



**Final Drainage Report Addendum
Peaceful Ridge at Fountain Valley Subdivision
El Paso County, Colorado**

June 2023

HR Green Project No: 2302308

Prepared For:

Peaceful Ridge Development Company

Contact: J. Ryan Watson

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Colorado Springs, CO 80911

Prepared By:

HR Green Development, LLC

Contact: Colleen Monahan, PE

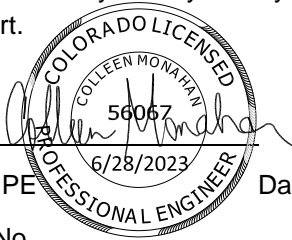
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PCD File No. CDR-22-015

Engineer's Statement:

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




Colleen Monahan, PE Date
State of Colorado No.

For and on behalf of HR Green Development, LLC

Owner/Developer's Statement:

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

By: 

Authorized Signature

June 29th, 2023

Date

Address: Peaceful Ridge Development Company
3 Widefield Boulevard
Colorado Springs, CO 80911

El Paso County Statement

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

Joshua Palmer, P.E. Date
County Engineer/ECM Administrator
Conditions:



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I. General Purpose, Location and Description

a. Purpose

The purpose of this Final Drainage Report (FDR) for Peaceful Ridge at Fountain Valley is to describe the onsite and offsite drainage patterns, size drainage infrastructure to safely capture and convey developed runoff to water quality and detention facilities, and to safely route detained stormwater to adequate outfalls.

b. Location

Peaceful Ridge at Fountain Valley, referred to as 'the site' herein, is to be developed as a single-family residential subdivision. The site lies within the Southeast ¼ Section 15, Township 15 South, Range 65 West of the 6th Principal Meridian, in El Paso County, Colorado. The property is approximately 60.14 acres of which 2.34 acres was dedicated as additional right-of-way along Marksheffel Road. The site is bound to the north by unplatted land which will be future Bradley Ridge subdivision, to the east by Marksheffel Road, to the south by Cottonwood Meadows Filing No. 3 and to the west by unplatted land. A vicinity map is presented in Appendix A.

c. Description of Property

The property is currently undeveloped and platted as Peaceful Ridge at Fountain Valley subdivision with 255 single-family lots, a detention basin tract and roadway rights-of-way. The construction plans for the overall site were previously approved by the County and are being refreshed to current County and District standards. With the update, three lots will be incorporated into the detention basin tract. Access to the development will be provided at Marksheffel Road at the northeast corner of the site with the construction of Peaceful Ridge Drive. Secondary access will be provided with the extension of Sleepy Meadows Drive at the southwest corner of the site.

The site generally slopes to the southeast at approximately 6%. There are no major drainageways or irrigation facilities that traverse the site. The vegetation consists primarily of native grasses and weeds. Per a NRCS web soil survey, the site's soil is comprised of Kim Loam (#43) which is classified within Hydrologic Soil Group B. A small portion of the site consists of Nelson-Tassel Fine Sandy Loams, Razor-Midway Complex and Stoneham Sandy Loam. These soils are classified as Hydrologic Soil Groups C and D.

There are no existing utilities on the site, however there are existing utilities in Marksheffel right-of-way adjacent to the east side of the site, including watermain, sanitary sewer, storm sewer, fiber optic, electric lines.

d. Floodplain Statement

Based on FEMA FIRM 08041C0957G December 7, 2018, the site is Zone X, which are areas determined to be outside the 0.2% annual chance flood. The map has been presented in Appendix A.

II. Drainage Design Criteria

a. Drainage Criteria

Hydrologic data and calculations were performed using Drainage Criteria Manual Volume 1 of El Paso County (EPCDCM), with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs Drainage Criteria Manual (CCSDCM), May 2014 revised January 2021.

Onsite drainage improvements are designed for the 5-year storm (minor event) and 100-year storm (major event) using rainfall values from CCSDCM Table 6-2 below. Runoff was calculated per CCSDCM Section 6.3.0 - Rational Method. 5-year and 100-year runoff coefficients were determined from Table 6-6 of the CCSDCM Vol. 1. Private, full spectrum pond design was completed using the latest version of Mile High Flood District's (MHFD) UD-Detention per CCSDCM Section 13.3.2.1 – Private, full spectrum Detention. The detention pond allowable release rate will be limited to less than historic rates.

Return Period (yr)	5	100
1-hr Rainfall Depth (in)	1.50	2.52

Inlets were sized per the methods described in EPCDCM Section III Chapter 7 – Street Drainage and Storm Water Inlets. Storm sewer was sized per the methods described in EPCDCM Section III Chapter 8 – Storm Drains and Appurtenances.

III. Drainage Basins and Subbasins

a. Previous Drainage Studies

The site is located within the Jimmy Camp Creek Drainage Basin. The site's drainage characteristics were previously studied in the following reports:

1. "Final Drainage Report for Cottonwood Meadows, Filing No. 1," prepared by HMS Group, LLC, approved November 4, 1999.
2. "Final Drainage Report for Cottonwood Meadows, Filings No. 2 and 3," prepared by HMS Group, LLC, approved May 31, 2000.
3. "Preliminary and Final Drainage Report, Peaceful Ridge at Fountain Valley Subdivision," prepared by Kiowa Engineering Corporation, approved October 17, 2006.
4. "Early Grading Drainage Report, Peaceful Ridge at Fountain Valley Subdivision," prepared by Kiowa Engineering Corporation, approved July 14, 2022. EGP-21-003.

According to the Cottonwood Meadows drainage reports, historic offsite Basin H-3 which consists of the western and southern portion of the site and a portion to the west of the site drained in a southeasterly direction onto the Cottonwood Meadows site prior to the development of Cottonwood Meadows. A trapezoidal channel in the back of the lots along the northern boundary line was constructed with the development of the Cottonwood Meadows property that now directs this offsite runoff to the east to Marksheffel Road. In the current condition, a total of $Q_5 = 21$ cfs $Q_{100} = 62$ cfs from Basin H-3 drains to the trapezoidal channel and discharges to the northeast corner of the Cottonwood Meadows development. According to the Cottonwood Meadows drainage reports, only historic runoff will be allowed to discharge to the trapezoidal channel. See Basin D-1 description for proposed runoff conditions to the existing trapezoidal channel.

b. Existing Subbasin Description

Basin E-1 contains approximately 27.76 acres of the northern portion of the site. Approximately $Q_5 = 16.4$ cfs $Q_{100} = 41.5$ cfs generated from this basin sheet flows to the east to a roadside ditch along Marksheffel Road. Runoff collected in this ditch travels to an existing 7' x 4' concrete box culvert. Runoff intercepted by this culvert is directed under Marksheffel Road to the east and ultimately discharges to Jimmy Camp Creek.

Basin E-2 contains approximately 33.34 acres of the southern portion of the site. Approximately $Q_5 = 18.6$ cfs $Q_{100} = 46.3$ cfs generated from this basin sheet flows in a southeasterly direction along the south boundary line. Runoff collected in the channel travels to the east to Marksheffel Road and discharges into the roadway corridor west side ditch. A portion of these flows ($Q_{100} = 31$ cfs per the Cottonwood Meadows F2 and F3 FDR) to the existing trapezoidal channel along the northern property boundary of the Cottonwood Meadows subdivision prior to entering into the roadside ditch along Marksheffel. This is the historic drainage condition for the basin per the Early Grading Drainage Report, Peaceful Ridge at Fountain Valley Subdivision (EGP FDR) and per the Cottonwood Meadows F2 and F3 FDR to route the site's flows around the Cottonwood Meadows Subdivision. However, the existing channel has been encroached upon by the Cottonwood Meadows homeowners and is potentially unstable.

Basin OS-1 contains approximately 32.60 acres north of the site. Approximately $Q_5 = 23.0$ cfs $Q_{100} = 16.4$ cfs generated from this basin sheet flows in an easterly and southeasterly direction to the roadside ditch along Marksheffel. Runoff from this basin does not enter the site until it nearly reaches Marksheffel Road. Runoff channel flows to the south to an existing 7' x 4' concrete box culvert.

Basin OS-2 contains approximately 3.05 acres west of the site. Approximately $Q_5 = 2.3$ cfs $Q_{100} = 6.0$ cfs generated from this basin sheet flows in a southeasterly direction to Sleep Meadows Drive. Runoff gutter flows to the south towards Fontaine Boulevard.

Basin OS-3 contains approximately 13.50 acres north of the site along Marksheffel Road. Approximately $Q_5 = 11.1$ cfs $Q_{100} = 28.6$ cfs generated from this basin sheet flows in a southeasterly direction to the roadside ditch along Marksheffel. Runoff gutter flows to the south towards Fontaine Boulevard. Runoff channel flows to the south to an existing 7' x 4' concrete box culvert that is under capacity due to shallow slopes. The existing 24" culvert located in Basin OS-3 north of the Peaceful Ridge Drive and Marksheffel intersection will be removed. A proposed 24" FES will replace the culvert and tie into existing 48" storm sewer within Marksheffel Road that has the capacity necessary to handle proposed flows.

Basin OS-4 contains approximately 9.38 acres west and south of the site. Approximately $Q_5 = 6.9$ cfs $Q_{100} = 18.4$ cfs from this basin accumulate in a broad natural channel which convey runoff to the south and away from the site. Some flows enter the west side borrow ditch for Sleepy Meadows Drive at a point several hundred feet south of the site. Some of these flows enter the Fontaine Boulevard Roadway Corridor, and some of these flows enter the FMIC Ditch. Basin OS-4 is raw land and is heavily vegetated with native grasses and weeds.

c. Proposed Subbasin Description

Basin OS-1 will remain as described in the existing condition of Basin OS2, with 3.05 acres. Stormwater ($Q_5 = 1.4$ cfs $Q_{100} = 9.5$ cfs) will drain into Basin C1 and is captured by onsite storm sewer.

Basin A0 is 1.73 acres of proposed single family residential rear lots. Stormwater ($Q_5 = 4.4$ cfs $Q_{100} = 8.7$ cfs) sheets flows across the rear of lots to DP1 within Bradley Ridge. Flows are captured within Bradley Ridge and conveyed to Pond 3. The Bradley Ridge drainage map is presented in Appendix E. Basin A0 is synonymous with Bradley Ridge Basin OS-3. Coordination is ongoing with Bradley Ridge to ensure the limits of Basin A0 are consistent. Per the approved EGP, Water Quality treatment for this basin is achieved by Infiltration Reduction Factoring within the rear yard areas. Calculations supporting treatment are presented in the IRF spreadsheet in Appendix B. As of the date of this report, Pond 3 is being constructed as a temporary sediment basin and will function as intended in the interim condition until final construction.

Basin A0.1 is 0.91 acres of proposed single family residential rear lots. Stormwater ($Q_5 = 2.2$ cfs $Q_{100} = 4.4$ cfs) sheets flows across the rear of lots to DP21. Flows are captured in a 24" FES at DP21 and piped to an existing 48" RCP storm sewer that already exists under Marksheffel Road. Flows from there continue to Jimmy Camp creek in existing storm sewer. Per the approved EGP, Water Quality treatment for this basin is achieved by Infiltration Reduction Factoring within the rear yard areas. Calculations supporting treatment are presented in the IRF spreadsheet in Appendix B.

Basin A1 is 2.62 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 5.0$ cfs $Q_{100} = 10.0$ cfs) is conveyed in curb and gutter to DP3. Flows at DP3 are captured in a 20' Type R inlet (Public) and piped to Pond A.

Basin A2 is 3.61 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 6.9$ cfs $Q_{100} = 13.9$ cfs) is conveyed in curb and gutter to DP4. Flows at DP4 are captured in a 15' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 2.5$ cfs bypass DP4 and continue south to DP5.

Basin B1 is 4.88 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 11.0$ cfs $Q_{100} = 22.0$ cfs) is conveyed in curb and gutter to DP5. Flows at DP5 are captured in a 20' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 5.8$ cfs bypass DP5 and continue south to DP15.

Basin B2 is 4.68 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 9.6$ cfs $Q_{100} = 19.3$ cfs) is conveyed in curb and gutter to DP15. Flows at DP15 are captured in a 15' Type R inlet (Public) and piped to Pond A. A total of $Q_5 = 0.7$ cfs, $Q_{100} = 8.5$ cfs bypass DP15 and continue south to DP16.

Basin B2.1 is 1.29 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 2.8$ cfs $Q_{100} = 5.7$ cfs) is conveyed in curb and gutter to DP16. Flows at DP16 are captured in a 15' Type R sump inlet (Public) and piped to Pond A.

Basin B3 is 4.88 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 9.4$ cfs $Q_{100} = 19.0$ cfs) is conveyed in curb and gutter to DP14. Flows at DP14 are captured in a 20' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 3.7$ cfs bypass DP14 and continue east to DP16.

Basin B4 is 4.66 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 9.8$ cfs $Q_{100} = 19.6$ cfs) is conveyed in curb and gutter to DP13. Flows at DP13 are captured in a 20' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 4.3$ cfs bypass DP13 and continue east to DP14.

Basin B5 is 5.93 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 11.9$ cfs $Q_{100} = 23.9$ cfs) is conveyed in curb and gutter to DP12. Flows at DP12 are captured in a 20' Type R inlet (Public) and piped to Pond A. A total of $Q_5 = 0.1$ cfs, $Q_{100} = 6.2$ cfs bypass DP12 and continue east to DP13.

Basin B6 is 2.38 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 4.6$ cfs $Q_{100} = 9.7$ cfs) is conveyed in curb and gutter to DP10. Flows at DP10 are captured in a 10' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 0.7$ cfs bypass DP10 and continue southeast to DP11.

Basin B7 is 4.19 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 8.2$ cfs $Q_{100} = 16.4$ cfs) is conveyed in curb and gutter to DP11. Flows at DP11 are captured in a 20' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 3.8$ cfs bypass DP11 and continue southeast to DP12.

Basin B8 is 1.14 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 2.5$ cfs $Q_{100} = 5.0$ cfs) is conveyed in curb and gutter to DP9. Flows at DP9 continue in curb and gutter to DP11 and are captured in a 20' Type R inlet (Public) and piped to Pond A.

Basin B9 is 2.44 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 4.8$ cfs $Q_{100} = 9.6$ cfs) is conveyed in curb and gutter to D18. Flows at DP18 are captured in a 15' Type R sump inlet (Public) and piped to Pond A.

Basin B10 is 1.47 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 2.6$ cfs $Q_{100} = 5.3$ cfs) is conveyed in curb and gutter to D18. Flows at DP18 are captured in a 15' Type R sump inlet (Public) and piped to Pond A.

Basin B11 is 1.39 acres of drainage tract and full spectrum detention area. Stormwater ($Q_5 = 3.7$ cfs $Q_{100} = 7.4$ cfs) sheet flows directly to the pond at DP19.

Basin C1 is 3.85 acres of proposed single family residential and roadway. Stormwater ($Q_5 = 7.9$ cfs $Q_{100} = 15.9$ cfs) is conveyed in curb and gutter to DP8. Flows at DP8 are captured in a 20' Type R inlet (Public) and piped to Pond A. A total of $Q_{100} = 4.5$ cfs bypass DP8 and continue south in Sleepy Meadows Drive curb and gutter.

Basins D1 and OS-D1 are a combined 3.42 acres, of which 2.73 acres is proposed single family residential from the on-site, and 0.69 acres is off-site from the Cottonwood Meadows Subdivision swale area along the Cottonwood Meadows northerly boundary. Due to encroachment causing instability of the existing swale, a proposed swale (Swale D1) will be built along the southerly boundary of the Peaceful Ridge site within a proposed 20' drainage and no build easement. Stormwater from the 3.42 acres ($Q_5 = 5.1$ cfs $Q_{100} = 11.2$ cfs) will flow easterly in the proposed swale to DP20, where Type L riprap rundown will be provided. The flow then enters the roadside ditch along Marksheffel and continues southerly to its ultimate discharge at Jimmy Camp Creek. Water Quality Treatment for Basin D1 is achieved in the rear yard areas. Calculations are presented in Appendix B. Hydraulic analysis for the proposed Swale D1 is presented in Appendix C.

Basin D2 is 1.33 acres of proposed single family residential. Stormwater ($Q_5 = 2.4$ cfs $Q_{100} = 4.9$ cfs) sheet flows to the proposed swale along Marksheffel. Runoff intercepted by this swale will continue south to an existing 7' x 4' box culvert (DP22). Runoff intercepted by this culvert is directed under Marksheffel Road to the east and ultimately discharges to Jimmy Camp Creek. Water Quality Treatment for Basin D2 is achieved in the rear yard areas. Water quality calculations are presented in Appendix B. Hydraulic analysis for the roadside ditch is presented in Appendix C.

Basin D3 is 1.27 acres of proposed single family residential. Stormwater ($Q_5 = 2.3$ cfs $Q_{100} = 4.6$ cfs) sheet flows to the proposed swale along Marksheffel. Runoff intercepted by this swale will continue south ditch along Marksheffel to DP23 and offsite. Water Quality Treatment for Basin D3 is achieved in the rear yard areas. Water quality calculations are presented in Appendix B. Hydraulic analysis for the roadside ditch is presented in Appendix C.

Basin D4 is 0.92 acres of undeveloped area and a portion of Marksheffel Road. Stormwater ($Q_5 = 1.5$ cfs $Q_{100} = 3.6$ cfs) sheet flows to the proposed swale ditch along Marksheffel. Runoff intercepted by this swale will continue south to an existing 7' x 4' box culvert (DP22). Runoff intercepted by this culvert is directed under Marksheffel Road to the east and ultimately discharges to Jimmy Camp Creek. Per Section I.7.1.B.7 of the EPCECM Appendix I, Basin D4 can be excluded from the water quality and detention standard.

Basin D5 is 2.40 acres of undeveloped area and a portion of Marksheffel Road. Stormwater ($Q_5 = 3.3$ cfs $Q_{100} = 7.3$ cfs) sheet flows to the existing roadside ditch along Marksheffel. Runoff intercepted by this swale will continue south ditch along Marksheffel to DP23 and offsite. Per Section I.7.1.B.7 of the EPCECM Appendix I, Basin D5 can be excluded from the water quality and detention standard.

Basin D6 is 0.17 acres of Peaceful Ridge Drive. Stormwater ($Q_5 = 0.8$ cfs $Q_{100} = 1.4$ cfs) flows in curb & gutter to a riprap rundown to DP21. Flows are captured in a proposed 24" FES at DP21 and piped to existing 48" storm sewer under Marksheffel Road and ultimately to Jimmy Camp Creek. Per Section I.7.1.C.1 of the EPCECM Appendix I, Basin D6 can be excluded from the water quality and detention standard. The total paved area excluded from water quality and detention is 0.65 acres from Basins D6-D8.

Basin D7 is 0.16 acres of Peaceful Ridge Drive. Stormwater ($Q_5 = 0.7$ cfs $Q_{100} = 1.3$ cfs) flows in curb & gutter to a riprap rundown to the swale along Marksheffel. Runoff intercepted by this swale will continue south to an existing 7' x 4' box culvert (DP22). Runoff intercepted by this culvert is directed under Marksheffel Road to the east and ultimately discharges to Jimmy Camp Creek. Per Section I.7.1.C.1 of the EPCECM Appendix I, Basin D7 can be excluded from the water quality and detention standard. The total paved area excluded from water quality and detention is 0.65 acres from Basins D6-D8.

Basin D8 is 0.32 acres of Sleep Meadows Drive. Stormwater ($Q_5 = 1.1$ cfs $Q_{100} = 2.1$ cfs) flows in curb & gutter southerly offsite, per the approved EGP FDR. Per Section I.7.1.C.1 of the EPCECM Appendix I, Basin D7 can be excluded from the water quality and detention standard. The total paved area excluded from water quality and detention is 0.65 acres from Basins D6-D8.

Basin JC5 is a MDDP basin shown for reference only. The existing 24" RCP culvert that is located within this basin at the intersection of Peaceful Ridge Drive and Marksheffel Road will be removed and replaced with a 24" FES that will be rerouted into the existing 48" RCP sewer under Marksheffel Road that routes the storm flow to the same location as the 7'x4' box culvert. The 7'x4' box culvert will be continued to be used for the stormwater from the outlet of the pond and south of Peaceful Ridge Drive.

IV. Drainage Facility Design

a. General Concept

Peaceful Ridge at Fountain Valley storm water will be collected by a series on inlets and piped to an onsite, full spectrum water quality and detention pond. Basins that cannot be reasonably captured and conveyed to the detention pond have been addressed with water quality exclusions from EPCECM Appendix I. The full spectrum water quality and detention pond will discharge at less than historic rates.

b. Water Quality & Detention

Pond A

Water quality and detention for proposed Basins OS1, C1 and B1 – B11 is provided in a full spectrum water quality and detention pond: Pond A. A total of 52.46 acres at 41.6% imperviousness will be detained in the pond. The WQCV is 0.805 ac-ft, the EURV is 1.494 ac-ft, and the 100-year volume is 4.310 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 72 and 72 hours, respectively. A forebay is located at the outfall into the pond and a 2.0' trickle channel conveys flow towards the outlet structure. A 10' access and maintenance road is provided to the bottom of the pond to facilitate future maintenance. A 100' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Marksheffel Road. The spillway will be lined with Type L riprap. Pond design calculations are presented in Appendix D.

The pond's outfall will be constructed within the right-of-way for Marksheffel Road. A Work-in-the-ROW permit will be required before construction can commence.

Water quality for Basins A0, A0.1, D1, D2 & D3 will be provided by Runoff Reduction methods. Mile High Flood District's Stormwater Management Practice Design Workbook (Version 3.07, November 2016) workbook was used to calculate the reduction and is presented in Appendix B.

Water quality for Basins D6-D8 has been excluded per Section I.7.1.C.1 of the EPCECM Appendix I.

c. Inspection and Maintenance

The private detention pond is to be owned and maintained by the Peaceful Ridge at Fountain Valley HOA. Maintenance access for the full spectrum detention facilities will be provided from public Right-of-Way.

d. Four Step Method to Minimize Adverse Impacts of Urbanization

Step 1 – Reducing Runoff Volumes: Low impact development (LID) practices are utilized to reduce runoff at the source. In general, stormwater discharges are routed across pervious areas prior to capture in storm sewer. This practice promotes infiltration and reduces peak runoff rates. The Runoff Reduction Factor method was used and is presented in Appendix B.

Step 2 – Treat and slowly release the WQCV: This step utilizes full spectrum water quality and detention to capture the WQCV and slowly release runoff from the site. Onsite full spectrum detention pond provides water quality treatment for the site. The WQCV is released over a period of 40 hours while the EURV releases over a period of 72 hours. Areas that couldn't be routed to the pond will employ runoff reduction measures to achieve water quality treatment.

Step 3 – Stabilize stream channels: This step establishes practices to stabilize drainageways and provide scour protection at stormwater outfalls. Erosion protection is provided at all concentrated stormwater discharge points in the form of riprap pads.

Step 4 – Consider the need for source controls: No industrial or commercial uses are proposed within this development and therefore no source controls are proposed.

e. Drainage and Bridge Fees

Drainage basin and bridge fees for Peaceful Ridge at Fountain Valley Subdivision were paid at time of platting.

f. Opinion of Probable Cost

An engineer's opinion of probable is presented in Appendix E.

g. Hydraulic Grade Line Analysis

A hydraulic grade line analysis of the proposed storm sewer is presented in Appendix C.

V. Summary

Peaceful Ridge at Fountain Valley Subdivision lies within the Jimmy Camp Creek Drainage Basin. Water quality and detention for the site is provided in a full spectrum water quality and detention ponds. The water quality and detention pond will be maintained by the Peaceful Ridge at Fountain Valley HOA. All drainage facilities were sized per the El Paso County Drainage Criteria Manuals.

VI. Drawings

Please refer to the appendices for vicinity and drainage basin maps.

VII. References

1. City of Colorado Springs – Drainage Criteria Manual, May 2014, Revised January 2021.
2. Drainage Criteria Manual of El Paso, Colorado, October 2018.
3. El Paso County Engineering Criteria Manual, October 2020.
4. Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018.
5. “Final Drainage Report for Cottonwood Meadows, Filing No. 1,” prepared by HMS Group, LLC, approved November 4, 1999.
6. “Final Drainage Report for Cottonwood Meadows, Filings No. 2 and 3,” prepared by HMS Group, LLC, approved May 31, 2000.
7. “Preliminary and Final Drainage Report, Peaceful Ridge at Fountain Valley Subdivision,” prepared by Kiowa Engineering Corporation, approved October 17, 2006.
8. “Early Grading Drainage Report, Peaceful Ridge at Fountain Valley Subdivision,” prepared by Kiowa Engineering Corporation, approved July 14, 2022.



APPENDIX A – VICINITY MAP, SOIL MAP, FEMA MAP

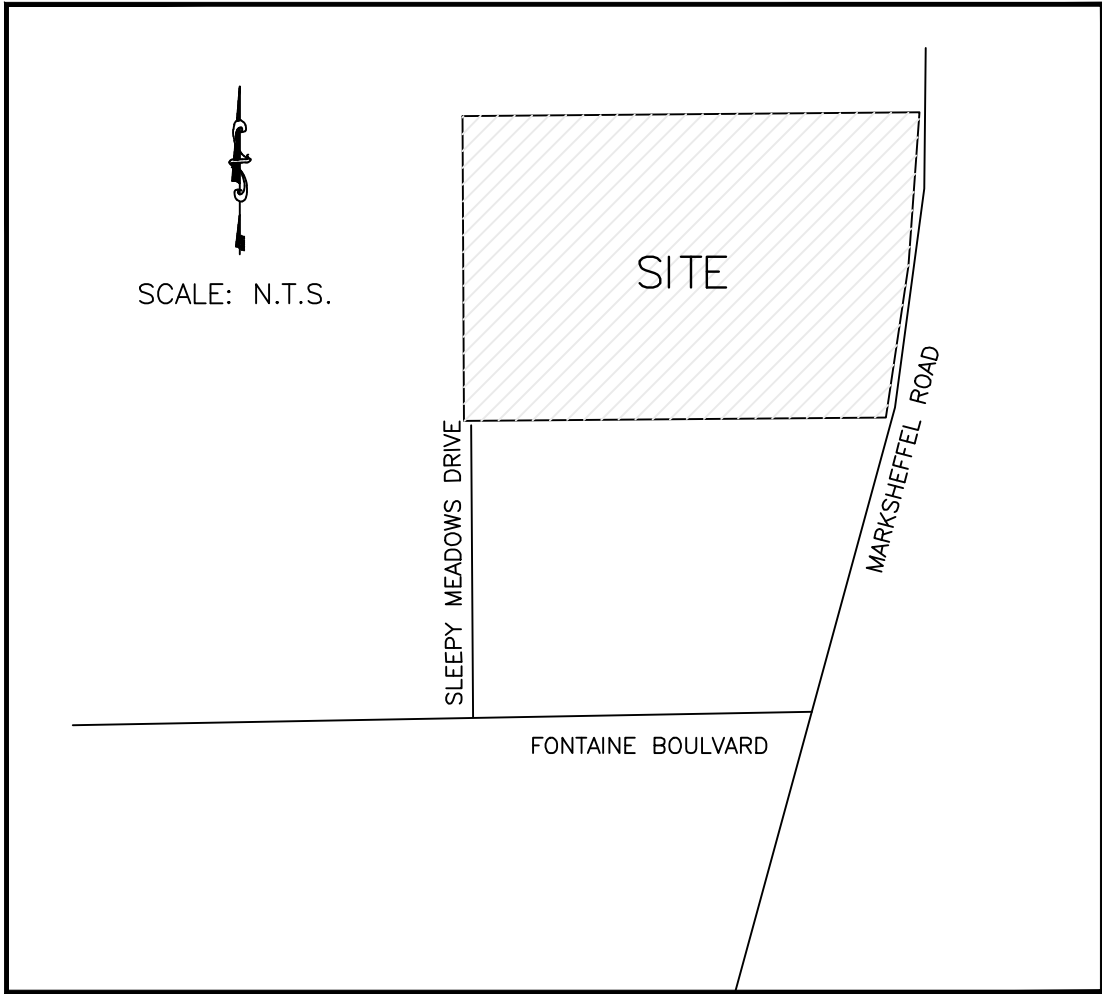
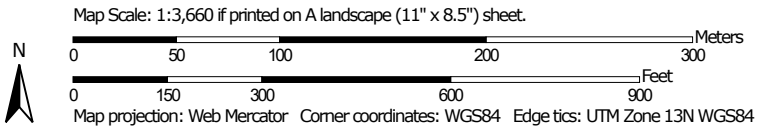


FIGURE 1
VICINITY MAP
PEACEFUL RIDGE at
FOUNTAIN VALLEY SUBDIVISION

Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 20, Sep 2, 2022

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

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
43	Kim loam, 1 to 8 percent slopes	B	57.0	88.9%
56	Nelson-Tassel fine sandy loams, 3 to 18 percent slopes	B	0.7	1.1%
75	Razor-Midway complex	D	4.5	7.0%
86	Stoneham sandy loam, 3 to 8 percent slopes	B	1.9	3.0%
Totals for Area of Interest			64.1	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.



APPENDIX B – HYDROLOGIC CALCULATIONS



PEACEFUL RIDGE	Calc'd by:	NQJ
PROPOSED CONDITIONS	Checked by:	CM
EL PASO COUNTY, COLORADO	Date:	6/28/2023

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	Q ₅ (cfs)	Q ₁₀₀ (cfs)
A0	1.73	44	4.4	8.7
A0.1	0.91	44	2.2	4.4
A1	2.62	44	5.0	10.0
A2	3.61	44	6.9	13.9
B1	4.88	44	11.0	22.0
B2	4.68	44	9.6	19.3
B2.1	1.29	44	2.8	5.7
B3	4.88	44	9.4	19.0
B4	4.66	44	9.8	19.6
B5	5.93	44	11.9	23.9
B6	2.38	44	4.9	9.7
B7	4.19	44	8.2	16.4
B8	1.14	44	2.5	5.0
B9	2.44	44	4.8	9.6
B10	1.47	44	2.6	5.3
B11	1.39	44	3.7	7.4
C1	3.85	44	7.9	15.9
OSD1	0.69	2	0.2	1.5
D1	2.73	44	5.4	10.9
D2	1.33	44	2.4	4.9
D3	1.27	44	2.3	4.6
D4	0.92	41	1.5	3.6
D5	2.40	51	3.3	7.3
D6	0.17	100	0.8	1.4
D7	0.16	100	0.7	1.3
D8	0.32	69	1.1	2.1
OS1	3.05	2	1.4	9.5
JC5	7.48	61	10.8	23.5

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ ₅ (cfs)	ΣQ ₁₀₀ (cfs)
1	A0	4.4	8.7
3	A1	5.0	10.0
4	A2	6.9	13.9
4.1	DP3 & DP4	11.5	20.7
5	B1	4.4	22.0
5.1	DP3-DP5	20.1	35.8
7	OS1	1.4	9.5
8	C1 & DP7	7.9	15.9
9	B8	2.5	5.0
10	B6	4.9	9.7
10.1	DP8 & DP10	13.5	27.4
11	B7	10.4	21.5
11.1	DP10.1 & DP11	23.5	44.3
12	B5	11.9	23.9
12.1	DP11.1 & DP12	34.4	62.5
13	B4	9.8	19.6
13.1	DP12.1 & DP13	42.7	77.2
14	B3	9.4	19.0
14.1	DP13.1 & DP14	51.8	92.2
15	B2	9.6	19.3
15.1	DP5.1 & DP15	27.5	47.9
16	B2.1	2.8	5.7
16.1	DP15.1 & DP16	30.2	66.2
17.1	DP14.1 & DP16.1	78.9	156.8
18	B9 & B10	2.6	5.3
18.1	DP17.1 & DP18	85.8	170.4
19	DP18.1 & B11	3.7	7.4
20	D1 & OSD1	5.1	11.2
21	D6 & JC5	10.8	23.5
21.1	DP21 & POND 3 OUT	21.8	87.0
22	DP21, D2, D4 & D7	13.5	125.4
22.1	DP21.1 & DP22	35.3	212.3
23	D3 & D5	5.0	10.9
24	D8	1.1	2.1



PEACEFUL RIDGE

PROPOSED CONDITIONS

EL PASO COUNTY, COLORADO

Calc'd by:

NQJ

Checked by:


CM

Date:

6/28/2023

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED	RESIDENTIAL (4.5 DU/AC)	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED			RESIDENTIAL (4.5 DU/AC)			COMPOSITE IMPERVIOUSNESS & C		
	ACRES					%I	C ₅	C ₁₀₀	%I	C ₅	C ₁₀₀	%I	C ₅	C ₁₀₀	%I	C ₅	C ₁₀₀
A0	0.00	0.00	1.73	1.73	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
A0.1	0.00	0.00	0.91	0.91	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
A1	0.00	0.00	2.62	2.62	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
A2	0.00	0.00	3.61	3.61	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B1	0.00	0.00	4.88	4.88	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B2	0.00	0.00	4.68	4.68	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B2.1	0.00	0.00	1.29	1.29	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B3	0.00	0.00	4.88	4.88	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B4	0.00	0.00	4.66	4.66	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B5	0.00	0.00	5.93	5.93	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B6	0.00	0.00	2.38	2.38	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B7	0.00	0.00	4.19	4.19	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B8	0.00	0.00	1.14	1.14	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B9	0.00	0.00	2.44	2.44	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B10	0.00	0.00	1.47	1.47	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
B11	0.00	0.01	1.38	1.39	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
C1	0.00	0.00	3.85	3.85	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
OSD1	0.69	0.00	0.00	0.69	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	2	0.09	0.36
D1	0.00	0.00	2.73	2.73	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
D2	0.00	0.00	1.33	1.33	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
D3	0.00	0.00	1.27	1.27	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	44	0.51	0.61
D4	0.55	0.37	0.00	0.92	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	41	0.42	0.60
D5	1.20	1.20	0.00	2.40	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	51	0.50	0.66
D6	0.00	0.17	0.00	0.17	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	100	0.90	0.96
D7	0.00	0.16	0.00	0.16	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	100	0.90	0.96
D8	0.10	0.22	0.00	0.32	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	69	0.65	0.77
D9	0.45	0.36	0.47	1.28	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	45	0.47	0.62
OS1	3.05	0.00	0.00	3.05	B	2	0.09	0.36	100	0.90	0.96	44	0.51	0.61	2	0.09	0.36
JC5	BASIN JC5 PER BHMD MDDP BY MATRIX			7.48											61	0.58	0.75
POND				52.46											41.6		

	PEACEFUL RIDGE	Calc'd by:	NQJ
	PROPOSED CONDITIONS	Checked by:	CM
	EL PASO COUNTY, COLORADO	Date:	6/28/2023

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T _o)			TRAVEL TIME (T _t)					TOTAL	
DESIGNATION	C _s	AREA (ac)	LENGTH (ft)	SLOPE %	t _o (min)	C _v	LENGTH (ft)	SLOPE %	V (ft/s)	t _t (min)	t _c (min)	
A0	0.51	1.73	25	25.0	1.8	20	1125	5.50	4.7	4.0	5.8	
A0.1	0.51	0.91	85	10.0	4.6	20	530	5.40	4.6	1.9	6.5	
A1	0.51	2.62	100	2.5	8.0	20	1450	5.50	4.7	5.2	13.1	
A2	0.51	3.61	90	2.5	7.6	20	1450	5.50	4.7	5.2	12.7	
B1	0.51	4.88	100	11.4	4.8	20	950	5.00	4.5	3.5	8.3	
B2	0.51	4.68	100	3.3	7.3	20	665	2.65	3.3	3.4	10.7	
B2.1	0.51	1.29	100	3.3	7.3	20	390	3.50	3.7	1.7	9.0	
B3	0.51	4.88	55	2.5	5.9	20	1350	2.90	3.4	6.6	12.5	
B4	0.51	4.66	100	3.4	7.2	20	500	2.00	2.8	2.9	10.1	
B5	0.51	5.93	100	12.0	4.7	20	1280	2.60	3.2	6.6	11.3	
B6	0.51	2.38	55	2.0	6.4	20	990	3.30	3.6	4.5	10.9	
B7	0.51	4.19	100	2.5	8.0	20	950	3.30	3.6	4.4	12.3	
B8	0.51	1.14	55	2.5	5.9	20	720	3.30	3.6	3.3	9.2	
B9	0.51	2.44	55	2.5	5.9	20	1500	4.00	4.0	6.3	12.2	
B10	0.51	1.47	55	2.5	5.9	20	1100	1.00	2.0	9.2	15.1	
B11	0.51	1.39	25	25.0	1.8	20	300	1.00	2.0	2.5	5.0	
C1	0.51	3.85	145	10.0	6.0	20	1000	3.30	3.6	4.6	10.6	
OSD1	0.09	0.69	73	13.6	6.6	15	1680	4.60	3.2	8.7	15.3	
D1	0.51	2.73	75	6.5	5.0	20	1500	3.60	3.8	6.6	11.6	
D2	0.51	1.33	100	10.0	5.0	10	405	0.50	0.7	9.5	14.6	
D3	0.51	1.27	100	10.0	5.0	10	405	0.50	0.7	9.5	14.6	
D4	0.42	0.92	50	15.0	3.6	10	360	0.50	0.7	8.5	12.1	
D5	0.50	2.40	50	15.0	3.2	10	930	0.50	0.7	21.9	25.1	
D6	0.90	0.17	17	2.0	1.2	20	350	1.00	2.0	2.9	5.0	
D7	0.90	0.16	17	2.0	1.2	20	350	1.00	2.0	2.9	5.0	
D8	0.65	0.32	17	2.0	2.7	20	200	4.50	4.2	0.8	5.0	
D9	0.47	1.28	50	2.0	6.5	10	350	1.00	1.0	5.8	12.3	
OS1	0.09	3.05	5	600.0	0.5	10	400	6.00	2.4	2.7	5.0	
JC5	0.58	7.48	BASIN OS2 PER BRADLEY RIDGE SUB. FIL NO. 1 FDR									

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L}}{S^{0.33}} \quad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C _v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*For buried riprap, select C_v value based on type of vegetative cover.



**PEACEFUL RIDGE
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR**

Calc'd by:

NQJ

Checked by:

Date:

6/28/2023

4.93404729

STREET	DESIGN POINT	BASIN ID	DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE			TRAVEL TIME			REMARKS	
			AREA (ac)	C _s	f _c (min)	C _s *A (ac)	f (in./hr.)	Q (cfs)	f _c (min)	C _s *A (ac)	f (in./hr.)	Q (cfs)	Q _{street} (cfs)	C _s *A (ac)	SLOPE %	Q _{pipe} (cfs)	C _s *A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)		TRAVEL TIME (min)
	1	A0	1.73	0.51	5.8	0.88	4.93	4.4						4.4	0.88	10.0							BASIN A0 FLOW OFFSITE TO NORTH, CAPTURED BY BRADLEY RIDGE STORM SEWER SYSTEM
		A0.1	0.91	0.51	6.5	0.46	4.77	2.2						2.2	0.46	10.0			295	6.3	0.78		BASIN A0.1 FLOW OFFSITE TO DP21
	3	A1	2.62	0.51	13.1	1.34	3.72	5.0						5.0	1.34	2.0	1.5	460	8.4	0.91		DP3 CAPTURED BY 20' TYPE R INLET, PIPE TO DP4.1	
	4	A2	3.61	0.51	12.7	1.84	3.77	6.9						6.9	1.83	2.0	1.5	35	8.4	0.07		DP4 CAPTURED BY 15' TYPE R INLET, PIPE TO DP4.1	
	4.1							14.0	3.17	3.62	11.5			11.5	3.17	2.0	2.0	400	10.2	0.65		DP4.1 FLOW, PIPE TO DP5.1	
	5	B1	4.88	0.51	8.3	2.49	4.40	11.0	8.3	2.49	4.40	11.0		11.0	2.50	2.0	1.5					DP5 CAPTURED BY 20' TYPE R INLET, PIPE TO DP5.1	
	5.1							14.7	5.67	3.55	20.1			20.1	5.67	2.5	2.5	520	13.2	0.66		DP5.1 FLOW, PIPE TO DP15.1	
	7	OS1	3.05	0.09	5.0	0.27	5.17	1.4														BASIN OS1 FLOW INTO BASIN C1	
	8	C1	3.85	0.51	10.6	1.96	4.04	7.9	10.6	2.24	4.04	9.0		9.0	2.24	2.0	1.5	455	8.4	0.90		DP8 CAPTURED BY 20' TYPE R INLET, PIPE TO DP11.1	
	9	B8	1.14	0.51	9.2	0.58	4.25	2.5														BASIN B8 FLOW @ DP9, C&G FLOW TO DP11	
		B7	4.19	0.51	12.3	2.14	3.82	8.2														BASIN B7 FLOW @ DP11	
	10	B6	2.38	0.51	10.9	1.21	4.00	4.9						5.0	1.25	2.0	1.5	95	8.4	0.19		DP10 FLOW CAPTURED BY 10' TYPE R INLET, PIPE TO DP10.1	
	10.1							11.5	3.45	3.91	13.5			13.5	3.45	2.0	1.5	90	8.4	0.18		DP10.1 FLOW, PIPE TO DP11.1	
	11							12.3	2.72	3.82	10.4			10.4	2.72	2.0	1.5	28	8.4	0.06		DP11 FLOW CAPTURED BY 20' TYPE R INLET, PIPE TO DP11.1	
	11.1							12.4	6.17	3.81	23.5			23.5	6.17	2.0	2.5	330	11.8	0.47		DP11.1 FLOW, PIPE TO DP12.1	
	12	B5	5.93	0.51	11.3	3.02	3.94	11.9	11.3	3.02	3.94	11.9	0.1	0.03	4.0			480	4.0	2.00		DP12 BYPASS FLOW, C&G TO DP13	
														11.8	2.99	2.0	1.5	28	8.4	0.06		DP12 FLOW CAPTURED BY 20' TYPE R INLET, PIPE TO DP12.1	
	12.1							12.8	9.16	3.75	34.4			34.4	9.16	4.0	2.5	530	16.7	0.53		COMBINED DP11.1 & DP12, PIPE TO DP13.1	
	13	B4	4.66	0.51	10.1	2.38	4.11	9.8	10.1	2.41	4.11	9.9		9.9	2.41	2.0	1.5	30	8.4	0.06		DP13 FLOW CAPTURED BY 20' TYPE R INLET, PIPE TO DP13.1	
	13.1							13.4	11.57	3.69	42.7			42.7	11.57	4.0	4.0	110	22.9	0.08		DP13.1 FLOW, PIPE TO DP14.1	
	14	B3	4.88	0.51	12.5	2.49	3.79	9.4	12.5	2.49	3.79	9.4		9.4	2.49	2.0	1.5	30	8.4	0.06		B14 CAPTURED BY 20' TYPE R INLET, PIPE TO DP14.1	
	14.1							13.5	14.06	3.68	51.8			51.8	14.06	4.0	5.0	290	26.5	0.18		DP14.1 FLOW, PIPE TO DP17.1	
	15	B2	4.68	0.51	10.7	2.39	4.03	9.6	10.7	2.39	4.03	9.6	0.7	0.18	2.0			295	2.8	1.74		DP15 BYPASS, C&G FLOW TO DP16	
														8.9	2.21	2.0	1.5	30	8.4	0.06		DP15 CAPTURED BY 15' TYPE R INLET, PIPE TO DP15.1	
	15.1							15.3	7.87	3.49	27.5			27.5	7.87	2.0	4.5	180	17.5	0.17		DP15.1 FLOW, PIPE TO DP16.1	
	16	B2.1	1.29	0.51	9.0	0.66	4.29	2.8	12.5	0.84	3.79	3.2		3.2	0.84	2.0	1.5	5	8.4	0.01		DP16 CAPTURED BY 15' TYPE R SUMP INLET, PIPE TO DP16.1	
	16.1							15.5	8.71	3.47	30.2			30.2	8.71	2.0	5.5	46	20.0	0.04		DP16.1 FLOW, PIPE TO DP17.1	
	17.1							15.6	22.77	3.47	78.9			78.9	22.77	2.0	6.0	31	21.2	0.02		DP17.1 FLOW, PIPE TO DP18.1	



**PEACEFUL RIDGE
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR**

Calc'd by:
Checked by:
Date:

NQJ

6/28/2023

4.93404729

STREET	DESIGN POINT	BASIN ID	DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE			TRAVEL TIME			REMARKS
			AREA (ac)	C _s	f _c (min)	C _s *A (ac)	f (in./hr.)	Q (cfs)	f _c (min)	C _s *A (ac)	f (in./hr.)	Q (cfs)	Q _{street} (cfs)	C _s *A (ac)	SLOPE %	Q _{pipe} (cfs)	C _s *A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	
		B9	2.44	0.51	12.2	1.24	3.84	4.8														BASIN B9 FLOW @ DP18
	18	B10	1.47	0.51	15.1	0.75	3.51	2.6	15.1	1.99	3.51	7.0			7.0	1.99						DP18 CAPTURED BY 15' TYPE R SUMP INLET, PIPE TO DP18.1
	18.1								15.6	24.77	3.46	85.8										DP18.1 FLOW, PIPE TO DP19
	19	B11	1.39	0.51	5.0	0.71	5.17	3.7	15.6	25.48	3.46	88.3										TOTAL FLOW ENTERING ON-SITE WQ & DETENTION POND
		OSD1	0.69	0.09	15.3	0.06	3.49	0.2														BASIN OSD1 FLOW INTO SWALE D1 TO DP20
		D1	2.73	0.51	11.6	1.39	3.91	5.4														BASIN D1 FLOW INTO SWALE D1 TO DP20
	20								15.3	1.45	3.49	5.1										DP20, FOLLOW HISTORIC DRAINAGE PATTERNS IN REAR LOT SWALE D-1
		D2	1.33	0.51	14.6	0.68	3.56	2.4														BASIN D2 FLOW @ DP22
		D3	1.27	0.51	14.6	0.65	3.56	2.3														BASIN D3 FLOW @ DP23
		D4	0.92	0.42	12.1	0.38	3.85	1.5														BASIN D4 FLOW @ DP22
		D5	2.40	0.50	25.1	1.19	2.75	3.3														BASIN D5 FLOW @ DP23
		D6	0.17	0.90	5.0	0.15	5.17	0.8														BASIN D6 FLOW @ DP21
		D7	0.16	0.90	5.0	0.14	5.17	0.7														BASIN D7 FLOW @ DP22
	21	JC5	7.48	0.58	-	-	-	10.8				13.8										DP21 FLOW (BASIN A0.1, D6 & JC5) CAPTURED BY TYPE C INLET, PIPE TO DP21.1
	21.1											21.8										COMBINED DP21 & POND 3 DISCHARGE, PIPE TO DP22.1 (EX STORM SEWER)
	22								14.6	1.20	3.56	13.5										DP22 FLOW, CAPTURED BY EX 7' X 4' RCBC, PIPE TO EX STORM SEWER
	22.1											35.3										DP22.2 FLOW, EX STORM SEWER FLOW EAST TO JIMMY CAMP CREEK
	23								25.1	1.84	2.75	5.0										DP23 FLOW, FOLLOW HISTORIC DRAINAGE PATTERNS IN ROADSIDE DITCH ALONG MARKSHEFFEL
	24	D8	0.32	0.65	5.0	0.21	5.17	1.1	5.0	0.21	5.17	1.1										DP24 FLOW, FLOW SOUTH OFFSITE TO SLEEPY MEADOWS DRIVE C&G



PEACEFUL RIDGE
PROPOSED CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by: NQJ
Checked by:
Date: 6/28/2023

STREET	BASIN ID	AREA (ac)	DIRECT RUNOFF					TOTAL RUNOFF					OVERLAND			PIPE			TRAVEL TIME			REMARKS	
			C ₁₀₀	f _c (min)	C ₁₀₀ *A (ac)	f (in./hr.)	Q (cfs)	f _c (min)	C ₁₀₀ *A (ac)	f (in./hr.)	Q (cfs)	Q _{street} (cfs)	C ₁₀₀ *A (ac)	SLOPE %	Q _{PIPE} (cfs)	C ₁₀₀ *A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)		
	1	A0	1.73	0.61	5.8	1.06	8.28	8.7					8.7	1.06	10.0								BASIN A0 FLOW OFFSITE TO NORTH, CAPTURED BY BRADLEY RIDGE STORM SEWER SYSTEM
		A0.1	0.91	0.61	6.5	0.56	8.01	4.4					4.4	0.56	10.0				295	6.3	0.78		BASIN A0.1 FLOW OFFSITE TO DP21
	3	A1	2.62	0.61	13.1	1.60	6.25	10.0								10.0	1.60	2.0	1.5	460	8.4	0.91	DP3 CAPTURED BY 20' TYPE R INLET, PIPE TO DP4.1
	4	A2	3.61	0.61	12.7	2.20	6.33	13.9								11.4	1.80	2.0	1.5	350	2.8	2.06	DP4 BYPASS FLOW, C&G FLOW TO DP5
																				35	8.4	0.07	DP4 CAPTURED BY 15' TYPE R INLET, PIPE TO DP4.1
	4.1							14.0	3.40	6.08	20.7					20.7	3.40	2.0	2.0	400	10.2	0.65	DP4.1 FLOW, PIPE TO DP5.1
													5.8	0.78	2.0					670	2.8	3.95	DP5 BYPASS FLOW, C&G FLOW TO DP15
	5	B1	4.88	0.61	8.3	2.98	7.39	22.0	8.3	3.38	7.39	25.0				19.2	2.60	2.0	1.5				DP5 CAPTURED BY 20' TYPE R INLET, PIPE TO DP5.1
	5.1							14.7	6.00	5.96	35.8					35.8	6.00	2.5	2.5	520	13.2	0.66	DP5.1 FLOW, PIPE TO DP15.1
	7	OS1	3.05	0.36	5.0	1.10	8.68	9.5															BASIN OS1 FLOW INTO BASIN C1
	8	C1	3.85	0.61	10.6	2.35	6.78	15.9	10.6	3.45	6.78	23.4				18.4	2.71	2.0	1.5	455	8.4	0.90	DP8 BYPASS FLOW, C&G FLOW TO DP24
																							DP8 CAPTURED BY 20' TYPE R INLET, PIPE TO DP11.1
	9	B8	1.14	0.61	9.2	0.70	7.14	5.0															BASIN B8 FLOW @ DP9, C&G FLOW TO DP11
		B7	4.19	0.61	12.3	2.56	6.41	16.4															BASIN B7 FLOW @ DP11
	10	B6	2.38	0.61	10.9	1.45	6.71	9.7								9.0	1.34	2.0	1.5	50	2.8	0.29	DP10 BYPASS FLOW, C&G FLOW TO DP11
													0.7	0.11	2.0					95	8.4	0.19	DP10 FLOW CAPTURED BY 10' TYPE R INLET, PIPE TO DP10.1
	10.1							11.5	4.17	6.57	27.4					27.4	4.17	2.0	1.5	90	8.4	0.18	DP10.1 FLOW, PIPE TO DP11.1
	11							12.3	3.36	6.41	21.5					17.7	2.76	2.0	1.5	280	4.0	1.17	DP10 BYPASS FLOW, C&G TO DP12
													3.8	0.60	4.0					28	8.4	0.06	DP11 FLOW CAPTURED BY 20' TYPE R INLET, PIPE TO DP11.1
	11.1							12.4	6.93	6.39	44.3					44.3	6.93	2.0	2.5	330	11.8	0.47	DP11.1 FLOW, PIPE TO DP12.1
	12	B5	5.93	0.61	11.3	3.62	6.62	23.9	13.5	4.22	6.18	26.0				19.8	3.21	2.0	1.5	480	4.0	2.00	DP12 BYPASS FLOW, C&G TO DP13
													6.2	1.01	4.0					28	8.4	0.06	DP12 FLOW CAPTURED BY 20' TYPE R INLET, PIPE TO DP12.1
	12.1							13.6	10.14	6.17	62.5					62.5	10.14	4.0	2.5	530	16.7	0.53	COMBINED DP11.1 & DP12, PIPE TO DP13.1
	13	B4	4.66	0.61	10.1	2.84	6.90	19.6	15.5	3.85	5.83	22.5				18.2	3.12	2.0	1.5	110	4.0	0.46	DP13 BYPASS, C&G TO DP14
													4.3	0.73	4.0					30	8.4	0.06	DP13 FLOW CAPTURED BY 20' TYPE R INLET, PIPE TO DP13.1
	13.1							15.6	13.26	5.82	77.2					77.2	13.26	4.0	4.0	110	22.9	0.08	DP13.1 FLOW, PIPE TO DP14.1
	14	B3	4.88	0.61	12.5	2.98	6.37	19.0	16.0	3.71	5.76	21.3				17.6	2.76	2.0	1.5	295	2.8	1.74	B14 BYPASS, C&G TO DP16
													3.7	0.94	2.0					30	8.4	0.06	B14 CAPTURED BY 20' TYPE R INLET, PIPE TO DP14.1
	14.1							16.0	16.02	5.76	92.2					92.2	16.02	4.0	5.0	290	26.5	0.18	DP14.1 FLOW, PIPE TO DP17.1
	15	B2	4.68	0.61	10.7	2.85	6.77	19.3	12.3	3.63	6.41	23.3				14.8	2.19	2.0	1.5	295	2.8	1.74	DP15 BYPASS, C&G FLOW TO DP16
													8.5	1.45	2.0					30	8.4	0.06	DP15 CAPTURED BY 15' TYPE R INLET, PIPE TO DP15.1
	15.1							15.3	8.19	5.85	47.9					47.9	8.19	2.0	4.5	180	17.5	0.17	DP15.1 FLOW, PIPE TO DP16.1
	16	B2.1	1.29	0.61	9.0	0.79	7.20	5.7	17.7	3.18	5.49	17.5				17.5	3.18	2.0	1.5	5	8.4	0.01	DP16 CAPTURED BY 15' TYPE R SUMP INLET, PIPE TO DP16.1
	16.1							15.5	11.36	5.83	66.2					66.2	11.36	2.0	5.5	46	20.0	0.04	DP16.1 FLOW, PIPE TO DP17.1
	17.1							16.1	27.38	5.73	156.8					156.8	27.38	2.0	6.0	31	21.2	0.02	DP17.1 FLOW, PIPE TO DP18.1



PEACEFUL RIDGE
PROPOSED CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by: NQJ
Checked by:
Date: 6/28/2023

STREET	BASIN ID	DIRECT RUNOFF							TOTAL RUNOFF				OVERLAND			PIPE			TRAVEL TIME		REMARKS
		AREA (ac)	C ₁₀₀	f _c (min)	C ₁₀₀ *A (ac)	f (in./hr.)	Q (cfs)	f _c (min)	C ₁₀₀ *A (ac)	f (in./hr.)	Q (cfs)	Q _{street} (cfs)	C ₁₀₀ *A (ac)	SLOPE %	Q _{PIPE} (cfs)	C ₁₀₀ *A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	
	B9	2.44	0.61	12.2	1.49	6.44	9.6														BASIN B9 FLOW @ DP18
18	B10	1.47	0.61	15.1	0.90	5.90	5.3	15.1	2.39	5.90	14.1			14.1	2.39						DP18 CAPTURED BY 15' TYPE R SUMP INLET, PIPE TO DP18.1
18.1								16.2	29.77	5.72	170.4										DP18.1 FLOW, PIPE TO DP19
19	B11	1.39	0.61	5.0	0.85	8.68	7.4	16.2	30.62	5.72	175.2										TOTAL FLOW ENTERING ON-SITE WQ & DETENTION POND
	OSD1	0.69	0.36	15.3	0.25	5.86	1.5														BASIN OSD1 FLOW INTO SWALE D1 TO DP20
	D1	2.73	0.61	11.6	1.67	6.56	10.9														BASIN D1 FLOW INTO SWALE D1 TO DP20
20								15.3	1.91	5.86	11.2										DP20 FLOW (SWALE D-1)
	D2	1.33	0.61	14.6	0.81	5.98	4.9														BASIN D2 FLOW @ DP22
	D3	1.27	0.61	14.6	0.77	5.98	4.6														BASIN D3 FLOW @ DP23
	D4	0.92	0.60	12.1	0.55	6.46	3.6														BASIN D4 FLOW @ DP22
	D5	2.40	0.66	25.1	1.58	4.61	7.3														BASIN D5 FLOW @ DP23
	D6	0.17	0.96	5.0	0.16	8.68	1.4														BASIN D6 FLOW @ DP21
	D7	0.16	0.96	5.0	0.15	8.68	1.3														BASIN D7 FLOW @ DP22
21	JC5	7.48	0.75	-	-	-	23.5				29.4										DP21 FLOW (D6 & JC5) CAPTURED BY TYPE C INLET, PIPE TO DP21.1
21.1											87.0										COMBINED DP21 & POND 3 DISCHARGE, PIPE TO DP22.1 (EX STORM SEWER)
22								14.6	1.52	5.98	125.4										DP22 FLOW, CAPTURED BY EX 7' X 4' RCBC, PIPE TO EX STORM SEWER
22.1											212.3										DP22.2 FLOW, EX STORM SEWER FLOW EAST TO JIMMY CAMP CREEK
23								25.1	2.36	4.61	10.9										DP23 FLOW, FOLLOW HISTORIC DRAINAGE PATTERNS IN ROADSIDE DITCH ALONG MARKSHEFFEL
24	D8	0.32	0.77	5.0	0.25	8.68	2.1	10.6	0.98	6.78	6.6										DP24 FLOW, FLOW SOUTH OFFSITE TO SLEEPY MEADOWS DRIVE C&G

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: N. JOKERST
Company: HR GREEN
Date: May 2, 2023
Project: Peaceful Ridge IRF BASINS: A-0, A0.1, D-1, D-2 & D-3
Location: Widefield, CO

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.60 inches
 Depth of Average Runoff Producing Storm, d_e = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	SPA	SPA	UIA:RPA	UIA:RPA	SPA	SPA	UIA:RPA	UIA:RPA	SPA	SPA
Area ID	A-0-a	A-0-b	0-a	0-b	D-1-a	D-1-b	1-a	1-b	D-2-a	D-3-a	2-a	3-a
Downstream Design Point ID	1	21	1	21	20	20	20	20	22	23	22	23
Downstream BMP Type	None	None	None	None	None	None	None	None	None	None	None	None
DCIA (ft ²)	--	--	--	--	--	--	--	--	--	--	--	--
UIA (ft ²)	27,291	10,338	--	--	14,200	11,697	--	--	17,748	14,616	--	--
RPA (ft ²)	27,504	23,001	--	--	14,416	14,415	--	--	27,934	24,986	--	--
SPA (ft ²)	--	--	27,504	6,564	--	--	13,314	12,415	--	--	11,116	15,399
HSG A (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
HSG B (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
HSG C/D (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Average Slope of RPA (ft/ft)	0.020	0.080	--	--	0.250	0.200	--	--	0.200	0.200	--	--
UIA:RPA Interface Width (ft)	930.00	470.00	--	--	615.00	625.00	--	--	384.00	430.00	--	--

CALCULATED RUNOFF RESULTS

Area ID	A-0-a	A-0-b	0-a	0-b	D-1-a	D-1-b	1-a	1-b	D-2-a	D-3-a	2-a	3-a
UIA:RPA Area (ft ²)	54,795	33,339	--	--	28,616	26,112	--	--	45,682	39,602	--	--
L / W Ratio	0.06	0.15	--	--	0.08	0.07	--	--	0.31	0.21	--	--
UIA / Area	0.4981	0.3101	--	--	0.4962	0.4480	--	--	0.3885	0.3691	--	--
Runoff (in)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Runoff (ft ³)	0	0	0	0	0	0	0	0	0	0	0	0
Runoff Reduction (ft ³)	1137	431	1375	328	592	487	666	621	740	609	556	770

CALCULATED WQCV RESULTS

Area ID	A-0-a	A-0-b	0-a	0-b	D-1-a	D-1-b	1-a	1-b	D-2-a	D-3-a	2-a	3-a
WQCV (ft ³)	1137	431	0	0	592	487	0	0	740	609	0	0
WQCV Reduction (ft ³)	1137	431	0	0	592	487	0	0	740	609	0	0
WQCV Reduction (%)	100%	100%	0%	0%	100%	100%	0%	0%	100%	100%	0%	0%
Untreated WQCV (ft ³)	0	0	0	0	0	0	0	0	0	0	0	0

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	1	21	1	21	20	20	20	20	22	23	22	23
DCIA (ft ²)	0	0	0	0	0	0	0	0	0	0	0	0
UIA (ft ²)	27,291	10,338	27,291	10,338	25,897	25,897	25,897	25,897	17,748	14,616	17,748	14,616
RPA (ft ²)	27,504	23,001	27,504	23,001	28,831	28,831	28,831	28,831	27,934	24,986	27,934	24,986
SPA (ft ²)	27,504	6,564	27,504	6,564	25,729	25,729	25,729	25,729	11,116	15,399	11,116	15,399
Total Area (ft ²)	82,299	39,903	82,299	39,903	80,457	80,457	80,457	80,457	56,798	55,001	56,798	55,001
Total Impervious Area (ft ²)	27,291	10,338	27,291	10,338	25,897	25,897	25,897	25,897	17,748	14,616	17,748	14,616
WQCV (ft ³)	1,137	431	1,137	431	1,079	1,079	1,079	1,079	740	609	740	609
WQCV Reduction (ft ³)	1,137	431	1,137	431	1,079	1,079	1,079	1,079	740	609	740	609
WQCV Reduction (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Untreated WQCV (ft ³)	0	0	0	0	0	0	0	0	0	0	0	0

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft ²)	789,829
Total Impervious Area (ft ²)	243,573
WQCV (ft ³)	3,995
WQCV Reduction (ft ³)	3,995
WQCV Reduction (%)	100%
Untreated WQCV (ft ³)	0

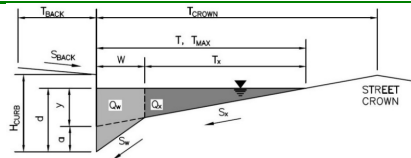


APPENDIX C – HYDRAULIC CALCULATIONS

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

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

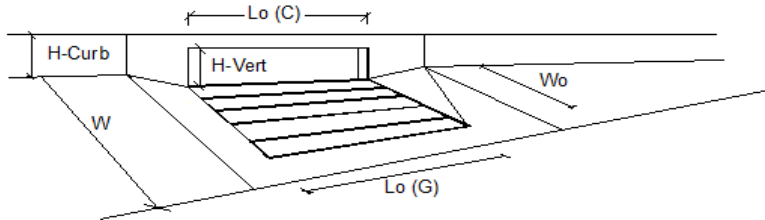
Project: PEACEFUL RIDGE
Inlet ID: DP3



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$				
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft				
Gutter Width	$W = 2.00$ ft				
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.040$ ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$T_{MAX} = 17.0$</td> <td style="text-align: center;">17.0</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$T_{MAX} = 17.0$	17.0
Minor Storm	Major Storm				
$T_{MAX} = 17.0$	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$d_{MAX} = 5.6$</td> <td style="text-align: center;">7.2</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$d_{MAX} = 5.6$	7.2
Minor Storm	Major Storm				
$d_{MAX} = 5.6$	7.2				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$Q_{allow} = 16.3$</td> <td style="text-align: center;">23.2</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$Q_{allow} = 16.3$	23.2
Minor Storm	Major Storm				
$Q_{allow} = 16.3$	23.2				
MAJOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">16.3</td> <td style="text-align: center;">23.2</td> </tr> </tbody> </table>	Minor Storm	Major Storm	16.3	23.2
Minor Storm	Major Storm				
16.3	23.2				
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.00 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.00 cfs on sheet 'Inlet Management'					

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)	
Type of Inlet	CDOT Type R Curb Opening
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$ inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$ ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$ ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f(G) = N/A$
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f(C) = 0.10$
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$	
Total Inlet Interception Capacity	$Q = 5.0$ cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$ cfs
Capture Percentage = Q_o/Q_o	$C\% = 100$ %

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP3	DP4	DP5
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows			
Minor Q_{Known} (cfs)	5.0	6.9	11.0
Major Q_{Known} (cfs)	10.0	13.9	25.0
Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.			
Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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_r (years)			
One-Hour Precipitation, P_1 (inches)			
Major Storm Rainfall Input			
Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	5.0	6.9	11.0
Major Total Design Peak Flow, Q (cfs)	10.0	13.9	25.0
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.0	2.5	5.8

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP8	DP10	DP11
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{known} (cfs)	9.0	4.9	10.4
Major Q_{known} (cfs)	22.9	9.7	21.5

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	9.0	4.9	10.4
Major Total Design Peak Flow, Q (cfs)	22.9	9.7	21.5
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	4.5	0.7	3.8

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP12	DP13	DP14
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	11.9	9.9	9.4
Major Q_{Known} (cfs)	26.0	22.5	21.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	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
Major Bypass Flow Received, Q_b (cfs)	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_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	11.9	9.9	9.4
Major Total Design Peak Flow, Q (cfs)	26.0	22.5	21.3
Minor Flow Bypassed Downstream, Q_b (cfs)	0.1	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	6.2	4.3	3.7

INLET MANAGEMENT

Worksheet Protected

INLET NAME	DP15
Site Type (Urban or Rural)	URBAN
Inlet Application (Street or Area)	STREET
Hydraulic Condition	On Grade
Inlet Type	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows	
Minor Q_{known} (cfs)	9.6
Major Q_{known} (cfs)	23.3

Bypass (Carry-Over) Flow from Upstream	
Receive Bypass Flow from:	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0
Major Bypass Flow Received, Q_b (cfs)	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_r (years)	
One-Hour Precipitation, P_1 (inches)	

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

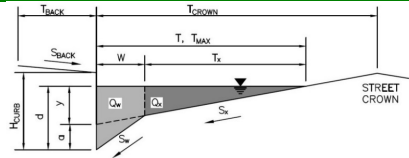
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	9.6
Major Total Design Peak Flow, Q (cfs)	23.3
Minor Flow Bypassed Downstream, Q_b (cfs)	0.7
Major Flow Bypassed Downstream, Q_b (cfs)	8.5

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

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

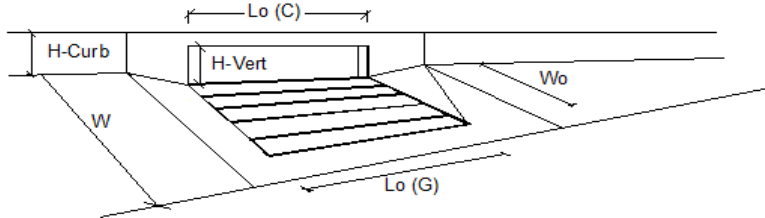
Project: PEACEFUL RIDGE
Inlet ID: DP4



Gutter Geometry:							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.040$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$T_{MAX} = 17.0$</td> <td style="text-align: center;">$T_{MAX} = 17.0$</td> </tr> <tr> <td style="text-align: center;">$d_{MAX} = 5.6$</td> <td style="text-align: center;">$d_{MAX} = 7.2$</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	$d_{MAX} = 5.6$	$d_{MAX} = 7.2$
Minor Storm	Major Storm						
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
$d_{MAX} = 5.6$	$d_{MAX} = 7.2$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </tbody> </table>	Minor Storm	Major Storm	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Minor Storm	Major Storm						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$Q_{allow} = 16.3$</td> <td style="text-align: center;">$Q_{allow} = 23.3$</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$Q_{allow} = 16.3$	$Q_{allow} = 23.3$		
Minor Storm	Major Storm						
$Q_{allow} = 16.3$	$Q_{allow} = 23.3$						
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion							
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.90 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 13.90 cfs on sheet 'Inlet Management'							

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)

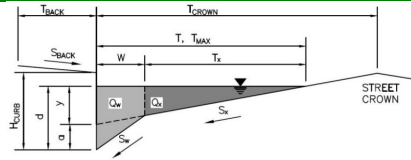


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	$a_{LOCAL} = 3.0$	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 3$	$N_o = 3$	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	$L_o = 5.00$	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	$W_o = N/A$	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f(G) = N/A$	$C_f(G) = N/A$	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f(C) = 0.10$	$C_f(C) = 0.10$	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 6.9$	$Q = 11.4$	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	$Q_b = 2.5$	cfs
Capture Percentage = Q_o/Q_o	$C\% = 100$	$C\% = 82$	%

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

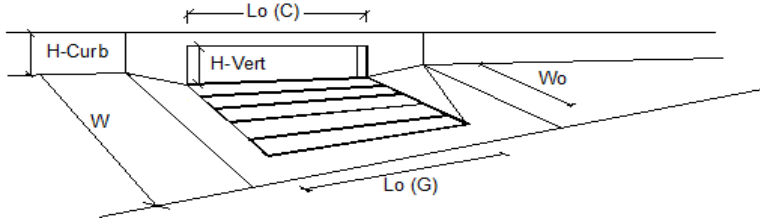
(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: PEACEFUL RIDGE
Inlet ID: DP5



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$				
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft				
Gutter Width	$W = 2.00$ ft				
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.022$ ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">$T_{MAX} = 17.0$</td> <td style="text-align: center; padding: 2px;">17.0</td> </tr> </tbody> </table> ft	Minor Storm	Major Storm	$T_{MAX} = 17.0$	17.0
Minor Storm	Major Storm				
$T_{MAX} = 17.0$	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">$d_{MAX} = 5.6$</td> <td style="text-align: center; padding: 2px;">7.2</td> </tr> </tbody> </table> inches	Minor Storm	Major Storm	$d_{MAX} = 5.6$	7.2
Minor Storm	Major Storm				
$d_{MAX} = 5.6$	7.2				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input checked="" type="checkbox"/></td> </tr> </tbody> </table>	Minor Storm	Major Storm	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Minor Storm	Major Storm				
<input type="checkbox"/>	<input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Spread Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">$Q_{allow} = 16.1$</td> <td style="text-align: center; padding: 2px;">28.2</td> </tr> </tbody> </table> cfs	Minor Storm	Major Storm	$Q_{allow} = 16.1$	28.2
Minor Storm	Major Storm				
$Q_{allow} = 16.1$	28.2				
MAJOR STORM Allowable Capacity is based on Depth Criterion					
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 11.00 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 25.00 cfs on sheet 'Inlet Management'					

INLET ON A CONTINUOUS GRADE

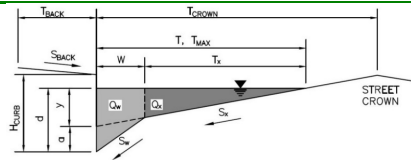


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$	4	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f (G) = N/A$	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f (C) = 0.10$	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 11.0$	19.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	5.8	cfs
Capture Percentage = Q_b/Q_o	$C\% = 100$	77	%

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

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

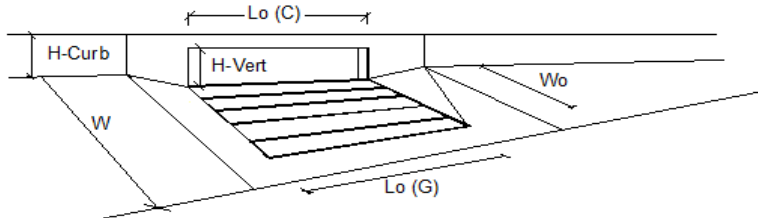
Project: PEACEFUL RIDGE
Inlet ID: DP8



Gutter Geometry:							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.033$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> </tr> </thead> <tbody> <tr> <td>$T_{MAX} =$</td> <td>17.0</td> <td>17.0</td> </tr> </tbody> </table> ft		Minor Storm	Major Storm	$T_{MAX} =$	17.0	17.0
	Minor Storm	Major Storm					
$T_{MAX} =$	17.0	17.0					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> </tr> </thead> <tbody> <tr> <td>$d_{MAX} =$</td> <td>5.6</td> <td>7.2</td> </tr> </tbody> </table> inches		Minor Storm	Major Storm	$d_{MAX} =$	5.6	7.2
	Minor Storm	Major Storm					
$d_{MAX} =$	5.6	7.2					
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/>						
MINOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Minor Storm</th> <th>Major Storm</th> </tr> </thead> <tbody> <tr> <td>$Q_{allow} =$</td> <td>17.2</td> <td>25.0</td> </tr> </tbody> </table> cfs		Minor Storm	Major Storm	$Q_{allow} =$	17.2	25.0
	Minor Storm	Major Storm					
$Q_{allow} =$	17.2	25.0					
MAJOR STORM Allowable Capacity is based on Depth Criterion							
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.00 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 22.90 cfs on sheet 'Inlet Management'							

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)

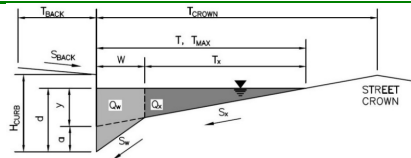


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$	4	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f (G) = N/A$	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f (C) = 0.10$	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 9.0$	18.4	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	4.5	cfs
Capture Percentage = Q_o/Q_o	$C\% = 100$	80	%

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

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

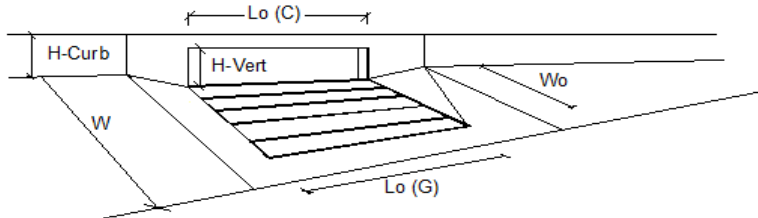
Project: PEACEFUL RIDGE
Inlet ID: DP10



Gutter Geometry:							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$						
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft						
Gutter Width	$W = 2.00$ ft						
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.022$ ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$						
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$T_{MAX} = 17.0$</td> <td style="text-align: center;">$T_{MAX} = 17.0$</td> </tr> <tr> <td style="text-align: center;">$d_{MAX} = 5.6$</td> <td style="text-align: center;">$d_{MAX} = 7.2$</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$	$d_{MAX} = 5.6$	$d_{MAX} = 7.2$
Minor Storm	Major Storm						
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$						
$d_{MAX} = 5.6$	$d_{MAX} = 7.2$						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </tbody> </table>	Minor Storm	Major Storm	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Minor Storm	Major Storm						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$Q_{allow} = 16.1$</td> <td style="text-align: center;">$Q_{allow} = 28.2$</td> </tr> </tbody> </table>	Minor Storm	Major Storm	$Q_{allow} = 16.1$	$Q_{allow} = 28.2$		
Minor Storm	Major Storm						
$Q_{allow} = 16.1$	$Q_{allow} = 28.2$						
MINOR STORM Allowable Capacity is based on Spread Criterion							
MAJOR STORM Allowable Capacity is based on Depth Criterion							
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.90 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.70 cfs on sheet 'Inlet Management'							

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)

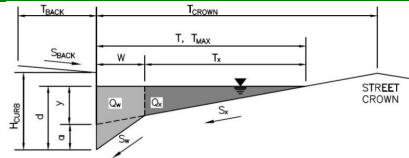


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	$a_{LOCAL} = 3.0$	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 3$	$N_o = 3$	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	$L_o = 5.00$	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	$W_o = N/A$	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f (G) = N/A$	$C_f (G) = N/A$	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f (C) = 0.10$	$C_f (C) = 0.10$	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 4.9$	$Q = 9.0$	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	$Q_b = 0.7$	cfs
Capture Percentage = Q_o/Q_o	$C\% = 100$	$C\% = 93$	%

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

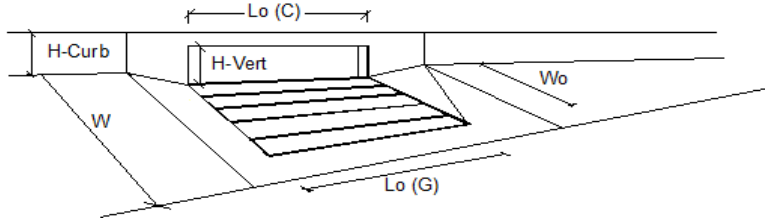
(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: PEACEFUL RIDGE
Inlet ID: DP11



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$				
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft				
Gutter Width	$W = 2.00$ ft				
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.040$ ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> </tr> </table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.2</td> </tr> </table> inches	Minor Storm	Major Storm	5.6	7.2
Minor Storm	Major Storm				
5.6	7.2				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input checked="" type="checkbox"/></td> </tr> </table>	Minor Storm	Major Storm	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Minor Storm	Major Storm				
<input type="checkbox"/>	<input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">16.3</td> <td style="text-align: center; padding: 2px;">23.6</td> </tr> </table> cfs	Minor Storm	Major Storm	16.3	23.6
Minor Storm	Major Storm				
16.3	23.6				
MAJOR STORM Allowable Capacity is based on Depth Criterion					
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 10.40 cfs on sheet 'Inlet Management'					
Major storm max. allowable capacity GOOD - greater than the design peak flow of 21.50 cfs on sheet 'Inlet Management'					

INLET ON A CONTINUOUS GRADE

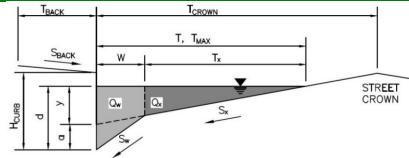


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$	4	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f (G) = N/A$	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f (C) = 0.10$	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 10.4$	17.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	3.8	cfs
Capture Percentage = Q_b/Q_o	$C\% = 100$	82	%

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

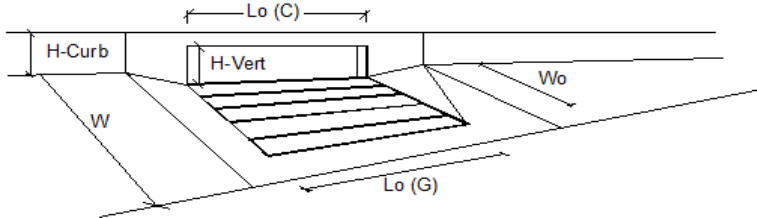
(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: PEACEFUL RIDGE
Inlet ID: DP12



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$				
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft				
Gutter Width	$W = 2.00$ ft				
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.040$ ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> </tr> </table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.6</td> </tr> </table> inches	Minor Storm	Major Storm	5.6	7.6
Minor Storm	Major Storm				
5.6	7.6				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input checked="" type="checkbox"/></td> </tr> </table>	Minor Storm	Major Storm	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Minor Storm	Major Storm				
<input type="checkbox"/>	<input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">16.3</td> <td style="text-align: center; padding: 2px;">27.9</td> </tr> </table> cfs	Minor Storm	Major Storm	16.3	27.9
Minor Storm	Major Storm				
16.3	27.9				
MAJOR STORM Allowable Capacity is based on Depth Criterion					
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 11.90 cfs on sheet 'Inlet Management'					
Major storm max. allowable capacity GOOD - greater than the design peak flow of 26.00 cfs on sheet 'Inlet Management'					

INLET ON A CONTINUOUS GRADE

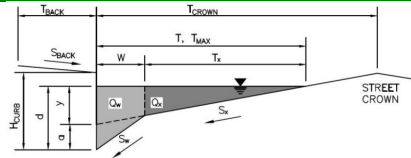


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$	4	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f (G) = N/A$	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f (C) = 0.10$	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 11.8$	19.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.1$	6.2	cfs
Capture Percentage = Q_b/Q_o	$C\% = 99$	76	%

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

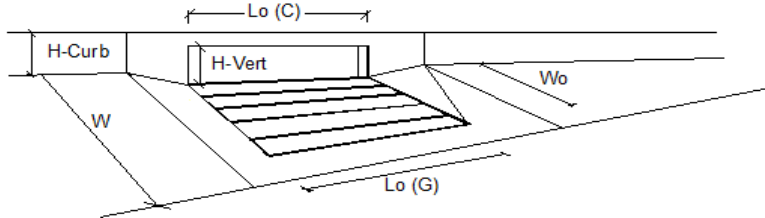
(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: PEACEFUL RIDGE
Inlet ID: DP13



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$				
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft				
Gutter Width	$W = 2.00$ ft				
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.040$ ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> </tr> </table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.6</td> </tr> </table> inches	Minor Storm	Major Storm	5.6	7.6
Minor Storm	Major Storm				
5.6	7.6				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 2px;"><input checked="" type="checkbox"/></td> </tr> </table>	Minor Storm	Major Storm	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Minor Storm	Major Storm				
<input type="checkbox"/>	<input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">16.3</td> <td style="text-align: center; padding: 2px;">27.9</td> </tr> </table> cfs	Minor Storm	Major Storm	16.3	27.9
Minor Storm	Major Storm				
16.3	27.9				
MAJOR STORM Allowable Capacity is based on Depth Criterion					
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.90 cfs on sheet 'Inlet Management'					
Major storm max. allowable capacity GOOD - greater than the design peak flow of 22.50 cfs on sheet 'Inlet Management'					

INLET ON A CONTINUOUS GRADE

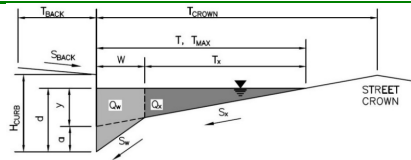


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$	4	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f (G) = N/A$	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f (C) = 0.10$	0.10	
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$			
Total Inlet Interception Capacity	$Q = 9.9$	18.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	4.3	cfs
Capture Percentage = Q_b/Q_o	$C\% = 100$	81	%

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

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

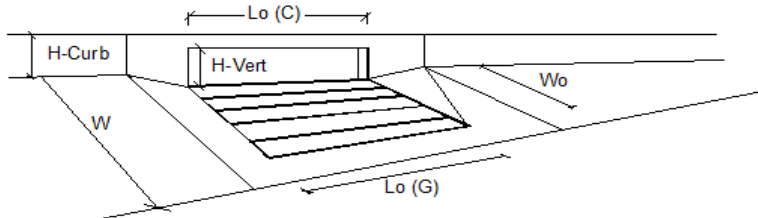
Project: PEACEFUL RIDGE
Inlet ID: DP14



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 7.5$ 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)	$n_{BACK} = 0.020$				
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches				
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft				
Gutter Width	$W = 2.00$ ft				
Street Transverse Slope	$S_x = 0.020$ 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	$S_o = 0.040$ ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.016$				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$T_{MAX} = 17.0$</td> <td style="text-align: center;">$T_{MAX} = 17.0$</td> </tr> </tbody> </table> ft	Minor Storm	Major Storm	$T_{MAX} = 17.0$	$T_{MAX} = 17.0$
Minor Storm	Major Storm				
$T_{MAX} = 17.0$	$T_{MAX} = 17.0$				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$d_{MAX} = 5.6$</td> <td style="text-align: center;">$d_{MAX} = 7.2$</td> </tr> </tbody> </table> inches	Minor Storm	Major Storm	$d_{MAX} = 5.6$	$d_{MAX} = 7.2$
Minor Storm	Major Storm				
$d_{MAX} = 5.6$	$d_{MAX} = 7.2$				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Minor Storm</th> <th style="font-size: small;">Major Storm</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">$Q_{allow} = 16.3$</td> <td style="text-align: center;">$Q_{allow} = 23.6$</td> </tr> </tbody> </table> cfs	Minor Storm	Major Storm	$Q_{allow} = 16.3$	$Q_{allow} = 23.6$
Minor Storm	Major Storm				
$Q_{allow} = 16.3$	$Q_{allow} = 23.6$				
MAJOR STORM Allowable Capacity is based on Depth Criterion					
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.40 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 21.30 cfs on sheet 'Inlet Management'					

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)

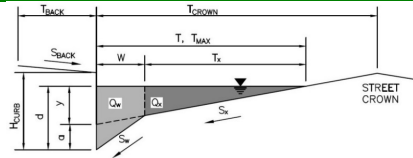


Design Information (Input)	
Type of Inlet	CDOT Type R Curb Opening
Local Depression (additional to continuous gutter depression 'a')	$a_{LOCAL} = 3.0$ inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 4$
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$ ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_o = N/A$ ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_f(G) = N/A$
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_f(C) = 0.10$
Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$	
Total Inlet Interception Capacity	$Q = 9.4$ cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$ cfs
Capture Percentage = Q_o/Q_o	$C\% = 100$ %

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

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

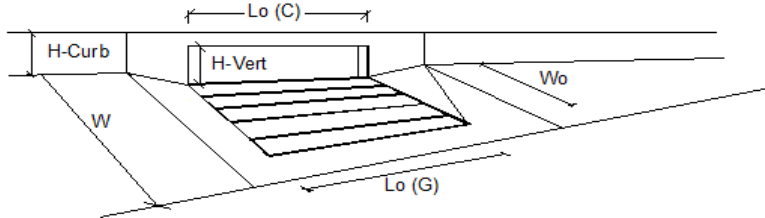
Project: PEACEFUL RIDGE
Inlet ID: DP15



Gutter Geometry:					
Maximum Allowable Width for Spread Behind Curb	T _{BACK} = 7.5 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} = 0.020				
Height of Curb at Gutter Flow Line	H _{CURB} = 6.00 inches				
Distance from Curb Face to Street Crown	T _{CROWN} = 17.0 ft				
Gutter Width	W = 2.00 ft				
Street Transverse Slope	S _x = 0.020 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 = 0.011 ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} = 0.016				
Max. Allowable Spread for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">17.0</td> <td style="text-align: center; padding: 2px;">17.0</td> </tr> </table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm				
17.0	17.0				
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">5.6</td> <td style="text-align: center; padding: 2px;">7.2</td> </tr> </table> inches	Minor Storm	Major Storm	5.6	7.2
Minor Storm	Major Storm				
5.6	7.2				
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/>				
MINOR STORM Allowable Capacity is based on Spread Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">11.4</td> <td style="text-align: center; padding: 2px;">25.8</td> </tr> </table> cfs	Minor Storm	Major Storm	11.4	25.8
Minor Storm	Major Storm				
11.4	25.8				
MAJOR STORM Allowable Capacity is based on Depth Criterion	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <th style="padding: 2px;">Minor Storm</th> <th style="padding: 2px;">Major Storm</th> </tr> <tr> <td style="text-align: center; padding: 2px;">11.4</td> <td style="text-align: center; padding: 2px;">25.8</td> </tr> </table> cfs	Minor Storm	Major Storm	11.4	25.8
Minor Storm	Major Storm				
11.4	25.8				
Minor storm max. allowable capacity GOOD - greater than the design peak flow of 9.60 cfs on sheet 'Inlet Management' Major storm max. allowable capacity GOOD - greater than the design peak flow of 23.30 cfs on sheet 'Inlet Management'					

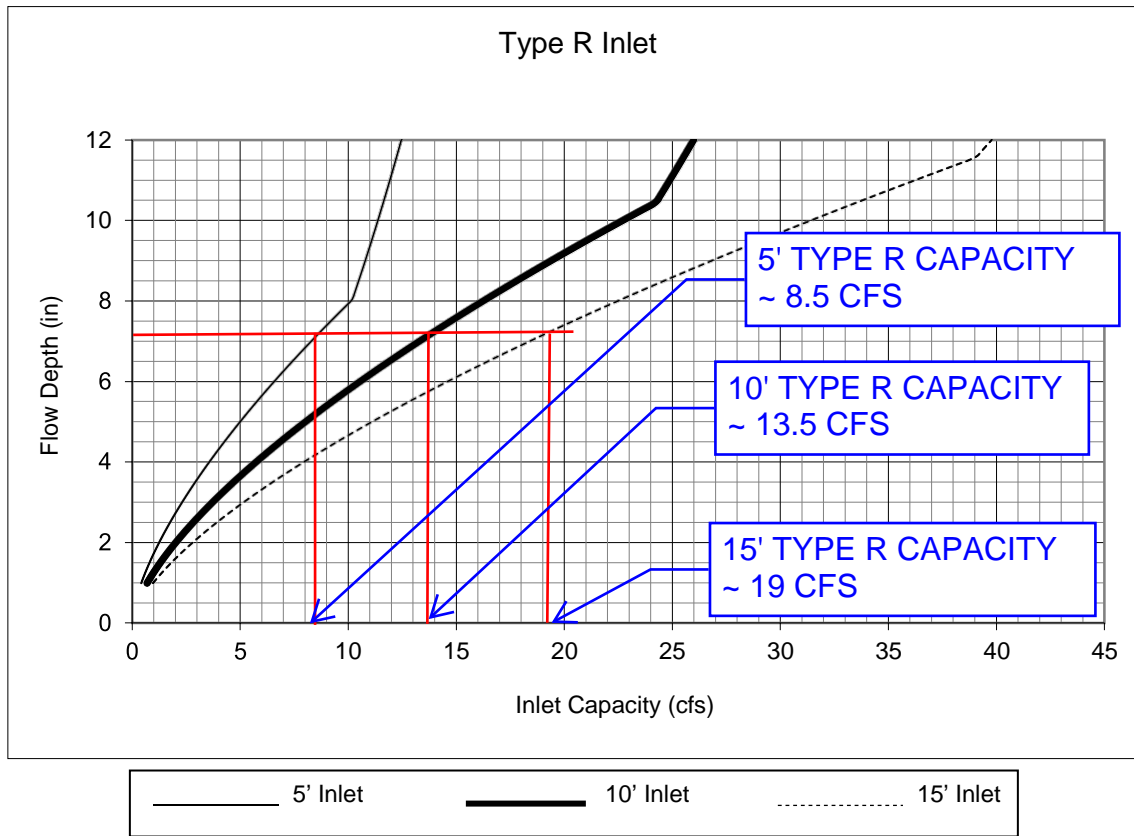
INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity			
Total Inlet Interception Capacity	8.9	14.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.7	8.5	cfs
Capture Percentage = Q _i /Q _o	93	64	%

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



PEACEFUL RIDGE SUMP INLETS:

DP16 Q100 = 17.5 CFS -> 15' TYPE R SUMP INLET

DP18 Q100 = 14.1 CFS -> 15' TYPE R SUMP INLET

Notes:

1. The standard inlet parameters must apply to use this chart.

5-YEAR SCENARIO

Conduit FlexTable: Combined Pipe/Node Report

Label	Upstream Structure	Diameter (in)	Length (Unified) (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)
CO-1	DP22		125.9	13.30	6.60	5,727.50	5,725.04	0.020	5,727.98	5,725.33	5,732.81	5,731.30
CO-2	EX-INLET		24.1	13.30	7.23	5,724.95	5,724.32	0.026	5,725.43	5,724.60	5,731.30	5,731.87
CO-3	EX-BOX	48.0	390.0	13.30	5.23	5,723.69	5,722.07	0.004	5,724.76	5,723.75	5,731.87	5,735.51
CO-4	DP22.2	60.0	380.6	34.70	8.44	5,721.32	5,718.35	0.008	5,722.96	5,719.66	5,735.51	5,729.35
CO-5	EX-MH-3	48.0	21.0	21.40	9.84	5,722.24	5,721.89	0.017	5,723.60	5,723.75	5,735.60	5,735.51
CO-7	MH-8	42.0	105.3	9.60	13.06	5,738.91	5,731.59	0.070	5,739.85	5,732.04	5,744.61	5,741.60
CO-8	MH-9	42.0	153.6	9.60	6.60	5,731.39	5,729.85	0.010	5,732.33	5,731.22	5,741.60	5,738.51
CO-9	DP21.1	48.0	117.5	21.40	10.50	5,729.35	5,727.00	0.020	5,730.71	5,727.88	5,738.51	5,735.60
CO-10	DP21	24.0	20.7	10.80	11.88	5,732.19	5,731.35	0.041	5,733.37	5,732.13	5,738.90	5,738.51
CO-12	EX-MH-1	60.0	335.7	34.70	6.83	5,718.18	5,716.73	0.004	5,719.82	5,718.26	5,729.35	5,722.00
P-1	DP18.1		15.8	85.70	10.58	5,732.29	5,732.17	0.008	5,734.58	5,734.23	5,739.17	5,737.00
P-2	DP17.1		31.0	78.90	9.39	5,732.57	5,732.39	0.006	5,734.76	5,734.68	5,739.10	5,739.17
P-3	DP14.1	42.0	279.1	51.70	13.71	5,739.34	5,733.65	0.020	5,741.59	5,735.10	5,746.39	5,739.10
P-4	DP13.1	36.0	95.4	42.70	16.59	5,743.53	5,739.84	0.039	5,745.66	5,742.58	5,750.10	5,746.39
P-5	DP12.1	36.0	485.1	34.30	16.20	5,764.29	5,743.53	0.043	5,766.19	5,746.66	5,770.81	5,750.10
P-6	DP11.1	30.0	280.3	23.40	14.27	5,775.71	5,764.79	0.039	5,777.36	5,767.03	5,782.64	5,770.81
P-7	DP10.1	24.0	59.7	13.50	11.32	5,778.00	5,776.21	0.030	5,779.32	5,778.09	5,785.02	5,782.64
P-8	MH-7	18.0	191.6	9.00	12.93	5,789.24	5,778.50	0.056	5,790.40	5,779.92	5,793.66	5,785.02
P-9	MH-8	18.0	156.1	9.00	10.57	5,794.49	5,789.44	0.032	5,795.65	5,790.17	5,799.68	5,793.66
P-10	DP8	18.0	43.0	9.00	8.81	5,795.45	5,794.59	0.020	5,796.61	5,795.47	5,800.15	5,799.68
P-11	DP14	18.0	29.0	9.40	8.96	5,741.93	5,741.34	0.020	5,743.11	5,742.58	5,746.66	5,746.39
P-12	DP13	18.0	29.5	9.90	9.00	5,745.62	5,745.03	0.020	5,746.83	5,746.66	5,750.37	5,750.10
P-13	DP12	18.0	29.5	11.80	9.33	5,766.38	5,765.79	0.020	5,767.69	5,766.86	5,771.08	5,770.81
P-14	DP11	18.0	29.5	10.40	14.43	5,778.21	5,776.21	0.068	5,779.45	5,778.09	5,782.91	5,782.64
P-15	MH9	18.0	59.0	5.00	7.58	5,779.68	5,778.50	0.020	5,780.54	5,779.92	5,785.63	5,785.02
P-16	DP10	18.0	29.0	5.00	7.58	5,780.56	5,779.98	0.020	5,781.42	5,780.61	5,784.83	5,785.63
P-17	DP16.1	42.0	39.7	30.20	7.11	5,732.85	5,732.65	0.005	5,735.71	5,735.70	5,739.25	5,739.10
P-18	MH-11	36.0	108.6	27.50	6.91	5,733.89	5,733.35	0.005	5,735.99	5,735.91	5,740.17	5,739.25
P-19	DP15.1	36.0	78.9	27.50	6.90	5,734.38	5,733.99	0.005	5,736.08	5,736.01	5,740.88	5,740.17
P-20	MH-13	36.0	259.7	20.10	7.72	5,736.54	5,734.38	0.008	5,737.98	5,736.78	5,743.22	5,740.88
P-21	DP5.1	30.0	264.2	20.10	8.59	5,739.93	5,737.04	0.011	5,741.45	5,738.24	5,745.60	5,743.22
P-22	MH-15	24.0	208.1	13.40	7.69	5,742.65	5,740.43	0.011	5,743.97	5,742.11	5,749.45	5,745.60

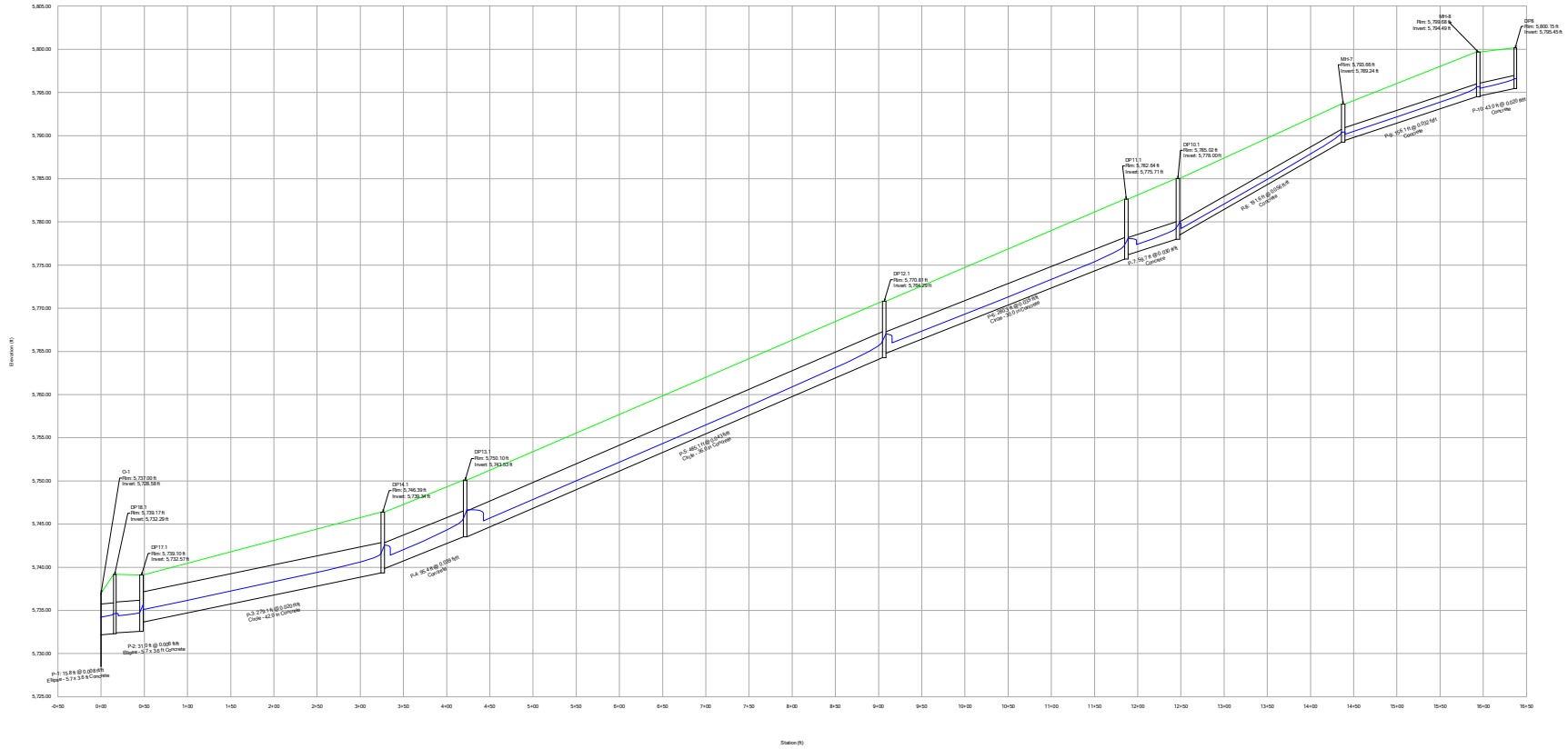
Conduit FlexTable: Combined Pipe/Node Report

Label	Upstream Structure	Diameter (in)	Length (Unified) (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)
P-23	MH-16	24.0	143.5	13.40	8.74	5,744.90	5,742.75	0.015	5,746.22	5,743.73	5,751.53	5,749.45
P-24	DP4.1	24.0	45.2	13.40	9.71	5,745.90	5,745.00	0.020	5,747.22	5,745.96	5,751.32	5,751.53
P-25	DP3	18.0	36.2	5.00	7.57	5,747.12	5,746.40	0.020	5,747.98	5,747.81	5,751.82	5,751.32
P-26	DP16	18.0	13.9	3.20	4.63	5,734.95	5,734.85	0.007	5,735.91	5,735.91	5,739.50	5,739.25
P-27	DP15	18.0	5.0	8.90	6.67	5,735.93	5,735.88	0.010	5,737.08	5,736.98	5,741.11	5,740.88
P-28	DP5	18.0	5.0	11.00	9.20	5,741.03	5,740.93	0.020	5,742.30	5,742.06	5,745.87	5,745.60
P-29	DP4	18.0	35.0	6.90	13.11	5,748.88	5,746.40	0.071	5,749.90	5,747.81	5,753.09	5,751.32
P-32 (Pr-Storm)	OUT. STRUCT.		56.3	8.00	3.99	5,730.25	5,730.04	0.004	5,730.92	5,730.76	5,738.00	5,738.00
P-33 (Pr-Storm)	MH-19	48.0	600.4	8.00	4.02	5,729.74	5,727.94	0.003	5,730.60	5,728.76	5,738.00	5,733.33
P-34 (Pr-Storm)	MH-18	48.0	24.2	8.00	4.34	5,727.74	5,727.65	0.004	5,728.56	5,728.47	5,733.33	5,733.00

5-YEAR SCENARIO

Profile Report

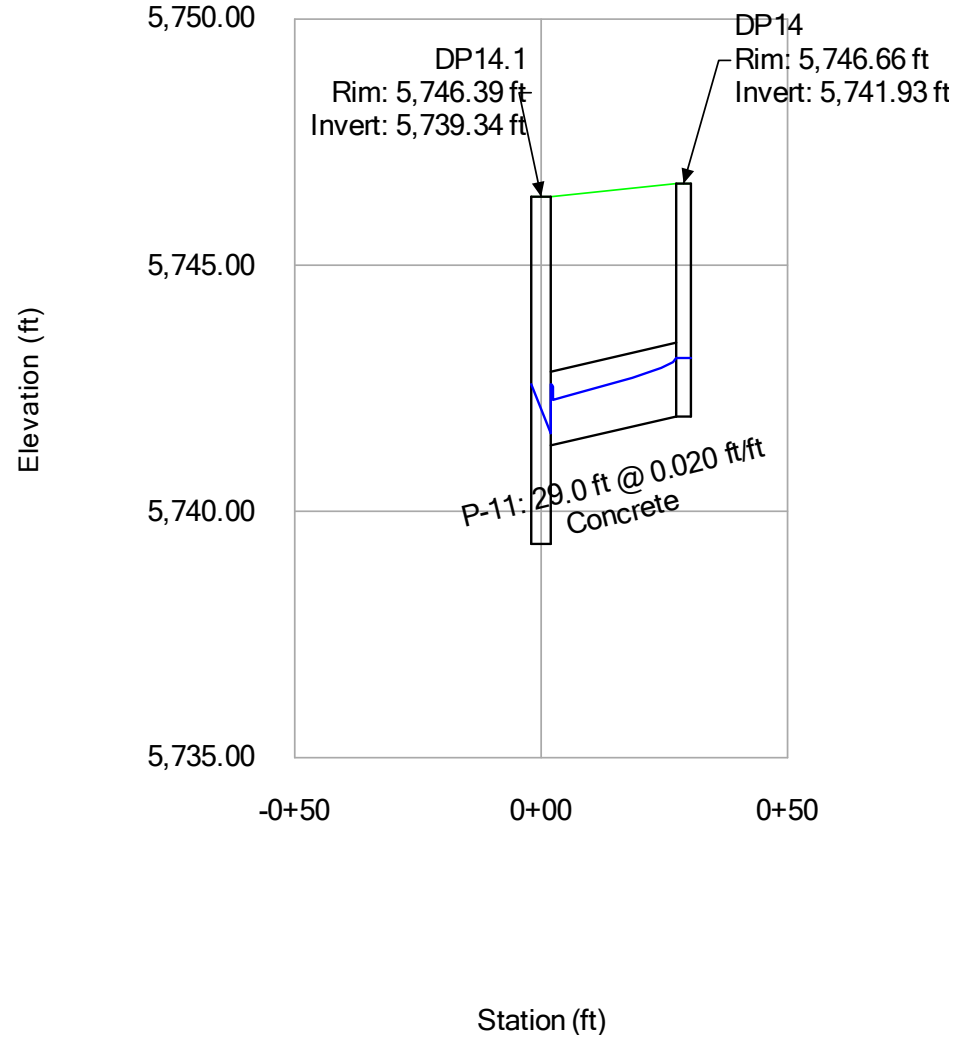
Engineering Profile - Storm-1 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

Profile Report

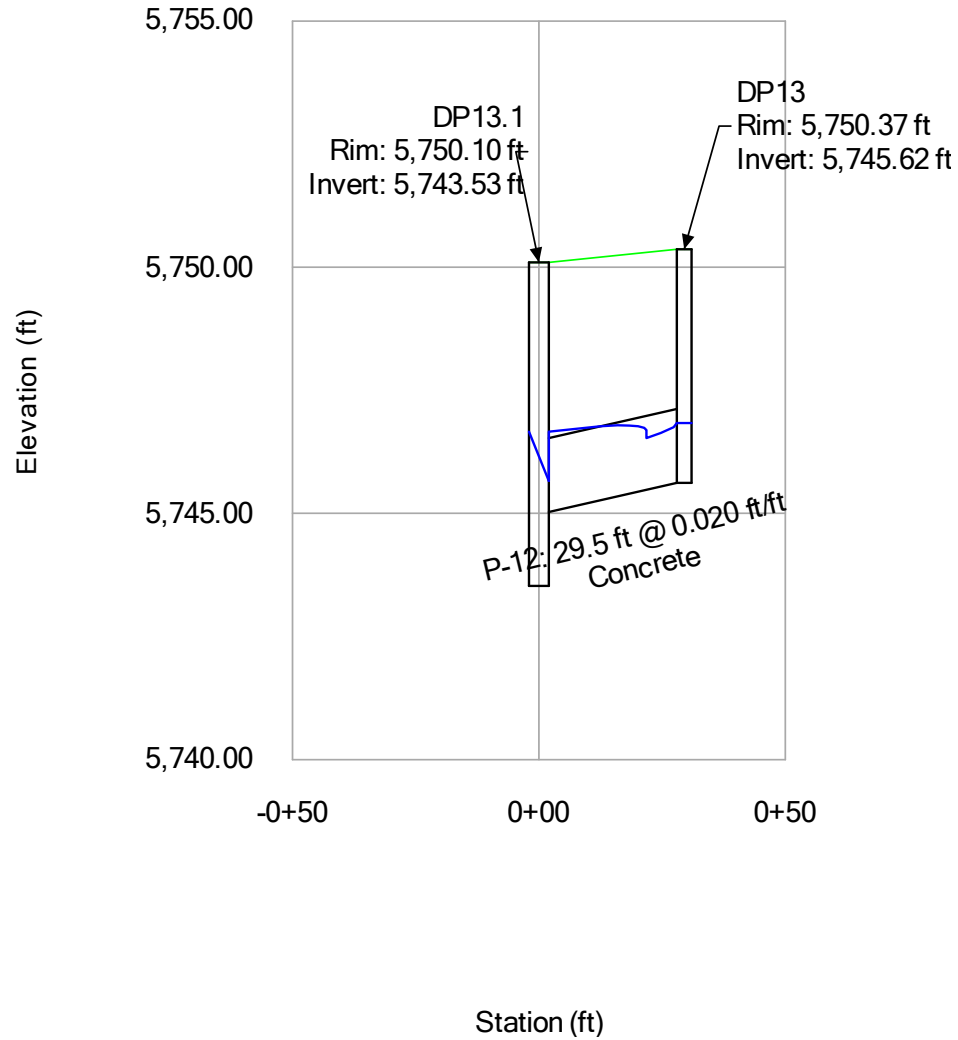
Engineering Profile - Storm-2 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

Profile Report

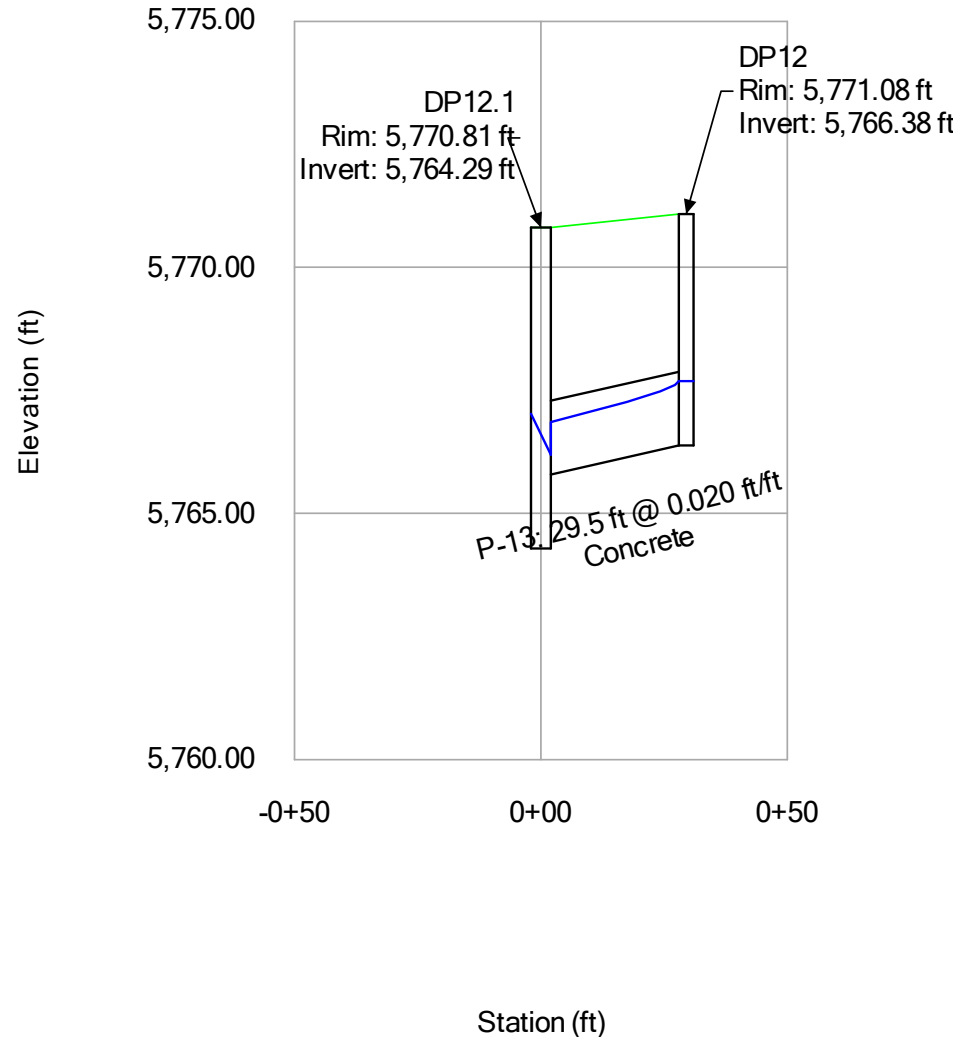
Engineering Profile - Storm-3 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

Profile Report

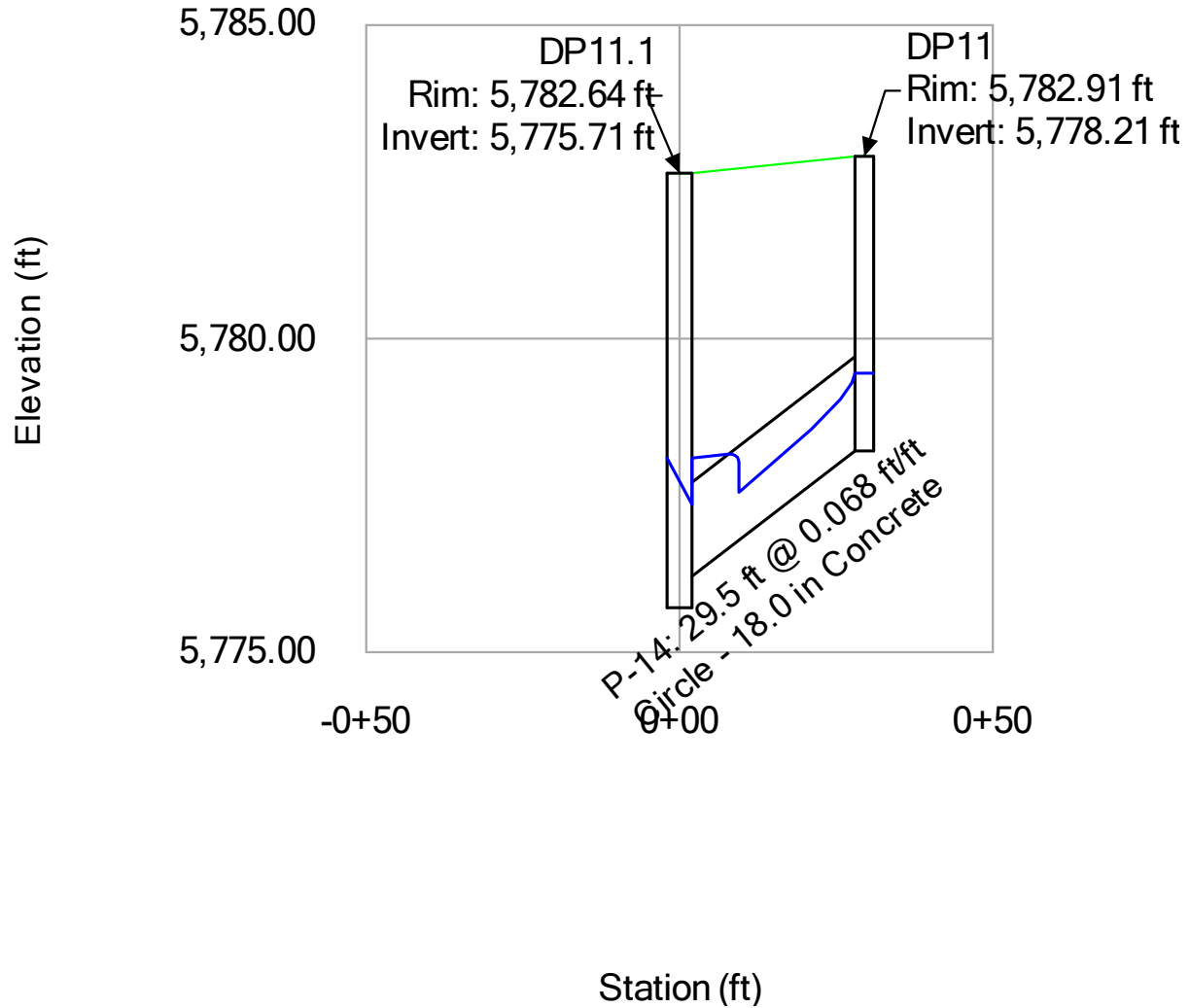
Engineering Profile - Storm-4 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

Profile Report

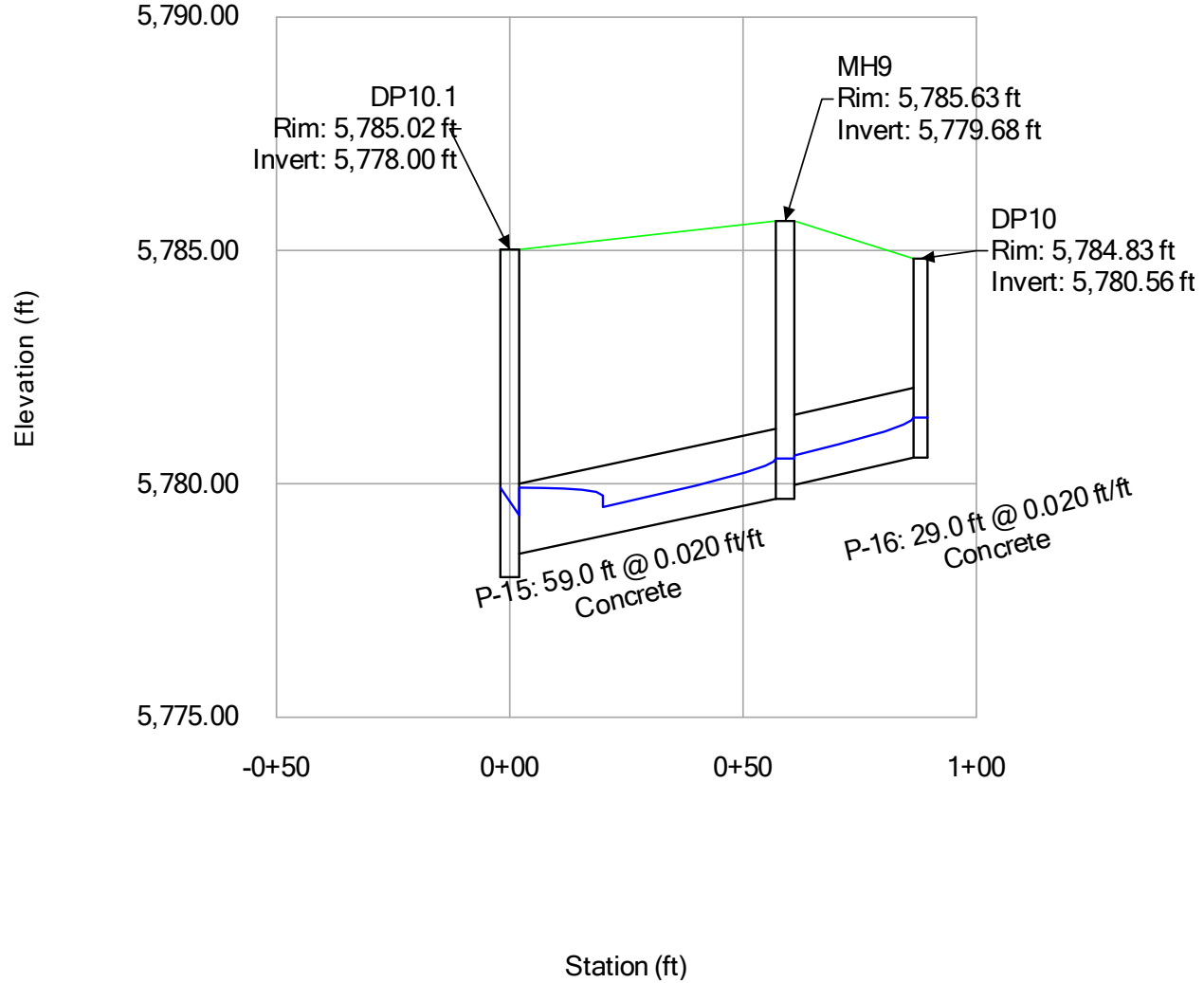
Engineering Profile - Storm-5 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

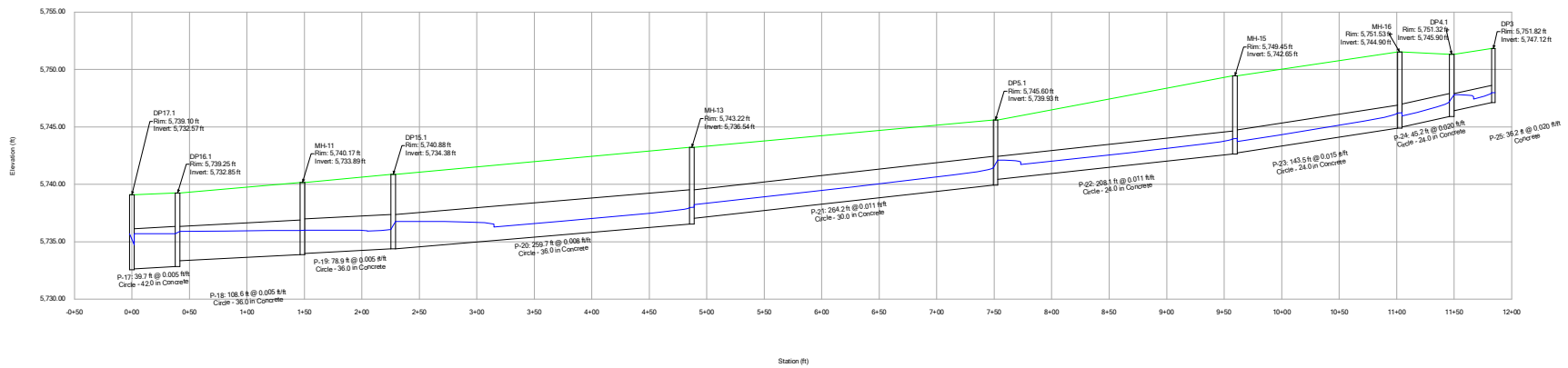
Profile Report

Engineering Profile - Storm-6 (Peaceful_Ridge.stsw)



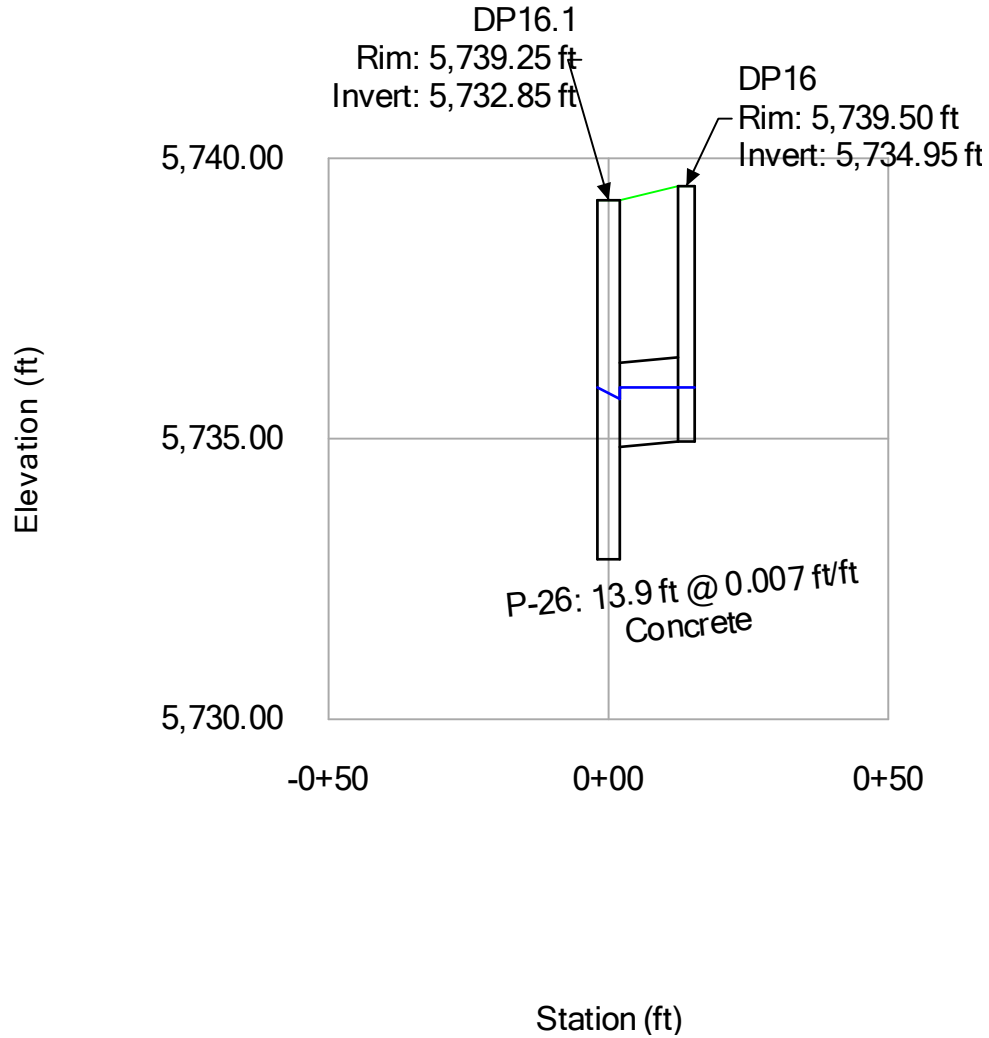
5-YEAR SCENARIO

Profile Report Engineering Profile - Storm-7 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

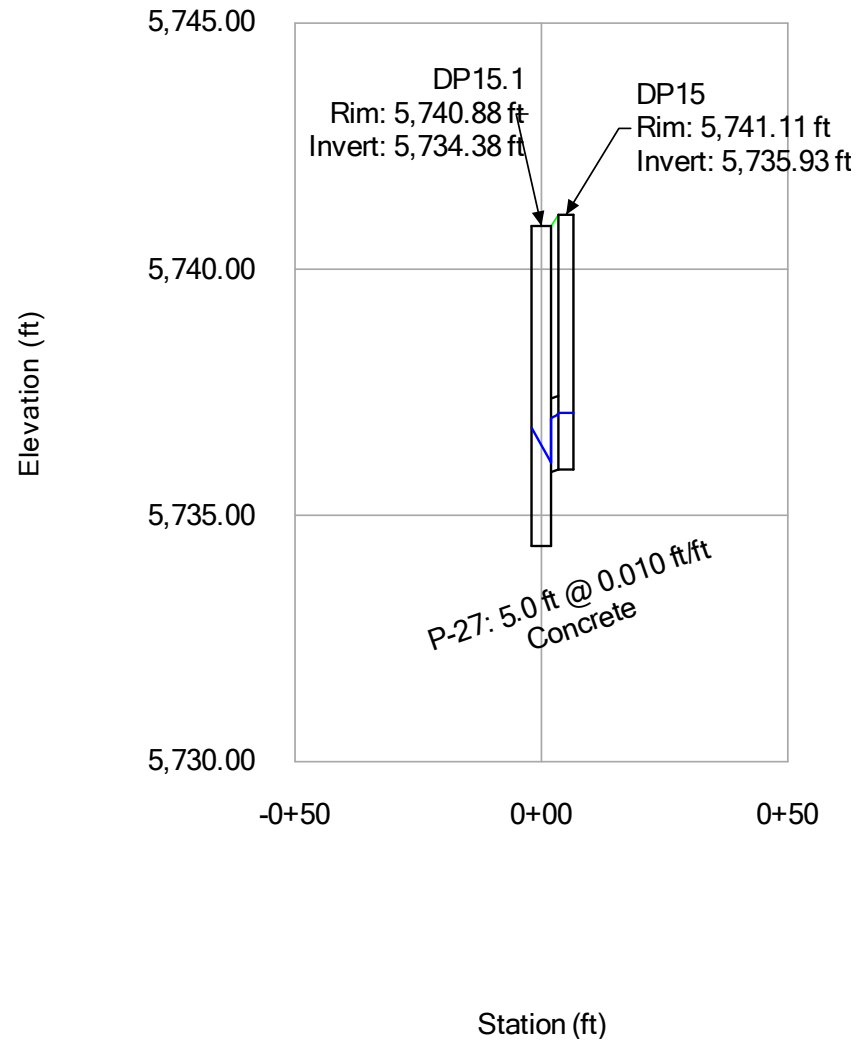
Profile Report
Engineering Profile - Storm-8 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

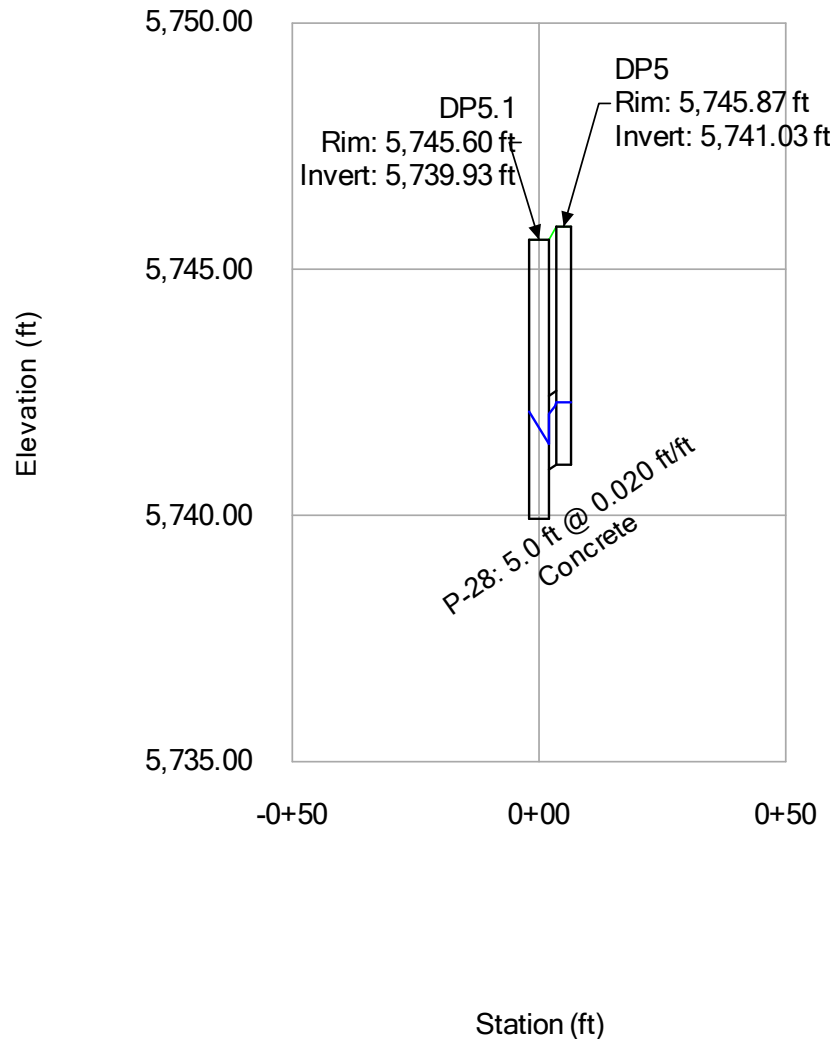
Profile Report

Engineering Profile - Storm-9 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

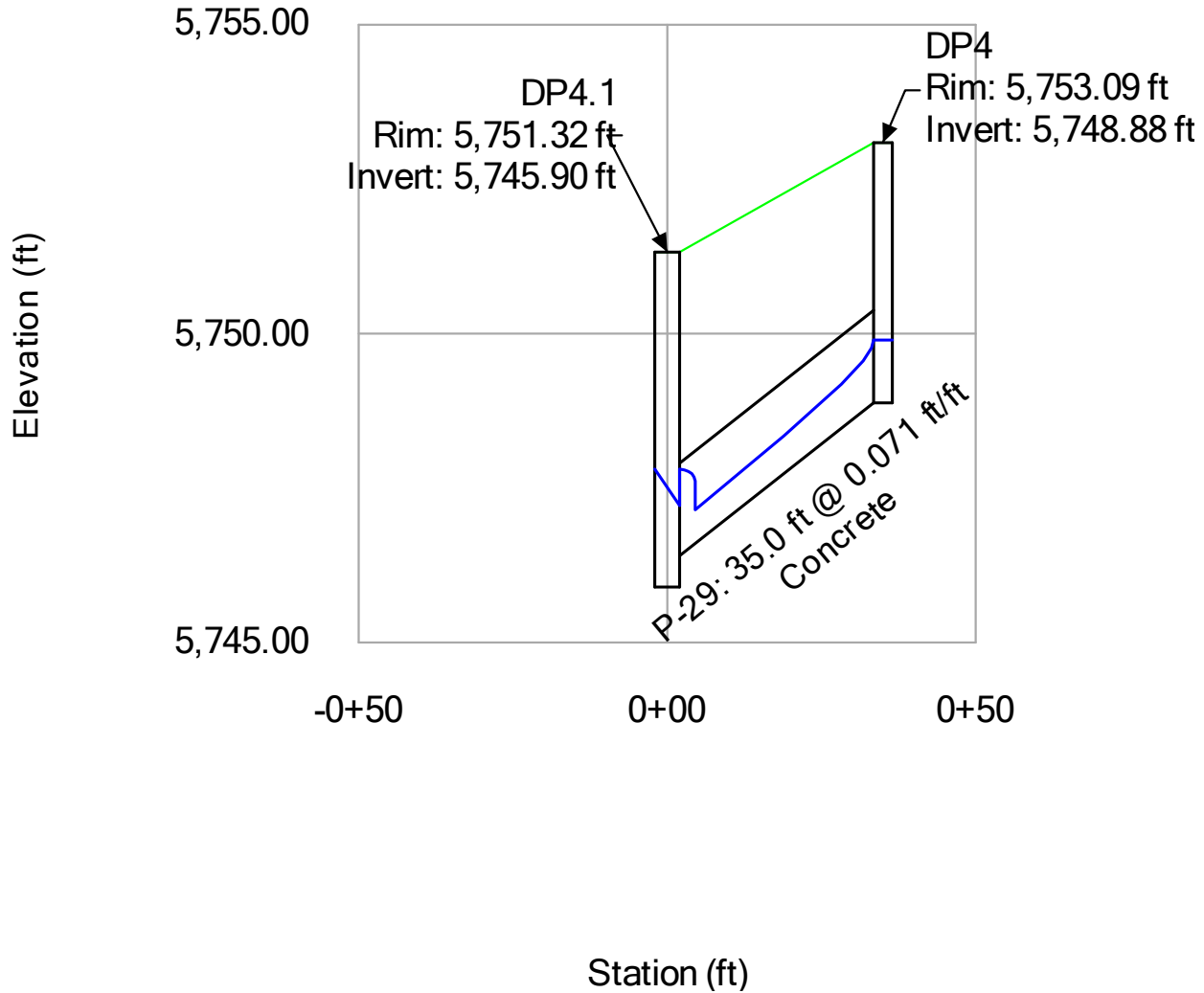
Profile Report Engineering Profile - Storm-10 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

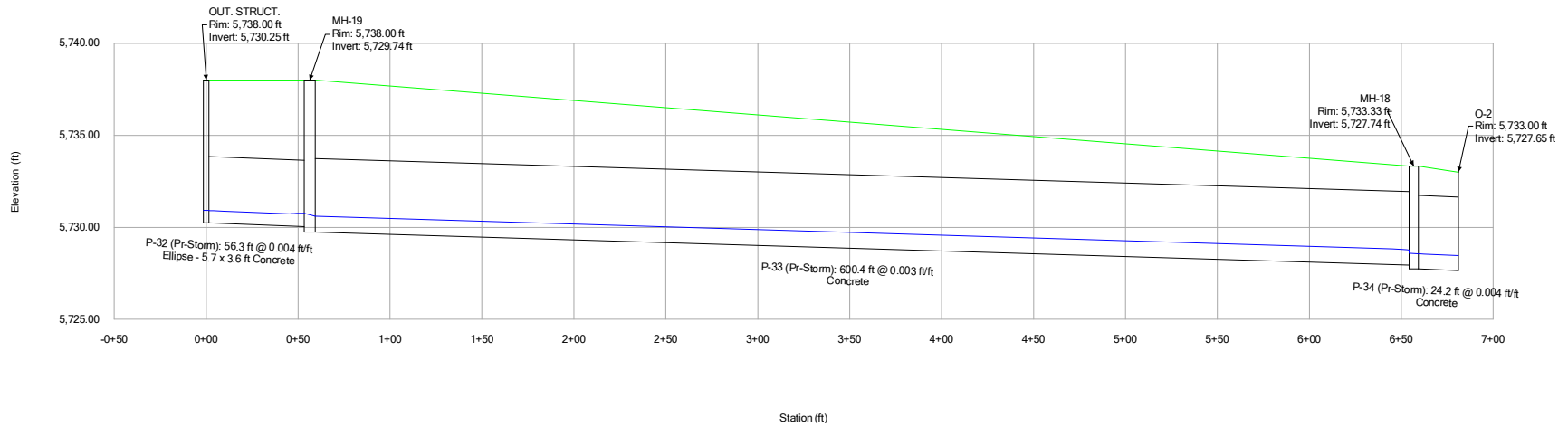
Profile Report

Engineering Profile - Storm-11 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

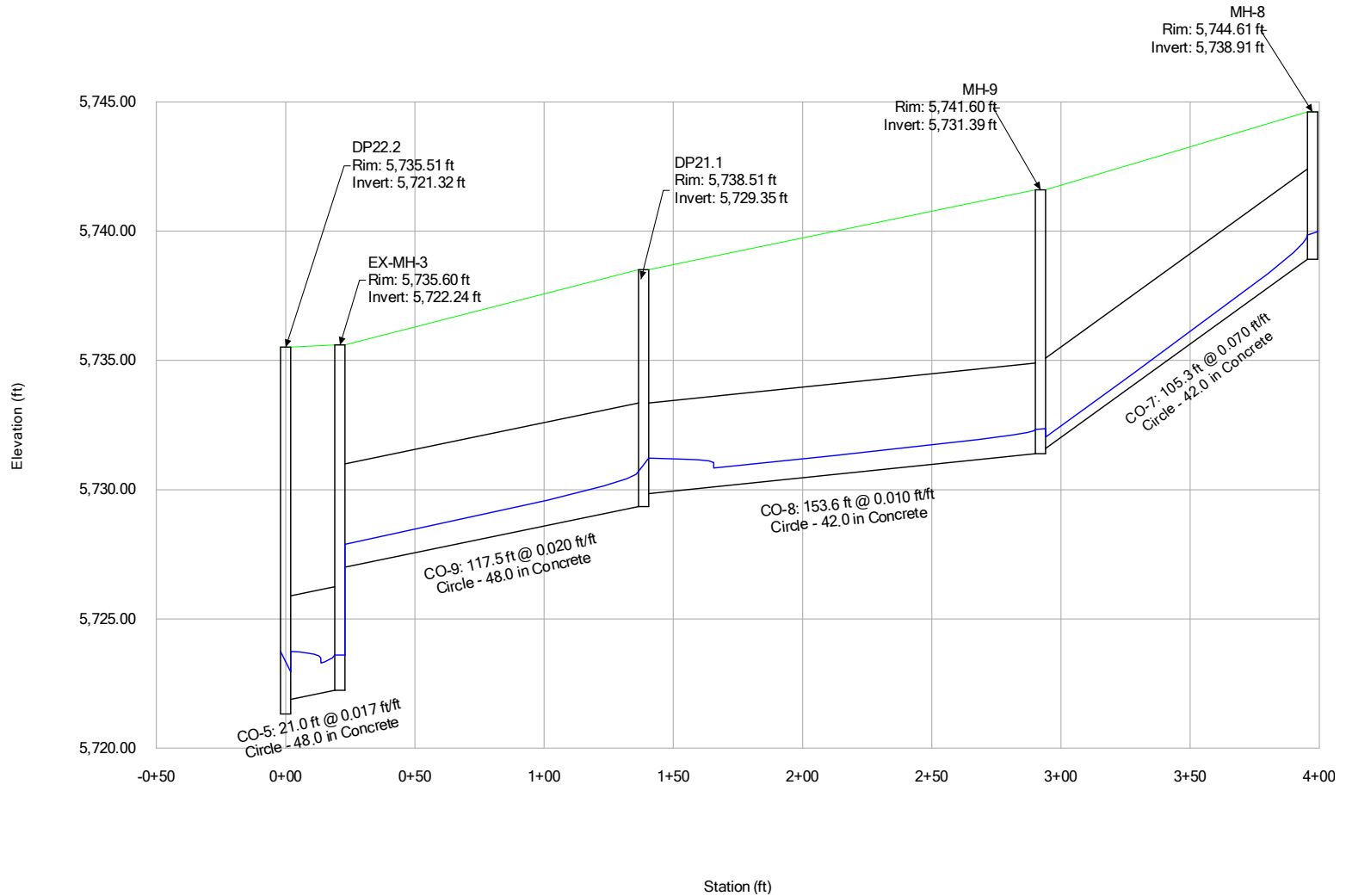
Profile Report Engineering Profile - Storm-12 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

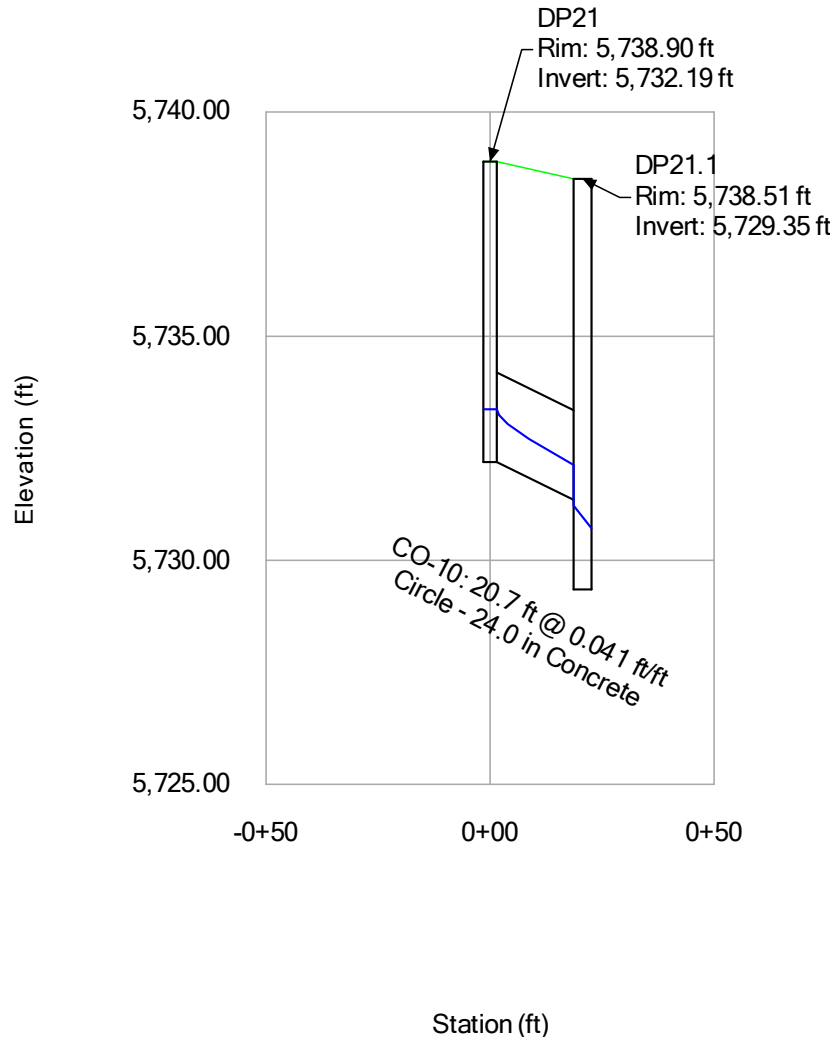
Profile Report

Engineering Profile - Storm-13 (Peaceful_Ridge.stsw)



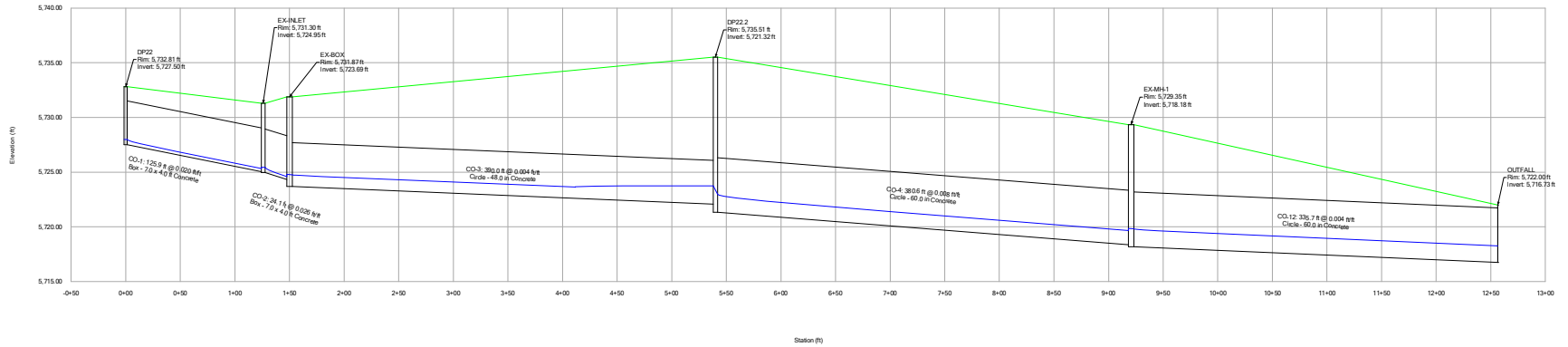
5-YEAR SCENARIO

Profile Report
Engineering Profile - Storm-14 (Peaceful_Ridge.stsw)



5-YEAR SCENARIO

Profile Report Engineering Profile - Ex-Storm-01 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Conduit FlexTable: Combined Pipe/Node Report

Label	Upstream Structure	Diameter (in)	Length (Unified) (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)
CO-1	DP22		125.9	124.60	14.83	5,727.50	5,725.04	0.020	5,731.43	5,731.30	5,732.81	5,731.30
CO-2	EX-INLET		24.1	124.60	4.45	5,724.95	5,724.32	0.026	5,731.59	5,731.57	5,731.30	5,731.87
CO-3	EX-BOX	48.0	390.0	124.60	9.92	5,723.69	5,722.07	0.004	5,731.41	5,728.48	5,731.87	5,735.51
CO-4	DP22.2	60.0	380.6	210.80	13.29	5,721.32	5,718.35	0.008	5,725.45	5,723.50	5,735.51	5,729.35
CO-5	EX-MH-3	48.0	21.0	86.20	6.86	5,722.24	5,721.89	0.017	5,728.55	5,728.48	5,735.60	5,735.51
CO-7	MH-8	42.0	105.3	57.60	22.04	5,738.91	5,731.59	0.070	5,741.29	5,732.79	5,744.61	5,741.60
CO-8	MH-9	42.0	153.6	57.60	10.82	5,731.39	5,729.85	0.010	5,733.77	5,733.48	5,741.60	5,738.51
CO-9	DP21.1	48.0	117.5	86.20	15.50	5,729.35	5,727.00	0.020	5,732.16	5,728.95	5,738.51	5,735.60
CO-10	DP21	24.0	20.7	23.50	14.63	5,732.19	5,731.35	0.041	5,733.91	5,733.48	5,738.90	5,738.51
CO-12	EX-MH-1	60.0	335.7	210.80	10.74	5,718.18	5,716.73	0.004	5,723.41	5,720.86	5,729.35	5,722.00
P-1	DP18.1		15.8	170.40	12.36	5,732.29	5,732.17	0.008	5,735.45	5,735.22	5,739.17	5,737.00
P-2	DP17.1		31.0	156.80	10.77	5,732.57	5,732.39	0.006	5,735.80	5,735.65	5,739.10	5,739.17
P-3	DP14.1	42.0	279.1	92.20	15.85	5,739.34	5,733.65	0.020	5,742.31	5,737.48	5,746.39	5,739.10
P-4	DP13.1	36.0	95.4	77.20	19.31	5,743.53	5,739.84	0.039	5,746.27	5,744.09	5,750.10	5,746.39
P-5	DP12.1	36.0	485.1	62.50	19.04	5,764.29	5,743.53	0.043	5,766.83	5,748.33	5,770.81	5,750.10
P-6	DP11.1	30.0	280.3	44.30	16.87	5,775.71	5,764.79	0.039	5,777.92	5,768.35	5,782.64	5,770.81
P-7	DP10.1	24.0	59.7	27.40	8.72	5,778.00	5,776.21	0.030	5,780.27	5,779.40	5,785.02	5,782.64
P-8	MH-7	18.0	191.6	18.40	15.41	5,789.24	5,778.50	0.056	5,790.70	5,781.48	5,793.66	5,785.02
P-9	MH-8	18.0	156.1	18.40	12.18	5,794.49	5,789.44	0.032	5,795.95	5,790.64	5,799.68	5,793.66
P-10	DP8	18.0	43.0	18.40	10.41	5,795.45	5,794.59	0.020	5,797.39	5,796.04	5,800.15	5,799.68
P-11	DP14	18.0	29.0	17.60	9.96	5,741.93	5,741.34	0.020	5,744.90	5,744.09	5,746.66	5,746.39
P-12	DP13	18.0	29.5	18.20	10.30	5,745.62	5,745.03	0.020	5,749.22	5,748.33	5,750.37	5,750.10
P-13	DP12	18.0	29.5	19.80	11.20	5,766.38	5,765.79	0.020	5,769.40	5,768.35	5,771.08	5,770.81
P-14	DP11	18.0	29.5	17.70	10.02	5,778.21	5,776.21	0.068	5,780.23	5,779.40	5,782.91	5,782.64
P-15	MH9	18.0	59.0	9.00	5.09	5,779.68	5,778.50	0.020	5,781.91	5,781.48	5,785.63	5,785.02
P-16	DP10	18.0	29.0	9.00	5.09	5,780.56	5,779.98	0.020	5,782.12	5,781.91	5,784.83	5,785.63
P-17	DP16.1	42.0	39.7	66.20	6.88	5,732.85	5,732.65	0.005	5,737.65	5,737.48	5,739.25	5,739.10
P-18	MH-11	36.0	108.6	47.90	6.78	5,733.89	5,733.35	0.005	5,738.96	5,738.40	5,740.17	5,739.25
P-19	DP15.1	36.0	78.9	47.90	6.78	5,734.38	5,733.99	0.005	5,739.40	5,739.00	5,740.88	5,740.17
P-20	MH-13	36.0	259.7	35.80	5.06	5,736.54	5,734.38	0.008	5,740.88	5,740.13	5,743.22	5,740.88
P-21	DP5.1	30.0	264.2	35.80	7.29	5,739.93	5,737.04	0.011	5,742.91	5,740.90	5,745.60	5,743.22
P-22	MH-15	24.0	208.1	20.70	6.59	5,742.65	5,740.43	0.011	5,745.50	5,743.75	5,749.45	5,745.60

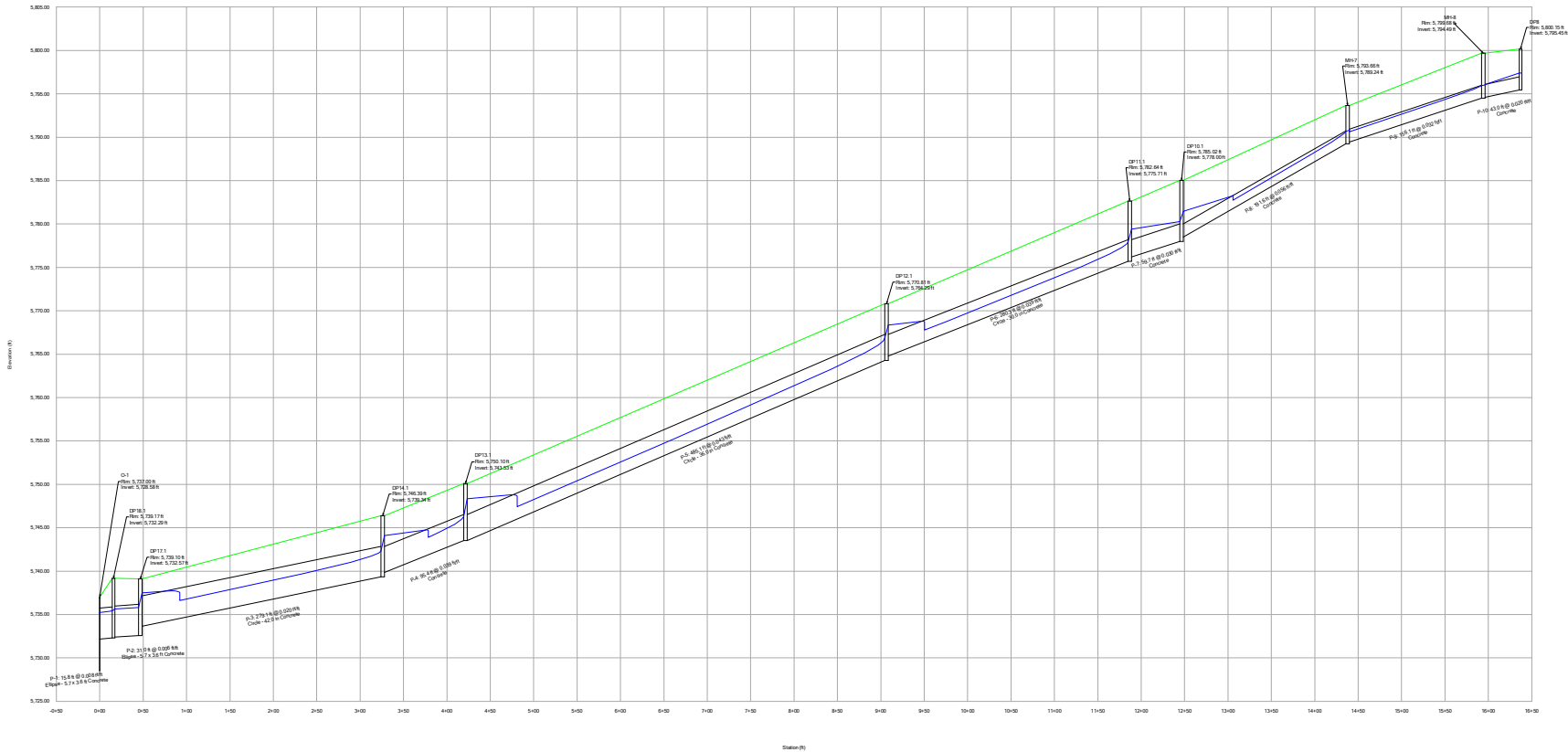
Conduit FlexTable: Combined Pipe/Node Report

Label	Upstream Structure	Diameter (in)	Length (Unified) (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)
P-23	MH-16	24.0	143.5	20.70	9.67	5,744.90	5,742.75	0.015	5,746.53	5,745.53	5,751.53	5,749.45
P-24	DP4.1	24.0	45.2	20.70	10.81	5,745.90	5,745.00	0.020	5,747.53	5,746.25	5,751.32	5,751.53
P-25	DP3	18.0	36.2	10.00	5.66	5,747.12	5,746.40	0.020	5,748.76	5,748.43	5,751.82	5,751.32
P-26	DP16	18.0	13.9	17.50	9.90	5,734.95	5,734.85	0.007	5,738.79	5,738.40	5,739.50	5,739.25
P-27	DP15	18.0	5.0	14.80	8.38	5,735.93	5,735.88	0.010	5,740.23	5,740.13	5,741.11	5,740.88
P-28	DP5	18.0	5.0	19.20	10.86	5,741.03	5,740.93	0.020	5,743.92	5,743.75	5,745.87	5,745.60
P-29	DP4	18.0	35.0	11.40	15.02	5,748.88	5,746.40	0.071	5,750.17	5,748.43	5,753.09	5,751.32
P-32 (Pr-Storm)	OUT. STRUCT.		56.3	115.80	7.19	5,730.25	5,730.04	0.004	5,736.53	5,736.33	5,738.00	5,738.00
P-33 (Pr-Storm)	MH-19	48.0	600.4	115.80	9.22	5,729.74	5,727.94	0.003	5,735.48	5,731.44	5,738.00	5,733.33
P-34 (Pr-Storm)	MH-18	48.0	24.2	115.80	9.22	5,727.74	5,727.65	0.004	5,731.29	5,730.90	5,733.33	5,733.00

100-YR SCENARIO

Profile Report

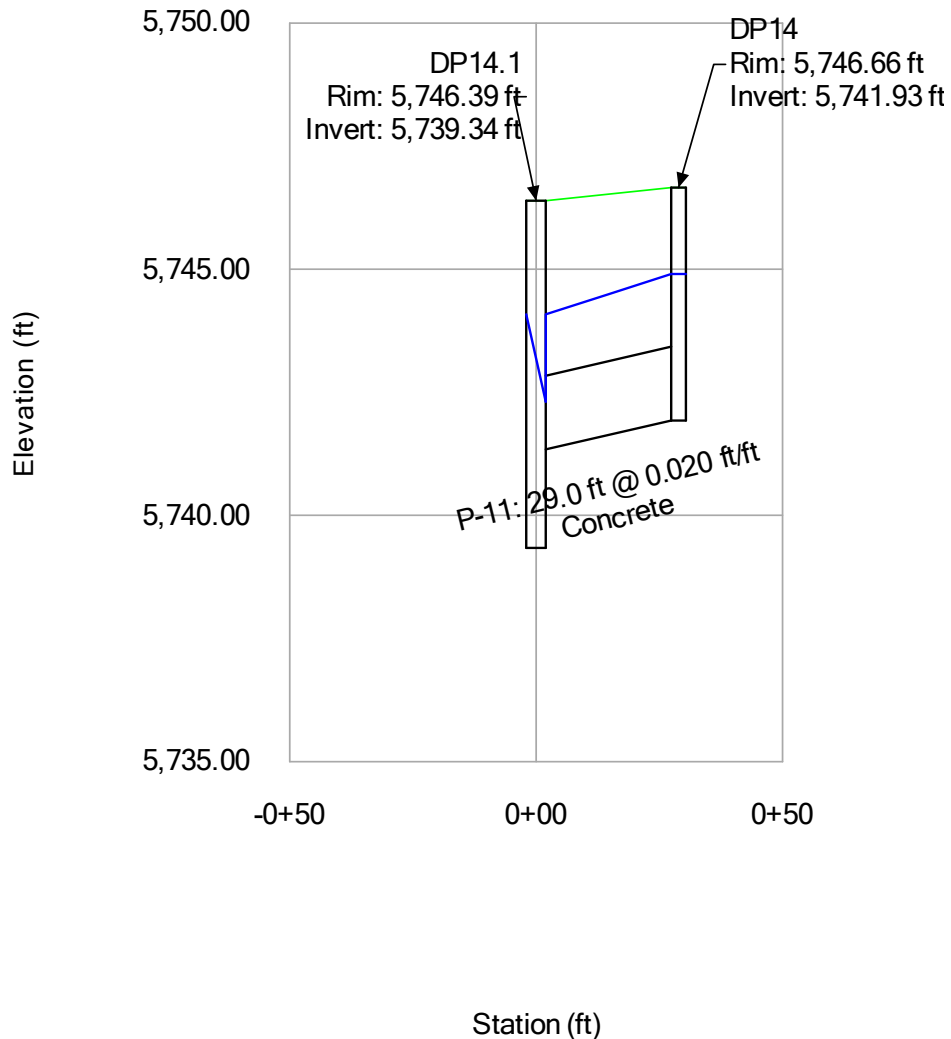
Engineering Profile - Storm-1 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

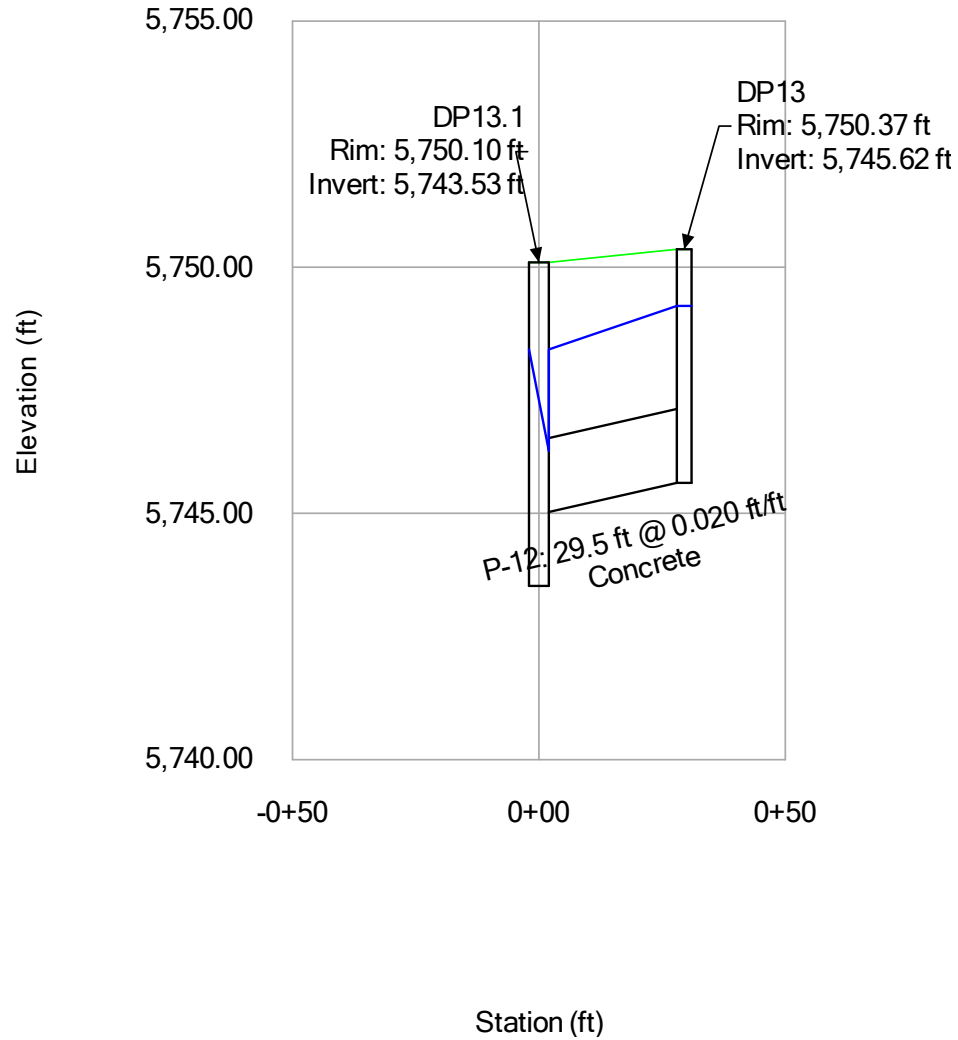
Engineering Profile - Storm-2 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

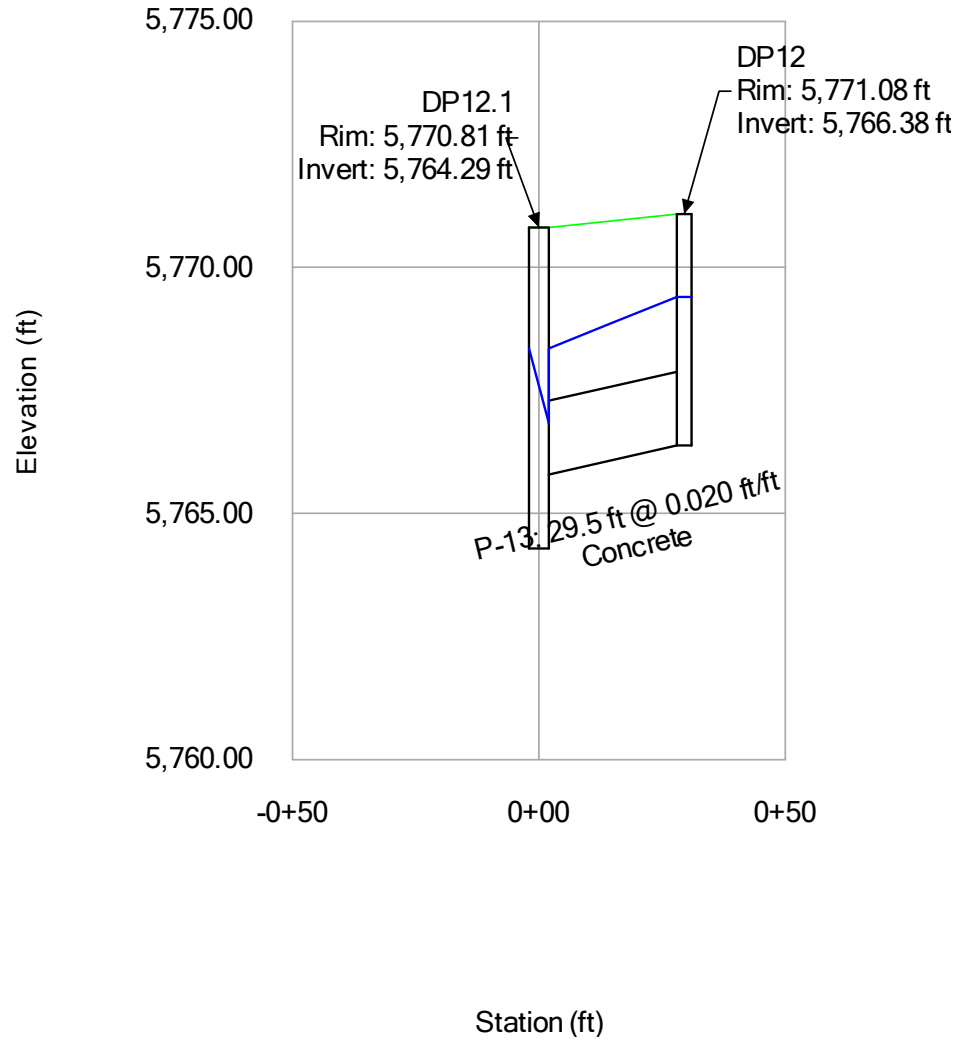
Engineering Profile - Storm-3 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

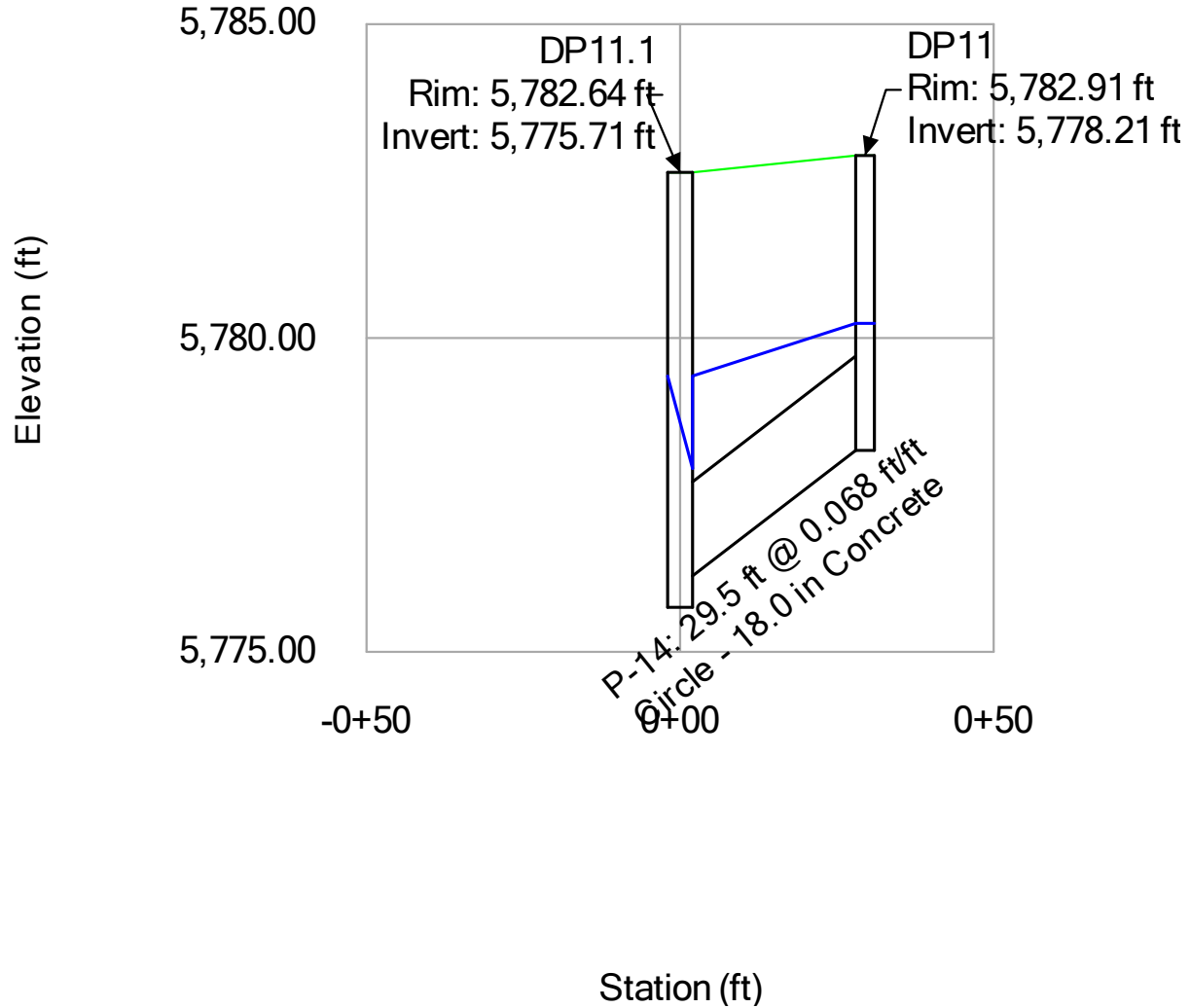
Engineering Profile - Storm-4 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

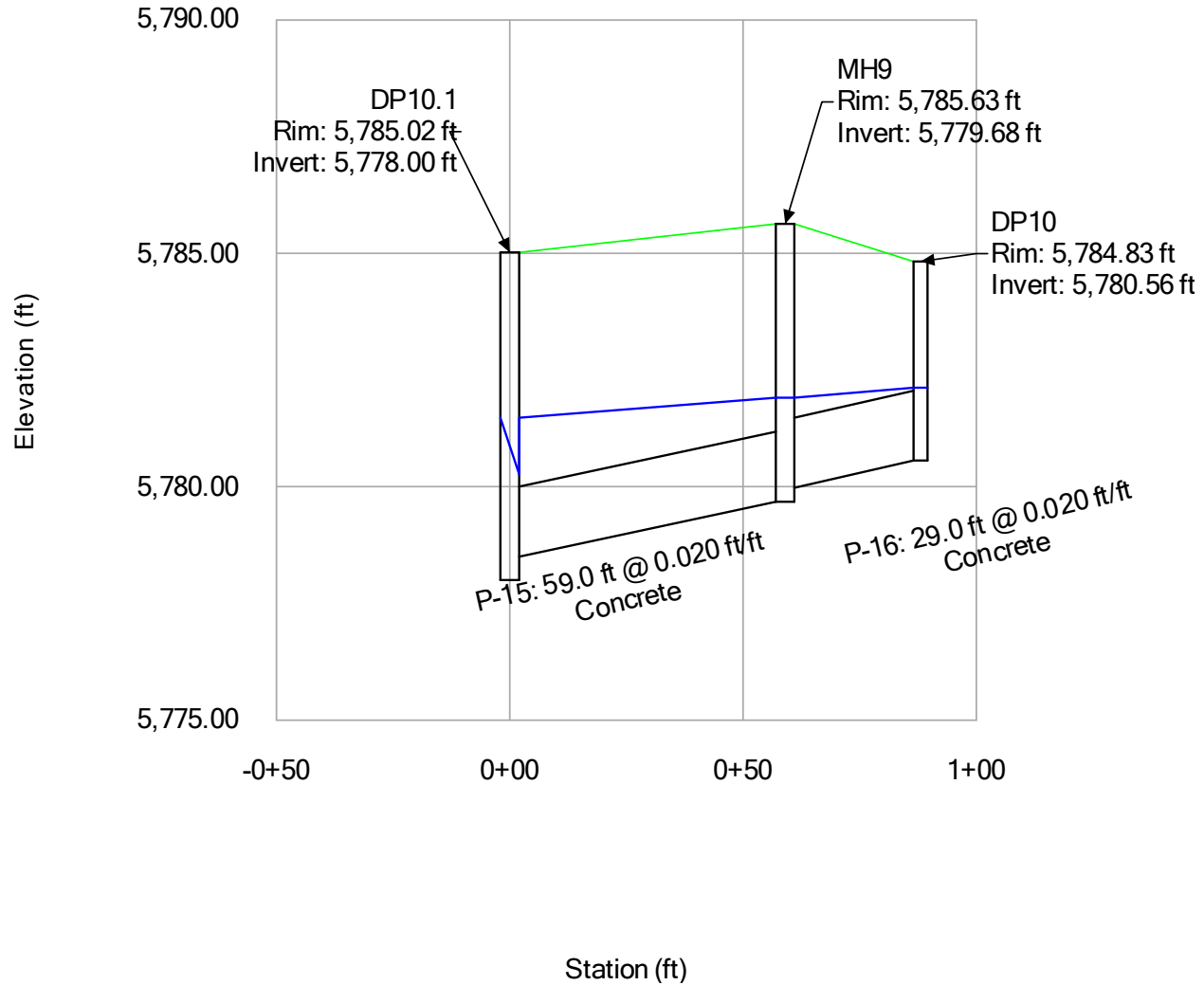
Engineering Profile - Storm-5 (Peaceful_Ridge.stsw)



100-YR SCENARIO

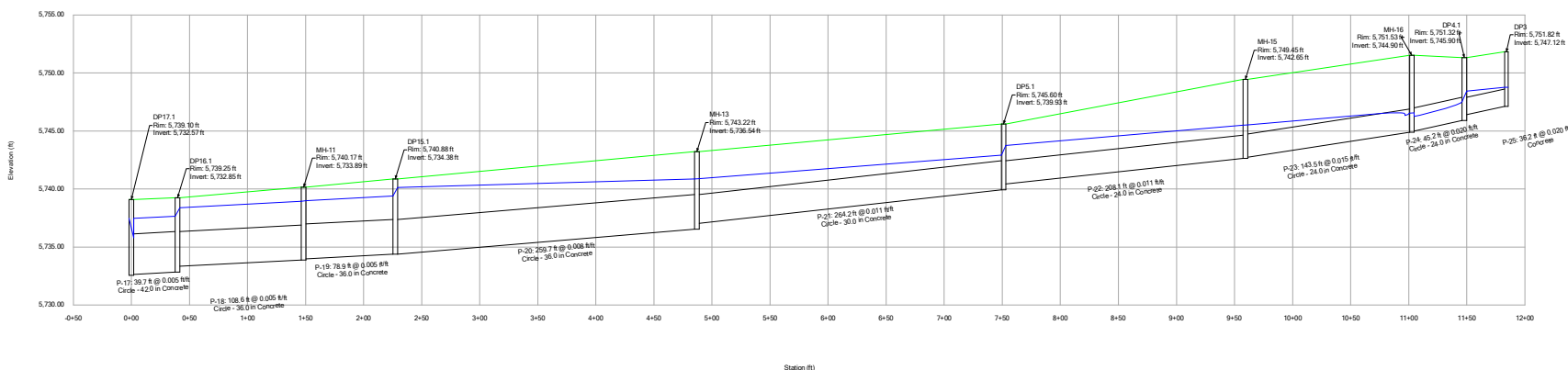
Profile Report

Engineering Profile - Storm-6 (Peaceful_Ridge.stsw)



100-YR SCENARIO

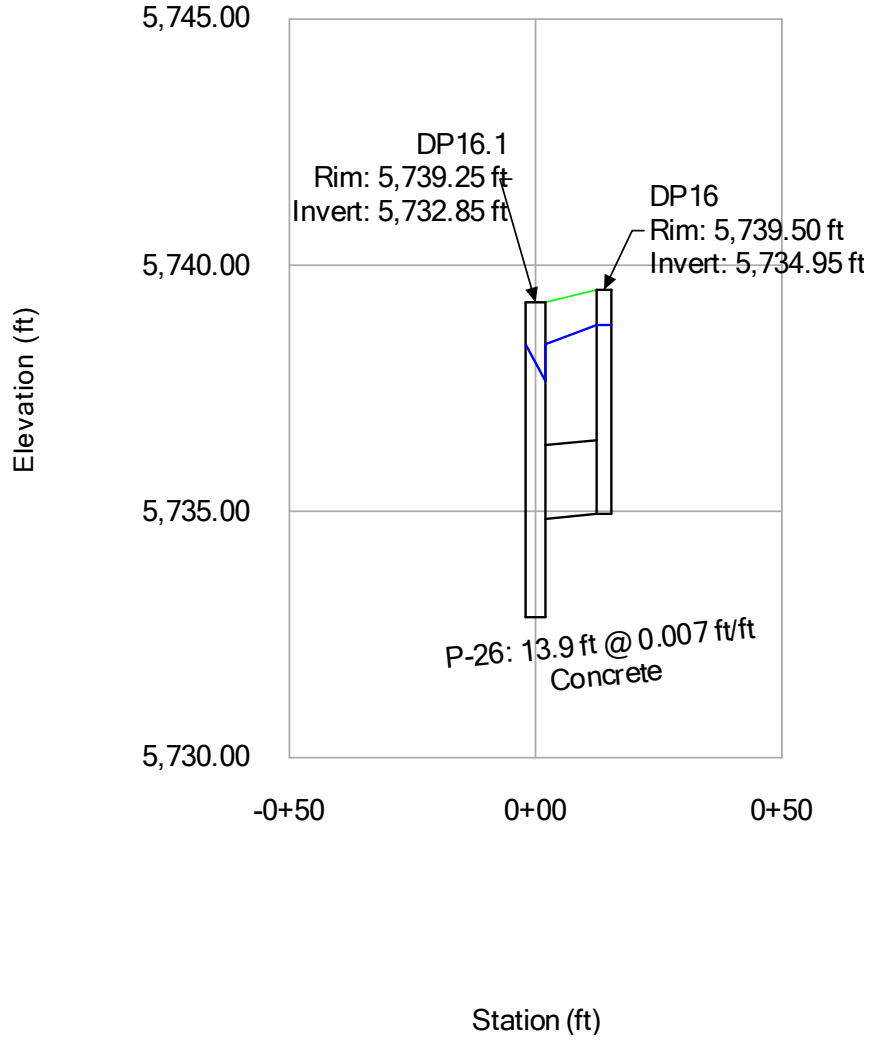
Profile Report Engineering Profile - Storm-7 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

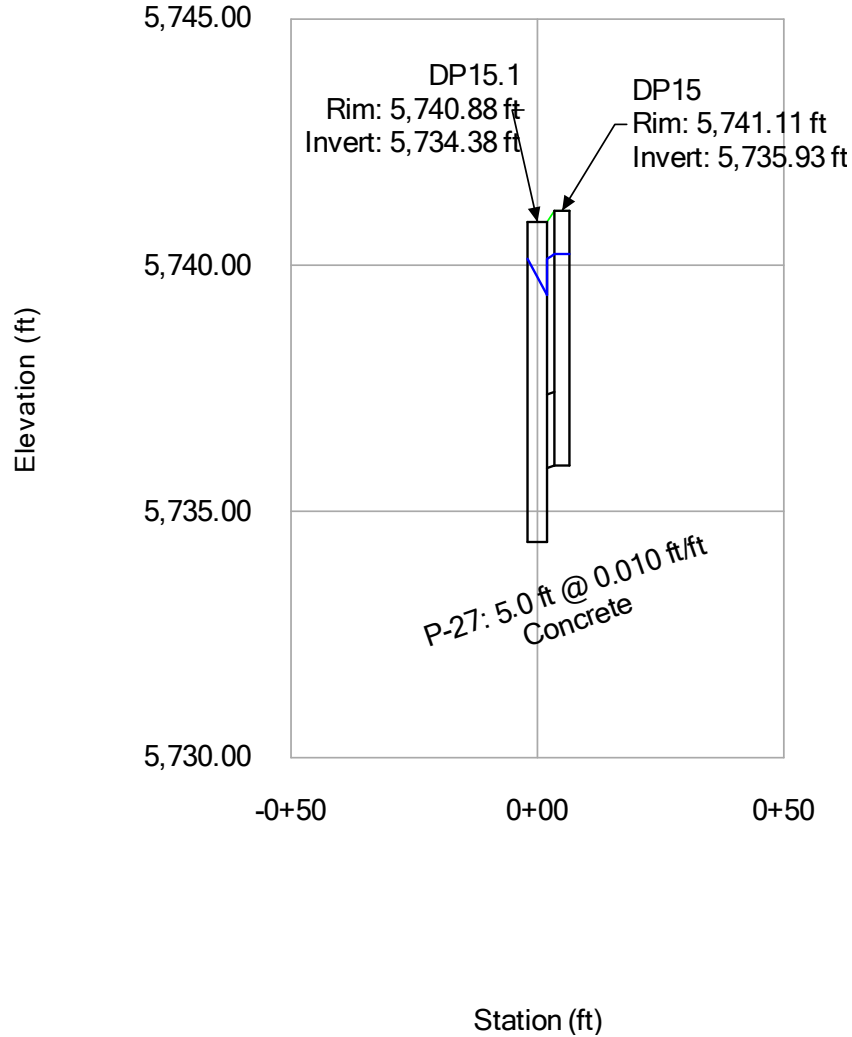
Engineering Profile - Storm-8 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

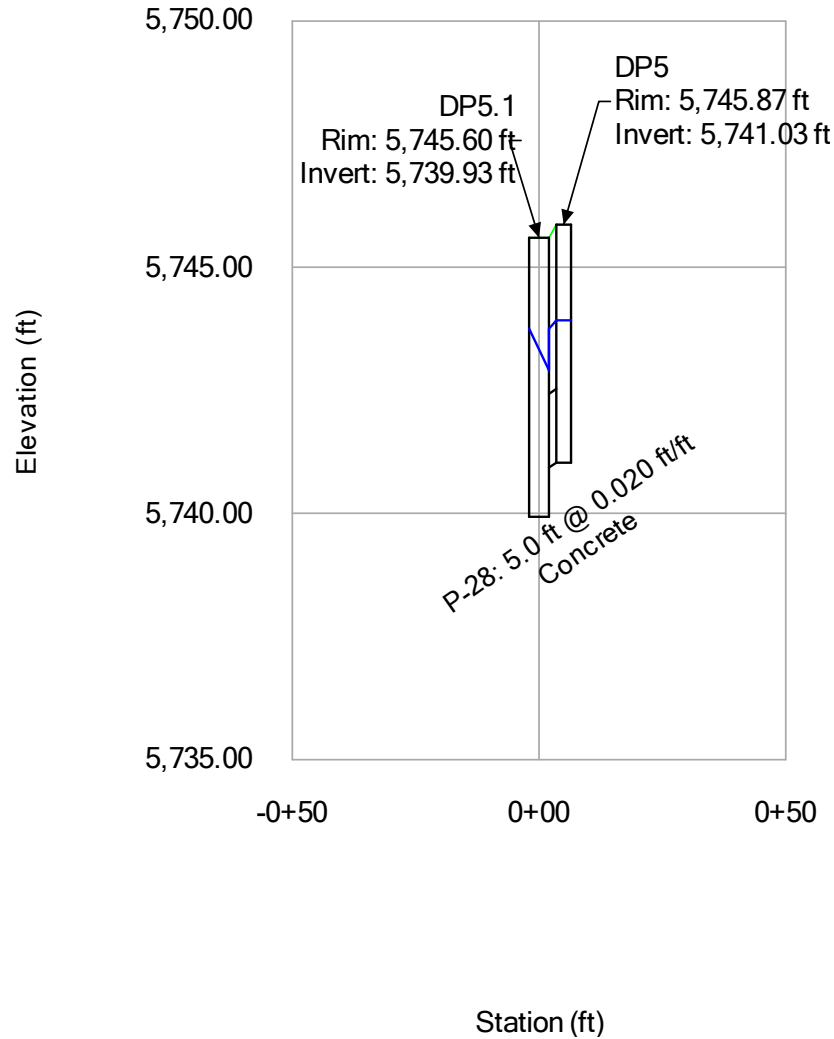
Engineering Profile - Storm-9 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

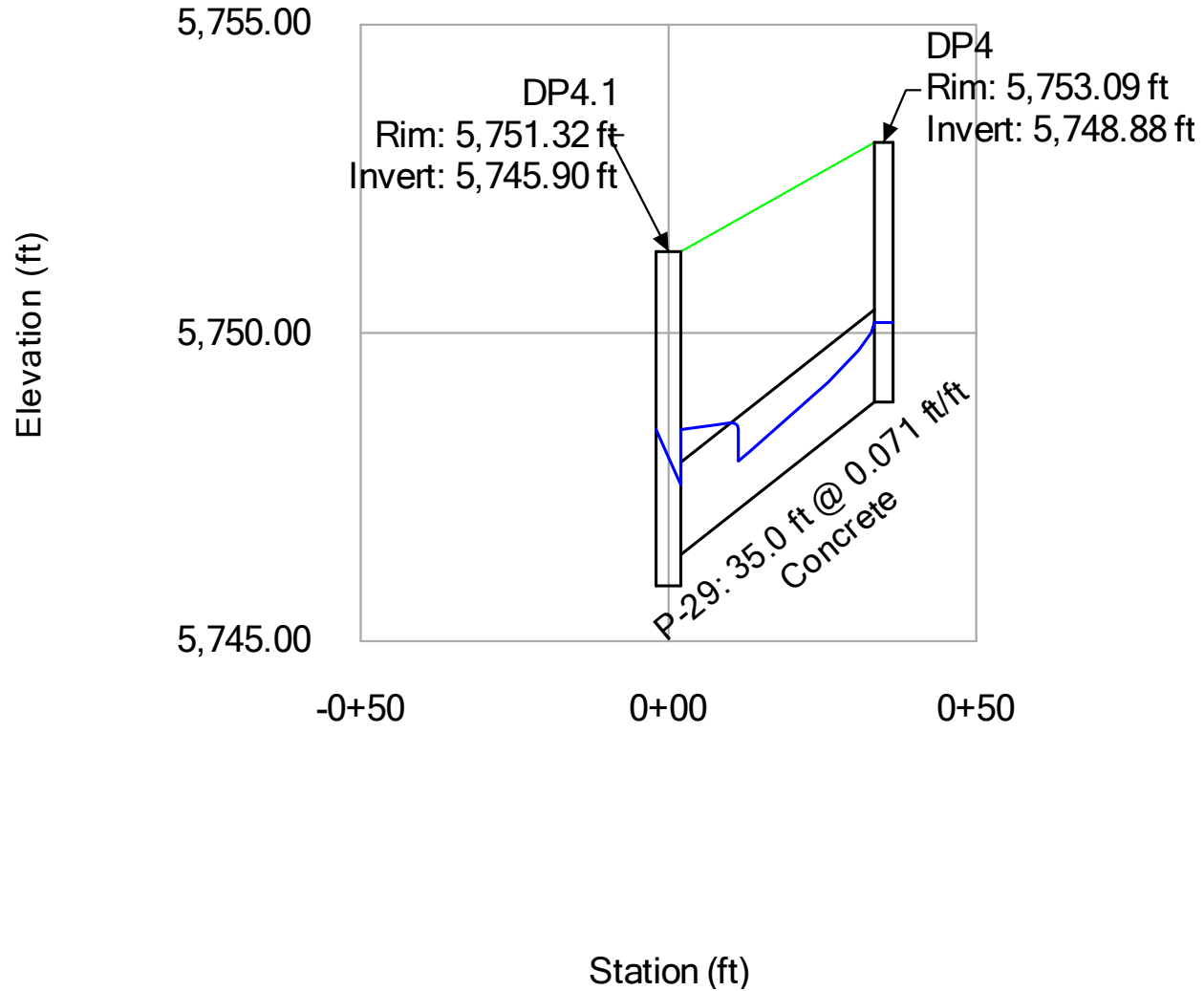
Engineering Profile - Storm-10 (Peaceful_Ridge.stsw)



100-YR SCENARIO

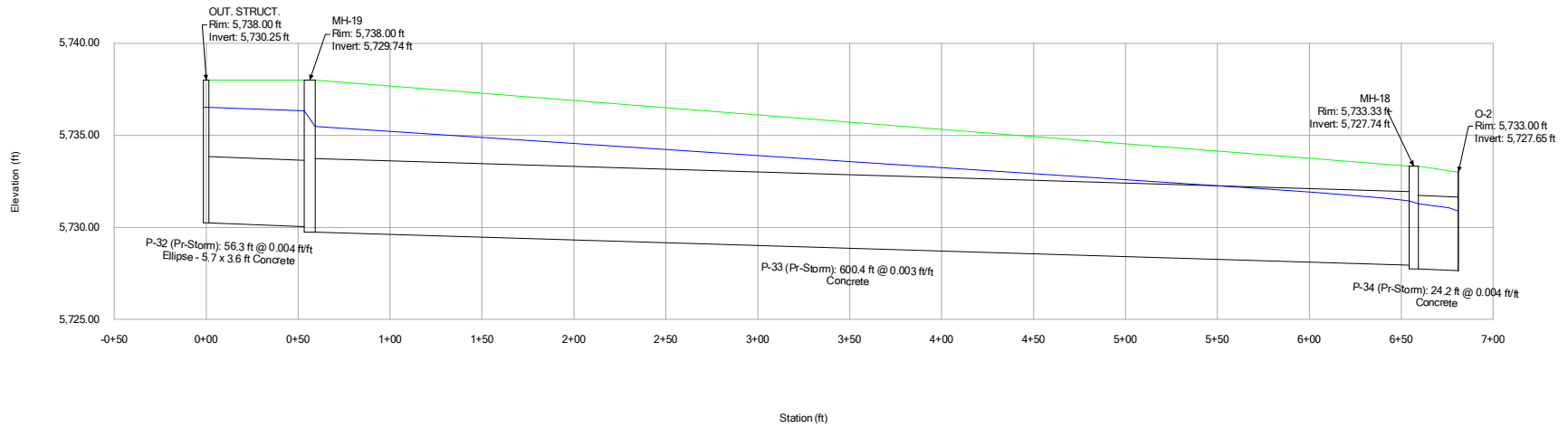
Profile Report

Engineering Profile - Storm-11 (Peaceful_Ridge.stsw)



100-YR SCENARIO

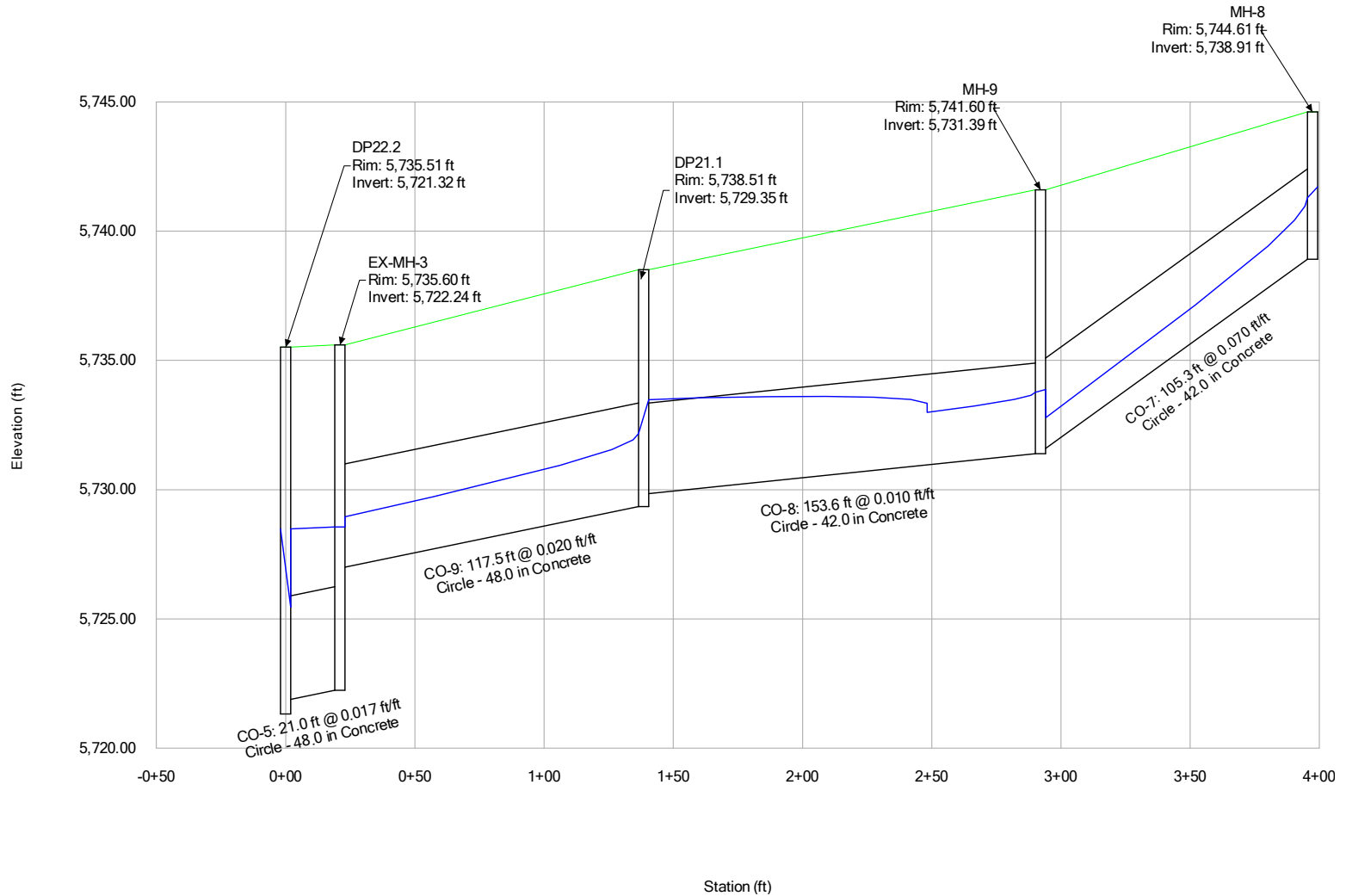
Profile Report Engineering Profile - Storm-12 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

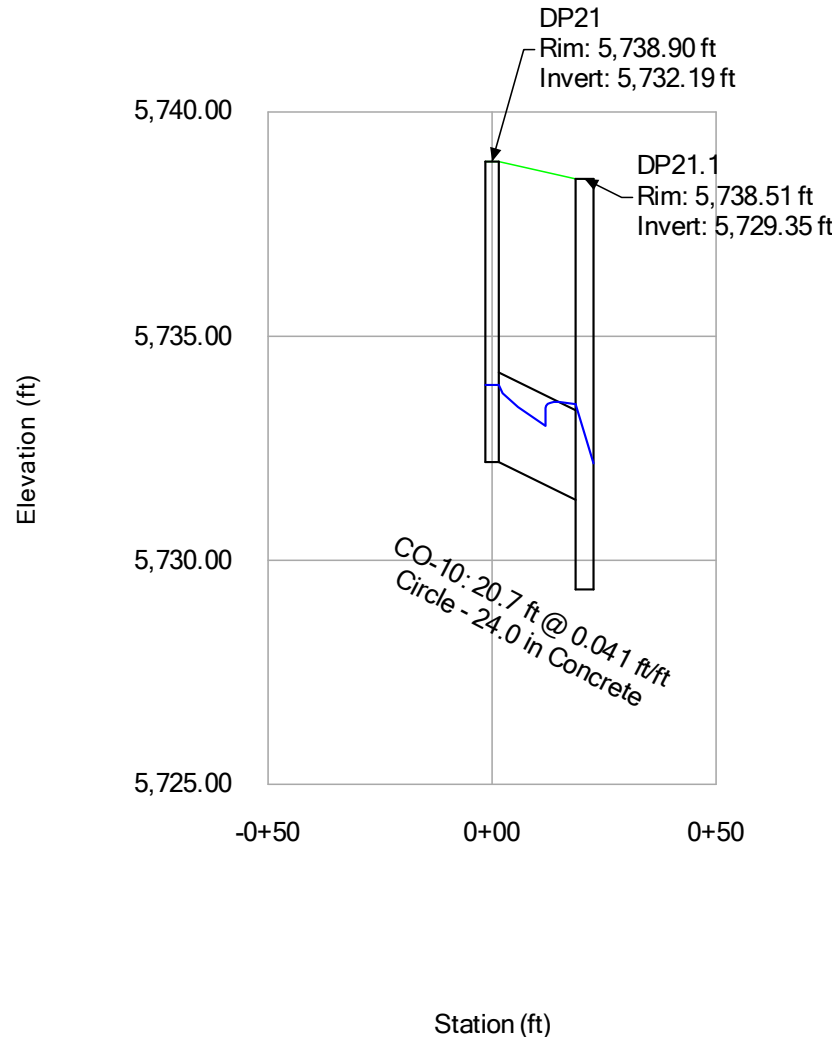
Engineering Profile - Storm-13 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

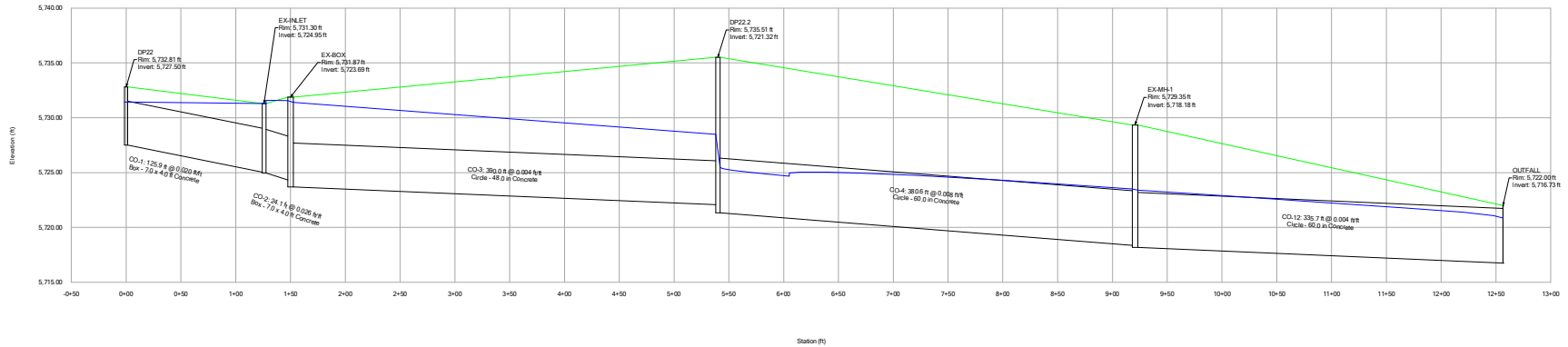
Engineering Profile - Storm-14 (Peaceful_Ridge.stsw)



100-YR SCENARIO

Profile Report

Engineering Profile - Ex-Storm-01 (Peaceful_Ridge.stsw)



Riprap Sizing - Spillway				
q (cfs/ft)	S (ft/ft)	C _f	n	D ₅₀ min. (in)
1.94	0.33	2	0	8.20

Type L Riprap (D₅₀ = 9") will be utilized for the spillway protection

Riprap Sizing - DP18 Overflow				
q (cfs/ft)	S (ft/ft)	C _f	n	D ₅₀ min. (in)
1.35	0.25	2	0	5.94

Type VL Riprap (D₅₀ = 6") will be utilized for the overflow protection

Riprap Sizing - Peaceful Ridge Rundown (Basin D6)				
q (cfs/ft)	S (ft/ft)	C _f	n	D ₅₀ min. (in)
0.10	0.25	2	0	1.38

Type VL Riprap (D₅₀ = 6") will be utilized for the rundown protection

Riprap Sizing - Peaceful Ridge Rundown (Basin 7)				
	S (ft/ft)	C _f	n	D ₅₀ min. (in)
0.22	0.25	2	0	2.13

Type VL Riprap (D₅₀ = 6") will be utilized for the rundown protection

Riprap Sizing - Pond Outfall (DP22)							
Pipe Dia (ft)	q (cfs/ft)	S (ft/ft)	C _f	n	D ₅₀ min. (in)	Length (ft, = 3x Pipe Dia)	Width (ft, = 3x Pipe Dia)
4	29.00	0.02	2	0	11.18	12	12

Type M Riprap (D₅₀ = 12") will be utilized for the outfall protection

$$D_{50} = 5.23 S^{0.43} (1.35 C_f q)^{0.56}$$

Equation 13-9

Where:

- D₅₀ = median rock size (in)
- S = longitudinal slope (ft/ft)
- C_f = concentration factor (1.0 to 3.0)
- q = unit discharge (cfs/ft)

When:

- η (porosity) = 0.0 (i.e., for buried soil riprap)

Forebay #1 Sizing	
Tributary Area (ac) =	53.55
Site % Impervious=	41.70
Total Impervious Acres =	22.33
WQCV (ac-ft) =	0.82
WQCV (ft ³)=	35,849.88
3% of WQCV =	1,075.50

Weir Report

Forebay Weir Sizing (Q = 2% Undetained Peak 100-Yr = 2% DP18.1 = 3.50 cfs)

Rectangular Weir

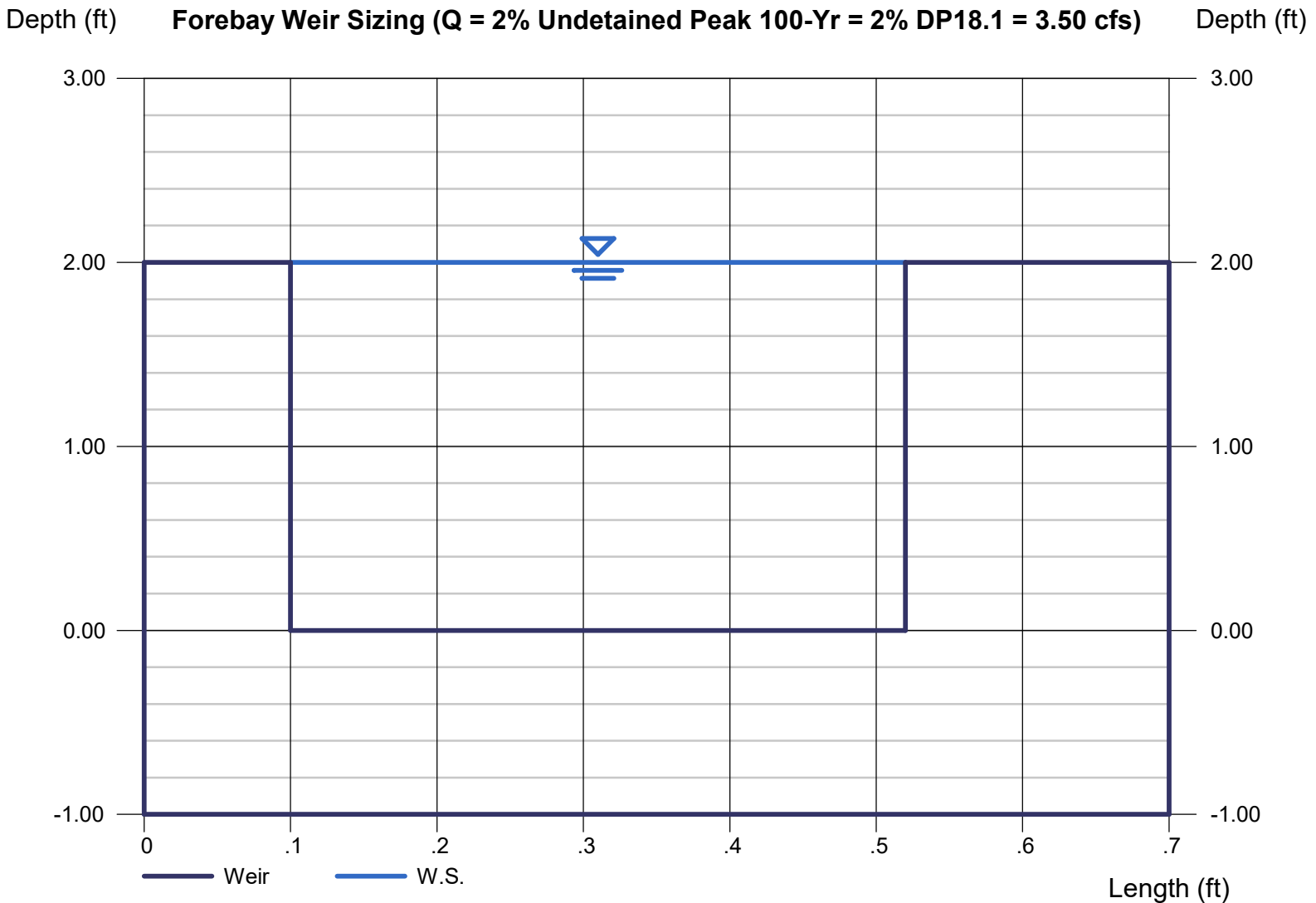
Crest = Sharp
Bottom Length (ft) = 0.42
Total Depth (ft) = 2.00

Highlighted

Depth (ft) = 2.00
Q (cfs) = 3.956
Area (sqft) = 0.84
Velocity (ft/s) = 4.71
Top Width (ft) = 0.42

Calculations

Weir Coeff. Cw = 3.33
Compute by: Q vs Depth
No. Increments = 5



Channel Report

Trickle Channel Capacity (Q = FB Release = 3.5 cfs)

Rectangular

Bottom Width (ft) = 2.00
Total Depth (ft) = 0.50

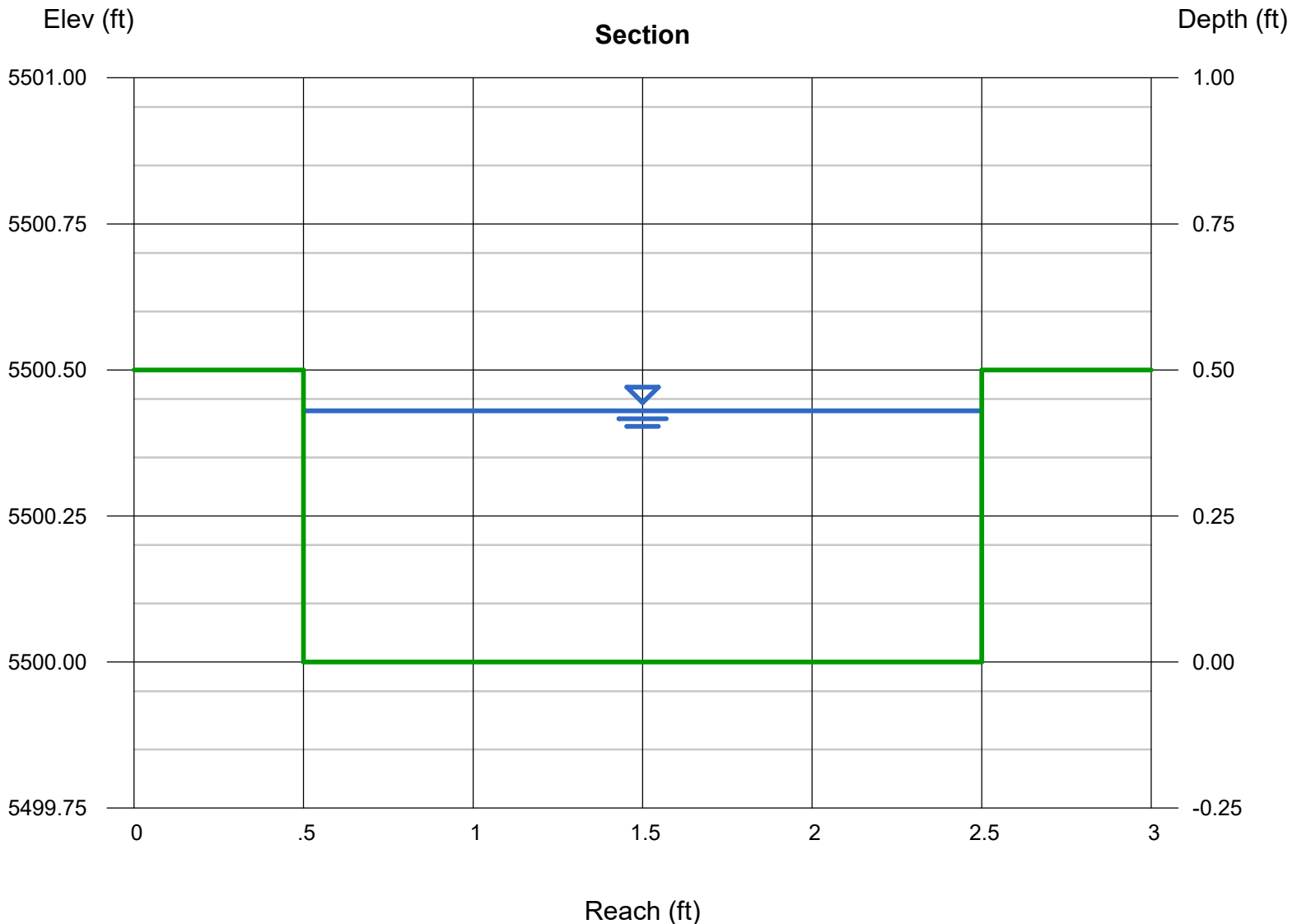
Invert Elev (ft) = 5500.00
Slope (%) = 1.00
N-Value = 0.016

Calculations

Compute by: Known Q
Known Q (cfs) = 3.50

Highlighted

Depth (ft) = 0.43
Q (cfs) = 3.500
Area (sqft) = 0.86
Velocity (ft/s) = 4.07
Wetted Perim (ft) = 2.86
Crit Depth, Yc (ft) = 0.46
Top Width (ft) = 2.00
EGL (ft) = 0.69



Channel Report

SWALE D1 - Q100 = DP20 = 11.2 CFS

Trapezoidal

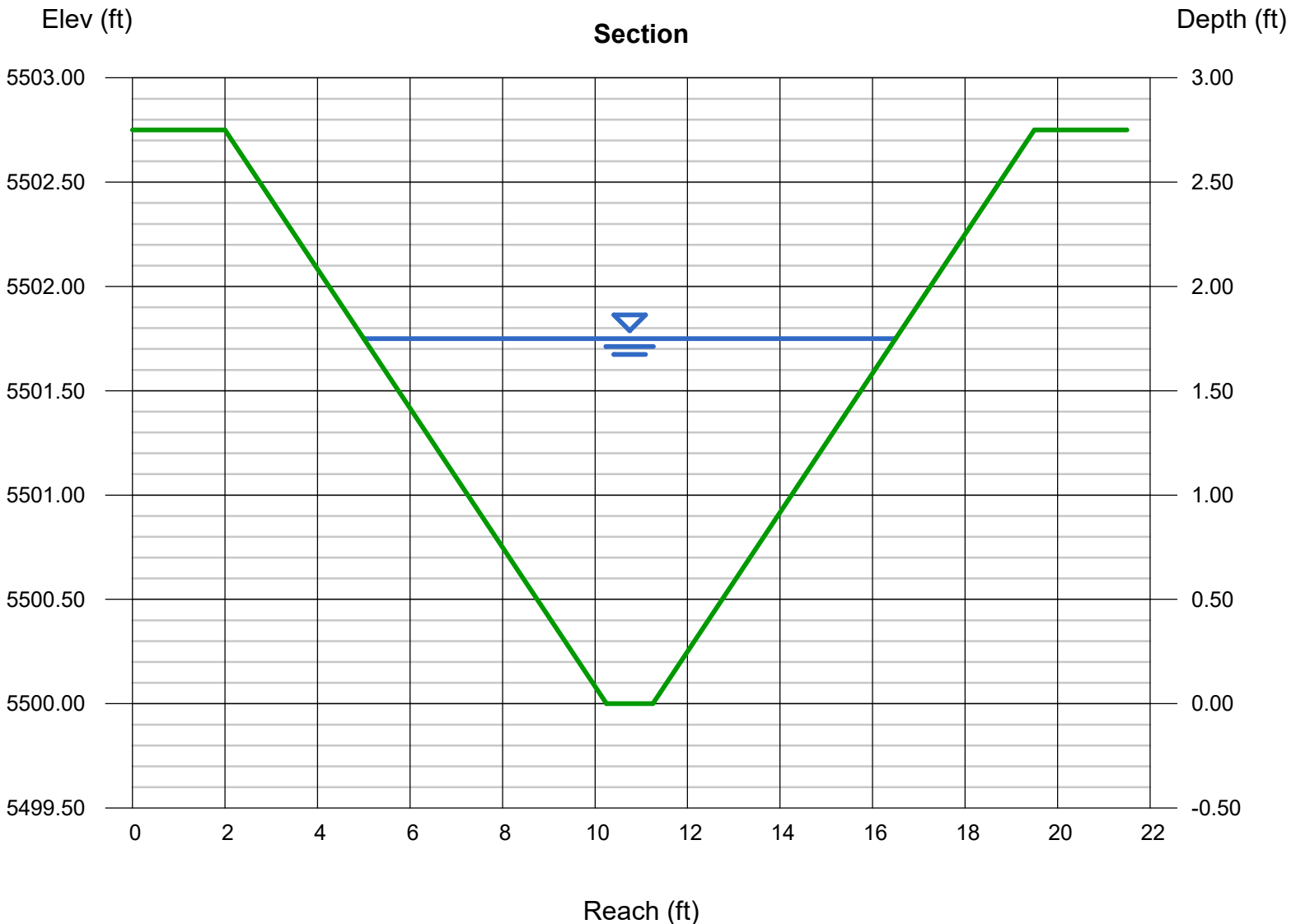
Bottom Width (ft) = 1.00
Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 2.75
Invert Elev (ft) = 5500.00
Slope (%) = 0.05
N-Value = 0.030

Highlighted

Depth (ft) = 1.75
Q (cfs) = 11.20
Area (sqft) = 10.94
Velocity (ft/s) = 1.02
Wetted Perim (ft) = 12.07
Crit Depth, Yc (ft) = 0.83
Top Width (ft) = 11.50
EGL (ft) = 1.77

Calculations

Compute by: Known Q
Known Q (cfs) = 11.20



Channel Report

BASIN D4 SWALE - Q100 = D2 + D4 = 8.5 CFS

Triangular

Side Slopes (z:1) = 3.00, 3.00

Total Depth (ft) = 3.00

Invert Elev (ft) = 5500.00

Slope (%) = 1.80

N-Value = 0.030

Calculations

Compute by: Known Q

Known Q (cfs) = 8.50

Highlighted

Depth (ft) = 0.88

Q (cfs) = 8.500

Area (sqft) = 2.32

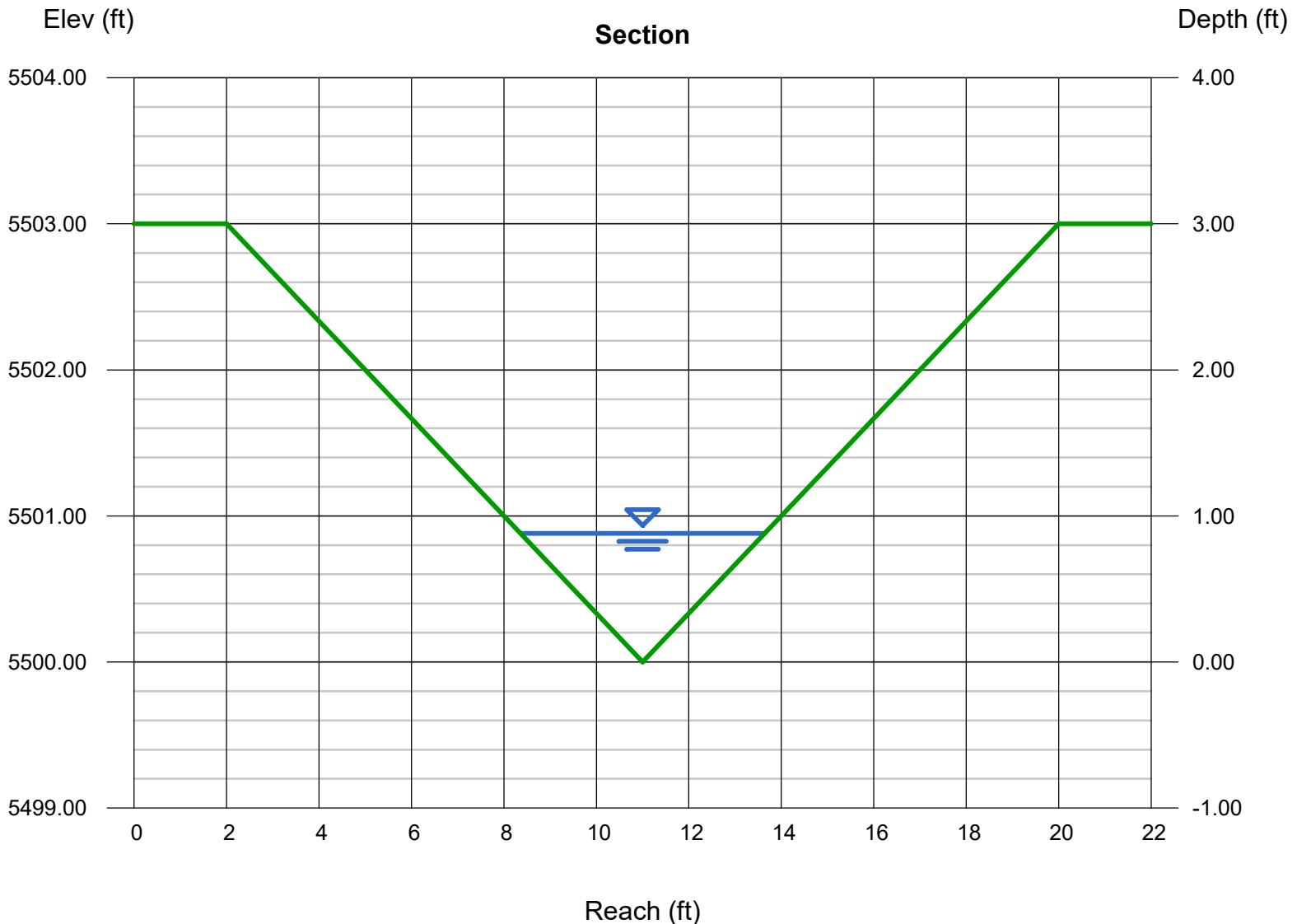
Velocity (ft/s) = 3.66

Wetted Perim (ft) = 5.57

Crit Depth, Yc (ft) = 0.88

Top Width (ft) = 5.28

EGL (ft) = 1.09



Channel Report

BASIN D5 SWALE: Q100 = DP23 FLOW = 10.9 cfs

Triangular

Side Slopes (z:1) = 5.00, 3.00
Total Depth (ft) = 3.00

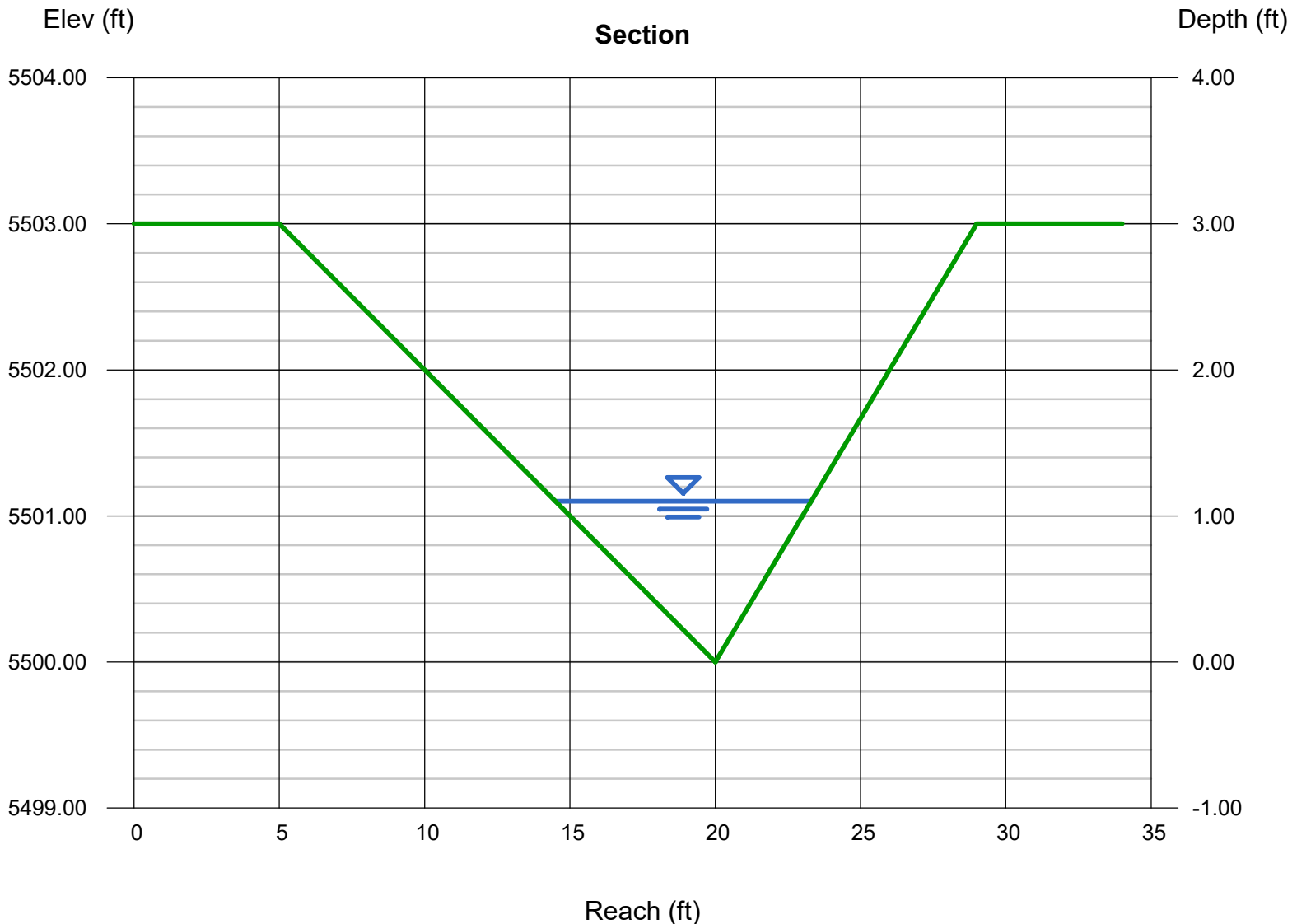
Invert Elev (ft) = 5500.00
Slope (%) = 0.50
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 10.90

Highlighted

Depth (ft) = 1.10
Q (cfs) = 10.90
Area (sqft) = 4.84
Velocity (ft/s) = 2.25
Wetted Perim (ft) = 9.09
Crit Depth, Yc (ft) = 0.86
Top Width (ft) = 8.80
EGL (ft) = 1.18



Channel Report

BASIN JC5 SWALE: Q100 = BASIN JC5 FLOW = 23.5 cfs

Triangular

Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 4.00

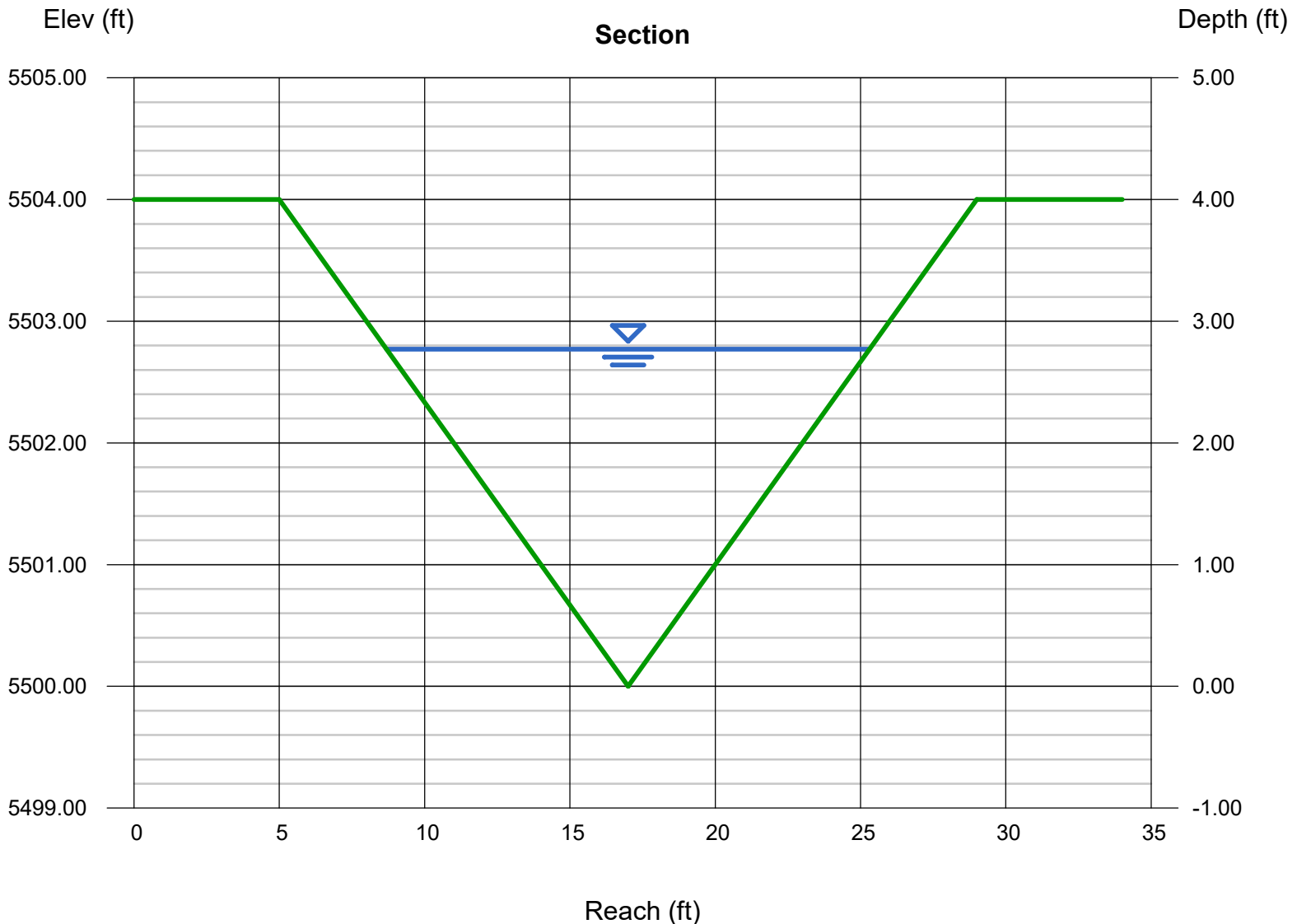
Invert Elev (ft) = 5500.00
Slope (%) = 0.03
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 23.50

Highlighted

Depth (ft) = 2.77
Q (cfs) = 23.50
Area (sqft) = 23.02
Velocity (ft/s) = 1.02
Wetted Perim (ft) = 17.52
Crit Depth, Yc (ft) = 1.31
Top Width (ft) = 16.62
EGL (ft) = 2.79





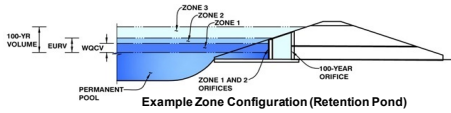
APPENDIX D – WATER QUALITY & DETENTION

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **PEACEFUL RIDGE FINAL DRAINAGE REPORT**

Basin ID: **BASINS OS1, A1, A2 & B1-B11**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	52.46	acres
Watershed Length =	2,200	ft
Watershed Length to Centroid =	250	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	41.60%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

Water Quality Capture Volume (WQCV) =	0.805	acre-feet
Excess Urban Runoff Volume (EURV) =	2.299	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.161	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	3.204	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	4.139	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	5.466	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	6.505	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	7.855	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	10,544	acre-feet
Approximate 2-yr Detention Volume =	1,702	acre-feet
Approximate 5-yr Detention Volume =	2,369	acre-feet
Approximate 10-yr Detention Volume =	3,237	acre-feet
Approximate 25-yr Detention Volume =	3,604	acre-feet
Approximate 50-yr Detention Volume =	3,779	acre-feet
Approximate 100-yr Detention Volume =	4,310	acre-feet

Optional User Overrides

		acre-feet
		acre-feet
	1.19	inches
	1.50	inches
	1.75	inches
	2.00	inches
	2.25	inches
	2.52	inches
		inches

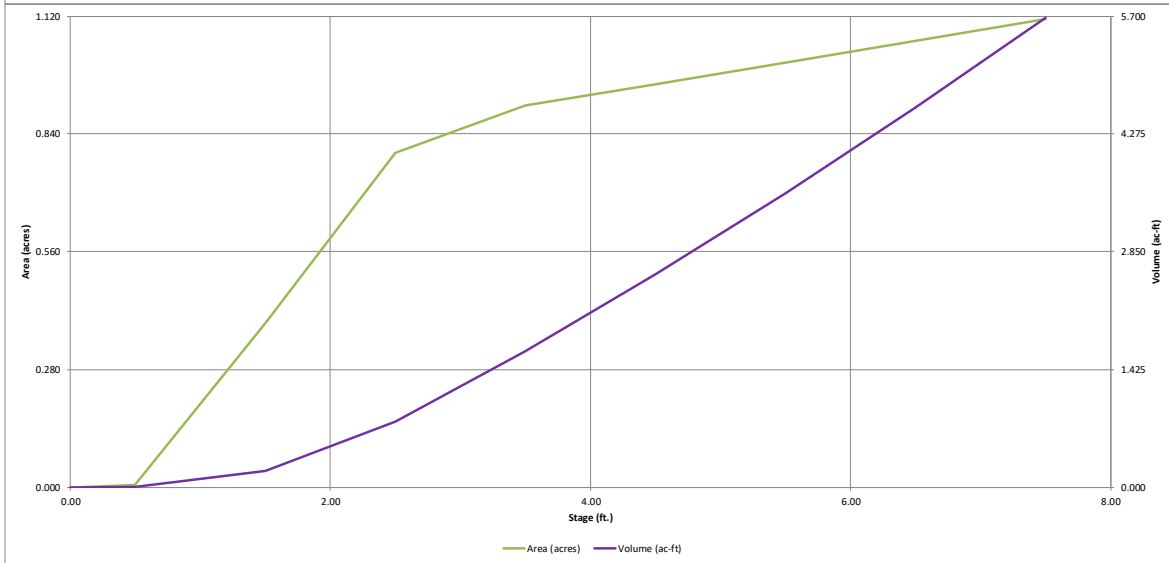
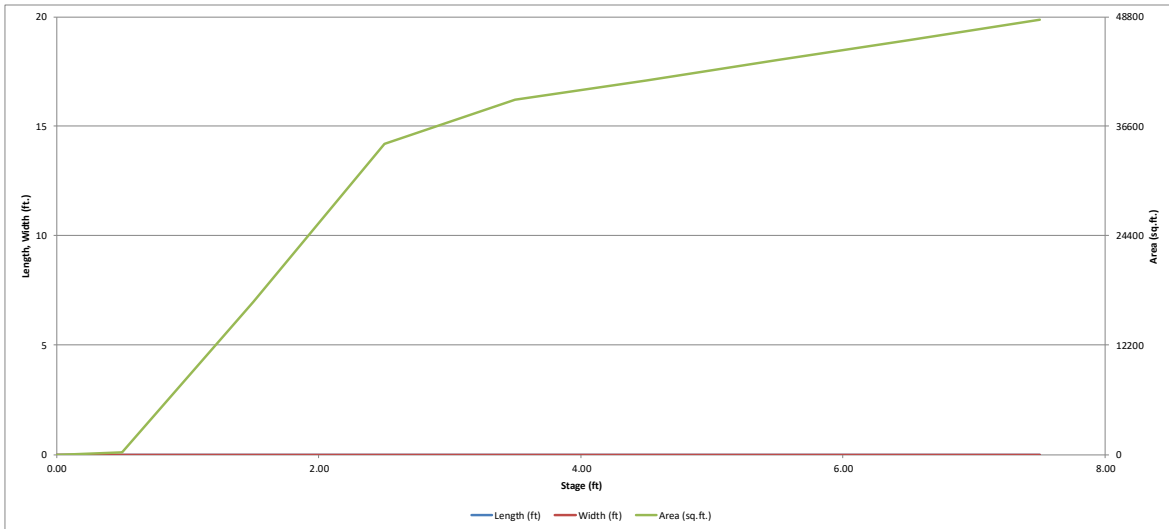
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.805	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.494	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.011	acre-feet
Total Detention Basin Volume =	4.310	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H _{total}) =	user	ft
Depth of Trickle Channel (H _{TC}) =	user	ft
Slope of Trickle Channel (S _{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S _{main}) =	user	H:V
Basin Length-to-Width Ratio (R _{L/W}) =	user	
Initial Surcharge Area (A _{ISV}) =	user	ft ²
Surcharge Volume Length (L _{SV}) =	user	ft
Surcharge Volume Width (W _{SV}) =	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)				
5730.25	Top of Micropool	--	0.00	--	--	0	0.000						
	5731	--	0.50	--	--	258	0.006	64	0.001				
	5732	--	1.50	--	--	17,009	0.390	8,698	0.200				
	5733	--	2.50	--	--	34,626	0.795	34,515	0.792				
	5734	--	3.50	--	--	39,531	0.908	71,594	1.644				
	5735	--	4.50	--	--	41,729	0.958	112,224	2.576				
	5736	--	5.50	--	--	43,957	1.009	155,067	3.560				
	5737	--	6.50	--	--	46,200	1.061	200,145	4.595				
	5738	--	7.50	--	--	48,476	1.113	247,483	5.681				

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

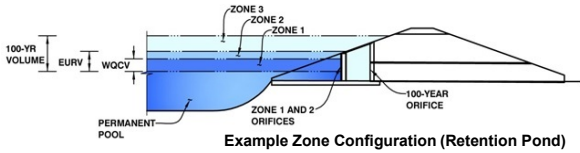


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-*Detention, Version 4.06 (July 2022)*

Project: PEACEFUL RIDGE FINAL DRAINAGE REPORT

Basin ID: BASINS OS1, A1, A2 & B1-B11



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.52	0.805	Orifice Plate
Zone 2 (EURV)	4.21	1.494	Circular Orifice
Zone 3 (100-year)	6.24	2.011	Weir&Pipe (Restrict)
Total (all zones)		4.310	

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft ²
Underdrain Orifice Centroid =	N/A	feet

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.52	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	10.10	inches
Orifice Plate: Orifice Area per Row =	2.97	sq. inches (diameter = 1-15/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.063E-02	ft ²
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft ²

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.84	1.68					
Orifice Area (sq. inches)	2.97	2.97	2.97					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	2.52	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	4.21	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	1.82	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected	
Vertical Orifice Area =	0.02	N/A	ft ²
Vertical Orifice Centroid =	0.08	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.21	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	34.00	N/A	feet
Overflow Weir Gate Slope =	12.00	N/A	H:V
Horiz. Length of Weir Sides =	10.00	N/A	feet
Overflow Gate Type =	Type C Gate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Gate Upper Edge, H _g =	5.04	N/A	feet
Overflow Weir Slope Length =	10.03	N/A	feet
Grate Open Area / 100-yr Orifice Area =	20.00	N/A	
Overflow Gate Open Area w/o Debris =	237.46	N/A	ft ²
Overflow Gate Open Area w/ Debris =	118.73	N/A	ft ²

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	48.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	43.00	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	11.87	N/A	ft ²
Outlet Orifice Centroid =	1.90	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.48	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	5.75	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	100.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.72	feet
Stage at Top of Freeboard =	7.47	feet
Basin Area at Top of Freeboard =	1.11	acres
Basin Volume at Top of Freeboard =	5.65	acre-ft

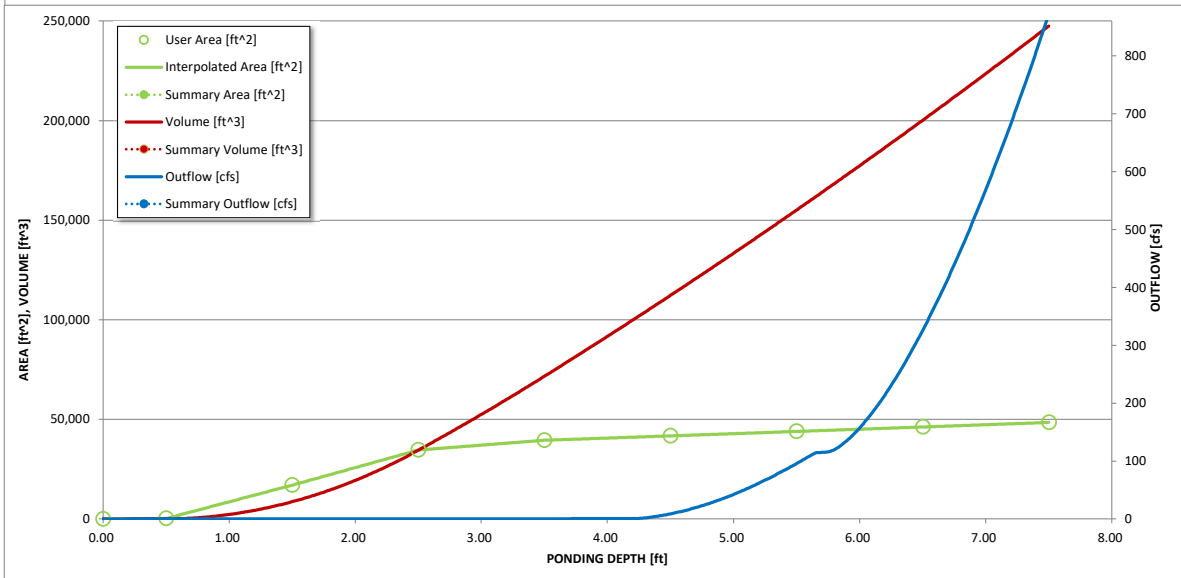
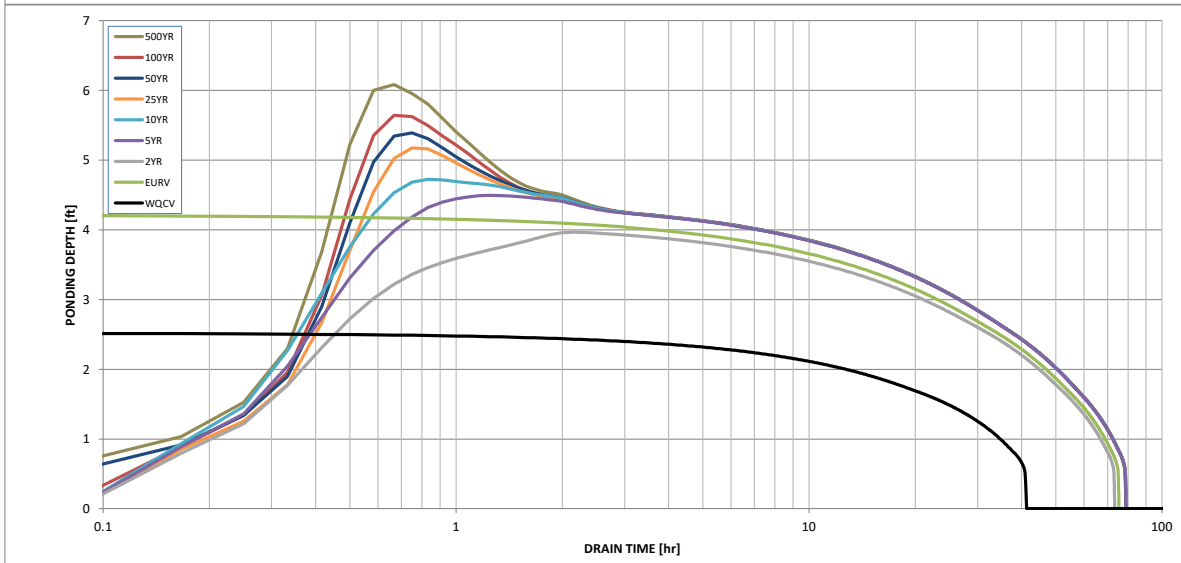
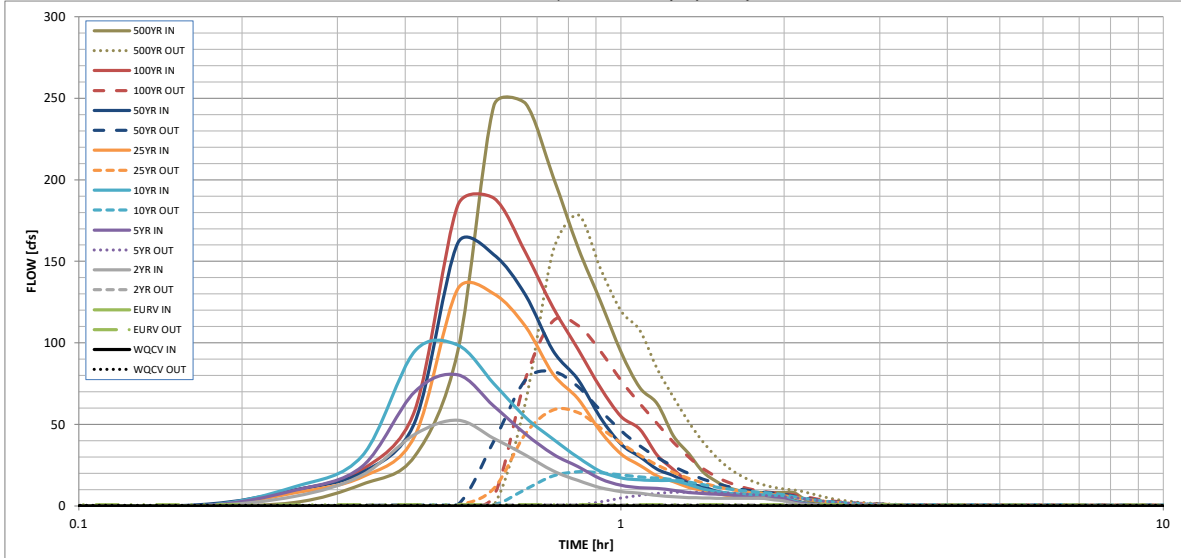
Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
One-Hour Rainfall Depth (in) =	0.805	2.299	2.161	3.204	4.139	5.466	6.505	7.855	10.544
CUHP Runoff Volume (acre-ft) =	N/A	N/A	2.161	3.204	4.139	5.466	6.505	7.855	10.544
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	11.0	30.1	45.7	75.4	95.5	120.5	167.2
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.21	0.57	0.87	1.44	1.82	2.30	3.19
Peak Inflow Q (cfs) =	N/A	N/A	52.6	80.3	98.7	133.1	161.0	188.7	246.9
Peak Outflow Q (cfs) =	0.4	0.7	0.6	8.5	21.0	58.9	82.4	113.5	178.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.5	0.8	0.9	0.9	1.1
Structure Controlling Flow =	Plate	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	0.0	0.1	0.2	0.3	0.5	0.5
Max Velocity through Gate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	68	66	69	67	65	63	60	56
Time to Drain 99% of Inflow Volume (hours) =	40	72	70	75	74	72	72	71	69
Maximum Ponding Depth (ft) =	2.52	4.21	3.96	4.49	4.72	5.17	5.39	5.64	6.08
Area at Maximum Ponding Depth (acres) =	0.80	0.94	0.93	0.96	0.97	0.99	1.00	1.02	1.04
Maximum Volume Stored (acre-ft) =	0.808	2.301	2.066	2.567	2.788	3.230	3.439	3.702	4.154

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.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	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	0.66	0.07	2.13
	0:15:00	0.00	0.00	5.79	9.49	11.78	7.92	9.69	9.65	13.26
	0:20:00	0.00	0.00	18.89	24.37	30.80	17.83	20.56	22.34	30.48
	0:25:00	0.00	0.00	43.82	70.10	94.84	42.91	51.31	58.63	94.70
	0:30:00	0.00	0.00	52.61	80.35	98.73	133.10	161.04	184.33	245.46
	0:35:00	0.00	0.00	41.35	61.09	74.93	130.06	154.06	188.73	246.90
	0:40:00	0.00	0.00	31.09	44.12	54.29	109.97	129.36	155.32	201.96
	0:45:00	0.00	0.00	21.47	31.64	40.96	80.87	95.13	121.55	158.61
	0:50:00	0.00	0.00	15.57	24.05	29.69	65.75	77.46	96.18	125.60
	0:55:00	0.00	0.00	11.21	16.61	21.21	45.73	54.19	72.47	94.60
	1:00:00	0.00	0.00	8.76	12.65	17.19	31.85	37.97	54.98	72.56
	1:05:00	0.00	0.00	7.83	11.20	15.98	24.95	30.24	46.98	62.77
	1:10:00	0.00	0.00	6.33	10.72	15.58	18.35	22.52	31.09	42.99
	1:15:00	0.00	0.00	5.57	9.54	15.47	14.90	18.50	22.31	32.06
	1:20:00	0.00	0.00	5.13	8.28	13.16	11.34	13.92	14.55	20.90
	1:25:00	0.00	0.00	4.89	7.55	10.43	9.62	11.67	10.50	14.98
	1:30:00	0.00	0.00	4.73	7.14	8.78	7.62	9.07	7.87	11.16
	1:35:00	0.00	0.00	4.64	6.90	7.82	6.51	7.62	6.48	9.17
	1:40:00	0.00	0.00	4.62	5.77	7.25	5.93	6.86	6.06	8.48
	1:45:00	0.00	0.00	4.62	5.14	6.90	5.64	6.48	5.88	8.16
	1:50:00	0.00	0.00	4.62	4.77	6.78	5.50	6.31	5.86	8.14
	1:55:00	0.00	0.00	3.65	4.58	6.34	5.44	6.22	5.86	8.14
	2:00:00	0.00	0.00	3.08	4.20	5.52	5.43	6.22	5.86	8.14
	2:05:00	0.00	0.00	1.75	2.39	3.16	3.12	3.56	3.36	4.65
	2:10:00	0.00	0.00	0.99	1.35	1.77	1.77	2.02	1.90	2.62
	2:15:00	0.00	0.00	0.50	0.71	0.92	0.93	1.06	0.99	1.36
	2:20:00	0.00	0.00	0.23	0.37	0.45	0.48	0.55	0.51	0.69
	2:25:00	0.00	0.00	0.09	0.14	0.16	0.18	0.20	0.18	0.24
	2:30:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.01
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	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
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	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	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
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	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
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APPENDIX E – REFERENCE MATERIAL

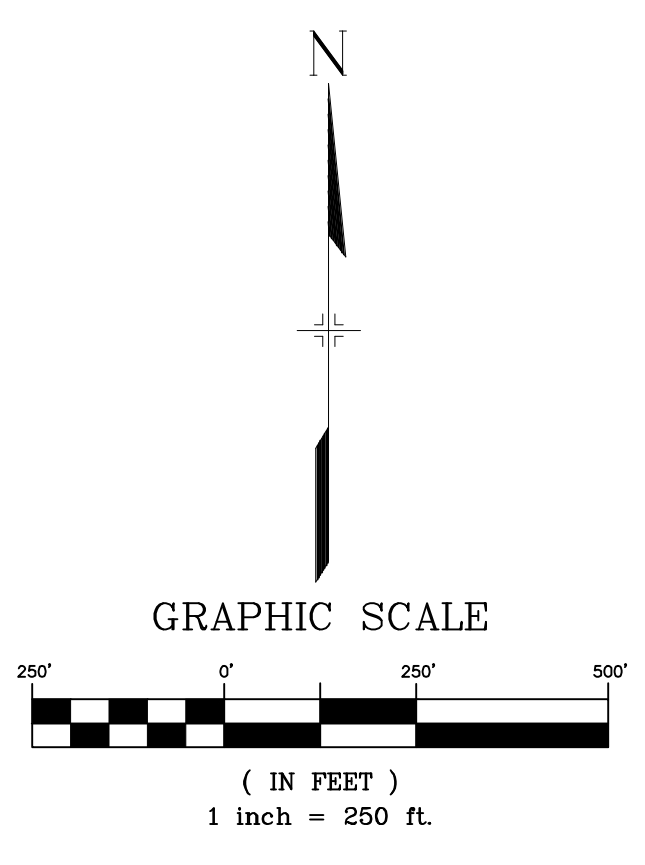


M-5
0.148 AC



LEGEND

- BASIN BOUNDARY
 - EXISTING CONTOUR
 - PROPOSED CONTOUR
 - PROPOSED STORM DRAIN PIPE
 - EXISTING STORM DRAIN PIPE
 - FLOW DIRECTION
 - EXISTING EDGE OF ROAD
 - PROPERTY LINE
-
- SUB BASIN DESIGNATION
 - 5-YEAR STORM EVENT PEAK FLOW (CFS)
 - 100-YEAR STORM EVENT PEAK FLOW (CFS)
 - SUB BASIN AREA (AC. OR SQ. MI.)
 - DESIGN POINT



Existing Design Point Summary - Rational Method

BRADLEY HEIGHTS MDDP				
Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
WF1	W1, TAR-EP	258.80	35.56	298.86
WF2	W2, W3	88.88	29.39	157.39
JC	J1	46.62	15.00	80.34

BRADLEY HEIGHTS MDDP EXISTING CONDITIONS HEG-HMS - SCS METHOD

Sub-basin	Area		Q5 CFS	Q100 CFS
	Acres	Sq. Mi.		
M1	92.4	0.1443	17.7	158.6
M2	144.3	0.2255	25.2	220.8
M3	146.3	0.2286	9.5	151.3
M4	149.4	0.2334	10.6	162.9
M5	105.9	0.1654	3.3	48.5
M6	144.4	0.2256	4.5	73.3
M7	108.3	0.1692	3.8	115.3
M8	158.4	0.2475	22.8	183.2
M9	150.8	0.2357	2.9	60
M10	88.8	0.1388	1.8	17.5
M11	69.1	0.1079	2	31
M12	106.2	0.1660	3.1	12.8
M13	144.4	0.2257	3.7	25.6
M14	72.7	0.1136	2	10.6
M15	59.1	0.0924	2.2	5.3
M16	148.5	0.2321	3.7	18.3
M17	182.0	0.2844	4.9	121.9
M18	163.5	0.2554	4.2	107.7
M19	192.0	0.3000	4.7	32.5
M20	89.5	0.1399	2.1	5.1
M21	146.6	0.2290	4.6	11.6
M22	66.1	0.1033	2.1	5.3
M23	132.8	0.2075	2.8	6.9
M24	99.6	0.1556	3.1	22.3
M25	101.8	0.1591	3.2	37.1
M26	114.3	0.1786	2	4.7
M27	124.9	0.1951	2.1	5

Design Points

DP	Area (ac.)	Area (sq. mi.)	Q5 CFS	Q100 CFS
DP-M0	3302.1	5.1595	81.4	1024.4
DP-M1	3302.1	5.1595	81.4	1024.4
DP-M2	3209.7	5.0152	78.8	987.8
DP-M3	3065.4	4.7897	69	897.8
DP-M4	2919.1	4.5611	62	804.4
DP-M5	250.2	0.3910	7.6	122.8
DP-M6	2102.0	3.2844	27	371.6
DP-M7	451.6	0.7056	8	70.4
DP-M8	1561.6	2.4400	17.7	284.3
DP-M9	875.6	1.3581	12.9	67.8
DP-M10	368.9	0.5764	9.1	23.2
DP-M11	239.2	0.3737	4	9.7

CITY OF COLORADO SPRINGS
BRADLEY HEIGHTS METRO DISTRICT
MASTER DEVELOPMENT DRAINAGE REPORT

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE.

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC. PROJECT NO. 211213.004

DESIGNED BY: JTS
DRAWN BY: JTS
CHECKED BY: JTS

SCALE: HORIZ. 1" = 250'
VERT. 1" = 5'

JANUARY 2022
DATE ISSUED: JANUARY 2022
DRAWING NO.: DR-01
SHEET 1 OF 5

SEAL

PREPARED BY: Matrix

NO.	DATE	DESCRIPTION	BY

COMPUTER FILE MANAGEMENT
FILE NAME: C:\211213.001\Bradley Heights Metro District\200 Drainage\201 Drainage Reports\MDDP\DWG\BRADLEY HEIGHTS DR.dwg
CTB FILE:
PLOT DATE: January 11, 2022 4:45:55 PM
THIS DRAWING IS CURRENTLY AS SHOWN AND MAY BE SUBJECT TO CHANGE.

Project Name: BRADLEY HEIGHTS MDDP
 Project Location: COLORADO SPRINGS, EL PASO COUNTY, CO
 Designer: JTS
 Notes: Proposed Conditions

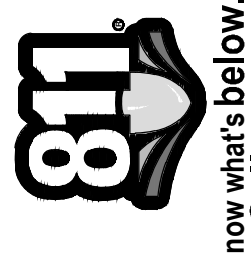
Average Channel Velocity: 4.00 ft/s (If specific channel vel is used, this will be ignored)
 Average Slope for Initial Flow: 0.04 ft/ft (If Elevations are used, this will be ignored)

SOIL TYPE CHOSEN BASED ON WORST CASE FOR TRIBUTARY AREA
 PCT Impervious 95% 65% 100% Rational 'C' Values 70% 30% 2%

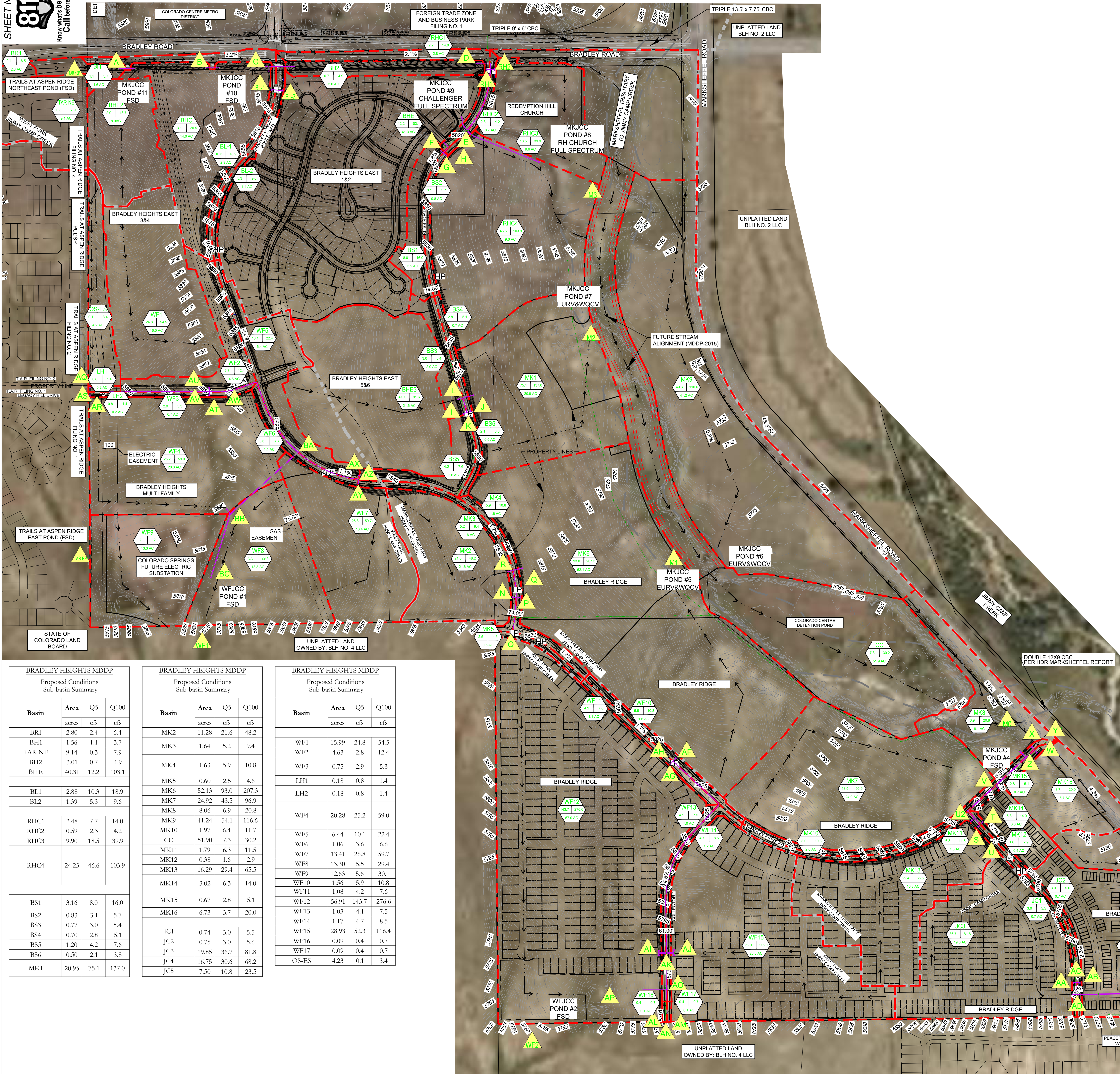
Channel Flow Type Key						
Heavy Meadow 2						
Tillage/Field 3						
Short Pasture and Lawns 4						
Nearly Bare Ground 5						
Grassed Waterway 6						
Paved Areas 7						

Sub-basin	Comments	Area		Soil Group	Commercial Areas (95% Impervious)		Residential (1/8 or less) (65% Impervious)			Pavement (100% Impervious)			Neighborhoods/Multi-Family (70% Impervious)			Residential (1/3 Acre) (30% Impervious)			Undeveloped/Pervious Areas (2% Impervious)			Composite		Percent Impervious	Flow Lengths				Average (feet/min)		Average (%)		Channel Flow Type (See Key Above)	Velocity (ft/s)	Channel Tc (min)	Rainfall Intensity & Rational Flow Rate					Sub-basin					
		sf	acres		C5	C100	C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100	Area (SF)	Initial ft	True Initial Length ft		Channel ft	True Channel Length ft	Slope	Tc (min)	Slope	Ground Type	Channel Tc (min)	Total (min)				i5 in/hr	i10 in/hr	i15 in/hr	i20 in/hr	i25 in/hr						
BR1	NORTH OF TRAILS AT ASPEN RIDGE	121992	2.80	0.0044	B	0.81	0.88	42600	0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36	79392	0.34	0.54	34.48	100	100	1268	1268	0.02	10.84	3.0	4	1.21	17.43	28.26	2.51	2.4	4.21	6.4	BR1
BH1	NE CORNER OF TRAILS, NW CORNER OF BRADLEY HEIGHTS	6952	1.59	0.0025	B	0.81	0.88		0.45	0.59				0.90	0.96	11729	0.49	0.62		0.25	0.47				0.09	0.36	57323	0.23	0.46	18.65	100	100	549	549	0.02	12.46	3.0	4	1.21	7.55	20.01	3.01	1.1	5.06	3.7	BH1
BH2	DITCH BETWEEN BRADLEY ROAD & BRADLEY HEIGHTS EAST	13927	3.01	0.0047	B	0.81	0.88		0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36	13927	0.09	0.36	2.00	20	20	1233	1233	0.05	4.75	2.0	4	0.99	20.76	25.51	2.65	0.7	4.45	4.9	BH2
BHE	BRADLEY HEIGHTS EAST F 1&2 UNDEVELOPED/DISCHARGE FROM FSD	1755694	40.31	0.0630	D	0.82	0.89		0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51	1755694	0.16	0.51	2.00	100	100	2332	2332	0.05	9.89	2.0	7	2.83	13.74	23.63	2.76	12.2	4.64	103.1	BHE
BHE2	BRADLEY HEIGHTS EAST F 3&4 UNDEVELOPED/DISCHARGE FROM MKJCC POND #11	382000	8.77	0.0137	B	0.81	0.88		0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36	382000	0.09	0.36	2.00	100	100	898	898	0.05	10.63	3.0	4	1.21	12.34	22.97	2.81	2.2	4.71	15.0	BHE2
BHE3	BRADLEY HEIGHTS EAST F 5&6 - DEVELOPED FLOWS	941040	21.60	0.0338	D	0.82	0.89		0.49	0.65	941040			0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.49	0.65	65.00	100	100	1100	1100	0.05	6.42	3.0	7	3.46	5.29	11.71	3.85	41.1	6.47	91.6	BHE3
BHC	BRADLEY HEIGHTS COMMERCIAL UNDEVELOPED/DISCHARGE FROM MKJCC POND #9	612207	14.05	0.0220	B	0.81	0.88		0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36	612207	0.09	0.36	2.00	100	100	1166	1166	0.05	10.63	2.0	4	0.99	19.63	30.26	2.41	3.1	4.05	20.7	BHC
TAR-NE	NORTHEAST TRAILS AT ASPEN RIDGE (PART OF TAR #9) UNDEVELOPED/DISCHARGE FROM FSD	398439	9.15	0.0143	B	0.81	0.88		0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36	398439	0.09	0.36	2.00	100	100	1750	1750	0.05	10.63	2.0	7	2.83	10.31	20.94	2.94	0.3	4.95	7.9	TAR-NE
BL1	WEST HALF OF BRADLEY LANDING DRAINING TO NORTH PORTION OF BRADLEY ROAD DRAINING EAST	130000	2.98	0.0047	B	0.81	0.88	130000	0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36		0.81	0.88	95.00	20	20	1372	1372	0.03	1.62	3.0	7	3.46	6.60	8.21	4.41	10.7	7.40	19.6	BL1
BL2	EAST HALF OF BRADLEY LANDING	60354	1.39	0.0022	B	0.81	0.88	60354	0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36		0.81	0.88	95.00	20	20	1212	1212	0.05	1.37	3.3	7	3.63	5.56	6.92	4.66	5.3	7.83	9.6	BL2
RHC1	SOUTH HALF OF BRADLEY ROAD BETWEEN BLISS AND BRADLEY LANDING	107935	2.48	0.0030	B	0.81	0.88	107935	0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36		0.81	0.88	95.00	92	92	1343	1343	0.02	3.97	1.9	7	2.76	8.12	12.09	3.80	7.7	6.39	14.0	RHC1
RHC2	EAST HALF OF BLISS ROAD ADJACENT TO REDEMPTION HILL CHURCH	25483	0.59	0.0009	B	0.81	0.88	25483	0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36		0.81	0.88	95.00	20	20	546	546	0.02	1.85	1.0	7	2.00	4.55	6.40	4.77	2.3	8.01	4.2	RHC2
RHC3	REDEMPTION HILL CHURCH	431154	9.90	0.0155	D	0.82	0.89		0.49	0.65				0.90	0.96		0.53	0.68	431154	0.30	0.57				0.16	0.51		0.53	0.68	70.00	100	100	1110	1110	0.02	8.14	2.0	7	2.83	6.54	14.68	3.50	18.5	8.07	39.9	RHC3
RHC4	RHC ADJACENT PROPERTY OWNED BY THE CHURCH	1055503	24.23	0.0379	D	0.82	0.89		0.49	0.65	1055503			0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.49	0.65	65.00	100	100	1035	1035	0.05	6.42	3.0	7	3.46	4.98	11.40	3.90	46.6	6.55	103.9	RHC4
BS1	BLISS ROAD	137852	3.16	0.0049	B	0.81	0.88	60390	0.45	0.59	77462			0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36		0.61	0.72	78.14	100	100	980	980	0.05	5.18	1.8	7	2.68	6.09	11.26	3.92	7.6	6.58	15.0	BS1
BS2	BLISS ROAD	35937	0.83	0.0013	B	0.81	0.88	35937	0.45	0.59				0.90	0.96		0.49	0.62		0.25	0.47				0.09	0.36		0.81	0.88	95.00	20	20	980	980	0.05	1.37	1.8	7	2.68	6.09	7.45	4.55	3.1	7.64	5.6	BS2
BS3	BLISS ROAD	33528	0.77	0.0012	D	0.82	0.89	33528	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	100	100	737	737	0.05	2.05	2.3	7	3.03	4.03	6.09	4.64	3.0	7.89	5.4	BS3
BS4	BLISS ROAD	30562	0.70	0.0011	D	0.82	0.89	30562	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	50	50	737	737	0.05	2.08	2.3	7	3.03	4.05	6.13	4.83	2.8	8.12	5.1	BS4
BS5	BLISS ROAD	52249	1.20	0.0019	D	0.82	0.89	52249	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	50	50	1147	1147	0.05	2.08	1.8	7	2.68	7.12	9.20	4.23	4.2	7.11	7.6	BS5
BS6	BLISS ROAD	21806	0.50	0.0008	D	0.82	0.89	21806	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	50	50	555	555	0.05	2.08	1.8	7	2.68	3.45	5.53	4.97	2.1	8.35	3.8	BS6
MS1	SCHOOL & PUD	912529	20.95	0.1388	D	0.82	0.89	912529	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	100	100	1170	1170	0.05	2.95	3.0	7	3.46	5.63	8.57	4.34	75.1	7.29	137.0	MS1
MK2	PUD-MARKSHEFFEL WOODMEN INVESTMENTS, LLC	491552	11.28	0.0179	D	0.82	0.89		0.49	0.65	491552			0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.49	0.65	65.00	100	100	1056	1056	0.05	6.42	3.0	7	3.46	5.08	11.30	3.88	21.6	6.22	48.2	MK2
MK1	BRADLEY LANDING BOULEVARD	71339	1.64	0.0024	D	0.82	0.89	71339	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	50	50	1303	1303	0.05	2.08	1.2	7	2.19	9.91	11.99	3.82	5.2	6.41	9.4	MK1
MK4	BRADLEY LANDING BOULEVARD	71100	1.63	0.0023	D	0.82	0.89	71100	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	50	50	830	830	0.05	2.08	1.2	7	2.19	6.31	8.99	4.37	5.9	7.35	10.8	MK4
MK5	BRADLEY RIDGE ROAD	20108	0.60	0.0010	D	0.82	0.89	20108	0.49	0.65				0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.82	0.89	95.00	50	50	157	157	0.05	2.08	1.0	7	2.00	1.31	3.00	5.10	2.5	8.58	4.6	MK5
MK6	PUD-MARKSHEFFEL WOODMEN INVESTMENTS, LLC	2270661	52.43	0.0924	D	0.82	0.89		0.49	0.65	2270661			0.90	0.96		0.53	0.68		0.30	0.57				0.16	0.51		0.49	0																	

Table with columns for DESIGN POINTS, Sub-basins/Comments, Area (sf, acres, Sq. Ft.), Soil Group, Rational 'C' Values (Commercial Areas, Residential, Pavement, Neighborhoods, Residential, Undeveloped, Composite, Percent Impervious), Flow Lengths (Initial, True Initial, Channel, Time Channel, Average), Tc (min), Rainfall Intensity & Rational Flow Rate (i5, Q5, i100, Q100), and DESIGN POINTS.



Know what's below.
Call before you dig.



Proposed Design Point Summary				
BRADLEY HEIGHTS MDDP				
Design Point	Sub-Basins	Total Area (ac.)	Q(5) (cfs)	Q(100) (cfs)
TAR-NEP	TRAILS AT ASPEN RIDGE NORTHEAST POND	9.09	0.20	7.90
A	1ST ENTRANCE EAST OF TAR	13.46	1.29	11.60
B	2ND ENTRANCE EAST OF TAR	35.44	3.33	25.29
C	BRADLEY LANDING BOULEVARD	35.44	3.33	25.29
D	BLISS ROAD BYPASS STORM	38.44	6.55	36.46
E	MKJCC POND #9 DISCHARGE & DP D	78.75	18.75	139.56
F	BS1	3.16	7.59	15.05
G	BS2	0.83	3.06	5.59
H	BS1-2	3.99	10.39	20.18
RH1	RHC1	2.48	7.70	14.05
RH2	RHC1-RHC2	3.06	9.51	17.36
I	BS3, BS5	1.97	7.56	13.78
J	BS4, BS6	1.20	4.98	9.08
K	BS3-BS6	3.17	12.17	22.19
L	BS3-BS6, BHE3	24.77	48.47	104.14
N	MK3	1.64	5.07	9.25
O	MK5	0.60	2.39	4.35
P	MK4	1.63	5.90	10.76
Q	MK3-MK5	3.87	11.97	21.82
R	MK2-5	15.16	34.92	72.65
S	MK11	1.79	6.29	11.47
T	MK12	0.38	1.60	2.92
U	MK11-MK12	2.17	7.54	13.75
U2	MK11-MK13	18.46	38.21	82.33
V	MK11-MK14	21.47	42.63	92.28
W	MK15	0.67	2.82	5.15
X	MK10	1.97	6.43	11.72
Y	MK10, MK15	2.64	8.61	15.70
Z	MK10-MK15	24.11	49.83	105.12
MKJCC POND #4	MK7, MK10-MK16-INFLOW	49.03	90.43	195.90
MKJCC POND #4	MK7, MK10-MK16-OUTFLOW	49.03	10.00	70.30
MKJCC POND #6	MK9	41.24	17.00	89.00
DP-M0	HEC-HMS CALCS CUMULATIVE OF OFFSITE FLOWS, COLORADO CENTRE REGIONAL POND DISCHARGE, POND MKJCC #4 DISCHARGE, AND MK-8	3264.34	338.40	1003.80
AA	JC1	0.74	3.00	5.47
AB	JC2	0.75	3.05	5.56
AC	JC1-JC2	1.48	6.05	11.03
AD	JC1-JC3	21.33	41.64	90.93
AE	JC1-JC4	38.07	69.67	153.48
JCC POND #3	JC1-JC4	38.07	7.40	59.80
JC	JC1-JC5	45.58	18.20	83.32
AF	WF10	1.56	5.98	10.91
AG	WF11	1.08	4.16	7.58
AH	WF10-WF11	2.64	10.14	18.49
AI	WF12 & WF13	57.93	146.69	282.09
AJ	WF14 & WF15	30.00	55.86	123.04
AK	WF10-WF15	90.57	180.08	358.35
AL	WF16	0.09	0.38	0.69
AM	WF17	0.09	0.38	0.69
AN	WF16-WF17	0.18	0.76	1.38
AO	WF10-WF17	90.75	180.52	359.15
WFJCC POND #2	DESIGN POINT AP: POND DISCHARGE	90.75	22.60	153.50
WF2	SITE DISCHARGE TO SOUTH	90.75	22.60	153.50
AQ	LH1 - AT GRADE AT BORDER WITH TRAILS AT ASPEN RIDGE	0.18	0.75	1.38
AR	LH2 - AT GRADE AT BORDER WITH TRAILS AT ASPEN RIDGE	0.18	0.75	1.38
AS	LH1-LH2	0.36	1.51	2.75
AT	WF3	0.75	2.90	5.28
AU	WF2	4.63	2.78	12.36
AV	WF2-WF3, LH1-LH2	5.74	6.53	19.46
AW	WF1-WF3, LH1-LH2	21.73	37.02	86.80
AX	WF5	6.44	10.07	22.45
AY	WF6	1.06	3.64	6.64
AZ	WF5-WF6	7.50	13.03	27.89
BA	WF1-WF3, WF5-WF6, LH1, LH2	29.23	43.77	101.53
BB	WF1-WF6, LH1-LH2	49.51	72.74	170.87
BC	WF1-WF8, LH1-LH2 INTO WFJCC POND #1	76.22	89.73	226.69
WFJCC POND #1	POND DISCHARGE	76.22	10.70	106.70
TAR-EP	TRAILS AT ASPEN RIDGE-EAST POND FULL BUILD-OUT DISCHARGE	160.87	5.80	139.50
WF1	TAR-EP, WF9, WFJCC POND #1 DISCHARGE	249.72	22.13	276.32

BRADLEY HEIGHTS MDDP Proposed Conditions Sub-basin Summary			
Basin	Area	Q5	Q100
	acres	cfs	cfs
BR1	2.80	2.4	6.4
BH1	1.56	1.1	3.7
TAR-NE	9.14	0.3	7.9
BH2	3.01	0.7	4.9
BHE	40.31	12.2	103.1
BL1	2.88	10.3	18.9
BL2	1.39	5.3	9.6
RHC1	2.48	7.7	14.0
RHC2	0.59	2.3	4.2
RHC3	9.90	18.5	39.9
RHC4	24.23	46.6	103.9
BS1	3.16	8.0	16.0
BS2	0.83	3.1	5.7
BS3	0.77	3.0	5.4
BS4	0.70	2.8	5.1
BS5	1.20	4.2	7.6
BS6	0.50	2.1	3.8
MK1	20.95	75.1	137.0

BRADLEY HEIGHTS MDDP Proposed Conditions Sub-basin Summary			
Basin	Area	Q5	Q100
	acres	cfs	cfs
MK2	11.28	21.6	48.2
MK3	1.64	5.2	9.4
MK4	1.63	5.9	10.8
MK5	0.60	2.5	4.6
MK6	52.13	93.0	207.3
MK7	24.92	43.5	96.9
MK8	8.06	6.9	20.8
MK9	41.24	54.1	116.6
MK10	1.97	6.4	11.7
CC	51.90	7.3	30.2
MK11	1.79	6.3	11.5
MK12	0.38	1.6	2.9
MK13	16.29	29.4	65.5
MK14	3.02	6.3	14.0
MK15	0.67	2.8	5.1
MK16	6.73	3.7	20.0
JC1	0.74	3.0	5.5
JC2	0.75	3.0	5.6
JC3	19.85	36.7	81.8
JC4	16.75	30.6	68.2
JC5	7.50	10.8	23.5

BRADLEY HEIGHTS MDDP Proposed Conditions Sub-basin Summary			
Basin	Area	Q5	Q100
	acres	cfs	cfs
WF1	15.99	24.8	54.5
WF2	4.63	2.8	12.4
WF3	0.75	2.9	5.3
LH1	0.18	0.8	1.4
LH2	0.18	0.8	1.4
WF4	20.28	25.2	59.0
WF5	6.44	10.1	22.4
WF6	1.06	3.6	6.6
WF7	13.41	26.8	59.7
WF8	13.30	5.5	29.4
WF9	12.63	5.6	30.1
WF10	1.56	5.9	10.8
WF11	1.08	4.2	7.6
WF12	56.91	143.7	276.6
WF13	1.03	4.1	7.5
WF14	1.17	4.7	8.5
WF15	28.93	52.3	116.4
WF16	0.09	0.4	0.7
WF17	0.09	0.4	0.7
OS-ES	4.23	0.1	3.4

CITY OF COLORADO SPRINGS
BRADLEY HEIGHTS METRO DISTRICT
MASTER DEVELOPMENT DRAINAGE REPORT

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE.

FOR AND ON BEHALF OF
MATRIX DESIGN GROUP, INC.
PROJECT NO. 211213.004

DESIGNED BY: JTS
DRAWN BY: JTS
CHECKED BY: JTS
SCALE: HORIZ. 1" = 250'
VERT. 1" = 10'

DATE ISSUED: JANUARY 2022
SHEET: 4 OF 5
DRAWING NO.: DR-04

POST DEVELOPMENT DRAINAGE CONDITIONS

COMPUTER FILE MANAGEMENT
FILE NAME: C:\211213.004\Bradley Heights Metro District\2020 Drainage Reports\MDDP\DWG\BRADLEY HEIGHTS DR.dwg
CTB FILE:
PLOT DATE: January 11, 2022 5:48:58 PM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

REVISIONS

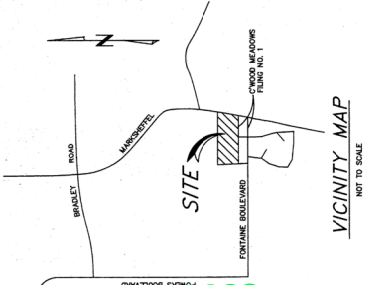
No.	DATE	DESCRIPTION	BY

DEVELOPED DRAINAGE MAP
COTTONWOOD MEADOWS, FIL. NOS. 2 & 3
 EL PASO COUNTY, COLORADO

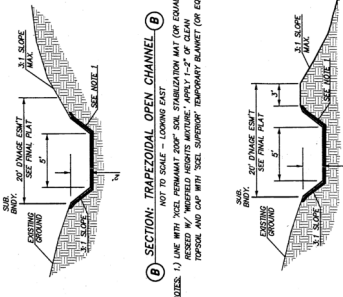
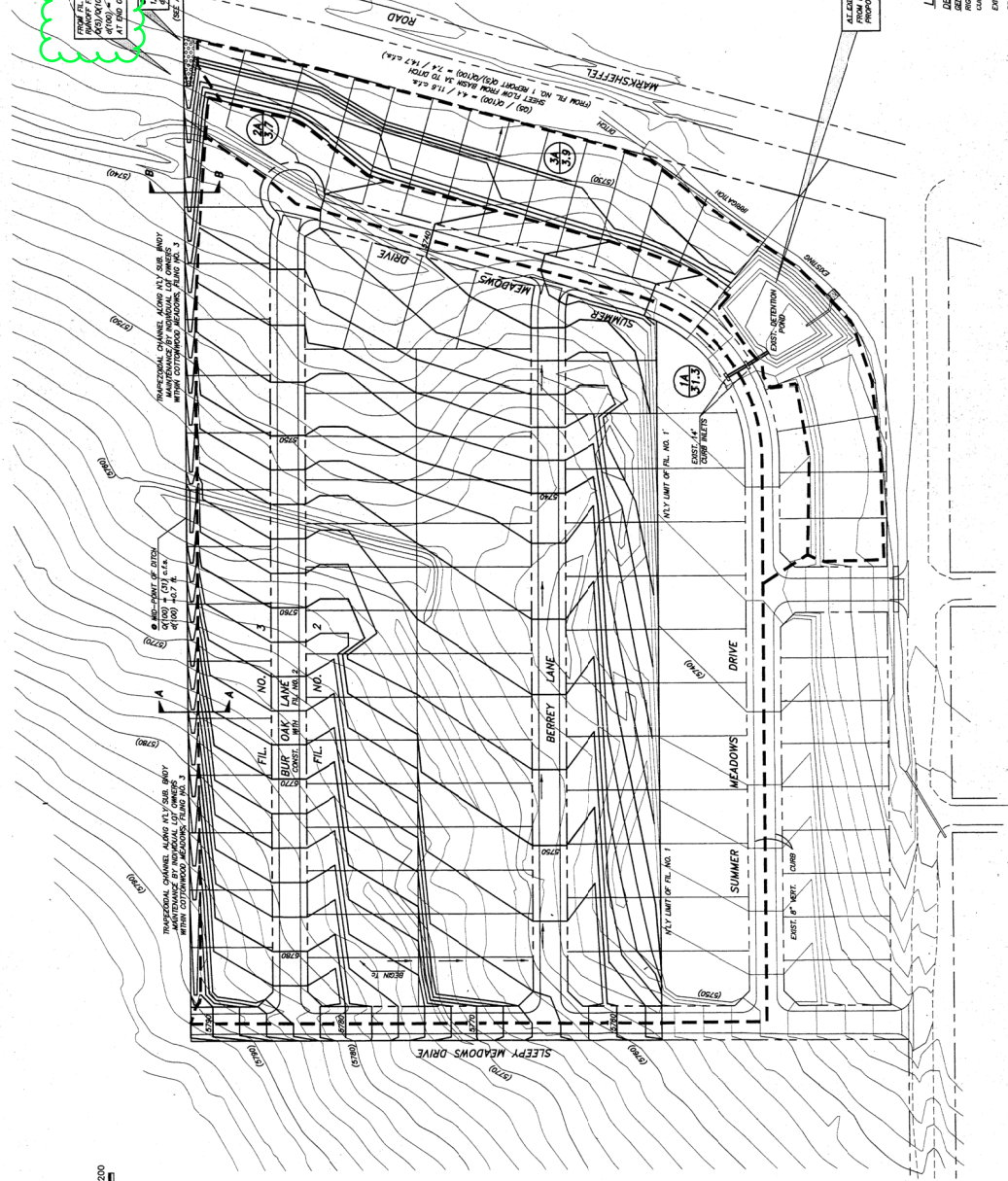
PREPARED FOR:
 RBL ENTERPRISES, LLC
 340 CARLSON DRIVE, COLORADO SPRINGS, CO 80919

HMS Group, LLC
 Civil Engineering & Design
 5555 Ehrhard Dr., Ste. 201, Co. Spk., CO 80918
 (719) 528-8544 (Office) (719) 528-4547 (Fax)

DATE	04/17/20	ADD SECTION TO EXISTING MAP AND TEXT FOR DESIGNATION AS PRIVATELY
DESIGN NUMBER	00002	REVISION
DRAWN	1/10/20	BY CHANGES OF LOT WITH PLANS NO. 3
SCALE	1"=100'	DATE
DATE	02/11/2000	PREPARED BY
DATE	02/22/00	RAISE THE CROSS SECTIONS TO REFLECT DRAINAGE EASEMENT.

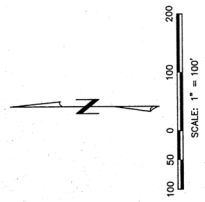


TRAPEZOIDAL CHANNEL ALONG ALL SIDE BOUNDARIES WITHIN COTTONWOOD MEADOWS, FIL. NOS. 2 & 3
 FROM FILE NO. 1 REPORT, REAK, (02) / (0100) = 41' / 11.8' (4.3) / (0100) = 41' / 11.8' (4.3) / (0100) = 41' / 11.8' (4.3) / (0100) = 41' / 11.8' (4.3)
 ALL EXISTING SECTIONS FROM FILE NO. 1 REPORT, REAK, (02) / (0100) = 41' / 11.8' (4.3) / (0100) = 41' / 11.8' (4.3) / (0100) = 41' / 11.8' (4.3) / (0100) = 41' / 11.8' (4.3)



LEGEND:

SYMBOL	DESCRIPTION
---	RIGHT-OF-WAY / PROPERTY LINE
---	CURBLINE
---	EXISTING CONTOUR (2' INTERVAL)
---	PROPOSED CONTOUR (2' INTERVAL)
---	EXIST. STORM DRAIN
---	EXIST. CURB INLET
---	EXISTING CURB / PAVEMENT
---	EXISTING LINE
---	PROPOSED CROSSHATCH
---	PAINT FOR TCO



PEACEFUL RIDGE AT FOUNTAIN VALLEY SUBDIVISION

ENGINEER'S OPINION OF PROBABLE COST - STORM SEWER & WATER QUALITY POND

SUMMARY TABLE

	PUBLIC STORM SEWER	\$ 750,333
	TOTAL:	\$ 750,333
	PRIVATE STORM SEWER	\$ 118,821
	PRIVATE DETENTION/WATER QUALITY POND	\$ 70,928
	TOTAL:	\$ 189,749

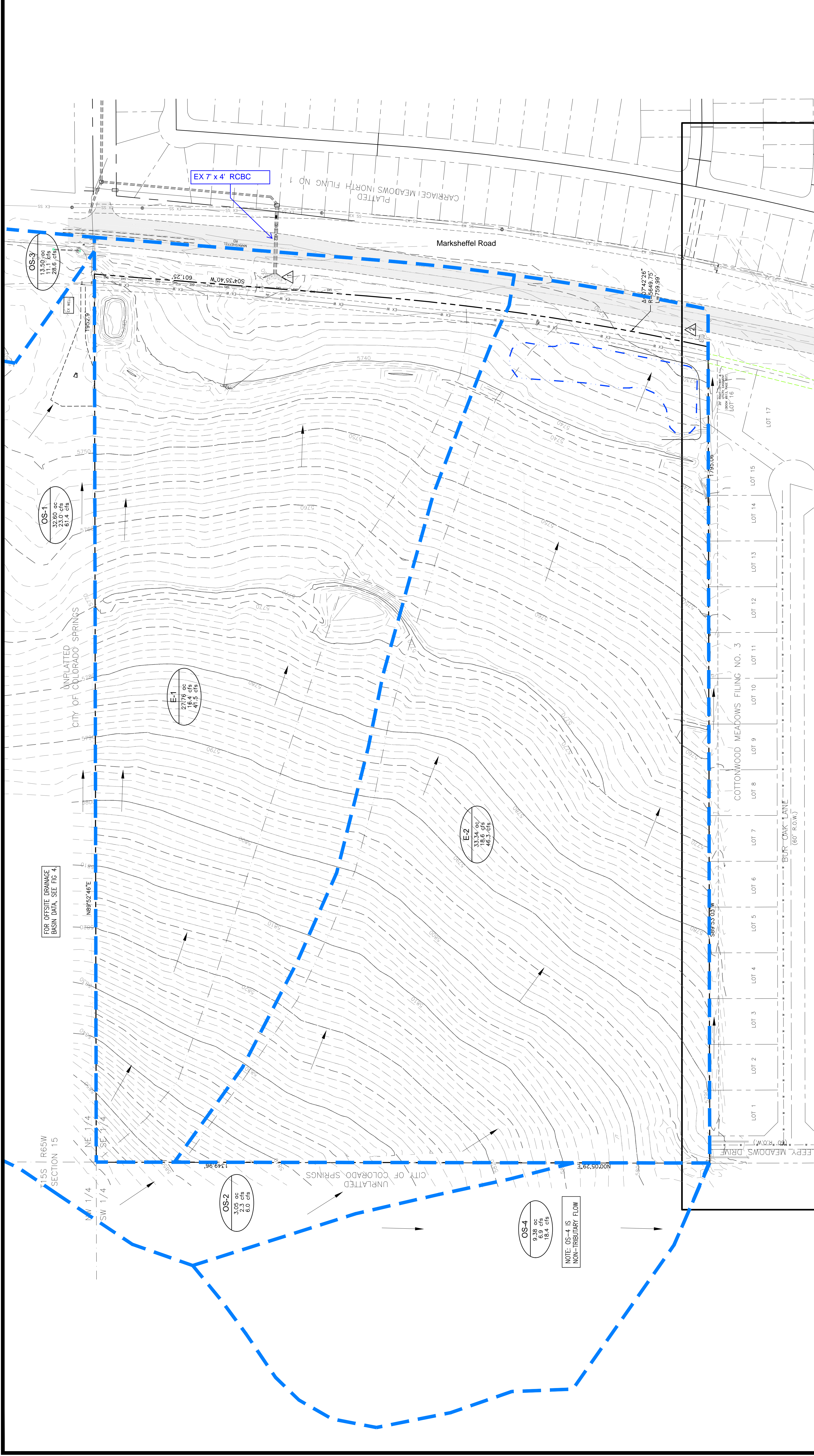
PUBLIC STORM SEWER	QUAN.	UNIT	UNIT PRICE	PRICE
4' DIA. TYPE II MH	10	EA	\$ 7,734.00	\$ 77,340.00
5' DIA. TYPE I MH	6	EA	\$ 7,734.00	\$ 46,404.00
6' DIA. TYPE I MH	1	EA	\$ 7,734.00	\$ 7,734.00
8' DIA. TYPE I MH (BOX BASE)	1	EA	\$ 14,061.00	\$ 14,061.00
18" RCP CL-III	361	LF	\$ 76.00	\$ 27,436.00
24" RCP CL-III	253	LF	\$ 91.00	\$ 23,023.00
30" RCP CL-III	624	LF	\$ 114.00	\$ 71,136.00
36" RCP CL-III	1028	LF	\$ 140.00	\$ 143,920.00
42" RCP CL-III	318	LF	\$ 187.00	\$ 59,466.00
68" x 43" HERCP	32	LF	\$ 402.00	\$ 12,864.00
10' TYPE R INLET	1	EA	\$ 9,507.00	\$ 9,507.00
15' TYPE R INLET	4	EA	\$ 12,858.00	\$ 51,432.00
20' TYPE R INLET	7	EA	\$ 14,109.00	\$ 98,763.00
	SUBTOTAL:			\$ 682,121
	10% ENGINEERING CONTINGENCY:			\$ 68,212
	TOTAL:			\$ 750,333

PRIVATE STORM SEWER	QUAN.	UNIT	UNIT PRICE	PRICE
6' DIA. TYPE I MH	3	EA	\$ 7,734.00	\$ 23,202.00
24" RCP CL-III	21	LF	\$ 91.00	\$ 1,911.00
42" RCP CL-III	260	LF	\$ 187.00	\$ 48,620.00
48" RCP CL-III	118	LF	\$ 228.00	\$ 26,904.00
68" x 43" HERCP	16	LF	\$ 402.00	\$ 6,432.00
24" RCP FES	1	EA	\$ 950.00	\$ 950.00
	SUBTOTAL:			\$ 108,019
	10% ENGINEERING CONTINGENCY:			\$ 10,802
	TOTAL:			\$ 118,821

PRIVATE DETENTION/WATER QUALITY POND	QUAN.	UNIT	UNIT PRICE	PRICE
POND EXCAVATION	5000	CY	\$ 7.00	\$ 35,000.00
MAINTENANCE ACCESS ROAD	5754	SY	\$ 24.00	\$ 138,096.00
OUTLET STRUCTURE	1	LS	\$ 30,000.00	\$ 30,000.00
CONCRETE TRICKLE CHANNEL	22	CY	\$ 150.00	\$ 3,300.00
FOREBAY	1	EA	\$ 15,000.00	\$ 15,000.00
TYPE L SOIL RIP RAP	874	TON	\$ 97.00	\$ 84,778.00
TYPE M SOIL RIP RAP	78	TON	\$ 97.00	\$ 7,566.00
POND WALL	3800	SF	\$ 55.00	\$ 209,000.00
8' DIA. TYPE I MH	1	EA	\$ 7,734.00	\$ 7,734.00
8' DIA. TYPE I MH (BOX BASE)	1	EA	\$ 14,061.00	\$ 14,061.00
60" x 38" HERCP	57	LF	\$ 348.00	\$ 19,836.00
48" FES	1	EA	\$ 2,406.00	\$ 2,406.00
48" RCP CL-III	625	LF	\$ 228.00	\$ 142,500.00
	SUBTOTAL:			\$ 709,277
	10% ENGINEERING CONTINGENCY:			\$ 70,928
	TOTAL:			\$ 780,205



APPENDIX F – DRAINAGE MAPS

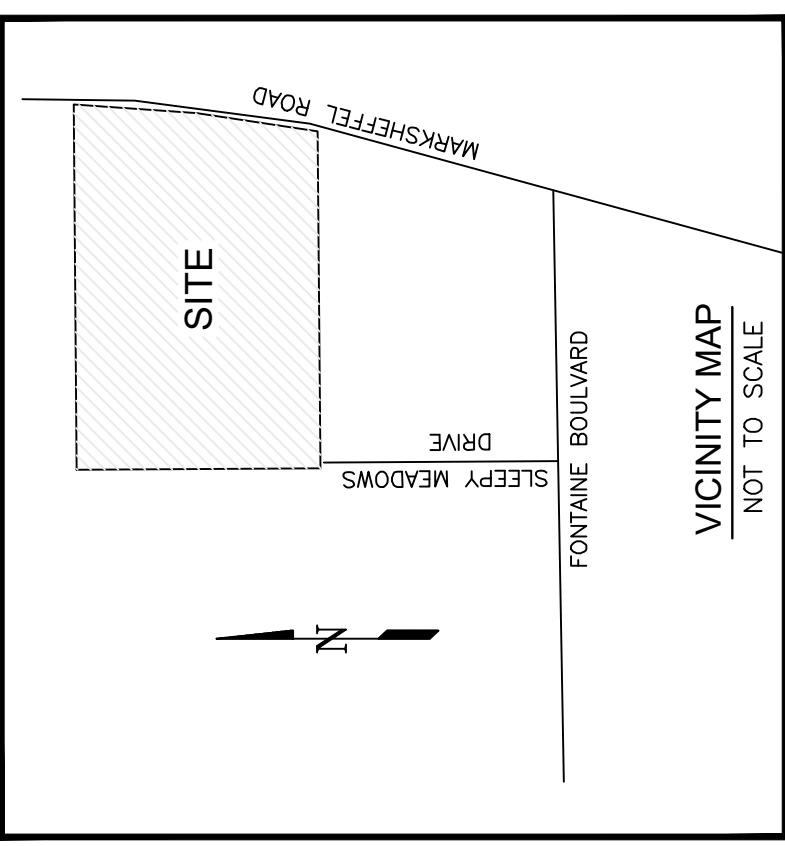
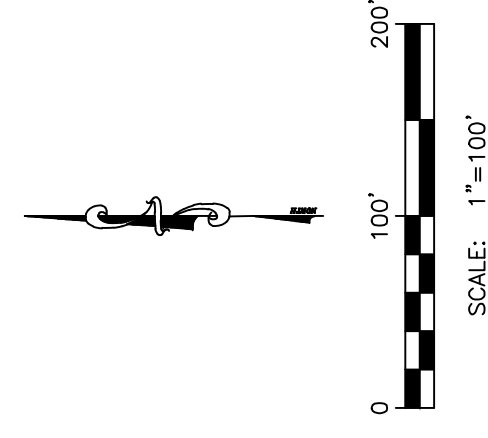


DESIGN POINT FLOWS

DESIGN POINT	5-YR FLOW	100-YR FLOW
△	47.5 cfs	123.8 cfs
△	20.5 cfs	51.1 cfs

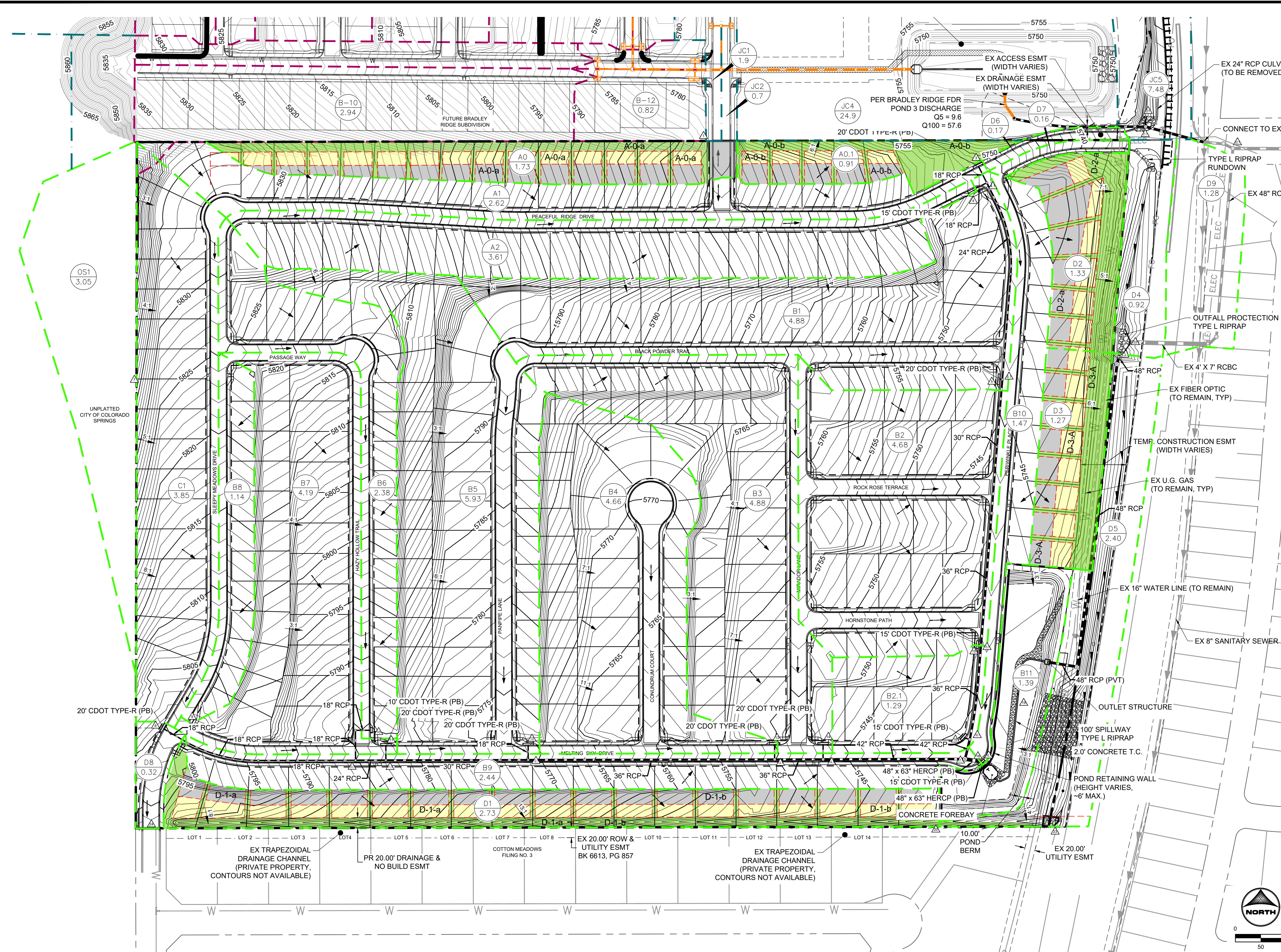
LEGEND

- DRAINAGE BASIN DESIGNATION
- DRAINAGE BASIN AREA
- 5-YEAR BASIN RUNOFF
- 100-YEAR BASIN RUNOFF
- 5-YEAR RUNOFF
- 100-YEAR RUNOFF
- DESIGN POINT
- DRAINAGE BASIN BOUNDARY
- FLOW DIRECTION
- TIME OF CONCENTRATION PATH
- EXISTING CONTOURS



NOTE: OS-4 IS
NON-TRIBUTARY FLOW

FOR OFFSITE DRAINAGE
BASIN DATA, SEE FIG. 4.



LEGEND:

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER (BY OTHERS)
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- PROPERTY BOUNDARY
- PROPOSED FLOW DIRECTION
- EXISTING FLOW DIRECTION
- PROPOSED DRAINAGE BASIN
- PROPOSED DRAINAGE BASIN (BRADLEY HEIGHTS MDDP)
- PROPOSED DRAINAGE BASIN (BRADLEY RIDGE FDR)
- DESIGN POINT
- PROPOSED BASIN LABEL

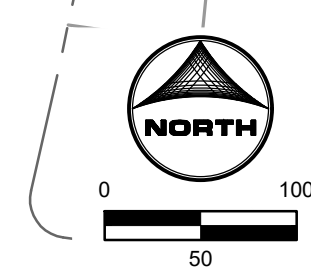
IRF BOUNDARIES

- UNCONNECTED IMPERVIOUS AREA (UIA)
- RECEIVING PERVIOUS AREA (RPA)
- SEPARATE PERVIOUS AREA (SPA)
- DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)

5250
5250

11
1.25

AREA (AC.)



DRAWN BY: NQJ	JOB DATE: 5/2/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS.
APPROVED: CM	JOB NUMBER: #####	0" = 1"
CAD DATE: 6/28/2023		IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.
CAD FILE: J:\2023\2302308\CAD\Drawings\C\Drainage\Pr_Runoff_Reduction_Map		

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen

HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 230
COLORADO SPRINGS, CO 80920
PHONE: 719.384.2440
FAX: 719.965.0044

PEACEFUL RIDGE AT FOUNTAIN VALLEY
PEACEFUL RIDGE DEVELOPMENT COMPANY
EL PASO COUNTY, CO

RUNOFF REDUCTION MAP

SHEET DRN 2