FINAL DRAINAGE REPORT

for

LARGENT SUBDIVISION
6985 MERIDIAN ROAD

Prepared for:

Hammers Construction, Inc.
1141 Woolsey Heights
Colorado Springs, CO 80915

January 18, 2018

Prepared by:

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PCD Project No. PPR-18-___

SF-18-003

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FINAL DRAINAGE REPORT
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DRAINAGE STATEMENT

Engineer's Statement:

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

John P. Schwab, P.E. #29891

Developer's Statement:

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

By:

Date

Print the Name, Title,
Business Name,
Address

El Paso County's Statement

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

Jennifer Irvine, P.E. Date
County Engineer / ECM Administrator

Conditions:

FLOODPLAIN STATEMENT

To the best of my knowledge and belief, no parts of the Largent Subdivision are located in a FEMA designated 100-year floodplain, as shown on FIRM panel No. 08041C0575F, dated March 17, 1997.

John P. Schwab, P.E. #29891

Remove this sheet w/ the design engineer's
signature since it is not required by the County.

I. INTRODUCTION

A. Property Location and Description

Big O Tires is planning to construct a new auto sales and service facility on a developed 1.2-acre property (El Paso County Assessor's Parcel No. 53124-01-008) located at the southeast corner of US Highway 24 (US24) and Meridian Road in the Falcon area of El Paso County, Colorado. The site is zoned Community Commercial (CC), and the proposed auto repair facility will require processing of a special use permit and a site development plan prior to establishing the use. The property is currently an unplatted tract described as a portion of Section 7, Township 13S, Range 64W, and a portion of Section 12, Township 13S, Range 65W of the 6th P.M., El Paso County, Colorado. The project will include platting the property as a single lot, which will be described as Lot 1, Largent Subdivision.

The north boundary of the property adjoins US Highway, and existing commercial development is located to the north across US24. The west boundary of the site adjoins Meridian Road, and existing commercial center is located to the west across Meridian Road. The property adjoins developed ranch properties to the east and south.

The proposed Site Development Plan consists of demolishing the existing buildings within the property and constructing a new 6,474 square-foot, single-story auto sales and service building, along with associated parking and site improvements. Access will be provided by a private access drive connection to Meridian Road at the western site boundary, in close proximity to the existing site access drive.

B. Scope

In support of the Subdivision Plat and Site Development Plan submittals to El Paso County, this report is intended to meet the requirements of a Final Drainage Report in accordance with El Paso County drainage criteria. This report will provide a summary of site drainage issues impacting the proposed development. The report will analyze impacts from upstream drainage patterns, site-specific developed drainage patterns, and impacts on downstream facilities. This report is based on the guidelines and criteria presented in the City of Colorado Springs and El Paso County "Drainage Criteria Manual."

Revise reference. County still uses the 1991 DCM and has only adopted portions of the City's 2014 DCM.

C. References

City of Colorado Springs & El Paso County "Drainage Criteria Manual, Volumes 1 and 2," revised May, 2014.

El Paso County "Engineering Criteria Manual," January 9, 2006.

FEMA, Flood Insurance Rate Map (FIRM) Number 08041C0575F, March 17, 1997.

Add the Falcon DBPS in the Reference. Add a narrative regarding the DBPS summarizing whether or not there are any DBPS improvements that will be associated with this development.

USDA/NRCS, “Custom Soil Resource Report for El Paso County Area, Colorado,” December 10, 2017.

II. EXISTING DRAINAGE CONDITIONS

The existing site topography generally slopes downward to the southwest with grades in the range of 1-3 percent. According to the Soil Survey of
Soil Conservation Service (SCS), on-site soils are compris
sandy loam soils, and these well-drained soils are classifie
(see Appendix A).

What was analyzed in the appendix is existing flows not historic. Update text to note existing.

As shown on the enclosed Historic Drainage Plan (Sheet EX1, Appendix D), the site has been delineated as one on-site drainage basin, and the site is not impacted by any off-site drainage basins.

The on-site area has been delineated as Basin A, which sheet flows towards the southwest corner of the property. The existing site is developed with several buildings, and the majority of the site is covered by compacted gravel. Historic flows from Basin A drain to Design Point #1, historic peak flows calculated as Q_5 = 2.4 cfs and Q_{100} = 5.1 cfs. Hydrologic calculations are enclosed in Appendix A.

III. PROPOSED DRAINAGE CONDITIONS

remove "school"

As shown on the enclosed Drainage Plan (Figure D1, Appendix A), the school site has been delineated as a single on-site drainage basin, consistent with the historic drainage analysis. Developed flows have been calculated based on the impervious areas associated with the proposed building and parking areas.

Developed Basin A will drain southerly across the site to a proposed stormwater detention pond along the southern boundary of the property. The proposed building pad
w rainage away from the
b around the perimeter of the
b orm inlets at selected locations,
c he proposed extended detention
b

With DP1 downstream of the EDB, these values should be the peak release rates from the pond plus the runoff from the small subbasin not draining into the EDB. See redlines on the proposed drainage map.

Private Storm Inlets A1 and A2 will intercept surface drainage along the east side of the building, and Private Storm Sewer A1 (12”) will flow south into Extended Detention Basin A. Private Storm Inlets A3-A5 will intercept surface drainage along the west side of the building, and Private Storm Sewer A3-A5 (12”) will also flow south into Extended Detention Basin A. Developed peak flows at Design Point #1 are calculated as Q_5 = 4.1 cfs and Q_{100} = 7.8 cfs.

Hydrologic calculations for the site are detailed in the attached spreadsheets (Appendix A), and peak flows are identified on Figures EX1 and D1 (Appendix D).

The contractor will be required to implement standard best management practices for erosion control during construction.

IV. DRAINAGE PLANNING FOUR STEP PROCESS

El Paso County Drainage Criteria require drainage planning to include a Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long-term source controls.

As stated in DCM Volume 2, the Four Step Process is applicable to all new and re-development projects with construction activities that disturb 1 acre or greater or that disturb less than 1 acre but are part of a larger common plan of development. The Four Step Process has been implemented as follows in the planning of this project:

Step 1: Employ Runoff Reduction Practices

- Minimize Impacts: The proposed auto service facility is being constructed on a previously developed site, so this re-development project will inherently minimize drainage impacts in comparison to development of a vacant site. Recognizing the existing compacted gravel covering the site, the proposed development of the site will result in a relatively small net increase in impervious site development.

Step 2: Stabilize Drainageways

- There are no drainageways directly adjacent to this project site. This site is a re-development project, and implementation of the proposed on-site drainage improvements and Detention Basin will minimize the downstream drainage impact from this site.

Step 3: Provide Water Quality Capture Volume (WQCV)

- EDB: The developed site will drain through a proposed Extended Detention Basin (EDB) along the south boundary of the property. Site drainage will be routed through the extended detention basin, which will capture and slowly release the WQCV over a 40-hour design release period.

Step 4: Consider Need for Industrial and Commercial BMPs

- No outside storage or industrial uses are proposed for this site.
- The proposed commercial development project will implement a Stormwater Management Plan including proper housekeeping practices and spill containment procedures.
- On-site drainage will be routed through the private Extended Detention Basin (EDB) to minimize introduction of contaminants to the County's public drainage system.

V. FLOODPLAIN IMPACTS

Floodplain limits in vicinity of this site are delineated in the applicable Flood Insurance Rate Map, FIRM Panel No. 08041C0575 dated March 17, 1997, which was revised by Letter of Map Revision (LOMR) Case No. 01-08-226P dated May 14, 2002. As depicted in the FIRM exhibit enclosed in Appendix D, this site is not impacted by any delineated 100-year FEMA floodplains.

VI. STORMWATER DETENTION AND WATER QUALITY

The proposed drainage and grading plan for the site includes a private Extended Detention Basin (EDB) at the south boundary of the site. This facility has been designed to provide the required stormwater detention and water quality mitigation for this site in accordance with El Paso County drainage criteria.

As detailed in the detention pond hydraulic calculations in Appendix C, the required total Full-Spectrum Detention Volume for this site has been calculated as 0.19 acre-feet, which includes the combined Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and 100-year Detention Volume. As detailed in Appendix C, the proposed Extended Detention Basin (EDB) A has been designed for a storage volume of 0.19 acre-feet, which meets the total required storage volume.

The proposed pond outlet structure has been designed using the UDFCD “UD-Detention” calculation spreadsheets, providing for a 40-hour release of the WQCV, and outlet structure sizing to maintain maximum allowable release rates from the pond. The EDB will have a grass-lined bottom and riprap trickle channel to encourage infiltration of stormwater prior to discharging into the downstream public drainage system.

The proposed stormwater detention facility will be privately owned and maintained by the property owner, and maintenance access will be provided from the adjacent parking lot.

VII. DRAINAGE BASIN FEES

Development of this commercial site will include construction of a private storm sewer system and private stormwater detention and water quality facilities within the site.

The site lies entirely within the Falcon Drainage Basin, which is tributary to the Black Squirrel Creek Drainage Basin. The Falcon Drainage Basin is subject to an El Paso County 2018 drainage basin fee of $27,762 per impervious acre, and a bridge fee of $3,814 per impervious acre. The required drainage and bridge fees are due at the time of recording the subdivision plat.

Recognizing that this project consists of re-development of a previously developed site, the required drainage basin fees have been calculated based on the net additional impervious area. The required drainage and bridge fees are calculated as follows:

Platted Area:		1.227 acres
Developed Impervious Area:		83.33%
Historic Impervious Area:		69.51%
Net Impervious Area:		13.82%
Net Impervious Area:	(1.227 ac.) * 13.82% =	**0.17 ac.**
Drainage Fee:	(0.17 ac.) @ ($27,762/ac.) =	$ 4,719.54
Bridge Fee:	(0.17 ac.) @ ($3,814/ac.) =	$ 648.38
Total Basin Fees:		**$ 5,367.92**

VIII. SUMMARY

The developed drainage patterns associated with the proposed Big O Tires development at the southeast corner of US24 and Meridian Road will remain consistent with historic conditions and the overall drainage plan for area. Developed flows from the site will drain through a proposed stormwater Detention Pond at the south boundary of the property prior to discharging to the existing downstream drainage system.

The proposed stormwater detention and water quality facilities have been designed to mitigate developed flow impacts and meet the County's stormwater detention and water quality requirements. Construction and proper maintenance of the proposed Extended Detention Basin, in conjunction with proper erosion control practices, will ensure that this developed site has no significant adverse drainage impact on downstream or surrounding areas.

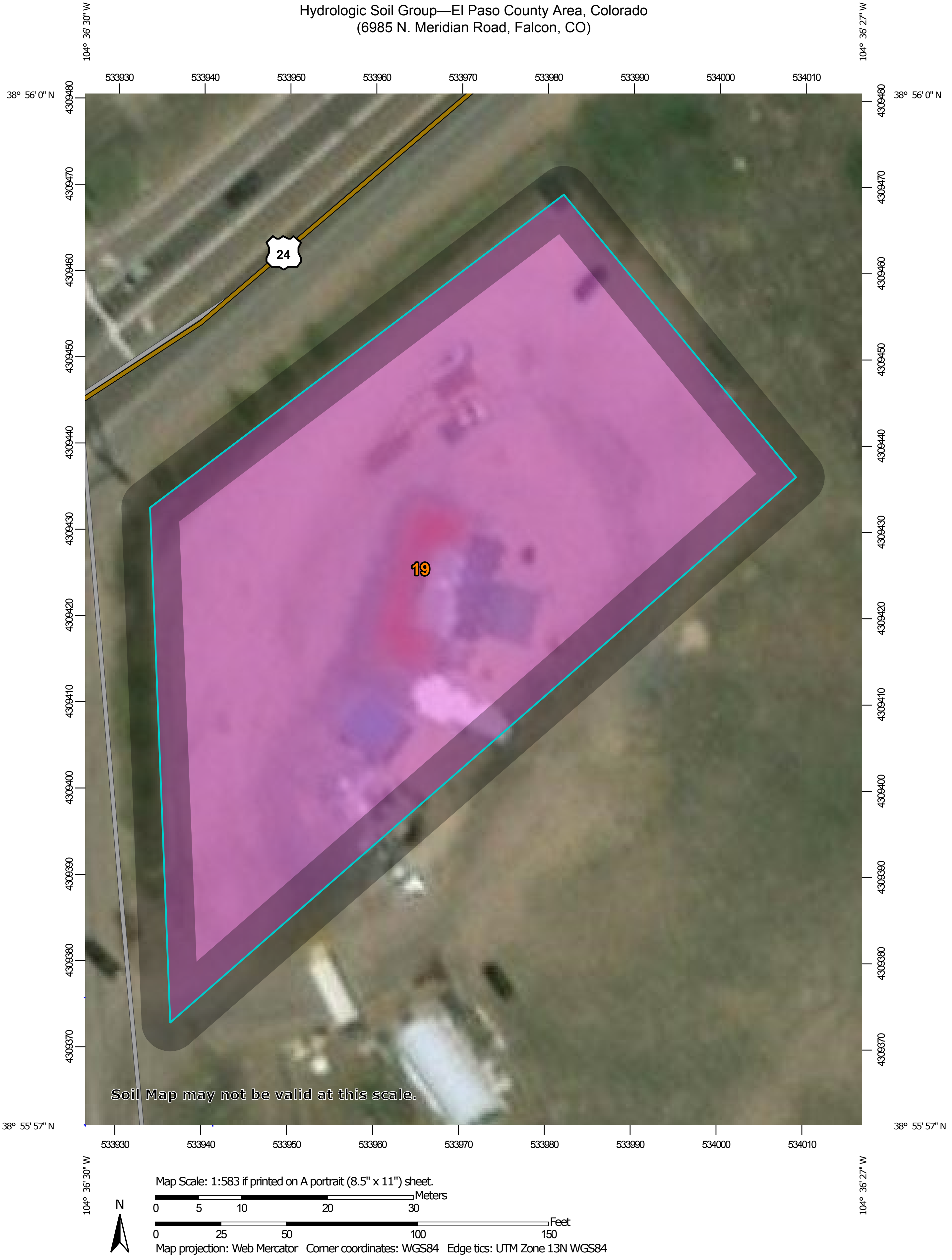
Revise the calculation. Based on ECM 3.13a for vacation/replat a basin drainage fee will be assessed based upon the new impervious acreage if no such fee has been previously paid. With no drainage basin fees previously paid, the fee is based on the new impervious acreage only (83.33%).

The calculation done above only applies if a basin drainage fee has been previously paid, and the replat results in an increase in impervious acreage, then fees are assessed on the additional impervious acreage only.

APPENDIX A

HYDROLOGIC CALCULATIONS

Hydrologic Soil Group—El Paso County Area, Colorado
(6985 N. Meridian Road, Falcon, CO)



Map Scale: 1:583 if printed on A portrait (8.5" x 11") sheet.

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.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

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

Date(s) aerial images were photographed: May 22, 2016—Mar 9, 2017

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
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	0.9	100.0%
Totals for Area of Interest			**0.9**	**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

Table 6-6. Runoff Coefficients for Rational Method

(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

$$t_c = t_i + t_t \qquad \text{(Eq. 6-7)}$$

Where:

t_c = time of concentration (min)

t_i = overland (initial) flow time (min)

t_t = travel time in the ditch, channel, gutter, storm sewer, etc. (min)

3.2.1 Overland (Initial) Flow Time

The overland flow time, t_i, may be calculated using Equation 6-8.

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad \text{(Eq. 6-8)}$$

Where:

t_i = overland (initial) flow time (min)
C_5 = runoff coefficient for 5-year frequency (see Table 6-6)
L = length of overland flow (300 ft maximum for non-urban land uses, 100 ft maximum for urban land uses)
S = average basin slope (ft/ft)

Note that in some urban watersheds, the overland flow time may be very small because flows quickly concentrate and channelize.

3.2.2 Travel Time

For catchments with overland and channelized flow, the time of concentration needs to be considered in combination with the travel time, t_t, which is calculated using the hydraulic properties of the swale, ditch, or channel. For preliminary work, the overland travel time, t_t, can be estimated with the help of Figure 6-25 or Equation 6-9 (Guo 1999).

$$V = C_v S_w^{0.5} \qquad \text{(Eq. 6-9)}$$

Where:

V = velocity (ft/s)

C_v = conveyance coefficient (from Table 6-7)

S_w = watercourse slope (ft/ft)

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.

The travel time is calculated by dividing the flow distance (in feet) by the velocity calculated using Equation 6-9 and converting units to minutes.

The time of concentration (t_c) is then the sum of the overland flow time (t_i) and the travel time (t_t) per Equation 6-7.

3.2.3 First Design Point Time of Concentration in Urban Catchments

Using this procedure, the time of concentration at the first design point (typically the first inlet in the system) in an urbanized catchment should not exceed the time of concentration calculated using Equation 6-10. The first design point is defined as the point where runoff first enters the storm sewer system.

$$t_c = \frac{L}{180} + 10 \qquad \text{(Eq. 6-10)}$$

Where:

t_c = maximum time of concentration at the first design point in an urban watershed (min)

L = waterway length (ft)

Equation 6-10 was developed using the rainfall-runoff data collected in the Denver region and, in essence, represents regional “calibration” of the Rational Method. Normally, Equation 6-10 will result in a lesser time of concentration at the first design point and will govern in an urbanized watershed. For subsequent design points, the time of concentration is calculated by accumulating the travel times in downstream drainageway reaches.

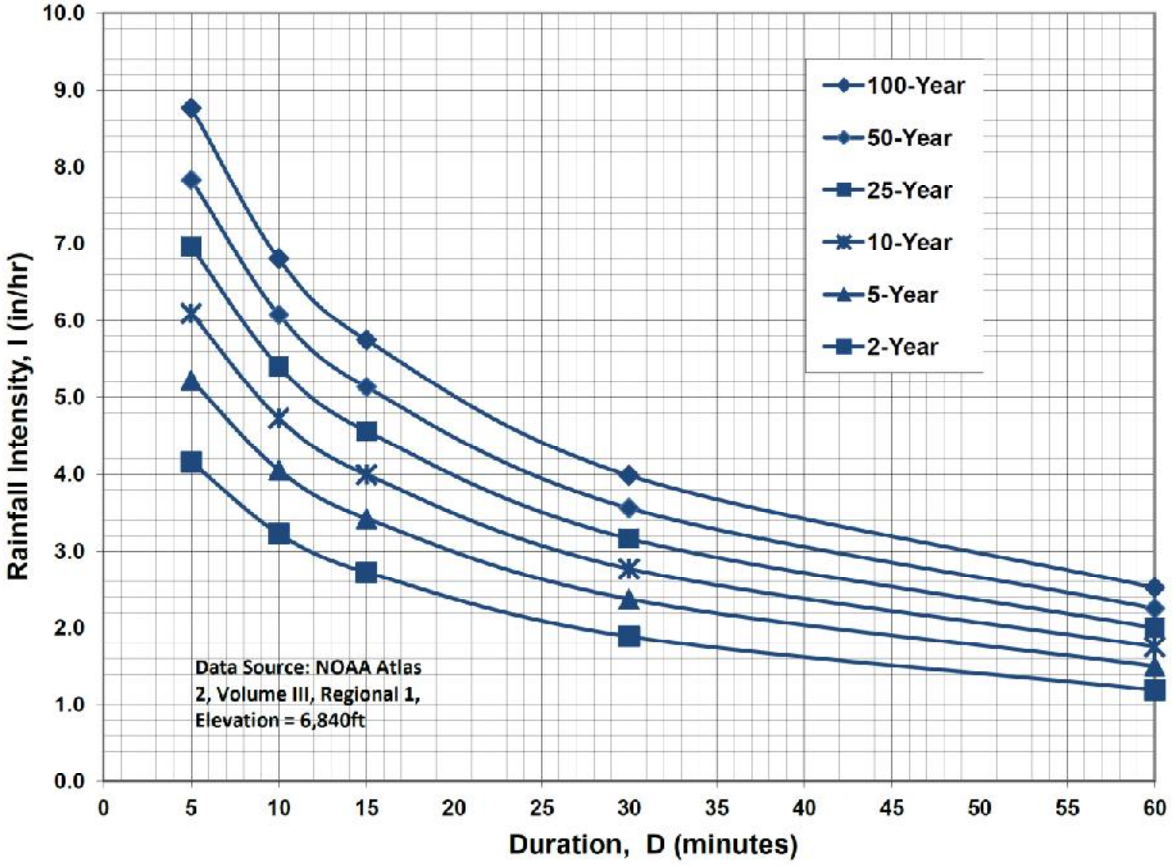
3.2.4 Minimum Time of Concentration

If the calculations result in a t_c of less than 10 minutes for undeveloped conditions, it is recommended that a minimum value of 10 minutes be used. The minimum t_c for urbanized areas is 5 minutes.

3.2.5 Post-Development Time of Concentration

As Equation 6-8 indicates, the time of concentration is a function of the 5-year runoff coefficient for a drainage basin. Typically, higher levels of imperviousness (higher 5-year runoff coefficients) correspond to shorter times of concentration, and lower levels of imperviousness correspond to longer times of

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



Data Source: NOAA Atlas 2, Volume III, Regional 1, Elevation = 6,840ft

IDF Equations

$$I_{100} = -2.52 \ln(D) + 12.735$$

$$I_{50} = -2.25 \ln(D) + 11.375$$

$$I_{25} = -2.00 \ln(D) + 10.111$$

$$I_{10} = -1.75 \ln(D) + 8.847$$

$$I_{5} = -1.50 \ln(D) + 7.583$$

$$I_{2} = -1.19 \ln(D) + 6.035$$

Note: Values calculated by equations may not precisely duplicate values read from figure.

BIG O TIRES - FALCON
COMPOSITE RUNOFF COEFFICIENTS

's being calculated is based on
ng condition not historic
ition. Change the header to
ting Condition"

HISTORIC CONDITIONS

5-YEAR C VALUES

BASIN	TOTAL AREA (AC)	(AC)		C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
A	1.2	0.04	BUILDING / ASPHALT	0.9	1.01	GRAVEL	0.59	0.17	LANDSCAPED	0.08	0.529

100-YEAR C VALUES

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
A	1.2	0.04	BUILDING / ASPHALT	0.96	1.01	GRAVEL	0.7	0.17	LANDSCAPED	0.35	0.660

IMPERVIOUS AREAS

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	WEIGHTED % IMP
A	1.2	0.04	BUILDING / ASPHALT	100	1.01	GRAVEL	80	0.17	LANDSCAPED	0	69.508

DEVELOPED CONDITIONS

5-YEAR C VALUES

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
A	1.2	1.0	BUILDING / ASPHALT	0.9	0.20	LANDSCAPED	0.08				0.763

100-YEAR C VALUES

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
A	1.2	1.0	BUILDING / ASPHALT	0.96	0.20	LANDSCAPED	0.35				0.858

IMPERVIOUS AREAS

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	WEIGHTED % IMP
A	1.2	1.0	BUILDING / ASPHALT	100	0.20	LANDSCAPED	0				83.333

BIG O TIRES - FALCON
RATIONAL METHOD

What's being calculated is based on existing condition not historic condition. Change the header to "Existing Condition"

HISTORIC FLOWS

			C		nd Flow			Channel flow							INTENSITY (5)		PEAK FLOW	
BASIN	DESIGN POINT	AREA (AC)	5-YEAR(7)	100-	[illegible]	PE FT)	Tco (1) (MIN)	CHANNEL LENGTH (FT)	CONVEYANCE COEFFICIENT C	SLOPE (FT/FT)	SCS (2) VELOCITY (FT/S)	Tt (3) (MIN)	TOTAL Tc (4) (MIN)	TOTAL Tc (4) (MIN)	5-YR (IN/HR)	100-YR (IN/HR)	Q5 (6) (CFS)	Q100 (6) (CFS)
A	1	1.2	0.529	[illegible]	[illegible]	10	10.5	300	20.00	0.0233	3.05	1.6	12.1	12.1	3.84	6.45	2.44	5.11

DEVELOPED FLOWS

			C		Overland Flow			Channel flow							INTENSITY (5)		PEAK FLOW	
BASIN	DESIGN POINT	AREA (AC)	5-YEAR(7)	100-YEAR (7)	LENGTH (FT)	SLOPE (FT/FT)	Tco (1) (MIN)	CHANNEL LENGTH (FT)	CONVEYANCE COEFFICIENT C	SLOPE (FT/FT)	SCS (2) VELOCITY (FT/S)	Tt (3) (MIN)	TOTAL Tc (4) (MIN)	TOTAL Tc (4) (MIN)	5-YR (IN/HR)	100-YR (IN/HR)	Q5 (6) (CFS)	Q100 (6) (CFS)
A	1	1.2	0.763	0.858	100	0.010	6.2	300	20.00	0.0233	3.05	1.6	7.8	7.8	4.50	7.56	4.12	7.78

1) OVERLAND FLOW Tco = (0.395*(1.1-RUNOFF COEFFICIENT)*(OVERLAND FLOW LENGTH^(0.5)/(SLOPE^(0.333))
2) SCS VELOCITY = C * ((SLOPE(FT/FT)^0.5)
    C = 2.5 FOR HEAVY MEADOW
    C = 5 FOR TILLAGE/FIELD
    C = 7 FOR SHORT PASTURE AND LAWNS
    C = 10 FOR NEARLY BARE GROUND
    C = 15 FOR GRASSED WATERWAY
    C = 20 FOR PAVED AREAS AND SHALLOW PAVED SWALES

3) MANNING'S CHANNEL TRAVEL TIME = L/V (WHEN CHANNEL VELOCITY IS KNOWN)
4) Tc = Tco + Tt
*** IF TOTAL TIME OF CONCENTRATION IS LESS THAN 5 MINUTES, THEN 5 MINUTES IS USED
5) INTENSITY BASED ON I-D-F EQUATIONS IN CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL
    $I_5 = -1.5 * \ln(Tc) + 7.583$
    $I_{100} = -2.52 * \ln(Tc) + 12.735$
6) Q = CiA

APPENDIX B

HYDRAULIC CALCULATIONS

BIG O TIRE - FALCON
STORM INLET SIZING SUMMARY

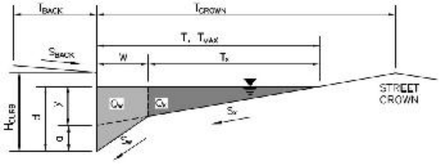
	BASIN FLOW			INLET FLOW					
INLET	DP	Q5 FLOW (CFS)	Q100 FLOW (CFS)	INLET FLOW % OF BASIN	Q5 FLOW (CFS)	Q100 FLOW (CFS)	INLET CONDITION / TYPE	INLET SIZE	INLET CAPACITY (CFS)
A1	1	4.1	7.8	20	0.8	1.6	SUMP TYPE 13	SGL	5.4
A2	1	4.1	7.8	20	0.8	1.6	SUMP TYPE 16	SGL	5.2
A3	1	4.1	7.8	20	0.8	1.6	SUMP TYPE 13	SGL	5.4
A4	1	4.1	7.8	20	0.8	1.6	SUMP TYPE 16	SGL	5.2
A5	1	4.1	7.8	20	0.8	1.6	SUMP TYPE 16	SGL	5.2

Version 4.05 Released March 2017

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

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

Project: **BIG O TIRES - FALCON**
Inlet ID: **Inlets A1 & A3**



Gutter Geometry (Enter data in the blue cells)

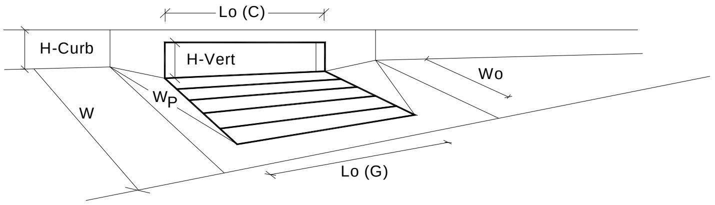
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	30.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	0.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.040	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} =	25.0	25.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



CDOT/Denver 13 Valley Grate ▾

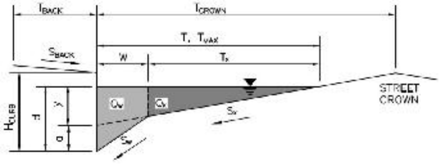
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT/Denver 13 Valley Grate		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	N/A	N/A	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	N/A	N/A	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	N/A	N/A	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	N/A	N/A	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	N/A	N/A	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	N/A	N/A	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	N/A	N/A	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	N/A	N/A	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	1.023	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	N/A	N/A	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.94	1.00	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**2.6**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.8	1.6	cfs

Version 4.05 Released March 2017

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

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

Project: **BIG O TIRES - FALCON**
Inlet ID: **Inlets A2, A4, & A5**



Gutter Geometry (Enter data in the blue cells)

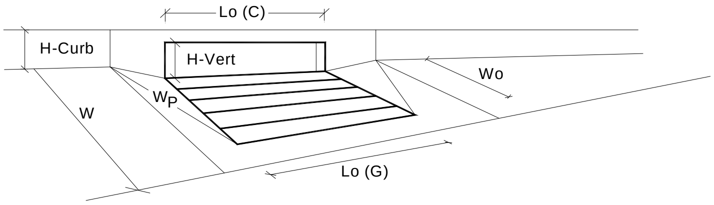
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
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} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	Denver No. 16 Combination ▾		MINOR	MAJOR	
Type of Inlet		Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	7.3	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	3.00	3.00	feet
Width of a Unit Grate		W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	0.31	0.31	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	3.60	3.60	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	0.60	0.60	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	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) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.66	0.66	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	0.629	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.44	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.94	1.00	
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	1.00	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.9**	**5.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.8	1.6	cfs

BIG O TIRE - FALCON
STORM SEWER SIZING SUMMARY

	PIPE FLOW			PIPE CAPACITY		
PIPE	BASINS	Q5 FLOW (CFS)	Q100 FLOW (CFS)	PIPE SIZE	MIN. PIPE SLOPE	FULL PIPE CAPACITY (CFS)
A1	A1	0.8	1.6	12	0.5%	2.5
A2	A1,A2	1.6	3.2	15	1.0%	6.5
A3	A3	0.8	1.6	12	0.5%	2.5
A4	A3,A4	1.6	3.2	12	0.5%	2.5
A5	A3,A4,A5	2.4	4.8	15	1.0%	6.5

ASSUMPTIONS:

1. STORM DRAIN PIPE ASSUMED TO BE RCP OR HDPE

Hydraulic Analysis Report

Project Data

Project Title: Big-O-Falcon

Designer: JPS

Project Date: Thursday, January 18, 2018

Project Units: U.S. Customary Units

Notes:

Channel Analysis: SD-A1-A3-A4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0130

Depth: 1.0000 ft

Result Parameters

Flow: 2.5193 cfs

Area of Flow: 0.7854 ft^2

Wetted Perimeter: 3.1416 ft

Hydraulic Radius: 0.2500 ft

Average Velocity: 3.2077 ft/s

Top Width: 0.0000 ft

Froude Number: 0.0000

Critical Depth: 0.6797 ft

Critical Velocity: 4.4319 ft/s

Critical Slope: 0.0077 ft/ft

Critical Top Width: 0.93 ft

Calculated Max Shear Stress: 0.3120 lb/ft^2

Calculated Avg Shear Stress: 0.0780 lb/ft^2

Channel Analysis: SD-A2-A5

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.2500 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Depth: 1.2500 ft

Result Parameters

Flow: 6.4598 cfs

Area of Flow: 1.2272 ft^2

Wetted Perimeter: 3.9270 ft

Hydraulic Radius: 0.3125 ft

Average Velocity: 5.2639 ft/s

Top Width: 0.0000 ft

Froude Number: 0.0000

Critical Depth: 1.0242 ft

Critical Velocity: 6.0025 ft/s

Critical Slope: 0.0100 ft/ft

Critical Top Width: 0.96 ft

Calculated Max Shear Stress: 0.7800 lb/ft^2

Calculated Avg Shear Stress: 0.1950 lb/ft^2

APPENDIX C

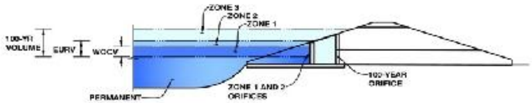
DETENTION POND CALCULATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: BIG O TIRES - FALCON

Basin ID: A



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type = EDB
Watershed Area = 1.20 acres
Watershed Length = 400 ft
Watershed Slope = 0.020 ft/ft
Watershed Imperviousness = 83.30% percent
Percentage Hydrologic Soil Group A = 100.0% percent
Percentage Hydrologic Soil Group B = 0.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Desired WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

			Optional User Override 1-hr Precipitation	
Water Quality Capture Volume (WQCV) =	0.035	acre-feet		
Excess Urban Runoff Volume (EURV) =	0.133	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.092	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.120	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.144	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.170	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.194	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.224	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.291	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	0.087	acre-feet		
Approximate 5-yr Detention Volume =	0.114	acre-feet		
Approximate 10-yr Detention Volume =	0.135	acre-feet		
Approximate 25-yr Detention Volume =	0.160	acre-feet		
Approximate 50-yr Detention Volume =	0.175	acre-feet		
Approximate 100-yr Detention Volume =	0.188	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) = 0.035 acre-feet
Zone 2 Volume (EURV - Zone 1) = 0.098 acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) = 0.055 acre-feet
Total Detention Basin Volume = 0.188 acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	2,727	0.063		
	--	1.00	--	--	--	2,727	0.063	2,700	0.062
	--	2.00	--	--	--	2,727	0.063	5,427	0.125
100-YR WSL	--	3.00	--	--	--	2,727	0.063	8,181	0.188
Top of Bank	--	4.00	--	--	--	2,727	0.063	10,908	0.250
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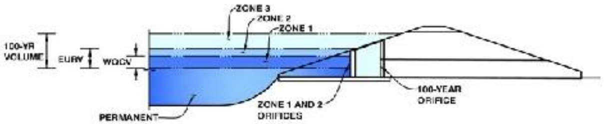
Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: BIG O TIRES - FALCON

Basin ID: A



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.56	0.035	Orifice Plate
Zone 2 (EURV)	2.13	0.098	Orifice Plate
Zone 3 (100-year)	3.01	0.055	Weir&Pipe (Restrict)
		0.188	**Total**

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

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

Calculated Parameters for Underdrain

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

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.13	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	8.50	inches
Orifice Plate: Orifice Area per Row =	0.78	sq. inches (diameter = 1 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	5.417E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.71	1.42					
Orifice Area (sq. inches)	0.78	0.78	0.78					

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

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

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	2.13	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	3.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	2.13	N/A	feet
Over Flow Weir Slope Length =	3.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	110.63	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	6.30	N/A	ft^2
Overflow Grate Open Area w/ Debris =	3.15	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	1.30		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.06	N/A	ft^2
Outlet Orifice Centroid =	0.06	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	0.54	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	1.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

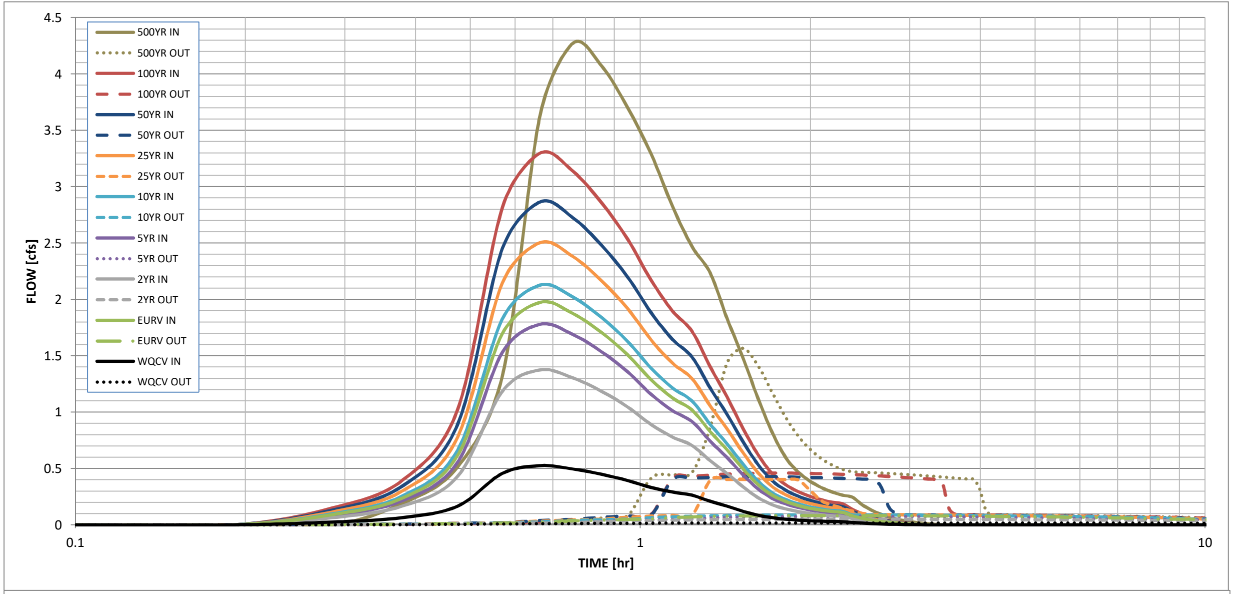
Spillway Design Flow Depth=	0.54	feet
Stage at Top of Freeboard =	4.54	feet
Basin Area at Top of Freeboard =	0.06	acres

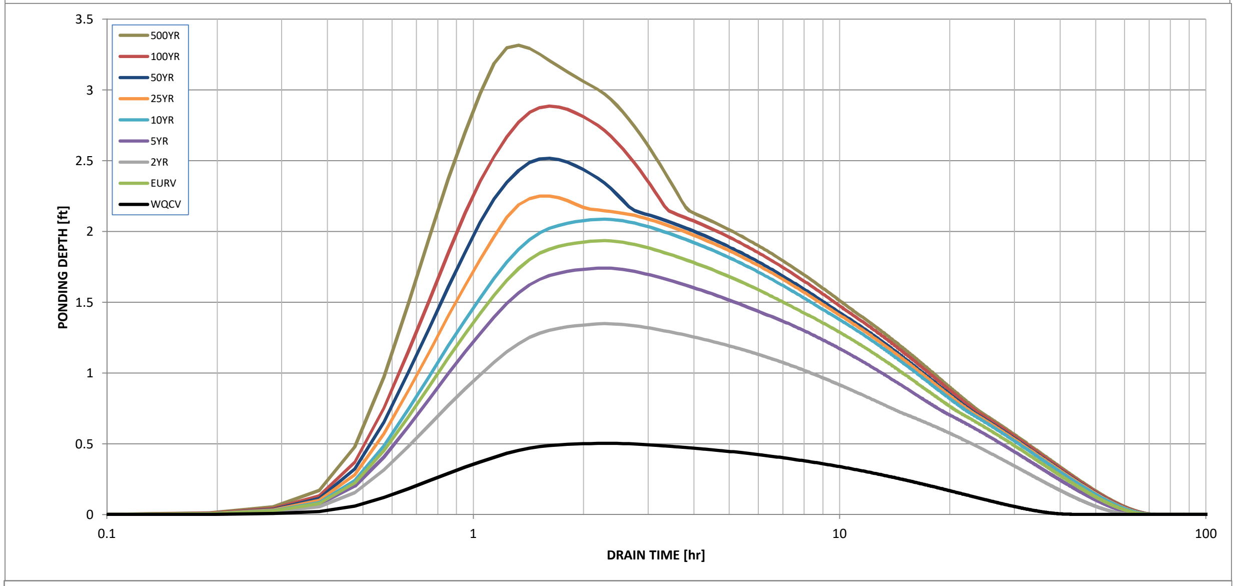
Routed Hydrograph Results

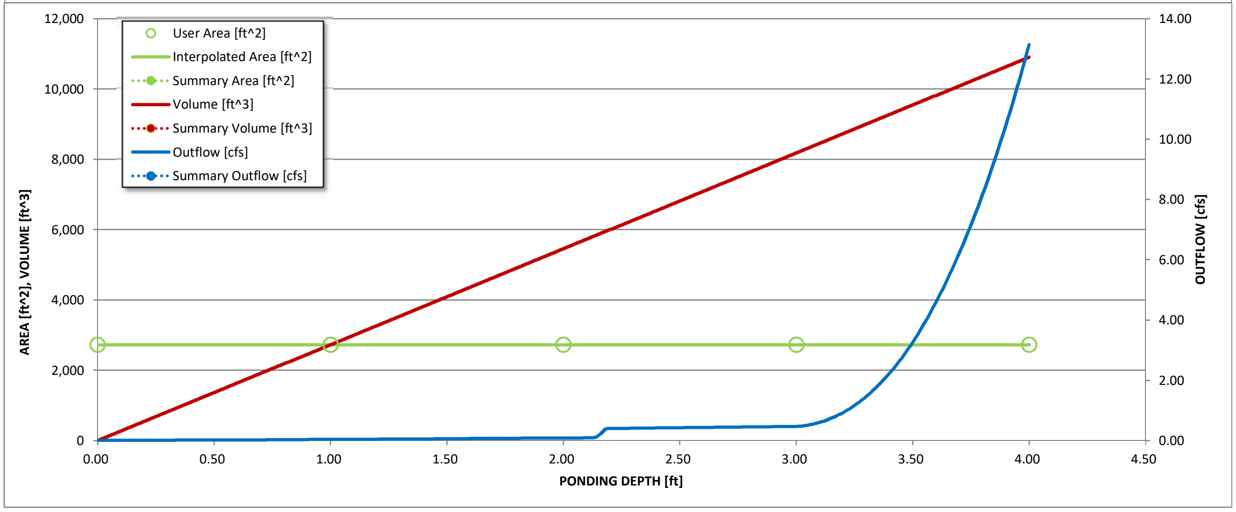
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.035	0.133	0.092	0.120	0.144	0.170	0.194	0.224	0.291
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.034	0.133	0.092	0.119	0.143	0.169	0.194	0.223	0.290
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.02	0.16	0.40	0.91
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	1.1
Peak Inflow Q (cfs) =	0.5	2.0	1.4	1.8	2.1	2.5	2.9	3.3	4.3
Peak Outflow Q (cfs) =	0.0	0.1	0.1	0.1	0.1	0.4	0.4	0.5	1.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	14.9	7.6	15.3	2.2	1.0	1.4
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.0	0.1	0.1	0.1
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	36	56	52	55	57	56	55	54	52
Time to Drain 99% of Inflow Volume (hours) =	**40**	62	57	61	63	63	62	62	61
Maximum Ponding Depth (ft) =	0.50	1.94	1.35	1.74	2.09	2.25	2.52	2.89	3.32
Area at Maximum Ponding Depth (acres) =	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Maximum Volume Stored (acre-ft) =	0.031	0.121	0.084	0.109	0.130	0.141	0.157	0.180	0.207

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







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

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs **UD-Detention, Version 3.07 (February 2017)**

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

	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.70 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph Constant	0:11:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:17:06	0.02	0.09	0.06	0.08	0.10	0.11	0.13	0.15	0.19
0.877	0:22:48	0.06	0.24	0.17	0.22	0.26	0.30	0.35	0.40	0.51
	0:28:30	0.17	0.62	0.43	0.56	0.66	0.78	0.89	1.02	1.32
	0:34:12	0.46	1.70	1.19	1.53	1.83	2.14	2.45	2.82	3.64
	0:39:54	0.53	1.97	1.37	1.78	2.13	2.50	2.87	3.30	4.27
	0:45:36	0.49	1.87	1.30	1.69	2.02	2.38	2.72	3.14	4.07
	0:51:18	0.45	1.70	1.18	1.53	1.84	2.16	2.48	2.85	3.70
	0:57:00	0.39	1.51	1.05	1.36	1.63	1.92	2.20	2.53	3.29
	1:02:42	0.33	1.29	0.89	1.16	1.39	1.64	1.88	2.17	2.83
	1:08:24	0.29	1.13	0.78	1.01	1.22	1.43	1.65	1.90	2.47
	1:14:06	0.26	1.02	0.70	0.92	1.10	1.30	1.49	1.72	2.23
	1:19:48	0.21	0.83	0.57	0.74	0.89	1.06	1.21	1.40	1.83
	1:25:30	0.17	0.66	0.46	0.60	0.72	0.85	0.98	1.13	1.48
	1:31:12	0.12	0.50	0.34	0.44	0.54	0.64	0.74	0.86	1.13
	1:36:54	0.09	0.36	0.24	0.32	0.39	0.46	0.54	0.63	0.83
	1:42:36	0.06	0.26	0.18	0.24	0.29	0.34	0.39	0.46	0.60
	1:48:18	0.05	0.21	0.14	0.19	0.23	0.27	0.31	0.36	0.47
	1:54:00	0.04	0.17	0.12	0.15	0.19	0.22	0.26	0.30	0.39
	1:59:42	0.04	0.15	0.10	0.13	0.16	0.19	0.22	0.25	0.33
	2:05:24	0.03	0.13	0.09	0.12	0.14	0.17	0.19	0.22	0.29
	2:11:06	0.03	0.12	0.08	0.11	0.13	0.15	0.17	0.20	0.26
	2:16:48	0.03	0.11	0.08	0.10	0.12	0.14	0.16	0.19	0.24
	2:22:30	0.02	0.08	0.06	0.07	0.09	0.10	0.12	0.14	0.18
	2:28:12	0.01	0.06	0.04	0.05	0.06	0.08	0.09	0.10	0.13
	2:33:54	0.01	0.04	0.03	0.04	0.05	0.05	0.06	0.07	0.10
	2:39:36	0.01	0.03	0.02	0.03	0.03	0.04	0.05	0.05	0.07
	2:45:18	0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.04	0.05
	2:51:00	0.00	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.03
	2:56:42	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	3:02:24	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02
	3:08:06	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	3:13:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:19:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:36:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:42:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:48:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:53:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:59:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:16:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:22:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:27:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:33:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:39:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:56:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:02:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:07:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:13:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:19:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:24:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:36:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:42:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:47:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:53:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:59:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:04:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:10:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:16:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:21:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:27:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:33:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:39:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:44:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:50:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships

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

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

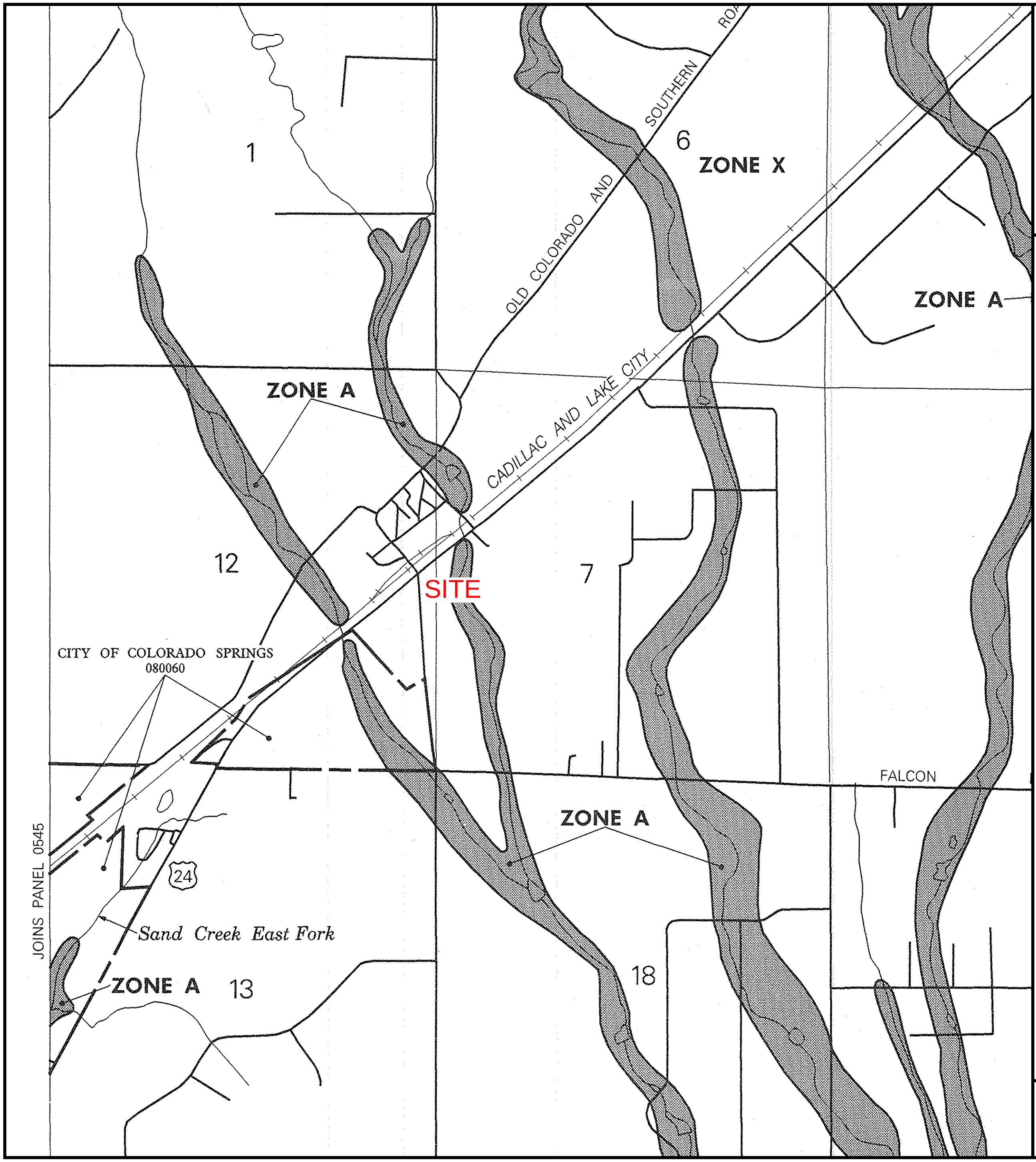
Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

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

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

APPENDIX D

FIGURES



APPROXIMATE SCALE IN FEET

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 575 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

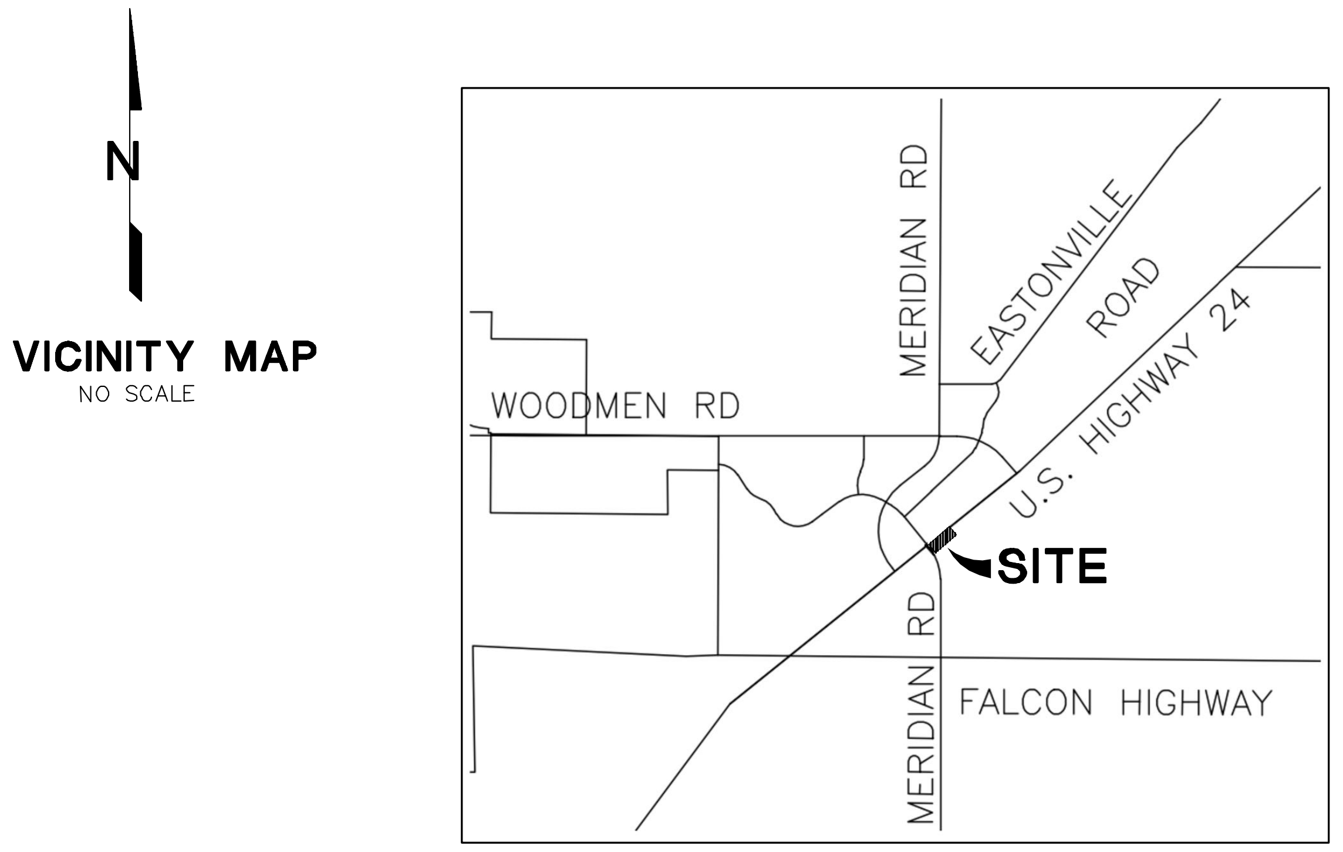
COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0575	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0575	F

MAP NUMBER
08041C0575 F

EFFECTIVE DATE:
MARCH 17, 1997

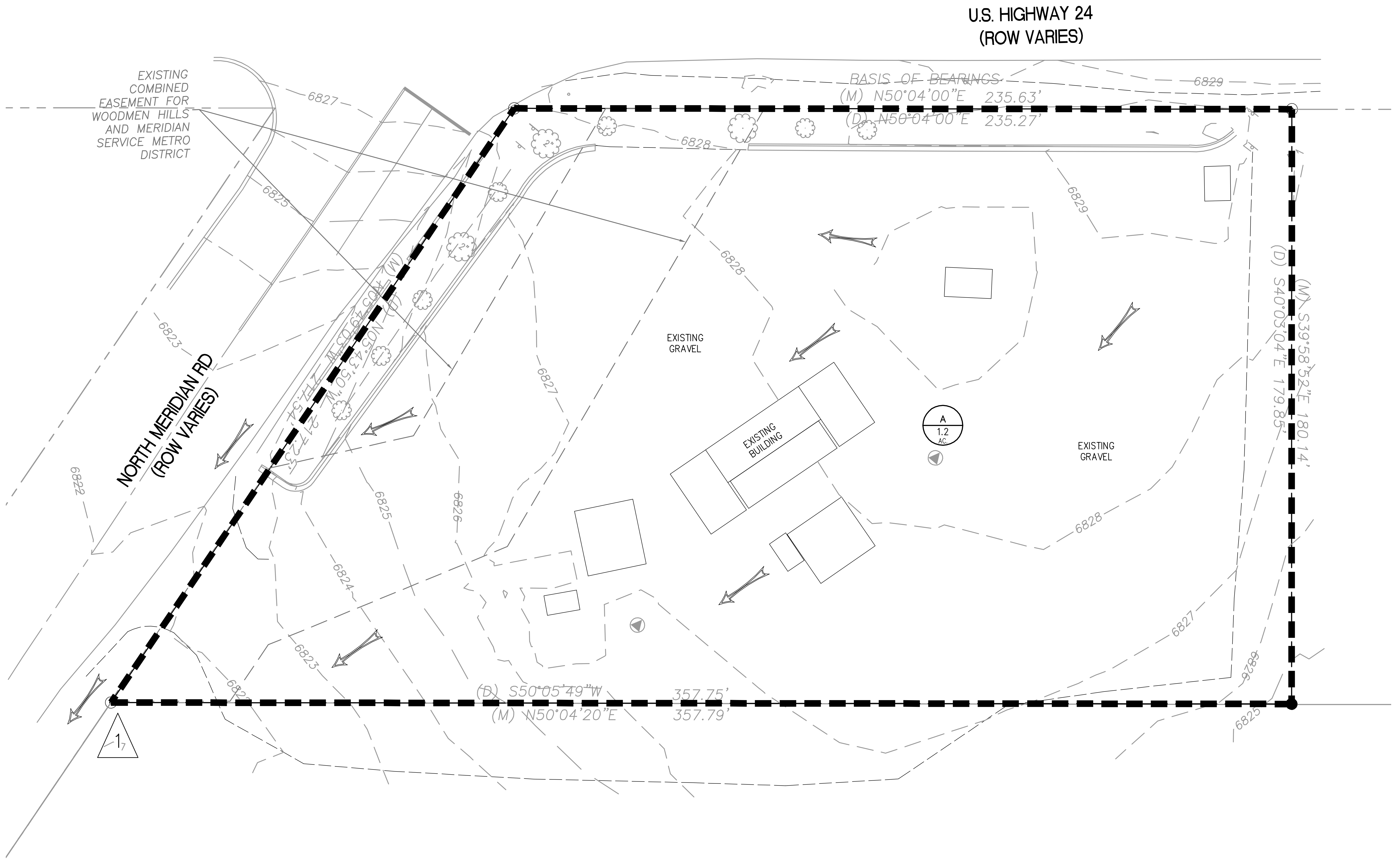
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



VICINITY MAP
NO SCALE

20' 0 20' 40'
ORIGINAL SCALE: 1"=20' (24"x36" SHEET)
CONTOUR INTERVAL=1'



SCHEDULE NO: 4307303007
OWNER NAME: I B S ENTERPRISES L L C
LOCATION: 6815 N MERIDIAN RD
MAILING ADDRESS: 845 N POWERS BLVD
COLORADO SPRINGS CO 80915-3617

DRAINAGE LEGEND

⁂	RIPRAP
——— — ———	PROPERTY LINES
- · · → · · -	FLOWLINE
▬ ▬ ▬	DRAINAGE BASIN BOUNDARY
⇒	FLOW DIRECTION ARROW
△ 5	DESIGN POINT
C14	DEVELOPED BASIN DESIGNATION
23.21 AC	DEVELOPED BASIN AREA (ACRES)

What's being calculated is based on existing condition not historic condition. Change the header to "Existing Condition"

SUMMARY HYDROLOGY TABLE

DESIGN POINT	Q_5 (CFS)	Q_{100} (CFS)
1	2.5	5.2

JPS ENGINEERING

19 E. Willamette Ave.
Colorado Springs, CO
80903

PH: 719-477-9429
FAX: 719-471-0766
www.jpsengr.com

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

No.	REVISION	BY	DATE
A	COUNTY SUBMITTAL	JPS	1/18/18

BIG "O" TIRES
6985 MERIDIAN RD, PEYTON, CO 80831

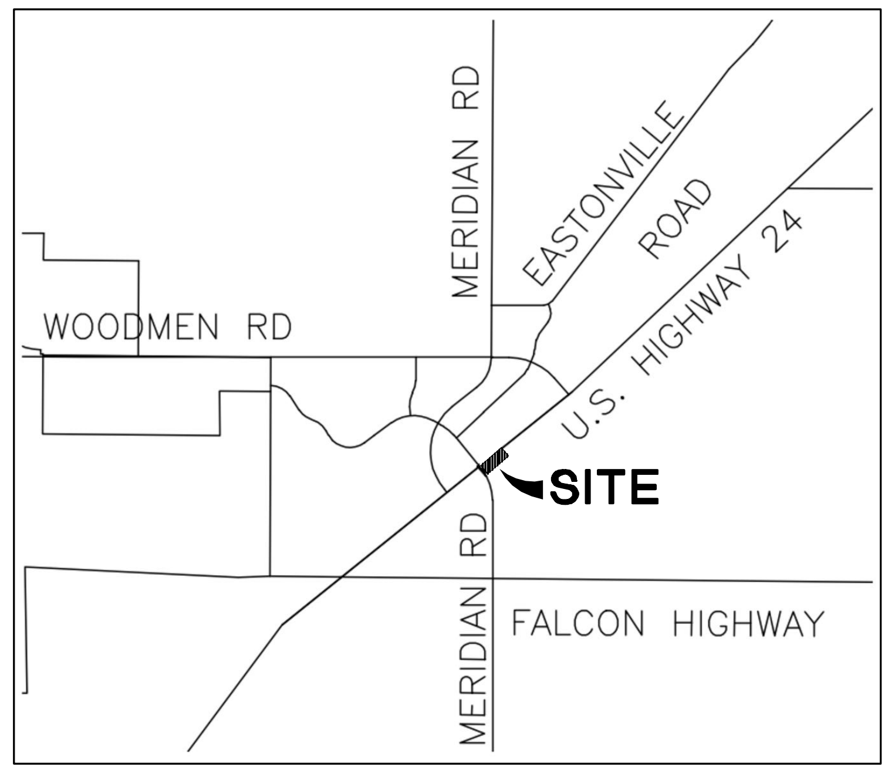
HISTORIC DRAINAGE PLAN

HORZ. SCALE:	1"=20'	DRAWN:	MSP
VERT. SCALE:	N/A	DESIGNED:	JPS
SURVEYED:	RIDGELINE	CHECKED:	JPS
CREATED:	11/11/17	LAST MODIFIED:	01/18/18
PROJECT NO:	091701	MODIFIED BY:	MSP

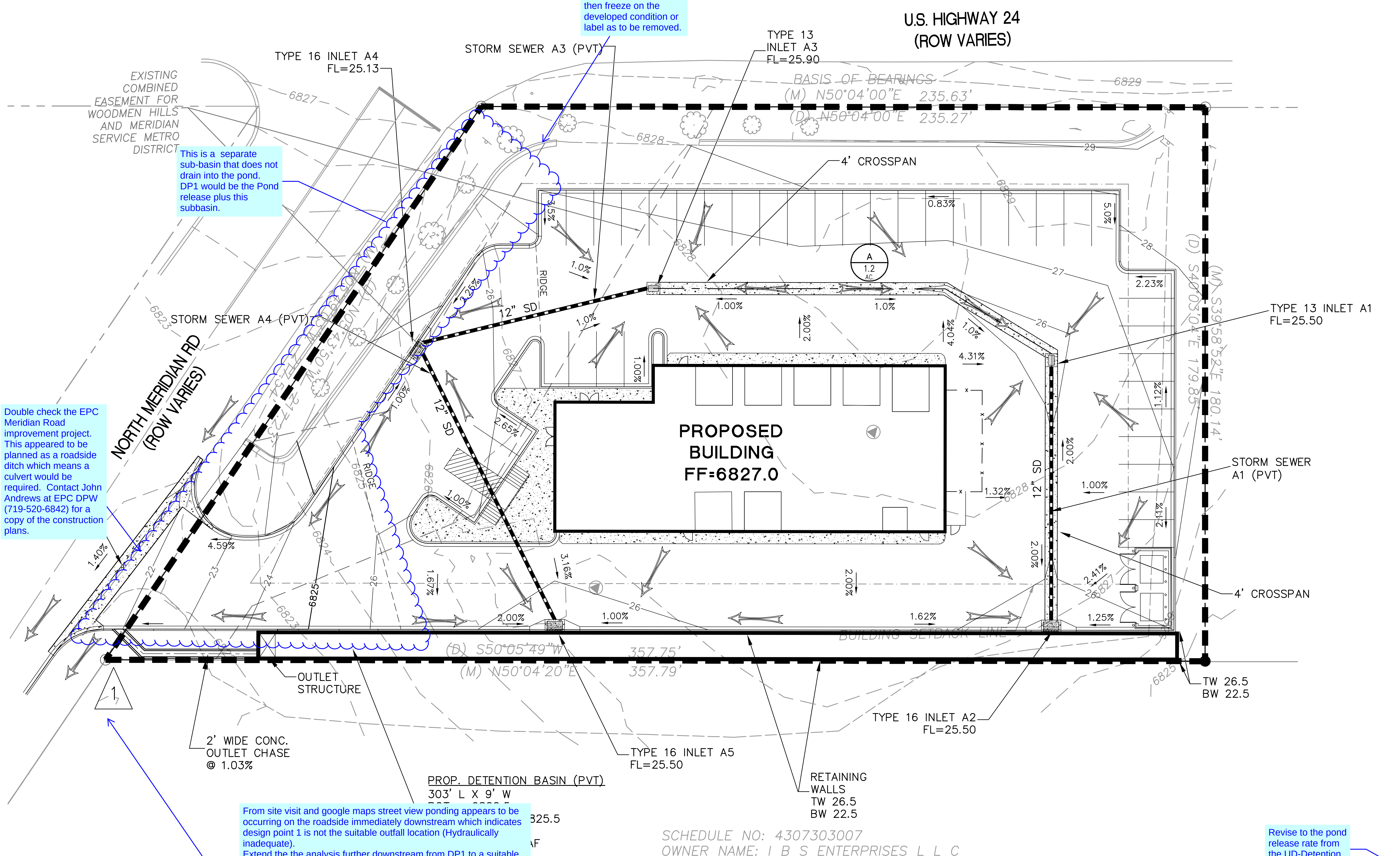
SHEET: EX1

C:\Civil3D 2018 projects\091701.hammers-big-O-falcon\dwg\Drainage\EX1.dwg Jan 18, 2018 - 2:14pm

VICINITY MAP
NO SCALE



ORIGINAL SCALE: 1"=20' (24"x36" SHEET)
CONTOUR INTERVAL=1'



Are these being demolished or protect in place? If removed, then freeze on the developed condition or label as to be removed.

This is a separate sub-basin that does not drain into the pond. DP1 would be the Pond release plus this subbasin.

Double check the EPC Meridian Road improvement project. This appeared to be planned as a roadside ditch which means a culvert would be required. Contact John Andrews at EPC DPW (719-520-6842) for a copy of the construction plans.

From site visit and google maps street view ponding appears to be occurring on the roadside immediately downstream which indicates design point 1 is not the suitable outfall location (Hydraulically inadequate).
Extend the the analysis further downstream from DP1 to a suitable outfall and provide recommendations for the required improvements. Update the narrative accordingly. Offsite improvements may be required.
See ECM Chapter 3 Section 3.2.4 for Suitable Outfall Location definition.

Contact/coordinate with EPC DPW (John Andrews, 719-520-6842).
A drainage report associated with the Meridian Road Project adjacent to the site may be available and may help determine whether or not the current outfall (DP1) is suitable or not.

SCHEDULE NO: 4307303007
OWNER NAME: I B S ENTERPRISES L L C
LOCATION: 6815 N MERIDIAN RD
MAILING ADDRESS: 845 N POWERS BLVD
COLORADO SPRINGS CO 80915–3617

BENCHMARK:
NO. 5 REBAR WITH YELLOW PLASTIC CAP PLS 30130 ELEV. 6821.02 NGVD29

DRAINAGE LEGEND

⁂	RIPRAP
— — —	PROPERTY LINES
– · · → · · –	FLOWLINE
▬ ▬ ▬	DRAINAGE BASIN BOUNDARY
⇒	FLOW DIRECTION ARROW
△ 5	DESIGN POINT
C14	DEVELOPED BASIN DESIGNATION
23.21 AC.	DEVELOPED BASIN AREA (ACRES)

IMPERVIOUS AREA CALCULATIONS:

TOTAL AREA = 1.227 AC.

IMPERVIOUS AREAS:

SURFACE TYPE	AREA
PAVEMENT/SIDEWALK	38,068 SF
BUILDING	6,474 SF
TOTAL	44,542 SF

= 1.022 AC
= **83.3%** IMPERVIOUS

SUMMARY HYDROLOGY TABLE

DESIGN POINT	Q_5 (CFS)	Q_{100} (CFS)
1	4.1	7.8

Revise to the pond release rate from the UD-Detention Worksheet.

JPS ENGINEERING

19 E. Willamette Ave.
Colorado Springs, CO
80903

PH: 719–477–9429
FAX: 719–471–0766
www.jpsengr.com

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1–800–922–1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

BIG "O" TIRES
6985 MERIDIAN RD, PEYTON, CO 80831

No.	REVISION	BY	DATE
A	COUNTY SUBMITTAL	JPS	1/18/18

DEVELOPED DRAINAGE PLAN

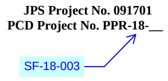
HORZ. SCALE: 1"=20'	DRAWN: MSP
VERT. SCALE: N/A	DESIGNED: JPS
SURVEYED: RIDGELINE	CHECKED: JPS
CREATED: 11/11/17	LAST MODIFIED: 01/18/18
PROJECT NO: 091701	MODIFIED BY: MSP

SHEET:
D1

C:\Civil3D 2018 projects\091701.hammers-big-O-falcon\dwg\Drainage\D1.dwg Jan 18, 2018 – 3:04pm

Markup Summary

dsdlaforce (17)



JPS Project No. 091701
PCD Project No. PPR-18-___

SF-18-003

Subject: Callout
Page Label: 1
Lock: Unlocked
Status:
Checkmark: Unchecked
Author: dsdlaforce
Date: 2/15/2018 12:53:13 PM
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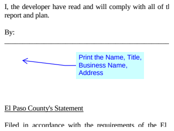

I, the developer have read and will comply with all of th
report and plan.

By:

Print the Name, Title, Business Name, Address

El Paso County's Statement

Filed in accordance with the requirements of the El

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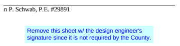

n P. Schwab, P.E. #29891

Remove this sheet w/ the design engineer's signature since it is not required by the County.

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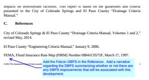

impacts on downstream facilities. This report is based on the guidelines and criteria presented in the City of Colorado Springs and El Paso County "Drainage Criteria Manual."

C. References

City of Colorado Springs & El Paso County "Drainage Criteria Manual, Volumes 1 and 2," revised May, 2014.

El Paso County "Engineering Criteria Manual," January 9, 2006.

FEMA, Flood Insurance Rate Map (FIRM) Number 08041C0575F, March 17, 1997.

Add the Falcon DBPS in the Reference. Add a narrative regarding the DBPS summarizing whether or not there are any DBPS improvements that will be associated with this development.

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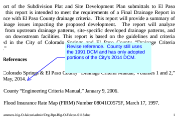
Add the Falcon DBPS in the Reference. Add a narrative regarding the DBPS summarizing whether or not there are any DBPS improvements that will be associated with this development.



ort of the Subdivision Plat and Site Development Plan submittals to El Paso this report is intended to meet the requirements of a Final Drainage Report in nce with El Paso County drainage criteria. This report will provide a summary of inage issues impacting the proposed development. The report will analyze from upstream drainage patterns, site-specific developed drainage patterns, and on downstream facilities. This report is based on the guidelines and criteria d in the City of Colorado Springs and El Paso County "Drainage Criteria ."

References

Colorado Springs & El Paso County "Drainage Criteria Manual, Volumes 1 and 2," May, 2014.

County "Engineering Criteria Manual," January 9, 2006.

Flood Insurance Rate Map (FIRM) Number 08041C0575F, March 17, 1997.

Revise reference. County still uses the 1991 DCM and has only adopted portions of the City's 2014 DCM.

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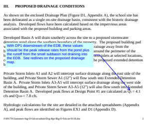
Revise reference. County still uses the 1991 DCM and has only adopted portions of the City's 2014 DCM.



III. PROPOSED DRAINAGE CONDITIONS

As shown on the enclosed Drainage Plan (Figure D1, Appendix A), the school site has been delineated as a single on-site drainage basin, consistent with the historic drainage analysis. Developed flows have been calculated based on the impervious areas associated with the proposed building and parking areas.

Developed Basin A will drain southerly across the site to a proposed stormwater detention pond along the southern boundary of the property. The proposed building pad

With DP1 downstream of the EDB, these values should be the peak release rates from the pond plus the runoff from the small subbasin not draining into the EDB. See redlines on the proposed drainage map.

Private Storm Inlets A1 and A2 will intercept surface drainage along the east side of the building, and Private Storm Sewer A1 (12") will flow south into Extended Detention Basin A. Private Storm Inlets A3-A5 will intercept surface drainage along the west side of the building, and Private Storm Sewer A3-A5 (12") will also flow south into Extended Detention Basin A. Developed peak flows at Design Point #1 are calculated as $Q_5 = 4.1$ cfs and $Q_{100} = 7.8$ cfs.

Hydrologic calculations for the site are detailed in the attached spreadsheets (Appendix A), and peak flows are identified on Figures EX1 and D1 (Appendix D).

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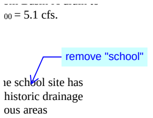
With DP1 downstream of the EDB, these values should be the peak release rates from the pond plus the runoff from the small subbasin not draining into the EDB. See redlines on the proposed drainage map.


00 = 5.1 cfs.

remove "school"

e school site has
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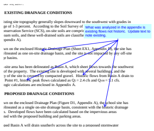
remove "school"



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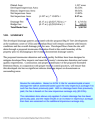
What was analyzed in the appendix is existing flows not historic. Update text to note existing.



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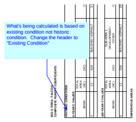
Revise the calculation. Based on ECM 3.13a for vacation/replat a basin drainage fee will be assessed based upon the new impervious acreage if no such fee has been previously paid. With no drainage basin fees previously paid, the fee is based on the new impervious acreage only (83.33%).

The calculation done above only applies if a basin drainage fee has been previously paid, and the replat results in an increase in impervious acreage, then fees are assessed on the additional impervious acreage only.



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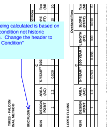
What's being calculated is based on existing condition not historic condition. Change the header to "Existing Condition"



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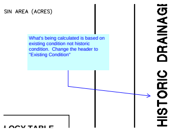
SIN AREA (ACRES)

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HISTORIC DRAINAG

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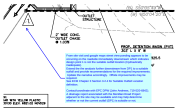

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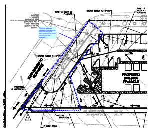
From site visit and google maps street view ponding appears to be occurring on the roadside immediately downstream which indicates design point 1 is not the suitable outfall location (Hydraulically inadequate).
Extend the the analysis further downstream from DP1 to a suitable outfall and provide recommendations for the required improvements. Update the narrative accordingly. Offsite improvements may be required.
See ECM Chapter 3 Section 3.2.4 for Suitable Outfall Location definition.

Contact/coordinate with EPC DPW (John Andrews, 719-520-6842). A drainage report associated with the Meridian Road Project adjacent to the site may be available and may help determine whether or not the current outfall (DP1) is suitable or not.



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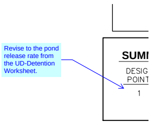
This is a separate sub-basin that does not drain into the pond.
DP1 would be the Pond release plus this subbasin.



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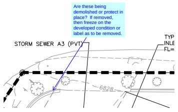
Revise to the pond release rate from the UD-Detention Worksheet.



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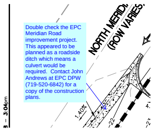
Are these being demolished or protect in place? If removed, then freeze on the developed condition or label as to be removed.



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Double check the EPC Meridian Road improvement project. This appeared to be planned as a roadside ditch which means a culvert would be required. Contact John Andrews at EPC DPW (719-520-6842) for a copy of the construction plans.

Penny (7)

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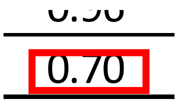

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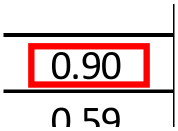

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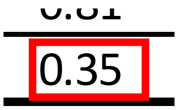

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SITE