

ITEM: Case No. PUD-0308-2020

PLANNER: Emily Cline-Gibson, Planner II

APPLICANT: Brue Baukol Capital Partners

OWNER: Redtail Ridge Portfolio, LLC

LOCATION: 1020 Rockcross Drive
Tract K, Redtail Ridge Filing No. 1

REQUEST: Approval of Resolution 17, Series 2025,
recommending approval of the Redtail Ridge Lift
Station Planned Unit Development (PUD)

VICINITY MAP:



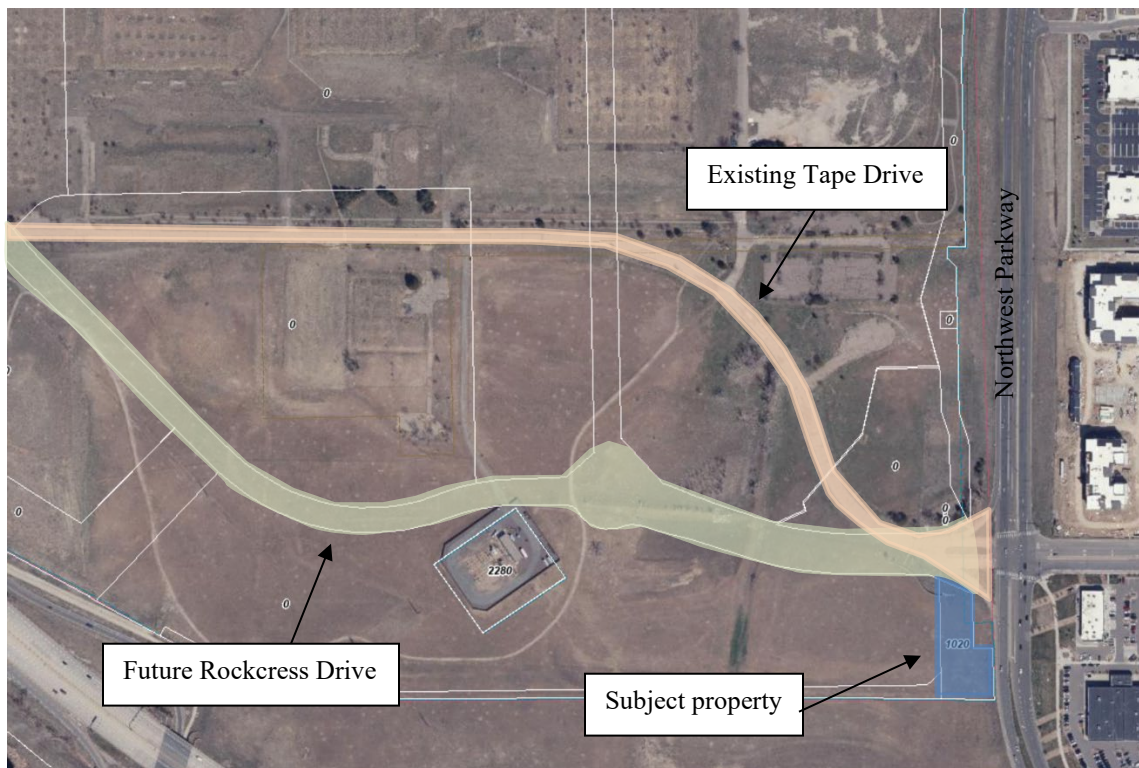
SUMMARY:

The applicant, Brue Baukol Capital Partners, is requesting approval of a final Planned Unit Development (PUD) to allow for the construction of a 1,031 square foot facility which will serve as the lift station for the Redtail Ridge development. The proposed development will include access from future Rockcress Drive with associated landscaping, parking, lighting, and required grading and utilities.

BACKGROUND:

The subject property is located in the southeastern corner of the Redtail Ridge Subdivision Filing No. 1. Development of this area is governed by the ConocoPhillips General Development Plan (GDP), which was established in 2010, and the Commercial Development Design Standards and Guidelines (CDDSG), which was adopted by City Council in 1997. Northwest Parkway is located to the east and Tape Drive is to the north. Directly south of the property is City of Broomfield vacant land.

The Redtail Ridge Filing No. 1 Subdivision was approved by City Council on August 20, 2024, and established a series of lots and blocks for development, road rights of way, utility easements, and private road access easements. As part of the Redtail Ridge improvements, Tape Drive, which extends from east to west across the development, will be removed and replaced by Rockcress Drive, which will serve as the primary east-west connector and will be the sole access road to the lift station property.



Existing and proposed roads in Redtail Ridge

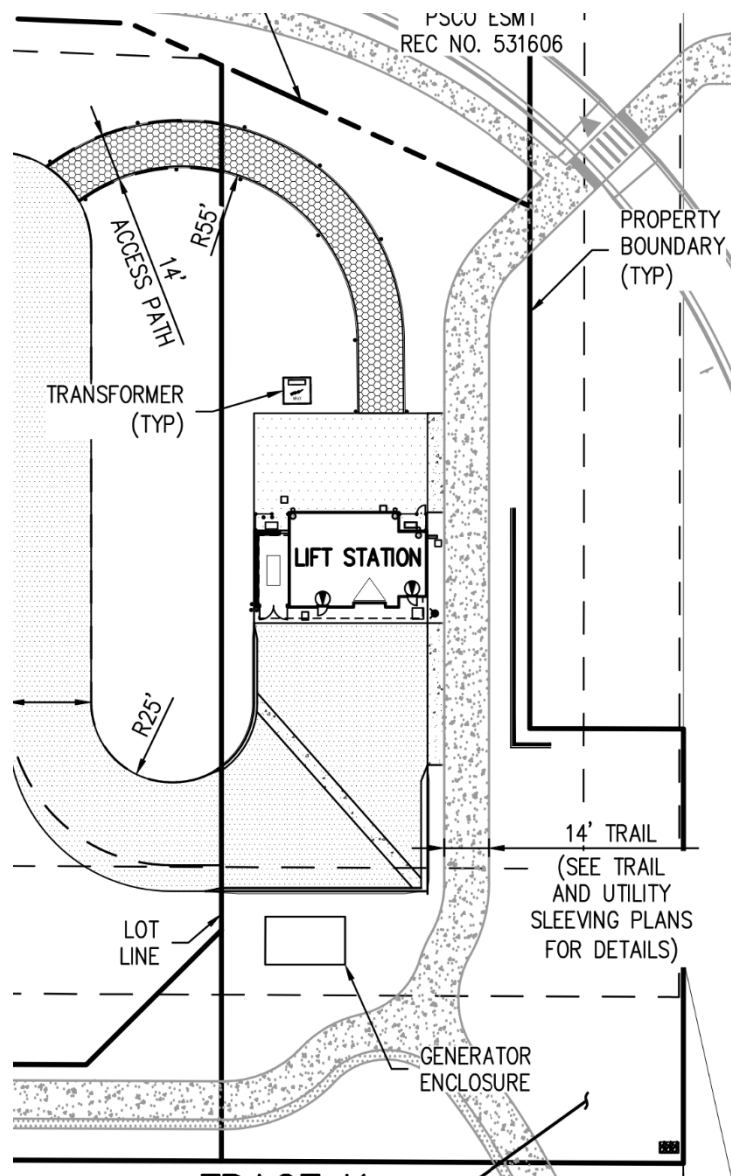
The proposed lift station will serve the entire Redtail Ridge development. Wastewater will be transported from the Redtail Ridge development to the City of Louisville Wastewater Treatment Plant, located at 1155 Empire Road, where it will be treated. This new station is necessary to meet the infrastructure needs for future development in Redtail Ridge. The station will be dedicated to the City of Louisville, and the City will maintain responsibility for operation and maintenance of the property.

PROPOSAL:

Site

The proposal includes constructing a 1,031 square foot building, which will be used for pumping sewage from the Redtail Ridge development to the Louisville Wastewater Treatment Plant. The building will include two primary rooms. The main room will be above a wet well and house piping and equipment. The wet well and associated equipment will be accessed from floor hatches located in the main room. The other room will be an electrical room which will house electrical equipment used to power the station. Also included with the proposal are exterior mechanical equipment areas, including an emergency backup generator which will be enclosed and located on the southern portion of the lot, utility transformers which will be located north of the building, and air handling and air conditioning units. An existing chain link fence that runs through the property is proposed to be removed.

Access to the property is for City operation and maintenance workers only, and no public access will be provided. A 24-foot access easement is dedicated to the property and will run from the proposed roundabout at Rockcress Drive to the western property boundary, connecting to a southern parking area. An additional 15-foot-wide access easement is proposed at the northwestern property boundary.



Site plan

Building

Architectural elevation drawing of a building with a gambrel roof. The drawing includes the following labels and features:

- EXHAUST LOUVER**: Located in the gable end of the roof.
- PRE-FINISHED METAL BUILDING FASCIA & SOFFIT PANELS**: Located along the eaves of the roof.
- 12** and **6**: Dimensions indicating the height of the gable and the main body of the building, respectively.
- ARCH. PRECAST CONC. LINTELS**: Located above the door and windows.
- 2" TH. PRE-FINISHED INSULATED BATTEN LOOK METAL BUILDING WALL PANELS**: Located on the upper portion of the walls.
- ARCHITECTURAL PRECAST CONC. WALL CAP**: Located on the lower portion of the walls.
- SYNTHETIC STONE FACING ON 8" CMU WALL**: Located on the base of the walls.

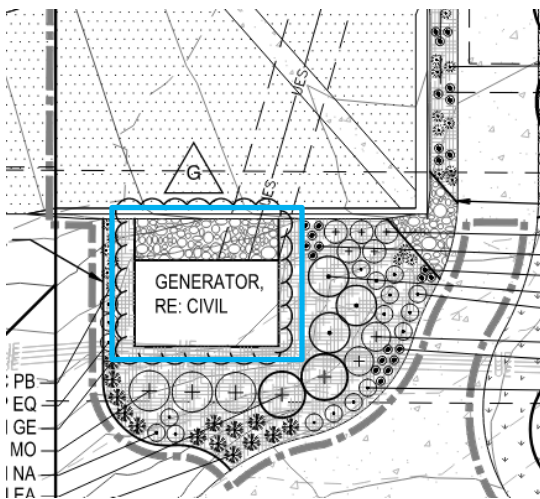
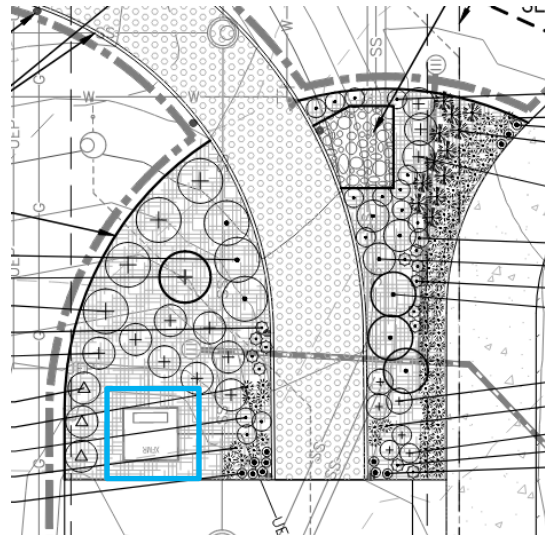
A yellow truck is shown to the left of the building for scale.

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Mechanical Equipment

A proposed generator will be in an enclosure measuring 13' x 5' and will be 7-feet tall. The enclosure structure is shown in the bottom right image below, however the final color will be selected to match the building and surroundings. An electric transformer will be located north of the building. Both the generator enclosure and transformer will be screened with landscaping that includes shrub, perennials, and ornamental grasses.

An HVAC unit and an air handling unit will be enclosed by stone walls that extend from the eastern and western sides of the building. The areas will include locked metal gates for controlled access.



Top left: Eastern and western stone wall enclosures; Bottom left: Landscape plan for generator enclosure; Top right: landscape plan for transformer; Bottom right: Generator enclosure

Waivers

The applicant is requesting the following waivers:

1. Allow prefinished painted metal siding as an exterior material.
2. Allow light spill outside of the site boundaries.

Staff analysis of each waiver request is found in the below section.

ANALYSIS:

Zoning Analysis

Compliance with Sec. 17.28.120

Section 17.28.120.A of the Louisville Municipal Code (LMC) lists 28 criteria for PUDs that must be satisfied or found not applicable to approve a PUD. Analysis and staff's recommended finding of each criterion is provided in the attached Appendix A. The proposal has overall been found to comply with all applicable standards of this section.

CDDSG Analysis

Compliance with the CDDSG

The CDDSG establishes design criteria and minimum standards for commercial development. Analysis of each applicable section is provided below.

CDDSG 1: Site Planning

The proposed building meets all setbacks and site coverage standards. Vehicle parking and building entrance are internal to the site and not visible from adjacent streets. All mechanical equipment is appropriately screened. The proposal meets the site standards for site grading and drainage in the CDDSG.

CDDSG 2: Vehicular Circulation and Parking

Access to the site will be provided by a primary access easement on the western side of the property, connecting to the roundabout at Rockcress Drive. A secondary access easement is located to the north. Both easements are granted by the owners of Lot 3, Block 1, and will remain in place once Lot 3, Block 1 is developed. No public parking is proposed, but a parking area for service vehicles is proposed south of the building.

CDDSG 3: Pedestrian and Bicycle Circulation

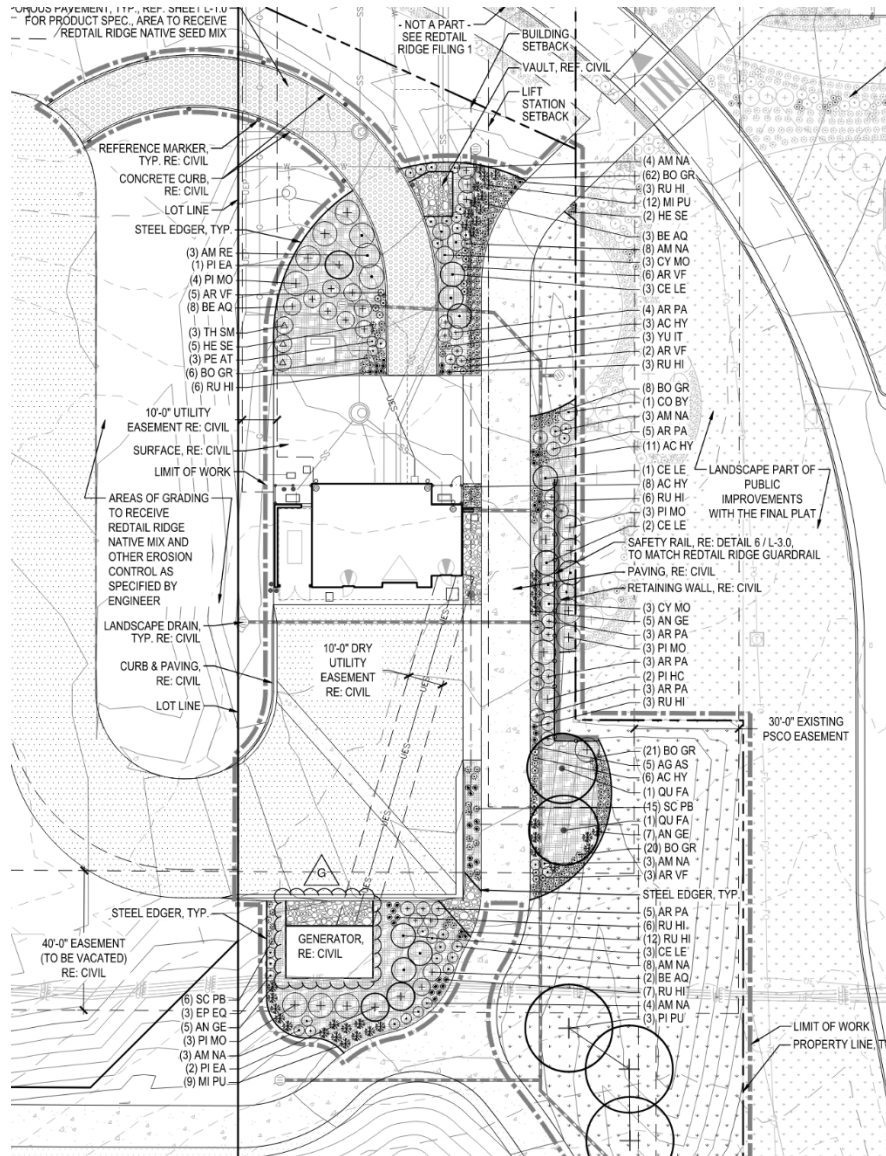
A 14-foot paved concrete trail is proposed on the eastern property boundary. The trail will connect to a larger trail system within the Redtail Ridge development. Since the proposed building will be used exclusively by service personnel and will not be publicly accessible, no additional pedestrian or bicycle amenities are provided on the site.

CDDSG 4: Architectural Design

The proposed building meets height standards and incorporates design elements consistent with the character of the Redtail Ridge development. The façade will include painted metal siding, for which a waiver is requested, and synthetic stone. The gabled roof and overall massing provide an appropriate scale. The building material, color, and texture further contribute to the architectural design.

CDDSG 5: Landscape Design

Ornamental and evergreen trees, shrubs, ornamental grasses, and perennials are proposed in a garden bed located on the north side of the building, near the entrance to the primary building. An additional landscape area is located on the southern side of the building, surrounding the proposed generator enclosure. Deciduous, ornamental, and evergreen trees are proposed along the paved trail as well. The proposed landscape plan satisfies planting requirements in the CDDSG. Additional landscaping outside property boundaries are included in a greater development plan for Redtail Ridge and are not part of this proposal.



Landscape plan

CDDSG 6: Screen Walls and Fences

The proposal includes two screen walls made of synthetic stone and extend from the building. The wall located on the west elevation will be 5-7-feet tall and will include a metal gate to fully enclose the HVAC unit. The wall located on the east elevation will be 13.2 feet tall and will enclose the air handling unit. This wall will also be made of synthetic stone material and will be enclosed with a gate. The CDDSG requires a minimum screen wall height of 6 feet and does not specify a maximum. No perimeter fencing is proposed.

CDDSG 8: Exterior Site Lighting

Three wall-mounted LED lights are proposed near the building entrances, along with one floodlight on the north façade that will only illuminate in emergency situations. All

lighting complies with maximum illumination standards outlined in the CDDSG. A photometric plan for normal operations and emergency operations are included with the proposal. One waiver is requested to allow light spill outside of property boundaries, which is further analyzed in the below section.

Waiver Analysis

Section 17.28.110 of the Louisville Municipal Code (LMC) sets the standards for all PUDs to comply with the underlying zoning standards and adopted design guidelines. The section also states that *any such requirements may be waived or modified through the approval process of the planned unit development if the spirit and intent of the development plan criteria contained in LMC Section 17.28.120 are met*. Analysis of each waiver request is provided below.

Allow prefinished painted metal siding as an exterior material

Section 4.5.1 of the CDDSG states that painted metal is not an acceptable exterior building material. The applicant is requesting a waiver from this standard to allow the use of painted metal siding on all sides of the proposed building. The proposed metal will be painted a brown color and will provide a complimentary and textural appeal alongside the synthetic stone, which is the other proposed building material. Additionally, the metal siding will align with the roof, which is proposed to be made of metal.

Allow light spill outside of the site boundaries

Section 8.1 of the CDDSG requires all site lighting and fixtures to be contained within the property boundaries. The proposal includes lighting that will spill a maximum of 12 feet outside of the western property boundary into Lot 1, Block 3. The light spill may range from 0.1 to 0.5 footcandles outside of property boundaries. Lighting levels have been coordinated with City operation and maintenance staff to ensure safe working conditions for normal and emergency activity. The minimum required 10-foot interior side yard building setback ensures that the majority of the lighting will not be visible from inside adjacent buildings on Lot 1, Block 3.

PUBLIC COMMENTS:

No public comments have been received as of the date of this report.

STAFF RECOMMENDATION:

Staff recommend approval of Resolution 17, Series 2025, recommending approval of the Redtail Ridge Lift Station Planned Unit Development (PUD).

ATTACHMENTS:

1. Resolution 17, Series 2025
2. Application Materials

APPENDIX A: PUD Criteria Analysis

Criteria 17.28.120 (A)	Finding	Narrative
1. An appropriate relationship to the surrounding area;	Compliant	The proposal is appropriate in size and scale to the surrounding area.
2. Circulation in terms of the internal street circulation system, designed for the type of traffic generated, safety, separation from living areas, convenience, access, and noise and exhaust control. Proper circulation in parking areas in terms of safety, convenience, separation and screening;	Compliant	The proposal includes one primary access easement that is 24-feet-wide, which is adequate for two-way vehicular access.
3. Consideration and provision for low and moderate-income housing;	Not applicable	The proposal does not include housing.
4. Functional open space in terms of optimum preservation of natural features, including trees and drainage areas, recreation, views, density relief and convenience of function;	Not applicable	The proposal does not include dedicated open space, nor is existing open space located near the property.
5. Variety in terms of housing types, densities, facilities and open space;	Not Applicable	The proposal does not include housing.
6. Privacy in terms of the needs of individuals, families and neighbors;	Not applicable	The proposal does not include housing.
7. Pedestrian and bicycle traffic in terms of safety, separation, convenience, access points of destination and attractiveness;	Compliant	The proposed concrete trail is located in an accessible location and connects to destination points outside of property boundaries.
8. Building types in terms of appropriateness to density, site relationship and bulk;	Not applicable	The proposed building is one story and 1,031 square feet in size, which is an appropriate size in relation to the surrounding area.
9. Building design in terms of orientation, spacing, materials, color, texture, storage, signs and lighting;	Not Applicable	The proposed building, including waivers, provides a variety of materials and textures.

10. Landscaping of total site in terms of purpose, such as screening, ornamental types used, and materials used, if any; and maintenance, suitability and effect on the neighborhood;	Compliant	The proposed landscape plan provides landscaping for utility screening, trail buffer, and overall site beautification.
11. Compliance with all applicable development design standards and guidelines and all applicable regulations pertaining to matters of state interest, as specified in <u>chapter 17.32</u> ;	Compliant	Aside from the requested waivers, the proposal complies with applicable design standards and guidelines.
12. None of the standards for annexation specified in <u>chapter 16.32</u> have been violated;	Not applicable	No annexation is proposed.
13. Services including utilities, fire and police protection, and other such services are available or can be made available to adequately serve the development specified in the final development plan.	Compliant	The proposed site layout is oriented in a way that provides access for utilities, fire, and police protection.

Criteria 17.28.120 (B)	Finding	Narrative
1. Development shall be in accordance with the adopted elements of the comprehensive development plan of the city, and in accordance with any adopted development design standards and guidelines.	Compliant	The proposal is in accordance with the adopted comprehensive plan and all adopted design standards and guidelines.
2. No structures in a planned unit development shall encroach upon the floodplain. Existing bodies of water and existing stream courses shall not be channelized or altered in a planned unit development plan.	Compliant	The subject property is not located in a floodplain, nor are there existing bodies of water in the area.
3. No occupied structure shall be located on ground showing severe subsidence potential without adequate design and study approved specifically by the city.	Not applicable	There are no signs of subsidence on the subject property.

4. The proposal should utilize and preserve existing vegetation, land forms, waterways, and historical or archeological sites in the best manner possible. Steep slopes and important natural drainage systems shall not be disrupted. How the proposal meets this provision, including an inventory of how existing vegetation is included in the proposal, shall be set forth on the landscape plan submitted to the city.	Not applicable	There are no existing landforms, waterways, historical sites, or significant vegetation on the subject property.
5. Visual relief and variety of visual sitings shall be located within a development in the overall site plan. Such relief shall be accomplished by building placements, shortened or interrupted street vistas, visual access to open space and other methods of design.	Not applicable	The proposal includes a single building that is less than 50 linear feet and will not be open to the public. As such, visual relief is not included with this proposal.
6. Open space within the project shall be located in such a manner as to facilitate pedestrian use and to create an area that is usable and accessible to residents of surrounding developments.	Not applicable	The proposal does not include dedicated open space within property boundaries.
7. Street design should minimize through traffic passing residential units. Suggested standards with respect to paving widths, housing setbacks and landscaping are set forth in public works standards of the city and applicable development design standards and guidelines. The system of streets, including parking lots, shall aid the order and aesthetic quality of the development.	Not applicable	The proposal does not include new streets within property boundaries.
8. There shall exist an internal pedestrian circulation system separate from the vehicular system such that allows access to adjacent parcels as well as to parks, open space or recreation facilities within the development. Pedestrian links to trail systems of the city shall be provided.	Compliant	The proposal includes a paved trail that will connect to an overall trail system in Redtail Ridge, providing adequate pedestrian circulation.

9. The project and development should attempt to incorporate features which reduce the demand for water usage.	Compliant	The proposed landscape plan includes native plant species that reduce water demand.
10. Landscape plans shall attempt to reduce heating and cooling demands of buildings through the selection and placement of landscape materials, paving, vegetation, earth forms, walls, fences, or other materials.	Compliant	The proposed landscape plan includes thoughtful layout of a variety of trees, shrubs, and vegetation that may provide additional benefits to the building.
11. Proposed developments shall be buffered from collector and arterial streets. Such buffering may be accomplished by earthen berms, landscaping, leafing patterns, and other materials. Entrance islands defining traffic patterns along with landscaping shall be incorporated into entrances to developments.	Compliant	The proposal is buffered from collector and arterial streets by landscaping and building setbacks.
12. There shall be encouraged the siting of lot arrangement, building orientation and roof orientation in developments so as to obtain the maximum use of solar energy for heating.	Compliant	The proposed gabled roof is oriented in a direction that may allow for solar energy in the future.
13. The overall PUD shall provide a variety of housing types.	Not applicable	The proposal does not include housing.
14. Neighborhoods within a PUD shall provide a range of housing size.	Not applicable	The proposal does not include housing.
15. Architectural design of buildings shall be compatible in design with the contours of the site, compatible with surrounding designs and neighborhoods, shall promote harmonious transitions and scale in character in areas of different planned uses, and shall contribute to a mix of styles within the city.	Compliant	The proposal includes architectural features that result in a visually appealing final product and are compatible with the surrounding Redtail Ridge development.

**RESOLUTION NO. 17
SERIES 2025**

**A RESOLUTION RECOMMENDING APPROVAL OF THE REDTAIL RIDGE LIFT
STATION PLANNED UNIT DEVELOPMENT**

WHEREAS, there has been submitted to the Louisville Planning Commission an application for a planned unit development to construct a lift station on the property located at 1020 Rockcress Drive; and

WHEREAS, the subject property, Tract K, Redtail Ridge Filing No. 1, is in the Planned Community Commercial (PC) Zone District; and

WHEREAS, City staff have reviewed the information submitted and found that the application complies with the Louisville zoning regulations, design standards and other applicable sections of the Louisville Municipal Code; and

WHEREAS, the Planning Commission has considered the application at a duly noticed public hearing on November 13, 2025, where evidence and testimony were entered into the record.

NOW THEREFORE, BE IT RESOLVED that the Planning Commission of the City of Louisville, Colorado does hereby recommend approval of the Redtail Ridge Lift Station Planned Unit Development to allow the construction of a lift station on the property at 1020 Rockcress Drive.

PASSED AND ADOPTED this 13th day of November, 2025.

By: _____
Steve Brauneis, Chair
Planning Commission

Attest: _____
Cullen Choi, Secretary
Planning Commission

ELECTRONIC LAND USE HEARING REQUEST CASE NO. _____

APPLICANT INFORMATION

Firm: Redtail Ridge Metropolitan District
Contact: Jay Hardy
Address: 1555 Blake Street, Suite 210
Denver, CO 80202
Mailing Address: Same as above.
Telephone: 970-581-8863
Fax: _____
Email: jay.hardy@bruebaukol.com

OWNER INFORMATION

Firm: Same as Applicant
Contact: _____
Address: _____
Mailing Address: _____
Telephone: _____
Fax: _____
Email: _____

REPRESENTATIVE INFORMATION

Firm: Dewberry Engineers, Inc.
Contact: Sam Franzen
Address: 990 S Broadway, Suite 400
Denver, CO 80209
Mailing Address: Same as above.
Telephone: 303-951-0618
Fax: _____
Email: sfranzen@dewberry.com

PROPERTY INFORMATION

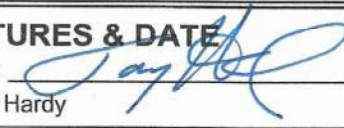
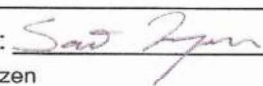
Common Address: See attached legal description
Legal Description: Lot _____ Blk _____
Subdivision _____
Area: _____ Sq. Ft.

TYPE (S) OF APPLICATION

- ☐ Annexation
- ☐ Zoning
- ☐ Preliminary Subdivision Plat
- ☐ Final Subdivision Plat
- ☐ Minor Subdivision Plat
- ☐ Preliminary Planned Unit Development (PUD)
- ☒ Final PUD
- ☐ Amended PUD
- ☐ Administrative PUD Amendment
- ☐ Special Review Use (SRU)
- ☐ SRU Amendment
- ☐ SRU Administrative Review
- ☐ Temporary Use Permit: _____
- ☐ CMRS Facility: _____
- ☐ Other: (easement / right-of-way; floodplain; variance; vested right; 1041 permit; oil / gas production permit)

I hereby request the public hearing(s) on this application be scheduled to be conducted by Electronic Participation in accordance with the attached Resolution No. 30, Series 2020, as adopted by the City Council on April 7, 2020, and in accordance with Resolution No. 38, Series 2020, as adopted by City Council on June 2, 2020 if such hearing(s) can be scheduled during a time period when in-person meetings are not being held due to a health epidemic or pandemic. I acknowledge that holding a quasi-judicial hearing by Electronic Participation may present certain legal risks and involves an area of legal uncertainty, and that having this application heard at a meeting held by Electronic Participation is optional and undertaken at my own risk. I also understand that in-person meetings are preferred for quasi-judicial hearings, and that even if electronic hearing(s) are scheduled, this application will be heard at an in-person meeting if in-person meetings have resumed by the scheduled hearing date(s). I further agree to defend and indemnify the City of Louisville in any action that may arise out of, or in connection with, conducting the hearing by Electronic Participation.

SIGNATURES & DATE

Applicant:  7/16/2021
Print: Jay Hardy
Owner: Same as Applicant.
Print: _____
Representative:  7/16/2021
Print: Sam Franzen

CITY STAFF USE ONLY

- ☐ Electronic Hearing Approved: _____
- ☐ Date(s) of Hearing(s): _____

DESCRIPTION

SITUATED IN THE NORTHEAST 1/4 OF SECTION 29, TOWNSHIP 1 SOUTH,
RANGE 69 WEST OF THE 6TH P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

A PARCEL OF LAND BEING A PORTION OF PARCEL 5 AS DESCRIBED BY SPECIAL WARRANTY DEED RECORDED AT RECEPTION NO. 03223274 OF THE BOULDER COUNTY RECORDS, SITUATED IN THE NORTHEAST QUARTER OF SECTION 29, TOWNSHIP 1 SOUTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 29;
THENCE SOUTH 00°00'35" WEST ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, A DISTANCE OF 1,180.75 FEET TO THE SOUTHEAST CORNER OF PARCEL NO. TK-75 AS DESCRIBED BY SPECIAL WARRANTY DEED RECORDED AT RECEPTION NO. 03223274, SAID POINT ALSO BEING THE **POINT OF BEGINNING**;
THENCE CONTINUING SOUTH 00°00'35" WEST ALONG SAID EAST LINE, A DISTANCE OF 136.13 FEET TO THE SOUTH LINE OF THE NORTH HALF OF SAID NORTHEAST QUARTER;
THENCE NORTH 89°42'42" WEST ALONG SAID SOUTH LINE, A DISTANCE OF 126.73 FEET;
THENCE NORTH 00°01'40" EAST, A DISTANCE OF 353.78 FEET TO A POINT OF NON-TANGENT CURVATURE;
THENCE ALONG THE ARC OF SAID CURVE TO THE RIGHT AN ARC LENGTH OF 83.14 FEET, SAID CURVE HAVING A RADIUS OF 202.00 FEET, A CENTRAL ANGLE OF 23°34'55", AND A CHORD WHICH BEARS SOUTH 62°15'22" EAST A CHORD DISTANCE OF 82.55 FEET TO A POINT OF NON-TANGENT CURVATURE;
THENCE ALONG THE ARC OF SAID CURVE TO THE RIGHT AN ARC LENGTH OF 13.21 FEET, SAID CURVE HAVING A RADIUS OF 15.00 FEET, A CENTRAL ANGLE OF 50°28'28", AND A CHORD WHICH BEARS SOUTH 25°13'39" EAST A CHORD DISTANCE OF 12.79 FEET TO THE WEST LINE OF SAID PARCEL NO. TK-75;
THENCE ALONG THE PERIMETER OF SAID PARCEL THE FOLLOWING TWO (2) COURSES:
1) SOUTH 00°00'35" WEST, A DISTANCE OF 168.13 FEET;
2) SOUTH 89°48'45" EAST, A DISTANCE OF 48.09 FEET TO THE **POINT OF BEGINNING**;

SAID PARCEL CONTAINS 32,962 SQUARE FEET OR 0.76 ACRES, MORE OR LESS.

BASIS OF BEARINGS: BEARINGS ARE BASED ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 29, ASSUMED TO BEAR SOUTH 00°00'35" WEST.

PREPARED BY: AARON MURPHY
PLS 38162
ON BEHALF OF: HARRIS KOCHER SMITH
1120 LINCOLN STREET, SUITE 1000
DENVER, CO 80203
303.623.6300



1120 LINCOLN STREET, SUITE 1000
DENVER, COLORADO 80203
P: 303.623.6300 F: 303.623.6311
HARRISKOCHERSMITH.COM

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH.

ISSUE DATE: 4-15-2020	PROJECT #: 190108
DATE	REVISION COMMENTS

DESCRIPTION

HKS HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

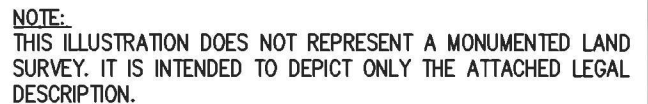
CHK'D BY: AWM
DRAWN BY: TWG

SHEET NO.

1

1 OF 2

SITUATED IN THE NORTHEAST 1/4 OF SECTION 29, TOWNSHIP 1 SOUTH,
RANGE 69 WEST OF THE 6TH P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO



NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH.

2 OF 2



MEMORANDUM

Date: December 1, 2023

To: Rob Zuccaro, Director of Community Development, City of Louisville

From: Sam Franzen, Dewberry Engineers

Subject: Redtail Ridge Lift Station Planned Unit Development Resubmittal

This memorandum and attachments serve as the third resubmittal of the Planned Unit Development (PUD) request for the proposed Redtail Ridge Lift Station in the City of Louisville. The project team consists of Redtail Ridge Metropolitan District, the City of Louisville (the operator), Dewberry Engineers (the lift station design engineer), Harrison Kocher Smith (the civil designer), and Norris Design (landscape architect).

BACKGROUND

The Redtail Ridge Lift Station will serve the Redtail Ridge development. The Redtail Ridge development is in a different drainage than the Louisville Wastewater Treatment Plant (WWTP). The lift station is needed to pump sewage from the development to the WWTP where it will be treated.

PROJECT DESCRIPTION

The Redtail Ridge Lift Station project includes a single building that is 1,031 square feet. The building will consist of two rooms. The main room is above a wet well and houses piping, instrumentation, and equipment. The wet well and pumps, piping, and instrumentation located in the wet well are accessed via hatches in the floor of the main room. The other room is an electrical room and will house electrical equipment used to power and control the lift station equipment and instrumentation. Drawings showing the general layout of the lift station are included in Attachment A.

The Lift Station site will also have on its premises an emergency backup generator housed in its own lockable enclosure, utility transformers, and an air handling unit which provides ventilation for the lift station. The generator enclosure will be factory coated to match the building color scheme. The air handling unit will be located directly adjacent to the building on a concrete pad and will be screened from view with a wall matching the building. Lockable gates will be provided on the entrances to the air handling unit area. There will also be fenced areas on the north side building housing an air conditioning condenser and an odor control unit. A site plan is included in Attachment A.

Exterior building finish materials will be as shown and described on the architectural sections and color rendering included in Attachment A. Proposed metal wall and roof material cut sheets are included in Attachment B along with a photograph of the proposed synthetic stone wall facing. Samples of the metal building material were provided with the previous submittal submitted in May 2020. The building shall be one story.

WAIVERS

A number of requirements listed in the City of Louisville Commercial Development Design Standards and Guidelines are not met by this project because it is not a typical commercial building in that it is non-occupied and solely intended to protect the mechanical equipment inside with occasional visits to the site by technicians. A table listing specific sections that are not being complied with and the reasoning is provided below as well as on the Cover of the drawings provided in Attachment A.

Requested Waivers of CDDS&G Not Applicable to Redtail Ridge Lift Station	
General	Many sections of the Commercial Development Design Standards and Guidelines do not apply to this PUD because of the nature of the building. The building is a new structure that is non-occupied and solely intended to protect the mechanical and electrical equipment inside with only very occasional visits to the site by technicians. See below for specific instances when the code is not applicable.
Section	Notes on Requirements
4.5.1.H	The pre-finished metal siding is a high quality material with a 20 year warranty that will match the aesthetics of the nearby fire station. A waiver has been requested in the PUD request letter.
6.2.C	The transformer and emergency generator are not screened from the west. The generator is in its own enclosure coated to match the building. Vegetation will be planted as possible around the generator and transformer; however, due to maintenance requirements vegetation has to be set back from both pieces of equipment. Future development plans call for a parking or drive areas to the west of this site which should limit the exposure of these items.
8.1D	Lighting has been coordinated with City O&M staff to provide sufficient lighting for normal and emergency activities at the lift station. Reducing the lighting will make working at the lift station more difficult and dangerous. The light on the north side of the building is a switched light that is only to be used in emergencies. Photometric plans with the north light on and off and included in the drawing set. Currently the maximum lumens outside the boundary is 0.5 to the west of the lift station. This is a low light level that we do not believe will negatively affect future development on the adjoining property. The light also spreads to the adjacent road right of ways to the north and east at a maximum lumens of 0.1. We expect those right of ways will be illuminated to a higher level than this by the road and traffic lighting.

LIGHTING

Site lighting will consist of a fully shielded down light mounted on the building above each door located on the south side of the building and a single fully shielded down light mounted on the west wall of the building to provide light for the HVAC area. A single flood light controlled by a

MEMORANDUM

switch inside the lift station will be mounted on the north wall of the lift station. This light will provide light to the north of a building where a portable pump would be parked and operated during an emergency event. The flood light will only be turned on during emergencies. Pole mounted lights are not included on the site. Lighting has been coordinated with City operations and maintenance staff to provide adequate lighting for normal and emergency operations and maintenance activities at the facility. Proposed light fixtures cut sheets and a photometric plan are included in the drawings.

UTILITIES

New electric, natural gas, and water utilities will be required. These utilities will be routed to the building from the nearest location in the new development. The utilities serving the site are shown on the site plan but may shift slightly as they are still being coordinated.

TRAFFIC AND PARKING

Initial site access will be via an exit from a 26 foot wide drive from a traffic circle. The load rating of the drive and gate securing entry to the drive are being coordinated with the City as part of the overall development plan. The drive will follow the future path of a drive lane through a planned parking lot for that parcel. The access path will be through the parking lot in the future. The paved area on the south side of the lift station that will be used as a turnaround and parking area and has coordinated with the City operations and maintenance staff.

The lift station will typically be visited a maximum of once per day by a single truck for approximately half an hour to check operations and equipment. Once a month preventative maintenance will be done which could require two trucks and take a full day. If there is an emergency at the lift station additional trucks and a trailer mounted bypass pump will be onsite until the emergency is resolved. A gravel area to the north of the lift station is provided for the bypass pump.

GRADING AND DRAINAGE

Existing and proposed site grading is shown in the drawing set. The lift station site was included in the drainage plan for the full development. Relative to the rest of the development the impervious area added on the lift station site is small. Drainage from the site is primary directed south and will sheet flow onto the adjoining property. Storage volume and retention will be added elsewhere in the development to account for the additional runoff produced from the lift station site.

LANDSCAPING

Landscaping has been added to the site to screen the building and ancillary equipment. A landscape plan is provided showing the proposed landscaping for the site. Some of the landscaping is within a Public Service Company (PSCO) easement on the site. The PSCO easements are owned by Xcel. Crossings of these easements have been discussed and agreed upon per the letter included as Attachment C. The path and road crossings on or adjacent to the

MEMORANDUM

lift station site are more obtrusive to the easement than the landscaping. Landscaping shown beyond the site boundaries is being coordinated as part of the Redtail Ridge Master Development Plan. Landscaping and irrigation within the lift station site shall be maintained by the Developer or the District.

OWNERSHIP DOCUMENTATION

The land the lift station will be constructed on is owned by Redtail Ridge Development LLC. The Special Warranty Deed for the development property and the legal description for the lift station site is provided as Attachment D.

ADJACENT PROPERTY OWNERS

Table 1 below lists ownership information for properties within 500 feet of the lift station. Information was taken from Boulder County and Broomfield County websites.

Table 1 Adjacent Property Owners

Parcel No.	Owner	County	Owner Address
157528268001	Centennial Venture Ltd. Liability Co.	Broomfield	1644 Platte St. Ste. 130, Denver, CO 80202
157528269001	Parkway Retail LLC	Broomfield	3434 47 th St. #220, Boulder, CO 80301
157528269003	Centennial Venture Ltd. Liability Co.	Broomfield	1644 Platte St. Ste. 130, Denver, CO 80202
157528269002	Centennial Venture Ltd. Liability Co.	Broomfield	1644 Platte St. Ste. 130, Denver, CO 80202
157528271001	Holman Broomfield Real Estate LLC	Broomfield	17800 SE Mill Plain Blvd. Ste. 190, Vancouver, WA 98683
157529105001	Phillips 66 Company	Broomfield	420 S Keeler, Bartlesville, OK 74003
157528200019	Phillips 66 Company	Broomfield	420 S Keeler, Bartlesville, OK 74003

SCHEDULE

Construction is planned to begin 2 months after plat approval.

ATTACHMENTS

Attachment A – Project Drawings

Attachment B – Exterior Building Materials Cut Sheets (Metal Wall and Roof and Stone Wall Facing)

Attachment C – Redtail Ridge Xcel Easement Encroachments Letter

Attachment D – Special Warranty Deed

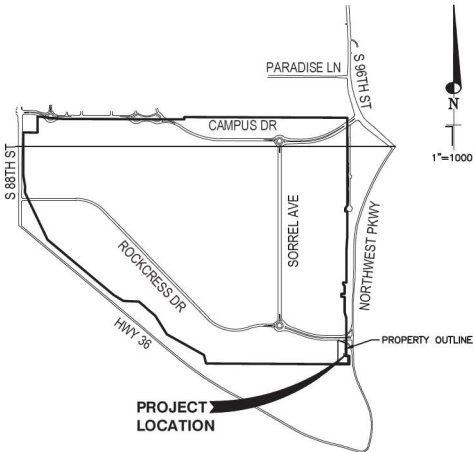
REDTAIL RIDGE LIFT STATION PLANNED UNIT DEVELOPMENT

TRACT K, REDTAIL RIDGE FILING NO. 1
LOCATED IN THE NORTHEAST QUARTER OF SECTION 29, TOWNSHIP 1 SOUTH, RANGE 69
WEST OF THE 6th P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

DRAWING INDEX

SHT. NO.	DWG. NO.	TITLE
1 OF 13	---	COVER
2 OF 13	C-1	OVERALL SITE PLAN
3 OF 13	C-2	SITE PLAN
4 OF 13	C-3	UTILITY PLAN
5 OF 13	C-4	GRADING PLAN
6 OF 13	L-1.0	LANDSCAPE PLANT SCHEDULE
7 OF 13	L-2.0	LANDSCAPE PLAN
8 OF 13	L-3.0	LANDSCAPE DETAILS
9 OF 13	A-4	BUILDING ELEVATIONS
10 OF 13	A-5	BUILDING ELEVATIONS
11 OF 13	E-101L	EXTERIOR PHOTOMETRIC PLAN NORMAL LIGHTING
12 OF 13	E-101L-1	EXTERIOR PHOTOMETRIC PLAN EMERGENCY LIGHTING
13 OF 13	E-3	LIGHTING FIXTURE CUT-SHEETS AND FIXTURE SCHEDULE

Requested Waivers of CDS&G Not Applicable to Redtail Ridge Lift Station	
Section	Waiver Request
4.5.1.H	Allow prefinished painted metal siding as an exterior material.
8.1D	Allow light spill outside of the site boundaries.



VICINITY MAP

GENERAL NOTES:

1. THE PROPERTY IS ZONED PLANNED COMMUNITY COMMERCIAL.
2. ALL LANDSCAPING WILL BE OWNED/MAINTAINED BY THE METRO DISTRICT.
3. THE CITY OF LOUISVILLE IS NOT RESPONSIBLE FOR DAMAGE TO, OR REPAIR OF, MONUMENT SIGNS, PAVEMENT SURFACES, OR LANDSCAPING CAUSED DURING REPAIR OR MAINTENANCE OF UTILITIES LOCATED WITHIN PUBLIC UTILITY EASEMENTS.

PROJECT DESCRIPTION:

THE BUILDING WILL BE APPROXIMATELY 1,031 SQUARE FEET THAT WILL HOUSE THE LIFT STATION FOR THE REDTAIL RIDGE DEVELOPMENT. THE LIFT STATION SITE WILL ALSO HOUSE A GENERATOR WITH ITS OWN ENCLOSURE COATED TO MATCH THE LIFT STATION COLOR SCHEME AND AN HVAC AREA THAT WILL BE SCREENED FROM VIEW.

LEGAL DESCRIPTION:

TRACT K
REDTAIL RIDGE FILING NO. 1
CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO
SAID PARCEL CONTAINS 32.962 SQUARE FEET OR 0.76 ACRES MORE OR LESS.

OWNERSHIP SIGNATURE BLOCK

The undersigned as the owner of the of the lands described herein, hereby agrees on behalf of itself, and its heirs, successors and assigns to develop and maintain the property described hereon in accordance and compliance with this approved plan and the Louisville Municipal Code.

REDTAIL RIDGE METROPOLITAN DISTRICT

Witness my/our hand(s) and seal(s) this ____ day of _____, 20 ____.

By: RODNEY RICHMOND, MANAGING PRINCIPAL

Owner Name and Signature

Notary Name (print)

(Notary Seal)

Notary Signature

My Commission Expires _____

CITY COUNCIL CERTIFICATE

Approved this ____ day of _____,
20 ____ by the City Council of the City of
Louisville, Colorado.
Resolution No. _____, Series _____
(City Seal)
Mayor Signature _____
City Clerk Signature _____

PLANNING COMMISSION CERTIFICATE

Approved this ____ day of _____,
20 ____ by the Planning Commission of the City
of Louisville, Colorado.
Resolution No. _____, Series _____

Contact Information

Landowner:
Redtail Ridge Development,
LLC
1555 Blake Street, Suite 210
Denver, CO 80202
Applicant:
Jay Hardy
1555 Blake Street, Suite 210
Denver, CO 80202
970-581-8863
jay.hardy@bruebaukol.com
Architect:
Lintjer+Haywood Architects
Bruce Lintjer
303-408-5939
blintjer@lintjer-haywood.com
Landscape Architect:
Norris Design
Jared Carlon
303-892-1166
jcarlon@norris-design.com
Photometric Engineer:
Dewberry Engineers Inc.
Stephen Blucher
919-424-3775
sblucher@dewberry.com

Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25

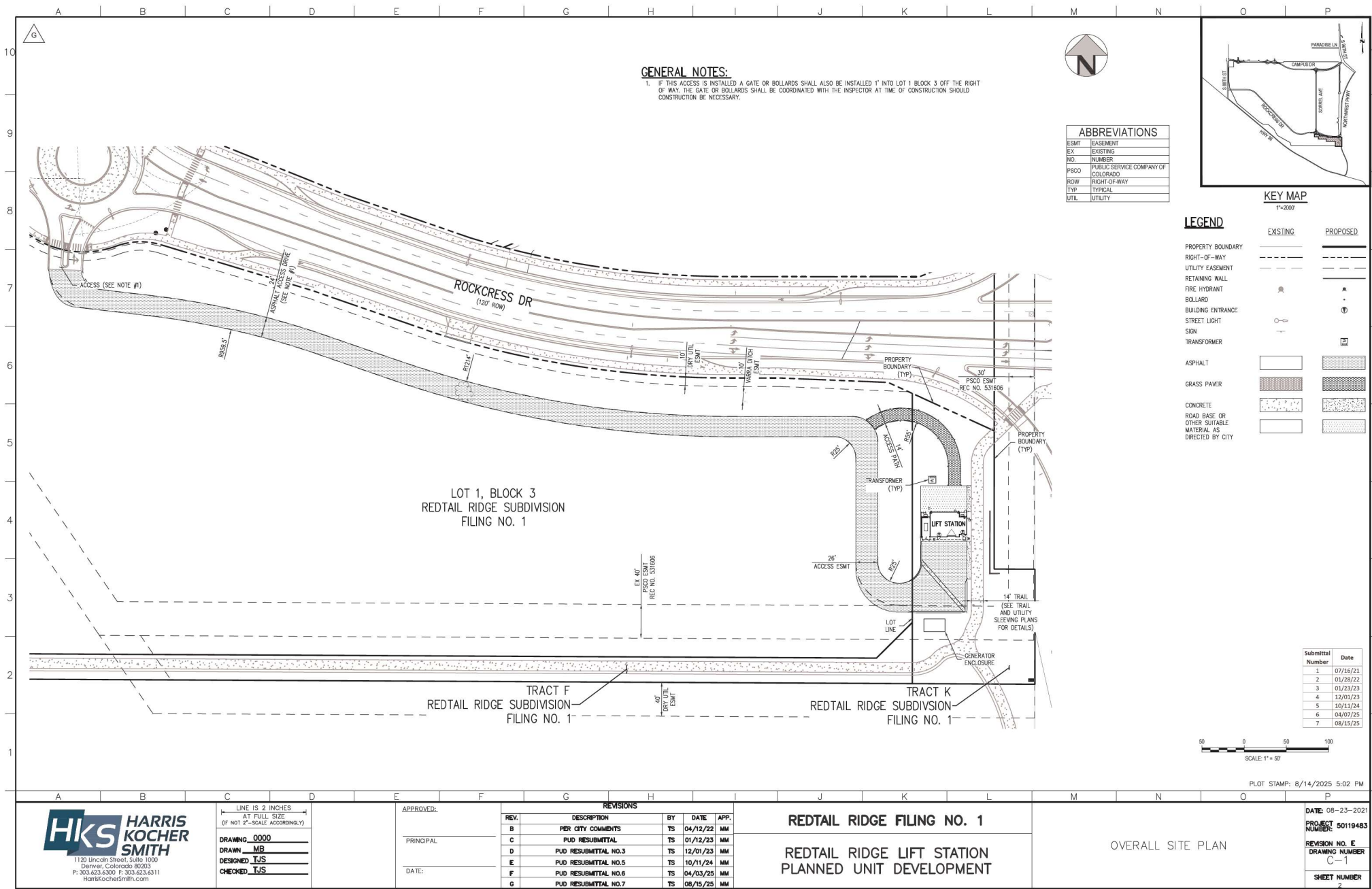
PLANNED UNIT DEVELOPMENT SUBMITTAL

AUGUST 2025



Dewberry Engineers Inc.

990 S. BROADWAY, SUITE 400
Denver, Colorado 80209
(303) 825-1802



GENERAL NOTES:

1. IF THIS ACCESS IS INSTALLED A GATE OR BOLLARDS SHALL ALSO BE INSTALLED 1' INTO LOT 1 BLOCK 3 OFF THE RIGHT OF WAY. THE GATE OR BOLLARDS SHALL BE COORDINATED WITH THE INSPECTOR AT TIME OF CONSTRUCTION SHOULD CONSTRUCTION BE NECESSARY.

ABBREVIATIONS	
ESMT	EASEMENT
EX	EXISTING
NO.	NUMBER
PSCD	PUBLIC SERVICE COMPANY OF COLORADO
ROW	RIGHT-OF-WAY
TYP	TYPICAL
UTIL	UTILITY

KEY MAP	
1"=2000'	
LEGEND	
EXISTING	PROPOSED
PROPERTY BOUNDARY	---
RIGHT-OF-WAY	---
UTILITY EASEMENT	---
RETAINING WALL	---
FIRE HYDRANT	⊙
BOLLARD	⊙
BUILDING ENTRANCE	⊙
STREET LIGHT	⊙
SIGN	⊙
TRANSFORMER	⊙
ASPHALT	▨
GRASS PAVEMENT	▨
CONCRETE	▨
ROAD BASE OR OTHER SUITABLE MATERIAL AS DIRECTED BY CITY	▨

Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25



PLOT STAMP: 8/14/2025 5:02 PM

HKS HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)
DRAWING 0000
DRAWN MB
DESIGNED TJS
CHECKED TJS

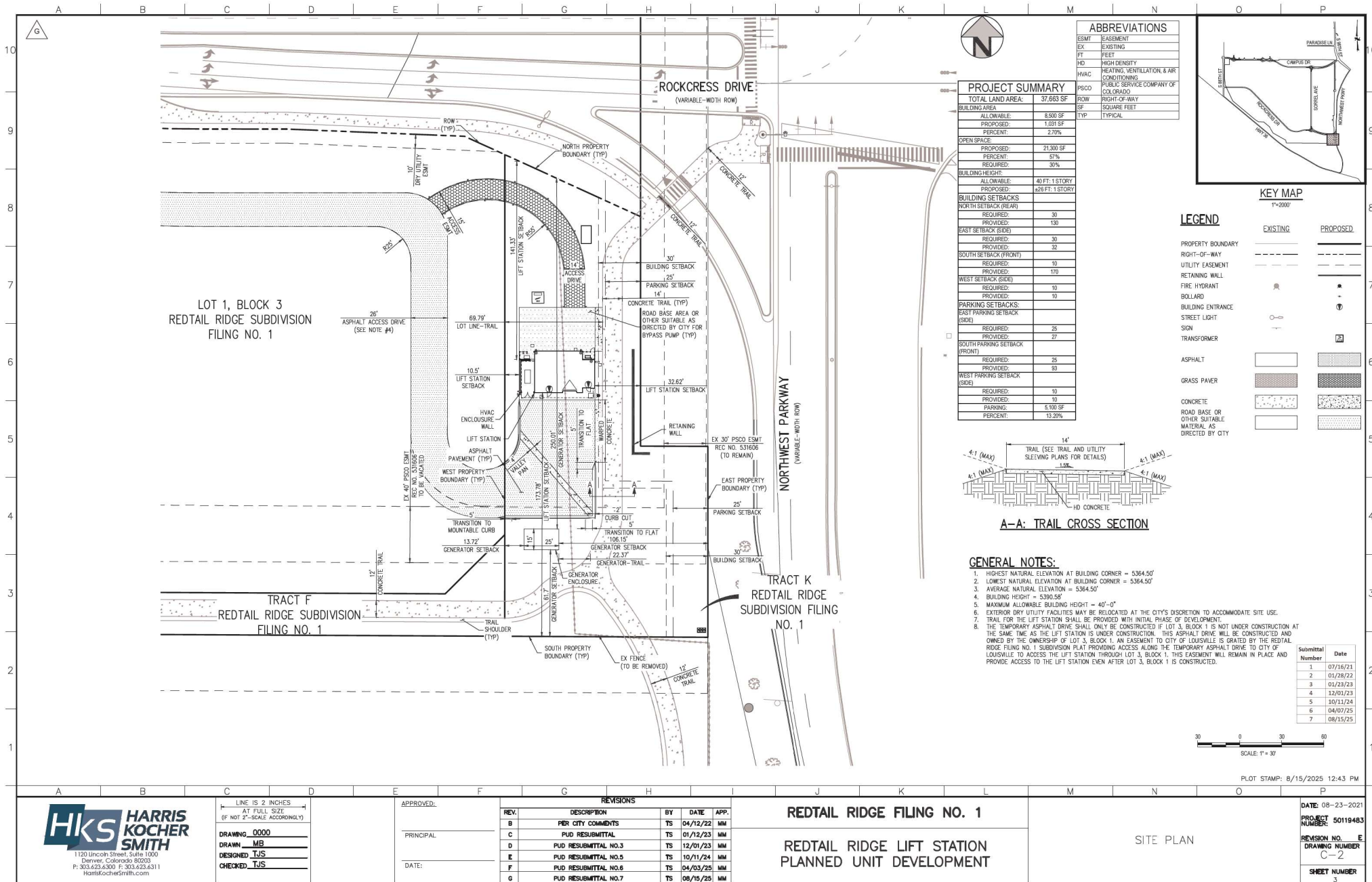
APPROVED:
PRINCIPAL
DATE:

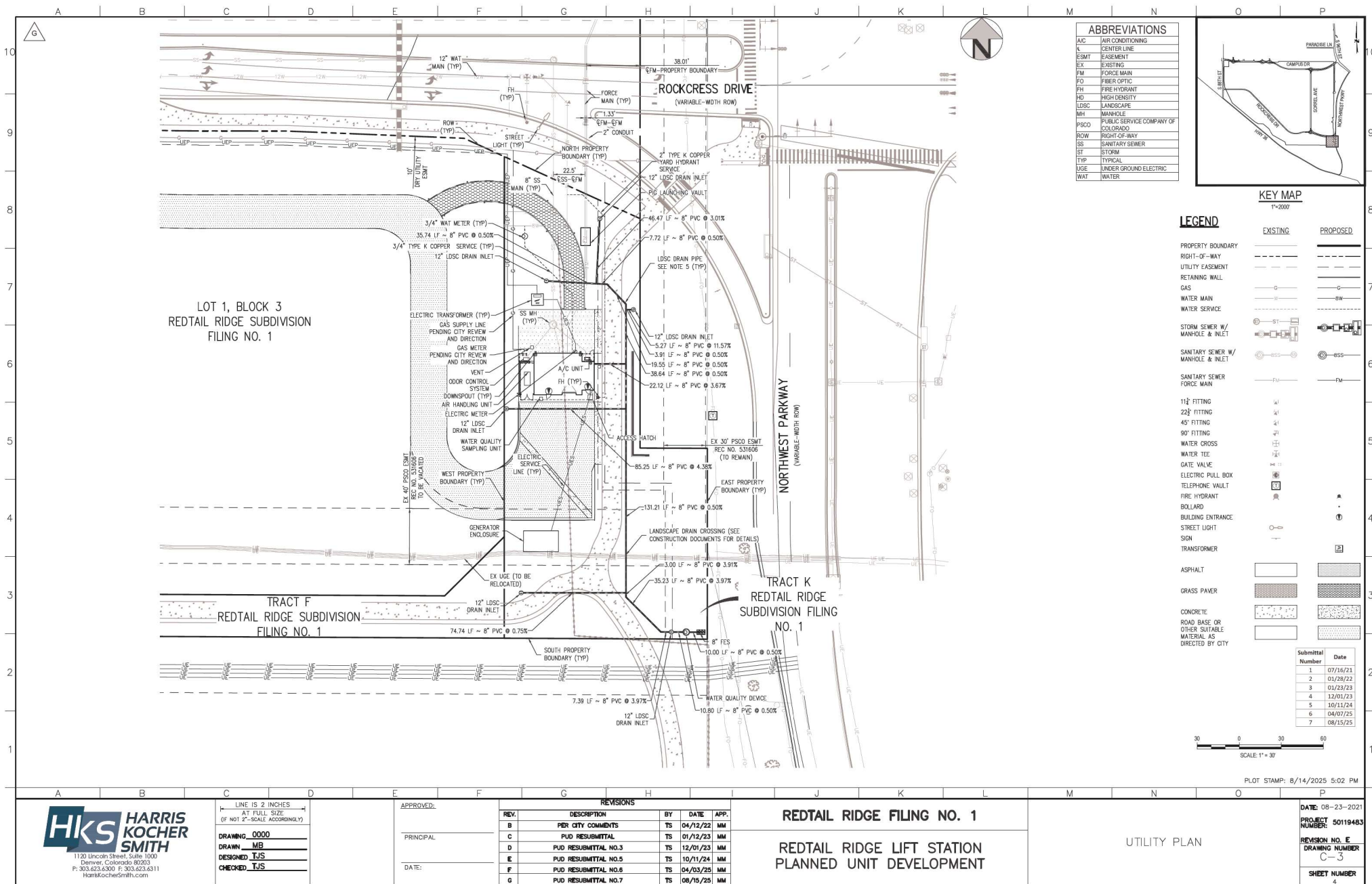
REVISIONS				
REV.	DESCRIPTION	BY	DATE	APP.
B	PER CITY COMMENTS	TS	04/12/22	MM
C	PUD RESUBMITTAL	TS	01/12/23	MM
D	PUD RESUBMITTAL NO.3	TS	12/01/23	MM
E	PUD RESUBMITTAL NO.5	TS	10/11/24	MM
F	PUD RESUBMITTAL NO.6	TS	04/03/25	MM
G	PUD RESUBMITTAL NO.7	TS	08/15/25	MM

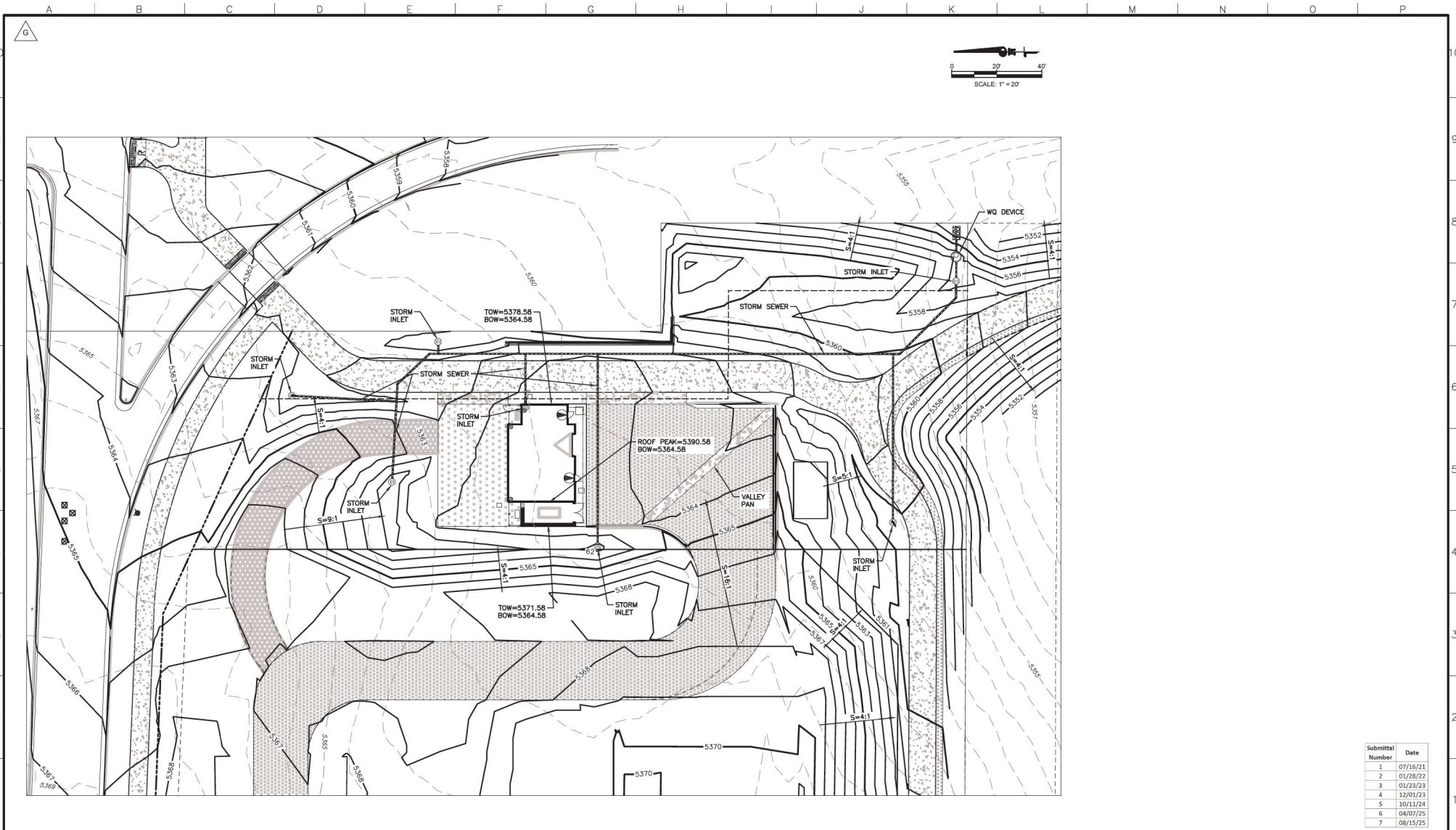
REDTAIL RIDGE FILING NO. 1
**REDTAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT**

OVERALL SITE PLAN

DATE: 08-23-2021
PROJECT NUMBER: 50119483
REVISION NO. E
DRAWING NUMBER C-1
SHEET NUMBER 2







Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25

Dewberry
Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
Denver, Colorado 80209
(303) 825-1802

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"=SCALE ACCORDINGLY)

DRAWING: CPL19483-1
DRAWN: TWL
DESIGNED: SEF
CHECKED: SEF

APPROVED:

PRINCIPAL

DATE:

REV.	DESCRIPTION	BY	DATE	APP.
A	PUD RESUBMITTAL	TWL	01/22/23	SEF
B	PUD RESUBMITTAL NO. 3	TWL	12/01/23	SEF
C	PUD RESUBMITTAL NO. 5	TWL	10/11/24	SEF
D	PUD RESUBMITTAL NO. 6	TWL	04/03/25	SEF
E	PUD RESUBMITTAL NO. 7	TWL	08/15/25	SEF

RETAIL RIDGE FILING NO. 1

RETAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT

CIVIL

GRADING PLAN

DATE: 01/11/23

PROJECT NUMBER: 50119483

REVISION NO. E

DRAWING NUMBER C-3

SHEET NUMBER 5

CODE	QTY	BOTANICAL NAME	COMMON NAME	ROOT	
TREES					<u>MATURE SIZE</u>
QU FA	2	QUERCUS ROBUR FASTIGIATA	PYRAMIDAL ENGLISH OAK	2" CAL. B & B	50' H X 20" W
EVERGREEN TREES					<u>MATURE SIZE</u>
PI PU	3	PICEA PUNGENS	COLORADO SPRUCE	2" CAL. B & B	60' H X 20" W
PI EA	4	PINUS LEUCODERMIS 'EMERALD ARROW'	EMERALD ARROW BOSNIAN PINE	2" CAL. B & B	30' H X 8" W
DECIDUOUS SHRUBS 2.4' SPREAD					<u>MATURE SIZE</u>
AM BU	33	AMORPHA NANA	FALSE INDIGO	#5 CONT.	2' H X 20" W
EP EQ	3	EPHEDRA EQUISETINA	BLUESTEM JOINT FIR	#5 CONT.	4' H X 4" W
PE AT	3	PEROVSKIA ATRIPLEXIFOLIA	RUSSIAN SAGE	#5 CONT.	5' H X 4" W
DECIDUOUS SHRUBS 5-7' SPREAD					<u>MATURE SIZE</u>
CO BY	1	CORNUS SERICEA 'BUD'S YELLOW'	BUD'S YELLOW DOGWOOD	#5 CONT.	8' H X 6" W
CY MO	6	CYTISUS SCOPARIUS 'MOONLIGHT'	MOONLIGHT BROM	#5 CONT.	6' H X 6" W
DECIDUOUS SHRUBS 7-9' SPREAD					<u>MATURE SIZE</u>
AM RE	3	AMELANCHIER ALNIFOLIA 'REGENT'	REGENT SERVICEBERRY	#5 CONT.	6' H X 6" W
CE LE	9	CERCOCARPUS LEDIFOLIUS	CURL-LEAF MOUNTAIN MAHOGANY	#5 CONT.	30' H X 12" W
EVERGREEN SHRUB 2.4' SPREAD					<u>MATURE SIZE</u>
YU IT	3	YUCCA FLACCIDATA 'IVORY TOWER'	IVORY TOWER YUCCA	#5 CONT.	4' H X 3" W
EVERGREEN SHRUBS 2.5' SPREAD					<u>MATURE SIZE</u>
AR PA	22	ARCTOSTAPHYLOS X COLORADENSIS 'PANCHITO'	PANCHITO MANZANITA	#5 CONT.	15' H X 5" W
EVERGREEN SHRUBS 5.7' SPREAD					<u>MATURE SIZE</u>
BE AG	13	BERBERIS AQUIFOLIUM	OREGON GRAPE	#5 CONT.	3' H X 6" W
TH SM	3	THUJA OCCIDENTALIS 'SMARAGD'	EMERALD GREEN ARBORVITAE	#5 CONT.	12' H X 5" W
EVERGREEN SHRUBS 7.0' SPREAD					<u>MATURE SIZE</u>
PI MO	13	PICEA PUNGENS 'MONTGOMERY'	MONTGOMERY SPRUCE	#5 CONT.	12' H X 10" W
PI HC	2	PINUS SYLVESTRIS 'HILLSIDE CREEPER'	HILLSIDE CREEPER SCOTCH PINE	#5 CONT.	12' H X 12" W
ORNAMENTAL GRASSES LARGE					<u>MATURE SIZE</u>
AN GE	17	ANDROPOGON GERARDII 'PINWINS' TM	WINDWALKER BIG BLUESTEM	#5 CONT.	6' H X 3" W
MI PU	21	MISCANTHUS SINENSIS 'PURPURESCENS'	PURPLE EULALIA GRASS	#5 CONT.	4' H X 3" W
ORNAMENTAL GRASSES MEDIUM					<u>MATURE SIZE</u>
AC HT	26	ACHATHERUM HYMENODES	INDIAN RICE GRASS	#1 CONT.	1.5' H X 1.5" W
BO GR	117	BOULETUA GRACILIS	BLUE GRAMA GRASS	#1 CONT.	2' H X 2" W
HE SE	117	HELICTOTRICHON SEMPERVIRENS	BLUE AVENA GRASS	#1 CONT.	3' H X 2" W
SC PB	21	SCHIZACHYRIUM SCOPARIUM 'PRAIRIE BLUES'	LITTLE BLUESTEM GRASS	#1 CONT.	4' H X 1.5" W
PERENNIALS LARGE					<u>MATURE SIZE</u>
AG AS	5	AGASTACHE RUPESTRIS 'VALERIE FINNET'	APACHE SUNSET THREADLEAF HYSSOP	#1 CONT.	3' H X 3" W
AR VF	16	ARTEMISIA LUDOVICIANA 'VALERIE FINNET'	VALERIE FINNET SAGEBRUSH	#1 CONT.	3.5' H X 3" W
PERENNIALS MEDIUM					<u>MATURE SIZE</u>
RU HI	46	RUDEBECKIA HIRTA	BLACK-EYED SUSAN	#1 CONT.	2' H X 2" W

REDTAIL RIDGE NATIVE GRASS SEED MIX

*"SHORTGRASS PRAIRIE MIX" BY ARKANSAS VALLEY SEED CO, OR APPROVED EQUAL.

COMMON NAME	PLSF# / ACRE	% OF TOTAL
BUFFALO GRASS	21.6	41.5%
SIDEATS GRAMA	0.8	1.9%
WESTERN WHEATGRASS	8.6	16%
BLUE GRAMA	4.0	8%
BOTTLEBRUSH SQUIRRELTAIL	4.0	8%
GREEN NEEDLEGRASS	2.8	5%
PRAIRIE JUNEGRASS	1.0	2%
SAND DROPSEED	0.20	0.5%
TOTAL	52.0 PLSF# / ACRE	100%

NAME	DESCRIPTION
POROUS PAVEMENT	MANUFACTURER - INVISIBLE STRUCTURES PRODUCT NAME - GRASSPAVE2 NOTES - INSTALL PER MANUFACTURER'S SPECIFICATIONS. SEE LANDSCAPE PLAN FOR LOCATION AND DETAIL 7 ON SHEET L-30 FOR EDGE CONSTRAINT TYPE.
COBBLE	SOURCE - LOCAL (BY CONTRACTOR) TYPE - 2" x 4" ROUNDED RIVER ROCK, TAN-BEIGE COLOR RANGE, AS IN REDTAN RIDGE PILING #1. SHALL BE PLACED @ 4" MIN. DEPTH OVER A NON WOVEN POLYPROPYLENE WEED BARRIER SUCH AS TYFAR OR MIRAFIX.

1. ALL PLANT MATERIALS SHALL MEET THE FOLLOWING SIZE CRITERIA, AS NOTED IN SECT. 5.7
DECIDUOUS SHADE/CANOPY TREES: 2" CALIPER
ORNAMENTAL TREES: 2" CALIPER (1.5" CALIPER MAY BE SUFFICIENT IN SOME CASES)
EVERGREEN TREES: 6'-8" HEIGHT (MINIMUM OF 25% SHALL BE 8" HEIGHT)
MULTI-STEM ORNAMENTALS: 8'-10' HEIGHT
SHRUBS: 5 GALLON CONTAINER GROWN
GROUND COVER/PERENNIALS: 2"-14" POTS
VINES: 1 GALLON CONTAINER GROWN
2. CITY FORESTER TO APPROVE/ACCEPT TREES IN RIGHT OF WAY.
3. ALL PLANT MATERIALS SHALL MEET THE SPECIFICATIONS OF THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN).
4. ALL TREES SHALL BE BALLED AND BURLAPPED.
5. DECIDUOUS TREES SHALL BE PLANTED A MINIMUM OF 7' AND EVERGREEN TREES A MINIMUM OF 10' FROM ALL PUBLIC UTILITIES.
6. VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO PLANTING.
7. A HORIZONTAL DISTANCE OF 40' SHALL BE MAINTAINED BETWEEN STREET LIGHT AND STREET TREES.
8. PRE-CONSTRUCTION CONFERENCE REQUIRED WITH PUBLIC WORKS PRIOR CONSTRUCTION.
9. DEVELOPMENT WILL HAVE A 2-YEAR WARRANTY ON ALL PUBLIC IMPROVEMENTS AFTER CONSTRUCTION ACCEPTANCE IS ISSUED. THIS NOTE SHALL NOT IMPACT THE DEVELOPMENT AGREEMENT.

Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25



Dewberry[®]
Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
Denver, Colorado 80209
(303) 825-1802

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"=SCALE ACCORDINGLY)

DRAWING _____
DRAWN EH
DESIGNED EH
CHECKED JC

APPROVED:

PRINCIPAL
JC

DATE:
08/14/2025

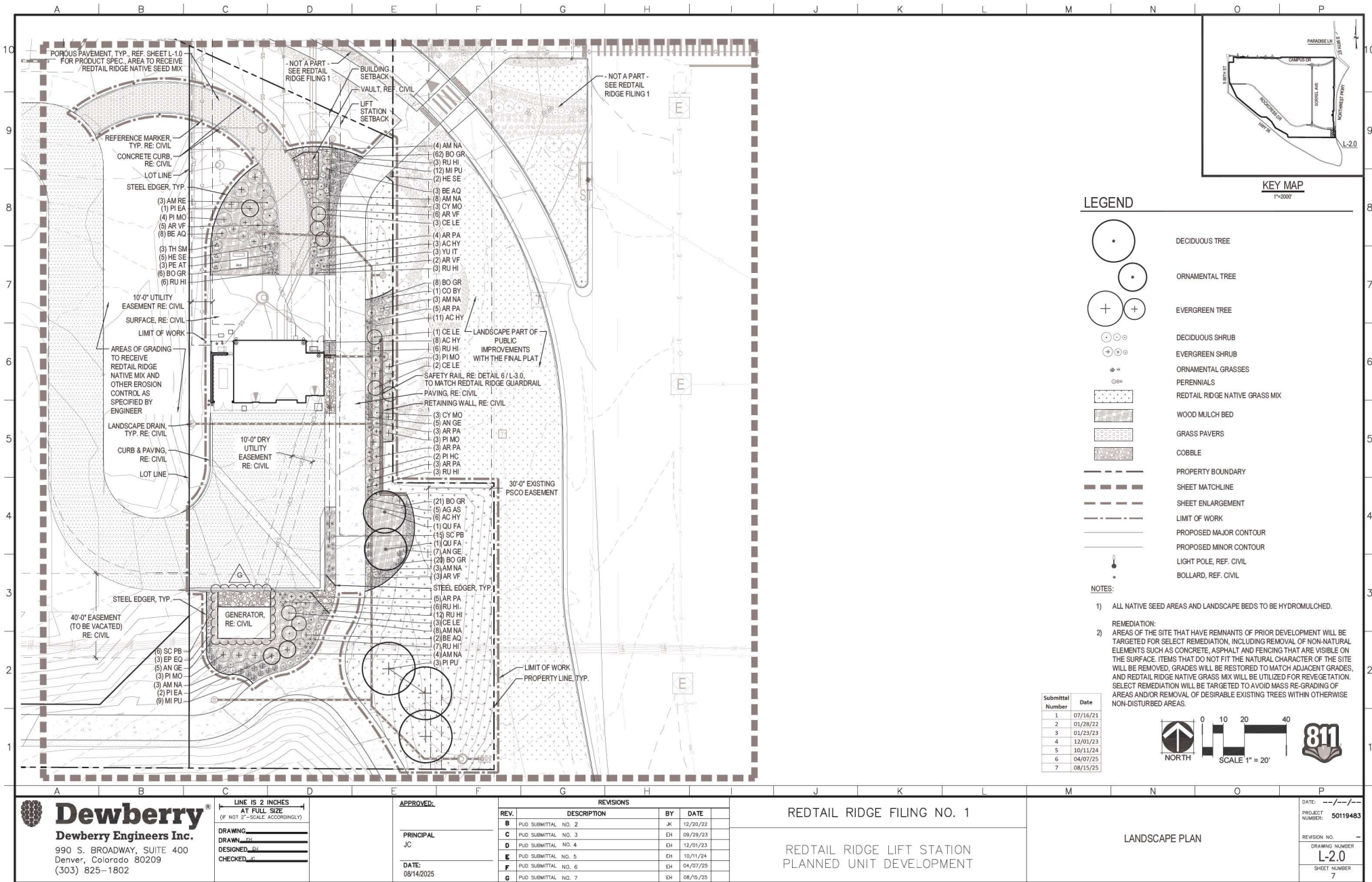
REVISIONS			
REV.	DESCRIPTION	BY	DATE
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C	PUD SUBMITTAL NO. 3	EH	09/29/23
D	PUD SUBMITTAL NO. 4	EH	12/01/23
E	PUD SUBMITTAL NO. 5	EH	10/11/24
F	PUD SUBMITTAL NO. 6	EH	04/07/25
G	PUD SUBMITTAL NO. 7	EH	08/15/25

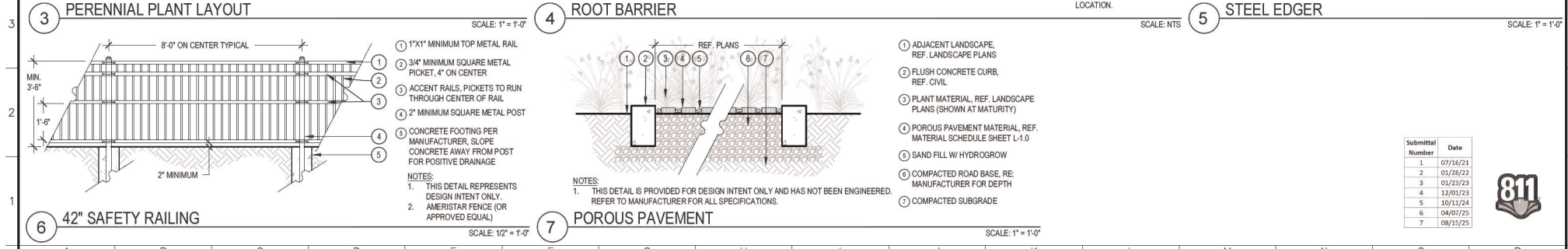
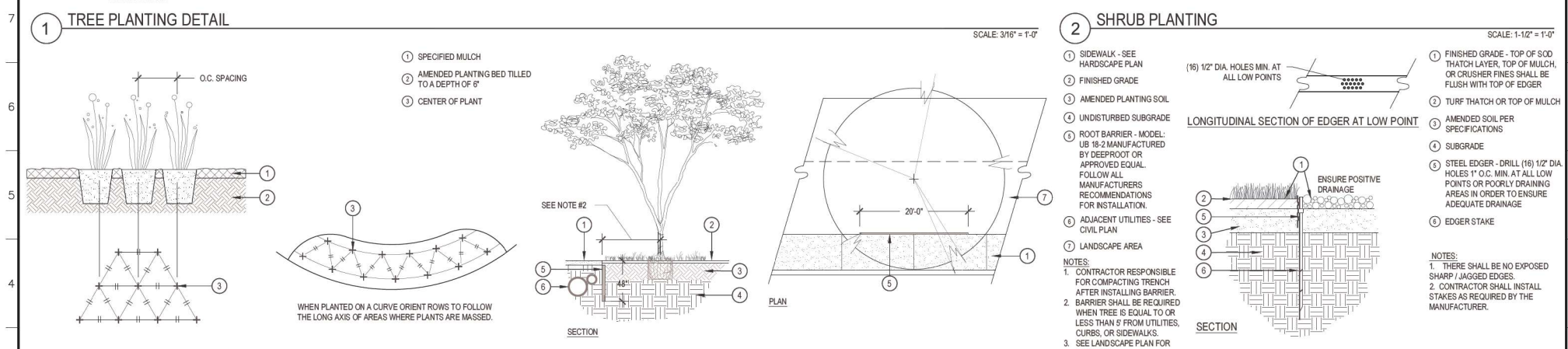
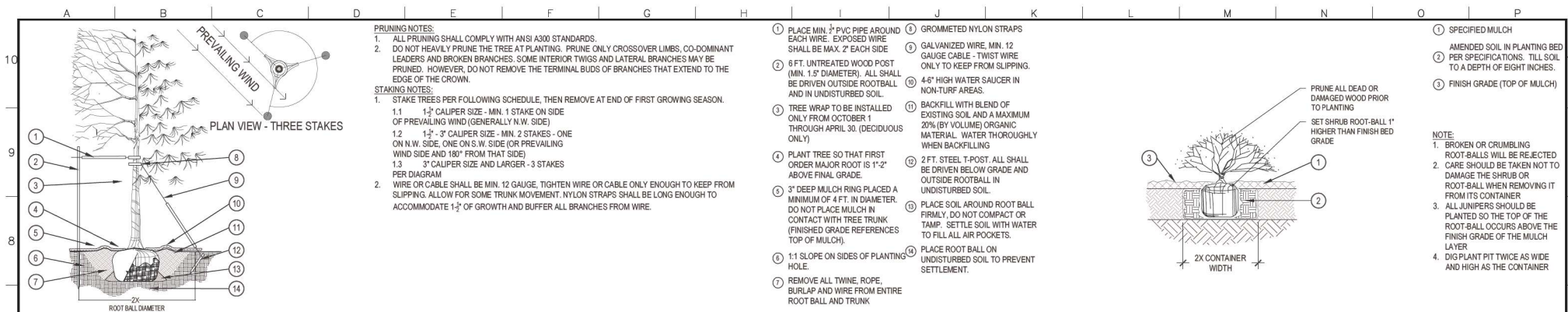
REDTAIL RIDGE FILING NO. 1

REDTAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT

LANDSCAPE PLANT SCHEDULE

DATE: --/--/--
PROJECT NUMBER: 50119483
REVISION NO. --
DRAWING NUMBER L-1.0
SHEET NUMBER 6





Dewberry
Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
DENVER, COLORADO 80209
(303) 825-1802

APPROVED:

PRINCIPAL
JC

DATE:
08/14/2025

REVISIONS

REV.	DESCRIPTION	BY	DATE
B	PUD SUBMITTAL NO. 2	JK	12/20/22
C	PUD SUBMITTAL NO. 3	EH	09/29/23
D	PUD SUBMITTAL NO. 4	EH	12/01/23
E	PUD SUBMITTAL NO. 5	EH	10/11/24
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G	PUD SUBMITTAL NO. 7	EH	08/15/25

RETAIL RIDGE FILING NO. 1

**RETAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT**

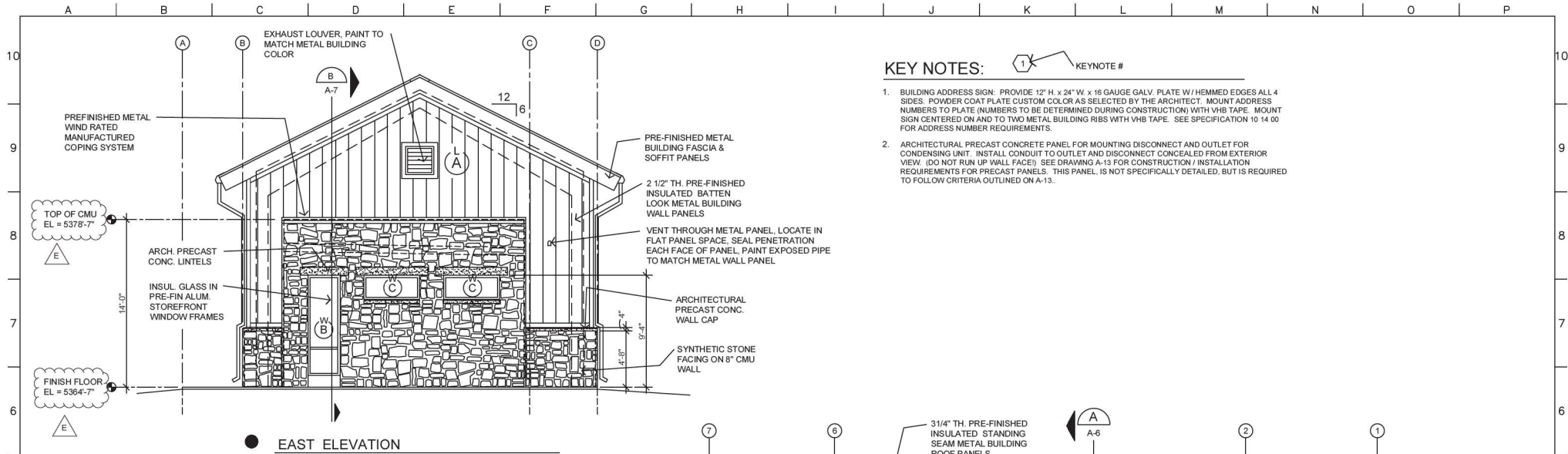
LANDSCAPE DETAILS

PROJECT NUMBER: 5019483

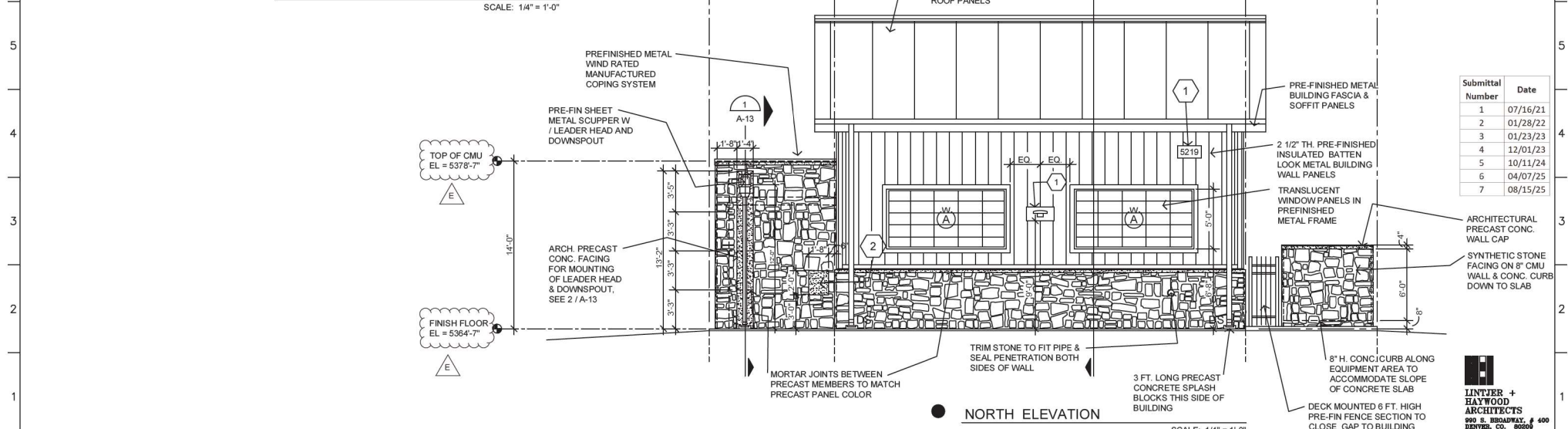
REVISION NO.: -

DRAWING NUMBER: L-3.0

SHEET NUMBER: 8



- KEY NOTES:**
- BUILDING ADDRESS SIGN: PROVIDE 12" H. x 24" W. x 16 GAUGE GALV. PLATE W/ HEMMED EDGES ALL 4 SIDES. POWDER COAT PLATE CUSTOM COLOR AS SELECTED BY THE ARCHITECT. MOUNT ADDRESS NUMBERS TO PLATE (NUMBERS TO BE DETERMINED DURING CONSTRUCTION) WITH VHB TAPE. MOUNT SIGN CENTERED ON AND TO TWO METAL BUILDING RIBS WITH VHB TAPE. SEE SPECIFICATION 10 14 00 FOR ADDRESS NUMBER REQUIREMENTS.
 - ARCHITECTURAL PRECAST CONCRETE PANEL FOR MOUNTING DISCONNECT AND OUTLET FOR CONDENSING UNIT. INSTALL CONDUIT TO OUTLET AND DISCONNECT CONCEALED FROM EXTERIOR VIEW. (DO NOT RUN UP WALL FACE). SEE DRAWING A-13 FOR CONSTRUCTION / INSTALLATION REQUIREMENTS FOR PRECAST PANELS. THIS PANEL IS NOT SPECIFICALLY DETAILED, BUT IS REQUIRED TO FOLLOW CRITERIA OUTLINED ON A-15.



Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25

LINTJER + HAYWOOD ARCHITECTS
 900 S. BROADWAY, # 400
 DENVER, CO. 80209
 303.408.5939 7500X

Dewberry
 Dewberry Engineers Inc.
 990 S. BROADWAY, SUITE 400
 Denver, Colorado 80209
 (303) 825-1802

LINE IS 2 INCHES
 AT FULL SIZE
 (IF NOT 2"=SCALE ACCORDINGLY)

DRAWING: A-4 DWG
 DRAWN: BRL
 DESIGNED: BRL
 CHECKED: BRL

REV.	DESCRIPTION	BY	DATE	APP.
A	BUILDING DEPARTMENT SUBMITTAL	BRL	08/24/21	BRL
B	PUD RESUBMITTAL NO. 3	BRL	01/12/23	BRL
C	PUD RESUBMITTAL NO. 5	BRL	12/12/23	BRL
D	PUD RESUBMITTAL NO. 6	BRL	10/11/24	BRL
E	PUD RESUBMITTAL NO. 7	BRL	08/15/25	BRL

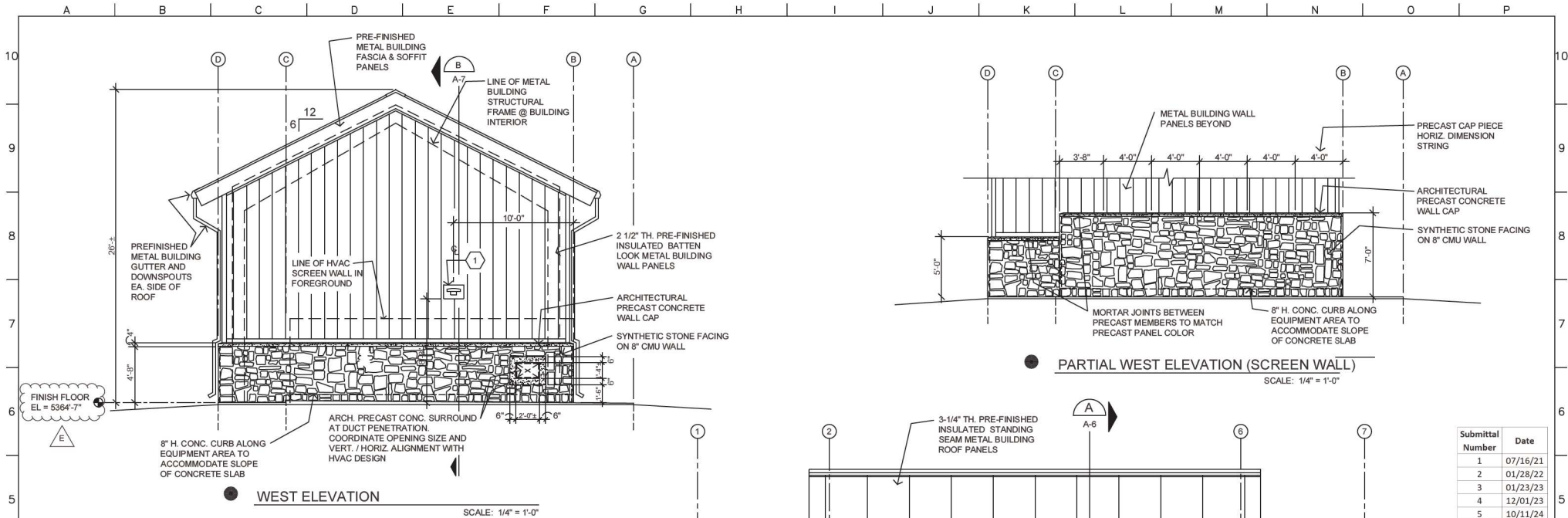
REDTAIL RIDGE FILING NO. 1

REDTAIL RIDGE LIFT STATION
 PLANNED UNIT DEVELOPMENT

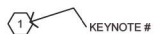
ARCHITECTURAL

BUILDING ELEVATIONS

DATE: 08/24/21
 PROJECT NUMBER: 50119483
 REVISION NO. E
 DRAWING NUMBER A-4
 SHEET NUMBER 5



KEY NOTES:



KEYNOTE #

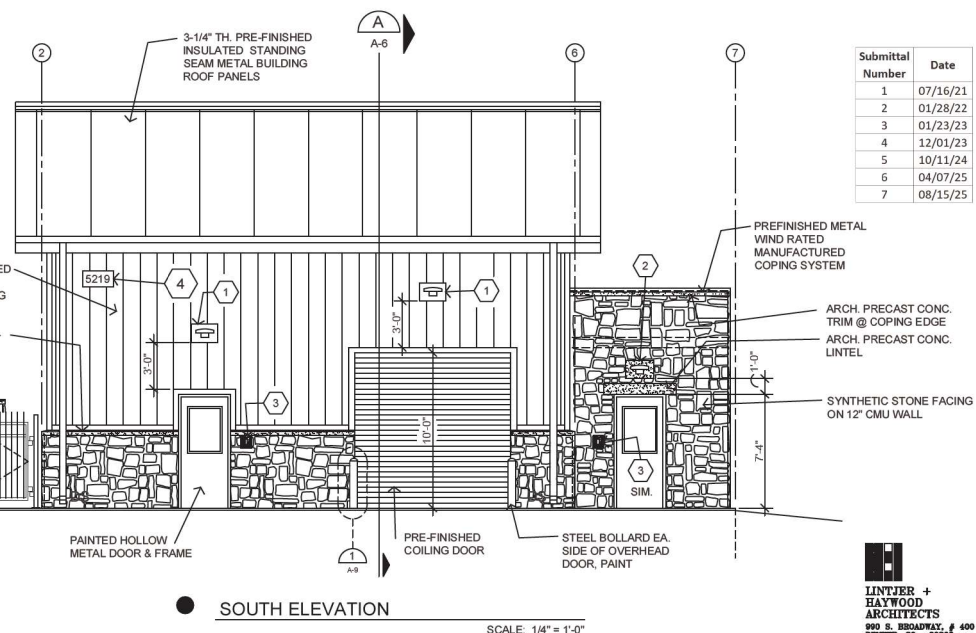
- (WALL) MOUNTED LIGHT FIXTURE. CENTER LIGHT FIXTURE ON 14" HIGH x 20" WIDE PREFINISHED PANEL CENTERED ON DOOR FRAME BELOW. SEE DETAIL 5 / A-12 FOR PANEL REQUIREMENTS.
- (WALL) MOUNTED LIGHT FIXTURE. CENTER LIGHT FIXTURE ON 16" HIGH x 24" WIDE ARCHITECTURAL PRECAST CONCRETE PANEL CENTERED ON DOOR FRAME BELOW. GROUT CMU AT PANEL SUPPORT DOWELS. SEE DETAIL 1 / A-12 FOR PANEL REQUIREMENTS.
- (WALL) MOUNTED ARCHITECTURAL PRECAST CONCRETE PANEL FOR DOOR ACCESS CONTROL. LOCATE PANEL 8" FROM DOOR JAMB. SEE DETAIL 3 / A-12 FOR PANEL REQUIREMENTS.
- BUILDING ADDRESS SIGN: PROVIDE 12" H. x 24" W. x 16 GAUGE GALV. PLATE W/ HEMMED EDGES ALL 4 SIDES. POWDER COAT PLATE CUSTOM COLOR AS SELECTED BY THE ARCHITECT. MOUNT ADDRESS NUMBERS TO PLATE (NUMBERS TO BE DETERMINED DURING CONSTRUCTION) WITH VHB TAPE. MOUNT SIGN CENTERED ON AND TO TWO METAL BUILDING RIBS WITH VHB TAPE. SEE SPECIFICATION 10.14.00 FOR ADDRESS NUMBER REQUIREMENTS.

FINISH FLOOR
EL = 5364'-7"



FINISH FLOOR
EL = 5364'-7"

DECK MOUNTED 6 FT.
HIGH, PRE-FIN METAL,
VEHICLE TYPE GATE
@ HVAC AREA END
WALL



Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25



Dewberry
Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
Denver, Colorado 80209
(303) 825-1802

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"=SCALE ACCORDINGLY)

DRAWING: A-5 DWG
DRAWN: BRL
DESIGNED: BRL
CHECKED: BRL

APPROVED:
PRINCIPAL
DATE:

REV.	DESCRIPTION	BY	DATE	APP.
A	BUILDING DEPARTMENT SUBMITTAL	BRL	09/24/21	BRL
B	PUD RESUBMITTAL NO. 3	BRL	01/12/23	BRL
C	PUD RESUBMITTAL NO. 3	BRL	12/1/23	BRL
D	PUD RESUBMITTAL NO. 5	BRL	10/11/24	BRL
E	PUD RESUBMITTAL NO. 7	BRL	08/15/25	BRL

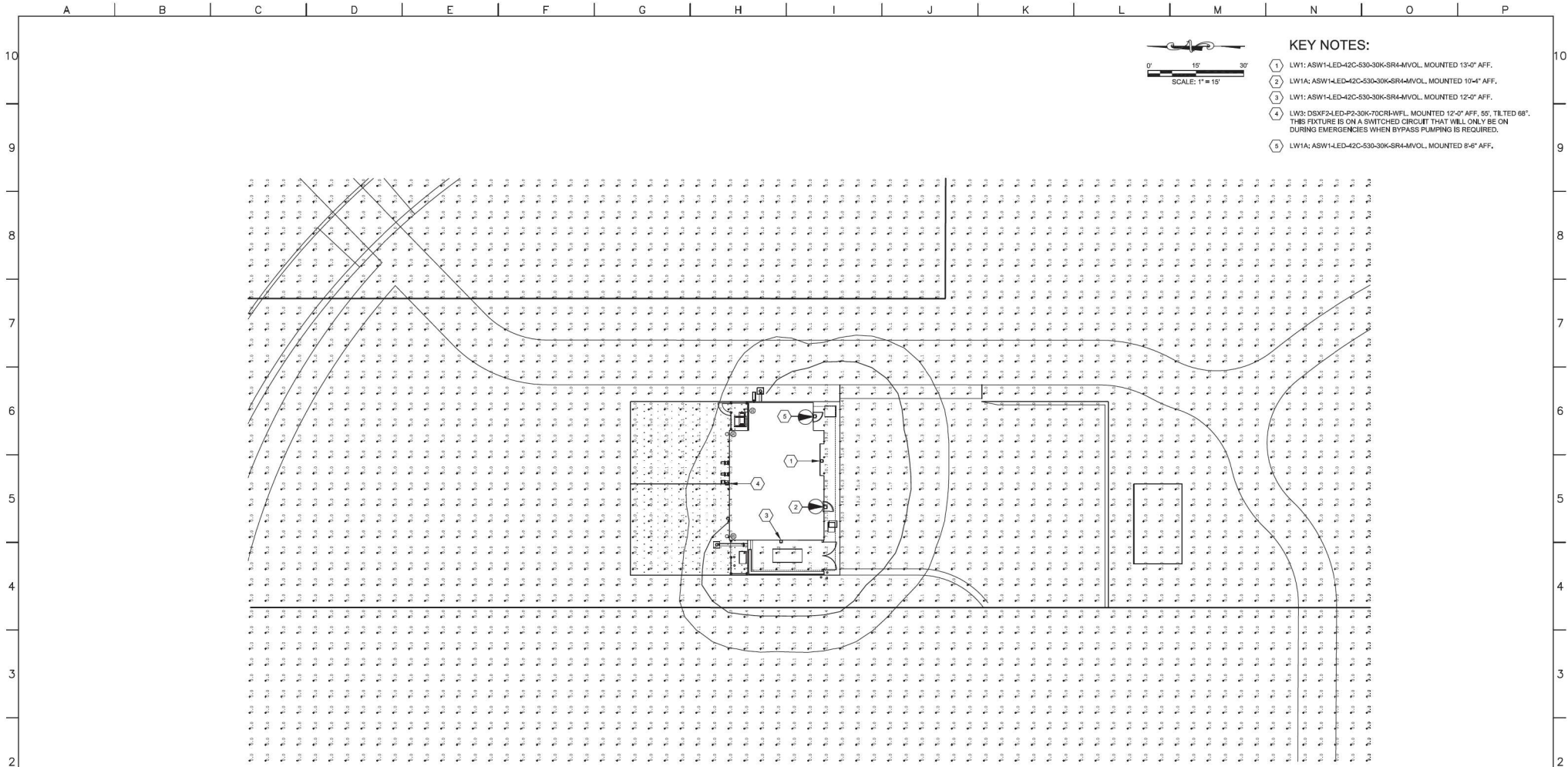
RETAIL RIDGE FILING NO. 1

RETAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT

ARCHITECTURAL

BUILDING ELEVATIONS

DATE: 09/24/21
PROJECT NUMBER: 50119483
REVISION NO. E
DRAWING NUMBER A-5
SHEET NUMBER 10



Submittal Number	Date
1	07/16/21
2	01/28/22
3	01/23/23
4	12/01/23
5	10/11/24
6	04/07/25
7	08/15/25

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Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
Denver, Colorado 80209
(303) 825-1802

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"=SCALE ACCORDINGLY)

DRAWING: EPL9483-101L
DRAWN: BDW
DESIGNED: JPB
CHECKED: JPB

APPROVED:

PRINCIPAL

DATE:

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APP.
A	PUD RESUBMITTAL	JPB	12/20/22	SEP
B	PUD RESUBMITTAL NO. 3	TWL	12/01/23	SEP
C	PUD RESUBMITTAL NO. 5	TWL	10/11/24	SEP
D	PUD RESUBMITTAL NO. 7	TWL	08/15/25	SEP

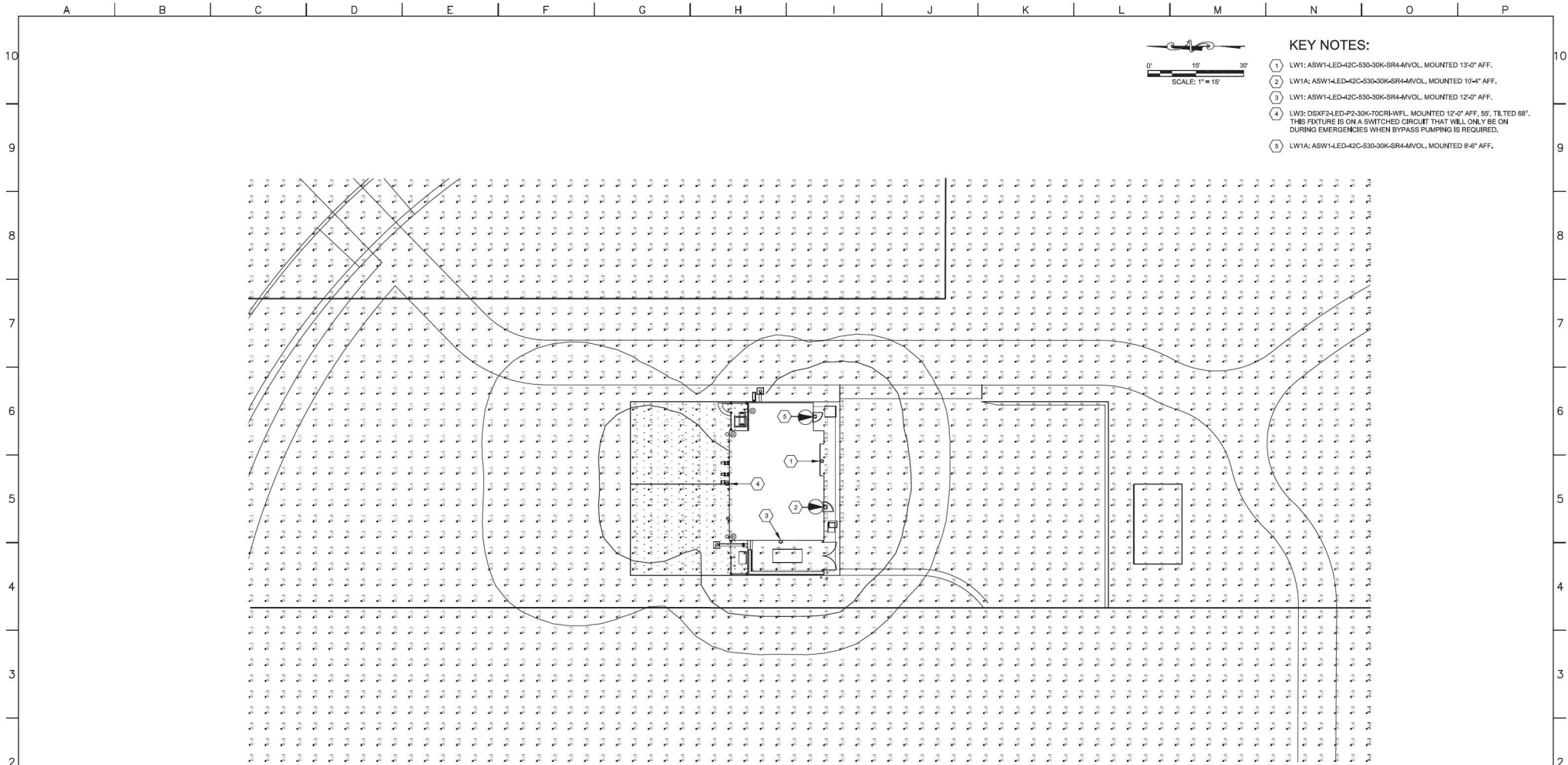
RETAIL RIDGE FILING NO. 1

RETAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT

ELECTRICAL

EXTERIOR PHOTOMETRIC PLAN
NORMAL LIGHTING

DATE: 12/20/22
PROJECT NUMBER: 50119483
REVISION NO. C
DRAWING NUMBER: E-101L
SHEET NUMBER 11



1 LIFT STATION PHOTOMETRIC PLAN
Scale: 1" = 15'

- KEY NOTES:**
- 1 LW1: ASW1-LED-42C-530-30K-SR4-MVOL, MOUNTED 13-0" AFF.
 - 2 LW1A: ASW1-LED-42C-530-30K-SR4-MVOL, MOUNTED 10-4" AFF.
 - 3 LW1: ASW1-LED-42C-530-30K-SR4-MVOL, MOUNTED 12-0" AFF.
 - 4 LW3: DISKFP2-LED-P2-30K-70CR-WFL, MOUNTED 12-0" AFF, 55° TILTED 68°. THIS FIXTURE IS ON A SWITCHED CIRCUIT THAT WILL ONLY BE ON DURING EMERGENCIES WHEN BYPASS PUMPING IS REQUIRED.
 - 5 LW1A: ASW1-LED-42C-530-30K-SR4-MVOL, MOUNTED 8-6" AFF.

Submittal Number	Date
1	07/16/21
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Dewberry
Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
Denver, Colorado 80209
(303) 825-1802

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"=SCALE ACCORDINGLY)

DRAWING: EPL9483-101L1
DRAWN: BDW
DESIGNED: JPB
CHECKED: JPB

APPROVED:

PRINCIPAL

DATE:

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APP.
A	PUD RESUBMITTAL	JPB	12/20/22	SEP
B	PUD RESUBMITTAL NO. 3	TWL	12/09/23	SEP
C	PUD RESUBMITTAL NO. 4	RWL	12/12/23	SEP
D	PUD RESUBMITTAL NO. 5	TWL	10/11/24	SEP
E	PUD RESUBMITTAL NO. 7	TWL	08/15/25	SEP

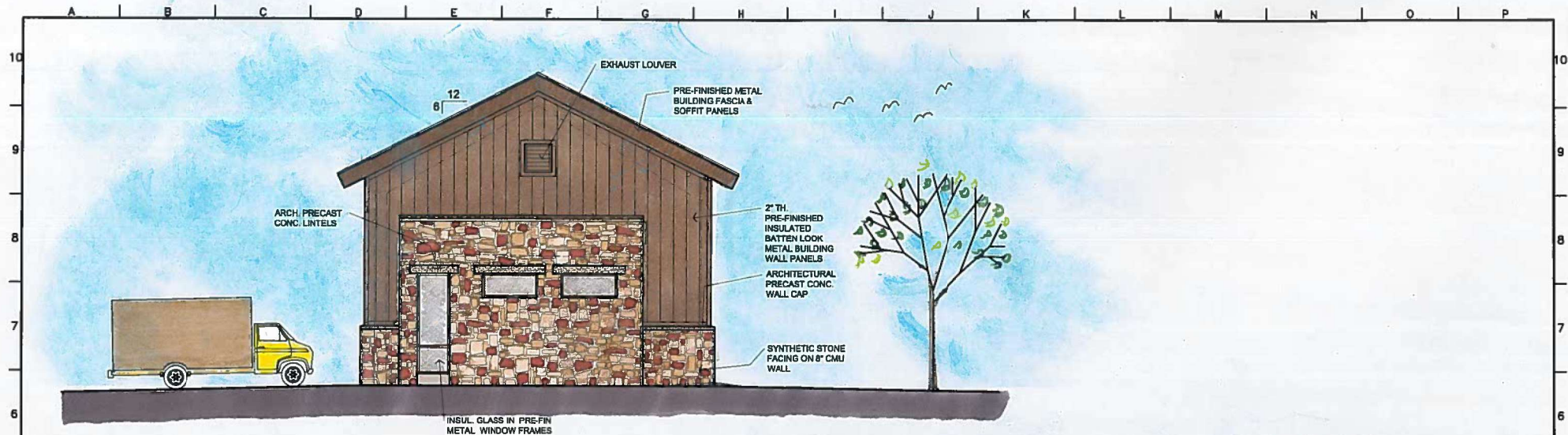
RETAIL RIDGE FILING NO. 1

RETAIL RIDGE LIFT STATION
PLANNED UNIT DEVELOPMENT

ELECTRICAL

EXTERIOR PHOTOMETRIC PLAN
EMERGENCY LIGHTING

DATE: 12/20/22
PROJECT NUMBER: 50119483
REVISION NO. D
DRAWING NUMBER
E-101L-1
SHEET NUMBER
12



● EAST ELEVATION

SCALE: 1/4" = 1'-0"



● NORTH ELEVATION

SCALE: 1/4" = 1'-0"

LINTIER + HAYWOOD ARCHITECTS
890 S. BROADWAY, # 400
DENVER, CO. 80203
303.466.9839 PHONE

Dewberry
Dewberry Engineers Inc.
990 S. BROADWAY, SUITE 400
Denver, Colorado 80208
(303) 825-1802

LINE IS 3/8" INCHES
AT FULL SIZE
(IF NOT 3/8" SCALE ACCORDINGLY)
DRAWING A-4 DWG
DRAWN ERL
DESIGNED ERL
CHECKED ERL

APPROVED:

PRINCIPAL

DATE

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APP.

CITY OF LOUISVILLE
LOUISVILLE, COLORADO
RETAIL RIDGE LIFT STATION

ARCHITECTURAL
BUILDING ELEVATION
RENDERINGS

DATE 05/05/20
PROJECT NAME 50115483
REVISION NO.
DRAWING NUMBER
EXHIBIT
SHEET NUMBER

KingRib 3 / KingRib 5

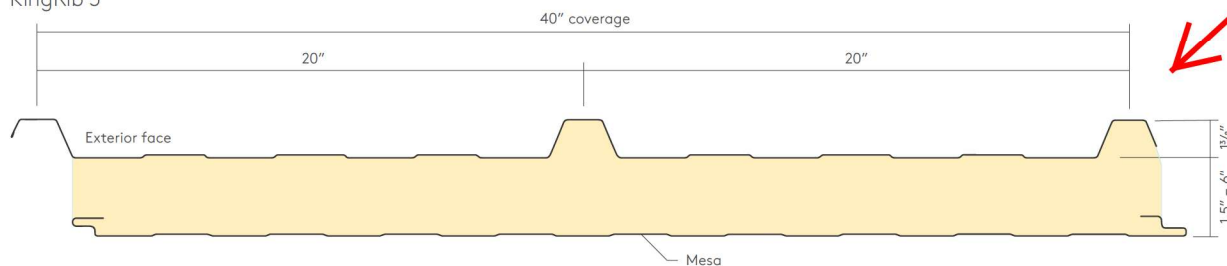
proposed wall panel
w / vertical batten
utilizing the 20"
spacing - bronze

KingRib insulated roof panels are the perfect option for a modern design combined with high energy-efficiency, durability, and high R-value.

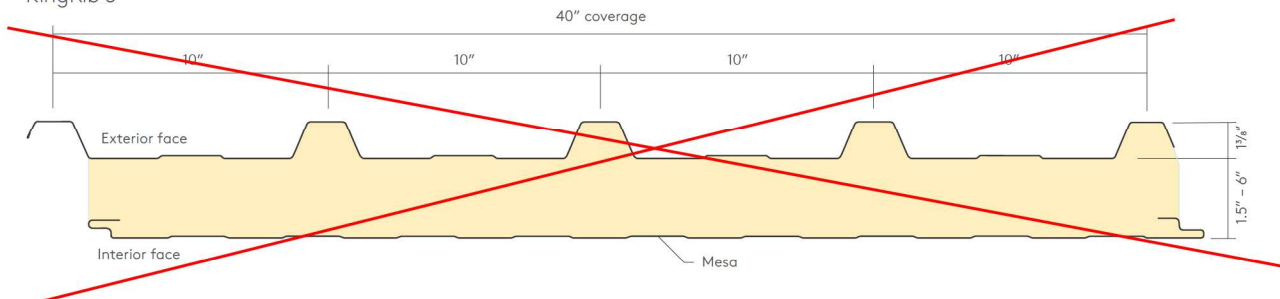


Profile:	Exterior: Mesa with Trapezoidal Ribs / Interior: Mesa
Embossing:	Exterior: Smooth / Interior: Embossed
Gauge:	Exterior: 26 ga Standard (24, 22 ga optional) / Interior: 26 ga Standard (24, 22 ga optional)
Width:	40"
Thickness:	1.5", 2.5", 4", 5", 6"
Length:	8' - 50'
Post fabrication:	Cutbacks
R-value:	~ 7.2 per inch per ASTM C518 @ 75°F / ~ 8.2 per inch per ASTM C518 @ 40°F

KingRib 3



KingRib 5



proposed metal roof panel -
standing seam - bronze

KingSeam

KingSeam insulated standing seam roof panels are designed to offer design flexibility and aesthetics combined with high R-values and unparalleled service life performance. Ideal for new and retrofit applications across a wide variety of building sectors.



Profile:	Exterior: Ribbed standing seam / Interior: Mesa
Embossing:	Exterior: Smooth / Interior: Embossed
Gauge:	Exterior: 26 ga Standard (24, 22 ga optional) / Interior: 26 ga Standard (24, 22 ga optional)
Width:	40"
Thickness:	3.25", 4", 5", 6"
Length:	8' - 50'
Post fabrication:	Cutbacks
R-value:	~ 7.2 per inch per ASTM C518 @ 75°F / ~ 8.2 per inch per ASTM C518 @ 35°F

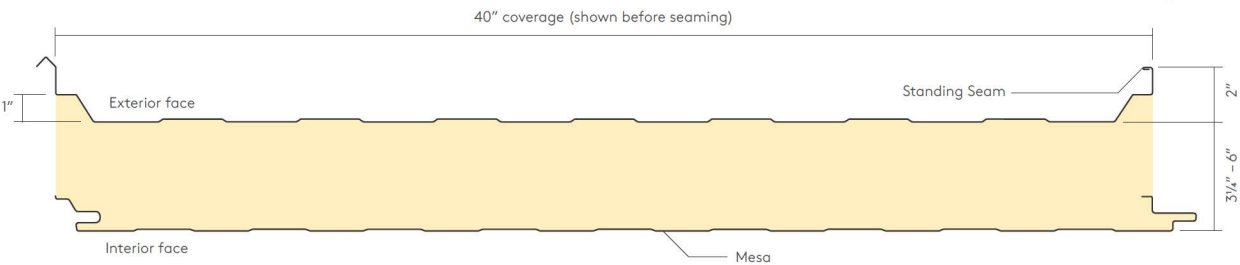






Image shown may not reflect actual configuration

Weather Protective and Sound Attenuated Enclosures

60Hz

Features

Robust/Highly Corrosion Resistant Construction

- Stainless steel flush fitting latches and hinges tested and proven to withstand extreme conditions of corrosion
- Zinc plated or stainless steel fastener

Excellent Access

- Single side access for service and controls
- All non-service sides have removable doors and/or panels
- Radiator fill access
- Lube oil and coolant drains piped to the exterior of the enclosure base
- Large cable entry area for installation ease
- Double doors on both sides
- Vertically hinged doors with solid bar door stays to hold doors in place when open

Security and Safety

- Lockable access doors which give full access to control panel and breaker
- Cooling fan and battery charging alternator fully guarded
- Fuel fill, oil fill, and battery can only be reached via lockable access
- Stub-up area is rodent proof.

Transportability

- These enclosures are of extremely rugged construction to withstand outdoor exposure and rough handling common on many construction sites. The sound deadening material is of a self-extinguishing design
- This range of enclosures are designed on modular principles with many interchangeable components permitting on site repair

Options

- Weather Protective – constructed with 16 gauge steel; industrial silencer mounted within the main enclosure body.
- Sound Attenuated Level 1 – constructed with 16 gauge steel; weather protective with critical silencer - silencer mounted in separate upward discharging radiator hood.
- Sound Attenuated Level 2 – constructed with 16 gauge steel; weather protective with critical silencer and 100% lined with sound deadening material – silencer mounted in separate upward discharging radiator hood.
- Sound Attenuated Aluminum constructed with 14 gauge Aluminum 5052 grade. Weather protective with critical silencer and 100% lined with sound deadening material – silencer mounted in separate upward discharging radiator hood.
- Caterpillar Yellow* or white paint.
- UL Listed sub base tanks.
- Externally mounted emergency stop button.
- Seismic certification per applicable building codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, IBC 2012, CBC 2007, CBC 2010.
- IBC certification for 180 mph wind loading

*Not available with Aluminium enclosures

Enclosure is expected to be approximately 13' long by 5 feet wide by 7 feet tall. Color will be selected by the Architect to match the building and surroundings.



August 1st, 2025

Attention:
City of Louisville
Department of Transportation & Infrastructure
Development Engineering Services
749 Main St.
Louisville, CO 80027

This letter summarizes how the proposed storm sewer and drainage improvements associated with Redtail Ridge Lift Station ("Project") conform to the provisions allowed by the Final Master Drainage Report for Redtail Ridge ("Report").

The Project is located at the southwest corner of the intersection of Rockcress Drive and Northwest Parkway, with a total acreage of 0.86 acres. The Site is bound by Redtail Ridge Filing No. 1 Lot 3 Block 1 to the west, Rockcress Drive to the north, Northwest Parkway to the east, and City and County of Broomfield open space to the south. A copy of the vicinity map can be found in Appendix A for reference. The Project is proposed as a sanitary sewer lift station, with associated improvements such as utility service, access road, trail, and grading.

As shown in the Report, sub-basin D-3 encompasses the entirety of this Project. Sub-basin D-3 has a peak runoff of 34.12 cubic feet per second ("cfs") for the major storm event and is routed to Pond C-2. Due to grading constraints within the Site, it is being proposed to direct runoff to the southeast corner of the Site through a system of landscape drains to an ADS Barracuda Max S3 system, where it will be treated. Water quality treatment devices are not typically allowed, however a variance has been submitted and approved by the City of Louisville allowing for one. This variance letter is included in Appendix E, for reference. Approximately 82% of the site can be captured to treat for water quality from a grading perspective. In storm events larger than the water quality event, it is assumed the landscape drains are clogged and runoff will flow to the east where it will continue south through an existing grass swale, following historic conditions. The 82% of the site which can be captured and treated for water quality, follows the City of Louisville design standards for their MS4 permit requirements.

Rational calculations were completed for the Project per City of Louisville and Mile High Flood District ("MHFD") standards and can be found in Appendix C, for reference. As shown on the proposed drainage plan, 82% of the runoff from the Project will be captured onsite, conveyed through the ADS Barracuda Max S3 system for treatment, and ultimately routed offsite. The remaining 18% of the runoff will directly flow offsite, without treatment. The minor and major storms being analyzed with this letter are the 2-year and 100-year respectively, per City of Louisville Criteria. The landscape drain system has been sized to accommodate the 2-year storm. Sizing calculations for the landscape drains are included in Appendix C, for reference.

Two sections were analyzed with this letter using the combined 100-year flow rate from basins A & B

below together totaling 2.42 cfs; Section C-C, near landscape drain A7-1, and Section D-D near the transformer north of the lift station. The 100-year total flow was used as a conservative measure to show that even though the 100-year flow does not specifically drain to either of these sections, there is more than 1' of freeboard over the water surface elevation to the lift station finished floor elevation. These sections are included in Appendix C, and shown on the Drainage Plan in Appendix D, for reference.

Capacity calculations were performed on landscape drain A7-1 just west of the lift station building. This landscape drain was analyzed with the 100-year storm due to its proximity to the lift station. Visually analyzing the amount of runoff going to this basin in the 100-year storm, it was determined that twice Basin B's 100-year runoff was a conservative estimate, which totals 0.14 cfs, as it is more than the flow that does go to A7-1. The capacity of A7-1 was determined based on the maximum head above the drain while maintaining 1' above finished floor was 0.79 ft which resulted in a capacity of 2.08 cfs. Therefore this drain is not a concern and will function properly. The other drains for the Project were analyzed with the 2-year storm due to it being assumed the drains are clogged in the 100-year storm event. Drain A3 was analyzed due to it having the smallest head available, 0.13 ft. The available capacity of drain A3 is 0.45 cfs while the minor storm event for Basin A yields 0.43 cfs. Therefore, all of the other drains for the Project have adequate capacity and follow Louisville Criteria.

SUB-BASIN DESCRIPTION

Basin A (0.71 acres, 36.05% impervious) encompasses a portion of the Project including the proposed building, driveway, trail, and associated landscaping. Runoff will be conveyed through proposed curb and gutter and landscape to a landscape drain system. The landscape drain system will convey runoff into an ADS Barracuda Max S3 system where it will be treated for water quality. In larger storm events, it is assumed the landscape drains are clogged and runoff will sheet flow to the east where it will continue to surface flow offsite and follow the historic drainage pattern south to Rock Creek through an existing grass swale. This emergency overflow path is shown on the Drainage Plan in Appendix D for reference. Peak flows from Basin A for the minor and major storm are 0.43 cfs and 2.34 cfs, respectively.

Basin B (0.07 acres, 2% impervious) encompasses a portion of Lot 1 Block 3 west of the lift station building. Runoff from this basin will flow onto the Project and be captured by a landscape drain where it will then be routed through A7-1 east to the proposed ADS Barracuda Max S3 system where it will be treated for water quality. In larger storm events, it is assumed the landscape drains are clogged and runoff will sheet flow to the north and east where it will continue to surface flow offsite and follow the historic drainage pattern south to Rock Creek through an existing grass swale. This emergency overflow path is shown on the Drainage Plan in Appendix D for reference. Peak flows from Basin B for the minor and major storm are 0.001 cfs and 0.08 cfs, respectively.

Basin OS-1 (0.16 acres, 23.87% impervious) encompasses a portion of the site where capturing runoff is not obtainable due to grading constraints. The basin includes a portion of the trail and landscaping. Runoff for this basin will sheet flow, untreated, to the east where it will continue to surface flow offsite and follow the historic drainage pattern south to Rock Creek through an existing grass swale. Peak flows



from Basin OS-1 for the minor and major storm are 0.06 cfs and 0.39 cfs, respectively.

A drainage plan has been included in Appendix D for reference.

Please contact me if you have any questions or require additional information.

Sincerely,

HARRIS KOCHER SMITH

Tim Saylor, PE
Licensed Professional Engineer
State of Colorado
No. 56955
On behalf of Harris Kocher Smith

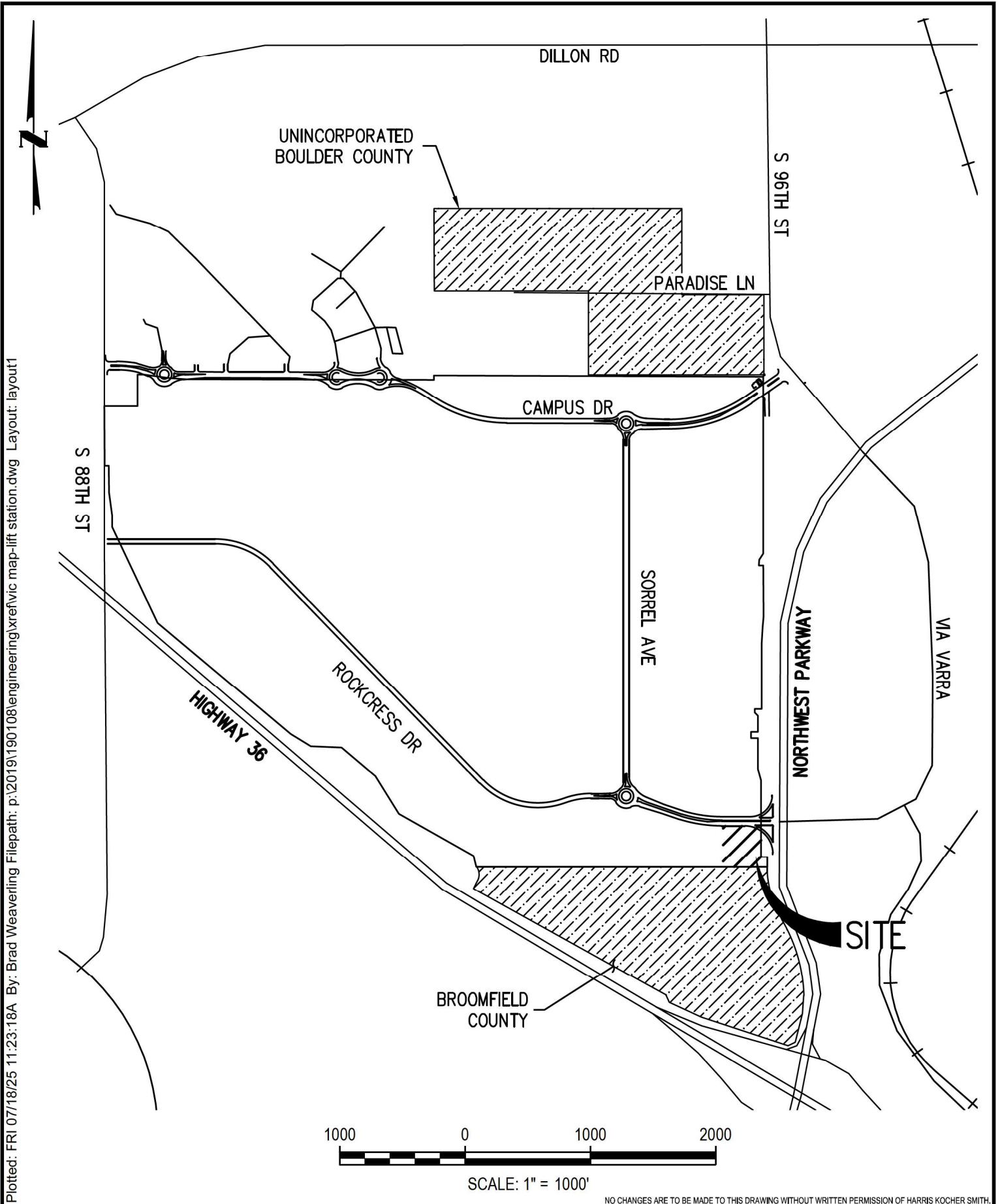
Appendix A

Vicinity Map

Flood Insurance Rate Map (FIRM)

NRCS Web Soil Survey (WSS)

Plotted: FRI 07/18/25 11:23:18A By: Brad Weaverling Filepath: p:\2019\190108\engineering\ref\vic map-lift station.dwg Layout: layout1



ISSUE DATE:	06-06-2019	PROJECT #:	190108
DATE	REVISION COMMENTS		

STERLING BAY

REDTAIL RIDGE
VICINITY MAP

HKS **HARRIS KOCHER SMITH**
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

DSN'D BY: TJS CHK'D BY: TJS DRAWN BY: SJA	SHEET NO. 1 1 OF 1
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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. This community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **Floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) booklet that accompanies this FIRM. Users should be aware that BFEs shown on the map represent rounded whole foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only to landward of 0.9 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **Floodways** were compiled at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The horizontal datum was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRM for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NGS12
National Geodetic Survey
SSM-C, #9022
1515 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (801) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was provided by the FEMA Map Service Center and the Boulder Area Spatial Data Cooperative (BASDC). Additional input was provided by the Town of Erie and the City of Longmont. These data are current as of 2004.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contain authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of community tables containing National Flood Insurance Program data for each community as well as a listing of the panels on which each community is located.

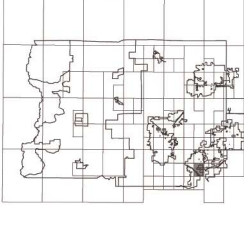
For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information exchange (PMI)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Coal Creek	3.3	Rock Creek	3.2

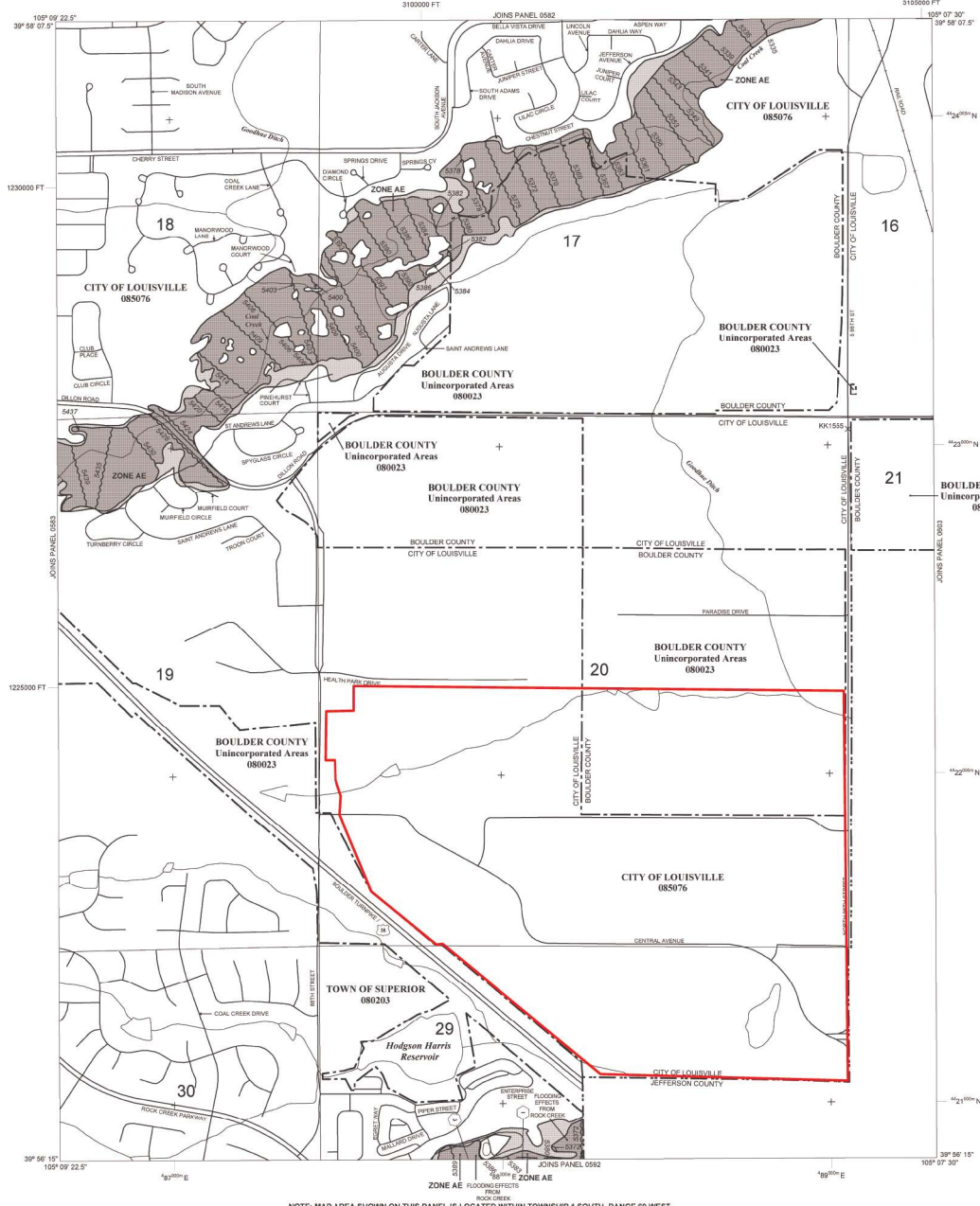
Example: To convert Coal Creek elevations to NAVD 88, 3.3 feet were added to the NAVD 29 elevations.

Panel Location Map



This digital Flood Insurance Rate map (FIRM) was produced through a cooperative agreement between the State of Colorado Water Conservation Board, the Upper Colorado River Flood Control District, and the Federal Emergency Management Agency (FEMA). The State of Colorado Water Conservation Board and the Upper Colorado River Flood Control District have entered into a long-term agreement of financial support to reduce the costs associated with flooding. As part of this effort, both the State of Colorado and the Upper Colorado River Flood Control District have joined in Cooperating Federal Partnerships with FEMA to produce this digital FIRM.

Additional Flood Hazard information and resources are available from local communities, the Colorado Water Conservation Board, and the Upper Colorado River Flood Control District.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 1 SOUTH, RANGE 69 WEST.

LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**
 - Zone AE:** The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AR, AN, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
 - Zone A:** No base flood elevations determined.
 - Zone AE:** Base Flood Elevations determined.
 - Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponds). Base Flood Elevations determined.
 - Zone AD:** Flood depths of 1 to 3 feet (usually areas of low-lying terrain). Average depths determined; for areas of adverse topography, velocities also determined.
 - Zone AR:** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a Federal Flood Protection System (FFPS) that has been removed. Zone AR indicates that the former flood control system is being retained to provide protection within urban subdivisions in Base Flood Elevations determined.
 - Zone AN:** Areas to be protected from 1% annual chance flood by a Federal Flood Protection System within urban subdivisions in Base Flood Elevations determined.
 - Zone V:** Coastal flood zone with velocity hazard (waves acting). No base Flood Elevations determined.
 - Zone VE:** Coastal flood zone with velocity hazard (waves acting). Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE:**
 - The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of obstructions so that the 1% annual chance flood can be carried without substantial increases in flood heights.

- OTHER FLOOD AREAS**
 - Zone X:** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with damage areas less than 1 square mile, and areas protected by levees from 1% annual chance flood.
 - Zone D:** Areas determined to be outside the 0.2% annual chance floodway.
 - Zone B:** Areas in which flood heights are unestimated, but probable.
- OTHER AREAS**
 - Zone C:** Areas determined to be outside the 0.2% annual chance floodway.
 - Zone E:** Areas in which flood heights are unestimated, but probable.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHERWISE PROTECTED AREAS (OPAs)**
 - CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain Boundary**
- Floodway Boundary**
- Zone A boundary**
- CBRS and OPA boundary**
- Boundary defining Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities**
- Base Flood Elevation line and value, elevation in feet** (ft, m)
- Base Flood Elevation value where uniform within zone, elevation in feet**

*Referenced to the North American Vertical Datum of 1988

--- Cross section line

--- Transit line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

1000-meter Universal Transverse Mercator grid values, zone 13

3100000 FT

5000-foot UTM: Colorado State Plane North Zone (FIPS Zone 5001), Lambert Conformal Conic Projection

Bench mark (see explanation in Notes to Users section of this FIRM panel)

--- River

--- MAP REPOSITORY

Refer to listing of map repositories on Map Index

EFFECTIVE DATE OF COLORADO FLOOD INSURANCE RATE MAP

June 1, 1995

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

May 4, 1998: To incorporate previously issued Letters of Map Revision, to add roads and road names, and to update corporate limits.

October 4, 2002: To change base flood elevations, to change special flood hazard areas, to change zone designations, to update roads and road names, to reflect updated topographic information, to incorporate previously issued Letters of Map Revision, and to change floodway boundaries.

November 18, 2012: To update the map to reflect the most current data, to add Special Flood Hazard Areas previously shown on Town of Erie, Colorado Flood Insurance Rate Map dated December 2, 2004, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to community mapping, refer to the Community Map History table located in the Flood Insurance Study Report for this jurisdiction.

To determine flood insurance in relation to the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-656-0825.

MAP SCALE 1" = 500'

0 100 200 FEET

0 100 200 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0584J

FIRM
FLOOD INSURANCE RATE MAP
BOULDER COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 584 OF 615
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS	COMMUNITY	NUMBER	PANEL	SUFFIX
	BOULDER COUNTY	0580J	0584	J
	LOUISVILLE, CITY OF	0580J	0584	J
	LOUISVILLE, TOWN OF	0580J	0584	J

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
08013C0584J

MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency



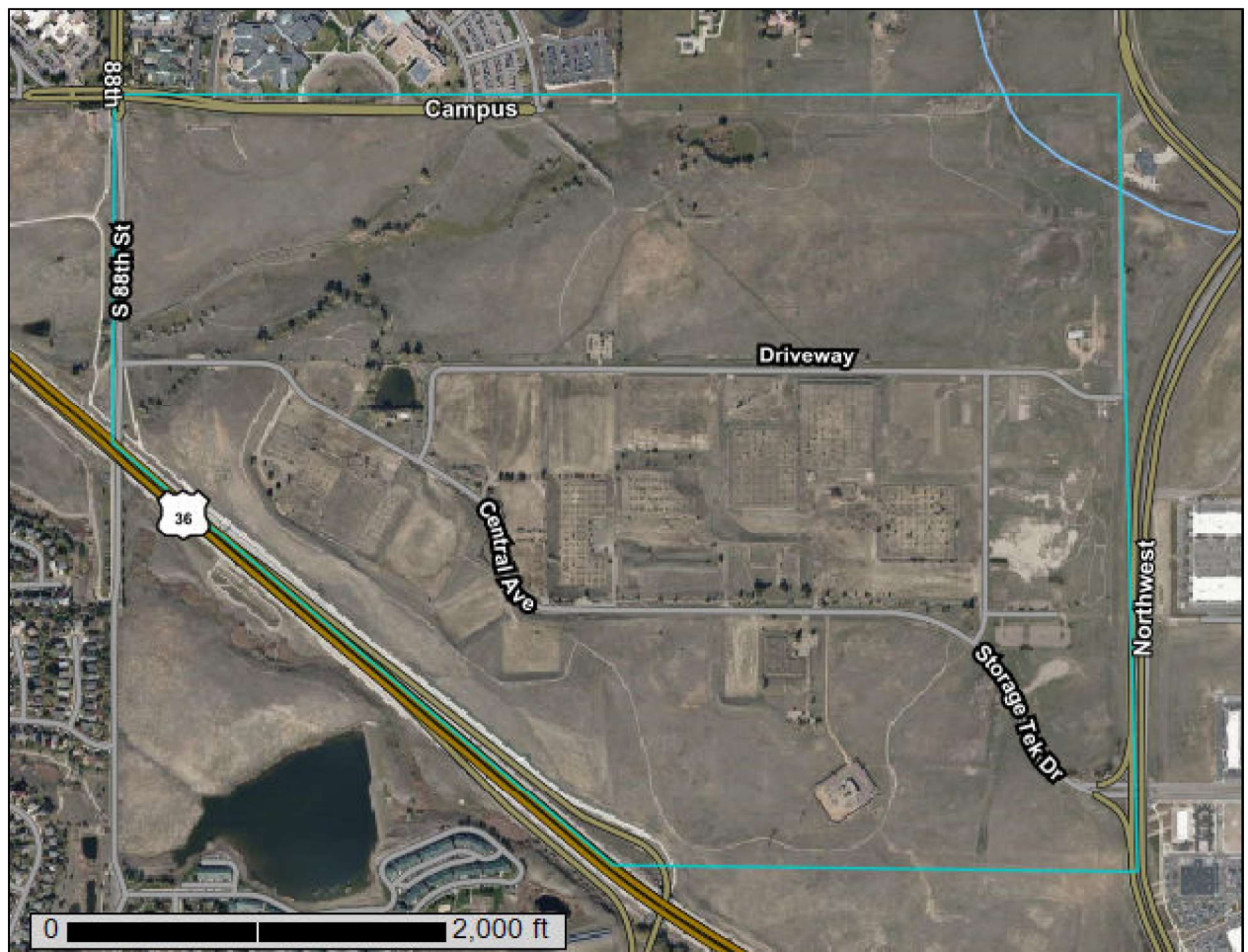
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Boulder County Area, Colorado**



January 6, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units).

Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

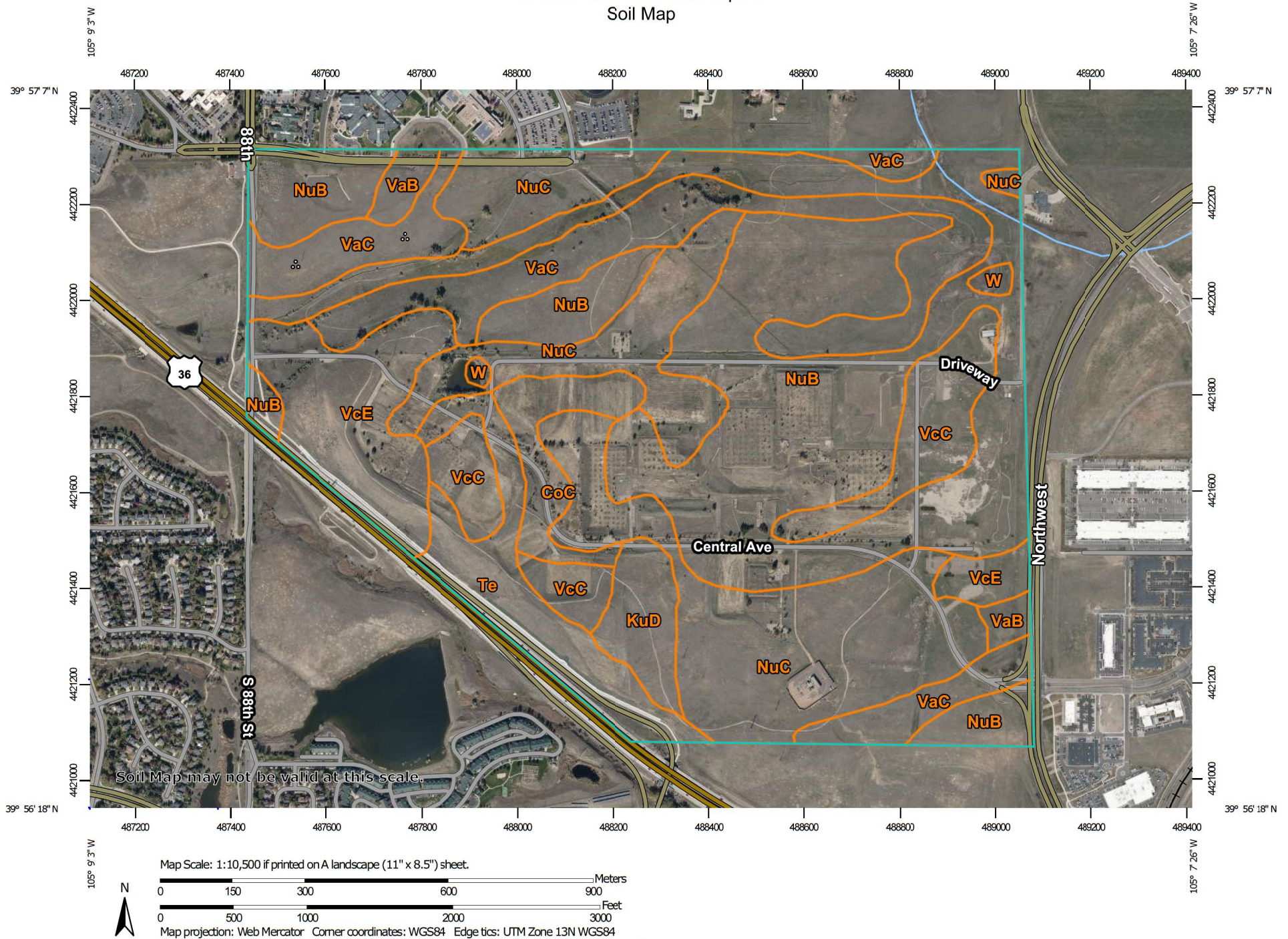
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 16, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2018—Apr 9, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CoC	Colby silty clay loam, 3 to 5 percent slopes	12.7	2.9%
KuD	Kutch clay loam, 3 to 9 percent slopes	10.6	2.4%
NuB	Nunn clay loam, 1 to 3 percent slopes	154.9	35.8%
NuC	Nunn clay loam, 3 to 5 percent slopes	97.4	22.5%
Te	Terrace escarpments	25.3	5.8%
VaB	Valmont clay loam, 1 to 3 percent slopes	5.7	1.3%
VaC	Valmont clay loam, 3 to 5 percent slopes	62.6	14.5%
VcC	Valmont cobbly clay loam, 1 to 5 percent slopes	27.7	6.4%
VcE	Valmont cobbly clay loam, 5 to 25 percent slopes	34.3	7.9%
W	Water	1.7	0.4%
Totals for Area of Interest		432.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They

generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Boulder County Area, Colorado

CoC—Colby silty clay loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: jprf
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Colby and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colby

Setting

Landform: Upland slopes
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Uniform eolian deposits

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 43 inches: silty clay loam
H3 - 43 to 60 inches: clay loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Loamy Plains (R067BY002CO)
Hydric soil rating: No

Minor Components

Gaynor

Percent of map unit: 5 percent
Hydric soil rating: No

Weld

Percent of map unit: 5 percent

Hydric soil rating: No

KuD—Kutch clay loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: jprx

Elevation: 4,900 to 5,500 feet

Mean annual precipitation: 12 to 18 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 140 to 155 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Kutch and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kutch

Setting

Landform: Valley sides

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Clayey residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 7 inches: clay loam

H2 - 7 to 22 inches: clay

H3 - 22 to 30 inches: clay

H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 9 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Natural drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 15 percent

Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

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Hydrologic Soil Group: D
Ecological site: Clayey Foothill (R049BY208CO)
Hydric soil rating: No

Minor Components

Renohill

Percent of map unit: 6 percent
Hydric soil rating: No

Nunn

Percent of map unit: 5 percent
Hydric soil rating: No

Samsil

Percent of map unit: 2 percent
Hydric soil rating: No

Shingle

Percent of map unit: 2 percent
Hydric soil rating: No

NuB—Nunn clay loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tlpl
Elevation: 3,900 to 5,840 feet
Mean annual precipitation: 13 to 17 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Nunn and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nunn

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pleistocene aged alluvium and/or eolian deposits

Typical profile

Ap - 0 to 9 inches: clay loam
Bt - 9 to 13 inches: clay loam
Btk - 13 to 25 inches: clay loam
Bk1 - 25 to 38 inches: clay loam
Bk2 - 38 to 80 inches: clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 7 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 0.5
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Clayey Plains (R067BY042CO)
Hydric soil rating: No

Minor Components

Heldt

Percent of map unit: 10 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey Plains (R067BY042CO)
Hydric soil rating: No

Satanta

Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Plains (R067BY002CO)
Hydric soil rating: No

NuC—Nunn clay loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tlpm
Elevation: 5,000 to 5,750 feet
Mean annual precipitation: 12 to 17 inches
Mean annual air temperature: 46 to 54 degrees F

Custom Soil Resource Report

Frost-free period: 100 to 160 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Nunn and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nunn

Setting

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Pleistocene aged alluvium and/or eolian deposits

Typical profile

A - 0 to 6 inches: clay loam

Bt - 6 to 18 inches: clay

Btk - 18 to 30 inches: clay

Bk - 30 to 47 inches: clay loam

BCK - 47 to 80 inches: clay loam

Properties and qualities

Slope: 3 to 5 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 7 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 0.5

Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: Clayey Plains (R067BY042CO)

Hydric soil rating: No

Minor Components

Satanta

Percent of map unit: 10 percent

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Loamy Plains (R067BY002CO)

Hydric soil rating: No

Te—Terrace escarpments

Map Unit Setting

National map unit symbol: jpsv
Elevation: 4,400 to 5,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Terrace escarpments: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terrace Escarpments

Setting

Landform: Paleoterraces, fan remnants
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Base slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Cobbly and stony colluvium over sandstone and shale

Typical profile

H1 - 0 to 6 inches: gravelly sand
H2 - 6 to 60 inches: gravelly sand, very gravelly sand, gravelly coarse sand
H2 - 6 to 60 inches:
H2 - 6 to 60 inches:

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

VaB—Valmont clay loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: jpsw
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Valmont and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valmont

Setting

Landform: Terraces, fan remnants

Landform position (three-dimensional): Base slope, tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Gravelly and cobbly loamy alluvium

Typical profile

H1 - 0 to 9 inches: clay loam

H2 - 9 to 29 inches: clay loam, clay

H2 - 9 to 29 inches: very gravelly loam, very gravelly sandy loam

H3 - 29 to 60 inches:

H3 - 29 to 60 inches:

Properties and qualities

Slope: 1 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Very high (about 12.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3s

Hydrologic Soil Group: C

Ecological site: Clayey Foothill (R049BY208CO)

Hydric soil rating: No

Minor Components

Nunn

Percent of map unit: 8 percent

Hydric soil rating: No

Fluventic haplaquolls

Percent of map unit: 4 percent

Landform: Terraces

Hydric soil rating: Yes

Heldt

Percent of map unit: 3 percent

Hydric soil rating: No

VaC—Valmont clay loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: jpsx
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Valmont and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valmont

Setting

Landform: Terraces, fan remnants
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly and cobbly loamy alluvium

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 24 inches: clay loam, clay
H2 - 7 to 24 inches: very gravelly loam, very gravelly sandy loam
H3 - 24 to 60 inches:
H3 - 24 to 60 inches:

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

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Ecological site: Clayey Foothill (R049BY208CO)

Hydric soil rating: No

Minor Components

Nunn

Percent of map unit: 8 percent

Hydric soil rating: No

Heldt

Percent of map unit: 5 percent

Hydric soil rating: No

Fluventic haplaquolls

Percent of map unit: 2 percent

Landform: Flood plains

Hydric soil rating: Yes

VcC—Valmont cobbly clay loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: jpsy

Elevation: 4,900 to 5,500 feet

Mean annual precipitation: 12 to 18 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 140 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Valmont and similar soils: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valmont

Setting

Landform: Terraces, fan remnants

Landform position (three-dimensional): Base slope, tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Gravelly and cobbly loamy alluvium

Typical profile

H1 - 0 to 8 inches: cobbly clay loam

H2 - 8 to 22 inches: clay loam, clay

H2 - 8 to 22 inches: very gravelly loam, very gravelly sandy loam

H3 - 22 to 60 inches:

H3 - 22 to 60 inches:

Properties and qualities

Slope: 1 to 5 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

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Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: Cobbly Foothills (R048AY346CO)

Hydric soil rating: No

VcE—Valmont cobbly clay loam, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: jpsz

Elevation: 4,900 to 5,500 feet

Mean annual precipitation: 12 to 18 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 140 to 155 days

Farmland classification: Not prime farmland

Map Unit Composition

Valmont and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valmont

Setting

Landform: Terraces, fan remnants

Landform position (three-dimensional): Base slope, riser

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Gravelly and cobbly loamy alluvium

Typical profile

H1 - 0 to 6 inches: cobbly clay loam

H2 - 6 to 18 inches: clay loam, clay

H2 - 6 to 18 inches: very gravelly loam, very gravelly sandy loam

H3 - 18 to 60 inches:

H3 - 18 to 60 inches:

Properties and qualities

Slope: 5 to 10 percent

Depth to restrictive feature: More than 80 inches

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Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Cobbly Foothills (R048AY346CO)
Hydric soil rating: No

Minor Components

Dacono

Percent of map unit: 9 percent
Hydric soil rating: No

Fluventic haplaquolls

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Aquolls

Percent of map unit: 5 percent
Landform: Marshes
Hydric soil rating: Yes

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Appendix B

Master Drainage Report Excerpts

Basin C (105.17 acres, 78% imperviousness) is generally in the eastern portion of the Site, lying east of Sorrel Avenue and west of S. 96th Street. It consists of roadways and developable land. The basin contains six sub-basins, four of which primarily contain roadways. The sub-basins not defined by proposed roadways (C-1, C-2) were delineated based on an existing ridge within the parcel. Roadway sub-basins (C-3, C-4, C-5, C-6) will be further subdivided in Filing No. 1 and with the Rockcress Extension plans based on inlet placement. A majority of runoff from Basin C is conveyed either to Pond C-1 or Pond C-2. 2.8 acres of land will release runoff directly to Tributary I, after appropriate water quality treatment. 0.34 acres of roadway, identified as Sub-basin C-6-3 in the future reports, will discharge to existing infrastructure in Northwest Parkway.

Basin D (44.08 acres, 46% imperviousness) is in the southern portion of the Site and generally lies south of Rockcress Drive and Basin E. Extents of proposed development and an existing ridge in Parcel E split Basin D and E. The basin is divided into five sub-basins: D-1, D-2, D-3, D-4, and D-5. Approximately 28.74 acres are proposed to develop with 70% impervious cover, while the rest is proposed to be left either undeveloped or as open space with an imperviousness of 2%. Developed runoff from Basin D will be conveyed to Pond C-2 while the undeveloped portions will continue to flow as they have historically. Portions of the basin flowing offsite are limited to areas wherein it is not practical to capture and treat runoff; these areas include portions of the lift station site, and portions of trail spanning the edge of the basin/property. Runoff from the lift station within the basin will be captured by landscape drains sized for the minor event and treated for water quality via an ADS hydrodynamic separator (HDS) system. Flows in excess of the HDS' treatment capacity will bypass the device and flow offsite. For additional details about the lift station and the associated water quality treatment, see the Redtail Ridge Lift Station Drainage Letter, submitted separately.

Basin E (34.11 acres, 75% imperviousness) constitutes developable land in the southwest portion of the Site, generally between Rockcress Drive and Basin D. Stormwater runoff in Basin E is proposed to be detained in a full spectrum detention facility, Pond E. It is anticipated that the basin area will be developed with curb, gutter, and sewer directing flows to the facility. The pond will ultimately outfall to the proposed sewer in Rockcress Drive. Detailed design of Pond E will be performed with the planned unit developed (PUD) PUD-8 design documents and reporting, which will be required to demonstrate conformance with the preliminary design guidance provided herein.

Basin F (17.05 acres, 2% imperviousness) is in the northern portion of the Site and is existing open space and will drain as it does historically. It is bound on the north by the property line and on the east, west, and south by Campus Drive. The historical flows for Basin F generally flow from the extents of the basin to the center where they meet Tributary I.

Table 1: Basin and Direct Runoff Summary Table

MAJOR DRAINAGE BASIN	CONTRIBUTING AREA (AC)	IMPERV	Q2 (CFS)	Q10 (CFS)	Q100 (CFS)	TRIBUTARY TO
A-1	37.99	2%	0.24	6.80	37.01	TRIBUTARY I
A-2-1	22.67	2%	0.14	4.07	22.07	TRIBUTARY I
A-2-2	25.02	85%	21.68	38.60	82.63	POND B
A-3	0.62	75%	0.24	0.46	1.08	POND C-2
B-1	79.46	85%	82.91	145.96	309.95	POND B
B-2	30.37	85%	33.22	59.73	123.29	POND C-2
C-1	53.21	80%	45.88	83.89	183.63	POND C-1
C-2	19.63	80%	22.10	41.84	88.58	POND C-2
C-3	14.38	78%	5.40	9.90	23.44	POND C-1
C-4	2.78	75%	1.69	3.20	7.26	TRIBUTARY I
C-5	13.12	70%	4.09	7.83	19.54	POND C-2
C-6	1.79	75%	1.20	2.26	5.11	POND C-2
D-1	17.48	70%	12.01	23.25	54.06	POND C-2
D-2	4.96	2%	0.05	1.43	7.19	OFFSITE
D-3	11.26	70%	7.58	14.67	34.12	POND C-2
D-4	8.37	2%	0.17	5.17	23.32	OFFSITE
D-5	2.01	2%	0.02	0.73	3.54	TRIBUTARY I
E	34.11	75%	28.44	53.10	119.32	POND E
F	17.1	2%	0.11	3.06	16.59	TRIBUTARY I
OS-1	77.43	9%	2.81	21.66	99.62	TRIBUTARY I
OS-2	32.32	6%	0.71	7.20	40.72	TRIBUTARY I
OS-3	19.51	5%	0.01	0.32	1.56	TRIBUTARY I

Goodhue Ditch

The Goodhue Ditch traverses the far northeast corner of the Site and is owned by the Ditch Company. The Goodhue Ditch contains a defined bed and bank with fringe wetlands along portions of the banks. The Goodhue Ditch is shown on the U.S. Geological Survey (USGS) Louisville topographic quadrangle and on the National Hydrography Dataset (NHD) as a canal/ditch and intermittent stream.

A crossing of the Goodhue Ditch by Campus Drive is planned, subject to Ditch Company's approval, with the proposed development. The Ditch will continue to outfall per historic conditions at the existing location on northeast property boundary. The Ditch Company has been contacted regarding the requirements of the proposed Goodhue Ditch revisions. The proposed Goodhue Ditch crossing has been designed

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

2-year

		Unit Hydrograph Parameters and Results										Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)		Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)	
Catchment Name/ID	User Comment for Catchment																
A-1		0.158	0.132	58.7	7.47	30.5	5.28	12.4	30	137,904	0.01	1,207	45.0	0.24	1,207	0.01	
A-2-1		0.158	0.105	59.0	6.25	30.7	4.42	10.4	18	82,292	0.01	720	45.0	0.14	720	0.01	
A-2-2		0.076	0.150	16.0	3.35	8.3	2.37	5.6	73	90,823	0.65	59,164	30.0	21.67	58,643	0.87	
A-3		0.079	0.028	37.6	2.30	19.6	1.62	3.8	1	2,251	0.57	1,277	35.0	0.24	1,254	0.39	
A-3-1		0.079	0.020	32.5	2.00	16.9	1.42	3.3	0	1,125	0.57	638	35.0	0.14	622	0.44	
A-3-2		0.079	0.020	32.5	2.00	16.9	1.42	3.3	0	1,125	0.57	638	35.0	0.14	622	0.44	
B-1		0.076	0.253	11.4	3.71	5.9	2.62	6.2	327	288,440	0.65	187,896	30.0	82.92	184,365	1.04	
B-2		0.076	0.164	9.9	2.74	5.1	1.94	4.6	144	110,243	0.65	71,815	30.0	33.22	69,136	1.09	
C-1		0.077	0.208	14.8	3.86	7.7	2.73	6.4	169	193,152	0.61	117,656	30.0	45.87	116,835	0.86	
C-2		0.077	0.133	7.6	2.28	4.0	1.61	3.8	121	71,257	0.61	43,405	25.0	22.10	40,142	1.13	
C-3		0.078	0.115	46.2	5.58	24.0	3.94	9.3	15	52,199	0.59	30,920	40.0	5.26	30,882	0.37	
C-3-1		0.077	0.041	27.8	2.37	14.4	1.67	3.9	2	5,118	0.61	3,118	35.0	0.74	3,045	0.53	
C-3-2		0.077	0.038	39.0	2.63	20.3	1.86	4.4	1	4,356	0.61	2,653	35.0	0.50	2,620	0.41	
C-3-3		0.079	0.025	27.6	2.03	14.3	1.43	3.4	1	1,779	0.57	1,009	35.0	0.24	979	0.49	
C-3-4		0.079	0.023	28.9	2.01	15.0	1.42	3.4	1	1,525	0.57	865	35.0	0.20	840	0.47	
C-3-5		0.077	0.032	13.8	1.84	7.2	1.30	3.1	3	2,977	0.61	1,813	30.0	0.67	1,688	0.82	
C-3-6		0.077	0.030	21.4	1.99	11.1	1.41	3.3	2	2,577	0.61	1,570	30.0	0.45	1,510	0.64	
C-3-7		0.077	0.034	19.0	2.00	9.9	1.41	3.3	2	3,449	0.61	2,101	30.0	0.65	2,010	0.69	
C-3-8		0.077	0.035	21.8	2.08	11.3	1.47	3.5	2	3,557	0.61	2,167	30.0	0.61	2,090	0.63	
C-3-9		0.079	0.028	55.5	2.70	28.8	1.91	4.5	1	2,360	0.57	1,338	40.0	0.19	1,327	0.30	
C-3-10		0.079	0.028	54.3	2.67	28.3	1.89	4.4	1	2,323	0.57	1,318	40.0	0.19	1,306	0.30	
C-3-11		0.077	0.026	32.0	2.14	16.7	1.51	3.6	1	1,888	0.61	1,150	35.0	0.25	1,123	0.47	
C-3-12		0.077	0.027	31.1	2.14	16.2	1.51	3.6	1	1,997	0.61	1,216	35.0	0.27	1,187	0.48	
C-3-13		0.077	0.033	27.5	2.20	14.3	1.55	3.7	2	3,231	0.61	1,968	35.0	0.47	1,915	0.53	
C-3-14		0.077	0.047	38.0	2.88	19.7	2.03	4.8	2	7,151	0.61	4,356	35.0	0.84	4,313	0.42	
C-3-15		0.077	0.048	38.5	2.92	20.0	2.06	4.9	2	7,333	0.61	4,467	35.0	0.85	4,426	0.42	
C-3-16		0.096	0.010	17.1	1.64	8.9	1.16	2.7	0	581	0.25	146	30.0	0.05	137	0.32	
C-4		0.079	0.054	20.9	2.37	10.9	1.68	4.0	6	10,091	0.57	5,725	30.0	1.69	5,555	0.61	
C-4-1		0.079	0.037	26.8	2.26	14.0	1.59	3.8	2	4,211	0.57	2,389	30.0	0.58	2,327	0.50	
C-4-2		0.079	0.043	26.8	2.37	13.9	1.68	4.0	3	5,881	0.57	3,336	30.0	0.82	3,258	0.50	
C-5		0.081	0.107	48.6	5.49	25.3	3.88	9.1	13	47,626	0.53	25,044	40.0	4.10	25,016	0.31	
C-5-1		0.098	0.035	75.3	3.51	39.2	2.48	5.9	2	9,075	0.23	2,129	45.0	0.26	2,125	0.10	
C-5-2		0.094	0.036	71.7	3.49	37.3	2.47	5.8	1	7,986	0.28	2,237	45.0	0.27	2,233	0.12	
C-5-3		0.079	0.033	52.4	2.82	27.3	1.99	4.7	1	3,267	0.57	1,853	40.0	0.28	1,838	0.31	
C-5-4		0.079	0.033	52.7	2.81	27.4	1.99	4.7	1	3,231	0.57	1,833	40.0	0.28	1,818	0.31	
C-5-5		0.079	0.027	32.9	2.19	17.1	1.55	3.6	1	2,178	0.57	1,236	35.0	0.26	1,207	0.43	
C-5-6		0.079	0.027	32.9	2.19	17.1	1.55	3.6	1	2,178	0.57	1,236	35.0	0.26	1,207	0.43	
C-5-7		0.079	0.032	53.4	2.81	27.8	1.98	4.7	1	3,086	0.57	1,750	40.0	0.26	1,736	0.31	
C-5-8		0.079	0.032	52.3	2.76	27.2	1.95	4.6	1	3,013	0.57	1,709	40.0	0.26	1,695	0.31	
C-5-9		0.079	0.022	7.3	1.62	3.8	1.15	2.7	2	1,343	0.57	762	25.0	0.36	644	0.96	
C-5-10		0.079	0.029	36.6	2.33	19.0	1.64	3.9	1	2,577	0.57	1,462	35.0	0.29	1,436	0.40	
C-5-11		0.079	0.029	36.6	2.33	19.1	1.64	3.9	1	2,577	0.57	1,462	35.0	0.29	1,436	0.40	
C-5-12		0.077	0.035	25.0	2.17	13.0	1.53	3.6	2	3,630	0.61	2,211	30.0	0.57	2,141	0.57	
C-5-13		0.077	0.034	30.5	2.30	15.8	1.63	3.8	1	3,485	0.61	2,123	35.0	0.47	2,075	0.49	
C-6		0.079	0.045	17.9	2.11	9.3	1.49	3.5	5	6,498	0.57	3,686	30.0	1.20	3,525	0.67	
C-6-1		0.079	0.027	25.7	2.04	13.3	1.44	3.4	1	2,214	0.57	1,256	30.0	0.31	1,215	0.52	
C-6-2		0.079	0.031	25.7	2.12	13.4	1.50	3.5	1	2,940	0.57	1,668	30.0	0.42	1,617	0.52	
C-6-3		0.079	0.022	12.1	1.70	6.3	1.20	2.8	1	1,343	0.57	762	30.0	0.30	701	0.82	
D-1		0.081	0.122	16.4	3.03	8.5	2.14	5.1	50	63,452	0.53	33,366	30.0	12.02	32,860	0.69	
D-2		0.158	0.053	33.2	2.85	17.3	2.02	4.8	7	18,005	0.01	155	35.0	0.05	153	0.01	
D-3		0.081	0.100	16.6	2.78	8.7	1.96	4.6	32	40,874	0.53	21,493	30.0	7.58	20,990	0.67	
D-4		0.158	0.067	12.2	2.13	6.3	1.50	3.5	32	30,383	0.01	266	30.0	0.17	249	0.02	
D-5		0.158	0.035	24.3	2.16	12.7	1.53	3.6	4	7,296	0.01	63	35.0	0.02	61	0.01	
E		0.079	0.168	13.1	3.19	6.8	2.26	5.3	122	123,819	0.57	70,240	30.0	28.44	68,353	0.83	
F		0.158	0.092	58.6	5.66	30.4	4.00	9.4	14	62,073	0.01	543	40.0	0.11	543	0.01	
OS-1		0.139	0.162	43.4	6.91	22.6	4.88	11.5	84	281,071	0.04	11,546	40.0	2.81	11,545	0.04	
OS-2		0.148	0.116	41.0	5.15	21.3	3.64	8.6	37	117,322	0.02	2,732	40.0	0.71	2,727	0.02	
OS-3		0.151	0.094	39.1	4.32	20.3	3.05	7.2	23	70,821	0.02	1,317	40.0	0.36	1,314	0.02	
EX-X		0.158	0.024	22.0	1.90	11.5	1.34	3.2	2	3,013	0.01	26	35.0	0.01	25	0.01	
OS-4-1		0.076	0.043	36.1	2.68	18.8	1.89	4.5	2	5,481	0.65	3,583	35.0	0.71	3,536	0.47	
OS-4-2		0.075	0.045	35.3	2.71	18.4	1.92	4.5	2	6,026	0.67	4,062	35.0	0.82	4,009	0.49	
OS-7-1		0.073	0.027	42.0	2.38	21.8	1.68	4.0	1	1,924	0.79	1,513	40.0	0.26	1,490	0.50	
OS-7-2		0.073	0.027	42.6	2.38	22.2	1.68	4.0	1	1,851	0.79	1,456	40.0	0.25	1,434	0.49	
OS-7-3		0.073	0.028	45.2	2.46	23.5	1.74	4.1	1	1,997	0.79	1,570	40.0	0.26	1,550	0.47	
OS-7-4		0.073	0.028	44.8	2.46	23.3	1.74	4.1	1	2,033	0.79	1,599	40.0	0.27	1,578	0.47	

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

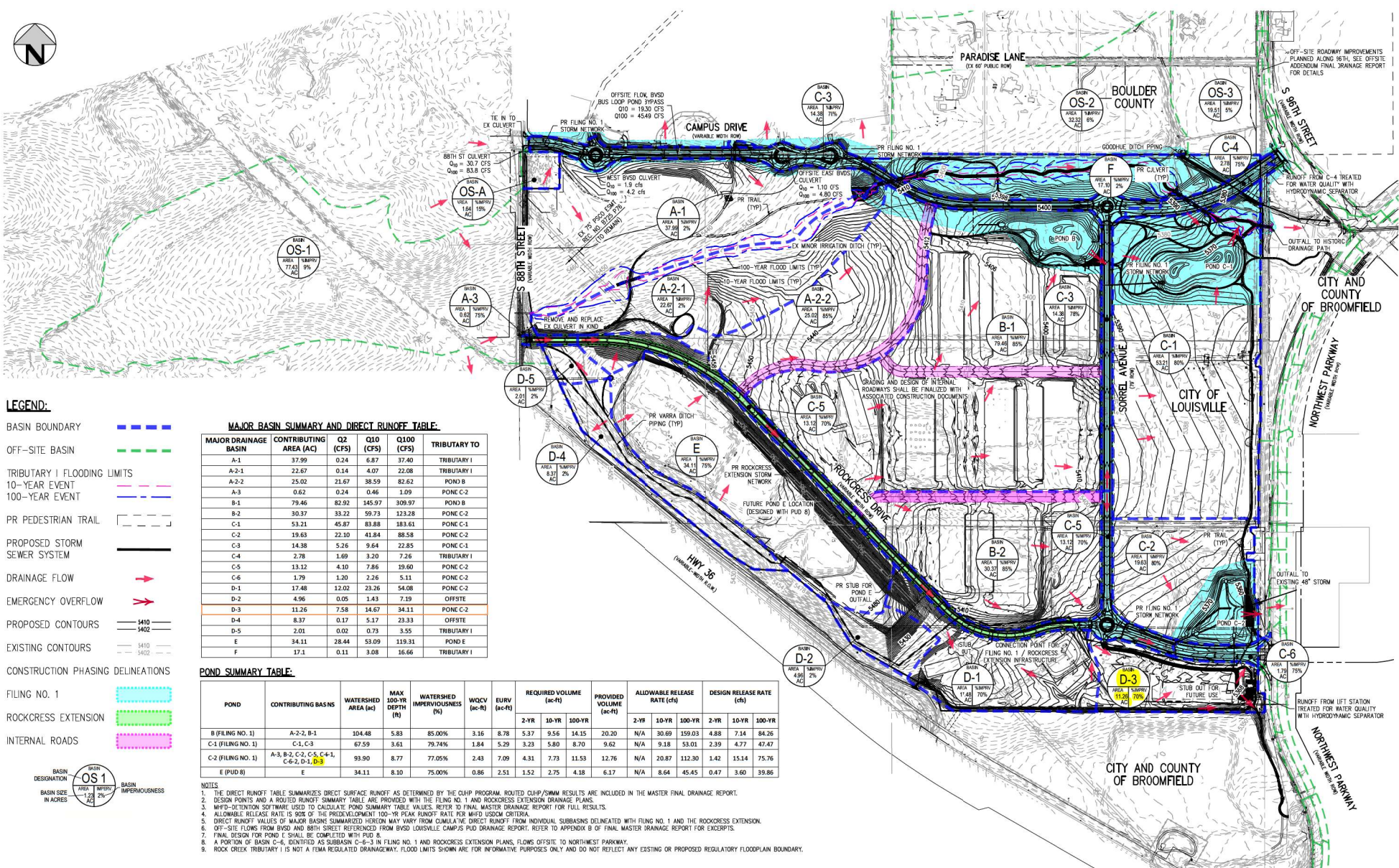
10-year

		Unit Hydrograph Parameters and Results										Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)	
Catchment Name/ID	User Comment for Catchment																
A-1		0.157	0.132	58.7	7.44	30.5	5.26	12.4	30	137,904	0.25	34,689	45.0	6.87	34,688	0.18	
A-2-1		0.157	0.104	59.0	6.23	30.7	4.40	10.4	18	82,292	0.25	20,700	45.0	4.07	20,706	0.18	
A-2-2		0.076	0.151	16.0	3.35	8.3	2.37	5.6	73	90,823	1.21	109,722	30.0	38.59	108,735	1.54	
A-3		0.079	0.028	37.5	2.30	19.5	1.62	3.8	1	2,251	1.09	2,451	35.0	0.46	2,407	0.74	
A-3-1		0.079	0.020	32.3	2.00	16.8	1.42	3.3	0	1,125	1.09	1,226	35.0	0.25	1,194	0.82	
A-3-2		0.079	0.020	32.3	2.00	16.8	1.42	3.3	0	1,125	1.09	1,226	35.0	0.25	1,194	0.82	
B-1		0.076	0.253	11.3	3.71	5.9	2.62	6.2	328	288,440	1.21	348,461	30.0	145.97	341,983	1.84	
B-2		0.076	0.164	9.8	2.74	5.1	1.94	4.6	145	110,243	1.21	133,184	25.0	59.73	128,168	1.97	
C-1		0.077	0.209	14.7	3.86	7.6	2.73	6.4	170	193,152	1.15	221,852	30.0	83.88	220,188	1.58	
C-2		0.077	0.133	7.6	2.28	3.9	1.61	3.8	121	71,257	1.15	81,845	25.0	41.84	75,660	2.13	
C-3		0.078	0.115	46.0	5.57	23.9	3.94	9.3	15	52,199	1.12	58,714	40.0	9.64	58,642	0.67	
C-3-1		0.077	0.041	27.7	2.37	14.4	1.67	3.9	2	5,118	1.15	5,879	30.0	1.37	5,740	0.97	
C-3-2		0.077	0.038	38.9	2.63	20.2	1.86	4.4	1	4,356	1.15	5,003	35.0	0.91	4,940	0.76	
C-3-3		0.079	0.025	27.4	2.02	14.3	1.43	3.4	1	1,779	1.09	1,937	30.0	0.45	1,879	0.93	
C-3-4		0.079	0.023	28.8	2.01	15.0	1.42	3.4	1	1,525	1.09	1,661	30.0	0.37	1,612	0.89	
C-3-5		0.077	0.032	13.7	1.84	7.1	1.30	3.1	3	2,977	1.15	3,419	30.0	1.22	3,182	1.49	
C-3-6		0.077	0.030	21.3	1.99	11.1	1.41	3.3	2	2,577	1.15	2,960	30.0	0.83	2,846	1.17	
C-3-7		0.077	0.034	19.0	2.00	9.9	1.41	3.3	2	3,449	1.15	3,961	30.0	1.20	3,788	1.26	
C-3-8		0.077	0.035	21.7	2.08	11.3	1.47	3.5	2	3,557	1.15	4,086	30.0	1.13	3,940	1.15	
C-3-9		0.079	0.028	55.2	2.70	28.7	1.91	4.5	1	2,360	1.09	2,570	40.0	0.36	2,548	0.55	
C-3-10		0.079	0.028	54.1	2.67	28.1	1.88	4.4	1	2,323	1.09	2,530	40.0	0.36	2,507	0.56	
C-3-11		0.077	0.026	31.9	2.14	16.6	1.51	3.6	1	1,888	1.15	2,168	35.0	0.45	2,116	0.87	
C-3-12		0.077	0.027	31.0	2.14	16.1	1.51	3.6	1	1,997	1.15	2,293	35.0	0.49	2,237	0.88	
C-3-13		0.077	0.033	27.4	2.20	14.3	1.55	3.7	2	3,231	1.15	3,711	30.0	0.86	3,612	0.97	
C-3-14		0.077	0.047	37.8	2.88	19.7	2.03	4.8	2	7,151	1.15	8,214	35.0	1.53	8,133	0.78	
C-3-15		0.077	0.048	38.4	2.91	20.0	2.06	4.9	2	7,333	1.15	8,422	35.0	1.55	8,345	0.77	
C-3-16		0.096	0.011	16.6	1.64	8.6	1.16	2.7	0	581	0.64	374	30.0	0.14	350	0.87	
C-4		0.079	0.054	20.8	2.37	10.8	1.67	4.0	6	10,091	1.09	10,992	30.0	3.20	10,665	1.15	
C-4-1		0.079	0.037	26.7	2.25	13.9	1.59	3.8	2	4,211	1.09	4,586	30.0	1.10	4,467	0.95	
C-4-2		0.079	0.043	26.6	2.37	13.8	1.68	4.0	3	5,881	1.09	6,405	30.0	1.55	6,254	0.96	
C-5		0.081	0.107	48.3	5.48	25.1	3.87	9.1	13	47,626	1.03	49,077	40.0	7.86	49,018	0.60	
C-5-1		0.097	0.036	73.1	3.49	38.0	2.47	5.8	2	9,075	0.62	5,625	45.0	0.71	5,614	0.28	
C-5-2		0.094	0.037	70.3	3.48	36.5	2.46	5.8	1	7,986	0.68	5,420	45.0	0.69	5,408	0.31	
C-5-3		0.079	0.033	52.2	2.81	27.1	1.99	4.7	1	3,267	1.09	3,558	40.0	0.52	3,530	0.58	
C-5-4		0.079	0.033	52.4	2.81	27.2	1.99	4.7	1	3,231	1.09	3,519	40.0	0.51	3,491	0.58	
C-5-5		0.079	0.027	32.8	2.19	17.0	1.55	3.6	1	2,178	1.09	2,372	35.0	0.49	2,317	0.81	
C-5-6		0.079	0.027	32.8	2.19	17.0	1.55	3.6	1	2,178	1.09	2,372	35.0	0.49	2,317	0.81	
C-5-7		0.079	0.032	53.2	2.80	27.6	1.98	4.7	1	3,086	1.09	3,361	40.0	0.48	3,334	0.57	
C-5-8		0.079	0.032	52.0	2.76	27.0	1.95	4.6	1	3,013	1.09	3,282	40.0	0.48	3,254	0.58	
C-5-9		0.079	0.022	7.2	1.62	3.8	1.15	2.7	2	1,343	1.09	1,463	25.0	0.69	1,235	1.86	
C-5-10		0.079	0.029	36.4	2.32	18.9	1.64	3.9	1	2,577	1.09	2,807	35.0	0.54	2,756	0.76	
C-5-11		0.079	0.029	36.5	2.32	19.0	1.64	3.9	1	2,577	1.09	2,807	35.0	0.54	2,756	0.76	
C-5-12		0.077	0.035	24.9	2.17	12.9	1.53	3.6	2	3,630	1.15	4,169	30.0	1.04	4,037	1.04	
C-5-13		0.077	0.034	30.3	2.30	15.8	1.62	3.8	1	3,485	1.15	4,003	35.0	0.86	3,913	0.90	
C-6		0.079	0.045	17.8	2.11	9.3	1.49	3.5	5	6,498	1.09	7,077	30.0	2.26	6,766	1.26	
C-6-1		0.079	0.027	25.5	2.04	13.3	1.44	3.4	1	2,214	1.09	2,412	30.0	0.60	2,331	0.98	
C-6-2		0.079	0.031	25.6	2.11	13.3	1.49	3.5	1	2,940	1.09	3,203	30.0	0.79	3,103	0.98	
C-6-3		0.079	0.022	12.0	1.70	6.2	1.20	2.8	1	1,343	1.09	1,463	30.0	0.56	1,345	1.53	
D-1		0.081	0.122	16.3	3.03	8.5	2.14	5.0	50	63,452	1.03	65,386	30.0	23.26	64,377	1.33	
D-2		0.157	0.053	33.2	2.85	17.3	2.01	4.7	7	18,005	0.25	4,529	35.0	1.43	4,470	0.29	
D-3		0.081	0.100	16.5	2.77	8.6	1.96	4.6	32	40,874	1.03	42,119	30.0	14.67	41,127	1.30	
D-4		0.157	0.067	12.2	2.12	6.3	1.50	3.5	32	30,383	0.25	7,643	30.0	5.17	7,166	0.62	
D-5		0.157	0.035	24.3	2.16	12.7	1.52	3.6	4	7,296	0.25	1,835	35.0	0.73	1,776	0.36	
E		0.079	0.168	13.1	3.19	6.8	2.25	5.3	122	123,819	1.09	134,864	30.0	53.09	131,229	1.56	
F		0.157	0.092	58.5	5.64	30.4	3.98	9.4	14	62,073	0.25	15,614	45.0	3.08	15,605	0.18	
OS-1		0.136	0.159	43.3	6.79	22.5	4.80	11.3	84	281,071	0.32	90,162	40.0	21.66	90,172	0.28	
OS-2		0.146	0.114	41.0	5.09	21.3	3.60	8.5	37	117,322	0.24	28,432	40.0	7.20	28,377	0.22	
OS-3		0.149	0.093	39.0	4.28	20.3	3.03	7.1	23	70,821	0.23	16,338	40.0	4.36	16,298	0.22	
EX-X		0.157	0.024	22.0	1.90	11.5	1.34	3.2	2	3,013	0.25	758	35.0	0.32	728	0.39	
OS-4-1		0.076	0.043	36.0	2.68	18.7	1.89	4.5	2	5,481	1.21	6,619	35.0	1.26	6,532	0.83	
OS-4-2		0.075	0.045	35.3	2.71	18.3	1.92	4.5	2	6,026	1.24	7,451	35.0	1.43	7,354	0.86	
OS-7-1		0.073	0.027	42.0	2.38	21.8	1.68	4.0	1	1,924	1.39	2,672	35.0	0.44	2,631	0.83	
OS-7-2		0.073	0.027	42.6	2.38	22.2	1.68	4.0	1	1,851	1.39	2,571	35.0	0.42	2,532	0.82	
OS-7-3		0.073	0.028	45.2	2.46	23.5	1.74	4.1	1	1,997	1.39	2,773	35.0	0.43	2,736	0.78	
OS-7-4		0.073	0.028	44.8	2.46	23.3	1.74	4.1	1	2,033	1.39	2,823	35.0	0.44	2,786	0.79	

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

100-year

		Unit Hydrograph Parameters and Results										Excess Precip.		Storm Hydrograph			
		CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)		Volume (c.f.)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)	
Catchment Name/ID	User Comment for Catchment																
A-1		0.156	0.131	58.7	7.42	30.5	5.24	12.4	30	137,904	1.52	208,970	55.0	37.40	208,965	0.98	
A-2-1		0.156	0.104	59.0	6.21	30.7	4.39	10.4	18	82,292	1.52	124,700	55.0	22.08	124,736	0.97	
A-2-2		0.076	0.151	16.0	3.35	8.3	2.36	5.6	74	90,823	2.47	224,472	35.0	82.62	222,420	3.30	
A-3		0.079	0.028	37.3	2.30	19.4	1.62	3.8	1	2,251	2.35	5,296	45.0	1.09	5,201	1.76	
A-3-1		0.079	0.020	32.2	2.00	16.8	1.42	3.3	0	1,125	2.35	2,648	40.0	0.60	2,579	1.93	
A-3-2		0.079	0.020	32.2	2.00	16.8	1.42	3.3	0	1,125	2.35	2,648	40.0	0.60	2,579	1.93	
B-1		0.076	0.253	11.3	3.70	5.9	2.62	6.2	329	288,440	2.47	712,892	35.0	309.97	699,737	3.90	
B-2		0.076	0.164	9.8	2.74	5.1	1.94	4.6	145	110,243	2.47	272,471	30.0	123.28	262,135	4.06	
C-1		0.077	0.209	14.7	3.85	7.6	2.72	6.4	170	193,152	2.41	465,944	35.0	183.61	462,292	3.45	
C-2		0.077	0.133	7.6	2.28	3.9	1.61	3.8	121	71,257	2.41	171,894	30.0	88.58	158,851	4.51	
C-3		0.078	0.115	45.9	5.56	23.9	3.93	9.3	15	52,199	2.39	124,685	50.0	22.85	124,539	1.59	
C-3-1		0.077	0.041	27.6	2.36	14.3	1.67	3.9	2	5,118	2.41	12,347	40.0	3.10	12,057	2.20	
C-3-2		0.077	0.038	38.8	2.63	20.2	1.86	4.4	1	4,356	2.41	10,508	45.0	2.11	10,374	1.76	
C-3-3		0.079	0.025	27.3	2.02	14.2	1.43	3.4	1	1,779	2.35	4,186	40.0	1.05	4,059	2.15	
C-3-4		0.079	0.023	28.7	2.01	14.9	1.42	3.4	1	1,525	2.35	3,588	40.0	0.88	3,483	2.09	
C-3-5		0.077	0.032	13.7	1.84	7.1	1.30	3.1	3	2,977	2.41	7,180	35.0	2.68	6,683	3.27	
C-3-6		0.077	0.030	21.2	1.99	11.0	1.40	3.3	2	2,577	2.41	6,217	35.0	1.83	5,976	2.58	
C-3-7		0.077	0.034	18.9	2.00	9.8	1.41	3.3	2	3,449	2.41	8,319	35.0	2.64	7,955	2.78	
C-3-8		0.077	0.035	21.7	2.08	11.3	1.47	3.5	2	3,557	2.41	8,582	35.0	2.50	8,275	2.55	
C-3-9		0.079	0.028	55.0	2.70	28.6	1.91	4.5	1	2,360	2.35	5,552	50.0	0.88	5,506	1.35	
C-3-10		0.079	0.028	53.9	2.66	28.0	1.88	4.4	1	2,323	2.35	5,467	50.0	0.88	5,416	1.37	
C-3-11		0.077	0.026	31.8	2.14	16.6	1.51	3.6	1	1,888	2.41	4,553	40.0	1.03	4,445	1.99	
C-3-12		0.077	0.027	30.9	2.13	16.1	1.51	3.6	1	1,997	2.41	4,816	40.0	1.12	4,698	2.03	
C-3-13		0.077	0.033	27.4	2.20	14.2	1.55	3.7	2	3,231	2.41	7,793	40.0	1.96	7,585	2.20	
C-3-14		0.077	0.047	37.7	2.87	19.6	2.03	4.8	2	7,151	2.41	17,251	45.0	3.54	17,082	1.80	
C-3-15		0.077	0.048	38.3	2.91	19.9	2.06	4.9	2	7,333	2.41	17,689	45.0	3.60	17,523	1.78	
C-3-16		0.095	0.011	16.3	1.64	8.5	1.16	2.7	0	581	1.91	1,109	35.0	0.41	1,036	2.57	
C-4		0.079	0.054	20.8	2.37	10.8	1.67	3.9	6	10,091	2.35	23,747	35.0	7.26	23,039	2.61	
C-4-1		0.079	0.037	26.6	2.25	13.8	1.59	3.8	2	4,211	2.35	9,909	40.0	2.55	9,649	2.20	
C-4-2		0.079	0.043	26.5	2.37	13.8	1.68	4.0	3	5,881	2.35	13,838	40.0	3.59	13,509	2.21	
C-5		0.080	0.107	48.1	5.47	25.0	3.86	9.1	13	47,626	2.29	109,261	50.0	19.60	109,117	1.49	
C-5-1		0.097	0.036	71.4	3.48	37.2	2.46	5.8	2	9,075	1.89	17,118	55.0	2.40	17,082	0.96	
C-5-2		0.094	0.037	69.2	3.47	36.0	2.46	5.8	1	7,986	1.94	15,526	55.0	2.21	15,492	1.00	
C-5-3		0.079	0.033	52.0	2.81	27.0	1.99	4.7	1	3,267	2.35	7,688	50.0	1.27	7,627	1.41	
C-5-4		0.079	0.033	52.2	2.81	27.2	1.98	4.7	1	3,231	2.35	7,602	50.0	1.25	7,542	1.40	
C-5-5		0.079	0.027	32.6	2.19	17.0	1.54	3.6	1	2,178	2.35	5,125	40.0	1.15	5,007	1.92	
C-5-6		0.079	0.027	32.7	2.19	17.0	1.54	3.6	1	2,178	2.35	5,125	40.0	1.15	5,007	1.92	
C-5-7		0.079	0.032	53.0	2.80	27.5	1.98	4.7	1	3,086	2.35	7,261	50.0	1.18	7,202	1.39	
C-5-8		0.079	0.032	51.8	2.76	27.0	1.95	4.6	1	3,013	2.35	7,090	50.0	1.17	7,030	1.41	
C-5-9		0.079	0.022	7.2	1.62	3.8	1.15	2.7	2	1,343	2.35	3,161	30.0	1.51	2,667	4.08	
C-5-10		0.079	0.029	36.3	2.32	18.9	1.64	3.9	1	2,577	2.35	6,065	45.0	1.27	5,954	1.79	
C-5-11		0.079	0.029	36.3	2.32	18.9	1.64	3.9	1	2,577	2.35	6,065	45.0	1.27	5,954	1.79	
C-5-12		0.077	0.035	24.8	2.17	12.9	1.53	3.6	2	3,630	2.41	8,757	40.0	2.32	8,478	2.32	
C-5-13		0.077	0.034	30.3	2.30	15.7	1.62	3.8	1	3,485	2.41	8,406	40.0	1.98	8,217	2.07	
C-6		0.079	0.045	17.7	2.11	9.2	1.49	3.5	5	6,498	2.35	15,290	35.0	5.11	14,613	2.86	
C-6-1		0.079	0.028	25.4	2.04	13.2	1.44	3.4	1	2,214	2.35	5,211	40.0	1.37	5,035	2.24	
C-6-2		0.079	0.031	25.5	2.11	13.3	1.49	3.5	1	2,940	2.35	6,919	40.0	1.82	6,701	2.24	
C-6-3		0.079	0.022	12.0	1.70	6.2	1.20	2.8	1	1,343	2.35	3,161	35.0	1.27	2,905	3.42	
D-1		0.080	0.122	16.2	3.02	8.4	2.14	5.0	51	63,452	2.29	145,571	35.0	54.08	143,287	3.09	
D-2		0.156	0.053	33.2	2.84	17.3	2.01	4.7	7	18,005	1.52	27,283	40.0	7.19	26,928	1.45	
D-3		0.080	0.100	16.5	2.77	8.6	1.96	4.6	32	40,874	2.29	93,771	35.0	34.11	91,547	3.03	
D-4		0.156	0.066	12.1	2.12	6.3	1.50	3.5	32	30,383	1.52	46,040	35.0	23.33	43,163	2.79	
D-5		0.156	0.035	24.3	2.15	12.7	1.52	3.6	4	7,296	1.52	11,056	40.0	3.55	10,701	1.77	
E		0.079	0.168	13.0	3.19	6.8	2.25	5.3	123	123,819	2.35	291,367	35.0	119.31	283,485	3.50	
F		0.156	0.092	58.5	5.62	30.4	3.97	9.4	14	62,073	1.52	94,061	55.0	16.66	94,003	0.97	
OS-1		0.134	0.157	43.2	6.71	22.4	4.74	11.2	84	281,071	1.59	445,892	50.0	99.62	445,986	1.29	
OS-2		0.144	0.113	40.9	5.06	21.3	3.57	8.4	37	117,322	1.51	176,827	45.0	40.72	176,472	1.26	
OS-3		0.148	0.092	39.0	4.26	20.3	3.01	7.1	23	70,821	1.50	105,895	45.0	25.31	105,642	1.30	
EX-X		0.156	0.023	22.0	1.90	11.5	1.34	3.2	2	3,013	1.52	4,566	40.0	1.56	4,383	1.87	
OS-4-1		0.076	0.043	35.9	2.68	18.7	1.89	4.5	2	5,481	2.47	13,544	40.0	2.83	13,365	1.87	
OS-4-2		0.075	0.045	35.2	2.71	18.3	1.91	4.5	2	6,026	2.50	15,064	40.0	3.18	14,866	1.92	
OS-7-1		0.073	0.027	42.0	2.38	21.8	1.68	4.0	1	1,924	2.65	5,099	45.0	0.93	5,021	1.76	
OS-7-2		0.073	0.027	42.6	2.38	22.2	1.68	4.0	1	1,851	2.65	4,907	45.0	0.89	4,832	1.75	
OS-7-3		0.073	0.028	45.2	2.46	23.5	1.74	4.1	1	1,997	2.65	5,292	45.0	0.92	5,222	1.68	
OS-7-4		0.073	0.028	44.8	2.46	23.3	1.74	4.1	1	2,033	2.65	5,388	45.0	0.95	5,316	1.69	



LEGEND:

- BASIN BOUNDARY
- OFF-SITE BASIN
- TRIBUTARY / FLOODING LIMITS
- 10-YEAR EVENT
- 100-YEAR EVENT
- PR PEDESTRIAN TRAIL
- PROPOSED STORM SEWER SYSTEM
- DRAINAGE FLOW
- EMERGENCY OVERFLOW
- PROPOSED CONTOURS
- EXISTING CONTOURS
- CONSTRUCTION PHASING DELINEATIONS
- FILING NO. 1
- ROCKCRESS EXTENSION
- INTERNAL ROADS

MAJOR BASIN SUMMARY AND DIRECT RUNOFF TABLE:

MAJOR DRAINAGE BASIN	CONTRIBUTING AREA (AC)	Q2 (CFS)	Q10 (CFS)	Q100 (CFS)	TRIBUTARY TO
A-1	37.99	0.24	6.87	37.40	TRIBUTARY I
A-2-1	22.67	0.14	4.07	22.08	TRIBUTARY I
A-2-2	25.02	0.16	38.59	82.62	POND B
A-3	0.62	0.24	0.46	1.09	POND C-2
B-1	79.46	82.92	145.97	309.97	POND B
B-2	30.37	33.22	59.73	123.28	POND C-2
C-1	53.21	45.87	83.88	183.61	POND C-1
C-2	19.63	22.10	41.84	88.58	POND C-2
C-3	14.38	5.26	9.64	22.85	POND C-1
C-4	2.78	1.69	3.20	7.26	TRIBUTARY I
C-5	13.12	4.10	7.86	19.60	POND C-2
C-6	1.79	1.20	2.26	5.11	POND C-2
D-1	17.48	12.02	23.26	54.08	POND C-2
D-2	4.96	0.05	1.43	7.19	OFFSITE
D-3	11.26	7.58	14.67	34.11	POND C-2
D-4	8.37	0.17	5.17	23.33	OFFSITE
D-5	2.01	0.02	0.73	3.55	TRIBUTARY I
E	34.11	28.44	53.09	119.31	POND E
F	17.1	0.11	3.08	16.66	TRIBUTARY I

POND SUMMARY TABLE:

POND	CONTRIBUTING BASINS	WATERSHED AREA (ac)	MAX 100-YR DEPTH (ft)	WATERSHED IMPERVIOUSNESS (%)	WQV (ac-ft)	EURV (ac-ft)	REQUIRED VOLUME (ac-ft)			PROVIDED VOLUME (ac-ft)	ALLOWABLE RELEASE RATE (cfs)			DESIGN RELEASE RATE (cfs)		
							2-YR	10-YR	100-YR		2-YR	10-YR	100-YR	2-YR	10-YR	100-YR
B (FILING NO. 1)	A-2-2, B-1	104.48	5.83	85.00%	3.16	8.78	5.37	9.56	14.15	20.20	N/A	30.69	159.03	4.88	7.14	84.26
C-1 (FILING NO. 1)	C-1, C-3	67.59	3.61	79.74%	1.84	5.29	3.23	5.80	8.70	9.62	N/A	9.18	53.01	2.39	4.77	47.47
C-2 (FILING NO. 1)	A-3, B-2, C-2, C-5, C-4-1, C-6-2, D-1, B-3	93.90	8.77	77.05%	2.43	7.09	4.31	7.73	11.53	12.76	N/A	20.87	112.30	1.42	15.14	75.76
E (PUD 8)	E	34.11	8.10	75.00%	0.86	2.51	1.52	2.75	4.18	6.17	N/A	8.64	45.45	0.47	3.60	39.86

- THE DIRECT RUNOFF TABLE SUMMARIZES DIRECT SURFACE RUNOFF AS DETERMINED BY THE CUPP PROGRAM. ROUTED CUPP/SWMM RESULTS ARE INCLUDED IN THE MASTER FINAL DRAINAGE REPORT.
- DESIGN POINTS AND A ROUTED RUNOFF SUMMARY TABLE ARE PROVIDED WITH THE FILING NO. 1 AND ROCKCRESS EXTENSION DRAINAGE PLANS.
- WQV-EXTENSION SOFTWARE USED TO CALCULATE POND SUMMARY TABLE VALUES. REFER TO FINAL MASTER DRAINAGE REPORT FOR FULL RESULTS.
- ALLOWABLE RELEASE RATE IS SIZE OF THE PREDEVELOPMENT 100-YR PEAK RUNOFF RATE PER WQV USDM CRITERIA.
- DIRECT RUNOFF VALUES OF MAJOR BASINS SUMMARIZED HEREON MAY VARY FROM CUMULATIVE DIRECT RUNOFF FROM INDIVIDUAL SUBBASINS DELINEATED WITH FILING NO. 1 AND THE ROCKCRESS EXTENSION.
- OFF-SITE FLOWS FROM BVSD AND 88TH STREET REFERENCED FROM BVSD LOUISVILLE CAMPUS PUD DRAINAGE REPORT; REFER TO APPENDIX B OF FINAL MASTER DRAINAGE REPORT FOR EXCERPTS.
- FINAL DESIGN FOR POND C SHALL BE COMPLETED WITH PUD 8.
- A PORTION OF BASIN C-6, IDENTIFIED AS SUBBASIN C-6-3 IN FILING NO. 1 AND ROCKCRESS EXTENSION PLANS, FLOWS OFFSITE TO NORTHWEST PARKWAY.
- ROCK CREEK TRIBUTARY I IS NOT A FEMA REGULATED DRAINAGEWAY. FLOOD LIMITS SHOWN ARE FOR INFORMATIVE PURPOSES ONLY AND DO NOT REFLECT ANY EXISTING OR PROPOSED REGULATORY FLOODPLAIN BOUNDARY.



DESIGNED BY: SDM
CHECKED BY: MAM
DRAWN BY: SDM

DATE	REVISION COMMENTS
04-05-2021	FIRST SUBMITTAL NEW PROGRAM
04-05-2021	SECOND SUBMITTAL NEW PROGRAM PER CITY COMMENTS
06-21-2021	THIRD SUBMITTAL NEW PROGRAM
07-07-2021	RESUBMITTAL POST PRELIMINARY PLAN
07-28-2021	CONSTRUCTION BID SET
08-04-2021	REDCITY COMMENTS
08-07-2021	REDCITY COMMENTS



STERLING BAY

RETAIL RIDGE
MASTER DRAINAGE PLAN

PRELIMINARY
NOT FOR
CONSTRUCTION

PROJECT #: 190108
SHEET NUMBER

1

1 OF 2

Appendix C

Rational Calculations

Landscape Drain Pipe 2 Year Storm Analysis

Section C-C Analysis

Section D-D Analysis

Landscape Drain A7-1 and A3 Capacity Calculations

RipRap Pad Sizing

Project Name: Redtail Ridge - Lift Stations

Composite C-Value Computations

Post-Development

Project No: 190108

Date: 11/06/23

Revised: 08/01/25

Design by: MJS

Checked by: TJS

Hydrologic Soil Group: C

BASIN	TOTAL AREA (ACRES)	ROOFS (90%)	GRAVEL (40%)	DRIVES & WALKS (90%)	GARAGE & STREETS (100%)	LANDSCAPE AREA (2%)	PERCENT IMPERVIOUS	C ₂ =	C ₅ =	C ₁₀ =	C ₁₀₀ =
A	0.71	0.03	0.05	0.22	0.00	0.41	36.05%	0.22	0.23	0.25	0.39
B	0.07	0.00	0.00	0.00	0.00	0.07	2.00%	0.01	0.01	0.01	0.13
OS-1	0.16	0.00	0.00	0.04	0.00	0.12	23.87%	0.13	0.14	0.15	0.30
Total On-Site	0.86	0.03	0.05	0.26	0.00	0.53	33.85%	0.21	0.22	0.23	0.37
Total Captured	0.78	0.03	0.05	0.22	0.00	0.48	32.90%	0.20	0.21	0.22	0.37

Project Name: Redtail Ridge - Lift Stations

Project No: 190108

Date: 11/6/2023

Revised: 8/1/2025

STANDARD FORM SF-2
TIME OF CONCENTRATION

Designed By: MJS

Checked By: TJS

SUB-BASIN DATA			INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Ti)					Tc CHECK (URBANIZED BASINS)			FINAL	REMARKS
BASIN	AREA (AC)	C _s	LENGTH (FT)	SLOPE %	Ti (MIN)	LENGTH (FT)	SLOPE %	C _v	VELOCITY (FPS)	Tt (MIN)	COMPOS. Tc (MIN)	TOTAL LENGTH	Tc = (L/180) + 10 (MIN)	Tc (MIN)	
A	0.71	0.23	10	2.00	3.99	148	5.00	20.00	4.47	0.55	5.00	158	10.88	5.00	
B	0.07	0.01	15	25.00	2.66	72	2.00	15.00	2.12	0.57	5.00	87	10.48	5.00	
OS-1	0.16	0.14	35	25.00	3.57	0	2.00	15.00	2.12	0.00	5.00	35	10.19	5.00	

1-HR Rainfall

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Return Interval (YR)	1-hour Rainfall				
WQ	0.6				
2	0.801				
5	1.08				
10	1.35				
100	2.49				
tc	WQ	2yr	5yr	5yr	100yr
5	2.0351	2.717	3.663	4.579	8.446
6	1.934	2.582	3.482	4.353	8.028
7	1.844	2.462	3.320	4.150	7.654
8	1.763	2.354	3.174	3.968	7.318
9	1.690	2.256	3.042	3.803	7.014
10	1.623	2.167	2.922	3.652	6.737
11	1.562	2.086	2.812	3.515	6.483
12	1.506	2.011	2.711	3.389	6.250
13	1.454	1.942	2.618	3.272	6.036
14	1.407	1.878	2.532	3.165	5.837
15	1.362	1.818	2.452	3.065	5.653
16	1.321	1.763	2.377	2.972	5.481
17	1.282	1.712	2.308	2.885	5.321
18	1.246	1.663	2.243	2.804	5.171
19	1.212	1.618	2.182	2.727	5.030
20	1.180	1.576	2.124	2.656	4.898

Project Name: Redtail Ridge - Lift Static
Project No: 190108
Date: 11/06/23
Revised: 08/01/25

STANDARD FORM SF-2
Post-Development
Rational Method Procedure

Designed By: MJS
Checked By: TJS
Design Storm: WQ YR

BASIN (s)	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				STREET/INLET					REMARKS
		AREA (AC)	RUNOFF COEFF	T _c (min)	C x A (AC)	I (IN/HR)	DIRECT RUNOFF, Q (CFS)	T _c (MAX)	Σ(C x A) (AC)	I (IN/HR)	TOTAL RUNOFF, Q (CFS)	SLOPE (%)	STREET FLOW (CFS)	INLET DESIGN FLOW (CFS)	STREET OR INLET INTERCEPTION (CFS)	CARRYOVER (CFS)	
A	1	0.71	0.22	5.00	0.16	2.04	0.32										Onsite Flows Captured
B	2	0.07	0.01	5.00	0.00	2.04	0.001										Off-Site Flows, Captured
OS-1	3	0.16	0.13	5.00	0.02	2.04	0.041										Off-Site Flows, Flows South Offsite

Project Name: Redtail Ridge - Lift Station
Project No: 190108
Date: 11/06/23
Revised: 08/01/25

STANDARD FORM SF-2
Post-Development
Rational Method Procedure

Designed By: MJS
Checked By: TJS
Design Storm: 2 YR

BASIN (s)	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				STREET/INLET					REMARKS
		AREA (AC)	RUNOFF COEFF	T _c (min)	C x A (AC)	I (IN/HR)	DIRECT RUNOFF, Q (CFS)	T _c (MAX)	Σ(C x A) (AC)	I (IN/HR)	TOTAL RUNOFF, Q (CFS)	SLOPE (%)	STREET FLOW (CFS)	INLET DESIGN FLOW (CFS)	STREET OR INLET INTERCEPTION (CFS)	CARRYOVER (CFS)	
A	1	0.71	0.22	5.00	0.16	2.72	0.43										Onsite Flows Captured
B	2	0.07	0.01	5.00	0.00	2.72	0.001										Off-Site Flows, Captured
OS-1	3	0.16	0.13	5.00	0.02	2.72	0.055										Off-Site Flows, Flows South Offsite

Project Name: Redtail Ridge - Lift Station
Project No: 190108
Date: 11/06/23
Revised: 08/01/25

STANDARD FORM SF-2
Post-Development
Rational Method Procedure

Designed By: MJS
Checked By: TJS
Design Storm: 100 YR

BASIN (s)	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				STREET/INLET					REMARKS
		AREA (AC)	RUNOFF COEFF	T _c (min)	C x A (AC)	I (IN/HR)	DIRECT RUNOFF, Q (CFS)	T _c (MAX)	Σ(C x A) (AC)	I (IN/HR)	TOTAL RUNOFF, Q (CFS)	SLOPE (%)	STREET FLOW (CFS)	INLET DESIGN FLOW (CFS)	STREET OR INLET INTERCEPTION (CFS)	CARRYOVER (CFS)	
A	-	0.71	0.39	5.00	0.28	8.45	2.34										Onsite Flows Captured
B	-	0.07	0.13	5.00	0.01	8.45	0.08										Off-Site Fows, Captured
OS-1	-	0.16	0.30	5.00	0.05	8.45	0.39										Off-Site Fows, Flows South Offsite

BASIN SUMMARY TABLE				
BASIN	AREA (AC)	WQ (CFS)	Q2 (CFS)	Q100 (CFS)
A	0.71	0.32	0.43	2.34
B	0.07	0.001	0.001	0.08
OS-1	0.16	0.04	0.06	0.39

Design
Point

impervious

36.05%
2.00%
23.87%

Channel Report

Landscape Drain 2 Year Storm Analysis

Circular

Diameter (ft)

= 0.67

Invert Elev (ft)

= 5354.00

Slope (%)

= 0.50

Minimum Slope

N-Value

= 0.013

Highlighted

Depth (ft)

= 0.34

Q (cfs)

= 0.430

Area (sqft)

= 0.18

Velocity (ft/s)

= 2.38

Wetted Perim (ft)

= 1.07

Crit Depth, Yc (ft)

= 0.31

Top Width (ft)

= 0.67

EGL (ft)

= 0.43

Calculations

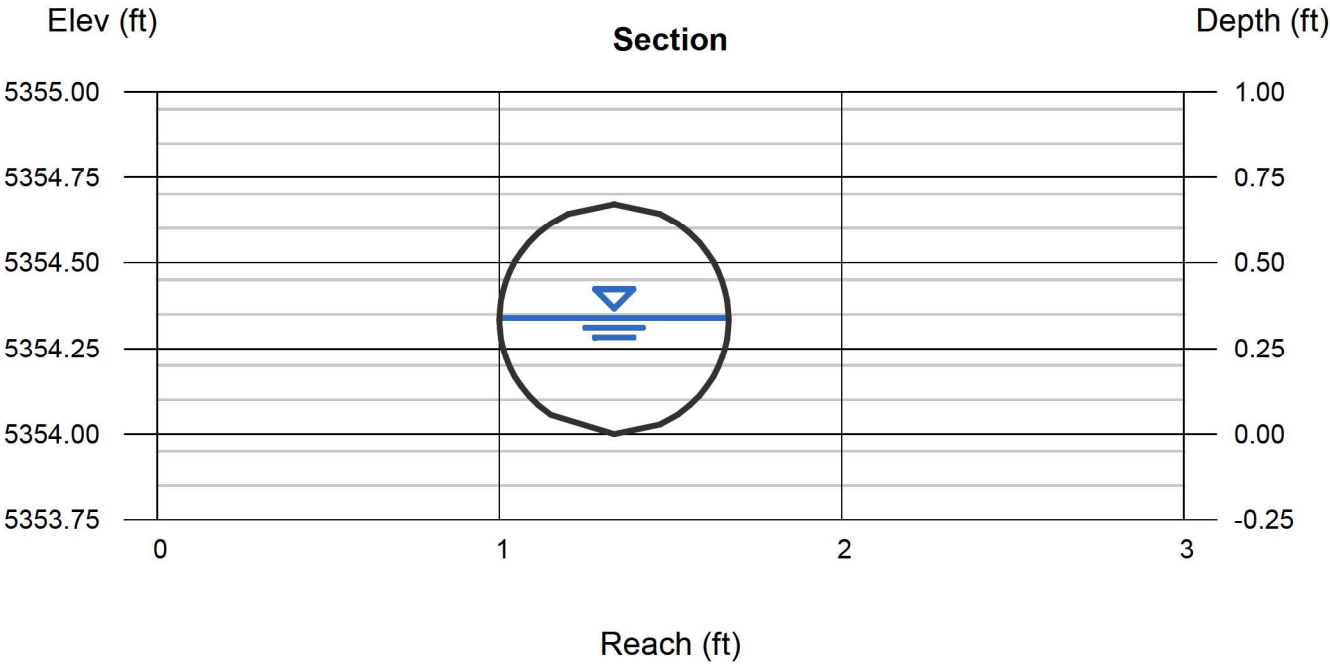
Compute by:

Known Q

Known Q (cfs)

= 0.43

Basin A + B 2-Year Flow

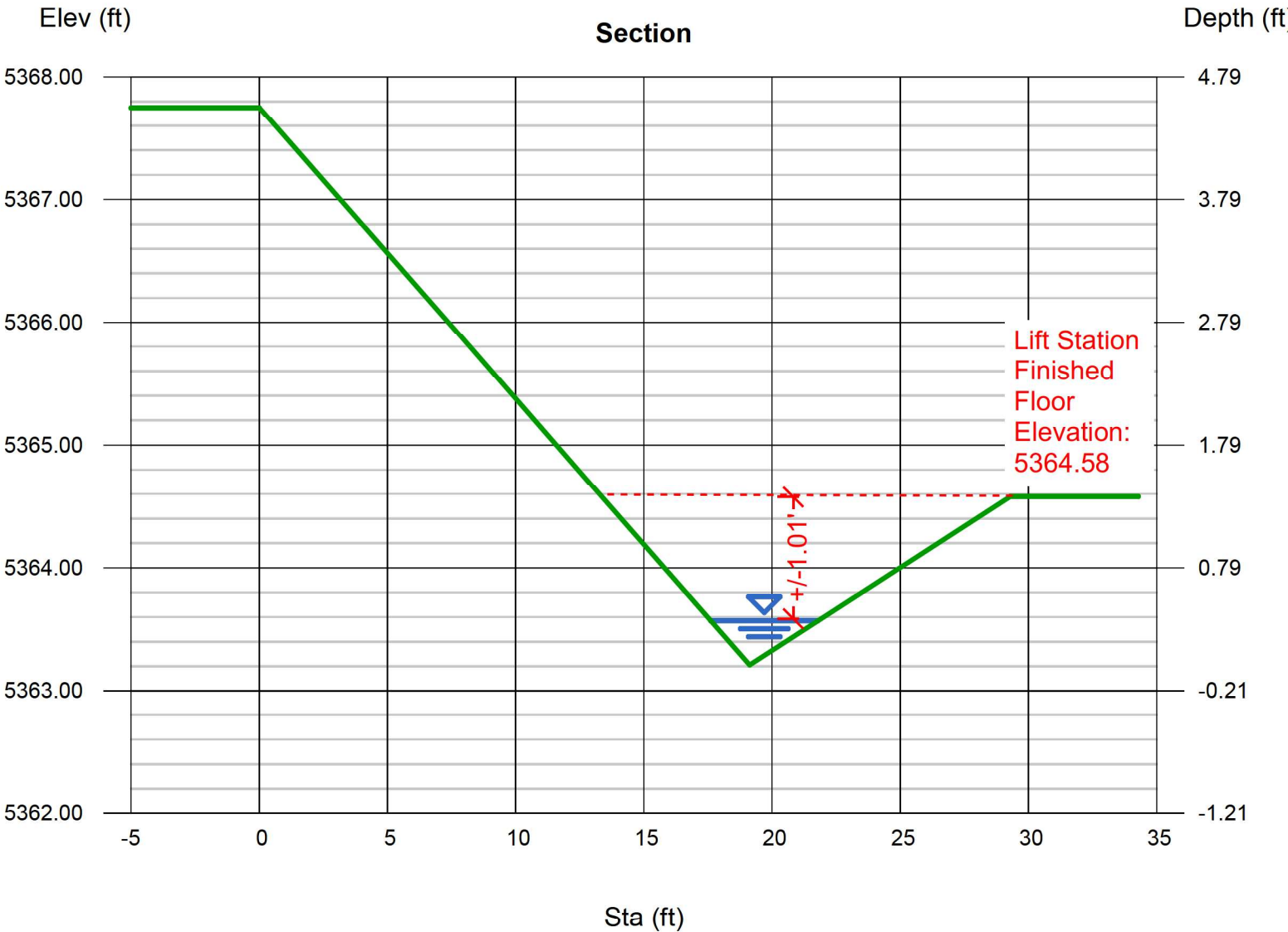


Channel Report

Section C-C

User-defined		Highlighted	
Invert Elev (ft)	= 5363.21	Depth (ft)	= 0.36
Slope (%)	= 2.00	Q (cfs)	= 2.420
N-Value	= 0.020	Area (sqft)	= 0.75
		Velocity (ft/s)	= 3.21
		Wetted Perim (ft)	= 4.25
Calculations		Crit Depth, Yc (ft)	= 0.41
Compute by:	Known Q	Top Width (ft)	= 4.19
Known Q (cfs)	= 2.42 Basin A + B 100-Year Flow	EGL (ft)	= 0.52

(Sta, El, n)-(Sta, El, n)...
(0.00, 5367.75)-(19.12, 5363.21, 0.020)-(29.29, 5364.58, 0.020)



Channel Report

Section D-D

User-defined

Invert Elev (ft) = 5363.33
Slope (%) = 2.38
N-Value = 0.021

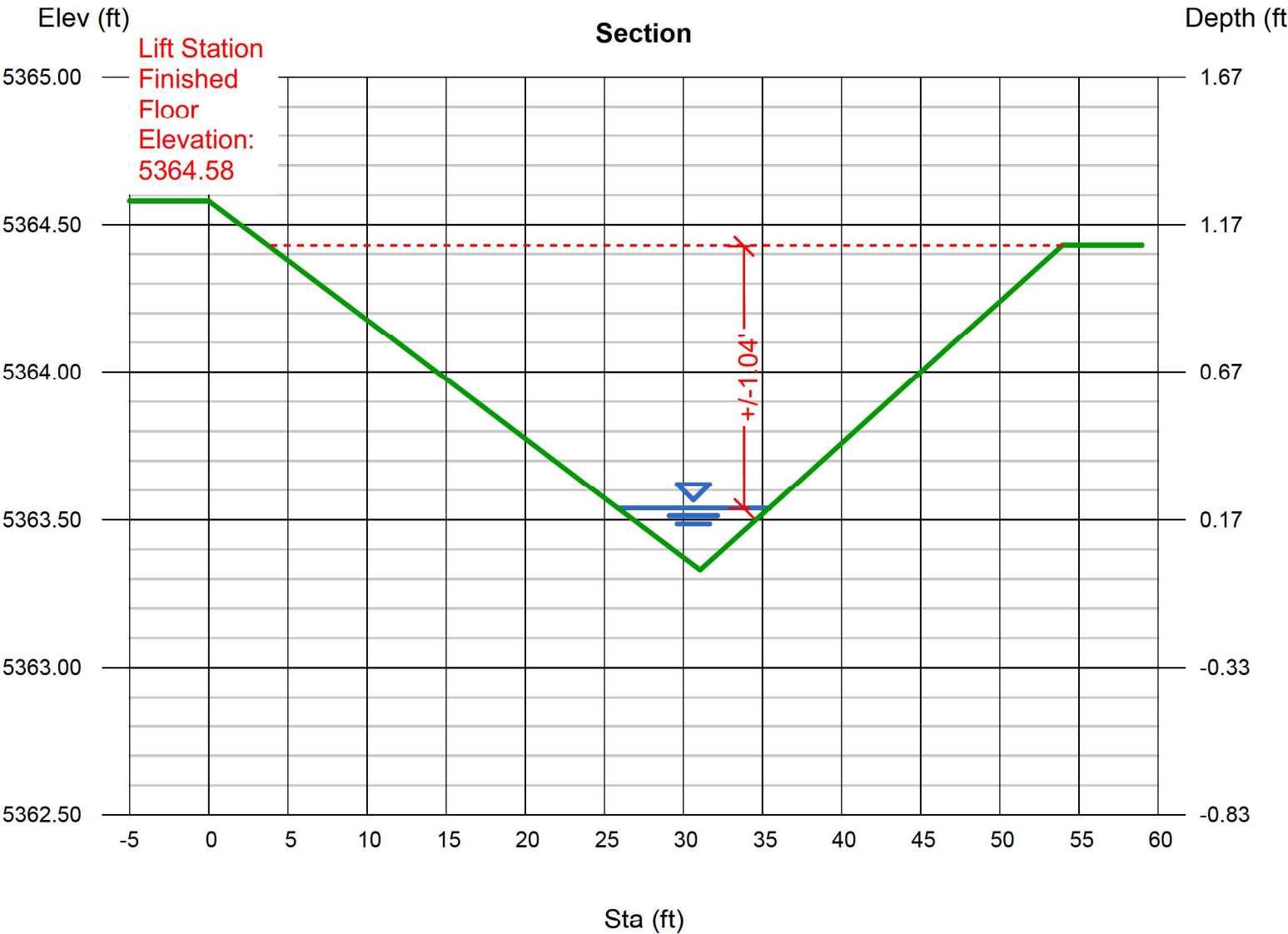
Calculations

Compute by: Known Q
Known Q (cfs) = 2.42 **Basin A + B 100-Year Flow**

Highlighted

Depth (ft) = 0.21
Q (cfs) = 2.420
Area (sqft) = 1.01
Velocity (ft/s) = 2.40
Wetted Perim (ft) = 9.60
Crit Depth, Yc (ft) = 0.24
Top Width (ft) = 9.59
EGL (ft) = 0.30

(Sta, El, n)-(Sta, El, n)...
(0.00, 5364.58)-(31.06, 5363.33, 0.022)-(53.98, 5364.43, 0.020)





Nyloplast Inlet Capacity Table

DISCLAIMER: SAFETY FACTORS ARE NOT INCLUDED IN THESE CALCULATIONS. ACTUAL CALCULATIONS SHOULD BE CARRIED OUT AND VERIFIED BY THE DESIGN ENGINEER TAKING INTO ACCOUNT ALL LOCAL CONDITIONS. NYLOPLAST RECOMMENDS USING A MINIMUM SAFETY FACTOR OF 1.25 FOR PAVED AREAS AND 2.0 FOR TURF AREAS. ADS/NYLOPLAST IS NOT RESPONSIBLE FOR MISUSE OF THIS TOOL.

Input	
Type of Grate	12" Dome
Head (ft)	0.79
Properties	
Orifice Flow Area (in)	70.37
Orifice Flow Area (ft)	0.49
Weir Flow Perimeter (in)	34.56
Weir Flow Perimeter (ft)	2.88
Solution	
Capacity (cfs)	2.08
Capacity (gpm)	932.23

MAXIMUM HEAD
FROM LANDSCAPE
DRAIN ELEVATION
TO 1' BELOW LIFT
STATION FINISHED
FLOOR

$$Q_{weir} = CLH^{3/2}$$

$C = 3.33$ Weir Discharge Coefficient

L = Perimeter of Grate Opening (ft)

H = Flow Height of Water Surface Above Weir (ft)

$$Q_{orifice} = CA\sqrt{2gh}$$

$C = 0.60$ Orifice Discharge Coefficient

A = Area of the Orifice (ft²)

g = Gravitational Constant $\left(32.2 \frac{ft}{s^2}\right)$

H = Depth of Water Above Center of Orifice (ft)



Nyloplast Inlet Capacity Table

DISCLAIMER: SAFETY FACTORS ARE NOT INCLUDED IN THESE CALCULATIONS. ACTUAL CALCULATIONS SHOULD BE CARRIED OUT AND VERIFIED BY THE DESIGN ENGINEER TAKING INTO ACCOUNT ALL LOCAL CONDITIONS. NYLOPLAST RECOMMENDS USING A MINIMUM SAFETY FACTOR OF 1.25 FOR PAVED AREAS AND 2.0 FOR TURF AREAS. ADS/NYLOPLAST IS NOT RESPONSIBLE FOR MISUSE OF THIS TOOL.

Input	
Type of Grate	12" Dome
Head (ft)	0.13
Properties	
Orifice Flow Area (in)	70.37
Orifice Flow Area (ft)	0.49
Weir Flow Perimeter (in)	34.56
Weir Flow Perimeter (ft)	2.88
Solution	
Capacity (cfs)	0.45
Capacity (gpm)	201.73

LOWEST HEAD
FROM ANY
LANDSCAPE DRAIN
ON SITE (DRAIN A3)

$$Q_{weir} = CLH^{3/2}$$

$C = 3.33$ Weir Discharge Coefficient

L = Perimeter of Grate Opening (ft)

H = Flow Height of Water Surface Above Weir (ft)

$$Q_{orifice} = CA\sqrt{2gh}$$

$C = 0.60$ Orifice Discharge Coefficient

A = Area of the Orifice (ft²)

g = Gravitational Constant $\left(32.2 \frac{ft}{s^2}\right)$

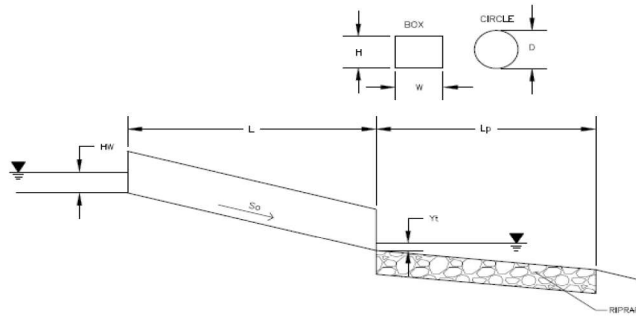
H = Depth of Water Above Center of Orifice (ft)

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.01 (April 2025)

Project: **REDTAIL RIDGE LIFT STATION - OUTFALL RIPRAP SIZING**

ID: _____



Soil Type:

Choose One:

☐ Sandy

☒ Non-Sandy

Design Information:

Design Discharge

Q = 2.42 cfs

Circular Culvert:

Barrel Diameter in Inches

D = 8 inches

Inlet Edge Type (Choose from pull-down list)

Grooved Edge in Headwall

OR:

Box Culvert:

Barrel Height (Rise) in Feet

H (Rise) = OR

Barrel Width (Span) in Feet

W (Span) =

Inlet Edge Type (Choose from pull-down list)

Number of Barrels

Barrels = 1

Inlet Elevation

Elev IN = 5353.75 ft

Outlet Elevation OR Slope

Elev OUT = 5353.7 ft

Culvert Length

L = 10 ft

Manning's Roughness

n = 0.014

Bend Loss Coefficient

k_b = 0

Exit Loss Coefficient

k_x = 1

Tailwater Surface Elevation

Y_t Elevation = ft

Max Allowable Channel Velocity

V = 5 ft/s

Calculated Results:

Culvert Cross Sectional Area Available

A = 0.35 ft²

Culvert Normal Depth

Y_n = 0.67 ft

Culvert Critical Depth

Y_c = 0.65 ft

Froude Number

Fr = -

Entrance Loss Coefficient

k_e = 0.20

Friction Loss Coefficient

k_f = 0.62

Sum of All Loss Coefficients

k_s = 1.82

Headwater:

Inlet Control Headwater

HW_I = 1.88 ft

Outlet Control Headwater

HW_O = 1.96 ft

Design Headwater Elevation

HW = 5355.71 ft

Headwater/Diameter OR Headwater/Rise Ratio

HW/D = 2.95 HW/D > 1.5!

Outlet Protection:

Flow/(Diameter^{2.5})

Q/D^{2.5} = 6.67 ft^{0.5}/s

Tailwater Surface Height

Y_t = 0.27 ft

Tailwater/Diameter

Y_t/D = 0.40

Expansion Factor

1/(2*tan(θ)) = 1.82

Flow Area at Max Channel Velocity

A_k = 0.48 ft²

Width of Equivalent Conduit for Multiple Barrels

W_{eq} = - ft

Length of Riprap Protection

L_p = 3 ft

Width of Riprap Protection at Downstream End

T = 3 ft

Adjusted Diameter for Supercritical Flow

Da = - ft

Minimum Theoretical Riprap Size

d₅₀ min = 4 in

Nominal Riprap Size

d₅₀ nominal = 6 in

MHFD Riprap Type

Type = VL

Appendix D

Drainage Plan

ADS Barracuda Max S3 Details

NO CHANGES ARE TO BE MADE TO THE DRAINAGE WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH.

DESIGN: PLANS AND SPECIFICATIONS FOR THE CITY OF LOUISVILLE, KENTUCKY, PREPARED BY HARRIS KOCHER SMITH, A PROFESSIONAL ENGINEERING FIRM, 1120 LINCOLN STREET, SUITE 1000, DENVER, COLORADO 80203. P: 303.823.6300 F: 303.823.6311 HARRIS.KOCHER@HKS.COM
CHECKED: MJS
DESIGNED: TJS
PER CITY COMMENTS: 05/28/2019
PER CITY COMMENTS: 06/04/2019

811 Know what's below.
Call before you dig.

CALL 3 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

SCALE: 1" = 20'

DESIGNED BY: TJS
CHECKED BY: MJS
DRAWN BY: MJS

HKS HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.823.6300 F: 303.823.6311
Harris.Kocher@hks.com

STERLING BAY

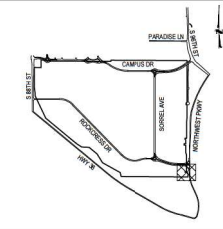
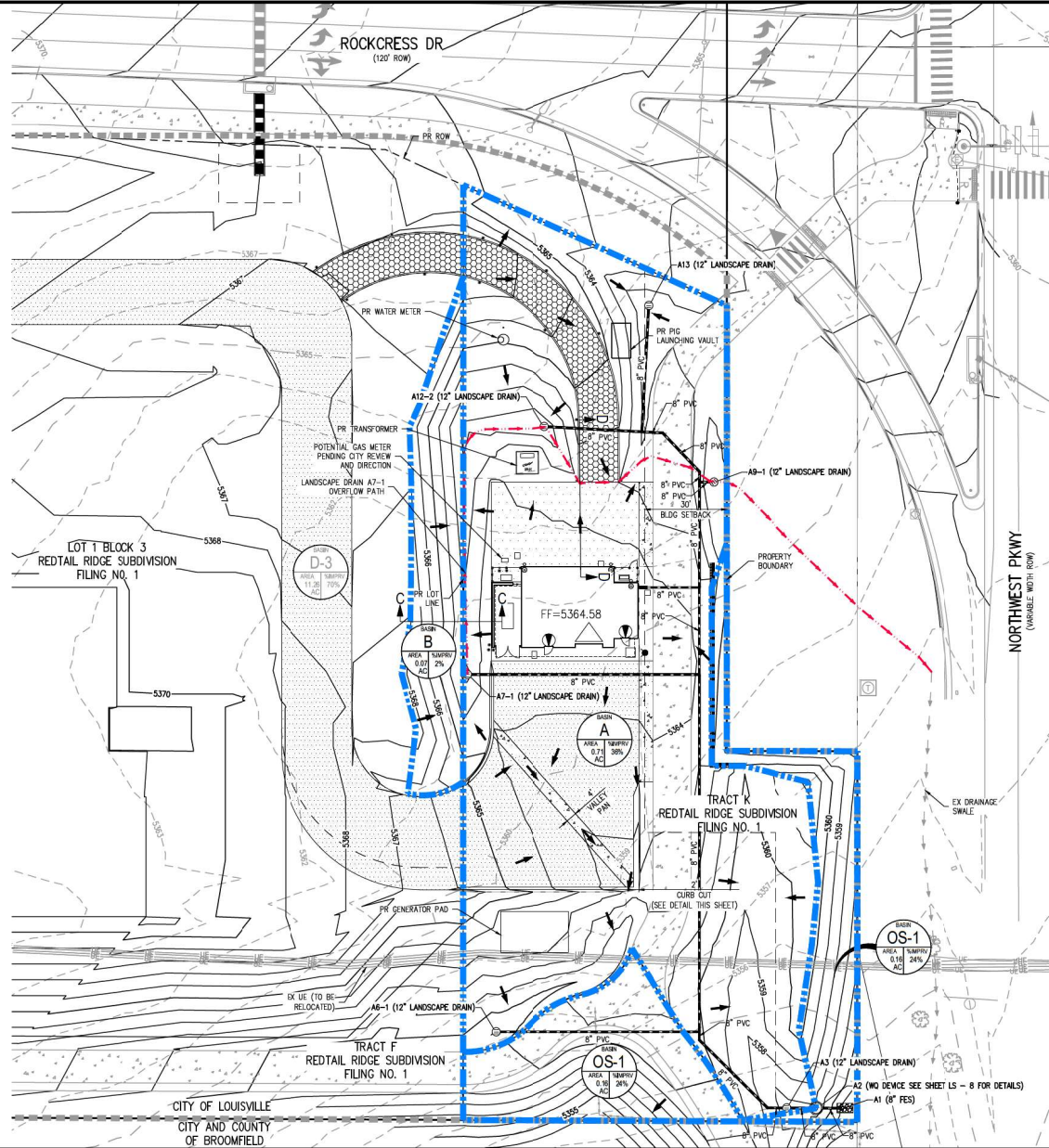
REDTAIL RIDGE
DRAINAGE PLAN

DATE	REVISION COMMENTS
05/07/2019	PRELIMINARY POST PRELIMINARY PLAN
05/28/2019	PER CITY
05/28/2019	PER CITY
06/04/2019	PER CITY COMMENTS
06/04/2019	PER CITY COMMENTS

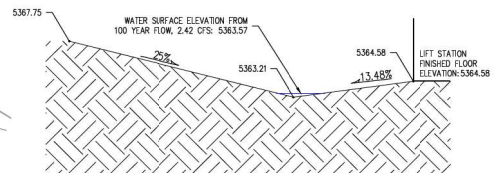
ISSUE DATE: 11-15-2019 PROJECT #: 190108

PROFESSIONAL ENGINEER
66965

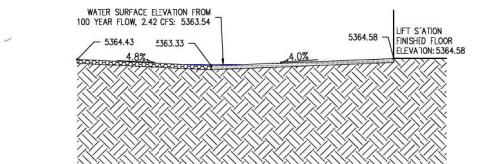
SHEET NO.
LS - 5
503 OF 506



KEY MAP
1"=200'



SECTION C-C
NTS



SECTION D-D
NTS

BASIN SUMMARY TABLE				
BASIN	AREA (AC)	WQ (CFS)	Q2 (CFS)	Q100 (CFS)
A	0.71	0.32	0.43	2.54
B	0.07	0.021	0.031	0.38
OS-1	0.16	0.04	0.06	0.39

LEGEND

PROPERTY BOUNDARY
EXISTING RIGHT-OF-WAY
EXISTING CONTOURS
PROPOSED STORM SEWER
PROPOSED DRAINAGE BASIN
EXISTING DRAINAGE BASIN
FLOW ARROW
EXISTING DRAINAGE BASIN
EXISTING DRAINAGE BASIN
CONCRETE

EXISTING:

BASIN DESIGNATION
BASIN SIZE IN ACRES
2-YR RATIONAL C COEFFICIENT
100-YR RATIONAL C COEFFICIENT

PROPOSED:

BASIN DESIGNATION
BASIN SIZE IN ACRES
2-YR RATIONAL C COEFFICIENT
100-YR RATIONAL C COEFFICIENT



CURB CUT DETAIL
NTS

NO CHANGES ARE TO BE MADE TO THE DRAWING WITHOUT WRITTEN PERMISSION OF ADAMS COOPER SYSTEMS

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	ADAMS COOPER SYSTEMS 303-545-7555 JRODRIGUEZ@ADSCORP.COM
ADDS SALES REP:	ADDS PIPELINE 303-475-8706 ADDS PIPELINE@ADSCORP.COM
PROJECT NO.:	1501111



RETAIL RIDGE - LIFT STATION

LOUISVILLE, COLORADO

ADS BARRACUDA SPECIFICATIONS

MATERIALS & FABRICATION
CONCRETE STRUCTURES, DESIGNED FOR H-20 AND/OR HS-20 TRAFFIC LOADING AND APPLICABLE SOIL LOADS OR AS OTHERWISE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER. THE MATERIALS AND STRUCTURAL DESIGN OF THE DEVICE SHALL BE FOR ASTM C587 AND ASTM C588.

48" HP MANHOLE STRUCTURES MADE FROM AN IMPACT MODIFIED COPOLYMER POLYPROPYLENE MEETING THE MATERIAL REQUIREMENTS OF ASTM F2724. THE EGG-TOOTH CONE REDUCER SHALL BE MANUFACTURED FROM POLYETHYLENE MATERIAL MEETING ASTM D3355 CLASS D3320D. GASKETS SHALL BE MADE OF MATERIAL MEETING THE REQUIREMENTS OF ASTM F477.

SEPARATOR MATERIALS SHALL BE SUBSTANTIALLY CONSTRUCTED OF STAINLESS STEEL, POLYETHYLENE, OR OTHER THERMOPLASTIC MATERIAL APPROVED BY THE MANUFACTURER.

PERFORMANCE
THE STORMWATER TREATMENT UNIT SHALL BE AN INLINE UNIT CAPABLE OF CONVEYING 100% OF THE DESIGN PEAK FLOW. IF PEAK FLOW RATES EXCEED MAXIMUM HYDRAULIC RATE, THE UNIT SHALL BE INSTALLED OFFLINE.

THE STORMWATER TREATMENT UNIT INTERNALS SHALL CONSIST OF (1) SEPARATOR CONE ASSEMBLY, AND (2) BUMP ASSEMBLY WHICH INCLUDES (3) LIDS WITH "TEETH".

THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 80% OF THE SUSPENDED SOLIDS ON AN ANNUAL AGGREGATE REMOVAL BASIS. S/D REMOVAL SHALL BE BASED ON FULL-SCALE THIRD PARTY TESTING USING D50 TO 100 MICRON GRAIN SIZE EQUIVALENT AND 30 mg/L INFILTRANT CONCENTRATION. S/D FULL-SCALE TESTING SHALL HAVE INCLUDED SEGMENT CAPTURE BASED ON ACTUAL TOTAL MASS COLLECTED BY THE STORMWATER TREATMENT UNIT.

OR
THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS USING A MEDIA MIX WITH 50-75 MICRON AND 200 mg/L INFILTRANT CONCENTRATION.

OR
THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS PER PREVIOUS 2013 NIDEP/ACAT HDS PROTOCOL.

MANUFACTURER
EACH STORMWATER TREATMENT SYSTEM SHALL BE A BARRACUDA SYSTEM AS MANUFACTURED BY ADVANCED DRAINAGE SYSTEMS™, 2650 HAMILTON EATON RD., HAMILTON, OHIO 45011.

BARRACUDA MAINTENANCE

BARRACUDA SYSTEMS MUST BE INSPECTED AND MAINTAINED PERIODICALLY. INSPECTION IS MADE BY CHECKING THE DEPTH OF SEDIMENT IN EACH MANHOLE WITH A GRAZ STICK OR SIMILAR DEVICE. MAINTENANCE IS REQUIRED WHEN THE SEDIMENT DEPTH IN EXCESS OF 20 INCHES. MINIMUM INSPECTION IS RECOMMENDED TWICE A YEAR TO MAINTAIN OPERATION AND FUNCTION OF THE UNIT.

MAINTENANCE INSTRUCTIONS

1. REMOVE THE MANHOLE COVER TO PROVIDE ACCESS TO THE POLLUTANT STORAGE. POLLUTANTS ARE STORED IN THE BUMP, BELOW THE BOWL ASSEMBLY, VISIBLE FROM THE SURFACE. YOU WILL ACCESS THIS AREA THROUGH THE CENTER ACCESS CYLINDER.
2. USE A VACUUM TRUCK OR OTHER SIMILAR EQUIPMENT TO REMOVE ALL WATER, DEBRIS, OILS AND SEDIMENT.
3. USE A HIGH PRESSURE HOSE TO CLEAN THE MANHOLE OF ALL THE REMAINING SEDIMENT AND DEBRIS. THEN, USE THE VACUUM TRUCK TO REMOVE THE WATER.
4. FILL THE CLEANED MANHOLE WITH WATER UNTIL THE LEVEL REACHES THE INVERT OF THE OUTLET PIPE.
5. REPLACE THE MANHOLE COVER.
6. DISPOSE OF THE POLLUTED WATER, OILS, SEDIMENT AND TRASH AT AN APPROVED FACILITY.
7. LOCAL REGULATIONS PROHIBIT THE DISCHARGE OF SOLID MATERIAL INTO THE SANITARY SYSTEM. CHECK WITH THE LOCAL SANITARY AUTHORITY FOR AUTHORITY TO DISCHARGE THE LIQUIDS.
8. SOME LOCALITIES TREAT THE POLLUTANTS AS LEACHATE. CHECK WITH LOCAL REGULATORS ABOUT DISPOSAL REQUIREMENTS.
9. ADDITIONAL LOCAL REGULATIONS MAY APPLY TO THE MAINTENANCE PROCEDURE.

BARRACUDA INSTALLATION NOTES

INSTALLATION OF THE STORMWATER TREATMENT UNIT(S) SHALL BE PERFORMED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. SUCH INSTRUCTIONS CAN BE OBTAINED BY CALLING ADVANCED DRAINAGE SYSTEMS AT (800) 821-8710 OR BY LOGGING ON TO WWW.ADS-CORP.COM

BARRACUDA MAX 60	
UNIT ID	A2
PEAK FLOW RATE (CFS)	4.2
TREATMENT FLOW RATE (CFS)	0.8

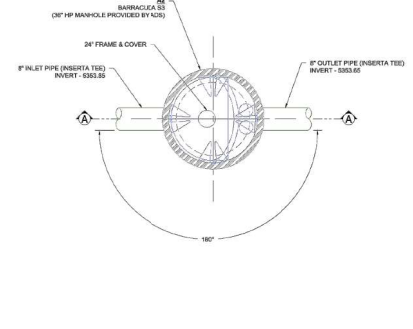
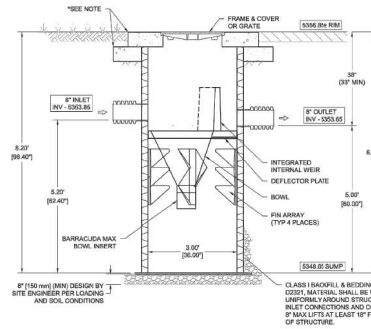
ATTENTION:

THIS TREATMENT UNIT WAS DESIGNED WITHOUT SITE SPECIFIC INFORMATION ON GROUNDWATER LEVELS. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE GROUNDWATER LEVEL RELATIVE TO THE BURIED DEPTH OF THE UNIT. IF THE GROUNDWATER DEPTH ABOVE THE BOTTOM OF THE BUMP EXCEEDS ONE THIRD THE DEPTH OF THE UNIT, CONTACT ADS FOR SOLUTIONS. SEE TECHNICAL NOTE 8.22 FOR GUIDANCE.

PLEASE NOTE: 4" x 10" (100 mm x 250 mm) CONNECTIONS REQUIRE THE USE OF INSERT-A-TIE FITTINGS AND ARE TO BE ORDERED SEPARATELY FROM THE WATER QUALITY HPF MANHOLE. INSERT-A-TIE FITTINGS ORDERED ARE DEPENDENT ON CONNECTION DIAMETER AND MATERIAL TYPE.

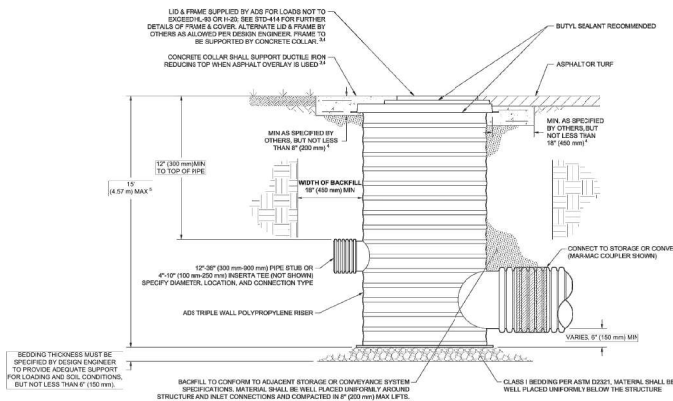
PRODUCT SPECIFICATIONS

- THE STORMWATER TREATMENT UNIT SHALL BE AN INLINE UNIT CAPABLE OF CONVEYING 100% OF THE DESIGN PEAK FLOW.
- IF PEAK FLOW RATES EXCEED MAXIMUM HYDRAULIC RATE, THE UNIT SHALL BE INSTALLED OFFLINE.
- THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 80% OF THE SUSPENDED SOLIDS ON AN ANNUAL AGGREGATE REMOVAL BASIS. S/D REMOVAL SHALL BE BASED ON FULL-SCALE THIRD PARTY TESTING USING D50 TO 100 MICRON GRAIN SIZE EQUIVALENT AND 30 mg/L INFILTRANT CONCENTRATION. S/D FULL-SCALE TESTING SHALL HAVE INCLUDED SEGMENT CAPTURE BASED ON ACTUAL TOTAL MASS COLLECTED BY THE STORMWATER TREATMENT UNIT.
- OR -
- THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS USING A MEDIA MIX WITH 50-75 MICRON AND 200 mg/L INFILTRANT CONCENTRATION.
- OR -
- THE BARRACUDA UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 50% OF TSS PER PREVIOUS 2013 NIDEP/ACAT HDS PROTOCOL.
- CONCRETE SLAB DIMENSIONS ARE FOR GUIDELINE PURPOSES ONLY. ACTUAL CONCRETE SLAB MUST BE DESIGNED TAKING INTO CONSIDERATION LOCAL SOIL CONDITIONS, TRAFFIC LOADING, & OTHER APPLICABLE DESIGN FACTORS.
- SUPPLIED BY ADS FOR LOADS NOT TO EXCEED 14.4K. SEE 8014-4 FOR FURTHER DETAILS OF FRAME & COVER. ALTERNATE LID & FRAME BY OTHERS ARE ALLOWED PER DESIGN ENGINEER. FRAME TO BE SUPPORTED BY CONCRETE COLLAR.



HP MANHOLE WIDUCTILE IRON FLATFRAME INSTALLATION

NTS



NOTES

1. ADS POLYPROPYLENE BASINS ARE TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS.
2. ADAPTERS CAN BE MOUNTED ON ANGLES OF 0° TO 30° TO DETERMINE MAXIMUM ANGLE BETWEEN ADAPTERS. SEE DRAWING NO. 1000-10-000.
3. ADAPTERS CAN BE MOUNTED ON ANGLES OF 0° TO 30° TO DETERMINE MAXIMUM ANGLE BETWEEN ADAPTERS. SEE DRAWING NO. 1000-10-000.
4. ADAPTERS CAN BE MOUNTED ON ANGLES OF 0° TO 30° TO DETERMINE MAXIMUM ANGLE BETWEEN ADAPTERS. SEE DRAWING NO. 1000-10-000.
5. CONCRETE SLAB DIMENSIONS ARE FOR GUIDELINE PURPOSES ONLY. ACTUAL CONCRETE SLAB MUST BE DESIGNED TAKING INTO CONSIDERATION LOCAL SOIL CONDITIONS, TRAFFIC LOADING, & OTHER APPLICABLE DESIGN FACTORS.
6. FOR BURIAL DEPTHS GREATER THAN 12' (3.7 m), OR WHERE GROUNDWATER WILL BE ENCOUNTERED, CONTACT ADS ENGINEERING.
7. GRATES/COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
8. FRAMES & REDUCING PLATE SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.

RETAIL RIDGE - LIFT STATION

LOUISVILLE, COLORADO

DATE: 07/20/2019

DESIGNED BY: JTS

CHECKED BY: MJS

PROJECT NO. 1501111

PRODUCT: BARRACUDA

MANUFACTURER: ADS

SCALE: 1/2\"/>

DATE: 07/20/2019

DESIGNED BY: JTS

CHECKED BY: MJS

PROJECT NO. 1501111

PRODUCT: BARRACUDA

MANUFACTURER: ADS

SCALE: 1/2\"/>

DATE: 07/20/2019

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SCALE: 1/2\"/>

DATE: 07/20/2019

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SCALE: 1/2\"/>

DATE: 07/20/2019

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PROJECT NO. 1501111

PRODUCT: BARRACUDA

MANUFACTURER: ADS

SCALE: 1/2\"/>

DATE: 07/20/2019

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PROJECT NO. 1501111

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DATE: 07/20/2019

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SCALE: 1/2\"/>

DATE: 07/20/2019

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DATE: 07/20/2019

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SCALE: 1/2\"/>

DATE: 07/20/2019

DESIGNED BY: JTS

CHECKED BY: MJS

PROJECT NO. 1501111

PRODUCT: BARRACUDA

MANUFACTURER: ADS

SCALE: 1/2\"/>

DATE: 07/20/2019

DESIGNED BY:

Appendix E

Variance Letter



DENVER • DALLAS/FORT WORTH

August 1, 2025

Cameron Fowlkes P.E., CFM
City Engineer
749 Main St
Louisville, CO 80027

via e-mail: cfowlkes@louisvilleco.gov

RE: Redtail Ridge
Variance Request Letter
Hydrodynamic Separator

Dear Mr. Fowlkes,

Harris Kocher Smith, on behalf of the Redtail Ridge Metropolitan District, is submitting this letter to request a variance allowing for the use of a specialized Hydrodynamic Separator (HDS) to achieve stormwater quality treatment for small areas of the Redtail Ridge development that are unable to be routed to our proposed water quality basins due to grade. Of the nearly 400 acres of developed area, less than 3.75 acres are very difficult to drain to our proposed water quality and detention basins and will need to be treated via HDS systems. Specifically, a 1.16-acre basin and a 1.62-acre basin at the intersection of Campus Drive and S 96th St collectively known together as basin C-4 and the 0.86-acre basin for the proposed lift station will utilize HDS structures to achieve water quality.

As we have discussed, during the evolution of the project design, and after our initial submittal of plans, Mile High Flood District (MHFD) modified their criteria, which the City of Louisville follows, and their recommended MS4 treatment measures in 2024. Specifically noting in Table 4-1 that HDSs do not generally meet the Runoff Reduction, Water Quality Capture Volume (WQCV) Capture Standards, nor the Pollutant Removal Standard for MS4 permit applicability.

A variance from the City of Louisville criteria is requested to allow for the use of the ADS Barracuda MAX HDS for the Redtail Ridge project because this system meets the requirements of the City's MS4 permit. As stated in comments from the city on this variance letter, the following two criteria must be met to allow for the ADS Barracuda MAX variance to be accepted.

- The Mile High flood district standard requires removal of **80-90% TSS** per the design of other water quality control designs.
- Louisville's MS4 permit has a requirement for the following for treatment and for an allowable area to not be treated:
 - (B) Pollutant Removal Standard:
 - The control measure(s) is designed to treat at a minimum the 80th percentile storm event. The control measure(s) shall be designed to treat stormwater runoff in a manner expected to reduce the event mean concentration of **total suspended solids (TSS) to a median value of 30 mg/L** or less.

ADS has provided two letters for the two locations on site which are proposed to use the HDS systems. Each letter, attached to this variance, indicates that the average removal efficiency calculated based on data collected by an independent third-party review was **80.1%** and that using the median event mean concentration for urban land uses, the discharge effluent mean concentration was reduced to less than 30 mg/L at **19.1 mg/L**.

For these reasons, we request the ADS Barracuda MAX be allowed within the limits of Redtail Ridge to treat for pollutant removal in the basins which cannot otherwise drain to the proposed water quality and detention ponds.

Please contact me if you have any questions or require additional information at tsayler@hkseng.com or 303-623-6300.

Timothy Sayler, P.E.

Project Manager

Harris Kocher Smith



Analysis of Barracuda MAX Removal Efficiencies

Project Name: Redtail Ridge – Filing 1

Unit: Unit C-4

Location: Louisville, CO

Project Information:

WQ Flow rate: 1.13 cfs

100-Year Bypass Flow: 7.26 cfs

Barracuda MAX S4

Treatment Capacity: 1.52 cfs

Peak Bypass Capacity: 10.5 cfs

Treatment System Information:

The below table demonstrates the Barracuda MAX system achieves an annualized weighted removal efficiency of 80.1% for incoming flows below, at, and above the listed treatment capacity of the specified system. These removal efficiencies were calculated based on data collected by Boggs Environmental Consultants, Inc during an independent third-party review of a Barracuda MAX water quality system. The testing performed follows the procedure outlined in the NJCAT verification program.

Fraction of MTR	Flow Rate (cfs)	Removal Efficiency	NJCAT Weighting Factor
25%	0.38	99.6%	0.25
50%	0.76	87.0%	0.30
75%	1.14	74.4%	0.20
100%	1.52	61.8%	0.15
125%	1.90	49.2%	0.10
Average Removal Efficiency		80.1%	

The 101 mg/L TSS incoming concentration is the “Median Event Mean Concentration for Urban Land Uses” provided by the Nationwide Urban Runoff Program (NURP).

Incoming EMC (mg/L)	WQ Flow Rate (cfs)	Removal Efficiency (%)	Discharge EMC (mg/L)
101	1.13	74.4%	25.9

As shown above, the proposed Barracuda MAX S3 system for the Redtail Ridge Filing No.1 Unit: C-4 has an expected reduction of Effluent Mean Concentration to less than 30mg/l, thus meeting the Colorado MS4 Performance Standard.

Our reason is water.™



Analysis of Barracuda MAX Removal Efficiencies

Project Name: Redtail Ridge – Lift Station

Unit: Lift Station

Location: Louisville, CO

Project Information:

WQ Flow rate: 0.32 cfs

100–Year Bypass Flow: 2.42 cfs

Barracuda MAX S3

Treatment Capacity: 0.85 cfs

Peak Bypass Capacity: 2.50 cfs

Treatment System Information:

The below table demonstrates the Barracuda MAX system achieves an annualized weighted removal efficiency of 80.1% for incoming flows below, at, and above the listed treatment capacity of the specified system. These removal efficiencies were calculated based on data collected by Boggs Environmental Consultants, Inc during an independent third-party review of a Barracuda MAX water quality system. The testing performed follows the procedure outlined in the NJCAT verification program.

Fraction of MTR	Flow Rate (cfs)	Removal Efficiency	NJCAT Weighting Factor
25%	0.38	99.6%	0.25
50%	0.76	87.0%	0.30
75%	1.14	74.4%	0.20
100%	1.52	61.8%	0.15
125%	1.90	49.2%	0.10
Average Removal Efficiency		80.1%	

The 101 mg/L TSS incoming concentration is the “Median Event Mean Concentration for Urban Land Uses” provided by the Nationwide Urban Runoff Program (NURP).

Incoming EMC (mg/L)	WQ Flow Rate (cfs)	Removal Efficiency (%)	Discharge EMC (mg/L)
101	0.32	99.6	0.4

As shown above, the proposed Barracuda MAX S3 system for the Redtail Ridge Lift Station Unit: Lift Station has an expected reduction of Effluent Mean Concentration to less than 30mg/l, thus meeting the Colorado MS4 Performance Standard.

Our reason is water.™

DESCRIPTION

SITUATED IN THE NORTHEAST 1/4 OF SECTION 29, TOWNSHIP 1 SOUTH, RANGE 69 WEST OF THE 6TH P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

A PARCEL OF LAND BEING A PORTION OF LOT 1, BLOCK 3, REDTAIL RIDGE FILING NO. 1 RECORDED AT RECEPTION NO. 04071256 OF THE RECORDS OF THE BOULDER COUNTY CLERK AND RECORDER, SITUATED IN THE NORTHEAST QUARTER OF SECTION 29, TOWNSHIP 1 SOUTH, RANGE 69 WEST OF THE SIXTH PRINCIPAL MERIDIAN, CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 29;

THENCE SOUTH 08°19'35" WEST, A DISTANCE OF 1,001.60 FEET TO A POINT ON THE EAST LINE OF SAID LOT 1 AND **THE POINT OF BEGINNING**;

THENCE SOUTH 00°00'35" WEST ALONG SAID EAST LINE, A DISTANCE OF 15.30 FEET TO A POINT OF NON-TANGENT CURVATURE;

THENCE ALONG THE ARC OF SAID CURVE TO THE LEFT AN ARC LENGTH OF 44.35 FEET, SAID CURVE HAVING A RADIUS OF 54.50 FEET, A CENTRAL ANGLE OF 46°37'14", AND A CHORD WHICH BEARS SOUTH 79°38'35" WEST A CHORD DISTANCE OF 43.13 FEET;

THENCE SOUTH 56°19'58" WEST, A DISTANCE OF 2.56 FEET TO THE EAST LINE OF THAT ACCESS EASEMENT GRANTED BY SAID REDTAIL RIDGE FILING NO. 1 AND A POINT OF NON-TANGENT CURVATURE;

THENCE ALONG SAID EAST LINE AND ALONG THE ARC OF SAID CURVE TO THE LEFT AN ARC LENGTH OF 15.40 FEET, SAID CURVE HAVING A RADIUS OF 30.00 FEET, A CENTRAL ANGLE OF 29°24'16", AND A CHORD WHICH BEARS NORTH 43°35'22" WEST A CHORD DISTANCE OF 15.23 FEET;

THENCE NORTH 56°19'58" EAST, A DISTANCE OF 5.19 FEET TO A POINT OF CURVATURE;

THENCE ALONG THE ARC OF SAID CURVE TO THE RIGHT AN ARC LENGTH OF 53.12 FEET, SAID CURVE HAVING A RADIUS OF 69.50 FEET, A CENTRAL ANGLE OF 43°47'36", AND A CHORD WHICH BEARS NORTH 78°13'46" EAST A CHORD DISTANCE OF 51.84 FEET TO THE **POINT OF BEGINNING**.

SAID PARCEL CONTAINS 779 SQUARE FEET OR 0.02 ACRES, MORE OR LESS.

BASIS OF BEARINGS: BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 29, TOWNSHIP 1 SOUTH, RANGE 69 WEST OF THE SIXTH PRINCIPAL MERIDIAN, ASSUMED TO BEAR NORTH 89°42'42" WEST, BEING MONUMENTED AT THE NORTH QUARTER CORNER OF SAID SECTION BY A #6 REBAR WITH A 3.25" BRASS CAP STAMPED "1998 PLS 16401" AND MONUMENTED AT THE NORTHEAST CORNER OF SAID SECTION BY A #6 REBAR WITH A 3.25" ALUMINUM CAP STAMPED "MERRICK & CO 2009 PLS 33200".

PREPARED BY: AARON MURPHY
PLS 38162
ON BEHALF OF: HARRIS KOCHER SMITH
1120 LINCOLN STREET, SUITE 1000
DENVER, CO 80203
303.623.6300



Plotted: WED 07/30/25 3:24:12P By: Aaron Murphy Filepath: p:\2019\190108\survey\esmt_acces_lot 1 block 3.dwg Layout: desc

ILLUSTRATION

SITUATED IN THE NORTHEAST 1/4 OF SECTION 29, TOWNSHIP 1 SOUTH, RANGE 69 WEST
OF THE 6TH P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

1/4 COR. SEC. 20/29

#6 REBAR W/ 3.25" BRASS CAP
"1998 PLS 16401"

POINT OF COMMENCEMENT

NE COR. SEC. 29

3.25" ALUM. CAP ON #6 REBAR
"MERRICK & CO 2009 PLS 33200"

BASIS OF BEARINGS

N LINE NE 1/4 SEC. 29 N89°42'42"W 2659.28'



ROCKCRESS DR

(PUBLIC R.O.W.)



LOT 1, BLOCK 3*

L=53.12'
R=69.50'
Δ=43°47'36"
ChB=N78°13'46"E
ChL=51.84'

PARCEL CONTAINS

779 SQ. FT.
OR 0.02 AC.±

24' CITY OF LOUISVILLE
ACCESS ESMT.*

N56°19'58"E 5.19'

L=15.40'
R=30.00'
Δ=29°24'16"
ChB=N43°35'22"W
ChL=15.23'

L=44.35'
R=54.50'
Δ=46°37'14"
ChB=S79°38'35"W
ChL=43.13'

S56°19'58"W 2.56'

POINT OF
BEGINNING

S00°00'35"W 15.30'

TRACT K*



SCALE: 1" = 20'

* = REDTAIL RIDGE FILING NO. 1 REC. NO. 04071256

NOTE:

THIS EXHIBIT DOES NOT REPRESENT A MONUMENTED LAND SURVEY.
IT IS INTENDED TO DEPICT ONLY THE ATTACHED DESCRIPTION.



1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

ILLUSTRATION

PROJECT #: 190108

CHECKED BY: AWM

DRAWN BY: TWG

SHEET NUMBER

2

2 OF 2