FINAL DRAINAGE REPORT
FOR
LOT 5 OF CLEARWAY

EL PASO COUNTY, COLORADO

August 2023

Prepared for:
WIRENUT HOME SERVICES
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Prepared by:

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Project #44-042

PCD Project No. PPR-22-034

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LOT 5 OF CLEARWAY

DRAINAGE PLAN STATEMENTS

ENGINEERS STATEMENT

The attached drainage plan and report was 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 omission on my part in preparing this report.

COLORADO REGISTERED
VIRGIL A. SANCHEZ
37160
08/10/23
PROFESSIONAL ENGINEER

Virgil A. Sanchez, P.E. #37160
For and on Behalf of M&S Civil Consultants, Inc

DEVELOPER'S STATEMENT

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

BY: _____

TITLE: Owner
DATE: 10/10/23

ADDRESS: Wirenut Home Services
~~6395 E. Platte Ave.~~ 525 Babcock Rd
Colorado Springs, CO 80915

EL PASO COUNTY'S STATEMENT

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

BY: _____ DATE: _____
County Engineer/ECM Administrator

CONDITIONS:

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PURPOSE

This document is intended to serve as the Final Drainage Report for the Lot 5 of Clearway. The purpose of this document is to identify and analyze the on and offsite drainage patterns and to ensure that post development runoff is routed through the site safely and in a manner that satisfies the requirements set forth by the El Paso County Drainage Criteria Manual. The development plan for Lot 5 will consist of asphalt parking lots, an office/warehouse building, asphalt storage, lighting, utility infrastructure, and landscaping. A Sand Filter Basin (Pond 1) is proposed to provide on-site water quality and detention. The parcel is zoned "CS CAD-O" and the proposed use is permissible within the commercial zoning criteria.

GENERAL LOCATION AND DESCRIPTION

Lot 5 of Clearway is located in the north quarter of Section 18, Township 14 South, Range 65 West of the 6th P.M. in El Paso County, Colorado. The parcel is bound to the north by existing commercial buildings approximately 6 feet from the northern boundary, and the East Fork Sand Creek Sub-tributary to the south and to the east by Cherokee Metropolitan District property, and to the west by City of Colorado Springs property and northwest by The Wrangler Mobile Home Park. As shown on the enclosed FIRM panel, a channel known as the East Fork of Sand Creek Sub-tributary flows from north to south approximately 15 feet from the eastern boundary of the site. The site is located within the greater Sand Creek Drainage Basin and is tributary to the Sand Creek Channel via the East Fork Sand Creek Sub-Tributary. A vicinity map showing the location of the proposed development has been provided in the appendix of this report.

The embankment toe of existing channel along the southern boundary of the site was stabilized with buried riprap during the completion of previous Clearway Properties subdivision improvements. Per the construction drawings, which are included within the referenced reports portion of the appendix, the riprap bank lining extends approximately 90 feet upstream of the east property line to approximately 32 feet downstream of the west property line. The typical section is constructed of 3 feet thick, type H riprap that extends 4 feet above and 3 feet below the toe of the slope at a 2:5:1 grade (SF96017). The embankment currently appears to be in stable condition, based on visual inspection, conducted by M&S Civil during the summer of 2023.

The proposed development and improvements will be constructed on approximately 3.05 acres of the 2.97-acre parcel and surrounding properties as well. The site is currently zoned "CS CAD-O" which is associated with commercial development. In the existing condition, both the parcel and offsite contributing watershed lands are sparsely vegetated, with ground cover consisting primarily of native grasses ranging in density from moderate to good. Construction related to the proposed development will consist of asphalt parking areas with an office/warehouse building, crushed asphalt storage area, lighting, landscaping, the installation of subsurface utilities, a water quality and detention storage pond and storm related conveyance structures. Slopes across the development typically range between 2% to 7%. Offsite flows reaching development are contributed in part from areas of The Wrangler Mobile

Home Park and the City of Colorado Springs property along the western boundary, from platted commercial property to the north and northeast. Flows produced within the development will be collected by proposed storm sewer improvements, swales, a riprap rundown, and will be routed to a proposed Sand Filter Basin (Pond 1) located at the southern boundary of the development.

PREVIOUS STUDIES AND PLANS

The following reports and plans were reviewed in the process of preparing this drainage study. The following summarizes the document intent or provides information that is of importance to the subject site:

- Drainage Letter for 6395 E. Platte Avenue, Colorado Springs, El Paso County, Colorado, by Law & Mariotti Consultants, Inc., Revised April 2003
    - Drainage report to accommodate construction of single story commercial building and parking on Lot 4, Clearway Subdivision Filing No. 2.
    - Report indicates that flows from onsite (Lot #4, Sub 2) and those reaching the site; were to be collected through a proposed 30" diameter RCP which is to outfall into East Fork of Sand Creek.
    - References that at the time of the writing of the report, Lot 5 is undeveloped and the recommended referenced stormwater improvements have not been installed.
    - Proposed flow reaching subject site (Lot #5) at DP2 total 31.57 cfs and 63.49 cfs in the 5 and 100-year events respectively (based upon full build-out).

- Grading & Erosion Control Plan for 6395 E. Platte Avenue, Colorado Springs, El Paso County, Colorado, by Kiowa Engineering Corporation.
    - Illustrated grading and drainage patterns for Lot #4, Clearway Subdivision Filing No. 2, located north of subject site.

- Drainage Letter Clearway No. 3, El Paso County, Colorado, by Oliver E Watts, Revised January 8, 2001
    - In support of Replat of Lot 3, Clearway into Clearway #3
    - All lots will drain westerly into the private drive, and then south down roadway
    - States that the original developer of the subdivision is responsible for the final routing of the runoff in accordance with the approved drainage plan, and the installation of the public and private improvements specified therein.
    - States that a letter of credit for aforementioned drainage improvements is on file with El Paso County

- Clearway No. 2 Final Plat, by MVE, Recorded, March 23, 1999.
    - Replats Clearway Lot 4, into four (4) Lots. Does not alter subject site.

- Drainage Letter and Grading and Erosion Control Plan, Platte View Office Complex Lots 1 and 2, Clearway Subdivision, El Paso County, Colorado, by Kiowa Engineering Corporation October 1998.
    - Illustrated grading and drainage patterns for lots (1 and 2), located north of subject site.
    - Runoff from Lots shall be directed to the street section.

- Platte View Office Park Grading and Erosion Control Plan, by Kiowa Engineering Corporation, October 1998.
    - Illustrated grading and drainage patterns for 1.4 acres lots (1 and 2), located north of

subject site.

- Clearway Final Plat, by LDC, Recorded, June 6 1997.
    - Officially subdivides the 9.29 acres into 5 lots, Establish subject site (Lot 5), shows subject site being impacted by floodplain.

- Clearway Properties 6335 E. Platte Avenue, El Paso County, Colorado, Final Design – Sand Creek Channel Improvements, dated July 10, 1996
    - Illustrates required channel improvements recommended by the report listed below.
        - Specifies that the channel lining shall consist of a 3' type H riprap layer to a vertical height of 4' at a slope of 2.5:1.
    - Existing maps show significant head cut back into property near the channel, proposed map grading shows filling of the existing swale and slope grading adjacent to SC channel.

- Preliminary and Final Drainage & Erosion Control Study, Clearway Subdivision 6335 E. Platte Avenue, El Paso County, Colorado , by Kiowa Engineering Corporation, March 1996.
    - The subject site was including as a part of a 9.3 acre basin.
    - Indicates flows north of Hwy 24 do not reach the site.
    - Indicates a portion of the site (subject site) is impacted by a floodplain.
    - Proposes that ~293 of 30" storm sewer should be extended into the site to convey collected runoff to East Fork Sand Creek Channel (private drainage improvements)
        - This collection appears to not include subject site.
    - States that per the DBPS, riprap channel lining wall to contain the 100-year floodplain is required along the southeast property boundary of the site (public drainage improvements).
        - Specifies that the channel lining shall consist of a 3' type H riprap layer to a vertical height of 4' at a slope of 2.5:1.

- Sand Creek Drainage Basin Planning Study, - Preliminary Design Report, City of Colorado Springs, El Paso County, Colorado, by Kiowa Engineering Corporation, Rev, October 1995.
    - Based upon mapping the subject site is located within the Reach EFSC-2 of the SCDB
        - Indicates that this segment of channel shall provided 100-year riprap lining required 3' depth.

SOILS

Soils for this project are delineated by the map in the appendix as Ellicott Loamy Coarse Sand (28) on the southeast corner of the property and Blakeland Loamy Sandy (8) throughout the majority of the property, both of which are characterized as Hydrologic Soil Types "A". Soils in the study area are shown as mapped by Soil Conservation Service in the "Soils Survey of El Paso County Area".

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual and where applicable the Urban Storm Drainage Criteria Manual. The Rational Method was used to estimate stormwater runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

HYDRAULIC CALCULATIONS

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. The relevant data sheets are included in the appendix of this report.

FLOODPLAIN STATEMENT

A portion of the site lies within the 100 year floodplain according to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 08041C0543 F, effective date March 17, 1997 and the more recent FIRM Panel No. 08041C0754 G, effective date December 7, 2018. Base Flood Elevation (BFE) lines from FIRM Panel No. 08041C0754 G (NGVD29) are used for hydraulic calculations, drainage maps, and a discussion within this report. No development is anticipated to occur within the floodplain located at the northwest corner of the site. See Proposed Drainage Map and the FIRM Panels located in the appendix of this report for details. The "Floodplain Area" provided on the plat is identified to denote the portion of the lot encumbered by the floodplain. Tract A is provided for the portion of the adjacent easterly lot encumbered by the floodplain. The Floodplain application and Floodplain permit are included in this report, in the Floodplain Map section in the appendix. The portions of the developed lots within the 100 year flood zone, are annotated as such on the plat. Additional work will be at the discretion of the local floodplain administrator in accordance with FEMA policy.

DRAINAGE CRITERIA

This drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual and where applicable the City of Colorado Springs DCM Volume 1 dated May 2014 effective January 2015. Hydrologic calculations were performed to determine runoff quantities for the 5-year and 100-year frequency storms for developed conditions using the Rational Method as required for basins having areas less than 130 acres (in accordance with Chapter 6 of the City of Colorado Springs DCM Volume 1). Full spectrum detention facilities have been designed in accordance with Section 3.2.1. of Chapter 13 of the City of Colorado Springs DCM Volume 1, dated May 2014, effective January 31, 2015 and Urban Drainage and Flood Control District Manuals dated January 2016.

FOUR STEP PROCESS

Step 1: Employ Runoff Reduction Practices. – Approximately 0.5 acres of the proposed, 2.97 acre development is being set aside for a Sand Filter Basin. Whenever possible, runoff produced within developed areas containing impervious surfaces will be routed through landscaped areas or earthen swales (grass-lined where slope exceeds 2%) to minimize direct connection of impervious surfaces.

Step 2: Stabilize drainage ways –The Lot 5 at Clearway site, proposes a Full Spectrum Detention (FSD) Pond to control developed runoff that is discharging to the East Fork Sand Creek Sub-Tributary located at southeastern boundary of the subject site. The FSD outlet structure has been designed to drain the water quality event storm in 40 hours, while reducing the 100 year peak discharge to approximately 90% of the predevelopment conditions. As such the development of the site is not anticipated to have negative effects on downstream drainageways. The toe of the existing embankment slope was previously stabilized using type 'H' riprap that extends 4 feet above and 3

feet below the toe of the slope at a 2:5:1 grade as a portion of the Clearway Properties subdivision improvements. This existing riprap bank lining extends approximately 90 feet upstream of the east property line to approximately 32 feet downstream of the west property line. Proposed riprap stilling basins located at the proposed pipe outfalls and erosion control matting placed along the proposed spillway embankment slope will also function to arrest erosion potential adjacent to existing drainage way.

Step 3: Provide water quality capture volume. – A Full Spectrum Detention Pond is proposed to reduce peak discharge rates and provide water quality treatment. The WQCV will be released over a 40 hour period while larger event storms will be released in periods of times between 64-80 hours.

Step 4: Consider Need for Industrial and Commercial BMP's – This submittal provides a final grading and erosion control plans with BMPs in place. The proposed project will use silt fence, inlet protection, straw bales, a vehicle tracking control pad, and concrete washout area, mulching and reseeding to mitigate the potential for erosion across the site. Wirenut Home Services shall be responsible for existing and potentially necessary the BMPs for the site including staging, storage and stockpile areas as determined by the contractor. Individual lot owners will be responsible for additional permanent BMPs if necessary, because of site uses.

EXISTING DRAINAGE CONDITIONS

Lot 5 of Clearway site consists of 2.97 acres situated north and west of the East Fork Sub-tributary of Sand Creek. There are no existing structures within the site. In accordance with El Paso County's Engineering Criteria Manual (ECM) and Drainage Criteria Manual's (DCM Vol. 1 & 2), an existing conditions hydrologic analysis was performed to determine existing flow quantities entering and exiting the subject site so a comparison to post development discharge rates could be made. As shown on the enclosed Existing Drainage Map (located in the appendix of this report) the existing site terrain within the parcel generally slopes from north to south at grades that vary between 2% to 15%. Site vegetation for the undeveloped areas is sparse, consisting primarily of native grasses. An existing 6-8" concrete retaining wall lies approximately 6-12 feet from the northern boundary of the site and protects a portion of the site from erosion effects from the offsite commercial area located to the north. The East Fork of Sand Creek Channel runs from the northeast to southwest along the southern boundary of the site. During a site visit it was observed that existing embankment, adjacent to the site, appears to be relatively stable and the slope grading appears to reflect conditions similar to that which was proposed on Clearway Properties, LLC Sand Creek Channel Improvement plans. Vegetation consisting of native grasses is present along the embankment slope as are a few small trees. A few pieces of exposed riprap used to stabilize the channel embankment, from a previous stabilization project, were present at the toe of the slope. Additional information regarding the improvements adjacent to the subject site have been provided in the Referenced Reports/Background Information in the Appendix. An overlay of the 100 yr floodplain (Zone AE) is shown on the Floodplain Map in the appendix, of which 0.28 acres overlaps the southeast corner of the site. Refer to the enclosed Existing Drainage Map in the appendix for visual representation of the detailed, existing drainage patterns discussed below.

Detailed Drainage Discussion

Design Point 1 ((DP1), Q5 = 7.3 cfs, Q100 = 14.0 cfs) receives runoff produced by **Basin D** (Q5 = 7.3 cfs, Q100 = 14.0 cfs), which consists of commercial, gravel and native grass covered platted land located along the northeast parcel property boundary. Runoff produced by **Basin D** is conveyed as sheet flow and earthen swale to the east towards **Design Point 1.** These flows will be routed via a retaining wall to **Design Point 2**.

Design Point 2 (**(DP2)**, Q5 = 22.5 cfs, Q100 = 42.3 cfs) receives runoff produced by **Basin B** (Q5 = 8.9 cfs, Q100 = 16.6 cfs), **Basin C** (Q5 = 8.3 cfs, Q100 = 15.4 cfs) and **DP 1**. These basins consist of platted commercial lots and a 30 foot street for ingress/egress. Flows produced by **DP1** join with flows from **Basin C** and are conveyed by a retaining wall along the south border of **Basin C**. Runoff produced by **Basins B and Basin C** is conveyed as sheet flow towards **Design Point 2.** Runoff from **Design Point 2** continues southeast towards **Basin F**.

Design Point 3 (**(DP3)**, Q5 = 22.8 cfs, Q100 = 44.6 cfs) receives runoff produced by **DP 2** and **Basin F** (Q5 = 0.3 cfs, Q100 = 2.5 cfs), which consists of native grass covered platted land located northeastern portion of the property. Runoff from these basins is conveyed as sheet flow to the southeast and is released on the southeast boundary of **Basin F** and routed southeast towards **Design Point 3.** This runoff travels south and east via an offsite swale, ultimately out-falling into the East Fork Sand Creek Sub-Tributary.

Design Point 4 (**(DP4)**, Q5 = 9.3 cfs, Q100 = 27.0 cfs) receives runoff produced by **Basin A** (Q5 = 9.3 cfs, Q100 = 27.0 cfs), which consist of developed gravel and un-developed native grass covered platted land located along the west portion of the property boundary. Runoff produced by **Basin A** is conveyed as sheet flow to the southeast towards **DP 4** on the west portion of the property boundary. Runoff from **DP 4** continues southeast towards **Basin E**.

Design Point 5 (**(DP5)**, Q5 = 9.6 cfs, Q100 = 28.9 cfs) receives runoff produced by **DP 4** and **Basin E** (Q5 = 0.3 cfs, Q100 = 2.3 cfs), which consists of native grass covered platted land located at the west portion of the property boundary. Runoff from **DP 4** and **Basin E** is conveyed as sheet flow to the south and southwest and is captured by an existing swale on the western property boundary, then routed southeast towards **DP 5.** This runoff outfalls into the existing channel shared by **Basin G**, which drains southeast to the East Fork Sand Creek Sub-Tributary.

Design Point 6 (**(DP6)**, Q5 = 31.0 cfs, Q100 = 72.3 cfs) receives runoff produced by **DP 3**, **DP 5** and **Basin G** (Q5 = 0.3 cfs, Q100 = 2.5 cfs), which consists of native grass covered platted land located at the southeast portion of the property. Runoff from **DP 3, DP 5** and **Basin G** encompass the runoff exiting the site which ultimately outfalls southeast to the East Fork Sand Creek Sub-Tributary.

The cumulative runoff value at DP6 are from the onsite flows and do not include the East Fork Sand Creek Sub-Tributary upstream flows and have been provided as a means to compare the pre and post development runoff anticipated to reach the channel (DP6).

The value provided by FEMA for Sand Creek East Fork Sub-Tributary at confluence with Sand Creek East Fork is 1970 cfs for the 100-year event.

PROPOSED DRAINAGE CHARACTERISTICS

The proposed development and improvements will be constructed on approximately 2.97 acres on-site, but 3.05 acres total (including off-site properties). The majority of the site has been accounted for as a building and parking lot area with space for a storage yard and the remaining northern portion identified as Tract C being considered as pastureland/undeveloped is shown on the Proposed Drainage Map. Refer to the Proposed Drainage Map and hydraulic calculations un the Appendix for weighted runoff coefficients of the site. Proposed drainage patterns generally remain consistent with those in the existing condition with surface runoff traveling north to south. A swale is proposed on the western boundary of the site to capture and route offsite runoff south to the Sand Creek East Fork Subtributary. Storm sewer and inlets is proposed, on the north and eastern edge of the site, to capture and route offsite runoff south to the Sand Creek East Fork Subtributary. The onsite runoff, is conveyed via storm sewer and inlets to the proposed FSD pond. The runoff reaching the pond will be detained and discharged via a staged outlet structure and proposed 18" RCP storm system to the East Fork Sand Creek Sub-Tributary below historic rates. The outfall into the East Fork Sand Creek Sub-Tributary channel is armored with a proposed riprap pad and is grading away from main flows within the channel. Type M riprap and permanent erosion control mat is recommended to stabilize the emergency spillway bank and all proposed grading around the outfall. Refer to the Proposed Drainage Map in the appendix for an illustration of the proposed site drainage patterns. All storm sewer, drainage structure and pond are private, and shall be maintained by owner. A detailed description of the proposed drainage characteristics follows:

Detailed Drainage Discussion

Design Point 1: ((DP1), Q5 = 6.8 cfs, Q100 = 12.7 cfs)
DP1 consists of 2.30 acres of offsite **Basin B** (Q5 = 6.8 cfs, Q100 = 12.7 cfs). Surface runoff from the existing neighboring Clearway Industrial Park (parking lot, gravel lot, building) within this basin generally flows from north to south as sheet flow and is routed via curb and gutter to a modified triple Denver Type 16 inlet with a mountable grate configuration (**INLET 1:** Q5 = 4.3 cfs, Q100 = 6.5 cfs). The intercepted flows are conveyed east through an 18" PP **Pipe Run 1** (Q5 = 4.3 cfs, Q100 = 6.5 cfs) until they combine with flows from **DP2**. Uncaptured runoff from this design point is conveyed as flow-by, **FB DP1** (Q5 = 2.5 cfs, Q100 = 6.2 cfs) towards **DP3**.

Design Point 2 ((DP2), Q5 = 7.1 cfs, Q100 = 13.2 cfs)
DP2 consists of 2.40 acres of offsite **Basin C** (Q5 = 7.1 cfs, Q100 = 13.2 cfs). Runoff from the existing neighboring Clearway Industrial Park (parking lot, gravel lot, building) within this basin travels as sheet flow north to south and is routed via curb and gutter a modified triple Denver Type 16 inlet with a mountable grate configuration (**INLET 2:** Q5 = 4.4 cfs, Q100 = 6.7 cfs) at **DP2**. The intercepted flow combines with flows from **PR1** and are conveyed south through 24" PP **Pipe Run 2** (Q5 = 8.7 cfs, Q100 = 13.2 cfs) to **DP4**. Uncaptured runoff from this design point is conveyed as flow-by, **FB DP2** (Q5 = 2.7 cfs, Q100 = 6.5 cfs) towards **DP4**.

Design Point 3 ((DP3), Q5 = 2.6 cfs, Q100 = 6.4 cfs)
DP3 consists of 0.02 acre, offsite **Basin F** (Q5 = 0.1 cfs, Q100 = 0.2 cfs) and **FB DP1.** Runoff from the existing neighboring Clearway Industrial Park (parking lot, gravel lot) within offsite **Basin F** travels as sheet flow south and is routed via curb and gutter a modified triple Denver Type 16 inlet with a mountable grate configuration (**INLET 3**: Q5 = 2.1 cfs, Q100 = 4.1 cfs) at **DP3**. The intercepted flows are routed east

through 15" **Pipe Run 3** (Q5 = 2.1 cfs, Q100 = 4.1 cfs) to **DP5**. Uncaptured runoff from this design point is conveyed east as flow-by, **FB DP3** (Q5 = 0.5 cfs, Q100 = 2.3 cfs) to **DP5.**

Design Point 4 ((DP4), Q5 = 2.8 cfs, Q100 = 6.8 cfs)
DP4 consists of 0.04 acre, offsite **Basin G** (Q5 = 0.2 cfs, Q100 = 0.4 cfs) and **FB DP2**. Runoff from the existing neighboring Clearway Industrial Park (parking lot, gravel lot, building) within this basin travels as sheet flow north to south and is routed via curb and gutter a modified triple Denver Type 16 inlet with a mountable grate configuration (**INLET 4**: Q5 = 2.2 cfs, Q100 = 4.3 cfs) at **DP4**. The intercepted flow combines with flow from **PR2** and **PR3** and is conveyed south through a 24" **Pipe Run 4** (Q5 = 13.0 cfs, Q100 = 21.6 cfs) to **DP5**. Uncaptured runoff from this design point is conveyed south as flow-by, **FB DP4** (Q5 = 0.6 cfs, Q100 = 2.5 cfs) towards **DP5**.

Design Point 5 ((DP5), Q5 = 4.6 cfs, Q100 = 11.7 cfs)
DP5 consists of 0.95 acre, offsite **Basin E** (Q5 = 3.3 cfs, Q100 = 6.1 cfs), **FB DP3** and **FB DP4**. All runoff from the existing neighboring Clearway Industrial Park (parking lot, gravel lot, building) within this basin travels southeast as sheet flow and is routed via curb and gutter a modified triple sump Denver Type 16 inlet with a mountable grate configuration (**INLET 5:** Q5 = 4.6 cfs, Q100 = 11.7 cfs) at **DP5**. The intercepted flows combines with flow from **PR4** and is conveyed southeast through 30" PP **Pipe Run 5** (Q5 = 16.9 cfs, Q100 = 31.5 cfs) to **DP6**.

Design Point 6 ((DP6), Q5 = 7.5 cfs, Q100 = 14.4 cfs)
DP6 consists of 3.18 acre, offsite **Basin D** (Q5 = 7.5 cfs, Q100 = 14.4 cfs). All runoff from the existing neighboring Clearway Industrial Park (parking lot, gravel lot, building) within this basin travels south as sheet flow to a natural swale and is fully captured via proposed Type D sump inlet **(INLET 6)** (Q5 = 7.5 cfs, Q100 = 14.4 cfs) at the design point. These flows are conveyed south through 24" PP **Pipe Run 6** (Q5 = 7.5 cfs, Q100 = 14.4 cfs) and combine with flows from **PR5** at a manhole. The combined flows continue south through a 36" PP **Pipe Run 7 & Pipe Run 8** (Q5 = 22.5 cfs, Q100 = 42.3 cfs) to a manhole at the end of **PR8.**

Design Point 8 ((DP8), Q5 = 1.5 cfs, Q100 = 2.8 cfs)
DP8 consists of 0.38 acre, onsite **Basin H** (Q5 = 1.5 cfs, Q100 = 2.8 cfs). Developed runoff from this basin, parking lot, is fully conveyed as sheet flow to a low point of the parking lot, where a proposed 5' CDOT Type R inlet shall be constructed. The flows entering the inlet will be directed southwest through 15" PP **Pipe Run 24** (Q5 = 1.5 cfs, Q100 = 2.8 cfs), until the flows combine with roof drain flows from 0.20 acre **Basin K** (Q5 = 0.7 cfs, Q100 = 1.4 cfs).

See below for detailed discussion of proportioned flow approximations from 0.20 acre **Basin K** (Q5 = 0.7 cfs, Q100 = 1.4 cfs) and how they enter the storm system main between **Pipe Runs 25 to 34**.

Roof Drain Detailed Discussion: Basin K
The area of the eastern side of the commercial building roof (**Basin K**) was divided into sections and the area of the sections with respect to the area of **Basin K**, determined the portion of runoff to each roof drain. A 6" PP **Pipe Run 25** (Q5 = 0.1 cfs, Q100 = 0.2 cfs) conveys runoff from ~14.3% of the basin to the east, until these flows merge with flows from **PR24** and are conveyed through 15" PP **Pipe Run 26** (Q5 = 1.6 cfs, Q100 = 3.0 cfs) and flow south. A 6" PP **Pipe Run 27** (Q5 = 0.2 cfs, Q100 = 0.3 cfs) conveys runoff from 21.4% of **Basin K** to the east, until these flows merge with flows from **PR26** and are conveyed

through 15" PP **Pipe Run 28** (Q5 = 1.8 cfs, Q100 = 3.4 cfs). A 6" PP **Pipe Run 29** (Q5 = 0.2 cfs, Q100 = 0.3 cfs) conveys runoff from 21.4% of **Basin K** to the east, until these flows merge with flows from **PR28** and are conveyed through 18" PP **Pipe Run 30** (Q5 = 2.0 cfs, Q100 = 3.7 cfs). A 6" PP **Pipe Run 31** (Q5 = 0.2 cfs, Q100 = 0.3 cfs) conveys runoff from 21.4% of **Basin K** to the east, until these flows merge with flows from **PR30** and are conveyed through 18" PP **Pipe Run 32** (Q5 = 2.1 cfs, Q100 = 4.0 cfs). A 6" PP **Pipe Run 33** (Q5 = 0.1 cfs, Q100 = 0.2 cfs) conveys runoff from 14.3% of **Basin K** to the east, until these flows merge with flows from **PR32** and are conveyed through 18" PP **Pipe Run 34** (Q5 = 2.2 cfs, Q100 = 4.2 cfs). Flows from **PR34** are routed to a manhole at the end of **PR34.**

Design Point 9 ((DP9), **Q5 = 2.0 cfs, Q100 = 3.7 cfs) DP9** consists of 0.48 acre, onsite **Basin O** (Q5 = 2.0 cfs, Q100 = 3.7 cfs). Developed runoff from this basin, crushed asphalt lot, is conveyed as sheet flow to a low point at the southeast corner of the sub-basin, where a proposed Nyloplast 2'x2' inlet shall be constructed. These flows shall then travel southwest through 12" PP **Pipe Run 36** (Q5 = 2.0 cfs, Q100 = 3.7 cfs) to **DP10**.

Design Point 10 ((DP10), **Q5 = 1.2 cfs, Q100 = 2.2 cfs)**
DP10 consists of 0.27 acre, onsite **Basin N** (Q5 = 1.2 cfs, Q100 = 2.2 cfs). Developed runoff from this primarily crushed asphalt lot, is fully conveyed as sheet flow to the southeast, where a shallow swale conveys runoff to a low point, where a proposed Nyloplast 2'x2' inlet shall be constructed. These flows will combine with flows from **PR36** and travel southwest through 18" PP **Pipe Run 37 &** 18" RCP **Pipe Run 38** (Q5 = 3.2 cfs, Q100 = 5.9 cfs) to a low tailwater riprap basin in the Sand Filter Basin at **DP13**.

See below for detailed discussion of proportioned flow approximations from 0.21 acre **Basin J** (Q5 = 0.8 cfs, Q100 = 1.5 cfs) and how they enter the storm system main between **Pipe Runs 9 to 20**.

Roof Drain Detailed Discussion: Basin J
The area of the western side of the roof (**Basin J**) was divided into sections and the area of the sections with respect to the area of **Basin J**, determined the portion of runoff to each roof drain. A 6" PP **Pipe Run 9** (Q5 = 0.1 cfs, Q100 = 0.2 cfs) conveys runoff from 13.3% of the basin to the west, then the flows travel south via a 6" PP **PR10** (Q5 = 0.1 cfs, Q100 = 0.2 cfs), until they combine with flow from **PR11.** A 6" PP **Pipe Run 11** (Q5 = 0.2 cfs, Q100 = 0.4 cfs) conveys runoff from 26.7% of **Basin J** to the west, until these flows merge with flows from **PR10** and are conveyed south through a 8" PP **Pipe Run 12** (Q5 = 0.3 cfs, Q100 = 0.6 cfs). A 6" PP **Pipe Run 14** (Q5 = 0.0 cfs, Q100 = 0.1 cfs) conveys runoff from 7.7%% of **Basin J** to the west, until these flows merge with flows from **PR12** and are conveyed through a 12" PP **Pipe Run 15** (Q5 = 0.4 cfs, Q100 = 0.7 cfs). A 6" PP **Pipe Run 16** (Q5 = 0.1 cfs, Q100 = 0.3 cfs) conveys runoff from 20% of **Basin J** to the west, until these flows merge with flows from **PR15** and are conveyed through a 12" PP **Pipe Run 17** (Q5 = 0.5 cfs, Q100 = 0.9 cfs). A 6" PP **Pipe Run 18** (Q5 = 0.1 cfs, Q100 = 0.1 cfs) conveys runoff from 7.7% of **Basin J** to the west, until these flows merge with flows from **PR17** and are conveyed south through a 12" PP **Pipe Run 19 & Pipe Run 20** (Q5 = 0.6 cfs, Q100 = 1.0 cfs) to **DP 11**.

Design Point 11 ((DP11), **Q5 = 0.7 cfs, Q100 = 1.4 cfs)**
DP11 consists of 0.18 acre, onsite **Basin L** (Q5 = 0.7 cfs, Q100 = 1.4 cfs). Developed runoff from this basin, crushed asphalt lot, is conveyed as sheet flow to a low point of the parking lot at the southwest boundary of the basin, where a proposed Nyloplast 24" grate inlet shall be constructed. Flows conveyed by

the inlet at **DP11**, will combine with flows from **Basin J** and be conveyed east through 15" PP **Pipe Run 21** (Q5 = 1.3 cfs, Q100 = 2.4 cfs) to **DP12**.

Design Point 12 ((DP12), Q5 = 0.5 cfs, Q100 = 1.0 cfs)
DP12 consists of 0.13 acre, onsite **Basin M** (Q5 = 0.5 cfs, Q100 = 1.0 cfs). Developed runoff from this basin, crushed asphalt lot, is fully conveyed as sheet flow to a low point of the parking lot at the southeast boundary of the basin, where a proposed Nyloplast 24" grate inlet shall be constructed. Flows conveyed by the inlet at **DP12** will combine with flows from **PR 21** and be conveyed northeast through a 15" PP **Pipe Run 22** (Q5 = 1.8 cfs, Q100 = 3.4 cfs). Flows from **PR22** combine with flows from **PR34** and are routed via a 24" RCP **Pipe Run 35** (Q5 = 4.0 cfs, Q100 = 7.5 cfs) to a low tailwater riprap basin in the Sand Filter Basin at **DP13**.

Design Point 13 ((DP13), Q5 = 7.7 cfs, Q100 = 14.8 cfs)
DP13 consists of 0.31 acre, onsite **Basin Q** (Q5 = 0.5 cfs, Q100 = 1.4 cfs). Developed runoff from this basin is conveyed to an onsite sand filter basin **Pond 1**. **Pond 1** receives flows from **PR35** (Q5 = 4.0 cfs, Q100 = 7.5 cfs), **PR38** (Q5 = 3.2 cfs, Q100 = 5.9 cfs), and **Basin Q** (Q5 = 0.5 cfs, Q100 = 1.4 cfs). Release rates from **Pond 1** are routed south via an 18" RCP **Pipe Run 39** (Q5 = 0.3 cfs, Q100 = 1.6 cfs), where the flows combine with flows from **PR8** to a 36" RCP **PR40** (Q5 = 21.3 cfs, Q100 = 41.4 cfs) to a low tailwater riprap basin in East Fork Sand Creek Subtributary at **DP16.** See Water Quality Provision for **Pond 1** information.

Design Point 14 ((DP14), Q5 = 9.4 cfs, Q100 = 27.5 cfs)
DP 14 consists of 9.92 acre of offsite **Basin A** (Q5 = 9.3 cfs, Q100 = 27.0 cfs) and onsite undeveloped 0.22 acre **Basin R** (Q5 = 0.1 cfs, Q100 = 0.6 cfs). Runoff from these basins is fully conveyed to a low point on the southeast boundary of **Basin R**. These flows are captured by a proposed Type D sump inlet. These flows are conveyed via by a 30" RCP **Pipe Run 41** (Q5 = 9.4 cfs, Q100 = 27.5 cfs) to a low tailwater riprap basin in East Fork Sand Creek Subtributary at **DP16.**

Design Point 15 ((DP15), Q5 = 0.1 cfs, Q100 = 0.7 cfs)
DP15 consists of 0.25 acre, onsite **Basin P** (Q5 = 0.1 cfs, Q100 = 0.7 cfs). The runoff from this basin flows to the east boundary of the site and then south toward the East Fork Sand Creek Subtributary at **DP16**.

Design Point 16 (DP16), (Q5 = 30.9 cfs, Q100 = 70.4 cfs)
DP16 receives flows from 0.52 on-site acre **Basin S** (Q5 = 0.2 cfs, Q100 = 1.5 cfs), **PR40** (Q5 = 21.3 cfs, Q100 = 41.4 cfs), **PR41** (Q5 = 9.4 cfs, Q100 = 27.5 cfs), and **DP15** (Q5 = 0.1 cfs, Q100 = 0.7 cfs). The cumulative flows at **DP16** (Q5 = 30.9 cfs, Q100 = 70.4 cfs) are approximately equivalent to the flows in the existing condition **EX DP6** (Q5 = 31.0 cfs, Q100 = 72.3 cfs) and are most likely less given no routing for the discharge of the pond flows were accounted for in this summation. As such, the development of this site will not adversely affect adjacent or downstream properties. It should be noted that **Basins P, R,** and **S** are periphery to the development and consist of largely undevelopable lands and shall only be disturbed to install drainage outfall facilities. The total area of the three basins total 0.99 acres (0.25+.22+.52 respectively). Per El Paso County Engineering Criteria Manual Appendix I Section I.7.1C.1 100% of the applicable development site is to be captured, except the County may exclude up to 20 percent, not to exceed 1 acre, of the applicable development site area when the County has determined that it is not

practicable to capture runoff from portions of the site that will not drain towards control measures. M&S Civil believes the lands in these sub-basins are relative to the aforementioned criteria.

WATER QUALITY PROVISIONS AND MAINTENANCE

A Sand Filter Detention Pond is being proposed for this site to address water quality from 2.12 acres at 86.3% imperviousness. The pond has been sized utilizing MHFD-Detention v4.06 and UD-BMP v3.07 from Urban Drainage and Flood Control District (UDFCD). The pond is not expected to carry future additional flows other than from this project. The pond is being constructed with an outlet control structure which limits the release rate of the pond through the use of weirs and an 18" RCP outlet pipe. The pond has been sized to store the WCQV, EURV, and the flood control volumes for the 2, 5, 10, 25, 50 and 100 year storm events. The WQCV will be slowly released over 12 hours. The maximum WQCV storage volume is 0.053 acre-feet. An overflow emergency spillway is proposed along the northwest embankment to safely convey flows to the existing East Fork Sand Creek Subtributary in the event of outlet clogging. The emergency overflow spillway will be at an elevation of 6254.67 feet and will have a length of 22.0 feet, and a spillway design flow depth of approx. 0.33 feet across the crest (passing the inflow of 15.2 cfs) should the outlet become clogged. The top of the proposed embankment will need to be constructed at approximately 6256.0 to provide one foot of freeboard. See Proposed Drainage Map in the appendix of this report. The following table provided below summarizes the peak inflows, outflows, storage volumes and water surface elevations for the water quality, 5 year, EURV and 100 year event storms.

WQCV Pond 1	WQCV	EURV	5 Year	100 Year
Maximum Volume Stored (acre-ft)	0.053	0.248	0.178	0.276
Maximum WS Elevation	6252.31	6254.20	6253.62	6254.41
Peak Inflow (cfs)	N/A	N/A	4.5	8.0
Peak Outflow (cfs)	0.1	0.3	0.3	1.6

(AS REPORTED BY MHFD DET V4-06 WORKSHEET)

The proposed pond will be private and shall be maintained by the property owner. Access shall be granted to the owner and El Paso County for access and maintenance of the private WQCV facility. A private maintenance agreement document shall accompany this report.

EROSION CONTROL

It is the policy of the El Paso County that we submit a grading and erosion control plan with the drainage report. Proposed silt fence, vehicle traffic control, and concrete washout area are proposed as erosion control measures. The costs for these measures have been provided on the Grading and Erosion Control plan.

CONSTRUCTION COST OPINION

Private Drainage Facilities (**NON-Reimbursable**):

Item	Description	Quantity		Unit Cost		Cost
1.	6" PP	181	LF	$25	/LF	$4,525.00
2.	8" PP	17	LF	$35	/LF	$595.00

3.	12" PP	258	LF	$45	/LF	$11,610.00
4.	15" PP	323	LF	$55	/LF	$15,840.00
5.	18” PP	221	LF	$68	/LF	$15,028.00
6.	24" PP	62	LF	$81	/LF	$5,022.00
7.	30” PP	130	LF	$125	/LF	$16,250.00
8.	36” PP	357	LF	$150	/LF	$53,550.00
9.	18” RCP	55	LF	$76	/LF	$4,180.00
10.	24” RCP	29	LF	$91	/LF	$2,639.00
11.	30” RCP	70	LF	$114	/LF	$7,980.00
12.	36” RCP	32	LF	$140	/LF	$4,480.00
13.	18” FES RCP	1	EA	$923	/EA	$923.00
14.	24” FES RCP	1	EA	$1046	/EA	$1,046.00
15.	30” FES RCP	1	EA	$1292	/EA	$1,292.00
16.	36” FES RCP	1	EA	$1845	/EA	$1,845.00
17.	Mod. Triple Type 16 Inlet	5	EA	$15200	/EA	$76,000.00
18.	Type C Outlet Structure	1	EA	$5900	/EA	$5,900.00
19.	Type D Inlet	2	EA	$6931	/EA	$13,862.00
20.	5’ Type R Inlet	1	EA	$6703	/EA	$6,703.00
21.	24” Grate and Drain Basin	2	EA	$2930	/EA	$5,860.00
22.	2’x2’ Steel Grate and Drain Basin	2	EA	$2930	/EA	$5,860.00
23.	Manhole	7	EA	$7734	/EA	$54,138.00
24.	Type M riprap, 2’ deep Low Tailwater	60	CY	$135	/CY	$8,100.00
	FSD Pond (Inlcuding Outlet Struct, Spillway Cutoff Wall, Riprap, Signs, Sand Filter Media, Erosion Blanket)	1	LS	$18,000	/LS	$18,000.00
					Total $	**$341,228.00**
					5% Contingency	**$17,061.40**
					10% Engineering	**$34,122.80**
					Total$	**$392,412.20**

M & S Civil Consultants, Inc. (M & S) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above and below is only an estimate of the facility cost and drainage basin fee amounts in 2022.

DRAINAGE & BRIDGE FEES – CLEARWAY, LOT 5

Fees not required as this lot was previously platted. Fees are not collected with site development plan applications.

SUMMARY

Per this final drainage report, the proposed drainage facilities recommended within this report will adequately convey, detain and route runoff from the planned development to the East Fork Sand Creek drainage way at peak flow rates which are below existing with no negative impacts on surrounding developments. All drainage facilities described herein and shown on the included Proposed Drainage Map (See Appendix), this final Drainage Report and site construction documents are submitted for simultaneous review. Care will be taken to accommodate overland emergency flow routes on site and temporary drainage conditions. The development of the Clearway, Lot 5 site will not adversely affect adjacent or downstream properties.

REFERENCES

1. El Paso County and City of Colorado Springs Drainage Criteria Manual Volume 1, El Paso County, CO. 1994.

2. Urban Storm Drainage Criteria Manual Volumes 1-3, Mile High Flood District, Latest Revisions.

3. City of Colorado Springs Design Criteria Manual, Volume 1, City of Colorado Springs, Latest Revision (2020-2021).

4. SCS Soils Map for El Paso County.

5. Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency (Map No. 08041C0543F), Effective date March 17, 1997.

5. Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency (Map No. 08041C0754G), Effective date December 7, 2018.

6. Sand Creek Drainage Basin Planning Study, Preliminary Design Report, Revised March 1996, by Kiowa Engineering Corporation.

7. Drainage Letter for 6395 E. Platte Avenue, Colorado Springs, El Paso County, Colorado, by Law & Mariotti Consultants, Inc., Revised April 2003

8. Grading & Erosion Control Plan for 6395 E. Platte Avenue, Colorado Springs, El Paso County, Colorado, by Kiowa Engineering Corporation.

9. Drainage Letter Clearway No. 3, El Paso County, Colorado, by Oliver E Watts, Revised January 8, 2001

10. Clearway No. 2 Final Plat, by MVE, Recorded, March 23, 1999.

11. Drainage Letter and Grading and Erosion Control Plan, Platte View Office Complex Lots 1 and 2, Clearway Subdivision, El Paso County, Colorado, by Kiowa Engineering Corporation October 1998.

12. Platte View Office Park Grading and Erosion Control Plan, by Kiowa Engineering Corporation, October 1998.

13. Clearway Final Plat, by LDC, Recorded, June 6 1997.

14. Clearway Properties 6335 E. Platte Avenue, El Paso County, Colorado, Final Design – Sand Creek Channel Improvements, dated July 10, 1996

15. Preliminary and Final Drainage & Erosion Control Study, Clearway Subdivision 6335 E. Platte Avenue, El Paso County, Colorado, by Kiowa Engineering Corporation, March 1996.

16. Sand Creek Drainage Basin Planning Study, - Preliminary Design Report, City of Colorado Springs, El Paso County, Colorado, by Kiowa Engineering Corporation, Rev, October 1995.

APPENDIX

VICINITY MAP

SOILS MAP

FIRM PANEL

HYDROLOGIC CALCULATIONS

HYDRAULIC CALCULATIONS / FSD POND CALCULATIONS

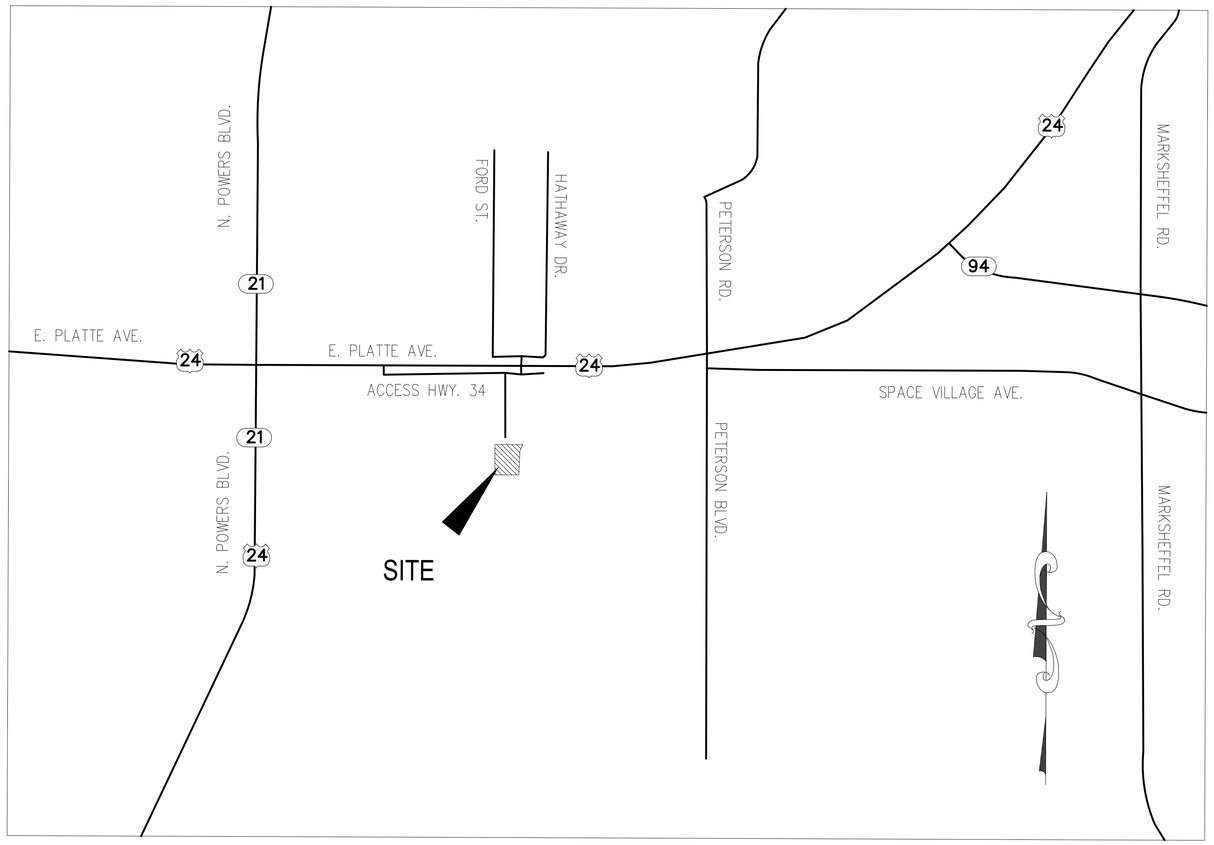
GRADING AND EROSION CONTROL PLAN

EXISTING AND PROPOSED DRAINAGE MAPS

REFERENCED REPORTS
(BACKGROUND INFORMATION)

APPENDIX

VICINITY MAP



VICINITY MAP

N.T.S.

CLEARWAY FILING NO. 2, LOT 5

VICINITY MAP

PROJECT NO. 44-042
DESIGNED BY: TAU
DRAWN BY: TAU
CHECKED BY: VAS
SCALE:
HORIZONTAL: N/A
VERTICAL: N/A
DATE: 05-20-2022
SHEET 1 OF 1
VIC01

212 N. WAHSATCH AVE, STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

REVISIONS:

NO.	DATE:	BY:	DESCRIPTION:	APRV'D. BY:	DATE:

File: O:\44042A-Wire Nut\Hammers\Dwg\Eng Exhibits\44-042 Vicinity Map.dwg Plotstamp: 5/15/2022 11:36 AM

SOILS MAP

NOT TO SCALE

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Summary by Map Unit — El Paso County Area, Colorado (CO625)

Map unit symbol	Map unit name	Rating
8	Blakeland loamy sand, 1 to 9 percent slopes	A
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A
111	Water	

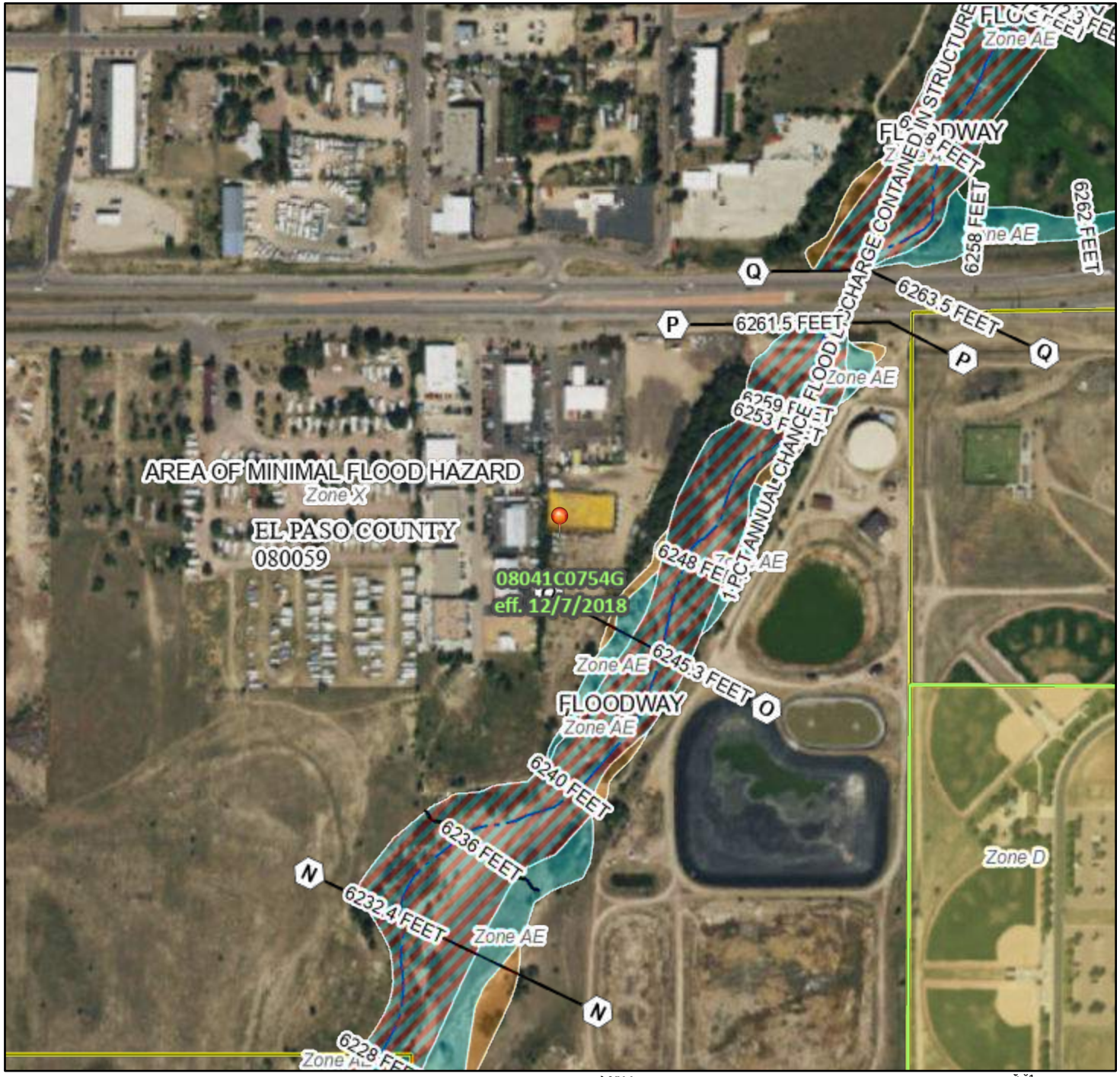
FALCON TRUCKING
FILING NO. 1
SOILS MAP

M&S CIVIL CONSULTANTS, INC.

FIRM PANEL

1DWLRQDO)ORRG+D]DUG/D\HU),50HWWH

FEMA



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	▨	$UHD ZLWK 5HGXFHG)ORRG 5LVN GXH WR /HYHH 6HH 1RWHV =RQH ;
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7KLV PDS FRPSOLHV ZLWK)(0\$V VWDQGDUGV IRU WKH XVH RI GLJLWDO IORRG PDSV LI LW LV QRW YRLG DV GHVFULEHG EHORZ 7KH EDVHPDS VKRZQ FRPSOLHV ZLWK)(0\$V EDVHPDS DFFXUDF\ VWDQGDUGV

7KH IORRG KD]DUG LQIRUPDWLRQ LV GHULYHG GLUHFWO\ IURP WKH DXWKRULWDWLYH 1)+/ ZHE VHUYLFHV SURYLGHG E\ )(0\$ 7KLV PDS ZDV H[SRUWHG RQ 'DWD $ DQG GRHV QRW UHIOHFW FKDQJHV RU DPHQGPHQWV VXEVHTXHQW WR WKLV GDWH DQG WLPH 7KH 1)+/ DQG HIIHFWLYH LQIRUPDWLRQ PD\ FKDQJH RU EHFRPH VXSHUVHGHG E\ QHZ GDWD RYHU WLPH

7KLV PDS LPDJH LV YRLG LI WKH RQH RU PRUH RI WKH IROORZLQJ PDS HOHPHQWV GR QRW DSSHDU EDVHPDS LPDJHU\ IORRG]RQH ODEHOV OHJHQG VFDOH EDU PDS FUHDWLRQ GDWH FRPPXQLW\ LGHQWLILHUV),50 SDQHO QXPEHU DQG)(50 HIIHFWLYH GDWH 0DS LPDJHV IRU XQPDSSHG DQG XQPRGHUQL]HG DUHDV FDQQRW EH XVHG IRU UHJXODWRU\ SXUSRVHV

%DVHPDS 86*6 1DWLRQDO 0DS 2UWKRLPDJHU\ 'DWD UHIUHVKHG 2FWREHU

HYDROLOGIC CALCULATIONS

CLEARWAY, LOT 5 (WIRENUT)
EXISTING CONDITIONS DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)

			STREETS/DEVELOPED			*DEVELOPED LOTS*			*UNDEVELOPED/LANDSCAPE*			*RUNOFF COEFFICIENT*	
BASIN	**TOTAL AREA** *(SF)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
A	***431946.186***	9.92	0.00	0.90	0.96	9.13	0.30	0.50	0.78	0.08	0.35	***0.28***	***0.49***
B	***133523.312***	3.07	0.00	0.90	0.96	3.07	0.73	0.81	0.00	0.08	0.35	***0.73***	***0.81***
C	***119110.0794***	2.73	0.00	0.90	0.96	2.73	0.73	0.81	0.00	0.08	0.35	***0.73***	***0.81***
D	***134064.3175***	3.08	1.44	0.73	0.81	1.63	0.59	0.70	0.00	0.08	0.35	***0.66***	***0.75***
E	***42111.756***	0.97	0.00	0.90	0.96	0.00	0.08	0.35	0.97	0.08	0.35	***0.08***	***0.35***
F	***46802.057***	1.07	0.00	0.90	0.96	0.00	0.08	0.35	1.07	0.08	0.35	***0.08***	***0.35***
G	***47704.938***	1.10	0.00	0.90	0.96	0.00	0.08	0.35	1.10	0.08	0.35	***0.08***	***0.35***

CLEARWAY, LOT 5 (WIRENUT)
EXISTING CONDITIONS DRAINAGE CALCULATIONS
(Area Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL**	**C_5**	**C_{100}**	**C_5**	**Length**	**Height**	**T_C**	**Length**	**Slope**	**Velocity**	**T_t**	**TOTAL**	**CHECK**	**I_5**	**I_{100}**	**Q_5**	**Q_{100}**
	(Acres)	*From DCM Table 5-1*			*(ft)*	*(ft)*	*(min)*	*(ft)*	*(%)*	*(fps)*	*(min)*	*(min)*	*(min)*	*(in/hr)*	*(in/hr)*	*(c.f.s.)*	*(c.f.s.)*
A	9.92	0.28	0.49	0.28	100	2	11.7	1174	0.5%	0.7	27.4	39.1	17.1	3.3	5.6	***9.3***	***27.0***
B	3.07	0.73	0.81	0.73	100	2	5.3	775	1.3%	2.3	5.7	11.0	14.9	4.0	6.7	***8.9***	***16.6***
C	2.73	0.73	0.81	0.73	100	2	5.3	675	1.5%	2.4	4.6	9.9	14.3	4.1	6.9	***8.3***	***15.4***
D	3.08	0.66	0.75	0.66	100	2	6.4	673	1.9%	1.4	8.1	14.5	14.3	3.6	6.0	***7.3***	***14.0***
E	0.97	0.08	0.35	0.08	50	2	8.2	298	8.4%	2.0	2.4	10.7	11.9	4.0	6.8	***0.3***	***2.3***
F	1.07	0.08	0.35	0.08	100	2	14.7	138	6.5%	1.8	1.3	15.9	11.3	3.9	6.6	***0.3***	***2.5***
G	1.10	0.08	0.35	0.08	100	1	18.4	169	14.8%	2.7	1.0	19.5	11.5	3.9	6.6	***0.3***	***2.5***

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: TAU
Date: 3/31/2022
Checked by: VAS

CLEARWAY, LOT 5 (WIRENUT)
EXISTING CONDITIONS DRAINAGE CALCULATIONS
(Basin Routing Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*PIPE / CHANNEL FLOW*				*Time of Travel (T_t)*	*INTENSITY **		*TOTAL FLOWS*		
DESIGN POINT	**CONTRIBUTING BASINS**	**CA_5**	**CA_{100}**	**C_5**	**Length** *(ft)*	**Height** *(ft)*	**T_C** *(min)*	**Length** *(ft)*	**Slope** *(%)*	**Velocity** *(fps)*	**T_t** *(min)*	**TOTAL** *(min)*	**I_5** *(in/hr)*	**I_{100}** *(in/hr)*	**Q_5** *(c.f.s.)*	**Q_{100}** *(c.f.s.)*	COMMENTS
1	**D**	2.02	2.31									14.3	3.6	6.0	***7.3***	***14.0***	conveyed by sheet flow and swale
				use D BASIN Tc													
2	**DP1, B, C**	6.25	7.01									14.3	3.6	6.0	***22.5***	***42.3***	conveyed by private street c&g
				use DP1 Tc													
3	**DP2, F**	6.34	7.39									14.3	3.6	6.0	***22.8***	***44.6***	conveyed by swale to East Fork Sand Creek
				use DP2 Tc													
4	**A**	2.80	4.84									17.1	3.3	5.6	***9.3***	***27.0***	conveyed to Lot 5
				use A BASIN Tc													
5	**DP4, E**	2.88	5.18									17.1	3.3	5.6	***9.6***	***28.9***	conveyed to East Fork Sand Creek
				use DP4 Tc													
6	**G, DP3, DP5**	9.30	12.95									17.1	3.3	5.6	***31.0***	***72.3***	conveyed to East Fork Sand Creek
				use DP5 Tc													

CLEARWAY, LOT 5 (WIRENUT)
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)

			STREETS/DEVELOPED			*DEVELOPED LOTS*			*UNDEVELOPED/LANDSCAPE*			*RUNOFF COEFFICIENT*	
BASIN	**TOTAL AREA** *(SF)*	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	**AREA** *(Acres)*	C_5	C_{100}	C_5	C_{100}
A	***431957.157***	9.92	0.00	0.90	0.96	9.13	0.30	0.50	0.78	0.08	0.35	***0.28***	***0.49***
B	***100360.697***	2.30	0.00	0.90	0.96	2.30	0.73	0.81	0.00	0.08	0.35	***0.73***	***0.81***
C	***104496.823***	2.40	0.00	0.90	0.96	2.40	0.73	0.81	0.00	0.08	0.35	***0.73***	***0.81***
D	***138334.367***	3.18	1.54	0.73	0.81	1.63	0.59	0.70	0.00	0.08	0.35	***0.66***	***0.75***
E	***41339.688***	0.95	0.00	0.90	0.96	0.95	0.73	0.81	0.00	0.08	0.35	***0.73***	***0.81***
F	***985.639***	0.02	0.02	0.90	0.96	0.00	0.73	0.81	0.00	0.08	0.35	***0.90***	***0.96***
G	***1858.029***	0.04	0.04	0.90	0.96	0.00	0.73	0.81	0.00	0.08	0.35	***0.90***	***0.96***
H	***16663.2647***	0.38	0.31	0.90	0.96	0.00	0.73	0.81	0.07	0.08	0.35	***0.75***	***0.85***
J	***8946.4333***	0.21	0.01	0.90	0.96	0.20	0.73	0.81	0.00	0.08	0.35	***0.74***	***0.82***
K	***8500.17***	0.20	0.00	0.90	0.96	0.20	0.73	0.81	0.00	0.08	0.35	***0.73***	***0.81***
L	***8030.0376***	0.18	0.15	0.90	0.96	0.00	0.73	0.81	0.03	0.08	0.35	***0.74***	***0.84***
M	***5636.8792***	0.13	0.11	0.90	0.96	0.00	0.73	0.81	0.02	0.08	0.35	***0.77***	***0.87***
N	***11732.9464***	0.27	0.26	0.90	0.96	0.00	0.73	0.81	0.00	0.08	0.35	***0.89***	***0.95***
O	***20775.492***	0.48	0.42	0.90	0.96	0.00	0.73	0.81	0.06	0.08	0.35	***0.80***	***0.89***
P	***10676.3463***	0.25	0.00	0.90	0.96	0.00	0.73	0.81	0.25	0.12	0.39	***0.12***	***0.39***
Q	***13401.6051***	0.31	0.00	0.90	0.96	0.11	0.59	0.74	0.20	0.12	0.39	***0.28***	***0.51***
R	***9732.1557***	0.22	0.00	0.90	0.96	0.005	0.59	0.74	0.22	0.08	0.35	***0.09***	***0.36***
S	***22678.4418***	0.52	0.00	0.90	0.96	0.02	0.08	0.35	0.50	0.08	0.35	***0.08***	***0.35***

CLEARWAY, LOT 5 (WIRENUT)
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Area Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel (T_t)*		*INTENSITY **		*TOTAL FLOWS*	
BASIN	**AREA TOTAL**	**C_5**	**C_{100}**	**C_5**	**Length**	**Height**	**T_C**	**Length**	**Slope**	**Velocity**	**T_t**	**TOTAL**	**CHECK**	**I_5**	**I_{100}**	**Q_5**	**Q_{100}**
	(Acres)	*From DCM Table 5-1*			*(ft)*	*(ft)*	*(min)*	*(ft)*	*(%)*	*(fps)*	*(min)*	*(min)*	*(min)*	*(in/hr)*	*(in/hr)*	*(c.f.s.)*	*(c.f.s.)*
A	9.92	0.28	0.49	0.28	100	2	11.7	1174	0.5%	0.7	27.4	39.1	17.1	3.3	5.6	***9.3***	***27.0***
B	2.30	0.73	0.81	0.73	100	2	5.3	674	1.2%	2.2	5.2	10.5	14.3	4.1	6.8	***6.8***	***12.7***
C	2.40	0.73	0.81	0.73	100	2	5.3	735	1.4%	2.3	5.3	10.6	14.6	4.0	6.8	***7.1***	***13.2***
D	3.18	0.66	0.75	0.66	100	2	6.3	685	1.9%	1.4	8.3	14.6	14.4	3.6	6.0	***7.5***	***14.4***
E	0.95	0.73	0.81	0.73	50	1	3.8	390	1.3%	2.3	2.9	6.6	12.4	4.7	8.0	***3.3***	***6.1***
F	0.02	0.90	0.96	0.90	25	1	1.1	17	1.5%	2.4	0.1	5.0	10.2	5.2	8.7	***0.1***	***0.2***
G	0.04	0.90	0.96	0.90	25	1	1.1	90	1.7%	2.6	0.6	5.0	10.6	5.2	8.7	***0.2***	***0.4***
H	0.38	0.75	0.85	0.75	50	1	3.5	130	0.8%	1.8	1.2	5.0	11.0	5.2	8.7	***1.5***	***2.8***
J	0.21	0.74	0.82	0.74	50	1	3.7	86	1.2%	2.2	0.7	5.0	10.8	5.2	8.7	***0.8***	***1.5***
K	0.20	0.73	0.81	0.73	50	1	3.8	86	1.2%	2.2	0.7	5.0	10.8	5.2	8.7	***0.7***	***1.4***
L	0.18	0.74	0.84	0.74	50	1	3.6	64	2.0%	2.8	0.4	5.0	10.6	5.2	8.7	***0.7***	***1.4***
M	0.13	0.77	0.87	0.77	50	1	3.3	62	2.0%	2.8	0.4	5.0	10.6	5.2	8.7	***0.5***	***1.0***
N	0.27	0.89	0.95	0.89	50	1	2.2	110	2.1%	2.9	0.6	5.0	10.9	5.2	8.7	***1.2***	***2.2***
O	0.48	0.80	0.89	0.80	50	1	3.0	130	0.8%	1.8	1.2	5.0	11.0	5.2	8.7	***2.0***	***3.7***
P	0.25	0.12	0.39	0.12	50	2	7.9	159	5.0%	1.6	1.7	9.6	11.2	4.2	7.0	***0.1***	***0.7***
Q	0.31	0.28	0.51	0.28	25	4	3.0	0	0.0%	0.0	0.0	5.0	10.1	5.2	8.7	***0.5***	***1.4***
R	0.22	0.09	0.36	0.09	25	2	4.6	356	2.8%	1.2	5.1	9.6	12.1	4.2	7.0	***0.1***	***0.6***
S	0.52	0.08	0.35	0.08	50	8	5.2	115	15.7%	2.8	0.7	5.9	10.9	4.9	8.3	***0.2***	***1.5***

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: TAU
Date: 6/8/2023
Checked by: VAS

CLEARWAY, LOT 5 (WIRENUT)
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Basin Routing Summary)

From Area Runoff Coefficient Summary				OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T_t)	INTENSITY *		TOTAL FLOWS		
DESIGN POINT	CONTRIBUTING BASINS	CA_5	CA_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)	COMMENTS
1	B	1.68	1.87	Basin B Tc Used								10.5	4.1	6.8	6.8	12.7	Mod Triple Denver Type 16 Grate Inlet
2	C	1.75	1.94	Basin C Tc Used								10.6	4.0	6.8	7.1	13.2	Mod Triple Denver Type 16 Grate Inlet
3	FB1, F	0.64	0.93	Basin B Tc Used								10.5	4.1	6.8	2.6	6.4	Mod Triple Denver Type 16 Grate Inlet
4	FB2, G	0.70	1.00	Basin C Tc Used								10.6	4.0	6.8	2.8	6.8	Mod Triple Denver Type 16 Grate Inlet
5	FB3, FB4, E	0.98	1.47	Basin E Tc Used								6.6	4.7	8.0	4.6	11.7	Mod Triple Denver Type 16 Grate Inlet
6	D	2.09	2.39	Basin D Tc Used								14.4	3.6	6.0	7.5	14.4	CDOT Type D Grate Inlet
8	H	0.29	0.33	Basin H Tc Used								5.0	5.2	8.7	1.5	2.8	CDOT Type R Inlet
9	O	0.38	0.42	Basin O Tc Used								5.0	5.2	8.7	2.0	3.7	CDOT Type R Inlet
10	N	0.24	0.26	Basin N Tc Used								5.0	5.2	8.7	1.2	2.2	Nyloplast 2'X2' Steel Bar Inlet
11	L	0.14	0.16	Basin L Tc Used								5.0	5.2	8.7	0.7	1.4	Nyloplast 24" Grate Inlet
12	M	0.10	0.11	Basin M Tc Used								5.0	5.2	8.7	0.5	1.0	Nyloplast 24" Grate Inlet
13	Q, PR35, PR38	1.48	1.71	Basin Q Tc Used								5.0	5.2	8.7	7.7	14.8	FSD POND
14	A, R	2.82	4.92	Basin A Tc Used								17.1	3.3	5.6	9.4	27.5	CDOT Type D Grate Inlet
15	P	0.03	0.10	Basin P Tc Used								9.6	4.2	7.0	0.1	0.7	SWALE CONVEYS FLOW TO EAST FORK SAND CREEK
16	S, DP15, PR40, PR41	9.29	12.62	PR41 Tc Used								17.1	3.3	5.6	30.9	70.4	EAST FORK SAND CREEK

CLEARWAY, LOT 5 (WIRENUT)
PROPOSED CONDITIONS DRAINAGE CALCULATIONS
(Storm Sewer Routing Summary)

PIPE RUN	Contributing Pipes/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity* I_5	Intensity* I_{100}	Flow Q_5	Flow Q_{100}
1	DP1	1.06	0.95	10.5	4.1	6.8	4.3	6.5
2	PR1, DP2	2.15	1.94	10.6	4.0	6.8	8.7	13.2
3	DP3	0.52	0.60	10.5	4.1	6.8	2.1	4.1
4	PR2, PR3, DP4	3.21	3.17	10.6	4.0	6.8	13.0	21.6
5	PR4, DP5	4.18	4.64	10.6	4.0	6.8	16.9	31.5
6	DP6	2.09	2.39	14.4	3.6	6.0	7.5	14.4
7	PR5, PR6	6.27	7.03	14.4	3.6	6.0	22.5	42.3
8	PR7	6.27	7.03	14.4	3.6	6.0	22.5	42.3
9	.02 ACRE BASIN J	0.02	0.02	5.0	5.2	8.7	0.1	0.2
10	PR9	0.02	0.02	5.0	5.2	8.7	0.1	0.2
11	.06 ACRE BASIN J	0.04	0.05	5.0	5.2	8.7	0.2	0.4
12	PR10, PR11	0.06	0.07	5.0	5.2	8.7	0.3	0.6
14	.01 ACRE BASIN J	0.01	0.01	5.0	5.2	8.7	0.0	0.1
15	PR12, PR14	0.07	0.08	5.0	5.2	8.7	0.4	0.7
16	.04 ACRE BASIN J	0.03	0.03	5.0	5.2	8.7	0.1	0.3
17	PR15, PR16	0.09	0.10	5.0	5.2	8.7	0.5	0.9
18	.02 ACRE BASIN J	0.01	0.01	5.0	5.2	8.7	0.1	0.1
19	PR17, PR18	0.11	0.12	5.0	5.2	8.7	0.6	1.0
20	PR19	0.11	0.12	5.0	5.2	8.7	0.6	1.0
21	PR20, DP11	0.24	0.27	5.0	5.2	8.7	1.3	2.4
22	PR21, DP12	0.34	0.39	5.0	5.2	8.7	1.8	3.4
24	DP8	0.29	0.33	5.0	5.2	8.7	1.5	2.8
25	.03 ACRE BASIN K	0.02	0.03	5.0	5.2	8.7	0.1	0.2
26	PR24, PR25	0.31	0.35	5.0	5.2	8.7	1.6	3.0
27	.05 ACRE BASIN K	0.03	0.04	5.0	5.2	8.7	0.2	0.3
28	PR26, PR27	0.34	0.39	5.0	5.2	8.7	1.8	3.4
29	.05 ACRE BASIN K	0.03	0.04	5.0	5.2	8.7	0.2	0.3
30	PR28, PR29	0.38	0.43	5.0	5.2	8.7	2.0	3.7
31	.05 ACRE BASIN K	0.04	0.04	5.0	5.2	8.7	0.2	0.3
32	PR30, PR31	0.41	0.46	5.0	5.2	8.7	2.1	4.0
33	.02 ACRE BASIN K	0.02	0.02	5.0	5.2	8.7	0.1	0.2
34	PR32, PR33	0.43	0.48	5.0	5.2	8.7	2.2	4.2
35	PR22, PR34	0.77	0.87	5.0	5.2	8.7	4.0	7.5
36	DP9	0.38	0.42	5.0	5.2	8.7	2.0	3.7
37	PR36, DP10	0.62	0.68	5.0	5.2	8.7	3.2	5.9
38	PR37	0.62	0.68	5.0	5.2	8.7	3.2	5.9
39	FSD POND RELEASE	0.12	0.38	30.0	2.5	4.2	0.3	1.6
40	PR8, PR39	6.40	7.42	17.1	3.3	5.6	21.3	41.4
41	DP14	2.82	4.92	17.1	3.3	5.6	9.4	27.5

* Intensity equations assume a minimum travel time of 5 minutes.

DP - Design Point
EX - Existing Design Point
FB- Flow By from Design Point
INT- Intercepted Flow from Design Point

Calculated by: TAU
Date: 6/8/2023
Checked by: VAS

HYDRAULIC CALCULATIONS / FSD POND CALCULATIONS

Weighted Percent Imperviousness of WQ Pond 1				
Contributing Basins	*Area (Acres)*	*C_5*	*Impervious % (I)*	*(Acres)*(I)*
H	0.38	0.75	91	34.81
J	0.21	0.74	91	18.69
K	0.20	0.73	90	17.56
L	0.18	0.74	91	16.78
M	0.13	0.77	93	11.97
N	0.27	0.89	99	26.67
O	0.48	0.80	95	45.31
Q	0.31	0.28	40	12.31
Totals	***2.15***			***184.09***
Imperviousness of WQ Pond 1	***85.6***			

Design Procedure Form: Sand Filter (SF)

UD-BMP (Version 3.07, March 2018)

Designer: Darin Moffett
Company: M&S Civil Consultants
Date: November 5, 2022
Project: Clearway, Lot 5 - WireNut
Location:

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of sand filter)	I_a = 85.6 %
B) Tributary Area's Imperviousness Ratio ($i = I_a/100$)	i = 0.856
C) Water Quality Capture Volume (WQCV) Based on 12-hour Drain Time $WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$	WQCV = 0.29 watershed inches
D) Contributing Watershed Area (including sand filter area)	Area = 93,676 sq ft
E) Water Quality Capture Volume (WQCV) Design Volume $V_{WQCV} = WQCV / 12 * Area$	V_{WQCV} = cu ft
F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.50 in
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume	$V_{WQCV\ OTHER}$ = cu ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{WQCV\ USER}$ = 2,308 cu ft
2. Basin Geometry	
A) WQCV Depth	D_{WQCV} = 0.8 ft
B) Sand Filter Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred). Use "0" if sand filter has vertical walls.	Z = 4.00 ft / ft
C) Minimum Filter Area (Flat Surface Area)	A_{Min} = 1002 sq ft
D) Actual Filter Area	A_{Actual} = 2310 sq ft
E) Volume Provided	V_T = cu ft
3. Filter Material	Choose One: (●) 18" CDOT Class B or C Filter Material; ( ) Other (Explain):
4. Underdrain System	
A) Are underdrains provided?	Choose One: (●) YES; ( ) NO
B) Underdrain system orifice diameter for 12 hour drain time	
i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice	y = 2.4 ft
ii) Volume to Drain in 12 Hours	Vol_{12} = 2,308 cu ft
iii) Orifice Diameter, 3/8" Minimum	D_O = 1 1/16 in

Design Procedure Form: Sand Filter (SF)

Designer: Darin Moffett
Company: M&S Civil Consultants
Date: November 5, 2022
Project: Clearway, Lot 5 - WireNut
Location:

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?	Choose One ○ YES ◉ NO
6. Inlet / Outlet Works A) Describe the type of energy dissipation at inlet points and means of conveying flows in excess of the WQCV through the outlet	A riprap stilling basin is provided at the inlet point Flows in excess of the WQCV are conveyed via a retangular slot in the outlet box wa box wall and enter the top of the box and discharge out via an restricted 18rcp

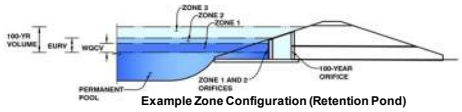
Notes:

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Clearway, Lot 5 (Wirenut)

Basin ID: Pond 1



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**SF**	
Watershed Area =	2.15	acres
Watershed Length =	335	ft
Watershed Length to Centroid =	165	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	85.60%	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 =	12.0	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.

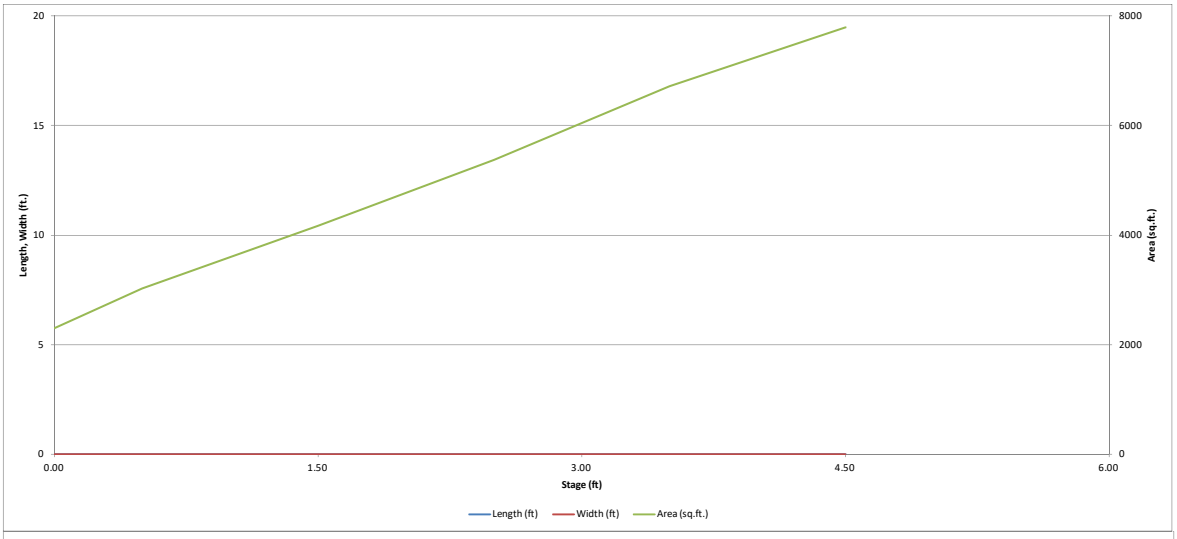
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.053	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.247	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.161	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.52 in.) =	0.212	acre-feet	1.52	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.246	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.289	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.331	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.378	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.484	acre-feet		inches
Approximate 2-yr Detention Volume =	0.162	acre-feet		
Approximate 5-yr Detention Volume =	0.214	acre-feet		
Approximate 10-yr Detention Volume =	0.251	acre-feet		
Approximate 25-yr Detention Volume =	0.297	acre-feet		
Approximate 50-yr Detention Volume =	0.323	acre-feet		
Approximate 100-yr Detention Volume =	0.347	acre-feet		

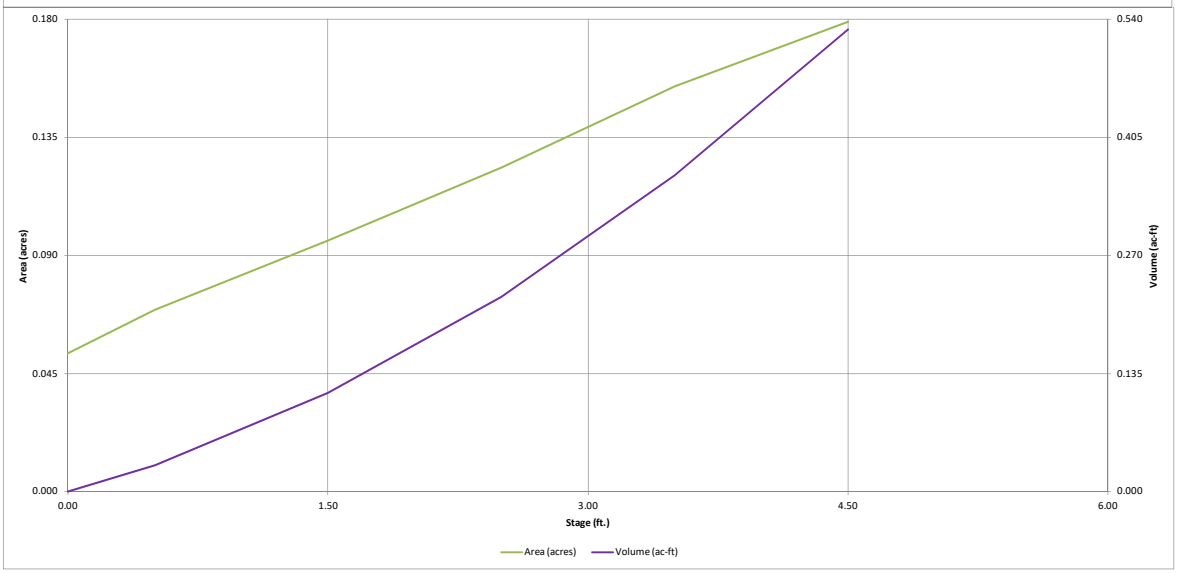
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.053	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.194	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.100	acre-feet
Total Detention Basin Volume =	0.347	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	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

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	2,300	0.053		
	--	0.50	--	--	--	3,023	0.069	1,331	0.031
	--	1.50	--	--	--	4,171	0.096	4,928	0.113
	--	2.50	--	--	--	5,380	0.124	9,703	0.223
	--	3.50	--	--	--	6,724	0.154	15,755	0.362
	--	4.50	--	--	--	7,797	0.179	23,016	0.528


20
15
10
5
0
Length, Width (ft.)
8000
6000
4000
2000
0
Area (sq.ft.)
0.00
1.50
3.00
4.50
6.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

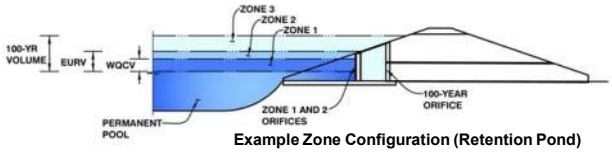

0.180
0.135
0.090
0.045
0.000
Area (acres)
0.540
0.405
0.270
0.135
0.000
Volume (ac-ft)
0.00
1.50
3.00
4.50
6.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Clearway, Lot 5 (Wirenut)

Basin ID: Pond 1



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.80	0.053	Filtration Media
Zone 2 (EURV)	2.69	0.194	Rectangular Orifice
Zone 3 (100-year)	3.41	0.100	Weir&Pipe (Restrict)
Total (all zones)		0.347	

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

Underdrain Orifice Invert Depth =	2.40	ft (distance below the filtration media surface)	Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Diameter =	1.10	inches	Underdrain Orifice Centroid =	0.05	feet

Calculated Parameters for Underdrain

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)

Centroid of Lowest Orifice =	N/A	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 =	N/A	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	sq. 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 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected			Zone 2 Rectangular	Not Selected
Invert of Vertical Orifice =	0.80	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.03	N/A
Depth at top of Zone using Vertical Orifice =	2.69	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.08	N/A
Vertical Orifice Height =	2.00	N/A	inches			
Vertical Orifice Width =	2.50		inches			

Calculated Parameters for Vertical Orif

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 =	2.69	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.69	N/A
Overflow Weir Front Edge Length =	2.91	N/A	feet	Overflow Weir Slope Length =	2.91	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	47.82	N/A
Horiz. Length of Weir Sides =	2.91	N/A	feet	Overflow Grate Open Area w/o Debris =	6.70	N/A
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	3.35	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow W

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 =	3.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.14	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.12	N/A
Restrictor Plate Height Above Pipe Invert =	2.40		inches	Half-Central Angle of Restrictor Plate on Pipe =	0.75	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.25	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.23	feet
Spillway Crest Length =	22.00	feet	Stage at Top of Freeboard =	4.48	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.18	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.52	acre-ft

Calculated Parameters for Spillway

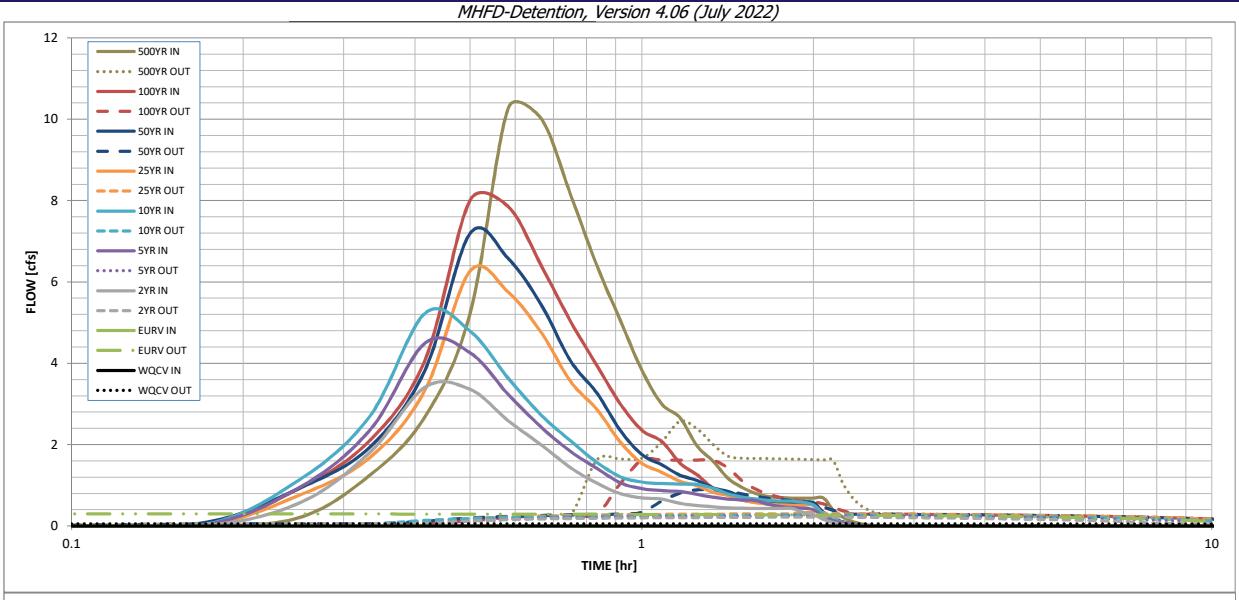
Routed Hydrograph Results

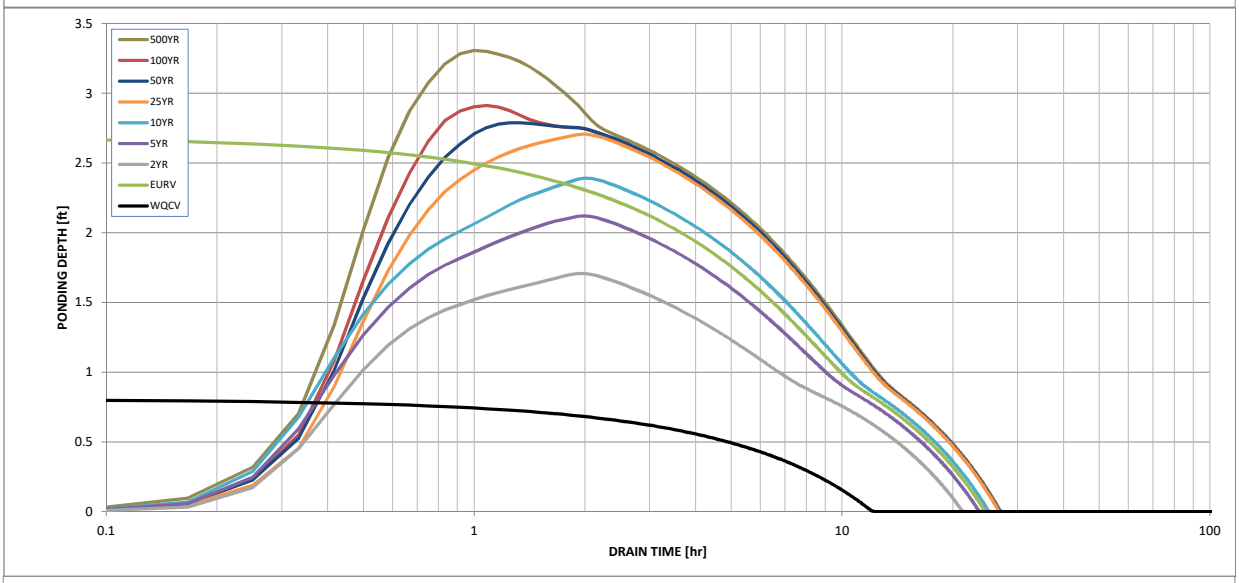
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through A

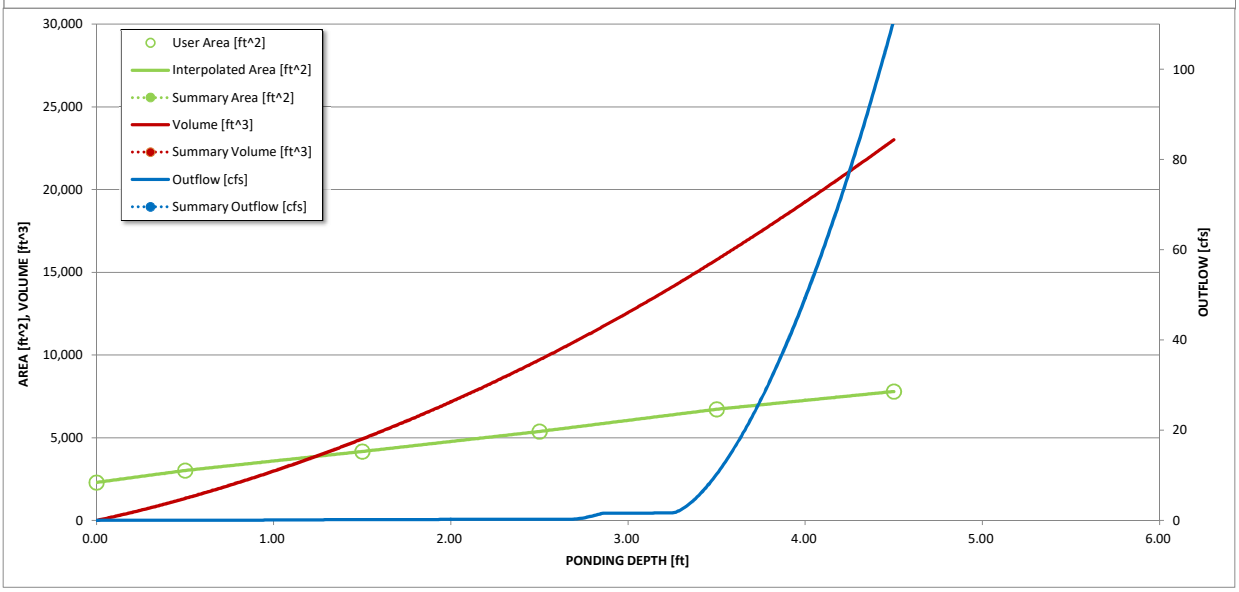
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.52	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.053	0.247	0.161	0.212	0.246	0.289	0.331	0.378
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.161	0.212	0.246	0.289	0.331	0.378
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.0	0.1	0.5	1.0	1.6
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	0.03	0.24	0.46	0.75
Peak Inflow Q (cfs) =	N/A	N/A	3.4	4.5	5.2	6.3	7.2	8.0
Peak Outflow Q (cfs) =	0.1	0.3	0.2	0.3	0.3	0.3	0.9	1.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	5.9	4.8	0.7	0.9	1.0
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	0.00	N/A	N/A	N/A	0.0	0.1	0.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	12	23	20	22	23	25	25	24
Time to Drain 99% of Inflow Volume (hours) =	**12**	24	21	23	25	26	26	26
Maximum Ponding Depth (ft) =	0.81	2.70	1.71	2.12	2.39	2.71	2.79	2.91
Area at Maximum Ponding Depth (acres) =	0.08	0.13	0.10	0.11	0.12	0.13	0.13	0.14
Maximum Volume Stored (acre-ft) =	0.053	0.248	0.133	0.178	0.209	0.248	0.259	0.276

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.20
	0:15:00	0.00	0.00	0.56	0.93	1.12	0.75	0.92	0.91	1.25
	0:20:00	0.00	0.00	1.81	2.35	2.70	1.68	1.94	2.10	2.69
	0:25:00	0.00	0.00	3.41	4.49	5.23	3.34	3.84	4.09	5.24
	0:30:00	0.00	0.00	3.35	4.25	4.79	6.27	7.20	8.02	10.28
	0:35:00	0.00	0.00	2.58	3.23	3.63	5.74	6.57	7.85	10.01
	0:40:00	0.00	0.00	1.99	2.42	2.72	4.74	5.43	6.39	8.15
	0:45:00	0.00	0.00	1.43	1.83	2.09	3.55	4.06	5.02	6.42
	0:50:00	0.00	0.00	1.05	1.42	1.56	2.87	3.28	3.95	5.06
	0:55:00	0.00	0.00	0.80	1.06	1.21	2.06	2.35	3.00	3.83
	1:00:00	0.00	0.00	0.69	0.91	1.08	1.54	1.76	2.35	3.00
	1:05:00	0.00	0.00	0.66	0.86	1.04	1.32	1.50	2.08	2.66
	1:10:00	0.00	0.00	0.56	0.84	1.02	1.10	1.25	1.54	1.97
	1:15:00	0.00	0.00	0.50	0.77	1.02	0.99	1.12	1.25	1.59
	1:20:00	0.00	0.00	0.47	0.70	0.92	0.83	0.94	0.93	1.17
	1:25:00	0.00	0.00	0.45	0.66	0.79	0.75	0.85	0.75	0.95
	1:30:00	0.00	0.00	0.44	0.63	0.70	0.64	0.72	0.64	0.80
	1:35:00	0.00	0.00	0.43	0.62	0.66	0.57	0.65	0.58	0.72
	1:40:00	0.00	0.00	0.43	0.53	0.63	0.54	0.61	0.56	0.70
	1:45:00	0.00	0.00	0.43	0.48	0.61	0.52	0.59	0.55	0.69
	1:50:00	0.00	0.00	0.43	0.45	0.61	0.51	0.58	0.55	0.69
	1:55:00	0.00	0.00	0.34	0.43	0.58	0.51	0.57	0.55	0.69
	2:00:00	0.00	0.00	0.29	0.40	0.51	0.51	0.57	0.55	0.69
	2:05:00	0.00	0.00	0.16	0.22	0.29	0.29	0.33	0.31	0.39
	2:10:00	0.00	0.00	0.09	0.13	0.16	0.16	0.19	0.18	0.22
	2:15:00	0.00	0.00	0.04	0.07	0.08	0.09	0.10	0.09	0.12
	2:20:00	0.00	0.00	0.02	0.03	0.04	0.04	0.05	0.05	0.06
	2:25:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	2:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet 1	Inlet 2	Inlet 3	Inlet 4	Inlet 5	Inlet 6	Inlet 8	Inlet 14
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	AREA	STREET	AREA
Hydraulic Condition	On Grade	On Grade	On Grade	On Grade	In Sump	Swale	In Sump	Swale
Inlet Type	Denver No. 16 Valley Grate	Denver No. 16 Valley Grate	Denver No. 16 Valley Grate	Denver No. 16 Valley Grate	Denver No. 16 Combination	CDOT Type D (In Series & Depressed)	CDOT Type R Curb Opening	CDOT Type D (In Series & Depressed)

USER-DEFINED INPUT

User-Defined Design Flows								
Minor Q_{Known} (cfs)	6.8	7.1	2.6	2.8	4.6	7.5	1.5	9.4
Major Q_{Known} (cfs)	12.7	13.2	6.4	6.8	11.7	14.4	2.8	27.5

Bypass (Carry-Over) Flow from Upstream								
Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0		0.0	0.0

Watershed Characteristics								
Subcatchment Area (acres)								
Percent Impervious								
NRCS Soil Type								

Watershed Profile								
Overland Slope (ft/ft)								
Overland Length (ft)								
Channel Slope (ft/ft)								
Channel Length (ft)								

Minor Storm Rainfall Input								
Design Storm Return Period, T, (years)								
One-Hour Precipitation, P_1 (inches)								

Major Storm Rainfall Input								
Design Storm Return Period, T, (years)								
One-Hour Precipitation, P_1 (inches)								

CALCULATED OUTPUT

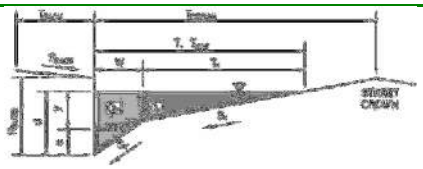
Minor Total Design Peak Flow, Q (cfs)	**6.8**	**7.1**	**2.6**	**2.8**	**4.6**	**7.5**	**1.5**	**9.4**
Major Total Design Peak Flow, Q (cfs)	**12.7**	**13.2**	**6.4**	**6.8**	**11.7**	**14.4**	**2.8**	**27.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	2.5	2.7	0.5	0.6	N/A	0.0	N/A	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	6.2	6.5	2.3	2.5	N/A	0.0	N/A	0.0

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **WireNut**
Inlet ID: **Inlet 1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.015	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.3	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.022	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.015	

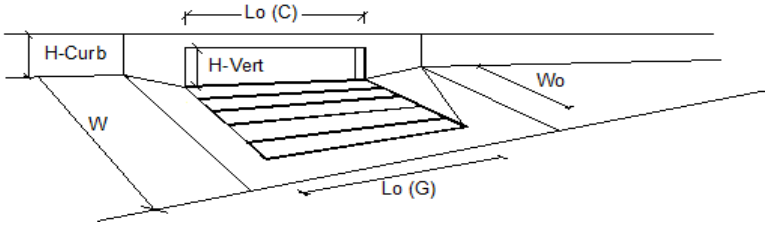
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.8	15.3	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.7	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**6.2**	**12.1**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'
WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



	Design Information (Input) Denver No. 16 Valley Grate		MINOR	MAJOR	
	Type of Inlet	Type =	Denver No. 16 Valley Grate		
Warning 1	Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	0.0	0.0	inches
	Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Warning 1	Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	9.67	9.67	ft
Warning 1	Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	2.75	2.75	ft
	Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	0.50	0.50	
	Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	N/A	N/A	
	Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
	Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	6.8	12.7	cfs
	Water Spread Width	T =	10.0	13.7	ft
	Water Depth at Flowline (outside of local depression)	d =	4.8	5.8	inches
	Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
	Ratio of Gutter Flow to Design Flow	E_o =	0.762	0.611	
	Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.6	5.0	cfs
	Discharge within the Gutter Section W	Q_w =	5.2	7.8	cfs
	Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
	Flow Area within the Gutter Section W	A_W =	0.83	1.07	sq ft
	Velocity within the Gutter Section W	V_W =	6.2	7.2	fps
	Water Depth for Design Condition	d_{LOCAL} =	4.8	5.8	inches
	Grate Analysis (Calculated)		MINOR	MAJOR	
	Total Length of Inlet Grate Opening	L =	9.67	9.67	ft
	Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	0.723	0.576	
	Under No-Clogging Condition		MINOR	MAJOR	
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	3.67	3.67	fps
	Interception Rate of Frontal Flow	R_f =	0.88	0.84	
	Interception Rate of Side Flow	R_x =	0.60	0.55	
	Interception Capacity	Q_i =	5.5	9.1	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	1.00	1.00	
	Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	0.50	0.50	
	Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	4.83	4.83	ft
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	2.55	2.55	fps
	Interception Rate of Frontal Flow	R_f =	0.78	0.73	
	Interception Rate of Side Flow	R_x =	0.23	0.20	
	Actual Interception Capacity	**Q_a =**	**4.3**	**6.5**	**cfs**
	Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**2.5**	**6.2**	**cfs**
	Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
	Equivalent Slope S_e (based on grate carry-over)	S_e =	N/A	N/A	ft/ft
	Required Length L_T to Have 100% Interception	L_T =	N/A	N/A	ft
	Under No-Clogging Condition		MINOR	MAJOR	
	Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	N/A	N/A	ft
	Interception Capacity	Q_i =	N/A	N/A	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient	CurbCoef =	N/A	N/A	
	Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	N/A	N/A	
	Effective (Unclogged) Length	L_e =	N/A	N/A	ft
	Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
	Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**N/A**	**N/A**	**cfs**
	Summary		MINOR	MAJOR	
	Total Inlet Interception Capacity	**Q =**	**4.3**	**6.5**	**cfs**
	Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.5**	**6.2**	**cfs**
	Capture Percentage = Q_a/Q_o =	**C% =**	**63**	**51**	**%**

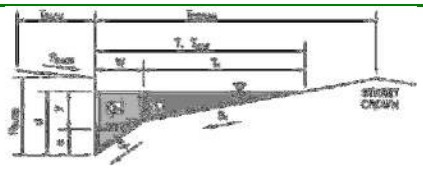
Warning 1: Dimension entered is not a typical dimension for inlet type specified.

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: WireNut
Inlet ID: Inlet 2



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.015	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.3	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.024	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.015	

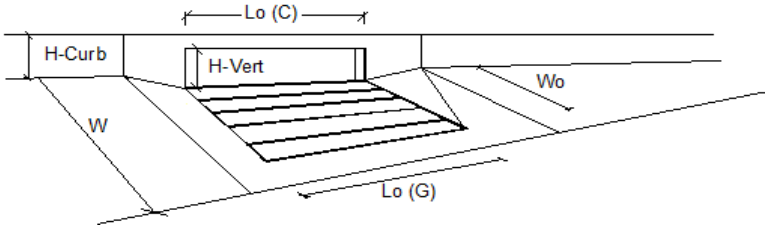
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.8	15.3	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.8	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**6.6**	**11.7**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'
WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



	Design Information (Input)	Denver No. 16 Valley Grate	MINOR	MAJOR	
	Type of Inlet	Type =	Denver No. 16 Valley Grate		
Warning 1	Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	0.0	0.0	inches
	Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Warning 1	Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	9.67	9.67	ft
Warning 1	Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	2.75	2.75	ft
	Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	0.50	0.50	
	Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	N/A	N/A	
	Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
	Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	7.1	13.2	cfs
	Water Spread Width	T =	9.8	13.2	ft
	Water Depth at Flowline (outside of local depression)	d =	4.9	5.9	inches
	Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
	Ratio of Gutter Flow to Design Flow	E_o =	0.761	0.615	
	Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.7	5.1	cfs
	Discharge within the Gutter Section W	Q_w =	5.4	8.1	cfs
	Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
	Flow Area within the Gutter Section W	A_W =	0.86	1.10	sq ft
	Velocity within the Gutter Section W	V_W =	6.3	7.4	fps
	Water Depth for Design Condition	d_{LOCAL} =	4.9	5.9	inches
	Grate Analysis (Calculated)		MINOR	MAJOR	
	Total Length of Inlet Grate Opening	L =	9.67	9.67	ft
	Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	0.723	0.579	
	Under No-Clogging Condition		MINOR	MAJOR	
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	3.67	3.67	fps
	Interception Rate of Frontal Flow	R_f =	0.87	0.82	
	Interception Rate of Side Flow	R_x =	0.61	0.56	
	Interception Capacity	Q_i =	5.7	9.4	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	1.00	1.00	
	Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	0.50	0.50	
	Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	4.84	4.84	ft
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	2.55	2.55	fps
	Interception Rate of Frontal Flow	R_f =	0.77	0.72	
	Interception Rate of Side Flow	R_x =	0.24	0.21	
	Actual Interception Capacity	**Q_a =**	**4.4**	**6.7**	**cfs**
	Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**2.7**	**6.5**	**cfs**
	Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
	Equivalent Slope S_e (based on grate carry-over)	S_e =	N/A	N/A	ft/ft
	Required Length L_T to Have 100% Interception	L_T =	N/A	N/A	ft
	Under No-Clogging Condition		MINOR	MAJOR	
	Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	N/A	N/A	ft
	Interception Capacity	Q_i =	N/A	N/A	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient	CurbCoef =	N/A	N/A	
	Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	N/A	N/A	
	Effective (Unclogged) Length	L_e =	N/A	N/A	ft
	Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
	Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**N/A**	**N/A**	**cfs**
	Summary		MINOR	MAJOR	
	Total Inlet Interception Capacity	**Q =**	**4.4**	**6.7**	**cfs**
	Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.7**	**6.5**	**cfs**
	Capture Percentage = Q_a/Q_o =	**C% =**	**63**	**51**	**%**

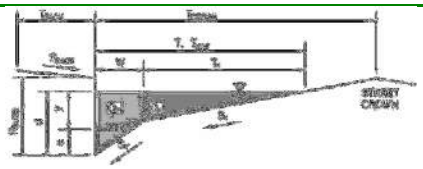
Warning 1: Dimension entered is not a typical dimension for inlet type specified.

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: WireNut
Inlet ID: Inlet 3



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.015	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.3	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.022	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.015	

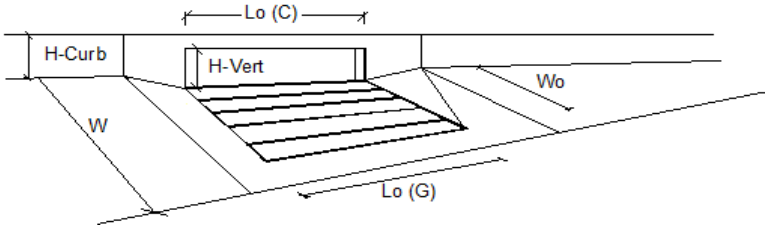
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.8	15.3	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.1	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**3.9**	**12.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



	Design Information (Input) Denver No. 16 Valley Grate		MINOR	MAJOR	
	Type of Inlet	Type =	Denver No. 16 Valley Grate		
Warning 1	Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	0.0	0.0	inches
	Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Warning 1	Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	9.67	9.67	ft
Warning 1	Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	2.75	2.75	ft
	Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	0.50	0.50	
	Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	N/A	N/A	
	Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
	Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.6	6.4	cfs
	Water Spread Width	T =	5.3	9.7	ft
	Water Depth at Flowline (outside of local depression)	d =	3.6	4.7	inches
	Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
	Ratio of Gutter Flow to Design Flow	E_o =	0.969	0.777	
	Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.1	1.4	cfs
	Discharge within the Gutter Section W	Q_w =	2.5	5.0	cfs
	Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
	Flow Area within the Gutter Section W	A_W =	0.52	0.81	sq ft
	Velocity within the Gutter Section W	V_W =	4.8	6.1	fps
	Water Depth for Design Condition	d_{LOCAL} =	3.6	4.7	inches
	Grate Analysis (Calculated)		MINOR	MAJOR	
	Total Length of Inlet Grate Opening	L =	9.67	9.67	ft
	Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	0.941	0.738	
	Under No-Clogging Condition		MINOR	MAJOR	
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	3.67	3.67	fps
	Interception Rate of Frontal Flow	R_f =	0.93	0.89	
	Interception Rate of Side Flow	R_x =	0.64	0.60	
	Interception Capacity	Q_i =	2.4	5.2	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	1.00	1.00	
	Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	0.50	0.50	
	Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	4.84	4.84	ft
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	2.55	2.55	fps
	Interception Rate of Frontal Flow	R_f =	0.83	0.79	
	Interception Rate of Side Flow	R_x =	0.27	0.24	
	Actual Interception Capacity	**Q_a =**	**2.1**	**4.1**	**cfs**
	Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**0.5**	**2.3**	**cfs**
	Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
	Equivalent Slope S_e (based on grate carry-over)	S_e =	N/A	N/A	ft/ft
	Required Length L_T to Have 100% Interception	L_T =	N/A	N/A	ft
	Under No-Clogging Condition		MINOR	MAJOR	
	Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	N/A	N/A	ft
	Interception Capacity	Q_i =	N/A	N/A	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient	CurbCoef =	N/A	N/A	
	Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	N/A	N/A	
	Effective (Unclogged) Length	L_e =	N/A	N/A	ft
	Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
	Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**N/A**	**N/A**	**cfs**
	Summary		MINOR	MAJOR	
	Total Inlet Interception Capacity	**Q =**	**2.1**	**4.1**	**cfs**
	Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.5**	**2.3**	**cfs**
	Capture Percentage = Q_a/Q_o =	**C% =**	**79**	**64**	**%**

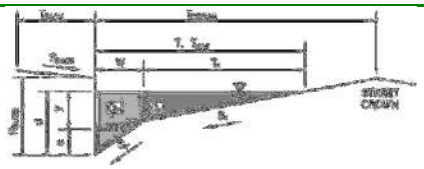
Warning 1: Dimension entered is not a typical dimension for inlet type specified.

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: WireNut
Inlet ID: Inlet 4



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.015	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.3	ft
Gutter Width	W =	3.00	ft
Street Transverse Slope	S_X =	0.024	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.015	

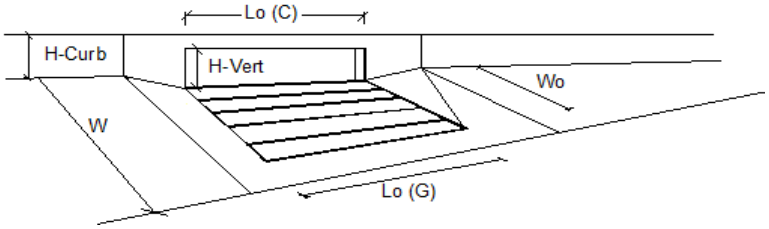
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.8	15.3	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.1	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**3.9**	**11.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



	Design Information (Input) Denver No. 16 Valley Grate		MINOR	MAJOR	
	Type of Inlet	Type =	Denver No. 16 Valley Grate		
Warning 1	Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	0.0	0.0	inches
	Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Warning 1	Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	9.67	9.67	ft
Warning 1	Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	2.75	2.75	ft
	Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	0.50	0.50	
	Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	N/A	N/A	
	Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
	Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.8	6.8	cfs
	Water Spread Width	T =	5.5	9.6	ft
	Water Depth at Flowline (outside of local depression)	d =	3.7	4.9	inches
	Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
	Ratio of Gutter Flow to Design Flow	E_o =	0.962	0.772	
	Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.1	1.6	cfs
	Discharge within the Gutter Section W	Q_w =	2.7	5.2	cfs
	Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
	Flow Area within the Gutter Section W	A_W =	0.55	0.84	sq ft
	Velocity within the Gutter Section W	V_W =	4.9	6.3	fps
	Water Depth for Design Condition	d_{LOCAL} =	3.7	4.9	inches
	Grate Analysis (Calculated)		MINOR	MAJOR	
	Total Length of Inlet Grate Opening	L =	9.67	9.67	ft
	Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	0.930	0.733	
	Under No-Clogging Condition		MINOR	MAJOR	
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	3.67	3.67	fps
	Interception Rate of Frontal Flow	R_f =	0.92	0.88	
	Interception Rate of Side Flow	R_x =	0.66	0.61	
	Interception Capacity	Q_i =	2.5	5.5	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	1.00	1.00	
	Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	0.50	0.50	
	Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	4.84	4.84	ft
	Minimum Velocity Where Grate Splash-Over Begins	V_o =	2.55	2.55	fps
	Interception Rate of Frontal Flow	R_f =	0.82	0.78	
	Interception Rate of Side Flow	R_x =	0.28	0.24	
	Actual Interception Capacity	**Q_a =**	**2.2**	**4.3**	**cfs**
	Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**0.6**	**2.5**	**cfs**
	Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
	Equivalent Slope S_e (based on grate carry-over)	S_e =	N/A	N/A	ft/ft
	Required Length L_T to Have 100% Interception	L_T =	N/A	N/A	ft
	Under No-Clogging Condition		MINOR	MAJOR	
	Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	N/A	N/A	ft
	Interception Capacity	Q_i =	N/A	N/A	cfs
	Under Clogging Condition		MINOR	MAJOR	
	Clogging Coefficient	CurbCoef =	N/A	N/A	
	Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	N/A	N/A	
	Effective (Unclogged) Length	L_e =	N/A	N/A	ft
	Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
	Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**N/A**	**N/A**	**cfs**
	Summary		MINOR	MAJOR	
	Total Inlet Interception Capacity	**Q =**	**2.2**	**4.3**	**cfs**
	Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.6**	**2.5**	**cfs**
	Capture Percentage = Q_a/Q_o =	**C% =**	**78**	**63**	**%**

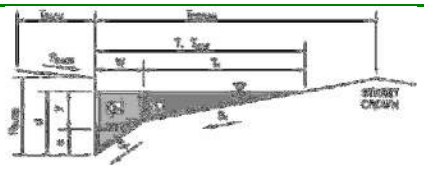
Warning 1: Dimension entered is not a typical dimension for inlet type specified.

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **WireNut**
Inlet ID: **Inlet 5**

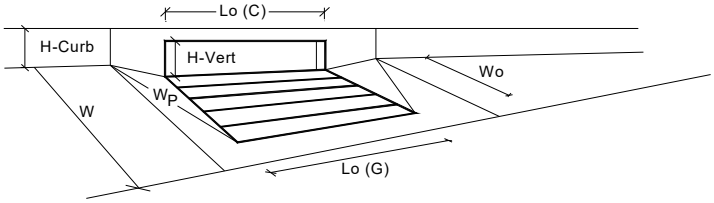


Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.015		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0		ft
Warning 1 Gutter Width	W =	3.00		ft
Street Transverse Slope	S_X =	0.011		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.015		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	29.5	29.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.5	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

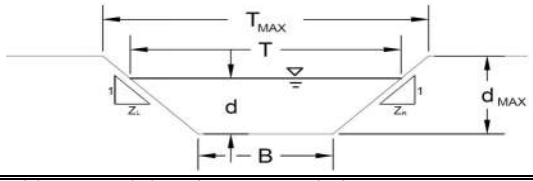


			MINOR	MAJOR	
	Design Information (Input) — Denver No. 16 Combination				
	Type of Inlet	Type =	Denver No. 16 Combination		
Warning 1	Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	0.00	0.00	inches
	Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
	Water Depth at Flowline (outside of local depression)	Ponding Depth =	7.0	9.5	inches
	Grate Information		MINOR	MAJOR	☑ Override Depths
	Length of a Unit Grate	L_o (G) =	9.67	9.67	feet
Warning 1	Width of a Unit Grate	W_o =	2.75	2.75	feet
	Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.31	0.31	
	Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
	Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.60	3.60	
	Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
	Curb Opening Information		MINOR	MAJOR	
	Length of a Unit Curb Opening	L_o (C) =	3.00	3.00	feet
	Height of Vertical Curb Opening in Inches	H_{vert} =	6.50	6.50	inches
	Height of Curb Orifice Throat in Inches	H_{throat} =	5.25	5.25	inches
	Angle of Throat (see USDCM Figure ST-5)	Theta =	0.00	0.00	degrees
Warning 1	Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.50	2.50	feet
	Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
	Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.70	3.70	
	Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.66	0.66	
	Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
	Depth for Grate Midwidth	d_{Grate} =	0.469	0.678	ft
	Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.54	ft
	Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	1.00	1.00	
	Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
	Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.66	0.90	
			MINOR	MAJOR	
	Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.5**	**12.4**	**cfs**
	Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.6	11.7	cfs

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

AREA INLET IN A SWALE

WireNut
Inlet 6



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =	C	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	3.00	ft
Warning 01 Left Side Slope	Z1 =	3.00	ft/ft
Warning 01 Right Side Sloe	Z2 =	3.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	13.00	13.00	ft
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	1.10	1.30	ft

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	20.9	35.8	cfs
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	1.10	1.30	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	7.5	14.4	cfs
Water Depth	d =	0.84	1.00	ft

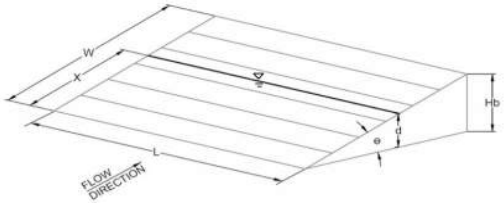
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

AREA INLET IN A SWALE

WireNut
Inlet 6

Inlet Design Information (Input)

Type of Inlet: CDOT Type D (In Series & Depressed) Inlet Type = CDOT Type D (In Series & Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	6.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.72	
Orifice Coefficient	C_o =	0.48	
Weir Coefficient	C_w =	1.53	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.84	2.00	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**40.9**	**42.6**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

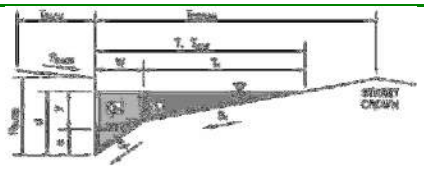
Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **WireNut**
Inlet ID: **Inlet 8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.015	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.3	ft
Warning 1 Gutter Width	W =	2.50	ft
Street Transverse Slope	S_X =	0.022	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.015	

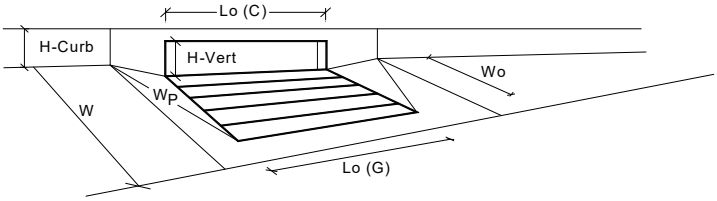
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.8	15.3	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.2	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

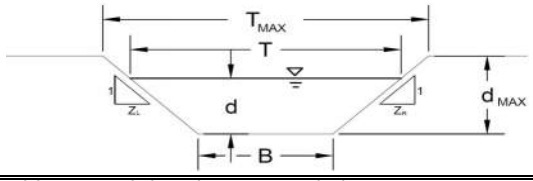
MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	4.5	5.9	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.50	2.50	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.17	0.28	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.58	0.75	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**2.1**	**4.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	1.5	2.8	cfs

AREA INLET IN A SWALE

WireNut
Inlet 14



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =	C	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	3.00	ft/ft
Right Side Sloe	Z2 =	3.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	14.00	16.00	ft
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	1.30	1.60	ft

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	10.6	27.7	cfs
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	1.30	1.60	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	9.4	27.5	cfs
Water Depth	d =	1.27	1.60	ft

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

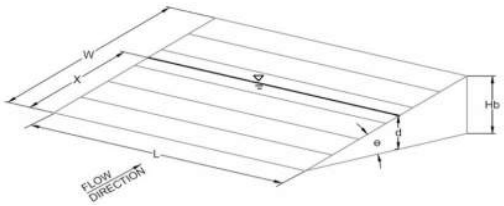
AREA INLET IN A SWALE

WireNut
Inlet 14

Inlet Design Information (Input)

Type of Inlet: CDOT Type D (In Series & Depressed)

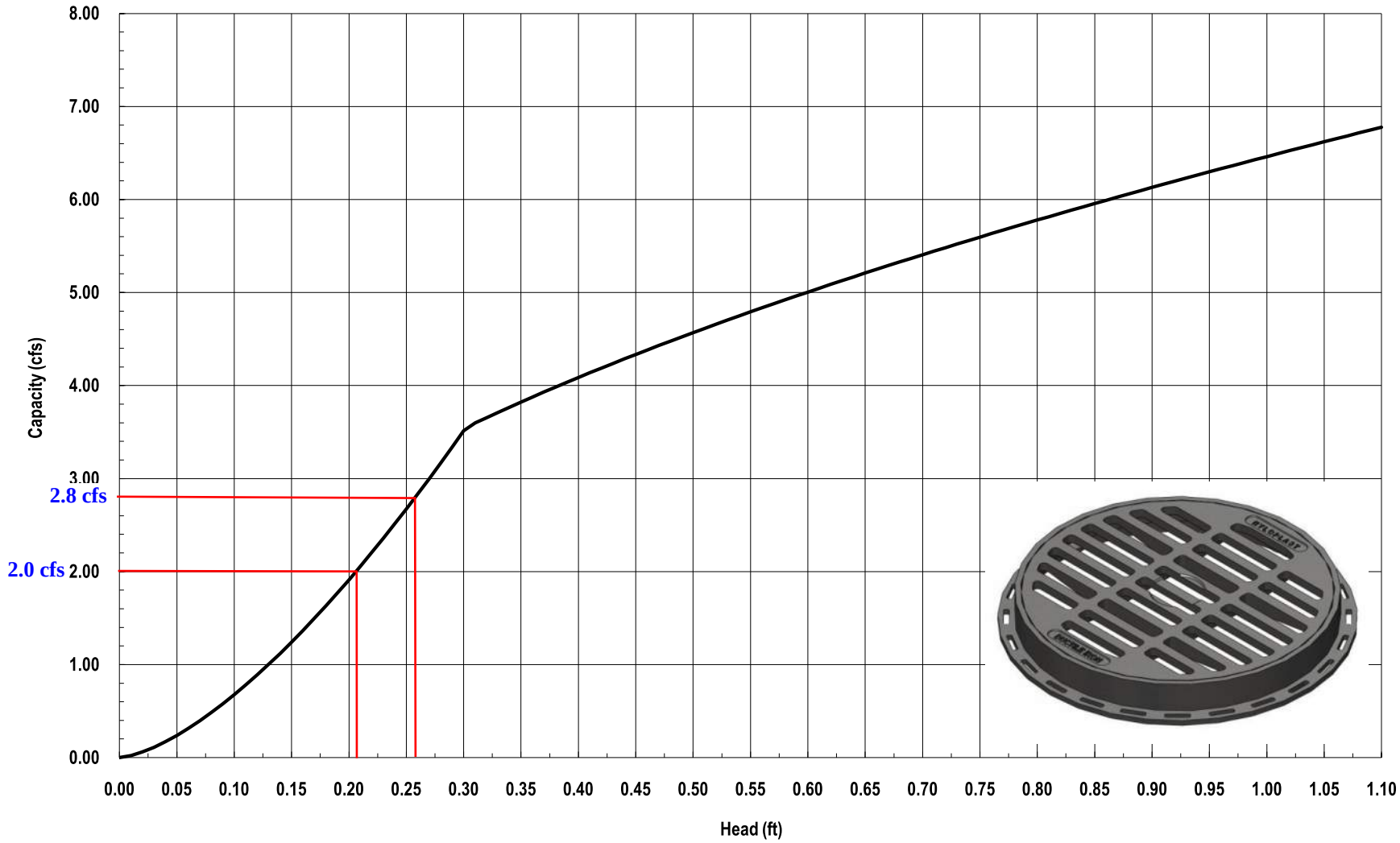
Inlet Type = CDOT Type D (In Series & Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	ft
Length of Grate	L =	6.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	ft
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.72	
Orifice Coefficient	C_o =	0.48	
Weir Coefficient	C_w =	1.53	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	2.27	2.60	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**45.4**	**48.6**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

Nyloplast 24" Standard Grate Inlet Capacity Chart



DP11=Q100=1.4 cfs 50% BLOCKAGE = 2.8 cfs
DP12=Q100=1.0 cfs 50% BLOCKAGE = 2.0 cfs

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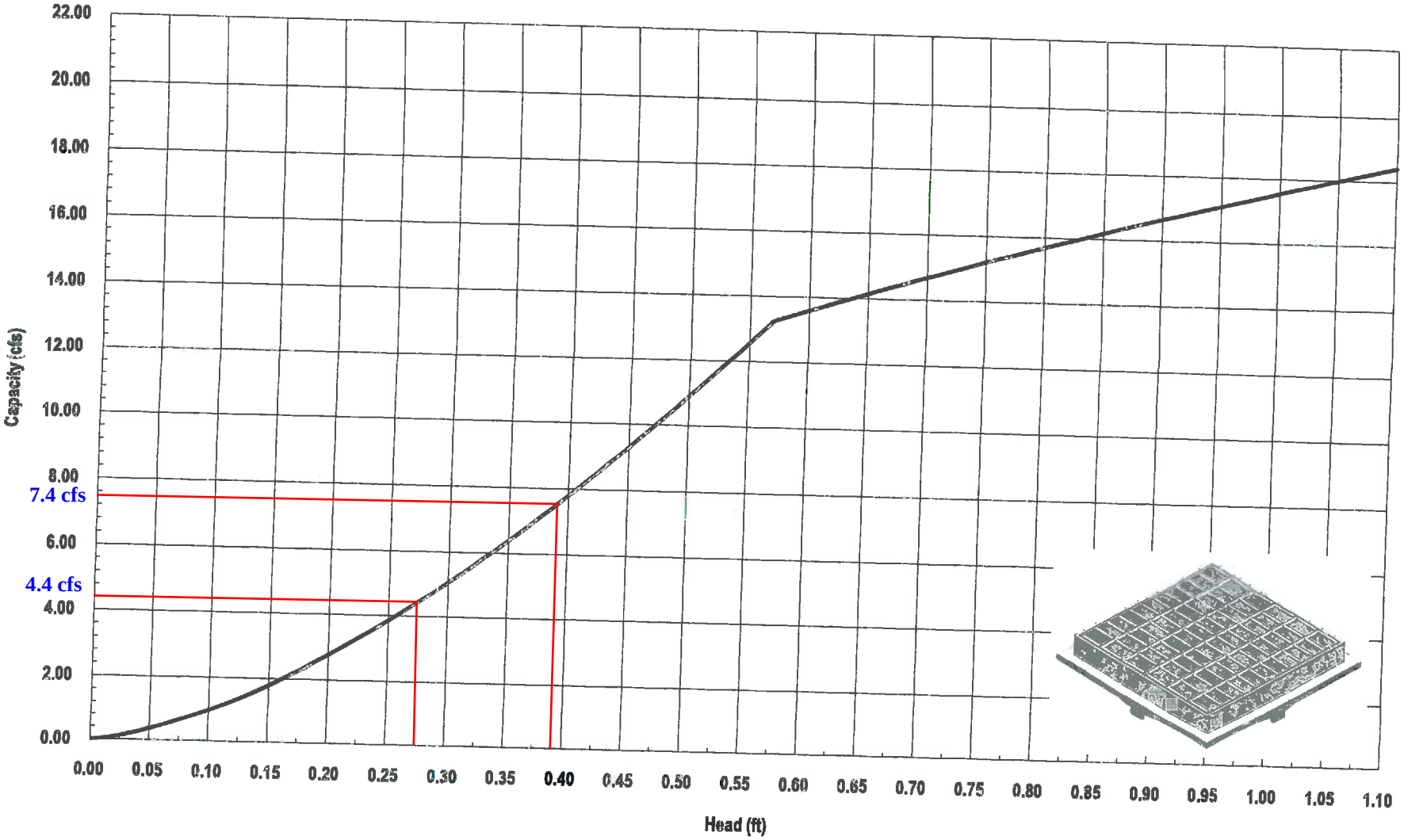
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

Nyloplast 2' x 2' Steel Bar / MAG Grate Inlet Capacity Chart



DP9= Q100=3.7 cfs 50% BLOCKAGE = 7.4 cfs
DP10= Q100=2.2 cfs 50% BLOCKAGE = 4.4 cfs

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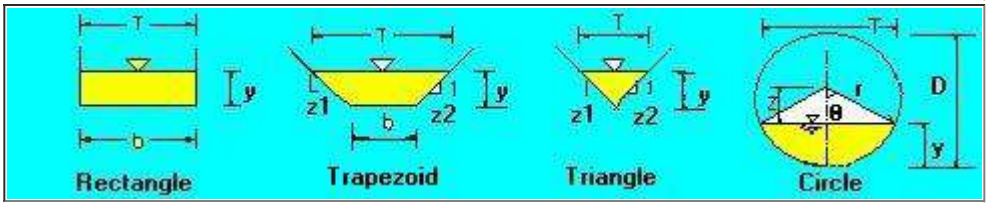
The open channel flow calculator

Select Channel Type: Triangle



Velocity(V)&Discharge(Q)

Select unit system: Feet(ft)

Channel slope: .02 ft/ft	Water depth(y): 1.25 ft	Bottom W(b) 0 ft
Flow velocity 5.9328 ft/s	LeftSlope (Z1): 3 to 1 (H:V)	RightSlope (Z2): 3 to 1 (H:V)
Flow discharge 27.8101 ft^3/s	Input n value 0.025 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 7.91 ft	Flow area 4.69 ft^2	Top width(T) 7.5 ft
Specific energy 1.8 ft	Froude number 1.32	Flow status Supercritical flow
Critical depth 1.4 ft	Critical slope 0.0109 ft/ft	Velocity head 0.55 ft

DP14~Q_{100}=27.5 cfs

Rating Table for Swale A-A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.018 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	27.50 cfs

Roughness Coefficient	Normal Depth (in)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.030	16.3	4.96	5.5	8.6	8.16
0.040	18.2	4.00	6.9	9.6	9.09

Worksheet for Spillway Rundown

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.500 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	24.00 ft
Discharge	15.20 cfs

Results	
Normal Depth	1.1 in
Flow Area	2.2 ft²
Wetted Perimeter	24.7 ft
Hydraulic Radius	1.1 in
Top Width	24.72 ft
Critical Depth	2.7 in
Critical Slope	0.022 ft/ft
Velocity	6.96 ft/s
Velocity Head	0.75 ft
Specific Energy	0.84 ft
Froude Number	4.124
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.1 in
Critical Depth	2.7 in
Channel Slope	0.500 ft/ft
Critical Slope	0.022 ft/ft

CIVIL CONSULTANTS, INC.
20 BOULDER CRESCENT, STE 110
COLORADO SPRINGS, CO 80903
(719) 955-5485

PROJECT: WIRENUT - PIPE 35 LTB CALC

DATE: 6/14/23

Pipe 35 LOW TAILWATER BASIN

$Q_{100} = 7.5$ cfs

DIA = 24"

$Q/D^{2.5} = 7.5/2^{2.5} = 7.5/5.65 = 1.32$

Use Figure 9.38

Assume $y_t/D_t = 0.4$

$Q/D^{1.5} = 7.5/2.0^{1.5} = 7.5/2.82 = 2.65$

Per Figure 9-38 Type L is Required (MIN) Use $d_{50} = 12"$ (Type M)

Per Figure 9-37

Pipe Size 18-24" D = 1.0, W = 4, L = 15

Upsized to D = 1.5' W = 6, L = 18.5

CIVIL CONSULTANTS, INC.
212 N. Wahsatch Ave., Ste. 305
Colorado Springs, CO
719.955.5485

Project: WIRENUT Pipe 38 - LTB Calc

Date: 6/14/23

Pipe 38 Low Tailwater Basin

$Q_{100} = 5.9$ cfs

Dia = 18"

$Q/D^{2.5} = 5.9/(1.5)^{2.5} = 5.9/2.76 = 2.14$

Use Figure 9.38

Assume $y_t/D_t = 0.4$

$Q/D^{1.5} = 5.9/1.5^{1.5} = 5.9/1.84 = 3.21$

Per Figure 9-38 Type 'L' is min Req'd <u>Use $D_{50} = 12"$ (type M)</u>

Per Figure 9-37
Pipe Size 18-24 D = 1.0, W = 4, L = 15

Used D = 1.5, W = 6, L = 17.5

CIVIL CONSULTANTS, INC.
212 N. Wahsatch Ave., Ste. 305
Colorado Springs, CO
719.955.5485

Project: WIRENUT - Pipe 40 - LTB calc

Date: 11/6/22

Pipe 40 - Low Tailwater Basin

$Q_{100} = 41.4$ cfs

$D_{ft} = 3.0$ ft

$Q/D_t^{2.5} = 41.4/3^{2.5} = 41.4/15.59 = 2.65 < 6.0$

Use Figure 9-38

Assume $y_t / D_t = 0.4$

$Q/D^{1.5} = 41.4/(3.0^{1.5}) = 7.96$

Per Figure 9-38 Type L is Req'd, Use $P_{50} = H$ (18") MIN. due to channel velocities of Sand Creek.

Per Figure 9-37

Basin Size

Pipe Size = 36". → D = 1'-6", W = 6', L = 20' MIN REQ'D

CIVIL CONSULTANTS, INC.

212 N. Wahsatch Ave., Ste. 305
Colorado Springs, CO
719.955.5485

Project: WIRENUT – Pipe 41 – LTB Calc

Date: 11/6/22

Pipe 41 – Low Tailwater Basin

$Q_{100} = 27.5$ cfs

Dia = 2.5 ft

$Q/D_o^{2.5} = 27.5/2.5^{2.5} = 27.5/9.88 = 2.78$

Use Figure 9.38

Assume $y_t/D_o = 0.4$

$Q/D^{1.5} = 27.5/(2.5^{1.5}) = 27.5/3.95 = 6.95$

Per Figure 9-38 Type L is Rigid MIN

Use d_{50} = H (18") due to channel velocities of Sand/Gravel

Per Figure 9-37

Basin size MIN.

Pipe Size = 30" → D = 1'-6", W = 6, L = 20'

$$H_a = \frac{(H + Y_n)}{2}$$ Equation 9-19

Where the maximum value of H_a shall not exceed H, and:

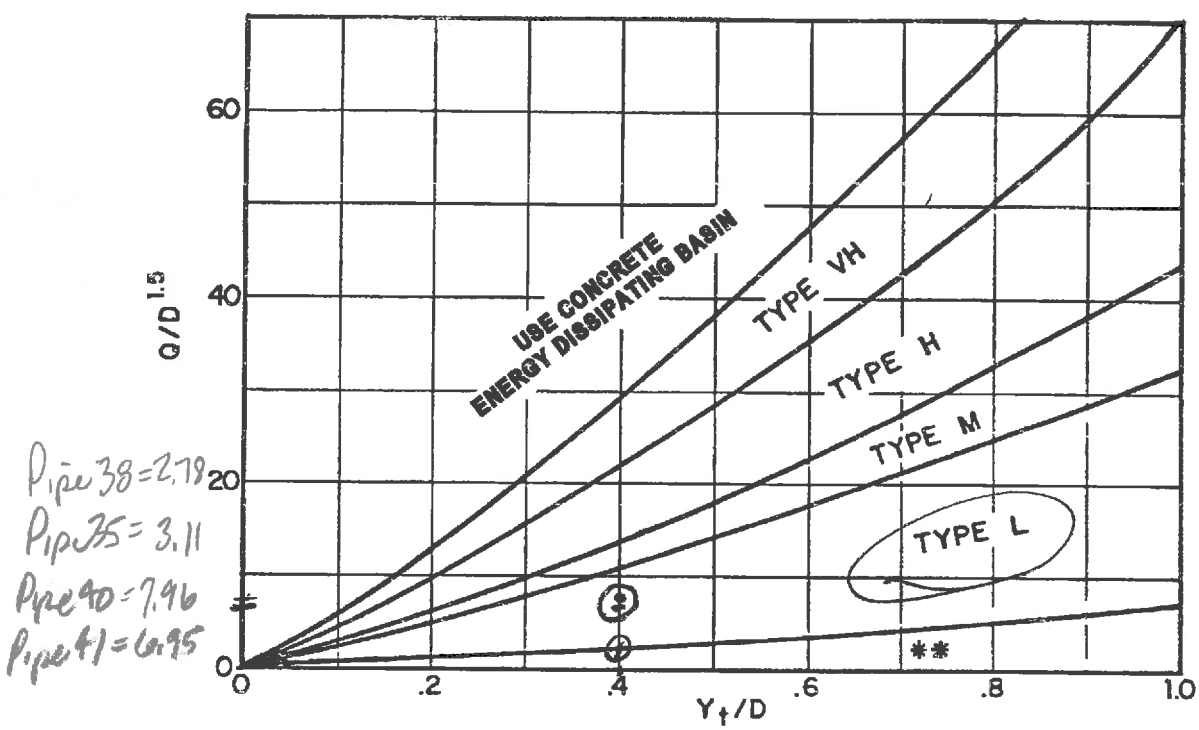
D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

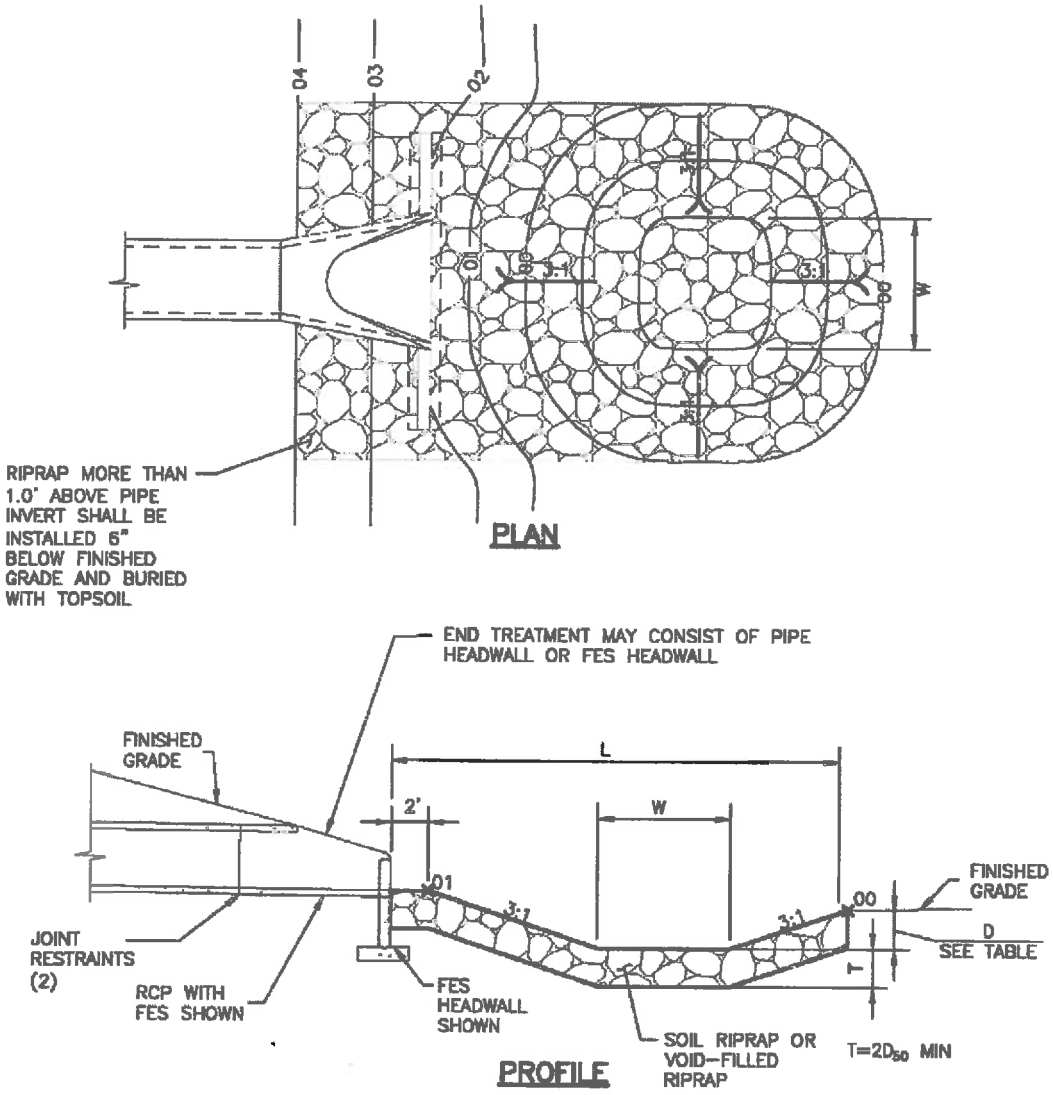
H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)



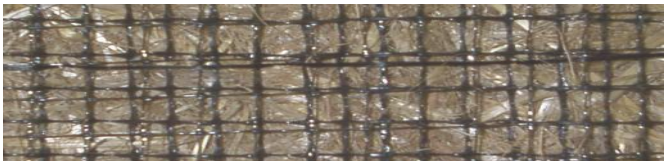
PIPE SIZE OR BOX HEIGHT	D	W*	L
18" – 24"	1'–0"	4'	15'
30" – 36"	1'–6"	6'	20'
42" – 48"	2'–0"	7'	24'
54" – 60"	2'–6"	8'	28'
66" – 72"	3'–0"	9'	32'

* IF OUTLET PIPE IS A BOX CULVERT WITH A WIDTH GREATER THAN W, THEN W = CULVERT WIDTH

Figure 9-37. Low tailwater riprap basin

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet
VMax® SC250® Turf Reinforcement Mat



DESCRIPTION

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 70% straw and 30% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

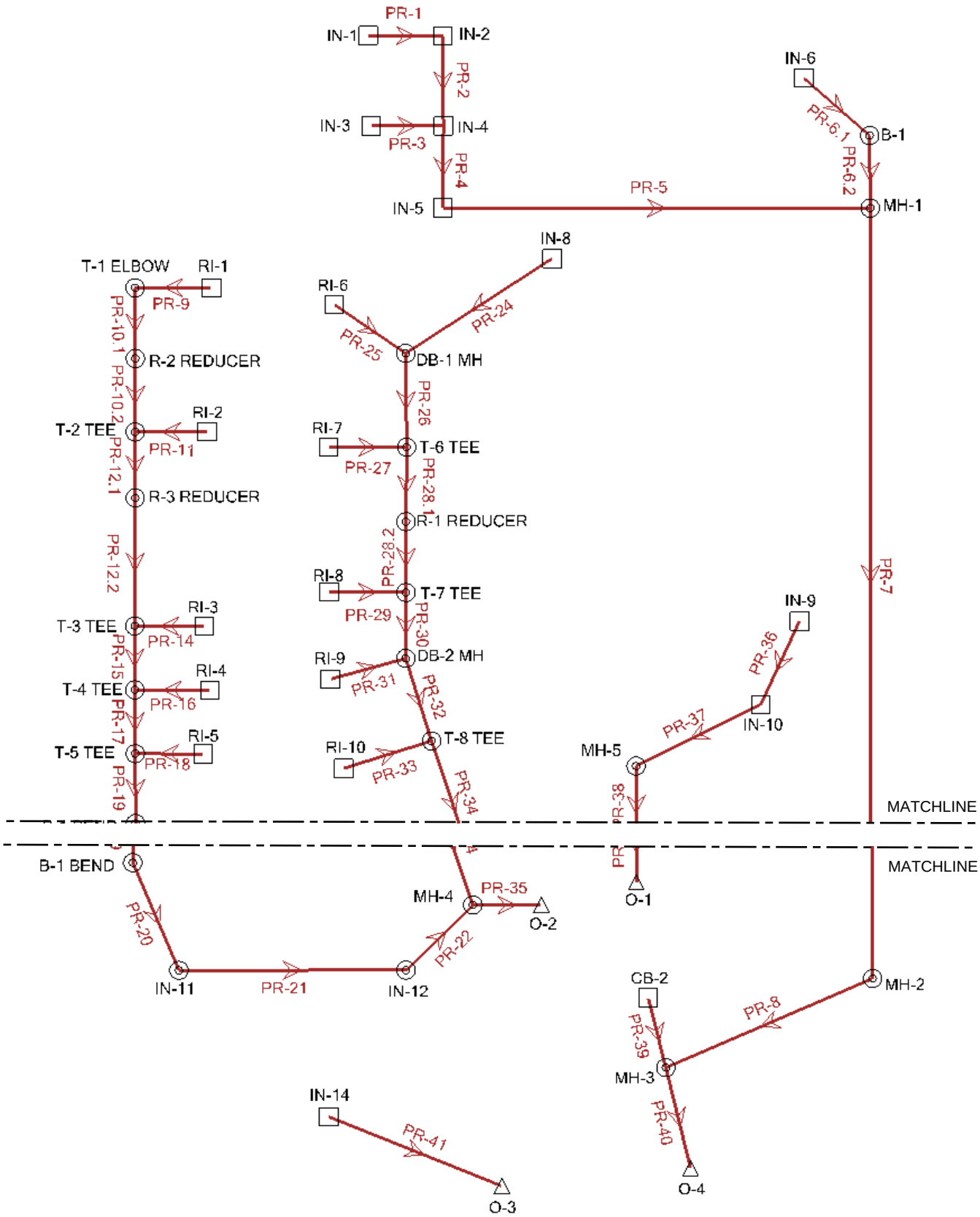
The SC250 shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	70% Straw Fiber	0.35 lb/sq yd (0.19 kg/sm)
	30% Coconut Fiber	0.15 lbs/sq yd (0.08 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene	5 lb/1000 sq ft (2.44 kg/100 sm)
	Middle, Corrugated UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene, UV Stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44m)
Length	55.5 ft (16.9 m)	90 ft (27.4 m)
Weight ± 10%	34 lbs (15.42 kg)	70 lbs (31.8 kg)
Area	40 sq yd (33.4 sm)	80 sq. yd. (66.8 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.62 in. (15.75 mm)
Resiliency	ASTM 6524	95.2%
Density	ASTM D792	0.891 g/cm^3
Mass/Unit Area	ASTM 6566	16.13 oz/sy (548 g/sm)
UV Stability	ASTM D4355/ 1000 HR	80%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz-in.
Light Penetration	ASTM D6567	4.1%
Tensile Strength – MD	ASTM D6818	709 lbs/ft (10.51 kN/m)
Elongation – MD	ASTM D6818	23.9%
Tensile Strength – TD	ASTM D6818	712 lbs/ft (10.56 kN/m)
Elongation – TD	ASTM D6818	36.9%
Biomass Improvement	ASTM D7322	441%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.5 psf (120 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	10.0 psf (480 Pa)	8.0 psf (383 Pa)
Unvegetated Velocity	9.5 fps (2.9 m/s)	
Vegetated Velocity	15 fps (4.6 m/s)	



INDEX MAP STRM 1-6

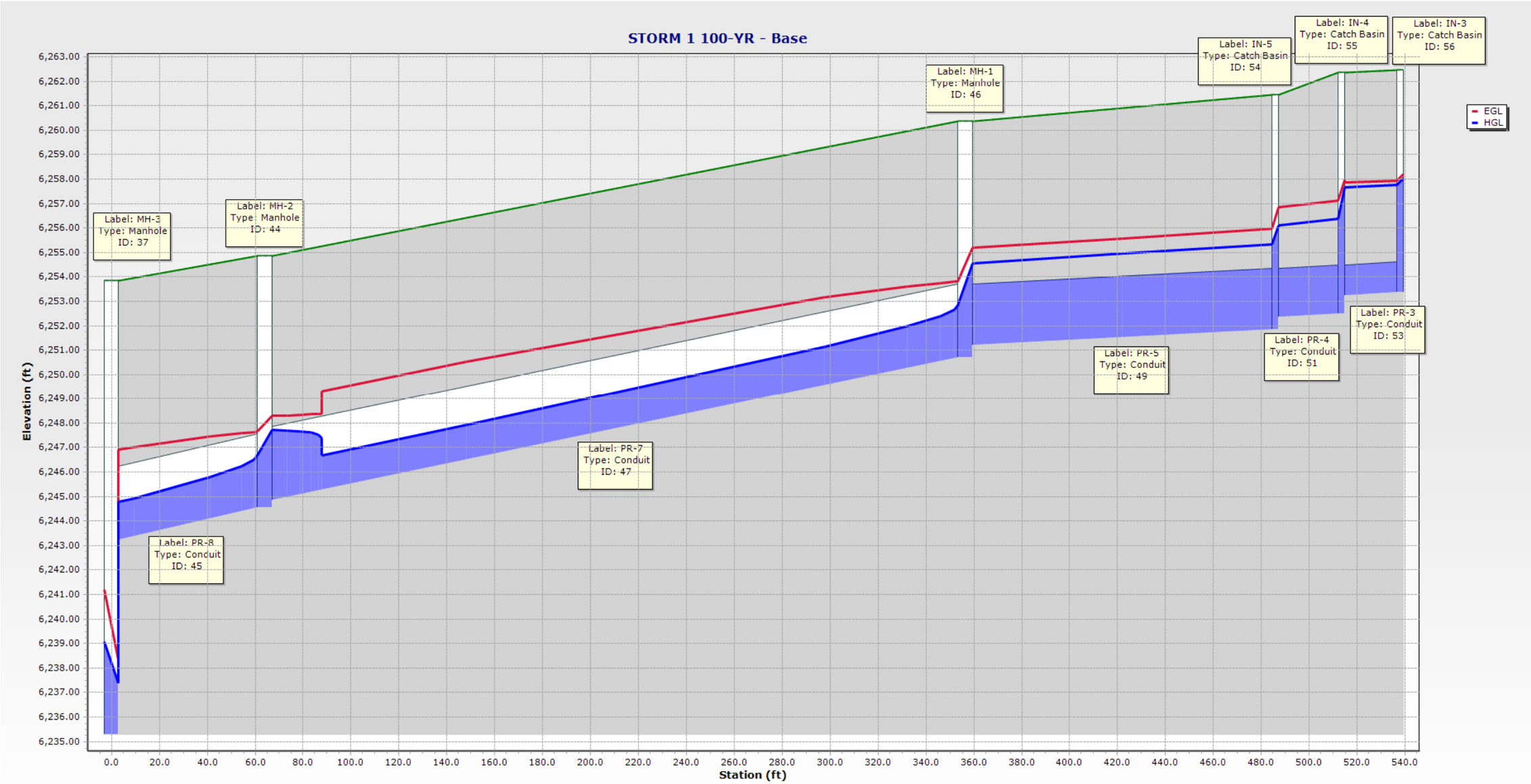
Conduit FlexTable: STRM - 100YR

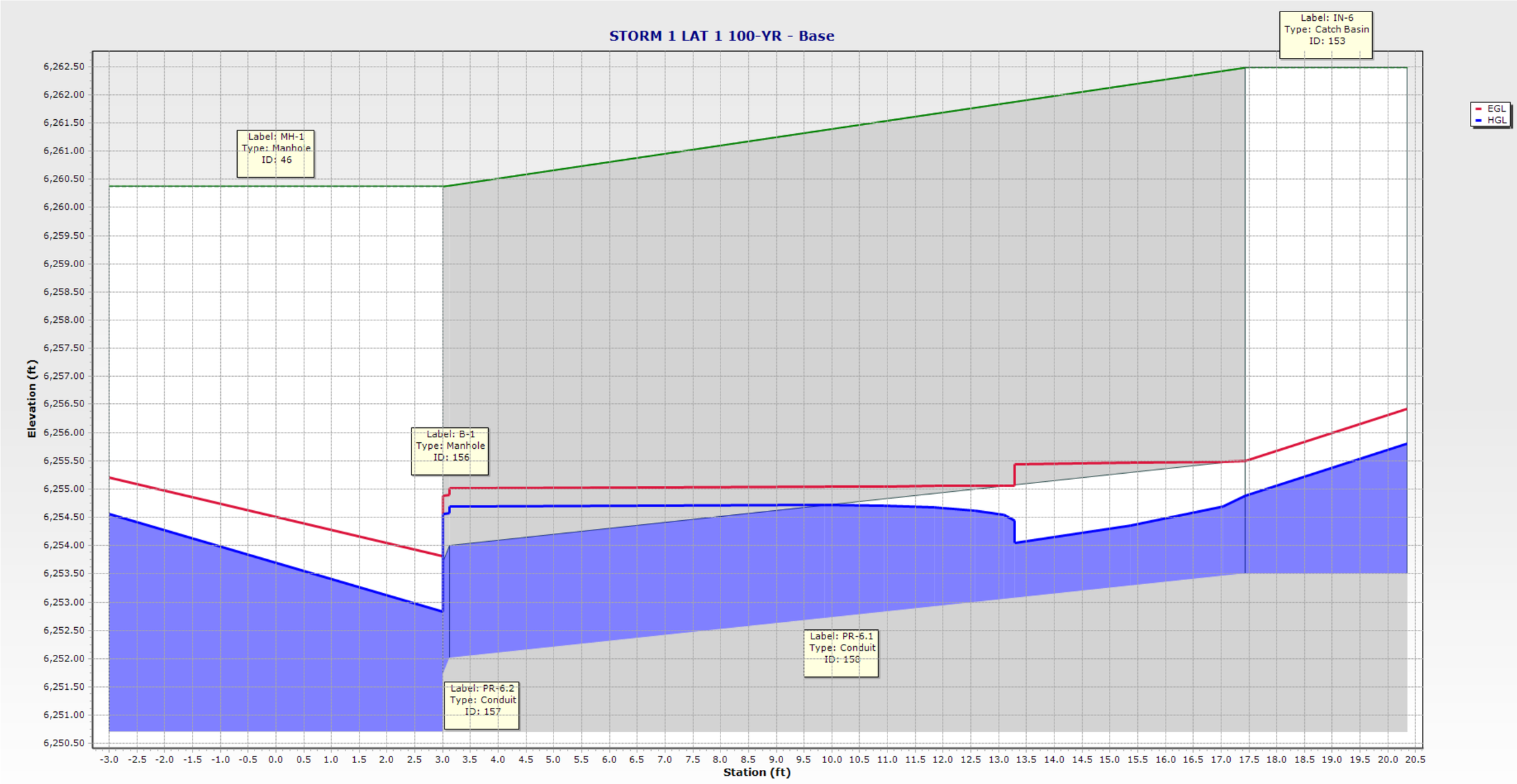
Label	ID	Upstream Structure	Flow (cfs)	Flow / Capacity (Design) (%)	Length (Unified) (ft)	Velocity (ft/s)	Froude Number	Depth (Normal) (ft)	Depth (Critical) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
PR-1	60	IN-1	6.50	87.8	24.2	3.68	(N/A)	1.09	0.99	6,258.37	6,258.28	6,258.16	6,258.07
PR-2	58	IN-2	13.20	84.7	14.7	4.20	(N/A)	1.41	1.31	6,258.00	6,257.95	6,257.73	6,257.68
PR-3	53	IN-3	4.10	90.4	24.3	3.34	(N/A)	0.93	0.82	6,257.95	6,257.85	6,257.77	6,257.68
PR-4	51	IN-4	21.60	134.3	27.7	6.88	(N/A)	(N/A)	1.66	6,257.11	6,256.86	6,256.38	6,256.12
PR-5	49	IN-5	31.50	108.7	129.4	6.42	(N/A)	(N/A)	1.91	6,255.96	6,255.20	6,255.32	6,254.56
PR-6.1	158	IN-6	14.40	20.6	15.8	17.50	(N/A)	0.62	1.37	6,255.49	6,255.01	6,254.88	6,254.69
PR-6.2	157	B-1	14.40	20.7	3.1	4.58	(N/A)	0.62	1.37	6,254.90	6,254.89	6,254.57	6,254.56
PR-7	47	MH-1	42.30	44.8	292.5	12.99	(N/A)	1.41	2.12	6,253.81	6,248.29	6,252.83	6,247.72
PR-8	45	MH-2	42.30	44.4	63.9	13.09	(N/A)	1.40	2.12	6,247.65	6,246.90	6,246.67	6,244.77
PR-9	113	RI-1	0.20	8.0	8.6	7.66	(N/A)	0.10	0.22	6,258.31	6,256.65	6,258.22	6,256.61
PR-10.1	164	T-1 ELBOW	0.20	50.5	42.2	2.02	(N/A)	0.25	0.22	6,256.60	6,256.47	6,256.54	6,256.44
PR-10.2	163	R-2 REDUCER	0.20	27.8	2.8	1.76	(N/A)	0.24	0.21	6,256.44	6,256.44	6,256.43	6,256.43
PR-11	111	RI-2	0.40	14.7	8.6	9.92	(N/A)	0.13	0.32	6,258.46	6,256.50	6,258.32	6,256.43
PR-12.1	167	T-2 TEE	0.60	68.9	13.5	2.69	(N/A)	0.41	0.36	6,256.42	6,256.34	6,256.30	6,256.19
PR-12.2	166	R-3 REDUCER	0.60	24.0	36.5	2.62	(N/A)	0.33	0.32	6,255.94	6,255.85	6,255.84	6,255.81
PR-14	109	RI-3	0.10	3.3	8.6	7.05	(N/A)	0.06	0.16	6,258.21	6,255.83	6,258.16	6,255.81
PR-15	78	T-3 TEE	0.70	27.5	45.0	2.77	(N/A)	0.36	0.35	6,255.80	6,255.70	6,255.69	6,255.67
PR-16	107	RI-4	0.30	9.6	8.6	10.06	(N/A)	0.10	0.28	6,258.39	6,255.74	6,258.28	6,255.67
PR-17	76	T-4 TEE	0.90	35.7	28.0	2.94	(N/A)	0.41	0.40	6,255.66	6,255.60	6,255.56	6,255.54
PR-18	104	RI-5	0.10	3.1	8.6	7.38	(N/A)	0.06	0.16	6,258.21	6,255.55	6,258.16	6,255.54
PR-19	74	T-5 TEE	1.00	40.3	24.7	2.99	(N/A)	0.44	0.42	6,255.53	6,255.43	6,255.39	6,255.32
PR-20	72	B-1 BEND	1.00	39.8	58.4	3.01	(N/A)	0.44	0.42	6,255.41	6,255.23	6,255.27	6,255.17
PR-21	70	IN-11	2.40	52.3	138.5	3.78	(N/A)	0.64	0.62	6,255.15	6,254.67	6,254.93	6,254.59
PR-22	68	IN-12	3.40	76.3	23.1	4.00	(N/A)	0.82	0.74	6,254.58	6,254.49	6,254.37	6,254.31
PR-24	98	IN-8	2.80	72.0	66.2	3.45	(N/A)	0.79	0.67	6,255.99	6,255.87	6,255.87	6,255.77
PR-25	130	RI-6	0.20	9.2	17.3	6.89	(N/A)	0.10	0.22	6,258.31	6,255.80	6,258.22	6,255.77
PR-26	96	DB-1 MH	3.00	66.6	39.1	3.93	(N/A)	0.75	0.70	6,255.67	6,255.59	6,255.54	6,255.48
PR-27	128	RI-7	0.30	11.9	16.2	8.62	(N/A)	0.12	0.28	6,258.39	6,255.52	6,258.28	6,255.48
PR-28.1	161	T-6 TEE	3.40	74.3	31.9	4.08	(N/A)	0.80	0.74	6,255.46	6,255.33	6,255.23	6,255.14
PR-28.2	160	R-1 REDUCER	3.40	40.2	3.1	4.52	(N/A)	0.66	0.70	6,255.14	6,255.14	6,255.04	6,255.04
PR-29	126	RI-8	0.30	11.4	16.2	8.86	(N/A)	0.11	0.28	6,258.39	6,255.08	6,258.28	6,255.04
PR-30	92	T-7 TEE	3.70	49.8	40.0	4.20	(N/A)	0.75	0.73	6,255.03	6,254.94	6,254.85	6,254.83
PR-31	123	RI-9	0.30	11.5	15.1	8.85	(N/A)	0.11	0.28	6,258.39	6,256.08	6,258.28	6,254.86
PR-32	90	DB-2 MH	4.00	54.8	33.1	4.23	(N/A)	0.79	0.77	6,254.81	6,254.75	6,254.66	6,254.63
PR-33	121	RI-10	0.20	9.4	28.2	6.78	(N/A)	0.10	0.22	6,258.31	6,254.65	6,258.22	6,254.63
PR-34	88	T-8 TEE	4.20	56.0	64.7	4.36	(N/A)	0.80	0.79	6,254.61	6,254.44	6,254.37	6,254.31
PR-35	66	MH-4	7.50	18.1	34.4	10.03	(N/A)	0.58	0.97	6,254.01	6,253.40	6,253.63	6,252.12
PR-36	139	IN-9	3.70	148.2	65.1	4.71	(N/A)	(N/A)	0.82	6,255.36	6,254.68	6,255.02	6,254.23
PR-37	137	IN-10	5.10	36.0	55.6	7.35	(N/A)	0.62	0.87	6,254.14	6,253.22	6,253.78	6,253.02
PR-38	135	MH-5	5.90	80.7	31.0	4.60	(N/A)	1.02	0.94	6,253.00	6,252.84	6,252.66	6,252.44
PR-39	40	CB-2	1.60	4.8	29.6	9.69	(N/A)	0.22	0.48	6,249.15	6,247.22	6,248.98	6,245.76
PR-40	38	MH-3	41.40	26.9	39.3	18.47	(N/A)	1.06	2.10	6,238.35	6,237.66	6,237.39	6,234.49
PR-41	33	IN-14	27.50	25.9	75.2	18.16	(N/A)	0.87	1.79	6,240.66	6,238.16	6,239.83	6,233.93

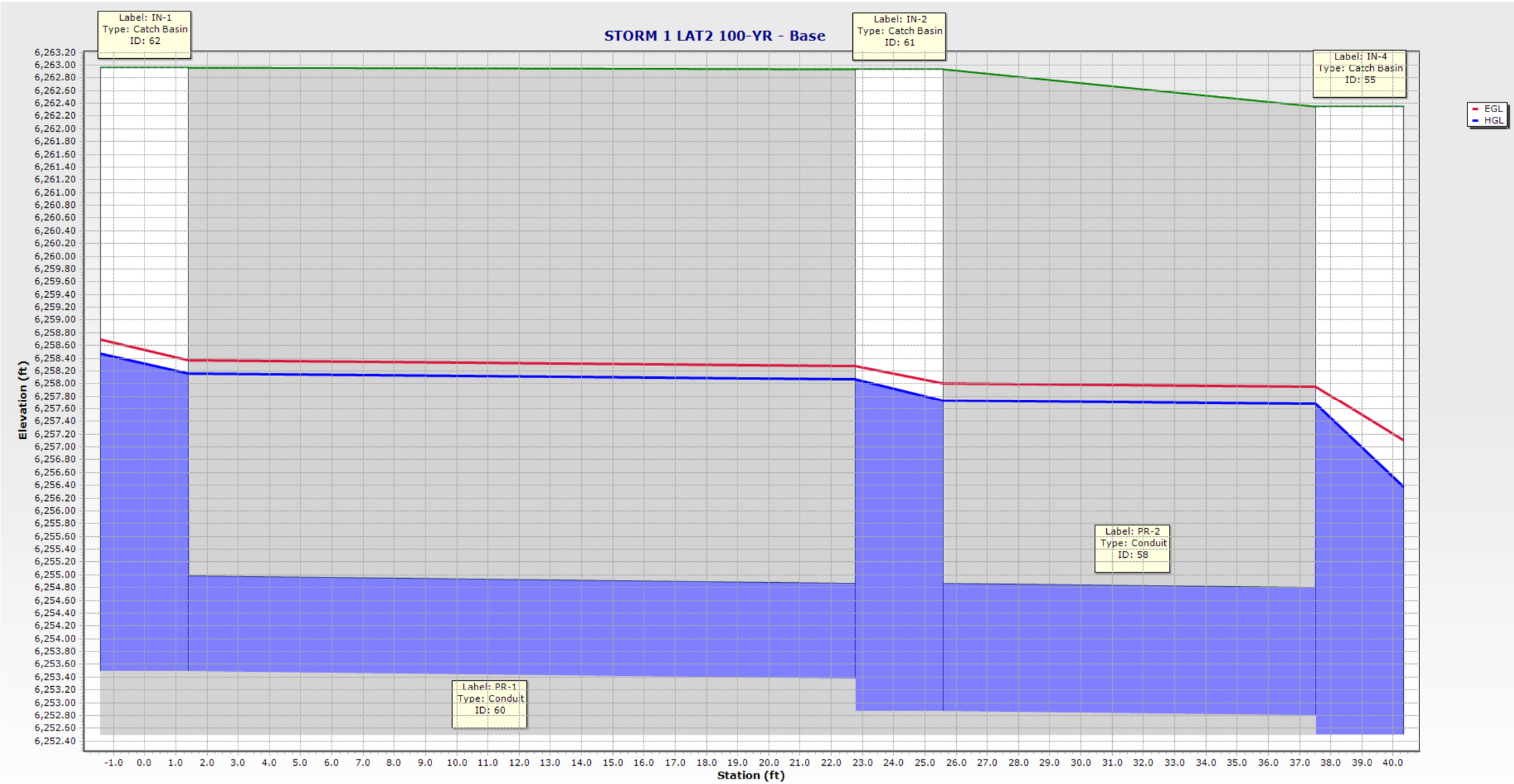
Headloss (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Upstream Structure Velocity (In-Governing) (ft/s)	Upstream Structure Headloss Coefficient	Upstream Structure Headloss (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Conduit Description
0.09	6,258.48	3.68	1.500	0.32	6,262.93	6,262.96	6,253.37	6,253.49	Circle - 18.0 in

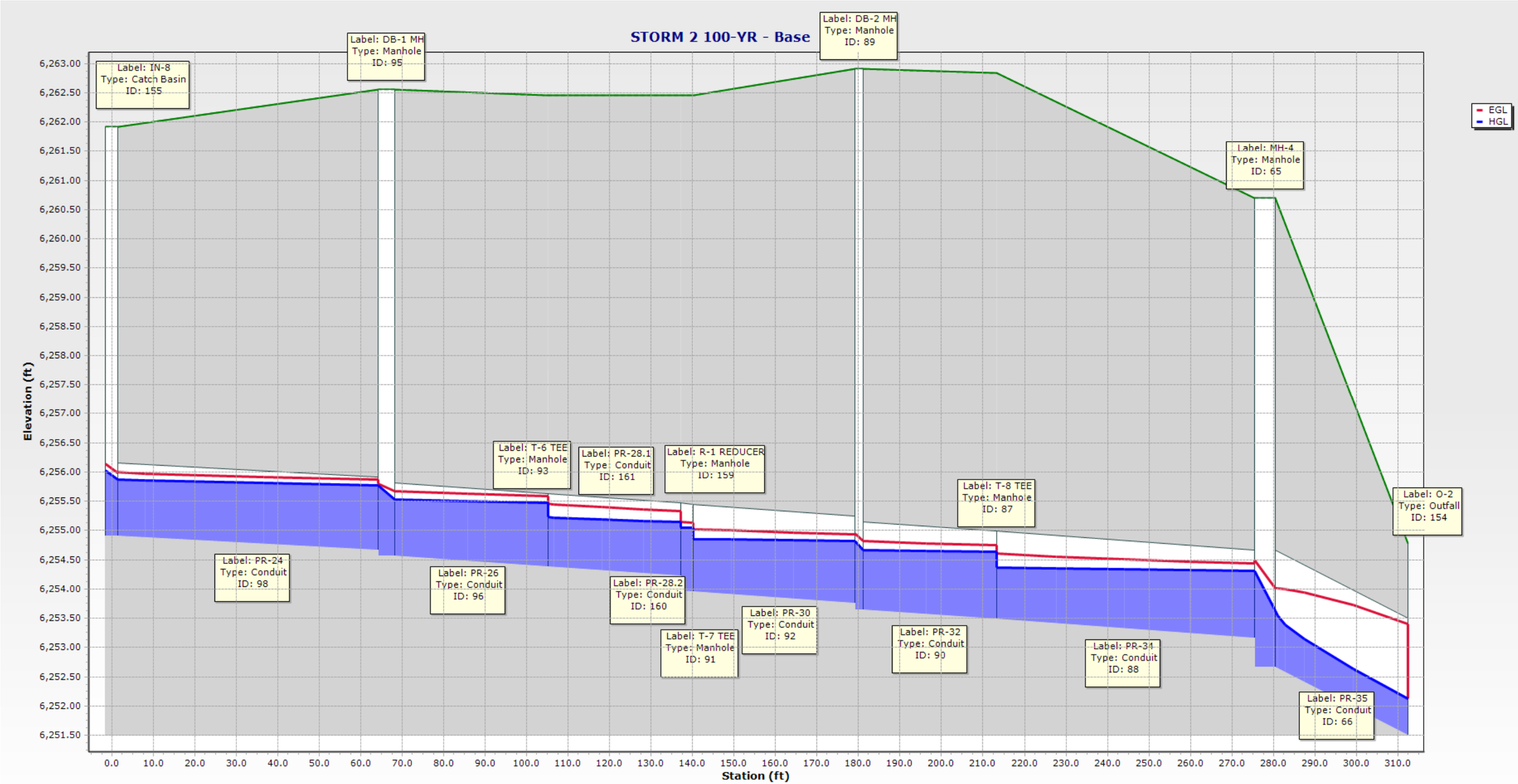
Conduit FlexTable: STRM - 100YR

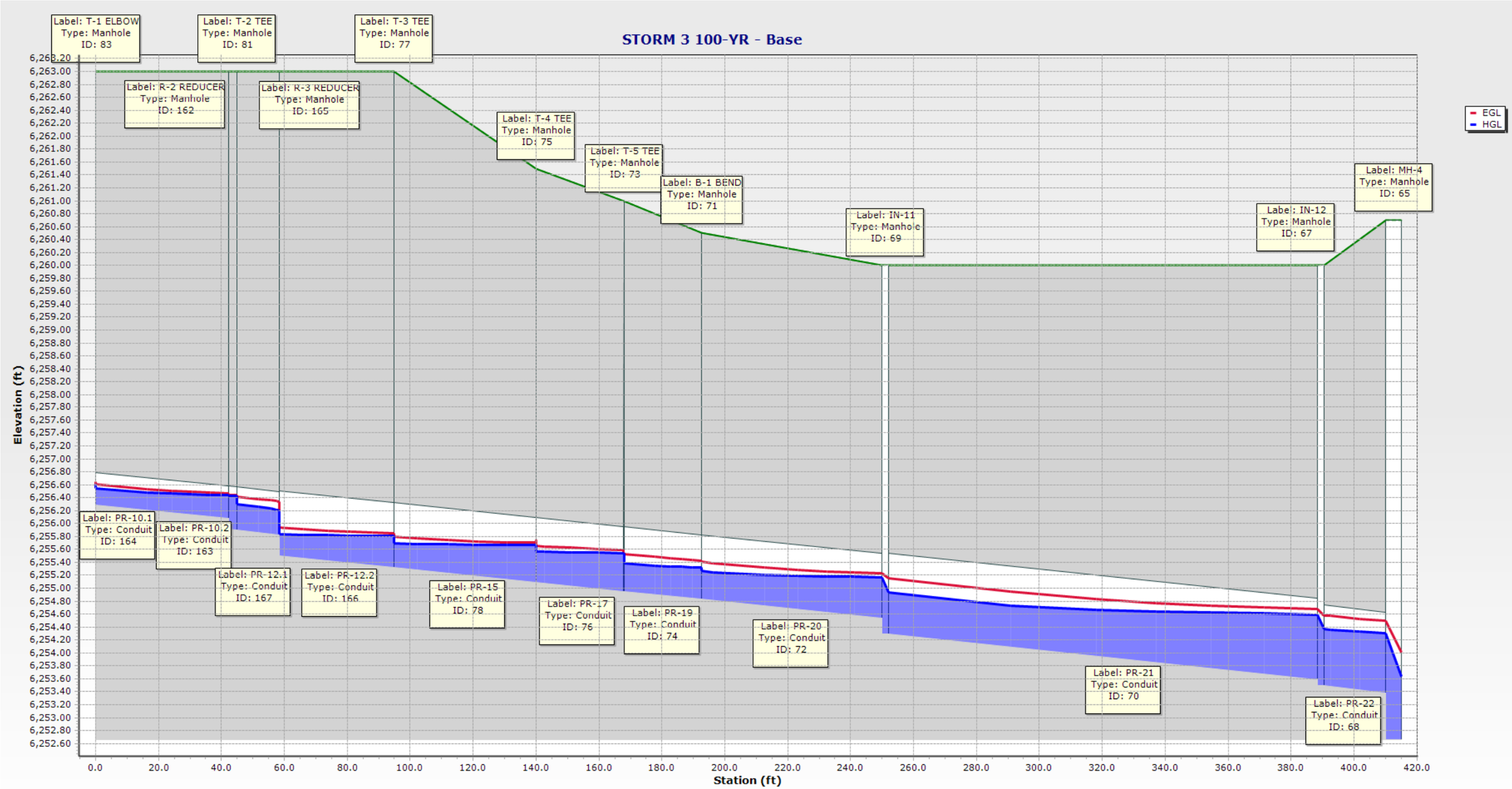
Headloss (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Upstream Structure Velocity (In-Governing) (ft/s)	Upstream Structure Headloss Coefficient	Upstream Structure Headloss (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Conduit Description
0.05	6,258.07	3.68	1.250	0.34	6,262.35	6,262.93	6,252.80	6,252.87	Circle - 24.0 in
0.10	6,258.03	3.34	1.500	0.26	6,262.35	6,262.46	6,253.25	6,253.37	Circle - 15.0 in
0.25	6,257.68	4.20	1.770	1.30	6,261.46	6,262.35	6,252.36	6,252.50	Circle - 24.0 in
0.76	6,256.12	6.88	1.250	0.80	6,260.38	6,261.46	6,251.21	6,251.86	Circle - 30.0 in
0.19	6,255.80	6.29	1.500	0.92	6,260.38	6,262.48	6,252.01	6,253.51	Circle - 24.0 in
0.01	6,254.69	4.58	0.350	0.11	6,260.38	6,260.38	6,251.71	6,252.01	Circle - 24.0 in
5.11	6,254.56	6.42	1.770	1.73	6,254.87	6,260.38	6,244.85	6,250.71	Circle - 36.0 in
1.90	6,247.72	6.08	1.070	1.04	6,253.85	6,254.87	6,243.25	6,244.55	Circle - 36.0 in
1.61	6,258.35	2.35	1.500	0.13	6,263.00	6,263.22	6,256.29	6,258.00	Circle - 6.0 in
0.10	6,256.61	1.50	1.100	0.07	6,263.00	6,263.00	6,256.08	6,256.29	Circle - 6.0 in
0.00	6,256.44	1.33	1.100	0.01	6,263.00	6,263.00	6,255.90	6,255.91	Circle - 8.0 in
1.89	6,258.53	2.99	1.500	0.21	6,263.00	6,263.22	6,255.98	6,258.00	Circle - 6.0 in
0.11	6,256.43	0.67	1.100	0.13	6,263.00	6,263.00	6,255.83	6,255.90	Circle - 8.0 in
0.03	6,255.95	3.07	1.100	0.11	6,263.00	6,263.00	6,255.32	6,255.50	Circle - 12.0 in
2.35	6,258.24	1.90	1.500	0.08	6,263.00	6,263.22	6,255.57	6,258.00	Circle - 6.0 in
0.03	6,255.81	1.57	1.100	0.12	6,261.50	6,263.00	6,255.09	6,255.32	Circle - 12.0 in
2.61	6,258.45	2.69	1.500	0.17	6,261.50	6,263.22	6,255.34	6,258.00	Circle - 6.0 in
0.02	6,255.67	2.20	1.100	0.10	6,261.00	6,261.50	6,254.95	6,255.09	Circle - 12.0 in
2.61	6,258.24	1.90	1.500	0.08	6,261.00	6,263.22	6,255.23	6,258.00	Circle - 6.0 in
0.07	6,255.54	0.77	1.100	0.15	6,260.50	6,261.00	6,254.83	6,254.95	Circle - 12.0 in
0.10	6,255.32	2.62	0.350	0.05	6,260.00	6,260.50	6,254.54	6,254.83	Circle - 12.0 in
0.34	6,255.17	1.92	1.070	0.24	6,260.00	6,260.00	6,253.59	6,254.29	Circle - 15.0 in
0.06	6,254.59	2.27	1.070	0.23	6,260.70	6,260.00	6,253.38	6,253.49	Circle - 15.0 in
0.10	6,256.02	2.76	1.250	0.15	6,262.55	6,261.91	6,254.67	6,254.91	Circle - 15.0 in
2.45	6,258.35	2.35	1.500	0.13	6,262.55	6,263.22	6,255.42	6,258.00	Circle - 6.0 in
0.06	6,255.77	1.36	1.770	0.24	6,262.45	6,262.55	6,254.38	6,254.57	Circle - 15.0 in
2.80	6,258.45	2.69	1.500	0.17	6,262.45	6,263.23	6,254.75	6,258.00	Circle - 6.0 in
0.09	6,255.48	2.62	1.100	0.25	6,262.45	6,262.45	6,254.22	6,254.38	Circle - 15.0 in
0.00	6,255.14	3.50	1.000	0.10	6,262.45	6,262.45	6,253.95	6,253.97	Circle - 18.0 in
3.23	6,258.45	2.69	1.500	0.17	6,262.45	6,263.22	6,254.45	6,258.00	Circle - 6.0 in
0.03	6,255.04	1.53	1.100	0.19	6,262.91	6,262.45	6,253.75	6,253.95	Circle - 18.0 in
3.41	6,258.45	2.69	1.500	0.17	6,262.91	6,263.22	6,254.75	6,258.00	Circle - 6.0 in
0.03	6,254.83	2.73	1.070	0.17	6,262.84	6,262.91	6,253.49	6,253.65	Circle - 18.0 in
3.59	6,258.35	2.35	1.500	0.13	6,262.84	6,263.22	6,253.99	6,258.00	Circle - 6.0 in
0.07	6,254.63	1.02	1.100	0.26	6,260.70	6,262.84	6,253.16	6,253.49	Circle - 18.0 in
1.52	6,254.31	3.49	1.770	0.67	6,260.70	6,254.78	6,252.66	6,251.50	Circle - 24.0 in
0.79	6,255.54	4.71	1.500	0.52	6,260.00	6,258.00	6,253.41	6,253.73	Circle - 12.0 in
0.76	6,254.23	5.37	1.250	0.45	6,260.27	6,260.00	6,251.90	6,252.91	Circle - 18.0 in
0.23	6,253.02	3.60	1.070	0.36	6,260.27	6,253.24	6,251.65	6,251.50	Circle - 18.0 in
3.21	6,249.23	3.33	1.500	0.26	6,253.85	6,254.15	6,245.54	6,248.50	Circle - 18.0 in
2.90	6,239.08	11.70	1.770	1.70	6,253.85	6,236.53	6,235.29	6,233.20	Circle - 36.0 in
5.90	6,241.08	7.32	1.500	1.25	6,253.00	6,235.79	6,238.04	6,233.00	Circle - 30.0 in

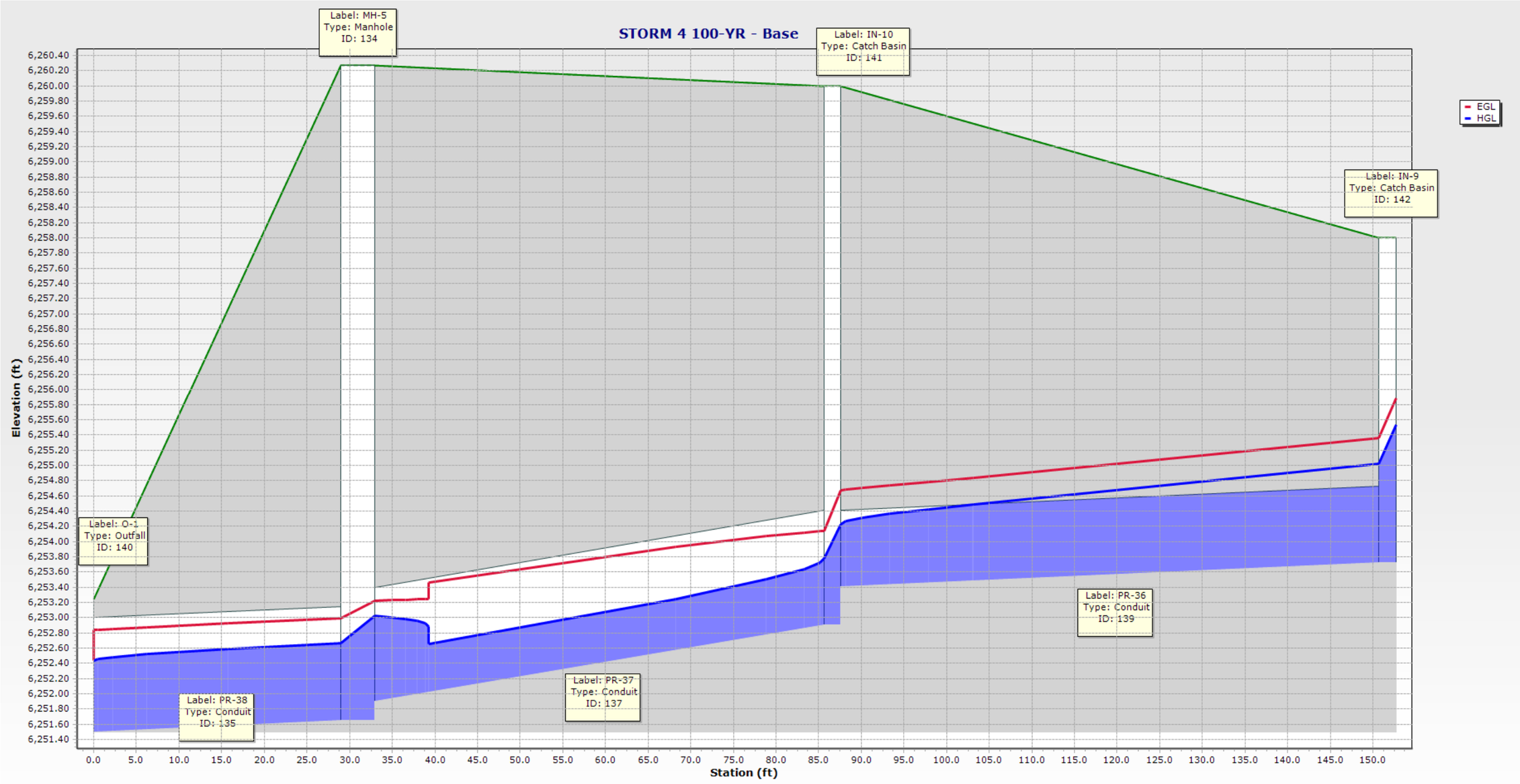

STORM 1 100-YR - Base
Elevation (ft)
Station (ft)
EGL
HGL
Label: MH-3
Type: Manhole
ID: 37
Label: MH-2
Type: Manhole
ID: 44
Label: MH-1
Type: Manhole
ID: 46
Label: IN-5
Type: Catch Basin
ID: 54
Label: IN-4
Type: Catch Basin
ID: 55
Label: IN-3
Type: Catch Basin
ID: 56
Label: PR-3
Type: Conduit
ID: 53
Label: PR-4
Type: Conduit
ID: 51
Label: PR-5
Type: Conduit
ID: 49
Label: PR-7
Type: Conduit
ID: 47
Label: PR-8
Type: Conduit
ID: 45

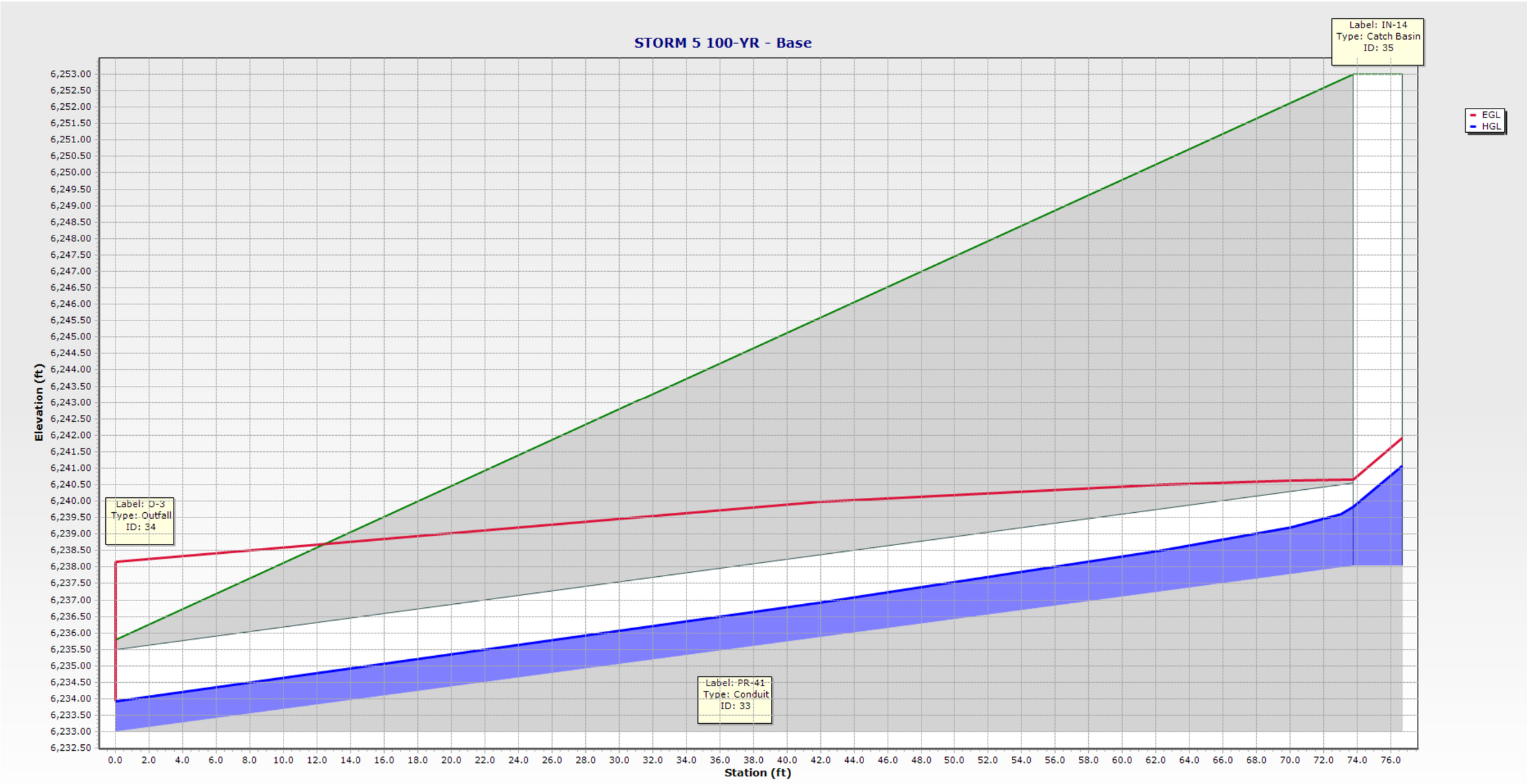

STORM 1 LAT 1 100-YR - Base
Label: IN-6
Type: Catch Basin
ID: 153
Label: MH-1
Type: Manhole
ID: 46
Label: B-1
Type: Manhole
ID: 156
Label: PR-6.1
Type: Conduit
ID: 158
Label: PR-6.2
Type: Conduit
ID: 157
EGL
HGL
Elevation (ft)
Station (ft)

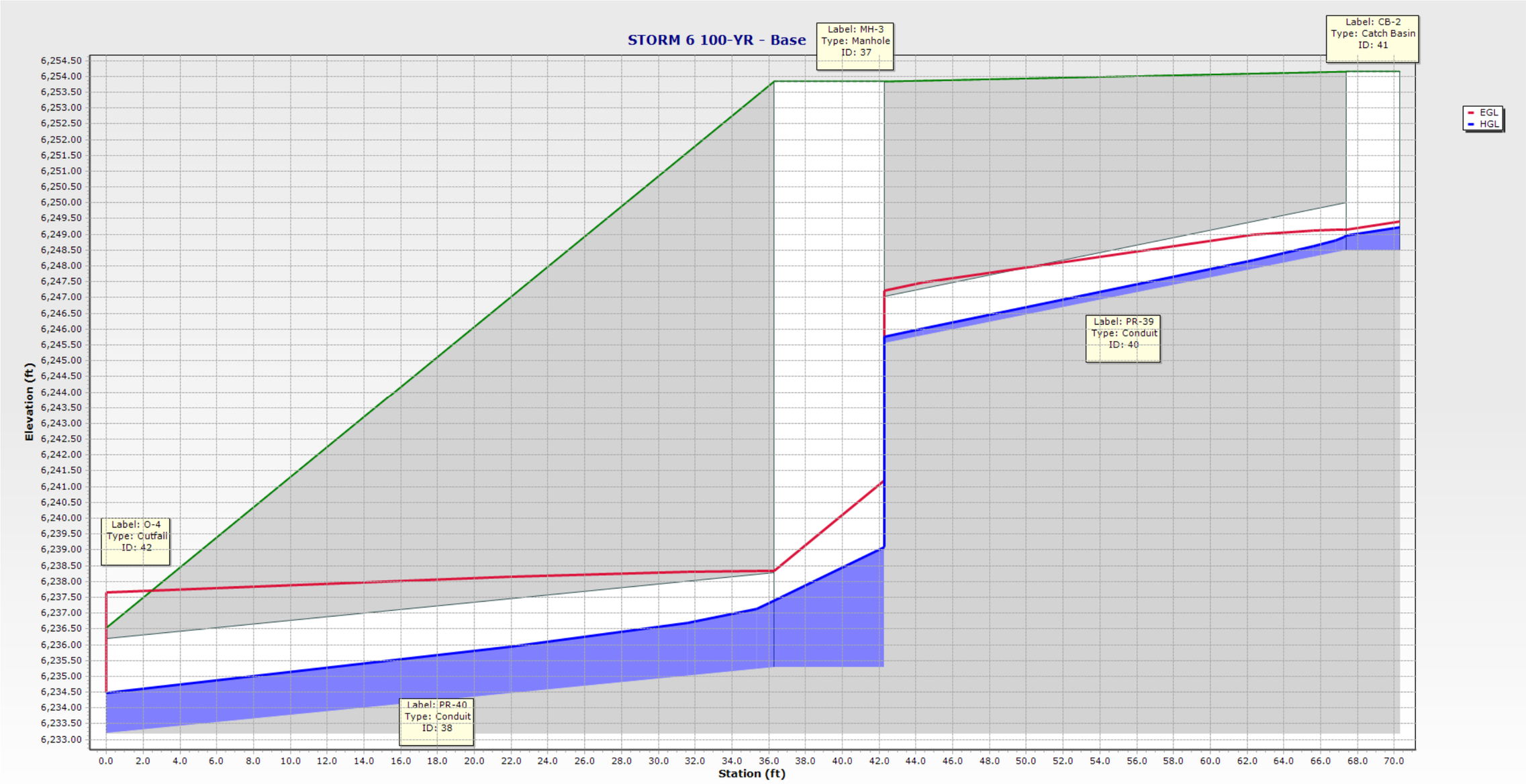

STORM 1 LAT2 100-YR - Base
Label: IN-1
Type: Catch Basin
ID: 62
Label: IN-2
Type: Catch Basin
ID: 61
Label: IN-4
Type: Catch Basin
ID: 55
Label: PR-1
Type: Conduit
ID: 60
Label: PR-2
Type: Conduit
ID: 58
EGL
HGL
Elevation (ft)
Station (ft)


STORM 2 100-YR - Base
Elevation (ft)
Station (ft)
EGL
HGL
Label: IN-8
Type: Catch Basin
ID: 155
Label: DB-1 MH
Type: Manhole
ID: 95
Label: DB-2 MH
Type: Manhole
ID: 89
Label: MH-4
Type: Manhole
ID: 65
Label: O-2
Type: Outfall
ID: 154
Label: T-6 TEE
Type: Manhole
ID: 93
Label: PR-28.1
Type: Conduit
ID: 161
Label: R-1 REDUCER
Type: Manhole
ID: 159
Label: T-8 TEE
Type: Manhole
ID: 87
Label: PR-24
Type: Conduit
ID: 98
Label: PR-26
Type: Conduit
ID: 96
Label: PR-28.2
Type: Conduit
ID: 160
Label: T-7 TEE
Type: Manhole
ID: 91
Label: PR-30
Type: Conduit
ID: 92
Label: PR-32
Type: Conduit
ID: 90
Label: PR-34
Type: Conduit
ID: 88
Label: PR-35
Type: Conduit
ID: 66


STORM 3 100-YR - Base
Label: T-1 ELBOW
Type: Manhole
ID: 83
Label: T-2 TEE
Type: Manhole
ID: 81
Label: T-3 TEE
Type: Manhole
ID: 77
Label: R-2 REDUCER
Type: Manhole
ID: 162
Label: R-3 REDUCER
Type: Manhole
ID: 165
Label: T-4 TEE
Type: Manhole
ID: 75
Label: T-5 TEE
Type: Manhole
ID: 73
Label: B-1 BEND
Type: Manhole
ID: 71
Label: IN-11
Type: Manhole
ID: 69
Label: IN-12
Type: Manhole
ID: 67
Label: MH-4
Type: Manhole
ID: 65
Label: PR-10.1
Type: Conduit
ID: 164
Label: PR-10.2
Type: Conduit
ID: 163
Label: PR-12.1
Type: Conduit
ID: 167
Label: PR-12.2
Type: Conduit
ID: 166
Label: PR-15
Type: Conduit
ID: 78
Label: PR-17
Type: Conduit
ID: 76
Label: PR-19
Type: Conduit
ID: 74
Label: PR-20
Type: Conduit
ID: 72
Label: PR-21
Type: Conduit
ID: 70
Label: PR-22
Type: Conduit
ID: 68
EGL
HGL
Elevation (ft)
Station (ft)


STORM 4 100-YR - Base
Label: MH-5
Type: Manhole
ID: 134
Label: IN-10
Type: Catch Basin
ID: 141
Label: IN-9
Type: Catch Basin
ID: 142
Label: O-1
Type: Outfall
ID: 140
Label: PR-38
Type: Conduit
ID: 135
Label: PR-37
Type: Conduit
ID: 137
Label: PR-36
Type: Conduit
ID: 139
EGL
HGL
Elevation (ft)
Station (ft)


STORM 5 100-YR - Base
Label: IN-14
Type: Catch Basin
ID: 35
EGL
HGL
Label: O-3
Type: Outfall
ID: 34
Label: PR-41
Type: Conduit
ID: 33
Elevation (ft)
Station (ft)


STORM 6 100-YR - Base
Label: MH-3
Type: Manhole
ID: 37
Label: CB-2
Type: Catch Basin
ID: 41
EGL
HGL
Label: PR-39
Type: Conduit
ID: 40
Label: O-4
Type: Outfall
ID: 42
Label: PR-40
Type: Conduit
ID: 38
Elevation (ft)
Station (ft)

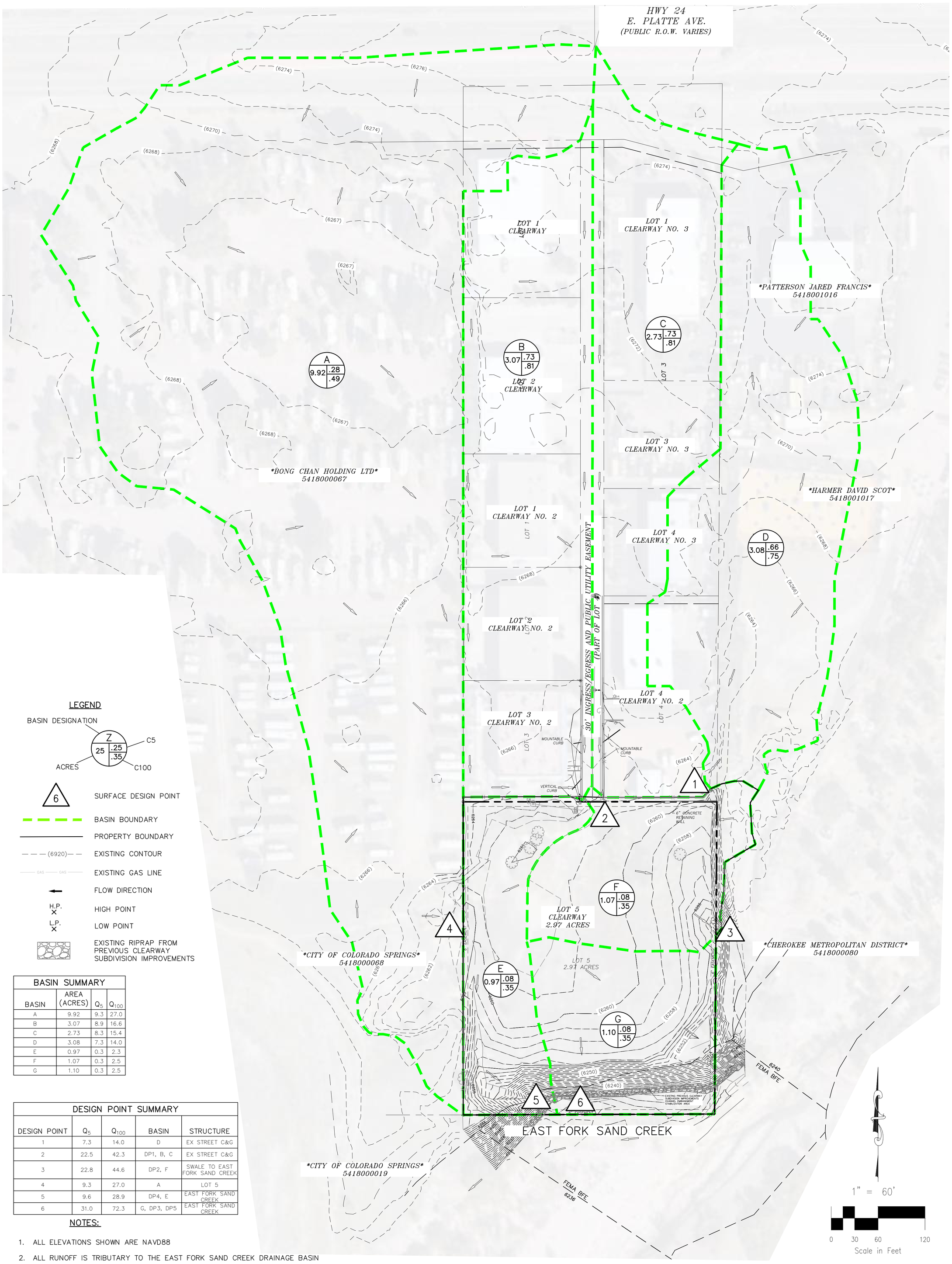
EXISTING AND PROPOSED DRAINAGE MAPS

CLEARWAY, LOT 5 (WIRENUT)

EL PASO COUNTY, STATE OF COLORADO

EXISTING DRAINAGE MAP

AUGUST 2023



LEGEND

BASIN DESIGNATION — Z; 25; .25; .35; C5; C100; ACRES

SURFACE DESIGN POINT

BASIN BOUNDARY

PROPERTY BOUNDARY

(6920) EXISTING CONTOUR

EXISTING GAS LINE

FLOW DIRECTION

H.P. HIGH POINT

L.P. LOW POINT

EXISTING RIPRAP FROM PREVIOUS CLEARWAY SUBDIVISION IMPROVEMENTS

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
A	9.92	9.3	27.0
B	3.07	8.9	16.6
C	2.73	8.3	15.4
D	3.08	7.3	14.0
E	0.97	0.3	2.3
F	1.07	0.3	2.5
G	1.10	0.3	2.5

DESIGN POINT SUMMARY				
DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
1	7.3	14.0	D	EX STREET C&G
2	22.5	42.3	DP1, B, C	EX STREET C&G
3	22.8	44.6	DP2, F	SWALE TO EAST FORK SAND CREEK
4	9.3	27.0	A	LOT 5
5	9.6	28.9	DP4, E	EAST FORK SAND CREEK
6	31.0	72.3	G, DP3, DP5	EAST FORK SAND CREEK

NOTES:

1. ALL ELEVATIONS SHOWN ARE NAVD88
2. ALL RUNOFF IS TRIBUTARY TO THE EAST FORK SAND CREEK DRAINAGE BASIN
3. ONSITE CONTOURS IN 1' INCREMENTS, OFFSITE CONTOURS TO THE WEST, NORTH AND EAST ARE IN 2' INCREMENTS

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

COLORADO REGISTERED PROFESSIONAL ENGINEER VIRGIL A. SANCHEZ 37160 08/09/23

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

M&S CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CLEARWAY, LOT 5 (WIRENUT)

EXISTING DRAINAGE MAP

PROJECT NO. 44-042	SCALE: HORIZONTAL: 1"=60' VERTICAL: N/A	DATE: 08/04/2023	
DESIGNED BY: TAU DRAWN BY: DLM CHECKED BY: VAS		SHEET 1 OF 1	EDM

CLEARWAY, LOT 5 (WIRENUT)

EL PASO COUNTY, STATE OF COLORADO

PROPOSED DRAINAGE MAP

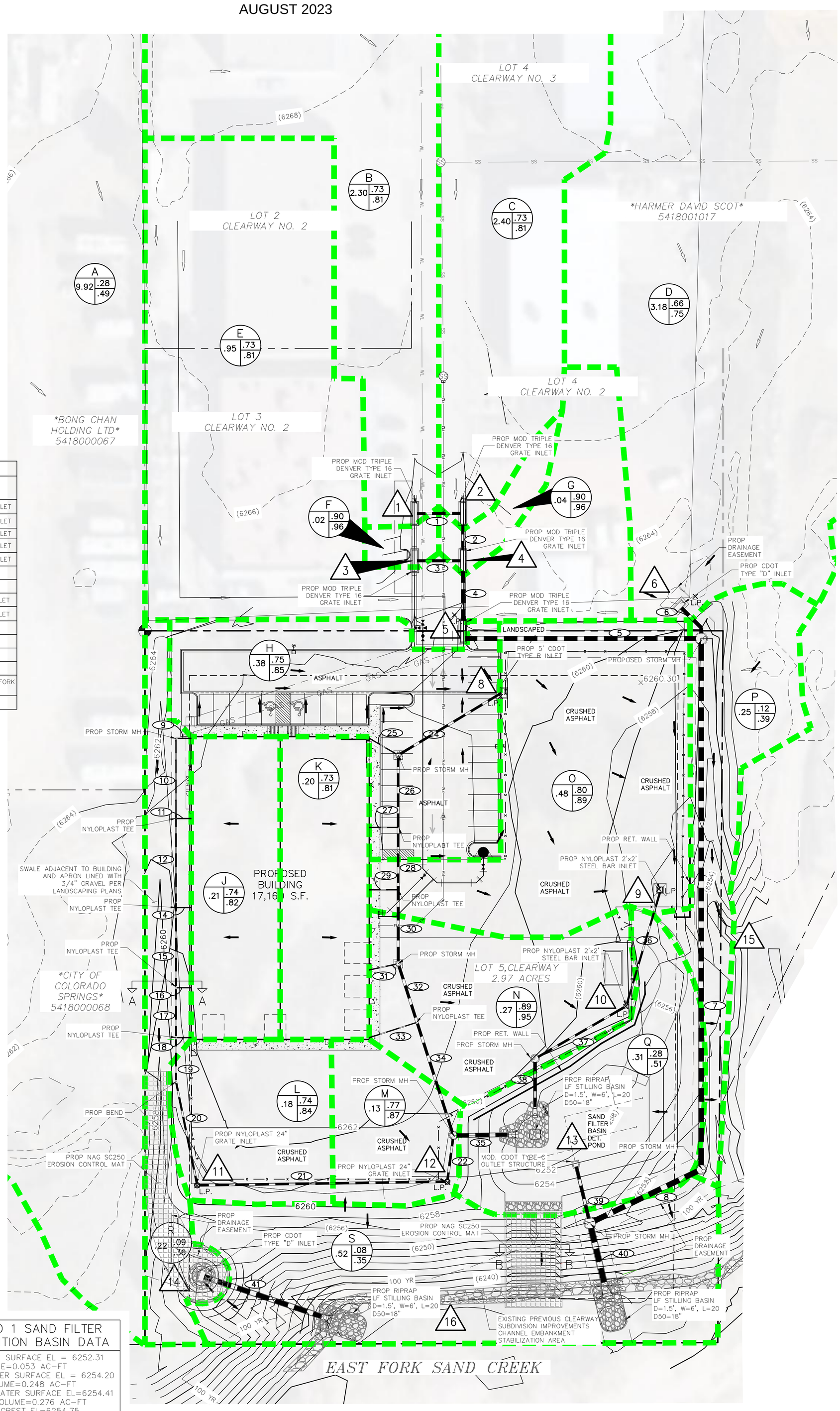
AUGUST 2023

LEGEND

BASIN DESIGNATION

Z | 25 | .25 | .35 | C5 | C100 | ACRES

- PIPE RUN REFERENCE LABEL
- SURFACE DESIGN POINT
- BASIN BOUNDARY
- PROPERTY BOUNDARY
- 6920 — PROP INDEX CONTOUR (10')
- PROP NOMINAL CONTOUR (2')
- (6920) — EXISTING INDEX CONTOUR (10')
- EXISTING NOMINAL CONTOUR (2')
- UGE — UNDERGROUND ELECTRICAL
- GAS — EXISTING GAS LINE
- PROPOSED STORM SEWER PIPE
- EMERGENCY OVERFLOW DIRECTION
- PROPOSED INLET
- PROPOSED FLARED END SECTION
- FLOW DIRECTION
- H.P. HIGH POINT
- L.P. LOW POINT
- EFFECTIVE 100 YEAR FLOODPLAIN
- EXISTING RIPRAP FROM PREVIOUS CLEARWAY SUBDIVISION IMPROVEMENTS
- PROPOSED RIPRAP/SOIL RIPRAP



1" = 30'

0 15 30 60

Scale in Feet

DESIGN POINT SUMMARY

DESIGN POINT	Q_5	Q_{100}	BASIN	STRUCTURE
1	6.8	12.7	B	MOD TRIPLE DENVER TYPE 16 INLET
2	7.1	13.2	C	MOD TRIPLE DENVER TYPE 16 INLET
3	2.6	6.4	FB1, F	MOD TRIPLE DENVER TYPE 16 INLET
4	2.8	6.8	FB2, G	MOD TRIPLE DENVER TYPE 16 INLET
5	4.6	11.7	FB3, FB4, E	MOD TRIPLE DENVER TYPE 16 INLET
6	7.5	14.4	D	CDOT TYPE D GRATE INLET
8	1.5	2.8	H	5' CDOT TYPE R INLET
9	2.0	3.7	O	NYLOPLAST 2'x2' STEEL BAR INLET
10	1.2	2.2	N	NYLOPLAST 2'x2' STEEL BAR INLET
11	0.7	1.4	L	NYLOPLAST 24" GRATE INLET
12	0.5	1.0	M	NYLOPLAST 24" GRATE INLET
13	7.7	14.8	Q, PR35, PR38	FSD POND
14	9.4	27.5	A, R	CDOT TYPE D GRATE INLET
15	0.1	0.7	P	SWALE CONVEYS FLOW TO EAST FORK SAND CREEK
16	30.9	70.4	S,DP15,PR40,PR41	EAST FORK SAND CREEK

BASIN SUMMARY

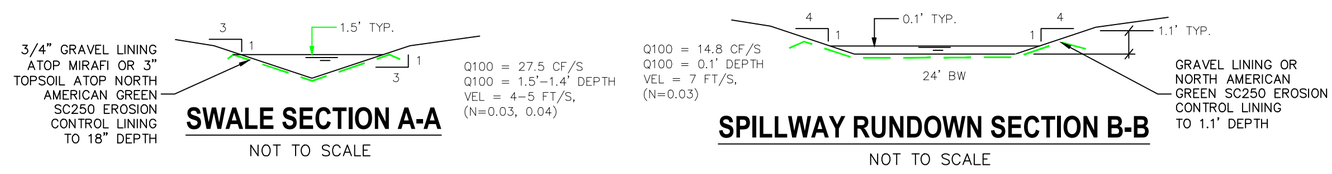
BASIN	AREA (ACRES)	Q_5	Q_{100}
A	9.92	9.3	27.0
B	2.30	6.8	12.7
C	2.40	7.1	13.2
D	3.18	7.5	14.4
E	0.95	3.3	6.1
F	0.02	0.1	0.2
G	0.04	0.2	0.4
H	0.38	1.5	2.8
J	0.21	0.8	1.5
K	0.20	0.7	1.4
L	0.18	0.7	1.4
M	0.13	0.5	1.0
N	0.27	1.2	2.2
O	0.48	2.0	3.7
P	0.25	0.1	0.7
Q	0.31	0.5	1.4
R	0.22	0.1	0.6
S	0.52	0.2	1.5

STORM SEWER SUMMARY

PIPE RUN	Q_5	Q_{100}	PIPE SIZE	CONTRIBUTING PIPES/DESIGN POINTS
1	4.3	6.5	18" PP	DP1
2	8.7	13.2	24" PP	PR1, DP2
3	2.1	4.1	15" PP	DP3
4	13.0	21.6	24" PP	PR2, PR3, DP4
5	16.9	31.5	30" PP	PR4, DP5
6	7.5	14.4	24" PP	DP6
7	22.5	42.3	36" PP	PR5, PR6
8	22.5	42.3	36" PP	PR7
9	0.1	0.2	6" PP	.02 ACRE BASIN J
10	0.1	0.2	6" PP	PR9
11	0.2	0.4	6" PP	.06 ACRE BASIN J
12	0.3	0.6	8" PP	PR10, PR11
14	0.0	0.1	6" PP	.01 ACRE BASIN J
15	0.4	0.7	12" PP	PR12, PR14
16	0.1	0.3	6" PP	.04 ACRE BASIN J
17	0.5	0.9	12" PP	PR15, PR16
18	0.1	0.1	6" PP	.02 ACRE BASIN J
19	0.6	1.0	12" PP	PR17, PR18
20	0.6	1.0	12" PP	PR19
21	1.3	2.4	15" PP	PR20, DP11
22	1.8	3.4	15" PP	PR21, DP12
24	1.5	2.8	15" PP	DP8
25	0.1	0.2	6" PP	.03 ACRE BASIN K
26	1.6	3.0	15" PP	PR24, PR25
27	0.2	0.3	6" PP	.05 ACRE BASIN K
28	1.8	3.4	15" PP	PR26, PR27
29	0.2	0.3	6" PP	.05 ACRE BASIN K
30	2.0	3.7	18" PP	PR28, PR29
31	0.2	0.3	6" PP	.05 ACRE BASIN K
32	2.1	4.0	18" PP	PR30, PR31
33	0.1	0.2	6" PP	.02 ACRE BASIN K
34	2.2	4.2	18" PP	PR32, PR33
35	4.0	7.5	24" RCP	PR22, PR34
36	2.0	3.7	12" PP	DP9
37	3.2	5.9	18" PP	PR36, DP10
38	3.2	5.9	18" RCP	PR37
39	0.3	1.6	18" RCP	FSD POND RELEASE
40	21.3	41.4	36" RCP	PR8, PR39
41	9.4	27.5	30" RCP	DP14

POND 1 SAND FILTER DETENTION BASIN DATA

WQ WATER SURFACE EL = 6252.31
WQ VOLUME=0.053 AC-FT
EURV WATER SURFACE EL = 6254.20
EURV VOLUME=0.248 AC-FT
100-YR WATER SURFACE EL=6254.41
100-YR VOLUME=0.276 AC-FT
SPILLWAY CREST EL=6254.75
TOP OF EMBANKMENT EL=6256.00
RATIONAL 100-YR INFLOW=14.8 CFS
MHFD 100-YR INFLOW = 8.0 CFS
MHFD 100-YR RELEASE = 1.6 CFS



SWALE SECTION A-A

NOT TO SCALE

SPILLWAY RUNDOWN SECTION B-B

NOT TO SCALE

NOTES

1. REFER TO EXISTING DRAINAGE MAP FOR BASINS A, B, C, AND D.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

COLORADO REGISTERED PROFESSIONAL ENGINEER VIRGIL A. SANCHEZ 37160 08/09/23

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CLEARWAY, LOT 5

PROPOSED DRAINAGE MAP

PROJECT NO. 44-042	SCALE: HORIZONTAL: 1"=30' VERTICAL: N/A	DATE: 08/04/2023	
DESIGNED BY: DLM DRAWN BY: TAU CHECKED BY: VAS		SHEET 1 OF 1	PDM

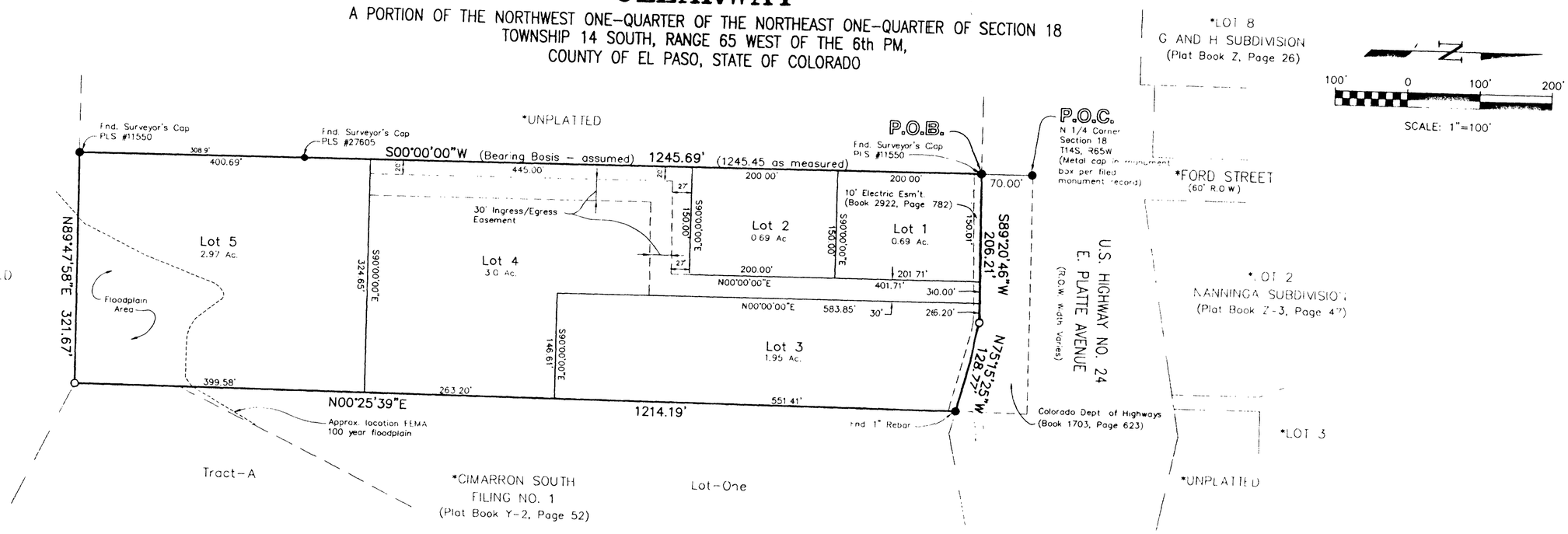
REFERENCED REPORTS
(BACKGROUND INFORMATION)

Clearway 54180

9674

CLEARWAY

A PORTION OF THE NORTHWEST ONE-QUARTER OF THE NORTHEAST ONE-QUARTER OF SECTION 18
TOWNSHIP 14 SOUTH, RANGE 65 WEST OF THE 6th PM,
COUNTY OF EL PASO, STATE OF COLORADO



KNOW ALL MEN BY THESE PRESENTS:

That CLEARWAY PROPERTIES, LLC, a Colorado Limited Liability Company, being the owner of the following described tract of land, to wit:

That portion of the West One-Half of the West One-Half of the Northwest One-Quarter of the Northeast One-Quarter(W1/2 W1/2 NW1/4 NE1/4) Section 18, Township 14 South, Range 65 West of the 6th PM, situate in El Paso County, Colorado, more particularly described as follows:

Commencing at the North One-Quarter corner of said Section 18 (all references to Plat Book, Book and/or Page are of the records of El Paso County, Colorado);

Thence S00°00'00"W along a line purported to be the West line of said W1/2 W1/2 NW1/4 NE1/4 Section 18, 70.00 feet to the Point of Beginning of the tract herein described;

Thence continue S00°00'00"W along said West line, 1245.69 feet;

Thence N89°47'58"E, 321.67 feet to a point on the Westerly boundary line of CIMARRON SOUTH FILING NO. 1 (Plat Book Y-2, Page 52);

Thence N00°25'39"E along said FILING'S Westerly boundary line, 1214.19 feet to a point on the Southerly right-of-way line of U.S. HIGHWAY NO. 24 (also known as E. Platte Avenue) (r.o.w. width varies), as described by document in Book 1703 at Page 623;

Thence N75°15'25"W along said Southerly right-of-way line, 128.77 feet;

Thence S89°20'46"W along said Southerly right-of-way line, 206.21 feet to the Point of Beginning;

Containing 9.29 acres, more or less.

DEDICATION:

The above owner has caused said tract of land to be surveyed and platted into lots and easements as shown on the accompanying plat, which plat is drawn to a fixed scale as indicated thereon and accurately sets farth the boundaries and dimensions of said tract and the locations of said lots and easements, which tract so platted shall be known as CLEARWAY, El Paso County, Colorado.

IN WITNESS WHEREOF:

The aforementioned, CLEARWAY PROPERTIES, LLC, a Colorado Limited Liability Company, has executed these presents this 7th day of March, 19 97 A.D.

CLEARWAY PROPERTIES, LLC

Ashton L. Randall, Member

Jerome F. Waite, Member

Kevin O. Rothschild, Member

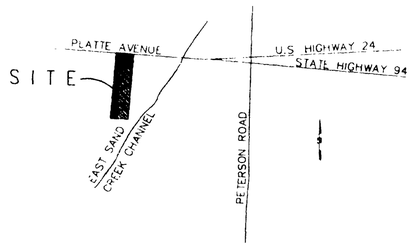
NOTARIAL:

STATE OF COLORADO }
COUNTY OF EL PASO } SS

The above and foregoing statement was acknowledged before me this 7th day of March, 19 97 A.D. by Ashton L. Randall, Jerome F. Waite and Kevin O. Rothschild, members in CLEARWAY PROPERTIES, LLC.

Witness my Hand and Seal.

My Commission expires: 11/1/97



VICINITY MAP
N.T.S.

EASEMENTS:

Unless shown otherwise, both sides of all rear lot lines are hereby platted with a six foot (6') easement for drainage purposes and public utilities only, and both sides of all side lot lines are hereby platted with a six foot (6') easement for public utilities only, with the sole responsibility for maintenance being vested with the adjoining property owners.

NOTES:

1. O – Indicates boundary survey monument to be set with a #4 rebar with Surveyor's Cap, PLS No. 20681
   ● – Indicates recovered survey monument as noted
2. * – Indicates not a part of this subdivision.
3. This survey does not constitute a title search by LDC, Inc. to determine ownership or easements of record. For all information regarding easements, rights of way and title of record, LDC, Inc. relied upon a Commitment for Title Insurance, prepared by Lawyers Title Insurance Corporation, Case No. 117349, dated February 5, 1996.
4. Basis of Bearings . . . . All bearings are based on a portion of the West line of the Northeast One-Quarter of Section 18, Township 14 South, Range 65 West of the 6th PM, El Paso County, Colorado being a found Surveyor's Cap, PLS No. 11550 at its Northerly end and a found Surveyor's Cap, PLS No. 11550 at its Southerly end, and a line between them bearing S00°00'00"W (assumed), a distance of 1245.45 feet.
5. Water and sewer are provided by the Cherokee Metropolitan District.
6. The El Paso County Department of Transportation and the Colorado Department of Highways must be contacted prior to the establishment of any driveways.
7. All structural foundations shall be located and designed by a Professional Engineer, currently registered in the State of Colorado. No structures are allowed within the designated floodplain areas.
8. This site is subject to an Avigation Easement recorded in Book N/A at Page N/A of the records of El Paso County, Colorado. R# 97064917

   No man-made or non-man-made ofstructions be allowed to penetrate the 40:1 Approach Surface.

   All exterior lighting plans be approved by the Director of Aviation to prevent a hazard to aircraft.

   No electromagnetic, light, or any physical emissions which might interfere with aircraft, avigation, communications or navigational aids be allowed.

   NOTICE: This property may be impacted by noise caused by aircraft operating into and out of the Colorado Springs Municipal Airport. The buyer should familiarize himself/herself with this potentiality and the ramifications thereof.

SURVEYOR'S STATEMENT:

The undersigned Colorado Registered Professional Land Surveyor does hereby state that the accompanying plat was surveyed and drawn under his direct responsibility and supervision and accurately shows the described tract of land, and subdivision thereof and that the requirements of Title 38 of the Colorado Revised Statutes, 1973, as amended, have been met to the best of his professional knowledge, belief and opinion.

COLORADO REGISTERED DAVID V. HOSTETLER 20681

David V Hostetler
Colorado Professional Land Surveyor No 20681

Date 02-20-97

APPROVALS:

This subdivision was approved by the EL PASO COUNTY PLANNING DEPARTMENT this 6th day of June, 1997 A.D.

Planning Director

Approved by the BOARD OF COUNTY COMMISSIONERS of El Paso County, Colorado, this 23rd day of January, 1997 A.D.

Chairman

RECORDING:

STATE OF COLORADO }
COUNTY OF EL PASO } SS

I hereby certify that this instrument was filed for record in my office at 3:42 o'clock P.M. this 6 day of June, 19 97 A.D., and is duly recorded in Plat Book N/A at Page N/A of the records of El Paso County, Colorado.

J. PATRICK KELLY
~~ARDIS W. SCHMIDT~~, CLERK AND RECORDER

RECEPTION NO.: 97064918
FEE 10.00 + 1.00 SC

BY: Kathleen McClafferty
Deputy

FEES:

Park Fee: N/A
School Fee: N/A
Drainage Fee: $3764.60
Bridge Fee: $6419.39

LDC, Inc.
PLANNING, SURVEYING, LAND SERVICES
3520 Austin Bluffs Parkway
Colorado Springs, CO 80918
(719) 528-6133 FAX (719) 528-6848

REVISIONS

NO.	DESCRIPTION	BY	DATE
1	Client Comments	DDS	02/28/96
2	Final County Comments	DDS	07/09/96
3	Ten-lot Revision	DVH	01/28/97
4	Lot 3 Revision	DDS	01/30/97

CLEARWAY
FINAL PLAT

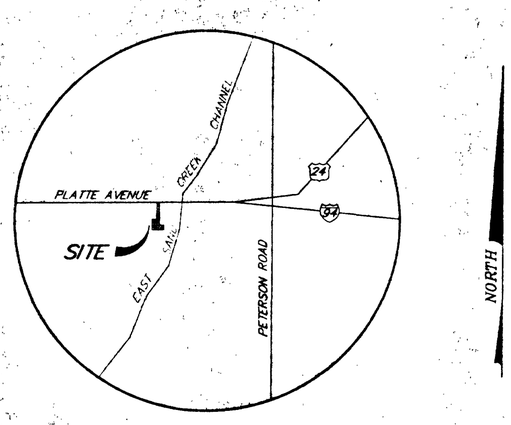
PROJECT NO. 96016 | Drawn By: DDS | Date: 02/24/96 | Checked By: DVH | Sheet: 1 of 1

CLEARWAY 54180

10231

CLEARWAY NO. 2

A REPLAT OF LOT 4, CLEARWAY, LOCATED IN THE NORTHEAST 1/4 OF SECTION 18, T 14 S, R 65 W OF THE 6th P.M., COUNTY OF EL PASO, STATE OF COLORADO



VICINITY MAP
N.T.S.

NOTES

ALL CORNERS SET WITH 1/2" REBAR AND CAP MARKED LS 17665, UNLESS OTHERWISE NOTED.

BEARINGS AS REFERRED TO HEREIN ARE RELATIVE TO THE WEST LINE OF CLEARWAY, AS RECORDED UNDER RECEPTION NO. 97064918 OF THE RECORDS OF EL PASO COUNTY, AS MONUMENTED AND SHOWN HEREON, BEARING OF S-00°00'00"-W.

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY M.V.E., INC. TO DETERMINE OWNERSHIP OF EASEMENTS OR RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHT-OF-WAYS AND TITLE OF RECORD, M.V.E., INC. RELIED UPON TITLE INSURANCE COMMITMENT NO. 126585TR AS PREPARED BY LAWYERS TITLE INSURANCE CORPORATION, AND DATED OCTOBER 21, 1997 AT 8:00 A.M.

A 30' INGRESS, EGRESS, AND UTILITY EASEMENT IS DESIGNATED FOR LOTS 1, 2, 3, & 5, CLEARWAY AND LOTS 1, 2, 3, & 4, CLEARWAY NO. 2 PURSUANT TO THE 'AMENDED RECIPROCAL EASEMENT AND MAINTENANCE AGREEMENT WITH DECLARATION OF EASEMENTS' AS RECORDED UNDER RECEPTION NO. 99044353 OF THE RECORDS OF EL PASO COUNTY, COLORADO. SAID DOCUMENTS SETS FORTH OWNERSHIP AND MAINTENANCE RESPONSIBILITY. THE EASEMENTS CONTAINED THEREIN ARE NOT DEDICATED FOR PUBLIC USE, EXCEPT FOR A GRANT TO USE THE EASEMENTS FOR FIRE, EMERGENCY AND POLICE ACCESS BY APPROPRIATE GOVERNMENTAL ENTITIES. SAID AMENDED RECIPROCAL EASEMENT AND MAINTENANCE AGREEMENT WITH DECLARATION OF EASEMENTS AMENDS THOSE TWO PRIOR RECIPROCAL EASEMENT AND MAINTENANCE AGREEMENT WITH DECLARATION OF EASEMENTS RECORDED AT RECEPTION NO.'S 97064919 AND 97066766 OF THE RECORDS OF THE CLERK AND RECORDER OF EL PASO COUNTY, COLORADO.

ALL STRUCTURAL FOUNDATIONS SHALL BE LOCATED AND DESIGNED BY A PROFESSIONAL ENGINEER, CURRENTLY REGISTERED IN THE STATE OF COLORADO.

WATER AND SANITARY SEWER SERVICES ARE TO BE PROVIDED BY CHEROKEE METROPOLITAN DISTRICT.

THE DEPARTMENT OF TRANSPORTATION MUST BE CONTACTED PRIOR TO THE ESTABLISHMENT OF ANY DRIVEWAY.

THE PROPERTY IS SUBJECT TO AN AVIGATION EASEMENT RECORDED UNDER RECEPTION NO. 97064917 OF SAID RECORDS.

NO MAN-MADE OR NON MAN-MADE OBSTRUCTIONS SHALL BE ALLOWED TO PENETRATE THE 40:1 APPROACH SURFACE.

ALL EXTERIOR LIGHTING PLANS SHALL BE APPROVED BY THE DIRECTOR OF AVIATION TO PREVENT A HAZARD TO AIRCRAFT.

NO ELECTROMAGNETIC, LIGHT OR ANY PHYSICAL EMISSIONS WHICH MIGHT INTERFERE WITH AIRCRAFT, AVIGATION, COMMUNICATIONS OR NAVIGATIONAL AIDS SHALL BE ALLOWED.

THE PROPERTY MAY BE IMPACTED BY NOISE CAUSED BY AIRCRAFT OPERATING INTO AND OUT OF THE COLORADO SPRINGS MUNICIPAL AIRPORT. THE BUYER SHOULD FAMILIARIZE HIMSELF/HERSELF WITH THIS POTENTIALITY AND RAMIFICATIONS THEREOF.

THE NORTHERLY 10 FEET OF LOT 4 IS SUBJECT TO A RIGHT OF WAY AND/OR EASEMENT TO THE CITY OF COLORADO SPRINGS FOR ELECTRIC LINE PURPOSES AS RECORDED IN BOOK 2922 AT PAGE 782.

THE PROPERTY IS SUBJECT TO TERMS, CONDITIONS, PROVISIONS, OBLIGATIONS AND EASEMENTS AS RECORDED UNDER RECEPTION NO. 97066766 OF SAID RECORDS.

THE PROPERTY IS SUBJECT TO TERMS, CONDITIONS, PROVISIONS, OBLIGATIONS AND EASEMENTS AS CONTAINED IN SUBDIVISION IMPROVEMENTS AGREEMENT AND RECORDED UNDER RECEPTION NO. 97064920 OF SAID RECORDS.

"NOTICE ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATIONS SHOWN HEREON." (SECTION 13-80-105 C.R.S.)

THE APPROVAL OF THIS REPLAT VACATES ALL AFFECTED PLATTED LOTS AND EASEMENTS FOR THE AREA DESCRIBED BY THIS PLAT.

EASEMENTS

UNLESS SHOWN GREATER IN WIDTH, ALL SIDE LOT LINES ARE HEREBY PLATTED WITH A SIX FOOT (6') EASEMENT FOR PUBLIC UTILITIES ONLY, AND ALL REAR LOT LINES ARE HEREBY PLATTED WITH A SIX FOOT (6') EASEMENT FOR DRAINAGE AND PUBLIC UTILITIES ONLY, WITH THE SOLE RESPONSIBILITY FOR MAINTENANCE BEING VESTED WITH ADJACENT PROPERTY OWNERS.

SURVEYOR'S STATEMENT:

THE UNDERSIGNED REGISTERED LAND SURVEYOR IN THE STATE OF COLORADO HEREBY STATES AND DECLARES THAT THE ACCOMPANYING REPLAT WAS SURVEYED AND DRAWN UNDER HIS SUPERVISION AND ACCURATELY SHOWS THE DESCRIBED TRACT OF LAND AND SUBDIVISION THEREOF AND DECLARES THAT, IN HIS PROFESSIONAL OPINION THE REQUIREMENTS OF TITLE 38 OF THE COLORADO REVISED STATUTES 1973, AS AMENDED HAVE BEEN MET TO THE BEST OF HIS KNOWLEDGE AND BELIEF.

THIS 19th DAY OF MARCH, 1999.

JOHN L. SWAYNE, P.L.S. 17665
FOR AND ON BEHALF OF M.V.E., INC.

(54180)

KNOW ALL MEN BY THESE PRESENTS:

THAT CLEARWAY PROPERTIES, LLC, A COLORADO LIMITED LIABILITY COMPANY, BEING THE OWNER OF THE FOLLOWING DESCRIBED TRACT OF LAND:

LOT 4, CLEARWAY AS RECORDED UNDER RECEPTION NO. 97064918 OF THE RECORDS OF EL PASO COUNTY, COLORADO, AND CONTAINING 3.0 ACRES MORE OR LESS.

DEDICATION:

THE ABOVE OWNER HAS CAUSED SAID LOT 4 TO BE SURVEYED, VACATED AND REPLATTED INTO LOTS, AND EASEMENTS, AS SHOWN ON THE ACCOMPANYING REPLAT, WHICH REPLAT IS DRAWN TO A FIXED SCALE AS INDICATED HEREON AND ACCURATELY SETS FORTH THE BOUNDARIES AND DIMENSIONS OF SAID LOT 4 AND THE LOCATION OF SAID LOTS, TRACT AND EASEMENTS ALL TO THE SATISFACTION OF THE BOARD OF COUNTY COMMISSIONERS AND WHICH LOT 4 SHALL BE KNOWN AS "CLEARWAY NO. 2", EL PASO COUNTY, COLORADO.

IN WITNESS WHEREOF:

THE AFOREMENTIONED CLEARWAY PROPERTIES, LLC, A COLORADO LIMITED LIABILITY COMPANY HAS EXECUTED THESE PRESENTS THIS 19th DAY OF March, 1999.

KEVIN O. ROTHSCHILD, MANAGING MEMBER

STATE OF COLORADO }
COUNTY OF EL PASO } SS

THE ABOVE AND FOREGOING STATEMENT WAS ACKNOWLEDGED BEFORE ME THIS 19th DAY OF March, 1999 BY KEVIN O. ROTHSCHILD.

WITNESS MY HAND AND OFFICIAL SEAL:

NOTARY PUBLIC

MY COMMISSION EXPIRES: 5-26-02

APPROVALS:

APPROVED BY THE EL PASO COUNTY PLANNING DEPARTMENT THIS 23rd DAY OF MARCH, 1999.

PLANNING DIRECTOR

APPROVED BY THE EL PASO COUNTY CHAIRMAN OF THE BOARD OF COUNTY COMMISSIONERS THIS 18th DAY OF MARCH, 1999.

CHAIRMAN OF BOARD

RECORDATION:

STATE OF COLORADO }
COUNTY OF EL PASO } SS

I HEREBY CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN MY OFFICE AT 10:39 O'CLOCK A.M. THIS 23 DAY OF March, 1999, AND IS DULY RECORDED UNDER RECEPTION NO. 99044354 OF THE RECORDS OF EL PASO COUNTY, COLORADO.

J. PATRICK KELLY, RECORDER

FEE: 20.00 BY: Kathleen McClafferty
DEPUTY

SURCHARGE: 1.00

SHEET 1 OF 2 DISK NO. 1728

MONUMENT VALLEY ENGINEERS INC.
ENGINEERS • SURVEYORS
1911 LELARAY ST., COLORADO SPRINGS, COLORADO 80909
(719) 635-5736

CLEARWAY NO. 2		
SCALE 1" = 50'	DRAWN BY BDK	DWG. NO. 60622002
DATE 3-19-99	CHECKED BY CCE	JOB NO. 60622

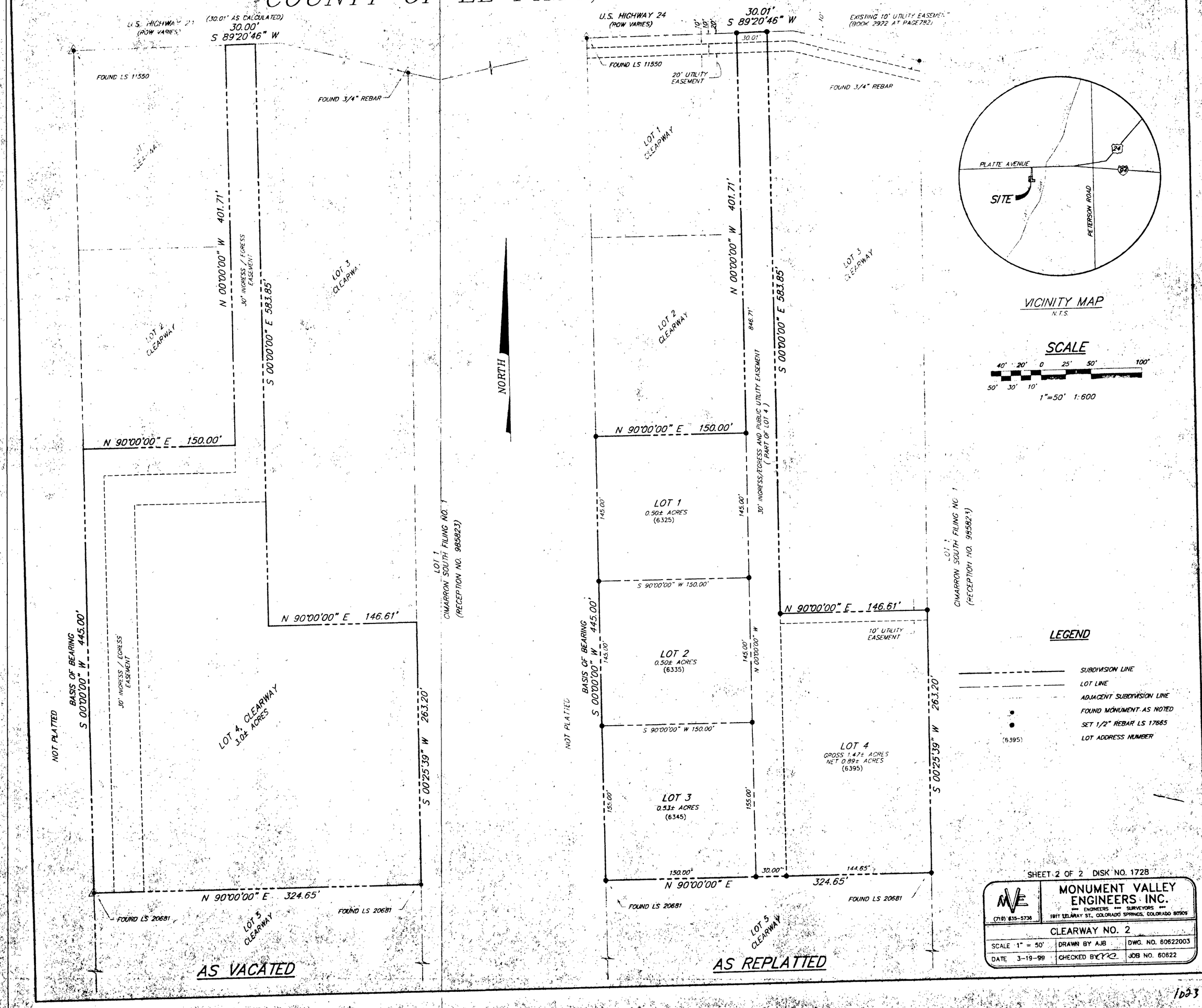
CLEARWAY NO 2 MKM

10231

10231

CLEARWAY NO. 2

A REPLAT OF LOT 4, CLEARWAY, LOCATED IN THE NORTHEAST 1/4 OF SECTION 18, T 14 S, R 65 W OF THE 6th P.M., COUNTY OF EL PASO, STATE OF COLORADO

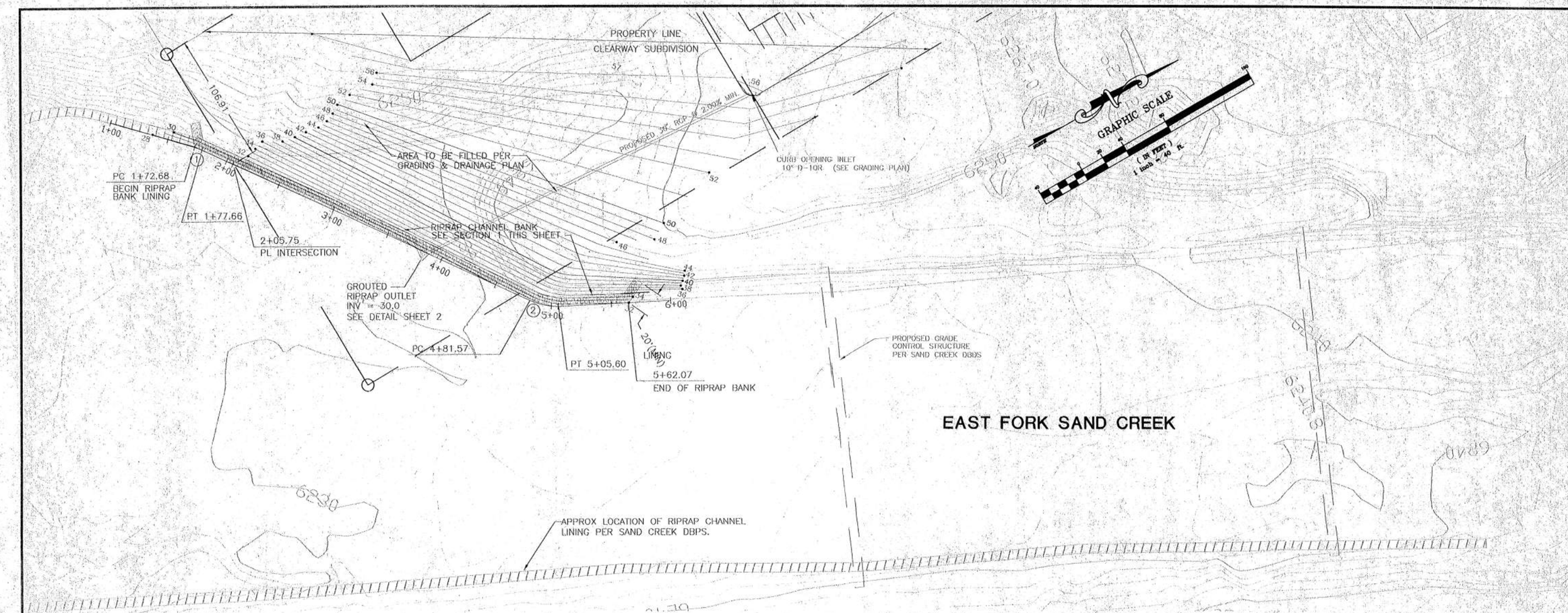


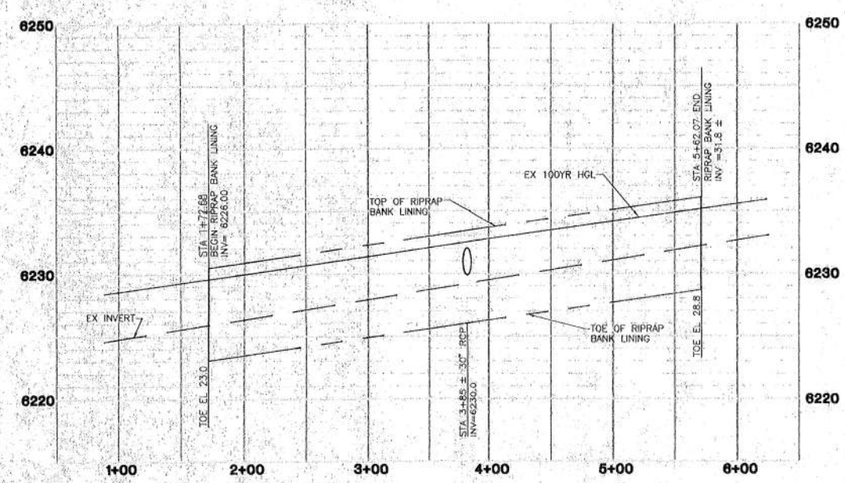
SHEET 2 OF 2 DISK NO. 1728

MONUMENT VALLEY ENGINEERS INC.
ENGINEERS • SURVEYORS
1817 LELARAY ST., COLORADO SPRINGS, COLORADO 80909
(719) 635-5736

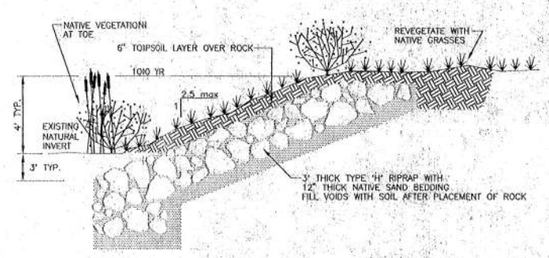
CLEARWAY NO. 2		
SCALE 1" = 50'	DRAWN BY AJB	DWG. NO. 60622003
DATE 3-19-99	CHECKED BY	JOB NO. 60622

10231





PROFILE



TYPICAL RIPRAP BANK DETAIL
N.T.S.

STATEMENT:
These detailed plans and specifications were prepared under my direction and supervision. Said detailed plans and specitications have been prepared according to the criteria established by the City/County for detailed drainage plans and specifications, and said detailed plans and specifications are in conformity with the master plan of the drainage basin. Said detailed drainage plans and specifications meet the purposes for which the particular drainage facility(s) is designed. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of the detailed drainage plans and specifications.

COLORADO REGISTERED PROFESSIONAL ENGINEER

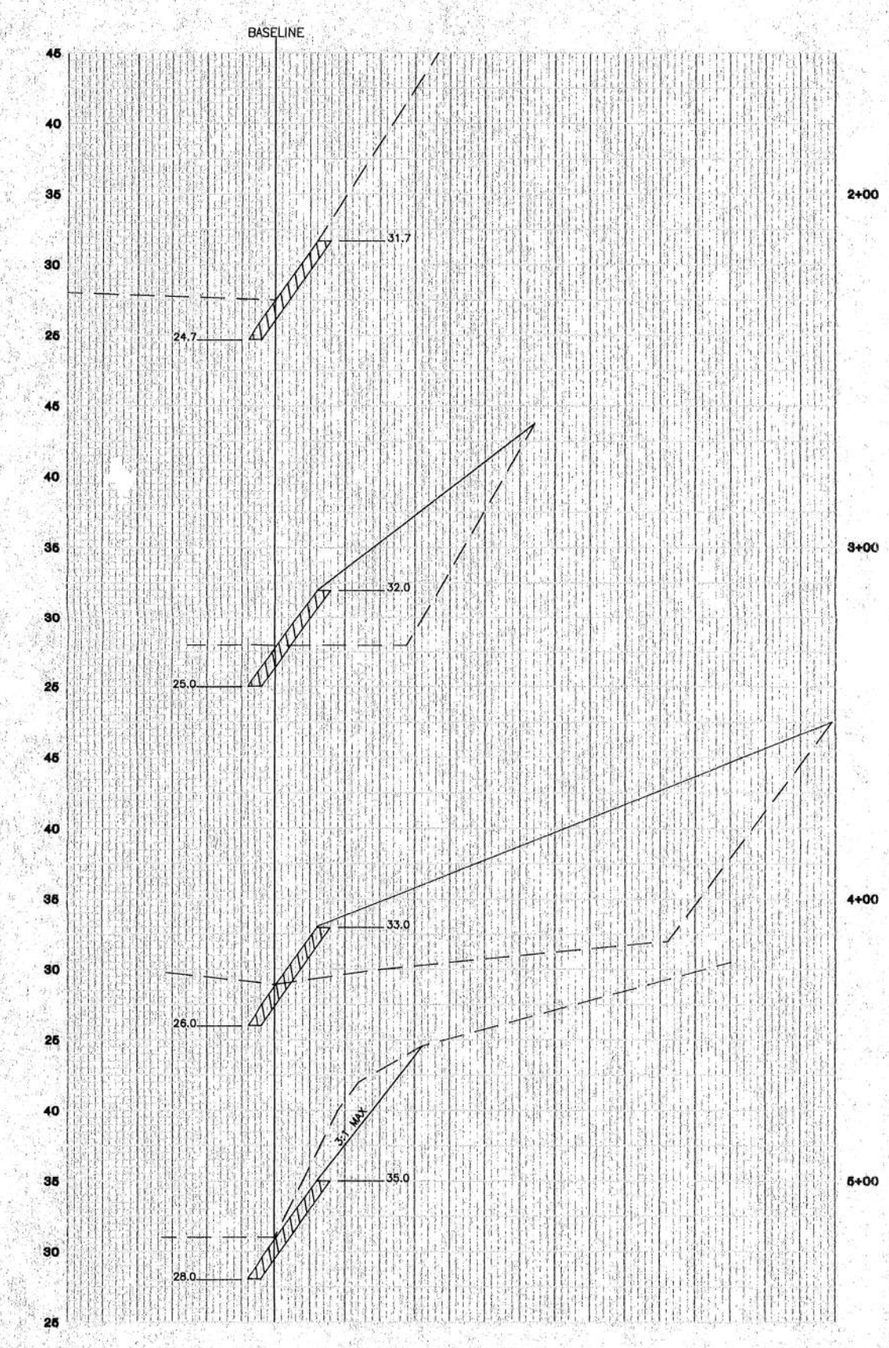
Engineer 1-8-97
Date

NOTE: Contrator shall coordinate a pre-construction conference with El Paso County.

Kiowa Engineering Corporation
1011 North Weber Street, Suite 200
Colorado Springs, Colorado
80903-2492
(719) 630-7342

CLEARWAY PROPERTIES
6335 E. PLATTE AVENUE
EL PASO COUNTY, COLORADO
FINAL DESIGN - SAND CREEK CHANNEL IMPROVEMENTS

Project No.:	9617
Scale:	1"=50'
Date:	7/9/96
Design:	RNW
Drawn:	CAP
Check:	RNW
Revisions:	

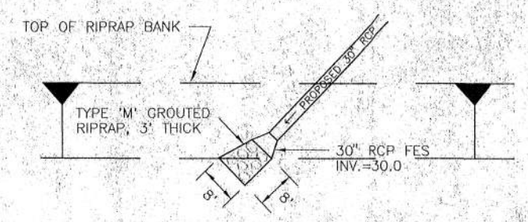


CROSS SECTIONS: 1"=20'H 1"=5'V

STATEMENT:
These detailed plans and specifications were prepared under my direction and supervision. Said detailed plans and specifications have been prepared according to the criteria established by the City/County for detailed drainage plans and specifications, and said detailed plans and specifications are in conformity with the master plan of the drainage basin. Said detailed drainage plans and specifications meet the purposes for which the particular drainage facility(s) is designed. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of the detailed drainage plans and specifications.

Engineer Date 1-8-97

NOTE: Contrator shall coordinate a pre-construction conference with El Paso County.



GROUTED RIPRAP OUTLET STRUCTURE
N.T.S

Kiowa Engineering Corporation
1011 North Weber Street, Suite 200
Colorado Springs, Colorado
80903-2492
(719) 630-7342

CLEARWAY PROPERTIES
6335 E. PLATTE AVENUE
EL PASO COUNTY, COLORADO
FINAL DESIGN - SAND CREEK CHANNEL IMPROVEMENTS

Project No.: 9617
Scale: 1"=50'
Date: 7/9/96
Design: RNW
Drawn: CAP
Check: RNW
Revisions:

STATEMENT:
To the best of my professional knowledge, belief and opinion, if grading work is performed in accordance with the provisions of the grading plan, the work will not become a hazard, endanger property, or adversely affect the safety, use or stability of a public way, drainage channel, of other properties.

Engineer Date 1-8-97

APPROVAL

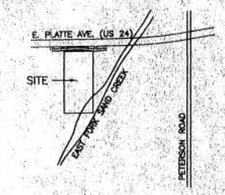
El Paso County Date

DEVELOPER/OWNER:

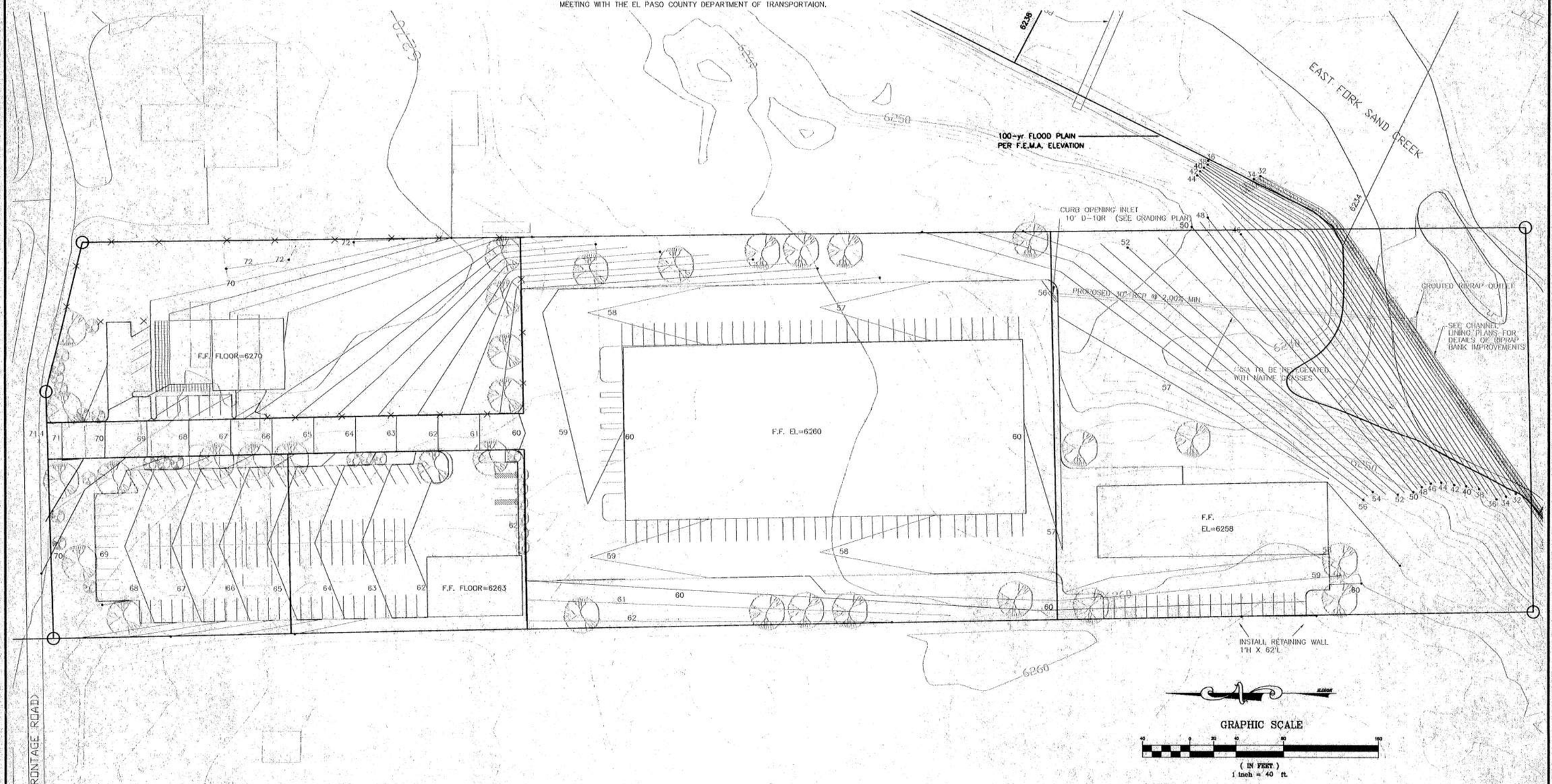
I agree to comply with the requirements of this grading and erosion control plan.

Developer/Owner Date

NOTE: THE CONTRACTOR SHALL COORDINATE A PRE-CONSTRUCTION MEETING WITH THE EL PASO COUNTY DEPARTMENT OF TRANSPORTAION.



VICINITY MAP

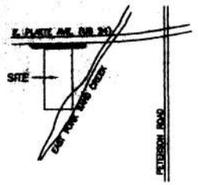


Kiowa Engineering Corporation
1011 North Weber Street, Suite 200
Colorado Springs, Colorado
80903-2492
(719) 630-7342

CLEARWAY PROPERTIES, LLC
6335 E. PLATTE AVENUE
EL PASO COUNTY, COLORADO
GRADING PLAN

Project No.: 9617
Scale: 1"=40'
Date: 8/8/96
Design: CAP
Drawn: CAP
Check: RNW
Revisions:

C1
of



VICINITY MAP

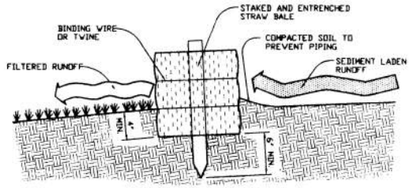
STRAW BALE BARRIER

DEFINITION

A TEMPORARY SEDIMENT BARRIER CONSISTING OF A ROW OF ENTRENCHED AND ANCHORED STRAW BALES

PURPOSES

1. TO INTERCEPT AND DETAIN SMALL AMOUNTS OF SEDIMENT FROM DISTURBED AREAS OF LIMITED EXTENT IN ORDER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
2. TO DECREASE THE VELOCITY OF SHEET FLOWS AND LOW-TO-MODERATE LEVEL CHANNEL FLOWS.



CROSS-SECTION OF A PROPERLY INSTALLED STRAW BALE

SILT FENCE DETAIL

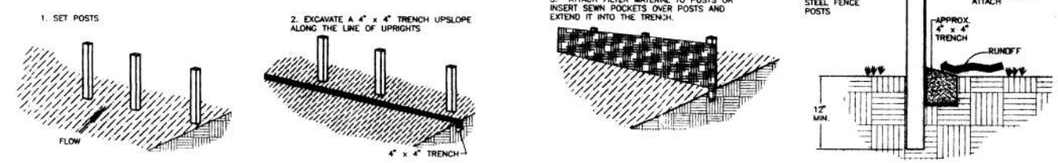
DEFINITION

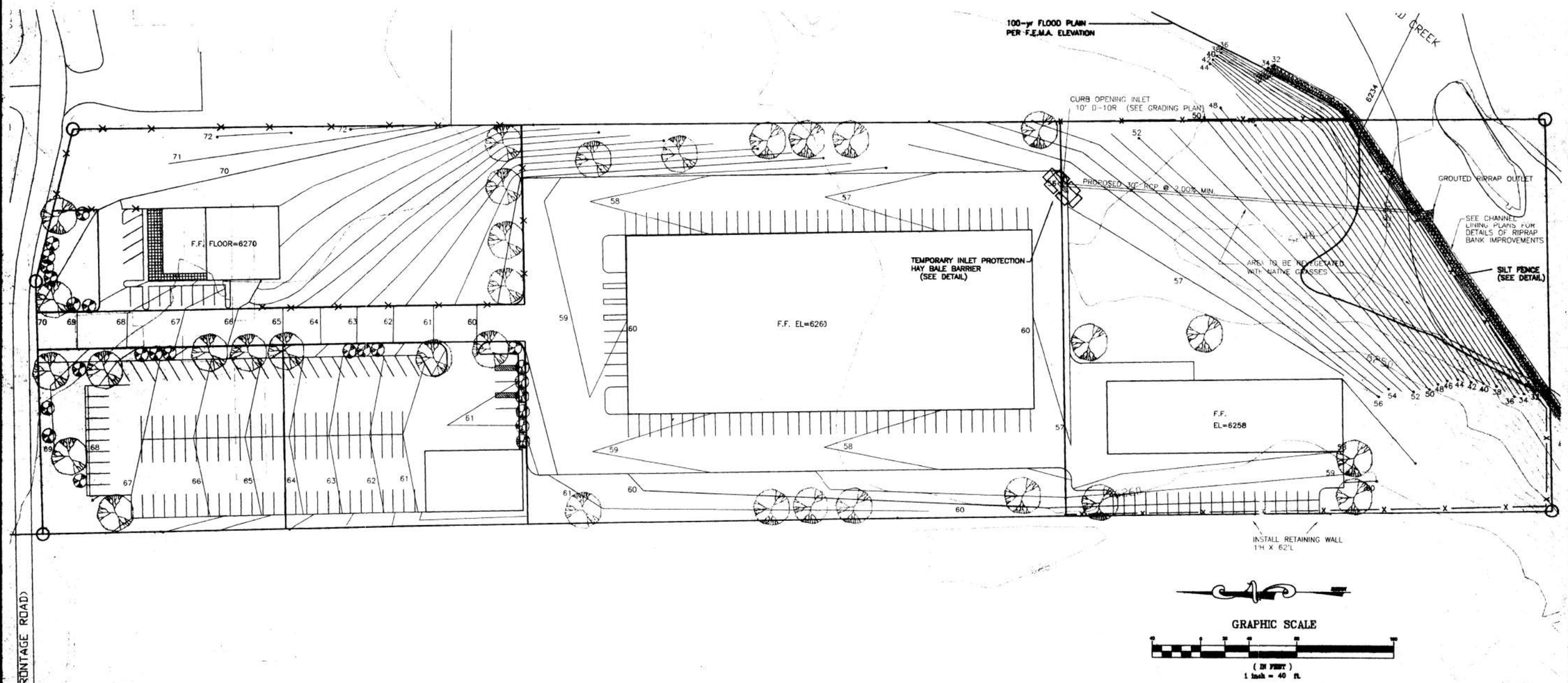
A TEMPORARY SEDIMENT BARRIER CONSISTING OF A FILTER FABRIC STRETCHED ACROSS AND ATTACHED TO SUPPORTING POSTS AND ENTRENCHED. THE SILT FENCE IS A TEMPORARY LINEAR FILTER BARRIER CONSTRUCTED OF SYNTHETIC FILTER FABRIC AND SUPPORTED BY WOODEN OR STEEL POSTS.

PURPOSES

1. TO INTERCEPT AND DETAIN SMALL AMOUNTS OF SEDIMENT FROM DISTURBED AREAS DURING CONSTRUCTION OPERATIONS IN ORDER TO REDUCE SEDIMENT IN RUNOFF FROM LEAVING THE SITE.
2. TO DECREASE THE VELOCITY OF SHEET FLOWS AND LOW-TO-MODERATE LEVEL CONCENTRATED FLOWS.

* NOTE: CONTRACTOR SHALL REMOVE SEDIMENT WHEN IT REACHES HALF THE FILTER FABRIC HEIGHT.





GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

Kiowa Engineering Corporation
1011 North Weber Street, Suite 200
Colorado Springs, Colorado
80903-2492
(719) 630-7342

CLEARWAY PROPERTIES, LLC
6386 E. PLATTE AVENUE
EL PASO COUNTY, COLORADO
EROSION CONTROL PLAN

Project No.:	96.17
Scale:	1"=40'
Date:	7/8/96
Design:	CAP
Drawn:	CAP
Check:	RNW
Revisions:	

Fig.3

2501

02228

DRAINAGE LETTER

CLEARWAY NO. 3

EL PASO COUNTY, COLORADO

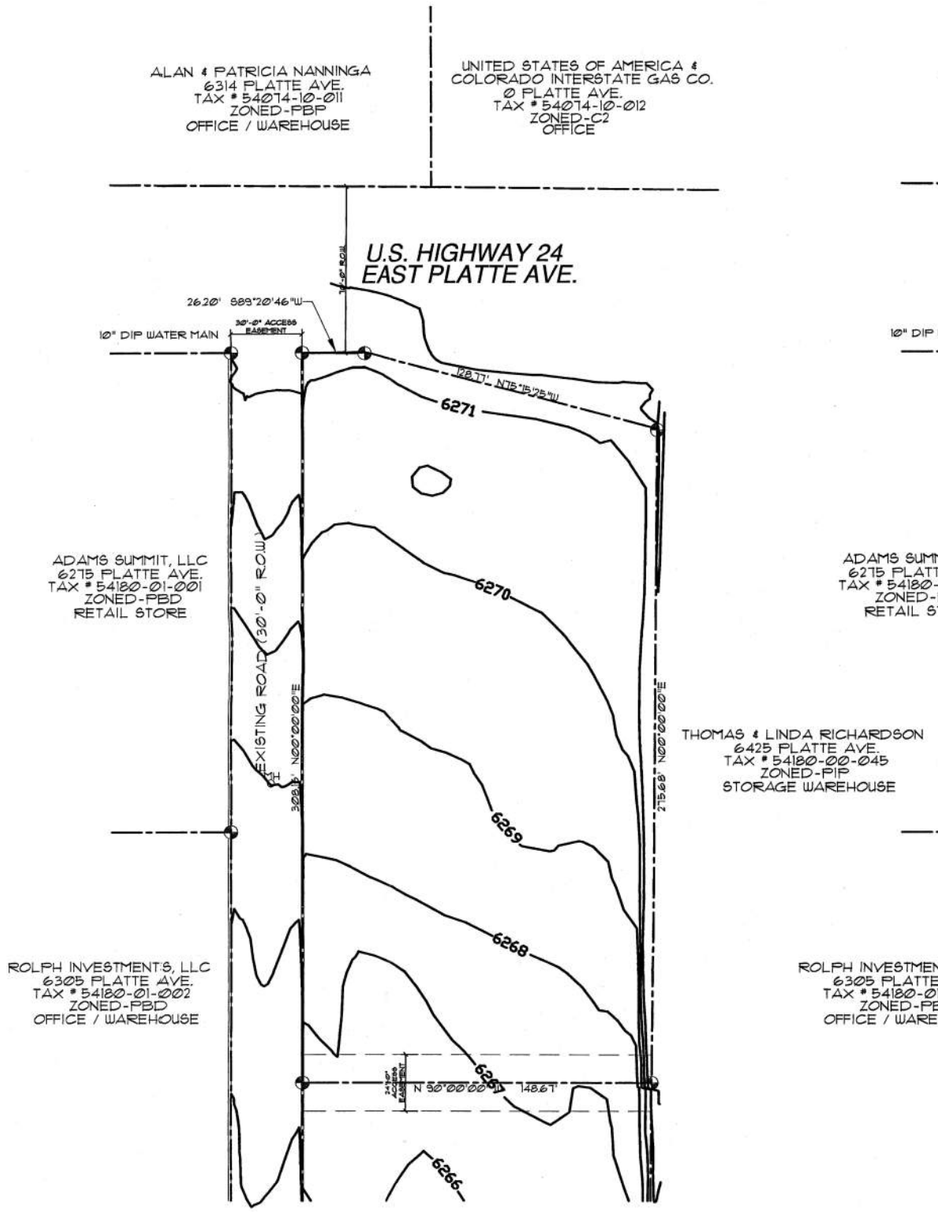
December 9, 2000

Revised
January 8, 2001

prepared for

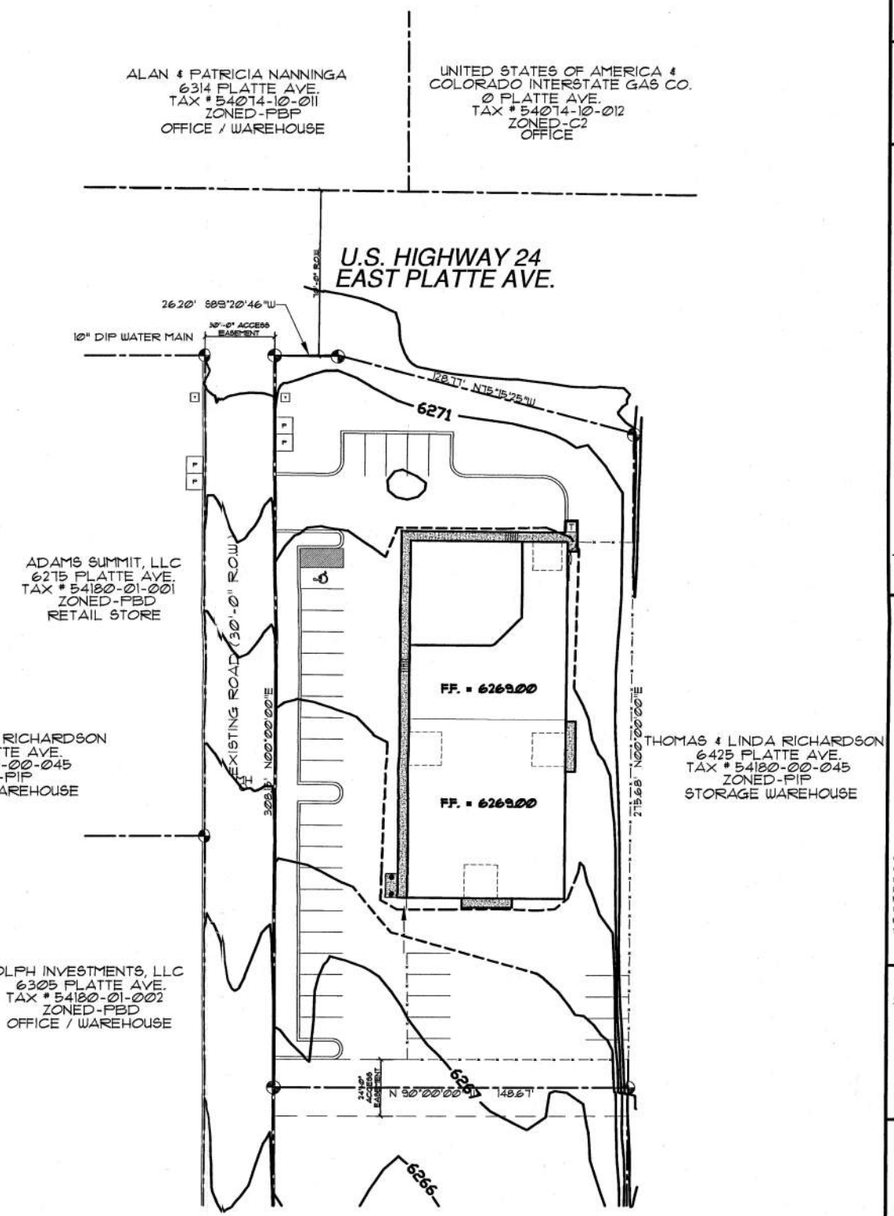
Hammers Construction

Oliver E. Watts
Consulting Engineer
Colorado Springs



1 / D1 EXISTING DRAINAGE PLAN
SCALE: 1"=30'-0"

GRAPHIC SCALE
30' 0 15' 30' 60' 120'
(IN FEET)
1 inch = 30' ft.



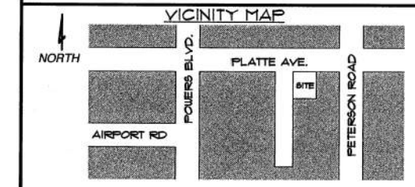
2 / D1 PROPOSED DRAINAGE PLAN
SCALE: 1"=30'-0"

GRAPHIC SCALE
30' 0 15' 30' 60' 120'
(IN FEET)
1 inch = 30' ft.

NORTH

PROJECT INFORMATION

VICINITY MAP



EXISTING CONTOURS
PROPOSED CONTOURS
SILT FENCE
WATER FLOW

GRADING PLAN / EROSION CONTROL STATEMENTS

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 City/County for drainage reports, and said report is in conformity with the 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.

Paul R. Bryant, Colorado P.E. #28932 Date

DEVELOPER'S STATEMENT:

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

Sneiker-Schleider Partnership
Business Name

BY:

TITLE: Matt Redlin, Agent for Sneiker-Schleider Partnership

ADDRESS: 7920 & 7890 Industry Road
Colorado Springs, CO. 80915

El Paso County Statement:

County Engineer Date

GENERAL NOTES:

ALL CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE CRITERIA SET FORTH BY THE CITY OF COLORADO SPRINGS CODES.

ALL DISTURBED AREAS SHALL BE RE-VEGETATED WITH NATIVE GRASSES AS SOON AS POSSIBLE

NO ATTEMPT HAS BEEN MADE TO LOCATE UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF ALL UTILITIES.

CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AT THE SITE PRIOR TO CONSTRUCTION.

CONTOURS ARE AT 1 FOOT INTERVALS.

ALL EXISTING TOPSOIL ON SITE SHALL BE STOCKPILED ON SITE DURING CONSTRUCTION. EXISTING TOPSOIL WILL BE SPREAD EVENLY ON PLANTING BEDS TO ESTABLISH FINAL GRADES.

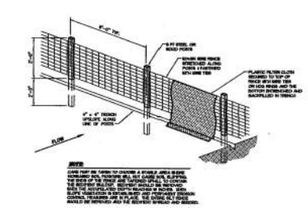
ALL EXISTING TREES TO REMAIN ARE LABELED ON PLAN AND SHALL BE PROTECTED WITH 3' HT. MIN. FENCING AROUND CRITICAL ROOT ZONE (DRIP LINE OF EACH TREE) FOR THE DURATION OF CONSTRUCTION. EXISTING TREES TO BE WATERED, 1" MIN. EVERY 14 DAYS DURING GROWING SEASON FOR THE DURATION OF CONSTRUCTION.

CONTACT MT. VIEW ELECTRIC # 495-2183 PRIOR TO START OF CONSTRUCTION. NOTE: ANY ALTERATIONS TO EXISTING ELECTRIC FACILITIES WILL BE AT THE DEVELOPERS EXPENSE.
EACH CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE UTILITY NOTIFICATION CENTER OF COLORADO BEFORE DIGGING FOR ANY IRRIGATION LINES OR SHRUB AND TREE PLANTING PITS. IF UTILITIES OCCUR AT THESE LOCATIONS EACH CONTRACTOR SHALL REPORT THESE PROBLEMS TO THE GENERAL CONTRACTOR.

OWNER:
SNEIKER-SCHLEIDER PARTNERSHIP
3430 CAPITAL DRIVE
COLORADO SPRINGS, CO 80915
(719) 591-1062

DEVELOPER CONTRACTOR:
HAMMERS CONSTRUCTION, INC.
3460 CAPITAL DRIVE
COLORADO SPRINGS, CO 80915
(719) 570-1599

LEGAL DESCRIPTION
LOT 1, MARKSHEFFEL INDUSTRIAL PARK
COUNTY OF EL PASO, COLORADO
LOT SIZE: 163,185.6 SF / 3.76 ACRES
PARCEL NO. 53332-01-001



SILT FENCE DETAIL

HAMMERS CONSTRUCTION INC.
PRESIDENT: STEVE R. HAMMERS
VICE PRES: DAVID J. HAMMERS
3460 CAPITAL DRIVE 719-570-1599
COLORADO SPRINGS, COLORADO 80915

DATE: JANUARY 2, 2002
DRAWN BY: TN
PROJECT MANAGER: MWR
CHECKED MANAGER:

PROJECT:
TORQUE ENTERPRISES, LLC
6417 & 6413 PLATTE AVENUE
COLORADO SPRINGS, CO
80915

PER EDCP MARCH 20, 2002

MAR 26 2002

D1
NO.
OF 1

NEW DOC

Preliminary and Final
Drainage & Erosion Control Study
Clearway Subdivision
6335 E. Platte Avenue
El Paso County, Colorado

Prepared For:

Clearway Properties, LLC
c/o Colorado Architecture Partnership
113 East Pikes Peak Avenue
Colorado Springs, Colorado 80903

Prepared By:

Kiowa Engineering Corporation
1011 North Weber Street
Suite 200
Colorado Springs, Colorado 80903

March 1996
Rev. July 10, 1996
P9617

developed with buildings and parking areas. Weighted runoff coefficients were calculated for the two Sub-basins assuming developed areas to be 90 to 95 percent impervious and undeveloped land to be 25 to 30 percent impervious. It is the intent of this drainage plan to maintain that there are no inflows from or outfalls to adjacent properties. (See calculations in Appendix A.)

III. Drainage Design Criteria

Hydrologic and hydraulic calculations have been performed using the methods and criteria presented in the *City of Colorado Springs & El Paso County Drainage Criteria Manual* and are included with this report. The flow rates generated are shown on Figure 3, Appendix B, and the calculations are presented in Appendix A. The following reports were also reviewed during the course of this study to insure that the proposed drainage plan will not adversely impact any off-site drainage.

College edukated.

Sand Creek Drainage Basin Planning Study - Preliminary Design Report, City of Colorado Springs, El Paso County, Colorado, Kiowa Engineering Corp., Rev. October 1995
City of Colorado Springs Flood Insurance Study, Revised 1992

Conclusions reached from the review of these reports and plans are as follows:

- The southeastern portion of the site lies within the 100 year floodplain of East Fork Sand Creek.
- A riprap channel lining wall to contain the 100 year floodplain will be required along the southeastern property boundary. The lining is specified as a 3' thick Type H riprap layer to a vertical height of 4 feet at a slope of 2.5:1 (see detail on Figure 2). This is the section specified for this segment of the East Fork Sand Creek in the DBDS.

IV. Floodplain Statement

The southeastern portion of the site lies within an area presently mapped as a 100-year floodplain in the El Paso County Flood Insurance Rate Map, Map No. 080059-0281-C (Rev.

9/30/92), which was prepared by the Federal Emergency Management Agency (FEMA). A floodplain development permit will be required for any work within the 100-yr floodplain. There are no buildings to be constructed within the 100-yr floodplain.

V. Drainage Facility Design

As previously stated, the site was considered as a single sub-basin. Under the proposed developed conditions, runoff at the site will sheet flow though the proposed parking areas and be collected by curb and gutter. In turn, the curb and gutter will direct the flow to a curb opening inlet in sump condition at the southeast corner which will outfall to East Fork Sand Creek. A 10-foot curb opening will convey the flow to a 30" RCP at 2% min. slope to the outfall at East Fork Sand Creek. The 30" RCP will outfall to East Fork Sand Creek onto a grouted riprap pad. During both the 10-year and the 100 year storm events ponding will occur causing submergence of the inlet without overtopping.

VI. Construction of Improvements

The location of the private onsite improvements for the site are shown on Figure 2 in the map pocket. The improvements include a 10-foot curb opening in sump condition, the installation 293 linear feet of 30" RCP at 2% min. slope to convey the flow from the inlet to the outfall at East Fork Sand Creek. Public improvements include the construction of the riprap bank lining at 2.5:1 slope to a vertical height of 4 feet as required in the Sand Creek Drainage Basin Planing Study. Grading and erosion control will be performed as per the Grading and Erosion Control Plan enclosed within the map pockets (see Figure 3).

VII. Economic Analysis

The site lies within the Sand Creek Drainage Basin. The calculated 1996 basin fees for El Paso County are as follows:

Basin Fees:

Drainage:	9.29 acres X $6,115.00 =	$ 56,808.35
Bridge:	9.29 acres X $ 330.00 =	$ 3,065.70
	Sub-Total =	$ 59,874.05
Pond:		
Land:	9.29 acres X $ 175.00 =	$ 1,625.75
	Sub-Total =	$ 1,625.75
	Total =	$ 61,499.80

Table I presents a cost estimate for construction of the private drainage improvements. Table II presents a cost estimate for the public improvements at the site. The total cost for both private and public facilities is estimated at $72,954.85.

Table I. Estimated Costs for Private Drainage Improvements

ITEM	UNITS	UNIT COST	COST
30" RCP	293 lf	$48/lf	14,064.00
30" RCP flared end section	1	$450	450.00
Outlet Structure	1	$2500	2500.00
Type 'M' riprap (30" outlet)	10 cy	$30/cy	300.00
Sub-total			**17,314.00**
5% Contingency			865.70
10% Engineering			1,731.40
TOTAL			**$19,911.10**

Table II. Estimated Costs for Public Drainage Improvements

ITEM	UNITS	UNIT COST	COST
Type 'H' riprap (bank lining)	900	$30/cy	27,000.00
Bank Lining Construction	425 lf	$45/lf	19,125.00
Sub-total			**$46,125.00**
5% Contingency			2,306.25
10% Engineering			4,612.50
TOTAL			**$53,043.75**

Kiowa Engineering Corporation

#2159

NEW DOC

March 12, 1997

Mr. Pyne Gramly
El Paso County Department of Transportation
3460 Marksheffel Road
Colorado Springs, CO 80922

RE: Final Drainage Plan, Clearway Subdivision, El Paso County, Colorado (Kiowa Project No. 96.17)

Dear Mr. Gramly:

At the request of Mr. Rick O'Connor with El Paso County Land Use, I have prepared the following information in support of the drainage plan for the above referenced project. The calculation for the public and private storm drainage improvements were established in the report. The channel improvements along the East Fork Sand Creek adjacent to the site are in conformance with the Sand Creek Drainage Basin Planning Study. As such they are reimbursable through the drainage basin fee system. The cost of the reimbursable improvements can be credited against the drainage fees owed at the time of platting. Accordingly, the drainage fee calculation for the Clearway Subdivision are as follows:

Drainage fee:	9.29 acres @ $6,115.00=	$56,808.35
Reimbursable drainage improvements		$53,043.75
Drainage Fees due at time of platting		$ 3,764.60

The fees for bridge and detention basin land remain the same as shown in the approved drainage plan for the site. The estimate of guaranteed funds remains unchanged.

If there are any questions or if I may be of further assistance, please feel free to call at any time.

Sincerely yours,
KIOWA ENGINEERING CORPORATION

Richard N. Wray, P.E.
Principal

cc: Rick O'Connor, Land Use
Kevin Rothschild

RNW/rnw
0312rnw1.doc

1011 N. Weber, Suite 200 Colorado Springs, Colorado 80903-2492
(719) 630-7342 (719) 630-0406 FAX

DRAINAGE LETTER

FOR

6395 E. PLATTE AVENUE
COLORADO SPRINGS, EL PASO COUNTY, COLORADO

Revised April 2003
February 2003

Prepared by:

Law & Mariotti Consultants, Inc.
619 North Cascade Avenue, Suite 206
Colorado Springs, CO 80903
(719) 442-1541

LMCI PN 02-074

DRAINAGE LETTER for

6395 E. Platte Avenue
Colorado Springs, El Paso County, CO

II. PURPOSE

Law and Mariotti was contracted to prepare this Drainage Letter and Plan for the proposed site modifications to the existing platted property located on the east side of E. Platte Avenue, enumerated as 6395 E. Platte Avenue. The proposed site modifications will consist of a single-story commercial use structure, landscape, and sidewalk and parking facilities.

This study will evaluate historical storm water management and characteristics; then compare historical storm water flows to the proposed developed storm water flows at comparable locations.

III. PROPERTY DECRIPTION AND LOCATION

A) **Location.** The property is legally described as Lot 4, Clearway Subdivision, Filing No. 2, County of El Paso, State of Colorado. Refer to Fig. 1.

The property is bound to the west by a paved private ingress/egress and public utility easement; to the north by an existing commercial use facility, to the east by an undeveloped commercially zoned lot and the East Fork Sand Creek; and to the south by an undeveloped commercially zoned lot. The property is presently undeveloped and does not have existing utility services.

B) **Description of Property.** The property is Zoned PBD OACGM, and represents approximately 1.46-acre area, presently undeveloped, and partially covered with native vegetation.

C) **Soil Description.** Upon review of the Soil Study of El Paso County Area, this area consists of Ellicott soil series. The Ellicott soil series is a deep, somewhat excessively drained soil formed in noncalcareous stratified sandy alluvium derived from arkose beds of granite. These soils are on terraces and flood plains. Permeability of the Ellicott soil is rapid; surface run-off is slow, the hazard of erosion is high and the hazard of soil blowing is moderate.

D) **Prior Drainage Study.** The property was included in a prior drainage study prepared for Clearway Subdivision, prepared by Kiowa Engineering Corporation, dated March 1996, revised on July 10, 1996. The site was included as part of a 9.3-acre area basin. Lot 4 boundary was then reconfigured in Clearway Subdivision, Filing #2. Lot #3 was later replatted into Lots #1 through #4, Clearway Subdivision, Filing #3, are adjoined to the north boundary of Lot #4, Clearway Subdivision, Filing #2. A drainage letter was prepared for Clearway No. 3, by Oliver Watts, dated December 9, 2000, and revised on January 8, 2001.

Each of the two referenced drainage studies clearly defined the developed stormwater flows as remaining on-site, collected within Lot #5, then conveyed offsite through a proposed 30" diameter RCP conduit, for outfall into nearby East Fork Sand Creek. The Drainage Letter prepared for Clearway No. 3 identifies that a letter of credit is on file with El Paso County to guarantee the installation of the required drainage improvements. To date, Lot #5 is undeveloped, and the referenced stormwater improvements have not been installed. The Drainage Letter prepared for Clearway No. 3 conforms with the intent of the Drainage Study originally prepared for Clearway Subdivision, directing all developed stormwater shall drain westerly and into the private drive, also identified within this report as the paved private ingress/egress and public utility easement.

However, final grading for Lots #1 through #4, of Clearway No. 3, were not developed in compliance with the intent of either drainage study. The westerly half of Lots #1 through #4 are graded to allow cross-lot flow from one lot to another, conveyed in a concrete lined inverted swale and through constructed curb weirs, ultimately discharging Filing #3 developed stormwater flow onto Lot #4, of Clearway Subdivision, Filing #2. Stormwater flows are of sufficient volumes to create an eroded flow path through the undeveloped Lot #4. No portion of this flow reaches the private drive, as intended. The balance of the developed stormwater for Lots #1 through #4 are released offsite, onto the adjoining property to the east, also not conforming the either drainage study. The Historical Drainage Plan provided as part of this drainage letter, represents the stormwater flow patterns as observed.

E) **Historical Drainage Basins.** Reference is made to the Drainage Plan - Historical Basins, prepared for this property and provided with this Drainage Letter, identified as Drawing #D-1, Prepared by Law & Mariotti Consultants, Inc. dated February 14, 2003.

Historical stormwater develops within three on-site sub-basins, designated as H-1, H-2, and H-3. All historical stormwater travels overland and is discharged at offsite locations designated as Design Points (DP) #2, #3, and #4.

Sub-basin H-1 flow historically travels southeasterly overland and discharges offsite at DP #4. Flows continue flow southeasterly overland toward and into East Fork Sand Creek. H-1 historical flows are Q_5=0.81cfs, and Q_{100}=1.84cfs. H-1 flows contribute to DP#4 flows.

Sub-basin H-2 flow historically travels southeasterly overland and discharges offsite at DP #2 onto adjoining Lot #1, Cimarron South, Filing No. 1. Flows continue southeasterly overland toward and into East Fork Sand Creek. H-2

Lot #4 shall be responsible for notifying the adjoining property owner prior to closing the curb opening (communications are presently occurring). Until such time that the curb opening is permanently closed, a temporary earth berm will be placed at the curb opening outfall location for temporary redirection of the off-site developed stormwater westerly toward the paved street, and away from the proposed structure. The redirection of OS-1 cross-lot drainage complies with approved drainage criteria, and with the prior drainage studies. Flow then continues southerly overland in the existing curb-and-gutter, and is combined with developed flows from D-1, D-2, D-3, D-4, and OS-2, and discharges offsite at DP #2 into Lot #5 as previously discussed. OS-1 flows represent DP #1 flows, and are Q_5= 4.32cfs, and Q_{100}=8.62cfs.

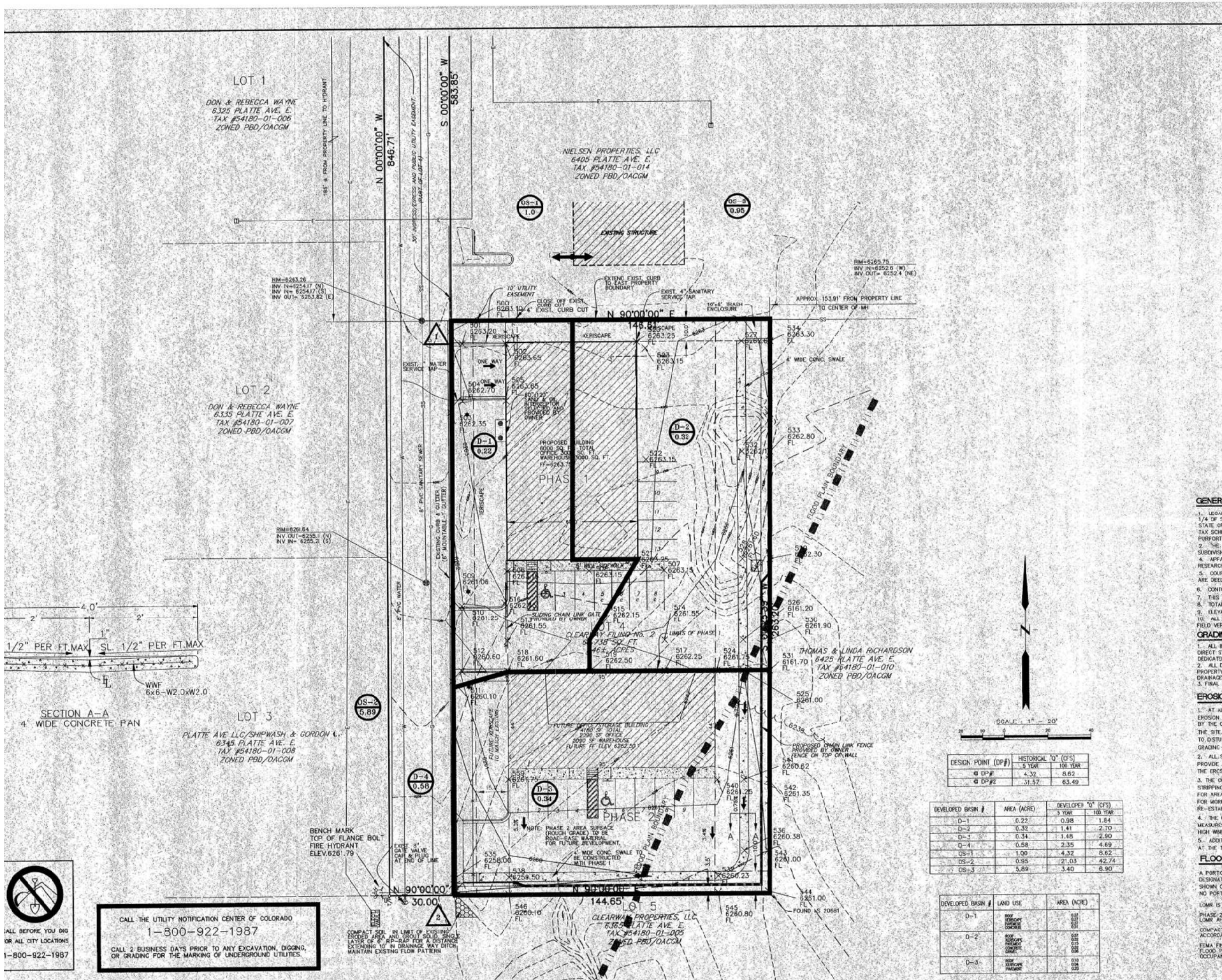
Off-site basin, OS-2 represents developed flows from Clearway Subdivision Lots west of the private drive. Stormwater flows easterly into the paved private drive, then continuing flow southerly and combine with D-1, D-2, D-3, D-4, and redirected flows from OS-1 at DP #2. OS-2 flows are Q_5= 21.03cfs, and Q_{100}=42.74cfs.

Off-site basin, OS-3 represents developed flows from the easterly half of Lots #1 through #4, of Clearway Filing #3, as discussed previously for the historical drainage evaluation. Stormwater then continues flow easterly onto adjoining Lot #1, Cimarron South, Filing No. 1. Flows continue southeasterly overland toward and into East Fork Sand Creek. OS-3 flows are Q_5= 3.40cfs, and Q_{100}=6.90cfs.

DP#2 flows are combined flows from D-1, D-2, D-3, D-4, OS-2, and redirected from OS-1, and are Q_5=31.57cfs, and Q_{100}=63.49cfs. Surface soils at this outfall location shall be reconstructed and improved for a distance not extending more than 10-feet into Lot #5, as shown on the Grading and Erosion Control Plan.

The developed stormwater flows calculated and provided in the Drainage Study prepared for Clearway Subdivision, including Lot #5 are Q_5=34.6cfs, and Q_{100}=63.6cfs. In utilizing the same criteria of the original drainage study, Lot #5 flows represent Q_5=11.05cfs, and Q_{100}=20.31cfs included in the overall flows. In comparison of planned flows to DP #2 developed flows, the developed flows for Clearway Subdivision have increased 34.1% for Q_5, and 46.7% for Q_{100}, representing the increased density of the overall subdivision.

El Paso County shall be responsible for directing the development of Lot #5 improvements to include all increased developed flows for the Clearway Subdivision, as reported within.



DESIGN POINT (DP#)	HISTORICAL "Q" (CFS)	
	5 YEAR	100 YEAR
@ DP#1	4.32	8.62
@ DP#2	31.57	63.49

DEVELOPED BASIN #	AREA (ACRE)	DEVELOPED "Q" (CFS)	
		5 YEAR	100 YEAR
D-1	0.22	0.98	1.84
D-2	0.32	1.41	2.70
D-3	0.34	1.48	2.90
D-4	0.58	2.35	4.69
OS-1	1.00	4.32	8.62
OS-2	0.95	21.03	42.74
OS-3	5.89	3.40	6.90

DEVELOPED BASIN #	LAND USE	AREA (ACRE)
D-1	ROOF XERISCAPE PAVEMENT CONCRETE	0.03 0.07 0.11 0.01
D-2	ROOF XERISCAPE PAVEMENT CONCRETE GRAVEL	0.03 0.08 0.13 0.02 0.06
D-3	ROOF XERISCAPE PAVEMENT	0.10 0.04 0.20

LAW & MARIOTTI CONSULTANTS, INC.
CIVIL ENGINEERING - LAND SURVEYING
4179 N. Chasuble Ave., Suite 106 Colorado Springs, CO 80903
719-442-1843 voice 719-442-1543 fax

PREPARED FOR:
HOLLADAY BROTHERS CONSTRUCTION
216 AUBURN DRIVE
COLORADO SPRINGS, CO 80909

PROJECT INFO.
URBAN ELECTRIC
6395 E. PLATTE AVE.
COLORADO SPRINGS, CO
EL PASO COUNTY, COLORADO

DESIGNED BY: NA
DRAWN BY: MKP
CHECKED BY: GCS

REVISIONS

SYMBOL	REVISION	DATE	INITIAL
	REVISION PER COUNTY COMMENTS	04-07-03	MKP

PLAN CONTROL

CONSTRUCTION ACTIVITY	ISSUE DATE

DRAWING INFO.

DRAINAGE PLAN
DEVELOPED BASINS

DATE: 02-14-03
SCALE: 1" = 20'
JOB NO.: 02-074
DRAWING NO.: D-2