INNOVATIVE DESIGN. **CLASSIC RESULTS.**

FINAL DRAINAGE REPORT
FOR
PEAK TECHNOLOGY CAMPUS – BUILDING #1
(A PORTION OF LOT 7, COLORADO SPRINGS AIRPORT FILING NO. 1C)
AND
PRELIMINARY DRAINAGE REPORT FOR BUILDING #2, #3, & #4

December 2020

Prepared for:
Flywheel Capital
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Prepared by:
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Job no. 2221.20

FINAL DRAINAGE REPORT FOR PEAK TECHNOLOGY CAMPUS BUILDING #1 AND PRELIMINARY DRAINAGE REPORT FOR BUILDING #2, #3, AND #4

Engineer's Statement

This report and plan for the drainage design of **Peak Technology Campus – Building #1 (A portion of Lot 7, Colorado Springs Airport Filing No. 1C)** was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

SIGNATURE (Affix Seal):______________________________

Kyle Campbell, Colorado P.E. No. 29794 Date

Developer's Statement

Flywheel Capital hereby certifies that the drainage facilities for **Peak Technology Campus – Building #1 (A portion of Lot 7, Colorado Springs Airport Filing No. 1C)** shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of **Peak Technology Campus – Building #1 (A portion of Lot 7, Colorado Springs Airport Filing No. 1C),** guarantee that final drainage design review will absolve **Flywheel Capital** and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Flywheel Capital
Name of Developer

____
Authorized Signature Date

____
Printed Name

____
Title

2828 Speer Blvd. Suite 220
Denver, CO 80211
Address:

City of Colorado Springs Statement:

Filed in accordance with Section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

______________________________ ______________
For City Engineer Date

Conditions:

CLASSIC CONSULTING ENGINEERS & SURVEYORS

FINAL DRAINAGE REPORT FOR PEAK TECHNOLOGY CAMPUS BUILDING #1 AND PRELIMINARY DRAINAGE REPORT FOR BUILDING #2, #3, AND #4

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FINAL DRAINAGE REPORT FOR PEAK TECHNOLOGY CAMPUS BUILDING #1 AND PRELIMINARY DRAINAGE REPORT FOR BUILDING #2, #3, AND #4

PURPOSE

This document is the Final Drainage Report for Peak Technology Campus Building #1 (A portion of Lot 7, Colorado Springs Airport Filing No. 1C) and Preliminary Drainage Report for Building #2, #3, and #4. The proposed drainage patterns, storm sewer, inlet locations, areas tributary to the site, and adequate outfall facilities are all analyzed within this report. The proposed development shall be in adherence to the City of Colorado Springs approved Master Development Drainage Plan for Colorado Springs Airport-Peak Innovation Park as well as current City Drainage Criteria. This property is tributary to the existing public Detention Facility "Pond 700".

GENERAL DESCRIPTION

The overall Peak Technology Campus – Building #1 development is located on a 5.79 acre proposed Phase 1 lease area located southeast of the Peak Innovation Parkway and Embraer Heights intersection. The proposed site is a portion of the previously platted Lot 7, Colorado Springs Airport Filing No. 1C, which is within the City of Colorado Springs, County of El Paso, and State of Colorado. The entire site ultimately will drain to an existing public detention/storm water quality facility located to the southeast of the overall campus, just north of Integration Loop (pond too). This report provides an analysis of the entire proposed campus, and details of Building #2, #3 and #4 have been assumed to support the Preliminary Drainage Report aspects of this analysis.

The overall campus, and Building #1 (Phase 1) is bounded to the north by existing Embraer Heights. The site is bound to the west by existing Peak Innovation Parkway, and to the south by future Integration Loop (by Airport). To the east a separate vacant parcel (not a part of this review). The average soil condition of the proposed site reflects Hydrologic Group "A" (Blakeland Loamy Sand) as determined by the "Soil Survey of El Paso County Area," prepared by the National Cooperative Soil Survey (see map in Appendix). This site is not within the streamside overlay.

EXISTING DRAINAGE CONDITIONS

The site is located within the Big Johnson Drainage Basin. Historically, the site drains in the southeasterly direction at grades varying from 2% to 30% into the future Integration Loop roadway. These undeveloped flows continue south toward Powers Boulevard. Prior to any construction, the overall site was approximately 100% covered with native grasses with no trees, except for the slope areas next to the existing roadways.

The site was most recently studied as part of the "Master Development Drainage Plan -Colorado Springs Airport Peak Innovation Park", by Enginuity, dated August 2020. The MDDP included a detailed a "Historic Hydrology Map" of the overall business park area that still applies for this study. See previously approved MDDP for additional discussion of the existing drainage conditions of the overall Peak Technology Campus as located in Basin 40 per the attached excerpt in the Appendix.

Calculations for these areas were not performed since covered in the MDDP and all the basins are truncated with the Building #1 Development (decrease in flows).

Also provided in the Appendix of this report is an "Existing Conditions" Drainage Map. While not required due to this site's inclusion in the recent MDDP, a description of the basin areas current tributary to the existing adjacent roadways is as follows:

Basin Ex-A: 1.97 acres of undeveloped native vegetated area and cut slopes along Embraer Heights. This area sheet flows into Embraer Heights.

Basin Ex-B: 2.04 acres of undeveloped native vegetated area and cut slopes along Peak Innovation Parkway. This area sheet flows into Peak Innovation Parkway.

Basin Ex-C: 4.44 acres of undeveloped native vegetated area and cut slopes along Peak Innovation Parkway. This area sheet flows into Peak Innovation Parkway.

Basin Ex-D: 0.84 acres of undeveloped native vegetated area and cut slopes along Embraer Heights. This area sheet flows into Embraer Heights.

Basin Ex-E: 13.68 acres of undeveloped native vegetated area and cut slopes along future Integration Loop. This area sheet flows into Integration Loop.

PROPOSED DRAINAGE CONDITIONS (ULTIMATE DEVELOPMENT)

A proposed Conditions Drainage Map is included in the appendix of this report and should be used as reference to the below detailed information.

Design Point 1 (Q_5 = 1.1 cfs, Q_{100}= 2.0 cfs) consists of runoff from Basin H, 0.30 acres of proposed parking lot, sidewalk and landscape area. A proposed 5' private Type R sump inlet will intercept the runoff with a 12" storm pipe (Pipe Run #1) conveying the collected flows south. The emergency route for this low point is to overtop the parking lot curb and enter Basin A before entering existing Embraer Heights roadway.

Design Point 2 (Q_5 = 0.8 cfs, Q_{100}= 1.6 cfs) consists of runoff from Basin I, 0.24 acres of proposed parking lot, sidewalk and landscape areas. A proposed 5' private Type R sump inlet will intercept all of the proposed flows and in an emergency situation, flows that over top the inlet will travel across Basin B into Peak Innovation Parkway. A proposed private 12" storm pipe (Pipe Run #2) will convey the collected flows east towards a proposed private Type 2 manhole.

Design Point 3 (Q_5 = 1.3 cfs, Q_{100}= 2.5 cfs) consists of runoff from Basin J, 0.36 acres of a proposed parking lot, sidewalk and landscape area. A proposed 5' private Type R sump inlet will intercept the entirety of this runoff and a private 12" storm pipe (Pipe Run #4 will convey to the flows east towards a proposed private Type 2 manhole. The emergency route for this low point is to overtop the parking lot curb and enter Basin B before entering Peak Innovation Parkway.

Design Point 4 (Q_5 = 2.7 cfs, Q_{100}= 5.2 cfs) consists of runoff from Basin K, 0.78 acres of proposed parking lot, sidewalk and landscape areas. A proposed 5' private Type R sump inlet will intercept the entirety of this runoff and a private 18" storm pipe (Pipe Run #6) will convey to the flows east towards the shared private drive aisle. The emergency route for this low point is to overtop the parking lot curb and enter Basin B. before entering Peak Innovation Parkway.

Pipe Run #7 (Q_5 = 8.3 cfs, Q_{100}= 15.5 cfs) is a proposed private 24" storm pipe that routes flows in an easterly direction to Design Point #10.

Design Point 5 (Q_5 = 3.2 cfs, Q_{100}= 6.1 cfs) consists of runoff from Basin L, 1.18 acres of proposed parking lot, sidewalk and landscape area. A proposed 5' private Type R sump inlet will intercept the runoff with an 18" storm pipe (Pipe Run #10) conveying the collected flows towards Design Point 6. The emergency route for this low point is to overtop the parking lot curb and enter Basin A before entering existing Embraer Heights roadway.

Design Point 6 (Q_5 = 1.1 cfs, Q_{100}= 2.1 cfs) consists of runoff from Basin M, 0.30 acres of proposed parking lot, sidewalk and landscape area. A proposed 5' private Type R sump inlet will intercept the flows with a 12" storm pipe (Pipe Run #11) conveying the collected flows toward Design Point 7. The emergency route for this low point is to overtop the parking lot curb and enter Basin L before entering existing Embraer Heights roadway.

Design Point 7 (Q_5 = 1.2 cfs, Q_{100}= 2.3 cfs) consists of runoff from Basin N, 0.33 acres of proposed parking lot, sidewalk and landscape area. A proposed 5' private Type R sump inlet will intercept these flows and a proposed private 12" storm system (Pipe Run #11) will direct them east. The emergency route for this low point is to overtop the parking lot curb and enter Basin M before entering existing Embraer Heights roadway.

Design Point 8 (Q_5 = 1.0 cfs, Q_{100}= 2.0 cfs) consists of runoff from Basin O, 0.27 acres of a proposed parking lot, sidewalk, fire access lane, loading dock and landscape area. A proposed private CDOT Type C sump inlet (or equivalent trench drain) will intercept all the flows and route it east towards the shared private drive aisle. The emergency route for this low point is to overtop the north curb and enter Basin N.

Design Point 9 (Q_5 = 2.6 cfs, Q_{100}= 4.9 cfs) consists of runoff from Basin P, 0.67 acres of proposed parking lot, sidewalk, fire access lane, loading dock and landscape area. A proposed private CDOT Type C grated sump inlet (or equivalent trench drain). Emergency overflow routing will be into Basin K.

Design Point 10 (Q_5 = 12.1 cfs, Q_{100}= 23.0 cfs) is comprised of flows from Basins H, I, J, K, L, M, N, O, and P, 3.76 acres of the majority of the Building #1 site. This combined flow is carried east in a proposed private 30" storm pipe (Pipe Run #17).

Design Point 11 (Q_5 = 9.1 cfs, Q_{100}= 17.5 cfs) consists of runoff from Basin S, 7.91 acres of future Building #2 parking lot, sidewalk building and landscape area. A proposed 24" private storm pipe stub will convey the collected undeveloped flows and future developed and route them toward Design Point 12. The emergency route for this low point is to enter Basin G.

Design Point 12 (Q_5 = 20.0 cfs, Q_{100}= 38.1 cfs) is the cumulative flows of Pipe Run #17 and #18. These flows are directed east in a proposed private 36" storm pipe to Design Point 15.

Design Point 13 (Q_5 = 2.1 cfs, Q_{100}= 4.3 cfs) consists of runoff from Basin G, 0.76 acres of proposed private drive aisle. A proposed 5' private Type R sump inlet will intercept the flows with a 12" private storm pipe conveying the collected flows toward Design Point 15. The emergency route for this low point is to overtop the westerly entrance and enter Basin E.

Design Point 14 (Q_5 = 1.4 cfs, Q_{100}= 2.8 cfs) consists of runoff from Basin F, 0.50 acres of proposed private drive aisle. A proposed 5' private Type R sump inlet will intercept the flows with a 12" storm pipe conveying the collected flows toward Design Point 15. The emergency route for this low point is to overtop the westerly entrance and enter Basin T.

The cumulative flows collected through Design Pont 15 are Q_5 = 22.7 cfs and Q_{100} = 43.7 cfs. These flows outfall in a southerly direction towards the existing public detention Pond 700. In Pipe Run #23, a proposed private 36" storm pipe at the south end of Pipe Run #23, flows from Basin E (41.4, 79.1) will be added as development takes place. The provided stub from the airport is a proposed private 48" storm sewer to convey the total flows of (Q_5 = 48.1 cfs, Q_{100}= 104.8 cfs)

The existing Pond 700facility had been previously designed and constructed to accommodate developed flows from this site (all 4 buildings). The airport / City will be providing a storm stub into the campus parcel as well as the required pond improvements (outlet and trickle channel to accommodate the full developed flows from the campus). The details of those improvements will be provided by the airport in a separate drainage report submittal.

EROSION CONTROL PLAN

The City of Colorado Springs Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate be submitted with the Final Drainage Report. We respectfully request that the Erosion Control Plan and cost estimate be submitted in conjunction with the appropriate Grading Plan and construction assurances posted prior to obtaining a grading permit.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs Drainage Criteria Manual, May 2014. The Rational Method was used to estimate stormwater runoff to the proposed inlets and storm sewer pipes and for comparison purposes to the runoff rates found within the existing drainage reports. Hydraulic grade lines for on-site private storm facilities will be provided in accordance with the City DCM and UDFCD manuals by using the UD-Sewer software from Urban Drainage. These calculations will be included in a future addendum to this report and plotted onto the storm profile construction drawings for those facilities 15" and larger. Pipe calculations were completed using Bentley FlowMaster V8i and are included in the Appendix.

The City of Colorado Springs has required the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways, and implements long-term source controls. The Four Step Process pertains to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control infrastructure are sized. The site adheres to this Four Step Process as follows:

1. As this site is located in a previously studied basin, developed flows were anticipated to be released into the existing and proposed downstream public facilities where water quality and full spectrum detention are being provided (Pond 700) In several areas, flows are rooted over landscape areas prior to being collected into proposed private storm facilities. Overall site disturbance is being minimized by not grading the future building area at this time. An IRF spreadsheet is includes in the appendix.
2. Permanent Stormwater Quality BMP's are existing downstream that provide all required water quality capture volume required for this site.
3. The ultimate recipient of the drainage flows from the site is Big Johnson Reservoir area. As the entire development (1 through 4) is treated by one existing full spectrum detention and water quality facility, no impacts to Big Johnson are anticipated. All flows from this site travel as pipe flow to the existing pond.
4. A site-specific stormwater quality and erosion control plan and narrative will be submitted and approved by City Engineering prior to any disturbance within the project area(s). Details such as site-specific source control construction BMP's as well as permanent BMP's will be detailed with this plan and narrative to protect receiving waters.

FLOODPLAIN STATEMENT

No portion of this site is located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C 0764G effective date, December 7, 2018(See Appendix).

DRAINAGE AND BRIDGE FEES

Peak Technology Campus – Building #1 are within the Big Johnson Drainage Basin. As this site was previously platted there are no Drainage and Bridge Fees required, nor are there any reimbursable storm sewer facilities.

CONSTRUCTION COST OPINION

Private Drainage Facilities (Non-reimbursable)

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	5' Type-R Inlet	9 EACH	$4,300/EA	$ 38,700.00
2.	12" RCP Storm Drain	345 LF	$35/LF	$ 12,075.00
3.	18" RCP Storm Drain	540 LF	$40/LF	$ 21,600.00
4.	24" RCP Storm Drain	480 LF	$52/LF	$ 24,960.00
5.	30" RCP Storm Drain	280 LF	$65/LF	$ 18,200.00
6.	36" RCP Storm Drain	770 LF	$80/LF	$ 61,600.00
7.	48" RCP Storm Drain	80 LF	$96/LF	$ 7,680.00
8.	Type I Storm MH	4 EACH	$6,500/EA	$ 26,000.00
9.	Type II Storm MH	8 EACH	$5,500/EA	$ 44,000.00
SUB-TOTAL				$ 254,815.00
10% ENGINEERING				$ 25,481.50
5% CONTINGENCIES				$ 12,740.75
TOTAL				**$ 293,037.25**

Classic Consulting Engineers & Surveyors cannot and does not guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular.

SUMMARY

Proposed flows generated by this site are routed to proposed on-site private facilities and ultimately to existing and proposed adjacent or downstream public facilities. The existing Public Full Spectrum Detention and Water Quality facility (Pond 700) restricts the release rate to allowable release rates as determined in the MDDP. The airport will be providing improvements to the pond and a pipe stub to our southeast campus for connection into. All sump inlets have overflow paths in case of inlet failure, and pipes have been sized to adequately convey the 100-year runoff rates to the proposed facility. All drainage facilities were sized using the current City of Colorado Springs Drainage Criteria and Urban Drainage and Flood Control District Criteria and will safely discharge storm water runoff to adequate existing outfalls.

As this site was previously anticipated in prior studies (and is in conformance with said studies), will not adversely affect surrounding or downstream development.

PREPARED BY:

Kyle Campbell
Division Manager

db/2221.20/FDR

REFERENCES

1. City of Colorado Springs Drainage Criteria Manual Volume 1, May 2014.

2. "Master Development Drainage Plan -Colorado Springs Airport – Peak Innovation Park," by Enginuity, dated August 2020.

3. Drainage Criteria Manual (Volume 3) latest revision April 2008, Urban Drainage and Flood Criteria District.

APPENDIX

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VICINITY MAP

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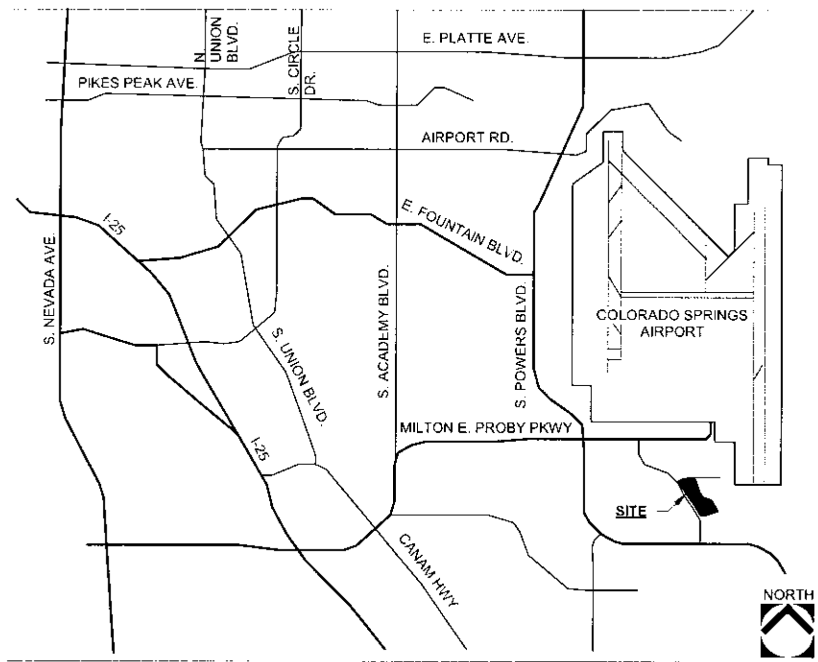

VICINITY MAP

SCALE: 1" = 2000'-0"

SOILS MAP (S.C.S SURVEY)

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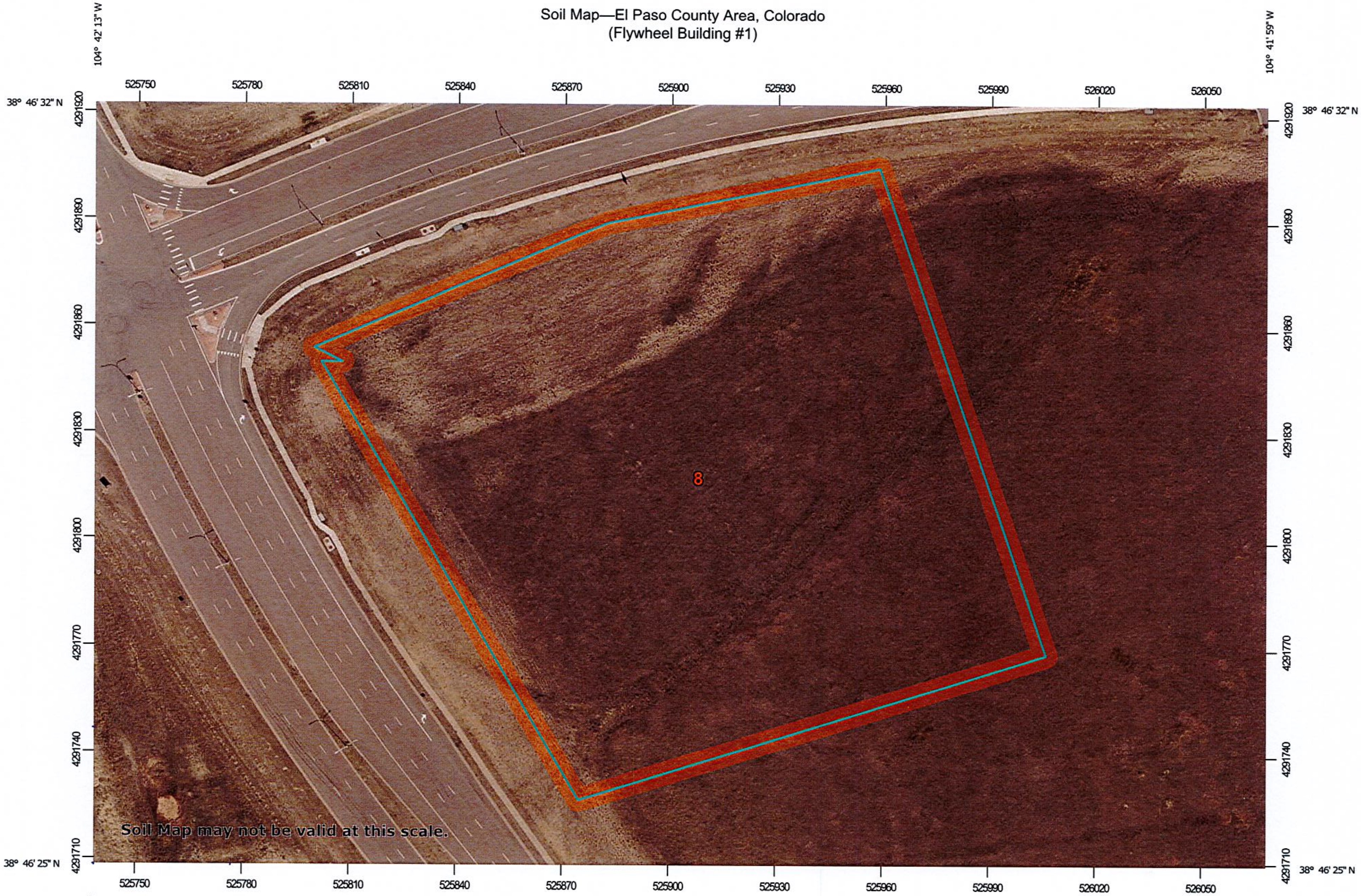
Soil Map—El Paso County Area, Colorado
(Flywheel Building #1)



Map Scale: 1:1,510 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	5.6	100.0%
Totals for Area of Interest		**5.6**	**100.0%**

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

F.E.M.A. MAP

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National Flood Hazard Layer FIRMette

FEMA

104°42'22"W 38°46'43"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

104°41'45"W 38°46'15"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/15/2020 at 6:00 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

DRAINAGE CALCULATIONS

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JOB NAME: *Peak Technology Campus - Building #1*
JOB NUMBER: *2221.20*
DATE: *12/12/20*
CALCULATED BY: *KRC*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS				LANDSCAPE/UNDEVELOPED AREAS				WEIGHTED			WEIGHTED CA		
		AREA (AC)	C(2)	C(5)	C(100)	AREA (AC)	C(2)	C(5)	C(100)	C(2)	C(5)	C(100)	**CA(2)**	**CA(5)**	**CA(100)**
A	0.62	0.00	0.89	0.90	0.96	0.62	0.02	0.08	0.35	0.02	0.08	0.35	**0.01**	**0.05**	**0.22**
B	0.58	0.00	0.89	0.90	0.96	0.58	0.02	0.08	0.35	0.02	0.08	0.35	**0.01**	**0.05**	**0.20**
C	1.39	0.00	0.89	0.90	0.96	1.39	0.02	0.08	0.35	0.02	0.08	0.35	**0.03**	**0.11**	**0.49**
D	0.39	0.00	0.89	0.90	0.96	0.39	0.02	0.08	0.35	0.02	0.08	0.35	**0.01**	**0.03**	**0.14**
E	10.87	8.70	0.89	0.90	0.96	2.17	0.02	0.08	0.35	0.72	0.74	0.84	**7.79**	**8.00**	**9.11**
F	0.50	0.30	0.89	0.90	0.96	0.20	0.02	0.08	0.35	0.54	0.57	0.72	**0.27**	**0.29**	**0.36**
G	0.76	0.46	0.89	0.90	0.96	0.30	0.02	0.08	0.35	0.55	0.58	0.72	**0.42**	**0.44**	**0.55**
H	0.30	0.24	0.89	0.90	0.96	0.06	0.02	0.08	0.35	0.72	0.74	0.84	**0.21**	**0.22**	**0.25**
I	0.24	0.19	0.89	0.90	0.96	0.05	0.02	0.08	0.35	0.71	0.73	0.83	**0.17**	**0.18**	**0.20**
J	0.36	0.29	0.89	0.90	0.96	0.07	0.02	0.08	0.35	0.72	0.74	0.84	**0.26**	**0.27**	**0.30**
K	0.78	0.62	0.89	0.90	0.96	0.16	0.02	0.08	0.35	0.71	0.73	0.83	**0.56**	**0.57**	**0.65**
L	1.18	0.94	0.89	0.90	0.96	0.24	0.02	0.08	0.35	0.71	0.73	0.84	**0.84**	**0.87**	**0.99**
M	0.30	0.24	0.89	0.90	0.96	0.06	0.02	0.08	0.35	0.72	0.74	0.84	**0.21**	**0.22**	**0.25**
N	0.33	0.26	0.89	0.90	0.96	0.07	0.02	0.08	0.35	0.71	0.73	0.83	**0.23**	**0.24**	**0.27**
O	0.27	0.22	0.89	0.90	0.96	0.05	0.02	0.08	0.35	0.73	0.75	0.85	**0.20**	**0.20**	**0.23**
P	0.67	0.54	0.89	0.90	0.96	0.13	0.02	0.08	0.35	0.72	0.74	0.84	**0.48**	**0.50**	**0.56**
Q	0.57	0.57	0.89	0.90	0.96	0.00	0.02	0.08	0.35	0.89	0.90	0.96	**0.51**	**0.51**	**0.55**
R	0.57	0.57	0.89	0.90	0.96	0.00	0.02	0.08	0.35	0.89	0.90	0.96	**0.51**	**0.51**	**0.55**
S	2.91	2.32	0.89	0.90	0.96	0.59	0.02	0.08	0.35	0.71	0.73	0.84	**2.08**	**2.14**	**2.43**
T	1.05	0.50	0.89	0.90	0.96	0.55	0.02	0.08	0.35	0.43	0.47	0.64	**0.46**	**0.49**	**0.67**

JOB NAMI *Peak Technology Campus - Building #1*
JOB NUM *2221.20*
DATE: *01/29/06*
CALC'D B *KRC*

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not bu	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.

$$t_c = \frac{L}{180} + 10$$

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}}$$

$$V = C_v S_w^{0.5}$$

Tc=L/V

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED CA(5)	CA(100)	OVERLAND C(5)	Length (ft)	Height (ft)	Tc (min)	STREET / CHANNEL FLOW Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	Tc TOTAL (min)	INTENSITY I(5) (in/hr)	I(100) (in/hr)	TOTAL FLOWS Q(5) (cfs)	Q(100) (cfs)
A	0.05	0.22	0.08	60	8	6.1	0	0.0%	0.0	0.0	6.1	4.88	8.19	**0.2**	**1.8**
B	0.05	0.20	0.08	60	6	6.7	0	0.0%	0.0	0.0	6.7	4.74	7.95	**0.2**	**1.6**
C	0.11	0.49	0.08	20	4	3.1	0	0.0%	0.0	0.0	5.0	5.17	8.68	**0.6**	**4.2**
D	0.03	0.14	0.08	50	2	8.2	0	0.0%	0.0	0.0	8.2	4.42	7.42	**0.1**	**1.0**
E	8.00	9.11	0.08	0	0	0.0	0	0.0%	0.0	0.0	5.0	5.17	8.68	**41.4**	**79.1**
F	0.29	0.36	0.08	10	0.2	4.6	300	1.5%	2.4	2.0	6.7	4.74	7.95	**1.4**	**2.8**
G	0.44	0.55	0.08	10	0.2	4.6	300	1.5%	2.4	2.0	6.7	4.74	7.95	**2.1**	**4.3**
H	0.22	0.25	0.08	15	0.3	5.7	160	2.5%	3.2	0.8	6.5	4.77	8.01	**1.1**	**2.0**
I	0.18	0.20	0.08	15	0.3	5.7	150	2.5%	3.2	0.8	6.5	4.78	8.03	**0.8**	**1.6**
J	0.27	0.30	0.08	15	0.3	5.7	70	4.0%	4.0	0.3	6.0	4.90	8.23	**1.3**	**2.5**
K	0.57	0.65	0.08	15	0.3	5.7	200	2.5%	3.2	1.1	6.7	4.72	7.93	**2.7**	**5.2**
L	0.87	0.99	0.08	90	2.25	12.9	80	3.0%	3.5	0.4	13.3	3.70	6.21	**3.2**	**6.1**
M	0.22	0.25	0.08	15	0.3	5.7	0	0.0%	0.0	0.0	5.7	4.98	8.36	**1.1**	**2.1**
N	0.24	0.27	0.08	15	0.3	5.7	0	0.0%	0.0	0.0	5.7	4.98	8.36	**1.2**	**2.3**
O	0.20	0.23	0.08	0	0	0.0	200	2.5%	3.2	1.1	5.0	5.17	8.68	**1.0**	**2.0**
P	0.50	0.56	0.08	0	0	0.0	250	3.0%	3.5	0.0	5.0	5.17	8.68	**2.6**	**4.9**

JOB NAMI *Peak Technology Campus - Building #1*
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DATE: *01/29/06*
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$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}}$$

$$V = C_v S_w^{0.5}$$

Tc=L/V

Table 6-7. Conveyance Coefficient, C_v

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

$$t_c = \frac{L}{180} + 10$$

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

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
Q	0.51	0.55	0.08	0	0	0.0	0	0.0%	0.0	0.0	5.0	5.17	8.68	**2.7**	**4.7**
R	0.51	0.55	0.08	0	0	0.0	0	0.0%	0.0	0.0	5.0	5.17	8.68	**2.7**	**4.7**
S	2.14	2.43	0.08	30	0.6	8.0	150	1.5%	2.4	1.0	9.0	4.28	7.19	**9.1**	**17.5**
T	0.49	0.67	0.08	10	0.2	4.6	300	2.5%	3.2	1.6	6.2	4.84	8.13	**2.4**	**5.5**

JOB NAME: *Peak Technology Campus - Building #1*
JOB NUMBER: *2221.20*
DATE: *12/12/20*
CALCULATED BY: *KRC*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
1	H	0.22	0.25	6.5	4.78	8.02	1.1	2.0	5' Priv Type R Sump Inlet
2	I	0.18	0.20	6.5	4.78	8.02	0.8	1.6	5' Priv Type R Sump Inlet
3	J	0.27	0.30	6.0	4.90	8.23	1.3	2.5	5' Priv Type R Sump Inlet
4	K	0.57	0.65	6.7	4.73	7.94	2.7	5.2	5' Priv Type R Sump Inlet
5	L	0.87	0.99	13.3	3.70	6.21	3.2	6.1	5' Priv Type R Sump Inlet
6	M	0.22	0.25	5.7	4.97	8.35	1.1	2.1	5' Priv Type R Sump Inlet
7	N	0.24	0.27	5.7	4.97	8.35	1.2	2.3	5' Priv Type R Sump Inlet
8	O	0.20	0.23	5.0	5.17	8.68	1.0	2.0	Priv CDOT Type C Grated Sump Inlet
9	P	0.50	0.56	5.0	5.17	8.68	2.6	4.9	Priv CDOT Type C Grated Sump Inlet
10	H, I, J, K, L, M, N, O, P	3.27	3.70	13.3	3.70	6.21	12.1	23.0	Priv Type 1 MH
11	S	2.14	2.43	9.0	4.29	7.20	9.1	17.5	Priv Storm Stub
12	DP 10 and 11	5.41	6.13	13.3	3.70	6.21	20.0	38.1	Priv Type 1 MH
13	G	0.44	0.55	6.7	4.73	7.94	2.1	4.3	5' Priv Type R Sump Inlet
14	F	0.29	0.36	6.7	4.73	7.94	1.4	2.8	5' Priv Type R Sump Inlet
15	DP 12, 13 and 14	6.14	7.04	13.3	3.70	6.21	22.7	43.7	Priv Type 1 MH
16	DP 15 and E	14.14	16.15	13.3	3.70	6.21	52.3	100.4	Priv Type 1 MH

JOB NAME: *Peak Technology Campus - Building #1*
JOB NUMBER: *2221.20*
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* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
1	H	0.22	0.25	6.5	4.78	8.02	1.1	2.0	Priv. 12"
2	I	0.18	0.20	6.5	4.78	8.02	0.8	1.6	Priv. 12"
3	PR 1 and 2	0.40	0.45	6.5	4.78	8.02	1.9	3.6	Priv. 18"
4	J	0.27	0.30	6.0	4.90	8.22	1.3	2.5	Priv. 12"
5	PR 3 and 4 and Basin Q	1.18	1.30	6.5	4.78	8.02	5.6	10.4	Priv. 24"
6	K	0.57	0.65	6.7	4.73	7.94	2.7	5.2	Priv. 18"
7	PR 5 and 6	1.75	1.95	6.7	4.73	7.94	8.3	15.5	Priv. 24"
8	P	0.50	0.56	5.0	5.17	8.68	2.6	4.9	Priv. 12"
9	PR 7 and 8	2.25	2.51	6.7	4.73	7.94	10.6	19.9	Priv. 24"
10	L	0.87	0.99	13.3	3.70	6.21	3.2	6.2	Priv. 18"
11	M	0.22	0.25	5.7	4.97	8.35	1.1	2.1	Priv. 12"
12	PR 10 and 11	1.09	1.24	13.3	3.70	6.21	4.0	7.7	Priv. 18"
13	N	0.24	0.27	5.7	4.97	8.35	1.2	2.3	Priv. 12"
14	PR 12 and 13	1.33	1.12	13.3	3.70	6.21	4.9	7.0	Priv. 18"

JOB NAME: *Peak Technology Campus - Building #1*
JOB NUMBER: *2221.20*
DATE: *12/12/20*
CALCULATED BY: *KRC*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
15	O	0.20	0.23	5.0	5.17	8.68	1.0	2.0	Priv. 12"
16	PR 14 and 15 and Basin R	2.04	1.90	13.3	3.70	6.21	7.6	11.8	Priv. 18"
17	PR 9 and 16	4.29	4.41	13.3	3.70	6.21	15.9	27.4	Priv. 30"
18	S	2.14	2.43	9.0	4.29	7.20	9.2	17.5	Priv. 24"
19	PR 17 and 18	4.43	6.84	13.3	3.70	6.21	16.4	42.5	Priv. 36"
20	F	0.29	0.36	6.7	4.73	7.94	1.4	2.8	Priv. 12"
21	G	0.44	0.55	6.7	4.73	7.94	2.1	4.3	Priv. 12"
22	PR 20 and 21	0.73	0.91	6.7	4.73	7.94	3.5	7.2	Priv. 18"
23	PR 19 and 22	5.16	7.75	13.3	3.70	6.21	19.1	48.2	Priv. 36"
24	PR 23 and E	13.16	16.86	13.3	3.70	6.21	48.7	104.8	Priv. 48"

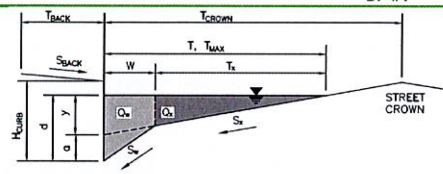
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #1



Gutter Geometry (Enter data in the blue cells)

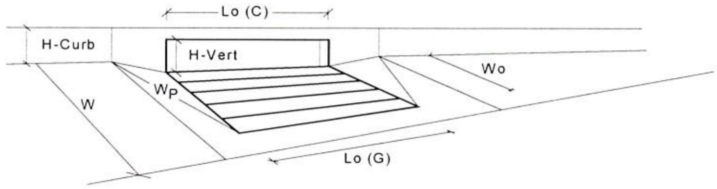
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	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



		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.6	3.6	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.22	0.22	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.47	0.47	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**2.3**	**2.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	2.0	cfs

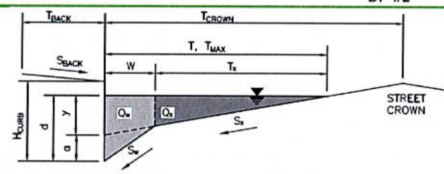
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #2



Gutter Geometry (Enter data in the blue cells)

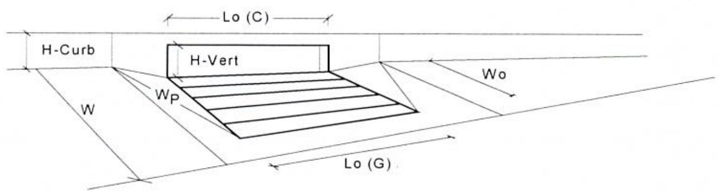
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.015	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	24.0	ft
Gutter Width	W =	1.00	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} =	0.018	

		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	6.0	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



		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.8	1.6	cfs

Warning 5: The width of unit is greater than the gutter width.

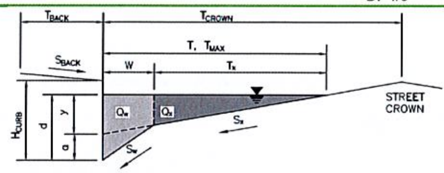
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #3



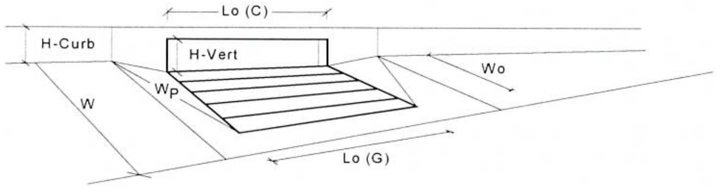
Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	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)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	5.9	5.9	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.3	2.5	cfs

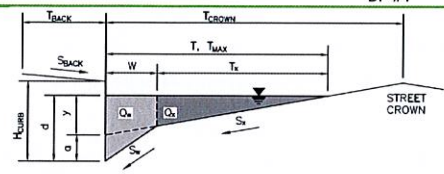
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	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} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	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} =	0.018	

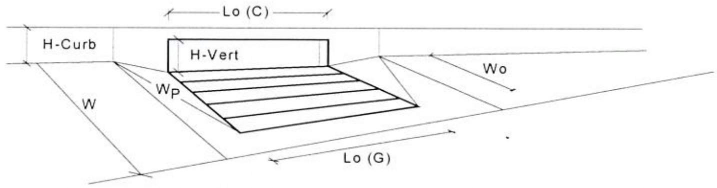
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions				

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

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.7	5.2	cfs

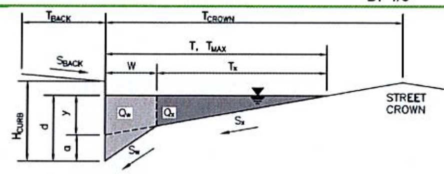
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #5



Gutter Geometry (Enter data in the blue cells)

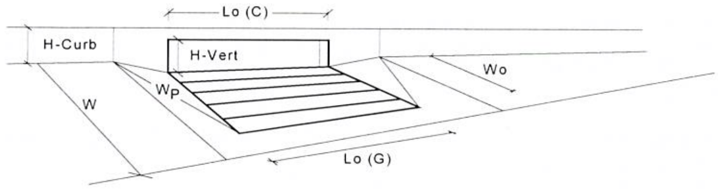
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.028	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	7.0	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



		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.7	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.47	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.85	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**5.9**	**7.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.2	6.1	cfs

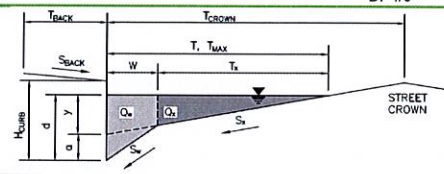
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #6



Gutter Geometry (Enter data in the blue cells)

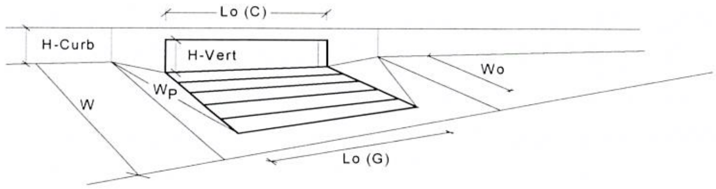
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	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



		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet: CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	2.1	cfs

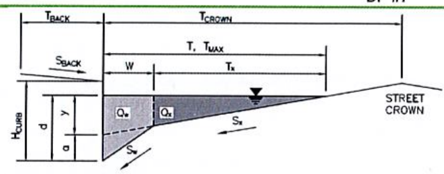
Version 4.05 Released March 2017

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

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #7



Gutter Geometry (Enter data in the blue cells)

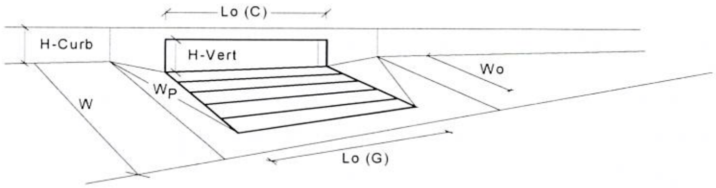
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	1.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	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)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.2	2.3	cfs

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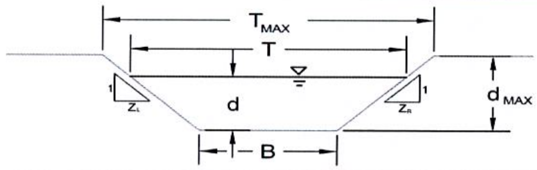
AREA INLET IN A SWALE

Peak Technology Campus - Building #1

DP #8 Loading dock



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ Non-Cohesive
- ○ Cohesive
- ◉ Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	25.00	25.00	feet
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	0.50	0.50	feet

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	12.5	12.5	cfs
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	0.23	0.23	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	1.0	2.0	cfs
Water Depth	d =	0.08	0.11	feet

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

Version 4.05 Released March 2017

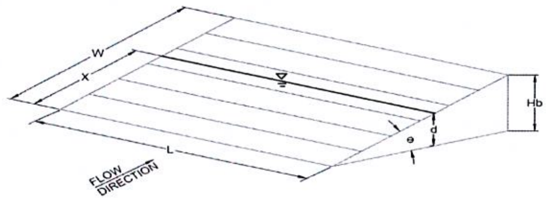
AREA INLET IN A SWALE

Peak Technology Campus - Building #1

DP #8 Loading dock

Inlet Design Information (Input)

Type of Inlet: CDOT Type C (Depressed) — Inlet Type = CDOT Type C (Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.84	
Orifice Coefficient	C_o =	0.56	
Weir Coefficient	C_w =	1.81	

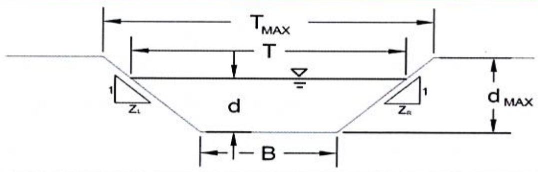
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.08	1.11	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**14.8**	**15.0**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	cfs
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	%

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Peak Technology Campus - Building #1

DP #9 Loading dock



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ Non-Cohesive
- ○ Cohesive
- ◉ Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	25.00	25.00	feet
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	0.50	0.50	feet

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	12.5	12.5	cfs
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	0.23	0.23	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	2.6	4.9	cfs
Water Depth	d =	0.12	0.16	feet

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

Version 4.05 Released March 2017

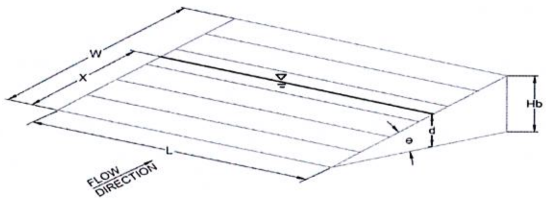
AREA INLET IN A SWALE

Peak Technology Campus - Building #1

DP #9 Loading dock

Inlet Design Information (Input)

Type of Inlet	CDOT Type C (Depressed)	Inlet Type =	CDOT Type C (Depressed)
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.84	
Orifice Coefficient	C_o =	0.56	
Weir Coefficient	C_w =	1.81	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.12	1.16	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	15.1	15.3	cfs
	Bypassed Flow, Q_b =	0.0	0.0	cfs
	Capture Percentage = Q_a/Q_o = C%	100	100	%

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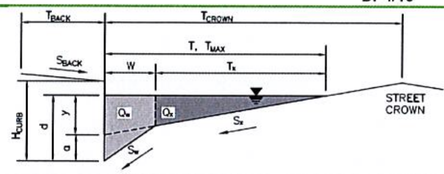
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #13



Gutter Geometry (Enter data in the blue cells)

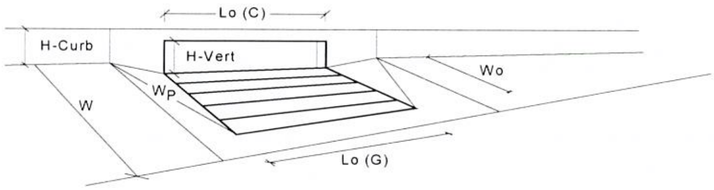
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	1.00	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	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)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**5.9**	**5.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.1	4.3	cfs

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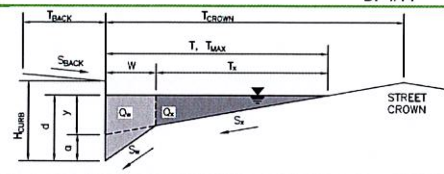
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Peak Technology Campus - Building #1

Inlet ID: DP #14



Gutter Geometry (Enter data in the blue cells)

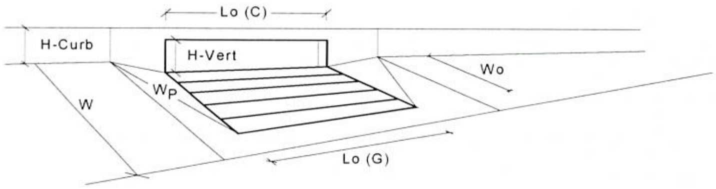
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.030	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} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	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)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.42	0.42	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} =	0.93	0.93	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**10.0**	**10.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.4	2.8	cfs

PR #1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	2.00 cfs

Results	
Normal Depth	5.5 in
Flow Area	0.4 ft²
Wetted Perimeter	1.5 ft
Hydraulic Radius	2.8 in
Top Width	1.00 ft
Critical Depth	7.2 in
Percent Full	45.9 %
Critical Slope	0.004 ft/ft
Velocity	5.68 ft/s
Velocity Head	0.50 ft
Specific Energy	0.96 ft
Froude Number	1.686
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	45.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.5 in
Critical Depth	7.2 in
Channel Slope	0.010 ft/ft
Critical Slope	0.004 ft/ft

PR #2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	1.60 cfs

Results	
Normal Depth	4.9 in
Flow Area	0.3 ft²
Wetted Perimeter	1.4 ft
Hydraulic Radius	2.6 in
Top Width	0.98 ft
Critical Depth	6.4 in
Percent Full	40.6 %
Critical Slope	0.004 ft/ft
Velocity	5.35 ft/s
Velocity Head	0.45 ft
Specific Energy	0.85 ft
Froude Number	1.711
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	40.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.9 in
Critical Depth	6.4 in
Channel Slope	0.010 ft/ft
Critical Slope	0.004 ft/ft

PR #3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Diameter	18.0 in
Discharge	3.60 cfs

Results	
Normal Depth	8.8 in
Flow Area	0.9 ft^2
Wetted Perimeter	2.3 ft
Hydraulic Radius	4.4 in
Top Width	1.50 ft
Critical Depth	8.7 in
Percent Full	49.1 %
Critical Slope	0.005 ft/ft
Velocity	4.17 ft/s
Velocity Head	0.27 ft
Specific Energy	1.01 ft
Froude Number	0.970
Maximum Discharge	7.99 cfs
Discharge Full	7.43 cfs
Slope Full	0.001 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	40.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.8 in
Critical Depth	8.7 in
Channel Slope	0.005 ft/ft
Critical Slope	0.005 ft/ft

PR #4

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	2.50 cfs

Results	
Normal Depth	6.3 in
Flow Area	0.4 ft²
Wetted Perimeter	1.6 ft
Hydraulic Radius	3.1 in
Top Width	1.00 ft
Critical Depth	8.1 in
Percent Full	52.3 %
Critical Slope	0.005 ft/ft
Velocity	6.01 ft/s
Velocity Head	0.56 ft
Specific Energy	1.08 ft
Froude Number	1.642
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.003 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	52.3 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.3 in
Critical Depth	8.1 in
Channel Slope	0.010 ft/ft
Critical Slope	0.005 ft/ft

PR #5

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Diameter	24.0 in
Discharge	10.40 cfs

Results	
Normal Depth	14.1 in
Flow Area	1.9 ft²
Wetted Perimeter	3.5 ft
Hydraulic Radius	6.6 in
Top Width	1.97 ft
Critical Depth	13.9 in
Percent Full	58.7 %
Critical Slope	0.005 ft/ft
Velocity	5.42 ft/s
Velocity Head	0.46 ft
Specific Energy	1.63 ft
Froude Number	0.968
Maximum Discharge	17.21 cfs
Discharge Full	16.00 cfs
Slope Full	0.002 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	61.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	14.1 in
Critical Depth	13.9 in
Channel Slope	0.005 ft/ft
Critical Slope	0.005 ft/ft

PR #6

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	18.0 in
Discharge	5.20 cfs

Results	
Normal Depth	8.9 in
Flow Area	0.9 ft²
Wetted Perimeter	2.3 ft
Hydraulic Radius	4.5 in
Top Width	1.50 ft
Critical Depth	10.5 in
Percent Full	49.7 %
Critical Slope	0.006 ft/ft
Velocity	5.93 ft/s
Velocity Head	0.55 ft
Specific Energy	1.29 ft
Froude Number	1.368
Maximum Discharge	11.30 cfs
Discharge Full	10.50 cfs
Slope Full	0.002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	49.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.9 in
Critical Depth	10.5 in
Channel Slope	0.010 ft/ft
Critical Slope	0.006 ft/ft

PR #7

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	24.0 in
Discharge	15.50 cfs

Results	
Normal Depth	14.6 in
Flow Area	2.0 ft²
Wetted Perimeter	3.6 ft
Hydraulic Radius	6.7 in
Top Width	1.95 ft
Critical Depth	17.0 in
Percent Full	60.8 %
Critical Slope	0.006 ft/ft
Velocity	7.76 ft/s
Velocity Head	0.93 ft
Specific Energy	2.15 ft
Froude Number	1.351
Maximum Discharge	24.33 cfs
Discharge Full	22.62 cfs
Slope Full	0.005 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	60.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	14.6 in
Critical Depth	17.0 in
Channel Slope	0.010 ft/ft
Critical Slope	0.006 ft/ft

PR #8

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	4.90 cfs

Results	
Normal Depth	10.6 in
Flow Area	0.7 ft²
Wetted Perimeter	2.5 ft
Hydraulic Radius	3.6 in
Top Width	0.64 ft
Critical Depth	10.9 in
Percent Full	88.6 %
Critical Slope	0.010 ft/ft
Velocity	6.66 ft/s
Velocity Head	0.69 ft
Specific Energy	1.58 ft
Froude Number	1.092
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.011 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	88.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	10.6 in
Critical Depth	10.9 in
Channel Slope	0.010 ft/ft
Critical Slope	0.010 ft/ft

PR #9

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	24.0 in
Discharge	19.90 cfs

Results	
Normal Depth	17.5 in
Flow Area	2.4 ft²
Wetted Perimeter	4.1 ft
Hydraulic Radius	7.2 in
Top Width	1.78 ft
Critical Depth	19.2 in
Percent Full	72.8 %
Critical Slope	0.008 ft/ft
Velocity	8.12 ft/s
Velocity Head	1.03 ft
Specific Energy	2.48 ft
Froude Number	1.221
Maximum Discharge	24.33 cfs
Discharge Full	22.62 cfs
Slope Full	0.008 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	72.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	17.5 in
Critical Depth	19.2 in
Channel Slope	0.010 ft/ft
Critical Slope	0.008 ft/ft

PR #10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	18.0 in
Discharge	6.20 cfs

Results	
Normal Depth	9.9 in
Flow Area	1.0 ft²
Wetted Perimeter	2.5 ft
Hydraulic Radius	4.8 in
Top Width	1.49 ft
Critical Depth	11.5 in
Percent Full	55.3 %
Critical Slope	0.006 ft/ft
Velocity	6.19 ft/s
Velocity Head	0.60 ft
Specific Energy	1.42 ft
Froude Number	1.332
Maximum Discharge	11.30 cfs
Discharge Full	10.50 cfs
Slope Full	0.003 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	55.3 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.9 in
Critical Depth	11.5 in
Channel Slope	0.010 ft/ft
Critical Slope	0.006 ft/ft

PR #11

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	2.10 cfs

Results	
Normal Depth	5.7 in
Flow Area	0.4 ft²
Wetted Perimeter	1.5 ft
Hydraulic Radius	2.9 in
Top Width	1.00 ft
Critical Depth	7.4 in
Percent Full	47.2 %
Critical Slope	0.004 ft/ft
Velocity	5.75 ft/s
Velocity Head	0.51 ft
Specific Energy	0.99 ft
Froude Number	1.678
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	47.2 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.7 in
Critical Depth	7.4 in
Channel Slope	0.010 ft/ft
Critical Slope	0.004 ft/ft

PR #12

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	18.0 in
Discharge	7.70 cfs

Results	
Normal Depth	11.4 in
Flow Area	1.2 ft²
Wetted Perimeter	2.8 ft
Hydraulic Radius	5.1 in
Top Width	1.44 ft
Critical Depth	12.9 in
Percent Full	63.6 %
Critical Slope	0.007 ft/ft
Velocity	6.49 ft/s
Velocity Head	0.66 ft
Specific Energy	1.61 ft
Froude Number	1.264
Maximum Discharge	11.30 cfs
Discharge Full	10.50 cfs
Slope Full	0.005 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	63.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.4 in
Critical Depth	12.9 in
Channel Slope	0.010 ft/ft
Critical Slope	0.007 ft/ft

PR #13

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	2.30 cfs

Results	
Normal Depth	6.0 in
Flow Area	0.4 ft^2
Wetted Perimeter	1.6 ft
Hydraulic Radius	3.0 in
Top Width	1.00 ft
Critical Depth	7.8 in
Percent Full	49.8 %
Critical Slope	0.004 ft/ft
Velocity	5.89 ft/s
Velocity Head	0.54 ft
Specific Energy	1.04 ft
Froude Number	1.661
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	49.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.0 in
Critical Depth	7.8 in
Channel Slope	0.010 ft/ft
Critical Slope	0.004 ft/ft

PR #14

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	18.0 in
Discharge	7.00 cfs

Results	
Normal Depth	10.7 in
Flow Area	1.1 ft^2
Wetted Perimeter	2.6 ft
Hydraulic Radius	5.0 in
Top Width	1.47 ft
Critical Depth	12.3 in
Percent Full	59.7 %
Critical Slope	0.007 ft/ft
Velocity	6.36 ft/s
Velocity Head	0.63 ft
Specific Energy	1.52 ft
Froude Number	1.297
Maximum Discharge	11.30 cfs
Discharge Full	10.50 cfs
Slope Full	0.004 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	59.7 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	10.7 in
Critical Depth	12.3 in
Channel Slope	0.010 ft/ft
Critical Slope	0.007 ft/ft

PR #15

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	2.00 cfs

Results	
Normal Depth	5.5 in
Flow Area	0.4 ft^2
Wetted Perimeter	1.5 ft
Hydraulic Radius	2.8 in
Top Width	1.00 ft
Critical Depth	7.2 in
Percent Full	45.9 %
Critical Slope	0.004 ft/ft
Velocity	5.68 ft/s
Velocity Head	0.50 ft
Specific Energy	0.96 ft
Froude Number	1.686
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	45.9 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.5 in
Critical Depth	7.2 in
Channel Slope	0.010 ft/ft
Critical Slope	0.004 ft/ft

PR #16

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	18.0 in
Discharge	11.80 cfs

Results	
Normal Depth	5.3 in
Flow Area	0.4 ft²
Wetted Perimeter	1.7 ft
Hydraulic Radius	3.0 in
Top Width	1.37 ft
Critical Depth	6.4 in
Percent Full	29.6 %
Critical Slope	0.005 ft/ft
Velocity	4.58 ft/s
Velocity Head	0.33 ft
Specific Energy	0.77 ft
Froude Number	1.428
Maximum Discharge	11.30 cfs
Discharge Full	10.50 cfs
Slope Full	0.000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	29.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.3 in
Critical Depth	6.4 in
Channel Slope	0.010 ft/ft
Critical Slope	0.005 ft/ft

PR #17

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	30.0 in
Discharge	27.40 cfs

Results	
Normal Depth	17.9 in
Flow Area	3.1 ft^2
Wetted Perimeter	4.4 ft
Hydraulic Radius	8.3 in
Top Width	2.45 ft
Critical Depth	21.4 in
Percent Full	59.8 %
Critical Slope	0.006 ft/ft
Velocity	8.95 ft/s
Velocity Head	1.24 ft
Specific Energy	2.74 ft
Froude Number	1.412
Maximum Discharge	44.12 cfs
Discharge Full	41.01 cfs
Slope Full	0.004 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	59.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	17.9 in
Critical Depth	21.4 in
Channel Slope	0.010 ft/ft
Critical Slope	0.006 ft/ft

PR #18

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	24.0 in
Discharge	17.50 cfs

Results	
Normal Depth	15.9 in
Flow Area	2.2 ft²
Wetted Perimeter	3.8 ft
Hydraulic Radius	7.0 in
Top Width	1.89 ft
Critical Depth	18.1 in
Percent Full	66.1 %
Critical Slope	0.007 ft/ft
Velocity	7.95 ft/s
Velocity Head	0.98 ft
Specific Energy	2.30 ft
Froude Number	1.300
Maximum Discharge	24.33 cfs
Discharge Full	22.62 cfs
Slope Full	0.006 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	66.1 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	15.9 in
Critical Depth	18.1 in
Channel Slope	0.010 ft/ft
Critical Slope	0.007 ft/ft

PR #19

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	36.0 in
Discharge	42.50 cfs

Results	
Normal Depth	20.9 in
Flow Area	4.3 ft²
Wetted Perimeter	5.2 ft
Hydraulic Radius	9.8 in
Top Width	2.96 ft
Critical Depth	25.5 in
Percent Full	58.0 %
Critical Slope	0.006 ft/ft
Velocity	10.00 ft/s
Velocity Head	1.55 ft
Specific Energy	3.29 ft
Froude Number	1.471
Maximum Discharge	71.74 cfs
Discharge Full	66.69 cfs
Slope Full	0.004 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	58.0 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	20.9 in
Critical Depth	25.5 in
Channel Slope	0.010 ft/ft
Critical Slope	0.006 ft/ft

PR #20

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	2.80 cfs

Results	
Normal Depth	6.7 in
Flow Area	0.5 ft^2
Wetted Perimeter	1.7 ft
Hydraulic Radius	3.2 in
Top Width	0.99 ft
Critical Depth	8.6 in
Percent Full	56.1 %
Critical Slope	0.005 ft/ft
Velocity	6.17 ft/s
Velocity Head	0.59 ft
Specific Energy	1.15 ft
Froude Number	1.610
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.004 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	56.1 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.7 in
Critical Depth	8.6 in
Channel Slope	0.010 ft/ft
Critical Slope	0.005 ft/ft

PR #21

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.010 ft/ft
Diameter	12.0 in
Discharge	4.30 cfs

Results	
Normal Depth	9.1 in
Flow Area	0.6 ft²
Wetted Perimeter	2.1 ft
Hydraulic Radius	3.6 in
Top Width	0.85 ft
Critical Depth	10.5 in
Percent Full	76.2 %
Critical Slope	0.008 ft/ft
Velocity	6.70 ft/s
Velocity Head	0.70 ft
Specific Energy	1.46 ft
Froude Number	1.360
Maximum Discharge	4.98 cfs
Discharge Full	4.63 cfs
Slope Full	0.009 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	76.2 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.1 in
Critical Depth	10.5 in
Channel Slope	0.010 ft/ft
Critical Slope	0.008 ft/ft

PR #22

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	18.0 in
Discharge	7.20 cfs

Results	
Normal Depth	10.9 in
Flow Area	1.1 ft²
Wetted Perimeter	2.7 ft
Hydraulic Radius	5.0 in
Top Width	1.46 ft
Critical Depth	12.5 in
Percent Full	60.8 %
Critical Slope	0.007 ft/ft
Velocity	6.40 ft/s
Velocity Head	0.64 ft
Specific Energy	1.55 ft
Froude Number	1.288
Maximum Discharge	11.30 cfs
Discharge Full	10.50 cfs
Slope Full	0.005 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	60.8 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	10.9 in
Critical Depth	12.5 in
Channel Slope	0.010 ft/ft
Critical Slope	0.007 ft/ft

PR #23

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.040 ft/ft
Diameter	36.0 in
Discharge	48.20 cfs

Results	
Normal Depth	15.0 in
Flow Area	2.8 ft^2
Wetted Perimeter	4.2 ft
Hydraulic Radius	7.9 in
Top Width	2.96 ft
Critical Depth	27.1 in
Percent Full	41.6 %
Critical Slope	0.006 ft/ft
Velocity	17.35 ft/s
Velocity Head	4.68 ft
Specific Energy	5.92 ft
Froude Number	3.155
Maximum Discharge	143.49 cfs
Discharge Full	133.39 cfs
Slope Full	0.005 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	41.6 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	15.0 in
Critical Depth	27.1 in
Channel Slope	0.040 ft/ft
Critical Slope	0.006 ft/ft

PR #24

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	48.0 in
Discharge	104.80 cfs

Results	
Normal Depth	30.4 in
Flow Area	8.4 ft²
Wetted Perimeter	7.4 ft
Hydraulic Radius	13.7 in
Top Width	3.85 ft
Critical Depth	37.2 in
Percent Full	63.4 %
Critical Slope	0.006 ft/ft
Velocity	12.47 ft/s
Velocity Head	2.42 ft
Specific Energy	4.95 ft
Froude Number	1.490
Maximum Discharge	154.51 cfs
Discharge Full	143.64 cfs
Slope Full	0.005 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	63.4 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	30.4 in
Critical Depth	37.2 in
Channel Slope	0.010 ft/ft
Critical Slope	0.006 ft/ft

MDDP MAPS

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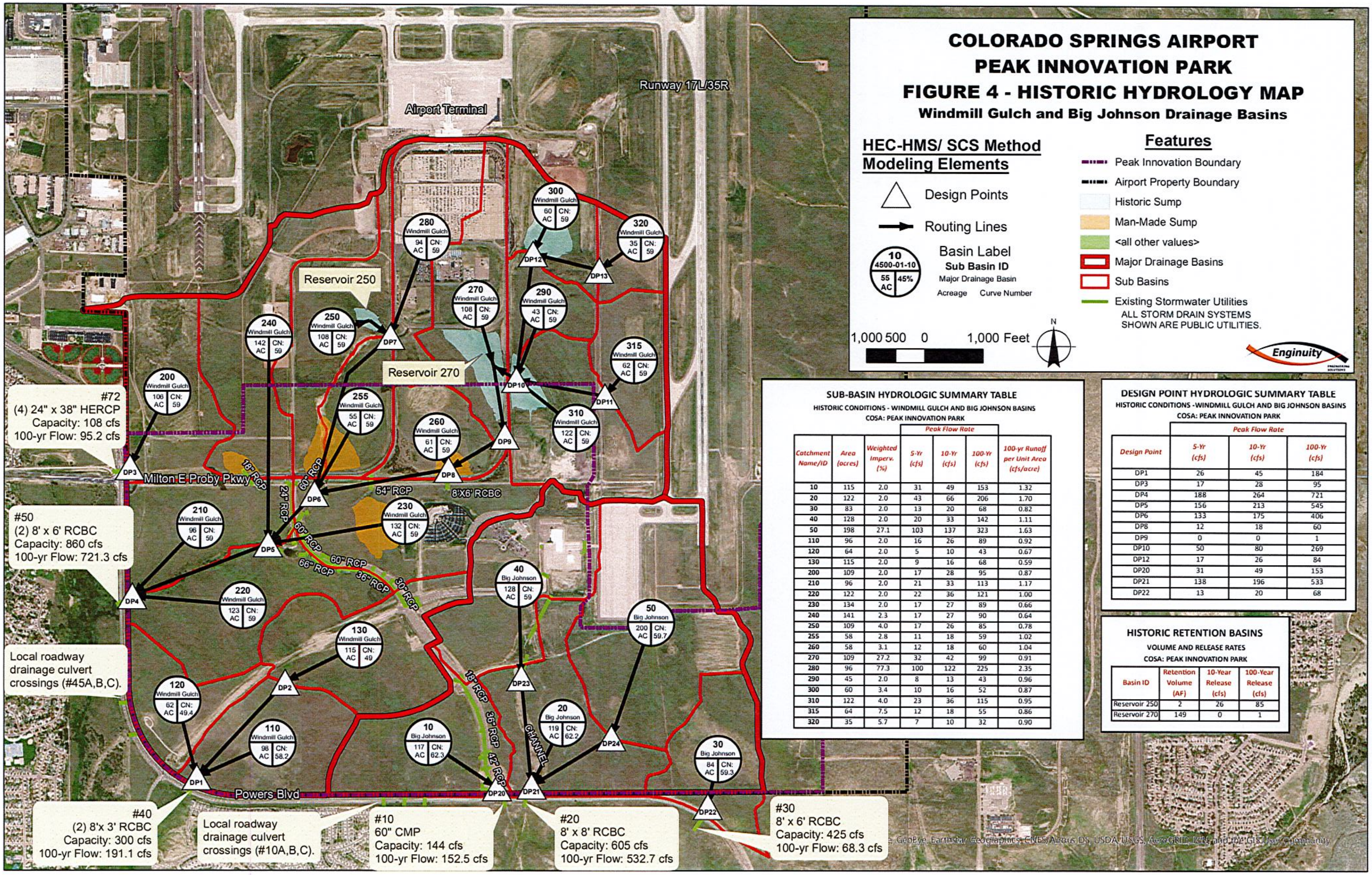
COLORADO SPRINGS AIRPORT
PEAK INNOVATION PARK
FIGURE 4 - HISTORIC HYDROLOGY MAP
Windmill Gulch and Big Johnson Drainage Basins



SUB-BASIN HYDROLOGIC SUMMARY TABLE
HISTORIC CONDITIONS - WINDMILL GULCH AND BIG JOHNSON BASINS
COSA: PEAK INNOVATION PARK

Catchment Name/ID	Area (acres)	Weighted Imperv. (%)	Peak Flow Rate 5-Yr (cfs)	Peak Flow Rate 10-Yr (cfs)	Peak Flow Rate 100-Yr (cfs)	100-yr Runoff per Unit Area (cfs/acre)
10	115	2.0	31	49	153	1.32
20	122	2.0	43	66	206	1.70
30	83	2.0	13	20	68	0.82
40	128	2.0	20	33	142	1.11
50	198	27.1	103	137	323	1.63
110	96	2.0	16	26	89	0.92
120	64	2.0	5	10	43	0.67
130	115	2.0	9	16	68	0.59
200	109	2.0	17	28	95	0.87
210	96	2.0	21	33	113	1.17
220	122	2.0	22	36	121	1.00
230	134	2.0	17	27	89	0.66
240	141	2.3	17	27	90	0.64
250	109	4.0	17	26	85	0.78
255	58	2.8	11	18	59	1.02
260	58	3.1	12	18	60	1.04
270	109	27.2	32	42	99	0.91
280	96	77.3	100	122	225	2.35
290	45	2.0	8	13	43	0.96
300	60	3.4	10	16	52	0.87
310	122	4.0	23	36	115	0.95
315	64	7.5	12	18	55	0.86
320	35	5.7	7	10	32	0.90

DESIGN POINT HYDROLOGIC SUMMARY TABLE
HISTORIC CONDITIONS -WINDMILL GULCH AND BIG JOHNSON BASINS
COSA: PEAK INNOVATION PARK

Design Point	Peak Flow Rate 5-Yr (cfs)	Peak Flow Rate 10-Yr (cfs)	Peak Flow Rate 100-Yr (cfs)
DP1	26	45	184
DP3	17	28	95
DP4	188	264	721
DP5	156	213	545
DP6	133	175	406
DP8	12	18	60
DP9	0	0	1
DP10	50	80	269
DP12	17	26	84
DP20	31	49	153
DP21	138	196	533
DP22	13	20	68

HISTORIC RETENTION BASINS
VOLUME AND RELEASE RATES
COSA: PEAK INNOVATION PARK

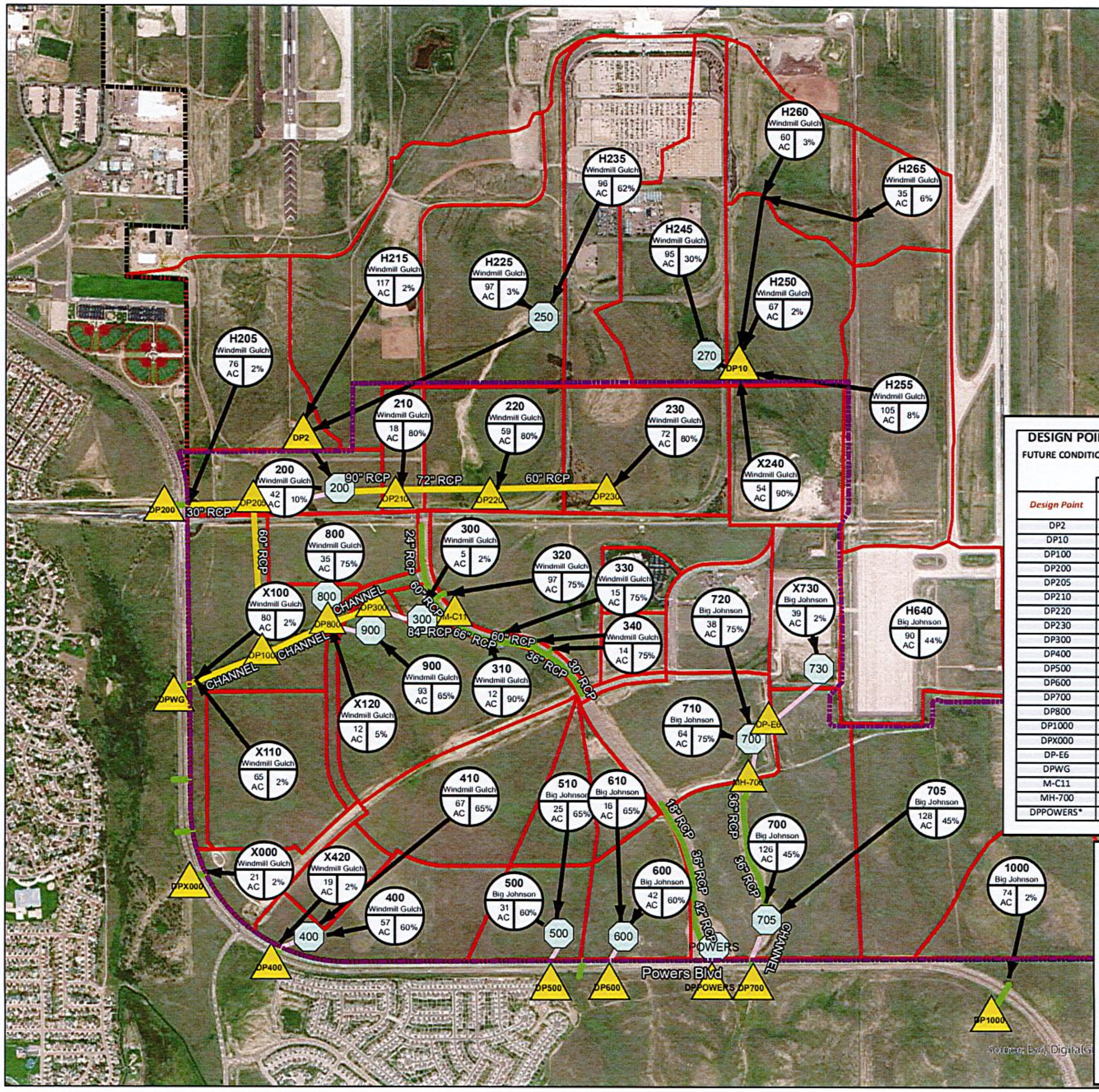
Basin ID	Retention Volume (AF)	10-Year Release (cfs)	100-Year Release (cfs)
Reservoir 250	2	26	85
Reservoir 270	149	0	1

GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

COSA - PEAK INNOVATION PARK

FIGURE 5 - FUTURE CONDITIONS HYDROLOGY MAP

Windmill Gulch and Big Johnson Drainage Basins



SWMM Modeling Elements

- Design Points
- Reservoirs
- Outlets
- Routing Lines

STORM DRAIN CONDUITS

- EX
- PROP

Features

Basin Label: 10 (Sub Basin ID), 4500-01-10 (Major Drainage Basin), 55 AC (Acreage), 45% (Percent Imperviousness)

- Peak Innovation Boundary
- Airport Property Boundary
- Sub Basins

ALL STORM DRAIN SYSTEMS SHOWN ARE PUBLIC UTILITIES.

ALL REGIONAL DETENTION FACILITIES ARE PRIVATE.

1,000 500 0 1,000 Feet

Enginuity Engineering Solutions

DESIGN POINT HYDROLOGIC SUMMARY TABLE

FUTURE CONDITIONS - WINDMILL GULCH AND BIG JOHNSON BASINS

COSA: PEAK INNOVATION PARK

Design Point	Peak Flow Rate 5-Yr (cfs)	10-Yr (cfs)	100-Yr (cfs)
DP2	117	158	388
DP10	106	144	291
DP100	104	128	241
DP200	29	44	101
DP205	53	61	89
DP210	199	243	453
DP220	186	228	422
DP230	107	131	244
DP300	32	46	110
DP400	48	56	86
DP500	13	17	30
DP600	6	18	49
DP700	117	146	470
DP800	72	91	189
DP1000	17	28	88
DPX000	6	12	38
DP-E6	91	107	178
DPWG	119	146	337
M-C11	143	175	332
MH-700	49	53	66
DPPOWERS*	-	37.9	76.2

*Report Data - See Appendix

100-YEAR REGIONAL DETENTION

VOLUME AND RELEASE RATES

COSA: PEAK INNOVATION PARK

Pond	Detention Volume (AF)	100-Year Release (cfs)
200	80.4	89
300	24.4	110
400	15.8	77
500	9.2	30
600	9.8	49
700	26.6	66
705	23.3	470
730	13.3	51
800	5.4	22
900	12.5	52
POWERS*	7.13	76.2

*Report Data - See Appendix

SUB-BASIN HYDROLOGIC SUMMARY TABLE

FUTURE CONDITIONS - WINDMILL GULCH AND BIG JOHNSON BASINS

COSA: PEAK INNOVATION PARK

Catchment Name/ID	Area (acres)	Weighted Imperv. (%)	Peak Flow Rate 5-Yr (cfs)	10-Yr (cfs)	100-Yr (cfs)	100-Yr Runoff per Unit Area (cfs/acre)
X000	19	2	6	10	31	1.62
X100	70	2	16	26	87	1.24
X110	64	2	10	16	52	0.81
X120	13	2	1	2	10	0.74
X240	51	2	9	14	48	2.33
X420	19	2	8	11	33	1.70
X730	38	2	16	25	79	2.04
200	51	10	24	36	99	1.94
210	19	80	44	54	100	5.21
220	58	80	80	97	180	3.13
230	70	80	107	131	244	3.46
300	6	2	4	6	17	2.61
310	19	90	31	37	68	3.52
320	96	75	98	121	227	2.37
330	13	75	14	17	33	2.56
340	13	75	27	33	63	4.91
400	58	60	53	66	128	2.23
410	64	65	61	76	147	2.30
500	32	60	51	64	126	3.93
510	26	65	31	39	76	2.96
600	38	60	58	73	147	3.84
610	19	65	23	28	56	2.91
700	128	45	166	213	448	3.50
705	128	43	159	205	440	3.43
710	64	75	87	106	200	3.13
720	38	75	57	70	131	3.41
800	38	75	81	100	189	4.92
900	90	65	113	140	274	3.05
1000	58	2	17	28	88	1.52
H205	77	2	11	17	57	0.75
H215	115	2	13	21	71	0.62
H225	96	3	16	25	83	0.86
H235	96	63	87	109	215	2.23
H245	96	30	38	51	119	1.23
H250	70	2	11	17	57	0.80
H255	102	8	17	25	74	0.72
H260	60	3	10	16	52	0.87
H265	35	6	7	10	32	0.89
H640	90	44	109	141	301	3.36

EXISTING CONDITIONS
DRAINAGE MAPS

CLASSIC
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CLASSIC
CONSULTING ENGINEERS & SURVEYORS

619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

PEAK TECHNOLOGY CAMPUS

EXITING CONDITIONS

DESIGNED BY	KC	SCALE		DATE	12/16/20
DRAWN BY	KC	(H) 1"= 80'		SHEET	1 OF 1
CHECKED BY	KRC	(V) 1"= N/A		JOB NO.	2221.20

PROPOSED CONDITIONS

DRAINAGE MAP

CLASSIC
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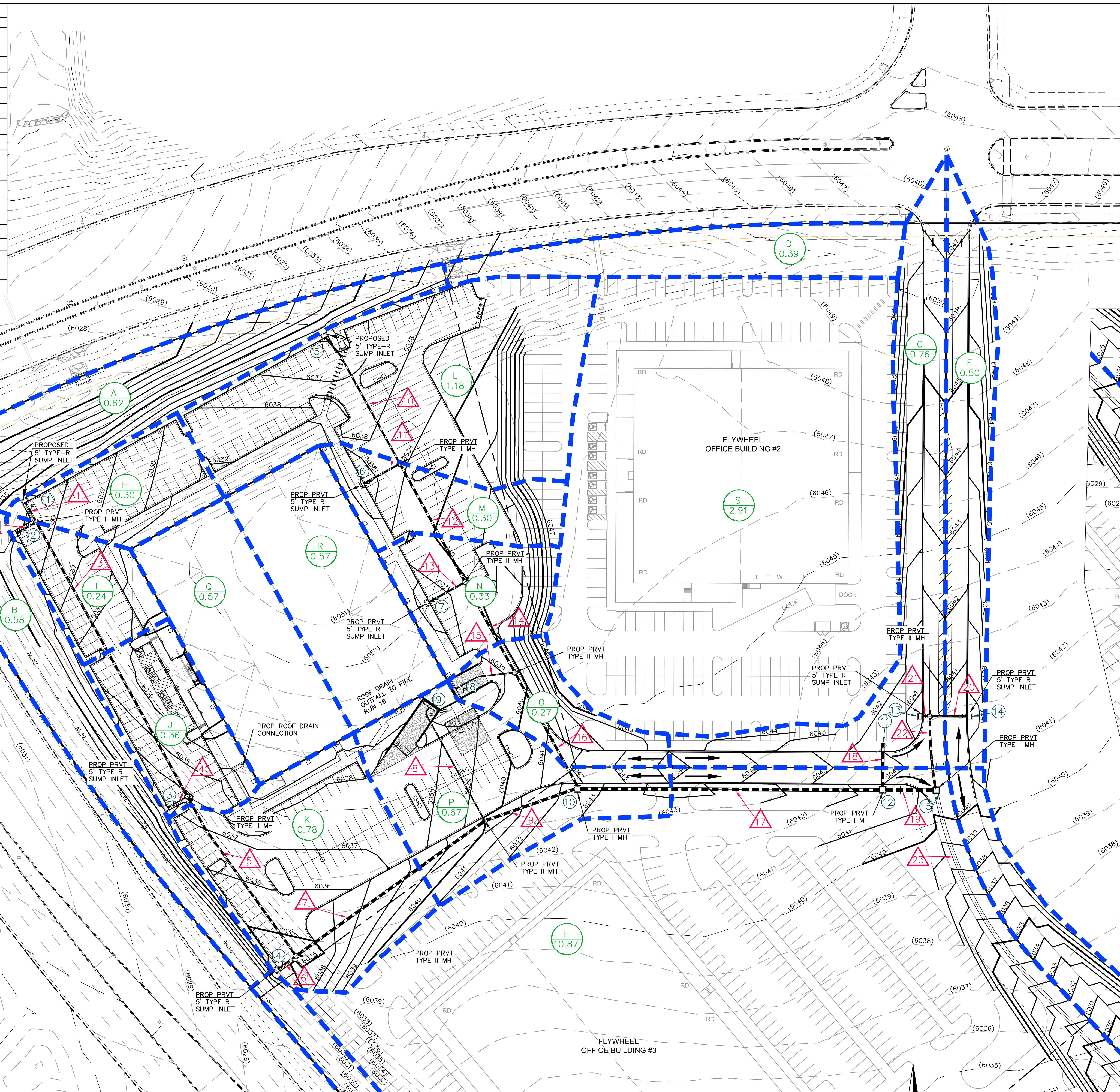
ENGINEERS & SURVEYORS

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Inlet Size
1	H	0.22	0.25	6.5	4.78	8.02	1.1	2.0	5' Priv Type R Sump Inlet
2	I	0.18	0.20	6.5	4.78	8.02	0.8	1.6	5' Priv Type R Sump Inlet
3	J	0.27	0.30	6.0	4.90	8.23	1.3	2.5	5' Priv Type R Sump Inlet
4	K	0.57	0.65	6.7	4.73	7.94	2.7	5.2	5' Priv Type R Sump Inlet
5	L	0.87	0.99	13.3	3.70	6.21	3.2	6.1	5' Priv Type R Sump Inlet
6	M	0.22	0.25	5.7	4.97	8.35	1.1	2.1	5' Priv Type R Sump Inlet
7	N	0.24	0.27	5.7	4.97	8.35	1.2	2.3	5' Priv Type R Sump Inlet
8	O	0.20	0.23	5.0	5.17	8.68	1.0	2.0	Priv CDOT Type C Grated Sump Inlet
9	P	0.50	0.56	5.0	5.17	8.68	2.6	4.9	Priv CDOT Type C Grated Sump Inlet
10	H, I, J, K, L, M, N, O, P	3.27	3.70	13.3	3.70	6.21	12.1	23.0	Priv Type 1 MH
11	S	2.14	2.43	9.0	4.29	7.20	9.1	17.5	Priv Storm Stub
12	DP 10 and 11	5.41	6.13	13.3	3.70	6.21	20.0	38.1	Priv Type 1 MH
13	G	0.44	0.55	6.7	4.73	7.94	2.1	4.3	5' Priv Type R Sump Inlet
14	F	0.29	0.36	6.7	4.73	7.94	1.4	2.8	5' Priv Type R Sump Inlet
15	DP 12, 13 and 14	6.14	7.04	13.3	3.70	6.21	22.7	43.7	Priv Type 1 MH
16	DP 15 and E	14.14	16.15	13.3	3.70	6.21	52.3	100.4	Priv Type 1 MH

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED CA(5)	WEIGHTED CA(100)	OVERLAND C(5)	OVERLAND Length (ft)	OVERLAND Height (ft)	OVERLAND Tc (min)	STREET / CHANNEL FLOW Length (ft)	STREET / CHANNEL FLOW Slope (%)	STREET / CHANNEL FLOW Velocity (fps)	STREET / CHANNEL FLOW Tc (min)	Tc TOTAL (min)	INTENSITY I(5) (in/hr)	INTENSITY I(100) (in/hr)	TOTAL FLOWS Q(5) (cfs)	TOTAL FLOWS Q(100) (cfs)
A	0.05	0.22	0.08	60	8	6.1	0	0.0%	0.0	0.0	6.1	4.88	8.19	**0.2**	**1.8**
B	0.05	0.20	0.08	60	6	6.7	0	0.0%	0.0	0.0	6.7	4.74	7.95	**0.2**	**1.6**
C	0.11	0.49	0.08	20	4	3.1	0	0.0%	0.0	0.0	5.0	5.17	8.68	**0.6**	**4.2**
D	0.03	0.14	0.08	50	2	8.2	0	0.0%	0.0	0.0	8.2	4.42	7.42	**0.1**	**1.0**
E	8.00	9.11	0.08	0	0	0.0	0	0.0%	0.0	0.0	5.0	5.17	8.68	**41.4**	**79.1**
F	0.29	0.36	0.08	10	0.2	4.6	300	1.5%	2.4	2.0	6.7	4.74	7.95	**1.4**	**2.8**
G	0.44	0.55	0.08	10	0.2	4.6	300	1.5%	2.4	2.0	6.7	4.74	7.95	**2.1**	**4.3**
H	0.22	0.25	0.08	15	0.3	5.7	160	2.5%	3.2	0.8	6.5	4.77	8.01	**1.1**	**2.0**
I	0.18	0.20	0.08	15	0.3	5.7	150	2.5%	3.2	0.8	6.5	4.78	8.03	**0.8**	**1.6**
J	0.27	0.30	0.08	15	0.3	5.7	70	4.0%	4.0	0.3	6.0	4.90	8.23	**1.3**	**2.5**
K	0.57	0.65	0.08	15	0.3	5.7	200	2.5%	3.2	1.1	6.7	4.72	7.93	**2.7**	**5.2**
L	0.87	0.99	0.08	90	2.25	12.9	80	3.0%	3.5	0.4	13.3	3.70	6.21	**3.2**	**6.1**
M	0.22	0.25	0.08	15	0.3	5.7	0	0.0%	0.0	0.0	5.7	4.98	8.36	**1.1**	**2.1**
N	0.24	0.27	0.08	15	0.3	5.7	0	0.0%	0.0	0.0	5.7	4.98	8.36	**1.2**	**2.3**
O	0.20	0.23	0.08	0	0	0.0	200	2.5%	3.2	1.1	5.0	5.17	8.68	**1.0**	**2.0**
P	0.50	0.56	0.08	0	0	0.0	250	3.0%	3.5	0.0	5.0	5.17	8.68	**2.6**	**4.9**
Q	0.51	0.55	0.08	0	0	0.0	0	0.0%	0.0	0.0	5.0	5.17	8.68	**2.7**	**4.7**
R	0.51	0.55	0.08	0	0	0.0	0	0.0%	0.0	0.0	5.0	5.17	8.68	**2.7**	**4.7**
S	2.14	2.43	0.08	30	0.6	8.0	150	1.5%	2.4	1.0	9.0	4.28	7.19	**9.1**	**17.5**
T	0.49	0.67	0.08	10	0.2	4.6	300	2.5%	3.2	1.6	6.2	4.84	8.13	**2.4**	**5.5**



FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Pipe Size*
1	H	0.22	0.25	6.5	4.78	8.02	1.1	2.0	Priv. 12"
2	I	0.18	0.20	6.5	4.78	8.02	0.8	1.6	Priv. 12"
3	PR 1 and 2	0.40	0.45	6.5	4.78	8.02	1.9	3.6	Priv. 18"
4	J	0.27	0.30	6.0	4.90	8.22	1.3	2.5	Priv. 12"
5	PR 3 and 4 and Basin Q	1.18	1.30	6.5	4.78	8.02	5.6	10.4	Priv. 24"
6	K	0.57	0.65	6.7	4.73	7.94	2.7	5.2	Priv. 18"
7	PR 5 and 6	1.75	1.95	6.7	4.73	7.94	8.3	15.5	Priv. 24"
8	P	0.50	0.56	5.0	5.17	8.68	2.6	4.9	Priv. 12"
9	PR 7 and 8	2.25	2.51	6.7	4.73	7.94	10.6	19.9	Priv. 24"
10	L	0.87	0.99	13.3	3.70	6.21	3.2	6.2	Priv. 18"
11	M	0.22	0.25	5.7	4.97	8.35	1.1	2.1	Priv. 12"
12	PR 10 and 11	1.09	1.24	13.3	3.70	6.21	4.0	7.7	Priv. 18"
13	N	0.24	0.27	5.7	4.97	8.35	1.2	2.3	Priv. 12"
14	PR 12 and 13	1.33	1.12	13.3	3.70	6.21	4.9	7.0	Priv. 18"
15	O	0.20	0.23	5.0	5.17	8.68	1.0	2.0	Priv. 12"
16	PR 14 and 15 and Basin R	2.04	1.90	13.3	3.70	6.21	7.6	11.8	Priv. 18"
17	PR 9 and 16	4.29	4.41	13.3	3.70	6.21	15.9	27.4	Priv. 30"
18	S	2.14	2.43	9.0	4.29	7.20	9.2	17.5	Priv. 24"
19	PR 17 and 18	4.43	6.84	13.3	3.70	6.21	16.4	42.5	Priv. 36"
20	F	0.29	0.36	6.7	4.73	7.94	1.4	2.8	Priv. 12"
21	G	0.44	0.55	6.7	4.73	7.94	2.1	4.3	Priv. 12"
22	PR 20 and 21	0.73	0.91	6.7	4.73	7.94	3.5	7.2	Priv. 18"
23	PR 19 and 22	5.16	7.75	13.3	3.70	6.21	19.1	48.2	Priv. 36"
24	PR 23 and E	13.16	16.86	13.3	3.70	6.21	48.7	104.8	Priv. 48"

LEGEND

EXISTING GROUND CONTOUR — 5910
PROPOSED FINISHED CONTOUR — 5910
SUBDIVISION BOUNDARY
LOT LINE
PROPOSED BASIN BOUNDARY
DIRECTION OF DRAINAGE
EXISTING STORM SEWER
EXISTING STORM INLET
PROPOSED STORM SEWER
PROPOSED STORM INLET
LOW POINT/HIGH POINT — LP/HP
BASIN IDENTIFIER / AREA IN ACRES — D / 1.41
PIPE RUN
DESIGN POINT

NOTE:
EACH LOADING DOCK AREA TO INCLUDE A PROPOSED PRIVATE 3'x3' CDOT TYPE C GRATED INLET (OR EQUIVALENT)

N

50 25 0 50 100

SCALE: 1" = 50'

CLASSIC CONSULTING ENGINEERS & SURVEYORS

619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785–0790
(719)785–0799 (Fax)

PEAK TECHNOLOGY CAMPUS
DEVELOPMENT PLAN
DEVELOPED CONDITIONS EXHIBIT

DESIGNED BY	KC	SCALE	DATE	12/02/20
DRAWN BY	KC	(H) 1"= 50'	SHEET	1 OF 1
CHECKED BY	KRC	(V) 1"= N/A	JOB NO.	2221.20

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