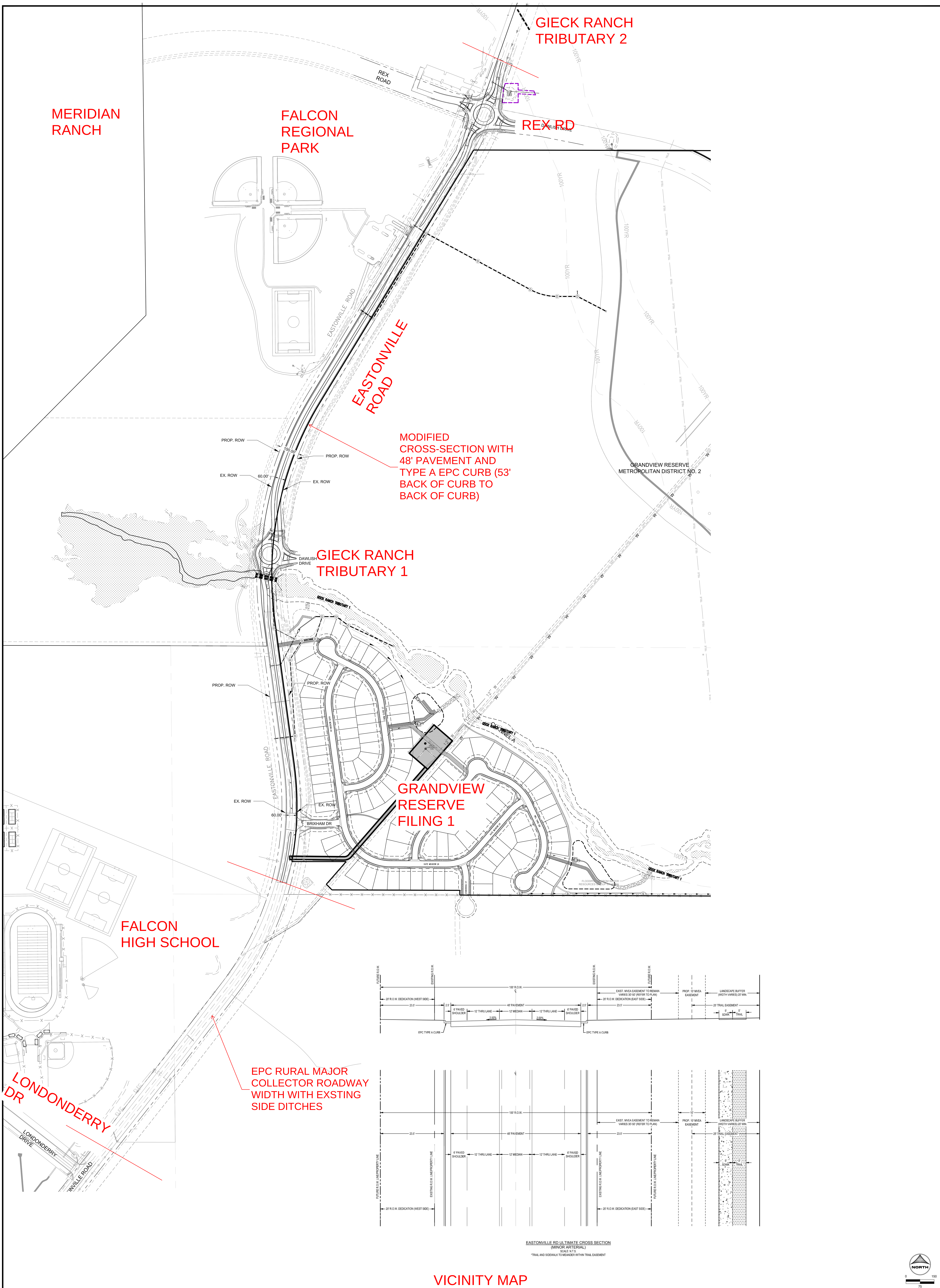


DRAWN BY: CPM	JOB DATE: 8/29/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
APPROVED:	JOB NUMBER: 201662.08		
CAD DATE: 8/29/2023			
CAD FILE: J:\2020\201662.08\CAD\Dwgs\Exhibits\-Overall-Exhibit			

NO.	DATE	BY	REVISION DESCRIPTION

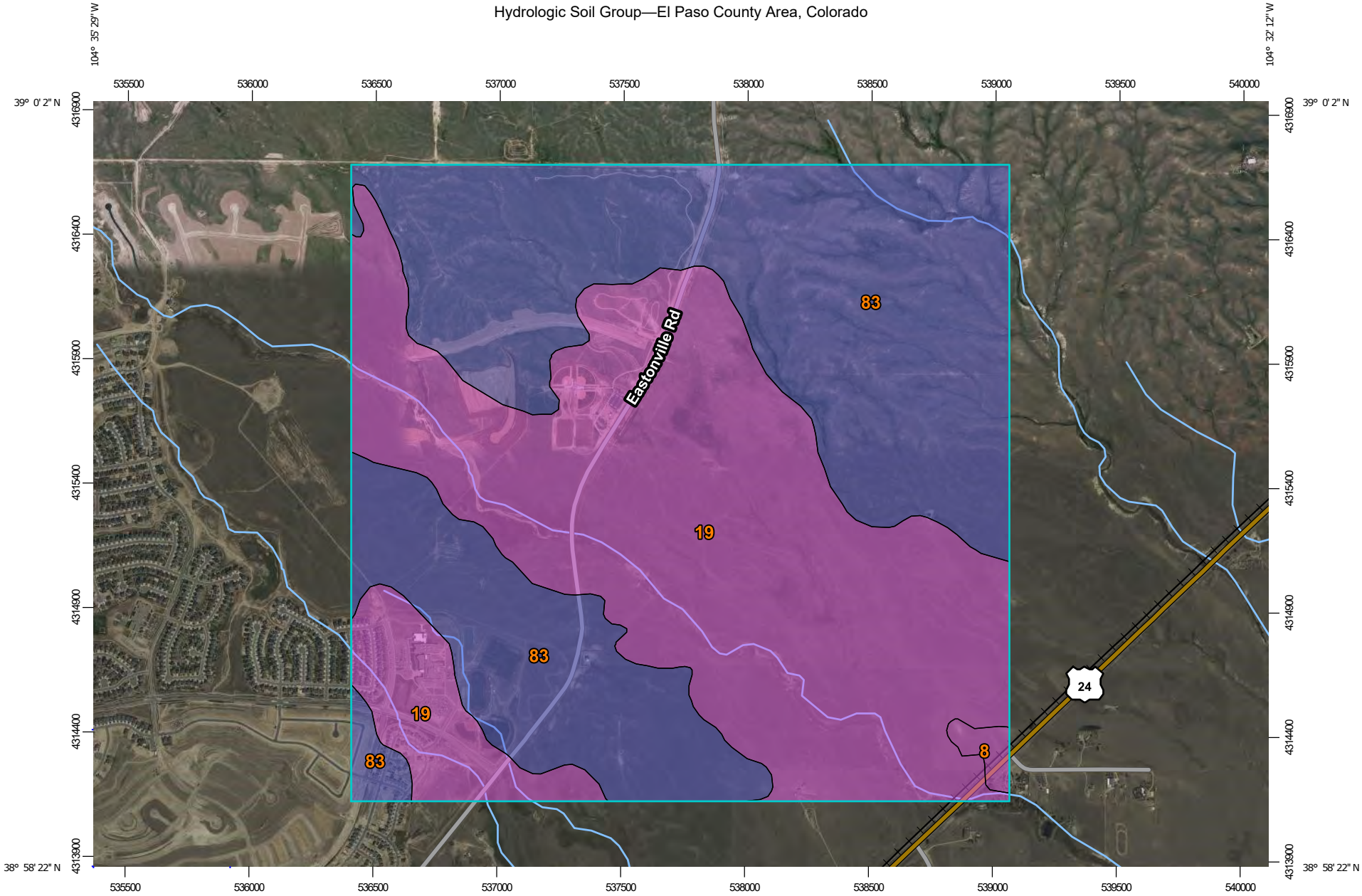
HRGreen
HR GREEN - COLORADO SPRINGS
7222 COMMERCE CENTER DR. SUITE 220
COLORADO SPRINGS CO 80919
PHONE: 719.622.6222
FAX: 844.273.1057

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
537000
537500
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
Meters
0 300 600 1200 1800
Feet
0 1000 2000 4000 6000
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/.

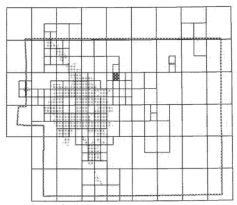
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

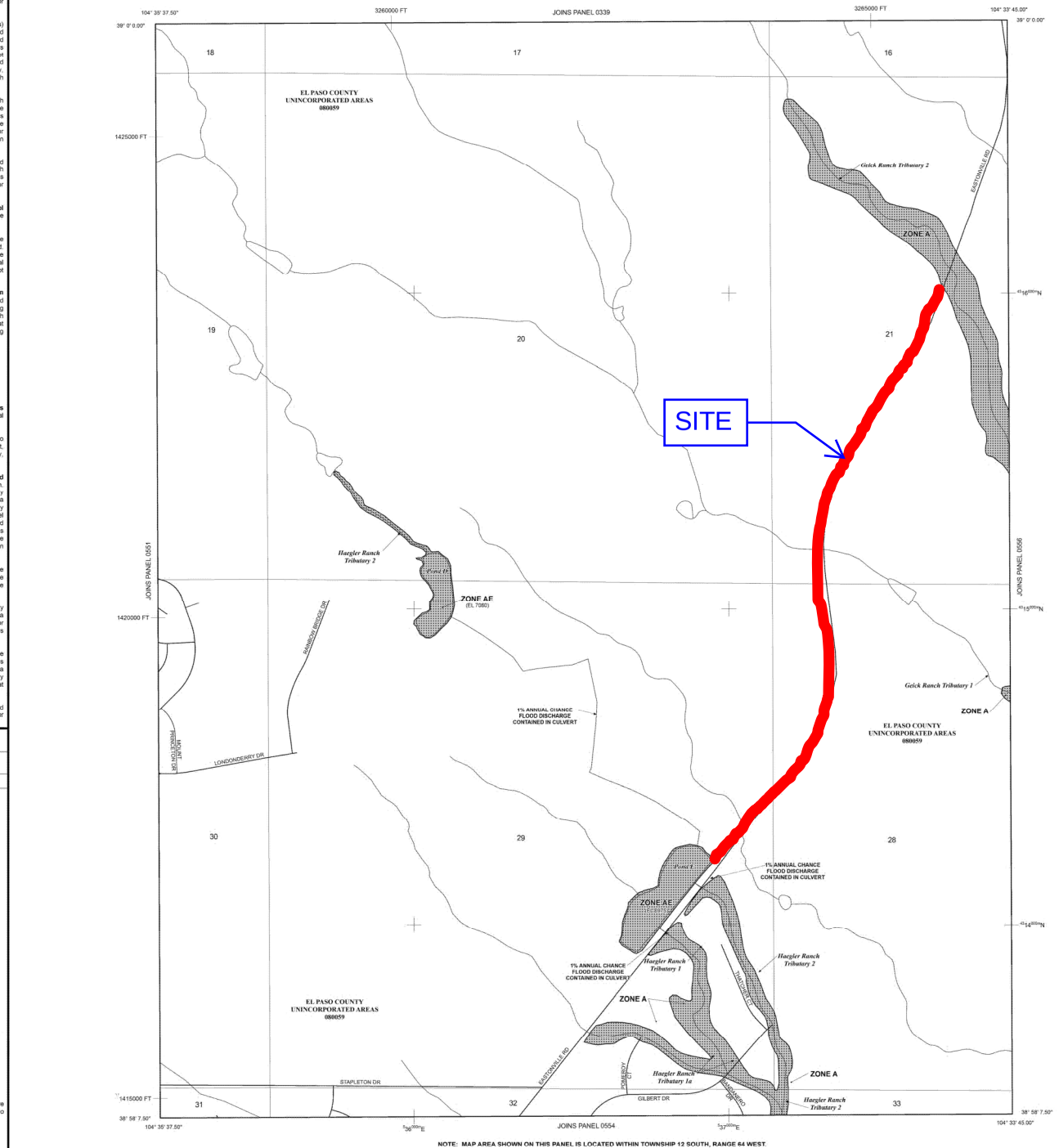
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

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

PANEL 0552G

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

NATIONAL FLOOD INSURANCE PROGRAM

APPENDIX B – HYDROLOGIC CALCULATIONS

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**CM**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**9/8/2023**

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
EX5	22.35	3	7.0	43.3
EX6	3.05	5	1.2	6.9
EX7	1.47	9	0.9	4.2
EX8	13.13	4	3.8	22.6
EX9	1.59	12	0.9	3.7

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
5	EX5	7.0	43.3
6	EX6	1.2	6.9
7	EX7	0.9	4.2
8	EX8	3.8	22.6
9	EX9	0.9	3.7

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

HRGreen	**EASTONVILLE ROAD**							**Calc'd by:**	**CM**										
	EXISTING CONDITIONS							**Checked by:**	**CM**										
	EL PASO COUNTY, CO							**Date:**	**9/8/2023**										

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*																	
EX5	22.09	0.26	0.00	22.35	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	3	0.10	0.37
EX6	2.96	0.09	0.00	3.05	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	5	0.11	0.38
EX7	1.36	0.11	0.00	1.47	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	9	0.15	0.40
EX8	12.88	0.25	0.00	13.13	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	4	0.11	0.37
EX9	1.43	0.16	0.00	1.59	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	12	0.17	0.42

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

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**CM**
	EXISTING CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**9/8/2023**

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*											
EX5	0.10	22.35	117	11.6	8.8	10	1162	3.4	1.8	10.5	19.3
EX6	0.11	3.05	207	9.0	12.5	10	250	4.0	2.0	2.1	14.6
EX7	0.15	1.47	50	3.4	8.2	10	174	4.4	2.1	1.4	9.6
EX8	0.11	13.13	125	3.1	14.0	10	1219	3.5	1.9	10.9	24.8
EX9	0.17	1.59	148	4.0	13.0	10	418	3.0	1.7	4.0	17.1

* 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
EXISTING CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	CM
Checked by:	CM
Date:	9/8/2023

			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)
	5	EX5	22.35	0.10	19.3	2.22	3.15	7.0															BASIN EX5 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	6	EX6	3.05	0.11	14.6	0.35	3.56	1.2															BASIN EX6 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	7	EX7	1.47	0.15	9.6	0.22	4.20	0.9															BASIN EX7 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	8	EX8	13.13	0.11	24.8	1.38	2.76	3.8															BASIN EX8 CAPTURED IN 24" CMP, PIPED ACROSS EASTONVILLE ROAD
	9	EX9	1.59	0.17	17.1	0.27	3.33	0.9															BASIN EX9 CAPTURED IN 36" CMP, PIPED ACROSS EASTONVILLE ROAD
																							* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

HRGreen

EASTONVILLE ROAD
EXISTING CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by:	CM
Checked by:	CM
Date:	9/8/2023

			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)
	5	EX5	22.35	0.37	19.3	8.20	5.28	43.3															BASIN EX5 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	6	EX6	3.05	0.38	14.6	1.15	5.98	6.9															BASIN EX6 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	7	EX7	1.47	0.40	9.6	0.60	7.04	4.2															BASIN EX7 CAPTURED IN 18" CMP, PIPED ACROSS EASTONVILLE ROAD
	8	EX8	13.13	0.37	24.8	4.88	4.64	22.6															BASIN EX8 CAPTURED IN 24" CMP, PIPED ACROSS EASTONVILLE ROAD
	9	EX9	1.59	0.42	17.1	0.67	5.59	3.7															BASIN EX9 CAPTURED IN 36" CMP, PIPED ACROSS EASTONVILLE ROAD
																							* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**CM**
	PROPOSED CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**9/8/2023**

BASIN SUMMARY TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
OS1	85.16	-	-	-
OS2	15.03	7	4.2	21.6
OS3	1.00	2	0.2	1.7
OS4	9.60	9	3.8	17.3
OS5	40.26	8	13.3	64.0
OS6	60.97	2	8.9	60.6
OS7	23.46	2	5.7	38.6
OS8	11.42	2	3.4	22.7
EA1	0.22	73	0.8	1.5
EA2	0.25	73	0.9	1.7
EA3	0.20	71	0.7	1.4
EA4	0.17	65	0.5	1.1
EA5	0.16	2	0.1	0.5
EA6	0.70	100	3.2	5.7
EA7	0.65	89	2.6	4.8
EA8	2.08	99	5.0	9.0
EA9	2.99	64	4.6	9.5
EA10	1.34	94	4.0	7.4
EA11	1.99	66	4.1	8.5
EA12	0.92	4	0.5	3.0
EA13	1.31	12	1.0	4.0
EA14	13.13	4	4.0	23.0
EA15	1.59	14	1.0	3.9

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	OS1 & G17	28.3	365.2
2	EA1	0.8	1.5
3	EA2	0.9	1.7
3.1	DP2 & DP3	1.6	3.2
4	EA5 & DP3.1	1.6	3.4
5	EA3	0.7	1.4
6	EA4	0.5	1.1
6.1	DP5 & DP6	1.2	2.4
7	OS2	4.2	21.6
8	OS3	0.2	1.7
8.1	DP7 & DP8	4.4	22.9
9.1	DP6.1 & DP8.1	4.9	23.8
10	EA7 & EA6	5.6	10.3
11	OS4 & G15 & DP9.1	10.5	144.3
12	OS5	13.3	64.0
12.1	DP11 & DP12	21.6	103.1
13	OS8	3.4	22.7
13.1	DP12.1 & DP13	23.4	115.2
14	EA8	5.0	9.0
15	EA9	4.6	9.5
15.1	DP14 & DP15	9.3	17.9
16	OS6 & G12 (G6*)	22.4	491.0
17	EA10	4.0	7.4
18	EA11	4.1	8.5
18.1	DP17 & DP18	8.0	15.4
19.1	DP15.1 & DP18.1	15.0	28.8
20	EA12	0.5	3.0
21	OS7	5.7	38.6
22	EA13	1.0	4.0
23	EA14	4.0	23.0
24	EA15	1.0	3.9

HRGreen	**EASTONVILLE ROAD**							**Calc'd by:**	**CM**									
	PROPOSED CONDITIONS							**Checked by:**	**CM**									
	EL PASO COUNTY, CO							**Date:**	**9/8/2023**									

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED	SINGLE FAMILY	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED			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}
OS1	85.16	0.00	0.00	85.16	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS2	14.33	0.70	0.00	15.03	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	7	0.13	0.39
OS3	1.00	0.00	0.00	1.00	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS4	8.90	0.70	0.00	9.60	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	9	0.15	0.40
OS5	37.90	2.36	0.00	40.26	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	8	0.14	0.40
OS6	60.97	0.00	0.00	60.97	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS7	23.46	0.00	0.00	23.46	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
OS8	11.42	0.00	0.00	11.42	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EA1	0.06	0.16	0.00	0.22	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	73	0.68	0.80
EA2	0.07	0.18	0.00	0.25	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	73	0.67	0.79
EA3	0.06	0.14	0.00	0.20	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	71	0.66	0.78
EA4	0.06	0.11	0.00	0.17	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	65	0.61	0.75
EA5	0.16	0.00	0.00	0.16	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	2	0.09	0.36
EA6	0.00	0.70	0.00	0.70	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	100	0.90	0.96
EA7	0.07	0.58	0.00	0.65	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	89	0.81	0.90
EA8	0.02	2.06	0.00	2.08	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	99	0.89	0.95
EA9	1.11	1.88	0.00	2.99	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	64	0.60	0.74
EA10	0.08	1.26	0.00	1.34	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	94	0.85	0.92
EA11	0.69	1.30	0.00	1.99	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	66	0.62	0.75
EA12	0.90	0.02	0.00	0.92	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	4	0.11	0.37
EA13	1.17	0.14	0.00	1.31	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	12	0.18	0.42
EA14	12.82	0.31	0.00	13.13	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	4	0.11	0.37
EA15	1.39	0.20	0.00	1.59	A/B	2	0.09	0.36	100	0.90	0.96	65	0.73	0.81	14	0.19	0.44
POND A				0.63											54		
POND B				9.32											70		
TSB #1				1.35											90		
Total				11.30													

HRGreen	**EASTONVILLE ROAD**	**Calc'd by:**	**CM**
	PROPOSED CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**9/8/2023**

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)
OS1 (EX1)*											
OS2	0.13	15.03	220	2.3	20.0	10	1450	2.3	1.5	15.9	36.0
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
OS5	0.14	40.26	300	4.4	18.7	10	1267	2.6	1.6	13.1	31.7
OS6	0.09	60.97	300	1.0	32.1	10	1790	2.0	1.4	21.1	53.2
OS7	0.09	23.46	300	11.6	14.2	10	1300	3.4	1.8	11.8	25.9
OS8	0.09	11.42	200	11.6	11.6	10	675	3.4	1.8	6.1	17.7
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	0.66	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	4.1	20	126	3.8	3.9	0.5	5.0
EA5	0.09	0.16	20	2.0	6.6	20	20	33.0	11.5	0.0	6.6
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	2.0	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	0.85	1.34	26	2.0	1.8	20	1220	0.6	1.5	13.1	15.0
EA11	0.62	1.99	26	2.0	3.6	20	1220	0.6	1.5	13.1	16.7
EA12	0.11	0.92	30	10.0	4.6	20	95	33.0	11.5	0.1	5.0
EA13	0.18	1.31	50	3.4	8.0	10	174	4.4	2.1	1.4	9.3
EA14	0.11	13.13	125	3.1	13.9	10	1219	3.5	1.9	10.9	24.8
EA15	0.19	1.59	148	4.0	12.8	10	418	3.0	1.7	4.0	16.8

* FLOWS TO THESE DESIGN POINTS WERE TAKEN FROM "THE SANCTUARY FILING 1 FDR" SO TC WAS NOT CALCULATED

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
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: NQJ
Checked by:
Date: 9/8/2023

		DIRECT RUNOFF						TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
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_{swale} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	OS1	85.16																				
1	G18*	321.53					28.3															BASIN OS1 AND G17 FLOW TO DP1 (DPG18), FOLLOWS HISTORIC DRAINAGE PATTERNS TO CHANNEL B
2	EA1	0.22	0.68	5.0	0.15	5.17	0.8								0.8	0.15	2.0	1.5	56	10.2	0.09	BASIN EA1 CAPTURED IN 5' TYPE R INLET @ DP2, PIPE TO DP3.1
3	EA2	0.25	0.67	5.0	0.17	5.17	0.9								0.9	0.17						BASIN EA2 CAPTURED IN 5' TYPE R INLET@ DP3, PIPE TO DP3.1
3.1								5.1	0.32	5.14	1.6				1.6	0.32	2.0	1.5	85	10.2	0.14	COMBINED DP2 & DP3 @ DP3.1, PIPE TO DP4 (POND A)
4	EA5	0.16	0.09	6.6	0.01	4.75	0.1	6.6	0.33	4.75	1.6											**COMBINED DP3.1 & BASIN EA5, TOTAL FLOW ENTERING POND A**
5	EA3	0.20	0.66	5.0	0.13	5.17	0.7								0.7	0.13	2.0	1.5	48	10.2	0.08	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								0.5	0.10	2.0	1.5				BASIN EA4 CAPTURED IN 5' TYPE R INLET @ DP6, PIPE TO DP6.1
6.1								5.1	0.24	5.15	1.2				0.0	0.24	2.0	1.5	1146	10.2	1.88	DP3 & DP4 FLOW @ DP5.1, PIPE TO DP9.1
7	OS2	15.03	0.13	36.0	1.92	2.21	4.2								4.2	1.92	2.0	1.5	44	10.2	0.07	BASIN OS2 CAPTURED IN 18" FES, PIPE TO DP8.1
8	OS3	1.00	0.09	25.2	0.09	2.74	0.2								0.2	0.09	2.0	1.5	38	10.2	0.06	BASIN OS3 CAPTURED IN 18" FES, PIPE TO DP8.1
8.1								36.0	2.01	2.21	4.4				4.4	2.01	2.0	1.5	55	10.2	0.09	COMBINED DP7 & DP8 @ DP8.1, PIPE TO DP9.1
9.1								36.1	2.25	2.20	4.9	4.9	2.25	1.7					620	2.6	3.96	COMBINED DP6.1 & DP8.1 @ DP9.1, DISCHARGE TO ROADSIDE SWALE TO DP11
	EA6	0.70	0.90	5.5	0.63	5.02	3.2															BASIN EA6 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
10	EA7	0.65	0.81	6.1	0.53	4.88	2.6	6.1	1.16	4.88	5.6											BASIN EA6 & EA7 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
11	OS4	9.60	0.15	26.6	1.43	2.66	3.8	40.1	3.68	2.05	7.5	3.0	3.68	1.7	10.5	3.68	2.0	2.0	85	10.2	0.14	BASIN OS4, DP9.1 CAPTURED & MERIDIAN RANCH DPG15 (3 CFS) IN 30" FES @ DP11, PIPE TO DP12.1
12	OS5	40.26	0.14	31.7	5.54	2.40	13.3								13.3	5.54	2.0	2.0	616	10.2	1.01	BASIN OS5 CAPTUREDI N 48" FES @ DP12, PIPE TO DP12.1
12.1								32.8	9.21	2.35	21.6				21.6	9.21	2.0	3.5	891	10.2	1.46	COMBINED DP11 & DP12 @ DP12.1, PIPE TO DP13.1
13	OS8	11.42	0.09	17.7	1.03	3.28	3.4								3.4	1.03	2.0	2.0	28	10.2	0.05	BASIN OS8 CAPTURED @ DP13 IN TYPE C INLET, PIPE TO DP13.1
13.1								34.2	10.24	2.28	23.4											COMBINED DP12.1 & DP13, PIPE TO CHANNEL B
14	EA8	2.08	0.89	26.4	1.86	2.67	5.0								5.0	1.86	2.0	2.0	8	10.2	0.01	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP14, PIPE TO DP15.1
15	EA9	2.99	0.60	28.6	1.79	2.55	4.6								4.6	1.79	2.0	2.0	54	10.2	0.09	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP15, PIPE TO DP15.1
15.1								28.7	3.65	2.55	9.3				9.3	3.65	2.0	2.0	641	10.2	1.05	COMBINED DP14 & DP15, PIPE TO DP19.1
	OS6	60.97	0.09	53.2	5.49	1.62	8.9															
16	G06*	832.7									22.4											THE SANCTUARY FILING 1 DPG06 (22.4 CFS), BYPASSED UNDER EASTONVILLE ROAD IN DUAL 10' x 3.5' CULVERTS
17	EA10	1.34	0.85	15.0	1.14	3.52	4.0								4.0	1.14	2.0	2.0	52	10.2	0.09	BASIN EA10 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
18	EA11	1.99	0.62	16.7	1.23	3.36	4.1								4.1	1.23	2.0	2.0	52	10.2	0.09	BASIN EA11 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
18.1								16.8	2.37	3.35	8.0				8.0	2.37	2.0	2.0	157	10.2	0.26	COMBINED DP17 & DP18 @ DP18.1, PIPE TO DP19.1
19.1								29.8	6.02	2.49	15.0				15.0	6.02	2.0	2.0	42	10.2	0.07	COMBINED DP15.1 & DP18.1, PIPE TO DP20

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	NQJ
Checked by:	
Date:	9/8/2023

		DIRECT RUNOFF						TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
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_{swale} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
20	EA12	0.92	0.11	5.0	0.10	5.17	0.5	29.8	6.12	2.49	15.2											COMBINED DP19.1 & BASIN EA12, TOTAL FLOW ENTERING POND B
21	OS7	23.46	0.09	25.9	2.11	2.70	5.7															BASIN OS7 TO DP21 BYPASS TO CHANNEL A
22	EA13	1.31	0.18	9.3	0.23	4.23	1.0															BASIN EA13 CAPTURED IN EX 18" CMP, PIPED ACROSS EASTONVILLE ROAD
23	EA14	13.13	0.11	24.8	1.43	2.77	4.0															BASIN EA14 CAPTURED IN EX 24" CMP, PIPED ACROSS EASTONVILLE ROAD
24	EA15	1.59	0.19	16.8	0.31	3.35	1.0															BASIN EA15 CAPTURED IN EX 36" CMP, PIPED ACROSS EASTONVILLE ROAD
																						* FLOWS TO THESE DESIGN POINTS WERE TAKEN FROM "THE SANCTUARY FILING 1 FDR" SO TC WAS NOT CALCULATED

EASTONVILLE ROAD

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	CM
Checked by:	CM
Date:	9/8/2023

HRGreen

		DIRECT RUNOFF						TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
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_{swale} (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)	
	OS1	85.16																				
1	G18*	321.53					365.2															BASIN OS1 AND G17 FLOW TO DP1 (DPG18), FOLLOWS HISTORIC DRAINAGE PATTERNS TO CHANNEL B
2	EA1	0.22	0.80	5.0	0.18	8.68	1.5								1.5	0.18	2.0	1.5	56	8.4	0.11	BASIN EA1 CAPTURED IN 5' TYPE R INLET @ DP2, PIPE TO DP3.1
3	EA2	0.25	0.79	5.0	0.20	8.68	1.7								1.7	0.20						BASIN EA2 CAPTURED IN 5' TYPE R INLET@ DP3, PIPE TO DP3.1
3.1								5.1	0.37	8.62	3.2				3.2	0.37	2.0	1.5	85	8.4	0.17	COMBINED DP2 & DP3 @ DP3.1, PIPE TO DP4 (POND A)
4	EA5	0.16	0.36	6.6	0.06	7.98	0.5	6.6	0.43	7.98	3.4											**COMBINED DP3.1 & BASIN EA5, TOTAL FLOW ENTERING POND A**
5	EA3	0.20	0.78	5.0	0.16	8.68	1.4								1.4	0.16	2.0	1.5	48	8.4	0.10	BASIN EA3 CAPTURED IN 5' TYPE R INLET @ DP5, PIPE TO DP6.1
6	EA4	0.17	0.75	5.0	0.13	8.68	1.1								1.1	0.13	2.0	1.5				BASIN EA4 CAPTURED IN 5' TYPE R INLET @ DP6, PIPE TO DP6.1
6.1								5.1	0.28	8.63	2.4				0.0	0.28	2.0	1.5	1146	8.4	2.27	DP3 & DP4 FLOW @ DP5.1, PIPE TO DP9.1
7	OS2	15.03	0.39	36.0	5.83	3.71	21.6								21.6	5.83	2.0	1.5	44	8.4	0.09	BASIN OS2 CAPTURED IN 18" FES, PIPE TO DP8.1
8	OS3	1.00	0.36	25.2	0.36	4.60	1.7								1.7	0.36	2.0	1.5	38	8.4	0.08	BASIN OS3 CAPTURED IN 18" FES, PIPE TO DP8.1
8.1								36.0	6.19	3.71	22.9				0.0	6.19	2.0	1.5	183	8.4	0.36	COMBINED DP7 & DP8 @ DP8.1, PIPE TO DP9.1
9.1								36.3	6.47	3.68	23.8	23.8	6.47	1.7					620	2.6	3.96	COMBINED DP6.1 & DP8.1 @ DP9.1, DISCHARGE TO ROADSIDE SWALE TO DP11
	EA6	0.70	0.96	5.5	0.67	8.43	5.7															BASIN EA6 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
10	EA7	0.65	0.90	6.1	0.58	8.19	4.8	6.1	1.25	8.19	10.3											BASIN EA6 & EA7 @ DP10 (TEMPORARY SEDIMENT BASIN #1)
11	OS4	9.60	0.40	26.6	3.88	4.46	17.3	40.3	10.35	3.42	89.4	54.9	10.35	1.7	144.3	10.35	2.0	2.0	85	8.4	0.17	BASIN OS4, DP9.1 CAPTURED & MERIDIAN RANCH DPG15 (54.9 CFS) IN 30" FES @ DP11, PIPE TO DP12.1
12	OS5	40.26	0.40	31.7	15.91	4.02	64.0								64.0	15.91	2.0	2.0	616	8.4	1.22	BASIN OS5 CAPTUREDI N 48" FES @ DP12, PIPE TO DP12.1
12.1								33.0	26.26	3.93	103.1				103.1	26.26	2.0	3.5	891	8.4	1.77	COMBINED DP11 & DP12 @ DP12.1, PIPE TO DP13.1
13	OS8	11.42	0.36	17.7	4.11	5.53	22.7								22.7	4.11	2.0	2.0	28	8.4	0.06	BASIN OS8 CAPTURED @ DP13 IN TYPE C INLET, PIPE TO DP13.1
13.1								34.7	30.37	3.79	115.2											COMBINED DP12.1 & DP13, PIPE TO CHANNEL B
14	EA8	2.08	0.95	26.4	1.98	4.51	9.0								9.0	1.98	2.0	2.0	8	8.4	0.02	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP14, PIPE TO DP15.1
15	EA9	2.99	0.74	28.6	2.20	4.32	9.5								9.5	2.20	2.0	2.0	54	8.4	0.11	BASIN EA8 CAPTURED IN 10' TYPE R SUMP @ DP15, PIPE TO DP15.1
15.1								28.7	4.19	4.27	17.9				17.9	4.19	2.0	2.0	641	8.4	1.27	COMBINED DP14 & DP15, PIPE TO DP19.1
	OS6	60.97	0.36	53.2	21.95	2.76	60.6															
16	G06*	832.7									491.0											THE SANCTUARY FILING 1 DPG06 (491 CFS), BYPASSED UNDER EASTONVILLE ROAD IN DUAL 10' x 3.5' CULVERTS
17	EA10	1.34	0.92	15.0	1.24	5.94	7.4								7.4	1.24	2.0	2.0	52	8.4	0.10	BASIN EA10 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
18	EA11	1.99	0.75	16.7	1.50	5.67	8.5								8.5	1.50	2.0	2.0	52	8.4	0.10	BASIN EA11 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP18.1
18.1								16.8	2.73	5.63	15.4				15.4	2.73	2.0	2.0	157	8.4	0.31	COMBINED DP17 & DP18 @ DP18.1, PIPE TO DP19.1
19.1								30.0	6.92	4.16	28.8				28.8	6.92	2.0	2.0	42	8.4	0.08	COMBINED DP15.1 & DP18.1, PIPE TO DP20

HRGreen

EASTONVILLE ROAD
PROPOSED CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by:	CM
Checked by:	CM
Date:	9/8/2023

		DIRECT RUNOFF						TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
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_{swale} (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)	
20	EA12	0.92	0.37	5.0	0.34	8.70	3.0	30.1	7.27	4.16	30.2											COMBINED DP19.1 & BASIN EA12, TOTAL FLOW ENTERING POND B
21	OS7	23.46	0.36	25.9	8.45	4.57	38.6															BASIN OS7 CAPTURED IN 30" FES, PIPED TO CHANNEL A
22	EA13	1.31	0.42	9.3	0.56	7.13	4.0															BASIN EA13 CAPTURED IN EX 18" CMP, PIPED ACROSS EASTONVILLE ROAD
23	EA14	13.13	0.37	24.8	4.91	4.68	23.0															BASIN EA14 CAPTURED IN EX 24" CMP, PIPED ACROSS EASTONVILLE ROAD
24	EA15	1.59	0.44	16.8	0.69	5.66	3.9															BASIN EA15 CAPTURED IN EX 36" CMP, PIPED ACROSS EASTONVILLE ROAD
																						* FLOWS TO THESE DESIGN POINTS WERE TAKEN FROM "THE SANCTUARY FILING 1 FDR" SO TC WAS NOT CALCULATED

APPENDIX C – HYDRAULIC CALCULATIONS

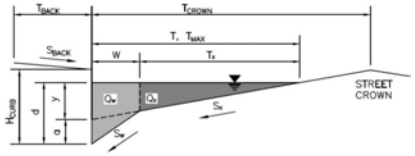
MHFD-Inlet, Version 5.01 (April 2021)

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 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**

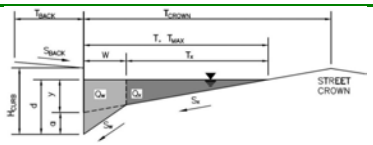
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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



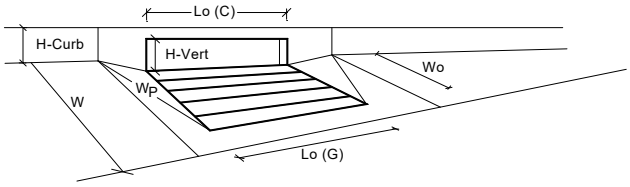
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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

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 =	5.9	7.3	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	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

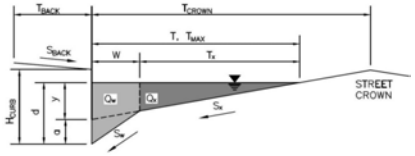
MHFD-Inlet, Version 5.01 (April 2021)

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**



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**

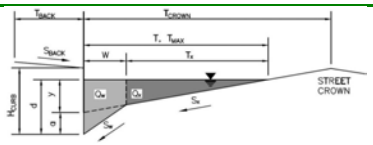
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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



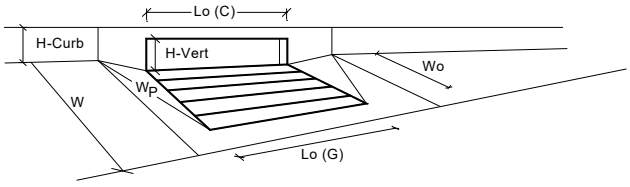
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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)



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

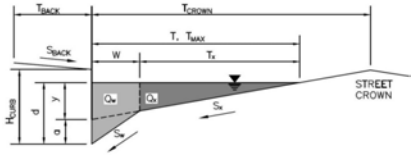
MHFD-Inlet, Version 5.01 (April 2021)

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**

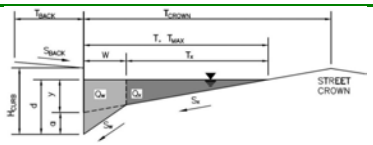
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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



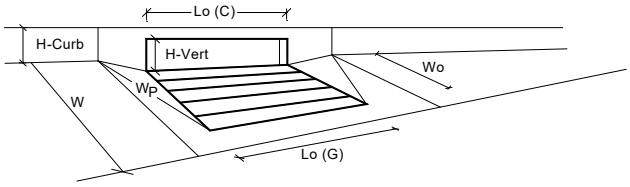
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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

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 =	5.9	7.3	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	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

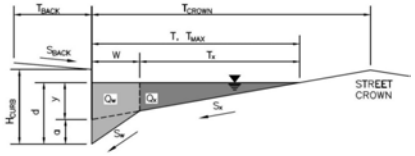
MHFD-Inlet, Version 5.01 (April 2021)

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**

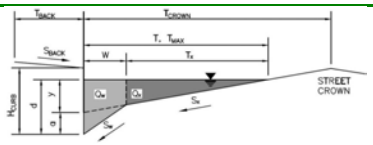
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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



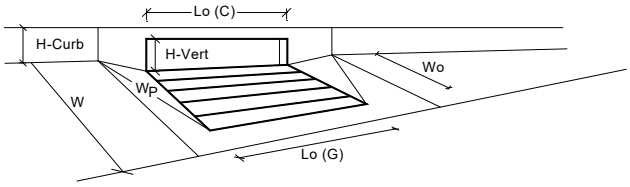
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	11.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	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

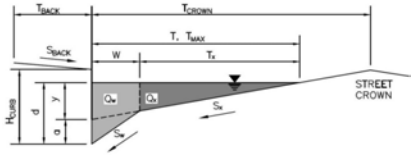
MHFD-Inlet, Version 5.01 (April 2021)

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**

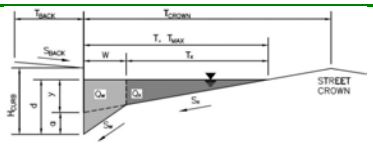
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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



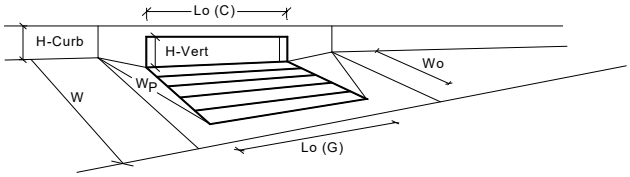
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	

Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	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	

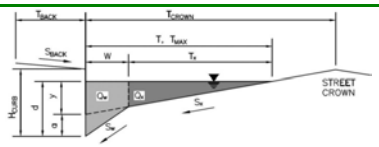
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.9**	**18.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.0	9.0	cfs

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)		☐	☐	

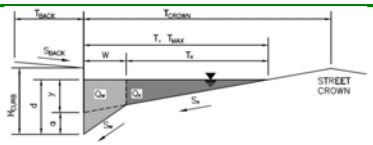
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**10.8**	**27.4**	**cfs**

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



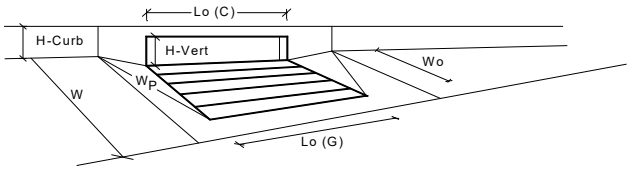
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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	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			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	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

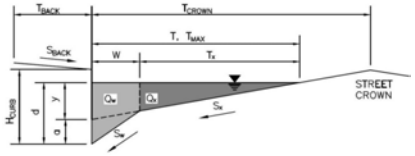
MHFD-Inlet, Version 5.01 (April 2021)

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: **DP17**



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 =	0.006	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 Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**10.0**	**25.4**	**cfs**

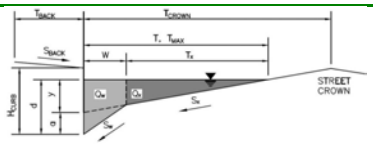
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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)

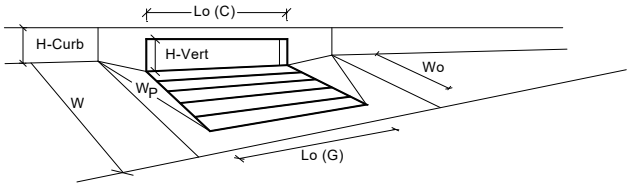
Project: **Eastonville Road**
Inlet ID: **DP17**



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 =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.9	7.8	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	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	$RF_{Combination}$ =	0.75	0.99	
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**	**8.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.0	7.4	cfs

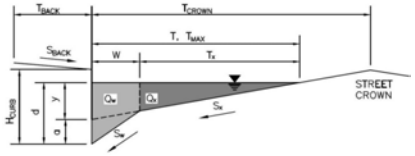
MHFD-Inlet, Version 5.01 (April 2021)

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: **DP18**



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 =	0.006	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} =**	**10.0**	**25.4**	**cfs**

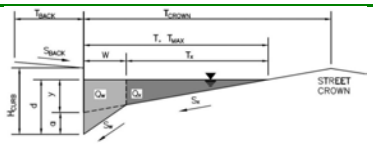
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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: DP18



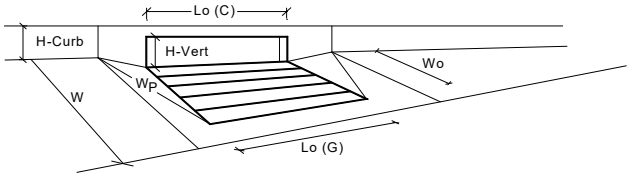
Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	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 =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.9	7.8	inches

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

Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	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	$RF_{Combination}$ =	0.75	0.99	
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	

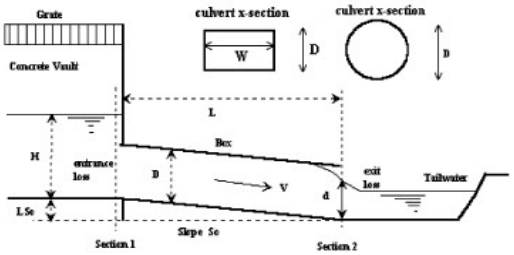
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.1**	**8.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.1	8.5	cfs

CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **EASTONVILLE ROAD**

ID: **DP7**



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	24	inches
	Inlet Edge Type (Choose from pull-down list)		Grooved Edge Projecting	
	OR:			
Box Culvert:	Barrel Height (Rise) in Feet	H (Rise) =		ft
	Barrel Width (Span) in Feet	W (Span) =		ft
	Inlet Edge Type (Choose from pull-down list)			
	Number of Barrels	# Barrels =	1	
	Inlet Elevation at Culvert Invert	Elev IN =	7022	ft
	Outlet Elevation **OR** Slope	Elev OUT =	7021.65	ft
	Culvert Length	L =	44	ft
	Manning's Roughness	n =	0.012	
	Bend Loss Coefficient	K_b =	0	
	Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.20
Friction Loss Coefficient	K_f =	0.46
Sum of All Loss Coefficients	K_s =	1.66
Minimum Energy Condition Coefficient	KE_{low} =	-0.0119
Orifice Inlet Condition Coefficient	C_d =	0.67

Calculations of Culvert Capacity (output):

Backwater calculations required to obtain Outlet Control Flowrate when HWo < 0.75 * Culvert Rise

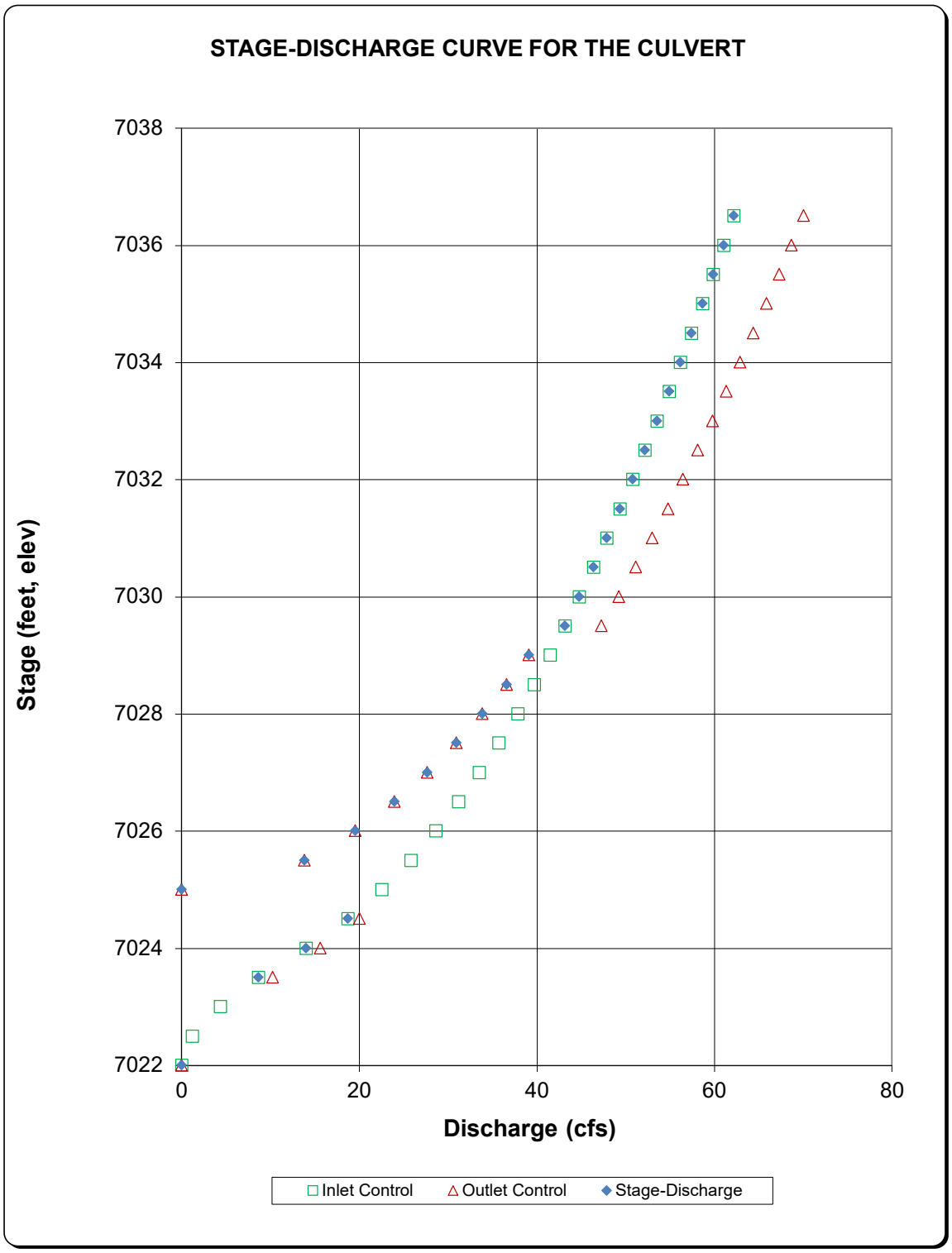
DP7
Q100 = 21.6 cfs

Headwater Surface Elevation (ft)	Tailwater Surface Elevation (ft)	Inlet Control Equation Used	Inlet Control Flowrate (cfs)	Outlet Control Flowrate (cfs)	Controlling Culvert Flowrate (cfs)	Flow Control Used
7022.00		No Flow (WS < inlet)	0.00	0.00	**0.00**	N/A
7022.50		Min. Energy. Eqn.	1.21	#N/A	#N/A	#N/A
7023.00		Min. Energy. Eqn.	4.36	#N/A	#N/A	#N/A
7023.50		Regression Eqn.	8.67	10.29	**8.67**	INLET
7024.00		Regression Eqn.	14.01	15.63	**14.01**	INLET
7024.50		Regression Eqn.	18.74	20.01	**18.74**	INLET
7025.00	7025.00	Regression Eqn.	22.57	0.00	**0.00**	N/A
7025.50	7025.00	Regression Eqn.	25.81	13.85	**13.85**	OUTLET
7026.00	7025.00	Regression Eqn.	28.61	19.57	**19.57**	OUTLET
7026.50	7025.00	Regression Eqn.	31.21	23.96	**23.96**	OUTLET
7027.00	7025.00	Regression Eqn.	33.53	27.66	**27.66**	OUTLET
7027.50	7025.00	Regression Eqn.	35.75	30.92	**30.92**	OUTLET
7028.00	7025.00	Regression Eqn.	37.86	33.87	**33.87**	OUTLET
7028.50	7025.00	Orifice Eqn.	39.71	36.59	**36.59**	OUTLET
7029.00	7025.00	Orifice Eqn.	41.48	39.11	**39.11**	OUTLET
7029.50		Orifice Eqn.	43.17	47.29	**43.17**	INLET
7030.00		Orifice Eqn.	44.80	49.27	**44.80**	INLET
7030.50		Orifice Eqn.	46.37	51.18	**46.37**	INLET
7031.00		Orifice Eqn.	47.89	53.01	**47.89**	INLET
7031.50		Orifice Eqn.	49.37	54.78	**49.37**	INLET
7032.00		Orifice Eqn.	50.81	56.50	**50.81**	INLET
7032.50		Orifice Eqn.	52.19	58.17	**52.19**	INLET
7033.00		Orifice Eqn.	53.55	59.79	**53.55**	INLET
7033.50		Orifice Eqn.	54.91	61.36	**54.91**	INLET
7034.00		Orifice Eqn.	56.16	62.90	**56.16**	INLET
7034.50		Orifice Eqn.	57.42	64.40	**57.42**	INLET
7035.00		Orifice Eqn.	58.66	65.87	**58.66**	INLET
7035.50		Orifice Eqn.	59.87	67.31	**59.87**	INLET
7036.00		Orifice Eqn.	61.05	68.71	**61.05**	INLET
7036.50		Orifice Eqn.	62.22	70.09	**62.22**	INLET
				Processing Time:	**01.04 Seconds**	

CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: EASTONVILLE ROAD
ID: DP7



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 8 2023

DP9.1 SWALE

Trapezoidal

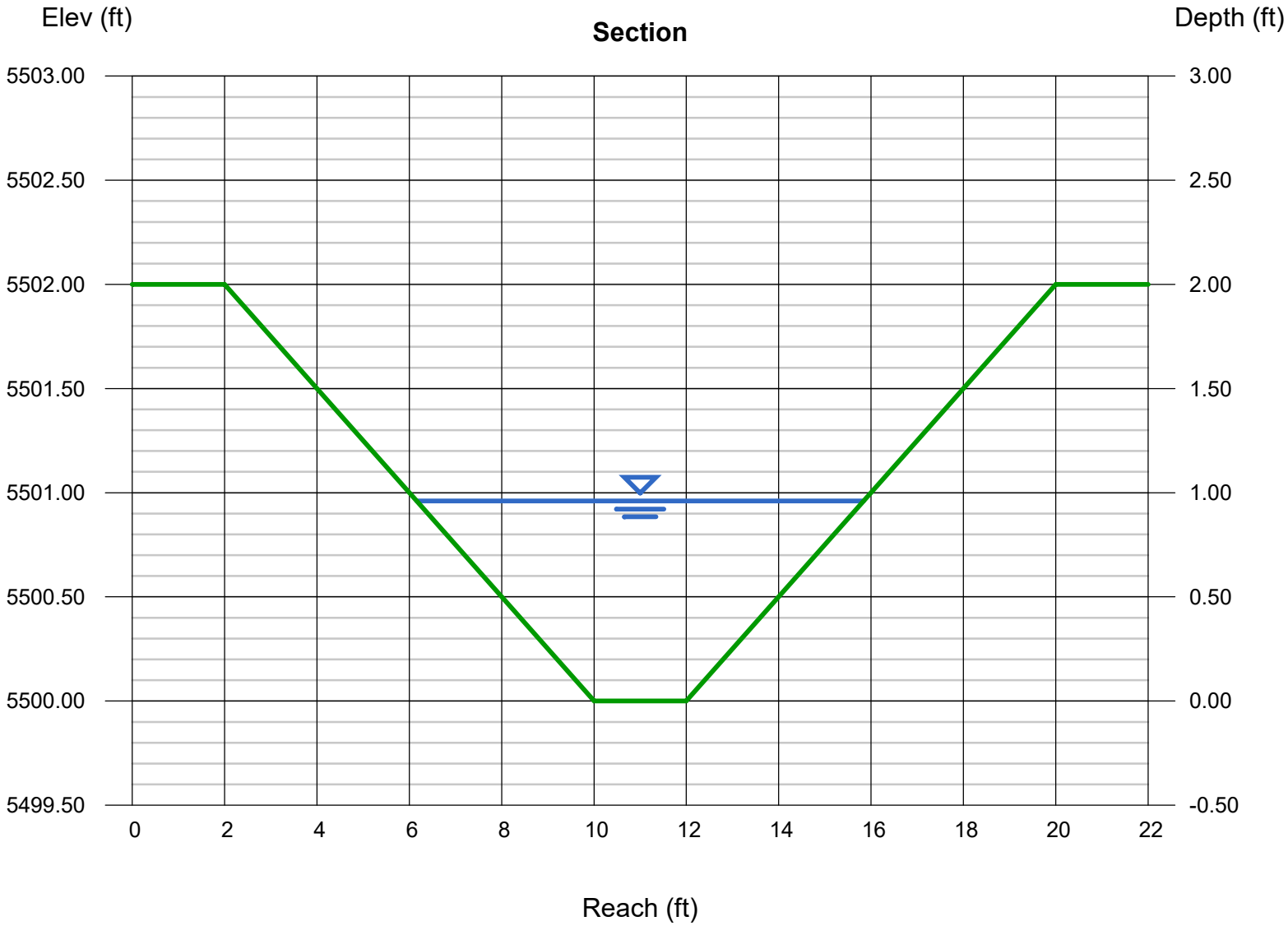
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 5500.00
Slope (%)	= 1.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 23.80

Highlighted

Depth (ft)	= 0.96
Q (cfs)	= 23.80
Area (sqft)	= 5.61
Velocity (ft/s)	= 4.25
Wetted Perim (ft)	= 9.92
Crit Depth, Yc (ft)	= 0.96
Top Width (ft)	= 9.68
EGL (ft)	= 1.24



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 8 2023

DP10 Swale

Triangular

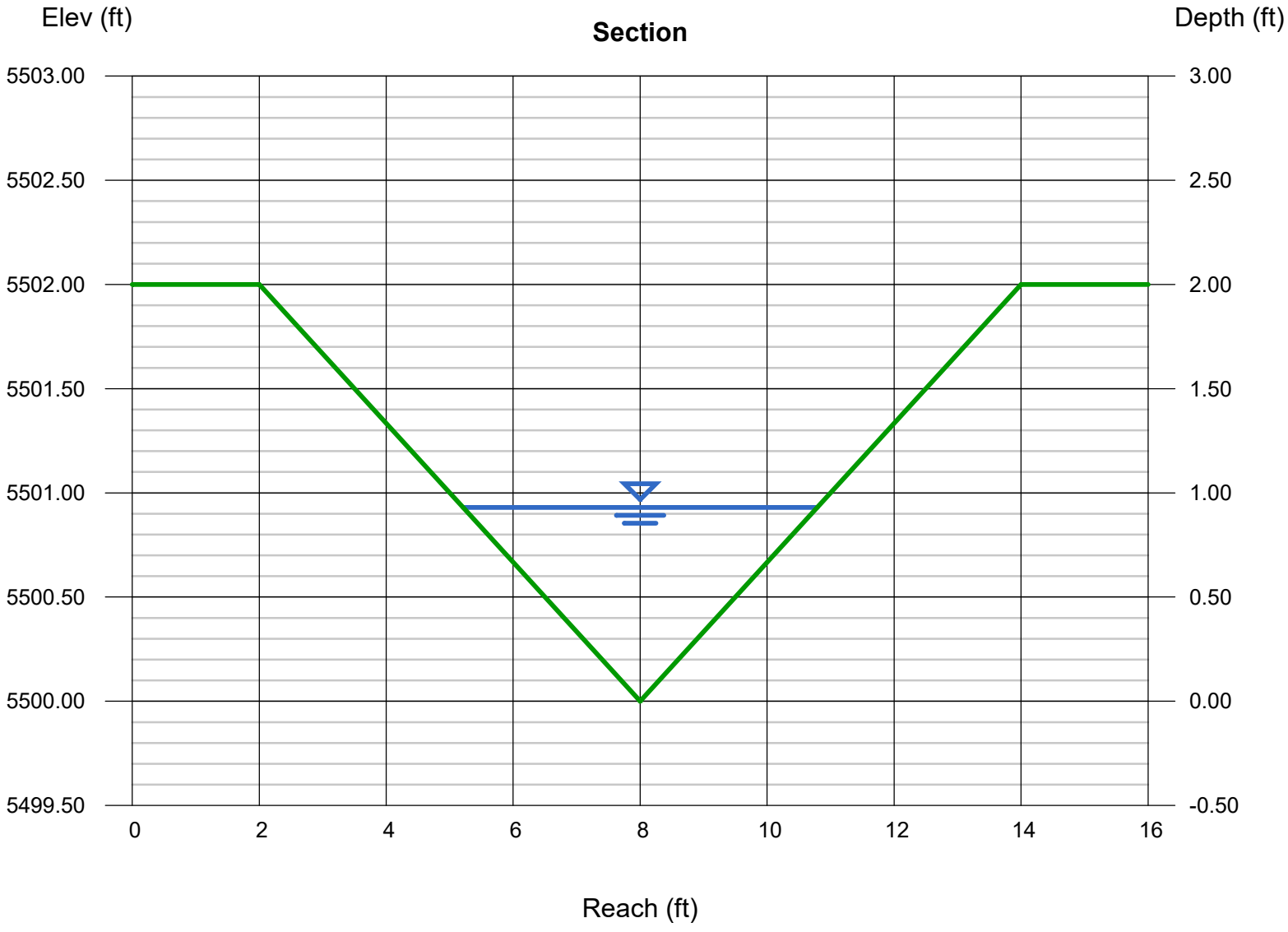
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 5500.00
Slope (%)	= 2.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.30

Highlighted

Depth (ft)	= 0.93
Q (cfs)	= 10.30
Area (sqft)	= 2.59
Velocity (ft/s)	= 3.97
Wetted Perim (ft)	= 5.88
Crit Depth, Yc (ft)	= 0.94
Top Width (ft)	= 5.58
EGL (ft)	= 1.17

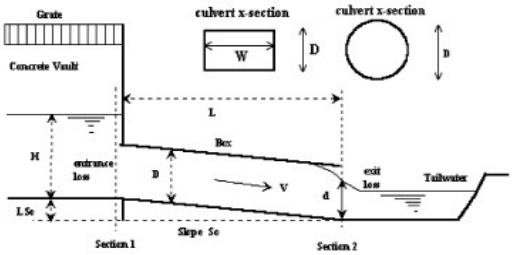


CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: EASTONVILLE ROAD

ID: DP11



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	30	inches
	Inlet Edge Type (Choose from pull-down list)		Grooved Edge Projecting	
OR:				
Box Culvert:	Barrel Height (Rise) in Feet	H (Rise) =		ft
	Barrel Width (Span) in Feet	W (Span) =		ft
	Inlet Edge Type (Choose from pull-down list)			
	Number of Barrels	# Barrels =	2	
	Inlet Elevation at Culvert Invert	Elev IN =	7010	ft
	Outlet Elevation **OR** Slope	Elev OUT =	7001	ft
	Culvert Length	L =	77	ft
	Manning's Roughness	n =	0.012	
	Bend Loss Coefficient	K_b =	0	
	Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.20
Friction Loss Coefficient	K_f =	0.60
Sum of All Loss Coefficients	K_s =	1.80
Minimum Energy Condition Coefficient	KE_{low} =	-0.3344
Orifice Inlet Condition Coefficient	C_d =	0.68

Calculations of Culvert Capacity (output):

Backwater calculations required to obtain Outlet Control Flowrate when HWo < 0.75 * Culvert Rise

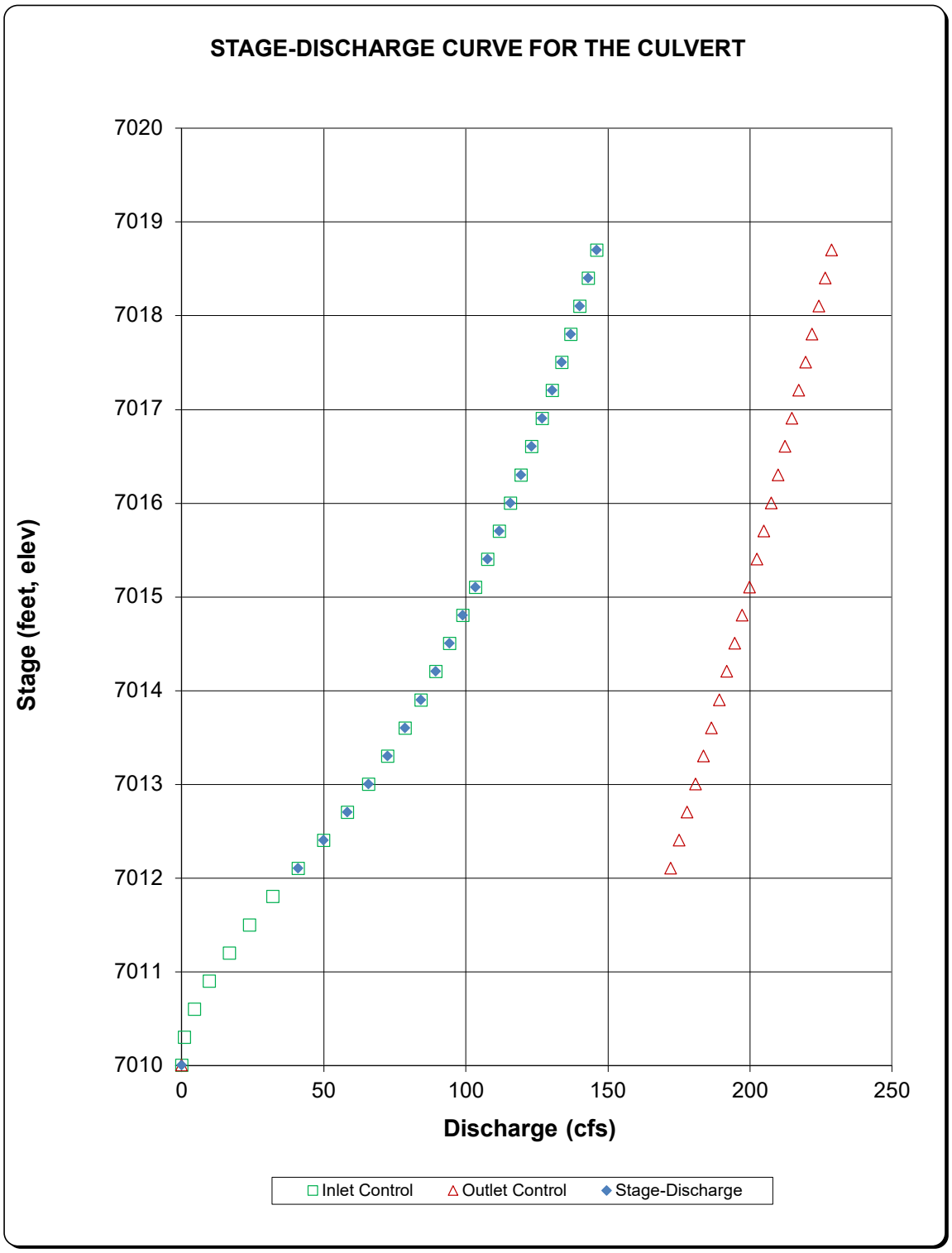
Headwater Surface Elevation (ft)	Tailwater Surface Elevation (ft)	Inlet Control Equation Used	Inlet Control Flowrate (cfs)	Outlet Control Flowrate (cfs)	Controlling Culvert Flowrate (cfs)	Flow Control Used
7010.00		No Flow (WS < inlet)	0.00	0.00	**0.00**	N/A
7010.30		Min. Energy. Eqn.	1.02	#N/A	#N/A	#N/A
7010.60		Min. Energy. Eqn.	4.46	#N/A	#N/A	#N/A
7010.90		Min. Energy. Eqn.	9.70	#N/A	#N/A	#N/A
7011.20		Min. Energy. Eqn.	16.72	#N/A	#N/A	#N/A
7011.50		Regression Eqn.	23.88	#N/A	#N/A	#N/A
7011.80		Regression Eqn.	32.02	#N/A	#N/A	#N/A
7012.10		Regression Eqn.	41.02	172.27	**41.02**	INLET
7012.40		Regression Eqn.	49.94	175.13	**49.94**	INLET
7012.70		Regression Eqn.	58.26	178.04	**58.26**	INLET
7013.00		Regression Eqn.	65.74	180.93	**65.74**	INLET
7013.30		Regression Eqn.	72.46	183.76	**72.46**	INLET
7013.60		Regression Eqn.	78.58	186.55	**78.58**	INLET
7013.90		Regression Eqn.	84.22	189.30	**84.22**	INLET
7014.20		Regression Eqn.	89.42	192.02	**89.42**	INLET
7014.50		Regression Eqn.	94.34	194.68	**94.34**	INLET
7014.80		Regression Eqn.	99.02	197.32	**99.02**	INLET
7015.10		Regression Eqn.	103.42	199.92	**103.42**	INLET
7015.40		Regression Eqn.	107.66	202.49	**107.66**	INLET
7015.70		Regression Eqn.	111.74	205.03	**111.74**	INLET
7016.00		Regression Eqn.	115.68	207.53	**115.68**	INLET
7016.30		Regression Eqn.	119.50	210.01	**119.50**	INLET
7016.60		Regression Eqn.	123.22	212.45	**123.22**	INLET
7016.90		Regression Eqn.	126.84	214.87	**126.84**	INLET
7017.20		Regression Eqn.	130.42	217.27	**130.42**	INLET
7017.50		Regression Eqn.	133.82	219.63	**133.82**	INLET
7017.80		Orifice Eqn.	137.00	221.97	**137.00**	INLET
7018.10		Orifice Eqn.	140.10	224.29	**140.10**	INLET
7018.40		Orifice Eqn.	143.14	226.58	**143.14**	INLET
7018.70		Orifice Eqn.	146.12	228.85	**146.12**	INLET
				Processing Time:	**00.70 Seconds**	

DP11
Q100 = 144.3 cfs

CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: EASTONVILLE ROAD
ID: DP11



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 8 2023

DP11 SWALE

Trapezoidal

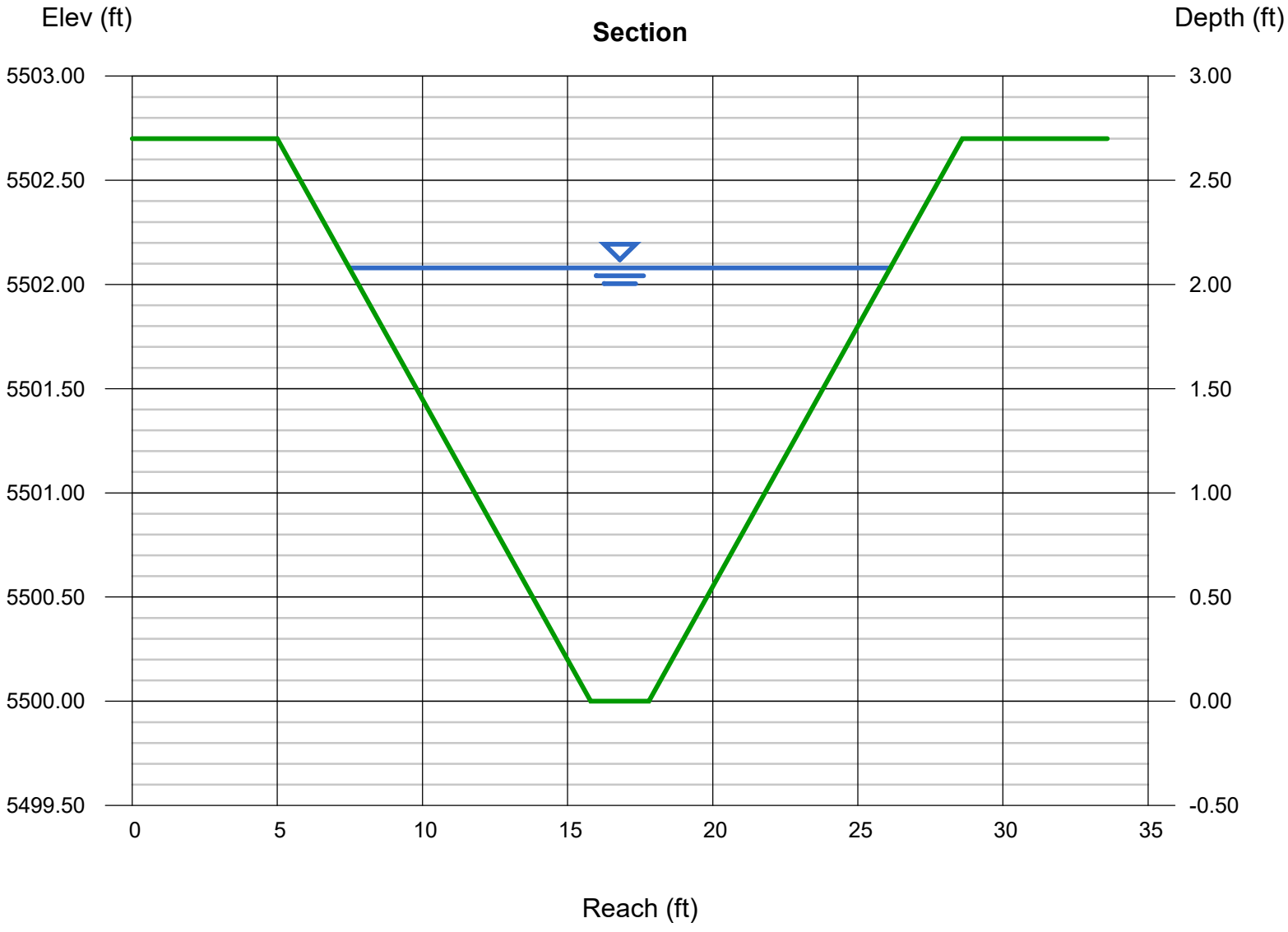
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.70
Invert Elev (ft)	= 5500.00
Slope (%)	= 1.60
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 144.30

Highlighted

Depth (ft)	= 2.08
Q (cfs)	= 144.30
Area (sqft)	= 21.47
Velocity (ft/s)	= 6.72
Wetted Perim (ft)	= 19.15
Crit Depth, Yc (ft)	= 2.18
Top Width (ft)	= 18.64
EGL (ft)	= 2.78

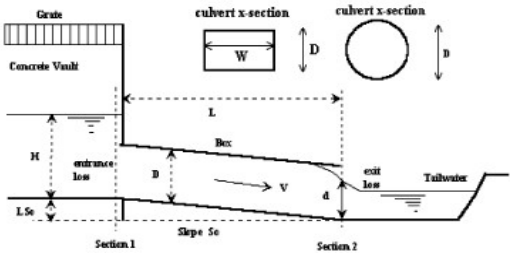


CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: EASTONVILLE ROAD

ID: DP12



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	48	inches
	Inlet Edge Type (Choose from pull-down list)		Grooved Edge Projecting	
	OR:			
Box Culvert:	Barrel Height (Rise) in Feet	H (Rise) =		ft
	Barrel Width (Span) in Feet	W (Span) =		ft
	Inlet Edge Type (Choose from pull-down list)			
	Number of Barrels	# Barrels =	1	
	Inlet Elevation at Culvert Invert	Elev IN =	7005	ft
	Outlet Elevation **OR** Slope	Elev OUT =	7004.03	ft
	Culvert Length	L =	82	ft
	Manning's Roughness	n =	0.012	
	Bend Loss Coefficient	K_b =	0	
	Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.20
Friction Loss Coefficient	K_f =	0.34
Sum of All Loss Coefficients	K_s =	1.54
Minimum Energy Condition Coefficient	KE_{low} =	-0.0218
Orifice Inlet Condition Coefficient	C_d =	0.67

Calculations of Culvert Capacity (output):

Backwater calculations required to obtain Outlet Control Flowrate when HWo < 0.75 * Culvert Rise

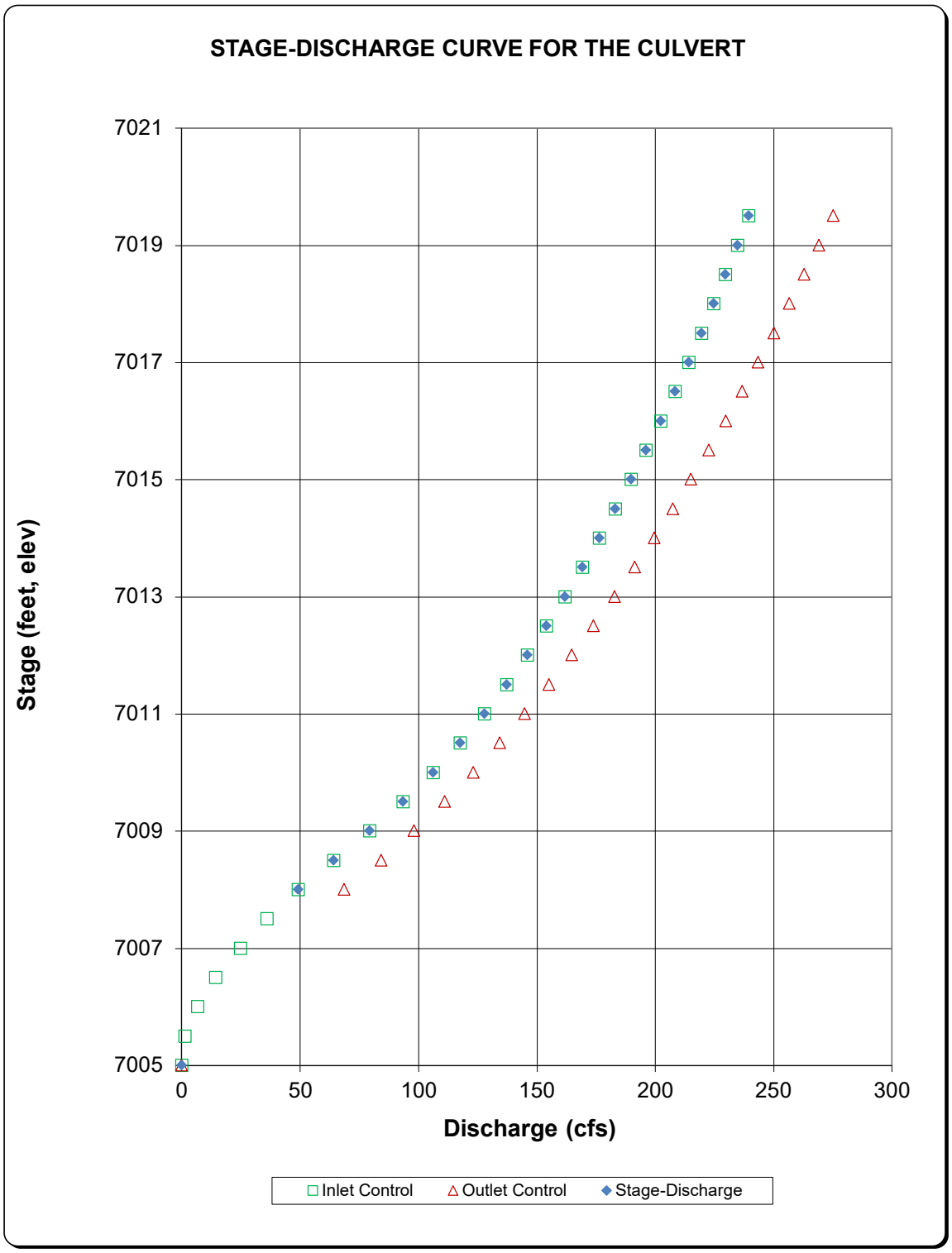
Headwater Surface Elevation (ft)	Tailwater Surface Elevation (ft)	Inlet Control Equation Used	Inlet Control Flowrate (cfs)	Outlet Control Flowrate (cfs)	Controlling Culvert Flowrate (cfs)	Flow Control Used
7005.00		No Flow (WS < inlet)	0.00	0.00	**0.00**	N/A
7005.50		Min. Energy. Eqn.	1.41	#N/A	#N/A	#N/A
7006.00		Min. Energy. Eqn.	6.62	#N/A	#N/A	#N/A
7006.50		Min. Energy. Eqn.	14.42	#N/A	#N/A	#N/A
7007.00		Min. Energy. Eqn.	24.74	#N/A	#N/A	#N/A
7007.50		Regression Eqn.	35.91	#N/A	#N/A	#N/A
7008.00		Regression Eqn.	49.22	68.69	**49.22**	INLET
7008.50		Regression Eqn.	64.21	84.22	**64.21**	INLET
7009.00		Regression Eqn.	79.41	98.27	**79.41**	INLET
7009.50		Regression Eqn.	93.51	111.15	**93.51**	INLET
7010.00		Regression Eqn.	106.17	123.14	**106.17**	INLET
7010.50		Regression Eqn.	117.52	134.36	**117.52**	INLET
7011.00		Regression Eqn.	127.81	145.02	**127.81**	INLET
7011.50		Regression Eqn.	137.22	155.13	**137.22**	INLET
7012.00		Regression Eqn.	145.96	164.77	**145.96**	INLET
7012.50		Regression Eqn.	154.16	174.03	**154.16**	INLET
7013.00		Regression Eqn.	161.92	182.90	**161.92**	INLET
7013.50		Regression Eqn.	169.31	191.43	**169.31**	INLET
7014.00		Regression Eqn.	176.41	199.62	**176.41**	INLET
7014.50		Regression Eqn.	183.21	207.56	**183.21**	INLET
7015.00		Regression Eqn.	189.76	215.23	**189.76**	INLET
7015.50		Regression Eqn.	196.13	222.63	**196.13**	INLET
7016.00		Regression Eqn.	202.33	229.83	**202.33**	INLET
7016.50		Regression Eqn.	208.36	236.84	**208.36**	INLET
7017.00		Regression Eqn.	214.24	243.62	**214.24**	INLET
7017.50		Orifice Eqn.	219.54	250.27	**219.54**	INLET
7018.00		Orifice Eqn.	224.70	256.72	**224.70**	INLET
7018.50		Orifice Eqn.	229.75	263.03	**229.75**	INLET
7019.00		Orifice Eqn.	234.71	269.20	**234.71**	INLET
7019.50		Orifice Eqn.	239.53	275.24	**239.53**	INLET
				Processing Time:	**01.06 Seconds**	

DP12
Q100 = 64.0 cfs

CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: EASTONVILLE ROAD
ID: DP12



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 8 2023

DP12 SWALE

Trapezoidal

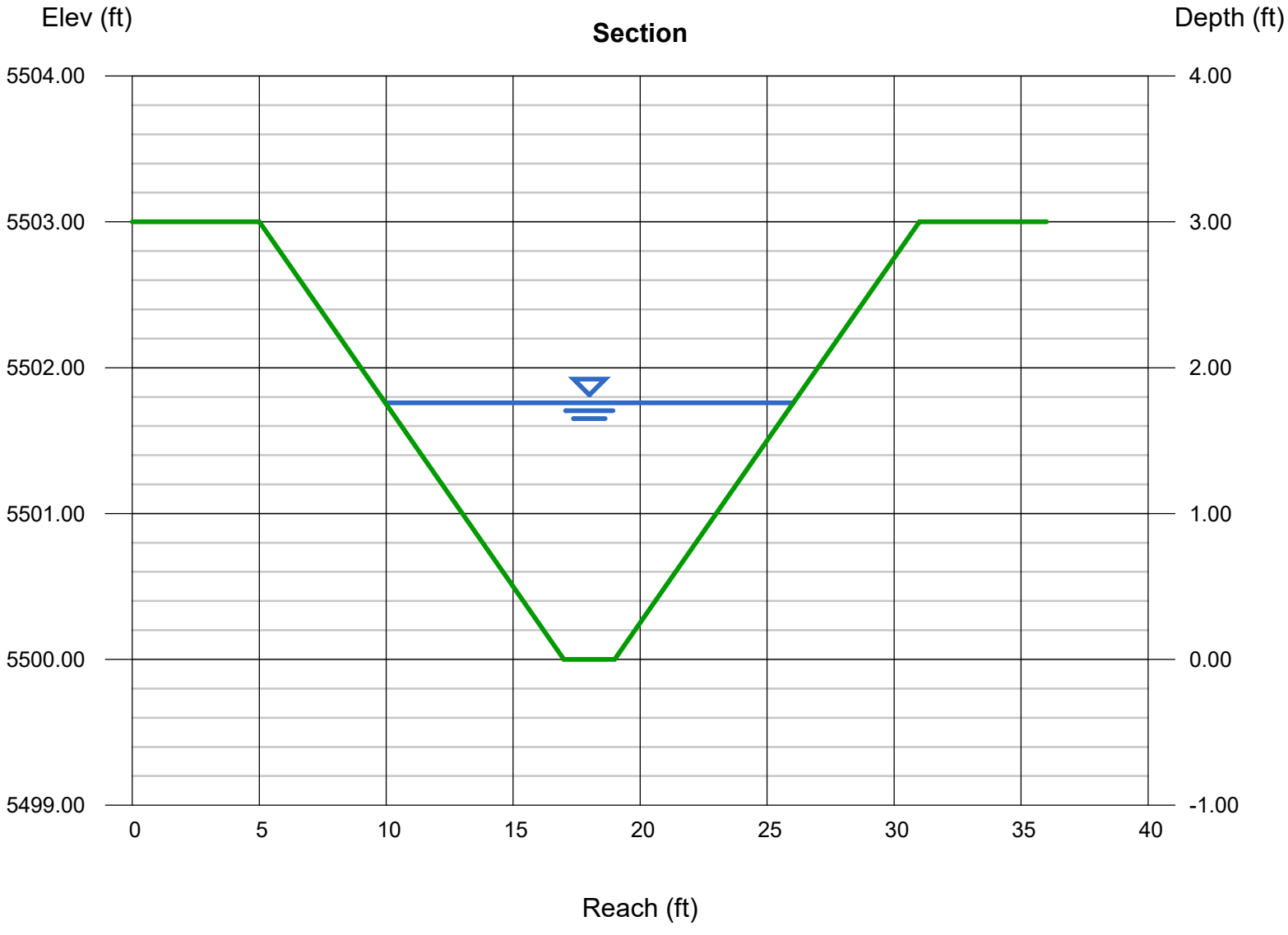
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 5500.00
Slope (%)	= 0.70
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 64.00

Highlighted

Depth (ft)	= 1.76
Q (cfs)	= 64.00
Area (sqft)	= 15.91
Velocity (ft/s)	= 4.02
Wetted Perim (ft)	= 16.51
Crit Depth, Yc (ft)	= 1.52
Top Width (ft)	= 16.08
EGL (ft)	= 2.01

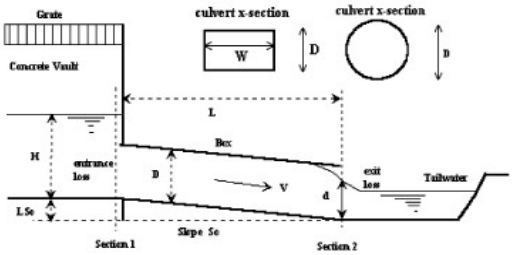


CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **Eastonville Road**

ID: **DP16**



Design Information (Input):

Circular Culvert:

Barrel Diameter in Inches	D =		inches
Inlet Edge Type (Choose from pull-down list)			

OR:

Box Culvert:

Barrel Height (Rise) in Feet	H (Rise) =	3.50	ft
Barrel Width (Span) in Feet	W (Span) =	10.00	ft
Inlet Edge Type (Choose from pull-down list)		1:1 Bevel w/ 45 deg. Flared Wingwall	
Number of Barrels	# Barrels =	2	
Inlet Elevation at Culvert Invert	Elev IN =	6997	ft
Outlet Elevation **OR** Slope	So =	0.0165	ft/ft
Culvert Length	L =	110	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	K_b =	0	
Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.50
Friction Loss Coefficient	K_f =	0.38
Sum of All Loss Coefficients	K_s =	1.88
Minimum Energy Condition Coefficient	KE_{low} =	-0.0001
Orifice Inlet Condition Coefficient	C_d =	0.65

Calculations of Culvert Capacity (output):

Backwater calculations required to obtain Outlet Control Flowrate when HWo < 0.75 * Culvert Rise

DP16
Q100 = 491.0 cfs

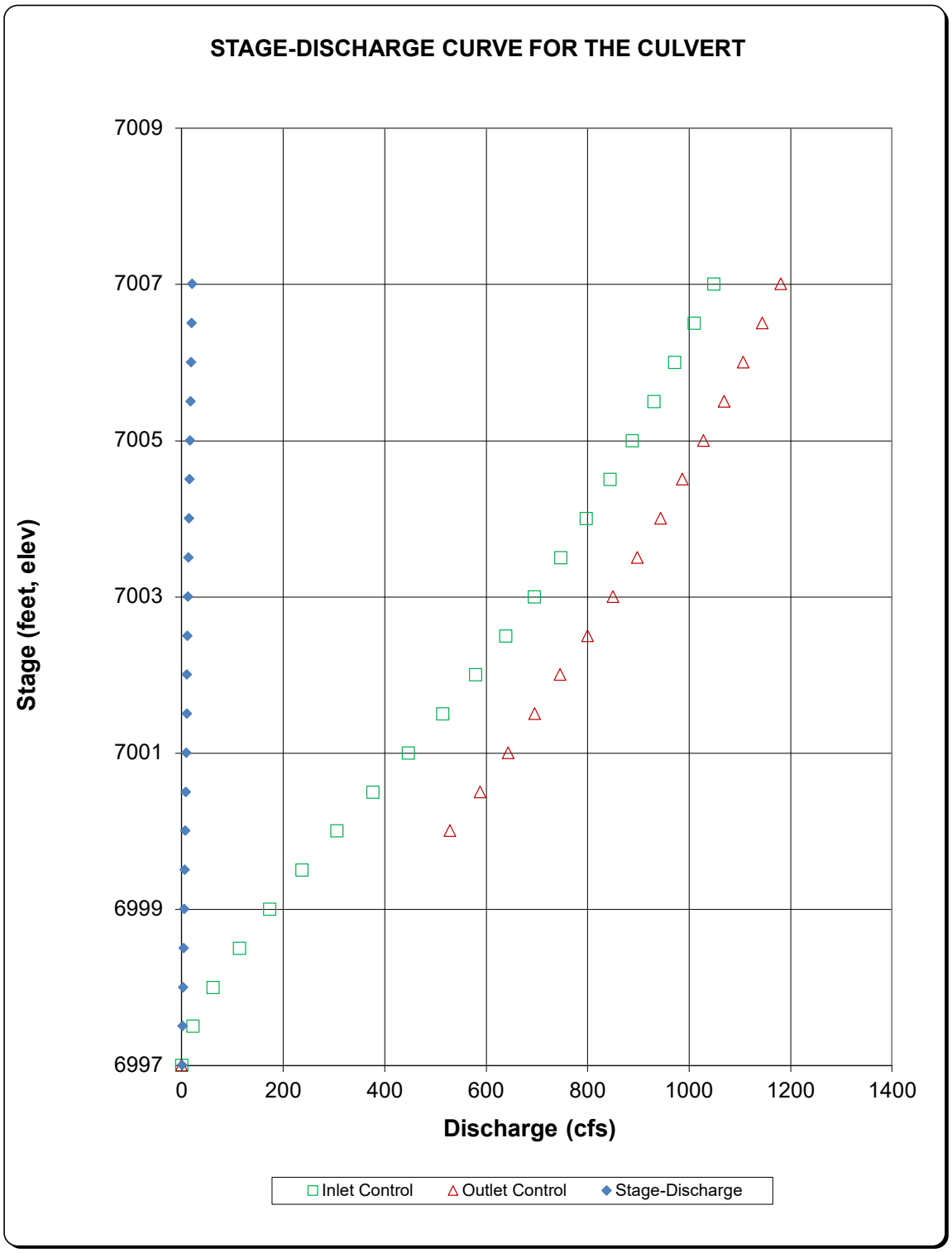
Headwater Surface Elevation (ft)	Tailwater Surface Elevation (ft)	Inlet Control Equation Used	Inlet Control Flowrate (cfs)	Outlet Control Flowrate (cfs)	Controlling Culvert Flowrate (cfs)	Flow Control Used
6997.00	6995.25	No Flow (WS < inlet)	0.00	0.00	**0.00**	N/A
6997.50		Min. Energy. Eqn.	21.86	#N/A	#N/A	#N/A
6998.00		Min. Energy. Eqn.	61.82	#N/A	#N/A	#N/A
6998.50		Min. Energy. Eqn.	113.50	#N/A	#N/A	#N/A
6999.00		Regression Eqn.	172.94	#N/A	#N/A	#N/A
6999.50		Regression Eqn.	237.14	#N/A	#N/A	#N/A
7000.00		Regression Eqn.	305.86	529.17	**305.86**	INLET
7000.50		Regression Eqn.	376.74	588.75	**376.74**	INLET
7001.00		Regression Eqn.	447.08	644.17	**447.08**	INLET
7001.50		Regression Eqn.	514.76	696.17	**514.76**	INLET
7002.00		Regression Eqn.	578.74	745.66	**578.74**	INLET
7002.50		Regression Eqn.	638.70	799.92	**638.70**	INLET
7003.00		Regression Eqn.	694.82	850.72	**694.82**	INLET
7003.50		Regression Eqn.	747.46	898.67	**747.46**	INLET
7004.00		Regression Eqn.	797.02	944.17	**797.02**	INLET
7004.50		Regression Eqn.	843.90	987.58	**843.90**	INLET
7005.00		Regression Eqn.	888.42	1,029.17	**888.42**	INLET
7005.50		Regression Eqn.	930.88	1,069.13	**930.88**	INLET
7006.00		Regression Eqn.	971.54	1,107.66	**971.54**	INLET
7006.50		Regression Eqn.	1,010.62	1,144.89	**1,010.62**	INLET
7007.00		Regression Eqn.	1,048.26	1,180.95	**1,048.26**	INLET

Processing Time: **00.16 Seconds**

CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: Eastonville Road
ID: DP16

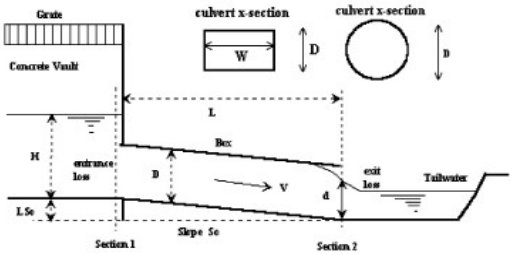


CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: EASTONVILLE ROAD

ID: DP21



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	30	inches
	Inlet Edge Type (Choose from pull-down list)		Grooved Edge Projecting	
OR:				
Box Culvert:	Barrel Height (Rise) in Feet	H (Rise) =		ft
	Barrel Width (Span) in Feet	W (Span) =		ft
	Inlet Edge Type (Choose from pull-down list)			
	Number of Barrels	# Barrels =	1	
	Inlet Elevation at Culvert Invert	Elev IN =	6992.64	ft
	Outlet Elevation **OR** Slope	Elev OUT =	6991.36	ft
	Culvert Length	L =	113	ft
	Manning's Roughness	n =	0.012	
	Bend Loss Coefficient	K_b =	0	
	Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.20
Friction Loss Coefficient	K_f =	0.88
Sum of All Loss Coefficients	K_s =	2.08
Minimum Energy Condition Coefficient	KE_{low} =	-0.0218
Orifice Inlet Condition Coefficient	C_d =	0.67

Calculations of Culvert Capacity (output):

Backwater calculations required to obtain Outlet Control Flowrate when HWo < 0.75 * Culvert Rise

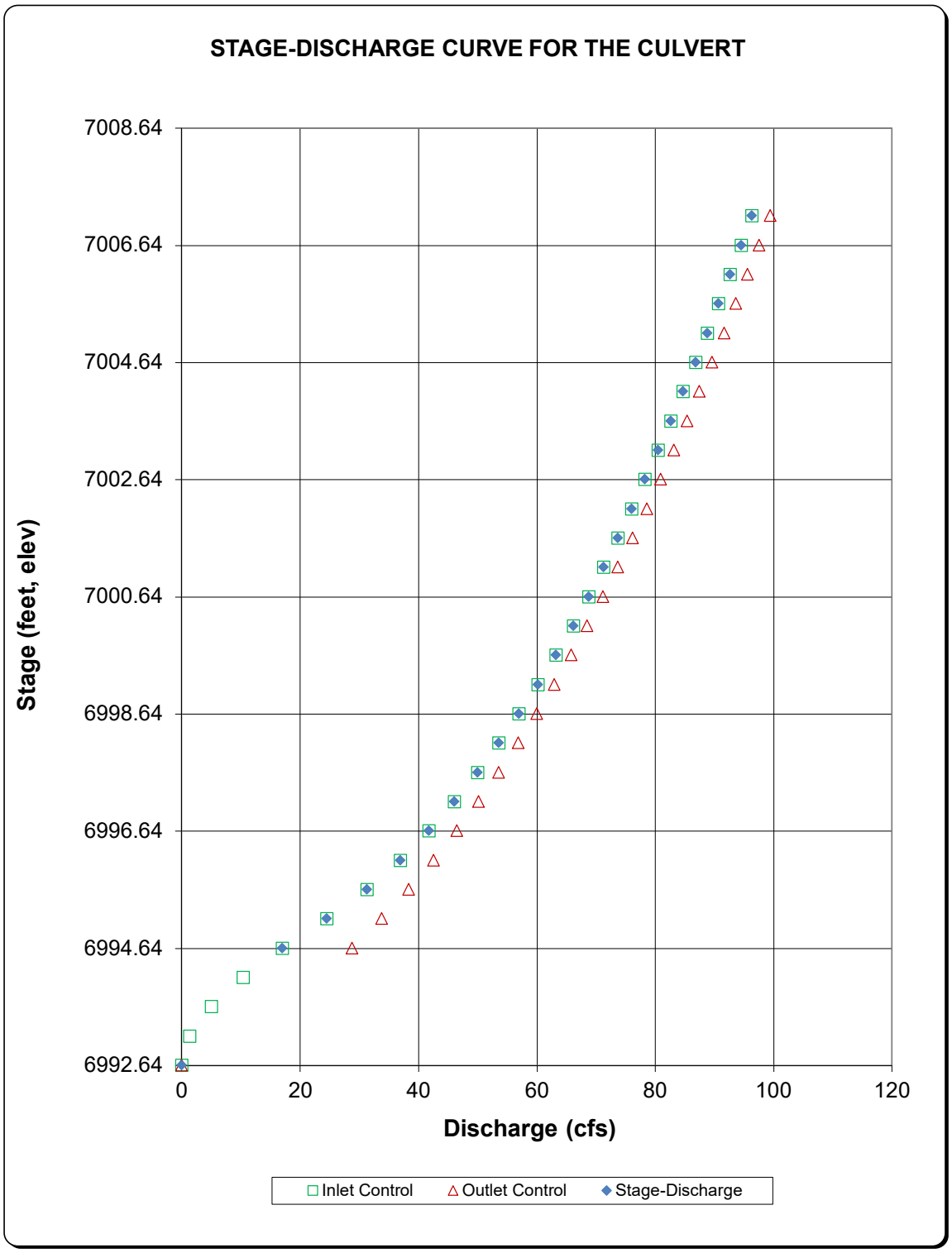
DP16
Q100 = 38.6 cfs

Headwater Surface Elevation (ft)	Tailwater Surface Elevation (ft)	Inlet Control Equation Used	Inlet Control Flowrate (cfs)	Outlet Control Flowrate (cfs)	Controlling Culvert Flowrate (cfs)	Flow Control Used
6992.64		No Flow (WS < inlet)	0.00	0.00	**0.00**	N/A
6993.14		Min. Energy. Eqn.	1.33	#N/A	#N/A	#N/A
6993.64		Min. Energy. Eqn.	5.03	#N/A	#N/A	#N/A
6994.14		Regression Eqn.	10.34	#N/A	#N/A	#N/A
6994.64		Regression Eqn.	17.00	28.78	**17.00**	INLET
6995.14		Regression Eqn.	24.51	33.84	**24.51**	INLET
6995.64		Regression Eqn.	31.27	38.40	**31.27**	INLET
6996.14		Regression Eqn.	36.95	42.60	**36.95**	INLET
6996.64		Regression Eqn.	41.81	46.50	**41.81**	INLET
6997.14		Regression Eqn.	46.11	50.15	**46.11**	INLET
6997.64		Regression Eqn.	50.00	53.59	**50.00**	INLET
6998.14		Regression Eqn.	53.61	56.86	**53.61**	INLET
6998.64		Regression Eqn.	57.01	59.98	**57.01**	INLET
6999.14		Regression Eqn.	60.18	62.96	**60.18**	INLET
6999.64		Regression Eqn.	63.23	65.82	**63.23**	INLET
7000.14		Regression Eqn.	66.16	68.55	**66.16**	INLET
7000.64		Orifice Eqn.	68.76	71.20	**68.76**	INLET
7001.14		Orifice Eqn.	71.26	73.75	**71.26**	INLET
7001.64		Orifice Eqn.	73.71	76.22	**73.71**	INLET
7002.14		Orifice Eqn.	76.02	78.61	**76.02**	INLET
7002.64		Orifice Eqn.	78.31	80.94	**78.31**	INLET
7003.14		Orifice Eqn.	80.51	83.20	**80.51**	INLET
7003.64		Orifice Eqn.	82.64	85.40	**82.64**	INLET
7004.14		Orifice Eqn.	84.73	87.50	**84.73**	INLET
7004.64		Orifice Eqn.	86.81	89.60	**86.81**	INLET
7005.14		Orifice Eqn.	88.81	91.66	**88.81**	INLET
7005.64		Orifice Eqn.	90.72	93.67	**90.72**	INLET
7006.14		Orifice Eqn.	92.63	95.63	**92.63**	INLET
7006.64		Orifice Eqn.	94.51	97.56	**94.51**	INLET
7007.14		Orifice Eqn.	96.34	99.45	**96.34**	INLET
				Processing Time:	**00.96 Seconds**	

CULVERT SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **EASTONVILLE ROAD**
ID: **DP21**



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 8 2023

DP21 SWALE

Trapezoidal

Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.50
Invert Elev (ft)	= 5500.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 38.60

Highlighted

Depth (ft)	= 1.32
Q (cfs)	= 38.60
Area (sqft)	= 9.61
Velocity (ft/s)	= 4.02
Wetted Perim (ft)	= 12.88
Crit Depth, Yc (ft)	= 1.20
Top Width (ft)	= 12.56
EGL (ft)	= 1.57