FINAL DRAINAGE REPORT

FOR

REUNION RIDGE FILING NO. 2
CITY OF COMMERCE CITY, COLORADO
CASE NO. D-515-21

Prepared for:

Clayton Properties Group II, Inc.
Dba Oakwood Homes
4908 Tower Road
Denver, CO 80249
Contact: Jim Hayes
Phone: 303-486-8644

Prepared by:

CORE Consultants, Inc.
3473 South Broadway
Englewood, CO 80113
Contact: Kevin Rohrbough, PE
Phone: 303-703-4444
CORE Project Number: 18-004

October 15, 2021

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Engineer's Statement:

I hereby certify that this final study for Reunion Ridge Filing No. 2, was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Commerce City Storm Drainage Design and Technical Criteria Manual for the owners thereof. I understand that the City of Commerce City does not and will not assume liability for drainage facilities designed by others.

_____

Kevin Rohrbough, P.E.
Registered Professional Engineer
State of Colorado No. 48992

I. GENERAL LOCATION AND DESCRIPTION

A. Location

Reunion Ridge Filing No. 2 is located in the NW 1/4 of Section 13, Township 2 South, Range 67 West of the Sixth Principal Meridian, City of Commerce, County of Adams, State of Colorado. The project is a separate filing within the Reunion Ridge Village 9 overall development. The site is approximately 0.2 miles south of the intersection of 104th Avenue and Revere Street. The Site is bounded by Reunion Ridge Way to the north and agricultural land to the east, west, and south. Reunion Ridge Filing No. 3, currently in the design phase by the same developer, is located adjacent to Filing No. 2 to the east. Future Turnberry South Residential development (by others) is located adjacent to Filing No. 2 to the west. A vicinity map is included in Appendix A.

The site is located within the DFA-0053 Major Drainage Basin that is tributary to the South Platte River. Existing Detention and Water Quality Pond T (Pond T), previously constructed with Phase 1 of the Reunion Village 9 overall development, is adjacent to the site at the northwest corner, and will receive developed flows from the site.

B. Description of Property

The site is approximately +/-17 acres, with slopes ranging from two to nine percent, and is currently in use as agricultural land.

According to information from the United States Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS), soils on-site are Ascalon-Vona sandy loam and Platner loam. These soils are further classified as belonging to Hydrologic Soil Groups (HSG) B and C, respectfully. Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately course textures. Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately coarse textures. Soils maps are included in Appendix A.

The site lies within Zone X (areas determined to be outside the 0.2% annual chance floodplain) on Flood Insurance Rate Map (FIRM) 08001C0339H, revised March 5, 2007, published by the Federal Emergency Management Agency (FEMA). There are no major drainageways within the site. A floodplain map is included in Appendix A.

Existing ground cover consists of 100 percent tillage. Vegetation in the developed condition will include open space planted with native seed mix, short lawns, and ornamental trees and bushes wherever buildings and hardscape are not proposed.

Proposed site improvements include 147 detached residential units with associated roadway and utility infrastructure.

This report includes discussion and calculations for the drainage facilities proposed with both Filing No. 2 and Filing No. 3. Both filings are also shown on the Drainage Maps as well. This is because both fillings have the same Owner, have been designed together, and will be constructed at approximately the same time. The

facilities associated with Filing No. 3 have been labeled as such throughout the report and Drainage Maps.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Basin Description

The site is located within the southernmost portion the DFA-0053 Major Drainage Basin, a tributary of the South Platte River, draining from southeast to northwest. The DFA-0053 watershed is bounded by the First Creek Major Basin to the south and west and the Second Creek Major Basin to the north and east.

There are no regulatory floodplains within the site. There are no nearby irrigation facilities, to our knowledge, that will influence or be influenced by the local drainage.

B. Sub-Basin Description

Existing runoff from the upstream off-site areas to the south and east surface drains toward the site; however, these flows are directed away from the Filings No. 2 and No. 3 sites by existing swales. A swale exists on the adjacent property to the south along the fence line that directs off-site flows to the west. An existing swale running adjacent to the Vaughn Way right-of-way captures flows from the east and conveys them to Existing Detention and Water Quality Pond T, to the west of the site. Existing hydrologic calculations are included in Appendix A and an Existing Drainage Map is included in the Back Pocket of this report.

Existing sub-basin descriptions:

EX-1
Consists of undeveloped area. Runoff flows overland to the north into an existing swale adjacent to Reunion Ridge Way. The swale conveys flows to the northwest, and discharges into the adjacent Pond T (DP EX1).

EX-2
Consists of roadway area and undeveloped area. Runoff flows overland to the southwest, off-site (DP EX2).

OS-1
Consists of off-site undeveloped area. Runoff flows overland to the northeast into an existing swale adjacent to Reunion Ridge Way. The swale conveys flows northwest, through the site, and discharges into the adjacent Pond T (DP EX1).

Developed runoff from the site will surface drain to proposed storm infrastructure and will discharge into Pond T. Proposed hydrologic calculations are included in Appendix A and a Proposed Drainage Map is included in the Back Pocket of this report.

Proposed sub-basin descriptions:

A-1 (area = 0.66 ac; 5-year runoff = 1.20 cfs; 100-year runoff = 3.60 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP A1. The proposed storm sewer conveys flows to the north and discharges into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the curb to the north, into Pond T.

A-2 (area = 1.08 ac; 5-year runoff = 1.41 cfs; 100-year runoff = 5.19 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP A2. The proposed storm sewer conveys flows to the north and discharges into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the road crown to the west, to the proposed inlet at DP A1.

A-3 (area = 2.49 ac; 5-year runoff = 2.67 cfs; 100-year runoff = 9.63 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP A3. The proposed storm sewer conveys flows to the north and discharges into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will be conveyed by the curb and gutter to the north, into Scranton Street, to the proposed inlet at DP A1.

A-4 (area = 1.00 ac; 5-year runoff = 0.99 cfs; 100-year runoff = 3.69 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP A4. The proposed storm sewer conveys flows to the north and discharges into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the road crown to the north, to the proposed inlet at DP A3.

A-5 (area = 1.28 ac; 5-year runoff = 1.18 cfs; 100-year runoff = 4.45 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP A5. The proposed storm sewer conveys flows to the north and discharges into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP A4.

A-5.1 (area = 2.53 ac; 5-year runoff = 3.43 cfs; 100-year runoff = 10.72 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP A5.1. The proposed storm sewer conveys flows to the north and discharges into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP A2.

A-6 (area = 1.75 ac; 5-year runoff = 3.23 cfs; 100-year runoff = 9.50 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP A6. The proposed storm sewer conveys flows to the north and discharges into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP A5.

A-7 (area = 0.26 ac; 5-year runoff = 0.69 cfs; 100-year runoff = 1.82 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP A7. The proposed storm sewer conveys flows to the north and discharges into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP A5.1.

A-8 (area = 0.19 ac; 5-year runoff = 0.61 cfs; 100-year runoff = 1.45 cfs)
Consists of lot area and roadway area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP A8. The proposed storm sewer conveys flows to the north and discharges into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP A7.

A-9 (area = 1.66 ac; 5-year runoff = 2.21 cfs; 100-year runoff = 7.35 cfs)
Consists of lot area and roadway area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP A9. The proposed storm sewer conveys flows to the north and discharges into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the road crown to the north, to the proposed inlet at DP A8.

A-10 (area = 1.47 ac; 5-year runoff = 0.83 cfs; 100-year runoff = 4.29 cfs)
Consists of lot area and landscape area. Runoff flows overland into two proposed swales and is conveyed to a proposed Type C sump inlet at DP A10. The proposed storm sewer conveys flows to the north and discharges into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the swale to the south, and flow off-site into the existing swale adjacent to the southern property line.

B-1 (area = 0.15 ac; 5-year runoff = 0.49 cfs; 100-year runoff = 1.16 cfs)
Consists of roadway area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP B1. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP B0), that ultimately releases into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the curb to the north, into Pond T.

B-2 (area = 0.98 ac; 5-year runoff = 1.30 cfs; 100-year runoff = 4.69 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP B2. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP B0), that ultimately releases into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the road crown to the west, to the proposed inlet at DP B1.

C-1 (area = 1.31 ac; 5-year runoff = 2.11 cfs; 100-year runoff = 6.79 cfs)
Consists of lot area and roadway area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP C1. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP C0), that ultimately releases into

Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will be conveyed by the curb and gutter to the north, into Reunion Ridge Way, to the proposed inlet at DP B2.

C-2 (area = 1.98 ac; 5-year runoff = 2.18 cfs; 100-year runoff = 7.34 cfs)
Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP C2. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP C0), that ultimately releases into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the road crown to the west, to the proposed inlet at DP C1.

D-1(area = 3.60 ac; 5-year runoff = 3.34 cfs; 100-year runoff = 11.06 cfs)
Is proposed with Filing No. 3. Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP D1. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP D0), that ultimately releases into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will be conveyed by the curb and gutter to the north, into Reunion Ridge Way, to the proposed inlet at DP C2.

D-2 (area = 1.17 ac; 5-year runoff = 2.14 cfs; 100-year runoff = 6.36 cfs)
Is proposed with Filing No. 3. Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R sump inlet at DP D2. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP D0), that ultimately releases into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the road crown to the west, to the proposed inlet at DP D1.

D-3 (area = 1.66 ac; 5-year runoff = 0.70 cfs; 100-year runoff = 3.59 cfs)
Is proposed with Filing No. 3. Consists of lot area and landscape area. Runoff flows overland into a proposed swale, and conveyed to a proposed Type C sump inlet at DP D3. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP D0), that ultimately releases into Pond T. In the case of inlet clogging, emergency overflow from the sump inlet will overtop the swale to the west, to the proposed inlet at DP D2.

D-4 (area = 0.63 ac; 5-year runoff = 1.49 cfs; 100-year runoff = 3.98 cfs)
Is proposed with Filing No. 3. Consists of lot area and roadway area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP D4. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge Way (DP D0), that ultimately releases into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP D1.

D-5 (area = 1.50 ac; 5-year runoff = 2.32 cfs; 100-year runoff = 7.52 cfs)
Is proposed with Filing No. 3. Consists of lot area, roadway area, and landscape area. Runoff flows overland into the proposed roadway, where it is conveyed to a proposed Type R on-grade inlet at DP D5. The proposed storm sewer conveys flows to the north, and will connect to the existing storm sewer system in Reunion Ridge

Way (DP D0), that ultimately releases into Pond T. Any flows bypassing the on-grade inlet will be conveyed north via curb and gutter to the proposed inlet at DP D2.

E-1 (area = 0.37 ac; 5-year runoff = 0.18 cfs; 100-year runoff = 0.98 cfs)
Consists of lot area and landscape area. Runoff flows overland to the south, off-site (DP E1).

E-2 (area = 0.49 ac; 5-year runoff = 0.39 cfs; 100-year runoff = 1.87 cfs)
Consists of lot area and landscape area. Runoff flows overland to the west, off-site (DP E2).

E-3 (area = 0.15 ac; 5-year runoff = 0.04 cfs; 100-year runoff = 0.61 cfs)
Consists of lot area and landscape area. Runoff flows overland to the west, off-site (DP E3).

E-4 (area = 0.38 ac; 5-year runoff = 0.42 cfs; 100-year runoff = 1.80 cfs)
Consists of lot area and landscape area. Runoff flows overland to the north, off-site, and into Pond T (DP E4).

OS-1 (area = 36.77 ac; 5-year runoff = 2.76 cfs; 100-year runoff = 42.46 cfs)
Consists of off-site undeveloped area. Runoff flows overland to the northeast into an existing swale adjacent to Reunion Ridge Way. The swale conveys flows northwest to the Type C inlet proposed with Filing No. 3 at DP D3. The storm sewer proposed with Filing No. 3 will connect to the existing storm sewer system in Reunion Ridge Way, that ultimately releases into Pond T.

III. DRAINAGE DESIGN CRITERIA

A. Regulations

This Drainage Addendum is in accordance with the guidelines set forth by the Commerce City Drainage Manual and the Mile High Flood District (MHFD) Urban Storm Drainage Criteria Manual (USDCM. These manuals were used as a basis of design for the site.

B. Development Criteria Reference and Constraints

This report conforms to the *Preliminary Drainage Report for Reunion Village 9* (Master Report), dated May 20, 2020, by JR Engineering, that details the drainage plan for the overall Reunion Village 9 development. Excerpts from the Master Report are included in Appendix C.

The Master Report designates this Filing No. 2 site and the adjacent Filing No. 3 site as included in sub-basin 9A1 of the overall Reunion Village 9 draining to Existing Detention and Water Quality Pond T. The design for Pond T accounts for sub-basin 9A1 at an imperviousness of 56.3 percent. The combined imperviousness for the proposed Filings No. 2 and No. 3 is approximately 53.7 percent; therefore, the site is in conformance with the Master Report and will not adversely impact the downstream infrastructure.

Site constraints that impact the drainage design of the site are the off-site flows entering the site from the south and the existing topography that includes rolling terrain, and the connection points to the existing storm infrastructure.

C. Hydrological Criteria

On-site hydrologic calculations were performed using a proprietary rational method workbook, developed by CORE in Microsoft Excel, to estimate peak overland runoff flows resulting from the minor (5-year) and major (100-year) storm events. The workbook utilizes rainfall data provided the Master Report. Hydrologic calculations are included in Appendix A

D. Hydraulic Criteria

Streets within the proposed development have been classified as local roads and include mountable type curb. This traffic classification corresponds to drainage classification Type A, per the City Criteria. Street and Inlet capacities were determined using the MHFD workbook, UD-Inlet_v4.060xlsm, with values based on the Type A drainage classification and mountable curb type. Hydraulic analysis and stormwater routing of the proposed storm sewer was completed using StormCAD v10.03.01.08 software by Bentley, with junction losses modeled per Table 2 of the supplemental MHFD publication, *Modeling Hydraulic and Energy Gradients in Storm Sewers*, dated October 6, 2009 by AMEC. Hydraulic calculations are included in Appendix B.

IV. DRAINAGE FACILITY DESIGN

A. General Concept

Runoff from the proposed residential development generally surface drains into the proposed Type A roadway mountable curb and gutter. These flows are captured by proposed storm sewer inlets and conveyed northwest to Existing Detention and Water Quality Pond T, adjacent to the site, or conveyed to the existing storm sewer in Reunion Ridge Way prior to discharging into Pond T.

B. Specific Details

The proposed storm sewer system will connect to the existing storm infrastructure of the overall Reunion Village 9 development in two places to the north. The proposed storm sewer serving majority of the site will connect to an existing RCP stub that discharges directly into the existing pond. The proposed storm sewer that serves the remaining eastern portion of the site will connect to an existing stub that connects to the existing storm infrastructure in the Reunion Ridge Way right-of-way prior to discharging into the existing pond. Coordination with other firms will be necessary to ensure these connections are made. The existing and proposed storm sewer infrastructure will be owned and maintained by the Reunion Metropolitan District.

V. CONCLUSIONS

A. Compliance with Standards

This report and associated calculations comply with the City of Commerce City "Storm Drainage Design and Technical Criteria Manual," the Mile High Flood District's "Urban Storm Drainage Criteria Manual," and the "Preliminary Drainage Report for Reunion Village 9" by JR Engineering.

B. Drainage Concept

The drainage plan for the overall Reunion Village 9 development is set forth by the Master Report, which designates the maximum allowable imperviousness for this Filing No. 2 site. Developed runoff from the site will be captured by the proposed storm sewer system that will connect to existing storm sewer infrastructure and be conveyed to Existing Detention and Water Quality Pond T, per the Master Report. The imperviousness of the site is less than the maximum allowable; therefore, flows will not adversely impact the downstream infrastructure.

VI. REFERENCES

A. City of Commerce City Storm Drainage Design and Technical Criteria Manual, 2021.

B. Mile High Flood District Urban Storm Drainage Criteria Manual, October 2019.

C. Modeling Hydraulic and Energy Gradients in Storm Sewers; AMEC Earth & Environmental, Inc., October 6, 2009.

D. Web Soil Survey, Soil Survey Staff (Natural Resources Conservation Service), United States Department of Agriculture. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed November 20, 2020.

E. Flood Insurance Rate Map (FIRM) No. 08001C0339H, Federal Emergency Management Agency, Revised March 16, 2016. Available online at the following link: https://msc.fema.gov/portal/home. Accessed November 20, 2020.

F. Preliminary Drainage Report for Reunion Village 9; JR Engineering, May 20, 2020

G. Final Drainage Report for Reunion Ridge Filing No. 3; CORE, June 11, 2021

Computer Modeling Programs:

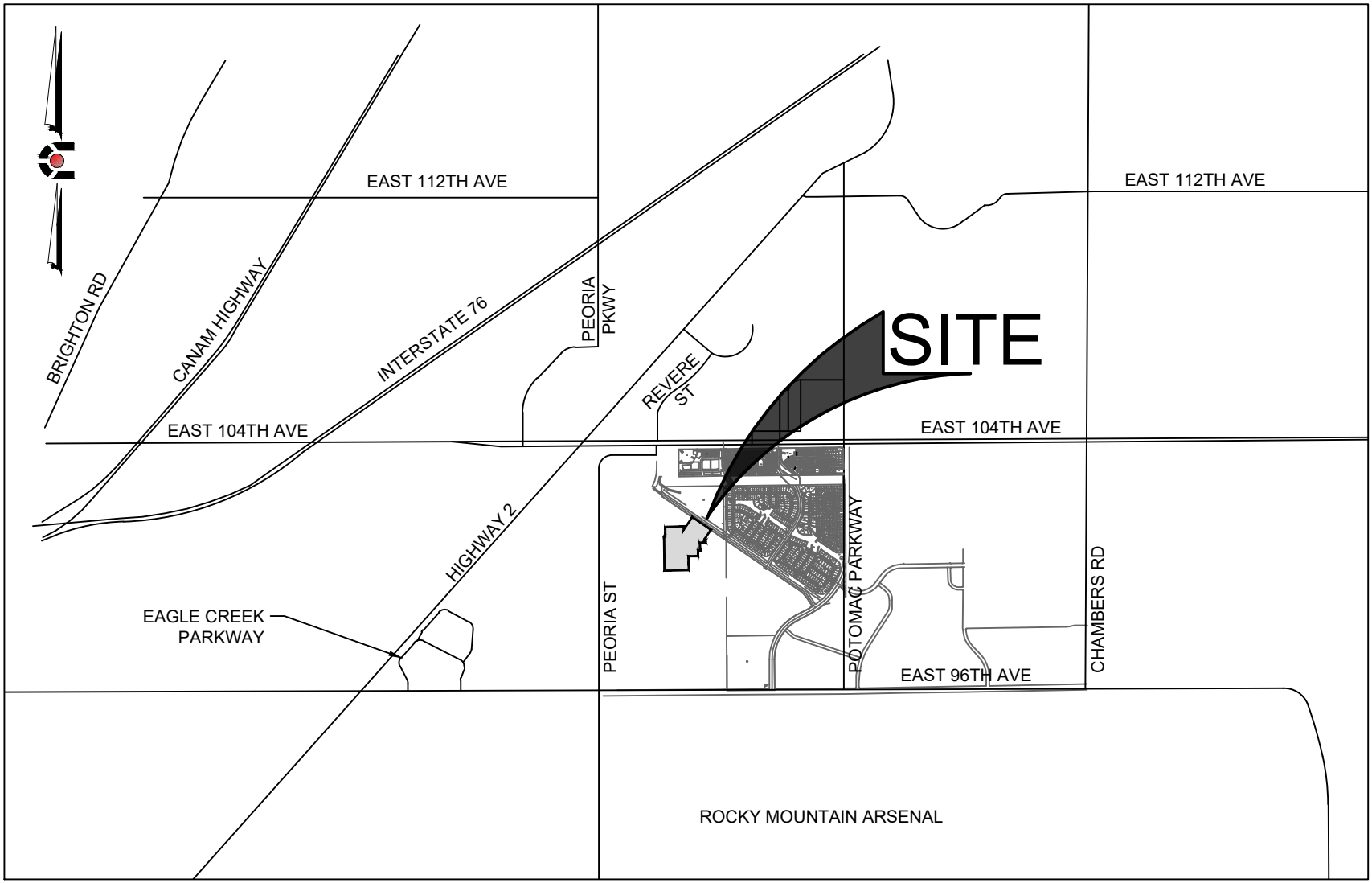
A. StormCAD by Bentley Systems, Inc., Version 10.03.01.08.

B. Hydraflow Express Extension for Autodesk Civil 3D by Autodesk, Version 2018.

C. Detention Basin Design Workbook (MHFD-Detention v4.03.xlsm) by Mile High Flood District, Version 4.03, May 2020.

APPENDIX A

HYDROLOGIC COMPUTATIONS



VICINITY MAP

SCALE: 1" = 1000'

Soil Map—Adams County Area, Parts of Adams and Denver Counties, Colorado

Map Scale: 1:3,130 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

Hydrologic Soil Group—Adams County Area, Parts of Adams and Denver Counties, Colorado

Map Scale: 1:3,130 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Adams County Area, Parts of Adams and Denver Counties, Colorado
Survey Area Data: Version 17, Jun 4, 2020

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

Date(s) aerial images were photographed: Oct 3, 2018—Dec 4, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AsC	Ascalon sandy loam, 3 to 5 percent slopes	B	0.6	1.7%
AvC	Ascalon-Vona sandy loams, 1 to 5 percent slopes	B	20.2	58.6%
PlB	Platner loam, 0 to 3 percent slopes	C	13.7	39.7%
Totals for Area of Interest			**34.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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

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The soil surveys that comprise your AOI were mapped at 1:20,000.

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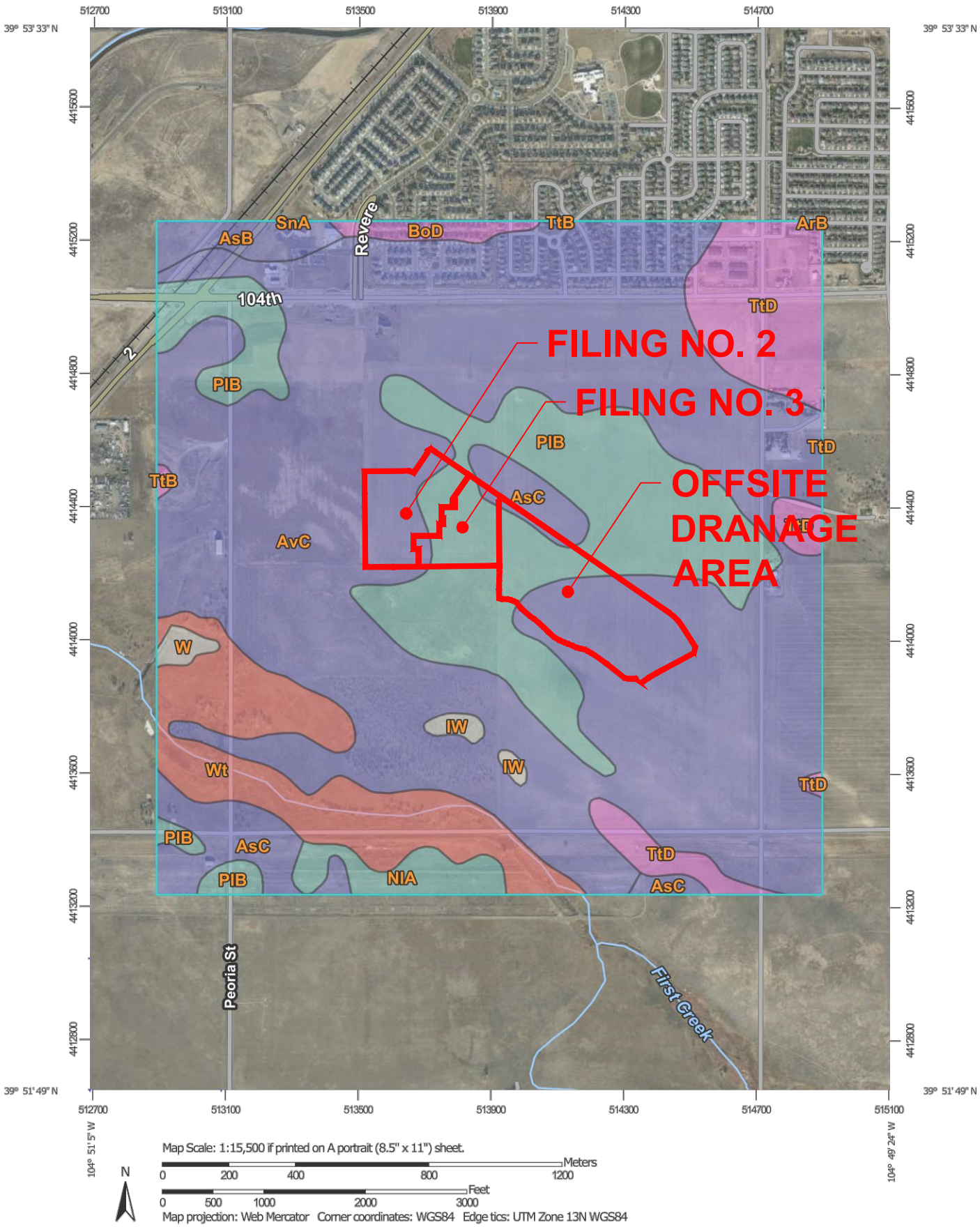
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AsC	Ascalon sandy loam, 3 to 5 percent slopes	0.6	1.7%
AvC	Ascalon-Vona sandy loams, 1 to 5 percent slopes	20.2	58.6%
PlB	Platner loam, 0 to 3 percent slopes	13.7	39.7%
Totals for Area of Interest		**34.4**	**100.0%**

Hydrologic Soil Group—Adams County Area, Parts of Adams and Denver Counties, Colorado



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

Soil Survey Area: Adams County Area, Parts of Adams and Denver Counties, Colorado
Survey Area Data: Version 17, Jun 4, 2020

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

Date(s) aerial images were photographed: Oct 3, 2018—Dec 4, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ArB	Ascalon loamy sand, 0 to 3 percent slopes	B	0.1	0.0%
AsB	Ascalon sandy loam, 0 to 3 percent slopes	B	14.2	1.4%
AsC	Ascalon sandy loam, 3 to 5 percent slopes	B	40.6	4.0%
AvC	Ascalon-Vona sandy loams, 1 to 5 percent slopes	B	599.4	59.5%
BoD	Blakeland loamy sand, 3 to 9 percent slopes	A	7.6	0.8%
IW	Intermittent water		4.1	0.4%
NlA	Nunn loam, 0 to 1 percent slopes	C	16.5	1.6%
PlB	Platner loam, 0 to 3 percent slopes	C	174.0	17.3%
SnA	Satanta loam, 0 to 1 percent slopes	C	0.1	0.0%
TtB	Truckton loamy sand, 0 to 3 percent slopes	A	1.2	0.1%
TtD	Truckton loamy sand, 3 to 9 percent slopes	A	63.3	6.3%
W	Water		3.6	0.4%
Wt	Wet alluvial land	D	81.6	8.1%
Totals for Area of Interest			**1,006.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC- 3, #9202
1315 East- West Highway
Silver Spring, MD 20910- 3282

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

Base map information shown on this FIRM was provided by the Adams County and Commerce City GIS departments. The coordinate system used for the production of the digital FIRM is Universe Transverse Mercator, Zone 13N, referenced to North American Datum of 1983 and the GRS 80 spheroid, Western Hemisphere.

This map reflects more detailed and up- to- date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the *Flood Insurance Study report* (which contains authoritative *hydraulic data*) may reflect stream channel distances that differ from what is shown on this map.

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

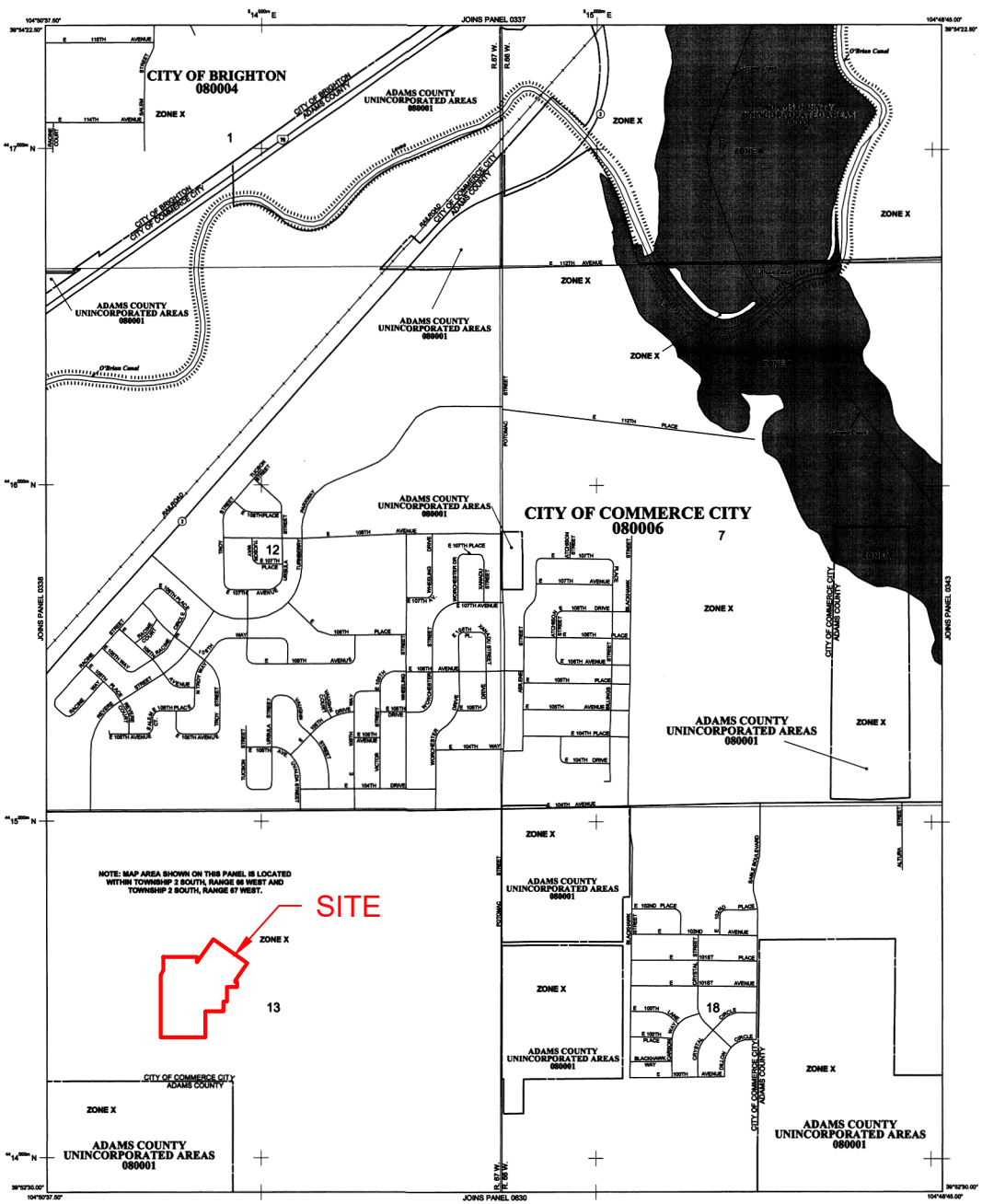
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which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

Contact the **FEMA Map Service Center** at 1- 800- 358- 9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1- 800- 358- 9620 and its website at http://www.msc.fema.gov/.

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

This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the State of Colorado Water Conservation Board, the Urban Drainage and Flood Control District, and the Federal Emergency Management Agency (FEMA). The State of Colorado Water Conservation Board and the Urban Drainage and Flood Control District have implemented a long-term approach of floodplain management to reduce the costs associated with flooding. As part of this effort, both the State of Colorado and the Urban Drainage and Flood Control District have joined in Cooperating Technical Partner agreements with FEMA to produce this digital FIRM.

Additional flood hazard information and resources are available from local communities, the Colorado Water Conservation Board, and the Urban Drainage and Flood Control District.



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 M — 5000-foot grid ticks: Alabama State Plane coordinate system, east zone (FIPSZONE 0101), Transverse Mercator
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 16, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 5, 2007 - to update map format.

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET
100 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0339H

FIRM

FLOOD INSURANCE RATE MAP

ADAMS COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 339 OF 1150
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ADAMS COUNTY	080001	0339	H
BRIGHTON, CITY OF	080004	0339	H
COMMERCE CITY, CITY OF	080006	0339	H

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

MAP NUMBER
08001C0339H

MAP REVISED
MARCH 5, 2007

Federal Emergency Management Agency

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Existing

CORE Project #: 18-004

Prepared By: DJB

COMPOSITE BASIN - PERCENT IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-3

		Residential							Lawns					Soil Type		
		Single Family			Other				Clay Soil							
		American Dream	Carriage Home 6 Pack	Home	N/A	Concrete/ Roof	Pavement	Gravel	2-7% Slope	>7% Slope	Historic			Soil Type A Area	Soil Type B Area	Soil Type C Area
% Imperv.		60.00%	45.00%	40.00%	45.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%					
BASIN	Design	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Total	Percent	Area	Area	Area
EX-1	EX1	-	-	-	-	-	0.93	-	-	-	27.06	27.98	5.2%	-	13.22	14.77
EX-2	EX2	-	-	-	-	-	-	-	-	-	0.76	0.76	2.0%	-	0.76	-
TOTAL EX		-	-	-	-	-	-	-	-	-	27.82	28.74	1.9%	-	-	-
OS-1	O1	-	-	-	-	-	2.32	-	-	-	34.46	36.77	8.2%	-	25.37	11.40

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Existing

CORE Project #: 18-004

Prepared By: DJB

TIME OF CONCENTRATION CALCULATIONS

-REFERENCE UDFCD Vol.1 Section 2.4 *NRCS Conveyance factors, K -REFERENCE UDFCD Vol.1 RUNOFF Table 6-2*

SF-2

Heavy Meadow	2.50	ort Grass Pasture & Lawns	7.00	Grassed Waterway	15.00
Tillage/field	5.00	Nearly Bare Ground	10.00	Paved Area & Shallow Gutter	20.00

SUB-BASIN DATA			INITIAL / OVERLAND TIME			CHANNEL / TRAVEL TIME T(t)						T(c) CHECK (URBANIZED BASINS)		FINAL T(c)
DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	% IMPER-VIOUS	USDCM Eq . 6-5	min.
EX-1	27.98	0.06	300	1.5	28.5	1063	0.8	7.0	0.6	29.2	57.7	5.2%	46.1	46.1
EX-2	0.76	0.01	166	2.4	18.9						18.9	2.0%		18.9
OS-1	36.77	0.07	300	2.5	23.8	2225	0.8	7.0	0.6	59.7	83.5	8.2%	65.8	65.8

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Existing

CORE Project #: 18-004

Prepared By: DJB

COMPOSITE DEVELOPED BASIN WEIGHTED "C" CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-4

i = % imperviousness/100 expressed as a decimal

C_A = Runoff coefficient for NRCS HSG A soils

C_B = Runoff coefficient for NRCS HSG B soils

C_{CD} = Runoff coefficient for NRCS HSG C and D soils.

Natural Resource Conservation Service (NRCS)

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	$C_A = 0.84i^{1.302}$	$C_A = 0.86i^{1.276}$	$C_A = 0.87i^{1.232}$	$C_A = 0.84i^{1.124}$	$C_A = 0.85i+0.025$	$C_A = 0.78i+0.110$	$C_A = 0.65i+0.254$
B	$C_B = 0.84i^{1.169}$	$C_B = 0.86i^{1.088}$	$C_B = 0.81i+0.057$	$C_B = 0.63i+0.249$	$C_B = 0.56i+0.328$	$C_B = 0.47i+0.426$	$C_B = 0.37i+0.536$
C/D	$C_{C/D} = 0.83i^{1.122}$	$C_{C/D} = 0.82i+0.035$	$C_{C/D} = 0.74i+0.132$	$C_{C/D} = 0.56i+0.319$	$C_{C/D} = 0.49i+0.393$	$C_{C/D} = 0.41i+0.484$	$C_{C/D} = 0.32i+0.588$

Total Weighted Runoff Coefficients, C			
2-Year	5-Year	10-Year	100-Year
0.04	0.06	0.14	0.48

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
EX-1	5.2%	0.05	A	0.02	0.02	0.02	0.15						
			B	0.03	0.03	0.10	0.45	13.22	27.98	0.03	0.06	0.14	0.48
			C or D	0.03	0.08	0.17	0.51	14.77					
EX-2	2.0%	0.02	A	0.01	0.01	0.01	0.13						
			B	0.01	0.01	0.07	0.44	0.76	0.76	0.01	0.01	0.07	0.44
			C or D	0.01	0.05	0.15	0.49						
OS-1	8.2%	0.08	A	0.03	0.04	0.04	0.17						
			B	0.04	0.06	0.12	0.46	25.37	36.77	0.05	0.07	0.14	0.48
			C or D	0.05	0.10	0.19	0.52	11.40					

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Existing

CORE Project #: 18-004

Prepared By: DJB

RATIONAL METHOD PEAK RUNOFF

5-Year STORM Rainfall Depth-Duration-Frequency (1-hr) = **1.12**

SF-3

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF			
DESIGN POINT	DRAIN BASIN	AREA ac.	5yr Runoff COEFF	T(c) min	C x A	I in/hr	Q cfs
EX1	EX-1	27.98	0.06	46.1	1.61	1.35	2.17
EX2	EX-2	0.76	0.01	18.9	0.01	2.27	0.02
O1	OS-1	36.77	0.07	65.8	2.59	1.06	2.76

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Existing

CORE Project #: 18-004

Prepared By: DJB

RATIONAL METHOD PEAK RUNOFF

100-YR STORM

SF-3 Rainfall Depth-Duration-Frequency (1-hr) = **2.53**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF			
DESIGN POINT	DRAIN BASIN	AREA ac.	100YR RUNNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs
EX1	EX-1	27.983	0.480	46.089	13.420	3.043	40.84
EX2	EX-2	0.76	0.44	18.93	0.332	5.121	1.70
O1	OS-1	36.77	0.48	65.83	17.683	2.401	42.46

RUNOFF SUMMARY TABLE - EXISTING				
DIRECT RUNOFF				
DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
EX1	EX-1	27.98	2.17	40.84
EX2	EX-2	0.76	0.02	1.70
O1	OS-1	36.77	2.76	42.46

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Proposed

CORE Project #: 18-004

Prepared By: DJB

COMPOSITE BASIN - PERCENT IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-3

		Residential							Lawns					Soil Type		
		Single Family			Other				Clay Soil							
		American Dream	Carriage Home 6 Pack	Home	Portch Light	Concrete/ Roof	Pavement	Gravel	2-7% Slope	>7% Slope	Historic			Soil Type A Area	Soil Type B Area	Soil Type C Area
% Imperv.		60.00%	45.00%	40.00%	40.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%					
BASIN	**Design**	**Area**	**Area**	**Area**	**Area**	**Area**	**Area**	**Area**	**Area**	**Area**	**Area**	**Total**	**Percent**	**Area**	**Area**	**Area**
A-1	A1	0.53	-	-	-	-	0.12	-	0.00	-	-	0.66	67.6%	-	0.66	-
A-2	A2	-	-	-	0.91	-	0.16	-	0.01	-	-	1.08	48.3%	-	0.65	0.43
A-3	A3	0.56	-	1.02	-	-	0.53	-	0.38	-	-	2.49	51.5%	-	2.49	-
A-4	A4	-	-	-	-	-	0.49	-	0.52	-	-	1.00	49.4%	-	1.00	-
A-5	A5	0.75	-	-	-	-	0.17	-	0.37	-	-	1.28	48.6%	-	1.28	-
A-5.1	A5.1	1.23	-	-	0.79	-	0.52	-	0.00	-	-	2.53	61.9%	-	1.27	1.27
A-6	A6	1.38	-	-	-	-	0.37	-	-	-	-	1.75	68.4%	-	1.05	0.70
A-7	A7	0.12	-	-	-	-	0.14	-	-	-	-	0.26	80.9%	-	-	0.26
A-8	A8	0.01	-	-	-	-	0.18	-	-	-	-	0.19	98.5%	-	0.11	0.08
A-9	A9	-	-	1.18	-	-	0.48	-	0.00	-	-	1.66	57.3%	-	1.50	0.17
A-10	A10	-	-	1.06	-	-	-	-	0.41	-	-	1.47	29.3%	-	0.51	0.95
SUBTOTAL A		**4.58**	**-**	**3.25**	**1.70**	**-**	**3.15**	**-**	**1.70**	**-**	**-**	**14.37**	**55.0%**	**-**	**-**	**-**
B-1	B1	-	-	-	-	-	0.15	-	-	-	-	0.15	100.0%	-	0.15	-
B-2	B2	-	-	-	0.53	-	0.29	-	0.16	-	-	0.98	51.7%	-	0.93	0.05
SUBTOTAL B		**-**	**-**	**-**	**0.53**	**-**	**0.45**	**-**	**0.16**	**-**	**-**	**1.13**	**58.2%**	**-**	**1.13**	**-**
C-1	C1	-	-	-	0.94	-	0.37	-	-	-	-	1.31	57.1%	-	-	1.31
C-2	C2	-	-	1.25	-	-	0.54	-	0.18	-	-	1.98	53.1%	-	-	1.98
SUBTOTAL C		**-**	**-**	**1.25**	**0.94**	**-**	**0.92**	**-**	**0.18**	**-**	**-**	**3.29**	**54.7%**	**-**	**3.29**	**-**

		Residential							Lawns					Soil Type		
		Single Family			Other				Clay Soil							
		American Dream	Carriage Home 6 Pack	Home	Portch Light	Concrete/ Roof	Pavement	Gravel	2-7% Slope	>7% Slope	Historic			Soil Type A Area	Soil Type B Area	Soil Type C Area
% Imperv.		60.00%	45.00%	40.00%	40.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%					
BASIN	Design	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Total	Percent	Area	Area	Area
D-1	D1	1.12	0.69	0.72	-	-	0.69	-	0.38	-	-	3.60	54.6%	-	-	3.60
D-2	D2	-	-	0.49	-	-	0.57	-	0.11	-	-	1.17	65.7%	-	0.02	1.14
D-3	D3	-	1.03	-	-	-	-	-	0.63	-	-	1.66	28.8%	-	0.33	1.33
D-4	D4	0.33	-	-	-	-	0.31	-	-	-	-	0.63	79.4%	-	-	0.63
D-5	D5	-	0.66	0.45	-	-	0.37	-	0.02	-	-	1.50	56.4%	-	-	1.50
SUBTOTAL D		**1.44**	**2.39**	**1.66**	**-**	**-**	**1.93**	**-**	**1.14**	**-**	**-**	**8.56**	**53.3%**	**-**	**8.56**	**-**
E-1	E1	-	-	0.27	-	-	-	-	0.10	-	-	0.37	29.6%	-	0.37	-
E-2	E2	-	-	0.43	-	-	-	-	0.06	-	-	0.49	35.3%	-	0.49	-
E-3	E3	0.02	-	-	-	-	-	-	0.13	-	-	0.15	11.0%	-	0.15	-
E-4	E4	0.25	-	-	-	-	-	-	0.13	-	-	0.38	40.5%	-	0.38	-
SUBTOTAL E		**0.27**	**-**	**0.70**	**-**	**-**	**-**	**-**	**0.42**	**-**	**-**	**1.39**	**32.6%**	**-**	**-**	**-**
TOTAL SITE		**6.29**	**2.39**	**6.86**	**3.16**	**-**	**6.44**	**-**	**3.59**	**-**	**-**	**28.74**	**53.5%**	**-**	**-**	**-**
OS-1	O1	-	-	-	-	-	2.32	-	-	-	34.46	36.77	8.2%	-	25.37	11.40

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Proposed

CORE Project #: 18-004

Prepared By: DJB

TIME OF CONCENTRATION CALCULATIONS

-REFERENCE UDFCD Vol.1 Section 2.4 *NRCS Conveyance factors, K -REFERENCE UDFCD Vol.1 RUNOFF Table 6-2*

SF-2

Heavy Meadow	2.50	ıort Grass Pasture & Lawns	7.00	Grassed Waterway	15.00
Tillage/field	5.00	Nearly Bare Ground	10.00	Paved Area & Shallow Gutter	20.00

SUB-BASIN DATA			INITIAL / OVERLAND TIME			CHANNEL / TRAVEL TIME T(t)						T(c) CHECK (URBANIZED BASINS)		FINAL T(c)
DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	% IMPER-VIOUS	USDCM Eq . 6-5	min.
A-1	0.66	0.56	40	2.8	4.4	413	0.9	20.0	1.8	3.7	8.1	67.6%	18.6	8.1
A-2	1.08	0.41	70	3.4	7.0	195	1.0	20.0	2.0	1.6	8.6	48.3%	19.8	8.6
A-3	2.49	0.42	90	2.0	9.3	755	1.3	20.0	2.3	5.5	14.8	51.5%	24.0	14.8
A-4	1.00	0.40	275	2.3	15.9						15.9	49.4%		15.9
A-5	1.28	0.39	285	1.9	17.6						17.6	48.6%		17.6
A-5.1	2.53	0.53	65	1.0	8.4	711	0.9	20.0	1.9	6.2	14.6	61.9%	22.6	14.6
A-6	1.75	0.58	26	1.5	4.2	547	1.0	20.0	2.0	4.5	8.7	68.4%	19.3	8.7
A-7	0.26	0.70	25	1.9	3.0	190	0.9	20.0	1.9	1.6	4.6	80.9%	13.9	5.0
A-8	0.19	0.84	22	1.5	1.9	280	0.9	20.0	1.9	2.5	4.4	98.5%	11.4	5.0
A-9	1.66	0.47	80	2.0	8.1	450	0.9	20.0	1.9	4.0	12.0	57.3%	20.9	12.0
A-10	1.47	0.26	50	6.2	5.9	450	0.6	7.0	0.5	14.3	20.2	29.3%	28.7	20.2
B-1	0.15	0.86	20	1.8	1.6	141	1.6	20.0	2.5	0.9	2.5	100.0%	9.8	5.0
B-2	0.98	0.42	30	1.1	6.5	270	0.8	20.0	1.8	2.6	9.1	51.7%	20.3	9.1
C-1	1.31	0.50	30	1.5	5.2	480	1.3	20.0	2.2	3.6	8.7	57.1%	20.5	8.7
C-2	1.98	0.47	171	1.0	15.1	350	1.2	20.0	2.2	2.6	17.8	53.1%	20.2	17.8
D-1	3.60	0.48	245	0.9	18.1	650	0.5	20.0	1.4	7.7	25.7	54.6%	25.9	25.7
D-2	1.17	0.57	78	2.2	6.5	310	1.5	20.0	2.4	2.1	8.6	65.7%	17.2	8.6
D-3	1.66	0.26	126	3.5	11.2	744	0.5	7.0	0.5	25.0	36.2	28.8%	34.5	34.5
D-4	0.63	0.69	25	1.5	3.3	470	1.1	20.0	2.1	3.8	7.1	79.4%	16.3	7.1
D-5	1.50	0.50	25	1.5	4.8	540	0.9	20.0	1.9	4.7	9.4	56.4%	21.9	9.4
E-1	0.37	0.23	50	0.3	16.6	275	1.3	7.0	0.8	5.7	22.3	29.6%	24.0	22.3
E-2	0.49	0.28	121	2.8	11.6						11.6	35.3%		11.6
E-3	0.15	0.08	65	25.0	5.1						5.1	11.0%		5.1
E-4	0.38	0.32	70	4.6	7.1						7.1	40.5%		7.1
OS-1	36.77	0.07	300	2.5	23.8	2225	0.8	7.0	0.6	59.7	83.5	8.2%	65.8	65.8

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Proposed

CORE Project #: 18-004

Prepared By: DJB

COMPOSITE DEVELOPED BASIN WEIGHTED "C" CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-4

i = % imperviousness/100 expressed as a decimal

C_A = Runoff coefficient for NRCS HSG A soils

C_B = Runoff coefficient for NRCS HSG B soils

C_{CD} = Runoff coefficient for NRCS HSG C and D soils.

Natural Resource Conservation Service (NRCS)

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	$C_A = 0.84i^{1.302}$	$C_A = 0.86i^{1.276}$	$C_A = 0.87i^{1.232}$	$C_A = 0.84i^{1.124}$	$C_A = 0.85i+0.025$	$C_A = 0.78i+0.110$	$C_A = 0.65i+0.254$
B	$C_B = 0.84i^{1.169}$	$C_B = 0.86i^{1.088}$	$C_B = 0.81i+0.057$	$C_B = 0.63i+0.249$	$C_B = 0.56i+0.328$	$C_B = 0.47i+0.426$	$C_B = 0.37i+0.536$
C/D	$C_{C/D} = 0.83i^{1.122}$	$C_{C/D} = 0.82i+0.035$	$C_{C/D} = 0.74i+0.132$	$C_{C/D} = 0.56i+0.319$	$C_{C/D} = 0.49i+0.393$	$C_{C/D} = 0.41i+0.484$	$C_{C/D} = 0.32i+0.588$

Total Weighted Runoff Coefficients, C			
2-Year	**5-Year**	**10-Year**	**100-Year**
0.24	0.27	0.34	0.59

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
A-1	67.6%	0.68	A	0.50	0.52	0.54	0.64	0.66	0.66	0.53	0.56	0.60	0.74
			B	0.53	0.56	0.60	0.74						
			C or D	0.53	0.59	0.63	0.76						
A-2	48.3%	0.48	A	0.33	0.34	0.36	0.49	0.65	1.08	0.36	0.41	0.46	0.66
			B	0.36	0.39	0.45	0.65						
			C or D	0.37	0.43	0.49	0.68	0.43					
A-3	51.5%	0.52	A	0.35	0.37	0.38	0.51	2.49	2.49	0.39	0.42	0.47	0.67
			B	0.39	0.42	0.47	0.67						
			C or D	0.39	0.46	0.51	0.70						
A-4	49.4%	0.49	A	0.34	0.35	0.36	0.50	1.00	1.00	0.37	0.40	0.46	0.66
			B	0.37	0.40	0.46	0.66						
			C or D	0.38	0.44	0.50	0.69						
A-5	48.6%	0.49	A	0.33	0.34	0.36	0.49	1.28	1.28	0.36	0.39	0.45	0.65
			B	0.36	0.39	0.45	0.65						
			C or D	0.37	0.43	0.49	0.68						
A-5.1	61.9%	0.62	A	0.45	0.47	0.48	0.59	1.27	2.53	0.48	0.53	0.57	0.73
			B	0.48	0.51	0.56	0.72						
			C or D	0.48	0.54	0.59	0.74	1.27					
A-6	68.4%	0.68	A	0.51	0.53	0.54	0.64	1.05	1.75	0.54	0.58	0.62	0.75
			B	0.54	0.57	0.61	0.75						
			C or D	0.54	0.60	0.64	0.76	0.70					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
A-7	80.9%	0.81	A	0.64	0.66	0.67	0.74		0.26	0.65	0.70	0.73	0.82
			B	0.66	0.68	0.71	0.81						
			C or D	0.65	0.70	0.73	0.82	0.26					
A-8	98.5%	0.98	A	0.82	0.84	0.85	0.88		0.19	0.82	0.84	0.86	0.89
			B	0.83	0.85	0.85	0.89	0.11					
			C or D	0.82	0.84	0.86	0.89	0.08					
A-9	57.3%	0.57	A	0.41	0.42	0.44	0.56		1.66	0.44	0.47	0.52	0.70
			B	0.44	0.47	0.52	0.70	1.50					
			C or D	0.44	0.51	0.56	0.72	0.17					
A-10	29.3%	0.29	A	0.17	0.18	0.19	0.34		1.47	0.21	0.26	0.33	0.59
			B	0.20	0.23	0.29	0.56	0.51					
			C or D	0.21	0.28	0.35	0.60	0.95					
B-1	100.0%	1.00	A	0.84	0.86	0.87	0.89		0.15	0.84	0.86	0.87	0.90
			B	0.84	0.86	0.87	0.90	0.15					
			C or D	0.83	0.86	0.87	0.89						
B-2	51.7%	0.52	A	0.36	0.37	0.39	0.51		0.98	0.39	0.42	0.48	0.67
			B	0.39	0.42	0.48	0.67	0.93					
			C or D	0.40	0.46	0.51	0.70	0.05					
C-1	57.1%	0.57	A	0.40	0.42	0.44	0.56		1.31	0.44	0.50	0.55	0.72
			B	0.44	0.47	0.52	0.69						
			C or D	0.44	0.50	0.55	0.72	1.31					
C-2	53.1%	0.53	A	0.37	0.38	0.40	0.52		1.98	0.41	0.47	0.52	0.70
			B	0.40	0.43	0.49	0.68						
			C or D	0.41	0.47	0.52	0.70	1.98					
D-1	54.6%	0.55	A	0.38	0.40	0.41	0.54		3.60	0.42	0.48	0.54	0.71
			B	0.41	0.45	0.50	0.68						
			C or D	0.42	0.48	0.54	0.71	3.60					
D-2	65.7%	0.66	A	0.49	0.50	0.52	0.62		1.17	0.52	0.57	0.62	0.75
			B	0.51	0.54	0.59	0.73	0.02					
			C or D	0.52	0.57	0.62	0.75	1.14					
D-3	28.8%	0.29	A	0.17	0.18	0.19	0.33		1.66	0.20	0.26	0.33	0.59
			B	0.20	0.22	0.29	0.56	0.33					
			C or D	0.21	0.27	0.34	0.60	1.33					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
D-4	79.4%	0.79	A	0.62	0.64	0.65	0.73		0.63	0.64	0.69	0.72	0.81
			B	0.64	0.67	0.70	0.80						
			C or D	0.64	0.69	0.72	0.81	0.63					
D-5	56.4%	0.56	A	0.40	0.41	0.43	0.55		1.50	0.44	0.50	0.55	0.72
			B	0.43	0.46	0.51	0.69						
			C or D	0.44	0.50	0.55	0.72	1.50					
E-1	29.6%	0.30	A	0.17	0.18	0.19	0.34		0.37	0.20	0.23	0.30	0.56
			B	0.20	0.23	0.30	0.56	0.37					
			C or D	0.21	0.28	0.35	0.61						
E-2	35.3%	0.35	A	0.22	0.23	0.24	0.39		0.49	0.25	0.28	0.34	0.59
			B	0.25	0.28	0.34	0.59	0.49					
			C or D	0.26	0.32	0.39	0.63						
E-3	11.0%	0.11	A	0.05	0.05	0.06	0.20		0.15	0.06	0.08	0.15	0.48
			B	0.06	0.08	0.15	0.48	0.15					
			C or D	0.07	0.13	0.21	0.53						
E-4	40.5%	0.41	A	0.26	0.27	0.29	0.43		0.38	0.29	0.32	0.39	0.62
			B	0.29	0.32	0.39	0.62	0.38					
			C or D	0.30	0.37	0.43	0.65						
OS-1	8.2%	0.08	A	0.03	0.04	0.04	0.17		36.77	0.05	0.07	0.14	0.48
			B	0.04	0.06	0.12	0.46	25.37					
			C or D	0.05	0.10	0.19	0.52	11.40					

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Proposed

CORE Project #: 18-004

Prepared By: DJB

RATIONAL METHOD PEAK RUNOFF

5-Year STORM Rainfall Depth-Duration-Frequency (1-hr) = **1.12**

SF-3

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF			
DESIGN POINT	DRAIN BASIN	AREA ac.	5yr Runoff COEFF	T(c) min	C x A	I in/hr	Q cfs
A1	A-1	0.66	0.56	8.1	0.37	3.28	1.20
A2	A-2	1.08	0.41	8.6	0.44	3.21	1.41
A3	A-3	2.49	0.42	14.8	1.04	2.56	2.67
A4	A-4	1.00	0.40	15.9	0.40	2.47	0.99
A5	A-5	1.28	0.39	17.6	0.50	2.35	1.18
A5.1	A-5.1	2.53	0.53	14.6	1.33	2.58	3.43
A6	A-6	1.75	0.58	8.7	1.01	3.19	3.23
A7	A-7	0.26	0.70	5.0	0.18	3.80	0.69
A8	A-8	0.19	0.84	5.0	0.16	3.80	0.61
A9	A-9	1.66	0.47	12.0	0.79	2.81	2.21
A10	A-10	1.47	0.26	20.2	0.38	2.19	0.83
B1	B-1	0.15	0.86	5.0	0.13	3.80	0.49
B2	B-2	0.98	0.42	9.1	0.41	3.15	1.30
C1	C-1	1.31	0.50	8.7	0.66	3.19	2.11
C2	C-2	1.98	0.47	17.8	0.93	2.34	2.18
D1	D-1	3.60	0.48	25.7	1.74	1.92	3.34
D2	D-2	1.17	0.57	8.6	0.67	3.21	2.14
D3	D-3	1.66	0.26	34.5	0.43	1.62	0.70
D4	D-4	0.63	0.69	7.1	0.44	3.43	1.49
D5	D-5	1.50	0.50	9.4	0.75	3.10	2.32
E1	E-1	0.37	0.23	22.3	0.08	2.08	0.2
E2	E-2	0.49	0.28	11.6	0.14	2.85	0.4
E3	E-3	0.15	0.08	5.1	0.01	3.77	0.0
E4	E-4	0.38	0.32	7.1	0.12	3.43	0.4
O1	OS-1	36.77	0.07	65.8	2.59	1.06	2.8

Reunion Ridge Filing No. 2 - Hydrologic Calculations - Proposed

CORE Project #: 18-004

Prepared By: DJB

RATIONAL METHOD PEAK RUNOFF

100-YR STORM

SF-3 Rainfall Depth-Duration-Frequency (1-hr) = **2.53**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF			
DESIGN POINT	DRAIN BASIN	AREA ac.	100YR RUNNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs
A1	A-1	0.655	0.744	8.111	0.487	7.400	3.60
A2	A-2	1.08	0.66	8.60	0.717	7.247	5.19
A3	A-3	2.49	0.67	14.76	1.664	5.787	9.63
A4	A-4	1.00	0.66	15.94	0.661	5.579	3.69
A5	A-5	1.28	0.65	17.60	0.837	5.314	4.45
A5.1	A-5.1	2.53	0.73	14.60	1.842	5.817	10.72
A6	A-6	1.75	0.75	8.74	1.318	7.204	9.50
A7	A-7	0.26	0.82	5.00	0.212	8.581	1.82
A8	A-8	0.19	0.89	5.00	0.169	8.581	1.45
A9	A-9	1.66	0.70	12.03	1.159	6.343	7.35
A10	A-10	1.47	0.59	20.20	0.867	4.950	4.29
B1	B-1	0.15	0.90	5.00	0.135	8.581	1.16
B2	B-2	0.98	0.67	9.05	0.659	7.111	4.69
C1	C-1	1.31	0.72	8.74	0.943	7.203	6.79
C2	C-2	1.98	0.70	17.77	1.387	5.288	7.34
D1	D-1	3.60	0.71	25.72	2.55	4.34	11.06
D2	D-2	1.17	0.75	8.62	0.88	7.24	6.36
D3	D-3	1.66	0.59	34.52	0.98	3.65	3.59
D4	D-4	0.63	0.81	7.07	0.51	7.75	3.98
D5	D-5	1.50	0.72	9.43	1.07	7.00	7.52
E1	E-1	0.37	0.56	22.30	0.21	4.70	0.98
E2	E-2	0.49	0.59	11.64	0.29	6.43	1.87
E3	E-3	0.15	0.48	5.14	0.07	8.52	0.61
E4	E-4	0.38	0.62	7.10	0.23	7.74	1.80
O1	OS-1	36.77	0.48	65.83	17.68	2.40	42.46

RUNOFF SUMMARY TABLE - PROPOSED				
DIRECT RUNOFF				
DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
A1	A-1	0.66	1.20	3.60
A2	A-2	1.08	1.41	5.19
A3	A-3	2.49	2.67	9.63
A4	A-4	1.00	0.99	3.69
A5	A-5	1.28	1.18	4.45
A5.1	A-5.1	2.53	3.43	10.72
A6	A-6	1.75	3.23	9.50
A7	A-7	0.26	0.69	1.82
A8	A-8	0.19	0.61	1.45
A9	A-9	1.66	2.21	7.35
A10	A-10	1.47	0.83	4.29
B1	B-1	0.15	0.49	1.16
B2	B-2	0.98	1.30	4.69
C1	C-1	1.31	2.11	6.79
C2	C-2	1.98	2.18	7.34
D1	D-1	3.60	3.34	11.06
D2	D-2	1.17	2.14	6.36
D3	D-3	1.66	0.70	3.59
D4	D-4	0.63	1.49	3.98
D5	D-5	1.50	2.32	7.52
E1	E-1	0.37	0.18	0.98
E2	E-2	0.49	0.39	1.87
E3	E-3	0.15	0.04	0.61
E4	E-4	0.38	0.42	1.80
O1	OS-1	36.77	2.76	42.46

APPENDIX B

HYDRAULIC COMPUTATIONS

Version 4.06 Released August 2018

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet A1	Inlet A2	Inlet A3	Inlet A4	Inlet A5	Inlet A5.1
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.2	1.4	2.7	1.0	1.2	3.4
Major Q_{Known} (cfs)	3.6	5.2	9.6	3.7	4.5	10.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	Inlet A5.1	No Bypass Flow Received	Inlet A5	Inlet A6	Inlet A7
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.7	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	2.7	0.0	2.2	5.4	0.1

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.2**	**1.4**	**2.7**	**1.0**	**1.9**	**3.4**
Major Total Design Peak Flow, Q (cfs)	**3.6**	**7.9**	**9.6**	**5.9**	**9.9**	**10.8**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	2.2	2.7

Minor Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Version 4.06 Released August 2018

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet A6	Inlet A7	Inlet A8	Inlet A9	Inlet B1	Inlet B2
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.2	0.7	0.6	2.2	0.5	1.3
Major Q_{Known} (cfs)	9.5	1.8	1.5	7.3	1.2	4.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	Inlet A8	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.2**	**0.7**	**0.6**	**2.2**	**0.5**	**1.3**
Major Total Design Peak Flow, Q (cfs)	**9.5**	**1.8**	**1.5**	**7.3**	**1.2**	**4.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.7	0.0	0.0	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	5.4	0.1	0.0	N/A	N/A	N/A

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Ti

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

PART OF FILING NO. 3

Version 4.06 Released August 2018

INLET MANAGEMENT

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INLET NAME	Inlet C1	Inlet C2	Inlet D1	Inlet D2	Inlet D3	Inlet D4
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	AREA	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump	Swale	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type C	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.1	2.2	3.5	2.1	0.7	1.5
Major Q_{Known} (cfs)	6.8	7.3	11.0	6.3	3.6	4.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	Inlet D4	Inlet D5	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.9	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.1**	**2.2**	**3.5**	**2.1**	**0.7**	**1.5**
Major Total Design Peak Flow, Q (cfs)	**6.8**	**7.3**	**11.0**	**7.2**	**3.6**	**4.0**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	0.0	0.0

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Ti

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

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INLET MANAGEMENT

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PART OF FILING NO. 3

INLET NAME	Inlet D5	Inlet A10
Site Type (Urban or Rural)	URBAN	URBAN
Inlet Application (Street or Area)	STREET	AREA
Hydraulic Condition	On Grade	Swale
Inlet Type	CDOT Type R Curb Opening	CDOT Type C

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.3	0.8
Major Q_{Known} (cfs)	7.5	4.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

Watershed Profile

Overland Slope (ft/ft)		
Overland Length (ft)		
Channel Slope (ft/ft)		
Channel Length (ft)		

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.3**	**0.8**
Major Total Design Peak Flow, Q (cfs)	**7.5**	**4.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.9	0.0

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A
C_5	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A
Overland Flow Time, Ti	N/A	N/A
Channel Travel Time, Tt	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A
Regional T_c	N/A	N/A
Recommended T_c	N/A	N/A
T_c selected by User	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A

Major Storm (Calculated) Analysis of Flow Ti

C	N/A	N/A
C_5	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A
Overland Flow Time, Ti	N/A	N/A
Channel Travel Time, Tt	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A
Regional T_c	N/A	N/A
Recommended T_c	N/A	N/A
T_c selected by User	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A

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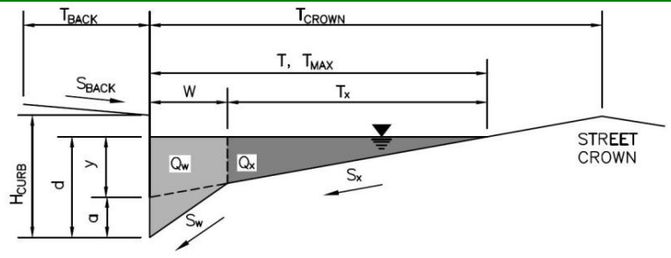
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

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

INLET IN A SUMP OR SAG LOCATION

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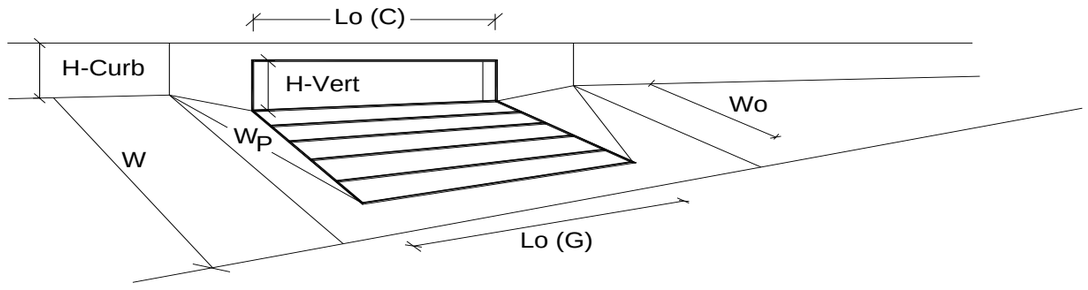


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	3.0	5.1	cfs
Interception with Clogging	Q_{wa} =	2.7	4.6	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	9.8	10.6	cfs
Interception with Clogging	Q_{oa} =	8.8	9.5	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	5.0	6.8	cfs
Interception with Clogging	Q_{ma} =	4.5	6.1	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**2.7**	**4.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	5.00	5.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	0.72	
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 =**	**2.7**	**4.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.2	3.6	cfs

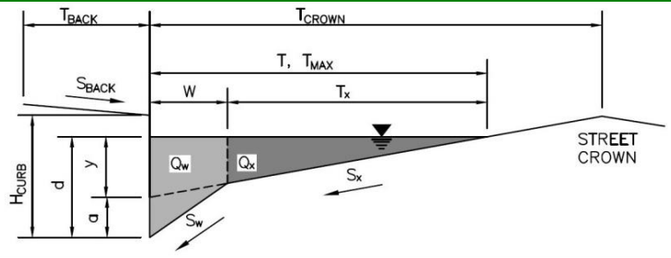
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

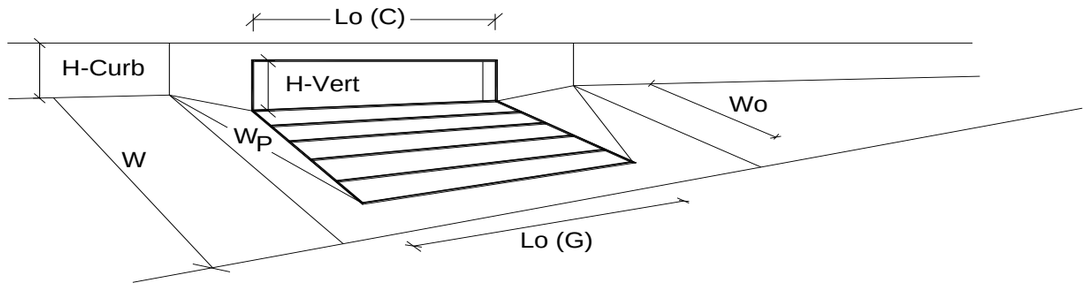
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.4	7.9	cfs

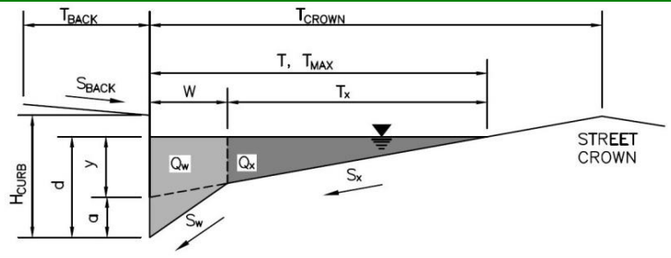
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A3



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

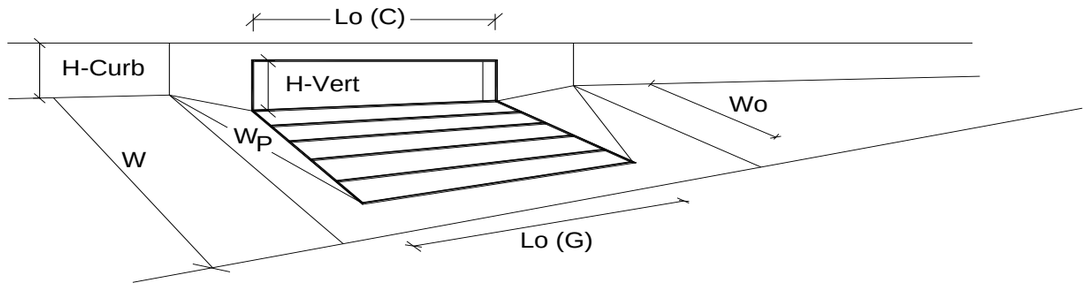
Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	3	3	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	
Clogging Factor for Multiple Units	Clog =	0.04	0.04	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	6.0	11.6	cfs
Interception with Clogging	Q_{wa} =	5.8	11.1	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	29.3	31.7	cfs
Interception with Clogging	Q_{oa} =	28.0	30.3	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	12.4	17.8	cfs
Interception with Clogging	Q_{ma} =	11.8	17.1	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.8**	**11.1**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.68	0.76	
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 =**	**5.8**	**11.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.7	9.6	cfs

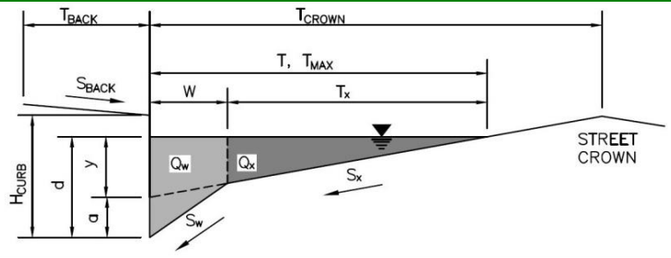
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

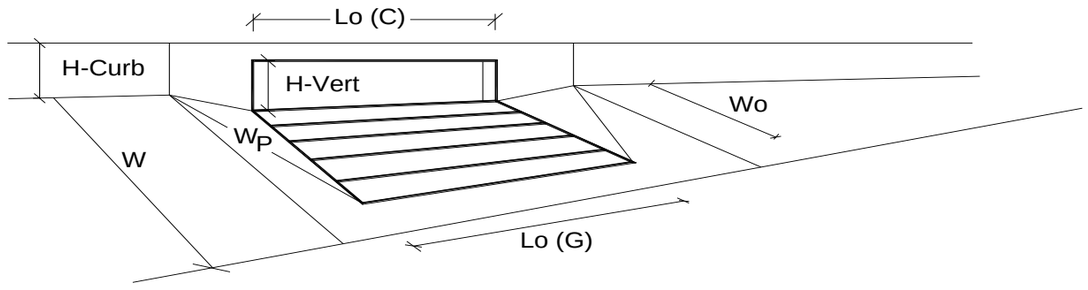
Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.0	5.9	cfs

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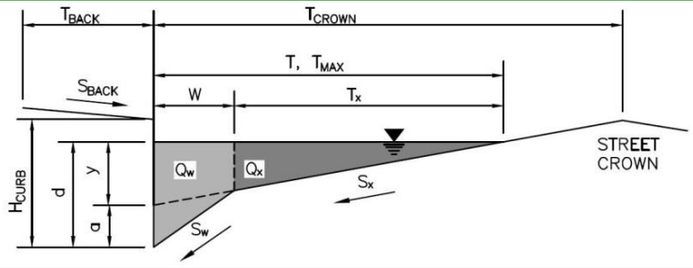
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A5



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

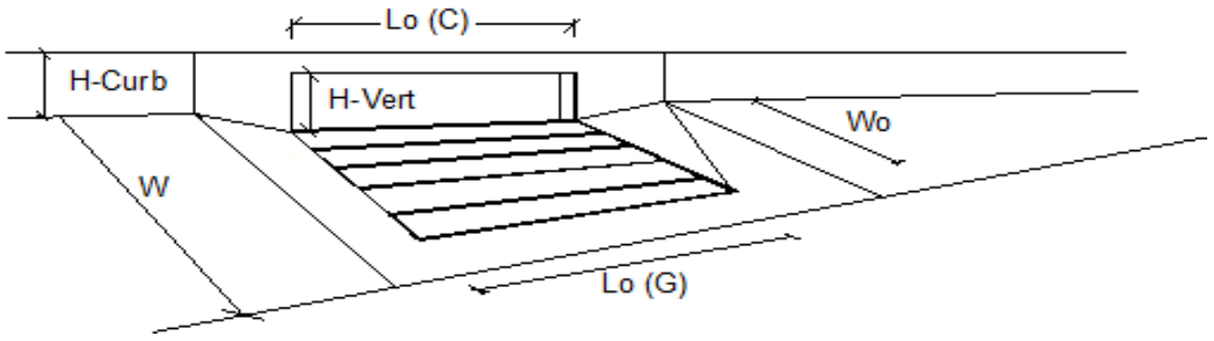
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



			MINOR	MAJOR	
Design Information (Input)					
Type of Inlet		Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)		**Q_o =**	**1.9**	**9.9**	cfs
Water Spread Width		T =	6.6	14.2	ft
Water Depth at Flowline (outside of local depression)		d =	3.1	4.9	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.781	0.420	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	0.4	5.7	cfs
Discharge within the Gutter Section W		Q_w =	1.5	4.1	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.35	0.65	sq ft
Velocity within the Gutter Section W		V_W =	4.3	6.3	fps
Water Depth for Design Condition		d_{LOCAL} =	7.6	9.4	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)		S_e =	0.215	0.125	ft/ft
Required Length L_T to Have 100% Interception		L_T =	5.75	16.95	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	5.75	10.00	ft
Interception Capacity		Q_i =	1.9	7.9	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoef =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.06	0.06	
Effective (Unclogged) Length		L_e =	9.37	9.37	ft
Actual Interception Capacity		**Q_a =**	**1.9**	**7.7**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.0**	**2.2**	cfs
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**1.9**	**7.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**2.2**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**78**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

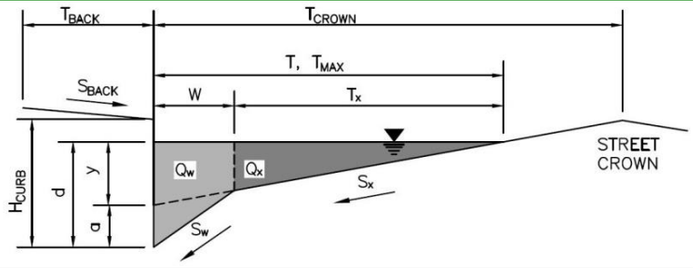
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A5.1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

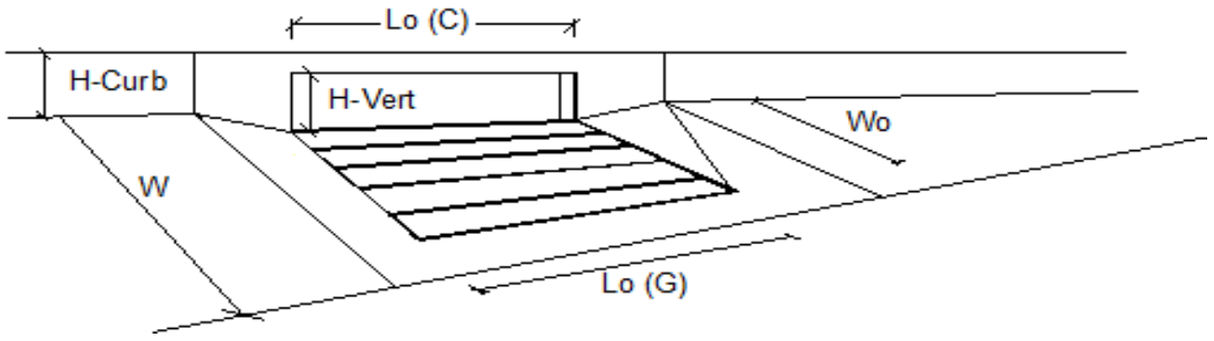
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	**Q_o =**	**3.4**	**10.8**	cfs
Water Spread Width	T =	8.9	14.7	ft
Water Depth at Flowline (outside of local depression)	d =	3.6	5.0	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.639	0.405	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.2	6.4	cfs
Discharge within the Gutter Section W	Q_w =	2.2	4.4	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.1	cfs
Flow Area within the Gutter Section W	A_W =	0.44	0.67	sq ft
Velocity within the Gutter Section W	V_W =	4.9	6.5	fps
Water Depth for Design Condition	d_{LOCAL} =	8.1	9.5	inches

Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	cfs

Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.180	0.121	ft/ft
Required Length L_T to Have 100% Interception	L_T =	8.34	17.97	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	8.34	10.00	ft
Interception Capacity	Q_i =	3.4	8.3	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.37	9.37	ft
Actual Interception Capacity	**Q_a =**	**3.4**	**8.1**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**2.7**	cfs

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.4**	**8.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**75**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

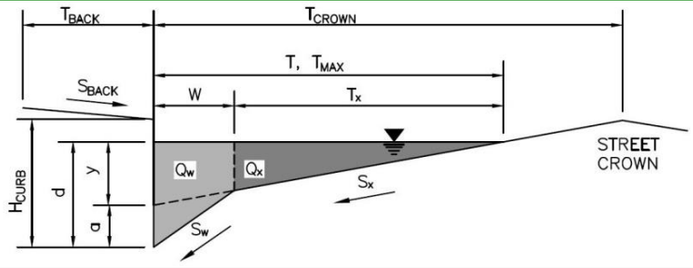
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A6



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

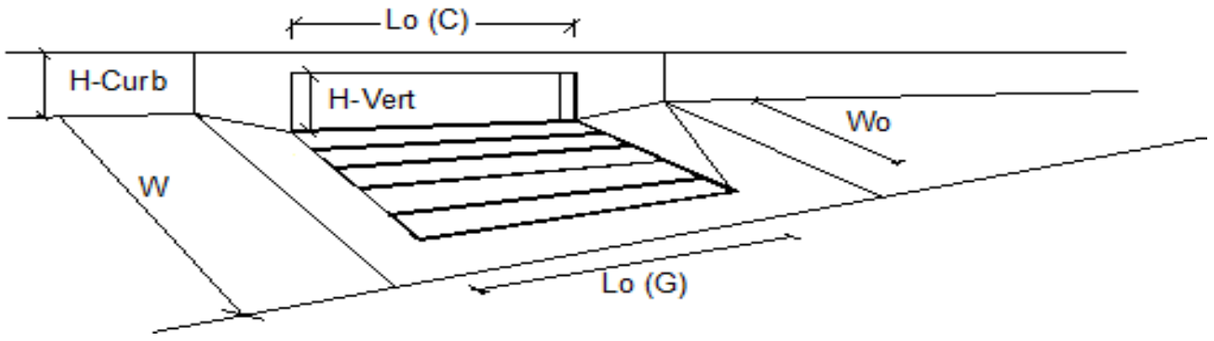
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



			MINOR	MAJOR	
Design Information (Input)					
Type of Inlet		Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)		**Q_o =**	**3.2**	**9.5**	cfs
Water Spread Width		T =	8.6	14.0	ft
Water Depth at Flowline (outside of local depression)		d =	3.6	4.9	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.653	0.426	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	1.1	5.4	cfs
Discharge within the Gutter Section W		Q_w =	2.1	4.0	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.43	0.64	sq ft
Velocity within the Gutter Section W		V_W =	4.9	6.3	fps
Water Depth for Design Condition		d_{LOCAL} =	8.1	9.4	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)		S_e =	0.183	0.127	ft/ft
Required Length L_T to Have 100% Interception		L_T =	8.01	16.53	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	5.00	5.00	ft
Interception Capacity		Q_i =	2.6	4.5	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoef =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.10	0.10	
Effective (Unclogged) Length		L_e =	4.50	4.50	ft
Actual Interception Capacity		**Q_a =**	**2.5**	**4.1**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.7**	**5.4**	cfs
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.5**	**4.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.7**	**5.4**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**77**	**43**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

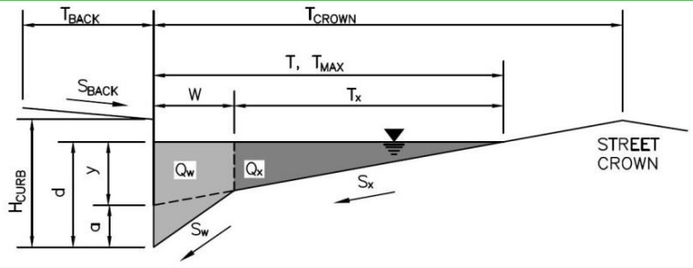
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A7



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

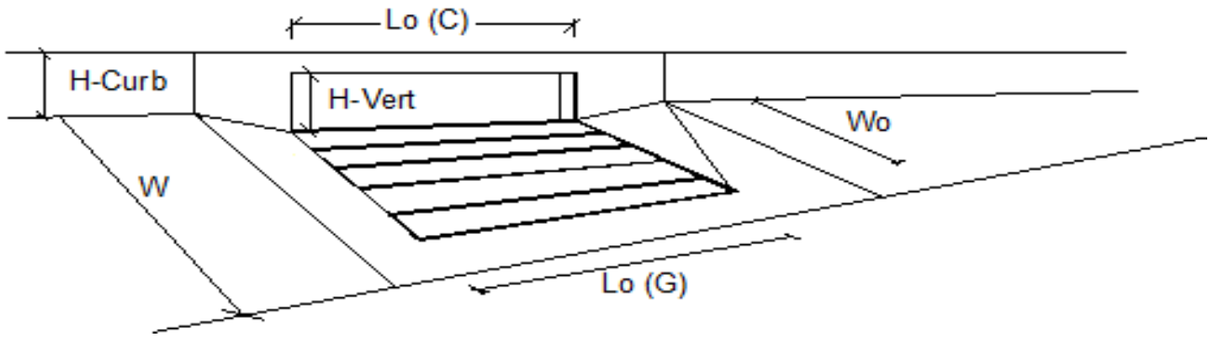
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	**Q_o =**	**0.7**	**1.8**	cfs
Water Spread Width	T =	2.3	6.5	ft
Water Depth at Flowline (outside of local depression)	d =	2.1	3.1	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	1.003	0.791	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.0	0.4	cfs
Discharge within the Gutter Section W	Q_w =	0.7	1.5	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.18	0.34	sq ft
Velocity within the Gutter Section W	V_W =	4.0	4.3	fps
Water Depth for Design Condition	d_{LOCAL} =	6.6	7.6	inches

Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	cfs

Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.271	0.218	ft/ft
Required Length L_T to Have 100% Interception	L_T =	3.11	5.60	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	3.11	5.00	ft
Interception Capacity	Q_i =	0.7	1.8	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**0.7**	**1.8**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**0.1**	cfs

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.7**	**1.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**95**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

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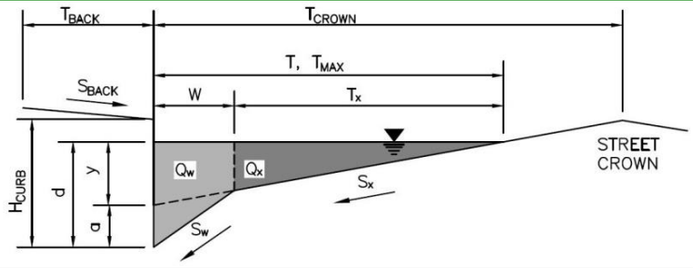
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A8



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

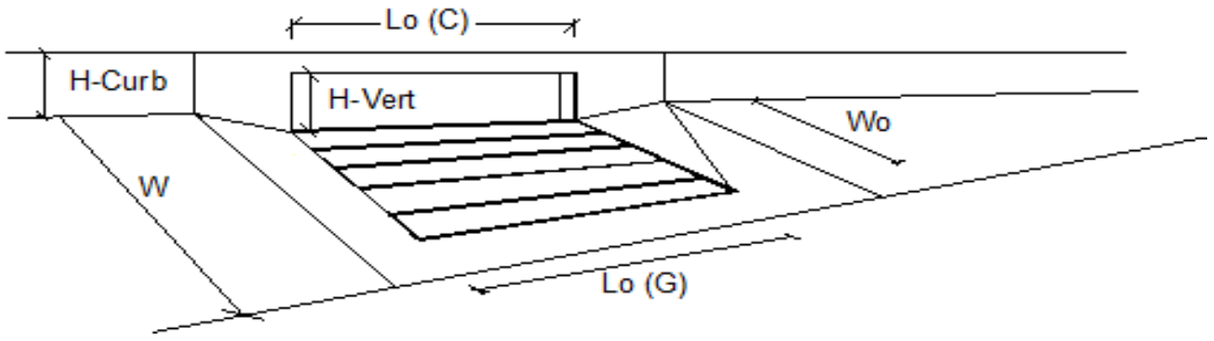
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	**Q_o =**	**0.6**	**1.5**	cfs
Water Spread Width	T =	2.2	5.6	ft
Water Depth at Flowline (outside of local depression)	d =	2.0	2.9	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	1.011	0.853	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.0	0.2	cfs
Discharge within the Gutter Section W	Q_w =	0.6	1.2	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.17	0.31	sq ft
Velocity within the Gutter Section W	V_W =	3.6	4.0	fps
Water Depth for Design Condition	d_{LOCAL} =	6.5	7.4	inches

Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	cfs

Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.271	0.233	ft/ft
Required Length L_T to Have 100% Interception	L_T =	2.88	4.79	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	2.88	4.79	ft
Interception Capacity	Q_i =	0.6	1.4	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**0.6**	**1.4**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**0.0**	cfs

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.6**	**1.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**99**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

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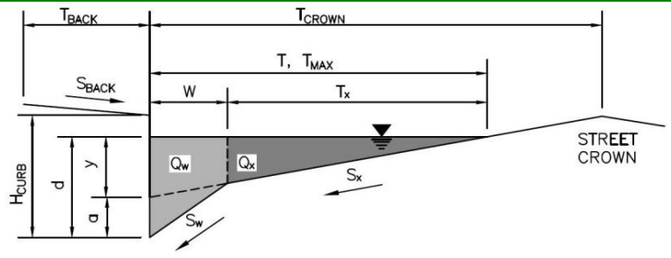
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet A9



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

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

INLET IN A SUMP OR SAG LOCATION

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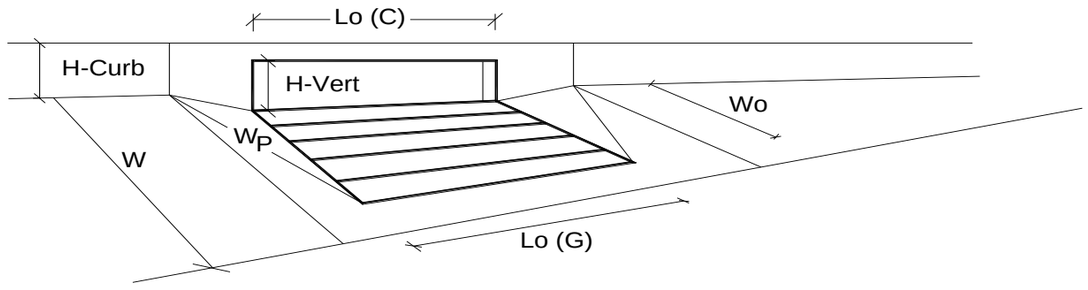

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.2	7.3	cfs

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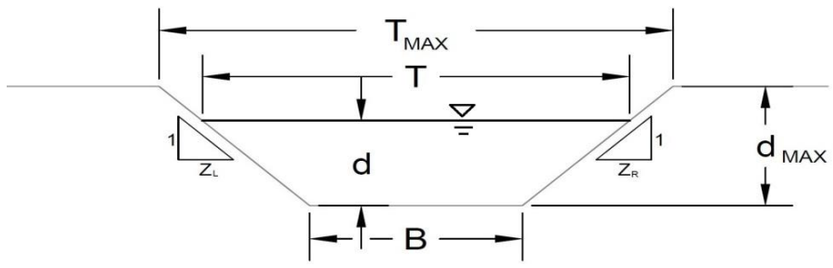
AREA INLET IN A SWALE

Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet A10



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 =	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Slope	Z2 =	10.00	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} =**	**30.80**	**30.80**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.54**	**1.54**	**feet**

Maximum Channel Capacity Based On Allowable Top Width

		Minor Storm	Major Storm	
Max. Allowable Top Width	**T_{MAX} =**	**30.80**	**30.80**	**ft**
Water Depth	d =	1.54	1.54	ft
Flow Area	A =	23.72	23.72	sq ft
Wetted Perimeter	P =	30.95	30.95	ft
Hydraulic Radius	R =	0.77	0.77	ft
Manning's n based on NRCS Vegetal Retardance	n =	0.037	0.037	
Flow Velocity	V =	4.72	4.72	fps
Velocity-Depth Product	VR =	3.62	3.62	ft^2/s
Hydraulic Depth	D =	0.77	0.77	ft
Froude Number	Fr =	0.95	0.95	
Max. Flow Based On Allowable Top Width	**Q_T =**	**111.9**	**111.9**	**cfs**

Maximum Channel Capacity Based On Allowable Water Depth

		Minor Storm	Major Storm	
Max. Allowable Water Depth	**d_{MAX} =**	**1.54**	**1.54**	**feet**
Top Width	T =	30.80	30.80	feet
Flow Area	A =	23.72	23.72	square feet
Wetted Perimeter	P =	30.95	30.95	feet
Hydraulic Radius	R =	0.77	0.77	feet
Manning's n based on NRCS Vegetal Retardance	n =	0.037	0.037	
Flow Velocity	V =	4.72	4.72	fps
Velocity-Depth Product	VR =	3.62	3.62	ft^2/s
Hydraulic Depth	D =	0.77	0.77	feet
Froude Number	Fr =	0.95	0.95	
Max. Flow Based On Allowable Water Depth	**Q_d =**	**111.9**	**111.9**	**cfs**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**111.9**	**111.9**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	**d_{allow} =**	**1.54**	**1.54**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.8**	**4.3**	**cfs**
Water Depth	**d =**	**0.45**	**0.66**	**feet**
Top Width	T =	9.06	13.17	feet
Flow Area	A =	2.05	4.33	square feet
Wetted Perimeter	P =	9.10	13.23	feet
Hydraulic Radius	R =	0.23	0.33	feet
Manning's n based on NRCS Vegetal Retardance	n =	0.200	0.101	
Flow Velocity	V =	0.39	0.99	fps
Velocity-Depth Product	VR =	0.09	0.32	ft^2/s
Hydraulic Depth	D =	0.23	0.33	feet
Froude Number	Fr =	0.14	0.30	

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 4.06 Released August 2018

AREA INLET IN A SWALE

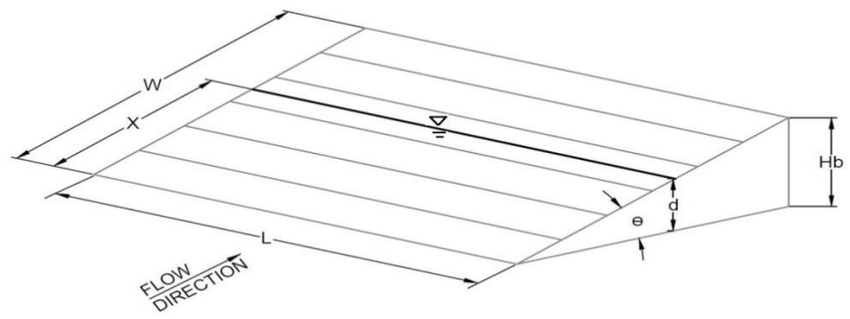
Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet A10

Inlet Design Information (Input)

Type of Inlet: CDOT Type C — Inlet Type = CDOT Type C

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 =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.45	0.66	
Grate Capacity as a Weir				
Submerged Side Weir Length	X =	3.00	3.00	feet
Inclined Side Weir Flow	Q_{ws} =	3.3	5.8	cfs
Base Weir Flow	Q_{wb} =	4.7	8.2	cfs
Interception without Clogging	Q_{wi} =	11.3	19.7	cfs
Interception with Clogging	Q_{wa} =	5.6	9.9	cfs
Grate Capacity as an Orifice				
Interception without Clogging	Q_{oi} =	21.8	26.2	cfs
Interception with Clogging	Q_{oa} =	10.9	13.1	cfs
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.6**	**9.9**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

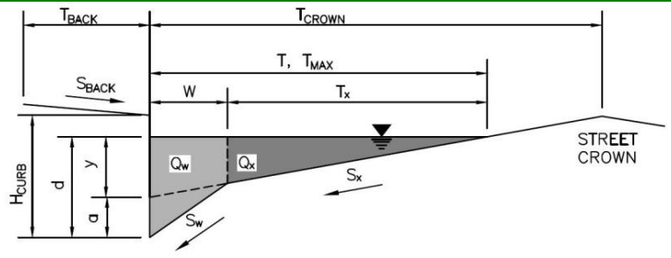
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet B1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

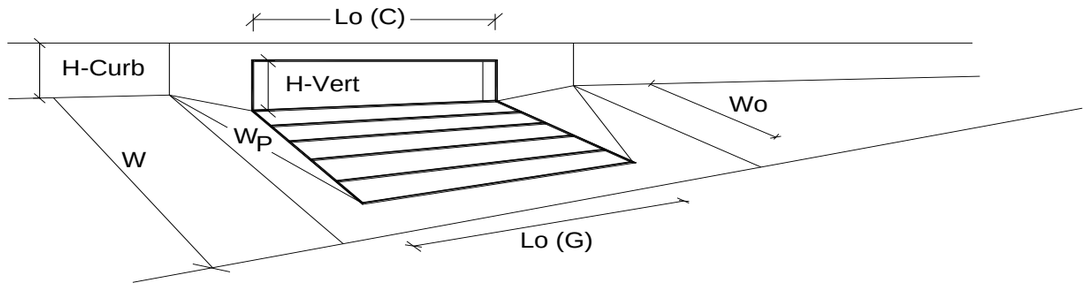
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	3.0	5.1	cfs
Interception with Clogging	Q_{wa} =	2.7	4.6	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	9.8	10.6	cfs
Interception with Clogging	Q_{oa} =	8.8	9.5	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	5.0	6.8	cfs
Interception with Clogging	Q_{ma} =	4.5	6.1	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**2.7**	**4.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	5.00	5.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	0.72	
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 =**	**2.7**	**4.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.5	1.2	cfs

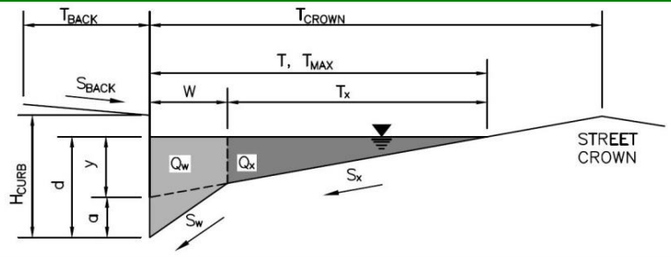
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet B2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

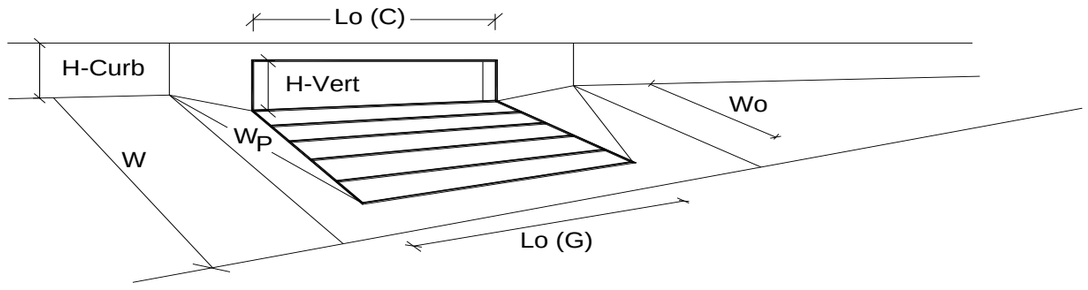
Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.3	4.7	cfs

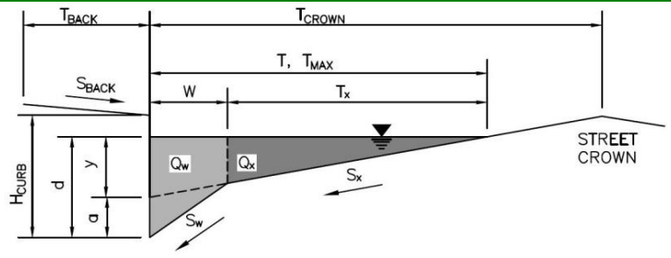
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet C1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

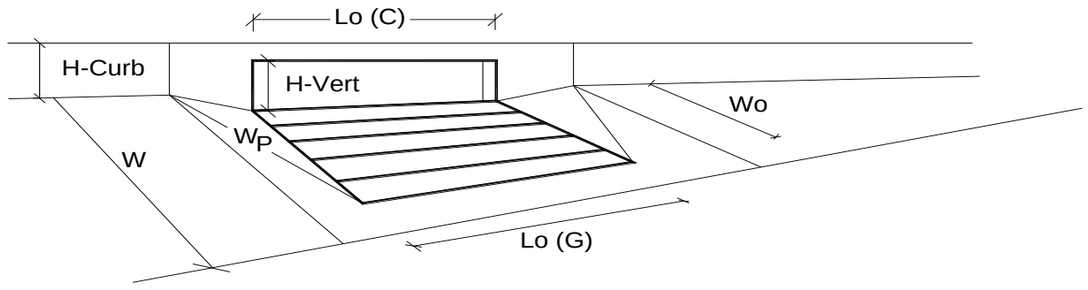
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.1	6.8	cfs

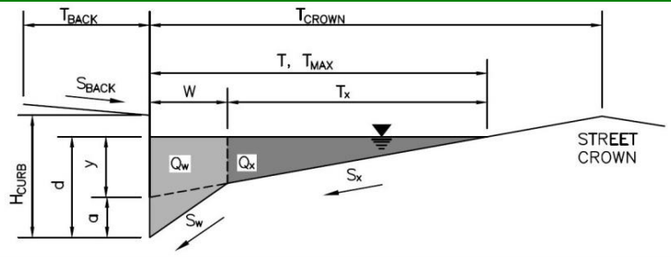
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet C2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

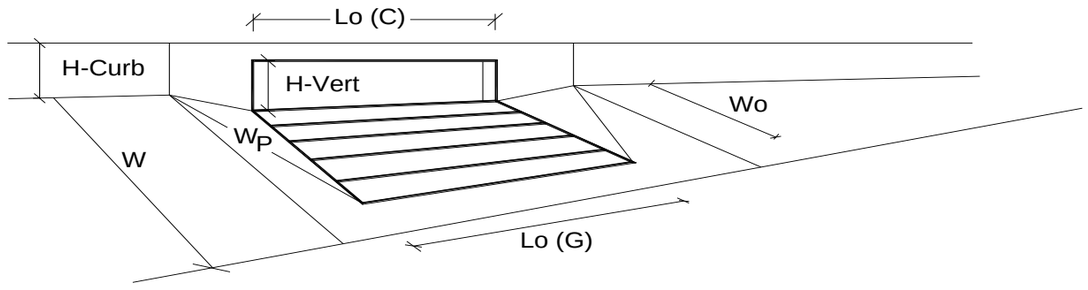
Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.2	7.3	cfs

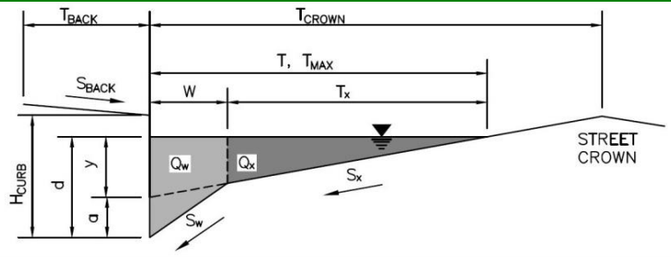
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet D1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

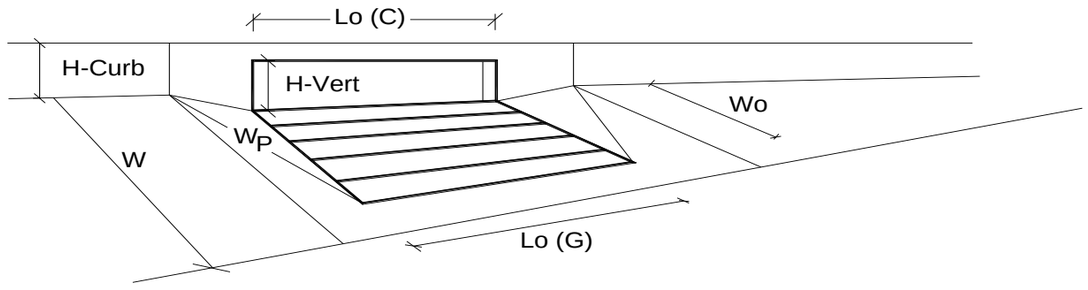
Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

	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 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	3	3	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	
Clogging Factor for Multiple Units	Clog =	0.04	0.04	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	6.0	11.6	cfs
Interception with Clogging	Q_{wa} =	5.8	11.1	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	29.3	31.7	cfs
Interception with Clogging	Q_{oa} =	28.0	30.3	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	12.4	17.8	cfs
Interception with Clogging	Q_{ma} =	11.8	17.1	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.8**	**11.1**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.68	0.76	
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 =**	**5.8**	**11.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.5	11.0	cfs

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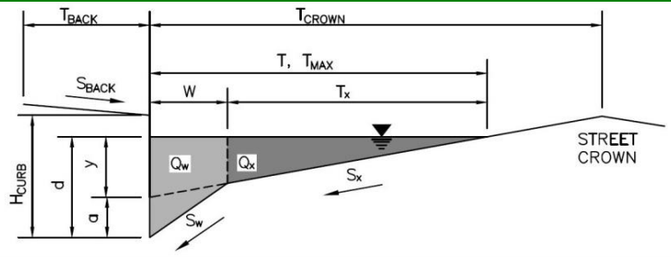
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet D2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Warning 01 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.200	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		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**

Warning 01: Manning's n-value does not meet the USDCM recommended design range.

INLET IN A SUMP OR SAG LOCATION

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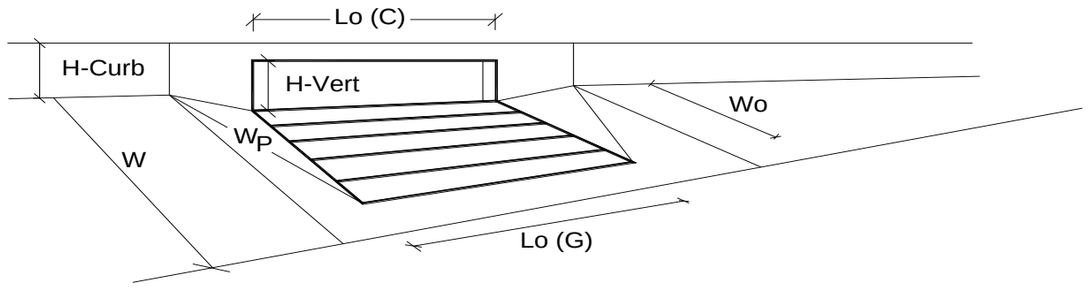

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	5.6	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 =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	4.9	9.3	cfs
Interception with Clogging	Q_{wa} =	4.6	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	21.1	cfs
Interception with Clogging	Q_{oa} =	18.3	19.8	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.1	13.0	cfs
Interception with Clogging	Q_{ma} =	8.5	12.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**4.6**	**8.7**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	12.5	17.0	ft
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.0	inches
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} =	0.21	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	0.91	
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 =**	**4.6**	**8.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.1	7.2	cfs

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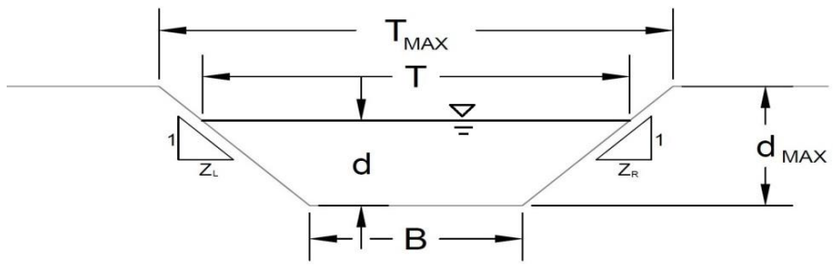
AREA INLET IN A SWALE

Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet D3



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 =	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0050	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Slope	Z2 =	4.00	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} =**	**16.00**	**16.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**2.00**	**2.00**	**feet**

Maximum Channel Capacity Based On Allowable Top Width

		Minor Storm	Major Storm	
Max. Allowable Top Width	**T_{MAX} =**	**16.00**	**16.00**	**ft**
Water Depth	d =	2.00	2.00	ft
Flow Area	A =	16.00	16.00	sq ft
Wetted Perimeter	P =	16.49	16.49	ft
Hydraulic Radius	R =	0.97	0.97	ft
Manning's n based on NRCS Vegetal Retardance	n =	0.043	0.043	
Flow Velocity	V =	2.40	2.40	fps
Velocity-Depth Product	VR =	2.33	2.33	ft^2/s
Hydraulic Depth	D =	1.00	1.00	ft
Froude Number	Fr =	0.42	0.42	
Max. Flow Based On Allowable Top Width	**Q_T =**	**38.4**	**38.4**	**cfs**

Maximum Channel Capacity Based On Allowable Water Depth

		Minor Storm	Major Storm	
Max. Allowable Water Depth	**d_{MAX} =**	**2.00**	**2.00**	**feet**
Top Width	T =	16.00	16.00	feet
Flow Area	A =	16.00	16.00	square feet
Wetted Perimeter	P =	16.49	16.49	feet
Hydraulic Radius	R =	0.97	0.97	feet
Manning's n based on NRCS Vegetal Retardance	n =	0.043	0.043	
Flow Velocity	V =	2.40	2.40	fps
Velocity-Depth Product	VR =	2.33	2.33	ft^2/s
Hydraulic Depth	D =	1.00	1.00	feet
Froude Number	Fr =	0.42	0.42	
Max. Flow Based On Allowable Water Depth	**Q_d =**	**38.4**	**38.4**	**cfs**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**38.4**	**38.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	**d_{allow} =**	**2.00**	**2.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.7**	**3.6**	**cfs**
Water Depth	**d =**	**0.78**	**1.08**	**feet**
Top Width	T =	6.24	8.63	feet
Flow Area	A =	2.44	4.65	square feet
Wetted Perimeter	P =	6.44	8.89	feet
Hydraulic Radius	R =	0.38	0.52	feet
Manning's n based on NRCS Vegetal Retardance	n =	0.192	0.088	
Flow Velocity	V =	0.29	0.77	fps
Velocity-Depth Product	VR =	0.11	0.40	ft^2/s
Hydraulic Depth	D =	0.39	0.54	feet
Froude Number	Fr =	0.08	0.19	

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'

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AREA INLET IN A SWALE

Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet D3

Inlet Design Information (Input)

Type of Inlet: CDOT Type C — Inlet Type = CDOT Type C

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 =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.78	1.08	
Grate Capacity as a Weir				
Submerged Side Weir Length	X =	3.00	3.00	feet
Inclined Side Weir Flow	Q_{ws} =	7.4	12.1	cfs
Base Weir Flow	Q_{wb} =	10.6	17.2	cfs
Interception without Clogging	Q_{wi} =	25.5	41.4	cfs
Interception with Clogging	Q_{wa} =	12.7	20.7	cfs
Grate Capacity as an Orifice				
Interception without Clogging	Q_{oi} =	28.6	33.6	cfs
Interception with Clogging	Q_{oa} =	14.3	16.8	cfs
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**12.7**	**16.8**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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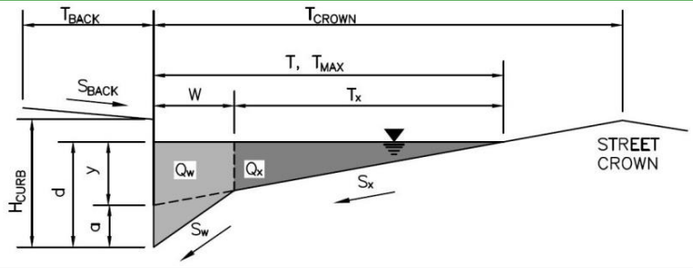
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet D4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

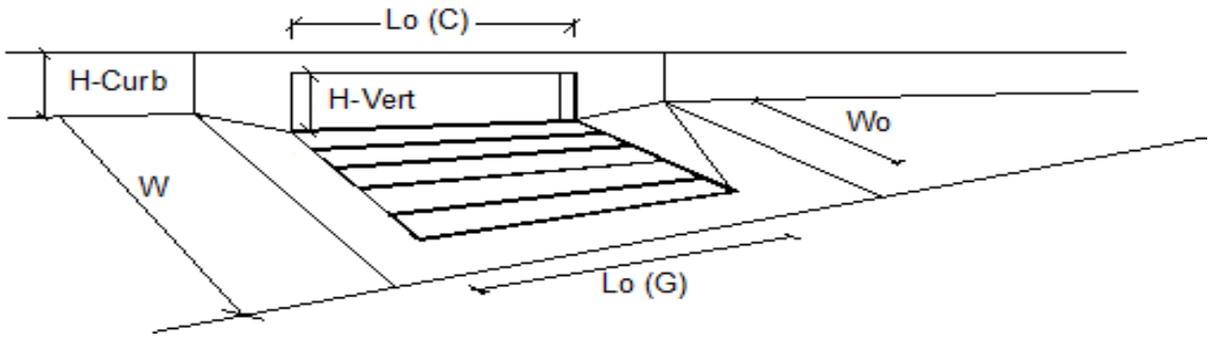
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	**Q_o =**	**1.5**	**4.0**	cfs
Water Spread Width	T =	5.7	9.5	ft
Water Depth at Flowline (outside of local depression)	d =	2.9	3.8	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.845	0.601	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.2	1.6	cfs
Discharge within the Gutter Section W	Q_w =	1.3	2.4	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.31	0.47	sq ft
Velocity within the Gutter Section W	V_W =	4.0	5.1	fps
Water Depth for Design Condition	d_{LOCAL} =	7.4	8.3	inches

Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	cfs

Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.232	0.171	ft/ft
Required Length L_T to Have 100% Interception	L_T =	4.87	9.26	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	4.87	9.26	ft
Interception Capacity	Q_i =	1.5	4.0	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.37	9.37	ft
Actual Interception Capacity	**Q_a =**	**1.5**	**4.0**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**0.0**	cfs

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

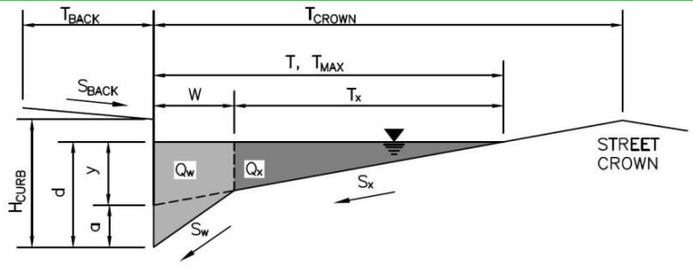
Version 4.06 Released August 2018

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

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

Project: Reunion Ridge Filing No. 2 - Preliminary Inlet Placing Calcs

Inlet ID: Inlet D5



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	6.9	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	10.0	10.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	5.4	5.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.3	0.3	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**15.7**	**15.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.5	22.5	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.5	20.5	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.475	0.263	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	3.8	22.8	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	3.8	22.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	8.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	2.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.3	33.0	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	8.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	4.8	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**7.3**	**27.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.50	6.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.96	inches

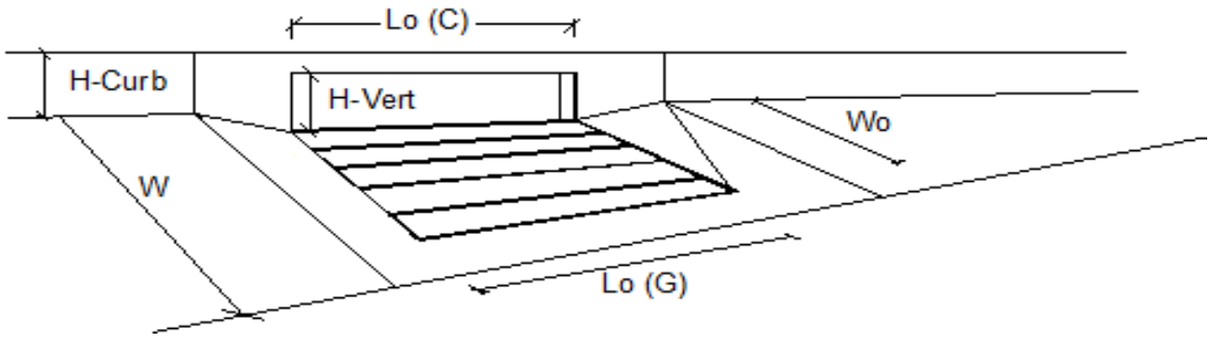
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.3**	**27.5**	**cfs**

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

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

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Warning 1 Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.5	4.5	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from Sheet *Inlet Management*)	**Q_o =**	**2.3**	**7.5**	cfs
Water Spread Width	T =	7.3	12.7	ft
Water Depth at Flowline (outside of local depression)	d =	3.3	4.6	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.735	0.469	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.6	4.0	cfs
Discharge within the Gutter Section W	Q_w =	1.7	3.5	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.38	0.59	sq ft
Velocity within the Gutter Section W	V_W =	4.5	5.9	fps
Water Depth for Design Condition	d_{LOCAL} =	7.8	9.1	inches

Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	cfs
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	cfs

Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S_e =	0.204	0.137	ft/ft
Required Length L_T to Have 100% Interception	L_T =	6.45	14.14	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	6.45	10.00	ft
Interception Capacity	Q_i =	2.3	6.7	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.37	9.37	ft
Actual Interception Capacity	**Q_a =**	**2.3**	**6.6**	cfs
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**0.9**	cfs

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.3**	**6.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**88**	**%**

Warning 1: Dimension entered is not a typical dimension for inlet type specified.

SHEET 1	JOB NO. 18-004	CREATED BY: SD	DATE: 09/11/21	REUNION RIDGE FILING NO.2	REUNION RIDGE FILING. 2 STORMCAD MAP	

CORE CONSULTANTS. INC.
3473 S. BROADWAY
ENGLEWOOD, CO 80113
303.703.4444
LIVEYOURCORE.COM

LAND DEVELOPMENT
ENERGY
PUBLIC INFRASTUCTURE

0 50
1 inch = 50 ft.

STORMCAD OUTPUT TABLES

5-Year

Conduit Table - Time: 0.00 hours

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (ft)	Slope (ft/ft)	Dia (in)	Mann. (n)	Flow (cfs)	Vel (ft/s)	Depth (ft)	Cap. (cfs)	HGL (In) (ft)	HGL (Out) (ft)
P-01	INLET B2	INLET B1	5,127.43	5,127.29	34.0	0.004	18.0	0.016	1.30	2.51	0.82	5.40	5,128.13	5,128.12
P-02	INLET B1	STUB B0	5,127.02	5,127.00	11.8	0.002	18.0	0.016	1.70	2.11	0.49	3.84	5,127.62	5,127.49
P-03	INLET C2	INLET C1	5,128.31	5,128.15	34.1	0.005	18.0	0.016	2.19	3.07	0.97	5.85	5,129.15	5,129.12
P-04	INLET C1	STUB C0	5,127.95	5,127.82	26.5	0.005	30.0	0.016	3.72	3.50	0.63	23.56	5,128.62	5,128.45
P-16	INLET A10	MH-01	5,134.40	5,133.79	154.3	0.004	24.0	0.016	0.84	2.15	0.90	11.58	5,134.78	5,134.69
P-17	MH-01	MH-02	5,133.69	5,132.64	271.6	0.004	24.0	0.016	0.82	2.11	1.52	11.41	5,134.19	5,134.16
P-18	INLET A9	MH-02	5,135.34	5,135.21	27.0	0.005	18.0	0.016	2.21	3.15	0.56	6.03	5,135.97	5,135.77
P-19	INLET A8	MH-02	5,135.24	5,135.21	7.0	0.005	18.0	0.016	0.61	2.19	0.29	6.03	5,135.56	5,135.50
P-20	MH-02	MH-03	5,132.54	5,132.30	60.0	0.004	24.0	0.016	2.69	3.01	1.35	11.62	5,133.66	5,133.64
P-21	MH-03	MH-04	5,132.20	5,131.46	184.5	0.004	30.0	0.016	2.67	2.94	1.66	21.08	5,133.14	5,133.12
P-22	INLET A7	MH-04	5,133.11	5,132.90	27.0	0.008	18.0	0.016	0.70	2.63	0.31	7.41	5,133.42	5,133.21
P-23	MH-04	MH-05	5,131.36	5,130.84	74.5	0.007	30.0	0.016	2.96	3.69	1.78	27.84	5,132.62	5,132.62
P-24	INLET A6	MH-05	5,130.94	5,130.84	7.0	0.014	18.0	0.016	3.27	1.85	1.78	10.20	5,132.63	5,132.62
P-25	MH-05	MH-06	5,130.74	5,129.21	277.9	0.006	30.0	0.016	4.93	3.93	2.86	24.72	5,132.12	5,132.07
P-26	INLET A5.1	MH-06	5,130.83	5,130.69	27.2	0.005	24.0	0.016	3.48	3.52	1.38	13.10	5,132.08	5,132.07
P-27	MH-06	INLET A5	5,130.69	5,130.65	6.8	0.005	36.0	0.016	7.36	4.21	0.85	38.61	5,131.57	5,131.51
P-28	INLET A5	MH-08	5,129.11	5,128.80	62.9	0.005	36.0	0.016	8.30	4.33	1.40	38.32	5,130.23	5,130.20
P-29	INLET A4	MH-07	5,129.00	5,128.87	27.0	0.005	18.0	0.016	1.00	0.56	1.84	6.03	5,130.71	5,130.71
P-30	MH-07	INLET A3	5,128.87	5,128.90	7.0	-0.005	18.0	0.016	2.70	1.53	1.84	6.03	5,130.71	5,130.71
P-31	MH-07	MH-08	5,128.67	5,128.48	42.8	0.004	24.0	0.016	3.52	3.31	1.71	11.93	5,130.21	5,130.20
P-32	MH-08	MH-09	5,128.60	5,128.13	94.0	0.005	36.0	0.016	11.00	4.68	1.40	38.32	5,129.70	5,129.52
P-33	MH-09	MH-10	5,127.93	5,127.51	82.4	0.005	36.0	0.016	10.92	4.67	1.05	38.32	5,129.02	5,128.56
P-34	INLET A2	INLET A1	5,129.04	5,128.87	34.0	0.005	18.0	0.016	1.43	2.80	0.45	6.03	5,129.54	5,129.32
P-35	INLET A1	MH-10	5,126.39	5,126.33	11.2	0.005	18.0	0.016	2.60	1.47	1.62	6.03	5,127.96	5,127.95
P-36	MH-10	STUB A0	5,126.13	5,126.01	24.7	0.005	36.0	0.016	12.37	4.83	1.12	38.32	5,127.31	5,127.13

STORMCAD OUTPUT TABLES

5-Year

Manhole Table - Time: 0.00 hours

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Headloss Coeff.	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Notes
MH-01	5,142.12	5,133.69	0.82	1.320	5,134.69	5,134.19	Standard	4' DIA MH
MH-03	5,140.08	5,132.20	2.67	1.320	5,133.64	5,133.14	Standard	4' DIA MH
MH-02	5,139.73	5,132.54	2.69	1.520	5,134.16	5,133.66	Standard	5' DIA MH
MH-04	5,137.89	5,131.36	2.96	1.020	5,133.12	5,132.62	Standard	5' DIA MH
MH-05	5,137.14	5,130.74	4.93	1.020	5,132.62	5,132.12	Standard	5' DIA MH
MH-06	5,134.84	5,129.21	7.36	1.520	5,132.07	5,131.57	Standard	5' DIA MH
MH-09	5,134.27	5,127.93	10.92	0.400	5,129.52	5,129.02	Standard	5' DIA MH
MH-08	5,134.11	5,128.36	11.00	1.020	5,130.20	5,129.70	Standard	5' DIA MH
MH-07	5,133.62	5,128.67	3.52	1.520	5,130.71	5,130.21	Standard	5' DIA MH
MH-10	5,133.28	5,126.13	12.37	1.770	5,127.95	5,127.31	Standard	5' DIA MH

STORMCAD OUTPUT TABLES

5-Year

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coeff.	Flow (Total) (cfs)	HGL (In) (ft)	HGL (Out) (ft)	Notes	Inlet Location
INLET A1	5,133.11	5,126.39	0.050	1.22	5,128.46	5,127.96	5' TYPE R INLET	In Sag
INLET A2	5,133.11	5,129.04	0.050	1.43	5,130.04	5,129.54	10' TYPE R INLET	In Sag
INLET A3	5,133.69	5,128.90	0.050	2.70	5,131.21	5,130.71	15' TYPE R INLET	In Sag
INLET A4	5,133.69	5,129.00	0.050	1.00	5,131.21	5,130.71	10' TYPE R INLET	In Sag
INLET A5	5,134.91	5,129.11	1.770	1.18	5,130.73	5,130.23	10' TYPE R INLET (MODIFIED)	In Sag
INLET A5.1	5,134.91	5,130.83	0.050	3.48	5,132.58	5,132.08	10' TYPE R INLET	In Sag
INLET A6	5,137.21	5,130.94	0.050	3.27	5,133.13	5,132.63	5' TYPE R INLET	In Sag
INLET A7	5,137.96	5,133.11	0.050	0.70	5,133.92	5,133.42	5' TYPE R INLET	In Sag
INLET A8	5,139.80	5,135.24	0.050	0.61	5,136.06	5,135.56	5' TYPE R INLET	In Sag
INLET A9	5,139.80	5,135.34	0.050	2.21	5,136.47	5,135.97	10' TYPE R INLET	In Sag
INLET A10	5,137.17	5,134.40	0.050	0.84	5,135.28	5,134.78	TYPE C INLET	In Sag
INLET B1	5,131.91	5,127.02	1.320	0.49	5,128.12	5,127.62	5' TYPE R INLET	In Sag
INLET B2	5,131.91	5,127.43	0.050	1.30	5,128.63	5,128.13	10' TYPE R INLET	In Sag
INLET C1	5,133.30	5,127.95	1.320	2.11	5,129.12	5,128.62	10' TYPE R INLET (MODIFIED)	In Sag
INLET C2	5,133.28	5,128.31	0.050	2.19	5,129.65	5,129.15	10' TYPE R INLET	In Sag

STORMCAD OUTPUT TABLES

5-Year

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (acres)	Runoff Coefficient	Time of C (min)	CA (acres)	Intensity (in/h)	Flow (cfs)
A1	INLET A1	0.660	0.560	8.100	0.370	3.277	1.22
A2	INLET A2	1.080	0.410	8.600	0.443	3.208	1.43
A3	INLET A3	2.490	0.420	14.800	1.046	2.559	2.70
A4	INLET A4	1.000	0.400	15.900	0.400	2.473	1.00
A5	INLET A5	1.280	0.390	17.600	0.499	2.352	1.18
A5.1	INLET A5.1	2.530	0.530	14.600	1.341	2.575	3.48
A6	INLET A6	1.750	0.580	8.700	1.015	3.194	3.27
A7	INLET A7	0.260	0.700	5.000	0.182	3.799	0.70
A8	INLET A8	0.190	0.840	5.000	0.160	3.799	0.61
A9	INLET A9	1.660	0.470	12.000	0.780	2.811	2.21
A10	INLET A10	1.470	0.260	20.200	0.382	2.192	0.84
B1	INLET B1	0.150	0.860	5.000	0.129	3.799	0.49
B2	INLET B2	0.980	0.420	9.100	0.412	3.142	1.30
C1	INLET C1	1.310	0.500	8.700	0.655	3.194	2.11
C2	INLET C2	1.980	0.470	17.800	0.931	2.339	2.19

STORMCAD OUTPUT TABLES

100-Year

Conduit Table - Time: 0.00 hours

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (ft)	Slope (ft/ft)	Dia (in)	Mann. (n)	Flow (cfs)	Vel (ft/s)	Depth (ft)	Cap. (cfs)	HGL (In) (ft)	HGL (Out) (ft)
P-01	INLET B2	INLET B1	5,127.43	5,127.29	34.0	0.004	18.0	0.016	4.71	3.44	1.33	5.40	5,128.71	5,128.63
P-02	INLET B1	STUB B0	5,127.02	5,127.00	11.8	0.002	18.0	0.016	5.64	3.19	0.92	3.84	5,128.13	5,127.92
P-03	INLET C2	INLET C1	5,128.31	5,128.15	34.1	0.005	18.0	0.016	7.39	4.18	1.57	5.85	5,129.98	5,129.73
P-04	INLET C1	STUB C0	5,127.95	5,127.82	26.5	0.005	30.0	0.016	12.37	4.86	1.18	23.56	5,129.23	5,129.00
P-16	INLET A10	MH-01	5,134.40	5,133.79	154.3	0.004	24.0	0.016	4.33	1.38	2.72	11.58	5,136.59	5,136.51
P-17	MH-01	MH-02	5,133.69	5,132.64	271.6	0.004	24.0	0.016	4.13	1.31	3.23	11.41	5,136.01	5,135.87
P-18	INLET A9	MH-02	5,135.34	5,135.21	27.0	0.005	18.0	0.016	7.43	4.20	1.06	6.03	5,136.63	5,136.26
P-19	INLET A8	MH-02	5,135.24	5,135.21	7.0	0.005	18.0	0.016	1.46	2.81	0.67	6.03	5,135.88	5,135.87
P-20	MH-02	MH-03	5,132.54	5,132.30	60.0	0.004	24.0	0.016	9.66	3.07	2.91	11.62	5,135.37	5,135.21
P-21	MH-03	MH-04	5,132.20	5,131.46	184.5	0.004	30.0	0.016	9.59	1.95	3.09	21.08	5,134.71	5,134.55
P-22	INLET A7	MH-04	5,133.11	5,132.90	27.0	0.008	18.0	0.016	1.84	3.48	1.65	7.41	5,134.57	5,134.55
P-23	MH-04	MH-05	5,131.36	5,130.84	74.5	0.007	30.0	0.016	10.17	2.07	3.14	27.84	5,134.05	5,133.98
P-24	INLET A6	MH-05	5,130.94	5,130.84	7.0	0.014	18.0	0.016	9.53	5.39	3.14	10.20	5,134.07	5,133.98
P-25	MH-05	MH-06	5,130.74	5,129.21	277.9	0.006	30.0	0.016	15.51	3.16	3.65	24.72	5,133.48	5,132.86
P-26	INLET A5.1	MH-06	5,130.83	5,130.69	27.2	0.005	24.0	0.016	10.83	3.45	2.17	13.10	5,132.95	5,132.86
P-27	MH-06	INLET A5	5,130.69	5,130.65	6.8	0.005	36.0	0.016	22.52	5.67	1.54	38.61	5,132.30	5,132.20
P-28	INLET A5	MH-08	5,129.11	5,128.80	62.9	0.005	36.0	0.016	25.88	5.82	2.77	38.32	5,131.67	5,131.56
P-29	INLET A4	MH-07	5,129.00	5,128.87	27.0	0.005	18.0	0.016	3.71	2.10	3.41	6.03	5,132.33	5,132.28
P-30	MH-07	INLET A3	5,128.87	5,128.90	7.0	-0.005	18.0	0.016	9.73	5.51	3.41	6.03	5,132.37	5,132.28
P-31	MH-07	MH-08	5,128.67	5,128.48	42.8	0.004	24.0	0.016	13.01	4.14	3.08	11.93	5,131.78	5,131.56
P-32	MH-08	MH-09	5,128.60	5,128.13	94.0	0.005	36.0	0.016	35.16	6.15	2.53	38.32	5,131.02	5,130.65
P-33	MH-09	MH-10	5,127.93	5,127.51	82.4	0.005	36.0	0.016	34.98	6.14	1.94	38.32	5,130.15	5,129.45
P-34	INLET A2	INLET A1	5,129.04	5,128.87	34.0	0.005	18.0	0.016	5.21	3.84	0.94	6.03	5,130.08	5,129.81
P-35	INLET A1	MH-10	5,126.39	5,126.33	11.2	0.005	18.0	0.016	8.71	4.93	2.86	6.03	5,129.31	5,129.20
P-36	MH-10	STUB A0	5,126.13	5,126.01	24.7	0.005	36.0	0.016	39.62	6.16	2.07	38.32	5,128.44	5,128.08

STORMCAD OUTPUT TABLES

100-Year

Manhole Table - Time: 0.00 hours

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Headloss Coeff.	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Notes
MH-01	5,142.12	5,133.69	4.13	1.320	5,136.51	5,136.01	Standard	4' DIA MH
MH-03	5,140.08	5,132.20	9.59	1.320	5,135.21	5,134.71	Standard	4' DIA MH
MH-02	5,139.73	5,132.54	9.66	1.520	5,135.87	5,135.37	Standard	5' DIA MH
MH-04	5,137.89	5,131.36	10.17	1.770	5,134.55	5,134.05	Standard	5' DIA MH
MH-05	5,137.14	5,130.74	15.51	1.020	5,133.98	5,133.48	Standard	5' DIA MH
MH-06	5,134.84	5,129.21	22.52	1.020	5,132.86	5,132.30	Standard	5' DIA MH
MH-09	5,134.27	5,127.93	34.98	0.400	5,130.65	5,130.15	Standard	5' DIA MH
MH-08	5,134.11	5,128.36	35.16	1.020	5,131.56	5,131.02	Standard	5' DIA MH
MH-07	5,133.62	5,128.67	13.01	1.520	5,132.28	5,131.78	Standard	5' DIA MH
MH-10	5,133.28	5,126.13	39.62	1.020	5,129.20	5,128.44	Standard	5' DIA MH

STORMCAD OUTPUT TABLES

100-Year

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coeff.	Flow (Total) (cfs)	HGL (In) (ft)	HGL (Out) (ft)	Notes	Inlet Location
INLET A1	5,133.11	5,126.39	0.050	3.63	5,129.81	5,129.31	5' TYPE R INLET	In Sag
INLET A2	5,133.11	5,129.04	0.050	5.21	5,130.58	5,130.08	10' TYPE R INLET	In Sag
INLET A3	5,133.69	5,128.90	0.050	9.73	5,132.87	5,132.37	15' TYPE R INLET	In Sag
INLET A4	5,133.69	5,129.00	0.050	3.71	5,132.83	5,132.33	10' TYPE R INLET	In Sag
INLET A5	5,134.91	5,129.11	1.770	4.46	5,132.17	5,131.67	10' TYPE R INLET (MODIFIED)	In Sag
INLET A5.1	5,134.91	5,130.83	0.050	10.83	5,133.45	5,132.95	10' TYPE R INLET	In Sag
INLET A6	5,137.21	5,130.94	0.050	9.53	5,134.57	5,134.07	5' TYPE R INLET	In Sag
INLET A7	5,137.96	5,133.11	0.050	1.84	5,135.07	5,134.57	5' TYPE R INLET	In Sag
INLET A8	5,139.80	5,135.24	0.050	1.46	5,136.38	5,135.88	5' TYPE R INLET	In Sag
INLET A9	5,139.80	5,135.34	0.050	7.43	5,137.13	5,136.63	10' TYPE R INLET	In Sag
INLET A10	5,137.17	5,134.40	0.050	4.33	5,137.09	5,136.59	TYPE C INLET	In Sag
INLET B1	5,131.91	5,127.02	1.320	1.17	5,128.63	5,128.13	5' TYPE R INLET	In Sag
INLET B2	5,131.91	5,127.43	0.050	4.71	5,129.21	5,128.71	10' TYPE R INLET	In Sag
INLET C1	5,133.30	5,127.95	1.320	6.85	5,129.73	5,129.23	10' TYPE R INLET (MODIFIED)	In Sag
INLET C2	5,133.28	5,128.31	0.050	7.39	5,130.48	5,129.98	10' TYPE R INLET	In Sag

STORMCAD OUTPUT TABLES

100-Year

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (acres)	Runoff Coefficient	Time of C (min)	CA (acres)	Intensity (in/h)	Flow (cfs)
A1	INLET A1	0.655	0.744	8.111	0.487	7.399	3.63
A2	INLET A2	1.080	0.660	8.600	0.713	7.246	5.21
A3	INLET A3	2.490	0.670	14.760	1.668	5.787	9.73
A4	INLET A4	1.000	0.660	15.940	0.660	5.579	3.71
A5	INLET A5	1.280	0.650	17.600	0.832	5.314	4.46
A5.1	INLET A5.1	2.530	0.730	14.600	1.847	5.816	10.83
A6	INLET A6	1.750	0.750	8.740	1.313	7.203	9.53
A7	INLET A7	0.260	0.820	5.000	0.213	8.581	1.84
A8	INLET A8	0.190	0.890	5.000	0.169	8.581	1.46
A9	INLET A9	1.660	0.700	12.030	1.162	6.343	7.43
A10	INLET A10	1.470	0.590	20.200	0.867	4.951	4.33
B1	INLET B1	0.150	0.900	5.000	0.135	8.581	1.17
B2	INLET B2	0.980	0.670	9.050	0.657	7.111	4.71
C1	INLET C1	1.310	0.720	8.740	0.943	7.203	6.85
C2	INLET C2	1.980	0.700	17.770	1.386	5.288	7.39

APPENDIX C

REFERENCE EXCERPTS

PRELIMINARY DRAINAGE REPORT
FOR
REUNION VILLAGE 9

May 20, 2020

Prepared For:
Reunion Metropolitan District
17910 East Parkside Drive North
Commerce City, Colorado 80022
Contact: Matt Urkoski

Prepared By:
JR ENGINEERING, LLC
7200 S Alton Way, Suite C400
Centennial, Colorado 80112
(303) 740-9393
Contact: Aaron Clutter, PE

DocuSigned by:
Brent Soderlin 6/16/2020
8B6907E0FGG545B...
City of Commerce City Engineering Approval

NOAA Atlas 14, Volume 8, Version 2
Location name: Commerce City, Colorado, USA*
Latitude: 39.8898°, Longitude: -104.7832°
Elevation: 5225.4 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.226 (0.178-0.289)	0.277 (0.218-0.355)	0.372 (0.291-0.477)	0.461 (0.358-0.593)	0.598 (0.457-0.816)	0.716 (0.531-0.985)	0.845 (0.605-1.19)	0.986 (0.678-1.43)	1.19 (0.787-1.76)	1.36 (0.869-2.02)
10-min	0.332 (0.260-0.424)	0.406 (0.319-0.520)	0.545 (0.425-0.698)	0.674 (0.524-0.869)	0.876 (0.669-1.20)	1.05 (0.778-1.44)	1.24 (0.886-1.74)	1.44 (0.993-2.09)	1.74 (1.15-2.58)	1.99 (1.27-2.96)
15-min	0.404 (0.317-0.517)	0.496 (0.388-0.634)	0.664 (0.519-0.851)	0.823 (0.639-1.06)	1.07 (0.815-1.46)	1.28 (0.949-1.76)	1.51 (1.08-2.12)	1.76 (1.21-2.54)	2.13 (1.41-3.15)	2.42 (1.55-3.61)
30-min	0.562 (0.441-0.718)	0.685 (0.537-0.876)	0.913 (0.714-1.17)	1.13 (0.876-1.45)	1.46 (1.12-1.99)	1.75 (1.30-2.40)	2.06 (1.47-2.90)	2.40 (1.65-3.47)	2.89 (1.91-4.29)	3.30 (2.11-4.91)
60-min	0.692 (0.543-0.884)	0.843 (0.661-1.08)	1.12 (0.877-1.44)	1.39 (1.08-1.78)	1.79 (1.37-2.45)	2.14 (1.59-2.95)	2.53 (1.81-3.56)	2.95 (2.03-4.26)	3.55 (2.35-5.27)	4.05 (2.59-6.03)
2-hr	0.822 (0.650-1.04)	1.00 (0.790-1.27)	1.33 (1.05-1.69)	1.64 (1.29-2.10)	2.13 (1.64-2.87)	2.54 (1.90-3.46)	3.00 (2.17-4.18)	3.49 (2.42-5.00)	4.21 (2.81-6.18)	4.80 (3.10-7.07)
3-hr	0.891 (0.708-1.12)	1.08 (0.859-1.36)	1.44 (1.14-1.82)	1.77 (1.39-2.25)	2.28 (1.77-3.07)	2.73 (2.05-3.69)	3.21 (2.33-4.45)	3.74 (2.61-5.32)	4.51 (3.03-6.57)	5.14 (3.34-7.52)
6-hr	1.06 (0.848-1.32)	1.27 (1.02-1.59)	1.66 (1.32-2.08)	2.03 (1.61-2.55)	2.59 (2.02-3.45)	3.08 (2.33-4.12)	3.61 (2.64-4.94)	4.19 (2.95-5.88)	5.02 (3.40-7.23)	5.71 (3.74-8.25)
12-hr	1.31 (1.05-1.62)	1.54 (1.25-1.91)	1.98 (1.59-2.46)	2.38 (1.90-2.97)	3.00 (2.35-3.93)	3.52 (2.69-4.65)	4.08 (3.02-5.52)	4.70 (3.34-6.52)	5.58 (3.81-7.94)	6.30 (4.18-9.02)
24-hr	1.57 (1.28-1.93)	1.87 (1.52-2.29)	2.38 (1.93-2.93)	2.84 (2.29-3.51)	3.51 (2.77-4.53)	4.07 (3.13-5.30)	4.66 (3.46-6.21)	5.29 (3.78-7.23)	6.17 (4.25-8.65)	6.87 (4.60-9.72)
2-day	1.81 (1.49-2.20)	2.18 (1.79-2.65)	2.80 (2.29-3.41)	3.32 (2.70-4.06)	4.06 (3.20-5.14)	4.65 (3.59-5.96)	5.25 (3.92-6.88)	5.87 (4.22-7.89)	6.71 (4.65-9.26)	7.37 (4.98-10.3)
3-day	1.98 (1.63-2.39)	2.35 (1.94-2.84)	2.97 (2.44-3.60)	3.50 (2.86-4.26)	4.25 (3.37-5.35)	4.85 (3.76-6.18)	5.46 (4.11-7.12)	6.10 (4.41-8.15)	6.96 (4.86-9.55)	7.64 (5.19-10.6)
4-day	2.11 (1.75-2.54)	2.47 (2.05-2.98)	3.09 (2.55-3.73)	3.62 (2.97-4.39)	4.38 (3.49-5.49)	4.98 (3.88-6.33)	5.61 (4.23-7.28)	6.26 (4.55-8.33)	7.15 (5.01-9.76)	7.85 (5.36-10.8)
7-day	2.40 (2.00-2.86)	2.78 (2.32-3.33)	3.43 (2.85-4.12)	3.99 (3.29-4.80)	4.78 (3.83-5.94)	5.40 (4.24-6.80)	6.05 (4.60-7.78)	6.72 (4.92-8.86)	7.63 (5.39-10.3)	8.34 (5.74-11.4)
10-day	2.65 (2.22-3.15)	3.06 (2.56-3.64)	3.75 (3.13-4.47)	4.33 (3.59-5.19)	5.15 (4.15-6.36)	5.79 (4.57-7.24)	6.45 (4.93-8.24)	7.13 (5.24-9.33)	8.05 (5.71-10.8)	8.75 (6.06-11.9)
20-day	3.39 (2.87-4.00)	3.87 (3.27-4.56)	4.65 (3.91-5.50)	5.30 (4.44-6.29)	6.20 (5.03-7.56)	6.90 (5.48-8.51)	7.60 (5.85-9.58)	8.31 (6.16-10.7)	9.25 (6.62-12.2)	9.97 (6.97-13.4)
30-day	3.99 (3.39-4.68)	4.54 (3.85-5.32)	5.42 (4.59-6.38)	6.15 (5.17-7.26)	7.15 (5.82-8.63)	7.90 (6.31-9.67)	8.65 (6.70-10.8)	9.41 (7.01-12.1)	10.4 (7.48-13.7)	11.1 (7.83-14.9)
45-day	4.71 (4.02-5.49)	5.37 (4.58-6.26)	6.42 (5.46-7.51)	7.28 (6.15-8.54)	8.43 (6.89-10.1)	9.29 (7.45-11.3)	10.1 (7.88-12.6)	11.0 (8.21-13.9)	12.0 (8.70-15.7)	12.8 (9.07-17.0)
60-day	5.29 (4.53-6.14)	6.06 (5.19-7.04)	7.29 (6.22-8.49)	8.28 (7.03-9.68)	9.59 (7.86-11.4)	10.6 (8.49-12.8)	11.5 (8.97-14.2)	12.4 (9.32-15.7)	13.6 (9.84-17.6)	14.4 (10.2-19.0)

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

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

Please refer to NOAA Atlas 14 document for more information.

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PRELIMINARY DRAINAGE REPORT FOR REUNION VILLAGE 9 - CUHP INPUT

Summary of CUHP Input Parameters (Version 2.0.0)

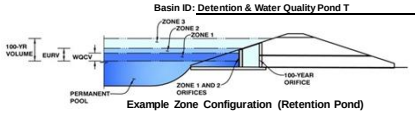
								Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			
Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	Percent Eff. Imperv.
9OS9	S_9OS9	REUNION	0.004	0.105	0.224	0.010	69.1	0.35	0.10	4.50	0.60	0.0018	0.00	0.92	0.30	67.28
9OS8	S_9OS8	REUNION	0.008	0.078	0.169	0.020	64.1	0.35	0.10	4.50	0.60	0.0018	0.00	0.91	0.28	62.21
9OS7	S_9OS7	REUNION	0.024	0.095	0.287	0.010	17.4	0.35	0.10	4.40	0.59	0.0018	0.00	0.35	0.12	14.41
9A0	S_9A0	REUNION	0.024	0.142	0.279	0.010	57.8	0.35	0.10	3.70	0.55	0.0018	0.00	0.89	0.26	55.89
9A5a	S_9A5a	REUNION	0.004	0.164	0.330	0.010	68.6	0.35	0.10	4.40	0.64	0.0017	0.00	0.92	0.30	66.69
9A5b	S_9A5b	REUNION	0.002	0.091	0.197	0.010	68.6	0.35	0.10	3.50	0.54	0.0018	0.00	0.92	0.30	67.01
9A5c	S_9A5c	REUNION	0.026	0.160	0.341	0.020	47.1	0.35	0.10	4.40	0.60	0.0018	0.00	0.84	0.22	44.66
9A5d	S_9A5d	REUNION	0.004	0.165	0.330	0.010	68.6	0.35	0.10	4.50	0.65	0.0017	0.00	0.92	0.30	66.66
9A4a	S_9A4a	REUNION	0.030	0.103	0.274	0.020	60.0	0.35	0.10	4.00	0.56	0.0018	0.00	0.90	0.27	58.17
9A4b	S_9A4b	REUNION	0.034	0.097	0.236	0.010	55.0	0.35	0.10	3.40	0.53	0.0018	0.00	0.88	0.25	53.11
9A3a	S_9A3a	REUNION	0.016	0.123	0.249	0.010	62.0	0.35	0.10	3.90	0.56	0.0018	0.00	0.90	0.28	60.22
9A3b	S_9A3b	REUNION	0.014	0.071	0.182	0.010	59.4	0.35	0.10	3.00	0.50	0.0018	0.00	0.90	0.27	57.78
9A2a	S_9A2a	REUNION	0.010	0.057	0.144	0.010	55.0	0.35	0.10	3.40	0.53	0.0018	0.00	0.88	0.25	53.11
9A2b	S_9A2b	REUNION	0.026	0.085	0.260	0.010	55.0	0.35	0.10	3.50	0.53	0.0018	0.00	0.88	0.25	53.09
9A2c	S_9A2c	REUNION	0.018	0.063	0.177	0.020	55.0	0.35	0.10	3.40	0.53	0.0018	0.00	0.88	0.25	53.11
9OS2a	S_9OS2a	REUNION	0.008	0.067	0.102	0.020	12.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.24	0.11	9.43
9A7	S_9A7	REUNION	0.105	0.229	0.462	0.020	58.1	0.35	0.10	4.40	0.60	0.0018	0.00	0.89	0.26	56.05
9A6	S_9A6	REUNION	0.099	0.234	0.455	0.010	51.4	0.35	0.10	3.90	0.56	0.0018	0.00	0.86	0.24	49.30
9A1	S_9A1	REUNION	0.066	0.116	0.331	0.010	56.3	0.35	0.10	3.90	0.56	0.0018	0.00	0.88	0.26	54.29
9E2	S_9E2	REUNION	0.008	0.099	0.199	0.010	59.3	0.35	0.10	4.60	0.70	0.0015	0.00	0.90	0.27	56.95
9OS5	S_9OS5	REUNION	0.006	0.077	0.246	0.020	2.0	0.35	0.10	4.80	0.81	0.0012	0.00	0.00	0.02	1.23
9OS6	S_9OS6	REUNION	0.029	0.121	0.180	0.020	60.0	0.35	0.10	4.40	0.59	0.0018	0.00	0.90	0.27	58.05
9OS10	S_9OS10	REUNION	0.001	0.014	0.028	0.010	56.2	0.35	0.10	4.50	0.60	0.0018	0.00	0.88	0.25	54.03
9B4	S_9B4	REUNION	0.003	0.122	0.259	0.010	87.7	0.35	0.10	4.50	0.60	0.0018	0.00	0.96	0.36	86.56
9B3	S_9B3	REUNION	0.005	0.059	0.180	0.010	87.7	0.35	0.10	4.60	0.72	0.0015	0.00	0.96	0.36	86.36
9B2a	S_9B2a	REUNION	0.165	0.118	0.376	0.030	55.0	0.35	0.10	4.60	0.72	0.0015	0.00	0.88	0.25	52.38
9B2b	S_9B2b	REUNION	0.008	0.028	0.138	0.020	55.0	0.35	0.10	4.80	0.84	0.0011	0.00	0.88	0.25	51.82
9B1a	S_9B1a	REUNION	0.015	0.074	0.169	0.040	73.5	0.35	0.10	4.50	0.60	0.0018	0.00	0.93	0.31	71.75
9B1b	S_9B1b	REUNION	0.011	0.039	0.109	0.020	67.8	0.35	0.10	4.60	0.71	0.0015	0.00	0.92	0.29	65.59
9B0	S_9B0	REUNION	0.021	0.082	0.175	0.010	100.0	0.35	0.10	4.70	0.79	0.0013	0.00	1.00	0.00	100.00
9E5	S_9E5	REUNION	0.001	0.117	0.161	0.020	59.3	0.35	0.10	5.00	1.00	0.0007	0.00	0.90	0.27	56.39
9E4	S_9E4	REUNION	0.005	0.104	0.208	0.010	59.3	0.35	0.10	5.00	1.00	0.0007	0.00	0.90	0.27	56.39
9E3	S_9E3	REUNION	0.005	0.144	0.288	0.040	59.3	0.35	0.10	4.70	0.73	0.0014	0.00	0.90	0.27	56.81
9OS1	S_9OS1	REUNION	0.015	0.104	0.152	0.020	2.0	0.35	0.10	4.80	0.83	0.0012	0.00	0.04	0.02	1.24
9OS2b	S_9OS2b	REUNION	0.053	0.142	0.308	0.020	25.0	0.35	0.10	4.60	0.71	0.0015	0.00	0.50	0.15	21.06
9OS2c	S_9OS2c	REUNION	0.006	0.047	0.112	0.030	55.0	0.35	0.10	4.80	0.80	0.0013	0.00	0.88	0.25	52.01
9OS4	S_9OS4	REUNION	0.036	0.087	0.233	0.020	2.0	0.35	0.10	5.00	1.00	0.0007	0.00	0.04	0.02	1.24
9C2	S_9C2	REUNION	0.063	0.140	0.330	0.020	55.0	0.35	0.10	4.80	0.80	0.0012	0.00	0.88	0.25	51.91
9C1	S_9C1	REUNION	0.035	0.068	0.239	0.030	55.0	0.35	0.10	4.50	0.61	0.0018	0.00	0.88	0.25	52.77
9C0	S_9C0	REUNION	0.006	0.045	0.089	0.030	90.4	0.35	0.10	4.50	0.60	0.0018	0.00	0.96	0.37	89.46
9E6	S_9E6	REUNION	0.011	0.203	0.525	0.030	59.3	0.35	0.10	4.70	0.77	0.0013	0.00	0.90	0.27	56.66
9OS3	S_9OS3	REUNION	0.037	0.573	1.161	0.010	2.0	0.35	0.10	4.80	0.82	0.0012	0.00	0.04	0.02	1.25
9101b	S_9101b	REUNION	0.035	0.091	0.318	0.030	55.0	0.35	0.10	4.80	0.84	0.0011	0.00	0.88	0.25	51.82
9101a	S_9101a	REUNION	0.007	0.019	0.092	0.090	59.3	0.35	0.10	5.00	1.00	0.0007	0.00	0.90	0.27	56.39
9F5	S_9F5	REUNION	0.036	0.176	0.291	0.030	60.3	0.35	0.10	4.70	0.77	0.0013	0.00	0.90	0.27	57.75
9F4	S_9F4	REUNION	0.012	0.116	0.256	0.010	65.0	0.35	0.10	4.50	0.60	0.0018	0.00	0.91	0.28	63.09
9F3	S_9F3	REUNION	0.035	0.199	0.278	0.010	45.6	0.35	0.10	4.50	0.60	0.0018	0.00	0.83	0.22	43.16
9F2	S_9F2	REUNION	0.003	0.057	0.149	0.010	87.7	0.35	0.10	4.50	0.60	0.0018	0.00	0.96	0.36	86.56
9F1	S_9F1	REUNION	0.020	0.080	0.175	0.020	69.9	0.35	0.10	4.50	0.60	0.0018	0.00	0.92	0.30	68.05
9E1	S_9E1	REUNION	0.004	0.097	0.193	0.030	59.3	0.35	0.10	4.50	0.61	0.0018	0.00	0.90	0.27	57.27
9D1	S_9D1	REUNION	0.037	0.120	0.222	0.010	40.0	0.35	0.10	4.40	0.59	0.0018	0.00	0.80	0.20	37.53

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: REUNION VILLAGE 9 PRELIMINARY DRAINAGE REPORT

Basin ID: Detention & Water Quality Pond T



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	201	acres
Watershed Length =	4,000	ft
Watershed Slope =	0.02	ft/ft
Watershed Imperviousness =	55%	percent
Percentage Hydrologic Soil Group A =	3%	percent
Percentage Hydrologic Soil Group B =	73%	percent
Percentage Hydrologic Soil Groups C/D =	25%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	Commerce City - Civic Center	
Water Quality Capture Volume (WQCV) =	3.692	acre-feet
Excess Urban Runoff Volume (EURV) =	11.603	acre-feet
2-yr Runoff Volume (P1 = 0.84 in.) =	6.877	acre-feet
5-yr Runoff Volume (P1 = 1.12 in.) =	10.033	acre-feet
10-yr Runoff Volume (P1 = 1.39 in.) =	13.962	acre-feet
25-yr Runoff Volume (P1 = 1.79 in.) =	21.161	acre-feet
50-yr Runoff Volume (P1 = 2.14 in.) =	26.679	acre-feet
100-yr Runoff Volume (P1 = 2.53 in.) =	33.875	acre-feet
500-yr Runoff Volume (P1 = 3.55 in.) =	51.401	acre-feet
Approximate 2-yr Detention Volume =	6.442	acre-feet
Approximate 5-yr Detention Volume =	9.433	acre-feet
Approximate 10-yr Detention Volume =	12.639	acre-feet
Approximate 25-yr Detention Volume =	15.482	acre-feet
Approximate 50-yr Detention Volume =	17.160	acre-feet
Approximate 100-yr Detention Volume =	20.068	acre-feet

Optional User Override 1-hr Precipitation

0.84	inches
1.12	inches
1.39	inches
1.79	inches
2.14	inches
2.53	inches
3.55	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	3.692	acre-feet
Zone 2 Volume (EURV - Zone 1) =	7.911	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	8.466	acre-feet
Total Detention Basin Volume =	20.068	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = 1 ft

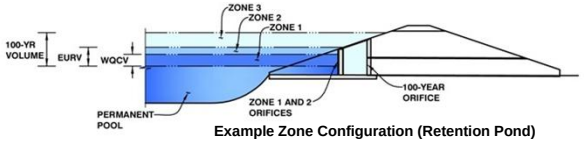
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
5122.00	--	1.00	--	--	--	4,538	0.104	2,224	0.051
5,123.00	--	2.00	--	--	--	39,026	0.896	23,662	0.543
5,124.00	--	3.00	--	--	--	85,459	1.962	86,293	1.981
5,125.00	--	4.00	--	--	--	130,418	2.994	194,231	4.459
5,126.00	--	5.00	--	--	--	159,905	3.671	339,393	7.791
5,127.00	--	6.00	--	--	--	174,278	4.001	506,484	11.627
5,128.00	--	7.00	--	--	--	182,509	4.190	684,878	15.723
5,129.00	--	8.00	--	--	--	182,438	4.188	867,351	19.912
5,130.00	--	9.00	--	--	--	199,204	4.573	1,058,172	24.292
5,131.00	--	10.00	--	--	--	207,663	4.767	1,261,606	28.962
5,131.33	--	10.33	--	--	--	210,650	4.836	1,330,627	30.547
5,132.00	--	11.00	--	--	--	216,194	4.963	1,473,620	33.830
5,133.00	--	12.00	--	--	--	224,591	5.156	1,694,013	38.889
5,133.50	--	12.50	--	--	--	228,838	5.253	1,807,370	41.492

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: REUNION VILLAGE 9 PRELIMINARY DRAINAGE REPORT

Basin ID: Detention & Water Quality Pond T



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.74	3.692	Orifice Plate
Zone 2 (EURV)	6.00	7.911	Rectangular Orifice
Zone 3 (100-year)	8.04	8.466	Weir&Pipe (Restrict)
		20.068	Total

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

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

Calculated Parameters for Underdrain

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

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.75	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	11.00	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	7.639E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.25	2.50					
Orifice Area (sq. inches)	11.00	11.00	11.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.75	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	6.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	8.00		inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	0.33	N/A	ft^2
Vertical Orifice Centroid =	0.25	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	12.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	6.00	N/A	feet
Over Flow Weir Slope Length =	6.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.10	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	50.40	N/A	ft^2
Overflow Grate Open Area w/ Debris =	25.20	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.37	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	48.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	30.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	8.26	N/A	ft^2
Outlet Orifice Centroid =	1.41	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.82	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

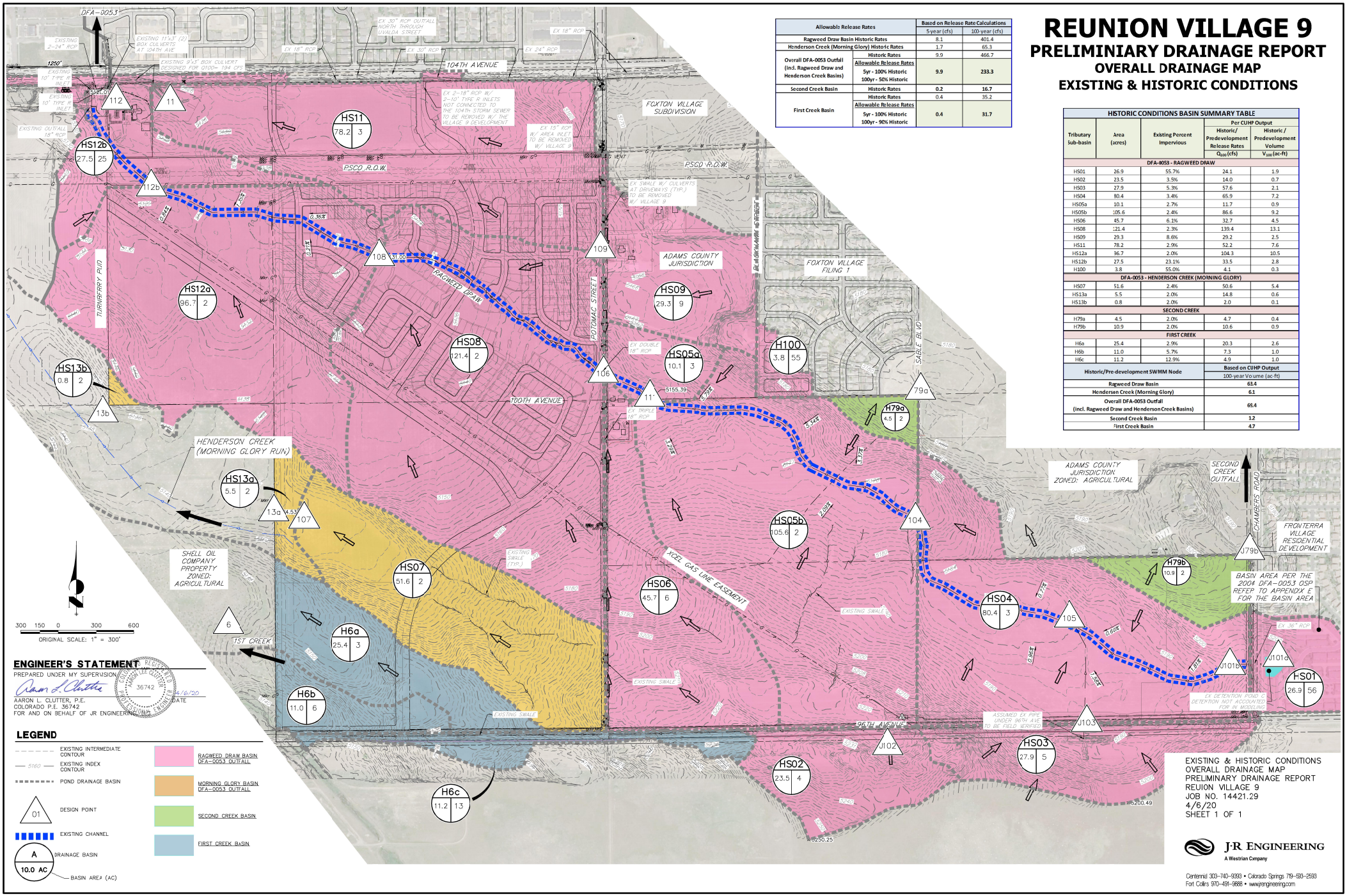
Calculated Parameters for Spillway

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

Routed Hydrograph Results

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	0.84	1.12	1.39	1.79	2.14	2.53	3.55
Calculated Runoff Volume (acre-ft) =	3.692	11.603	6.877	10.033	13.962	21.161	26.679	33.875	51.401
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	3.689	11.588	6.866	10.020	13.939	21.140	26.655	33.839	51.355
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.04	0.19	0.63	0.91	1.29	2.15
Predevelopment Peak Q (cfs) =	0.0	0.0	1.8	7.1	38.1	126.2	183.8	259.7	431.7
Peak Inflow Q (cfs) =	61.6	188.0	113.1	163.3	224.5	334.6	416.7	520.2	750.5
Peak Outflow Q (cfs) =	1.7	4.5	3.3	4.2	15.6	91.4	103.4	111.9	130.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.4	0.7	0.6	0.4	0.3
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.2	1.7	1.9	2.1	2.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	37	63	51	59	65	62	60	58	54
Time to Drain 99% of Inflow Volume (hours) =	40	67	55	63	70	69	68	68	67
Maximum Ponding Depth (ft) =	3.64	5.83	4.62	5.44	6.27	7.07	7.80	8.96	11.77
Area at Maximum Ponding Depth (acres) =	2.61	3.94	3.41	3.82	4.05	4.19	4.19	4.56	5.11
Maximum Volume Stored (acre-ft) =	3.422	10.912	6.411	9.439	12.674	16.016	19.074	24.110	37.708

REUNION VILLAGE 9
PRELIMINIARY DRAINAGE REPORT
OVERALL DRAINAGE MAP
EXISTING & HISTORIC CONDITIONS



Allowable Release Rates		Based on Release Rate Calculations	
		5-year (cfs)	100-year (cfs)
Ragweed Draw Basin Historic Rates		8.1	401.4
Henderson Creek (Morning Glory) Historic Rates		1.7	65.3
Overall DFA-0053 Outfall (incl. Ragweed Draw and Henderson Creek Basins)	Historic Rates	9.9	466.7
	Allowable Release Rates 5yr - 100% Historic 100yr - 50% Historic	9.9	233.3
Second Creek Basin	Historic Rates	0.2	16.7
First Creek Basin	Historic Rates	0.4	35.2
	Allowable Release Rates 5yr - 100% Historic 100yr - 90% Historic	0.4	31.7

HISTORIC CONDITIONS BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Existing Percent Impervious	Per CUHP Output: Historic/ Predevelopment Release Rates Q_{100} (cfs)	Per CUHP Output: Historic / Predevelopment Volume V_{100} (ac-ft)
DFA-0053 - RAGWEED DRAW				
HS01	26.9	55.7%	24.1	1.9
HS02	23.5	3.5%	14.0	0.7
HS03	27.9	5.3%	57.6	2.1
HS04	80.4	3.4%	65.9	7.2
HS05a	10.1	2.7%	11.7	0.9
HS05b	105.6	2.4%	86.6	9.2
HS06	45.7	6.1%	32.7	4.5
HS08	121.4	2.3%	139.4	13.1
HS09	29.3	8.6%	29.2	2.5
HS11	78.2	2.9%	52.2	7.6
HS12a	96.7	2.0%	104.3	10.5
HS12b	27.5	23.1%	33.5	2.8
H100	3.8	55.0%	4.1	0.3
DFA-0053 - HENDERSON CREEK (MORNING GLORY)				
HS07	51.6	2.4%	50.6	5.4
HS13a	5.5	2.0%	14.8	0.6
HS13b	0.8	2.0%	2.0	0.1
SECOND CREEK				
H79a	4.5	2.0%	4.7	0.4
H79b	10.9	2.0%	10.6	0.9
FIRST CREEK				
H6a	25.4	2.9%	20.3	2.6
H6b	11.0	5.7%	7.3	1.0
H6c	11.2	12.9%	4.9	1.0

Historic/Pre-development SWMM Node	Based on CUHP Output: 100-year Volume (ac-ft)
Ragweed Draw Basin	63.4
Hendersen Creek (Morning Glory)	6.1
Overall DFA-0053 Outfall (Incl. Ragweed Draw and Hendersen Creek Basins)	65.4
Second Creek Basin	1.2
First Creek Basin	4.7

ENGINEER'S STATEMENT

PREPARED UNDER MY SUPERVISION

AARON L. CLUTTER, P.E.
COLORADO P.E. 36742
FOR AND ON BEHALF OF JR ENGINEERING

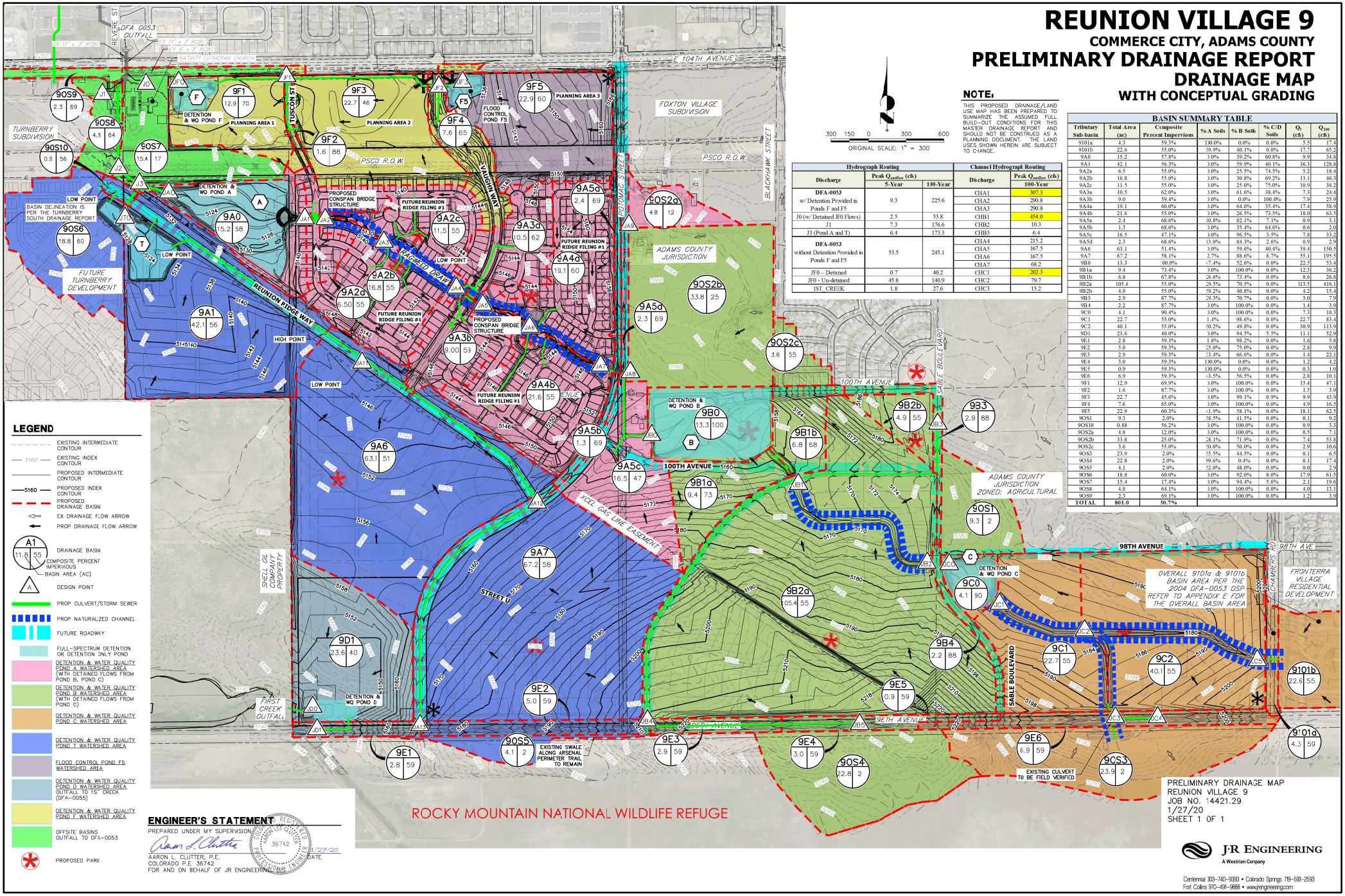
36742 — 4/6/20 — DATE

LEGEND

- EXISTING INTERMEDIATE CONTOUR
- 5160 EXISTING INDEX CONTOUR
- POND DRAINAGE BASIN
- 01 DESIGN POINT
- EXISTING CHANNEL
- A / 10.0 AC DRAINAGE BASIN / BASIN AREA (AC)
- RAGWEED DRAW BASIN DFA-0053 OUTFALL
- MORNING GLORY BASIN DFA-0053 OUTFALL
- SECOND CREEK BASIN
- FIRST CREEK BASIN

EXISTING & HISTORIC CONDITIONS
OVERALL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
REUION VILLAGE 9
JOB NO. 14421.29
4/6/20
SHEET 1 OF 1

J·R ENGINEERING
A Westrian Company
Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com



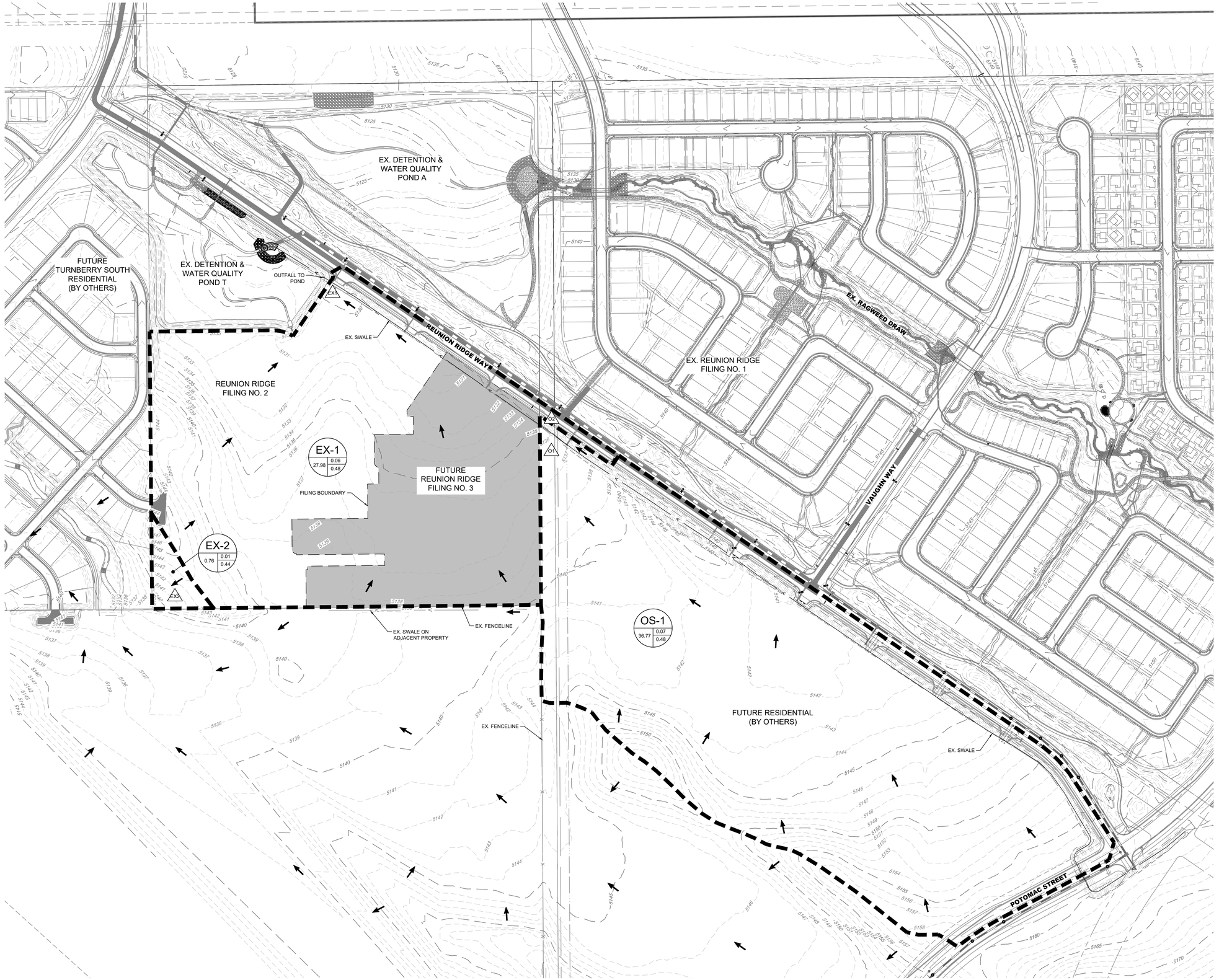
Hydrograph Routing			Channel Hydrograph Routing	
Discharge	Peak $Q_{outflow}$ (cfs)		Discharge	Peak $Q_{outflow}$ (cfs)
	5-Year	100-Year		100-Year
DFA-0053 w/ Detention Provided in Ponds F and F5	9.3	225.6	CHA1	307.3
			CHA2	290.8
			CHA3	290.8
J0 (w/ Detained JF0 Flows)	2.5	53.8	CHB1	454.0
J1	7.3	176.6	CHB2	10.3
J3 (Pond A and T)	6.4	173.3	CHB3	6.4
DFA-0053 without Detention Provided in Ponds F and F5	53.5	245.1	CHA4	215.2
			CHA5	167.5
			CHA6	167.5
			CHA7	68.2
JF0 – Detained	0.7	40.2	CHC1	202.3
JF0 - Un-detained	45.8	140.9	CHC2	79.7
1ST CREEK	1.8	27.6	CHC3	15.2

BASIN SUMMARY TABLE

Tributary Sub-basin	Total Area (ac)	Composite Percent Impervious	% A Soils	% B Soils	% C/D Soils	Q_5 (cfs)	Q_{100} (cfs)
9101a	4.3	59.3%	100.0%	0.0%	0.0%	5.5	17.4
9101b	22.6	55.0%	59.9%	40.1%	0.0%	17.7	65.3
9A0	15.2	57.8%	3.0%	39.2%	60.8%	9.9	34.8
9A1	42.1	56.3%	3.0%	59.9%	40.1%	36.3	128.8
9A2a	6.5	55.0%	3.0%	25.5%	74.5%	5.2	18.4
9A2b	16.8	55.0%	3.0%	30.8%	69.2%	13.1	46.3
9A2c	11.5	55.0%	3.0%	25.0%	75.0%	10.9	38.2
9A3a	10.5	62.0%	3.0%	61.6%	38.4%	7.3	24.4
9A3b	9.0	59.4%	3.0%	0.0%	100.0%	7.9	25.9
9A4a	19.1	60.0%	3.0%	64.6%	35.4%	17.4	58.9
9A4b	21.6	55.0%	3.0%	26.5%	73.5%	18.0	63.2
9A5a	2.4	68.6%	10.8%	82.1%	7.1%	0.9	3.1
9A5b	1.3	68.6%	3.0%	35.4%	64.6%	0.6	2.0
9A5c	16.5	47.1%	3.0%	96.5%	3.5%	7.8	33.2
9A5d	2.3	68.6%	13.0%	84.3%	2.6%	0.9	2.9
9A6	63.1	51.4%	3.0%	59.6%	40.4%	39.4	150.5
9A7	67.2	58.1%	3.7%	88.6%	8.7%	55.1	195.3
9B0	13.3	100.0%	47.4%	52.6%	0.0%	22.5	53.4
9B1a	9.4	73.4%	3.0%	100.0%	0.0%	12.3	36.2
9B1b	6.8	67.8%	26.6%	73.4%	0.0%	8.6	26.8
9B2a	105.4	55.0%	29.5%	70.5%	0.0%	113.5	416.1
9B2b	4.9	55.0%	59.2%	40.8%	0.0%	4.2	15.4
9B3	2.9	87.7%	29.3%	70.7%	0.0%	3.0	7.9
9B4	2.2	87.7%	3.0%	100.0%	0.0%	1.4	3.9
9C0	4.1	90.4%	3.0%	100.0%	0.0%	7.3	18.1
9C1	22.7	55.0%	1.4%	98.6%	0.0%	22.7	83.4
9C2	40.1	55.0%	50.2%	49.8%	0.0%	30.9	113.9
9D1	23.6	40.0%	3.0%	94.5%	5.5%	11.1	52.9
9E1	2.8	59.3%	1.8%	98.2%	0.0%	1.6	5.8
9E2	5.0	59.3%	25.0%	75.0%	0.0%	2.8	9.9
9E3	2.9	59.3%	33.4%	66.6%	0.0%	1.4	22.1
9E4	3.0	59.3%	130.0%	0.0%	0.0%	1.2	4.2
9E5	0.9	59.3%	130.0%	0.0%	0.0%	0.3	1.0
9E6	6.9	59.3%	43.5%	56.5%	0.0%	2.8	10.1
9F1	12.9	69.9%	3.0%	100.0%	0.0%	15.4	47.1
9F2	1.6	87.7%	3.0%	100.0%	0.0%	1.5	3.9
9F3	22.7	45.6%	3.0%	99.1%	0.9%	9.9	43.9
9F4	7.6	65.0%	3.0%	100.0%	0.0%	4.9	16.2
9F5	22.9	60.3%	41.9%	58.1%	0.0%	18.1	62.3
9OS1	9.3	2.0%	58.5%	41.5%	0.0%	0.1	9.2
9OS10	0.88	56.2%	3.0%	100.0%	0.0%	0.9	3.3
9OS2a	4.8	12.0%	3.0%	100.0%	0.0%	0.5	7.1
9OS2b	33.8	25.0%	28.1%	71.9%	0.0%	7.4	53.8
9OS2c	3.6	55.0%	50.0%	50.0%	0.0%	2.9	10.6
9OS3	23.9	2.0%	55.5%	44.5%	0.0%	0.1	6.5
9OS4	22.8	2.0%	99.6%	0.4%	0.0%	0.1	17.4
9OS5	4.1	2.0%	52.0%	48.0%	0.0%	0.0	2.9
9OS6	18.8	60.0%	3.0%	92.0%	8.0%	17.9	61.5
9OS7	15.4	17.0%	3.0%	94.4%	5.6%	2.1	19.6
9OS8	4.8	64.1%	3.0%	100.0%	0.0%	4.0	13.1
9OS9	2.3	69.1%	3.0%	100.0%	0.0%	1.2	3.9
TOTAL	**801.0**	**50.7%**					

BACK POCKET

DRAINAGE MAPS



0 150' 300'

1 inch = 150 ft.

LEGEND

- X / AREA XX.X / 0.45 / 0.60 — BASIN DESIGNATION; 5 YEAR COEFFICIENTS; 100 YEAR COEFFICIENTS
- X — DESIGN POINT
- DIRECTIONAL FLOW ARROW
- PROPOSED DRAINAGE BASIN
- 5280 PROPOSED MAJOR CONTOUR
- 5279 PROPOSED MINOR CONTOUR
- 5280 EXISTING MAJOR CONTOUR
- 5279 EXISTING MINOR CONTOUR
- EASEMENT
- RIGHT OF WAY (R.O.W.)
- CENTERLINE
- PROJECT BOUNDARY
- EXISTING STORM & STUB OUT
- STORM MANHOLES
- CRUSHER FINES MAINTENANCE ACCESS
- RIPRAP
- 100 YEAR FLOODPLAIN
- WETLAND
- LIMITS OF CONSTRUCTION
- RETAINING WALL
- DRAINAGE SWALE

NOTES:

1. THERE ARE NO REGULATORY FLOODPLAINS ON-SITE.

RUNOFF SUMMARY TABLE - EXISTING

DIRECT RUNOFF				
DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
EX1	EX-1	27.98	2.17	40.84
EX2	EX-2	0.76	0.02	1.70
O1	OS-1	36.77	2.76	42.46

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#	REVISION DESCRIPTION	DATE	BY
A	1ST SUBMITTAL FOR REVIEW	05/2021	DJB

REUNION RIDGE FILING NO. 2
COMMERCE CITY, COLORADO

FINAL DRAINAGE REPORT
EXISTING DRAINAGE MAP

NOT FOR CONSTRUCTION

DESIGNED BY: DJB
DRAWN BY: DJB
CHECKED BY: KJR

JOB NO. 18-004

SHEET 1 OF 2

10/14/2021 4:00 PM X:\18-004 REUNION RIDGE FILINGS\CIVIL\CAD\PLANS\FILING 2\DRAINAGE\DRAINAGE MAP EXISTING.DWG

LEGEND

EXISTING / PROPOSED

- BASIN DESIGNATION
- 5 YEAR COEFFICIENTS / 100 YEAR COEFFICIENTS
- DESIGN POINT
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ROUTE
- PROPOSED DRAINAGE BASIN
- EXISTING DRAINAGE BASIN
- 5280 PROPOSED MAJOR CONTOUR
- 5279 PROPOSED MINOR CONTOUR
- 5280 EXISTING MAJOR CONTOUR
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- RIGHT OF WAY (R.O.W.)
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- PROJECT BOUNDARY
- PROPOSED STORM & STUB OUT
- EXISTING STORM & STUB OUT
- STORM MANHOLES
- STORM INLETS
- FES, FOREBAY, & TRICKLE CHANNEL
- OUTLET STRUCTURE
- CRUSHER FINES MAINTENANCE ACCESS
- RIPRAP
- 100 YEAR FLOODPLAIN
- WETLAND
- LIMITS OF CONSTRUCTION
- RETAINING WALL
- DRAINAGE SWALE

NOTES:

1. THERE ARE NO REGULATORY FLOODPLAINS ON-SITE.

RUNOFF SUMMARY TABLE - PROPOSED

DIRECT RUNOFF

DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
A1	A-1	0.66	1.20	3.60
A2	A-2	1.08	1.41	5.19
A3	A-3	2.49	2.67	9.63
A4	A-4	1.00	0.99	3.69
A5	A-5	1.28	1.18	4.45
A5.1	A-5.1	2.53	3.43	10.72
A6	A-6	1.75	3.23	9.50
A7	A-7	0.26	0.69	1.82
A8	A-8	0.19	0.61	1.45
A9	A-9	1.66	2.21	7.35
A10	A-10	1.47	0.83	4.29
B1	B-1	0.15	0.49	1.16
B2	B-2	0.98	1.30	4.69
C1	C-1	1.31	2.11	6.79
C2	C-2	1.98	2.18	7.34
D1	D-1	3.60	3.34	11.06
D2	D-2	1.17	2.14	6.36
D3	D-3	1.66	0.70	3.59
D4	D-4	0.63	1.49	3.98
D5	D-5	1.50	2.32	7.52
E1	E-1	0.37	0.18	0.98
E2	E-2	0.49	0.39	1.87
E3	E-3	0.15	0.04	0.61
E4	E-4	0.38	0.42	1.80
OI	OS-1	36.77	2.76	42.46

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#	REVISION DESCRIPTION	DATE	BY
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REUNION RIDGE FILING NO. 2
COMMERCE CITY, COLORADO

FINAL DRAINAGE REPORT
PROPOSED DRAINAGE MAP

NOT FOR CONSTRUCTION

DESIGNED BY: DJB
DRAWN BY: DJB
CHECKED BY: KJR

JOB NO. 18-004

SHEET 2 OF 2

10/14/2021 4:00 PM X:\18-004 REUNION RIDGE FILINGS\CIVIL\CAD\PLANS\FILING 2\DRAINAGE\DRAINAGE MAP PROPOSED.DWG