EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

Info Only: EPC engineering comments are in blue text.

FINAL DRAINAGE REPORT
FOR
PLATTE SELF STORAGE
COLORADO SPRINGS, COLORADO

MAY 2024

Prepared For:
RMG – ROCKY MOUNTAIN GROUP
5085 List Drive, #200
Colorado Springs, CO 80919
719.548.0600

Prepared By:

TERRA NOVA ENGINEERING, INC.
721 S. 23RD Street
Colorado Springs, CO 80904
719.635.6422

TNE Job No. 2419.00
County Job No. ###

Please include project No. PPR2418

FINAL DRAINAGE REPORT
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COLORADO SPRINGS, COLORADO

TABLE OF CONTENTS

APPENDICIES

FINAL DRAINAGE REPORT
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DESIGN ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Dane Frank, P.E. 50207 Date

On behalf of Terra Nova Engineering, Inc.

OWNER/DEVELOPER'S STATEMENT:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

_____ _____

Authorized Signature Date

_____

Printed Name, Title

_____

Business Name

_____

Address

EL PASO COUNTY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Jennifer Irvine, P.E. Date

County Engineer / ECM Administrator

Conditions:

Joshua Palmer

FINAL DRAINAGE REPORT
FOR
PLATTE SELF STORAGE
COLORADO SPRINGS, COLORADO

PURPOSE

The purpose of this Final Drainage Report is to identify and analyze the proposed drainage patterns, determine proposed runoff quantities, size drainage structures for conveyance of developed runoff, and present solutions to drainage impacts on-site and off-site resulting from this development. The site has not previously been platted or studied.

GENERAL DESCRIPTION

This Final Drainage Report (FDR) is an analysis of approximately 17.22 acres of developed land located at 6001 E Platte Ave. The site is currently in use as and landscaping materials yard and is being developed as a mini storage facility. The site is in the northwest quarter of Section 18, Township 14 South, Range 65 West of the 6th Principal Meridian within El Paso County. The parcels are bounded to the north by Motel Road and E Platte Ave, to the east by two unplatted lots, to the south by an unplatted lot and LOT 2 COLORADO SPRINGS AIRPORT FIL NO 1B, and to the west by unplatted lots. (see vicinity map in appendix).

The site lies within the Sand Creek Basin, with storm runoff surface draining west across the site, before flowing onto the neighboring property where Sand Creek East Fork is located.

Soils for this project are delineated by the map in the appendix as Blakeland loamy sand (8), 1 to 9 percent slopes. Soils in the study area are shown as mapped by NRCS in the "Soils Survey of El Paso County Area" and contains soils of Hydrologic Group A.

The site is currently developed with mostly dirt surfaces, some gravel and asphalt areas, and minimal vegetation that is mostly native grasses around the perimeter. The site drains to the west, with an average slope of 6.6%.

EXISTING DRAINAGE CONDITIONS

There are multiple existing buildings, a weight scale, miles of retaining or freestanding walls being used to create material storage areas, and a pond (low area that doesn't drain) on the site. Most of the west side of the site is bermed up before an embankment drops down, which results in little runoff leaving the site. The existing pond area is said to be largely paved (unconfirmed), so most runoff would leave the site by evaporation.

There are ten drainage basins, four of which are offsite. See attached Existing Drainage Map in the appendix.

Offsite Basins

Basin OS-Z is 6.34 acres and drains to Design Point Z on the east property line of the site. This basin is offsite and drains onto the site and into Basin EX-C. The basin surfaces are primarily dirt and gravel (construction yard). Basin OS-Z has flows of Q_5 = 6.1 cfs and Q_{100} = 16.7 cfs.

Basin OS-Y is 8.15 acres and drains to Design Point Y on the east property line of the site. This basin is offsite and drains onto the site and into Basin EX-C. The basin surfaces are primarily dirt and gravel (construction yard), with some native grass area. Basin OS-Y has flows of Q_5 = 3.6 cfs and Q_{100} = 15.4 cfs.

Basin OS-X is 1.20 acres and drains to Design Point X on the south property line of the site. This basin is offsite and drains onto the site and into Basin EX-C. The basin surfaces are native grass (undeveloped land). Basin OS-X has flows of Q_5 = 0.4 cfs and Q_{100} = 2.3 cfs.

Basin OS-W is 0.45 acres and drains to Design Point W on the north property line of the site. This basin is offsite and drains onto the site and into Basin EX-B. The basin surfaces are native grass and asphalt (area beside Motel Road and the site's driveway). Basin OS-W has flows of Q_5 = 0.5 cfs and Q_{100} = 1.3 cfs.

Onsite Basins

Basin EX-A is 0.30 acres and drains to Design Point A at the site's north property line. Runoff

flows off the site and onto the Motel Road right of way. This basin consists of landscaping areas and buildings. Basin EX-A has flows of Q_5 = 0.2 cfs and Q_{100} = 0.8 cfs.

Basin EX-B is 0.64 acres and drains to Design Point B at the at the site's north property line. Runoff flows off the site and onto the Motel Road right of way. This basin consists of landscaping areas, buildings, some pavement, and a swale. Basin EX-A has flows of Q_5 = 1.1 cfs and Q_{100} = 2.6 cfs.

Basin EX-C is 15.4 acres and drains to Design Point C at the existing pond on the site. Runoff doesn't appear to leave this pond other than by evaporation. This basin includes the bulk of the site and includes buildings, roads, storage areas, and parking areas. The surfaces are primarily dirt, gravel, or paved. Basin EX-C has flows of Q_5 = 29.0 cfs and Q_{100} = 65.0 cfs.

Basin EX-D is 1.05 acres and drains to Design Point D at the site's south/west property line. Runoff flows off the site and onto the adjacent property. This basin is primarily a dirt storage/stockpile area. Basin EX-D has flows of Q_5 = 0.3 cfs and Q_{100} = 1.9 cfs.

Indicate that this flow travels through Basin OS-X and enters back onto the site at DP X, combining flows with OS-X.

Basin EX-E is 0.16 acres and drains to Design Point E at the site's west property line. Runoff flows off the site and onto the adjacent property. This basin consists an earth embankment. Basin EX-E has flows of Q_5 = 0.1 cfs and Q_{100} = 0.5 cfs.

Basin EX-F is 0.23 acres and drains to Design Point F at the site's northwest property line. Runoff flows off the site and onto the adjacent property. This basin consists an earth embankment. Basin EX-F has flows of Q_5 = 0.1 cfs and Q_{100} = 0.7 cfs.

PROPOSED DRAINAGE CONDITIONS

Runoff in the developed conditions consists of 14 basins, four of which are offsite. Below is a description of the runoff in the developed conditions and how it will be safely routed, treated and detained. Basins on the west half of the site are proposed as undeveloped, but the proposed detention pond has been sized to account for their future commercial development.

Discuss how water quality is being addressed for each sub-basin.

Offsite Basins

The offsite basins remain the same as in the existing condition.

Please describe the path of runoff flow at each Design Point. Once collected at these points, where will the runoff flow next? How will these flows interact with the storm infrastructure (including proposed or existing pipes, culverts, inlets, swales, ponds, etc.)? Additional comments may be added after addressing these points.

Onsite Basins

Include what basins are being combined at each DP location

Basin PR-1 is 0.07 acres and drains to Design Point 1 at the site's north property line. Basin PR-1 is a landscaping area behind proposed Building B. Basin PR-1 has flows of Q_5 = 0.0 cfs and Q_{100} = 0.2 cfs.

Basin PR-2 is 0.13 acres and drains to Design Point 2 at the site's north property line. Basin PR-2 is a landscaping area behind proposed Building A. Basin PR-2 has flows of Q_5 = 0.1 cfs and Q_{100} = 0.4 cfs.

Basin PR-3 is 5.12 acres and drains to Design Point 3 at the west edge of the proposed mini-storage area. This area consists almost entirely of buildings and pavement that drain to an inlet. Basin PR-3 has flows of Q_5 = 23.1 cfs and Q_{100} = 41.4 cfs.

Basin PR-4 is 3.66 acres and drains to Design Point 4 at the west edge of a gravel parking area. This area is a gravel yard, and the two future canopies have been included in the drainage calcs. Basin PR-4 has flows of Q_5 = 8.2 cfs and Q_{100} = 16.8 cfs.

Please specify this inlet with private/public, proposed/existing, type, size. If it is a sump inlet, please discuss emergency path if it gets clogged.

Basin PR-5 is 0.56 acres and drains to Design Point 5 at the site's south property line. The swale in this basin catches offsite flow and carries it west and back offsite. Basin PR-5 has flows of Q_5 = 0.1 cfs and Q_{100} = 0.9 cfs.

Basin PR-6 is 6.64 acres and drains to Design Point 6 at the northeast corner of the site. This basin is most of the western portion of the site and will remain undeveloped. The propoed detention pond is located in this basin. Basin PR-6 has flows of Q_5 = 3.1 cfs and Q_{100} = 13.1 cfs.

Basin PR-7 is 0.34 acres and drains to Design Point 7 at the northwest edge of the site. This basin is an earth embankment area that sheet flows offsite to the adjacent property. Basin PR-7 has flows of Q_5 = 0.2 cfs and Q_{100} = 1.1 cfs.

Basin PR-8 is 0.30 acres and drains to Design Point 8 at the west edge of the site. This basin is an earth embankment area that sheet flows offsite to the adjacent property. Basin PR-8 has flows of Q_5 = 0.2 cfs and Q_{100} = 1.0 cfs.

Basin PR-9 is 0.59 acres and drains to Design Point 9 at the west edge of the site. This basin is an earth embankment and flatter area that sheet flows offsite to the adjacent property. Basin PR-9 has flows of Q_5 = 0.2 cfs and Q_{100} = 1.5 cfs.

Basin PR-10 is 0.40 acres and drains to Design Point 10 at the east edge of the site. This basin is between the east property line and proposed buildings that is largely embankment with a concrete drain trench to collect runoff from offsite. The drain trench discharges into a storm sewer. Basin PR-10 has flows of Q_5 = 0.3 cfs and Q_{100} = 1.4 cfs.

List all the basins that contribute to DP 6.

At Design Point 6 the combined flow of the currently proposed development and future commercial development will be captured in a 2.657 acre-foot Extended Detention Basin. Runoff entering the pond through the storm sewer system will be routed into a 702 cu-ft concrete lined forebay with a 1.5 feet high concrete cutoff wall. A 3 inch notch in the wall drains the flow to a 2' concrete trickle channel, then the runoff is routed to the 3.0' deep micropool which has a 6" deep initial surcharge area. The 32.96 acres tributary to the EDB are 44% impervious. Based upon this we need a WQCV of 0.523 ac-ft, an EURV volume of 1.091 ac-ft and 100-year volume of 1.044 ac-ft for a total volume needed of 2.657 ac-ft. The bottom of the micropool elevation is at 6199.50 while the top of the ISV elevation is at 6202.50. The WQCV orifice starts at 6202.00 with two 1-5/8 inch diameter holes spaced 20.40 inches apart, then one 1-1/2 inch diameter hole spaced 20.40 inches apart, then one 3.00" diameter spaced 8.40 inches apart. A 4'x4' outlet structure is set at 6210.00. The 100-year water elevation tops out at 6210.54. A 18" HDPE storm pipe will release Q_5=0.5 cfs and Q_{100}=11.3 cfs discharge to a stilling basin at the west property line, which will outfall onto the adjacent property.

Please compare the runoff at the design point (DP) between the existing and proposed conditions as they leave the site.

There is one storm sewer system proposed on the site. This system collects runoff from the drain trench along the east property line and the two curb inlets in the mini-storage area and pipes the

The existing flow at this point appears to sheet flow, will a stilling basin be sufficient to ensure a suitable outfall and matching the existing condition?

runoff to the detention pond. There are a series of area inlets along the storm pipe in the mini-storage area that are not required to capture runoff, but will lessen the surface flow along the central drive aisle. The storm pipes on the west side of the site have been sized to have some extra capacity so that the future commercial development can tie into them as well.

In an effort to protect receiving water and as part of the "four-step process to minimize adverse impacts of urbanization" this site was analyzed in the following manner:

1. Reduce Runoff- There is no runoff reduction in the proposed mini-storage area. The proposed parking area south of the mini-storage has been surfaced with gravel, which will reduce runoff. These items will reduce the volume of runoff using ponding and infiltration.
2. Stabilize Drainageways- There are no existing or proposed drainageways onsite. The Sand Creek East Fork is located west of the site; however, channel improvements have previously been constructed there.
3. Provide Water Quality Capture Volume (WQCV)- The Extended Detention Basin has been sized and designed to sufficiently capture the required WQCV and slowly release it though the outlet structure, thereby allowing solids and contaminants to settle out.
4. Consider Need for Industrial and Commercial BMPs- The proposed development is an indoor mini storage facility; therefore, no Industrial and Commercial BMPs have been proposed.

Discuss exclusions to areas that do not drain to the proposed EDB

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County Storm Drainage Design Criteria Manual - Volumes 1 & 2, latest editions. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals. The Urban Drainage Criteria Manual was used to calculate the detention and water quality volume.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County Storm Drainage Design Criteria Manual – Volumes 1 & 2, latest editions. The pertinent data sheets are included in the appendix of this report.

A culvert is proposed at one of the site entrances. Design calculations have been included for the proposed culvert.

Street runoff capacity calculations for the onsite drive isles have been included.

FLOODPLAIN STATEMENT

No portion of this site is within a designated FEMA floodplain, as determined by FIRM Number 08041C0754 G, dated December 7, 2018 (see appendix).

WATER QUALITY

The proposed detention basin provides water quality treatment for nearly all of the proposed development.

Runoff from basins PR-1, PR-2, PR-5, PR-7, PR-8, and PR-9 are not captured by the proposed detention pond. Basins PR-1 and PR-2 are landscaping areas along the property line with no impervious area. Basin PR-5 is an undeveloped area with a swale that directs offsite flow back offsite, with no impervious area. Basins PR-7 and PR-8 are earth embankments on the downstream edge of the site that drop 10-15 feet in elevation, with no impervious area. Basin PR-9 is part flatter undeveloped area and part earth embankment on the downstream edge of the site that doesn't flow toward the detention pond, with no impervious area. The combined area of these basins is 1.69 acres, with zero impervious area. As there is no impervious area in these basins, no WQCV treatment is required for them. Additionally, as all of these basins are landscaping or undeveloped areas, they would qualify as water quality treatment areas (grass buffers).

All disturbed areas are required to be accounted for with treatment or water quality exclusions, not impervious areas.

If the areas are proposed to as "runoff reduction" water quality treatment areas as stated in the sentence after, they need to be identified as separate pervious areas with supporting calculations and identified clearly on the plans. Vegetation in RPAs and SPAs should have a uniform density of at least 80%. In the Drainage Report, runoff reduction calculations (UD-BMP spreadsheet or equivalent) shall be included. In the Drainage Report, include a figure delineating all proposed UIA, RPA, and SPA areas to be utilized for runoff reduction. All RPAs and SPAs are considered PCMs and therefore require a signed PCM Maintenance Agreement and an O&M Manual.

CONSTRUCTION COST OPINION

Public Reimbursable

None

Public Non-Reimbursable

None

Include a cost estimate for each PBMP with line items for all components (ex: riprap, road base, forebay, trickle channel, outlet structure, outlet pipe, spillway, etc). Input the total value into the FAE form under "Permanent Pond/BMP (provide engineer's estimate)" in Section 1. The total should not include grading, which is a separate line item in Section 1: "Earthwork." The cost estimate should include labor costs (as a separate line item or added into the cost of each component).

Private Non-Reimbursable

1. 48" RCP	260 LF	$ 245	$ 63,700
2. 42" RCP	80 LF	$ 201	$ 16,080
3. 36" RCP	385 LF	$ 151	$ 58,135
4. 30" RCP	170 LF	$ 123	$ 20,910
5. 24" RCP	115 LF	$ 98	$ 11,270
6. 18" HDPE	36 LF	$ 50	$ 1,800
7. 6' Manhole	1 EA	$ 10,000	$ 10,000
8. 7' Manhole	1 EA	$ 14,000	$ 14,000
9. CDOT Type C Area Inlet	9 EA	$ 6,037	$ 54,333
10. 16' D-10-R Curb Inlet	1 EA	$ 13,835	$ 13,835
11. 20' D-10-R Curb Inlet	1 EA	$ 20,000	$ 20,000
12. Concrete Drain Trench	710 LF	$ 200	$ 142,000
13. EDB	1 EA	$ 100,000	$ 100,000
		Total	**$ 426,063**

DRAINAGE FEES

This drainage report is part of a site development application; therefore, no drainage fees are due.

MAINTENANCE

The Extended Detention Basin is private and will be maintained by the property owner. The proposed storm sewers are private and will be maintained by the property owner.

SUMMARY

Development of this site will not adversely affect the surrounding development. This report is in general conformance with the previous reports which included this site. Site runoff and storm drain appurtenances from the development will not adversely affect the downstream and surrounding developments and will be safely routed to the proposed extended detention basin and runoff reduced to the allowable pre-developed rates while slowly treating the water quality capture volume.

Please include name, date of approval and prepared by whom of the previous reports. Also, please include them in the reference part.

Provide discussion earlier in report discussing suitable outfall location. Provide comparison of existing flow rates to developed/released flow rates.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Dane Frank, P.E.
Project Engineer

Jobs/2419.00/Drainage/241900 FDR.doc

BIBLIOGRAPHY

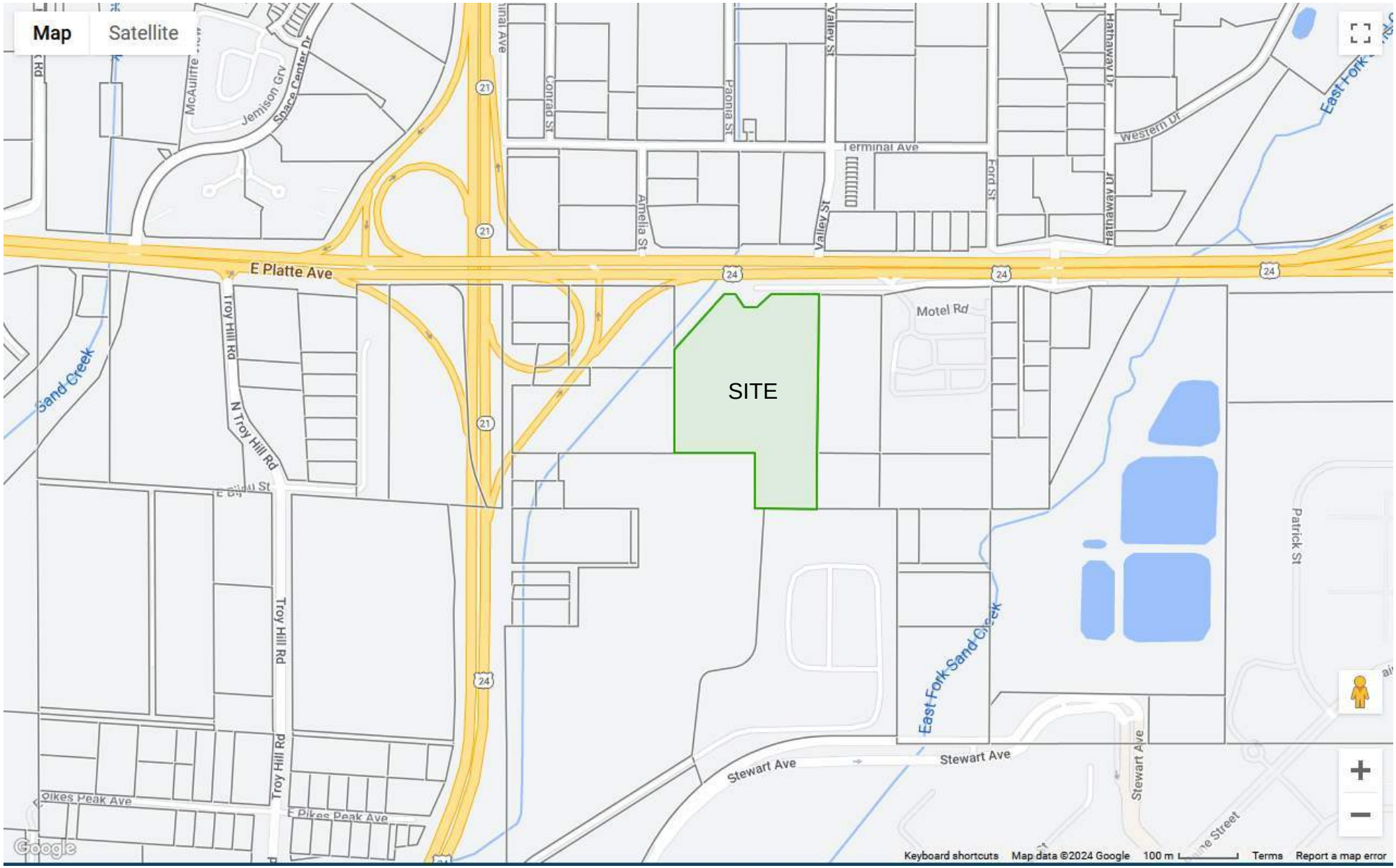
El Paso County Drainage Criteria Manual-Volumes 1 & 2, latest edition

VICINITY MAP

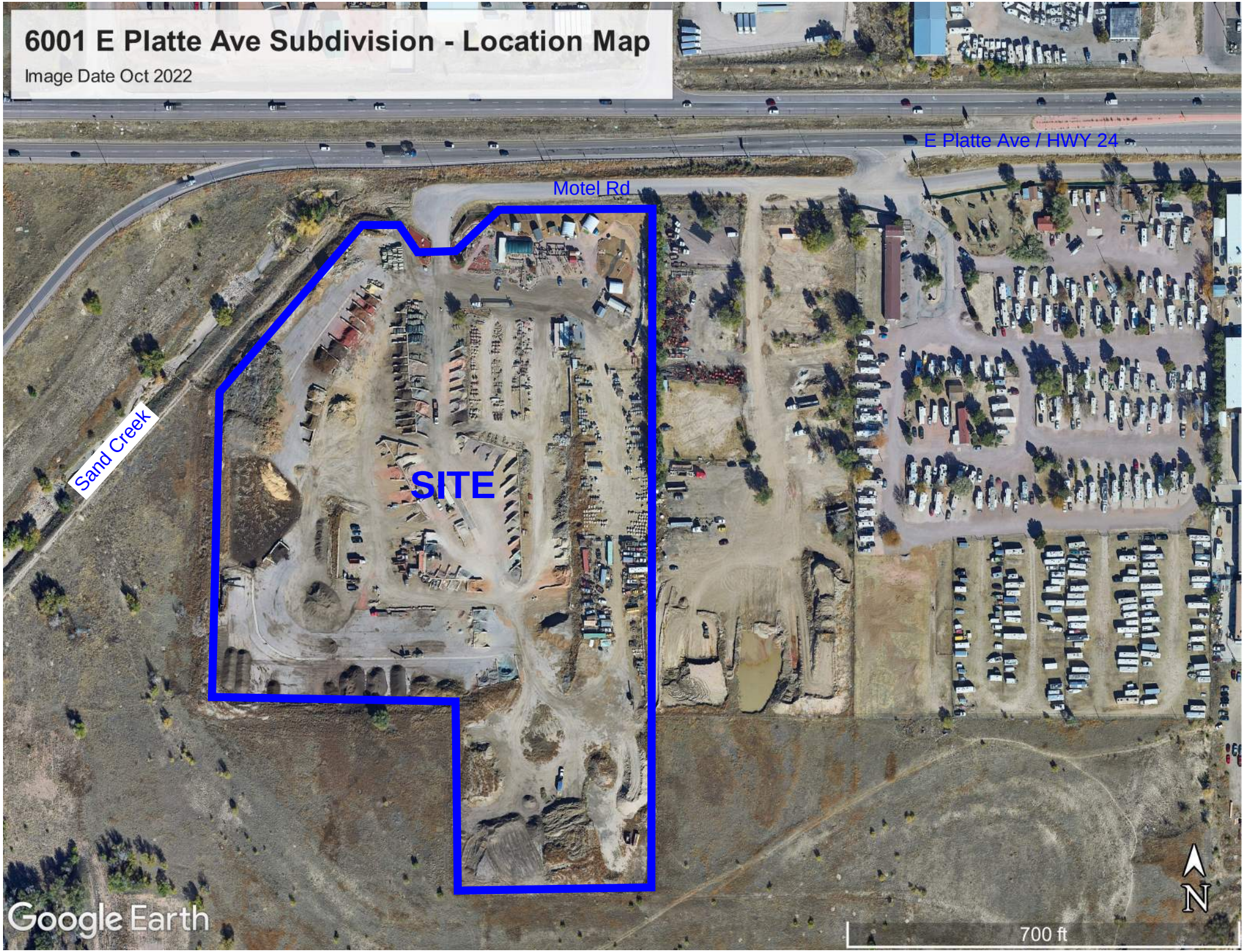
El Paso County - Community: Property Search

Schedule Number: 5418000075

PLATTE SELF STORAGE
Vicinity Map



North is up ^^^


6001 E Platte Ave Subdivision - Location Map
Image Date Oct 2022
E Platte Ave / HWY 24
Motel Rd
Sand Creek
SITE
N
700 ft
Google Earth

NRCS SOILS MAP

Map Scale: 1:2,120 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

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 1:24,000.

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: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

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
8	Blakeland loamy sand, 1 to 9 percent slopes	16.5	100.0%
Totals for Area of Interest		**16.5**	**100.0%**

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

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

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

FEMA FIRM MAP

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. The **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) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM 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 landward of 0.0' North American Vertical Datum of 1988 (NAVD88). 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 computed 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 NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs 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 (NAVD88)**. 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, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

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 (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

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 Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

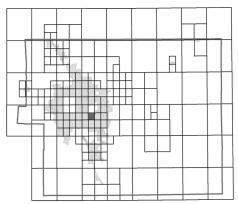
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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 Zones A, AE, AH, AO, AR, A99, 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 ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); 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 encroachment 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 drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

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 D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0754G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 754 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0754	G
EL PASO COUNTY	080059	0754	G

Notice: This map was released on 05/15/2020 to make a correction.This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

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 08041C0754G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

HYDROLOGIC CALCULATIONS

PLATTE SELF STORAGE
AREA RUNOFF COEFFICIENT (C) SUMMARY

EXISTING

BASIN	TOTAL AREA *(Acres)*	*DEVELOPED / IMPERVIOUS*			*UNDEVELOPED / NON-IMPERVIOUS*			*WEIGHTED*		*WEIGHTED CA*	
		AREA *(Acres)*	C_5	C_{100}	AREA *(Acres)*	C_5	C_{100}	C_5	C_{100}	CA_5	CA_{100}
OS-Z	6.34	1.90	0.90	0.96	4.44	0.08	0.35	0.33	0.53	2.07	3.38
OS-Y	8.15	0.82	0.90	0.96	7.33	0.08	0.35	0.16	0.41	1.32	3.35
OS-X	1.20	0.02	0.90	0.96	1.18	0.08	0.35	0.09	0.36	0.11	0.43
OS-W	0.45	0.11	0.90	0.96	0.34	0.08	0.35	0.28	0.50	0.13	0.22
EX-A	0.30	0.05	0.90	0.96	0.25	0.08	0.35	0.22	0.45	0.07	0.14
EX-B	0.64	0.29	0.90	0.96	0.35	0.08	0.35	0.45	0.63	0.29	0.40
EX-C	15.4	7.70	0.90	0.96	7.70	0.08	0.35	0.49	0.66	7.55	10.09
EX-D	1.05	0.02	0.90	0.96	1.03	0.08	0.35	0.10	0.36	0.10	0.38
EX-E	0.16	0.00	0.90	0.96	0.16	0.08	0.35	0.08	0.35	0.01	0.06
EX-F	0.23	0.00	0.90	0.96	0.23	0.08	0.35	0.08	0.35	0.02	0.08
Total	33.92	10.91									

Calc:	DLF
Date:	4/29/2024
Checked:	

PLATTE SELF STORAGE
AREA RUNOFF COEFFICIENT (C) SUMMARY

PROPOSED

BASIN	TOTAL AREA *(Acres)*	*DEVELOPED / IMPERVIOUS*			*UNDEVELOPED / NON-IMPERVIOUS*			*WEIGHTED*		*WEIGHTED CA*	
		AREA *(Acres)*	C_5	C_{100}	AREA *(Acres)*	C_5	C_{100}	C_5	C_{100}	CA_5	CA_{100}
OS-Z	6.34	1.90	0.90	0.96	4.44	0.08	0.35	0.33	0.53	2.07	3.38
OS-Y	8.15	0.82	0.90	0.96	7.33	0.08	0.35	0.16	0.41	1.32	3.35
OS-X	1.20	0.02	0.90	0.96	1.18	0.08	0.35	0.09	0.36	0.11	0.43
OS-W	0.45	0.11	0.90	0.96	0.34	0.08	0.35	0.28	0.50	0.13	0.22
1	0.07	0.00	0.90	0.96	0.07	0.08	0.35	0.08	0.35	0.01	0.02
2	0.13	0.00	0.90	0.96	0.13	0.08	0.35	0.08	0.35	0.01	0.05
3	5.12	5.12	0.90	0.96	0.00	0.08	0.35	0.90	0.96	4.61	4.92
4	3.66	2.38	0.90	0.96	1.28	0.08	0.35	0.61	0.75	2.24	2.73
5	0.56	0.01	0.90	0.96	0.55	0.08	0.35	0.09	0.36	0.05	0.20
6	6.64	0.66	0.90	0.96	5.98	0.08	0.35	0.16	0.41	1.07	2.73
7	0.34	0.01	0.90	0.96	0.33	0.08	0.35	0.10	0.37	0.04	0.13
8	0.30	0.01	0.90	0.96	0.29	0.08	0.35	0.11	0.37	0.03	0.11
9	0.59	0.01	0.90	0.96	0.58	0.08	0.35	0.09	0.36	0.06	0.21
10	0.40	0.04	0.90	0.96	0.36	0.08	0.35	0.16	0.41	0.06	0.16
Total	33.95	11.09									

Calc:	DLF
Date:	4/29/2024
Checked:	0

Use same labeling convention as in report and on drainage map

PLATTE SELF STORAGE
RUNOFF SUMMARY

EXISTING

BASIN	AREA TOTAL (Acres)	WEIGHTED C_5 * For Calcs See Runoff Summary	WEIGHTED C_{100} * For Calcs See Runoff Summary	OVERLAND C_5	OVERLAND Length (ft)	OVERLAND Slope (ft/ft)	OVERLAND T_t (min)	STREET / CHANNEL FLOW Length (ft)	STREET / CHANNEL FLOW Slope (%)	STREET / CHANNEL FLOW Velocity (fps)	STREET / CHANNEL FLOW T_t (min)	T_C TOTAL (min)	INTENSITY I_5 (in/hr)	INTENSITY I_{100} (in/hr)	TOTAL FLOWS Q_5 (c.f.s.)	TOTAL FLOWS Q_{100} (c.f.s.)
OS-Z	6.34	0.33	0.53	0.33	300	0.02	19.3	230	2.0%	1.4	2.7	22.0	2.9	4.9	6.1	16.7
OS-Y	8.15	0.16	0.41	0.16	300	0.03	20.4	505	3.0%	1.7	4.9	25.3	2.7	4.6	3.6	15.4
OS-X	1.20	0.09	0.36	0.09	300	0.05	18.5	0	5.0%	2.2	0.0	18.5	3.2	5.4	0.4	2.3
OS-W	0.45	0.28	0.50	0.28	300	0.07	13.5	160	7.0%	2.6	1.0	14.5	3.6	6.0	0.5	1.3
EX-A	0.30	0.22	0.45	0.22	300	0.07	14.5	0	7.0%	2.6	0.0	14.5	3.6	6.0	0.2	0.8
EX-B	0.64	0.45	0.63	0.45	300	0.07	10.7	250	7.0%	2.6	1.6	12.2	3.8	6.4	1.1	2.6
EX-C	15.4	0.49	0.66	0.49	300	0.07	10.0	330	7.0%	2.6	2.1	12.1	3.8	6.4	29.0	65.0
EX-D	1.05	0.10	0.36	0.10	300	0.03	21.9	40	3.0%	1.7	0.4	22.2	2.9	4.9	0.3	1.9
EX-E	0.16	0.08	0.35	0.08	30	0.40	3.0	0	40.0%	6.3	0.0	5.0	5.2	8.7	0.1	0.5
EX-F	0.23	0.08	0.35	0.08	35	0.24	3.8	0	24.0%	4.9	0.0	5.0	5.2	8.7	0.1	0.7

Calc:	DLF
Date:	4/29/2024
Checked:	0

PLATTE SELF STORAGE
RUNOFF SUMMARY

PROPOSED

BASIN	AREA TOTAL (Acres)	WEIGHTED C_5	WEIGHTED C_{100}	OVERLAND C_5	OVERLAND Length (ft)	OVERLAND Slope (ft/ft)	OVERLAND T_t (min)	STREET / CHANNEL FLOW Length (ft)	STREET / CHANNEL FLOW Slope (%)	STREET / CHANNEL FLOW Velocity (fps)	STREET / CHANNEL FLOW T_t (min)	T_C TOTAL (min)	INTENSITY I_5 (in/hr)	INTENSITY I_{100} (in/hr)	TOTAL FLOWS Q_5 (c.f.s.)	TOTAL FLOWS Q_{100} (c.f.s.)
		* For Calcs See Runoff Summary														
OS-Z	6.34	0.33	0.53	0.33	300	0.02	19.3	230	2.0%	1.4	2.7	22.0	2.9	4.9	6.1	16.7
OS-Y	8.15	0.16	0.41	0.16	300	0.03	20.4	505	3.0%	1.7	4.9	25.3	2.7	4.6	3.6	15.4
OS-X	1.20	0.09	0.36	0.09	300	0.05	18.5	0	5.0%	2.2	0.0	18.5	3.2	5.4	0.4	2.3
OS-W	0.45	0.28	0.50	0.28	300	0.07	13.5	160	7.0%	2.6	1.0	14.5	3.6	6.0	0.5	1.3
1	0.07	0.08	0.35	0.08	100	0.08	9.3	0	8.0%	2.8	0.0	9.3	4.2	7.1	0.0	0.2
2	0.13	0.08	0.35	0.08	45	0.25	4.3	0	25.0%	5.0	0.0	5.0	5.2	8.7	0.1	0.4
3	5.12	0.90	0.96	0.90	100	0.02	2.9	450	2.0%	2.8	2.7	5.5	5.0	8.4	23.1	41.4
4	3.66	0.61	0.75	0.61	100	0.02	7.0	400	2.0%	1.0	6.7	13.7	3.7	6.1	8.2	16.8
5	0.56	0.09	0.36	0.09	300	0.02	25.0	0	2.0%	1.0	0.0	25.0	2.8	4.6	0.1	0.9
6	6.64	0.16	0.41	0.16	300	0.02	23.3	0	2.0%	1.0	0.0	23.3	2.9	4.8	3.1	13.1
7	0.34	0.10	0.37	0.10	25	0.33	2.8	0	33.0%	4.0	0.0	5.0	5.2	8.7	0.2	1.1
8	0.30	0.11	0.37	0.11	35	0.33	3.3	0	33.0%	4.0	0.0	5.0	5.2	8.7	0.2	1.0
9	0.59	0.09	0.36	0.09	100	0.06	10.1	0	6.0%	1.7	0.0	10.1	4.1	6.9	0.2	1.5
10	0.40	0.16	0.41	0.16	10	0.33	1.7	350	1.0%	2.0	2.9	5.0	5.2	8.7	0.3	1.4

Calc:	DLF
Date:	4/29/2024
Checked:	0

Use same labeling convention as in report and on drainage map

PLATTE SELF STORAGE
SURFACE ROUTING SUMMARY

EXISTING

Design Point(s)	*Contributing Basins*	*Area (ac)*	*Flow (cfs)*	
			Q_5	Q_{100}
Z	**OS-Z**	6.34	6.1	16.7
Y	**OS-Y**	8.15	3.6	15.4
X	**OS-X,EX-D**	2.25	0.7	4.2
W	**OS-W**	0.45	0.5	1.3
A	**EX-A**	0.30	0.2	0.8
B	**EX-B**	0.64	1.1	2.6
C	**OS-Z,OS-Y,OS-X,EX-C,EX-D**	32.14	39.4	101.4
D	**EX-D**	1.05	0.3	1.9
E	**EX-E**	0.16	0.1	0.5
F	**EX-F**	0.23	0.1	0.7

Calc:	DLF
Date:	4/29/2024
Checked:	0

PLATTE SELF STORAGE
SURFACE ROUTING SUMMARY

PROPOSED

Design Point(s)	*Contributing Basins*	*Area (ac)*	*Flow (cfs)*	
			Q_5	Q_{100}
1	**PR-1**	0.07	0.0	0.2
2	**PR-2**	0.13	0.1	0.4
3	**PR-3**	5.12	23.1	41.4
4	**OS-Y,PR-4**	11.81	11.8	32.2
5	**OX-X,PR-5**	1.76	0.5	3.3
6	**PR-6**	6.64	3.1	13.1
7	**PR-7**	0.34	0.2	1.1
8	**PR-8**	0.30	0.2	1.0
9	**PR-9**	0.59	0.2	1.5
10	**OS-Z,PR-10**	6.74	6.4	18.1

Calc:	DLF
Date:	4/29/2024
Checked:	0

Include design points W, X, Y & Z

This should include all basins which end up in detention pond

PLATTE SELF STORAGE
PIPE ROUTING SUMMARY

Pipe Run	*Inlet #*	*Contributing Flow Sources*	*5 Year Flow (cfs)*	*100 Year Flow (cfs)*	*Slope*	*Pipe Size & Type*	**Owner**
PR#1	***-***	PR#2	41.4	91.7	2.7%	48" RCP	PVT
PR#2	***-***	PR#3	41.4	91.7	2.2%	48" RCP	PVT
PR#3	***#1***	PR#4,PR-3	41.4	91.7	2.2%	42" RCP	PVT
PR#4	***#2***	PR#5	18.3	50.3	1.7%	42" RCP	PVT
PR#5	***#3***	PR#6,PR#11	18.3	50.3	2.1%	42" RCP	PVT
PR#6	***#4***	PR#7	6.4	18.1	5.0%	30" RCP	PVT
PR#7	***#5***	PR#8	6.4	18.1	1.9%	30" RCP	PVT
PR#8	***#6***	PR#9	6.4	18.1	1.9%	30" RCP	PVT
PR#9	***#7***	PR#10	6.4	18.1	1.9%	24" RCP	PVT
PR#10	***#10***	PR#13	6.4	18.1	1.7%	24" RCP	PVT
PR#13	***#11***	OS-Z,PR-10	6.4	18.1	1.9%	24" RCP	PVT
PR#11	***#8***	PR#12	11.8	32.2	1.0%	36" RCP	PVT
PR#12	***#9***	OS-Y,PR-4	11.8	32.2	1.0%	36" RCP	PVT
PR#90	***-***	Pond outlet	0.5	11.3	1.4%	18" HDPE	PVT

Calc:	DLF
Date:	4/29/2024
Checked:	0

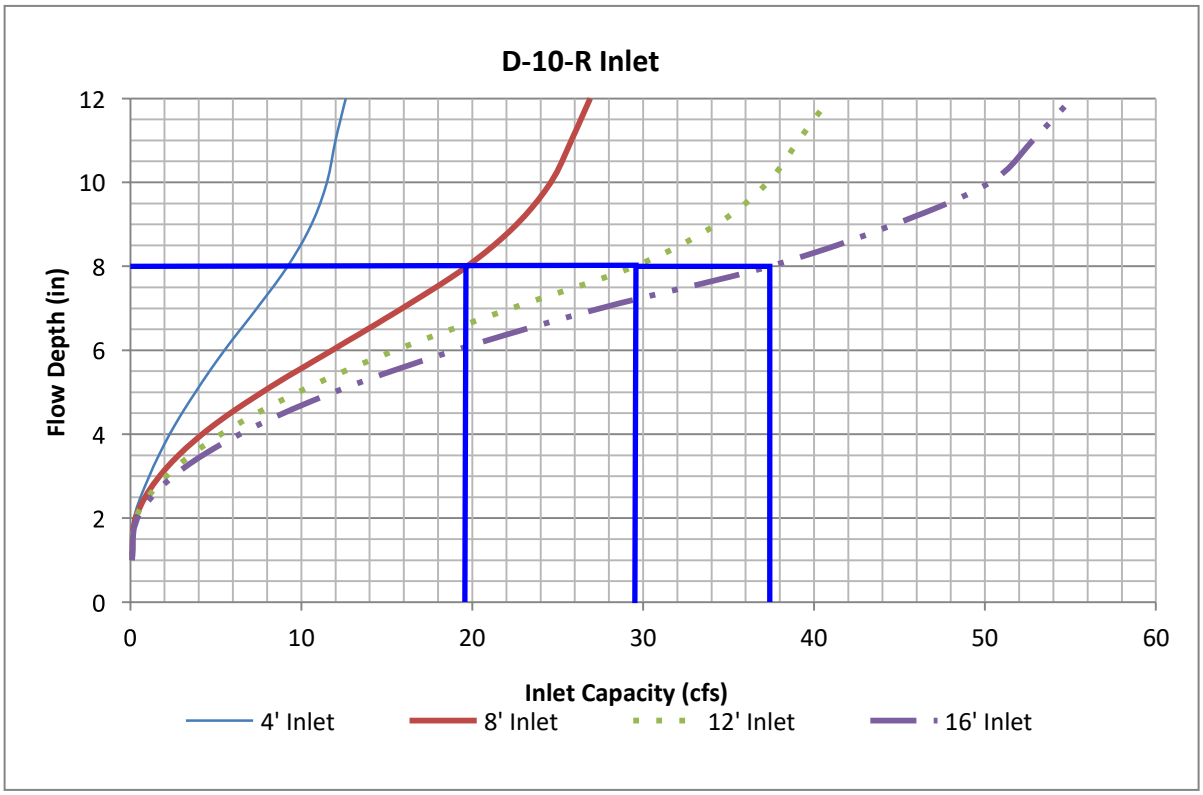
HYDRAULIC CALCULATIONS

Please include inlet management tab, and inlet calculations.

Also include calculations for riprap outlet protection

2419.00
Curb Inlet Capacity

Figure 8-12. Inlet Capacity Chart Sump Conditions, Curb Opening (D-10-R) Inlet



- A 8' inlet has a capacity of 19.5 cfs.
- A 12' inlet has a capacity of 29.5 cfs.
- A 16' inlet has a capacity of 37.0 cfs.
- Combining 8' and 12' inlets would give a capacity of 49 cfs for a 20' inlet.

Please provide swale ID. Please ensure IDs match the ID labeled on the proposed drainage map.

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **Platte Self Storage** Location: Mini-Storage 30' V Drive Aisles at 1% - Capacity

By: Dane Frank Date: 4/2/2024

Chk By: Date: version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

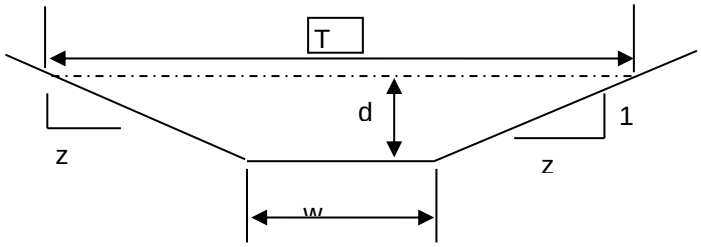
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	20
z (sideslope)=	20
b (btm width, ft)=	0
d (depth, ft)=	0.25
S (slope, ft/ft)	0.01
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.25	1.25	10.01	0.12	2.85511683	3.5689	2.855117	3.5689	T =	10
								Dm =	0.125
				Sc low =	0.0049	Sc high =	0.0049		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0035	0.0064	0.0035	0.0064		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project:	**Platte Self Storage**	Location:	Mini-Storage Drive Aisles at 2% - Capacity	
By:	Dane Frank	Date:	3/27/2024	
Chk By:		Date:		version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

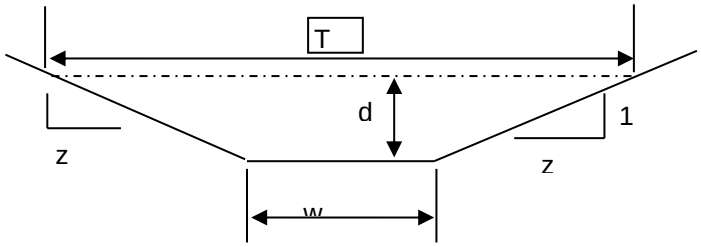
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	33.3
z (sideslope)=	33.3
b (btm width, ft)=	0
d (depth, ft)=	0.35
S (slope, ft/ft)	0.02
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.35	4.08	23.32	0.17	5.0558412	20.624	5.055841	20.624	T =	23.31
								Dm =	0.175
				Sc low =	0.0044	Sc high =	0.0044		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0031	0.0057	0.0031	0.0057		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **Platte Self Storage** Location: East Drain Trench (need Q=9.1 cfs)

By: John Fornander Date: 4/19/2024

Chk By: Date: version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

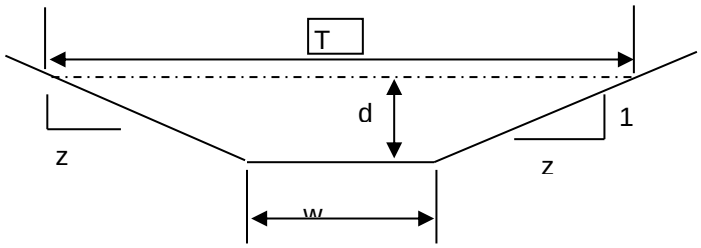
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT

z (sideslope)=	0
z (sideslope)=	0
b (btm width, ft)=	1.5
d (depth, ft)=	1
S (slope, ft/ft)	0.01
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
1	1.50	3.50	0.43	6.49748573	9.74623	6.497486	9.74623	T =	1.5
								Dm =	1.000
				Sc low =	0.0076	Sc high =	0.0076		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0053	0.0099	0.0053	0.0099		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

Please provide erosion protection for this open channel as velocity is above the standard velocity per DCM vol.1, chapter 10, table 10-4

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project:	**Platte Self Storage**	Location:	Bldg AH Drive Aisle (need Q=3.6 cfs)	
By:	John F	Date:	4/2/2024	
Chk By:		Date:		version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

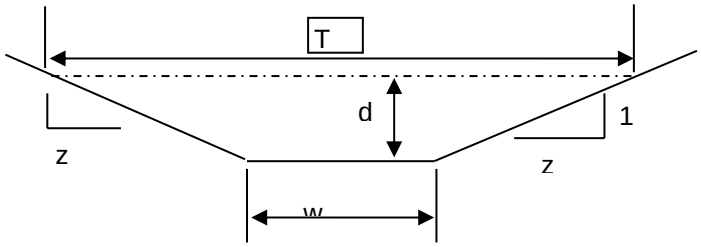
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	14.3
z (sideslope)=	16
b (btm width, ft)=	0
d (depth, ft)=	0.35
S (slope, ft/ft)	0.01
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.35	1.86	10.63	0.17	3.570899	6.62714	3.570899	6.62714	T =	10.605
								Dm =	0.175
				Sc low =	0.0044	Sc high =	0.0044		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0031	0.0057	0.0031	0.0057		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **Platte Self Storage** Location: Bldg N+RV Drive Aisel (need Q=31 cfs)

By: John F Date: 4/2/2024

Chk By: Date: version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

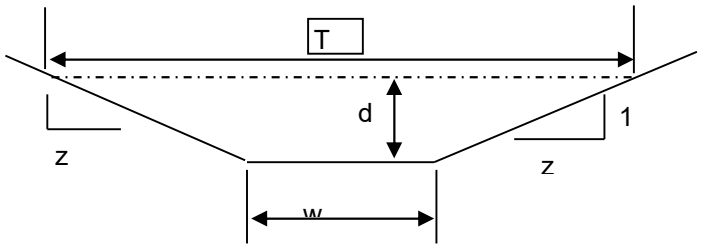
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	7.1
z (sideslope)=	14.7
b (btm width, ft)=	0
d (depth, ft)=	0.7
S (slope, ft/ft)	0.01
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.7	5.34	15.33	0.35	5.65883356	30.2238	5.658834	30.2238	T =	15.26
								Dm =	0.350
				Sc low =	0.0035	Sc high =	0.0035		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0025	0.0046	0.0025	0.0046		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

Please provide erosion protection for this open channel as velocity is above the standard velocity per DCM vol.1, chapter 10, table 10-4

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **Platte Self Storage** Location: Bldg Central Drive Aisel (need Q=41.3 cfs)

By: John F Date: 4/2/2024

Chk By: Date: version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

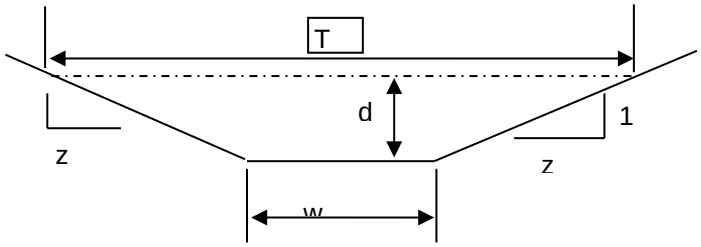
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	33
z (sideslope)=	33
b (btm width, ft)=	0
d (depth, ft)=	0.5
S (slope, ft/ft)	0.02
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.5	8.25	33.02	0.25	6.41304341	52.9076	6.413043	52.9076	T =	33
								Dm =	0.250
				Sc low =	0.0039	Sc high =	0.0039		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0027	0.0051	0.0027	0.0051		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

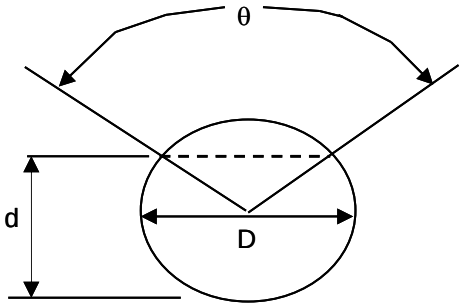
Please provide erosion protection for this open channel as velocity is above the standard velocity per DCM vol.1, chapter 10, table 10-4

Created by: Mike O'Shea

MANNING'S EQUATION FOR PIPE FLOW

Project:	Platte Self Storage	Location:	Driveway Culvert (need Q=2 cfs)	
By:	Dane Frank	Date:	4/5/2024	
Chk. By:		Date:		mdo version 12.8.00

Clear Data Entry Cells



INPUT

D=	18	inches
d=	18	inches
n=	0.013	mannings coeff
θ=	0.0	degrees
S=	0.04	slope in/in

Mannings Formula

$Q=(1.486/n)AR_h^{2/3}S^{1/2}$

R=A/P

A=cross sectional area

P=wetted perimeter

S=slope of channel

n=Manning's roughness coefficient

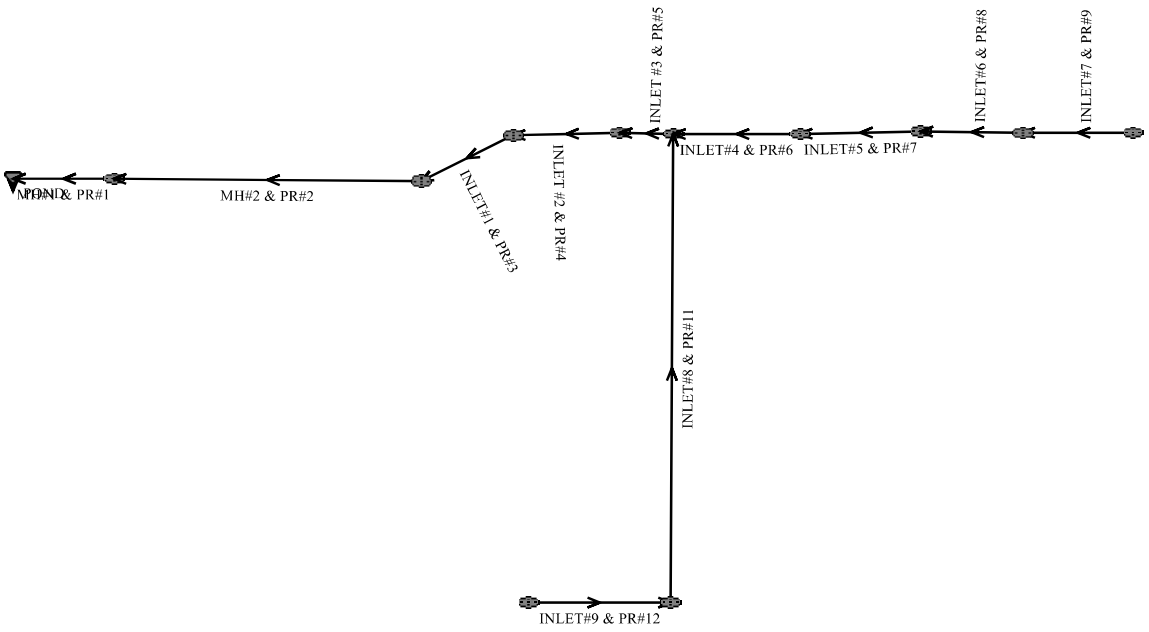
$V=(1.49/n)R_h^{2/3}S^{1/2}$

Q=V x A

Solution to Mannings Equation				
Area,ft^2	Wetted Perimeter, ft	Hydraulic Radius, ft	velocity ft/s	flow, cfs
1.77	4.71	0.38	11.89	21.01

Manning's n-values	
PVC	0.01
PE (<9"dia)	0.015
PE (>12"dia)	0.02
PE(9-12"dia)	0.017
CMP	0.025
ADS N12	0.012
HCMP	0.023
Conc	0.013

Created by: Mike O'Shea



2419.00 6001 E Platte Ave Storage East System Layout

Program: UDSEWER Math Model Interface 2.1.1.4
Run Date: 4/26/2024 2:19:34 PM

UDSewer Results Summary

Project Title: 6001 E Platte Storage - 5 Year
Project Description: East System

System Input Summary

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in): 1.50
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 300
Maximum Urban Overland Len. (ft): 100
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 6.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 6209.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
POND	6211.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH#1 & PR#1	6220.00	41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MH#2 & PR#2	6223.50	41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#1 & PR#3	6233.50	41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #2 & PR#4	6234.00	18.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #3 & PR#5	6234.40	18.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#8 & PR#11	6237.45	11.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#9 & PR#12	6236.85	11.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#4 & PR#6	6235.60	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#5 & PR#7	6236.80	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#6 & PR#8	6238.10	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#7 & PR#9	6239.30	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#10 & PR#10	6239.85	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TRENCH & PR#13	6240.35	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
POND	0.00	0.00	0.00	0.00	0.00	5.97	6.91	0.15	41.30	
MH#1 & PR#1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.30	
MH#2 & PR#2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.30	
INLET#1 & PR#3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.30	
INLET #2 & PR#4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.20	
INLET #3 & PR#5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.20	
INLET#8 & PR#11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.80	
INLET#9 & PR#12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.80	
INLET#4 & PR#6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
INLET#5 & PR#7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
INLET#6 & PR#8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
INLET#7 & PR#9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
INLET#10 & PR#10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	
TRENCH & PR#13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
MH#1 & PR#1	30.00	6205.00	2.7	6205.80	0.013	0.03	0.00	CIRCULAR	48.00 in	48.00 in
MH#2 & PR#2	227.00	6211.00	2.2	6216.00	0.013	0.05	0.00	CIRCULAR	48.00 in	48.00 in
INLET#1 & PR#3	45.00	6216.80	2.2	6217.80	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #2 & PR#4	24.00	6225.50	1.7	6225.90	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #3 & PR#5	7.00	6226.00	2.1	6226.15	0.013	0.05	0.00	CIRCULAR	42.00 in	42.00 in
INLET#8 & PR#11	352.00	6227.75	1.0	6231.25	0.013	1.00	0.25	CIRCULAR	36.00 in	36.00 in
INLET#9 & PR#12	31.00	6231.55	1.0	6231.85	0.013	1.00	0.00	CIRCULAR	36.00 in	36.00 in
INLET#4 & PR#6	47.00	6228.15	5.0	6230.50	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#5 & PR#7	57.00	6230.60	1.9	6231.70	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#6 & PR#8	62.00	6231.80	1.9	6233.00	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#7 & PR#9	57.00	6233.60	1.9	6234.70	0.013	0.05	0.00	CIRCULAR	24.00 in	24.00 in
INLET#10 & PR#10	24.00	6235.00	1.7	6235.40	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in
TRENCH & PR#13	32.00	6235.70	1.9	6236.30	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
MH#1 & PR#1	235.17	18.71	23.03	6.93	13.62	14.08	2.75	Supercritical	41.30	0.00	
MH#2 & PR#2	213.76	17.01	23.03	6.93	14.30	13.15	2.50	Supercritical	41.30	0.00	
INLET#1 & PR#3	150.38	15.63	24.00	7.27	15.04	13.34	2.45	Supercritical	41.30	0.00	
INLET #2 & PR#4	130.22	13.53	15.64	5.57	10.61	9.54	2.12	Supercritical	18.20	0.00	
INLET #3 & PR#5	146.19	15.19	15.64	5.57	10.01	10.36	2.38	Supercritical	18.20	0.00	
INLET#8 & PR#11	66.69	9.43	13.08	5.09	10.25	7.11	1.60	Supercritical	11.80	0.00	
INLET#9 & PR#12	65.82	9.31	13.08	5.09	10.32	7.05	1.58	Supercritical	11.80	0.00	
INLET#4 & PR#6	91.96	18.73	10.05	4.44	5.36	10.77	3.41	Supercritical	6.40	0.00	
INLET#5 & PR#7	57.14	11.64	10.05	4.44	6.78	7.69	2.15	Supercritical	6.40	0.00	
INLET#6 & PR#8	57.22	11.66	10.05	4.44	6.77	7.70	2.15	Supercritical	6.40	0.00	
INLET#7 & PR#9	31.51	10.03	10.75	4.70	7.34	7.87	2.09	Supercritical	6.40	0.00	

INLET#10 & PR#10	29.28	9.32	10.75	4.70	7.62	7.46	1.94	Supercritical	6.40	0.00	
TRENCH & PR#13	31.05	9.88	10.75	4.70	7.39	7.78	2.06	Supercritical	6.40	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
MH#1 & PR#1	41.30	CIRCULAR	48.00 in	48.00 in	27.00 in	27.00 in	48.00 in	48.00 in	12.57	
MH#2 & PR#2	41.30	CIRCULAR	48.00 in	48.00 in	27.00 in	27.00 in	48.00 in	48.00 in	12.57	
INLET#1 & PR#3	41.30	CIRCULAR	42.00 in	42.00 in	27.00 in	27.00 in	42.00 in	42.00 in	9.62	
INLET #2 & PR#4	18.20	CIRCULAR	42.00 in	42.00 in	21.00 in	21.00 in	42.00 in	42.00 in	9.62	
INLET #3 & PR#5	18.20	CIRCULAR	42.00 in	42.00 in	21.00 in	21.00 in	42.00 in	42.00 in	9.62	
INLET#8 & PR#11	11.80	CIRCULAR	36.00 in	36.00 in	21.00 in	21.00 in	36.00 in	36.00 in	7.07	
INLET#9 & PR#12	11.80	CIRCULAR	36.00 in	36.00 in	21.00 in	21.00 in	36.00 in	36.00 in	7.07	
INLET#4 & PR#6	6.40	CIRCULAR	30.00 in	30.00 in	12.00 in	12.00 in	30.00 in	30.00 in	4.91	
INLET#5 & PR#7	6.40	CIRCULAR	30.00 in	30.00 in	15.00 in	15.00 in	30.00 in	30.00 in	4.91	
INLET#6 & PR#8	6.40	CIRCULAR	30.00 in	30.00 in	15.00 in	15.00 in	30.00 in	30.00 in	4.91	
INLET#7 & PR#9	6.40	CIRCULAR	24.00 in	24.00 in	15.00 in	15.00 in	24.00 in	24.00 in	3.14	
INLET#10 & PR#10	6.40	CIRCULAR	24.00 in	24.00 in	15.00 in	15.00 in	24.00 in	24.00 in	3.14	
TRENCH & PR#13	6.40	CIRCULAR	24.00 in	24.00 in	15.00 in	15.00 in	24.00 in	24.00 in	3.14	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6209.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
MH#1 & PR#1	6205.00	6205.80	0.00	0.00	6209.00	6209.00	6209.21	0.01	6209.23
MH#2 & PR#2	6211.00	6216.00	0.01	0.00	6212.19	6217.92	6214.88	3.79	6218.66

INLET#1 & PR#3	6216.80	6217.80	0.07	0.00	6218.05	6220.34	6220.82	0.00	6220.82
INLET #2 & PR#4	6225.50	6225.90	0.01	0.00	6226.50	6227.20	6227.50	0.19	6227.69
INLET #3 & PR#5	6226.00	6226.15	0.00	0.00	6227.21	6228.38	6228.50	0.00	6228.50
INLET#8 & PR#11	6227.75	6231.25	0.04	0.04	6228.60	6232.34	6229.39	3.35	6232.74
INLET#9 & PR#12	6231.55	6231.85	0.04	0.00	6232.41	6232.94	6233.18	0.16	6233.34
INLET#4 & PR#6	6228.15	6230.50	0.00	0.00	6228.60	6231.34	6230.40	1.25	6231.64
INLET#5 & PR#7	6230.60	6231.70	0.00	0.00	6231.34	6232.54	6232.08	0.76	6232.84
INLET#6 & PR#8	6231.80	6233.00	0.00	0.00	6232.54	6233.84	6233.29	0.86	6234.14
INLET#7 & PR#9	6233.60	6234.70	0.00	0.00	6234.21	6235.60	6235.17	0.77	6235.94
INLET#10 & PR#10	6235.00	6235.40	0.01	0.00	6235.64	6236.30	6236.50	0.14	6236.64
TRENCH & PR#13	6235.70	6236.30	0.01	0.00	6236.32	6237.20	6237.26	0.28	6237.54

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 1.00 ft

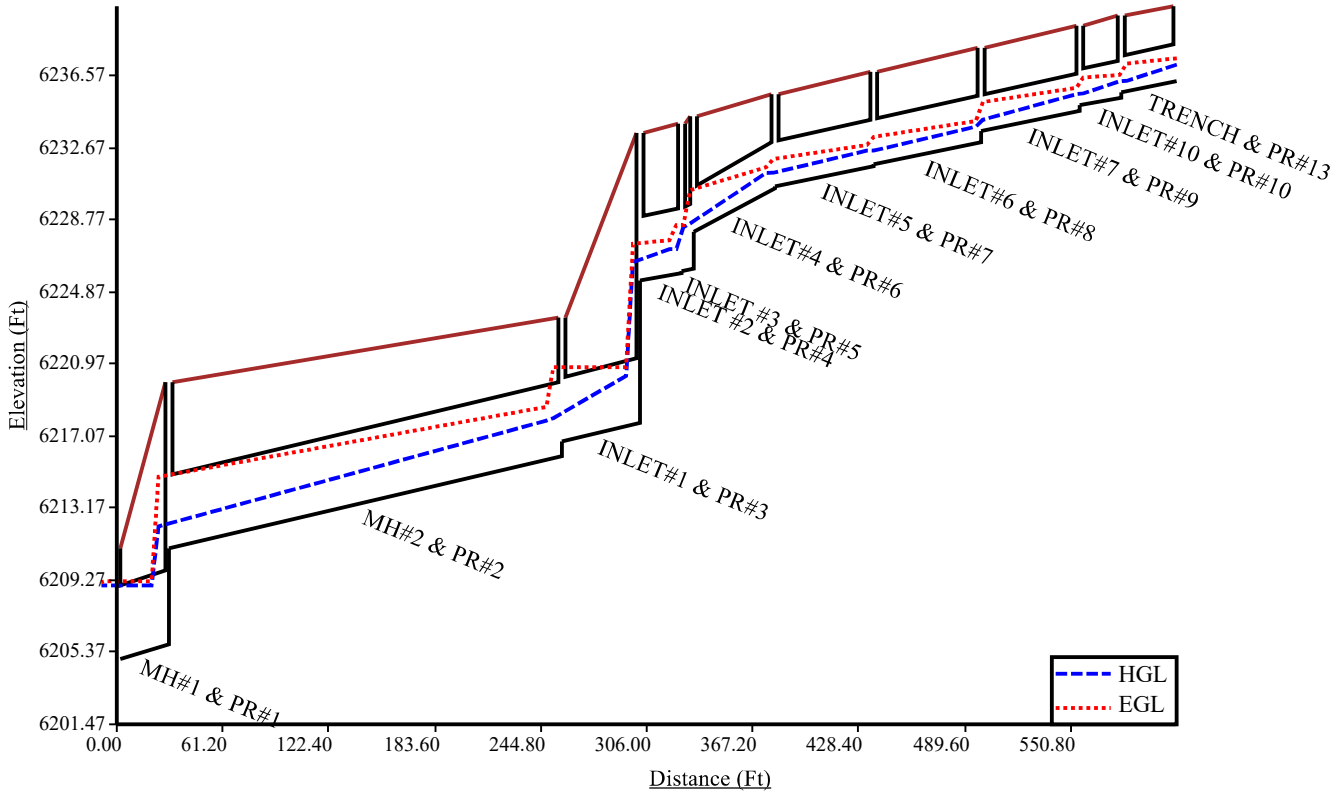
					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
MH#1 & PR#1	30.00	5.00	6.00	7.83	9.00	6.92	1.58	25.40	15.12	9.78	138.93	
MH#2 & PR#2	227.00	5.00	6.00	7.83	15.00	9.92	4.58	12.00	8.42	3.08	675.92	
INLET#1 & PR#3	45.00	4.50	6.00	7.25	10.90	7.58	2.83	28.90	16.58	11.83	246.33	
INLET #2 & PR#4	24.00	4.50	6.00	7.25	13.50	8.87	4.12	13.70	8.98	4.23	66.48	
INLET #3 & PR#5	7.00	4.50	6.00	7.25	13.49	8.87	4.12	14.00	9.13	4.38	19.65	
INLET#8 & PR#11	352.00	4.00	6.00	6.67	11.30	7.48	3.32	10.40	7.03	2.87	688.55	
INLET#9 & PR#12	31.00	4.00	6.00	6.67	9.80	6.73	2.57	8.00	5.83	1.67	49.76	
INLET#4 & PR#6	47.00	3.50	6.00	6.08	11.00	7.04	3.46	8.70	5.89	2.31	75.23	
INLET#5 & PR#7	57.00	3.50	6.00	6.08	8.50	5.79	2.21	8.70	5.89	2.31	78.37	
INLET#6 & PR#8	62.00	3.50	6.00	6.08	8.50	5.79	2.21	8.70	5.89	2.31	85.25	

INLET#7 & PR#9	57.00	3.00	4.00	5.50	8.00	5.08	2.25	8.20	5.18	2.35	63.18	
INLET#10 & PR#10	24.00	3.00	4.00	5.50	7.60	4.88	2.05	7.90	5.03	2.20	25.37	
TRENCH & PR#13	32.00	3.00	4.00	5.50	7.30	4.73	1.90	7.10	4.63	1.80	31.39	

Total earth volume for sewer trenches = 2244 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
    - Four inches for pipes less than 33 inches.
    - Six inches for pipes less than 60 inches.
    - Eight inches for all larger sizes.

Main Run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6220.97
6217.07
6213.17
6209.27
6205.37
6201.47
Elevation (Ft)
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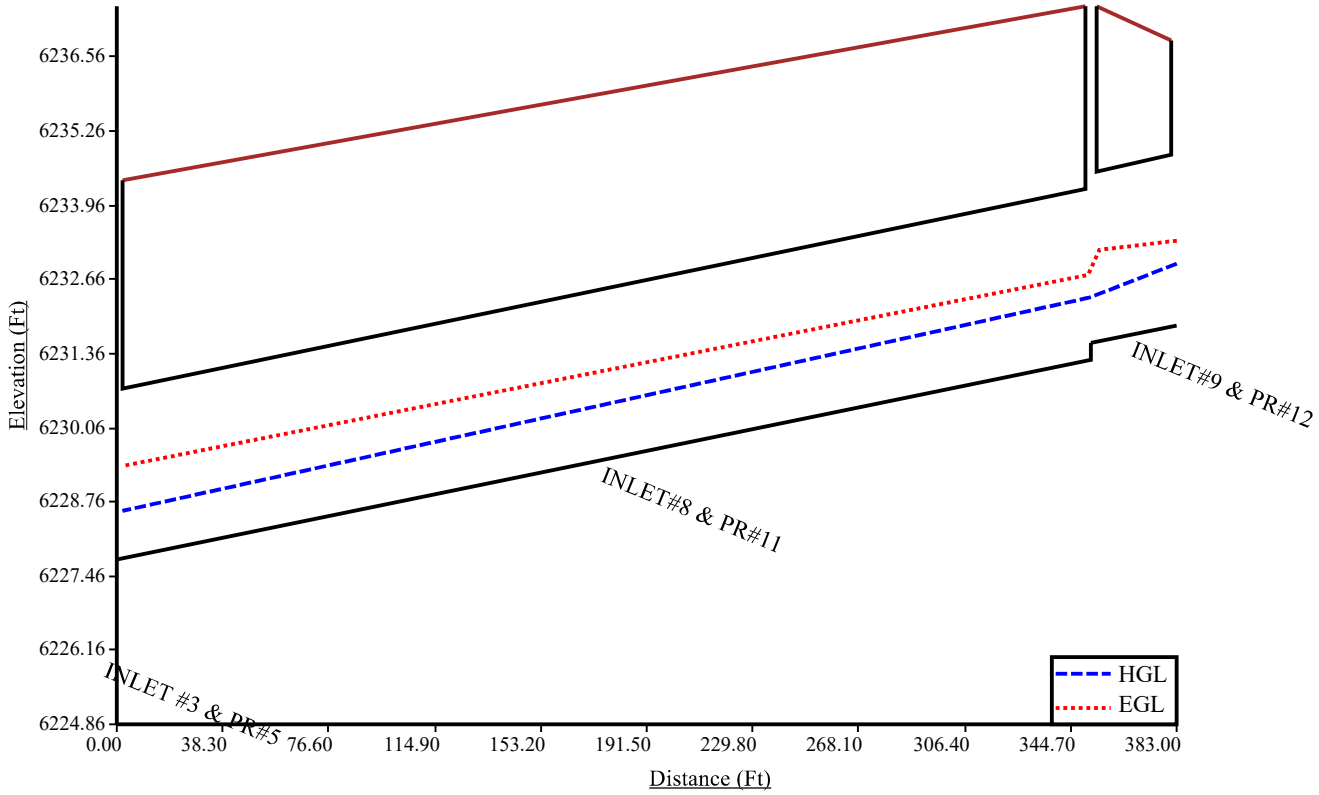
61.20
122.40
183.60
244.80
306.00
367.20
428.40
489.60
550.80
Distance (Ft)
MH#1 & PR#1
MH#2 & PR#2
INLET#1 & PR#3
INLET #2 & PR#4
INLET#3 & PR#5
INLET#4 & PR#6
INLET#5 & PR#7
INLET#6 & PR#8
INLET#7 & PR#9
INLET#10 & PR#10
TRENCH & PR#13
HGL
EGL

South Run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6233.96
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6231.36
6230.06
6228.76
6227.46
6226.16
6224.86
Elevation (Ft)
0.00
38.30
76.60
114.90
153.20
191.50
229.80
268.10
306.40
344.70
383.00
Distance (Ft)
INLET #3 & PR#5
INLET#8 & PR#11
INLET#9 & PR#12
HGL
EGL

Program: UDSEWER Math Model Interface 2.1.1.4
Run Date: 4/26/2024 10:31:41 AM

UDSewer Results Summary

Project Title: 6001 E Platte Storage - 100 Year
Project Description: East System

System Input Summary

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in): 2.52
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 300
Maximum Urban Overland Len. (ft): 100
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 6.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 6212.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
POND	6211.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MH#1 & PR#1	6220.00	91.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MH#2 & PR#2	6223.50	91.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#1 & PR#3	6233.50	91.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #2 & PR#4	6234.00	50.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET #3 & PR#5	6234.40	50.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#8 & PR#11	6237.45	32.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#9 & PR#12	6236.85	32.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#4 & PR#6	6235.60	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#5 & PR#7	6236.80	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#6 & PR#8	6238.10	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#7 & PR#9	6239.30	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INLET#10 & PR#10	6239.85	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TRENCH & PR#13	6240.35	18.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
POND	0.00	0.00	0.00	0.00	0.00	7.84	11.69	0.07	91.70	Surface Water Present (Upstream)
MH#1 & PR#1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.70	Surface Water Present (Downstream)
MH#2 & PR#2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.70	
INLET#1 & PR#3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.70	
INLET #2 & PR#4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.30	
INLET #3 & PR#5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.30	
INLET#8 & PR#11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.20	
INLET#9 & PR#12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.20	
INLET#4 & PR#6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	

INLET#5 & PR#7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	
INLET#6 & PR#8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	
INLET#7 & PR#9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	
INLET#10 & PR#10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	
TRENCH & PR#13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.10	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
MH#1 & PR#1	30.00	6205.00	2.7	6205.80	0.013	0.03	0.00	CIRCULAR	48.00 in	48.00 in
MH#2 & PR#2	227.00	6211.00	2.2	6216.00	0.013	0.05	0.00	CIRCULAR	48.00 in	48.00 in
INLET#1 & PR#3	45.00	6216.80	2.2	6217.80	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #2 & PR#4	24.00	6225.50	1.7	6225.90	0.013	0.24	0.00	CIRCULAR	42.00 in	42.00 in
INLET #3 & PR#5	7.00	6226.00	2.1	6226.15	0.013	0.05	0.00	CIRCULAR	42.00 in	42.00 in
INLET#8 & PR#11	352.00	6227.75	1.0	6231.25	0.013	1.00	0.25	CIRCULAR	36.00 in	36.00 in
INLET#9 & PR#12	31.00	6231.55	1.0	6231.85	0.013	1.00	0.00	CIRCULAR	36.00 in	36.00 in
INLET#4 & PR#6	47.00	6228.15	5.0	6230.50	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#5 & PR#7	57.00	6230.60	1.9	6231.70	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#6 & PR#8	62.00	6231.80	1.9	6233.00	0.013	0.05	0.00	CIRCULAR	30.00 in	30.00 in
INLET#7 & PR#9	57.00	6233.60	1.9	6234.70	0.013	0.05	0.00	CIRCULAR	24.00 in	24.00 in
INLET#10 & PR#10	24.00	6235.00	1.7	6235.40	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in
TRENCH & PR#13	32.00	6235.70	1.9	6236.30	0.013	0.11	0.00	CIRCULAR	24.00 in	24.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
MH#1 & PR#1	235.17	18.71	34.84	9.39	20.81	17.55	2.69	Pressurized	91.70	30.00	
MH#2 & PR#2	213.76	17.01	34.84	9.39	21.96	16.36	2.43	Supercritical	91.70	0.00	
INLET#1 & PR#3	150.38	15.63	35.59	10.55	23.69	16.40	2.28	Supercritical	91.70	0.00	
INLET #2 & PR#4	130.22	13.53	26.60	7.83	18.12	12.66	2.09	Supercritical	50.30	0.00	
INLET #3 & PR#5	146.19	15.19	26.60	7.83	16.99	13.79	2.36	Supercritical	50.30	0.00	

INLET#8 & PR#11	66.69	9.43	22.09	7.08	17.64	9.35	1.54	Supercritical	32.20	0.00	
INLET#9 & PR#12	65.82	9.31	22.09	7.08	17.77	9.26	1.52	Supercritical	32.20	0.00	
INLET#4 & PR#6	91.96	18.73	17.29	6.18	9.02	14.56	3.49	Supercritical	18.10	0.00	
INLET#5 & PR#7	57.14	11.64	17.29	6.18	11.60	10.33	2.15	Supercritical	18.10	0.00	
INLET#6 & PR#8	57.22	11.66	17.29	6.18	11.59	10.34	2.15	Supercritical	18.10	0.00	
INLET#7 & PR#9	31.51	10.03	18.39	7.01	13.04	10.38	1.95	Supercritical	18.10	0.00	
INLET#10 & PR#10	29.28	9.32	18.39	7.01	13.65	9.81	1.79	Supercritical	18.10	0.00	
TRENCH & PR#13	31.05	9.88	18.39	7.01	13.16	10.26	1.92	Supercritical	18.10	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
MH#1 & PR#1	91.70	CIRCULAR	48.00 in	48.00 in	36.00 in	36.00 in	48.00 in	48.00 in	12.57	
MH#2 & PR#2	91.70	CIRCULAR	48.00 in	48.00 in	36.00 in	36.00 in	48.00 in	48.00 in	12.57	
INLET#1 & PR#3	91.70	CIRCULAR	42.00 in	42.00 in	36.00 in	36.00 in	42.00 in	42.00 in	9.62	
INLET #2 & PR#4	50.30	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
INLET #3 & PR#5	50.30	CIRCULAR	42.00 in	42.00 in	30.00 in	30.00 in	42.00 in	42.00 in	9.62	
INLET#8 & PR#11	32.20	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
INLET#9 & PR#12	32.20	CIRCULAR	36.00 in	36.00 in	30.00 in	30.00 in	36.00 in	36.00 in	7.07	
INLET#4 & PR#6	18.10	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
INLET#5 & PR#7	18.10	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
INLET#6 & PR#8	18.10	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
INLET#7 & PR#9	18.10	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
INLET#10 & PR#10	18.10	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
TRENCH & PR#13	18.10	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6212.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
MH#1 & PR#1	6205.00	6205.80	0.00	0.00	6212.00	6212.12	6212.83	0.12	6212.95
MH#2 & PR#2	6211.00	6216.00	0.04	0.00	6212.83	6218.90	6216.99	3.29	6220.27
INLET#1 & PR#3	6216.80	6217.80	0.34	0.00	6219.24	6221.54	6222.95	0.00	6222.95
INLET #2 & PR#4	6225.50	6225.90	0.10	0.00	6227.01	6229.02	6229.50	0.00	6229.50
INLET #3 & PR#5	6226.00	6226.15	0.02	0.00	6229.04	6229.95	6230.37	0.00	6230.37
INLET#8 & PR#11	6227.75	6231.25	0.32	0.34	6230.71	6233.09	6231.04	2.83	6233.87
INLET#9 & PR#12	6231.55	6231.85	0.32	0.00	6233.41	6233.69	6234.36	0.11	6234.47
INLET#4 & PR#6	6228.15	6230.50	0.01	0.00	6229.96	6231.94	6232.19	0.34	6232.53
INLET#5 & PR#7	6230.60	6231.70	0.01	0.00	6231.95	6233.14	6233.22	0.51	6233.73
INLET#6 & PR#8	6231.80	6233.00	0.01	0.00	6233.15	6234.44	6234.43	0.61	6235.03
INLET#7 & PR#9	6233.60	6234.70	0.03	0.00	6234.69	6236.23	6236.36	0.64	6236.99
INLET#10 & PR#10	6235.00	6235.40	0.06	0.00	6236.29	6236.93	6237.63	0.06	6237.69
TRENCH & PR#13	6235.70	6236.30	0.06	0.00	6236.99	6237.83	6238.43	0.16	6238.59

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

The trench side slope is 1.0 ft/ft
The minimum trench width is 1.00 ft

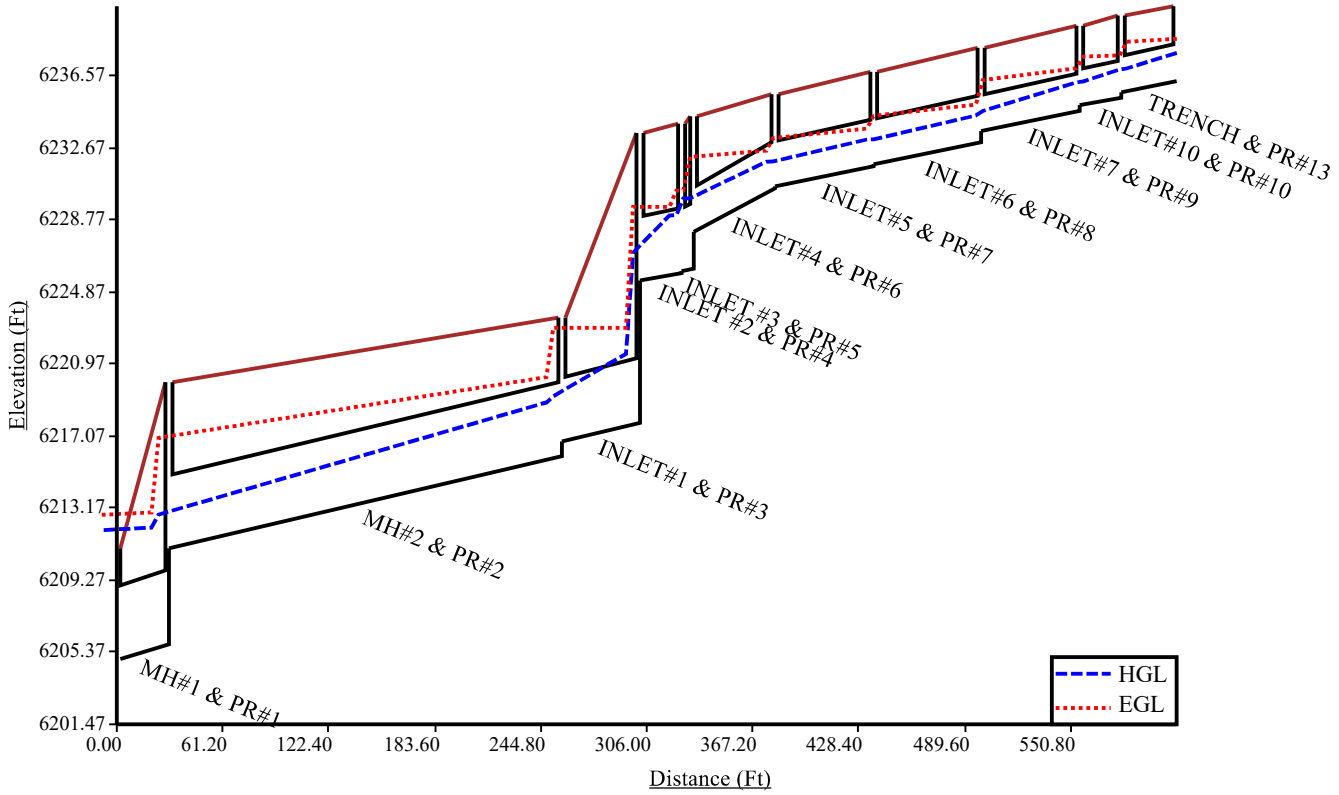
					Downstream			Upstream				
Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Volume (cu. yd)	Comment
MH#1 & PR#1	30.00	5.00	6.00	7.83	9.00	6.92	1.58	25.40	15.12	9.78	138.93	
MH#2 & PR#2	227.00	5.00	6.00	7.83	15.00	9.92	4.58	12.00	8.42	3.08	675.92	

INLET#1 & PR#3	45.00	4.50	6.00	7.25	10.90	7.58	2.83	28.90	16.58	11.83	246.33	
INLET #2 & PR#4	24.00	4.50	6.00	7.25	13.50	8.87	4.12	13.70	8.98	4.23	66.48	
INLET #3 & PR#5	7.00	4.50	6.00	7.25	13.49	8.87	4.12	14.00	9.13	4.38	19.65	
INLET#8 & PR#11	352.00	4.00	6.00	6.67	11.30	7.48	3.32	10.40	7.03	2.87	688.55	
INLET#9 & PR#12	31.00	4.00	6.00	6.67	9.80	6.73	2.57	8.00	5.83	1.67	49.76	
INLET#4 & PR#6	47.00	3.50	6.00	6.08	11.00	7.04	3.46	8.70	5.89	2.31	75.23	
INLET#5 & PR#7	57.00	3.50	6.00	6.08	8.50	5.79	2.21	8.70	5.89	2.31	78.37	
INLET#6 & PR#8	62.00	3.50	6.00	6.08	8.50	5.79	2.21	8.70	5.89	2.31	85.25	
INLET#7 & PR#9	57.00	3.00	4.00	5.50	8.00	5.08	2.25	8.20	5.18	2.35	63.18	
INLET#10 & PR#10	24.00	3.00	4.00	5.50	7.60	4.88	2.05	7.90	5.03	2.20	25.37	
TRENCH & PR#13	32.00	3.00	4.00	5.50	7.30	4.73	1.90	7.10	4.63	1.80	31.39	

Total earth volume for sewer trenches = 2244 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
    - Four inches for pipes less than 33 inches.
    - Six inches for pipes less than 60 inches.
    - Eight inches for all larger sizes.

Main Run


Elevation (Ft)
6236.57
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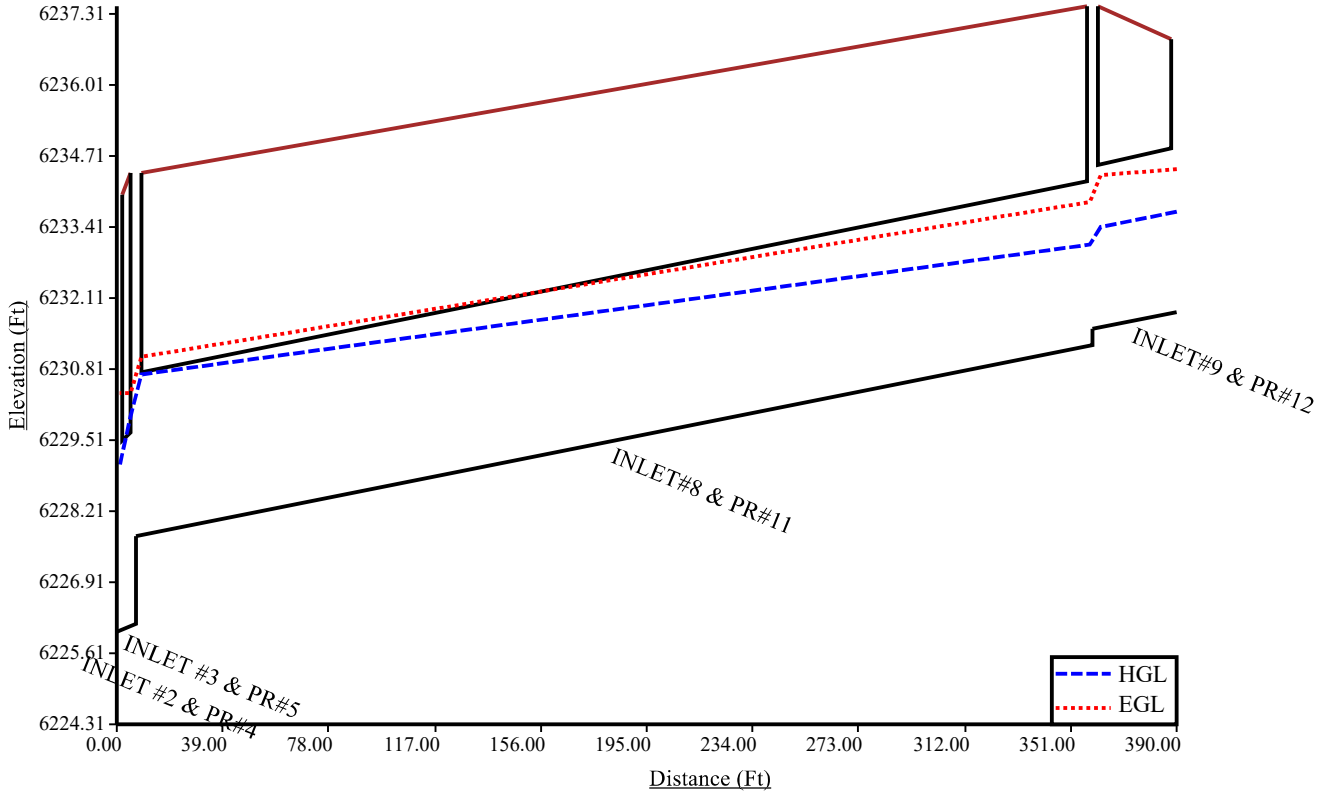
6228.77
6224.87
6220.97
6217.07
6213.17
6209.27
6205.37
6201.47
0.00
61.20
122.40
183.60
244.80
306.00
367.20
428.40
489.60
550.80
Distance (Ft)
MH#1 & PR#1
MH#2 & PR#2
INLET#1 & PR#3
INLET #2 & PR#4
INLET#3 & PR#5
INLET#4 & PR#6
INLET#5 & PR#7
INLET#6 & PR#8
INLET#7 & PR#9
INLET#10 & PR#10
TRENCH & PR#13
HGL
EGL

South Run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6234.71
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6229.51
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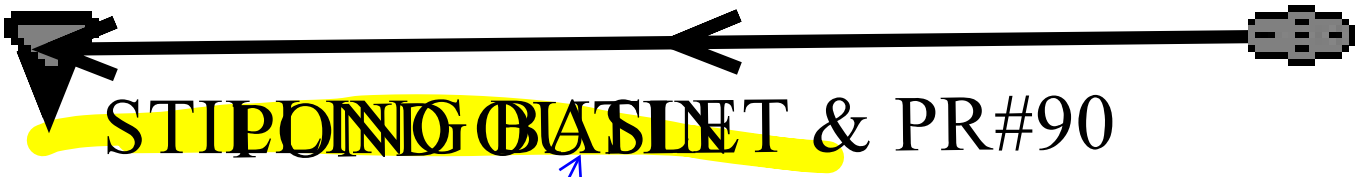
6225.61
6224.31
Elevation (Ft)
0.00
39.00
78.00
117.00
156.00
195.00
234.00
273.00
312.00
351.00
390.00
Distance (Ft)
INLET #2 & PR#4
INLET #3 & PR#5
INLET#8 & PR#11
INLET#9 & PR#12
HGL
EGL



Stilling Basin

Pond Outlet & PR#90

2419.00 6001 E Platte Ave Storage
Pond Outlet Layout

Please fix this error.

Program: UDSEWER Math Model Interface 2.1.1.4
Run Date: 4/26/2024 2:34:34 PM

UDSewer Results Summary

Project Title: 6001 E Platte Storage - 5 Year
Project Description: Pond Outlet System

System Input Summary

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in): 1.50
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 300
Maximum Urban Overland Len. (ft): 100
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 6.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 6201.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
STILLING BASIN	6201.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

POND OUTLET & PR#90	6209.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	Comment
STILLING BASIN	0.00	0.00	0.00	0.00	0.00	0.08	6.02	2.12	0.50	
POND OUTLET & PR#90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	Surface Water Present (Downstream)

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
POND OUTLET & PR#90	36.00	6201.00	1.4	6201.50	0.012	0.03	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
POND OUTLET & PR#90	13.50	7.64	3.14	2.42	2.37	3.64	1.74	Supercritical	0.50	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	Peak Flow (cfs)	Cross Section	Rise	Span	Rise	Span	Rise	Span	Area (ft^2)	Comment
POND OUTLET & PR#90	0.50	CIRCULAR	18.00 in	18.00 in	6.00 in	6.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available

size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6201.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
POND OUTLET & PR#90	6201.00	6201.50	0.00	0.00	6201.19	6201.76	6201.40	0.45	6201.85

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

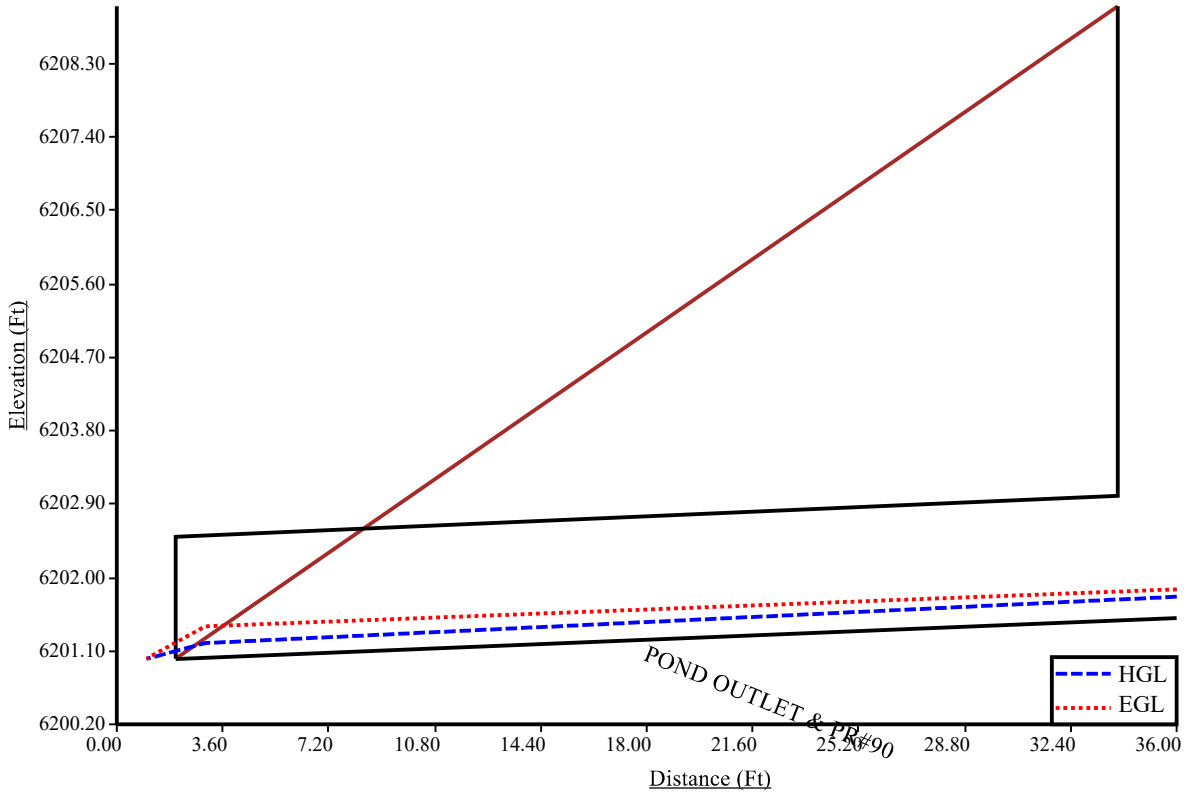
The trench side slope is 1.0 ft/ft
The minimum trench width is 1.00 ft

					Downstream			Upstream				
Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Volume (cu. yd)	Comment
POND OUTLET & PR#90	36.00	2.50	4.00	4.92	0.00	0.55	0.00	14.50	8.04	5.79	43.45	Sewer Too Shallow

Total earth volume for sewer trenches = 43 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

Pond Outlet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6205.60
6204.70
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6202.90
6202.00
6201.10
6200.20
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0.00
3.60
7.20
10.80
14.40
18.00
21.60
25.20
28.80
32.40
36.00
Distance (Ft)
POND OUTLET & PP#90
HGL
EGL

Program: UDSEWER Math Model Interface 2.1.1.4
Run Date: 4/26/2024 2:28:37 PM

UDSewer Results Summary

Project Title: 6001 E Platte Storage - 100 Year
Project Description: Pond Outlet System

System Input Summary

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in): 2.52
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 300
Maximum Urban Overland Len. (ft): 100
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 6.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 6201.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
STILLING BASIN	6201.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

POND OUTLET & PR#90	6209.00	11.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	Comment
STILLING BASIN	0.00	0.00	0.00	0.00	0.00	0.97	11.67	0.09	11.30	
POND OUTLET & PR#90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.30	Surface Water Present (Downstream)

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
POND OUTLET & PR#90	36.00	6201.00	1.4	6201.50	0.012	0.03	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
POND OUTLET & PR#90	13.45	7.61	15.41	7.02	12.64	8.53	1.53	Supercritical	11.30	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	Peak Flow (cfs)	Cross Section	Rise	Span	Rise	Span	Rise	Span	Area (ft^2)	Comment
POND OUTLET & PR#90	11.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available

size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6201.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
POND OUTLET & PR#90	6201.00	6201.50	0.00	0.00	6202.05	6202.78	6203.18	0.37	6203.55

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

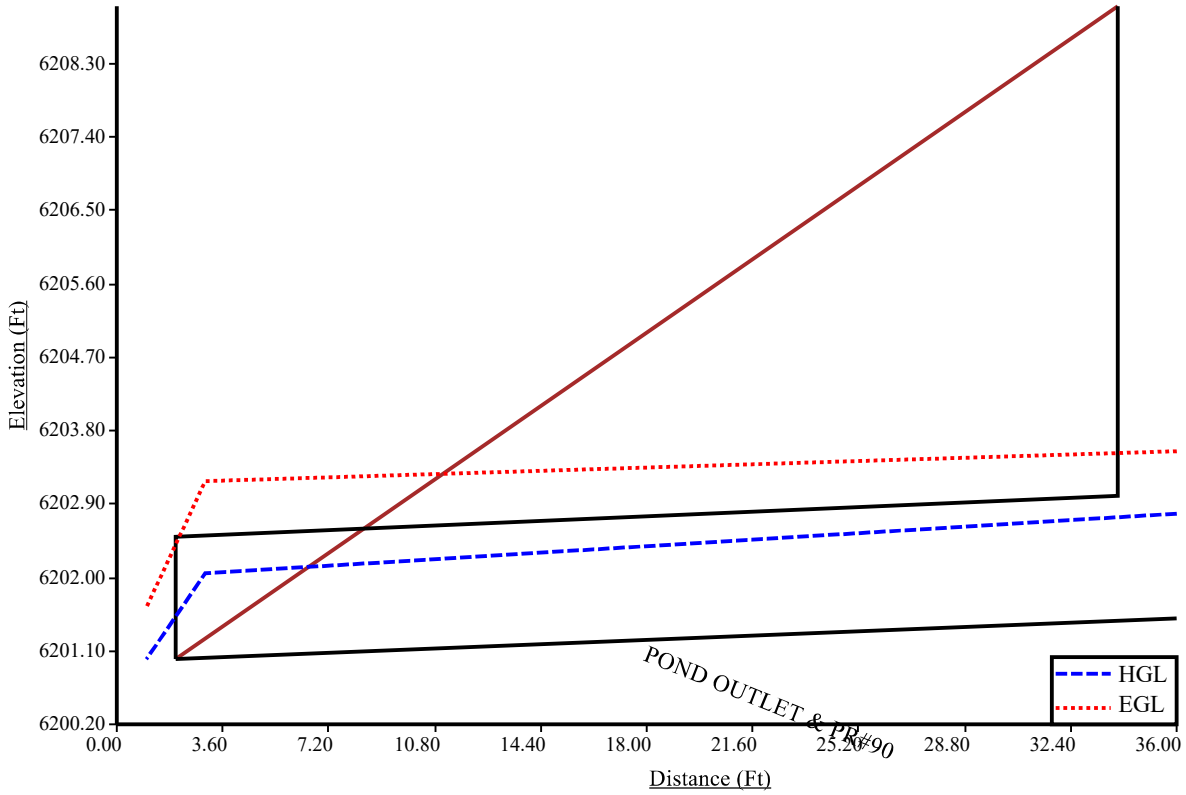
The trench side slope is 1.0 ft/ft
The minimum trench width is 1.00 ft

					Downstream			Upstream				
Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)	Volume (cu. yd)	Comment
POND OUTLET & PR#90	36.00	2.50	4.00	4.92	0.00	0.54	0.00	14.50	8.04	5.79	43.44	Sewer Too Shallow

Total earth volume for sewer trenches = 43 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

Pond Outlet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6207.40
6206.50
6205.60
6204.70
6203.80
6202.90
6202.00
6201.10
6200.20
Elevation (Ft)
0.00
3.60
7.20
10.80
14.40
18.00
21.60
25.20
28.80
32.40
36.00
Distance (Ft)
POND OUTLET & PD #90
HGL
EGL

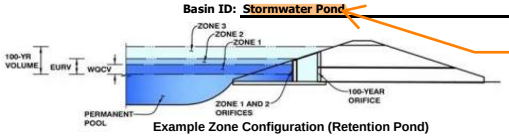
DETENTION CALCULATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Platte Self Storage

Basin ID: Stormwater Pond



Example Zone Configuration (Retention Pond)

Provide pond identifier, see GEC Plan comments

Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft²)	Optional Override Area (ft²)	Area (acre)	Volume (ft³)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	35	0.001		
6203	--	1.00	--	--	--	119	0.003	77	0.002
6204	--	2.00	--	--	--	3,553	0.082	1,913	0.044
6205	--	3.00	--	--	--	10,414	0.239	8,896	0.204
6206	--	4.00	--	--	--	15,905	0.365	22,056	0.506
6207	--	5.00	--	--	--	21,269	0.488	40,643	0.933
6208	--	6.00	--	--	--	25,579	0.587	64,067	1.471
6209	--	7.00	--	--	--	28,311	0.650	91,012	2.089
6210	--	8.00	--	--	--	31,084	0.714	120,709	2.771
6211	--	9.00	--	--	--	33,911	0.778	153,207	3.517
6212	--	10.00	--	--	--	36,847	0.846	188,586	4.329
6213	--	11.00	--	--	--	39,841	0.915	226,930	5.210

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	32.96	acres
Watershed Length =	1,610	ft
Watershed Length to Centroid =	730	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	44.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

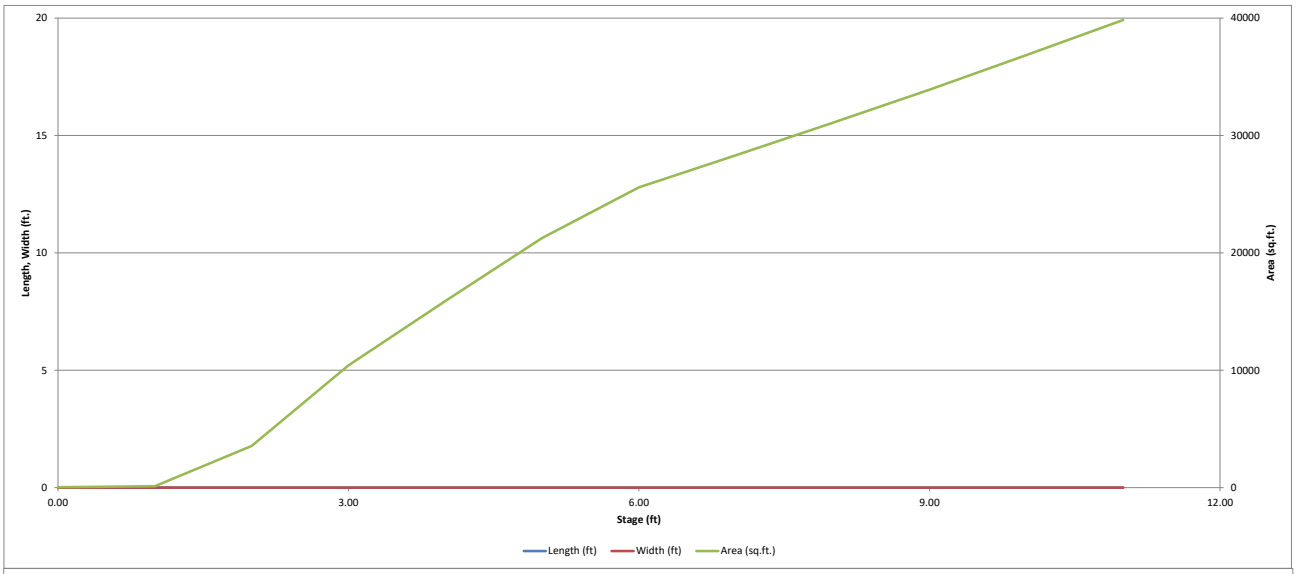
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.523	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.613	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.211	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.620	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.947	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.517	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.072	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.789	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3 in.) =	4.970	acre-feet	3.00	inches
Approximate 2-yr Detention Volume =	1.032	acre-feet		
Approximate 5-yr Detention Volume =	1.363	acre-feet		
Approximate 10-yr Detention Volume =	1.673	acre-feet		
Approximate 25-yr Detention Volume =	2.063	acre-feet		
Approximate 50-yr Detention Volume =	2.320	acre-feet		
Approximate 100-yr Detention Volume =	2.657	acre-feet		

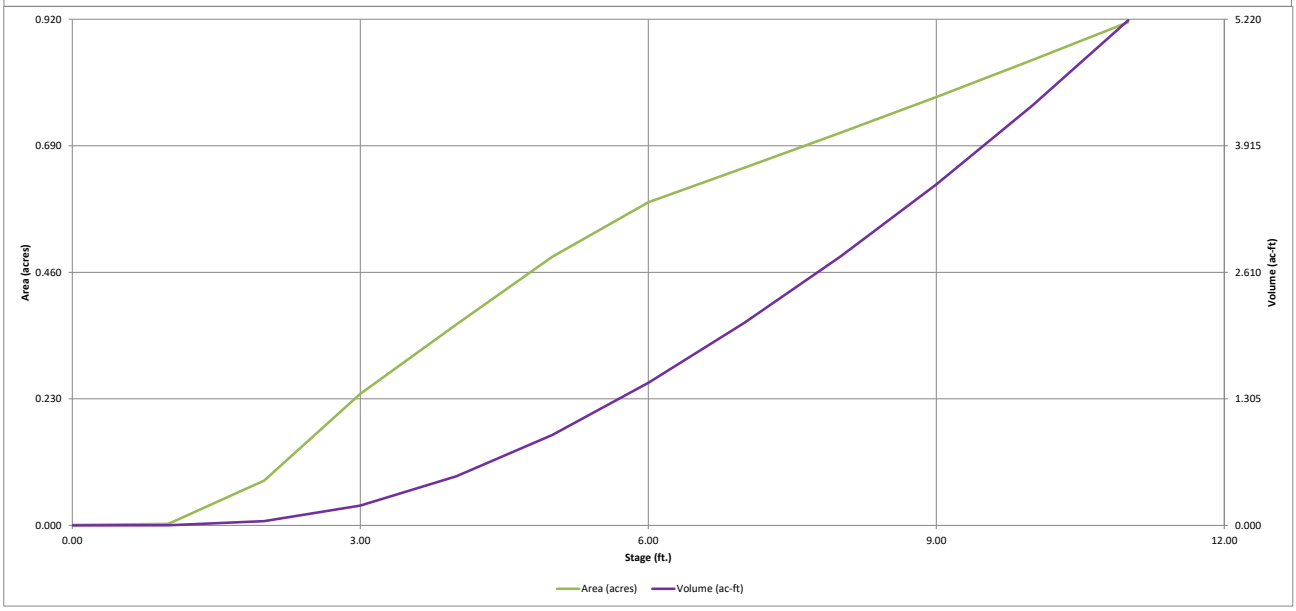
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.523	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.091	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.044	acre-feet
Total Detention Basin Volume =	2.657	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



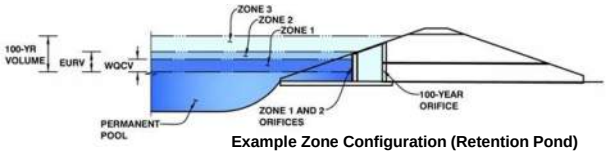


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **Platte Self Storage**

Basin ID: **Stormwater Pond**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.05	0.523	Orifice Plate
Zone 2 (EURV)	6.24	1.091	Orifice Plate
Zone 3 (100-year)	7.84	1.044	Weir&Pipe (Restrict)
Total (all zones)		2.657	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)

Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft^2

Underdrain Orifice Centroid = feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	5.56	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.70	3.40	4.10				
Orifice Area (sq. inches)	1.64	1.64	1.50	3.00				

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	8.00	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	8.00	N/A	feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	10.11	N/A	
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	12.66	N/A	ft^2
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	6.33	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.25	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.56	N/A	feet
Restrictor Plate Height Above Pipe Invert =	12.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.91	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	9.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.93 feet
Spillway Crest Length =	23.00	feet	Stage at Top of Freeboard =	10.93 feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.91 acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	5.15 acre-ft

Calculated Parameters for Spillway

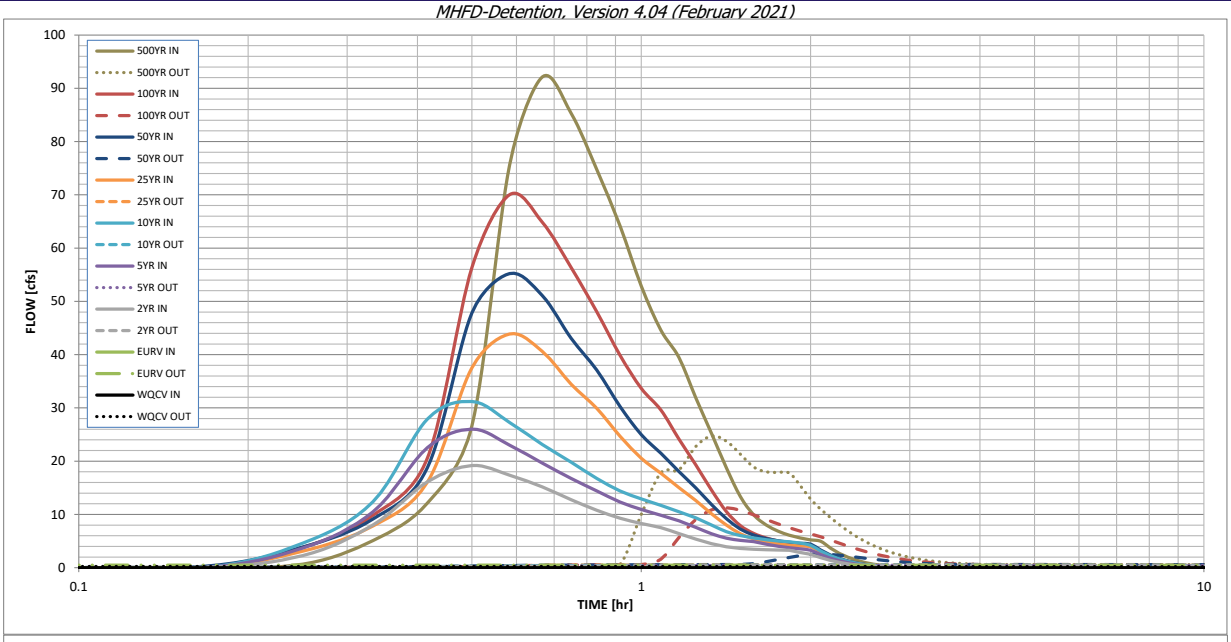
Routed Hydrograph Results

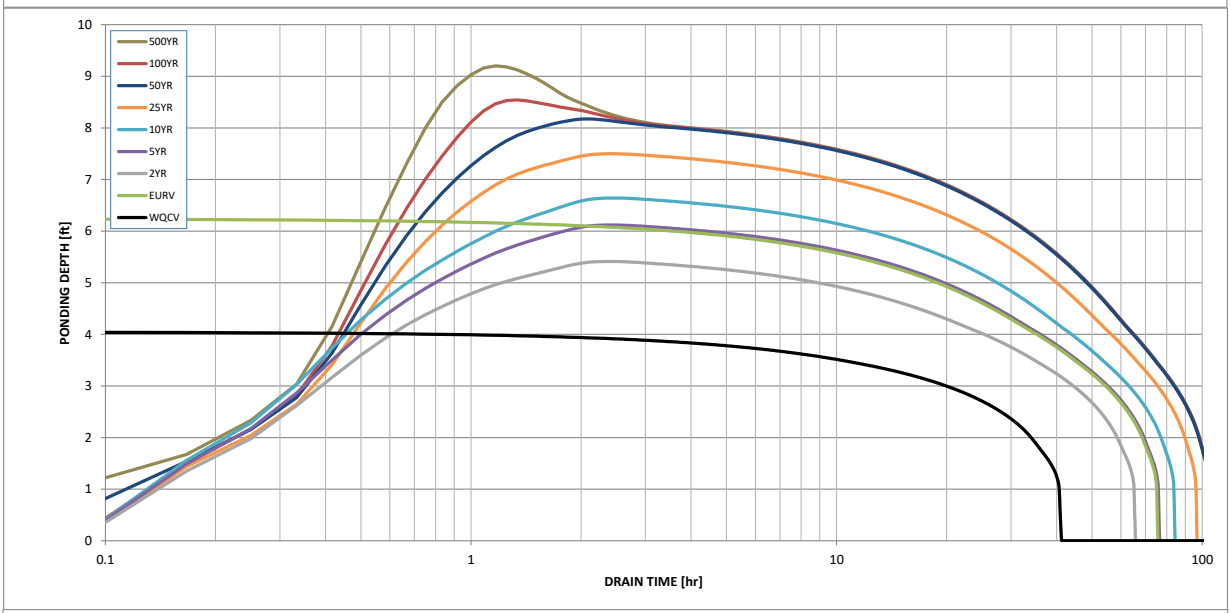
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

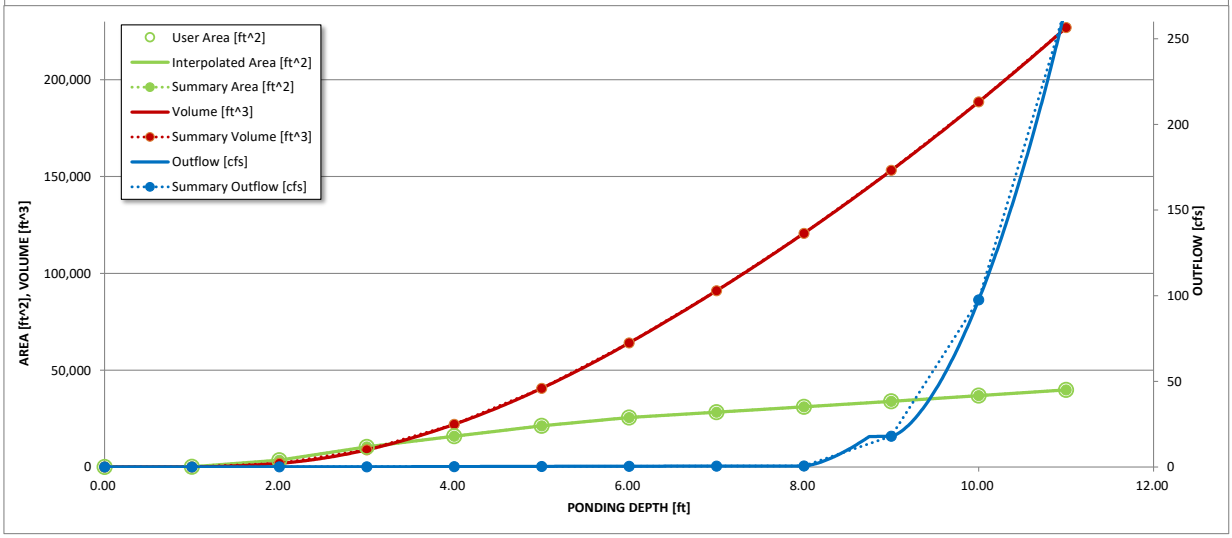
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.00
CUHP Runoff Volume (acre-ft) =	0.523	1.613	1.211	1.620	1.947	2.517	3.072	3.789	4.970
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.211	1.620	1.947	2.517	3.072	3.789	4.970
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	0.6	0.8	7.3	14.6	23.9	38.1
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.02	0.22	0.44	0.72	1.16
Peak Inflow Q (cfs) =	N/A	N/A	19.2	26.0	31.2	43.9	55.2	70.0	92.1
Peak Outflow Q (cfs) =	0.2	0.5	0.4	0.5	0.5	0.6	2.6	11.3	24.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	0.6	0.1	0.2	0.5	0.6
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.2	0.8	1.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	68	60	69	76	87	93	92	89
Time to Drain 99% of Inflow Volume (hours) =	**40**	72	63	73	81	92	100	99	98
Maximum Ponding Depth (ft) =	4.05	6.24	5.41	6.12	6.64	7.50	8.18	8.54	9.20
Area at Maximum Ponding Depth (acres) =	0.37	0.60	0.53	0.59	0.63	0.68	0.72	0.75	0.79
Maximum Volume Stored (acre-ft) =	0.525	1.614	1.142	1.536	1.859	2.415	2.893	3.166	3.674

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

PLATTE SELF STORAGE

PROPOSED FORBAY DESIGN VOLUME

ELEV (FT + 6000)	*AREA (SF)*	*AREA AVG. (SF)*	*DELTA ELEV. (FT)*	*VOLUME (CF)*	*VOLUME TOTAL (CF)*
204.00	468				
		468	1.5	702	
206.00	468				702

205.5 684

End Area Method: **702** C.F.
0.016 A.F.

3% of WQCV = 683.46 cu-ft

TOTAL= ***702.00*** **>** **683.46**

PROPOSED MICROPOOL VOLUME

ELEV (FT + 6000)	*AREA (SF)*	*AREA AVG. (SF)*	*DELTA ELEV. (FT)*	*VOLUME (CF)*	*VOLUME TOTAL (CF)*
199.50	35				
		35	2.5	87	
202.00	35				87

End Area Method: 87 C.F.
0.002 A.F.

Forebay Wall Notch

Notch to releae 2% of the undetained 100-year peak discharge.

100-y peak discharge	=	**23.9**	cfs
2.0%	=	**0.48**	cfs

The general form of the equation for horizontal crested weirs is Q = CLH3/2 where:

Q = Weir flow discharge (cfs)	**0.48**	
C = Weir flow coefficient	3.4	
H = Depth of flow over the weir (ft)	1.50	Opening Height
L = Length of the weir (ft)	**0.08**	Length
L = Length of the weir (in)	**1**	

Minimim notch length is 3" per standards

Notch to releae 2% of the undetained 100-year peak discharge is 3" wide by 18" high (min allowed)

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project:	**Platte Self Storage**		Location:	2' TRICKEL CHANNEL	
By:	JS	Date:	4/29/2024		
Chk By:	DF	Date:	4/29/2024		version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

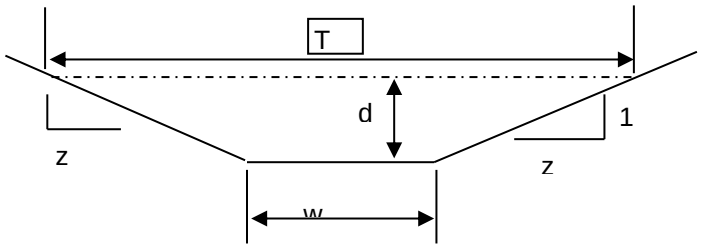
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	0
z (sideslope)=	0
b (btm width, ft)=	2
d (depth, ft)=	0.5
S (slope, ft/ft)	0.01
n_{low} =	0.013
n_{high} =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.5	1.00	3.00	0.33	5.49513943	5.49514	5.495139	5.49514	T =	2
								Dm =	0.500
				Sc low =	0.0053	Sc high =	0.0053		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0037	0.0069	0.0037	0.0069		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

Please provide erosion protection for this open channel as velocity is above the standard velocity per DCM vol.1, chapter 10, table 10-4

Please include calculations for trickle channel, emergency spillway, ripraps, stilling basin.

Per DCMv2 – Chap 4.2, trickle channel should at a minimum provide capacity equal to twice the release capacity at the upstream forebay outlet. Provide these calcs in the drainage report and revise plans as needed.

We need to know how much of the proposed area of disturbance (not just the impervious surfaces) is treated vs untreated and if there are any exclusions that apply to the untreated areas. So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc.) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#). An accompanying summary table on this map would also be very helpful (example provided):

DRAINAGE MAPS

Water Quality Treatment Summary Table

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond A (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.# (ac)	Applicable WQ Exclusions (App I.7.1.B.#)
A	4.50	4.50	4.50				
B	1.25	1.25		1.25			
C	6.00	4.00				4.00	ECM App I.7.1.B.5
D	2.50	2.50	1.00		0.50	1.00	ECM App I.7.1.B.7
E	3.00		3.00				
F	8.25						
Total	25.50	12.25	8.50	1.25	0.50	5.00	
Comments		*[For each row, the sum of the values in Columns 4-7 must be greater than or equal to the value in Column 3 above.]*	*[Values in this column can be more than Column 3 if over-treating non-disturbed areas of the same land-use.]*	*[See RR calc spreadsheet.]*	*[Total must be <20% of site and <1ac.]*		

Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)	Total Proposed Disturbed Area Excluded from WQ (ac)	Minimum Area to be Treated (ac)
12.25	9.75	5.50	6.75

PLATTE SELF STORAGE
SITE DEVELOPMENT PLAN
EXISTING DRAINAGE MAP
MAY 2024

LEGEND

- P-7 / 12.22 / 85 IMP — BASIN DESIGNATION, AREA IN BASIN (AC), PERCENT IMPERVIOUS
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- TIME OF CONCENTRATION PATH

NOTES

1. BROWN GROUND SURFACE CONTOURS ARE LIDAR DATA DOWNLOADED FROM THE COLORADO HAZARD MAPPING & RISK MAP PORTAL, DATA SET: 2018 3DEP EAST CO EL PASO. THIS DATA IS APPROXIMATE. LIDAR DATA IS FROM 2018 AND AT 2' INTERVALS.

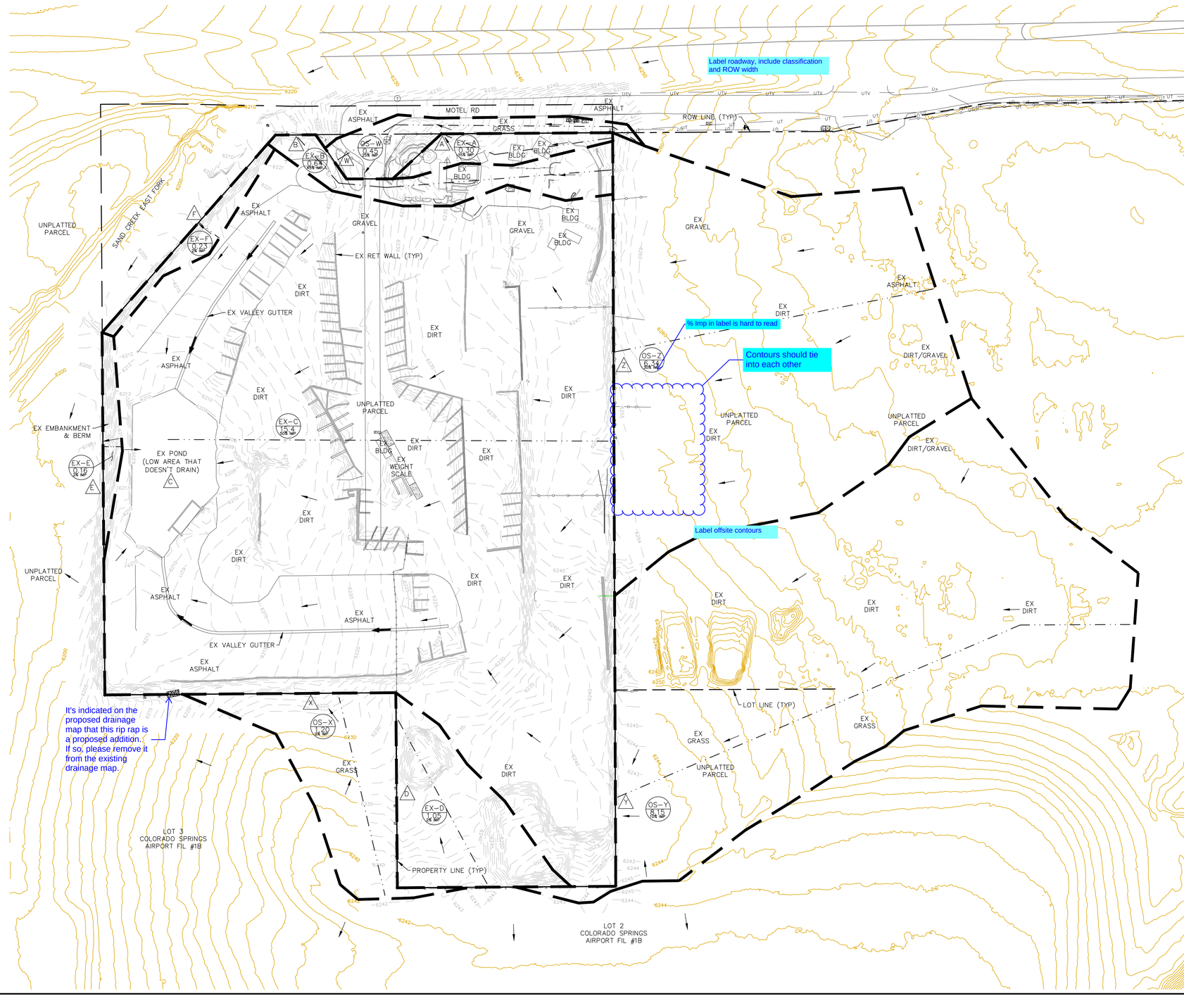
2. THE EXISTING SITE IS A LANDSCAPING MATERIALS YARD. GROUND SURFACES ARE DIRT, GRAVEL, AND ASPHALT. THE EDGE OF ASPHALT IS OFTEN COVERED BY DIRT/GRAVEL AND IT'S EXTENTS ARE ONLY ROUGHLY KNOWN.

BASIN SUMMARY

BASIN	AREA TOTAL (Acres)	TOTAL FLOWS Q_5 (c.f.s.)	TOTAL FLOWS Q_{100} (c.f.s.)
OS-Z	6.34	6.1	16.7
OS-Y	8.15	3.6	15.4
OS-X	1.20	0.4	2.3
OS-W	0.45	0.5	1.3
EX-A	0.30	0.2	0.8
EX-B	0.64	1.1	2.6
EX-C	15.4	29.0	65.0
EX-D	1.05	0.3	1.9
EX-E	0.16	0.1	0.5
EX-F	0.23	0.1	0.7

DESIGN POINT SUMMARY

Design Point(s)	Contributing Basins	Area (ac)	Flow (cfs) Q_5	Flow (cfs) Q_{100}
Z	OS-Z	6.34	6.1	16.7
Y	OS-Y	8.15	3.6	15.4
X	OS-X,EX-D	2.25	0.7	4.2
W	OS-W	0.45	0.5	1.3
A	EX-A	0.30	0.2	0.8
B	EX-B	0.64	1.1	2.6
C	OS-Z,OS-Y,OS-X,EX-C,EX-D	32.14	39.4	101.4
D	EX-D	1.05	0.3	1.9
E	EX-E	0.16	0.1	0.5
F	EX-F	0.23	0.1	0.7



REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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Creative Civil Engineering Solutions
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnesinc.com

PLATTE SELF STORAGE

EXISTING DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2419.00
DATE ISSUED 05/07/24
SHEET NO. 1 OF 4

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PLATTE SELF STORAGE

SITE DEVELOPMENT PLAN

PROPOSED DRAINAGE MAP

MAY 2024

LEGEND

- P-7 / 12.22 / 25 IMP — BASIN DESIGNATION, AREA IN BASIN (AC), PERCENT IMPERVIOUS
- D — DESIGN POINT
- BASIN BOUNDARY
- EXISTING 1' CONTOUR
- GROUND SURFACE FLOW DIRECTION
- ROAD AND DITCH FLOW DIRECTION
- PROPOSED RETAINING WALL
- TIME OF CONCENTRATION PATH

NOTES

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BASIN SUMMARY

BASIN	AREA TO TAL (Acres)	TOTAL FLOWS Q_5 (c.f.s.)	TOTAL FLOWS Q_{100} (c.f.s.)
OS-Z	6.34	6.1	16.7
OS-Y	8.15	3.6	15.4
OS-X	1.20	0.4	2.3
OS-W	0.45	0.5	1.3
1	0.07	0.0	0.2
2	0.13	0.1	0.4
3	5.12	23.1	41.4
4	3.66	8.2	16.8
5	0.56	0.1	0.9
6	6.64	3.1	13.1
7	0.34	0.2	1.1
8	0.30	0.2	1.0
9	0.59	0.2	1.5
10	0.40	0.3	1.4

DESIGN POINT SUMMARY

Design Point(s)	Contributing Basins	Area (ac)	Flow (cfs) Q_5	Flow (cfs) Q_{100}
1	PR-1	0.07	0.0	0.2
2	PR-2	0.13	0.1	0.4
3	PR-3	5.12	23.1	41.4
4	OS-Y,PR-4	11.81	11.8	32.2
5	OX-X,PR-5	1.76	0.5	3.3
6	PR-6	6.64	3.1	13.1
7	PR-7	0.34	0.2	1.1
8	PR-8	0.30	0.2	1.0
9	PR-9	0.59	0.2	1.5
10	OS-Z,PR-10	6.74	6.4	18.1

See comments on summary table in report

Please display more off-site contour 50 -200 feet beyond the boundary or drainage basin delineation line to illustrate how the runoff diverges from the site.

Please show and label all side slope of the pond. Side slope cannot be steeper than 3:1.

Please consider the distance between inlet and outlet. Distance measured along the trickle channel (from inlet to outlet) to the average basin width is at least 1.5:1, and greater than 2:1 is preferred. USDCM, Chapter 4, T-6.

Please show all drainage easements.

Please show and label spillway with type, size, and condition.

Disturbed areas must be within the drainage basin boundary.

Please provide calculation for the riprap

Please show and label the maintenance access connection to a stable, existing/proposed driveway/local roadway.

All pond components must be called out and labeled within the drainage map.

Please label all grass swale IDs to match the calculations, including the slope of each swale, ownership details, and its condition.

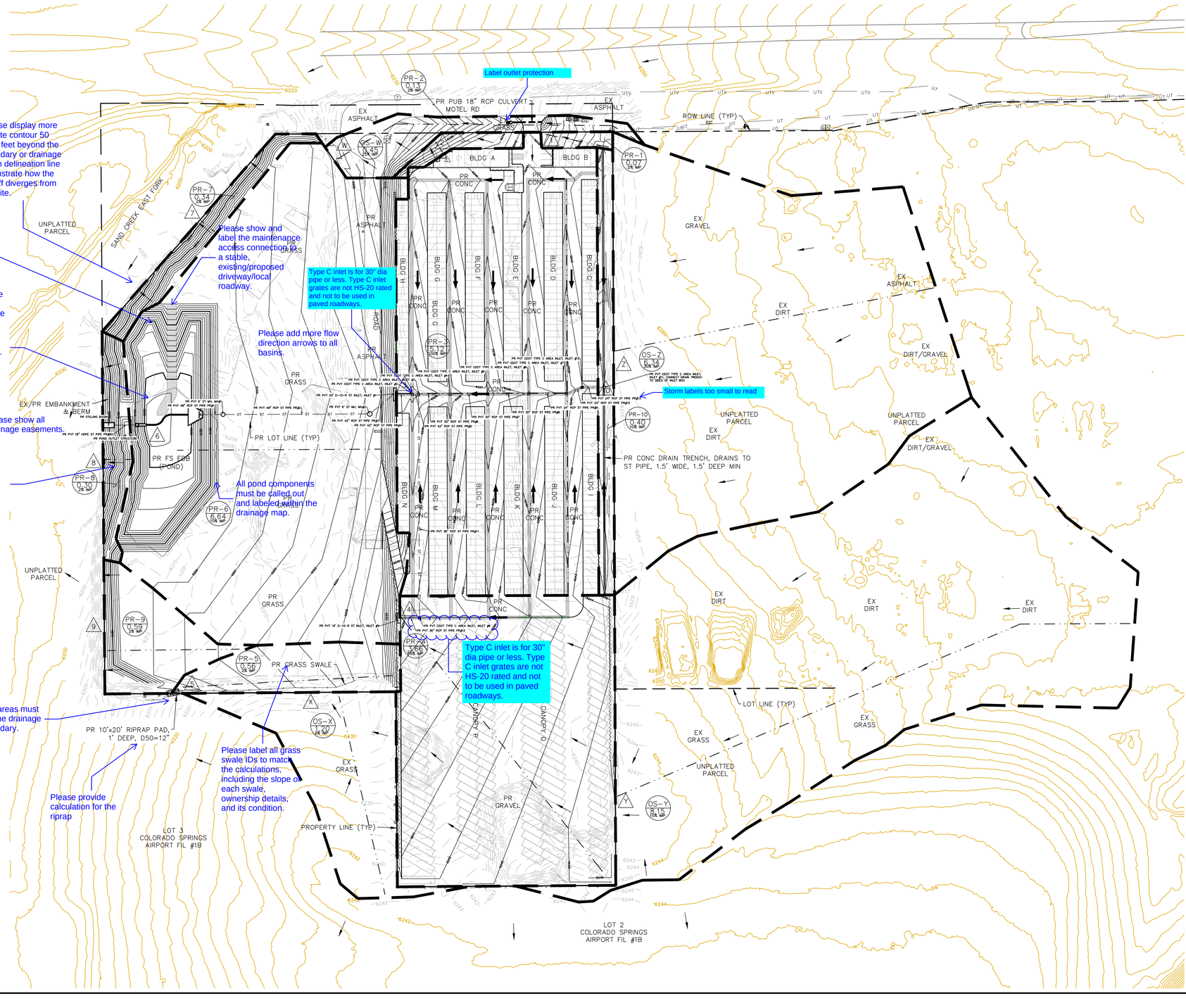
Please add more flow direction arrows to all basins.

Label outlet protection

Type C inlet is for 30" dia pipe or less. Type C inlet grates are not HS-20 rated and not to be used in paved roadways.

Type C inlet is for 30" dia pipe or less. Type C inlet grates are not HS-20 rated and not to be used in paved roadways.

Storm labels too small to read



REVISIONS

NO.	DESCRIPTION	DATE

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PLATTE SELF STORAGE

PROPOSED DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2419.00
DATE ISSUED 05/07/24
SHEET NO. 2 OF 4

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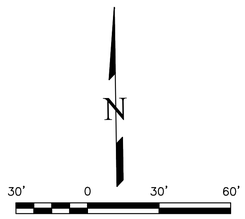
PLATTE SELF STORAGE
SITE DEVELOPMENT PLAN
PROPOSED DETENTION POND
MAY 2024

FOR REFERENCE ONLY
NOT FOR CONSTRUCTION

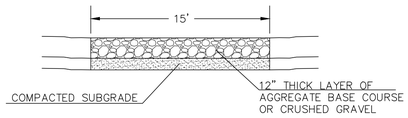
GRADING LEGEND

PROPOSED	PR	EXISTING CONTOURS – MINOR	6231
EXISTING	EX	EXISTING CONTOURS – MAJOR	6230
FINISHED SURFACE	FS	PROPOSED CONTOURS – 1'	6231
FINISHED GROUND	FG	EXISTING PROPERTY LINE	
TOP OF CURB	TC	PROPOSED RET WALL	
FLOWLINE	FL	PROPOSED RIPRAP	
FINISH GROUND AT TOP OF WALL	TW	WATER LINE	W
FINISHED GROUND AT BOTTOM OF WALL	BW	SANITARY SEWER LINE	SS
LOW POINT	LP	GAS LINE	UG
HIGH POINT	HP	UNDERGROUND ELECTRICAL LINE	UE
FLOW ARROW		TELEPHONE LINE	UT
PROPOSED CONTOURS (LiDAR)	6130	FIBER OPTIC LINE	FO
		STORM SEWER LINE	ST
		LIMIT OF CONSTRUCTION	
		LIMIT OF SOIL DISTURBANCE	
		PROPOSED FENCE	
		FIRE HYDRANT	

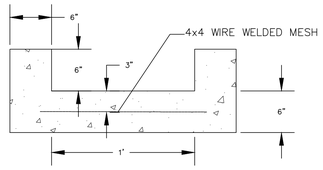


POND WATER LEVEL ELEVS
WQCV: 6206.05
EURV: 6208.24
100-YR: 6210.54

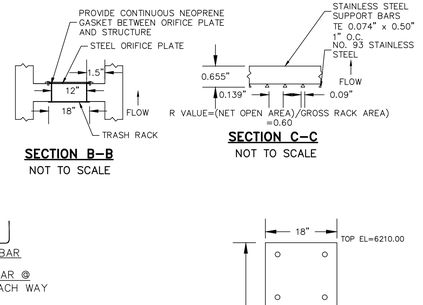
Construction plans are not reviewed within the drainage report. Please remove.



15' MAINTENANCE ACCESS ROAD SECTION
NOT TO SCALE

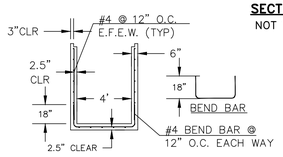


1' CONCRETE TRICKLE CHANNEL
NOT TO SCALE

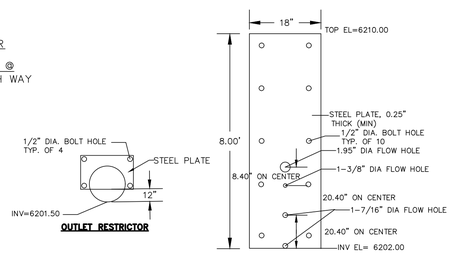


SECTION B-B
NOT TO SCALE

SECTION C-C
NOT TO SCALE

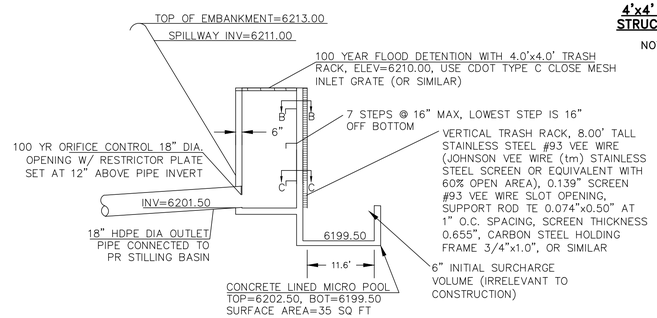


4'x4' OUTLET BOX STRUCTURAL DETAIL
NOT TO SCALE

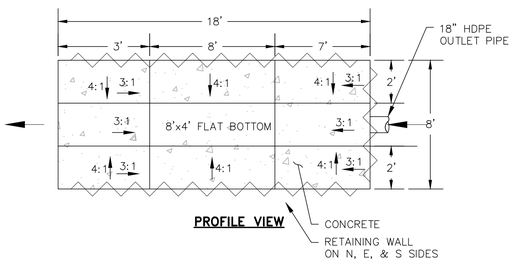


OUTLET RESTRICTOR

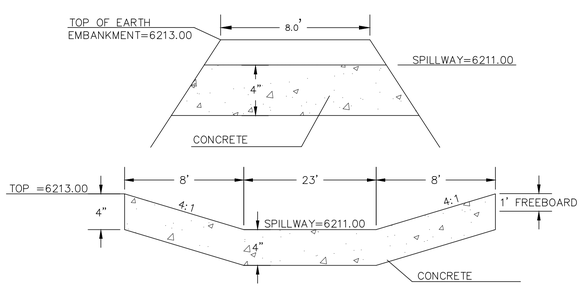
INLET ORIFICE PLATE PERFORATED HOLE PATTERN
NOT TO SCALE



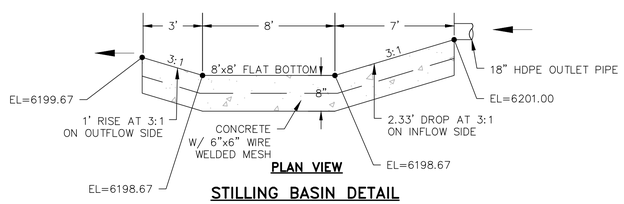
OUTLET STRUCTURE
NOT TO SCALE



PROFILE VIEW

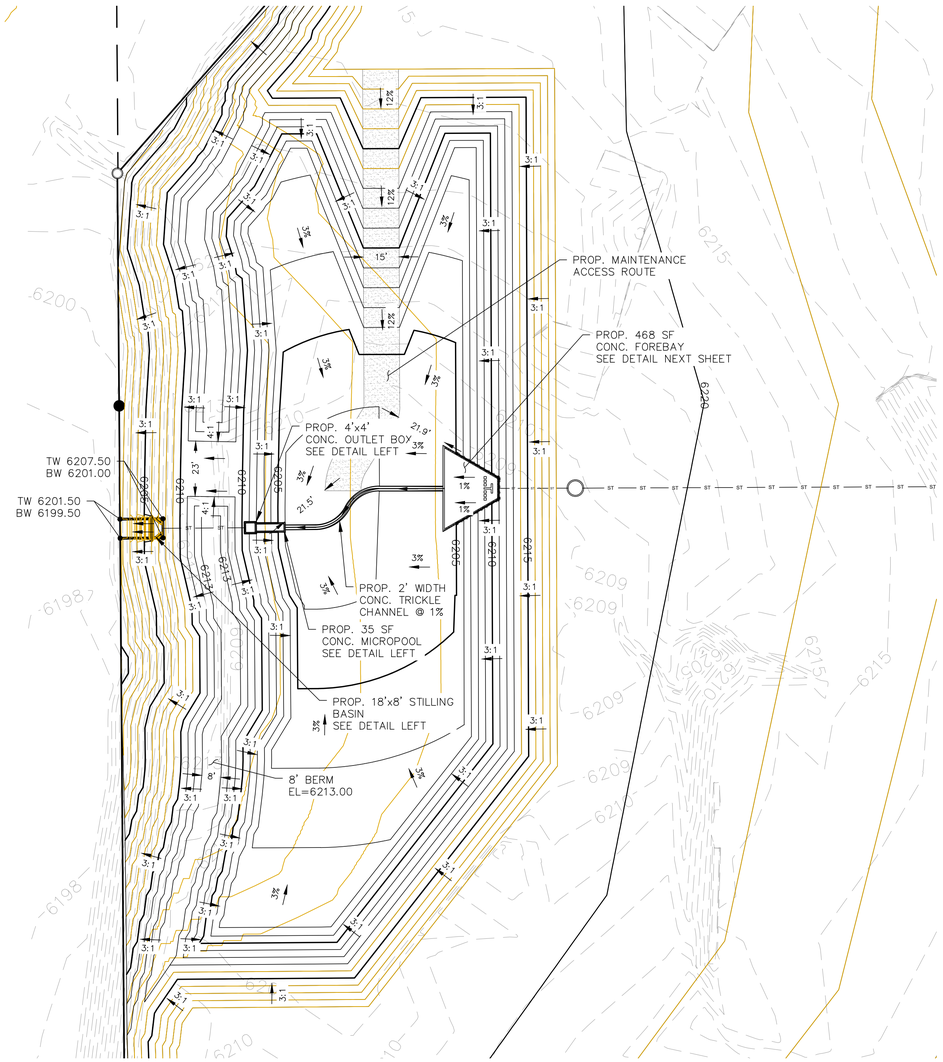


EDB EMERGENCY WEIR
NOT TO SCALE



PLAN VIEW

STILLING BASIN DETAIL
NOT TO SCALE



NOTES

1. ALL HDPE STORM PIPE IS TO BE SMOOTH INTERIOR PIPE.
2. LARGE BLOCKS OF TEXT QUOTING STANDARD DRAWINGS OR DETAILS ARE INCLUDED AS A REQUIREMENT OF COUNTY REVIEWERS.

BENCHMARKS

#5 REBAR WITH ORANGE PLASTIC CAP MARKED "CSAM, LLC PLS 32439", FLUSH WITH GROUND – ELEV.=6513.85 (NAVD-1988) [NORTHWEST PROPERTY CORNER]

REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:
RMG-ROCKY MOUNTAIN GROUP
ATTN:
5085 LIST DR. #200
COLORADO SPRINGS, CO 80919
719.548.0600

Terra Nova Engineering, Inc. "Creative Civil Engineering Solutions"
721 S. 23RD STREET
COLORADO SPRINGS, CO 80904
OFFICE: 719-635-6422
FAX: 719-635-6426
www.tnesinc.com

PLATTE SELF STORAGE

PROPOSED DETENTION POND

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD

H-SCALE AS SHOWN
V-SCALE N/A

JOB NO. 2419.00
DATE ISSUED 05/07/24
SHEET NO. 3 OF 4

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PLATTE SELF STORAGE
SITE DEVELOPMENT PLAN
PROPOSED DETENTION POND
MAY 2024

GRADING LEGEND

PROPOSED	PR	EXISTING CONTOURS – MINOR	6231
EXISTING	EX	EXISTING CONTOURS – MAJOR	6230
FINISHED SURFACE	FS	PROPOSED CONTOURS – 1'	6231
FINISHED GROUND	FG	EXISTING PROPERTY LINE	
TOP OF CURB	TC	PROPOSED RET WALL	
FLOWLINE	FL	PROPOSED RIPRAP	
FINISH GROUND AT TOP OF WALL	TW	WATER LINE	W
FINISHED GROUND AT BOTTOM OF WALL	BW	SANITARY SEWER LINE	SS
LOW POINT	LP	GAS LINE	UG
HIGH POINT	HP	UNDERGROUND ELECTRICAL LINE	UE
FLOW ARROW		TELEPHONE LINE	UT
PROPOSED CONTOURS (LiDAR)	6130	FIBER OPTIC LINE	FO
		STORM SEWER LINE	ST
		LIMIT OF CONSTRUCTION	
		LIMIT OF SOIL DISTURBANCE	
		PROPOSED FENCE	
		FIRE HYDRANT	

POND WATER LEVEL ELEVS

WQCV: 6206.05
EURV: 6208.24
100-YR: 6210.54

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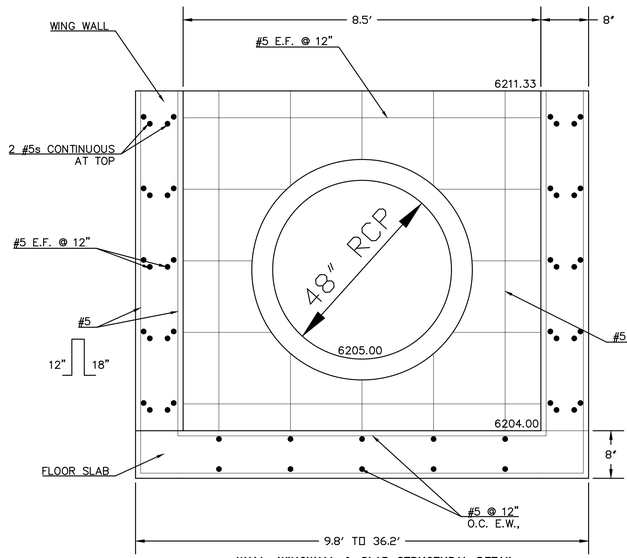
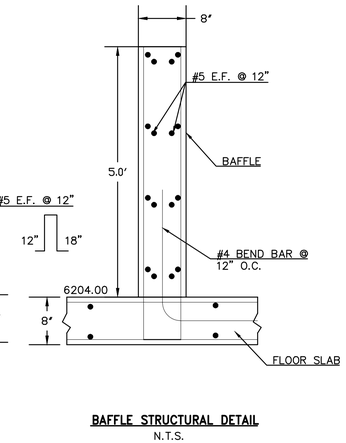
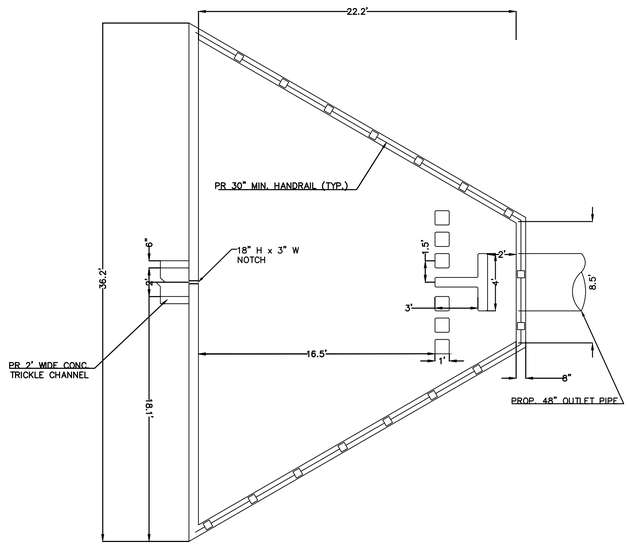


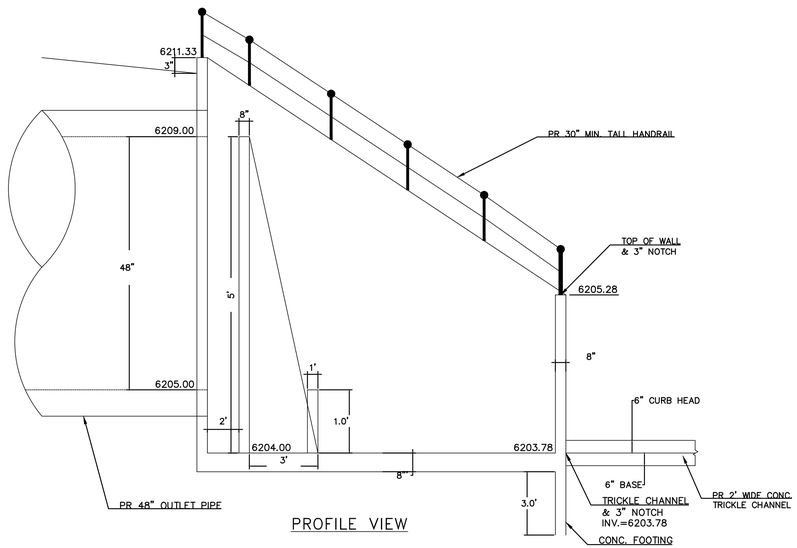
WALL, WINGWALL & SLAB STRUCTURAL DETAIL
N.T.S.



BAFFLE STRUCTURAL DETAIL
N.T.S.



FOREBAY PLAN VIEW
1"=5'



PROFILE VIEW

FOREBAY PROFILE VIEW
N.T.S.

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