# FINAL DRAINAGE REPORT
## FOR
# LOT 5 OF CLEARWAY

# EL PASO COUNTY, COLORADO

SEPTEMBER 2022

Prepared for:
**WIRENUT HOME SERVICES**
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Colorado Springs, CO 80915
(719)-227-0500

Prepared by:

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Project #44-042

PCD Project No. PPR-22-034

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## FOR
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### 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.

_____
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:_____
DATE:_____

ADDRESS: Wirenut Home Services
6395 E. Platte Ave.
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:

# FINAL DRAINAGE REPORT
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### APPENDIX

A discussion has been added to the report

A discussion has been added to the report, its unclear ito MS civil f the channel improvements have been made at this time. Per our client it was determined in the PreApp meeting that no channel improvements would be required as a part of this project

Review 1 comment:
Please provide discussion/background on the previous drainage studies for the site. See PCD File No. SF96017, VR97018, **PPR02019.**
**Review 2: Unresolved.**

**AGE REPORT FOR**

**CLEARWAY**

Review 1 comment:
The sand creek DBPS identified improvements to Sand Creek channel. It appears that clearway subdivision may have completed channel related improvements. Please provide background/discussion on these improvements. I have provided the EDARP file number for clearway subdivision for your use (SF96017).

Review 2: Unresolved. Please address the comments.

This document is intended to serve as the Final Dra
of this document is to identify and analyze the on
development runoff is routed through the site safel
forth by the El Paso County Drainage Criteria Man
asphalt parking lots, an office/warehouse building
landscaping. A Sand Filter Basin (Pond 1) is pro
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 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.

## 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. The development of this site is not anticipated to have negative effects on downstream drainageways. The existing channel embankment has been stabilized at the FSD pond's emergency spillway and where the outlet pipe from the pond enters the channel. The existing channel is to remain, and no improvements are necessary for this reach of the channel (See "Referenced Reports" in the Appendix).

**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. DL Holdings, LLC 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%. 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 runoff from the north. The East Fork Sand Creek Sub-Tributary continues from north to south approximately 10 feet from the eastern boundary of the site. It was observed that existing channel banks appear to be stable with established vegetation and minimal scour. The existing channel is to remain, and no improvements have been determined to be necessary for this reach of the channel (See "Background" 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.

review 1: please provide.
review 2: unresolved.

text has been added

**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 outfalling 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 bulding 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 = 6.6 cfs). The intercepted flows are conveyed east through an 18" PP **Pipe Run 1** (Q5 = 4.3 cfs, Q100 = 6.6 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 = 6.1 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 = 4.5 cfs, Q100 = 6.8 cfs) at **DP2**. The intercepted flow combines with flows from **PR1** and are conveyed south through 24" PP **Pipe Run 2** (Q5 = 8.9 cfs, Q100 = 13.4 cfs) to **DP4**. Uncaptured runoff from this design point is conveyed as flow-by, **FB DP2** (Q5 = 2.6 cfs, Q100 = 6.4 cfs) towards **DP4**.

**Design Point 3 ((DP3), Q5 = 2.6 cfs, Q100 = 6.3 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 = 2.2 cfs) to **DP5.**

**Design Point 4 ((DP4), Q5 = 2.7 cfs, Q100 = 6.7 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 = 13.1 cfs, Q100 = 21.8 cfs) to **DP5**. Uncaptured runoff from this design point is conveyed south as flow-by, **FB DP4** (Q5 = 0.5 cfs, Q100 = 2.4 cfs) towards **DP5**.

**Design Point 5 ((DP5), Q5 = 4.5 cfs, Q100 = 11.5 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 = 4.5 cfs, Q100 = 11.5 cfs) at **DP5**. The intercepted flows combines with flow from **PR4** and is conveyed southeast through 30" PP **Pipe Run 5** (Q5 = 12.7 cfs, Q100 = 30.5 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 7 ((DP7), Q5 = 0.7 cfs, Q100 = 1.3 cfs)**
**DP7** consists of 0.17 acre, onsite **Basin I** (Q5 = 0.7 cfs, Q100 = 1.3 cfs). Developed runoff from this basin (parking lot) is conveyed as sheet flow to a low point of the parking lot where a Nyloplast 24" grate inlet (**INLET 7**) intercepts the flows and conveys them west through 12" PP **Pipe Run 23** (Q5 = 0.7 cfs, Q100 = 1.3 cfs). Intercepted runoff is routed to **DP8**.

**Design Point 8 ((DP8), Q5 = 1.3 cfs, Q100 = 2.4 cfs)**
**DP8** consists of 0.33 acre, onsite **Basin H** (Q5 = 1.3 cfs, Q100 = 2.4 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 modified single sump Denver Type 16 inlet shall be constructed. The flows entering the inlet will combine with flows from **PR23** and will be directed southwest through 15" PP **Pipe Run 24** (Q5 = 1.9 cfs, Q100 = 3.6 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 24 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 = 2.2 cfs, Q100 = 4.1 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 = 2.3 cfs, Q100 = 4.4 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 = 2.5 cfs, Q100 = 4.7 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 = 2.7 cfs, Q100 = 5.1 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 = 2.8 cfs, Q100 = 5.2 cfs). Flows from **PR34** are routed to a manhole at the end of **PR34.**

**Design Point 9 ((DP9), Q5 = 1.5 cfs, Q100 = 2.8 cfs) DP9** consists of 0.25 acre, onsite **Basin O** (Q5 = 1.5 cfs, Q100 = 2.8 cfs). Developed runoff from this basin, asphalt lot, is conveyed as sheet flow and concentrated flow via 6" curb and gutter to a low point of the parking lot at the southeast corner of the sub-basin, where a proposed 5' Type R grate inlet shall be constructed. These flows shall then travel southwest through 12" PP **Pipe Run 36** (Q5 = 1.5 cfs, Q100 = 2.8 cfs) to **DP10**.

A 24" nyoplast grate inlet is shown on the plans. Please revise accordingly.

**Design Point 10 ((DP10), Q5 = 1.2 cfs, Q100 = 2.2 cfs)**

**DP10** consists of 0.40 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' steel bar 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 = 2.8 cfs, Q100 = 5.1 cfs) to a low tailwater riprap basin in the Sand Filter Basin at **DP13**.

corrected

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). Approximately 10% of **Basin J** is paved in asphalt and an area drain fully conveys the flow from this portion south through an 8" PP **PR13** (Q5 = 0.5 cfs, Q100 = 1.0 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 **PR13** and are conveyed through a 12" PP **Pipe Run 15** (Q5 = 0.6 cfs, Q100 = 1.1 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 = 0.7 cfs,

Q100 = 1.3 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 = 0.8 cfs, Q100 = 1.5 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 = 0.9 cfs, Q100 = 1.5 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 = 1.6 cfs, Q100 = 3.0 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 = 2.0 cfs, Q100 = 3.8 cfs). Flows from **PR22** combine with flows from **PR34** and are routed via a 24" RCP **Pipe Run 35** (Q5 = 4.7 cfs, Q100 = 8.8 cfs) to a low tailwater riprap basin in the Sand Filter Basin at **DP13**.

**Design Point 13 ((DP13), Q5 = 7.9 cfs, Q100 = 15.1 cfs)**
**DP13** consists of 0.27 acre, onsite **Basin Q** (Q5 = 0.4 cfs, Q100 = 1.3 cfs). Developed runoff from this basin is conveyed to an onsite sand filter basin **Pond 1**. **Pond 1** receives flows from **PR35** (Q5 = 4.8 cfs, Q100 = 8.8 cfs), **PR38** (Q5 = 2.8 cfs, Q100 = 5.1 cfs), and **Basin Q** (Q5 = 0.4 cfs, Q100 = 1.3 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 = 22.8 cfs, Q100 = 43.9 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 0.27 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 = 32.5 cfs, Q100 = 73.7 cfs)**
**DP16** receives flows from 0.54 on-site acre **Basin S** (Q5 = 0.2 cfs, Q100 = 1.6 cfs), **PR40** (Q5 = 19.1 cfs, Q100 = 41.7 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 = 28.8 cfs, Q100 = 71.5 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 are otherwise experience disturbance to otherwise undevelopable land which allows for the installation of bypass runoff conveyance (swales or pipe or overflow routing) or grade tie ins and possess no impervious structure or improvement. The total area of disturbance within these basins are less than 20% of the site which is also less than 1.0 acre and are not otherwise receiving

Please identify the exclusion in appendix I (I.7.1.C.1) that allows for these basins to not be treated in the narrative. Also adding up the basin areas totals 1.03 (.22+.27+.54) acres. If you are rounding up, please do not to ensure that the the total area is not over 1 acre.

The discussion has been revised to include reference to the ECM section and the basins total 0.99 acres.

CE

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 15.1 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 | 0.247 | 0.177 | 0.275 |
| Maximum WS Elevation | 6252.31 | 6254.19 | 6253.61 | 6254.40 |
| Peak Inflow (cfs) | N/A | N/A | 4.5 | 7.9 |
| 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 | 276 | LF | $45 | /LF | $12,420.00 |
| **4.** | 15" PP | 312 | LF | $55 | /LF | $17,160.00 |
| **5.** | 18” PP | 238 | LF | $68 | /LF | $16,184.00 |
| **6.** | 24" PP | 65 | LF | $81 | /LF | $5,265.00 |
| **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 | $78 | /LF | $4,290.00 |
| **10.** | 24” RCP | 27 | LF | $104 | /LF | $2,808.00 |
| **11.** | 30” RCP | 70 | LF | $130 | /LF | $9,100.00 |
| **12.** | 36” RCP | 32 | LF | $155 | /LF | $4,960.00 |
| **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 | $1292.00 |
| **16.** | 36” FES RCP | 1 | EA | $1845 | /EA | $1845.00 |
| **17.** | Triple Type 16 Inlet | 5 | EA | $11,900 | /EA | $59,500.00 |
| **18.** | Single Type 16 Inlet | 1 | EA | $5900 | /EA | $5,900.00 |
| **19.** | Type D Inlet | 2 | EA | $4800 | /EA | $9,600.00 |
| **19.** | Type R Inlet | 1 | EA | $5000 | /EA | $5,000.00 |
| **21.** | 24” Grate and Drain Basin | 3 | EA | $2930 | /EA | $8,790.00 |
| **22.** | 2’x2’ Steel Grate and Drain Basin | 1 | EA | $2930 | /EA | $2,930.00 |
| **23.** | Manhole | 6 | EA | $6500 | /EA | $39,000.00 |
| **24.** | Type M riprap, 2’ deep Low Tailwater | 60 | CY | $65 | /CY | $3,900.00 |
| | FSD Pond (Inlcuding Outlet Struct, Spillway Cutoff Wall, Riprap, Signs, Sand Filter Media, Erosion Blanket) | 1 | LS | $17,408 | /LS | $17,408.00 |
| | | | | | **Total $** | **$302,171.00** |
| | | | | | **5% Contingency** | **$15,212.05** |
| | | | | | **10% Engineering** | **$30,424.10** |
| | | | | | **Total$** | **$349,877.15** |

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 Filing 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 Sub-Tributary 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 Manuals".

2.) "Urban Storm Drainage Criteria Manual"

3.) SCS Soils Map for El Paso County.

4.) 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.

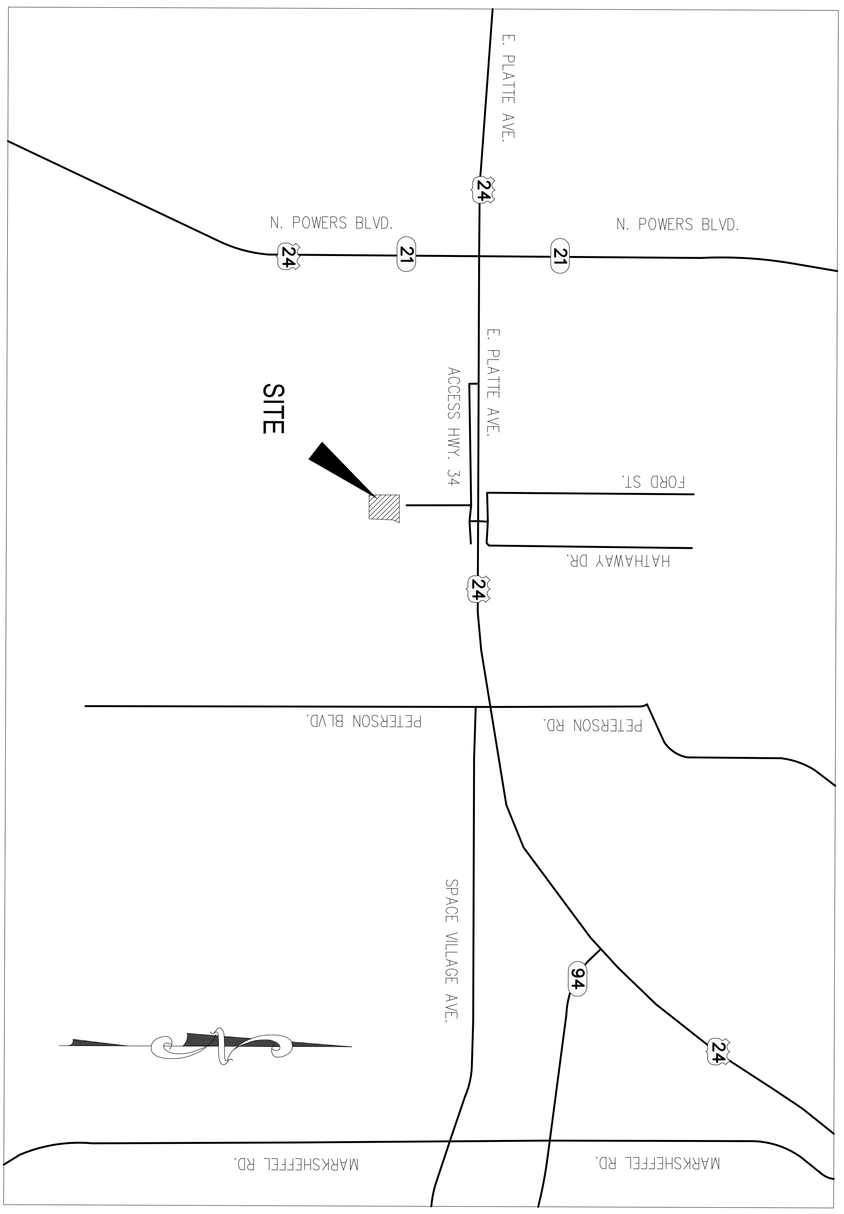
7.) "Sand Creek Drainage Basin Planning Study, Preliminary Design Report", Revised March 1996, by Kiowa Engineering Corporation.

# APPENDIX

**VICINITY MAP**

# VICINITY MAP

N.T.S.




REVISIONS:

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

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

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

COLORADO REGISTERED 37160 PROFESSIONAL ENGINEER

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

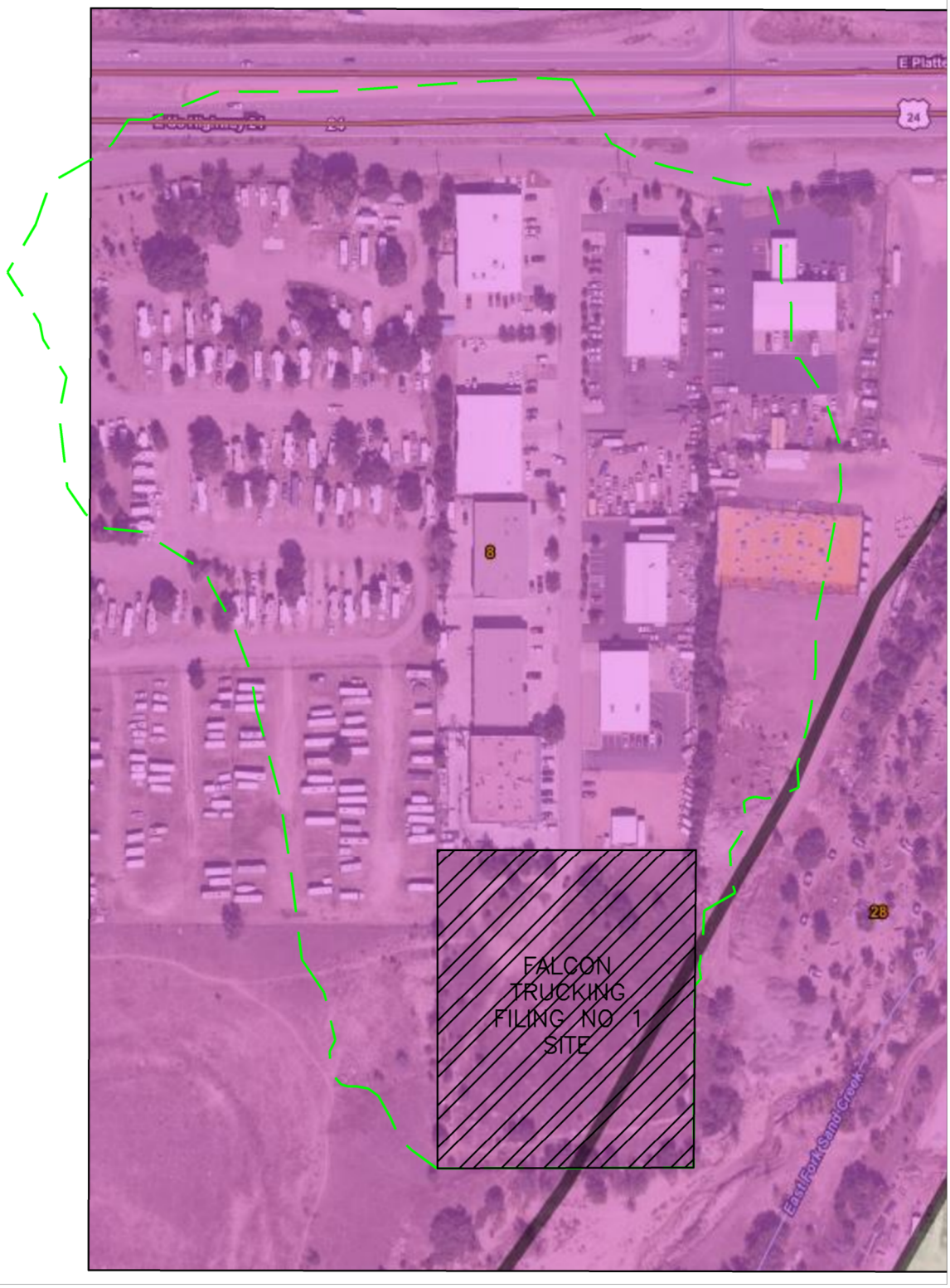
CIVIL CONSULTANTS, INC.
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CLEARWAY FILING NO. 2, LOT 5

VICINITY MAP

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

**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

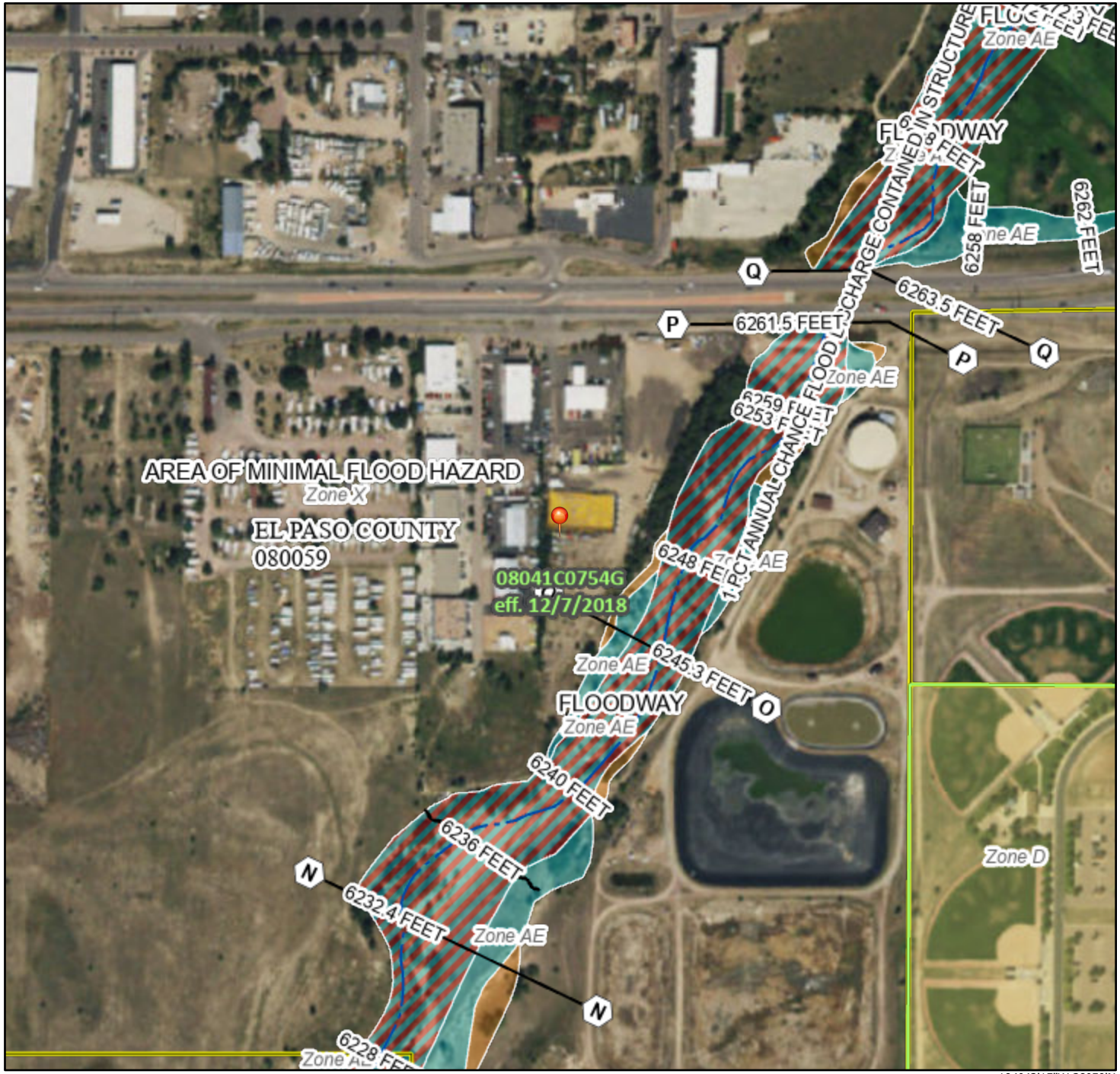
M&S CIVIL CONSULTANTS, INC.

**FIRM PANEL**

# National Flood Hazard Layer FIRMette

FEMA

104°42'52"W 38°50'28"N




104°42'15"W 38°50'N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

*Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020*

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

**SPECIAL FLOOD HAZARD AREAS**
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

**OTHER AREAS OF FLOOD HAZARD**
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

**OTHER AREAS**
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

**GENERAL STRUCTURES**
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**MAP PANELS**
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/16/2022 at 9:02 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

# 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** *(Acres)* | **$C_5$** *From DCM Table 5-1* | **$C_{100}$** *From DCM Table 5-1* | **$C_5$** | **Length** *(ft)* | **Height** *(ft)* | **$T_C$** *(min)* | **Length** *(ft)* | **Slope** *(%)* | **Velocity** *(fps)* | **$T_t$** *(min)* | **TOTAL** *(min)* | **CHECK** *(min)* | **$I_5$** *(in/hr)* | **$I_{100}$** *(in/hr)* | **$Q_5$** *(c.f.s.)* | **$Q_{100}$** *(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 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*** | 0.33 | 0.74 | 0.84 | 0.74 | 50 | 1 | 3.6 | 130 | 0.8% | 1.8 | 1.2 | 5.0 | 11.0 | 5.2 | 8.7 | ***1.3*** | ***2.4*** |
| ***I*** | 0.17 | 0.78 | 0.87 | 0.78 | 50 | 1 | 3.3 | 20 | 1.0% | 2.0 | 0.2 | 5.0 | 10.4 | 5.2 | 8.7 | ***0.7*** | ***1.3*** |
| ***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*** | 0.37 | 0.81 | 0.89 | 0.81 | 50 | 1 | 3.0 | 130 | 0.8% | 1.8 | 1.2 | 5.0 | 11.0 | 5.2 | 8.7 | ***1.5*** | ***2.8*** |
| ***P*** | 0.27 | 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*** | 0.27 | 0.30 | 0.53 | 0.30 | 25 | 4 | 2.9 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 10.1 | 5.2 | 8.7 | ***0.4*** | ***1.3*** |
| ***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*** | 0.54 | 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: 9/8/2022
Checked by: VAS

# *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*** | ***14220.3891*** | 0.33 | 0.26 | 0.90 | 0.96 | 0.00 | 0.73 | 0.81 | 0.06 | 0.08 | 0.35 | ***0.74*** | ***0.84*** |
| ***I*** | ***7232.3461*** | 0.17 | 0.14 | 0.90 | 0.96 | 0.00 | 0.73 | 0.81 | 0.02 | 0.08 | 0.35 | ***0.78*** | ***0.87*** |
| ***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*** | ***15975.1975*** | 0.37 | 0.33 | 0.90 | 0.96 | 0.00 | 0.73 | 0.81 | 0.04 | 0.08 | 0.35 | ***0.81*** | ***0.89*** |
| ***P*** | ***11556.6812*** | 0.27 | 0.00 | 0.90 | 0.96 | 0.00 | 0.73 | 0.81 | 0.27 | 0.12 | 0.39 | ***0.12*** | ***0.39*** |
| ***Q*** | ***11950.3526*** | 0.27 | 0.00 | 0.90 | 0.96 | 0.11 | 0.59 | 0.74 | 0.17 | 0.12 | 0.39 | ***0.30*** | ***0.53*** |
| ***R*** | ***9732.1557*** | 0.22 | 0.00 | 0.90 | 0.96 | 0.005 | 0.59 | 0.74 | 0.218 | 0.08 | 0.35 | ***0.09*** | ***0.36*** |
| ***S*** | ***23352.4001*** | 0.54 | 0.00 | 0.90 | 0.96 | 0.02 | 0.08 | 0.35 | 0.52 | 0.08 | 0.35 | ***0.08*** | ***0.35*** |

# *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 | | | | | | | | | 10.5 | 4.1 | 6.8 | ***6.8*** | ***12.7*** | Mod Triple Denver Type 16 Grate Inlet |
| | | | | Basin B Tc Used | | | | | | | | | | | | | |
| ***2*** | **C** | 1.75 | 1.94 | | | | | | | | | 10.6 | 4.0 | 6.8 | ***7.1*** | ***13.2*** | Mod Triple Denver Type 16 Grate Inlet |
| | | | | Basin C Tc Used | | | | | | | | | | | | | |
| ***3*** | **FB1, F** | 0.64 | 0.92 | | | | | | | | | 10.5 | 4.1 | 6.8 | ***2.6*** | ***6.3*** | Mod Triple Denver Type 16 Grate Inlet |
| | | | | Basin B Tc Used | | | | | | | | | | | | | |
| ***4*** | **FB2, G** | 0.27 | 0.49 | | | | | | | | | 10.6 | 4.0 | 6.8 | ***1.1*** | ***3.3*** | Mod Triple Denver Type 16 Grate Inlet |
| | | | | Basin C Tc Used | | | | | | | | | | | | | |
| ***5*** | **FB3, FB4, E** | 0.84 | 1.21 | | | | | | | | | 6.6 | 4.7 | 8.0 | ***4.0*** | ***9.6*** | Mod Triple Denver Type 16 Grate Inlet |
| | | | | Basin E Tc Used | | | | | | | | | | | | | |
| ***6*** | **D** | 2.09 | 2.39 | | | | | | | | | 14.4 | 3.6 | 6.0 | ***7.5*** | ***14.4*** | CDOT Type D Grate Inlet |
| | | | | Basin D Tc Used | | | | | | | | | | | | | |
| ***7*** | **I** | 0.13 | 0.14 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***0.7*** | ***1.3*** | Nyloplast 24" Grate Inlet |
| | | | | Basin I Tc Used | | | | | | | | | | | | | |
| ***8*** | **H** | 0.24 | 0.28 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***1.3*** | ***2.4*** | Mod Single Denver Type 16 Grate Inlet |
| | | | | Basin H Tc Used | | | | | | | | | | | | | |

# *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 |
| ***9*** | **O** | 0.30 | 0.33 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***1.5*** | ***2.8*** | Nyloplast 24" Grate Inlet |
| | | | | Basin O Tc Used | | | | | | | | | | | | | |
| ***10*** | **N** | 0.24 | 0.26 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***1.2*** | ***2.2*** | Nyloplast 2'X2' Steel Bar Inlet |
| | | | | Basin N Tc Used | | | | | | | | | | | | | |
| ***11*** | **L** | 0.14 | 0.16 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***0.7*** | ***1.4*** | Nyloplast 24" Grate Inlet |
| | | | | Basin L Tc Used | | | | | | | | | | | | | |
| ***12*** | **M** | 0.10 | 0.11 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***0.5*** | ***1.0*** | Nyloplast 24" Grate Inlet |
| | | | | Basin M Tc Used | | | | | | | | | | | | | |
| ***13*** | **Q, PR35, PR38** | 1.52 | 1.74 | | | | | | | | | 5.0 | 5.2 | 8.7 | ***7.9*** | ***15.1*** | FSD POND |
| | | | | Basin Q Tc Used | | | | | | | | | | | | | |
| ***14*** | **A, R** | 2.82 | 4.92 | | | | | | | | | 17.1 | 3.3 | 5.6 | ***9.4*** | ***27.5*** | CDOT Type D Grate Inlet |
| | | | | Basin A Tc Used | | | | | | | | | | | | | |
| ***15*** | **p** | 0.03 | 0.10 | | | | | | | | | 9.6 | 4.2 | 7.0 | ***0.1*** | ***0.7*** | SWALE CONVEYS FLOW TO EAST FORK SAND CREEK |
| | | | | Basin P Tc Used | | | | | | | | | | | | | |
| ***16*** | **S, DP15, PR40, PR41** | | | | | | | | | | | | | | ***28.6*** | ***66.2*** | EAST FORK SAND CREEK |
| | | | | Basin S Tc Used | | | | | | | | | | | | | |

# *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** | | *Flow* | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *$I_5$* | *$I_{100}$* | *$Q_5$* | *$Q_{100}$* |
| *1* | **DP1** | 1.06 | 0.97 | 10.5 | 4.1 | 6.8 | ***4.3*** | ***6.6*** |
| *2* | **PR1, DP2** | 1.47 | 1.44 | 10.6 | 4.0 | 6.8 | ***5.9*** | ***9.8*** |
| *3* | **DP3** | 0.52 | 0.60 | 10.5 | 4.1 | 6.8 | ***2.1*** | ***4.1*** |
| *4* | **PR2, PR3, DP4** | 2.23 | 2.41 | 10.6 | 4.0 | 6.8 | ***9.0*** | ***16.4*** |
| *5* | **PR4, DP5** | 3.08 | 3.62 | 10.6 | 4.0 | 6.8 | ***12.4*** | ***24.6*** |
| *6* | **DP6** | 2.09 | 2.39 | 14.4 | 3.6 | 6.0 | ***7.5*** | ***14.4*** |
| *7* | **PR5, PR6** | 5.17 | 6.01 | 14.4 | 3.6 | 6.0 | ***18.5*** | ***36.2*** |
| *8* | **PR7** | 5.17 | 6.01 | 14.4 | 3.6 | 6.0 | ***18.5*** | ***36.2*** |
| *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*** |
| *13* | **PR12, .06 ACRE BASIN J** | 0.10 | 0.12 | 5.0 | 5.2 | 8.7 | ***0.5*** | ***1.0*** |
| *14* | **.01 ACRE BASIN J** | 0.01 | 0.01 | 5.0 | 5.2 | 8.7 | ***0.0*** | ***0.1*** |
| *15* | **PR13, PR14** | 0.11 | 0.12 | 5.0 | 5.2 | 8.7 | ***0.6*** | ***1.1*** |
| *16* | **.04 ACRE BASIN J** | 0.03 | 0.03 | 5.0 | 5.2 | 8.7 | ***0.1*** | ***0.3*** |
| *17* | **PR15, PR16** | 0.14 | 0.15 | 5.0 | 5.2 | 8.7 | ***0.7*** | ***1.3*** |
| *18* | **.02 ACRE BASIN J** | 0.01 | 0.01 | 5.0 | 5.2 | 8.7 | ***0.1*** | ***0.1*** |

# *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** | | *Flow* | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *$I_5$* | *$I_{100}$* | *$Q_5$* | *$Q_{100}$* |
| ***19*** | **PR17, PR18** | 0.15 | 0.17 | 5.0 | 5.2 | 8.7 | ***0.8*** | ***1.5*** |
| ***20*** | **PR19** | 0.15 | 0.17 | 5.0 | 5.2 | 8.7 | ***0.8*** | ***1.5*** |
| ***21*** | **PR20, DP11** | 0.29 | 0.32 | 5.0 | 5.2 | 8.7 | ***1.5*** | ***2.8*** |
| ***22*** | **PR21, DP12** | 0.39 | 0.44 | 5.0 | 5.2 | 8.7 | ***2.0*** | ***3.8*** |
| ***23*** | **DP7** | 0.13 | 0.14 | 5.0 | 5.2 | 8.7 | ***0.7*** | ***1.3*** |
| ***24*** | **PR23, DP8** | 0.37 | 0.42 | 5.0 | 5.2 | 8.7 | ***1.9*** | ***3.6*** |
| ***25*** | **.03 ACRE BASIN K** | 0.02 | 0.03 | 5.0 | 5.2 | 8.7 | ***0.1*** | ***0.2*** |
| ***26*** | **PR24, PR25** | 0.40 | 0.45 | 5.0 | 5.2 | 8.7 | ***2.0*** | ***3.9*** |
| ***27*** | **.05 ACRE BASIN K** | 0.03 | 0.04 | 5.0 | 5.2 | 8.7 | ***0.2*** | ***0.3*** |
| ***28*** | **PR26, PR27** | 0.43 | 0.48 | 5.0 | 5.2 | 8.7 | ***2.2*** | ***4.2*** |
| ***29*** | **.05 ACRE BASIN K** | 0.03 | 0.04 | 5.0 | 5.2 | 8.7 | ***0.2*** | ***0.3*** |
| ***30*** | **PR28, PR29** | 0.46 | 0.52 | 5.0 | 5.2 | 8.7 | ***2.4*** | ***4.5*** |
| ***31*** | **.05 ACRE BASIN K** | 0.04 | 0.04 | 5.0 | 5.2 | 8.7 | ***0.2*** | ***0.3*** |
| ***32*** | **PR30, PR31** | 0.50 | 0.56 | 5.0 | 5.2 | 8.7 | ***2.6*** | ***4.9*** |
| ***33*** | **.02 ACRE BASIN K** | 0.02 | 0.02 | 5.0 | 5.2 | 8.7 | ***0.1*** | ***0.2*** |
| ***34*** | **PR32, PR33** | 0.51 | 0.58 | 5.0 | 5.2 | 8.7 | ***2.7*** | ***5.0*** |
| ***35*** | **PR22, PR34** | 0.90 | 1.01 | 5.0 | 5.2 | 8.7 | ***4.7*** | ***8.8*** |
| ***36*** | **DP9** | 0.30 | 0.33 | 5.0 | 5.2 | 8.7 | ***1.5*** | ***2.8*** |

# *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** | | *Flow* | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *$I_5$* | *$I_{100}$* | *$Q_5$* | *$Q_{100}$* |
| ***37*** | **PR36, DP10** | 0.54 | 0.58 | 5.0 | 5.2 | 8.7 | ***2.8*** | ***5.1*** |
| ***38*** | **PR37** | 0.54 | 0.58 | 5.0 | 5.2 | 8.7 | ***2.8*** | ***5.1*** |
| ***39*** | **FSD POND RELEASE** | | | | | | ***0.3*** | ***0.3*** |
| ***40*** | **PR8, PR39** | | | | | | ***18.8*** | ***36.5*** |
| ***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: 9/8/2022
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** | 0.33 | 0.74 | 91 | 29.71 |
| **I** | 0.17 | 0.78 | 94 | 15.61 |
| **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** | 0.37 | 0.81 | 95 | 34.84 |
| **Q** | 0.27 | 0.30 | 40 | 10.97 |
| | | | | |
| ***Totals*** | ***2.12*** | | | ***182.79*** |
| ***Imperviousness of WQ Pond 1*** | ***86.3*** | | | |

# Design Procedure Form: Sand Filter (SF)

UD-BMP (Version 3.07, March 2018) 

**Designer:** Darin Moffett
**Company:** M&S Civil Consultants
**Date:** June 3, 2022
**Project:** Clearway No.2, 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): $I_a$ = 85.2 %

B) Tributary Area's Imperviousness Ratio (i = $I_a$/100): i = 0.852

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 = 103,237 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): $V_{WQCV\ USER}$ = 2,222 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): $A_{Min}$ = 1099 sq ft

D) Actual Filter Area: $A_{Actual}$ = 2331 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: $Vol_{12}$ = 2,222 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:** June 3, 2022
**Project:** Clearway No.2, Lot 5 - WireNut
**Location:**

| | |
|---|---|
| 5. Impermeable Geomembrane Liner and Geotextile Separator Fabric<br>A) Is an impermeable liner provided due to proximity of structures or groundwater contamination? | Choose One: ○ YES ◉ NO |
| 6. Inlet / Outlet Works<br>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<br>Flows in excess of the WQCV are conveyed via a retangular slot in the outlet box wa<br>box wall and enter the top of the box and discharge out via an restricted 18rcp |

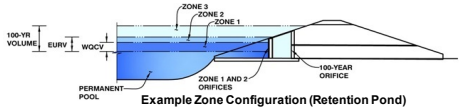
Notes:

# 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 = | 2.12 | acres |
| Watershed Length = | 335 | ft |
| Watershed Length to Centroid = | 165 | ft |
| Watershed Slope = | 0.020 | ft/ft |
| Watershed Imperviousness = | 86.30% | 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) = | 0.246 | 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.) = | 0.211 | acre-feet | 1.52 | inches |
| 10-yr Runoff Volume (P1 = 1.75 in.) = | 0.245 | acre-feet | 1.75 | inches |
| 25-yr Runoff Volume (P1 = 2 in.) = | 0.287 | acre-feet | 2.00 | inches |
| 50-yr Runoff Volume (P1 = 2.25 in.) = | 0.328 | acre-feet | 2.25 | inches |
| 100-yr Runoff Volume (P1 = 2.52 in.) = | 0.375 | acre-feet | 2.52 | inches |
| 500-yr Runoff Volume (P1 = 3.14 in.) = | 0.480 | acre-feet | | inches |
| Approximate 2-yr Detention Volume = | 0.162 | acre-feet | | |
| Approximate 5-yr Detention Volume = | 0.213 | acre-feet | | |
| Approximate 10-yr Detention Volume = | 0.250 | acre-feet | | |
| Approximate 25-yr Detention Volume = | 0.295 | acre-feet | | |
| Approximate 50-yr Detention Volume = | 0.322 | acre-feet | | |
| Approximate 100-yr Detention Volume = | 0.345 | acre-feet | | |

## Define Zones and Basin Geometry

| | | |
|---|---|---|
| Zone 1 Volume (WQCV) = | 0.053 | acre-feet |
| Zone 2 Volume (EURV - Zone 1) = | 0.193 | acre-feet |
| Zone 3 Volume (100-year - Zones 1 & 2) = | 0.100 | acre-feet |
| Total Detention Basin Volume = | 0.345 | 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

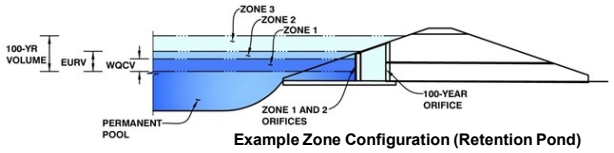
| Stage - Storage Description | Stage (ft) | Optional Override Stage (ft) | Length (ft) | Width (ft) | Area ($ft^2$) | Optional Override Area ($ft^2$) | Area (acre) | Volume ($ft^3$) | Volume (ac-ft) |
|---|---|---|---|---|---|---|---|---|---|
| **Media Surface** | -- | 0.00 | -- | -- | -- | 2,300 | 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 |

# 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 | 0.193 | Rectangular Orifice |
| Zone 3 (100-year) | 3.40 | 0.100 | Weir&Pipe (Restrict) |
| Total (all zones) | | 0.345 | |

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 | | | Calculated Parameters for Vertical Orif | |
|---|---|---|---|---|---|---|
| | | | | | 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 | | | |

A 2"x2" orifice is identified in the CD. revise accordingly so that they are consistent with each other

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 | | | Calculated Parameters for Overflow W | |
|---|---|---|---|---|---|---|
| | | | | | 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 | % | | | |

orifice plate detail revised

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

| | Zone 3 Restrictor | Not Selected | | | Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla | |
|---|---|---|---|---|---|---|
| | | | | | 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 |

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

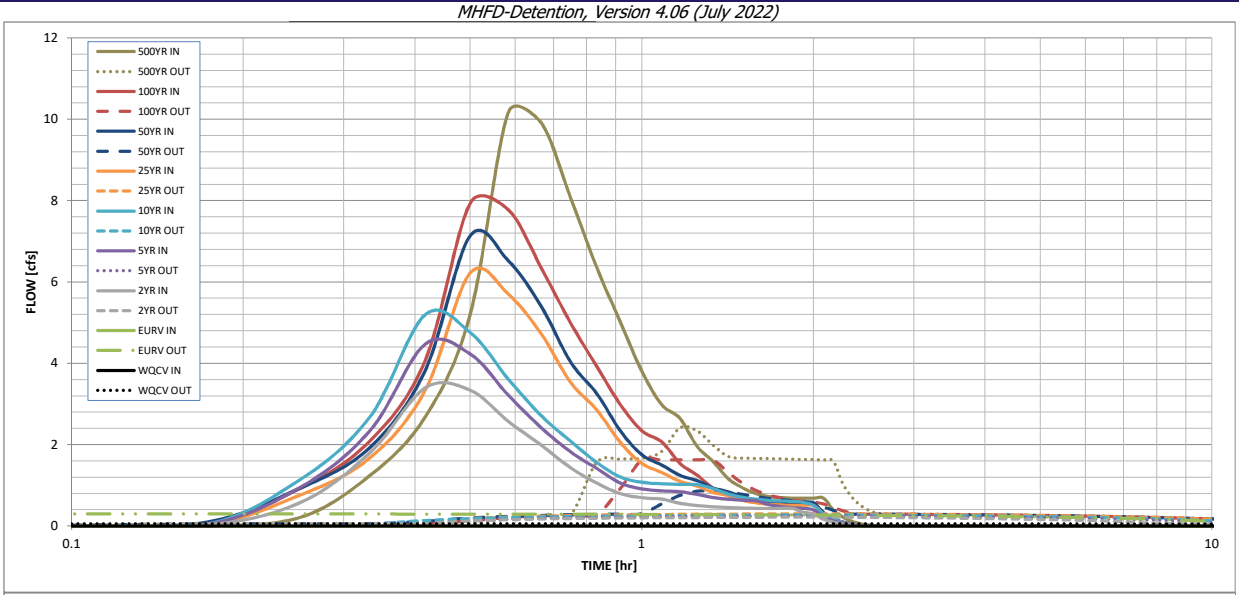
Routed Hydrograph Results

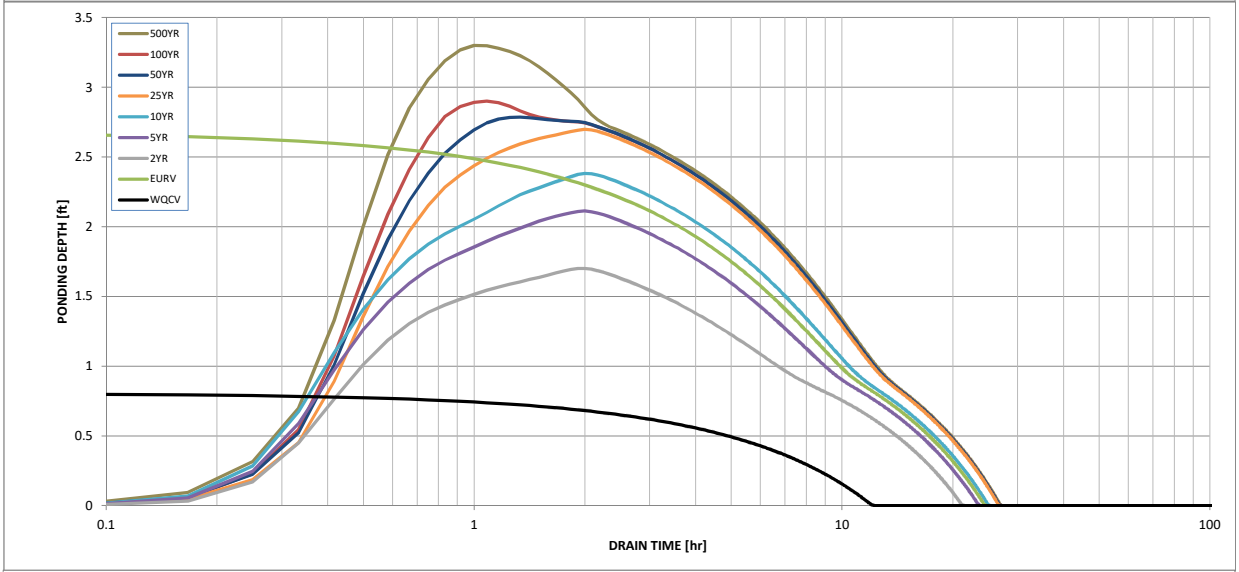
*The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AI*

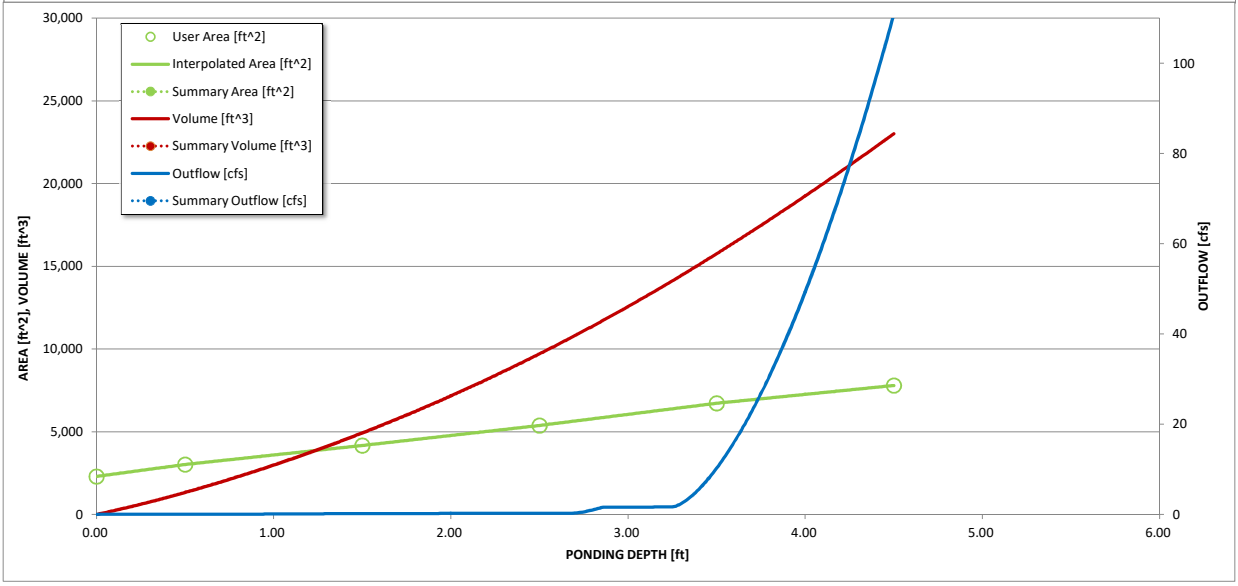
| Design Storm Return Period = | WQCV | EURV | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year |
|---|---|---|---|---|---|---|---|---|
| One-Hour Rainfall Depth (in) = | N/A | N/A | 1.19 | 1.52 | 1.75 | 2.00 | 2.25 | 2.52 |
| CUHP Runoff Volume (acre-ft) = | 0.053 | 0.246 | 0.161 | 0.211 | 0.245 | 0.287 | 0.328 | 0.375 |
| Inflow Hydrograph Volume (acre-ft) = | N/A | N/A | 0.161 | 0.211 | 0.245 | 0.287 | 0.328 | 0.375 |
| 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 | 0.45 | 0.74 |
| Peak Inflow Q (cfs) = | N/A | N/A | 3.4 | 4.5 | 5.2 | 6.2 | 7.1 | 7.9 |
| 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 | 6.0 | 4.9 | 0.6 | 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 | N/A | 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 | 24 | 26 | 26 | 26 |
| Maximum Ponding Depth (ft) = | 0.81 | 2.69 | 1.70 | 2.11 | 2.38 | 2.70 | 2.78 | 2.90 |
| 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 | 0.247 | 0.133 | 0.177 | 0.208 | 0.247 | 0.259 | 0.275 |

# 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 | 0.55 | 0.92 | 1.11 | 0.75 | 0.91 | 0.91 | 1.24 |
| | 0:20:00 | 0.00 | 0.00 | 1.80 | 2.34 | 2.68 | 1.67 | 1.93 | 2.09 | 2.67 |
| | 0:25:00 | 0.00 | 0.00 | 3.39 | 4.47 | 5.19 | 3.33 | 3.82 | 4.06 | 5.20 |
| | 0:30:00 | 0.00 | 0.00 | 3.34 | 4.23 | 4.76 | 6.22 | 7.13 | 7.94 | 10.17 |
| | 0:35:00 | 0.00 | 0.00 | 2.57 | 3.21 | 3.61 | 5.70 | 6.52 | 7.77 | 9.90 |
| | 0:40:00 | 0.00 | 0.00 | 1.98 | 2.41 | 2.71 | 4.71 | 5.39 | 6.34 | 8.07 |
| | 0:45:00 | 0.00 | 0.00 | 1.43 | 1.82 | 2.08 | 3.53 | 4.03 | 4.98 | 6.36 |
| | 0:50:00 | 0.00 | 0.00 | 1.05 | 1.41 | 1.56 | 2.86 | 3.26 | 3.92 | 5.02 |
| | 0:55:00 | 0.00 | 0.00 | 0.79 | 1.05 | 1.20 | 2.06 | 2.34 | 2.98 | 3.80 |
| | 1:00:00 | 0.00 | 0.00 | 0.69 | 0.91 | 1.07 | 1.54 | 1.75 | 2.34 | 2.98 |
| | 1:05:00 | 0.00 | 0.00 | 0.66 | 0.86 | 1.04 | 1.32 | 1.50 | 2.07 | 2.64 |
| | 1:10:00 | 0.00 | 0.00 | 0.55 | 0.84 | 1.02 | 1.10 | 1.24 | 1.54 | 1.96 |
| | 1:15:00 | 0.00 | 0.00 | 0.50 | 0.77 | 1.02 | 0.98 | 1.11 | 1.25 | 1.58 |
| | 1:20:00 | 0.00 | 0.00 | 0.47 | 0.70 | 0.92 | 0.83 | 0.93 | 0.92 | 1.17 |
| | 1:25:00 | 0.00 | 0.00 | 0.45 | 0.66 | 0.78 | 0.75 | 0.84 | 0.75 | 0.94 |
| | 1:30:00 | 0.00 | 0.00 | 0.44 | 0.63 | 0.70 | 0.64 | 0.71 | 0.64 | 0.80 |
| | 1:35:00 | 0.00 | 0.00 | 0.43 | 0.62 | 0.65 | 0.57 | 0.64 | 0.58 | 0.72 |
| | 1:40:00 | 0.00 | 0.00 | 0.43 | 0.53 | 0.62 | 0.54 | 0.61 | 0.56 | 0.70 |
| | 1:45:00 | 0.00 | 0.00 | 0.43 | 0.48 | 0.61 | 0.52 | 0.58 | 0.55 | 0.68 |
| | 1:50:00 | 0.00 | 0.00 | 0.43 | 0.45 | 0.60 | 0.51 | 0.58 | 0.55 | 0.68 |
| | 1:55:00 | 0.00 | 0.00 | 0.34 | 0.43 | 0.58 | 0.51 | 0.57 | 0.55 | 0.68 |
| | 2:00:00 | 0.00 | 0.00 | 0.29 | 0.39 | 0.51 | 0.51 | 0.57 | 0.55 | 0.68 |
| | 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 | 0.18 | 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) | Denver No. 16 Valley Grate | CDOT Type D (In Series & Depressed) |

**USER-DEFINED INPUT**

**User-Defined Design Flows**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minor $Q_{known}$ (cfs) | 6.8 | 7.1 | 2.6 | 2.7 | 4.5 | 7.5 | 1.3 | 9.4 |
| Major $Q_{known}$ (cfs) | 12.7 | 13.2 | 6.3 | 6.7 | 11.5 | 14.4 | 2.4 | 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**

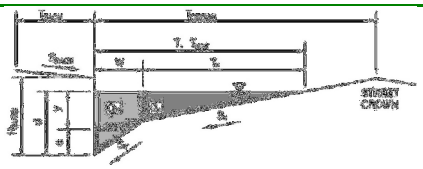
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Minor Total Design Peak Flow, Q (cfs)** | **6.8** | **7.1** | **2.6** | **2.7** | **4.5** | **7.5** | **1.3** | **9.4** |
| **Major Total Design Peak Flow, Q (cfs)** | **12.7** | **13.2** | **6.3** | **6.7** | **11.5** | **14.4** | **2.4** | **27.5** |
| Minor Flow Bypassed Downstream, $Q_b$ (cfs) | 2.5 | 2.6 | 0.5 | 0.5 | N/A | 0.0 | N/A | 0.0 |
| Major Flow Bypassed Downstream, $Q_b$ (cfs) | 6.1 | 6.4 | 2.2 | 2.4 | 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 = | 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 | $S_O$ = | 0.020 | ft/ft |
| Manning's Roughness for Street Section (typically between 0.012 and 0.020) | $n_{STREET}$ = | 0.015 | |

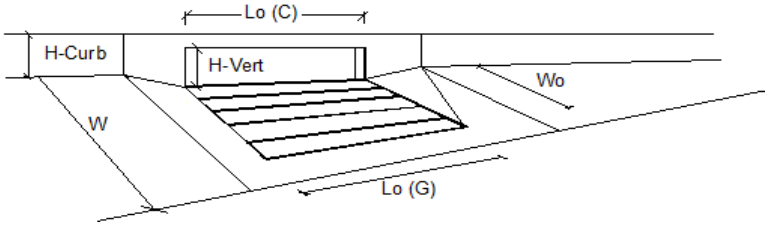
| | | Minor Storm | Major Storm | |
|---|---|---|---|---|
| Max. Allowable Spread for Minor & Major Storm | $T_{MAX}$ = | 14.8 | 15.3 | ft |
| Max. Allowable Depth at Gutter Flowline for Minor & Major Storm | $d_{MAX}$ = | 4.7 | 6.0 | inches |
| Allow Flow Depth at Street Crown (check box for yes, leave 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 | **$Q_{allow}$ =** | **7.2** | **14.0** | **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)*



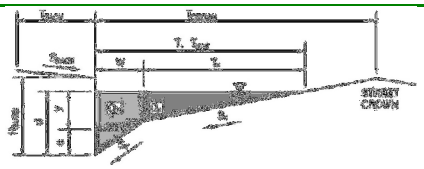

| | | | | | |
|---|---|---|---|---|---|
| | Design Information (Input) | Denver No. 16 Valley Grate | MINOR | MAJOR | |
| | Type of Inlet | Type = | Denver No. 16 Valley Grate | | |
| | Local Depression (additional to continuous gutter depression 'a') | $a_{LOCAL}$ = | 2.0 | 2.0 | inches |
| | Total 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) | $L_o$ = | 10.92 | 10.92 | ft |
| **Warning 1** | Width of a Unit Grate (cannot be greater than W, Gutter Width) | $W_o$ = | 2.50 | 2.50 | 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*) | $Q_o$ = | 6.8 | 12.7 | cfs |
| | Water Spread Width | T = | 10.7 | 14.2 | ft |
| | Water Depth at Flowline (outside of local depression) | d = | 4.6 | 5.5 | inches |
| | Water Depth at Street Crown (or at $T_{MAX}$) | $d_{CROWN}$ = | 0.0 | 0.0 | inches |
| | Ratio of Gutter Flow to Design Flow | $E_o$ = | 0.643 | 0.507 | |
| | Discharge outside the Gutter Section W, carried in Section $T_x$ | $Q_x$ = | 2.4 | 6.3 | cfs |
| | Discharge within the Gutter Section W | $Q_w$ = | 4.4 | 6.4 | cfs |
| | Discharge Behind the Curb Face | $Q_{BACK}$ = | 0.0 | 0.0 | cfs |
| | Flow Area within the Gutter Section W | $A_W$ = | 0.71 | 0.89 | sq ft |
| | Velocity within the Gutter Section W | $V_W$ = | 6.2 | 7.2 | fps |
| | Water Depth for Design Condition | $d_{LOCAL}$ = | 6.6 | 7.5 | inches |
| | Grate Analysis (Calculated) | | MINOR | MAJOR | |
| | Total Length of Inlet Grate Opening | L = | 10.92 | 10.92 | ft |
| | Ratio of Grate Flow to Design Flow | $E_{o\text{-}GRATE}$ = | 0.642 | 0.507 | |
| | Under No-Clogging Condition | | MINOR | MAJOR | |
| | Minimum Velocity Where Grate Splash-Over Begins | $V_o$ = | 3.98 | 3.98 | fps |
| | Interception Rate of Frontal Flow | $R_f$ = | 0.93 | 0.88 | |
| | Interception Rate of Side Flow | $R_x$ = | 0.68 | 0.63 | |
| | Interception Capacity | $Q_i$ = | 5.7 | 9.6 | 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 | $L_e$ = | 5.46 | 5.46 | ft |
| | Minimum Velocity Where Grate Splash-Over Begins | $V_o$ = | 2.73 | 2.73 | fps |
| | Interception Rate of Frontal Flow | $R_f$ = | 0.82 | 0.76 | |
| | Interception Rate of Side Flow | $R_x$ = | 0.30 | 0.26 | |
| | Actual Interception Capacity | **$Q_a$ =** | **4.3** | **6.6** | **cfs** |
| | Carry-Over Flow = $Q_o$-$Q_a$ (to be applied to curb opening or next d/s inlet) | **$Q_b$ =** | **2.5** | **6.1** | **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** | **6.6** | **cfs** |
| | Total Inlet Carry-Over Flow (flow bypassing inlet) | **$Q_b$ =** | **2.5** | **6.1** | **cfs** |
| | Capture Percentage = $Q_a$/$Q_o$ = | **C% =** | **64** | **52** | **%** |

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

# 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 = | 2.50 | 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 | |

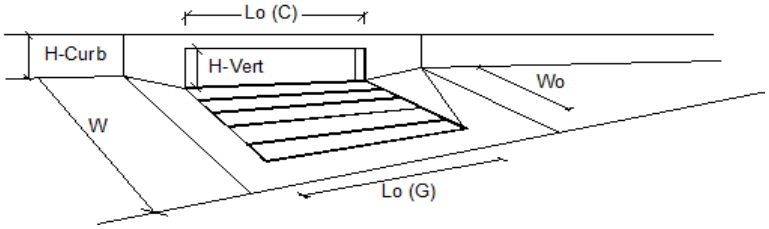
| | | Minor Storm | Major Storm | |
|---|---|---|---|---|
| Max. Allowable Spread for Minor & Major Storm | $T_{MAX}$ = | 14.8 | 15.3 | ft |
| Max. Allowable Depth at Gutter Flowline for Minor & Major Storm | $d_{MAX}$ = | 4.8 | 6.0 | inches |
| Allow Flow Depth at Street Crown (check box for yes, leave 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 | **$Q_{allow}$ =** | **7.5** | **13.4** | **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)*



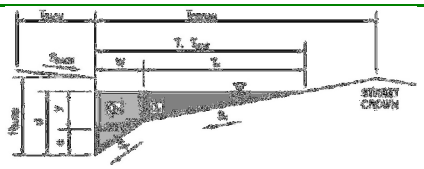

| | | | | | |
|---|---|---|---|---|---|
| | Design Information (Input) | Denver No. 16 Valley Grate | | MINOR | MAJOR | |
| | Type of Inlet | | Type = | Denver No. 16 Valley Grate | | |
| | Local Depression (additional to continuous gutter depression 'a') | | $a_{LOCAL}$ = | 2.0 | 2.0 | inches |
| | 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) | | $L_o$ = | 10.92 | 10.92 | ft |
| **Warning 1** | Width of a Unit Grate (cannot be greater than W, Gutter Width) | | $W_o$ = | 2.50 | 2.50 | 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*) | | $Q_o$ = | 7.1 | 13.2 | cfs |
| | Water Spread Width | | T = | 10.4 | 13.7 | ft |
| | Water Depth at Flowline (outside of local depression) | | d = | 4.7 | 5.7 | inches |
| | Water Depth at Street Crown (or at $T_{MAX}$) | | $d_{CROWN}$ = | 0.0 | 0.0 | inches |
| | Ratio of Gutter Flow to Design Flow | | $E_o$ = | 0.645 | 0.512 | |
| | Discharge outside the Gutter Section W, carried in Section $T_x$ | | $Q_x$ = | 2.5 | 6.4 | cfs |
| | Discharge within the Gutter Section W | | $Q_w$ = | 4.6 | 6.8 | cfs |
| | Discharge Behind the Curb Face | | $Q_{BACK}$ = | 0.0 | 0.0 | cfs |
| | Flow Area within the Gutter Section W | | $A_W$ = | 0.73 | 0.92 | sq ft |
| | Velocity within the Gutter Section W | | $V_W$ = | 6.3 | 7.3 | fps |
| | Water Depth for Design Condition | | $d_{LOCAL}$ = | 6.7 | 7.7 | inches |
| | Grate Analysis (Calculated) | | | MINOR | MAJOR | |
| | Total Length of Inlet Grate Opening | | L = | 10.92 | 10.92 | ft |
| | Ratio of Grate Flow to Design Flow | | $E_{o\text{-}GRATE}$ = | 0.645 | 0.512 | |
| | Under No-Clogging Condition | | | MINOR | MAJOR | |
| | Minimum Velocity Where Grate Splash-Over Begins | | $V_o$ = | 3.98 | 3.98 | fps |
| | Interception Rate of Frontal Flow | | $R_f$ = | 0.92 | 0.86 | |
| | Interception Rate of Side Flow | | $R_x$ = | 0.69 | 0.64 | |
| | Interception Capacity | | $Q_i$ = | 6.0 | 10.0 | 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 | | $L_e$ = | 5.46 | 5.46 | ft |
| | Minimum Velocity Where Grate Splash-Over Begins | | $V_o$ = | 2.73 | 2.73 | fps |
| | Interception Rate of Frontal Flow | | $R_f$ = | 0.81 | 0.75 | |
| | Interception Rate of Side Flow | | $R_x$ = | 0.31 | 0.27 | |
| | Actual Interception Capacity | | **$Q_a$ =** | **4.5** | **6.8** | **cfs** |
| | Carry-Over Flow = $Q_o$-$Q_a$ (to be applied to curb opening or next d/s inlet) | | **$Q_b$ =** | **2.6** | **6.4** | **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 =** | **4.5** | **6.8** | **cfs** |
| | Total Inlet Carry-Over Flow (flow bypassing inlet) | | **$Q_b$ =** | **2.6** | **6.4** | **cfs** |
| | Capture Percentage = $Q_a$/$Q_o$ = | | **C% =** | **63** | **52** | **%** |

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

# 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 = | 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 | $S_O$ = | 0.020 | ft/ft |
| Manning's Roughness for Street Section (typically between 0.012 and 0.020) | $n_{STREET}$ = | 0.015 | |

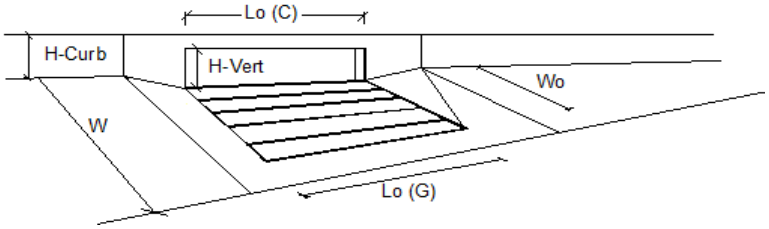
| | | Minor Storm | Major Storm | |
|---|---|---|---|---|
| Max. Allowable Spread for Minor & Major Storm | $T_{MAX}$ = | 14.8 | 15.3 | ft |
| Max. Allowable Depth at Gutter Flowline for Minor & Major Storm | $d_{MAX}$ = | 4.1 | 6.0 | inches |
| Allow Flow Depth at Street Crown (check box for yes, leave 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 | **$Q_{allow}$ =** | **4.5** | **14.0** | **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)*



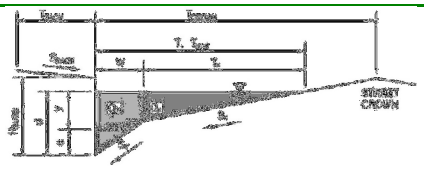

| | | | | | |
|---|---|---|---|---|---|
| | Design Information (Input) | Denver No. 16 Valley Grate | | MINOR | MAJOR | |
| | Type of Inlet | | Type = | Denver No. 16 Valley Grate | | |
| | Local Depression (additional to continuous gutter depression 'a') | | $a_{LOCAL}$ = | 2.0 | 2.0 | inches |
| | 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) | | $L_o$ = | 10.92 | 10.92 | ft |
| **Warning 1** | Width of a Unit Grate (cannot be greater than W, Gutter Width) | | $W_o$ = | 2.50 | 2.50 | 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 | 6.3 | cfs |
| | Water Spread Width | | T = | 6.3 | 10.3 | ft |
| | Water Depth at Flowline (outside of local depression) | | d = | 3.5 | 4.5 | inches |
| | Water Depth at Street Crown (or at $T_{MAX}$) | | $d_{CROWN}$ = | 0.0 | 0.0 | inches |
| | Ratio of Gutter Flow to Design Flow | | $E_o$ = | 0.877 | 0.661 | |
| | Discharge outside the Gutter Section W, carried in Section $T_x$ | | $Q_x$ = | 0.3 | 2.1 | cfs |
| | Discharge within the Gutter Section W | | $Q_w$ = | 2.3 | 4.2 | cfs |
| | Discharge Behind the Curb Face | | $Q_{BACK}$ = | 0.0 | 0.0 | cfs |
| | Flow Area within the Gutter Section W | | $A_W$ = | 0.47 | 0.68 | sq ft |
| | Velocity within the Gutter Section W | | $V_W$ = | 4.9 | 6.1 | fps |
| | Water Depth for Design Condition | | $d_{LOCAL}$ = | 5.5 | 6.5 | inches |
| | Grate Analysis (Calculated) | | | MINOR | MAJOR | |
| | Total Length of Inlet Grate Opening | | L = | 10.92 | 10.92 | ft |
| | Ratio of Grate Flow to Design Flow | | $E_{o\text{-}GRATE}$ = | 0.876 | 0.661 | |
| | Under No-Clogging Condition | | | MINOR | MAJOR | |
| | Minimum Velocity Where Grate Splash-Over Begins | | $V_o$ = | 3.98 | 3.98 | fps |
| | Interception Rate of Frontal Flow | | $R_f$ = | 0.99 | 0.94 | |
| | Interception Rate of Side Flow | | $R_x$ = | 0.73 | 0.69 | |
| | Interception Capacity | | $Q_i$ = | 2.5 | 5.4 | 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 | | $L_e$ = | 5.46 | 5.46 | ft |
| | Minimum Velocity Where Grate Splash-Over Begins | | $V_o$ = | 2.73 | 2.73 | fps |
| | Interception Rate of Frontal Flow | | $R_f$ = | 0.87 | 0.82 | |
| | Interception Rate of Side Flow | | $R_x$ = | 0.36 | 0.31 | |
| | 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** | **2.2** | **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 =** | **2.1** | **4.1** | **cfs** |
| | Total Inlet Carry-Over Flow (flow bypassing inlet) | | **$Q_b$ =** | **0.5** | **2.2** | **cfs** |
| | Capture Percentage = $Q_a$/$Q_o$ = | | **C% =** | **81** | **65** | **%** |

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

# 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 = | 2.50 | 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 | |

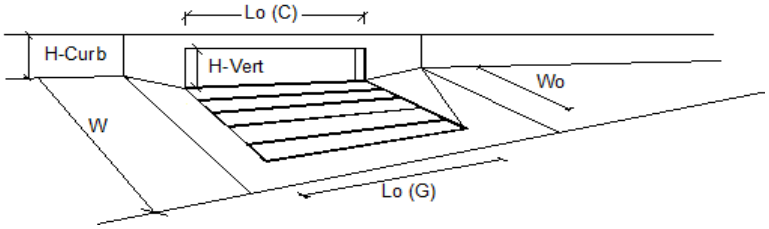
| | | Minor Storm | Major Storm | |
|---|---|---|---|---|
| Max. Allowable Spread for Minor & Major Storm | $T_{MAX}$ = | 14.8 | 15.3 | ft |
| Max. Allowable Depth at Gutter Flowline for Minor & Major Storm | $d_{MAX}$ = | 4.1 | 6.0 | inches |
| Allow Flow Depth at Street Crown (check box for yes, leave 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 | **$Q_{allow}$ =** | **4.4** | **13.4** | **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)*




| | | | MINOR | MAJOR | |
|---|---|---|---|---|---|
| | Design Information (Input) | | | | |
| | Type of Inlet | Type = | Denver No. 16 Valley Grate | | |
| | Local Depression (additional to continuous gutter depression 'a') | $a_{LOCAL}$ = | 2.0 | 2.0 | 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) | $L_o$ = | 10.92 | 10.92 | ft |
| **Warning 1** | Width of a Unit Grate (cannot be greater than W, Gutter Width) | $W_o$ = | 2.50 | 2.50 | 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*) | $Q_o$ = | 2.7 | 6.7 | cfs |
| | Water Spread Width | T = | 6.2 | 10.1 | 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 | $E_o$ = | 0.876 | 0.658 | |
| | Discharge outside the Gutter Section W, carried in Section $T_x$ | $Q_x$ = | 0.3 | 2.3 | cfs |
| | Discharge within the Gutter Section W | $Q_w$ = | 2.4 | 4.4 | cfs |
| | Discharge Behind the Curb Face | $Q_{BACK}$ = | 0.0 | 0.0 | cfs |
| | Flow Area within the Gutter Section W | $A_W$ = | 0.48 | 0.71 | sq ft |
| | Velocity within the Gutter Section W | $V_W$ = | 4.9 | 6.2 | fps |
| | Water Depth for Design Condition | $d_{LOCAL}$ = | 5.6 | 6.7 | inches |
| | Grate Analysis (Calculated) | | MINOR | MAJOR | |
| | Total Length of Inlet Grate Opening | L = | 10.92 | 10.92 | ft |
| | Ratio of Grate Flow to Design Flow | $E_{o\text{-}GRATE}$ = | 0.874 | 0.658 | |
| | Under No-Clogging Condition | | MINOR | MAJOR | |
| | Minimum Velocity Where Grate Splash-Over Begins | $V_o$ = | 3.98 | 3.98 | fps |
| | Interception Rate of Frontal Flow | $R_f$ = | 0.98 | 0.92 | |
| | Interception Rate of Side Flow | $R_x$ = | 0.74 | 0.69 | |
| | Interception Capacity | $Q_i$ = | 2.6 | 5.7 | 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 | $L_e$ = | 5.46 | 5.46 | ft |
| | Minimum Velocity Where Grate Splash-Over Begins | $V_o$ = | 2.73 | 2.73 | fps |
| | Interception Rate of Frontal Flow | $R_f$ = | 0.87 | 0.81 | |
| | Interception Rate of Side Flow | $R_x$ = | 0.37 | 0.32 | |
| | 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) | **$Q_b$ =** | **0.5** | **2.4** | **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) | **$Q_b$ =** | **0.5** | **2.4** | **cfs** |
| | Capture Percentage = $Q_a$/$Q_o$ = | **C% =** | **81** | **64** | **%** |

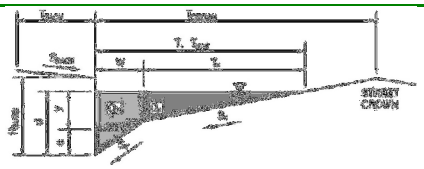
**Warning 1: Dimension entered is not a typical dimension for inlet type specified.**

*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 5**



Gutter Geometry:

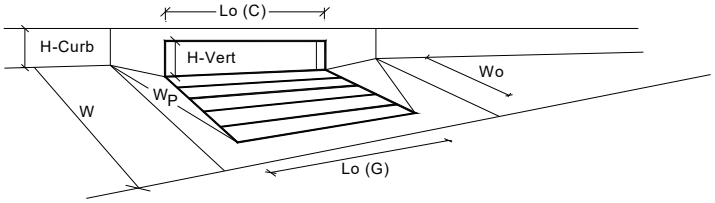
| | | | |
|---|---|---|---|
| Maximum Allowable Width for Spread Behind Curb | $T_{BACK}$ = | 10.0 | ft |
| Side Slope Behind Curb (leave blank for no conveyance credit behind curb) | $S_{BACK}$ = | 0.020 | ft/ft |
| Manning's Roughness Behind Curb (typically between 0.012 and 0.020) | $n_{BACK}$ = | 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 |
| Gutter Width | W = | 2.50 | 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)*




| Design Information (Input) | | MINOR | MAJOR | |
|---|---|---|---|---|
| Type of Inlet | Type = | Denver No. 16 Combination | | |
| Local Depression (additional to continuous gutter depression 'a' from above) | $a_{local}$ = | 2.00 | 2.00 | inches |
| Number of Unit Inlets (Grate or Curb Opening) | No = | 3 | 3 | |
| Water Depth at Flowline (outside of local depression) | Ponding Depth = | 6.0 | 8.0 | inches |
| **Grate Information** | | MINOR | MAJOR | ☑ Override Depths |
| Length of a Unit Grate | $L_o$ (G) = | 3.00 | 3.00 | feet |
| Width of a Unit Grate | $W_o$ = | 1.73 | 1.73 | 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 |
| 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 | |

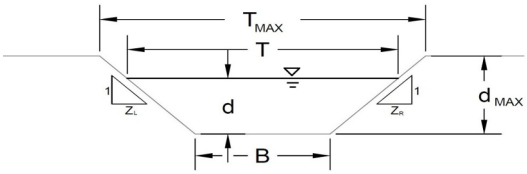
| Low Head Performance Reduction (Calculated) | | MINOR | MAJOR | |
|---|---|---|---|---|
| Depth for Grate Midwidth | $d_{Grate}$ = | 0.536 | 0.704 | ft |
| Depth for Curb Opening Weir Equation | $d_{Curb}$ = | 0.29 | 0.46 | ft |
| Combination Inlet Performance Reduction Factor for Long Inlets | $RF_{Combination}$ = | 0.57 | 0.75 | |
| Curb Opening Performance Reduction Factor for Long Inlets | $RF_{Curb}$ = | 0.97 | 1.00 | |
| Grated Inlet Performance Reduction Factor for Long Inlets | $RF_{Grate}$ = | 0.57 | 0.75 | |

| | | MINOR | MAJOR | |
|---|---|---|---|---|
| Total Inlet Interception Capacity (assumes clogged condition) | **$Q_a$ =** | **7.2** | **16.0** | **cfs** |
| **Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)** | $Q_{PEAK\ REQUIRED}$ = | 4.5 | 11.5 | cfs |

# 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

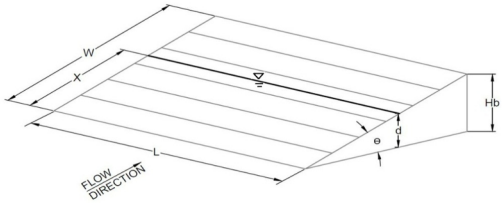
**WireNut**

**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.**

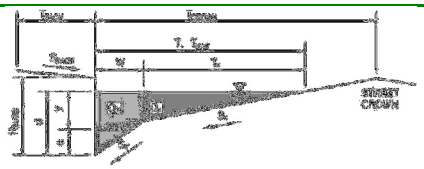
*MHFD-Inlet, Version 5.01 (April 2021)*

# 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:

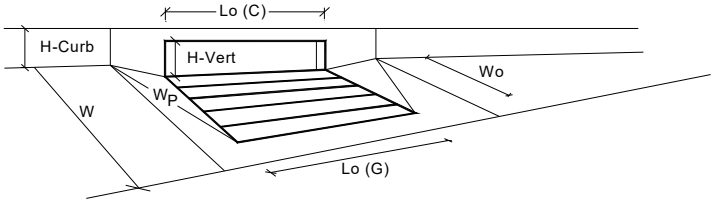
| | | | |
|---|---|---|---|
| Maximum Allowable Width for Spread Behind Curb | $T_{BACK}$ = | 5.0 | ft |
| Side Slope Behind Curb (leave blank for no conveyance credit behind curb) | $S_{BACK}$ = | 0.020 | ft/ft |
| Manning's Roughness Behind Curb (typically between 0.012 and 0.020) | $n_{BACK}$ = | 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 | 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)*



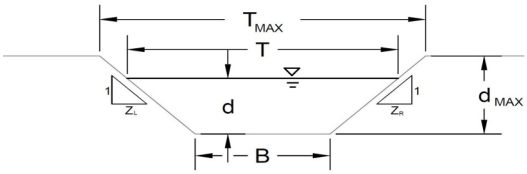

| | | | MINOR | MAJOR | |
|---|---|---|---|---|---|
| **Design Information (Input)** | Denver No. 16 Valley Grate | | | | |
| Type of Inlet | | Type = | Denver No. 16 Valley Grate | | |
| Local Depression (additional to continuous gutter depression 'a' from above) | | $a_{local}$ = | 2.00 | 2.00 | inches |
| Number of Unit Inlets (Grate or Curb Opening) | | No = | 1 | 1 | |
| Water Depth at Flowline (outside of local depression) | | Ponding Depth = | 4.2 | 5.9 | inches |
| **Grate Information** | | | MINOR | MAJOR | ☐ Override Depths |
| Length of a Unit Grate | | $L_o$ (G) = | 3.64 | 3.64 | feet |
| **Warning 1** Width of a Unit Grate | | $W_o$ = | 2.50 | 2.50 | 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) = | N/A | N/A | feet |
| Height of Vertical Curb Opening in Inches | | $H_{vert}$ = | N/A | N/A | inches |
| Height of Curb Orifice Throat in Inches | | $H_{throat}$ = | N/A | N/A | inches |
| Angle of Throat (see USDCM Figure ST-5) | | Theta = | N/A | N/A | degrees |
| Side Width for Depression Pan (typically the gutter width of 2 feet) | | $W_p$ = | N/A | N/A | feet |
| Clogging Factor for a Single Curb Opening (typical value 0.10) | | $C_f$ (C) = | N/A | N/A | |
| Curb Opening Weir Coefficient (typical value 2.3-3.7) | | $C_w$ (C) = | N/A | N/A | |
| Curb Opening Orifice Coefficient (typical value 0.60 - 0.70) | | $C_o$ (C) = | N/A | N/A | |
| **Low Head Performance Reduction (Calculated)** | | | MINOR | MAJOR | |
| Depth for Grate Midwidth | | $d_{Grate}$ = | 0.330 | 0.469 | ft |
| Depth for Curb Opening Weir Equation | | $d_{Curb}$ = | N/A | N/A | ft |
| Combination Inlet Performance Reduction Factor for Long Inlets | | $RF_{Combination}$ = | N/A | N/A | |
| Curb Opening Performance Reduction Factor for Long Inlets | | $RF_{Curb}$ = | N/A | N/A | |
| Grated Inlet Performance Reduction Factor for Long Inlets | | $RF_{Grate}$ = | 0.61 | 0.86 | |
| | | | MINOR | MAJOR | |
| Total Inlet Interception Capacity (assumes clogged condition) | | **$Q_a$ =** | **1.3** | **3.1** | **cfs** |
| **Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)** | | $Q_{PEAK\ REQUIRED}$ = | 1.3 | 2.4 | cfs |

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

# 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'**

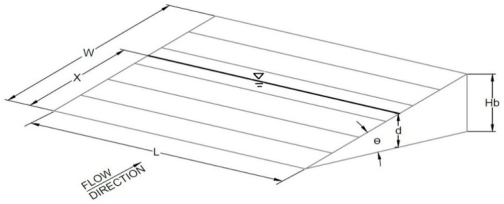
# AREA INLET IN A SWALE

**WireNut**

**Inlet 14**

Inlet Design Information (Input)

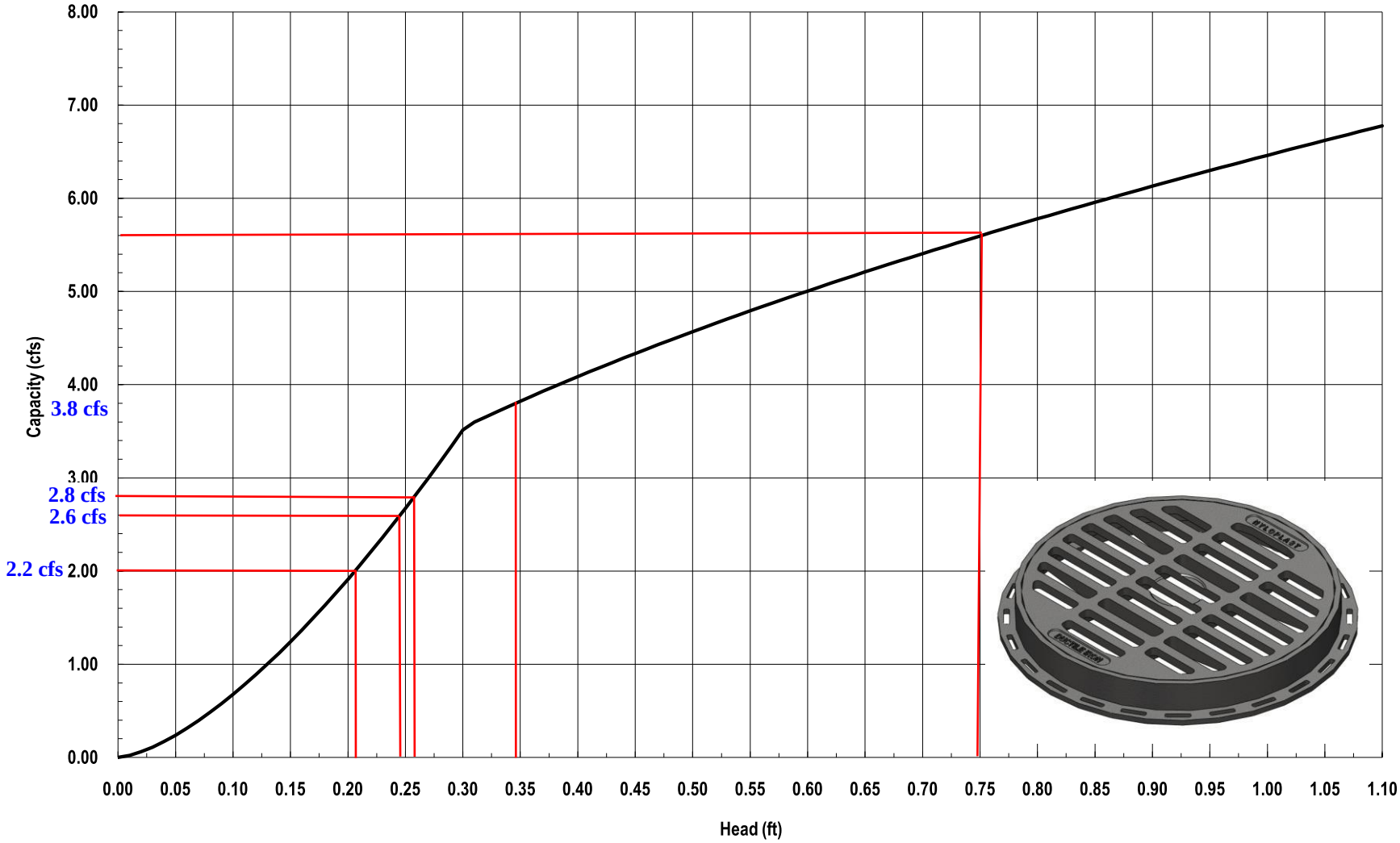
Type of Inlet: CDOT Type D (In Series & Depressed) — Inlet Type = CDOT Type D (In Series & Depressed)




| | | | |
|---|---|---|---|
| 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** | **%** |

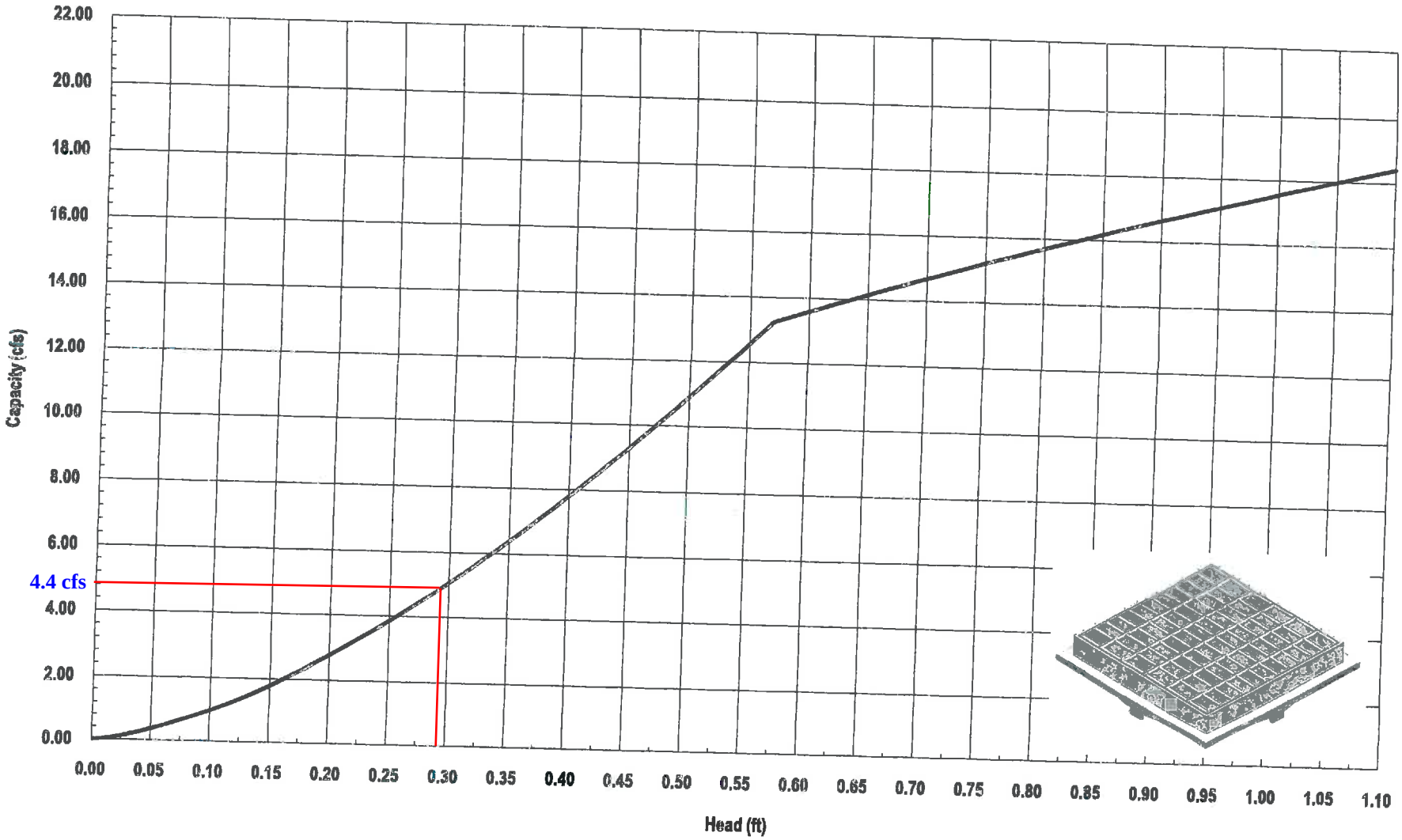
# Nyloplast 24" Standard Grate Inlet Capacity Chart




**DP7= $Q_{100}$=1.3 cfs 50% BLOCKAGE = 2.6 cfs**
**DP9= Q100=2.8 cfs 50% BLOCKAGE = 5.6 cfs**
**DP11=Q100=1.4 cfs 50% BLOCKAGE = 2.8 cfs**
**DP12=Q100=1.0 cfs 50% BLOCKAGE = 2.0 cfs**

Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

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

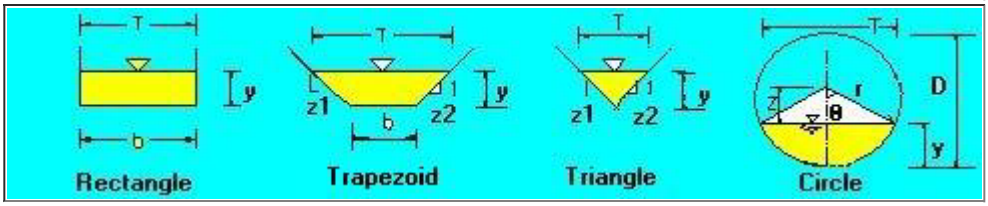



**DP10= $Q_{100}$=2.2 cfs 50% BLOCKAGE = 4.4 cfs**

Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

# 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**

# 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 | 15.10 cfs |

| Results | |
|---|---|
| Normal Depth | 1.1 in |
| Flow Area | 2.2 ft² |
| Wetted Perimeter | 24.7 ft |
| Hydraulic Radius | 1.1 in |
| Top Width | 24.71 ft |
| Critical Depth | 2.7 in |
| Critical Slope | 0.022 ft/ft |
| Velocity | 6.94 ft/s |
| Velocity Head | 0.75 ft |
| Specific Energy | 0.84 ft |
| Froude Number | 4.122 |
| 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 |

# Worksheet for Swale A-A

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.030 |
| Channel Slope | 0.018 ft/ft |
| Left Side Slope | 3.000 H:V |
| Right Side Slope | 3.000 H:V |
| Discharge | 27.50 cfs |

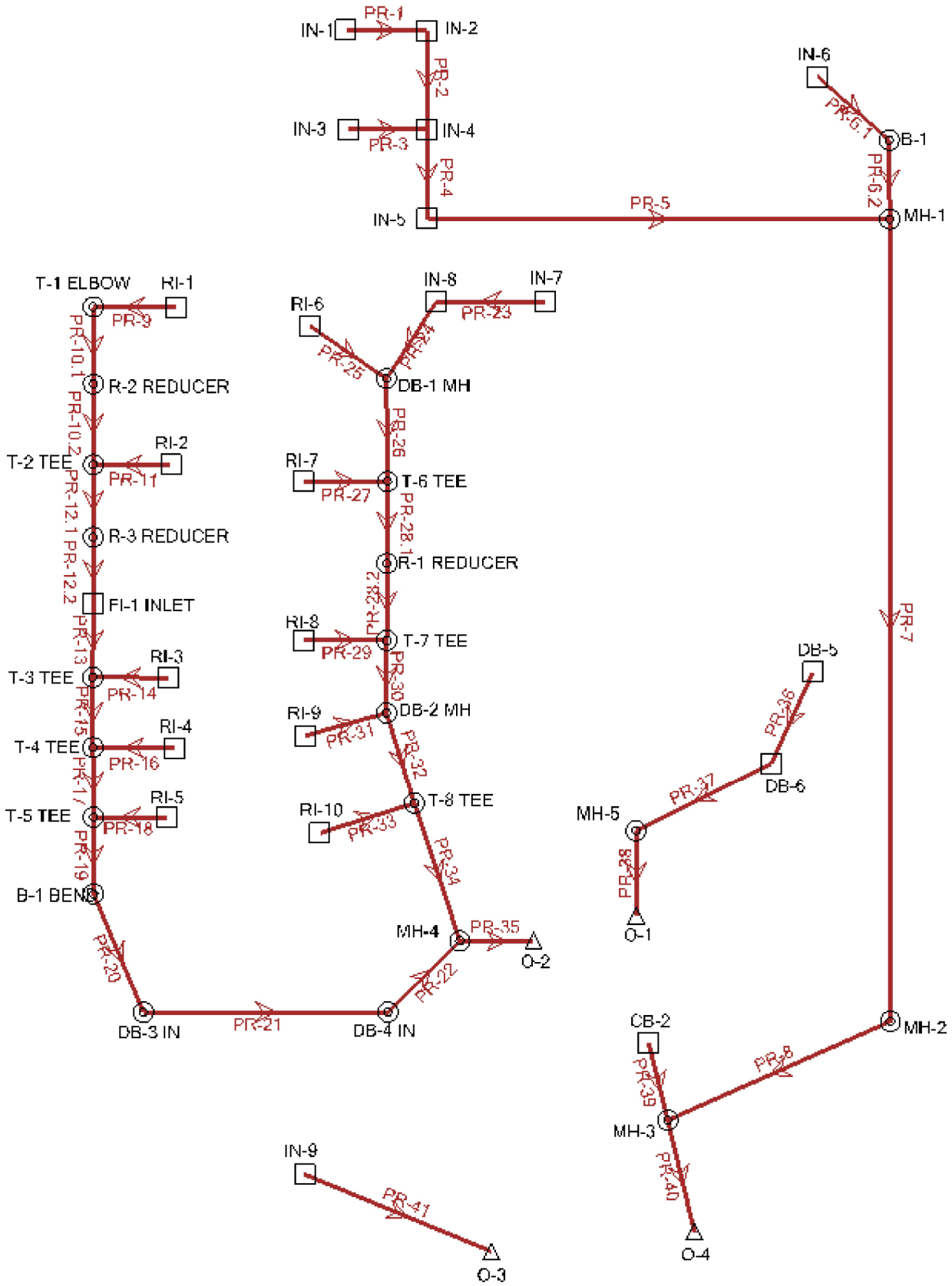
| Results | |
|---|---|
| Normal Depth | 16.3 in |
| Flow Area | 5.5 ft² |
| Wetted Perimeter | 8.6 ft |
| Hydraulic Radius | 7.7 in |
| Top Width | 8.16 ft |
| Critical Depth | 16.7 in |
| Critical Slope | 0.016 ft/ft |
| Velocity | 4.96 ft/s |
| Velocity Head | 0.38 ft |
| Specific Energy | 1.74 ft |
| Froude Number | 1.061 |
| Flow Type | Supercritical |

velocity appears to be 5'/s

| 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 | 16.3 in |
| Critical Depth | 16.7 in |
| Channel Slope | 0.018 ft/ft |
| Critical Slope | 0.016 ft/ft |

# WIRENUT INDEX MAP STORM 1-6

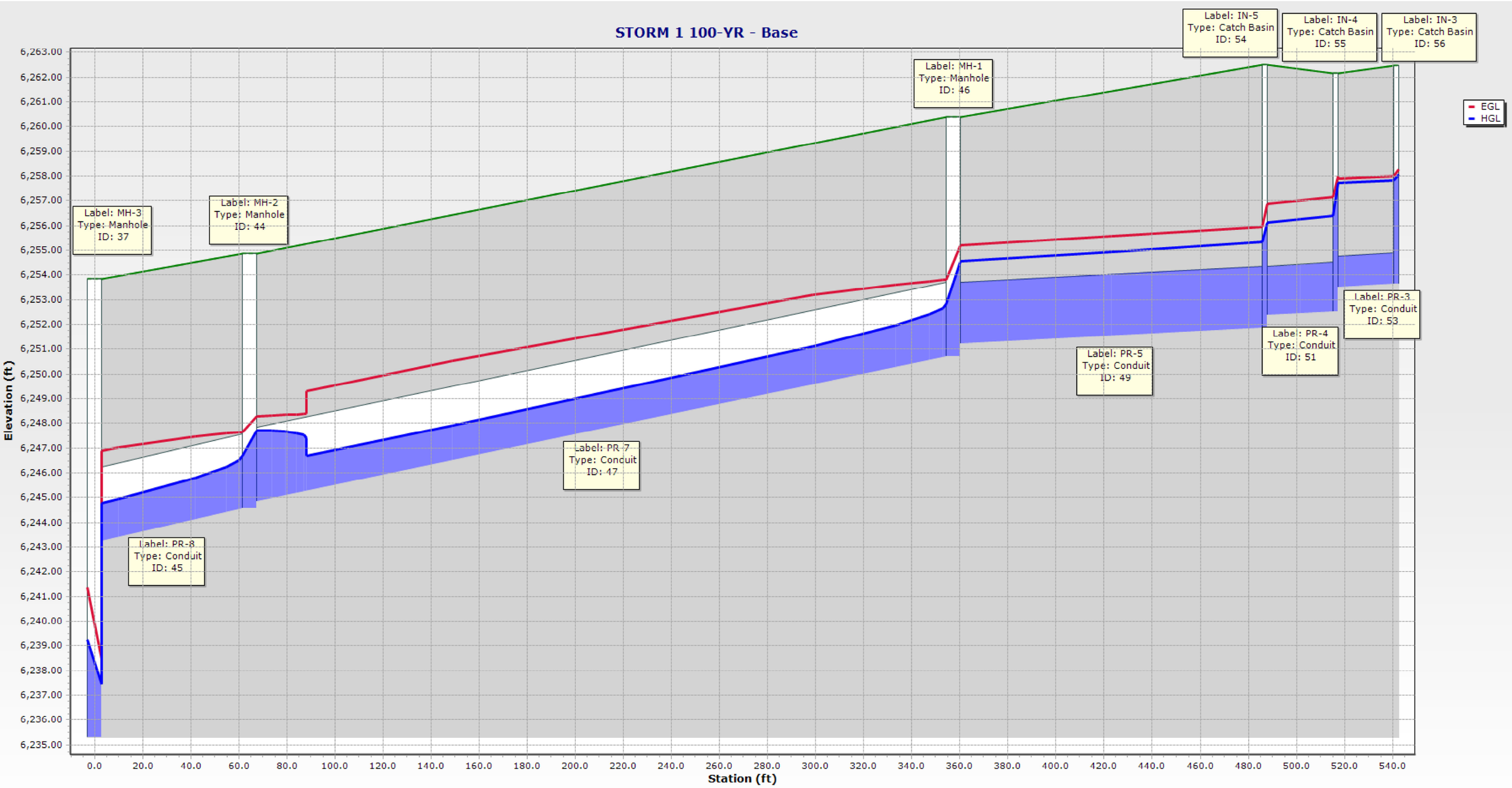


# Conduit FlexTable: STRM 1-6 100 YR

| Label | ID | Upstream Structure | Flow (cfs) | Flow / Capacity (Design) (%) | Length (Unified) (ft) | Velocity (ft/s) | 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) | Headloss (ft) | Upstream Structure Hydraulic Grade Line (In) (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PR-41 | 33 | IN-9 | 27.50 | 24.8 | 69.1 | 18.72 | 0.85 | 1.79 | 6,240.66 | 6,238.29 | 6,239.83 | 6,233.92 | 5.91 | 6,241.08 |
| PR-40 | 38 | MH-3 | 43.90 | 28.5 | 31.1 | 18.79 | 1.10 | 2.16 | 6,238.46 | 6,237.97 | 6,237.45 | 6,235.01 | 2.44 | 6,239.24 |
| PR-39 | 40 | CB-2 | 1.60 | 4.8 | 29.6 | 9.69 | 0.22 | 0.48 | 6,249.15 | 6,247.22 | 6,248.98 | 6,245.76 | 3.21 | 6,249.23 |
| PR-8 | 45 | MH-2 | 42.30 | 44.5 | 64.4 | 13.05 | 1.40 | 2.12 | 6,247.65 | 6,246.90 | 6,246.67 | 6,244.78 | 1.90 | 6,247.72 |
| PR-7 | 47 | MH-1 | 42.30 | 44.8 | 293.0 | 12.98 | 1.41 | 2.12 | 6,253.81 | 6,248.29 | 6,252.83 | 6,247.72 | 5.11 | 6,254.56 |
| PR-5 | 49 | IN-5 | 31.50 | 108.6 | 129.3 | 6.42 | (N/A) | 1.91 | 6,255.96 | 6,255.20 | 6,255.32 | 6,254.56 | 0.76 | 6,256.12 |
| PR-4 | 51 | IN-4 | 21.80 | 136.3 | 29.6 | 6.94 | (N/A) | 1.67 | 6,257.15 | 6,256.87 | 6,256.40 | 6,256.12 | 0.27 | 6,257.72 |
| PR-3 | 53 | IN-3 | 4.10 | 90.2 | 25.2 | 3.34 | 0.93 | 0.82 | 6,258.00 | 6,257.90 | 6,257.82 | 6,257.72 | 0.10 | 6,258.08 |
| PR-2 | 58 | IN-2 | 13.40 | 78.2 | 15.7 | 4.27 | 1.33 | 1.32 | 6,258.06 | 6,258.00 | 6,257.78 | 6,257.72 | 0.06 | 6,258.13 |
| PR-1 | 60 | IN-1 | 6.60 | 90.5 | 24.9 | 3.73 | 1.12 | 0.99 | 6,258.45 | 6,258.35 | 6,258.23 | 6,258.13 | 0.10 | 6,258.55 |
| PR-35 | 66 | MH-4 | 8.80 | 50.3 | 26.8 | 5.57 | 1.00 | 1.06 | 6,254.14 | 6,253.99 | 6,253.72 | 6,253.50 | 0.21 | 6,254.47 |
| PR-22 | 68 | DB-4 IN | 3.80 | 85.3 | 23.1 | 4.08 | 0.89 | 0.79 | 6,254.72 | 6,254.64 | 6,254.53 | 6,254.47 | 0.06 | 6,254.73 |
| PR-21 | 70 | DB-3 IN | 2.80 | 61.0 | 138.5 | 3.93 | 0.70 | 0.67 | 6,255.23 | 6,254.82 | 6,254.99 | 6,254.73 | 0.26 | 6,255.25 |
| PR-20 | 72 | B-1 BEND | 1.50 | 59.7 | 58.4 | 3.34 | 0.56 | 0.52 | 6,255.56 | 6,255.35 | 6,255.39 | 6,255.25 | 0.14 | 6,255.45 |
| PR-19 | 74 | T-5 TEE | 1.50 | 60.4 | 24.7 | 3.31 | 0.56 | 0.52 | 6,255.68 | 6,255.58 | 6,255.52 | 6,255.45 | 0.07 | 6,255.70 |
| PR-17 | 76 | T-4 TEE | 1.30 | 48.3 | 28.0 | 3.40 | 0.49 | 0.48 | 6,255.82 | 6,255.76 | 6,255.72 | 6,255.70 | 0.02 | 6,255.83 |
| PR-15 | 78 | T-3 TEE | 1.10 | 43.2 | 45.0 | 3.13 | 0.46 | 0.44 | 6,255.96 | 6,255.88 | 6,255.86 | 6,255.83 | 0.03 | 6,255.97 |
| PR-13 | 80 | FI-1 INLET | 1.00 | 40.6 | 33.5 | 2.97 | 0.44 | 0.42 | 6,256.09 | 6,256.02 | 6,256.00 | 6,255.97 | 0.03 | 6,256.11 |
| PR-34 | 88 | T-8 TEE | 5.00 | 66.7 | 64.7 | 4.54 | 0.90 | 0.86 | 6,254.77 | 6,254.61 | 6,254.56 | 6,254.47 | 0.09 | 6,254.79 |
| PR-32 | 90 | DB-2 MH | 4.90 | 67.1 | 33.1 | 4.43 | 0.90 | 0.85 | 6,255.01 | 6,254.93 | 6,254.84 | 6,254.79 | 0.05 | 6,255.02 |
| PR-30 | 92 | T-7 TEE | 4.50 | 60.6 | 40.0 | 4.40 | 0.84 | 0.81 | 6,255.22 | 6,255.14 | 6,255.06 | 6,255.02 | 0.04 | 6,255.24 |
| PR-26 | 96 | DB-1 MH | 3.90 | 86.6 | 39.1 | 3.18 | 0.90 | 0.80 | 6,255.99 | 6,255.85 | 6,255.83 | 6,255.69 | 0.14 | 6,256.11 |
| PR-24 | 98 | IN-8 | 3.60 | 77.9 | 46.9 | 2.93 | 0.83 | 0.77 | 6,256.39 | 6,256.25 | 6,256.26 | 6,256.11 | 0.15 | 6,256.43 |
| PR-23 | 100 | IN-7 | 1.30 | 51.8 | 34.3 | 1.66 | 0.51 | 0.48 | 6,256.51 | 6,256.47 | 6,256.47 | 6,256.43 | 0.05 | 6,256.54 |
| PR-18 | 104 | RI-5 | 0.10 | 3.1 | 8.6 | 7.38 | 0.06 | 0.16 | 6,258.21 | 6,255.71 | 6,258.16 | 6,255.70 | 2.46 | 6,258.24 |
| PR-16 | 107 | RI-4 | 0.30 | 9.6 | 8.6 | 10.06 | 0.10 | 0.28 | 6,258.39 | 6,255.86 | 6,258.28 | 6,255.83 | 2.45 | 6,258.45 |
| PR-14 | 109 | RI-3 | 0.10 | 3.3 | 8.6 | 7.05 | 0.06 | 0.16 | 6,258.21 | 6,255.98 | 6,258.16 | 6,255.97 | 2.19 | 6,258.24 |
| PR-11 | 111 | RI-2 | 0.40 | 14.7 | 8.6 | 9.92 | 0.13 | 0.32 | 6,258.46 | 6,256.50 | 6,258.32 | 6,256.43 | 1.89 | 6,258.53 |
| PR-9 | 113 | RI-1 | 0.20 | 8.0 | 8.6 | 7.66 | 0.10 | 0.22 | 6,258.31 | 6,256.65 | 6,258.22 | 6,256.61 | 1.61 | 6,258.35 |
| PR-33 | 121 | RI-10 | 0.20 | 9.4 | 28.2 | 6.78 | 0.10 | 0.22 | 6,258.31 | 6,254.81 | 6,258.22 | 6,254.79 | 3.43 | 6,258.35 |
| PR-31 | 123 | RI-9 | 0.30 | 11.5 | 15.1 | 8.85 | 0.11 | 0.28 | 6,258.39 | 6,256.08 | 6,258.28 | 6,254.86 | 3.41 | 6,258.45 |
| PR-29 | 126 | RI-8 | 0.30 | 11.4 | 16.2 | 8.86 | 0.11 | 0.28 | 6,258.39 | 6,255.27 | 6,258.28 | 6,255.24 | 3.04 | 6,258.45 |
| PR-27 | 128 | RI-7 | 0.30 | 11.9 | 16.2 | 8.62 | 0.12 | 0.28 | 6,258.39 | 6,255.73 | 6,258.28 | 6,255.69 | 2.58 | 6,258.45 |
| PR-25 | 130 | RI-6 | 0.20 | 9.2 | 17.3 | 6.89 | 0.10 | 0.22 | 6,258.31 | 6,256.13 | 6,258.22 | 6,256.11 | 2.11 | 6,258.35 |
| PR-38 | 135 | MH-5 | 5.10 | 62.6 | 24.9 | 4.87 | 0.86 | 0.87 | 6,252.88 | 6,252.73 | 6,252.52 | 6,252.36 | 0.16 | 6,252.90 |
| PR-37 | 137 | DB-6 | 5.10 | 36.0 | 55.6 | 7.35 | 0.62 | 0.87 | 6,254.14 | 6,253.16 | 6,253.78 | 6,252.90 | 0.88 | 6,254.23 |
| PR-36 | 139 | DB-5 | 2.80 | 117.2 | 57.8 | 3.57 | (N/A) | 0.72 | 6,254.81 | 6,254.49 | 6,254.60 | 6,254.23 | 0.37 | 6,254.91 |
| PR-6.2 | 157 | B-1 | 14.40 | 20.7 | 3.1 | 4.58 | 0.62 | 1.37 | 6,254.90 | 6,254.89 | 6,254.57 | 6,254.56 | 0.01 | 6,254.69 |
| PR-6.1 | 158 | IN-6 | 14.40 | 20.6 | 15.8 | 17.50 | 0.62 | 1.37 | 6,255.49 | 6,255.01 | 6,254.88 | 6,254.69 | 0.19 | 6,255.80 |
| PR-28.2 | 160 | R-1 REDUCER | 4.20 | 49.7 | 3.1 | 4.78 | 0.75 | 0.79 | 6,255.35 | 6,255.34 | 6,255.24 | 6,255.24 | 0.00 | 6,255.35 |
| PR-28.1 | 161 | T-6 TEE | 4.20 | 91.8 | 31.9 | 4.23 | 0.94 | 0.83 | 6,255.67 | 6,255.55 | 6,255.45 | 6,255.35 | 0.11 | 6,255.69 |
| PR-10.2 | 163 | R-2 REDUCER | 0.20 | 27.8 | 2.8 | 1.76 | 0.24 | 0.21 | 6,256.44 | 6,256.44 | 6,256.43 | 6,256.43 | 0.00 | 6,256.44 |
| PR-10.1 | 164 | T-1 ELBOW | 0.20 | 50.5 | 42.2 | 2.02 | 0.25 | 0.22 | 6,256.60 | 6,256.47 | 6,256.54 | 6,256.44 | 0.10 | 6,256.61 |
| PR-12.2 | 166 | R-3 REDUCER | 0.60 | 20.7 | 3.0 | 2.91 | 0.31 | 0.32 | 6,256.14 | 6,256.13 | 6,256.11 | 6,256.11 | 0.00 | 6,256.14 |
| PR-12.1 | 167 | T-2 TEE | 0.60 | 68.9 | 13.5 | 2.69 | 0.41 | 0.36 | 6,256.42 | 6,256.34 | 6,256.30 | 6,256.19 | 0.11 | 6,256.43 |

# Conduit FlexTable: STRM 1-6 100 YR

| 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 | Manning's n | Friction Slope (ft/ft) | Slope (Calculated) (ft/ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 7.32 | 1.500 | 1.25 | 6,253.00 | 6,235.79 | 6,238.04 | 6,233.00 | Circle - 30.0 in | 0.013 | 0.034 | 0.073 |
| 11.68 | 1.770 | 1.79 | 6,253.85 | 6,236.53 | 6,235.29 | 6,233.63 | Circle - 36.0 in | 0.013 | 0.016 | 0.053 |
| 3.33 | 1.500 | 0.26 | 6,253.85 | 6,251.50 | 6,245.54 | 6,248.50 | Circle - 18.0 in | 0.013 | 0.065 | -0.100 |
| 6.08 | 1.070 | 1.04 | 6,253.85 | 6,254.87 | 6,243.25 | 6,244.55 | Circle - 36.0 in | 0.013 | 0.012 | -0.020 |
| 6.42 | 1.770 | 1.73 | 6,254.87 | 6,260.38 | 6,244.85 | 6,250.71 | Circle - 36.0 in | 0.013 | 0.019 | -0.020 |
| 6.94 | 1.250 | 0.80 | 6,260.38 | 6,262.50 | 6,251.21 | 6,251.86 | Circle - 30.0 in | 0.013 | 0.006 | -0.005 |
| 4.27 | 1.770 | 1.32 | 6,262.50 | 6,262.16 | 6,252.36 | 6,252.51 | Circle - 24.0 in | 0.013 | 0.009 | -0.005 |
| 3.34 | 1.500 | 0.26 | 6,262.16 | 6,262.48 | 6,253.51 | 6,253.63 | Circle - 15.0 in | 0.013 | 0.004 | -0.005 |
| 3.73 | 1.250 | 0.35 | 6,262.16 | 6,262.51 | 6,252.80 | 6,252.89 | Circle - 24.0 in | 0.013 | 0.004 | -0.006 |
| 3.73 | 1.500 | 0.33 | 6,262.51 | 6,263.14 | 6,253.39 | 6,253.51 | Circle - 18.0 in | 0.013 | 0.004 | -0.005 |
| 3.36 | 1.770 | 0.75 | 6,260.70 | 6,254.78 | 6,252.66 | 6,252.50 | Circle - 24.0 in | 0.013 | 0.006 | 0.006 |
| 2.38 | 1.070 | 0.20 | 6,260.70 | 6,260.00 | 6,253.38 | 6,253.49 | Circle - 15.0 in | 0.013 | 0.003 | -0.005 |
| 2.51 | 1.070 | 0.26 | 6,260.00 | 6,260.00 | 6,253.59 | 6,254.29 | Circle - 15.0 in | 0.013 | 0.003 | -0.005 |
| 2.93 | 0.350 | 0.06 | 6,260.00 | 6,260.50 | 6,254.54 | 6,254.83 | Circle - 12.0 in | 0.013 | 0.004 | -0.005 |
| 0.52 | 1.100 | 0.18 | 6,260.50 | 6,261.00 | 6,254.83 | 6,254.95 | Circle - 12.0 in | 0.013 | 0.004 | -0.005 |
| 1.54 | 1.100 | 0.11 | 6,261.00 | 6,261.50 | 6,254.93 | 6,255.09 | Circle - 12.0 in | 0.013 | 0.002 | -0.006 |
| 0.59 | 1.100 | 0.11 | 6,261.50 | 6,263.00 | 6,255.09 | 6,255.32 | Circle - 12.0 in | 0.013 | 0.002 | -0.005 |
| 1.14 | 1.250 | 0.12 | 6,263.00 | 6,262.93 | 6,255.32 | 6,255.48 | Circle - 12.0 in | 0.013 | 0.002 | -0.005 |
| 1.02 | 1.100 | 0.24 | 6,260.70 | 6,262.84 | 6,253.16 | 6,253.49 | Circle - 18.0 in | 0.013 | 0.002 | -0.005 |
| 8.85 | 1.070 | 0.18 | 6,262.84 | 6,262.84 | 6,253.49 | 6,253.65 | Circle - 18.0 in | 0.013 | 0.002 | -0.005 |
| 1.53 | 1.100 | 0.18 | 6,262.84 | 6,262.45 | 6,253.75 | 6,253.95 | Circle - 18.0 in | 0.013 | 0.002 | -0.005 |
| 1.02 | 1.770 | 0.28 | 6,262.45 | 6,262.45 | 6,254.38 | 6,254.57 | Circle - 15.0 in | 0.013 | 0.004 | -0.005 |
| 1.66 | 1.250 | 0.17 | 6,262.45 | 6,262.00 | 6,254.67 | 6,254.91 | Circle - 15.0 in | 0.013 | 0.003 | -0.005 |
| 1.66 | 1.500 | 0.06 | 6,262.00 | 6,260.58 | 6,255.16 | 6,255.33 | Circle - 12.0 in | 0.013 | 0.001 | -0.005 |
| 1.90 | 1.500 | 0.08 | 6,261.00 | 6,263.22 | 6,255.23 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.293 | -0.324 |
| 2.69 | 1.500 | 0.17 | 6,261.50 | 6,263.22 | 6,255.34 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.295 | -0.311 |
| 1.90 | 1.500 | 0.08 | 6,263.00 | 6,263.22 | 6,255.57 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.261 | -0.284 |
| 2.99 | 1.500 | 0.21 | 6,263.00 | 6,263.22 | 6,255.98 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.229 | -0.236 |
| 2.35 | 1.500 | 0.13 | 6,263.00 | 6,263.22 | 6,256.29 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.194 | -0.200 |
| 2.35 | 1.500 | 0.13 | 6,262.84 | 6,263.22 | 6,253.99 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.124 | -0.143 |
| 2.69 | 1.500 | 0.17 | 6,262.84 | 6,263.22 | 6,254.75 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.152 | -0.215 |
| 2.69 | 1.500 | 0.17 | 6,262.45 | 6,263.22 | 6,254.45 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.192 | -0.219 |
| 2.69 | 1.500 | 0.17 | 6,262.45 | 6,263.23 | 6,254.75 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.164 | -0.200 |
| 2.35 | 1.500 | 0.13 | 6,262.45 | 6,263.22 | 6,255.42 | 6,258.00 | Circle - 6.0 in | 0.013 | 0.126 | -0.149 |
| 4.06 | 1.070 | 0.38 | 6,260.18 | 6,253.24 | 6,251.65 | 6,251.50 | Circle - 18.0 in | 0.013 | 0.006 | 0.006 |
| 4.07 | 1.250 | 0.45 | 6,260.18 | 6,259.00 | 6,251.90 | 6,252.91 | Circle - 18.0 in | 0.013 | 0.018 | -0.018 |
| 3.68 | 1.500 | 0.32 | 6,259.00 | 6,260.07 | 6,253.41 | 6,253.67 | Circle - 12.0 in | 0.013 | 0.006 | -0.004 |
| 4.58 | 0.350 | 0.11 | 6,260.38 | 6,260.38 | 6,251.71 | 6,252.01 | Circle - 24.0 in | 0.013 | 0.004 | -0.095 |
| 6.29 | 1.500 | 0.92 | 6,260.38 | 6,262.48 | 6,252.01 | 6,253.51 | Circle - 24.0 in | 0.013 | 0.030 | -0.095 |
| 3.61 | 1.000 | 0.11 | 6,262.45 | 6,262.45 | 6,253.95 | 6,253.97 | Circle - 18.0 in | 0.013 | 0.002 | -0.006 |
| 3.18 | 1.100 | 0.24 | 6,262.45 | 6,262.45 | 6,254.22 | 6,254.38 | Circle - 15.0 in | 0.013 | 0.004 | -0.005 |
| 1.33 | 1.100 | 0.01 | 6,263.00 | 6,263.00 | 6,255.90 | 6,255.91 | Circle - 8.0 in | 0.013 | 0.000 | -0.004 |
| 1.50 | 1.100 | 0.07 | 6,263.00 | 6,263.00 | 6,256.08 | 6,256.29 | Circle - 6.0 in | 0.013 | 0.003 | -0.005 |
| 3.07 | 1.100 | 0.02 | 6,262.93 | 6,263.00 | 6,255.48 | 6,255.50 | Circle - 12.0 in | 0.013 | 0.001 | -0.007 |
| 0.67 | 1.100 | 0.13 | 6,263.00 | 6,263.00 | 6,255.83 | 6,255.90 | Circle - 8.0 in | 0.013 | 0.006 | -0.005 |


STORM 1 100-YR - Base
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: MH-1
Type: Manhole
ID: 46
EGL
HGL
Label: MH-3
Type: Manhole
ID: 37
Label: MH-2
Type: Manhole
ID: 44
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
Elevation (ft)
6,263.00
6,262.00
6,261.00
6,260.00
6,259.00
6,258.00
6,257.00
6,256.00
6,255.00
6,254.00
6,253.00
6,252.00
6,251.00
6,250.00
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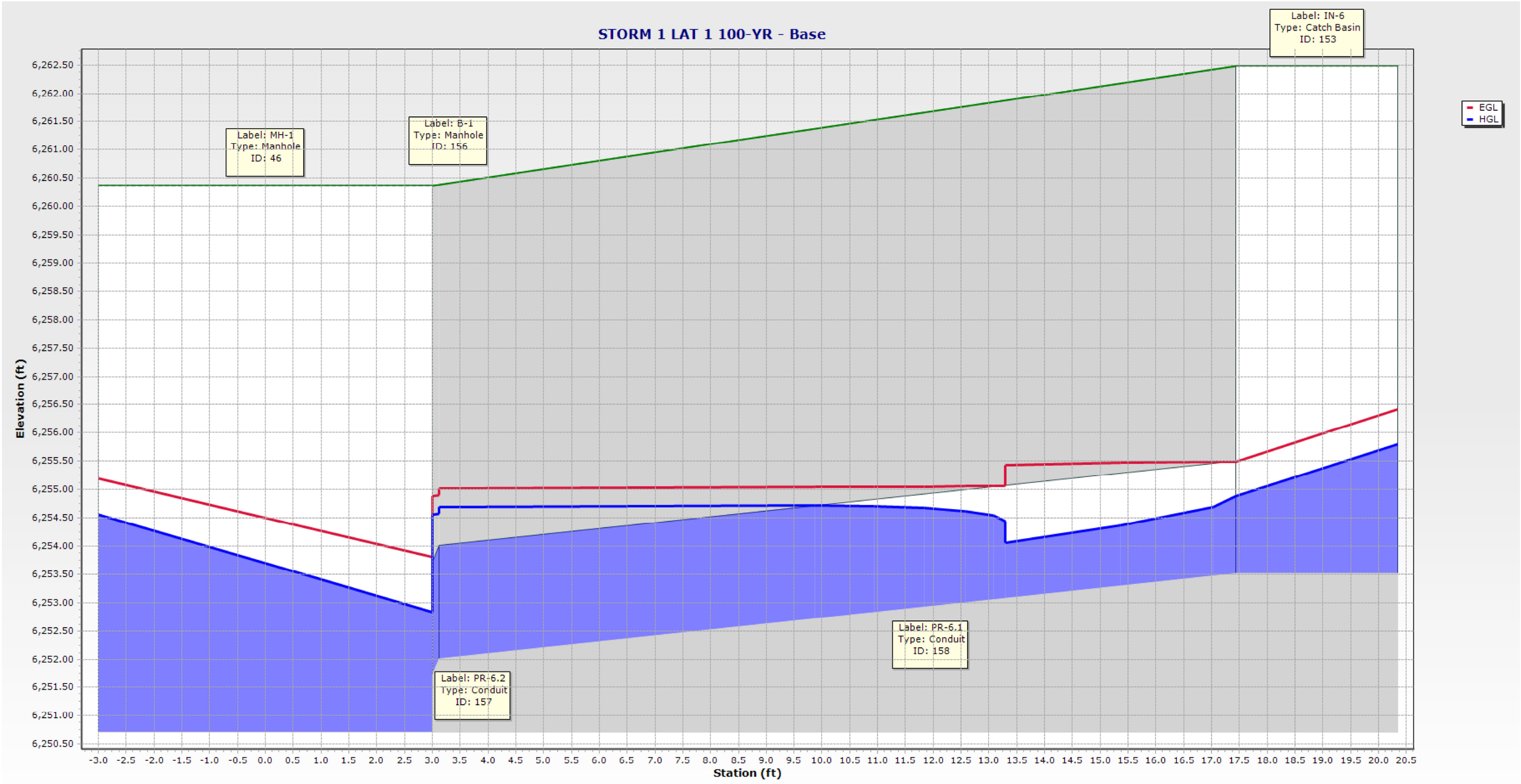
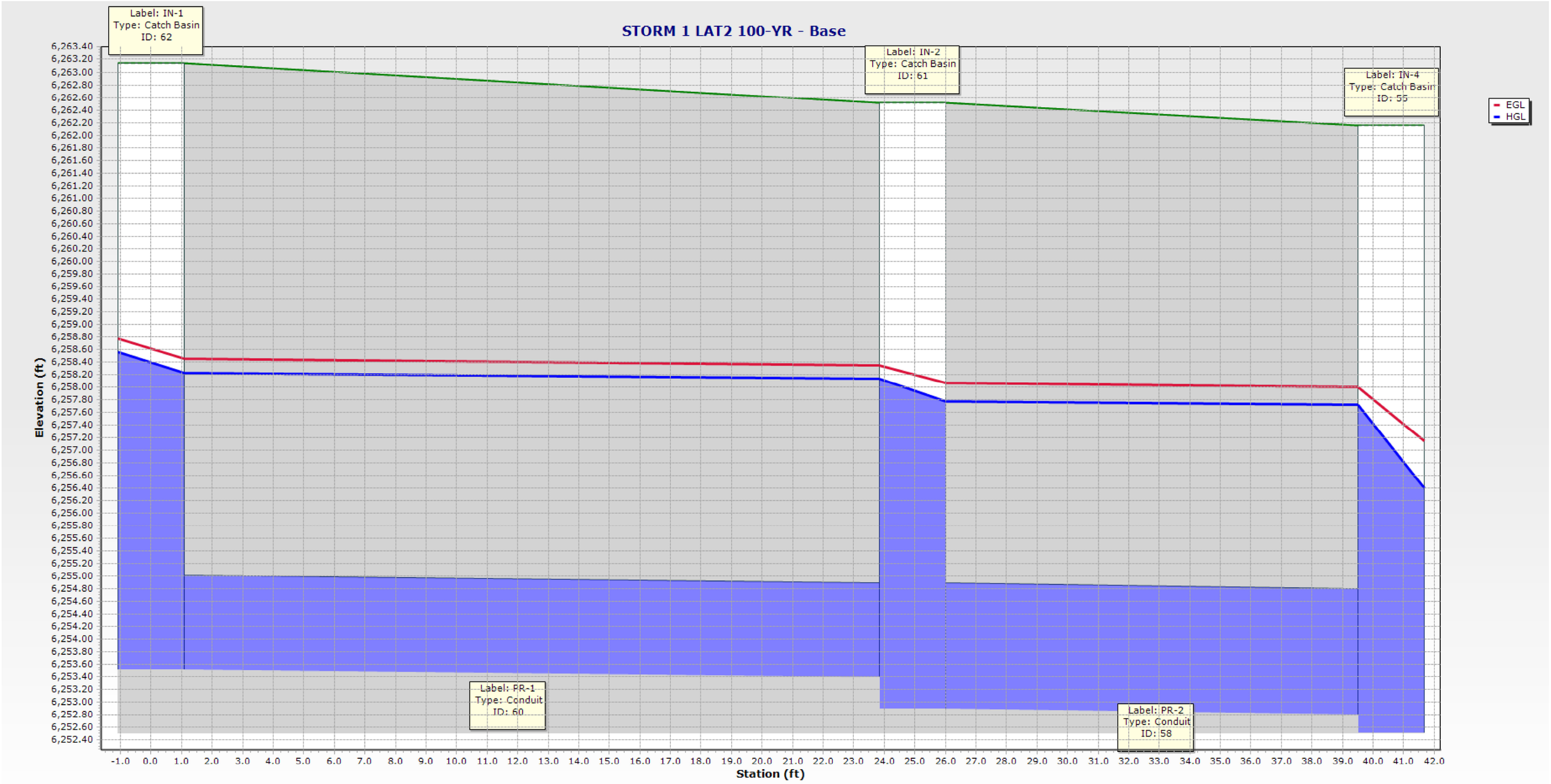
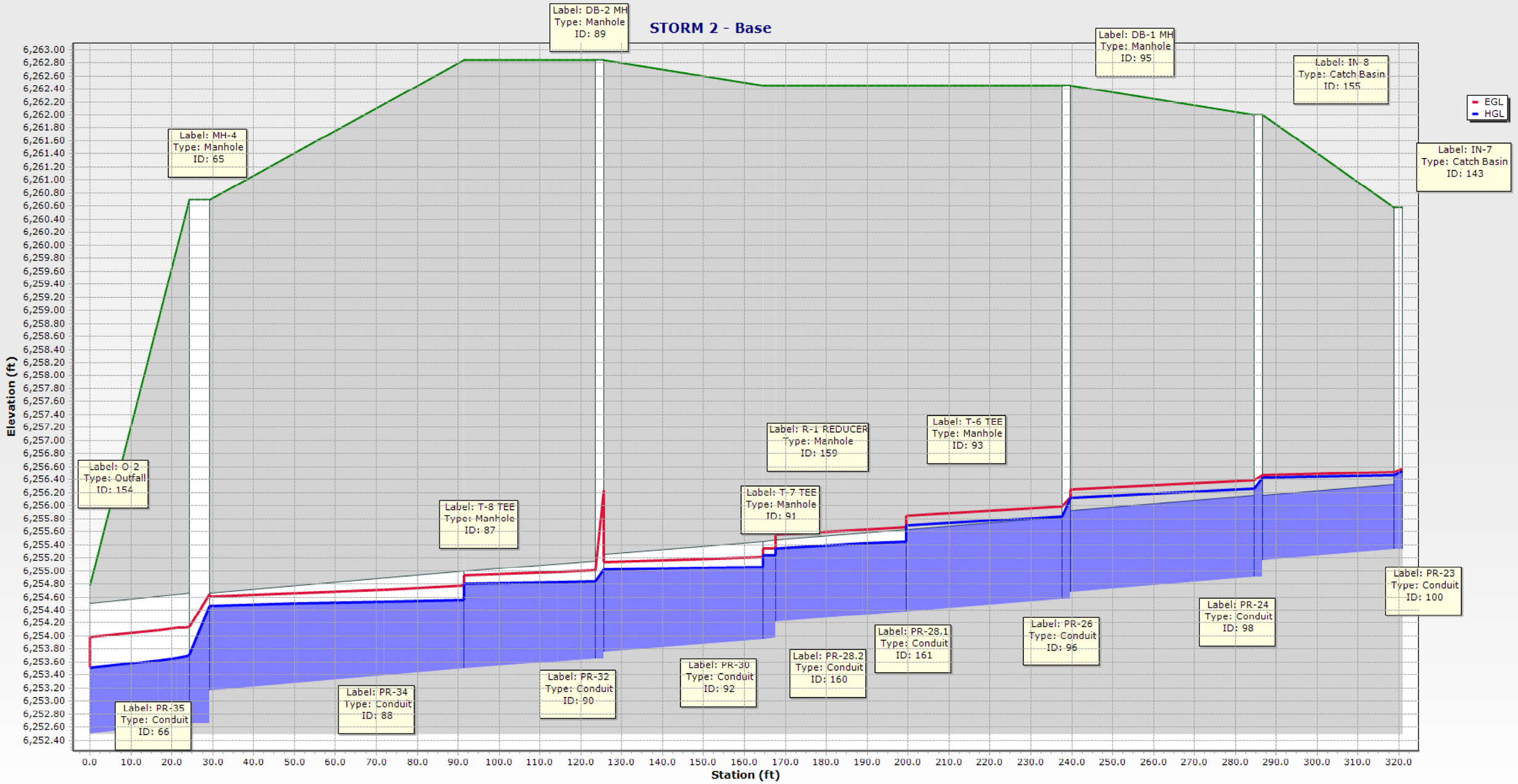
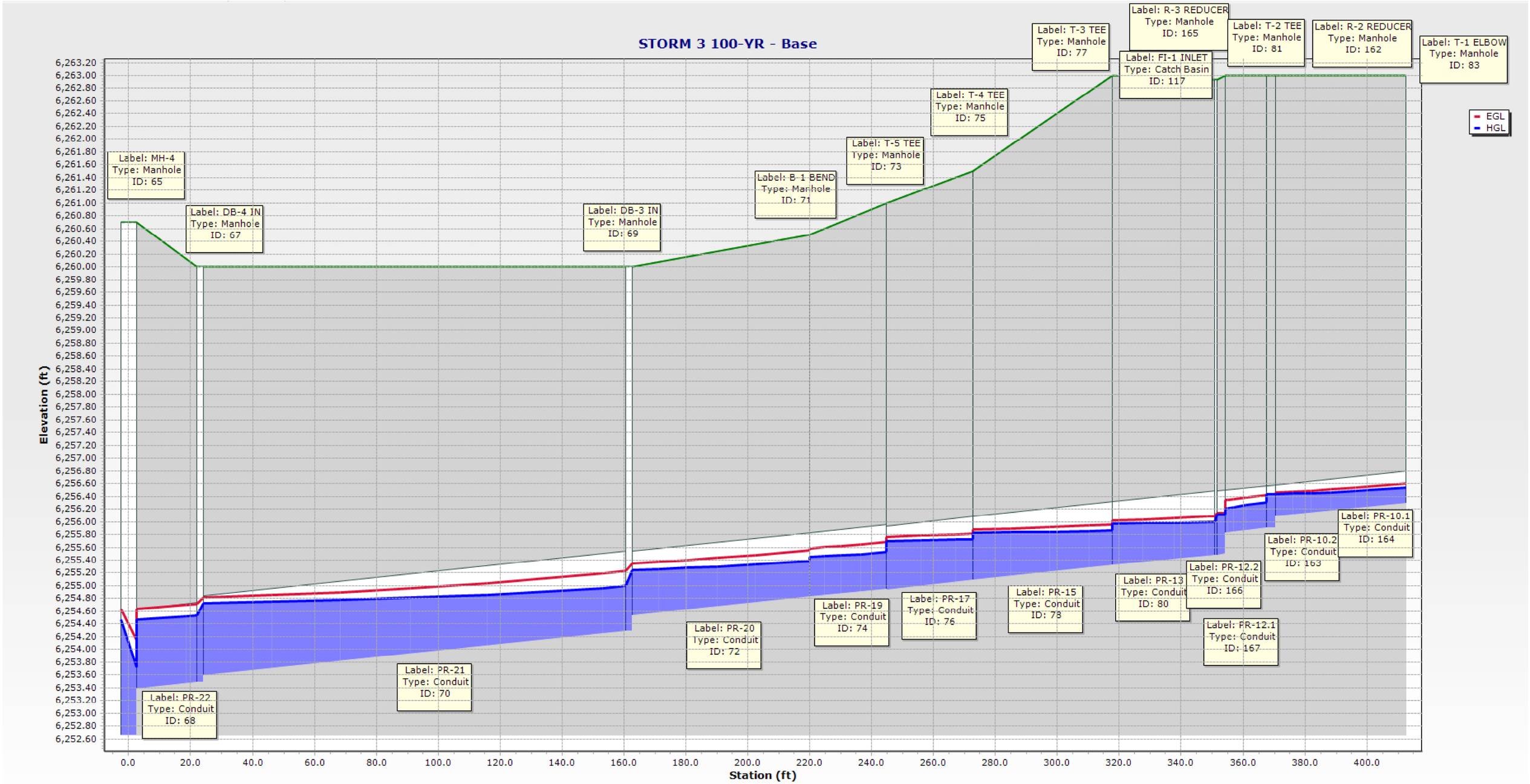
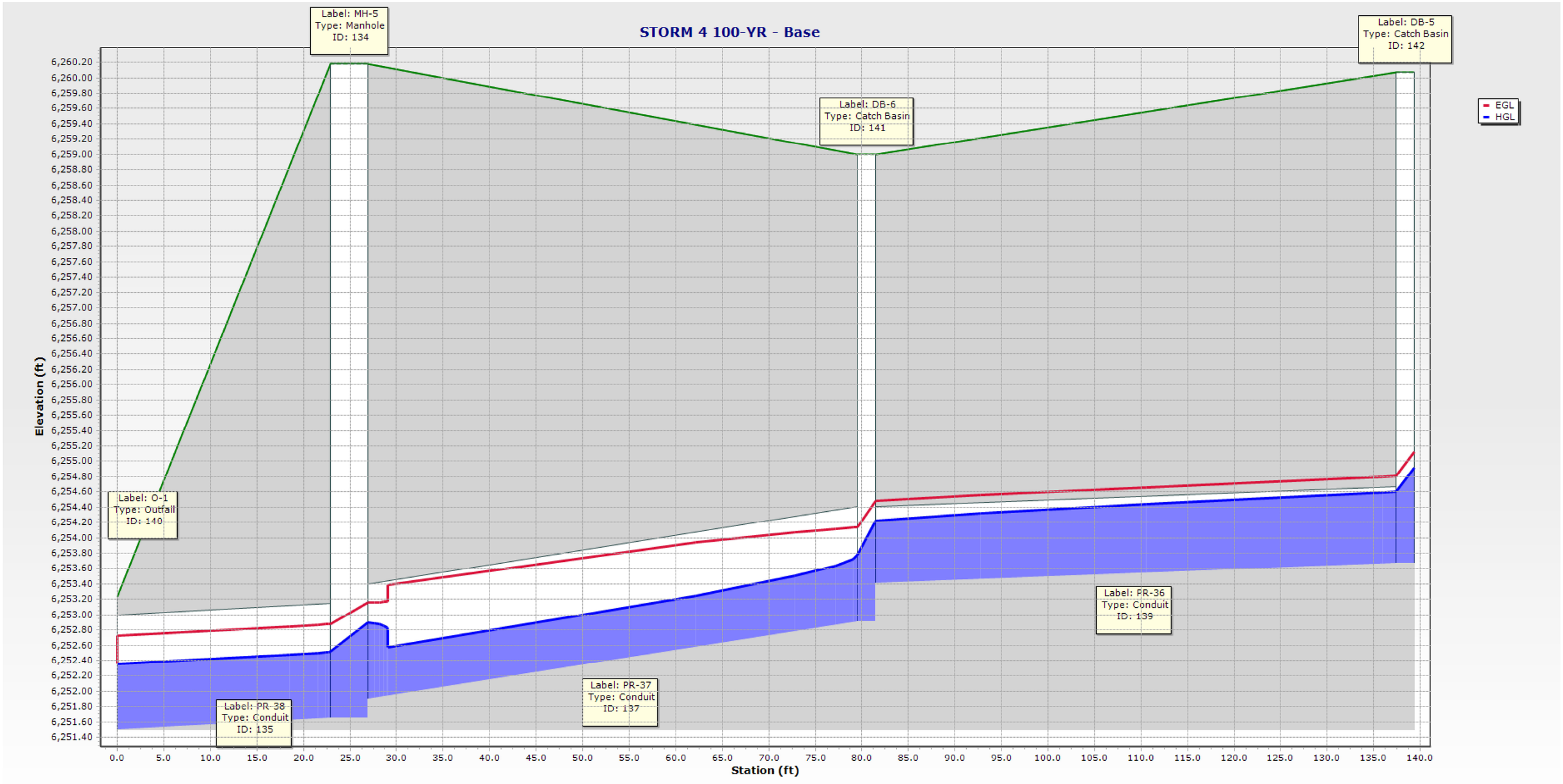
6,243.00
6,242.00
6,241.00
6,240.00
6,239.00
6,238.00
6,237.00
6,236.00
6,235.00
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
220.0
240.0
260.0
280.0
300.0
320.0
340.0
360.0
380.0
400.0
420.0
440.0
460.0
480.0
500.0
520.0
540.0
Station (ft)

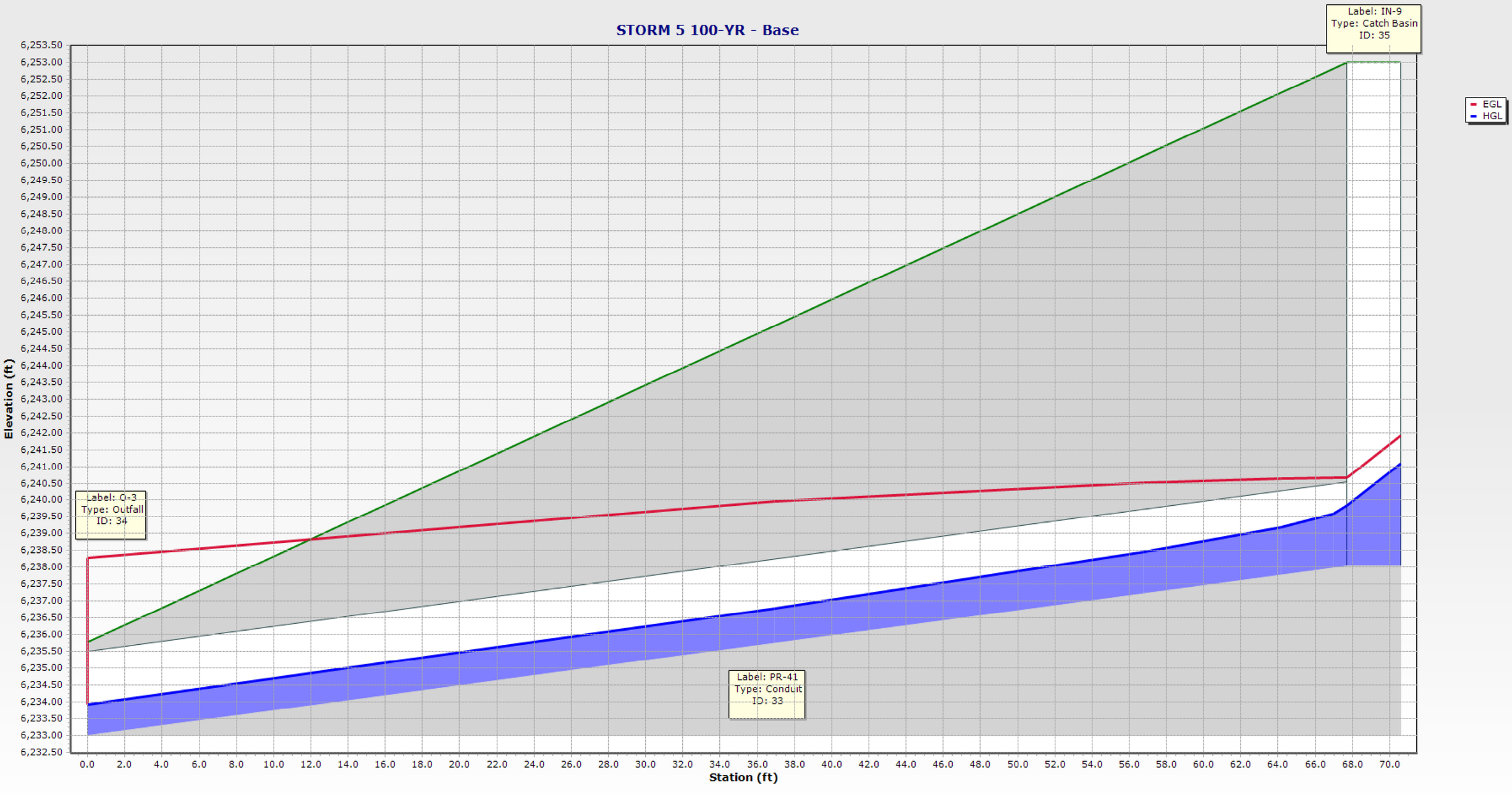

STORM 1 LAT 1 100-YR - Base
Label: IN-6
Type: Catch Basin
ID: 153
Label: MH-1
Type: Manhole
ID: 46
Label: B-1
Type: Manhole
ID: 156
EGL
HGL
Label: PR-6.1
Type: Conduit
ID: 158
Label: PR-6.2
Type: Conduit
ID: 157
Elevation (ft)
6,262.50
6,262.00
6,261.50
6,261.00
6,260.50
6,260.00
6,259.50
6,259.00
6,258.50
6,258.00
6,257.50
6,257.00
6,256.50
6,256.00
6,255.50
6,255.00
6,254.50
6,254.00
6,253.50
6,253.00
6,252.50
6,252.00
6,251.50
6,251.00
6,250.50
-3.0 -2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5
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
EGL
HGL
Label: PR-1
Type: Conduit
ID: 60
Label: PR-2
Type: Conduit
ID: 58
Elevation (ft)
Station (ft)


STORM 2 - Base
Label: DB-2 MH
Type: Manhole
ID: 89
Label: DB-1 MH
Type: Manhole
ID: 95
Label: IN-8
Type: Catch Basin
ID: 155
EGL
HGL
Label: MH-4
Type: Manhole
ID: 65
Label: IN-7
Type: Catch Basin
ID: 143
Label: R-1 REDUCER
Type: Manhole
ID: 159
Label: T-6 TEE
Type: Manhole
ID: 93
Label: O-2
Type: Outfall
ID: 154
Label: T-8 TEE
Type: Manhole
ID: 87
Label: T-7 TEE
Type: Manhole
ID: 91
Label: PR-23
Type: Conduit
ID: 100
Label: PR-24
Type: Conduit
ID: 98
Label: PR-28.1
Type: Conduit
ID: 161
Label: PR-26
Type: Conduit
ID: 96
Label: PR-28.2
Type: Conduit
ID: 160
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
Elevation (ft)
Station (ft)


STORM 3 100-YR - Base
Label: MH-4
Type: Manhole
ID: 65
Label: DB-4 IN
Type: Manhole
ID: 67
Label: DB-3 IN
Type: Manhole
ID: 69
Label: B-1 BEND
Type: Manhole
ID: 71
Label: T-5 TEE
Type: Manhole
ID: 73
Label: T-4 TEE
Type: Manhole
ID: 75
Label: T-3 TEE
Type: Manhole
ID: 77
Label: FI-1 INLET
Type: Catch Basin
ID: 117
Label: R-3 REDUCER
Type: Manhole
ID: 165
Label: T-2 TEE
Type: Manhole
ID: 81
Label: R-2 REDUCER
Type: Manhole
ID: 162
Label: T-1 ELBOW
Type: Manhole
ID: 83
EGL
HGL
Label: PR-22
Type: Conduit
ID: 68
Label: PR-21
Type: Conduit
ID: 70
Label: PR-20
Type: Conduit
ID: 72
Label: PR-19
Type: Conduit
ID: 74
Label: PR-17
Type: Conduit
ID: 76
Label: PR-15
Type: Conduit
ID: 78
Label: PR-13
Type: Conduit
ID: 80
Label: PR-12.2
Type: Conduit
ID: 166
Label: PR-12.1
Type: Conduit
ID: 167
Label: PR-10.2
Type: Conduit
ID: 163
Label: PR-10.1
Type: Conduit
ID: 164
Elevation (ft)
6,263.20
6,263.00
6,262.80
6,262.60
6,262.40
6,262.20
6,262.00
6,261.80
6,261.60
6,261.40
6,261.20
6,261.00
6,260.80
6,260.60
6,260.40
6,260.20
6,260.00
6,259.80
6,259.60
6,259.40
6,259.20
6,259.00
6,258.80
6,258.60
6,258.40
6,258.20
6,258.00
6,257.80
6,257.60
6,257.40
6,257.20
6,257.00
6,256.80
6,256.60
6,256.40
6,256.20
6,256.00
6,255.80
6,255.60
6,255.40
6,255.20
6,255.00
6,254.80
6,254.60
6,254.40
6,254.20
6,254.00
6,253.80
6,253.60
6,253.40
6,253.20
6,253.00
6,252.80
6,252.60
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
220.0
240.0
260.0
280.0
300.0
320.0
340.0
360.0
380.0
400.0
Station (ft)


STORM 4 100-YR - Base
Label: MH-5
Type: Manhole
ID: 134
Label: DB-6
Type: Catch Basin
ID: 141
Label: DB-5
Type: Catch Basin
ID: 142
EGL
HGL
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
Elevation (ft)
Station (ft)


STORM 5 100-YR - Base
Label: IN-9
Type: Catch Basin
ID: 35
EGL
HGL
Label: Q-3
Type: Outfall
ID: 34
Label: PR-41
Type: Conduit
ID: 33
Elevation (ft)
Station (ft)
6,253.50
6,253.00
6,252.50
6,252.00
6,251.50
6,251.00
6,250.50
6,250.00
6,249.50
6,249.00
6,248.50
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6,234.00
6,233.50
6,233.00
6,232.50
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
40.0
42.0
44.0
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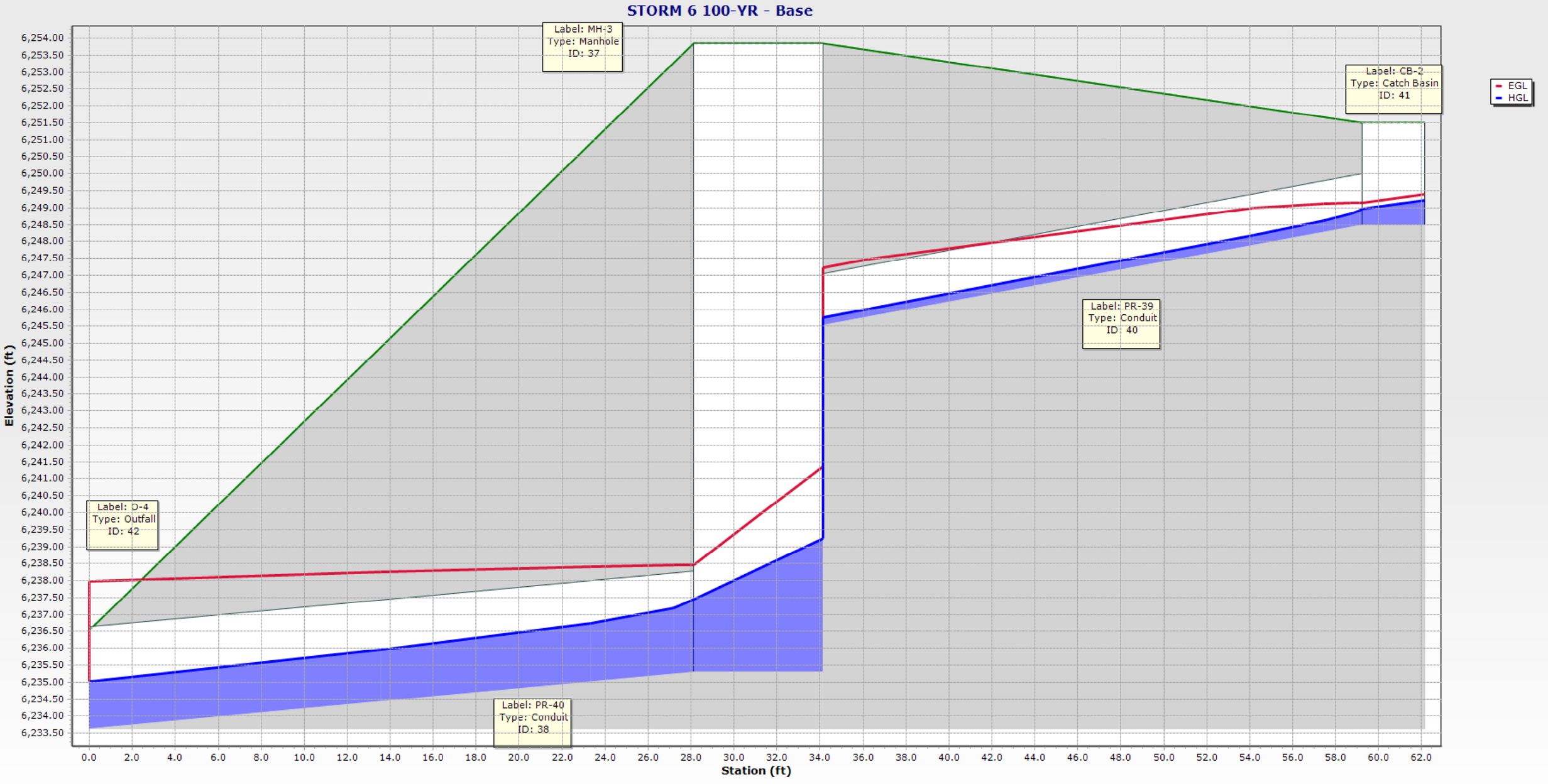
56.0
58.0
60.0
62.0
64.0
66.0
68.0
70.0


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)
6,254.00
6,253.50
6,253.00
6,252.50
6,252.00
6,251.50
6,251.00
6,250.50
6,250.00
6,249.50
6,249.00
6,248.50
6,248.00
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6,235.50
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6,234.50
6,234.00
6,233.50
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
36.0
38.0
40.0
42.0
44.0
46.0
48.0
50.0
52.0
54.0
56.0
58.0
60.0
62.0

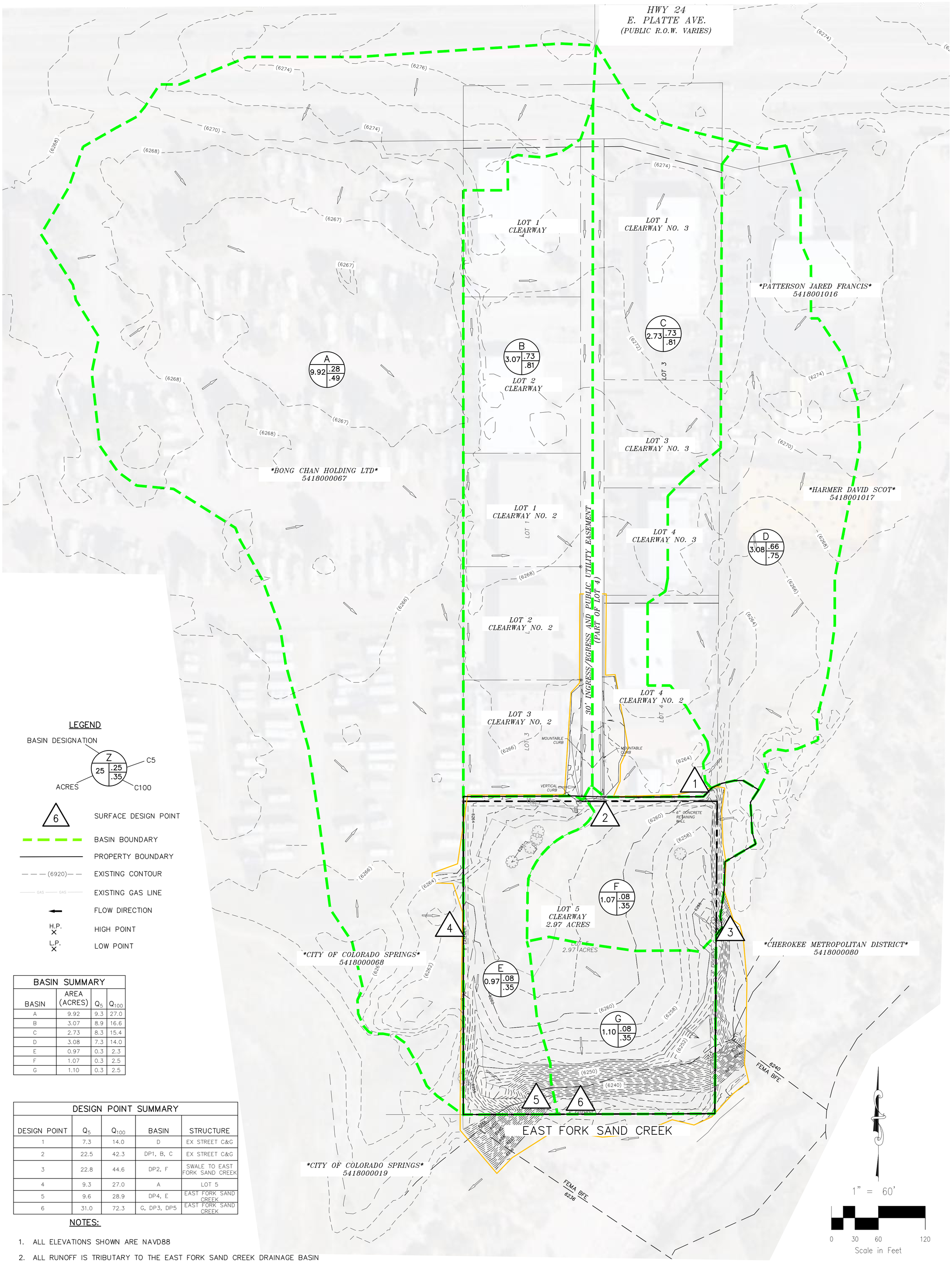
**EXISTING AND PROPOSED DRAINAGE MAPS**

# CLEARWAY, LOT 5 (WIRENUT)

## EL PASO COUNTY, STATE OF COLORADO

# EXISTING DRAINAGE MAP

SEPTEMBER 2022




**LEGEND**

BASIN DESIGNATION — Z | 25 | .25 / .35 — C5 / C100 — ACRES

6 — SURFACE DESIGN POINT

BASIN BOUNDARY

PROPERTY BOUNDARY

(6920) — EXISTING CONTOUR

GAS — GAS — EXISTING GAS LINE

FLOW DIRECTION

H.P. — HIGH POINT

L.P. — LOW POINT

| 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

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

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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: 09/06/2022 | |
| DESIGNED BY: TAU<br>DRAWN BY: DLM<br>CHECKED BY: VAS | | SHEET 1 OF 1 | EDM |

File: O:\44042A-Wire Nut\Hammers\Drainage\Drainage Map\Proposed Drainage Map.dwg Plotstamp: 9/12/2022 11:40 AM

# CLEARWAY, LOT 5 (WIRENUT)

## EL PASO COUNTY, STATE OF COLORADO

# PROPOSED DRAINAGE MAP

SEPTEMBER 2022

LEGEND

- BASIN DESIGNATION (Z; 25 ACRES; .25; .35)
- PIPE RUN REFERENCE LABEL (C5; C100)
- SURFACE DESIGN POINT (4; 6)
- 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 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

| 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 | 6.3 | FB1, F | MOD TRIPLE DENVER TYPE 16 INLET |
| 4 | 2.7 | 6.7 | FB2, G | MOD TRIPLE DENVER TYPE 16 INLET |
| 5 | 4.5 | 11.5 | FB3, FB4, E | MOD TRIPLE DENVER TYPE 16 INLET |
| 6 | 7.5 | 14.4 | D | CDOT TYPE D GRATE INLET |
| 7 | 0.7 | 1.3 | I | NYLOPLAST 24" GRATE INLET |
| 8 | 1.3 | 2.4 | H | MOD SINGLE DENVER TYPE 16 INLET |
| 9 | 1.5 | 2.8 | O | NYLOPLAST 24" GRATE 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 | 7.9 | 15.1 | Q | 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 | 32.5 | 73.7 | 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 | 0.33 | 1.3 | 2.4 |
| I | 0.17 | 0.7 | 1.3 |
| 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 | 0.37 | 1.5 | 2.8 |
| P | 0.27 | 0.1 | 0.7 |
| Q | 0.27 | 0.4 | 1.3 |
| R | 0.22 | 0.1 | 0.6 |
| S | 0.54 | 0.2 | 1.5 |

1" = 30'

0 15 30 60

Scale in Feet

| STORM SEWER SUMMARY | | | | |
|---|---|---|---|---|
| PIPE RUN | $Q_5$ | $Q_{100}$ | PIPE SIZE | CONTRIBUTING PIPES/DESIGN POINTS |
| 1 | 4.3 | 6.6 | 18" PP | DP1 |
| 2 | 8.8 | 13.4 | 24" PP | PR1, DP2 |
| 3 | 2.1 | 4.1 | 15" PP | DP3 |
| 4 | 13.1 | 21.8 | 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 |
| 13 | 0.5 | 1.0 | 12" PP | PR12, .06 ACRE BASIN J |
| 14 | 0.0 | 0.1 | 6" PP | .01 ACRE BASIN J |
| 15 | 0.6 | 1.1 | 12" PP | PR13, PR14 |
| 16 | 0.1 | 0.3 | 6" PP | .04 ACRE BASIN J |
| 17 | 0.7 | 1.3 | 12" PP | PR15, PR16 |
| 18 | 0.1 | 0.1 | 6" PP | .02 ACRE BASIN J |
| 19 | 0.8 | 1.5 | 12" PP | PR17, PR18 |
| 20 | 0.8 | 1.5 | 12" PP | PR19 |
| 21 | 1.5 | 2.8 | 15" PP | PR20, DP11 |
| 22 | 2.0 | 3.8 | 15" PP | PR21, DP12 |
| 23 | 0.7 | 1.3 | 12" PP | DP7 |
| 24 | 1.9 | 3.6 | 15" PP | PR23, DP8 |
| 25 | 0.1 | 0.2 | 6" PP | .03 ACRE BASIN K |
| 26 | 2.0 | 3.9 | 15" PP | PR24, PR25 |
| 27 | 0.2 | 0.3 | 6" PP | .05 ACRE BASIN K |
| 28 | 2.2 | 4.2 | 15" PP | PR26, PR27 |
| 29 | 0.2 | 0.3 | 6" PP | .05 ACRE BASIN K |
| 30 | 2.6 | 4.9 | 18" PP | PR28, PR29 |
| 31 | 0.1 | 0.2 | 6" PP | .05 ACRE BASIN K |
| 32 | 2.6 | 4.9 | 18" PP | PR30, PR31 |
| 33 | 0.1 | 0.2 | 6" PP | .02 ACRE BASIN K |
| 34 | 2.7 | 5.0 | 18" PP | PR32, PR33 |
| 35 | 4.7 | 8.8 | 24" RCP | PR22, PR34 |
| 36 | 1.5 | 2.8 | 12" PP | DP9 |
| 37 | 2.8 | 5.1 | 18" PP | PR36, DP10 |
| 38 | 2.8 | 5.1 | 18" RCP | PR37 |
| 39 | 0.3 | 1.6 | 18" RCP | FSD POND RELEASE |
| 40 | 22.81 | 43.9 | 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 = 6254.19 |
| EURV VOLUME=0.269 AC-FT |
| 100-YR WATER SURFACE EL=6254.40 |
| 100-YR VOLUME=0.275 AC-FT |
| SPILLWAY CREST EL=6254.75 |
| TOP OF EMBANKMENT EL=6256.00 |
| RATIONAL 100-YR INFLOW=15.1 CFS |
| MHFD 100-YR INFLOW = 7.9 CFS |
| MHFD 100-YR RELEASE = 1.6 CFS |

NOTES

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

Review 1: analyze and identify the protection needed at this proposed channel.

Additionally, an easement should be provided for the proposed channel. Please reflect this on the GEC and site plan.

Review 2: Unresolved. The velocity is 5.9 ft/s per the open channel calculation provided. Per DCMV1 Table 10-4 the max permissible velocity for native grass (grass legume) is approx 4 ft/s. Provide the necessary protection at this channel.

added info

provided additional protection where needed

gravel via landscaping will be provided adjacent to building

review 1: please tie the proposed contours with existing. typical throughout the plan

Review 2: Unresolved.

proposed and existing contours now both set at 10' and 2' increments. previously 1' and 5' proposed contours were shown on the plan

spillway calculation provided in appendix. based upon the undetained rational flow. the type of protection has been added to the plan.
The protection spec sheet has been added to the appendix.

Review 1:
label the spillway and protection and provide design analysis of the spillway conveying the undetained rational flow and the protection down the embankment.

Review 2: Please identify the protection required/provided. If erosion control blanket is proposed, then provide the spec sheet in the drainage report showing the capacity of the ECB proposed to demonstrate that it meets the design calculation.

review 1:
please label the proposed stilling basins with proposed specifications throughout the plans and provide design analysis
Review 2: Unresolved. Provide the nomograph/detail used for the design of the stilling basin in the report. Additionally identify the riprap size.

The detail has and will continue to be provided in the plans
The appropriate callouts have been added to this sheet which specify the construction materials/sizes.
The standard detail is provided in the plans, is no also included in the report. This is a standardized detail based upon pipe size.
There is no additional analyzing required.

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

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

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212 N. WAHSATCH AVE., STE 305
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PHONE: 719.955.5485

CLEARWAY, LOT 5

PROPOSED DRAINAGE MAP

PROJECT NO. 44-042
DESIGNED BY: DLM
DRAWN BY: TAU
CHECKED BY: VAS
SCALE: HORIZONTAL: 1"=30' VERTICAL: N/A
DATE: 09/08/2022
SHEET 1 OF 1
PDM