



# **FINAL DRAINAGE REPORT FOR LOTS 6 & 7 MONUMENT RIDGE**

**December 20, 2019**

Prepared for:

Bucher Design Studios  
P.O. Box 5  
Palmer Lake, CO 80133

WestWorks Job #91601

## **FINAL DRAINAGE REPORT for LOTS 6 & 7 MONUMENT RIDGE**

**Engineer's Statement:**

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

\_\_\_\_\_  
Chad D. Kuzbek, Colorado PE #35751  
For and on behalf of WestWorks Engineering

\_\_\_\_\_  
Date

**Developer's Statement:**

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

\_\_\_\_\_  
Business Name

By: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

**Town of Monument:**

Filed in accordance with Section 17.45 of the Zoning Ordinance for the Town of Monument, and Section 16.12.060 of the Subdivision Code for the Town of Monument, revised February, 2007.

\_\_\_\_\_  
Director of Development Services

\_\_\_\_\_  
Date

# **FINAL DRAINAGE REPORT for LOTS 6 & 7 MONUMENT RIDGE**

## **PURPOSE**

The purpose of this drainage report is to identify specific solutions to problems on site and off-site resulting from the development of this subdivision to be platted.

## **GENERAL LOCATION AND DESCRIPTION**

Lots 6 & 7 are 3.4 acres within the overall Monument Ridge site which consists of 26.6 acres within the northeast quarter of Section 36, Township 11 South, Range 67 West of the Sixth P.M. in the Town of Monument, El Paso County, Colorado. This site is bounded by Baptist Road to the north, Struthers Road to the west, and rural residential lots of the Chaparral Hills subdivision to the east and south. Proposed development of the site consists of multiple commercial buildings with associated drive aisles, parking, and landscaping. The site ultimately drains into the main channel of Jackson Creek on the west side of Struthers Road.

The site is currently undeveloped and covered with native grasses and patches of gamble oak. The terrain is rolling and generally drains from east to west. Existing soils on the site consist mostly of Peyton-Pring complex (Map Symbol 68). The average existing soil condition on the site reflects the characteristics of Hydrologic Soil Group 'B' as designated in the "Soil Survey of El Paso County Area," prepared by the USDA NRCS.

## **DRAINAGE BASINS AND SUB-BASINS**

This site was previously studied in the "Preliminary/Final Drainage Report for Monument Ridge," by WestWorks Engineering dated August 10, 2007. This previous study anticipated fully developed commercial on this site to drain into detention facility Pond A. The internal drives and storm drain infrastructure was designed to handle full commercial development on these 2 lots. The drainage map from this previously approved study is included in the Appendix of this report.

Given the commercial development and relatively small basins all basins are modeled using the minimum time of concentration of 5 minutes.

The detailed site drainage is as follows:

### **Design Point 1 ( $Q_5 = 0.5$ CFS and $Q_{100} = 1$ CFS)**

DP1 represents runoff from Basin A1. This runoff will sheet flow into the existing shared private drive. The overall drainage study accounts for a portion of this site draining into the shared private drive.

### **Design Point 2 ( $Q_5 = 0.7$ CFS and $Q_{100} = 1$ CFS)**

DP2 is a proposed CDOT Type 13 combination inlet in sump collecting flows from Basin A2. Collected flows will be routed via storm drain design point SD100 to an existing inlet in the private drive.

**Design Point 3 ( $Q_5 = 2$  CFS and  $Q_{100} = 4$  CFS)**

DP3 is a set of 3 separate proposed CDOT Type 13 combination inlets in sump collecting flows from Basin A3. Collected flows will be routed via storm drain design point SD101 to storm drain SD103.

**Design Point 4 ( $Q_5 = 0.7$  CFS and  $Q_{100} = 1$  CFS)**

DP4 is a proposed CDOT Type 13 combination inlet in sump collecting flows from Basin A4. Collected flows will be routed via storm drain design point SD102 to storm drain SD103.

**Design Point 5 ( $Q_5 = 3$  CFS and  $Q_{100} = 6$  CFS)**

DP5 is a proposed triple CDOT Type 13 combination inlet in sump collecting flows from Basin A5. Collected flows will be routed via storm drain design point SD104 to an existing storm drain stub.

**Design Point 6 ( $Q_5 = 2$  CFS and  $Q_{100} = 4$  CFS)**

DP6 is a proposed double CDOT Type 13 combination inlet in sump collecting flows from Basin A6. Collected flows will be routed via storm drain design point SD105 to storm drain SD106.

**Design Point 7 ( $Q_5 = 1$  CFS and  $Q_{100} = 2$  CFS)**

DP7 is a proposed CDOT Type 13 combination inlet in sump collecting flows from Basin A7. Collected flows will be routed via storm drain design point SD106 to an existing storm manhole in the shared private drive.

## **DRAINAGE DESIGN CRITERIA**

This drainage report was prepared in accordance to the criteria established in the City of Colorado Springs and El Paso County Drainage Criteria Manual, as well as the "Design Criteria and Construction Specifications Manual for Residential Development," for the Triview Metropolitan District. This report has taken into account the results and recommendations of the following previous drainage study:

"Preliminary/Final Drainage Report for Monument Ridge," by WestWorks Engineering dated August 10, 2007.

For the Rational Method, flows are calculated for the 5-year and 100-year recurrence intervals. The average runoff coefficients, 'C' values, are taken from Table 6-6 and the Intensity-Duration-Frequency curves are taken from Figure 6-5 of the City Drainage Criteria Manual. Time of concentration for overland flow and storm drain or gutter flow are calculated per Section 3.2 of the City Drainage Criteria Manual. Calculations for the Rational Method are shown in the Appendix of this report. Detention volume is calculated in accordance with the City Drainage Criteria Manual Guidelines.

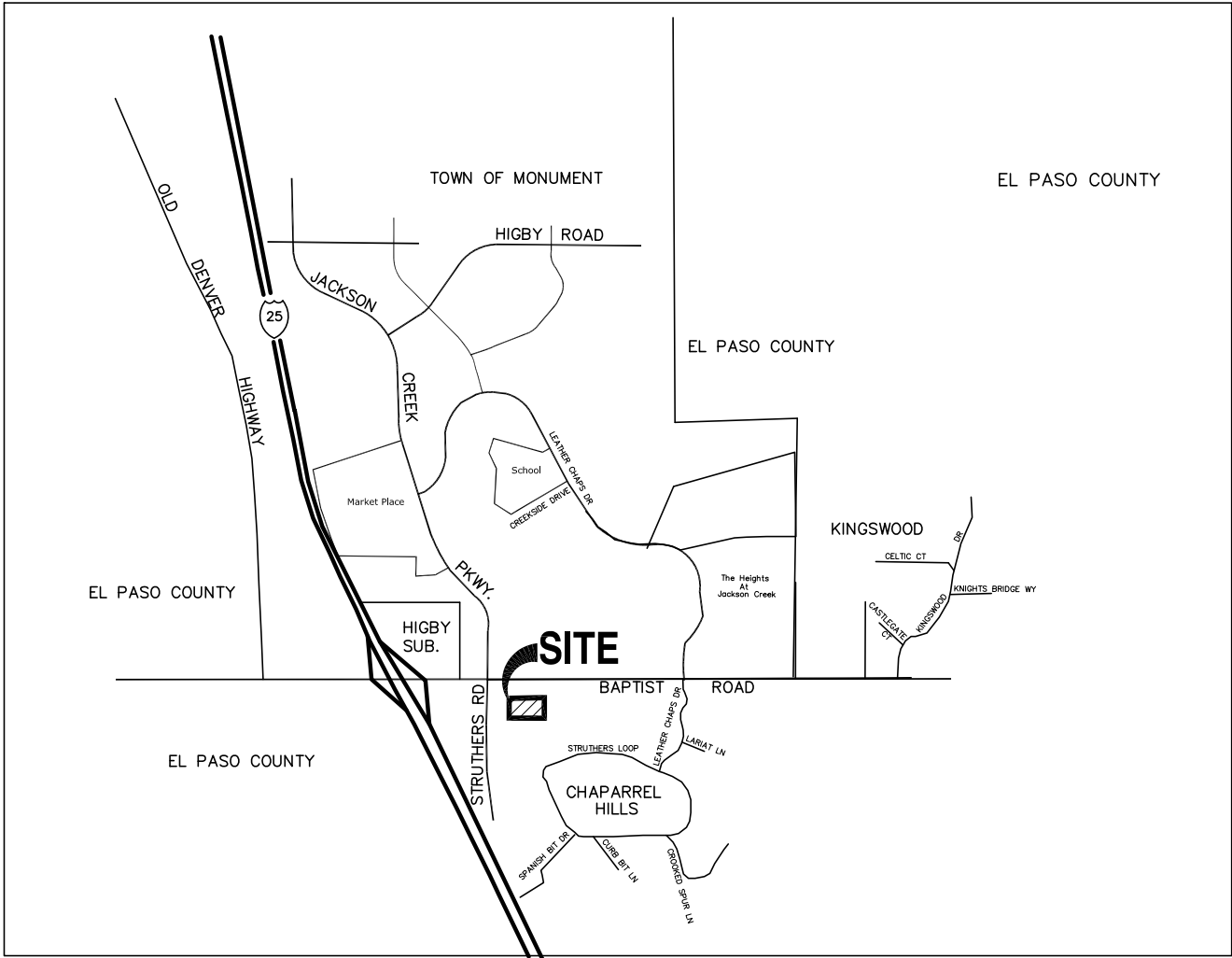
## **DRAINAGE FACILITY DESIGN**

All inlets, storm drains, culverts, and open channels are sized using the procedures outlined in the City Drainage Criteria Manual. All of the drainage systems, including the streets, are designed to safely route the 5-year and 100-year storm flows. Hydraulic grade line calculations for the proposed storm drain design will be included with the storm drain constructions drawings.

## **FLOODPLAIN STATEMENT**

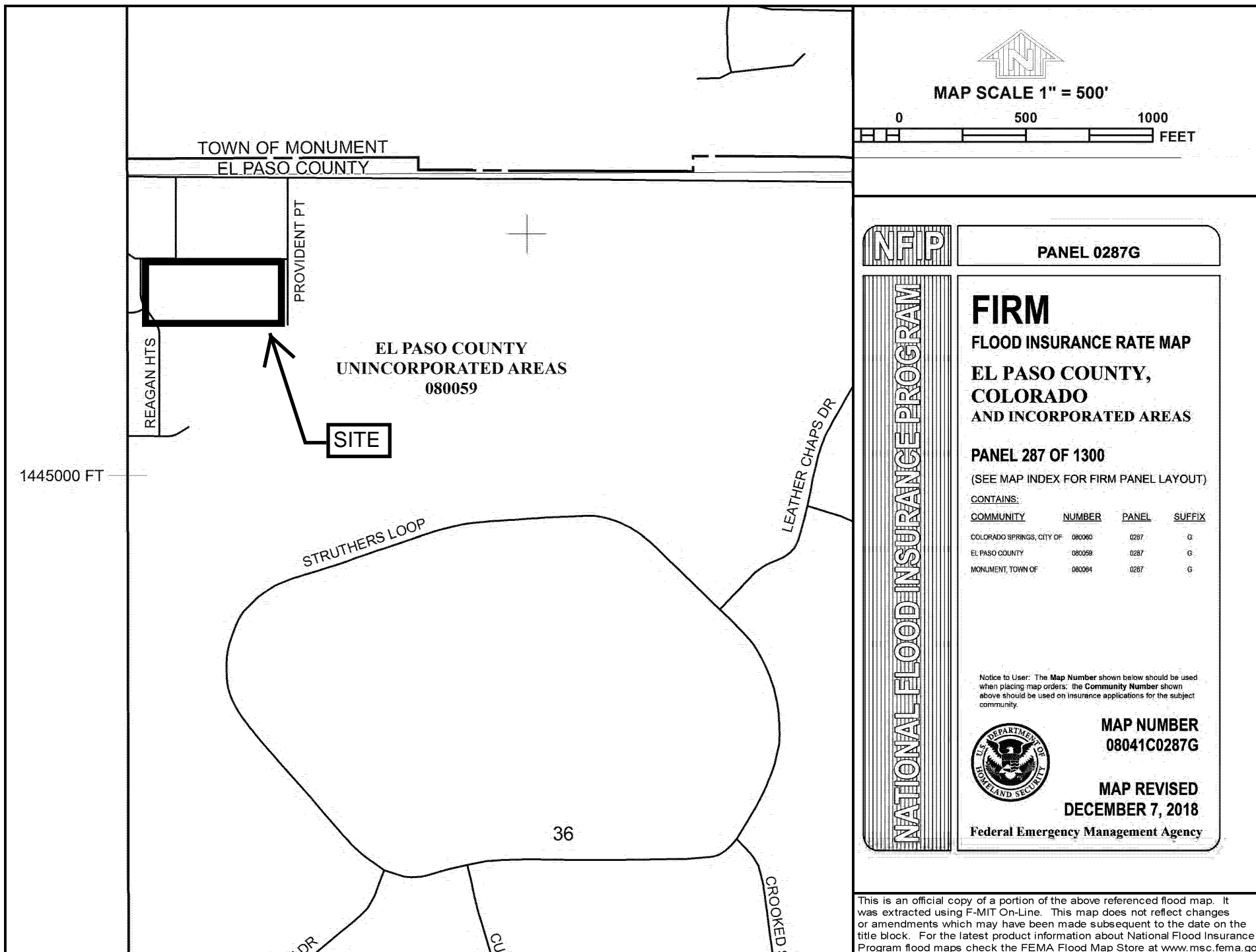
No portion of this Site is within a F.E.M.A. designated floodplain per Flood Insurance Rate Map Community Panel Nos. 08041C0287 G, effective December 7, 2018.

## **APPENDIX**



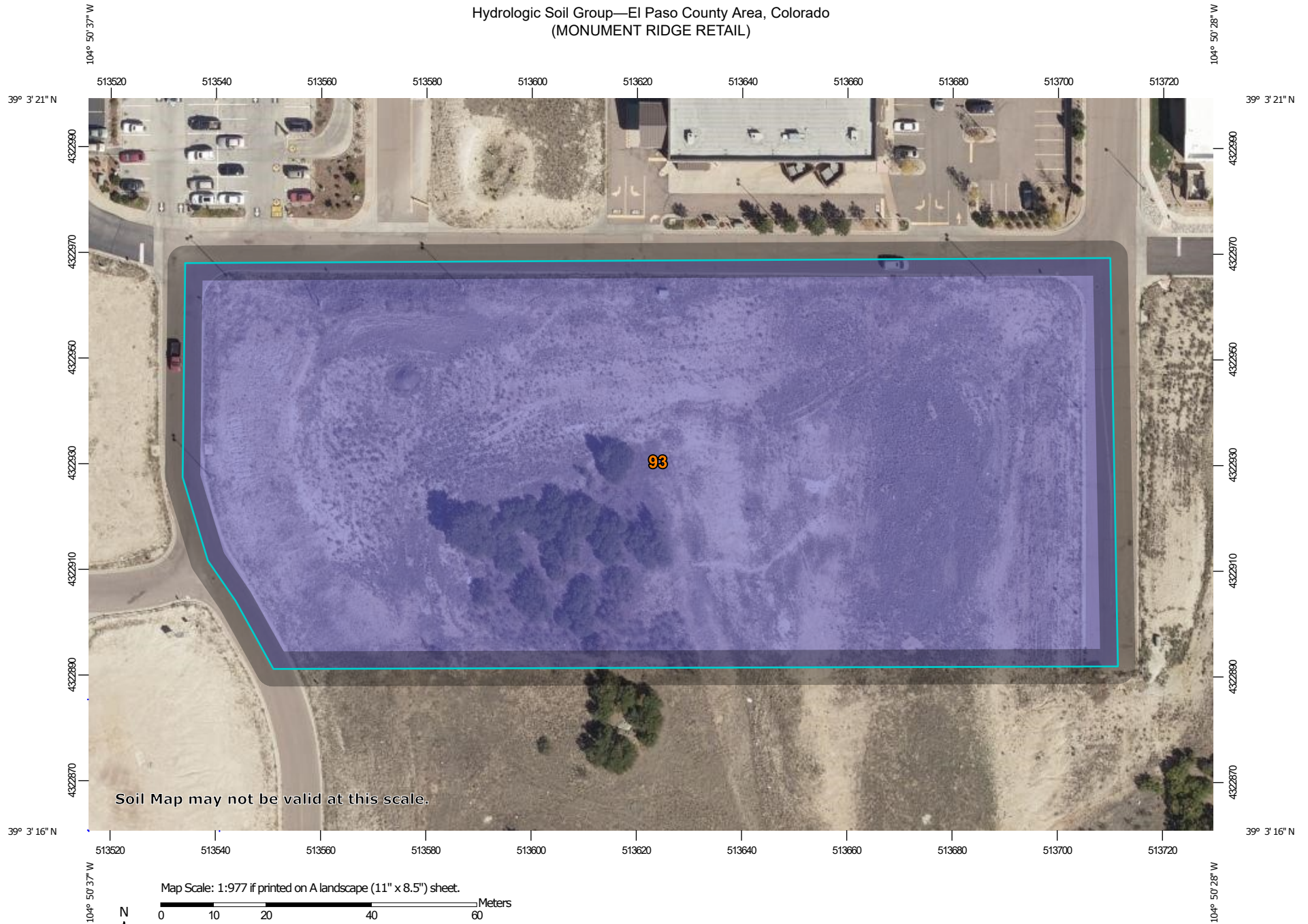
**VICINITY MAP**

N.T.S.





# Hydrologic Soil Group—El Paso County Area, Colorado (MONUMENT RIDGE RETAIL)



## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	3.3	100.0%
<b>Totals for Area of Interest</b>			<b>3.3</b>	<b>100.0%</b>

## 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.

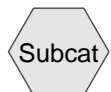
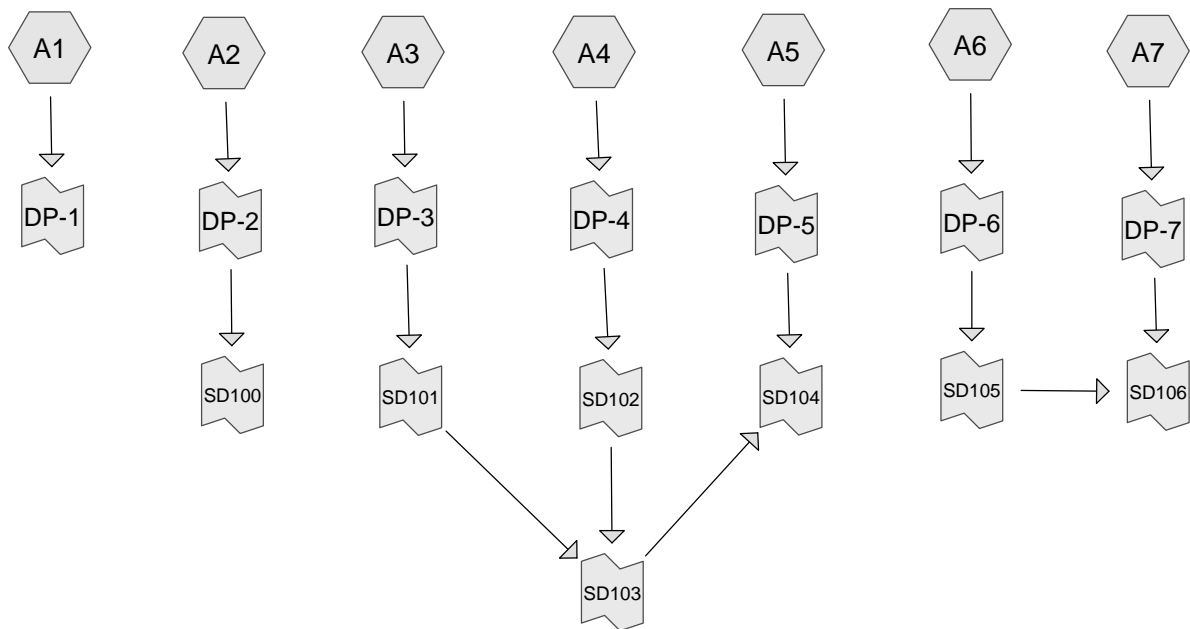
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over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

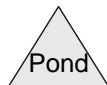
## **HYDROLOGIC CALCULATIONS**



Subcat



Reach



Pond



Link

#### Drainage Diagram for 5YR-DEVELOPED

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**5YR-DEVELOPED***El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr*

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**Subcatchment A1:**

Runoff = 0.49 cfs @ 0.08 hrs, Volume= 0.004 af, Depth= 0.21"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.100	0.90	HARDSCAPE
0.100	0.08	LANDSCAPE
0.200	0.49	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment A2:**

Runoff = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af, Depth= 0.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.150	0.90	HARDSCAPE
0.050	0.08	LANDSCAPE
0.200	0.70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment A3:**

Runoff = 1.86 cfs @ 0.08 hrs, Volume= 0.013 af, Depth= 0.32"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.400	0.90	HARDSCAPE
0.100	0.08	LANDSCAPE
0.500	0.74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**5YR-DEVELOPED***El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr*

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**Subcatchment A4:**

Runoff = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af, Depth= 0.30"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.150	0.90	HARDSCAPE
0.050	0.08	LANDSCAPE
0.200	0.70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**Subcatchment A5:**

Runoff = 3.22 cfs @ 0.08 hrs, Volume= 0.023 af, Depth= 0.34"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.700	0.90	HARDSCAPE
0.100	0.08	LANDSCAPE
0.800	0.80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**Subcatchment A6:**

Runoff = 2.29 cfs @ 0.08 hrs, Volume= 0.016 af, Depth= 0.33"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.500	0.90	HARDSCAPE
0.100	0.08	LANDSCAPE
0.600	0.76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**5YR-DEVELOPED***El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr*

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**Subcatchment A7:**

Runoff = 0.91 cfs @ 0.08 hrs, Volume= 0.006 af, Depth= 0.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr

Area (ac)	C	Description
0.200	0.90	HARDSCAPE

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Link DP-1:**

Inflow Area = 0.200 ac, Inflow Depth = 0.21" for 5-Year event

Inflow = 0.49 cfs @ 0.08 hrs, Volume= 0.004 af

Primary = 0.49 cfs @ 0.08 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-2:**

Inflow Area = 0.200 ac, Inflow Depth = 0.30" for 5-Year event

Inflow = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af

Primary = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-3:**

Inflow Area = 0.500 ac, Inflow Depth = 0.32" for 5-Year event

Inflow = 1.86 cfs @ 0.08 hrs, Volume= 0.013 af

Primary = 1.86 cfs @ 0.08 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-4:**

Inflow Area = 0.200 ac, Inflow Depth = 0.30" for 5-Year event

Inflow = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af

Primary = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**5YR-DEVELOPED***El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr*

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**Link DP-5:**

Inflow Area = 0.800 ac, Inflow Depth = 0.34" for 5-Year event  
Inflow = 3.22 cfs @ 0.08 hrs, Volume= 0.023 af  
Primary = 3.22 cfs @ 0.08 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-6:**

Inflow Area = 0.600 ac, Inflow Depth = 0.33" for 5-Year event  
Inflow = 2.29 cfs @ 0.08 hrs, Volume= 0.016 af  
Primary = 2.29 cfs @ 0.08 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-7:**

Inflow Area = 0.200 ac, Inflow Depth = 0.39" for 5-Year event  
Inflow = 0.91 cfs @ 0.08 hrs, Volume= 0.006 af  
Primary = 0.91 cfs @ 0.08 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD100:**

Inflow Area = 0.200 ac, Inflow Depth = 0.30" for 5-Year event  
Inflow = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af  
Primary = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD101:**

Inflow Area = 0.500 ac, Inflow Depth = 0.32" for 5-Year event  
Inflow = 1.86 cfs @ 0.08 hrs, Volume= 0.013 af  
Primary = 1.86 cfs @ 0.08 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD102:**

Inflow Area = 0.200 ac, Inflow Depth = 0.30" for 5-Year event  
Inflow = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af  
Primary = 0.70 cfs @ 0.08 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs



**5YR-DEVELOPED***El Paso County 5-Year Duration=5 min, Inten=5.17 in/hr*

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**Link SD103:**

Inflow Area = 0.700 ac, Inflow Depth = 0.31" for 5-Year event  
Inflow = 2.57 cfs @ 0.08 hrs, Volume= 0.018 af  
Primary = 2.57 cfs @ 0.08 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD104:**

Inflow Area = 1.500 ac, Inflow Depth = 0.33" for 5-Year event  
Inflow = 5.79 cfs @ 0.08 hrs, Volume= 0.041 af  
Primary = 5.79 cfs @ 0.08 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD105:**

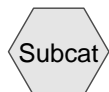
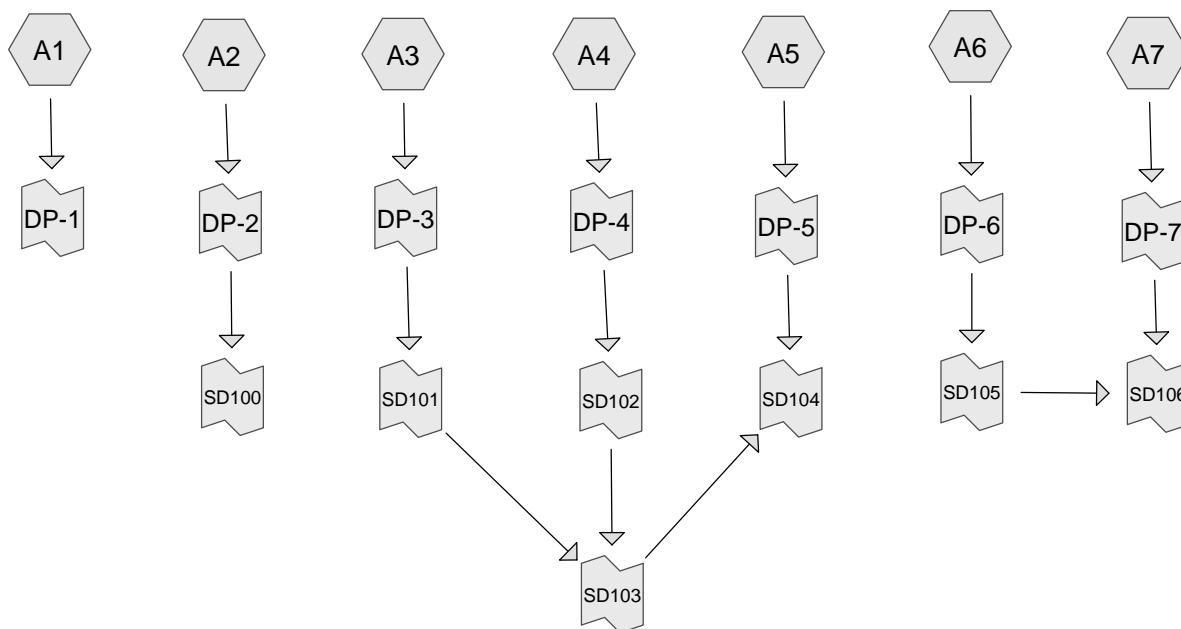
Inflow Area = 0.600 ac, Inflow Depth = 0.33" for 5-Year event  
Inflow = 2.29 cfs @ 0.08 hrs, Volume= 0.016 af  
Primary = 2.29 cfs @ 0.08 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD106:**

Inflow Area = 0.800 ac, Inflow Depth = 0.34" for 5-Year event  
Inflow = 3.20 cfs @ 0.08 hrs, Volume= 0.023 af  
Primary = 3.20 cfs @ 0.08 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

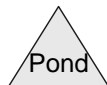
Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs



Subcat



Reach



Pond



Link

#### Drainage Diagram for 100YR-DEVELOPED

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**100YR-DEVELOPED***El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr*

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**Subcatchment A1:**

Runoff = 1.10 cfs @ 0.08 hrs, Volume= 0.008 af, Depth= 0.47"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.100	0.96	HARDSCAPE
0.100	0.35	LANDSCAPE
0.200	0.65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment A2:**

Runoff = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af, Depth= 0.58"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.150	0.96	HARDSCAPE
0.050	0.35	LANDSCAPE
0.200	0.81	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment A3:**

Runoff = 3.55 cfs @ 0.08 hrs, Volume= 0.025 af, Depth= 0.61"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.400	0.96	HARDSCAPE
0.100	0.35	LANDSCAPE
0.500	0.84	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**100YR-DEVELOPED***El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr*

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**Subcatchment A4:**

Runoff = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af, Depth= 0.58"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.150	0.96	HARDSCAPE
0.050	0.35	LANDSCAPE
0.200	0.81	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**Subcatchment A5:**

Runoff = 5.95 cfs @ 0.08 hrs, Volume= 0.042 af, Depth= 0.64"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.700	0.96	HARDSCAPE
0.100	0.35	LANDSCAPE
0.800	0.88	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**Subcatchment A6:**

Runoff = 4.36 cfs @ 0.08 hrs, Volume= 0.031 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.500	0.96	HARDSCAPE
0.100	0.35	LANDSCAPE
0.600	0.86	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry,</b>

**100YR-DEVELOPED***El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr*

Prepared by WestWorks Engineering

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12/20/2019

**Subcatchment A7:**

Runoff = 1.62 cfs @ 0.08 hrs, Volume= 0.012 af, Depth= 0.69"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr

Area (ac)	C	Description
0.200	0.96	HARDSCAPE

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Link DP-1:**

Inflow Area = 0.200 ac, Inflow Depth = 0.47" for 100-Year event

Inflow = 1.10 cfs @ 0.08 hrs, Volume= 0.008 af

Primary = 1.10 cfs @ 0.08 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-2:**

Inflow Area = 0.200 ac, Inflow Depth = 0.58" for 100-Year event

Inflow = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af

Primary = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-3:**

Inflow Area = 0.500 ac, Inflow Depth = 0.61" for 100-Year event

Inflow = 3.55 cfs @ 0.08 hrs, Volume= 0.025 af

Primary = 3.55 cfs @ 0.08 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-4:**

Inflow Area = 0.200 ac, Inflow Depth = 0.58" for 100-Year event

Inflow = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af

Primary = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**100YR-DEVELOPED***El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr*

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**Link DP-5:**

Inflow Area = 0.800 ac, Inflow Depth = 0.64" for 100-Year event  
Inflow = 5.95 cfs @ 0.08 hrs, Volume= 0.042 af  
Primary = 5.95 cfs @ 0.08 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-6:**

Inflow Area = 0.600 ac, Inflow Depth = 0.62" for 100-Year event  
Inflow = 4.36 cfs @ 0.08 hrs, Volume= 0.031 af  
Primary = 4.36 cfs @ 0.08 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link DP-7:**

Inflow Area = 0.200 ac, Inflow Depth = 0.69" for 100-Year event  
Inflow = 1.62 cfs @ 0.08 hrs, Volume= 0.012 af  
Primary = 1.62 cfs @ 0.08 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD100:**

Inflow Area = 0.200 ac, Inflow Depth = 0.58" for 100-Year event  
Inflow = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af  
Primary = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD101:**

Inflow Area = 0.500 ac, Inflow Depth = 0.61" for 100-Year event  
Inflow = 3.55 cfs @ 0.08 hrs, Volume= 0.025 af  
Primary = 3.55 cfs @ 0.08 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD102:**

Inflow Area = 0.200 ac, Inflow Depth = 0.58" for 100-Year event  
Inflow = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af  
Primary = 1.37 cfs @ 0.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**100YR-DEVELOPED***El Paso County 100-Year Duration=5 min, Inten=8.68 in/hr*

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**Link SD103:**

Inflow Area = 0.700 ac, Inflow Depth = 0.60" for 100-Year event  
Inflow = 4.92 cfs @ 0.08 hrs, Volume= 0.035 af  
Primary = 4.92 cfs @ 0.08 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD104:**

Inflow Area = 1.500 ac, Inflow Depth = 0.62" for 100-Year event  
Inflow = 10.86 cfs @ 0.08 hrs, Volume= 0.077 af  
Primary = 10.86 cfs @ 0.08 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD105:**

Inflow Area = 0.600 ac, Inflow Depth = 0.62" for 100-Year event  
Inflow = 4.36 cfs @ 0.08 hrs, Volume= 0.031 af  
Primary = 4.36 cfs @ 0.08 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

**Link SD106:**

Inflow Area = 0.800 ac, Inflow Depth = 0.64" for 100-Year event  
Inflow = 5.98 cfs @ 0.08 hrs, Volume= 0.043 af  
Primary = 5.98 cfs @ 0.08 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

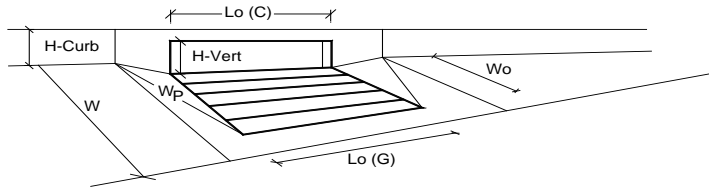
Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

## **HYDRAULIC CALCULATIONS**



# INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

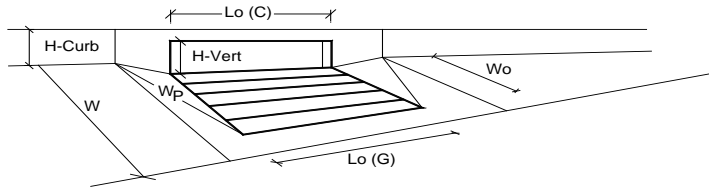


DP-2

Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT/Denver 13 Combination	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)		d <sub>local</sub> =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
<b>Grate Information</b>			MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>g</sub> (G) =	3.00	3.00	feet
Width of a Unit Grate		W <sub>g</sub> =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>l</sub> (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	0.60	0.60	
<b>Curb Opening Information</b>			MINOR	MAJOR	
Length of a Unit Curb Opening		L <sub>c</sub> (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>p</sub> =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>l</sub> (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	0.66	0.66	
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR	
Depth for Grate Midwidth		d <sub>Grate</sub> =	0.523	0.523	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	0.33	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	0.94	0.94	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	0.94	0.94	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		Q <sub>a</sub> =	3.6	3.6	cfs
		Q <sub>PEAK REQUIRED</sub> =	0.7	1.0	cfs

# INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

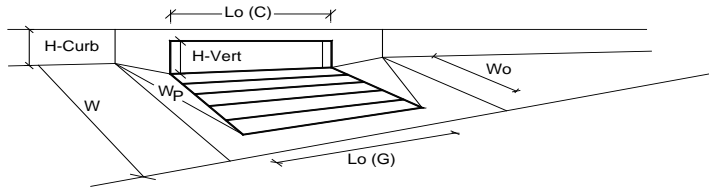


DP-3

Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT/Denver 13 Valley Grate	Type =	CDOT/Denver 13 Valley Grate		
Local Depression (additional to continuous gutter depression 'a' from above)		d <sub>local</sub> =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	3	3	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
<b>Grate Information</b>			MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>g</sub> (G) =	3.00	3.00	feet
Width of a Unit Grate		W <sub>g</sub> =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>l</sub> (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	0.60	0.60	
<b>Curb Opening Information</b>			MINOR	MAJOR	
Length of a Unit Curb Opening		L <sub>c</sub> (C) =	N/A	N/A	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	N/A	N/A	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	N/A	N/A	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	N/A	N/A	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>p</sub> =	N/A	N/A	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>l</sub> (C) =	N/A	N/A	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	N/A	N/A	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	N/A	N/A	
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR	
Depth for Grate Midwidth		d <sub>Grate</sub> =	0.523	0.523	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	N/A	N/A	ft
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	N/A	N/A	
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	0.57	0.57	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		Q <sub>a</sub> =	4.4	4.4	cfs
		Q <sub>PEAK REQUIRED</sub> =	2.0	4.0	cfs

# INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

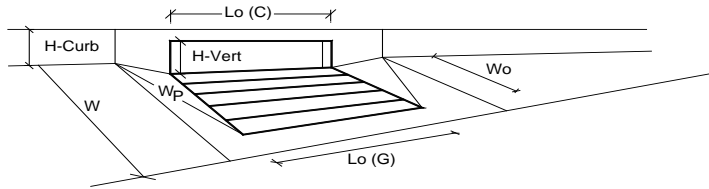


DP-4

Design Information (Input)		MINOR		MAJOR		
Type of Inlet	CDOT/Denver 13 Combination	Type =	CDOT/Denver 13 Combination			
Local Depression (additional to continuous gutter depression 'a' from above)		d <sub>local</sub> =	2.00	2.00	inches	
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1		
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches	
<b>Grate Information</b>			MINOR	MAJOR		<input type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>g</sub> (G) =	3.00	3.00	feet	
Width of a Unit Grate		W <sub>g</sub> =	1.73	1.73	feet	
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	0.43	0.43		
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>l</sub> (G) =	0.50	0.50		
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	3.30	3.30		
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	0.60	0.60		
<b>Curb Opening Information</b>			MINOR	MAJOR		
Length of a Unit Curb Opening		L <sub>c</sub> (C) =	3.00	3.00	feet	
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	6.50	6.50	inches	
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	5.25	5.25	inches	
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees	
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>p</sub> =	2.00	2.00	feet	
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>l</sub> (C) =	0.10	0.10		
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	3.70	3.70		
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	0.66	0.66		
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR		
Depth for Grate Midwidth		d <sub>Grate</sub> =	0.523	0.523	ft	
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	0.33	0.33	ft	
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	0.94	0.94		
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	1.00	1.00		
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	0.94	0.94		
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			MINOR	MAJOR		
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		Q <sub>a</sub> =	3.6	3.6	cfs	
		Q <sub>PEAK REQUIRED</sub> =	0.7	1.0	cfs	

# INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

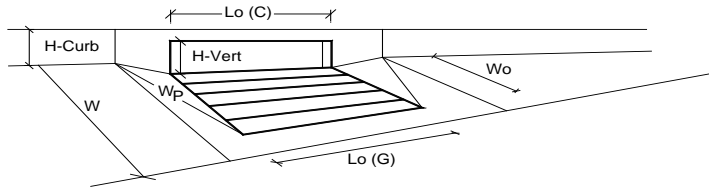


DP-5

Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT/Denver 13 Combination	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)		$a_{local}$ =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	3	3	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
<b>Grate Information</b>			MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate		$L_o (G)$ =	3.00	3.00	feet
Width of a Unit Grate		$W_o$ =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		$A_{ratio}$ =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_l (G)$ =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w (G)$ =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o (G)$ =	0.60	0.60	
<b>Curb Opening Information</b>			MINOR	MAJOR	
Length of a Unit Curb Opening		$L_o (C)$ =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches		$H_{vert}$ =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches		$H_{throat}$ =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		$W_p$ =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		$C_l (C)$ =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		$C_w (C)$ =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		$C_o (C)$ =	0.66	0.66	
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR	
Depth for Grate Midwidth		$d_{Grate}$ =	0.523	0.523	ft
Depth for Curb Opening Weir Equation		$d_{Curb}$ =	0.33	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	0.57	
Curb Opening Performance Reduction Factor for Long Inlets		$RF_{Curb}$ =	0.97	0.97	
Grated Inlet Performance Reduction Factor for Long Inlets		$RF_{Grate}$ =	0.57	0.57	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_a$ =	6.4	6.4	cfs
		$Q_{PEAK REQUIRED}$ =	3.0	6.0	cfs

# INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017

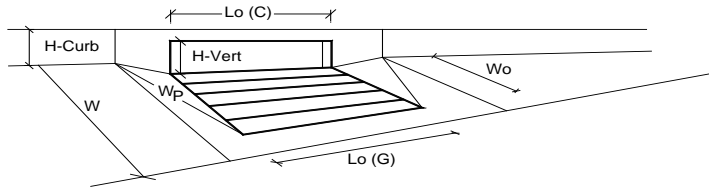


DP-6

Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT/Denver 13 Combination	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)		d <sub>local</sub> =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
<b>Grate Information</b>			MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate		L <sub>g</sub> (G) =	3.00	3.00	feet
Width of a Unit Grate		W <sub>g</sub> =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A <sub>ratio</sub> =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C <sub>l</sub> (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C <sub>w</sub> (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C <sub>o</sub> (G) =	0.60	0.60	
<b>Curb Opening Information</b>			MINOR	MAJOR	
Length of a Unit Curb Opening		L <sub>c</sub> (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches		H <sub>vert</sub> =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches		H <sub>throat</sub> =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W <sub>p</sub> =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C <sub>l</sub> (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C <sub>w</sub> (C) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C <sub>o</sub> (C) =	0.66	0.66	
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR	
Depth for Grate Midwidth		d <sub>Grate</sub> =	0.523	0.523	ft
Depth for Curb Opening Weir Equation		d <sub>Curb</sub> =	0.33	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets		RF <sub>Combination</sub> =	0.71	0.71	
Curb Opening Performance Reduction Factor for Long Inlets		RF <sub>Curb</sub> =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF <sub>Grate</sub> =	0.71	0.71	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		Q <sub>a</sub> =	5.3	5.3	cfs
		Q <sub>PEAK REQUIRED</sub> =	2.0	4.0	cfs

# INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



DP-7

Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT/Denver 13 Combination	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)		$a_{local}$ =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
<b>Grate Information</b>			MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate		$L_o$ (G) =	3.00	3.00	feet
Width of a Unit Grate		$W_o$ =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		$A_{ratio}$ =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_l$ (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w$ (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o$ (G) =	0.60	0.60	
<b>Curb Opening Information</b>			MINOR	MAJOR	
Length of a Unit Curb Opening		$L_o$ (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches		$H_{vert}$ =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches		$H_{throat}$ =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		$W_p$ =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		$C_l$ (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		$C_w$ (C) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		$C_o$ (C) =	0.66	0.66	
<b>Low Head Performance Reduction (Calculated)</b>			MINOR	MAJOR	
Depth for Grate Midwidth		$d_{Grate}$ =	0.523	0.523	ft
Depth for Curb Opening Weir Equation		$d_{Curb}$ =	0.33	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.94	0.94	
Curb Opening Performance Reduction Factor for Long Inlets		$RF_{Curb}$ =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		$RF_{Grate}$ =	0.94	0.94	
<b>Total Inlet Interception Capacity (assumes clogged condition)</b>			MINOR	MAJOR	
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_a$ =	3.6	3.6	cfs
		$Q_{PEAK REQUIRED}$ =	1.0	2.0	cfs

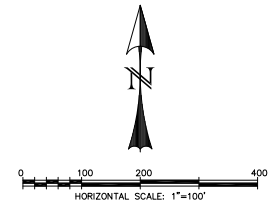
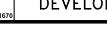
## **DRAINAGE MAPS**



## TOWN OF MONUMENT, EL PASO COUNTY, COLORADO



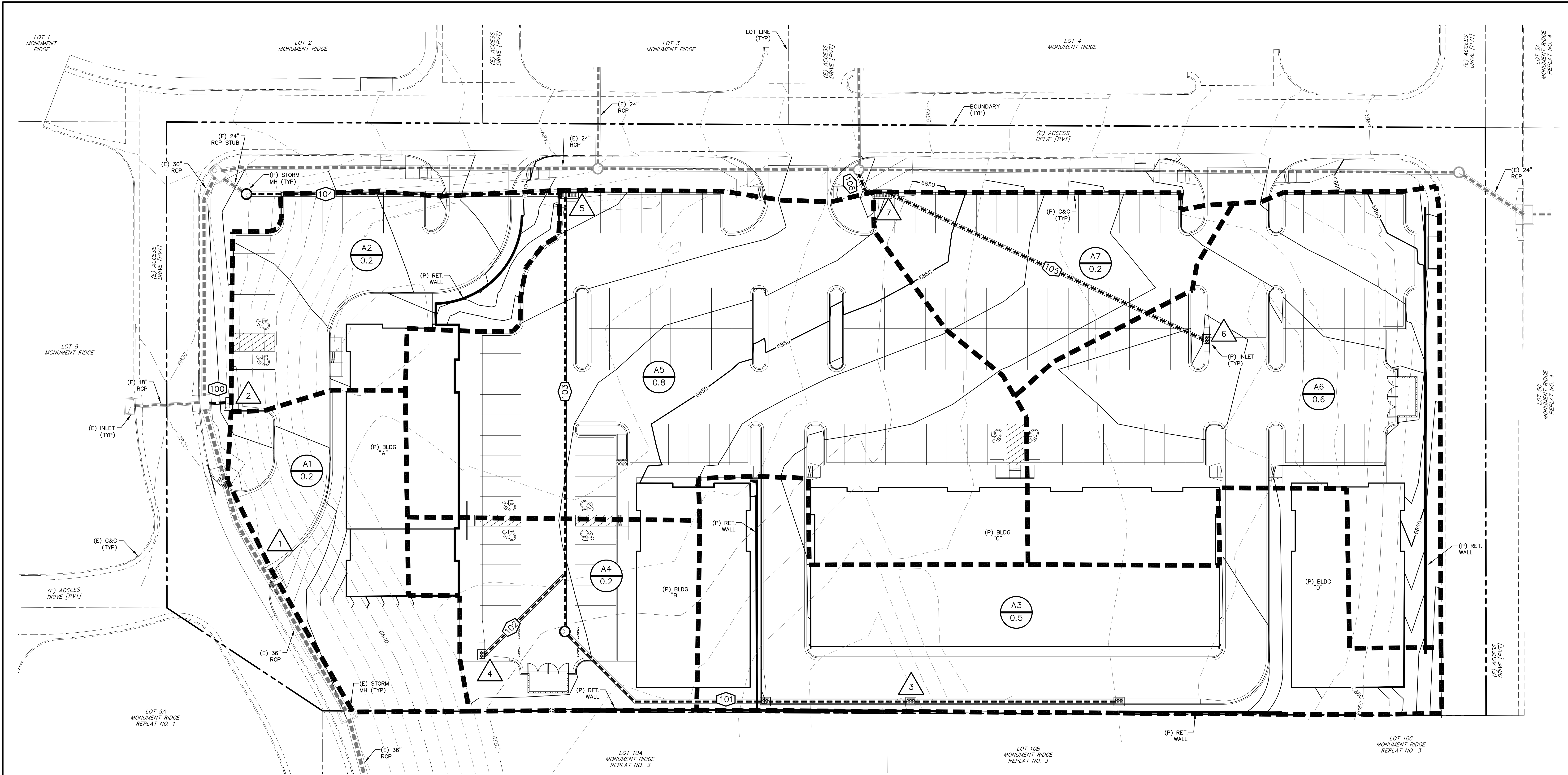
POND	Q10 [CFS]	Q100 [CFS]
A		
IN	65	127
OUT	13	30
VOLUME	1.8 AC-FT	3.3 AC-FT
C		
IN	10	18
OUT	7	15
VOLUME	0.1 AC-FT	0.3 AC-FT
OS-A1		
IN	4	7
OUT	3	7
VOLUME	0.05 AC-FT	0.05 AC-FT

NOTE:  
ALL RUNOFF AND VOLUME QUANTITIES BASED ON THE 2-YEAR AMC III STORM MODEL.



REV.	DESCRIPTION	DATE	REVIEW:	DESIGN DATA:	PREPARED FOR:	 <small>40553101 JOB OR DRAWING NUMBER (714) 686-5674</small>	MONUMENT RIDGE	DRAWN BY: CDK	
1.	PER TOWN OF MONUMENT & TRIVIEW METRO COMMENTS	7/28/06	STREET DESIGN: ROUGH CUT REVIEW _____ DATE _____ FINAL REVIEW _____ DATE _____ DRAINAGE DESIGN: _____ DATE _____	SIDEWALKS: WIDTH: _____ LOCATION: <input type="checkbox"/> Attached <input type="checkbox"/> Detached ASPHALT THICKNESS: _____ AC Surface _____ AC Base _____ CURB TYPE: <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 AGG. BASE THICKNESS: _____ Class 6 _____ Class 5 _____ Class 2 _____ R/W WIDTH: _____ F/C-F/C _____ STREET TYPE: _____ HVEEM _____	ESI 15 NORTH NEVADA AVENUE COLORADO SPRINGS, CO 80903			SCALE: 1"=100'	DATE: 7/28/06
								JOB NUMBER	SHEET
								90537	2 OF 2





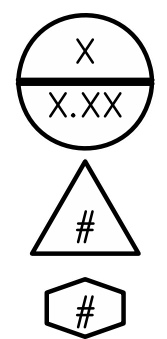
LEGEND

- PROPOSED  
EXISTING  
FUTURE  
CURB AND GUTTER  
RIGHT-OF-WAY  
HIGH POINT  
LOW POINT  
BOUNDARY  
RIGHT-OF-WAY  
LOT LINE  
(E) STORM SEWER, INLET, MH  
(P) STORM SEWER, INLET, MH

- (P)  
(E)  
(F)  
C&G  
ROW  
HP  
LP

DRAINAGE LEGEND

- BASIN IDENTIFIER  
BASIN AREA [AC]  
SURFACE DESIGN POINT IDENTIFIER  
SWALE DESIGN POINT IDENTIFIER  
DRAINAGE BASIN BOUNDARY



DRAINAGE BASIN

BASIN	Q <sub>5</sub> [CFS]	Q <sub>100</sub> [CFS]
A1	0.5	1
A2	0.7	1
A3	2	4
A4	0.7	1
A5	3	6
A6	2	4
A7	1	2

DESIGN POINT

DESIGN POINT	Q <sub>5</sub> [CFS]	Q <sub>100</sub> [CFS]	DESCRIPTION
1	0.5	1	SHEET FLOW INTO THE ADJACENT PRIVATE DRIVE
2	0.7	1	(P) C&G TYPE 13 COMBINATION INLET
3	2	4	(P) TRIPLE C&G TYPE 13 COMBINATION INLET
4	0.7	1	(P) C&G TYPE 13 COMBINATION INLET
5	3	6	(P) TRIPLE C&G TYPE 13 COMBINATION INLET
6	2	4	(P) DOUBLE C&G TYPE 13 COMBINATION INLET
7	1	2	(P) C&G TYPE 13 COMBINATION INLET
SD100	0.7	1	(P) 18" RCP STORM DRAIN
SD101	2	4	(P) 18" RCP STORM DRAIN
SD102	0.7	1	(P) 18" RCP STORM DRAIN
SD103	3	5	(P) 18" RCP STORM DRAIN
SD104	6	11	(P) 18" RCP STORM DRAIN
SD105	2	4	(P) 18" RCP STORM DRAIN
SD106	3	6	(P) 18" RCP STORM DRAIN



0 20 40  
SCALE: 1" = 20'

REV.	DESCRIPTION	DATE



PREPARED FOR:  
BUCHER DESIGN  
STUDIO, INC.  
P.O. BOX 5  
PALMER LAKE, CO 80133  
(719) 484-0480

NOT FOR  
CONSTRUCTION



MONUMENT RIDGE  
LOTS 6 & 7  
DRAINAGE MAP  
DEVELOPED CONDITIONS

DESIGNED BY:	MGP	DRAWN BY:	MGP
SCALE:	1"=20'	DATE:	12/13/19
JOB NUMBER	91911	SHEET	DR-01