ENGINEERING REVIEW COMMENTS IN BLUE BOXES WITH BLUE TEXT

HRGreen

HRGREEN.COM

Eastonville Road – Londonderry Dr. to Rex Rd.
Segment 2 Improvements
Stationing 47+00.00 – 79+31.62

Final Drainage Report

March 2024

HR Green Project No: 201662.08

Prepared For:

D.R. Horton

Contact: Riley Hillen, P.E.

9555 S. Kingston Ct.

Englewood, CO 80112

Prepared By:

HR Green Development, LLC

Contact: Colleen Monahan, P.E., LEED AP

cmonahan@hrgreen.com

(719) 394-2433

EDARP Filing No:

CDR2321

See comment letter also.

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, P.E., LEED AP

State of Colorado No. 56067

For and on behalf of HR Green Development, LLC

Date

Owner/Developer's Statement:

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

By: _____ _____

Authorized Signature Date

Address: D.R. Horton
9555 S. Kingston Court
Englewood, CO

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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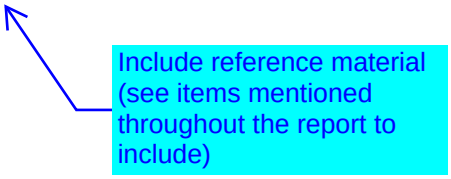
Appendices



I. General Purpose, Location and Description

a. Purpose

The purpose of this Final Drainage Report (FDR) for Eastonville Road Segment 2 Improvements 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. This drainage report will detail the improvements of Eastonville Road from Londonderry Dr. to Rex Road for Segment 2. Stations 47+00.00 to 79+32.00 contain the Segment 2 Improvements for the Eastonville Road from Londonderry Drive to Rex Road for the portion of the project north of Grandview Filing No. 1. The project is all one project, however, the planset has been broken into two segments to align with the Grandview Reserve Filings. A separate FDR describes Segment 2 of the project.

b. Location

gravel

1

Eastonville Road from Londonderry Dr. to Rex Road, referred to as 'the site' herein, is an existing 26' wide temporary pavement road in El Paso County, Colorado. Per field inspection the existing pavement is not full depth, and therefore described as 'temporary' for the purpose of this report. The site lies in the existing 60' wide El Paso County Right-of-Way within Sections 21 and 28, Township 12 South, Range 64 West of the 6th Principal Meridian, in El Paso County, State of Colorado.

The site is bound by undeveloped land to the east and west that has historically been used as ranching lands. Falcon Regional Park, which contains ballparks and parking, and Falcon High School also border the site to the west. All lands to the east and west of the site are unplatted. A vicinity map is presented in Appendix A.

c. Description of Property

The site is approximately 0.69 miles (2.17 acres) of existing temporary pavement roadway north of Londonderry Dr. and south of Rex Road. Per field inspection the existing pavement is not full depth, and therefore described as 'temporary' for the purpose of this report. The existing temporary pavement width for the length of the project is 26' wide. There are 4' wide gravel shoulders and native landscaped swales are located on both sides of the roadway. Offsite stormwater is bypassed under the road through a series of existing culverts. See Appendix A for an existing conditions photo.

The existing roadway has slopes ranging from 0.3% up to about 4%. The general topography of the surrounding area is typical of high desert, short prairie grass with gently rolling hillside with slopes ranging from 2% to 4%. The project site drains generally from the west to the east and is tributary to Black Squirrel Creek.

Per a NRCS soil survey, the site is made up of Type A Columbine gravelly sandy loam, Type A Blakeland loamy sand and Type B Stapleton sandy loam. The NRCS soil survey is presented in Appendix A.

Gieck Ranch Tributary #1 (Channel A) is the only drainageway that traverses the site in the west to east direction through an existing culvert under Eastonville Road. The channel is a mapped wetland and a wetland permit will be required for a part of this Eastonville Road improvement project. Channel A is not within a FEMA floodplain.

Gieck Ranch Tributary #2 is located on the north end of the project site and will not be impacted by this project. There are no known irrigation facilities in the area.

Existing utilities include an underground gas line that runs under Eastonville road through the Grandview reserve property south of the segment 2 improvements, an existing raw water line that follows the west side of Eastonville north of Falcon Regional Park, and an existing aboveground electrical line along the western side of Eastonville Road. An existing drainage map with these facilities is presented in Appendix F.

d. Floodplain Statement

Based on FEMA Firm map 08041C0552G December 7, 2018, the site is not located in any FEMA designated floodplain. See FEMA Firm Map in Appendix A. There is a Zone A floodplain north of the site and a Zone AE south of the site, both of which will not be altered with the associated Eastonville Road improvements.

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 the NOAA Atlas 14 Point Precipitation Frequency Data Server. Runoff was calculated per CCSDCM Section 6.3.0 - Rational Method. 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.

Rainfall Depths per NOAA Atlas 14		
Return Period (yr)	5	100
1-hr Rainfall Depth (in)	1.21	2.49

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

III. Drainage Basins and Subbasins

a. Major Basin Description

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

1. "Gieck Ranch Drainage Basin Planning Study" prepared by Drexel, Barrel & Co, February 2010.
2. "Master Development Drainage Plan Meridian Ranch" prepared by Tech Contractors, July 2021.
3. "Final Drainage Report for The Sanctuary Filing 1 at Meridian Ranch" by Tech Contractors, August 2022.

Gieck Ranch Drainage Basin is a 22.05 square mile watershed located in El Paso County, Colorado. Gieck Ranch Drainage Basin is tributary to Black Squirrel Creek which drains to the Arkansas River. The majority of the basin is undeveloped and is rolling range land typical of Colorado's semi-arid climates. It should be noted that the Gieck Ranch DBPS has not been approved at the time of this report.

The Meridian Ranch MDDP and The Final Drainage Report for The Sanctuary Filing 1 at Meridian Ranch indicate that the Eastonville Road culvert crossing at the Gieck Ranch Tributary #1, within the project boundary, does not provide enough capacity for the historic flow rates. This culvert will be upgraded as part of this project.

Within the Gieck Ranch Drainage Basin, ranching has historically been the predominant land use, with rolling topography between 2%-4% slopes. Recently urbanization is occurring within the drainage basin, most notably for this project are Meridian Ranch and Latigo Trails Developments. Both are single family residential neighborhoods located upstream to the west and northwest of the Eastonville Segment 2 Improvements project site.

b. Existing Subbasin Description

Eastonville Road Segment 2 (the site) accepts flows from areas to the west and northwest of the site, including portions of Meridian Ranch and Latigo Trails Development. The flows and design points used in the following descriptions are taken from the approved Meridian Ranch MDDP and The Final Drainage Report for The Sanctuary Filing 1 at Meridian Ranch provides the detailed analysis of the pond releases and flows as they outfall from those developments upstream of this Eastonville Road site. For the purpose of this report, full buildout of the Meridian Ranch development was assumed; hence the developed peak flow rates from the "future buildout conditions" for the entirety of Meridian Ranch were used to evaluate the existing conditions below.

replace all "temporary pavement" with "treated gravel"

Basin EX1 (The Sanctuary Filing 1 FG-38) is 85.16 acres of undeveloped area and temporary pavement area to the crown of Eastonville Road roadway. Stormwater from this basin combines with flows from Latigo Trails South Pond (The Sanctuary Filing 1 G-17) is conveyed overland to DP1 for a total area of 321.5 acres (The Sanctuary Filing 1 G18). Flows at DP1 (Q_5 = 28.3 cfs Q_{100} = 365.2 cfs) are conveyed across Eastonville Road in an existing 24" CMP culvert and discharges to Gieck Ranch Tributary #2 (Channel B). This basin is located upstream of the Eastonville project and is presented here to show where flows go that are upstream of the project site. The Eastonville project will have no impact on this basin.

Basin EX2 (The Sanctuary Filing 1 FG36) is 18.88 acres undeveloped area, parking lot, and temporary pavement to the crown of Eastonville Road roadway. Stormwater from this basin is conveyed overland to DP2 (The Sanctuary Filing 1 FG36). Flows at DP2 (Q_5 = 1.7 cfs Q_{100} = 18.8 cfs) are conveyed southerly across Rex Road in an existing 24" RCP culvert and discharges to Basin EX3.

Basin EX3 is 51.06 acres of undeveloped area and the Falcon Regional Park ball fields and temporary pavement to the crown of Eastonville Road roadway. Stormwater from this basin combines with flows from The Sanctuary Filing 1 Design Point G15 via an existing roadside swale where it then combines with DP2 flows. Flows travel to DP3 for a total area of 131.3 acres (The Sanctuary Filing 1 Design Point G16) where they are conveyed across Eastonville Road in an existing 24" CMP culvert (Q_5 = 6.1 cfs Q_{100} = 112.1 cfs).

Basin EX4 is 62.87 acres of undeveloped area and temporary pavement to the crown of Eastonville Road roadway. Stormwater from this basin combines with flows from The Sanctuary Filing 1 Design Point G12 (Meridian Ranch Pond G) to Gieck Ranch Tributary #1 and an existing roadside swale to DP 4 for a total area of 832.7 acres (The Sanctuary Filing 1 Design Point G06) (Q_5 = 22.4 cfs Q_{100} = 491 cfs). Flows at DP4 are conveyed across Eastonville Road in an existing 18" CMP culvert and discharges to Gieck Ranch Tributary #1 (Channel A).

c. Proposed Subbasin Description

Description of Proposed Project

The proposed project includes improvements to Eastonville Road from Londonderry Drive to Rex Road. As described above, the current condition of the existing roadway in this area consists of 26' wide temporary pavement roadway with 4' wide sand shoulders and weedy swales located on both sides of the roadway. Offsite stormwater is bypassed under the road through a series of existing culverts.

The proposed improvements from Rex Road south to the southern property line of the proposed Grandview Reserve Filing 1 include removal of the 26' wide temporary pavement and replacing the road with a Modified Urban Minor Arterial Roadway Cross-Section consisting of 48' pavement and Type A EPC curb (53' back of curb to back of curb). This includes Basins EA1-EA11.

Refer to the Eastonville Road Segment 1 improvements FDR for subbasin information and calculations south of subbasins EA10 & EA11.

Unresolved:
Verify all basin flows with hydrology spreadsheet

Eastonville Road Basins

Basin EA1 is 0.22 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.7 cfs Q_{100} = 1.3 cfs) is conveyed in curb and gutter to DP2. Flows at DP2 are captured in a 5' Type R sump inlet (Public) and piped to Pond C, a private full spectrum sand filter basin. Basin EA1 will be detained by the Pond C Sand Filter.

Basin EA2 is 0.25 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.8 cfs Q_{100} = 1.5 cfs) is conveyed in curb and gutter to DP3. Flows at DP3 are captured in a 5' Type R sump inlet (Public) and piped to Pond C. Basin EA2 will be detained by the Pond C Sand Filter.

Basin EA3 is 0.20 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.7 cfs Q_{100} = 1.4 cfs) is conveyed in curb and gutter to DP5. Flows at DP5 are captured in a 5' Type R sump inlet (Public) and piped to DP9.1. Basin EA3 will not be detained per the Meridian Ranch MDDP as this basin has been over-detained within Meridian Ranch.

Unresolved:
DP6.1? There is no DP9.1 shown on map or listed in hydrology spreadsheet

Unresolved:
Include excerpt in append
Meridian Ranch MDDP ar

Basin EA4 is 0.17 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Se
Stormwater (Q_5 = 0.5 cfs Q_{100} = 1.1 cfs) is conveyed in curb and gutter to DP6. Flows at DP6 are captured in a 5' Type R sump inlet (Public) and piped to DP9.1. Basin EA4 will not be detained per the Meridian Ranch MDDP as this basin has been over-detained within Meridian Ranch.

Basin EA5 is 0.16 acres of undeveloped area and includes the Pond C Sand Filter. Stormwater (Q_5 = 0.1 cfs Q_{100} = 0.4 cfs) is flows directly into the Pond C Sand Filter.

Basin EA6 is 0.70 acres of undeveloped area that will be future roadway (Rex Road) once the Grandview Filing 1 development is constructed. Stormwater (Q_5 = 3.1 cfs Q_{100} = 5.5 cfs) is conveyed in a swale to DP10: Temporary Sediment Basin #1 (TSB #1). TSB #1 has been sized for the paved area of the roundabout and the future paved area of Rex Road within Basin EA6. The swale will be removed with the construction of Rex Road curb and gutter. Basin EA6 will be detained in TSB #1.

Basin EA7 is 0.65 acres of undeveloped area that will be future roadway (Rex Road) once the Grandview Filing 1 development is constructed. Stormwater (Q_5 = 2.5 cfs Q_{100} = 4.7 cfs is conveyed in a swale to DP10: Temporary Sediment Basin #1 (TSB #1). TSB #1 has been sized for the paved area of the roundabout and the future paved area of Rex Road within Basin EA7. The swale will be removed with the construction of Rex Road curb and gutter. Basin EA7 will be detained in TSB #1.

Basin EA8 is 2.08 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 5.0 cfs Q_{100} = 9.0 cfs) is conveyed in curb and gutter to DP14. Flows at DP14 are captured in a 10' Type R sump inlet (Public) and piped to Pond B. Basin EA8 will be detained Pond B Full Spectrum Detention Basin.

Basin EA9 is 2.99 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 4.6 cfs Q_{100} = 9.5 cfs) is conveyed in curb and gutter to DP15. Flows at DP15 are captured in a 10' Type R sump inlet (Public) and piped to Pond B. Basin EA9 will be detained Pond B Full Spectrum Detention Basin.

Basin EA10 is 0.12 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.6 cfs Q_{100} = 1.1cfs) is conveyed in curb and gutter to DP16.1 Flows from DP16.1 drain south and captured in a 10' Type R sump inlet (Public) and piped to Pond B. This inlet design is in the Eastonville Road Segment 1 FDR. Basin EA10 will be detained Pond B Full Spectrum Detention Basin which is detailed in the Eastonville Road Segment 1 FDR.

Basin EA11 is 0.19 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.5 cfs Q_{100} = 1.0 cfs) is conveyed in curb and gutter to DP17.1. Flows from DP17.1 drain south and captured in a 10' Type R sump inlet (Public) and piped to Pond B. This inlet design is in the Eastonville Road Segment 1 FDR. Basin EA10 will be detained Pond B Full Spectrum Detention Basin which is detailed in the Eastonville Road Segment 1 FDR.

Unresolved:
Verify all basin flows with hydrology spreadsheet. Include all basins in spreadsheet and summary table on maps

Offsite Basins

Basin OS1 (EX1) is 85.16 acres of undeveloped area. Stormwater from this basin combines with flows from Latigo Trails South Pond (The Sanctuary Filing 1 G-17) is conveyed overland to DP1 (The Sanctuary Filing 1 G18). Flows at DP1 (Q_5 = 28.3 cfs Q_{100} = 365.2 cfs) are conveyed across Eastonville Road in an existing 24" CMP culvert and discharges to Gieck Ranch Tributary #2 (Channel B). This basin is located upstream of the Eastonville project and is presented here to show where flows go that are upstream of the project site. The Eastonville project will have no impact on this basin.

Basin OS2 is 15.03 acres of undeveloped land and parking area north of Rex Road and contains a portion of Rex Road (Q_5 = 4.2 cfs Q_{100} = 21.6 cfs). Stormwater is conveyed to DP7 and is captured in a proposed 24" RCP culvert and piped south across Rex Road. No development associated with Eastonville Road will occur in Basin OS2.

Basin OS3 is 1.00 acre of undeveloped land (Q_5 = 0.2 cfs Q_{100} = 1.2 cfs) along the western edge of Eastonville Road. Stormwater is conveyed to DP8 and is captured in a proposed 18" RCP culvert and piped south across Rex Road. No development associated with Eastonville Road will occur in Basin OS3.

Basin OS4 is 9.60 acres of undeveloped land (Q_5 = 3.8 cfs Q_{100} = 17.3 cfs) along the western edge of Eastonville Road. Stormwater is conveyed to DP11 in a roadside swale where it combines with Meridian Ranch DP G15 flows (Q_5 = 8 cfs Q_{100} = 54.0 cfs) before being captured in a proposed 30" RCP culvert and piped to Channel B. The combined flows as it reaches DP11 is Q_5 = 10.5 cfs Q_{100} = 144.5 cfs.

Basin OS5 is 40.26 acres of undeveloped land and Falcon Regional Park (Q_5 = 13.3 cfs Q_{100} = 64.0 cfs) along the western edge of Eastonville Road. Stormwater is conveyed to DP12 in a roadside swale and is captured in a proposed 48" RCP culvert and piped to Channel B.

Basin OS6 is 60.83 acres of undeveloped land (Q_5 = 8.9 cfs Q_{100} = 60.6 cfs) along the western edge of Eastonville Road. Basin OS6 flows are adapted directly from the approved The Sanctuary Filing 1 FDR.

Stormwater is conveyed to DP16 in a roadside swale where it combines with Meridian Ranch DP G12 flows before being conveyed across Eastonville Road in dual 10' x 3.5' RCBC to Channel A. The combined flows at DP16 (EX4) are Q_5 = 22.4 cfs Q_{100} = 491 cfs.

Basin OS7 is future outflow of 11.42 acres of a future stormwater detention pond outflow developed land that will be detained to meet existing conditions (Q_5 = 3.4 cfs Q_{100} = 22.7 cfs) in the southeast corner of Eastonville Road and Rex Road. From there, stormwater is piped to Channel B.

IV. Drainage Facility Design

a. General Concept

The proposed improvements from Rex Road south to the southern property line of the proposed Grandview Reserve Filing 1 include removal of the 26' wide temporary pavement and replacing the road with a Modified Urban Minor Arterial Roadway Cross-Section consisting of 48' pavement and Type A EPC curb (53' back of curb to back of curb). Inlets will be placed at low points and roundabout entrances. Stormwater from this roadway will be piped to either a full spectrum detention pond, sand filter or temporary sediment basin. All ponds and water quality features will discharge at less than historic rates.

b. Water Quality & Detention

Pond C (Sand Filter)

Water quality and stormwater detention for Basins EA1, 2, & 5 is provided in Sand Filter Basin C. SFB C is a private, full spectrum sand filter basin within the Grandview Reserve property to be developed in the future. In Pond C, a total of 0.63 from the proposed project acres at 54% composite imperviousness will be detained. The minimum required acreage of treatment is 0.63 acres. The WQCV is 0.009 ac-ft, the EURV is 0.037 ac-ft, and the 100-year detention volume is 0.062 ac-ft. The WQCV, EURV and 100-year storms are released in 12, 41 and 44 hours, respectively. A 10' access and maintenance road is provided to the bottom of the pond to facilitate maintenance of the pond facilities. A 12' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard south. SFB C outfalls towards the future Channel B improvements at historic runoff rates. Runoff from Pond C will follow historic drainage patterns and not exceed historic flow rates.

Pond B (Full Spectrum Detention Basin)

EDB B "Pond B" will provide detention and water quality treatment for subbasins EA8 & EA9 per this report. Refer to the Eastonville Road Segment 1 FDR for detention basin details.

c. Inspection and Maintenance

After completion of construction and upon the Board of County Commissioners acceptance, it is anticipated that all drainage facilities within the public Right-of-Way are to be owned and maintained by El Paso County.

All private detention ponds are to be owned and maintained by the Grandview Reserve Metropolitan District NO. 2 (DISTRICT), once established, unless an agreement is reached stating otherwise. Maintenance access for all full spectrum detention facilities will be provided from public Right-of-Way. Maintenance access for the drainageways will be provided through the proposed tracts.

V. Wetlands Mitigation

There is an existing wetland in Gieck Ranch Tributary #1 (Channel A). The wetland is contained entirely within the channel and is classified as jurisdictional. A Nationwide Wetland Permit will be applied for due to the disturbed area at the Dawlish Roundabout. Wetlands maintenance will be the responsibility of the DISTRICT.

VI. 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 Impervious Reduction Factor (IRF) method was used and is presented in Appendix D.

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 at least 12 hours for SFBs and 40 hours for EDBs while the EURV is released over a period of 40-44 hours for SFBs and 68 - 72 hours for EDBs as recommended by the MHFD.

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.

VII. Drainage and Bridge Fees

Gieck Ranch drainage basin has not been established as a fee basin within El Paso County. Therefore, no drainage basin fees are due at time of platting.

VIII. Opinion of Probable Cost

An engineer's opinion of probable cost has been provided below for public and private drainage infrastructure improvements. This includes cost estimates for the public full spectrum sand filter basin C. All required stormwater infrastructure will be installed per El Paso County Requirements.

Public Infrastructure Cost Estimate			
Line Item	**Quantity**	**Unit Price**	**Cost**
15" Reinforced Concrete Pipe	128	$45 LF	$5,760
18" Reinforced Concrete Pipe	808	$76 LF	$61,408
24" Reinforced Concrete Pipe	161	$114 LF	$18,354
48" Reinforced Concrete Pipe	1678	$187 LF	$313,786
15" CDOT FES	1	$500 EA	$500

Unresolved:
Quantities and unit costs should match with FAE estimate

18" is minimum size allowed

24" CDOT FES	2	$684	EA	$1,368
48" CDOT FES	2	$912	EA	$1,824
6' DIA Storm Manhole	12	$7,734	EA	$92,808
10' CDOT Type R Inlet	6	$6,703	EA	$40,218
Rip Rap, d50 size from 6"-24"	2	$97	Tons	$194
3' x 10' Concrete Box Culvert w/ Wingwalls	110	$400	Tons	$44,000
10% Contingency				$58,022
TOTAL:				**$638,242**

Public SFB C Cost Estimate				
Line Item	**Quantity**	**Unit Price**		**Cost**
Rip Rap, d50 size from 6"-24" (Inflow)	1.5	$97	Tons	$146
Sand Filter Media	44	$100	/CY	$4,400
4" Perforated PVC Underdrain	10	$10	/LF	$100
12" ABC Maintenance Access	19	$40	/CY	$760
Outlet Structure w/ Orifice Plate	1	$5,000	EA	$5,000
Rip Rap, d50 size from 6"-24" (Spillway)	19.5	$97	Tons	$1,892
12" RCP Outlet Pipe	150	$60	/LF	$9,000
12" RCP FES	1	$350	EA	$350
10% Contingency				$2,165
TOTAL:				**$23,812**

does not match what is shown in Section 1 of FAE

IX. Hydraulic Grade Line Analysis

Hydraulic grade line analysis and final pipe sizes have been sized and and calculations are provided in Appendix C. All proposed storm sewer will be designed in accordance with El Paso County Drainage Criteria Manuals.

X. Summary

Eastonville Road lies within the Gieck Ranch Drainage Basin. Water quality and detention for the site is provided in full spectrum water quality and detention ponds, sand filters and temporary sediment basins. There is one major drainageway that traverses the site: Gieck Ranch Tributary 1. The water quality and detention features ponds will be maintained by the Grandview Reserve Metropolitan District No. 2 (DISTRICT). All drainage facilities were sized per the El Paso County Drainage Criteria Manuals.

The development of this project will not adversely affect downstream properties.

XI. Drawings

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

XII. 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. Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018.
4. “Gieck Ranch Drainage Basin Planning Study” prepared by Drexel, Barrel & Co, February 2010.
5. “Master Development Drainage Plan Meridian Ranch” prepared by Tech Contractors, July 2021.
6. “The Sanctuary Filing 1 at Meridian Ranch” prepared by Tech Contactors, August 2022.

APPENDIX A – VICINITY MAP, PHOTOS, SOIL MAP, FEMA MAP

MERIDIAN RANCH

FALCON REGIONAL PARK

REX ROAD

GIECK RANCH TRIBUTARY 2

REX RD

DAWLISH DRIVE

EASTONVILLE ROAD

EASTONVILLE ROAD

MODIFIED CROSS-SECTION WITH 48' PAVEMENT AND TYPE A EPC CURB (53' BACK OF CURB TO BACK OF CURB)

PROP. ROW
100.00'
PROP. ROW
EX. ROW
60.00'
EX. ROW

GIECK RANCH TRIBUTARY 1

DAWLISH DRIVE

GRANDVIEW RESERVE METROPOLITAN DISTRICT NO. 2

PROP. ROW
PROP. ROW

EASTONVILLE ROAD

GRANDVIEW RESERVE FILING 1

EX. ROW
60.00'
EX. ROW

BRIXHAM DR

KATE MEADOW LN

GIECK RANCH TRIBUTARY 1

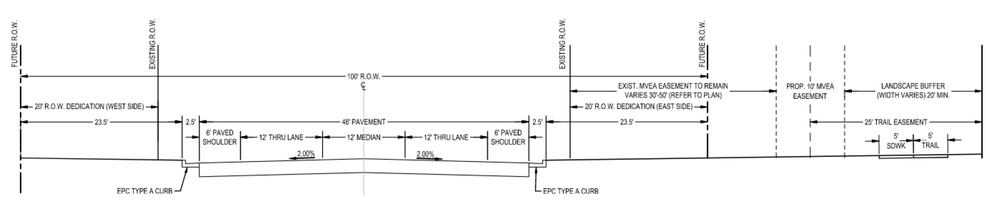
FLOODPLAIN FROM WATER RESOURCES REPORT (TYP.)

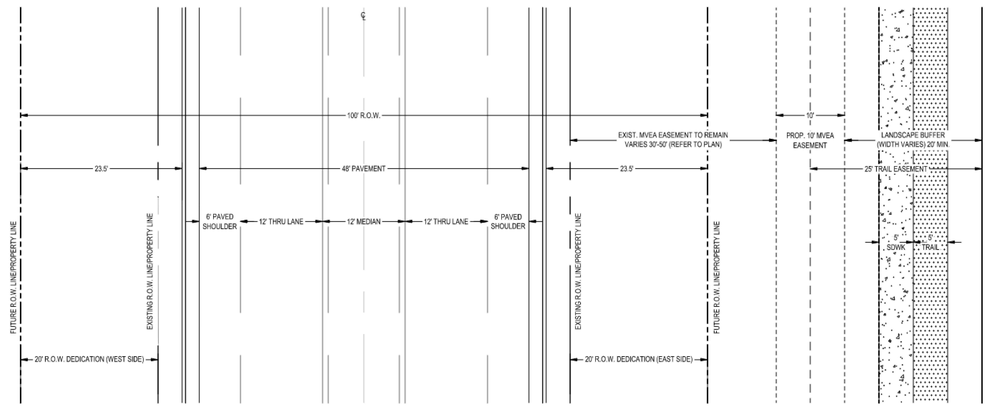
FALCON HIGH SCHOOL

LONDONDERRY DR

LONDONDERRY DRIVE

EASTONVILLE ROAD





EASTONVILLE RD ULTIMATE CROSS SECTION
(MINOR ARTERIAL)
SCALE: N.T.S.
*TRAIL AND SIDEWALK TO MEANDER WITHIN TRAIL EASEMENT

VICINITY MAP

N.T.S.

NORTH
0 150
75

DRAWN BY: CPM JOB DATE: 8/29/2023
APPROVED: JOB NUMBER: 201662.08
CAD DATE: 8/29/2023
CAD FILE: J:\2020\201662.08\CAD\Dwgs\Exhibits\-Overall-Exhibit

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - COLORADO SPRINGS
7222 COMMERCE CENTER DR. SUITE 220
COLORADO SPRINGS CO 80919
PHONE: 719.622.6222
FAX: 844.273.1057

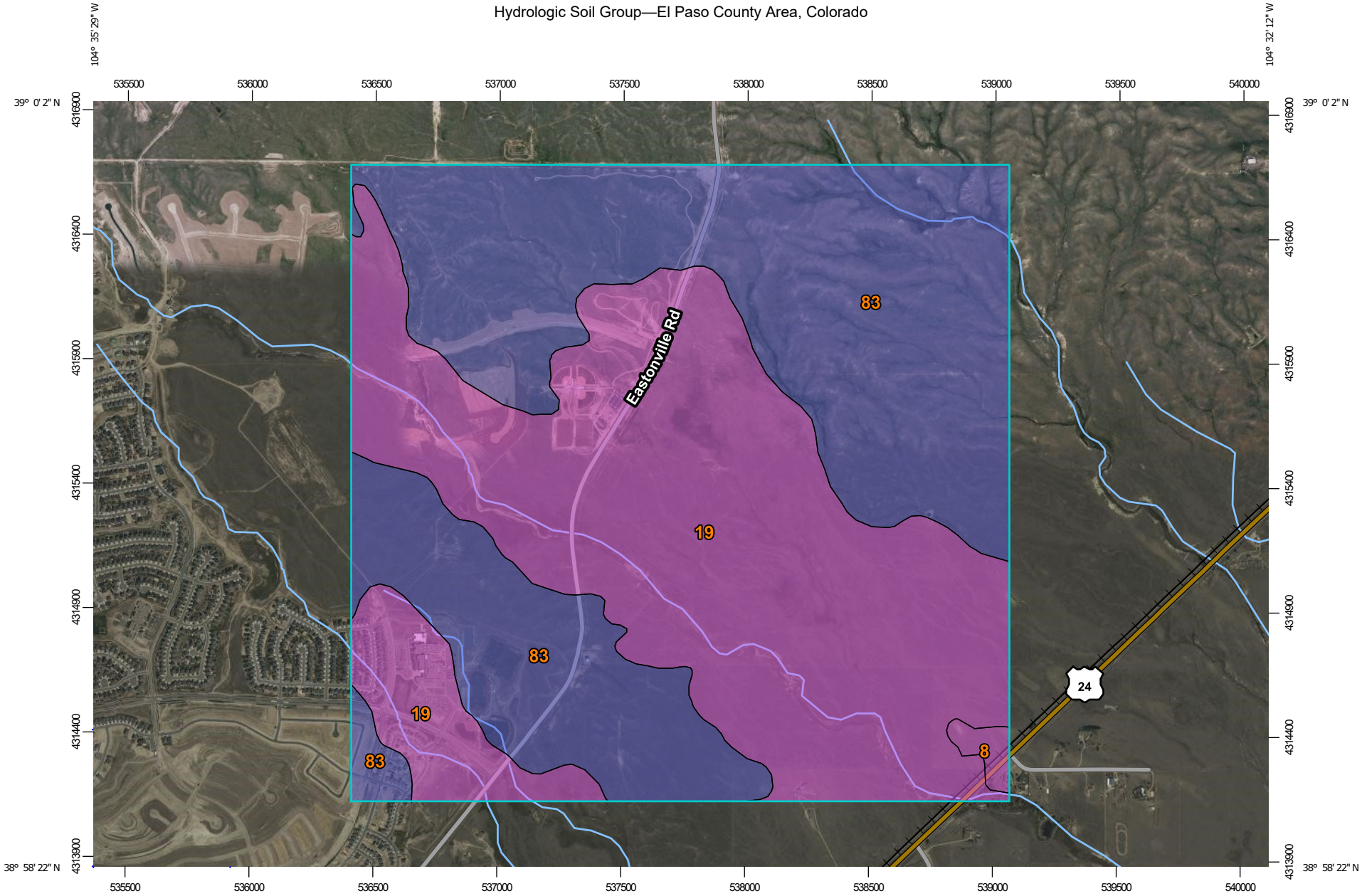
EASTONVILLE ROAD
DR HORTON
EL PASO COUNTY, CO

OVERALL EASTONVILLE PLAN

SHEET 1

1

Photo - at Londonderry and Eastonville looking north


104° 35' 29" W
104° 32' 12" W
39° 0' 2" N
38° 58' 22" N
535500
536000
536500
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538000
538500
539000
539500
540000
4316900
4316400
4315900
4315400
4314900
4314400
4313900
Eastonville Rd
83
19
83
19
83
8
24
Map Scale: 1:21,700 if printed on A landscape (11" x 8.5") sheet.
N
0 300 600 1200 1800 Meters
0 1000 2000 4000 6000 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil 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.

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 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 11, 2018—Jun 12, 2021

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
8	Blakeland loamy sand, 1 to 9 percent slopes	A	10.4	0.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	839.5	49.8%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	835.7	49.6%
Totals for Area of Interest			**1,685.6**	**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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

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

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

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

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

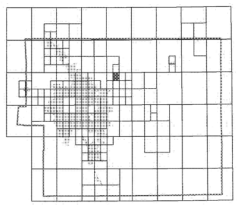
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

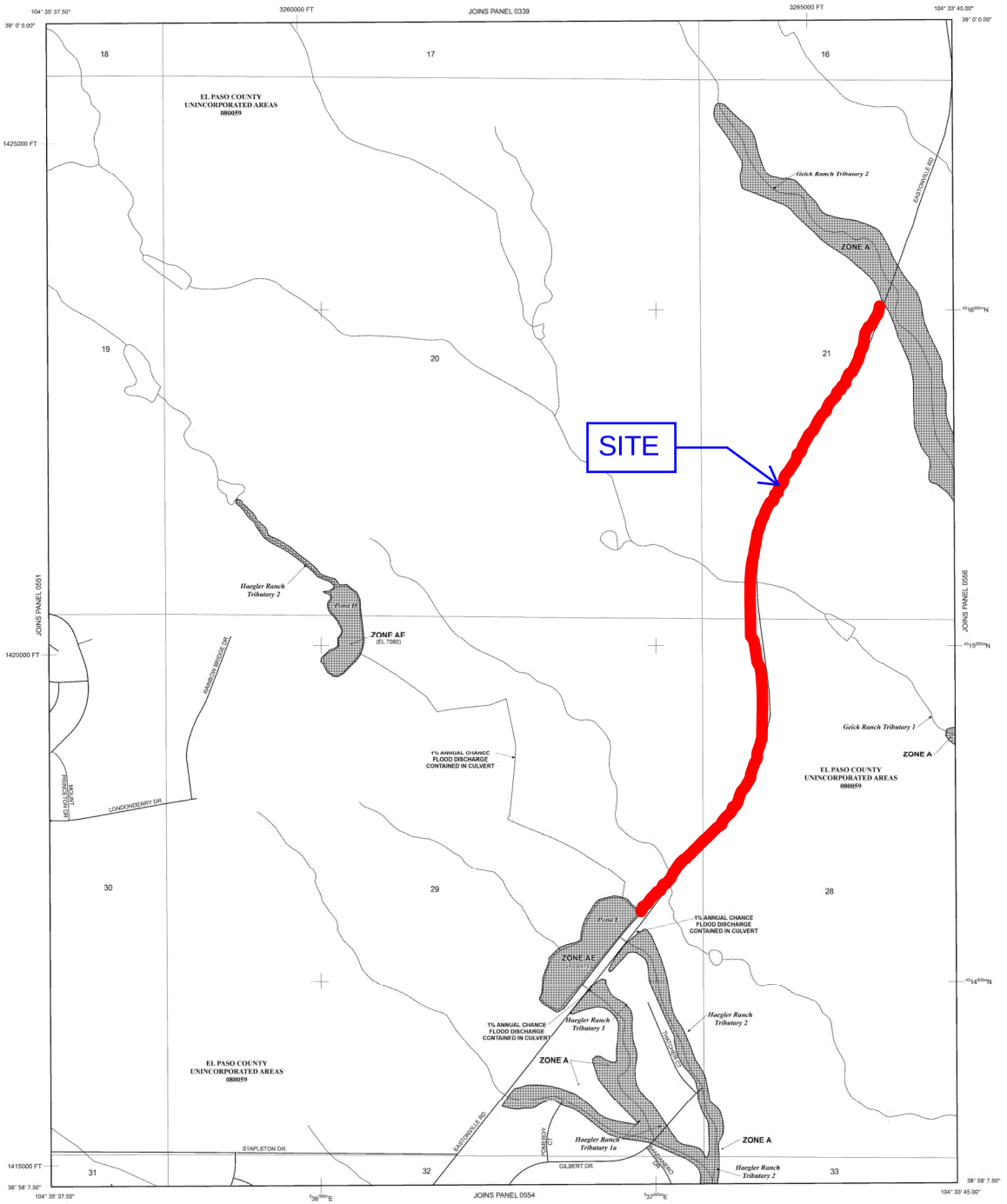
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



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

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



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 64 WEST.

LEGEND

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

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

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

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

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

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

A — A — Cross section line
23 — 23 — Transect line
97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4175000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

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

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0552G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 552 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0552	G

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

MAP NUMBER
08041C0552G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

NOAA Atlas 14, Volume 8, Version 2
Location name: Elbert, Colorado, USA*
Latitude: 38.9796°, Longitude: -104.5696°
Elevation: 6996 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.239** (0.189-0.303)	**0.291** (0.231-0.370)	**0.381** (0.301-0.486)	**0.461** (0.361-0.589)	**0.576** (0.440-0.768)	**0.671** (0.499-0.904)	**0.770** (0.554-1.06)	**0.875** (0.604-1.24)	**1.02** (0.678-1.48)	**1.14** (0.733-1.67)
10-min	**0.350** (0.277-0.444)	**0.426** (0.338-0.542)	**0.558** (0.441-0.711)	**0.674** (0.529-0.863)	**0.844** (0.644-1.12)	**0.982** (0.731-1.32)	**1.13** (0.811-1.56)	**1.28** (0.884-1.81)	**1.49** (0.992-2.17)	**1.66** (1.07-2.44)
15-min	**0.426** (0.338-0.541)	**0.520** (0.412-0.660)	**0.681** (0.537-0.867)	**0.823** (0.645-1.05)	**1.03** (0.785-1.37)	**1.20** (0.891-1.62)	**1.37** (0.988-1.90)	**1.56** (1.08-2.21)	**1.82** (1.21-2.65)	**2.03** (1.31-2.98)
30-min	**0.608** (0.482-0.771)	**0.740** (0.586-0.940)	**0.968** (0.764-1.23)	**1.17** (0.916-1.49)	**1.46** (1.11-1.94)	**1.70** (1.26-2.28)	**1.94** (1.40-2.68)	**2.20** (1.52-3.12)	**2.57** (1.71-3.73)	**2.86** (1.84-4.19)
60-min	**0.775** (0.615-0.984)	**0.933** (0.739-1.18)	**1.21** (0.956-1.54)	**1.46** (1.15-1.87)	**1.84** (1.41-2.47)	**2.16** (1.61-2.92)	**2.49** (1.80-3.45)	**2.85** (1.97-4.05)	**3.37** (2.24-4.90)	**3.78** (2.44-5.54)
2-hr	**0.943** (0.754-1.19)	**1.12** (0.898-1.42)	**1.46** (1.16-1.84)	**1.76** (1.39-2.23)	**2.22** (1.72-2.97)	**2.62** (1.97-3.52)	**3.04** (2.21-4.19)	**3.50** (2.45-4.95)	**4.16** (2.80-6.03)	**4.70** (3.06-6.85)
3-hr	**1.03** (0.829-1.29)	**1.22** (0.978-1.53)	**1.57** (1.25-1.97)	**1.90** (1.51-2.40)	**2.41** (1.88-3.22)	**2.86** (2.17-3.84)	**3.34** (2.45-4.60)	**3.88** (2.73-5.48)	**4.66** (3.15-6.74)	**5.29** (3.46-7.69)
6-hr	**1.20** (0.968-1.48)	**1.40** (1.13-1.74)	**1.78** (1.44-2.22)	**2.16** (1.73-2.70)	**2.76** (2.18-3.66)	**3.28** (2.52-4.39)	**3.86** (2.86-5.29)	**4.51** (3.20-6.34)	**5.46** (3.73-7.86)	**6.24** (4.12-9.01)
12-hr	**1.38** (1.13-1.70)	**1.61** (1.31-1.98)	**2.05** (1.66-2.53)	**2.48** (2.00-3.07)	**3.15** (2.51-4.15)	**3.74** (2.89-4.96)	**4.39** (3.28-5.96)	**5.12** (3.66-7.13)	**6.17** (4.25-8.82)	**7.04** (4.69-10.1)
24-hr	**1.60** (1.31-1.95)	**1.87** (1.54-2.28)	**2.38** (1.94-2.91)	**2.85** (2.32-3.51)	**3.60** (2.88-4.67)	**4.24** (3.29-5.56)	**4.94** (3.71-6.63)	**5.71** (4.12-7.87)	**6.82** (4.73-9.66)	**7.73** (5.20-11.0)
2-day	**1.85** (1.54-2.24)	**2.18** (1.80-2.63)	**2.76** (2.28-3.34)	**3.29** (2.70-4.01)	**4.11** (3.30-5.27)	**4.80** (3.76-6.22)	**5.54** (4.19-7.36)	**6.35** (4.62-8.68)	**7.50** (5.25-10.5)	**8.44** (5.73-11.9)
3-day	**2.03** (1.69-2.44)	**2.39** (1.98-2.87)	**3.02** (2.50-3.64)	**3.60** (2.97-4.36)	**4.47** (3.60-5.69)	**5.20** (4.08-6.70)	**5.98** (4.55-7.90)	**6.83** (4.99-9.28)	**8.03** (5.65-11.2)	**9.00** (6.15-12.7)
4-day	**2.18** (1.82-2.61)	**2.56** (2.13-3.06)	**3.22** (2.68-3.87)	**3.82** (3.16-4.62)	**4.73** (3.83-6.00)	**5.49** (4.33-7.04)	**6.30** (4.81-8.30)	**7.18** (5.26-9.72)	**8.43** (5.94-11.7)	**9.43** (6.46-13.3)
7-day	**2.58** (2.17-3.07)	**2.98** (2.50-3.54)	**3.68** (3.08-4.39)	**4.32** (3.60-5.18)	**5.29** (4.30-6.65)	**6.09** (4.84-7.76)	**6.96** (5.34-9.09)	**7.89** (5.82-10.6)	**9.21** (6.55-12.8)	**10.3** (7.10-14.4)
10-day	**2.93** (2.48-3.47)	**3.36** (2.84-3.98)	**4.13** (3.47-4.90)	**4.81** (4.02-5.74)	**5.83** (4.76-7.28)	**6.68** (5.32-8.45)	**7.58** (5.85-9.86)	**8.55** (6.34-11.4)	**9.92** (7.08-13.7)	**11.0** (7.65-15.4)
20-day	**3.91** (3.33-4.58)	**4.51** (3.84-5.29)	**5.52** (4.68-6.50)	**6.39** (5.39-7.55)	**7.63** (6.25-9.37)	**8.62** (6.90-10.8)	**9.64** (7.47-12.4)	**10.7** (7.98-14.1)	**12.2** (8.74-16.6)	**13.3** (9.31-18.4)
30-day	**4.70** (4.02-5.47)	**5.44** (4.65-6.34)	**6.65** (5.66-7.78)	**7.66** (6.49-9.00)	**9.06** (7.44-11.0)	**10.1** (8.15-12.5)	**11.2** (8.74-14.3)	**12.3** (9.24-16.2)	**13.8** (9.98-18.7)	**15.0** (10.5-20.6)
45-day	**5.67** (4.88-6.57)	**6.55** (5.63-7.60)	**7.97** (6.82-9.27)	**9.12** (7.77-10.7)	**10.7** (8.79-12.9)	**11.9** (9.56-14.5)	**13.0** (10.2-16.4)	**14.2** (10.6-18.4)	**15.6** (11.3-21.0)	**16.7** (11.9-23.0)
60-day	**6.48** (5.60-7.48)	**7.46** (6.43-8.62)	**9.01** (7.74-10.4)	**10.3** (8.77-11.9)	**11.9** (9.82-14.3)	**13.1** (10.6-16.0)	**14.3** (11.2-18.0)	**15.5** (11.7-20.0)	**16.9** (12.3-22.6)	**18.0** (12.8-24.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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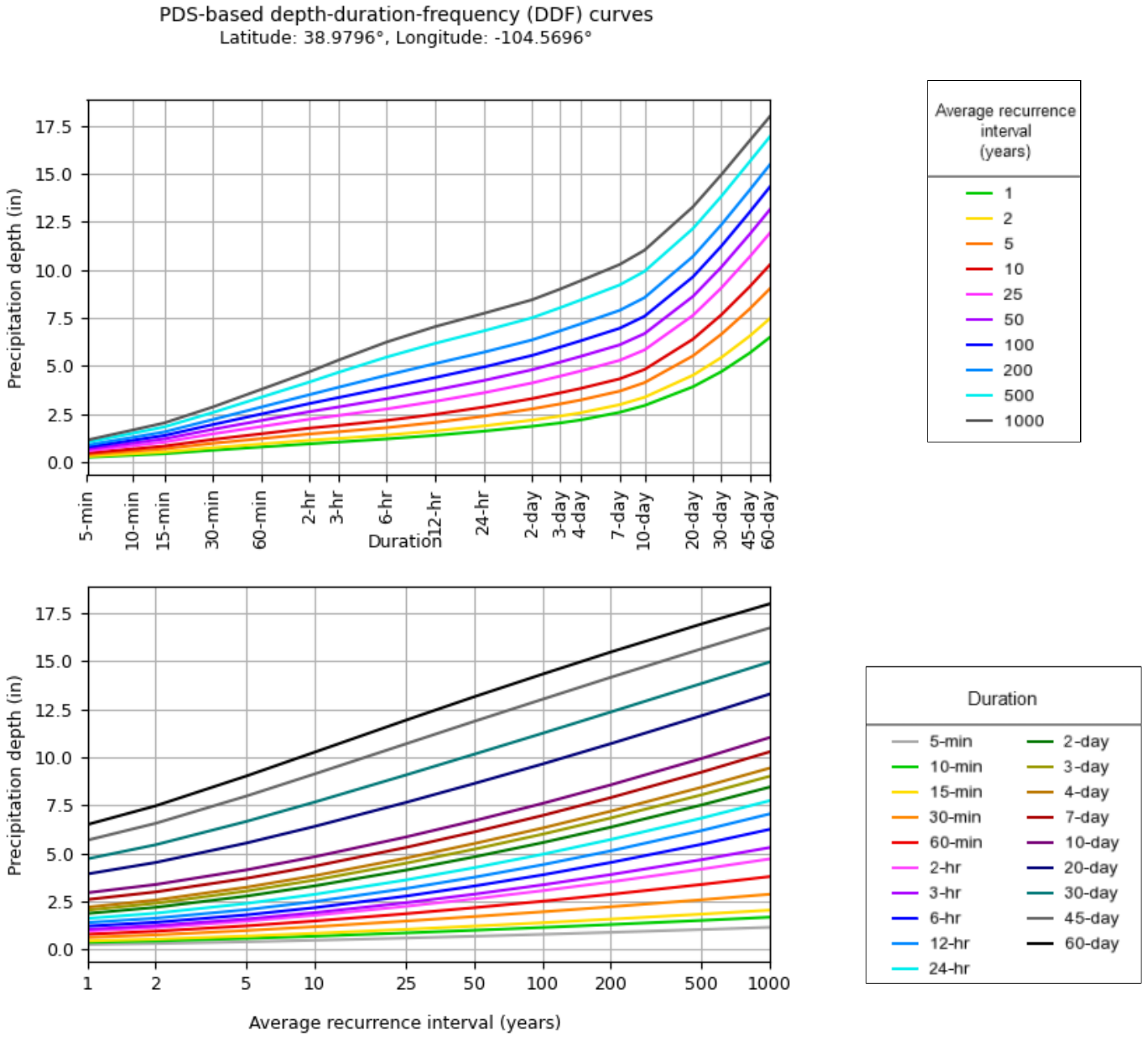
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Wed Nov 22 20:22:49 2023

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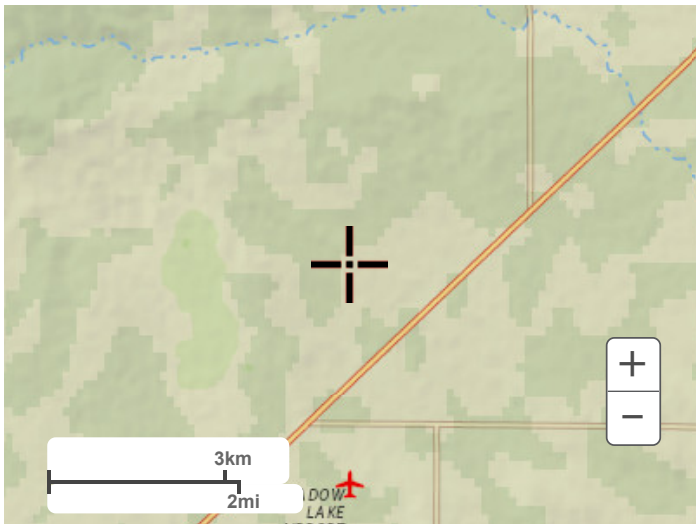
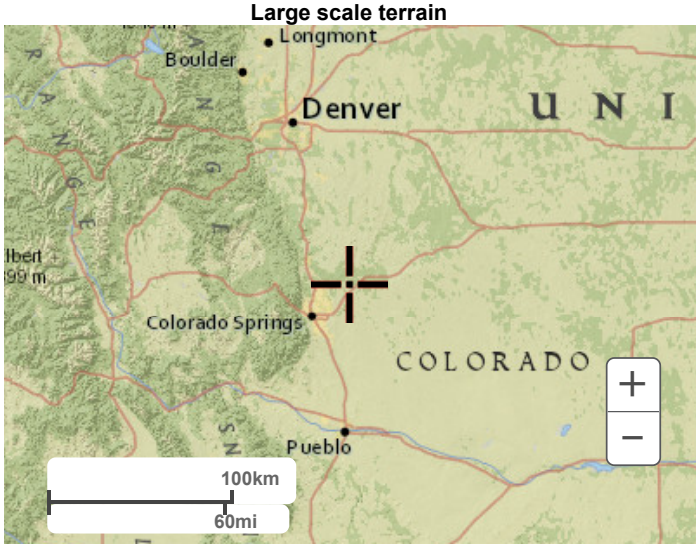
Maps & aerials

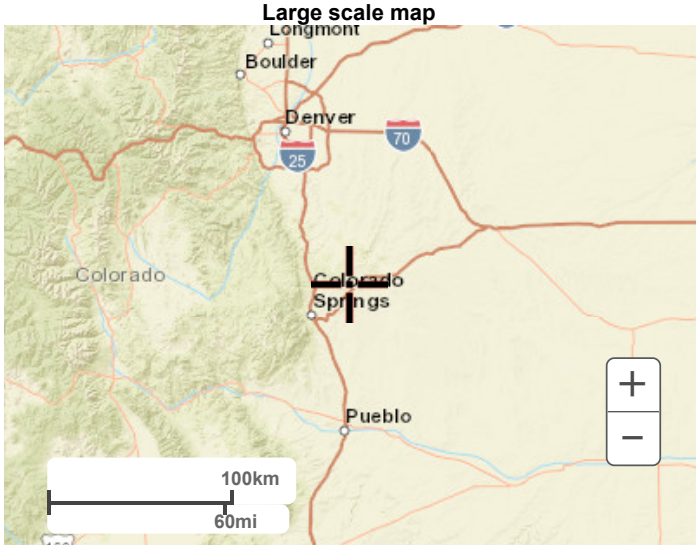
Small scale terrain



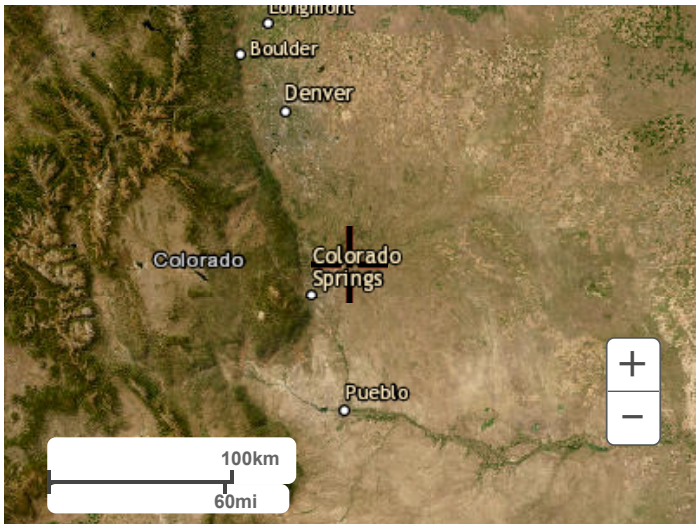
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX B – HYDROLOGIC CALCULATIONS

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**CM**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**2/1/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
G18*	321.53	-	28.3	365.2
FG36*	18.88	-	1.7	18.8
G16*	131.26	-	6.1	112.1
G06*	832.70	-	22.4	491.0

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	G18*	28.3	365.2
2	FG36*	1.7	18.8
3	G16*	6.1	112.1
4	G06*	22.4	491.0

*** AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR**

Unresolved:
Basin labels do not match basin labels on drainage map. Please revise to show same labels. Labels listed here are design points. From map, need to list basins FG35, Ex1 thru Ex4

HRGreen	**EASTONVILLE ROAD**						**Calc'd by:**	**CM**	
	EXISTING CONDITIONS						**Checked by:**	**CM**	
	EL PASO COUNTY, CO						**Date:**	**2/1/2024**	

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	WALKS & DRIVES	SINGLE FAMILY	TOTAL	SOIL TYPE	UNDEVELOPED			WALKS & DRIVES			SINGLE FAMILY			COMPOSITE IMPERVIOUSNESS & C		
	ACRES					%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}
EX1 - EX4*																	

* FLOWS TO DESIGN POINTS 1-4 WERE TAKEN FROM "THE SANCTUARY FILING 1 FDR" SO C WAS NOT CALCULATED FOR CONTRIBUTING AREAS EX1 - EX4

Provide excerpts from Sanctuary FDR for these calculations. Include them in "Excerpts from other reports" section.

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**CM**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**2/1/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)
EX1-EX4*											

* FLOWS TO THESE DESIGN POINTS WERE TAKEN FROM "THE SANCTUARY FILING 1 FDR" SO TC WAS NOT CALCULATED FOR CONTRIBUTING AREAS EX1 - EX4

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

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.

HRGreen	EASTONVILLE ROAD																					Calc'd by:	CM
	EXISTING CONDITIONS																					Checked by:	CM
	DESIGN STORM: 5-YEAR																					Date:	2/1/2024
			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (in)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	1	G18*	321.53									28.3											DP 1 CAPTURED IN GIECK RANCH TRIB #2 (CHANNEL B)
	2	FG36*	18.88									1.7											DP 2 CAPTURED IN 24" RCP CULVERT, PIPED TO BASIN EX3
	3	G16*	131.26									6.1											BASIN EX2, DP2 & DPG15 (SANCTUARY FDR Q5=3 CFS) CAPTURED IN 24" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD
	4	G06*	832.70									22.4											BASIN EX4 & DPG12 (SANCTUARY FDR Q5 = 21 CFS) CAPTURED IN 18" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD TO GIECK RANCH TRIB #1 (CHANNEL A)
																							* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

Unresolved:
Basin Labels need to match with basin labels on map

HRGreen

EASTONVILLE ROAD
EXISTING CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by:	CM
Checked by:	CM
Date:	2/1/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (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	G18*	321.53									365.2											DP 1 CAPTURED IN GIECK RANCH TRIB #2 (CHANNEL B)
	2	FG36*	18.88									18.8											DP 2 CAPTURED IN 24" RCP CULVERT, PIPED TO BASIN EX3
	3	G16*	131.26									112.1											BASIN EX2, DP2 & DPG15 (SANCTUARY FDR Q5=3 CFS) CAPTURED IN 24" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD
	4	G06*	832.70									491.0											BASIN EX4 & DPG12 (SANCTUARY FDR Q5 = 21 CFS) CAPTURED IN 18" CMP CULVERT, PIPED ACROSS EASTONVILLE ROAD TO GIECK RANCH TRIB #1 (CHANNEL A)

*** AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR**

HRGreen	**EASTONVILLE ROAD SEG 2**	**Calc'd by:**	**SPC**
	PROPOSED CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**2/2/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
EA1	0.22	73	0.8	1.5
EA2	0.25	72	0.9	1.7
EA3	0.20	70	0.7	1.3
EA4	0.17	65	0.5	1.1
EA5	0.16	0	0.1	0.4
EA6	0.70	100	3.2	5.3
EA7	0.65	89	2.6	4.8
EA8	2.08	99	5.2	8.8
EA9	2.99	63	5.0	10.4
EA10	0.16	75	0.6	1.1
EA11	0.15	67	0.5	1.0
*G18	321.53	-	28.3	365.2
*FG36	18.88	-	1.7	18.8
OS3	1.00	2	0.3	2.2
OS4	9.60	9	4.8	21.6
*G16	131.26	-	6.1	112.1
*G06	832.70	-	22.4	491.0
OS7	11.42	2	3.6	24.4

* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	G18	28.3	365.2
2	FG36	1.7	18.8
2.1	EA1	0.8	1.5
3	G16, DP11	6.1	112.1
3.1	EA2, DP2.1	1.6	3.2
4	G06	22.4	491.0
4.1	EA5, DP3.1	1.7	3.4
5	EA3	0.7	1.3
6	DP5, EA4	1.2	2.4
6.1	DP6, DP8	2.9	22.4
7	OS3	0.3	2.2
8	DP2, DP7	2.0	21.0
9	DP6.1	2.9	22.4
10	EA6, EA7	5.6	9.9
11	OS4, DP9	7.5	44.0
12	OS7	3.6	24.4
13	DP3, DP12	26.0	136.4
14	EA8	5.2	8.8
15	EA9	5.0	10.4
15.1	DP14, DP15	10.2	19.1
16.1	EA10	0.6	1.1
17.1	EA11	0.5	1.0

EASTONVILLE ROAD SEG 2
PROPOSED CONDITIONS
EL PASO COUNTY, CO

Calc'd by: SPC

Checked by: CM

Date: 11/27/2023

SOIL TYPE: HSG A&B

COMPOSITE 'C' FACTORS

	LAND USE TYPE															TOTAL	COMPOSITE IMPERVIOUSNESS & C FACTOR		
	Paved			Historic Flow Analysis-- Greenbelts, Agriculture			Lawns			Land Use Undefined			Land Use Undefined						
	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}				
	100	0.90	0.96	2	0.09	0.36	0	0.08	0.35	0	0.00	0.00	0	0.00	0.00				
BASIN	ACRES			ACRES			ACRES			ACRES			ACRES			ACRES	%I	C_5	C_{100}
EA1	0.16						0.06									0.22	73	0.68	0.79
EA2	0.18						0.07									0.25	72	0.67	0.79
EA3	0.14						0.06									0.20	70	0.65	0.78
EA4	0.11						0.06									0.17	65	0.61	0.74
EA5	0.00						0.16									0.16	0	0.08	0.35
EA6	0.70						0.00									0.70	100	0.90	0.96
EA7	0.58						0.07									0.65	89	0.81	0.89
EA8	2.06						0.02									2.08	99	0.89	0.95
EA9	1.88						1.11									2.99	63	0.60	0.73
EA10	0.12						0.04									0.16	75	0.70	0.81
EA11	0.10						0.05									0.15	67	0.63	0.76
G18																321.53			
FG36																18.88			
OS3				1.00												1.00	2	0.09	0.36
OS4	0.70			8.90												9.60	9	0.15	0.40
G16																131.26			
G06																832.70			
OS7				11.42												11.42	2	0.09	0.36
Pond A	0.34			0.00			0.29									0.63	54	0.52	0.68

HRGreen	**EASTONVILLE ROAD SEG 2**	**Calc'd by:**	**SPC**
	PROPOSED CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**2/2/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)
EA1	0.68	0.22	34	2.0	3.6	20	137	1.4	2.4	1.0	5.0
EA2	0.67	0.25	34	2.0	3.6	20	60	1.4	2.4	0.4	5.0
EA3	0.65	0.20	34	2.0	3.8	20	126	1.4	2.4	0.9	5.0
EA4	0.61	0.17	34	2.0	4.2	20	126	3.8	3.9	0.5	5.0
EA5	0.08	0.16	20	2.0	6.6	20	20	33.0	11.5	0.0	6.7
EA6	0.90	0.70	26	2.0	1.5	20	630	1.7	2.6	4.0	5.5
EA7	0.81	0.65	24	2.0	2.1	20	630	1.7	2.6	4.0	6.1
EA8	0.89	2.08	26	2.0	1.5	20	2500	0.7	1.7	24.9	26.4
EA9	0.60	2.99	26	2.0	3.7	20	2500	0.7	1.7	24.9	28.6
EA10	0.70	0.16	26	2.0	3.0	20	157	0.6	1.5	1.7	5.0
EA11	0.63	0.15	26	2.0	3.5	20	157	0.6	1.5	1.7	5.2
G18											
FG36											
OS3	0.09	1.00	220	2.1	21.4	10	345	2.3	1.5	3.8	25.2
OS4	0.15	9.60	153	3.1	14.8	10	1124	2.5	1.6	11.8	26.6
G16											
G06											
OS7	0.09	11.42	200	11.6	11.6	10	675	3.4	1.8	6.1	17.7

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

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.

HRGreen

EASTONVILLE ROAD SEG 2
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	SPC
Checked by:	CM
Date:	2/2/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	1	G18	321.53					28.3				**28.3**											
	2	FG36	18.88					1.7				**1.7**											
	2.1	EA1	0.22	0.68	5.0	0.15	5.17	0.8	5.0	0.15	5.17	**0.8**				0.8	0.15	1.0	1.5	56	5.9	0.16	BASIN EA1 CAPTURED IN 5' TYPE R INLET @ DP2, PIPE TO DP3.1
	3	G16						6.1				**6.1**											
	3.1	EA2	0.25	0.67	5.0	0.17	5.17	0.9	5.0	0.32	5.17	**1.6**				1.6	0.32	5.1	1.5	34	13.4	0.04	BASIN EA2 CAPTURED IN 5' TYPE R INLET@ DP3, PIPE TO DP3.1
	4	G06						22.4				**22.4**											
	4.1	EA5	0.16	0.08	6.7	0.01	4.74	0.1	6.7	0.33	5.17	**1.7**											COMBINED DP2.1 & DP3.1 @ DP3.1, PIPE TO DP4 (POND A)
	5	EA3	0.20	0.65	5.0	0.13	5.17	0.7	5.0	0.13	5.17	**0.7**				0.7	0.13	0.5	1.3	48	3.7	0.21	BASIN EA3 CAPTURED IN 5' TYPE R INLET @ DP5, PIPE TO DP6.1
	6	EA4	0.17	0.61	5.0	0.10	5.17	0.5	5.2	0.23	5.11	**1.2**				1.2	0.23	2.4	1.3	43	8.1	0.09	BASIN EA4 CAPTURED IN 5' TYPE R INLET @ DP6, PIPE TO DP6.1
	6.1								13.2	0.32	3.71	**2.9**				2.9	0.32	1.0	2.0	61	7.2	0.14	DP6 & DP8 FLOW @ DP6.1, PIPE TO DP9
	7	OS3	1.00	0.09	13.1	0.09	3.72	0.3	13.1	0.09	3.72	**0.3**				0.3	0.09	0.8	2.0	43	6.4	0.11	BASIN OS3 CAPTURED IN 15" FES, PIPE TO DP8
	8	OS3	1.00	0.09	13.1	0.09	3.72	0.3	13.1	0.09	3.72	**2.0**				2.0	0.09	1.5	1.3	38	6.4	0.10	DP2 & DP7 FLOW @ DP8, PIPE TO DP9
	9								13.2	0.32	3.71	**2.9**	2.9	0.32	2.1					615	2.9	3.56	DP6.1 @ DP9, DISCHARGE TO ROADSIDE SWALE TO DP11
	10	EA6	0.70	0.90	5.5	0.63	5.02	3.2	6.1	1.16	4.88	**5.6**											BASIN EA6 & EA7 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
		EA7	0.65	0.81	6.1	0.53	4.88	2.6															
	11	OS4	9.60	0.15	17.1	1.43	3.32	4.8	17.1	1.76	3.32	**7.5**	7.5	1.76	0.5					530	1.4	6.25	BASIN OS4, DP9.1 CAPTURED & MERIDIAN RANCH DPG15 (3 CFS) IN 30" FES @ DP11, SWALE TO DP3
	12	OS7	11.42	0.09	14.9	1.03	3.53	3.6	14.9	1.03	3.53	**3.6**				3.6	1.03	1.0	1.5	28	5.9	0.08	BASIN OS7 CAPTURED @ DP12 IN TYPE C INLET, PIPE TO DP13
	13								14.9	1.03	3.53	**26.0**											COMBINED DP3 & DP12, PIPE TO CHANNEL B
	14	EA8	2.08	0.89	24.0	1.86	2.81	5.2	24.0	1.86	2.81	**5.2**				5.2	1.86	7.0	1.5	8	15.7	0.01	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP14, PIPE TO DP15.1
	15	EA9	2.99	0.60	24.0	1.78	2.81	5.0	24.0	1.78	2.81	**5.0**				5.0	1.78	1.8	1.5	54	7.9	0.11	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP15, PIPE TO DP15.1
	15.1								24.1	3.64	2.81	**10.2**											COMBINED DP14 & DP15, PIPE TO DP18 OF THE EASTONVILLE ROAD SEGMENT 1 FDR
	16.1	EA10	0.16	0.70	5.0	0.11	5.17	0.6	5.0	0.11	5.17	**0.6**											BASIN EA10 CONVEYED VIA CURB & GUTTER TO 10' TYPE R INLET. INLET DESIGN IS PROVIDED IN THE EASTONVILLE ROAD SEGMENT 1 FDR
	17.1	EA11	0.15	0.63	5.2	0.09	5.11	0.5	5.2	0.09	5.11	**0.5**											BASIN EA11 CONVEYED VIA CURB & GUTTER TO 10' TYPE R INLET. INLET DESIGN IS PROVIDED IN THE EASTONVILLE ROAD SEGMENT 1 FDR

Unresolved:
Delete one of the OS3 basins?

Unresolved:
Missing Basins OS1, OS2, FG35 & OS6

HRGreen

EASTONVILLE ROAD SEG 2

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	SPC
Checked by:	CM
Date:	2/2/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (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	G18						365.2				**365.2**											
	2	FG36						18.8				**18.8**											
	2.1	EA1	0.22	0.79	5.0	0.17	8.68	1.5	5.0	0.17	8.68	**1.5**				1.5	0.17	1.0	1.5	56	5.9	0.16	BASIN EA1 CAPTURED IN 5' TYPE R INLET @ DP2, PIPE TO DP3.1
	3	G16						112.1				**112.1**				112.1	0.00	5.1	1.5	34	13.4	0.04	
	3.1	EA2	0.25	0.79	5.0	0.20	8.68	1.7	5.0	0.37	8.66	**3.2**											BASIN EA2 CAPTURED IN 5' TYPE R INLET@ DP3, PIPE TO DP3.1
	4	G06						491.0				**491.0**				491.0	0.00	0.5	1.3	48	3.7	0.21	
	4.1	EA5	0.16	0.35	6.7	0.06	7.95	0.4	6.7	0.43	7.95	**3.4**				3.4	0.43	2.4	1.3	43	8.1	0.09	COMBINED DP2.1 & DP3.1 @ DP3.1, PIPE TO DP4 (POND A)
	5	EA3	0.20	0.78	5.0	0.16	8.68	1.3	5.0	0.16	8.68	**1.3**				1.3	0.16	1.0	2.0	61	7.2	0.14	BASIN EA3 CAPTURED IN 5' TYPE R INLET @ DP5, PIPE TO DP6.1
	6	EA4	0.17	0.74	5.0	0.13	8.68	1.1	5.1	0.28	8.61	**2.4**				2.4	0.28	0.8	2.0	43	6.4	0.11	BASIN EA4 CAPTURED IN 5' TYPE R INLET @ DP6, PIPE TO DP6.1
	6.1								16.7	0.64	5.64	**22.4**				22.4	0.64	1.5	1.3	38	6.4	0.10	DP6 & DP8 FLOW @ DP6.1, PIPE TO DP9
	7	OS3	1.00	0.36	13.1	0.36	6.24	2.2	13.1	0.36	6.24	**2.2**				2.2	0.36	1.0	2.0	56	7.2	0.13	BASIN OS3 CAPTURED IN 15" FES, PIPE TO DP8
	8	OS3	1.00	0.36	13.1	0.36	6.24	2.2	13.1	0.36	6.24	**21.0**	21.0	0.36	2.1					615	2.9	3.56	DP2 & DP7 FLOW @ DP8, PIPE TO DP9
	9								16.8	0.64	5.63	**22.4**											DP6.1 @ DP9, DISCHARGE TO ROADSIDE SWALE TO DP11
	10	EA6	0.70	0.90	5.5	0.63	8.43	5.3	6.1	1.21	8.19	**9.9**											BASIN EA6 & EA7 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
		EA7	0.65	0.89	6.1	0.58	8.19	4.8					0.0	0.00	0.5					530	1.4	6.25	
	11	OS4	9.60	0.40	17.1	3.88	5.58	21.6	17.1	4.52	5.58	**44.0**				44.0	4.52	1.0	4.0	1500	11.4	2.19	BASIN OS4, DP9.1 CAPTURED & MERIDIAN RANCH DPG15 (3 CFS) IN 30" FES @ DP11, SWALE TO DP3
	12	OS7	11.42	0.36	14.9	4.11	5.93	24.4	14.9	4.11	5.93	**24.4**				24.4	4.11	1.0	1.5	28	5.9	0.08	BASIN OS7 CAPTURED @ DP12 IN TYPE C INLET, PIPE TO DP13
	13								14.9	4.11	5.92	**136.4**											COMBINED DP3 & DP12, PIPE TO CHANNEL B
	14	EA8	2.08	0.89	24.0	1.86	4.72	8.8	24.0	1.86	4.72	**8.8**				8.8	1.86	7.0	1.5	8	15.7	0.01	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP14, PIPE TO DP15.1
	15	EA9	2.99	0.73	24.0	2.19	4.72	10.4	24.0	2.19	4.72	**10.4**				10.4	2.19	1.8	1.5	54	7.9	0.11	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP15, PIPE TO DP15.1
	15.1								24.1	4.05	4.71	**19.1**											COMBINED DP14 & DP15, PIPE TO DP18 OF THE EASTONVILLE ROAD SEGMENT 1 FDR
	16.1	EA10	0.16	0.81	5.0	0.13	8.68	1.1	5.0	0.13	8.68	**1.1**											BASIN EA10 CONVEYED VIA CURB & GUTTER TO 10' TYPE R INLET. INLET DESIGN IS PROVIDED IN THE EASTONVILLE ROAD SEGMENT 1 FDR
	17.1	EA11	0.15	0.76	5.2	0.11	8.58	1.0	5.2	0.11	8.58	**1.0**											BASIN EA11 CONVEYED VIA CURB & GUTTER TO 10' TYPE R INLET. INLET DESIGN IS PROVIDED IN THE EASTONVILLE ROAD SEGMENT 1 FDR

APPENDIX C – HYDRAULIC CALCULATIONS

Unresolved:
Provide design calculations for all proposed swales & ditches

Unresolved:
Provide design calculations for riprap outlet protection at end of all culverts

Unresolved:
Provide analysis of any existing culverts that remain

Unresolved:
Include DP1 calculations for existing and needed culvert size

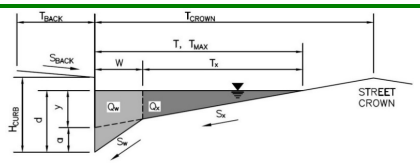
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Eastonville Road**

Inlet ID: **DP2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.7**	**30.0**	**cfs**

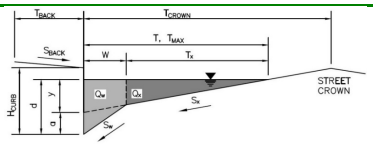
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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

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

Project: Eastonville Road
Inlet ID: DP2



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

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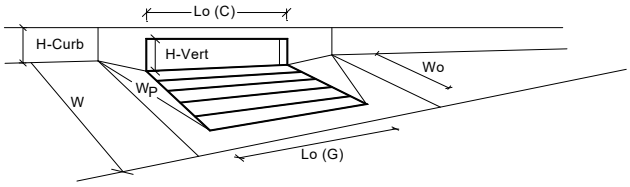


Design Information (Input) — CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.9	7.3	inches

Grate Information — ☐ Override Depths

		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.32	0.44	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.75	0.93	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.1**	**8.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.8	1.5	cfs

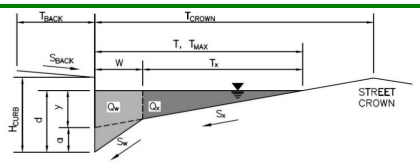
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Eastonville Road**

Inlet ID: **DP3**



Delete this sheet. DP3 is for the flow in the roadside ditch, not within the roadway, so street capacity calculation not needed for DP3

Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**14.7**	**30.0**	**cfs**

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

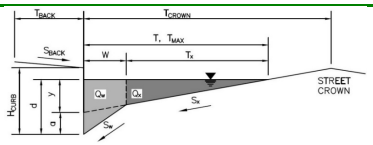
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: Eastonville Road
Inlet ID: DP3



Gutter Geometry:

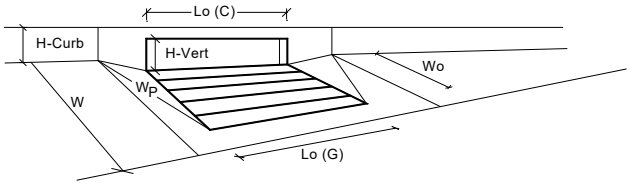
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Delete this portion as DP 3 is within the roadside ditch at the culvert opening, not a curb inlet. Provide inlet design if an area inlet is being used at DP 3 and delete if not.

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =			inches
Number of Unit Inlets (Grate or Curb Opening)	No =			
Water Depth at Flowline (outside of local depression)	Ponding Depth =			inches

Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =			feet
Width of a Unit Grate	W_o =			feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =			
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =			
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =			
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =			

Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =			feet
Height of Vertical Curb Opening in Inches	H_{vert} =			inches
Height of Curb Orifice Throat in Inches	H_{throat} =			inches
Angle of Throat (see USDCM Figure ST-5)	Theta =			degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =			feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =			
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =			
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =			

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	N/A	N/A	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**			**cfs**
	$Q_{PEAK\ REQUIRED}$ =			cfs

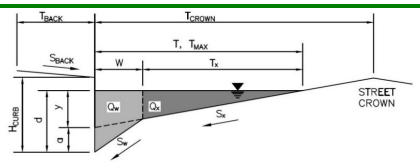
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Eastonville Road**

Inlet ID: **DP5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.017	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**16.8**	**34.3**	**cfs**

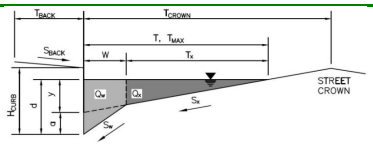
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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

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

Project: Eastonville Road
Inlet ID: DP5



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

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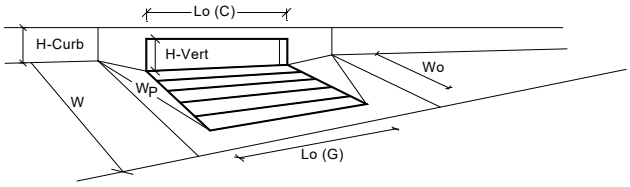


Design Information (Input) — CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.9	7.3	inches

Grate Information — ☐ Override Depths

		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.32	0.44	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.75	0.93	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.1**	**8.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.7	1.4	cfs

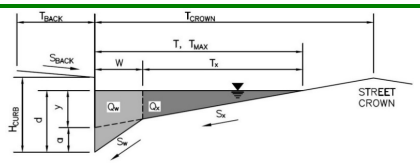
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Eastonville Road**

Inlet ID: **DP6**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.017	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**17.0**	**34.3**	**cfs**

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

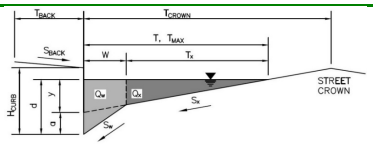
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: Eastonville Road
Inlet ID: DP6



Gutter Geometry:

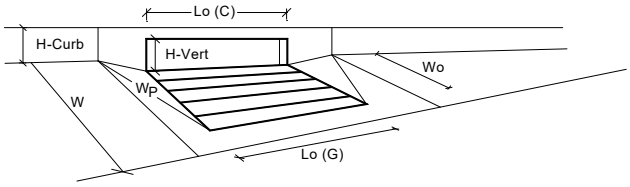
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	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 =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	24.0	24.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	3.5	3.5	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input) — CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.5	3.5	inches

Grate Information — ☐ Override Depths

		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.13	0.13	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.45	0.45	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.99	0.99	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.2**	**1.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.5	1.1	cfs

Unresolved:
Per hydrology spreadsheet, DP6 has Q100 of 2.4 cfs.
Interception capacity is not adequate at this inlet

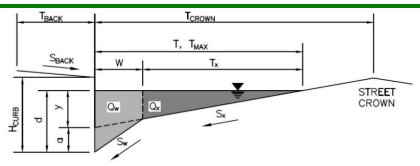
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Eastonville Road**

Inlet ID: **DP14**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	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 =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**10.8**	**27.4**	**cfs**

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

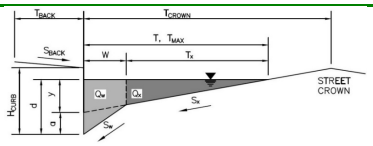
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: Eastonville Road
Inlet ID: DP14



Gutter Geometry:

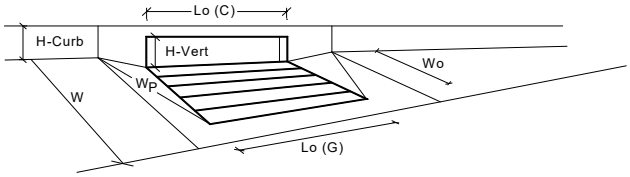
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	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 =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input) — CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.9	7.8	inches

Grate Information — ☐ Override Depths

		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.32	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.55	0.73	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.9**	**18.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.0	9.0	cfs

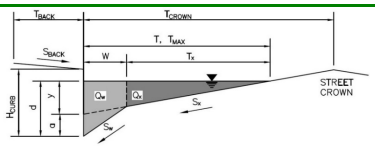
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Eastonville Road**

Inlet ID: **DP15**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	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 =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**10.8**	**27.4**	**cfs**

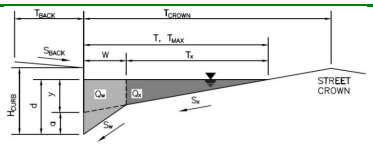
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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

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

Project: Eastonville Road
Inlet ID: DP15



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	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 =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

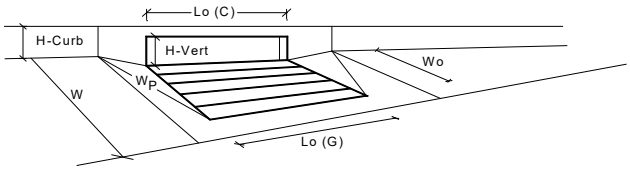
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.9	8.8	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input) — CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.9	7.8	inches

Grate Information ☐ Override Depths

		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information

		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

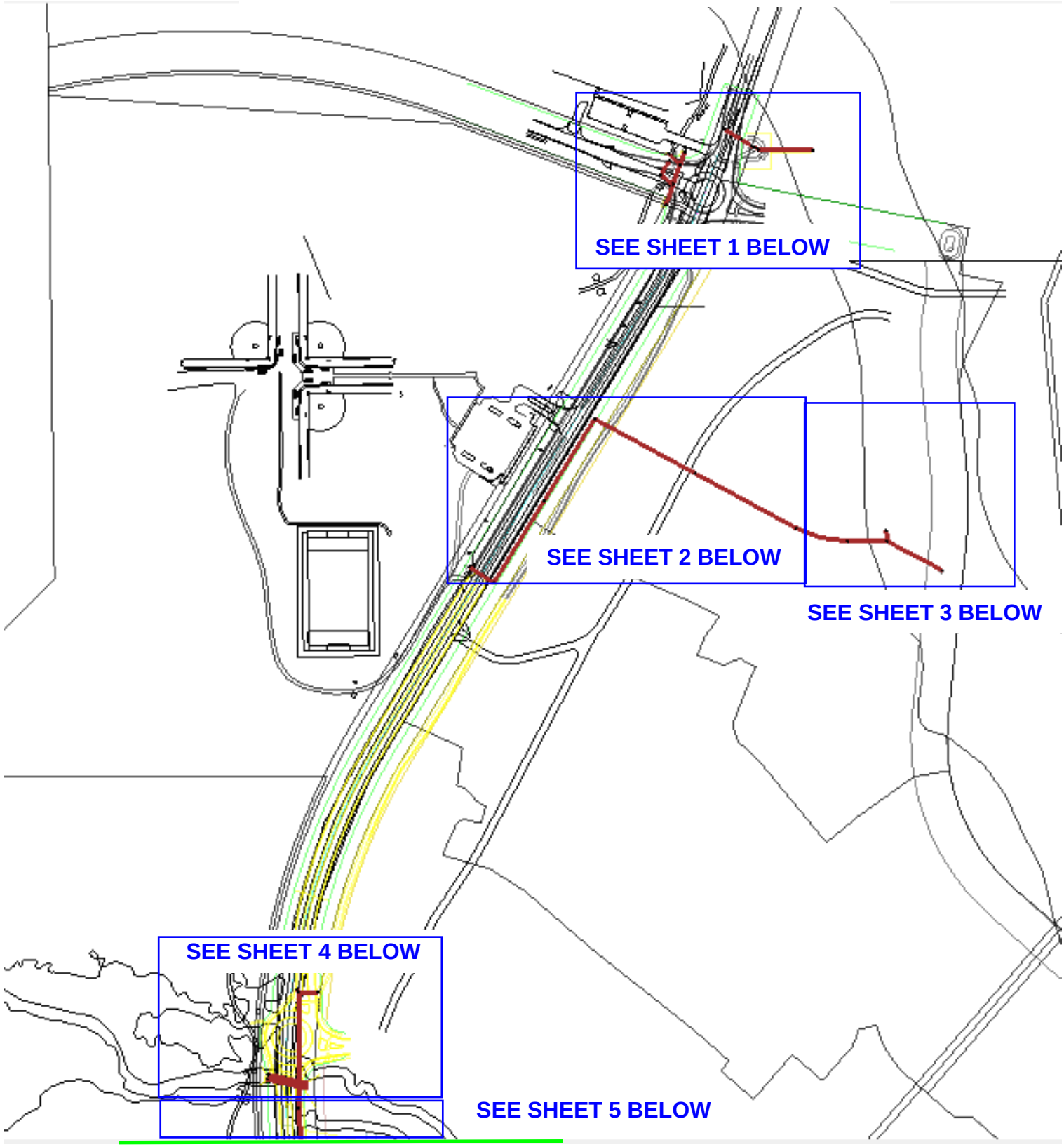
Low Head Performance Reduction (Calculated)

		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.32	0.48	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.55	0.73	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

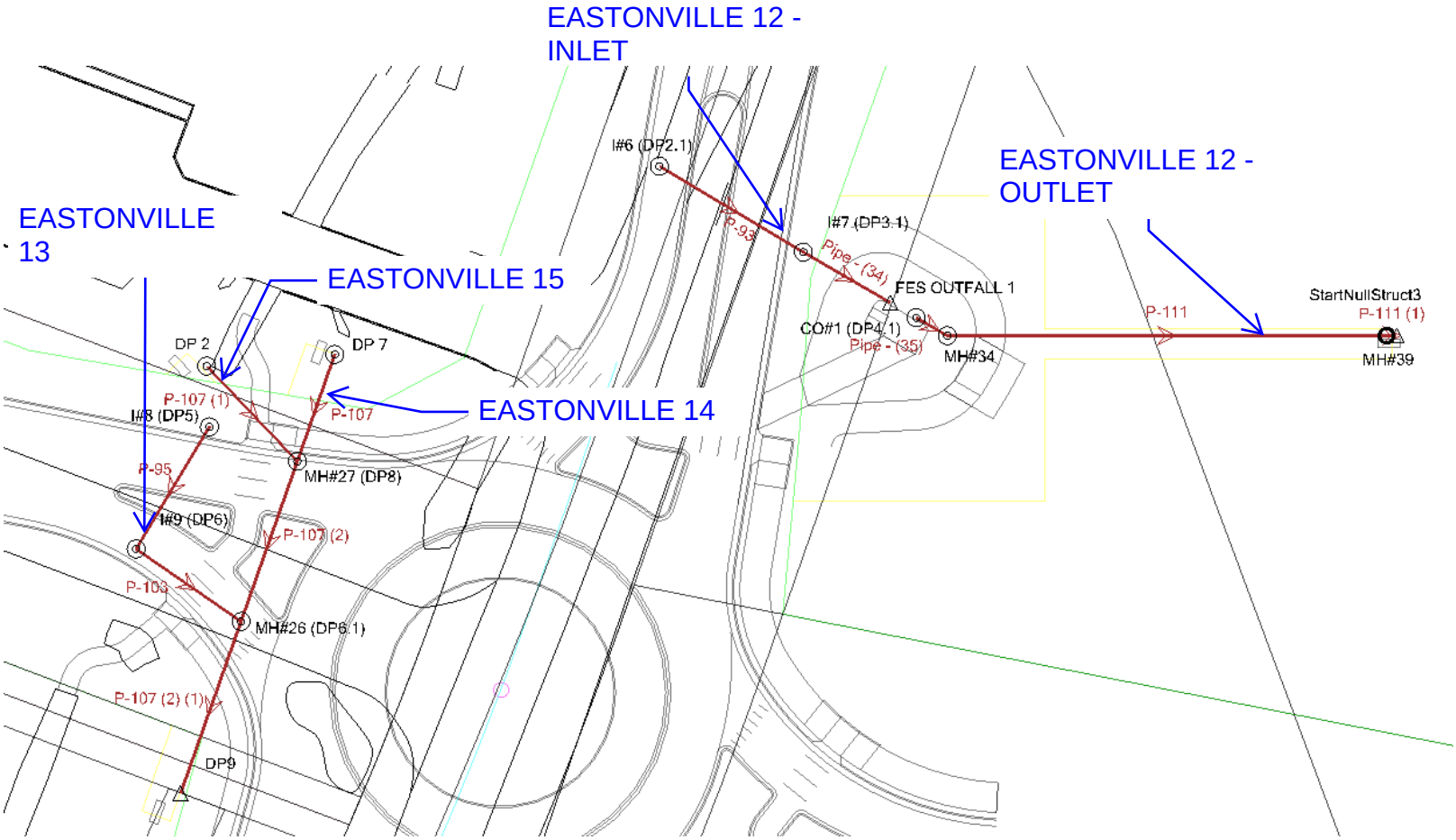
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**9.9**	**18.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.6	9.5	cfs

Verify correct design flows are being used at all inlets.

STORMCAD NETWORK LAYOUT: SEGMENT 2



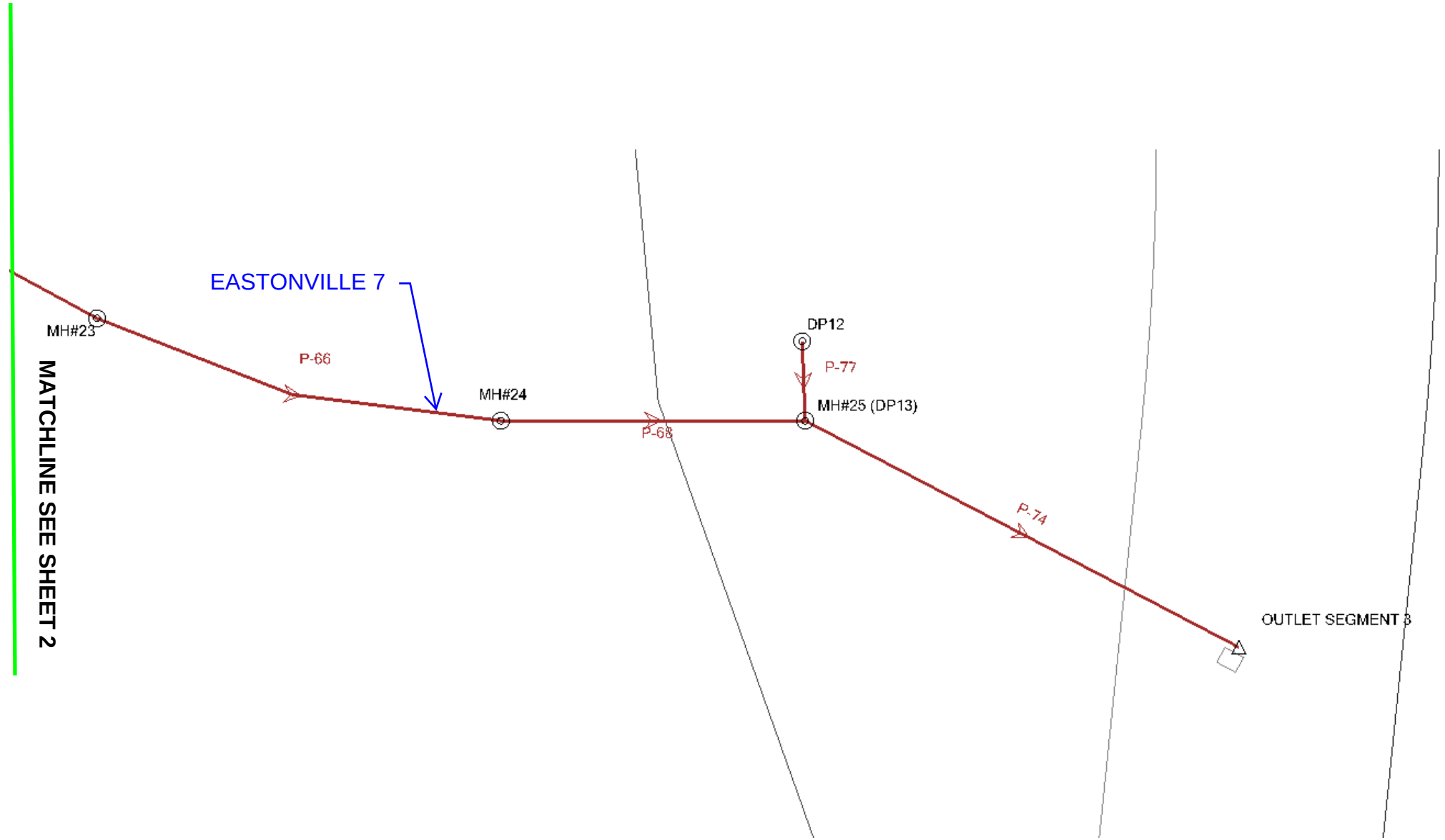
MATCHLINE REFER TO SEGMENT 2 FDR


EASTONVILLE 12 - INLET
EASTONVILLE 12 - OUTLET
EASTONVILLE 13
EASTONVILLE 15
EASTONVILLE 14
I#6 (DP2.1)
P-93
I#7 (DP3.1)
Pipe - (34)
FES OUTFALL 1
CO#1 (DP4.1)
Pipe - (35)
MH#34
P-111
StartNullStruct3
P-111 (1)
MH#39
DP 2
DP 7
P-107 (1)
I#8 (DP5)
P-107
MH#27 (DP8)
P-95
I#9 (DP6)
P-107 (2)
P-103
MH#26 (DP6.1)
P-107 (2) (1)
DP9

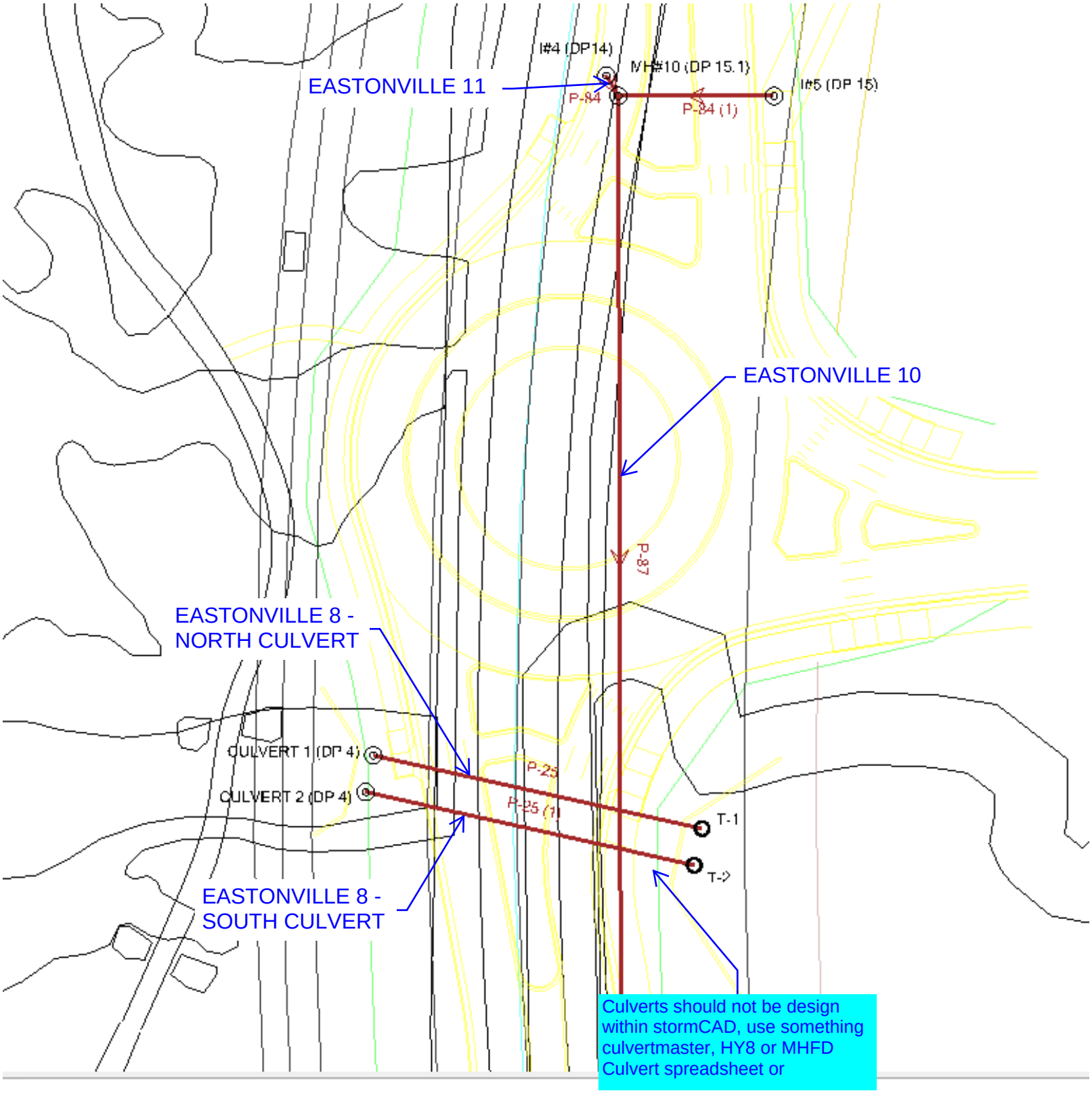
SHEET 1


MH#21
P-54
P-54 (1)
MH#22
P-54 (1)
MH#23
MH#20
P-53
EASTONVILLE 7
DP 1
P-55
MH#19
MATCHLINE SEE SHEET 3

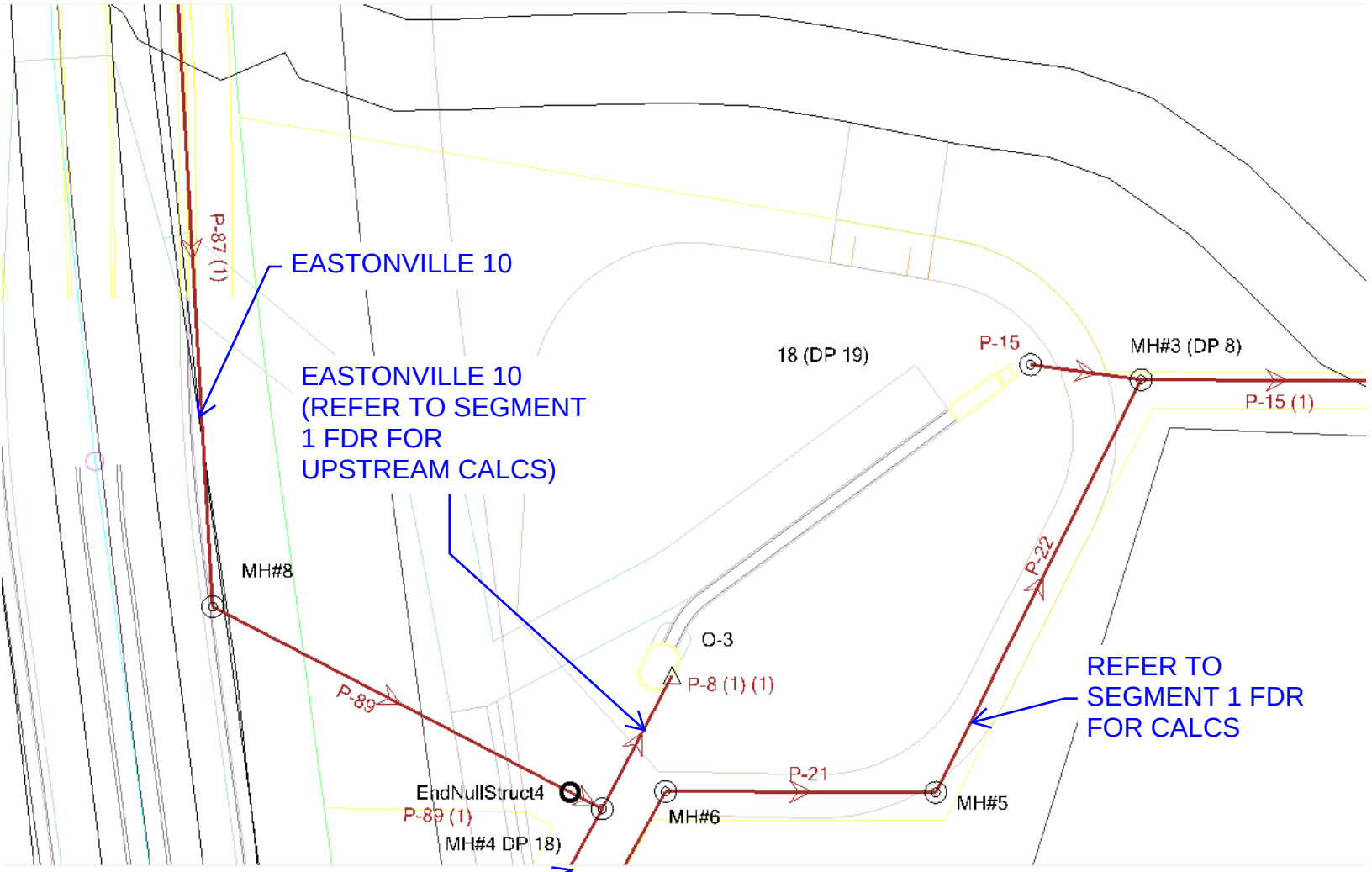
SHEET 2


EASTONVILLE 7
MH#23
P-66
MH#24
P-68
DP12
P-77
MH#25 (DP13)
P-74
OUTLET SEGMENT 3
MATCHLINE SEE SHEET 2

SHEET 3


I#4 (DP14)
MH#10 (DP 15.1)
I#5 (DP 15)
EASTONVILLE 11
P-84
P-84 (1)
EASTONVILLE 10
P-87
EASTONVILLE 8 -
NORTH CULVERT
CULVERT 1 (DP 4)
CULVERT 2 (DP 4)
P-25
P-25 (1)
T-1
T-2
EASTONVILLE 8 -
SOUTH CULVERT
Culverts should not be design
within stormCAD, use something
culvertmaster, HY8 or MHFD
Culvert spreadsheet or

SHEET 4


P-87 (1)
EASTONVILLE 10
EASTONVILLE 10
(REFER TO SEGMENT
1 FDR FOR
UPSTREAM CALCS)
18 (DP 19)
P-15
MH#3 (DP 8)
P-15 (1)
MH#8
P-22
O-3
P-8 (1) (1)
P-89
REFER TO
SEGMENT 1 FDR
FOR CALCS
P-21
EndNullStruct4
P-89 (1)
MH#6
MH#5
MH#4 DP 18)
REFER TO
SEGMENT 1 FDR
FOR CALCS

SHEET 5

100 YEAR TAILWATER CONDITION: PIPE SUMMARY TABLE

	Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Notes	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
66: P-8 (1) (1)	P-8 (1) (1)	MH#4 DP 18)	6,985.66	O-3	6,984.83	41.6	0.020	24.0	26.20	8.34	31.99	81.9	Concrete Pip	6,988.54	6,987.98
67: P-124	P-124	I#5 (DP 14)	6,981.25	O-5	6,981.08	34.3	0.005	18.0	6.50	4.74	7.43	87.5	Concrete Pip	6,982.33	6,982.10
68: P-121 (2)	P-121 (2)	44 (80)	6,970.65	O-6	6,970.61	9.0	0.005	24.0	9.00	2.86	15.95	56.4	Concrete Pip	6,972.88	6,972.87
69: P-18	P-18	I#3 (DP 7)	6,985.73	MH#7	6,985.38	71.3	0.005	42.0	53.30	8.11	71.14	74.9	Concrete Pip	6,988.48	6,988.38
70: P-20	P-20	MH#7	6,985.38	MH#6	6,984.50	175.6	0.005	42.0	53.30	8.11	71.14	74.9	Concrete Pip	6,987.84	6,987.61
71: P-5	P-5	I#2 (DP 17)	6,989.29	I#1 (DP 16)	6,989.74	52.0	-0.009	18.0	5.10	5.59	9.77	52.2	Concrete Pip	6,990.61	6,990.44
72: P-8 (1)	P-8 (1)	I#2 (DP 17)	6,988.79	MH#4 DP 18)	6,985.66	156.4	0.020	24.0	10.50	9.12	31.99	32.8	Concrete Pip	6,989.95	6,989.64
73: P-21	P-21	MH#6	6,984.50	MH#5	6,984.13	74.6	0.005	42.0	53.30	8.11	71.14	74.9	Concrete Pip	6,987.15	6,987.05
74: P-22	P-22	MH#5	6,984.13	MH#3 (DP 8)	6,980.80	127.1	0.026	42.0	53.30	15.14	162.72	32.8	Concrete Pip	6,986.41	6,983.39
75: P-15	P-15	18 (DP 19)	6,983.26	MH#3 (DP 8)	6,982.80	30.8	0.015	18.0	3.00	5.95	12.90	23.3	Concrete Pip	6,983.92	6,983.30
76: P-15 (1)	P-15 (1)	MH#3 (DP 8)	6,980.80	MH#2 (DP 8)	6,980.43	75.1	0.005	42.0	1.77	3.11	70.62	2.5	Concrete Pip	6,983.39	6,983.39
77: P-16	P-16	MH#2 (DP 8)	6,980.43	MH#1	6,980.05	78.1	0.005	42.0	54.30	8.06	70.19	77.4	Concrete Pip	6,982.74	6,982.46
78: P-123	P-123	I#4 (DP 13)	6,981.51	I#5 (DP 14)	6,981.25	52.0	0.005	18.0	3.40	4.11	7.43	45.8	Concrete Pip	6,982.73	6,982.69
79: P-17	P-17	MH#1	6,980.05	OUTFALL	6,979.36	139.8	0.005	42.0	54.30	8.10	70.67	76.8	Concrete Pip	6,982.36	6,981.66
80: P-125	P-125	44 (69) (DP 15)	6,978.42	44 (70)	6,977.55	54.5	0.016	18.0	1.20	4.67	13.30	9.0	Concrete Pip	6,978.83	6,977.85
83: P-122	P-122	INLET (DP 3)	6,978.16	44 (65)	6,973.52	183.8	0.025	30.0	24.50	12.34	65.19	37.6	Concrete Pip	6,979.85	6,974.58
84: P-121	P-121	I#8 (DP 10)	6,971.18	44 (80)	6,970.65	105.1	0.005	24.0	9.00	5.26	16.06	56.0	Concrete Pip	6,973.05	6,972.89
85: P-130	P-130	I#6 (DP 1)	6,970.85	44 (81)	6,970.04	81.5	0.010	18.0	3.60	5.37	10.47	34.4	Concrete Pip	6,971.57	6,970.79
86: P-130 (1)	P-130 (1)	44 (81)	6,970.04	44 (77)	6,969.39	65.0	0.010	18.0	3.60	5.39	10.50	34.3	Concrete Pip	6,970.76	6,970.00
87: P-121 (1)	P-121 (1)	I#8 (DP 10)	6,971.68	I#7 (DP 9)	6,971.95	52.0	-0.005	18.0	4.10	4.37	7.57	54.2	Concrete Pip	6,973.24	6,973.18
88: P-131	P-131	44 (78) (DP 11)	6,968.42	44 (79)	6,967.50	62.5	0.015	18.0	1.40	4.75	12.77	11.0	Concrete Pip	6,968.87	6,967.84
126: P-111	P-111	MH#34	7,019.01	MH#39	7,017.01	146.6	0.014	18.0	3.40	5.94	12.28	27.7	Concrete Pip	7,019.72	7,017.55
127: P-89	P-89	MH#8	6,986.87	MH#4 DP 18)	6,985.66	111.1	0.011	24.0	19.10	6.08	23.64	80.8	Concrete Pip	6,990.43	6,989.64
128: P-25 (1)	P-25 (1)	CULVERT 2 (DP 4)	6,997.01	O-10	6,995.27	116.5	0.015		295.50	16.72	461.86	64.0	Concrete Bo	7,000.01	6,997.28
129: P-25	P-25	CULVERT 1 (DP 4)	6,997.01	O-7	6,995.27	116.6	0.015		245.50	15.71	461.72	53.2	Concrete Bo	6,999.67	6,997.02
131: P-107 (2)	P-107 (2) (1)	MH#26 (DP6.1)	7,020.50	DP9	7,019.00	60.7	0.025	24.0	22.40	11.97	35.57	63.0	Concrete Pip	7,022.19	7,020.22
132: P-103	P-103	I#9 (DP6)	7,023.00	MH#26 (DP6.1)	7,022.00	42.7	0.023	18.0	2.40	6.54	16.08	14.9	Concrete Pip	7,023.89	7,023.91
133: P-107 (2)	P-107 (2)	MH#27 (DP8)	7,021.00	MH#26 (DP6.1)	7,020.50	56.6	0.009	24.0	21.00	6.68	21.26	98.8	Concrete Pip	7,024.40	7,023.91
134: P-107	P-107	DP 7	7,023.01	MH#27 (DP8)	7,021.75	37.8	0.033	15.0	2.20	1.79	11.81	18.6	Concrete Pip	7,025.07	7,025.03
135: P-107 (1)	P-107 (1)	MH#27 (DP8)	7,021.00	DP 2	7,021.26	43.9	-0.006	24.0	18.80	5.98	17.41	108.0	Concrete Pip	7,025.33	7,025.03
136: P-95	P-95	I#8 (DP5)	7,024.00	I#9 (DP6)	7,023.00	47.5	0.021	18.0	1.30	5.26	15.24	8.5	Concrete Pip	7,024.43	7,023.94
137: P-93	P-93	I#6 (DP2.1)	7,022.36	I#7 (DP3.1)	7,021.80	55.9	0.010	18.0	1.50	4.22	10.51	14.3	Concrete Pip	7,022.99	7,023.02
138: Pipe - (34	Pipe - (34)	I#7 (DP3.1)	7,021.80	FES OUTFALL 1	7,021.01	33.5	0.023	18.0	3.20	7.09	16.07	19.9	Concrete Pip	7,023.01	7,023.00
140: P-44 (1)	P-44 (1)	MH#20	7,001.18	MH#21	6,998.52	266.5	0.010	48.0	112.10	8.92	143.63	78.0	Concrete Pip	7,005.57	7,003.94
141: P-64	P-64	MH#21	6,998.52	MH#22	6,995.26	316.5	0.010	48.0	112.10	12.80	145.88	76.8	Concrete Pip	7,001.72	6,997.89
142: P-44	P-44	MH#19	7,003.94	MH#20	7,001.28	266.5	0.010	48.0	112.10	12.64	143.63	78.0	Concrete Pip	7,007.14	7,005.63
143: P-26	P-26	DP 3	7,005.01	MH#19	7,004.04	81.5	0.012	48.0	112.10	8.92	156.73	71.5	Concrete Pip	7,009.86	7,009.36
144: P-64 (1)	P-64 (1)	MH#22	6,995.15	MH#23	6,988.82	316.6	0.020	48.0	112.10	16.57	203.15	55.2	Concrete Pip	6,998.35	6,995.31
145: P-87	P-87	MH#10 (DP 15.1)	6,994.25	MH#9	6,989.76	320.7	0.014	24.0	19.10	9.26	26.78	71.3	Concrete Pip	6,995.82	6,992.24
146: P-87 (1)	P-87 (1)	MH#9	6,989.76	MH#8	6,986.87	197.4	0.015	24.0	19.10	6.08	27.33	69.9	Concrete Pip	6,992.21	6,990.80
147: P-84	P-84	I#4 (DP14)	6,995.69	MH#10 (DP 1...	6,994.25	8.1	0.179	18.0	8.80	4.98	44.40	19.8	Concrete Pip	6,997.31	6,997.25
148: P-84 (1)	P-84 (1)	MH#10 (DP 15.1)	6,994.75	I#5 (DP 15)	6,995.50	53.9	-0.014	18.0	10.40	5.89	12.40	83.9	Concrete Pip	6,997.78	6,997.25
149: P-66	P-66	MH#23	6,988.82	MH#24	6,988.00	149.0	0.006	48.0	112.10	8.92	106.64	105.1	Concrete Pip	6,995.25	6,994.34
150: P-68	P-68	MH#24	6,988.00	MH#25 (DP13)	6,987.50	107.8	0.005	48.0	112.10	8.92	97.84	114.6	Concrete Pip	6,994.28	6,993.62
151: P-77	P-77	DP12	6,990.32	MH#25 (DP13)	6,989.50	28.1	0.029	24.0	24.40	7.77	38.62	63.2	Concrete Pip	6,993.95	6,993.62
152: P-74	P-74	MH#25 (DP13)	6,987.50	OUTLET SEG...	6,986.67	173.3	0.005	48.0	136.40	10.85	99.34	137.3	Concrete Pip	6,991.97	6,990.15

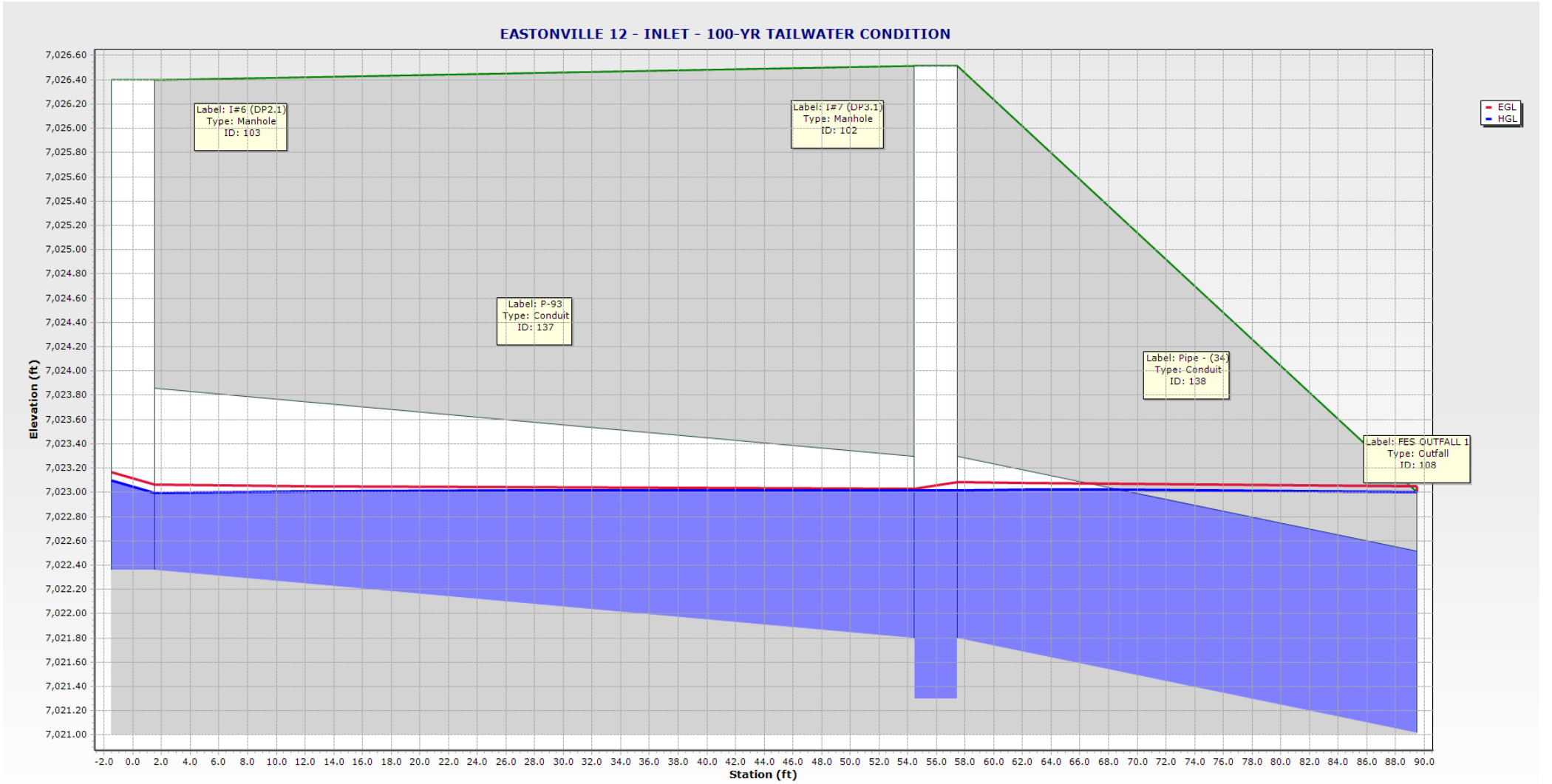
NOTE: SEGMENT 1 PIPES & STRUCTURES INCLUDED IN TABLE, REFER TO FDR FOR COMPLETE ANALYSIS.

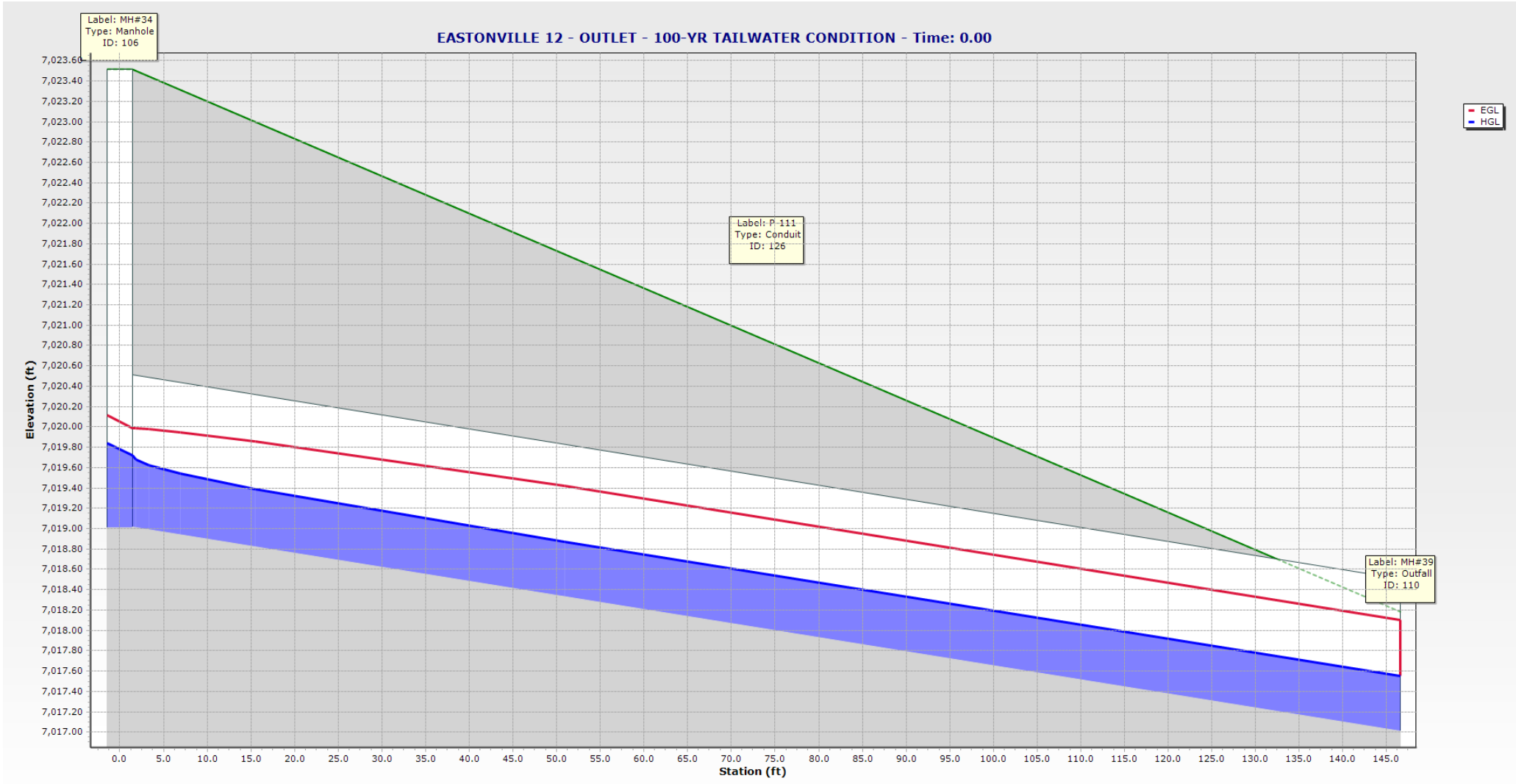
100 YEAR TAILWATER CONDITION: STRUCTURE SUMMARY TABLE

	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Hydraulic Grade Line (In) (ft)	Notes	Headloss (ft)
35: MH#7	MH#7	6,993.52	6,993.52	53.30	2.47	6,987.84	Standard	6,988.38	STORM MH	0.54
36: I#1 (DP 16	I#1 (DP 16)	6,993.41	6,993.41	5.10	0.87	6,990.61	Standard	6,991.15	CDOT Type-	0.54
37: MH#4 DP	MH#4 DP 18)	6,993.40	6,993.40	26.20	2.88	6,988.54	Standard	6,989.64	STORM MH	1.10
38: I#2 (DP 17	I#2 (DP 17)	6,993.39	6,993.39	10.50	1.17	6,989.95	Standard	6,990.44	CDOT Type-	0.49
39: MH#6	MH#6	6,993.02	6,993.02	53.30	2.65	6,987.15	Standard	6,987.61	STORM MH	0.46
40: MH#5	MH#5	6,991.91	6,991.91	53.30	2.28	6,986.41	Standard	6,987.05	STORM MH	0.64
41: MH#3 (DP	MH#3 (DP 8)	6,991.13	6,991.13	1.77	2.28	6,983.39	Standard	6,983.39	STORM MH	0.00
42: I#3 (DP 7)	I#3 (DP 7)	6,990.73	6,990.73	53.30	2.83	6,988.48	Standard	6,989.49	CDOT Type-	1.01
43: 18 (DP 19)	18 (DP 19)	6,988.71	6,988.71	3.00	2.42	6,983.92	Standard	6,984.30	CDOT Type-	0.38
44: MH#2 (DP	MH#2 (DP 8)	6,985.74	6,985.74	54.30	2.31	6,982.74	Standard	6,983.39	STORM MH	0.65
45: I#4 (DP 13	I#4 (DP 13)	6,985.02	6,985.02	3.40	1.42	6,982.73	Standard	6,982.84	CDOT Type-	0.12
46: I#5 (DP 14	I#5 (DP 14)	6,985.02	6,985.02	6.50	1.28	6,982.33	Standard	6,982.69	CDOT Type-	0.36
47: MH#1	MH#1	6,984.95	6,984.95	54.30	2.31	6,982.36	Standard	6,982.46	STORM MH	0.10
49: 44 (69) (D	44 (69) (DP 15)	6,982.64	6,982.64	1.20	0.41	6,978.83	Standard	6,978.85	CDOT Type-	0.01
55: 44 (80)	44 (80)	6,975.21	6,975.21	9.00	2.13	6,972.88	Standard	6,972.89	Cylindrical S	0.01
56: 44 (81)	44 (81)	6,975.03	6,975.03	3.60	0.72	6,970.76	Standard	6,970.79	Cylindrical S	0.03
57: I#7 (DP 9)	I#7 (DP 9)	6,974.64	6,974.64	4.10	1.29	6,973.24	Standard	6,973.39	CDOT Type-	0.15
58: I#8 (DP 10	I#8 (DP 10)	6,974.64	6,974.64	9.00	1.87	6,973.05	Standard	6,973.18	CDOT Type-	0.14
59: I#6 (DP 1)	I#6 (DP 1)	6,973.20	6,973.20	3.60	0.72	6,971.57	Standard	6,972.00	CDOT Type-	0.42
60: 44 (78) (D	44 (78) (DP 11)	6,973.16	6,973.16	1.40	0.44	6,968.87	Standard	6,969.03	CDOT Type-	0.16
98: MH#26 (D	MH#26 (DP6.1)	7,027.15	7,027.15	22.40	1.69	7,022.19	Standard	7,023.91	STORM MH	1.73
99: MH#27 (D	MH#27 (DP8)	7,027.09	7,027.09	21.00	3.40	7,024.40	Standard	7,025.03	STORM MH	0.62
100: I#9 (DP6)	I#9 (DP6)	7,027.04	7,027.04	2.40	0.89	7,023.89	Standard	7,023.94	CDOT Type-	0.05
101: I#8 (DP5)	I#8 (DP5)	7,026.63	7,026.63	1.30	0.43	7,024.43	Standard	7,024.66	CDOT Type-	0.23
102: I#7 (DP3.	I#7 (DP3.1)	7,026.51	7,026.51	3.20	1.71	7,023.01	Standard	7,023.02	CDOT Type-	0.00
103: I#6 (DP2.	I#6 (DP2.1)	7,026.40	7,026.40	1.50	0.63	7,022.99	Standard	7,023.10	CDOT Type-	0.10
106: MH#34	MH#34	7,023.51	7,023.51	3.40	0.70	7,019.72	Standard	7,019.84	CDOT Type-	0.13
111: MH#21	MH#21	7,014.03	7,014.03	112.10	3.20	7,001.72	Standard	7,003.94	STORM MH	2.22
112: MH#20	MH#20	7,012.41	7,012.41	112.10	4.38	7,005.57	Standard	7,005.63	STORM MH	0.06
113: MH#19	MH#19	7,010.85	7,010.85	112.10	3.20	7,007.14	Standard	7,009.36	STORM MH	2.22
115: MH#22	MH#22	7,005.85	7,005.85	112.10	3.20	6,998.35	Standard	6,998.44	STORM MH	0.08
116: MH#9	MH#9	7,001.03	7,001.03	19.10	2.45	6,992.21	Standard	6,992.24	STORM MH	0.03
117: I#4 (DP1	I#4 (DP14)	7,000.17	7,000.17	8.80	1.62	6,997.31	Standard	6,997.89	CDOT Type-	0.58
118: MH#10 (	MH#10 (DP 1...	7,000.01	7,000.01	19.10	1.57	6,995.82	Standard	6,997.25	STORM MH	1.43
119: I#5 (DP 1	I#5 (DP 15)	6,999.67	6,999.67	10.40	1.88	6,997.78	Standard	6,998.59	CDOT Type-	0.81
120: MH#8	MH#8	6,996.13	6,996.13	19.10	3.77	6,990.43	Standard	6,990.80	STORM MH	0.37
121: MH#23	MH#23	6,997.20	6,997.20	112.10	6.42	6,995.25	Standard	6,995.31	STORM MH	0.06
122: MH#24	MH#24	6,996.25	6,996.25	112.10	6.28	6,994.28	Standard	6,994.34	STORM MH	0.06
123: DP12	DP12	6,996.40	6,996.40	24.40	3.63	6,993.95	Standard	6,995.35	CDOT Type-	1.41
124: MH#25 (	MH#25 (DP13)	6,995.75	6,995.75	136.40	4.47	6,991.97	Standard	6,993.62	STORM MH	1.65
190: INLET (D	INLET (DP 3)	6,980.96	6,980.96	24.50	1.69	6,979.85	Standard	6,980.98	CDOT FES	1.13
192: DP 7	DP 7	7,024.45	7,024.45	2.20	1.44	7,024.45	Standard	7,024.52	CDOT FES	0.07
193: DP 2	DP 2	7,024.26	7,024.26	18.80	3.00	7,024.26	Standard	7,025.10	CDOT FES	0.83
194: DP 3	DP 3	7,009.43	7,009.43	112.10	4.42	7,009.43	Standard	7,011.29	CDOT FES	1.86
196: CULVERT	CULVERT 1 (...	7,000.01	7,000.01	245.50	2.66	6,999.67	Standard	7,001.66	Dummy Null	1.99
197: CULVERT	CULVERT 2 (...	7,000.01	7,000.01	295.50	3.00	7,000.01	Standard	7,002.27	Dummy Null	2.26

	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
48: OUTFALL	OUTFALL	6,983.32	6,979.44		6,981.66	54.30	CDOT FES
53: 44 (70)	44 (70)	6,979.33	6,977.55		6,977.85	1.20	CDOT FES
54: 44 (65)	44 (65)	6,976.31	6,973.52		6,974.58	24.50	CDOT FES
61: 44 (77)	44 (77)	6,971.10	6,969.39		6,970.00	3.60	CDOT FES
64: 44 (79)	44 (79)	6,969.82	6,967.50		6,967.84	1.40	CDOT FES
107: DP9	DP9	7,022.74	7,019.00		7,020.22	22.40	CDOT FES
108: FES OUTF	FES OUTFALL 1	7,023.00	7,021.01	7,023.00	7,023.00	3.20	CDOT FES
110: MH#39	MH#39	7,018.18	7,017.01		7,017.55	3.40	CDOT FES
125: OUTLET S	OUTLET SEG...	6,991.09	6,986.67	6,988.30	6,990.15	136.40	CDOT FES
162: O-3	O-3	6,987.98	6,984.83	6,987.98	6,987.98	26.20	Dummy Null
164: O-5	O-5	6,982.10	6,981.08	6,982.10	6,982.10	6.50	Dummy Null
165: O-6	O-6	6,972.87	6,970.61	6,972.87	6,972.87	9.00	Dummy Null
203: O-7	O-7	6,998.27	6,995.27		6,997.02	245.50	Dummy Null
207: O-10	O-10	6,998.27	6,995.27		6,997.28	295.50	Dummy Null

NOTE: SEGMENT 1 PIPES & STRUCTURES INCLUDED IN TABLE, REFER TO FDR FOR COMPLETE ANALYSIS.


EASTONVILLE 12 - INLET - 100-YR TAILWATER CONDITION
Elevation (ft)
Station (ft)
EGL
HGL
Label: I#6 (DP2.1)
Type: Manhole
ID: 103
Label: I#7 (DP3.1)
Type: Manhole
ID: 102
Label: P-93
Type: Conduit
ID: 137
Label: Pipe - (34)
Type: Conduit
ID: 138
Label: FES OUTFALL 1
Type: Outfall
ID: 108


EASTONVILLE 12 - OUTLET - 100-YR TAILWATER CONDITION - Time: 0.00
Label: MH#34
Type: Manhole
ID: 106
Label: P-111
Type: Conduit
ID: 126
Label: MH#39
Type: Outfall
ID: 110
EGL
HGL
Elevation (ft)
Station (ft)
7,023.60
7,023.40
7,023.20
7,023.00
7,022.80
7,022.60
7,022.40
7,022.20
7,022.00
7,021.80
7,021.60
7,021.40
7,021.20
7,021.00
7,020.80
7,020.60
7,020.40
7,020.20
7,020.00
7,019.80
7,019.60
7,019.40
7,019.20
7,019.00
7,018.80
7,018.60
7,018.40
7,018.20
7,018.00
7,017.80
7,017.60
7,017.40
7,017.20
7,017.00
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
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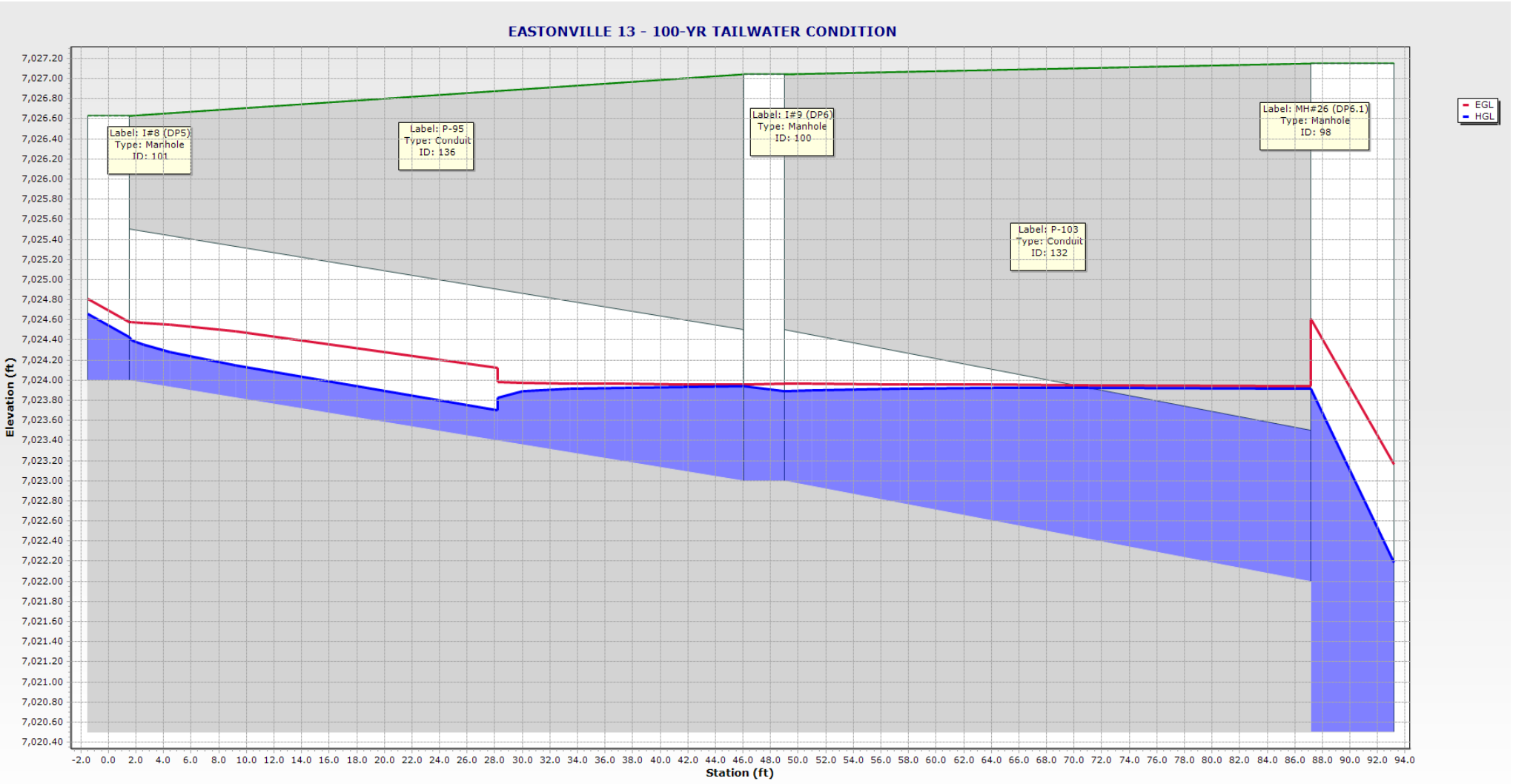
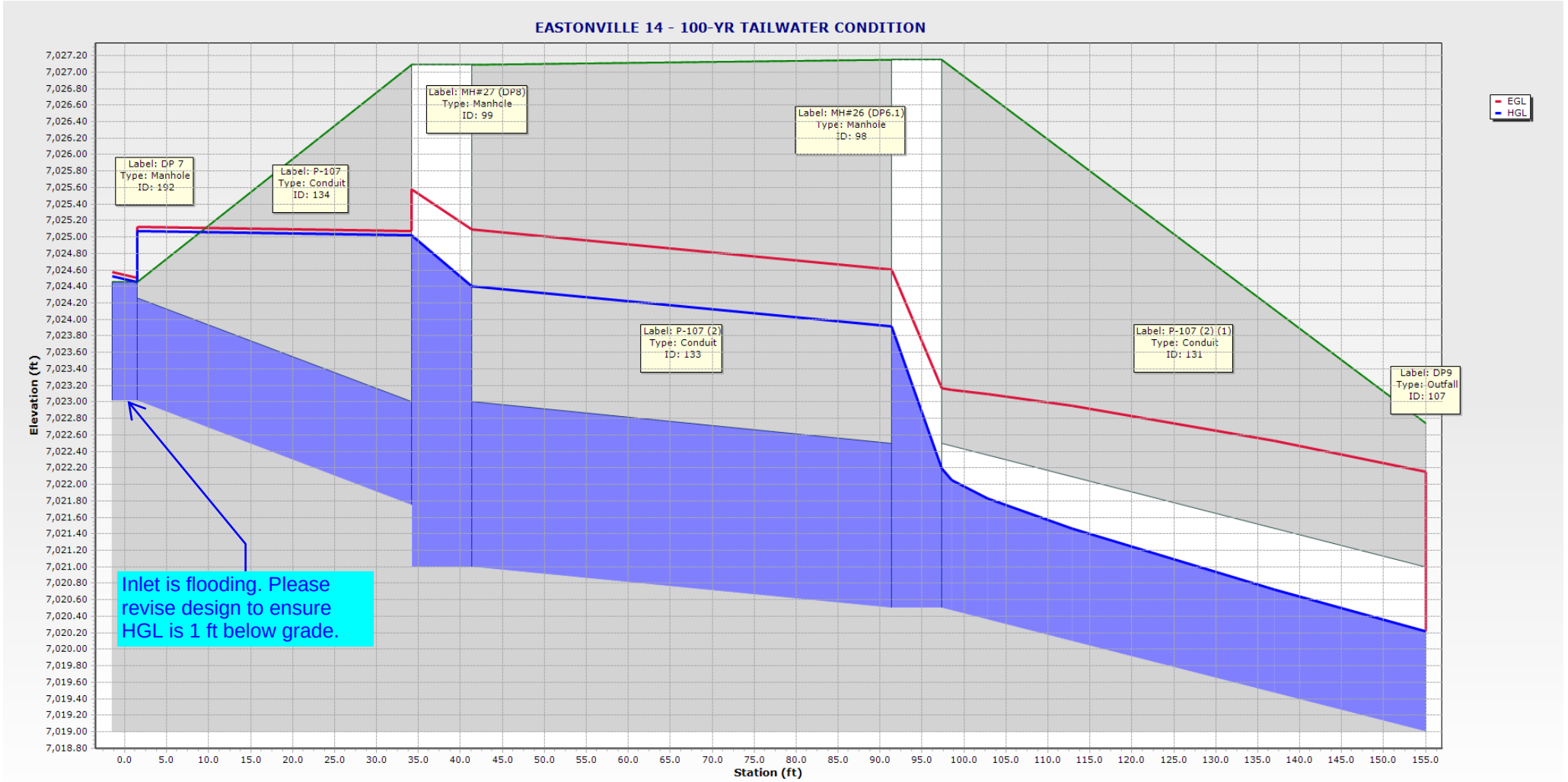
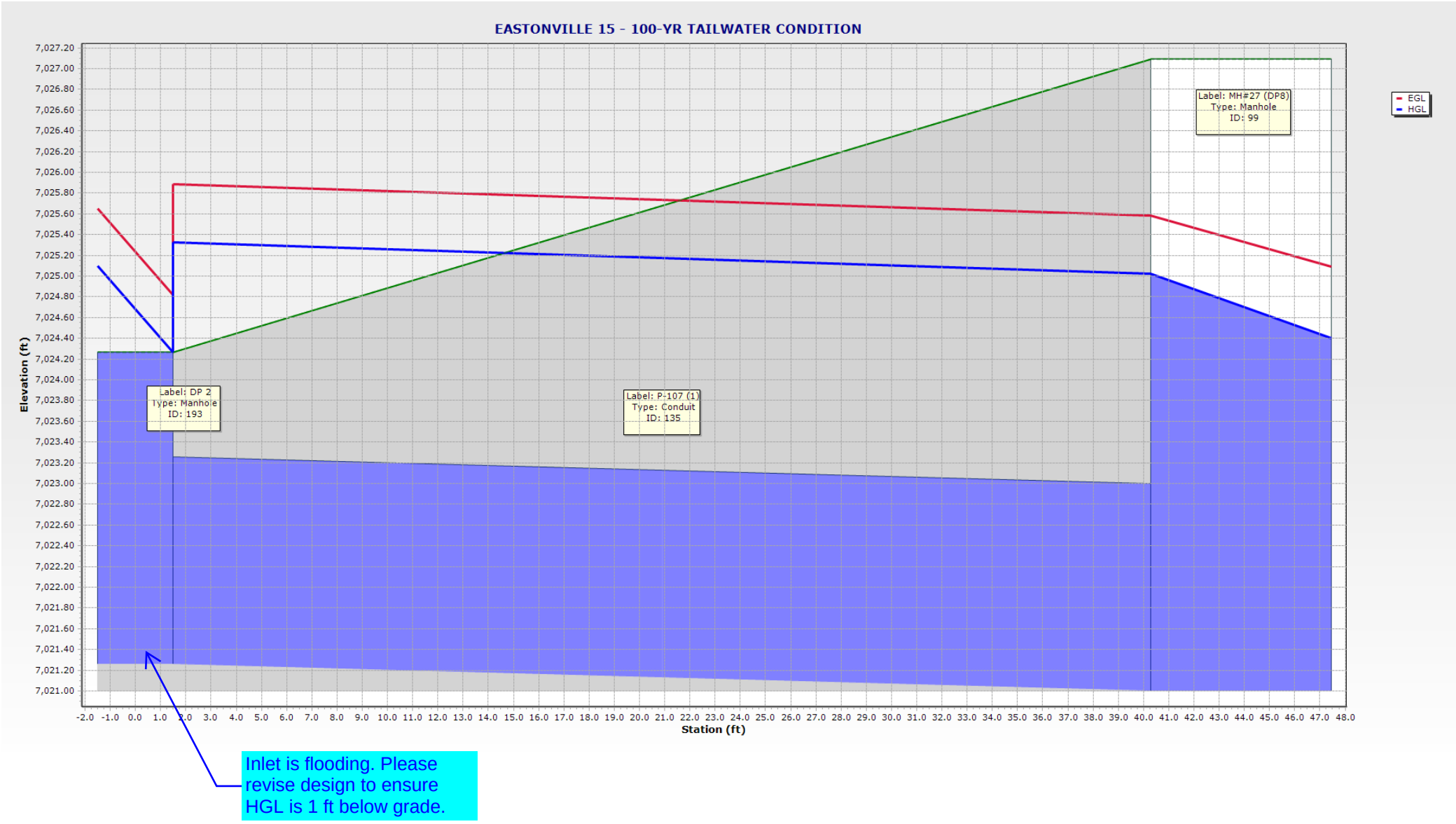
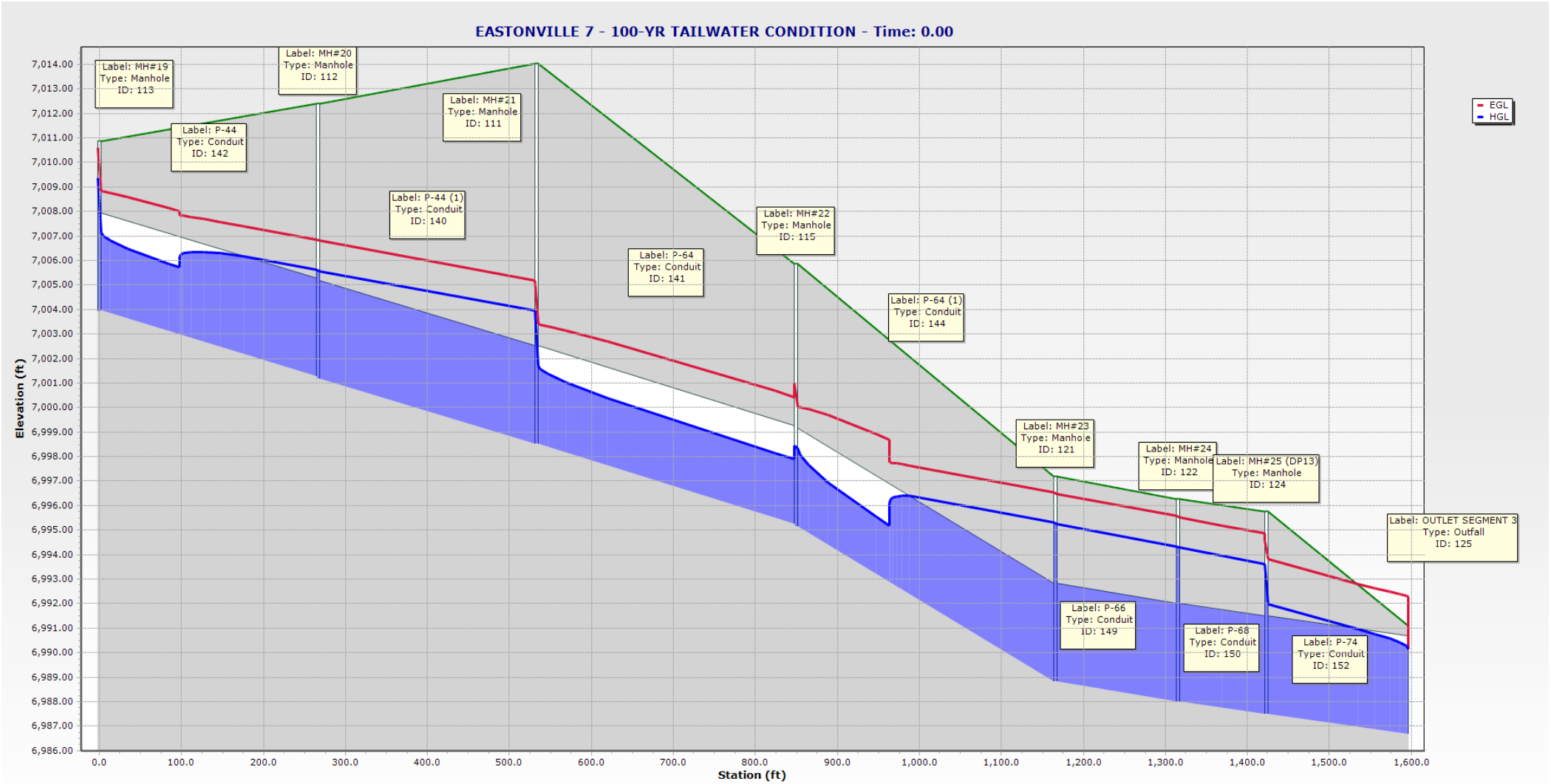
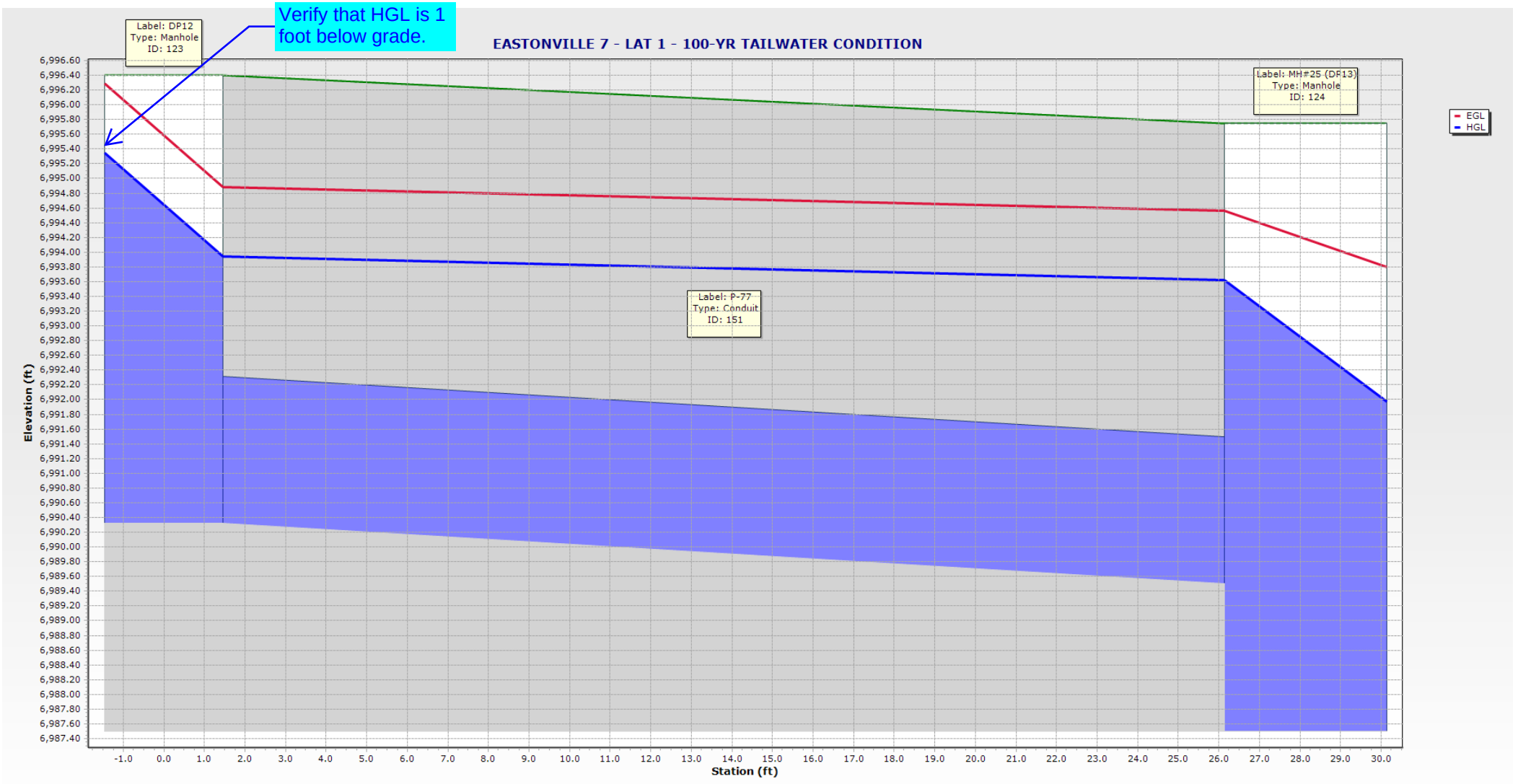
115.0
120.0
125.0
130.0
135.0
140.0
145.0


EASTONVILLE 13 - 100-YR TAILWATER CONDITION
Label: I#8 (DP5)
Type: Manhole
ID: 101
Label: P-95
Type: Conduit
ID: 136
Label: I#9 (DP6)
Type: Manhole
ID: 100
Label: P-103
Type: Conduit
ID: 132
Label: MH#26 (DP6.1)
Type: Manhole
ID: 98
EGL
HGL
Elevation (ft)
Station (ft)

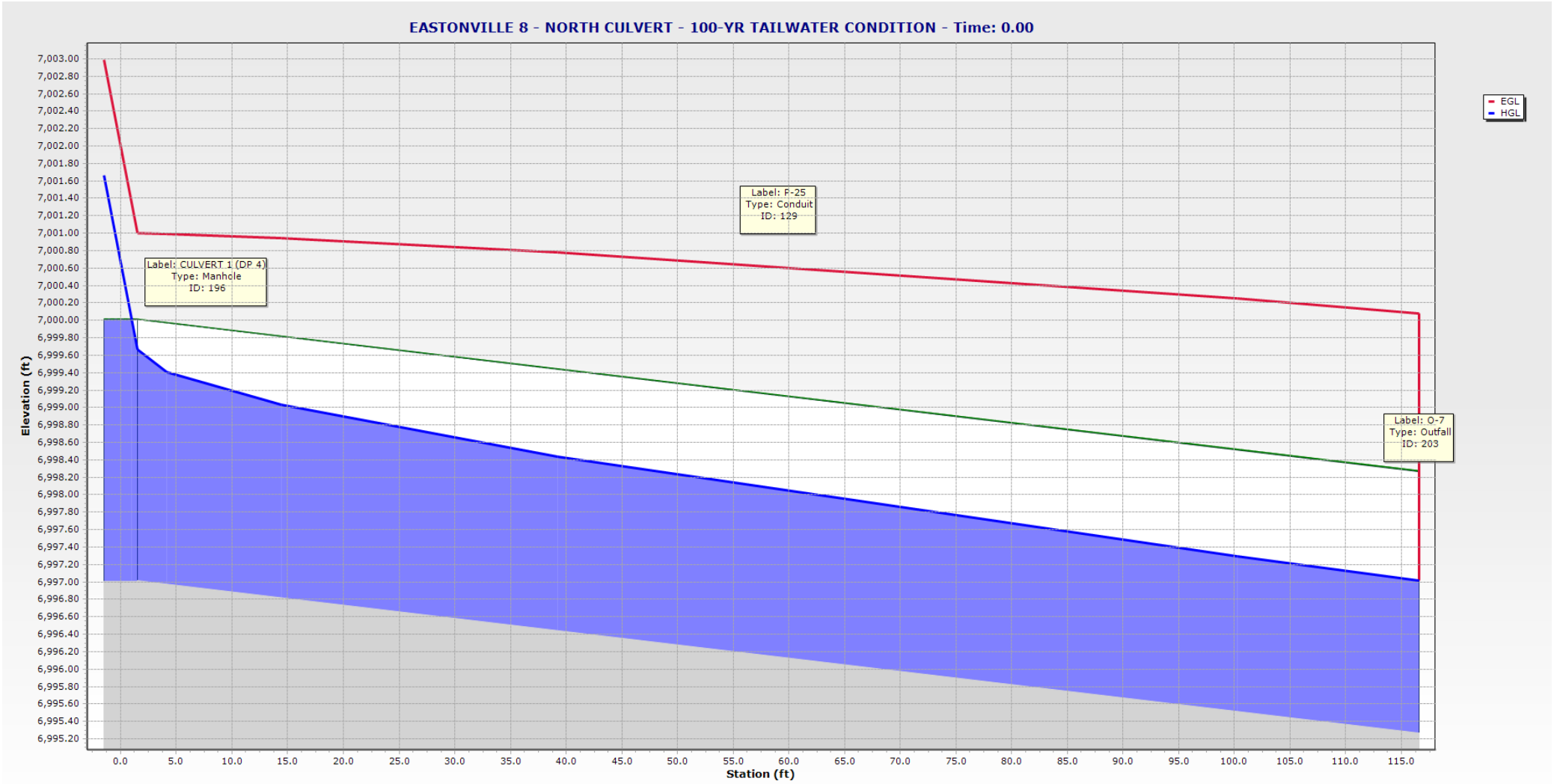

EASTONVILLE 14 - 100-YR TAILWATER CONDITION
Label: DP 7
Type: Manhole
ID: 192
Label: P-107
Type: Conduit
ID: 134
Label: MH#27 (DP8)
Type: Manhole
ID: 99
Label: P-107 (2)
Type: Conduit
ID: 133
Label: MH#26 (DP6.1)
Type: Manhole
ID: 98
Label: P-107 (2) (1)
Type: Conduit
ID: 131
Label: DP9
Type: Outfall
ID: 107
EGL
HGL
Inlet is flooding. Please revise design to ensure HGL is 1 ft below grade.
Elevation (ft)
Station (ft)

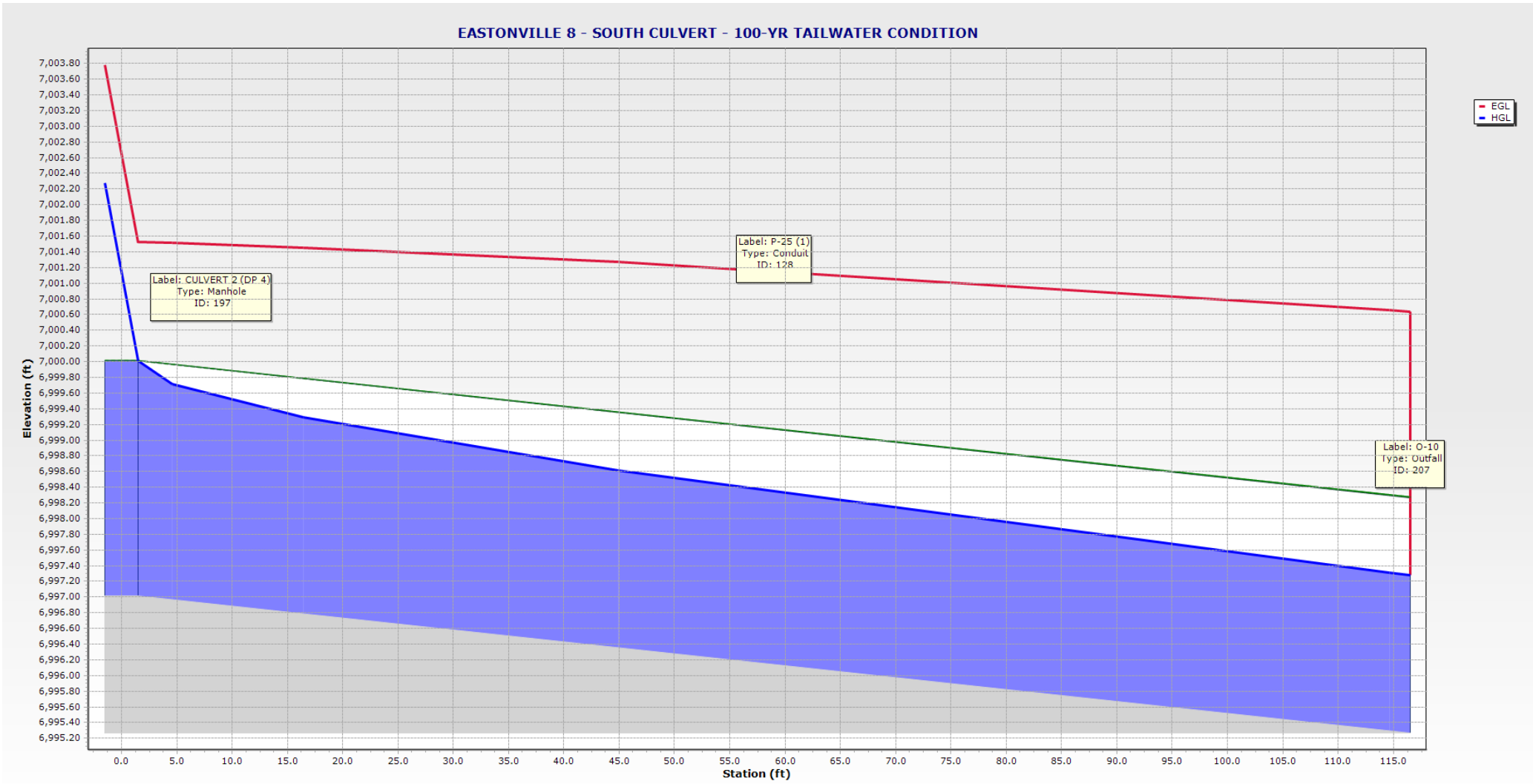

EASTONVILLE 15 - 100-YR TAILWATER CONDITION
Elevation (ft)
Station (ft)
EGL
HGL
Label: DP 2
Type: Manhole
ID: 193
Label: P-107 (1)
Type: Conduit
ID: 135
Label: MH#27 (DP8)
Type: Manhole
ID: 99
Inlet is flooding. Please revise design to ensure HGL is 1 ft below grade.


EASTONVILLE 7 - 100-YR TAILWATER CONDITION - Time: 0.00
EGL
HGL
Label: MH#19
Type: Manhole
ID: 113
Label: MH#20
Type: Manhole
ID: 112
Label: MH#21
Type: Manhole
ID: 111
Label: MH#22
Type: Manhole
ID: 115
Label: MH#23
Type: Manhole
ID: 121
Label: MH#24
Type: Manhole
ID: 122
Label: MH#25 (DP13)
Type: Manhole
ID: 124
Label: OUTLET SEGMENT 3
Type: Outfall
ID: 125
Label: P-44
Type: Conduit
ID: 142
Label: P-44 (1)
Type: Conduit
ID: 140
Label: P-64
Type: Conduit
ID: 141
Label: P-64 (1)
Type: Conduit
ID: 144
Label: P-66
Type: Conduit
ID: 149
Label: P-68
Type: Conduit
ID: 150
Label: P-74
Type: Conduit
ID: 152
Elevation (ft)
7,014.00
7,013.00
7,012.00
7,011.00
7,010.00
7,009.00
7,008.00
7,007.00
7,006.00
7,005.00
7,004.00
7,003.00
7,002.00
7,001.00
7,000.00
6,999.00
6,998.00
6,997.00
6,996.00
6,995.00
6,994.00
6,993.00
6,992.00
6,991.00
6,990.00
6,989.00
6,988.00
6,987.00
6,986.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
1,100.0
1,200.0
1,300.0
1,400.0
1,500.0
1,600.0
Station (ft)


Verify that HGL is 1 foot below grade.
EASTONVILLE 7 - LAT 1 - 100-YR TAILWATER CONDITION
Label: DP12
Type: Manhole
ID: 123
Label: MH#25 (DP13)
Type: Manhole
ID: 124
Label: P-77
Type: Conduit
ID: 151
EGL
HGL
Elevation (ft)
Station (ft)
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
6,995.00
6,994.80
6,994.60
6,994.40
6,994.20
6,994.00
6,993.80
6,993.60
6,993.40
6,993.20
6,993.00
6,992.80
6,992.60
6,992.40
6,992.20
6,992.00
6,991.80
6,991.60
6,991.40
6,991.20
6,991.00
6,990.80
6,990.60
6,990.40
6,990.20
6,990.00
6,989.80
6,989.60
6,989.40
6,989.20
6,989.00
6,988.80
6,988.60
6,988.40
6,988.20
6,988.00
6,987.80
6,987.60
6,987.40
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
21.0
22.0
23.0
24.0
25.0
26.0
27.0
28.0
29.0
30.0

Use other format besides StormCAD to design culverts, to properly determine HW elevation, overtopping, etc




EASTONVILLE 8 - SOUTH CULVERT - 100-YR TAILWATER CONDITION
EGL
HGL
Label: P-25 (1)
Type: Conduit
ID: 128
Label: CULVERT 2 (DP 4)
Type: Manhole
ID: 197
Label: O-10
Type: Outfall
ID: 207
Elevation (ft)
Station (ft)
7,003.80
7,003.60
7,003.40
7,003.20
7,003.00
7,002.80
7,002.60
7,002.40
7,002.20
7,002.00
7,001.80
7,001.60
7,001.40
7,001.20
7,001.00
7,000.80
7,000.60
7,000.40
7,000.20
7,000.00
6,999.80
6,999.60
6,999.40
6,999.20
6,999.00
6,998.80
6,998.60
6,998.40
6,998.20
6,998.00
6,997.80
6,997.60
6,997.40
6,997.20
6,997.00
6,996.80
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
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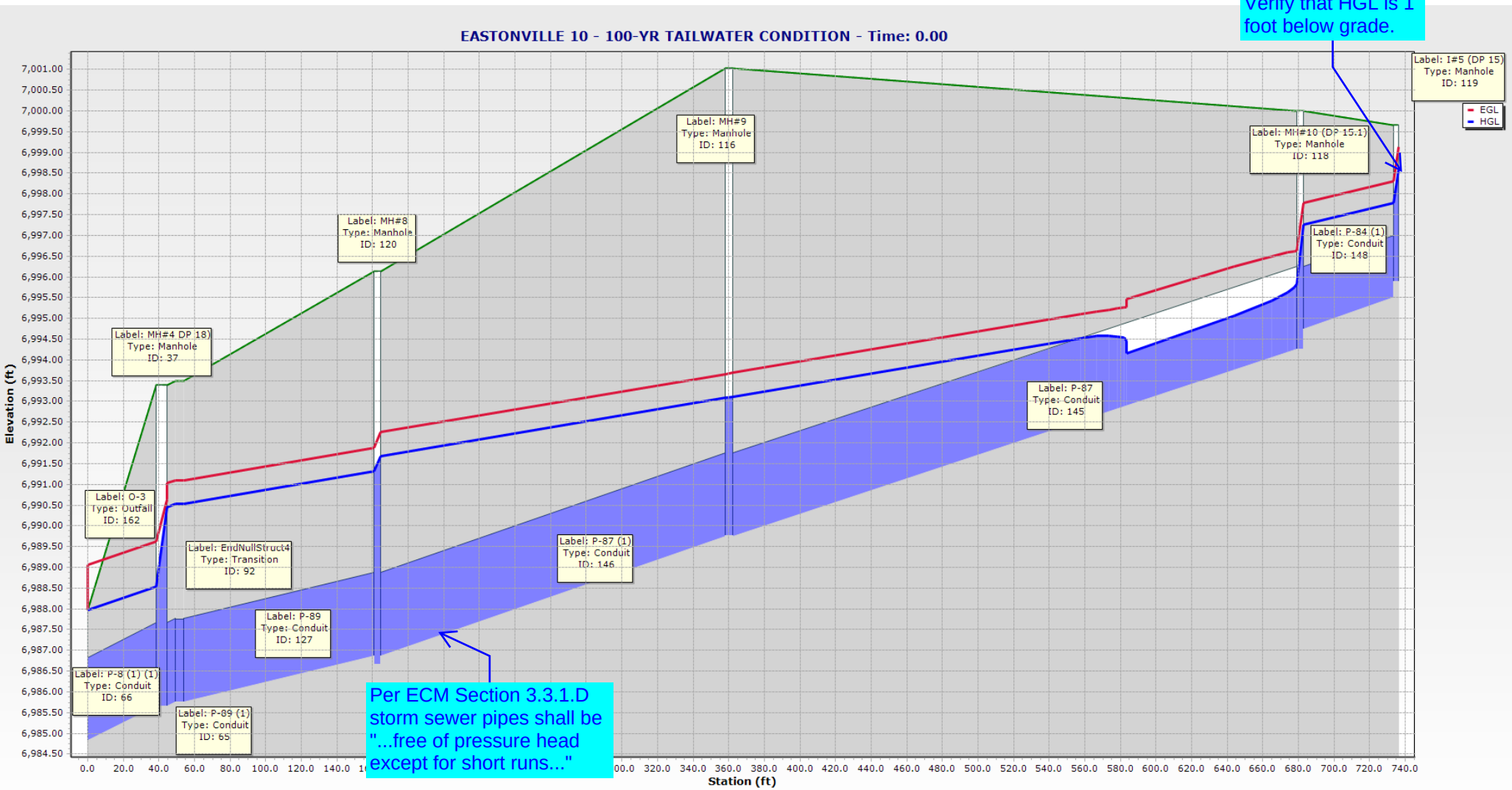
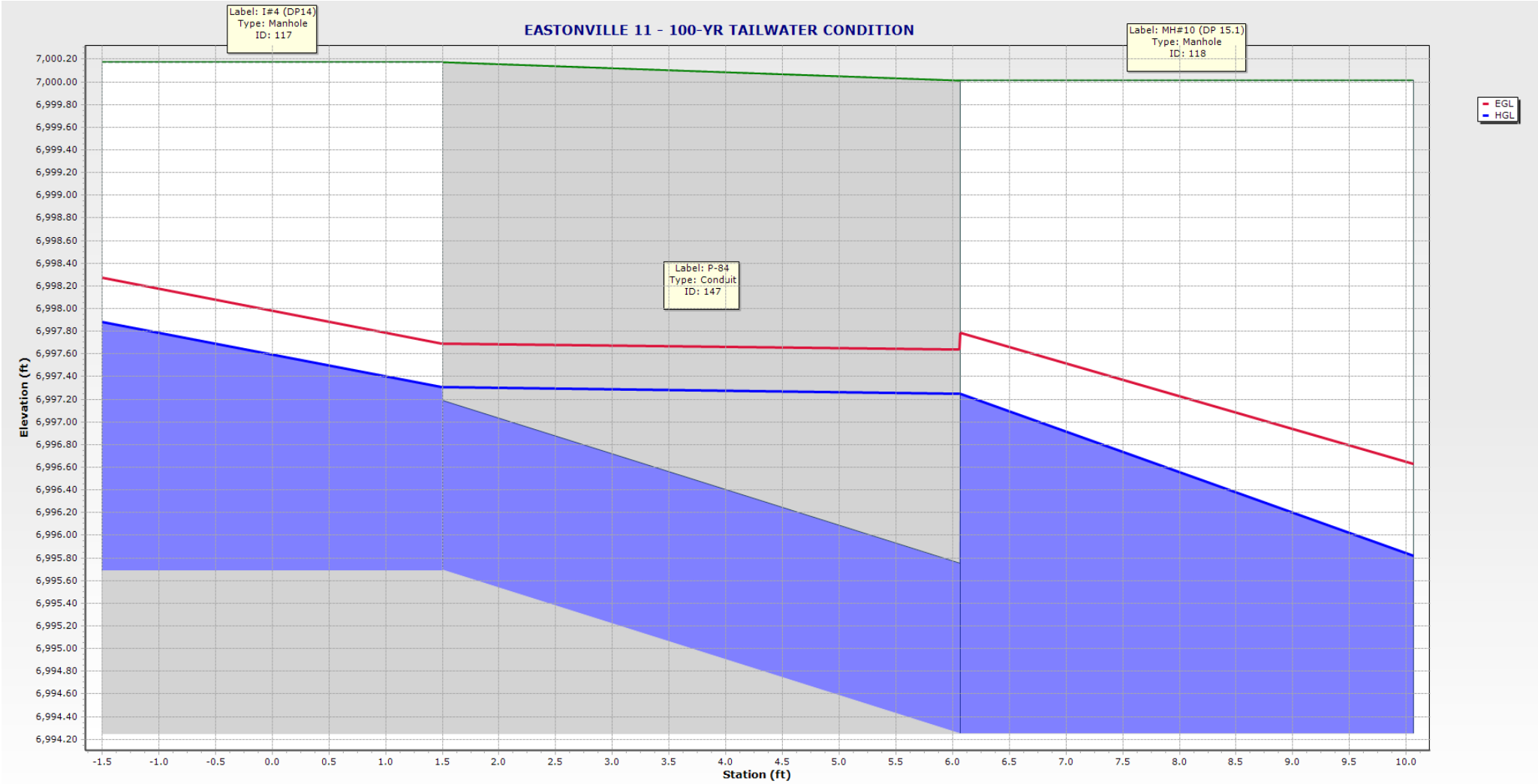
90.0
95.0
100.0
105.0
110.0
115.0


EASTONVILLE 10 - 100-YR TAILWATER CONDITION - Time: 0.00
Verify that HGL is 1 foot below grade.
Label: I#5 (DP 15)
Type: Manhole
ID: 119
EGL
HGL
Label: MH#9
Type: Manhole
ID: 116
Label: MH#10 (DP 15.1)
Type: Manhole
ID: 118
Label: MH#8
Type: Manhole
ID: 120
Label: P-84 (1)
Type: Conduit
ID: 148
Label: MH#4 DP 18)
Type: Manhole
ID: 37
Label: P-87
Type: Conduit
ID: 145
Label: O-3
Type: Outfall
ID: 162
Label: EndNullStruct4
Type: Transition
ID: 92
Label: P-87 (1)
Type: Conduit
ID: 146
Label: P-89
Type: Conduit
ID: 127
Label: P-8 (1) (1)
Type: Conduit
ID: 66
Label: P-89 (1)
Type: Conduit
ID: 65
Per ECM Section 3.3.1.D storm sewer pipes shall be "...free of pressure head except for short runs..."
Elevation (ft)
Station (ft)


EASTONVILLE 11 - 100-YR TAILWATER CONDITION
Label: I#4 (DP14)
Type: Manhole
ID: 117
Label: MH#10 (DP 15.1)
Type: Manhole
ID: 118
Label: P-84
Type: Conduit
ID: 147
EGL
HGL
Elevation (ft)
Station (ft)
7,000.20
7,000.00
6,999.80
6,999.60
6,999.40
6,999.20
6,999.00
6,998.80
6,998.60
6,998.40
6,998.20
6,998.00
6,997.80
6,997.60
6,997.40
6,997.20
6,997.00
6,996.80
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
6,995.00
6,994.80
6,994.60
6,994.40
6,994.20
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0

5 YEAR TAILWATER CONDITION: PIPE SUMMARY TABLE

	Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Notes	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
66: P-8 (1) (1)	P-8 (1) (1)	MH#4 DP 18)	6,985.66	O-3	6,984.83	41.6	0.020	24.0	15.60	4.97	31.99	48.8	Concrete Pip	6,988.57	6,988.37
67: P-124	P-124	I#5 (DP 14)	6,981.25	O-5	6,981.08	34.3	0.005	18.0	3.90	4.25	7.43	52.5	Concrete Pip	6,982.28	6,982.25
68: P-121 (2)	P-121 (2)	44 (80)	6,970.65	O-6	6,970.61	9.0	0.005	24.0	4.20	1.34	15.95	26.3	Concrete Pip	6,973.23	6,973.23
69: P-18	P-18	I#3 (DP 7)	6,985.73	MH#7	6,985.38	71.3	0.005	42.0	7.90	4.88	71.14	11.1	Concrete Pip	6,986.58	6,986.42
70: P-20	P-20	MH#7	6,985.38	MH#6	6,984.50	175.6	0.005	42.0	7.90	4.88	71.14	11.1	Concrete Pip	6,986.22	6,985.54
71: P-5	P-5	I#2 (DP 17)	6,989.29	I#1 (DP 16)	6,989.74	52.0	-0.009	18.0	3.00	4.87	9.77	30.7	Concrete Pip	6,990.40	6,990.02
72: P-8 (1)	P-8 (1)	I#2 (DP 17)	6,988.79	MH#4 DP 18)	6,985.66	156.4	0.020	24.0	6.30	7.92	31.99	19.7	Concrete Pip	6,989.68	6,988.96
73: P-21	P-21	MH#6	6,984.50	MH#5	6,984.13	74.6	0.005	42.0	7.90	4.88	71.14	11.1	Concrete Pip	6,985.35	6,985.17
74: P-22	P-22	MH#5	6,984.13	MH#3 (DP 8)	6,980.80	127.1	0.026	42.0	7.90	8.74	162.72	4.9	Concrete Pip	6,984.97	6,981.95
75: P-15	P-15	18 (DP 19)	6,983.26	MH#3 (DP 8)	6,982.80	30.8	0.015	18.0	0.30	3.02	12.90	2.3	Concrete Pip	6,983.47	6,982.96
76: P-15 (1)	P-15 (1)	MH#3 (DP 8)	6,980.80	MH#2 (DP 8)	6,980.43	75.1	0.005	42.0	8.30	4.92	70.62	11.8	Concrete Pip	6,981.67	6,981.50
77: P-16	P-16	MH#2 (DP 8)	6,980.43	MH#1	6,980.05	78.1	0.005	42.0	8.30	4.90	70.19	11.8	Concrete Pip	6,981.30	6,980.95
78: P-123	P-123	I#4 (DP 13)	6,981.51	I#5 (DP 14)	6,981.25	52.0	0.005	18.0	2.10	3.61	7.43	28.3	Concrete Pip	6,982.43	6,982.42
79: P-17	P-17	MH#1	6,980.05	OUTFALL	6,979.36	139.8	0.005	42.0	8.30	4.92	70.67	11.7	Concrete Pip	6,980.92	6,980.17
80: P-125	P-125	44 (69) (DP 15)	6,978.42	44 (70)	6,977.55	54.5	0.016	18.0	0.30	3.09	13.30	2.3	Concrete Pip	6,978.63	6,977.71
83: P-122	P-122	INLET (DP 3)	6,978.16	44 (65)	6,973.52	183.8	0.025	30.0	3.70	7.19	65.19	5.7	Concrete Pip	6,978.80	6,973.93
84: P-121	P-121	I#8 (DP 10)	6,971.18	44 (80)	6,970.65	105.1	0.005	24.0	4.20	1.34	16.06	26.1	Concrete Pip	6,973.27	6,973.23
85: P-130	P-130	I#6 (DP 1)	6,970.85	44 (81)	6,970.04	81.5	0.010	18.0	0.50	3.05	10.47	4.8	Concrete Pip	6,971.11	6,970.31
86: P-130 (1)	P-130 (1)	44 (81)	6,970.04	44 (77)	6,969.39	65.0	0.010	18.0	0.50	3.05	10.50	4.8	Concrete Pip	6,970.30	6,969.61
87: P-121 (1)	P-121 (1)	I#8 (DP 10)	6,971.68	I#7 (DP 9)	6,971.95	52.0	-0.005	18.0	2.20	3.71	7.57	29.1	Concrete Pip	6,973.32	6,973.30
88: P-131	P-131	44 (78) (DP 11)	6,968.42	44 (79)	6,967.50	62.5	0.015	18.0	0.40	3.27	12.77	3.1	Concrete Pip	6,968.66	6,967.68
126: P-111	P-111	MH#34	7,019.01	MH#39	7,017.01	146.6	0.014	18.0	1.70	4.88	12.28	13.8	Concrete Pip	7,019.50	7,017.39
127: P-89	P-89	MH#8	6,986.87	MH#4 DP 18)	6,985.66	111.1	0.011	24.0	10.20	3.25	23.64	43.2	Concrete Pip	6,989.18	6,988.96
128: P-25 (1)	P-25 (1)	CULVERT 2 (DP 4)	6,997.01	O-10	6,995.27	116.5	0.015		11.20	5.01	461.86	2.4	Concrete Bo	6,997.35	6,995.49
129: P-25	P-25	CULVERT 1 (DP 4)	6,997.01	O-7	6,995.27	116.6	0.015		11.20	5.01	461.72	2.4	Concrete Bo	6,997.35	6,995.49
131: P-107 (2)	P-107 (2) (1)	MH#26 (DP6.1)	7,020.50	DP9	7,019.00	60.7	0.025	24.0	2.90	6.82	35.57	8.2	Concrete Pip	7,021.09	7,019.39
132: P-103	P-103	I#9 (DP6)	7,023.00	MH#26 (DP6.1)	7,022.00	42.7	0.023	18.0	1.20	5.34	16.08	7.5	Concrete Pip	7,023.41	7,022.28
133: P-107 (2)	P-107 (2)	MH#27 (DP8)	7,021.00	MH#26 (DP6.1)	7,020.50	56.6	0.009	24.0	2.00	4.25	21.26	9.4	Concrete Pip	7,021.49	7,021.47
134: P-107	P-107	DP 7	7,023.01	MH#27 (DP8)	7,021.75	37.8	0.033	15.0	0.30	4.09	11.81	2.5	Concrete Pip	7,023.22	7,021.89
135: P-107 (1)	P-107 (1)	MH#27 (DP8)	7,021.00	DP 2	7,021.26	43.9	-0.006	24.0	1.70	3.52	17.41	9.8	Concrete Pip	7,021.71	7,021.65
136: P-95	P-95	I#8 (DP5)	7,024.00	I#9 (DP6)	7,023.00	47.5	0.021	18.0	0.70	4.38	15.24	4.6	Concrete Pip	7,024.31	7,023.50
137: P-93	P-93	I#6 (DP2.1)	7,022.36	I#7 (DP3.1)	7,021.80	55.9	0.010	18.0	0.80	3.51	10.51	7.6	Concrete Pip	7,023.00	7,023.00
138: Pipe - (34	Pipe - (34)	I#7 (DP3.1)	7,021.80	FES OUTFALL 1	7,021.01	33.5	0.023	18.0	1.60	5.81	16.07	10.0	Concrete Pip	7,023.00	7,023.00
140: P-44 (1)	P-44 (1)	MH#20	7,001.18	MH#21	6,998.52	266.5	0.010	48.0	6.10	5.68	143.63	4.2	Concrete Pip	7,001.90	6,999.57
141: P-64	P-64	MH#21	6,998.52	MH#22	6,995.26	316.5	0.010	48.0	6.10	5.74	145.88	4.2	Concrete Pip	6,999.24	6,995.82
142: P-44	P-44	MH#19	7,003.94	MH#20	7,001.28	266.5	0.010	48.0	6.10	5.68	143.63	4.2	Concrete Pip	7,004.66	7,001.84
143: P-26	P-26	DP 3	7,005.01	MH#19	7,004.04	81.5	0.012	48.0	6.10	6.03	156.73	3.9	Concrete Pip	7,005.73	7,004.99
144: P-64 (1)	P-64 (1)	MH#22	6,995.15	MH#23	6,988.82	316.6	0.020	48.0	6.10	7.23	203.15	3.0	Concrete Pip	6,995.87	6,989.55
145: P-87	P-87	MH#10 (DP 15.1)	6,994.25	MH#9	6,989.76	320.7	0.014	24.0	10.20	7.94	26.78	38.1	Concrete Pip	6,995.39	6,990.92
146: P-87 (1)	P-87 (1)	MH#9	6,989.76	MH#8	6,986.87	197.4	0.015	24.0	10.20	8.07	27.33	37.3	Concrete Pip	6,990.90	6,989.29
147: P-84	P-84	I#4 (DP14)	6,995.69	MH#10 (DP 1...	6,994.25	8.1	0.179	18.0	5.20	16.82	44.40	11.7	Concrete Pip	6,996.57	6,995.64
148: P-84 (1)	P-84 (1)	MH#10 (DP 15.1)	6,994.75	I#5 (DP 15)	6,995.50	53.9	-0.014	18.0	5.00	6.64	12.40	40.3	Concrete Pip	6,996.36	6,995.64
149: P-66	P-66	MH#23	6,988.82	MH#24	6,988.00	149.0	0.006	48.0	6.10	4.60	106.64	5.7	Concrete Pip	6,989.54	6,989.51
150: P-68	P-68	MH#24	6,988.00	MH#25 (DP13)	6,987.50	107.8	0.005	48.0	6.10	4.33	97.84	6.2	Concrete Pip	6,989.51	6,989.51
151: P-77	P-77	DP12	6,990.32	MH#25 (DP13)	6,989.50	28.1	0.029	24.0	3.60	7.70	38.62	9.3	Concrete Pip	6,990.98	6,989.93
152: P-74	P-74	MH#25 (DP13)	6,987.50	OUTLET SEG...	6,986.67	173.3	0.005	48.0	26.00	6.66	99.34	26.2	Concrete Pip	6,989.01	6,988.30

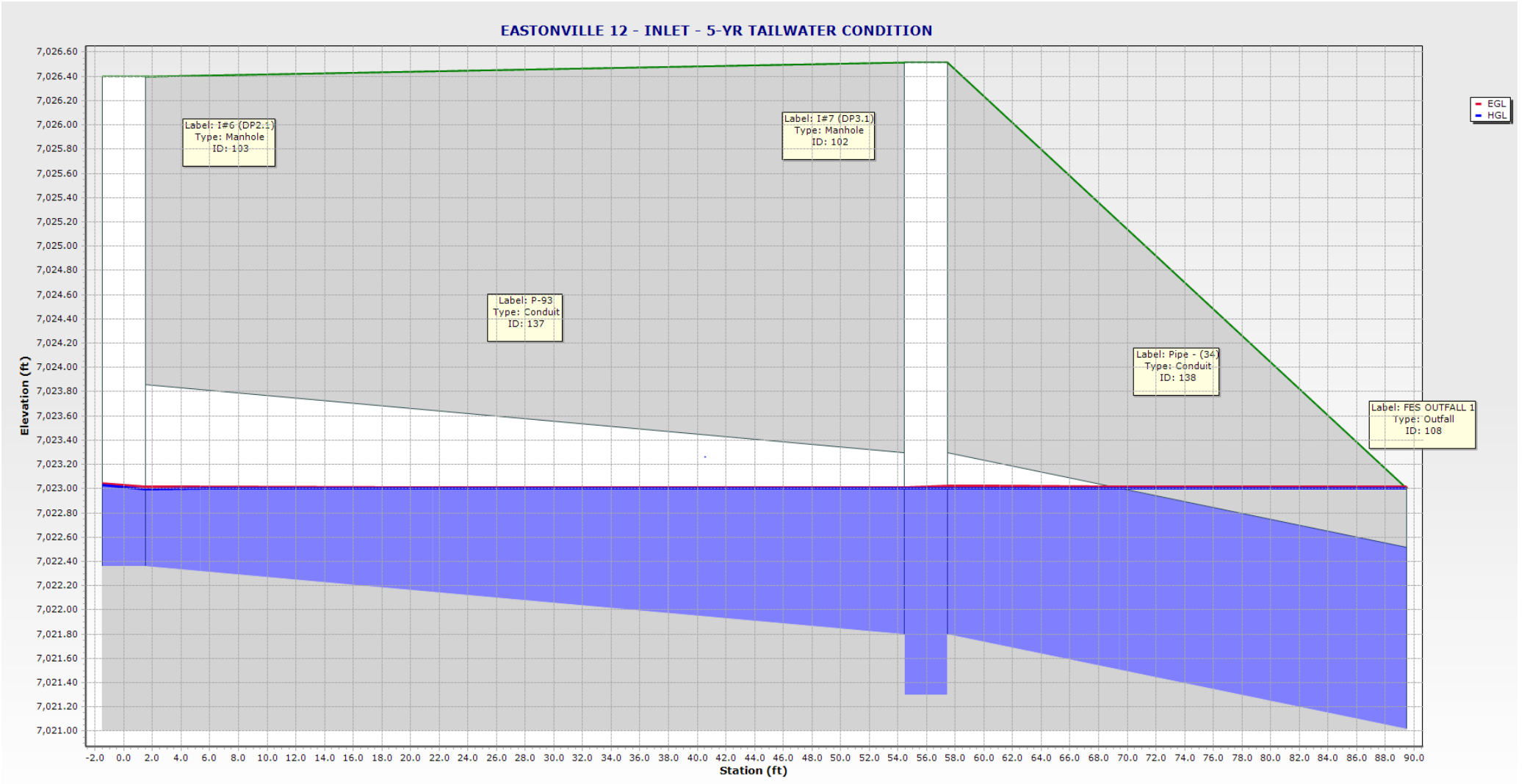
NOTE: EASTONVILLE 12 - INLET, EASTONVILLE 10, & EASTONVILLE 11 SEGMENTS HAVE BEEN ANALYZED IN THE FREE OUTFALL CONDITION BELOW TO MEET CAPACITY & VELOCITY REQUIREMENTS. SEGMENT 1 PIPES & STRUCTURES INCLUDED IN TABLE, REFER TO FDR FOR COMPLETE ANALYSIS.

5 YEAR TAILWATER CONDITION: STRUCTURE SUMMARY TABLE

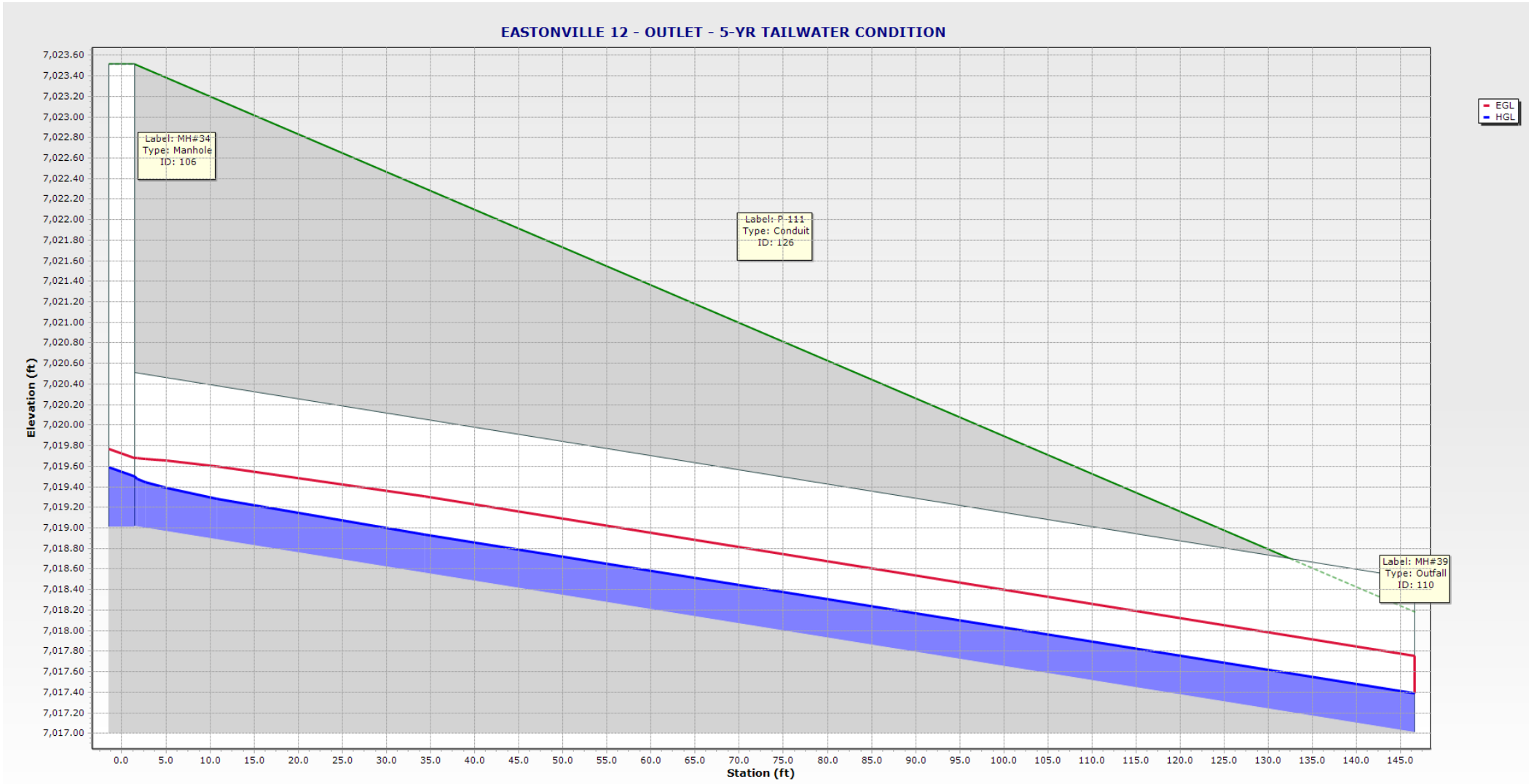
	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Notes	Headloss (ft)
35: MH#7	MH#7	6,993.52	6,993.52	7.90	0.85	6,986.22	6,986.42	STORM MH	0.19
36: I#1 (DP 16	I#1 (DP 16)	6,993.41	6,993.41	3.00	0.66	6,990.40	6,990.77	CDOT Type-	0.38
37: MH#4 DP	MH#4 DP 18)	6,993.40	6,993.40	15.60	2.91	6,988.57	6,988.96	STORM MH	0.39
38: I#2 (DP 17	I#2 (DP 17)	6,993.39	6,993.39	6.30	0.90	6,989.68	6,990.02	CDOT Type-	0.35
39: MH#6	MH#6	6,993.02	6,993.02	7.90	0.85	6,985.35	6,985.54	STORM MH	0.19
40: MH#5	MH#5	6,991.91	6,991.91	7.90	0.85	6,984.97	6,985.17	STORM MH	0.19
41: MH#3 (DP	MH#3 (DP 8)	6,991.13	6,991.13	8.30	0.56	6,981.67	6,981.95	STORM MH	0.28
42: I#3 (DP 7)	I#3 (DP 7)	6,990.73	6,990.73	7.90	0.93	6,986.58	6,987.03	CDOT Type-	0.45
43: 18 (DP 19)	18 (DP 19)	6,988.71	6,988.71	0.30	1.96	6,983.47	6,983.57	CDOT Type-	0.10
44: MH#2 (DP	MH#2 (DP 8)	6,985.74	6,985.74	8.30	0.87	6,981.30	6,981.50	STORM MH	0.20
45: I#4 (DP 13	I#4 (DP 13)	6,985.02	6,985.02	2.10	1.13	6,982.43	6,982.51	CDOT Type-	0.08
46: I#5 (DP 14	I#5 (DP 14)	6,985.02	6,985.02	3.90	1.23	6,982.28	6,982.42	CDOT Type-	0.15
47: MH#1	MH#1	6,984.95	6,984.95	8.30	0.87	6,980.92	6,980.95	STORM MH	0.03
49: 44 (69) (D	44 (69) (DP 15)	6,982.64	6,982.64	0.30	0.20	6,978.63	6,978.63	CDOT Type-	0.01
55: 44 (80)	44 (80)	6,975.21	6,975.21	4.20	2.48	6,973.23	6,973.23	Cylindrical S	0.00
56: 44 (81)	44 (81)	6,975.03	6,975.03	0.50	0.26	6,970.30	6,970.31	Cylindrical S	0.01
57: I#7 (DP 9)	I#7 (DP 9)	6,974.64	6,974.64	2.20	1.37	6,973.32	6,973.36	CDOT Type-	0.04
58: I#8 (DP 10	I#8 (DP 10)	6,974.64	6,974.64	4.20	2.09	6,973.27	6,973.30	CDOT Type-	0.03
59: I#6 (DP 1)	I#6 (DP 1)	6,973.20	6,973.20	0.50	0.26	6,971.11	6,971.25	CDOT Type-	0.14
60: 44 (78) (D	44 (78) (DP 11)	6,973.16	6,973.16	0.40	0.23	6,968.66	6,968.74	CDOT Type-	0.08
98: MH#26 (D	MH#26 (DP6.1)	7,027.15	7,027.15	2.90	0.59	7,021.09	7,021.47	STORM MH	0.38
99: MH#27 (D	MH#27 (DP8)	7,027.09	7,027.09	2.00	0.49	7,021.49	7,021.65	STORM MH	0.16
100: I#9 (DP6)	I#9 (DP6)	7,027.04	7,027.04	1.20	0.41	7,023.41	7,023.50	CDOT Type-	0.09
101: I#8 (DP5)	I#8 (DP5)	7,026.63	7,026.63	0.70	0.31	7,024.31	7,024.47	CDOT Type-	0.16
102: I#7 (DP3.	I#7 (DP3.1)	7,026.51	7,026.51	1.60	1.70	7,023.00	7,023.00	CDOT Type-	0.00
103: I#6 (DP2.	I#6 (DP2.1)	7,026.40	7,026.40	0.80	0.64	7,023.00	7,023.03	CDOT Type-	0.03
106: MH#34	MH#34	7,023.51	7,023.51	1.70	0.49	7,019.50	7,019.59	CDOT Type-	0.08
111: MH#21	MH#21	7,014.03	7,014.03	6.10	0.72	6,999.24	6,999.57	STORM MH	0.33
112: MH#20	MH#20	7,012.41	7,012.41	6.10	0.72	7,001.90	7,001.91	STORM MH	0.01
113: MH#19	MH#19	7,010.85	7,010.85	6.10	0.72	7,004.66	7,004.99	STORM MH	0.33
115: MH#22	MH#22	7,005.85	7,005.85	6.10	0.72	6,995.87	6,995.88	STORM MH	0.01
116: MH#9	MH#9	7,001.03	7,001.03	10.20	1.14	6,990.90	6,990.92	STORM MH	0.02
117: I#4 (DP1	I#4 (DP14)	7,000.17	7,000.17	5.20	0.88	6,996.57	6,997.11	CDOT Type-	0.55
118: MH#10 (	MH#10 (DP 1...	7,000.01	7,000.01	10.20	1.14	6,995.39	6,995.64	STORM MH	0.24
119: I#5 (DP 1	I#5 (DP 15)	6,999.67	6,999.67	5.00	0.46	6,996.36	6,996.89	CDOT Type-	0.53
120: MH#8	MH#8	6,996.13	6,996.13	10.20	2.52	6,989.18	6,989.29	STORM MH	0.10
121: MH#23	MH#23	6,997.20	6,997.20	6.10	0.72	6,989.54	6,989.55	STORM MH	0.01
122: MH#24	MH#24	6,996.25	6,996.25	6.10	1.51	6,989.51	6,989.51	STORM MH	0.00
123: DP12	DP12	6,996.40	6,996.40	3.60	0.67	6,990.98	6,991.35	CDOT Type-	0.36
124: MH#25 (	MH#25 (DP13)	6,995.75	6,995.75	26.00	1.51	6,989.01	6,989.51	STORM MH	0.50
190: INLET (D	INLET (DP 3)	6,980.96	6,980.96	3.70	0.63	6,978.80	6,979.13	CDOT FES	0.34
192: DP 7	DP 7	7,024.45	7,024.45	0.30	0.21	7,023.22	7,023.33	CDOT FES	0.11
193: DP 2	DP 2	7,024.26	7,024.26	1.70	0.45	7,021.71	7,021.95	CDOT FES	0.24
194: DP 3	DP 3	7,009.43	7,009.43	6.10	0.72	7,005.73	7,006.10	CDOT FES	0.37
196: CULVERT	CULVERT 1 (...	7,000.01	7,000.01	11.20	0.34	6,997.35	6,997.61	Dummy Null	0.25
197: CULVERT	CULVERT 2 (...	7,000.01	7,000.01	11.20	0.34	6,997.35	6,997.61	Dummy Null	0.25

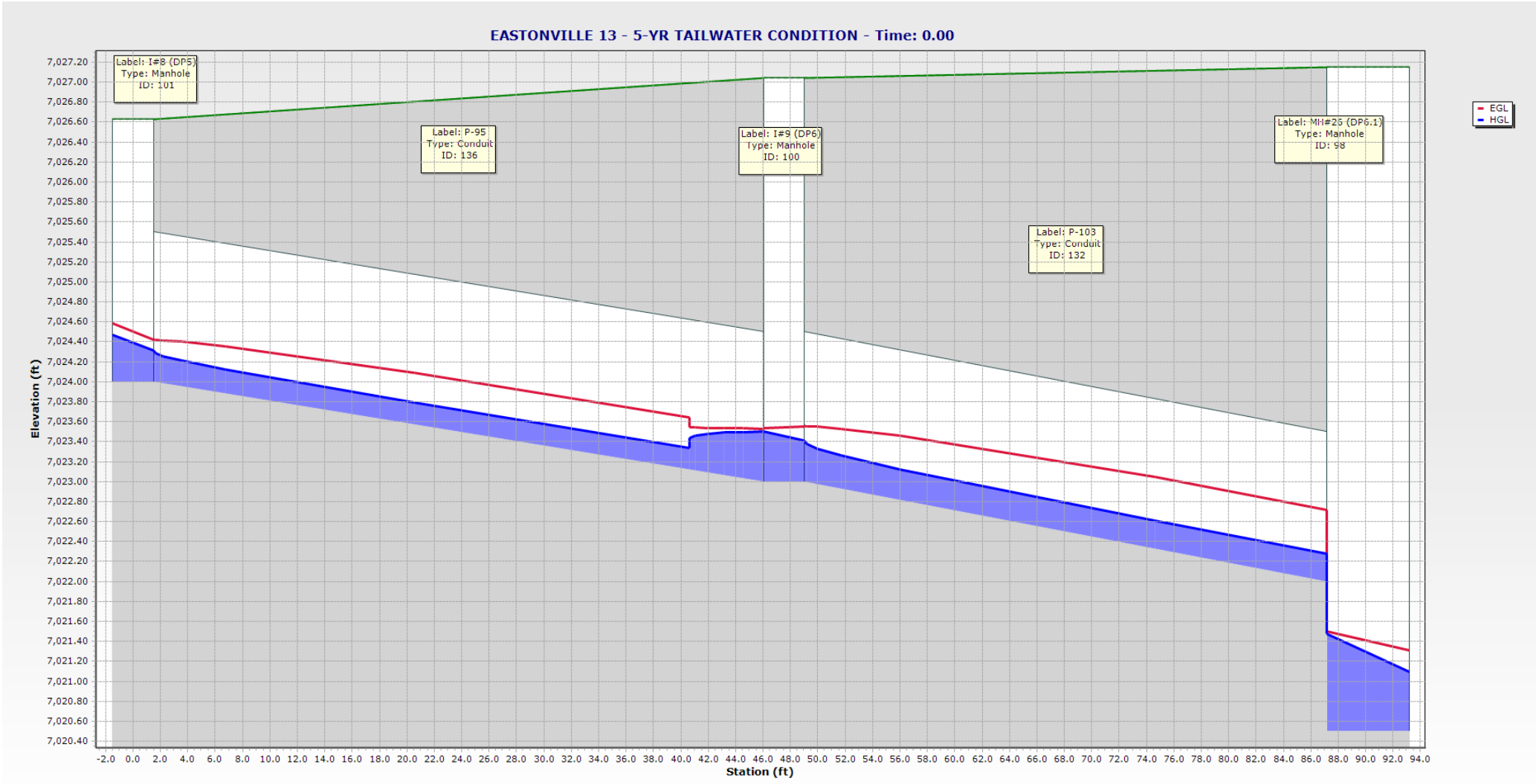
	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
48: OUTFALL	OUTFALL	6,983.32	6,979.44		6,980.17	8.30	CDOT FES
53: 44 (70)	44 (70)	6,979.33	6,977.55		6,977.71	0.30	CDOT FES
54: 44 (65)	44 (65)	6,976.31	6,973.52		6,973.93	3.70	CDOT FES
61: 44 (77)	44 (77)	6,971.10	6,969.39		6,969.61	0.50	CDOT FES
64: 44 (79)	44 (79)	6,969.82	6,967.50		6,967.68	0.40	CDOT FES
107: DP9	DP9	7,022.74	7,019.00		7,019.39	2.90	CDOT FES
108: FES OUTF	FES OUTFALL 1	7,023.00	7,021.01	7,023.00	7,023.00	1.60	CDOT FES
110: MH#39	MH#39	7,018.18	7,017.01		7,017.39	1.70	CDOT FES
125: OUTLET S	OUTLET SEG...	6,991.09	6,986.67	6,988.30	6,988.30	26.00	CDOT FES
162: O-3	O-3	6,987.98	6,984.83	6,988.37	6,988.37	15.60	Dummy Null
164: O-5	O-5	6,982.10	6,981.08	6,982.25	6,982.25	3.90	Dummy Null
165: O-6	O-6	6,972.87	6,970.61	6,973.23	6,973.23	4.20	Dummy Null
203: O-7	O-7	6,998.27	6,995.27		6,995.49	11.20	Dummy Null
207: O-10	O-10	6,998.27	6,995.27		6,995.49	11.20	Dummy Null

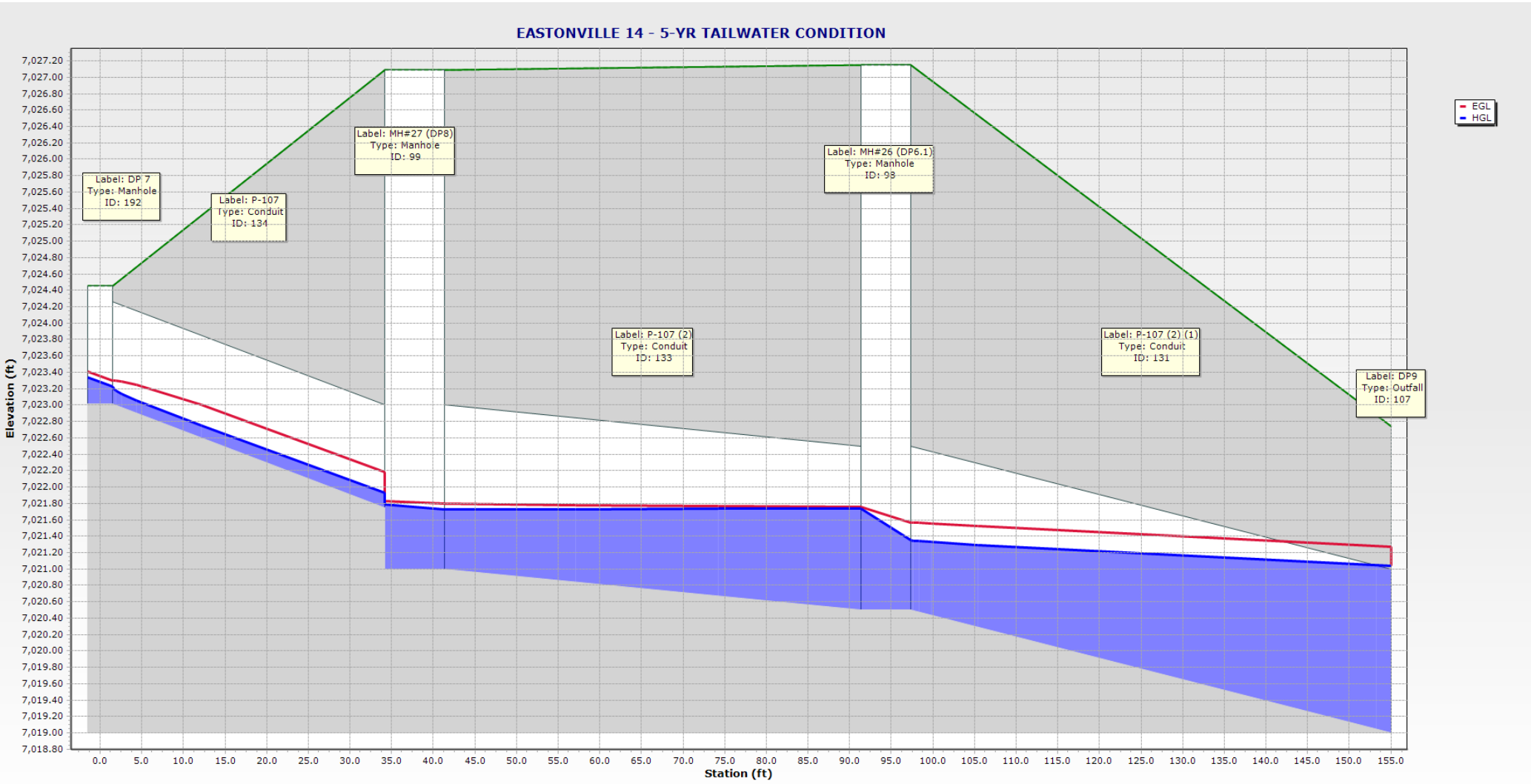
NOTE: EASTONVILLE 12 - INLET, EASTONVILLE 10, & EASTONVILLE 11 SEGMENTS HAVE BEEN ANALYZED IN THE FREE OUTFALL CONDITION BELOW TO MEET CAPACITY & VELOCITY REQUIREMENTS. SEGMENT 1 PIPES & STRUCTURES INCLUDED IN TABLE, REFER TO FDR FOR COMPLETE ANALYSIS.

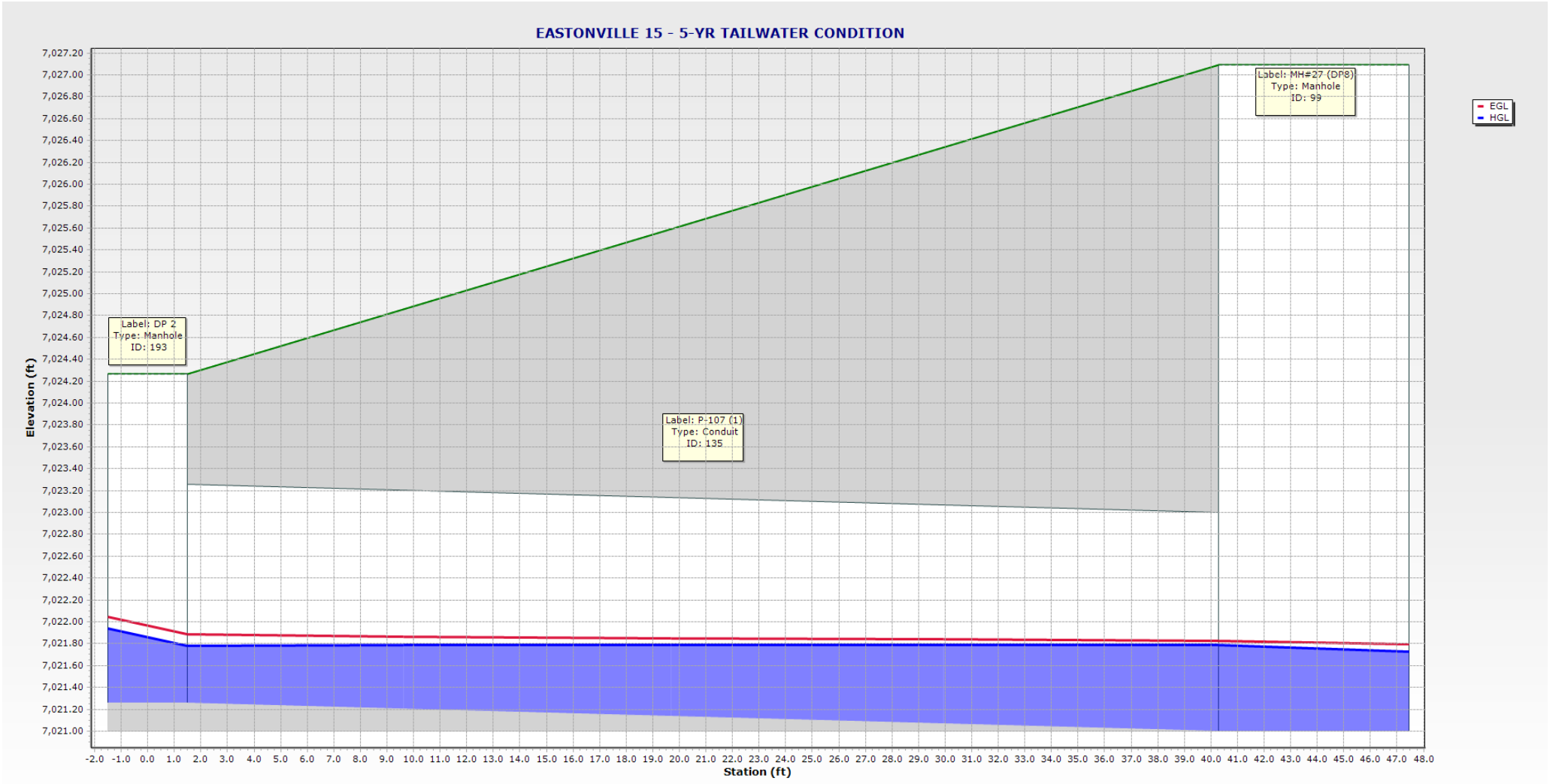


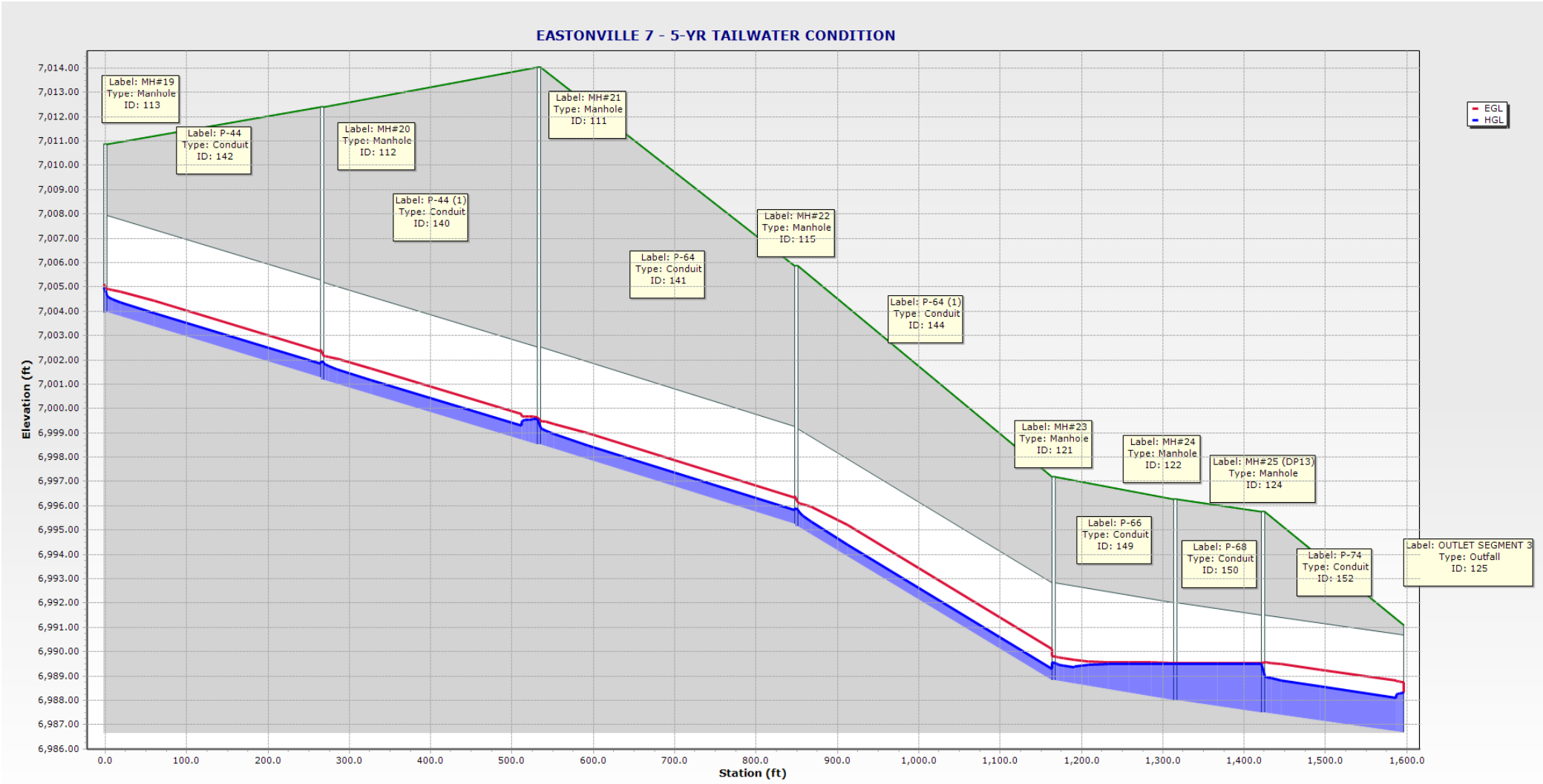
NOTE: THIS SEGMENT HAS BEEN ANALYZED IN THE FREE OUTFALL CONDITION BLEOW TO MEET CAPACITY & VELOCITY REQUIREMENTS

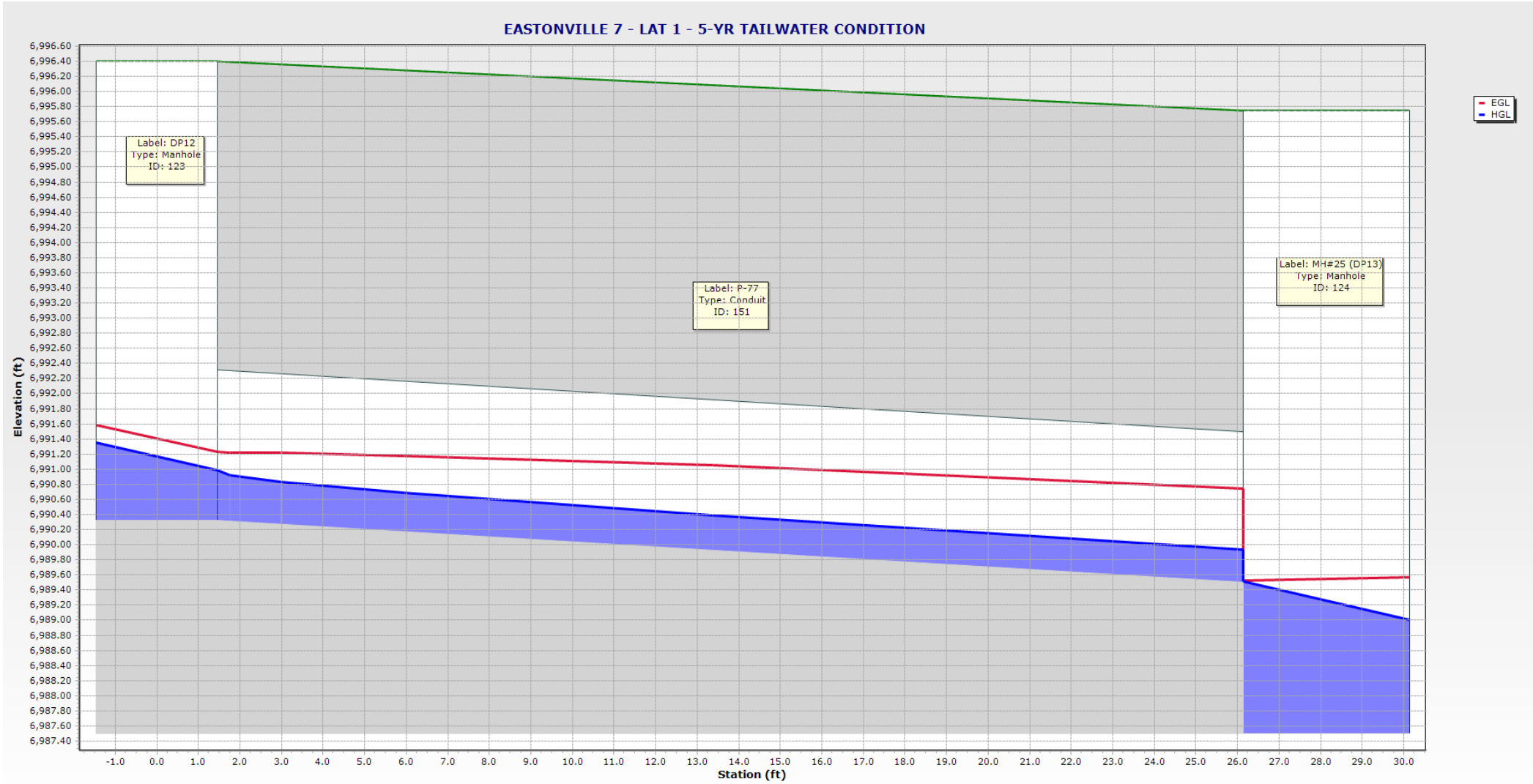

EASTONVILLE 12 - OUTLET - 5-YR TAILWATER CONDITION
Elevation (ft)
Station (ft)
EGL
HGL
Label: MH#34
Type: Manhole
ID: 106
Label: P-111
Type: Conduit
ID: 126
Label: MH#39
Type: Outfall
ID: 110

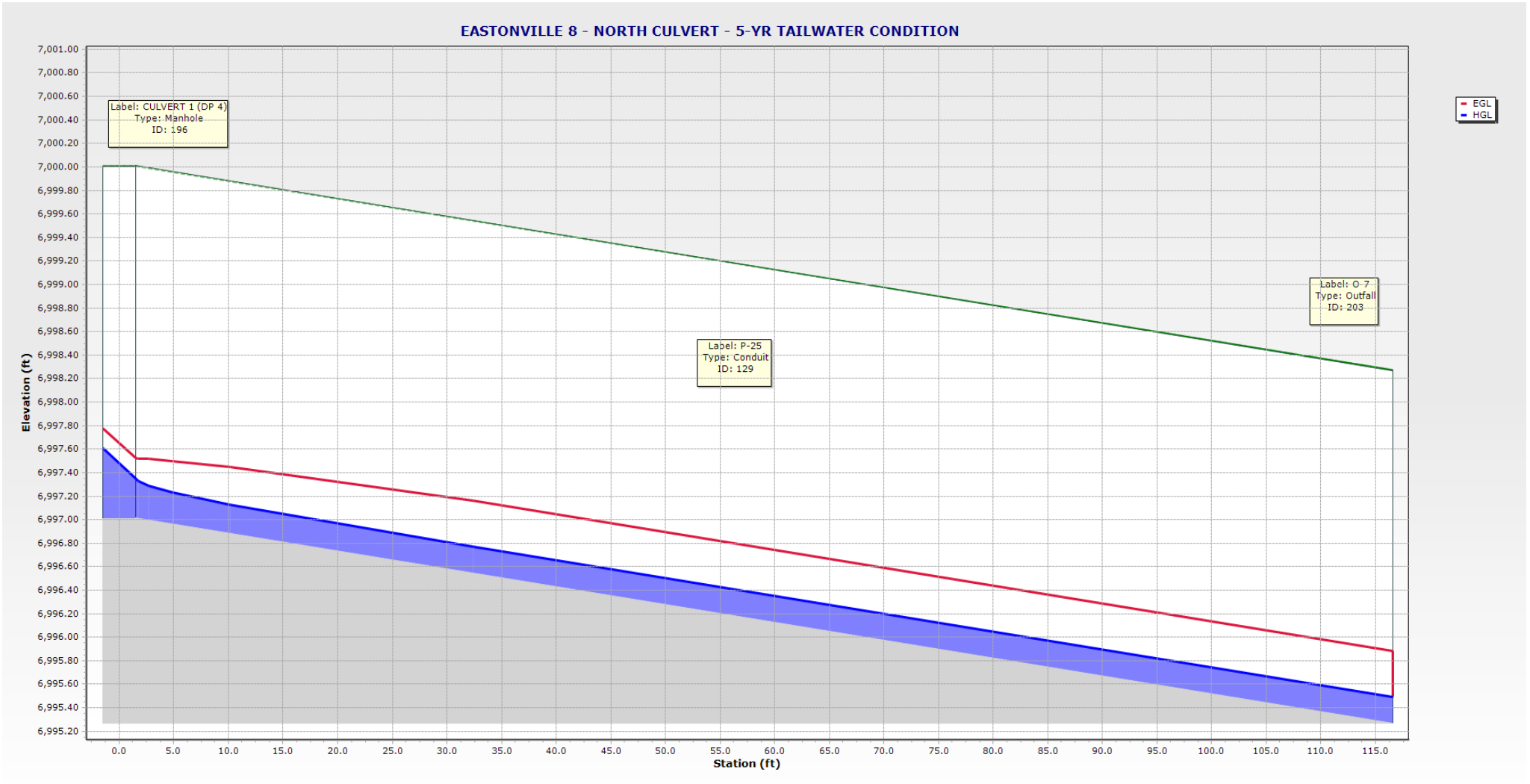

EASTONVILLE 13 - 5-YR TAILWATER CONDITION - Time: 0.00
Label: I#8 (DP5)
Type: Manhole
ID: 101
Label: P-95
Type: Conduit
ID: 136
Label: I#9 (DP6)
Type: Manhole
ID: 100
Label: P-103
Type: Conduit
ID: 132
Label: MH#26 (DP6.1)
Type: Manhole
ID: 98
EGL
HGL
Elevation (ft)
Station (ft)

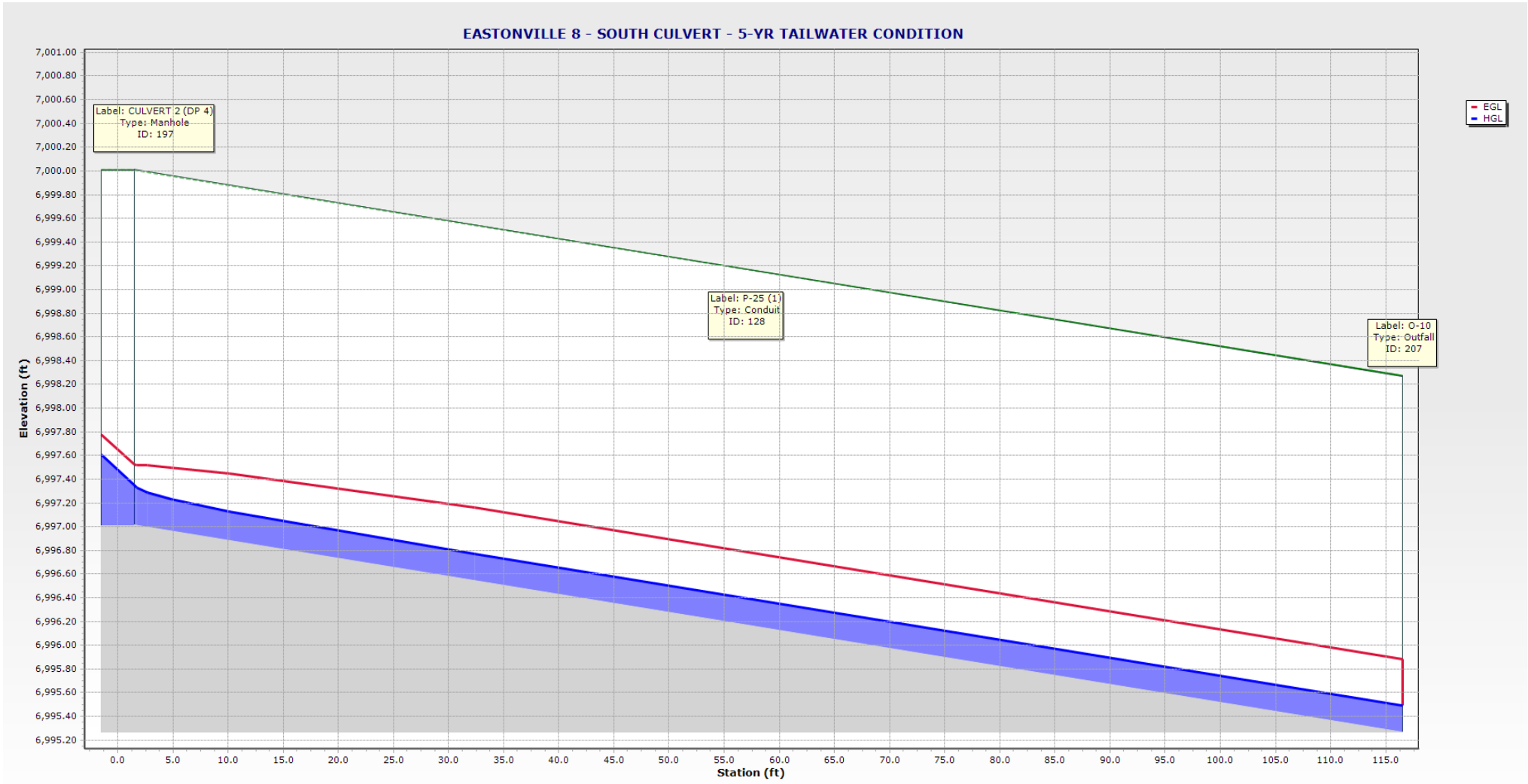

EASTONVILLE 14 - 5-YR TAILWATER CONDITION
EGL
HGL
Label: DP 7
Type: Manhole
ID: 192
Label: P-107
Type: Conduit
ID: 134
Label: MH#27 (DP8)
Type: Manhole
ID: 99
Label: P-107 (2)
Type: Conduit
ID: 133
Label: MH#26 (DP6.1)
Type: Manhole
ID: 98
Label: P-107 (2) (1)
Type: Conduit
ID: 131
Label: DP9
Type: Outfall
ID: 107
Elevation (ft)
Station (ft)

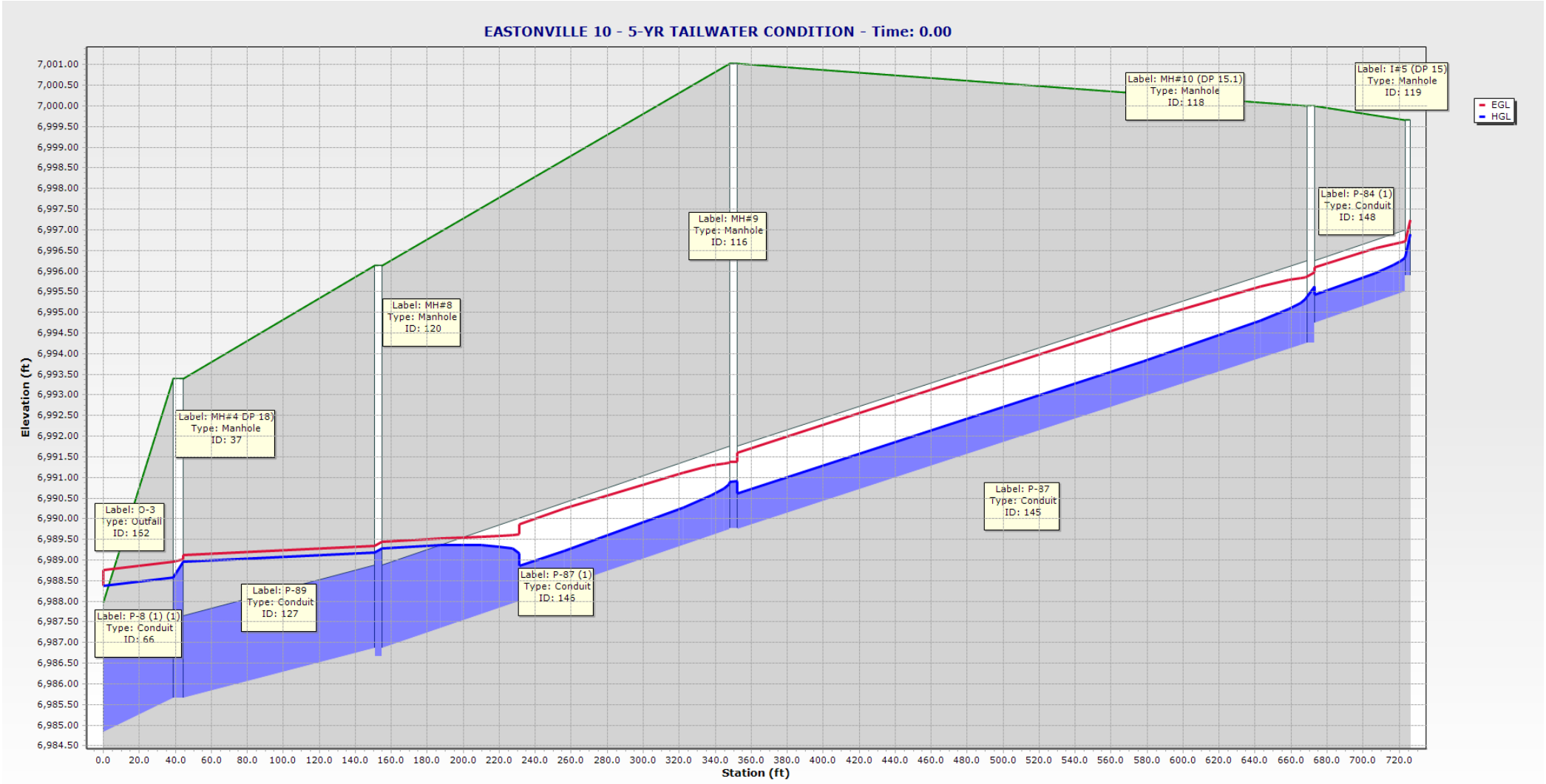

EASTONVILLE 15 - 5-YR TAILWATER CONDITION
Label: DP 2
Type: Manhole
ID: 193
Label: P-107 (1)
Type: Conduit
ID: 135
Label: MH#27 (DP8)
Type: Manhole
ID: 99
EGL
HGL
Elevation (ft)
Station (ft)
7,027.20
7,027.00
7,026.80
7,026.60
7,026.40
7,026.20
7,026.00
7,025.80
7,025.60
7,025.40
7,025.20
7,025.00
7,024.80
7,024.60
7,024.40
7,024.20
7,024.00
7,023.80
7,023.60
7,023.40
7,023.20
7,023.00
7,022.80
7,022.60
7,022.40
7,022.20
7,022.00
7,021.80
7,021.60
7,021.40
7,021.20
7,021.00
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0 22.0 23.0 24.0 25.0 26.0 27.0 28.0 29.0 30.0 31.0 32.0 33.0 34.0 35.0 36.0 37.0 38.0 39.0 40.0 41.0 42.0 43.0 44.0 45.0 46.0 47.0 48.0


EASTONVILLE 7 - 5-YR TAILWATER CONDITION
Label: MH#19
Type: Manhole
ID: 113
Label: P-44
Type: Conduit
ID: 142
Label: MH#20
Type: Manhole
ID: 112
Label: P-44 (1)
Type: Conduit
ID: 140
Label: MH#21
Type: Manhole
ID: 111
Label: P-64
Type: Conduit
ID: 141
Label: MH#22
Type: Manhole
ID: 115
Label: P-64 (1)
Type: Conduit
ID: 144
Label: MH#23
Type: Manhole
ID: 121
Label: MH#24
Type: Manhole
ID: 122
Label: MH#25 (DP13)
Type: Manhole
ID: 124
Label: P-66
Type: Conduit
ID: 149
Label: P-68
Type: Conduit
ID: 150
Label: P-74
Type: Conduit
ID: 152
Label: OUTLET SEGMENT 3
Type: Outfall
ID: 125
EGL
HGL
Elevation (ft)
7,014.00
7,013.00
7,012.00
7,011.00
7,010.00
7,009.00
7,008.00
7,007.00
7,006.00
7,005.00
7,004.00
7,003.00
7,002.00
7,001.00
7,000.00
6,999.00
6,998.00
6,997.00
6,996.00
6,995.00
6,994.00
6,993.00
6,992.00
6,991.00
6,990.00
6,989.00
6,988.00
6,987.00
6,986.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
1,100.0
1,200.0
1,300.0
1,400.0
1,500.0
1,600.0
Station (ft)

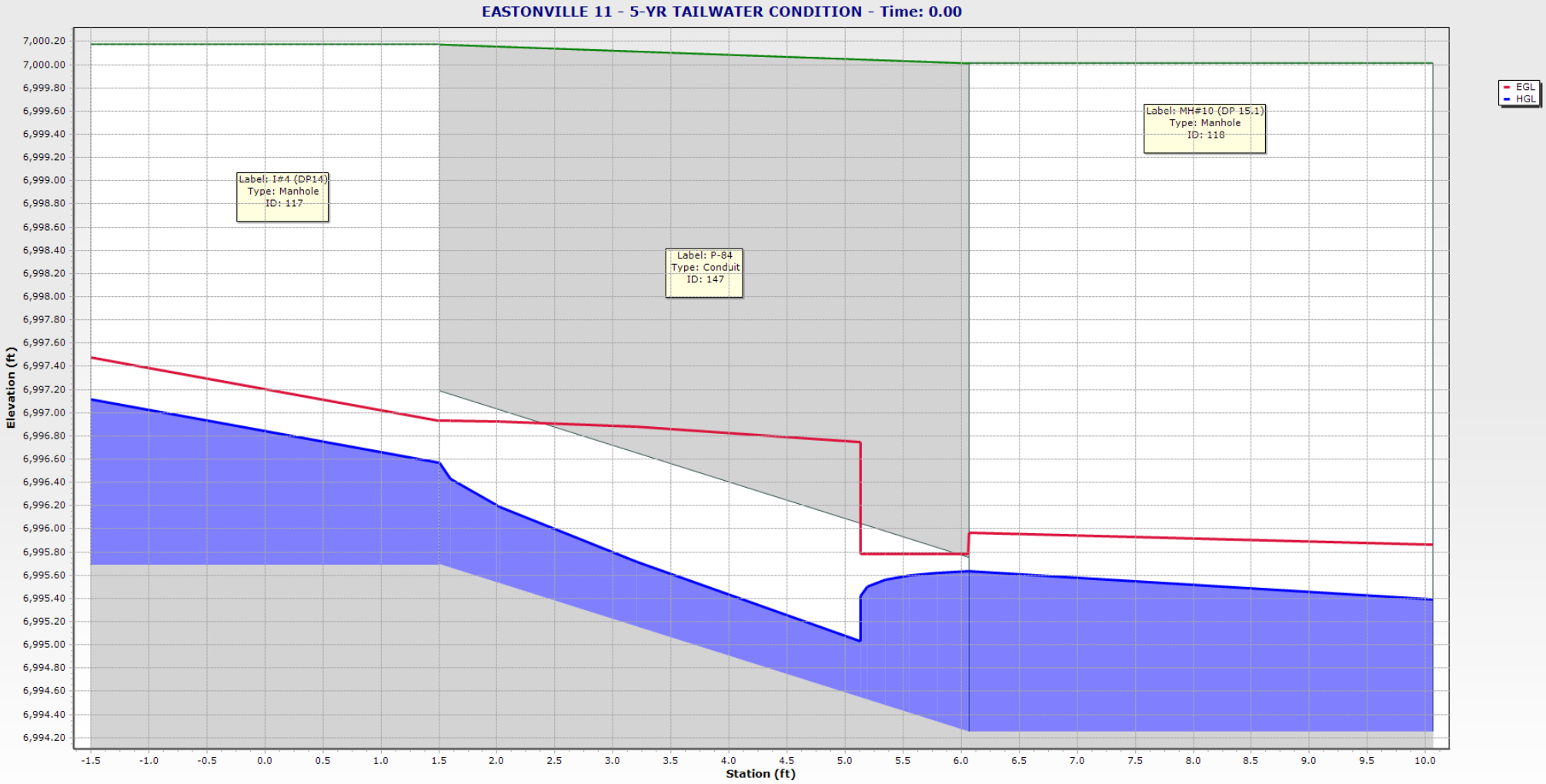

EASTONVILLE 7 - LAT 1 - 5-YR TAILWATER CONDITION
Elevation (ft)
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
6,995.00
6,994.80
6,994.60
6,994.40
6,994.20
6,994.00
6,993.80
6,993.60
6,993.40
6,993.20
6,993.00
6,992.80
6,992.60
6,992.40
6,992.20
6,992.00
6,991.80
6,991.60
6,991.40
6,991.20
6,991.00
6,990.80
6,990.60
6,990.40
6,990.20
6,990.00
6,989.80
6,989.60
6,989.40
6,989.20
6,989.00
6,988.80
6,988.60
6,988.40
6,988.20
6,988.00
6,987.80
6,987.60
6,987.40
Label: DP12
Type: Manhole
ID: 123
Label: P-77
Type: Conduit
ID: 151
Label: MH#25 (DP13)
Type: Manhole
ID: 124
EGL
HGL
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
21.0
22.0
23.0
24.0
25.0
26.0
27.0
28.0
29.0
30.0
Station (ft)


EASTONVILLE 8 - NORTH CULVERT - 5-YR TAILWATER CONDITION
Label: CULVERT 1 (DP 4)
Type: Manhole
ID: 196
Label: P-25
Type: Conduit
ID: 129
Label: O-7
Type: Outfall
ID: 203
EGL
HGL
Elevation (ft)
Station (ft)
7,001.00
7,000.80
7,000.60
7,000.40
7,000.20
7,000.00
6,999.80
6,999.60
6,999.40
6,999.20
6,999.00
6,998.80
6,998.60
6,998.40
6,998.20
6,998.00
6,997.80
6,997.60
6,997.40
6,997.20
6,997.00
6,996.80
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
115.0


EASTONVILLE 8 - SOUTH CULVERT - 5-YR TAILWATER CONDITION
Label: CULVERT 2 (DP 4)
Type: Manhole
ID: 197
Label: P-25 (1)
Type: Conduit
ID: 128
Label: O-10
Type: Outfall
ID: 207
EGL
HGL
Elevation (ft)
Station (ft)
7,001.00
7,000.80
7,000.60
7,000.40
7,000.20
7,000.00
6,999.80
6,999.60
6,999.40
6,999.20
6,999.00
6,998.80
6,998.60
6,998.40
6,998.20
6,998.00
6,997.80
6,997.60
6,997.40
6,997.20
6,997.00
6,996.80
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
115.0



NOTE: THIS SEGMENT HAS BEEN ANALYZED IN THE FREE OUTFALL CONDITION BLEOW TO MEET CAPACITY & VELOCITY REQUIREMENTS



NOTE: THIS SEGMENT HAS BEEN ANALYZED IN THE FREE OUTFALL CONDITION BLEOW TO MEET CAPACITY & VELOCITY REQUIREMENTS

5 YEAR FREE OUTFALL CONDITION: PIPE SUMMARY TABLE

	Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Notes	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
66: P-8 (1) (1)	P-8 (1) (1)	MH#4 DP 18)	6,985.66	O-3	6,984.83	41.6	0.020	24.0	15.60	10.12	31.99	48.8	Concrete Pip	6,987.09	6,985.89
67: P-124	P-124	I#5 (DP 14)	6,981.25	O-5	6,981.08	34.3	0.005	18.0	3.90	4.25	7.43	52.5	Concrete Pip	6,982.13	6,982.10
68: P-121 (2)	P-121 (2)	44 (80)	6,970.65	O-6	6,970.61	9.0	0.005	24.0	4.20	4.28	15.95	26.3	Concrete Pip	6,971.37	6,971.31
69: P-18	P-18	I#3 (DP 7)	6,985.73	MH#7	6,985.38	71.3	0.005	42.0	7.90	4.88	71.14	11.1	Concrete Pip	6,986.58	6,986.42
70: P-20	P-20	MH#7	6,985.38	MH#6	6,984.50	175.6	0.005	42.0	7.90	4.88	71.14	11.1	Concrete Pip	6,986.22	6,985.54
71: P-5	P-5	I#2 (DP 17)	6,989.29	I#1 (DP 16)	6,989.74	52.0	-0.009	18.0	3.00	4.87	9.77	30.7	Concrete Pip	6,990.40	6,990.02
72: P-8 (1)	P-8 (1)	I#2 (DP 17)	6,988.79	MH#4 DP 18)	6,985.66	156.4	0.020	24.0	6.30	7.92	31.99	19.7	Concrete Pip	6,989.68	6,987.76
73: P-21	P-21	MH#6	6,984.50	MH#5	6,984.13	74.6	0.005	42.0	7.90	4.88	71.14	11.1	Concrete Pip	6,985.35	6,985.17
74: P-22	P-22	MH#5	6,984.13	MH#3 (DP 8)	6,980.80	127.1	0.026	42.0	7.90	8.74	162.72	4.9	Concrete Pip	6,984.97	6,981.95
75: P-15	P-15	18 (DP 19)	6,983.26	MH#3 (DP 8)	6,982.80	30.8	0.015	18.0	0.30	3.02	12.90	2.3	Concrete Pip	6,983.47	6,982.96
76: P-15 (1)	P-15 (1)	MH#3 (DP 8)	6,980.80	MH#2 (DP 8)	6,980.43	75.1	0.005	42.0	8.30	4.92	70.62	11.8	Concrete Pip	6,981.67	6,981.50
77: P-16	P-16	MH#2 (DP 8)	6,980.43	MH#1	6,980.05	78.1	0.005	42.0	8.30	4.90	70.19	11.8	Concrete Pip	6,981.30	6,980.95
78: P-123	P-123	I#4 (DP 13)	6,981.51	I#5 (DP 14)	6,981.25	52.0	0.005	18.0	2.10	3.61	7.43	28.3	Concrete Pip	6,982.35	6,982.34
79: P-17	P-17	MH#1	6,980.05	OUTFALL	6,979.36	139.8	0.005	42.0	8.30	4.92	70.67	11.7	Concrete Pip	6,980.92	6,980.17
80: P-125	P-125	44 (69) (DP 15)	6,978.42	44 (70)	6,977.55	54.5	0.016	18.0	0.30	3.09	13.30	2.3	Concrete Pip	6,978.63	6,977.71
83: P-122	P-122	INLET (DP 3)	6,978.16	44 (65)	6,973.52	183.8	0.025	30.0	3.70	7.19	65.19	5.7	Concrete Pip	6,978.80	6,973.93
84: P-121	P-121	I#8 (DP 10)	6,971.18	44 (80)	6,970.65	105.1	0.005	24.0	4.20	4.30	16.06	26.1	Concrete Pip	6,971.90	6,971.38
85: P-130	P-130	I#6 (DP 1)	6,970.85	44 (81)	6,970.04	81.5	0.010	18.0	0.50	3.05	10.47	4.8	Concrete Pip	6,971.11	6,970.31
86: P-130 (1)	P-130 (1)	44 (81)	6,970.04	44 (77)	6,969.39	65.0	0.010	18.0	0.50	3.05	10.50	4.8	Concrete Pip	6,970.30	6,969.61
87: P-121 (1)	P-121 (1)	I#8 (DP 10)	6,971.68	I#7 (DP 9)	6,971.95	52.0	-0.005	18.0	2.20	3.71	7.57	29.1	Concrete Pip	6,972.51	6,972.23
88: P-131	P-131	44 (78) (DP 11)	6,968.42	44 (79)	6,967.50	62.5	0.015	18.0	0.40	3.27	12.77	3.1	Concrete Pip	6,968.66	6,967.68
126: P-111	P-111	MH#34	7,019.01	MH#39	7,017.01	146.6	0.014	18.0	1.70	4.88	12.28	13.8	Concrete Pip	7,019.50	7,017.39
127: P-89	P-89	MH#8	6,986.87	MH#4 DP 18)	6,985.66	111.1	0.011	24.0	10.20	7.25	23.64	43.2	Concrete Pip	6,988.02	6,987.76
128: P-25 (1)	P-25 (1)	CULVERT 2 (DP 4)	6,997.01	O-10	6,995.27	116.5	0.015		11.20	5.01	461.86	2.4	Concrete Bo	6,997.35	6,995.49
129: P-25	P-25	CULVERT 1 (DP 4)	6,997.01	O-7	6,995.27	116.6	0.015		11.20	5.01	461.72	2.4	Concrete Bo	6,997.35	6,995.49
131: P-107 (2)	P-107 (2) (1)	MH#26 (DP6.1)	7,020.50	DP9	7,019.00	60.7	0.025	24.0	2.90	6.82	35.57	8.2	Concrete Pip	7,021.09	7,019.39
132: P-103	P-103	I#9 (DP6)	7,023.00	MH#26 (DP6.1)	7,022.00	42.7	0.023	18.0	1.20	5.34	16.08	7.5	Concrete Pip	7,023.41	7,022.28
133: P-107 (2)	P-107 (2)	MH#27 (DP8)	7,021.00	MH#26 (DP6.1)	7,020.50	56.6	0.009	24.0	2.00	4.25	21.26	9.4	Concrete Pip	7,021.49	7,021.47
134: P-107	P-107	DP 7	7,023.01	MH#27 (DP8)	7,021.75	37.8	0.033	15.0	0.30	4.09	11.81	2.5	Concrete Pip	7,023.22	7,021.89
135: P-107 (1)	P-107 (1)	MH#27 (DP8)	7,021.00	DP 2	7,021.26	43.9	-0.006	24.0	1.70	3.52	17.41	9.8	Concrete Pip	7,021.71	7,021.65
136: P-95	P-95	I#8 (DP5)	7,024.00	I#9 (DP6)	7,023.00	47.5	0.021	18.0	0.70	4.38	15.24	4.6	Concrete Pip	7,024.31	7,023.50
137: P-93	P-93	I#6 (DP2.1)	7,022.36	I#7 (DP3.1)	7,021.80	55.9	0.010	18.0	0.80	3.51	10.51	7.6	Concrete Pip	7,022.69	7,022.28
138: Pipe - (34	Pipe - (34)	I#7 (DP3.1)	7,021.80	FES OUTFALL 1	7,021.01	33.5	0.023	18.0	1.60	5.81	16.07	10.0	Concrete Pip	7,022.27	7,021.33
140: P-44 (1)	P-44 (1)	MH#20	7,001.18	MH#21	6,998.52	266.5	0.010	48.0	6.10	5.68	143.63	4.2	Concrete Pip	7,001.90	6,999.57
141: P-64	P-64	MH#21	6,998.52	MH#22	6,995.26	316.5	0.010	48.0	6.10	5.74	145.88	4.2	Concrete Pip	6,999.24	6,995.82
142: P-44	P-44	MH#19	7,003.94	MH#20	7,001.28	266.5	0.010	48.0	6.10	5.68	143.63	4.2	Concrete Pip	7,004.66	7,001.84
143: P-26	P-26	DP 3	7,005.01	MH#19	7,004.04	81.5	0.012	48.0	6.10	6.03	156.73	3.9	Concrete Pip	7,005.73	7,004.99
144: P-64 (1)	P-64 (1)	MH#22	6,995.15	MH#23	6,988.82	316.6	0.020	48.0	6.10	7.23	203.15	3.0	Concrete Pip	6,995.87	6,989.55
145: P-87	P-87	MH#10 (DP 15.1)	6,994.25	MH#9	6,989.76	320.7	0.014	24.0	10.20	7.94	26.78	38.1	Concrete Pip	6,995.39	6,990.92
146: P-87 (1)	P-87 (1)	MH#9	6,989.76	MH#8	6,986.87	197.4	0.015	24.0	10.20	8.07	27.33	37.3	Concrete Pip	6,990.90	6,988.32
147: P-84	P-84	I#4 (DP14)	6,995.69	MH#10 (DP 1...	6,994.25	8.1	0.179	18.0	5.20	16.82	44.40	11.7	Concrete Pip	6,996.57	6,995.64
148: P-84 (1)	P-84 (1)	MH#10 (DP 15.1)	6,994.75	I#5 (DP 15)	6,995.50	53.9	-0.014	18.0	5.00	6.64	12.40	40.3	Concrete Pip	6,996.36	6,995.64
149: P-66	P-66	MH#23	6,988.82	MH#24	6,988.00	149.0	0.006	48.0	6.10	4.60	106.64	5.7	Concrete Pip	6,989.54	6,989.51
150: P-68	P-68	MH#24	6,988.00	MH#25 (DP13)	6,987.50	107.8	0.005	48.0	6.10	4.33	97.84	6.2	Concrete Pip	6,989.51	6,989.51
151: P-77	P-77	DP12	6,990.32	MH#25 (DP13)	6,989.50	28.1	0.029	24.0	3.60	7.70	38.62	9.3	Concrete Pip	6,990.98	6,989.93
152: P-74	P-74	MH#25 (DP13)	6,987.50	OUTLET SEG...	6,986.67	173.3	0.005	48.0	26.00	6.66	99.34	26.2	Concrete Pip	6,989.01	6,988.30

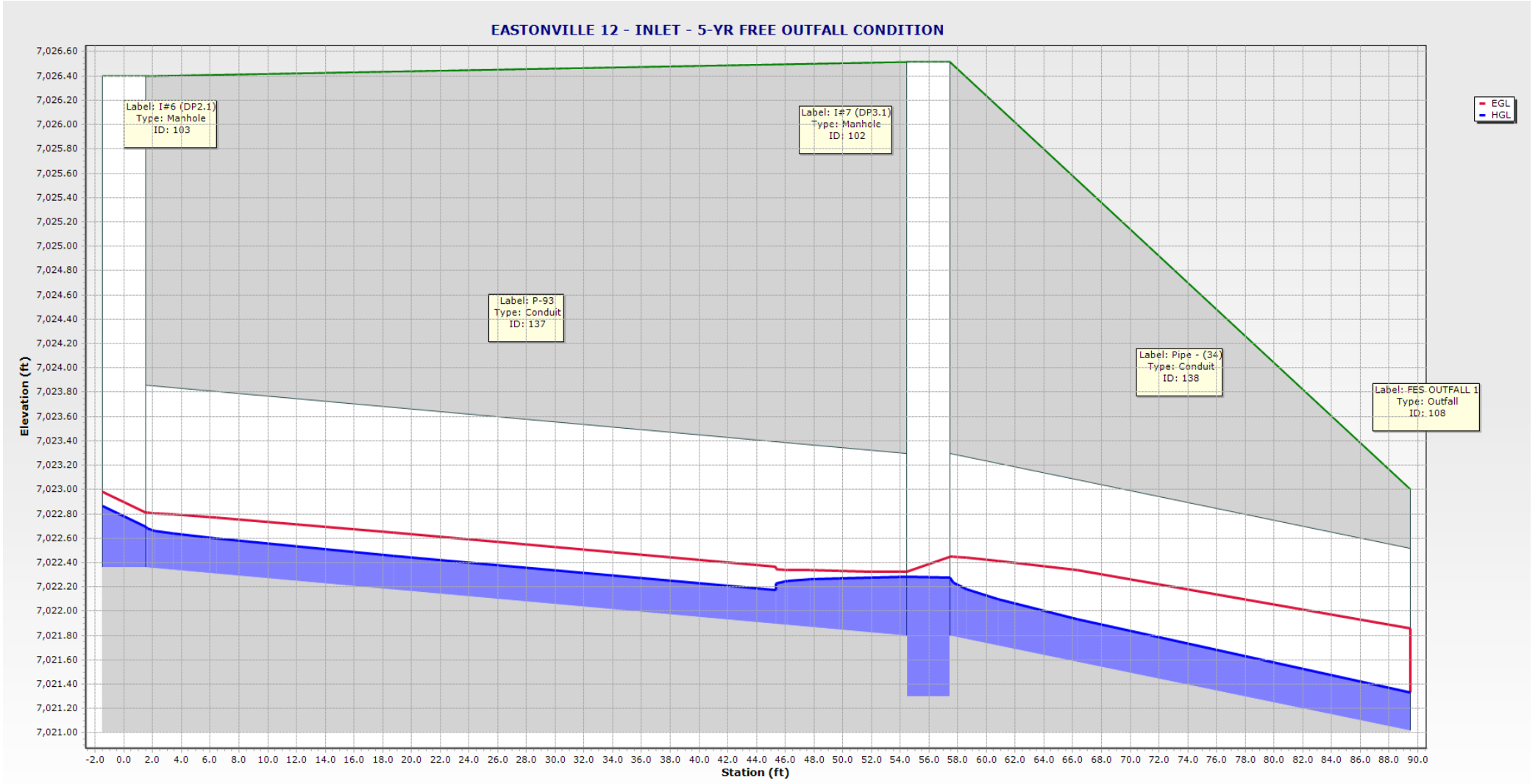
NOTE: SEE PROFILES BELOW FOR PIPES STUDIED WITH THIS ANALYSIS

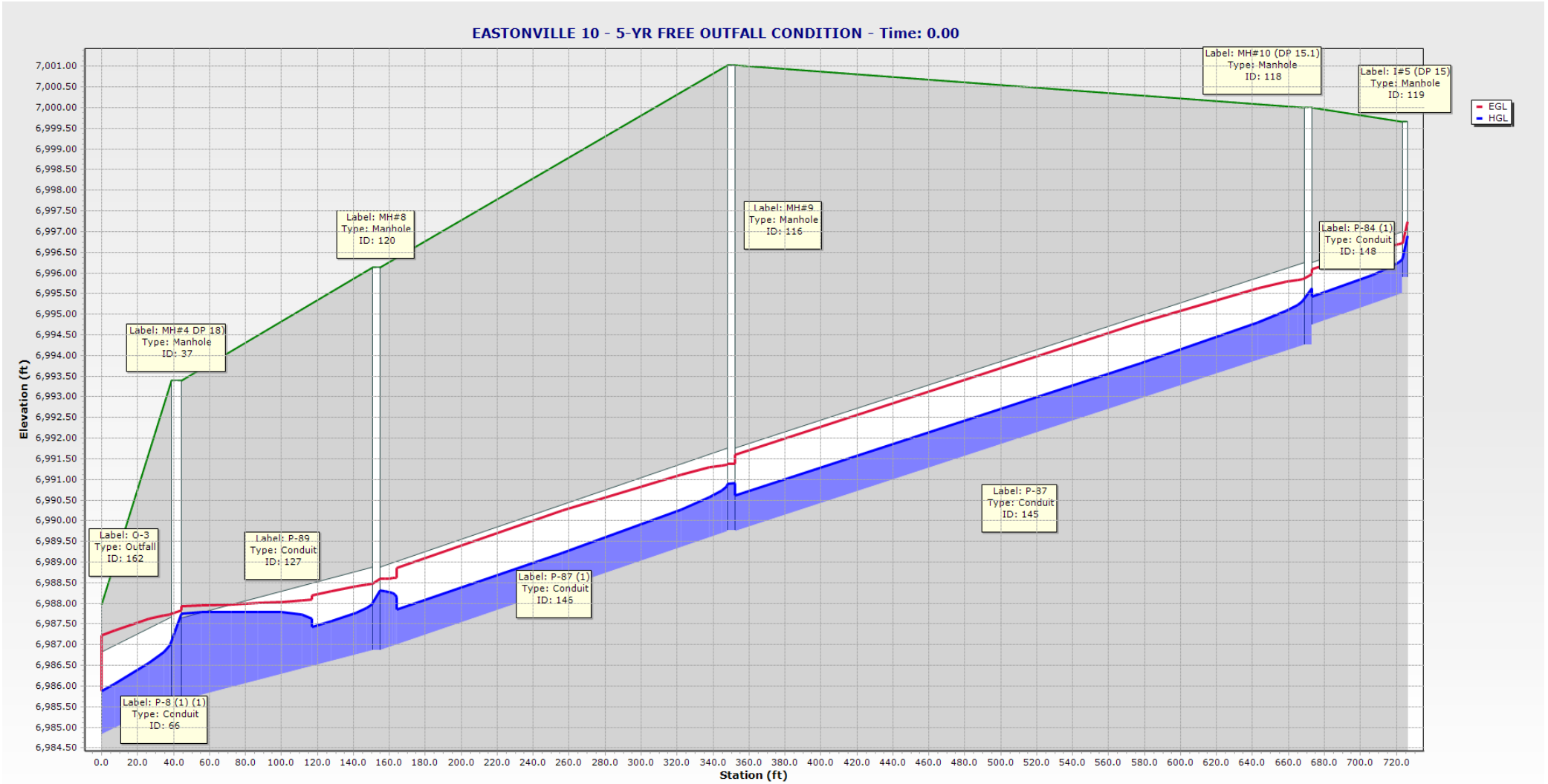
5 YEAR FREE OUTFALL CONDITION: STRUCTURE SUMMARY TABLE

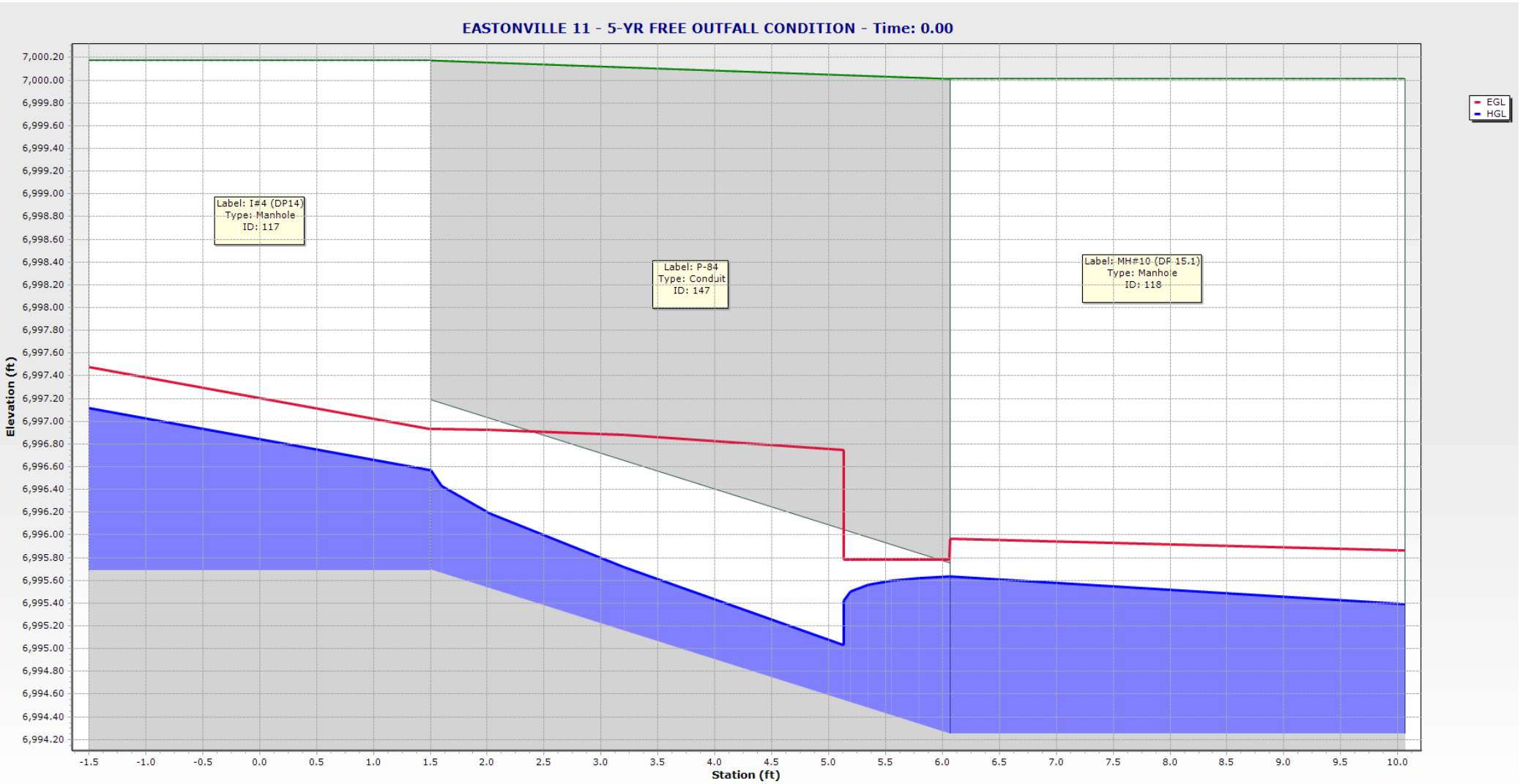
	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Notes	Headloss (ft)
35: MH#7	MH#7	6,993.52	6,993.52	7.90	0.85	6,986.22	6,986.42	STORM MH	0.19
36: I#1 (DP 16	I#1 (DP 16)	6,993.41	6,993.41	3.00	0.66	6,990.40	6,990.77	CDOT Type-	0.38
37: MH#4 DP	MH#4 DP 18)	6,993.40	6,993.40	15.60	1.42	6,987.09	6,987.76	STORM MH	0.67
38: I#2 (DP 17	I#2 (DP 17)	6,993.39	6,993.39	6.30	0.90	6,989.68	6,990.02	CDOT Type-	0.35
39: MH#6	MH#6	6,993.02	6,993.02	7.90	0.85	6,985.35	6,985.54	STORM MH	0.19
40: MH#5	MH#5	6,991.91	6,991.91	7.90	0.85	6,984.97	6,985.17	STORM MH	0.19
41: MH#3 (DP	MH#3 (DP 8)	6,991.13	6,991.13	8.30	0.56	6,981.67	6,981.95	STORM MH	0.28
42: I#3 (DP 7)	I#3 (DP 7)	6,990.73	6,990.73	7.90	0.93	6,986.58	6,987.03	CDOT Type-	0.45
43: 18 (DP 19)	18 (DP 19)	6,988.71	6,988.71	0.30	1.96	6,983.47	6,983.57	CDOT Type-	0.10
44: MH#2 (DP	MH#2 (DP 8)	6,985.74	6,985.74	8.30	0.87	6,981.30	6,981.50	STORM MH	0.20
45: I#4 (DP 13	I#4 (DP 13)	6,985.02	6,985.02	2.10	1.04	6,982.35	6,982.45	CDOT Type-	0.10
46: I#5 (DP 14	I#5 (DP 14)	6,985.02	6,985.02	3.90	1.09	6,982.13	6,982.34	CDOT Type-	0.21
47: MH#1	MH#1	6,984.95	6,984.95	8.30	0.87	6,980.92	6,980.95	STORM MH	0.03
49: 44 (69) (D	44 (69) (DP 15)	6,982.64	6,982.64	0.30	0.20	6,978.63	6,978.63	CDOT Type-	0.01
55: 44 (80)	44 (80)	6,975.21	6,975.21	4.20	0.62	6,971.37	6,971.38	Cylindrical S	0.01
56: 44 (81)	44 (81)	6,975.03	6,975.03	0.50	0.26	6,970.30	6,970.31	Cylindrical S	0.01
57: I#7 (DP 9)	I#7 (DP 9)	6,974.64	6,974.64	2.20	0.56	6,972.51	6,972.82	CDOT Type-	0.31
58: I#8 (DP 10	I#8 (DP 10)	6,974.64	6,974.64	4.20	0.72	6,971.90	6,972.17	CDOT Type-	0.27
59: I#6 (DP 1)	I#6 (DP 1)	6,973.20	6,973.20	0.50	0.26	6,971.11	6,971.25	CDOT Type-	0.14
60: 44 (78) (D	44 (78) (DP 11)	6,973.16	6,973.16	0.40	0.23	6,968.66	6,968.74	CDOT Type-	0.08
98: MH#26 (D	MH#26 (DP6.1)	7,027.15	7,027.15	2.90	0.59	7,021.09	7,021.47	STORM MH	0.38
99: MH#27 (D	MH#27 (DP8)	7,027.09	7,027.09	2.00	0.49	7,021.49	7,021.65	STORM MH	0.16
100: I#9 (DP6)	I#9 (DP6)	7,027.04	7,027.04	1.20	0.41	7,023.41	7,023.50	CDOT Type-	0.09
101: I#8 (DP5)	I#8 (DP5)	7,026.63	7,026.63	0.70	0.31	7,024.31	7,024.47	CDOT Type-	0.16
102: I#7 (DP3.	I#7 (DP3.1)	7,026.51	7,026.51	1.60	0.97	7,022.27	7,022.28	CDOT Type-	0.01
103: I#6 (DP2.	I#6 (DP2.1)	7,026.40	7,026.40	0.80	0.33	7,022.69	7,022.87	CDOT Type-	0.18
106: MH#34	MH#34	7,023.51	7,023.51	1.70	0.49	7,019.50	7,019.59	CDOT Type-	0.08
111: MH#21	MH#21	7,014.03	7,014.03	6.10	0.72	6,999.24	6,999.57	STORM MH	0.33
112: MH#20	MH#20	7,012.41	7,012.41	6.10	0.72	7,001.90	7,001.91	STORM MH	0.01
113: MH#19	MH#19	7,010.85	7,010.85	6.10	0.72	7,004.66	7,004.99	STORM MH	0.33
115: MH#22	MH#22	7,005.85	7,005.85	6.10	0.72	6,995.87	6,995.88	STORM MH	0.01
116: MH#9	MH#9	7,001.03	7,001.03	10.20	1.14	6,990.90	6,990.92	STORM MH	0.02
117: I#4 (DP1	I#4 (DP14)	7,000.17	7,000.17	5.20	0.88	6,996.57	6,997.11	CDOT Type-	0.55
118: MH#10 (	MH#10 (DP 1...	7,000.01	7,000.01	10.20	1.14	6,995.39	6,995.64	STORM MH	0.24
119: I#5 (DP 1	I#5 (DP 15)	6,999.67	6,999.67	5.00	0.46	6,996.36	6,996.89	CDOT Type-	0.53
120: MH#8	MH#8	6,996.13	6,996.13	10.20	1.15	6,988.02	6,988.32	STORM MH	0.30
121: MH#23	MH#23	6,997.20	6,997.20	6.10	0.72	6,989.54	6,989.55	STORM MH	0.01
122: MH#24	MH#24	6,996.25	6,996.25	6.10	1.51	6,989.51	6,989.51	STORM MH	0.00
123: DP12	DP12	6,996.40	6,996.40	3.60	0.67	6,990.98	6,991.35	CDOT Type-	0.36
124: MH#25 (	MH#25 (DP13)	6,995.75	6,995.75	26.00	1.51	6,989.01	6,989.51	STORM MH	0.50
190: INLET (D	INLET (DP 3)	6,980.96	6,980.96	3.70	0.63	6,978.80	6,979.13	CDOT FES	0.34
192: DP 7	DP 7	7,024.45	7,024.45	0.30	0.21	7,023.22	7,023.33	CDOT FES	0.11
193: DP 2	DP 2	7,024.26	7,024.26	1.70	0.45	7,021.71	7,021.95	CDOT FES	0.24
194: DP 3	DP 3	7,009.43	7,009.43	6.10	0.72	7,005.73	7,006.10	CDOT FES	0.37
196: CULVERT	CULVERT 1 (...	7,000.01	7,000.01	11.20	0.34	6,997.35	6,997.61	Dummy Null	0.25
197: CULVERT	CULVERT 2 (...	7,000.01	7,000.01	11.20	0.34	6,997.35	6,997.61	Dummy Null	0.25

	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	Notes
48: OUTFALL	OUTFALL	6,983.32	6,979.44		6,980.17	8.30	CDOT FES
53: 44 (70)	44 (70)	6,979.33	6,977.55		6,977.71	0.30	CDOT FES
54: 44 (65)	44 (65)	6,976.31	6,973.52		6,973.93	3.70	CDOT FES
61: 44 (77)	44 (77)	6,971.10	6,969.39		6,969.61	0.50	CDOT FES
64: 44 (79)	44 (79)	6,969.82	6,967.50		6,967.68	0.40	CDOT FES
107: DP9	DP9	7,022.74	7,019.00		7,019.39	2.90	CDOT FES
108: FES OUTF	FES OUTFALL 1	7,023.00	7,021.01		7,021.33	1.60	CDOT FES
110: MH#39	MH#39	7,018.18	7,017.01		7,017.39	1.70	CDOT FES
125: OUTLET S	OUTLET SEG...	6,991.09	6,986.67	6,988.30	6,988.30	26.00	CDOT FES
162: O-3	O-3	6,988.37	6,984.83		6,985.89	15.60	Dummy Null
164: O-5	O-5	6,982.10	6,981.08	6,982.10	6,982.10	3.90	Dummy Null
165: O-6	O-6	6,972.87	6,970.61		6,971.31	4.20	Dummy Null
203: O-7	O-7	6,998.27	6,995.27		6,995.49	11.20	Dummy Null
207: O-10	O-10	6,998.27	6,995.27		6,995.49	11.20	Dummy Null

NOTE: SEE PROFILES BELOW FOR PIPES STUDIED WITH THIS ANALYSIS


EASTONVILLE 12 - INLET - 5-YR FREE OUTFALL CONDITION
Elevation (ft)
Station (ft)
EGL
HGL
Label: I#6 (DP2.1)
Type: Manhole
ID: 103
Label: I#7 (DP3.1)
Type: Manhole
ID: 102
Label: P-93
Type: Conduit
ID: 137
Label: Pipe - (34)
Type: Conduit
ID: 138
Label: FES OUTFALL 1
Type: Outfall
ID: 108


EASTONVILLE 10 - 5-YR FREE OUTFALL CONDITION - Time: 0.00
Elevation (ft)
Station (ft)
EGL
HGL
Label: MH#10 (DP 15.1)
Type: Manhole
ID: 118
Label: I#5 (DP 15)
Type: Manhole
ID: 119
Label: MH#8
Type: Manhole
ID: 120
Label: MH#9
Type: Manhole
ID: 116
Label: P-84 (1)
Type: Conduit
ID: 148
Label: MH#4 DP 18)
Type: Manhole
ID: 37
Label: O-3
Type: Outfall
ID: 162
Label: P-89
Type: Conduit
ID: 127
Label: P-87
Type: Conduit
ID: 145
Label: P-87 (1)
Type: Conduit
ID: 145
Label: P-8 (1) (1)
Type: Conduit
ID: 66


EASTONVILLE 11 - 5-YR FREE OUTFALL CONDITION - Time: 0.00
Label: I#4 (DP14)
Type: Manhole
ID: 117
Label: P-84
Type: Conduit
ID: 147
Label: MH#10 (DP 15.1)
Type: Manhole
ID: 118
EGL
HGL
Elevation (ft)
Station (ft)
7,000.20
7,000.00
6,999.80
6,999.60
6,999.40
6,999.20
6,999.00
6,998.80
6,998.60
6,998.40
6,998.20
6,998.00
6,997.80
6,997.60
6,997.40
6,997.20
6,997.00
6,996.80
6,996.60
6,996.40
6,996.20
6,996.00
6,995.80
6,995.60
6,995.40
6,995.20
6,995.00
6,994.80
6,994.60
6,994.40
6,994.20
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0

APPENDIX D – WATER QUALITY & DETENTION

Design Procedure Form: Sand Filter (SF)

UD-BMP (Version 3.07, March 2018) **Sheet 1 of 2**

Designer: SPC
Company: HR Green
Date: January 30, 2024
Project: Eastonville Road - Segment 2 Improvements
Location: El Paso County, CO

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of sand filter) — I_a = 54.0 %

B) Tributary Area's Imperviousness Ratio (i = I_a/100) — i = 0.540

C) Water Quality Capture Volume (WQCV) Based on 12-hour Drain Time
WQCV= 0.8 * (0.91* i^3 - 1.19 * i^2 + 0.78 * i) — WQCV = 0.17 watershed inches

D) Contributing Watershed Area (including sand filter area) — Area = 27,443 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume
V_{WQCV} = WQCV / 12 * Area — V_{WQCV} = 398 cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — d_6 = in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume — $V_{WQCV\ OTHER}$ = cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{WQCV\ USER}$ = cu ft

2. Basin Geometry

A) WQCV Depth — D_{WQCV} = 1.0 ft

B) Sand Filter Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred). Use "0" if sand filter has vertical walls. — Z = 4.00 ft / ft

C) Minimum Filter Area (Flat Surface Area) — A_{Min} = 185 sq ft

D) Actual Filter Area — A_{Actual} = 200 sq ft

E) Volume Provided — V_T = 4288 cu ft

3. Filter Material

Choose One
(●) 18" CDOT Class B or C Filter Material
( ) Other (Explain):

4. Underdrain System

A) Are underdrains provided?

Choose One
(●) YES
( ) NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice — y = 2.0 ft

ii) Volume to Drain in 12 Hours — Vol_{12} = 398 cu ft

iii) Orifice Diameter, 3/8" Minimum — D_O = 7/16 in

Design Procedure Form: Sand Filter (SF)

Designer: SPC
Company: HR Green
Date: January 30, 2024
Project: Eastonville Road - Segment 2 Improvements
Location: El Paso County, CO

5. Impermeable Geomembrane Liner and Geotextile Separator Fabric A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?	Choose One: ○ YES ◉ NO
6. Inlet / Outlet Works A) Describe the type of energy dissipation at inlet points and means of conveying flows in excess of the WQCV through the outlet	Engery dissapation at inlet points provided via riprap, and means of conveying flows in excess of the WQCV through the outlet is via the modified type 'C' inlet outlet structure grate, and a restricted outlet pipe.

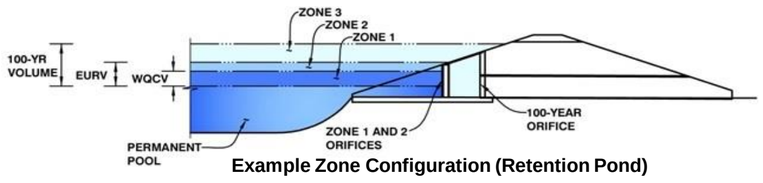
Notes:

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)

Project: **Eastonville Road**

Basin ID: **POND C**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**SF**	
Watershed Area =	0.63	acres
Watershed Length =	171	ft
Watershed Length to Centroid =	85	ft
Watershed Slope =	0.018	ft/ft
Watershed Imperviousness =	54.00%	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 =	12.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.009	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.037	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.93 in.) =	0.023	acre-feet	0.93 inches
5-yr Runoff Volume (P1 = 1.21 in.) =	0.032	acre-feet	1.21 inches
10-yr Runoff Volume (P1 = 1.46 in.) =	0.043	acre-feet	1.46 inches
25-yr Runoff Volume (P1 = 1.84 in.) =	0.063	acre-feet	1.84 inches
50-yr Runoff Volume (P1 = 2.16 in.) =	0.079	acre-feet	2.16 inches
100-yr Runoff Volume (P1 = 2.49 in.) =	0.097	acre-feet	2.49 inches
500-yr Runoff Volume (P1 = 3.37 in.) =	0.142	acre-feet	3.37 inches
Approximate 2-yr Detention Volume =	0.022	acre-feet	
Approximate 5-yr Detention Volume =	0.031	acre-feet	
Approximate 10-yr Detention Volume =	0.041	acre-feet	
Approximate 25-yr Detention Volume =	0.050	acre-feet	
Approximate 50-yr Detention Volume =	0.054	acre-feet	
Approximate 100-yr Detention Volume =	0.062	acre-feet	

Define Zones and Basin Geometry

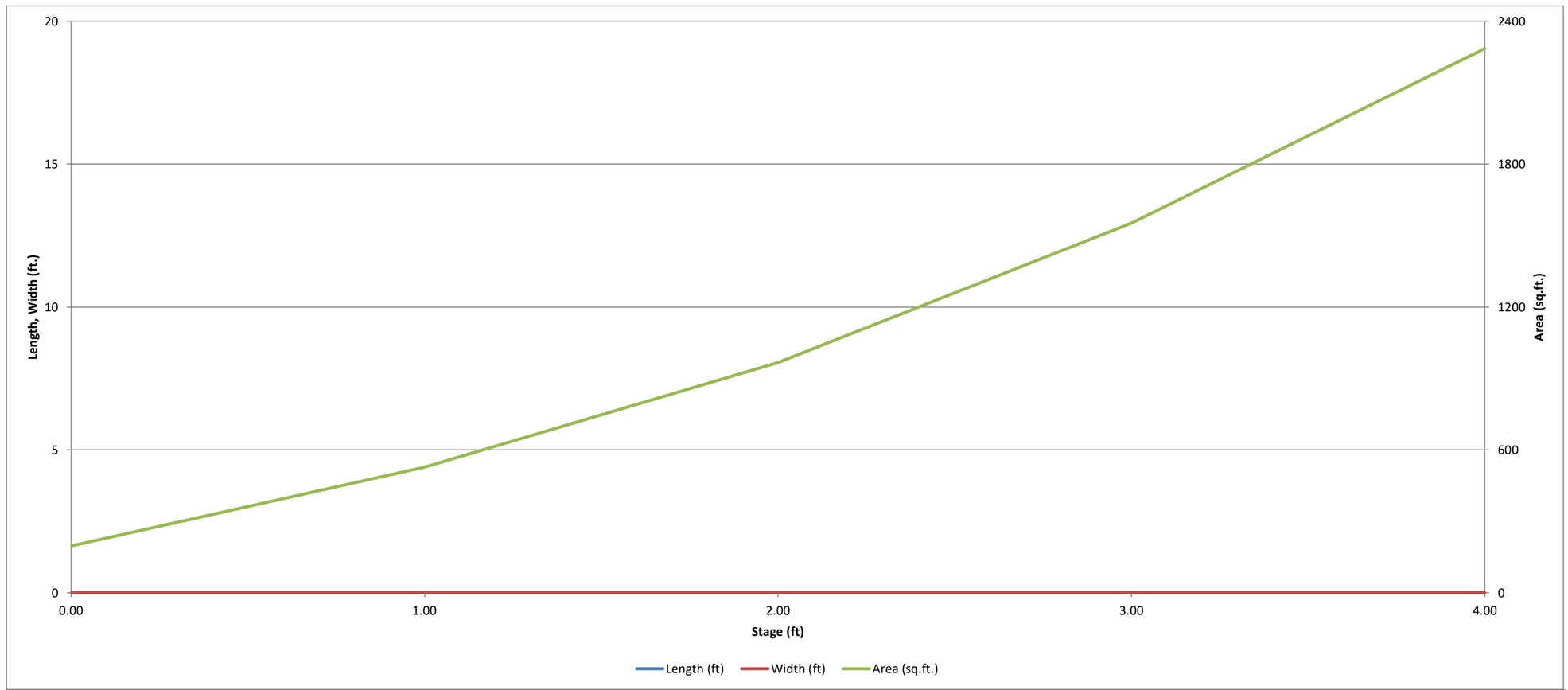
Zone 1 Volume (WQCV) =	0.009	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.027	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.025	acre-feet
Total Detention Basin Volume =	0.062	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

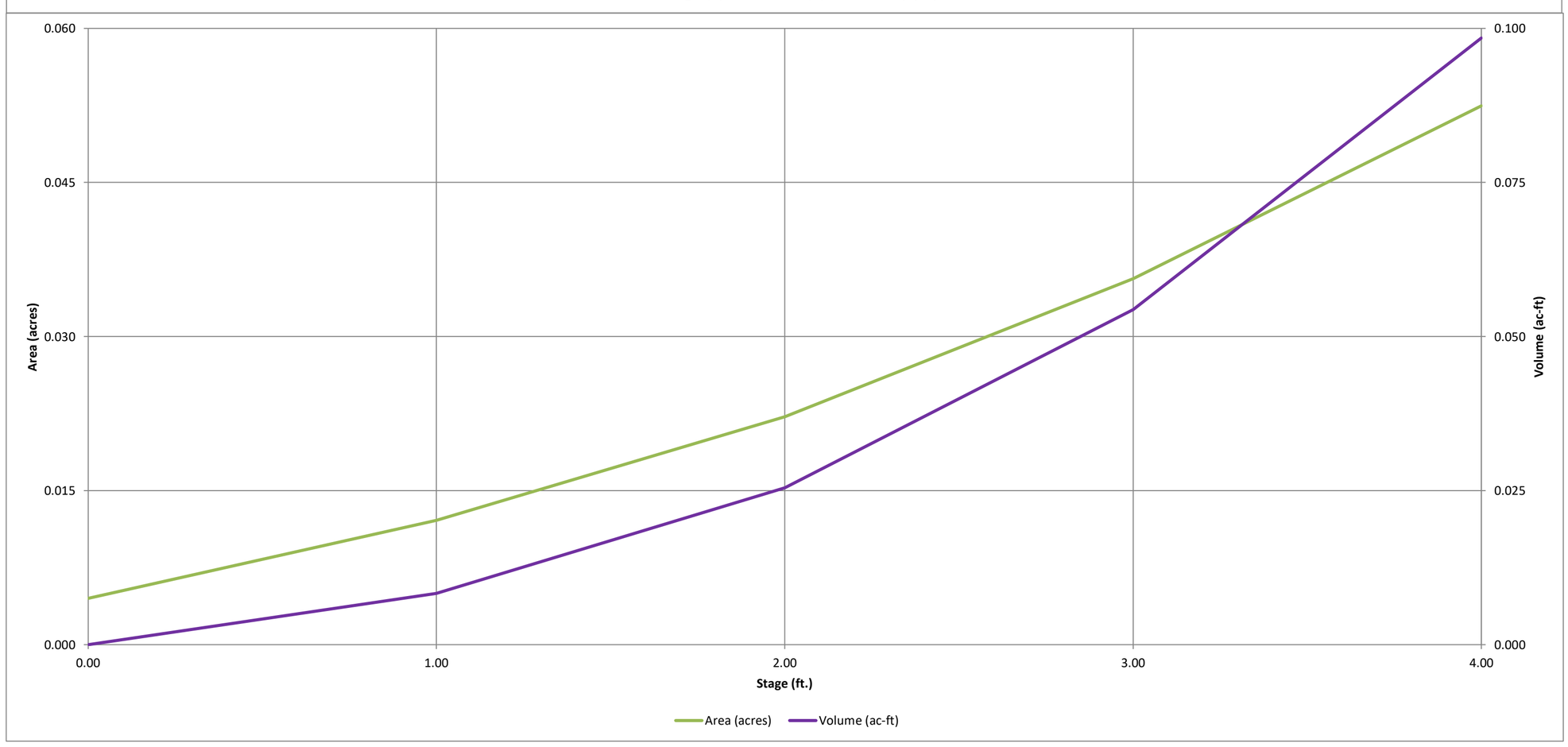
Depth Increment = ft

	Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
7021	**Media Surface**	--	0.00	--	--	--	197	0.005		
	7022	--	1.00	--	--	--	528	0.012	362	0.008
	7023	--	2.00	--	--	--	967	0.022	1,110	0.025
	7024	--	3.00	--	--	--	1,552	0.036	2,369	0.054
	7025	--	4.00	--	--	--	2,285	0.052	4,288	0.098

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)



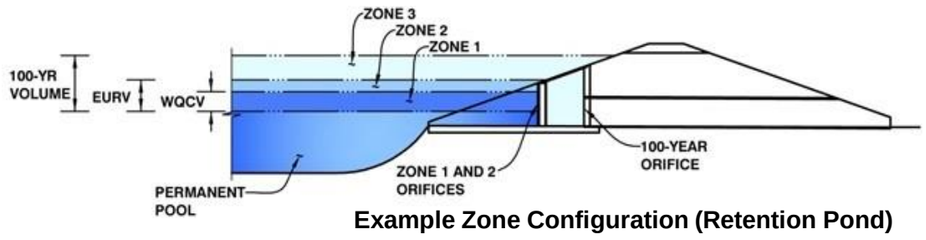


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)

Project: **Eastonville Road**

Basin ID: **POND C**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.07	0.009	Filtration Media
Zone 2 (EURV)	2.45	0.027	Filtration Media
Zone 3 (100-year)	3.20	0.025	Weir&Pipe (Restrict)
Total (all zones)		0.062	

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

Underdrain Orifice Invert Depth =	1.97	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.47	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft^2
Underdrain Orifice Centroid =	0.02	feet

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

Centroid of Lowest Orifice =	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	N/A	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	N/A	sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	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 (optional)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	2.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	3.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	2.50	N/A	feet
Overflow Weir Slope Length =	3.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	63.46	N/A	
Overflow Grate Open Area w/o Debris =	6.26	N/A	ft^2
Overflow Grate Open Area w/ Debris =	3.13	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 =	2.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	12.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	2.20		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.10	N/A	ft^2
Outlet Orifice Centroid =	0.11	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	0.88	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	2.86	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	12.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.14	feet
Stage at Top of Freeboard =	4.00	feet
Basin Area at Top of Freeboard =	0.05	acres
Basin Volume at Top of Freeboard =	0.10	acre-ft

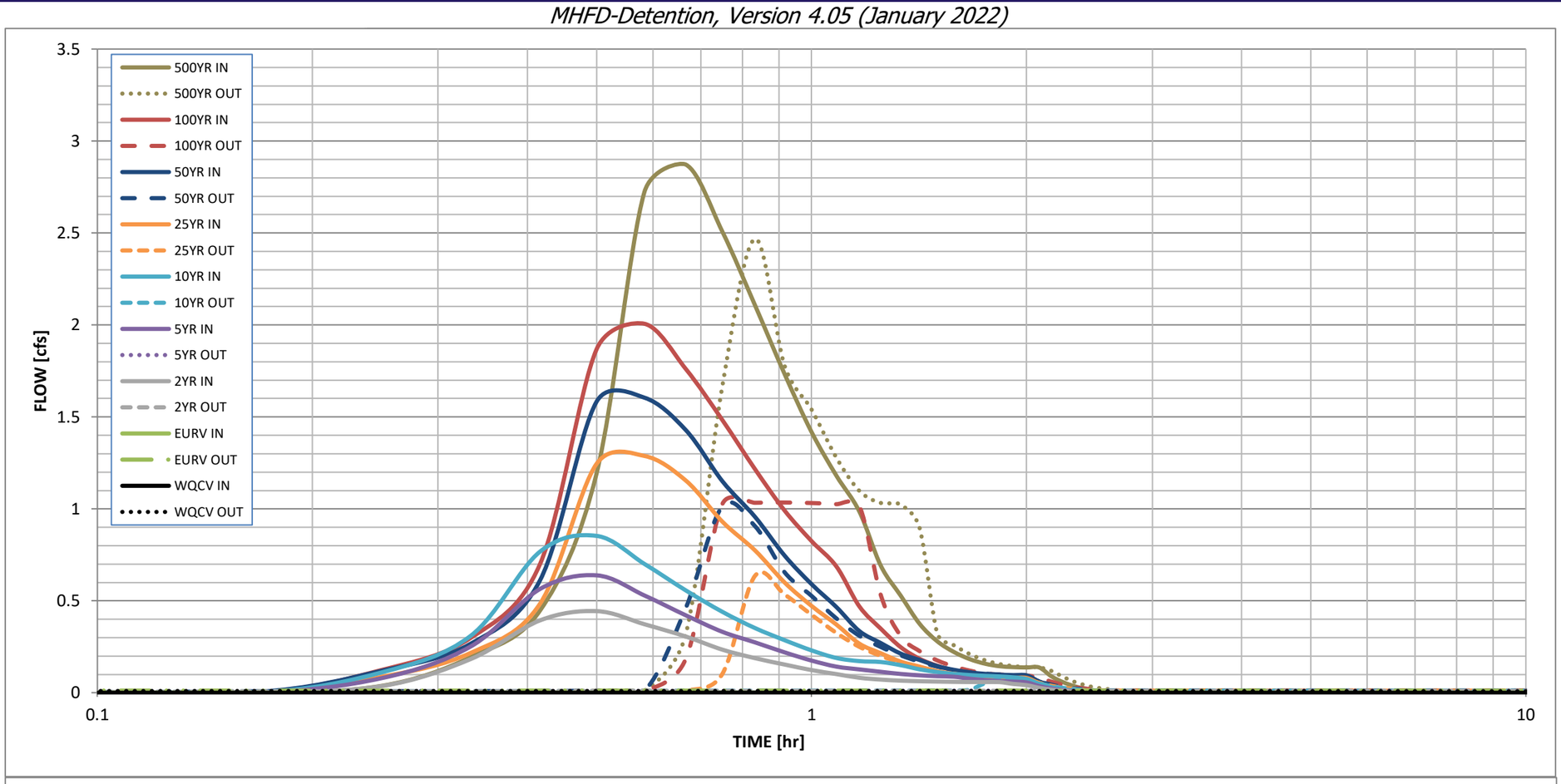
Routed Hydrograph Results

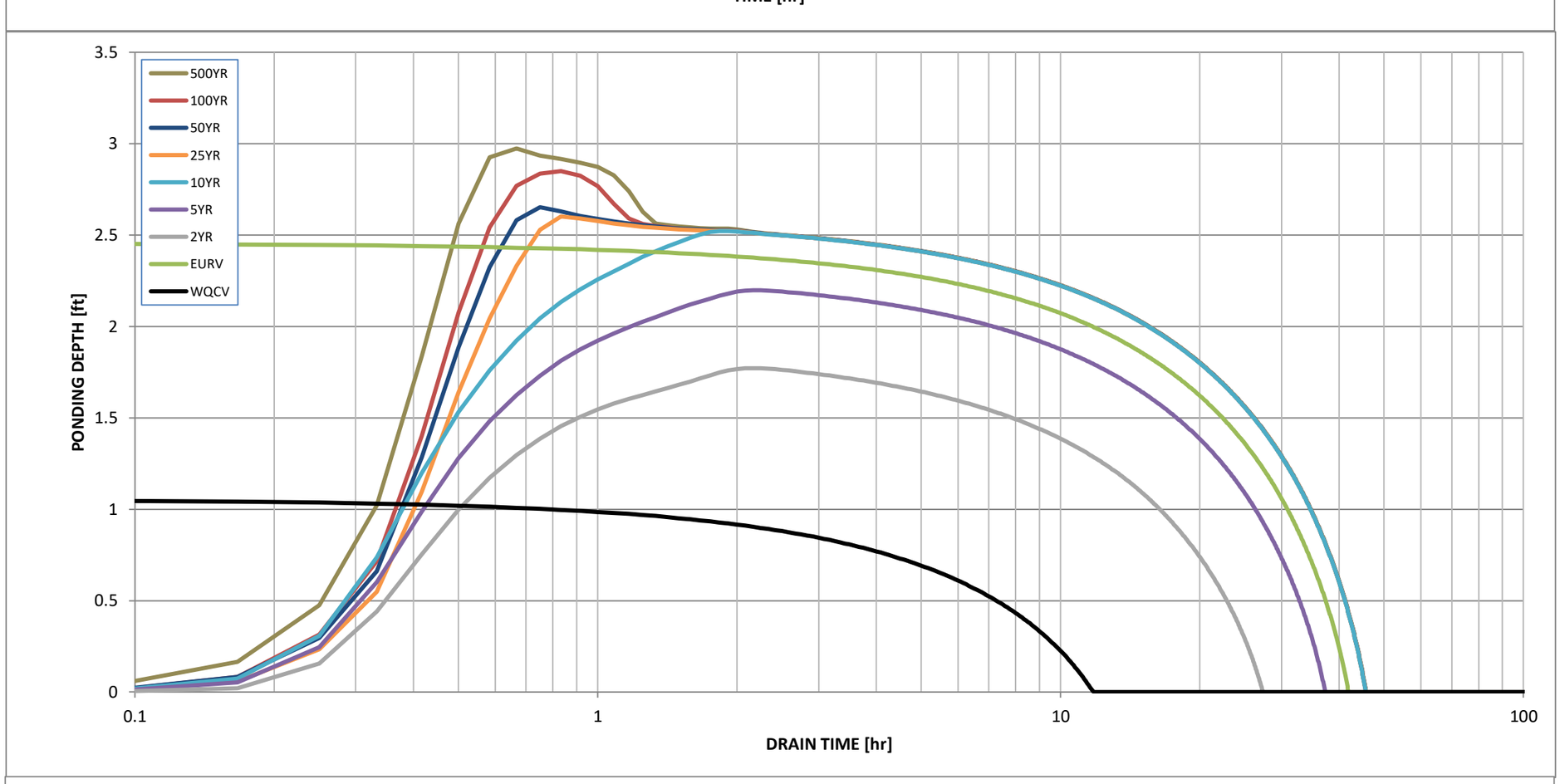
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

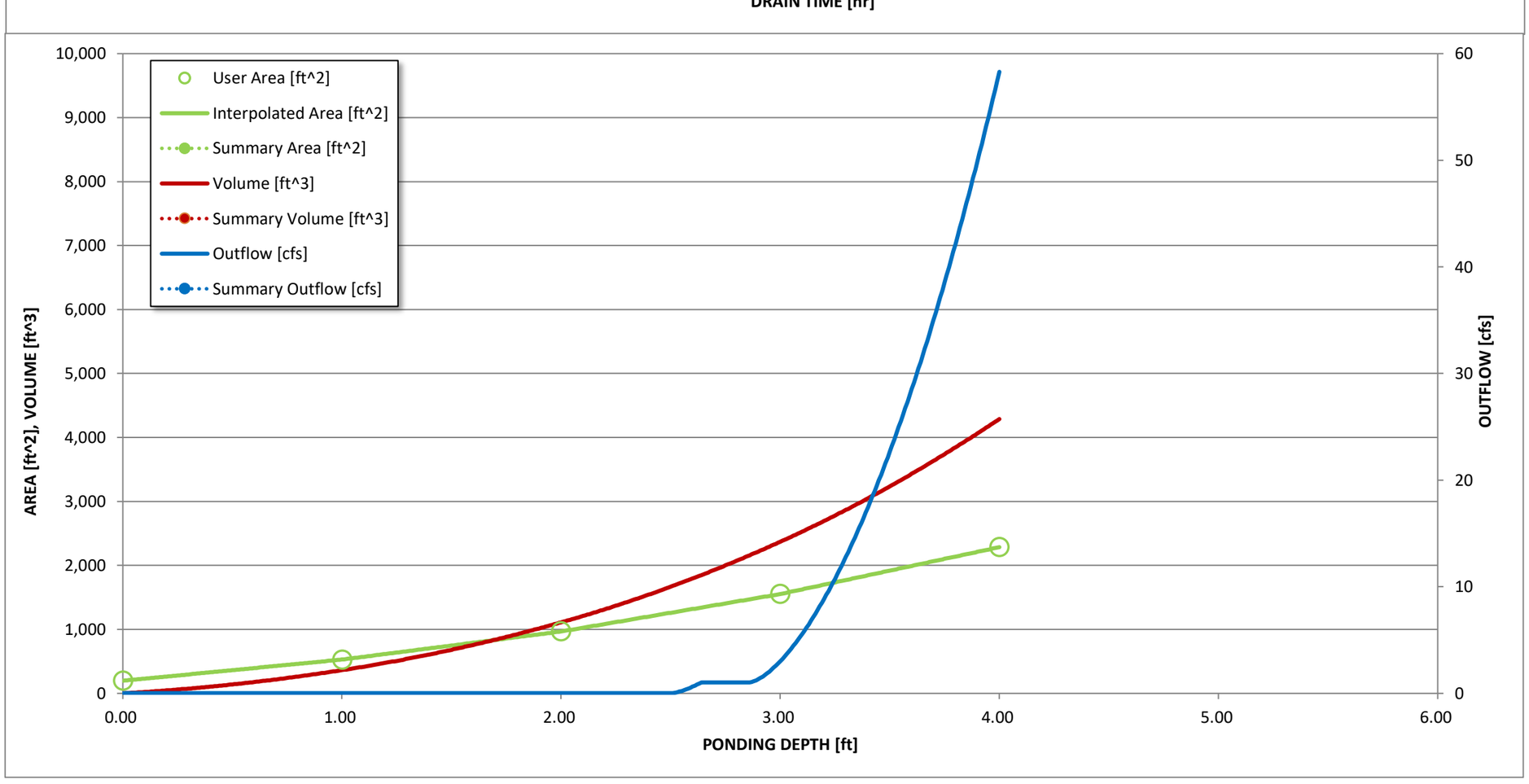
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.93	1.21	1.46	1.84	2.16	2.49	3.37
CUHP Runoff Volume (acre-ft) =	0.009	0.037	0.023	0.032	0.043	0.063	0.079	0.097	0.142
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.023	0.032	0.043	0.063	0.079	0.097	0.142
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.1	0.2	0.5	0.8	1.0	1.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.12	0.32	0.87	1.20	1.59	2.49
Peak Inflow Q (cfs) =	N/A	N/A	0.4	0.6	0.9	1.3	1.6	2.0	2.9
Peak Outflow Q (cfs) =	0.0	0.0	0.0	0.0	0.1	0.6	1.0	1.0	2.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.4	1.2	1.3	1.0	1.6
Structure Controlling Flow =	Filtration Media	Filtration Media	Filtration Media	Filtration Media	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.1	0.2	0.2	0.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	11	40	26	36	44	43	42	42	40
Time to Drain 99% of Inflow Volume (hours) =	**12**	41	27	37	45	45	45	44	44
Maximum Ponding Depth (ft) =	1.06	2.46	1.77	2.20	2.52	2.60	2.65	2.85	2.97
Area at Maximum Ponding Depth (acres) =	0.01	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.04
Maximum Volume Stored (acre-ft) =	0.009	0.037	0.021	0.030	0.039	0.041	0.043	0.049	0.053

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
	0:15:00	0.00	0.00	0.04	0.08	0.11	0.09	0.12	0.12	0.19
	0:20:00	0.00	0.00	0.18	0.25	0.31	0.22	0.27	0.30	0.45
	0:25:00	0.00	0.00	0.39	0.56	0.77	0.48	0.61	0.70	1.19
	0:30:00	0.00	0.00	0.44	0.64	0.85	1.25	1.58	1.87	2.72
	0:35:00	0.00	0.00	0.37	0.53	0.70	1.29	1.60	2.01	2.87
	0:40:00	0.00	0.00	0.31	0.42	0.56	1.15	1.43	1.76	2.51
	0:45:00	0.00	0.00	0.23	0.33	0.44	0.93	1.15	1.48	2.11
	0:50:00	0.00	0.00	0.19	0.27	0.35	0.77	0.96	1.22	1.73
	0:55:00	0.00	0.00	0.15	0.22	0.29	0.60	0.75	0.99	1.42
	1:00:00	0.00	0.00	0.12	0.18	0.23	0.47	0.59	0.83	1.18
	1:05:00	0.00	0.00	0.10	0.14	0.19	0.37	0.47	0.69	0.99
	1:10:00	0.00	0.00	0.08	0.13	0.17	0.27	0.34	0.47	0.69
	1:15:00	0.00	0.00	0.07	0.11	0.17	0.22	0.27	0.35	0.53
	1:20:00	0.00	0.00	0.07	0.10	0.15	0.17	0.21	0.25	0.38
	1:25:00	0.00	0.00	0.06	0.10	0.13	0.14	0.18	0.19	0.28
	1:30:00	0.00	0.00	0.06	0.09	0.11	0.12	0.15	0.15	0.22
	1:35:00	0.00	0.00	0.06	0.09	0.10	0.10	0.12	0.12	0.18
	1:40:00	0.00	0.00	0.06	0.08	0.10	0.09	0.11	0.11	0.16
	1:45:00	0.00	0.00	0.06	0.07	0.09	0.09	0.10	0.10	0.14
	1:50:00	0.00	0.00	0.06	0.06	0.09	0.08	0.10	0.09	0.14
	1:55:00	0.00	0.00	0.05	0.06	0.08	0.08	0.10	0.09	0.14
	2:00:00	0.00	0.00	0.04	0.06	0.08	0.08	0.10	0.09	0.14
	2:05:00	0.00	0.00	0.03	0.04	0.05	0.05	0.06	0.06	0.09
	2:10:00	0.00	0.00	0.02	0.02	0.03	0.03	0.04	0.04	0.06
	2:15:00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.04
	2:20:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.02
	2:25:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	2:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

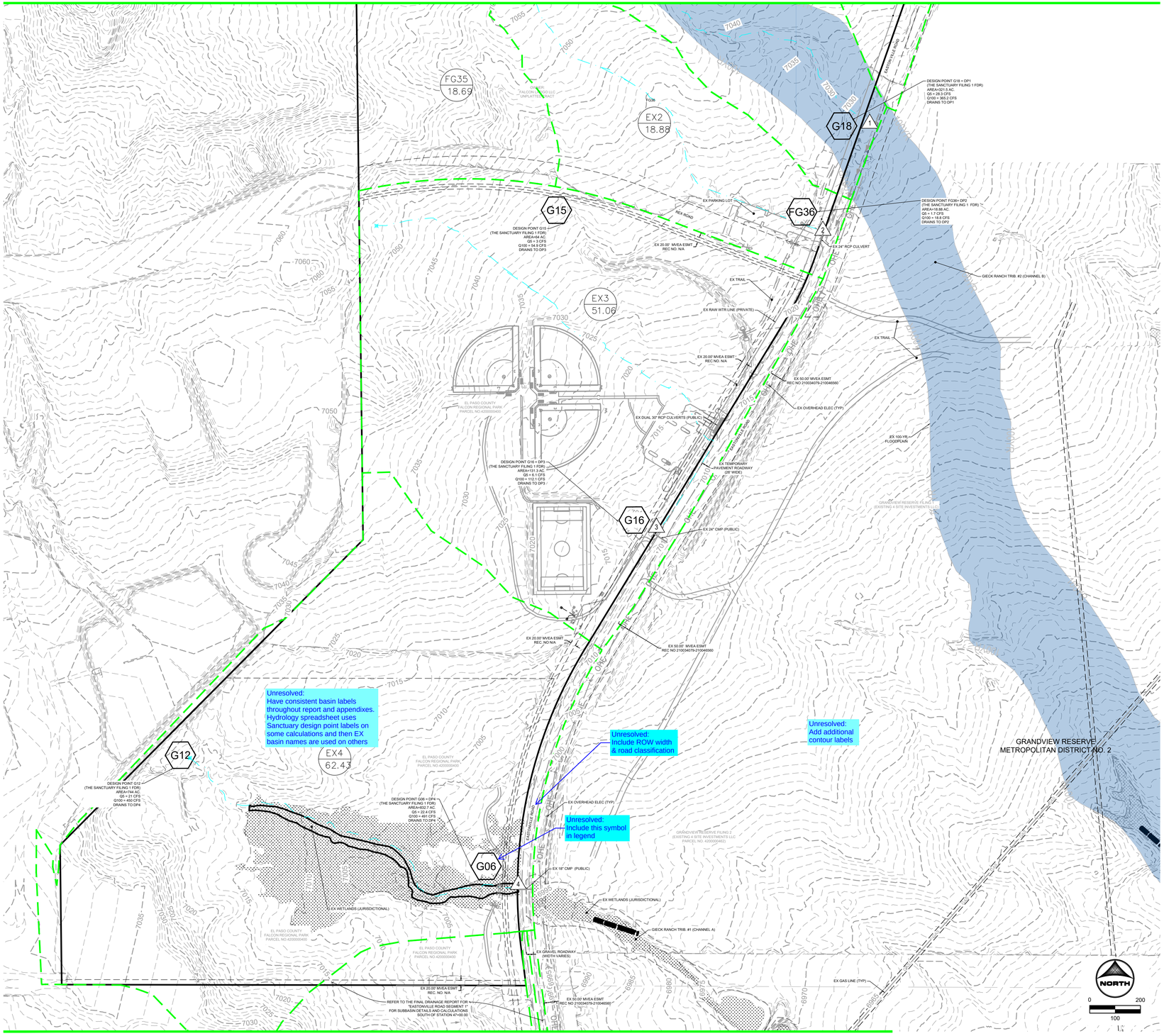
Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

APPENDIX E – DRAINAGE MAPS

SEE SHEET 2



Unresolved:
Have consistent basin labels throughout report and appendixes. Hydrology spreadsheet uses Sanctuary design point labels on some calculations and then EX basin names are used on others

Unresolved:
Include ROW width & road classification

Unresolved:
Include this symbol in legend

Unresolved:
Add additional contour labels

REFER TO EASTONVILLE ROAD SEGMENT 1 FDR

LEGEND:

- EXISTING MAJOR CONTOUR — — — 5250 — — —
- EXISTING MINOR CONTOUR
- EX STORM SEWER
- EX DRAINAGE SWALE
- EX PROPERTY LINE
- EXISTING FLOW DIRECTION
- PROPOSED DRAINAGE BASIN
- DESIGN POINT
- PROPOSED BASIN LABEL (NAME / AREA)

Unresolved:
- Add Basin and Design Point Summary Tables
- Label all existing easements (all maps)
- Text is hard to read, suggest making it a little larger
-Could not find Design Points G15, G18, FG36, or G16 in the Sanctuary FDR for comparison. Recommended highlighting them in the reference section.

DRAWN BY:	SPC	JOB DATE:	1/30/2024
APPROVED:	CM	JOB NUMBER:	201662.08
CAD DATE:	1/31/2024		
CAD FILE:	J:\2020\201662\CAD\Dwgs\C\Eastonville_Road_662.08\Drainage\201662.08_FDR_map_ex_Seq2		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 — 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PKWY SUITE 230
COLORADO SPRINGS CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

EASTONVILLE ROAD
D.R. HORTON
EL PASO COUNTY, CO

D·R·HORTON America's Builder

EXISTING CONDITIONS - DRAINAGE MAP

SHEET DRN 1

CALLAHAN, SEAN, 1/31/2024 3:15 PM

LEGEND:

- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- EX STORM SEWER
- EX DRAINAGE SWALE
- EX PROPERTY LINE
- EXISTING FLOW DIRECTION
- PROPOSED DRAINAGE BASIN
- DESIGN POINT
- PROPOSED BASIN LABEL (NAME / AREA)

EX1
85.16

EX2
18.88

EX3
51.06

EX LOWPOINT
(DRAINS BASIN OS11 ACROSS EASTONVILLE)

MR

EASTONVILLE ROAD

DESIGN POINT G18 = DP1
(THE SANCTUARY FILING 1 FDR)
AREA=321.5 AC.
Q5 = 28.3 CFS
Q100 = 365.2 CFS
DRAINS TO DP1

G18

1

OWNER:
FALCON LATIGO LLC
UNPLATTED TRACT

FG36

DESIGN POINT FG36= DP2
(THE SANCTUARY FILING 1 FDR)
AREA=18.88 AC.
Q5 = 1.7 CFS
Q100 = 18.8 CFS
DRAINS TO DP2

EX PARKING LOT

G15

REX ROAD

DESIGN POINT G15
E SANCTUARY FILING 1 FDR)
AREA=64 AC.
Q5 = 3 CFS
Q100 = 54.9 CFS
DRAINS TO DP3

EX 20.00' MVEA ESMT
REC NO. N/A

EX 24" RCP CULVERT

GIECK RANCH TRIB. #2 (CHANNEL B)

EX TRAIL

EX RAW WTR LINE (PRIVATE)

EX TRAIL

NORTH

0 200

100

Unresolved:
Viewport appears to be at a larger scale than the previous sheet, even though scales say they are the same. Please have viewport at same scale as previous sheet.

SEE SHEET 1

DRAWN BY:	SPC	JOB DATE:	1/30/2024
APPROVED:	CM	JOB NUMBER:	201662.08
CAD DATE:	1/31/2024		
CAD FILE:	J:\2020\201662\CAD\Dwgs\C\Eastonville_Road_662.08\Drainage\201662.08_FDR_map_ex_Sg2		

BAR IS ONE INCH ON OFFICIAL DRAWINGS.
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

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EASTONVILLE ROAD
D.R. HORTON
EL PASO COUNTY, CO

D·R·HORTON America's Builder

EXISTING CONDITIONS - DRAINAGE MAP

SHEET DRN 2

HR GREEN Xrefs: xgl-1-dh01_FDR_EX_ex_drain_map_legend; xv-dsgn_662; xv-utl_662; xv-cove-662; 201662.08_FDR_map_ex_Sg1

SEE SHEET 2

SEE EXISTING CONDITIONS DRAINAGE MAP

DP12 SWALE

EX MVEA ABOVE GROUND ELECTRICAL BOX TO REMAIN

EX WELL STATION

GRANDVIEW RESERVE FILING 1 (EXISTING 4 SITE INVESTMENTS LLC PARCEL NO. 4200000462)

EX 50.00' MVEA ESMT REC NO 210034079-210046560

Unresolved: Is there a wall along here? If so, please label

EA8 2.08

EA9 2.99

DP16 SWALE

Unresolved: Add additional contour labels

G12

DESIGN POINT G12 (MERIDIAN RANCH MDDP) Q5 = 21 CFS Q100 = 450 CFS DRAINS TO DP16

EL PASO COUNTY FALCON REGIONAL PARK PARCEL NO.4200000400

OS6 60.83

Label inlets and include if sump/at-grade and size

Label all storm infrastructure, include if public/private and existing/proposed/future.

15" RCP (PUBLIC)

FUTURE GRANDVIEW RESERVE

24" RCP (PUBLIC)

EX STORM PIPE TO BE REMOVED

GRANDVIEW RESERVE TO DETAIN REMAINING ROUNDABOUT AREA

G06

EA11 0.15

DESIGN POINT G06 = DP4 (THE SANCTUARY FILING 1 FDR) AREA=832.7 AC. Q5 = 22.4 CFS Q100 = 491 CFS DRAINS TO DP4

CHANNEL A (GIECK RANCH TRIBUTARY 1)

Can't read label

TYPE L RIPRAP SPILLWAY

24" RCP (PUBLIC)

EX CULVERTS TO REMAIN

DUAL 10' X 3.5' RCBC (PUBLIC)

END OF SEGMENT 1 EASTONVILLE RD IMPROVEMENTS

EA10 0.16

GRANDVIEW RESERVE FILING 2 (EXISTING 4 SITE INVESTMENTS LLC PARCEL NO. 4200000462)

GIECK RANCH TRIBUTARY 1

18" RCP (PUBLIC)

42" RCP (PUBLIC)

DP7 SWALE (SWALE 3)

EDB B FULL SPECTRUM EXTENDED DETENTION BASIN

CONCRETE FOREBAY & 2.0' CONCRETE TRICKLE CHANNEL

EX 20.00' MVEA ESMT REC. NO. N/A

SUBBASIN "FUTURE" TRIBUTARY TO PROVIDED STORM SEWER STUB

REFER TO THE FINAL DRAINAGE REPORT FOR "EASTONVILLE ROAD SEGMENT 1" FOR SUBBASIN DETAILS AND CALCULATIONS SOUTH OF STATION 47+00.00

10' CDOT Type-R

6' CDOT Type-D

???' STORM MH

Provide MH size

Label drainage easement. Easement needs to include all of riprap.

48.00' PVMT WIDTH

EX 50.00' MVEA ESMT REC NO 210034079-210046560

Unresolved: Ensure all existing and proposed easements are labeled

TYPE A C&G

Unresolved: Label road and include ROW width and classification

MERIDIAN RANCH INVESTMENTS INC PARCEL NO. 4200000451

PR 100.00' ROW

REFER TO EASTONVILLE ROAD SEGMENT 1 FDR

LEGEND:

PROPOSED MAJOR CONTOUR	5250
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	5250
EXISTING MINOR CONTOUR	
PROPOSED STORM SEWER	
PROPOSED DRAINAGE SWALE	
PROPERTY LINE	
PROPOSED FLOW DIRECTION	
EXISTING FLOW DIRECTION	
PROPOSED DRAINAGE BASIN	
DESIGN POINT	1
PROPOSED BASIN LABEL	NAME / AREA
PRELIMINARY 100-YR FLOODPLAIN	
WETLANDS	
DESIGN POINT PER MERIDIAN RANCH	XX

Missing Basins OS1, OS2. OS6 & FG35 in summary table.

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q5 (cfs)	Q100 (cfs)
EA1	0.22	73	0.8	1.5
EA2	0.25	72	0.9	1.7
EA3	0.20	70	0.7	1.3
EA4	0.17	65	0.5	1.1
EA5	0.16	0	0.1	0.4
EA6	0.70	100	3.2	5.3
EA7	0.65	89	2.6	4.8
EA8	2.08	99	5.2	8.8
EA9	2.99	63	5.0	10.4
EA10	0.16	75	0.6	1.1
EA11	0.15	67	0.5	1.0
*G18	321.53	-	28.3	365.2
*FG36	18.88	-	1.7	18.8
OS3	1.00	2	0.3	2.2
OS4	9.60	9	4.8	21.6
*G16	131.26	-	6.1	112.1
*G06	832.70	-	22.4	491.0
OS7	11.42	2	3.6	24.4

These are design point labels. Please move to design point table and list corresponding basins in this table.

* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)
1	G18	28.3	365.2
2	FG36	1.7	18.8
2.1	EA1	0.8	1.5
3	G16	6.1	112.1
3.1	EA2, DP2.1	1.6	3.2
4	G06	22.4	491.0
4.1	EA5, DP3.1	1.7	3.4
5	EA3	0.7	1.3
6	DP5, EA4	1.2	2.4
6.1	DP6, DP8	2.9	22.4
7	OS3	0.3	2.2
8	DP2, DP7	2.0	21.0
9	DP6.1	2.9	22.4
10	EA6, EA7	5.6	9.9
11	OS4, DP9	7.5	44.0
12	OS7	3.6	24.4
13	DP2, DP12	26.0	136.4
14	EA8	5.2	8.8
15	EA9	5.0	10.4
15.1	DP14, DP15	10.2	19.1
16.1	EA10	0.6	1.1
17.1	EA11	0.5	1.0

NORTH

0 100

50

DRAWN BY:	SPC	JOB DATE:	3/12/2024
APPROVED:	CM	JOB NUMBER:	201662.08
CAD DATE:	3/15/2024		
CAD FILE:	J:\2020\201662\CAD\Dwgs\C\Eastonville_Road_662.08\Drainage\201662.08_FDR_map_Seg2		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"

IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen

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1975 RESEARCH PKWY SUITE 230
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EASTONVILLE ROAD
D.R. HORTON
EL PASO COUNTY, CO

D·R·HORTON America's Builder

PROPOSED CONDITIONS - DRAINAGE MAP

SHEET DRN 1

SEE EXISTING CONDITIONS DRAINAGE MAP

SEE EXISTING CONDITIONS DRAINAGE MAP

FG35
18.69

OS2
15.03

OS1
85.16

G18

DESIGN POINT G18 = DP1
(THE SANCTUARY FILING 1 FDR)
AREA=321.5 AC.
Q5 = 28.3 CFS
Q100 = 365.2 CFS
DRAINS TO DP1

EX DRAINAGE SWALE
(REDIRECTS FG38 TO CHANNEL B)

Unresolved:
Show and label Basin FG38

DESIGN POINT FG36= DP2
(THE SANCTUARY FILING 1 FDR)
AREA=18.88 AC.
Q5 = 1.7 CFS
Q100 = 18.8 CFS
DRAINS TO DP2

Unresolved:
Show and label existing culvert, mentioned in report. Show limits of water elevation overtopping roadway

Unresolved:
Do OS1/G18 flows spill this way before overtopping Eastonville?

OS3
1.00

EA2
0.25

G15

FG36

EA1
0.22

DESIGN POINT G15
(THE SANCTUARY FILING 1 FDR)
AREA=64 AC.
Q5 = 3 CFS
Q100 = 54.9 CFS
DRAINS TO DP3

REX ROAD

EX STORM PIPE
TO BE REMOVED

18" RCP (PUBLIC)

POND C
(WQ SAND FILTER)

EA3
0.20

EX 20.00' MVEA ESMT
REC NO. N/A

EA4
0.17

PR. TEMPORARY SEDIMENT BASIN #1

18" RCP (PUBLIC)

EA5
0.16

PR 10' X 4' RCBC
(FUTURE)

18" RCP (PUBLIC)

DP10 SWALE

24" RCP (PUBLIC)

EL PASO COUNTY
FALCON REGIONAL PARK
PARCEL NO.4200000400

OS4
9.60

DP9.1 SWALE

FUTURE
REX
ROAD

EA7
0.65

EA6
0.70

Unresolved:
Provide calculations for all swales

W/ 12" PVC RISER PIPE

TYPE L RIPRAP
SPILLWAY

EX CULVERTS
TO REMAIN

EX 100-YR FLOODPLAIN

EX 20.00' MVEA ESMT
REC NO. N/A

TYPE 2 C&G

DP11 SWALE

EX 50.00' MVEA ESMT
REC NO 210034079-210046560

CHANNEL B - GIECK RANCH TRIB. 2
(NOT A PART OF THIS PROJECT,
SHOWN FOR REFERENCE)

OS7
11.42

CD's have these culverts as remaining. Please coordinate between plans and map to show same information. If they remain, please provide analysis showing how pipes work with developed flow

EX CULVERTS
(TO BE FLOW FILLED)

EX PARKING AREA TO REMAIN

OS5
40.26

EA9
2.99

GRANDVIEW RESERVE FILING 1
(EXISTING 4 SITE INVESTMENTS LLC)

EA8
2.08

EL PASO COUNTY
FALCON REGIONAL PARK
PARCEL NO.4200000400

DESIGN POINT G16 = DP3
(THE SANCTUARY FILING 1 FDR)
AREA=131.3 AC.
Q5 = 6.1 CFS
Q100 = 112.1 CFS
DRAINS TO DP3

48" RCP (PUBLIC)

DP12 SWALE

48" RCP (PUBLIC)

EX POND TO REMAIN

EASTONVILLE ROAD

G16

EX STORM PIPE
TO BE REMOVED

Provide DP

EX 20.00' MVEA ESMT
REC. NO N/A

48" RCP (PUBLIC)

48" RCP (PUBLIC)

SEE SHEET 1

NORTH

0 50 100

LEGEND:

PROPOSED MAJOR CONTOUR	5250
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	5250
EXISTING MINOR CONTOUR	
PROPOSED STORM SEWER	
PROPOSED DRAINAGE SWALE	
PROPERTY LINE	
PROPOSED FLOW DIRECTION	
EXISTING FLOW DIRECTION	
PROPOSED DRAINAGE BASIN	
DESIGN POINT	1
PROPOSED BASIN LABEL	NAME / AREA
PRELIMINARY 100-YR FLOODPLAIN	
WETLANDS	
DESIGN POINT PER MERIDIAN RANCH	XX

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q5 (cfs)	Q100 (cfs)
EA1	0.22	73	0.8	1.5
EA2	0.25	72	0.9	1.7
EA3	0.20	70	0.7	1.3
EA4	0.17	65	0.5	1.1
EA5	0.16	0	0.1	0.4
EA6	0.70	100	3.2	5.3
EA7	0.65	89	2.6	4.8
EA8	2.08	99	5.2	8.8
EA9	2.99	63	5.0	10.4
EA10	0.16	75	0.6	1.1
EA11	0.15	67	0.5	1.0
*G18	321.53	-	28.3	365.2
*FG36	18.88	-	1.7	18.8
OS3	1.00	2	0.3	2.2
OS4	9.60	9	4.8	21.6
*G16	131.26	-	6.1	112.1
*G06	832.70	-	22.4	491.0
OS7	11.42	2	3.6	24.4

* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)
1	G18	28.3	365.2
2	FG36	1.7	18.8
2.1	EA1	0.8	1.5
3	GP16, DP11	6.1	112.1
3.1	EA2, DP2.1	1.6	3.2
4	G06	22.4	491.0
4.1	EA5, DP3.1	1.7	3.4
5	EA3	0.7	1.3
6	DP5, EA4	1.2	2.4
6.1	DP6, DP8	2.9	22.4
7	OS3	0.3	2.2
8	DP2, DP7	2.0	21.0
9	DP6.1	2.9	22.4
10	EA6, EA7	5.6	9.9
11	OS4, DP9	7.5	44.0
12	OS7	3.6	24.4
13	DP3, DP12	26.0	136.4
14	EA8	5.2	8.8
15	EA9	5.0	10.4
15.1	DP14, DP15	10.2	19.1
16.1	EA10	0.6	1.1
17.1	EA11	0.5	1.0

DRAWN BY: SPC JOB DATE: 3/15/2024
APPROVED: CM JOB NUMBER: 201662.08
CAD DATE: 3/22/2024
CAD FILE: J:\2020\201662\CAD\Dwgs\C\Eastonville_Road_662.08\Drainage\201662.08_FDR_map_Seg2

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

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EASTONVILLE ROAD
D.R. HORTON
EL PASO COUNTY, CO

D·R·HORTON America's Builder

PROPOSED CONDITIONS - DRAINAGE MAP

SHEET DRN 2