions. Upstream dimensions were taken as a reference comparison. The upstream reference reach (stable) bankfull dimensions include a width of 11 feet and a mean depth of 0.75 feet. The width to depth ratio is approximately 15. The floodprone width is over 40 feet wide which results in an entrenchment ratio of greater than 2.7. These are stable values for a Rosgen C stream type. The bankfull measurements below the canal within the identified study area resulted in the following values:

- 6.5 feet wide and 1.3 feet mean depth at bankfull resulting in a width to depth ratio of 5 and an entrenchment ratio of 1.7 and incision ratio of 3.0;
- 8.8 feet wide and 1 feet mean depth at bankfull resulting in a width to depth ratio of 8.8 and an entrenchment ratio of 1.6 and incision ratio of 4.0; and,

Preliminary

- 10.9 feet wide and 0.75 feet mean depth (area of previous bank stabilization work) at bankfull resulting in a width to depth ratio of 14.5 and an entrenchment ratio of 1.45 and incision ratio of 3.1.

These values indicate a destabilized channel. The areas where no previous bank stabilization efforts occurred were generally less stable as compared to the areas where previous stabilization work occurred. However, the previous work is currently being undermined because of channel incision from the narrow, high, and steep valley constraints and disconnection from the floodplain.

Desktop survey and observations resulted in general characteristics of channel stability. The stream banks on both sides of the channel were historically manipulated as material was added to the landfill. The banks were graded to their current steep slopes and raised elevations as opposed to forming naturally through fluvial processes. These elevations vary but banks are generally 3 to 12 feet higher within the study area compared to the stable upstream reference reach. The steep and narrow banks result in high entrenchment and incision ratios and generally low width to depth ratios. This confinement yields accelerated sheer stress and velocity compared to the upstream reference reach due to the disconnection from the floodplain. The resulting excessive energy has a high capacity for sediment transportation for both the volume and size of bed material (competency and capacity). These conditions result in vertical channel incision.

Intermittent Grade control within the channel was observed consisting of tree roots and periodic rip rap placement. The grade controls serve to lessen incision where they exist.

The study reach contained mature trees throughout the reach that are supporting soil retention. The mature trees, eastern cottonwoods with intermittent-stage willow and ash trees, are the primary surface cover in the BEHI rating and contribute to streambank stabilization. The network of tree roots prevents further bank erosion and is the main source of habitat within the study reach. The tree canopy provides thermal regulation for the stream channel. This mature tree stand is providing an essential function for the study reach.

Numerous species of flora and fauna were observed within the study area. The flora community consisted of 35 identified species and is available upon request. The inventory contains numerous native and non-native species. Fauna observed consisted primarily of 15 bird species observed during the site visit. No fish or macroinvertebrate sampling occurred during the site visit. Two garter snakes were observed during the site visit. Serval bird nesting sites were observed for both cavity and nest building dwellers. Mammals observed included squirrels, and tracks and scat signified the presence of racoons and opossums.

As previously stated, a stream bank stabilization project was constructed in sections of the reach. These areas occurred within sections 7A, 8A, 5B, and portions of 6B. The streambank stabilization work consisted of bank grading, biodegradable erosion control blankets, soil lifts along 7A, and seeding and live stakes. The vegetation within these areas is generally in good condition and the live stakes are thriving. In sections 7A, 5B, and portions of 6B, the

Preliminary

channel incision is causing an undercut in the banks. This is threatening the stability of the stabilization work and the biodegradable erosion control blankets are exposed. 5B has the most significant erosion within the previously repaired sections. Blankets along 5B were observed 4 feet above the water surface. Section 8A is stable and in good condition.

Sharp meanders were observed throughout the reach. The highest rates of erosion were observed along sharp meanders. These meanders are predicted to be a result of historic grading and the presence of tree roots. Layers of gravel bed material were observed at the historic elevation of the streambed. The meander at section 5B contained a relic gravel streambed layer that is over 3 feet higher than the current channel invert. This indicates the channel has eroded over 3' vertically within this section since previous stabilization efforts.

4.0 Conclusions

The root causes of instability within the reach were identified as valley confinement and low radius of curvature (sharp corners along the meanders). These causes cannot be repaired without significant impacts to adjacent land use and the mature forest stand. Impacts would include potential exposure of utilities, relocation of pedestrian trails (because of the need of laying back the streambank grading at stable slopes), exposing previously closed landfill material along the right bank, removing mature trees (some greater than 6' diameter at breast height) which would subsequently eliminate shading, existing bank and channel protection, and habitat.

The previous installation and design of the improvements of the bank stabilization appear to be executed correctly. However, due to the root causes of degradation, these improvements are not functioning or at risk of failure in 3 of the 4 areas. Prior to visiting the site, bank treatments were discussed as potential mitigation for the bank degradation. It is the opinion of Terracon that these options would be unsuccessful due to the valley constraints. Any fill within the channel would further constrain the valley by reducing cross section width thereby increasing the energy and sediment transport within the channel and exacerbating the root causes. Grading the banks back at less steep stable slopes would obliterate the mature trees, and "spot fixes" would likely fail as did previous efforts to stem localized erosion.

Areas identified for stream bank improvements without impacting mature trees is limited. Section 5B could benefit from bank stabilization efforts including grading that would not significantly impact mature trees nor exacerbate the root causes identified. A larger segment of the study area could be improved by installing live stakes if plant establishment could occur prior to bank failure as seen in previous efforts.

Stream stability for this reach will require significant efforts. A permanent fix requires floodplain reconnection and partial realignment of the channel to avoid the tortuous sinuosity. This will require impacting the landfill on the right bank and/or potential utilities and recreation trail on the left bank. Furthermore, stream realignment will result in the removal of most of the mature trees that provide essential riparian functions.

Preliminary

Another option includes bank grading, armoring, and incorporation of in-channel grade controls. This would also require the removal of numerous mature trees as well as importing a large quantity of boulders to create a stable reach. The solution could potentially transfer accelerated energy to downstream reaches, which would need to be analyzed as part of the design process. Both options would incur significant costs, and neither are recommended at this time based on their impacts to the mature trees that are providing significant stream and habitat benefits and buffers from surrounding land use.

There are opportunities to provide the stream localized floodplain relief. The two sections include widening along the left bank near 5A through 9A. However, these sections include areas beyond the property limits owned by Chelton, LLC and would require removal of several mature trees. The right bank section near 5B could also be regraded and stabilized. Secondary adverse effects could occur at 5B like in previous stabilization attempts. This meander has a radius of curvature that is a lower value than what is considered stable for the reach. While this would not address the root causes of the source of instability, stabilizing this section would prevent further bank retreat as there are no mature trees along this section to prevent further degradation of the banks.

A streambed lift was considered for the reaches below sections 4A and 3B. This would be a costly solution that would require additional studies, disturbance of adjacent property, and the installation of grade control features.

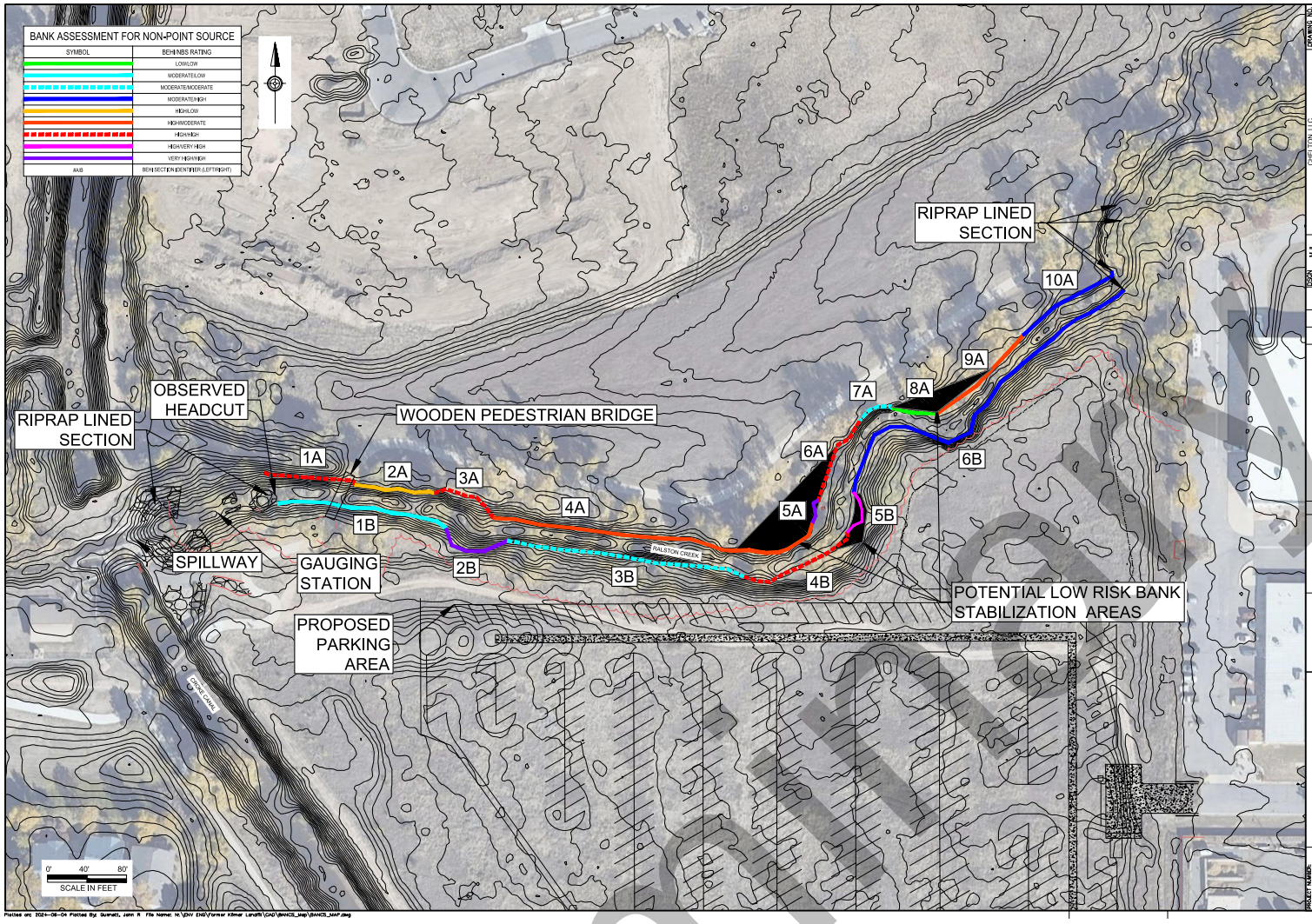
It is recommended that the channel be monitored again in three years to observe the changes in the stream channel to estimate the long-term trend. If the stream continues to actively degrade to the point that it threatens infrastructure and mature trees are lost due to degradation, a restoration or stabilization could be justified. Conversely, the surface protection provided by the tree roots could arrest further erosion or the stream could evolve to a stable condition through bank widening and collapsing as depicted in Rogen's stream evolutionary predictions. The long-term trend should be verified prior to advancing stabilization efforts that may be ineffective or cause greater harm to the reach.

Preliminary

Preliminary

APPENDIX A

BANCS MAP



Preliminary

APPENDIX B

PHOTOGRAPHIC LOG

Preliminary

Photo 1	
Date: 4/24/2024	
Description: Facing upstream viewing spillway of Ralston Creek over Croke Canal.	
Photo 2	
Date: 4/24/2024	
Description: Viewing downstream from gauging station towards segments 1A (River Left) and 1B (River Right). Sections begin immediately downstream of the riprap. .	

DRAFT

Photo 3	
Date: 4/24/2024	
Description: Facing downstream viewing segment 1A (left bank).	
Photo 4	
Date: 4/24/2024	
Description: Facing downstream viewing segment 1B (right bank)	

Preliminary

Photo 5	
Date: 4/24/2024	
Description: Facing downstream viewing segments 2A on left and 1B continued on right.	
Photo 6	
Date: 4/24/2024	
Description: Facing downstream viewing 3A.	

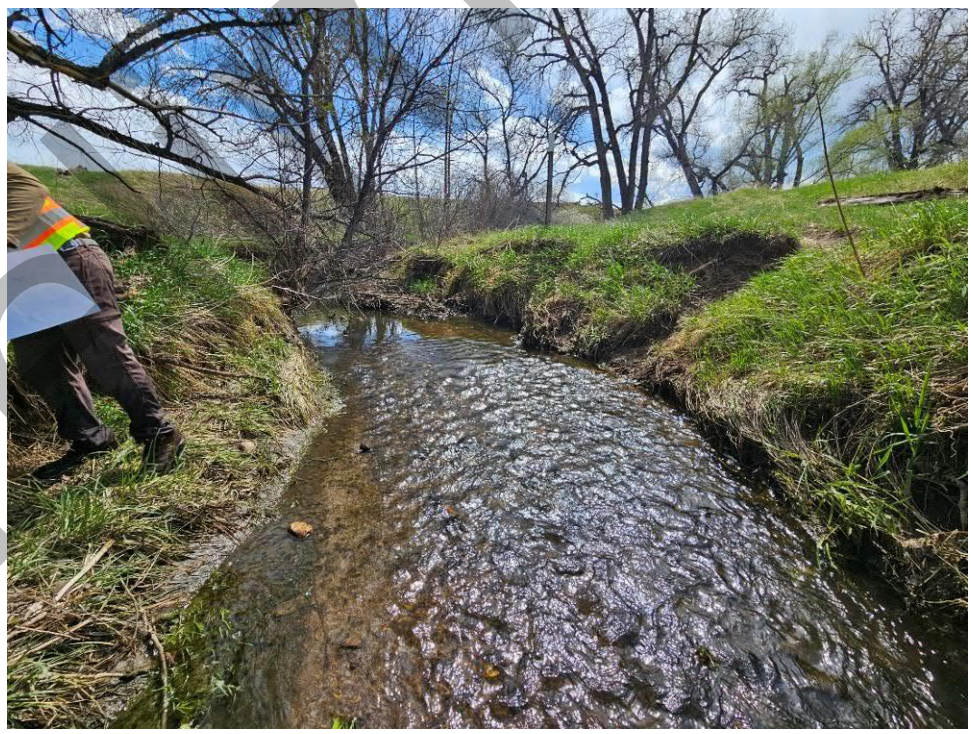
Primary

Photo 7	
Date: 4/24/2024	
Description: Facing downstream viewing 2B.	
Photo 8	
Date: 4/24/2024	
Description: Facing upstream viewing 4A on right and 3B on left. Note undercut on 4A which resulted in a HIGH BANCS rating while 3B resulted in a MODERATE rating.	

PRELIMINARY

Photo 9	
Date: 4/24/2024	
Description: Facing upstream viewing 5A.	
Photo 10	
Date: 4/24/2024	
Description: Facing downstream viewing 5B.	

Preliminary

Photo 11	
Date: 4/24/2024	
Description: Facing downstream viewing segments 6A and 6B.	
Photo 12	
Date: 4/24/2024	
Description: Facing upstream viewing 7A on the right.	

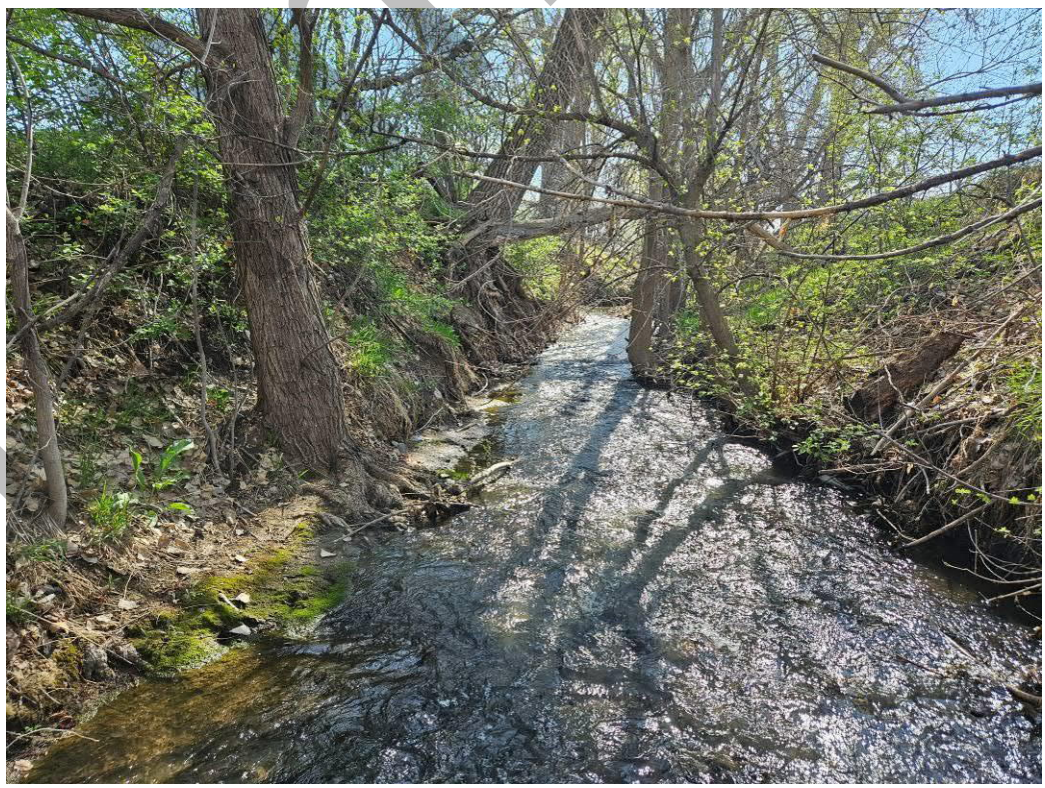
Proprietary

Photo 13	
Date: 4/24/2024	
Description: Facing upstream viewing transition from 7A to 8A (right).	
Photo 14	
Date: 4/24/2024	
Description: Facing upstream viewing 9A (right) and 6B (left). Note undercut on 9A and bank collapse on 6B. 9A is trending towards collapsing.	

PRELIMINARY

Photo 15	
Date: 4/24/2024	
Description: Facing upstream viewing the downstream end of 10A (right) and 6B (left)	
Photo 16	
Date: 4/24/2024	
Description: Facing downstream and viewing the terminus of the study reach.	

Primary

Photo 17	
Date: 4/25/2024	
Description: Facing towards Ralston Creek and the pedestrian bridge at the upstream end of the study reach. Viewing example of numerous mature riparian trees present.	
Photo 18	
Date: 4/25/2024	
Description: Viewing example of soil retention mature trees are providing despite poor bank height ratio, bank angle, and erodible sandy soils.	

Draft

Photo 19	
Date: 4/25/2024	
Description: Viewing eroded bank with dense root protection.	
Photo 20	
Date: 4/26/2024	
Description: Viewing specimen mature cottonwood tree.	

Preliminary

Photo 21	
Date: 4/25/2024	
Description: Viewing failing previous bank stabilization efforts due to vertical channel incision and undercutting the bank stabilization from channel confinement.	
Photo 22	
Date: 4/25/2024	
Description: Viewing reference reach section upstream from Croke Canal.	

PRELIMINARY

APPENDIX C

BANCS DATA SUMMARY TABLE

Preliminary

Project Name	Ralston Creek								
Feature Feature I.D. (Bank., Headcut or Deposition I.D.)	Length, ft (Bank or deposition)	Height, ft (Bank or Headcut)	BEHI Rating	NBS Rating	Predicted Rate of Bank Erosion (ft/year)	Predicted Erosion Amount (ft^3/year)	Predicted Erosion Amount (tons/year)	Predicted Erosion Rate (tons/year/ft)	Comments
1A	102.9	12.5	High	High	1.00	1290.37	36.76	0.60	
2A	82.1	3.1	High	Low	0.40	101.80	2.90	0.06	
3A	78.3	11.0	High	High	1.00	861.30	24.54	0.53	
4A	343.3	2.0	High	Moderate	0.64	439.42	12.52	0.06	
5A	28.4	4.1	Very High	High	1.00	116.44	3.32	0.20	
6A	92.5	3.7	High	High	1.00	342.25	9.75	0.18	
7A	40.6	2.3	Moderate	Moderate	0.30	28.01	0.80	0.03	
8A	46.9	1.0	Low	Low	0.02	0.94	0.03	0.00	
9A	119.0	3.2	High	Moderate	0.64	243.71	6.94	0.10	
10A	114.3	2.0	Moderate	High	0.80	182.88	5.21	0.08	
1B	164.3	1.5	Moderate	Low	0.13	30.81	0.88	0.01	
2B	103.2	11.5	Very High	High	1.00	1186.80	33.81	0.55	
3B	244.2	2.9	Moderate	Moderate	0.30	212.45	6.05	0.04	
4B	123.8	3.0	High	High	1.00	371.40	10.58	0.14	
5B	40.4	3.7	High	Very High	1.75	261.59	7.45	0.31	
6B	388.5	3.4	Moderate	High	0.80	1056.72	30.11	0.13	
TOTAL OF ALL GRIDS	**2112.7**	**N/A**	**N/A**	**N/A**	**11.8**	**6726.9**	**191.6**	**3.0**	

Preliminary

Reporting hazardous substance

Documentation	LDC	Comment
VCUP Application 7.5 Notice of Environmental Use Restriction and NAD Request The proposed remedial actions identified are considered to be protective of human health and the environment as exposure to landfill materials, arsenic in soils, and VOCs and methane in soil gas will be mitigated either through the removal of landfill materials or through engineered controls. However, impacted landfill material will be left in place at concentrations that exceed EPA Industrial/Worker RSLs and vapor intrusion screening levels that predict indoor air quality exceedances.	**Sec. 74-164. - Definitions.** Wherever a more stringent or less stringent interpretation of the definition of "hazardous substance" is possible, the more stringent interpretation shall be applied. **Sec. 74-168. - Standards and administration.** (a) (2)Any determination that a Phase I or higher assessment is necessary shall, at a minimum, consider whether a hazardous substance may reasonably be believed to exist in the property; the planned or potential use of the property; the potential economic, health, or safety consequences of permitting a potentially hazardous waste to remain unidentified or unremediated on the property; proximity of the hazardous waste to contaminable sources such as groundwater; the proximity of the hazardous waste to adjacent property; the potential exposure of the general populace to hazardous substances by incidental contact; as well as appropriate standards and requirements established by the Colorado Department of Public Health and Environment and the Environmental Protection Agency concerning lawful and/or hazardous contaminant levels regarding the nature and make up of the property in question. The city may further adopt, in the manner described in subsection (d) of this section, such other factors, criteria, standards, requirements, or procedures as may be reasonably necessary to implement the provisions of this article.	Anecdotal Information: **SMALL BUSINESS LIABILITY RELIEF AND BROWNFIELDS REVITALIZATION ACT** [[Page 115 STAT. 2356]] Public Law 107-118 107th Congress ``(C) Notices.--The person provides all legally required notices with respect to the discovery or release of any hazardous substances at the facility.  ``(D) Care.--The person exercises appropriate care with respect to hazardous substances found at The facility by taking reasonable steps to-- ``(i) stop any continuing release; ``(ii) prevent any threatened future release; ``(iii) prevent or limit human, environmental, or natural resource exposure to any previously released hazardous substance.

Insufficient identification of hazardous substance

Documentation	LDC	Comment
VCUP Application 4.9.6 Shallow Exploratory Excavations TP-04 also consisted of 2 feet of clayey brown well graded sand fill overlaying tires, bed spring, metal, newspaper, small paint cans, glass, bottles, wood, rubber, and household waste. TP-05 was excavated deeper to further characterize the landfill debris in the northwestern corner of the site. It consisted of 3 feet of brown fill which continued from 3 to 9.5 feet along with plastic, metal, springs, wood, rubber, tires, burlap, cloth, cans, and bottles	**Sec. 74-168. - Standards and administration.** (3) The city may reject any assessment which in the reasonable judgment of the city does not sufficiently identify the nature and scope of the hazardous material or substances, or which otherwise fails to enumerate such necessary activity or actions as may be required to remediate the condition of environmental contamination, or which is otherwise defective because of inadequacy or faulty performance by the person or company performing such assessment. Rejection of an assessment by the city shall not relieve any property owner of the responsibility for having an assessment performed as may be required under this article.	Anecdotal Information: **Why wasn't identification of bottle of Toluene (possible laboratory sample) identified in VCUP?** **Could other bottles noted in excavation contain other chemical matter?** 06/2023 Neighbors from GEOS and Forest Springs Communities met with Norris Design Project Manager and Terracon Staff at 6800 Kilmer St landfill site---at that time, a Terracon engineer stated Toluene was found in a labeled bottle in excavation soil layers 07/25/2023 Neighborhood meeting-ND and Terracon staff; engineer referenced finding a bottle of Toluene during excavation **Note: No identification of bottle of Toluene in VCUP Application Summary**

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

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Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
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PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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Appendix B Laboratory Data Form Is (under separate cover)

1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

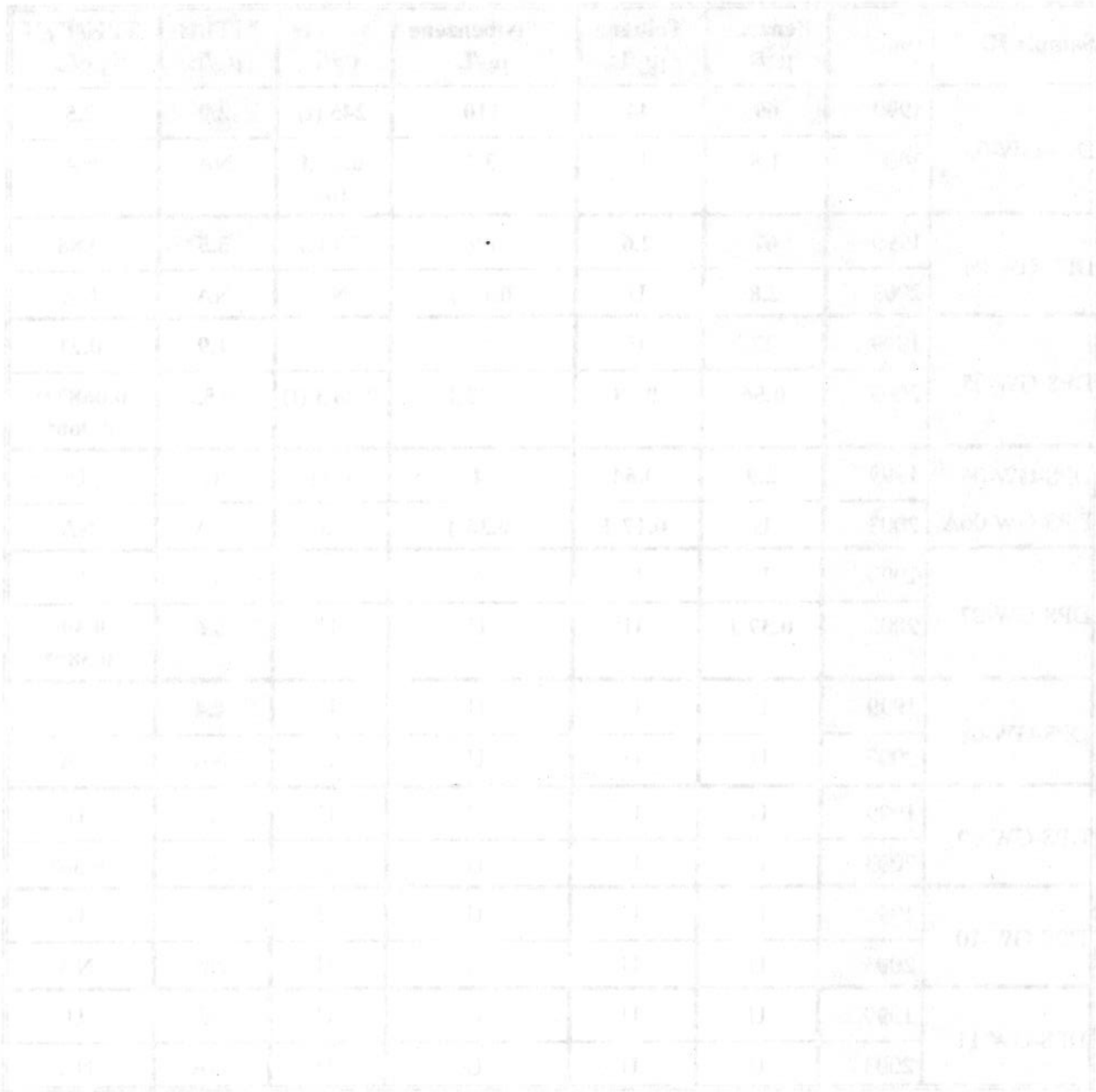
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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Item No. 9

City of Golden

911 10TH ST. GOLDEN, CO 80401
TEL: 303-384-8000
FAX: 303-384-8001
WWW.CITYOFGOLDEN.NET

Affordable and Thriving

8b Establish a Plan for Providing Quality Multi-Use Fields to The Community.

Council Memorandum

To: The Honorable Mayor and City Council

From: Rod Tarullo, Director of Parks, Recreation, and Golf

Through Carly Lorentz, Interim City Manager

Date: August 9, 2022

Re: Multi-use Sports Fields Discussion

Purpose of Agenda Item: To obtain Council feedback on two potential concepts that address aging infrastructure of multi-use sports fields, thus improving playability and ensuring safe facility conditions. Communicate next steps based on Council feedback.

Background: The Rooney Road Sports Complex opened in September of 2007, providing five multi-use synthetic turf fields of various sizes for use by regional sports teams. The fields are constructed on top of a former landfill owned by Jefferson County. A portion of the complex not on the landfill is also owned separately by Jefferson County Open Space.

After over 15 years of use, all the synthetic turf fields are showing their age and are past their typical lifecycle. The City has approximately $1.2 million dollars in a fund to provide replacement turf. This is not enough money to make all the repairs/replacement the facility needs. Besides the failing turf, there has been significant subsidence from the landfill underneath the fields that need to be addressed.

While designated as a regional complex by the County and the City, Table Mountain Soccer Association is the primary user of the facility. They also fund the regular maintenance of the complex. They have suggested replacing the turf for the last several years.

The Rooney site has several constraints because it is built on a landfill:

- There are no utilities to the site

- There cannot be permanent lighting because the pole structures would compromise the landfill cap
- There is an ongoing concern of subsidence
- There is no opportunity for shade structures and landscaping because there is no water available or allowed, and again the potential of compromising the cap

While providing bare bones multi-use fields for the last fifteen years, the long-term viability of this location is suspect. It will never have all the elements that help make other regional facilities more functional and pleasurable.

City staff was approached late 2019 by Jeffco seeking feedback on a preliminary proposal to modify the lease for the Rooney Road Sports Complex site. They are master planning the area to include a new slash/composting area in association with Rooney Road Recycling Center (3RC), trail connections, and other Jeffco park uses. They have renamed the Rooney area Tincup Park.

This plan would consider removing the southernmost field and changing parking for the sports complex. This would consolidate the sports fields and parking, and greatly reduce the land leased by the City for the sports complex. The current lease covers the entire hogback/former landfill area and is set to expire in 2026. The County has prepared a new draft lease that only includes the four northern fields of the sports complex area.

Alternative Locations: With all this in mind, several staff from the City and Jeffco have been looking for possible alternative sites to potentially move the Rooney Road Sports Complex. There is very limited land in the Golden area that is large enough and flat enough to consider a multi-field complex. Staff understands this was one of the reasons Rooney looked so appealing twenty years ago.

Consideration has been given to multiple locations including Jeffco owned property, none of which have panned out to be practical, financially viable, or sustainable for future investment. This led us to two alternatives using current City owned/leased land for consideration:

Alternative 1: Reinvest in Rooney, securing a new lease between the City and County for just the four northern field areas and entering into a new lease to allow for recovery of life cycle of replacement turf. The new lease would not include the South field which is needed for the slash/Jeffco development. Use the current budgeted $1.2 million which will repair and resurface the turf and subsidence of one existing field. This will not cover all needed repairs for the other three current fields. There is concern for continued subsidence on the property. Likely timeline of a year for completion of work accomplished with current budget. (See attachment A).

Alternative 2: Investigate program usage of city owned Ulysses fields to maximize scheduling. Consider remodel/renovation of two southern most existing baseball/softball fields to multi-use sports fields to better accommodate current and future needs of all sports programs. This change would consider the use of artificial turf or natural turf with advantages and disadvantages of both. (See attachment B).

Participation numbers have changed dramatically over the last two years. It is a challenge to anticipate future participation numbers. Any field allotment changes would need input from affected sports organizations.

This alternative allows the City to reinvest in current City owned assets. It provides for potential positive improvements over Rooney such as site furnishing upgrades like permanent lighting, seating and shade, restrooms, water, etc. Likely timeline of 2 years to get assessment completed and redesigns/renovations constructed and operational.

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when the City ends sports use of the property.

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AREA "D" 120' X 90'
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VAULT TOILET
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150'-0"
U8? / U9 / U10 Field
U8? / U9 / U10 Field
380'
360'
330'
10'
18'-0"
24'-6"
20'-0"
35'-0"

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Forest Springs Concerns: Proposed Kilmer landfill reuse

Sharon McCarthy <[redacted]> Mon, Jul 8, 2024 at 12:36 PM
To: Lauren Simpson <lsimpson@arvada.org>, Randy Moorman <rmoorman@arvada.org>, Bob Fifer <BFifer@arvada.org>, JMarriott@arvada.org, Lisa Feret <lferet@arvada.org>, sambrose@arvada.org, Sharon Davis <sdavis@arvada.org>
Cc: Jeremiah Bebo <jbebo@arvada.org>

Mayor and Members of City Council,

My name is Sharon McCarthy and I live in Forest Springs. I represent my community in learning more about the reuse of closed unregulated landfills. Our concern is that the 14 acre landfill on Kilmer St is developed in an environmentally responsible and sustainable manner that supports the City's Comprehensive Plan. I am aware that Council Member comments are restricted in possible quasi-judicial situations.

- At a Neighborhood Meeting with the developer last year, the following is one of the many concerns neighbors verbalized:

  B. Please provide 5 locations where CDPHE had knowledge that the requested VCUP was for a redevelopment for RV storage or other heavy equipment over an existing unregulated, uncompacted landfill with minimal clean-up, minimal capping, and parking surfacing as is being proposed by Chelton LLC.

  Answer: The purpose of the Voluntary Cleanup program is to determine if there are environmental concerns regarding the redevelopment of this site. With the approved Materials Management Plan, the proposed aggregate surface cover, the storm water detention pond, and lack of environmental releases/concerns, this site is suitable for an RV storage and heavy equipment. There are dozens of storage facilities placed on landfills throughout the state. There are two through VCUP (Sheridan Redevelopment Area and the Colfax Landfill II; 17999 E. Colfax Ave). Source: see p 1 of attached document

  Note: 17999 E Colfax is the Aurora Landfill, a Superfund classification per the Environmental Protection Agency and is part of the parent project, Lowry Landfill. https://cumulis.epa.gov/supercpad/CurSites/csitinfo.cfm?id=0802058 Still researching Colfax II and the Sheridan Redevelopment Area.

- The Environmental Protection Agency provides excellent examples of reuse of Superfund sites but little information about Brownfields (Kilmer landfill category) and almost no data on what happens if the reused project fails.

  We have several area examples of surface reuse of landfills but only two documented examples when the reuse project fails.

  - The first project is the Denver Public Schools Bus Terminal on Brighton Blvd in north Denver. See attached 2004 evaluation of the site. Our focus is on the following pages:

- p 8 Site Characteristics
- pp 12-13 Previous Investigation
- p 12 mentions site listed as “No Further Action” per governing agency
- p 13 describes recommendations based on discovery of leaks of oil/gas in subsurface due to subsidence from shifting and settling of soils in landfill material beneath the site
- p 14 describes probable cause of settlement and recommended possible remediation methods
- p 18 Field Observations
- p 25 Risk Evaluation Limitation
- p 28 Historical Data Comparison--including quarterly data collection by Chen (consultant) (original Chen evaluation for Kilmer St landfill available upon request)
- p 30 mentions “...catastrophic failure from settling and decomposition of landfill material from beneath the site.”

- The second project is the Rooney Road Sports Complex in Golden. The research we include about this project demonstrates the landfill reuse designed and initiated in 2007 was accomplished with the best of intentions. Decisions were based on information known at the time. The City designated a financial plan for future repair of the sports fields. Fast forward to 2022 and the City was faced with a deteriorating surface of the playing fields, changing substructure, and an astronomical cost to amend the original plan. We include a Youtube recording of a Golden City Council meeting https://goldenco.granicus.com/player/clip/4207?view_id=2&meta_id=117828&redirect=true as well as a City Memo expressing concerns and discussing the logistics of refurbishing the sports fields.

- One major interest is the structural integrity of the unregulated landfill and how will the substructure respond to tons of heavy equipment stored on the surface. If subsidence occurs, how and who will repair surface and subsurface damage? Equally important, we are concerned about the proximity of the landfill to Ralston Creek. Will pollution from the shifting soils and decaying organic material in the landfill mix with groundwater and taint the waters of Ralston Creek?

- Included are supporting resources: Youtube video, Golden City Council Memo, Summary of Research, Client Response to questions from Neighborhood meeting.

When I look at the 14 acres of land at Kilmer St, I see gently rolling berms, native grasses, and open space. What I don't seek, is that which might be compared to an iceberg. The subsurface of this land holds the "table of contents" to the history of the landfill/dump. I don't pretend to understand 99.9% of scientific articles on landfills. What catches my eye is there is much to learn about unregulated landfills. Research must take place but collecting data costs time and money not only for the initial project but for budgeting maintenance and replacement costs if the subsurface fails to support the project.

The answers provided in the Consultant's Mitigation Plan and the Final Answers to our questions in the November 2023 response sound valid. But----what if the answers are based on textbook theories? The Rooney Road Sports Complex demonstrates an actual "hands on" example of failed reuse of an unregulated landfill. The planned "second" reuse is for a Solar Array.

There are many open questions whether the current developer's plan for a proposed RV storage lot has accurate answers for now------ and the future for the citizens of Arvada.

We spoke with one developer interested in this land but passed because in order to reuse the landfill responsibly, all contents should be removed at a cost that would not provide a profitable return on the investment.

I include Jeremiah Bebo to direct this email for our Forest Springs file.

Thank you for reading.

Respectfully,

Sharon McCarthy
Forest Springs

4 attachments

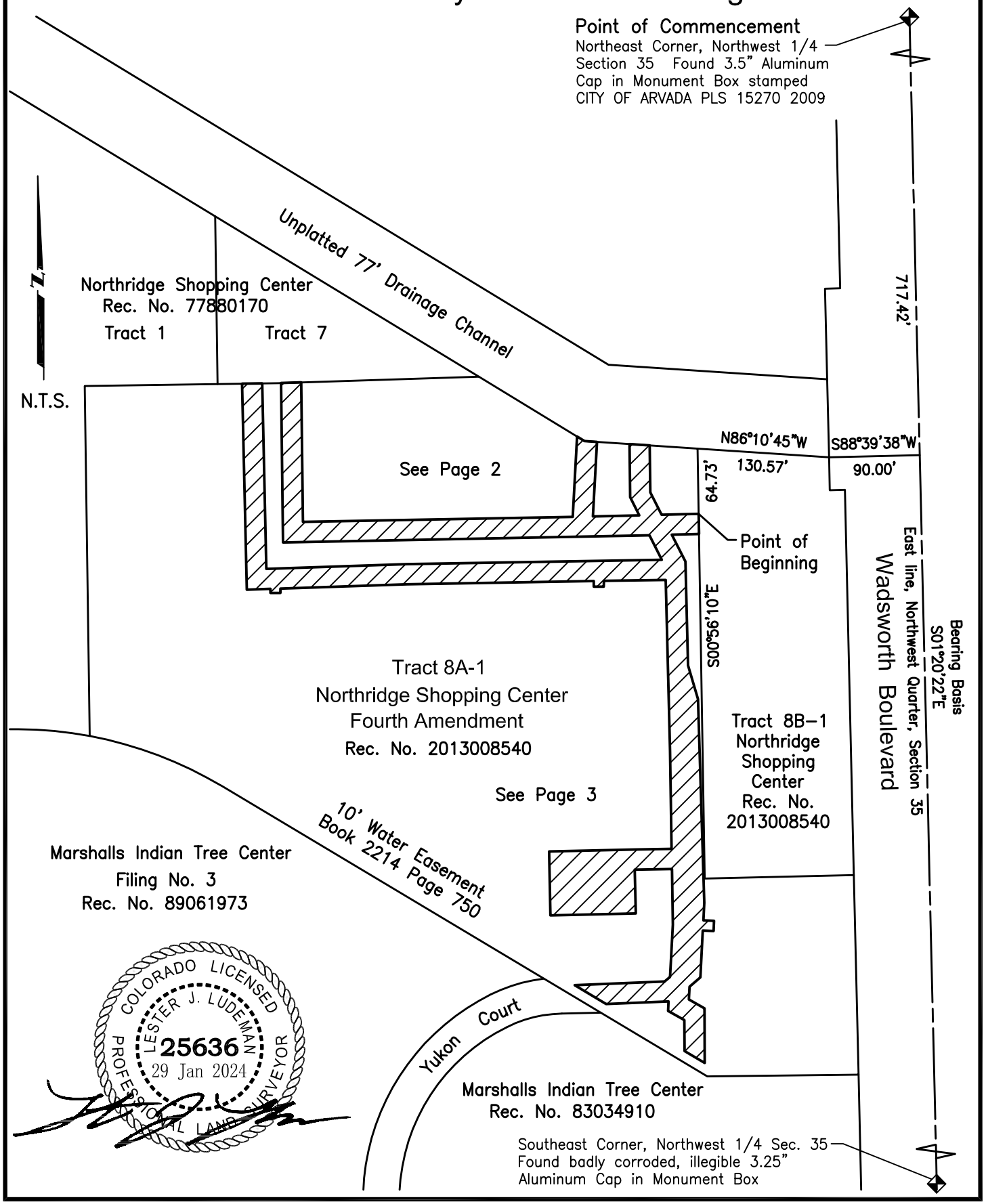
Golden CC agenda item 8-23-2022.rooney landfill and fields (1) (1) (1).pdf
8122K

Research.pdf
100K

DPS TBA (1).pdf
7958K

8-Final-Public-comment-Response-11-10-2023-1-2 (1).pdf
292K

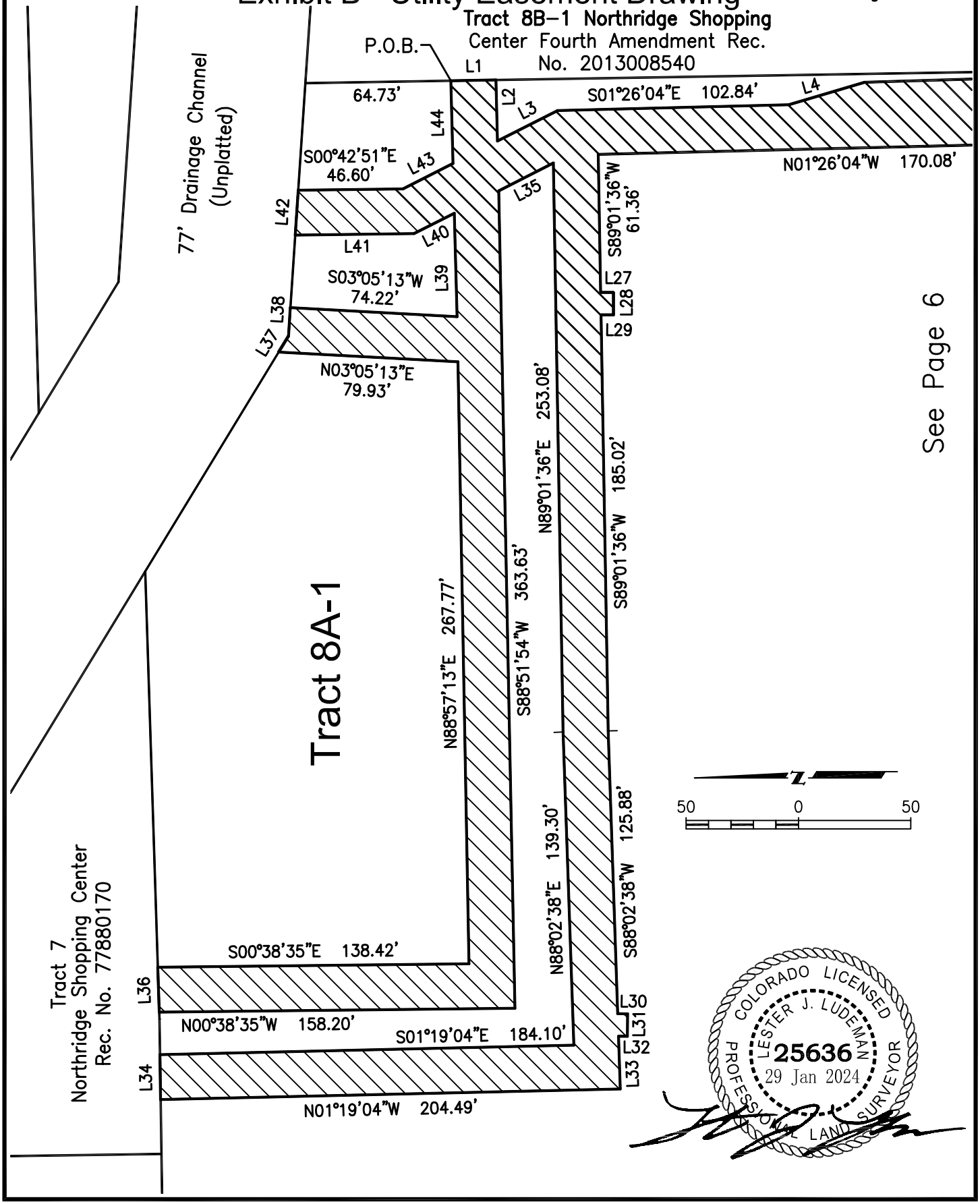
Exhibit B - Utility Easement Drawing



COLORADO LICENSED
LESTER J. LUDEMAN
25636
29 Jan 2024
PROFESSIONAL LAND SURVEYOR

Exhibit B - Utility Easement Drawing

Tract 8B–1 Northridge Shopping Center Fourth Amendment Rec. No. 2013008540



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Line	Bearing	Distance
L1	S00°56'10"E	20.00'
L2	S88°30'36"W	27.13'
L3	S26°52'02"E	30.01'
L4	S16°25'54"E	35.11'
L5	S03°03'07"W	17.39'
L6	S86°56'53"E	10.67'
L7	S03°03'07"W	10.00'
L8	N87°30'05"W	10.67'
L9	S03°03'07"W	46.63'
L10	S49°30'16"W	14.02'
L11	S03°14'42"W	12.84'
L12	S60°19'02"E	17.74'
L13	S00°17'41"E	54.22'
L14	N59°07'03"W	23.38'
L15	N00°17'41"W	30.57'
L16	N60°19'02"W	18.58'
L17	N03°14'42"E	9.31'
L18	S87°35'53"W	61.99'
L19	N59°07'03"W	36.44'
L20	N87°35'53"E	89.33'
L21	N49°30'16"E	7.03'
L22	N03°14'42"E	51.83'
L23	N00°58'05"W	55.24'
L24	S89°01'55"W	36.98'
L25	S01°18'54"E	43.43'
L26	N89°01'55"E	37.10'
L27	S00°02'17"W	5.65'
L28	N89°57'43"W	10.00'
L29	N00°02'17"E	5.47'
L30	S00°15'52"W	4.36'
L31	N89°44'08"W	10.00'
L32	N00°15'52"E	3.97'
L33	S88°02'38"W	23.47'
L34	N89°10'14"E	20.00'
L35	N26°52'02"W	27.28'
L36	N88°10'31"E	20.00'
L37	S58°40'33"E	8.48'
L38	S86°10'45"E	12.53'
L39	N88°30'37"E	46.03'
L40	N26°52'02"W	20.11'
L41	N00°42'51"W	52.83'
L42	S86°10'45"E	20.06'
L43	S26°52'02"E	24.95'
L44	N88°30'37"E	36.81'

Item No. 9

City of Golden

911 10TH ST. GOLDEN, CO 80401
TEL: 303-384-8000
FAX: 303-384-8001
WWW.CITYOFGOLDEN.NET

Affordable and Thriving

8b Establish a Plan for Providing Quality Multi-Use Fields to The Community.

Council Memorandum

To: The Honorable Mayor and City Council

From: Rod Tarullo, Director of Parks, Recreation, and Golf

Through Carly Lorentz, Interim City Manager

Date: August 9, 2022

Re: Multi-use Sports Fields Discussion

Purpose of Agenda Item: To obtain Council feedback on two potential concepts that address aging infrastructure of multi-use sports fields, thus improving playability and ensuring safe facility conditions. Communicate next steps based on Council feedback.

Background: The Rooney Road Sports Complex opened in September of 2007, providing five multi-use synthetic turf fields of various sizes for use by regional sports teams. The fields are constructed on top of a former landfill owned by Jefferson County. A portion of the complex not on the landfill is also owned separately by Jefferson County Open Space.

After over 15 years of use, all the synthetic turf fields are showing their age and are past their typical lifecycle. The City has approximately $1.2 million dollars in a fund to provide replacement turf. This is not enough money to make all the repairs/replacement the facility needs. Besides the failing turf, there has been significant subsidence from the landfill underneath the fields that need to be addressed.

While designated as a regional complex by the County and the City, Table Mountain Soccer Association is the primary user of the facility. They also fund the regular maintenance of the complex. They have suggested replacing the turf for the last several years.

The Rooney site has several constraints because it is built on a landfill:

- There are no utilities to the site

- There cannot be permanent lighting because the pole structures would compromise the landfill cap
- There is an ongoing concern of subsidence
- There is no opportunity for shade structures and landscaping because there is no water available or allowed, and again the potential of compromising the cap

While providing bare bones multi-use fields for the last fifteen years, the long-term viability of this location is suspect. It will never have all the elements that help make other regional facilities more functional and pleasurable.

City staff was approached late 2019 by Jeffco seeking feedback on a preliminary proposal to modify the lease for the Rooney Road Sports Complex site. They are master planning the area to include a new slash/composting area in association with Rooney Road Recycling Center (3RC), trail connections, and other Jeffco park uses. They have renamed the Rooney area Tincup Park.

This plan would consider removing the southernmost field and changing parking for the sports complex. This would consolidate the sports fields and parking, and greatly reduce the land leased by the City for the sports complex. The current lease covers the entire hogback/former landfill area and is set to expire in 2026. The County has prepared a new draft lease that only includes the four northern fields of the sports complex area.

Alternative Locations: With all this in mind, several staff from the City and Jeffco have been looking for possible alternative sites to potentially move the Rooney Road Sports Complex. There is very limited land in the Golden area that is large enough and flat enough to consider a multi-field complex. Staff understands this was one of the reasons Rooney looked so appealing twenty years ago.

Consideration has been given to multiple locations including Jeffco owned property, none of which have panned out to be practical, financially viable, or sustainable for future investment. This led us to two alternatives using current City owned/leased land for consideration:

Alternative 1: Reinvest in Rooney, securing a new lease between the City and County for just the four northern field areas and entering into a new lease to allow for recovery of life cycle of replacement turf. The new lease would not include the South field which is needed for the slash/Jeffco development. Use the current budgeted $1.2 million which will repair and resurface the turf and subsidence of one existing field. This will not cover all needed repairs for the other three current fields. There is concern for continued subsidence on the property. Likely timeline of a year for completion of work accomplished with current budget. (See attachment A).

Alternative 2: Investigate program usage of city owned Ulysses fields to maximize scheduling. Consider remodel/renovation of two southern most existing baseball/softball fields to multi-use sports fields to better accommodate current and future needs of all sports programs. This change would consider the use of artificial turf or natural turf with advantages and disadvantages of both. (See attachment B).

Participation numbers have changed dramatically over the last two years. It is a challenge to anticipate future participation numbers. Any field allotment changes would need input from affected sports organizations.

This alternative allows the City to reinvest in current City owned assets. It provides for potential positive improvements over Rooney such as site furnishing upgrades like permanent lighting, seating and shade, restrooms, water, etc. Likely timeline of 2 years to get assessment completed and redesigns/renovations constructed and operational.

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U8? / U9 / U10 Field
U8? / U9 / U10 Field
380'
360'
330'
10'
18'-0"
24'-6"
20'-0"
35'-0"

1. "While landfills are required to have plastic or clay lining by federal regulation, these liners tend to have leaks. This can result in leachate, a liquid produced by landfill sites, contaminating nearby water sources, further damaging ecosystems."
:https://www.colorado.edu/ecenter/2021/04/15/hidden-damage-landfills

2. "The solid waste placed in landfills or open dumps are subjected to either groundwater underflow or infiltration from precipitation or any other possibility of infiltration of water. During rainfall, the dumped solid waste receives water and the by-products of its decomposition move into the water through the waste deposition. The liquid containing innumerable organic and inorganic compounds is called 'leachate'. This leachate accumulates at the bottom of the landfill and percolates through the soil and reaches the groundwater (Mor et al. [4])."

"Areas near landfills have a greater possibility of groundwater contamination because of the potential pollution source of leachate originating from the nearby dumping site. Such contamination of groundwater results in a substantial risk to local groundwater resource user and to the natural environment."
cbi.nlm.nih.gov/pmc/articles/PMC3561079/#:~:text=Areas%20near%20landfills%20have%20a,and%20to%20the%20natural%20environment

3. "Globally, landfills are one of the major threats to groundwater resources.....Waste placed in landfills or open dumps is subjected to either groundwater underflow or infiltration from precipitation. This waste gradually releases its initial water through rock pores and some of its decomposition by-products which contain innumerable organic and inorganic compounds called “leachates.” The leachates accumulate at the bottom of the landfill and percolates through the soil contaminating water sources.
https://drearth.com/resources/article/how-do-landfills-impact-groundwater/

4. The "Kilmer St landfill" (by definition-a dump) was closed prior to Federal regulations governing the construction and maintenance of a landfill.A "modern" landfill has:

a. The bottom liner system is designed to keep waste from coming in contact with the environment - particularly groundwater. From the bottom up, the system is: 1) 2 feet of clay 2) a plastic liner and 3) a protective layer 2 feet thick, usually comprised of sand.

b. Cells are specific areas where the waste is dumped and compacted (crushed).

c. The storm water drainage system collects rainwater that falls on the landfill. The system may include plastic drainage pipes that collect water and move it to a retention pond at the Class 3 landfill. This water has not come into contact with the garbage.

d. The leachate collection system collects liquids - called leachate - that are part of the MSW and any water (e.g., rainwater) that comes into contact with the garbage. This water works its way through the Class 3 landfill like water percolating through coffee grounds. As the water moves through the garbage, it picks up contaminants. It must be collected and treated.

e. Methane collection systems collect methane gas created during the decomposition of garbage. Bacteria break down the garbage. The by-product is landfill gas that is about half methane and half carbon dioxide with very small amounts of nitrogen and oxygen. Methane gas presents a hazard because it can explode and/or burn. Methane is actively collected in a series of pipes, then passively vented or burned through a flare.

f . The final covering or cap is placed on the Class 3 landfill when it is closed. The final cover has: 1) 18 inches of clay at the bottom; 2) a plastic liner in the middle; and 3) 2 feet of soil on top. The covering seals the waste from air and reduces the amount of water getting into the landfill. It also prevents pests (birds, rats, mice, flying insects and so on) from getting into the waste.
https://scdhec.gov/environment/land-and-waste-landfills/how-landfills-work

5. By contrast, closed enregulated dumps don't have to meet the above regulations:

From the 1950s through the early 1980s, when many of the region's largest facilities were first built, landfills were usually lined with compacted soil and clay. But that technology was ultimately abandoned because it didn't prevent leachate from escaping for long. A clay liner even a foot thick will fail within five years. That means that it's pretty safe to assume that any landfill that began operating with unlined or clay lined cells is leaking toxic contaminants.

By the late 1980s landfills had started to use single plastic liner systems, and eventually, two liner systems were required. But these often rip during installation, and they always develop holes and cracks over time.

The thing is, these landfills with their leaky liners can't be fixed. It's impossible to retrofit old cells with newer technology. And even if you could replace old liners with the plastic ones required today, we are still talking about plastic and synthetic clay. These newer liners too will break down over time, meaning we are merely kicking the contamination can down the road for our kids to suffer the consequences.

The production of leachate cannot be avoided, and despite the attempted collection of leachate in newer landfills, some of it still escapes into the environment. The failure of these double liner systems is not only inevitable, it is also acknowledged by the agency enforcing it. EPA itself has said: "No liner… can keep all liquids out of the ground for all time. Eventually liners will either degrade, tear, or crack and will allow liquid to migrate out of the unit."
https://www.clf.org/blog/all-landfills-leak-and-our-health-and-environment-pay-the-toxic-price/

6. " Most older landfills, however, do not have these safeguards. Older landfills were often sited over aquifers or close to surface waters and in permeable soils with shallow water tables, enhancing the potential for leachate to contaminate ground water. Closed landfills can continue to pose a ground water contamination threat if they are not capped with an impermeable material (such as clay) before closure to prevent the leaching of contaminants by precipitation." See p 4
https://www.epa.gov/sites/default/files/2015-08/documents/mgwc-gwc1.pdf

7. "EPA promulgated the Landfills Effluent Guidelines and Standards in 2000. The regulation (40 CFR Part445) covers discharges of landfill wastewater to surface waters. The regulatory requirements are incorporated into NPDES permits."
https://www.epa.gov/eg/landfills-effluent-guidelines

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

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U.S. ENVIRONMENTAL PROTECTION AGENCY

Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
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PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

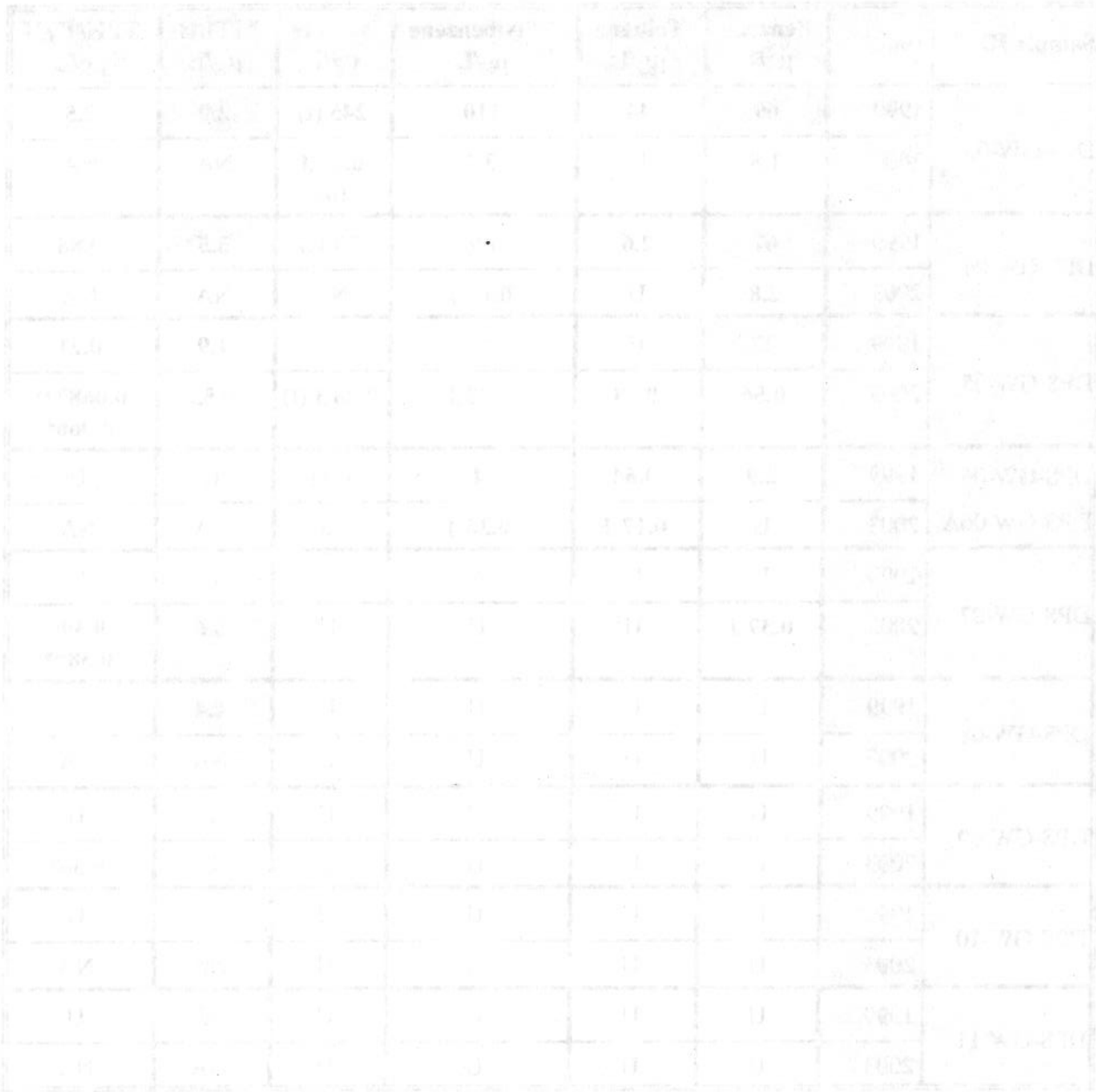
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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COLORADO
Department of Public Health & Environment

November 10, 2023

RE: Former Kilmer Landfill Redevelopment – VCP Public Comments

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As part of the Former Kilmer Landfill redevelopment project, Chelton, LLC and Terracon Consultants, Inc. facilitated public comment on the Voluntary Cleanup Program (VCP) application at the request of the Colorado Department of Public Health and Environment (CDPHE). This memorandum summarizes Terracon's review and responses to the public comments submitted during the comment period. Following Terracon's public meeting on July 25th, 2023, addressing the contents of the VCP application and related environmental investigations, a public comment period was established in coordination with CDPHE. A dedicated email address was provided to local residents to submit comments on the presentation and VCP application package. Comments were also compiled by the organizers of a local community organization and submitted to CDPHE and Terracon. This public comment period extended from August 2, 2023, to September 5, 2023. Upon completion of the comment period, Terracon compiled and reviewed the submitted comments, and provided responses as applicable. Following this initial response, Terracon provided the compiled comments and responses to CDPHE for their review and additional comment. All comments and responses were then jointly reviewed by Terracon and CDPHE for completeness and finalized for entry into the public record.

Comment and Response Summary

Comments Forwarded from Friends of Ralston Creek Community Group:

A. In the event CDPHE approved other VCUPs as described for 6800 Kilmer, is CDPHE aware of any shortcomings years after the redevelopment?

The Voluntary Cleanup application is based upon the current environmental conditions at the site. Currently there are no exceedances in the surface waters or groundwater. If environmental conditions change due to an environmental release in the environment, the owner of the property will be responsible for addressing the release and clean it up to regulatory standards

B. Please provide 5 locations where CDPHE had knowledge that the requested VCUP was for a redevelopment for RV storage or other heavy equipment over an existing unregulated, uncompacted landfill with minimal clean-up, minimal capping, and parking surfacing as is being proposed by Chelton LLC.

The purpose of the Voluntary Cleanup program is to determine if there are environmental concerns regarding the redevelopment of this site. With the approved Materials Management Plan, the proposed aggregate surface cover, the storm water detention pond, and lack of environmental releases/concerns, this site is suitable for an RV storage and heavy equipment. There are dozens of storage facilities placed on landfills throughout the state. There are two through VCUP (Sheridan Redevelopment Area and the Colfax Landfill II; 17999 E. Colfax Ave).

C. Terracon in report of 07.24.2007 (item 1. 4) references a prior ESA Phase I report. Terracon has not submitted this report – requested during the public meeting?

The Phase I ESA was prepared using an outdated ASTM standard. The completion of multiple ESAs (compliant with the most current ASTM standard) and investigations since 2007 serve as a more complete and up to date evaluation of site history and conditions.

D. The EPA with email of 12.04.22 stated "Please be assured that the CDPHE, as the lead regulatory agency will continue to provide programmatic oversight for any future VCUP applicant through-out the process of clean-up, in order to assure compliance with environmental laws, appropriate land use, and established environmental standards". (1) Please clarify the scope and extent of the programmatic oversight during construction, following construction and acceptance of the applicant's self-certification? (2) Please clarify how CDPHE will "assure compliance with environmental laws, appropriate land use, and established environmental standards?

The Voluntary Cleanup program is a self-certifying program where the environmental professional certifies the work. This property does not show any environmental contamination (soil, groundwater, surface water), and the Materials Management Plan (MMP) guides how any environmental contamination will be handled. The property will have an environmental covenant placed on the property and the MMP will be mandated for any future excavations in the property. Also as part of the environmental covenant, the owners will have to certify they are following the MMP, along with yearly CDPHE site inspections.

E. Quality Monitoring Program (QMP). (1) What will be the requirements for long-term monitoring of ground water, surface water, air and soil following completion of construction? (2) What is the scope of the QMP? (3) Who will design the QMP?

A CDPHE No Action Determination requires the landowner/operator to provide notice of changed conditions or planned changes in land use or disturbance. Based upon the current site conditions (there is no signs of groundwater or surface water contamination) there is no requirement for a QMP. If there were environmental concerns (groundwater or surface water exceedances), the applicant would be required to remediate any releases.

F. No Action Determination. (1) Will any conditions for approval of the VCUP such as long-term monitoring be recorded as part of the VCUP or No Action Determination (NAD)? (2) What will be the criteria and conditions for approval of NAD at the 6800 Kilmer site? (3) Since initiation of the VCUP program how many sites with approved VCUPs have developed problems requiring actions or posing risk to the public? (4) How many legacy or unregulated landfill sites with grading and surfacing proposed by Chelton LLC have been issued VCUPs and NADs by CDPHE, or other state environmental/health agencies?

1. Due to the lack of evidence of an environmental release, no long-term monitoring is required.
2. A No Action Determination is granted when there is no release to the environment and the site is protective of human health and the environment.
3. Of the current over 1,600 voluntary cleanup applications, I do not know of any releases to the public from sites issued a No Action Determination. I can't attest to sites which were turned into service stations or sites which deal with hazardous materials as their current operations. For such releases they will be addresses through the appropriate regulatory authority; i.e. Oil and Public Safety, Hazardous Waste Program, Solid Waste Program etc.
4. I do not know of any other Chelton LLC sites which may have come through CDPHE or another regulatory agency.

G. The Ogden investigation identified the presence of lead in concentrations above the drinking water standards (54 mg/kg). Ogden reported this to CDH and JeffCo Health Department. Neither CDH (now CDPHE) nor JeffCo Health responded. (1) CDPHE requested testing of additional water sample for lead; sample were below levels of concern. Why were Ralston Creek sediment samples not tested? (2) Why was the 1991 Ogden notification on the presence of lead not further investigated to understand why both CDH and JeffCo Public Health failed to respond?

Comparison of total metals concentrations in groundwater to groundwater standards is not appropriate. The 1991 groundwater sample with elevated lead concentrations was reported as total lead (not dissolved). Groundwater samples collected by Terracon in 2007 and 2022 do not indicate lead impacts to site groundwater. Soil samples were collected immediately from the creek bank immediately adjacent to the water levels in Ralston Creek by Terracon in 2022, and the reported analytical results did not indicate impacts to site soils. When looking at groundwater exceedances CDPHE looks for pathways which could reach the public. In this case, groundwater leaving the site did not exceed regulatory standards, thus eliminating the public consumption pathway.

H. Terracon states that all pathways are closed. As shown in the redevelopment of the Brighton Blvd, Denver, CO landfill, pathways do re-open based on the type of development. Why is CDPHE only concerned with current pathways but ignores how redevelopments if not planned/designed, and executed properly do have a role in re-opening or creating new pathways?

The Voluntary Cleanup program's role in the redevelopment of this property is to determine if the remediation plan for this site will be protective of human health and the environment at the time of construction. With the armoring of the stream embankments, the MMP, the environmental professional's oversight of the project, very limited exposure to the landfill contents during construction, and lack of environmental exposure to the public, we are not currently concerned of opening or creating new pathways. The site will be more protective to the environment after the development has been completed.

I. What obligation rest with the owner, developer, and/or consultant (Terracon) for full clean-up in the event unidentified and/or large quantities of COC's are encountered, and/or a significant hazard or problem is encountered or created during the development work, i.e., who is liable for the entire site if the owner/developer decides to walk away from the site> default based on Terracon's recommendations?

The Materials Management Plan (MMP) included as part of the VCP Application specifies that environmental impacts and/or changed conditions discovered during site development activities are to be documented and addressed based on applicable environmental regulations, and CDPHE will be notified. Unexpected environmental impacts or changed conditions will be summarized the Project Completion Report, which will be a public document. Any hazardous material excavated during the redevelopment of the site will need to be documented and disposed of properly. The site owner is responsible for issues arising from the property. Currently, there are no releases to the environment. If the developer decides to walk away, the landfill material will be placed under sufficient cover to eliminate pathways to the environment.

J. What is the chain of liability for the site should the applicant's project cause development of environmental issues and walk away from the site?

The states Solid Waste program, working in conjunction with the Voluntary Cleanup program, would have limited authority to force the owner to address any environmental issues. If the release were significant, then Federal CERCLA Liability might be an option.

K. The 07.18.2007 geotechnical report prepared by Terracon contains the following statements: "…. the presence of randomly placed and highly compressible landfill material will require complete removal, or considerable site modification, to construct a more stable subgrade for foundations, slabs and pavements….". "Significant additional movement will occur should the landfill materials not be completely removed and/or subsurface soils become elevated in moisture content". In 2023 Terracon proposes to construct roadways over the "highly compressible" land fill material. Provide an explanation of this dramatic change?

The 2007 geotechnical report provides recommendations for the construction of larger structures, utilities, and paved roadways. The currently proposed development is significantly different and less intrusive than that proposed in 2007, so recommendations are substantially changed. Planned roadways and parking areas are to be constructed with aggregate gravel materials. This material is easily regraded and refreshed as necessary, should settling occur.

L. Why is a suitable and functional Landfill Cap System not part of this redevelopment to prevent water infiltration into the old landfill, control gas flow from the waste to the atmosphere, and contain waste material under stresses/loading anticipated based on the development scheme. (1) Please explain how the proposed surfacing (gravel and asphalt millings) can perform as a functional cap system and for what period. (2) Will there be a separate cap system in addition to the proposed surfacing (gravel and asphalt millings)? (3) Please explain how the proposed surfacing will affect water percolation into the landfill and flushing out COCs from the landfill? (3) What are the projected or potential characteristics of the resulting increase in leachate (CECs = contaminants of emerging concern)?

No cap system is required as part of the VCUP, and no cap system is planned as part of site development. The proposed surface materials should slightly reduce infiltration into the landfill materials. Surface runoff will be diverted to the onsite lined stormwater detention basin. No significant changes to groundwater conditions are anticipated. There has been no evidence of COCs leaching from the landfill into Ralston Creek or offsite groundwater.

M. A functional cap system combined with proper drainage design is critical to prevent water infiltration in the landfill and/or prevent ponding. (1) What drainage provision are included to prevent water infiltration or ponding? What is the supplemental water percolation into the waste based on cap design and proposed surfacing?

The site will be graded to drain towards a stormwater detention basin, which will be lined with an impervious liner. This will eliminate ponding and reduce water infiltration into buried landfill debris. An engineered landfill cap is neither warranted or required.

N. What impact has the additional water percolation on leachate formation (water contaminated with various organic and inorganic substances)? What are possible characteristics of the leachate and associated threads to environment, ground water, surface waters, wildlife, and human health?

Site development should slightly reduce percolation into the landfill materials. Terracon notes that precipitation has infiltrated the landfill in its current state since the early 1970s. Contaminants of concern were not detected above applicable regulatory standards in site groundwater or in Ralston Creek during the most recent investigations, and site changes are not anticipated to alter groundwater conditions.

O. Groundwater sampling. Ogden suspected the presence of a "breached" water table and recommend drilling to a depth of 30-50ft BGS. (1) Why did Terracon limit drilling to 29ft BGS? (2) Why did CDPHE approve the limited drilling proposal by Terracon?

Terracon has not observed soil lithology that would indicate significant differences in bedrock or groundwater conditions below 30 feet bgs. Borings across the site are consistent in both type and depth of fill materials and native soils. Based on Terracon's boring logs, a clay confining layer above the bedrock is not apparent. Since there were no lines of evidence suggesting environmental contamination at the level above 30-35', CDPHE could not arbitrarily make the consultants to drill to a deeper level.

P. Groundwater sampling conducted at the site as reported in the various reports seem to have been conducted mostly in periods of where groundwater levels may have been low due to the time of the year of low precipitation periods. May and June 2023 were months of high precipitation following several years of below normal precipitation. (1) Why was ground water monitoring and sampling not conducted during or following this high precipitation period as ground water levels could have risen into the landfill material and mobilized soluble COCs or generated new COCs both in water and as volatile species such as methane?

Groundwater sampling has been conducted at different times of the year and results have been generally consistent during that time. Due to the porous nature of placed waste material, significant or sustained rises in groundwater elevation following precipitation events is not expected. Also during low groundwater levels, any possible contamination would be more likely to present itself due to concentrations in the groundwater being elevated vs high groundwater levels where the concentrations would be more dilute.

Q. The applicant intends to construct a Stormwater Detention Basin to collect and slowly discharge storm water from a precipitation event. The application has not provided details on how much stormwater and quality. The applicant states that the site will be "streetscaped and landscaped areas, with packed gravel of compacted asphalt millings as surfacing materials in in drive and parking areas". The applicant states that the surfacing is expected to reduce infiltration of water into the landfill. (1) How much will water infiltration be reduced? (2) How will potential spills of fluids from RVs such as gasoline, diesel fuel, oil, and antifreeze be disposed of? (3) What will be quantity and quality of storm water reporting to the detention pond? How much of any given fluid spill will infiltrate into the landfill and groundwater?

Infiltration reduction is not a specific remedial action to be quantified. Potential spills will be handled according to state/local regulations and are outside the purview of the VCUP. Standard operation procedures will be in place for any reportable spills of fluids from onsite activities. Stormwater drainage quality from the site is anticipated to be consistent with roadway and parking area drainage in the surrounding area.

R. The critical components of a landfill cap are the barrier layers that minimize water infiltration and the drainage layer that transmits water across the cover to the detention basin. (1) How will surface water, likely contaminated with various hydrocarbon fluids and other chemicals, reach the Detention Basin? (2) How will subsidence of the cap impact surface water (+contamination) flow to the detention basin?

1. A typical landfill cap design is not required for the site due to absence of an environmental release.
2. Maintaining the slope of the surface cover is part of maintenance of the site and will be part of ongoing operations at the site.

S. Explain why testing of the Ralston Creek was limited to surface waters? Why was sediment and eDNA testing omitted?

Surface water was sampled to evaluate if water quality was being impacted from onsite sources. Upstream, onsite, and downstream sample results were consistent. Soil sampling was also conducted along Ralston Creek, on the property side of the streambank, and no environmental impacts were observed. Sediments were not sampled based on the streambank and surface water sampling results. Analyzed contaminants of concern included those required by the VCP.

T. How will the Ralston Creek and the RC bank be protected during the development?

Streambank stabilization and armoring will take place as part of development. No significant construction activities are planned near the creek or floodplain.

U. Describe how the RC bank will be stabilized? What will be the goals of the RC bank stabilization? Erosion prevention? Prevention of groundwater seepage (leachate) from the landfill to RC?

Stabilization will occur under a plan approved by the Mile High Flood District. Erosion prevention is the main goal of the plan.

V. What is the extent of the Ralston Creek bank stabilization?

Stabilization details are to be outlined in the approved plan, and will occur on sections of the streambank deemed to be impaired according to field data collected as part of the stabilization plan.

W. Provide support for your claim that that methane will not infiltrate parked RVs with or without cover? Air modelling? Studies?

Soil vapor infiltration into parked RVs is not anticipated to be an issue. Terracon consulted with in-house remediation subject matter experts regarding this concern. The following factors were considered:

- Tarps are not sealed to the ground.
- Vents on tarps appear to be standard to avoid moisture buildup (https://www.nationalrvcovers.com/s/class-a-rv-covers.html).
- The distance between the ground and bottom of most RVs.
- There are few penetration points in the bottom of RVs.
- Pipes to discharge black and grey water are capped and discharge near the side of RVs.
- The rest of the underside of a RV is fairly secure to avoid water, snow, rodents, and insects to penetrate the bottom while traveling or being stored

X. How will deep-rooted vegetation be integrated so the performance of the cap is not impaired?

An engineered cap is not part of the VCP remedial action plan. (Deep-rooted vegetation will not be part of the surface parking area). Only plants approved as part of the Mile High Flood District erosion control plan will be allowed along Ralston Creek. Additional details on surface vegetation and landscaping are part of the design process handled through the City of Arvada. Annual maintenance of the landscaping will be part of the ongoing maintenance of the site.

Y. The EPA has proposed PFAS national primary drinking water regulation. The EPA expects that if fully implemented the rule will prevent thousands of deaths. Why did testing of groundwater, surface water and soils exclude testing for Per- and Polyfluoroalkyl Substances (PFAS)?

There is currently no enforceable level for PFAS in groundwater, and the onsite groundwater will not be utilized for any purposes.

Z. The IPCC reports that the global warming potential for methane is about 84 higher over a 20-year timeframe than CO_2, that means it traps 84 times more heat per mass unit than carbon dioxide (CO_2) and 105 times the effect when accounting for aerosol interactions. (1) How much methane does the site currently release (per month/per annum)? (2) How much methane is projected to escape the site during redevelopment? (3) What is the methane release projections post redevelopment? (4) Will there be methane monitoring stations for the entire site?

No methane modeling is required or planned for the site and it is outside the purview of the VCP. Ambient air/breathing zone methane monitoring will be conducted during subsurface construction activities for worker protection under applicable OSHA standards. Continued methane monitoring will only take place for the onsite building and associate vapor mitigation system (VMS). Outside of the one building (security/entry shed), methane monitoring is not a promulgated environmental regulation for this property.

AA. The EPA maintains a log of redeveloped superfund sites and brownfield redevelopments. Does CDPHE consider these examples in approving the VCUP for 6800 Kilmer? If so, please provide examples?

This property is not a Superfund site, but it is a Brownfield site. When the Voluntary Cleanup Program approves a redevelopment site, it's based upon the environmental characterization (soil, groundwater, surface water and in this case indoor air) of the site and the possible exposure pathways. In this situation there are no completed exposure pathways, except for methane in buildings. A state approved methane mitigation system will be part of the state's approval process.

BB. In the event there is little documentation of similar redevelopments (ref Questions A, B) is Kilmer Street a "experiment" without scientific or empiric backing?

There are dozens of instances where landfills are being used as open storage of vehicles and heavy equipment throughout the state. This project has been characterized multiple times and there is no sign of an environmental release of concern coming from this property.

CC. The Colorado Geological Survey (CGS) suggests that "Collapsible soils are a major geologic hazard for land development in many locations across the state. This hazard manifests itself as ground settlement, which can be damaging to overlying structures if the soil problems are not mitigated or if the structure is not engineered properly. (1) Is CGS incorrect in this case? (2) If CGS is correct has CDPHE anticipated soil properties in the event the VCUP is granted?

1. Terracon prepared a Geotechnical Engineering Report for the site in August 2023. Settlement of site soils was considered and addressed in the recommendations of the report.
2. The recent Terracon Geotechnical Engineering does not suggest that collapsible soils are a land hazard for this project. Based upon the well logs, test pits and condition of the existing surface cover on the property, CDPHE does not view this as an issue.

DD. The RVs proposed to be stored at the site will include a significant amount of fuel (diesel, unleaded, propane, etc.). What is the proposed vehicle evacuation plan in the event of a fire event, either at the RV storage site or moving toward the RV storage site?

This is an operational question not pertinent to the VCP application. There will be a loop road constructed onsite that is capable of supporting firefighting operations should a fire occur onsite.

Comments Received Via Public Email:

A. I am a concerned citizen of Arvada and worried about the proposed use of the land at this address along the Ralston Creek in Northwest Arvada. This area was previously a landfill and there are still many unanswered questions about letting a RV storage lot be placed on the property. Constructing this development so close to the river is of great concern. With three hundred gas guzzling RV's being parked by the river, how will runoff into the river be avoided? In a heavy rain the water washes into the creek. This location seems like a really bad idea. Besides possible water pollution, this seems like "development pollution". If you look at an overhead view of this area, you are approving a non-residential development being squeezed into an area with houses on three sides. This will impact the property values, as well as what the county collects from property taxes. In the long run a park or open space is a much better use of this land. Do not let a company from Florida come it and rape our land. Listen to the people who live here, work here, and pay taxes here!

Terracon believes this is an operational/City of Arvada question, outside the requirements of the CDPHE VCP program.

B. We were told the liner of the retention basin was impervious. What are the retention basin's liner age/rating specifications?

The detention basin liner will meet specifications required by state and local regulations, specifically the CDPHE Solid Waste division. Final design of the retention basin/liner will be approved by this division.

C. F/U questions: who monitors to identify any failure the retention liner may have? How is mitigation undertaken if any issues arrise with the liner?

Site operator is responsible for evaluating liner condition. If issues arise, they will be responsible for repair or replacement of damaged liner and any other necessary mitigation efforts. Quality assurance (QA) and quality control (QC) protocols will be followed during liner installation.

D. We heard at the meeting that health and safety of people is a primary focus for the area and the VCUP. However, there was no specific mention of protection of the health and safety of wildlife that live in and utilize the area. Why can't that become a part of the focus of the VCUP?

The Voluntary Cleanup Programs mission is to assist landowners in redeveloping their land in an environmentally safe manner, which is protective of human health and the environment. The State Voluntary Cleanup Bill (House Bill 94-1299) does not require an evaluation for safety of wildlife. As with almost all redevelopment plans of this size, I do not know of any other state or federal requirement to evaluate the safety of wildlife.

E. According to Terracon, no industrial/hazardous/medical waste was observed in samples taken. A point to stress may be that no one really knows all that was deposited in that

landfill. Disturbing the area to undertake development is not worth the risk to the health of the environment (people, wildlife and the creek). Samples taken do not represent the true findings of what is potentially buried there. It's like sampling 10 people out of 10,000 to determine if there is an active virus in a certain population. Inconclusive results at best.

Landfill waste has been observed in over 25 soil borings and multiple test pits across the site during prior investigations. The nature of the buried debris has consistently been in line with reported disposal of household/municipal waste. Should waste of unknown characteristics be discovered during site development, additional testing and evaluation is required as part of the Materials Management Plan under the VCP.

F. How will the area be policed regularly to ensure that users of the area are complying with laws and other requirements to safeguard the outlying environment? This was brought up at the meeting and once again brushed aside as an operational issue.

The site will be subject to applicable federal/state/local laws and regulations. Under the VCP and any No Action Determination, changes in environmental conditions are required to be reported to CDPHE.

G. Will water samples be taken regularly to ensure that the creek is not being used as a dumping ground purposely or accidentally? Where and how often?

Ralston Creek is a tributary to Clear Creek and sampled on a quarterly basis. If significant anomalous readings are reported, the state has protocols in place to try to pinpoint the origin of the release and go after the possible entity.

H. The Terracon presentation indicates that in two historical boring samples, arsenic levels are above Colorado background value. What is that value and how is it determined as safe/acceptable? Why can't more boring samplings be undertaken?

CDPHE has published a risk management guidance document relating to naturally occurring arsenic concentrations in Colorado soils. The document utilizes US EPA data to evaluate average naturally occurring arsenic values across the state. This background average for all land uses is 11 mg/kg. The average arsenic in soil samples analyzed for metals across the site is 9.18 mg/kg.

I. The Ralston Creek water sampling seems insufficient. According to Terracon, it's been discovered that there presently is no surface water contamination. However, how is the impact of development at the site considered as a viable consideration of potential creek contamination part of the VCUP approval process?

Sampling was conducted at the request of CDPHE and included the potential contaminants list required by CDPHE. Sampling of Ralston Creek and downstream waterways is conducted quarterly to evaluate water quality and evaluate potential impacts to surface water.

J. What does the vapor mitigation system installation entail? Who determines if this is adequate now and in future years?

The vapor mitigations system will include an impervious liner below the building foundation, with porous gravel and vapor collector pipes attached to a riser. The system will be "active", with a blower to extract air from the collector pipes and safely vent it to the outside. Additionally, there will be sensors designed to measure methane levels within the structure, tied into the fire alarm control panel. Should methane levels reach trigger values at or above 10 percent of the lower explosive limit, alarms will sound and appropriate

response personnel will be notified. The system design is in line with industry standards and is consistent with systems in use at numerous sites across Colorado. The full system design is performed and checked by Terracon's in-house vapor mitigation subject matter expert, and is signed and sealed by a professional engineer registered in the state of Colorado. Additionally, CDPHE has to approve of the methane mitigation system design plans as part of the VCP process.

K. What excavation and soil removal is planned? Once again, disturbing the area will cause increases in methane and other gas/materials emissions which can prove unsafe to the surrounding environment.

The overall site plan is still under development prior to review by the City of Arvada. Currently, limited excavation is planned for the stormwater detention basin, onsite office building, and utility areas as necessary. Excavation will be conducted so as to minimize the disturbance of landfill debris where possible. Excavation operations will be overseen and monitored by an environmental professional, and disturbed landfill debris will be characterized and disposed of in accordance with regulations. During the excavation process, once methane reaches the atmosphere it rapidly dissipates and breaks down.

L. What is the planned streambank stabilization plan? What impact when that is undertaken will this have to the surrounding environment? How will success in stabilization be determined?

The streambank stabilization efforts may include removal of some existing vegetation, regrading of the streambank elevations, placement of appropriate geotextile, natural fiber, or rock armoring erosion control systems, and planting of native plants suitable to revegetate the disturbed areas. The stabilization work is intended to protect Ralston Creek from impacts related to the adjacent buried landfill

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Forest Springs info for the proposed RV storage lot

Sharon McCarthy <[redacted]> Fri, May 3, 2024 at 9:25 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Good morning Jeremiah,

I have 2 recordings and one large memo from the City of Golden files for the Rooney Road Sports complex. While most of the material concerns the reuse of the landfills from a sports complex to a solar array, observations of the field's conditions may apply to any subsidence issues in the reuse of an unregulated landfill.

Please add to the Forest Springs public file.

Thanks.

Sharon McCarthy

https://goldenco.granicus.com/player/clip/4207?view_id=2&meta_id=117828&redirect=true

https://goldenco.granicus.com/player/clip/3388?view_id=2&meta_id=105165&redirect=true

Rooney_Road_Sports_Complex_Memo.pdf
74K

City of Golden

911 10TH ST. GOLDEN, CO 80401
TEL: 303-384-8000
FAX: 303-384-8001
WWW.CITYOFGOLDEN.NET

Council Memorandum

To: The Honorable Mayor and City Council

From: Rod Tarullo, Director of Parks, Recreation, and Golf

Through: Jason T Slowinski, City Manager

Date: October 8, 2019

Re: Rooney Road Sports Complex

Purpose of Agenda Item: To provide City Council with history and an overview of the Rooney Road Sports Complex, including plans for upcoming CIP spending.

Background: Jefferson County and Jefferson County Open Space own approximately 188 acres of property known as Hogback Park, west of Rooney Road and North of I-70. This location was previously used as an unofficial dump in the 1940s and '50s. The county purchased the property in 1958 and operated a landfill there until closing it in 1980.

Because of its previous use as a landfill and regardless of any future uses, the County needed to place a sealing cap over the landfill, and mitigate the potential hazard of methane gas through a collection system.

In the late 1990's discussion was started about the potential of creating a sports complex on the property. There was a need for regional athletic fields primarily for the soccer community. Level ground for playing fields in the Golden area is a rare commodity. Jeffco brought the City of Golden to the table because they are not in the business of providing/programing athletic amenities. The City owns and programs multiple fields in the Parks and Recreation system. The thought was to use Jeffco land and have the City build and operate the complex. The soccer club Table Mountain Soccer Association (TMSA), dba Colorado Ice, also participated in these discussions.

A Master Plan was developed for the site which included approximately 65 acres and the potential of up to 19 rectangular multipurpose playing fields. The idea of sports fields on a landfill was not new. South Suburban Parks and Recreation District in South Denver had built fields on a landfill at their Regional Lorenz Park.

In 2004-05 the County capped the landfill and installed the methane collection system. In anticipation of the sports complex project, the cap included more dirt than was required and tiered earthwork to accommodate the number of fields for the master plan.

The City entered into a twenty-year agreement and lease of the property in 2006. The lease included the sports complex, an open space parcel, a dog park envelope and a fourth parcel to the East, all at the Rooney Road site. This site also houses the Rooney Road Recycle Center (3RC)

facility which is under a separate lease. The City has not chosen to use the dog park envelope or the open space parcel. In 2007 the City annexed the entire area under lease, now providing public safety services to the property. The current lease's termination in 2026, unless extended may further complicate deliberations.

The City contracted with American Civil Constructors (ACC) in 2006 for construction of five fields or approximately 410,000 square foot of artificial turf at a cost just under $3,000,000. Table Mountain Soccer Association committed $500,000 to the project with the County providing the bulk of the funds through Open Space Joint Venture Grants to the City awarded in 2002-03.

The City entered into agreement with Table Mountain Soccer Association in 2006, defining the $500,000 construction grant, field use and scheduling, fees, maintenance, and capital reserve fund for replacement of the fields. TMSA is the primary user of this complex and per the agreement pays the cost of maintenance. The County lease provides language confirming priority usage for county residents and some opportunity for fee differentials to various user groups.

There have been four amendments to the original twenty-year lease. In August, 2007, the First Amendment to the Lease removed the fourth parcel and re-described the remaining property as one large tract instead of dividing it into the Sports Complex Parcel, Open Space Parcel, and Dog Park Envelope. The Open Space Parcel, Dog Park Envelope, and a portion of the Sports Complex Parcel are County Open Space assets and the remaining portion of the Sports Complex Parcel is an asset of the County's General Fund.

The County leases to the Rooney Road Recycling Center Authority (3RC) an approximately 2.1 acre in holding to the Lease property, on which 3RC's household hazardous waste recycling building is located. The County, Golden, and other local governments are members of 3RC and pay assessments for 3RC's operation of its household hazardous waste recycling program.

In 2008 there was a desire by the County and 3RC to operate a slash recycling operation on approximately ten acres in the general location of the previously described Dog Park Envelope. Because of the lease language, the City did not have the authority to allow the County (who own the land) to use the property for this use. Also, because the property was owned specifically by Open Space, this use was only available/allowable on a temporary basis. By creating the Second and Third Amendment to the Lease, slash recycling was permitted at the site through August 27, 2012.

For a variety of reasons including the temporary nature of the use, the County desired 3RC to discontinue the slash recycling at the end of the term of the third amendment. The closure, removal of materials, and restoration of the area could not be completed by the August 27, 2012 date. A Fourth Amendment then provided for the area to accommodate slash operations up to October 31, 2012, with removal of the operation and materials by December 31, 2012, and reseeding of the area by March 15, 2013. All four amendments were at the request of the County.

In 2017, an initiative was passed by Golden citizens which authorizes City Council to contact the Jefferson County Board of County Commissioners and discuss revision of the City's lease on the Rooney Road Sports Complex property to allow the use of up to 15 acres of undeveloped property for future renewable energy facilities. At the present time, this option has not been pursued. As a

part of the effort to potentially use land previously earmarked for future sports complex development, the City's Sustainability group offered to pay for a new drainage study for TMSA to identify needed drainage repairs and improvements.

The drainage study completed by City Sustainability in advance of the solar project referendum was received by Parks and Recreation staff and TMSA in October 2017. This drainage study was reviewed by City of Golden Stormwater engineers in March of 2018. This drainage study was also sent to American Civil Constructors (ACC) who was the General Contractor to build the complex for their review. Fields 2-5 were originally built with sheet flow drainage to the Northeast and Field 1 to the East. The drainage report calls for the fields to be re-crowned along a centerline. Pricing information was requested from ACC based on the exact specifications outlined in the drainage report including completely re-grading the fields which results in replacement of 3/4 of the concrete curbing required with that plan and a significantly high price tag. Separately, TMSA sought pricing from Academy Sports Turf which simply removes the turf, fixes the low curbs and fills in the low spots while maintaining sheet flow drainage. This is considerably less expensive. These numbers were used in the biannual budget planning process in summer and fall of 2018. The study also identified several areas on site but off the fields that needed repair or correction. In efforts to save funds to be used on the fields, City Public Works did the site work off but around the fields in-house, saving approximately $45,000. The rest of the drainage challenges can only be completed as a part of turf replacement. With our twelve years' experience on this site, any and all grading can shift/change at some point after regrading. This is to be expected and will continue until such a time as the decomposition of all materials in the underlying areas are complete.

Current Conditions: All five fields are reaching the end of their life cycle. Some of the fields are in worse conditions than others. Player safety is of utmost concern for the City and TMSA. Compaction, grade/drainage, and wear of the carpet all contribute to the need for replacement.

Over the years the fields have been impacted by a few significant storm events that have overwhelmed the drainage and deposited sediment in the turf. These events have contributed to the compaction on the turf. There have been several remedial actions taken to prevent further damage including adding drainage tile, construction of a wall on field one, and several regrading of the parking areas. Efforts have been made to remove as much of the sediments on the field as possible.

As the fields settle, drainage changes leaving multiple areas of low spots which then impact quality of the turf.

TMSA estimates a minimum of 130,000 visits to the complex annually. With twelve years of operation (2007-19) there has been over 1.5 million users. The turf has a lifespan and play has contributed to the need for turf replacement.

Site Challenges: This property is unique and offers many challenges to construction and operation.

- The property is owned by two different entities of the County. The County General Fund and the County Open Space Fund have different rules and regulations that must be adhered to on their use. The sports complex is situated over both ownerships.
- Because of the previous use as a landfill, and the need to cap and collect methane gas, several conditions exist.
    - There are no utilities allowed to the site except electricity to the 3RC building. No water-no irrigation- no natural grass or landscaping like trees for shade. With no water or sewer, porta potties are all that is available for athletes and spectators.
    - Nothing can penetrate the cap over the landfill. We cannot erect poles for lighting of the fields or any large shade structures.
    - Methane collection wells dictate locations of some improvements. No smoking is allowed on the property and staff are required to have safety training.
    - There is considerable ground movement as the material in the landfill decomposes and as gas is extracted. This is like building something on a jiffy pop popcorn bubble. Because of soil instability there are constant challenges with settling, drainage, infiltration, and structural stability. There is always the risk of larger objects like appliances or car bodies surfacing from the landfill. While there is movement on the entire site, the most notable movement has actually occurred off the cap. Speculation is that areas around the perimeter of the cap may have been used many years prior to the County purchase as dumping areas which have been covered but continue to decompose.
    - Roadways and parking areas would not hold up to movement with typical asphalt or concrete. Recycled asphalt and road base provide the flexibility needed in these conditions.

Replacement Project to Date: City staff met with turf manufacturing reps at 2018 Fall Conferences. Research was completed on different kinds of turf, different manufacturing methods and installations. This continued in the Spring of 2019 with site visits including Douglas County Fairgrounds Regional Park, Real Colorado Fields and City of Denver Valverde Park among others. There was a lot of money being spent on turf projects by metro area school districts in the summer of 2019. Installers had been booked through summer and fall for many months making a winter 2019-2020 start date the best possible option.

Drainage conversations continued with the City's Stormwater Division. A plan was developed for them to address much of the drainage repair and / or installation off the fields. This work was largely completed through the spring and summer of 2019. Only some additional work for the South West corner of Field 1 remains.

Communications with colleagues from Evergreen Parks and Recreation District, City of Denver and South Suburban Parks and Recreation District on turf complexes in their agencies was completed. Elements of these projects reflect similarities to Rooney Road and/or best practices in project management or maintenance practices. Research was completed on post-installation maintenance agreements and turf maintenance equipment and writing those items into final purchase and installation agreements.

Staff obtained copies of several other agencies RFP's for similar projects and scope of work. Co-op purchasing is an option for this project. Researched co-op purchasing options and discussed with Finance to understand appropriate public process.
Staff met or discussed with TMSA (Laura Albrecht) on options many times. Sought their input on turf selection, installer options, project schedule and completion priorities.

A meeting was held on Tuesday, September 24, 2019 that included City Staff, TMSA representatives, representatives from Shaw Sports Turf and Academy Sports Turf installers to discuss moving forward with the project. City Staff and TMSA are in agreement that the priority for replacement with the funding that currently exists is Field 1 and Field 2. Pricing was requested for the project as agreed upon with the understanding that co-op purchasing would be used. Challenges behind the project were identified, namely that the settling that has occurred across the fields is likely to quickly return despite any leveling that may be achieved in the project. Due to the limitations of available funds, the project is being planned to maintain sheet flow vs the crowned centerline as recommended in the drainage study.

Staff anticipates work commencing approximately 6-8 weeks after decision to move forward. Work would continue through the winter, weather permitting, with minimal impact on Colorado Ice and their spring season schedule.

Jefferson County: City staff has recently been approached by Jeffco seeking feedback on a preliminary proposal to modify the lease for the site. They are investigating the possibility of master planning the area to include a new slash/composting area in association with 3RC, trail connections, and other trail uses. This plan would consider relocating the two southern most fields and changing parking for the sports complex. This would consolidate the sports fields and parking and greatly reduce the land leased by the City for the sports complex. The plan could retain the potential for the City to negotiate a lease for a community solar garden as well. This is a new development to the City. It is our understanding that this concept is highly supported by 3RC. There may be reason to give the County time to further explore their proposal.

Fiscal Impact: According to the Finance Department, there is approximately $1,175,000 in the capital reserve for Rooney Road Sports Complex. As part of the City-TMSA agreement, a capital reserve fund for turf replacement was established. Part of fees for field use include a portion that goes to this replacement fund. This has amounted to approximately $450,000 of the $1,175,000 collected over the last twelve years.

Balance remaining from original construction	$100,000
City Contributions from Open Space Fund	$425,000
Capital Replacement Fees	$450,000
2009 Reimbursement for Jeffco Joint Venture Grant	$150,000
Interest Earnings	$115,000
2014 Capital Expense	($65,000)
	$1,175,000
	=========

TMSA and City staff agree to prioritize fields based on pricing for the project.

In February of this year, Academy Sports Turf provided a cost to complete the entire complex at $2,100,000. In September of 2018, ACC provided a cost to complete the entire complex at $3,100,000. Based on pricing we received on October 10, 2019 from Academy Sports Turf the cost of replacement turf and field grading will cost $527,500 for Field 1 and $502,000 for Field 2 or approximately $1,029,500.

Council has received a letter dated September 26, 2019 from Colorado Ice Board member Peter Townsend requesting City funding to complete all field replacement in 2020.

Clearly, the current replacement fee does not generate enough funds to keep up with replacement cycles. This needs to be addressed moving forward.

Community Impact: The Rooney Road Sports Complex provides five synthetic turf playing fields serving a regional need. Primary users of the complex are TMSA dba CO ICE which include Golden residents and surrounding areas. Alternative fields are not readily accessible.

Summary: This memo provides City Council with history and an overview of the Rooney Road Sports Complex, including plans for upcoming CIP spending.

The location serves a valuable resource for local youth soccer players. TMSA has been the primary beneficiary and a good partner, providing a level of financial support for the amenity.

Because of limitations of the site, the property will never be comparable with other regional sports complexes, lacking landscaping, lighting, shade, permanent parking, etc. Grading and drainage corrections and improvements will be ongoing for the life of the facility.

The City should be aware of the lease duration and terms with Jefferson County, and their potential desire to renegotiate based on recent planning by Jeffco Open Space.

There will be an ongoing CIP cost to replace synthetic turf on all fields as they reach the end of their lifecycle. Replacement funding needs to be looked at to avoid similar shortfalls in the future.

The over $1,000,000 current project does not complete the needed turf replacement for the entire complex.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Additional research for 6800 Kilmer landfill

Sharon McCarthy <[redacted]> Thu, Jun 22, 2023 at 3:14 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Good day Jeremiah,

I'm a nag about subsurface stability when considering reuse of the unregulated landfill at Kilmer St. I attended the Brownfields Conference last week and spoke with someone from the EPA. She suggested researching geotechnical issues when building on a landfill and shared an old report about subsidence issues on a local school bus storage lot. I include research I obtained as well as the original 2004 report (pp 8 & 12 describe subsidence). I contacted DPS and await a response from the representative listed in the report.

In a round table discussion, an environmental attorney briefly mentioned legal action involving landfill reuse. My recollection is the owner of the re-developed landfill has a legal responsibility to inform users of the re-developed facility of previous use of the land. I don't know any details or if I mis-understood his statement. If accurate, is the City Attorney aware of this responsibility?

I zoomed in on the Jeffco commissioner's meeting this week primarily for the MNU campaign and was surprised with a presentation from the Director of Rocky Mountain Airport. Long story, the 3rd runway has to be repaired for a cost of $14M or eliminated. The reason the cost is so high is because the subsurface soils have to be dug up and the soil base has to be amended to accommodate paving and planes landing---something to think about. It would be interesting to read the full report for context.

I heard a report on the vessel lost while on a mission to the Titanic. A researcher stated his reservation about the vessel was there were no benchmarks as to strength of construction material with repeated missions. When I asked Terracon engineers if they had examples of heavy equipment storage on unregulated landfills, their answer was "EPA doesn't have requirements for how land is reused"----wrong answer. Does Terracon, Norris Designs, or Chelton business have any benchmark success examples as to the reuse of unregulated landfills with heavy equipment storage?

Thank you.

Sharon McCarthy
Forest Springs

2 attachments

Landfill stability-06.19.pdf
291K

DPS TBA.pdf
7958K

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

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Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
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PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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APPENDICES

Appendix A Chain-of-Custody Forms (under separate cover)
Appendix B Laboratory Data Form Is (under separate cover)

1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

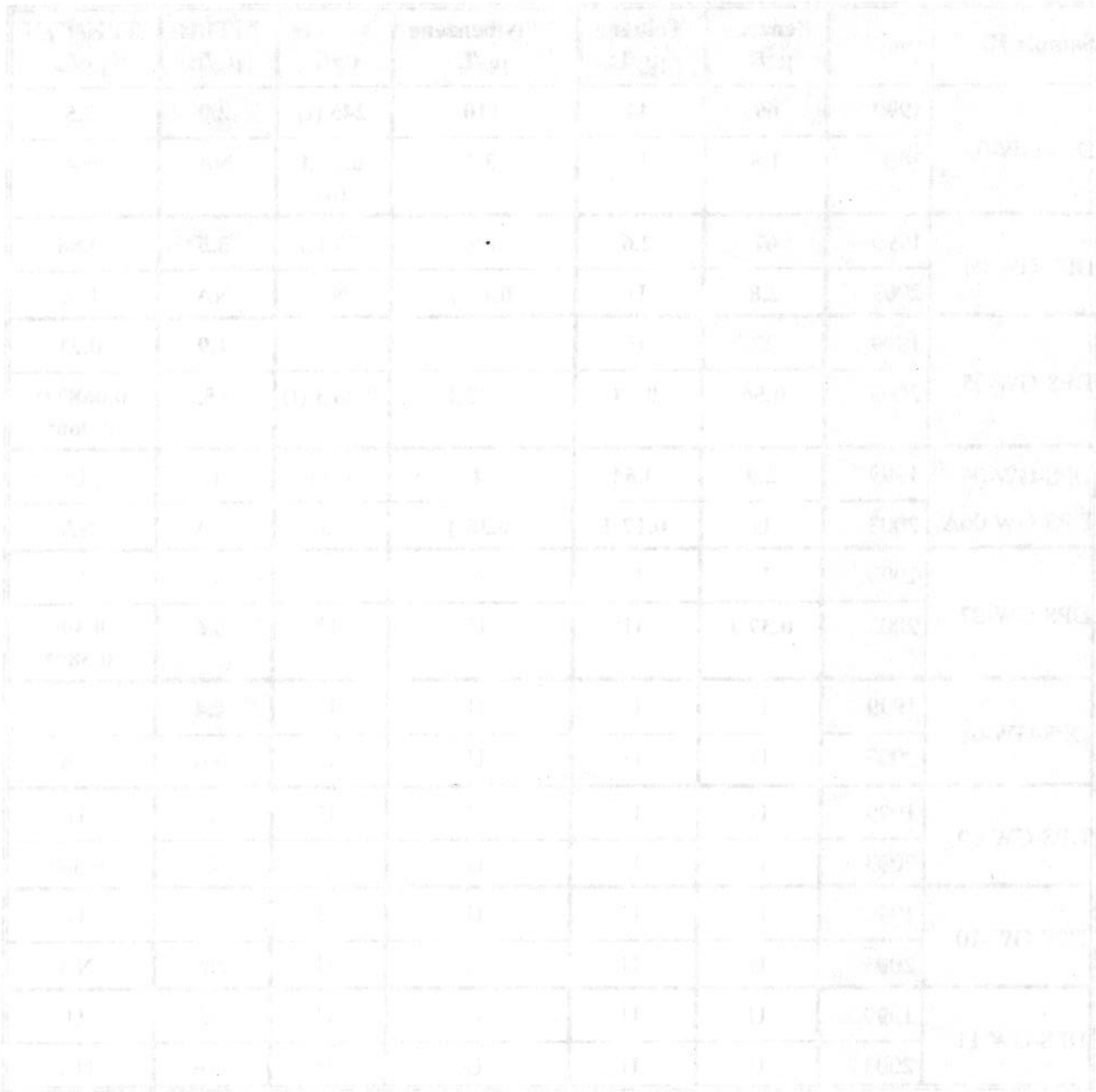
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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1.0 INTRODUCTION

In General, **Landfills (waste dump areas) endure from a major post-closure settlement that takes place over a prolonged period of time**. A huge differential settlement may deteriorate structures, foundations, and other related facilities that constructed atop of a landfill. In addition, it may lead to shattering of the geomembrane and wastage of the cover system in the landfills. The refuse (waste) materials show diversified engineering properties that diverge over positions and time within the landfill. **Hence, with the conjunction of that the landfills behavior is not fully understood; recognize a conventional soil mechanics approach less appealing to predict the settlement.** Instead, empirical and semi-empirical approaches of estimating the landfill settlement are commonly used side by side with field observations. (Ling et al. 1998)

https://www.researchgate.net/publication/306378961_LANDFILL_SETTLEMENT_ANALYSIS to download full text

18.9 LANDFILL REDEVELOPMENT

The movement of brownfields redevelopment has helped invigorate existing slow process of remediation of contaminated sites. The use of risk based clean-up approaches now allowed in many states has facilitated brownfields redevelopment.

Landfills are a particular subset of brownfields, particularly older landfills in industrialized areas. Older landfills that were never properly closed are true brownfields with idle land from which pollutants are often discharged. With investigation and limited remediation, this subset of brownfields-like sites presents unique opportunities for redevelopment. Redeveloping landfills is particularly challenging not only due to clean-up issues, but also the geotechnical issues of building on waste. Most of the unregistered landfills were never properly closed. Only a handful of unregistered landfills were properly closed and received a Closure and Post Closure Plan Approval pursuant to the Amended State Solid Waste Management Act of 1975 and/or the Sanitary Landfill Facility Closure and Contingency Fund Act of 1992. The few properly closed landfills were either large private commercial landfills, sole source industrial landfills owned by major corporations, or municipal landfills. Hundreds of registered landfills were never properly closed because the owners lacked the resources to comply with regulatory closure requirements. While the Sanitary Landfill Facility Closure and Contingency Fund Act provides a revenue source through a tax on operating landfills, the State has historically not utilized these funds for closure of abandoned landfills and reserved the public funds for emergency actions, such as extinguishing a landfill fire or remediating methane migration. A wide variety of remediation techniques can be utilized in landfill redevelopment. In the simplest case, waste can be capped in place with one foot of silty, clayey material and one and one-half feet soil cover. In the most complex case, a slurry wall/sheet pile wall can be used to contain leachate from outflow from the site and an interior leachate system can be installed. The degree of capping, containment and leachate collection depends on the underlying geology, leachate strength and site specific cap design.

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Abstract

Several noteworthy stability failures occurred at landfills in the United States in the 1980s and early 1990s, a timeframe coinciding with the promulgation of modern US environmental regulations. These failures were extensively studied, and lessons were learned. A state-of-practice developed to enable the design of waste fills to be stable throughout their construction, operation, and closure periods. However, a survey of landfill performance in the United States in the 2010–2019 timeframe shows that waste fill stability failures continue to occur. This paper, an expansion of the 2018 Terzaghi Lecture given by the first author, presents a brief review of several waste fill failures from the 1980s and 1990s and the lessons learned during that period. Several more recent waste fill failures are then reviewed, from which it is concluded that 20–30 years after the earlier failures, facility operators and design engineers are relearning the earlier lessons, as well as new lessons related to evolving waste streams and operating practices. The paper concludes with a discussion of the current standard-of-care for the design of US waste fills and suggests that this standard can be improved through application of the lessons described herein.
https://ascelibrary.org/doi/10.1061/%28ASCE%29GT.1943-5606.0002291

Avoid Soft Soil Problems at Landfills

October 30, 2017

Discovering unexpected pockets of soft soils at the time of construction can delay your project and drive up costs for landfills, support features, and many other types of construction. If you don't find them, building over them can result in unexpected settlement affecting a structure or building, or cause a slope stability problem for a berm or stockpile. You can avoid both of these scenarios with early investigation and appropriate construction planning.

While landfill development investigations typically require numerous soil borings within the proposed waste limits of the landfill, it's common to overlook perimeter areas. Pockets of soft soil deposits can be associated with nearby existing wetlands, lakes, or rivers; with wind-blown silt or ancient lake deposits from periods of glaciation; or with fill placed during previous site uses.

The landfill perimeter areas may contain tanks for leachate or fuel, buildings, perimeter berms for screening or landscaping, stockpiles, and other features. A tank or building constructed over soft soils could experience unexpected settlement affecting the performance and value of the structure. The potential for a slope stability problem can increase for a large berm or stockpile built on soft soils.

The first step to avoid these problems and identify problem soils is to include perimeter areas in your subsurface investigation. Perform soil borings or test pit excavations at the locations of the proposed perimeter features such as tanks or berms. If you encounter soft soils, address them like this:

- If the deposits are relatively shallow, excavate the soft soils and replace them with compacted engineered fill.
- If the deposits are deeper and there is sufficient time in the project schedule, pre-load the soft soil area to reduce future settlement and increase soil strength before construction, and monitor the pre-loading with instrumentation such as vibrating wire piezometers and settlement platforms to confirm when the pre-loading design goals have been achieved. Preloading can be accomplished with temporary soil fill placement that is later removed when the pre-loading is completed or by staged placement of fill for a permanent fill feature such as a berm.
- If the project schedule doesn't allow for pre-loading and the soft deposits are deep, consider a ground improvement method such as GeopiersTM to improve soil strength and stiffness in place. You can then proceed with constructing tanks, buildings, berms, or other structures over the improved soil area without special foundations. You may also use a deep foundation system such as piles or drilled piers to build over a soft soil area.

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Geotechnical aspects of landfill design and construction. Part 1: principles and requirements

H. L. Jessberger

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Ground Board

Geotechnical Engineering Advisory Panel Paper 10435

Written discussion closes 15 June 1994

■ **This Paper, the first in a series of three, presents the requirements of geotechnical landfill design including site assessment, safety considerations and quality assurance. It also introduces the following parts of the series.**

Geotechnical aspects are essential factors to be considered in the course of the design and construction of waste landfills which often constitute waste piles. Basic geotechnical aspects relate to, among other factors, slope stability, settlement or permeability, including those of the structural elements such as the stabilizing elements, anchors or sealing layers and drainage blankets. Within this context, particular attention must be given to the specific landfill problems caused by the properties of the waste, the contaminant content of the leachate, etc. Furthermore, the landfill design must take into account long-term considerations, because the function of the containment elements has to be effective as long as there remains a risk of pollution of the groundwater, soil or air from the landfill.

2. This series of papers discusses a number of geotechnical aspects which are essential for landfill design and construction, and takes into account the landfill as a system that includes the subsoil and waste as well as the landfill operation. It is intended to highlight the problems and to present solutions or engineering approaches which may be of benefit to the designer, construction team and the operator or owner of the landfill. The papers are based on research projects directed by the Author, on the experience of his consulting group and, not least, on the work of the International Society for Soil Mechanics and Foundation Engineering European Technical Committee 8 (ISSMFE ETC 8), 'Geotechnics of Landfills and Contaminated Land'.

3. The series comprises three parts. In this Paper, the principles and requirements of geotechnical landfill design are presented; the second deals with relevant material parameters and test methods; and in the last, selected calculation methods for specific geotechnical problems of waste landfills are discussed.

Waste management

4. Waste management is the objective of sanitary engineering. For a landfill design project it is necessary to know the design volume and nature of the waste. Therefore, the future development of waste production and disposal is an important consideration with respect to appropriate containment technology.

5. Table 1 shows that in 1990 in Germany only a small proportion of the waste produced was disposed of by incineration; most was placed in landfills and about one-quarter was recycled or reused. These figures show that a relatively small amount of hazardous waste was disposed of (by incineration) but that a huge amount of less dangerous waste—construction debris and excavated soil—was disposed of in landfills or was recycled or reused. The disposal of waste in landfills requires containment elements designed with regard to the particular waste type.

6. The situation will change within a decade due to the new Federal Legislation[1] which demands that municipal waste should be disposed of mainly by incineration. This will decrease the amount of waste disposed of in landfills. Further, it means that the constituents of waste will change from mainly organic to inorganic, and this development should be reflected in the technology used for landfill barriers. Added to this, the politics of this issue is focused on waste reduction in general and this will lead to another change in momentum.

7. We can draw four conclusions from the foregoing.

(*a*) There is a growing need for landfills.
(*b*) The nature of the waste will change and therefore so will the requirements for landfill containment elements.

Table 1. Some figures of waste production and disposal in Germany in 1990

Waste production: 10^6 t/year	
Municipal	40
Industrial including	244
Construction debris and excavated soil	126
Hazardous waste	15
Waste disposal: %	
Landfill	*c.* 90
By incineration	*c.* 8·5
Recycled or reused (e.g. construction debris): 10^6 t/year	69

Hans Ludwig Jessberger is Professor of Civil Engineering at Ruhr University, Bochum, in Germany. This series of papers results from his British Geotechnical Society touring lecture in 1993

See last sentence of 1st paragraph--".....must take into account long term considerations…..as long as there remains a risk of pollution of the groundwater, soil, or air from the landfill."
https://www.icevirtuallibrary.com/doi/10.1680/igeng.1994.26377

Chapter 7 Slope Stability Analysis 7 .1

Overview Slope stability analysis is used in a wide variety of geotechnical engineering problems, including, but not limited to, the following:

• Determination of stable cut and fill slopes

• Assessment of overall stability of retaining walls, including global and compound stability (includes permanent systems and temporary shoring systems)

• Assessment of overall stability of shallow and deep foundations for structures located on slopes or over potentially unstable soils, including the determination of lateral forces applied to foundations and walls due to potentially unstable slopes

• Stability assessment of landslides (mechanisms of failure, and determination of design properties through back-analysis), and design of mitigation techniques to improve stability

• Evaluation of instability due to liquefaction

Types of slope stability analyses include rotational slope failure, translational failure, irregular surfaces of sliding, and infinite slope failure. Stability analysis techniques specific to rock slopes, other than highly fractured rock masses that can in effect be treated as soil, are described in Chapter 12. Detailed stability assessment of landslides is described in Chapter 13.

If groundwater varies seasonally, long-term monitoring of the groundwater levels in the soil should be conducted. If groundwater levels tend to be responsive to significant rainfall events, the long-term groundwater monitoring should be continuous, and on-site rainfall data collection should also be considered.

https://www.wsdot.wa.gov/publications/manuals/fulltext/M46-03/Chapter7.pdf to download full text

Subsidence is the sinking or settling of the ground surface. It can occur by a number of processes. Ground subsidence may result from the settlement of native low density soils, or the caving in of natural or man-made underground voids. Subsidence may occur gradually over many years as sags or depressions form on the ground surface. More infrequent, subsidence may occur abruptly as dangerous ground openings that could swallow any part of a structure that happen to lie at that location, or leave a dangerous steep-sided hole. In Colorado, the types of subsidence of greatest concern are settlement related to collapsing soils, sinkholes in karst areas, and the ground subsidence over abandoned mine workings.

Legal definition

H.B. 1041, 106-7-103(10): *Ground subsidence* means a process characterized by downward displacement of surface material caused by natural phenomena such as removal of underground fluids, natural consolidation, or dissolution of underground minerals, or by man-made phenomena such as underground mining.

https://coloradogeologicalsurvey.org/hazards/ground-subsidence/

Another type of ground subsidence that commonly occurs in Colorado is the settlement and ground collapse that occurs in certain types of geologically recent, unconsolidated sediments — usually referred to as soils by engineers and contractors. This group of soils those that can rapidly settle or collapse the ground are known as *collapsible soils*.

Collapsible soils are a major geologic hazard for land development in many locations across the state. This particular hazard manifests itself as ground settlement, which can be damaging to overlying structures if the soil problems are not mitigated or if the structure is not engineered properly. Ground settlement can cause severe damage to man-made structures such as foundations, pavements, concrete slabs, utilities, and irrigation works. Although not of the severity of damage related to swelling soils and heaving claystone bedrock, ground settlement has resulted in hundreds of millions of dollars in damage. As growth pressure increases in many places in Colorado, more areas susceptible to soil collapse are considered for development. The best illustration of this geologic hazard's potential liability was the case of townhomes damaged by collapsing soils in a Glenwood Springs development built in the early 2000s. The court case resulted in a $12 million payment by the developer and his engineering consultants to the townhome owners.

https://coloradogeologicalsurvey.org/hazards/collapsible-soil/

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Fwd: More subsurface stuff

Sharon McCarthy <[redacted]> Fri, May 19, 2023 at 10:10 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Good morning Jeremiah,

Please add the following to our FS file for the proposed RV landfill re-development project.

Thanks.

Sharon

---------- Forwarded message ---------
From: **Sharon McCarthy** <[redacted]
Date: Fri, May 19, 2023 at 10:02 AM
Subject: More subsurface stuff
To: Karen Gerbatsch <[redacted]>, RAINER W GERBATSCH <[redacted], Richard BOHLING [redacted]>, Sharon McCarthy <[redacted]

Did some more research on subsurface soil stability in unregulated landfills---all stuff over my head---only took inorganic/organic chemistry! There are chapters from a textbook that looked promising and could be purchased for $29.95/chapter.

Let me know if you want me to do more.

4 attachments

Subsurface soil stability.pdf
68K

Landfills textbook1.pdf
181K

Landfills textbook2.pdf
4010K

Landfills textbook3.pdf
876K

Additional Research Unregulated Landfill Subsurface Soil Stability

- **Geotechnical Practice for Waste Disposal** pp 244–268

See attachment

https://link.springer.com/chapter/10.1007/978-1-4615-3070-1_11

- **Solid Waste Engineering and Management** pp 659–706

Abstract

Management of a landfill is a continuous process that proceeds long after the active landfill period, which is called landfill post-closure/after-care management. In most developed and developing countries, this after-care period is regulated for a minimum of 30 years after landfill closure. This ensures waste stabilization within the landfill layers, and there are minimal environmental threats to the surrounding area, especially from the leachate and landfill gas emissions. This chapter covers the legislation and requirements imposed by most countries related to the proper management of landfills during this passive phase, which involves the monitoring requirement and emission evaluation. The basic principles of landfill technology, its types, and operation will first be discussed as it influences after-care management. Emphasis will be made toward three methods/approaches (evaluation through target value, evaluation using impact/risk assessment, and evaluation through a performance-based system) in determining the completion or endpoint for the post-closure period. Both the advantages and disadvantages of each method will be further discussed and summarized.

https://link.springer.com/chapter/10.1007/978-3-030-89336-1_10

- **Stability of MSW Landfill Slopes Reinforced with Geogrids**

See attachment

https://www.mdpi.com/2076-3417/12/22/11866

- **Stability of slopes of municipal solid waste landfills with co-disposal of biosolids**

See attachment

https://www.witpress.com/Secure/elibrary/papers/GEO06/GEO06022FU1.pdf

- **Geosynthetics in Civil and Environmental Engineering** pp 540–545

Abstract

Unregulated solid waste landfills are causing severe environmental impacts for environment and human health due to the formation of leachates and landfill gas during decomposition of organic wastes. Common problems that usually be faced with these sites are visual pollution, air pollution, water pollution, soil contamination, spreading of waste, spreading of diseases, subsidence and odor. Therefore the rehabilitation of waste dumping sites has become a matter of importance for controlling these adverse effects. In this study, it is aimed to promote the rehabilitation of unregulated solid waste landfills and to provide guidance on how to effectively rehabilitate these sites so that off-site emissions from leachate and landfill gases are minimized. This study focuses on the geotechnical solutions to the problems associated with open waste dump sites. Full rehabilitation process includes shaping the waste body, surface water control, leachate management, gas management, final cover system with HDPE liner, settlement analysis, slope stability analysis and monitoring after closure. As a case study, data belongs to the unregulated solid waste landfill called Silivri are used. For the rehabilitation of the unregulated landfill, USEPA and Turkish Regulations are taken as major guidelines.

https://link.springer.com/chapter/10.1007/978-3-540-69313-0_101

- **Characterization of an unregulated landfill using surface-based geophysics and geostatistics**

Abstract

This paper develops a geoelectrical and geostatistical-based methodology that can be used to screen unregulated landfills for the presence of leachate and obtain an approximation of the vertical/spatial extent of waste. The methodology uses a surface electromagnetic (EM) survey combined with indicator kriging. Indicator kriging allows for the use of EM data that have been collected over highly electrically conductive material such as that occurring within landfills. Indicator kriging maps were generated for several vertical sections cut through a landfill to establish the landfill strata. Similarly, horizontal sections were generated to evaluate the areas extent of waste and leachate in the vadose zone and saturated zones, respectively. The horizontal and vertical maps were combined to estimate the volume of solid waste and liquid within three zones: (1) waste, (2) waste and/or leachate, and (3) potential leachate. The methodology appears to hold promise in providing results that can be used as part of a hazard assessment, or to assist in the placement of monitoring wells at sites requiring additional study. A case study is used to demonstrate the methodology at an unregulated landfill in eastern Nebraska.

Authors:
Woldt, W E; Jones, D D [1]; Hagemeister, M E [2]

https://www.osti.gov/biblio/302233

CHAPTER 11

Stability of landfills

Issa S. Oweis

11.1 INTRODUCTION

The stability of landfills is controlled in broad terms by the following factors:

1. the properties of the supporting soil;
2. the strength characteristics and weight of refuse;
3. inclination of the slope;
4. leachate levels and movements within the landfill;
5. type of cover; and
6. cover resistance to erosion.

In all cases, the presence of water acts as a destabilizing agent in reducing the strength and increasing the destabilizing force.

Assessment of the stability of solid waste landfills is somewhat less reliable than for soil embankments. The unit weight of refuse and its strength are difficult to determine and could vary over a wide range. Assessment of these variables is largely based on case histories and site-specific investigations (Oweis and Khera, 1990). Because of the extreme variability in refuse composition, the usual soil sampling and testing of soils on relatively small samples is not applicable for refuse such as typical municipal waste.

The purpose of this chapter is to present procedures for stability evaluation. Potential instability could occur in the foundation soil, the refuse, or the cover. In all cases the safety margin is expressed in terms of the factor of safety, F, and is defined as

$$F = \frac{\text{Available strength along the potential failure surface}}{\text{Mobilized strength along the potential failure surface}} \quad (11.1)$$

Geotechnical Practice for Waste Disposal.
Edited by David E. Daniel.
Published in 1993 by Chapman & Hall, London. ISBN 0 412 35170 6

11.2 TYPES OF INSTABILITY

Figures 11.1 and 11.2 illustrate two stability situations. In Fig. 11.1 a landfill rests on a firm base such as rock or compact sand. The landfill has a liner and a leachate collection system and no leachate mound is expected to develop. The refuse mass in this case could slide along the liner (potential failure surface abc), or if the slopes are steep, the refuse could fail along a failure surface such as de. Modern landfills are designed with typical slopes of 3:1 horizontal to vertical and in a dry condition, refuse is known to stand almost vertically for cuts as deep as 6 m or more. From observations of the Global landfill failure, the steep chasm in refuse at the top of the failure zone was about 12 m high (Oweis *et al.*, 1985). If the leachate collection system fails, a leachate mound will develop, resulting in a lower factor of safety.

Figure 11.2 depicts an old landfill on soft ground. It is desired to increase the height of the landfill from level ab to cd. Because no leachate collection system is present, a leachate mound should be expected unless a water balance analysis indicates otherwise. In this

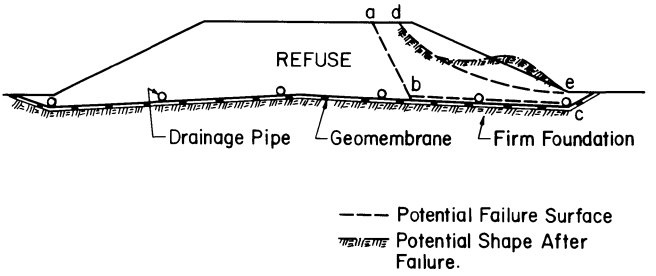

Fig. 11.1 Stability of a landfill on firm base.

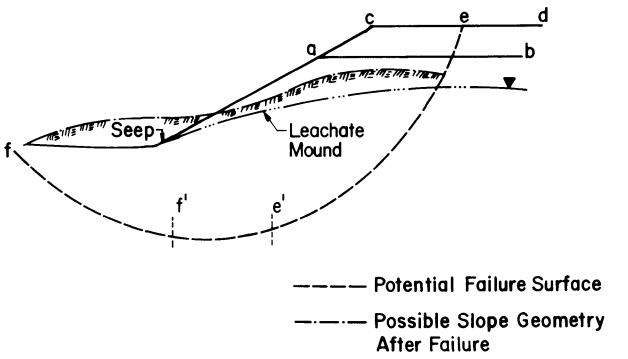

Fig. 11.2 Stability of a landfill expansion on soft base.

applied sciences

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Article

Stability of MSW Landfill Slopes Reinforced with Geogrids

Mehmet Salih Keskin * and Sedat Kezer

Department of Civil Engineering, Dicle University, 21280 Diyarbakir, Turkey
* Correspondence: mskeskin@dicle.edu.tr

Abstract: Slope stability is one of the main problems encountered in MSW (municipality solid waste) landfill designs. Slope stability calculations become difficult due to the heterogeneous structure of MSW landfills and leachate, and therefore, slope geometries are formed by choosing low slope angles for safe designs. This causes less waste to be stored on site. This study presents slope stability analyses of MSW landfills. Numerical analyses were performed using finite element and limit equilibrium methods. The stability behavior of landfill slopes was analyzed for both unreinforced and geogrid-reinforced conditions in order to investigate the effects of shear strength parameters, the unit weight of soil waste, and material model parameters. It has been seen that the stability of landfill slopes can be increased significantly using geogrid materials. When the optimum geogrid parameters obtained from the numerical analysis results are used, it has been observed that the safety factor of the slope can be increased by up to approximately two times. Slopes in landfills reinforced with geogrid reinforcements can be formed steeper, allowing more solid waste to be stored. Considering the high initial investment cost of MSW landfills, it has been concluded that storing more solid waste with the use of geogrids will provide significant economic gains. Based on the results, the optimum values of geogrid parameters were determined and suggested for maximum reinforcing effects in MSW landfill slopes.

Keywords: MSW landfill; slope stability; geogrid; finite element; limit equilibrium

check for updates

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1. Introduction

Today, rapid population growth, urbanization, industrialization, and technological developments have revealed the problem of pollution. Solid waste, which constitutes a large part of the pollution problem, is a situation that needs to be managed and improved in all countries of the world. Solid wastes have polluted and continue to pollute ground and underground waters. After the damage caused by ground and groundwater pollution became visible, the importance of this type of pollution was understood, and laws and regulations were prepared to eliminate the pollution that had occurred. If waste is not stored in a way that causes minimum damage to the environment, it is inevitable that negative effects will occur in the future. Since it is not possible to completely destroy waste, the main objective should be to reduce its mass, that is, to reduce its volume and to store it regularly in a way that will allow for reuse with technological developments that may occur in the following years.

Slope stability analyses in MSW landfills are very important both to know how high it can be filled without any movement on the slopes, and to determine the angle of the slopes that will be reconstructed if old or abandoned MSW sites are reused as construction sites.

In general, stability problems on slopes in landfills are similar to movements seen on normal slopes. Due to the non-homogeneous materials and non-uniform distribution in a landfill, movement can be observed on the slopes ranging from surface ruptures to large landslides. Similar to all natural or artificial slopes, the stability of slopes in MSW landfills against slipping and collapse under various loads is analyzed by the limit equilibrium method (LEM). In this method, the equilibrium between resisting and sliding forces is investigated on a known or accepted critical slip surface. In slope stability analyses, a

certain factor of safety (FS) is determined, and necessary analyses are made. The FS calculated as a result of these analyses reveals whether the slope is stable against failure or the degree of stability.

With the finite element method (FEM), which is another method for slope stability analysis, slopes can be analyzed under different soil conditions and load combinations. By designing the slopes in two or three dimensions and using the appropriate soil model, realistic stress and displacement values can be obtained. In addition, necessary analyses can be made in cases where the slope is strengthened with different materials. Two approaches are generally used when performing slope stability analyses with FEM. In the first approach, the gravity increase method, the gravitational acceleration is increased until slope failure. In the second approach, the strength reduction method, cohesion and internal friction angles are reduced until slope failure.

There are numerous studies in the literature on the stability of slopes in MSW landfills [1–8]. In these studies, the slope stability analyses were carried out using both conventional LEM and FEM.

Seed et al. [1] analyzed the causes of slope failure at a landfill in California. According to the results obtained from the analyses performed in the study, the FS was determined to be between 0.85 and 1.25 at the failure time.

Eid et al. [2] investigated the stability of MSW landfill slopes. According to the results obtained from laboratory tests, field experiments, and back-calculations, it has been shown that the shear strength parameters for landfills can be considered as 35° and 0–50 kpa for the internal friction angle and cohesion, respectively.

In the study carried out by Koerner and Soong [3], ten landfill failures were discussed. According to the results obtained, numerical analyses for stability calculations depend more on shear strength than other parameters.

Gharabaghi et al. [4] carried out slope stability analyses at two existing solid waste landfills in Brazil. As a result of the study, it was stated that the determination of suitable shear strength parameters and the solid waste composition, grain diameter, degree of deterioration, and moisture content in the field are very important in the analysis.

Chang [5] carried out three-dimensional numerical analyses to model the slope failure occurring in the Kettleman Hills Landfill. It was shown that the internal friction angle and cohesion values obtained as a result of the back-analysis carried out for the post-failure slope and the values obtained by the laboratory experiments were compatible.

Stark et al. [6] investigated the shear strength of MSW landfills by back-analysis of failed waste slopes using laboratory tests and field experiments. Using the results obtained from the study, suggestions were made for modeling the shear strength of landfills in analyses.

Hossain and Haque [7] analyzed the stability of landfill slopes as a function of time and decomposition. In the study, numerical analyses were carried out using FEM and LEM. At the end of the study, they compared the obtained results from the numerical analyses.

In the study carried out by Huvaj-Sarihan and Stark [8], the shear strength parameters of waste landfills were investigated using back-analysis of failed waste slopes. They presented the back analyses of the failed waste slopes in four landfills. Each of the landfill slope failures was reviewed, and the results of the back-analyses were presented. At the end of the study, the obtained and recommended parameters were compared with other studies.

Because the tensile strength of the soils is low, the slopes can be made more stable with materials such as metal reinforcements, geotextiles, or geogrids placed inside the slope. High-strength elements are used in these structures, which are defined as reinforced slopes. While metal strips or reinforcements were used in the first applications, today such materials have been replaced by geosynthetic materials. In slopes that are reinforced to increase stability, a solution is realized by including the geogrid forces in the limit equilibrium or finite element analysis as known forces. Geogrids are high-strength, polymer-structured, geosynthetic materials with sufficient space and different grid structures to ensure interlocking with the soil. In its chemical structure, polyethylene-, polyester-,

or polypropylene-type polymers are available. Geogrids have an important role in the reinforcement of soils with their high tensile strength and are often used to reinforce slopes.

Although there are many studies in the literature on the stability of slopes in landfills, investigations on the stability behavior of reinforced landfill slopes are limited. Today, increasing the stability of slopes using geogrid materials has become a routine and standard practice. However, their use for the reinforcement of landfill slopes is rare. The few studies that have been carried out on reinforcing solid waste slopes using geogrids usually include field applications.

Zornberg and Kavazanjian [9] investigated the integrity of geogrid-reinforced landfill slopes subjected to differential settlements and seismic loadings experimentally and numerically. According to the results obtained from the study, it showed that the critical reinforced region corresponding to different loading mechanisms occurred at different elevations within the reinforced soil structure.

Jiang et al. [10] performed finite element analysis to investigate the failure mechanism and FS values of a geotextile-reinforced extended berm in a MSW landfill slope of 45°.

Ke Han et al. [11] performed a one-year field monitoring of a MSW landfill slope reinforced by geogrids. Using the results obtained, suggestions were made for future studies on the subject.

While the reinforcement of MSW landfill slopes using geogrids is available at existing landfills, the interactions between the solid waste material and geogrids have not yet been clearly demonstrated. In particular, studies on field observations of the results obtained by numerical and theoretical studies are quite limited. Subjects such as the long-term behavior of geogrids, the effect of mechanical creep, and the friction between geogrids and MSWs still need to be investigated. Friction characteristics between synthetic materials and geotechnical materials also have an important impact on slope stability. Interface shear behavior of synthetic and geotechnical materials has been studied recently due to slope failures in landfills.

Bergado et al. [12] investigated the properties of different interfaces in landfills using laboratory experiments.

In the study by Kim and Frost [13], the geotextile/geomembrane interfacial shear behavior was investigated experimentally and generalized interfacial shear mechanisms were proposed based on the results obtained.

Cen et al. [14] performed a study on the cyclic interface shear between geomembranes and sandy gravel. At the end of the study, a new empirical correlation was suggested.

In the experimental study carried out by Shi et al. [15], shear tests were performed at the geomembrane/geotextile and geomembrane/geocomposite/sand liner interfaces where the normal stress changes at different shear stages. According to the results obtained from the study, it was stated that the effects of normal stress changes on the lining interface strength should be considered in the slope stability analysis of MSW landfills.

A study was carried out experimentally investigating the interface creep behavior between geomembranes and geotextiles in the lining system by Lu et al. [16]. Conventional direct shear tests were conducted using different combinations of geomembranes and geotextiles. It was recommended to conduct longer-term geomembrane–geotextile interface creep tests in order to understand the interface creep mechanism in depth.

This study presents the slope stability analysis of MSW landfills carried out using finite element and limit equilibrium methods. Finite element analyses were performed using PLAXIS [17], and limit equilibrium analyses were performed using the SLOPE/W [18] computer programs. The stability behavior of the landfill slopes was analyzed for both unreinforced and geogrid-reinforced conditions. A landfill slope model was selected for the analysis, and model parameters were obtained from the studies available in the literature. In this study, the optimum value of the vertical distance between the geogrid reinforcements and the number of reinforcements, which increase the FS of the MSW slope, are obtained, and the necessary recommendations for practical applications are presented.

2. Materials and Methods

For the slope stability analyses in landfills, a model with a width of 210 m and a height of 45 m was created (Figure 1). The geometry was reconstructed for different slope angles in the analyses. The symmetry of the geometric model was used for convenience in the analyses. Slope stability analyses of the model were performed with PLAXIS using FEM, and SLOPE/W using LEM. Unreinforced and reinforced analysis results obtained by both methods were compared.

In the analysis, the waste material and soil were modeled with the Mohr–Coulomb model (MCM). The input parameters were obtained from previous experimental studies. The most important issue in the slope stability analysis of MSW landfills is the realistic estimation of the parameters of the waste material including unit weight, internal friction angle, and cohesion. Due to the natural properties of solid waste materials, such as moisture content, degree of degradation, waste composition, and particle size, it is very difficult to determine these parameters in the laboratory. When the existing studies in the literature are examined, it is seen that the mentioned shear strength parameters and unit weight values are in a wide range.

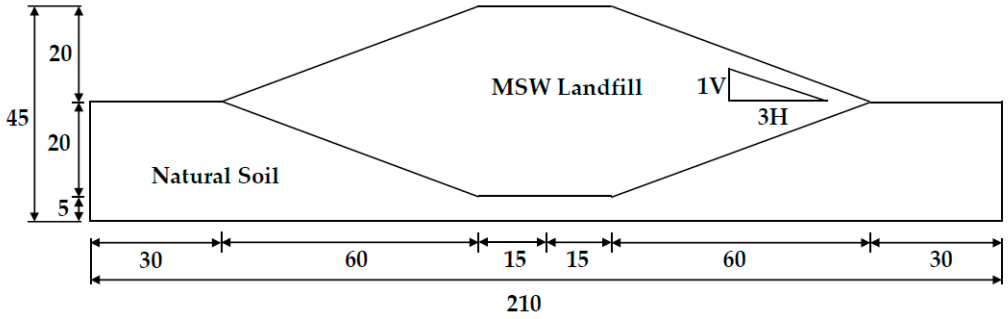


Figure 1. Landfill geometry for 1V/3H (dimensions are in meters).

Many investigations have been performed on the geotechnical properties of landfills to examine the settlement and stability of landfills [19–24].

Average in-place unit weights, γ, used by owners and operators for landfill capacity estimates are typically in the range of 8.6 to 10.2 kN/m^3. Values in this range have also been used for seismic analyses by [25–27]. Fassett et al. [28], in their study, presented a summary of the unit weight values obtained in situ by various researchers for MSW. Accordingly, the unit weight values were between 2.9 kN/m^3 to 14.4 kN/m^3.

The shear strength values of the MSW landfills presented in the studies carried out on the subject are very variable, with internal friction angles, ϕ, as low as 10 degrees and as high as 53 degrees and cohesion values, c, varying from 0 to 67 kPa [29].

In the study performed by Sharma et al. [30] in an existing MSW landfill, Poisson's ratio value was obtained as 0.49. Karimpour-Fard and Machado [31] carried out an experimental study to estimate the deformation properties of MSW materials. The results obtained from this study show that Poisson's ratio value varies between 0.35 and 0.49.

The modulus of elasticity, E, of waste materials is not constant and depends on the average stress [28,32]. Therefore, the modulus of elasticity value is in a wide range.

In the stability analysis, the material parameters presented in Table 1, obtained as a result of the literature study, were used for the modeling of the solid waste material and soil.

Table 1. MC model parameters.

Parameters	Soil	MSW
Unit weight, γ (kN/m^3)	17.0	9.0
Elasticity moduli, E (kPa)	14,000	6500
Poisson's ratio, ν (-)	0.25	0.45
Internal friction angle, ϕ (°)	25	15
Cohesion, c (kPa)	15.0	10.0
Dilatation angle, ψ (°)	0.0	0.0

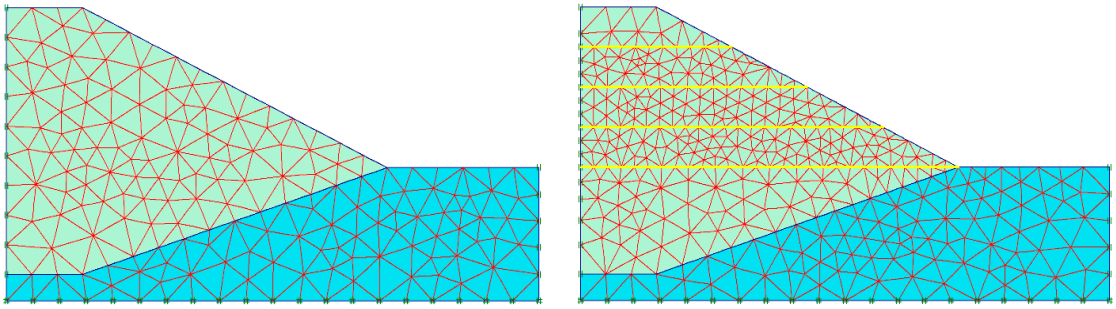
The geometric model of the MSW landfill was created in the PLAXIS computer program as two-dimensional. Slope analyses were performed according to plane strain conditions. In the modeling, triangular elements with 15 nodes were chosen to obtain more accurate and sensitive results.

In the analyses, the standard boundary conditions available in the PLAXIS program were selected. Vertical and horizontal displacements at the base of the geometric model ($u_x = 0$, $u_y = 0$) were assumed to be zero, while on the vertical side of the slope, only vertical displacements were taken into account ($u_x = 0$, u_y = free).

In the analyses, geogrid elements were used to model the geogrid reinforcement layers. The EA value of 1100 kN/m was entered into the program as the material property of the geogrid reinforcement layers.

While creating the finite element mesh, the most suitable mesh structure that gives the most accurate result in the optimum time where the analysis results do not change much was investigated. For this purpose, the effect of the mesh structure on the FS was investigated by performing analyses for medium, fine, and very fine mesh. As a result of the analyses carried out, no significant change was observed in the results in the case of the fine mesh, and the model was created in a fine mesh structure.

In the unreinforced case, the analyses were carried out using two phases. In the first phase, the initial stresses due to the soil self-weight were created, and in the second stage, the phi-c reduction analysis was performed. In the reinforced case, the geogrid reinforcement was activated, and the analyses were carried out. For the finite element analysis, the slope geometries considered in the reinforced and unreinforced conditions are shown in Figure 2.



(**a**) (**b**)

Figure 2. (**a**) Unreinforced; (**b**) reinforced. Slope geometry used in finite element analyses.

In this study, limit equilibrium analyses were performed using the SLOPE/W computer program. With the LEM, the behavior of the soils was modeled based on certain assumptions, and geotechnical problems could be solved according to these assumptions. In this method, assuming that the slip circle was formed on a certain surface, FS values were obtained by comparing the forces sliding along this surface with the forces resisting the slip. With these analysis methods, the static equilibrium equation of the slope was attempted to be obtained using the Mohr–Coulomb stress criteria. There are three main types of limit equilibrium analyses used in slope stability calculations. These are: the slice

method, the wedge method, and the infinite slope method. The most widely used method in slope stability analysis is the slice method. The slice methods used in practice are based on dividing the slip surface into sufficient vertical slices. Many approaches have been developed using the slice method, such as those by Bishop [33], Janbu [34], Spencer [35], and Morgenstern and Price [36]. Although there are some differences in practice between these methods, the common feature is the investigation of the slip mass equilibrium on a known or accepted critical slip surface. The slice method was used in the analyses performed in this study. The Bishop and half-sine function methods were selected in the calculations. Figure 3 shows the geometry of the unreinforced and reinforced models considered in the limit equilibrium analysis.

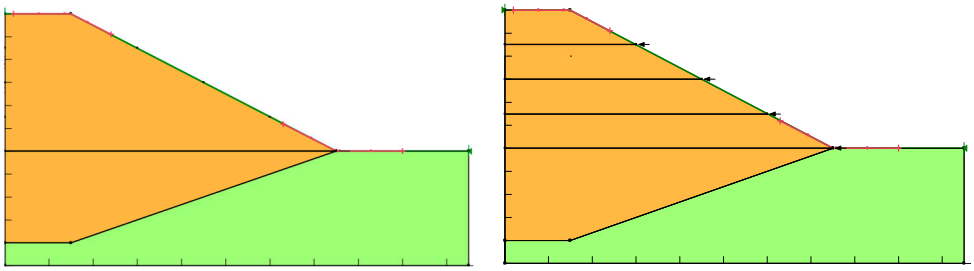


Figure 3. (**a**) Unreinforced; (**b**) reinforced. Slope geometry used in limit equilibrium analysis.

The Mohr–Coulomb model (MCM) was used as the material model in the analysis. The values in Table 1 were used for the material parameters required in this model. After the material properties were entered into the program, the slip surface model was defined. There are two types of failures in the SLOPE/W program: circular and block slip. The circular slip surface model was used in the slope analysis. Although there are many methods to determine the circular slip surface, the entry and exit method was used. The reason for using this method was that the boundaries of the slip surface could be determined clearly.

3. Results and Discussion

In this section, the stability analysis results of the unreinforced and reinforced MSW slopes are presented. Analyses were carried out using finite element and limit equilibrium methods. FSs were obtained using the strength reduction method in the FEM analysis and the Bishop method in the LEM analysis.

3.1. Unreinforced Analyses

In the unreinforced analyses, stability calculations were performed for different cohesion, internal friction angle, unit weight, and slope angle values to investigate the effects of these parameters on the stability of the MSW landfill. While the parameter whose effect will be examined in the analyses is variable, all other parameters are taken as constant.

3.1.1. Effect of Cohesion

In order to investigate the effect of cohesion (c) on slope stability, analyses were carried out for different cohesion values of the MSW landfill. In the analyses, the other parameters were chosen as $\phi = 15°$; $\psi = 0°$; $E = 6500$ kN/m^2; $\nu = 0.45$; $\gamma = 9$ kN/m^3; and $\beta = 18.43°$ (1V/3H). The FS values for different cohesion values obtained as a result of the FEM and LEM analyses are shown in Table 2 and Figure 4.

Table 2. Analysis results for different cohesion values.

Cohesion, c (kPa)	Factor of Safety (FS)	
	FEM	LEM
5	1.23	1.25
10	1.52	1.55
15	1.77	1.80
20	1.99	2.03
25	2.22	2.23
30	2.46	2.42
35	2.64	2.60
40	2.79	2.77
45	2.95	2.94
50	3.11	3.11

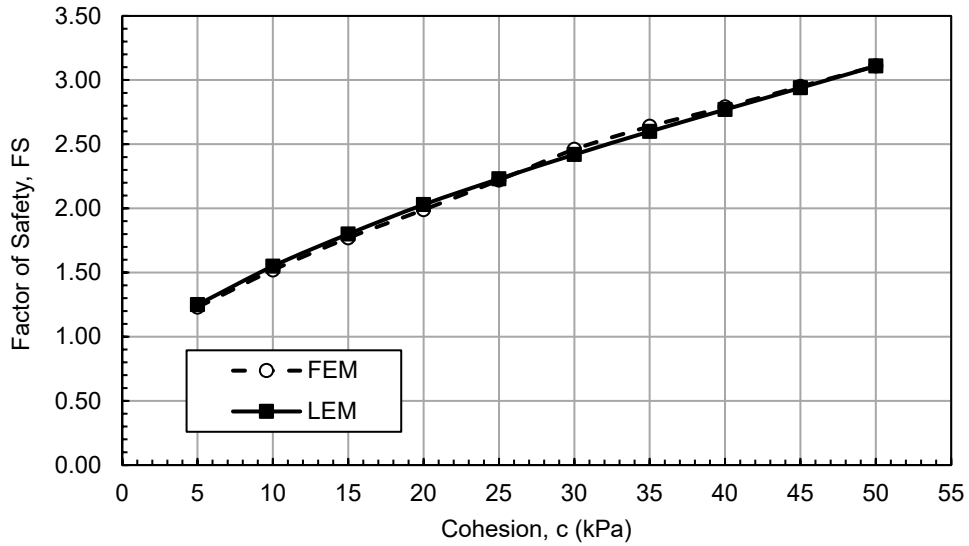


Figure 4. Variation in FS with c.

From the analyses, it was seen that the FS of the slope increased with increasing c values, as expected. When Figure 4 is examined, it can be said that the FS of the slope increases approximately linearly with the increase in the cohesion value. The increase observed in the FS value is due to the increase in the forces resisting the shear stresses occurring in the MSW landfill due to the increase in the cohesion. In addition, it was observed that the FS values obtained by FEM and LEM are close to each other.

3.1.2. Effect of the Internal Friction Angle

The effect of the internal friction angle (ϕ) on slope stability analyzed for different ϕ values of the MSW landfill. In the analyses, the other parameters were chosen as c = 10 kPa, $\psi = 0^\circ$, E = 6500 kN/m^2, $\nu = 0.45$, $\gamma = 9$ kN/m^3, and $\beta = 18.43^\circ$ (1V/3H). The FS values for different internal friction angle values obtained as a result of the FEM and LEM analyses can be seen in Table 3 and Figure 5.

Table 3. Analysis results for different internal friction angle values.

Internal Friction Angle, ϕ (°)	Factor of Safety (FS)	
	FEM	LEM
5	0.81	0.93
10	1.17	1.19
15	1.52	1.55
20	1.84	1.91
25	2.21	2.27
30	2.60	2.64
35	3.00	3.06
40	3.45	3.52
45	3.88	4.05
50	4.40	4.67

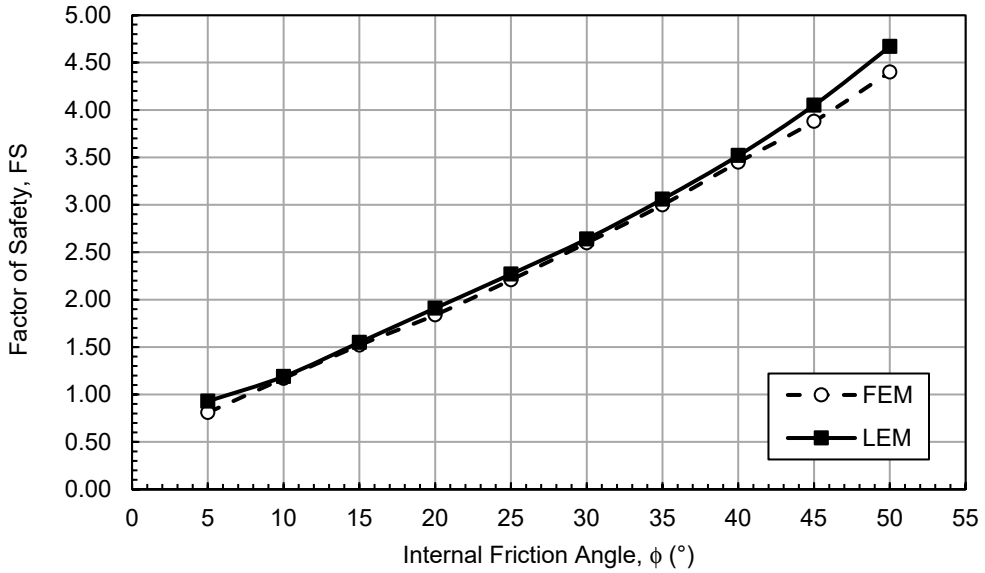


Figure 5. Variation in FS with ϕ.

From the analyses, it was observed that the FS of the slope increased with increasing ϕ values, as expected. When Figure 5 is examined, it is clear that the FS of the slope increases approximately linearly with the increase in the ϕ value. Although the reason for the increase in the FS value is similar to the cohesion effect, higher FS values are obtained due to the increase in ϕ. In addition, it is seen that the FS values obtained by LEM are slightly higher than the values obtained by FEM.

3.1.3. Effect of Unit Weight

Analyses were carried out for different unit weight values of the MSW landfill to investigate the effect of unit weight (γ) on slope stability. In the analyses, the other parameters were chosen as c = 10 kPa, ψ = 0°, E = 6500 kN/m^2, ν = 0.45, ϕ = 15°, and β = 18.43° (1V/3H). Table 4 and Figure 6 show the FS values for different internal friction angle values obtained as a result of the FEM and LEM analyses.

Table 4. Analysis results for different unit weight values.

Unit Weight (γ) (kN/m^3)	Factor of Safety (FS)	
	FEM	LEM
9	1.52	1.55
10	1.46	1.50
11	1.42	1.45
12	1.37	1.42
13	1.34	1.38

From the analysis results, it can be seen that with the increase in the γ value, the FS of the slope decreased. It is thought that this linear decrease is due to the increase in the shear stresses in the MSW landfill. In addition, it is seen that the FS values obtained by LEM are higher by about 2% than the values obtained by FEM.

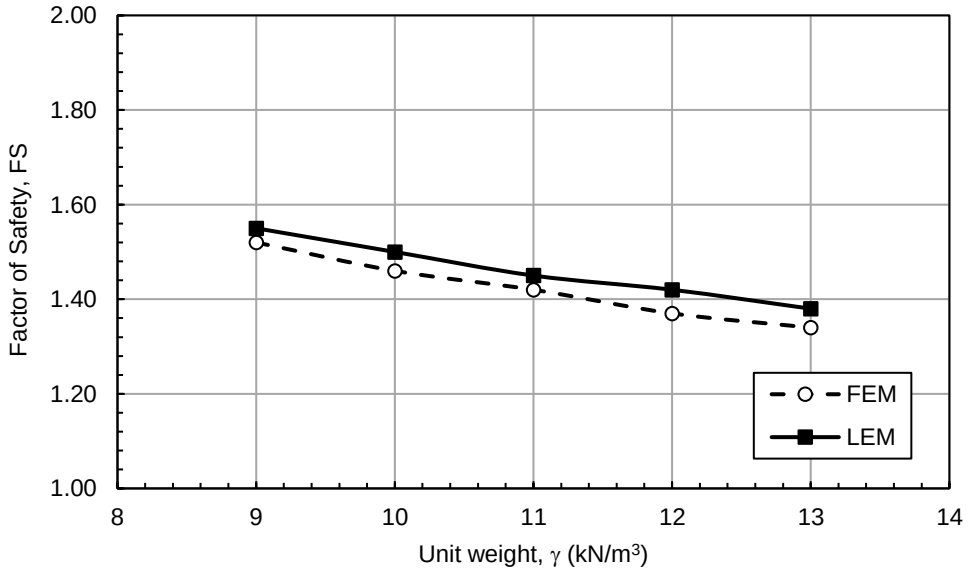


Figure 6. Variation in FS with γ.

3.1.4. Effect of Slope Angle

Analyses were performed for different slope angle values (β = 45°–26.56°–18.43°–14.04°–11.31°) In the analysis, the other parameters were selected as c = 10 kPa, ψ = 0°, E = 6500 kN/m^2, ν = 0.45, ϕ = 15°, and γ = 9 kN/m^3. Table 5 and Figure 7 present the FS values for different slope angle values obtained as a result of the FEM and LEM analyses.

As seen from Table 5 and Figure 7, as expected, the FS values decrease with the increasing slope angle. It is clear that the FS values obtained by FEM and LEM are very close to each other.

Slope geometry is one of the major parameters affecting the stability calculations. The FS of the slope decreases depending on the increase in height and slope angle. Increasing the slope angle can trigger movement in the slope mass. The slope may become too steep to balance the shear stress, and as a result, the angle of repose can be exceeded, and mass movement may occur. Landfill designers often choose safe slopes such as 1V/3H and 1V/4H to design the slopes in conventional landfills. In other words, stability problems that may occur in MSW slopes due to the increase in moisture content and decrease in interlocking properties are eliminated by designing low-angle slopes. However, low-angle slopes are not economical because of the reduction in storage capacity [37]. Due to the uncertainties in the prediction of parameters, it is recommended that the FS determined to ensure long-term stability should be between 1.5–3.0 [38].

Table 5. Unreinforced analysis results.

Slope Angle (β)	Vertical/Horizontal	Factor of Safety (FS)	
		FEM	LEM
45°	1V/1H	0.49	0.52
26.56°	1V/2H	0.99	1.02
18.43°	1V/3H	1.52	1.55
14.04°	1V/4H	2.00	2.08
11.31°	1V/5H	2.55	2.63

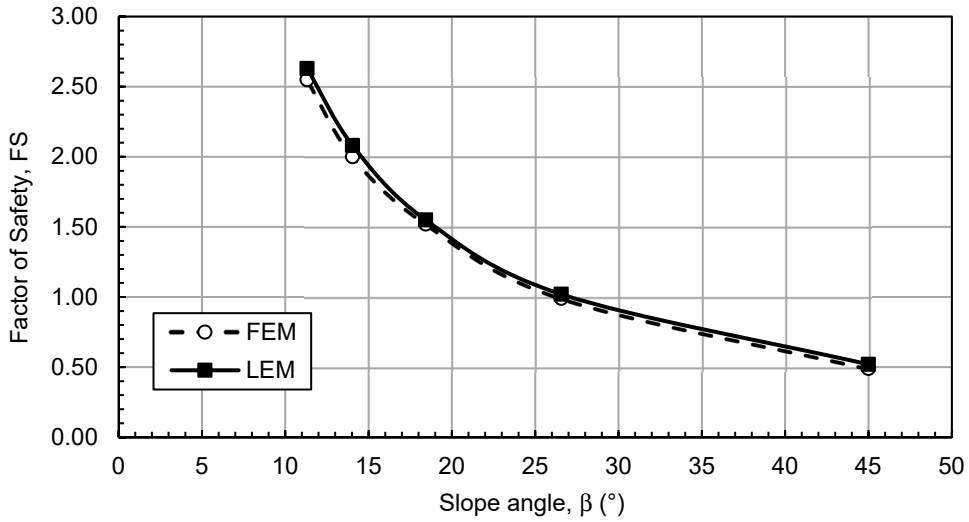


Figure 7. Variation in FS with β.

When the analysis results are examined, it is seen that the necessary FS values cannot be obtained in cases where the slope is 1V/1H and 1V/2H.

When the FS values obtained as a result of the FEM and LEM analyses are compared, it is seen that the FS obtained with LEM are generally higher. There are many studies in the literature that perform slope stability analysis using LEM and FEM and compare the results [39–44].

When the results obtained from these studies are examined, it is seen that although the FS values obtained by LEM and FEM analyses are in general agreement, there are differences of up to 10%. According to Rotaru et al. [44], although there are acceptable differences between the FS values obtained from the LEM and FEM analyses, this reveals a fundamental difference in the principles of approach between the analyses. While LEM is based on a static force or moment equilibrium analysis, the formulations used in FEM depend on the stress–strain relationship. Due to the differences in the assumptions and approaches made in the analysis methods, there are differences between the FS values obtained from the LEM and FEM analyses.

The failure planes obtained as a result of the FEM and LEM analyses are shown in Figures 8 and 9, respectively. In FEM analysis, failure planes are shown as shear strain increments. As can be seen from Figures 8 and 9, the failure planes contact the toe of the slopes in the analyses performed without reinforcements at different slope angles.

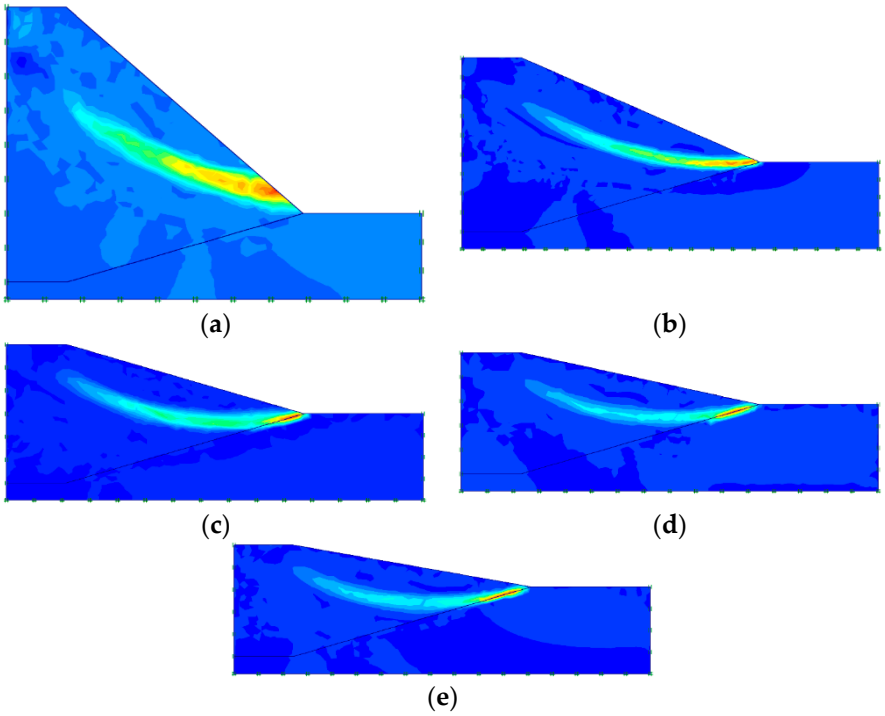


Figure 8. (**a**) 1V/1H; (**b**) 1V/2H; (**c**) 1V/3H; (**d**) 1V/4H; (**e**) 1V/5H. Failure planes (FEM).

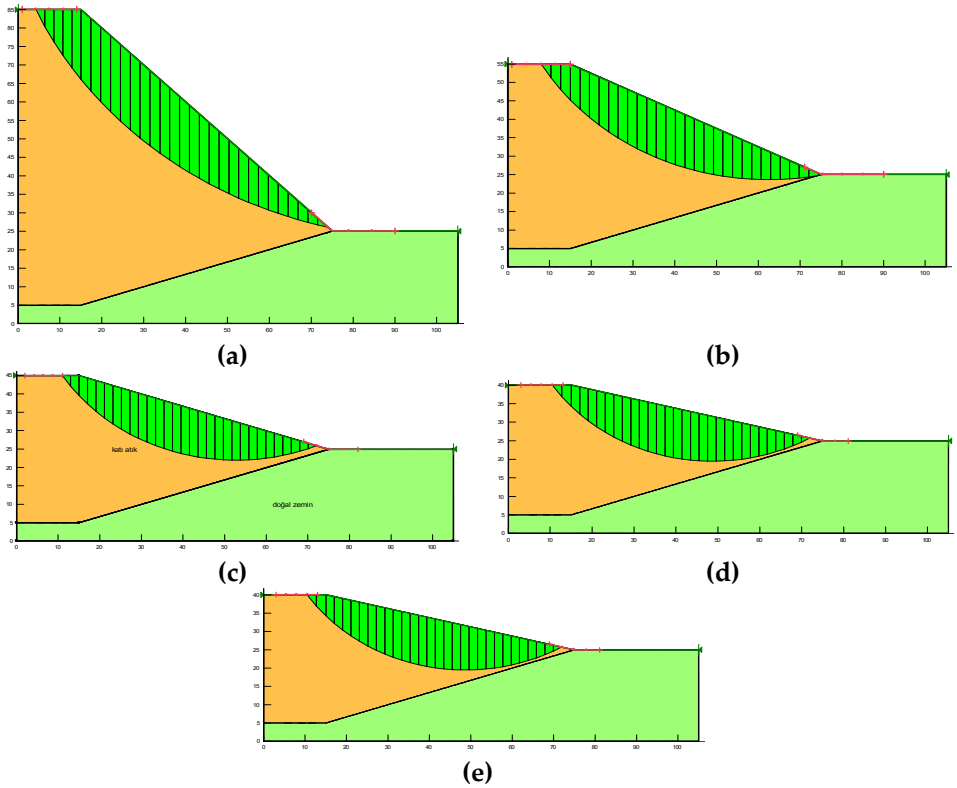


Figure 9. (**a**) 1V/1H; (**b**) 1V/2H; (**c**) 1V/3H; (**d**) 1V/4H; (**e**) 1V/5H. Failure planes (LEM).

3.2. Reinforced Analyses

The results of the FEM analysis of the behavior of geogrid-reinforced solid waste landfills are presented. By using the optimum number of geogrids obtained as a result of the FEM analysis, LEM analyses were performed, and the results were compared. In addition, FEM analyses were carried out to obtain the relation of the FS of the MSW landfill

slope reinforced with the optimum number of reinforcements depending on the parameters of c, ϕ, γ, and the material model.

3.2.1. Effect of Geogrid Number

In the analyses, the effect of placing geogrid reinforcements at various spacings on the slope stability was investigated by using the PLAXIS computer program. For this purpose, as a result of the analyses carried out previously without reinforcements, a solid waste landfill with a slope angle of $\beta = 26.56^{\circ}$ whose safety number is FS = 0.99, that is, 1V/2H slope, H = 30 m high, was considered, and analyses were carried out by placing geogrid reinforcements at different spacings. In the analyses, other the parameters were the internal friction angle, $\phi = 15^{\circ}$; cohesion, c = 10 kN/m^2; dilatation angle, $\psi = 0^{\circ}$; modulus of elasticity, E = 6500 kN/m^2; Poisson's ratio, $\nu = 0.45$; and the unit volume weight, $\gamma = 9$ kN/m^3. Geogrid spacings (h) were taken as certain ratios of the slope height (H) and made dimensionless in terms of H/h. In the analyses, an EA value of 1100 kN/m was entered into the program as the material property of the geogrid reinforcement layers.

In the FEM analysis, while determining the initial stresses of the landfill slope, first, the gravitational force was applied since the MSW landfill slope is not horizontal. In the second stage, geogrids were activated, and in the third stage, stability analyses were performed with the phi-c reduction method, and FS values were obtained.

A numerical analysis set was carried out to determine the effects of the geogrid reinforcement on the slope stability. The Analysis was carried out in seven sets. Table 6 summarizes the analysis sets with the constant and variable parameters used.

Table 6. Reinforced analysis sets.

Analysis No	Slope Height, H (m)	Geogrid Spacing, h (m)	H/h
1	30	1.0	30
2	30	2.0	15
3	30	3.0	10
4	30	5.0	6
5	30	6.0	5
6	30	7.5	4
7	30	10.0	3

Figure 10 and Table 7 present the FS values obtained with different geogrid numbers.

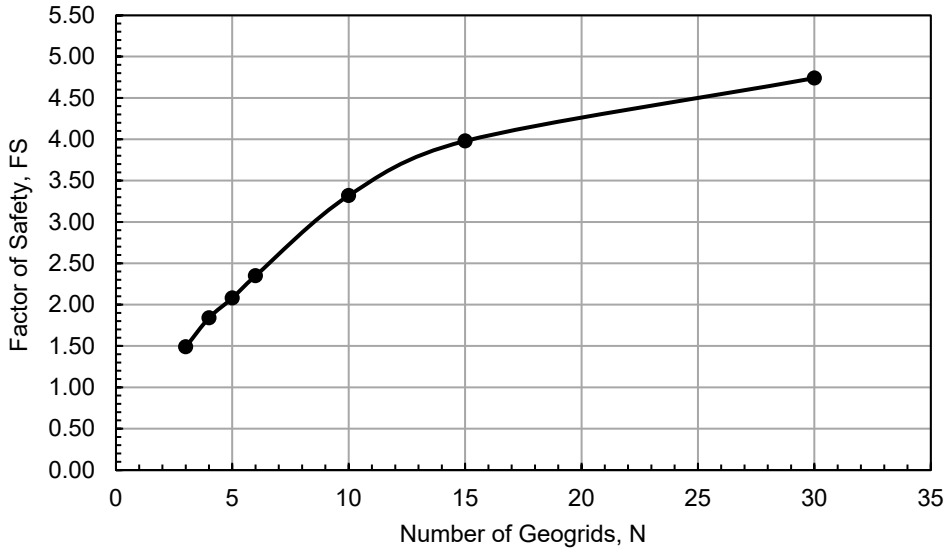


Figure 10. Variation in FS with N.

Table 7. Results of reinforced analysis.

Number of Geogrids, N	Factor of Safety, FS
0	0.99
3	1.49
4	1.84
5	2.08
6	2.35
10	3.32
15	4.68
30	4.74

When the results obtained from the reinforced analyses are evaluated, it is seen that the stability of the slope can be increased significantly depending on the geogrid reinforcement spacing and the geogrid number values in the case of using geogrid reinforcements. According to Table 7 and Figure 10, as the reinforcement spacing decreases, in other words, as the number of reinforcements increases, higher FS values are obtained. However, since the FS value is generally desired to be higher than 1.50 (FS > 1.50) in slope stability analyses, it has been observed that this criterion cannot be provided if the geogrid reinforcement spacing is 10 m (N = 3) or more. According to the results, the safety factor value (FS = 0.99), which is less than 1.50 in the unreinforced condition, becomes greater than 1.50 (FS = 1.84) when N = 4 geogrid reinforcements are placed in the MSW landfill slope. Although the FS > 1.50 criterion is provided for other reinforcement spacings (H/h = 30, H/h = 15, H/h = 10, H/h = 6 and H/h = 5), it is seen that the H/h = 4 combination is more suitable for an economical solution in the model considered.

Analyses were performed to investigate the effect of the weight of the geogrids on the FS of the MSW landfill slope. In the analyses, factory values were used for the geogrid weight, and the weight was applied to the slope as a surcharge load. As a result of the analyses, no change was observed in the FS of the slope in the case of the N = 4 geogrid, while a decrease of approximately 2% in the FS of the slope was observed in the analyses performed for the N = 30 geogrid.

The failure plane occurring in the MSW landfill slope can be obtained by plotting the shear strain increment. In the unreinforced condition, the failure plane is quite distinct and extends to the toe region of the slope (Figure 11a). The failure plane moved away from the toe region due to the increase in the number of geogrids placed in the slope (Figure 11b–e). This is due to the high tensile strength of the geogrid reinforcements [45]. As the number of geogrids placed in the slope increases, in other words, as the vertical distance between the geogrids decreases, the slip circle is formed in a thinner region.

When the studies on the reinforcement of the MSW landfill slope using geogrids were examined, it was seen that a similar behavior was obtained. In the study carried out by Hettiarachchi and Ge [37], it was stated that the FS of the slope could be increased by 1.63 times if five geogrids were placed in the 25 m high 1V/3H MSW landfill slope.

Table 8 and Figure 12 present the FS changes depending on the number of geogrids in the case of the N = 4 geogrid in the MSW landfill with a 1V/2H slope.

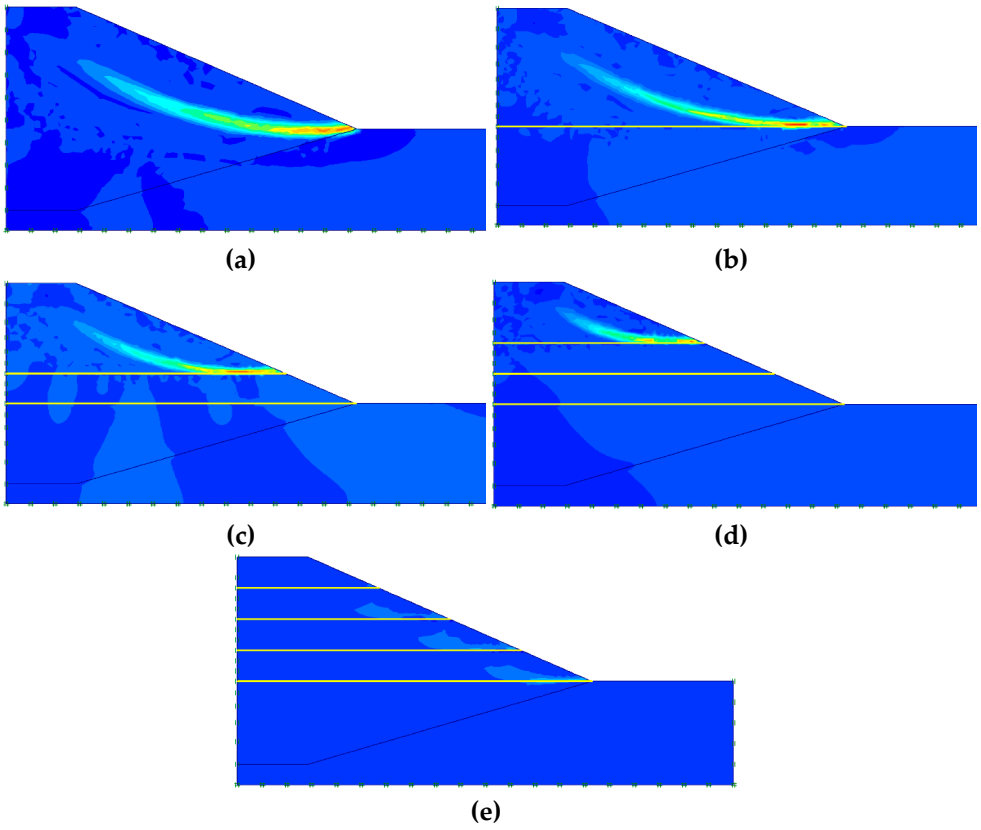


Figure 11. (**a**) Shear strain increment (without geogrids); (**b**) shear strain increment with one geogrid; (**c**) shear strain increment with two geogrids; (**d**) shear strain increment with three geogrids; (**e**) shear strain increment with four geogrids. Shear strain increment in FEM analysis.

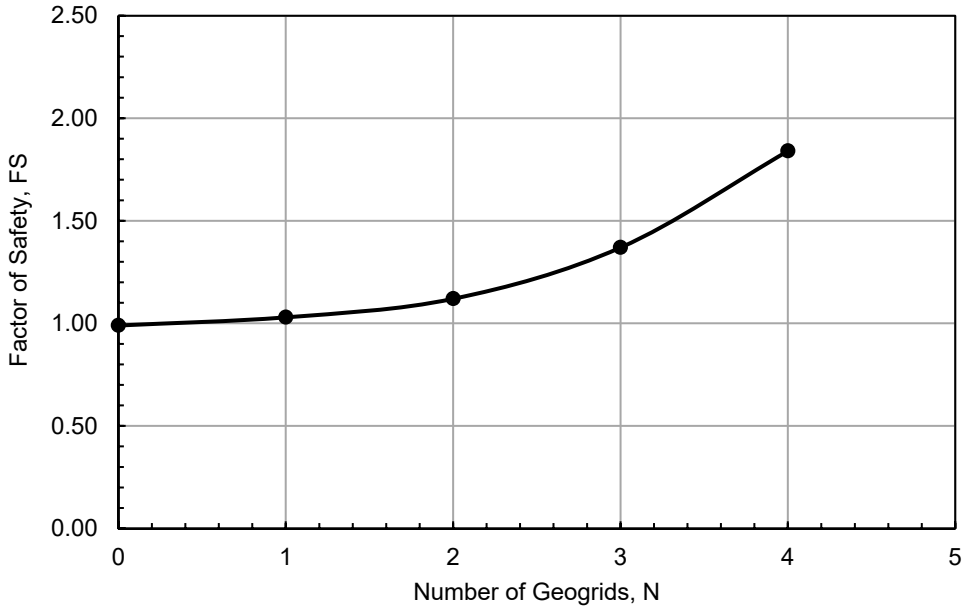


Figure 12. Variation in FS with N (1V/2H slope) (FEM).

Table 8. FEM analysis results for the reinforced slope (1V/2H slope, N = 4).

Number of Geogrids, N	Factor of Safety, FS
0	0.99
1	1.03
2	1.12
3	1.37
4	1.84

Table 8 and Figure 12 show that the FS value can be increased up to FS = 1.84 by placing the geogrid reinforcements in the MSW landfill slope with h = 7.5 m spacings. In this case, the FS value increases by approximately 1.86 times compared to the unreinforced condition.

By using the optimum number of geogrids (N = 4) obtained by the finite element method, limit equilibrium analyses were carried out with the SLOPE/W program. In the analyses, other parameters were $\phi = 15^{\circ}$; c = 10 kN/m^2; $\psi = 0^{\circ}$; E = 6500 kN/m^2; $\nu = 0.45$; γ =9 kN/m^3; and $\beta = 26.56^{\circ}$.

In the case where the geogrid reinforcement layers are placed in the MSW landfill slope as h = 7.5 m, the FS values obtained for N = 4 geogrids are shown in Table 9, and the geogrid number (N)–safety number (FS) relationship is shown in Figure 13.

Table 9. LEM analysis results for the reinforced slope (1V/2H slope, N = 4).

Number of Geogrids, N	Factor of Safety, FS
0	1.02
1	1.05
2	1.30
3	1.57
4	1.89

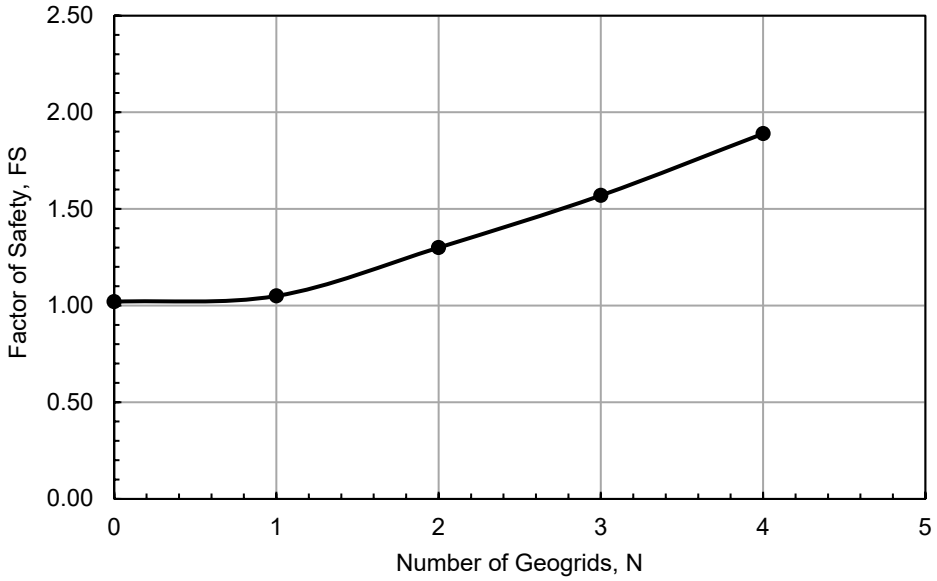


Figure 13. Variation in FS with N (1V/2H slope) (LEM).

From Table 9 and Figure 13, it is seen that the FS value can be increased up to FS = 1.89 by placing geogrid reinforcements at 7.5 m spacings in the MSW landfill slope. In this case, the FS value increases by approximately 1.85 times compared to the unreinforced condition (FS = 1.02). Figure 14 presents the slip surfaces obtained from the LEM analysis.

Figure 15 presents the factor of safety–number of geogrids relationship obtained as a result of the FEM and LEM analyses for N = 4 geogrids. It can be seen from Figure 15 that for geogrid-reinforced MSW landfill slopes, the FS values obtained by LEM are greater

than those obtained by FEM. It is thought that the reason for this is due to some limitations in some local stresses occurring at the top and toe of the slope in limit equilibrium methods. In this study, the FS values obtained by LEM are on average 2% greater for the unreinforced case and 8% for the reinforced case than those obtained by FEM.

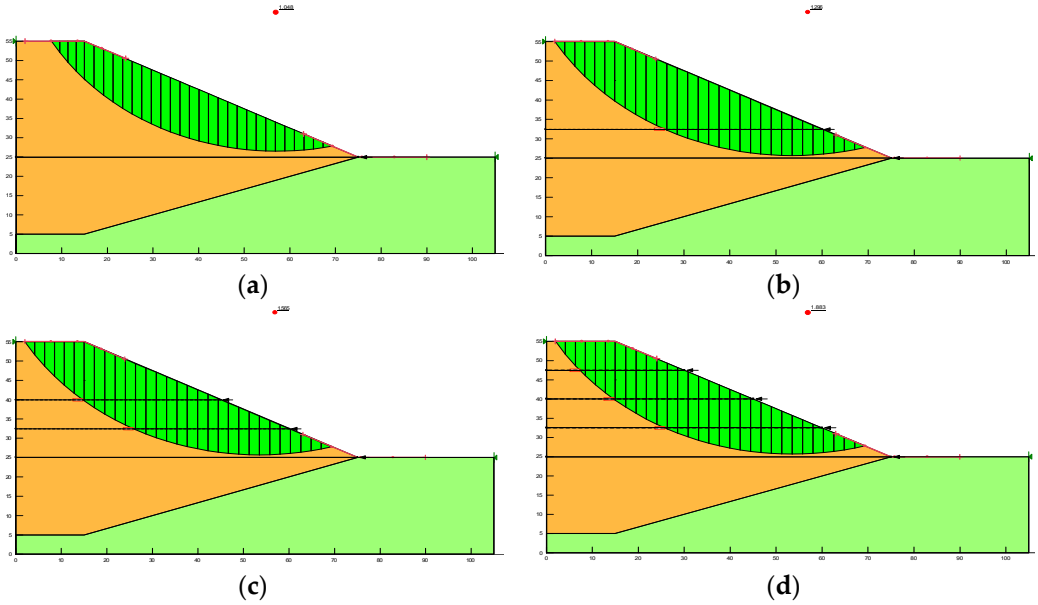


Figure 14. (**a**) N = 1; (**b**) N = 2; (**c**) N = 3; (**d**) N = 4. Slip surfaces of the reinforced slope obtained by LEM analysis.

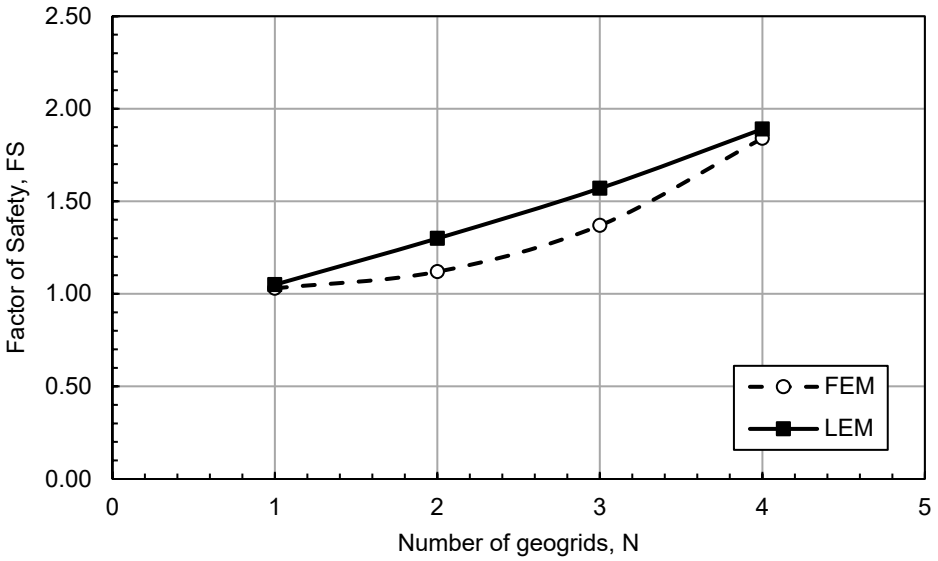


Figure 15. Comparison of FEM and LEM results (N = 4).

3.2.2. Effect of Cohesion on the Reinforced Slope

In order to investigate the effect of cohesion (c) on the optimum reinforced slope stability, FE analyses were carried out for different cohesion values of the MSW landfill. In the analyses, the other parameters were chosen as $\phi = 15°$; $\psi = 0°$; E = 6500 kN/m^2; $\nu = 0.45$; $\gamma = 9$ kN/m^3; $\beta = 26.56°$ (1V/2H); and N = 4. The FS values for different cohesion values obtained as a result of the FEM analyses are shown in Table 10 and Figure 16.

Table 10. Analysis results for different cohesion values (N = 4).

Cohesion, c (kPa)	Factor of Safety (FS)
	FEM
5	1.33
10	1.84
15	2.32
20	2.78
25	3.22
30	3.65
35	4.09
40	4.53
45	4.96
50	5.38

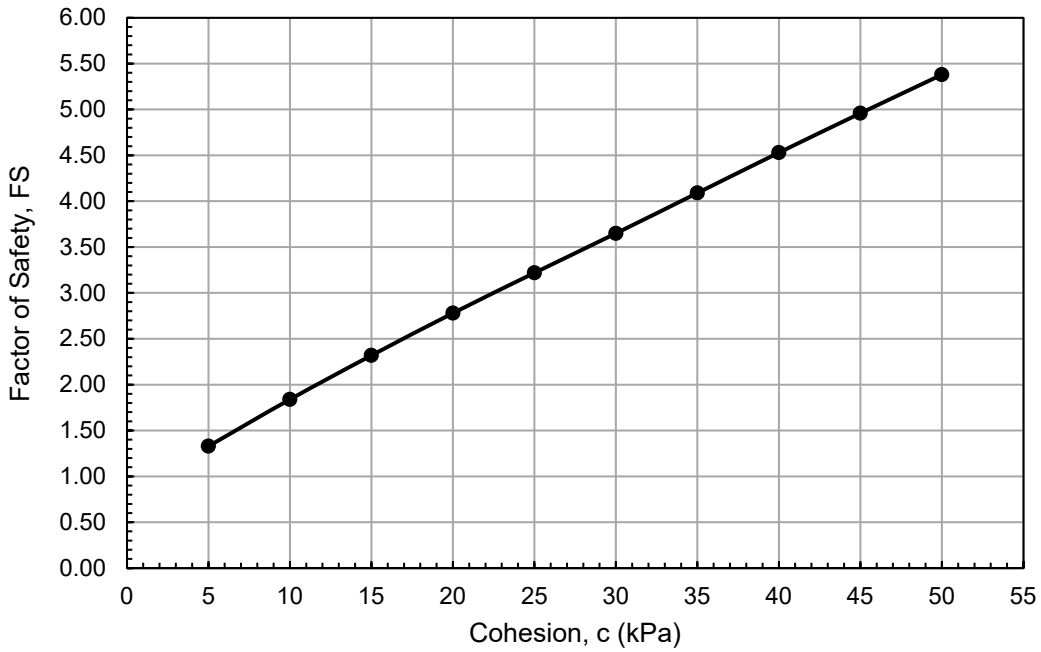


Figure 16. Variation in FS with c for the reinforced slope.

From the analyses performed to determine the effect of cohesion (c) on the reinforced slope stability, it can be seen that the FS of the slope increases linearly with an increasing cohesion value.

3.2.3. Effect of Internal Friction Angle on the Reinforced Slope

FEM analyses were carried out for different ϕ values of the MSW landfill to investigate the effect of ϕ on slope stability. In the analyses, the other parameters were chosen as c = 10 kPa, ψ = 0°, E = 6500 kN/m^2, ν = 0.45, γ = 9 kN/m^3, β = 26.56° (1V/2H), and N = 4.

Table 11 and Figure 17 show the FS values for different internal friction angle values obtained from the FEM analyses.

Table 11. Analysis results for different internal friction angle values (N = 4).

Internal Friction Angle, ϕ (°)	Factor of Safety (FS)
	FEM
5	1.21
10	1.54
15	1.84
20	2.13
25	2.46
30	2.76
35	3.12
40	3.47
45	3.89
50	4.38

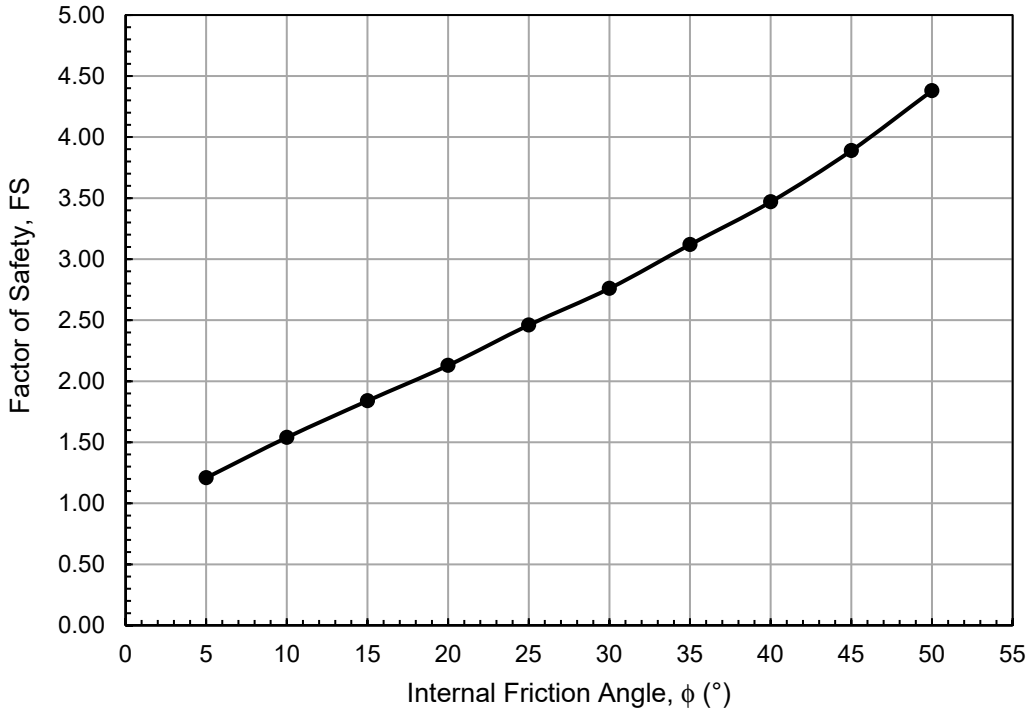


Figure 17. Variation in FS with ϕ for the reinforced slope.

From the analyses performed for investigating the effect of ϕ on the reinforced slope stability, it is clear that the FS of the reinforced slope increases approximately linearly with the increase in the ϕ value, similar to the cohesion effect.

Depending on the increase in the ϕ and c values of the MSW landfill, the shear stresses, displacement, and strain values occurring in the slope decrease, and the FS of the slope increases. In addition, with the increase in the shear strength parameters, the interaction between the geogrid reinforcements and the MSW landfill material increases, which allows for higher FS values.

3.2.4. Effect of Unit Weight on the Reinforced Slope

Table 12 and Figure 18 show the variation in FS values with γ of the MSW landfill. In the analyses, the other parameters were chosen as c = 10 kPa, ψ = 0°, E = 6500 kN/m^2, ν = 0.45, ϕ = 15°, β = 26.56° (1V/2H), and N = 4.

Table 12. Analysis results for different unit weight values (N = 4).

Unit Weight (γ) (kN/m^3)	Factor of Safety (FS)
	FEM
9	1.84
10	1.74
11	1.65
12	1.58
13	1.52

As seen in Table 12 and Figure 18, the unit weight of solid waste significantly affects the stability of the MSW landfill in reinforced conditions. A wide range of γ values can be obtained depending on the waste type, the degree of degradation and compaction, and the depth at which the sample was taken. As a result, the FS decreases depending on the increase in the γ value.

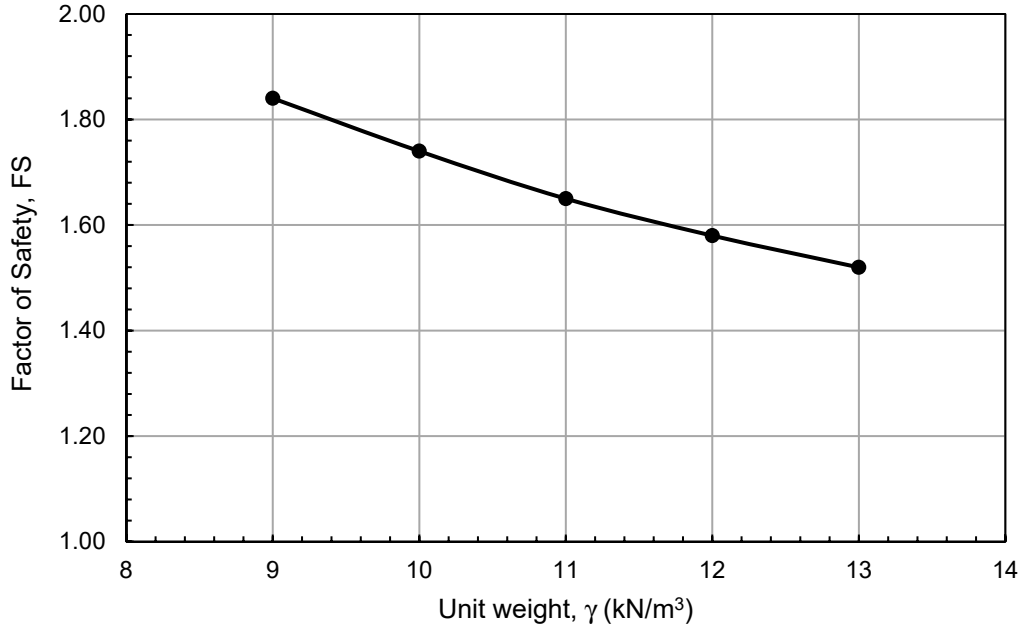


Figure 18. Variation in FS with γ for the reinforced slope.

3.2.5. Effect of Material Model on the Reinforced Slope

In this study, the Mohr–Coulomb material model (MCM) was used to analyze the slope stability of the MSW landfill. MCM has been used by many researchers in the analysis of MSW landfill slopes because it gives acceptable results and the parameters required for modeling can be obtained more easily than other advanced material models [7,46–48]. The creep deformation and humidity distribution of MSW plays a key role in the stability of MSW landfill slopes [49,50]. Given this, the Mohr–Coulomb model cannot accurately represent the macroscopic response without considering the mechanical creep. Finite element analyses were performed using the soft soil creep model (SSCM) in the PLAXIS program for investigating the mechanical creep effect on the stability behavior of the MSW landfill slope.

The SSCM is used to model the time-dependent behavior of soft soils. Cohesion, c; internal friction angle, ϕ; dilatation angle, ψ; modified compression index, λ^*; modified swelling index, κ^*; and the modified creep index, μ^*, are entered as input parameters in the model. The modified compression index, λ^*; the modified swelling index, κ^*; and the

modified creep index, μ^*, can be obtained both from an isotropic compression test and an oedometer test [17]. These parameters can be calculated from Equations (1)–(3).

$$\lambda^* = \frac{C_c}{2.3(1+e)} \tag{1}$$

$$\kappa^* \approx \frac{2}{2.3}\frac{C_r}{(1+e)} \tag{2}$$

$$\mu^* \approx \frac{C_\alpha}{2.3(1+e)} \tag{3}$$

where C_c is the compression index, C_r is the recompression index, C_α is the secondary compression index, and e is the initial void ratio. The parameters used in the analyses were obtained from the studies available in the literature. Gabr and Valero [20] conducted compressibility tests and reported that the C_c value is between 0.4–0.9, C_α ranges from 0.03 to 0.009, and the initial void ratio, e, ranges between 1.0 and 3.0. Kavazanjian et al. [51] presented the results of one-dimensional compression tests on MSWs with varying degrees of degradation and found that values of the recompression index, C_r, varied from 0.003 to 0.017. In the analyses performed using the SSCM, mean values were taken and the input parameters, the modified compression index, λ^*; the modified swelling index, κ^*; and the modified creep index, μ^*, were obtained using C_c = 0.65, C_α = 0.0195, C_r = 0.01, and e = 2.

When Table 13 and Figure 19 are examined, it is seen that the FS values obtained using the SSCM in both the unreinforced and reinforced conditions are lower than the values obtained using MCM. While the difference between the FS values is 2% in the unreinforced case, this difference is around 3.3% in the reinforced case.

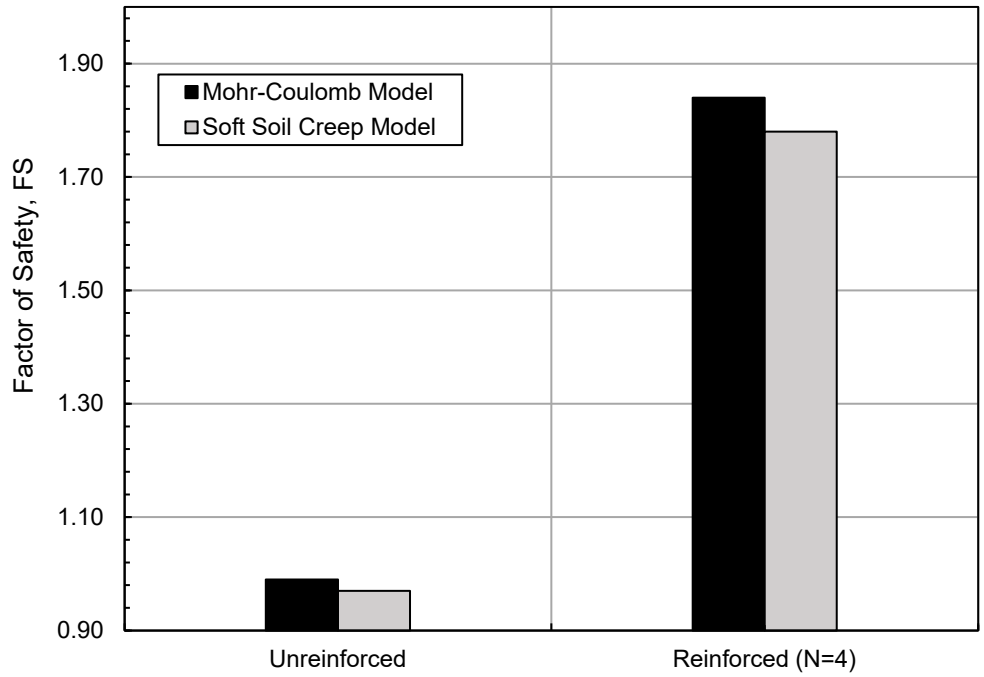


Figure 19. FS values obtained from different material models.

Table 13. Analysis results for different material models (N = 4).

Material Model	Factor of Safety	
	Unreinforced	Reinforced (N = 4)
SSCM	0.97	1.78
MCM	0.99	1.84

4. Conclusions

In this study, stability analyses of MSW landfill slopes in unreinforced and geogrid-reinforced conditions were carried out. Analyses were carried out using FEM and LEM. Based on the analysis results, the following main conclusions can be drawn:

- According to the results obtained from the unreinforced and reinforced analyses, the FS of the MSW landfill slope changes depending on the internal friction angle, cohesion, unit weight, and material model parameters of the solid waste. Considering that the range given for these parameters in the literature is quite wide, choosing these parameters correctly is very important in the stability calculations of the slope.
- By using geogrid reinforcements, the FS of MSW landfill slopes can be improved significantly. Reinforced slopes behave similar to a composite material due to the interlocking and frictional resistances that occur between the reinforcements and the waste material. With the use of geogrid reinforcements, the stability of the slopes increases, while the FS increases significantly.
- According to the results obtained from the reinforced analyses, it has been seen that the FS can be increased by up to 1.86 times by placing four geogrid reinforcements in the 1V/2H MSW landfill slope. In other words, if geogrid reinforcements are placed inside the MSW landfill slope, more solid waste can be stored compared to the traditional 1V/3H slope.
- The optimum number of geogrids and the vertical spacing required for different heights, slope angles, and different indices and shear strength parameters of the solid waste material can be obtained by numerical modeling of MSW landfill slopes.
- Since the limit equilibrium and finite element methods use different approximation principles in slope stability analysis, there are differences between the FS values obtained by the two methods.
- While the boundaries of the slip surface are determined by the user in LEM analyses, the slip surface is automatically created by the program in FEM analyses. In addition, the failure surface mechanism can be revealed by plotting shear strain increases in FEM analyses.
- Considering the mechanical creep behavior in the analysis of MSW landfill slopes, more realistic solutions can be obtained. In the preliminary analyses carried out using the SSCM within the scope of this study, there is a slight difference in FS values obtained using the MCM. Although the MCM is frequently used in studies on the subject, advanced material models that can take into account mechanical creep and time-dependent behavior should be used.

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Stability of slopes of municipal solid waste landfills with co-disposal of biosolids

M. Chopra, D. Reinhart, M. Vajirkar & B. Koodhathinkal
University of Central Florida, Orlando, Florida, USA

Abstract

This paper deals with the impact of the addition of biosolids on the geotechnical properties of class I landfills with Municipal Solid Waste (MSW). The properties are estimated from a field exploration program using the Cone Penetration Test (CPT). The geotechnical shear strength parameters (angle of internal friction and cohesion) of MSW and biosolids mixture are estimated by correlation with the CPT results. These parameters are then used to study the impact of the addition of biosolids on the stability of the slope of the landfill. The slope stability analysis is conducted on various landfill models using the software SLOPE/W. The waste is assumed to act similar to a cohesionless soil. Based on the field explorations, the angle of internal friction was found to be about 29°. Previous research indicated that the most suitable approach to introducing biosolids into the landfill was in the form of trenches. From the slope stability analysis, it was found that the factor of safety reduces significantly with the introduction of biosolids due to a reduction in the shear strength and with increase in the overall moisture content.
Keywords: landfills, biosolids, slope stability analysis, cone penetrometer.

1 Introduction

Landfills are well engineered facilities that are used for disposal of Municipal Solid Waste (MSW) and are located, designed, monitored, operated and financed to ensure compliance with federal regulations. Disposal of water treatment facility sludge and wastewater treatment facility biosolids presents significant challenges to facility operators, as this practice often violates loading of metals and exceeds the allowable levels of pathogens for land application. Thus,

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landfilling of the biosolids is promising as it results in minimal contact with humans and can provide moisture in the landfill for it to act as a bioreactor.
With the addition of sludge and biosolids, significant changes in the composition and characteristics of landfill may take place. The stability of waste slopes is particularly important and depends on the strength properties of the MSW with biosolids. The complexity of the problem is further increased by the heterogeneous nature of waste, placement conditions and level of decay of various constituents of the landfills. Proper analysis and design of the landfills have pushed the boundaries of geotechnical engineering practice, in terms of proper identification and assessment of strength and deformation characteristics of waste materials (Sharma et al. [1]; Sadek et al. [2]).

Typical laboratory approaches to measure the geotechnical parameters of the waste such as density, moisture content, cohesion, and shear strength have limitations due the heterogonous nature of the MSW. The scarcity of data is due to the difficulties in sampling and testing the refuse. This difficulty is further compounded by the fact that refuse composition and properties are likely to change within a landfill and the waste is likely to decompose with time. An alternate method for estimating landfill geotechnical properties is using in-situ testing devices that provide accuracy with minimal efforts and costs. In the field of geotechnical engineering, a device that meets these criteria for soil testing is the Cone Penetrometer. The unit weight, moisture content, friction angle and cohesion influence the stability of landfill side slopes and interfaces among landfill components. True cohesion between particles is unlikely in landfills but there may be significant cohesion that results from interlocking and overlapping of the landfilled constituents (Singh and Murphy [3]).

This paper aims to evaluate the performance of slopes in landfills that may allow the co-disposal of sludges and biosolids, using standard slope stability analyses. Field tests using a Cone Penetrometer are carried out, followed by a slope stability analysis on landfill models using the computer software SLOPE/W (Geo-Slope [4]).

2 Field site description

The field study was conducted at the Highlands County Landfill, located in Highlands County, Sebring, Florida. Two test MSW pads, namely Pilot Area (PA) and Control Area (CA) were constructed at this location. Each test pad was about 120 by 100 feet in plan dimensions at it base and 40 by 60 feet at the top. The height of each test pad was about 10 feet. The compacted waste below the test pads had an average thickness of about 13.2 feet. Liquid biosolids from the City of Sebring Wastewater Treatment Plant were added to the waste in the PA. Two tanker loads of unstabilized biosolids in the form of sludge were transported from the City of Sebring Wastewater Treatment Plant to the site. The liquid sludge had a solids content of 23 g/l or about 3%. The sludge volume was about 1,202 cubic feet which occupied about six inches of depth on an average. The measured decrease in the surface elevation of the impounded sludge due to infiltration of sludge moisture into the underlying and surrounding MSW over 48

hours was about 0.8 inches on an average. Based on the rate of evaporation for the site area for the month of May, approximately 0.45 inches of the measured decrease in sludge level over 48 hours could be attributed to evaporation losses from the surface. The resulting average thickness of the remaining sludge in the entire impoundment was about 4.75 inches.

The bulldozer operator had no problem operating the machine over the top of the sludge. The bearing capacity for the wide track, low ground pressure bulldozer (36-inch wide tracks) was excellent with no machine tilting or soft spots were encountered. The three-foot thick layer of MSW was compacted into a layer about 1.5 feet thick, without any observed extrusion of sludge to the surface. No soft spots were encountered and no pumping action was observed as the compactor moved back and forth. Additional MSW was then placed, spread, and compacted on the pad. All four side slopes were constructed at a final grade of about 1:3. The entire surface of the test pad was covered with 24 inches of loosely spread intermediate cover soil. The Control Area (CA) was prepared in a similar manner without the addition of sludge.

A total of 28 cone penetration tests were then conducted at these areas, five at CA and twenty three at PA. CPT locations were taken as close to edge of the slope as the truck could be placed.

3 Methodology

3.1 Cone penetration tests

The CPT utilizes electrical transducers rather than analog gauges to obtain a nearly continuous profile of point (tip) resistance, sleeve friction and pore pressure with depth. Specialized data acquisition hardware and software was used to record readings from the transducers at a frequency of approximately five readings per second. Electrical signals reading were then converted to engineering units of stress using device-specific calibration factors. Immediately after the sounding was completed, the borehole was filled with bentonite clay to the top of the intermediate soil cover to prevent water and gas transport from the landfill.

The desired depth of soundings in pilot area and control area was about 20 feet from the intermediate soil cover. Ten soundings had to be terminated at depths shallower than the intended depth due to buried obstructions encountered in the path of the cone in the test areas. The data was stored and used in a subsequent statistical data reduction analysis to determine the geotechnical properties for use in subsequent slope stability modeling. A frequency distribution curve of the values of tip resistance was created for each sounding. In order to eliminate outliers in the tip resistance values, the cut off frequency values was selected as 20. Unrealistic tip resistance and pore pressure values are possibly due to the heterogeneous material and obstructions.

Based on the field results for tip resistance and sleeve friction, an attempt was made to estimate the location and potential effect of the biosolids layers within the MSW mass. However, this layer could not be identified explicitly, as the

biosolids added had only about 3% solids content; it is likely that the wet material got very well mixed with the MSW.

The CPT data provides a repeatable index of the aggregate behavior of the in situ soil in the immediate area of the probe (Robertson [5]). Based on the average values of the MSW parameters, the landfill material is seen to behave similar to "Coarse Grained Sandy-Silty Soil". Since the material is classified as sand, charts proposed by Robertson and Campanella [6] may be used to estimate the friction angle for the MSW. The resulting friction angle values were adjusted proportionally for variation in density. This is a conservative approach and the actual friction angle (ϕ) may be somewhat higher. From the generalized equation for friction angle, the average value of friction angle was found to be 29º.

3.2 Slope stability analysis

The behavior of MSW is assumed to be frictional in nature and is governed by the Mohr-Coulomb criteria. The slope stability analysis was conducted using the software SLOPE/W. Daily or intermediate cover was not taken into account in the slope stability analysis. The biosolids or sludges were placed in trenches. The geotechnical properties needed for modeling the slope stability were determined in the field using CPT testing as discussed in the previous section. The landfills were analyzed under circular failure and block failure conditions, and the factors of safety against these modes of failure were evaluated. This paper only presents the results of the study with circular failure. A factor of safety is an index indicating the relative stability of a slope. It does not imply the actual risk level of the slope due the variability of input parameters. With probabilistic analysis, two useful indices are available to quantify the stability or the risk level of a slope. These two indices are known as the probability of failure and the reliability index. The input parameters required for the Mohr-Coulomb Failure Model are unit weight, angle of internal friction and cohesion with associated standard deviation (SD) values for each parameter.

Table 1 shows the properties of each material used as input in the model. In Table 1, MSW+BS1, MSW+BS2 and MSW+BS3 refer to layers of different moisture content, which indicate the gradual migration of the biosolids' moisture into the MSW. This is reflected in the gradation of shear strength parameters with addition of biosolids to the MSW. The shear strength parameters were estimated from the field data obtained using the CPT.

For landfills modeled using the circular failure model, the radius of failure plane and the center of the circular failure plane are required to be defined. The radius of the failure plane was specified such that it covers a large range of radii, while the grid for the center of the circular failure plane was chosen so that the minimum factor of safety lies within the grid. Once the landfill model is developed and the grid and radii for the failure plane are specified, slope stability analysis is carried out. A typical result from the program is shown in Figure 1 indicating the failure plane and the minimum factor of safety for the chosen grid.

Table 1: Landfill material properties used in modelling.

Material Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)	Source
MSW	70 (SD=5)	0	29 (SD=5)	Field CPT
BS	35 (SD=5)	0	0	Ref [7]
MSW + BS1	70 (SD=5)	0	7 (SD=5)	Extrapolated Results
MSW + BS2	70 (SD=5)	0	15 (SD=5)	Extrapolated Results
MSW + BS3	70 (SD=5)	0	22 (SD=5)	Extrapolated Results
Sand Liner	30 (SD=3)	0	40 (SD=5	Ref [8]

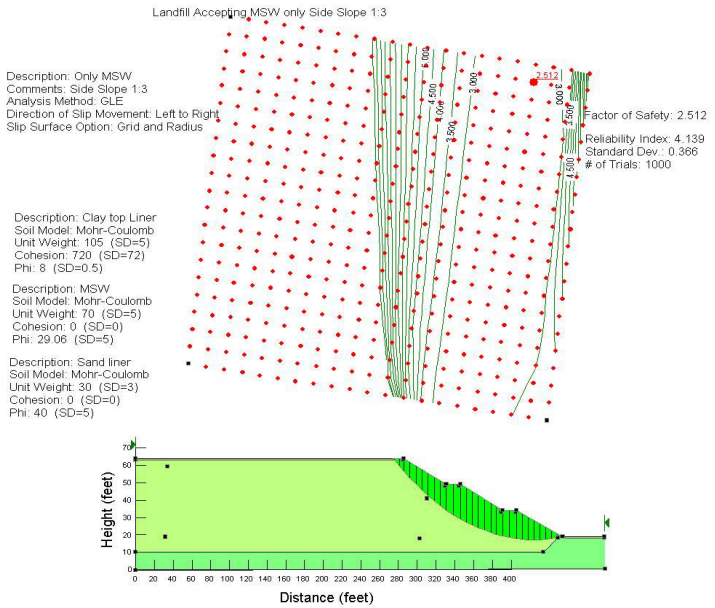

Figure 1: Typical slope stability analysis - landfill of slope 1:3 with MSW only – circular failure.

Next, a landfill model was generated incorporating the placement of biosolids in trenches as shown in Figure 2. The width of the trench was about 2-2.5 feet and spacing between the trenches was about fifteen feet. The depth of the trenches was about six feet. Biosolids were added in the trenches. The trenches were then filled with regular MSW and compacted with regular effort. The compaction effort needed to compact the waste layer was reduced based on

discussions with the landfill operators. Slope stability analysis was then conducted on landfill models with side slope varying from 1:2 to 1:4. Although side slope 1:2 is not permitted in Florida state regulation, it is studied as an extreme condition.

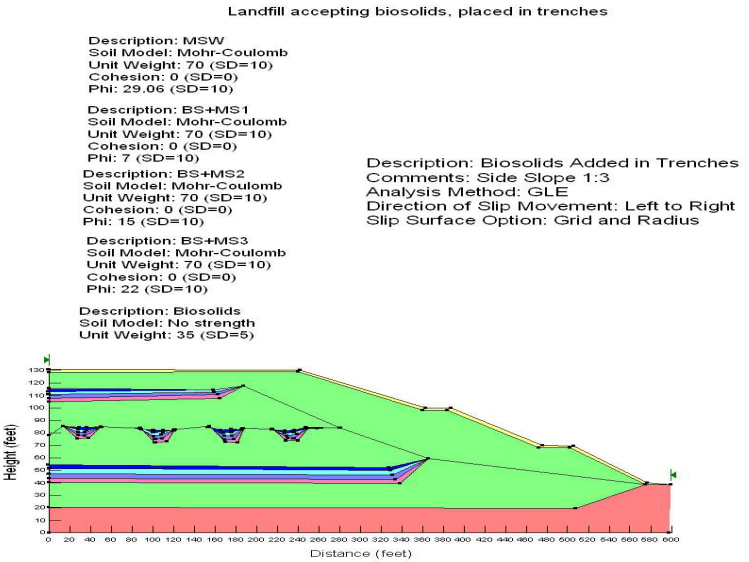

Figure 2: Typical landfill profile with biosolids placed in trenches.

4 Results

The results are reported in two parts - results from the field tests and those from the subsequent slope stability study. Field tests conducted consisted of Cone Penetration Test on areas receiving biosolids, areas without biosolids. The average tip resistances range from 60 to 100 tsf, the average sleeve resistance is in the range of 0.7 to 2.4 tsf. These are similar to the range of tip resistance and sleeve resistance values from previous literature on CPT used in landfills. The region of solid waste is characterized by a highly variable set of test results.

The CPT results indicated that the cone frequently encountered stiff objects, which produced sharp peaks in the tip resistance measurements resulting in highly variable readings. However, a trend of increasing lower bound tip resistance with depth, was apparent in most the tests. It is important, therefore, to reduce these data by eliminating unrealistic outliers based on cone tip resistance and pore pressure values. From the CPT probes, daily or interim cover soil could not be distinguished from the refuse.

Using the method proposed by Robertson and Campanella [6], it is possible to derive the profile of friction angle as a function of depth from the piezocone penetration data for the landfill. The average value of friction angle is 29º. This value of friction angle (ϕ) is used for slope stability analyses.

Slope stability analysis was conducted using commercially available software SLOPE/W on models of landfills with and without biosolids. Biosolids were placed in trenches and different values of side slope such as 1:2, 1:3 and 1:4 were modeled. Three scenarios are considered.

1. Landfill with MSW only.
2. Landfill with MSW and biosolids which were placed in trenches.
3. Landfill with MSW and biosolids in trenches taken close to the edge of the slopes.

Table 2 presents the results of the factor of safety (FOS) of landfill slopes for the different conditions that are modeled for the circular failure mode.

Table 2: Factor of safety for landfills with different side slopes.

Side Slope	MSW only		MSW and Biosolids		MSW and Biosolids with trenches close to side slope	
	FOS	Reliability Index	FOS	Reliability Index	FOS	Reliability Index
1:2	1.94	16.3	1.72	19.0	1.26	7.0
1:3	2.51	19.3	2.17	17.4	1.28	6.4
1:4	2.96	21.8	2.31	3.4	1.75	11.1

5 Discussion

Flattening the slope not only reduces the sum of the driving forces, but also tends to force the failure surface deeper into the ground. The change in length of the failure surface increases in the resisting forces because the shear strength is distributed over a wider area, thereby enhancing stability. Results for FOS suggest that the stability of the landfill slope has been reduced with the addition of biosolids.

The factor of safety is clearly reduced if the biosolids trenches are placed close to the edges of the slopes. This scenario allows a weak plane to develop close to the side slope and encourages the failure plane to pass through this weak layer. This situation is considered unstable and needs to be avoided in the field. These results are similar to the previous work by Koodhathinkal [7] who tested MSW with biosolids in a laboratory study. The lower values may be attributed to a lower friction angle for biosolids that are placed as discrete layers and may not be completely mixed in with the MSW.

Disposing of biosolids in trenches is a feasible solution from both slope stability point of consideration and ease of field application practice. However, trenches should not be close to the edge side of the landfill as the factor of safety reduces significantly.

Berms at the toe of slopes contribute to resisting forces and as a result there is an increase in the factor of safety when considering local failures.

6 Conclusions

Based on the field explorations, the angle of internal friction was found to be about 29°. The most suitable approach to introducing biosolids into the landfill was in the form of trenches. From the slope stability analysis, it was found that the factor of safety reduces significantly with the introduction of biosolids due to a reduction in the shear strength and with increase in the overall moisture content.

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[7] Koodhathinkal, B. R. (2003). Stability of Slopes in a Class I Landfills with Co-Disposal of Sludges and Biosolids. MS Thesis, University Of Central Florida.

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CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer St Research

Sharon McCarthy <[redacted] Wed, Jan 24, 2024 at 8:36 AM
To: "rmorris@arvada.org" <rmorris@arvada.org>
Cc: Jeremiah Bebo <jbebo@arvada.org>

Ms Morris,

My name is Sharon McCarthy and I live in west Arvada. I represent the Forest Springs community as a member of a non-profit group Friends of Ralston Creek Neighborhoods(FRCN). I attended the Council meeting on Monday, January 22 and understand the role of the legal department to protect the City and its citizens from potential litigation.

You may be aware that FRCN represents neighbors concerned about a proposed RV storage lot at 6800 Kilmer St, a closed unregulated landfill. I share with you some questions about language in the Voluntary Cleanup(VCUP) and a document representing the developer's responses to a public meeting. I respect that you may not comment on my information. I include Jeremiah Bebo with this email as he is the Project Manager for the proposed RV redevelopment and maintains a file of community communication.

I submit two examples of failed redevelopment of old landfills as a FYI. We researched the Rooney Sports Complex in Golden. The City planned for resurface work and was faced with a decision as to how to address more complex issues. The fields were designed in 2007 with information known at the time. Ten-fifteen years later, the surface areas of the fields had to be replaced and only if the subsurface was remediated at the cost of millions of dollars. Another failed redevelopment of an old landfill is a DPS bus terminal in north Denver. Both these sites demonstrate evidence of settlement and subsidence that are costly to remediate initially and long term.

Our concern is lack of evidence if heavy equipment storage of RVs over prolonged periods of time may influence unstable subsurface areas of sifting soils and organic decay in 1, 5, 10, 15 years. What legal options are in place now to protect the interests of the City? The previous owner of this property paid $1.5M for the land and several years later filed for bankruptcy and walked away. The present owner purchased the landfill in 2012 for $85k in back taxes. What if history repeats itself and subsidence forces the project to close? Who will pick up the tab or will the land be a dormant eyesore?

This source is from the Voluntary Cleanup(VCUP). We question the "legalese".

25-16-310. Enforceability of voluntary clean-up plans and no action determinations.

(1) Voluntary clean-up plans are not enforceable against a property owner; except that, if the department can demonstrate that a property owner who initiated a voluntary clean-up under an approved plan has failed to fully and properly implement that plan, the **department may require** further action if the action is authorized by other laws or regulations of this state.

(2) Information provided by a property owner to support a voluntary clean-up plan or no action petition shall not provide the department with an independent basis to seek penalties from the property owner pursuant to state environmental statutes or regulations. If, pursuant to other state statutes or regulations, the department initiates an enforcement action against the property owner subsequent to the submission of a voluntary clean-up plan or no action petition regarding the contamination addressed in the plan or petition, the voluntary disclosure of the information in the plan or petition shall be considered by the enforcing authority to reduce or eliminate any penalties assessed to the property owner.

These are questions and responses from the attached document, "Final Public Comment....."

- A. In the event CDPHE approved other VCUPs as described for 6800 Kilmer, is CDPHE aware of any shortcomings years after the redevelopment?
    - The Voluntary Cleanup application is based upon the current environmental conditions at the site. Currently there are no exceedances in the surface waters or groundwater. If environmental conditions change due to an environmental release in the environment, **the owner of the property will be responsible** for addressing the release and clean it up to regulatory standards. What provisions does the City have in place if ownership transfers?

- J. What is the chain of liability for the site should the applicant’s project cause development of environmental issues and walk away from the site?
    - The state's Solid Waste program, working in conjunction with the Voluntary Cleanup program, **would have limited authority to force the owner to address any environmental issues**. If the release were significant, then Federal CERCLA Liability **might be** an option. These statements lack the more binding language "shall" and suggest a cat and mouse game.

eNote to save time: DPS reference--see pp 14, 18, 37

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3 attachments

Golden CC agenda item 8-23-2022.rooney landfill and fields (2) (1).pdf
8122K

DPS TBA.pdf
7958K

#8-Final Public comment Response 11-10-2023 (1) (2).pdf
292K

Item No. 9

City of Golden

911 10TH ST. GOLDEN, CO 80401
TEL: 303-384-8000
FAX: 303-384-8001
WWW.CITYOFGOLDEN.NET

Affordable and Thriving

8b Establish a Plan for Providing Quality Multi-Use Fields to The Community.

Council Memorandum

To: The Honorable Mayor and City Council

From: Rod Tarullo, Director of Parks, Recreation, and Golf

Through Carly Lorentz, Interim City Manager

Date: August 9, 2022

Re: Multi-use Sports Fields Discussion

Purpose of Agenda Item: To obtain Council feedback on two potential concepts that address aging infrastructure of multi-use sports fields, thus improving playability and ensuring safe facility conditions. Communicate next steps based on Council feedback.

Background: The Rooney Road Sports Complex opened in September of 2007, providing five multi-use synthetic turf fields of various sizes for use by regional sports teams. The fields are constructed on top of a former landfill owned by Jefferson County. A portion of the complex not on the landfill is also owned separately by Jefferson County Open Space.

After over 15 years of use, all the synthetic turf fields are showing their age and are past their typical lifecycle. The City has approximately $1.2 million dollars in a fund to provide replacement turf. This is not enough money to make all the repairs/replacement the facility needs. Besides the failing turf, there has been significant subsidence from the landfill underneath the fields that need to be addressed.

While designated as a regional complex by the County and the City, Table Mountain Soccer Association is the primary user of the facility. They also fund the regular maintenance of the complex. They have suggested replacing the turf for the last several years.

The Rooney site has several constraints because it is built on a landfill:

- There are no utilities to the site

- There cannot be permanent lighting because the pole structures would compromise the landfill cap
- There is an ongoing concern of subsidence
- There is no opportunity for shade structures and landscaping because there is no water available or allowed, and again the potential of compromising the cap

While providing bare bones multi-use fields for the last fifteen years, the long-term viability of this location is suspect. It will never have all the elements that help make other regional facilities more functional and pleasurable.

City staff was approached late 2019 by Jeffco seeking feedback on a preliminary proposal to modify the lease for the Rooney Road Sports Complex site. They are master planning the area to include a new slash/composting area in association with Rooney Road Recycling Center (3RC), trail connections, and other Jeffco park uses. They have renamed the Rooney area Tincup Park.

This plan would consider removing the southernmost field and changing parking for the sports complex. This would consolidate the sports fields and parking, and greatly reduce the land leased by the City for the sports complex. The current lease covers the entire hogback/former landfill area and is set to expire in 2026. The County has prepared a new draft lease that only includes the four northern fields of the sports complex area.

Alternative Locations: With all this in mind, several staff from the City and Jeffco have been looking for possible alternative sites to potentially move the Rooney Road Sports Complex. There is very limited land in the Golden area that is large enough and flat enough to consider a multi-field complex. Staff understands this was one of the reasons Rooney looked so appealing twenty years ago.

Consideration has been given to multiple locations including Jeffco owned property, none of which have panned out to be practical, financially viable, or sustainable for future investment. This led us to two alternatives using current City owned/leased land for consideration:

Alternative 1: Reinvest in Rooney, securing a new lease between the City and County for just the four northern field areas and entering into a new lease to allow for recovery of life cycle of replacement turf. The new lease would not include the South field which is needed for the slash/Jeffco development. Use the current budgeted $1.2 million which will repair and resurface the turf and subsidence of one existing field. This will not cover all needed repairs for the other three current fields. There is concern for continued subsidence on the property. Likely timeline of a year for completion of work accomplished with current budget. (See attachment A).

Alternative 2: Investigate program usage of city owned Ulysses fields to maximize scheduling. Consider remodel/renovation of two southern most existing baseball/softball fields to multi-use sports fields to better accommodate current and future needs of all sports programs. This change would consider the use of artificial turf or natural turf with advantages and disadvantages of both. (See attachment B).

Participation numbers have changed dramatically over the last two years. It is a challenge to anticipate future participation numbers. Any field allotment changes would need input from affected sports organizations.

This alternative allows the City to reinvest in current City owned assets. It provides for potential positive improvements over Rooney such as site furnishing upgrades like permanent lighting, seating and shade, restrooms, water, etc. Likely timeline of 2 years to get assessment completed and redesigns/renovations constructed and operational.

Fiscal Impact: The City has been collecting replacement fees from Rooney field users since the fields became operational. There is currently approximately $1,200,000 available in the fund balance for replacement of the artificial turf. The following opinions of probable costs have been provided by contractors and consultants.

Fix Rooney Fields (provided by original contractor ACC, Inc)

Field 2	86,950 Sq ft	$ 783,850.68
Field 3	69,700 Sq ft	$ 639,645.96
Field 4	69,700 Sq ft	$ 639,645.96
Field 5	69,700 Sq ft	$ 639,645.96
General Conditions		$ 182,407.18
Erosion Control		$ 28,456.93
Drainage Work per study		$ 73,085.26
Perimeter Turf Alternate ($18,559.59 per field x 4)		$ 74,238.00
Asphalt Alternate (Parking)		$ 447,678.88
		$3,435,642.63

This estimate does not include any consultant fees or contingency.

Jeffco design contribution covers new work for parking/roadways.
The current lease requires removal of improvements at Rooney
when the City ends sports use of the property.

**Tincup Ridge Park Design Contribution (provided by Jeffco)		$ 89,970.19
**Rooney Field Removal (provided by IMEG)	$976,037.00 -	$1,351,096.00

The Ulysses estimate includes over a million dollars of contingency.

Convert Two Ulysses Fields to Multi-use (provided by landscape architect and engineer MIG, IMEG)

215,000 sq ft of synthetic multiuse turf	$2,267,200.00
Restrooms/Storage Building/Lighting, Paving, etc.	$3,251,490.00
Mobilization and General Conditions	$ 551,869.00
Owners Design Contingency	$ 551,869.00
Other Costs-design and bidding/construction contingency	$1,110,243.00
	$7,732,671.00

Alternative Natural Grass $5,729,613.00

Potential additional funding for either alternative could come from a combination of Lodging tax proceeds and internal loans. Finance Director Jeff Hansen will be at the Council meeting to answer questions that you might have regarding financial options.

Community Impact: There is a need to provide safe, reliable playing fields for youth and adult sports in Golden. The most urgent need is to resolve current field conditions at Rooney Road Sports Complex. Any changes to existing fields will impact various sports programs in potentially positive and negative ways.

Community outreach is imperative to identify current and future needs for each sports program and to work to ensure maximum efficiencies in scheduling and use. Outreach is also important for ancillary park users. This could include skateboard and dog park users at Ulysses Park, and users of the new Tincup Park and slash operation at the Rooney location.

Other community impacts include prioritization of use of resources within the parks system, long term, and short-term investment analysis, serving local and/or regional users, timing of improvements, temporary field solutions until any approved plan is completed, and the potential use of artificial or natural grass turf should a location other than Rooney be considered.

Next Steps: Should Council support more fully investigating either alternative, staff will conduct additional outreach to field users, community members, and general park users to receive feedback on the preferred alternative. Staff would anticipate reporting back to Council in November with a proposed plan including timeline, funding sources, and more specific details for your review and possible action.

Recommendation: Staff recommends City Council direct staff to conduct further investigation and community outreach regarding alternatives one and/or two of this memo for the purpose of identifying and establishing a preferred path to address aging infrastructure of multiuse sports fields in Golden.

Attachments: Rooney Fields Master Plan 2006
Ulysses Concept

APPROXIMATE LIMITS OF LANDFILL
LIMITS OF NEW CAP
FUTURE PARKING +-75 SPACES
AREA "C" 120' X 90'
AREA "D" 120' X 90'
VAULT TOILET
FIELD 6 330' X 195'
FIELD 13 330' X 195'
FIELD 14 330' X 195'
FUTURE PARKING +-150 SPACES
FUTURE PARKING +- 60 SPACES
FIELD 7 330' X 195'
FIELD 12 330' X 195'
FIELD 15 360' X 225'
PRACTICE AREA "B" 120' X 90'
+- 60 SPACES
WOOD FENCE
FIELD 5 SOCCER 330' X 195'
FIELD 8 330' X 195'
FIELD 11 330' X 195'
WOOD FENCE
CHAIN LINK FENCE
WOOD FENCE
FIELD 4 SOCCER WOMEN'S LACROSSE 330' X 195'
FIELD 9 330' X 195'
FUTURE PARKING +-200 SPACES
WOOD FENCE
CHAIN LINK FENCE
WOOD FENCE
FIELD 3 SOCCER MEN'S LACROSSE 330' X 195'
FIELD 10 330' X 195'
WOOD FENCE
CHAIN LINK FENCE
MAINTENANCE BUILDING
WOOD FENCE
FIELD 2 SOCCER FOOTBALL 360' X 225'
FUTURE PARKING +- 90 SPAC
50 X 50 PLAY AREA
LIMITS OF NEW CAP
PRACTICE AREA "A" 120' X 90'
+-100 SPACES
VAULT TOILET
CHAIN LINK FENCE
50 X 50 PLAY AREA
WOOD FENCE
FUTURE PARKING AND LOOP ROAD ALIGNMENT +- 120 SPACES
+-40 SPACES
CONCRETE BUILDING ONE STORY
EXISTING PAVEMENT
EXISTING FENCE
FIELD 1 SOCCER 360' X 240'
6,570 SF OF ROAD INSIDE PROPERTY LINE
EXISTING POWER LINE TO REMAIN
PHASE ONE IMPROVEMENTS
RECYCLED ASPHALT 185,553 SF (outside of recycling center's property line)
ROAD BASE - PEDESTRIAN PATHS 72,618 SF
SYNTHETIC TURF

U11 / U12 Field
225'-0"
150'-0"
U11 / U12 Field
225'-0"
240'
150'-0"
U8? / U9 / U10 Field
120'-0"
150'-0"
U8? / U9 / U10 Field
120'-0"
150'-0"
U8? / U9 / U10 Field
U8? / U9 / U10 Field
380'
360'
330'
10'
18'-0"
24'-6"
20'-0"
35'-0"

COLORADO
Department of Public Health & Environment

November 10, 2023

RE: Former Kilmer Landfill Redevelopment – VCP Public Comments

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As part of the Former Kilmer Landfill redevelopment project, Chelton, LLC and Terracon Consultants, Inc. facilitated public comment on the Voluntary Cleanup Program (VCP) application at the request of the Colorado Department of Public Health and Environment (CDPHE). This memorandum summarizes Terracon's review and responses to the public comments submitted during the comment period. Following Terracon's public meeting on July 25th, 2023, addressing the contents of the VCP application and related environmental investigations, a public comment period was established in coordination with CDPHE. A dedicated email address was provided to local residents to submit comments on the presentation and VCP application package. Comments were also compiled by the organizers of a local community organization and submitted to CDPHE and Terracon. This public comment period extended from August 2, 2023, to September 5, 2023. Upon completion of the comment period, Terracon compiled and reviewed the submitted comments, and provided responses as applicable. Following this initial response, Terracon provided the compiled comments and responses to CDPHE for their review and additional comment. All comments and responses were then jointly reviewed by Terracon and CDPHE for completeness and finalized for entry into the public record.

Comment and Response Summary

Comments Forwarded from Friends of Ralston Creek Community Group:

A. In the event CDPHE approved other VCUPs as described for 6800 Kilmer, is CDPHE aware of any shortcomings years after the redevelopment?

The Voluntary Cleanup application is based upon the current environmental conditions at the site. Currently there are no exceedances in the surface waters or groundwater. If environmental conditions change due to an environmental release in the environment, the owner of the property will be responsible for addressing the release and clean it up to regulatory standards

B. Please provide 5 locations where CDPHE had knowledge that the requested VCUP was for a redevelopment for RV storage or other heavy equipment over an existing unregulated, uncompacted landfill with minimal clean-up, minimal capping, and parking surfacing as is being proposed by Chelton LLC.

The purpose of the Voluntary Cleanup program is to determine if there are environmental concerns regarding the redevelopment of this site. With the approved Materials Management Plan, the proposed aggregate surface cover, the storm water detention pond, and lack of environmental releases/concerns, this site is suitable for an RV storage and heavy equipment. There are dozens of storage facilities placed on landfills throughout the state. There are two through VCUP (Sheridan Redevelopment Area and the Colfax Landfill II; 17999 E. Colfax Ave).

C. Terracon in report of 07.24.2007 (item 1. 4) references a prior ESA Phase I report. Terracon has not submitted this report – requested during the public meeting?

The Phase I ESA was prepared using an outdated ASTM standard. The completion of multiple ESAs (compliant with the most current ASTM standard) and investigations since 2007 serve as a more complete and up to date evaluation of site history and conditions.

D. The EPA with email of 12.04.22 stated "Please be assured that the CDPHE, as the lead regulatory agency will continue to provide programmatic oversight for any future VCUP applicant through-out the process of clean-up, in order to assure compliance with environmental laws, appropriate land use, and established environmental standards". (1) Please clarify the scope and extent of the programmatic oversight during construction, following construction and acceptance of the applicant's self-certification? (2) Please clarify how CDPHE will "assure compliance with environmental laws, appropriate land use, and established environmental standards?

The Voluntary Cleanup program is a self-certifying program where the environmental professional certifies the work. This property does not show any environmental contamination (soil, groundwater, surface water), and the Materials Management Plan (MMP) guides how any environmental contamination will be handled. The property will have an environmental covenant placed on the property and the MMP will be mandated for any future excavations in the property. Also as part of the environmental covenant, the owners will have to certify they are following the MMP, along with yearly CDPHE site inspections.

E. Quality Monitoring Program (QMP). (1) What will be the requirements for long-term monitoring of ground water, surface water, air and soil following completion of construction? (2) What is the scope of the QMP? (3) Who will design the QMP?

A CDPHE No Action Determination requires the landowner/operator to provide notice of changed conditions or planned changes in land use or disturbance. Based upon the current site conditions (there is no signs of groundwater or surface water contamination) there is no requirement for a QMP. If there were environmental concerns (groundwater or surface water exceedances), the applicant would be required to remediate any releases.

F. No Action Determination. (1) Will any conditions for approval of the VCUP such as long-term monitoring be recorded as part of the VCUP or No Action Determination (NAD)? (2) What will be the criteria and conditions for approval of NAD at the 6800 Kilmer site? (3) Since initiation of the VCUP program how many sites with approved VCUPs have developed problems requiring actions or posing risk to the public? (4) How many legacy or unregulated landfill sites with grading and surfacing proposed by Chelton LLC have been issued VCUPs and NADs by CDPHE, or other state environmental/health agencies?

1. Due to the lack of evidence of an environmental release, no long-term monitoring is required.
2. A No Action Determination is granted when there is no release to the environment and the site is protective of human health and the environment.
3. Of the current over 1,600 voluntary cleanup applications, I do not know of any releases to the public from sites issued a No Action Determination. I can't attest to sites which were turned into service stations or sites which deal with hazardous materials as their current operations. For such releases they will be addresses through the appropriate regulatory authority; i.e. Oil and Public Safety, Hazardous Waste Program, Solid Waste Program etc.
4. I do not know of any other Chelton LLC sites which may have come through CDPHE or another regulatory agency.

G. The Ogden investigation identified the presence of lead in concentrations above the drinking water standards (54 mg/kg). Ogden reported this to CDH and JeffCo Health Department. Neither CDH (now CDPHE) nor JeffCo Health responded. (1) CDPHE requested testing of additional water sample for lead; sample were below levels of concern. Why were Ralston Creek sediment samples not tested? (2) Why was the 1991 Ogden notification on the presence of lead not further investigated to understand why both CDH and JeffCo Public Health failed to respond?

Comparison of total metals concentrations in groundwater to groundwater standards is not appropriate. The 1991 groundwater sample with elevated lead concentrations was reported as total lead (not dissolved). Groundwater samples collected by Terracon in 2007 and 2022 do not indicate lead impacts to site groundwater. Soil samples were collected immediately from the creek bank immediately adjacent to the water levels in Ralston Creek by Terracon in 2022, and the reported analytical results did not indicate impacts to site soils. When looking at groundwater exceedances CDPHE looks for pathways which could reach the public. In this case, groundwater leaving the site did not exceed regulatory standards, thus eliminating the public consumption pathway.

H. Terracon states that all pathways are closed. As shown in the redevelopment of the Brighton Blvd, Denver, CO landfill, pathways do re-open based on the type of development. Why is CDPHE only concerned with current pathways but ignores how redevelopments if not planned/designed, and executed properly do have a role in re-opening or creating new pathways?

The Voluntary Cleanup program's role in the redevelopment of this property is to determine if the remediation plan for this site will be protective of human health and the environment at the time of construction. With the armoring of the stream embankments, the MMP, the environmental professional's oversight of the project, very limited exposure to the landfill contents during construction, and lack of environmental exposure to the public, we are not currently concerned of opening or creating new pathways. The site will be more protective to the environment after the development has been completed.

I. What obligation rest with the owner, developer, and/or consultant (Terracon) for full clean-up in the event unidentified and/or large quantities of COC's are encountered, and/or a significant hazard or problem is encountered or created during the development work, i.e., who is liable for the entire site if the owner/developer decides to walk away from the site> default based on Terracon's recommendations?

The Materials Management Plan (MMP) included as part of the VCP Application specifies that environmental impacts and/or changed conditions discovered during site development activities are to be documented and addressed based on applicable environmental regulations, and CDPHE will be notified. Unexpected environmental impacts or changed conditions will be summarized the Project Completion Report, which will be a public document. Any hazardous material excavated during the redevelopment of the site will need to be documented and disposed of properly. The site owner is responsible for issues arising from the property. Currently, there are no releases to the environment. If the developer decides to walk away, the landfill material will be placed under sufficient cover to eliminate pathways to the environment.

J. What is the chain of liability for the site should the applicant's project cause development of environmental issues and walk away from the site?

The states Solid Waste program, working in conjunction with the Voluntary Cleanup program, would have limited authority to force the owner to address any environmental issues. If the release were significant, then Federal CERCLA Liability might be an option.

K. The 07.18.2007 geotechnical report prepared by Terracon contains the following statements: "…. the presence of randomly placed and highly compressible landfill material will require complete removal, or considerable site modification, to construct a more stable subgrade for foundations, slabs and pavements….". "Significant additional movement will occur should the landfill materials not be completely removed and/or subsurface soils become elevated in moisture content". In 2023 Terracon proposes to construct roadways over the "highly compressible" land fill material. Provide an explanation of this dramatic change?

The 2007 geotechnical report provides recommendations for the construction of larger structures, utilities, and paved roadways. The currently proposed development is significantly different and less intrusive than that proposed in 2007, so recommendations are substantially changed. Planned roadways and parking areas are to be constructed with aggregate gravel materials. This material is easily regraded and refreshed as necessary, should settling occur.

L. Why is a suitable and functional Landfill Cap System not part of this redevelopment to prevent water infiltration into the old landfill, control gas flow from the waste to the atmosphere, and contain waste material under stresses/loading anticipated based on the development scheme. (1) Please explain how the proposed surfacing (gravel and asphalt millings) can perform as a functional cap system and for what period. (2) Will there be a separate cap system in addition to the proposed surfacing (gravel and asphalt millings)? (3) Please explain how the proposed surfacing will affect water percolation into the landfill and flushing out COCs from the landfill? (3) What are the projected or potential characteristics of the resulting increase in leachate (CECs = contaminants of emerging concern)?

No cap system is required as part of the VCUP, and no cap system is planned as part of site development. The proposed surface materials should slightly reduce infiltration into the landfill materials. Surface runoff will be diverted to the onsite lined stormwater detention basin. No significant changes to groundwater conditions are anticipated. There has been no evidence of COCs leaching from the landfill into Ralston Creek or offsite groundwater.

M. A functional cap system combined with proper drainage design is critical to prevent water infiltration in the landfill and/or prevent ponding. (1) What drainage provision are included to prevent water infiltration or ponding? What is the supplemental water percolation into the waste based on cap design and proposed surfacing?

The site will be graded to drain towards a stormwater detention basin, which will be lined with an impervious liner. This will eliminate ponding and reduce water infiltration into buried landfill debris. An engineered landfill cap is neither warranted or required.

N. What impact has the additional water percolation on leachate formation (water contaminated with various organic and inorganic substances)? What are possible characteristics of the leachate and associated threads to environment, ground water, surface waters, wildlife, and human health?

Site development should slightly reduce percolation into the landfill materials. Terracon notes that precipitation has infiltrated the landfill in its current state since the early 1970s. Contaminants of concern were not detected above applicable regulatory standards in site groundwater or in Ralston Creek during the most recent investigations, and site changes are not anticipated to alter groundwater conditions.

O. Groundwater sampling. Ogden suspected the presence of a "breached" water table and recommend drilling to a depth of 30-50ft BGS. (1) Why did Terracon limit drilling to 29ft BGS? (2) Why did CDPHE approve the limited drilling proposal by Terracon?

Terracon has not observed soil lithology that would indicate significant differences in bedrock or groundwater conditions below 30 feet bgs. Borings across the site are consistent in both type and depth of fill materials and native soils. Based on Terracon's boring logs, a clay confining layer above the bedrock is not apparent. Since there were no lines of evidence suggesting environmental contamination at the level above 30-35', CDPHE could not arbitrarily make the consultants to drill to a deeper level.

P. Groundwater sampling conducted at the site as reported in the various reports seem to have been conducted mostly in periods of where groundwater levels may have been low due to the time of the year of low precipitation periods. May and June 2023 were months of high precipitation following several years of below normal precipitation. (1) Why was ground water monitoring and sampling not conducted during or following this high precipitation period as ground water levels could have risen into the landfill material and mobilized soluble COCs or generated new COCs both in water and as volatile species such as methane?

Groundwater sampling has been conducted at different times of the year and results have been generally consistent during that time. Due to the porous nature of placed waste material, significant or sustained rises in groundwater elevation following precipitation events is not expected. Also during low groundwater levels, any possible contamination would be more likely to present itself due to concentrations in the groundwater being elevated vs high groundwater levels where the concentrations would be more dilute.

Q. The applicant intends to construct a Stormwater Detention Basin to collect and slowly discharge storm water from a precipitation event. The application has not provided details on how much stormwater and quality. The applicant states that the site will be "streetscaped and landscaped areas, with packed gravel of compacted asphalt millings as surfacing materials in in drive and parking areas". The applicant states that the surfacing is expected to reduce infiltration of water into the landfill. (1) How much will water infiltration be reduced? (2) How will potential spills of fluids from RVs such as gasoline, diesel fuel, oil, and antifreeze be disposed of? (3) What will be quantity and quality of storm water reporting to the detention pond? How much of any given fluid spill will infiltrate into the landfill and groundwater?

Infiltration reduction is not a specific remedial action to be quantified. Potential spills will be handled according to state/local regulations and are outside the purview of the VCUP. Standard operation procedures will be in place for any reportable spills of fluids from onsite activities. Stormwater drainage quality from the site is anticipated to be consistent with roadway and parking area drainage in the surrounding area.

R. The critical components of a landfill cap are the barrier layers that minimize water infiltration and the drainage layer that transmits water across the cover to the detention basin. (1) How will surface water, likely contaminated with various hydrocarbon fluids and other chemicals, reach the Detention Basin? (2) How will subsidence of the cap impact surface water (+contamination) flow to the detention basin?

1. A typical landfill cap design is not required for the site due to absence of an environmental release.
2. Maintaining the slope of the surface cover is part of maintenance of the site and will be part of ongoing operations at the site.

S. Explain why testing of the Ralston Creek was limited to surface waters? Why was sediment and eDNA testing omitted?

Surface water was sampled to evaluate if water quality was being impacted from onsite sources. Upstream, onsite, and downstream sample results were consistent. Soil sampling was also conducted along Ralston Creek, on the property side of the streambank, and no environmental impacts were observed. Sediments were not sampled based on the streambank and surface water sampling results. Analyzed contaminants of concern included those required by the VCP.

T. How will the Ralston Creek and the RC bank be protected during the development?

Streambank stabilization and armoring will take place as part of development. No significant construction activities are planned near the creek or floodplain.

U. Describe how the RC bank will be stabilized? What will be the goals of the RC bank stabilization? Erosion prevention? Prevention of groundwater seepage (leachate) from the landfill to RC?

Stabilization will occur under a plan approved by the Mile High Flood District. Erosion prevention is the main goal of the plan.

V. What is the extent of the Ralston Creek bank stabilization?

Stabilization details are to be outlined in the approved plan, and will occur on sections of the streambank deemed to be impaired according to field data collected as part of the stabilization plan.

W. Provide support for your claim that that methane will not infiltrate parked RVs with or without cover? Air modelling? Studies?

Soil vapor infiltration into parked RVs is not anticipated to be an issue. Terracon consulted with in-house remediation subject matter experts regarding this concern. The following factors were considered:

- Tarps are not sealed to the ground.
- Vents on tarps appear to be standard to avoid moisture buildup (https://www.nationalrvcovers.com/s/class-a-rv-covers.html).
- The distance between the ground and bottom of most RVs.
- There are few penetration points in the bottom of RVs.
- Pipes to discharge black and grey water are capped and discharge near the side of RVs.
- The rest of the underside of a RV is fairly secure to avoid water, snow, rodents, and insects to penetrate the bottom while traveling or being stored

X. How will deep-rooted vegetation be integrated so the performance of the cap is not impaired?

An engineered cap is not part of the VCP remedial action plan. (Deep-rooted vegetation will not be part of the surface parking area). Only plants approved as part of the Mile High Flood District erosion control plan will be allowed along Ralston Creek. Additional details on surface vegetation and landscaping are part of the design process handled through the City of Arvada. Annual maintenance of the landscaping will be part of the ongoing maintenance of the site.

Y. The EPA has proposed PFAS national primary drinking water regulation. The EPA expects that if fully implemented the rule will prevent thousands of deaths. Why did testing of groundwater, surface water and soils exclude testing for Per- and Polyfluoroalkyl Substances (PFAS)?

There is currently no enforceable level for PFAS in groundwater, and the onsite groundwater will not be utilized for any purposes.

Z. The IPCC reports that the global warming potential for methane is about 84 higher over a 20-year timeframe than CO_2, that means it traps 84 times more heat per mass unit than carbon dioxide (CO_2) and 105 times the effect when accounting for aerosol interactions. (1) How much methane does the site currently release (per month/per annum)? (2) How much methane is projected to escape the site during redevelopment? (3) What is the methane release projections post redevelopment? (4) Will there be methane monitoring stations for the entire site?

No methane modeling is required or planned for the site and it is outside the purview of the VCP. Ambient air/breathing zone methane monitoring will be conducted during subsurface construction activities for worker protection under applicable OSHA standards. Continued methane monitoring will only take place for the onsite building and associate vapor mitigation system (VMS). Outside of the one building (security/entry shed), methane monitoring is not a promulgated environmental regulation for this property.

AA. The EPA maintains a log of redeveloped superfund sites and brownfield redevelopments. Does CDPHE consider these examples in approving the VCUP for 6800 Kilmer? If so, please provide examples?

This property is not a Superfund site, but it is a Brownfield site. When the Voluntary Cleanup Program approves a redevelopment site, it's based upon the environmental characterization (soil, groundwater, surface water and in this case indoor air) of the site and the possible exposure pathways. In this situation there are no completed exposure pathways, except for methane in buildings. A state approved methane mitigation system will be part of the state's approval process.

BB. In the event there is little documentation of similar redevelopments (ref Questions A, B) is Kilmer Street a "experiment" without scientific or empiric backing?

There are dozens of instances where landfills are being used as open storage of vehicles and heavy equipment throughout the state. This project has been characterized multiple times and there is no sign of an environmental release of concern coming from this property.

CC. The Colorado Geological Survey (CGS) suggests that "Collapsible soils are a major geologic hazard for land development in many locations across the state. This hazard manifests itself as ground settlement, which can be damaging to overlying structures if the soil problems are not mitigated or if the structure is not engineered properly. (1) Is CGS incorrect in this case? (2) If CGS is correct has CDPHE anticipated soil properties in the event the VCUP is granted?

1. Terracon prepared a Geotechnical Engineering Report for the site in August 2023. Settlement of site soils was considered and addressed in the recommendations of the report.
2. The recent Terracon Geotechnical Engineering does not suggest that collapsible soils are a land hazard for this project. Based upon the well logs, test pits and condition of the existing surface cover on the property, CDPHE does not view this as an issue.

DD. The RVs proposed to be stored at the site will include a significant amount of fuel (diesel, unleaded, propane, etc.). What is the proposed vehicle evacuation plan in the event of a fire event, either at the RV storage site or moving toward the RV storage site?

This is an operational question not pertinent to the VCP application. There will be a loop road constructed onsite that is capable of supporting firefighting operations should a fire occur onsite.

Comments Received Via Public Email:

A. I am a concerned citizen of Arvada and worried about the proposed use of the land at this address along the Ralston Creek in Northwest Arvada. This area was previously a landfill and there are still many unanswered questions about letting a RV storage lot be placed on the property. Constructing this development so close to the river is of great concern. With three hundred gas guzzling RV's being parked by the river, how will runoff into the river be avoided? In a heavy rain the water washes into the creek. This location seems like a really bad idea. Besides possible water pollution, this seems like "development pollution". If you look at an overhead view of this area, you are approving a non-residential development being squeezed into an area with houses on three sides. This will impact the property values, as well as what the county collects from property taxes. In the long run a park or open space is a much better use of this land. Do not let a company from Florida come it and rape our land. Listen to the people who live here, work here, and pay taxes here!

Terracon believes this is an operational/City of Arvada question, outside the requirements of the CDPHE VCP program.

B. We were told the liner of the retention basin was impervious. What are the retention basin's liner age/rating specifications?

The detention basin liner will meet specifications required by state and local regulations, specifically the CDPHE Solid Waste division. Final design of the retention basin/liner will be approved by this division.

C. F/U questions: who monitors to identify any failure the retention liner may have? How is mitigation undertaken if any issues arrise with the liner?

Site operator is responsible for evaluating liner condition. If issues arise, they will be responsible for repair or replacement of damaged liner and any other necessary mitigation efforts. Quality assurance (QA) and quality control (QC) protocols will be followed during liner installation.

D. We heard at the meeting that health and safety of people is a primary focus for the area and the VCUP. However, there was no specific mention of protection of the health and safety of wildlife that live in and utilize the area. Why can't that become a part of the focus of the VCUP?

The Voluntary Cleanup Programs mission is to assist landowners in redeveloping their land in an environmentally safe manner, which is protective of human health and the environment. The State Voluntary Cleanup Bill (House Bill 94-1299) does not require an evaluation for safety of wildlife. As with almost all redevelopment plans of this size, I do not know of any other state or federal requirement to evaluate the safety of wildlife.

E. According to Terracon, no industrial/hazardous/medical waste was observed in samples taken. A point to stress may be that no one really knows all that was deposited in that

landfill. Disturbing the area to undertake development is not worth the risk to the health of the environment (people, wildlife and the creek). Samples taken do not represent the true findings of what is potentially buried there. It's like sampling 10 people out of 10,000 to determine if there is an active virus in a certain population. Inconclusive results at best.

Landfill waste has been observed in over 25 soil borings and multiple test pits across the site during prior investigations. The nature of the buried debris has consistently been in line with reported disposal of household/municipal waste. Should waste of unknown characteristics be discovered during site development, additional testing and evaluation is required as part of the Materials Management Plan under the VCP.

F. How will the area be policed regularly to ensure that users of the area are complying with laws and other requirements to safeguard the outlying environment? This was brought up at the meeting and once again brushed aside as an operational issue.

The site will be subject to applicable federal/state/local laws and regulations. Under the VCP and any No Action Determination, changes in environmental conditions are required to be reported to CDPHE.

G. Will water samples be taken regularly to ensure that the creek is not being used as a dumping ground purposely or accidentally? Where and how often?

Ralston Creek is a tributary to Clear Creek and sampled on a quarterly basis. If significant anomalous readings are reported, the state has protocols in place to try to pinpoint the origin of the release and go after the possible entity.

H. The Terracon presentation indicates that in two historical boring samples, arsenic levels are above Colorado background value. What is that value and how is it determined as safe/acceptable? Why can't more boring samplings be undertaken?

CDPHE has published a risk management guidance document relating to naturally occurring arsenic concentrations in Colorado soils. The document utilizes US EPA data to evaluate average naturally occurring arsenic values across the state. This background average for all land uses is 11 mg/kg. The average arsenic in soil samples analyzed for metals across the site is 9.18 mg/kg.

I. The Ralston Creek water sampling seems insufficient. According to Terracon, it's been discovered that there presently is no surface water contamination. However, how is the impact of development at the site considered as a viable consideration of potential creek contamination part of the VCUP approval process?

Sampling was conducted at the request of CDPHE and included the potential contaminants list required by CDPHE. Sampling of Ralston Creek and downstream waterways is conducted quarterly to evaluate water quality and evaluate potential impacts to surface water.

J. What does the vapor mitigation system installation entail? Who determines if this is adequate now and in future years?

The vapor mitigations system will include an impervious liner below the building foundation, with porous gravel and vapor collector pipes attached to a riser. The system will be "active", with a blower to extract air from the collector pipes and safely vent it to the outside. Additionally, there will be sensors designed to measure methane levels within the structure, tied into the fire alarm control panel. Should methane levels reach trigger values at or above 10 percent of the lower explosive limit, alarms will sound and appropriate

response personnel will be notified. The system design is in line with industry standards and is consistent with systems in use at numerous sites across Colorado. The full system design is performed and checked by Terracon's in-house vapor mitigation subject matter expert, and is signed and sealed by a professional engineer registered in the state of Colorado. Additionally, CDPHE has to approve of the methane mitigation system design plans as part of the VCP process.

K. What excavation and soil removal is planned? Once again, disturbing the area will cause increases in methane and other gas/materials emissions which can prove unsafe to the surrounding environment.

The overall site plan is still under development prior to review by the City of Arvada. Currently, limited excavation is planned for the stormwater detention basin, onsite office building, and utility areas as necessary. Excavation will be conducted so as to minimize the disturbance of landfill debris where possible. Excavation operations will be overseen and monitored by an environmental professional, and disturbed landfill debris will be characterized and disposed of in accordance with regulations. During the excavation process, once methane reaches the atmosphere it rapidly dissipates and breaks down.

L. What is the planned streambank stabilization plan? What impact when that is undertaken will this have to the surrounding environment? How will success in stabilization be determined?

The streambank stabilization efforts may include removal of some existing vegetation, regrading of the streambank elevations, placement of appropriate geotextile, natural fiber, or rock armoring erosion control systems, and planting of native plants suitable to revegetate the disturbed areas. The stabilization work is intended to protect Ralston Creek from impacts related to the adjacent buried landfill

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

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Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
File (2 copies)	START2, EPA Region VIII

PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

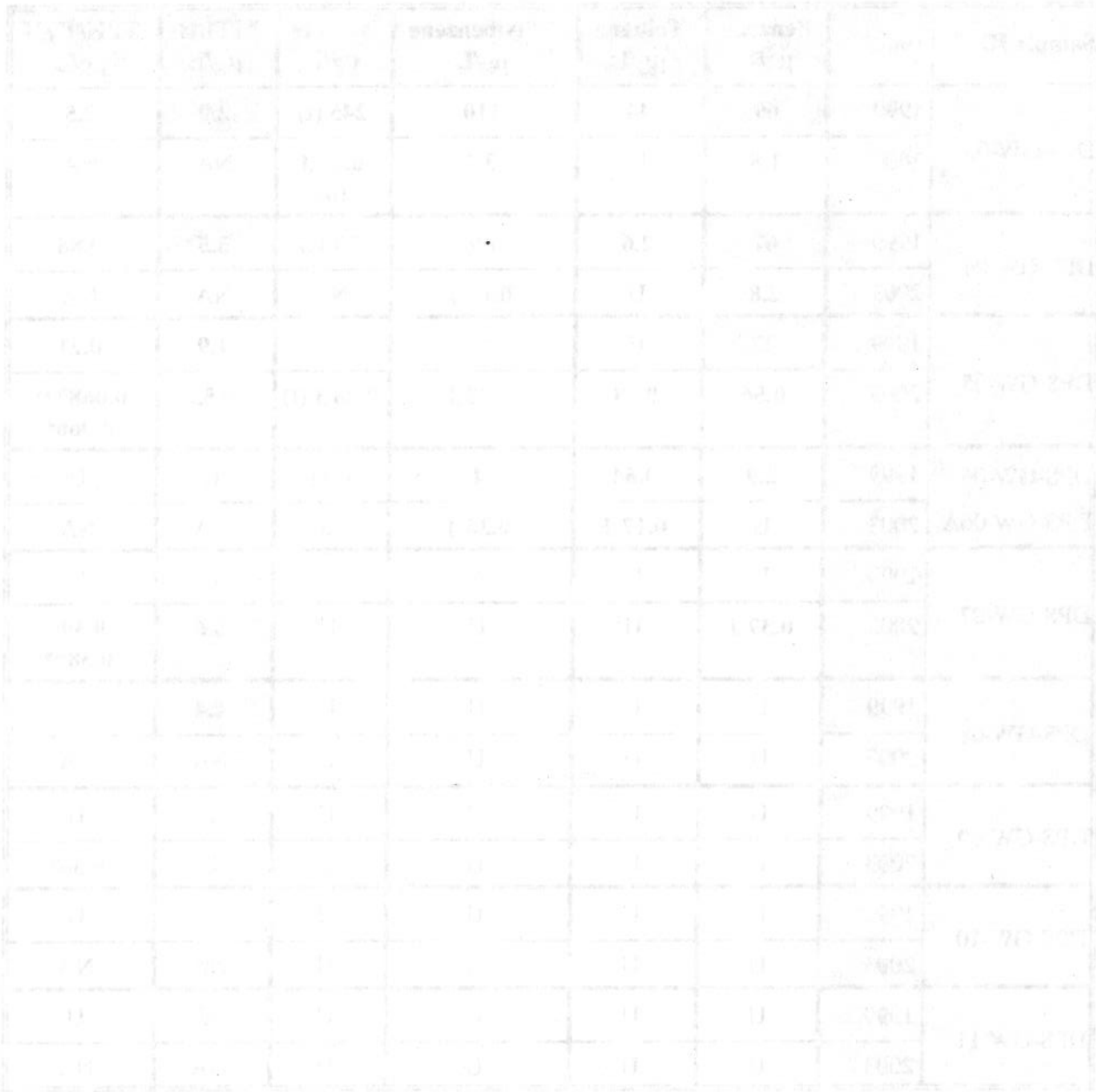
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Follow Research: Kilmer Landfill

Sharon McCarthy <[redacted]> Mon, Jul 15, 2024 at 1:29 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Good day, Jeremiah,

As a follow-up to a previous email I shared with Members of Council, I have additional research from recent and historical sources.

- Terracon Proposed RV Storage Yard Geotechnical Engineering Report 6800 Kilmer Street August 4, 2023 | Terracon Project No. 25235085
- Ogden Environmental and Energy Services Company, Inc. JANUARY 17, 1992
- Chen and Associates Consulting Geotechnical Engineers Soil & Foundation Investigation Proposed Bridge Across Ralston Creek Cottonwood Subdivision Jefferson County, COLORADO January 27, 1982

Even though the 3 reports span over 40 years, review of the findings suggest similar professional methodology. Perhaps the Terracon Report from 2023 gives the most insightful opinion of the instability of the subsurface of a landfill. While the Ogden Report recommends that the landfill not be used for commercial or residential use, the findings are more detailed in the Terracon Report.

It is interesting to note that the Terracon Report reflects concern about the small building on site. My understanding is this proposed building is on the perimeter of the landfill which might be considered more stable. There does not seem any reference to the stability of the landfill's substructure over a large interior area over the methane plume and whether that substructure will support the weight of 350+ RV's, thirteen 20 foot lights posts, and possibly water lines to fire hydrants.

The Terracon Report seems the most supportive of findings from the Golden Rooney Road Sports Complex decision.

Thanks.

Sharon

Three Geotechnical Reports.pdf
88K

Ogden Report-1992

9.0 SUMMARY

The following are pertinent data derived from the Ogden Phase I environmental assessment:
There is an inactive landfill on the LTMR site south of Ralston Creek.
The 25 acres of the LTMR site north of Ralston Creek does not appear to have been impacted by human activities.
The property that borders the south bank of Ralston Creek appears to be polluted by discharges from the landfill. Visible hydrocarbons are on the water surface.
Groundwater samples from the landfill contain lead at concentrations of .0065 mg/L, which is above the EPA drinking water standard of .0050 mg/L.
Soil samples from the landfill contain volatile organic compounds. Offending analytes are methylenechloride, acetone, tetrachloroethane, toluene, and total xylenes.
A composite soil sample demonstrated an excessive concentration of lead in the amount of 54 mg/kg

10.0 RECOMMENDATIONS

Based on the evaluation of prior data and data collected during the Preliminary Phase II site assessment, it is probable that contaminants are present on the site and that the potential for migration to offsite localities exists. Therefore, we would recommend the following activities to more clearly define the extent and nature of contamination on the LTMR site:

- Excavate spot locations of high magnetic response to determine if leaking drums are present.
- Design a statistically-based random soil sampling program.
- Design a statistically-based groundwater sampling program. Install deeper auger drilled monitoring wells at 30 to 50 ft depth.
- Case with large enough PVC for retrieving samples by bailing or the bladder pump method.
- Screen shallow groundwater monitoring wells in the landfill material and schedule sampling to be collected to allow for seasonal flux of contaminants.
- Determine perched water elevation. Selectively screen below landfill in permanent water table at low aquifer confining elevations to test for heavy compounds.
- Determining permanent water table and, if possible, the lower base confining depth.
- Schedule interval time sampling for surface water monitoring of Ralston Creek. Identify flora/fauna kill mechanisms.
- **Landfill area should not be developed for commercial or residential construction.** (Emphasis added)
- Monitor contemporary methane presence

Chen Report

Based on these readings, it appears that combustible gas is being generated within this landfill in quantities sufficient to be considered a hazard. The combustible range of methane gas is between 5% and 15% by volume in air. Concentrations above this range are too rich to burn.

However, gas migration or exposure to the atmosphere will result in dilution of the gas and result in a flammable condition. Care should be taken when excavating within or adjacent to the landfill mass. Venting of excavations will be required. Any C " J > "z /..J <1 structures built over the landfill will require special methane gas controls. There are 2 basic approaches to controlling the migration of methane into structures. These include barriers separating the proposed structure from the landfill and ventilation systems.

Access roads, parking areas, underground utilities and other facilities constructed on landfill materials will be subjected to large ... differential movements and a corrosive environment. Hie owner should be aware of the high risk of distress associated with construction on landfills.

CONCLUSIONS
(1) The proposed structure should be founded on piers drilled into bedrock and designed for maximum end bearing pressure of 40,000 psf, a skin friction of 4,000 psf and a minimum dead load pressure of 15,000 psf, with design and construction details as outlined.
(2) Alternate foundation systems consisting of steel H-piles and designed for a maximum stress of 12,000 psi with tip reinforcement or spread footings placed on the lower sand and gravel strata and designed for a maximum bearing pressure of 6,000 psf may be used.
(3) Trash fill varying in depth from 8 to 16 feet was encountered across the site south of Ralston Creek. **This landfill material is generating sufficient quantities of combustible methane gas to be hazardous**

Proposed RV Storage Yard Geotechnical Engineering Report 6800 Kilmer Street August 4, 2023 | Terracon Project No. 25235085

The Ralston Creek Trail is located adjacent to the northwest corner of the site between Ralston Creek and the Croke Canal. This trail is used for public recreation. There are no fences or other barriers to prevent access to the site. **The closest residence to the site is located within 200 feet of the southeast corner of the site across the Croke Canal**. P 551

Based upon the results of our field exploration and laboratory testing, it is our opinion the existing fill materials and landfill debris should not be used to support foundations, interior slabs, exterior slabs-on-grade construction without complete removal and modification. P 114

Existing Fill Materials and Landfill Debris About 9 to 14 feet of existing fill materials and landfill debris was encountered in the exploratory borings. The landfill debris primarily consisted of construction debris and domestic trash. We understand the site is within the boundaries of a pre-existing landfill. Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement. **Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project.** P 121

The stability of subgrade soils may be affected by precipitation, repetitive construction traffic, or other factors. If unstable conditions are encountered or develop during construction, workability may be improved by overexcavation of wet zones and mixing these soils with crushed gravel. Use of geotextiles could also be considered as a stabilization technique. Lightweight excavation equipment may be required to reduce subgrade pumping.

Engineered fill should consist of approved materials that are free of organic matter and debris. P 123

1. We recommend that engineered fill be tested for water content and compaction during placement. Should the results of the in-place density tests indicate the specified water or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified water and compaction requirements are achieved.
2. Water levels should be maintained low enough to allow for satisfactory compaction to be achieved without the compacted fill material pumping when proofrolled.
3. Moisture conditioned clay soils should not be allowed to dry out. A loss of moisture within these materials could result in an increase in the materials expansive potential. **Subsequent wetting of these materials could result in undesirable movement.** P 124-125

Utility Recommendations
It has been our experience with other structures constructed on landfill debris that utilities constructed below or adjacent to structures on landfill debris will move significantly and will likely require excavation and full replacement multiple times over the life of the office building. Utilities constructed below structurally-supported floor systems should not be supported on the subgrade, but should be suspended in crawlspace areas independent of the subgrade materials. Utilities outside of the office building constructed on or within the existing fill materials over the existing landfill debris will have a very high risk of movement. Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris. **It is our opinion that movement on the order of 2 feet or more is possible.** P 127

Structurally Supported Floor Recommendations
Based on the subsurface conditions, slabs-on-grade constructed on the landfill debris without any modification is not recommended, as the slabs will have a very high risk of movement. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below the office building may be cost-prohibitive for the project. On this basis, we recommend the interior floor system of the office building be designed as a structurally supported floor, supported independently of the of the subgrade materials. P 129

Exterior Flatwork
Exterior flatwork constructed over unimproved landfill debris will have a very high the risk of long-term movement. Long-term movement from unimproved landfill debris cannot be quantified due to the nature of the debris, and reduction of this type of movement is likely only possible through complete removal of the fill and debris. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below exterior flatwork may be cost-prohibitive for the project. Support of exterior flatwork on the existing fill and landfill debris can be considered; **however, it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development.** Frequent maintenance and full replacement of flatwork on unimproved landfill debris should be anticipated for this development. To reduce the risk of shallow, localized movement of exterior flatwork, we recommend that the subgrade materials are scarified or removed to a depth of at least 12 inches and properly moisture treating and compacting suitable on-site soils to grade. New fill materials beneath slabs-on-grade should be placed and compacted as outlined in the Earthwork section of this report. Again, t**his recommendation is intended to reduce the risk of shallow, localized movement but will not reduce the risk of deep, long-term movement of the existing fill and landfill debris.** P 130

For the proposed RV storage lot, Table 5.07.1.1 of the Standards states the minimum 20-year, 18-kip Equivalent Single Axle Load (ESAL) for Commercial and Business parking lots as 70,000. This ESAL value was utilized for our design. We anticipated a gravel fire access road may be planned at the site. We have assumed that the fire access road will experience a maximum of one trip per week of a fire truck with a maximum weight of 85,000 pounds and three axles. The traffic loading for the fire truck is included in our ESAL estimate for this project. P 131

It is imperative that the subgrade be protected from a loss of moisture. **A significant loss of moisture of the pavement supporting materials could result in additional movement of the subgrade.** P 132

Aggregate-Surfaced Roadways –
Maintenance Future performance of aggregate surface areas constructed at this site will be dependent upon several factors, including:
■ Maintaining stable moisture content of the subgrade soils both before and after roadway construction.
■ Providing for a planned program of preventative maintenance. Rutting of the aggregate surface layer and loss of surfacing materials will occur over the life of the drives/parking areas. Maintenance of the surface material and drainage are critical to the performance of aggregate surface roads. Since the surface materials are unprotected, proper drainage is key against loss of strength and stability of the surface materials. **Poor drainage allows water to remain on the surface and percolate into the aggregate base course section, reducing the strength of the underlying subgrade soils.** Well-shaped crowns with a slope of at least ½ inch per foot and adequate surface ditches or subsurface drains are essential to achieving rapid surface drainage.

Maintenance of the roadway shape and ditches or drains should be performed at least twice a year, particularly during wetter periods of the year and when snow removal is required, though more frequent maintenance may be required depending on actual traffic, drainage, and smoothness requirements. If unstable conditions develop during roadway usage, scarifying and drying of the subgrade, or placement of additional gravel material may be required. **Loss of surfacing materials from dust can be significant and may result in a roadway surface course that is several inches thinner within a few years. The reduced thickness will result in loss of strength and poor drainage.** P 133

Construction Considerations
Site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the subgrade may not be suitable for construction and corrective action will be required. The subgrade should be carefully evaluated at the time of construction for signs of disturbance or excessive rutting. **If disturbance has occurred, subgrade areas should be reworked, moisture conditioned, and properly compacted** to the recommendations in this report immediately prior to placing aggregate surface materials. P 132

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken. P 134

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Proposed RV storage lot on "Kilmer St"

Sharon McCarthy <[redacted]> Mon, Jun 3, 2024 at 12:01 PM
To: Lauren Simpson <lsimpson@arvada.org>, Bob Fifer <BFifer@arvada.org>, JMarriott@arvada.org, "sdavis@arvada.org" <sdavis@arvada.org>, Randy Moorman <rmoorman@arvada.org>, "sambrose@arvada.org" <sambrose@arvada.org>, "lferet@arvada.org" <lferet@arvada.org>
Cc: Jeremiah Bebo <jbebo@arvada.org>

Mayor and Members of City Council,

My name is Sharon McCarthy and I live in Forest Springs. I represent my community in learning more about the reuse of closed unregulated landfills. Our concern is that the 14 acre landfill on Kilmer St is developed in an environmentally responsible and sustainable manner that supports the City's Comprehensive Plan. I am aware that Council Member comments are restricted in possible quasi-judicial situations.

I personally believe in research, facts, and data. Since December 2021, I have learned much about unregulated landfills development, Federal Regulations, historical information, failed landfill reuse projects, and documentation. I especially learned the value of "language" and the "written word" in research data. With that said, I'm concerned about language in several documents about the reuse of the Kilmer St landfill.

I share the specific wording from the document and include the reference source. In my opinion, there seems to be possible conflict in language used in the Terracon Report and the approved Colorado Department of Public Health and Environment (CDPHE) Voluntary Clean Up Application (VCUP). I also note that unregulated landfills closed prior to current legislation do not have to adhere to present environmental law. (Refer to Sun Article)

A. Terracon Geotechnical Report--August 23, 2024

P 129

> "Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. **Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.** Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations. **Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken."**

P 130

> "Construction and site development have the potential to affect adjacent properties. Such **impacts can include damages due to vibration, modification of groundwater/surface water flow during construction,** foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The **owner and contractor should consider a preconstruction/precondition survey of surrounding development.** If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing."

Source: https://www.arvadapermits.org/eTRAKiT3/viewAttachment.aspx?Group=PROJECT&ActivityNo=DA2024-0016&key=HVG%3a2403061241411255

B. Colorado Department of Public Health and Environment (CDPHE)--November 30, 2023

P 1

"Based on this review the Department has concluded that, if fully and properly implemented, the plan will attain a degree of cleanup and control of hazardous substances …., "

"The **approval of the voluntary cleanup plan by the Department, and the Department's conclusions and opinions relating thereto, apply only to conditions on the property and state standards that exist at the time of submission of, and which were addressed in the voluntary cleanup plan application.**"

Source: https://oitco.hylandcloud.com/cdphermpop/docpop/docpop.aspx

C. SMALL BUSINESS LIABILITY RELIEF AND BROWNFIELDS REVITALIZATION ACT [[Page 115 STAT. 2356]]
Public Law 107-118 107th Congress

``(C) Notices.--The **person provides all legally required notices with respect to the discovery or release of any hazardous substances at the facility.**

``(D) Care.--The person exercises appropriate care with respect to hazardous substances found at The facility by taking reasonable steps to--

``(i) **stop any continuing release**;

``(ii) prevent any threatened future release;

``(iii) prevent or limit human, environmental, or natural resource exposure to any previously released hazardous substance.

Sources:
https://www.epa.gov/laws-regulations/summary-resource-conservation-and-recovery-act

https://19january2017snapshot.epa.gov/brownfields/brownfield-overview-and-definition_.html#:~:text=The%202002%20Small%20Business%20Liability%20Relief%20and%20Brownfields,sectors%20to%20promote%20sustainable%20Brownfields%20cleanup%20and%20reuse.

https://19january2021snapshot.epa.gov/history/epa-history-resource-conservation-and-recovery-act_.html

D. Resource Conservation and Recovery Act (RCRA)

This 1976 act and subsequent amendments give EPA the authority to control certain hazardous and nonhazardous wastes, including environmental problems that could result from underground tanks storing petroleum and other hazardous substances. Learn about the Resource Conservation and Recovery Act.

The hazardous waste program, under RCRA Subtitle C, establishes a **system for controlling hazardous waste from the time it is generated until its ultimate disposal — in effect, from "cradle to grave**."

In summary, the issue of reuse of closed unregulated landfill is open for discussion. Decisions for redevelopment should be based on data but research is expensive and not a top priority for many communities and/or governments. To the naked eye, the landfill at Kilmer St looks benign---an open field with native grasses. Few onlookers would recognize that the land is like an iceberg with the real danger below the surface. In all our research, we have not found any examples of heavy equipment storage areas redeveloped on non-mitigated landfills adjacent to a running body of water (Ralston Creek).

Reuse of landfills closed prior to RCRA is like "the wild West" of re-development---no need to adhere to Federal legislation for environmental concerns. The VCUP approval is based on "information known at this time" and textbook hypothesis. But what if this thinking is short sighted? I heard a report on the water situation in Flint, Michigan. Once media coverage subsided, the concern seemed to vanish but in reality, the challenges to the water supply are still present. Will history repeat itself with the redevelopment of the unregulated landfill only to have environmental issues surface 5, 10, 25 years later? Will the future generation ask the question--- "*What were they thinking?*"

"The Colorado Department of Public Health and Environment recently began creating an inventory of landfills that closed after 1967, when the state passed the Colorado Solid Waste Act and began regulating them. Most of the closed landfills in Colorado shut down under looser requirements than currently exist, purposefully ceasing operations ahead of 1993 federal rules that ramped up environmental standards.

About 90 landfills in Colorado opted to close instead of meeting the standards. State officials intend to inspect each of them to determine whether they were closed properly and present “a low risk to the people and the environment.”

The site visits of those landfills, many now closed for 25 years, have not yet begun."

Source: https://coloradosun.com/2018/09/17/where-does-colorados-trash-go/

I include Jeremiah Bebo in this email for our Forest Springs file for the RV Storage Lot.

Thank you for your time.

Respectfully,

Sharon McCarthy

Terracon Report--LDC (2).pdf
55K

Terracon Report

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken. p 129

Materials from excavations within the existing soil fill and debris materials may contain contaminants which may prevent the material from being used as fill for the development of this site. Based on the variability of landfill debris content within the soil fill at this site, reuse of the soil fill will likely be difficult. Careful excavation and grading efforts, and full-time observations will be required to separate portions of the fill that are free of deleterious materials. p 117

LDC

Sec. 74-164. - Definitions. Wherever a more stringent or less stringent interpretation of the definition of "hazardous substance" is possible, the more stringent interpretation shall be applied. **Sec. 74-168. - Standards and administration.** (a) (2)Any determination that a Phase I or higher assessment is necessary shall, at a minimum, consider whether a hazardous substance may reasonably be believed to exist in the property; the planned or potential use of the property; the potential economic, health, or safety consequences of permitting a potentially hazardous waste to remain unidentified or unremediated on the property; proximity of the hazardous waste to contaminable sources such as groundwater; the proximity of the hazardous waste to adjacent property; the potential exposure of the general populace to hazardous substances by incidental contact; as well as appropriate standards and requirements established by the Colorado Department of Public Health and Environment and the Environmental Protection Agency concerning lawful and/or hazardous contaminant levels regarding the nature and make up of the property in question. The city may further adopt, in the manner described in subsection (d) of this section, such other factors, criteria, standards, requirements, or procedures as may be reasonably necessary to implement the provisions of this article.	Anecdotal Information: **SMALL BUSINESS LIABILITY RELIEF AND BROWNFIELDS REVITALIZATION ACT** [[Page 115 STAT. 2356]] Public Law 107-118 107th Congress ``(C) Notices.--The person provides all legally required notices with respect to the discovery or release of any hazardous substances at the facility.  ``(D) Care.--The person exercises appropriate care with respect to hazardous substances found at The facility by taking reasonable steps to-- ``(i) stop any continuing release; ``(ii) prevent any threatened future release; ``(iii) prevent or limit human, environmental, or natural resource exposure to any previously released hazardous substance.

R. Bohling (14991 W. 70th Ave., Arvada)
Comments On
Second Submittal – 2023 Terracon Geotechnical Engineering Report
Arvada RV Storage – 6800 Kilmer Street
DA2024-0016

The following are my comments pertaining to the second submittal Geotechnical Engineering Report, by Terracon, dated August 4, 2023, for the proposed Arvada RV Storage (DA2024-0016) at 6800 Kilmer, Arvada, CO.

Geotechnical investigations and reports contain foundational information on which to base successful construction projects. This is particularly relevant for the Kilmer landfill site. The major conclusions from my review of the second submittal 2023 Terracon Geotechnical Report and other Applicant 2nd submittal documents, which should have used, been coordinated, and consistent with the 2023 Geotechnical Report, are as follows:

1. That there is a considerable risk of facility component failures (pavements, foundations, flatwork, utility corridors), if the geotechnical report recommendations for construction and maintenance are not followed.

2. That over excavation of landfill materials and backfill with engineered materials is the most prudent but likely most costly way to construct the proposed facilities.

3. That the alternatives to over excavation and backfill were not significantly detailed or discussed to instill confidence that they would be successful if used for the project.

4. That the 2023 geotechnical report (as well as the 2007 Terracon Geotechnical Report) stresses the importance of site drainage and prevention of infiltration of meteoric waters into the subgrade layers of the project site.

5. That there are inconsistencies and lack of coordination between the 2023 Geotechnical report, which examined possible aggregate surfacing for roads and parking surfaces, and the Applicant's other 2nd submittal documents (site plans, erosion plan, drainage plans) which show road and parking surfaces to be one or a mix of the following - asphalt, concrete, recycled asphalt concrete.

6. That the Drainage and Erosion control reports seem to have not considered the requirement for positive site drainage and how site roads and parking surfaces need to be constructed to promote drainage off those surfaces.
    - Sheet flow to the northeast cannot occur with crowned and ditched interior roads with north / south orientations.
    - The road and parking surfaces need to be relatively impervious, requiring most of the meteoric waters reporting to the detention pond.
    - The imperviousness factor used in the drainage report of only 28% looks low according to Mile High Flood District's, Manual 1, Section 3.0, Tables 6.2 and 6.3 which indicates a factor of 60% to 90% should be used.
    - The use of a low imperviousness factor likely results in a significantly undersized detention pond.

7. The report appears to ignore several Arvada City and other code requirements including:
    - All weather paved fire access roads.
    - IFC requirement for all facility areas being accessible within 600' of a fire hydrant.
    - Proper labelling, , and signing of technical reports.

R. Bohling (14991 W. 70th Ave., Arvada)
Comments On
Second Submittal – 2023 Terracon Geotechnical Engineering Report
Arvada RV Storage – 6800 Kilmer Street
DA2024-0016

Development of the Kilmer property has been investigated by several developers since 1982 for proposed commercial and residential developments. To support those proposed projects several geotechnical and Environmental site assessments were performed, including Chen & Associates 1982 (geotechnical), Ogden Environmental and Energy Services 1991 (environmental assessment), Terracon 2007 (geotechnical), and Terracon 2023 (geotechnical). These studies assessed the site from a geotechnical aspect and provided recommendations to support design engineering and construction of the various projects proposed for the site.

All the reports clearly illustrate the challenges that the geotechnical aspects of the site present for design engineering, and construction of anything proposed for the Kilmer landfill site. The reports all seem to concur that over excavation of landfill material and debris followed by replacement of excavated materials with engineered fill is the most prudent manner to construct facilities on the landfill. The Ogden report (Recommendations, page 25, report attached) goes as far to say that the "Landfill area should not be developed for commercial or residential construction."

The 2023 Terracon Geotechnical Report is consistent with the historical reports and again illustrates the significant difficulties associated in engineering and constructing buildings, roadways, and parking surfaces on the Kilmer landfill which was unpermitted and accepted most any kind of waste material during the time it operated.

Summary Comments, and Questions:

The following are my summary comments, and questions from my review of the Terracon 2023 Geotechnical Engineering Report are as follows. I have provided more detailed comments with report references following this summary comment section:

- **The report repeatedly warns that anything constructed on landfill materials carries a high risk of failure and if built may require extensive maintenance and or multiple replacements over the life of the facility and that the.** (Risk of high settlement up to 2 feet and the risk of movement over the landfill materials.)

- The report is heavily caveated regarding the problems in constructing buildings, foundations, utility runs, roadways, and parking surfaces on the landfill and in the recommendations for the design of earthworks, grading and drainage, foundation and slabs, and roadway and parking surfaces. **The report clearly indicates building anything on the landfill materials is risky due to the high risk of settlement and movement, and that over excavation and backfill with engineered materials is the most prudent but costly way to construct the proposed facilities.**

- **Failure to properly address the serious geotechnical problems of the Kilmer site could create a failed project very similar in nature to the projects such as the Rooney Road Sports Complex in Jefferson County which had serious subsidence for soccer fields and the Denver Public Schools Northeast Bus Terminal which also had failures of facilities due to landfill subsidence.** (Reports on these two failures are attached to these comments.)

- **The report, as with the other application documents for Arvada RV Storage, does not convey what exactly the applicant intends to build regarding surfacing of site roads and the parking spaces. What is the surfacing of the roadways and parking / storage areas?** The 2023 Geotech report indicates the use of **aggregate** surfacing for roads and parking whereas the site plan sheet 1 notes **shows asphalt or concrete fire roads**, sheet 2 of the site plans shows

recycled asphalt, the erosion control plan sheet EC2 shows **recycled asphalt**, whereas the Geotech report of 2007 discusses **asphalt or concrete pavements**.

- The report states that traffic loading information was not available. The range of vehicles to travel and be stored at the site should be known or approximated at this stage. The traffic report estimates the traffic trips to and from the site that could have been used for some information.

- **The Geotech report states that a stable subgrade moisture in aggregate surfaced areas and that surfaces must be designed to prevent poor drainage, ponding, and percolation into to the surfaces which would weaken the road and parking surface, and subgrade soils. The report stresses that maintenance of the surface material and drainage are critical to the performance of aggregate surface roads. "Well-shaped crowns with a slope of at least ½ inch per foot and adequate surface ditches or subsurface drains are essential to achieving rapid surface drainage." The requirement to shed meteoric waters rapidly implies a relatively high imperviousness factor which was not discussed in the Geotechnical report.**

- **The drainage report does not appear to have considered the Geotechnical report design requirements for the road and parking surfaces, nor that large amounts of water cannot be allowed to infiltrate and damage the subgrade materials. The amount of water shed by the surfaced areas directly affects the sizing of the detention pond and its appurtenances commented on below.**

- There appears to be no coordination or use of the 2023 Geotechnical Report recommendations in the various submittal documents including:

    - Inconsistent statement of roadway and parking surfacing:
        - 2023 Geotech indicates the uses of aggregate for road and parking surfacing.
        - 2007 Geotech report indicates asphalt or concrete for roads.
        - Sheet 1 of the site plan states that the fire access roads will be all weather asphalt or concrete.
        - Sheet 2 of the site plans indicates that the fire access road as being recycled asphalt.
        - Sheet 2 of the site plans shows recycled asphalt road and parking surfacing.
        - The drainage report does not indicate any surfacing material.

    - **No Coordination with the Drainage report as follows:**

        - **No consideration of road crown and ditch requirements which would affect flow direction.**
        - Sheet flow is shown to the Northeast, which cannot occur with properly crowned and ditched roadways that are oriented north / south.
        - **The drainage report uses a 28% impervious factor which does not seem plausible since the road and parking surfaces must be designed to remove water and to minimize percolation to the sub grade.**
        - **The 28% impervious factor is low based on review of the Mile High Flood Districts Manual 1, Section 3.0 Imperviousness Tables 6.2 and 6.3 which provides imperviousness factors by land use type or surface types. These tables show the impervious factor should be on the order of 60% to 80%.**

- The Drainage report for the **previously proposed Golden RV storage used a 40%** imperviousness which is still low but much higher than 28**%. Why the change or justification for using 28%?**
- **Note: The use of a low imperviousness factor likely means that the detention pond is undersized.**
- **Note: I will provide additional comments on the drainage report in a separate document.**

- The Geotechnical report was not mentioned or apparently considered in the Preliminary Stream Bank Stability study.
- The VCUP application relied on the 2007 Geotechnical Report and may have to be coordinated with the 2023 Geotechnical Report.

- The report also states that many of the engineering aspects of the project are intended to avoid the high cost removal of landfill materials and replacement with engineered fill. **The 2023 Geotechnical report and the 2007 Terracon Geotechnical report clearly recognize that complete removal of land fill materials and replacement with engineered fill would be the preferred and safest manner on which to construct the proposed project albeit the most expensive construction method. The proposed project cannot simply be a grade and gravel project which ignores the serious geotechnical issues of the site for the sake of a minimal cost project.**

- **The high cost of properly addressing the site geotechnical issues is likely the primary reason that previously proposed projects for the site failed to advance, (Golden RV Storage 2022, 2007 proposed housing development).** The complete removal of landfill materials and replacement with engineered fill appears to be the only sure and safe way to construct fire access roads and building foundations. The requirement for all weather paved fire access roads will likely impose a similar burden on this project.

- The report goes into a significant amount of detail on the required maintenance of the aggregate surfaced areas that will most likely require regular services from a geotechnical firm and earthworks contractor. **Grading and moisture adjustment for aggregate surfaced areas will likely be year round activities and not simply twice a year activity as the report suggests as a minimum. The report also states that many parts of the facilities such as flatwork and utilities would have to be replaced over the life of the project.**

- **Arvada City Code requires all weather paved fire access roads which was again noted in the AFPD's 2nd submittal comments.** The Geotech report attempts to address the requirements for all weather paved fire access roads by stating that a "gravel fire access road may be planned for the site. It does not state how this type of road is in compliance with the City Code. The report implies aggregate surfaces roads are paved roads however the title for the table page 17 which is discussing Minimum Aggregate Sections is "Typical Unpaved Section – Post Construction Traffic. The use of "unpaved" is used again for the page prior to the aggregate thickness nomograph in the Supporting Information section which shows the contents as "Unpaved Roadway Nomograph". Was this the actual nomograph used? The Nomograph title in the report is for a fire access road but for an Xcel Energy site and has a totally different Terracon project number than the project number for the Arvada RV site.

- **The AFPD also noted that "per IFC section 507.1, 507.5.1, and because this is considered a facility, fire hydrants must be provided on site such that all areas are within 600 feet from a fire hydrant."** The report does not address buried pipelines or fire hydrants but states that utilities

within existing fill materials over the existing landfill debris will have a very high risk of movement, on the order of two feet or more. It further states that reduction or elimination of this movement is likely only possible through complete removal of the fill and debris. A discussion and recommendation in the Report would have been prudent in regard to the fire hydrant loop and hydrant design per Arvada Engineering Code of Standards and Specifications.

- The report does not discuss if more site investigations are needed to design the fire access road and fire hydrant systems.

- The Public has raised many safety and environmental concerns about the proposed project for which the Geotechnical report does little to allay these concerns. **The report states that bore holes were backfilled immediately due to safety concerns and where borehole P1 was terminated due to encountering suspected asbestos materials.** What were the safety concerns requiring backfilling of holes? The Asbestos noted in this report continues to indicate that asbestos is highly prevalent on the site and is seemly a public exposure risk from any construction activities as well as from any surfacing failures.

- The **Report mentions Terracon's previous Preliminary Geotechnical Engineering Report, dated July 18, 2007**, which is part of the Applicant's submittal as part of their VCUP application. However, the Terracon 2023 Geotechnical Engineering report did not discuss or compare the 2023 findings to the 2007 report findings. One would have thought the following should been discussed and compared:

    - Borehole program (2007 did 10 boreholes versus only 4 in 2023)
    - Bore hole logs (cover depth, landfill material depth, depths to native materials and bedrock)
    - Why were new holes needed in 2023 and why and how were their locations chosen?
    - Groundwater depth and analyses
    - Soil Characterizations
    - Landfill material characteristics.
    - Foundation, pavement, slabs design.
    - Design Recommendations
    - Why the new report supports the project better or supersedes the findings from the 2007 report.

- The reasons for not discussing the 2007 report were not given, however, one suspects that the 2007 report recommendations did not support the aggregate pavement and parking surfaces and that it more clearly stated that landfill materials should not be used to support foundations, slabs or pavements. The following excerpt from the 2007 report summarizes that report's recommendations which indicate that the more costly construction method is recommended for the site.

    > "Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, the existing landfill materials should not be used for support of foundations, slabs, and/or pavements. **Within areas of new construction we recommend complete removal of landfill materials and replacement with engineered fill.** Partial removal and replacement could be considered in areas where potentially significant movement can be tolerated, such as landscaped areas, private roadways or utility corridors. **Ventilation pipes/vents should be installed throughout the property limits in areas where any landfill materials are left in place to prevent gas build up from decomposing organic matter.** The design of such a ventilation system is beyond the scope of this study. Removal

of landfill materials will likely require proper off-site disposal, as determined by on-site field screening methods."
(It is noted that the 2007 report was obtained to support a residential construction project however the data should be applicable for foundations, slabs, and roads for the proposed RV storage project. The 2007 report was also used for the previous RV storage project proposed in 2022)

- The 2023 report does not discuss measures to address methane and other VOCs as did the Terracon Geotechnical report of 2007 and remains a concern of the Public.

- It is noted that the 2023 Geotechnical report has not been properly signed and sealed nor properly labeled according to Arvada code and State of Colorado code. The 2023 report has not been labelled as "Preliminary" which it most likely is. State code also requires the "Preliminary" designation for documents not considered final.

  The Arvada Engineering Code of Standards and Specifications, Section 728.01 – Pavement Design General, describes the requirement for a geotechnical report to support the design of paved roadways. It clearly states that the report must be completed by or under the supervision and signed by a Professional Engineer registered in the State of Colorado. It also describes the distinction between final and preliminary reports. Colorado Code of Regulations, Rules of Professional Engineering Practice section 1.5 A and B contain the rules for Sealing Requirements for Professional Engineers in the State of Colorado.

  State code also requires the Cover or Signature page of a report to be signed and dated and sealed by the Professional Engineer responsible for the document. A PE seal has been affixed to a transmittal letter to their client and does not convey the proper responsibility of the PE which sealing the report cover page attests to. The letter is not part of the report nor is it listed in the Report table of contents.

- The Geotechnical report states dust palliatives, such as magnesium chloride, could be considered to reduce the rate of aggregate loss and associated dust. The report did not discuss dust emission rates or that the proposed aggregate surface complies with Arvada Land Development Code section 4-5-4-2 which is for the surfacing and maintenance of off-street parking. It also did not discuss potential water quality issues for site groundwater or surface water due to the use of such chemicals. The need for continuing monitoring and maintenance is needed to ensure that dust palliatives are effective.

Detailed Comments, References, and Questions:

1. **Warning on Building on the Landfill –**

   The report repeatedly warns that anything constructed on landfill materials carries a high risk of failure and if built will require extensive maintenance and/or multiple replacements over the life of the facility.

   See Report Summary pages i and ii earthwork, interior floors, pavements and the Geotechnical Overview page 6.

2. **Heavily Caveated on the Risks of Building on the Landfill -**

The following excerpts from the report show the caveats regarding the risks of building on the landfill.

a. "Based upon the results of our field exploration and laboratory testing, **it is our opinion the existing fill materials and landfill debris should not be used to support foundations, interior slabs, exterior slabs-on-grade construction without complete removal and modification.**

Exterior slabs-on-grade and gravel pavements constructed on the existing artificial fill materials **will have a high risk of movement**.

To improve performance, we recommend over excavating a portion of the existing fill materials below these elements, then processing, moisture conditioning and compacting the materials back to subgrade elevation." (page I, Earthwork)

Note that there is no quantification of what constitutes improved performance.

b. "Slab-on-grade floors supported on new engineered fill are **feasible in areas where it is economical to remove and replace the existing fill materials with new engineered fill.** Due to the varying fill depths, we anticipate it will not be economical to replace the existing fill materials in all areas of the subject site. In areas where existing fill materials are encountered to depths that make it uneconomical to remove and replace these materials, structural floors supported independently of the subgrade soils are recommended. "(page ii)

c. "We understand new pavements, including the driveway entrance and all parking areas will consist of aggregate base course. **Gravel pavements constructed on the existing landfill debris will have a high risk of movement.** To improve performance, we recommend over excavating a portion of the existing fill materials below the gravel pavements, then processing, moisture conditioning and compacting the materials back to subgrade elevation." (page ii, Pavements)

Note, this point seems to have omitted backfilling excavated landfill material with engineered fill. No mention of geotextiles or if landfill materials can be compacted.

d. **"Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement.** Because of the **high risk of significant movement**, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction." (page 6)

e. "Support of exterior flatwork and aggregate-surfaced trailer areas on the existing fill and landfill debris can be considered; however, **it has been our experience that flatwork, utilities and other structures constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development. Frequent maintenance and full replacement of flatwork and utilities on unimproved landfill debris should be anticipated for this development. Regrading and/or placement of additional aggregate should be anticipated for aggregate surfaced areas."** (page 6)

f. "**The stability of subgrade soils may be affected by precipitation, repetitive construction traffic, or other factors.** If unstable conditions are encountered or develop during construction, workability may be improved by over excavation of wet zones and mixing these soils with crushed gravel. Use of geotextiles could also be considered as a stabilization technique. Lightweight excavation equipment may be required to reduce **subgrade pumping**."

g. "**Based on the subsurface conditions, slabs-on-grade constructed on the landfill debris without any modification is not recommended, as the slabs will have a very high risk of movement. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below the office building may be cost-prohibitive for the project.** On this basis, we recommend the interior floor system of the office building be designed as a structurally supported floor, supported independently of the of the subgrade materials. A minimum 12-inch crawlspace or void space between the low point for any element of the floor system and the ground surface is typically recommended for structural floor construction. **Due to the high risk of long-term movement of utilities constructed within the subgrade materials, a crawlspace or void space that is safely accessible for inspection and maintenance of utilities is recommended**." (page 14)

Note: This should have been a section where infiltration and accumulation of methane or other VOCs is considered and discussed.

h. "**Exterior flatwork constructed over unimproved landfill debris will have a very high the risk of long-term movement. Long-term movement from unimproved landfill debris cannot be quantified due to the nature of the debris, and reduction of this type of movement is likely only possible through complete removal of the fill and debris.** Due to the depths of the fill and debris, complete removal of the fill and landfill debris below exterior flatwork may be cost-prohibitive for the project. Support of exterior flatwork on the existing fill and landfill debris can be considered; however, **it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development. Frequent maintenance and full replacement of flatwork on unimproved landfill debris should be anticipated for this development."** (pages 14 & 15)

i. "**Aggregate-surfaced areas constructed over unimproved landfill debris will have a very high the risk of long-term movement.** As discussed previously, complete removal of the fill and landfill debris may be cost-prohibitive for the project. Support of aggregate-surfaced trailer areas on the existing fill and landfill debris can be considered; **however, it has been our experience that aggregate-surfaced areas constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance. Regrading and/or placement of additional aggregate should be anticipated for aggregate-surfaced areas over the life of the project.**" (pages 16 &17)

j. "The recommended aggregate thickness assumes a maximum rut depth of 3 inches from traffic loading. **Rutting of the aggregate surface layer and loss of aggregate from the surface layer will occur over the life of the access drives and parking areas. It is imperative that the subgrade be protected from a loss of moisture. A significant loss of moisture of the pavement supporting materials could result in additional movement of the subgrade."** (page 17)

k. **"It has been our experience with other structures constructed on landfill debris that utilities constructed below or adjacent to structures on landfill debris will move significantly and will likely require excavation and full replacement multiple times over the life of the office building.** Utilities constructed below structurally-supported floor systems should not be supported on the subgrade, but should be suspended in crawlspace areas independent of the subgrade materials. Utilities outside of the office building constructed on or within the existing fill materials over the existing landfill debris will have a very high risk of movement. **Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris. It is our opinion that movement on the order of 2 feet or more is possible.**" (page12) **(Note this is the only place where the risk of movement is quantified.)**

3. What is Being Proposed for Roads and Parking Surfacing? –

The report, as with the other application documents for Arvada RV Storage, does not convey what exactly the applicant intends to build regarding site roads and the parking spaces / RV storage spaces or that initial engineering has been performed to support the submittals by the applicant.

The following are examples of the lack of project definition, facility design, and coordination with the other Applicant's submittals:

a. **The Geotechnical Report states that the storage yard is to consist of new gravel surfacing whereas the site plan drawings show that the roadways and RV parking areas could be recycled asphalt, asphalt, or concrete. The drainage report does not state what surface is the basis for the drainage calculations.**

The geotechnical properties differ significantly between those materials which impact design engineering. The 2023 Geotechnical Report does not discuss the use of recycled asphalt for the site. The cited Terracon Preliminary Geotechnical Report of 2007 did not examine recycled asphalt for use at the site but contained preliminary designs for asphalt or concrete pavements.

b. The Geotechnical report states that **the fire access roads may be planned to be gravel** and designed for a truck running over it once per week whereas sheet 1 of the site plan **states that the fire access roads will be all weather asphalt or concrete**. The fire access roads on the site plans are noted as being asphalt or concrete in the general notes sheet 1, and as recycled asphalt sheet 2.

Arvada code requires all weather paved access roads.

The AFPD second submittal comments state that paved fire access roads must be provided throughout the facility perimeter loop.

c. The Geotechnical report states that Terracon was provided the 6880 Kilmer Concept Plans A & B for information by Chelton (page 1 of report), but it appears that neither plan was attached for reference nor what information was used for the Geotechnical report.

d. "Anticipated structural loads were not provided. In the absence of information provided by the design team, we will use the following loads in our engineering analyses based on our experience with similar projects." (page2)

e. **"At the time this report was written, traffic loading information was not available. Therefore, we have estimated traffic loads for these areas based on the procedures outlined in the Standards."** (page 16) (**How can the interior site roads and parking surfaces be designed to any confidence level if the basic vehicle loading information is unknown? What is the largest RV or Truck the site will store use the interior roads on the site? Arvada has codified some prescriptive standards against which the vehicle loadings should be compared.)**

4. **Road and Parking Surface Design Must Promote Drainage and Minimize Percolation and Ponding to Subgrade –**

   a. **"Future performance of aggregate surface areas constructed at this site will be dependent upon several factors, including:**

      - **Maintaining stable moisture content of the subgrade soils both before and after roadway construction.**

      - **Providing for a planned program of preventative maintenance."**

   b. **"Rutting of the aggregate surface layer and loss of surfacing materials will occur over the life of the drives/parking areas. Maintenance of the surface material and drainage are critical to the performance of aggregate surface roads. Since the surface materials are unprotected, proper drainage is key against loss of strength and stability of the surface materials. Poor drainage allows water to remain on the surface and percolate into the aggregate base course section, reducing the strength of the underlying subgrade soils. "**

   c. **"Well-shaped crowns with a slope of at least ½ inch per foot and adequate surface ditches or subsurface drains are essential to achieving rapid surface drainage. Maintenance of the roadway shape and ditches or drains should be performed at least twice a year,** particularly during wetter periods of the year and when snow removal is required, though more frequent maintenance may be required depending on actual traffic, drainage, and smoothness requirements. If unstable conditions develop during roadway usage, scarifying and drying of the subgrade, or placement of additional gravel material may be required."

   d. The 2007 Geotechnical Report also describes the importance of proper drainage for pavements and parking surfaces on the landfill.

      - (Page 17) "Future performance of pavements constructed on the clayey soils and bedrock at this site will be dependent upon several factors, including:

- magnitude of settlement/consolidation of fill materials.
- **maintaining stable moisture content of the subgrade soils.**
- providing for a planned program of preventative maintenance."

- (Pages 22 & 23) "**Maximum grades practical should be used for paving and flatwork to prevent areas where water can pond.** In addition, allowances in final grades should take into consideration post- construction movement of flatwork, particularly if such movement would be critical.

  Where paving or flatwork abuts the structure, care should be taken that joints are properly sealed and maintained to prevent the infiltration of surface water."

5. **No Coordination of Geotechnical in Design and Report Documents**

There appears to be no coordination or use of the 2023 Geotechnical Report in the other various submittal documents as follows:

- The various documents are inconsistent and have not been coordinated on the type surfacing that will be used for the roads and parking areas as follows:
  - The 2023 Geotech Report (page I) shows the road and parking surfaces are **gravel surfacing**.
  - The 2023 Geotech Report states this about the fire access road: "We anticipated a **gravel fire access road** may be planned at the site.
  - Sheet 1 of the Site Plan, General Notes, Item #2. States that the fire access roads will **either be asphalt or concrete**.
  - Sheet 2 of the Site Plans, upper left below detention pond, shows the parking lot as **recycled asphalt**.
  - The drainage report specifies **no type of surface**.

  (Note: Each type of surface has different properties that affect design and function, in particular the imperviousness of the surface.)

- The Drainage report by Harris Kocher Smith dated June 14, 2024, does not appear to have incorporated or have considered the findings and recommendations from the 2023 Geotechnical Report including the following:

  - No consideration of road crown and ditch requirements but shows sheet flow to the Northeast which **cannot occur with crowned and ditched roadways oriented to north /south**. Flows would have to be north along roads. There likely would have to be drains to carry drainage under the north fire access road to the detention pond.
  - The drainage report uses a 28% impervious factor which does not seem plausible since the road and parking surfaces must be designed to remove water to minimize percolation to the sub grade.
  - **The 28% impervious factor is low based on review of the Mile High Flood Districts Manual 1, Chapter 6, Section 3.0 Imperviousness Tables 6.2 and 6.3 which provides imperviousness factors by land use type or surface types.**

These tables seem to indicate that an impervious factor on the order of 60% to 80% should be used.

- **The 28% imperviousness factor would be more indicative of parks and open space, landscaped areas, or lawns.**
- **Using a low imperviousness factor likely results in significantly under sizing of the detention pond.**
- **A review was made of the drainage report submitted for the previous RV storage proposal for the site which was also performed by Harris Kocher Smith. That report used an imperviousness of 40% however the report did not discuss what surface the 40% factor was based on.**
- **A 40% imperviousness factor would be indicative of a grass covered field, landscaped areas, or single family homes all of which do not represent a compacted parking or road surface.**
- **A 40% factor is still probably too low for a site where the surfaces must be designed to promote rapid drainage from crowned roads and parking areas into accompanying ditches. This report again used sheet flow which does not seem plausible due to the road crowning and ditch requirements and road and ditch orientation.**

Note: I will provide comments on the drainage report in a separate document.

- Arvada Municipal code clearly calls for all fire access roads to all weather paved roads per the following code section:

The Arvada Municipal Code dictates the following:

Sec. 42-56. I.F.C. Section 503.2.1, Surface.

Section 503.2.3 Surface, is hereby amended to read as follows:

"503.2.3 Surface. **Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be paved so as to provide all-weather driving capabilities."**

(Ord. No. 4739, § 3, 9-14-2020)

The Geotechnical report appears to the City Municipal Code saying a gravel road may be planned for the project. The Geotechnical report does not state why such a road is being planned nor how the gravel fire road complies with Arvada Municipal Code.

The Applicant's **site plan sheet 1** shows that the fire access roads will be all weather paved roads **(concrete or asphalt).** Sheet 2 of the site plan shows recycled asphalt as the surfacing material. The drainage report and plan drawings do not indicate any type of surfacing. There is an obvious disconnect and inconsistencies with the Applicant's other submittals.

6. **Avoiding the High Cost of Removal of Landfill Materials and Replacement with Engineered Fill –**

The following are excerpts from 2023 Geotechnical report referring to the high cost of removal and replacement of landfill materials which are usually followed by an alternative that may be considered but that don't seem to have a strong endorsement by the geotechnical consultant.

- "**Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction.**

Due to the depths of the fill and debris, **complete removal of the fill and landfill debris may be cost-prohibitive for the project**. On this basis, the proposed office building could be designed with a deep foundation system, such as helical piles, with a structurally supported floor system." (Page 6)

- "Due to the depths of the fill and debris, complete removal of the fill and landfill debris below the office building may be cost-prohibitive for the project. On this basis, we recommend the interior floor system of the office building be designed as a structurally supported floor, supported independently of the of the subgrade materials." (page 14)

- "Exterior flatwork constructed over unimproved landfill debris will have a very high risk of long-term movement. Long-term movement from unimproved landfill debris cannot be quantified due to the nature of the debris, and reduction of this type of movement is likely only possible through complete removal of the fill and debris. **Due to the depths of the fill and debris, complete removal of the fill and landfill debris below exterior flatwork may be cost-prohibitive for the project."** (pages 14 & 15)

- "Aggregate-surfaced areas constructed over unimproved landfill debris will have a very high the risk of long-term movement. **As discussed previously, complete removal of the fill and landfill debris may be cost-prohibitive for the project.** Support of aggregate-surfaced trailer areas on the existing fill and landfill debris can be considered; however, it has been our experience that aggregate-surfaced areas constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance. Regrading and/or placement of additional aggregate should be anticipated for aggregate-surfaced areas over the life of the project." (pages 16 &17)

7. High Maintenance of Facilities if Constructed.

The report repeatedly states that anything constructed over landfill material, even using materials such as geotextiles, will require continuing and relatively extensive maintenance or replacement. The concern here is, will the Applicant perform the required maintenance and not let the property fall into disrepair and will lack of maintenance cause or create conditions on or within the landfill that could cause health or environmental hazards. An RV storage facility is not likely a high revenue generator and probably cannot withstand a large operating cost for facility maintenance and replacement.

- "Support of exterior flatwork and aggregate-surfaced trailer areas on the existing fill and landfill debris can be considered; however, it has been our experience that flatwork, utilities and other structures constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development. **Frequent maintenance and full replacement of flatwork and utilities on unimproved landfill debris should be anticipated for this development. Regrading and/or placement of additional aggregate should be anticipated for aggregate surfaced areas**. "(page 6) Geotechnical Overview

- "It has been our experience with other structures constructed on landfill debris that **utilities constructed below or adjacent to structures on landfill debris will move significantly and will likely require excavation and full replacement multiple times over the life of the office building.** Utilities constructed below structurally-supported floor systems should

not be supported on the subgrade, but should be suspended in crawlspace areas independent of the subgrade materials. Utilities outside of the office building constructed on or within the existing fill materials over the existing landfill debris will have a very high risk of movement. **Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris. It is our opinion that movement on the order of 2 feet or more is possible.** (page12)

- "Aggregate-surfaced areas constructed over unimproved landfill debris will have a very high the risk of long-term movement. **As discussed previously, complete removal of the fill and landfill debris may be cost-prohibitive for the project.** Support of aggregate-surfaced trailer areas on the existing fill and landfill debris can be considered; however, it has been our experience that aggregate-surfaced areas constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance. Regrading and/or placement of additional aggregate should be anticipated for aggregate-surfaced areas over the life of the project. (pages 16 &17)

- "Future performance of aggregate surface areas constructed at this site will be dependent upon several factors, including:

    - **Maintaining stable moisture content of the subgrade soils both before and after roadway construction.**

    - **Providing for a planned program of preventative maintenance."**

"Maintenance of the surface material and drainage are critical to the performance of aggregate surface roads. Since the surface materials are unprotected, proper drainage is key against loss of strength and stability of the surface materials. Poor drainage allows water to remain on the surface and percolate into the aggregate base course section, reducing the strength of the underlying subgrade soils." (page 18)

8. Public Safety Concerns Again Evident in Geotechnical Report Findings

The Geotechnical report does not allay the Publics' Safety and Environmental concerns about the project and only increases those concerns. The following are excerpts from the Geotechnical report illustrating this:

a. "**Due to safety concerns**, borings were backfilled immediately after completion. Therefore, subsequent groundwater measurements were not obtained." (Page 5, footnote 1. Under the drill hole boring information)

   The report introduction states that the second purpose of the drilling was to provide information on ground water conditions but for some reason a full set of ground water observations was not collected. It appears that groundwater level data after allowing the drillhole water levels to stabilize after drilling were not collected. No ground water samples were collected for analysis.

   What are the safety concerns noted in the report? Was there methane or other VOCs venting from the holes? Was there some hazardous material detected such as described in the following point b?

What was so hazardous that subsequent groundwater measurements could not be obtained? None of the previous reports mention anything about having to immediately fill bore holes and not obtain groundwater measurements.

b. "Boring No. PI was terminated around 15 feet due to **encountering suspected asbestos containing materials** and was offset and redrilled (offset boring designated as Boring No. PIA)." (page 1, Introduction)

Why was a second hole drilled? What was the suspected material? Apparently, the offset hole did not encounter suspected asbestos containing materials.

Asbestos is a contaminant of concern that is pervasive on the site as noted in the Applicant's VCUP application.

c. "From a geotechnical perspective, the near-surface existing fill soils that are free of debris and contaminants may be considered for reuse as engineered fill for this project, provided the materials are free of deleterious materials and the material meets the requirements in the Earthwork section."

What contaminants and deleterious materials would preclude the use of near surface soils? There needs to be a list of unacceptable materials. Has any near surface soil been analyzed for any of the potential unacceptable materials?

d. The Materials Management Plan was not noted or referenced by the Geotechnical report. The manner in which site material is delineated and cleared for use in construction needs to be coordinated between the two documents as well as with the VCUP.

e. "Although evidence of underground facilities such as grease pits and septic tanks were not observed during our exploration, such features could be encountered during construction. **If unexpected fills or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction**." (page7)

It appears that there is a concern that these types of materials will be encountered and demonstrating that there is significant amount of uncertainty in attempting to construct anything on the landfill.

One of the Public's key concerns has and is, will the Applicant conscientiously approve and finance the added costs for over excavation and engineered backfill or will they walk away from the project potentially leaving open excavations that could cause health and or environmental problems. The number of caveats about the high cost of over excavation and engineered backfill only increases the concern that the Applicant will walk away if unforeseen problems arise.

f. The report fails to discuss methane and other VOCs that are present at various locations on the site and what engineering is needed to safely construct buildings, utility runs and trenches, and the parking and road surfaces. Active mitigation will be required for buildings.

Roads could require passive mitigation to prevent road or parking surface failure and exposure issues. The 2007 Terracon Preliminary Geotechnical Report makes mention of methane and that the design of facilities will need to consider methane and VOCs in their design.

9. 2023 report versus Previous Reports

The geotechnical aspects of the Kilmer site have been investigated on at three occasions:

- Chen & Associates 1982
- Terracon Preliminary Geotechnical Engineering Report 2007
- Terracon Propose RV Storage Yard Geotechnical Report 2023

The 2023 Report mentions Terracon's previous Preliminary Geotechnical Engineering Report, dated July 18, 2007, which is part of the Applicant's submittal as part of their VCUP application. However, the Terracon 2023 Geotechnical Engineering report did not discuss or compare the 2023 findings to the 2007 report findings. The Chen and Associates report was made known to the Applicant in the VCUP comments and process.

One would have thought that prior geotechnical reports should have been reviewed and used in the development of the 2023 site investigation. The results from the 2023 investigation should have been compared and or contrasted to the results from the previous investigations.

The following should have been discussed and compared:

- Borehole programs (2007 did 10 boreholes versus only 4 in 2023)
- Why were the locations for the 2023 holes chosen as they seem to be twins of holes from the 2007 program?
- Bore hole logs (cover depth, landfill material depth, depths to native materials and bedrock)
- Groundwater depth and analyses
- Soil characterizations
- Soil chemical analysis
- Landfill material characteristics.
- Foundation, pavement, slabs design.
- Design Recommendations

The stated purpose of the report was not clearly stated in the report however the letter from Terracon to their client immediately following the report cover or title page states that:

> "This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and aggregate surface pavements for the proposed project. "

The reasons for not discussing the 2007 report were not given however one suspects that the 2007 report recommendations did not support the aggregate pavement and parking surfaces and more clearly stated that landfill materials should not be used to support foundations, slabs or pavements. The following excerpt from the 2007 report summarizes the report recommendations which indicate that the more costly construction method is recommended for the site.

> "Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, the existing landfill materials should not be used for support of foundations, slabs, and/or pavements. **Within areas of new construction we recommend complete removal of landfill materials and replacement with engineered fill.** Partial removal and replacement could be considered in areas where potentially significant movement can be tolerated, such as landscaped areas, private roadways or utility corridors. **Ventilation pipes/vents should be installed throughout the property limits in areas where any landfill materials are left in place to prevent gas build up from decomposing organic matter.** The design of such a ventilation system is beyond the scope of this study. Removal of landfill materials will likely require proper off-site disposal, as determined by on-site field screening methods."
> *(It is noted that the 2007 report was developed to support a residential construction project however the data should be applicable for foundations, slabs, and roads for the proposed RV storage project. The 2007 report was also used for the previous RV storage project proposed in 2022 and is part of the VCUP application.)*

In reviewing the 2007 Preliminary Terracon Geotechnical report, one is given the impression that the recommendations and descriptions of alternatives were much more detailed than the those in the 2023 report.

10. 2023 Geotechnical Report Made No Mention of Methane or VOCs and Mitigation

The report does not discuss methane and other VOCs that are present at various locations on the site and what engineering is needed to safely construct buildings, utility runs and trenches, and the parking and road surfaces. Active mitigation will be required for buildings. What effects do gas build up or venting have on the road and parking surfaces? Do roads require passive mitigation to prevent road or parking surface failure and exposure issues?

The 2007 Terracon Preliminary Geotechnical Report makes mention of gas the design of facilities will need to consider as follows:

> "Ventilation pipes/vents should be installed throughout the property limits in areas where any landfill materials are left in place to prevent gas build up from decomposing organic matter. The design of such a ventilation system is beyond the scope of this study." (pages 6 & 7)

11. Standards for Sealing Reports by Professional Engineers and Status Designation of Documents

It is noted that the 2023 Geotechnical report has not been properly signed and sealed by a Colorado professional Engineer nor properly labeled as "Preliminary" according to Arvada code and State of Colorado code. The 2023 report has not been labelled as "Preliminary" which it most likely is. State code also requires the "Preliminary" designation for documents not considered final.

The Arvada Engineering Code of Standards and Specifications, Section 728.01 – Pavement Design General, describes the requirement for a geotechnical report to support the design of paved roadways. It clearly states that the report must be completed by or under the supervision of and signed by a Professional Engineer registered in the State of Colorado. It also describes the distinction between final and preliminary reports.

Colorado Code of Regulations, Rules of Professional Engineering Practice section 1.5 A and B contain the rules for Sealing Requirements for Professional Engineers in the State of Colorado.

State code also requires the Cover or Signature page of a report to be signed and dated and sealed. A PE seal has been affixed to a transmittal letter to their client and does not convey the proper responsibility of the PE which sealing the report cover page attests to and as required by Colorado Code.

12. Parking and Road Surface Airborne Dust

The Arvada City Land Development Code section 4-5-4-2 describes the requirements for surfacing and maintenance for off street parking.

Of particular importance are the requirements as follows:

- The surfacing material shall **protect** against potholes, erosion, **and dust**.
- Parking spaces shall be defined on the pavement surface with striping and color delineation.
- **Use of the alternative surface will not cause undue airborne dust**.
- **Off-street parking surfaces shall be kept in good condition**, **free of** weeds, **dust**, trash or debris, and parking space lines or markings shall be kept clearly visible and distinct.

The 2023 Geotechnical Report recommends magnesium chloride as a dust palliative.

Why or how magnesium chloride was selected was not explained.

Magnesium chloride is a common dust palliative whose effectiveness, as with other palliatives, depend on many factors including the following:

- fines content of the aggregate
- proper drainage from the roadway surface
- climate – dry versus humid
- monitoring and maintenance of the aggregate surface

Note a dust palliative in this case is primarily to be used to minimize aggregate loss and with a secondary purpose being dust control.

The report does not examine how much dust could be generated by the site or compare the proposed aggregate surface to dust emissions from other types of surfaces or palliatives.

The site is generally windy and could generate significant dust emissions from a poorly selected surface and or palliative.

A literature search suggests that magnesium chloride or similar calcium chloride may not be the best palliative for use in Arvada's dry climate.

Literature also warns about the solubility and mobility of the chloride content of the magnesium chloride which can find its way into ground water or surface waters. Rain and snow melt can flush chlorides easily into the site drainage or into the site ground water. Due to the proximity of the site to Ralston Creek, the overuse or misuse of dust palliatives has the potential to detrimentally affect the water quality in the creek.

Neither the Geotechnical report nor the site drainage report discuss water quality that could result from the use of dust palliatives at the site.

In order to function as intended, palliatives require regular monitoring and maintenance particularly following precipitation events.

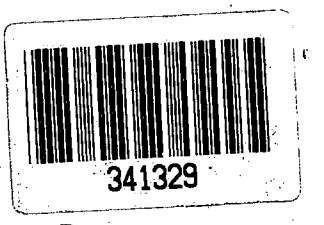
448141

BOB WILSON
Geologist

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

4582 So. Uister Street Pkwy. Suite 415
Denver, CO 80237
303 843 6210 Fax 303 843 6215

COTTONWOOD WEST INDUSTRIAL PARK PHASE I ENVIRONMENTAL SITE ASSESSMENT AND PRELIMINARY PHASE II ANALYSIS



Submitted by

Ogden Environmental and Energy Services Company, Inc.
Denver, Colorado 80237

to

LeisureTime Management Resources, Inc.
Lakewood, Colorado 80228

CONTRACT NO. LT-1-91-092

January 17, 1991

COTTONWOOD WEST INDUSTRIAL PARK

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND

PRELIMINARY PHASE II ANALYSIS

ARVADA, COLORADO

Prepared for
LeisureTime Management Resources, Inc.
and Resolution Trust Corporation
555 Zang, Suite 300
Lakewood, Colorado 80228

by
Ogden Environmental and Energy Services, Inc.
Denver Operations
Standford Place 3, Suite 415
4582 South Ulster Street Parkway
Denver, Colorado 80237

LTMR Contract LT-1-91-092

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APPENDICES

1.0 INTRODUCTION

Ogden Environmental Energy Services Company (Ogden) has completed a Phase I Environmental Site Assessment (ESA) at the Cottonwood West Industrial Park (referred to herein as the "property" or "LTMR site." This ESA has been prepared for the exclusive use of LeisureTime Management Resources, Inc. (LTMR) and the Resolution Trust Corporation (RTC).

1.1 PURPOSE

The purpose of the Phase I ESA is to:

- identify the presence of a release or threat of a release of any hazardous substance affecting the property;
- determine the level of compliance with current selective environmental standards, laws, and regulations with respect to the property;
- provide support background for valuation of the property;
- establish baseline information for environmental liability for historical and comparative purposes;
- identify any hazardous substance that may have been utilized, stored, released, or disposed on the property; and
- identify the need for additional testing/monitoring to evaluate the scope, location, source, and nature of any releases, or threat of releases, of hazardous and toxic substances affecting the property or adjacent properties—both public and private.

1.2 GENERAL SITE INFORMATION

The site is located within the east one-half of Section 1, Township 3 South, Range 70 West of the 6th Prime Meridian, Jefferson County, State of Colorado. Specifically, the site is located near W. 68th Place and Joyce Street, Arvada, Colorado. The site consists of six parcels of land with five parcels being within the subdivision Cottonwood West Industrial Park Filing Number 1,

and the sixth parcel being directly south of the subdivision. Please refer to the 1986 Aerial Photograph Site Vicinity Map (1"=200') (Appendix B). The full property legal descriptions are included in Appendix C.

The property is bordered on the north by agricultural land with sparsely scattered single family homes, zoned A-1, City of Arvada. To the east of the property and directly adjacent to the site is Systems Engineering Associates, Inc., a vacant subdivided lot, and B-TEN SYSTEMS INC. Following the eastern boundary to the southern most point is The City of Arvada's Municipal Service Center/Public Works Department.

The Arvada Municipal Service Center houses the Police Department's impoundment yard, the Fleet Services Division, the Traffic and Water Departments, and the Engineering Department's Soil Lab. Adjacent to these facilities are open-air, temporary asphalt stockpiles. Directly east of the stockpiles is the Jefferson County School District's (JCSD's) Arvada Bus Terminal and maintenance yard. All of the land use to the east is zoned Planned Unit Development-Industrial (PUD-I), City of Arvada. Directly to the south of the property is the Croke Canal; south of the canal is a single-family home with a barn and silo surrounded by agricultural land. This land is zoned A-2 Jefferson County Zoning. Directly west of the site is the Croke Canal, and west of the canal is agricultural land with scattered single-family homes. This land is zoned A-2 and is within Jefferson County jurisdiction. The closest major intersection is to the southeast at 64th Avenue and Indiana Street.

The historical use of the site was researched in order to ascertain the probability of past waste disposal. Information researched included the following:

- Chain of Title
- Topographic Maps
- Historical Aerial Photographs (Appendices A and B)
- Geotechnical Site Evaluation; a 1982 Chen and Associates Soil and Foundation Investigation report, which was provided by LTMR is included in Appendix H.
- Soil Conservation Service Maps (Appendix E)
- Personal Interviews

In November 1985, Jefferson County recorded the Cottonwood West Industrial Park Filing 1, located in the City of Arvada. This 25.4-acre subdivision is the northern part of the site located north of Ralston Creek. There are also 13 acres (more or less) located south of the creek, which is also part of the LTMR site (see Figure 1, Appendix D). The subject property was annexed from Jefferson County by the City of Arvada in 1981 and 1982.

1.2.1 Chain of Title

The Chain of Title and deed research was conducted at the Jefferson County Court House in the Tax Assessors office and the County Clerk and Records office. Property ownership dating back to 1932 is listed below.

Date(s)	Ownership
Cottonwood West Industrial Park Filing 1 (Block 1, Block 2, Block 3, Block 4 Lot 1, Block 4 Lot 2)	
Present - March 18, 1988	Cottonwood West LTD.
March 18, 1988 - November 21, 1985	Cottonwood West Industrial Park Inc.
November 21, 1985 - July 20, 1981	Pulse Holding LTD.
July 20, 1981 - January 22, 1954	Earl N. & Ruth M. Murray
January 22, 1954 - November 29, 1945	Arthur H. Meisner
November 29, 1945 - September 19, 1932	Joseph H. Parish
Property South of Cottonwood West Industrial Park Filing 1	
Present - March 18, 1988	Cottonwood West LTD.
March 18, 1988 - November 2, 1981	Cottonwood West Industrial Park
November 2, 1981 - July 20, 1981	Pulse Holdings LTD.
July 20, 1981 - January 22, 1954	Earl N. & Ruth M. Murray
January 22, 1954 - November 29, 1945	Arthur H. Meisner
November 29, 1945 - May 28, 1932	Joseph H. Perish

No industrial or manufacturing interests have occupied the property in the specified time period. Prior to use as a landfill, the land was utilized for agricultural purposes. Although part of the site was planned for commercial development, no such activity was established. Other than the landfill site, the land remains in an agricultural state.

Presently, the subject site is vacant. The City of Arvada has zoned this property PUD-I. This zoning district allows for the construction of planned office/industrial parks.

The northern 25-acre portion of the site was subdivided in 1985 into five parcels: Block 1, Block 2, Block 3, Block 4-Lot 1, and Block 4-Lot 2. Streets and easements have been dedicated to the City of Arvada; but since no development has occurred, the streets have not been constructed.

The southern 13-acre portion of the site has not been subdivided. It is separated from the northern portion of the site by Ralston Creek.

1.2.2 Topographical Map Reference

United States Geological Survey (USGS) 7.5 minute (Golden Quadrangle) topographical maps were reviewed. The most recent quad edition is from a 1965 base with photo-revisions in 1980. The map shows the property to be relatively flat with a slight eastward tilt and lying geographically within the Ralston Creek drainage basin.

2.0 SITE INFORMATION HISTORICAL

2.1 AERIAL PHOTOGRAPHS

Historical aerial photographs were obtained from the City of Arvada Planning Department and the Jefferson County Mapping Department. The photographs examined were dated 1970 and 1986. In 1970, aerial photography revealed undeveloped land with possible agricultural uses north of Ralston Creek. The parcel south of Ralston Creek there is evidence of a landfill excavation with placement of a soil cap over the excavation. Aerial photography dated 1986 shows surface scrapes north of Ralston Creek where proposed roads in the Cottonwood Industrial Park were excavated. Today this parcel is covered by native grasses. The parcel south of Ralston Creek shows natural vegetation with a noticeably raised surface area. Commercial and industrial development is established along the eastern property line.

2.2 ENVIRONMENTAL EXTRACTS FROM PRIOR SOIL ANALYSIS

In 1982, a construction/development firm conducted a preliminary discovery process to determine the bearing capacity and structural suitability for bridge emplacement across Ralston Creek. A soil and foundation investigation report prepared by Chen and Associates Consulting Geotechnical Engineers confirmed the presence of a landfill south of Ralston Creek on a 13-acre tract. The Chen report revealed the presence of explosive levels of methane gas in three wells. This report is in reference to job no. 23,548 dated January 27, 1982, and is presented in Appendix H.

3.0 SPECIFIC SITE INFORMATION

The 25-acre tract north of Ralston Creek consists of hummocky surface conditions probably formed from the removal of topsoil where the proposed roadways were scrapped within the subdivision. Within this area, there is no indication of any environmental problems. South of Ralston Creek, the 13-acre subject site is a flat lying surface condition that has been artificially elevated approximately 5 to 10 ft above the surrounding landscape. This difference in relief is one indication of the presence of landfill material. This surface of fill area is partially unconsolidated and demonstrates signs of subsidence throughout.

According to soil surveys conducted by the USDA Soil Conservation Service, the predominant native soil type at and around the site consists of well-drained clayey soils that formed in material derived from mudstone and shale. The soil service map—located in Appendix E— is composed of an overlay of an aerial photograph that was taken from either 1978 or 1979 orthophotographs.

4.0 PERSONAL INTERVIEWS

On December 23, 1991, Ogden personnel interviewed people living and working in an area within a half-mile radius of the site.

The Arvada Municipal Service Center/Public Works Department borders the property on the southern quarter of the east side. Built in 1975, the Service Center houses several departments. In the past, spoils from Street and Water Department projects were stored on the western side of the property bordering the LTMR site. Presently, asphalt from old streets and roads is temporarily stored there and is later hauled away to be recycled. East of this location is the Police Department's impoundment yard. Southeast of the impoundment yard is the gas shed and two underground unleaded fuel tanks. Kevin Muenchow, fleet services coordinator for the Department, said that an additional two tanks were located there in the past. He directed Ogden to contact Callie Videtich, environmental analyst for the Water Quality and Environmental Services Department for the City of Arvada. Ms. Videtich confirmed that two underground storage tanks were pulled from the Municipal Service Center site on April 4, 1991, and were sent out as scrap iron. The tanks had been leaking. Ms. Videtich stated that the contamination plume from the tanks remains on their property extending 200 ft east toward the Indiana St. and 150 feet north towards JCSD. James McCarthy, Manager of the Arvada Water Quality and Environmental Services Department, concurred with the above information. Maps and documentation of the contamination will be available when the final report is released by the end of January 1992.

JCSD's Arvada Bus Terminal is located 675 ft east of the site and is bordered on the north by 68th Avenue. The terminal, built in 1976, is used for repair and maintenance of school busses. Two underground fuel tanks are located on the property. Patricia Cawfield, legal assistant to Bill Johnson, JCSD's Environmental Compliance Manager, stated that there is soil contamination heading in a north, northeast direction away from the LTMR site. As of November 11, 1991, eight monitoring wells were on the JCSD property, and the County was in the process of developing and implementing a corrective action plan for this contamination.

Bob Monzingo, a 19-year veteran of the Arvada Volunteer Fire Department, said he knew of no "Haz-Mat" responses, major fires, or floods on the LTMR site. His station is located one-half mile southeast of the site.

Jack Mathes, a two-year employee of B-TEN Systems, Inc., 6803 Joyce St., confirmed that dumping has occurred directly south of his building. He did not know the nature or extent of

this activity. This activity would probably occur at the Arvada Municipal Service Center stockpile area, since Ogden personnel did not observe recently dumped material directly on the LTMR site.

Kenneth P. Dixon is an employee of Systems Engineering Associates, Inc., which borders the site on the east and is north of the Arvada Municipal Service Center. During the 11 years that he has been at this location, he has noticed small-scale, farming-type operations in the field north of Ralston Creek. He has seen surveyors on the subject property many times. Mr. Dixon also said that he has noticed fire trucks at Glass Tech Solar, Inc. (GTSI), which is located directly east of his building, across Joyce Street. A few months ago, he saw a Haz-Mat Team removing something from the building. Several people working in the area have expressed concern with GTSI at 6800 Joyce Street. A sticker on the entrance door states that the facility is monitored by an MDA Scientific toxic gas detection system. Scott Brown, President of the now defunct GTSI, is the new owner of the building. He said the gas cylinders that were once stored in the building are gone. The contents of an underground acid tank north of the building had been neutralized, and the tank was removed January 13, 1992. In his opinion, the tank did not leak. Ogden was not able to determine the type of acid stored underground.

Ogden interviewed H.D. Adams on December 27, 1991. Mr. Adams has owned the property immediately south of the Croke Canal since 1972. He remembers the land south of Ralston Creek and north of the canal being farmed for hay and/or oats through the years 1972–1975. He estimates that the landfill, operated by Jefferson County, was closed in the late 1960s or early 1970s but before 1972. Since 1972, he can remember several junk items appearing along Ralston Creek. He recalls no major floods, industrial incidents, or unusual odors on the LTMR subject site.

On December 23, 1991, Ogden personnel interviewed Don Forbes, the owner of Lawn A Mat, a lawn service company. Mr. Forbes' property is across the Croke Canal west of the LTMR site. He has resided on this property since 1958. Tests performed on his well water at that time showed no problems. He knew of no unusual occurrences on the LTMR site. He responded to Ogden's questions about chemicals used in his lawn service company by saying that he had a tank with Trimeck Pesticide. This tank always remains on a truck for transportation to job sites. Ogden was not able to determine the depth of the producing aquifer or geologic formation from which Mr. Forbes gets his water.

Ruth Murray, owner of the LTMR site from 1954 to 1981, presently still owns some acreage across the Croke Canal south-southwest of the LTMR site. When she moved there 38 years ago, Jefferson County was operating the landfill with a guard on duty. She recalls that the landfill was

capped around 1971. Ms. Murray was told by the County that the property could be built upon in 10 years.

Sundstrand Fluid Handling is located southeast, diagonally from the LTMR site. John Randolf has been employed as Plant Engineer since the plant was constructed in 1976. The plant fabricates water pumps and recycles paint thinners and stoddard solvents that comprise its listed waste codes. The only tank on the facility is inside, containing water soluble coolant. The contents of the tank are periodically removed for appropriate disposal. According to Randolf, there is 17 ft of landfill buried in the northern 10 acres of Sundstrand's property. Not wanting to become involved in the waste-stream liability, Sundstrand has not done any testing of the area. Jefferson County has declared that Sundstrand was not involved with the landfill and any fill associated contamination in the area. Randolf has lived near the LTMR site area for over 30 years. Randolf further noted that he personally dumped trash at the site between the years of 1955 to 1967 when the site was a landfill.

Ogden personnel questioned Randolf about the three tanks listed in the Colorado Department of Health's 1989 Underground Storage Tank (UST) Inventory. Randolf confirmed that Sundstrand did have three USTs containing wastewater, waste oil, and petroleum. These three tanks were removed several years ago.

5.0 CURRENT SITE USE

The subject site presently is vacant. The City of Arvada has zoned this property PUD-I (Planned Unit Development-Industrial). This zoning district allows for the construction of planned office/industrial parks.

The northern 25-acre portion of the site was subdivided in 1985 into five parcels: Block 1, Block 2, Block 3, Block 4-Lot 1, and Block 4-Lot 2). Streets and easements have been dedicated to the City of Arvada; but because no development has occurred, the streets have not been constructed, although scars for prior earthwork is present.

The southern 13-acre portion of the site has not been subdivided. It is separated from the northern portion of the site by Ralston Creek and its floodplain restraints.

6.0 ENVIRONMENTAL REGULATION RESEARCH

6.1 FEDERAL AND STATE LISTINGS

CERCLIS (Comprehensive Environmental Response and Liability Information)
AERRCO (American Ecological Recycle Research Corporation)
T25 RTOW S23+26 (on Highway 72 West of Indiana)
Arvada
Operable Unit = 00
Completion date = 6/1/88

RCRA (Resource Conservation and Recovery Act) Master Facility List
Cobe Labs Inc.Contact: Gary Wilson
Date: 8/15/80Haz. Waste Codes: D001, F001, F005, V238
EPA ID# = COD000716555
Generator = 1

Sundstrand Fluid Handling Contact: John Randolf
Date: 3/11/87Haz. Waste Codes: D001, F001, F003, F005
EPA ID# = COD095153292
Generator = 2

Systems Engineering Associates, Inc. Contact: Jenene Francis-Novotny
Date: 2/2/87Haz. Waste Codes: D001, F003, F005
EPA ID# = COD981547391
Generator = 2

Glass Tech Solar Inc.Contact: Mike Rosencrans
Date: 8/12/88Haz. Waste Codes: D001, F001, F002, F003
EPA ID# = COD982648438
Generator = 2

SARA (Superfund Amendments and Reauthorization Act) TITLE III - Toxic Release Inventory

Cobe Laboratories
14401 W. 65th Way
Arvada, CO 80004
Elain Zummer (303) 231-4243
75-09-2 Dichloromethane
76-13-1 Freon 113
107-68-8 Mathylene BIS (Phenyl Isocyn)

NPDES (National Pollutant Discharge Elimination System) - none

Superfund Sites

Rocky Flats Plant
Golden, CO 80402

TSD (treatment, storage and disposal) List - RCRA facilities - nothing in zip code 80004

Underground Storage Tank (Inventory)

Colorado Highway Department; 1989, 2 tanks
65555 Indiana St.
Arvada, CO

Sundstrand - John Randolf; 1989, 3 tanks
14845 W. 64th Av.
Arvada, CO 80004

LUST - Leaking Underground Storage Tanks

Colorado Highway Department; notification date 01/05/91
6555 Indiana St.

Solid Waste Landfills

Landfill Name	Hazard Type	Water Type
Ralston Creek-72nd & Indiana	unknown	refuse
Arvada Shops-66th & Indiana	unknown	refuse

6.2 AGENCY INTERVIEWS

In an effort to discover any past misuse or environmentally relevant occurrences pertinent to the LTMR property, contact was made with the following individuals:

Steve Steigleder, Deputy Fire Marshall at Arvada Fire Station #6, has lived in Arvada for 29 years. He remembers the landfill—described in the Site Reconnaissance Section—as being the major landfill for Northern Jefferson County at that time. He recalls that general rubbish and trash from the community was deposited there. He also stated that all of the hazardous material responses to the area have been only to Glass Tech Solar, Inc. These responses have been to false alarms. There was an underground storage tank that has contained acid near the north side of the building. Scott Brown, the owner of the building states that the tank was removed January 13, 1992.

Colorado Department of Natural Resources; no reclamation permits have been issued for Section 1, T3S, R70W.

Sharon Pansey of the Oil and Gas Commission stated that there are no oil or gas wells within Section 1, T3-S, R7OW.

7.0 SITE RECONNAISSANCE

7.1 GENERAL DESCRIPTION

The 40-acre subject site is bisected in a west-to-east direction by Ralston Creek, which is a natural geomorphic surface drainage feature. The active stream channel averages about 5 ft wide, and the flood plain, including natural levies, ranges from 35 ft to 100 ft in width. Water depth was approximately 1 foot. The layout is clearly shown on the aerial photographs in Appendix B. Approximately 25 acres lie on the north side of the creek. Water was running through the property at the time of Ogden's investigation. The stream probably runs year-round and receives recharge from a combination of groundwater, surface runoff, and input from a mechanical canal meter gate at the east bank of the Croke Canal. Therefore, the flow volumes in the stream are highly variable over time. The flux in flow rates would certainly affect the concentration of contaminants that enter the stream from the adjacent buried refuse. These conditions must certainly affect the contaminant impact on the aquatic and wildlife environment of this wetland system. No fish were observed, but abundant algae is present adjacent to the subject property. A Jefferson County document, titled "Jefferson County Health Department, Methane Site Investigation, 1980," establishes the fact that the 13 acres south of the creek were a known landfill. The presence of methane from borehole punch surveys and landfill histories are presented in the above report.

The 13 acres south of the creek contain an abandoned landfill. In January 1982, Chen and Associates Consulting Geotechnical Engineers conducted a "soil and foundation investigation" on behalf of KKBNA (supposedly a land development company). The Chen report is contained in Appendix H of this report. Nine boreholes were drilled. The purpose of this investigation was to determine the structural suitability of the earth to support a bridge across Ralston Creek that would connect the entire proposed commercial development. Three auger holes were drilled on the creek bank to evaluate the weight bearing capacity of the soils. Six additional auger test holes were drilled on the south side of the creek to determine the depth of trash fill. It was determined that the refuse extended vertically from the surface to a depth of 25 ft. The landfill on the subject property represents a portion of a much larger refuse area that borders the subject property on the east, south, and west sides. Refer to the aerial photographs in Appendix B for orientation.

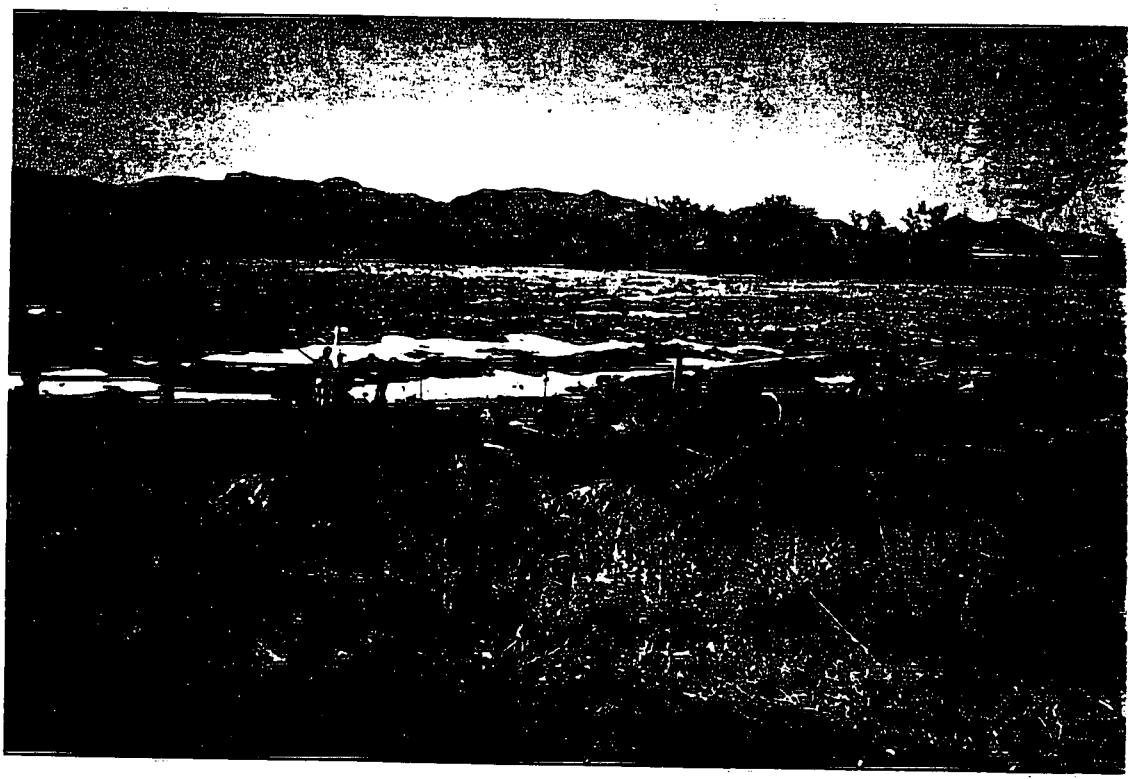
Four of the holes drilled by Chen encountered methane. Since three of the holes reported explosive levels of gas, the area is considered to be a hazard. Two of the Chen-drilled holes are

View looking west. Arvada City Water pumphouse along side Ralston Creek spillway into Croke canal. Note frozen creek water on west side of canal.

C-LINE #52564

Ice formation on Ralston Creek, west of Croke Canal. Stream is visually clean from here westward to Arvada Reservoir.

View southeasterly along the north western bank of the LTMR site; Croke Canal front and right, gate to Ralston Creek on left. Very high canal banks here.



Landfill Site panorama.

C-LINI #[illegible]564

Surface water sample point adjacent to landfill. Note that the stream is unfrozen.

Trash in stream adjacent to landfill on right side of photo. "Water Bed"? Note stream is running. Not iced over.

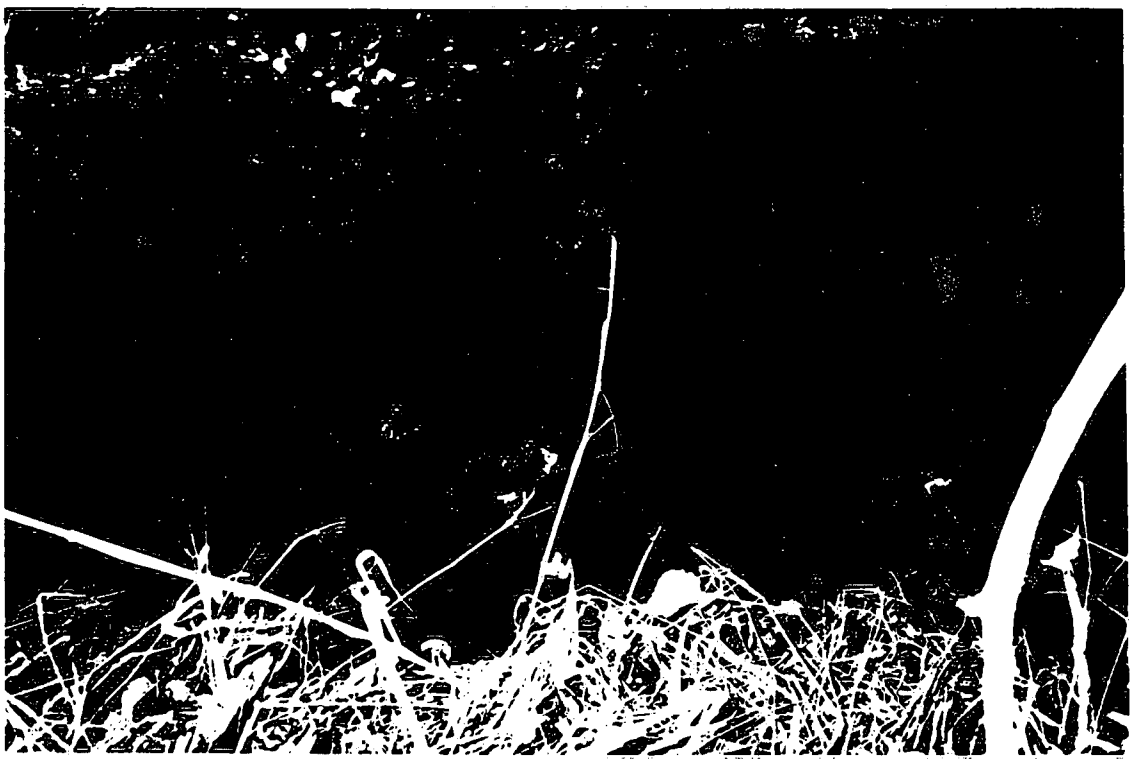
Ralston Creek adjacent to landfill. Note floating hydrocarbon (petroleum fluorescence) on each side of channel.

Ralston Creek adjacent to landfill. Polarizing lense on camera makes water transparent. Note orange scum and floating petroleum fluorescence next to bank.

Hole #1 with Mobile Drill Rig. Equipment operator for scale.

Pumping for groundwater sample.

Floating algae on main Ralston Creek channel with hydrocarbon sheen at each bank. Note water is not frozen.



Healthy green algae. Note: Petroleum sheen on water surface.

still identifiable at the surface. Both were cased with thin PVC and plugged with a grout; therefore, none were useful for bailing for groundwater sampling.

The Croke Canal meanders through the old landfill and comprises the south and western boundaries of the LTMR site. Water was actively flowing in December—during the time of our investigation. Water in the canal was not sampled for contaminants. There was no obvious visible pollution along the property boundary. However, it may be that the canal is receiving contaminants from the landfill materials. The nature and extent of any contamination was not determined since it is beyond the scope of the Phase I investigation.

7.2 MAGNETIC SURVEY

Ogden conducted a magnetic survey to determine the distribution of buried refuse that is present on the property. This survey was accomplished by physically walking a controlled grid shown on the aerial photograph in Appendix B. The equipment employed was a Fisher model TW6, which is capable of detection to a depth of 30 ft below surface. Such magnetic induction devices respond to most iron metals. The assumption that some metal objects would be distributed ubiquitously within the landfill proved to be correct. It was determined that no landfill refuse is present on the subject property north of Ralston Creek, which is basically raw agricultural land. However, the 13 acres south of the creek is completely covered by landfill material. Some local spots indicated high magnetic responses (anomalies) that may signify large metal objects (e.g., drums). Future Phase II intrusive activities will need to clear these anomalies.

At various places, refuse is exposed. In one instance, newspapers and magazines were found that date back to 1972. Personal interviews revealed that dumping activity took place well into the 1970s, although the Jefferson county records hinted that the dump was closed in the 1950s.

7.3 RADIOLOGICAL SURVEY

Since this landfill resides near the U.S. Department of Energy Rocky Flats Plant nuclear facility, Ogden elected to provide a cursory radiological survey as a courtesy to the client. No radiation materials were expected, but this particular survey was conducted to eliminate the possibility that lost or transient radiological materials might end up in this public dumping facility located so close to a known nuclear facility. A walkover survey was performed using a Ludlum model 19 Micro Rad Survey meter. Several background readings were taken both offsite and onsite, and the background level was 10 mR/hr gamma radiation, which is normal and acceptable.

The site was walked on a 20-foot grid with an approximate meter swing of 5 ft, thereby providing a 25% coverage survey. The maximum meter indication noted was 18 mR/hr, which is normal and acceptable as a natural soil background. These resultant readings are considered negative, thus confirming our assumption that no radiological sources are present on the landfill area.

7.4 pH SURVEY

The pH readings from the drive-tube and the baseline well water sample ranged from 6.32 to 7.90, respectively. Samples taken from within the landfill tend to be more acidic (Table 1). In addition, two pH readings were taken from Ralston Creek within the property boundary.

Table 1. Field parameter data

Well Hole	pH	Conductivity	PID	Explosiometer
1	7.36	923	NIL	NIL
2	7.59	1110	NIL	NIL
3	7.84	528	NIL	NIL
4	*	*	.005 ppm	NIL
5	See Note			
6	6.32	802	NIL	NIL
7	See Note			
8	7.90	403	NIL	NIL
Stream Sample (▸ on map)	5.56	503	*	*
Upstream Sample	7.61	420	*	*

*No sample taken.

Note: Wells 5 and 7 are nonexistent.

7.5 VISUAL OBSERVATIONS OF ENVIRONMENTAL IMPACTS

7.5.1 Upstream

None of the visual pollution was observed upstream, to the west side of Croke Canal. A visual survey was made upstream for the approximate distance of one-half mile, and this portion of the stream appeared unpolluted. However, it is appropriate to note that various parts of the upstream areas were frozen, and the ice could have hidden possible visual pollution effects in case some of the floating oils and/or orange-colored material has floated downstream from offsite of the Cottonwood Park property.

7.5.2 Adjacent

Ralston Creek appears to be receiving contamination directly from the landfill. Visual contamination is apparent on the surface of the stream and along the shoreline. Actual refuse is in the stream channel (see photographs), and an oil scum is floating on the surface. There is orange discoloration of the channel bottom materials and submerged algae. This discoloration is possibly caused by oxidizing and/or acidizing fluids that periodically emit from the landfill. The floating oils and probable corrosive fluids that caused the orange discoloration of the stream probably entered Ralston Creek from the exposed landfill refuse that border the flood plain next to the subject property. There is no indication that these potential pollutants migrated onto the property from upstream. There is abundant green algae present in the stream for this time of the year, and it is more prolific adjacent to the landfill. The active growth algae colonies are likely enhanced due to nutrients emitting from the landfill, such as phosphorous and nitrogen.

7.5.3 Downstream

The Ralston Creek flood plain is a public recreation facility in this area. There is a cement bicycle path that parallels the stream. The western limit of the paved bike path actually begins on the subject property and extends eastward. A downstream inspection also was made approximately one-quarter mile east of the property, and visible pollution is present.

It is a striking contrast that the upstream portion of Ralston Creek was frozen, in addition to being visually clear, and unfrozen adjacent to the subject landfill. Hydrocarbons, acids, and dissolved solids may provide an "antifreeze" effect that prevents the stream from freezing at the ambient temperatures, which existed during the time of our investigation. All stream pH readings were taken by hand-held equipment. Values recorded ranged from 5.56 to 7.11 adjacent to the landfill (refer to Table 1). Floating hydrocarbons could have a buffer effect,

and thus a broad range of pH measurements are explainable. Other variables that usually affect pH values are variable effluent sources and biologic activity.

7.6 DRIVE TUBE WELL INSTALLATIONS

Part of this environmental site assessment effort was to acquire groundwater and surface water samples from the property. The 1982 Chen drilling activity revealed explosive levels of methane emanating from the subsurface. Methane is a common component of landfills and originates from the decay of buried organic material in the refuse. Since it was thus established that methane is present, Ogden utilized a drive tube technique of installing monitoring wells. The drive tube system is very cost effective and somewhat safer to operate in a potentially explosive atmosphere.

Six drive tube wells were installed and left in place for future sampling opportunity. Well #8 was placed north of the creek as a baseline control. The 25 acres north of the creek are basically raw agricultural land, although some shallow surface scraping has scarred the land. The earth moving was obviously the beginning of a construction effort to develop the Cottonwood land parcel. The effect can be viewed on the aerial photos (Appendix B). No other industrial or commercial activity is apparent, and no landfill material is present, so it was felt that this portion of the property would suffice for baseline analytical control.

For safety considerations, in addition to methane detection, a portable explosimeter and a portable photoionization detector (PID) were utilized. Each drive tube installation was monitored. Surprisingly, negligible levels of methane were detected. Only hole #4 demonstrated one-half of one percent by volume, volatile gasses. Comparing the 10-year old Chen report, where explosive levels of gas were reported, our measurements are unexpectedly on the low side. Cold air temperatures could have had a suppression effect, or biologic reduction of land fill organics may have declined over time.

7.7 SAMPLING AND ANALYSIS

A total of six water samples were taken and analyzed for pH, volatile organics, and metals. One composite soil sample was taken for metal analysis. Note the aerial photographs in Appendix B for locations of wells and surface samples. All samples of water and soil were taken in accordance with standard EPA procedures. Laboratory reports for both the mobile/field gas chromatograph (GC) and the fixed-base GC/MS are located in Appendices I and F, respectively.

Water samples were collected to analyze for (VOA) volatile organics in two, 40-milliliter amber glass vials having a teflon-coated silicon septum. The vials contained no preservative and were filled in a manner to ensure that no headspace or bubbles were present. A total metals sample was also collected in a 1-liter polycarbonate, plastic container. The sample was preserved with 3 mL of nitric acid (NHO_3) in order to adjust the pH to less than 2. An oil and grease sample containing no preservative was collected in a 1-liter amber glass jar with a teflon-coated septum. All containers were filled using a direct immersion method.

Soil samples were taken from two areas. A VOA sample was collected from an area of darkly-stained soil near borehole #4 in a 2-oz glass jar having a teflon-coated lid insert. The soil was lightly compressed into the jar providing zero headspace. An identical suite of samples was collected from a location approximately 150 ft north and slightly west of the dark stain. Samples were collected from an embankment that was eroded to expose strata of fill materials. These two samples were composited and submitted to the laboratory for total lead and polychlorinated biphenyls (PCBs).

Samples collected and analyzed are as follows:

- Field GC—five groundwater and one surface water, non-acid preserved
- ATI Laboratories—one groundwater for VOA, non-acid preserved
- ATI Laboratories—one groundwater for total lead, acid preserved with nitric acid (HNO_3) to a pH of 2.0
- ATI Laboratories—one composite soil for PCBs and total lead
- ATI Laboratories—one soil for volatile organic analysis

7.7.1 Field GC

Six samples were taken and immediately analyzed in the field. A mobil GC was used to evaluate the samples for BTEX (benzene, toluene, ethylbenzene, xylenes). All field analyses data are located in Appendix I. Drive tube well numbers 1, 2, 3, 6, and 8 were analyzed, as well as one sample taken from Ralston Creek. Well number 8 (see aerial photo) was designated as the baseline control point for groundwater data comparisons within the subject property boundary.

None of the six samples analyzed in the field showed elevated levels from BTEX compounds.

7.7.2 Fixed Base Laboratory (ATI Laboratories, Inc.)

7.7.2.1 Water

One water sample was taken from borehole #6 in the center of the landfill, and one composite soil sample was taken directly from landfill cover.

The water was analyzed for volatile organics by EPA Method 8240, and nothing significant was noted.

The values in Appendix E are considered to be minimum and probably indicate sources of volatile organic materials buried in the landfill.

The water was also analyzed for total lead by EPA Method 239.1 and was found to contain an elevated level of lead that exceeds EPA drinking water standards.

7.7.2.2 Soil

One composite soil sample was collected and analyzed for PCBs by EPA Method 8080 and for volatile organics by EPA Method 8240. The sample was found to contain trichlorofluoromethane (freon) and also lead at elevated levels. The test for PCB was negative. The soil sample also contained elevated levels of volatile organics. Methylene chloride, acetone, 1,1,1-trichloroethane, tetrachloroethane, ethylbenzene, toluene, and total xylenes were all present.

7.7.2.3 Stream water

One surface water sample was taken from Ralston Creek to analyze for petroleum by EPA Modified Method 8015. The water was skimmed so as to collect as much floating product as possible. The compound was identified as diesel grade fuel oil (Appendix F). In addition, the laboratory also observed some late-eluting chromatographic peaks that indicate the presence of high molecular weight components, but these components could not be positively identified.

7.8 SAMPLING AND ANALYTICAL CAVEATS

The drive tube wells were placed at 12 to 15 ft total depth below surface and were generally terminated at "refusal point." This means that these small-bore wells were not able to penetrate a sufficient depth into the harder ground below soil development and trash fill. The Chen drilling

activity reported groundwater levels to be around 10 to 12 ft below ground surface. Therefore, we assumed that drive tubes would be placed below the water table.

At the beginning of the project while sampling with drive tubes, we anticipated obtaining adequate groundwater samples. Surprisingly, the pumping of water from the wells proved very difficult. It is common and expected that water tables fluctuate from season to season. We were able to obtain minimum samples from five of the six drive tube wells. Hard suction pumping can result in the loss of volatile organics from samples. Since the analytical results on samples taken from this site were low, it makes the outcome of nondetect or relatively low levels of VOAs suspect. For any future site characterization activity, a bailing method and/or submersible bladder pump is preferable. However, the December 1991 sampling activity raised questions about the water table and our ability to identify and/or characterize contaminants with such a cursory level of effort dictated by a Phase I Site Assessment approach.

In the landfill, there is very likely a perched water table. This could be caused by "clay lifts" within the landfill. The underlying permanent water table must certainly be affected by the level of the Croke Canal seasonally. The banks of the canal were not measured for this report, but the Croke Canal is unusually deep (estimated 30- to 35-foot banks) on the subject site. The water to feed Croke Canal is supplied from Clear Creek.

There is also the man made Ralston/Arvada Reservoir and associated water treatment plant approximately two miles upstream. This reservoir is used for limited public recreation and also as a culinary water supply locally.

In addition, there is a large pumping facility immediately adjacent to the LTMR site. This pumping station was built by the Army Corps of Engineers and is now operated by the City of Arvada. It is for the purpose of extracting water from Croke Canal and pumping it up hydrological gradient, into Ralston/Arvada Reservoir.

These man made and artificially operated water mechanisms most certainly have significant effects on groundwater elevations. Artificial controls, combined with natural seasonal meteoric events, will cause large fluctuations in groundwater dynamics, water table elevations, and vadose zone moisture contents.

8.0 CONCLUSIONS

Caution should be taken when excavating in, or adjacent to, landfill materials. Proper ventilation of excavations and/or buildings will be required. Any structures built on or immediately adjacent to the landfill will require special explosive gas controls. Also, roads, parking areas, underground utilities and other facilities may be subjected to differential compaction and corrosive environments.

No contaminants were identified in the portable field GC analytical results. However, only BTEX compounds were analyzed. However, the fixed-base laboratory results indicated the presence of elevated levels of lead in the borehole water sample and soil sample. Volatile organic compounds were also detected in the soil sample near borehole #4. These results indicate that a more thorough monitoring program should be implemented.

From the methane levels reported by Chen in 1982 and our observations of visual hydrocarbons in Ralston Creek, a curious situation arises. We feel that the permanent unconfined groundwater table may be deeper than the drive tube well method was able to penetrate. In addition, many pollutants have a specific gravity greater than one, therefore these heavy compounds would seek lower elevations in the ground water aquifer. The penetrations that we made were not likely to have been deep enough to sample "heavy" contaminants. Indeed, it is possible that the drive tube efforts intersected either perched "water," or even under-saturated vadose pods. It appears that the drive tubes, and/or previously drilled Chen auger holes, are not deep enough to effectively collect representative groundwater samples.

It is apparent at this time that the "nature and extent" of pollution emanating from the landfill is not determinable with the Preliminary Phase II level of effort. However, the recently collected information is valid and acceptable, to plan further evaluations in progress toward an actual "site characterization."

The vacant land adjoining the LTMR site west of Croke Canal has been designated for use as "Jefferson County Parks Open Area." The subject site may, at some time in the future, become useful for open area park type of utilization. This could require some level of clean-up if the Ralston Creek area is confirmed to be contaminated. A comprehensive Phase II site assessment would need to be developed and implemented to make this determination. As part of any Phase II assessment, the impact of surrounding activities needs to be assessed (i.e., commercial nursery, use of pesticides, etc.).

9.0 SUMMARY

The following are pertinent data derived from the Ogden Phase I environmental assessment:

- There is an inactive landfill on the LTMR site south of Ralston Creek.
- The 25 acres of the LTMR site north of Ralston Creek does not appear to have been impacted by human activities.
- The property that borders the south bank of Ralston Creek appears to be polluted by discharges from the landfill. Visible hydrocarbons are on the water surface.
- Groundwater samples from the landfill contain lead at concentrations of .0065 mg/L, which is above the EPA drinking water standard of .0050 mg/L.
- Soil samples from the landfill contain volatile organic compounds. Offending analytes are methylenechloride, acetone, tetrachloroethane, toluene, and total xylenes.
- A composite soil sample demonstrated an excessive concentration of lead in the amount of 54 mg/kg.

10.0 RECOMMENDATIONS

Based on the evaluation of prior data and data collected during the Preliminary Phase II site assessment, it is probable that contaminants are present on the site and that the potential for migration to offsite localities exists. Therefore, we would recommend the following activities to more clearly define the extent and nature of contamination on the LTMR site:

- Excavate spot locations of high magnetic response to determine if leaking drums are present.
- Design a statistically-based random soil sampling program.
- Design a statistically-based groundwater sampling program.
- Install deeper auger drilled monitoring wells at 30 to 50 ft depth.
- Case with large enough PVC for retrieving samples by bailing or the bladder pump method.
- Screen shallow groundwater monitoring wells in the landfill material and schedule sampling to be collected to allow for seasonal flux of contaminants.
- Determine perched water elevation.
- Selectively screen below landfill in permanent water table at low aquifer confining elevations to test for heavy compounds. Determining permanent water table and, if possible, the lower base confining depth.
- Schedule interval time sampling for surface water monitoring of Ralston Creek. Identify flora/fauna kill mechanisms.
- Landfill area should not be developed for commercial or residential construction.
- Monitor contempary methane presence.

11.0 REPORTING TO GOVERNMENT AGENCIES

Low levels of lead were identified in water and soil samples taken from the landfill area. The concentrations in the water did exceed EPA drinking water standards. Therefore, it is necessary to report the findings to the Colorado Department of Health (CDH) and also to the Jefferson County Health Department. Since Colorado is a "primary state," the CDH will report to the EPA, should it be deemed necessary.

One original report containing the lead in water concentration values should be sent to:

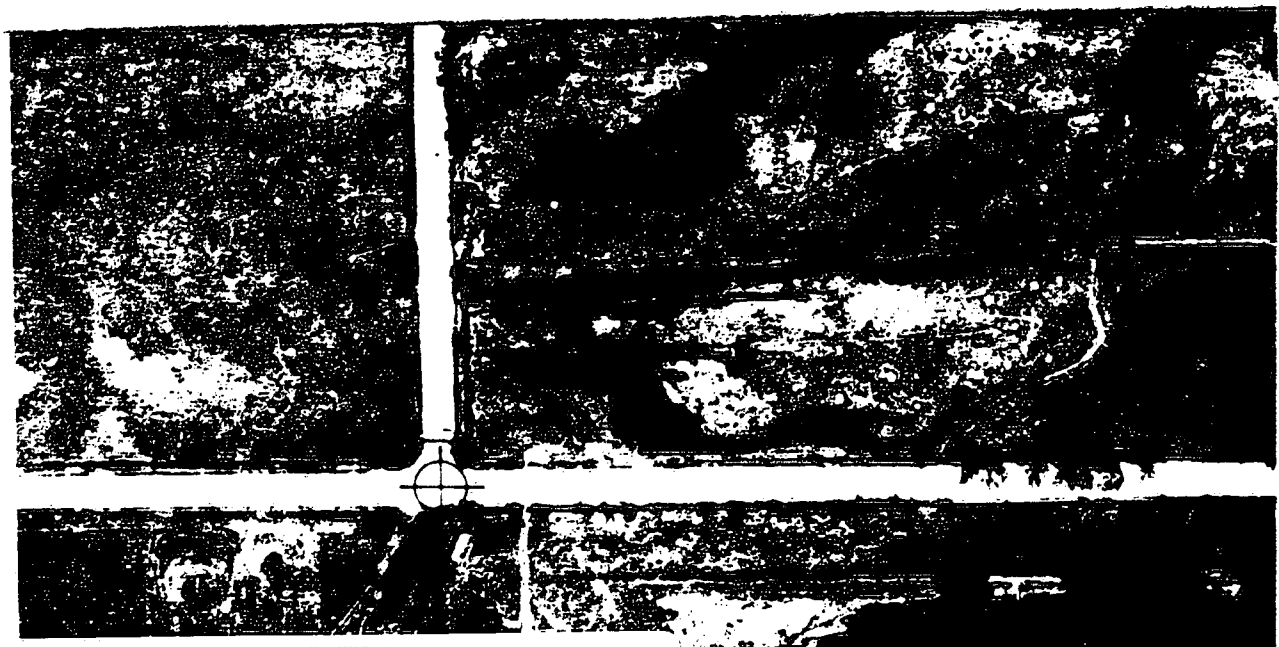
Mr. Glenn Mallory
Solid Waste Unit Leader
Colorado Department of Health
Hazardous Materials and Waste Management
4210 East 11th Avenue
Denver, Colorado 80220-3716

A carbon copy should also be sent to:

Mr. Cliff Myers
Environmental Health Division
Jefferson County Health Department
260 South Kipling
Lakewood, Colorado 80226

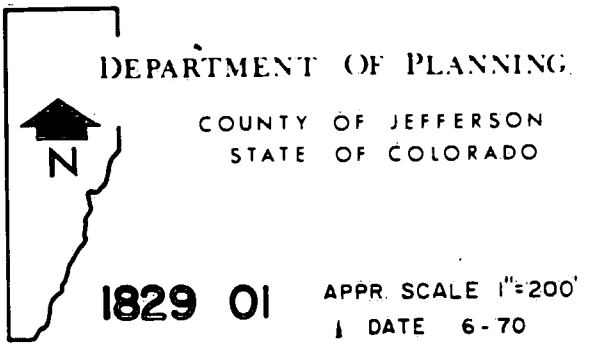
APPENDIX A

1970 AERIAL PHOTOGRAPH - SITE VICINITY MAP, PRECOMMERCIAL DEVELOPMENT



APPENDIX A

1970 Aerial Photograph
Site Vicinity Map
Precommercial Development



DEPARTMENT OF PLANNING

COUNTY OF JEFFERSON
STATE OF COLORADO

1829 01

APPR. SCALE 1"=200'
DATE 6-70

APPENDIX B

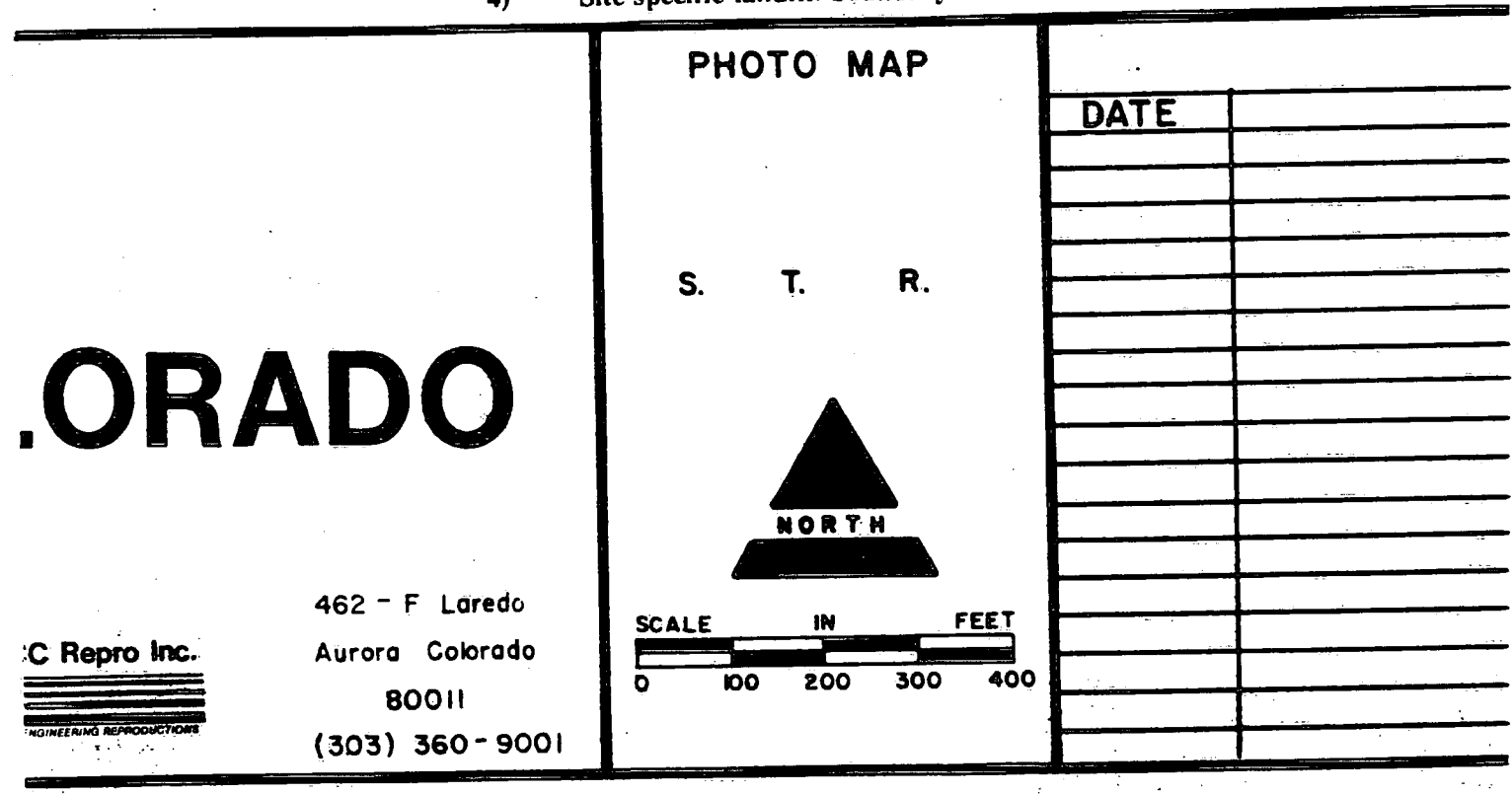
1986 AERIAL PHOTOGRAPH

1) Survey Traverse Grid for Magnetic Survey and Radiological Survey
2) Drive tube well locations
3) ▸ = water sample taken from Ralston Creek
4) Site specific landfill boundary-highlighted in yellow

APPENDIX B

1986 Aerial Photograph

1) Survey Traverse Grid For Magnetic Survey & Radiological Survey
2) Drive tube well locations
3) ▸ = water sample taken from Ralston Creek
4) Site specific landfill boundary



APPENDIX C

LEGAL DESCRIPTION AND ACCOMPANYING MAP

Recorded at ..... o'clock ..... M., ...
Reception No. .....

RECORDED IN
COUNTY OF JEFFERSON
STATE OF COLORADO
RECEPTION NO. 88040360
04/28/88 10:20 9.00

THIS DEED, Made this 18th day of March
19 88 , between

COTTONWOOD WEST INDUSTRIAL PARK INC.
a Colorado Corporation
of the City and County of DENVER and State of Colorado, of the first part, and

COTTONWOOD WEST LTD. ****
a Colorado limited partnership of the
County of DENVER and State of Colorado, of the second part;

WITNESSETH, That the said party of the first part, for and in consideration of the sum of TEN DOLLARS AND OTHER GOOD AND VALUABLE CONSIDERATION
Dollars,
to the said party of the first part, in hand paid by the said party of the second part, the receipt whereof is hereby confessed and acknowledged, has granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey and confirm unto the said party of the second part, its heirs and assigns forever, all the following described lot or parcel of land, situate, lying and being in the County of JEFFERSON and State of Colorado, to wit:

SEE EXHIBIT A ATTACHED HERETO FOR LEGAL DESCRIPTION
SEE EXHIBIT B ATTACHED HERETO FOR ADDITIONAL PROVISIONS

**** c/o Gibraltar Companies
Denver Corporate Center Tower III
7900 E. Union Avenue Suite 850
Denver, Co. 80237

also known as street and number vacant land

Together with all and singular the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues and profits thereof; and all the estate, right, title, interest, claim and demand whatsoever, of the said part of the first part, either in law or equity, of, in and to the above bargained premises, with the hereditaments and appurtenances; TO HAVE AND TO HOLD the said premises above bargained and described, with the appurtenances, unto
the said party of the second part, its heirs and assigns forever.

And the said part y of the first part, for itself its heirs, executors and administrators, does covenant, grant, bargain and agree to and with the said party of the second part, its heirs and assigns, the above bargained premises in the quiet and peaceable possession of said party of the second part, its heirs and assigns, against all and every person or persons lawfully claiming or to claim the whole or any part thereof, by, through or under the said party of the first part to WARRANT AND FOREVER DEFEND.

IN WITNESS WHEREOF, The said party of the first part has hereunto set its hand and seal the day and year first above written.

Signed, Sealed and Delivered In the presence of

..... [SEAL]
COTTONWOOD WEST INDUSTRIAL PARK INC. [SEAL]
..... [SEAL]
James Moilanen, Pres.

STATE OF COLORADO,
County of } ss.

The foregoing instrument was acknowledged before me this day of March
1988 by James Moilanen, President of Cottonwood West Industrial Park Inc., a Colorado corporation

My commission expires 8/11/92 . 19 . Witness my hand and official seal.

Notary Public

1616 16th St. Denver, 80202

16 SPECIAL WARRANTY DEED. —Bradford Publishing Co., 1821-48 Stout Street, Denver, Colorado (573-5011) 5-76

STATE DOCUMENTARY FEE
APR 28 1988

-4-4d-480116?-1

EXHIBIT A
TO SPECIAL WARRANTY DEED
DATED MARCH 18, 1988

2
2

Lot 7
Cottonwood Park in Ralston Valley

and

A portion of the East 1/2 of Section 1, Township 3 South, Range 70 West of the 6th P.M., more particularly described as follows: Beginning at the Northeast corner of the Northwest 1/4 of the Southeast 1/4 of said Section 1; thence South 00 degrees 03 minutes 01 seconds East along the Easterly line of said Northwest 1/4 of the Southeast 1/4, 463.77 feet to the Northerly right-of-way line of the Croke Canal; thence Northwesterly along said Northerly right-of-way line the following 8 courses: (1) thence North 82 degrees 50 minutes 54 seconds West, 150.11 feet to a point of curve; (2) thence along a curve to the right having a radius of 963.78 feet, a central angle of 11 degrees 23 minutes 39 seconds, 191.66 feet to a point of tangent; (3) thence North 71 degrees 27 minutes 15 seconds West along said tangent, 276.15 feet to a point of curve; (4) thence along a curve to the right having a radius of 208.06 feet, a central angle of 37 degrees 31 minutes 18 seconds, 136.26 feet to a point of tangent; (5) thence North 33 degrees 55 minutes 57 seconds West along said tangent, 557.70 feet to a point of curve; (6) thence along a curve to the right having a radius of 388.56 feet, a central angle of 39 degrees 23 minutes 06 seconds, 267.10 feet to a point of tangent; (7) thence North 05 degrees 27 minutes 09 seconds East along said tangent, 755.43 feet to a point of curve; (8) thence along a curve to the right having a radius of 565.00 feet, a central angle of 09 degrees 47 minutes 25 seconds, 96.54 feet to the Northerly line of the Southwest 1/4 of the Northeast 1/4 of said Section 1; thence South 89 degrees 27 minutes 29 seconds East along said Northerly line, 991.49 feet to the Northeast corner of said Southwest 1/4 of the Northeast 1/4; thence South 00 degrees 03 minutes 48 seconds West along the Easterly line of said Southwest 1/4 of the Northeast 1/4, 1320.46 feet to the point of beginning.

Also known as All of Blocks 1, 2, 3, and 4
Cottonwood West Industrial Park Filing No. 1,
All situate in the County of Jefferson,
State of Colorado

RECEPTION NO. 88040360

3

3

EXHIBIT B
TO SPECIAL WARRANTY DEED
DATED MARCH 18, 1988

By accepting this conveyance, second party hereby assumes and agrees to pay that certain obligation evidenced by that certain Promissory Note dated January 10, 1985 in the principal amount of $2,425,000.00 payable to Otero Savings and Loan Association, secured by that certain Deed of Trust recorded January 11, 1985 under Reception No. 85003626, Jefferson County, Colorado public records, as said Note and Deed of Trust have been subsequently modified. Second party's assumption and agreement to pay the foregoing obligation includes its assumption and ratification of the acts of certain third parties as evidenced by instruments recorded at Reception Numbers 85003627, 86006149, 86088951 and 86088952, even if those parties had no authority to complete or perform those acts.

RECEPTION NO. 88040360

DEDICATION:

NOW ALL MEN BY THESE PRESENTS: THAT THE UNDERSIGNED, BEING THE OWNERS OF A PARCEL OF LAND IN THE EAST 1/2 OF SECTION 1, TOWNSHIP 3 SOUTH, RANGE 70 WEST OF THE 6TH P.M., CITY OF ARVADA, COUNTY OF JEFFERSON, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 1; THENCE SOUTH 00°02'54" EAST, ALONG THE EAST LINE OF THE NORTHEAST 1/4 OF SAID SECTION 1, A DISTANCE OF 1323.58 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1; THENCE NORTH 89°39'54" WEST, ALONG THE NORTH LINE OF SAID SOUTHEAST 1/4 OF THE NORTHEAST 1/4 A DISTANCE OF 1322.17 FEET TO THE NORTHEAST CORNER OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1, THE TRUE POINT OF BEGINNING; THENCE SOUTH 00°11'39" EAST, ALONG THE EAST LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, AND ALONG THE WEST LINE OF LOT 1, RESUBDIVISION OF LOTS 5 AND 6, COTTONWOOD PARK IN RALSTON VALLEY, A SUBDIVISION RECORDED IN THE OFFICE OF THE JEFFERSON COUNTY CLERK AND RECORDER UNDER RECEPTION NUMBER 79058658, A DISTANCE OF 313.56 FEET; THENCE NORTH 89°47'39" EAST, ALONG THE SOUTH LINE OF SAID LOT 1, A DISTANCE OF 250.22 FEET TO A POINT ON THE WEST RIGHT-OF-WAY LINE OF JOYCE STREET; THENCE ALONG THE WEST RIGHT-OF-WAY LINE OF JOYCE STREET THE FOLLOWING THREE (3) COURSES:

(1) SOUTH 29°55'40" WEST, A DISTANCE OF 68.23 FEET TO A POINT OF CURVE;
(2) ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 125.13 FEET AND A CENTRAL ANGLE OF 29°26'36" A DISTANCE OF 64.30 FEET, THE LONG CHORD OF WHICH BEARS SOUTH 15°12'22" WEST, A DISTANCE OF 63.60, TO A POINT OF TANGENCY;
(3) SOUTH 00°29'04" WEST, A DISTANCE OF 201.41 FEET;

THENCE ALONG THE NORTH LINE OF LOT 18, COTTONWOOD PARK IN RALSTON VALLEY, A SUBDIVISION RECORDED IN THE OFFICE OF THE JEFFERSON COUNTY CLERK AND RECORDER IN BOOK 55 AT PAGE 11 THE FOLLOWING TWO (2) COURSES:

(1) SOUTH 71°50'32" WEST, A DISTANCE OF 150.35 FEET;
(2) NORTH 68°52'48" WEST, A DISTANCE OF 57.62 FEET TO A POINT ON THE EAST LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1;

THENCE SOUTH 00°11'39" EAST, ALONG THE EAST LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, AND ALONG THE WEST LINE OF SAID LOT 18, A DISTANCE OF 104.00 FEET; THENCE SOUTH 53°57'00" WEST, A DISTANCE OF 542.86 FEET; THENCE NORTH 80°49'37" WEST A DISTANCE OF 464.19 FEET; THENCE SOUTH 84°04'28" WEST, A DISTANCE OF 154.44 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF THE CROAK CANAL; THENCE ALONG THE EASTERLY RIGHT-OF-WAY LINE OF SAID CROAK CANAL THE FOLLOWING THREE (3) COURSES:

(1) ALONG THE ARC OF A NON-TANGENT CURVE TO THE RIGHT WITH A RADIUS OF 388.56 FEET AND A CENTRAL ANGLE OF 27°49'12" A DISTANCE OF 188.67 FEET, THE LONG CHORD OF WHICH BEARS NORTH 08°39'33" WEST, A DISTANCE OF 186.82 FEET TO A POINT OF TANGENCY;
(2) NORTH 05°15'03" EAST, A DISTANCE OF 755.43 FEET TO A POINT OF CURVE;
(3) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 565.00 FEET AND A CENTRAL ANGLE OF 09°47'20" A DISTANCE OF 96.53 FEET, THE LONG CHORD OF WHICH BEARS NORTH 10°08'43" EAST, A DISTANCE OF 96.41 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION;

THENCE SOUTH 89°39'54" EAST, ALONG THE NORTH LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, A DISTANCE OF 990.20 FEET TO THE TRUE POINT OF BEGINNING. CONTAINING 25.486 ACRES.

HAVE LAID OUT, PLATTED, AND SUBDIVIDED THE ABOVE DESCRIBED LAND, UNDER THE NAME AND STYLE OF COTTONWOOD WEST INDUSTRIAL PARK FILING NO. 1, AND BY THESE PRESENTS DO DEDICATE TO THE CITY OF ARVADA IN FEE SIMPLE THE STREETS AND PUBLIC WAYS AS SHOWN ON THE PLATS, AND GRANTS TO THE PUBLIC UTILITIES, AND THE CITY OF ARVADA, THE RIGHT TO INSTALL, MAINTAIN, AND OPERATE MAINS, TRANSMISSION LINES, SERVICE LINES, AND APPURTENANCES, AS MAY BE NECESSARY TO PROVIDE SUCH UTILITY, CABLE TELEVISION, AND SANITARY SERVICES WITHIN THIS SUBDIVISION OR PROPERTY CONTIGUOUS THERETO, THROUGH, OVER, UNDER, AND ACROSS STREETS, UTILITY AND OTHER EASEMENTS, AND OTHER PUBLIC PLACES AS SHOWN ON THE PLAT.

COTTONWOOD WEST INDUSTRIAL PARK, INC., A COLORADO CORPORATION.

BY: Dennis M. Orr
PRESIDENT

ATTEST: D. Robert Clary
Assistant Secretary

SEAL

STATE OF COLORADO)
COUNTY OF) SS

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 21st DAY OF October, A.D., 19 85, BY THE ABOVE PARTIES.

WITNESS MY HAND AND SEAL.
MY COMMISSION EXPIRES 7-26-89

NAME Julia A. Mabey
ADDRESS 828 So. Oneida
Denver, CO 80224

HOLDER OF DEED OF TRUST

EARL N. MURRAY

RUTH M. MURRAY

LEGAL DESCRIPTION

A PORTION OF THE EAST HALF OF SECTION 1, TOWNSHIP 3 SOUTH, RANGE 70 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF JEFFERSON, STATE OF COLORADO, WHICH CONSIDERING THE EAST LINE OF THE SOUTHEAST 1/4 OF SAID SECTION 1 AS BEARING NORTH 00°02'49" WEST AND WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO IS MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF THE NORTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SAID SECTION 1; THENCE NORTH 89°32'02" WEST, ALONG THE NORTH LINE OF SAID NORTHEAST 1/4 OF THE SOUTHEAST 1/4, A DISTANCE OF 1318.84 FEET TO THE NORTHEAST CORNER OF THE NORTHWEST 1/4 OF THE SOUTHEAST 1/4 OF SAID SECTION 1, THE TRUE POINT OF BEGINNING; THENCE SOUTH 00°15'07" EAST, ALONG THE EAST LINE OF SAID NORTHWEST 1/4 OF THE SOUTHEAST 1/4, A DISTANCE OF 463.77 FEET TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF THE CROKE CANAL; THENCE NORTHWESTERLY ALONG SAID NORTHERLY RIGHT-OF-WAY LINE THE FOLLOWING EIGHT (8) COURSES:

(1) NORTH 83°03'00" WEST, A DISTANCE OF 150.11 FEET TO A POINT OF CURVE;

(2) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 963.78 FEET AND A CENTRAL ANGLE OF 11°23'39" A DISTANCE OF 191.66 FEET, THE LONG CHORD OF WHICH BEARS NORTH 77°21'10" WEST, A DISTANCE OF 191.35 FEET TO A POINT OF TANGENT;

(3) NORTH 71°39'21" WEST, A DISTANCE OF 276.15 FEET TO A POINT OF CURVE;

(4) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 208.06 FEET AND A CENTRAL ANGLE OF 37°31'18" A DISTANCE OF 136.26 FEET, THE LONG CHORD OF WHICH BEARS NORTH 52°53'42" WEST, A DISTANCE OF 133.83 FEET TO A POINT OF TANGENT;

(5) NORTH 34°08'03" WEST, A DISTANCE OF 557.70 FEET TO A POINT OF CURVE;

(6) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 388.56 FEET AND A CENTRAL ANGLE OF 39°23'06" A DISTANCE OF 267.10 FEET, THE LONG CHORD OF WHICH BEARS NORTH 14°26'30" WEST, A DISTANCE OF 261.87 FEET TO A POINT OF TANGENT;

(7) NORTH 05°15'03" EAST, A DISTANCE OF 755.43 FEET TO A POINT OF CURVE;

(8) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 565.00 FEET AND A CENTRAL ANGLE OF 09°47'20" A DISTANCE OF 96.53, THE LONG CHORD OF WHICH BEARS NORTH 10°08'43" EAST, A DISTANCE OF 96.41 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1;

THENCE SOUTH 89°39'54" EAST ALONG SAID NORTH LINE, A DISTANCE OF 990.20 FEET TO THE NORTHEAST CORNER OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1; THENCE SOUTH 00°11'39" EAST, ALONG THE EAST LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, A DISTANCE OF 313.56 FEET TO THE NORTHWEST CORNER OF LOT 7, COTTONWOOD PARK IN RALSTON VALLEY, RECORDED IN BOOK 55 AT PAGE 10 IN THE RECORDS OF JEFFERSON COUNTY; THENCE NORTH 89°47'39" EAST, ALONG THE NORTH LINE OF SAID LOT 7, A DISTANCE OF 250.22 FEET TO THE NORTHEAST CORNER OF SAID LOT 7; THENCE SOUTHERLY ALONG THE WESTERLY RIGHT-OF-WAY LINE OF JOYCE STREET THE FOLLOWING THREE (3) COURSES:

(1) SOUTH 29°55'41" WEST, A DISTANCE OF 68.23 FEET TO A POINT OF CURVE;

(2) ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 125.00 FEET AND A CENTRAL ANGLE OF 29°26'36" A DISTANCE OF 64.30 FEET, THE LONG CHORD OF WHICH BEARS SOUTH 15°12'49" WEST, A DISTANCE OF 63.60 FEET TO A POINT OF TANGENT;

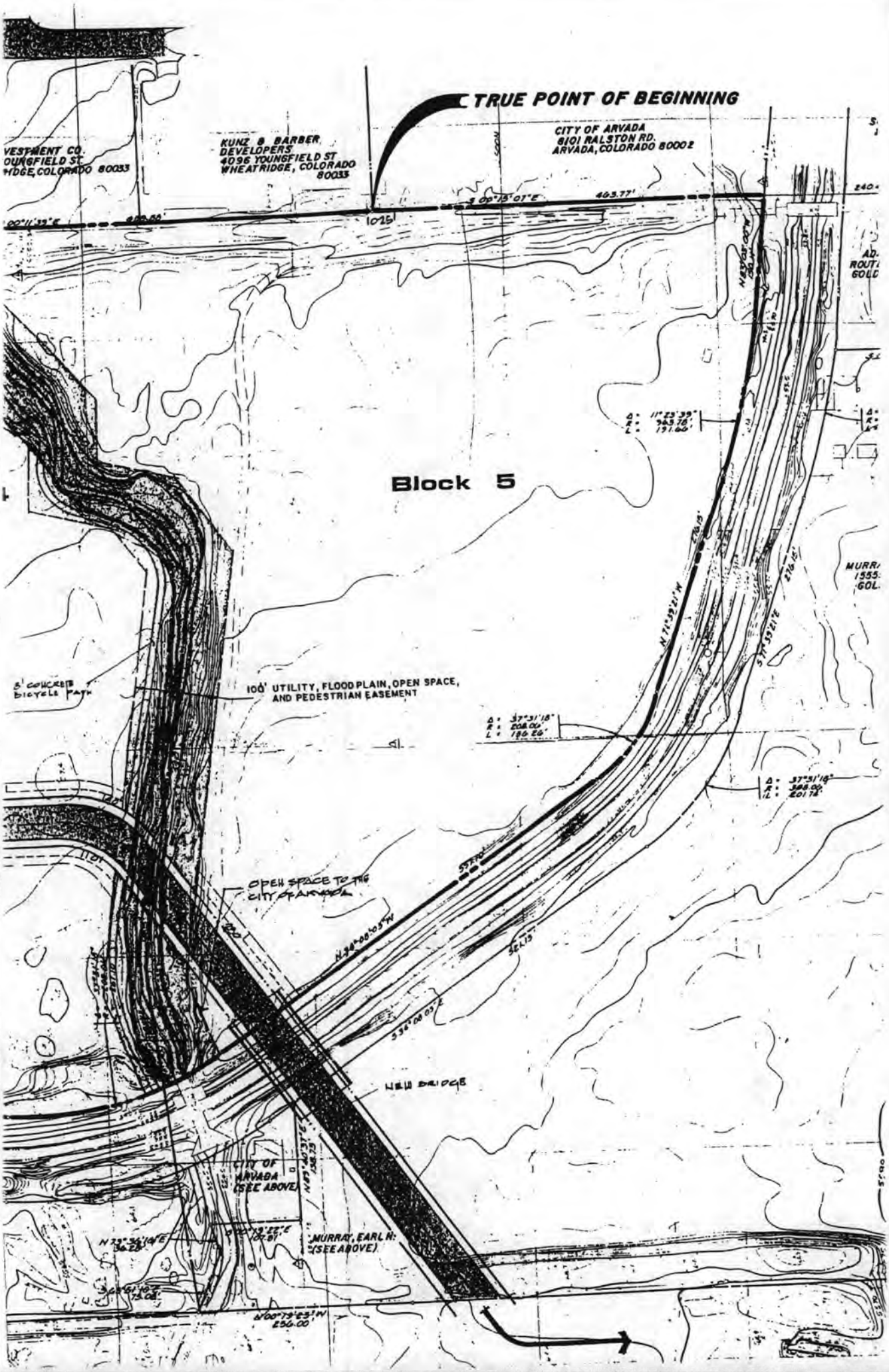
(3) SOUTH 00°29'04" WEST A DISTANCE OF 201.41 FEET; THENCE ALONG THE SOUTHERLY LINE OF SAID LOT 7 THE FOLLOWING TWO (2) COURSES:

(1) SOUTH 71°50'32" WEST, A DISTANCE OF 150.35 FEET;

(2) NORTH 68°52'48" WEST, A DISTANCE OF 57.62 FEET TO A POINT ON THE EAST LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1;

THENCE SOUTH 00°11'39" EAST ALONG SAID EAST LINE, A DISTANCE OF 659.88 FEET TO THE TRUE POINT OF BEGINNING. CONTAINING 39.497 ACRES.

JOYCE STREET
DIXON, KENNETH P.
1868 S. SAND LILY DRIVE
GOLDEN, COLORADO 80401
S 00°11'33"E
313.96'
W. 68TH PLACE
20' BUILDING LINE
10' UTILITY EASEMENT
100 YEAR FLOOD PLAIN
10' UTILITY EASEMENT
20' BUILDING LINE
100' FLOOD PLAIN
Block 1
Block
PARCEL NO.1
39.497 ACRES
Block 3
CLARK, J. WICKHAM & DORIS L.
& CLARK, J WICKHAM III
7041 & 7031 INDIANA ST.
GOLDEN, COLORADO 80403
10' UTILITY EASEMENT
20' BUILDING LINE
N 01°39'34" W
1321.30'
KIMBER STREET
825'
20' BUILDING LINE
10' UTILITY EASEMENT
Block 2
N 03°13'03"E
1933.29'
ONOKE CANAL
THE FARMERS RESERVOIR IRRIGATION CO.
725 MALLEY DRIVE
NORTHGLENN, CO
NOT A PART
FORBES, DONALD R.
15000 W. 72nd AVE
GOLDEN, COLORADO
80403


TRUE POINT OF BEGINNING
CITY OF ARVADA
8101 RALSTON RD.
ARVADA, COLORADO 80002
KUNZ & BARBER
DEVELOPERS
4096 YOUNGFIELD ST
WHEATRIDGE, COLORADO
80033
VESTMENT CO.
OUNGFIELD ST.
RIDGE, COLORADO 80033
S 00°13'07"E 463.77'
Block 5
5' CONCRETE BICYCLE PATH
100' UTILITY, FLOOD PLAIN, OPEN SPACE, AND PEDESTRIAN EASEMENT
OPEN SPACE TO THE CITY OF ARVADA
NEW BRIDGE
CITY OF ARVADA (SEE ABOVE)
MURRAY, EARL N. (SEE ABOVE)
N00°13'23"W 256.00'

APPENDIX D

JEFFERSON COUNTY QUARTER SECTION MAPS

1) 1986 Aerial Photograph - Site vicinity map with street and waterway labels.

2) Jefferson County Quarter Section 30-01 map

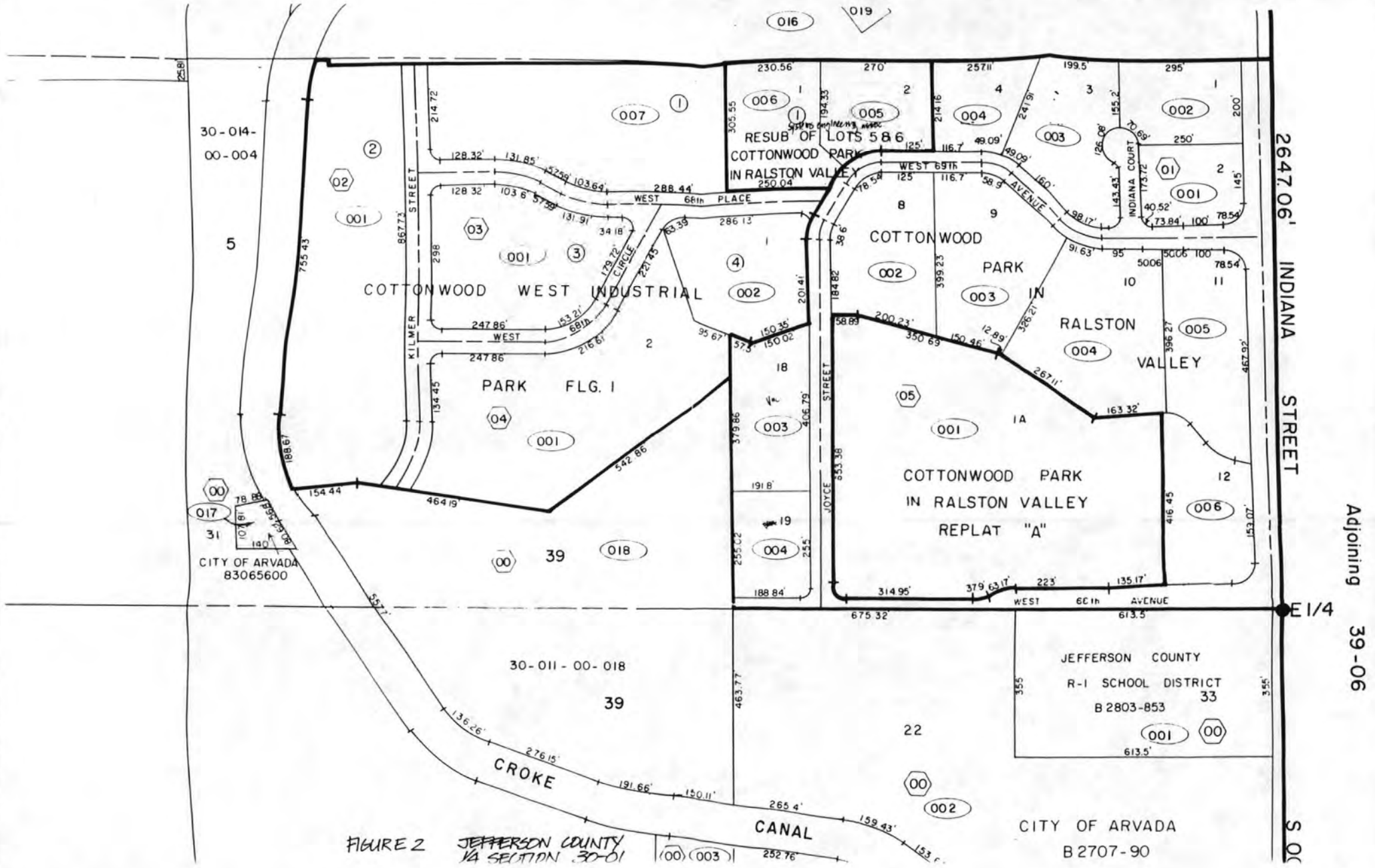


FIGURE 2 JEFFERSON COUNTY VA SECTION 30-01

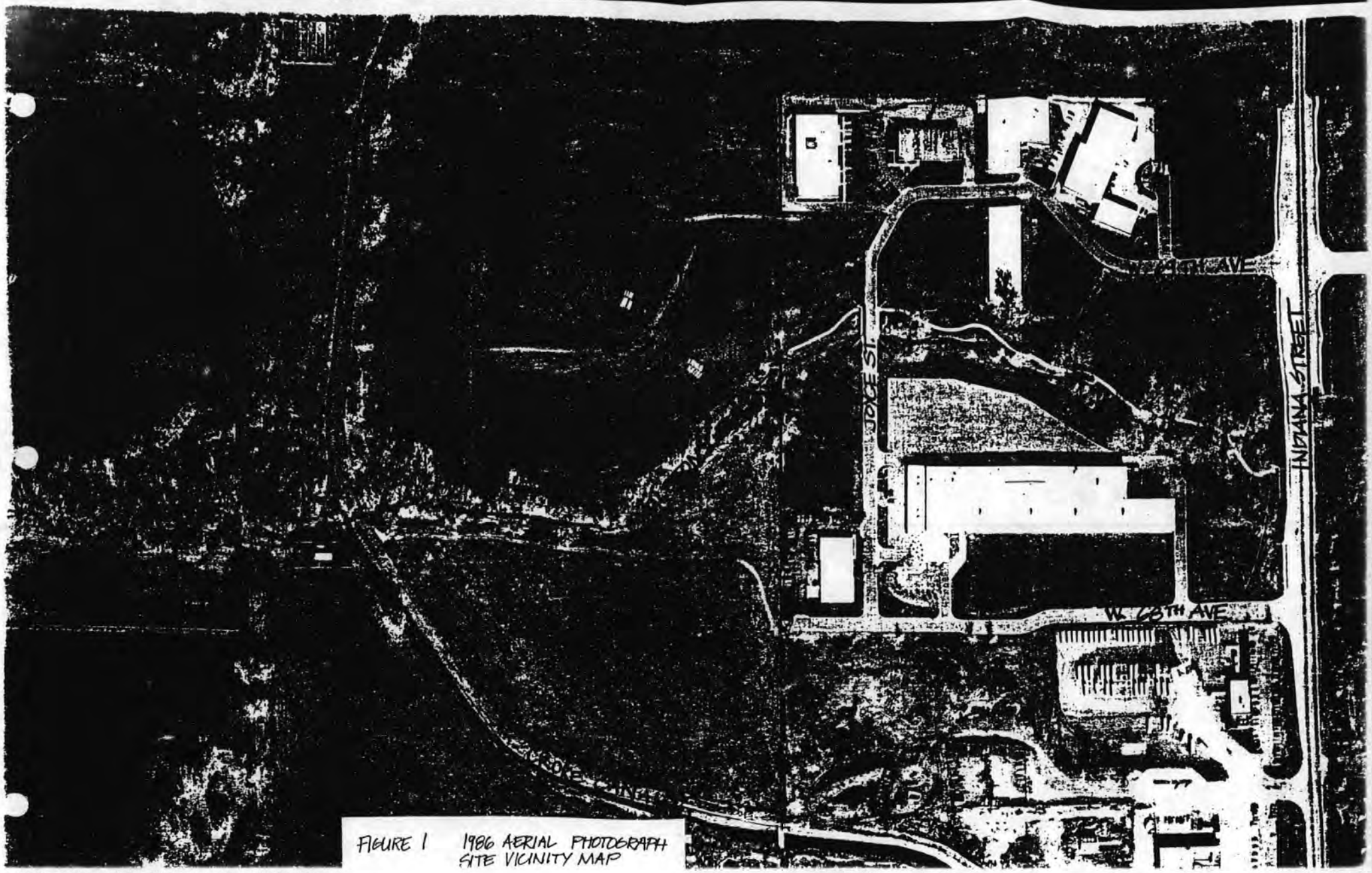
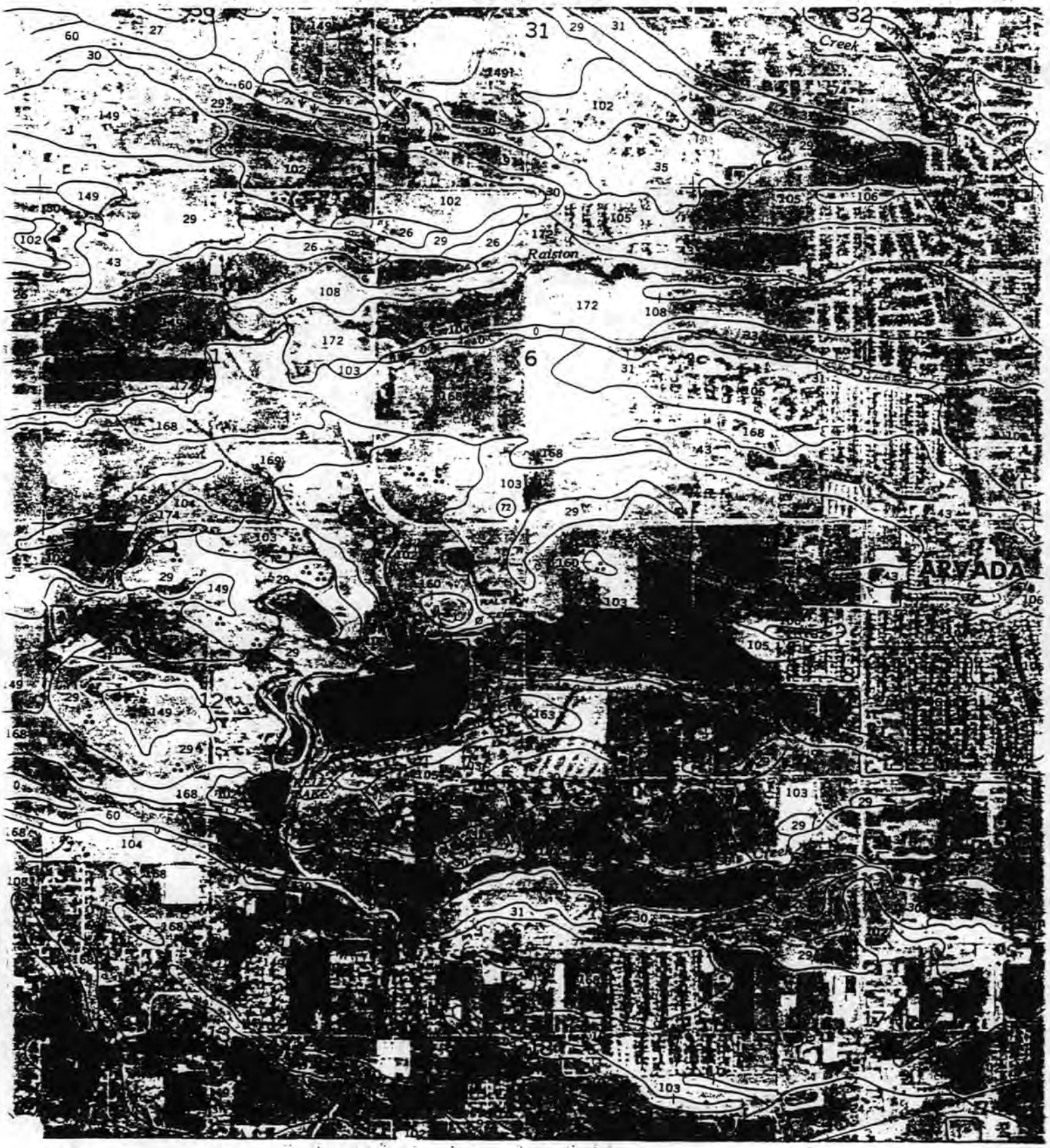


FIGURE 1 1986 AERIAL PHOTOGRAPH
SITE VICINITY MAP

APPENDIX E

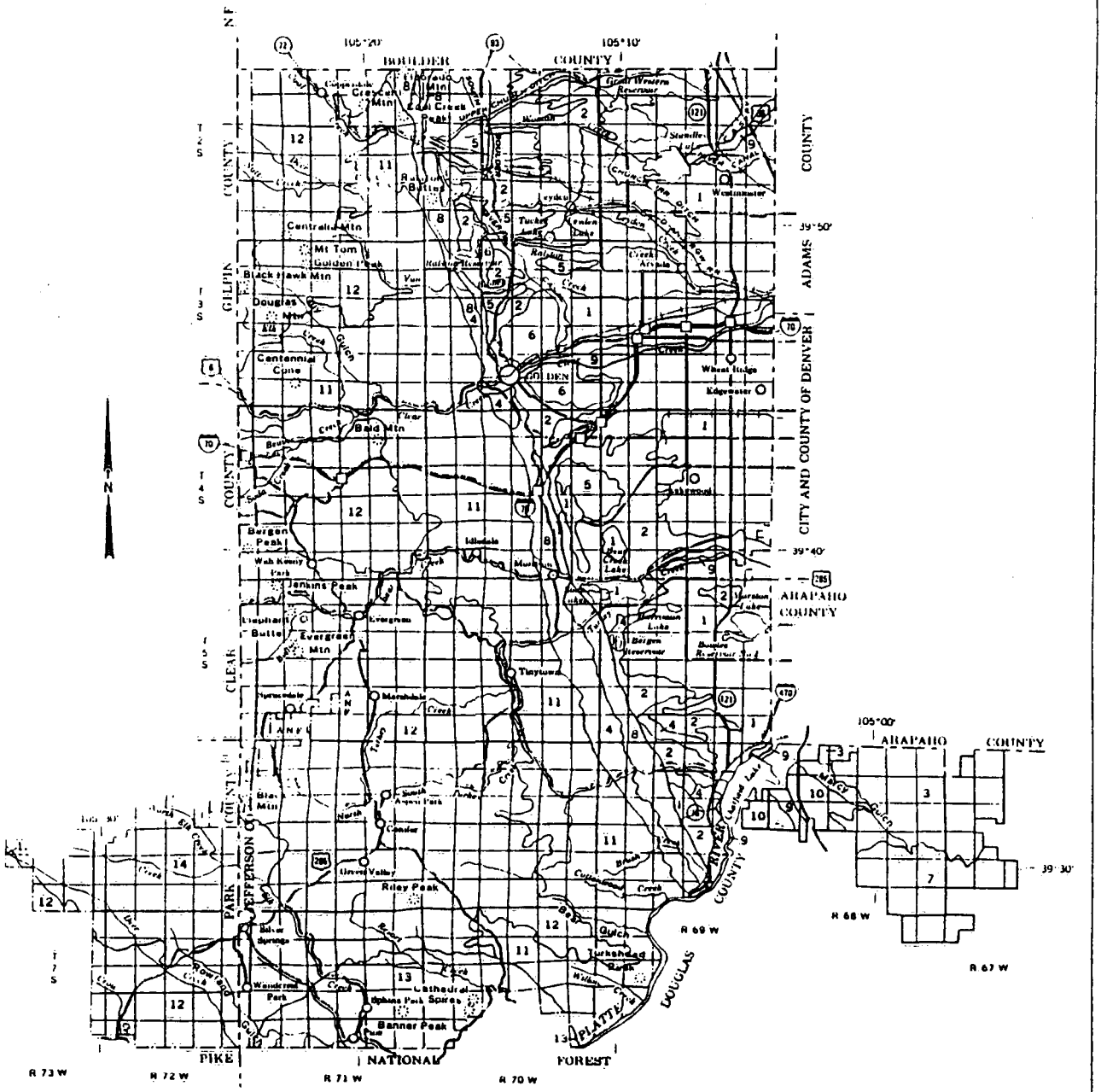
U.S.D.A. SOIL CONSERVATION SERVICE MAPS

1) Soil Survey Map and Legend
2) General Soil Map


Raiston
ARVADA
Creek
Creek

SOIL LEGEND

SYMBOL	NAME
1	Alda loam, 0 to 2 percent slopes
2	Alda-Niwot complex, 0 to 2 percent slopes
3	Allens Park Variant-Ratake-Rock outcrop complex, 30 to 50 percent slopes
4	Argiustolls, loamy, 15 to 30 percent slopes
5	Argiustolls-Rock outcrop complex, 15 to 60 percent slopes
6	Arvada clay loam, 0 to 2 percent slopes
7	Ascalon sandy loam, 5 to 9 percent slopes
8	Ascalon sandy loam, 9 to 15 percent slopes
9	Baller-Rock outcrop complex, 15 to 50 percent slopes
10	Baller Variant-Lavina-Rock outcrop complex, 5 to 15 percent slopes
11	Baller Variant-Lavina-Rock outcrop complex, 15 to 30 percent slopes
12	Blakeland loamy sand, 0 to 9 percent slopes
13	Blakeland loamy sand, 9 to 15 percent slopes
14	Breece sandy loam, 9 to 25 percent slopes
15	Bresser sandy loam, 0 to 5 percent slopes
16	Bresser gravelly sandy loam, 9 to 25 percent slopes
17	Critchell gravelly sandy loam, 0 to 3 percent slopes
18	Critchell gravelly sandy loam, 3 to 9 percent slopes
19	Critchell gravelly sandy loam, 9 to 15 percent slopes
20	Critchell stony sandy loam, 0 to 5 percent slopes
21	Cryofluvents, 0 to 5 percent slopes
22	Cumulic Cryoborolls, loamy, 0 to 5 percent slopes
23	Curecanti very stony sandy loam, 15 to 50 percent slopes
24	Daconio Variant gravelly clay loam, 0 to 3 percent slopes
25	Denver clay loam, 0 to 2 percent slopes
26	Denver clay loam, 2 to 5 percent slopes
27	Denver clay loam, 5 to 9 percent slopes
28	Denver cobbly clay loam, 5 to 9 percent slopes
29	Denver-Kutch clay loams, 5 to 9 percent slopes
30	Denver-Kutch clay loams, 9 to 15 percent slopes
31	Denver-Kutch-Midway clay loams, 9 to 25 percent slopes
32	Denver-Kutch-Urban land complex, 5 to 9 percent slopes
33	Denver-Kutch-Urban land complex, 9 to 15 percent slopes
34	Denver-Urban land complex, 0 to 2 percent slopes
35	Denver-Urban land complex, 2 to 5 percent slopes
36	Denver-Urban land complex, 5 to 9 percent slopes
37	Earcree gravelly sandy loam, 9 to 15 percent slopes
38	Earcree Variant very gravelly sandy loam, 3 to 9 percent slopes
39	Earcree Variant very gravelly sandy loam, 9 to 15 percent slopes
40	Earcree Variant-Venable complex, 0 to 15 percent slopes
41	Englewood clay loam, 0 to 2 percent slopes
42	Englewood clay loam, 2 to 5 percent slopes
43	Englewood clay loam, wet, 0 to 3 percent slopes
44	Englewood-Urban land complex, 0 to 2 percent slopes
45	Flatirons very cobbly sandy loam, 0 to 3 percent slopes
46	Flatirons very stony sandy loam, 0 to 5 percent slopes
47	Flatirons very stony sandy loam, 5 to 9 percent slopes
48	Flatirons very stony sandy loam, 9 to 15 percent slopes
49	Flatirons very stony sandy loam, 15 to 30 percent slopes
50	Fluvaquents, sandy, 0 to 2 percent slopes
51	Fondis loam, 0 to 3 percent slopes
52	Garber Variant very gravelly sandy loam, 5 to 9 percent slopes
53	Garber Variant very gravelly sandy loam, 9 to 15 percent slopes
54	Grimstone stony sandy loam, 9 to 15 percent slopes
55	Grimstone-Hiwan-Rock outcrop complex, 30 to 60 percent slopes
56	Grimstone-Peeler-Rock outcrop complex, 15 to 30 percent slopes
57	Grimstone-Peeler-Rock outcrop complex, 30 to 50 percent slopes
58	Hargreave sandy loam, 3 to 9 percent slopes
59	Hargreave-Bernal sandy loams, 9 to 15 percent slopes
60	Haverson loam, 0 to 3 percent slopes
61	Haverson loam, 3 to 9 percent slopes
62	Heldt clay, 3 to 9 percent slopes
63	Heldt clay, 9 to 15 percent slopes
64	Herdman-Sprucedale-Rock outcrop complex, 9 to 15 percent slopes
65	Herdman-Sprucedale-Rock outcrop complex, 15 to 30 percent slopes
66	Kittredge-Earcree complex, 3 to 9 percent slopes
67	Kittredge-Earcree complex, 9 to 20 percent slopes
68	Kittredge-Venable complex, 0 to 15 percent slopes
69	Laporte Variant complex, 15 to 60 percent slopes
70	Lavate sandy loam, 3 to 9 percent slopes
71	Lavate sandy loam, 9 to 15 percent slopes
72	Lavate-Bernal-Rock outcrop complex, 15 to 30 percent slopes
73	Lavina loam, very rocky, 0 to 5 percent slopes
74	Lebsack clay loam, saline, 0 to 2 percent slopes
75	Legault-Hiwan stony loamy sands, 5 to 15 percent slopes
76	Legault-Hiwan stony loamy sands, 15 to 30 percent slopes
77	Legault-Hiwan-Rock outcrop complex, 30 to 50 percent slopes
78	Legault-Tolvar-Rock outcrop complex, 50 to 70 percent slopes
79	Leyden-Nunn-Rooney complex, 9 to 30 percent slopes
80	Leyden-Primen-Standley cobbly clay loams, 15 to 50 percent slopes
81	Leyden-Primen-Standley extremely stony clay loams, 30 to 70 percent slopes
82	Leyden-Standley-Primen cobbly clay loams, 9 to 15 percent slopes
83	Leyden-Standley-Primen very cobbly clay loams, 30 to 60 percent slopes
84	Lininger-Ratake complex, 5 to 15 percent slopes
85	Lininger-Ratake complex, 15 to 30 percent slopes
86	Lininger-Trag sandy loams, 3 to 9 percent slopes
87	Lininger-Trag sandy loams, 9 to 20 percent slopes
88	Loveland clay loam, 0 to 1 percent slopes
89	Loveland Variant gravelly sandy loam, 0 to 2 percent slopes
90	Manzano fine sandy loam, 0 to 2 percent slopes
91	Manzanola clay loam, 0 to 5 percent slopes
92	Manzanola clay loam, 5 to 9 percent slopes
93	Manzanola clay loam, 9 to 15 percent slopes
94	Manzanola clay loam, 15 to 25 percent percent slopes
95	Manzanola cobbly clay loam, 15 to 25 percent slopes
96	Manzanola-Renohill-Stoneham complex, 9 to 15 percent slopes
97	McClave clay loam, 0 to 3 percent slopes
98	Midway clay loam, 9 to 30 percent slopes
99	Midway stony clay loam, 15 to 40 percent slopes
100	Nederland very cobbly sandy loam, 15 to 50 percent slopes
101	Nederland Variant very cobbly sandy loam, 30 to 50 percent slopes
102	Nunn clay loam, 0 to 2 percent slopes
103	Nunn clay loam, 2 to 5 percent slopes
104	Nunn clay loam, 5 to 9 percent slopes
105	Nunn-Urban land complex, 0 to 2 percent slopes
106	Nunn-Urban land complex, 2 to 5 percent slopes
107	Nunn-Urban land complex, 5 to 9 percent slopes
108	Nunn Variant-Urban land complex, 0 to 3 percent slopes
109	Paymaster sandy loam, 0 to 3 percent slopes
110	Pits, clayey
111	Pits, gravel
112	Platner loam, 3 to 5 percent slopes
113	Platner-Urban land complex, 0 to 3 percent slopes
114	Raleigh very gravelly sandy loam, 9 to 15 percent slopes
115	Raleigh very gravelly sandy loam, 15 to 30 percent slopes
116	Raleigh very gravelly sandy loam, 30 to 50 percent slopes
117	Raleigh very gravelly sandy loam, 2 to 9 percent south slopes
118	Raleigh very gravelly sandy loam, 9 to 15 percent south slopes
119	Raleigh very gravelly sandy loam, 15 to 30 percent south slopes
120	Raleigh stony sandy loam, 30 to 50 percent south slopes
121	Raleigh-Rock outcrop complex, 50 to 70 percent slopes
122	Ratake-Cathedral very stony sandy loams, 25 to 60 percent slopes
123	Ratake-Cathedral-Rock outcrop complex, 25 to 60 percent slopes
124	Ratake-Cathedral-Rock outcrop complex, 25 to 60 percent north slopes
125	Ratake-Lininger stony sandy loams, 30 to 60 percent slopes
126	Razor-Heldt clay loams, 9 to 25 percent slopes
127	Razor-Heldt-Midway cobbly clay loams, 15 to 30 percent slopes
128	Rednun clay loam, 0 to 3 percent slopes
129	Rednun clay loam, 3 to 9 percent slopes
130	Rednun clay loam, 9 to 15 percent slopes
131	Rednun-Chapin Variant clay loams, 9 to 15 percent slopes
132	Renohill loam, 5 to 9 percent slopes
133	Renohill-Manzanola clay loams, 9 to 15 percent slopes
134	Renohill-Midway complex, 9 to 15 percent slopes
135	Resort-Sohinx very gravelly sandy loams, 9 to 15 percent slopes
136	Resort-Sohinx very gravelly sandy loams, 15 to 30 percent slopes
137	Resort-Sohinx very gravelly sandy loams, 30 to 50 percent slopes
138	Rock outcrop, igneous and metamorphic
139	Rock outcrop, sedimentary
140	Rock outcrop-Cathedral-Ratake complex, 50 to 100 percent slopes
141	Rogert-Herdman-Rock outcrop complex, 30 to 70 percent slopes
142	Rooney very cobbly sandy loam, 15 to 50 percent slopes
143	Rooney-Primen-Leyden complex, 15 to 50 percent slopes
144	Rooney-Rock outcrop complex, 50 to 70 percent slopes
145	Rosane sandy loam, 0 to 3 percent slopes
146	Rosane-Venable fine sandy loams, 0 to 3 percent slopes
147	Sohinx-Resort-Rock outcrop complex, 50 to 70 percent slopes
148	Standley-Leyden-Primen very stony clay loams, 15 to 30 percent slopes
149	Standley-Nunn gravelly clay loams, 0 to 5 percent slopes
150	Tolvar very gravelly loamy sand, 15 to 30 percent slopes
151	Torrifluvents, very gravelly, 0 to 3 percent slopes
152	Trag sandy loam, 3 to 9 percent slopes
153	Trag sandy loam, 9 to 25 percent slopes
154	Troutdale gravelly sandy loam, 3 to 9 percent slopes
155	Troutdale-Kittredge sandy loams, 5 to 15 percent slopes
156	Troutdale-Rogert-Kittredge complex, 15 to 30 percent slopes
157	Troutdale-Sprucedale gravelly sandy loams, 3 to 15 percent slopes
158	Truckton sandy loam, 0 to 3 percent slopes
159	Truckton sandy loam, 3 to 9 percent slopes
160	Ulm clay loam, 5 to 9 percent slopes
161	Ulm-Urban land complex, 0 to 3 percent slopes
162	Ulm-Urban land complex, 3 to 5 percent slopes
163	Ulm-Urban land complex, 5 to 9 percent slopes
164	Ulm-Urban land complex, 9 to 18 percent slopes
165	Ustic Torriorthents, loamy, 15 to 50 percent slopes
166	Ustic Torriorthents, clayey, 0 to 50 percent slopes
167	Ustorthents, cool-Rock outcrop complex, 15 to 50 percent slopes
168	Valmont clay loam, 0 to 3 percent slopes
169	Veldkamp-Nederland very cobbly sandy loams, 0 to 3 percent slopes
170	Venable loam, 0 to 3 percent slopes
171	Venable loam, 3 to 9 percent slopes
172	Wann fine sandy loam, 0 to 2 percent slopes
173	Willowman cobbly sandy loam, 0 to 5 percent slopes
174	Willowman-Leyden cobbly loams, 9 to 30 percent slopes
175	Yoder Variant gravelly sandy loam, 9 to 30 percent slopes
176	Yoder Variant-Midway complex, 15 to 60 percent slopes



SOIL ASSOCIATIONS

DOMINANTLY WELL DRAINED, CLAYEY AND LOAMY SOILS ON HIGH TERRACES, HILL SLOPES, AND FANS

1 — Nunn Denver. Nearly level to gently sloping, deep, well drained clayey soils that formed in material derived from shale stone and shale

2 — Denver Kutch. Moderately sloping to steep, deep and moderately deep well drained clayey soils that formed in material derived from mudstone and shale

3 — Platner Renohob. Gently sloping to strongly sloping deep and moderately deep well drained clayey soils that formed in material derived from mudstone and shale

4 — Catchall Loveton Redmon. Nearly level to moderately steep, deep well drained loamy and clayey soils that formed in red beds material derived from sedimentary rocks

DOMINANTLY WELL DRAINED CLAYEY AND GRAVELLY SOILS ON FANS TERRACES, HILL SLOPES AND STABLE SUMMITS

5 — Nunn Midway. Nearly level to slopes deep well drained clayey and gravelly soils that formed in alluvial deposits

DOMINANTLY WELL DRAINED STONY CLAYEY OR CLAYEY SOILS ON MESA TOPS, STABLE SUMMITS AND HILL SLOPES

6 — Leyden Loveton. Nearly level to very steep, moderately deep to shallow well drained clayey and clayey soils that formed in material derived from volcanic rock and shale

7 — Nunn Rooney Loveton. Moderately sloping to very steep, deep shallow and moderately deep well drained clayey and loamy soils that formed in material derived from sedimentary rocks

DOMINANTLY WELL DRAINED STONY AND LOAMY SOILS ON PEDIMENTS AND HILL SLOPES

8 — Argixerolls Rock outcrop Buster. Moderately steep to very steep, shallow to deep well drained clayey and loamy soils that formed in colluvium derived from sedimentary rocks

DOMINANTLY SOMEWHAT EXCESSIVELY DRAINED AND SOMEWHAT POORLY DRAINED LOAMY, VERY GRAVELLY AND SANDY SOILS ON FLOOD PLAINS AND LOW TERRACES

9 — Aeric Torrifluvents. Very gravelly, Nearly level, deep, somewhat excessively drained and somewhat poorly drained, loamy very gravelly and sandy soils that formed in mixed alluvium

DOMINANTLY SOMEWHAT EXCESSIVELY DRAINED AND WELL DRAINED SANDY AND LOAMY SOILS ON HIGH TERRACES AND HILL SLOPES

10 — Stoneham Trustum. Nearly level to strongly sloping, deep somewhat excessively drained and well drained sandy and loamy soils that formed in colluvium sand and sandy loess

DOMINANTLY WELL DRAINED STONY GRAVELLY LOAMY AND SANDY SOILS ON MOUNTAIN SIDE SLOPES AND STABLE SUMMITS AREAS IN DRAINAGEWAYS

11 — Rotolla Lithic. Moderately sloping to very steep, shallow to moderately deep, well drained, stony gravelly and loamy soils that formed in material derived from igneous and metamorphic rocks

12 — Herdson Rock. Moderately sloping to very steep, shallow, well drained, stony gravelly, loamy and sandy soils that formed in material derived from igneous and metamorphic rocks

13 — Rock Outcrop. Strongly sloping to very steep, shallow, somewhat excessively drained gravelly, loamy soils that formed in grus of the Pikes Peak Granite

14 — Raleigh Gaynor Variant. Gently sloping to very steep, shallow to deep, somewhat excessively drained and well drained, gravelly, loamy soils that formed in grus of the Pikes Peak Granite

* The texture given in the description heading is that of the soil and or the underlying material of the major soils in each map unit

Each area outlined on the map consists of more than one kind of soil. The map unit name for principal township, range, and section for the area on the soil survey map is

U S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GENERAL SOIL MAP

GOLDEN AREA COLORADO PARTS OF DENVER, DOUGLAS, JEFFERSON AND PARK COUNTIES.

Scale 1:253,440

0 1 2 3 4 Miles

4 Miles = 1"

APPENDIX F

LABORATORY RESULTS
ATI (ANALYTICAL TECHNOLOGIES, INC.)

Analytical Technologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

Message

Dave,

Here are your results.

Steve F.

To Dave Runyon Company EREE

Fax No. 843-6215 Date 1-14-92

From Steven Fry Number of pages including this sheet 21

If you do not receive all the pages please call us back as soon as possible.

Analytical Technologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

January 14, 1992

Mr. Dave Runyon
ERCE
Stanford Place 3, Suite 415
4582 South Ulster Street Parkway
Denver, CO 80237

RE: ATI Workorder: 91-12-190
Client Project Name: Cottonwood ESA

Dear Mr. Runyon:

Two soil samples and two water samples were received from ERCE on December 27, 1991. The samples were scheduled for the following analyses: Volatile Organics, PCB's, and Total Lead. Results for these analyses are contained in the following report.

Please note that the Volatile Organic surrogate recoveries for sample "001" were outside the method required limits. This sample was re-analyzed and the surrogates once again did not meet the required recovery limits. This is probably due to the matrix of the sample, i.e., the sample resembled activated carbon.

Thank you for your confidence in Analytical Technologies, Inc. Should you have any questions, please call.

Sincerely yours,

Steven Fry, Ph.D.
Project Manager

SF/kci

Enclosures

Analytical Technologies, Inc.

QUALITY ASSURANCE DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Alex Blanche, GC/GCMS Supervisor

CERTIFICATION

Analytical Technologies Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

Analytical Technologies, Inc.

QUALITY ASSURANCE
DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Tom Austin, Jr.
GC/HPLC/Fuels Supervisor

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID:
Reagent Blank

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Soil

Lab Sample ID: 91-12-190-RB
Date Collected: N/A
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration ug/kg
Chloromethane	< 10
Bromomethane	< 10
Vinyl chloride	< 10
Chloroethane	< 10
Methylene chloride	< 5
Acetone	< 10
Carbon disulfide	< 5
1,1-Dichloroethene	< 5
1,1-Dichloroethane	< 5
1,2-Dichloroethene (Total)	< 5
Chloroform	< 5
1,2-Dichloroethane	< 5
2-Butanone	< 10
1,1,1-Trichloroethane	< 5
Carbon tetrachloride	< 5
Vinyl Acetate	< 10
Bromodichloromethane	< 5
1,2-Dichloropropane	< 5
cis-1,3-Dichloropropene	< 5
Trichloroethene	< 5
Dibromochloromethane	< 5
1,1,2-Trichloroethane	< 5
Benzene	< 5
trans-1,3-Dichloropropene	< 5
Bromoform	< 5
2-Hexanone	< 10
4-Methyl-2-pentanone	< 10
Tetrachloroethene	< 5
1,1,2,2-Tetrachloroethane	< 5
Toluene	< 5
Chlorobenzene	< 5
Ethylbenzene	< 5
Styrene	< 5
Total Xylenes	< 5

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	70-121
Toluene-d8	104	81-117
Bromofluorobenzene	102	74-121

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 001

Lab Name: Analytical Technologies Inc. Lab Sample ID: 91-12-190-01
Client Name: ERCE Date Collected: 12/26/91
Client Project ID: Cottonwood ESA Date Analyzed: 01/09/92
Sample Matrix: Soil Dilution Factor: 1

COMPOUND NAME	Concentration (ug/kg)		
Chloromethane	<	10	
Bromomethane	<	10	
Vinyl chloride	<	10	
Chloroethane	<	10	
Methylene chloride		120	
Acetone		68	
Carbon disulfide	<	5	
1,1-Dichloroethene		2	J
1,1-Dichloroethane	<	5	
1,2-Dichloroethene (Total)		4	J
Chloroform		3	J
1,2-Dichloroethane	<	5	
2-Butanone	<	10	
1,1,1-Trichloroethane		12	
Carbon tetrachloride	<	5	
Vinyl Acetate	<	10	
Bromodichloromethane	<	5	
1,2-Dichloropropane	<	5	
cis-1,3-Dichloropropene	<	5	
Trichloroethene		4	J
Dibromochloromethane	<	5	
1,1,2-Trichloroethane	<	5	
Benzene		4	J
trans-1,3-Dichloropropene	<	5	
Bromoform	<	5	
2-Hexanone	<	10	
4-Methyl-2-pentanone	<	10	
Tetrachloroethene		23	
1,1,2,2-Tetrachloroethane	<	5	
Toluene		24	
Chlorobenzene		4	J
Ethylbenzene		7	
Styrene	<	5	
Total Xylenes		43	

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	93	70-121
Toluene-d8	72 *	81-117
Bromofluorobenzene	122 *	74-121

* Outside control limits.

J = compound detected below practical quantitation limit.

VOLATILE ORGANICS DATA SHEET

Tentatively Identified Compounds

Client Sample ID:

001

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-01

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1

Matrix: Soil

Concentration units: ug/kg

COMPOUND NAME	RT	Concentration	Q
Trichlorofluoromethane		120 J	

J = estimated value

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID:
Reagent Blank

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Water

Lab Sample ID: 91-12-190-RB
Date Collected: N/A
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration ug/L	
Chloromethane	<	10
Bromomethane	<	10
Vinyl chloride	<	10
Chloroethane	<	10
Methylene chloride	<	5
Acetone	<	10
Carbon disulfide	<	5
1,1-Dichloroethene	<	5
1,1-Dichloroethane	<	5
1,2-Dichloroethene (Total)	<	5
Chloroform	<	5
1,2-Dichloroethane	<	5
2-Butanone	<	10
1,1,1-Trichloroethane	<	5
Carbon tetrachloride	<	5
Vinyl Acetate	<	10
Bromodichloromethane	<	5
1,2-Dichloropropane	<	5
cis-1,3-Dichloropropene	<	5
Trichloroethene	<	5
Dibromochloromethane	<	5
1,1,2-Trichloroethane	<	5
Benzene	<	5
trans-1,3-Dichloropropene	<	5
Bromoform	<	5
2-Hexanone	<	10
4-Methyl-2-pentanone	<	10
Tetrachloroethene	<	5
1,1,2,2-Tetrachloroethane	<	5
Toluene	<	5
Chlorobenzene	<	5
Ethylbenzene	<	5
Styrene	<	5
Total Xylenes	<	5

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	76-116
Toluene-d8	104	88-110
Bromofluorobenzene	102	86-115

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 004

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Water

Lab Sample ID: 91-12-190-03
Date Collected: 12/26/91
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration (ug/L)	
Chloromethane	<	10
Bromomethane	<	10
Vinyl chloride	<	10
Chloroethane	<	10
Methylene chloride	<	5
Acetone	<	10
Carbon disulfide	<	5
1,1-Dichloroethene	<	5
1,1-Dichloroethane	<	5
1,2-Dichloroethene (Total)	<	5
Chloroform	<	5
1,2-Dichloroethane	<	5
2-Butanone	<	10
1,1,1-Trichloroethane	<	5
Carbon tetrachloride	<	5
Vinyl Acetate	<	10
Bromodichloromethane	<	5
1,2-Dichloropropane	<	5
cis-1,3-Dichloropropene	<	5
Trichloroethene	<	5
Dibromochloromethane	<	5
1,1,2-Trichloroethane	<	5
Benzene	<	5
trans-1,3-Dichloropropene	<	5
Bromoform	<	5
2-Hexanone	<	10
4-Methyl-2-pentanone	<	10
Tetrachloroethene	<	5
1,1,2,2-Tetrachloroethane	<	5
Toluene	<	5
Chlorobenzene	<	5
Ethylbenzene	<	5
Styrene	<	5
Total Xylenes	<	5

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	76-116
Toluene-d8	102	88-110
Bromofluorobenzene	101	86-115

Tentatively Identified Compounds

Client Sample ID:

004

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-03

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1 1

Matrix: Water

Concentration units: ug/L

COMPOUND NAME	RT	Concentration	Q
Methyl-t-butyl ether		10 J	

J = estimated value

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
Method 8240

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Sample Matrix: Water

Client Sample ID: In House

Lab Sample ID: 20199905/AZ

Date Analyzed: 01/09/92

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	MS Concentration (ug/L)	MS % REC
1,1-Dichloroethene	50	<	5	57	114
Trichloroethene	50	<	5	43	86
Benzene	50	<	5	39	78
Toluene	50	<	5	51	102
Chlorobenzene	50	<	5	50	100

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD % REC	% RPD
1,1-Dichloroethene	50	58	116	2
Trichloroethene	50	44	88	2
Benzene	50	41	82	5
Toluene	50	49	98	4
Chlorobenzene	50	51	102	2

QUALITY CONTROL LIMITS

Compound	Water		Soil	
	%REC	RPD	% Rec	RPD
1,1-Dichloroethene	61 - 145	14	59 - 172	22
Trichloroethene	71 - 120	14	62 - 137	24
Benzene	76 - 127	11	60 - 133	21
Toluene	76 - 125	13	59 - 139	21
Chlorobenzene	75 - 130	13	66 - 142	21

PCB ANALYSIS DATA SHEET
Method 8080

Lab Name: Analytical Technologies Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-RBS

Sample Matrix: Sodium Sulfate

Sample Weight: 30 g

GPC Cleanup: N

Client Sample ID: Reagent Blank

Date Collected: N/A

Date Extracted: 12/30/91

Date Analyzed: 01/03/92

Extract Volume: 10 mL

Dilution Factor: 1

Compound	Conc (mg/kg)
PCB 1016	< 0.03
PCB 1221	< 0.03
PCB 1232	< 0.03
PCB 1242	< 0.03
PCB 1248	< 0.03
PCB 1254	< 0.03
PCB 1260	< 0.03

SURROGATE RECOVERY

Compound	% Recovery
Tetrachloro-m-xylene	86

PCB ANALYSIS DATA SHEET
Method 8080

Lab Name: Analytical Technologies Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-02A

Sample Matrix: Soil

Sample Weight: 30 g

GPC Cleanup: N

Client Sample ID: 002

Date Collected: 12/26/91

Date Extracted: 12/30/91

Date Analyzed: 01/03/92

Extract Volume: 10 mL

Dilution Factor: 1

Compound	Conc (mg/kg)
PCB 1016	< 0.03
PCB 1221	< 0.03
PCB 1232	< 0.03
PCB 1242	< 0.03
PCB 1248	< 0.03
PCB 1254	< 0.03
PCB 1260	< 0.03

SURROGATE RECOVERY

Compound	% Recovery
Tetrachloro-m-xylene	98

PCB MATRIX SPIKE RESULTS
Method 8080

Client Sample ID: In House

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Lab Sample ID: 91-12-114-01A

Sample Matrix: Soil

Date Analyzed: 12/19/91

GC Column: DB-1701

Compound	Spike Added (mg/kg)	Sample Concentration (mg/kg)	MS Concentration (mg/kg)	MS Percent Recovery
PCB 1260	0.50	< 0.3	0.597	119

Compound	Spike Added (mg/kg)	MSD Concentration (mg/kg)	MSD Percent Recovery	RPD
PCB 1260	0.50	0.607	121	2

PCB ON-GOING PRECISION AND RECOVERY
Method 8080

Lab Name: Analytical Technologies, Inc. Lab Sample ID: 91-12-190-OPR

Client Name: ERCE Date Analyzed: 01/03/92

Sample Matrix: Soil GC Column: DB-608

Compound	Spike Added (mg/kg)	OPR Concentration (mg/kg)	OPR Percent Recovery
PCB 1260	0.50	0.590	118

Compound	Spike Added (mg/kg)	OPRD Concentration (mg/kg)	OPRD Percent Recovery	RPD
PCB 1260	0.50	0.657	131	11

Analytical Technologies, Inc.

QUALITY ASSURANCE DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Steve Workman

Steve Workman, GC/HPLC/Inorganics Supervisor

CERTIFICATION

Analytical Technologies Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/03/92

Sample Matrix: Soil

Client ID.	ATI ID.	Lead Conc. (mg/kg)
Reagent Blank	91-12-190-RB	< 5
002	91-12-190-02	56

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/02/92

Sample Matrix: Water

Client ID.	ATI ID.	Lead Conc. (mg/L)
Reagent Blank	91-12-190-RB	< 0.003
005	91-12-190-04	0.065

TOTAL LEAD MATRIX SPIKE

Client Sample ID: In House

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Prep Date: 01/02/92

Lab Sample ID: 9659A/FL

Date Analyzed: 01/03/92

Sample Matrix: Soil

Compound	Spike Added (mg/kg)	Sample Concentration (mg/kg)	MS Concentration (mg/kg)	MS Percent Recovery
Lead	50	< 5	54	108

TOTAL LEAD MATRIX SPIKE

Client Sample ID: In House

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Prep Date: 01/02/92

Lab Sample ID: 9600B-1/FL

Date Analyzed: 01/02/92

Sample Matrix: Water

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS Percent Recovery
Lead	0.80	< 0.003	0.80	100

12-17-91

CONTRACTOR ERCE SAMPLERS Ron C. Holm, Will Glasgow PROJECT • COTTONWOOD ESA

SITE CONTACT/PHONE DAVE RUNYON 843-6210 LAB/LOCATION ATI - FORT COLLINS

C-O-C NUMBER 0001

~~EG&G ROCKY FLATS~~ RCRA, CHAIN OF CUSTODY

ERCE (DENVER)
DENVER TECH CENTER
STANFORD PLACE #3 STE 415 Denver Co

	DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED-F POT DISS-P	TURN AROUND RUSH -R	OUT OF SPEC REPORTS	PRESERVATIVE: COOLED TO 4 C	HCl	NAOH	HNO3	H2SO4	BOTTLE CODES: VOA	OIL+GREASE	PCB's + METALS	TOTAL METALS
01	12-26-91	1330	001	LANDFILL	2 oz GLASS	1	S				Y					X			
02		1335	002	LANDFILL	2 oz GLASS	2	S				Y							X	
*		1420	003	Ralston Creek	2 oz Glass	1	W				Y						X		
03		1500	004	Hole #6	40 ml Amber	2	W				Y					X			
04		1505	005	Hole #6	1 Liter	1	W				Y				X				X

Ron 12-26-91

E 12-26-91

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
Ron C. Holm	12-27-91	0919	Debi Burdick	12/27/91	9:15 am

REMARKS

SHIPMENT METHOD personal delivery by Ron.

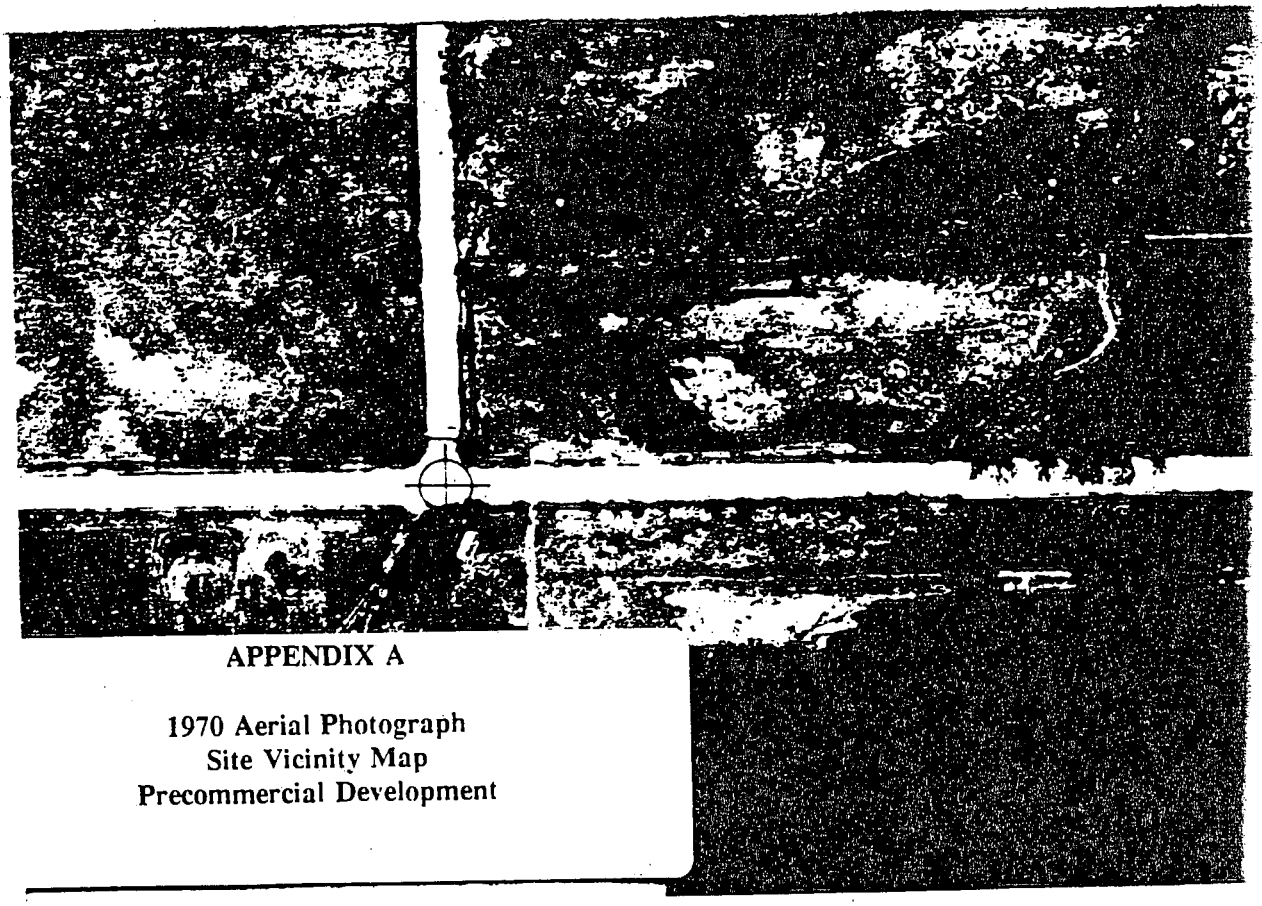
LABORATORY USE ONLY	Y	N
PCKG RECD/CUSTODY SEALS INTACT	✓	
SAMPLE LABELS/COCs AGREE	✓	
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

* HOLD SAMPLE - DO NOT RUN. NOT ENOUGH SAMPLE. RON WILL GET BACK TO US 12/27/91 & ?

R-96%
01-14-1992 17:47 303 490 1522 ATI FT COLLINS P.21
303 490 1522 01-14-92 05:46PM P021 #06

APPENDIX A

1970 AERIAL PHOTOGRAPH - SITE VICINITY MAP, PRECOMMERCIAL DEVELOPMENT



APPENDIX A

1970 Aerial Photograph
Site Vicinity Map
Precommercial Development

DEPARTMENT OF PLANNING

COUNTY OF JEFFERSON
STATE OF COLORADO

1829 01

APPR. SCALE 1"=200'
DATE 6-70

APPENDIX B

1986 AERIAL PHOTOGRAPH

1) Survey Traverse Grid for Magnetic Survey and Radiological Survey
2) Drive tube well locations
3) ▸ = water sample taken from Ralston Creek
4) Site specific landfill boundary-highlighted in yellow

APPENDIX B

1986 Aerial Photograph

1) Survey Traverse Grid For Magnetic Survey & Radiological Survey
2) Drive tube well locations
3) ▸ = water sample taken from Ralston Creek
4) Site specific landfill boundary

PHOTO MAP

S. T. R.

.ORADO

NORTH

SCALE IN FEET

0 100 200 300 400

DATE

C Repro Inc.
ENGINEERING REPRODUCTIONS
462 - F Laredo
Aurora Colorado
80011
(303) 360-9001

APPENDIX C

LEGAL DESCRIPTION AND ACCOMPANYING MAP

Recorded at ..... o'clock ..... M., ...
Reception No. .....

RECORDED IN
COUNTY OF JEFFERSON
STATE OF COLORADO
RECEPTION NO. 88040360
04/28/88 10:20 9.00

THIS DEED, Made this 18th day of March
19 88 , between

COTTONWOOD WEST INDUSTRIAL PARK INC.
a Colorado Corporation
of the City and County of DENVER and State of Colorado, of the first part, and

COTTONWOOD WEST LTD. ****
a Colorado limited partnership of the
County of DENVER and State of Colorado, of the second part;

WITNESSETH, That the said party of the first part, for and in consideration of the sum of TEN DOLLARS AND OTHER GOOD AND VALUABLE CONSIDERATION
Dollars,
to the said party of the first part, in hand paid by the said party of the second part, the receipt whereof is hereby confessed and acknowledged, has granted, bargained, sold and conveyed, and by these presents does grant, bargain, sell, convey and confirm unto the said party of the second part, its heirs and assigns forever, all the following described lot or parcel of land, situate, lying and being in the County of JEFFERSON and State of Colorado, to wit:

SEE EXHIBIT A ATTACHED HERETO FOR LEGAL DESCRIPTION
SEE EXHIBIT B ATTACHED HERETO FOR ADDITIONAL PROVISIONS

**** c/o Gibraltar Companies
Denver Corporate Center Tower III
7900 E. Union Avenue Suite 850
Denver, Co. 80237

also known as street and number vacant land

Together with all and singular the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues and profits thereof; and all the estate, right, title, interest, claim and demand whatsoever, of the said part of the first part, either in law or equity, of, in and to the above bargained premises, with the hereditaments and appurtenances; TO HAVE AND TO HOLD the said premises above bargained and described, with the appurtenances, unto the said party of the second part, its heirs and assigns forever.

And the said party of the first part, for itself its heirs, executors and administrators, does covenant, grant, bargain and agree to and with the said party of the second part, its heirs and assigns, the above bargained premises in the quiet and peaceable possession of said party of the second part, its heirs and assigns, against all and every person or persons lawfully claiming or to claim the whole or any part thereof, by, through or under the said party of the first part to WARRANT AND FOREVER DEFEND.

IN WITNESS WHEREOF, The said party of the first part has hereunto set its hand and seal the day and year first above written.

Signed, Sealed and Delivered in the presence of

..... [SEAL]
COTTONWOOD WEST INDUSTRIAL PARK INC. [SEAL]
..... [SEAL]
James Moilanen, Pres.

STATE OF COLORADO, }
County of } ss.

The foregoing instrument was acknowledged before me this day of March
1988 by James Moilanen, President of Cottonwood West Industrial Park, Inc., a Colorado corporation

My commission expires 8/11/89 . 19 . Witness my hand and official seal.

Notary Public
1410 Grant Denver 80203

STATE DOCUMENTARY FEE APR 28 1988

-4-88011167-1

SPECIAL WARRANTY DEED. —Bradford Publishing Co., 1921-46 Street, Denver, Colorado (573-5011) 5-76

EXHIBIT A
TO SPECIAL WARRANTY DEED
DATED MARCH 18, 1988

2
2

Lot 7
Cottonwood Park in Ralston Valley

and

A portion of the East 1/2 of Section 1, Township 3 South, Range 70 West of the 6th P.M., more particularly described as follows: Beginning at the Northeast corner of the Northwest 1/4 of the Southeast 1/4 of said Section 1; thence South 00 degrees 03 minutes 01 seconds East along the Easterly line of said Northwest 1/4 of the Southeast 1/4, 463.77 feet to the Northerly right-of-way line of the Croke Canal; thence Northwesterly along said Northerly right-of-way line the following 8 courses: (1) thence North 82 degrees 50 minutes 54 seconds West, 150.11 feet to a point of curve; (2) thence along a curve to the right having a radius of 963.78 feet, a central angle of 11 degrees 23 minutes 39 seconds, 191.66 feet to a point of tangent; (3) thence North 71 degrees 27 minutes 15 seconds West along said tangent, 276.15 feet to a point of curve; (4) thence along a curve to the right having a radius of 208.06 feet, a central angle of 37 degrees 31 minutes 18 seconds, 136.26 feet to a point of tangent; (5) thence North 33 degrees 55 minutes 57 seconds West along said tangent, 557.70 feet to a point of curve; (6) thence along a curve to the right having a radius of 388.56 feet, a central angle of 39 degrees 23 minutes 06 seconds, 267.10 feet to a point of tangent; (7) thence North 05 degrees 27 minutes 09 seconds East along said tangent, 755.43 feet to a point of curve; (8) thence along a curve to the right having a radius of 565.00 feet, a central angle of 09 degrees 47 minutes 25 seconds, 96.54 feet to the Northerly line of the Southwest 1/4 of the Northeast 1/4 of said Section 1; thence South 89 degrees 27 minutes 29 seconds East along said Northerly line, 991.49 feet to the Northeast corner of said Southwest 1/4 of the Northeast 1/4; thence South 00 degrees 03 minutes 48 seconds West along the Easterly line of said Southwest 1/4 of the Northeast 1/4, 1320.46 feet to the point of beginning.

Also known as All of Blocks 1, 2, 3, and 4
Cottonwood West Industrial Park Filing No. 1,
All situate in the County of Jefferson,
State of Colorado

RECEPTION NO. 88040360

3

3

EXHIBIT B
TO SPECIAL WARRANTY DEED
DATED MARCH 18, 1988

By accepting this conveyance, second party hereby assumes and agrees to pay that certain obligation evidenced by that certain Promissory Note dated January 10, 1985 in the principal amount of $2,425,000.00 payable to Otero Savings and Loan Association, secured by that certain Deed of Trust recorded January 11, 1985 under Reception No. 85003626, Jefferson County, Colorado public records, as said Note and Deed of Trust have been subsequently modified. Second party's assumption and agreement to pay the foregoing obligation includes its assumption and ratification of the acts of certain third parties as evidenced by instruments recorded at Reception Numbers 85003627, 86006149, 86088951 and 86088952, even if those parties had no authority to complete or perform those acts.

RECEPTION NO. 88040360

DEDICATION

:OW ALL MEN BY THESE PRESENTS: THAT THE UNDERSIGNED, BEING THE OWNERS OF A PARCEL OF LAND IN ,HE EAST 1/2 OF SECTION 1, TOWNSHIP 3 SOUTH, RANGE 70 WEST OF THE 6TH P.M., CITY OF ARVAOA, COUNTY OF JEFFERSON, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 1; THENCE SOUTH 00°02'54" EAST, ALONG THE EAST LINE OF THE NORTHEAST 1/4 OF SAID SECTION 1, A DISTANCE OF 1323.58 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1; THENCE NORTH 89°39'54" WEST, ALONG THE NORTH LINE OF SAID SOUTHEAST 1/4 OF THE NORTHEAST 1/4 A DISTANCE OF 1322.17 FEET TO THE NORTHEAST CORNER OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1, THE TRUE POINT OF BEGINNING; THENCE SOUTH 00°11'39" EAST, ALONG THE EAST LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, AND ALONG THE WEST LINE OF LOT 1, RESUBDIVISION OF LOTS 5 AND 6, COTTONWOOD PARK IN RALSTON VALLEY, A SUBDIVISION RECORDED IN THE OFFICE OF THE JEFFERSON COUNTY CLERK AND RECORDER UNDER RECEPTION NUMBER 79058658, A DISTANCE OF 313.56 FEET; THENCE NORTH 89°47'39" EAST, ALONG THE SOUTH LINE OF SAID LOT 1, A DISTANCE OF 250.22 FEET TO A POINT ON THE WEST RIGHT-OF-WAY LINE OF JOYCE STREET; THENCE ALONG THE WEST RIGHT-OF-WAY LINE OF JOYCE STREET THE FOLLOWING THREE (3) COURSES:

(1) SOUTH 29°55'40" WEST, A DISTANCE OF 68.23 FEET TO A POINT OF CURVE;
(2) ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 125.13 FEET AND A CENTRAL ANGLE OF 29°26'36" A DISTANCE OF 64.30 FEET, THE LONG CHORD OF WHICH BEARS SOUTH 15°12'22" WEST, A DISTANCE OF 63.60, TO A POINT OF TANGENCY;
(3) SOUTH 00°29'04" WEST, A DISTANCE OF 201.41 FEET;

THENCE ALONG THE NORTH LINE OF LOT 18, COTTONWOOD PARK IN RALSTON VALLEY, A SUBDIVISION RECORDED IN THE OFFICE OF THE JEFFERSON COUNTY CLERK AND RECORDER IN BOOK 55 AT PAGE 11 THE FOLLOWING TWO (2) COURSES:

(1) SOUTH 71°50'32" WEST, A DISTANCE OF 150.35 FEET;
(2) NORTH 68°52'48" WEST, A DISTANCE OF 57.62 FEET TO A POINT ON THE EAST LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1;

...ENCE SOUTH 00°11'39" EAST, ALONG THE EAST LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, AND ALONG THE WEST LINE OF SAID LOT 18, A DISTANCE OF 104.00 FEET; THENCE SOUTH 53°57'00" WEST, A DISTANCE OF 542.86 FEET; THENCE NORTH 80°49'37" WEST A DISTANCE OF 464.19 FEET; THENCE SOUTH 84°04'28" WEST, A DISTANCE OF 154.44 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF THE CROAK CANAL; THENCE ALONG THE EASTERLY RIGHT-OF-WAY LINE OF SAID CROAK CANAL THE FOLLOWING THREE (3) COURSES:

(1) ALONG THE ARC OF A NON-TANGENT CURVE TO THE RIGHT WITH A RADIUS OF 388.56 FEET AND A CENTRAL ANGLE OF 27°49'12" A DISTANCE OF 188.67 FEET, THE LONG CHORD OF WHICH BEARS NORTH 08°39'33" WEST, A DISTANCE OF 186.82 FEET TO A POINT OF TANGENCY;
(2) NORTH 05°15'03" EAST, A DISTANCE OF 755.43 FEET TO A POINT OF CURVE;
(3) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 565.00 FEET AND A CENTRAL ANGLE OF 09°47'20" A DISTANCE OF 96.53 FEET, THE LONG CHORD OF WHICH BEARS NORTH 10°08'43" EAST, A DISTANCE OF 96.41 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION;

THENCE SOUTH 89°39'54" EAST, ALONG THE NORTH LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, A DISTANCE OF 990.20 FEET TO THE TRUE POINT OF BEGINNING. CONTAINING 25.486 ACRES.

HAVE LAID OUT, PLATTED, AND SUBDIVIDED THE ABOVE DESCRIBED LAND, UNDER THE NAME AND STYLE OF COTTONWOOD WEST INDUSTRIAL PARK FILING NO. 1, AND BY THESE PRESENTS DO DEDICATE TO THE CITY OF ARVADA IN FEE SIMPLE THE STREETS AND PUBLIC WAYS AS SHOWN ON THE PLATS, AND GRANTS TO THE PUBLIC UTILITIES, AND THE CITY OF ARVADA, THE RIGHT TO INSTALL, MAINTAIN, AND OPERATE MAINS, TRANSMISSION LINES, SERVICE LINES, AND APPURTENANCES, AS MAY BE NECESSARY TO PROVIDE SUCH UTILITY, CABLE TELEVISION, AND SANITARY SERVICES WITHIN THIS SUBDIVISION OR PROPERTY CONTIGU-OUS THERETO, THROUGH, OVER, UNDER, AND ACROSS STREETS, UTILITY AND OTHER EASEMENTS, AND ER PUBLIC PLACES AS SHOWN ON THE PLAT.

COTTONWOOD WEST INDUSTRIAL PARK, INC., A COLORADO CORPORATION.

BY: Dennis M. Dow
PRESIDENT

ATTEST: D. Robert Clary
Assistant Secretary

SEAL

STATE OF COLORADO)
COUNTY OF) SS

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 21st DAY OF October, A.D., 19 85, BY THE ABOVE PARTIES.

WITNESS MY HAND AND SEAL.
MY COMMISSION EXPIRES 7-26-89

NAME Julia A. Mabey
ADDRESS 828 So. Oneida
Denver, CO 80224

HOLDER OF DEED OF TRUST

EARL N. MURRAY

RUTH M. MURRAY

LEGAL DESCRIPTION

A PORTION OF THE EAST HALF OF SECTION 1, TOWNSHIP 3 SOUTH, RANGE 70 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF JEFFERSON, STATE OF COLORADO, WHICH CONSIDERING THE EAST LINE OF THE SOUTHEAST 1/4 OF SAID SECTION 1 AS BEARING NORTH 00°02'49" WEST AND WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO IS MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF THE NORTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SAID SECTION 1; THENCE NORTH 89°32'02" WEST, ALONG THE NORTH LINE OF SAID NORTHEAST 1/4 OF THE SOUTHEAST 1/4, A DISTANCE OF 1318.84 FEET TO THE NORTHEAST CORNER OF THE NORTHWEST 1/4 OF THE SOUTHEAST 1/4 OF SAID SECTION 1, THE TRUE POINT OF BEGINNING; THENCE SOUTH 00°15'07" EAST, ALONG THE EAST LINE OF SAID NORTHWEST 1/4 OF THE SOUTHEAST 1/4, A DISTANCE OF 463.77 FEET TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF THE CROKE CANAL; THENCE NORTHWESTERLY ALONG SAID NORTHERLY RIGHT-OF-WAY LINE THE FOLLOWING EIGHT (8) COURSES:

(1) NORTH 83°03'00" WEST, A DISTANCE OF 150.11 FEET TO A POINT OF CURVE;

(2) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 963.78 FEET AND A CENTRAL ANGLE OF 11°23'39", A DISTANCE OF 191.66 FEET, THE LONG CHORD OF WHICH BEARS NORTH 77°21'10" WEST, A DISTANCE OF 191.35 FEET TO A POINT OF TANGENT;

(3) NORTH 71°39'21" WEST, A DISTANCE OF 276.15 FEET TO A POINT OF CURVE;

(4) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 208.06 FEET AND A CENTRAL ANGLE OF 37°31'18" A DISTANCE OF 136.26 FEET, THE LONG CHORD OF WHICH BEARS NORTH 52°53'42" WEST, A DISTANCE OF 133.83 FEET TO A POINT OF TANGENT;

(5) NORTH 34°08'03" WEST, A DISTANCE OF 557.70 FEET TO A POINT OF CURVE;

(6) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 388.56 FEET AND A CENTRAL ANGLE OF 39°23'06" A DISTANCE OF 267.10 FEET, THE LONG CHORD OF WHICH BEARS NORTH 14°26'30" WEST, A DISTANCE OF 261.87 FEET TO A POINT OF TANGENT;

(7) NORTH 05°15'03" EAST, A DISTANCE OF 755.43 FEET TO A POINT OF CURVE;

(8) ALONG THE ARC OF A CURVE TO THE RIGHT WITH A RADIUS OF 565.00 FEET AND A CENTRAL ANGLE OF 09°47'20" A DISTANCE OF 96.53, THE LONG CHORD OF WHICH BEARS NORTH 10°08'43" EAST, A DISTANCE OF 96.41 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1;

THENCE SOUTH 89°39'54" EAST ALONG SAID NORTH LINE, A DISTANCE OF 990.20 FEET TO THE NORTHEAST CORNER OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1; THENCE SOUTH 00°11'39" EAST, ALONG THE EAST LINE OF SAID SOUTHWEST 1/4 OF THE NORTHEAST 1/4, A DISTANCE OF 313.56 FEET TO THE NORTHWEST CORNER OF LOT 7, COTTONWOOD PARK IN RALSTON VALLEY, RECORDED IN BOOK 55 AT PAGE 10 IN THE RECORDS OF JEFFERSON COUNTY; THENCE NORTH 89°47'39" EAST, ALONG THE NORTH LINE OF SAID LOT 7, A DISTANCE OF 250.22 FEET TO THE NORTHEAST CORNER OF SAID LOT 7; THENCE SOUTHERLY ALONG THE WESTERLY RIGHT-OF-WAY LINE OF JOYCE STREET THE FOLLOWING THREE (3) COURSES:

(1) SOUTH 29°55'41" WEST, A DISTANCE OF 68.23 FEET TO A POINT OF CURVE;

(2) ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 125.00 FEET AND A CENTRAL ANGLE OF 29°26'36" A DISTANCE OF 64.30 FEET, THE LONG CHORD OF WHICH BEARS SOUTH 15°12'49" WEST, A DISTANCE OF 63.60 FEET TO A POINT OF TANGENT;

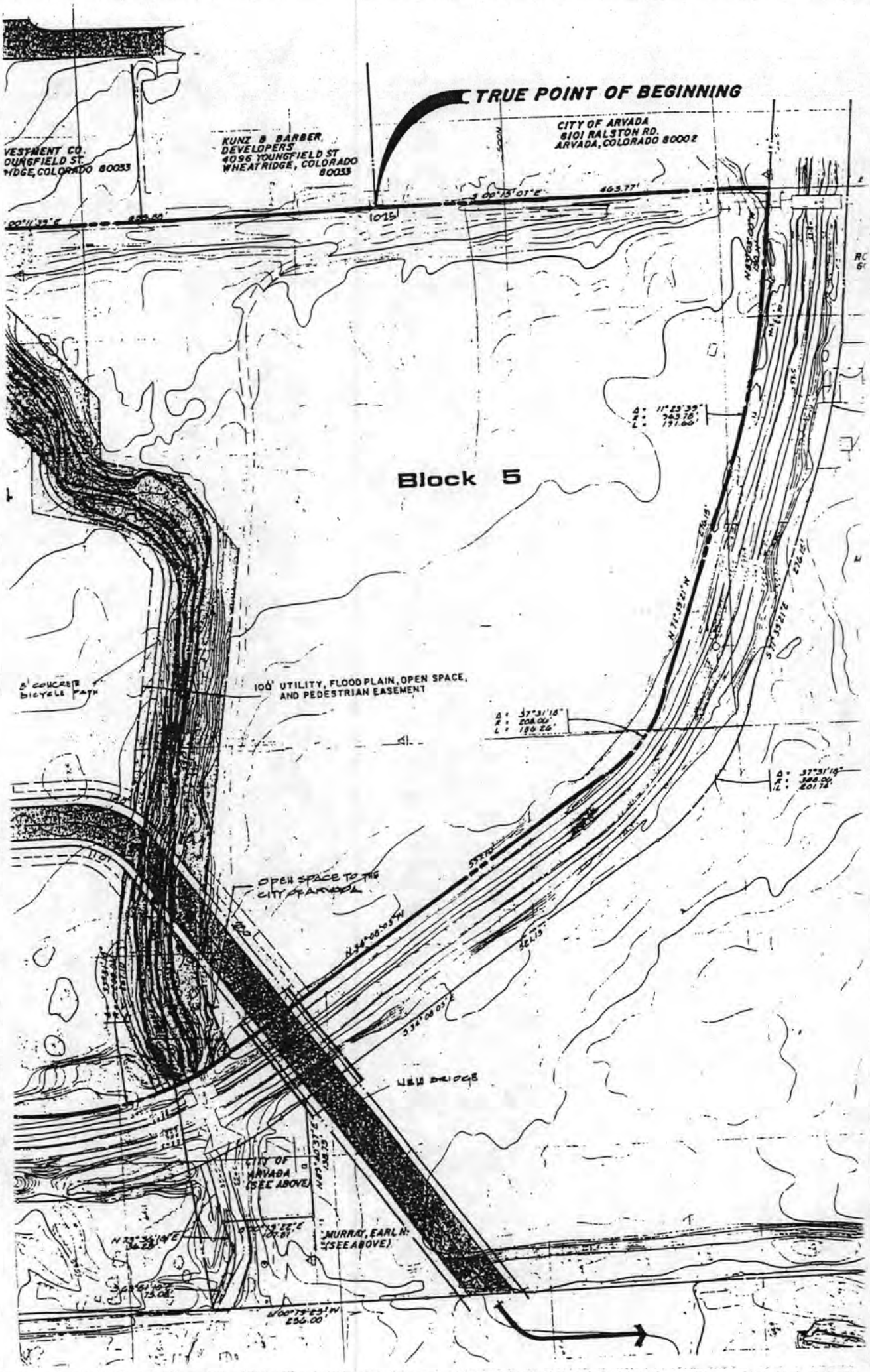
(3) SOUTH 00°29'04" WEST A DISTANCE OF 201.41 FEET; THENCE ALONG THE SOUTHERLY LINE OF SAID LOT 7 THE FOLLOWING TWO (2) COURSES:

(1) SOUTH 71°50'32" WEST, A DISTANCE OF 150.35 FEET;

(2) NORTH 60°52'48" WEST, A DISTANCE OF 57.62 FEET TO A POINT ON THE EAST LINE OF THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SAID SECTION 1;

THENCE SOUTH 00°11'39" EAST ALONG SAID EAST LINE, A DISTANCE OF 659.88 FEET TO THE TRUE POINT OF BEGINNING. CONTAINING 39.497 ACRES.

JOYCE STREET
DIXON, KENNETH P.
1862 S. SAND LILY DRIVE
GOLDEN, COLORADO 80401
S00°11'33"E
313.50'
W. 68TH PLACE
10' BUILDING & UTILITY EASEMENT
10' UTILITY EASEMENT
20' BUILDING LINE
100' FLOOD PLAIN
W. 68TH CIRCLE
Block 1
Block
PARCEL NO.1
39.497 ACRES
Block 3
CLARK, J. WICKHAM & DORIS L.
& CLARK, J WICKHAM II
7041 & 7031 INDIANA ST.
GOLDEN, COLORADO 80403
N89°55'34"W
1321.94'
10' UTILITY EASEMENT
20' BUILDING LINE
KEMPER STREET
826'
20' BUILDING LINE
10' UTILITY EASEMENT
Block 2
N05°15'03"E
795.25'
CHORE CANAL
THE FARMERS RESERVOIR IRRIGATION CO.
725 MALLEY DRIVE
NORTHGLENN, CO
NOT A PART
FORBES, DONALD R.
15000 W. 72nd AVE.
GOLDEN, COLORADO
80403


TRUE POINT OF BEGINNING
CITY OF ARVADA
6101 RALSTON RD.
ARVADA, COLORADO 80002
KUNZ & BARBER
DEVELOPERS
4096 YOUNGFIELD ST
WHEATRIDGE, COLORADO
80033
VESTMENT CO.
OUNGFIELD ST.
IDGE, COLORADO 80033
S 00°13'01"E 463.77'
S 89°11'32"E 492.60'
1025'
Block 5
Δ: 11°23'39"
R: 943.78'
L: 191.00'
Δ: 37°31'16"
R: 208.00'
L: 136.26'
Δ: 37°31'16"
R: 308.00'
L: 201.74'
8' CONCRETE BICYCLE PATH
100' UTILITY, FLOOD PLAIN, OPEN SPACE, AND PEDESTRIAN EASEMENT
OPEN SPACE TO THE CITY OF ARVADA
N 34°00'03"W
S 34°00'03"E
NEW BRIDGE
CITY OF ARVADA (SEE ABOVE)
MURRAY, EARL H. (SEE ABOVE)
N 00°13'01"W
256.00'

APPENDIX D

JEFFERSON COUNTY QUARTER SECTION MAPS

1) 1986 Aerial Photograph - Site vicinity map with street and waterway labels.

2) Jefferson County Quarter Section 30-01 map

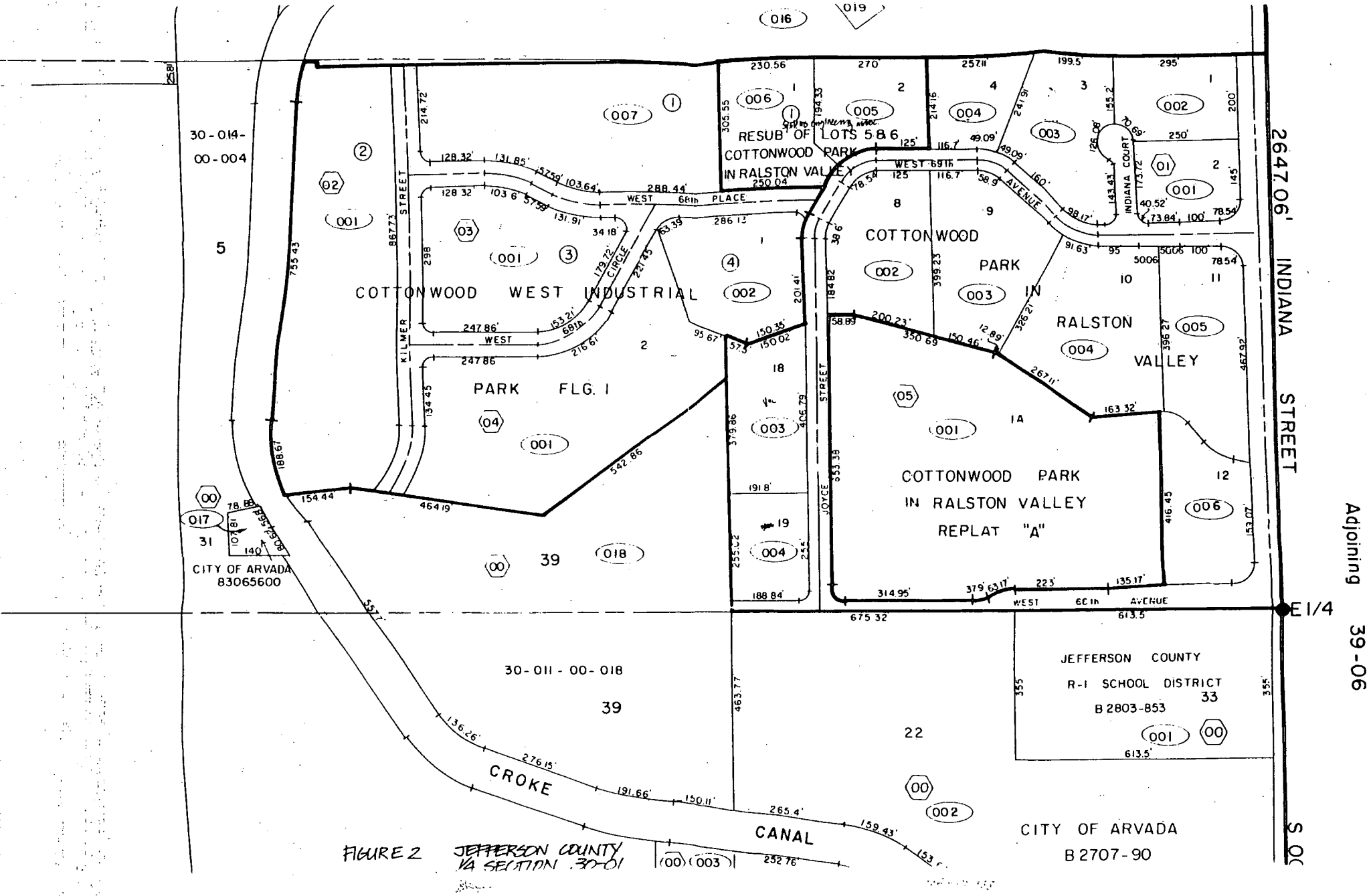


FIGURE 2 JEFFERSON COUNTY VA SECTION 30-01

FIGURE 1 1986 AERIAL PHOTOGRAPH SITE VICINITY MAP

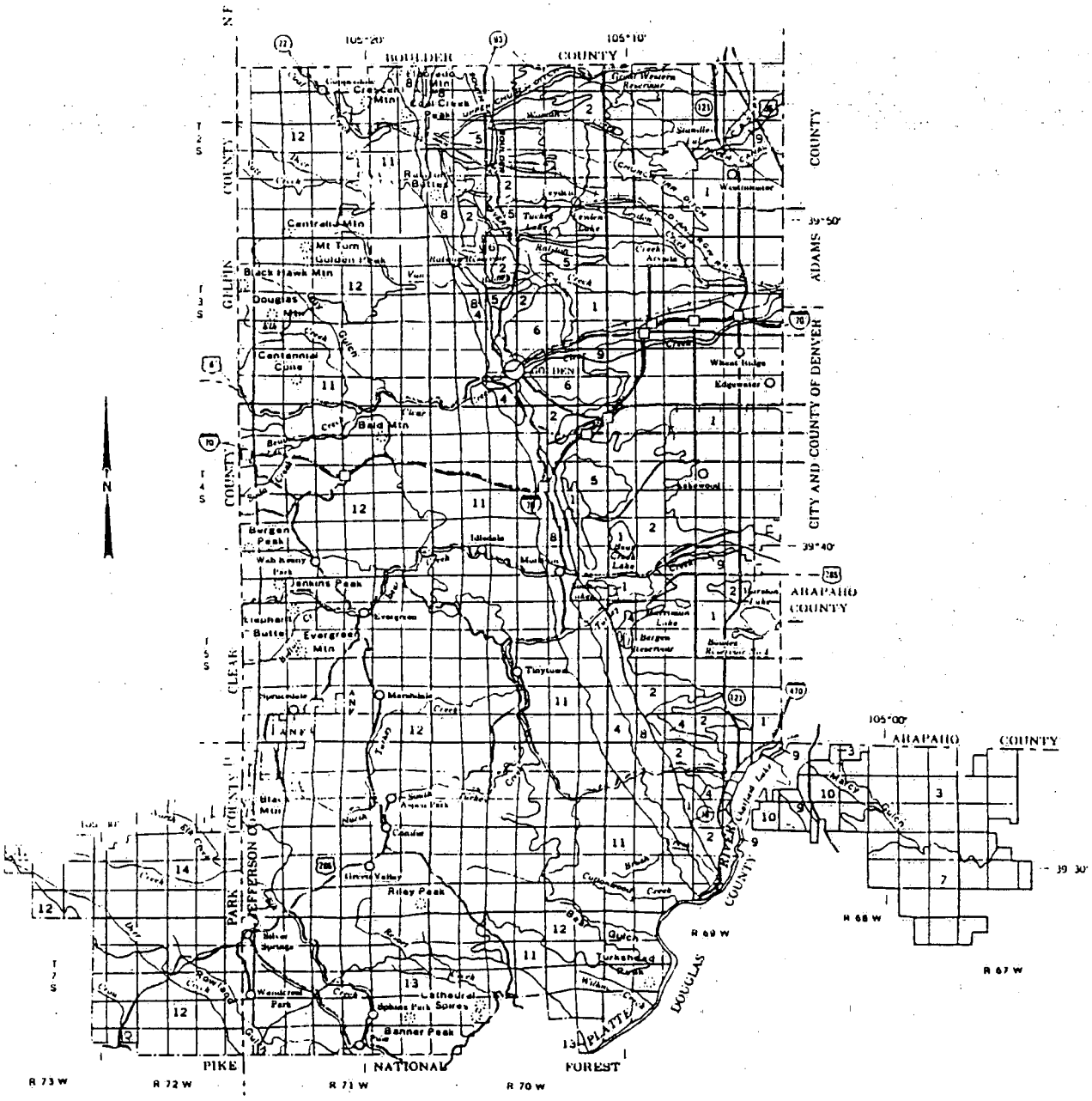
APPENDIX E

U.S.D.A. SOIL CONSERVATION SERVICE MAPS

1) Soil Survey Map and Legend
2) General Soil Map

SOIL LEGEND

SYMBOL	NAME
1	Alda loam, 0 to 2 percent slopes
2	Alda-Niwot complex, 0 to 2 percent slopes
3	Allens Park Variant-Ratake-Rock outcrop complex, 30 to 50 percent slopes
4	Argiustolls, loamy, 15 to 30 percent slopes
5	Argiustolls-Rock outcrop complex, 15 to 60 percent slopes
6	Arvada clay loam, 0 to 2 percent slopes
7	Ascalon sandy loam, 5 to 9 percent slopes
8	Ascalon sandy loam, 9 to 15 percent slopes
9	Baller-Rock outcrop complex, 15 to 50 percent slopes
10	Baller Variant-Lavina-Rock outcrop complex, 5 to 15 percent slopes
11	Baller Variant-Lavina-Rock outcrop complex, 15 to 30 percent slopes
12	Blakeland loamy sand, 0 to 9 percent slopes
13	Blakeland loamy sand, 9 to 15 percent slopes
14	Breece sandy loam, 9 to 25 percent slopes
15	Bresser sandy loam, 0 to 5 percent slopes
16	Bresser gravelly sandy loam, 9 to 25 percent slopes
17	Critchell gravelly sandy loam, 0 to 3 percent slopes
18	Critchell gravelly sandy loam, 3 to 9 percent slopes
19	Critchell gravelly sandy loam, 9 to 15 percent slopes
20	Critchell stony sandy loam, 0 to 5 percent slopes
21	Cryofluvents, 0 to 5 percent slopes
22	Cumulic Cryoborolls, loamy, 0 to 5 percent slopes
23	Curecanti very stony sandy loam, 15 to 50 percent slopes
24	Dacono Variant gravelly clay loam, 0 to 3 percent slopes
25	Denver clay loam, 0 to 2 percent slopes
26	Denver clay loam, 2 to 5 percent slopes
27	Denver clay loam, 5 to 9 percent slopes
28	Denver cobbly clay loam, 5 to 9 percent slopes
29	Denver-Kutch clay loams, 5 to 9 percent slopes
30	Denver-Kutch clay loams, 9 to 15 percent slopes
31	Denver-Kutch-Midway clay loams, 9 to 25 percent slopes
32	Denver-Kutch-Urban land complex, 5 to 9 percent slopes
33	Denver-Kutch-Urban land complex, 9 to 15 percent slopes
34	Denver-Urban land complex, 0 to 2 percent slopes
35	Denver-Urban land complex, 2 to 5 percent slopes
36	Denver-Urban land complex, 5 to 9 percent slopes
37	Earcree gravelly sandy loam, 9 to 15 percent slopes
38	Earcree Variant very gravelly sandy loam, 3 to 9 percent slopes
39	Earcree Variant very gravelly sandy loam, 9 to 15 percent slopes
40	Earcree Variant-Venable complex, 0 to 15 percent slopes
41	Englewood clay loam, 0 to 2 percent slopes
42	Englewood clay loam, 2 to 5 percent slopes
43	Englewood clay loam, wet, 0 to 3 percent slopes
44	Englewood-Urban land complex, 0 to 2 percent slopes
45	Flatirons very cobbly sandy loam, 0 to 3 percent slopes
46	Flatirons very stony sandy loam, 0 to 5 percent slopes
47	Flatirons very stony sandy loam, 5 to 9 percent slopes
48	Flatirons very stony sandy loam, 9 to 15 percent slopes
49	Flatirons very stony sandy loam, 15 to 30 percent slopes
50	Fluvaquents, sandy, 0 to 2 percent slopes
51	Fondis loam, 0 to 3 percent slopes
52	Garber Variant very gravelly sandy loam, 5 to 9 percent slopes
53	Garber Variant very gravelly sandy loam, 9 to 15 percent slopes
54	Grimstone stony sandy loam, 9 to 15 percent slopes
55	Grimstone-Hiwan-Rock outcrop complex, 30 to 60 percent slopes
56	Grimstone-Peeler-Rock outcrop complex, 15 to 30 percent slopes
57	Grimstone-Peeler-Rock outcrop complex, 30 to 50 percent slopes
58	Hargreave sandy loam, 3 to 9 percent slopes
59	Hargreave-Bernal sandy loams, 9 to 15 percent slopes
60	Haverson loam, 0 to 3 percent slopes
61	Haverson loam, 3 to 9 percent slopes
62	Heldt clay, 3 to 9 percent slopes
63	Heldt clay, 9 to 15 percent slopes
64	Herdman-Sorucedale-Rock outcrop complex, 9 to 15 percent slopes
65	Herdman-Sorucedale-Rock outcrop complex, 15 to 30 percent slopes
66	Kittredge-Earcree complex, 3 to 9 percent slopes
67	Kittredge-Earcree complex, 9 to 20 percent slopes
68	Kittredge-Venable complex, 0 to 15 percent slopes
69	Laporte Variant complex, 15 to 60 percent slopes
70	Lavate sandy loam, 3 to 9 percent slopes
71	Lavate sandy loam, 9 to 15 percent slopes
72	Lavate-Bernal-Rock outcrop complex, 15 to 30 percent slopes
73	Lavina loam, very rocky, 0 to 5 percent slopes
74	Lebsack clay loam, saline, 0 to 2 percent slopes
75	Legault-Hiwan stony loamy sands, 5 to 15 percent slopes
76	Legault-Hiwan stony loamy sands, 15 to 30 percent slopes
77	Legault-Hiwan-Rock outcrop complex, 30 to 50 percent slopes
78	Legault-Tolvar-Rock outcrop complex, 50 to 70 percent slopes
79	Leyden-Nunn-Rooney complex, 9 to 30 percent slopes
80	Leyden-Primen-Standley cobbly clay loams, 15 to 50 percent slopes
81	Leyden-Primen-Standley extremely stony clay loams, 30 to 70 percent slopes
82	Leyden-Standley-Primen cobbly clay loams, 9 to 15 percent slopes
83	Leyden-Standley-Primen very cobbly clay loams, 30 to 60 percent slopes
84	Lininger-Ratake complex, 5 to 15 percent slopes
85	Lininger-Ratake complex, 15 to 30 percent slopes
86	Lininger-Trag sandy loams, 3 to 9 percent slopes
87	Lininger-Trag sandy loams, 9 to 20 percent slopes
88	Loveland clay loam, 0 to 1 percent slopes
89	Loveland Variant gravelly sandy loam, 0 to 2 percent slopes
90	Manzano fine sandy loam, 0 to 2 percent slopes
91	Manzanola clay loam, 0 to 5 percent slopes
92	Manzanola clay loam, 5 to 9 percent slopes
93	Manzanola clay loam, 9 to 15 percent slopes
94	Manzanola clay loam, 15 to 25 percent percent slopes
95	Manzanola cobbly clay loam, 15 to 25 percent slopes
96	Manzanola-Renohill-Stoneham complex, 9 to 15 percent slopes
97	McClave clay loam, 0 to 3 percent slopes
98	Midway clay loam, 9 to 30 percent slopes
99	Midway stony clay loam, 15 to 40 percent slopes
100	Nederland very cobbly sandy loam, 15 to 50 percent slopes
101	Nederland Variant very cobbly sandy loam, 30 to 50 percent slopes
102	Nunn clay loam, 0 to 2 percent slopes
103	Nunn clay loam, 2 to 5 percent slopes
104	Nunn clay loam, 5 to 9 percent slopes
105	Nunn-Urban land complex, 0 to 2 percent slopes
106	Nunn-Urban land complex, 2 to 5 percent slopes
107	Nunn-Urban land complex, 5 to 9 percent slopes
108	Nunn Variant-Urban land complex, 0 to 3 percent slopes
109	Paymaster sandy loam, 0 to 3 percent slopes
110	Pits, clevey
111	Pits, gravel
112	Platner loam, 3 to 5 percent slopes
113	Platner-Urban land complex, 0 to 3 percent slopes
114	Raleigh very gravelly sandy loam, 9 to 15 percent slopes
115	Raleigh very gravelly sandy loam, 15 to 30 percent slopes
116	Raleigh very gravelly sandy loam, 30 to 50 percent slopes
117	Raleigh very gravelly sandy loam, 2 to 9 percent south slopes
118	Raleigh very gravelly sandy loam, 9 to 15 percent south slopes
119	Raleigh very gravelly sandy loam, 15 to 30 percent south slopes
120	Raleigh stony sandy loam, 30 to 50 percent south slopes
121	Raleigh-Rock outcrop complex, 50 to 70 percent slopes
122	Ratake-Cathedral very stony sandy loams, 25 to 60 percent slopes
123	Ratake-Cathedral-Rock outcrop complex, 25 to 60 percent slopes
124	Ratake-Cathedral-Rock outcrop complex, 25 to 60 percent north slopes
125	Ratake-Lininger stony sandy loams, 30 to 60 percent slopes
126	Razor-Heldt clay loams, 9 to 25 percent slopes
127	Razor-Heldt-Midway cobbly clay loams, 15 to 30 percent slopes
128	Rednun clay loam, 0 to 3 percent slopes
129	Rednun clay loam, 3 to 9 percent slopes
130	Rednun clay loam, 9 to 15 percent slopes
131	Rednun-Chaney Variant clay loams, 9 to 15 percent slopes
132	Renohill loam, 5 to 9 percent slopes
133	Renohill-Manzanola clay loams, 9 to 15 percent slopes
134	Renohill-Midway complex, 9 to 15 percent slopes
135	Resort-Sohinx very gravelly sandy loams, 9 to 15 percent slopes
136	Resort-Sohinx very gravelly sandy loams, 15 to 30 percent slopes
137	Resort-Sohinx very gravelly sandy loams, 30 to 50 percent slopes
138	Rock outcrop, igneous and metamorphic
139	Rock outcrop, sedimentary
140	Rock outcrop-Cathedral-Ratake complex, 50 to 100 percent slopes
141	Rogert-Heroman-Rock outcrop complex, 30 to 70 percent slopes
142	Rooney very cobbly sandy loam, 15 to 50 percent slopes
143	Rooney-Primen-Leyden complex, 15 to 50 percent slopes
144	Rooney-Rock outcrop complex, 50 to 70 percent slopes
145	Rosane sandy loam, 0 to 3 percent slopes
146	Rosane-Venable fine sandy loams, 0 to 3 percent slopes
147	Sohinx-Resort-Rock outcrop complex, 50 to 70 percent slopes
148	Standley-Leyden-Primen very stony clay loams, 15 to 30 percent slopes
149	Standley-Nunn gravelly clay loams, 0 to 5 percent slopes
150	Tolvar very gravelly loamy sand, 15 to 30 percent slopes
151	Torrifluvents, very gravelly, 0 to 3 percent slopes
152	Trag sandy loam, 3 to 9 percent slopes
153	Trag sandy loam, 9 to 25 percent slopes
154	Troutdale gravelly sandy loam, 3 to 9 percent slopes
155	Troutdale-Kittredge sandy loams, 5 to 15 percent slopes
156	Troutdale-Rogert-Kittredge complex, 15 to 30 percent slopes
157	Troutdale-Sorucedale gravelly sandy loams, 3 to 15 percent slopes
158	Truckton sandy loam, 0 to 3 percent slopes
159	Truckton sandy loam, 3 to 9 percent slopes
160	Ulm clay loam, 5 to 9 percent slopes
161	Ulm-Urban land complex, 0 to 3 percent slopes
162	Ulm-Urban land complex, 3 to 5 percent slopes
163	Ulm-Urban land complex, 5 to 9 percent slopes
164	Ulm-Urban land complex, 9 to 18 percent slopes
165	Ustic Torriorthents, loamy, 15 to 50 percent slopes
166	Ustic Torriorthents, clayey, 0 to 50 percent slopes
167	Ustorthents, cool-Rock outcrop complex, 15 to 50 percent slopes
168	Valmont clay loam, 0 to 3 percent slopes
169	Veldkamp-Nederland very cobbly sandy loams, 0 to 3 percent slopes
170	Venable loam, 0 to 3 percent slopes
171	Venable loam, 3 to 9 percent slopes
172	Wann fine sandy loam, 0 to 2 percent slopes
173	Willowman cobbly sandy loam, 0 to 5 percent slopes
174	Willowman-Leyden cobbly loams, 9 to 30 percent slopes
175	Yoder Variant gravelly sandy loam, 9 to 30 percent slopes
176	Yoder Variant-Midway complex, 15 to 60 percent slopes



SOIL ASSOCIATIONS

1 — DOMINANTLY WELL DRAINED CLAYEY AND LOAMY SOILS ON HIGH TERRACES, HILL SLOPES AND FANS

Nunn Denver. Nearly level to gently sloping, deep, well drained, clayey soils that formed in material derived from shale and shale.

2 — Denver Kutch. Moderately sloping to steep, deep and moderately deep, well drained, clayey soils that formed in material derived from mudstone and shale.

3 — Platner Manvel. Gently sloping to strongly sloping, deep and moderately deep, well drained, clayey soils that formed in material derived from mudstone and shale.

4 — Crowfoot Lovells Redman. Nearly level to moderately steep, deep, well drained, loamy and clayey soils that formed in red shale material derived from sedimentary rocks.

DOMINANTLY WELL DRAINED CLAYEY AND GRAVELLY SOILS ON FANS, TERRACES, HILL SLOPES AND STABLE MOUNTAINS

5 — Tomah Venner. Nearly level to steep, deep, well drained, loamy and gravelly soils that formed in alluvial sediments.

MODERATELY WELL DRAINED STONY CLAYEY OR CLAYEY SOILS ON MOUNTAIN TOPS, STABLE MOUNTAINS AND HILL SLOPES

6 — Leyden Lovells. Nearly level to very steep, moderately deep to shallow, well drained, stony and rocky soils that formed in material derived from volcanic rock and shale.

7 — Nunn Bresser Loveland. Moderately sloping to very steep, deep, shallow and moderately deep, well drained, clayey and loamy soils that formed in material derived from sedimentary rocks.

EXCESSIVELY WELL DRAINED STONY AND LOAMY SOILS ON ESCARPMENTS AND HILL SLOPES

8 — Ascarsmith, Rock outcrop Bullet. Moderately sloping to very steep, shallow to deep, well drained, stony and loamy soils that formed in bedrock derived from sedimentary rocks.

9 — DOMINANTLY SOMEWHAT EXCESSIVELY DRAINED AND SOMEWHAT POORLY DRAINED LOAMY VERY GRAVELLY AND SANDY SOILS ON FLOOD PLAINS AND LOW TERRACES

Aska Torrifluvents, very gravelly. Nearly level, deep, somewhat excessively drained and moderately poorly drained, loamy, very gravelly and sandy soils that formed in alluvium.

10 — DOMINANTLY SOMEWHAT EXCESSIVELY DRAINED AND WELL DRAINED SANDY AND LOAMY SOILS ON HIGH TERRACES AND HILL SLOPES

Bushvalley Trockton. Nearly level to strongly sloping, deep, somewhat excessively drained and well drained, sandy and loamy soils that formed in alluvium sand and sandy loams.

DOMINANTLY WELL DRAINED STONY GRAVELLY LOAMY AND SANDY SOILS ON MOUNTAIN SIDE SLOPES AND STABLE SUMMITS AND ON DRAINAGE WAYS

11 — Nakaibito Lithosol. Moderately sloping to very steep, shallow to moderately deep, well drained, stony, gravelly and loamy soils that formed in material derived from igneous and metamorphic rocks.

12 — Herbman Rock. Moderately sloping to very steep, shallow, well drained, stony, gravelly, sandy and loamy soils that formed in material derived from igneous and metamorphic rocks.

13 — Rock Raleigh. Strongly sloping to very steep, shallow, somewhat excessively drained, gravelly, loamy soils that formed in grus of the Pikes Peak Granite.

14 — Raleigh Rock Ire Variant. Gently sloping to very steep, shallow to deep, somewhat excessively drained and well drained, gravelly, loamy soils that formed in grus of the Pikes Peak Granite.

*The textural groups on the descriptions according to that of the soil and on all the underlying material of the deepest soils in each mapping unit.

Each area mentioned on the map consists of more than one kind of soil. The order is often random. For general planning, refer to a detailed soil survey report for the kind of soil in the area.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

GENERAL SOIL MAP

GOLDEN AREA COLORADO
PARTS OF
DENVER, DOUGLAS, JEFFERSON AND PARK COUNTIES.

Scale 1:253,440

1 0 1 2 3 4 Miles

4 Miles = 1"

APPENDIX F

LABORATORY RESULTS
ATI (ANALYTICAL TECHNOLOGIES, INC.)

Analytical Technologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

Message

Dave,

Here are your results.

Steve F.

To Dave Runyon Company EREE

Fax No. 843-6215 Date 1-14-92

From Steven Fry Number of pages including this sheet 21

If you do not receive all the pages please call us back as soon as possible.

Analytical Technologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

January 14, 1992

Mr. Dave Runyon
ERCE
Stanford Place 3, Suite 415
4582 South Ulster Street Parkway
Denver, CO 80237

RE: ATI Workorder: 91-12-190
Client Project Name: Cottonwood ESA

Dear Mr. Runyon:

Two soil samples and two water samples were received from ERCE on December 27, 1991. The samples were scheduled for the following analyses: Volatile Organics, PCB's, and Total Lead. Results for these analyses are contained in the following report.

Please note that the Volatile Organic surrogate recoveries for sample "001" were outside the method required limits. This sample was re-analyzed and the surrogates once again did not meet the required recovery limits. This is probably due to the matrix of the sample, i.e., the sample resembled activated carbon.

Thank you for your confidence in Analytical Technologies, Inc. Should you have any questions, please call.

Sincerely yours,

Steven Fry, Ph.D.
Project Manager

SF/kci

Enclosures

Analytical Technologies, Inc.

QUALITY ASSURANCE
DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Alex Blanche, GC/GCMS Supervisor

CERTIFICATION

Analytical Technologies Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

Analytical Technologies, Inc.

QUALITY ASSURANCE
DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Tom Austin, Jr.
GC/HPLC/Fuels Supervisor

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID:
Reagent Blank

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Soil

Lab Sample ID: 91-12-190-RB
Date Collected: N/A
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration ug/kg	
Chloromethane	<	10
Bromomethane	<	10
Vinyl chloride	<	10
Chloroethane	<	10
Methylene chloride	<	5
Acetone	<	10
Carbon disulfide	<	5
1,1-Dichloroethene	<	5
1,1-Dichloroethane	<	5
1,2-Dichloroethene (Total)	<	5
Chloroform	<	5
1,2-Dichloroethane	<	5
2-Butanone	<	10
1,1,1-Trichloroethane	<	5
Carbon tetrachloride	<	5
Vinyl Acetate	<	10
Bromodichloromethane	<	5
1,2-Dichloropropane	<	5
cis-1,3-Dichloropropene	<	5
Trichloroethene	<	5
Dibromochloromethane	<	5
1,1,2-Trichloroethane	<	5
Benzene	<	5
trans-1,3-Dichloropropene	<	5
Bromoform	<	5
2-Hexanone	<	10
4-Methyl-2-pentanone	<	10
Tetrachloroethene	<	5
1,1,2,2-Tetrachloroethane	<	5
Toluene	<	5
Chlorobenzene	<	5
Ethylbenzene	<	5
Styrene	<	5
Total Xylenes	<	5

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	70-121
Toluene-d8	104	81-117
Bromofluorobenzene	102	74-121

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 001

Lab Name: Analytical Technologies Inc. Lab Sample ID: 91-12-190-01
Client Name: ERCE Date Collected: 12/26/91
Client Project ID: Cottonwood ESA Date Analyzed: 01/09/92
Sample Matrix: Soil Dilution Factor: 1

COMPOUND NAME	Concentration (ug/kg)		
Chloromethane	<	10	
Bromomethane	<	10	
Vinyl chloride	<	10	
Chloroethane	<	10	
Methylene chloride		120	
Acetone		68	
Carbon disulfide	<	5	
1,1-Dichloroethene		2	J
1,1-Dichloroethane	<	5	
1,2-Dichloroethene (Total)		4	J
Chloroform		3	J
1,2-Dichloroethane	<	5	
2-Butanone	<	10	
1,1,1-Trichloroethane		12	
Carbon tetrachloride	<	5	
Vinyl Acetate	<	10	
Bromodichloromethane	<	5	
1,2-Dichloropropane	<	5	
cis-1,3-Dichloropropene	<	5	
Trichloroethene		4	J
Dibromochloromethane	<	5	
1,1,2-Trichloroethane	<	5	
Benzene		4	J
trans-1,3-Dichloropropene	<	5	
Bromoform	<	5	
2-Hexanone	<	10	
4-Methyl-2-pentanone	<	10	
Tetrachloroethene		23	
1,1,2,2-Tetrachloroethane	<	5	
Toluene		24	
Chlorobenzene		4	J
Ethylbenzene		7	
Styrene	<	5	
Total Xylenes		43	

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	93	70-121
Toluene-d8	72 *	81-117
Bromofluorobenzene	122 *	74-121

* Outside control limits.

J = compound detected below practical quantitation limit.

VOLATILE ORGANICS DATA SHEET

Tentatively Identified Compounds

Client Sample ID:

001

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-01

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1

Matrix: Soil

Concentration units: ug/kg

COMPOUND NAME	RT	Concentration	Q
Trichlorofluoromethane		120 J	

J = estimated value

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID:
Reagent Blank

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Water

Lab Sample ID: 91-12-190-RB
Date Collected: N/A
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration ug/L	
Chloromethane	<	10
Bromomethane	<	10
Vinyl chloride	<	10
Chloroethane	<	10
Methylene chloride	<	5
Acetone	<	10
Carbon disulfide	<	5
1,1-Dichloroethene	<	5
1,1-Dichloroethane	<	5
1,2-Dichloroethene (Total)	<	5
Chloroform	<	5
1,2-Dichloroethane	<	5
2-Butanone	<	10
1,1,1-Trichloroethane	<	5
Carbon tetrachloride	<	5
Vinyl Acetate	<	10
Bromodichloromethane	<	5
1,2-Dichloropropane	<	5
cis-1,3-Dichloropropene	<	5
Trichloroethene	<	5
Dibromochloromethane	<	5
1,1,2-Trichloroethane	<	5
Benzene	<	5
trans-1,3-Dichloropropene	<	5
Bromoform	<	5
2-Hexanone	<	10
4-Methyl-2-pentanone	<	10
Tetrachloroethene	<	5
1,1,2,2-Tetrachloroethane	<	5
Toluene	<	5
Chlorobenzene	<	5
Ethylbenzene	<	5
Styrene	<	5
Total Xylenes	<	5

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	76-116
Toluene-d8	104	88-110
Bromofluorobenzene	102	86-115

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 004

Lab Name: Analytical Technologies Inc. Lab Sample ID: 91-12-190-03
Client Name: ERCE Date Collected: 12/26/91
Client Project ID: Cottonwood ESA Date Analyzed: 01/09/92
Sample Matrix: Water Dilution Factor: 1

COMPOUND NAME	Concentration (ug/L)		
Chloromethane	<	10	
Bromomethane	<	10	
Vinyl chloride	<	10	
Chloroethane	<	10	
Methylene chloride	<	5	
Acetone	<	10	
Carbon disulfide	<	5	
1,1-Dichloroethene	<	5	
1,1-Dichloroethane	<	5	
1,2-Dichloroethene (Total)	<	5	
Chloroform	<	5	
1,2-Dichloroethane	<	5	
2-Butanone	<	10	
1,1,1-Trichloroethane	<	5	
Carbon tetrachloride	<	5	
Vinyl Acetate	<	10	
Bromodichloromethane	<	5	
1,2-Dichloropropane	<	5	
cis-1,3-Dichloropropene	<	5	
Trichloroethene	<	5	
Dibromochloromethane	<	5	
1,1,2-Trichloroethane	<	5	
Benzene	<	5	
trans-1,3-Dichloropropene	<	5	
Bromoform	<	5	
2-Hexanone	<	10	
4-Methyl-2-pentanone	<	10	
Tetrachloroethene	<	5	
1,1,2,2-Tetrachloroethane	<	5	
Toluene	<	5	
Chlorobenzene	<	5	
Ethylbenzene	<	5	
Styrene	<	5	
Total Xylenes	<	5	
Surrogate Recoveries:	**%**	**Rec**	**% Rec Limits**
1,2-Dichloroethane-d4		87	76-116
Toluene-d8		102	88-110
Bromofluorobenzene		101	86-115

Tentatively Identified Compounds

Client Sample ID:

004

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-03

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1 1

Matrix: Water

Concentration units: ug/L

COMPOUND NAME	RT	Concentration	Q
Methyl-t-butyl ether		10 J	

J = estimated value

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
Method 8240

Lab Name: Analytical Technologies, Inc.

Client Sample ID: In House

Client Name: ERCE

Lab Sample ID: 20199905/AZ

Sample Matrix: Water

Date Analyzed: 01/09/92

Compound	Spike Added (ug/L)	Sample Concentration (ug/L)	MS Concentration (ug/L)	MS % REC
1,1-Dichloroethene	50	< 5	57	114
Trichloroethene	50	< 5	43	86
Benzene	50	< 5	39	78
Toluene	50	< 5	51	102
Chlorobenzene	50	< 5	50	100

Compound	Spike Added (ug/L)	MSD Concentration (ug/L)	MSD % REC	% RPD
1,1-Dichloroethene	50	58	116	2
Trichloroethene	50	44	88	2
Benzene	50	41	82	5
Toluene	50	49	98	4
Chlorobenzene	50	51	102	2

QUALITY CONTROL LIMITS

Compound	Water		Soil	
	%REC	RPD	% Rec	RPD
1,1-Dichloroethene	61 - 145	14	59 - 172	22
Trichloroethene	71 - 120	14	62 - 137	24
Benzene	76 - 127	11	60 - 133	21
Toluene	76 - 125	13	59 - 139	21
Chlorobenzene	75 - 130	13	66 - 142	21

PCB ANALYSIS DATA SHEET
Method 8080

Lab Name: Analytical Technologies Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-RBS

Sample Matrix: Sodium Sulfate

Sample Weight: 30 g

GPC Cleanup: N

Client Sample ID: Reagent Blank

Date Collected: N/A

Date Extracted: 12/30/91

Date Analyzed: 01/03/92

Extract Volume: 10 mL

Dilution Factor: 1

Compound	Conc (mg/kg)
PCB 1016	< 0.03
PCB 1221	< 0.03
PCB 1232	< 0.03
PCB 1242	< 0.03
PCB 1248	< 0.03
PCB 1254	< 0.03
PCB 1260	< 0.03

SURROGATE RECOVERY

Compound	% Recovery
Tetrachloro-m-xylene	86

PCB ANALYSIS DATA SHEET
Method 8080

Lab Name: Analytical Technologies Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-02A

Sample Matrix: Soil

Sample Weight: 30 g

GPC Cleanup: N

Client Sample ID: 002

Date Collected: 12/26/91

Date Extracted: 12/30/91

Date Analyzed: 01/03/92

Extract Volume: 10 mL

Dilution Factor: 1

Compound	Conc (mg/kg)
PCB 1016	< 0.03
PCB 1221	< 0.03
PCB 1232	< 0.03
PCB 1242	< 0.03
PCB 1248	< 0.03
PCB 1254	< 0.03
PCB 1260	< 0.03

SURROGATE RECOVERY

Compound	% Recovery
Tetrachloro-m-xylene	98

PCB MATRIX SPIKE RESULTS
Method 8080

Client Sample ID: In House

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Lab Sample ID: 91-12-114-01A

Date Analyzed: 12/19/91

Sample Matrix: Soil

GC Column: DB-1701

Compound	Spike Added (mg/kg)	Sample Concentration (mg/kg)	MS Concentration (mg/kg)	MS Percent Recovery
PCB 1260	0.50	< 0.3	0.597	119

Compound	Spike Added (mg/kg)	MSD Concentration (mg/kg)	MSD Percent Recovery	RPD
PCB 1260	0.50	0.607	121	2

PCB ON-GOING PRECISION AND RECOVERY
Method 8080

Lab Name: Analytical Technologies, Inc.

Lab Sample ID: 91-12-190-OPR

Client Name: ERCE

Date Analyzed: 01/03/92

Sample Matrix: Soil

GC Column: DB-608

Compound	Spike Added (mg/kg)	OPR Concentration (mg/kg)	OPR Percent Recovery
PCB 1260	0.50	0.590	118

Compound	Spike Added (mg/kg)	OPRD Concentration (mg/kg)	OPRD Percent Recovery	RPD
PCB 1260	0.50	0.657	131	11

Analytical Technologies, Inc.

QUALITY ASSURANCE
DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Steve Workman

Steve Workman, GC/HPLC/Inorganics Supervisor

CERTIFICATION

Analytical Technologies Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/03/92

Sample Matrix: Soil

Client ID.	ATI ID.	Lead Conc. (mg/kg)
Reagent Blank	91-12-190-RB	< 5
002	91-12-190-02	56

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/02/92

Sample Matrix: Water

Client ID.	ATI ID.	Lead Conc. (mg/L)
Reagent Blank	91-12-190-RB	< 0.003
005	91-12-190-04	0.065

TOTAL LEAD MATRIX SPIKE

Client Sample ID: In House

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Prep Date: 01/02/92

Lab Sample ID: 9659A/FL

Date Analyzed: 01/03/92

Sample Matrix: Soil

Compound	Spike Added (mg/kg)	Sample Concentration (mg/kg)	MS Concentration (mg/kg)	MS Percent Recovery
Lead	50	< 5	54	108

TOTAL LEAD MATRIX SPIKE

Client Sample ID: In House

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Lab Sample ID: 9600B-1/FL

Sample Matrix: Water

Prep Date: 01/02/92

Date Analyzed: 01/02/92

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS Percent Recovery
Lead	0.80	< 0.003	0.80	100

11-12-170

CON...ACTOR ERCE SAMPLERS Ron C. Holm, Will Glasgow PROJECT # COTR00101 ESA

SITE CONTACT/PHONE DAVE RUNYON 843-6210 LAB/LOCATION ATI - FORT COLLINS

C-O-C NUMBER 0001

~~ERCE ROCKY FLATS~~ RCRA, CHAIN OF CUSTODY

ERCE (DENVER)
DENVER TECH CENTER
STANFORD PLACE #3 STE 415 Denver Co

	DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED-F POT DISS-P	TURN AROUND RUSH -R	OUT OF SPEC REPORTS	PRESERVATIVE: COOLED TO 4C	HCl	NaOH	HNO3	H2SO4	BOTTLE CODES: VOA	OIL+GREASE	RCRA + METALS	TOTAL METALS
01	12-26-91	1330	001	LANDFILL	2oz GLASS	1	S				Y					X			
02		1335	002	LANDFILL	2oz GLASS	2	S				Y						X	X	
*		1420	003	Walnut Creek	2oz GLASS	1	W				Y					X			
03		1500	004	Hole #6	40ml Vials	2	W				Y					X			
04		1505	005	Hole #6	Liter	1	W				Y			X				X	

Pour 12-26-91

Pour 12-26-91

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
Ron C. Holm	11-27-91	0919	Debi Busdick	12/27/91	9:15 am

LABORATORY USE ONLY	Y	N
PCKG RECD/CUSTODY SEALS INTACT	✓	
SAMPLE LABELS/COCs AGREE	✓	
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

REMARKS

SHIPMENT METHOD personal delivery by Ron.

* HOLD SAMPLE - DO NOT RUN. NOT ENOUGH SAMPLE. RON WILL GET BACK TO US 12/27/91 & [illegible] ANOTHER SAMPLING (TOTAL METALS FOR SOIL & WATER SAMPLES)

R=96%
01-14-1992 17:47 303 490 1522
303 490 1522 ATI FT COLLINS
01-14-92 05:46PM P021 #06 P.21

AnalyticalTechnologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

January 3, 1992

Mr. Dave Runyon
ERCE
Stanford Place 3, Suite 415
4582 South Ulster Street Parkway
Denver, CO 80237

RE: ATI Workorder: 91-12-195
Client Project Name: Cottonwood ESA

Dear Mr. Runyon:

One water sample was received from ERCE on December 27, 1991. The sample was scheduled for Total Extractable Petroleum Hydrocarbons analysis. Results for this analysis are contained in the following report.

Thank you for your confidence in Analytical Technologies, Inc. Should you have any questions, please call.

Sincerely yours,

Penny Brogan-Paley for

Steven Fry, Ph.D.
Project Manager

SF/jw

Enclosures

Analytical Technologies, Inc.

QUALITY ASSURANCE
DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Eddy Hammerquist

Eddy Hammerquist, Fuels Supervisor

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS
Modified Method 8015

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

ATI Workorder Number: 91-12-195

Date Collected: 12/27/91

Date Extracted: 12/31/91

Date Analyzed: 12/31/91

Sample Matrix: Water

Client Sample ID	Lab Sample ID	Dilution Factor	Conc. TEPH (mg/L)
Reagent Blank	91-12-195-RB	1	< 1
006	91-12-195-01	1	2

Note: Sample 006 contains high molecular weight components which could not be quantified by TPH-D analytical conditions.

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS
MATRIX SPIKE RESULTS
Modified Method 8015

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Sample ID: 008

Lab Sample ID: 91-12-195-01

Sample Matrix: Water

Date Analyzed: 12/31/91

GC Column: DB-5

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS Percent Recovery
TEPH	10	2	10	80

Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MSD Percent Recovery	Matrix Spike RPD
TEPH	10	9.8	78	2

CONTRA ERCE - DENVER SAMPLERS Ron C. Holm PROJECT COTTONWOOD E

SITE CONTACT/PHONE DAVE RUNYON 843-6210 LAB/LOCATION ATI - FT. COLLINS

C-O-C NUMBER 0002

~~CO&G ROCKY FLATS~~ RCH, CHAIN OF CUSTODY

ERCE - STANFORD PL. 3 SUITE 415
4582 So. Ulster St. Pkwy
DENVER, CO 80237

	DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED-F POT DISS-P	TURN AROUND RUSH-R	OUT OF SPEC REPORTS	PRESERVATIVE: COOLED TO 4 C	HCl	NAOH	HNO3	H2SO4	BOTTLE CODES
01	12/27/91	1605	006	Ralston Cr.	1L glass amb	1	W				Y					A1

9-12-195

POR 12-27-91

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
Ron C. Holm	12/27/91	0750	Derek Fullerton	12/28/91	8:50

REMARKS WILL CALL MONDAY WITH ANALYSIS.

SHIPMENT METHOD

LABORATORY USE ONLY	Y	N
PCKG RECD/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

R-96%
01-03-1992 13:24 303 490 1522 ATI FT COLLINS P.06/06
303 490 1522 01-03-92 01:28PM P006 #38

APPENDIX G

DATA VALIDATION SUMMARY OF LABORATORY RESULTS

Date: 01\15\92
Client: D. Runyon (Ogden)
Reviewer: T. Perrin

Data Validation Summary

Samples and Analyses

Client Sample ID	Lab Sample ID	Analysis	Matrix
001	91-12-190-01	Volatiles	SOIL
004	91-12-190-03	Volatiles	WATER
002	91-12-190-02A	PCBs	SOIL
002	91-12-190-02	Total Lead	SOIL
005	91-12-190-04	Total Lead	WATER

Volatile Organics:

1. Overall Assessment:
Only result summaries were provided so compound identification could not be confirmed from raw instrument results nor could the calculations be verified. No data for instrument tuning or calibration was provided.
Data is acceptable with qualifications as noted below.

2. Holding times:
Per W. Glasgow the sample for volatile water analysis was not preserved with acid. The holding time for volatile analysis of an unpreserved water sample is 7 days. The sample was analyzed at 14 days after collection, therefore analytes were qualified "UJ" in sample 004. Since there are no guidelines for soils the soil sample was not qualified.

3. Surrogate Recoveries:
Surrogate compounds were added to the samples as a measure of purging efficiency. Surrogate recoveries were acceptable for both reagent blanks and sample 004. Recovery for surrogate toluene-d8 was low and bromofluorobenzene high for soil sample 001. All detects were qualified as estimated "J" and all quantitation limits as estimated "UJ" in sample 001 for this QC exceedance. In the case narrative the lab attributed the non-compliant surrogate recoveries to a matrix effect because on reanalysis the surrogate performance did not improve.

4. Reagent Blank:
A reagent blank was analyzed to evaluate possible laboratory-introduced contamination. No target analytes were reported in the reagent blanks. A TIC result page was not provided for the reagent blanks. Whether this is an omission by the lab or whether no TICs were detected in the reagent blanks is unknown. One tentatively identified compound (TIC) was reported in each sample. Trichlorofluoromethane (freon) is a common laboratory contaminant and therefore may not be a true sample constituent in analysis 001.

5. Matrix Spike/Matrix Spike Duplicate:
An associated matrix spike/matrix spike duplicate was performed on a water sample although not on the Ogden water sample. % Recoveries and RPDs were acceptable.

PCBs:

1. Overall Assessment:
No PCBs were reported in the sample. Only result summaries were provided so compound identification could not be confirmed from raw instrument results nor could the calculations be verified. No qualification of data was required.

2. Holding times:
Holding times were acceptable.

3. Surrogate Recoveries:
A surrogate compound was added to the sample before extraction as a measure of the extraction efficiency. The surrogate recoveries at 86 and 98% are considered acceptable for the reagent blank and sample 002 respectively.

4. Reagent Blank:
A reagent blank was analyzed to evaluated possible laboratory-introduced contamination. No target analytes were reported in the method blank.

5. Matrix Spike/Matrix Spike Duplicate:
A matrix spike/matrix spike duplicate was performed on a soil sample although not on the Ogden soil sample. The MS/MSD was analyzed 11 days before sample 002 was extracted so is not really indicative of extraction conditions for sample 002. % Recoveries and RPDs were acceptable. No qualifications were required.

Total Lead:

1. Overall Assessment:
Raw data was not provided for review; therefore, sample results and QC data were reviewed based on information presented in the respective summary forms. Sample results were acceptable without qualifications.

2. Holding Times:
The soil and water sample were analyzed within the water holding time of six months. The water sample was preserved with HNO_3.

3. Blanks:
Blank data presented on the Total Lead analysis data sheet was acceptable.

4. Matrix Spike:
An acceptable Matrix Spike percent recovery (%R) of 108% and 100% were recorded on the Total Lead Matrix Spike sheet for the soil and water samples respectively.

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 001

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Soil

Lab Sample ID: 91-12-190-01
Date Collected: 12/26/91
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration (ug/kg)		Raw Qual	Qual Code	Val Code
Chloromethane	< 10		UJ	S	VV
Bromomethane	< 10				
Vinyl chloride	< 10				
Chloroethane	< 10				
Methylene chloride	120		J		
Acetone	68		J		
Carbon disulfide	< 5		UJ		
1,1-Dichloroethene	2	J	J		
1,1-Dichloroethane	< 5		UJ		
1,2-Dichloroethene (Total)	4	J	J		
Chloroform	3	J	J		
1,2-Dichloroethane	< 5		UJ		
2-Butanone	< 10		UJ		
1,1,1-Trichloroethane	12		J		
Carbon tetrachloride	< 5		UJ		
Vinyl Acetate	< 10				
Bromodichloromethane	< 5				
1,2-Dichloropropane	< 5				
cis-1,3-Dichloropropene	< 5				
Trichloroethene	4	J	J		
Dibromochloromethane	< 5		UJ		
1,1,2-Trichloroethane	< 5		UJ		
Benzene	4	J	J		
trans-1,3-Dichloropropene	< 5		UJ		
Bromoform	< 5				
2-Hexanone	< 10				
4-Methyl-2-pentanone	< 10				
Tetrachloroethene	23		J		
1,1,2,2-Tetrachloroethane	< 5		UJ		
Toluene	24		J		
Chlorobenzene	4	J	J		
Ethylbenzene	7		J		
Styrene	< 5		UJ		
Total Xylenes	43		J		

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	93	70-121
Toluene-d8	72 *	81-117
Bromofluorobenzene	122 *	74-121

* Outside control limits.

J = compound detected below practical quantitation limit.

OGDEN VALIDATED

VOLATILE ORGANICS DATA SHEET

Tentatively Identified Compounds

Client Sample ID:

001

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-01

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1

Matrix: Soil

Concentration units: ug/kg

COMPOUND NAME	RT	Concentration	Q	Raw Qual	Qual Code	Val Code
Trichlorofluoromethane		120 J		NJ		W

J = estimated value

OGDEN VALIDATED

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 004

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Water

Lab Sample ID: 91-12-190-03
Date Collected: 12/26/91
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration (ug/L)	Rev Qual	Qual Code	Val Code
Chloromethane	< 10	UJ	H	VV
Bromomethane	< 10			
Vinyl chloride	< 10			
Chloroethane	< 10			
Methylene chloride	< 5			
Acetone	< 10			
Carbon disulfide	< 5			
1,1-Dichloroethene	< 5			
1,1-Dichloroethane	< 5			
1,2-Dichloroethene (Total)	< 5			
Chloroform	< 5			
1,2-Dichloroethane	< 5			
2-Butanone	< 10			
1,1,1-Trichloroethane	< 5			
Carbon tetrachloride	< 5			
Vinyl Acetate	< 10			
Bromodichloromethane	< 5			
1,2-Dichloropropane	< 5			
cis-1,3-Dichloropropene	< 5			
Trichloroethene	< 5			
Dibromochloromethane	< 5			
1,1,2-Trichloroethane	< 5			
Benzene	< 5			
trans-1,3-Dichloropropene	< 5			
Bromoform	< 5			
2-Hexanone	< 10			
4-Methyl-2-pentanone	< 10			
Tetrachloroethene	< 5			
1,1,2,2-Tetrachloroethane	< 5			
Toluene	< 5			
Chlorobenzene	< 5			
Ethylbenzene	< 5			
Styrene	< 5			
Total Xylenes	< 5			

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	76-116
Toluene-d8	102	88-110
Bromofluorobenzene	101	86-115

OGDEN VALIDATED

Tentatively Identified Compounds

Client Sample ID:

004

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-03

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1 1

Matrix: Water

Concentration units: ug/L

COMPOUND NAME	RT	Concentration	Q	Lab Qual	Qual Code	Val Code
Methyl-t-butyl ether		10 J		NJ		VV

J = estimated value

OGDEN VALIDATED

PCB ANALYSIS DATA SHEET
Method 8080

Lab Name: Analytical Technologies Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-02A

Sample Matrix: Soil

Sample Weight: 30 g

GPC Cleanup: N

Client Sample ID: 002

Date Collected: 12/26/91

Date Extracted: 12/30/91

Date Analyzed: 01/03/92

Extract Volume: 10 mL

Dilution Factor: 1

Compound	Conc (mg/kg)	Rev Qual	Qual Code	Val Code
PCB 1016	< 0.03	U		VV
PCB 1221	< 0.03			
PCB 1232	< 0.03			
PCB 1242	< 0.03			
PCB 1248	< 0.03			
PCB 1254	< 0.03			
PCB 1260	< 0.03			

SURROGATE RECOVERY

Compound	% Recovery
Tetrachloro-m-xylene	98

OGDEN VALIDATED

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/02/92

Sample Matrix: Water

Client ID.	ATI ID.	Lead Conc. (mg/L)	Reason Qual	Qual Code	Val Code
Reagent Blank	91-12-190-RB	< 0.003			
005	91-12-190-04	0.065			V V

OGDEN VALIDATED

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/03/92

Sample Matrix: Soil

Client ID.	ATI ID.	Lead Conc. (mg/kg)	Raw Qual	Qual Code	Val Code
Reagent Blank	91-12-190-RB	< 5			
002	91-12-190-02	56			VV

OGDEN VALIDATED

Qualifier Codes for Organics

1)	Holding times were exceeded:	H
2)	Tuning (BFB or DFTPP) was non-compliant:	M
3)	Calibration:	
	a) RRF was <0.05:	R
	b) %RSD or %D was outside of QC limits:	C
4)	Blanks:	
	a) Presumed contamination from method blank:	B
	b) Presumed contamination from trip blank:	T
	c) Presumed contamination from field blank:	F
5)	Surrogate recovery was outside of QC limits:	S
6)	MS/MSD recovery was poor or RPD high:	Q
7)	Field duplicates showed poor agreement:	E
8)	IS Performance was unsatisfactory:	I
9)	Compound ID:	
	a) False positive (reported compound was not present):	+
	b) False Negative (compound was present but not reported):	-
10)	Reported result or other information was incorrect:	$
11)	TIC identity or reported retention time has been changed:	?
12)	Original analyses, dilutions, reanalyses or duplicate data that should not be used because another more technically sound analysis is available:	D
13)	Instrument performance for pesticides was poor:	P
14)	Unusual problems with the data that have been described in the Data Summary in a specific section. For example, *11 indicates that an unusual problem has been described in section 11 of the Data Summary:	*#

Reviewer Codes

U The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

J The analyte was positively identified in the sample, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample. Values are of limited use.

R The data are unusable (presence or absence cannot be determined). Resampling and/or reanalysis is necessary for verification.

N Presumptive evidence of the presence of the material.

NJ Presumptive evidence of the presence of the material at an estimated quantity.

UJ The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

Validation Codes

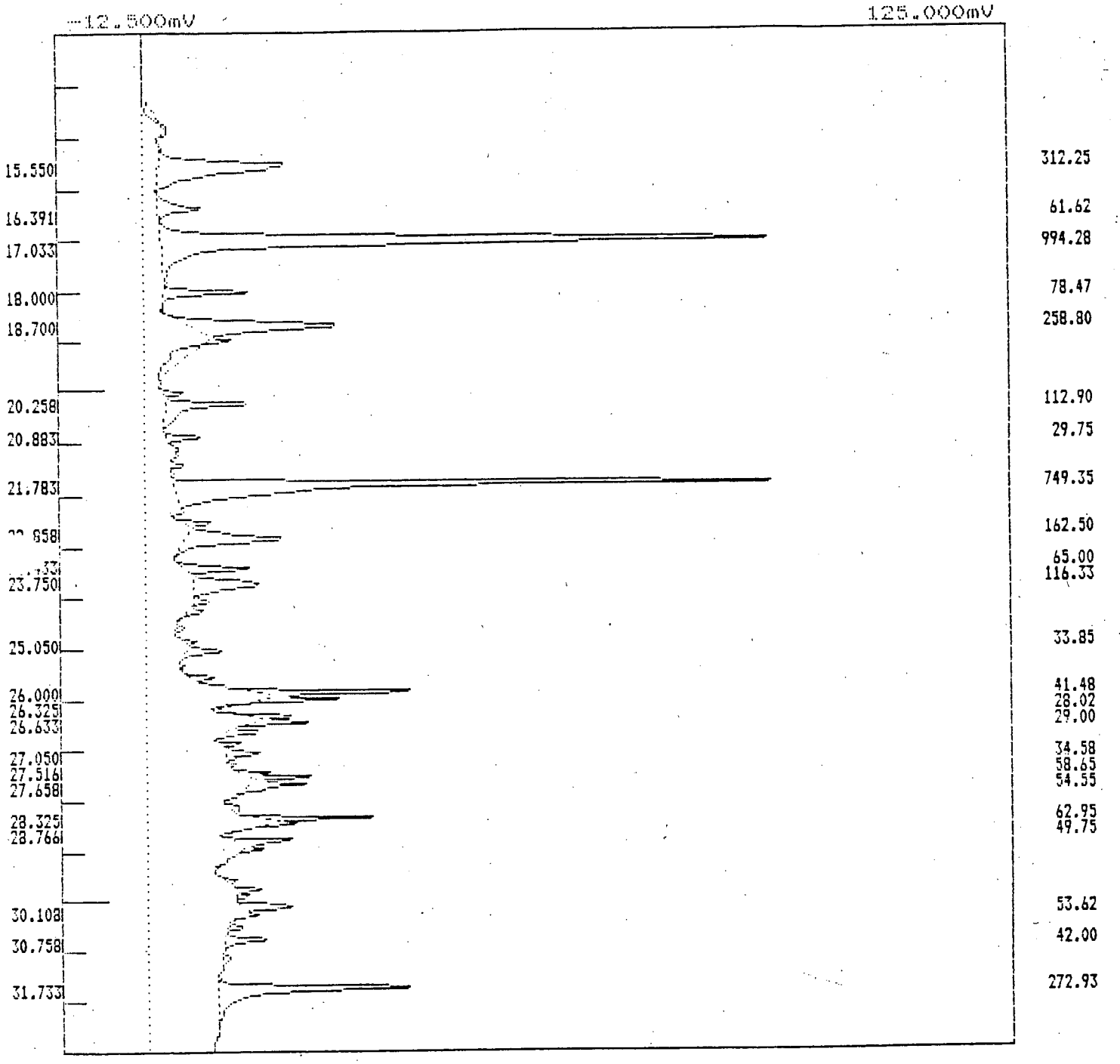
Validation Code	Definition	Usability
VV	Validated Valid	Usable data
VI	Validated Invalid	Unusable for any purpose.
UN	Unvalidated	All data which has not been validated e.g. trip blanks

APPENDIX H

CHEN AND ASSOCIATES CONSULTING GEOTECHNICAL ENGINEERS

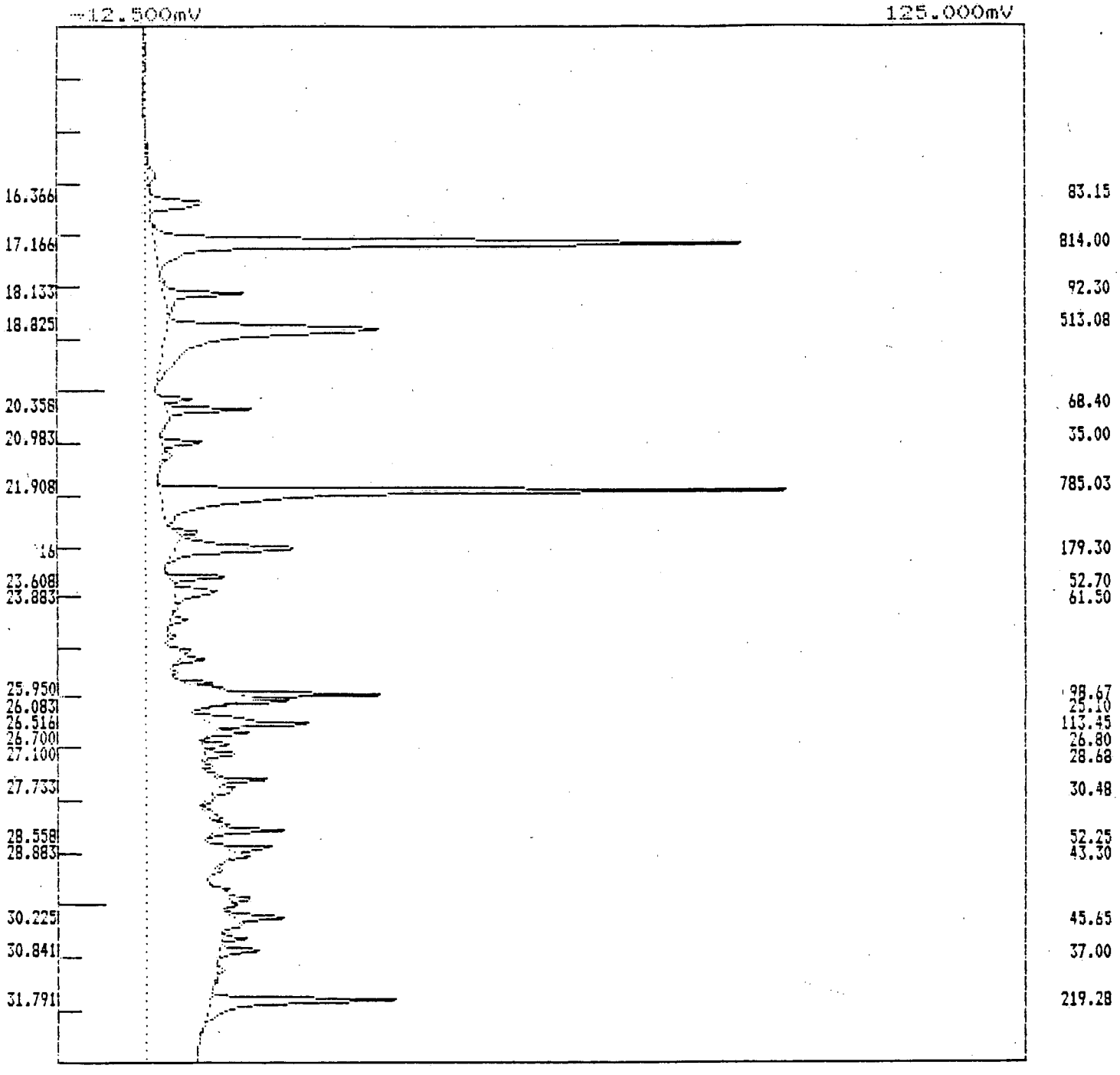
"Soil & Foundation Investigation Proposed Bridge Across Ralston Creek Cottonwood Subdivision"

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : BH02 WS01, 5ML PURGE COLLECTED @ 1330 @ 15'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C6.CHR
Temperature : 8020.TEM
Components : 8020C.CPT
Date : 12/26/1991
Time : 14:43:34



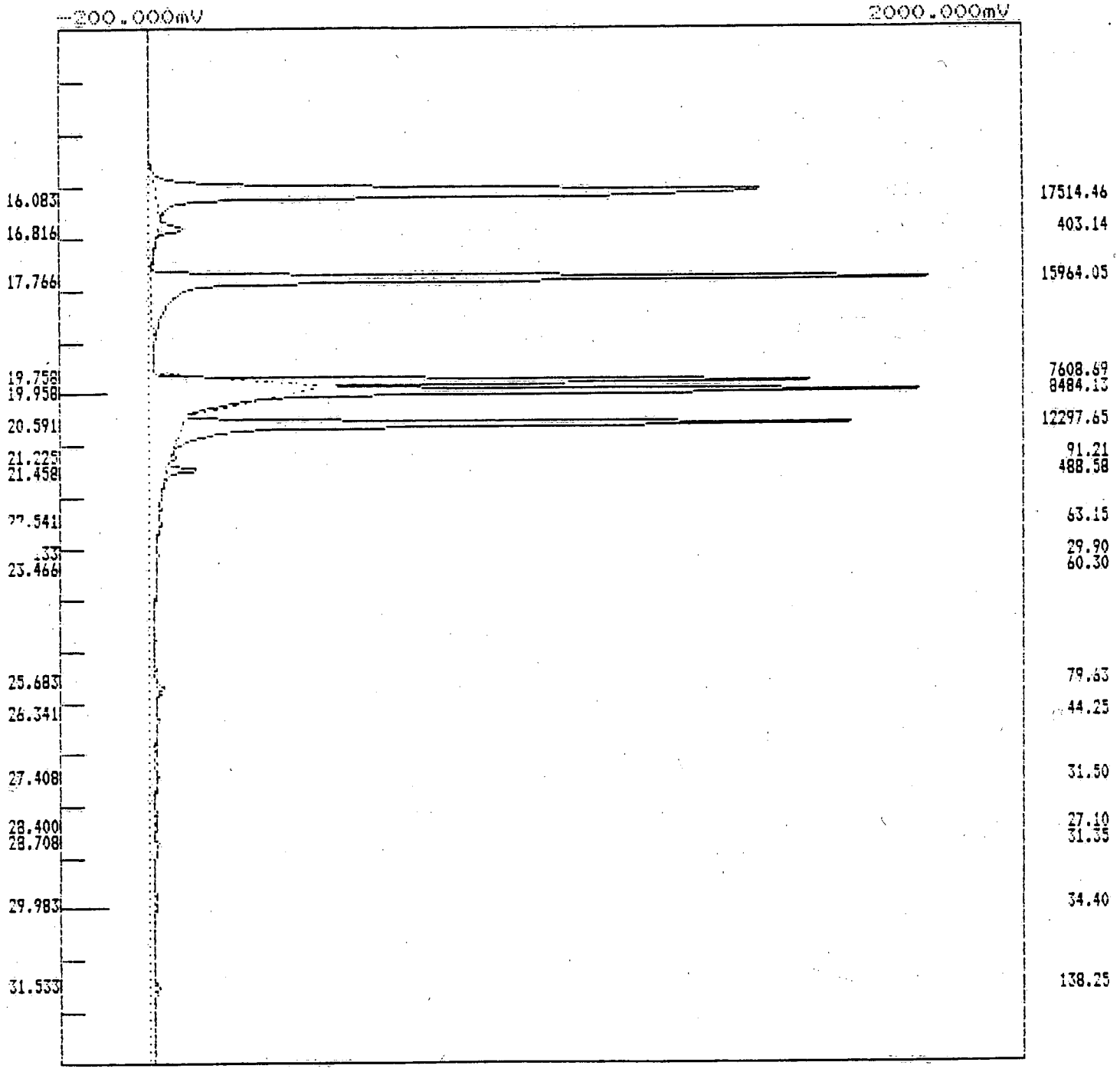
Component	Number	Retention	Area	External	Internal	Units
[illegible]ene	1	16.391	61.62	N/A	N/A	NG
[illegible]oluene surr	2	17.033	994.28	887.86	150.0000	NG
Toluene	3	18.000	78.47	N/A	N/A	NG
m/p-Xylene	4	20.258	112.90	N/A	N/A	NG
o-Xylene	7	20.883	29.75	N/A	N/A	NG
BFB - surr	8	21.783	749.35	279.53	150.0000	NG
			2026.38	224.01	296.0000	

Control File : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : 5ML DI H2O BLANK (250NG SURR'S)
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C4.CHR
Temperature : 8020.TEM
Components : 8020CD23.CPT
Date : 12/26/1991
Time : 11:29:45



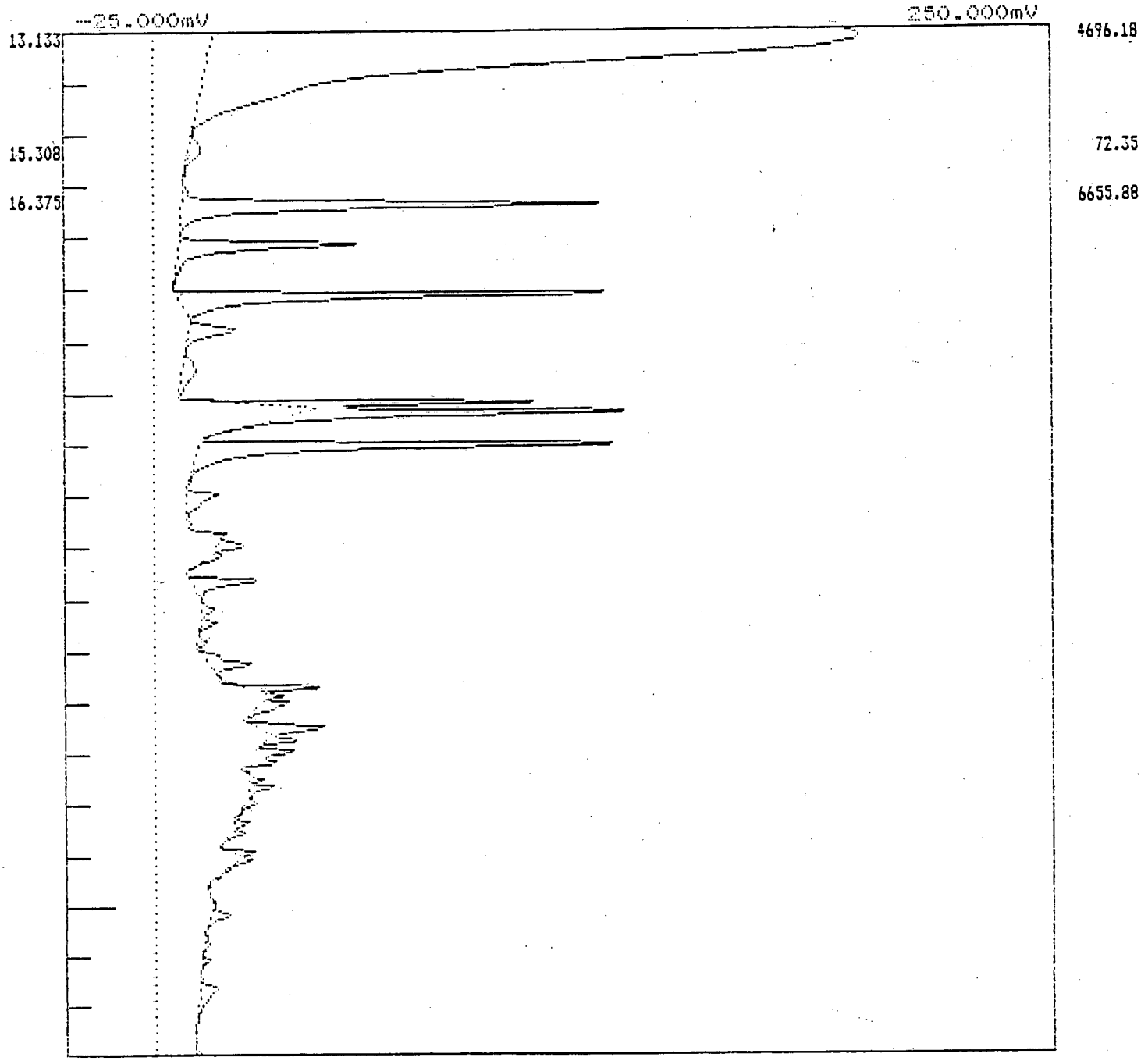
Component	Number	Retention	Area	External	Internal	Units
[illegible]zene	1	16.366	83.15	N/A	N/A	NG
[illegible]oluene surr	2	17.166	814.00	734.82	150.0000	NG
Toluene	3	18.133	92.30	N/A	N/A	NG
m/p-Xylene	6	20.358	68.40	N/A	N/A	NG
o-Xylene	7	20.983	35.00	N/A	N/A	NG
BFB - surr	8	21.908	785.03	291.92	150.0000	NG
6			1877.88	67.79	296.0000	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : 5000NG BTEX CALIB STD (250NG SURR'S)
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C3.CHR
Temperature : 8020.TEM
Components : 8020CD23.CPT
Date : 12/26/1991
Time : 10:50:50



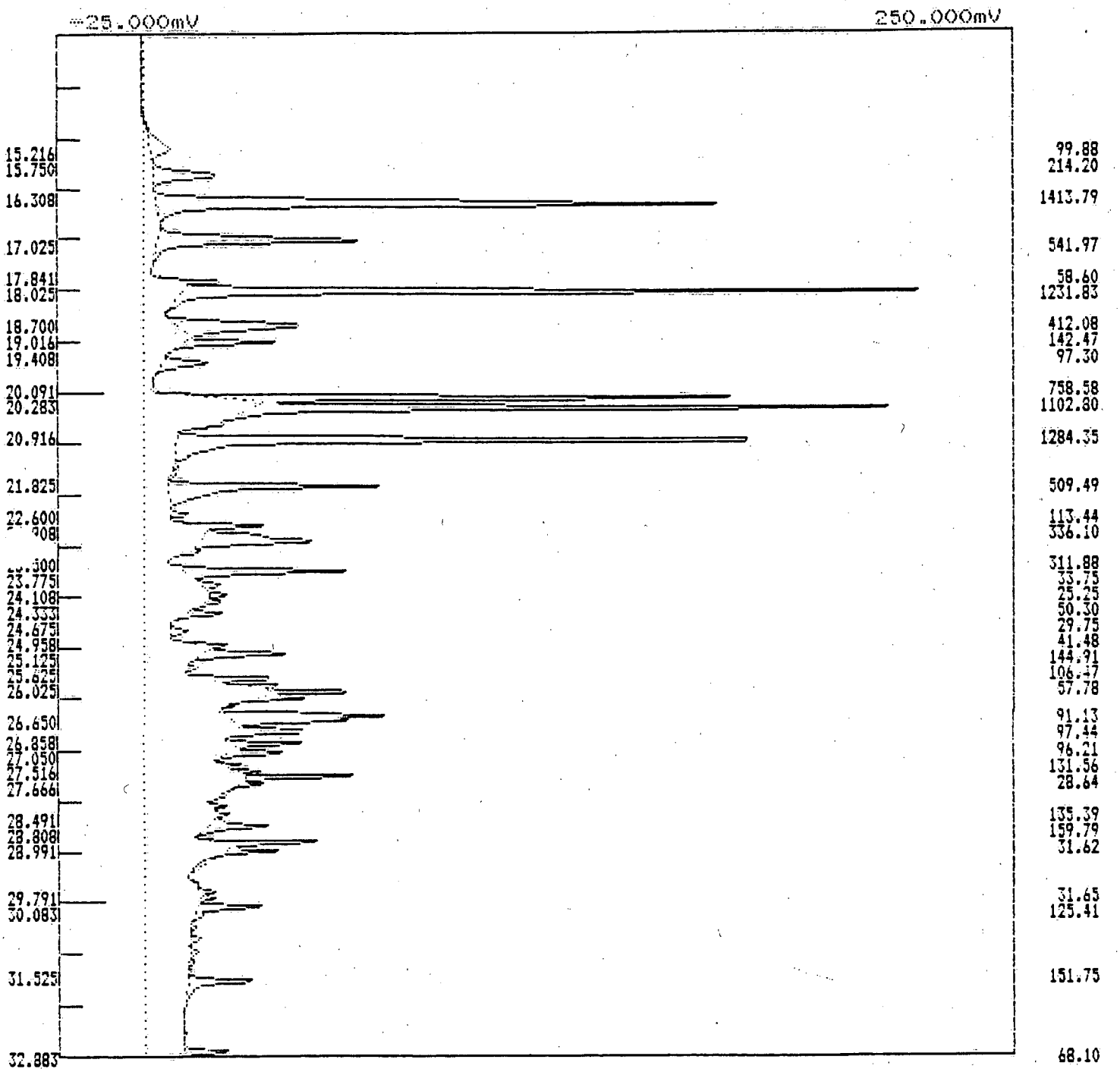
Component	Number	Retention	Area	External	Internal	Units
T ene	1	16.083	17514.46	5001.31	1943.2584	NG
FB Toluene surr	2	16.816	403.14	386.05	150.0000	NG
Toluene	3	17.766	15964.05	5001.31	1943.2552	NG
Ethylbenzene	5	19.758	7608.69	4999.09	3967.3364	NG
m/p-Xylene	6	19.958	8484.13	5002.66	3970.1669	NG
o-Xylene	7	20.591	12297.65	4998.99	3967.2535	NG
BFB - surr	8	21.225	91.21	51.07	150.0000	NG
BFB - surr	8	21.458	488.58	189.01	150.0000	NG

Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 2 FID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225D1.CHR
Temperature : 8020.TEM
Components : 8020TPGH.CPT
Date : 12/26/1991
Time : 07:07:01



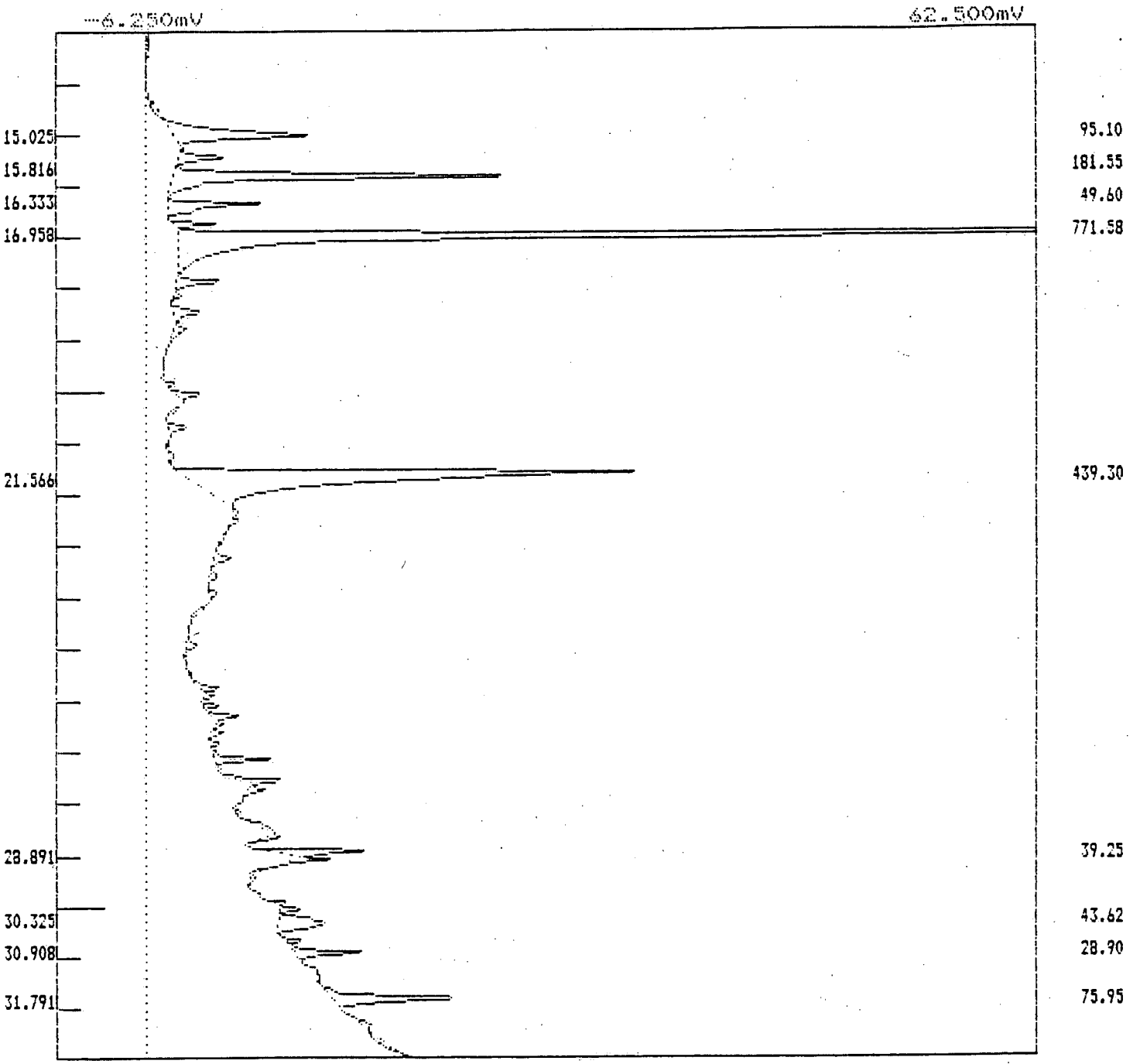
Component	Number	Retention	Area	External	Internal	Units
TOTL PRGBL H-C	1	16.375	6655.88	N/A	N/A	
1			6655.88	N/A	N/A	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C1.CHR
Temperature : 8020.TEM
Components : 8020CD23.CPT
Date : 12/26/1991
Time : 07:07:01



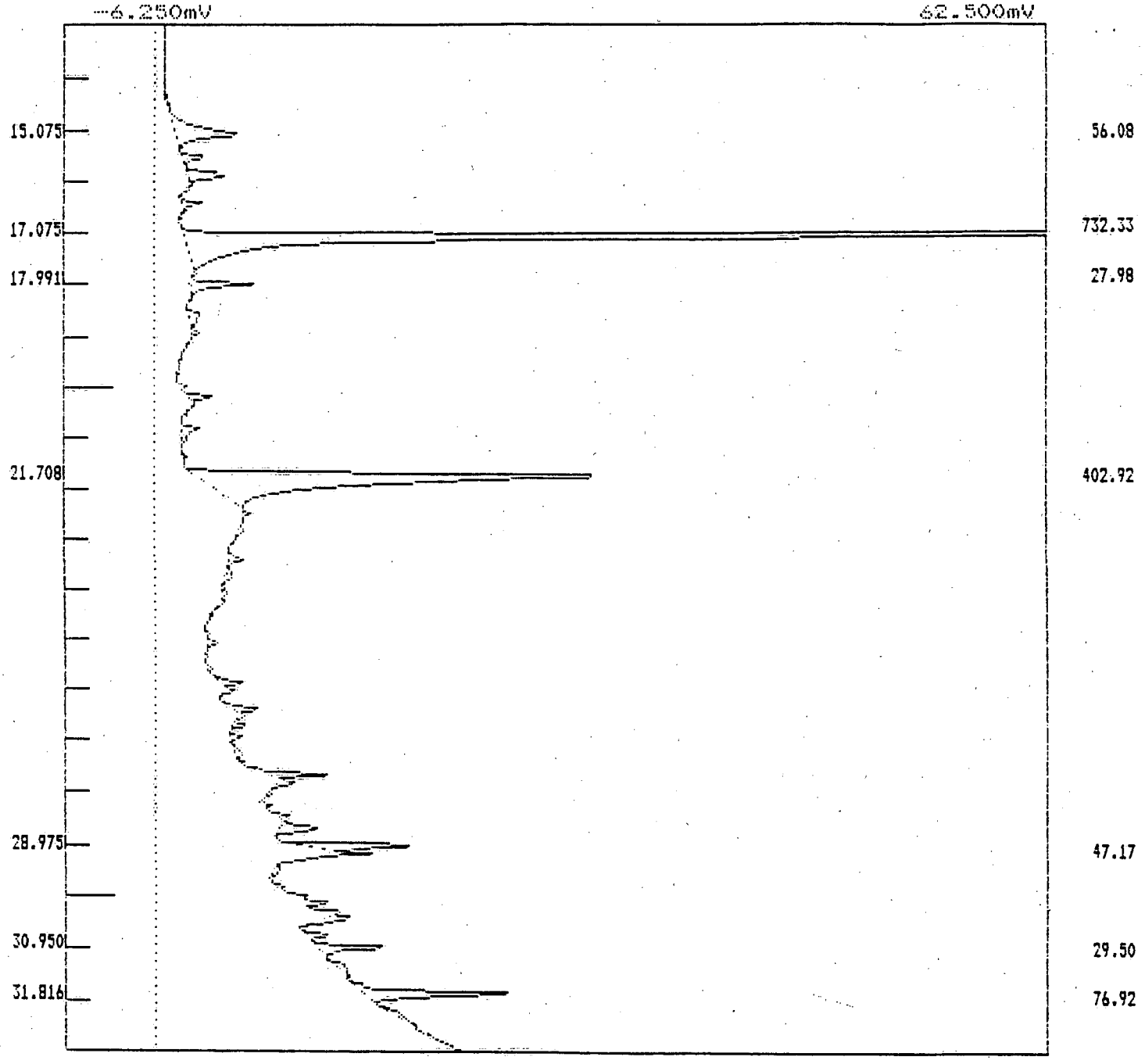
Component	Number	Retention	Area	External	Internal	Units
B ene	1	16.308	1413.79	251.12	74.7528	NG
FB foluene surr	2	17.025	541.97	503.90	150.0000	NG
Toluene	3	17.841	58.60	N/A	N/A	NG
Toluene	3	18.025	1231.83	250.59	74.5956	NG
Ethylbenzene	5	20.091	758.58	249.01	190.3119	NG
m/p-Xylene	6	20.283	1102.80	251.80	192.4420	NG
o-Xylene	7	20.916	1284.35	251.87	192.4984	NG
BFB - surr	8	21.825	509.49	196.27	150.0000	NG

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : BH06 WS01 5ML PURGE COLLECTED @ 1453 @ 18'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A6.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 15:19:45



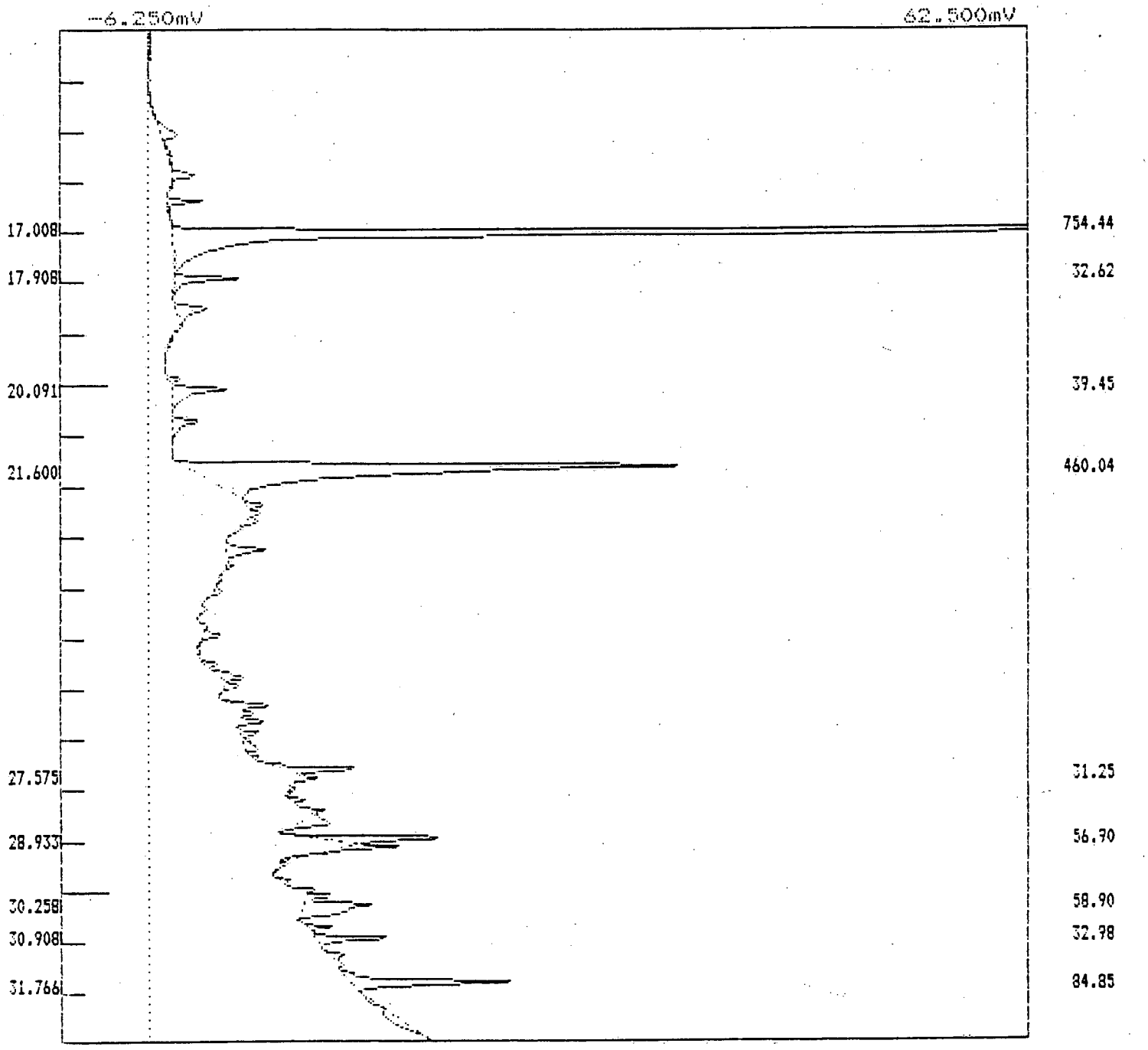
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.333	49.60	6.53	1.6474	NG
F3-Toluene surr	2	16.958	771.58	594.23	150.0000	NG
I - surr	8	21.566	439.30	148.56	150.0000	NG
3			1260.48	749.32	301.6474	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : BH03 WS01 5ML PURGE COLLECTED @ 1352 @ 18'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A5.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 14:21:11



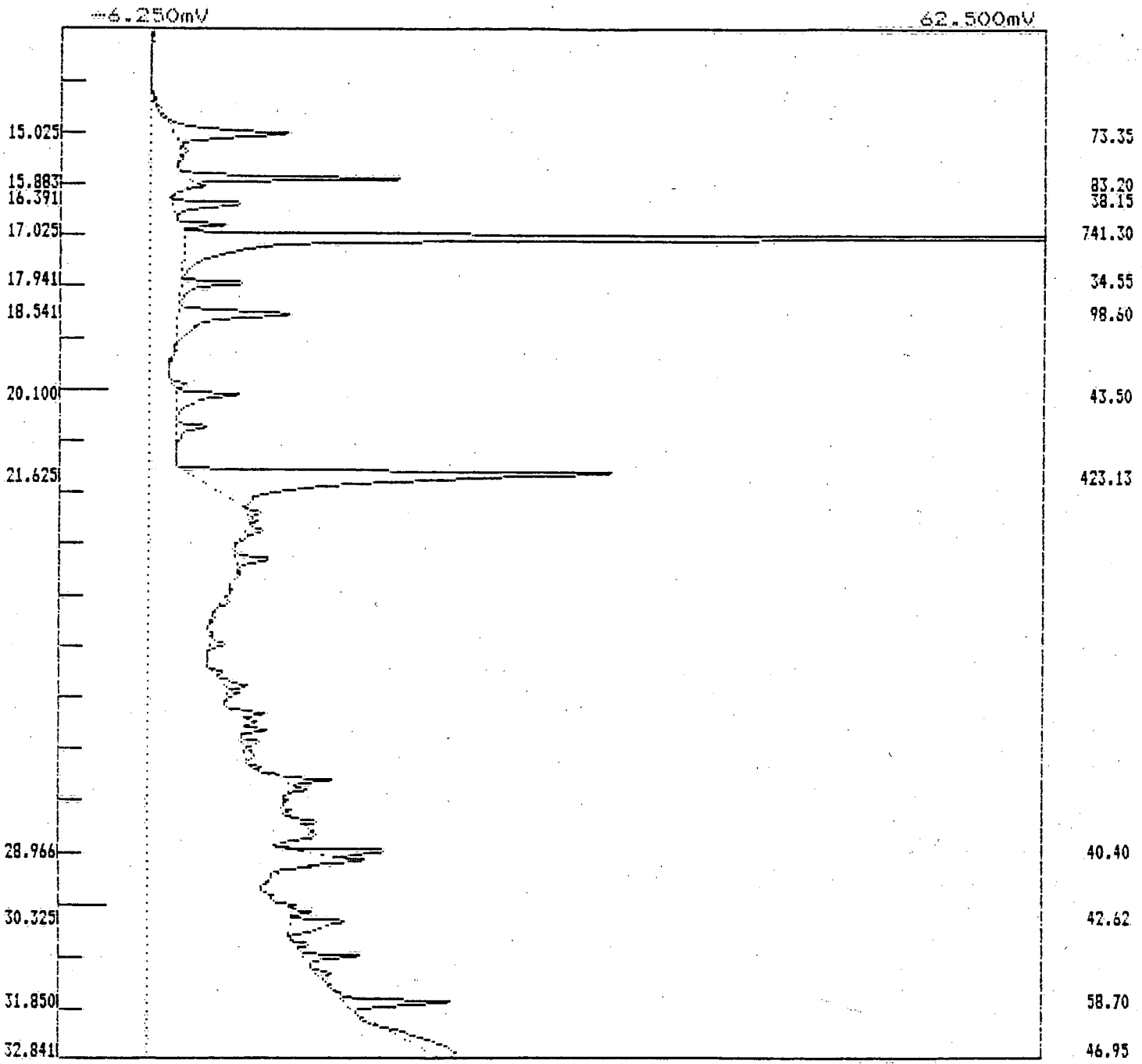
Component	Number	Retention	Area	External	Internal	Units
F3-Toluene surr	2	17.075	732.33	566.76	150.0000	NG
Toluene	3	17.991	27.98	3.68	0.9742	NG
F3 - surr	8	21.708	402.92	141.17	150.0000	NG
3			1163.23	711.61	300.9742	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : RALSTON CRK WS01 5ML PURGE COLLT'D @1325@SURF.
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A4.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 13:33:35



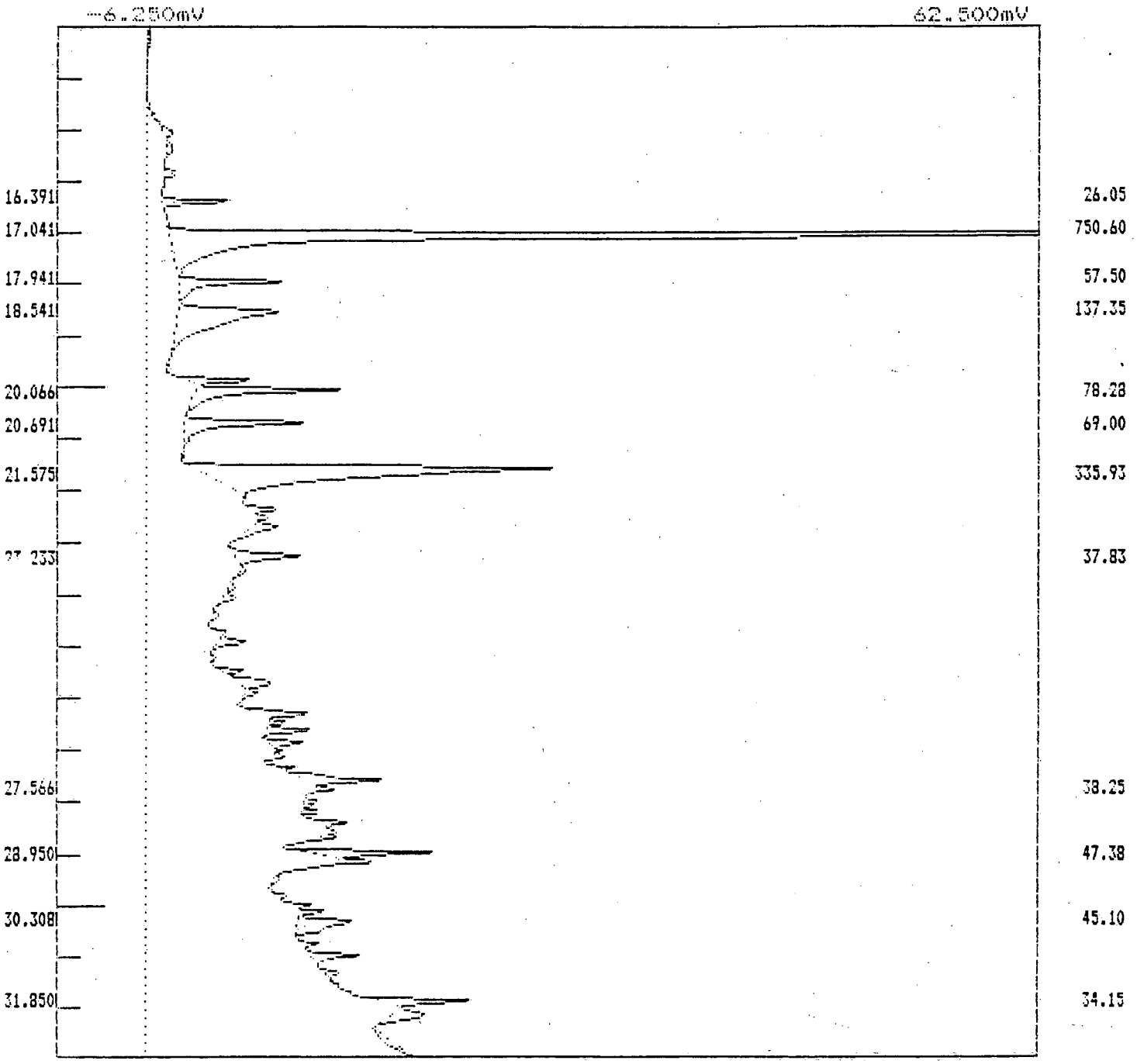
Component	Number	Retention	Area	External	Internal	Units
F3-Toluene surr	2	17.008	754.44	582.24	150.0000	NG
Toluene	3	17.908	32.62	4.29	1.1059	NG
m -Xylene	6	20.091	39.45	10.60	10.4128	NG
t - surr	8	21.600	460.04	152.77	150.0000	NG
4			1286.55	749.90	311.5188	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : BH01 WS01 5ML PURGE COLLECTED @ 1057 @ 12'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A3.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 11:11:45



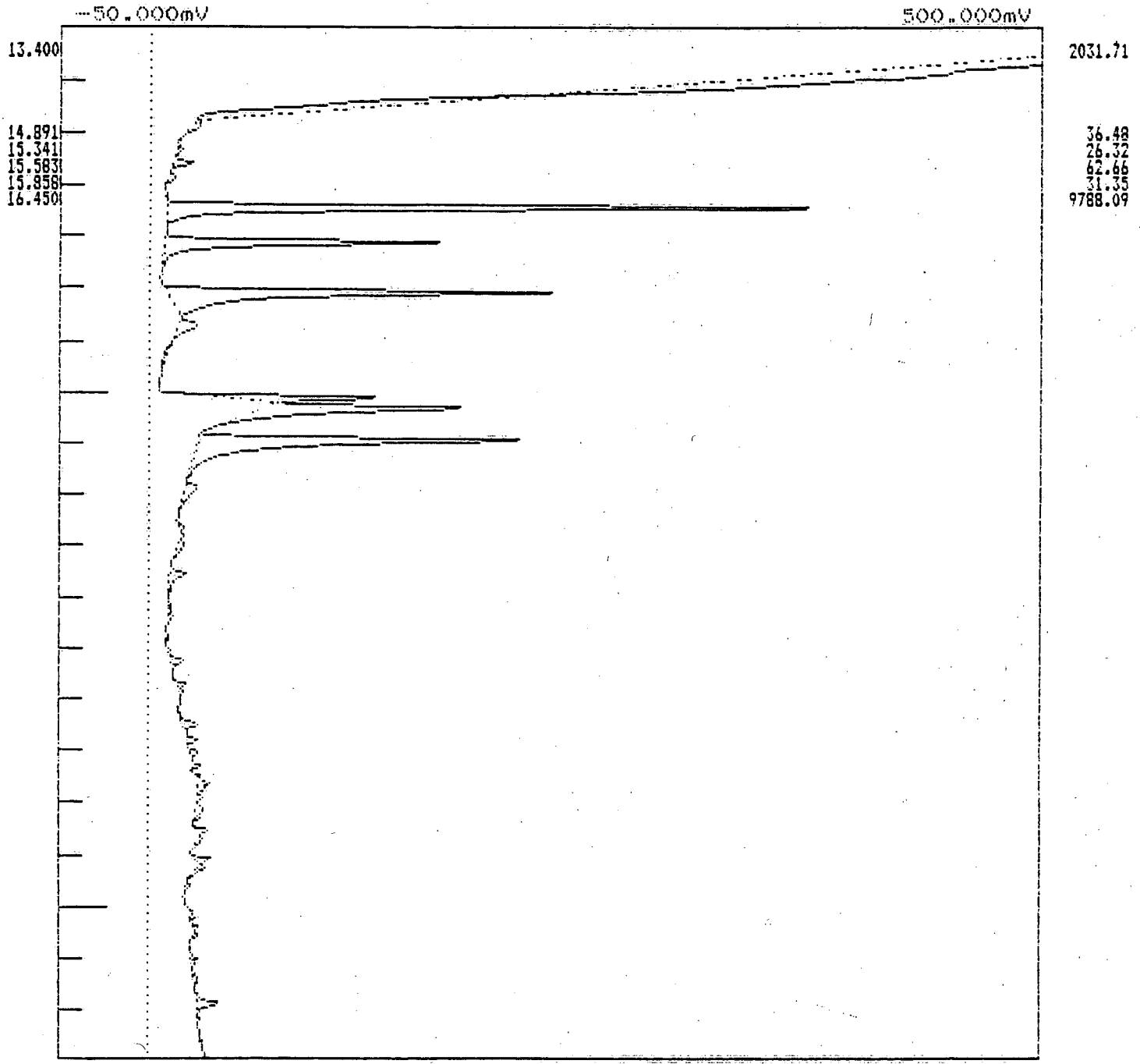
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.391	38.15	5.02	1.3140	NG
F3-Toluene surr	2	17.025	741.30	573.04	150.0000	NG
T ene	3	17.941	34.55	4.55	1.1900	NG
m, -Xylene	6	20.100	43.50	11.69	12.0738	NG
BFB - surr	8	21.625	423.13	145.28	150.0000	NG
5			1280.63	739.58	314.5778	

Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : 5 ML DI H2O BLANK (250NG SURR'S)
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A2.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 09:26:18



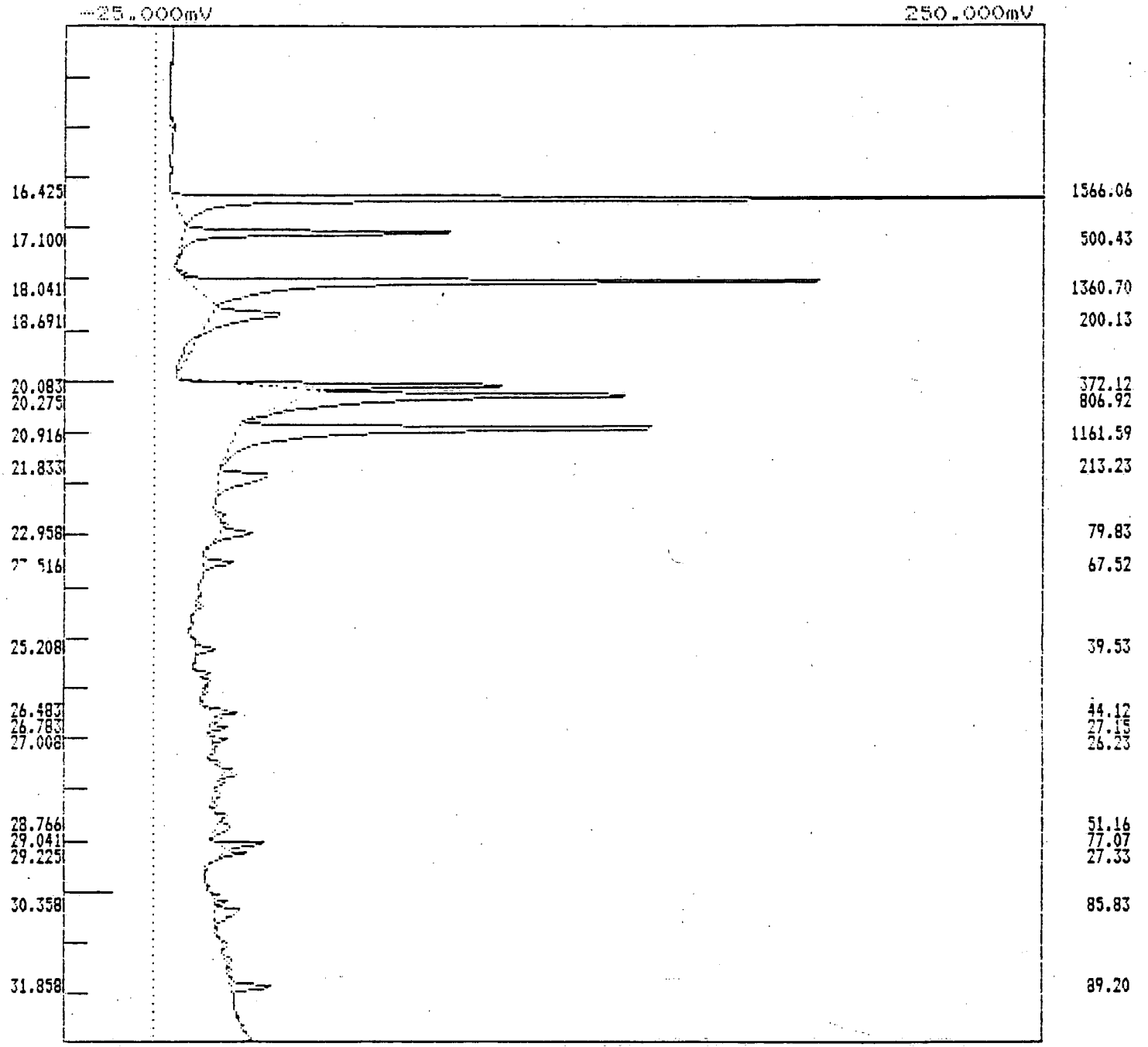
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.391	26.05	3.43	0.8672	NG
FB-Toluene surr	2	17.041	750.60	579.54	150.0000	NG
Toluene	3	17.941	57.50	7.57	1.9582	NG
p -Xylene	6	20.066	78.28	21.04	24.7398	NG
o -Xylene	7	20.691	69.00	13.27	15.6013	NG
BFB - surr	8	21.575	335.93	127.58	150.0000	NG
6			1317.35	752.43	343.1865	

Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 2 FID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225B1.CHR
Temperature : 8020.TEM
Components : 8020TPGH.CPT
Date : 12/26/1991
Time : 07:06:29



Component	Number	Retention	Area	External	Internal	Units
TOTL PRGBL H-C	1	16.450	9788.09	N/A	N/A	
1			9788.09	N/A	N/A	

Description : INSTRUMENT 5 CH 1 PID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A1.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 07:06:29



Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.425	1566.06	206.06	76.4270	NG
FB-Toluene surr	2	17.100	500.43	404.42	150.0000	NG
Toluene	3	18.041	1360.70	179.04	66.4053	NG
Ethylbenzene	5	20.083	372.12	186.06	271.8159	NG
m -Xylene	6	20.275	806.92	216.91	316.8863	NG
o -Xylene	7	20.916	1161.59	223.38	326.3371	NG
BFB - surr	8	21.833	213.23	102.68	150.0000	NG
7			5981.06	1518.56	1357.8717	

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH06 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: RALSTON CRK WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

chen and associates
CONSULTING GEOTECHNICAL ENGINEERS
96 SOUTH ZUNI STREET • DENVER, COLORADO 80223 • 303/744-7105

SOIL & FOUNDATION INVESTIGATION
PROPOSED BRIDGE ACROSS RALSTON CREEK
COTTONWOOD SUBDIVISION
JEFFERSON COUNTY, COLORADO

Prepared for:

KKBNA
7456 W. 5th Avenue
Denver CO 80226

Attn: Mr. Gary Thomas

RECEIVED
JAN 29 1982
K-K-B-N-A

Job No. 23,548

January 27, 1982

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PURPOSE AND SCOPE OF STUDY

This report presents the results of a soil and foundation investigation for a bridge across Ralston Creek in Cottonwood Subdivision, Jefferson County, Colorado. The project site is shown on Fig. 1.

This report has been prepared to summarize the data obtained and to present our conclusions and recommendations based on the conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction of the proposed facility are included.

PROPOSED CONSTRUCTION

An 80 foot long single-span structure is proposed for the site. The structure will be approximately 44 feet wide and include two 15 foot lanes and two 5 foot sidewalks with parapets. The type of construction had not been finalized at the time of our investigation. For purposes of this report, the foundation loads were assumed to range between 100 and 300 kips per abutment.

If loadings or conditions are significantly different from those described above, we should be notified to re-evaluate the recommendations contained in this report.

SITE CONDITIONS

The bridge site is located in the Cottonwood Subdivision on Kilmer Street. The structure will provide access across Ralston Creek. At the time of our investigation, the creek was approximately 4 feet wide

with flowing water about 6 inches deep. The north bank is nearly vertical with an overall depth of approximately 12 feet. The south bank is on a 1:1 slope with an intermediate bench.

The site was vacant at the time of our investigation. The vegetation consists of native grasses, weeds and deciduous trees along Ralston Creek.

Croke Canal is approximately 300 feet west of the proposed ditch site and runs perpendicular to Ralston Creek. The flow in the canal is approximately 15 feet wide with the water level at approximately elevation 60. A gate controls the flow from the canal into the creek. At the time of our investigation, the gate was closed. It appears that water seeps from the canal into the creek.

SUBSURFACE CONDITIONS

To evaluate the subsurface conditions at the bridge site, 3 test holes were drilled at the approximate locations shown on Fig. 1. Six additional test holes were drilled in the subdivision south of Ralston Creek to determine the extent and depth of trash fill.

In general, the subsoils at the site were highly variable. They consisted of 20 to 25 feet of trash fill, organic silt, clay, sand and gravel overlying bedrock. Trash fill varied in depth from 8 to 16 feet across the entire area south of Ralston Creek. This is an old landfill which consists of approximately 3 feet of sandy clay overlying various metal, plastic, wood, paper, glass and organic material. The exact lateral and vertical extent of the fill was not determined as a result of this investigation.

A 2.5 to 3 foot layer of organic silt was encountered in Test Holes 1, 7 and 9 below the trash fill. The clay is sandy and medium stiff and the sand is clayey and medium dense. The gravel and sand layer varied in thickness from 7 to 13 feet. This material is poorly graded and dense to very dense with scattered cobbles.

Claystone bedrock underlies the overburden soils. The claystone consists of a 1.5 to 2.5 foot weathered mantel overlying sandy and hard to very hard claystone. Field penetration tests and unconfined compression tests indicate that the bedrock is capable of supporting moderate foundation loads without undergoing significant settlements. Results of laboratory tests are shown on Figs 4 and 5 and summarized on Table I.

Free water was encountered at depths of 10.5 to 14 feet below the ground surface at the time of drilling and when measured 4 to 8 days after drilling, see Figs. 2 and 3.

Ground intersect landfill

EXISTING LANDFILL

Landfill debris consisting of mixtures of wood, paper, glass, plastic and metal was encountered in all of the test holes drilled south of Ralston Creek. This area and two areas to the south have been identified by the Jefferson County Health Department as known landfills. The approximate locations of these fills, results of bar hole punch gas surveys and landfill histories, are presented in a report prepared by the department.[1]

1. Jefferson County Health Department, Methane Site Investigation, 1980.

Combustible gas measurements were taken during our investigation to determine if combustible gases were present in the landfill. The measurements were obtained with an MSA Model 53 gas scope. This instrument allows the measurement of the percent by volume of combustible gas in air and the percent lower explosive limit (LEL). The measurements obtained indicated 85% to 100% of the LEL and 3% to 28% combustible gases. The readings are summarized below:

Hole No.	% LEL	% Gas
4	100	10
5	85	3
6	100	28
9	100	13

Based on these readings, it appears that combustible gas is being generated within this landfill in quantities sufficient to be considered a hazard. The combustible range of methane gas is between 5% and 15% by volume in air. Concentrations above this range are too rich to burn. However, gas migration or exposure to the atmosphere will result in dilution of the gas and result in a flammable condition.

Care should be taken when excavating within or adjacent to the landfill mass. Venting of excavations will be required. Any structures built over the landfill will require special methane gas controls. There are 2 basic approaches to controlling the migration of methane into structures. These include barriers separating the proposed structure from the landfill and ventilation systems. Access roads, parking areas, underground utilities and other facilities constructed on landfill materials will be subjectd to large differential movements and a corrosive environment. The owner should

be aware of the high risk of distress associated with construction on landfills.

FOUNDATION RECOMMENDATIONS

Based on the subsurface conditions encountered at the site and the proposed construction, we recommend that the bridge be supported on drilled piers founded in the underlying unweathered bedrock. The following design and construction details should be observed for a drilled pier foundation system:

(1) Piers should be designed for a maximum end bearing pressure of 40,000 psf and a skin friction of 4,000 psf for the portion of the pier in unweathered bedrock. Piers should be designed for a minimum dead load pressure of 15,000 psf based on end area only. Uplift on the piers can be resisted by utilizing 50% of the skin friction value plus the weight of the pier.

(2) Piers should penetrate at least three pier diameters into the competent bedrock. A minimum penetration of 5 feet into the bedrock is recommended.

(3) Piers should be designed to resist lateral loads assuming a modulus of horizontal subgrade reaction in the clay of 40 tcf, a constant of horizontal subgrade reaction in the granular soils of 60 tcf and a modulus of horizontal subgrade reaction of 200 tcf in the bedrock. Resistance to lateral loads should be neglected in the trash fill and all materials above estimated scour depth.

(4) The minimum spacing requirements between caissons on the site should be 3 diameters from center to center. At this spacing, no

reduction in axial or horizontal soil modulus values is required. Piers grouped less than 3 diameters center to center should be studied on an individual basis to determine the appropriate reduction in both lateral and axial capacity.

(5) A minimum pier diameter of 24 inches is recommended to facilitate proper cleaning and observation of the pier hole.

(6) Concrete utilized in the piers should be a fluid mix with sufficient slump so that concrete will fill the void between reinforcing steel and the pier hole.

(7) Rock penetration in all pier holes should be roughened artificially to assist the development of peripheral shear between the pier and the bedrock. The roughening should be installed with a grooving tool in a pattern approved by the soil engineer.

The specifications should allow the soil engineer to eliminate the requirements for pier roughening if it appears the roughening procedure is not beneficial. This could occur if the pier hole is sufficiently roughened by the drilling process or if the presence of water results in a degradation of the pier hole during the roughening procedure.

(8) Based on the results of our field exploration, laboratory testing and experience with similiar, properly constructed caisson foundations, we estimate that pier settlement will be low. Generally, we estimate that settlement for a 24 to 36 inch diameter pier will be approximately 3/4 to 1 inch when designed with the criteria presented herein. The settlement of closely

spaced piers will be larger and should be studied on an individual basis.

(9) Pier holes should be properly cleaned prior to the placement of concrete.

(10) The presence of water and the nature of overburden strata encountered at the site indicates that the use of casing will be required to reduce water infiltration into the pier holes. If water cannot be removed prior to placement of concrete, the tremie method should be used after the hole has been well cleaned. In no case should concrete be placed in more than 3 inches of water.

(11) Gravel and cobbles were encountered during drilling of our test holes. These conditions will complicate the drilling process and may reduce the effectiveness or prevent seating of the casing in the upper bedrock surface. The drilling contractor should be made aware of this information and should be prepared for these conditions during the pier installation.

(12) Adequate construction equipment should be used to drill the piers to the required penetration and seat the casing into the bedrock materials. If shallow refusal is encountered in the bedrock our office should be notified to evaluate the conditions and establish that true refusal has been met with adequate equipment.

(13) A representative of the soil engineer should observe the pier drilling operations.

FOUNDATION ALTERNATES

Based on the subsurface conditions encountered, the proposed bridge may be supported on high-capacity driven piles or spread footings.

Driven Pile Alternate: The following design and construction details should be closely followed for a driven pile foundation system.

(1) The maximum allowable pile capacity should not exceed a service stress of 12,000 psi.

(2) The pile type should consist of heavy steel H-pile with tip reinforcement.

(3) The piles should penetration a minimum of 3 feet into unweathered bedrock.

(4) The piles should be designed to resist lateral loads using a modulus of subgrade reaction of 40 tcf, a constant of horizontal subgrade reaction in the clay of 60 tcf and a modulus of horizontal subgrade reaction of 200 tcf in the bedrock. Resistance to lateral loads should be neglected in the trash fill material and all material above the estimated scour depths.

(5) All piers should be advanced to virtual refusal. Virtual refusal is defined as 20 blows per inch with an approved pile hammer.

(6) The rated energy output of the hammer should be between 1800 and 2,000 foot-pounds per square inch of pile cross-sectional area.

(7) The hammer should be operating at the manufacturers recommended stroke when virtual refusal is measured.

(8) Due to the dense to very dense sand and gravel strata at the site, difficult driving conditions should be anticipated. These

conditions could adversely affect the structural integrity of the piles and also result in variable penetration into subsurface materials. Consequently, predrilling may be required to advance piles through the sand and gravel overburden materials.

(9) A representative of the soil engineer should observe the pile driving operations.

Spread Footing Alternate: The structure may be founded on spread footings placed on the dense to very dense sand and gravel strata. The following design and construction details should be observed for spread footing foundation system.

(1) Footings placed on undisturbed sand and gravel strata may be designed for a maximum allowable soil bearing pressure of 6,000 psf.

(2) Spread footings placed on granular soils should have a minimum footing dimension of not less than 36 inches.

(3) Footings should be provided with adequate scour protection above their bearing elevation.

(4) The lateral resistance of spread footing foundations placed on the undisturbed sand and gravel strata at the site will be a combination of the passive earth pressure against the side of the footing and the sliding resistance of the footing on the foundation materials. Sliding friction at the bottom of the footings can be taken as 0.4 times the vertical dead load. Passive pressure against the sides of the footings can be

calculated using an equivalent fluid pressure of 200 psf per foot of depth.

(5) Based on experience, we estimate that total settlement for footings designed and constructed as discussed in this section will be approximately 3/4 inch.

(6) The proposed footing elevations appear to be near or slightly above ground water level. Therefore, it may be necessary to dewater some footing excavations during construction. Dewatering should not be conducted by pumping from inside the footing excavations. This may decrease the supporting capacity of the soils.

(7) A representative of the soil engineer should observe all footing excavations prior to concrete placement in order to evaluate the supporting capacity of foundation materials.

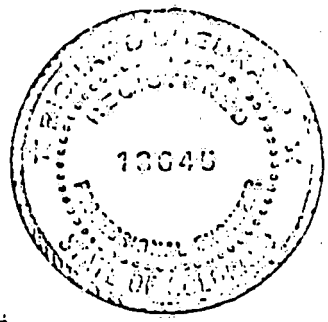
ABUTMENT AND WINGWALL BACKFILL

Backfill within 6 feet of the abutments and wingwalls should be Class 1 structural backfill in accordance with Colorado Standard Specifications for Road and Bridge Construction and should be compacted to a density of not less than 95% as determined in accordance with ASTM D698. Design lateral loads on wingwalls and abutments should be based on equivalent fluid pressure of 40 psf per foot.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in this area for

use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory holes drilled at the locations indicated on the exploratory hole plan. The nature and extent of variations between the exploratory holes may not become evident until excavation is performed. If during construction, soil, rock and ground water conditions appear to be different from those described herein, this office should be advised at once so that re-evaluation of the recommendations may be made. We recommend on-site observation of excavations and foundation bearing strata by a soil engineer.



CHEN AND ASSOCIATES, INC.

By _____
Richard J. Suedkamp, P.E.

Reviewed By _____
David M. Jubenville, P.E.

RJS:fs

CONCLUSIONS

(1) The proposed structure should be founded on piers drilled into bedrock and designed for maximum end bearing pressure of 40,000 psf, a skin friction of 4,000 psf and a minimum dead load pressure of 15,000 psf, with design and construction details as outlined.

(2) Alternate foundation systems consisting of steel H-piles and designed for a maximum stress of 12,000 psi with tip reinforcement or spread footings placed on the lower sand and gravel strata and designed for a maximum bearing pressure of 6,000 psf may be used.

(3) Trash fill varying in depth from 8 to 16 feet was encountered across the site south of Ralston Creek. This landfill material is generating sufficient quantities of combustible methane gas to be hazardous.

Fill, man-made, sandy clay.

Trash fill, man-made, clay, metal, plastic, wood, paper organic materials.

Organic silt, slightly sandy, slightly clayey, stiff, moist to v moist, black.

Clay (CL), sandy, medium to stiff, moist to very moist, red to brown, occasionaly gravel.

Gravel, silty to sandy, poorly graded, medium dense to very dens wet, brown, scattered cobbles.

Weathered Claystone, sandy, firm to medium hard, moist, rust to

Claystone, sandy, very hard, moist, gray.

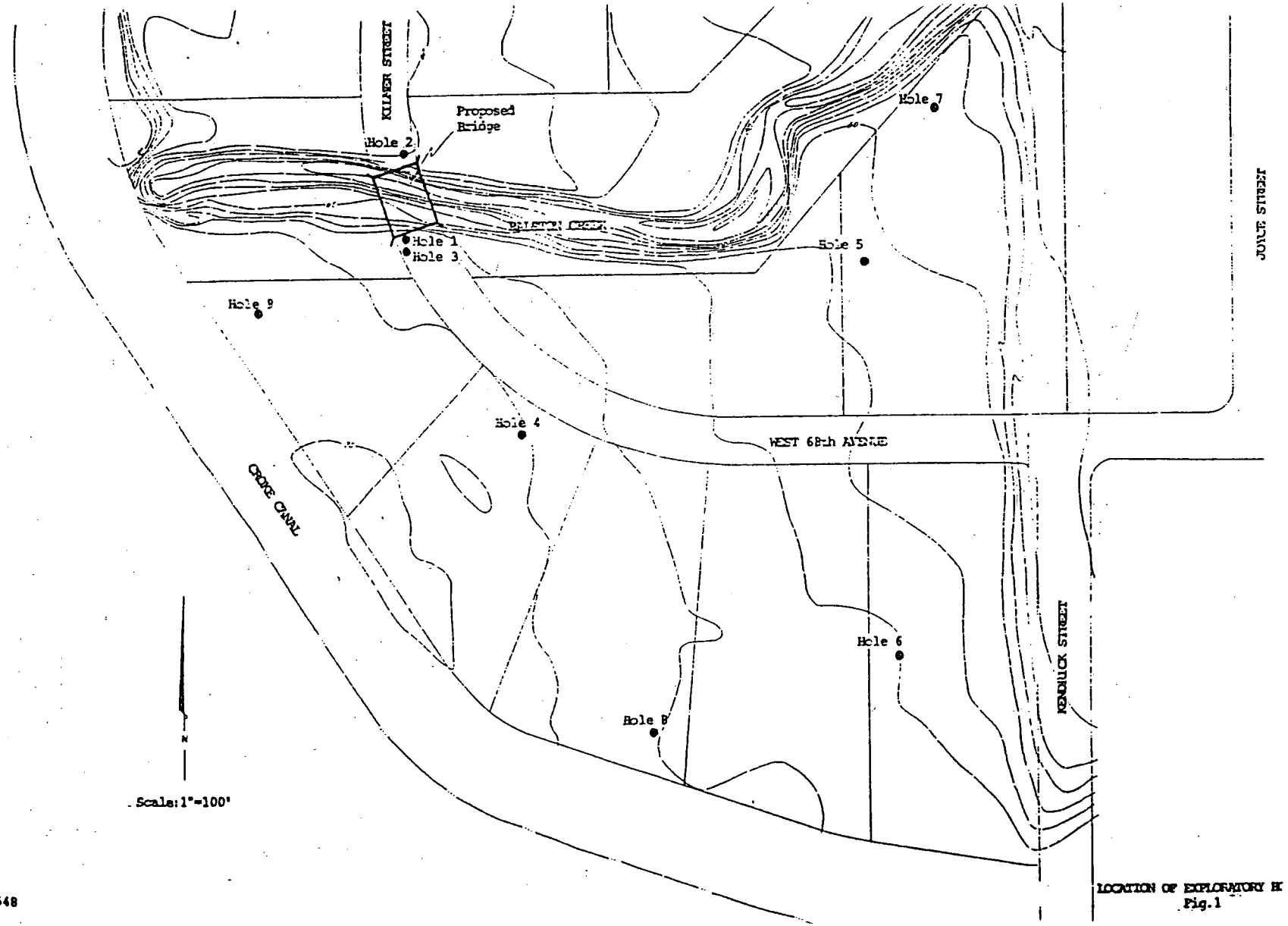
Undisturbed drive sample. The symbol 15/12 indicates that 15 blc a 140 pound hammer falling 30 inches were required to drive the 12 inches.

Standard Split Spoon Sample.

Indicates P.V.C. pipe installed to depth shown.

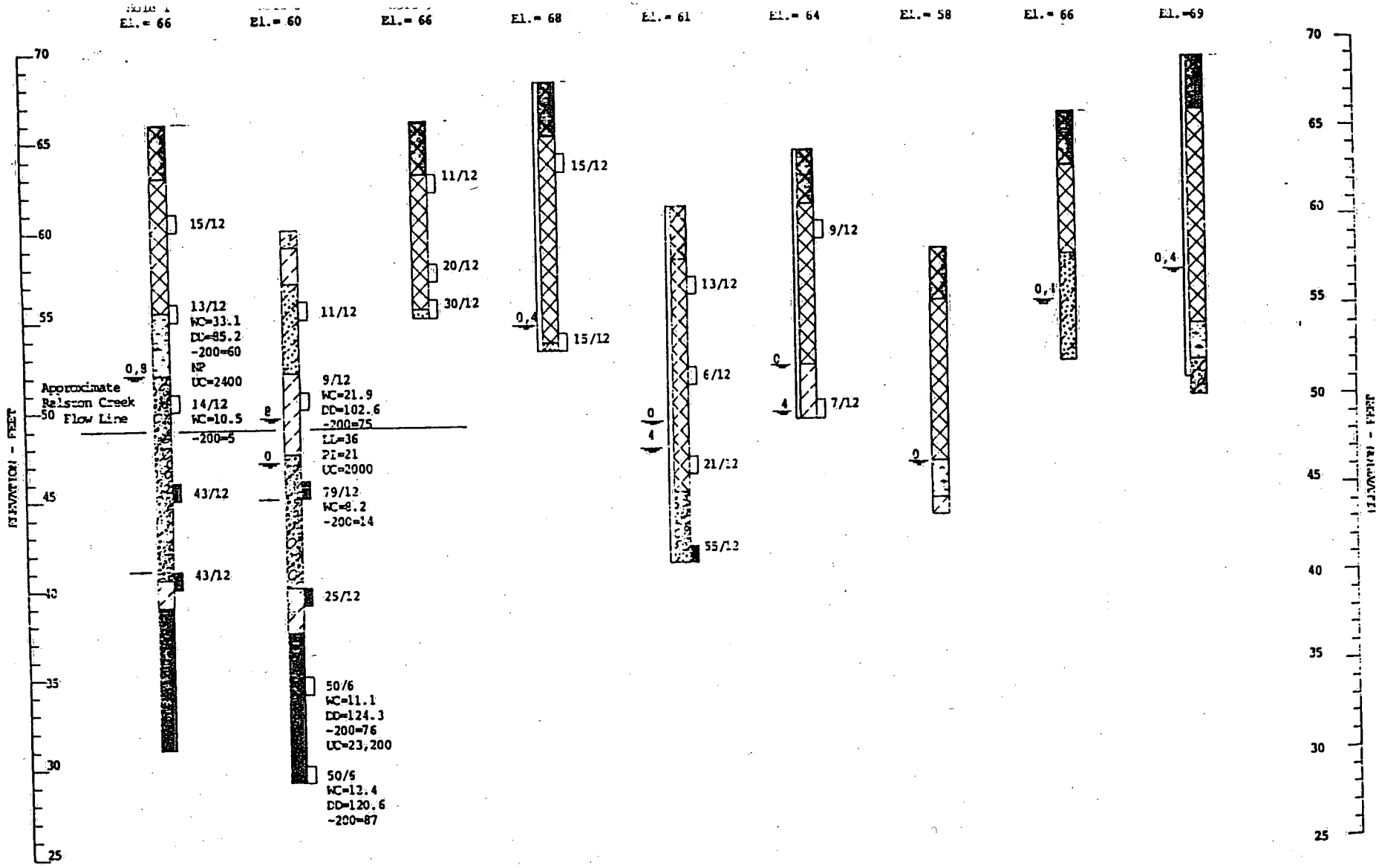
Indicates depth to free water.

Depth at which hole caved.



23,548

LOCATION OF EXPLORATORY H
Fig.1



LOGS OF EXPLORATORY HOLES
Fig. 2

23.54R

Fill, man-made, sandy clay.

Trash fill, man-made, clay, metal, plastic, wood, paper organic materials.

Organic silt, slightly sandy, slightly clayey, stiff, moist to very moist, black.

Clay (CL), sandy, medium to stiff, moist to very moist, red to brown, occasionaly gravel.

Gravel, silty to sandy, poorly graded, medium dense to very dense, wet, brown, scattered cobbles.

Weathered Claystone, sandy, firm to medium hard, moist, rust to brown

Claystone, sandy, very hard, moist, grey.

Undisturbed drive sample. The symbol 15/12 indicates that 15 blows of a 140 pound hammer falling 30 inches were required to drive the sampler 12 inches.

Standard Split Spoon Sample.

Indicates P.V.C. pipe installed to depth shown.

Indicates depth to free water.

Depth at which hole caved.

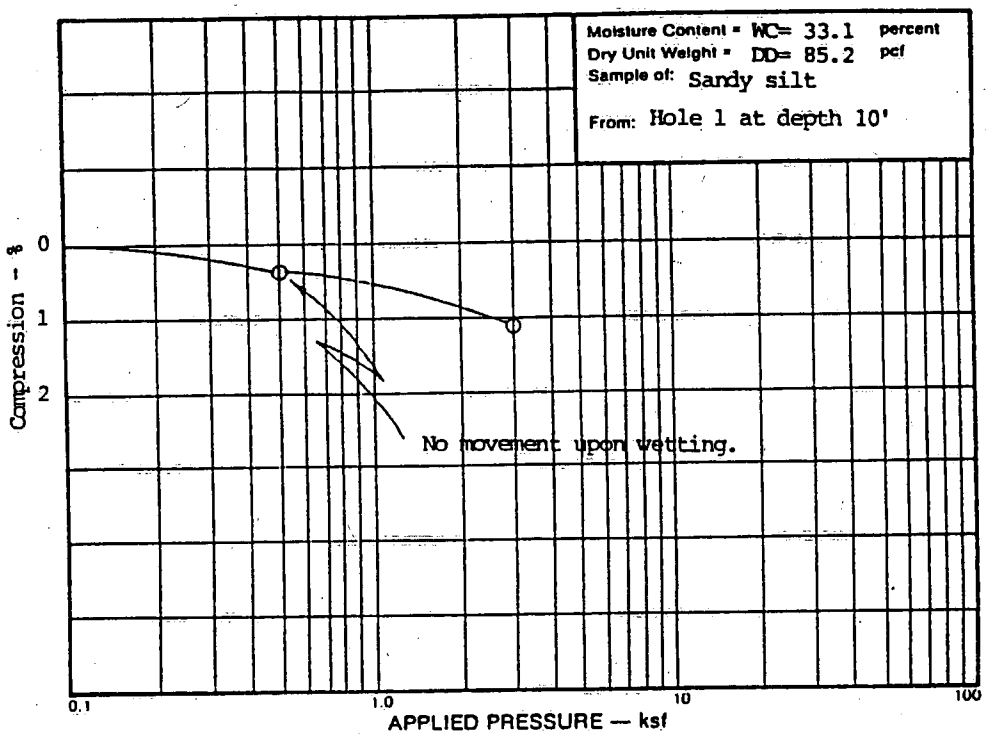
NOTES:

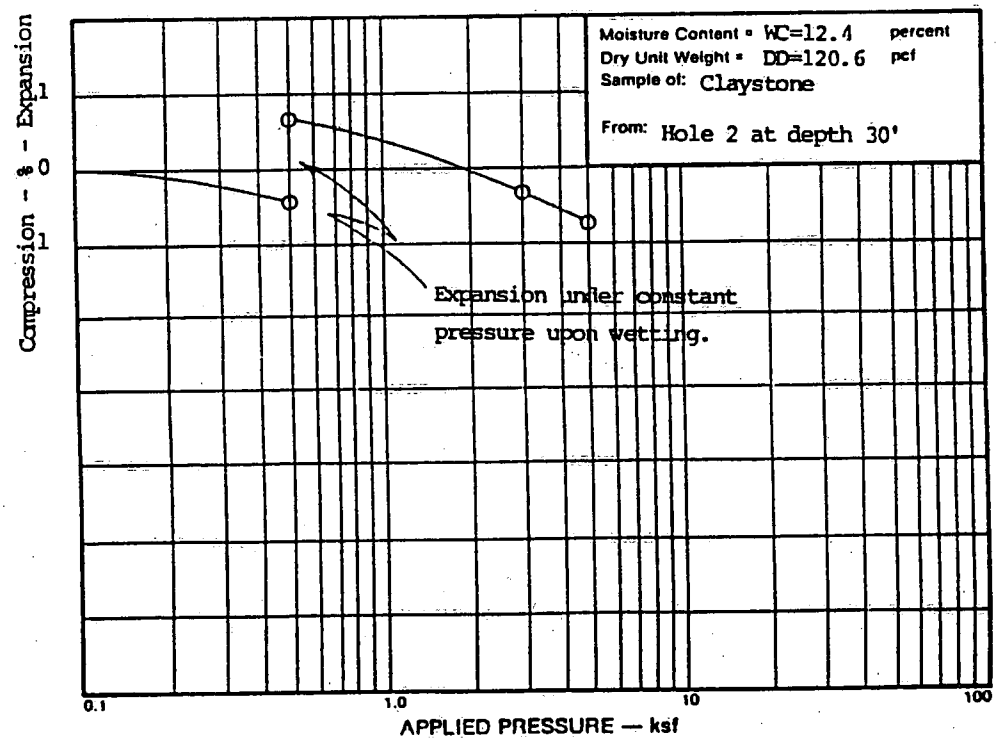
1. Test holes were drilled on January 11 and 18, 1982 with a 6-inch diameter continuous flight hollow stem and 4-inch diameter continuous flight power auger.
2. Location of test holes are approximate and were determined by pacing from existing Croke Channel.
3. Elevations of test hole were determined by interpolation between contours on the plan provided.
4. The locations and elevations of test holes should be considered accurate only to the degree implied by the method used.
5. The stratification lines shown on the test hole logs represent the approximate boundary between soil types and the transition may be gradual.
6. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rain fall, temperature, and other factors at the time measurements were made.
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   -200 = Percent Passing No. 200 Sieve;
   LL = Liquid Limit (%);
   PI = Plasticity Index (%);
   NP = Non Plastic;
   UC = Unconfined Compressive Strength (psf).

LEGEND AND NOTES
Fig. 3

CA-1-79

chen and associates, inc.





23,548

SWELL-CONSOLIDATION TEST RESULTS

Fig. 4

CHEN AND ASSOCIATES

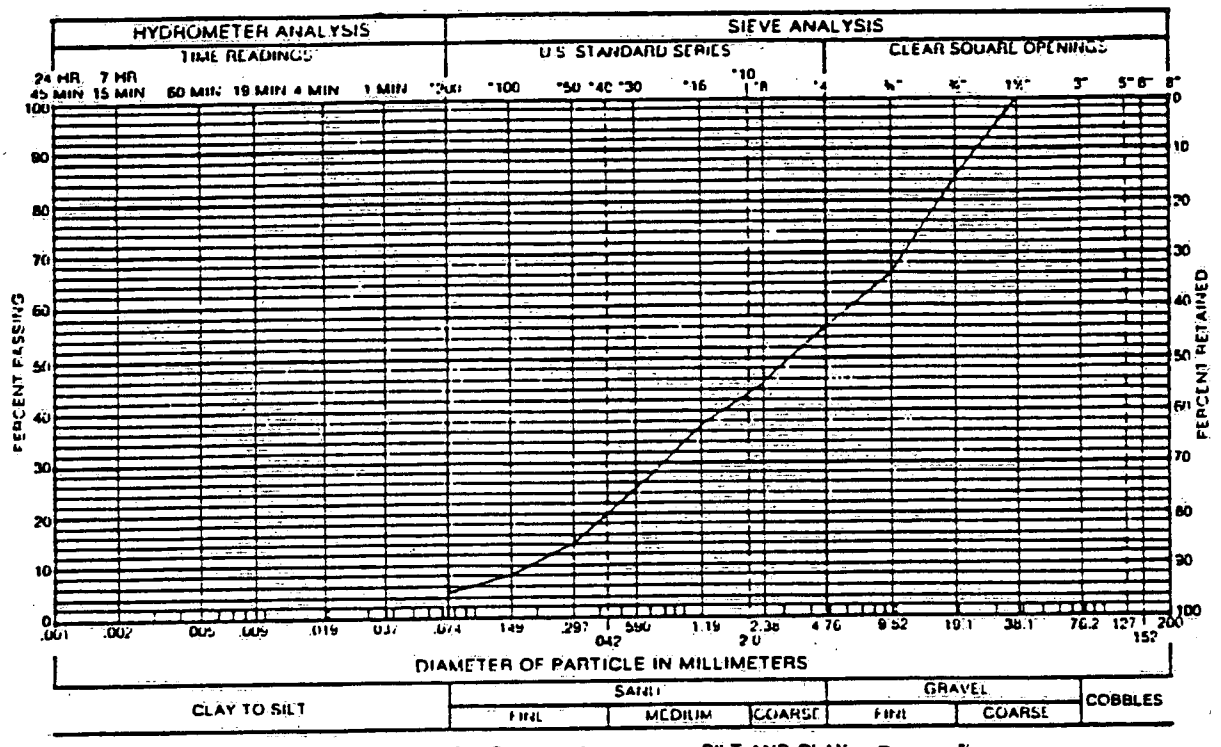
TABLE I

SUMMARY OF LABORATORY TEST RESULTS

Job No. 23,548
Page 1 of 1

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)		SOIL OR BEDROCK TYPE
HOLE	DEPTH (FEET)			GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
1	10	33.1	85.2			60		NP	2400		Sandy silt
	15	10.5	—	44	51	5					Silty sand and gravel.
2	9	21.9	102.6			75	36	21	2000		Sandy clay
	14	8.2	—	50	36	14					Clayey sand and gravel
	25	11.1	124.3			76			23200		Claystone
	30	12.4	120.6			87					Claystone

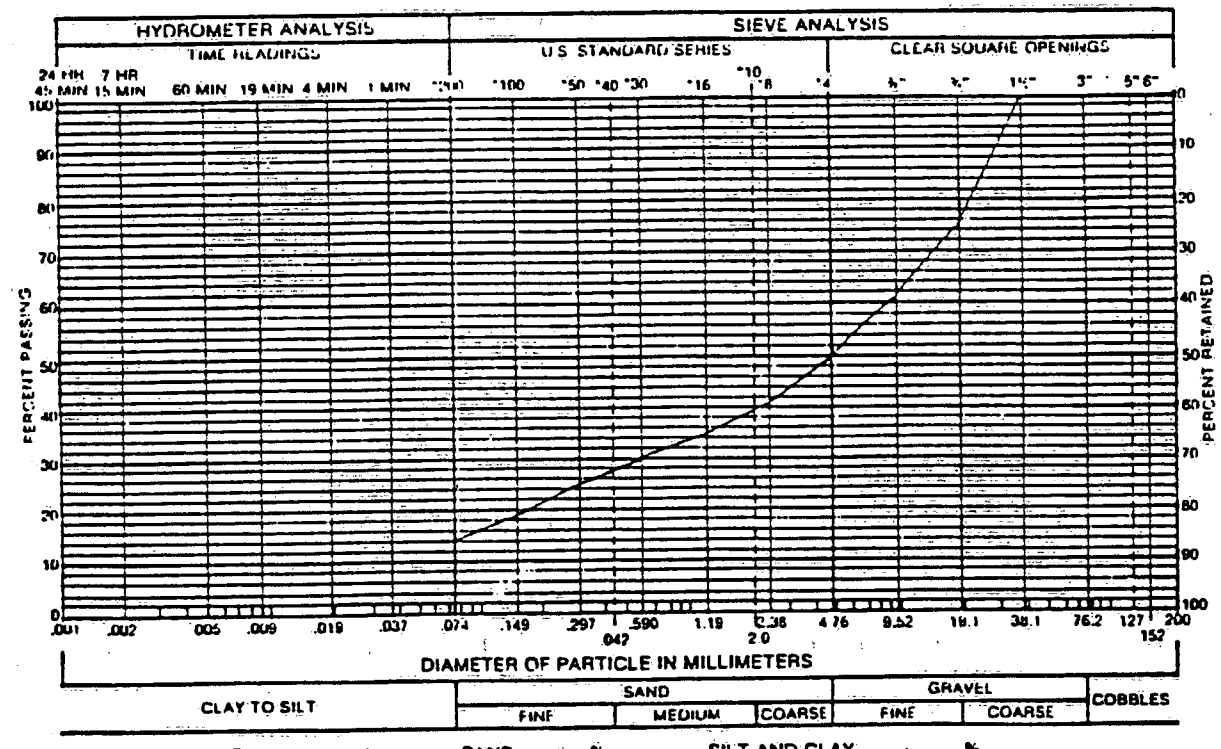
chen and associates, inc.



GRAVEL 44 % SAND 51 % SILT AND CLAY 5 %

LIQUID LIMIT % PLASTICITY INDEX %

SAMPLE OF Silty sand and gravel FROM Hole 1 at depth 15'



GRAVEL 50 % SAND 36 % SILT AND CLAY 14 %

LIQUID LIMIT % PLASTICITY INDEX %

SAMPLE OF Clayey sand and gravel FROM Hole 2 at depth 14'

APPENDIX I

FIELD GC (GAS CHROMATOGRAPH) DATA

GEO
CORPORATION

ERCE
Stanford Place 3, Suite 415
4582 South Ulster St Pkwy
Denver, CO 80237
Attention: Mr. Dave Runyon

Mr. Runyon:

Here are the analytical results for the project done on site at 69th and Indiana in Arvada, Colorado. There were 6 water samples collected, and subsamples were taken from all of these and analyzed.

The instrumentation was calibrated for the SW-846 Method 8020 suite of analytes and unleaded gasoline by Method 8015. Of these, the benzene, toluene, ethylbenzene, and xylene subset (BTEX), and the total volatile hydrocarbons (TVH) are reported.

The PQL for the BTEX analytes is 5 ug/L and for the total volatile hydrocarbons it is 2 mg/L.

The sample analysis for boring #8 was lost due to generator failure. Notation in the analysis log book showed sample run (BH08 WS01) to be clean.

If there are any questions concerning the data or the analysis, please feel free to call.

Cordially,

Adam P. Macdonald

Adam P. Macdonald
Geochemist
GEO Environmental
(303) 279-4655

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH01 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH02 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH03 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

AnalyticalTechnologies, Inc. 225 Commerce Drive Fort Collins, Colorado 80524 (303) 490-1511

January 3, 1992

Mr. Dave Runyon
ERCE
Stanford Place 3, Suite 415
4582 South Ulster Street Parkway
Denver, CO 80237

RE: ATI Workorder: 91-12-195
Client Project Name: Cottonwood ESA

Dear Mr. Runyon:

One water sample was received from ERCE on December 27, 1991. The sample was scheduled for Total Extractable Petroleum Hydrocarbons analysis. Results for this analysis are contained in the following report.

Thank you for your confidence in Analytical Technologies, Inc. Should you have any questions, please call.

Sincerely yours,

Penny Brogan-Daly for

Steven Fry, Ph.D.
Project Manager

SF/jw

Enclosures

Analytical Technologies, Inc.

QUALITY ASSURANCE
DATA REVIEW

The data contained in the following report has been reviewed and approved by the appropriate supervisory personnel listed below:

Eddy Hammerquist

Eddy Hammerquist, Fuels Supervisor

CERTIFICATION

Analytical Technologies, Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the method employed.

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS
Modified Method 8015

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

ATI Workorder Number: 91-12-195

Date Collected: 12/27/91

Date Extracted: 12/31/91

Date Analyzed: 12/31/91

Sample Matrix: Water

Client Sample ID	Lab Sample ID	Dilution Factor	Conc. TEPH (mg/L)
Reagent Blank	91-12-195-RB	1	< 1
006	91-12-195-01	1	2

Note: Sample 006 contains high molecular weight components which could not be quantified by TPH-D analytical conditions.

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS
MATRIX SPIKE RESULTS
Modified Method 8015

Lab Name: Analytical Technologies, Inc.

Client Name: ERCE

Lab Sample ID: 91-12-195-01

Sample Matrix: Water

Client Sample ID: 006

Date Analyzed: 12/31/91

GC Column: DB-5

Compound	Spike Added (mg/L)	Sample Concentration (mg/L)	MS Concentration (mg/L)	MS Percent Recovery
TEPH	10	2	10	80

Compound	Spike Added (mg/L)	MSD Concentration (mg/L)	MSD Percent Recovery	Matrix Spike RPD
TEPH	10	9.8	78	2

CONTRA ERCE - DENVER SAMPLERS Ron C. Holm PROJECT COTTONWOOD E

SITE CONTACT/PHONE DAVE RUNYON 843-6210 LAB/LOCATION ATI - FT. COLLINS

C-O-C NUMBER 0002

~~EG&G ROCKY FLATS~~ RCH, CHAIN OF CUSTODY

ERCE - STANFORD PL. 3 SUITE 415
4582 So. Ulster St. Pkwy
DENVER, CO 80237

	DATE/TIME	SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED-F POT DISS-P	TURN AROUND RUSH-R	OUT OF SPEC REPORTS	PRESERVATIVE: COOLED TO 4C	HCl	NaOH	HNO3	H2SO4	BOTTLE CODES
01	12/27/91 1605	006	Ralston Cr.	1 L glass Amb	1	W				Y					45

91-12-195

RCH 12-27-91

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
Ron C Holm	12/27/91 1615	Derek Fullerton	12/28/91 8:50

REMARKS WILL CALL MONDAY WITH ANALYSIS.

SHIPMENT METHOD

LABORATORY USE ONLY	Y	N
PCKG RECD/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

R-96%
303 490 1522
01-03-92 01:28PM P006 #38
01-03-1992 13:24 303 490 1522 ATI FT COLLINS P.06/06

APPENDIX G

DATA VALIDATION SUMMARY OF LABORATORY RESULTS

Date: 01\15\92
Client: D. Runyon (Ogden)
Reviewer: T. Perrin

Data Validation Summary

Samples and Analyses

Client Sample ID	Lab Sample ID	Analysis	Matrix
001	91-12-190-01	Volatiles	SOIL
004	91-12-190-03	Volatiles	WATER
002	91-12-190-02A	PCBs	SOIL
002	91-12-190-02	Total Lead	SOIL
005	91-12-190-04	Total Lead	WATER

Volatile Organics:

1. Overall Assessment:
Only result summaries were provided so compound identification could not be confirmed from raw instrument results nor could the calculations be verified. No data for instrument tuning or calibration was provided.
Data is acceptable with qualifications as noted below.

2. Holding times:
Per W. Glasgow the sample for volatile water analysis was not preserved with acid. The holding time for volatile analysis of an unpreserved water sample is 7 days. The sample was analyzed at 14 days after collection, therefore analytes were qualified "UJ" in sample 004. Since there are no guidelines for soils the soil sample was not qualified.

3. Surrogate Recoveries:
Surrogate compounds were added to the samples as a measure of purging efficiency. Surrogate recoveries were acceptable for both reagent blanks and sample 004. Recovery for surrogate toluene-d8 was low and bromofluorobenzene high for soil sample 001. All detects were qualified as estimated "J" and all quantitation limits as estimated "UJ" in sample 001 for this QC exceedance. In the case narrative the lab attributed the non-compliant surrogate recoveries to a matrix effect because on reanalysis the surrogate performance did not improve.

4. Reagent Blank:
A reagent blank was analyzed to evaluate possible laboratory-introduced contamination. No target analytes were reported in the reagent blanks. A TIC result page was not provided for the reagent blanks. Whether this is an omission by the lab or whether no TICs were detected in the reagent blanks is unknown. One tentatively identified compound (TIC) was reported in each sample. Trichlorofluoromethane (freon) is a common laboratory contaminant and therefore may not be a true sample constituent in analysis 001.

5. Matrix Spike/Matrix Spike Duplicate:
An associated matrix spike/matrix spike duplicate was performed on a water sample although not on the Ogden water sample. % Recoveries and RPDs were acceptable.

PCBs:

1. Overall Assessment:
No PCBs were reported in the sample. Only result summaries were provided so compound identification could not be confirmed from raw instrument results nor could the calculations be verified. No qualification of data was required.

2. Holding times:
Holding times were acceptable.

3. Surrogate Recoveries:
A surrogate compound was added to the sample before extraction as a measure of the extraction efficiency. The surrogate recoveries at 86 and 98% are considered acceptable for the reagent blank and sample 002 respectively.

4. Reagent Blank:
A reagent blank was analyzed to evaluated possible laboratory-introduced contamination. No target analytes were reported in the method blank.

5. Matrix Spike/Matrix Spike Duplicate:
A matrix spike/matrix spike duplicate was performed on a soil sample although not on the Ogden soil sample. The MS/MSD was analyzed 11 days before sample 002 was extracted so is not really indicative of extraction conditions for sample 002. % Recoveries and RPDs were acceptable. No qualifications were required.

Total Lead:

1. Overall Assessment:
Raw data was not provided for review; therefore, sample results and QC data were reviewed based on information presented in the respective summary forms. Sample results were acceptable without qualifications.

2. Holding Times:
The soil and water sample were analyzed within the water holding time of six months. The water sample was preserved with HNO_3.

3. Blanks:
Blank data presented on the Total Lead analysis data sheet was acceptable.

4. Matrix Spike:
An acceptable Matrix Spike percent recovery (%R) of 108% and 100% were recorded on the Total Lead Matrix Spike sheet for the soil and water samples respectively.

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 001

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Soil

Lab Sample ID: 91-12-190-01
Date Collected: 12/26/91
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration (ug/kg)		Lab Qual	Qual Code	Val Code
Chloromethane	< 10		U	S	VV
Bromomethane	< 10		U		
Vinyl chloride	< 10		U		
Chloroethane	< 10		U		
Methylene chloride	120		J		
Acetone	68		J		
Carbon disulfide	< 5		U		
1,1-Dichloroethene	2	J	J		
1,1-Dichloroethane	< 5		U		
1,2-Dichloroethene (Total)	4	J	J		
Chloroform	3	J	J		
1,2-Dichloroethane	< 5		U		
2-Butanone	< 10		U		
1,1,1-Trichloroethane	12		J		
Carbon tetrachloride	< 5		U		
Vinyl Acetate	< 10		U		
Bromodichloromethane	< 5		U		
1,2-Dichloropropane	< 5		U		
cis-1,3-Dichloropropene	< 5		U		
Trichloroethene	4	J	J		
Dibromochloromethane	< 5		U		
1,1,2-Trichloroethane	< 5		U		
Benzene	4	J	J		
trans-1,3-Dichloropropene	< 5		U		
Bromoform	< 5		U		
2-Hexanone	< 10		U		
4-Methyl-2-pentanone	< 10		U		
Tetrachloroethene	23		J		
1,1,2,2-Tetrachloroethane	< 5		U		
Toluene	24		J		
Chlorobenzene	4	J	J		
Ethylbenzene	7		J		
Styrene	< 5		U		
Total Xylenes	43		J		

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	93	70-121
Toluene-d8	72 *	81-117
Bromofluorobenzene	122 *	74-121

* Outside control limits.

J = compound detected below practical quantitation limit.

OGDEN VALIDATED

VOLATILE ORGANICS DATA SHEET

Tentatively Identified Compounds

Client Sample ID:

001

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-01

Date Collected: 12/26/91

Date Analyzed: 01/09/92

Dilution Factor: 1

Matrix: Soil

Concentration units: ug/kg

COMPOUND NAME	RT	Concentration	Q	Raw Qual	Qual Code	Val Code
Trichlorofluoromethane		120 J		NJ		W

J = estimated value

OGDEN VALIDATED

VOLATILE ORGANICS DATA SHEET

Method 8240

Client Sample ID: 004

Lab Name: Analytical Technologies Inc.
Client Name: ERCE
Client Project ID: Cottonwood ESA
Sample Matrix: Water

Lab Sample ID: 91-12-190-03
Date Collected: 12/26/91
Date Analyzed: 01/09/92
Dilution Factor: 1

COMPOUND NAME	Concentration (ug/L)		Rev Qual	Qual Code	Val Code
Chloromethane	<	10	UJ	H	VV
Bromomethane	<	10			
Vinyl chloride	<	10			
Chloroethane	<	10			
Methylene chloride	<	5			
Acetone	<	10			
Carbon disulfide	<	5			
1,1-Dichloroethene	<	5			
1,1-Dichloroethane	<	5			
1,2-Dichloroethene (Total)	<	5			
Chloroform	<	5			
1,2-Dichloroethane	<	5			
2-Butanone	<	10			
1,1,1-Trichloroethane	<	5			
Carbon tetrachloride	<	5			
Vinyl Acetate	<	10			
Bromodichloromethane	<	5			
1,2-Dichloropropane	<	5			
cis-1,3-Dichloropropene	<	5			
Trichloroethene	<	5			
Dibromochloromethane	<	5			
1,1,2-Trichloroethane	<	5			
Benzene	<	5			
trans-1,3-Dichloropropene	<	5			
Bromoform	<	5			
2-Hexanone	<	10			
4-Methyl-2-pentanone	<	10			
Tetrachloroethene	<	5			
1,1,2,2-Tetrachloroethane	<	5			
Toluene	<	5			
Chlorobenzene	<	5			
Ethylbenzene	<	5			
Styrene	<	5			
Total Xylenes	<	5			

Surrogate Recoveries:	% Rec	% Rec Limits
1,2-Dichloroethane-d4	87	76-116
Toluene-d8	102	88-110
Bromofluorobenzene	101	86-115

OGDEN VALIDATED

Tentatively Identified Compounds

Client Sample ID

004

Laboratory Name: Analytical Technologies, Inc. Date Collected: 12/26/91

Client Name: ERCE Date Analyzed: 01/09/92

Client Project ID: Cottonwood ESA Dilution Factor: 1 1

Lab Sample ID: 91-12-190-03 Matrix: Water

Concentration units: ug/L

COMPOUND NAME	RT	Concentration	Q	Lab Qual	Qual Code	Val Code
Methyl-t-butyl ether		10 J		NJ		VV

J = estimated value

OGDEN VALIDATED

PCB ANALYSIS DATA SHEET
Method 8080

Lab Name: Analytical Technologies Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Lab Sample ID: 91-12-190-02A

Sample Matrix: Soil

Sample Weight: 30 g

GPC Cleanup: N

Client Sample ID: 002

Date Collected: 12/26/91

Date Extracted: 12/30/91

Date Analyzed: 01/03/92

Extract Volume: 10 mL

Dilution Factor: 1

Compound	Conc (mg/kg)	Rev Qual	Qual Code	Val Code
PCB 1016	< 0.03	U		VV
PCB 1221	< 0.03			
PCB 1232	< 0.03			
PCB 1242	< 0.03			
PCB 1248	< 0.03			
PCB 1254	< 0.03			
PCB 1260	< 0.03			

SURROGATE RECOVERY

Compound	% Recovery
Tetrachloro-m-xylene	98

OGDEN VALIDATED

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/02/92

Sample Matrix: Water

Client ID.	ATI ID.	Lead Conc. (mg/L)	Raw Qual	Qual Code	Val Code
Reagent Blank	91-12-190-RB	< 0.003			
005	91-12-190-04	0.065			V V

OGDEN VALIDATED

TOTAL LEAD ANALYSIS DATA SHEET

Laboratory Name: Analytical Technologies, Inc.

Client Name: ERCE

Client Project ID: Cottonwood ESA

Workorder Number: 91-12-190

Date Collected: 12/26/91

Prep Date: 01/02/92

Date Analyzed: 01/03/92

Sample Matrix: Soil

Client ID.	ATI ID.	Lead Conc. (mg/kg)	Raw Qual	Qual Code	Val Code
Reagent Blank	91-12-190-RB	< 5			
002	91-12-190-02	56			VV

OGDEN VALIDATED

Qualifier Codes for Organics

1)	Holding times were exceeded:	H
2)	Tuning (BFB or DFTPP) was non-compliant:	M
3)	Calibration:	
	a) RRF was <0.05:	R
	b) %RSD or %D was outside of QC limits:	C
4)	Blanks:	
	a) Presumed contamination from method blank:	B
	b) Presumed contamination from trip blank:	T
	c) Presumed contamination from field blank:	F
5)	Surrogate recovery was outside of QC limits:	S
6)	MS/MSD recovery was poor or RPD high:	Q
7)	Field duplicates showed poor agreement:	E
8)	IS Performance was unsatisfactory:	I
9)	Compound ID:	
	a) False positive (reported compound was not present):	+
	b) False Negative (compound was present but not reported):	-
10)	Reported result or other information was incorrect:	$
11)	TIC identity or reported retention time has been changed:	?
12)	Original analyses, dilutions, reanalyses or duplicate data that should not be used because another more technically sound analysis is available:	D
13)	Instrument performance for pesticides was poor:	P
14)	Unusual problems with the data that have been described in the Data Summary in a specific section. For example, *11 indicates that an unusual problem has been described in section 11 of the Data Summary:	*#

Reviewer Codes

U The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

J The analyte was positively identified in the sample, but the associated numerical value may not be an accurate representation of the amount actually present in the environmental sample. Values are of limited use.

R The data are unusable (presence or absence cannot be determined). Resampling and/or reanalysis is necessary for verification.

N Presumptive evidence of the presence of the material.

NJ Presumptive evidence of the presence of the material at an estimated quantity.

UJ The material was analyzed for but was not detected. The sample quantitation limit is an estimated quantity.

Validation Codes

Validation Code	Definition	Usability
VV	Validated Valid	Usable data
VI	Validated Invalid	Unusable for any purpose.
UN	Unvalidated	All data which has not been validated e.g. trip blanks

APPENDIX H

CHEN AND ASSOCIATES CONSULTING GEOTECHNICAL ENGINEERS

"Soil & Foundation Investigation Proposed Bridge Across Ralston Creek Cottonwood Subdivision"

chen and associates
CONSULTING GEOTECHNICAL ENGINEERS
86 SOUTH ZUNI STREET • DENVER, COLORADO 80223 • 303/744-7105

SOIL & FOUNDATION INVESTIGATION
PROPOSED BRIDGE ACROSS RALSTON CREEK
COTTONWOOD SUBDIVISION
JEFFERSON COUNTY, COLORADO

Prepared for:

KKBNA
7456 W. 5th Avenue
Denver CO 80226

Attn: Mr. Gary Thomas

RECEIVED
JAN 29 1982
K-K-B-N-A

Job No. 23,548

January 27, 1982

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PURPOSE AND SCOPE OF STUDY

This report presents the results of a soil and foundation investigation for a bridge across Ralston Creek in Cottonwood Subdivision, Jefferson County, Colorado. The project site is shown on Fig. 1.

This report has been prepared to summarize the data obtained and to present our conclusions and recommendations based on the conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction of the proposed facility are included.

PROPOSED CONSTRUCTION

An 80 foot long single-span structure is proposed for the site. The structure will be approximately 44 feet wide and include two 15 foot lanes and two 5 foot sidewalks with parapets. The type of construction had not been finalized at the time of our investigation. For purposes of this report, the foundation loads were assumed to range between 100 and 300 kips per abutment.

If loadings or conditions are significantly different from those described above, we should be notified to re-evaluate the recommendations contained in this report.

SITE CONDITIONS

The bridge site is located in the Cottonwood Subdivision on Kilmer Street. The structure will provide access across Ralston Creek. At the time of our investigation, the creek was approximately 4 feet wide

with flowing water about 6 inches deep. The north bank is nearly vertical with an overall depth of approximately 12 feet. The south bank is on a 1:1 slope with an intermediate bench.

The site was vacant at the time of our investigation. The vegetation consists of native grasses, weeds and deciduous trees along Ralston Creek.

Croke Canal is approximately 300 feet west of the proposed ditch site and runs perpendicular to Ralston Creek. The flow in the canal is approximately 15 feet wide with the water level at approximately elevation 60. A gate controls the flow from the canal into the creek. At the time of our investigation, the gate was closed. It appears that water seeps from the canal into the creek.

SUBSURFACE CONDITIONS

To evaluate the subsurface conditions at the bridge site, 3 test holes were drilled at the approximate locations shown on Fig. 1. Six additional test holes were drilled in the subdivision south of Ralston Creek to determine the extent and depth of trash fill.

In general, the subsoils at the site were highly variable. They consisted of 20 to 25 feet of trash fill, organic silt, clay, sand and gravel overlying bedrock. Trash fill varied in depth from 8 to 16 feet across the entire area south of Ralston Creek. This is an old landfill which consists of approximately 3 feet of sandy clay overlying various metal, plastic, wood, paper, glass and organic material. The exact lateral and vertical extent of the fill was not determined as a result of this investigation.

A 2.5 to 3 foot layer of organic silt was encountered in Test Holes 1, 7 and 9 below the trash fill. The clay is sandy and medium stiff and the sand is clayey and medium dense. The gravel and sand layer varied in thickness from 7 to 13 feet. This material is poorly graded and dense to very dense with scattered cobbles.

Claystone bedrock underlies the overburden soils. The claystone consists of a 1.5 to 2.5 foot weathered mantel overlying sandy and hard to very hard claystone. Field penetration tests and unconfined compression tests indicate that the bedrock is capable of supporting moderate foundation loads without undergoing significant settlements. Results of laboratory tests are shown on Figs 4 and 5 and summarized on Table I.

Free water was encountered at depths of 10.5 to 14 feet below the ground surface at the time of drilling and when measured 4 to 8 days after drilling, see Figs. 2 and 3.

Ground wt. intersect landfill

EXISTING LANDFILL

Landfill debris consisting of mixtures of wood, paper, glass, plastic and metal was encountered in all of the test holes drilled south of Ralston Creek. This area and two areas to the south have been identified by the Jefferson County Health Department as known landfills. The approximate locations of these fills, results of bar hole punch gas surveys and landfill histories, are presented in a report prepared by the department.[1]

1. Jefferson County Health Department, Methane Site Investigation, 1980.

Combustible gas measurements were taken during our investigation to determine if combustible gases were present in the landfill. The measurements were obtained with an MSA Model 53 gas scope. This instrument allows the measurement of the percent by volume of combustible gas in air and the percent lower explosive limit (LEL). The measurements obtained indicated 85% to 100% of the LEL and 3% to 28% combustible gases. The readings are summarized below:

Hole No.	% LEL	% Gas
4	100	10
5	85	3
6	100	28
9	100	13

Based on these readings, it appears that combustible gas is being generated within this landfill in quantities sufficient to be considered a hazard. The combustible range of methane gas is between 5% and 15% by volume in air. Concentrations above this range are too rich to burn. However, gas migration or exposure to the atmosphere will result in dilution of the gas and result in a flammable condition.

Care should be taken when excavating within or adjacent to the landfill mass. Venting of excavations will be required. Any structures built over the landfill will require special methane gas controls. There are 2 basic approaches to controlling the migration of methane into structures. These include barriers separating the proposed structure from the landfill and ventilation systems. Access roads, parking areas, underground utilities and other facilities constructed on landfill materials will be subjectd to large differential movements and a corrosive environment. The owner should

be aware of the high risk of distress associated with construction on landfills.

FOUNDATION RECOMMENDATIONS

Based on the subsurface conditions encountered at the site and the proposed construction, we recommend that the bridge be supported on drilled piers founded in the underlying unweathered bedrock. The following design and construction details should be observed for a drilled pier foundation system:

(1) Piers should be designed for a maximum end bearing pressure of 40,000 psf and a skin friction of 4,000 psf for the portion of the pier in unweathered bedrock. Piers should be designed for a minimum dead load pressure of 15,000 psf based on end area only. Uplift on the piers can be resisted by utilizing 50% of the skin friction value plus the weight of the pier.

(2) Piers should penetrate at least three pier diameters into the competent bedrock. A minimum penetration of 5 feet into the bedrock is recommended.

(3) Piers should be designed to resist lateral loads assuming a modulus of horizontal subgrade reaction in the clay of 40 tcf, a constant of horizontal subgrade reaction in the granular soils of 60 tcf and a modulus of horizontal subgrade reaction of 200 tcf in the bedrock. Resistance to lateral loads should be neglected in the trash fill and all materials above estimated scour depth.

(4) The minimum spacing requirements between caissons on the site should be 3 diameters from center to center. At this spacing, no

reduction in axial or horizontal soil modulus values is required. Piers grouped less than 3 diameters center to center should be studied on an individual basis to determine the appropriate reduction in both lateral and axial capacity.

(5) A minimum pier diameter of 24 inches is recommended to facilitate proper cleaning and observation of the pier hole.

(6) Concrete utilized in the piers should be a fluid mix with sufficient slump so that concrete will fill the void between reinforcing steel and the pier hole.

(7) Rock penetration in all pier holes should be roughened artificially to assist the development of peripheral shear between the pier and the bedrock. The roughening should be installed with a grooving tool in a pattern approved by the soil engineer.

The specifications should allow the soil engineer to eliminate the requirements for pier roughening if it appears the roughening procedure is not beneficial. This could occur if the pier hole is sufficiently roughened by the drilling process or if the presence of water results in a degradation of the pier hole during the roughening procedure.

(8) Based on the results of our field exploration, laboratory testing and experience with similiar, properly constructed caisson foundations, we estimate that pier settlement will be low. Generally, we estimate that settlement for a 24 to 36 inch diameter pier will be approximately 3/4 to 1 inch when designed with the criteria presented herein. The settlement of closely

spaced piers will be larger and should be studied on an individual basis.

(9) Pier holes should be properly cleaned prior to the placement of concrete.

(10) The presence of water and the nature of overburden strata encountered at the site indicates that the use of casing will be required to reduce water infiltration into the pier holes. If water cannot be removed prior to placement of concrete, the tremie method should be used after the hole has been well cleaned. In no case should concrete be placed in more than 3 inches of water.

(11) Gravel and cobbles were encountered during drilling of our test holes. These conditions will complicate the drilling process and may reduce the effectiveness or prevent seating of the casing in the upper bedrock surface. The drilling contractor should be made aware of this information and should be prepared for these conditions during the pier installation.

(12) Adequate construction equipment should be used to drill the piers to the required penetration and seat the casing into the bedrock materials. If shallow refusal is encountered in the bedrock our office should be notified to evaluate the conditions and establish that true refusal has been met with adequate equipment.

(13) A representative of the soil engineer should observe the pier drilling operations.

FOUNDATION ALTERNATES

Based on the subsurface conditions encountered, the proposed bridge may be supported on high-capacity driven piles or spread footings.

Driven Pile Alternate: The following design and construction details should be closely followed for a driven pile foundation system.

(1) The maximum allowable pile capacity should not exceed a service stress of 12,000 psi.

(2) The pile type should consist of heavy steel H-pile with tip reinforcement.

(3) The piles should penetration a minimum of 3 feet into unweathered bedrock.

(4) The piles should be designed to resist lateral loads using a modulus of subgrade reaction of 40 tcf, a constant of horizontal subgrade reaction in the clay of 60 tcf and a modulus of horizontal subgrade reaction of 200 tcf in the bedrock. Resistance to lateral loads should be neglected in the trash fill material and all material above the estimated scour depths.

(5) All piers should be advanced to virtual refusal. Virtual refusal is defined as 20 blows per inch with an approved pile hammer.

(6) The rated energy output of the hammer should be between 1800 and 2,000 foot-pounds per square inch of pile cross-sectional area.

(7) The hammer should be operating at the manufacturers recommended stroke when virtual refusal is measured.

(8) Due to the dense to very dense sand and gravel strata at the site, difficult driving conditions should be anticipated. These

conditions could adversely affect the structural integrity of the piles and also result in variable penetration into subsurface materials. Consequently, predrilling may be required to advance piles through the sand and gravel overburden materials.

(9) A representative of the soil engineer should observe the pile driving operations.

Spread Footing Alternate: The structure may be founded on spread footings placed on the dense to very dense sand and gravel strata. The following design and construction details should be observed for spread footing foundation system.

(1) Footings placed on undisturbed sand and gravel strata may be designed for a maximum allowable soil bearing pressure of 6,000 psf.

(2) Spread footings placed on granular soils should have a minimum footing dimension of not less than 36 inches.

(3) Footings should be provided with adequate scour protection above their bearing elevation.

(4) The lateral resistance of spread footing foundations placed on the undisturbed sand and gravel strata at the site will be a combination of the passive earth pressure against the side of the footing and the sliding resistance of the footing on the foundation materials. Sliding friction at the bottom of the footings can be taken as 0.4 times the vertical dead load. Passive pressure against the sides of the footings can be

calculated using an equivalent fluid pressure of 200 psf per foot of depth.

(5) Based on experience, we estimate that total settlement for footings designed and constructed as discussed in this section will be approximately 3/4 inch.

(6) The proposed footing elevations appear to be near or slightly above ground water level. Therefore, it may be necessary to dewater some footing excavations during construction. Dewatering should not be conducted by pumping from inside the footing excavations. This may decrease the supporting capacity of the soils.

(7) A representative of the soil engineer should observe all footing excavations prior to concrete placement in order to evaluate the supporting capacity of foundation materials.

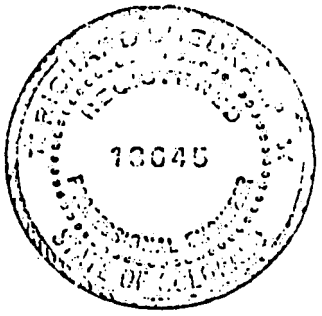
ABUTMENT AND WINGWALL BACKFILL

Backfill within 6 feet of the abutments and wingwalls should be Class 1 structural backfill in accordance with Colorado Standard Specifications for Road and Bridge Construction and should be compacted to a density of not less than 95% as determined in accordance with ASTM D698. Design lateral loads on wingwalls and abutments should be based on equivalent fluid pressure of 40 psf per foot.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in this area for

use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory holes drilled at the locations indicated on the exploratory hole plan. The nature and extent of variations between the exploratory holes may not become evident until excavation is performed. If during construction, soil, rock and ground water conditions appear to be different from those described herein, this office should be advised at once so that re-evaluation of the recommendations may be made. We recommend on-site observation of excavations and foundation bearing strata by a soil engineer.



CHEN AND ASSOCIATES, INC.

By _____
Richard J. Suedkamp, P.E.

Reviewed By _____
David M. Jubenville, P.E.

RJS:fs

CONCLUSIONS

(1) The proposed structure should be founded on piers drilled into bedrock and designed for maximum end bearing pressure of 40,000 psf, a skin friction of 4,000 psf and a minimum dead load pressure of 15,000 psf, with design and construction details as outlined.

(2) Alternate foundation systems consisting of steel H-piles and designed for a maximum stress of 12,000 psi with tip reinforcement or spread footings placed on the lower sand and gravel strata and designed for a maximum bearing pressure of 6,000 psf may be used.

(3) Trash fill varying in depth from 8 to 16 feet was encountered across the site south of Ralston Creek. This landfill material is generating sufficient quantities of combustible methane gas to be hazardous.

LEGEND:

Fill, man-made, sandy clay.

Trash fill, man-made, clay, metal, plastic, wood, paper organic materials.

Organic silt, slightly sandy, slightly clayey, stiff, moist to ver moist, black.

Clay (CL), sandy, medium to stiff, moist to very moist, red to brown, occasionaly gravel.

Gravel, silty to sandy, poorly graded, medium dense to very dense, wet, brown, scattered cobbles.

Weathered Claystone, sandy, firm to medium hard, moist, rust to br

Claystone, sandy, very hard, moist, gray.

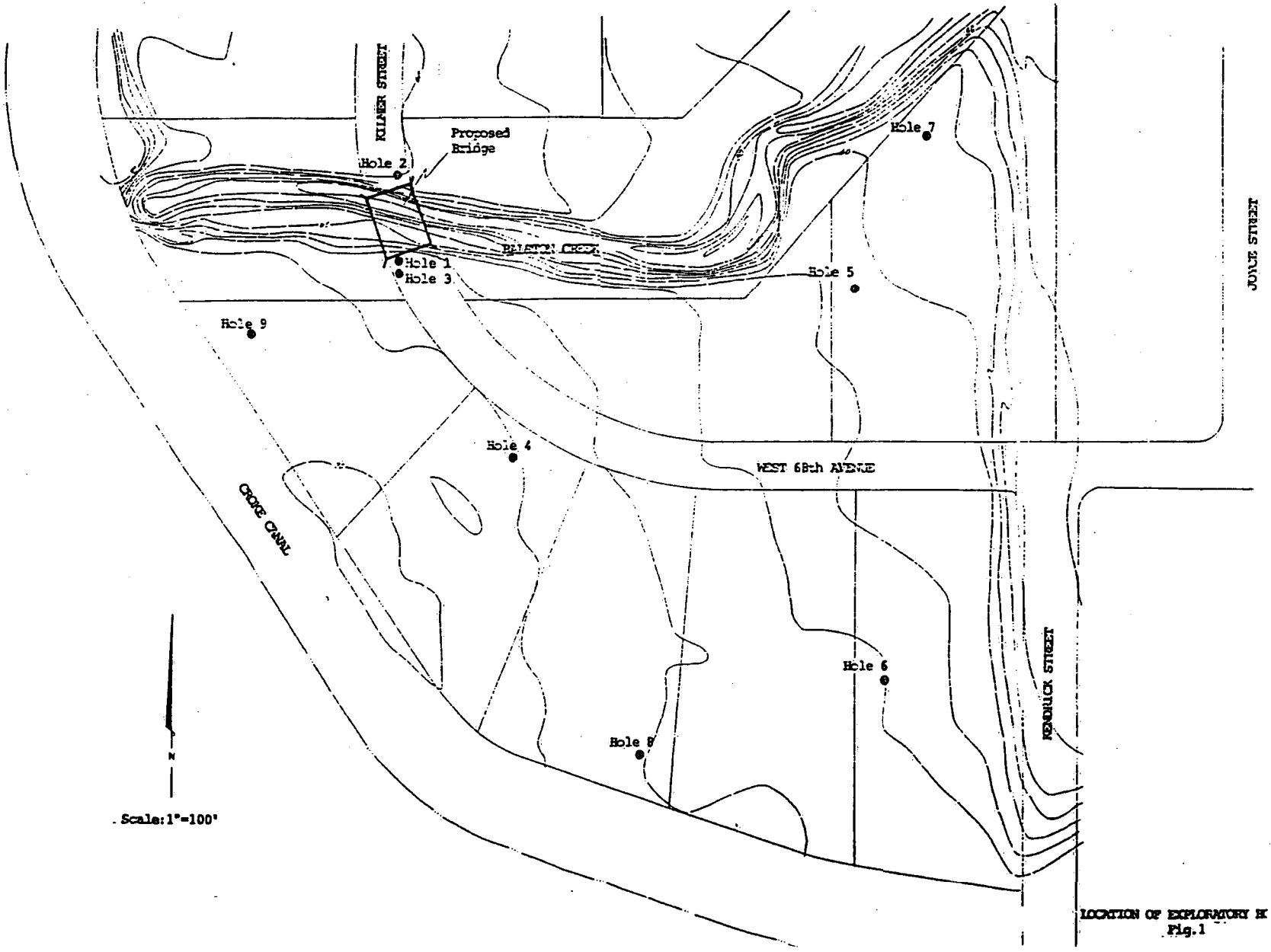
Undisturbed drive sample. The symbol 15/12 indicates that 15 blows a 140 pound hammer falling 30 inches were required to drive the sa 12 inches.

Standard Split Spoon Sample.

Indicates P.V.C. pipe installed to depth shown.

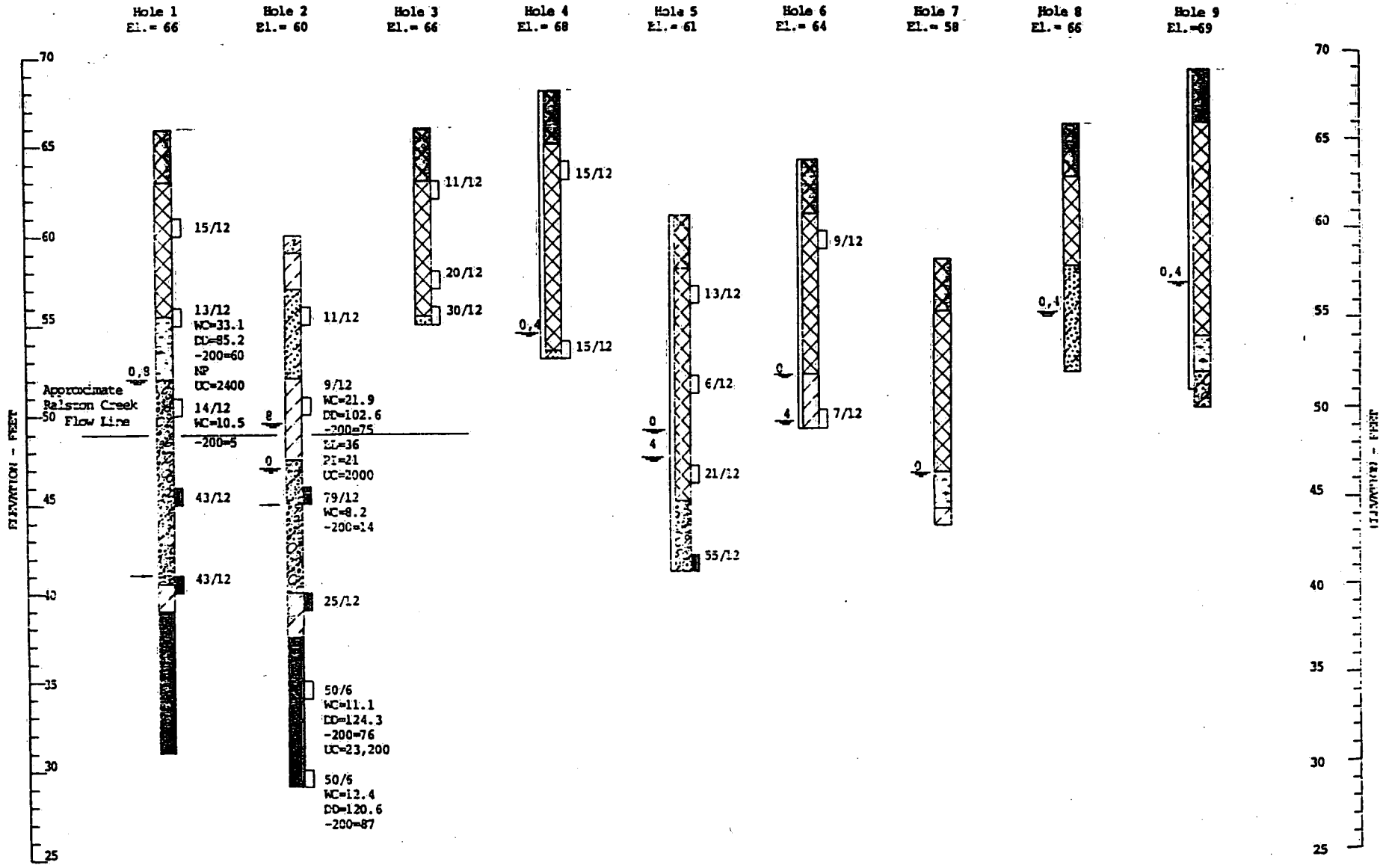
Indicates depth to free water.

Depth at which hole caved.



23,548

LOCATION OF EXPLORATORY H
Fig.1



23.548

LOGS OF EXPLORATORY HOLES
Fig. 2

Fill, man-made, sandy clay.

Trash fill, man-made, clay, metal, plastic, wood, paper organic materials.

Organic silt, slightly sandy, slightly clayey, stiff, moist to very moist, black.

Clay (CL), sandy, medium to stiff, moist to very moist, red to brown, occasionally gravel.

Gravel, silty to sandy, poorly graded, medium dense to very dense, wet, brown, scattered cobbles.

Weathered Claystone, sandy, firm to medium hard, moist, rust to brown.

Claystone, sandy, very hard, moist, grey.

Undisturbed drive sample. The symbol 15/12 indicates that 15 blows of a 140 pound hammer falling 30 inches were required to drive the sampler 12 inches.

Standard Split Spoon Sample.

Indicates P.V.C. pipe installed to depth shown.

4 Indicates depth to free water.

Depth at which hole caved.

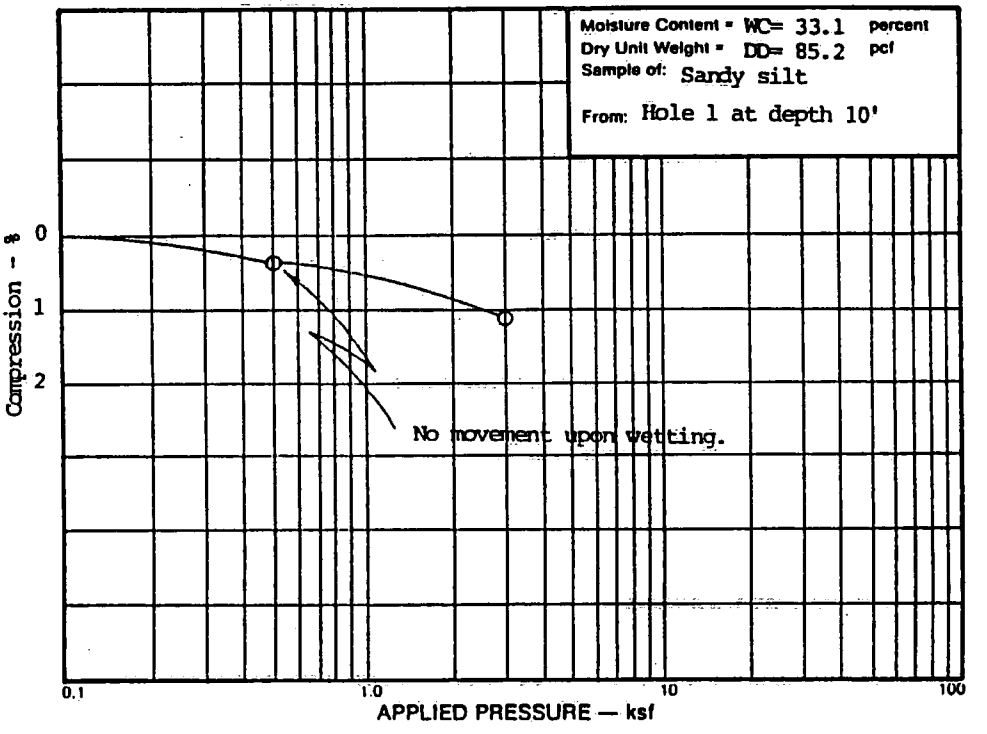
NOTES:

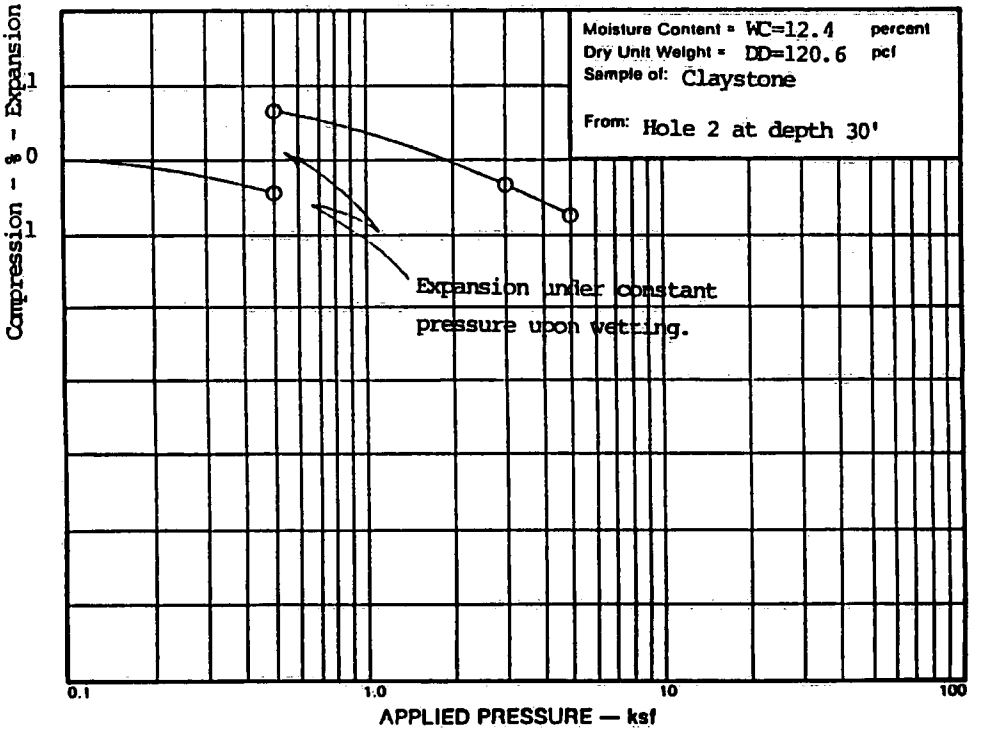
1. Test holes were drilled on January 14 and 18, 1982 with a 6-inch diameter continuous flight hollow stem and 4-inch diameter continuous flight power auger.
2. Location of test holes are approximate and were determined by pacing from existing Croke Channel.
3. Elevations of test hole were determined by interpolation between contours on the plan provided.
4. The locations and elevations of test holes should be considered accurate only to the degree implied by the method used.
5. The stratification lines shown on the test hole logs represent the approximate boundary between soil types and the transition may be gradual.
6. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rain fall, temperature and other factors at the time measurements were made.
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   -200 = Percent Passing No. 200 Sieve;
   LL = Liquid Limit (%);
   PI = Plasticity Index (%);
   NP = Non Plastic;
   UC = Unconfined Compressive Strength (psf).

LEGEND AND NOTES
Fig. 3

CA-1-79

chen and associates, inc.





23,548 SWELL-CONSOLIDATION TEST RESULTS Fig. 4

CHEN AND ASSOCIATES

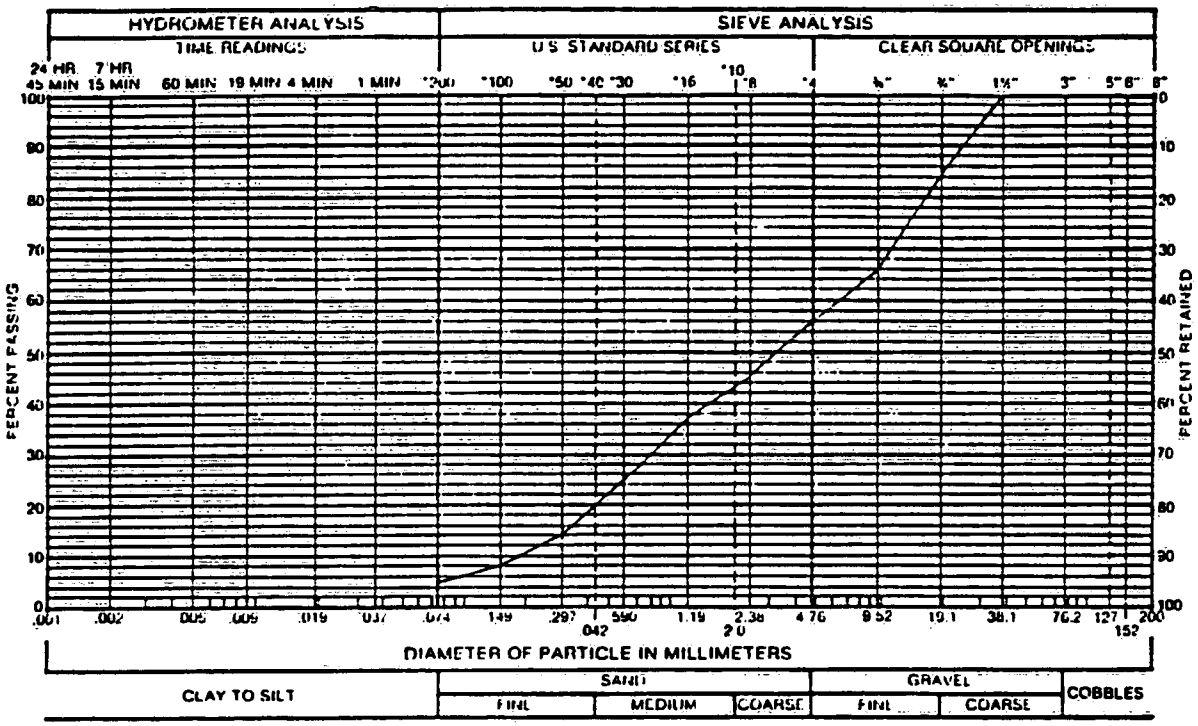
TABLE I

SUMMARY OF LABORATORY TEST RESULTS

Job No. 23,548
Page 1 of 1

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)		SOIL OR BEDROCK TYPE
HOLE	DEPTH (FEET)			GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
1	10	33.1	85.2			60		NP	2400		Sandy silt
	15	10.5	—	44	51	5					Silty sand and gravel.
2	9	21.9	102.6			75	36	21	2000		Sandy clay
	14	8.2	—	50	36	14					Clayey sand and gravel
	25	11.1	124.3			76			23200		Claystone
	30	12.4	120.6			87					Claystone

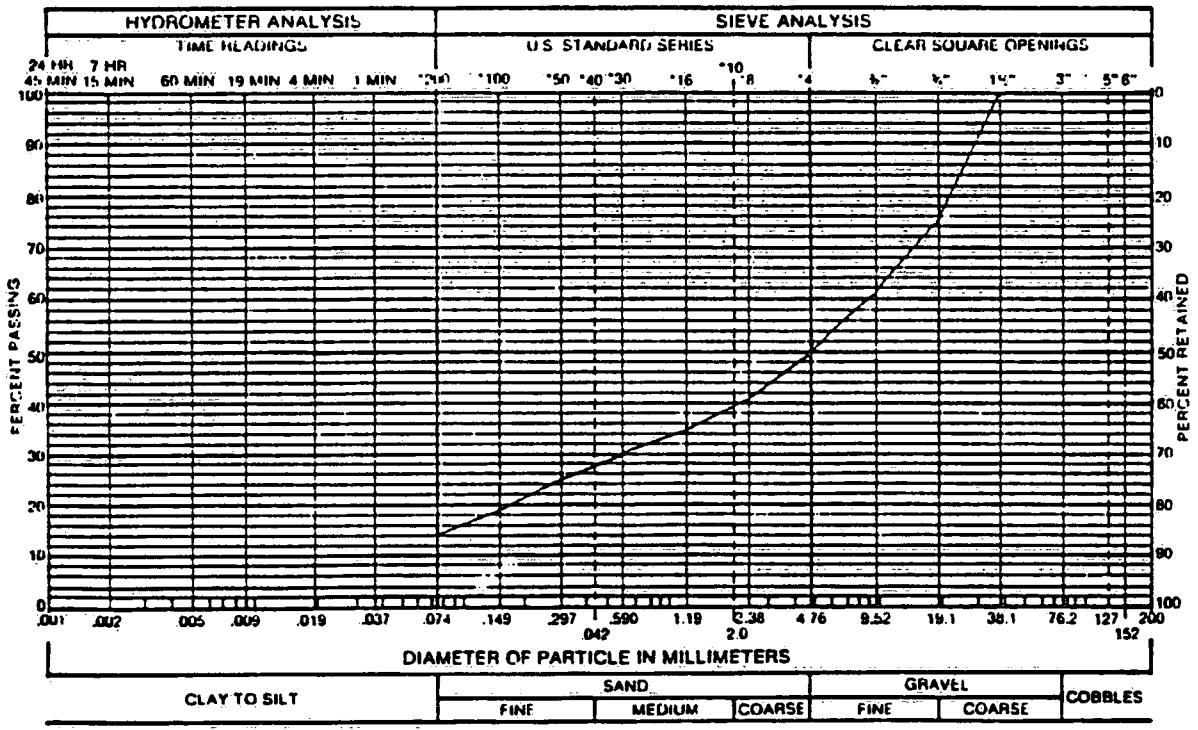
chen and associates, inc.



GRAVEL 44 % SAND 51 % SILT AND CLAY 5 %

LIQUID LIMIT % PLASTICITY INDEX %

SAMPLE OF Silty sand and gravel FROM Hole 1 at depth 15'



GRAVEL 50 % SAND 36 % SILT AND CLAY 14 %

LIQUID LIMIT % PLASTICITY INDEX %

SAMPLE OF Clayey sand and gravel FROM Hole 2 at depth 14'

GRADATION TEST RESULTS

APPENDIX I

FIELD GC (GAS CHROMATOGRAPH) DATA

GEO
CORPORATION

ERCE
Stanford Place 3, Suite 415
4582 South Ulster St Pkwy
Denver, CO 80237
Attention: Mr. Dave Runyon

Mr. Runyon:

Here are the analytical results for the project done on site at 69th and Indiana in Arvada, Colorado. There were 6 water samples collected, and subsamples were taken from all of these and analyzed.

The instrumentation was calibrated for the SW-846 Method 8020 suite of analytes and unleaded gasoline by Method 8015. Of these, the benzene, toluene, ethylbenzene, and xylene subset (BTEX), and the total volatile hydrocarbons (TVH) are reported.

The PQL for the BTEX analytes is 5 ug/L and for the total volatile hydrocarbons it is 2 mg/L.

The sample analysis for boring #8 was lost due to generator failure. Notation in the analysis log book showed sample run (BH08 WS01) to be clean.

If there are any questions concerning the data or the analysis, please feel free to call.

Cordially,

Adam P. Macdonald

Adam P. Macdonald
Geochemist
GEO Environmental
(303) 279-4655

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH01 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH02 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH03 WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

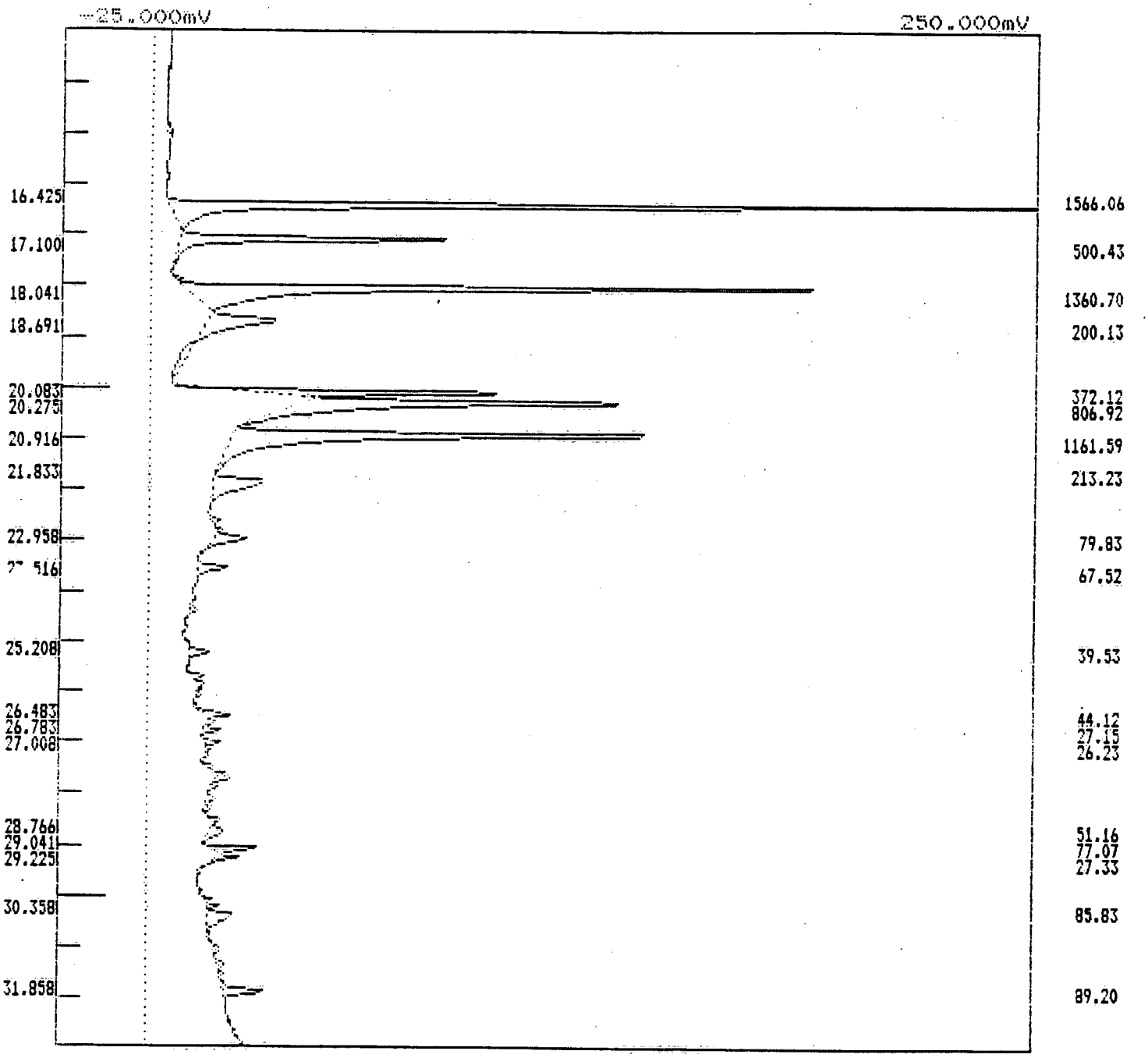
Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: RALSTON CRK WS01

Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Client: ERCE
Chromatographer: Adam P. Macdonald
Analysis Date: December 26, 1991
Analysis: SW-846 Method 8015/8020
Location: 69th & Indiana Arvada, CO
Sample Number: BH06 WS01

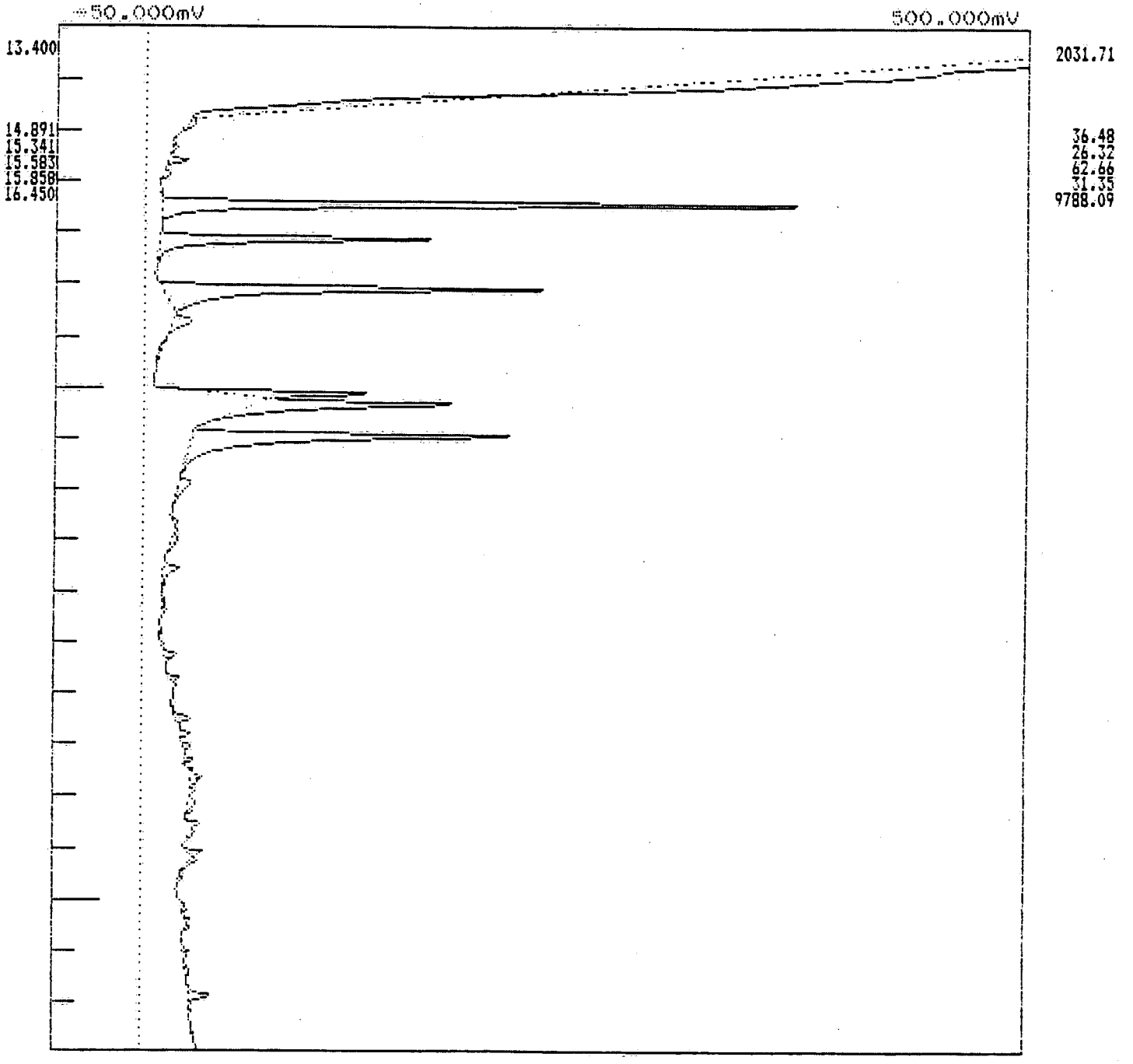
Analyte	Concentration	
Benzene	<5	ug/L
Toluene	<5	ug/L
Ethylbenzene	<5	ug/L
Total Xylenes	<5	ug/L
Total Volatile Hydrocarbons	<2	mg/L

Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A1.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 07:06:29



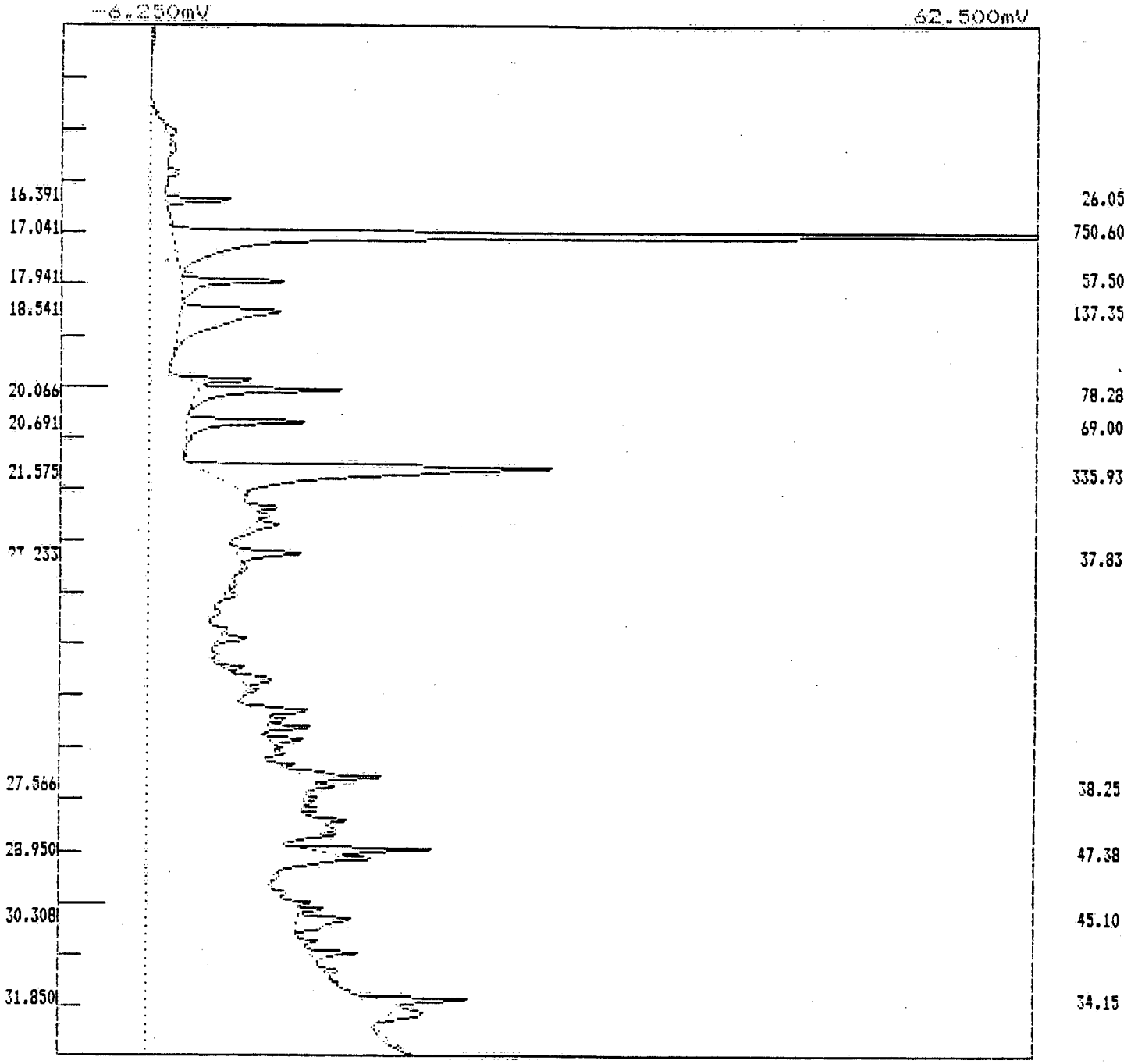
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.425	1566.06	206.06	76.4270	NG
F3-Toluene surr	2	17.100	500.43	404.42	150.0000	NG
Toluene	3	18.041	1360.70	179.04	66.4053	NG
Ethylbenzene	5	20.083	372.12	186.06	271.8159	NG
m -Xylene	6	20.275	806.92	216.91	316.8863	NG
o -Xylene	7	20.916	1161.59	223.38	326.3371	NG
BFB - surr	8	21.833	213.23	102.68	150.0000	NG
7			5981.06	1518.56	1357.8717	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 2 FID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225B1.CHR
Temperature : 8020.TEM
Components : 8020TPGH.CPT
Date : 12/26/1991
Time : 07:06:29



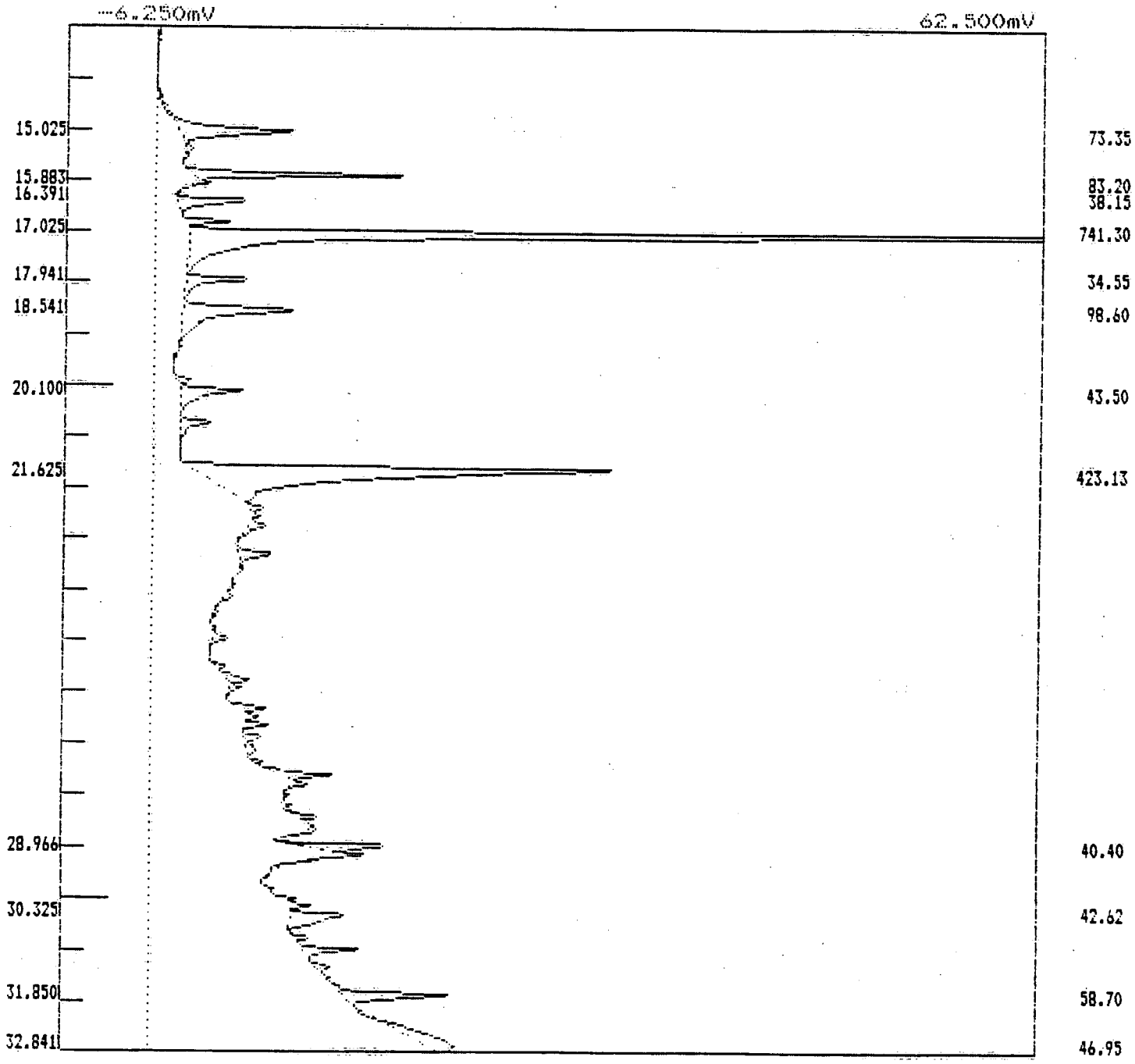
Component	Number	Retention	Area	External	Internal	Units
TOTL PRGBL H-C	1	16.450	9788.09	N/A	N/A	
1			9788.09	N/A	N/A	

Control File : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : 5 ML DI H2O BLANK (250NG SURR'S)
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A2.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 09:26:18



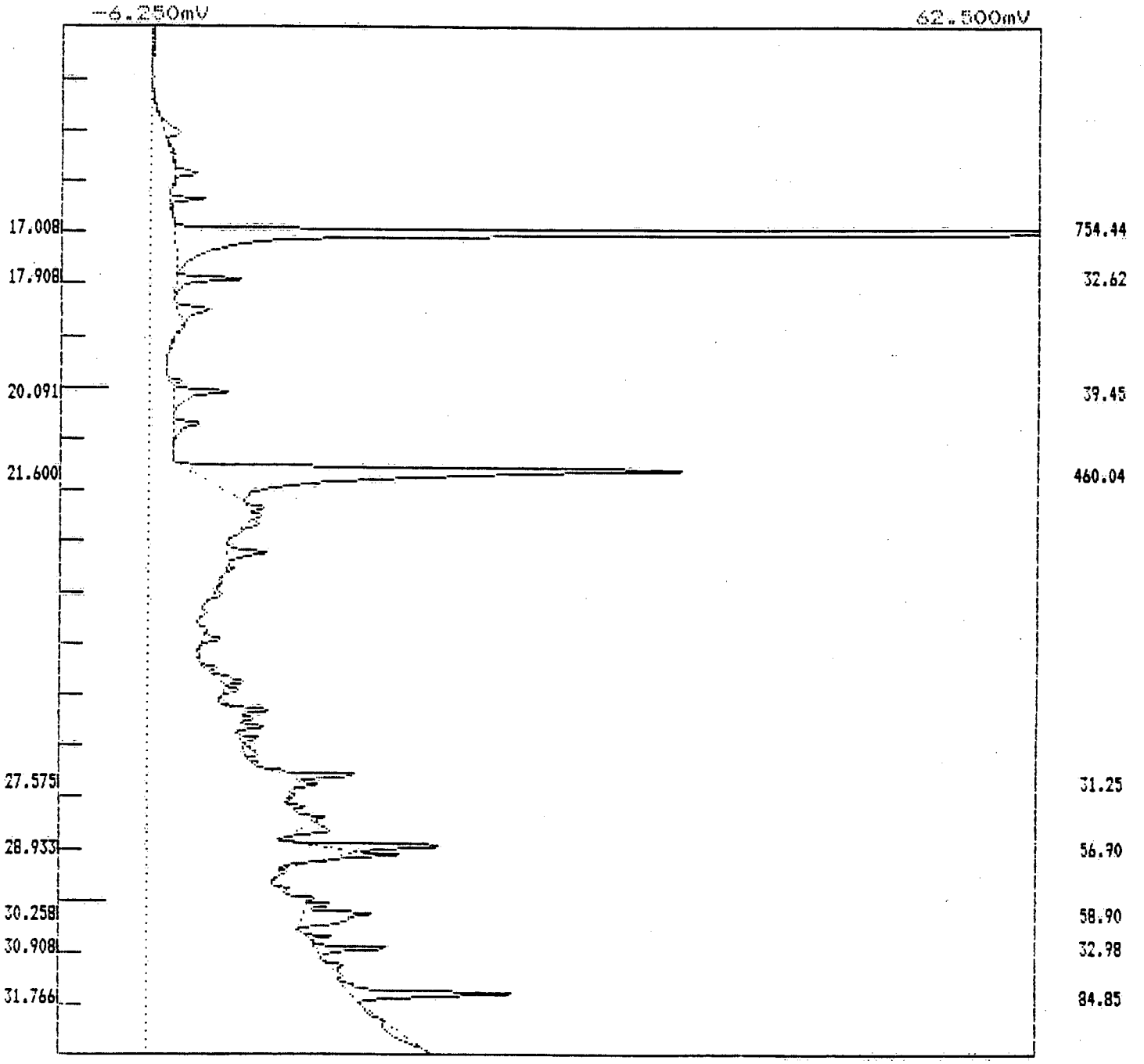
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.391	26.05	3.43	0.8872	NG
FB-Toluene surr	2	17.041	750.60	579.54	150.0000	NG
Toluene	3	17.941	57.50	7.57	1.9582	NG
m -Xylene	6	20.066	78.28	21.04	24.7398	NG
o -Xylene	7	20.691	69.00	13.27	15.6013	NG
BFB - surr	8	21.575	335.93	127.58	150.0000	NG
6			1317.35	752.43	343.1865	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : BH01 WS01 5ML PURGE COLLECTED @ 1057 @ 12'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A3.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 11:11:45



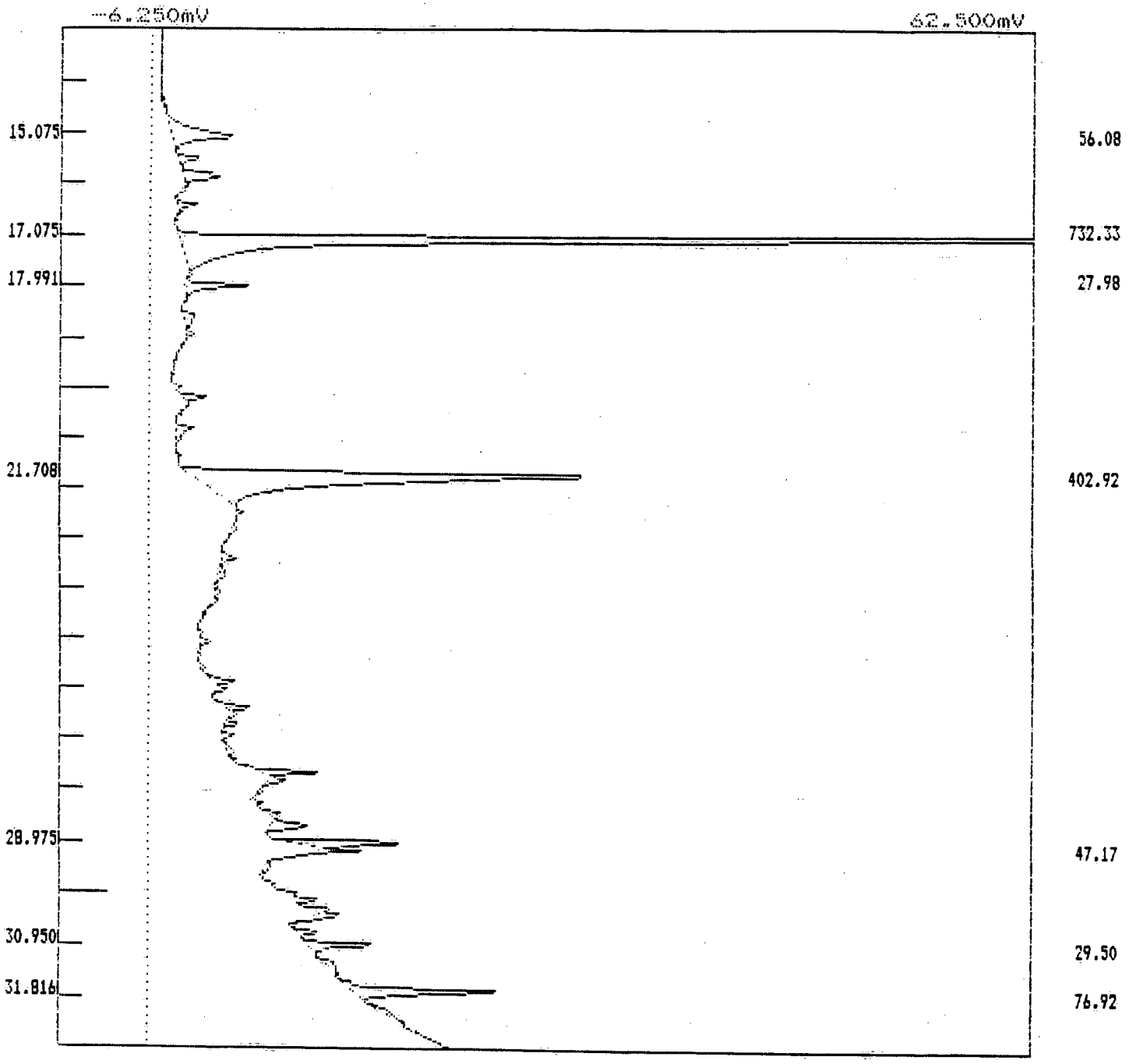
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.391	38.15	5.02	1.3140	NG
F3-Toluene surr	2	17.025	741.30	573.04	150.0000	NG
T uene	3	17.941	34.55	4.55	1.1900	NG
m, -Xylene	6	20.100	43.50	11.69	12.0738	NG
BFB - surr	8	21.625	423.13	145.28	150.0000	NG
5			1280.63	739.58	314.5778	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : RALSTON CRK WS01 5ML PURGE COLLT'D @1325@SURF.
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A4.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 13:33:35



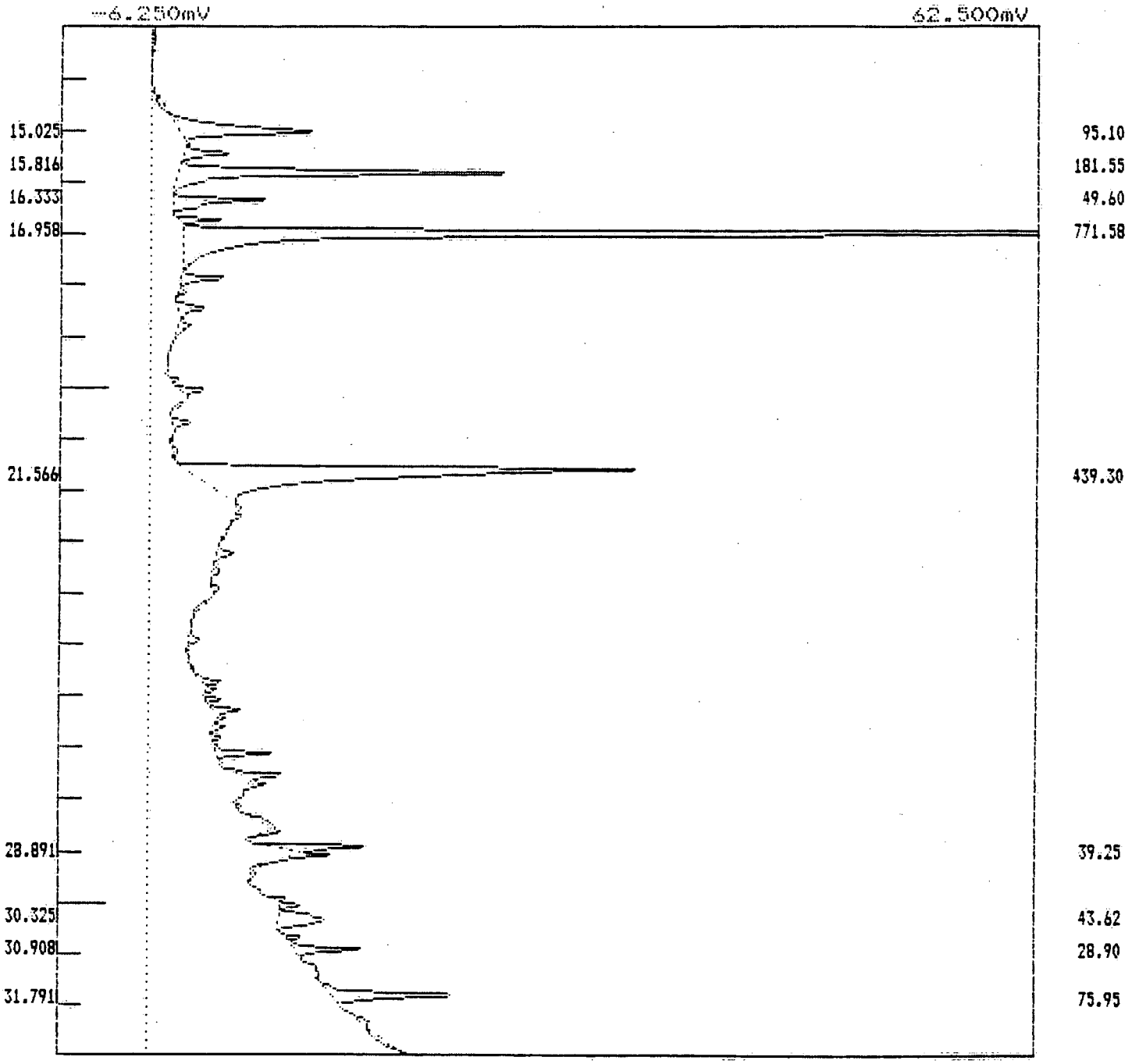
Component	Number	Retention	Area	External	Internal	Units
F3-Toluene surr	2	17.008	754.44	582.24	150.0000	NG
Toluene	3	17.908	32.62	4.29	1.1059	NG
m -Xylene	6	20.091	39.45	10.60	10.4128	NG
1 - surr	8	21.600	460.04	152.77	150.0000	NG
4			1286.55	749.90	311.5188	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : BH03 WS01 5ML PURGE COLLECTED @ 1352 @ 18'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A5.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 14:21:11



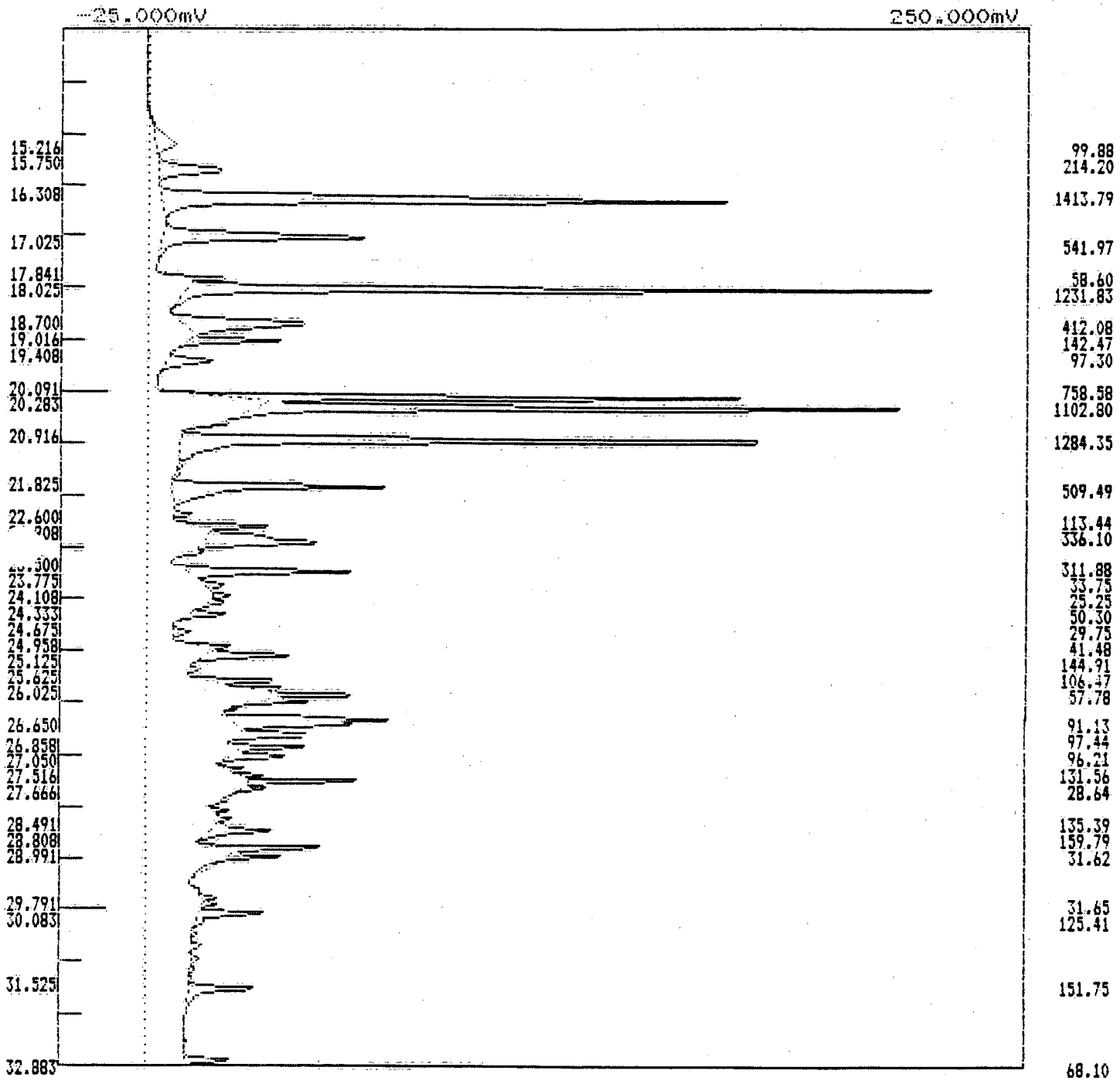
Component	Number	Retention	Area	External	Internal	Units
F3-Toluene surr	2	17.075	732.33	566.76	150.0000	NG
Toluene	3	17.991	27.98	3.68	0.9742	NG
[illegible] - surr	8	21.708	402.92	141.17	150.0000	NG
3			1163.23	711.61	300.9742	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 5 CH 1 PID
Conditions : BH06 WS01 5ML PURGE COLLECTED @ 1453 @ 18'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225A6.CHR
Temperature : 8020.TEM
Components : 8020A.CPT
Date : 12/26/1991
Time : 15:19:45



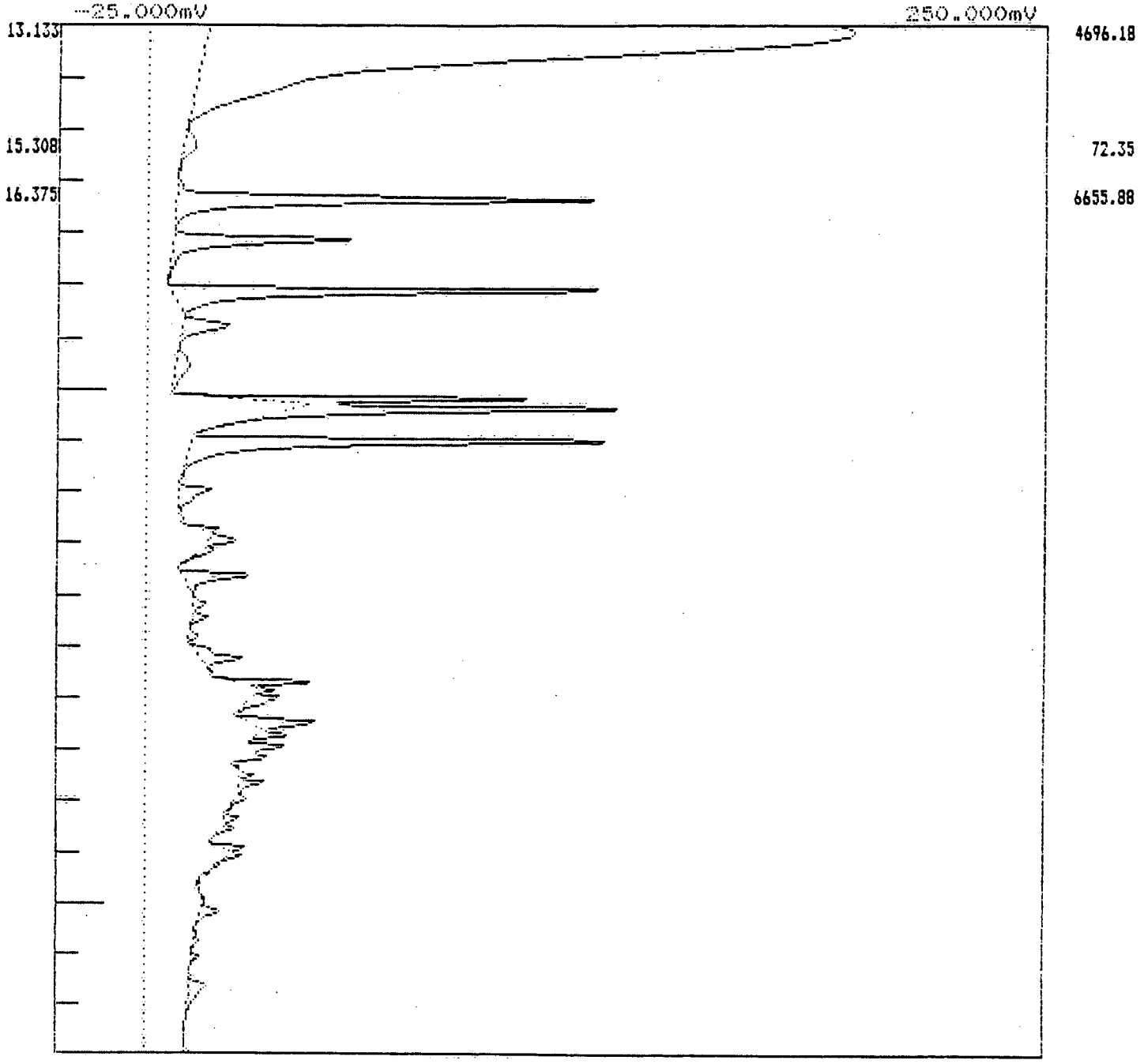
Component	Number	Retention	Area	External	Internal	Units
Benzene	1	16.333	49.60	6.53	1.6474	NG
F3-Toluene surr	2	16.958	771.58	594.23	150.0000	NG
I - surr	8	21.566	439.30	148.56	150.0000	NG
3			1260.48	749.32	301.6474	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C1.CHR
Temperature : 8020.TEM
Components : 8020CD23.CPT
Date : 12/26/1991
Time : 07:07:01



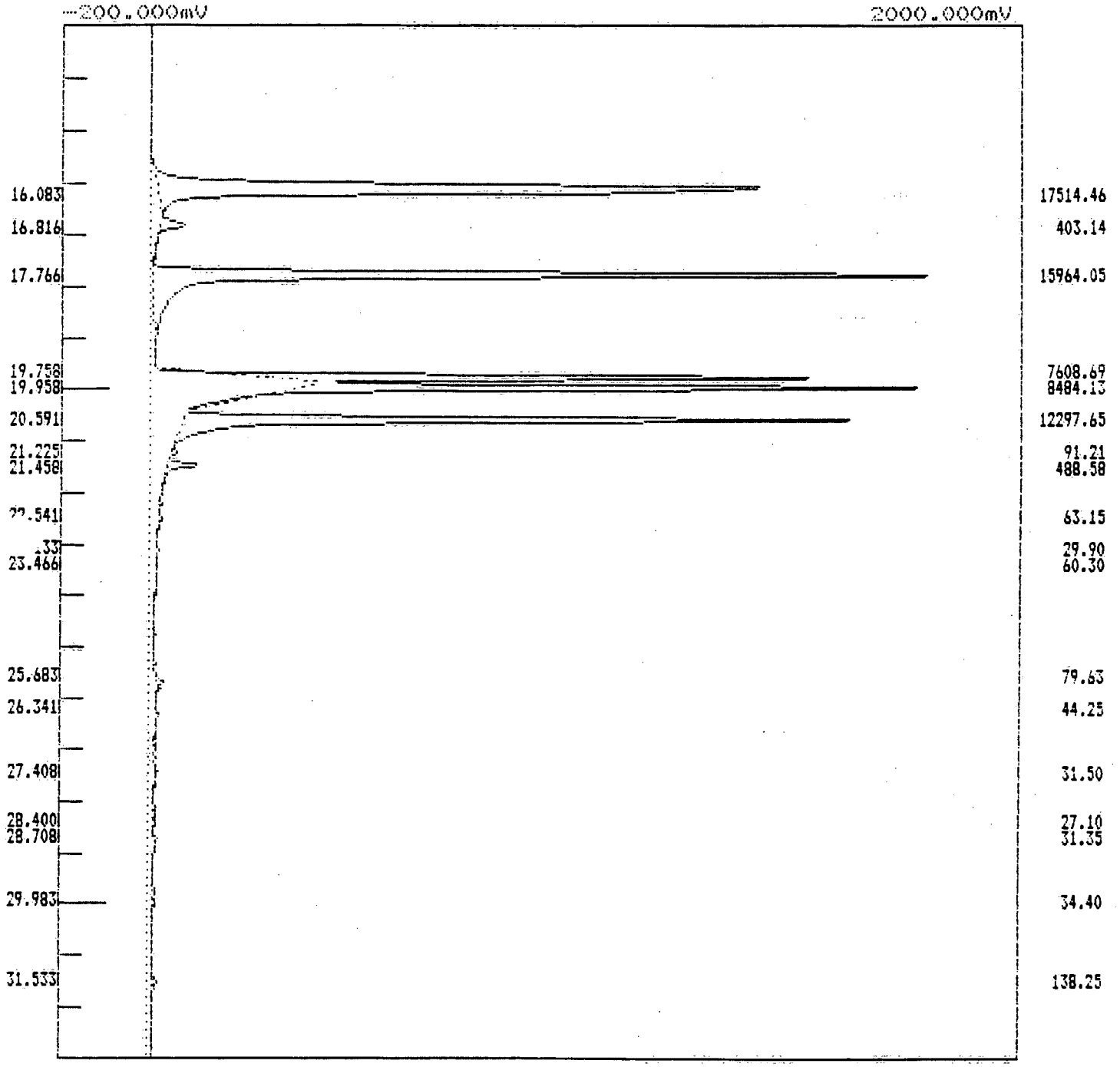
Component	Number	Retention	Area	External	Internal	Units
B ene	1	16.308	1413.79	251.12	74.7528	NG
F. toluene surr	2	17.025	541.97	503.90	150.0000	NG
Toluene	3	17.841	58.60	N/A	N/A	NG
Toluene	3	18.025	1231.83	250.59	74.5956	NG
Ethylbenzene	5	20.091	758.58	249.01	190.3119	NG
m/p-Xylene	6	20.283	1102.80	251.80	192.4420	NG
o-Xylene	7	20.916	1284.35	251.87	192.4984	NG
BFB - surr	8	21.825	509.49	196.27	150.0000	NG

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 2 FID
Conditions : 250NG BTEX CALIB STD
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225D1.CHR
Temperature : 8020.TEM
Components : 8020TPGH.CPT
Date : 12/26/1991
Time : 07:07:01



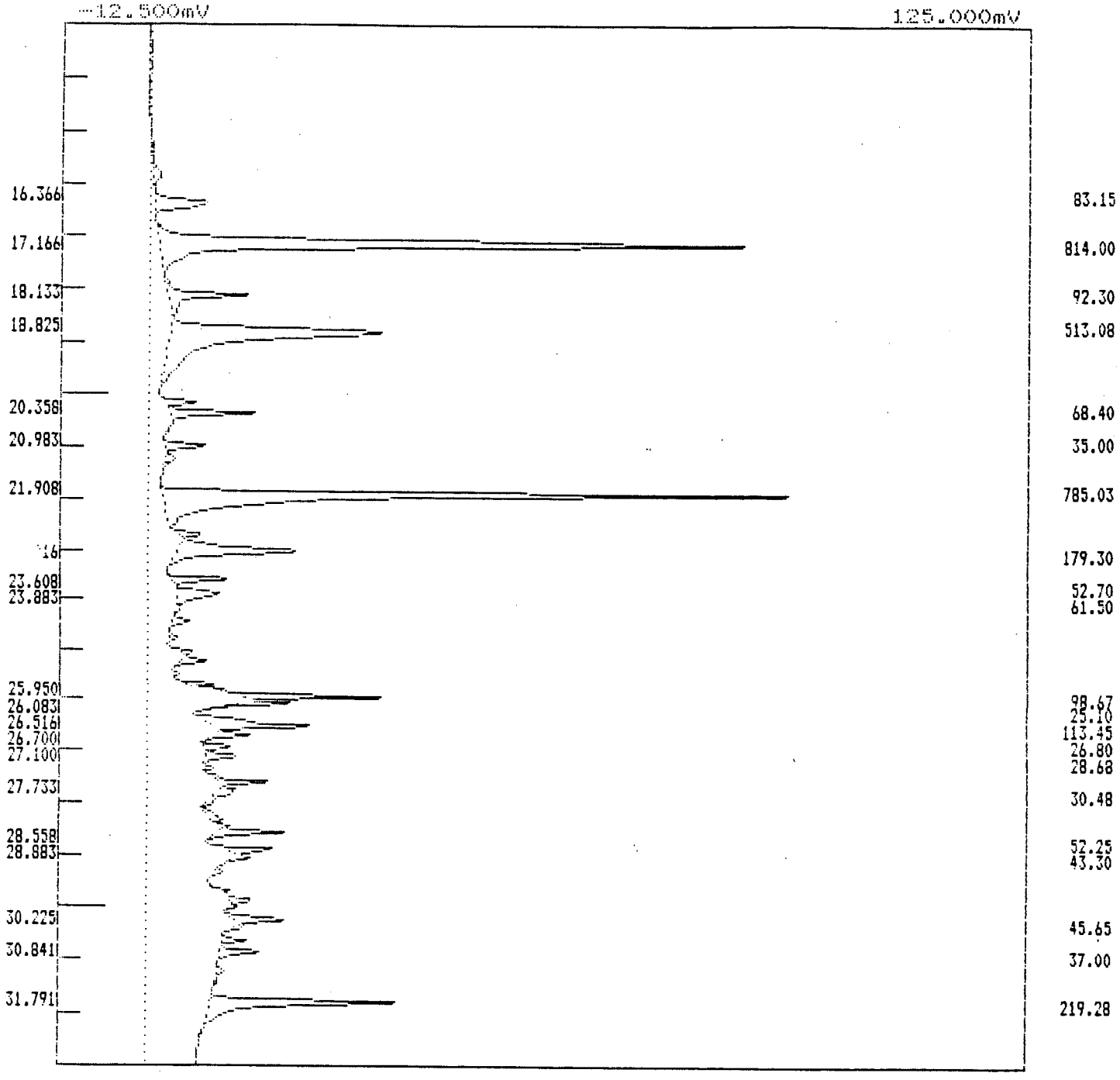
Component	Number	Retention	Area	External	Internal	Units
TOTL PRGBL H-C	1	16.375	6655.88	N/A	N/A	
1			6655.88	N/A	N/A	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : 500ONG BTEX CALIB STD (250NG SURR'S)
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C3.CHR
Temperature : 8020.TEM
Components : 8020CD23.CPT
Date : 12/26/1991
Time : 10:50:50



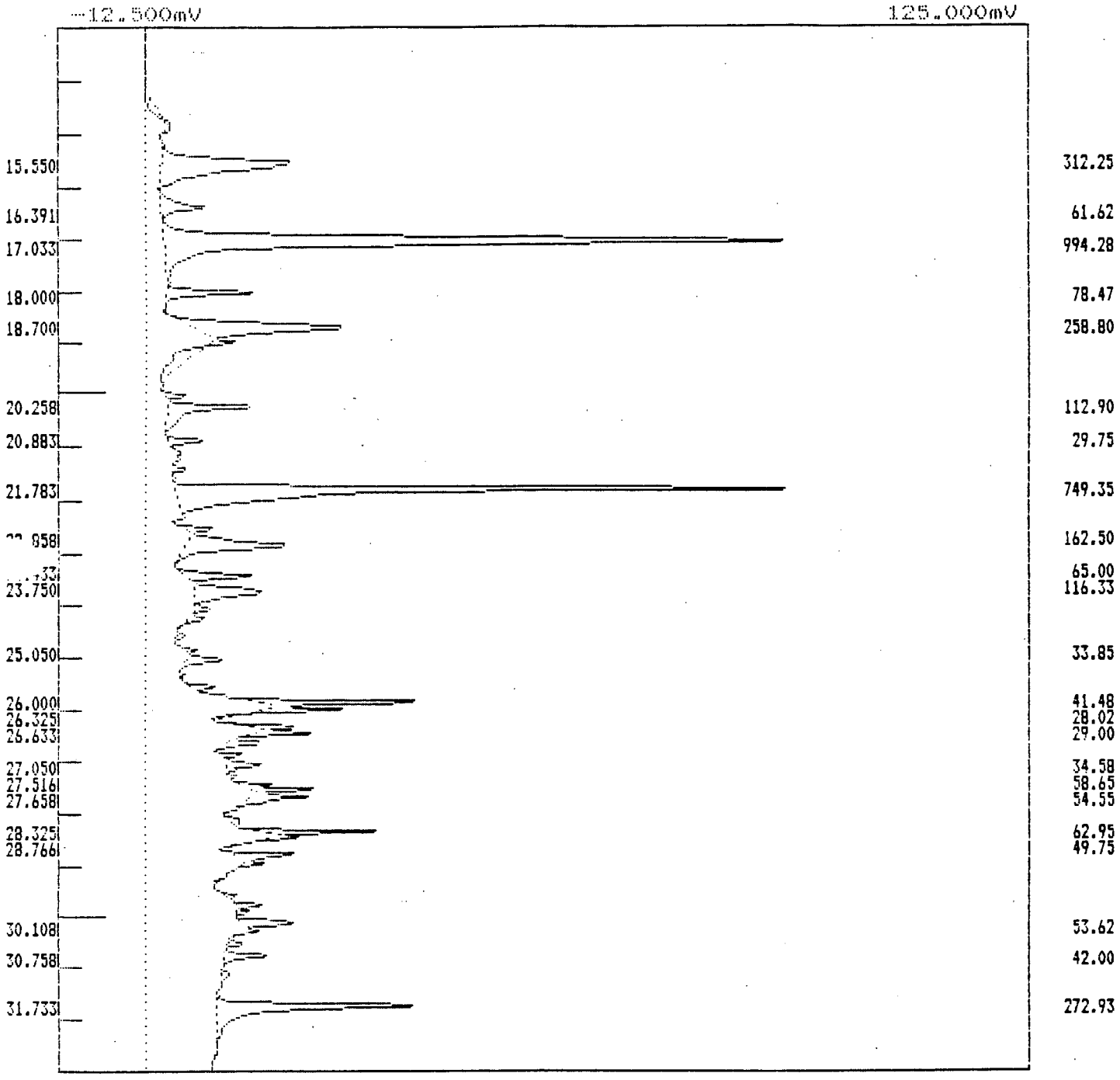
Component	Number	Retention	Area	External	Internal	Units
[illegible]zene	1	16.083	17514.46	5001.31	1943.2584	NG
PJ Toluene surr	2	16.816	403.14	386.05	150.0000	NG
Toluene	3	17.766	15964.05	5001.31	1943.2552	NG
Ethylbenzene	5	19.758	7608.69	4999.09	3967.3364	NG
m/p-Xylene	6	19.958	8484.13	5002.66	3970.1669	NG
o-Xylene	7	20.591	12297.65	4998.99	3967.2535	NG
BFB - surr	8	21.225	91.21	51.07	150.0000	NG
BFB - surr	8	21.458	488.58	189.01	150.0000	NG

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : 5ML DI H2O BLANK (250NG SURR'S)
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C4.CHR
Temperature : 8020.TEM
Components : 8020CD23.CPT
Date : 12/26/1991
Time : 11:29:45



Component	Number	Retention	Area	External	Internal	Units
F [illegible]zene	1	16.366	83.15	N/A	N/A	NG
[illegible]-Toluene surr	2	17.166	814.00	734.82	150.0000	NG
Toluene	3	18.133	92.30	N/A	N/A	NG
m/p-Xylene	6	20.358	68.40	N/A	N/A	NG
o-Xylene	7	20.983	35.00	N/A	N/A	NG
BFB - surr	8	21.908	785.03	291.92	150.0000	NG
6			1877.88	67.79	296.0000	

Control file : 8020.CON
Operator : GEO ENVIRONMENTAL
Description : INSTRUMENT 6 CH 1 PID
Conditions : BH02 WS01 5ML PURGE COLLECTED @ 1330 @ 15'
: ERCE 69TH & INDIANA ARVADA, CO
: SW-846 METHOD 8015/8020
File : 1225C6.CHR
Temperature : 8020.TEM
Components : 8020C.CPT
Date : 12/26/1991
Time : 14:43:34



Component	Number	Retention	Area	External	Internal	Units
[illegible]ene	1	16.391	61.62	N/A	N/A	NG
[illegible]luene surr	2	17.033	994.28	887.86	150.0000	NG
Toluene	3	18.000	78.47	N/A	N/A	NG
m/p-Xylene	6	20.258	112.90	N/A	N/A	NG
o-Xylene	7	20.883	29.75	N/A	N/A	NG
BFB - surr	8	21.783	749.35	279.53	150.0000	NG
6			2026.38	224.01	296.0000	

Item No. 9

City of Golden

911 10TH ST. GOLDEN, CO 80401
TEL: 303-384-8000
FAX: 303-384-8001
WWW.CITYOFGOLDEN.NET

Affordable and Thriving

8b Establish a Plan for Providing Quality Multi-Use Fields to The Community.

Council Memorandum

To: The Honorable Mayor and City Council

From: Rod Tarullo, Director of Parks, Recreation, and Golf

Through Carly Lorentz, Interim City Manager

Date: August 9, 2022

Re: Multi-use Sports Fields Discussion

Purpose of Agenda Item: To obtain Council feedback on two potential concepts that address aging infrastructure of multi-use sports fields, thus improving playability and ensuring safe facility conditions. Communicate next steps based on Council feedback.

Background: The Rooney Road Sports Complex opened in September of 2007, providing five multi-use synthetic turf fields of various sizes for use by regional sports teams. The fields are constructed on top of a former landfill owned by Jefferson County. A portion of the complex not on the landfill is also owned separately by Jefferson County Open Space.

After over 15 years of use, all the synthetic turf fields are showing their age and are past their typical lifecycle. The City has approximately $1.2 million dollars in a fund to provide replacement turf. This is not enough money to make all the repairs/replacement the facility needs. Besides the failing turf, there has been significant subsidence from the landfill underneath the fields that need to be addressed.

While designated as a regional complex by the County and the City, Table Mountain Soccer Association is the primary user of the facility. They also fund the regular maintenance of the complex. They have suggested replacing the turf for the last several years.

The Rooney site has several constraints because it is built on a landfill:

- There are no utilities to the site

- There cannot be permanent lighting because the pole structures would compromise the landfill cap
- There is an ongoing concern of subsidence
- There is no opportunity for shade structures and landscaping because there is no water available or allowed, and again the potential of compromising the cap

While providing bare bones multi-use fields for the last fifteen years, the long-term viability of this location is suspect. It will never have all the elements that help make other regional facilities more functional and pleasurable.

City staff was approached late 2019 by Jeffco seeking feedback on a preliminary proposal to modify the lease for the Rooney Road Sports Complex site. They are master planning the area to include a new slash/composting area in association with Rooney Road Recycling Center (3RC), trail connections, and other Jeffco park uses. They have renamed the Rooney area Tincup Park.

This plan would consider removing the southernmost field and changing parking for the sports complex. This would consolidate the sports fields and parking, and greatly reduce the land leased by the City for the sports complex. The current lease covers the entire hogback/former landfill area and is set to expire in 2026. The County has prepared a new draft lease that only includes the four northern fields of the sports complex area.

Alternative Locations: With all this in mind, several staff from the City and Jeffco have been looking for possible alternative sites to potentially move the Rooney Road Sports Complex. There is very limited land in the Golden area that is large enough and flat enough to consider a multi-field complex. Staff understands this was one of the reasons Rooney looked so appealing twenty years ago.

Consideration has been given to multiple locations including Jeffco owned property, none of which have panned out to be practical, financially viable, or sustainable for future investment. This led us to two alternatives using current City owned/leased land for consideration:

Alternative 1: Reinvest in Rooney, securing a new lease between the City and County for just the four northern field areas and entering into a new lease to allow for recovery of life cycle of replacement turf. The new lease would not include the South field which is needed for the slash/Jeffco development. Use the current budgeted $1.2 million which will repair and resurface the turf and subsidence of one existing field. This will not cover all needed repairs for the other three current fields. There is concern for continued subsidence on the property. Likely timeline of a year for completion of work accomplished with current budget. (See attachment A).

Alternative 2: Investigate program usage of city owned Ulysses fields to maximize scheduling. Consider remodel/renovation of two southern most existing baseball/softball fields to multi-use sports fields to better accommodate current and future needs of all sports programs. This change would consider the use of artificial turf or natural turf with advantages and disadvantages of both. (See attachment B).

Participation numbers have changed dramatically over the last two years. It is a challenge to anticipate future participation numbers. Any field allotment changes would need input from affected sports organizations.

This alternative allows the City to reinvest in current City owned assets. It provides for potential positive improvements over Rooney such as site furnishing upgrades like permanent lighting, seating and shade, restrooms, water, etc. Likely timeline of 2 years to get assessment completed and redesigns/renovations constructed and operational.

Fiscal Impact: The City has been collecting replacement fees from Rooney field users since the fields became operational. There is currently approximately $1,200,000 available in the fund balance for replacement of the artificial turf. The following opinions of probable costs have been provided by contractors and consultants.

Fix Rooney Fields (provided by original contractor ACC, Inc)

Field 2	86,950 Sq ft	$ 783,850.68
Field 3	69,700 Sq ft	$ 639,645.96
Field 4	69,700 Sq ft	$ 639,645.96
Field 5	69,700 Sq ft	$ 639,645.96
General Conditions		$ 182,407.18
Erosion Control		$ 28,456.93
Drainage Work per study		$ 73,085.26
Perimeter Turf Alternate ($18,559.59 per field x 4)		$ 74,238.00
Asphalt Alternate (Parking)		$ 447,678.88
		$3,435,642.63

This estimate does not include any consultant fees or contingency.

Jeffco design contribution covers new work for parking/roadways.
The current lease requires removal of improvements at Rooney
when the City ends sports use of the property.

**Tincup Ridge Park Design Contribution (provided by Jeffco)		$ 89,970.19
**Rooney Field Removal (provided by IMEG)	$976,037.00 -	$1,351,096.00

The Ulysses estimate includes over a million dollars of contingency.

Convert Two Ulysses Fields to Multi-use (provided by landscape architect and engineer MIG, IMEG)

215,000 sq ft of synthetic multiuse turf	$2,267,200.00
Restrooms/Storage Building/Lighting, Paving, etc.	$3,251,490.00
Mobilization and General Conditions	$ 551,869.00
Owners Design Contingency	$ 551,869.00
Other Costs-design and bidding/construction contingency	$1,110,243.00
	$7,732,671.00

Alternative Natural Grass $5,729,613.00

Potential additional funding for either alternative could come from a combination of Lodging tax proceeds and internal loans. Finance Director Jeff Hansen will be at the Council meeting to answer questions that you might have regarding financial options.

Community Impact: There is a need to provide safe, reliable playing fields for youth and adult sports in Golden. The most urgent need is to resolve current field conditions at Rooney Road Sports Complex. Any changes to existing fields will impact various sports programs in potentially positive and negative ways.

Community outreach is imperative to identify current and future needs for each sports program and to work to ensure maximum efficiencies in scheduling and use. Outreach is also important for ancillary park users. This could include skateboard and dog park users at Ulysses Park, and users of the new Tincup Park and slash operation at the Rooney location.

Other community impacts include prioritization of use of resources within the parks system, long term, and short-term investment analysis, serving local and/or regional users, timing of improvements, temporary field solutions until any approved plan is completed, and the potential use of artificial or natural grass turf should a location other than Rooney be considered.

Next Steps: Should Council support more fully investigating either alternative, staff will conduct additional outreach to field users, community members, and general park users to receive feedback on the preferred alternative. Staff would anticipate reporting back to Council in November with a proposed plan including timeline, funding sources, and more specific details for your review and possible action.

Recommendation: Staff recommends City Council direct staff to conduct further investigation and community outreach regarding alternatives one and/or two of this memo for the purpose of identifying and establishing a preferred path to address aging infrastructure of multiuse sports fields in Golden.

Attachments: Rooney Fields Master Plan 2006
Ulysses Concept

APPROXIMATE LIMITS OF LANDFILL
LIMITS OF NEW CAP
FUTURE PARKING +-75 SPACES
AREA "C" 120' X 90'
AREA "D" 120' X 90'
VAULT TOILET
FIELD 6 330' X 195'
FIELD 13 330' X 195'
FIELD 14 330' X 195'
FUTURE PARKING +-150 SPACES
FUTURE PARKING +- 60 SPACES
FIELD 7 330' X 195'
FIELD 12 330' X 195'
FIELD 15 360' X 225'
PRACTICE AREA "B" 120' X 90'
+- 60 SPACES
WOOD FENCE
FIELD 5 SOCCER 330' X 195'
FIELD 8 330' X 195'
FIELD 11 330' X 195'
WOOD FENCE
CHAIN LINK FENCE
WOOD FENCE
FIELD 4 SOCCER WOMEN'S LACROSSE 330' X 195'
FIELD 9 330' X 195'
FUTURE PARKING +-200 SPACES
WOOD FENCE
CHAIN LINK FENCE
WOOD FENCE
FIELD 3 SOCCER MEN'S LACROSSE 330' X 195'
FIELD 10 330' X 195'
WOOD FENCE
CHAIN LINK FENCE
MAINTENANCE BUILDING
WOOD FENCE
FIELD 2 SOCCER FOOTBALL 360' X 225'
FUTURE PARKING +- 90 SPAC
50 X 50 PLAY AREA
LIMITS OF NEW CAP
PRACTICE AREA "A" 120' X 90'
+-100 SPACES
VAULT TOILET
CHAIN LINK FENCE
50 X 50 PLAY AREA
WOOD FENCE
FUTURE PARKING AND LOOP ROAD ALIGNMENT +- 120 SPACES
+-40 SPACES
CONCRETE BUILDING ONE STORY
EXISTING PAVEMENT
EXISTING FENCE
FIELD 1 SOCCER 360' X 240'
6,570 SF OF ROAD INSIDE PROPERTY LINE
EXISTING POWER LINE TO REMAIN
PHASE ONE IMPROVEMENTS
RECYCLED ASPHALT 185,553 SF (outside of recycling center's property line)
ROAD BASE - PEDESTRIAN PATHS 72,618 SF
SYNTHETIC TURF

U11 / U12 Field
225'-0"
150'-0"
U11 / U12 Field
225'-0"
240'
150'-0"
U8? / U9 / U10 Field
120'-0"
150'-0"
U8? / U9 / U10 Field
120'-0"
150'-0"
U8? / U9 / U10 Field
U8? / U9 / U10 Field
380'
360'
330'
10'
18'-0"
24'-6"
20'-0"
35'-0"

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

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U.S. ENVIRONMENTAL PROTECTION AGENCY

Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
File (2 copies)	START2, EPA Region VIII

PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

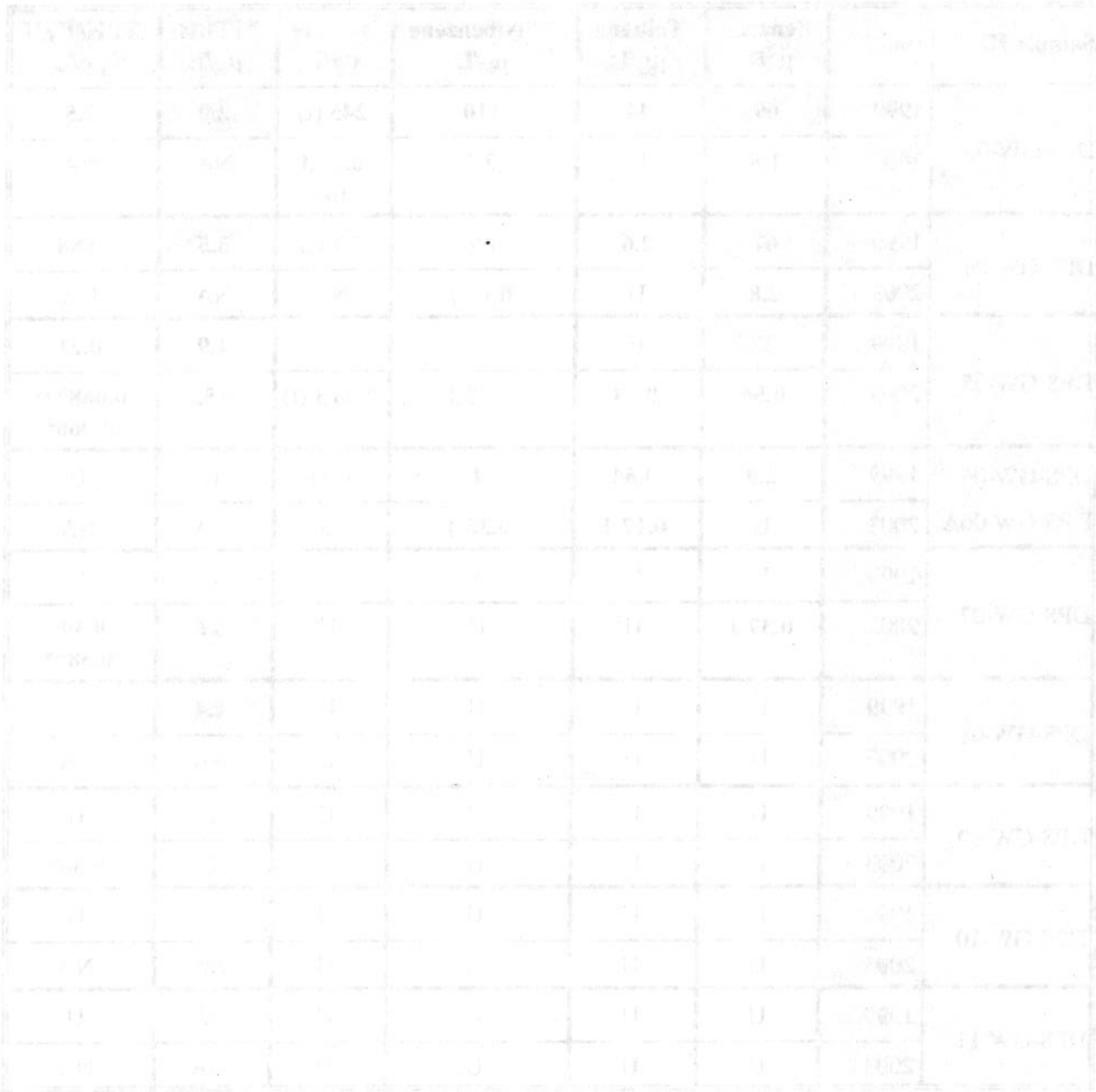
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer St Landfill-Proposed RV Storage Lot

Sharon McCarthy <[redacted]> Tue, Sep 3, 2024 at 9:07 AM
To: Lauren Simpson <[redacted]>, [redacted], Sharon Davis <s[redacted]>, Lisa Feret <[redacted]>, Bob Fifer <[redacted]>, [redacted], Randy Moorman <[redacted]>, Jeremiah Bebo <[redacted]>, [redacted]

Members of the Planning Commission and City Council:

My name is Sharon McCarthy and I live at 6688 Kendrick Dr 80007.

Purpose:

To discuss how the proposed RV storage lot at 6800 Kilmer St compares to 3 other RV storage lot areas in Arvada.

Introduction:

- There are three RV storage lots in east Arvada that are all zoned IG. For reference, I include a google search of these locations (attached)
- It's noteworthy there are a few RV lots in small enclaves of unincorporated Jeffco within the outer city limits.
    - RV storage lot, which is between Highway 72 and the railroad, west of Indiana, and east of Hwy 93.
        - You'll see that there's a small patch of green within the unincorporated area along Hwy 72, which indicates it's within the City.
        - This parcel is zoned IL and it's a self-storage business with several enclosed buildings.
        - There are a handful of RVs parked outside in the back, away from 72. It's clear that the primary use is self-storage, not outside RV storage.
    - There is an unincorporated enclave with an RV lot that is east of Indiana (Arvada Boat and RV Storage).
- There are other RV lots close to the city limits **but not within them**.
    - Perhaps this highlights the practical reality that RV lots (except for those clearly in industrial areas like the three in east Arvada) do not belong in Arvada's residential areas.

Challenge:

- Note the attached pdf maps of the locations of those three RV lots in east Arvada. The blue line represents the area east of Lamar Street and south of 60th Avenue.

- **This is important because the LDC treats this area differently.**
  - Specifically, Section 5-1-6-3.B.2. provides that "Outdoor storage areas shall not be located within 300 feet of a RA or RN zoning district, except within the area south of West 60th Avenue and east of Lamar Street."

Research/Discussion:

- I refer to this legal definition: "the process of singling out a small parcel of land for a use classification totally different from that of the surrounding area for the benefit of the owner of such property and to the detriment of other owners." [ref]Anderson's American Law of Zoning, 4th Edition, § 5.12 (1995).[/ref]
  - This is the definition for "spot zoning"---not the topic for discussion; perhaps the language might apply when considering an amendment to the Comprehensive Plan.

- LDC 11-3-3-1` Definitions
  - Light Industry is a defined term in the LDC. It also does not explicitly reference RV storage. In fact it states:
    - "Light Industry. Uses that involve research and development, assembly, remanufacturing, compounding, packaging, testing, or treatment of products, generally from previously prepared materials or components, **with limited outside storage and limited external impacts or risks such that the use is not defined as heavy industry or heavy logistic center.** Light industry also includes wholesaling, warehousing, and distribution uses that involve fewer than 76 heavy truck trips per day. For illustrative purposes, light industrial uses include...."

- It might be argued that:
  - limited outside storage" is intended to be a secondary use to other uses and not a primary use, such as with an RV storage lot
  - an RV storage lot in this location has more than "limited external impacts" to surrounding homes and other uses and therefore is not "functionally comparable" to a bakery or other explicitly uses permitted in IL zoning
  - an RV storage lot is effectively a heavy industrial use the Planning Director should not allow in IL zoning
  - approving an RV lot in IL zoning is inconsistent with the "general requirements" of the LDC's purpose and intent as defined in Section 1-1-1-2:

    1. Implement the City of Arvada Comprehensive Plan, as that plan may be amended or replaced from time to time;

    2. Ensure that all development in the City is consistent with the spirit and intent of other plans and policies adopted by City Council;
    3. Promote the public health, safety, convenience, comfort, prosperity, and general welfare;
    4. Promote the creation of safe, unique, interesting, inclusive, and economically vibrant places throughout the City;
    5. Protect the quality and character of stable residential neighborhoods;

12. Provide protection from nuisances and hazards.

Finally……..

Landfills were developed away from residential areas. Development creeped up until landfills were surrounded by housing developments. At one time, 6800 Kilmer St landfill fit in the landscape of the adjacent properties along Indiana zoned IG and IL. The land across Croke Canal and Ralston Creek was open space.

An amendment for the Comprehensive Plan addresses a plot of land---open space, native grasses, gentle berms. An amendment to the Comprehensive Plan is an attempt to make all parts of the proposed project "fit". An amendment to the Comprehensive Plan might acknowledge that the closed unregulated landfill is the least understood component of the proposed RV storage lot. Like an iceberg, the most dangerous portion of a landfill is what we can't see. But unlike the iceberg which is one solid substance, it is difficult to determine the contents of the subsurface of a 14 acre landfill of varying depths--perhaps 26 feet in some areas. An amendment to the Comprehensive Plan seeks to uphold the criteria for development but perhaps should view this unregulated landfill unlike other vacant land. Discussion of the subsurface of the landfill is not a red herring. Rather, it is a misunderstood orphan of the development storm.

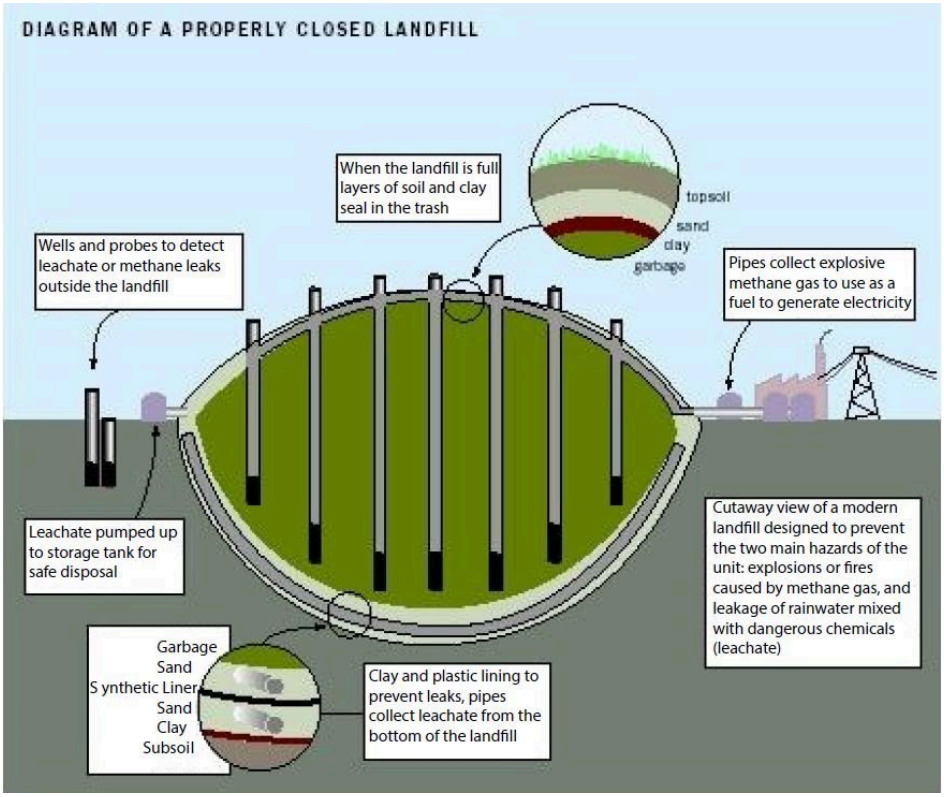
It wasn't until the 1960's, that concerns about the environment surfaced.

"The Resource Conservation and Recovery Act (RCRA) is our nation's primary law governing the disposal of solid and hazardous waste. RCRA was signed into law on October 21, 1976 to address the increasing problems the nation faced from our growing volume of municipal and industrial waste. RCRA was an amendment to the Solid Waste Disposal Act of 1965, which was the first statute that specifically focused on improving solid waste disposal methods." https://www.epa.gov/rcra/history-resource-conservation-and-recovery-act-rcra

"For some sites, however, an appropriate regulatory framework does not exist. For example, contamination which predates the RCRA statute would not be subject to RCRA authority. As a result, several states have developed programs that provide alternate mechanisms for reviewing, approving, and overseeing these voluntary cleanup-up efforts. In 1994, the Colorado General Assembly passed the Voluntary Cleanup and Redevelopment Act, which formalized a non-regulatory process for cleaning up certain types of sites..... The program is designed to operate expeditiously, with minimal administrative processes and costs. Accordingly, no regulations have been promulgated for the Voluntary Cleanup and Redevelopment Act." https://cdphe.colorado.gov/environmental-cleanup-guidance-and-policy Go to Voluntary Cleanup Roadmap

Non-hazardous solid waste is regulated under Subtitle D of RCRA. States play a lead role in ensuring the federal criteria for operating municipal solid waste and industrial waste landfills regulations are met, and they may set more stringent requirements. In absence of an approved state program, the federal requirements must be met by waste facilities. The revised criteria in Title 40 of the Code of Federal Regulations (CFR) part 258 addresses seven major aspects of MSWLFs, which include the following:

- Location restrictions—ensure that landfills are ***built in suitable geological areas*** **away from faults, wetlands, flood plains** or other restricted areas.
- Composite liners requirements—include a flexible membrane (i.e., geo-membrane) overlaying two feet of compacted clay soil lining the bottom and sides of the landfill. They are used to *protect groundwater and the underlying soil from leachate releases*.
- Leachate collection and removal systems—sit on top of the composite liner and removes leachate from the landfill for treatment and disposal.
    - ***Leachate*** *- formed when rain water filters through wastes placed in a landfill.* When this liquid comes in contact with buried wastes, it leaches, or draws out, chemicals or constituents from those wastes. https://www.epa.gov/landfills/municipal-solid-waste-landfills



None of the above criteria applies to the unregulated landfill at 6800 Kilmer St that was closed prior to 1960's regulations. Brownfields from this era have a blank canvas for redevelopment. The developer's plans tick all the boxes for Voluntary Cleanup as suggested by CDPHE for Brownfield reuse. Language in the Comprehensive Plan is being reviewed with Land Development Codes. Modifications suggested by the developer are termed minor.

Perhaps we should pause and consider the elephant in the room--- "right environmentally responsible redevelopment" of the landfill for current and future use. The 6800 Kilmer St landfill was probably the "right business" in the "right place" at the "right time". We might heed the lyrics, "the times they are a-changin".

Respectfully,

Sharon McCarthy

---

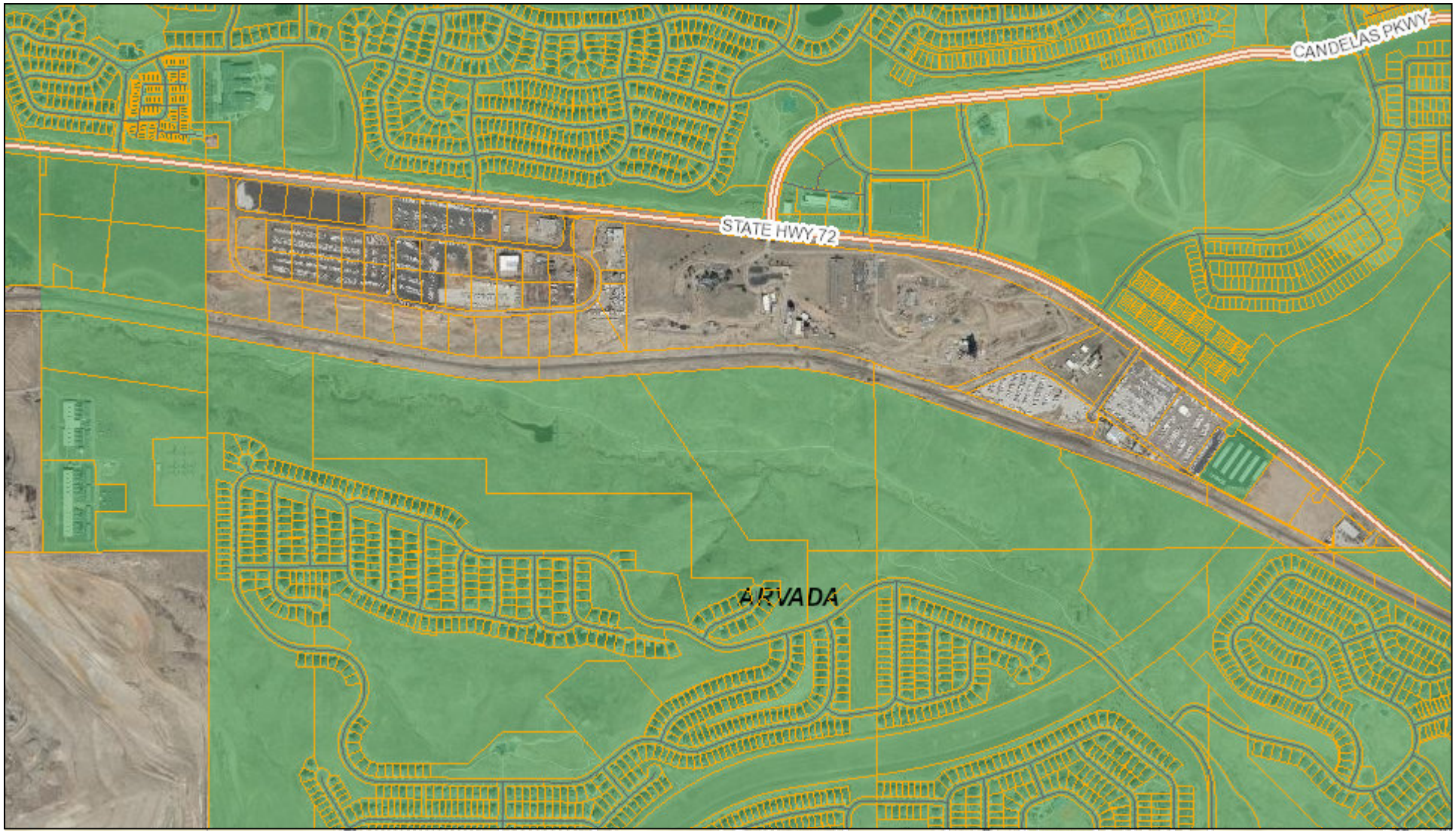
3 attachments

unincorp along 72.pdf
491K

rv storage lots in arvada area.pdf
1056K

3 RV Lots South of 60th and East of Lamar.jmap.pdf
571K

unincorp along 72



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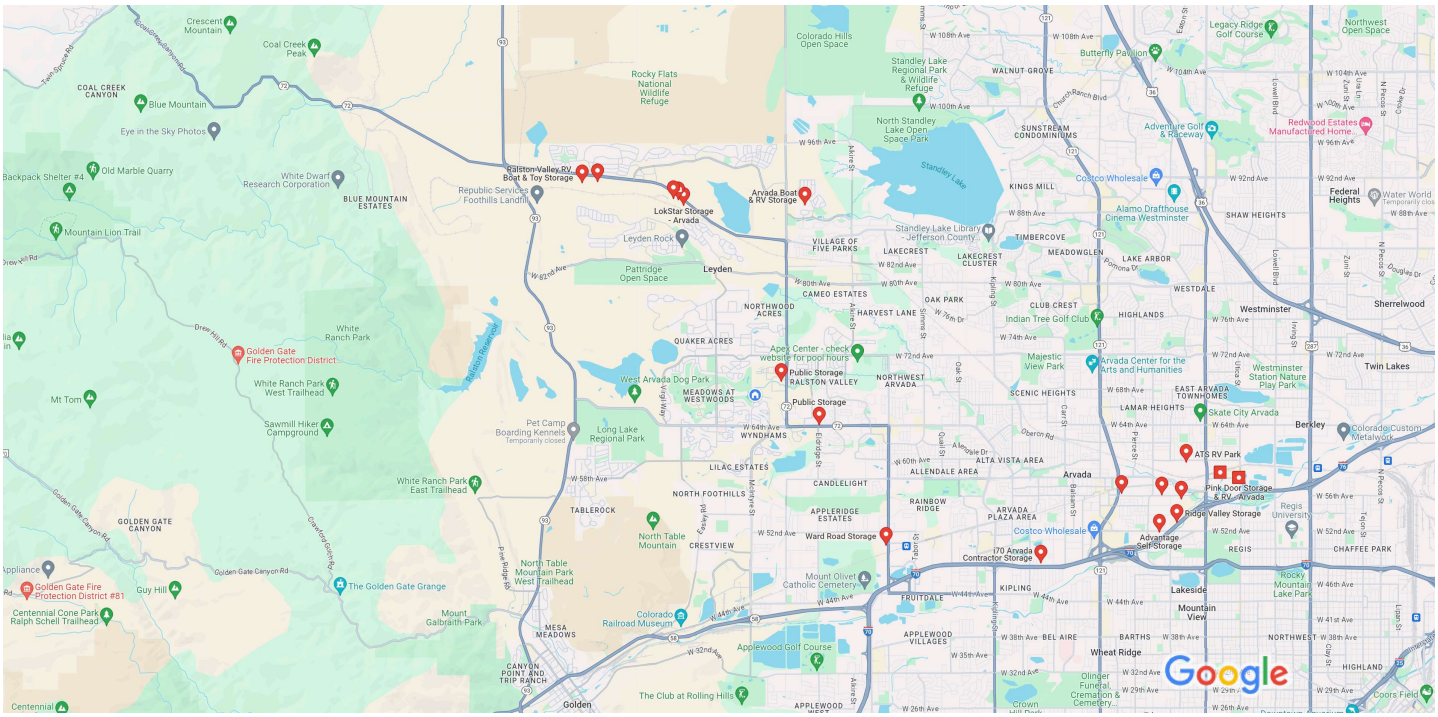
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Author: ArcGIS Web AppBuilder
Date: 2/28/2024

Google Maps rv storage lots in arvada colorado



Map data ©2024 Google 1 mi

Rating Hours All filters

Results

Sponsored

Simply Storage

4.5 ★★★★½ (160)

Self-storage facility · 4911 W 58th Ave

Open · Closes 6 PM · (720) 513-2715

Website Directions

4911 West 58th Ave.

Visit Site · universalstoragegroup.com/arvada-co/view-rates

Sponsored

Pink Door Storage & RV - Arvada

3.7 ★★★½☆ (124)

RV storage facility · 5775 Tennyson St

Website Directions

Open · Closes 6 PM · (720) 204-5458

Outdoor Storage In Arvada, CO
Visit Site · pinkdoorstorage.com/Vehicle_Storage/Outdoor_...

Arvada Boat & RV Storage
4.4 ★★★★½ (5)
Self-storage facility · 8850 Indiana St
Open · Closes 8 PM · (720) 399-6214
Website Directions

Ralston Valley RV, Boat & Toy Storage
4.9 ★★★★★ (47)
RV storage facility · 19160 CO-72
Open 24 hours · (720) 362-1000
Website Directions

"I cannot say enough positive about this rv storage site!"

Greenbox RV and Boat Storage
3.8 ★★★★☆ (5)
RV storage facility · 17190 CO-72
Open · Closes 6 PM · (720) 807-5100
Website Directions

"A good convenient place to store my RV."

Dodo's RV Storage
4.2 ★★★★☆ (19)
RV storage facility · 6325 W 56th Ave
Open 24 hours · (303) 881-1921
Website Directions

Mike's 56th Avenue RV Storage
4.5 ★★★★½ (31)
RV storage facility · 5830 W 56th Ave
Open 24 hours · (303) 422-6181
Directions

"Great place to store your RV ."

Pink Door Storage & RV - Arvada
3.7 ★★★½☆ (124)
RV storage facility · 5775 Tennyson St
Open · Closes 6 PM · (720) 204-5458
Website Directions

"Very happy to store our RV here."

Stor-Rite RV & Boat Storage II

4.4 ★★★★½ (14)
RV storage facility · 17180 CO-72
Open 24 hours · (720) 261-7083

Website Directions

"Thank you for 14 years of Storing our RV Cruiser with you."

Ridge Valley Storage

3.7 ★★★½☆ (32)
RV storage facility · 5300 Gray Ct
Open · Closes 5 PM · (303) 786-7348

Website Directions

"I need and well maintained storage facilities for RVs and trailers"

Uncle Jon's Outdoor Storage

4.8 ★★★★★ (56)
RV storage facility · 18930 CO-72
Open 24 hours · (303) 420-5252

Website Directions

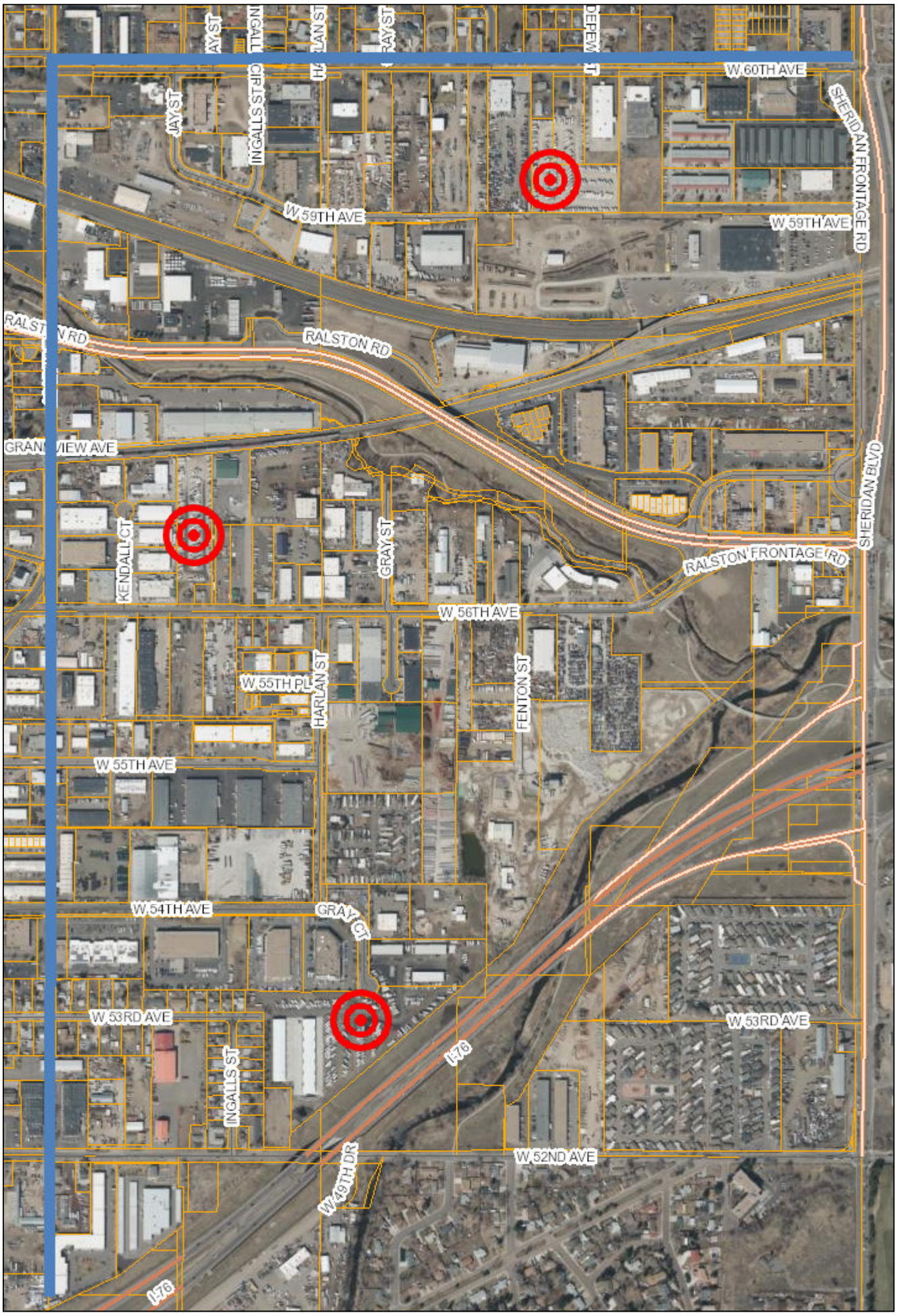
"We stored our RV for the last two years and never had a problem."

Uncle Jon's Outdoor Storage Lot B

No reviews
RV storage facility
Open 24 hours · (303) 420-5252

Website Directions

3 RV Lots South of 60th Ave and East of Lamar St.



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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Author: ArcGIS Web AppBuilder
Date: 8/31/2023

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer St--Load Bearing Capacity

Sharon McCarthy <[redacted]> Thu, Sep 5, 2024 at 12:14 PM
To: Lauren Simpson <[redacted]>, [redacted], Sharon Davis <[redacted]>, Lisa Feret <[redacted]>, Bob Fifer <[redacted]>, [redacted], Randy Moorman <[redacted]>, Jeremiah Bebo <[redacted]>, [redacted]

Members of City Council and Planning Commission:

My name is Sharon McCarthy and I live at 6688 Kendrick Drive 80007

Purpose:
To introduce the subject of "load bearing capacity" as applicable to tons of RV's stored on closed, unregulated landfill (defined as a dump).

Introduction:
Modern landfills have come a long way in the last few decades, due to updated regulations and **better understanding** of the science. **Modern landfills are well-engineered and managed** facilities for the disposal of solid waste. Landfills are located, designed, operated and monitored to ensure compliance with federal regulations. They are also designed to **protect the environment from contaminants**, which may be present in the waste stream. Landfills **cannot be built in environmentally-sensitive areas,** and they are **placed using on-site environmental monitoring systems**. These monitoring systems check for any sign of groundwater contamination and for landfill gas, as well as provide additional safeguards. Today's landfills must meet stringent design, operation and closure requirements established under the Resource Conservation and Recovery Act (RCRA). https://www.epa.gov/landfills/basic-information-about-landfills

Challenge:

- "…contamination which predates the RCRA (1976 Resources Conservation and Recovery Act) statute would not be subject to RCRA authority." https://cdphe.colorado.gov/hm/environ-cleanup-guidance-policy
    - Do we assume that landfills closed prior to RCRA do not have the same concerns prompting federal legislation or that we can ignore them and hope they go away?
    - Was a line drawn in the sand to designate a start point for regulation?
    - Can this line be crossed for scientific considerations?

- language in the description of modern landfills questioning current decisions about the pre-regulated 6800 Kilmer St area:
    - Better understanding of the science
    - Managed facilities for the disposal of solid waste
    - Protect the environment from contaminants
    - Cannot be built in environmentally-sensitive areas
    - Placed using on-site environmental monitoring systems

- The applicant's Terracon Geotechnical Report August 2023 suggests:

    - "Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement. Because of the high risk of significant movement, it is our opinion that **unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction**. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project."

    - The report elaborates, "however, it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development.....Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project.....**Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris**. **It is our opinion that movement on the order of 2 feet or more is possible.**" (Emphasis added) (see attachment *Three Examples*….)

Research and Discussion:

- "In geotechnical engineering, **bearing capacity** is the capacity of soil to support the loads applied to the ground. The bearing capacity of soil is the maximum average contact pressure between the foundation and the soil which should not produce shear failure in the soil. *Ultimate bearing capacity* is the theoretical maximum pressure which can be supported without failure; *allowable bearing capacity* is the ultimate bearing capacity divided by a factor of safety. Sometimes, on soft soil sites, large settlements may occur under loaded foundations without actual shear failure occurring; in such cases, the allowable bearing capacity is based on the maximum allowable settlement. The allowable bearing pressure is the maximum pressure that can be applied to the soil without causing failure. The ultimate bearing capacity, on the other hand, is the maximum pressure that can be applied to the soil before it fails.

  There are three modes of failure that limit bearing capacity: general shear failure, local shear failure, and punching shear failure. It depends upon the shear strength of soil as well as shape, size, depth and type of foundation." https://en.wikipedia.org/wiki/Bearing_capacity

- "....old construction debris that has been *previously compacted* will not experience significant settlement because of low biochemical degradation;..... a thin cap over a relatively new landfill cell containing *unconsolidated municipal waste*, which would see short- and long-term settlement, may be at a much higher risk of damage, and any new construction may therefore be subject to a much lower allowable bearing capacity requirement." https://geosyntheticsmagazine.com/2022/03/03/geocells-for-redevelopment-on-closed-landfills/

- "Many possibilities exist for post-closure landfill development. The large, open tract of land is amenable to many end-uses, the most popular of which include recreation, solar farms, and landfill gas usage. ,,,,,*However, all landfill sites are unique in some way and will require judgement by engineers, governing bodies, and the public."* https://www.geoengineer.org/education/web-class-projects/cee-549-geoenvironmental-engineering-fall-2017/assignments/end-uses-of-landfills

- "The *stability of waste dumps is a long-term research topic of slope engineering.* Therefore, considering the bearing capacity of the waste dump foundation, the angle and limit of the height of the waste dump slope are calculated, which provides a basis for the stability analysis of the waste dump foundation (Cho et al., 2014; Chen H et al., 2021). **The traditional analysis methods mainly focus on the stability evaluation of waste dump (Huang F M et al., 2021), and less consideration is given to the bearing capacity of the waste dump base**.

On the premise of considering the base lithology and rock thickness, the base stability of the waste dump is guaranteed, and the optimal waste angle and height of the waste dump are calculated. The *bearing capacity of the weak foundation of the waste dump will change significantly under the action of pressure, water, and time for a long time, which is very important to the stability of the waste dump and needs further research in the future* (Li X S et al., 2021). This study applies to the calculation of bearing capacity of the weak foundation of the waste dump, provides technical support for the stability evaluation of waste dump, has good application value, and will achieve good engineering results in the application of open-pit waste dump.

In this study, a calculation method of bearing capacity of waste dump base based on the improved Prandtl formula is proposed. The *ultimate bearing capacity of the base is defined as the ultimate dumping height corresponding to a specific slope angle, and the influence laws of different base lithology and base thickness on the maximum bearing capacity of the base of the waste dump are analyzed.* The rationality and reliability of the calculation method of foundation bearing capacity of waste dump proposed in this paper are verified through an engineering example." Bearing Capacity Calculation of Soft Foundation of Waste Dumps—A Case of Open-Pit Mine

Finally…..

I learned that there are many fields of engineering involved in solving everyday environmental concerns. In researching load bearing capacities, I learned this particular field of engineering is complex and worldwide. There are many formulas, diagrams, theories, pictures, and a language that I can't read much less attempt to understand!

But what I did comprehend, there is much to learn and each landfill is different. In fact, sections of an unregulated landfill can have different properties and challenges. I learned that it's not only what went into the closed unregulated landfill, but how the form, slope, soil composition, rock, and environment of the structure of the landfill contribute to "containment". I learned that the name itself "unregulated" tells the story. Research about unregulated landfills is like the layers of an onion that you peel away---and cry!

The 6800 Kilmer St landfill was "born" in the 1930's and continued use until the 1970's. Exact dates were not available for verification. Landfills were designed at the time for land "far away" from residential developments. Ecosystems and suburbs were unknown terms. There were no rules for landfills, hence the definition of a "dump....the systematic burial of waste with daily, intermediate and final covers only began in the 1940s. In the past, waste was simply left in piles or thrown into pits." https://en.wikipedia.org/wiki/Landfill

Fast forward to the present. Residential communities encroach old landfills which resemble open space. Engineering fields involve the study of soils, rocks, dump pit slope, ground water, etc. Textbooks are based on research. Even with data and studies, we know that unregulated landfills with unstable subsurfaces, no knowledge of the soils, and design of the substructure are like an ongoing science experiment. We have solid reports from Terracon Consultants of site investigation of the landfill and adjacent Ralston Creek area. We have tons of research.

Do we want to test the load bearing capacity of tons of RVs stored on an unknown infrastructure and risk a challenge to the ecosystem of the Ralston Creek area?

Respectfully,

Sharon McCarthy

Three Geotechnical Reports.pdf
89K

Ogden Report-1992

9.0 SUMMARY

The following are pertinent data derived from the Ogden Phase I environmental assessment:
There is an inactive landfill on the LTMR site south of Ralston Creek.
The 25 acres of the LTMR site north of Ralston Creek does not appear to have been impacted by human activities.
The property that borders the south bank of Ralston Creek appears to be polluted by discharges from the landfill. Visible hydrocarbons are on the water surface.
Groundwater samples from the landfill contain lead at concentrations of .0065 mg/L, which is above the EPA drinking water standard of .0050 mg/L.
Soil samples from the landfill contain volatile organic compounds. Offending analytes are methylenechloride, acetone, tetrachloroethane, toluene, and total xylenes.
A composite soil sample demonstrated an excessive concentration of lead in the amount of 54 mg/kg

10.0 RECOMMENDATIONS

Based on the evaluation of prior data and data collected during the Preliminary Phase II site assessment, it is probable that contaminants are present on the site and that the potential for migration to offsite localities exists. Therefore, we would recommend the following activities to more clearly define the extent and nature of contamination on the LTMR site:

- Excavate spot locations of high magnetic response to determine if leaking drums are present.
- Design a statistically-based random soil sampling program.
- Design a statistically-based groundwater sampling program. Install deeper auger drilled monitoring wells at 30 to 50 ft depth.
- Case with large enough PVC for retrieving samples by bailing or the bladder pump method.
- Screen shallow groundwater monitoring wells in the landfill material and schedule sampling to be collected to allow for seasonal flux of contaminants.
- Determine perched water elevation. Selectively screen below landfill in permanent water table at low aquifer confining elevations to test for heavy compounds.
- Determining permanent water table and, if possible, the lower base confining depth.
- Schedule interval time sampling for surface water monitoring of Ralston Creek. Identify flora/fauna kill mechanisms.
- **Landfill area should not be developed for commercial or residential construction.** (Emphasis added)
- Monitor contemporary methane presence

Chen Report-1982

Based on these readings, it appears that combustible gas is being generated within this landfill in quantities sufficient to be considered a hazard. The combustible range of methane gas is between 5% and 15% by volume in air. Concentrations above this range are too rich to burn.

However, gas migration or exposure to the atmosphere will result in dilution of the gas and result in a flammable condition. Care should be taken when excavating within or adjacent to the landfill mass. Venting of excavations will be required. Any C " J > "z /..J <1 structures built over the landfill will require special methane gas controls. There are 2 basic approaches to controlling the migration of methane into structures. These include barriers separating the proposed structure from the landfill and ventilation systems.

Access roads, parking areas, underground utilities and other facilities constructed on landfill materials will be subjected to large ... differential movements and a corrosive environment. Hie owner should be aware of the high risk of distress associated with construction on landfills.

CONCLUSIONS
(1) The proposed structure should be founded on piers drilled into bedrock and designed for maximum end bearing pressure of 40,000 psf, a skin friction of 4,000 psf and a minimum dead load pressure of 15,000 psf, with design and construction details as outlined.
(2) Alternate foundation systems consisting of steel H-piles and designed for a maximum stress of 12,000 psi with tip reinforcement or spread footings placed on the lower sand and gravel strata and designed for a maximum bearing pressure of 6,000 psf may be used.
(3) Trash fill varying in depth from 8 to 16 feet was encountered across the site south of Ralston Creek. **This landfill material is generating sufficient quantities of combustible methane gas to be hazardous**

Proposed RV Storage Yard Geotechnical Engineering Report 6800 Kilmer Street August 4, 2023 | Terracon Project No. 25235085

The Ralston Creek Trail is located adjacent to the northwest corner of the site between Ralston Creek and the Croke Canal. This trail is used for public recreation. There are no fences or other barriers to prevent access to the site. **The closest residence to the site is located within 200 feet of the southeast corner of the site across the Croke Canal**. P 551 (Since this section is from a 1995 report, the house identified is probably the non-HOA house below me)

Based upon the results of our field exploration and laboratory testing, it is our opinion that the existing fill materials and landfill debris should not be used to support foundations, interior slabs, exterior slabs-on-grade construction without complete removal and modification. P 114

Existing Fill Materials and Landfill Debris About 9 to 14 feet of existing fill materials and landfill debris was encountered in the exploratory borings. The landfill debris primarily consisted of construction debris and domestic trash. We understand the site is within the boundaries of a pre-existing landfill. Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement. **Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project.** P 121

The stability of subgrade soils may be affected by precipitation, repetitive construction traffic, or other factors. If unstable conditions are encountered or develop during construction, workability may be improved by overexcavation of wet zones and mixing these soils with crushed gravel. Use of geotextiles could also be considered as a stabilization technique. Lightweight excavation equipment may be required to reduce subgrade pumping.

Engineered fill should consist of approved materials that are free of organic matter and debris. P 123

1. We recommend that engineered fill be tested for water content and compaction during placement. Should the results of the in-place density tests indicate the specified water or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified water and compaction requirements are achieved.
2. Water levels should be maintained low enough to allow for satisfactory compaction to be achieved without the compacted fill material pumping when proofrolled.
3. Moisture conditioned clay soils should not be allowed to dry out. A loss of moisture within these materials could result in an increase in the materials expansive potential. **Subsequent wetting of these materials could result in undesirable movement.** P 124-125

Utility Recommendations
It has been our experience with other structures constructed on landfill debris that utilities constructed below or adjacent to structures on landfill debris will move significantly and will likely require excavation and full replacement multiple times over the life of the office building. Utilities constructed below structurally-supported floor systems should not be supported on the subgrade, but should be suspended in crawlspace areas independent of the subgrade materials. Utilities outside of the office building constructed on or within the existing fill materials over the existing landfill debris will have a very high risk of movement. Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or

elimination of this type of movement is likely only possible through complete removal of the fill and debris. **It is our opinion that movement on the order of 2 feet or more is possible.** P 127

Structurally Supported Floor Recommendations

Based on the subsurface conditions, slabs-on-grade constructed on the landfill debris without any modification is not recommended, as the slabs will have a very high risk of movement. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below the office building may be cost-prohibitive for the project. On this basis, we recommend the interior floor system of the office building be designed as a structurally supported floor, supported independently of the of the subgrade materials. P 129

Exterior Flatwork

Exterior flatwork constructed over unimproved landfill debris will have a very high the risk of long-term movement. Long-term movement from unimproved landfill debris cannot be quantified due to the nature of the debris, and reduction of this type of movement is likely only possible through complete removal of the fill and debris. Due to the depths of the fill and debris, complete removal of the fill and landfill debris below exterior flatwork may be cost-prohibitive for the project. Support of exterior flatwork on the existing fill and landfill debris can be considered; **however, it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development.** Frequent maintenance and full replacement of flatwork on unimproved landfill debris should be anticipated for this development. To reduce the risk of shallow, localized movement of exterior flatwork, we recommend that the subgrade materials are scarified or removed to a depth of at least 12 inches and properly moisture treating and compacting suitable on-site soils to grade. New fill materials beneath slabs-on-grade should be placed and compacted as outlined in the Earthwork section of this report. Again, t**his recommendation is intended to reduce the risk of shallow, localized movement but will not reduce the risk of deep, long-term movement of the existing fill and landfill debris.** P 130

For the proposed RV storage lot, Table 5.07.1.1 of the Standards states the minimum 20-year, 18-kip Equivalent Single Axle Load (ESAL) for Commercial and Business parking lots as 70,000. This ESAL value was utilized for our design. We anticipated a gravel fire access road may be planned at the site. We have assumed that the fire access road will experience a maximum of one trip per week of a fire truck with a maximum weight of 85,000 pounds and three axles. The traffic loading for the fire truck is included in our ESAL estimate for this project. P 131

It is imperative that the subgrade be protected from a loss of moisture. **A significant loss of moisture of the pavement supporting materials could result in additional movement of the subgrade.** P 132

Aggregate-Surfaced Roadways –

Maintenance Future performance of aggregate surface areas constructed at this site will be dependent upon several factors, including:

■ Maintaining stable moisture content of the subgrade soils both before and after roadway construction.

■ Providing for a planned program of preventative maintenance. Rutting of the aggregate surface layer and loss of surfacing materials will occur over the life of the drives/parking areas. Maintenance of the surface material and drainage are critical to the performance of aggregate surface roads. Since the surface materials are unprotected, proper drainage is key against loss of strength and stability of the surface materials. **Poor drainage allows water to remain on the surface and percolate into the aggregate base course section, reducing the strength of the underlying subgrade soils.** Well-shaped crowns with a slope of at least ½ inch per foot and adequate surface ditches or subsurface drains are essential to achieving rapid surface drainage.

Maintenance of the roadway shape and ditches or drains should be performed at least twice a year, particularly during wetter periods of the year and when snow removal is required, though more frequent maintenance may be required depending on actual traffic, drainage, and smoothness requirements. If unstable conditions develop during roadway usage, scarifying and drying of the subgrade, or placement of additional gravel material may be required. **Loss of surfacing materials from dust can be significant and may result in a roadway surface course that is several inches thinner within a few years. The reduced thickness will result in loss of strength and poor drainage.** P 133

Construction Considerations
Site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the subgrade may not be suitable for construction and corrective action will be required. The subgrade should be carefully evaluated at the time of construction for signs of disturbance or excessive rutting. **If disturbance has occurred, subgrade areas should be reworked, moisture conditioned, and properly compacted** to the recommendations in this report immediately prior to placing aggregate surface materials. P 132

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken. P 134

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storage

Leo Lohman <[redacted]> Thu, Dec 23, 2021 at 4:17 PM
To: JBEBO@arvada.org

I live directly south of the berm that separates the proposed RV lot and the subdivision. I have no problem if they want to store RVs there. I believe there will be a minimum of noise and activity from owners parking their vehicles there.

I live at [redacted] Circle in Forest Springs.

Leo Lohman
[redacted]

Sent from my iPad

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

FW: recommendations for protecting Ralston Creek

Victoria (Tori) Baker [redacted] Thu, Jul 11, 2024 at 3:57 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>
Cc: [redacted]

Jeremiah,

This is Tori Baker, checking in with you again about the development application from the RV park (DA2024-0016). I am still interested in see how Colorado Parks and Wildlife weighs in on this. As I understood you a few months ago, they weigh in at this point in the process because the property abuts a riparian area. I found the second application for the development online, but nothing yet from the CPW. Is there a report from there coming? Or, was one there and I missed it?

It's a very long application, with 400 or more pages of new documents and another 400 or so of historical documents. But, I did look through it. I see many responses to community concerns, such as requesting higher walls around the project, landscaping plans, and dimming lights at night. I didn't see anything that addressed parks and wildlife.

The report quotes the city's comprehensive plan requirements, which includes that the "The proposed amendment will have no major negative impacts on transportation, services, and facilities" (page 4 of the cover letter). So, it is clear from the plan that developments should not adversely affect services to the city's residents. The Ralston Creek Trail area is a beloved service to many of the city residents. And, the area does protect human health. (I have data on that, too.) The Trail area should be considered clearly and completely in the application for this development.

I imagine that a CPW assessment would address these and other issues.

- Light levels were addressed in the application, but somewhat vaguely. Light adversely affects pretty much every species of animals studied for this issue: mammals, birds, fish, even worms. (I can send you some reviews of this literature.) I that they propose of 20 foot high lights and a 70% reduction in light after closing. But, I don't see where the base level of light is given. How do they determine that this will suffice to keep light from entering the Ralston Creek Trail area and disrupting plants and animals there?

- I didn't find anywhere that the report addressed noise. This also adversely affects many different species. What is the limit on noise in the Ralston Creek Trail? Is it the same as residential codes? Stricter?

- Runoff into the creek also worries me. I see that it is addressed extensively in the report, yet perhaps not sufficiently. I know that the Colorado Department of Public Health and Environment earlier addressed issues of human health, including water. But, they did not address the effects on water for parks or wildlife. (Perhaps this was addressed in Appendix G, "Wetlands Review"? It is mentioned but not provided.) The effects of water for parks and wildlife are not always the same as for humans. The level of acceptable pH, for example, are different for human needs than for fish. I saw the new report on the detention pond, "Final Drainage Report," dated June 21, 2024. It says that all water from that pond will be treated and then released into Ralston Creek using "Water Quality Control Volume" as the quality control (page 4). I see in a subsequent document ("City of Arvada Operations and Maintenance Manual") that annual reporting is required to the city (page 2). Likewise, the "Stormwater Management Report" describes efforts to identify pollutants in

drainage. But, nowhere did I find enough information to know if this quality control only considers humans. If that is the case, then what standards will be used to protect parks and wildlife?

I know that this project brings you a lot of work. Thank you for your responsive, skilled, and friendly demeanor throughout. I appreciate you taking the time for this issue. Mallards and the other creatures in the Ralston Creek Trail area do not vote for the city council, but we must nonetheless take them into account.

Victoria (Tori) Baker, PhD, RN, Public Health Nurse

Geos Neighborhood

[redacted]

Arvada, CO 80007

[redacted]

From: Victoria (Tori) Baker
Sent: Wednesday, January 10, 2024 2:25 PM
To: [redacted]>
Subject: RE: recommendations for protecting Ralston Creek

Philip,

I heard back from Jeremiah Bebo, a planner from the City of Arvada. He said that the report from CDPHE is based on a voluntary clean-up application, not a development application. Now he will get a development application. When he gets that, given that the project abuts a riparian area, he will send out a formal request for Parks and Wildlife to weigh in.

Tori

Victoria Baker
[redacted]
Arvada, CO 80007
[redacted]

From: Victoria (Tori) Baker
Sent: Wednesday, January 10, 2024 12:28 PM
To: [redacted]
Subject: RE: recommendations for protecting Ralston Creek

Philip

I am writing you about the proposed development in Arvada along the Ralston Creek. We talked about this a few months ago (as below).

I understand that CDPHE has approved it in regards to its effect on human health. But, of course, they are not charged with assessing its effect on other species or on the adjoining riparian area. I am concerned about those effects, though.

When I looked online at Arvada's development site (https://www.arvadapermits.org/etrakit3/search/project.aspx?activityno=da2021-0146), I didn't see a report from Parks and Wildlife. As far as that goes, I also didn't see the report from CDPHE. I didn't find the site very easy to navigate, so I wasn't sure what was there. I called them today and left a message asking them if they have a report from Parks and Wildlife. But, I thought I could also ask you. Did you all weigh in?

Tori

Victoria Baker

[redacted]

Arvada, CO 80007

[redacted]

From: Victoria (Tori) Baker
Sent: Wednesday, August 30, 2023 7:07 PM
To: [redacted]
Subject: RE: recommendations for protecting Ralston Creek

Philip,

I was looking through the Arvada City codes, trying to find any protections for wildlife. I don't know if any of this is of use to you, but here is what I found.

I found a specific reference to Parks and Wildlife (under its old name) in the "Code of the City of Arvada." I didn't quite get what the reference means. It seems to refer only to natural features located within the development. But, here it is.

https://library.municode.com/co/arvada/codes/code_of_ordinances?nodeId=LADECOARCO_CH4ENSIDE_ART4-1ENQU_DIV4-1-4NAHAENNSAR

> 4-1-4-2. - Limits of development.
>
> The Limits of Development ("LOD") shall indicate the specific areas of a subdivision within which the development activity shall be contained in order to avoid areas identified in Section 4-1-4-3, Natural Hazard Areas, and features identified in Section 4-1-4-4, Significant Natural Features. LODs shall be indicated by the Applicant on the plat, and shall be reviewed and approved by the City as part of the development approval process based on:
>
> 1. A visual analysis of the location and apparent extent of areas affected by natural hazards and significant natural features;
>
> 2. Site topography, including but not limited to such characteristics as steepness of slopes, existing drainage features, rock outcroppings, river and stream terraces, valley walls, ridgelines, and scenic topographic features;
>
> 3. Any recommendations made by any other reviewing agency, including without limitation the U.S. Fish and Wildlife Service or the Colorado Division of Wildlife; and
>
> 4. The practical needs of proposed construction activity in terms of ingress and egress to the developed project and necessary staging and operational areas.

Farther down there is a section of the city code that specifically points out the need to preserve riparian areas and wildlife corridors.

(https://library.municode.com/co/arvada/codes/code_of_ordinances?nodeId=LADECOARCO_CH4ENSIDE_ART4-6LABU)

> Encourage the preservation, protection and enhancement of the environmental quality of the City by:
>
> …
>
> D. Preserving natural features such as stream corridors, wetlands and riparian areas, wildlife corridors, mature trees, ditches, and natural ponds;

Also, the purpose of the Arvada land development code includes “8. Encourage the conservation and efficient use of water and other natural resources;” (https://library.municode.com/co/arvada/codes/code_of_ordinances?nodeId=LADECOARCO Chap 1).

Tori

Victoria Baker
[redacted]
Arvada, CO 80007
[redacted]

From: Victoria (Tori) Baker
Sent: Wednesday, August 30, 2023 5:33 PM
To: [redacted]
Subject: recommendations for protecting Ralston Creek

Philip,

Thanks again for taking on this report about the Golden RV Storage (DA2021-0146) proposal to the Arvada city planners. The Mallards of Ralston Creek thank you, too. I hope you can address light, noise, and water for them.

Fonda Apostolopoulos of CDPHE is heading the effort to keep this development safe for the humans. He is at [redacted]

Tori

Victoria Baker
[redacted]
Arvada, CO 80007
[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage

[redacted] <[redacted]> Wed, Dec 22, 2021 at 7:27 PM
To: jbebo@arvada.org

Hello Kristin and Jeremiah,

I live at [redacted] Circle in the Forest Springs development and received the letter from the City of Arvada regarding the potential Golden RV Storage.

The Summary of 1st Submittal Documents.golden RV storage states "Consolidated Mutual Water Line easement being directly adjacent to the south property line, a fence cannot be located within this easement. Instead, the fence is proposed to the north of the easement. The landscaping is proposed to be on the outside (south side) rather than inside the fence in order to provide a more aesthetic buffer from neighboring properties." Currently the maintenance road on the west and south side of the referenced property is raised approximately two to four feet higher in areas than the adjacent land. In order to help with noise abatement and visual aesthetics, suggest a raised berm be constructed on the existing already raised maintenance roadway around the entire perimeter of the property with the proposed trees/bushes planted on the elevated berm area. The integrity of the landfill needs to be maintained, therefore, creating an elevated berm for trees/bushes should help keep roots from penetrating the landfill cover while creating a more visually aesthetic appearance and reduce noise to nearby homes In addition, one drawing in the document shows a 6' fence on the west side of the property. This is does not appear adequate to block the view of he proposed RV storage from nearby homes.

The proposed RV storage would require lighting in order to provide security. The lighting needed for the proposed RV storage is a significant and major concern to residents who live near the property. Several homes that back up to the property in Forest Springs have bedrooms on that side of their home. Lights shining all night into one's bedroom is unacceptable. Other homes would have lights shining all night in other rooms of their homes and that is unacceptable.

I do realize this piece of land is an odd shape with only one ingress and egress and an RV storage would be something that could utilize the property. However, the current proposed plan does not appear to sufficiently block lighting nor to sufficiently create an aesthetically pleasing appearance to the surrounding neighborhoods blocking the sight and sound of RVs. I ask that the developer reassess their plans to ensure lighting, aesthetics, noise abatement be looked at from the standpoint of their home being next to the property.

There are other concerns as well such as trash and debris, loud music being played while RV owners are in the storage lot, etc. What type of security is being planned so that nearby residents can be assured that the facility will not become a high crime area, with their homes then being threatened.

I am not in favor of the proposed RV storage area the way the current plan appears to be defined.

Thank you for the opportunity to provide feedback.

Regards,

Barbara DeCet

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage

[redacted]<[redacted] Sun, Dec 26, 2021 at 6:58 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Reference application number DA2021-0146

Hello Jeremiah,

Thank you for responding to my original email. After giving this project more thought, I wanted to add some clarity to my previous email expressing my objections to the current proposed application for an RV storage area at 6800 Kilmer.

- The property is located among developments with Forest Springs boundary located directly across the canal on the south side of the property and other homes facing the property on the west. A section of land directly north side of the property is currently under development for new homes near West Woods Mesa homes.
- Locating an RV storage in the middle of residences will adversely affect the neighborhood property values as well as having a negative visual impact on the neighborhoods effectively changing the character of the neighborhood from warm and welcoming to an unpleasant trailer parking lot experience.
- Forest Springs homes located on the south and west side of this property are in a direct line of sight where any type of security lighting will shine directly into their homes 24/7. Forest Springs residents will lose their privacy.
- Owners of RVs can pick up and drop off RVs at any time of day or night creating noise, stirring up gravel/ dust and shining of extra lights.
- RV's can be prone to vandalism thereby drawing an element of persons who would then be more prone to breaking into nearby homes. Forest Springs residents are primarily older residents and thus easy targets for the criminal element.
- The current proposed fencing does not adequately address developing the area in a pleasing manner congruent with the adjacent neighborhoods.
- Ralston Creek trail users will have an unpleasant view of recreational vehicles.

The acreage will be developed at some time and having it developed into something that adds a positive value to the neighborhood would be desired. I ask the City of Arvada to get involved to create a youth recreational area such as tee-ball, football, soccer, volleyball etc. or even an open park area with soft-surface trails meandering throughout the property connecting with the Ralston Creek trail. A development of this type would have a positive impact on the surrounding neighborhoods and users of the Ralston Creek trail.

If the RV storage proposal is approved by the City of Arvada, please request the developer to build a tall berm surrounding the storage faciity, adding year-round vegetation to help shield lighting and reduce noise.

Thank you for listening,

Barbara DeCet

[redacted]

Forest Springs HOA

[redacted]

[Quoted text hidden]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer Street – RV Storage Lot – Development Application No. DA2021-0146

Chad Ellington <[redacted]> Thu, Jan 13, 2022 at 2:17 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>
Cc: "Nathan Laudick, PE" <[redacted]>, "djones@arvada.org" <djones@arvada.org>, Randy Moorman <rmoorman@arvada.org>, "lsimpson@arvada.org" <lsimpson@arvada.org>, "jmarriott@arvada.org" <jmarriott@arvada.org>, Lisa Smith <lsmith@arvada.org>, "bfifer@arvada.org" <bfifer@arvada.org>, "Mark G. Deven (mdeven@arvada.org)" <mdeven@arvada.org>

Good Afternoon Mr. Bebo –

We are the owners and developers of Blocks 1-9 at the Geos Neighborhood which is directly adjacent to the proposed RV Storage Lot.

As a developer who often seeks amendments to land use designations, we rarely find ourselves in opposition to this type of an effort, but the proposed use is simply not appropriate or compatible for this location and its existing surroundings.

Please include this letter with the official record stating this stakeholder's opposition to the proposed rezoning in the above-referenced application.

An RV Storage facility should be located in a more suitable area than this site which is tucked into residential surroundings and bordered by the Croke Canal and Ralston Creek Trail.

Changing the use is just taking a shortcut to what really needs to be done here. That dump site and all of the waste needs to be removed and relocated. My partners and I have looked into this property and the remediation reports in great depth. We believe it is economically feasible to relocate all of the landfill materials and maintain its intended use as future mixed-use residential.

Further, the proposed Land Use does NOT conform with Arvada's Comprehensive Plan 2014. This site is clearly identified to be "Mixed-Use Residential Emphasis" per page 33 of the Comp Plan. An RV Storage lot may be the easiest solution to developing this site right now but it violates many of the City's policies as stated in the Comp Plan including Policy CC-1.3 titled "Compatible Infill" as well as CC-1.4 titled "Working with Stakeholders"… "and the community to consider a project's potential effects and strive for integration in a manner that helps enrich the district's character."

I think you're hearing from many neighbors that this proposed change of use is met with serious objection.

Thanks for your consideration.

Chad

CHADELLINGTON

PEAK DEVELOPMENT

[redacted]

[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Pending Development DA2012-0146

David DeMars <[redacted]> Wed, Feb 2, 2022 at 1:15 PM
To: "djones@arvada.org" <djones@arvada.org>, "jbebo@arvada.org" <jbebo@arvada.org>

Re: RV Park in Arvada, adjacent to Ralston Creek Trail

My wife and I are residents of the Westown townhomes development. We love the location and enjoy taking our grandkids to the many local parks, biking to Arvada for lunch and the many other outdoor activities available in this area. After reading your summary of this project, we would like to document our strenuous objection to the proposed use of this property. I understand the desire of the developer to capitalize on his RV storage concept, and there may very well be market for this type of activity. But not on this site, for all the reasons you outlined in your project review document. Issues with this specific site, due to its history, will limit what should be approved, not to mention the proximity to existing residential and recreational developments. I believe the negative impacts of this use at this location exceeds any community benefit to be derived.

Thank you for your consideration in this matter.

David & Mary DeMars
[redacted]
Arvada, CO

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV storage in west Arvada

Brian Glover <[redacted]> Tue, Jan 4, 2022 at 12:53 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Jeremiah-

Here we go again. The Amazon project was recently defeated as many many people decided it was not a good fit for the area. This included many City Council officials.

So now we have the RV storage lot. Although on the surface a better fit for the area than Amazon (even though there are actually proposed in different areas) I once again have to state that this isn't a great fit for the area.
The primary reason for this in my opinion is the bright glaring lights that will shine continuously all night to try and keep the area safe. Well, since the RC trail is right in the immediate area and many forms of wildlife inhabit the area, bright shining lights would prove to be a mighty disturbance for many if not all of them. Please imagine if you will, the effect of the lights shining all night. I imagine some of the other impacts of the project would also be negative, including cars and vehicles coming in and out at all times, and traffic increases in the area. We all know that the area is already quite congested with all of the recent housing developments. More traffic here is not a good plan for the area. I'm confident your studies have indicated that this can be absorbed without too much problem (like your studies showed that the Amazon traffic would be acceptable) but frankly studies and statistics can be modified or interpreted anyway that one wants.

I encourage you to keep these things in mind as the project approval moves forward. Once again, not a great fit for the area. The lights blazing at all hours should be enough to solidify your good judgment.

Thank you,

Brian Glover
Forest Springs Resident

January 6, 2022

Mr. Jeremiah Bebo, Planner II
Community and Economic Development
City of Arvada
8101 Ralston Road
Arvada, CO 80002
Via Email: JBebo@Arvada.org

RE: 6800 Kilmer Street – RV Storage Lot – Development Application No. DA2021-0146

Dear Mr. Bebo:

I am submitting these comments on behalf of the Colorado Tap House in response to the notification received regarding the above-referenced Application.

As a 'soon to open' new business in the immediate area, we bring a unique perspective. We understand how active the surrounding communities are and how much they cherish the Ralston Creek Trail the flows directly through our property.

We listened to the public and made many adjustments to our plans to accommodate and address their stated concerns over protecting Ralston Creek and its wildlife habitat (e.g., leaving our property south of the bike trail undeveloped) and even took steps to enhance the trail (e.g., bike repair station and horse hitching post). We adjusted our parking lot lighting to use lower poles, timers and use light fixtures that minimize light pollution. We even redesigned our building and added significant additional landscaping / trees / shrubs to address certain noise and light concerns.

I would ask that you encourage the developer to consider the input of the surrounding communities as the City of Arvada encouraged us to do.

Finally, being immediately downstream from the proposed development we do have some environmental concerns of the development being built on an old dump site. To add further context, when we were searching for a building location, we actually spoke to the listing agent at the time about the property at 6800 Kilmer St. and due to our perceived environmental impact risk of developing on the old dump we did not pursue further. We would ask that a thorough study be performed of the environmental risks and impacts of the proposed development on the old dump before approving.

Thank you for your consideration and let me know if we can provide any further information or address any questions.

Sincerely,

Erik A. Zeitlow

Erik Zeitlow – President
Colorado Tap House
[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV storage -Arvada

Debra <[redacted]> Wed, Mar 16, 2022 at 2:02 PM
To: jbebo@arvada.org

Dear City Planning Dept.:
I'm writing in protest of the proposed RV Storage facility in W. Arvada. We live in Forest Springs adjacent to the proposed site, use the Ralston Valley Creek trail all the time, walk through neighborhoods and am so disgusted with the continued development in our area!

Please leave "open spaces" OPEN !!

I'm asking….Why do the city planners insist on building in open spaces here in Arvada? Is it just the money???? Many people like us who have lived here in Arvada a while came because of it's quieter neighborhoods and to escape the high density development; have some open land to breathe and relax…. and Arvada is being ruined the continued building and high density developments!! …. Getting more crowded on streets and paths…

PLEASE keep our open spaces open and preserve our quality of life here. The Arvada Dept. here are to serve the interests of our city…. please stop the building..

Thank you for your time,
Debra Thyfault
Arvada, CO

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage Appl#DA2021-0146

Barbara Hohenegger <[redacted]> Sun, Dec 26, 2021 at 12:42 AM
To: "JBEBO@arvada.org" <JBEBO@arvada.org>

Mr Bebo,

The Westwoods neighborhood is a jewel in the City of Arvada.
Ask any of our nature centric residents what they value most here and you'll hear, the clean, quiet natural atmosphere and the Ralston Creek Trail. A wondrous place for our mental well-being and physical health.

How could an unsightly 14 acre RV parking lot for 556 Motor Homes (a huge number) ever be considered appropriate along this trail, and surrounded by residential neighborhoods? "…paved paradise and put up a parking lot", as the song goes.

Hundreds of people jog, walk, bike this area daily, several dozen have this area in direct view from their homes and patios. Consider:

1. Noise pollution
   Large noisy vehicles on a noisy gravel road pulling in and out and around the lot.
   Often loud voices and loud music.
2. Air pollution
   Big rigs, many with trailers spewing gas fumes and dust
3. Light pollution
   The many tall bright lights (for security, another issue) reflecting off of large shiny white aluminum clad Motor Homes.
   The area will glow. The sky, and clouds, and stars lost for many blocks near the 14 acres.
   Head lights flashing into windows of homes and people on the trails.

This is a noisy, dirty, industrial eyesore. Unhealthy for the people passing by and living here.
We won't even get into the effects on the plants , water, and wildlife.
A once protected and appreciated part of the City of Arvada, which contributes so positively to the lives of so many, damaged and lost forever.

RV storage. We've used them for years.
Vehicle alarms go off at all hours.
Rigs are "warmed up" for 15-20 minutes before they leave the lot. Noise and fumes pollute the atmosphere.
There's always trash.
People staying the night and longer is common - Dad's "doghouse".
As is the drinking and drugs so prevalent among many.
A magnet for vandalism.

Please. A more appropriate business for this lovely residential area.

On a personal note, there are several homes very close to this yard. Within 50 feet. All the harmful aspects of this parking lot have severe negative affects for us.
Consider the substantial loss of property value and well-being we will have to endure.
Would it be OK in your backyard?
Please hear us. Thank you.

Barbara Hohenegger

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Fire safety concerns for Application DA2021-0146 - Golden RV storage on 6800 Kilmer

Ellen Bothner <[redacted]> Fri, Mar 4, 2022 at 9:50 AM
To: jbebo@arvada.org

Hi Jeremiah,

I am writing in regards to Application DA2021-0146 for the proposed development of a RV storage lot on 6800 Kilmer in Arvada.

Since this property was previously a landfill, I have concerns regarding the environmental condition of this property in regards to possible methane pockets and other issues that may arise from development. With the recent Marshall fires, it is important to insure this land is not a fire hazard and is safe for development.

I would like to recommend that a complete land site study be performed to determine the condition of this property to determine whether it is safe to develop to park multiple gas powered vehicles in storage on top of this land. Also, if a sottering iron or welding torch is used when the vehicles are parked to perform minor maintenance, will this create a signficiant fire risk.

Thank you for your consideration of this recommendation.

Ellen Bothner
Resident of Arvada, CO

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Comments on Application DA2021-0146: Golden RV Storage

Ellen Bothner <[redacted]> Sun, Dec 26, 2021 at 1:53 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>

I am a resident in the Forest Springs neighborhood and was notified of Application DA2021-0146 regarding the development of a Golden RV Storage property.

I have the following comments on this application that I wanted to provide in an effort to find a more suitable development project for this land. Thank you for your consideration of this information.

Ellen Bothner
[redacted]

1. This RV Storage area is proposed to be developed behind existing homes with bedroom windows in the backs of the houses. The lighting proposed for this 24x7 storage area will create light pollution directly into this neighborhood's houses where lighting currently does not exist. A property that will not create 24x7 lighting into existing homes should be considered for this area.

2. The type of fencing on this property is not clear in the application. In order to make this type of property suitable to the pleasant area that currently exists with walking trails and beautiful homes in existing neighborhoods , the fencing should be a solid rock wall approximately 12 feet or higher.

3. The application does not include any noise restrictions on the RV's when they are parked in this facility. It will be important that running of the RV's not be allowed to perform maintenance or cleaning on this property. If this is allowed at a 24x7 facility, this will create undesirable noise into the existing homes in this area.

4. The application does not mention the Security that will be in place at this facility. RV parking lots without Security have resulted in people taking up residence in long term parked RV's without the owners or the property manager's knowledge. This could result in an undesirable issue in this location.

5. The landscaping around the property does not include any plantings outside the fencing area. In concert with the current beauty of this area, landscaping outside the fencing area should be included to tie into the walking trail.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Our comments on RV storage proposal

Elaine Fitzgerald <[redacted] Mon, Dec 27, 2021 at 3:06 PM
To: Bebo Jeremiah <jbebo@arvada.org>

Here are the comments we have so far:
We are upset by this proposal as we are directly south of the site.

- Decrease in property value of our homes by as much as 100K
- Fencing vs. wall: wall preferred but needs to be higher than 6 feet. Will the developer clean off any graffiti that may occur?
- Lighting is a huge concern as our property will experience light pollution.
- We own a spa which is in back yard. Privacy concerns.
- What will be accessibility? 24/7?
- Noise in early morning/late evening from vehicles loading and moving.
- Smell of diesel fuel polluting area.
- Landscaping: only small shrubs allowed on south side so very little coverage of unsightly RVs from our living room.
- Ditch company needs access to clean and maintain Croke Canal. Trucks and equipment would affect any shrubbery and how would debris from canal be disposed of?
- Wind: we have a lot of wind storms here. Debris from RV storage could fly and cause damage to our property.
- Crime: RVs are a target for break ins. That would impact our safety.
- Homeless seeking shelter
- Environmental concerns: It is on landfill and the disturbance could cause gas emissions.
- Ugly view, impacts the well being of residents, walkers, cyclists
- We will need to invest in new window coverings to block the vie

Just a thought: is the property for sale and could a large group of people buy it as it is now?

Respectfully,

Elaine Fitzgerald
Gerald Spann
[redacted]
Arvada, CO 80007

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

DA2021-0146

Erik Zeitlow <[redacted]> Sun, Jan 16, 2022 at 10:36 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>

Jeremiah – I shared these thoughts with some others regarding DA2021-0146 (RV Lot – 6800 Kilmer), but wanted to add this to the record as I'd really like to know how the developer calculated their outdoor storage as it does not seem to be calculated per code based on the diagrams and examples in the code documentation. Thanks, Erik

In a recent response letter to the City they state:

• 35% maximum outdoor storage allowed.
Response: The area designated for RV storage is 609,840 square feet or 31% of the gross site area.

I'd be curious how they came up with 31% when the parking area is clearly MUCH MUCH more … did the calculate the size of the stalls and not the aisles etc?

The reason I find this interesting is that the 35% outdoor storage seems to be from the Light Industrial (IL) zone … seems like they are more a General Industrial (IG) use?

2-1-6-2 **IL: Industrial, Light** A. Purpose. The purpose of the Industrial, Light (IL) zoning district is to provide areas for light manufacturing, assembly and fabrication uses, office, research, food and beverage processing, packaging, or bottling, and compatible recreational activities.

Max. Outdoor Storage of Lot Area 35%

2-1-6-3 **IG: Industrial, General** A. Purpose. The purpose of the Industrial, General (IG) zoning district is to provide areas for a wide variety of industrial, manufacturing and heavy industries, heavy logistics centers, storage yards, and comparable uses and activities, as well as less intensive industries and supporting uses.

Max. Outdoor Storage 90%

I included the red border which seems to indicate the outdoor storage area.

Figure 2-1-6-3: Illustrative Industrial, General Lot and Building Standards

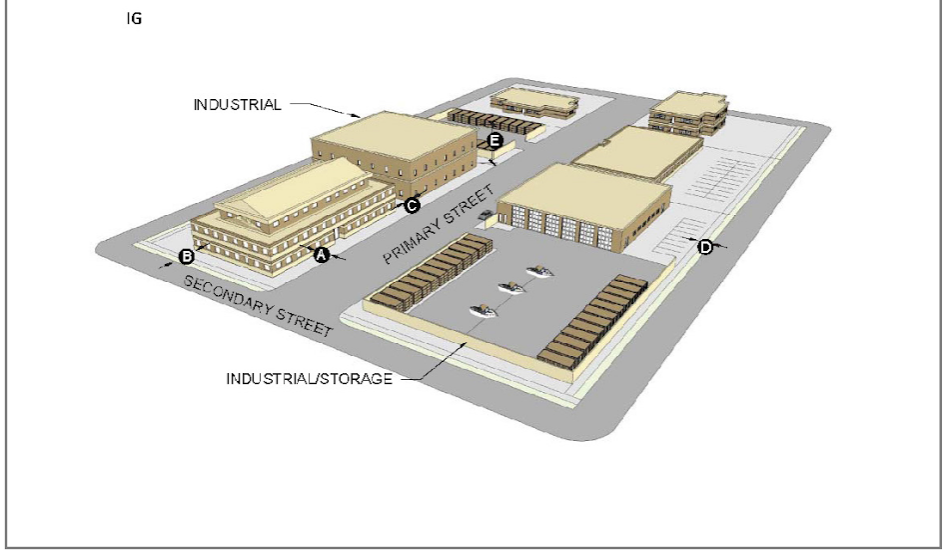
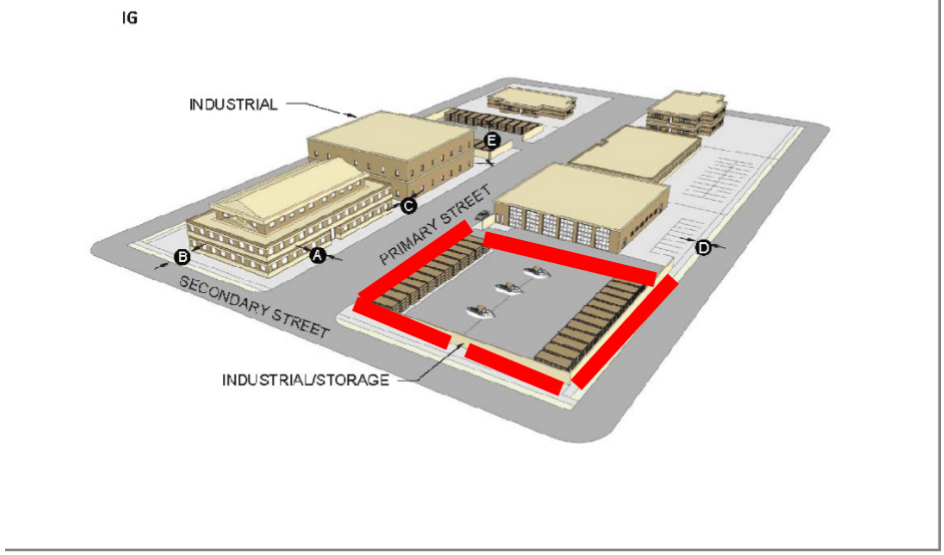
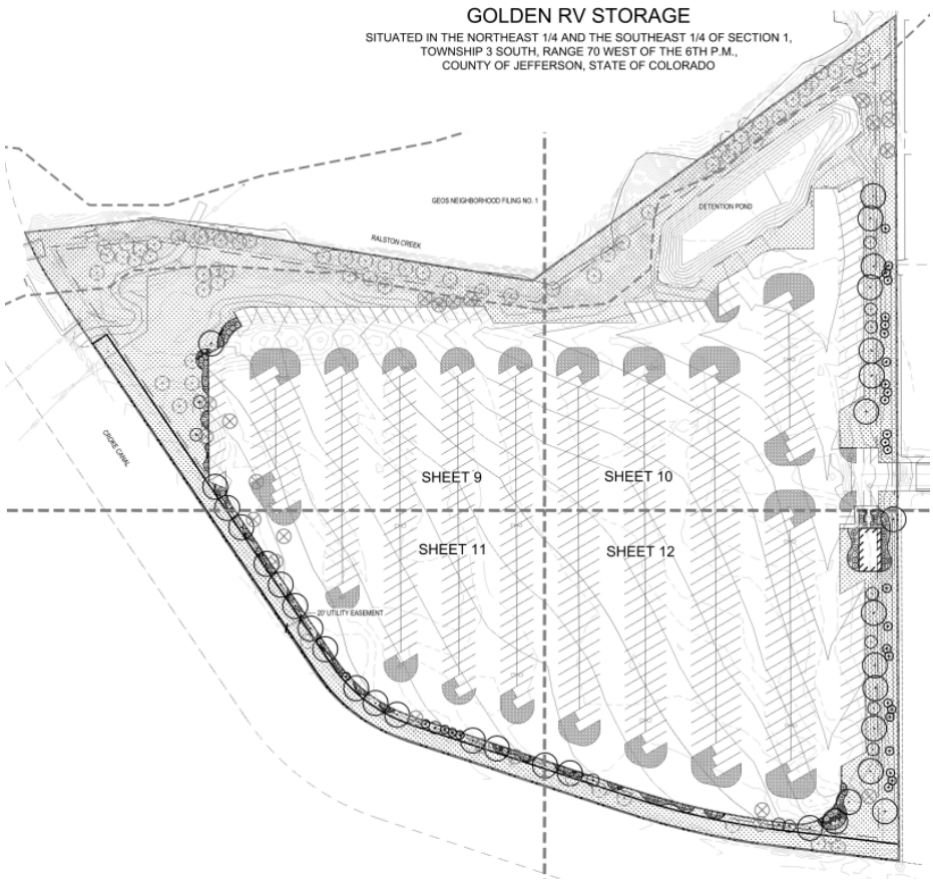


Figure 2-1-6-3: Illustrative Industrial, General Lot and Building Standards




GOLDEN RV STORAGE
SITUATED IN THE NORTHEAST 1/4 AND THE SOUTHEAST 1/4 OF SECTION 1,
TOWNSHIP 3 SOUTH, RANGE 70 WEST OF THE 6TH P.M.,
COUNTY OF JEFFERSON, STATE OF COLORADO
GEOS NEIGHBORHOOD FILING NO. 1
DETENTION POND
RALSTON CREEK
CROKE CANAL
SHEET 9
SHEET 10
SHEET 11
SHEET 12
20' UTILITY EASEMENT

December 28, 2021

Mr. Jeremiah Bebo, Planner II
Community and Economic Development
City of Arvada
8101 Ralston Road
Arvada, CO 80002
Via Email: JBebo@Arvada.org

RE: 6800 Kilmer Street – RV Storage Lot – Development Application No. DA2021-0146

Dear Mr. Bebo:

I am submitting these comments to the above-referenced Application on behalf of my fellow residents of Forest Springs Subdivision whose names are listed below. Forest Springs is in close proximity to the western and southern boundary of the development parcel, separated by only the Croke Canal. The comments are a group effort and reflect our significant concerns with the proposed development.

Thank you for your consideration, and please let me know if we can provide any further information or if you have questions we can address.

Sincerely,

Steven L. Snyder
[redacted]
Forest Springs Subdivision
[redacted]

copy:
David Jones, Mayor Pro-Tem and Councilmember, District 4, djones@arvada.org
Randy Moorman, Councilmember, District 1, rmoorman@arvada.org
Lauren Simpson, Councilmember, District 2, lsimpson@arvada.org
John Marriott, Councilmember, District 3, jmarriott@arvada.org
Lisa Smith, Councilmember At-Large, lsmith@arvada.org
Bob Fifer, Councilmember At-Large, bfifer@arvada.org
Kristin Dean, Senior Associate – Planner, Norris Design

BACKGROUND

1. **RV Lot Development**. Application No. DA2021-0146 is for the development of 14 acres at 6800 Kilmer Street for an RV storage lot with 556 RV spaces. The applicant proposes a six-foot-tall perimeter fence and 17 35-foot-tall light poles to illuminate the entire lot. The application is only subject to administrative review without any public review by the Arvada City Council unless the Community and Economic Development Director determines the application does not comply with the requirements of the Arvada Land Development Code (Code).

2. **Forest Springs Subdivision**. Several residential lots in the Subdivision back up to the Croke Canal. In many instances, the lots are no more than 100 feet from the boundary of the development site. Several residents have decks and bedroom and living room windows in direct view of the site. Residents and hundreds of visitors each day enjoy walking the Arvada trails along the Canal and the Ralston Creek trail, which adjoins the north boundary of the proposed development.

3. **Arvada Land Development Code**. The proposed development is subject to the terms of the Code. The stated purpose of the Code is, in part, to promote "the public health, safety, convenience, comfort, prosperity, and general welfare;" protect "the quality and character of stable residential developments;" and provide "***protection from nuisances and hazards***." As stated in Division 1-1-2. of the Code, the "provisions of this Code shall be considered the ***minimum requirements*** necessary for the promotion of the public health, safety, convenience, comfort, prosperity, and general welfare." (Emphasis added in both instances.)

FOREST SPRINGS RESIDENTS' QUESTIONS

1. A large methane plume resulting from a buried landfill lies beneath the site. It is our understanding that digging is not permitted due to the methane risk. In that case, how can fencing, 35-foot-tall light poles, other improvements, and RVs that can weigh in excess of 10,000 pounds be safely installed or placed on the site?
2. What is the maximum height and weight of RVs that could be stored at the site?
3. Assuming a low average weight of 5,000 pounds per RV and with 556 RV spaces, 2,780,000 pounds of RVs could be placed on site. How is this safe?
4. What would be the hours of operation of the RV lot?
5. Will the RV lot be available to patrons 24 hours a day?
6. What steps will be in place to ensure that dust from the site will be mitigated?
7. Will the applicant be using any additives in the gravel to ensure that dust does not become an issue?
8. Will the lot owner be responsible for maintaining the perimeter, including removing graffiti?
9. How will maintenance obligations be enforced?
10. How will trees and other landscaping be watered to ensure they reach full maturity?
11. What type of security will be in place for the RV lot and how will it protect local residents?
12. What protocols will be in place to ensure RV owners do not "live" in their RVs or that the lot doesn't become a homeless encampment?
13. Will the RV lot management allow RVs to run during maintenance or cleaning?

14. Quantitatively, how much light will leave the site and be visible from Subdivision property?
15. Will the lights be completely turned off after hours?
16. What is the proposed material for the fence?
17. What steps will be in place to ensure the development does not cause erosion resulting in the discharge of materials from the old dump into Ralston Creek?

FOREST SPRINGS RESIDENTS' CONCERNS AND REQUESTS

Many residents of Forest Springs subdivision have significant concerns with the RV lot application. In our view, the proposed development does not meet the intent and purpose of the Code. Given its close proximity to Forest Springs, resulting visual impacts, light pollution, noise, air pollution, security risks, and privacy concerns associated with the RV lot will create "nuisances and hazards" for many subdivision residents and trail visitors. The proposed development does not protect the "quality and character" of Forest Springs residents; rather, it would unreasonably interfere with the use and enjoyment of our properties. In fact, the development as proposed will likely significantly diminish the property values of several residents' properties, perhaps by as much as $100,000 per lot. Therefore, the residents listed below have the following requests concerning the application.

1. Lighting. The proposed 17 light poles are 35 feet high and would provide a total 9,657 watts or 1,227,077 lumens of light. Instead, we request that the RV lot remain unlit to eliminate light pollution and the environmental risks caused by placing improvements onsite. If lighting is allowed, we request that:

    a. Light poles not exceed 20 feet in height.
    b. The number of light poles be reduced to 8.
    c. The amount of light pollution leaving the RV lot be significantly reduced by also using lower wattage, angling light away from adjoining properties, and using state of the art lighting that minimizes light pollution. The proposed lighting may be suitable for industrial uses but not when such uses are close to residential developments.
    d. The lights be completely turned off one hour after sunset.

2. Perimeter Buffer.

    a. We ask that the perimeter bufferyard be a minimum 12 feet tall and composed of a solid material to minimize the RV lot's visual impact and to address neighborhood privacy concerns. A bufferyard of this height supports the purpose of Article 4-6 (Landscape and Buffering) of the Code, which encourages the preservation and protection of the character of the City by "**Buffering uses that tend to create disproportionate impacts on adjacent properties in terms of noise, dust, lighting, and other factors** that may be mitigated using landscaping, fencing, berms, distance, and/or divisional walls." Code Section 4.6.1.1.B.2. (Emphasis added.)
    b. In order to better separate the RV lot from the residents' properties, the required landscaping be placed on the outside of the bufferyard.
    c. In addition to a 25-foot setback, the perimeter landscape buffer be increased to 25 feet.

d. The landscaping plan should double the number of trees and the minimum diameter of the trees planted should be 6 inches.

3. Noise and Air Pollution. In order to minimize dust, engine exhaust fumes, and noise from engines, traffic, RV alarms, and other sources, we request that:

   a. Hours of operation be limited to dawn to dusk with no lighting on site.
   b. RV owners cannot access the lot after hours.
   c. The use of RV security and backup alarms not be permitted or be significantly restricted.
   d. RVs not be allowed to idle for extended periods.

FOREST SPRINGS RESIDENTS SUPPORTING THESE COMMENTS:

Larry Fike
Karen Helm
Robert Smith
Darlene Evans
Dorian and Laurie Ross
George and Holly Golen
Linda and Brady Stone
Wanda Kitterman
Sharon McCarthy
Patti Joseph
Ariane Meyer
Jo and Rich Stewart
Jonathan and Amy Haas
Bob Connolly
Barb Hohenegger
Gerry Spann
Elaine Fitzgerald
Jack and Kelly Weil
Jeff and Colleen Mason
Ellen Bothner
Cynde and Rick Simms
Ted and Rita Sysling
Linda and Mark Graham
Rick and Chris Moody
Barb DeCet
Scott and Sandi Michaels
Robin and Bill Fawcett
Diana and Kevin Craig
Barb Lutz
Pat Salazar
Joe and Debbie Burke
Liz Bublitz
Ryan Oglesby
Amanda Snyder
Ruth Breckon
Frank Giardino
Joyce and Jim Cullen
Scott Oppenheimer
Cecilia and Dale Hartsock
Rosemary Dickson
Mary and Bob Jaeger
Brian and Patti Glover
Nancy Weller
Mike and Marty Flanigan
Steve Snyder

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

additions

Sharon McCarthy <[redacted]> Wed, Dec 29, 2021 at 9:30 AM
To: jbebo@arvada.org
Cc: David Spiegler <[redacted]>, Harry Plummer <[redacted]>, Shirley Plummer <[redacted]>, nancy koepsel <[redacted]>, val jones <[redacted]>, Joanne Flynn <[redacted]>, david & debra thyfault <[redacted]>

Jeremiah,

In trying to meet the deadline to submit the final document to you, I left off a few neighbors' names. Please add these names to the document Steve Snyder emailed yesterday. The following names and those on the final document reflect comments from approximately 48% households in Forest Springs.

David and Joyce Spiegler
Harry and Shirley Plummer
Nancy Koepsel
Valerie Jones
Joannie Flynn
David and Debra Thyfault

Thanks.

Sharon McCarthy

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

additions to FS Document

Sharon McCarthy <[redacted]> Thu, Dec 30, 2021 at 2:25 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Good afternoon, Jeremiah,

Please add the following names supporting the FS document:

Edwin and Margaret Johnson
Tom and Linda Parisi
Mel Gyurko
Jim Buckner
Fran Jones
Donna Johnson
Barbara and Larry Wapensky
Aileen Laubhan
Rosalie Spicola
Tim and Patti Lester
David and Stacey Thompson
Dale and Evelyn Hunzelman
Sherri Lombardi
Lillian Hudson and Tom Lanigan
Carol Soucie
Nancy O'Brien
Richard Remington
Al Taylor

More names are coming!

Sharon McCarthy

Mr. Jeremiah Bebo, Planner II
Community and Economic Development
City of Arvada, 8101 Ralston Road
Arvada, CO 80002 Email: JBebo@Arvada.org
RE: 6800 Kilmer Street – RV Storage Lot – Development Application No. DA2021-0146

Dear Mr. Bebo:

I am submitting these comments to the above-referenced Application on behalf of my fellow residents of the GEOS Neighborhood Metro District whose names are listed below. This was a Superfund Site completed in 1996. See EPA record below.

Landfill At Cottonwood Park

NW Of 68th Ave & Joyce St, Arvada, CO 80004

National Priorities List: No Status: Archived

Landfill At Cottonwood Park is a superfund site located at NW corner of 68th Ave & Joyce St, Arvada, CO 80004. The Environmental Protection Agency (EPA) identifies sites such as Landfill At Cottonwood Park because they posed and continue to pose substantial risk to human health and/or the environment due to contamination by one or more hazardous wastes. Landfill At Cottonwood Park is currently registered as an Archived superfund site by the EPA and does not require any clean up action or further investigation at this time.

This application reaches beyond a simple administrative review given the impact on homeowners that live next to this parcel of land. It is unclear whether the LDC has any provisions for development over an EPA superfund site.

GEOS Neighborhood - Block 10 residential lots are all within a block of the Ralston Creek and Ralston Creek Trail. In many instances, the lots are no more than 300 feet from the boundary of the development site. The Townhome and Duplex residents have a direct view of the site. 91 new homes have been approved with more to follow that will also be impacted by this development. Residents and hundreds of visitors each day enjoy walking the Arvada trails along the Ralston Creek trail, which adjoins the north boundary of the proposed development.

Thank you for your consideration, and please let me know if you have any questions.

Sincerely,

Karen Gerbatsch, HAC Chair, GEOS Neighborhood Metro District, 201-370-1356

CC: David Jones, Mayor Pro-Tem and Councilmember, District 4, djones@arvada.org
Randy Moorman, Councilmember, District 1, rmoorman@arvada.org
Lauren Simpson, Councilmember, District 2, lsimpson@arvada.org
John Marriott, Councilmember, District 3, jmarriott@arvada.org
Lisa Smith, Councilmember At-Large, lsmith@arvada.org
Bob Fifer, Councilmember At-Large, bfifer@arvada.org
Mark Deven, City Manager, mdeven@arvada.org

In addition to the comments from the Forest Springs community, GEOS residents have compiled a list of questions/issues:

A. What are the requirements/stipulations for any development over an EPA superfund site containing a methane plume? The Terracon submitted reports are dated July 2007 (prelim/final), 2017 and 2021. The 2017 report identified Methane concentrations exceeding the Lower Explosion Limit (LEL). The 2021 report recommends that the "…."existing fill materials should not be used for support of foundation slabs, pavements and/or utilities without significant modifications". The 2021 report also recommends an additional site assessment.

B. Our concerns are multifold but center around the fact that a methane plume, combined with 500+ store RV's loaded with gas, diesel, propane and potentially other flammable substances represents a significant fire hazard. The recent fires in Boulder County, and its cause(s) need to be factored into the current LDC (2020 edition). Unless this has been accomplished the application must be rejected.

C. The submission by Norris Engineering does not include an environmental impact study other than the submitted Terracon reports. The reports are void on the impact this development will have on wildlife that flourished along the Ralston Creek.

D. Lighting. The submission does not include a comprehensive lighting plan/scheme. The lightpole foundations clearly extent vertically below the layer that covers the landfill. The plan is silent on how longs lighting will be in use on a daily basis. Even though downward lighting is proposed the plan does not clarify whether lighting is compliance with the Dark Sky protocol (https://www.darksky.org/our-work/lighting/lighting-for-citizens/lighting-basics/). While lighting is a security element, as proposed it will have a highly negative impact on wildlife and surrounding communities. We propose that any lighting scheme is revised to meet the requirements of "Dark Sky" and is powered by site-generated renewable energy.

E. Chemicals and Waste Storage:

1. Above ground chemical or waste storage - potential for leakage, abatement measures;
2. Underground chemical or waste storage - potential for leakage, abatement measures;
3. Fuel and propane storage within each RV - significant fuel source during any fire event (let's keep the Marshall fire in mind) - ignition potential
4. RV fuel or oil leakage; containment measures; abatement;
5. Dump sites or disposal areas for human waste and other waste;
6. Emissions from RV's running for various reasons.
7. RV washing operations - run-off, soaps/chemical use; collection/containment;
8. The detention pond on the north will likely contain run off from vehicles and chemicals dropped from vehicles. Its location appears to be a contamination risk to Ralston Creek and wildlife near the creek. Construction of proposed containments will more than likely disturb the superfund site; how will the owner/operator control construction and/or respond to disturbance of the superfund site?? Submissions suggests that the owner/operator is responsible for the assessment of any contaminant spill and its remediation. What are the qualifications of the owner/operator to assess any potential spill, diagnose its severity and implement the correct remediation?

F. Privacy fencing along the north is at the bottom of a hill. Accordingly, the fence will traverse the Ralston Creek at multiple locations, eliminated access to a section of the trail that parallels the course of

the creek and will not mitigate any view of the stored RV's nor prevent any light pollution. As side from these concerns old-growth trees will have to be removed.

G. The land is zoned IL, but storage facilities fall under IG definition. Therefore, is this the correct use of this land as it is zoned?

The report states that 35% is the maximum outdoor storage allowed. The Response was: The area designated for RV storage is 609,840 sq feet or 31% of the gross site area. How was that calculated as the parking area is clearly much, much more? Did they calculate the size of the stalls and not the aisles, etc?

Which brings up the question, are they really a Light Industrial (IL) facility or more of a General Industrial facility/use per the definitions below:

2-1-6-2 IL: Industrial, Light A. Purpose. The purpose of the Industrial, Light (IL) zoning district is to provide areas for light manufacturing, assembly and fabrication uses, office, research, food and beverage processing, packaging, or bottling, and compatible recreational activities.

Max. Outdoor Storage of Lot Area 35%

2-1-6-3 IG: Industrial, General A. Purpose. The purpose of the Industrial, General (IG) zoning district is to provide areas for a wide variety of industrial, manufacturing and heavy industries, heavy logistics centers, storage yards, and comparable uses and activities, as well as less intensive industries and supporting uses.

Max. Outdoor Storage 90%

Residents of GEOS Neighborhood have significant concerns with the RV lot application. In our view, the proposed development does not meet the intent and purpose of the LDC nor the "Sustain Arvada" vision. Given its close proximity to several communities, such as the GEOS Neighborhood, the resulting visual impacts, light pollution, noise, air/water pollution, security risks, and privacy concerns associated with the RV lot will create "nuisances and hazards" for many neighborhood residents and trail visitors. Largely undetermined is the impact a disturbed EPA superfund site will have on bordering communities. The proposed development does not protect the "quality and character" of our and other residents; rather, it would unreasonably interfere with the use and enjoyment of our properties. In fact, the development being proposed, which will sit on land owned by a speculator residing out of state, will significantly diminish the property values of most of the residents' properties. Therefore, the GEOS Neighborhood residents listed below request that the development proposal is rejected.

List of GEOS Residents Opposed:

James and Patty Horan
Andy and Jane Bilisoly
Ryan Bearder
Gerardo Aguilera
Christine Talmage
Mark Rauenzahn
Kevin and Shea Thomas
Shanna Boutte
Michael and Angie Olivero
Danielle Murray and Miranda Bauer
Michael Cohen and Lorienne Fisher
Derek Kramer
David Matzinger and Lynn Baalman
Dar-lon Chang, Michelle Ouyang, and Ayla Chang
Rainer and Karen Gerbatsch
Christian Oggel and Jennifer Page
Glen Swanson and Jen Meredith
Norbert Klebl
Lynn Voss
Iga Chudzicka
Bret Morstad
Eric and Melissa Brown
Erik Mathys and Debra Gander
Mike and Cera Meintzer
Suzanne Grandchamp
Kyle and Amy Flora
Chris and Kristina Beck
David DeCato
Jami Alley

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage

Gordy <[redacted]> Mon, Jan 17, 2022 at 3:25 PM
To: jbebo@arvada.org

Mr. Bebo!

Obviously there have been a lot of concerns expressed about the proposed Golden RV storage area.

One that has not been expressed a lot is environmental impact on Ralston Trail itself. "Along the way you'll find many features that highlight Arvada's natural heritage: a rich variety of plant life, lakes and ponds, preserved wildlife habitats, bird sanctuaries, and historic sites." This is a quote from Arvada's web site.

The impact on this 13 or 14 acres will destroy natural habitat for numerous species of wildlife. Great Horned Owls, Bob Cats, Coyotes to name a few, replaced by recreational vehicles that are stored by most owners for 9 months out of a year. Many will only be used for 2 weeks or less. The additional activity of people coming and going will impact wildlife BEYOND Ralston Trail not to mention the impact on Indiana Street and its traffic problems.

Please reconsider this proposed development.

Sincerely,

Gordon Snow
[redacted]
Arvada, CO 80007
[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Proposed RV storage site

Wanda Kitterman <[redacted]> Thu, Dec 23, 2021 at 3:04 PM
To: JBEBO@arvada.org

I live in Forest Springs and I protest the site for the storage for RV's. I bought here because we have some open space around us and I would like to see it stay that way.
This is a residential area and there seems to be a lot more suitable areas away from
neighborhoods like ours. RV storage sites are pretty unsightly and they are generally put out away from the city. I see loads of undeveloped land north of Arvada up Indiana.

Wanda Kitterman
Sent from my iPad

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Proposed RV Storage

Jim Buckner [redacted]> Thu, Dec 30, 2021 at 9:42 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>

We live in the Forest Springs neighborhood adjacent to this proposed RV storage location. This storage lot will lower the property values in our neighborhood because of the flood lights and traffic of moving the RV's in and out 24 hours a day. Especially 500+ RV's.
Why not build a park or something similar to enhance the area rather than ruin our beautiful area. It was bad enough when Arvada allowed the condos on the south side of our neighborhood that back up almost to our back doors.

A large percentage of our homeowners are seniors who have lived here for many years. So, please do not allow this to happen to us.

Jim Buckner
[redacted].

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storage Facility in West Arvada

joe burke [redacted] Sun, Dec 26, 2021 at 11:07 AM
To: jbebo@arvada.org

City Of Arvada,
I live in Forest Springs neighborhood in West Arvada. I received the notice of application to put in an RV storage park. I oppose it! A park there would be an eyesore for part of our neighborhood, not to mention the view from the Ralston Creek trail. We currently have an abundance of wildlife that crosses that open space and it would be sad to lose that. The lights from the lot will shine right into five of the bedroom windows of my neighbors. As the city of Arvada continues to develop every last open space, I don't foresee this application not getting approved. In that case I would ask the city to make the developer put in a 30 foot berm on the South side of the space to block it from our neighborhood. A high fence along the North side of the space would block the view from the trail. A restriction on operating hours to only daytime, would eliminate the light issue. The best use of that space would be for the city to buy it and make a park.

Joe Burke
Forest Springs

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storage Lot-West Arvada

joe burke <[redacted]> Fri, Jan 14, 2022 at 11:19 AM
To: jbebo@arvada.org

Jeremiah,

Good Day. Did you receive the letter from our Forest Springs neighborhood opposing the development of the RV park off 68th street in West Arvada? Forest Springs is vehemently opposed for a number of reasons stated in the letter. This type of development is not keeping with the "quality and character" of our area. The environmental impact would be enormous. That area is home to abundant wildlife as well as all the people that walk and bicycle along the Ralston Creek Trail.

Our 108 homes represent $70,000,000 worth of Arvada Real Estate. Neighbors are concerned about their property values and many are talking of moving if this goes forward. How will that benefit Arvada? Please keep me informed of the activity of this project.

Joe Burke
President Forest Springs HOA

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage

Jim Cullen <[redacted]> Thu, Dec 23, 2021 at 2:34 PM
To: jbebo@arvada.org

Mr. Bebo,

We are writing regarding the proposed Golden RV Storage, 6800 Kilmer St. We reside in Forest Springs, which is adjacent to the proposed site and have lived here for the past 23 years. The area surrounding Forest Springs is visibility beautiful. We have a golf course, a bike path and a City park as our neighbors. The idea of an RV storage is hugely inconsistent with the rest of our local community. The busy Ralston Creek bike path would lose it's wilderness feel to the industrial look of RV storage.

Please help us preserve the beauty of our neighborhood and reject the RV storage. Forest Springs is primarily a senior community and the beauty, security and access of our community is of utmost importance to us. It's difficult to imagine that an RV storage site would enhance our property values.

Thank you for your consideration.

Jim and Joyce Cullen

[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

FW: Proposed RV Storage

JAMES M JOYCE M Cullen <[redacted]> Tue, Mar 22, 2022 at 1:47 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>

From: JAMES M JOYCE M Cullen <[redacted]
Sent: Tuesday, March 22, 2022 1:45 PM
To: jebo@arvada.org
Cc: rmoorman@arvada.org; lsimpson@arvada.org; jmarriott@arvada.org; djones@arvada.org; lsmith@arvada.org; bfifer@arvada.org; mdeven@arvada.org; rstachelski@arvada.org
Subject: Proposed RV Storage

Mr. Bebo,

We attended the meeting last Wednesday evening, March 16, 2022 regarding the proposed RV storage in western Arvada. We learned a good deal about the developer and the scope of the project. We left the meeting very concerned that a project such as this would be considered next to multiple residential communities. Our concerns are as follows:

- The proposed site is a former landfill. As such, methane gas is present, per the presentation. Methane gas is a highly flammable gas even when partially mitigated.

- The developer stated the site will house 500 RV sites. Many RV's will occupy more than one site, resulting in a estimated storage of 350-400 RV's.

- Each RV will have one or two propane tanks, ranging in size for 20lbs. to 50 lbs. A conservative estimate of 650 -700 propane tanks will be onsite at any given time. Each RV will have gas in it's gas tank, also.

-The site is located within 200 feet of both Forest Springs (110 homes) and GEOS (total number of homes unknown). The two developments are separated from the proposed storage site by a field of natural grasses.

Given the recent Marshall fire and the unimaginable damage caused by it, it seems remarkably short sighted to allow such a potentially explosive RV storage site so close to so many homes. The presence of underground methane, 650 – 700 propane tanks, plus the gas in each RV and the proximity to several hundred homes makes this a highly volatile situation.

A quick Google search regarding RV fires yielded an RV explosion last week in Thornton, Co. that killed two and another in Colorado Springs, in November, 2021 that destroyed the nearby home and the RV.

We are deeply concerned that our physical safety and that of our home is being threatened by the possible approval of this proposal. Please reject the proposal at this site and assist the developer in finding a more appropriate location.

Thank you for your consideration.

Jim and Joyce Cullen

[redacted]Forest Springs)

[redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage Project

LYNN BAALMAN [redacted]> Sun, Jan 16, 2022 at 1:44 PM
To: "JBebo@Arvada.org" <JBebo@arvada.org>

TO:

Mr. Jeremiah Bebo, Planner II
Community and Economic Development
City of Arvada
8101 Ralston Road
Arvada, CO 80002
Via Email: JBebo@Arvada.org

RE: 6800 Kilmer Street – RV Storage Lot – Development Application No. DA2021-0146

This email is to express our concern and non-support of the proposed RV Storage lot at 6800 Kilmer Street for Golden RV Storage. We are homeowners in GEOS, Phase I, just directly north of the proposed site, and I am confident that such an unsightly scene as hundreds of stored RV's, some of which are just left because homeowners don't want them anymore and can't get rid of them, will negatively impact the value of our property. If we were currently looking for a home, and found out it would be adjacent to an RV storage site, we would not buy in that neighborhood. RV storage sites are extremely ugly, and to the extent we have to have them, should be on the extreme edge of metropolitan areas, or better yet a few miles outside of the end of a metropolitan area.

This is a very bad decision that could impact hundreds of homeowners by lowering their market value, especially Forest Springs, and GEOS, Phase I (which we are in, and Phases II and III, soon to be built. I think our City Council should make the right decision and veto this proposed site.

Lynn Baalman
Dave Matzinger
[redacted]
Arvada, CO 80007

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Proposal Site

1 message

Larry Wapensky <[redacted]> Tue, Jan 25, 2022 at 11:14 AM
To: Jeremiah Bebo <jbebo@arvada.org>
Cc: Jacob Moyer <jmoyer@arvada.org>

Jeremiah. Again thank you for your timely help and information about Stormwater.

I contacted Jacob Moyer in your Stormwater group and we had a good discussion.

I would like to clarify my original technical comments.

My intent was to raise concerns to the City of Arvada about possible enviromental problems from the landfill that was in use from 1937-1983. I don't know if the landfill was licensed or not.
With detailed technical information provided by the Applicant, the City of Arvada could make better informed corrective measures proposals, if any, at the proposed RV site to protect the environment, public health, and RV storage users.

My comments were highly technical. I believe that many people could have raised similar concerns.

The Applicant should get approval from the City of Arvada on any site specific sampling and chemical analyses plans. This helps the Applicant, the City of Arvada, and the public. How? If there were approved sampling and analyses plans that were implemented by the Applicant, It could help decrease future second guessing on what was done or not done and why.

I assume CDPHE will make cogent comments on this proposed RV storage site.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storage Proposal

Larry Wapensky [redacted]> Wed, Jan 19, 2022 at 6:46 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Greetings Jeremiah. Thanks for your help.

I have a few technical questions about the RV storage proposal. The site is designated IL (industrial light). It will have 556 RV storage spaces and an 1890 sq. foot office building.

1. Did the City of Arvada consider enviornmentally capping the 14 acre site, that is filled to a depth of 20 feet with trash and chemicals, while protecting Ralston Creek and the Croke Canal? Tennis courts, an athletic field, or just a grassy field could be alternate uses for the site.

The disposal site was operated from 1937 to 1983 and poses long term environmental concerns. Solid waste can shift during construction and RV storage use, and may pose a contamination threat to Ralston Creek, Croke Canal, and people.

2. Future Submittals. in the future I may pose technical questions. Would you prefer it if I sent my comments to the City of Arvada's enviornmental team or to you to distribute to the team. Let me know.

3. pH. I may have missed it but I did not see any pH measurements at bore sites. The Applicant's environmental team may have decided not to perform these tests. Why? Simple test.

4. TCLP. The Applicant's environmetnal team relied on the TCLP procedure for hazardous waste. Good data was obtained. Did the City's environmental team approve the sampling and analytical protocols?
It seems to me that the City of Arvada would be more interested in total metal contamination using methods that dissolve metals for analysis at this facility. The TCLP provides useful information for hazardous waste but total metal analysis would be more complete and accurate. I could write more on this point, but it would be lengthy.

5. Pesticides. Is it reasonable to assume that DDT other common pesticides that were in use from 1937-1983 were possibly disposed at this site? The Applicant does not provide analytical information on this subject.
I think the City of Arvada would like to know this information. Were PCBs disposed at the site?

6. NH_3. Is ammonia present? Nitrogenous compounds?

7. Table 1. Summary of Gas Analytical Results. Many of the identified chemicals pose concern. In this short note I will focus on vinyl chloride. Two samples had really high levels of this carcinogen. Vinyl chloride causes a rare form of liver cancer as well as other cancers.

8. Total Metal analysis. There are a number of metals that could be analyzed at the site. At a minimun, I would suggest that the Applicant analyze for As, Pb, Hg, Cd, U, Cr, Ba, and Be. The City of Arvada may wish to have this information. Many of these elements are considered toxic metals.

9. Radiological analysis. Could radiological substances have been disposed at this site? The Applicant does discuss UMTRA. Is there any radiological contamination? The Applicant would need to survey samples with radiolgical equipment to detemine if there is any radiological activity. Naturally occuring Rn most likely would be detected. It seems to me the City of Arvada would like this information.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Project DA2021-0146

[redacted] < [redacted] Wed, Dec 22, 2021 at 9:02 AM
Reply-To: [redacted]
To: "JBEBO@ARVADA.ORG" <JBEBO@arvada.org>

I have received your notice of Administrative Applildcation regarding the RV storage facility. I am a resident of Forest Springs and would like to state my opposition to the project. The location of the project is directly across from our community to the North across from the Ralston trail and creek. The plans do not state any efforts to try to enhance or beautify the project to keep in concert with the golf course and our community. Patricia Salazar, [redacted]
Arvada, Colo. 80007

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV - Kilmer Landfill - Historical EPA FOIA Documents Supporting Area Residents Concerns

Richard BOHLING <[redacted]> Tue, May 10, 2022 at 10:37 AM
To: Jeremiah Bebo <jbebo@arvada.org>
Cc: David Jones <djones@arvada.org>, Randy Moorman <rmoorman@arvada.org>, Lauren Simpson <lsimpson@arvada.org>, Lisa Smith <lsmith@arvada.org>, John Marriott <jmarriott@arvada.org>, Bob Fifer <bfifer@arvada.org>, Marc Williams <mwilliams@arvada.org>, David Benetts <[redacted], Pajares <[redacted]>, Fonda Apostolopoulos <[redacted], Rainer Gerbatsch <r[redacted]

Dear Mr. Bebo**:**

We are writing to inform you that the Friends of Ralston Creek Neighborhoods obtained, through a FOIA request to the US EPA, several historical environmental reports regarding the Kilmer landfill which is the proposed site for the Golden RV Storage. These documents reenforce the concerns we expressed previously to you. The documents also contain new information not previously disclosed by the project Applicant or their technical consultants.

We are transmitting copies of the documents listed as follows with this email. Also, we have provided some excepts (below) taken from the documents regarding some of our key concerns.

1. Cottonwood West Industrial Park, Phase I Environmental Site Assessment and Preliminary Phase II Analysis, Ogden Environmental and Energy Services Company, Inc, for Leisure Time Management Resources, Inc., January 17, 1991

2. Soil & Foundation Investigation Proposed Bridge Across Ralston Creek Cottonwood Subdivision, (Appendix H of the Ogden Report, pages 135 to 180) Chen and Associates Consulting Geotechnical Engineers, for KKBNA, January 27, 1982

3. Preliminary Assessment Landfill At Cottonwood Park Cerclis ID# CO0000309054, Morrison Knudsen Corporation, for the US EPA Region VIII, January 24, 1995

The following are brief discussions and key excerpts from the documents:

Age of the Landfill:

The applicant’s submittals to date have shown that the landfill was operated by Jefferson County from 1939 to 1942 and an unknown entity till possibly the 1960’s.

The Ogden and Morrison Knudsen reports both definitively state that the landfill was operated by Jefferson County till about 1972. It was also indicated that the landfill was a major landfill in Jefferson County. These were based on interviews with government agencies and area residents.

“**Steve Steigleder, Deputy Fire Marshall at Arvada Fire Station #6**, has lived in Arvada for 29 years. He remembers the landfill—described in the Site Reconnaissance Section—**as being the**

major landfill for Northern Jefferson County at that time. He recalls that general rubbish and trash from the community was deposited there." (page 14 Ogden)

"The site was used as a landfill by Jefferson County from 1954 to 1971 or 1972 and covers 13 acres. The site property was annexed by the City of Arvada in 1981 and 1982." Page 1, Morrison Knudsen).

The Ogden report (page 16) also reported the following regarding the landfill age:

"At various places, refuse is exposed. In one instance, newspapers and magazines were found that date back to 1972. Personal interviews revealed that dumping activity took place well into the 1970s, although the Jefferson county records hinted that the dump was closed in the 1950s."

Landfill Discharge to Ralston Creek:

The Ogden report indicated that the landfill was discharging contaminants into Ralston Creek.

"Ralston Creek appears to be receiving contamination directly from the landfill. Visual contamination is apparent on the surface of the stream and along the shoreline. Actual refuse is in the stream channel (see photographs), and an oil scum is floating on the surface. There is orange discoloration of the channel bottom materials and submerged algae. This discoloration is possibly caused by oxidizing and/or acidizing fluids that periodically emit from the landfill. The floating oils and probable corrosive fluids that caused the orange discoloration of the stream probably entered Ralston Creek from the exposed landfill refuse that border the flood plain next to the subject property. There is no indication that these potential pollutants migrated onto the property from upstream. There is abundant green algae present in the stream for this time of the year, and it is more prolific adjacent to the landfill. The active growth algae colonies are likely enhanced due to nutrients emitting from the landfill, such as phosphorous and nitrogen." (page 18 Ogden)

"It is a striking contrast that the upstream portion of Ralston Creek was frozen, in addition to being visually clear, and unfrozen adjacent to the subject landfill. Hydrocarbons, acids, and dissolved solids may provide an "antifreeze" effect that prevents the stream from freezing at the ambient temperatures, which existed during the time of our investigation. All stream pH readings were taken by hand-held equipment. **Values recorded ranged from 5.56 to 7.11 adjacent to the landfill** (refer to Table 1). Floating hydrocarbons could have a buffer effect and thus a broad range of pH measurements are explainable. Other variables that usually affect pH values are variable effluent sources and biologic activity." (pages 18 and 19 Ogden)

Ogden noted that Ralston Creek upstream of the landfill had a pH of 7.61 while adjacent to the landfill the water had an acidic pH of 5.56.

Landfill Soil and Water Analyses:

We have expressed concerns about the contamination in the landfill and the potential to move offsite. The Ogden report supports these concerns and the need for investigation of the contamination at the site, particularly surface and ground water over at least a one year period.

The Ogden report (page 24) summarized water and soil sample analyses as follows:

- **"**The property that borders the south bank of Ralston Creek appears to be polluted by discharges from the landfill. Visible hydrocarbons are on the water surface.**"**
- **"**Groundwater samples from the landfill contain lead at concentrations of .0065 mg/L, which is above the EPA drinking water standard of .0050 mg/L.**"**

- **"**Soil samples from the landfill contain volatile organic compounds. Offending analytes are methylenechloride, acetone, tetrachloroethane, toluene, and total xylenes.**"**
- **"**A composite soil sample demonstrated an excessive concentration of lead in the amount of 54 mg/kg**."**

Ogden also performed a magnetic site survey and found the following:

"Ogden conducted a magnetic survey to determine the distribution of buried refuse that is present on the property. This survey was accomplished by physically walking a controlled grid shown on the aerial photograph in Appendix B. The equipment employed was a Fisher model TW6, which is capable of detection to a depth of 30 ft below surface. Such magnetic induction devices respond to most iron metals. The assumption that some metal objects would be distributed ubiquitously within the landfill proved to be correct. It was determined that no landfill refuse is present on the subject property north of Ralston Creek, which is basically raw agricultural land. However, the 13 acres south of the creek is completely covered by landfill material. **Some local spots indicated high magnetic responses (anomalies) that may signify large metal objects (e g., drums). Future Phase II intrusive activities will need to clear these anomalies."**

The Ogden magnetic survey indicated a potential concern for buried drums or other large metal objects and a need for further investigation of the metal anomalies.

Combustible Gas

Chen and Associates performed a geotechnical investigation of the site for a proposed bridge.

Their investigation (page 5) detected combustible gas in several boreholes, in potentially hazardous quantities, similar to the results of the later Terracon investigations. Combustible gas testing on four of the six boreholes drilled by Chen and Associates in the landfill indicated the presence of gas at the 85% to 100% lower explosive limit and a combustible gas composition of 3% to 28%.

The Chen report (page 5) also states the following in regard to excavating within or near the landfill:

"Care should be taken when excavating within or adjacent to the landfill mass. Venting of excavations will be required. Any structures built over the landfill will require special methane gas controls. There are 2 basic approaches to controlling the migration of methane into structures. These include barriers separating the proposed structure from the landfill and ventilation systems. **Access roads, parking areas, underground utilities and other facilities constructed on landfill materials will be subjected to large differential movements and as corrosive environment. The owner should be aware of the high risk of distress associated with construction on landfills**."

As communicated previously, we do not believe the applicant has the appropriate geotechnical information nor has considered the geotechnical problems in their proposed designs to date.

Ogden Recommendations:

The Ogden Report (page 25) contains a list of recommendations, as follows, which echo most the recommendations made by Terracon, the applicant's environmental and geotechnical consultant, that have not been addressed particularly for further site investigations.

"Based on the evaluation of prior data and data collected during the Preliminary Phase II site assessment, it is probable that contaminants are present on the site and that the potential for

migration to offsite localities exists. Therefore, we would recommend the following activities to more clearly define the extent and nature of contamination on the LTMR site.

- **Excavate spot locations of high magnetic response to determine if leaking drums are present.**
- **Design a statistically-based random soil sampling program.**
- **Design a statistically-based groundwater sampling program.**
- Install deeper auger drilled monitoring wells at 30 to 50 ft depth.
- Case with large enough PVC for retrieving samples by bailing or the bladder pump method.
- **Selectively screen below landfill in permanent water table at low aquifer confining elevations to test for heavy compounds. Determining permanent water table and, if possible, the lower base confining depth.**
- **Schedule interval time sampling for surface water monitoring of Ralston Creek.**
- Identify flora/fauna kill mechanisms.
- Screen shallow groundwater monitoring wells in the landfill material and schedule sampling to be collected to allow for seasonal flux of contaminants.
- **Landfill area should not be developed for commercial or residential construction.**
- **Monitor contemporary methane presence."**

We have significant concerns regarding the proposed RV storage project on the Kilmer landfill that have not been addressed and the documents found through the EPA FOIA request causes greater concern about the proposed project.

Sincerely;

Richard Bohling, P.E.

Rainer Gerbatsch, RRC, PRC, LEED

Copy Distribution:

Arvada City Council
D. Jones – City of Arvada
R. Moorman – City of Arvada
L. Simpson – City of Arvada
L. Smith – City of Arvada
J. Marriott – City of Arvada
B. Fifer – City of Arvada
M. Williams – Mayor City of Arvada

F. Apostolopoulos – CDPHE

D. Bennetts - Mile High Flood District
C. Pajares - Mile High Flood District

3 attachments

Ogden 1.17.91 448141.pdf
7424K

Chen Report Excerpt.pdf
1033K

MK Prelim Assess to EPA 1.24.95 446846.pdf
817K

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storage 6800 Kilmer

Connollygrumpy <[redacted]> Thu, Dec 23, 2021 at 12:27 PM
Reply-To: Connollygrumpy <[redacted]>
To: "JBEBO@ARVADA.ORG" <JBEBO@arvada.org>

Very opposed to this R.A.Connolly [redacted]

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage - Unanswered Questions and Concerns - from Neighborhood Meeting of 3/16/22

rg2056@icloud.com [redacted] Fri, Apr 1, 2022 at 10:50 AM
To: Jeremiah Bebo <jbebo@arvada.org>, Richard BOHLING <[redacted]

Good morning Mr. Bebo:

Thank you for response and your assurance that our comments and questions are directed to the appropriate review party and will be part of the project record.

As the review progress grinds on no doubt extended by the applicants' incessant changes from submission to submission, we need your input on the following topics:

1. In an email the CDPHE stated that the agency "is waiting for some calculations regarding the placement of buildings and the loading of these buildings on the landfill." The CDPHE email further indicates that these are new buildings which the city has requested!? We are, to say the least, perplexed on why the city would request new buildings! Please provide an explanation for this request. Our recollection based of the discussions during the Public Meeting is an "above board" review process? The residents bordering this project will be impacted by any decision/scheming conducted between the city and the developer Carlson! We need to have transparency on the action of the City of Arvada.
2. Perhaps someone at the Planning Department will recall the flood of 2013 (see enclosed photos). The flood exposed a segment of the northern flank (along the southern bank of the Ralston Creek) of the old landfill spilling landfill debris (and likely untold other compounds) into the Ralston Creek. The damage to the landfill was repaired! We suspect that the repairing authority was the City of Arvada. Why has this incident not been referenced in any of the submission review

comments? The Terracon reports are void of this incidence as well, although Terracon unequivocally states that there are “....no data gaps”! How was the damage to the landfill caping repaired? Was any testing conducted of the Ralston Creek?

3. Has the City of Arvada investigated how many capped landfills have been “converted” to RV storage yards in the middle of residential neighborhoods and bordered by two (2) waterways? What were/are the review parameters City Staff used as a basis that allowed this proposed development to move forward initially? You made it clear during the Public Hearing that the City of Arvada does not care how its development decisions impact residents, however one would hope that you consider the impact on health, public and environmental safety??

Thank you for your prompt response.

Rainer W Gerbatsch – send from MacBookPro

[redacted]

[redacted]

[Quoted text hidden]

14-112094SR_exposed CDPHElandfill near forest springs landfill 64th and Indiana (1) (1) (1).pdf
7891K

RV Storage Fire Safety – City Council Public Comment – 07.15.24

Good evening – Brian Glover and Rainer Gerbatsch, both residents of Arvada are here to present to City Council fire safety concerns regarding the 6800 Kilmer development.

Colorado experienced its most destructive wildfire in 2021 – the Marshall Fire. Two small fires, fanned by a relentless wind resulted in a roaring wall of flame that arrived at the edge of 2 towns in less than an hour. The resultant suburban firestorm destroyed or damaged more than 1100 homes and 30 commercial properties in less than 4 hours. The residential damage estimate: $500 million.

This fire finally brought "Wildland-Urban-Interface" (abbreviated as "WUI") and fire safety of suburban Denver front and center. A simple grass fire, supported by high winds, can propagate at an enormous speed and transform itself into a Multi-Hazard Fire.

Whereas the Denver suburbs were not considered WUI in the past, in 2025, most of Arvada, including western Arvada will be officially re-categorized as WUI zone.

The City of Arvada assesses fire safety for this Development under the 2018 IFC. This code is strictly structure oriented and does not provide any guidance on a development for the exclusive storage of hundreds of RVs. The fire department has profound concerns but is bound to uphold a code that is structure oriented.

Wildfire regulatory powers and duties reside with local jurisdictions. It is our understanding that Arvada with adopt a WUI Code later this year – available details while sparse point to another code that is structure oriented and does not address nor assess the risks and consequences associated with dense RV storage in the midst of established residential communities.

Residents bordering the development need to understand how another wildfire, fueled and propagated by a large series of explosions from hundreds of RVs loaded with propane and gasoline stored in their midst will impact their lives and homes? First responders in the Marshall fire had specific concerns about exterior fuel tanks exploding.

Communities with a single-entry point and exit forces firefighter to make decisions about when to cut and run for safety reasons. Is there adequate water supply and pressure with a single hydrant located outside the development? What can hamper firefighting in such a development during a fast-moving wildfire amplified by high winds? What are the implications for Preparedness, Response, and Mitigation with this massive fuel load?

RV storage at the site is dense, will be difficult to navigate, and allows only limited and slow vehicle movement. The site features a single road, without turn-around provisions. The development is placed over essentially unmitigated landfill debris. Access road and parking areas are considered unstable, and subject to substantial movement. What are the chances of

the site devolving into a labyrinth of unstable or partly collapsed surfacing? Who is or will be the responsible entity to maintain this blighted site? The developer is an out-of-state corporation shielded from liability – the only local interest - profit.

Any fire in this warren, would be difficult and dangerous for the fire department to control, even without high winds and the likelihood of unstable surfacing.
----------3 min switch ----------

The site experiences heavy prevailing winds from the west. Available evacuation routes are to the east. How could residents be successfully evacuated? Are roads within and leading out of existing communities suitable to act as evacuation routes and fire breaks?

RVs, aside from carrying large quantities of fossil fuels, are full of flammable materials. It can take less than 30 seconds for the interior to go "up in smoke and flames" known in the fire speak as a flash-over.

Mitigation is defined as "activities intended to reduce the potential for unwanted impact". Wildfire mitigation strategies are evolving rapidly to just keep pace with the evolving climate crisis. Colorado has warmed by 2^0F over the last 30 years. Wildfire seasons have, and are increasing as the climate crises deepens. Location, design, and proposed use of this development is diametrically opposed to evolving wildfire mitigation strategies – it increases risk and threatens to overwhelm local firefighting capacities.

There are many questions and no answers as the development concept is unprecedented, bordering on haphazard considering all converging elements of associated risk. This scheme received CDPHE approval on the basis of a poorly established environmental status quo. The sparse approval criteria are ignorant of construction and operational impacts and consequences.

The fundamental question then is:

Not IF but WHEN the next wildfire visits, is the City of Arvada prepared to absorb the risk of this development, and willing to accept responsibility for a death and property toll that will be very hard to predict?

The City is responsible to mitigate wildfire capacity.

The Planning Department is considering a demonstrably illegal land use? A land-use demanded by an out-of-state developer that increases future risks and jeopardizes safety for residents invested in Arvada.

This character of this development is neither public improvement nor enhancement. It's blatant attempt to corrupt the LDC makes a mockery of public welfare.

This development cannot be facilitated via a process decided by non-elected staff. The exposure and risks inherent demands deliberation by council members elected by and with input from Arvada residents.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage - Neighborhood Meeting of 03.16.2022

[redacted] Fri, Mar 18, 2022 at 4:55 PM
To: "jbebo@arvada.org" <jbebo@arvada.org>
Cc: Richard BOHLING <[redacted]>, Mike Rawluk <[redacted]>, Sharon McCarthy [redacted]>, "f[redacted]>, Karen M Gerbatsch <[redacted]>

Dear Mr Bebo:

I am submitting this correspondence on behalf of residents of Forest Springs, Westwood Mesa and GEOS present at the neighborhood meeting on 03.16.2022 and based on an analysis of the Norris presentation for the Golden RV Storage and the disappointing and unsatisfactory responses by the Applicant's and their technical representatives from the Q&A session.

- It was apparent that the Applicant's design team could not present a clear picture of the remediation concepts for the proposed development at the Kilmer Landfill.

- Nor were they able to respond in even rudimentary detail to a variety of questions regarding the scope of investigation, geotechnical considerations and for the design of the parking surfaces including grading, materials to be used, permeability of the parking surface, and areas designed to support fire trucks. A section sketch would be a minimal expectation showing the proposed parking and storage surfaces plus some preliminary specifications supporting the design.

- Replies like, the parking will be graded and covered with a surface that will be impermeable without disturbing the landfill materials, were not backed by any design sketches, new geotechnical information nor even reliance on the dated 15-year-old geotechnical report.

- Additionally, the Applicant has not shown a grading plan, given no estimates of the quantities of hazardous or potentially RCRA classified materials that will be excavated and transported from the site through the City nor where these materials will be disposed.

- It is evident that the Applicant has ignored the limitations and recommendations of the Terracon LSI dated July 24, 2007, as well as recommendations made in the only Geotechnical report for additional detailed soils investigations and for a comprehensive groundwater study over a period of time.

- The Applicant submitted their VCUP application prematurely, given the fact that the conclusions and recommendations of the 2007 Terracon reports identified above were not considered to support the new design parking and storage surfaces. Further, it is puzzling that the City of Arvada has accepted the Applicant’s second submission considering the lack of detail and inclusion of information requested based on the review of the first submission.

- The Applicant is yet again making a major modification to their site design which seems to be a moving target. The site and remediation cannot be properly evaluated until such time the Applicant has a relatively firm design.

We urge you to request that the Applicant contact CDPHE for a complete withdrawal of their VCUP application until such time that a firm site design backed by sound engineering and environmental considering is submitted for evaluation by the

City and CDPHE.

Additionally, we will be submitting a list of questions for review with the Applicant soon.

Thank you

Rainer W Gerbatsch – send from MacBookPro

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Proposed RV storage lot.

Richard Remington <[redacted]> Thu, Dec 23, 2021 at 1:43 PM
To: JBEBO@arvada.org

Concerning the proposed RV storage lot that would be just North of Forest Springs Housing Ares, I am opposed as I believe there is a good chance it will lower the value of our homes. I say this because residents in some of the homes in our area will have the RV storage lot in view from their windows. Also the best walking path for our area goes directly across the canal from the proposed RV lot and many residents use this path on a daily basis. Please turn down the application for an RV storage lot in this area.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

An invitation to City Planning personnel re so-called Golden RV Storage plans

Richard Stewar [redacted] Mon, Mar 28, 2022 at 3:22 PM
To: jbebo@arvada.org

Since our windows and our deck [redacted]. would give arguably the highest, most revealing view at the contemplated "Golden RV" storage, we would invite members of the city planning staff to our house for a look. Our deck rail is at least 12' above our ground level, which in turn is quite a bit above the level where RVs would be parked, so until that far-off day when screening trees grow tall, our view will be merciless.

I personally found a bit of consolation recently in developer Clay Carlson's musings about possibly adding a long storage shed (or row of sheds) on the near side of his acreage, which would, to quite an extent, block our cluttered view of hundreds of RVs. The view of the back of those sheds would, I hope, be at least presentable. But Carlson may not as yet have submitted that revised plan, nor is it clear whether setting such a shed (or row of sheds) on that fill-soil would be advisable, anyway.

Be all that as it may, our invitation to city planning staffers to see what our view could be, is "on the table". Let us know if you wish to come.

IRELAND STAPLETON

JAMES R. SILVESTRO
ATTORNEY AT LAW
[redacted]

April 6, 2022

SENT VIA EMAIL

Jeremiah Bebo
City of Arvada, Planner II
8101 Ralston Road
Arvada, CO 80002
JBebo@Arvada.org

RE: Friends of Ralston Creek Neighborhoods – Opposition to Proposed Project No. DA2021-0146

Dear Mr. Bebo:

This law firm represents the Friends of Ralston Creek Neighborhoods ("**FRCN**") in connection with its opposition to the "Golden RV Storage" proposal submitted on behalf of Carlson Associations, Inc. ("**Carlson**") to redevelop the property located at 6800 Kilmer St. (the "**Site**") and referred to by Arvada as Project No. DA2021-0146. FRCN is a Colorado non-profit that is dedicated to protecting the health, safety, and welfare of Ralston Creek and surrounding communities within the immediate vicinity of the Site.

Based upon its most recent submittals in connection with Project No. DA2021-0146 (the "**Development Application**"), Carlson seeks to develop the Site into 556 RV storage spaces and a 1,890-square foot office building. The purpose of this letter is to highlight some of the most pressing concerns that FRCN has with Carlson's proposal for the Site.

At this point, FRCN's primary concerns are twofold: (1) the major modification that Carlson seeks as part of its proposal with respect to outdoor storage is inconsistent with the Land Development Code (the "**LDC**") and essentially seeks to rezone the site to allow for heavy industry without going through the necessary review and approval for such a rezoning; and (2) the environmental remediation that Carlson proposes for the Site is insufficient to ensure that the existing environmental contamination at the Site will not migrate into Ralston Creek and the surrounding community. Each of these issues is addressed in turn below.

1. Carlson's Request to Nearly Double the Amount of Allowable Outdoor Storage Is Inconsistent with the IL Zoning of the Site.

One of the major modifications requested by Carlson seeks to increase the maximum outdoor storage allowed at the Site from 35 percent to 65 percent—or nearly twice the amount of allowable outdoor storage within the Site's IL (Industrial Light) Zone. This would make "Outdoor Storage," which is intended to be an accessory use within the IL Zone, the predominant and primary use at the Site. Because this proposed major modification directly conflicts with the purpose of IL zoning under the LDC, it must be denied. *See* LDC Div. 8-3-11-4(A) ("The Major Modification procedure is not intended to serve as a waiver of the intent of the LDC or to circumvent the variance procedure.").

Under the LDC, the IL Zone is intended "to provide areas for light manufacturing, assembly and fabrication uses, office, research, food and beverage processing, packaging, or bottling, and compatible recreational activities." LDC Div. 2-1-6-2(A). The LDC defines "Light Industry" as "[u]ses that involve research and development, assembly, remanufacturing, compounding, packaging, testing, or treatment of products, generally from previously prepared materials or components, **with limited outside storage and limited external impacts** or risks such that the use is not defined as heavy industry or heavy logistics center." LDC Div. 2-11-3-1 (emphasis added). In other words, industrial uses within the IL Zone are primarily intended to be confined to the inside of warehouses or other buildings so as to limit the impact of such uses on neighboring properties—especially those which are zoned for non-industrial uses.

Consistent with this, Division 2-1-6-2(C) of the LDC limits outdoor storage within the IL Zone to no more than 35 percent of a parcel. Outdoor storage is defined as "[s]torage of materials, merchandise, stock, supplies, machines, **operable vehicles**, equipment, manufacturing materials, or chattels of any nature **that are not kept in a structure having at least four walls and a roof**, regardless of how long such materials are kept on the premises." LDC Div. 11-3-3-1 (emphasis added). Moreover, Division 4-3-3-5(D) of the LDC expressly confirms that outdoor storage is not intended to be the primary use within the IL Zone as "[o]utdoor storage areas shall only be used for the storage of operable equipment or materials **used for the conduct of an approved use located on the same lot**." (Emphasis added); *see also* LDC Div. 3-1-3-8(D) (providing that "Motor Vehicle Storage" should be "located **behind the principal building**" (emphasis added)).

Carlson's request for a major modification to allow 65 percent of the Site to be used as outdoor storage is fundamentally incompatible with the definition and purpose of IL zoning. Accordingly, Carlson's request is effectively a request to rezone the Site to IG (Industrial General) without actually going through the necessary steps to effectuate such a radical change. Unlike the Site's existing IL Zoning, a "storage yard"[1] is a primary use within the IG Zone and the maximum amount of "outdoor storage" can occupy up to 90 percent of a parcel. Of course, the reason that Carlson has not formally sought to rezone the Site to IG is obvious—such a rezoning would almost

[1] Division 11-3-3-1 of the LDC defines a "storage yard" to include "[a] location for outdoor storage of operable equipment," which is exactly what Carlson is proposing for the Site.

certainly be denied since the location of the Site and the existing surrounding uses, which include established residential subdivisions, Ralston Creek, the Ralston Creek Trail, and other open space are fundamentally incompatible with heavy industrial uses. But the same rationale dictates that Carlson's request for a major modification to squeeze an incompatible outdoor storage yard within the IL Zone must likewise be denied.

Carlson's proposed heavy industrial use is especially problematic at this Site for several reasons. For example, Carlson's plan provides that its proposed RV storage facility will require that significant volumes of flammable materials be stored onsite, including propane, gasoline, and industrial cleaning products. These combustible materials will be stored at the Site in close proximity to trees, shrubs, and native grasses that could provide further fuel in the event of an explosion or a fire and which could result in devastating consequences for all surrounding members of the community. Carlson's proposal could also create security issues for neighboring landowners, as a massive new parking lot may be difficult to secure and could invite opportunities for illegal squatting, theft, or vandalism. Finally, by proposing to pave over the vast majority of the Site, Carlson seeks to significantly add to the amount of impermeable surfaces in the area. This will create significant additional surface water runoff (which may be polluted by petroleum products and other contaminants that will leak from vehicles and collect on the parking surface) and further increase the heat island effect in this area of Arvada.

Each of these negative externalities will be difficult if not impossible to mitigate, and surrounding landowners will be harmed as a result. These negative impacts confirm the fundamental incompatibility of what is effectively a plan to convert the Site to a heavy industrial use with a proposed development that is presumptively not allowed within the IL Zone.

Pursuant to Division 8-3-11-4(D) of the LDC, a major modification may only be approved if the applicant can satisfy all five of the required criteria for approval. Here, Carlson cannot satisfy *any* of these requirements:

1. Carlson's outdoor storage proposal is inconsistent with the allowable uses within the IL Zoning at the Site because outdoor storage is only intended to be an accessory use within the IL Zone;

2. Carlson has not demonstrated any creativity with its plan to create what is essentially a large parking lot that would occupy nearly the entire Site;

3. The proposal will result in what is effectively a heavy industrial development (allowed only within the IG Zone) that is incompatible with neighboring residential subdivisions as well as Ralston Creek and the regional recreational amenity provided by the Ralston Creek Trail;

4. For many of the same reasons, the proposed use will negatively impact the health, safety, and general welfare of surrounding property owners as well as the general public; and

5. Carlson has not identified any way to satisfactorily mitigate against these substantial harms.

Ultimately, there is no basis to approve Carlson's major modification request to double the amount of allowable outdoor storage at the Site to allow for outdoor storage as the primary use at the Site in violation of the IL Zoning. Accordingly, FRCN respectfully requests that Arvada deny this request.

2. Given the Known Contamination at the Site, Carlson's Proposal Poses a Significant Threat to the Health, Safety, and Welfare of the Surrounding Community.

As Carlson and Staff have confirmed, the Site is presently contaminated due to the continued presence of a historic unpermitted and non-sanitary landfill at the Site. Although many of Carlson's application materials discuss the use of the Site as an unpermitted landfill by Jefferson County in the 1930's and 1940's, FRCN is also aware that the Site was used for illegal dumping for many, many years after the County landfill was officially closed in the 1940's.

Although the historic contamination at the Site has mostly remained buried, it has at times nevertheless caused pollution to move off of the Site, especially into Ralston Creek. For example, the 2013 floods and resulting erosion along the creek channel caused a portion of the historic landfill to be exposed and to dump unknown quantities of trash and other pollution into Ralston Creek:

The contaminated legacy of the Site is especially concerning to FRCN in light of Carlson's current proposal, and FRCN is not convinced that the contaminated legacy of the Site will be fully contained as a result of the pending voluntary cleanup ("**VCUP**") application that Carlson has submitted to the CDPHE. While CDPHE's voluntary cleanup program is intended to incentivize voluntary cleanup efforts where resources might not otherwise exist to remediate historic contamination, Carlson's proposal is a special case where its proposed future use threatens to expose an unknown volume of contaminants that have remained buried on site for more than a

generation To date, Carlson has only done very limited sampling of the Site and there is no telling what contamination might be unearthed from this historic, unpermitted landfill once Carlson begins excavating the Site.

While we understand that Arvada's general practice is to defer to the CDPHE when dealing with brownfields remediation, FRCN urges the City to take a more hands-on and proactive approach with Carlson's proposal, especially in light of the Site's proximity to Ralston Creek. Here, the CDPHE has not required Carlson to conduct extensive testing as a condition of issuing a VCUP. Similarly, it does not appear that there has been any recent groundwater testing at the Site to determine what impacts the abandoned landfill might be having and/or whether contaminants of concern are flowing off of the Site below the surface. The most recent geotechnical investigation of the Site is nearly 15 years old, and Carlson has not explained how it intends to address the many challenges with the geography of the Site that are identified in that report. Moreover, Carlson has not provided detailed engineering drawings to address the likely potential for compaction, subsidence, surface runoff, or subsurface flows. The proposal likewise does not include any engineering drawings or specifications for the proposed liner to be placed on top of the historic contamination or otherwise address how the proposed changes to the Site could change the levels of methane that are currently being released.

FRCN is especially concerned that CDPHE does not require a developer to post a bond to ensure that any cleanup is finished once it is started and to ensure that there are resources available to guarantee that ongoing monitoring (including methane monitoring within buildings) can continue into the future even after the developer moves on or potentially becomes defunct.

CDPHE's consideration of Carlson's VCUP application does not appear to consider all of the impacts that will occur at the Site as a result of Carlson's development. For example, CDPHE's comments on Carlson's VCUP application do not specifically consider any issues that might result from short-term or long-term soil compaction after several thousands of tons of recreational vehicles are planned to be moved onto the Site.

Again, however well-intentioned the CDPHE may be, its primary goal is to facilitate the approval of Carlson's proposed VCUP to leverage Carlson's private resources to clean up at least some of the historic contamination at the Site. But greenlighting Carlson's proposed development of the Site will result in numerous additional environmental challenges and concerns which have not been fully investigated or resolved through the VCUP process. FRCN and other neighboring landowners are much more concerned about the long-term environmental effects that could result if this cleanup is not completed properly and with a guaranteed long-term funding source to ensure that all required remediation and monitoring actually happen.

Accordingly, before approving any site plan for the Site, FRCN respectfully requests that the City require Carlson to: (1) complete a more robust investigation of the existing contamination at the Site; (2) provide for any and all necessary environmental remediation and mitigation in light of this complete investigation; and (3) post an environmental bond sufficient to cover all of these

long-term costs, so that the City or some other entity can step in to ensure that no aspect of this cleanup remains unfinished after Carlson exposes the long-buried contamination at the Site.

* * *

On behalf of FRCN, I thank you for your time and careful consideration of FRCN's significant concerns about this proposal. Please include a copy of this letter in the administrative land use file for Project No. DA2021-0146 and please let us know of any further developments related to Carlson's proposal, including but not limited to any subsequent submittals from Carlson, any responsive comments from the City to Carlson, any public meetings or hearings regarding any aspect of Project No. DA2021-0146, and/or any further opportunities for referral comments.

Please let me know if you have any questions regarding any of the foregoing. We thank the City and Staff for your time and careful consideration of these important matters.

Sincerely,

James Silvestro

Cc: Mayor Marc Williams
Mayor Pro-Tem David Jones
Randy Moorman
Lauren Simpson
John Marriott
Lisa Smith
Bob Fifer
Rachel Morris
Mark Deven
Ryan Stachelski
Harshwinder Badhesha

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Kilmer Street Landfill

Sharon McCarthy [redacted] Thu, Jun 16, 2022 at 10:02 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Good morning Jeremiah,

In conducting research to better understand unregulated landfills reuse, I stumbled upon the Environmental Center at CU Boulder. I received several contacts, one being Randy Moorman. As a courtesy to CU staff, I contacted Randy and acknowledged his independent status of our concerns. He was polite and suggested I send any concerns to the City.

1) Do you have an update from the RV developer for the RV project on the Kilmer Street landfill?

2) This is a copy of a letter we sent to several news agencies. We received notice that the Arvada Press will place the letter in a future edition and Westword interviewed us for a future article.

Good day!

My name is Sharon McCarthy. I am a resident of Forest Springs in West Arvada as well as one founding organizer of the nonprofit Friends of Ralston Creek Neighborhoods (FRCN) https://frcneighborhoods.org.

Three communities in West Arvada received notice in mid-December 2021 that a developer was planning a proposed RV storage lot on a closed unregulated landfill adjacent to our communities. We sensed this was not a good idea and quickly collected our resources. We organized a non-profit and started researching the topic of unregulated landfills. What we discovered was more concerning.

- Many unregulated landfills were closed when laws were more lenient; therefore they comply with standards at that time but most likely would fail current operational standards
- Colorado Department of Public Health and Environment (CDPHE) Voluntary Clean Up Act (VCUP) is lax towards development and leaves oversight of cleanup to vendors

Our concerns are two fold: the interruption of the pristine Ralston Trail wildlife environment by unsightly RV's and the effect of tons of road and RV's on the subsurface of the unregulated landfill possibly contaminating Ralston Creek waters.

Closing of the landfill and subsequent development of the land seems to be well within the past and current legislature. If this land was in the middle of a desert, the concerns might be of a different nature. However, since the land is adjacent to Ralston Creek, we question if the same application of law and operational guidelines can be applied to development? This situation is not a "one size fits all." The 2013 flood already breached the bank of Ralston Creek ---see pics in FRCN Document Library. What if there is another 100-year event? What is the effect of tons of roads and RV's on substructure? And really, what is the substructure---unstable mix of soils and trash and unknown hazardous elements?

> "The Colorado Department of Public Health and Environment recently began creating an inventory of landfills that closed after 1967, when the state passed the Colorado Solid Waste Act and began regulating them. Most of the closed landfills in Colorado shut down under looser requirements than currently exist, purposefully ceasing operations ahead of 1993 federal rules that ramped up environmental standards. About 90 landfills in Colorado opted to close instead of meeting the standards. State officials intend to inspect each of them to determine whether they were closed properly and present “a low risk to the people and the environment.”The site visits of those landfills, many now closed for 25 years, have not yet begun."
> Source: Colorado Sun 09/18

For information on a study conducted in 1982--the Chen Report see the Friends of Ralston Creek Neighborhoods Document Library https://www.frcneighborhoods.org/document-library/. Additional information was found in a later study conducted in 2007 by Terracon. Details furnished upon request.

Our questions are:

- Are the same environmental conditions noted in 1982 and 2007 still present today?
- What are the properties of the elements as to the degree of hazard to wildlife and communities?
- How stable is substructure---will shift of soils and trash cause hazard conditions?
- What examples of unregulated landfill end uses and mitigation are available?
- How much research has an RV developer done beyond looking at a piece of land covered with native grasses---does he know what is beneath the surface?

We are looking for partners in the media willing to work with us to enlighten our neighbors and the City about the potential threat to the Ralston Creek Trail wildlife environment. We have research and will share but we need help.

Can you support us?

Thank you for your interest.

Thanks Jeremiah. Have a "cool" weekend!

Sharon McCarthy

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Environmentally responsible land development-6800 Kilmer Street 80007

Sharon McCarthy [redacted] Fri, Feb 24, 2023 at 8:25 AM
To: Daniel Ryley <dryley@arvada.org>
Cc: Jeremiah Bebo <jbebo@arvada.org>

Good day Daniel.

Thank you for your patience in answering questions I have about the City's plan for economic development. As mentioned previously, the article in the latest Arvada Report-- "Connecting economic development and the community" is timely for the concerns communities have for environmentally responsible development of the closed, unregulated landfill at 6800 Kilmer Street. The sentence that stood out for me was:

> "Results from the most recent survey revealed the importance of engaging the broader community in economic development conversations."

I appreciate that you sent our suggestions to the City's community engagement folks and of our group's offer to connect on this particular project/site.

Since your last email, several individuals from neighboring communities noticed barrels on the land and shared their pictures and thoughts on social media. Our group also received a status update for Voluntary Cleanup of the area from CDPHE's Director of Hazardous Materials and Waste Management Department.

Lastly, residents received a notice from "Speak Up Arvada" about planning for the proposed new water treatment facility. Kudos to the individual(s) responsible for consolidating data into a succinct and easy to understand information source.

I especially found the Criteria Evaluation model useful. I wonder if the decision making process might be applied to the proposed RV storage lot? In my unprofessional opinion, perhaps 2 of 3 evaluation categories are applicable to the storage lot. Four of five sub-categories have potential evaluation for environmentally responsible development of a closed, unregulated landfill. I highlighted language related to the proposed RV storage lot in yellow or red. I'm sure concerned neighbors welcome the opportunity to discuss the Criteria Evaluation model for environmentally responsible development of 6800 Kilmer Street.

I'm sending this email to the City Planning Department to be included in our neighborhood file for the proposed RV storage lot development.

Thank you for reading.

Sharon McCarthy
Forest Springs Community

Evaluation Criteria for proposed Arvada Water Treatment Plant

Source: Speak Up Arvada Notice email on February 22

Community

Does not impact a community asset or local character: parks, open space, historical and cultural sites, established residential, schools, or viewscapes

Impact to public parks or open space

Impact to land that has been preserved due to historical or cultural heritage value **6800 Kilmer Street lacks historical/heritage value but is in a "limbo" category as an unregulated landfill not subject to current landfill legislation**

Proximity to land used mainly for housing

Impact to views from public lands, rights of way and residences

Site-Characteristics

Potential interference with potential development in the area

Location outside of the 500-year floodplain, limited vulnerability to wildfires, and other climate vulnerabilities **14 acre site is a tight location adjacent to native grasses and residential areas with wood frame houses; Jeffco Environmental Engineer shared pictures of Ralston Creek breach following 2013 "100 year flood"**

Potential impact to potential and existing wetlands

The resilience of a site based on unique risks such as coal mines or sinking land **lack of national brownfield data/current examples of tons of roadbase/RV vehicles on unstable subsurface of decomposing material; propane/gasoline storage tanks in 500+ RV vehicles plus methane from landfill waste pose potential fire/explosion threat**

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

This document has been prepared for the U.S. Environmental Protection Agency under Contract No. 68-W-00-118. The material contained herein is not to be disclosed to, discussed with, or made available to any person or persons for any reason without prior express approval of a responsible officer of the U.S. Environmental Protection Agency. In the interest of conserving natural resources, this document is printed on recycled paper and double-sided as appropriate.

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U.S. ENVIRONMENTAL PROTECTION AGENCY

Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
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PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

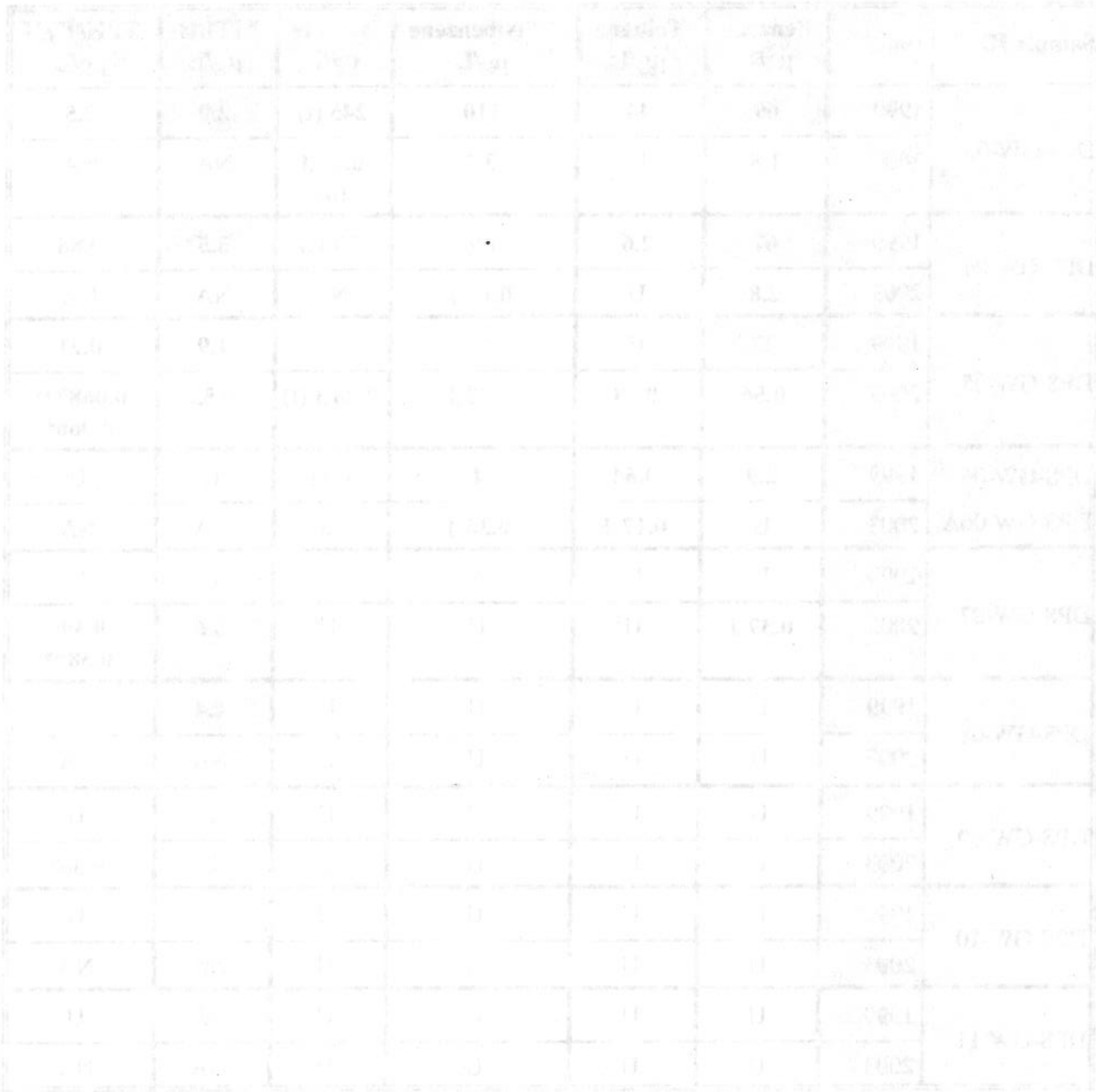
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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URS Operating Services, Inc. (UOS). 2003. Telephone conversation between Essi Ellis (START2) and Anne Hellie (START2) regarding cleanup levels of arsenic and lead for the Vasquez Boulevard & I-70 project. August 27, 2003.

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6700 Kilmer St Unregulated Landfill

Sharon McCarthy [redacted] Thu, Oct 6, 2022 at 10:11 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Jeremiah,

Good morning. Hope all is well as can be with a ton of work and covid still around!

Found this tidbit and ask that it be added to our file for the unregulated landfill. Not sure if relevant but Jake in Stormwater would probably know. I know CDPHE asked for water samples.

https://www.epa.gov/eg/landfills-effluent-guidelines

Landfills discharging directly to surface waters are subject to the Effluent Guidelines regulation.

The regulation generally does not apply to captive landfills located at industrial facilities (e.g., organic chemical manufacturing plants, pulp and paper mills, or petroleum refineries) since wastewater produced from many of these facilities is already regulated by an effluent guideline or pretreatment standard for that industry.

For non-hazardous landfills, the wastewater treatment technologies that EPA used as the basis for the effluent limitations included equalization, activated sludge biological treatment, and multimedia filtration. For hazardous waste landfills, the wastewater treatment technologies included equalization, chemical precipitation, activated sludge biological treatment, and multimedia filtration. Landfill operators may choose the technologies best suited for their sites so long as the wastewater discharged from their facilities meet the effluent limits set by the regulation.

As announced in Preliminary Effluent Guidelines Program Plan 15 (September 2021), EPA is conducting a detailed study of landfill wastewater discharges, including obtaining the following data:

- Current size and scope of the landfills industry that generates and collects landfill wastewater
- Analytical data for per-and polyfluoroalkyl substances (PFAS) discharges from landfills nationwide, particularly direct discharge data on PFAS concentrations other than perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS)
- Profile of indirect discharging landfills, including the amount of wastewater they discharge and their impact on POTW influent and effluent PFAS concentrations
- Current wastewater control practices and treatment technologies in place at landfills and whether there are landfills currently implementing PFAS treatment for leachate.

2000 Rule

- Final Rule - Federal Register notice (January 19, 2000)
  - Development Document for Final Effluent Limitations Guidelines and Standards for the Landfills Point Source Category (pdf) (1.85 MB, January 2000, 821-R-99-019) Describes industry processes, pollutants generated, available control and treatment

technologies, the technical basis for the final rule, and costs of the rule (821-R-99-019; January 2000)
  - Environmental Assessment for Final Effluent Limitations Guidelines and Standards for the Landfills Point Source Category (pdf) (147.07 KB, January 2000, 821-B-99-006) (821-B-99-006; January 2000)
  - Economic Analysis of Final Effluent Limitations Guidelines and Standards for the Landfills Point Source Category (pdf) (327.73 KB, November 1999, 821-B-99-005) (821-B-99-005; November 1999)
- Proposed Rule - Federal Register notice (February 6, 1998)

Thanks. . Beaver still in Croke Canal but not as available. Raccoons are hanging in his old haunt---and they seem to be controlling the muskrat population. The two sets of GHOW offspring have left to start life elsewhere. Have a beautiful Autumn.

Sharon McCarthy

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

f/u questions from Wednesday meeting

Sharon McCarthy <[redacted]> Thu, Mar 17, 2022 at 12:07 PM
To: Jeremiah Bebo <jbebo@arvada.org>, Sharon McCarthy <[redacted]>

Jeremiah,

Thank you for taking time to update information I will share with neighbors. I appreciate the time you took to respond to my email.

My comments from Wednesday's meeting:

1st speaker from a business neighbor who couldn't think of a better use of land.

I am unable to find any development that reuses an unregulated dump (I was informed a Landfill is an EPA term for a regulated area---any unregulated area is a dump) or a regulated landfill. There was an example of an unregulated dump in Newcastle, Delaware that used a portion of the dump as storage for his construction vehicles. All the sites I researched, regulated and unregulated either go with top surface use such as recreation areas or complete mitigation and rebuild such as a recycle plant in Denver.

How do we know how the subsurface of an unregulated dump is going to react? Placing driveways on unmitigated dumps suggests " deep dynamic compaction were employed to improve the characteristics of the waste fill and the underlying soil to accommodate the construction of roadways and parking lots." https://www.witpress.com/Secure/elibrary/papers/BF02/BF02004FU.pdf see 5.6 and 5.7

For example, I attempted to pick up a 40 lb bag of bird seed at Costco. I say attempted, because when I grabbed it in the middle, the seed shifted to either end and threw the bag off balance. Will the subsurface of the proposed project shift with the stress of added weight?

As to the design of the proposed project, the addition of storage buildings would probably be preferred to an 8 foot wall for the Forest Springs community. The visibility of the storage facility to the folks using the RC Trail, Geos, and the additional new construction on the south side of the Geos property is not addressed.

Would a covered area be a better solution? More costly but less offensive. Would provide more security from intruders and the weather---hail and wind damage. A covered facility might even result in lower insurance premiums for RV owners. The cost would be offset with higher rental fees.

2020 Storage

Located about three blocks southeast of Coors Field, this facility offers covered RV storage in Denver. The fact that you will be placed on a waiting list to park in this downtown Denver self-storage facility tells you that customers believe that the managers know what they're doing. Video cameras help keep your unit even safer at this Denver RV self storage facility. If you are a student, active military, or senior, take advantage of the 10% discount off their monthly rate that starts at $175.

2020 Arapahoe Street

Denver, CO 80205

Just a few random thoughts. There are numerous examples of creative and profitable reuse of landfills and dumps. It would be nice to see an area where folks could meet.

Have a nice "Spring" week-end!

Respectfully,

Sharon McCarthy

Another Look at Developing 6800 Kilmer Street

When I walk from the FS community onto the “berm trail”, it’s as if I stepped into another part of Arvada.

I walk along the west side of the canal overlooking the parcel of land. The 14 acres of native grassland provides food for several animal species: seeds for flocks of geese and ducks and small animals and snakes for red tail hawks, great horned owls, and coyotes. The north side of the property is the real gem--you walk on the wild side. This area faces a short, narrow strip of native plants and trees at the edge of Ralston Creek and attracts numerous species of birds, coyotes, ducks, deer and the occasional mountain lion! The real attraction is being so close to the peace and tranquility of nature.

I am not against developing this parcel of land. Perhaps, there can be a “creative” development that yields less financial profit and more social profit. Folks from at least 5+ nearby communities walk, run, jog, skateboard, and cycle on Ralston Trail and pass this property. I would like to encourage the City to acquire the land for an outdoor recreation area. Add courts for volleyball, basketball, bocce ball, pickleball, a miniature golf course, batting cages, stationary exercise equipment, putting green, outdoor golf simulator. Maybe have a mini garden center. The area could also offer nearby industries to use the amenities for their employees---and also contribute to the financial maintenance of the area.

There are pro/con issues that need exploration. The purpose of a dawn to dusk outdoor recreation area is a destination folks can walk to. With increased housing construction and little green space, an area such as this if planned properly can be a model for other cities facing the same building boom as in Arvada.

Review

1. Not opposed to development but do oppose RV storage yard for many reasons --primarily being built on landfill with access to methane gas
2. Land is unbuildable--what other options have been explored?
3. Suggestion: Develop area into a “destination” residents can walk to
    a. I am the FS neighborhood lead for the citywide NC platform. Several years ago, NC suggested neighborhoods establish “gathering areas” to integrate communities
    b. What if the 14 acres were developed as an “walkable” outdoor gathering area open to several local communities: Geos, FS, West Town, Home Town, West Woods, and beyond.
    c. Residents from local communities walk and bike the Ralston Trail and pass by the open space
    d. Integrate with commercial eatery scheduled to open about ¼ block from the open space area
4. Amenities of gathering area:
    a. Open courts---basketball, pickleball, bocce ball
    b. Soccer field
    c. Batting cages
    d. Miniature golf course
    e. Putting greens and Golf simulators
    f. Stationary exercise equipment as mounted in FS park
    g. Miniature botanical garden---learning center
    h. Pavilion for craft meetups---learning center
    i. Move goats to property---
5. The gathering space would primarily be established as a neighborhood area neighbors can walk to although provisions for parking suggested.
6. Walkable also from commercial venue across from Geos

7. Open to employees of light industrial businesses in area---owners contribute to cost as incentive to offer exercise for employees---lunch hour and post work
8. Maintenance
    a. Mix use of free and pay for use activities
    b. Maybe offer yearly business memberships
    c. Offer both scheduled and open time activities
9. Multigenerational focus
    a. Society has changed. Families are scattered. Many children have grandparents that live distances away.
    b. Activities such as learning centers for flowers and petting zoo can recruit retirees (teachers) to staff center and offer a role model “grandparent”
10. Pros
    a. Model for other cities with new housing and reduced green space
    b. Support City goal for increased recreational and gathering spaces
    c. Demonstrate City decision makers are focused on “planned” development
    d. Integrate with local communities and businesses
    e. Opportunity for local businesses to offer lunch hour recreational activity
    f. Does not require water lines, electricity
    g. 2012 purchase price $85K---how much profit for investor if City purchases land
11. Cons
    a. Who will invest
    b. ROI not as financially profitable as RV storage area
    c. Who will manage property/activities
    d. Dawn to dusk activities---no lighting
    e. Fair weather use
    f. Liability

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV storage facility--6800 Kilmer St

Sharon McCarthy <[redacted]> Wed, Dec 22, 2021 at 10:37 AM
To: jbebo@arvada.org

Jerimiah,

I live at 6688 Kendrick Dr in Forest Springs and object to the use of the land for a RV storage facility.

I DO NOT object to development of the land by the investor. A RV storage facility seems like a quick and dirty answer that Norris Designs assigned to the land use. There is no thought given to maintenance, aesthetics, or relationship to surrounding communities. I refer to the quote, "putting lipstick on a pig" to convey my thoughts. I noticed Norris is involved with landscape architecture. Their plan done professionally will pass all city requirements but lacks creativity and environmental responsibility in my opinion.

I see development of this land as an opportunity for the city to become involved in a more user friendly and sustainable project. There are oodles of housing developments popping up---many with families and kiddos. Ralston Trail is getting more foot and cycle traffic. The city endorses park development. What if the city bought more time and came up with a "creative and thoughtful" use of this land. I don't understand business logistics but I'm thinking of a "recreation center" based on the APEX center but more homespun and centered on outdoor activity and exercise---courts for basketball, bocce ball, pickleball that appeal to multi-generations. Add a few exercise areas similar to those in Forest Springs Park. Maybe space for an open air flea and craft market on weekends. The goats on the Geos development are a hit--how about a petting zoo for kiddos. Maybe include a small botonical garden as a learning center similar to Majestic Gardens. This project would link with the new commercial establishment being built across from the Geos development. The main idea is to develop a recreational area that folks can walk to---easily accessible from West Woods communities, Geos and additional 200+ homes in the area, Hometown, condos on 64th, and Forest Springs.

I once had a boss/mentor who advised me not to come to him with a problem unless I had 3 possible solutions. I join my neighbors in asking the city to reconsider the initial plan for an RV storage area and we will roll up our sleeves and work with the city and surrounding communities to come up with a creative use of the land.

This is an opportunity for the city to stand out, be innovative, and use imagination. Have a project that folks can be proud of and boast of city support instead of posting negative messages about city use of development on Nextdoor.

I am also the neighborhood lead for the citywide Neighbors Connected platform in our community. Our mission statement is "neighbors connecting and sharing ideas". If you ask, we will be there.

Respectfully,

Sharon McCarthy
[redacted] 80007

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Meeting Comments

Sharon McCarthy <[redacted]> Fri, Mar 18, 2022 at 12:56 PM
To: Jeremiah Bebo <jbebo@arvada.org>

Jeremiah and City Planners,

First, I emailed your clarifications to my FS neighbors yesterday and received about 10 comments thanking me! The road map provides valuable information that is difficult to digest at a meeting. Having a printed guide allows folks to follow the process and know what to expect. Thank you for taking time for the clarification. It might be time well spent if folks develop a sense of trust that City Planners are making solid decisions.

Secondly, I understand Norris Designs(ND) is well respected in the Denver area. However, I question their attention to small projects as in several interactions I've observed.

- In June 2018, I was contacted by the City's Neighborhood Engagement Coordinator to arrange for a focus group about proposed land development for RV vehicles. An individual from our neighborhood volunteered to be our contact with ND and exchanged information with the ND representative. We were assured that ND would contact us in the near future for additional information----still waiting.

- According to online information:

  Attached to your case is a "Notice of Administration Application" form and a mailing affidavit. This will need to be filled out and mailed no later than December 11, 2021 to all property owners that are within 500 feet of the development boundary."
  The certified affidavit of mailing on December 14, 2021 is attached. Most neighbors received the letter around 12/17 in a community where a large number of residents celebrate the Christmas season. Several neighbors easily misplaced or discarded an envelope from Norris Designs---looks like junk mail.

- Neighbors who arrived at 5:30 (to get a good parking spot) were greeted with "I guess only you folks showed up so we'll get started" only to have the neighbors tell Kristin that the meeting was scheduled to begin at 6pm and not 5:30 as she "thought".

- Per LDC **8-2-3-4. - Neighborhood meetings.**

  All neighborhood meetings shall be convened at a place in the vicinity of the proposed development. City Hall is in our City but not in our vicinity. When a Neighborhood meeting took place prior to the West Town subdivision, the developers arranged a meeting at a local church.

I understand casually overlooked details might be viewed as nit picking. I also hesitate to share these comments as they may seem frivolous with all the projects that City Planners are working on. Little things---but makes me question ND's accuracy, trust, and attention to rules.

Jeremiah, these are rambling observations and don't need a response. Just something to think about.

Happy Spring and have a wonderful weekend!

Sharon McCarthjy

2 attachments

Arvada ADMIN Letter.pdf
398K

AFFIDAVIT OF MAILING - NOTICE OF ADMINISTRATIVE APPLICATION (1).pdf
111K

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Kilmer St Storage Area

Sharon McCarthy [redacted] Wed, Feb 16, 2022 at 7:48 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Jeremiah,

Would you please forward my comments to Kristin Dean, Norris Designs Planner? I don't have her email address. Thank you.

Sharon

Ms Dean,

I am a resident of Forest Springs. While my house is not adjacent to the proposed land development, I have a full view of approximately 1/2 of the area from my back windows. It will not be a pretty sight to look at RV vehicles. While the proposed fence designed for the storage area might mitigate the view for homeowners on the same level of the proposed RV project, no fence will block the view of RV vehicles from my window. I enclose pics for reference.

I understand this is a business deal. Norris Designs is well respected in the area. I ask you to picture your personal home dwelling in an area that overlooks a RV storage area. I challenge anyone at Norris Designs familiar with the RV project to affirm they would not mind the project in their backyard.

There are other options for the area that would not be as profitable for the land investor but would be more creative, pleasing, and functional for surrounding communities. How about a mixed use of the land---fee for service activity such as a miniature golf course and simulated golfing lanes mingling with free sport areas? Thinking outside the box could provide a model for suburban development coming up short on outdoor recreation and green space. The area would be a "destination" for folks walking Raston Trail and provide a link to at least two businesses along the trail---the Tap House and a Coffee House. It could be a recreation area linking folks from at least 8 nearby communities to form a neighborhood gathering area. At the same time, it offers an opportunity for local businesses such as Sundyne to offer an off campus exercise area. At the virtual meeting for the proposed development at McIntyre/54th, I heard proponents connect affordable housing to business recruitment. Perhaps affordable recreation can link neighbors in communities as well as employees in local business.

I know this letter labels me as NIMBY. It is meant to be constructive and not destructive. I sent you this email to "vent" and really don't expect anything to change. It's sad.

Resepectfully,

Sharon McCarthy
[redacted]
Forest Springs

3 attachments

Room with view1.JPG
3105K

Room with view2.JPG
4140K

Room with view3.JPG
3550K

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer Street Project

Sharon McCarthy <[redacted]> Mon, Jul 24, 2023 at 10:47 AM
To: Jeremiah Bebo <jbebo@arvada.org>

Good day Jeremiah,

I'm attaching more research for our Forest Spring file for the proposed 6800 Kilmer St redevelopment.

One author stated that perhaps old unregulated landfills be a "subset" of brownfields. If you have an old brownfield building, you can replace rusty pipes, remove asbestos, and replace lead painted walls with new drywall, but how can cdphe or epa know the effects of what lurks beneath the subsurface of a landfill ---now and the future? The vcup favors one size fits all.

Terracon engineers could not provide data demonstrating successful reuse of a landfill with a heavy equipment storage area. We can provide an example of a failed landfill redevelopment with the DPS bus storage area. (attachment DPS-pp 14, 18)

In the FS Declaration, Article 6 Section 6.1 (c) (i-vii) maintenance of Tract A (berm over old landfill) is described and stated as an HOA responsibility. How solid is the Terracon design and is there a "warranty" on design and workmanship? Does the question go to protect the City if an "incomplete design" cause sinkholes that damage RV's? We know the vcup mentions a developer walking away from an incomplete project. What if soft soils and decaying organic matter cause damage and the owner cuts his losses and abandons the development? What if the chemicals lurking beneath the surface spill out ---there are no provisions in vcup for f/u and/or monitoring soil and surface/ground water testing.

My first concern is legal and I emailed an attorney from the Brownfields Conference as to his presentation on a developer's legal responsibility to inform users of methane presence/liability. My other concern is on soil stability and I have an email to the Colorado Geologic Survey. In research, there are options available for soil compaction to insure stability but at a hefty cost to the developer. I do not see any mention of addressing soil stability (geotechnical) in the VCUP, which causes me to question the integrity of the site design.

Thanks for your patience.

Sharon

2 attachments

Suggestions for Redevelopment of old landfills.pdf
101K

DPS TBA.pdf
7958K

Suggestions for Redevelopment of old landfills

Many questions needed to be resolved. For instance, who would be responsible for complying with the terms of the Administrative Consent Order(ACO)? Who would be liable for potential fines if the milestones in the ACO were not met? How would the town ensure that the developer appropriately complied with the ACO? How would the town monitor the developer's activities? What protection mechanisms would the town have in the event that the developer defaulted on its obligations? How would the developer "take over" the closure process from the town? Should the developer be required to use the same closure consultant that had been working with the town? A lengthy lease was required between the town and the developer to deal with these issues and more.

(Massachusetts) Department of Environmental Protection's (DEP) regulations require that the owner or operator establish or obtain, and continuously maintain, financial assurance satisfactory to DEP, that it is at all times financially capable of complying with the closure requirement. The ACO required that the town appropriate necessary funds for performing the milestones in the ACO, including final closure and remediation of the landfill. Therefore, a key issue addressed under the terms of the lease concerned the town's obligation under the ACO to provide a financial assurance mechanism to ensure that financial resources are available to meet the type of closure and post-closure requirements set out in the ACO.

Other legal issues associated with the landfill assessment and closure requirements relate to the intended post-closure use. For instance, if the post-closure use will involve commercial and/or retail buildings, the owner must decide whether and when to sell or lease the property. Carefully crafted lease and purchase and sale agreements must be drafted to address such issues as who will maintain the obligations and responsibilities for closure and the post-closure monitoring.

https://corporate.findlaw.com/law-library/landfill-closure-and-redevelopment-three-case-studies.html

Deep Dynamic Compaction

Old landfills or dumps present some unique soil stability challenges. Deep dynamic compaction (DDC) is a ground stabilization technique that has gained popularity in recent years to improve subsurface soil conditions. DDC involves dropping 6 to 30-ton weights from a height between 30 and 75 feet to achieve the desired soil compaction. DDC can effectively apply to a range of subsurface materials, including former C&D debris or municipal solid waste dumps.

DDC provides a stable foundation for future development, minimizes differential settlement while leaving the landfill waste in place, and eliminates the costs associated with removing, transporting, and disposing of buried waste, costing millions of dollars. For simplicity's sake, let's consider a 1-acre old landfill or a dumpsite with an average of 15 feet of waste. If excavating the waste and replacing it with clean fill, the disposal fee costs for the excavated waste alone could exceed $400,000. Alternatively, DDC costs range from $1.50 to $2.00 per square foot or $65,000 to $87,120 per acre, excluding mobilization, which costs around $30,000.

https://www.scsengineers.com/remediation-cost-saving-approach-to-redeveloping-on-old-landfills-or-dumps/

https://www.scsengineers.com/services/brownfields-and-voluntary-remediation/

Managing settlement

Consolidation – the sinking and settling of the land as waste breaks down – is another of the biggest problems affecting redevelopment on landfill sites.

As decomposition occurs, depressions can develop on the site surface, and fluid that trickles out of a landfill (known as the leachate) also carries contaminants and has the potential to spoil the ground water in the surrounding area.

Whilst a significant amount of the settlement takes place within five years of a landfill's closure, it can continue for decades, albeit at a slower rate. Engineers must evaluate the land carefully before making recommendations to build on the site to ensure the area is safely stabilised. Structures will often be piled and suspended to ensure the firm ground beneath it is bearing the majority of the weight, rather than the landfill itself.

Care needs to be taken to ensure that differential settlement between the ridged piled structure and the ground-bearing external areas do not cause significant problems. This can be specifically pronounced with drainage which should be checked annually.

Dynamic compaction was used on the ground during the first phase of the Island Road development in 2017. This entails the repeated dropping of a heavy weight on the ground at regularly spaced intervals; the density of the soil was increased, and 230mm of consolidation was averaged on-site. The impact of the free-falling weight creates stress waves which can penetrate up to 10m – depending on the weight and the height from which it is dropped.

Rapid impact compaction was implemented during the second phase of development during 2018, consolidating loose-fill soils on the site to help minimise ongoing settlement. This technique uses a hydraulic pile-driving hammer to continually strike a plate on the surface of the ground. This constant contact drives energy into the ground, which mitigates concerns over flying debris and creates a uniform support for foundation footing.

These methods should be tested on site ahead of time to gauge how it will respond before major works begin. Both techniques should be carefully monitored and recorded; as if either is overused it can create a localised heaving of the soil which is detrimental to the soil strength.

The ground can also be tested after the use of this technology to evidence the level of improvement accomplished. Using a cone penetration pressure method, groundwater content and soil density can be measured in comparison to pre-ground improvement statistics.

https://www.fca-magazine.com/features/voice-of-the-industry/1489-bedesign-regenerating-former-landfill-sites

Site Characterization Is Key

The range of conditions that may be present at landfills/dumps being considered for redevelopment extends from those associated with historical neighborhood or industrial dumps to those of regulated monofills and solid waste landfills. A clear and accurate understanding of the pre-existing conditions will determine the level and type of effort required to redevelop the land.

Inappropriate development on or adjacent to landfills/dumps with inadequately controlled conditions can indeed result in hazards and harm. Proceeding in a manner that recognizes the need for good property assessment (such as the process illustrated in the flow diagram) can and does result in successful landfill redevelopments.

https://www.greenbiz.com/article/down-dumps-redevelop

Decomposition or the release of contaminants may continue even when some corrective action has been taken. In addition, closed unlined landfills may have no closed post-closure monitoring if they were closed before Subtitle D regulations came into effect in the late 1980s. Before Subtitle D regulated landfills, there were no liner, leachate collection, or gas requirements. Landfill caps were 2 inches of soil with no slope requirements. Potential landfill failures may occur:

- Erosion of the cap by natural weathering, vegetation, or animals
- No leachate collection systems
- No liners, resulting in groundwater contamination
- Rainfall, creating more leachate that migrates into groundwater (via the bathtub effect), and slope failure
- Landfill gas, such as methane and carbon dioxide, releases

For example, landfills redeveloped a few decades ago have differential settlement issues today, and having a maintenance program in place at the time of construction can help mitigate these problems. There's a lot of responsibility in owning a development on a landfill. Maintenance plans extend into perpetuity. Regulatory agencies are concerned with these, and rightly so. They want to make sure that all this great engineering that's been completed to make the development safe is maintained, and that they have a responsible party to turn to 10 or 20 years down the road. It's an important part of the planning process.

The landfills that are primed for development now are the older landfills that were closed in the 1960s through the 1980s, for several reasons. For example, in the Bay Area they tend to be close to the Bay. You could never get a permit for that now, but this historical legacy has left us with developable parcels close to infrastructure and existing populations. Because those landfills have been closed for

several decades, some settlement has already occurred, and the landfill gas generation rate is also trending downward, so those risks are lessened.

Again, the approach is multidisciplinary, and the engineering expertise that Langan brings in terms of environmental, geotechnical and site-civil is really key. What Langan can do is help set the stage in terms of all the issues that need to be considered.

https://www.cclr.org/expert-advice/the-ultimate-form-of-land-recycling

PHASE II ENVIRONMENTAL SITE ASSESSMENT

DPS BUS TERMINAL TBA
City and County of Denver, Colorado

EPA Contract No. 68-W-00-118
TDD No. 0209-0005

Prepared By:
Essi Ellis (TN and Associates, Inc.)
Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 5/6/04
Johanna Miller, On-Scene Coordinator, EPA, Region VIII

Approved: _____ Date: 2 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 2/3/04
Essi Ellis (TN&Associates, Inc.), START2 Environmental Scientist

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Johanna Miller	On-Scene Coordinator, EPA Region VIII

DENVER PUBLIC SCHOOLS

Joni Rix	Hazardous Materials Specialist

URS OPERATING SERVICES, INC.

Essi Ellis (TN & Associates, Inc.)	Environmental Scientist, START2, EPA Region VIII
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PHASE II ENVIRONMENTAL SITE ASSESSMENT
DPS BUS TERMINAL - TARGETED BROWNFIELDS ASSESSMENT
City and County of Denver, Colorado

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1.0 INTRODUCTION

URS Operating Services, Inc. (UOS) was tasked by the U.S. Environmental Protection Agency (EPA), Region VIII, to conduct a Targeted Brownfields Site Assessment (TBA) at the Denver Public Schools (DPS) Northeast Bus Terminal site (DPS Bus Terminal) in Denver, Colorado (Figure 1). The work was conducted under the Technical Direction Document (TDD) #0209-0005, by EPA Region VIII Superfund Technical Assessment and Response Team 2 (START2) Contract No. 68-W-00-118.

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance facility.

This Phase II Environmental Site Assessment Report (Phase II) is designed to be used in conjunction with the Phase I and Field Sampling Plan (Phase I and FSP) prepared for the TBA at the DPS Bus Terminal in the City and County of Denver, Colorado. Field activities at the DPS Bus Terminal were conducted from June 16 through June 19, 2003. The Phase I and FSP was approved by the EPA Brownfields Project Manager, Ms. Johanna Miller, on June 2, 2003.

2.0 OBJECTIVES

The specific objectives of this Phase II include:

- Assess and evaluate potential and recognized environmental conditions identified in the Phase I;
- Develop sufficient information to determine, with respect to the recognized environmental conditions assessed, that hazardous substances or petroleum products have not been disposed or released at the property, thereby documenting that the property is suitable for its planned use; and/or
- Develop sufficient information about the presence of a recognized environmental condition at the site to provide sufficient data to assist the Brownfields team in making informed business/environmental decisions regarding the future use of the site.

Recognized environmental conditions are defined in ASTM E 1903-97 as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing

release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

The Phase II investigation may consist of several iterations of field sampling and may be terminated at any point, once the objectives of the Brownfields team have been satisfied.

3.0 SITE CHARACTERISTICS

The DPS Bus Terminal is located at 4850 Brighton Boulevard in Denver, Colorado (Figure 1). Prior to approximately 2001, this property's address was 1805 East 48th Avenue. The site is located in the southwest quarter of the southeast quarter of Section 14, T. 3 S., R. 68 W. and is reported as Denver County Assessor's Office parcel number 0214407008000. The DPS Bus Terminal Property appears on the 1965 Revised 1994 U.S. Geological Survey (USGS) 7.5-minute topographic Quadrangle map of Commerce City, Colorado.

The DPS Bus Terminal is approximately 12.5 acres in size and is located in an area of commercial and residential uses. The DPS Bus Terminal property is bound on the north by a commercial property owned by Arnold Lessing, which was once used as a Peterbilt repair facility but has been vacant in recent years, and a U.S. Postal Service property (Denver Public Schools (DPS) 2002a). It is bordered on the east by High Street, on the south by East 48th Avenue, and on the southwest by the Brannan Sand & Gravel Company (Brannan), which is an asphalt paving contractor and concrete supplier. The DPS Bus Terminal is bordered on the west by Brighton Boulevard. A Burlington Northern Railroad line runs parallel and adjacent to Brighton Boulevard on the northwest of the site. Elyria Park is located east of High Street and residential properties are located south of East 48th Avenue. The National Western Stock Show Association (NWSA) owns the land west of Brighton Boulevard, including an overflow bus parking lot, which DPS leases from the NWSA.

The DPS Bus Terminal is currently used by DPS as a maintenance, fueling, and bus parking facility. The site is entirely surrounded by a chain-linked fence and is approximately 90 percent paved with asphalt and concrete. As shown in Figure 2, a two-building complex with offices and 10 maintenance/service bays, a

bus wash station, a three-station fuel island, and two equipment storage sheds are on the southern half of the site. Building 1 (which contains offices and service bays 1 through 3) and building 2 (which contains service bays 4 through 10) appear to be constructed mainly of concrete cinder blocks with concrete slab floors. Labeled drums and containers of maintenance fluids (greases, oils, and other lubricants) and miscellaneous repair tools are stored throughout the service bays. Currently, one underground oil/water separator and seven underground storage tanks (USTs) are on site: one 30,000-gallon tank with diesel; one 10,000-gallon tank with unleaded gasoline; one 2,000-gallon tank with motor oil; one 2,000-gallon tank with antifreeze (ethylene glycol); one 2,000-gallon tank with automatic transmission fluid (ATF); one 1,000-gallon tank with windshield washer fluid; and one 1,000-gallon overflow tank for the oil/water separator. The UST area is located directly north of service bay number 10. Two aboveground storage tanks (ASTs) are also on the DPS property: one 10,000-gallon waste oil AST located south of the building 1; and one 250-gallon propane AST located within a fenced compound on a concrete slab east of the fueling island. The northern half of the property is mainly bus parking with an employee parking lot in the northeast portion of the property.

3.1 GEOLOGY AND HYDROGEOLOGY

The DPS Bus Terminal is underlain by Broadway alluvium (Pleistocene) consisting of generally well-stratified medium to coarse-grained sand and gravel to a depth of approximately 45 feet below ground surface (bgs) (Lewis Maintenance Company, Inc. (Lewis) 2000). The Denver Formation (Upper Cretaceous), which is approximately 600 to 1,100 feet thick throughout the Denver Basin, is made up generally of silty sands and claystones. The Arapahoe Formation, which is a coarser-grained formation, lies below the Denver Formation. Both formations tilt gently to the east as a result of the uplift of the Rocky Mountains (U.S. Geological Survey (USGS) 1995).

The current DPS Bus Terminal subsurface conditions, since much of the alluvium was removed during previous sand and gravel operations, generally consist of 7 to 9.5 feet of dense to loose, sandy fill material, overlying landfill materials that extend to a depth of 26 to 29 feet bgs (Chen-Northern, Inc. (Chen) 1993). The landfill material is mainly composed of clay, sand, glass, various metals, wood, plastic and grass clippings (DPS Date Unknown). Native sand and gravel have been encountered below the landfill materials to approximately 43 feet bgs, below which claystone bedrock of the Denver Formation was encountered (Chen 1993).

The depth to groundwater in the area of the site is approximately 28 to 30 feet bgs. Groundwater flow direction varies from north to northwest toward the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The groundwater systems that underlie the DPS Bus Terminal are the Denver Basin aquifer, the overlying surficial alluvial aquifer along the South Platte River Valley, and the Arapahoe Aquifer (USGS 1995). The Arapahoe Aquifer, located at depths greater than 580 feet bgs, is defined by the base of the shale beds in the lower part of the overlying Denver Formation (USGS 1983). The base of this aquifer is defined by the top of the shale, coal seams, and thin beds of sandstone and siltstone in the upper part of the underlying Laramie Formation (USGS 1995). The Arapahoe Aquifer is composed of fine to coarse sands and is an important source of usable water in the region (USGS 1983).

3.2 HYDROLOGY

The hydrology in the area of the DPS Bus Terminal is dominated by the South Platte River, which is located approximately 2,000 feet northwest of the site (Lewis 2000). The 11-year (1982 to 1993) mean annual flow of the South Platte River in this area was 305 cubic feet per second (cfs) (USGS 1994).

There are three designated storm water retention areas on site, as required by the Denver Wastewater Management Division. The northwest corner retention area serves to retain storm water from the main bus parking lot; the southeast corner of the site serves as a retention area for storm water from the garage, bus wash, and fueling island; and the northeast corner serves as a retention area for runoff from the employee parking lot area. These retention areas are designed to accumulate storm water and other runoff for adsorption on site and metered delivery to the storm sewer system, if necessary. The metering of excess water is controlled by the size and placement of openings in the retaining wall adjacent to these areas. Any water that is deep enough to reach these openings can be discharged off of the DPS Bus Terminal property into the storm water system. This discharge is allowed only if the water reaches the height of the openings. Most of the water remains on site and drains into the soil (DPS 1997).

3.3 METEOROLOGY

Situated a long distance from any major moisture source, and separated from the Pacific Ocean by several high mountain barriers, Denver generally exhibits low relative humidity and light precipitation.

In winter, the high altitude and mountains to the west combine to moderate temperatures in Denver. In spring, polar air often collides with warm, moist air from the Gulf of Mexico and these collisions result in frequent, rapid and drastic weather changes. Much of the precipitation falls as snow, especially in March and early April. Summer precipitation falls mainly from scattered thunderstorms during the afternoon and evening. In autumn there are few thunderstorms and invasions of cold air are infrequent. As a result, there is more sunshine and less severe weather than at any other time of the year (Colorado Climate Center (CCC) 2002).

Between 1971 and 2000, average high and low fall/winter temperatures were 51 and 22.5 degrees Fahrenheit, respectively. Average high and low spring/summer temperatures are 77.5 and 49 degrees Fahrenheit, respectively (National Oceanic and Atmospheric Administration (NOAA) 2002).

Denver's first freeze usually occurs in early October, and the last freeze usually occurs in early May. The average seasonal snowfall is approximately 60 inches. Average yearly precipitation between 1971 and 2000 was approximately 15.81 inches (1.32 inches monthly average) (NOAA 2002).

4.0 HISTORICAL OWNERSHIP, USE, AND PREVIOUS INVESTIGATIONS

4.1 HISTORICAL OWNERSHIP AND USE

Brannan Sand and Gravel Company historically owned and operated a sand and gravel quarry on what is now the DPS Bus Terminal Property, Arnold Lessing property, and U.S. Postal Service (USPS) property. The sand and gravel quarry also extended onto the J&B Auto Crusher (junk cars and scrap metal yard), Saway (auto body and fiberglass repair) and Transport Equipment, Inc. (refrigeration service and repair) properties, which are all located north of the USPS property. Once the sand and gravel resources were exhausted, a 70-foot-wide racetrack was built on the gravel pit bottom, forming a semicircular arc across the northern one-third of the property and extending onto

the northern adjacent properties (CTL/Thompson, Inc. (CTL) 1992). The quarry was later operated as a sanitary landfill by the City and County of Denver (Colorado Department of Health (CDH) 1988). The exact dates of the quarry, racetrack, and landfill operations are uncertain due to conflicting information from topographic maps, aerial photos, and historical reports.

The landfill was completely backfilled and graded in 1967. DPS purchased the land in 1976 and began construction of building 1 (Figure 2) (DPS 2002c).

Two fueling islands, the north and south fueling islands, were installed in 1977 and 1986 adjacent to each other on the southern portion of the DPS Bus Terminal property. A total of seven USTs containing diesel, unleaded gasoline, antifreeze, ATF and windshield washer fluid were constructed in these areas. Two additional USTs containing used and unused motor oil were also installed just west of these fueling island areas (Owens-Corning World Headquarters (Owens) 1992). These USTs were excavated in 1992 the current UST area and fuel island were constructed at the DPS Bus Terminal in 1993 (DPS 2002d).

Construction of building 2 and the bus wash began in 1994 (DPS 2002e).

4.2 PREVIOUS INVESTIGATIONS

In June 1988, the Hazardous Materials and Waste Management Division of the Colorado Department of Health (CDH), now known as the Colorado Department of Public Health and Environment (CDPHE), performed a site inspection (SI) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and conducted sampling to characterize on-site contaminants disposed of in the landfill, to determine the extent of potential groundwater contamination, to determine the extent of potential soil contamination, and to determine whether adjacent surface waters had been impacted by hazardous substances from the landfill (CDH 1988). From this investigation, CDH concluded that the landfill had not released organic or inorganic contaminants to the environment based on the limited number of identifiable substances and the lack of quantifiable volumes found in the analytical results. CDH recommended that the site be listed as a "No Further Action" (NFA) site in February 1989 (CDH 1989).

In August 1992, CTL/Thompson, Inc. (CTL) performed a soils and foundation investigation in anticipation of construction of the bus wash and building 2 and pavement rehabilitations at the DPS Bus Terminal. CTL logged the landfill material and screened for methane gas concentrations at the site and recommended that gas control and vent systems be installed in the bus wash and in building 2 at the time of their construction (CTL 1992). According to DPS personnel, these gas control and vent systems were never installed (DPS 2002d).

In October 1992, leaks of approximately 6,000 gallons of unleaded gasoline and smaller amounts of diesel and motor oil were detected in subsurface materials in the fueling island areas. These gasoline and diesel leaks occurred as a result of subsurface subsidence at the DPS Bus Terminal site, due to the shifting and settling of landfill material present beneath the site (Lewis 2000). Emergency excavations of the north and south fueling islands and USTs and the motor oil USTs commenced in October 1992 (Chen 1992).

Chen-Northern, Inc (Chen) performed two subsequent subsurface hydrocarbon investigations at the DPS Bus Terminal following the UST excavations. Groundwater monitoring and subsurface material excavation tasks were performed during these investigations. From these investigations, Chen confirmed that a petroleum product plume was identified in groundwater at the DPS property and extended off-site, north of the DPS Bus Terminal site. The primary constituents of the plume included benzene, toluene, ethylbenzene, and xylenes (BTEX) (Chen 1993).

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted primarily by Maxim Technologies, Inc. (Maxim), for approximately seven years, beginning in November 1992.

Maxim's final quarterly groundwater monitoring report, dated October 11, 1999, revealed that benzene and total BTEX concentrations in the dissolved plume at the DPS Bus Terminal site had significantly diminished since the 1992 leak. In October 1999, Maxim, on behalf of DPS, submitted a "No Further Action Request" letter to the Colorado Department of Labor and Employment's (CDLE) Oil Inspection Section. Maxim's request was based on the following criteria (Maxim Technologies, Inc. (Maxim) 1999):

- The source contamination was removed in 1992 when the leaking USTs were excavated;

- Free product was removed and had not reappeared in any monitoring well since April 1996;
- Groundwater flow patterns had remained relatively consistent over time;
- There was no impact to water supply wells;
- The extent of the dissolved contaminant plume had been defined;
- Plume contaminant concentrations had been significantly decreasing since April 1996; and
- Inorganic parameters corroborated bio-degradation of the dissolved hydrocarbons.

According to the Colorado Storage Tank Information System (COSTIS) database, a No Further Action Required determination was granted by the CDLE in March 2000 (Colorado Department of Labor and Employment (CDLE) 2002).

In November 2001, following a tank tightness test that indicated that the currently existing USTs at the DPS Bus Terminal were subsiding, Ground Engineering Consultants (Ground) performed a geotechnical investigation in order to assess subsurface conditions at the site. From this study, Ground concluded that the settlement in the bus parking area was caused by the improper backfill placement and/or insufficient compaction from the previous construction/ remediation activities as well as from the decaying/decomposing of the sanitary landfill materials (which created voids in the subsurface). Ground also concluded that the settlement in the fueling and UST areas was caused by decaying/decomposing landfill materials. Ground provided several options to DPS for remediation of the subsurface materials and USTs at the site, including excavation and replacement, driven pile-supported structural concrete, pressurized compaction grouting, dynamic compaction, and geotextile/composite pavement sections (Ground Engineering Consultants (Ground) 2001).

DPS is exploring removing the USTs and installing them aboveground in the southeast corner the DPS Bus Terminal property. Due to the subsidence in the southeast corner of the site, DPS has suggested that other options may need to be explored. (DPS 2002b).

5.0 SAMPLING ACTIVITIES AND FIELD OBSERVATIONS

The START2 field sampling team included Essi Ellis of TN&Associates, Inc. (field team leader), Eric Scott of UOS (health and safety coordinator), Becci Treitz of LT Environmental, Jeff Miller of UOS, and Bryan Williams of Tetra Tech. Field work was conducted in Level D Personal Protective Equipment, which included hard hats, steel-toed boots, latex and cotton gloves, and ear plugs.

A total of 19 soil gas locations were field screened for percent oxygen, carbon monoxide, percent methane, volatile organic compounds (VOCs), and hydrogen sulfide. Six confirmation soil gas samples were collected and submitted for laboratory confirmation; all six samples were analyzed for methane and four of the six were also analyzed for VOCs.

Three surface soil samples were submitted to a laboratory and analyzed for lead and arsenic. Eight shallow subsurface soil samples were submitted to a laboratory and analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) - diesel range organics (DRO), TPH-gasoline range organics (GRO) and TPH-motor oil range organics (MORO). Five landfill characterization soil samples were submitted to a geotechnical laboratory for grain size, density, percent moisture and Atterberg Limits analyses.

Groundwater samples collected from eleven monitoring wells on site were submitted to laboratories for analyses. Seven of the groundwater samples were analyzed for BTEX compounds and the remaining four groundwater samples were analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), TPH-DRO, TPH-GRO and Total Recoverable Chromium (TRC). One purge water sample was collected from the 55-gallon purge water drum on site following the groundwater sampling event. The purge water sample was submitted to a laboratory and sampled for TRC, VOCs, SVOCs, and pesticides/PCBs.

Field quality assurance/quality control (QA/QC) samples included the collection of three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater (triple volume) spike/matrix spike (MS/MSD) sample and one soil (double volume) MS/MSD sample were collected for this investigation for laboratory QA/QC. Table 1 contains the sampling rationale for the DPS Bus Terminal.

5.1 SOIL GAS SAMPLING

A Geoprobe® direct push rig was used to advance 19 soil gas boreholes to depths between 5 and 8 feet bgs. All 19 soil gas boreholes were field screened for percent methane and oxygen and for carbon monoxide and hydrogen sulfide concentrations using a Landfill Gas Analyzer (LGA). Each borehole was field screened for VOCs using a photoionization detector (PID)/flame ionization detector (FID).

At each location where soil gas was screened, a small diameter polyethylene tube was lowered into the Geoprobe® rods and attached to a threaded fitting at the bottom of the rods. The tube was attached at the surface to the screening instruments.

At six Geoprobe® locations, soil gas samples were collected into one-liter Summa™ canisters for laboratory methane and VOC analyses. Soil gas sample collection followed the procedures for use of Summa™ canisters and the collection of air samples detailed in the UOS Technical Standard Operating Procedure (TSOP) 4.30, "Summa Canister Air Sample Collection" (URS Operating Services, Inc. (UOS) 2000). Each soil gas sample was collected from one Geoprobe® hole at a depth of five to eight feet bgs, depending on the location. At each location to be sampled, the polyethylene tube was attached to the Summa™ canister, the valve on the canister was opened, and the sample was collected.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding EPA Region III Risk-Based Concentrations (RBCs) in soil gas samples are shown in Figures 3 and 4.

5.2 GROUNDWATER SAMPLING

Groundwater samples were collected from 11 existing on-site monitoring wells. At the time the FSP was submitted, only nine monitoring wells were known to be on the site. Two additional monitoring wells were located on site at the time of sampling in June 2003 and were sampled as opportunity groundwater samples.

Field personnel collected groundwater samples in accordance with UOS TSOP 4.12, "Groundwater Sampling" (UOS 2000). Water level measurements were taken at each monitoring well location prior to purging as described in UOS TSOP 4.13 "Water Level Measurements"(UOS 2000). Field parameters (pH, temperature, total dissolved solids, and conductivity) were collected during purging to determine whether the monitoring well had been properly purged as described in UOS TSOP 4.14

"Water Sample Field Measurements" (UOS 2000). Tables 4 through 9 list groundwater field and laboratory data.

A Delrin 32-millimeter (mm) foot valve pump and appropriate length of dedicated 1-inch high density polyethylene (HDPE) tubing were lowered into each monitoring well to purge each well and to collect the groundwater sample directly into the sample containers. The foot valve pump was decontaminated per UOS TSOP between sample locations (UOS 2000).

Sample locations and analytical results exceeding RBCs are shown in Figure 5.

5.3 SHALLOW SUBSURFACE SOIL SAMPLES

A Geoprobe® direct push rig was used to advance eight shallow subsurface boreholes and collect shallow subsurface soil samples. Eight shallow subsurface soil samples were collected in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). In order to obtain enough subsurface material to fill all required sample containers, each borehole was advanced to a depth of four to eight feet bgs. Shallow subsurface soil samples were collected as grab samples from the acetate core sleeves and transferred to appropriate sample containers using disposable plastic scoops.

Upon completion of sampling, all boreholes were backfilled to within two feet of ground surface. The final two feet was then filled with bentonite to form a barrier against filtration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.4 SURFACE SOIL SAMPLES

Three composite surface soil samples were collected at the DPS Bus Terminal in accordance with UOS TSOP 4.16 "Surface and Shallow Depth Soil Sampling" (UOS 2000). Samples were collected from areas that were not paved and that were approximately 20 feet by 20 feet in size. Each surface soil sample was collected as a composite sample from the four corners and center of the sample area

(from 0 to 2 inches bgs) using a disposable plastic scoop. The sample was then homogenized in a seal-top poly bag and transferred to appropriate sample containers.

Sample locations and analytical results exceeding RBCs are shown in Figure 6.

5.5 LANDFILL CHARACTERIZATION SAMPLES

A Geoprobe® direct push rig was used to advance five landfill characterization boreholes (DPS-SB-01 through DPS-SB-05) to collect samples to be submitted to a geotechnical laboratory. Each borehole was drilled through the landfill material to refusal or to a depth where native soil or groundwater was reached. Landfill characterization samples were collected directly into the Geoprobe® acetate core sleeves, at four-foot intervals, as the boreholes were drilled. Each four-foot core sleeve was capped with air-tight Geoprobe® acetate core sleeve caps and submitted to a private laboratory for geotechnical analyses.

Upon completion of sampling, all boreholes were backfilled with bentonite to form a barrier against infiltration. If the borehole was advanced through asphalt or concrete, an asphalt or concrete patch was placed over the bentonite.

Sample locations are shown in Figure 6.

5.6 FIELD OBSERVATIONS

Field observations of note include the following:

- Obvious subsidence of the asphalt bus and employee parking areas and the areas of the fueling island and maintenance buildings was seen at the DPS Bus Terminal during the June 2003 sampling event.

- The landfill material is mixed with soil in the employee parking lot area where the five landfill characterization boreholes were drilled, which made it difficult to determine the thickness of the landfill material in the boreholes. The boundary between cover material and landfill material was not distinct. However, the thickness of soil cover on the landfill

is estimated at approximately 2 feet to 6 feet and the depth to the bottom of the landfill material is estimated at 7 feet to 28 feet bgs. Thus, the thickness of the landfill material is estimated as 4 feet to 22 feet.

- Landfill material observed included paper, concrete, brick, and glass. Groundwater was encountered within each monitoring well at depths ranging from 14.6 feet to 32.2 feet bgs.

- Strong odors (of petroleum and/or solvents) emanated from the monitoring wells during purging and collecting groundwater samples DPS-GW-05, DPS-GW-04, DPS-GW-03, and particularly DPS-GW-07 and DPS-GW-06. Thick "sludge-like" material was removed from the monitoring well when it was being purged to collect sample DPS-GW-07.

6.0 FIELD QUALITY CONTROL PROCEDURES

All samples were handled and preserved as described in UOS TSOP 4.2, "Sample Containers, Preservation, and Maximum Holding Times." Calibration of the pH, temperature, total dissolved solids, and conductivity meter followed instrument manufacturers' instruction manuals and UOS TSOP 4.14, "Water Sample Field Measurements" (UOS 2000).

All non-disposable sampling equipment was decontaminated prior to initial use. All non-disposable sampling equipment was decontaminated after the collection of each sample in accordance with UOS TSOP 4.11, "Equipment Decontamination." Basic decontamination consisted of washing or brushing gross particulate off sampling equipment with tap water and a scrub brush, followed by washing equipment with a solution of Liquinox® and distilled water, rinsing with distilled water, rinsing with methanol (and/or nitric acid), and finally rinsing with distilled water. After decontamination, the equipment was allowed to gravity drain and was then will be wrapped in aluminum foil to minimize potential contamination (UOS 2000).

The following samples were collected to evaluate data quality at the site:

- One rinsate blank, DPS-RB-01,for analysis collected from the Geoprobe® shoe;

- Three trip blanks, DPS-TB-01, DPS-TB-02, and DPS-TB-03, for VOC and/or TPH-GRO analyses;

- One duplicate aqueous sample per set of 20 aqueous samples collected. Sample DPS-GW-60 was collected as a duplicate of aqueous sample DPS-GW-06; and

- One double volume of sample DPS-SO-03 and one triple volume of sample DPS-GW-07 for laboratory MS/MSD purposes.

The "UOS Generic Quality Assurance Project Plan" serves as the primary guide for the integration of QA/QC procedures for the Superfund Technical Assessment Response Team (START) contract (UOS 2001).

7.0 CHAIN OF CUSTODY

After sample collection and identification, all samples were handled in strict accordance with the chain-of-custody protocol specified in UOS TSOP 4.3, "Chain of Custody" (UOS 2000). The chain-of-custody forms are in Appendix A.

8.0 ANALYTICAL DATA

8.1 DATA REVIEW

All sample data collected during this TBA were reviewed by a UOS chemist. The following qualifiers have been added to certain samples as described below:

J The associated numerical value is an estimated quantity because the Quality Control criteria were not met in the laboratory.

R Analytical result was rejected due to the percent recovery of deuterated monitoring compounds being lower than the acceptance limits.

U The material was analyzed for, but was not detected above the level of the reported value. The reported value is either the contract required quantitation limit (CRQL) (for organic analyses) or the contract required detection limit (CRDL) (for inorganic analyses).

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

B The analyte was also detected in the associated method blank.

P Used for pesticide/aroclor target analyte when there is a greater than 25% difference for detected concentrations between the two gas chromatograph (GC) columns. The lower of the two values is reported.

X The analyte was diluted below an accurate quantitation level.

H The fuel pattern was in the heavier end of the retention time window for the analyte of interest.

UJ The reported quantitation limit is estimated because Quality Control criteria were not met. Element or compound was not detected.

* Duplicate analysis not within control limits.

N Spiked sample recovery not within control limits.

Concentrations of contaminants detected at levels above published benchmark criteria are noted by shading in the tables at the end of this report. Background sample analytical results are also presented since cleanup levels generally are not selected that are lower than background concentrations.

8.2 DATA COMPARISON AND INTERPRETATION

The potential receptors at the site include office and bus maintenance workers, construction workers, and off-site residents. The following sections summarize the comparison of analytical results to published guidance, obtained from the RBCs table, that has been determined to be protective of human health and the environment for the given environmental pathways. The RBCs have limitations as follows: they do not consider contamination from soil to air, cumulative risk from multiple contaminants or media, or dermal risk. In addition, many RBCs are based on adult risks. The calculations are the result of the combination of toxicity factors with standard exposure scenarios that produce chemical concentrations corresponding to fixed levels of risk (a Hazard Quotient of 1 or a lifetime cancer risk of one in one million, whichever occurs at a lower concentration). The assumptions used in the standard exposure scenarios can be found on the EPA

Region III web page under Technical Background Information (U.S. Environmental Protection Agency (EPA) 2002a). These standards were developed using protective exposure scenarios and do not represent concentrations at which the EPA and the state generally would require a clean-up.

The TPH-GRO, TPH-DRO, and TPH-MORO results will be compared to background values because there are no published standards for them. In addition, pesticides/PCBs and SVOCs that do not have RBCs will be compared to background levels.

9.0 ANALYTICAL RESULTS

Soil gas samples were submitted to Air Toxics, Ltd. for VOCs analysis via Modified TO-14A and for methane analysis via Modified ASTM D-1946.

Groundwater samples were submitted to Paragon Analytics, Inc. for BTEX compound analysis via SW8021, TPH-GRO analysis via SW8015, TPH-DRO and TPH-MORO analyses via SW8015MCALUFT, and TRC analysis via SW6010. Groundwater samples were submitted to Datachem Laboratories for low level routine analytical service (RAS) analyses of SVOCs, pesticides/PCBs and VOCs.

Surface soil samples were submitted to Paragon Analytics, Inc. for lead and arsenic analyses via SW6010.

Shallow subsurface soil samples were submitted to Paragon Analytics, Inc. for TPH-GRO analysis via SW8015, and TPH-DRO and TPH-MORO analysis via SW8015MCALUFT. Shallow subsurface soil samples were submitted to Ace Technologies, Inc. for RAS analyses of SVOCs and VOCs.

Landfill characterization samples were submitted to Advanced Terra Testing for geotechnical analyses including percent moisture, density, grain size, and Atterberg Limits.

9.1 SOIL GAS ANALYTICAL RESULTS

Levels of methane in soil gas do not have a health standard. However, the lower explosive limit (LEL), which is the point at which the atmosphere becomes explosive, is 5% methane by volume and the upper explosive limit (UEL) is 15% methane by volume. Methane percentages greater than 15% are no longer explosive but represent an asphyxiation hazard. In addition, when ventilation is used

to lower methane percentages that are greater than 15%, the percentages must eventually pass through the explosive range and again become an explosive hazard.

Methane and VOC gas accumulation in enclosed structures (such as offices or storage or warehouse facilities) could create explosion hazards and potentially impact health risks by exposure via the air pathway.

9.1.1 Methane and Other Combustible Gases Analytical Results

Methane field screening methods indicated the presence of methane in each of the six samples submitted for laboratory confirmation. Five of the six samples, collected throughout the DPS Bus Terminal, and submitted for laboratory analysis contained methane at levels higher than the LEL of 5% by volume. Detections ranged from 5 to 11 times greater than the LEL.

Field screening equipment detected carbon monoxide concentrations ranging from 38 to 237 parts per million (ppm) in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-04 at 237 ppm and DPS-SG-03 at 178 ppm. Carbon monoxide has an Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) concentration of 50 ppm and an Immediately Dangerous to Life and Health (IDLH) limit of 1,200 ppm in ambient air.

Field screening equipment detected hydrogen sulfide concentrations ranging from 5 to 27 ppm in soil gas boreholes throughout the DPS Bus Terminal. The highest concentrations were detected in DPS-SG-14 at 27 ppm and DPS-SG-07 at 20 ppm. Hydrogen sulfide has a PEL ceiling concentration of 20 ppm and an IDLH limit of 100 ppm in ambient air.

Field data and methane analytical results for soil gas samples are presented in Table 2.

9.1.2 VOC Analytical Results

Sample DPS-SG-06 had detections of 17 analytes at levels ranging up to 3.47×10^5 times greater than their respective RBCs. Analytes detected in this sample above their RBCs are

BTEX compounds; vinyl chloride; cis-1,2-dichloroethene; trichloroethane (TCE); tetrachloroethene (PCE); 1,3,5-trimethylbenzene; 1,2,4-trimethylbenzene; 1,4-dichlorobenzene and hexane. Analyte detections above RBC levels were also detected in soil gas samples DPS-SG-03, DPS-SG-04 and DPS-SG-17.

See Table 3 for soil gas results that exceeded the 1 X 10^{-4} soil gas risk factor for the soil vapor intrusion to the indoor air pathway (EPA 2002b).

Laboratory soil gas VOC results are presented in Table 3. VOC field data are presented in Table 2.

9.2 GROUNDWATER ANALYTICAL RESULTS

Contaminants in groundwater may contribute to surface water contamination and can cause a human health risk if contaminated groundwater or surface water are used as drinking water. In addition, contaminated groundwater may cause air contamination if vapors concentrate in basements or other restricted areas.

The groundwater sample analytical results are reported in Tables 5 through 9. Analytical results that exceed the RBCs are shaded in the tables and are shown on Figure 5. Groundwater sample field data are presented in Table 4.

9.2.1 Total Recoverable Chromium (TRC) Analytical Results

Laboratory analysis of groundwater samples DPS-GW-05 and DPS-GW-07 detected TRC at levels slightly above the Colorado Water Standard (CWS) Maximum Contaminant Level (MCL) value of 0.10 mg/L. TRC was detected in groundwater sample DPS-GW-09 at a level equal to the CWS MCL value. TRC was detected in groundwater sample DPS-GW-02 at a level below the CWS MCL.

Laboratory groundwater TRC results are presented in Table 5.

9.2.2 TPH-GRO, TPH DRO, and TPH MORO Analytical Results

Laboratory analysis of sample DPS-GW-05 detected levels of TPH-GRO and TPH-MORO at slightly higher than background levels. These values were relatively low and were qualified as estimated because the values were below the laboratory reporting limit. Levels slightly above background of TPH-MORO and TPH-DRO were detected in sample DPS-GW-07. TPH-MORO was detected in a slightly higher amount than the background value in DPS-GW-09. Not one of the TPH-GRO, TPH-MORO or TPH-DRO results was higher than 0.39 ppm.

Laboratory groundwater TPH-GRO, TPH-MORO, and TPH-DRO results are presented in Table 6.

9.2.3 SVOC Analytical Results

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)-pyrene were detected in sample DPS-GW-07 at levels above their Colorado Groundwater Standard (CGS) values of 0.0048 µg/L. Phenanthrene was also detected in sample DPS-GW-07 at a level of 0.57 µg/L (estimated), which exceeds the non-detect value of background sample DPS-GW-02.

Laboratory groundwater SVOC results are presented in Table 7.

9.2.4 VOC Analytical Results

Benzene was not detected in groundwater samples submitted for VOC analysis at levels above the CWS MCL value of 5.0 µg/L except in sample DPS-GW-06. The reliability of this DPS-GW-06 analytical results is questionable due to the discrepancies between results found in this sample and the duplicate sample, DPS-GW-60, collected from the same monitoring well.

There are significant discrepancies for BTEX compound analytical results between sample DPS-GW-06 and the duplicate sample DPS-GW-60 collected from the same monitoring well

on June 18, 2003. Benzene was detected in sample DPS-GW-06 at a level of 13 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Toluene was detected in sample DPS-GW-06 at a level of 16 µg/L and was detected in sample DPS-GW-60 at a level of 1.3 µg/L. Ethylbenzene was detected in sample DPS-GW-06 at a level of 44 µg/L and was detected in sample DPS-GW-60 at a level of 2.9 µg/L. m,p-Xylenes were detected in sample DPS-GW-06 at a level of 82 µg/L and were detected in sample DPS-GW-60 at a level of 9.1 µg/L. o-Xylene was detected in sample DPS-GW-06 at a level of 27 µg/L and was detected in sample DPS-GW-60 at a level of 2.5 µg/L. Because of the magnitude of difference between these data results and insufficient evidence of the cause of the discrepancies, on September 3, 2003 the START2 field team re-sampled the monitoring well from which samples DPS-GW-06 and DPS-GW-60 were collected. In the new groundwater sample DPS-GW-06A, collected in September 2003, benzene was not detected, toluene was detected at a level of 0.17 µg/L (estimated), ethylbenzene was detected at a level of 0.36 µg/L (estimated) and total xylenes were detected a level of 1.0 µg/L. None of the analytes detected in groundwater sample DPS-GW-06A were found at levels above their respective CWS MCL values. PCE was detected in sample DPS-GW-06A, collected in September 2003, at a level of 3.0 µg/L and TCE was detected at a level of 0.20 µg/L (estimated). PCE and TCE were not detected at levels above their respective CWS MCL values.

PCE was also detected in four original groundwater samples submitted for VOC analysis. PCE was detected in sample DPS-GW-02 at a level of 5.1 µg/L, which exceeds the CWS MCL value of 5.0 µg/L. PCE in the remaining four groundwater samples was detected at levels below the CWS MCL value.

TCE was detected in groundwater samples DPS-GW-06A and DPS-GW-07. TCE in the groundwater samples submitted for VOC analysis was detected at levels below the CWS MCL value of 5.0 µg/L. Very few PCE degradation products were detected, presumably due to the relatively low concentrations of PCE found in groundwater samples.

Chloroform was detected in all five laboratory samples submitted for VOC analysis. Chloroform was not detected in groundwater samples at levels above the CWS MCL value of 6.0 µg/L

Methyl-tert-butyl-ether (MTBE) was detected in three of the five groundwater samples submitted for VOC analysis. MTBE was detected in groundwater sample DPS-GW-07 at a level of 6.6 µg/L, which exceeds the RBC value of 2.6 µg/L. MTBE in the remaining two groundwater samples submitted for VOC analysis was detected at levels below the RBC value.

Bromodichloromethane was detected in groundwater samples DPS-GW-02 and DPS-GW-09. Bromodichloromethane in the groundwater samples submitted for VOC analysis was detected at levels below the CGS value of 0.56 µg/L.

Laboratory groundwater VOCs results are presented in Table 8.

9.2.5 Pesticide/PCB Analytical Results

Alpha-BHC; gamma-BHC, aldrin; 4,4' DDE; 4,4' DDD; 4,4' DDT; and endosulfan sulfate found in several groundwater samples submitted for pesticide/PCB analysis were not detected at levels above their respective CGS values.

Levels of beta-BHC, endrin ketone, alpha-chlordane, and gamma-chlordane found in groundwater sample DPS-GW-07 slightly exceeded their respective background values. Levels of alpha-chlordane and gamma-chlordane found in groundwater sample DPS-GW-05 also slightly exceeded their respective background values. All of the pesticide/PCB analytical results found above background levels, except alpha-chlordane detected in DPS-GW-07, were qualified as estimated because they were lower than the laboratory reporting limit. There are no RBC or CGS benchmark values for these compounds.

Laboratory groundwater pesticide/PCB results are presented in Table 9.

9.2.6 Tentatively Identified Compounds

Tentatively identified compounds (TICs) were found in the SVOC and VOC groundwater samples. A total of 93 TICs were listed for the SVOC samples and a total of 4 TICs were listed for the VOC samples. The TICs were listed either with the suspected compound name or as an unknown compound with estimated concentrations. A detailed listing of the TICs for each sample is presented on the Form 1s contained in Appendix B.

9.2.7 Historical Data Comparison

Quarterly groundwater monitoring and product recovery at the DPS Bus Terminal site were conducted by Chen-Northern, Inc. and Maxim Technologies, Inc. for approximately seven years, beginning in November 1992 and ending in March 1999. This monitoring began following a leak of 6,000 gallons of unleaded gasoline (as well as smaller, undetermined quantities of diesel and motor oil) from former USTs near the fueling station and the subsequent product plume located on and migrating off-site toward the northeast.

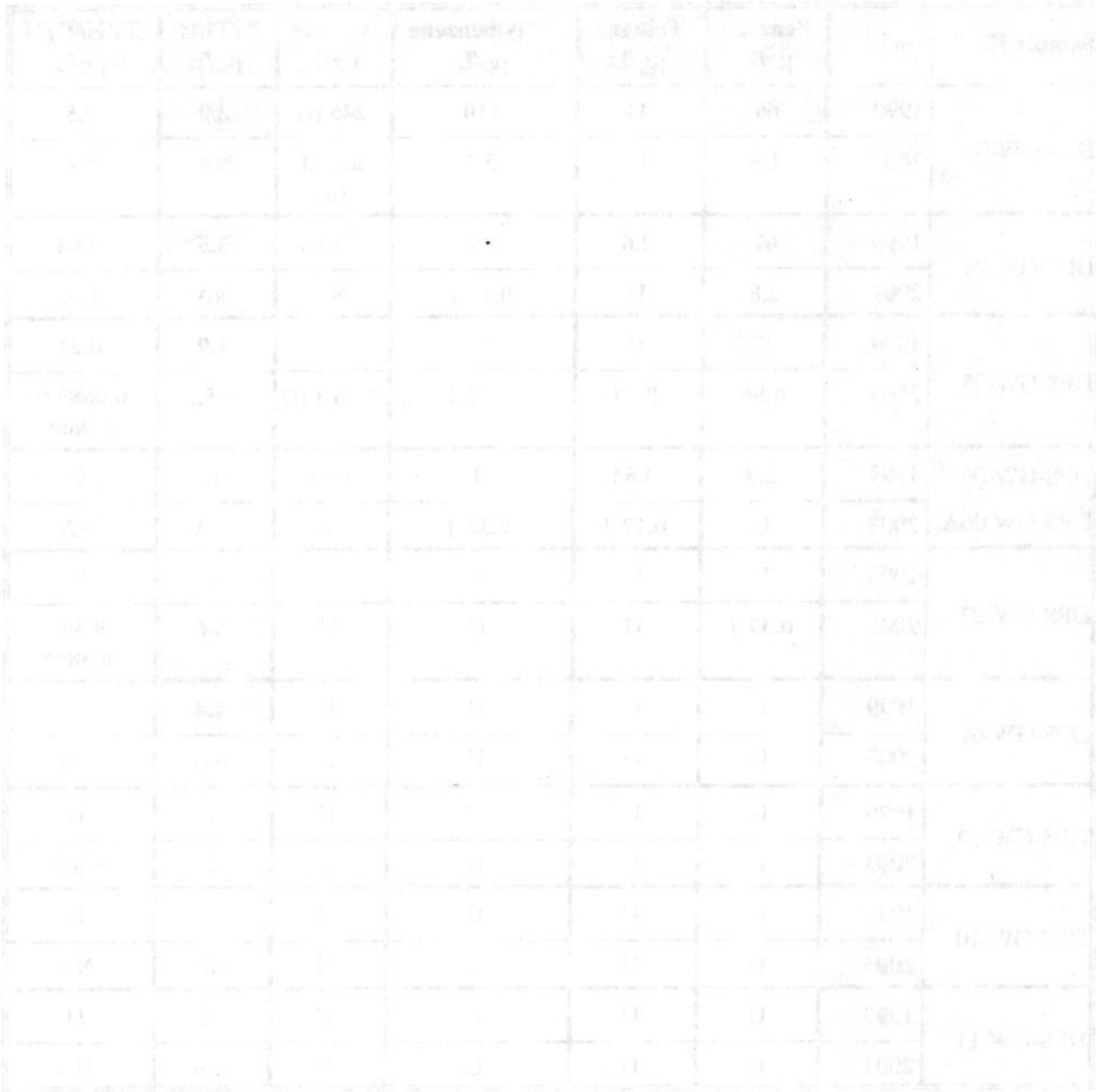
Maxim's final quarterly groundwater monitoring event (March 1999) sample results are compared to UOS's June 2003 sampling event sample results in the table below (Maxim 1999). For purposes of this comparison, monitoring wells and corresponding samples are called DPS-GW-01 through DPS-GW-11.

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
CWS MCL		5.0	1,000	700	10,000	-	-
Region III RBCs		0.34 C	750 N	1,300 N	210 N	2.6 C	NA
DPS-GW-01	1999	U	U	U	U	U	U
	2003	U	U	U	NA	NA	NA
DPS-GW-02	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.54***

Sample ID	Date	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L	MTBE µg/L	TPH/TVH µg/L
DPS-GW-03	1999	**69**	**44**	**110**	**245 (t)**	**2.9**	**2.5**
	2003	**1.8**	U	3.7	**0.22 J (o)**	NA	NA
DPS-GW-04	1999	**67**	**2.6**	**120**	**7.7 (t)**	**3.5**	**0.88**
	2003	**2.8**	U	**0.19 J**	NA	NA	NA
DPS-GW-05	1999	**22**	U	U	U	**1.9**	**0.21**
	2003	**0.56**	**0.18**	**0.35 J**	**0.48 J (t)**	**0.53**	**0.068*** 0.066***
DPS-GW-06	1999	**2.9**	**0.64**	**4**	**0.41**	U	U
DPS-GW-06A	2003	U	**0.17 J**	**0.36 J**	**1.0**	NA	NA
DPS-GW-07	1999	U	U	U	U	U	U
	2003	**0.39 J**	U	U	U	**6.6**	**0.39* 0.38****
DPS-GW-08	1999	U	U	U	U	**4.4**	U
	2003	U	U	U	U	NA	NA
DPS-GW-09	1999	U	U	U	U	U	U
	2003	U	U	U	U	U	**0.56***
DPS-GW-10	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA
DPS-GW-11	1999	U	U	U	U	U	U
	2003	U	U	U	U	NA	NA

t	Total Xylenes	***	TPH -GRO
o	o-Xylenes	TBD	To Be Determined in the September 2003 sampling event.
m,p	m,p-Xylenes	J	Estimated value.
TVH	Total Volatile Hydrocarbons	U	Not detected
TPH	Total Petroleum Hydrocarbons	NA	Not Analyzed.
*	TPH-MORO	µg/L	Micrograms per liter.
**	TPH-DRO	mg/kg	Milligrams per kilogram.
C	Carcinogenic	N	Non-carcinogenic

Detection above CWS MCL; if CWS does not exist, detection above Region III RBC benchmarks.



9.3 SHALLOW SUBSURFACE SOIL ANALYTICAL RESULTS

9.3.1 TPH-GRO, TPH-DRO, and TPH-MORO Analytical Results

TPH-MORO was detected in sample DPS-SS-03 in an amount of 5.1 mg/kg (estimated), which is greater than the DPS-SO-01 (background sample) value of 2.7 mg/kg (estimated). TPH-MORO was detected in sample DPS-SS-04 in an amount approximately equivalent to the concentration in sample DPS-SS-01. In four laboratory shallow subsurface soil samples, DPS-SS-05 through DPS-SS-08 (two collected adjacent to the fuel island and two collected adjacent to the bus wash), TPH-MORO was detected in amounts significantly higher than the background level of 2.7 mg/kg . In samples DPS-SS-05 through DPS-SS-08, TPH-DRO was detected in amounts higher than the background level. In sample DPS-SS-05, collected south of the fuel island, the highest amounts of TPH-MORO and TPH-DRO were detected at 7,700 mg/kg and 2,300 mg/kg, respectively.

Laboratory shallow subsurface soil TPH-GRO, TPH-DRO, and TPH-MORO analytical results are presented in Table 10.

9.3.2 SVOC Analytical Results

Samples DPS-SS-01, DPS-SS-02, DPS-SS-03, DPS-SS-04, DPS-SS-06 and DPS-SS-07 had no detections of SVOC analytes. Seven SVOCs were detected in sample DPS-SS-05; Phenanthrene was detected at a level of 0.51 mg/kg, which is above the background level. All other analytes detected were lower than their respective RBCs.

Laboratory shallow subsurface soil SVOC results are presented in Table 11.

9.3.3 VOC Analytical Results

Very low levels (none above the industrial RBC of 920,000 mg/kg) of acetone were detected in all eight shallow subsurface soil samples submitted for VOC analysis. Acetone is a common VOC lab contaminant and was also found in the method blank for this batch of samples.

Laboratory shallow subsurface soil VOC results are presented in Table 12.

9.4 SURFACE SOIL ANALYTICAL RESULTS

9.4.1 Arsenic and Lead Analytical Results

In samples DPS-SO-02 and DPS-SO-03 arsenic was detected at levels of 2.2 mg/kg and 3.7 mg/kg, respectively. These levels slightly exceeded the industrial RBC level of 1.9 mg/kg for arsenic. In samples DPS-SO-01, DPS-SO-02, and DPS-SO-03 lead was detected at levels of 25 mg/kg, 62 mg/kg, and 47 mg/kg, respectively. These values were significantly lower than the cleanup levels established for the Vasquez Boulevard & I-70 Superfund project in Denver, Colorado, of 70 mg/kg for arsenic and 400 mg/kg for lead (UOS 2003).

Laboratory surface soil arsenic and lead results are presented in Table 13.

9.5 LANDFILL CHARACTERIZATION SAMPLES RESULTS

Geotechnical laboratory landfill characterization sample results for density, percent moisture, grain size, and Atterberg Limits are presented in Table 14.

10.0 RISK EVALUATION LIMITATIONS

Uncertainties and limitations are inherent in the process of evaluating risk. The level of certainty associated with the conclusions of an evaluation of risk is conditional upon the quality of data and models used to identify chemicals and estimate concentrations, the assumptions made in estimating exposure conditions, and the methods used to develop toxicity factors. Uncertainties in the process could result in an overestimation or underestimation of risk. However, it is standard in risk assessment (per EPA guidance) to require conservative (health protective) assumptions when uncertainty about a particular factor in quantifying risk exists, so as not to underestimate potential risk. Therefore, the risk assessment process is generally skewed toward overestimating rather then underestimating risk. Potential sources of uncertainty related to this specific site include the following:

- Laboratory minimum analytical detection limits, required by the EPA Contract Laboratory Program (CLP) contract, exceeded RBC standards for some chemicals. A non-detect result in a sample therefore does not necessarily ensure that the chemical is absent.

- A grid system was used to determine soil gas sample locations within the landfill. This system is useful in discovering "hotspots" when historical data are unavailable to indicate discrete areas of contamination, but does not ensure that hotspots will not be missed. Judgmental, biased sampling was used to determine shallow subsurface soil sample locations, based on areas of potential high risk of contamination near the maintenance, fueling, and bus wash facilities. Biased sampling was used to determine surface soil sample locations, based on limited surface soil areas (i.e. areas that are not paved or concrete) at the DPS Bus Terminal. These methods are useful in discovering limited areas of contamination, but do not ensure that similar contamination does not exist throughout the remainder of the site. Biased sampling was used to obtain landfill characterization samples, based on the historical landfill characterization locations.

- Laboratory QA/QC issues related to analytical data may have biased some concentrations either high or low.

- Comparison of site data to RBCs does not take into account the possibility that the cumulative risk of multiple contaminants, each present in groundwater, soil, or air at concentrations less than their respective RBCs, could still pose an unacceptable risk.

- The RBCs address risk in each environmental medium (water, soil, and air) separately, while an individual may be exposed by more than one pathway.

- The RBCs do not address dermal risk associated with contaminants.

- The RBCs used for comparison at this site are based on conservative, standard assumptions about exposures that may not reflect the actual exposures at the site that may be less intense. RBCs for groundwater are based on drinking water although groundwater in the area is not be used for drinking water. The RBCs for soil gas are based on ambient air. The concentrations detected in soil gas are representative of concentrations accumulating in soil over time. At the time of sampling, these levels did not represent outdoor ambient air concentrations. Soil gas concentrations may or may not accurately represent levels that would accumulate in buildings or levels to which workers who disturb the soil would be exposed. The RBCs for soil are based on industrial levels that result

from the current facility operations and most of the surrounding land use. Should residential housing our a school be constructed on the property, more conservative benchmarks should potentially be considered.

- The RBCs do not address risk to ecological receptors (e.g., contaminated groundwater interacting with surface water).

- RBCs were unavailable for five of the VOCs that were detected in soil gas samples. RBCs were not available for eight pesticides/PCBs or TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in groundwater. RBCs were unavailable for lead detected in surface soils and for one SVOC analyte and TPH-DRO, TPH-GRO, and TPH-MORO compounds detected in shallow subsurface soils. Although some of these compounds are not toxic except at extremely high concentrations, the lack of standards for these chemicals may contribute to an underestimation of potential hazard/risk, the magnitude of which depends on the concentrations and toxicity of the chemicals. The five chemicals detected in soil gas for which there are no RBCs are methane, freon 12, freon 114, freon, cyclohexane, heptane, and 4-ethyltoluene. The eight pesticides/PCBs detected in groundwater for which there are no RBCs are alpha-BHC; beta-BHC; gamma-BHC (lindane); 4,4' DDE; endrin ketone; alpha-chlordane; gamma-chlordane, and endosulfan sulfate. The one SVOC analyte detected in shallow subsurface soil for which there is no RBC is phenanthrene.

11.0 SUMMARY

DPS has requested assistance from the EPA with characterizing environmental conditions at the DPS Bus Terminal and maintenance faciluiity.

A TBA was conducted by START2 at the DPS Bus Terminal in Denver, Colorado. Field activities were conducted from June 16 through19, 2003. Sampling activities included the collection of nineteen field screening soil gas samples, six laboratory confirmation soil gas samples, three surface soil laboratory samples, eight shallow subsurface soil laboratory samples, eleven groundwater laboratory samples, and landfill characterization samples taken from five boreholes to be analyzed for geotechnical parameters. Field QA/QC samples included three trip blanks, one duplicate groundwater sample, and one rinsate blank. One groundwater MS/MSD sample and one soil MS/MSD sample were collected for laboratory QA/QC purposes.

High detections of methane and VOCs in soil gas resulting from landfill material decomposition were found in samples collected throughout the site. Sample DPS-SG-06, collected from the center of the site, had the highest detection of methane in the six laboratory confirmation samples submitted for analysis. DPS-SG-06 also had the highest number of detections and concentrations of VOCs in soil gas. Samples DPS-SG-03 and DPS-SG-04, collected south and north of the fuel island, respectively, also had detections of VOCs during the June 2003 sampling event.

Groundwater was analyzed for chromium in four monitoring wells in order to determine whether the nearby ACME Precision Industries CORRACTS facility could be considered a potential source of contamination at the site. Three of the four TRC results exceeded or equaled the CWS MCL value. Based on the detections of TRC in samples collected at the site, it is possible that the groundwater at the DPS Bus Terminal has been affected by chromium migrating from the ACME Precision Industries facility.

Benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and phenanthrene were detected in sample DPS-GW-07 at levels above their CGS or background values.

None of the detections of benzene in groundwater samples submitted for analysis were detected at levels above the CWS MCL value of 5.0 µg/L.

Chloroform was detected at levels below the CWS MCL in samples from all monitoring wells sampled for VOCs.

The highest concentration of PCE was detected in sample DPS-GW-02, collected in the southeast corner of the site (upgradient, background sample), at a level of 5.1mg/L which exceeds the CWS MCL of 5.0 mg/L. In the remaining four groundwater samples submitted for VOC analysis, PCE was detected at levels below the CWS MCL value. These remaining four wells are located downgradient from DPS-GW-02. The source of this PCE contamination is currently unknown.

In September 2003, sample DPS-GW-06A was collected from the monitoring well from which groundwater sample DPS-GW-06 and duplicate sample DPS-GW-60 were collected. The sample DPS-GW-06A analytical results more closely matched analytical results of sample DPS-GW-60, the duplicate sample of DPS-GW-06 collected in June 2003. Significantly lower concentrations of benzene, toluene, ethylbenzene and xylenes were detected in DPS-GW-60 and DPS-GW-06A compared to concentrations detected in sample DPS-GW-06. The lower levels of VOCs found in DPS-GW-60 and DPS-GW-06A more closely resemble the analytical results from the final quarterly groundwater monitoring event of March 1999, and therefore the analytical results from sample DPS-GW-06A (obtained from the September 2003 sampling event) were used in Figure 5.

TPH-MORO and TPH-DRO were detected at levels of 7,700 mg/kg and 2,300 mg/kg, respectively, in sample DPS-SS-05, collected directly south of the fuel island. TPH-MORO was also detected at levels significantly above background in samples collected from the north and south sides of the bus wash and from the sample collected north of the fuel island.

Arsenic was found in all three surface soil samples (collected from the northeast, northwest, and southeast corners of the site) at levels approximately three to nine times greater than the residential RBC. Lead was found in surface soil samples collected in the northeast and northwest corners of the site at levels above the DPS-SO-01 background level. None of the arsenic or lead levels exceeded the cleanup criteria of 70 and 400 ppm respectively, used for the Vasquez Boulevard and I-70 Superfund project in Denver, Colorado.

12.0 RECOMMENDATIONS

A geophysical survey is recommended should further structural redevelopment occur at the DPS Bus Terminal.

A gas control and vent system should be installed at the DPS Bus Terminal in order to minimize landfill gas exposure.

The USTs at the DPS Bus Terminal should be removed prior to catastrophic failure from settling and decomposition of landfill material beneath the site.

Groundwater from the surficial aquifer should not be used without sufficient testing.

Cleanup of shallow subsurface soil near the fuel island and bus wash should be considered.

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CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

RV Storage - Arvada - 6800 Kilmer Street

Steve Snyder <[redacted] Fri, Mar 18, 2022 at 10:46 AM
To: [redacted]
Cc: Jeremiah Bebo <JBebo@arvada.org>, Sharon McCarthy <[redacted]

Hi Kristin -

My name is Steve Snyder and I live at [redacted] in Forest Springs. My house is in direct view of most of the property at 6800 Kilmer Street.

Thank you for hosting the public meeting on Wednesday night. I attended though I did not sign the sign-in sheet. I was hoping you could address some questions and comments I have concerning the proposed development -

1. I'd like to echo the comment my neighbor made at the meeting regarding the simulated views of the RV lot and perimeter wall. It appears one of those photos was taken from the trail below my house. I understand the purpose was to depict the view of trail users but the simulated photos do not accurately represent the view from several Forest Springs homes including mine. As the elevation of my home is several feet above the trail, I would see much more of the RV lot, vehicles, and lighting from my main bedroom, office, and deck windows, which total approximately 56 square feet of glass.
2. It is difficult for me to assess the impact of the lighting from my house based on the photometric exhibit included in the 2nd submittal. I appreciate the developer reducing the light pole height and light intensity, and using warmer lights; however, based on the submittal drawings I would view several light poles from my house. Will the developer be providing a photometric simulation as requested by the City? I would appreciate receiving more information concerning the lighting in order for me to assess its impact to my and my neighbors' homes.
3. How far will the perimeter fence be set back from the canal maintenance road? It appears from the drawings that all or some of the road is located within Chelton's property and the developer is using the road to satisfy the City's setback requirement. Please also let me know the typical width of the landscaping outside of the perimeter wall.
4. I continue to have concerns with the risk of methane explosions resulting from the development. As you know, prior soil testing at more than one test well revealed methane concentrations exceeding 10% of the lower explosive level for methane. Although this constitutes a recognized environmental condition, the December 2021 limited site investigation only addressed methane with regard to the building on the east side of the property and the detention pond. Additional methane testing was not conducted for the rest of the property. I understand the developer will rest on the VCP it seeks from CDPHE. Regardless, my lot is about 200' from Chelton's property - what assurances can be given that a methane explosion will not damage my house or endanger lives?
5. I would ask that the developer consider motion-detection lights rather than reduced lighting that stays on throughout the night. As mentioned at the meeting, such lighting is recommended by the International Dark-Sky Association. The owner and developer may not be aware of the rich diversity of birds and wildlife in the area. From my property alone, I have observed 78 species of birds. Many raptors and other birds nest in the trees and shrubs adjoining Chelton's property and hunt prey in the field. Currently, a great horned owl is nesting directly north of the field and along the creek.
6. I would like to learn more about the possible plan revision to include self-storage buildings along the south and west perimeter. Could you please provide more information, including:

    a. What will be stored in the buildings?
    b. Besides storage, will there be other activities within the buildings?
    c. What would be the buildings' outward-facing material? You mentioned perhaps a brick veneer, which sounds like a good option.
    d. Would lights be placed on the building that would cast light visible to neighbors?
    e. Could you please provide a schematic of the buildings?

Thank you very much for taking the time to address my questions and comments. I would be happy to discuss them further.

Steve

December 28, 2021

(**Updated January 5, 2022**)

Mr. Jeremiah Bebo, Planner II
Community and Economic Development
City of Arvada
8101 Ralston Road
Arvada, CO 80002
Via Email: JBebo@Arvada.org

RE: 6800 Kilmer Street – RV Storage Lot – Development Application No. DA2021-0146

Dear Mr. Bebo:

I am submitting these comments to the above-referenced Application on behalf of my fellow residents of Forest Springs Subdivision whose names are listed below. Forest Springs is in close proximity to the western and southern boundary of the development parcel, separated by only the Croke Canal. The comments are a group effort and reflect our significant concerns with the proposed development.

Thank you for your consideration, and please let me know if we can provide any further information or if you have questions we can address.

Sincerely,

Steven L. Snyder
[redacted]
Forest Springs Subdivision
[redacted]

copy:
David Jones, Mayor Pro-Tem and Councilmember, District 4, djones@arvada.org
Randy Moorman, Councilmember, District 1, rmoorman@arvada.org
Lauren Simpson, Councilmember, District 2, lsimpson@arvada.org
John Marriott, Councilmember, District 3, jmarriott@arvada.org
Lisa Smith, Councilmember At-Large, lsmith@arvada.org
Bob Fifer, Councilmember At-Large, bfifer@arvada.org
Kristin Dean, Senior Associate – Planner, Norris Design

BACKGROUND

1. **RV Lot Development**. Application No. DA2021-0146 is for the development of 14 acres at 6800 Kilmer Street for an RV storage lot with 556 RV spaces. The applicant proposes a six-foot-tall perimeter fence and 17 35-foot-tall light poles to illuminate the entire lot. The application is only subject to administrative review without any public review by the Arvada City Council unless the Community and Economic Development Director determines the application does not comply with the requirements of the Arvada Land Development Code (Code).

2. **Forest Springs Subdivision**. Several residential lots in the Subdivision back up to the Croke Canal. In many instances, the lots are no more than 100 feet from the boundary of the development site. Several residents have decks and bedroom and living room windows in direct view of the site. Residents and hundreds of visitors each day enjoy walking the Arvada trails along the Canal and the Ralston Creek trail, which adjoins the north boundary of the proposed development.

3. **Arvada Land Development Code**. The proposed development is subject to the terms of the Code. The stated purpose of the Code is, in part, to promote "the public health, safety, convenience, comfort, prosperity, and general welfare;" protect "the quality and character of stable residential developments;" and provide "***protection from nuisances and hazards***." As stated in Division 1-1-2. of the Code, the "provisions of this Code shall be considered the ***minimum requirements*** necessary for the promotion of the public health, safety, convenience, comfort, prosperity, and general welfare." (Emphasis added in both instances.)

FOREST SPRINGS RESIDENTS' QUESTIONS

1. A large methane plume resulting from a buried landfill lies beneath the site. It is our understanding that digging is not permitted due to the methane risk. In that case, how can fencing, 35-foot-tall light poles, other improvements, and RVs that can weigh in excess of 10,000 pounds be safely installed or placed on the site?
2. What is the maximum height and weight of RVs that could be stored at the site?
3. Assuming a low average weight of 5,000 pounds per RV and with 556 RV spaces, 2,780,000 pounds of RVs could be placed on site. How is this safe?
4. What would be the hours of operation of the RV lot?
5. Will the RV lot be available to patrons 24 hours a day?
6. What steps will be in place to ensure that dust from the site will be mitigated?
7. Will the applicant be using any additives in the gravel to ensure that dust does not become an issue?
8. Will the lot owner be responsible for maintaining the perimeter, including removing graffiti?
9. How will maintenance obligations be enforced?
10. How will trees and other landscaping be watered to ensure they reach full maturity?
11. What type of security will be in place for the RV lot and how will it protect local residents?
12. What protocols will be in place to ensure RV owners do not "live" in their RVs or that the lot doesn't become a homeless encampment?
13. Will the RV lot management allow RVs to run during maintenance or cleaning?

14. Quantitatively, how much light will leave the site and be visible from Subdivision property?
15. Will the lights be completely turned off after hours?
16. What is the proposed material for the fence?
17. What steps will be in place to ensure the development does not cause erosion resulting in the discharge of materials from the old dump into Ralston Creek?

FOREST SPRINGS RESIDENTS' CONCERNS AND REQUESTS

Many residents of Forest Springs subdivision have significant concerns with the RV lot application. In our view, the proposed development does not meet the intent and purpose of the Code. Given its close proximity to Forest Springs, resulting visual impacts, light pollution, noise, air pollution, security risks, and privacy concerns associated with the RV lot will create "nuisances and hazards" for many subdivision residents and trail visitors. The proposed development does not protect the "quality and character" of Forest Springs residents; rather, it would unreasonably interfere with the use and enjoyment of our properties. In fact, the development as proposed will likely significantly diminish the property values of several residents' properties, perhaps by as much as $100,000 per lot. Therefore, the residents listed below have the following requests concerning the application.

1. Lighting. The proposed 17 light poles are 35 feet high and would provide a total 9,657 watts or 1,227,077 lumens of light. Instead, we request that the RV lot remain unlit to eliminate light pollution and the environmental risks caused by placing improvements onsite. If lighting is allowed, we request that:

    a. Light poles not exceed 20 feet in height.
    b. The number of light poles be reduced to 8.
    c. The amount of light pollution leaving the RV lot be significantly reduced by also using lower wattage, angling light away from adjoining properties, and using state of the art lighting that minimizes light pollution. The proposed lighting may be suitable for industrial uses but not when such uses are close to residential developments.
    d. The lights be completely turned off one hour after sunset.

2. Perimeter Buffer.

    a. We ask that the perimeter bufferyard be a minimum 12 feet tall and composed of a solid material to minimize the RV lot's visual impact and to address neighborhood privacy concerns. A bufferyard of this height supports the purpose of Article 4-6 (Landscape and Buffering) of the Code, which encourages the preservation and protection of the character of the City by "**Buffering uses that tend to create disproportionate impacts on adjacent properties in terms of noise, dust, lighting, and other factors** that may be mitigated using landscaping, fencing, berms, distance, and/or divisional walls." Code Section 4.6.1.1.B.2. (Emphasis added.)
    b. In order to better separate the RV lot from the residents' properties, the required landscaping be placed on the outside of the bufferyard.
    c. In addition to a 25-foot setback, the perimeter landscape buffer be increased to 25 feet.
    d. The landscaping plan should double the number of trees and the minimum diameter of the trees planted should be 6 inches.

3. Noise and Air Pollution. In order to minimize dust, engine exhaust fumes, and noise from engines, traffic, RV alarms, and other sources, we request that:

    a. Hours of operation be limited to dawn to dusk with no lighting on site.
    b. RV owners cannot access the lot after hours.
    c. The use of RV security and backup alarms not be permitted or be significantly restricted.
    d. RVs not be allowed to idle for extended periods.

FOREST SPRINGS RESIDENTS SUPPORTING THESE COMMENTS:

Larry Fike
Karen Helm
Robert Smith
Darlene Evans
Dorian and Laurie Ross
George and Holly Golen
Linda and Brady Stone
Wanda Kitterman
Sharon McCarthy
Patti Joseph
Ariane Meyer
Jo and Rich Stewart
Jonathan and Amy Haas
Bob Connolly
Barb Hohenegger
Gerry Spann
Elaine Fitzgerald
Jack and Kelly Weil
Jeff and Colleen Mason
Ellen Bothner
Cynde and Rick Simms
Ted and Rita Sysling
Linda and Mark Graham
Rick and Chris Moody
Barb DeCet
Scott and Sandi Michaels
Robin and Bill Fawcett
Diana and Kevin Craig
Barb Lutz
Pat Salazar
Joe and Debbie Burke
Liz Bublitz
Ryan Oglesby
Amanda Snyder
Ruth Breckon
Frank Giardino
Joyce and Jim Cullen
Scott Oppenheimer
Cecilia and Dale Hartsock
Rosemary Dickson
Mary and Bob Jaeger
Brian and Patti Glover
Nancy Weller
Mike and Marty Flanigan
Steve Snyder

January 5, 2022 Update – Additional Forest Springs residents supporting these comments:

Edwin and Margaret Johnson
Tom and Linda Parisi
Mel Gyurko
Jim Buckner
Fran Jones
Donna Johnson
Barbara and Larry Wapensky
Aileen Laubhan
Rosalie Spicola
Tim and Patricia Lester
Dale and Evelyn Hunzelman
Harry and Shirley Plummer
Sherri Lombardi
Lillian Hudson & Tom Lanigan
Carol Soucie
Nancy O'Brine
Richard Remington
Al Taylor
Rick Hubina
David and Stacey Thompson
Ed Kline
Sherry Howerton
David Cutler & Chong Rector
Eleanor and Judy Graham
Terry and Judy Havens
Joannie Flynn
Mary Bolig
Nancy Koepsel
Salley Smith
David and Sheila Rhodes
Val Jones
Pat Eilts
David and Joyce Spiegler
David and Debra Thyfault

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Golden RV Storage

vivian sylvest <[redacted]> Sun, Dec 26, 2021 at 12:14 PM
To: "JBEBO@ARVADA.org" <JBEBO@arvada.org>

Dear Jeremiah-

My husband and I are residents of Westwood Mesa and have been since its development. I am writing in regards to the plans for the Golden RV Storage. I understand that the land is zoned for these types of businesses. However, since they are so close to the nature that Ralston Creek Train provides I feel their design needs to be considered.

RV storage can be a sensitive topic, as many consider them eye-sores. So, having these businesses I understand are important. We are sad to lose this land for walking the path around, many do with and without their dogs. The geese gather there as well as owls, hawks, and coyotes, making it appear as a natural habitat. If we must lose this, my hope is the City of Arvada will require the design of Golden RV Storage to conceal the storage. Many of these storage places have chain link fences, which can take away from the visual appeal.

A brick or wood fence that reaches high enough to conceal the RVs and other storage facilities will allow the Ralston Creek Trail to continue to offer the feel of nature. Please consider what residents of Arvada will have to view. This land not only backs up to the Ralston Creek Trail, but homes on three sides will overlook this.

Ultimately, I am against this business coming in. However, I am realistic in what the City wants and gains from this land being utilized by a business. I wish it would become a park or a business that patrons could access from the trail, such as the Taphouse going in across the creek.

Should the development of this be reviewed and we are able to attend and voice our opinions, please let me know when that will take place.

Thank you,

Vivian Sylvest & Tom Butler
[redacted]
Arvada, CO 80007

CED Boards and Commission <cedboardsandcommission@arvada.org>

6800 Kilmer St--Load Bearing Capacity

Sharon McCarthy <[redacted]> Thu, Sep 5, 2024 at 12:14 PM
To: Lauren Simpson <[redacted]>, [redacted], Sharon Davis <[redacted]>, Lisa Feret <[redacted]>, Bob Fifer <[redacted]>

Members of City Council and Planning Commission:

My name is Sharon McCarthy and I live at 6688 Kendrick Drive 80007

Purpose:
To introduce the subject of "load bearing capacity" as applicable to tons of RV's stored on closed, unregulated landfill (defined as a dump).

Introduction:
Modern landfills have come a long way in the last few decades, due to updated regulations and **better understanding** of the science. **Modern landfills are well-engineered and managed** facilities for the disposal of solid waste. Landfills are located, designed, operated and monitored to ensure compliance with federal regulations. They are also designed to **protect the environment from contaminants**, which may be present in the waste stream. Landfills **cannot be built in environmentally-sensitive areas,** and they are **placed using on-site environmental monitoring systems**. These monitoring systems check for any sign of groundwater contamination and for landfill gas, as well as provide additional safeguards. Today's landfills must meet stringent design, operation and closure requirements established under the Resource Conservation and Recovery Act (RCRA). https://www.epa.gov/landfills/basic-information-about-landfills

Challenge:

- "…contamination which predates the RCRA (1976 Resources Conservation and Recovery Act) statute would not be subject to RCRA authority." https://cdphe.colorado.gov/hm/environ-cleanup-guidance-policy
    - Do we assume that landfills closed prior to RCRA do not have the same concerns prompting federal legislation or that we can ignore them and hope they go away?
    - Was a line drawn in the sand to designate a start point for regulation?
    - Can this line be crossed for scientific considerations?

- language in the description of modern landfills questioning current decisions about the pre-regulated 6800 Kilmer St area:
    - Better understanding of the science
    - Managed facilities for the disposal of solid waste
    - Protect the environment from contaminants
    - Cannot be built in environmentally-sensitive areas
    - Placed using on-site environmental monitoring systems

- The applicant's Terracon Geotechnical Report August 2023 suggests:

    - "Landfill debris can degrade and/or decompose over time, consolidate with fluctuation or infiltration of water, or collapse unpredictably, resulting in a very high risk of movement. Because of the high risk of significant movement, it is our opinion that **unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction**. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project."

    - The report elaborates, "however, it has been our experience that flatwork constructed on unimproved landfill debris will move significantly and will likely require frequent observation and maintenance, in addition to full replacement multiple times over the life of the development.....Because of the high risk of significant movement, it is our opinion that unimproved existing fill and landfill debris should not be used to support foundations or slab-on-grade construction. Due to the depths of the fill and debris, complete removal of the fill and landfill debris may be cost-prohibitive for the project.....**Long-term movement from the landfill debris cannot be quantified due to the nature of the debris, and reduction or elimination of this type of movement is likely only possible through complete removal of the fill and debris**. **It is our opinion that movement on the order of 2 feet or more is possible.**" (Emphasis added) (see attachment *Three Examples*….)

Research and Discussion:

- "In geotechnical engineering, **bearing capacity** is the capacity of soil to support the loads applied to the ground. The bearing capacity of soil is the maximum average contact pressure between the foundation and the soil which should not produce shear failure in the soil. *Ultimate bearing capacity* is the theoretical maximum pressure which can be supported without failure; *allowable bearing capacity* is the ultimate bearing capacity divided by a factor of safety. Sometimes, on soft soil sites, large settlements may occur under loaded foundations without actual shear failure occurring; in such cases, the allowable bearing capacity is based on the maximum allowable settlement. The allowable bearing pressure is the maximum pressure that can be applied to the soil without causing failure. The ultimate bearing capacity, on the other hand, is the maximum pressure that can be applied to the soil before it fails.

  There are three modes of failure that limit bearing capacity: general shear failure, local shear failure, and punching shear failure. It depends upon the shear strength of soil as well as shape, size, depth and type of foundation." https://en.wikipedia.org/wiki/Bearing_capacity

- "....old construction debris that has been *previously compacted* will not experience significant settlement because of low biochemical degradation;..... a thin cap over a relatively new landfill cell containing *unconsolidated municipal waste*, which would see short- and long-term settlement, may be at a much higher risk of damage, and any new construction may therefore be subject to a much lower allowable bearing capacity requirement." https://geosyntheticsmagazine.com/2022/03/03/geocells-for-redevelopment-on-closed-landfills/

- "Many possibilities exist for post-closure landfill development. The large, open tract of land is amenable to many end-uses, the most popular of which include recreation, solar farms, and landfill gas usage. ,,,,,*However, all landfill sites are unique in some way and will require judgement by engineers, governing bodies, and the public."* https://www.geoengineer.org/education/web-class-projects/cee-549-geoenvironmental-engineering-fall-2017/assignments/end-uses-of-landfills

- "The *stability of waste dumps is a long-term research topic of slope engineering.* Therefore, considering the bearing capacity of the waste dump foundation, the angle and limit of the height of the waste dump slope are calculated, which provides a basis for the stability analysis of the waste dump foundation (Cho et al., 2014; Chen H et al., 2021). **The traditional analysis methods mainly focus on the stability evaluation of waste dump (Huang F M et al., 2021), and less consideration is given to the bearing capacity of the waste dump base**.

On the premise of considering the base lithology and rock thickness, the base stability of the waste dump is guaranteed, and the optimal waste angle and height of the waste dump are calculated. The *bearing capacity of the weak foundation of the waste dump will change significantly under the action of pressure, water, and time for a long time, which is very important to the stability of the waste dump and needs further research in the future* (Li X S et al., 2021). This study applies to the calculation of bearing capacity of the weak foundation of the waste dump, provides technical support for the stability evaluation of waste dump, has good application value, and will achieve good engineering results in the application of open-pit waste dump.

In this study, a calculation method of bearing capacity of waste dump base based on the improved Prandtl formula is proposed. The *ultimate bearing capacity of the base is defined as the ultimate dumping height corresponding to a specific slope angle, and the influence laws of different base lithology and base thickness on the maximum bearing capacity of the base of the waste dump are analyzed.* The rationality and reliability of the calculation method of foundation bearing capacity of waste dump proposed in this paper are verified through an engineering example." Bearing Capacity Calculation of Soft Foundation of Waste Dumps—A Case of Open-Pit Mine

Finally…..

I learned that there are many fields of engineering involved in solving everyday environmental concerns. In researching load bearing capacities, I learned this particular field of engineering is complex and worldwide. There are many formulas, diagrams, theories, pictures, and a language that I can't read much less attempt to understand!

But what I did comprehend, there is much to learn and each landfill is different. In fact, sections of an unregulated landfill can have different properties and challenges. I learned that it's not only what went into the closed unregulated landfill, but how the form, slope, soil composition, rock, and environment of the structure of the landfill contribute to "containment". I learned that the name itself "unregulated" tells the story. Research about unregulated landfills is like the layers of an onion that you peel away---and cry!

The 6800 Kilmer St landfill was "born" in the 1930's and continued use until the 1970's. Exact dates were not available for verification. Landfills were designed at the time for land "far away" from residential developments. Ecosystems and suburbs were unknown terms. There were no rules for landfills, hence the definition of a "dump....the systematic burial of waste with daily, intermediate and final covers only began in the 1940s. In the past, waste was simply left in piles or thrown into pits." https://en.wikipedia.org/wiki/Landfill

Fast forward to the present. Residential communities encroach old landfills which resemble open space. Engineering fields involve the study of soils, rocks, dump pit slope, ground water, etc. Textbooks are based on research. Even with data and studies, we know that unregulated landfills with unstable subsurfaces, no knowledge of the soils, and design of the substructure are like an ongoing science experiment. We have solid reports from Terracon Consultants of site investigation of the landfill and adjacent Ralston Creek area. We have tons of research.

Do we want to test the load bearing capacity of tons of RVs stored on an unknown infrastructure and risk a challenge to the ecosystem of the Ralston Creek area?

Respectfully,

Sharon McCarthy

Three Geotechnical Reports.pdf
89K

All Public

Comments Received up to September 12, 2024, at 12pm

Good Evening – I am Karen Gerbatsch living at 6872 Juniper Ct. and represent the Friends of Ralston Creek Neighborhoods.

The Arvada Planning Department has scheduled a Planning Commission public hearing on 9/17/24 for the 6800 Kilmer RV Storage project, to consider a major comprehensive plan amendment from mixed use – residential to industrial office in order to correctly align with the current zoning of IL (Industrial Light).

We believe the Comp Plan should not be amended because the current classification is consistent with the Geos neighborhood classification to the immediate north and is also compatible with the surrounding residential and recreational uses in the adjacent Forest Springs neighborhood. Given the unique location of this site immediately adjacent and with direct access to the Ralston Creek and Trail, this is an ideal location for a mixed-use development, similar to Geos, that can support residential growth and small-scale commercial uses along this critical pedestrian and cycling corridor. This classification is also a reasonable approach to stepping down the more intensive uses to the east, including an existing light industrial warehouse and several quasi-municipal service buildings.

Rather than changing the Comp Plan to match the zoning for this site, the City should look to rezone the property to match the "Mixed-Use: Residential Emphasis" classification under the current version of the Comp Plan. The industrial light zoning of this parcel in the LDC is inappropriate due to the adjacent and surrounding uses and the additional, incompatible strain that industrial development of this site would obviously place on the Ralston Creek. And industrial light zoning only allows outdoor storage to support the primary industrial light business, not be the primary business.

Also, there is no reason to amend the Comp Plan for a single parcel just to facilitate one property owner's (still incomplete) land use proposal. Given the unique challenges of this site, we dispute that it could ever be safely developed without full remediation, and to date, this landowner has not been willing to spend the money that is needed to do that. And if they are not willing to ensure that any development will be safe for surrounding residents, then the City should not allow the developer to move forward with this proposal. This is yet another reason why the Planning Commission can and should deny this request.

Recently, the Jeffco Planning Commission reviewed a rezoning for expansion request by Gerdes Storage, off Indiana near Candelas. The request was denied with the Chairperson stating: "when I look at the Candelas Neighborhood, I can't see the compatibility. A compatible zip code maybe, but, RV storage doesn't meet the expectations of the county or the city of Arvada. And the land use decisions run with the land, not the owner. So, we have to look at what serves the public interest of the entire northwest Arvada neighborhood." (Project Report attached – 23-108064RZ)

We will ask the Arvada Planning Commission to look at what serves the public interest of the entire southwest Arvada neighborhood as well and deny this request.

1. REQUEST FOR CONTINUANCE

This is an application to rezone the subject property from the Agricultural – Two (A-2) zone district to a Planned Development (PD) zone district to allow for outdoor storage of recreational vehicles, campers, boats, trailers, and one single family residence.

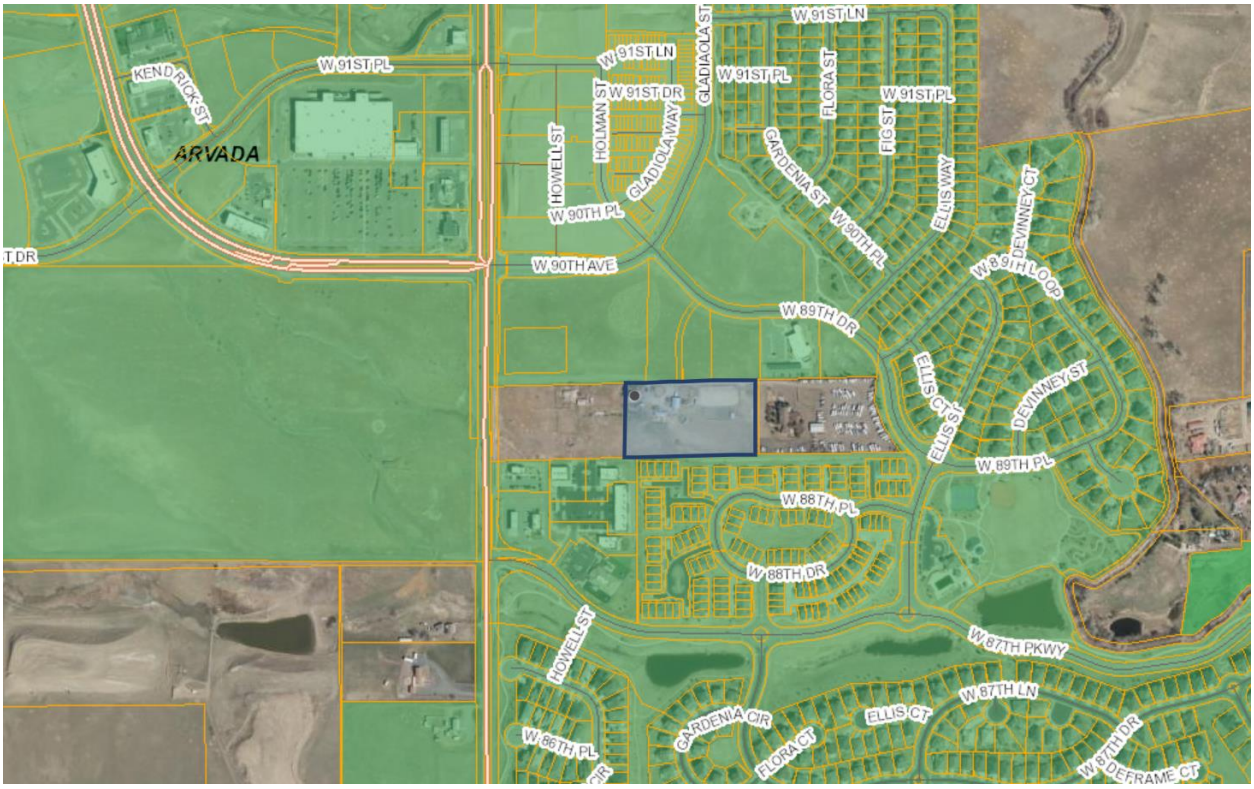
The applicant seeks a continuance of the hearing on the merits of this application from March 26, 2024 to April 30, 2024. On March 18, 2024, the applicant requested this continuance to a date certain to "seek clarity on services from Arvada Utilities." Staff is not opposed to the applicant's request for a continuance. However, the need for the continuance is not clear to staff. Because the property is within the unincorporated County boundary, it is staff's understanding that the City of Arvada would not provide utility services to the site. During the Planning Commission hearing on February 27, 2024, the Planning Commissioners contemplated whether a continuance would be warranted to give the applicant additional time to address the rezoning criteria with additional requirements, focused on the mitigation of negative impacts to the surrounding area, in the proposed Official Development Plan. Ultimately, the Planning Commission voted (4 to 3) to recommend denial of the application to the Board of County Commissioners. The Planning Commission discussed a fundamental issue with the compatibility of the proposed land use to the surrounding area as a reason for recommending denial.

2. REQUEST FOR REZONING

The remainder of this staff report analyzes the rezoning application, pursuant to the Zoning Resolution, based on the information available to staff at the time the staff report was written. The remainder of the staff report will inform the Board's decision on the request for rezoning, should the case be heard on March 26, 2024 and not continued to April 30, 2024.

The applicant is requesting to create a new Planned Development, the Gerdes Storage II Official Development Plan (ODP), to create two use areas: one that would allow the existing single-family dwelling use, and the second would allow for the use of outdoor storage of recreational vehicles, campers, boats, trailers, and other small recreational vehicles. The ODP would allow increased fencing heights, reduced setbacks for structures and outdoor storage, and reduced landscape standards.

As discussed herein, staff has outstanding concerns with the rezoning request.



3. CONTEXT

The subject property is in north central Jefferson County on the east side of Indiana Street, southeast of the intersection of Candelas Parkway/W 90th Avenue and Indiana Street. The lots to the south are developed with townhomes in a Planned Unit Development (PUD) zone district, and mixed-use commercial in a Mixed-Use Suburban (MX-S) zone district, both within the City of Arvada. The lots to the north are vacant and are zoned PUD and MX-S, within the City of Arvada. The lot to the west is zoned Agricultural – Two (A-2). The area is characterized by a mix of commercial, industrial, agricultural, and residential land uses.

The adjacent property to the east is an RV storage lot under the same ownership, zoned PD and governed by the Gerdes Storage Official Development Plan, recorded at reception number 2018111007. This property to the east was originally rezoned in 2005, when the area was more rural in nature.

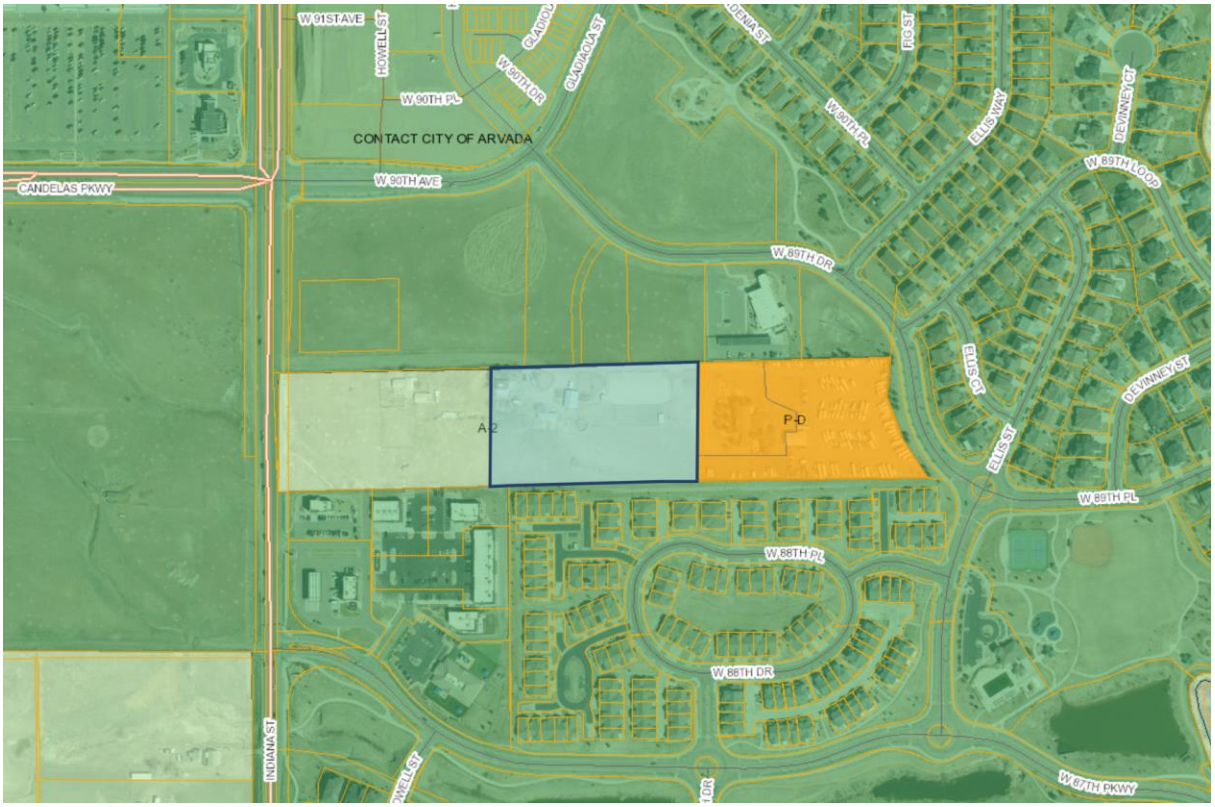
1. Aerial Image of Subject Property in 2006

The 2005 ODP allowed for storage of up to 80 RVs, as well as an excavation business and residence. This ODP was amended in 2018 to allow a larger area to be used for RV storage, and to eliminate the excavation business. A second proposed amendment to allow for the subdivision of the lot into two lots - one for the residence and the other for the RV storage area was denied primarily due to the lack of proof of water and sanitation services to serve the development allowed under the proposed rezoning amendment.

There are existing structures on the property: a single-family dwelling that is intended to be maintained as a home or caretakers' unit, barn, storage structure, and three mini-structures. The current zoning went into effect for this property in 1951.

4. SURROUNDING ZONING/LAND USE

	Adjacent Zoning	Land Use
North:	City of Arvada (Planned Unit Development and Mixed-Use Suburban)	Vacant
South:	City of Arvada (Planned Unit Development and Mixed-Use Suburban)	Multi-Family Residential and Commercial
East:	Planned Development (PD)	Outdoor Storage
West:	Agricultural – Two (A-2)	Single-Family Residential



5. SUMMARY OF PROPOSED CHANGES

	Current Zoning (A-2)	Proposed Zoning
Uses	Single Family Dwelling allowed. Outdoor Storage not allowed. Accessory structures including private garage, barn, and storage sheds allowed.	Use Area 1: Single Family Dwelling, Accessory Storage within Barn Use Area 2: Outdoor Storage of recreational vehicles, campers, boats, trailers, and other small recreational vehicles (e.g. snowmobiles, ATVs), Accessory Private Storage within shed/mini-structure
Structure Setbacks	Front: 50’ for primary structures and (non-livestock) accessory structures Side: 30’ for primary structures, 50’ for (non-livestock) accessory structures Rear: 50’ for all structures	For all structures: North (Front): 40’ West (Side): 10’ East (Side): 20’ South (Rear): 20’
Fencing	Maximum fence height: 7’ On adjacent lots where allowed fence heights differ, the lower height restriction shall govern.	Maximum fence height: 15’ Minimum fence height adjacent to north, west, and east property lines: 11’ Fence adjacent to south property line is to be 15’ tall, with uppermost 4’ consisting of wood lattice.
Landscaping	Dissimilar Use Perimeter Areas landscape screen (required between adjacent properties with dissimilar uses): 10-feet deep; 1 tree per every 30 linear feet and 5 shrubs per 500 square feet of total perimeter landscaped area, ground cover. No less than 75% of total required plant materials shall be evergreen. 10% total site area minimum landscaping.	10’ landscape buffer on south property line. Specific planting requirements not noted.
	Standards for Outdoor Storage Use (Industrial zone districts)	**Proposed Zoning**
Setbacks	No outdoor storage shall be allowed within a required front setback or landscaping area.	Outdoor recreational vehicle, boat, and trailer storage less than 10’ in height: 10’ setback Outdoor recreational vehicle, boat, and trailer storage more than 10’ in height: 20’ setback

6. TRANSPORTATION

Access to this property is through the property to the north, using a private easement, that connects the subject property to Indiana Street, a Minor Arterial street. The proposed Rezoning to allow for the outdoor storage use on the subject property is anticipated to have minimal impacts to the existing transportation network in comparison to allowed uses within the current zone district. A Trip Generation Memorandum was provided comparing the maximum trips generated under existing and proposed uses/zoning. The additional trips generated by this Rezoning would not negatively impact Jefferson County roadways; Indiana Street and adjacent intersections are maintained by City of Arvada.

7. CRITERIA FOR DECISIONS FOR PLANNED DEVELOPMENT REZONING APPLICATIONS

Section 6 of the Zoning Resolution states, *In reviewing Rezoning and Special Use applications, the Planning Commission and the Board of County Commissioners may consider the following criteria:*

- ○ *a. The compatibility with existing and allowable land uses in the surrounding area.*
- ✗ *b. The degree of conformance with applicable land use plans.*
- ○ *c. The ability to mitigate negative impacts upon the surrounding area.*
- ✓ *d. The availability of infrastructure and services.*
- ○ *e. The effect upon the health, safety, and welfare of the residents and landowners in the surrounding area.*

a. The compatibility with existing and allowable land uses in the surrounding area.

The proposed land uses are compatible with a portion of the existing and allowable land uses in the surrounding area. The proposed zoning is compatible with the existing outdoor RV storage lot to the east of the subject property. The other surrounding land is zoned for agricultural, single- and multi-family residential and commercial mixed-use, which is not compatible with outdoor storage uses.

b. The degree of conformance with applicable land use plans.

The Comprehensive Master Plan (CMP), an advisory document required by State statute, contains Goals and Policies that are used to guide land use decisions. The Area Plans section of the CMP contains supplementary policies and land use recommendations for evaluation.

	Summary	**Conforms with CMP?** ✓ ○ ✗
Land Use	The CMP discusses the need for a variety of uses to create a vibrant, enduring community. The Plan encourages diverse communities in which to live, work, and enjoy outdoor recreation.	✗

Physical Constraints	The CMP describes physical constraints as those physical features that due to safety concerns may potentially restrict where and how development occurs. Physical Constraints include geologic hazards and constraints, floodplains, wetlands, wildfire, radiation, landfills, abandoned mines, and wildlife habitat	
Community Resources	The CMP contains policies that relate to historic structures or sites, scenic corridors, natural features, air quality, light, odor and noise pollution, open space and trails.	
Infrastructure Water and Services	The CMP describes the importance of new developments having adequate Transportation, Water and Wastewater, and Services.	

Staff concludes that the subject request is not in conformance with the applicable goals and policies of the Comprehensive Master Plan (CMP).

Land Use: The proposed outdoor storage uses are out of conformance with Area 14 of the North Plains Area Plan recommendation within the CMP. The CMP recommends residential uses with a density of 5-12 dwelling units per acre. The proposed use would result in removing the opportunity to create 25 – 60 dwelling units, based on current CMP recommendations. With the housing needs of the county, this opportunity cost is quite high. Further, the number of jobs created by the proposed rezoning is minimal because it would simply be an expansion of the existing RV storage lot to the east. Therefore, the proposed rezoning would not create additional housing or jobs.

Because the proposed outdoor storage land uses are out of conformance with the CMP recommendation for residential uses on the subject property, the CMP requires the applicant to address the following three factors:

1) How the impacts associated with the proposed land use(s) will be mitigated compared with the recommended land uses;
2) How the proposed land uses are compatible with the surrounding land use recommendations and community character; and
3) What change of circumstance has occurred in the local area since the land use recommendation was adopted.

1) How the impacts associated with the proposed land use(s) will be mitigated compared with the recommended land uses:

The applicant stated that there will be no construction on the site. Staff disagrees, as the Zoning Resolution would require the lot for vehicle storage to be paved, and the ODP requires fencing to be constructed. The vehicle storage use impacts would not be properly mitigated to the north, south, or west uses, especially with the ODP reducing setbacks and landscaping standards. While fencing may help with mitigation, it doesn't mitigate all visual, fume, or odor impacts of outdoor vehicle storage.

2) How the proposed land uses are compatible with the surrounding land use recommendations and community character:

The applicant stated that the use will be compatible with the property to the east that is approved for a similar use. While Staff agrees that this use could be compatible with the existing use of the property to the east, the use is not compatible with the residential properties to the south and the agricultural property to the west. It is not compatible with the CMP land use recommendations for the surrounding

properties. The City of Arvada Comprehensive Plan designates the surrounding property as Suburban Residential, allowing a density up to 6 units per acre. The proposed use would not be compatible with the surrounding area recommendations for the City of Arvada's Comprehensive Plan.

3) What change of circumstance has occurred in the local area since the land use recommendation was adopted:

The applicant stated that there have been no changes to circumstances in the area.

Staff disagrees that there have been no changes in circumstances to the area. There has been an increase in residential development adjacent to this property since the land use recommendation was adopted. However, this change of circumstances does not constitute the requested land use change as the outdoor storage would be less compatible with the residential uses that have developed in the area.

Overall, staff finds that the three factors have not been adequately addressed and staff further finds that the proposed Rezoning for outdoor storage is out of conformance with the Comprehensive Master Plan.

Physical Constraints: The CMP describes physical constraints as those physical features that due to safety concerns may potentially restrict where and how development occurs. There are no floodplains or geologic hazards on the property. The property is identified as a Maximum Wildlife Quality Area and as a Bald Eagle Winter Range and Forage Area. The site is not a known nesting area but is within the known foraging range of the bald eagles that nest at Standly Lake. Many adjacent properties have prairie dog nests, but an examination of historic aerial photographs of the subject property appears to show no such prairie dog nests. While technically out of compliance with the CMPs goals on preservation of wildlife habitat, there is no evidence that bald eagles currently use the site for foraging, due to the historic use of the property. The applicant did not address this with the Rezoning request. The request is generally consistent with the Physical Constraints goals and policies of the CMP.

Community Resources: The Community Resources section contains policies that relate to historic structures or sites, scenic corridors, natural features, air quality, light, odor and noise pollution, open space and trails.

The Historical Commission had no concerns about the Rezoning proposal.

Impacts from vehicle storage have not been adequately addressed in this proposal. Tall fencing has been proposed to mitigate some of the visual impacts of the stored RVs, but the size of the proposed fence itself is a visual impact. Further, the ODP reduces setbacks and landscaping requirements from the minimum requirements of the Zoning Resolution. This results in a more visually impactful use than recommended by the CMP, and more visually impactful than allowed by the standards in the Zoning Resolution. This request is not consistent with the Community Resources goals and policies of the CMP.

Infrastructure, Water and Services: Existing infrastructure and services are available and adequate to support the uses proposed by this Rezoning. If this request is approved, traffic to the site is anticipated to be minimal, with a slight increase from allowed uses. The existing access street is privately maintained. The property is within the Arvada Fire Protection District and the Jefferson County Sheriff's Office provides law enforcement to the area. Water and wastewater services are provided by individual well and septic. The well permit allows water for use by a single dwelling and irrigation of up to 1,000 square feet. The applicable agencies have reviewed the proposed zoning and there are no concerns. Therefore, the request is consistent with the Infrastructure, Water and Services goals and policies of the CMP.

c. The ability to mitigate negative impacts upon the surrounding area.

Staff has identified negative impacts of the Rezoning to the surrounding area that have not been mitigated. While the proposed use may not result in significant lighting impacts to the surrounding properties, there are outstanding concerns about visual impacts for surrounding properties.

Rather than mitigating the visual, and noise impacts from outdoor vehicle storage - a dissimilar use to the adjacent uses to the north, south, and west - the proposal contributes to them by reducing setback requirements and landscape standards from those that would otherwise be required by the Zoning Resolution. As a result, adequate buffers and screening between the dissimilar uses would not exist.

Additionally, by not meeting the CMP recommended land use of residential dwelling units, the County and its community members miss out on the opportunity to provide additional housing at a time when housing supply is needed.

d. The availability of infrastructure and services.

The existing infrastructure and services are available and adequate to support the proposed Rezoning, as stated above. However, it should be noted that the well permit does not allow for the irrigation of more than 1,000 square feet of landscaping, so any requirement for landscaping above this amount will require additional water from another source.

e. The effect upon health, safety, and welfare of the residents and landowners in the surrounding area.

The proposed land use may result in impacts to the health, safety, and welfare of the residents and landowners in the surrounding area. Noise, fumes, and visual impacts of outdoor vehicle storage are not adequately mitigated in this proposal. A further reduction of setback and landscape requirements does not ensure adequate buffering for adjacent residential and agricultural properties.

8. COMMERCIAL MINERAL DEPOSITS

No known commercial mineral deposits exist on the subject property.

9. COMMUNITY MEETING

A Community Meeting was held on March 21, 2023. There were 7 citizens in attendance. Questions and concerns were presented by community members during the meeting related to lighting, fencing, landscaping, and land disturbance occurring on site. Please see the Community Meeting Summary included in this case packet for more details.

10. COMMUNITY/REFERRAL RESPONSES

During the processing of this Rezoning application, Staff received five community responses regarding this proposal. Staff has identified three citizen comments in opposition, all of which were about the potential impact to prairie dog habitat on the property. Two citizens responded in favor of the proposal, with one stating that the existing RV storage to the east is a low impact neighbor.

11. AGENCY REFERRAL RESPONSES

This application was sent on referral to 10 Jefferson County Departments & Divisions, 11 external agencies, and 7 registered associations (please see the HOA mailing list in the case packet for more information). The request was sent on three referrals, all of which resulted in modifications to the proposed ODP. There are no known outstanding issues with the referral agencies.

12. NOTIFICATION

Notification of the proposed development was sent and posted in accordance with the Zoning Resolution. Please see the attached Notification Summary for more information.

13. POST HEARING REVIEW

If the Rezoning is approved, the post hearing review shall be in accordance with the Zoning Resolution as follows:

The applicant shall have 28 days after Board of County Commissioner's approval to submit a 'clean' copy of the approved red-marked ODP and pay the recordation fees. The Case Manager will have 7 days to review the submitted ODP. If the revisions have been made in accordance with the approval conditions, Staff will affirm and record the ODP documents, as appropriate. If the submitted documents are not in conformance with the approved red-marked ODP, the red-marked ODP shall be recorded.

14. SUBSEQUENT PROCESSES

If the Rezoning is approved, a Site Development Plan and subsequent Permits would be required prior to development on the site. During these processes, the plans/permits would be sent on referral to numerous internal and external agencies. The Site Development Plan and Permit applications are processes that will ensure compliance with all the County's development regulations.

SUMMARY OF STAFF ANALYSIS AND RECOMMENDATION

Staff's analysis concludes that the proposed Rezoning is out of conformance with specific land use goals and policies outlined within the CMP, and therefore does not meet the land use recommendations of the CMP. The use would remove the potential to address housing needs in the area and would not create new jobs. Potential negative impacts to the surrounding area, primarily visual impacts of outdoor vehicle storage, have not been adequately addressed using development standards in the ODP. A reduction of setback and landscape requirements does not ensure adequate buffering for adjacent residential and agricultural properties. Infrastructure and services are adequate and available to support the proposed uses. Because the Rezoning application does not satisfactorily address all of the criteria in the Zoning Resolution for the Board to consider when deciding a rezoning case, staff recommends **DENIAL** of the proposed Rezoning.

FINDINGS:

Based on the analysis included in this report, staff concludes that the proposal does not satisfactorily address all of the criteria below which the Board of County Commissioners may consider, as detailed in subsection 6 in this staff report.

1. **The Rezoning proposal to allow for outdoor storage is not compatible with the existing and allowable single- and multi-family residential, commercial, and industrial land uses in**

the surrounding area. Development standards to increase compatibility by mitigating negative impacts have not been incorporated into the proposed Official Development Plan (ODP).

2. **The proposal is not in conformance with the Comprehensive Master Plan (Plan). It does not meet the Plan's land use recommendation for low-density residential uses, and the applicant has not adequately addressed the three factors to be met for proposals out of conformance with the Plan. The Plan goals and policies for Physical Constraints and Community Resources are also not met.**

3. **The ability to mitigate the negative impacts of the proposed land use upon the surrounding area has been considered and found to not be addressed through development standards in the ODP. Negative visual, noise and odor impacts have not been adequately mitigated using appropriate development standards for setbacks, landscaping, and fencing.**

4. **The subject property is served by the Arvada Fire Protection District and the Jefferson County Sheriff's Office. Water and wastewater services will be provided by individual well and septic systems. Existing infrastructure and services are available and adequate to serve the proposed land use at the property.**

5. **The proposed land use may result in significant impacts to the health, safety, and welfare of the residents and landowners in the surrounding area**.

PLANNING COMMISSION ACTION:

Planning Commission Recommendation (Resolution Dated February 28, 2024 Attached):

Approval	
Approval with Conditions	
Denial	X (4-3)

The case was heard on the Regular Agenda of the Planning Commission's February 28, 2024 hearing. Public testimony was heard from one individual who represents the owner of the abutting property, in Arvada, to the north. The testimony identified concerns about access and that the proposed use would be incompatible with the allowed uses of his client's property, zoned Mixed-Use Suburban. The Planning Commission discussed the compatibility of the proposed use with the surrounding area, and whether mitigation measures, such as increased buffers, setbacks, and landscaping, could mitigate the negative impacts presented by staff, and improve compatibility. The Planning Commission explored the idea of a continuance, to give the applicant additional time to work on addressing staff and Planning Commission member concerns through additional ODP requirements. While some Planning Commission members did appear to be open to a continuance, a motion recommending denial of the application was made and approved by the majority of the Planning Commission in a 4 to 3 vote.

BOARD OF COUNTY COMMSSIONERS ACTION:

The Board of County Commissioners is charged with reviewing the request, staff report, and Planning Commission recommendation, receiving testimony and evidence on the application and approving or denying the request.

COMMENTS PREPARED BY:

Sara Hutchinson

Sara Hutchinson
Planner
March 20, 2024

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer St Landfill: Landscape

Sharon McCarthy <[redacted] Tue, Sep 10, 2024 at 10:31 AM
To: Lauren Simpson <lsimpson@arvada.org>, sambrose@arvada.org, Sharon Davis <sdavis@arvada.org>, Lisa Feret <lferet@arvada.org>, Bob Fifer <BFifer@arvada.org>, JMarriott@arvada.org, Randy Moorman <rmoorman@arvada.org>, Jeremiah Bebo <jbebo@arvada.org>, cedboardsandcommission@arvada.org

Members of City Council and Planning Commission:

My name is Sharon McCarthy and I live at 6688 Kendrick Dr 80007

Purpose
To explore how the study of Landscape and the City's Comprehensive Plan influences redevelopment of the 6800 Kilmer St landfill.

Introduction
Norris Designs is the firm representing the client's application for the proposed 6800 Kilmer St RV storage lot and is an industry leader in Landscape Architecture and Urban Planning. From their website:

> "We believe in the power of place and the ability our environments have to inspire us all. Every day, we set out to change the world for the better through thoughtful placemaking. We create communities that move people to create lasting memories.
> We shape the public realm, activating the imagination. Then, we bring places to life with unique identities that live and breathe." https://www.norris-design.com/who-we-are/

Challenge

The City's Comprehensive Plan and Land Development Code seem to embrace the principles of Landscape Architecture:

- 2014 Comprehensive Plan Resource Conservation and Environment

  POLICY R-1.1: Buffers and Setbacks
  The City will require new developments to *provide buffers for creeks, water bodies, existing wetlands, riparian areas, and wildlife corridors to retain water quality and environmental integrity.*

  POLICY R-1.2: Land Use and Infrastructure
  Decisions All decisions involving infrastructure and land use should be reviewed in light of a *changing climate* that may have different and more erratic precipitation trends.

  GOAL R-1: *Minimize the impact of new development on natural areas to allow continued cohabitation of people*

  POLICY R-2.1: Water Quality Features The City will require water quality features in new developments to *minimize degradation of stream water quality.*

- Land Development Code

  4-2-1-3. - *Protection of existing vegetation, wildlife areas and natural features.*
  a. All subdivisions shall comply with the standards in Division 4-1-4, Natural Hazards and Environmentally-Sensitive Areas.
  b. All subdivision plats shall be laid out with due *regard to geologic hazards, including but not limited to existing soils conditions and slope stability.* All subdivisions shall
  evidence design and use ***compatibility with existing soils, particularly in regard to topography, drainage, bearing capacity, and erosion potential.*** All subdivision design shall ensure adequate protection from potentially hazardous or undesirable soils or geological conditions on the development site.
  3. No subdivision shall be approved where the design or related facilities clearly constitute the creation of a hazardous circumstance or lack of provision for the public safety.

  4-1-4-5. - Steep slopes and hazardous building conditions**.**

  B. *Unstable Slopes and other Hazards.* No new principal building, and no new accessory structure (except mini-structures), shall be constructed in any location that shows evidence of slope instability, landslides, avalanche, flooding, or other *natural or man-made hazards*. If the City makes a preliminary determination that such evidence exists, the Applicant shall demonstrate that the slope's ground surface and subsurface are not unstable, that the proposed development will not cause instability or increase the potential for slope failure, and that the development of the slope will not increase the degree of hazards.

Research and Discussion

Landscape Architecture Defined

Colorado State University

Landscape architects lead the stewardship, planning, and design of built and natural environments. ...emphasis is on the relationship between design, nature, and society: the impact of environments on the individual as well as the impact of users on the environment.....**analyze the natural elements of a site including the climate, soil, slope of the land, drainage, sunlight, and vegetation**. Nature, culture, form, and space are the classic elements of landscape architecture .... https://catalog.colostate.edu/general-catalog/colleges/agricultural-sciences/horticulture-landscape-architecture/landscape-architecture-major/

University of Kentucky

Landscape architects design public spaces such as parks, campuses, streetscapes, and urban gathering places that shape community identity and provide opportunities for public life. ....create more sustainable and active communities.....improve air quality and mitigate high temperatures with urban green spaces.....design resilient infrastructure solutions for

problems such as increased flooding from stormwater and rising sea levels aggravated by climate change.....**conserve valued natural and agricultural resources by analyzing regions and working with communities on plans for landscape stewardship**. https://ukla.ca.uky.edu/student-resources/information-hub

University of Illinois

How do neighborhoods take shape? Who turns empty lots downtown into bustling community spaces with rain gardens and green zones? How are unused railroad lines transformed into paths for biking, walking, and bird watching?....use creativity, innovation, and problem-solving processes to create designs that are not only healthy for people and the planet, but also beautiful. https://landarch.illinois.edu/programs/bachelor-of-landscape-architecture/

Cornell University

Landscape architecture is one of the most exciting fields of study for those interested in addressing issues of critical importance to the future of our planet and its inhabitants. Through development of projects ranging from intimate gardens to parks, towns, cities and broader regions, landscape architects are poised to intervene at a wide range of scales, in myriad contexts and for multiple constituencies. ..... **address issues of infrastructure, water management, sea-level rise, flooding, cultural heritage and environmental justice**. https://cals.cornell.edu/landscape-architecture

Harvard University
.....advance research and innovative design practices in the natural and built environments, as they intersect with **processes of urbanization and the urgent challenges posed by a changing climate**, including widespread environmental and social inequities.....explore the multiple ways that landscapes positively contribute to the complexities of the contemporary city, to a more equitable distribution of ecological and environmental resources..... https://www.gsd.harvard.edu/landscape-architecture/

University of Michigan
Joan Iverson Nassauer, FASLA works in the field of ecological design. She develops design proposals to *improve ecosystem services, and uses social science methods to learn how human experience affects and is affected by landscapes*..... evidence of human care in the landscape has a powerful normative effect on human perceptions and behavior to change landscapes. Her *research has influenced green infrastructure design, ecological restoration, urban and rural watershed management, transportation planning, and the **development of metropolitan neighborhoods and brownfields***. https://www.joan-nassauer.com/joan-nassauer

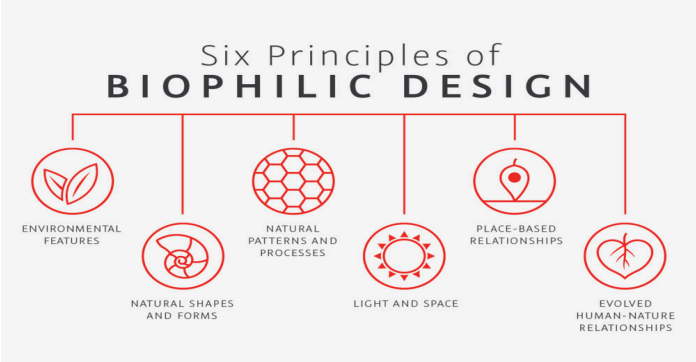
Norris Designs

Placemaking begins with possibility. Our integrated approach brings people of all disciplines together to **discover the inherent potential in every site, create a singular vision, and then bring it to life**. Our planners, landscape architects, brand specialists, irrigation experts, construction managers and placemakers come together to transform concept into reality — creating places that grow better with time.

As the heart of this conservation-based community(Maryland Creek), **every design element from the site itself to the natural trails, native plant palette, limited use of lighting to comply with Dark Sky standards, and preservation of habitats reinforces the principles of biophilic design.** https://www.norris-design.com/

Biophilic Design is the practice of connecting people and nature within our built environments and communities. The International Living Future Institute has seen a demonstrated need among the Living Building Challenge community for biophilic design resources that can take the practice from theory to reality. https://living-future.org/biophilic-design/

Biophilic design is the practice of reconnecting people and nature within the built environment. Biophilic design involves translating elements derived from nature, into design outcomes that ultimately improve the health and wellbeing of occupants and foster a connection with nature https://thebiophilicdesigner.com/biophilic-design



Are these examples of "biophilic design"?

Finally.....

- Perhaps more discussion about the substructure and topographic landscape of the landfill should take place. Recurrent language such as "slope, erosion, soil, relationships" pop up in academic descriptions, research articles, and the City's documents. At the September 9, 2024 City Council meeting, there were suggestions that the current LDC might need a deeper look because some LDC language might not address unique issues. It is difficult to find language in the LDL that is specific to landfill redevelopment. Forest Springs Park and Forest Springs berm are "covered landfills" with varying contents and different reuses. 6800 Kilmer St landfill is unlike either of these examples because of its large methane plume. Redevelopment of unregulated landfills is a global issue with academic examples from other countries. (see Global Snippets)
- Language in **DIVISION 4-8-2. - GENERAL LIGHTING STANDARDS** might need more exploration as how lighting influences the immediate environment and long term management
  Does overnight lighting potentially challenge biophilic design and affect natural behaviors of nocturnal wildlife, nesting birds, and seasonal cycles in trees and landscape?

  - *Artificial lights affect biological processes, such as plant photosynthesis, animals' orientation and migrations, and human circadian rhythms. As communities replace older lights with energy-efficient light-emitting diode (LED) lamps, they must weigh the needs of people with damage to local wildlife.*

    Researchers have developed a tool that categorizes LED lamps by their output, energy efficiency and predicted impacts on wildlife, people and the darkness of the night sky.

    The researchers predict that filtered yellow-green and amber LEDs should have lower effects on wildlife than high-pressure sodium lamps, and that blue-toned light will affect wildlife — including birds, insects, fish, and sea turtles — more than orange- and yellow-toned light. https://news.mongabay.com/2018/06/let-there-be-light-but-be-mindful-of-the-wildlife/

- The study, led by researchers from Northeastern Illinois University, showed that the city's nocturnal animals roamed less and were less active as nighttime light levels increased. Researchers started seeing significant changes in animal behavior in areas with lighting as dim as 6 lux, a unit of measurement that describes the amount of light falling on the surface. For reference, 6 lux is slightly dimmer than Earth's surface at twilight; typical kitchen lighting is around 500 lux. https://earthobservatory.nasa.gov/images/145767/night-lights-can-disrupt-wildlife

- This darkness interruption has dangerous and disruptive side effects for insects, birds, reptiles, amphibians, and humans. The effects extend to migration, navigation, plant blooming as well as when trees lose their leaves. All activities are affected by the period of light and not temperature. A *season's photoperiod is the only consistent factor in the natural environment. Therefore, many species of plants and animals rely on the length of the night to indicate the proper season for budding & flowering, mating, molting, and other life cycle activities. The timing between flowering and pollinators or gatherers may not mesh. This photoperiodic sensitivity is often so acute that many species can detect discrepancies in natural light as short as one minute.* Reproductive cycles are most often disrupted when artificial light at night interferes with species' natural detection systems.

  Change in light signals the start of activities as foraging (feeding & substance), sheltering, mating and reproducing (fireflies & frogs), and communicating (glowworms & coyotes). Artificial lights alter an animal's circadian rhythm and create miss-cues. https://kids.niehs.nih.gov/topics/natural-world/wildlife/ecology/lighting

- Night lighting (especially light along the red to infrared spectrums) effectively extends the day for many plants. Since angiosperms *(flowering plants, including most trees) determine things like dormancy, flowering, and growth based upon the amount of uninterrupted darkness that falls upon them,* this can have wide-ranging repercussions, including unsafe periods of non-dormancy.

  Photoperiods also influence leaf shape, surface hairiness (pubescence), pigmentation, and root development, all of which impact fitness, and all of which can potentially be **disrupted by light pollution**. Of course, anything that impacts flowering plants also impacts pollinating insects. And since one third of our entire food supply depends on pollinators, it impacts all of us as well. https://listverse.com/2014/08/14/10-ways-that-light-pollution-harms-the-world/

- Several years ago, members of the Ventura Audubon Society approached the operators of a power plant about an hour north of Los Angeles. Its location—an otherwise undeveloped stretch of sandy beach—is a habitat that has become as rare as it is crucial for California shorebirds such as the threatened western snowy plover.

  For more than a decade, the society had been counting 20 or more plover nests each year to the north and south of the generating station. But the birds never nested on the half-mile of sand directly in front of the plant, and the conservationists suspected the facility's bright security lights might be the problem. Plovers need darkness to hide their open-sand nests from nighttime predators. The plant managers agreed to dim the lights, and the following year, in 2013, 10 snowy plover nests appeared on the previously barren beachfront. https://www.nwf.org/Magazines/National-Wildlife/2023/Summer/Conservation/Light-Pollution-Wildlife

- To understand the impacts, and find compromise solutions between human and animal needs, the researchers focused on insects, sea turtles, salmon and Newell's shearwater, a seabird, for which existing data were readily available. They found that the *worst nighttime lights are intense blue and white colors -- some affect species as much as the brightness of midday sun -- and three times more than yellow or green lights designed with wavelengths less disruptive to wildlife.*

  "If we don't provide advice and information to decision makers, they will go with the cheapest lighting or lighting that serves only one interest and does not balance other interests," Longcore said. "We provide a method to assess the probable consequences of new light sources to keep up with the changing technology and wildlife concerns." https://www.sciencedaily.com/releases/2018/06/180612090618.htm

- To recognize the benefits of sustainable outdoor lighting, NPS (National Park Service) recommends the following basic principles.

  .... what type of outdoor lighting is appropriate for an area or structure/facility in a national park is whether there even needs to be a light at all.... increasing light output does not necessarily equate to a safer nighttime environment ....use the lowest light output for a task. ....selected and installed with proper height and light distribution to prevent light spill or trespass beyond the task area .....blue light may also adversely affect both human and wildlife health and behavior. https://www.nps.gov/subjects/nightskies/sustainable-outdoor-lighting.htm

The more we research, the more we realize the complexity of redeveloping a closed, unregulated landfill. Any reuse seems to be trying to fit an oval peg into a round shaped hole.

- There are concerns about:
  - environment--water location, heat islands, light/noise pollution, and the effect of nocturnal lighting.
  - safety--disruptions to wildlife behavior that may possibly increase human/wildlife conflicts especially along the walking paths near Ralston Creek and adjacent neighborhoods.
  - society--impact of commercial development adjacent to the Ralston Creek Trail providing a recreational outlet for many residents and visitors.
  - science--landscaping described in the original site plan---will it survive and thrive in an artificial light environment.
  - logistics--how the inner container and subsurface of the landfill challenges geotechnical and construction knowledge and experience.
  - ecology--potential impact to Ralston Creek and Croke Canal areas.
  - general--how *any* redevelopment of the complex landfill adheres to the current language of the Comprehensive Plan and Land Development Code.

I had a mentor who said "don't come to me about a problem unless you have 3 possible solutions." We are available to discuss. The task before the Planning Commission and City Council is heavy with questions and concerns. We hope our research will assist in making decisions.

Respectfully,

Sharon McCarthy

Global Snippets.pdf
57K

Global Snippets

"In simple terms, former and abandoned landfills can be defined as areas in the landscape that have been used for waste disposal. **Closed landfills mostly lack environmental protection measures.**" https://www.academia.edu/5517222/Landfill_redevelopment_Model_Strategy

"All these **activities emphasize the impact of properly organized green areas and development** of degraded areas such as municipal solid waste landfill on the environmental and sociological conditions.
"https://www.academia.edu/68660737/The_Concept_of_Land_Use_Development_of_a_Municipal_Solid_Waste_Landfill_the_Ceg%C5%82%C3%B3w_Commune_Case_Study?email_work_card=title

"Many landfills all around the world are located in or nearby urban areas where the land is scarce and highly demanded. Therefore, an important question arises on how to re-use this piece of threatening land. The aim of this study is to highlight the benefits of landscape work with the **roles of landscape architects or equivalent disciplines to succeed a sustainable development of a landfill site** not only after the landfill being closed but also from the beginning of it."
https://www.academia.edu/39785263/Toward_Sustainable_Development_of_a_Landfill_Landfill_to_Landscape_or_Landscape_along_with_Landfill_A_Review?email_work_card=title

"Landfill management should not to work of only environmental engineers. A variety of **disciplines should work together for landfill management, e.g. landscape architects, soil scientists,hydrologists, geologists and environmental engineers**."

Holistic Planning

Goal	Strategic Approaches	Application
Harmony with Nature	Ecological integration with surrounding area	Remediation projects Plant cover
Harmony with Physical Environment	Hiding the physical disturbance of landfill-keeping balanced landscape	Aligning landfill topography with surroundings
Sustainable health conditions	Protection from waste and pathogens	Use of plants for leachate treatment
Social integrity	Obtaining support from stakeholders	Waste management awareness
Sustainable economic conditions	Creating income source	Transforming landfill into productive establishment

https://www.academia.edu/9264410/A_holistic_management_of_waste_landfills_in_Mediterranean_city_The_case_study_of_Antalya_Kizilli?email_work_card=abstract-read-more

October 28, 2024 Re: 6800 Kilmer RV Storage Major Comprehensive Plan Amendment

Members, Arvada City Council,

By way of introduction, we moved to Arvada/Forest Springs in 1997 . Our 27-year residence is our retirement home. Joyce (75) and Jim(78) have been absolutely thrilled with our lives in Arvada . Nearby growth has increased the convenience and variety of shopping options. Our community has many of Arvada's jewels nearby: Westwoods Golf Course to our west, the Ralston Creek trail to our north and Forest Springs Park to our east. It is truly a terrific location.

The proposed RV storage just northwest of Forest Springs is cause for many concerns. We are located 3-4 miles south of the Marshall Fire, where many, many lives and homes were destroyed. If each RV stored in the proposed development has 1-2 propane tanks, a fire would have a disastrous impact on the surrounding residential communities. The project proposes one entrance and NO fire hydrants on the site. This lack of fire fighting access spells disaster for nearby residents.

Forest Springs has 110 homes, primarily owned by elderly residents. Many of our neighbors do not drive and/or have significant mobility issues. Should a fire occur, and we'd be foolish to believe that it couldn't after the Marshall fire, many of our neighbors would not be able to evacuate themselves. There are two entrances/exits to/from Forest Springs. City resources that would be needed to fight the fire would need to be dedicated to assisting the elderly residents of Forest Springs evacuate. The only thing separating the proposed development and our homes is natural grasses and a narrow waterway.

The property proposed in the application has water flowing on two sides. To the north is Ralston Creek and the bike path, to the south is the Croak farmer's canal. Both waterways would be vulnerable to pollution from the proposed RV storage. The property is an unmitigated methane landfill. Disturbing this landfill soil has potential for significant environmental damage.

Certainly, the Ralston Creek bike path is one of Avada's jewels. The City continues to improve the use and beauty of the path corridor thereby assuring residents of the commitment the City has made to preserving and improving this community resource. The addition of the Colorado Tap House has provided a wonderful gathering place for our neighborhood. The addition of an RV storage site or any other industrial business does not fit the character of our neighborhood ,the Ralston Creek bike path , Westwoods Golf Course or Forest Springs Park.

We strongly encourage you to oppose this amendment to the City's Comprehensive Plan and preserve the beauty and safety of our neighborhood.

Thank you for your consideration.

Sincerely,

Jim and Joyce Cullen

Arvada, Colorado

CITY OF ARVADA

Kristen Rush <kristen@arvada.org>

6800 Kilmer RV Storage Major Comprehensive Plan Adjustment

1 message

Linda STONE [redacted] Sat, Oct 26, 2024 at 11:18 AM
To: "Kristen@ARVADA.ORG" <Kristen@arvada.org>

City Council,
Please be advised that Brady & I are residents of Forest Springs and as such are vehemently opposed to the above proposed project. Too many safety issues that are not addressed could potentially result in something similar to the Superior fire. We have lived here since 2000. A property that could contain as many as 1500 propane tanks which could explode during a fire is a very scary thought. No hydrants on premises could make it impossible to control a fire. Please make note that Brady & I are VEHEMENTLY OPPOSED to this project. Thank you.

Brady & Linda Stone

[redacted]

Arvada, CO 80007

[redacted]

Hi Mr. Silvestro,

I was forwarded your email and I wanted to send you the relevant sections of our code for the November 4th public hearing on Kilmer RV storage. This is a unique situation that we haven't dealt with before- we haven't had a Comprehensive Plan Amendment denied by the Planning Commission but where the applicant still wanted to move forward to City Council. We have chosen the process providing the most opportunities for public input and due process for everyone involved and consistent with our Land Development Code (LDC) and our adopted 2014 Comprehensive Plan.

The LDC states that **"when considering amendments to this Code text and/or maps, the Planning Commission and City Council shall pay reasonable regard to the policies of the Comprehensive Plan."** (1-1-5-2) The provision does not state that a Planning Commission denial precludes City Council from also hearing the matter. This process is consistent with all of our land use applications. Under Arvada's LDC the Planning Commission is the final decision maker on the sign code only.

Further, Arvada's adopted 2014 Comprehensive Plan outlines the amendment process on page 5-3 and states: "All Plan Amendments shall be considered by the Planning Commission and City Council pursuant to their respective powers as set out in Chapter 1 of the Arvada Land Development Code." Chapter 1 of the LDC does not explicitly state that a Comprehensive Plan Amendment denial by the Planning Commission results in City Council not hearing the application. In actuality, our Code and Comprehensive Plan state Planning Commission **and** City Council repeatedly.

I agree that the process is not clearly outlined in our Code and that is something we will address with our Comprehensive Plan update that will begin in 2025. This process was communicated to the applicant and your clients from the beginning and any change now would be an accusation of violating due process. We encourage your clients to get involved with our Comprehensive Plan update next year- there will be a plethora of opportunities for the public to help shape our guiding document going forward.

Please let me know if you have any other questions regarding the upcoming hearing.

Emily Grogg

Senior Assistant City Attorney

Counsel,

Thank you for your response.

However, we disagree that the LDC provides the City Council with authority to amend the CMP. In particular, Section 1-1-5-2 of the LDC does not speak to CMP amendments, but rather says that other land use decisions that the City Council might make must be done so in accordance with the operative version of the CMP. More significantly, Colorado's municipal zoning law expressly provides that the Planning Commission is the body with sole authority to adopt and update the CMP. C.R.S. 31-23-206. There is no similar statutory authority which would allow for the City Council to consider the Planning Commission's denial of a proposed CMP amendment.

As such, we believe it is improper for the City Council to consider this issue. Rather, the denial of the proposed CMP amendment became final when it was denied by the Planning Commission.

Has the City Council been briefed on this issue and/or do you expect that they might consider it before the hearing moves forward next week? We would respectfully request that that happen in the hopes of avoiding what we believe is an improper and unnecessary proceeding.

Separately, we are also confused about the City's apparent representation (as reflected in your statement on page 6 of the attached Planning Commission minutes) that staff can still consider the applicant's site plan application notwithstanding the City's denial of the CMP Amendment. Because that proposed use is inconsistent with the current designation of the site under the CMP, how does the City possibly have discretion to approve this non-conforming use?

Thank you again for your time and attention to these important matters.
Please include a copy of this email in the planning file for 6800 Kilmer Street as well as the planning file for the related and recently denied request for a Comprehensive Plan amendment for that site.

Regards,
James Silvestro
Attorney at Law
Ireland Stapleton Pryor & Pascoe, PC

Mr. Silvestro,

As I stated in my previous email, I agree with you that the process is not clearly laid out in our code but the Arvada's Comprehensive Plan on page 5-3 outlines the process for plan Amendments and states as follows:

"Plan Amendments may include changes to the Land Use Plan map. Other amendments may be as small as correcting text or map errors. Plan Amendments may be initiated by either the City or property owners. The process for making these amendments is described below. All Plan Amendments shall be considered by the Planning Commission and City Council pursuant to their respective powers as set out in Chapter 1 of the Arvada Land Development Code."

LDC 1-1-5-2 discusses the Comp Plan, amendments to the code, and amendments to maps. Nowhere does it state that City Council is barred from hearing a Comp Plan Amendment request. And as I'm sure you're aware, C.R.S. 31-23-202 gives municipalities authority "to make, adopt, amend, extend, add to, or carry out a plan as provided in this part 2 and to create by ordinance or resolution a planning commission with the powers and duties set forth in this part 2."

It is unfortunate that we can not point to a specific code provision that clearly outlines the step-by-step process and we will be addressing that in our upcoming Comprehensive Plan update but because it is not clear, we will not potentially violate due process. We will always err on the side of allowing public hearings and encouraging public involvement, especially on matters of great importance to our citizens.

As for the City accepting a Site Plan application going forward, you are correct- nothing in our code prohibits a property with the proper zoning from submitting a Site Plan application. But as I explained at length during the hearing, one of the Site Plan criteria for approval is compliance with our Comprehensive Plan. There are many properties in existence that do not match the Comprehensive Plan land use designation. The zoning is codified law, the Comprehensive Plan is a guiding document adopted by the City. As I stated at the hearing, the Site Plan is a separate process with separate criteria to consider. If the Site Plan is submitted, it will be reviewed administratively and there are numerous opportunities for anyone who disagrees with the administrative decision to be heard at that time.

Your letter will be made part of the record and provided to City Council.

Emily Grogg

Senior Assistant City Attorney

CITY OF ARVADA

Bryan Goddard <bgoddard@arvada.org>

Fwd: 11/4/2024 Public hearing @ 6;15 pm; 6800 Kilmer RV storage

Kristen Rush <kristen@arvada.org> Wed, Oct 30, 2024 at 11:16 AM
To: Bryan Goddard <bgoddard@arvada.org>

Sent from my iPhone

Begin forwarded message:

From: Douglas Perryman <[redacted]>
Date: October 30, 2024 at 11:04:56 AM MDT
To: Jbebo@arvada.org, kristen@arvada.org
Cc: Douglas Perryman <[redacted]>, tstephens@msihoa.com
Subject: 11/4/2024 Public hearing @ 6;15 pm; 6800 Kilmer RV storage

CASE Number: DA2024-0016

My wife and I have been residents of Forest Springs HOA for approximately 17 years, since 2007.

We object to any change from the existing mixed-use residential zoning category.

Regards

Doug Perryman, PE, CSP

[redacted]

Arada, Colorado 80007

Safety Consultant

[redacted]

[redacted]

To be wary is to be ready for the unexpected.

CITY OF ARVADA

Kristen Rush <kristen@arvada.org>

6800 Kilmer RV storage

1 message

Heather Brockman Lee [redacted] Mon, Oct 21, 2024 at 6:12 PM
To: kristen@arvada.org

Hi Kristen,
I am a resident of Westwoods, on Noble Ct, writing to express my strong opposition to the proposed RV park. The Ralston Creek Trail is a jewel of Arvada, and putting an RV park so close to the beloved and well used trail will be an eyesore, decrease property values and worst of all create more pollution that will end up in our waterways. A better use for that space would be to rezone it as a wildlife refuge.

Thank you for your time,
Heather Lee

Public Comments Received from September 12, 2024, after 12pm to September 16, 2024, at 5pm

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

Kilmer

1 message

Elaine Fitzgerald <[redacted]> Mon, Sep 16, 2024 at 4:31 PM
To: Jeremiah Bebo <jbebo@arvada.org>

My husband, Gerald Spann, and I are residents of Forest Springs, and live at 6762 Kilmer Ct , just south of the proposed development of an RV storage lot.

According to the Land Development Code, Section 1-1-1-2, Purpose and Intent, it is stated,
“ The purpose and intent of this code is to:

#3: Promote the public health, safety, convienience, comfort, prosperity and general welfare

#4: Promote the creation of safe, unique, interesting, inclusive, and economical vibrant places throughout the city

#5: Protect the quality and character of stable residential neighborhoods

#12: Provide protection from nuisances and hazards"

My comments are the following:

#3: I am worried that the Ralston Creek will be polluted due to the vast number of RVs that may have runoff, that wildlife will be harmed, that prosperity for my family and the neighbor’s will be harmed by lower home values and therefore fewer tax dollars to support Arvada, that my health and my husband’s could be endangered by possible gas emissions and pollution. As far as general welfare, I find that most neighbors and users of Ralston Trail are very unhappy about this prospect. And what about the issues concerning fires on this very windy part of Arvada? Light pollution is another factor to consider.

#4; This area is beautiful! The addition of the Colorado Tap House has been a boon to the area. An RV storage lot will detract from the vibrancy of this neighborhood.

#5: We are original owners of our home, living here since 1998. The area has grown by leaps since then and I think the city has done an admirable job of development in the area. Forest Springs, West Woods Mesa, Geos, New Town are all lovely residential developments. I have heard that my home may be uninsurable if this goes through.
An RV lot does not fit!

#12: If a RV lot goes in, what will it look like in a few years or 10? Grafitti on fences, trash blown all over, light pollution for neighbors. Who will be in charge of upkeep? There are so many reasons that this proposed project does not fit in with Land Development Code.

In conclusion, I ask that the commitee listen to us, the taxpayers, the residents, the people who love and choose to live here in Arvada.

Thank you,
Elaine M Fitzgerald

CITY OF ARVADA

Jeremiah Bebo <jbebo@arvada.org>

6800 Kilmer RV Storage Plan

Mary Jaeger <[redacted]> Mon, Sep 16, 2024 at 8:26 PM
To: jbebo@arvada.org

Dear Mr Bebo
I am unable to attend the planning commission tomorrow night, so I am writing my concerns against this project. I am a resident of Forest Springs & am very concerned about the proximity of this type of facility.
I am unsure of the safety of a facility (and surrounding neighborhoods) filled with propane tanks with not multiple roads in/out of the area for fire protection and suppression.
This appears to be an inappropriate usage of this land, especially with so many residential neighborhoods surrounding it.
I know a lot of work has been addressed to the security of the area, amount of lighting (either too much or too little), landscaping to soften the border, and many other isssues. I expect our City Council to protect the land use in our neighborhoods.
An RV Storage facility does not belong in this location. The Council should not change the comprehensive plan from residential to industrial/light to fit this storage facility into 6800 Kilmer.
I may not have all the legal objections, but my opinion is that this rv storage does not belong on this property.

Mary Jaeger
15454 W 67th Ave
Arvada. CO. 80007

CITY OF ARVADA

CED Boards and Commission <cedboardsandcommission@arvada.org>

Fwd: presentation for September 17th

1 message

Josie Suk <jsuk@arvada.org> Tue, Sep 17, 2024 at 8:35 AM
To: CED Boards and Commission <cedboardsandcommission@arvada.org>

---------- Forwarded messa
From: **Sharon McCarthy** [redacted]
Date: Mon, Sep 16, 2024 at 4:30 PM
Subject: presentation for September 17th
To: <jsuk@arvada.org
Cc: Sharon McCarthy [redacted]

Josie,

Just received your email. If it's too late, I'll be better prepared for next meeting! Thanks.

If it's not too late, my presentation and attachments for the meeting:

Good evening, members of the Commission.
My name is Sharon McCarthy. I live at 6688 Kendrick Dr

I ask for your patience, as I'm only an interested neighbor trying to understand this process and lingo and to bring my concerns to your attention.

I include a google search of locations that I mention. (Only exhibit C included in this email)

Exhibit A

- Highlights RV lots in small enclaves of unincorporated Jeffco within the outer city limits.

Exhibit B

- Shows a parcel on 72 that is zoned IL. There are a handful of RVs parked outside in the back, but it's clear that the primary use is self-storage, not outside RV storage.

Exhibit C

- Uses a blue line to identify the street locations of three RV storage lots in east Arvada that are all zoned IG and are clearly located in industrial and not residential areas.

  This is important because the LDC treats this area differently. Specifically, Section 5-1-6-3.B.2. provides that "Outdoor storage areas shall not be located within 300 feet of a RA or RN zoning district, except within the area south of West 60th Avenue and east of Lamar Street."

Commissioners, if you refer to page 4 of your staff report, please note the zoning and land use for this property and the surrounding area. As you can see, the triangular property is zoned IL. The tan areas to the north, west, and south of this site are all single family residential with some small businesses, like the Colorado Taphouse to the Northeast.

We question #2 and #7 of the LDC approval criteria:
#2 ".....is compatible with surrounding area….."

- Our fundamental concern is that an RV lot adjoining significant and increasing residential areas has substantial impacts to the environment and neighborhood residents. In fact, while there is limited open space and commercial areas near the landfill, the triangular shaped property is surrounded on two sides by land that is primarily residential areas. GEOS PUD has a very small amount of commercial space but it's essentially residential. And the OS to the south and west is a very narrow strip of land where the canal runs and is immediately abutted by residential.

We question #7 ".....promote the public welfare and be consistent with the goals and policies of the comprehensive plan…."

- Approving an RV lot in IL zoning is inconsistent with at least four "general LDC requirements" defined in Section 1-1-1-2. An amendment to the Comprehensive Plan DOES NOT:

> 3. Promote the public health, safety, convenience, comfort, prosperity, and general welfare;
>
> 4. Promote the creation of safe, unique, interesting, inclusive, …places ….;
>
> 5. Protect the quality and character of stable residential neighborhoods;
>
> 12. Provide protection from nuisances and hazards.

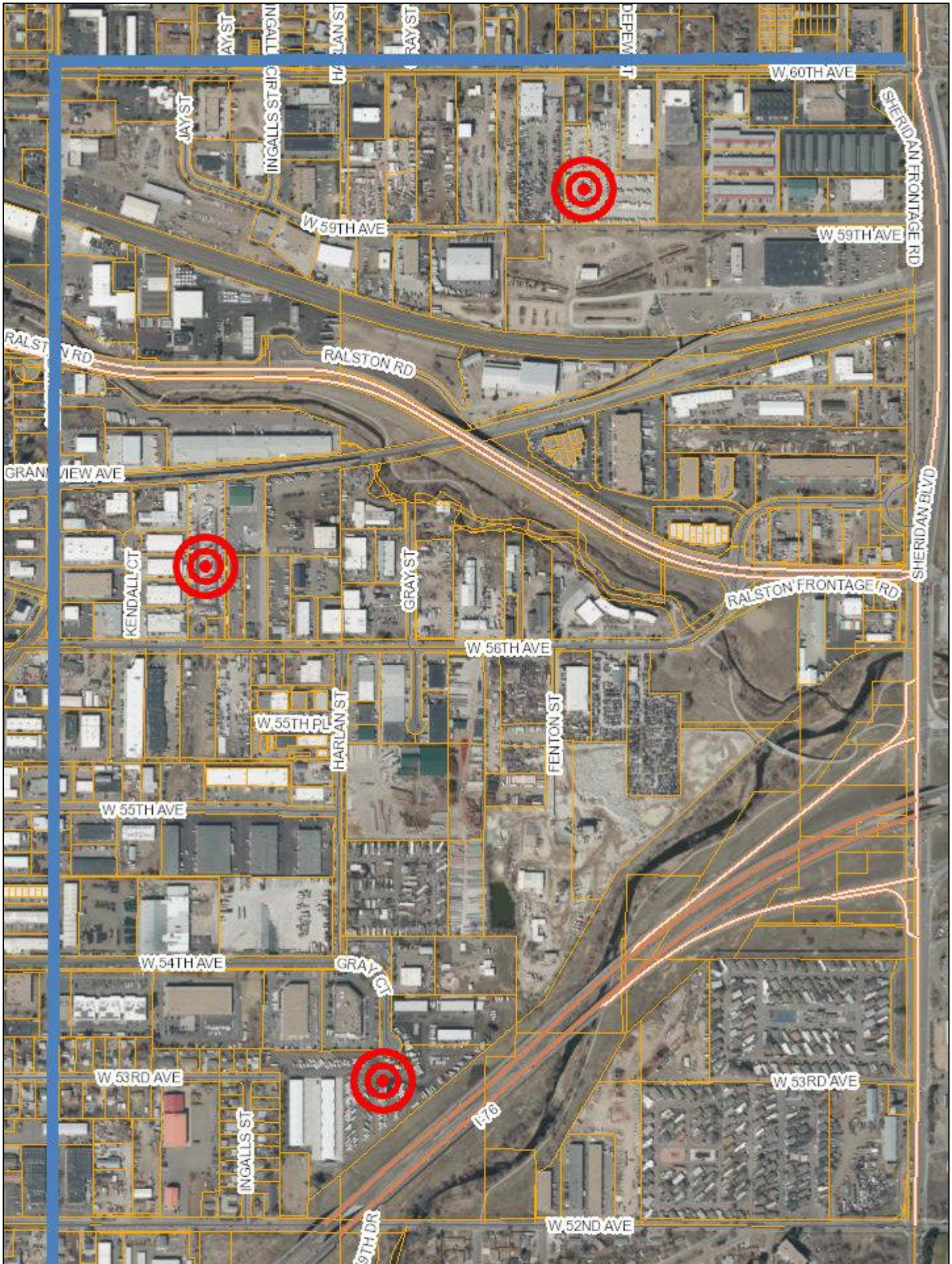
At some point, this property was probably "the right business" in the "right place" at the "right time". Perhaps we should pause and consider the "right environmentally responsible redevelopment" of the landfill--- for current and future times.

--
JOSIE**SUK**
Development Systems and Administrative Manager
Desk: 720-898-7627
Mobile: 720-582-4419
E-Mail: jsuk@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

CITY OF ARVADA

3 RV Lots South of 60th and East of Lamar.jmap (1).pdf
571K

3 RV Lots South of 60th Ave and East of Lamar St.



CED Boards and Commission <cedboardsandcommission@arvada.org>

DA2024-0016

2 messages

Jay Smolen Frances Rozie [redacted] Mon, Sep 16, 2024 at 10:49 AM
To: "jbebo@arvada.org" <jbebo@arvada.org>, "cedboardsandcommission@arvada.org" <cedboardsandcommission@arvada.org>

Frances Rozier
6858 Lupine Way
Arvada, CO 80007

Mr. Bebo and Council members:

I am in total agreement with my husband, Jay Smolen and am vehemently opposed to the approval of rezoning that will allow this project to proceed. My backyard overlooks the Croke Canal and a portion of the subject property.

Page 4 of the Land Development Code addresses the purpose and intent of the Code. Under paragraph 1-1-1-2, items 3, 4, 5 and 12 directly address our neighborhood and the new condo development to the north. If this project is allowed to continue, these items will be disregarded and thus deviates from the purpose of the Code as listed.

Given that this property is built on an old garbage dump, there are inherent hazards that cannot be overlooked. Letting this parcel remain as open space for use by wildlife and residents is the best and safest for our neighborhoods and the city of Arvada.

Thank you -

Fran Rozier
Sent from Outlook

Get Outlook for iOS

Jeremiah Bebo <jbebo@arvada [redacted] Mon, Sep 16, 2024 at 11:33 AM
To: Jay Smolen Frances Rozier
Cc: "cedboardsandcommission@arvada.org" <cedboardsandcommission@arvada.org>

Thank you Fran. I will ensure that the emails from both yourself and your husband are added to the record for the project.

Best,

Jeremiah Bebo, AICP
He/Him/His
Senior Planner
Community & Economic Development
(720)898-7438
jbebo@arvada.org

AICP CERTIFIED

CITY OF ARVADA

[Quoted text hidden]

CED Boards and Commission <cedboardsandcommission@arvada.org>

DA2024-0016

1 message

Jay Smolen Frances Rozie [redacted] Mon, Sep 16, 2024 at 10:34 AM

To: "jbebo@arvadaco.org" <jbebo@arvadaco.org>, "cedboardsandcommission@arvada.org" <cedboardsandcommission@arvada.org>

Jay Smolen
6858 Lupine Way
Arvada, CO 80007

Mr. Bebo and Council members:

I am vehemently opposed to the approval of rezoning that will allow this project to proceed. My backyard overlooks the Croke Canal and a portion of the subject property.

Page 4 of the Land Development Code addresses the purpose and intent of the Code. Under paragraph 1-1-1-2, items 3, 4, 5 and 12 directly address our neighborhood and the new condo development to the north. If this project is allowed to continue, these items will be disregarded and thus deviates from the purpose of the Code as listed.

Given that this property is built on an old garbage dump, there are inherent hazards that cannot be overlooked. Letting this parcel remain as open space for use by wildlife and residents is the best and safest for our neighborhoods and the city of Arvada.

Thank you -

Jay Smolen
Sent from Outlook

CED Boards and Commission <cedboardsandcommission@arvada.org>

6800 Kilmer RV Storage Comprehensive Plan Amendment DA2024-0016

1 message

David Soucie [redacted] Sat, Sep 14, 2024 at 2:38 PM
To: "cedboardsandcommission@arvada.org" <cedboardsandcommission@arvada.org> [redacted]

Please accept these comments on behalf of David Soucie SOUCIE who resides at 6868 Lupine Way in Arvada, CO 80007.

I live in the Forest Springs community, which is adjacent to the Ralston Creek wildlife area, and the proposed project .

My resident is immediately adjacent to the west of the proposed project within 100 feet of the property line. I have a clear line of sight to the project from my east facing windows.

My intent is to be present during the meeting scheduled for Tuesday, September 17, 2024 at 6:15 PM. Please acknowledge receipt of these comments.

The comments are being sent prior to the deadline in the notice which states no later than 5 PM on the day before the meeting takes place.

I understand these comments will be part of the permanent record.

[redacted]avid Soucie
[redacted]

Ralston Creek RV Storage Proposal.docx
12K

Ralston Creek RV Storage Proposal

My name is David Soucie.
I live at 6868 Lupine Way in the Forrest Springs community in Arvada Colorado.
Forest Springs is adjacent to the Ralston Creek Wildlife area and also immediately adjacent to the proposed RV Storage lot. It's is separated only by the Croke Creek Canal which is a Clear Creek Tributary. The Croke Creek canal is used to divert water for irrigation farms and food production land in the area.
While the proposed RV Storage lot will have significant and permanent negative ecological and financial impacts throughout Arvada, my address is the closest property to the proposed RV Storage lot.
Below is a list of concerns and questions for this hearing;
Potential dumping of black water, grey water and winterization antifreeze will have a widespread and irreversible deadly impact on the wildlife in the Ralston Creek Wildlife area.
In my experience as an RV owner for the last 32 years I have witnessed at every lot dumping of toxic wastewater and winterization antifreeze. I can attest that without an approved waste dump on site there is a much higher occurence of renters committing dumping onto the ground.
Without an on site wastewater dumping station the renters will be required to transport the RV's to a remote dump station to properly dispose of the waste water and the winterization antifreeze. This is very time consuming and inconvenient. Again, I have witnessed and can attest that RV storage renters do not take the time to dispose of the waste and winterization antifreeze properly. Rather, they dump this toxic material directly onto the ground at the facility.
The impact of this practice on the proposed site would be devastating, permanent and irreversible contamination of the Ralston Creek Wildlife ground water and water table.
The toxic materials drain through permeable ground cover or drainage into the water table. Due to the proposed RV storage lot being adjacent ralston creek wildlife area this will certainly cause a devastating and permanent loss of life and the pristine wildlife preserve Arvada government leaders and residents have fought to preserve.
The closest black/grey water dump is in Louisville to the north and 44th and Wadsworth to the south
Why Antifreeze? To prevent freezing and rupture of sewer and water line in RV's in Colorado winters and RV requires winterization with an average of two gallons of antifreeze in the pipes, water, black water and grey water RV tanks. 300 spaces times 2 gallons is 600 gallons of toxic antifreeze per year being brought into this site.
Antifreeze poses a serious fatal risk to animals. It has a smell and taste that attracts wild and domestic animals. However, ingesting the fluid certainly it is fatal.
Where does that antifreeze go in the spring when the RV is de-winterized and made ready for summer? In my experience directly on to the ground at the storage facility.
An additional observation is that RV's leak. If there is a leak in these systems. The antifreeze spills direct into the Ralston Creek Wildlife water table.

DO NOT DISTURB WILDLIFE
There are hundreds of signs along the Ralston creek wildlife are emphasizing the rules of use along the path. Do not disturb wildlife is on every one of them.
How can the owners of this property assure us this project will not permanently disturb the wildlife?
Our home is directly adjacent to the Ralston Creek Wildlife preserve. When we first moved in I went out the back door to walk my dog. When I turned on my porch light I saw some movement in the tree a couple hundred feet away. It was a beautiful Owl that was perched in the tree. The

small 60 watt porch light from more than a hundred feet away was enough to disturb the owl and make him leave his nest.
I gave since seen the owl return at dusk many times. And I do not use my back porch light any longer to prevent disturbing the Owl.
While the tree is over 100 feet from my back porch is is less than 75 feet from the proposed RV storage lot which has proposed 24 hour lighted access.
How is it possible this development would not disturb wildlife o. The Ralston Creek Wildlife area?
Illegal residents
Another common practice I have witnessed is indigents and sometimes owners living in the RV's
We all know the cost of living in Colorado has skyrocketed. RV storage lots and even storage units in my experience are a popular place for a cheap place to live.
This create a risk of increased house invasion and crime to the adjacent neighborhood.
See questions about this issue below.
Questions,
What will the applicant do to mitigate the likelihood and/or protect against the permanent impact of renters allowing toxic and deadly waste resulting in devastating, permanent and irreversible contamination of the Ralston Creek Wildlife ground water and water table caused by toxic and deadly Waster water and antifreeze entering the Ralston Creek Wildlife Area water table?
What will the applicant do to mitigate the likelihood and/or eliminate the short term and inevitable long term impact noise and light will have as a disturbance and populations to wildlife in the Ralston Creek Wildlife area both during construction and after the project becomes operational?
What will the applicant do to thwart people from living in or staying overnight in the stores units? Nightly patrols? Motion detectors? limited access at night? 24 hour access invites late night activities and illegal squatters.
What will the city of Arvada do to monitor the applicant's mitigation plans. And at what cost to the taxpayers?
Daily Police patrols to protect adjacent homeowners from criminal activities and or using the storage lot as an unapproved residence or shelter at the RV storage lot? This is very costly and takes police presence away from where it's needed in other parts of our city.
Continuous testing and monitoring of the soils and water in the area?
Inspections of RV's to assure they are not leaking toxic materials?
Enforcement of legal action and/or fines for renters and the owner who are responsible for contamination of the ground and water?
Bonds provided by the owner to assure proper cleanup of toxic waste or materials?
Does the owner have an adequate umbrella insurance policy to cover the cost of cleanup?
If not they could simply file bankruptcy and leave the taxpayers to pay for cleaning up the disaster left behind.
This project has potential to directly affect the quality of life in Aravada and we are relying on you as our government oversight to assure the safety, ecology and and quality of life in this City.
Thank you for your attention to these concerns and we look forward to answers to these vital questions.

Sincerely,

David B Soucie
Arvada West Hall of Fame inductee.
Resident first in 1970 as a student at Vanderhoof elementary school, then Drake, then Arvada West graduate.

In 1988 - 2006 with a son at Arvada West.
Now in 2024 as a 65 year old.

Planning Commission Meeting
September 17, 2024

PUBLIC HEARINGS
REQUEST TO SPEAK OR REQUEST TO HAVE NAME ENTERED INTO RECORD

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PLEASE PRINT:

Name ALICIA SVALDI

City (not the complete address) ARVADA

AGENDA ITEMS SPEAKING ON: RV STORAGE

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☐
   i. I am for the Issue ☑
   ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☐
   i. I am for the Issue ☐
   ii. I am against the Issue ☐

Planning Commission Meeting
September 17, 2024

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PLEASE PRINT:

Name JAY SMOLEN

City (not the complete address) NEVADA

AGENDA ITEMS SPEAKING ON: RV STORAGE

Please check appropriate boxes:

I will be representing a group: FOREST SVCS

1. I wish to speak ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒

2. I don't wish to speak but enter my name in the record ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

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PLEASE PRINT:

Name RICK SIMMS

City (not the complete address) ARVADA

AGENDA ITEMS SPEAKING ON: ZONING / COMP PLAN

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☑
2. I don't wish to speak but enter my name in the record ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

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PLEASE PRINT:

Name SHARON MC CARTHY

City (not the complete address) ARVADA

AGENDA ITEMS SPEAKING ON: ZONING

Please check appropriate boxes:

I will be representing a group: FOREST SPRINGS

1. I wish to speak ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒

2. I don't wish to speak but enter my name in the record ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

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PLEASE PRINT:

Name Rich Bohling

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: Arvada RV Storage Comp Plan

Please check appropriate boxes:

I will be representing a group:_____

1. I wish to speak ☒
   i. I am for the Issue ☐
   ii. I am against the Issue ☒
2. I don't wish to speak but enter my name in the record ☐
   i. I am for the Issue ☐
   ii. I am against the Issue ☐

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PLEASE PRINT:

Name Debra Gander

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: Kilmer - RV Storage

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☐
   i. I am for the Issue ☐
   ii. I am against the Issue ☑
2. I don't wish to speak but enter my name in the record ☐
   i. I am for the Issue ☐
   ii. I am against the Issue ☐

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PLEASE PRINT:

Name ERIK MATHYS

City (not the complete address) ARVADA

AGENDA ITEMS SPEAKING ON: KILMER

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒
2. I don't wish to speak but enter my name in the record ☐
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PLEASE PRINT:

Name Ed Yovnak

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: Kilmer RV Storage

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒
2. I don't wish to speak but enter my name in the record ☐
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PLEASE PRINT:

Name David Soucie

City (not the complete address) ARVADA

AGENDA ITEMS SPEAKING ON: RV Storage

Please check appropriate boxes:

I will be representing a group: Forest Springs among others

1. I wish to speak ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒

2. I don't wish to speak but enter my name in the record ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

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PLEASE PRINT:

Name David Spiegler

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: _____

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☑

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PLEASE PRINT:

Name Elaine Fitzgerald

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: What does this mean in simple language?

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☑
   - i. I am for the Issue ☑
   - ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☐
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PLEASE PRINT:

Name Nancy Koepsel

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: _____

Please check appropriate boxes:

I will be representing a group: ~~Forest Spr~~

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☑
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PLEASE PRINT:

Name Rita. Sysling

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: _____

Please check appropriate boxes:

I will be representing a group: Forest Springs

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☒
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PLEASE PRINT:

Name Ellen Bothner

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: _____

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐
2. I don't wish to speak but enter my name in the record ☒
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PLEASE PRINT:

Name Larry L. Fike d/b/a Knox Helm

City (not the complete address) 6654 Kendrick Dr, Boulder, 80607

AGENDA ITEMS SPEAKING ON: _____

Please check appropriate boxes:

I will be representing a group: _____

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐
2. I don't wish to speak but enter my name in the record ☑
   - i. I am for the Issue ☐
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PLEASE PRINT:

Name Sherry Howerton

City (not the complete address) _____

AGENDA ITEMS SPEAKING ON: RV Storage

Please check appropriate boxes:

I will be representing a group: Forest Springs

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐
2. I don't wish to speak but enter my name in the record ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒

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PLEASE PRINT:

Name Robert G. Smith
Salley M Smith

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: R.V. Storage
Very bad idea

Please check appropriate boxes:

I will be representing a group:_____

1. I wish to speak ☐
   i. I am for the Issue ☐
   ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☒
   i. I am for the Issue ☐
   ii. I am against the Issue ☒

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PLEASE PRINT:

Name Jill Soucie

City (not the complete address) Arvada

AGENDA ITEMS SPEAKING ON: RV Storage

Please check appropriate boxes:

I will be representing a group: Forest Spring

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐

2. I don't wish to speak but enter my name in the record ☒
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☒

(NO SPEAK)

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PLEASE PRINT:

Name JOYCE SPIEGLER

City (not the complete address) ARVADA

AGENDA ITEMS SPEAKING ON: _____

Please check appropriate boxes:

I will be representing a group: Forest Springs

1. I wish to speak ☐
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☐
2. I don't wish to speak but enter my name in the record ☑
   - i. I am for the Issue ☐
   - ii. I am against the Issue ☑

SUMMARY MINUTES OF PLANNING COMMISSION ACTION HELD
September 17, 2024

Planning Commission meeting minutes are not an exact transcript and represent key points and the basis of discussion.

1. CALLED MEETING TO ORDER– By Michael P. Griffith at 6:17 P.M.

2. PLEDGE OF ALLEGIANCE

3. ROLL CALL OF MEMBERS

Those present: Michael P. Griffith, Andrew Gay, Tim Knapp, Brandon Figliolino, Tom Aljinovich, Doug Magee, Steve Hannan

THOSE ABSENT

None

ALSO PRESENT: Jessica Garner, Director of Community and Economic Development; Rob Smetana, City Planning Manager; Emily Grogg, Sr. Ass't. City Attorney; Josie Suk, Development Systems and Administrative Manager; Emiley Yoshihara, Civil Engineer II; Jake Moyer, Stormwater Administrate; Jeremiah Bebo, Sr. Planner; Heidi Van Gieson, Development Technician I; Dixielee Rodriguez, Recording Secretary.

4. APPROVAL OF MINUTES

June 18, 2024. The minutes stand approved as printed.

5. GENERAL BUSINESS

None

6. REPORTS

None

7. PUBLIC COMMENT

There was no one wishing to speak. (This is for Items NOT on the Agenda) Public Comment was closed.

8. **PUBLIC HEARINGS**

8.A. Major Comprehensive Plan Amendment for 6800 Kilmer RV Storage, a 14.01 acre parcel, addressed as 6800 Kilmer St. and located at the terminus of West 68th Avenue just west of Indiana Street.

Before beginning the hearing, Mr. Griffith made a statement explaining what the Planning Commission would be voting on. And that it is a recommendation to the City Council and just a part of the process.

Emily Grogg explained that the Planning Commission only has authority to determine the Comp Plan amendment. She explained what that meant and the remaining opportunities for public involvement if the project progresses. She reiterates what Mr. Griffith stated.

Mr. Griffith swore in all guests that would be speaking.

Mr. Griffith opened the public hearing.

Mr. Griffith asked if all of the required documents were in order.

Mr. Bebo stated that publication in the newspaper was required and posting log and mailing affidavit for the noticing requirements were in order.

Mr. Griffith asked are there any additions or corrections to the Staff Report?

Mr. Bebo stated Yes there are corrections to the Staff Report. two corrections on page 7-"Ay" to "any" - then "slop" to "slope" and added the neighborhood meeting summary to the staff report.

Ms. Grogg stated that all public comment that has been received has been provided to the Planning Commissioners which included the prior public comment from 2021.

Mr. Griffith stated the following items have been submitted and will be made a part of the permanent record, publication notice, posting notice, mailing notice and affidavit, and public comment to include complete email chains between staff and public.

Mr. Griffith asked Mr. Bebo to introduce the project.

Mr. Bebo introduced the project. Norris Design requests approval of a Major Comprehensive Plan Amendment from mixed use to office/industrial to match the IL (Industrial, Light) zoning that is already in place. Subject property is about 14 acres in size located West 68th Avenue just west of Indiana Street and is currently undeveloped. The Applicant has submitted a site plan amendment and Staff conducted historical research to understand the planned future land uses for the site based on past Arvada Comprehensive Plans. Arvada's first Comprehensive Plan was adopted in 1964 and designated this site as Low-Density Residential. In 1973, the land use designation was changed to Industrial Office Park. However, in 2005, the land use designation was changed to Mixed Use – Residential Emphasis and remains as such. In May of 2020, the property was rezoned to IL as part of the larger Arvada Land Development Code (LDC) Update and citywide rezoning. Concurrently, a Comprehensive Plan Update was approved in order to align the new zone districts with the Comprehensive Plan. The land use designation of the subject property was not revised as part of this update, which resulted in the continued conflict. December 2021, a similar application for an RV storage with a higher number of RV parking spaces was proposed, Ultimately that application was withdrawn. Current application that has

been submitted has a reduced number of RV parking spaces and removed the need for any Major Modifications. With the administrative review for the site plan and minor subdivision plat the volunteer clean up application, along with any environment clean up review will be required to follow CDPHE (Colorado Department of Public Health and Environment). Staff took into consideration the following: transportation, surrounding land uses, access, and natural features of the site Areas around this site are zoned light industrial. Staff recommends approval of the Comprehensive Plan Amendment.

Applicant - Eva Mather with Norris Design - not a resident of Arvada. Describes the location and where the Ralston Creek Trail borders the site, Geos and West Woods Mesa to the north. Forest Springs and Croke Canal to the south. Industrial developments to the east and Westwoods golf course to the west. Existing constraints make a multi-modal interconnected street layout with public plazas and pedestrian-oriented design makes it incredibly difficult to achieve. Mass transit in this area is scarce. There are easements and open space requirements on the north that cannot be changed. Site is surrounded by natural features and is only accessible by one road through an industrial park which makes the site an “island”. The property is a former landfill site. Costs to build single-family homes would be too high or infeasible. Applicant agrees to dedicate a public access easement for the Ralston Creek Trail and clean up the environmental conditions.

PUBLIC COMMENT

The public input portion of the hearing was opened.

Mr. Griffith opened the hearing for comments from the public.

IN FAVOR

Alisha Svaldi - Unincorporated resident but owns a building and has business in this area that is light industrial. Has been there since ‘98. Her company is the manufacturer for AeroSpace. Has big semi’s coming through this area to her business. Currently it doesn't bother anyone because there is no one around except for this property. Feels it should be changed to industrial/office. Does not want it to have Residential in this area. Having the RV’s storage down that road would be best use for this property. You do not want kids riding around this area. Would like our businesses to be protected. This would be the best use for this property.

IN OPPOSITION

Elaine Fitzsgerald - Resident of Arvada, She lives on the south border of the site. Three things she disagrees with, minimum impact surrounding areas, she strongly disagrees, developer stated only 7 houses would be impacted. She is one of the 7 and stated that she is offended that she doesn’t count. Compatibility with the surrounding area, come by and see if you think this is compatible with the area. Public welfare, RV spewing pollution, light pollution, trash and graffiti.She asked that they do not change it.

David Soucie - Resident of Arvada, Been in Arvada since 6th grade, he has done several developments and two large projects. He thinks that the comp plan is developed by and for the people of Arvada. This is the intent for the development of Arvada. Now the city is saying it's wrong and wants to change it. Shows a picture of where his home is. That he had owls that live

in a large tree behind his home. What has been conveniently left out is that there is wild life there, which is compatible with mixed use residential. There are other options with this property. Perhaps mixed use is not the right thing but Industrial light is not the right one. And it is the developers responsibility not the City's.

Ed Yovak - Resident of Arvada speaking for Rainier Gerbatsch lives in Geos (currently out of town). Size of RV storage is outside the boundaries of the area of the classification of IL (industrial light). The city staff seeks the approval even though the developer has failed to submit a complete and concise plan.Over the last 40 years 3 separate Geotechnical Engineers have issued warnings not to develop this site unless there is full remediation of this site. To ensure safety and responsible development, it is centered on minimizing cost while not ignoring these geological warnings.There have been detailed reports that have been documented and submitted in public comments.

Eric Mathys - Resident of Arvada, also representing comments of someone (did not give name) that could not be present for the meeting. There are 7 listed approval criteria to consider, he is addressing item 6 and 7 of the criteria listed. Item 6 -The land was a landfill and with proper remediation it can be used for residential purposes and can be made safe. Higher cost remediation is recommended for all type development. Lower cost alternatives can be considered but if the developer decides to do this they are responsible for the higher risk of failure and high level of continued maintenance.This creates more potential environmental exposure. Item 7 - Applicants' response states this will be consistent with public welfare and goals of the surrounding area. Site improvements are on private property and no improvements for water, sewer and electricity. Approved improvements are to the regulated improvements like lights and landscape for the project. Gravel parking lot will create a blighted site and dust, emission problems and other environmental concerns. If the developer is not willing to ensure the safety of the surrounding residents the city should not be allowed this proposal for this site.

Debra Gander - Resident of Arvada - Also represents a group of people too. Asking the PC commissioners to not approve the comp plan amendment. Developer stated the proposed development will be an extension of the industrial area already there. This use may be compatible with the property on the east side of the property. It is not compatible with neighborhoods to the north, west and south of the site. With access to Ralston creek and trail this is ideal for residential and small commercial use. If the developer is not willing to invest in this property to ensure the safety of the site the city should not approve their application. Project is avoiding improvements that are needed in many areas. Given the legacy of the environmental contamination of the site, any proposal of the site should go to public hearing, not administrative process hidden from public view.

Rich Bohling - Resident of Arvada. no reason for the Planning Commission to amend the comp plan for a single parcel to facilitate a property owners still incomplete proposal. Regarding item #1- doubtful it can be developed without remediation. The landowner is unwilling to spend the money for remediation. Changing the comp plan to industrial/office does not lessen the enormous process of the site. This cannot ignore the problems of the site. The geo report back in 91' it says the area should not be developed for commercial or residential on the site.

Sharon McCarthy - Resident of Arvada - Speaking for a group of people - Forest Springs. West side of town located in unincorporated Jeffco there are already 2 RV storage lots. There is a 3rd parcel on 72 there are RV's parked in the back. On the east side there are 3 RV storage lots located in IG, and are in industrial, not in residential area. In the LDC 5-1-6-3- b2 defines what

this means. A RV storage lot near the surrounding residential area will create an unsafe area and create hazards to the residents.

Rick Simms - Resident of Arvada - Lives in Forest Springs area - Believes the comp plan should not be amended. Current comp plan goes with the current surrounding area. There is no reason to amend the comp plan of specific use or facilitate a owners land use proposal and cannot be developed without complete remediation to the site. Just recently Jeffco's planning commission reviewed a proposal off Indiana and candelas was denied. Feels it is not compatible. Land use runs with the land not the owner. Urge you to look at what serves the people of Arvada and to deny this request.

Jay Smolen - Resident of Arvada- shows a picture on the overhead projector. He does not approve of the rezoning of the plan. How deep is the layer of garbage at this site? How deep do they have to dig for redevelopment of this site? Rezoning could affect air quality and water in Croke Creek and Ralston creek. Disrupt the wildlife in the area. The rezoning should be thought through before it is approved.

Emily Grogg spoke up to make some legal clarification about Rezoning. Tonight is about a Comprehensive Plan amendment. This developer already has the correct rezoning. This is only for the Comprehensive Plan Amendment. Rezoning is very different from what we are dealing with tonight.

APPLICANT REBUTTAL

Kevin Saylor - Not a resident - Works for Terracon - Working on the environment aspects of the project. Will address concerns with the streambank and in communication with Mile High Flood District. Concerning all environment items, they are working with CDPHE (Colorado Department of Public Health and Environment), and have an approved plan for that. When the project is under development it will be under full oversight of an Environmental Field Professional.

Ms. Mather stated doesn't like to be accused of avoiding things. Had Kevin speak on the environment items. She felt that she addressed the comments from the public in her presentation already. Reiterating on Alisha's comment about this being an extension of the industrial and the heavy industrial fleet that exists. Feels kids living and playing on a street that does not have sidewalks usually don't go together. There are no streets to extend to. Only one way in and out. When a comp plan amendment may not happen regularly but it does happen. It just happened not too long ago for the Taphouse down the road.

QUESTIONS FROM THE COMMISSION

Mr. Hannan asked the following question to staff: Is the comp plan a vision and long range plan for implementation and legally enforceable?

Ms Grogg stated: Correct, there is no legal requirement for properties to be in compliance with the comp plan. This is the guiding document for new development. The LDC is what is codified and law.

Mr. Hannan asked if there are other instances where there is this kind of disconnect with the comp plan and Land Development Code.

Mr. Bebo stated that it is not super common but yes there are other areas where we have conflicts between the comp plan and zoning or vice versa.

Ms. Grogg stated that one of the criterias in the LDC for the site plan states that it must meet Comp Plan.

Mr. Hannan asked when the site plan is developed will it be looked at administratively and can it be called up by City Council to be reviewed at any time?

Mr. Bebo stated that a site plan can be reviewed and approved administratively. If the project is approved or denied by staff, it can be called up by the City Council.

Mr. Hannan stated the environmental condition is concerning to him. What is the city's role?

Mr. Bebo stated we defer environmental issues to (CDPHE) Colorado Department of Public Health and Environment. As we don't have our own environment department.

Ms. Grogg stated legally we do not have any authority to overrule CDPHE. We have to follow state law. We do not have the required personnel on staff.

Mr. Hannan asked about the 2020 LDC review. Was there any discussion about this property at that point?

Mr. Bebo stated No, this property was not singularly identified and reviewed.There is a history of this property changing over time in the comp plan but was industrial for a very long period of time. Unsure why it was changed to Mixed Use - Residential in 2005.

Mr. Gay asked, does this meet the criteria for infill development?

Mr. Bebo stated it is a little challenging, it is one of the last remaining undeveloped parcels in the city and is surrounded by development on all sides which make it infill. However, this is larger property than what is typically seen in infill development in Arvada.

Mr. Gay asked if the Comp Plan Amendment is a precursor to a site plan discussion? And when that happens is that internal or goes to a public hearing or administrative?

Mr. Bebo stated that it would be approved or denied by city staff and would not come before the Planning Commission. But can be called up by the City Council and then a public hearing would be held on that.

Ms. Grogg stated that if the Planning Commission decides to deny the Comp Plan Amendment the applicant can go forward with the Site Plan because they do have the zoning. That is where as stated before, it would be missing the criteria that is looked at by staff. Final decision would be made by the Director. If the administrative decision is made then the City Council can call up and public comment could be made again at that time.

Mr. Gay asked criteria #2 - What was the logic that was used to not count the north and south borders of the parcel the same as the east when analyzing compatibility?

Mr. Bebo stated he felt it was more compatible to what is to the east based on the utilization of access with the existing Industrial area to the east.He also discussed how the presence of the

Ralston Creek and Croke Canal act as natural buffers to the neighborhoods to the north and south. making this site integrate more with the industrial to the east.

Mr. Gay asked about criteria #7 - Is there a public benefit for industrial uses versus residential uses on this site? Is this anecdotal or actual data that shows this?

Mr. Bebo stated that Staff believes that prohibiting residential uses on this property is in the interest of public welfare due to the existing conditions of the site, access limitations, and the presence of light and heavy industrial uses along West 68th Avenue. If residential was built on the site, they would have to drive, walk and bike through industrial uses which also have heavy truck traffic.

Ms. Grogg stated that there is not a definition to “public welfare” in the Comprehensive Plan. Staff did their best on interpreting that criterion.

Mr. Magee asked that no matter what the Planning Commission decides the City Council can make whatever decision they please in their discussion and hearing comments from the public.

Ms. Grogg stated that is correct, the City Council can make their own decisions on this and does not have to follow what Planning Commission recommendation. We have decided to follow the path that allows the most public input.

Mr. Magee asked about the zoning which is industrial light in the Land Development Code, has been this since the early 80’s changed in 2020 pud industrial to current industrial light. Then land use designation from ‘73 - ‘05 it was industrial office and not sure why it was changed to its current use.

Mr Bebo responded that is correct.

Mr. Magee asked the applicant about the clean up on this development. No matter what you pursue on this site you will need to follow the guidance by the State department?

Mr. Saylor stated yes they have to follow CDPHE guidance and if they have to they will amend their plan.

Mr. Magee asked if they will get different guidance depending on what development they do?

Mr. Saylor stated if the project changes they could be looking at institution controls or engineering controls.

Mr. Magee asked if the embankment improvement for protection is it voluntary or required?

Mr. Saylor stated the program administrator wanted to see some improvements in their plan.

Mr. Figliolino asked staff the Industrial Light definition in the LDC, does not say outdoor storage or RV. Is this allowed under IL?

Mr. Bebo stated that there are general zoning statements that are not intended to capture all uses. We have the use tables that are within chapter 3 showing the uses in detail what can be used. These are intent statements not the bread and butter of the use.

Mr. Knapp asked for clarification about page 9 #7 of the staff report. That this project does comply and promote public health and welfare. What other uses can be constructed at this site?

Mr. Bebo stated That is part of the problem, we have other permitted uses that can go under the current IL zoning district. Give examples of these. If rezoning to Mixed use, it would be forced to a higher density residential in this area primarily townhomes, small lot single family dwellings, condo or apartments..Which brings up the issue with transportation is this area.

Mr. Aljinovich stated thank you to all that spoke tonight. To the City, this is a small step to the other items for this site. A check box and could be many changes along the way Bigger plan..

Ms. Grogg stated yes that is correct. The site plan review is in its early stages. There are many more ahead.

Mr. Aljinovich asked, "Are we here for a small step in that process?

Ms. Grogg stated yes that is correct. Wanted to point out that the site plan has an entirely different set of criteria that must be met.

MOTION: 8.A.1

It was moved by Mr. Figliolino that a Resolution by the Planning Commission for the City of Arvada, Colorado to Amend the 2014 Arvada Comprehensive Plan Land Use Designation pertaining to 6800 Kilmer RV Storage from Mixed Use: Residential Emphasis to Industrial/Office, generally located a 14.01 acre parcel, addressed as 6800 Kilmer St. and located at the terminus of West 68th Avenue just west of Indiana Street, City of Arvada and State of Colorado be approved and recommended to City Council for ratification..

This motion is based on the finds of fact and approved criteria on Pages 8 & 9 of the staff report.

DISCUSSION OF MOTION

Mr. Knapp stated findings for him there are existing residential uses north and south of this parcel. There are some barriers, creek, canals and trails, along these areas there are indigenous trees and shrubs. Intended use for this parcel is RV storage. We need to consider the compatibility. He feels RV storage does not comply with this. He feels that the proposed project does not benefit the public welfare. He will not be voting in favor of this amendment.

Mr. Hannan stated there are 7 criterias that need to be met, #2 is the access and the boundaries to this site. Gave examples of where there is access if residential remained that use. #6 Keeping with key elements, we got confused about this area. IL seems less invasive to the area than residential. There are natural boundaries north and south. What is best for Arvada? Feels putting a townhome there would be a good use there. He will be voting against the comp plan amendment.

Mr. Gay stated that criteria #2- about the natural barriers on the north and south, is not good enough for him. These are not really barriers to him, they are land features. Criteria #7- that

light industrial would be less invasive for this area than residential is not a fact that we know. This is not a yes or no, more like change or no change. He will be voting against the amendment.

Mr. Figliolino stated he is concerned with criteria #2 does not believe it is an island. For #7 - He does not believe this project will promote public welfare. He feels that this project does not meet criteria 1, 2 and 7. He will be voting no.

Mr. Griffith extended gratitude to the public that has come out to the meeting and staff. Tough for him he sees an undeveloped land that is contaminated and it is unclear how much. City does not have a department that would deal with what remediation would be required. Meeting the goals and objectives in the 2014 Comprehensive Plan and # 2 and 7 about meeting those goals. These do not match the goals. He will be voting against this motion.

Those voting Yes: Magee
Those voting No: Knapp, Gay, Figliolino, Hannan, Griffith, Aljinovich
Those absent: None
The motion not carried: 6 no - 1 yes

9. **OTHER ITEMS**

Mr. Smetana stated that there are no items scheduled for the next Planning Commission meetings on October 8th and October 22nd, and therefore the meetings can be canceled.

Motion to cancel the October 8th and October 22nd meetings: 7 Yes - 0 No. Motion carries.

Mr. Smetana asked to cancel the Nov 5th meeting due to it being election night and proposed to have a special meeting on 11/12

Motion to cancel the November 5th meeting and schedule a special meeting on November 12th: 7 Yes - 0 No. Motion carries.

10. **ADJOURNED** at 8:20pm

_____
Michael P. Griffith, Chair

_____
Brandon Figliolino, Secretary

_____
Dixielee Rodriguez, Recording Secretary

Application for a Comprehensive Plan Amendment

City Council | November 4, 2024
6800 Kilmer - RV Storage
Arvada, Colorado

NORRIS DESIGN
PEOPLE + PLACEMAKING

Development Team

CHELTON, LLC
DAVID SCHNEIDER

NORRIS DESIGN
PEOPLE + PLACEMAKING
EVA MATHER + CARL RUNGE +
DANIEL BRASWELL

BFW ATTORNEYS | BURNS FIGA & WILL | 40 YEARS OF TRUSTED COUNSEL
SCOTT CLARK

HKS HARRIS KOCHER SMITH
KEVIN KENNEDY +
CHARLEY PEOPLES

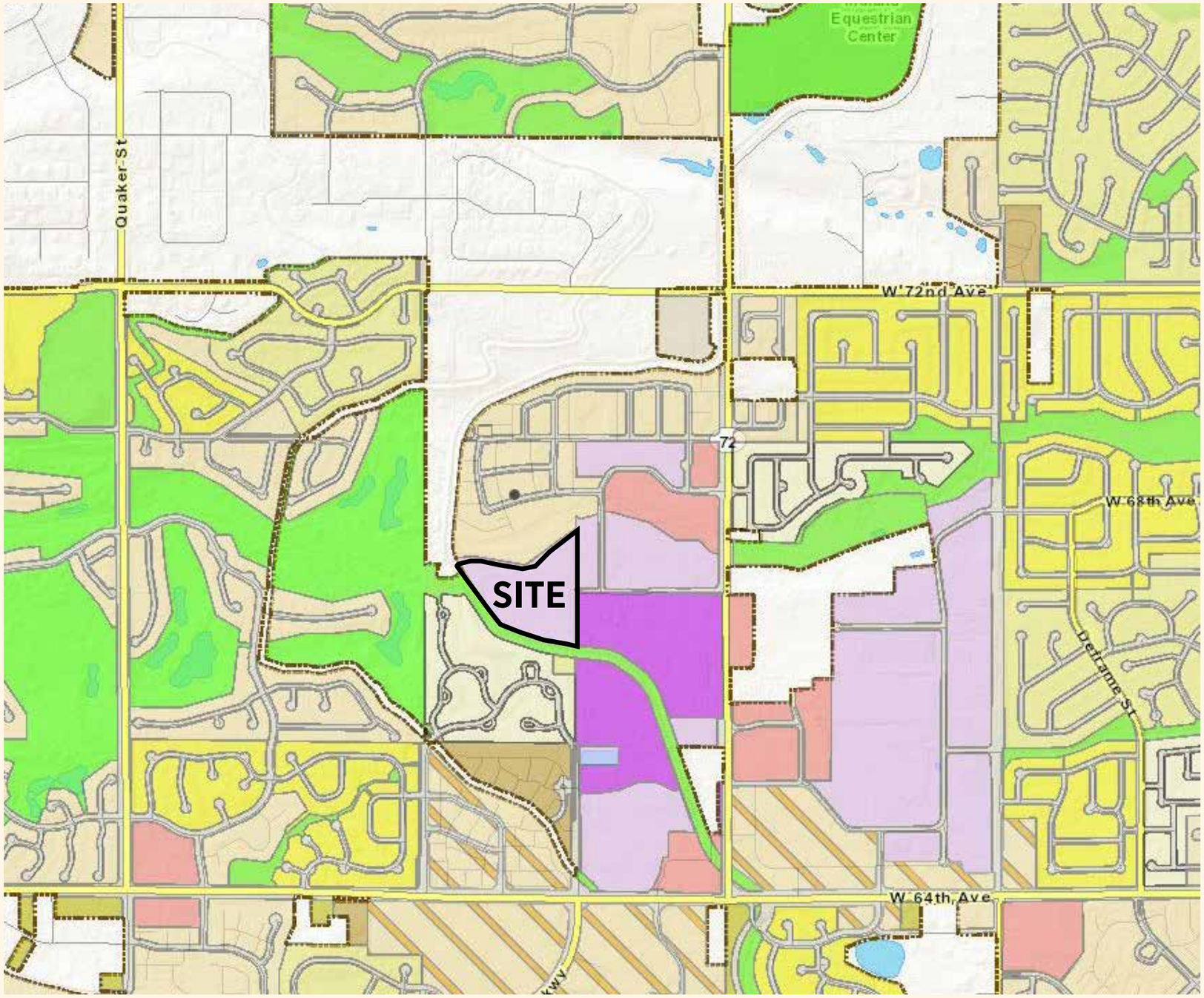
Terracon
JEFF ATTIG +
KEVIN SAYLOR

STUDIO LIGHTNING
JACOB BENNEFIELD

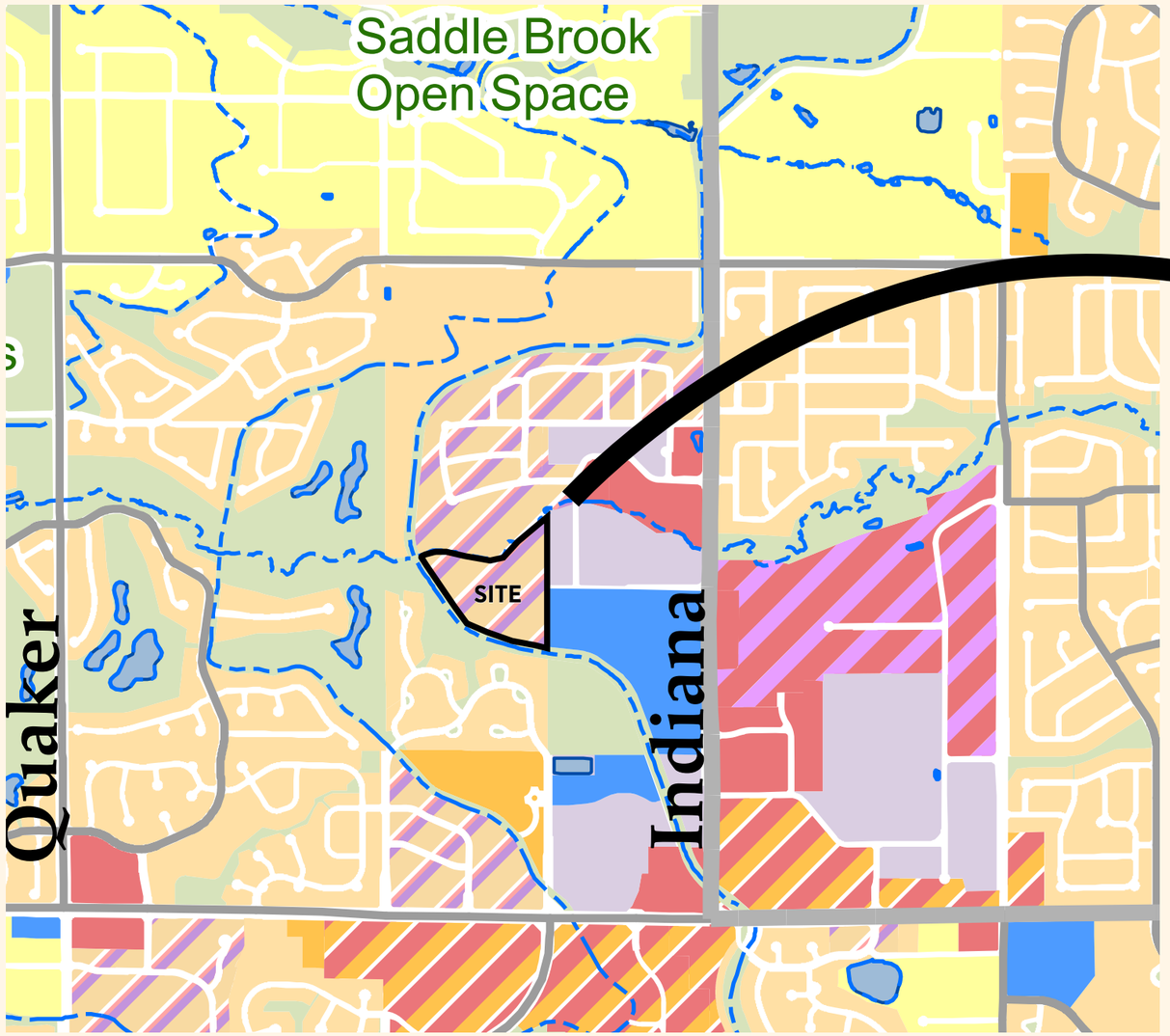
HAUSER ARCHITECTS
CURTIS KOLDEWAY

Site Location

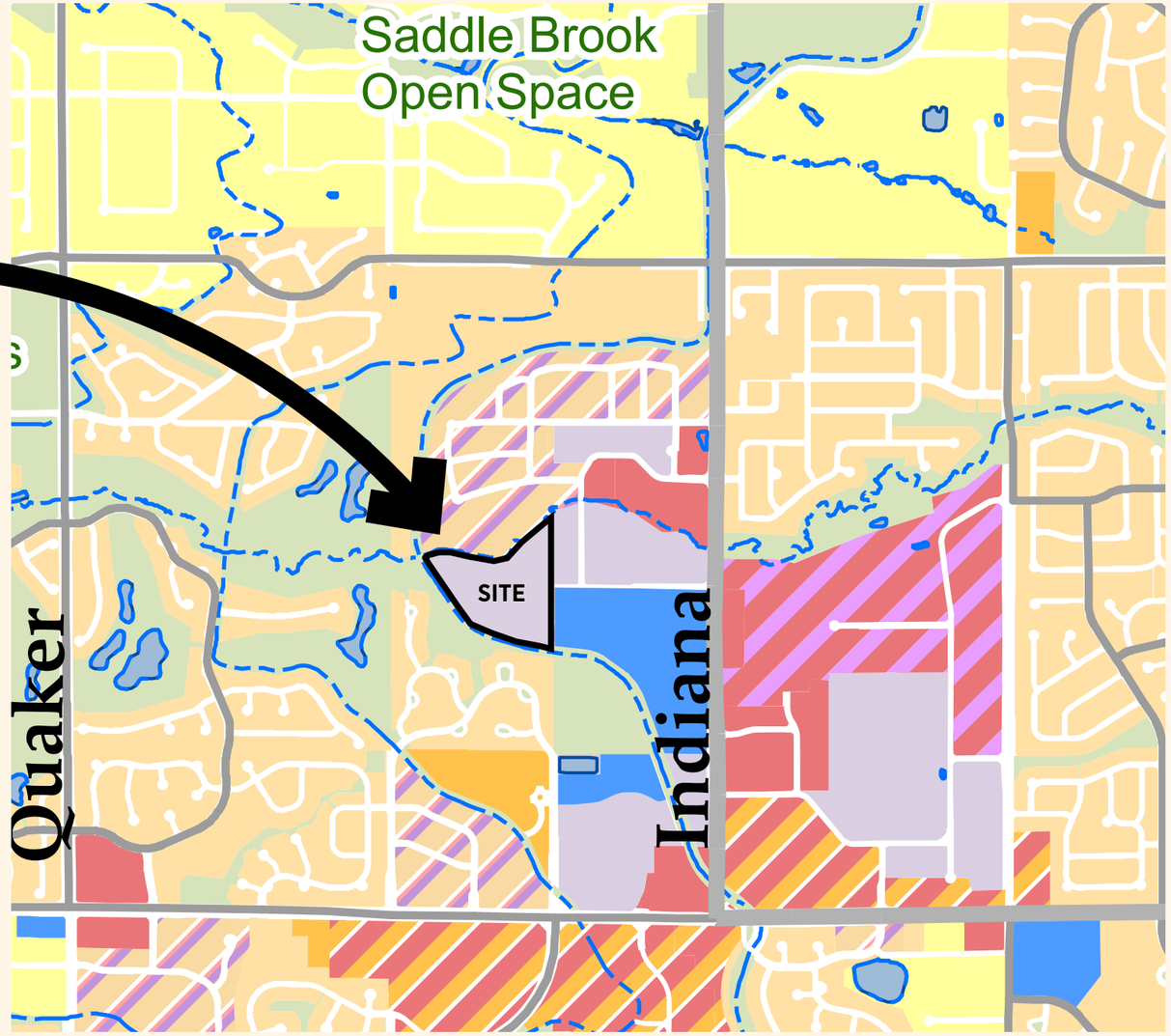
Site Enlargement



Existing Zoning | Industrial Light (IL)



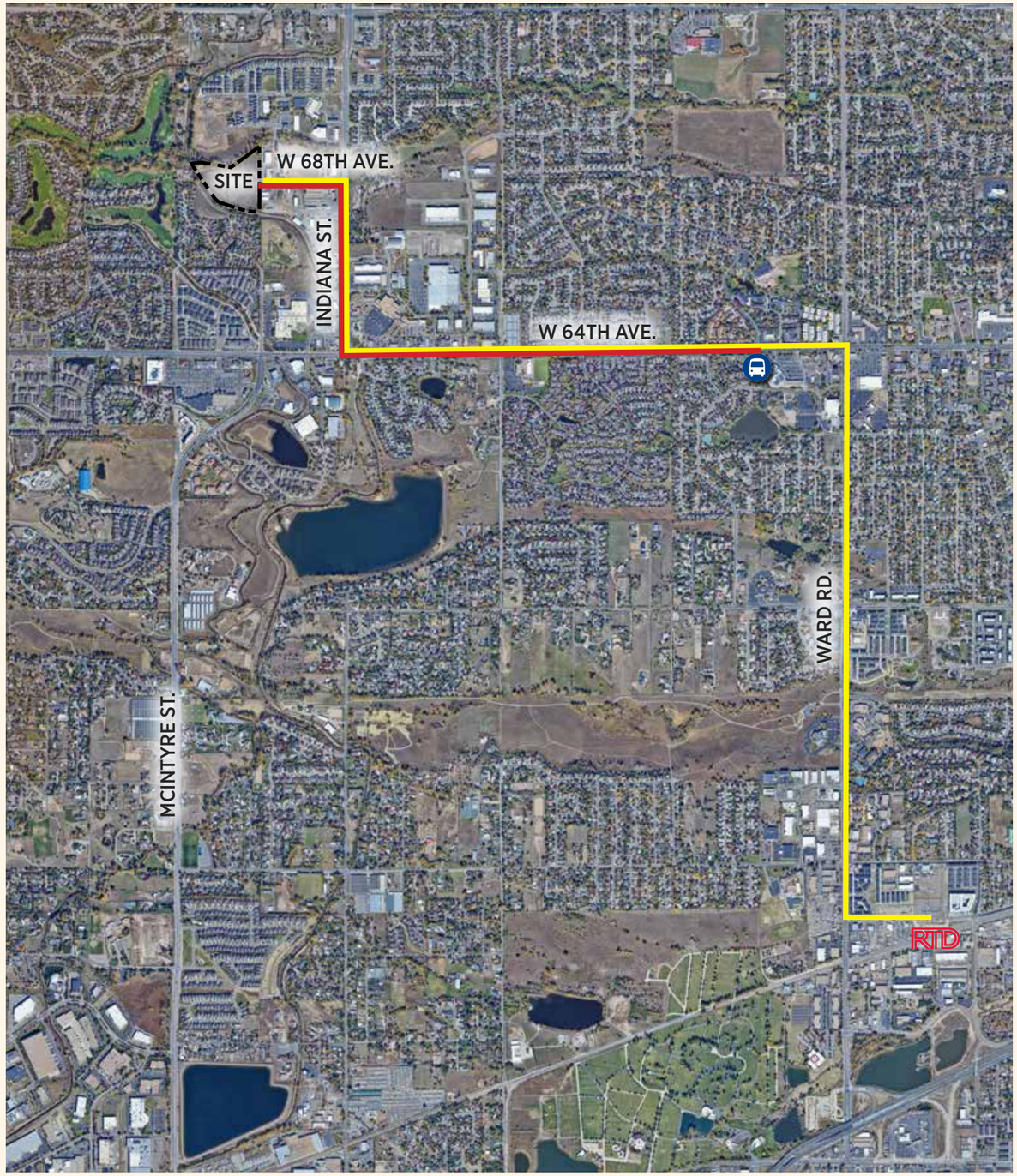
Existing Comprehensive Plan Use: Mixed-Use: Residential Emphasis



Proposed Comprehensive Plan Use: Industrial Light/Office

*The environmental covenant on the property limits a number of uses that would be allowed under the MU-R designation

Comprehensive Plan Amendment

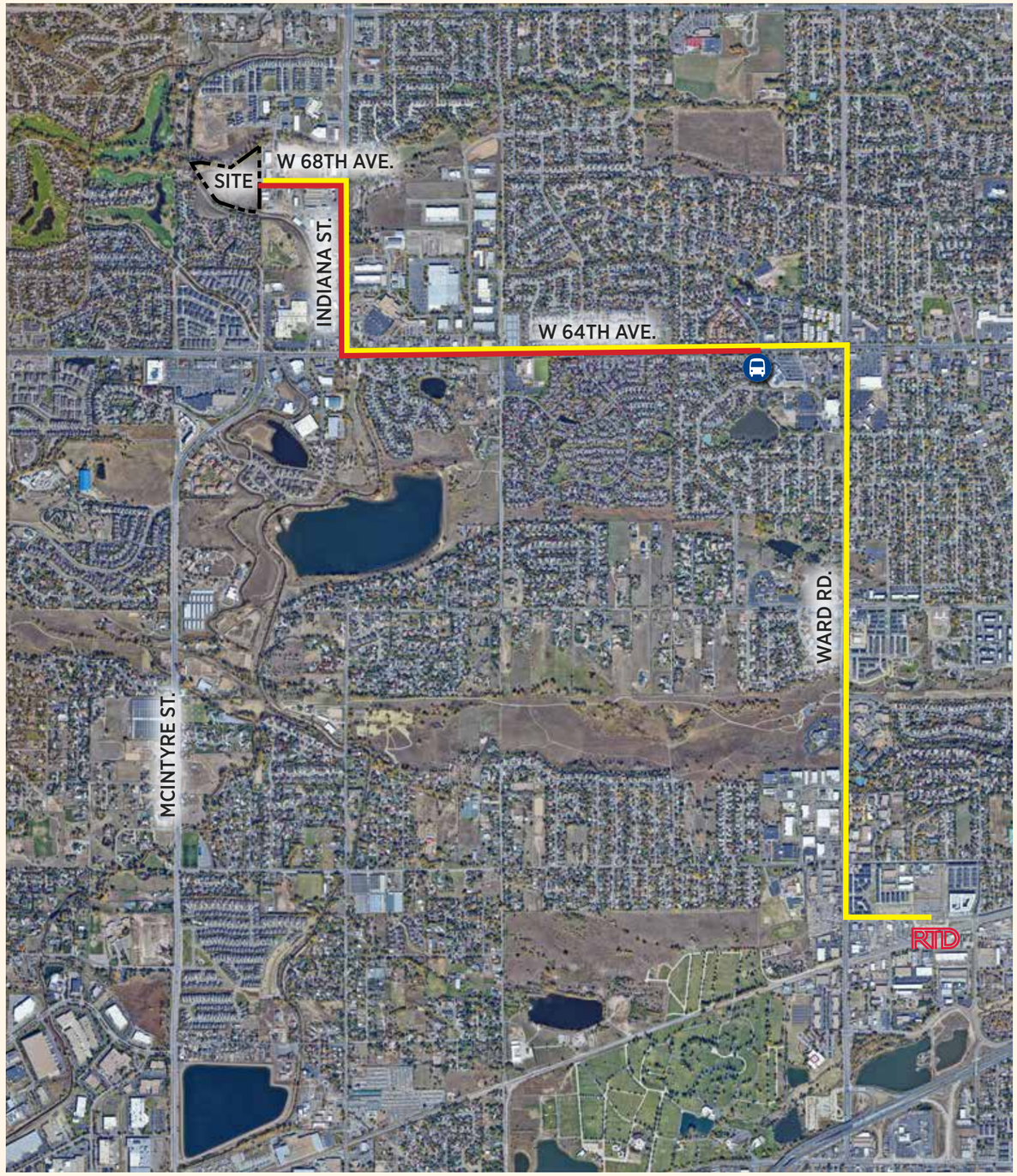


Criteria 2: Compatibility

The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.

The proposed amendment is compatible with the surrounding area, providing an extension of the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- A Mixed Use-Residential Site should provide good access to mass transit.
- Nearest operational bus stop ~2 miles from site
  - ~5 min. drive
  - ~40 min. walk
- Nearest operation train station ~5 miles from site
  - ~10 min. drive
  - ~90 min. walk



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2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

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	2	Compatibility The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.
✓	3	**Transportation** **The proposed amendment will have no major negative impacts on transportation, services, and facilities.**
✓	4	**Utilities** **The proposed amendment will have minimal effect on service provision, including adequacy or availability of urban facilities and services, and is compatible with existing and planned service provisions.**
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	7	Public Welfare The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.

Comprehensive Plan

Overarching Theme: Smart decisions about transit and residential development to promote vibrant communities

- "New ***emphasis on integrating economic growth and neighborhood vitality with all transportation modes:*** streets, transit, commuter rail, bicycle, and pedestrian, to complete and connect Arvada"

- "Arvadans' desire a local government that is fiscally sustainable. This requires wise governance and current and future land uses that generate enough revenue to provide a high level of municipal services. ***City economic development programs, zoning, signage and permitting processes must encourage business development while protecting the integrity of the community.*** This can be achieved through an appropriate balance of residential and commercial development."

Comprehensive Plan

POLICY L-3.1: Designated Mixed-Use Areas

- "Criteria for New and Redeveloping Mixed-Use Areas Mixed-use areas are envisioned as ***strategically located,*** high intensity, pedestrian-oriented activity areas ***providing a range of retail, business, civic, cultural, and residential opportunities*** for the surrounding trade area. Mixed-use areas should be located in urban centers or designated corridors and should create or demonstrate the following characteristics:

    - ***Transit-supportive residential densities*** with ***a mix of housing*** types and ***affordability***;
    - ***Transit-supportive mix of retail*** and employment opportunities;
    - ***Streets or other physical features that help define the center;***
    - Public plazas, gathering spaces or amenities designed as a focal point;
    - ***Transit service***
    - ***Pedestrian-oriented*** site design; and
    - ***Interconnected network of multi-modal streets*** linking to surrounding areas.

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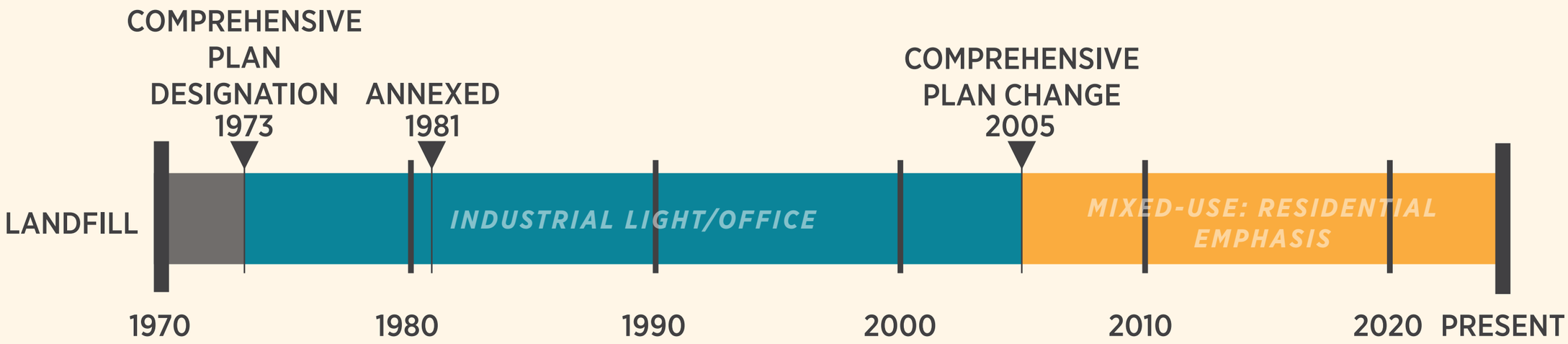
Criteria 2: Compatibility

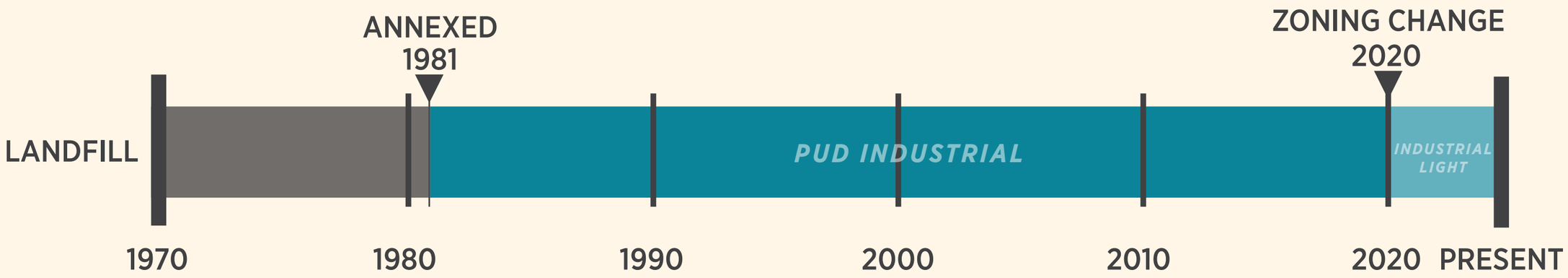
The proposed amendment is compatible with the surrounding area, providing an extension of the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- Compatible with Surrounding **Industrial** Land Uses:
  - This site has been zoned for Industrial for 43 years.
  - When the land was annexed by the City, they identified it for industrial property.
  - Directly connected to developed industrial property to the east, including the City's heavy industrial operations and a bus farm.
  - Development on access road has heavy truck traffic
  - No sidewalks
  - Neither pedestrian nor commuter friendly.

COMPREHENSIVE PLAN TIMELINE



ZONING TIMELINE



Designation Timeline

Criteria 2: Compatibility

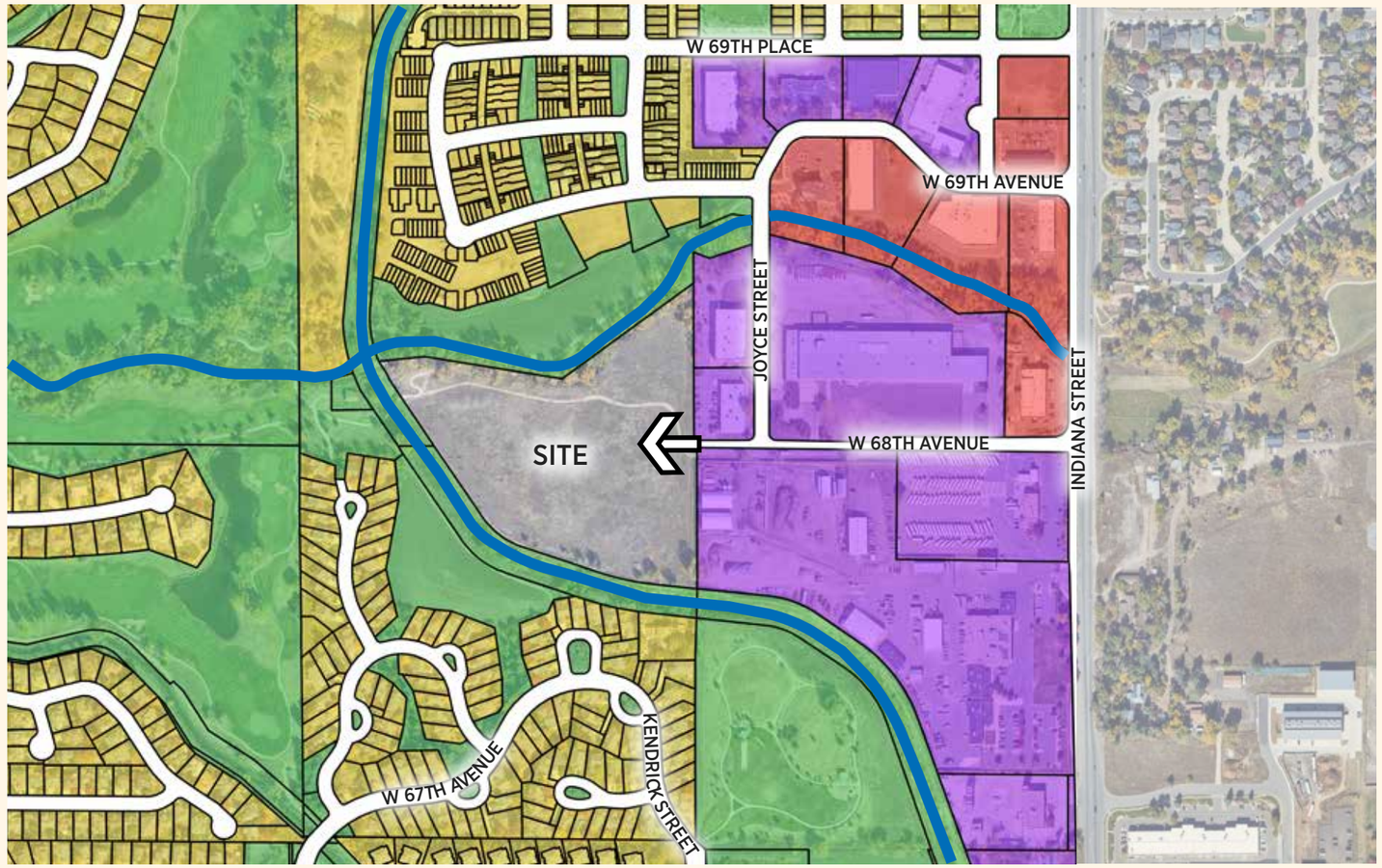
The proposed amendment is compatible with the surrounding area, providing an extension of the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

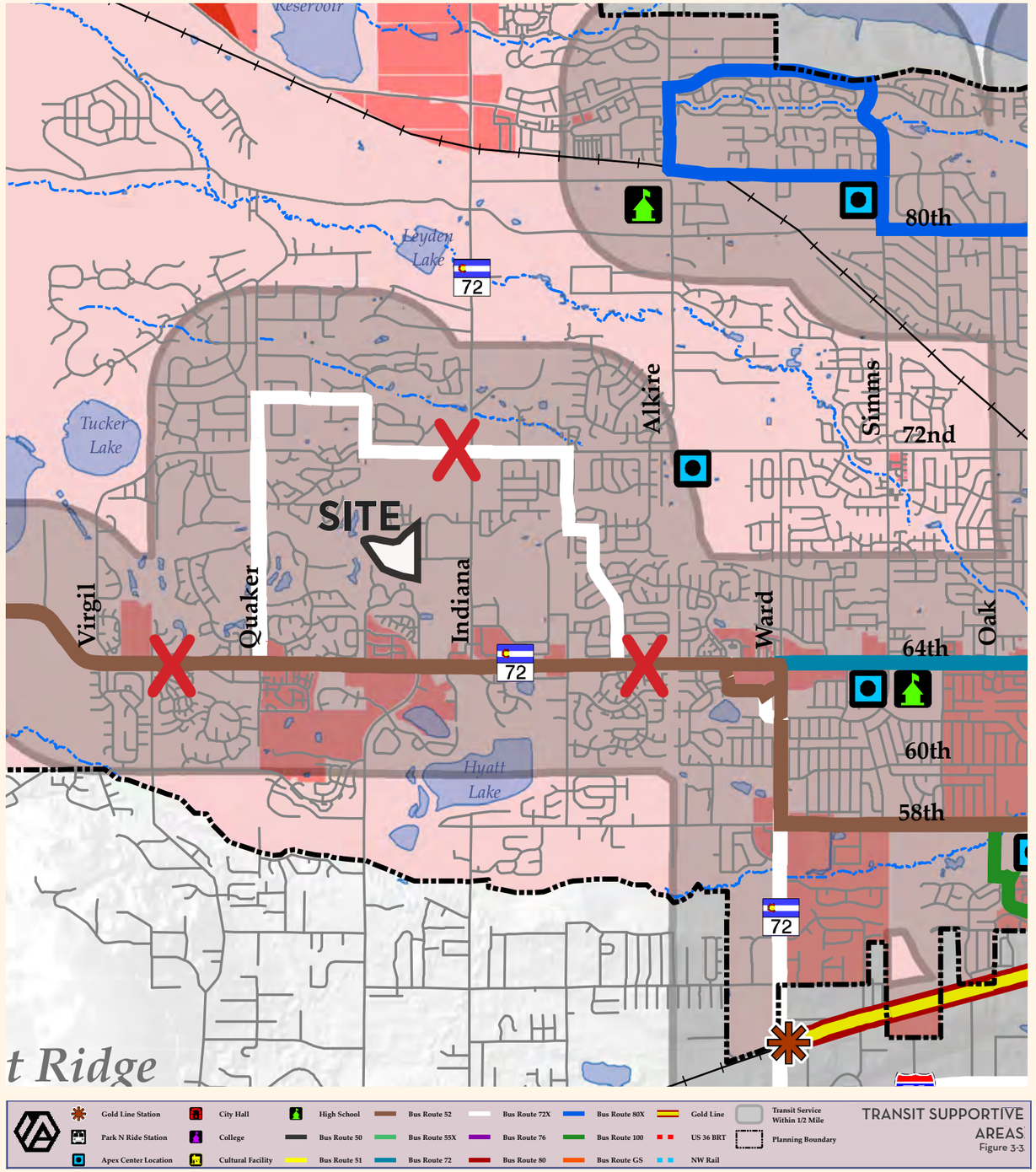
- Incompatible with Residential Use
  - Bounded by heavy and light industrial operations to east.
  - Only access is through industrial properties No sidewalks on streets to provide pedestrian connectivity.
  - Heavy truck traffic incompatible with pedestrians and local residential traffic.

Criteria 2: Compatibility

The proposed amendment is compatible with the surrounding area, providing an extension of the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- Single Point of access to the site
    - Development has built up in all directions surrounding this site
    - Only one access point to the site
    - Insufficient access for residential development
    - Mixed Use Residential: 7 units/acre minimum = 99 units



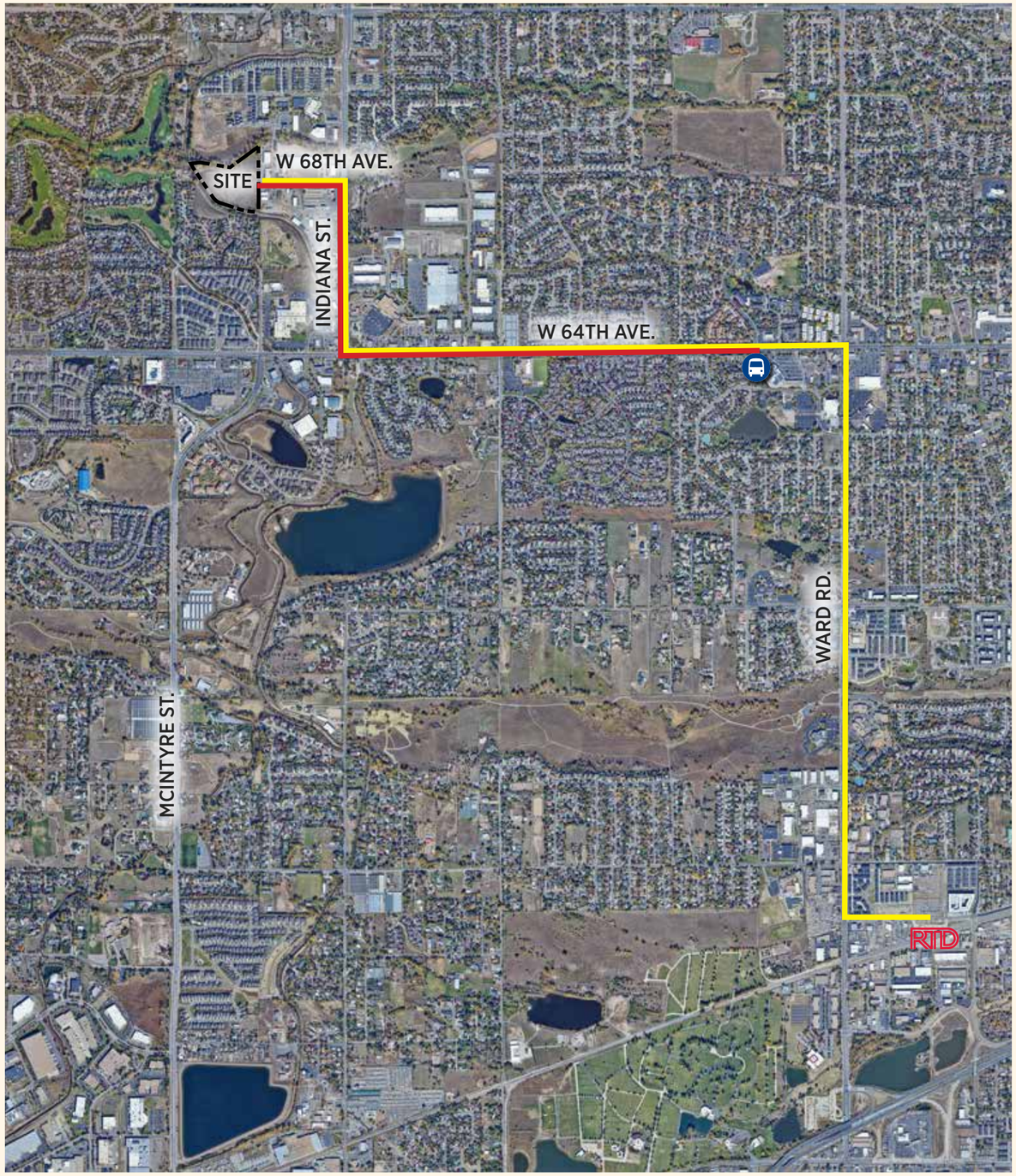


2014 Comprehensive Plan Transit Map

Criteria 2: Compatibility

The proposed amendment is compatible with the surrounding area, providing an extension of the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- A Mixed Use-Residential Site should provide good access to mass transit.
- In 2014, closest bus route was at the intersection of Indiana and 72nd, approximately 0.75 miles from the property .
- RTD has since permanently closed the two closest transit routes:
    - Bus Route 52 (east-west travel along 64th Ave.)
    - Bus Route 72X (north-south and east-west travel around 72nd Ave.)



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✓	**7**	**Public Welfare** **The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.**

Criteria 7: Public Welfare

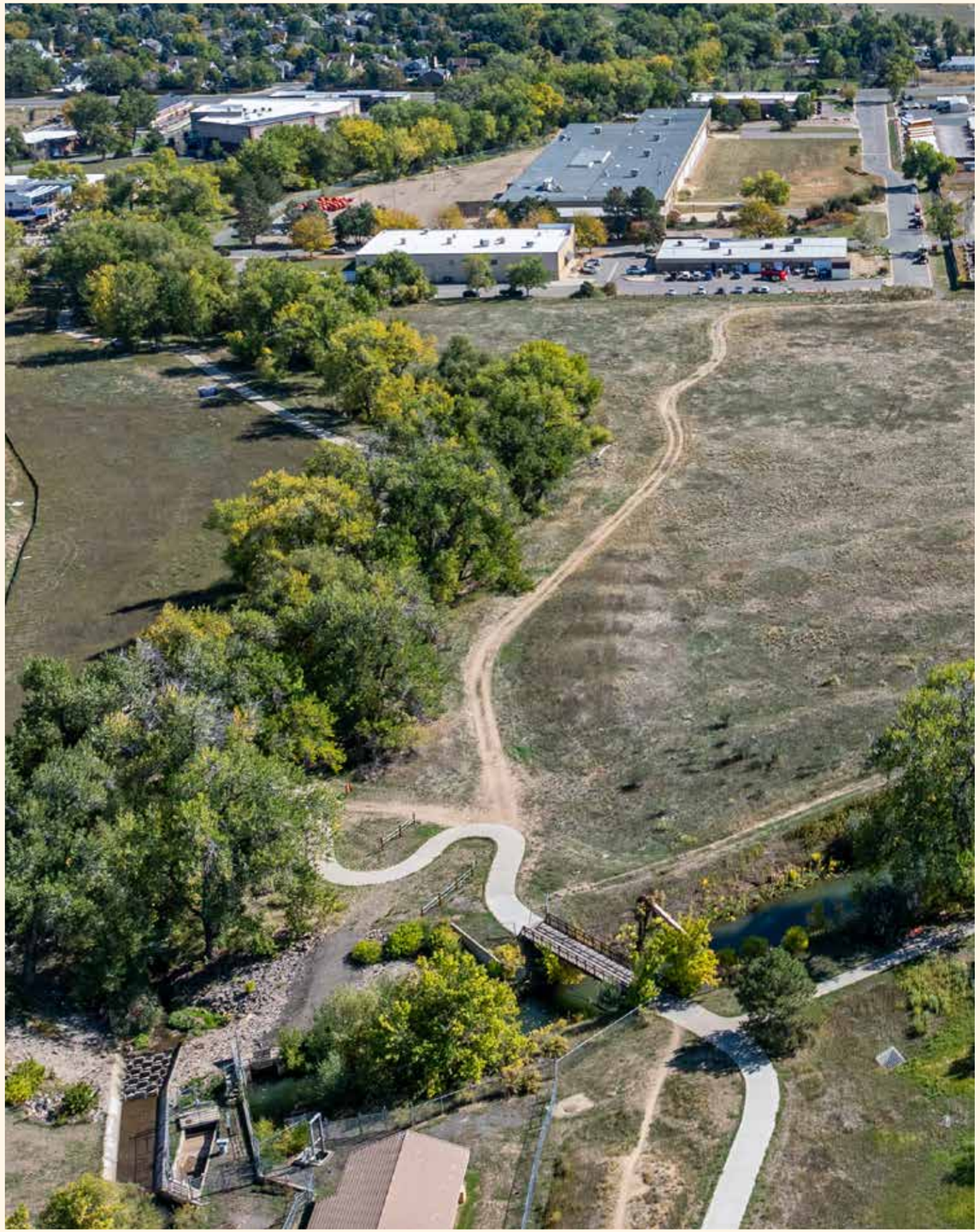
- Developing the site ensures that the landfill will have consistent monitoring.

Criteria 7: Public Welfare

- This land use ensures a significant buffer along the southern property line
    - Maintain native plant materials
    - Support a better wildlife corridor

Criteria 7: Public Welfare

- This land use ensures a significant buffer along the southern property line
    - Maintain native plant materials
    - Support a better wildlife corridor



Criteria 7: Public Welfare

- Along with the Final Plat, the developer has committed to dedicating a public access easement for the Ralston Creek Trail.

2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

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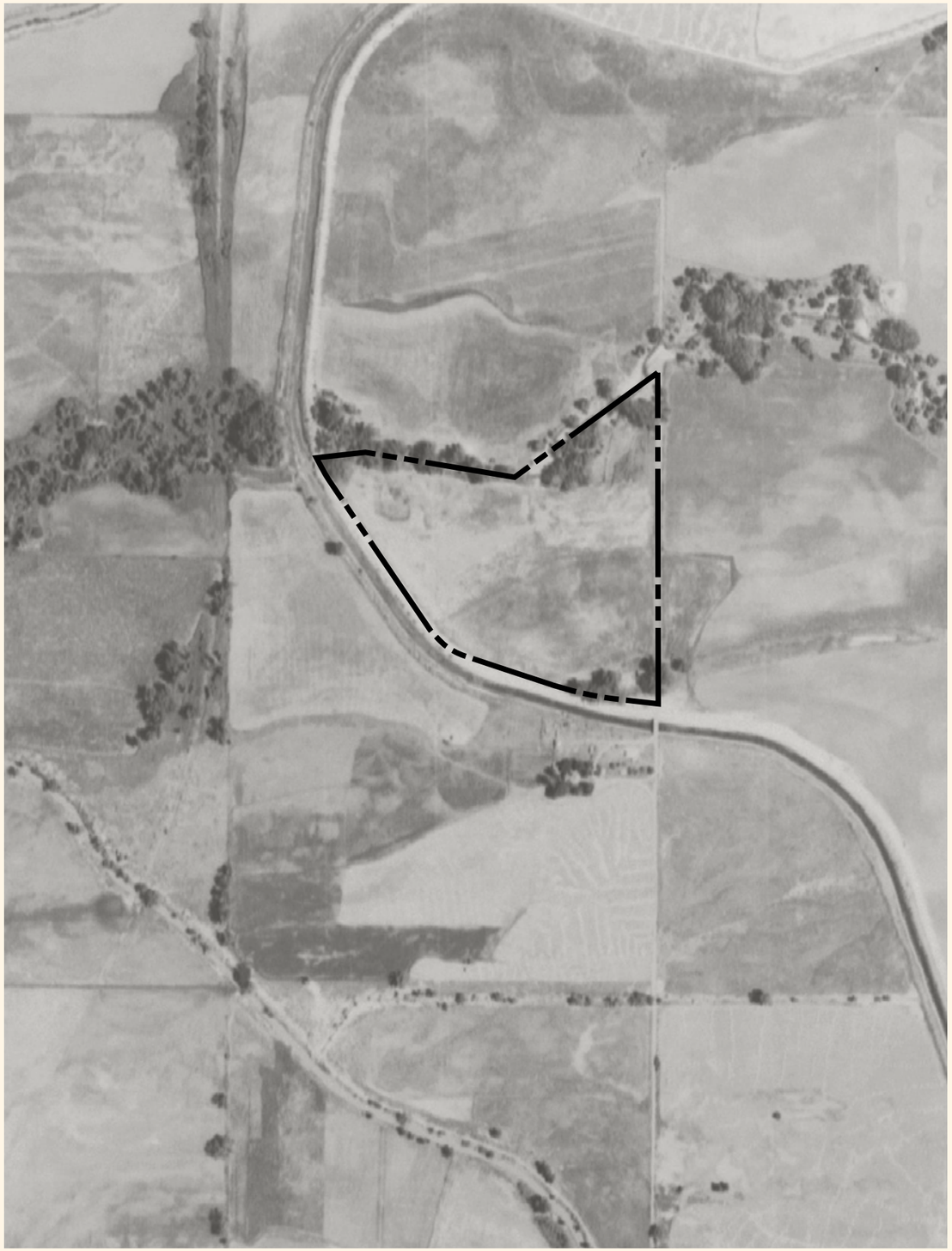
Criteria 1: Feasibility

Residential Development of the Site is not Feasible

- Construction of Residential Units on Top of the Current Landfill is Not Feasible
- Removal of Landfill Materials is Not Economically Feasible
- Uses on Top of Old Landfills Typically Have Low Loading and Are Commonly Industrial Uses



Criteria 1: Feasibility

This site is not feasible for residential. For this reason, the existing Comprehensive Plan is in need of the proposed amendment.

Site Issues

- Parcel was a former common landfill site operated by Jefferson County from the 1930s to 1970s
- Closed in the 1970s before current regulations were in place
- Old landfills commonly have a wide variety of wastes and potential contaminants
- They often generate methane gas and odors from decomposition
- The site is unfit for residential development without costly environmental remediation

Criteria 1: Feasibility

This site is not feasible for residential. For this reason, the existing Comprehensive Plan is in need of the proposed amendment.

Site Status

- Capped with 1’ to 5’ of fill
- Hummocky topography indicates settling and decomposition
- There are methane gas and odor issues
- Geotechnical Stability Issues
- Data Collected since the 1990s indicates that there are some issues present, but none that trigger any particular regulatory action
- It has a VCUP Approved by CDHPE to repurpose the landfill for industrial use

Criteria 1: Feasibility

Construction of Residential Units on Top of the Current Landfill is Not Feasible

- ***CDPHE will not allow residential construction on top of a historic landfill***
- Geotechnical Costs
    - 30’ deep piers
    - Establishment of Clean Corridors
    - Differential Settlement and Dynamic Compaction
    - Significant Site Disturbance
- Risks – Create Significant Financial Risk with Unknown Cost Implications
    - Methane Gas
    - Odor
    - Potential Indoor Air Exposure
    - Failed Utilities
    - Geotechnical Remedy Costs

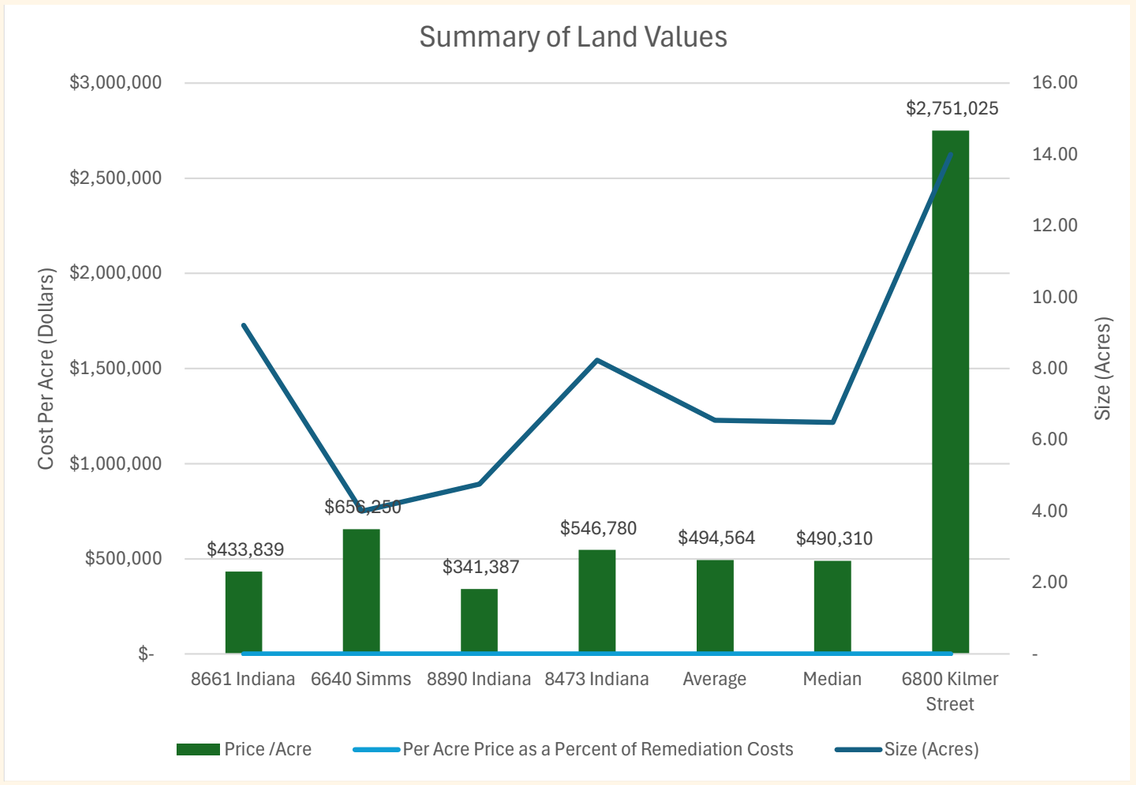
Criteria 1: Feasibility

Removal of the Landfill is Not Economically Feasible

Assumptions:

- Approximately 11 acres of Landfill Material
- Assume Average Excavation Depth of 14’ (12’ landfill + 2’ below landfill)
- Assume 20% Asbestos Containing Waste
- Assume Dewatering
- ACM Oversight
- Backfill and Compact with Clean Fill
- 30% Contingency
- 311,000 cubic yards

Total Estimated Cost to Remove Landfill = $38.7 Million



Criteria 1: Feasibility

Removal of the Landfill is Not Economically Feasible

- ***Remediation Cost Per Acre = $2.75 Million***
- Remediation Cost Per Unit = $393,004
- These costs don't include horizontal development costs (utilities, roads, etc.)
- Financing Won't be Available Until Remedy is Complete
- ***Raw Land Cost is Approximately 5 times that of other development sites***

<u>Other Considerations:</u>

- 270 Trucks Per Day
- Completion Timeline = 62 weeks

Criteria 1: Feasibility

Construction on Historic Landfills are Commonly Low Impact Industrial Uses

- Light Industrial Buildings with proper foundation design and sub-slab ventilation
- Vehicle Storage Yards
- Inventory Storage Yards
- Raw Material Storage Yards (aggregate)
- Recreational Vehicle Storage Yards
- Solar Arrays (though differential settlement is commonly a problem)

2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

✓	1.	Necessity / Feasibility The existing comprehensive plan and/or any related element thereof is in need of the proposed amendment.
✓	2	Compatibility The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.
✓	3	Transportation The proposed amendment will have no major negative impacts on transportation, services, and facilities.
✓	4	Utilities The proposed amendment will have minimal effect on service provision, including adequacy or availability of urban facilities and services, and is compatible with existing and planned service provisions.
✓	5	Annexation The proposed amendment, if for an area outside of the City's current municipal boundaries, is consistent with the City's ability to annex property.
✓	**6**	**Strict Adherence** **Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.**
✓	7	Public Welfare The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.

Criteria 6: Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.

- Residential not allowed in industrial zones (LDC § 3-1-2-2)
- Mixed Use: Residential requires housing as the “predominant” use (Comp. Plan p. 2-25)
- The two designations cannot co-exist
- Residential not a viable use
- Industrial uses are the only viable uses
- Without Industrial Light/Office designation the property has no viable use or value
- In 2020, City Council approved zoning modification that retained industrial use

Thank You!

Backup Slides

Timeline

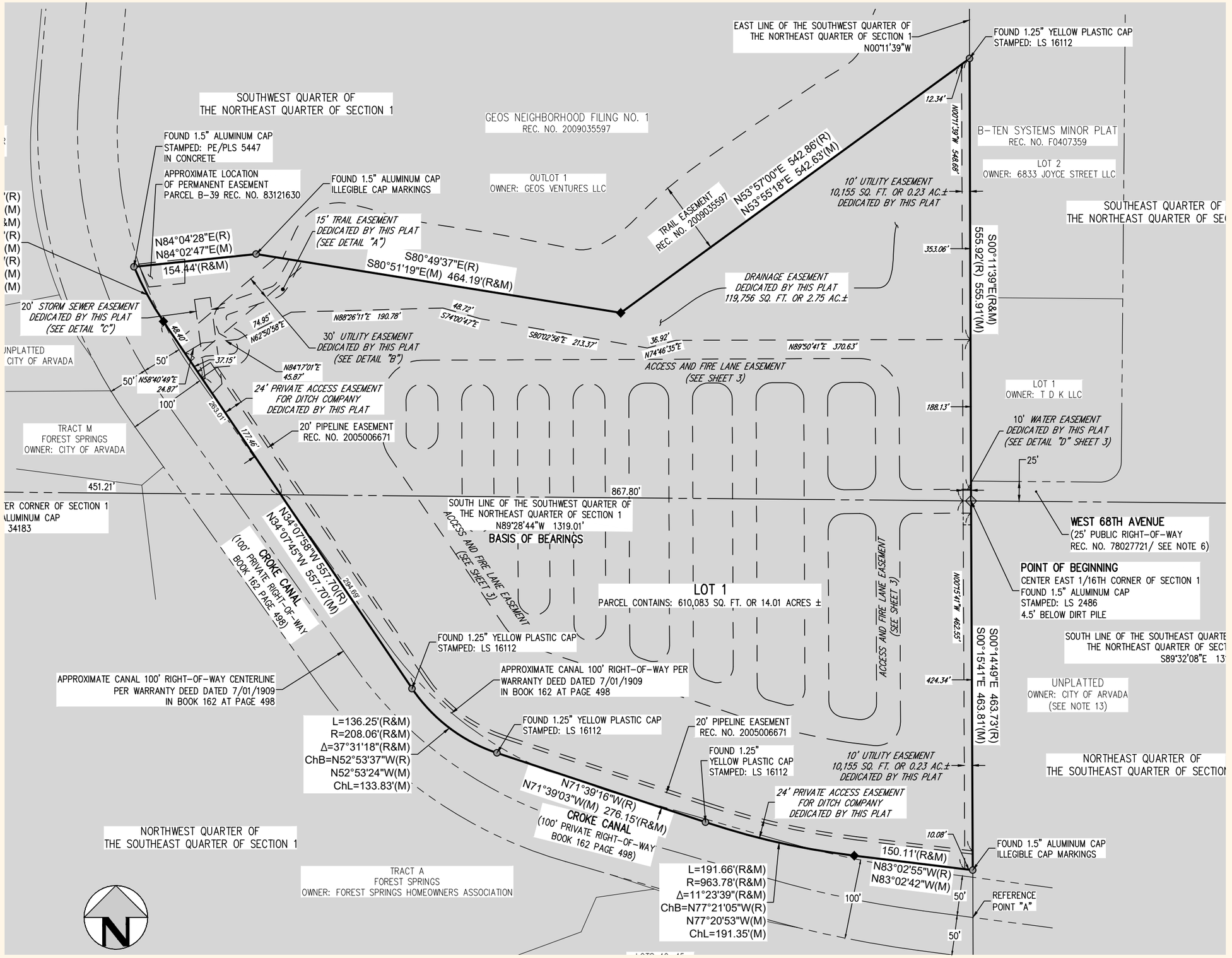
- **6/1/2020: Arvada City Council approves and adopts the Arvada Land Development Code (2020), which rezoned 6800 Kilmer to IL (Industrial) zoning (Council Bill No. CB20-012, Ordinance No. 4728, Exhibit C)**
- 12/7/2021: 1st Site Plan Submittal
- 2/11/2022: 2nd Site Plan Submittal
- 3/16/2022: Official Site Plan Neighborhood Meeting
- **6/2022: Developer Change**
- 10/2022: Environmental Site Assessment Begins
- **7/18/2023: Voluntary Clean Up Action (VCP) Begins**
- 7/23/2023: Public Meeting in Arvada to discuss VCP with CDPHE
- 7/2023 - 9/2023: VCP Public Comment Period Open with Chelton, Terracon & CDPHE addressing Q/A
- **11/30/2023: VCP Approval by CDPHE**
- **1/2024: Site Plan Design Begins**
- 1/24/2024: Neighborhood Meeting Associated with a new Site Plan Application
- **2/2024: 1st Submittal for Site Plan with Minor Subdivision, Construction Documents and a Minor Comprehensive Plan Amendment**
- 2/2024 - 8/2024: City Review and Project Revisions per Staff and referral comments
- **9/17/2024: Planning Commission hearing for a Minor Comprehensive Plan Amendment to align with the current IL (Industrial) zone district**
- 11/4/2024: Planned City Council hearing for a Minor Comprehensive Plan Amendment to align with the current IL (Industrial) zone district -- pending PC hearing

Site History and Project Background

At Time Of Final Plat:

- Dedication Of Public Use Easement

  For The Ralston Creek Trail.



Final Plat

Existing Zoning - Permitted Uses

- Zoned Industrial Light (IL) per the City of Arvada's 2020 Land Development Code (CB20-012, Ordinance 4728, Exhibit C)
- Permitted Land Use - Motor Vehicle Storage
- Permitted Land Use - Outdoor Storage

Proposed Site Plan - RV Storage

- Lot size: 14 ac
- RV parking spaces: 355
- Office building: 240 SF
- Detention pond: 36,025 SF
- Landscaping: 53%
  - Includes minimum 240' buffer from fenceline to RN-4 zoning

Site Plan | Recreational Vehicle Storage

Other Uses Allowed in IL:

- Adult entertainment
- Outdoor amusement
- Brew pub / distillery
- Recreation
- Animal training / kennel / vet
- Office / retail
- Crematorium / funeral home
- Daycare (adult or child)
- School
- Hospital / medical office
- Light industry
- Recycling drop-off
- Fueling / service station
- Motor vehicle repair and service (heavy and light vehicles)
- Car wash
- Vehicle equipment & sales

2022 Site Plan Summary:

- Lot size: 14 ac
- RV parking spaces: 557
- Building: 1,405 sf
- Detention pond: 21,850 sf
- Landscaping: 28%

2022 Site Plan

2022 SITE PLAN

- RV parking spaces: 557
- Building: 1,405 sf
- Detention pond: 21,850 sf
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- 20 Ft southern planting buffer
- 20 Ft northern planting buffer
- 70 Ft western planting buffer

2024 SITE PLAN

- RV parking spaces: 355

  REDUCED BY 202 SPACES
- Building: 240 sf

  REDUCED BY +/- 1,100SF
- Detention pond: 36,025 sf

  INCREASED IMPERVIOUSNESS BY +/- 14,000SF
- Landscaping: 53%

  INCREASED BY 25%

  ADDITION OF 2' BERM TO ACCENTUATE TREE HEIGHT
- 135 Ft southern planting border

  INCREASED BY 115'
- 35 Ft northern planting buffer

  INCREASED BY 15'
- 140 Ft western planting buffer

  INCREASED BY 70'

Site Plan Comparison

View Analysis | Existing Condition

View Analysis | Built Condition

View Analysis | Existing Condition

View Analysis | Built Condition

View Analysis | Existing Condition

View Analysis | Built Condition

Existing Site - Ideal Candidate for Comprehensive Plan Amendment

Criteria 1: The existing comprehensive plan and/or any related element thereof is in need of the proposed amendment.

Policy L-3.2: Criteria for New and Redeveloping Mixed Use Areas

Mixed Use Areas Should Be Located In Urban Centers Or Designated Corridors And Should Demonstrate The Following Characteristics

- Transit-supportive residential densities with a mix of housing types and affordability;
- Transit-supportive mix of retail and employment opportunities;

Site Constraints Include:

- Former landfill site
- Minimum density for Mixed Use = 7 dwelling units per acre
- Setbacks for Mixed Use (Multifamily Residential)
  - 15-20’ (front)
  - 10-20’ (rear)
- Single access point
  - Low traffic uses required with current access
  - Residential would likely require at least two points of access

Results:

Existing constraints would necessitate high density to meet MU-R, costly soil remediation would limit housing affordability, land uses allow for smaller setbacks without added buffers, and residential land use likely not permissible with single point of access.

2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

	1.	Necessity / Feasibility The existing comprehensive plan and/or any related element thereof is in need of the proposed amendment.
	2	Compatibility The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.
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	5	Annexation The proposed amendment, if for an area outside of the City's current municipal boundaries, is consistent with the City's ability to annex property.
	6	Strict Adherence Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.
	7	Public Welfare The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.

PROJECT NARATIVE
6800 KILMER STREET, ARVADA, CO

Chelton LLC seeks reconsideration of its Petition for Comprehensive Plan Amendment to modify the designation for 6800 Kilmer Street. The Property is zoned Light Industrial (IL), but the current Comprehensive Plan designates the Property for Mixed-Use Residential development. Because the Arvada Development Code requires new development to comply with the Comprehensive Plan, these mutually exclusive designations prevent development of the Property. Moreover, the Property presents very unique circumstances making any development other than light industry impractical. In particular, the Property is a closed municipal solid waste landfill that is directly connected to other industrial properties and that has very limited options for ingress and egress. Therefore, Chelton seeks amendment of the Comprehensive Plan to align the planned uses with the Property's current zoning.

In November 2024, City Council denied the requested amendment. Council has consented to reconsidering that decision. Chelton appreciates this opportunity and is presenting additional information about its planned development and use of the Property, including modifications to the development plan to address concerns raised by both neighbors and Council members.

Chelton proposes to develop the property for outdoor RV storage. This is perhaps the only practical and viable use of the Property. Storage will be on a surface lot, which minimizes the need to excavate landfill material while also avoiding significant structural stability and methane intrusion concerns that would result from an enclosed building on the Property. RV storage also minimizes the level of activity and noise that will be experienced on a day-to-day basis as compared to other possible surface uses, such as a construction yard or materials storage that would involve a daily buzz of activity with trucks, forklifts and other equipment. RV storage makes a much more appropriate transition from the residential neighborhoods located north and south of the Property to the heavy industrial properties immediately east of the Property, including the City's maintenance facility.

The project will include 355 surface RV parking spaces, a small office building, a detention pond, and enhanced landscaping to buffer the perimeter of the site. In total, 53% of the proposed planned development is landscaping/open space. The Property also has significant natural separation from residential areas in the form of water ways, the Croke Canal to the south and west and Ralston Creek to the north. In addition, a twenty-four foot tall mound screens most of the Forrest Springs neighborhood from view of the Property.

In response to the comments submitted at the hearing in November 2025, Chelton considered and is implementing further modifications to its development plan. Chelton evaluated altering the setbacks to residential areas, but doing so would significantly reduce the number of parking spaces and make the project financially infeasible. However, Chelton proposes additional landscaping to better screen the facility from the few homes that have a view of it. This landscaping includes increasing the height of a proposed berm from four feet to six feet. Chelton also proposes additional trees to provide a denser canopy and thus better screening of the lot. The trees will have the added benefit of screening the other industrial properties, including the City's maintenance facility, from the residential properties.

6800 KILMER VIEW STUDY - EXISTING CONDITION

SEPTEMBER 2025

VIEW STUDY RENDERINGS ARE BASED ON CURRENT SUBMITTAL DRAWINGS AND SUBJECT TO CHANGE

NORRIS DESIGN
PEOPLE + PLACEMAKING

6800 KILMER VIEW STUDY - PROPOSED CONDITION

SEPTEMBER 2025

VIEW STUDY RENDERINGS ARE BASED ON CURRENT SUBMITTAL DRAWINGS AND SUBJECT TO CHANGE

NORRIS DESIGN
PEOPLE + PLACEMAKING

6800 KILMER VIEW STUDY - EXISTING CONDITION

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NORRIS DESIGN
PEOPLE + PLACEMAKING

6800 KILMER VIEW STUDY - PROPOSED CONDITION

SEPTEMBER 2025

VIEW STUDY RENDERINGS ARE BASED ON CURRENT SUBMITTAL DRAWINGS AND SUBJECT TO CHANGE

NORRIS DESIGN
PEOPLE + PLACEMAKING

ARVADA COLORADO RV STORAGE SITE PLAN

SITUATED IN THE NORTHEAST 1/4 AND THE SOUTHEAST 1/4 OF SECTION 1,
TOWNSHIP 3 SOUTH, RANGE 70 WEST OF THE 6TH P.M.,
CITY OF ARVADA, COUNTY OF JEFFERSON, STATE OF COLORADO

LEGEND:

- CANOPY TREES
- EXISTING TREE TO BE REMOVED
- EXISTING TREE TO REMAIN
- ORNAMENTAL TREES
- EVERGREEN TREES
- EVERGREEN SHRUBS
- DECIDUOUS SHRUBS
- ORNAMENTAL GRASSES
- LANDSCAPE BED (LOW HYDROZONE)
- NATIVE SEED (VERY LOW HYDROZONE)
- WETLAND SEED (NON-IRRIGATED)
- COBBLE
- PROPERTY LINE
- FENCE-RE:AMENITY SCHEDULE ON SHEET 11

NOTES:
1. ALL PROPOSED PLANTS SHALL BE LOW OR VERY LOW WATER USE.

NORTH

0 25' 50' 100'
1" = 50'

*NOT FOR CONSTRUCTION

CHECKED BY: CR
DRAWN BY: JR

NORRIS DESIGN
PEOPLE + PLACEMAKING
3218 MANOR ROAD
SUITE 200
AUSTIN, TX 78723
P 512.900.7888
NORRIS-DESIGN.COM

ARVADA COLORADO RV STORAGE SITE PLAN
6800 KILMER ST
ARVADA, COLORADO

OWNER:
CHELTON LLC
PO BOX 460010
FORT LAUDERDALE, FL 33346

NOT FOR CONSTRUCTION

DATE:
03/01/24 - SUBMITTAL 01
06/21/24 - SUBMITTAL 02
03/14/25 - SUBMITTAL 03

SHEET TITLE:
BERM EXHIBIT

811

COMMENTS RECEIVED AFTER SEPTEMBER 3, 2025

Heidi Van Gieson <hvangieson@arvada.org>

Fwd: Kilmer RV Storage project

Julia Duncan <jduncan@arvada.org> Mon, Sep 29, 2025 at 8:26 AM
To: Planning Admin <plnadmin@arvada.org>

Good Morning,

Please see the below for public comment for Kilmer.

Let me know if you need anything else.

Sincerely,

Julia

Julia Duncan
Senior Planner
8101 Ralston Rd.
Arvada, CO 80002
Phone: 720-898-7458
jduncan@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

---------- Forwarded message ---------
From: **Ed Yevak** <[redacted]>
Date: Fri, Sep 26, 2025 at 10:04 AM
Subject: Kilmer RV Storage project
To: JDuncan@arvada.org <JDuncan@arvada.org>

Good Morning Julia, I am a commercial insurance agent residing / working in Arvada since 1996 and a number of years ago at a city council meeting the mayor at the time stated that because of all the potential liability with an unregulated and unmitigated landfill the city had declined to purchase the property. The same can be said for any insurance carrier…..none, zero would knowingly insure this property. My concern is that if the city allows this project it will slip thru the underwriting process and become insured. But if a claim occurs in any way related to the landfill, pollution for instance the history of the site will emerge and the carrier instead of paying the claim will fight it because they realize the potential liability. The affected parties might then be reduced to pursuing a South Dakota LLC, the current land owner. I don't foresee a happy ending and all this can be avoided by not allowing the project or requiring it to be cleaned up.

Thanks for your time….!

Ed Yevak

[redacted]

[redacted]

[redacted]

[redacted]

BINDING DISCLAIMER: Please note, insurance coverage cannot be bound or altered by leaving an email or voice mail message

CONFIDENTIALITY NOTICE

The information contained in this communication, including attachments is privileged and confidential. It is intended only for the exclusive use of the addressee. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering it to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited if you have received this communication in error. Please notify us by telephone immediately. Thank you.

CITY OF ARVADA

Josie Suk <jsuk@arvada.org>

Fwd: KNOWN LAST NIGHT -- Public Hearing Date for City Council Review of DA2025-0061 6800 Kilmer RV Storage is 10/21/25

Jessica Garner <jegarner@arvada.org> Wed, Sep 3, 2025 at 12:47 PM
To: Josie Suk <jsuk@arvada.org>

---------- Forwarded message ---------
From: **Rob Smetana** <rsmetana@arvada.org>
Date: Wed, Sep 3, 2025 at 12:13 PM
Subject: Fwd: KNOWN LAST NIGHT -- Public Hearing Date for City Council Review of DA2025-0061 6800 Kilmer RV Storage is 10/21/25
To: Jessica Garner <jegarner@arvada.org>

FYI.

Rob Smetana, AICP
Manager of City Planning and Development
720.898.7440
rsmetana@arvada.org
Regular Office Hours: Monday through Friday 8:00am to 5pm

AICP CERTIFIED

CITY OF ARVADA

---------- Forwarded mess
From: **Karen Gerbatsch** [redacted]
Date: Wed, Sep 3, 2025 at 11:29 AM
Subject: KNOWN LAST NIGHT -- Public Hearing Date for City Council Review of DA2025-0061 6800 Kilmer RV Storage is 10/21/25
To: Lauren Simpson <lsimpson@arvada.org>, Randy Moorman <rmoorman@arvada.org>, Bob Fifer <bfifer@arvada.org>, John Marriott <jmarriott@arvada.org>, Shawna Ambrose <sambrose@arvada.org>, Sharon Davis <sdavis@arvada.org>, <brupert@arvada.org>
Cc: Rob Smetana <rsmetana@arvada.org>, <jduncan@arvada.org>

Mayor and Council Members - last night's discussion to reopen the 11/04/24 public hearing, to set aside rules of procedure, and reconsider your decision to deny changing the comprehensive plan was built on falsehoods. The public hearing due dates attachment below was posted before the meeting, setting the City Council Review date of 10/21/25.

When asked about what new information was to be presented and when, the answer was "unknown". Why would any council do this without understanding what new information was going to be presented? That your legal team had the wrong information was incredulous! The motion to waive the minimum interval requirement was thrown out with only the

vote to hear new unproven information in a public hearing remained. City Council has had 2 Executive Legal Sessions on issues related to 6800 Kilmer RV Storage and this is the best legal strategy provided?

Every one of your constituents is sincerely frustrated with the stance that developers rule. The planning department must have worked with the developer to make LDC changes that would benefit this project since, as soon as they were passed, this project came alive again. Why don't you send it back to the Planning Commission where the review belongs with "new Information". A developer that only paid $85K for a 14 acre polluted dump in 2012 certainly seems to have more influence over Arvada government than its citizens.

TRUST - 5 simple letters with depth of meaning. TRUST is quickly vanishing. See geotechnical excerpts from three reports below on this unstable landfill. And please have this added to the new project file DA2025-0061.

Karen Gerbatsch, Sharon McCathy and Rick Simms representing Friends of Ralston Creek Neighborhoods

--

Jessica Garner, AICP
Community and Economic Development Director
Desk: 720-898-7016
Mobile: 720-454-4117
E-Mail: jegarner@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

2 attachments

Public Hearing Due Dates CC_1 (1).pdf
48K

Three Geotechnical Reports (2).pdf
130K

CITY OF ARVADA

Heidi Van Gieson <hvangieson@arvada.org>

Fwd: Written Comments – 6800 Kilmer Street RV Storage (Public Comment)

Josie Suk <jsuk@arvada.org> Fri, Sep 26, 2025 at 9:49 AM
To: Heidi Van Gieson <hvangieson@arvada.org>, Dixielee Rodriguez <drodriguez@arvada.org>

For RV storage

---------- Forwarded message ---------
From: **Kristen Rush** <kristen@arvada.org>
Date: Thu, Sep 25, 2025 at 11:36 PM
Subject: Fwd: Written Comments – 6800 Kilmer Street RV Storage (Public Comment)
To: Josie Suk <jsuk@arvada.org>

Sent from my iPhone

Begin forwarded message:

From: Jesse Glover [redacted]>
Date: September 25, 2025 at 5:48:01 PM MDT
To: Council@arvada.org
Cc: kristen@arvada.org, Jbebo@arvada.org, cedboardsandcommissions@arvada.org, pod@arvada.org
Subject: Written Comments – 6800 Kilmer Street RV Storage (Public Comment)

Date: 9/25/2025

Dear Arvada Planning Staff and City Council,

I am submitting written comments regarding the proposed RV storage facility at 6800 Kilmer Street. I am an Arvada resident and I oppose approval of this application.

Key concerns:

- Proximity to Ralston Creek & Trail: The site lies immediately adjacent to a sensitive riparian corridor used by families, cyclists, and wildlife. Any spill, erosion, or cover failure would flow directly toward the creek.
- Closed Landfill Risks: This is a historic landfill (pre-modern liners/leachate controls). Heavy vehicle traffic, grading, and utility work can compromise the cover, mobilize contaminants, and exacerbate methane migration.
- Wastewater & Stormwater: RVs generate gray/black water and carry fuels, oils, and cleaners. Without full sanitary connections and robust spill controls, the risk of illicit discharge or accidental release is non-trivial. Impervious surfaces will increase runoff toward the creek.
- Public Safety & Nuisance: Propane cylinders, batteries, and fuels elevate fire risk; firefighting runoff itself can contaminate surface waters. Late-night lighting and traffic are incompatible with a creek-adjacent neighborhood and greenbelt.
- Land-Use Compatibility: Long-term open storage of vehicles is inconsistent with the character and environmental values of the Ralston Creek corridor.

If the City considers approval despite these issues, I request, at minimum, the following conditions and independent reviews prior to any permits:

- Third-party hydrogeologic assessment (groundwater/leachate pathways) and methane monitoring/mitigation plan meeting current best practices.

- Full sanitary sewer connections for any RV servicing; explicit prohibition of on-site dumping; SPCC/HAZMAT plan; secondary containment for fuels/chemicals.
- Stormwater plan sized for extreme events with treatment/filtration before discharge; no net increase in runoff to the creek.
- Setback, fencing, lighting, and hours that protect the riparian corridor and trail users; dark-sky compliant lighting.
- A financial assurance/bond for monitoring and remediation tied to the operator, not taxpayers.
- Ongoing independent environmental monitoring with public reporting.

Given the environmental sensitivity and liabilities, I urge the City to deny the application. Preserving the health of Ralston Creek and the safety of nearby neighborhoods should take precedence.

Thank you for considering my comments.

Sincerely,
Jesse Glover
Arvada, CO resident
[redacted]

--
Josie Suk
Development Systems and Administrative Manager
Desk: 720-898-7627
Mobile: 720-582-4419
E-Mail: jsuk@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

Rehearing
Application for
Comprehensive Plan Amendment

City Council | October 21, 2025
6800 Kilmer - RV Storage
Arvada, Colorado

NORRIS DESIGN
PEOPLE + PLACEMAKING

CHELTON, LLC
DAVID SCHNEIDER

CLARK HILL
SCOTT CLARK

NORRIS DESIGN
PEOPLE + PLACEMAKING

EVA MATHER + CARL RUNGE +
DANIEL BRASWELL

HKS HARRIS KOCHER SMITH

KEVIN KENNEDY +
CHARLEY PEOPLES

Terracon

JEFF ATTIG +
KEVIN SAYLOR

STUDIO LIGHTNING

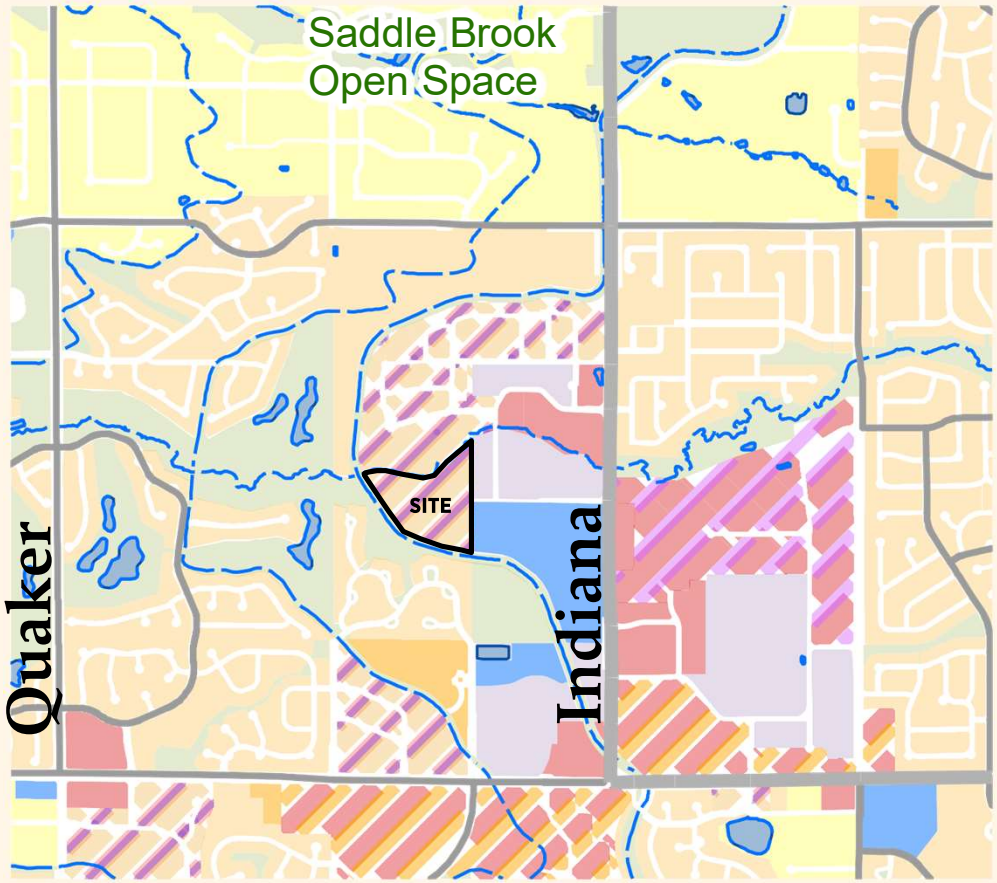
JACOB BENNEFIELD

HAUSER
ARCHITECTS

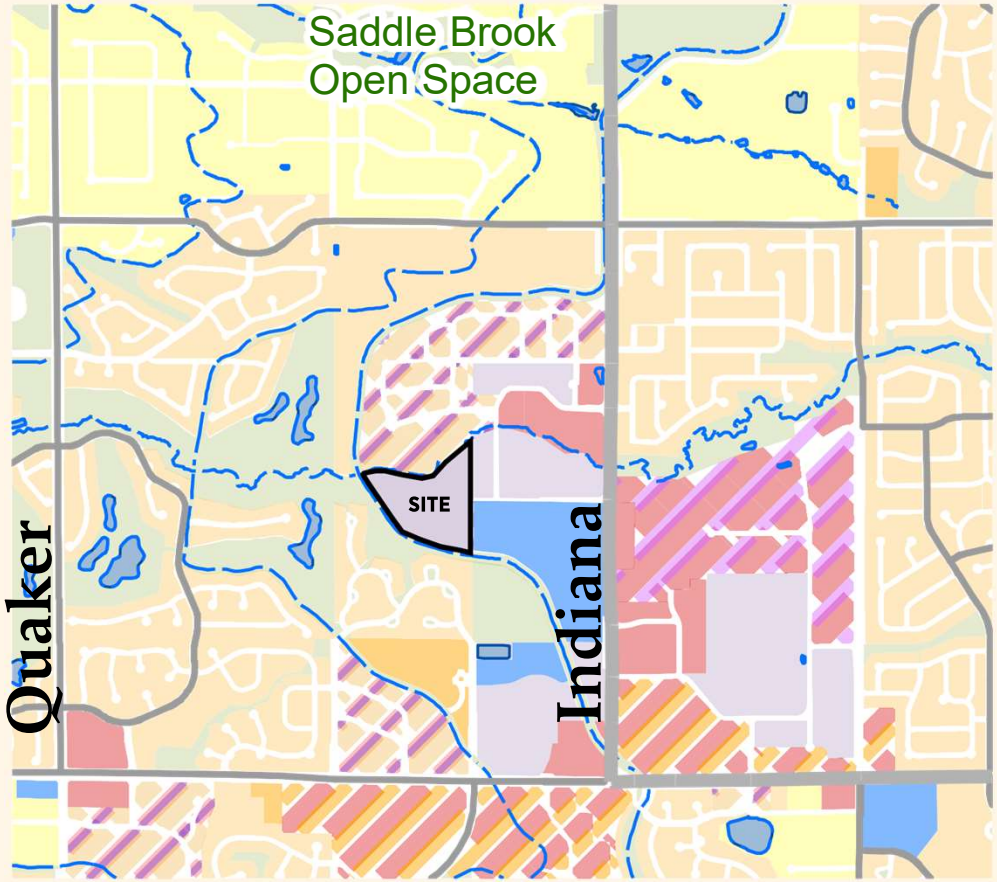
CURTIS KOLDEWAY

FOREST
SPRINGS
GEOS
NEIGHBORHOOD
Ralston Creek
Croke Canal
W 68TH Avenue

Site Enlargement



Existing Comprehensive Plan Use: Mixed-Use: Residential Emphasis



Proposed Comprehensive Plan Use: Industrial Light/Office

*An environmental covenant will limit the allowed uses and expressly prohibit residential use, which is a condition of CDPHE approval of the VCUP.

Comprehensive Plan Amendment

2022 SITE PLAN

- RV parking spaces: 557
- Building: 1,405 sf
- Detention pond: 21,850 sf
- Landscaping: 28%
- 20 Ft southern planting buffer
- 20 Ft northern planting buffer
- 70 Ft western planting buffer

2025 SITE PLAN

- RV parking spaces: 355

  REDUCED BY 202 SPACES
- Added 7' opaque fencing around the developed portion of the site.
- Building size revision: 240 sf

  REDUCED BY +/- 1,100SF
- Detention pond: 36,025 sf

  INCREASED BY +/- 14,000SF
- Landscaping: 53%

  INCREASED BY 25%

  ADDITION OF 2'-6' BERM TO ACCENTUATE TREE HEIGHT and SCREEN THE SITE MORE EFFECTIVELY
- 135 Ft southern planting border

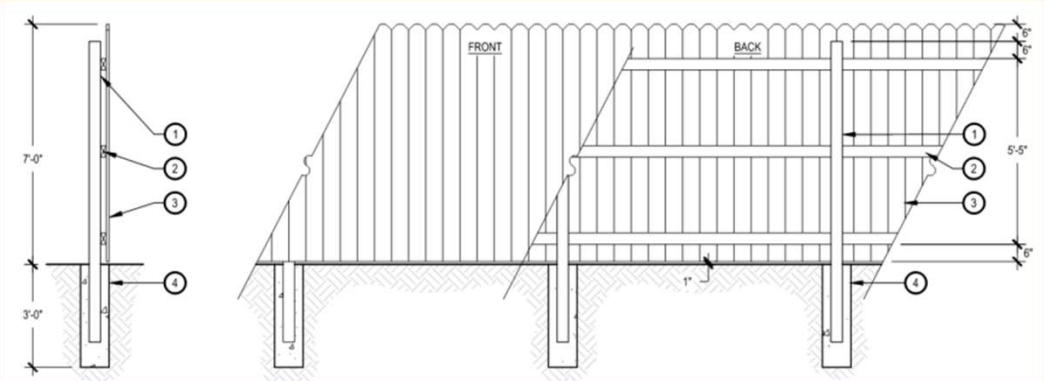
  INCREASED BY 115'
- 35 Ft northern planting buffer

  INCREASED BY 15'
- 140 Ft western planting buffer

  INCREASED BY 70'

Site Plan Comparison

7’ SAMPLE FENCE DETAIL



2025 SITE PLAN

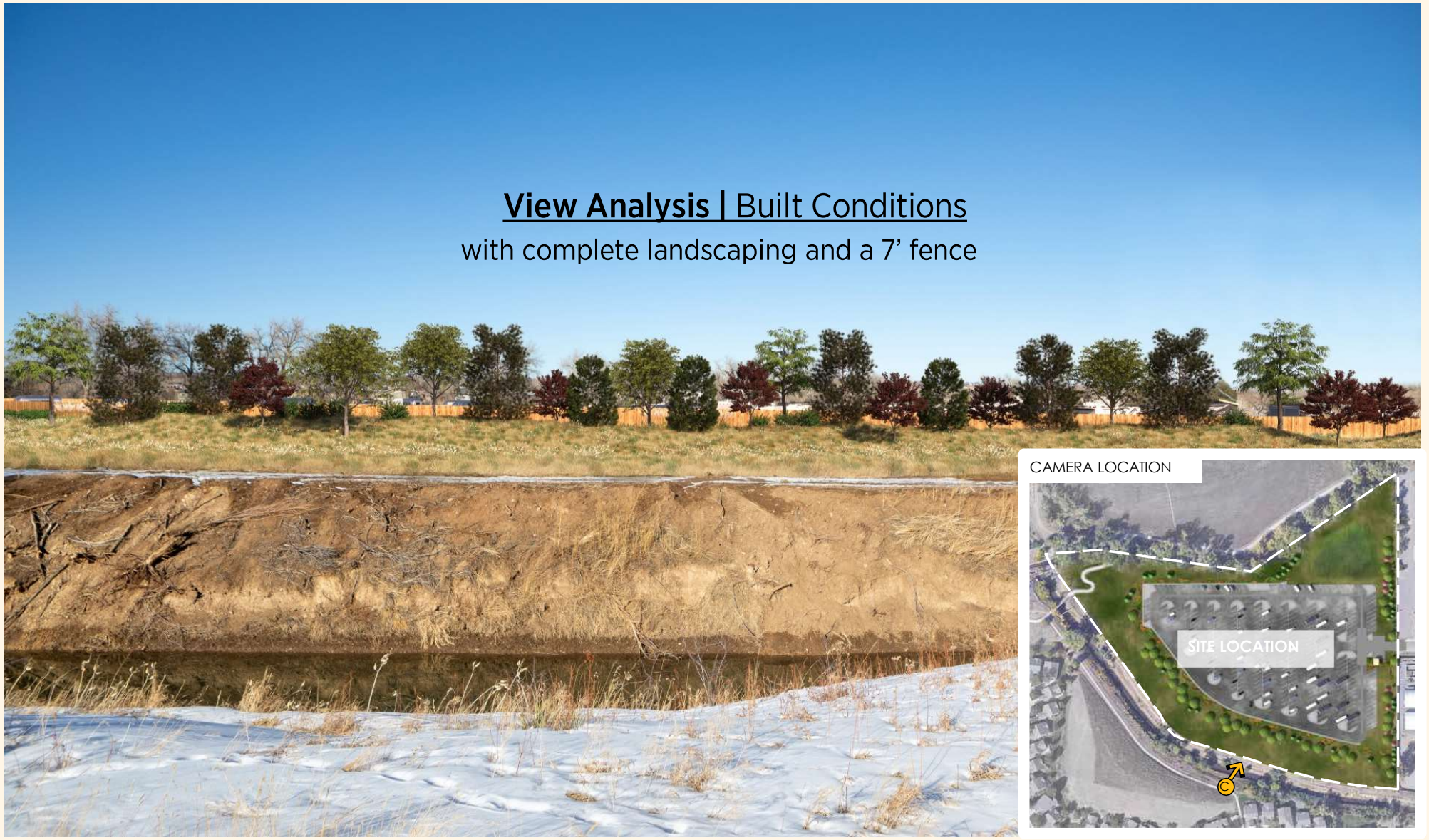
- *REVISED southern buffer:*
- **Doubled** the number of trees from 32 to 64
  - 27 of the 64 are evergreen (42%)
- Berm height increased from 2.5’ to 4-7’

Site Plan Comparison

View Analysis | Existing Conditions

View Analysis | Built Conditions

View Analysis | Existing Conditions


View Analysis | Built Conditions
with complete landscaping and a 7’ fence
CAMERA LOCATION
SITE LOCATION

View Analysis | Existing Conditions
CAMERA LOCATION
SITE LOCATION

View Analysis | Built Condition

Comprehensive Plan

Overarching Theme: Smart decisions about transit and residential development to promote vibrant communities

- "New ***emphasis on integrating economic growth and neighborhood vitality with all transportation modes:*** streets, transit, commuter rail, bicycle, and pedestrian, to complete and connect Arvada."

- "Arvadans desire a local government that is fiscally sustainable. This requires wise governance and current and future land uses that generate enough revenue to provide a high level of municipal services. ***City economic development programs, zoning, signage, and permitting processes must encourage business development while preserving the community's integrity.*** This can be achieved through an appropriate balance of residential and commercial development."

POLICY L-3.1: Designated Mixed-Use Areas

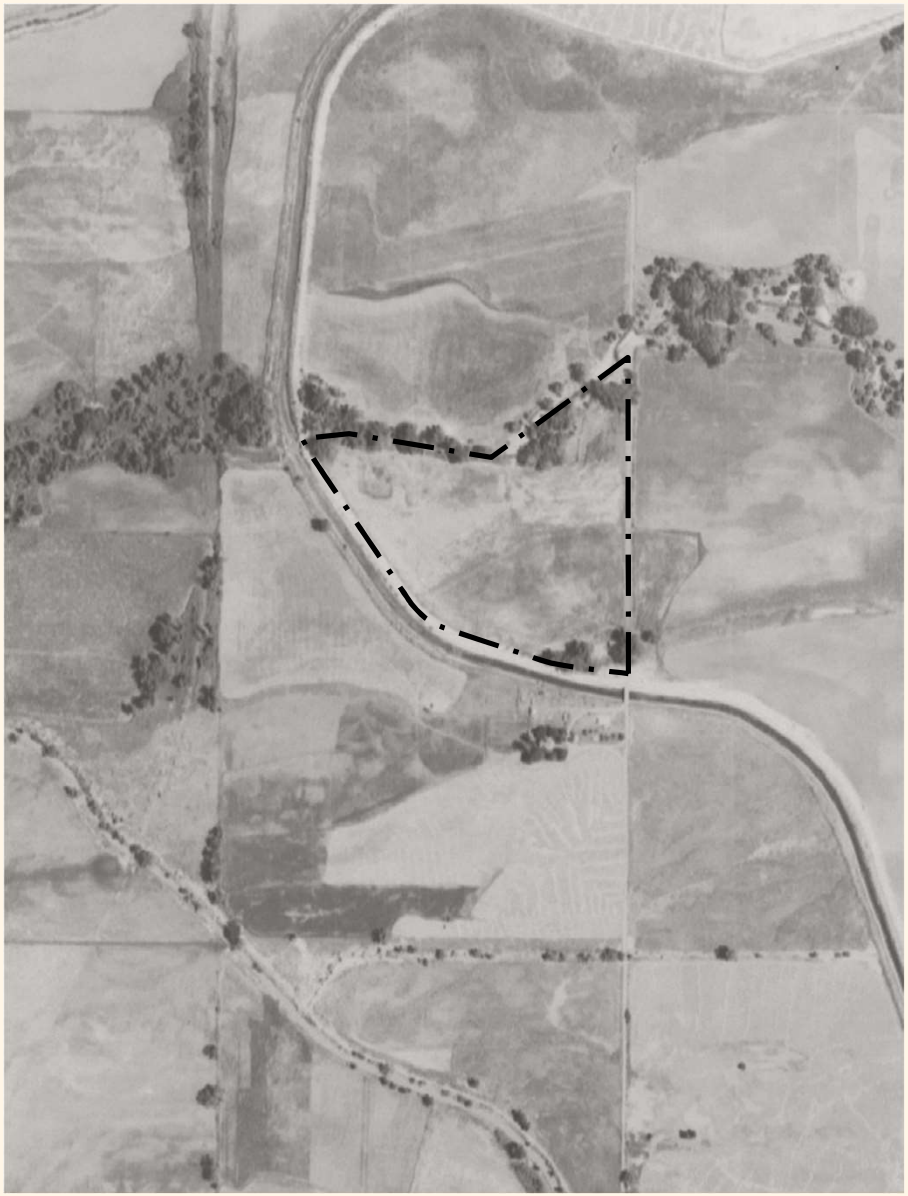
- "Criteria for New and Redeveloping Mixed-Use Areas. Mixed-use areas are envisioned as strategically located, high-intensity, pedestrian-oriented activity areas ***providing a range of retail, business, civic, cultural, and residential opportunities*** for the surrounding trade area. Mixed-use areas should be located in urban centers or designated corridors and should create or demonstrate the following characteristics:

    - ***Transit-supportive residential densities*** with ***a mix of housing*** types and ***affordability***;
    - ***Transit-supportive mix of retail*** and employment opportunities;
    - ***Streets or other physical features that help define the center;***
    - Public plazas, gathering spaces, or amenities designed as a focal point;
    - ***Transit service***
    - ***Pedestrian-oriented*** site design; and
    - ***An interconnected network of multi-modal streets linking to the*** surrounding areas.

Comprehensive Plan

2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

	1.	Necessity The existing comprehensive plan and/or any related element thereof is in need of the proposed amendment.
	2	Compatibility The proposed amendment is compatible with the surrounding area and the goals and policies of the Comprehensive Plan.
	3	Transportation The proposed amendment will have no major negative impacts on transportation, services, and facilities.
	4	Utilities The proposed amendment will have minimal effect on service provision, including adequacy or availability of urban facilities and services, and is compatible with existing and planned service provisions.
N/A	5	Annexation The proposed amendment, if for an area outside of the City's current municipal boundaries, is consistent with the City's ability to annex property.
	6	**Strict Adherence** **Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.**
	7	Public Welfare The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.



Criteria 1: Necessity

This site is not suitable for residential use. For this reason, the existing Comprehensive Plan requires the proposed amendment.

Site Issues

- Parcel was a former common landfill site operated by Jefferson County from the 1930s to the 1970s.
- The Landfill closed in the 1970s, before current regulations were in place.
- Old landfills will have a wide variety of wastes and potential contaminants.
- They often generate methane gas and odors from decomposition.
- The site is unfit for residential development without costly environmental remediation.

Criteria 1: Necessity

This site is not feasible for residential use. For this reason, the existing Comprehensive Plan requires the proposed amendment.

Site Status

- The Landfill is capped with 1' to 5' of loose clean fill.
- Hummocky topography indicates possible settling and decomposition.
- Methane gas and odor issues makes the use of buildings, ie. Homes challenging.
- There are some Geotechnical Stability Issues.
- Data collected since the 1990s indicate that some of these issues are present, but none trigger any particular or immediate regulatory action.
- We have a current VCUP approved by CDHPE to repurpose the landfill solely for industrial use.

CDPHE will not allow residential construction on top of a historic landfill.

Criteria 1: Necessity

Residential Development of the Site is not Feasible

- Construction of Residential Units on Top of the Existing Landfill is Not Feasible due to the extensive and deep landfill material.
- Removal of Landfill Materials is Not Economically Feasible.

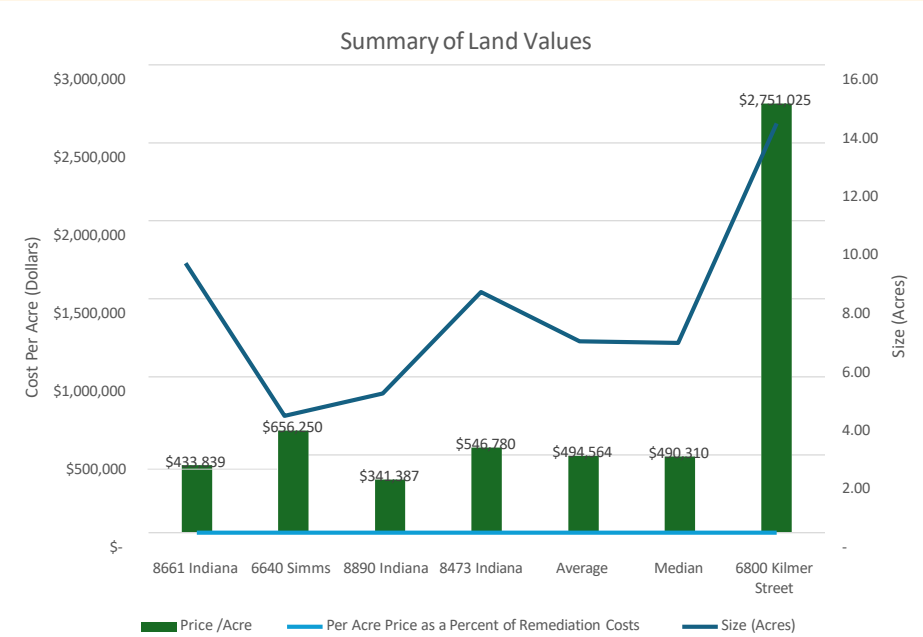
Some issues related to residential development

- Will have to establish Clean Corridors for utilities and roads
- Differential Settlement is possible and requires Dynamic Compaction.
- Significant Site Disturbance will occur.

- Risks – Create Significant Financial Risk with Unknown Cost Implications
  - Methane Gas Exposure and odors
  - Potential Indoor Air Exposure
  - Failed Utilities
  - Geotechnical Remedy Costs

Construction on Historic Landfills is Typically a Low-Impact Industrial Use

- Vehicle Storage Yards
- Inventory Storage Yards
- Raw Material Storage Yards (aggregate)
- Recreational Vehicle Storage Yards
- Solar Arrays (though differential settlement is commonly a problem)



Other Considerations:

- 270 Trucks Per Day are required to remove the landfill material
- Completion Timeline = 62 weeks

Criteria 1: Necessity

Removal of the Landfill is Not Economically Feasible

Total Estimated Cost to Remove Landfill = $38.7 Million

Assumptions:

- Approximately 11 acres of Landfill Material
- Assumes Average Excavation Depth of 14' (12' landfill + 2' below landfill)
- Assumes 20% Asbestos-Containing Waste
- Assumes Dewatering
- Requires ACM Oversight
- Backfill and Compact with Clean Fill
- Add in a 30% Contingency
- This resulted in the removal of 311,000 cubic yards of landfill materials.

==========

- **Remediation Cost Per Acre *= $2.75 Million***
- Remediation Cost Per Unit = $393,004
- These costs do not include horizontal development costs (utilities, roads, etc.)
- Financing will not be Available Until the Removal and Remediation are completed.
- **Raw Land Cost is approximately 5 times the cost of other development sites**

Criteria 2: Compatibility

The proposed amendment is compatible with the surrounding area, extending the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of the site.

Compatible with Surrounding **Industrial** Land Uses:

- This site has been zoned for Industrial use for 43 years.
- When the City annexed the land, it was identified as industrial property.
- The site is directly connected to developed industrial property to the east, accessible only via West 68th Avenue. This traverses the City's heavy industrial operations and a bus farm.
- The only access road, West 68th Avenue, experiences heavy truck traffic at all times of the day.
- There are no sidewalks on West 68th Avenue.
- West 68th Avenue is neither pedestrian nor commuter-friendly.

Criteria 2: Compatibility

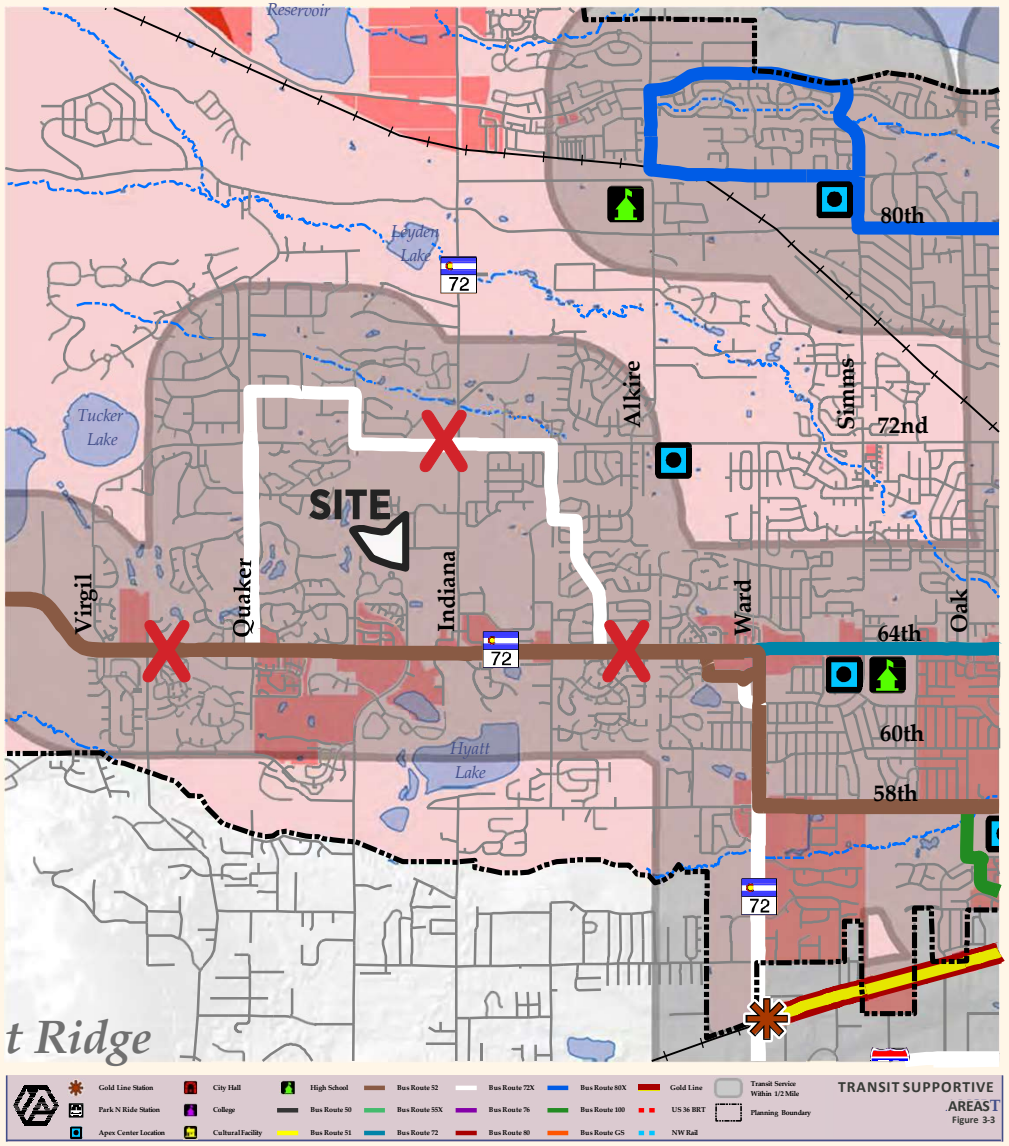
The proposed amendment is compatible with the surrounding area, extending the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- Development has built up in all directions surrounding this site
- There is only one access point to the site, on West 68th Avenue.
- Insufficient access for residential development
- Mixed Use Residential: 7 units/acre minimum = 99 units, which is not financially feasible to construct on a former landfill.

Criteria 2: Compatibility

The proposed amendment is compatible with the surrounding area, providing an extension of the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- Now, nearest operational bus stop ~2 miles from site
  - ~5 min. drive
  - ~40 min. walk
- Nearest train station ~5 miles from site
  - ~10 min. drive
  - ~90 min. walk



2014 Comprehensive Plan Transit Map

Criteria 2: Compatibility

The proposed amendment is compatible with the surrounding area, extending the Industrial zoning and Industrial/Office Comprehensive Plan Land Use Designations directly to the east of this site.

- A Mixed Use-Residential Site should provide good access to mass transit.
- In 2014, closest bus route was at the intersection of Indiana and 72nd, approximately 0.75 miles from the property .
- RTD has since permanently closed the two closest transit routes:
  - Bus Route 52 (east-west travel along 64th Ave.)
  - Bus Route 72X (north-south and east-west travel around 72nd Ave.)

Criteria 3: Transportation

The proposed amendment will have no major negative impacts on transportation, services, and facilities.

- The single point of access to the site on West 68th Avenue is not limited due to the very low traffic generated by the RV storage site.
- Standard Trip Generation calculations show a maximum of 64 trips per day and only 6 trips per day during peak hours.

Criteria 4: Utilities

The proposed amendment will have minimal effect on service provision, including adequacy or availability of urban facilities and services, and is compatible with existing and planned service provisions.

- Water and sewer services can be provided to the small site office building by extending the existing lines along Joyce Street and West 68th Avenue. The City of Arvada has approved this use contingent upon plan submittal and approval by the city.
- Electrical service will be provided to the site by extension of existing lines on West 68th Avenue.

2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

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	6	**Strict Adherence** **Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.**
	7	Public Welfare The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.

Criteria 6: Strict adherence to the existing comprehensive plan would result in a situation neither intended nor in keeping with other key elements and policies of the plan.

- Residential is not allowed in industrial zones (LDC § 3-1-2-2).
- Mixed Use: Residential requires housing as the "predominant" use (Comp. Plan p. 2-25).
- The two designations cannot co-exist.
- Residential is not a viable use.
- Industrial uses are the only viable uses.
- Without an industrial light or office designation, the property has no viable use or value.
- In 2020, the City Council approved a zoning modification that retained industrial use.

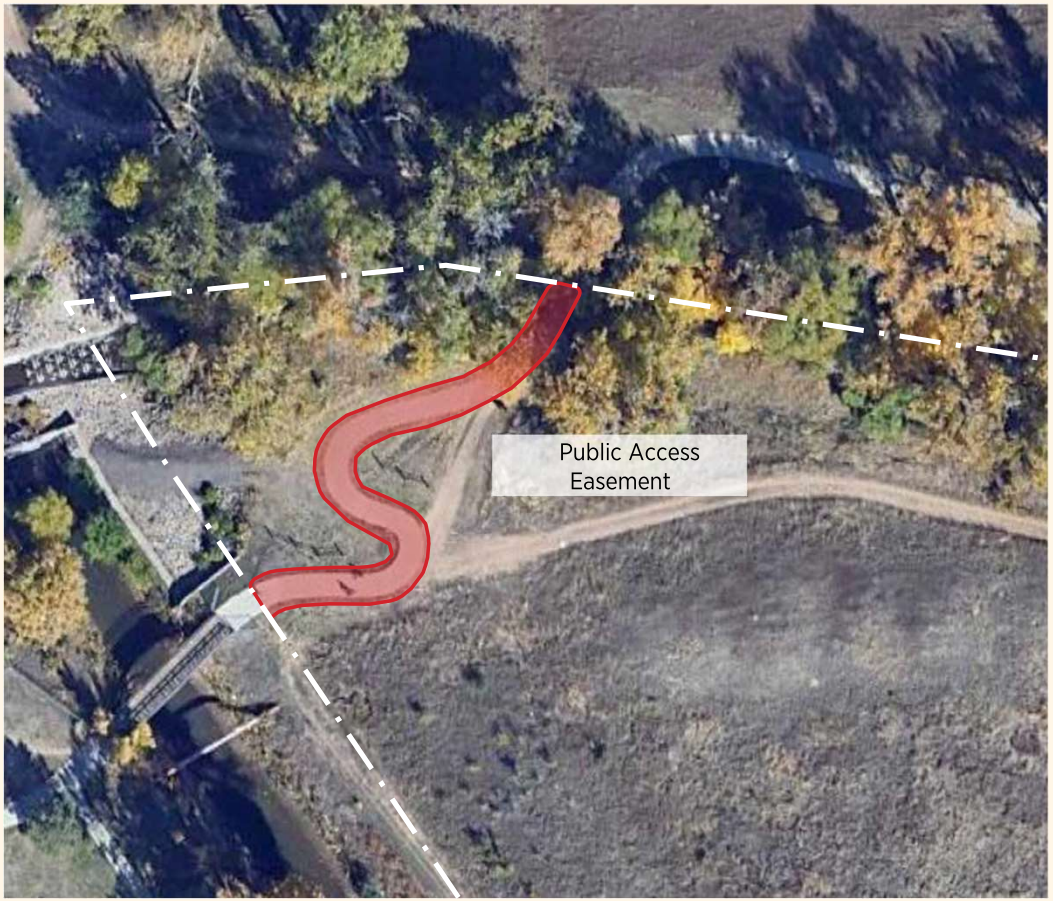
Criteria 7: Public Welfare

- The only way to achieve constant monitoring of the landfill is by developing the site.
- The only viable land use is Industrial.
- The proposed industrial utilization provides a significant buffer zone from residences situated beyond the Croke Canal to the southwest of the property boundary.
    - The buffer maintains native plant materials.
    - This natural buffer supports a better wildlife corridor.

Criteria 7: Public Welfare

The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.

- As shown on the Final Plat, the developer has committed to dedicating a public access easement for the Ralston Creek Trail that has already been constructed and traverses the western edge of the site.



2014 City of Arvada Comprehensive Plan | Major Amendment Approval Criteria

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✔	7	Public Welfare The proposed plan amendment will promote the public welfare and will be consistent with the goals and policies of the comprehensive plan and the elements thereof.

Thank You!

COMMENTS RECEIVED AFTER SEPTEMBER 3, 2025

Heidi Van Gieson <hvangieson@arvada.org>

Fwd: Kilmer RV Storage project

Julia Duncan <jduncan@arvada.org> Mon, Sep 29, 2025 at 8:26 AM
To: Planning Admin <plnadmin@arvada.org>

Good Morning,

Please see the below for public comment for Kilmer.

Let me know if you need anything else.

Sincerely,

Julia

Julia Duncan
Senior Planner
8101 Ralston Rd.
Arvada, CO 80002
Phone: 720-898-7458
jduncan@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

---------- Forwarded message ---------
From: **Ed Yevak** <[redacted]>
Date: Fri, Sep 26, 2025 at 10:04 AM
Subject: Kilmer RV Storage project
To: JDuncan@arvada.org <JDuncan@arvada.org>

Good Morning Julia, I am a commercial insurance agent residing / working in Arvada since 1996 and a number of years ago at a city council meeting the mayor at the time stated that because of all the potential liability with an unregulated and unmitigated landfill the city had declined to purchase the property. The same can be said for any insurance carrier…..none, zero would knowingly insure this property. My concern is that if the city allows this project it will slip thru the underwriting process and become insured. But if a claim occurs in any way related to the landfill, pollution for instance the history of the site will emerge and the carrier instead of paying the claim will fight it because they realize the potential liability. The affected parties might then be reduced to pursuing a South Dakota LLC, the current land owner. I don't foresee a happy ending and all this can be avoided by not allowing the project or requiring it to be cleaned up.

Thanks for your time….!

Ed Yevak

[redacted]

[redacted]

[redacted]

[redacted]

BINDING DISCLAIMER: Please note, insurance coverage cannot be bound or altered by leaving an email or voice mail message

CONFIDENTIALITY NOTICE

The information contained in this communication, including attachments is privileged and confidential. It is intended only for the exclusive use of the addressee. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering it to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited if you have received this communication in error. Please notify us by telephone immediately. Thank you.

CITY OF ARVADA

Josie Suk <jsuk@arvada.org>

Fwd: KNOWN LAST NIGHT -- Public Hearing Date for City Council Review of DA2025-0061 6800 Kilmer RV Storage is 10/21/25

Jessica Garner <jegarner@arvada.org> Wed, Sep 3, 2025 at 12:47 PM
To: Josie Suk <jsuk@arvada.org>

---------- Forwarded message ---------
From: **Rob Smetana** <rsmetana@arvada.org>
Date: Wed, Sep 3, 2025 at 12:13 PM
Subject: Fwd: KNOWN LAST NIGHT -- Public Hearing Date for City Council Review of DA2025-0061 6800 Kilmer RV Storage is 10/21/25
To: Jessica Garner <jegarner@arvada.org>

FYI.

Rob Smetana, AICP
Manager of City Planning and Development
720.898.7440
rsmetana@arvada.org
Regular Office Hours: Monday through Friday 8:00am to 5pm

AICP CERTIFIED

CITY OF ARVADA

---------- Forwarded mess
From: **Karen Gerbatsch** [redacted]
Date: Wed, Sep 3, 2025 at 11:29 AM
Subject: KNOWN LAST NIGHT -- Public Hearing Date for City Council Review of DA2025-0061 6800 Kilmer RV Storage is 10/21/25
To: Lauren Simpson <lsimpson@arvada.org>, Randy Moorman <rmoorman@arvada.org>, Bob Fifer <bfifer@arvada.org>, John Marriott <jmarriott@arvada.org>, Shawna Ambrose <sambrose@arvada.org>, Sharon Davis <sdavis@arvada.org>, <brupert@arvada.org>
Cc: Rob Smetana <rsmetana@arvada.org>, <jduncan@arvada.org>

Mayor and Council Members - last night's discussion to reopen the 11/04/24 public hearing, to set aside rules of procedure, and reconsider your decision to deny changing the comprehensive plan was built on falsehoods. The public hearing due dates attachment below was posted before the meeting, setting the City Council Review date of 10/21/25.

When asked about what new information was to be presented and when, the answer was "unknown". Why would any council do this without understanding what new information was going to be presented? That your legal team had the wrong information was incredulous! The motion to waive the minimum interval requirement was thrown out with only the

vote to hear new unproven information in a public hearing remained. City Council has had 2 Executive Legal Sessions on issues related to 6800 Kilmer RV Storage and this is the best legal strategy provided?

Every one of your constituents is sincerely frustrated with the stance that developers rule. The planning department must have worked with the developer to make LDC changes that would benefit this project since, as soon as they were passed, this project came alive again. Why don't you send it back to the Planning Commission where the review belongs with "new Information". A developer that only paid $85K for a 14 acre polluted dump in 2012 certainly seems to have more influence over Arvada government than its citizens.

TRUST - 5 simple letters with depth of meaning. TRUST is quickly vanishing. See geotechnical excerpts from three reports below on this unstable landfill. And please have this added to the new project file DA2025-0061.

Karen Gerbatsch, Sharon McCathy and Rick Simms representing Friends of Ralston Creek Neighborhoods

--

Jessica Garner, AICP
Community and Economic Development Director
Desk: 720-898-7016
Mobile: 720-454-4117
E-Mail: jegarner@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

2 attachments

Public Hearing Due Dates CC_1 (1).pdf
48K

Three Geotechnical Reports (2).pdf
130K

CITY OF ARVADA

Heidi Van Gieson <hvangieson@arvada.org>

Fwd: Written Comments – 6800 Kilmer Street RV Storage (Public Comment)

Josie Suk <jsuk@arvada.org> Fri, Sep 26, 2025 at 9:49 AM
To: Heidi Van Gieson <hvangieson@arvada.org>, Dixielee Rodriguez <drodriguez@arvada.org>

For RV storage

---------- Forwarded message ---------
From: **Kristen Rush** <kristen@arvada.org>
Date: Thu, Sep 25, 2025 at 11:36 PM
Subject: Fwd: Written Comments – 6800 Kilmer Street RV Storage (Public Comment)
To: Josie Suk <jsuk@arvada.org>

Sent from my iPhone

Begin forwarded message:

From: Jesse Glover [redacted]>
Date: September 25, 2025 at 5:48:01 PM MDT
To: Council@arvada.org
Cc: kristen@arvada.org, Jbebo@arvada.org, cedboardsandcommissions@arvada.org, pod@arvada.org
Subject: Written Comments – 6800 Kilmer Street RV Storage (Public Comment)

Date: 9/25/2025

Dear Arvada Planning Staff and City Council,

I am submitting written comments regarding the proposed RV storage facility at 6800 Kilmer Street. I am an Arvada resident and I oppose approval of this application.

Key concerns:

- Proximity to Ralston Creek & Trail: The site lies immediately adjacent to a sensitive riparian corridor used by families, cyclists, and wildlife. Any spill, erosion, or cover failure would flow directly toward the creek.
- Closed Landfill Risks: This is a historic landfill (pre-modern liners/leachate controls). Heavy vehicle traffic, grading, and utility work can compromise the cover, mobilize contaminants, and exacerbate methane migration.
- Wastewater & Stormwater: RVs generate gray/black water and carry fuels, oils, and cleaners. Without full sanitary connections and robust spill controls, the risk of illicit discharge or accidental release is non-trivial. Impervious surfaces will increase runoff toward the creek.
- Public Safety & Nuisance: Propane cylinders, batteries, and fuels elevate fire risk; firefighting runoff itself can contaminate surface waters. Late-night lighting and traffic are incompatible with a creek-adjacent neighborhood and greenbelt.
- Land-Use Compatibility: Long-term open storage of vehicles is inconsistent with the character and environmental values of the Ralston Creek corridor.

If the City considers approval despite these issues, I request, at minimum, the following conditions and independent reviews prior to any permits:

- Third-party hydrogeologic assessment (groundwater/leachate pathways) and methane monitoring/mitigation plan meeting current best practices.

- Full sanitary sewer connections for any RV servicing; explicit prohibition of on-site dumping; SPCC/HAZMAT plan; secondary containment for fuels/chemicals.
- Stormwater plan sized for extreme events with treatment/filtration before discharge; no net increase in runoff to the creek.
- Setback, fencing, lighting, and hours that protect the riparian corridor and trail users; dark-sky compliant lighting.
- A financial assurance/bond for monitoring and remediation tied to the operator, not taxpayers.
- Ongoing independent environmental monitoring with public reporting.

Given the environmental sensitivity and liabilities, I urge the City to deny the application. Preserving the health of Ralston Creek and the safety of nearby neighborhoods should take precedence.

Thank you for considering my comments.

Sincerely,
Jesse Glover
Arvada, CO resident
[redacted]

--
Josie Suk
Development Systems and Administrative Manager
Desk: 720-898-7627
Mobile: 720-582-4419
E-Mail: jsuk@arvada.org
Regular Office Hours: Monday through Friday 8:00 am - 5:00 pm

CITY OF ARVADA

REPORT FROM CITY COUNCIL

AGENDA ITEM 12.A.

DATE: October 21, 2025

SUBJECT: Council Committee Reports

Report in Brief

City Council members are appointed to various committees and boards as set out on the attached listing. As meetings are held, individual council members will report back to the full City Council any relevant discussions and issues that occurred.

Prepared by:
Chris Koch, CCO Admin

Lauren Simpson	Arvada City Attorney Committee Arvada Municipal Court/Judicial Committee Arvada Urban Renewal Authority Arvada Visitors Center Committee *Metro Mayors' Caucus Urban Drainage and Flood Control District West Connect Coalition E-470 Authority (Alternate)
Randy Moorman	Arvada Audit Committee Arvada Center for the Arts and Humanities Arvada Sustainability Committee CML Policy Committee Jefferson Parkway Public Highway Authority Northwest Parkway Authority (Alternate)
Shawna Ambrose	Adams County Regional Economic Partnership (ACREP) Arvada Audit Committee Bond Oversight Committee CML Policy Committee Housing Advisory Committee Jefferson County R-1 Schools Coordinating Committee Arvada Visitors Center Committee (Alternate) Olde Town Business Improvement (BID) (Alternate)

Sharon Davis	Apex Coordinating Committee Arvada Municipal Court/Judicial Committee Denver Regional Council of Governments (DRCOG) Jefferson County Community Corrections Board Jefferson Economic Development Council (JDEC) Jeffco Transportation Action & Advisory Group (JEFFTAAG) E-470 Authority (Alternate)
Bob Fifer	Arvada City Attorney Committee Arvada Fire Protection District Coordinating Committee Arvada Transportation Committee Jefferson Parkway Public Highway Authority Smart City Advisory Committee Northwest Parkway Authority (Alternate)
John Marriott	Arvada Economic Development Association Board Bond Oversight Committee Olde Town Business Improvement (BID)
Brad Rupert	Arvada Chamber of Commerce Government Affairs Committee Arvada Fire Protection District Coordinating Committee Jefferson County R-1 Schools Coordinating Committee Smart City Advisory Committee Adams County Regional Economic Partnership (ACREP) (Alternate) Denver Regional Council of Governments (DRCOG) (Alternate) Jeffco Transportation Action & Advisory Group (JEFFTAAG) (Alternate) Jefferson County Community Corrections Board (Alternate) West Connect Coalition (Alternate)

*asterisked committees are not appointed by Council

CITY OF ARVADA

REPORT TO CITY COUNCIL

AGENDA ITEM 13.A.

TO: THE HONORABLE CITY COUNCIL DATE: October 21, 2025

SUBJECT: Review of Future Workshops and Presentations

Report in Brief

The City Manager's Office maintains a list of upcoming workshops and presentations to be scheduled for City Council meetings. During City Manager Reports, at the end of City Council business meetings, City Manager Don Wick, will review with City Council the tentative schedule and make any adjustments necessary.

Prepared by:
Chris Koch, CCO Admin

Reviewed by:

Approved by:

Rachel Morris, City Attorney	10/06/2025
Linda Haley, Deputy City Manager	10/06/2025
Don Wick, City Manager	10/06/2025

Enclosure, exhibits & attachments required to support the report

2025 CITY COUNCIL WORKSHOPS, STUDY SESSIONS, PRESENTATIONS AND RETREATS (TENTATIVE)

WORKSHOPS	Date	Lead
Waste Diversion Action Plan	**Oct 28**	INFRA
Sidewalk Assistance (formerly 50/50 program)	**Oct 28**	INFRA
Pay Plan	**Oct 28**	HR
Comp Plan Update	**Dec 9**	CED
Infrastructure Annual Report (Tentative)	**Dec 9**	INFRA
2026		
Storm Water 101	**Jan 13**	INFRA
Climate Action Plan The City team and consultants will be providing an update on the draft Climate Action and Sustainability Plan. We will be seeking input from the Council on direction and priorities to include in the final plan we intend to bring forward for adoption in January.	**Jan 27**	INFRA
International Building Codes update and Wildland Urban Interface Code	**Jan 27**	CED
ADA Transition Plan Updates	**Feb 10**	INFRA
No Meeting – Board and Commission Interviews	**Feb 24**	
Solid Waste Rates and Fees	**Mar 10**	INFRA
Business meeting – no workshops	**Mar 24**	
Annual Update for City Attorney's Office	**Apr 14**	CAO
Annual Update for Municipal Court	**Apr 14**	MC
SW Rate Structure	**Apr 28**	INFRA
W/WW/SW Rates and Fees – Why and How	**May 12**	INFRA
	May 26	
System Development Charges	**June 9**	INFRA
No meeting – CML Conference	**June 23**	
No Meeting – Appointee Evaluations	**July 14**	
W/WW/SW Rates and Fees – Financial Scenario	**July 28**	INFRA
W/WW/SW Rates and Fees – Final Scenario	**Aug 25**	INFRA
	Sept 8	
Place holder for additional W/WW/SW Rates and Fees (if needed)	**Sept 22**	INFRA
	Oct 13	
	Oct 27	
	Nov 10	
No Meeting – Holiday Week	**Nov 24**	
Infrastructure Annual Report	**Dec 8**	INFRA
No Meeting – Holiday Week	**Dec 22**	
Harvest Festival	**TBD**	
End of Year City Council Strategic Plan Update	**TBD**	CMO
Building Code Update	**TBD**	CED
Parks Master Plan	**TBD**	VCN
Pavement Program	**TBD**	INFRA
PRESENTATIONS		
STUDY SESSIONS		

Revised 10-15-25

Council Bylaws	**Nov 18**	CAO
City Expenditures, BID and Chamber funding	**TBD**	Finance
Waste Diversion Plan	**TBD**	INFRA
COUNCIL JOINT MEETINGS/DINNERS:		
Denver Water Board Apex Board AURA Board Arvada Center Board–Per Coop Agreement - Annually after October 1 of each year Jefferson Parkway Meeting with Jeffco and Broomfield Council Annual Retreat		