

PRELIMINARY DRAINAGE REPORT

GRANDVIEW RESERVE FILING NO. 1

El Paso County, Colorado

PREPARED FOR: D.R. Horton 9555 S. Kingston Court Englewood, CO

Engineering Review

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PREPARED BY: Galloway & Company, Inc. 1155 Kelly Johnson Blvd., Suite 305 Colorado Springs, CO 80920

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ENGINEER'S STATEMENT

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

Brady A. Shyrock, PE #38164 For and on behalf of Galloway & Company, Inc. Date

DEVELOPER'S CERTIFICATION

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

By:

Date

Address: D.R. Horton 9555 S. Kingston Court Englewood, CO

EL PASO COUNTY CERTIFICATION

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

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

Conditions:

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I. Purpose

The purpose of this Preliminary Drainage Report is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site, and to identify which types of drainage facilities will be needed and where they will be located. This report will remain in general compliance with the approved MDDP prepared by HR Green, dated November 2020.

II. General Description

The project is a single-family residential development located in the Falcon area of El Paso County, Colorado. The site is located in a portion of the South half of Section 21, the North half of Section 28, Township 12 South, Range 64 West of the 6th Principal Meridian, County of El Paso, State of Colorado. The subject property is bounded by Eastonville Road to the west, the proposed extension of Rex Road to the north, undeveloped land proposed as future development to the east, and undeveloped land within the Waterbury Development to the south. A Vicinity Map is included in **Appendix A**.

This preliminary drainage report is the basis for the drainage facility design in conformance with the previously approved MDDP for the site prepared by HR Green, "*Grandview Reserve Master Development Drainage Plan*", HR Green, November 2020 (**MDDP**). The site consists of approximately 189.479 acres and includes 568 dwelling units.

The existing soil types within the proposed site as determined by the NRCS Web Soil Survey for El Paso County Area consist of Columbine gravelly sandy loam (hydrologic soil group A) and Stapleton sandy loam (hydrologic soil group B). See the soils map included in **Appendix A**.

III. Drainage Criteria

Hydrology calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

The drainage calculations were based on the criteria manual Figure 6-5 and IDF equations to determine the intensity and are listed in Table 1 below.

Return Period	One Hour Depth (in).	Intensity (in/hr)
5-year	1.50	5.17
100-year	2.52	8.68

Table 1 - Precipitation Data

The rational method was used to calculate peak flows as the tributary areas are less than 100 acres. The rational method has been proven to be accurate for basins of this size and is based on the following formula:

Q = CIA

Where:

Q = Peak Discharge (cfs)
C = Runoff Coefficient
I = Runoff intensity (inches/hour)
A = Drainage area (acres)

The runoff coefficients are calculated based on land use, percent imperviousness, and design storm for each basin, as shown in the drainage criteria manual (Table 6-6). Composite percent impervious and C values were calculated using the residential, streets, roofs, and lawns coefficients found in Table 6-6 of the manual.

The 100-year event was used as the major storm event. The 5-year event was used as the minor event. The UD-Inlets v5.01 spreadsheet was utilized for the sizing of the proposed sump inlets.

The UD-Detention v4.04 spreadsheet was utilized for the design of the proposed on-site water quality ponds, Ponds A, B, C, D, E.

IV. Existing Drainage Conditions

The site is contained fully within one major drainage basin; the Gieck Ranch Drainage Basin and is tributary to Black Squirrel Creek. The site generally drains from north to south with an average slope of 2% outside of the channel. The rational method was used to analyze the individual basins within the site because their size permits it.

There are two (2) major drainageways that currently convey existing on & off-site flows through the site to the southeast. These are the Main Stem (MS) and Main Stem Tributary Number 2 (MST) as referenced in the **MDDP**. Both drainageways generally flow to the southeast towards Highway 24, before crossing via existing drainage structures. Currently, these channels receive flows from two off-site basins, one from the west (west of Basin B1 per the **MDDP**; 0.17 mi², $Q_5 = \pm 67$ cfs, $Q_{100} = \pm 413$ cfs) and the second from the northwest of Basin C1 per the **MDDP**; 0.44 mi², $Q_5 = \pm 59$ cfs, $Q_{100} = \pm 280$ cfs) and are routed under Eastonville Road via existing pipe culverts. There is an existing 24" CMP that conveys runoff under Eastonville Road at the MS, a location approximately 650 feet north of the proposed Rex Road extension that directs runoff via overtopping Eastonville Road at MST, and a 20" x 27" ECMP that directs runoff beneath Eastonville Road at the Falcon Regional Park.

While the **MDDP** shows a total of 22 basins that were analyzed as part of the overall Grandview Reserve development, for the purposes of this report, 7 of the Basins within the MDDP will be used for analysis. These Basins include A1, B1, B2, C1, B3, and the two off-site Basins situated to the northwest of Eastonville Road.

For a more in-depth analysis of existing tributary conditions as it pertains to this phase of development, an existing basin map has been prepared. The existing map can be found in **Appendix F** and basins are described below.

Basin EX-1 (16.18 AC, $Q_5 = 4.4$ cfs, $Q_{100} = 31.5$ cfs): Located on the southwest portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem channel (**DP 1**).

Address the combined flows $\sqrt{1000}$ including flows from the west

Basin EX-2 (46.06 AC, $Q_5 = 10.3$ cfs, $Q_{100} = 72.8$ cfs): Located in the southwest portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the Main Stem channel (**DP** 2).

Basin EX-3 (64.34 AC, $Q_5 = 13.1$ cfs, $Q_{100} = 93.3$ cfs): Located in the central portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem Tributary #2 channel (**DP 3**).

Basin EX-4 (2.68 AC, $Q_5 = 0.8$ cfs, $Q_{100} = 6.1$ cfs): Located on the eastern portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the east into Main Stem Tributary #2 channel (**DP 4**).

Basin EX-5 (26.15 AC, $Q_5 = 6.5$ cfs, $Q_{100} = 46.5$ cfs): Located in the north central portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem Tributary #2 channel (**DP 5**).

Basin EX-6 (31.53 AC, $Q_5 = 8.6$ cfs, $Q_{100} = 60.9$ cfs): Located on the northern portion of the site, this basin consists of un-developed land. Runoff from this basin will sheet flow to the southeast before channelizing and eventually out falling into Main Stem Tributary #2 channel (**DP 6**).

Runoff generated at Design Points 3, 4, 5, and 6 combine at Design Point 7 at the southeast corner of the property within the Main Stem Tributary #2 channel (**DP 7**).

V. Four Step Process

The Four Step Process is used to minimize the adverse impacts of urbanization and is a vital component of developing a balanced, sustainable project. Below identifies the approach to the four-step process:

1. Employ Runoff Reduction Practices

This step uses low impact development (LID) practices to reduce runoff at the source. Generally, rather than creating point discharges that are directly connected to impervious areas runoff is routed through pervious areas to promote infiltration. The Impervious Reduction Factor (IRF) method was used and calculations can be found in **Appendix E.**

2. Stabilize Channels

This step implements stabilization to channels to accommodate developed flows while protecting infrastructure and controlling sediment loading from erosion in the drainageways. Erosion protection in the form of riprap pads at all outfall points to the channel to prevent scouring of the channel from point discharges. The existing channel analysis and design for the Main Stem Channel (MS) is to be completed by others and a report for the channel improvements will be submitted for review separately.

Provide Water Quality Capture Volume (WQCV)

This step utilizes formalized water quality capture volume to slow the release of runoff from the site. The EURV volume will release in 72 hours, while the WQCV will release in no less than 40 hours. Onsite water quality control volume detention ponds will provide water quality treatment for all of the developed areas, prior to the runoff being released into either of the major drainage ways. Refer to WQCV Plan in **Appendix F.**

3.

4. Consider Need for Industrial and Commercial BMPs

As this project is all residential development and no commercial or industrial development is proposed, there will be no need for any specialized BMPs which would be associated with an industrial or commercial site.

VI. Proposed Drainage Conditions

The proposed development lies completely within the Gieck Ranch Drainage Basin and consists of five (5) larger basins (A, B, C, D, &E) which have been broken down into fifty-three (53) smaller sub-basins. Site runoff will be collected via inlets & pipes and diverted to one of the nine proposed full spectrum detention ponds. All necessary calculations can be found within the appendices of this report.

According to the **MDDP**, there are two major drainageways that run through the site. As was discussed within the Existing Conditions portion of the report, both the Main Stem (MS) and Main Stem Tributary Number 2 (MST) run through the site conveying runoff from the northwest to the southeast. Presently, these channels receive flows from two off-site basins, one from the west (west of Sub-basin OS-3 per this report and Basin B1 per the **MDDP**; 0.17 mi², $Q_5 = \pm 67$ cfs, $Q_{100} = \pm 413$ cfs) and the second from the north (northwest of Sub-basin OS-1 per this report and Basin C1 per the **MDDP**; 0.44 mi², $Q_5 = \pm 59$ cfs, $Q_{100} = \pm 280$ cfs) and are routed under Eastonville Road via existing pipe culverts. There is an existing 24" CMP that conveys runoff under Eastonville Road at the MS, a location approximately 650 feet north of the proposed Rex Road extension that directs runoff via overtopping Eastonville Road at MST, and a 20" x 27" ECMP that directs runoff beneath Eastonville Road at the Falcon Regional Park.

Basin OS-1 (3.28 AC, $Q_5 = 7.2$ cfs, $Q_{100} = 15.1$ cfs) and **Basin OS-2** (2.31 AC, $Q_5 = 4.6$ cfs, $Q_{100} = 10.3$ cfs): Located at the northwestern border of the site within the public ROW for Eastonville Road, contains the proposed improvements to Eastonville Road. This drainage basin consists entirely of onsite roadway improvements outside of the project site. Runoff from this basin will sheet flow to the proposed curb & gutter along Eastonville Road. The flows will then be routed to the south where they will be captured by a combination of inlets, roadside swale, and storm sewer piping, which will convey and discharge the developed runoff into a detention pond on the north side of the MS and west of Eastonville Road (Northern Pond). Runoff will be treated prior to being released at historic rates immediately upstream from the MS and Eastonville Road.

Basin OS-3 (3.02 AC, $Q_5 = 7.0$ cfs, $Q_{100} = 15.3$ cfs) and **Basin OS-4** (3.00 AC, $Q_5 = 6.2$ cfs, $Q_{100} = 14.3$ cfs): Located at the southwestern border of the site within the public ROW for Eastonville Road, contains the proposed improvements to Eastonville Road. This drainage basin consists entirely of onsite roadway improvements outside of the project site. Runoff from this basin will sheet flow to the proposed curb & gutter along Eastonville Road. The flows will then be routed to the north where they will be captured by a combination of inlets, roadside swale, and storm sewer piping, which will convey and discharge the developed runoff into a detention pond on the north side of the MS and west of Eastonville Road (Southern Pond). Runoff will be treated prior to being released at historic rates immediately upstream from the MS and Eastonville Road.

Preliminary sizing calculations for the two FSD facilities has been completed with the northern and southern ponds requiring approximately 1.035 ac-ft and 0.522 ac-ft of storage capacity, respectively. Preliminary sizing for the MS and Eastonville Road crossing has been included as part of the "*Final Drainage Report for Eastonville Road from Future Rex Road to Londonderry Drive*", by HR Green, March

2022. This crossing will require 3-60" RCP pipes with type M riprap for 50' L x 30' W at the downstream end.

There are no proposed major channel improvements for MS associated with this development -however, MST is proposed to be re-routed. The analysis for both channels and design of MST were done by others and a separate report will be submitted for review for all channel improvements.

The site will provide five (5) Full Spectrum Extended Detention Basins (EDBs). Ponds A, B, C, D, & E, will discharge treated runoff at historic rates directly into either the MS or MST Channel. The project site will also provide two (2) Temporary Sediment Basins (TSBs). TSB-1 at Rex Road and TSB-2 at the southern corner of the church property will discharge treated runoff at historic rates directly into MST at the northern portion of the project site.

The Rex Rd. TSB or SFB will need to be sized to function as a PBMP.

As has been mentioned previously, the site is proposed to have a land use of single family residential. The site will consist primarily of 1/8 Acre lots, with some 1/4 Acre and 1/3 Acre lots, public roadways, along with dedicated Tracts for amenity and/or institutional uses. TSB?

The proposed institutional use (**Sub-basin A-1**) area flows have been included in this analysis at a preliminary level only. The Sub-basin is located on the northwest corner of the site, East of Eastonville Rd. & south of the proposed extension of Rek Rd. It is assumed that the area will have a conservative imperviousness value of 90%. Sub-basin A-1 encompasses an area of 11.23 area and proposed developed runoff for the site has been calculated to be $Q_5 = 46.4$ cfs, $Q_{100} = 90.7$ cfs. However, in the interim conditions, runoff from this basin ($Q_5 = 4.2$ cfs, $Q_{100} = 29.9$ cfs) will sheet flow from the northwest to the southeast, to a separate, temporary onsite detention and water quality facility (SPB) positioned at the southeastern corner of the property, where treated flows will be released to a proposed modified CDOT Type 'C' inlet on the west side of lyvbridge Boulevard (DP 1). Flows will then be routed under Ivybridge Boulevard, via 24" RCP, to the updated Main Stem Tributary 2 channel. It is anticipated that the property will be developed at a later date as a fill in subsequent to the proposed development of the majority of this project site. This property will need to submit a separate drainage report, complete with an updated water quality and detention design, as part of its development. Installation of an internal storm sewer system separate from the outfall for the property will be required. The development is responsible for ensuring the site drainage, once constructed, will not adversely impact any adjacent properties and downstream facilities. Preliminary pond sizing calculations have been provided in Appendix E for reference. As stated above, water quality and detention will be addressed with the future development of the institutional site.

Basin-1 (1.22 AC, $Q_5 = 4.2$ cfs, $Q_{100} = 8.4$ cfs): Located at the northern border of the site, Basin-1 contains the proposed Phase 1 improvements to Rex Rd. This drainage basin consists entirely of onsite roadway improvements within the project site. Runoff from this basin will sheet flow to the proposed curb & gutter along Rex Rd. The flows will then be routed to the east where they will be conveyed to a proposed Sand Filter Basin (SFB) where runoff will be treated prior to discharging into Main Stem Tributary #2 channel.

Basin A-2a (4.21 AC, $Q_5 = 8.1$ cfs, $Q_{100} = 18.9$ cfs): Located on the north portion of the site, this basin consists of residential lots, Tintagel Trail, and a portion of the north half of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the northeast side of the intersection of Tintagel Trail and Dawlish Drive (**DP 2a**).

Basin A-2b (2.75 AC, $Q_5 = 8.4$ cfs, $Q_{100} = 16.7$ cfs): Located on the north portion of the site, this basin consists of residential lots, Ivybridge Boulevard, and a portion of the north half of Dawlish Drive. Runoff from this basin will sheet flow from the residential lots to the adjacent Dawlish Drive and directly from within the ROW of Ivybridge Boulevard. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' inlet in sump conditions, located on the northeast side of the intersection of Ivybridge Boulevard and Dawlish Drive (**DP 2b**).

Basin A-3 (0.36 AC, $Q_5 = 1.6$ cfs, $Q_{100} = 3.2$ cfs): Located on the north portion of the site, this basin consists of a portion of the south half of Dawlish Drive. Flows will be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' inlet in sump conditions, located on the southeast side of the intersection of Ivybridge Boulevard and Dawlish Drive (**DP 3**).

Basin A-4a (6.05 AC, $Q_5 = 9.4$ cfs, $Q_{100} = 21.9$ cfs): Located on the northwestern portion of the site, this basin consists of residential lots, Primley Woods Path, and a portion of the west half of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the west side of Dawlish Drive **(DP 4a)**, between Primley Woods Path and St Ives Way. Bypass flows will then be routed downstream to a proposed (public) 15' CDOT Type 'R' sump inlet, located on the west side of Dawlish Drive directly across from Sparkwell Street **(DP4)**. Emergency overflows will be routed downstream via proposed curb and gutter to Design Point 7 within Sparkwell Street.

Basin A-4b (3.81 AC, $Q_5 = 6.2$ cfs, $Q_{100} = 14.5$ cfs): Located on the northwestern portion of the site, this basin consists of residential lots, St Ives Way, and a portion of the west half of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the west side of Dawlish Drive **(DP 4b)**, between Primley Woods Path and St Ives Way. Bypass flows will then be routed downstream to a proposed (public) 15' CDOT Type 'R' sump inlet, located on the west side of Dawlish Drive directly across from Sparkwell Street **(DP4)**. Emergency overflows will be routed downstream via proposed curb and gutter to Design Point 7 within Sparkwell Street.

Basin A-5 (0.35 AC, $Q_5 = 1.6$ cfs, $Q_{100} = 3.1$ cfs): Located on the north portion of the site, this basin consists of a portion of the east half of Dawlish Drive. Flows will be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' inlet in sump conditions, located on the east side of Dawlish Drive (DP 5), Just north of the intersection of Sparkwell Street and Dawlish Drive. Emergency overflows will be routed downstream via proposed curb and gutter to Design Point 7 within Sparkwell Street.

Basin A-6 (2.76 AC, $Q_5 = 4.6$ cfs, $Q_{100} = 10.7$ cfs): Located centrally on the site, this basin consists of residential lots, Penryn Circle, and a portion of the south half of Sparkwell Street. Runoff from this basin will sheet flow from the lots to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located on the south side of Sparkwell Street (**DP 6**), Just southeast of the intersection of Penryn Circle & Sparkwell Street. Emergency overflows will overtop Sparkwell Street crown to Design Point 7 (**DP 7**), then overtop curb and gutter and be routed downstream via an overflow swale to proposed Pond A.

Basin A-7 (0.23 AC, $Q_5 = 1.1$ cfs, $Q_{100} = 2.0$ cfs): Located centrally on the site, this basin consists of a portion of the north half of Sparkwell Street. Runoff from this basin will sheet flow from edge of ROW to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' inlet in sump conditions, located on the north side of Sparkwell Street (**DP 7**), Just northeast of the

private?

intersection of Penryn Circle & Sparkwell Street. Emergency overflows will overtop curb and gutter and be routed downstream via an overflow swale to proposed Pond A.

Basin A-8 (5.44 AC, $Q_5 = 14.7$ cfs, $Q_{100} = 30.8$ cfs): Located centrally on the site, this basin consists entirely of proposed amenity / park facilities. Runoff from this basin will sheet flow to paved parking lot and drive aisle with curb and gutter. Flows will then be routed, via curb & gutter, to a series of proposed (public) CDOT Type 'R' inlets and area inlets with storm sewer piping conveying generated runoff downstream to Design Point 8 (**DP 8**), located at the southeast corner of the park site. Emergency overflows will overtop curb and gutter and will sheet flow, across green space, to proposed Pond A.

Basin A-9 (4.91 AC, $Q_5 = 7.4$ cfs, $Q_{100} = 17.3$ cfs): Located in the central portion of the site, directly west from Pond A. This basin consists of residential lots, one-half of Pixie Place, a section of Salcombe Trail, and a section of the west half of Sparkwell Street. Runoff from this basin will sheet flow to the proposed roadways, where runoff will be directed downstream, via curb & gutter, a proposed (public) 20' CDOT Type 'R' sump inlet (**DP 7a**). Runoff is then conveyed downstream to **DP 7b** where additional runoff is added from Sub-basin A-10.

Basin A-10 (1.02 AC, $Q_5 = 2.1$ cfs, $Q_{100} = 4.9$ cfs): Located in the central portion of the site, directly west from Pond A. This basin consists of residential lots and the easter half of a section of Sparkwell Street. Runoff from this basin will sheet flow to the proposed roadway, where runoff will be directed downstream, via curb & gutter, a proposed (public) 5' CDOT Type 'R' sump inlet (**DP 7b**). Runoff is then directed downstream to the northwest corner of Pond A. Flows will then be routed to the outlet structure (**DP 8**), via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem Tributary #2 channel. Emergency overflows will overtop via an emergency spillway and be routed downstream directly to MST.

Basin A-11 (3.56 AC, $Q_5 = 2.0$ cfs, $Q_{100} = 8.6$ cfs): Located on the eastern limits of the site, adjacent to the proposed Main Stem Tributary #2 drainageway. This basin consists of the rear portion of lots along Sparkwell Street and the proposed (private) Full Spectrum Detention Pond A. Runoff from this basin will sheet flow directly to Pond A. Flows will then be routed to the outlet structure (**DP 8**), via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem Tributary #2 channel. Emergency overflows will overtop via an emergency spillway and be routed downstream directly to MST.

Basin B-1 (3.33 AC, $Q_5 = 5.3$ cfs, $Q_{100} = 12.3$ cfs): Located on the western limits of the site, adjacent to Eastonville Road. This basin consists of residential lots and the southwest portion of Pixie Place. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' inlet in sump conditions, located at the end of the Cul-De-Sac of Pixie Place (DP 9). Emergency overflows will overtop curb and gutter and be routed downstream via an overflow swale to Dawlish Drive and then downstream via curb & gutter to Design Point DP 10b.

Basin B-2 (4.51 AC, $Q_5 = 7.1$ cfs, $Q_{100} = 16.5$ cfs): Located on the western limits of the site, partially adjacent to Eastonville Road. This basin consists of residential lots, the northwest portion of Pixie Place and the northwestern portion of Dawlish Drive. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 10a)**, located on the northwest side of Dawlish Drive, northeast of Marazion Way. Bypass flows are conveyed downstream via curb & gutter to **DP 10b** where a proposed (public) 15' CDOT Type 'R' at-grade inlet captures flows.

Basin B-3 (4.05 AC, $Q_5 = 7.8$ cfs, $Q_{100} = 18.2$ cfs): Located on the western portion of the site, this basin consists of residential lots, the northwest portion of Dawlish Drive, and Marazion Way. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' sump inlet (DP 10b), located northeast from the intersection of Dawlish Drive and Zelda Street. on the northwest side of Dawlish Drive, northeast of Marazion Way. Emergency overflows will overtop the crown of the roadway and be conveyed downstream via curb and gutter to Design Point DP 11, DP12b, and DP13.

Basin B-4 (1.35 AC, $Q_5 = 4.5$ cfs, $Q_{100} = 9.2$ cfs): Located in the west-central portion of the site. This basin consists of the southeast portion of Dawlish Drive. Runoff from this basin will sheet flow directly to the curb & gutter and be directed downstream to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located east of the intersection of Dawlish Drive & Zelda Street (DP 11). Emergency overflows will overtop the curb return flowline and be conveyed downstream via curb and gutter to Design Point DP 12b.

Basin B-5 (5.12 AC, $Q_5 = 7.9$ cfs, $Q_{100} = 18.5$ cfs): Located centrally on the site, this basin consists of residential lots, Marazion Way, the northwest portion of Salcombe Trail, and the southwest portion of Pixie Place. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet (**DP 12a**), located on the northwest side of Salcombe Trail, northeast of the intersection between Zelda Street and Salcombe Trail. Bypass flows are conveyed downstream via curb & gutter to **DP 12b**.

Basin B-6 (2.28 AC, $Q_5 = 3.7$ cfs, $Q_{100} = 8.7$ cfs): Located centrally on the site. This basin consists of residential lots and the northwest portion of Plinky Plonk Path. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the northwest side of Plinky Plonk Path (DP 14). Bypass flows are conveyed downstream via curb & gutter to **DP 12b**.

Basin B-7 (0.89 AC, $Q_5 = 1.6$ cfs, $Q_{100} = 3.8$ cfs): Located centrally on the site. This basin consists of residential lots and the southeast portion of Plinky Plonk Path. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' at-grade inlet, located on the southeast side of Plinky Plonk Path (DP 15). Bypass flows are conveyed downstream via curb & gutter to **DP 12b**.

Basin B-8 (3.23 AC, $Q_5 = 5.3$ cfs, $Q_{100} = 12.4$ cfs): Located centrally on the site. This basin consists of residential lots, the southeast portion of Plinky Plonk Path, and the northeast portion of Zelda Street. Runoff from this basin will sheet flow from the lots to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet, located on the southeast side of the intersection between Plinky Plonk Path and Zelda Street (**DP 12b**). Emergency overflows will overtop the crown of the roadway and be conveyed downstream via curb and gutter to Design Point **DP 13**.

Basin B-9 (2.42 AC, $Q_5 = 3.8$ cfs, $Q_{100} = 9.0$ cfs): Located centrally on the site, adjacent to the Main Stem channel. This basin consists residential lots and the southwest portion of Zelda Street. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' sump inlet, located on the southwest side of the intersection between Plinky Plonk Path and Zelda Street (**DP 13**). Emergency overflows will overtop the curb & gutter of the roadway and be conveyed downstream via a graded swale into Pond B (**DP 16**).

Basin B-10 (1.10 AC, $Q_5 = 0.5$ cfs, $Q_{100} = 3.3$ cfs): Located centrally on the site, adjacent to the Main Stem channel. This basin consists of the proposed (private) Full Spectrum Detention Pond B. Runoff from this basin will sheet flow directly to Pond B. Flows will then be routed to the outlet structure **(DP 16)**, via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin C-1 (4.12 AC, $Q_5 = 6.8$ cfs, $Q_{100} = 16.0$ cfs): Located on the east portion of the site, this basin consists of residential lots and the eastern half of a portion of Salcombe Trail. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the southeast side of the intersection of Stoke Gabriel Way and Totness Terrace (**DP 17b**). Bypass flows are conveyed downstream via curb & gutter to **DP 17e**.

C Dr. and Totness Terrace

Basin C-2 (2.71 AC, $Q_5 = 4.9$ cfs, $Q_{100} = 11.4$ cfs): Located on the eastern portion of the site, this basin consists of residential lots and the southern portion of Roads O & R. Runoff from this basin will sheet flow from the lots to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet (DP 17a), located on the southwest side of the intersection of Stoke Gabriel Way and Totness Terrace. Bypass flows are conveyed downstream via curb & gutter to DP 17c.

Basin C-3 (1.56 AC, Q₅ = 3.3 cfs, Q₁₀₀ = 7.7 cfs): Located on the southeast polition of the site, this basin consists of residential lots and the eastern half of Totness Terrace. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet (DP 17a), located on the southwest side of the intersection of Stoke Gabriel Way and Totness Terrace. Bypass flows are conveyed downstream via curb & gutter to DP 17c.

Basin C-4 (2.47 AC, $Q_5 = 4.1$ cfs, $Q_{100} = 9.6$ cfs): Located on the southeast portion of the site, this basin consists of residential lots and the eastern half of Frogmore Lane. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet (**DP 17c**), located on the southwest side of the intersection of Stoke Gabriel Way and Frogmore Lane. Bypass flows are conveyed downstream via curb & gutter to **DP 17d**.

Basin C-5 (3.09 AC, $Q_5 = 5.5$ cfs, $Q_{100} = 12.8$ cfs): Located on the southeast portion of the site, this basin consists of residential lots and the western half of Stoke Gabriel Way. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet (**DP 17d**), located on the northwest side of the intersection of Stoke Gabriel Way and Galmpton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 17g**.

Basin C-6 (2.10 AC, $Q_5 = 3.2$ cfs, $Q_{100} = 7.4$ cfs): Located on the southeast portion of the site, this basin consists of residential lots and the eastern half of Stoke Gabriel Way. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet (**DP 17e**), located on the northeast side of the intersection of Stoke Gabriel Way and Galmpton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 17h**.

Basin C-7 (6.72 AC, $Q_5 = 11.3$ cfs, $Q_{100} = 26.3$ cfs): Located in the central portion of the site, this basin consists of residential lots and the **eastern** half of **Galmpton** Drive. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet **(DP 18a)**, located on the west side of the intersection of **Totness** Terrace and Galmpton Drive. Bypass flows are conveyed downstream via curb & gutter to **DP 18b**.

Basin C-8 (5.11 AC, $Q_5 = 8.6$ cfs, $Q_{100} = 20.0$ cfs): Located in the central portion of the site, this basin consists of residential lots, a portion of Totness Terrace, and the western half of Galmpton Drive. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet (DP 17f), located on the southeast side of the intersection of Totness Terrace and Galmpton Drive. Bypass flows are conveyed downstream via curb & gutter to DP 17g and DP 17h.

Basin C-9a (3.5 AC, $Q_5 = 5.6$ cfs, $Q_{100} = 13.1$ cfs): Located on the southeast corner of the site, this basin consists of residential lots, a portion of Frogmore Lane, and the northern half of Galmpton Drive. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' sump inlet (DP 17g), located on the north side of Galmpton Drive **just north of Hope Cove Loop**. Bypass flows are conveyed downstream via curb & gutter to DP 17h. Emergency overflows will overtop the crown of Galmpton Drive and be routed downstream via proposed curb and gutter to Design Point **18b** within Galmpton Drive.

Basin C-9b (3.69 AC, $Q_5 = 5.9$ cfs, $Q_{100} = 13.7$ cfs): Located on the southeast corner of the site, this basin consists of residential lots and the northern half of Galmpton Drive. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet (DP 17h), located on the north side of Galmpton Drive just north of Hope Cove Loop. Emergency overflows will overtop the crown of Galmpton Drive and be routed downstream via proposed curb and gutter to Design Point **18b** within Galmpton Drive.

Basin C-10 (3.51 AC, $Q_5 = 5.2$ cfs, $Q_{100} = 12.2$ cfs): Located on the southeast corner of the site, this basin consists of residential lots and the southern half of Galmpton Drive. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' sump inlet (**DP 18b**), located on the south side of Galmpton Drive just north of Hope Cove Loop. Emergency overflows will overtop the curb & gutter of Galmpton Drive and be routed downstream via a graded grassed swale and curb & gutter within Hope Cove Loop to Design Point **19** within Hope Cove Loop.

Basin C-11 (0.46 AC, $Q_5 = 1.0$ cfs, $Q_{100} = 2.3$ cfs): Located on the southeast corner of the site, this basin consists of a grassed amenity area and the north half of Hope Cove Loop. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' sump inlet (**DP 19**), located on the north side of Hope Cove Loop. Emergency overflows will overtop the crown of Hope Cove Loop and be routed downstream via curb & gutter to Design Point **20** within Hope Cove Loop.

Basin C-12 (1.79 AC, $Q_5 = 3.1$ cfs, $Q_{100} = 7.2$ cfs): Located on the southeast corner of the site, this basin consists of a grassed amenity area and the north half of Hope Cove Loop. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 5' CDOT Type 'R' sump inlet (**DP 20**), located on the south side of Hope Cove Loop. Emergency overflows will overtop the curb & gutter of Hope Cove Loop and be routed downstream via a graded swale to Design Point **21** within Pond C.

Basin C-13 (2.37 AC, $Q_5 = 0.8$ cfs, $Q_{100} = 5.5$ cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the proposed (private) Full Spectrum Detention Pond C. Runoff from this basin will sheet flow directly to Pond C. Flows will then be routed to the outlet structure (**DP 21**), via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin C-14 (1.53 AC, $Q_5 = 0.5$ cfs, $Q_{100} = 3.8$ cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the undeveloped area outside and downstream of the proposed (private) Full Spectrum Detention Pond C. Runoff from this basin will sheet flow directly to the Main Stem Tributary Number 2 (MST).

Verify grades, ped crossing and crosspan

Basin D-1 (2.98 AC, $Q_5 = 4.6$ cfs, $Q_{100} = 10.9$ cfs): Located on the southwest portion of the site, adjacent to Eastonville Road. This basin consists of residential lots, the west half of Kate Meadow Lane, and the north half of Brixham Drive. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located on the west side of Kate Meadow Lane (DP 22), just north of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will overtop the crown of Kate Meadow Lane and be routed downstream via curb & gutter to Design Point 23 within Kate Meadow Lane.

enter crosspan and flow to DP24? –

Basin D-2 (0.87 AC, $Q_5 = 1.7$ cfs, $Q_{100} = 4.0$ cfs): Located on the southwest portion of the site, this basin consists of residential lots and the eastern half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located on the east side of Kate Meadow Lane (**DP 23**), just southeast of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will pool up and be routed around the curb return at the intersection of Kate Meadow Lane and Farm Close Court downstream via curb & gutter to Design Point **24** within Farm Close Court.

Basin D-3 (3.66 AC, $Q_5 = 6.0$ cfs, $Q_{100} = 14.0$ cfs): Located on the southwest portion of the site, this basin consists of residential lots and the <u>eastern</u> half of Farm Close Court. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' inlet in sump conditions, located on the west side of Farm Close Court (**DP 24**), just southeast of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will overtop the crown and be routed downstream via curb & gutter in Farm Close Court to Design Point **25**.

Basin D-4 (2.00 AC, $Q_5 = 3.7$ cfs, $Q_{100} = 8.5$ cfs): Located on the southwest portion of the site, this basin consists of residential lots and the eastern half of Farm Close Court. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 10' CDOT Type 'R' inlet in sump conditions, located on the east side of Farm Close Court (**DP 25**), just southeast of the intersection of Kate Meadow Lane & Farm Close Court. Emergency overflows will overtop curb & gutter and be routed downstream via a graded swale within the maintenance access path to Pond D at Design Point **26**.

Basin D-5 (1.53 AC, $Q_5 = 2.0$ cfs, $Q_{100} = 6.0$ cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists partially of residential lots and the proposed (private) Full Spectrum Detention Pond D. Runoff from this basin will sheet flow directly to Pond D. Flows will then be routed to the outlet structure (DP 26), via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin D-6 (0.83 AC, $Q_5 = 0.3$ cfs, $Q_{100} = 2.1$ cfs): Located on the southwest corner of the site, adjacent to the Main Stem channel. This basin consists of the undeveloped area outside and downstream of the proposed (private) Full Spectrum Detention Pond D. Runoff from this basin will sheet flow directly to the Main Stem channel (MS).

Grandview Reserve Filing No. 1 PDR

Address the Eastonville Road culvert crossings into Basins D1, E1, and A-4a

Basin D-7 (1.80 AC, $Q_5 = 2.5$ cfs, $Q_{100} = 6.5$ cfs): Located on the southwest corner of the site, adjacent to the Main Stem channel. This basin consists of the back portions of residential lots and a drainage swale. Runoff from this basin will sheet flow from the residential lots, into the adjacent swale and will be routed directly to Pond D.

Basin E-1 (5.13 AC, $Q_5 = 9.5$ cfs, $Q_{100} = 22.1$ cfs): Located on the southern portion of the site, this basin consists of residential lots, the southern half of Brixham Drive, Starcross Court, and the southern half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the southwest corner of the intersection between Kate Meadow Lane and Mill Yard Circle (**DP 27**), just north of the cul-de-sac. Bypass flows are conveyed downstream via curb & gutter to **DP 29**.

Basin E-2 (5.42 AC, $Q_5 = 10.1$ cfs, $Q_{100} = 23.6$ cfs): Located on the southern portion of the site, this basin consists of residential lots, a small portion of Mill Yard Circle, and the north half of Kate Meadow Lane. Runoff from this basin will sheet flow to the adjacent roadways. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' at-grade inlet, located on the northwest corner of the intersection between Kate Meadow Lane and Mill Yard Circle (**DP 28**), just north of the cul-de-sac. Bypass flows are conveyed downstream via curb & gutter to **DP 29**.

Basin E-3 (3.20 AC, $Q_5 = 6.0$ cfs, $Q_{100} = 14.0$ cfs): Located on the southern portion of the site, this basin consists of residential lots and the western half of Mill Yard Circle. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 15' CDOT Type 'R' sump inlet, located just northeast from the cul-de-sac of Mill Yard Circle (**DP 29**). Emergency overflows will overtop the crown of Mill Yard Circle and be routed downstream via curb & gutter to Design Point **30**.

Basin E-4 (6.28 AC, $Q_5 = 9.0$ cfs, $Q_{100} = 21.0$ cfs): Located on the southern portion of the site, this basin consists of residential lots and the eastern half of Mill Yard Circle. Runoff from this basin will sheet flow to the adjacent roadway. Flows will then be routed, via curb & gutter, to a proposed (public) 20' CDOT Type 'R' sump inlet, located just northeast from the cul-de-sac of Mill Yard Circle (**DP 30**). Emergency overflows will overtop the curb & gutter and be routed downstream via a graded swale within the maintenance access to Pond E at Design Point **31**.

Basin E-5 (1.13 AC, $Q_5 = 0.4$ cfs, $Q_{100} = 3.0$ cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the proposed (private) Full Spectrum Detention Pond E. Runoff from this basin will sheet flow directly to Pond E. Flows will then be routed to the outlet structure (**DP 31**), via a concrete trickle channel, where it will eventually discharge, at historic rates, into the adjacent Main Stem channel.

Basin E-6 (0.74 AC, $Q_5 = 0.3$ cfs, $Q_{100} = 1.8$ cfs): Located on the southeast corner of the site, adjacent to the Main Stem channel. This basin consists of the undeveloped area outside and downstream of the proposed (private) Full Spectrum Detention Pond E. Runoff from this basin will sheet flow directly to the Main Stem channel (MS).

VII. Storm Sewer System the south

All development is anticipated to be urban and will include storm sewer & street inlets. Storm sewers collect storm water runoff and convey the water to the water quality facilities prior to discharging. Storm sewer systems will be designed to the 100-year storm and checked with the 5-year storm. Inlets will be

placed at sump areas and intersections where street flow is larger than street capacity. UDFCD Inlet spreadsheet has been used to determine the size of all sump inlets.

There will be a minimum of 5 proposed storm systems within the site. Each of the nine storm sewer systems will discharge storm water into its correlated WQCV pond. Each system will consist of reinforced concrete pipe (RCP), CDOT Type 'R' inlets, and storm sewer manholes.

- Swales in A-1 and C-7 also?

Additionally, there is one (1) proposed drainage swale that runs along the back of the residential lots in Basin D-7. The swale was analyzed using the Bentley software FlowMaster to properly size a trapezoidal channel to convey the 100-year flows from the basin to Pond D, while providing 1.0-ft of freeboard. The sizing calculations can be found in **Appendix D.** Describe the size and provide

cross-sections on the drainage plan.

The Final drainage report will include details concerning at-grade inlet locations, street capacity, storm sewer sizing, outlet protection and location. Preliminary sump inlets have been sized and the calculations can be found in **Appendix D**. As mentioned, these sump inlets sizes are preliminary and are currently oversized. It is anticipated that the inlets will reduce in size with the addition of at-grade inlets at the time of the Final Drainage Report.

VIII. Proposed Water Quality Detention Ponds

Nine (9) Water Quality Capture Volume Detention Ponds will be provided for the proposed site, two (2) of which are temporary in nature. All of the proposed ponds are private and will be maintained by the DISTRICT, once established. These detention ponds are proposed to be full spectrum and will provide water quality and detention. The WQCV and EURV release will be controlled with an orifice plate. The release rates for the WQCV and EURV will be 40-hours and 72-hours, respectively. The 100-year volume will be controlled by orifice and/or restrictor plate and will be designed to release at or below the pre-development flow rate. Outlet structures, forebays, trickle channels, etc. will be designed with the final drainage report during final plat. The required FSD pond volumes are as described below:

Pond A: Located to the north of the site, just west of the newly routed Main Stem Tributary #2 channel. This pond will discharge into the Main Stem Tributary #2, ultimately merging with Main Stem to the south, off-site. The required volume WQCV and EURV are 0.75 Ac-Ft & 2.104 Ac-Ft, respectively. The total required detention basin volume is 4.254 Ac-Ft.

Pond B: Located centrally on the site, just east of the Main Stem drainage way. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.592 Ac-Ft & 1.653 Ac-Ft, respectively. The total required detention basin volume is 3.355 Ac-Ft.

Pond C: Located on the southeast portion of the site, between the Main Stem & Main Stem Tributary #2 channels. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.875 Ac-Ft & 2.405 Ac-Ft, respectively. The total required detention basin volume is 4.941 Ac-Ft.

Pond D: Located centrally on the site, just west of the Main Stem channel. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.251 Ac-Ft & 0.672 Ac-Ft, respectively. The total required detention basin volume is 1.404 Ac-Ft.

Pond E: Located on the south side of the site, just west of the Main Stem channel. This pond will discharge into the Main Stem channel. The required volume WQCV and EURV are 0.426 Ac-Ft & 1.150 Ac-Ft, respectively. The total required detention basin volume is 2.395 Ac-Ft.

Provide the volumes calculated by the MHFD routed hydrographs **TSB-1:** Located on the far north side of the site, just east of the extension of Rex Road. This TSB will discharge into the Main Stem Tributary Number 2 (MST). The TSB has been sized to treat the developed runoff for water quality prior to releasing into MST. This TSB captures an upstream tributary area of approximately 1.22 acres and per the MHFD standard, this TSB has been upsized to 2-acre tributary area.

TSB-2: Located on the north side of the site, at the southeast corner of the church property. This TSB will discharge into the Main Stem Tributary Number 2 (MST This TSB captures an upstream tributary area of approximately 11.23 acres and per the MHFD standard, this TSB has been upsized to 12-acre tributary area.

Address the other 2 for Eastonville Rd.

IX. Proposed Channel Improvements

According to the **MDDP**, there are two major drainage ways that run through the site. As was discussed within the Existing Conditions portion of the report, both the Main Stem channel (MS) and Main Stem Tributary #2 channel (MST) run through the site. There are no proposed major channel improvements for MS. An analysis has been done for the Main Stem channel (MS) with both existing and future condition flows as described within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022 (**CLOMR**). Both scenarios, throughout the channel fall within the channel stability criteria.

The MST is proposed to be rerouted. As part of this rerouting of MST, offsite upstream tributary flows will be captured upstream from the proposed Rex Road extension and be conveyed via culvert to the rerouted MST. An analysis has been done for the Main Stem Tributary Number 2 (MST) with both existing and future condition flows as described within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022 (**CLOMR**). Both scenarios, throughout the channel fall within the channel stability criteria.

All developed runoff will be captured and conveyed to one of the corresponding water quality and detention facilities and release at or below historic levels. Therefore, there will be no adverse impact to downstream facilities. The analysis for both drainage ways (MS and MST), offsite upstream tributary capture, and design of MST were done by HR Green within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022 (**CLOMR**) which will be submitted separately for review. A copy of this report is included in Appendix B.

X. Maintenance

not found; also provide HEC-RAS - tables showing velocities, FR, shear, depths, etc.

After completion of construction and upon the Board of County Commissioners acceptance, it is anticipated all drainage facilities within the public Right-of-Way are to be owned and maintained by El Paso County.

All private detention ponds are to be owned and maintained by the Grandview Reserve Metropolitan District No. 2 (DISTRICT), once established, unless an agreement is reached stating otherwise. The proposed Main Stem channel (MS) and Main Stem Tributary Number 2 (MST) will be maintained by the DISTRICT. Maintenance access for all full spectrum detention facilities will be provided from public Right-of-Way. Maintenance access for MS and MST will be provided along the respective eastern top of channel bank within the proposed tracts.

XI. Wetlands Mitigation

In Appendix? Provide report title and date

There are two existing wetlands on site associated with the two major channels, MS and MST. The wetlands are both contained within the existing channels with the wetland in MS being classified as jurisdictional and the wetland in MST classified as non-jurisdictional. The wetlands will be analyzed with the channel report by others. Wetlands maintenance will be the responsibility of the the Grandview Reserve Metropolitan District No. 2 (DISTRICT).

XII. Floodplain Statement

provide final USACE determination

A portion of the project sit lies with Zone A Special Flood Hazard Area as defined by the FIRM Map number 08041C0552G and 08041C0556G effective December 7, 2018. A copy of the FIRM Panel is included in **Appendix A.** FEMA-approved floodplain elevations are required to be shown on final plats.

XIII. Drainage Fees & Maintenance

Gieck Ranch Basin is not listed as part of the El Paso County drainage basin fee program. Unless otherwise instructed, no drainage fees will be assessed. If it is found drainage basin fees are required, these will be included in the Final Drainage Report.

XIV. Conclusion

The Grandview Reserve residential subdivision lies within the Gieck Ranch Drainage Basin. Water quality for the site is provided in five on-site Full Spectrum Detention Ponds; Ponds A, B, C, D, & E as well as two Temporary Sediment Basins; TSB-1 and TSB-2. All drainage facilities within this report were sized according to the El Paso County Drainage Criteria Manuals. There are two major channels passing through the site Main Stem channel and Main Stem Tributary Number 2, which will be addressed by HR Green within the *Grandview Reserve CLOMR Report*, HR Green; September 2021; revised January 2022. The five (5) WQCV ponds will be maintained by a newly established Grandview Reserve Metropolitan District No. 2 (DISTRICT). A Final Drainage Report will be submitted along with the final plat and construction drawings.

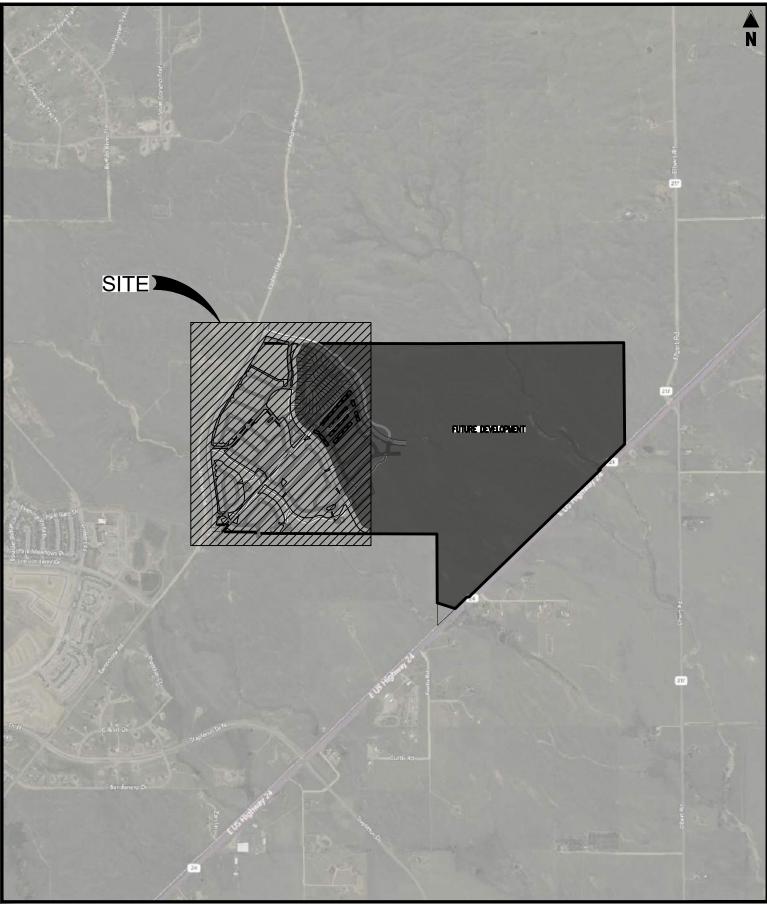
XV. References

- 1. El Paso County Drainage Criteria Manual, 1990.
- 2. Drainage Criteria Manual, Volume 2, City of Colorado Springs, 2002.
- 3. El Paso County Drainage Criteria Manual Update, 2015.
- 4. El Paso County Engineering Criteria Manual, 2020.
- 5. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, January 2016 (with current revisions).
- 6. *Gieck Ranch Drainage Basin Study (DBPS),* Drexel Barrell, October 2010 (Not adopted by County).
- 7. Grandview Reserve Master Development Drainage Plan (MDDP), HR Green, November 2020.
- 8. Final Drainage Report for Eastonville Road from Future Rex Road to Londonderry Drive, by HR Green, March 2022.
- 9. Grandview Reserve CLOMR Report, HR Green; September 2021; revised January 2022.

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APPENDIX A Exhibits and Figures



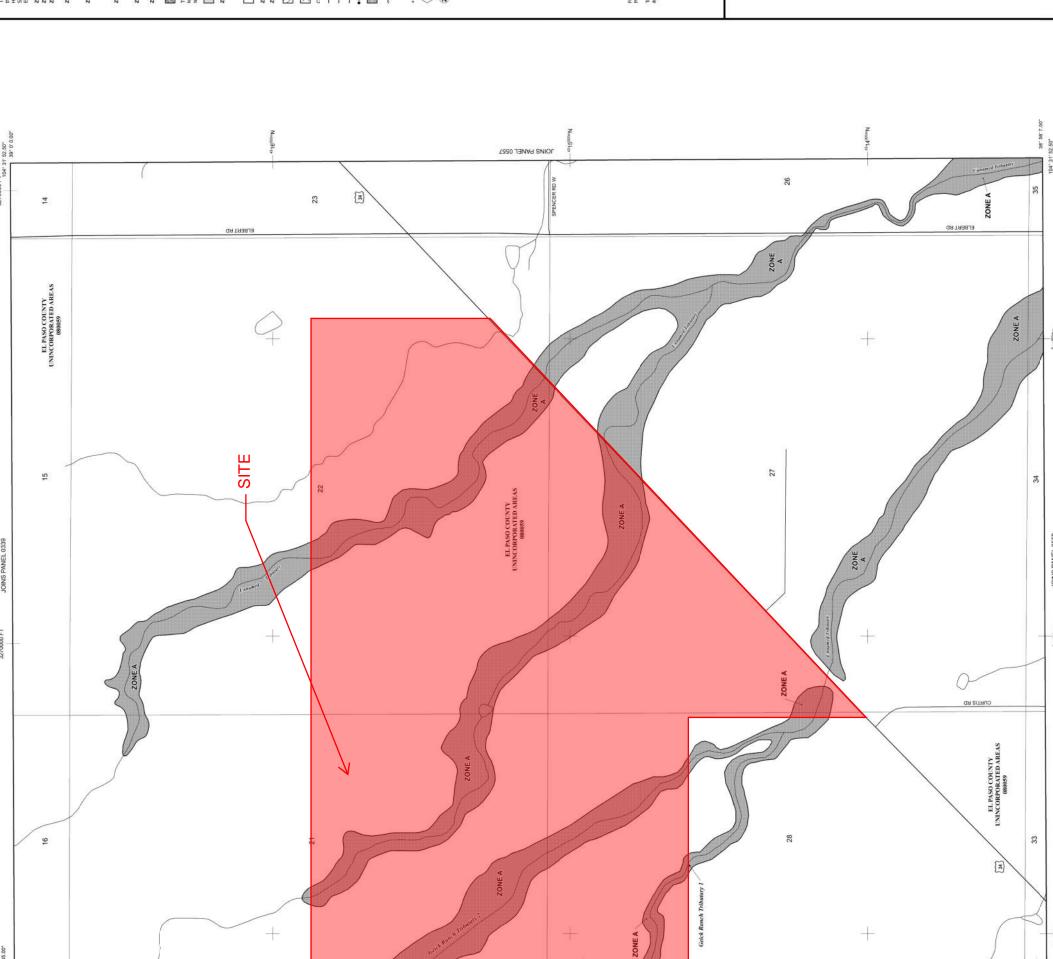
GRANDVIEW RESERVE

EASTONVILLE RD SCALE: 1"=2,000' VICINITY MAP

Project No:	HRG1.20
Drawn By:	JDP
Checked By:	RGD
Date:	07/26/2021



1155 Kelly Johnson Blvd., Suite 305 Colorado Springs, CO 80920 719.900.7220 • GallowayUS.com



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Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Victual Datum of 1988 (NAVDBS). Users of the FRM should be aware that coastal froad elevations are also provided in the Summary of Silivatar Elevations table in the Flood returner could be used for construction and/or floodplaim management purposes when they are higher than the elevations shown on this FIRM.

1425000 FT

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 juriadiction.

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

the land The projection used in the preparation of this map was Universal Transver-tation (UTIX) cone 13. The horizontial datum was Vaniversal Transver Differences in datum, spheroid, projection or UTIX zones zones used in 1 Differences in map diagent jurisdictions may result in slight positio differences in map disartes across jurisdiction boundaries. These differences do a differences of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum** of **1368 (NAVD88)**. These flood elevations must be compared to structure and ground elevations tenerocial on branne write. The atom. For findmation regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey webies at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following dates.

NGS Information Services NOAA, NNGS12 Notional 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 for Services Blanch of the National Geodetic Survey at (301) 77.5-32.2 or visit its websile at http://www.ngs.neas.gov.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Ubilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date stream channel configurations and foodpain defineations than those shown on the previous FIRM for its jurisdiction. The floodpains defineations than those shown on the previous FIRM may take been adjusted to controm to these new stream channel confluencions. As a result, the Flood channel and the previous FIRM may result, the Flood Preview and Floodoway Data tables in the Rlood Instrance Sludy Report (which containes authoritative hydraulic data) may reflect stream channel distances that differ from while is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles baselines may deviate significantly, from the new base map channel report and Hoodowy Data Tables in the FIS report. As a result, the profile baselines may deviate significantly, from the new base map channel reports and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publicator. Because changes are uso anreasations or de-annexations thave concurred 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 parelise, community map reposition didresser and a lasting of Communities table containing National Flood insurance Program dates for each community as well as a listing of the panels on which each community is located. Contact FEMA Map Service Center (INSC) via the FEMA Map Information eXchange (FMIX). 4-377-355-750 for information on available products and with this FFMIX. Available products may include previously seaved Letters of Map Change. a Flood Instrumente Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-355-9520 and its website at Mtp///www.msc.fema.gov/

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

Offset (ft) El Paso County Vertical Datum Offset Table Flooding Source

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

Panel Location Map

-E

This Digital Flood Insurance Rate Map (DFIRM) was produced through a cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).



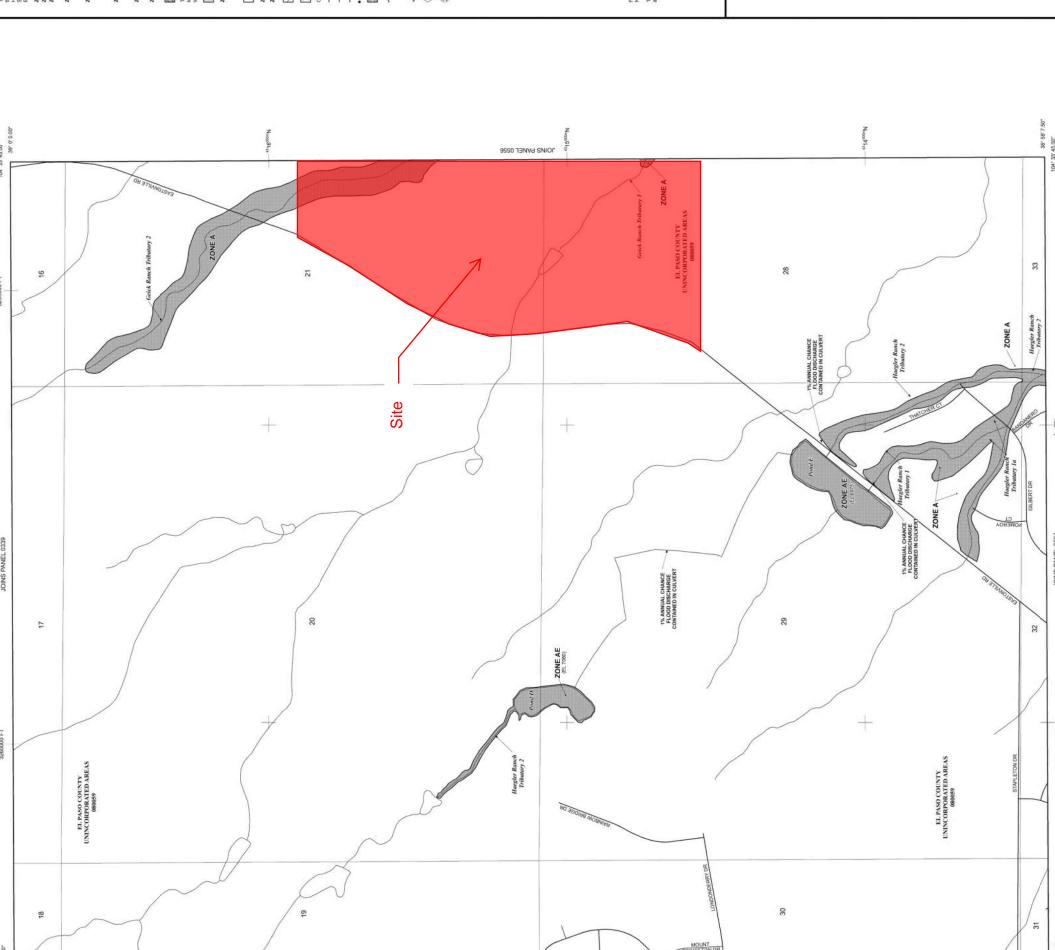
Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.

1415000 FT 38° 58° 7.50°

104 39" 0' 0.00"

101/02 PANEL 0552

1420000 FT



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NGS Information Services NOAA, NNGS12 National Geodetic Survey SSMC3, #9202 1315 East-West Highway Silver Spring, MD 20910-3282

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Base Map information shown on this FIRM was provided in digital format by EI Pasc County, Colorado Springs Utilities, City of Fourtian, Bureau of Land Management National Occasific and Atmospheric Administration, United States Geological Survey and Anterson Consulting Engineers, inc. These data are ourtient as of 2006.

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you have questions about this map or questions concerning the National Floc surance Program in greater) please call +4377-FBMA MAP (1-877-336-2627) ; the FEMA website at http://www.fema.gov/business/nfig.

REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION ical Datum Offset (ft) bsite at http://www.fema.gov/usenses. El Paso County Vertical Datum Offset Table Vertical Flooding Source

Panel Location Map

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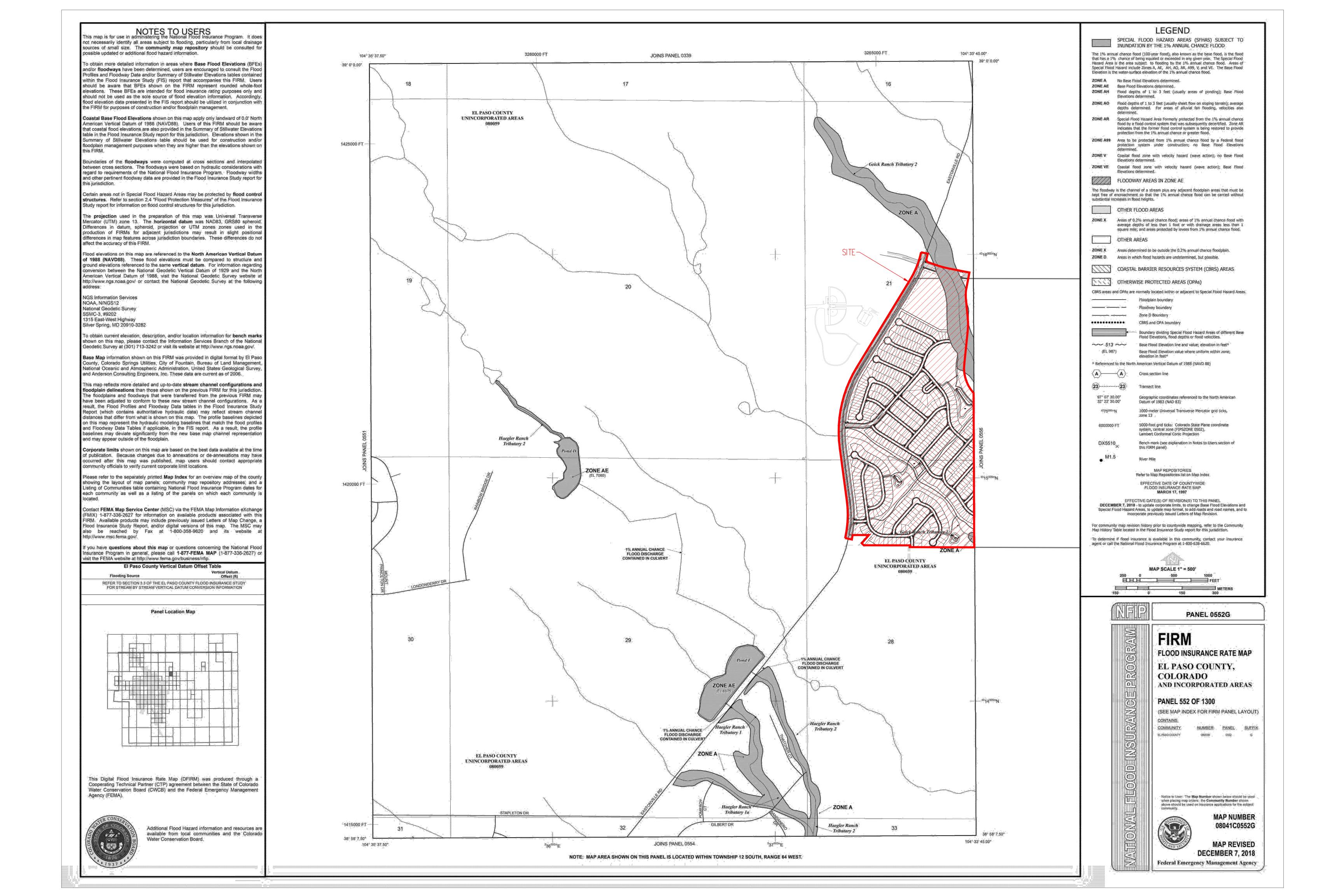
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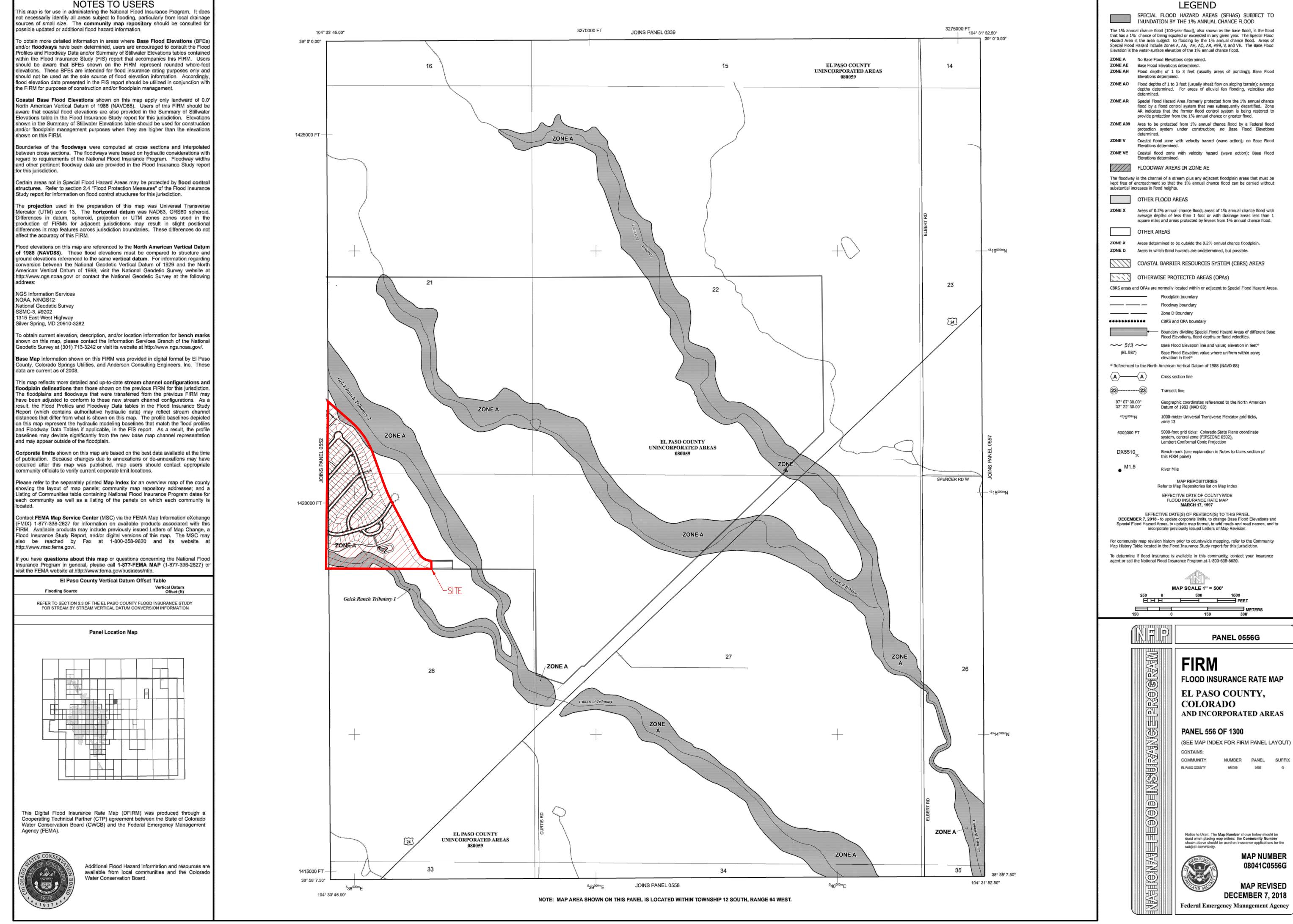
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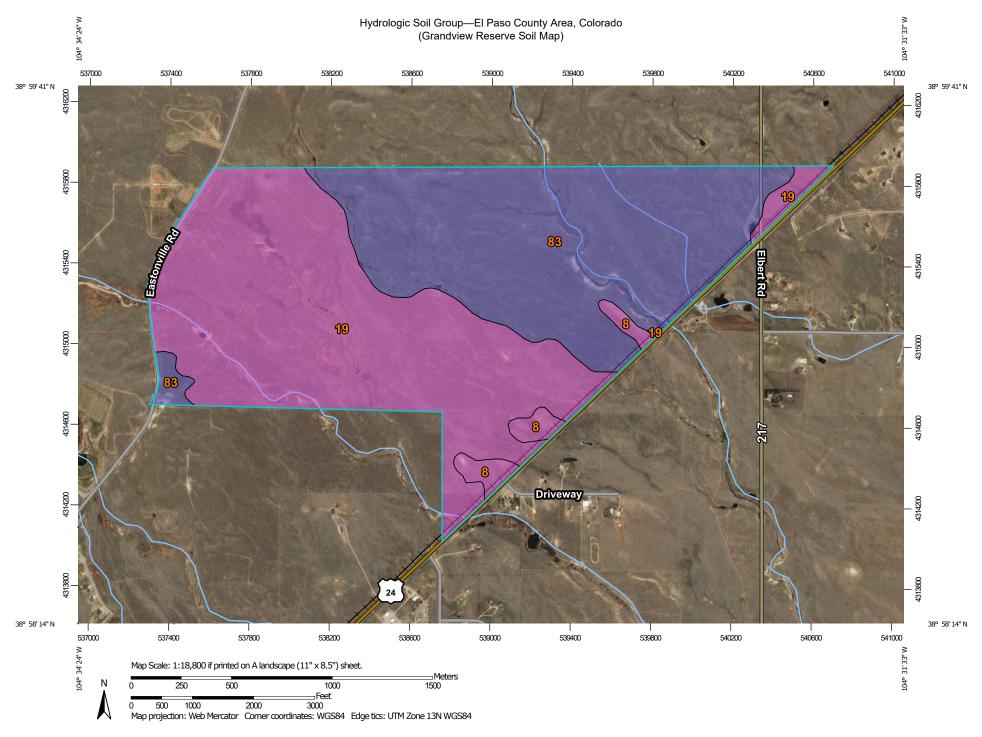
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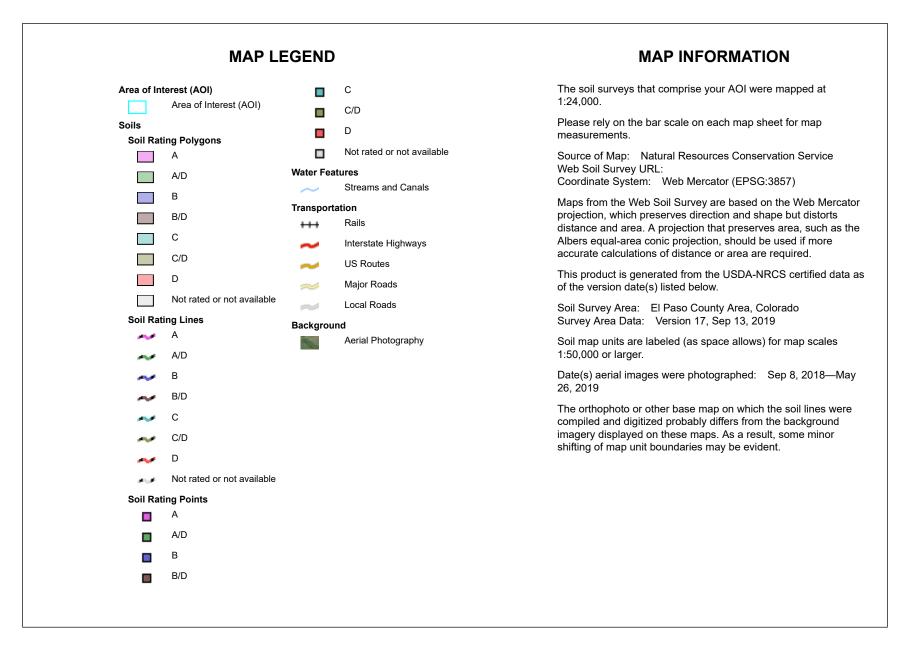
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USDA Natural Resources

Conservation Service

Web Soil Survey National Cooperative Soil Survey 4/6/2020 Page 1 of 4



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	22.4	2.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	450.7	52.5%
83	Stapleton sandy loam, 3 to 8 percent slopes	В	385.4	44.9%
Totals for Area of Inter	rest	858.5	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



Precipitation Frequency Data Server



NOAA Atlas 14, Volume 8, Version 2 Location name: Peyton, Colorado, USA* Latitude: 38.985°, Longitude: -104.565° Elevation: 6975.71 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

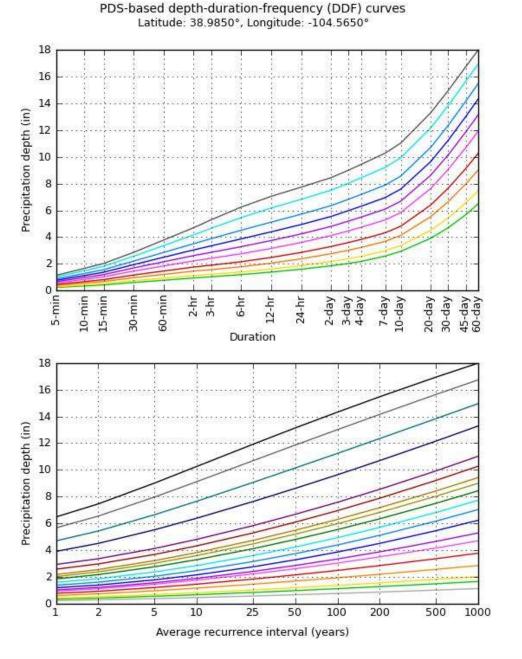
100	-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹ Average recurrence interval (years)									
Duration	1	2	5	10	25	50	100	200	500	1000
5-min	0.239	0.291	0.381	0.461	0.576	0.671	0.770	0.875	1.02	1.14
	(0.189-0.303)	(0.231-0.370)	(0.301-0.486)	(0.361-0.589)	(0.440-0.768)	(0.499-0.904)	(0.554-1.06)	(0.604-1.24)	(0.678-1.48)	(0.733-1.67)
10-min	0.350	0.426	0.558	0.674	0.844	0.982	1.13	1.28	1.49	1.66
	(0.277-0.444)	(0.338-0.542)	(0.441-0.711)	(0.529-0.863)	(0.644-1.13)	(0.731-1.32)	(0.811-1.56)	(0.884-1.81)	(0.992-2.17)	(1.07-2.44)
15-min	0.426	0.520	0.681	0.823	1.03	1.20	1.37	1.56	1.82	2.03
	(0.338-0.541)	(0.412-0.660)	(0.537-0.867)	(0.645-1.05)	(0.785-1.37)	(0.891-1.62)	(0.988-1.90)	(1.08-2.21)	(1.21-2.65)	(1.31-2.98)
30-min	0.608	0.740	0.968	1.17	1.46	1.70	1.94	2.21	2.57	2.86
	(0.482-0.771)	(0.586-0.940)	(0.764-1.23)	(0.916-1.49)	(1.11-1.94)	(1.26-2.29)	(1.40-2.68)	(1.52-3.12)	(1 71-3 73)	(1.85-4.19)
60-min	0.775	0.933	1.21	1.46	1.84	2.16	2.49	2.85	3.37	3.78
	(0.615-0.984)	(0 739-1 19)	(0.956-1.54)	(1.15-1.87)	(1.41-2.47)	(1.61-2.92)	(1.80-3.45)	(1.97-4.05)	(2.24-4.90)	(2.44-5.55)
2-hr	0.943	1.13	1.46	1.76	2.22	2.62	3.04	3.50	4.16	4.70
	(0.754-1.19)	(0.898-1.42)	(1.16-1.84)	(1.39-2.23)	(1.72-2.97)	(1.97-3.52)	(2.21-4.19)	(2.45-4.95)	(2.80-6.03)	(3.06-6.85)
3-hr	1.03	1.22	1.57	1.90	2.41	2.86	3.35	3.88	4.66	5.29
	(0.829-1.29)	(0.978-1.53)	(1.25-1.97)	(1.51-2.40)	(1.88-3.22)	(2.17-3.84)	(2.45-4.60)	(2.73-5.48)	(3.15-6.74)	(3.46-7.69)
6-hr	1.20	1.40	1.78	2.16	2.76	3.28	3.86	4.51	5.46	6.24
	(0.968-1.49)	(1.13-1.74)	(1.44-2.22)	(1.73-2.70)	(2.18-3.66)	(2.52-4.39)	(2.86-5.29)	(3.21-6.34)	(3.73-7.86)	(4.12-9.01)
12-hr	1.38	1.61	2.05	2.48	3.15	3.74	4.39	5.12	6.17	7.04
	(1.13-1.70)	(1.31-1.98)	(1.67-2.53)	(2.00-3.07)	(2.51-4.15)	(2.89-4.96)	(3.28-5.96)	(3.67-7.13)	(4.25-8.82)	(4.69-10.1)
24-hr	1.60	1.87	2.38	2.85	3.60	4.24	4.94	5.71	6.82	7.73
	(1.31-1.95)	(1.54-2.28)	(1.94-2.91)	(2.32-3.51)	(2.88-4.67)	(3.29-5.56)	(3.71-6.63)	(4.12-7.87)	(4.73-9.66)	(5.20-11.0)
2-day	1.85	2.18	2.76	3.29	4.11	4.80	5.54	6.35	7.50	8.44
	(1.54-2.24)	(1.80-2.63)	(2.28-3.35)	(2.70-4.01)	(3.30-5.27)	(3.76-6.22)	(4.19-7.36)	(4.62-8.68)	(5.25-10.5)	(5.73-11.9)
3-day	2.03	2.39	3.02	3.60	4.47	5.20	5.98	6.83	8.03	9.00
	(1.69-2.44)	(1.98-2.87)	(2.50-3.64)	(2.97-4.36)	(3.60-5.69)	(4.09-6.70)	(4.55-7.90)	(4.99-9.28)	(5.65-11.2)	(6.15-12.7)
4-day	2.18	2.56	3.22	3.82	4.73	5.49	6.30	7.18	8.43	9.43
	(1.82-2.61)	(2.13-3.06)	(2.68-3.87)	(3.16-4.62)	(3.83-6.00)	(4.33-7.04)	(4.81-8.30)	(5.26-9.72)	(5.95-11.7)	(6.46-13.3)
7-day	2.58	2.98	3.68	4.32	5.29	6.09	6.96	7.89	9.21	10.3
	(2.17-3.07)	(2.50-3.54)	(3.08-4.39)	(3.60-5.18)	(4.31-6.65)	(4.84-7.76)	(5.34-9.09)	(5.82-10.6)	(6.55-12.8)	(7 10-14 4)
10-day	2.93	3.37	4.13	4.81	5.83	6.68	7.58	8.55	9.92	11.0
	(2.48-3.47)	(2.84-3.98)	(3.47-4.90)	(4.02-5.74)	(4.76-7.29)	(5.32-8.45)	(5.85-9.86)	(6.34-11.4)	(7.09-13.7)	(7.65-15.4)
20-day	3.91	4.51	5.52	6.39	7.63	8.62	9.64	10.7	12.2	13.3
	(3.33-4.58)	(3.84-5.29)	(4.68-6.50)	(5.39-7.55)	(6.25-9.37)	(6.90-10.8)	(7.47-12.4)	(7.98-14.1)	(8.74-16.6)	(9.31-18.4)
30-day	4.70	5.44	6.65	7.66	9.06	10.1	11.2	12.3	13.8	15.0
	(4.02-5.47)	(4.65-6.34)	(5.66-7.78)	(6.49-9.00)	(7.44-11.0)	(8.15-12.5)	(8.74-14.3)	(9.24-16.2)	(9.98-18.7)	(10.5-20.6)
45-day	5.67	6.55	7.97	9.12	10.7	11.9	13.0	14.2	15.6	16.7
	(4.88-6.57)	(5.63-7.60)	(6.82-9.27)	(7.77-10.7)	(8.79-12.9)	(9.56-14.5)	(10.2-16.4)	(10.6-18.4)	(11.3-21.0)	(11.9-23.0)
60-day	6.49 (5.60-7.48)	7.46 (6.43-8.62)	9.01 (7.74-10.4)	10.3 (8.77-11.9)	11.9 (9.82-14.3)	13.1 (10.6-16.0)	14.3 (11.2-18.0)	15.5 (11.7-20.0)	16.9 (12.3-22.6)	18.0 (12.8-24.6)

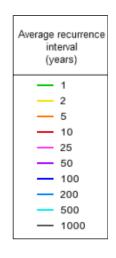
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

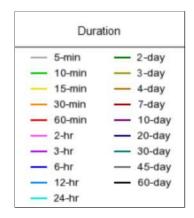
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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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PF graphical







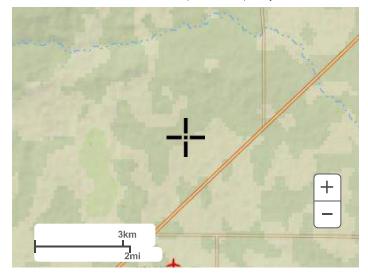
NOAA Atlas 14, Volume 8, Version 2

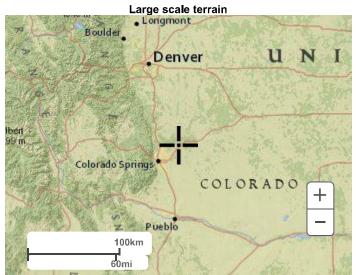
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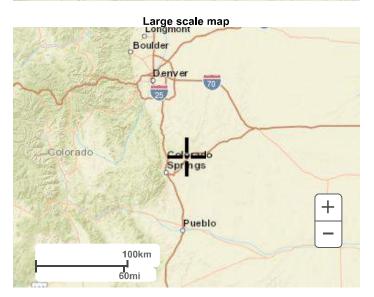
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Maps & aerials

Small scale terrain

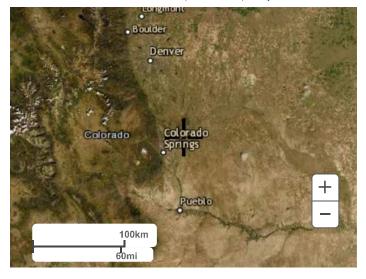






Large scale aerial

Precipitation Frequency Data Server



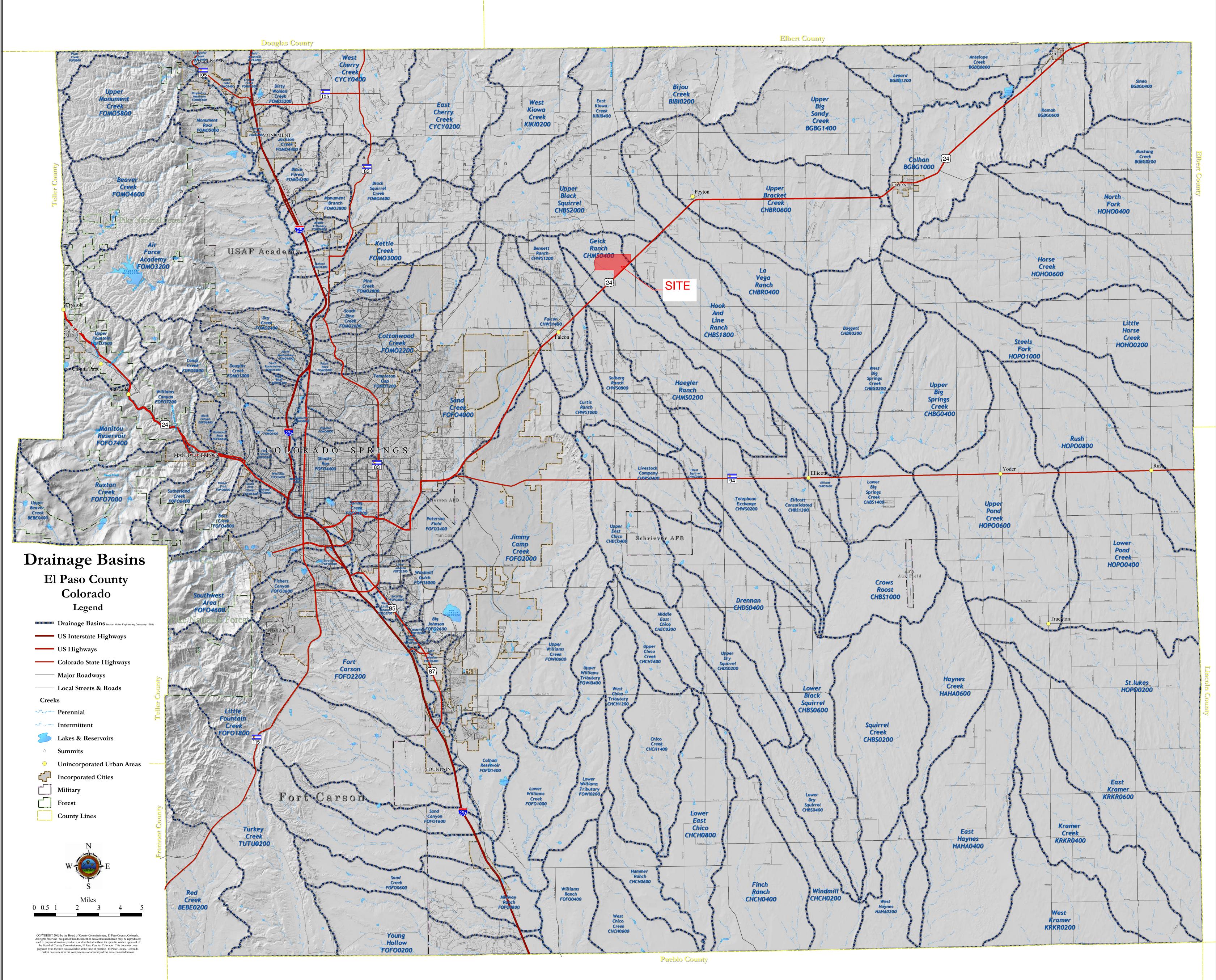
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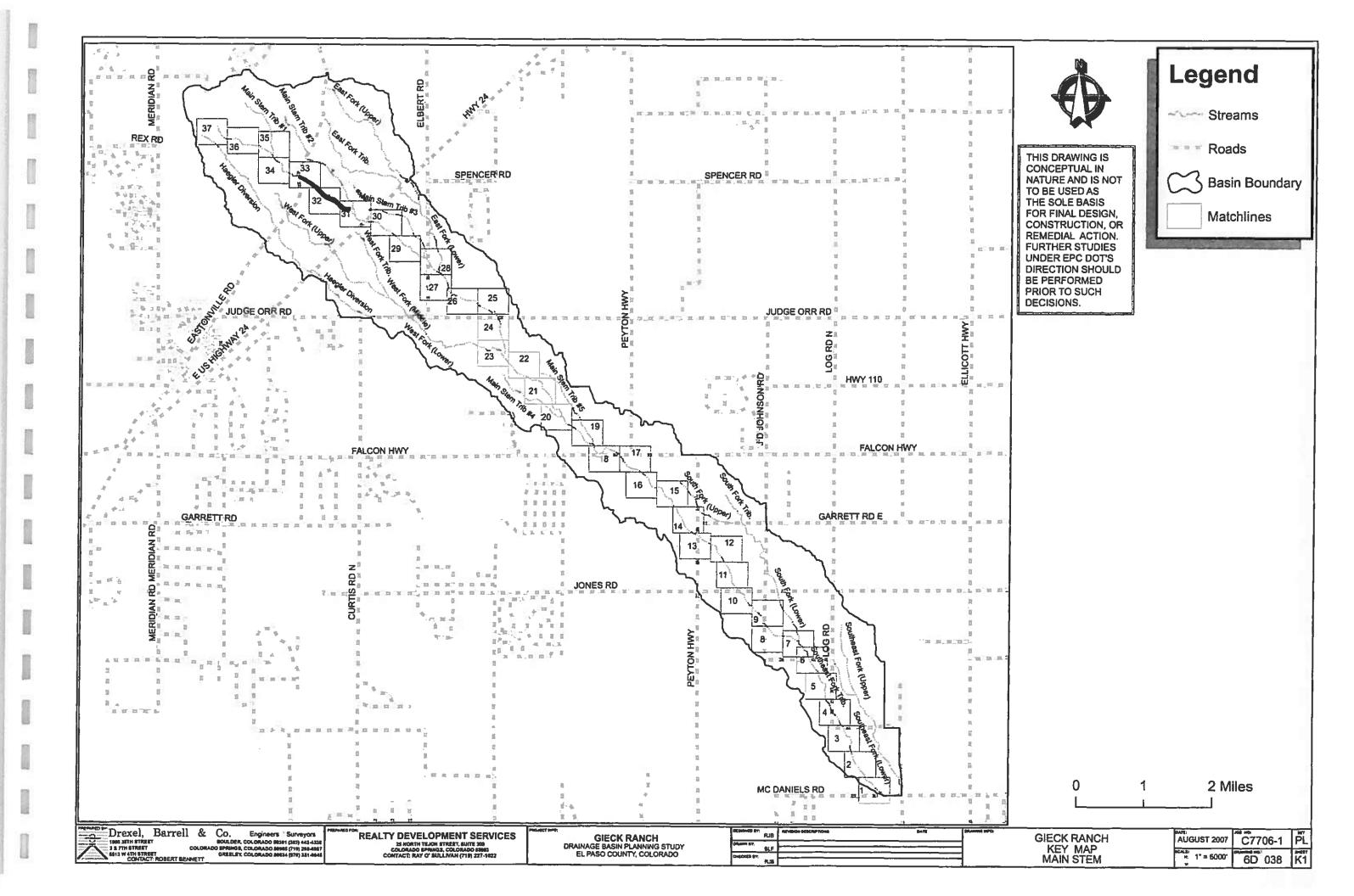
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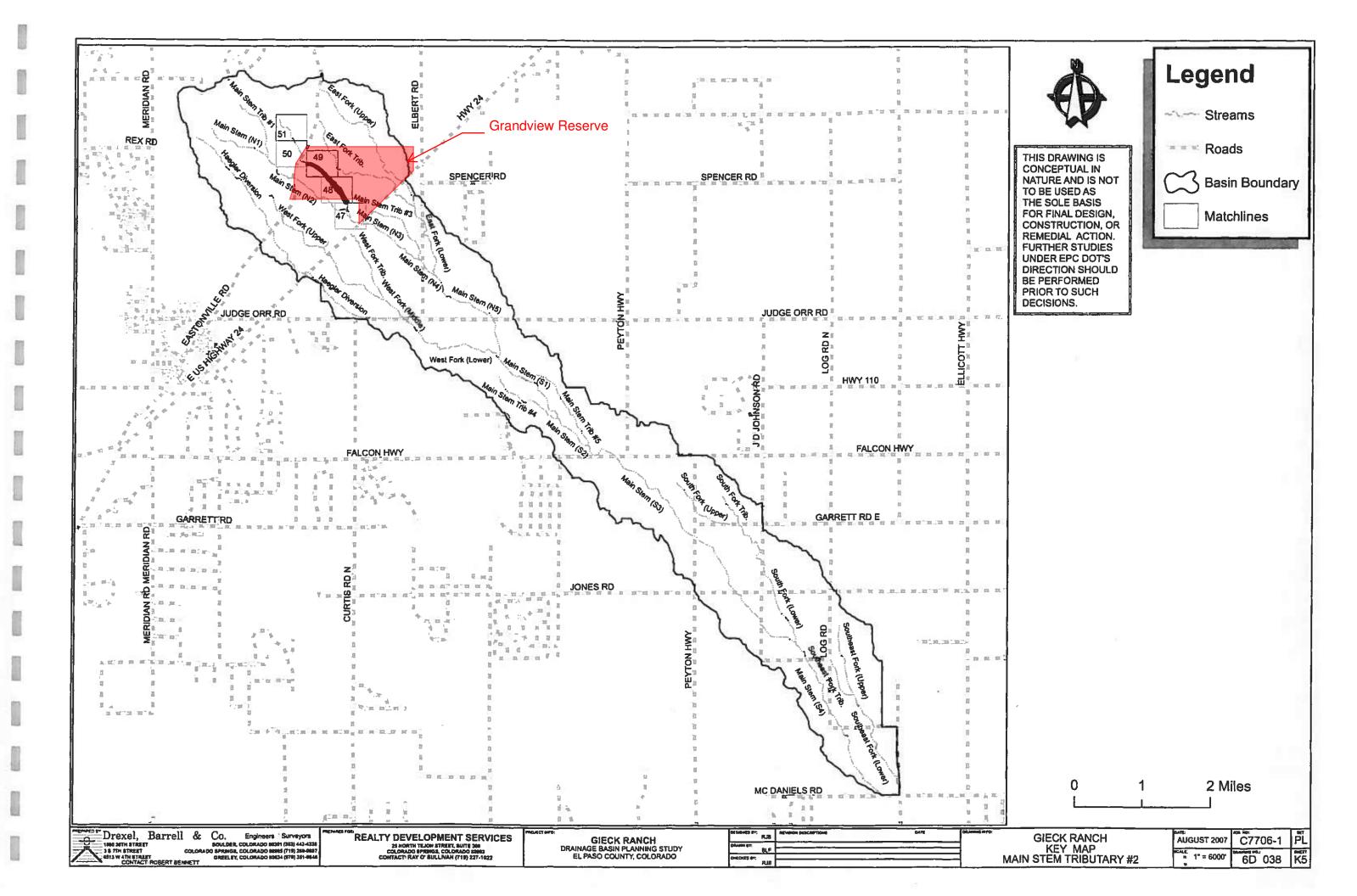
<u>Disclaimer</u>

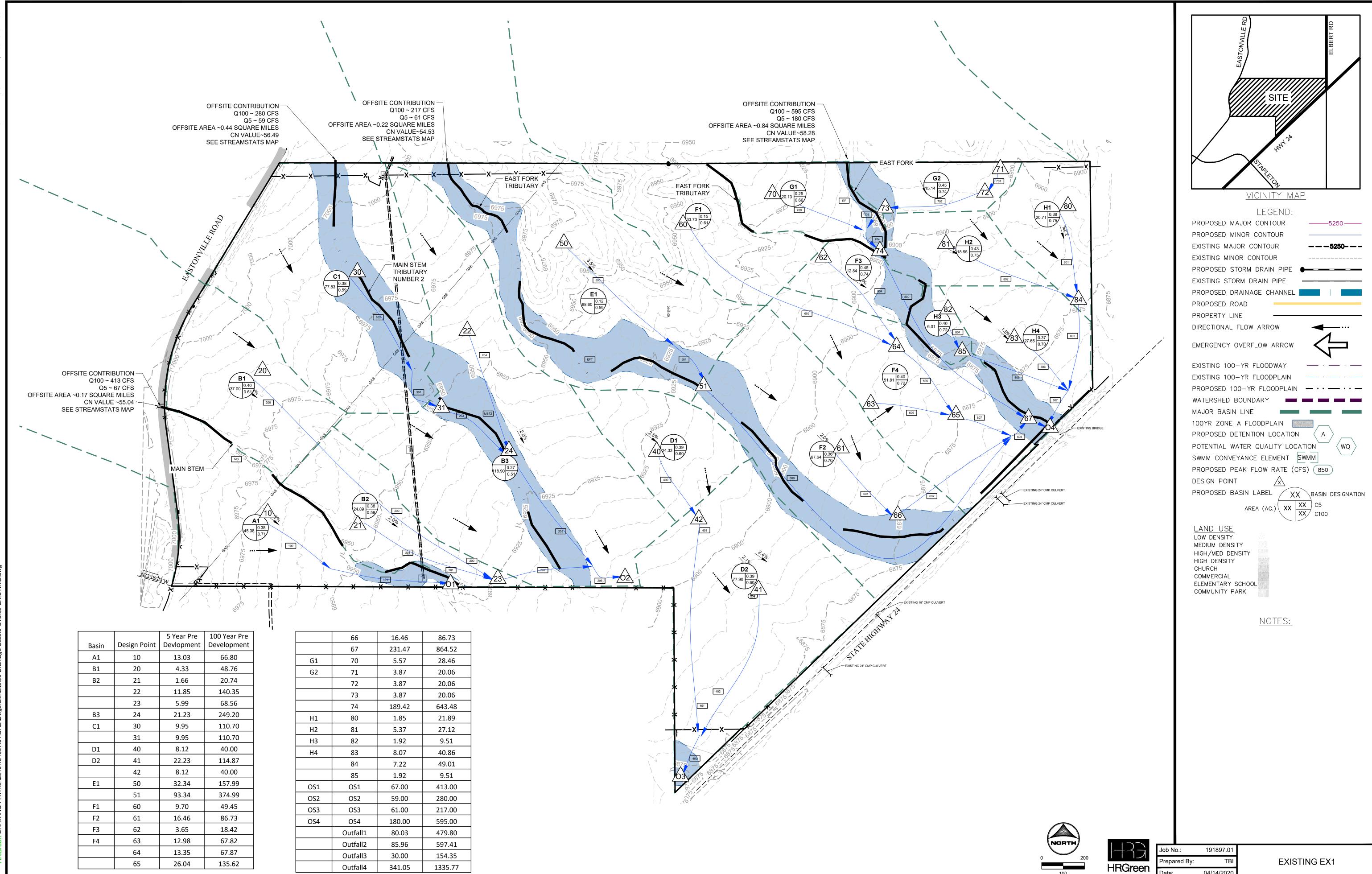
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APPENDIX B MDDP & DBPS Sheet References









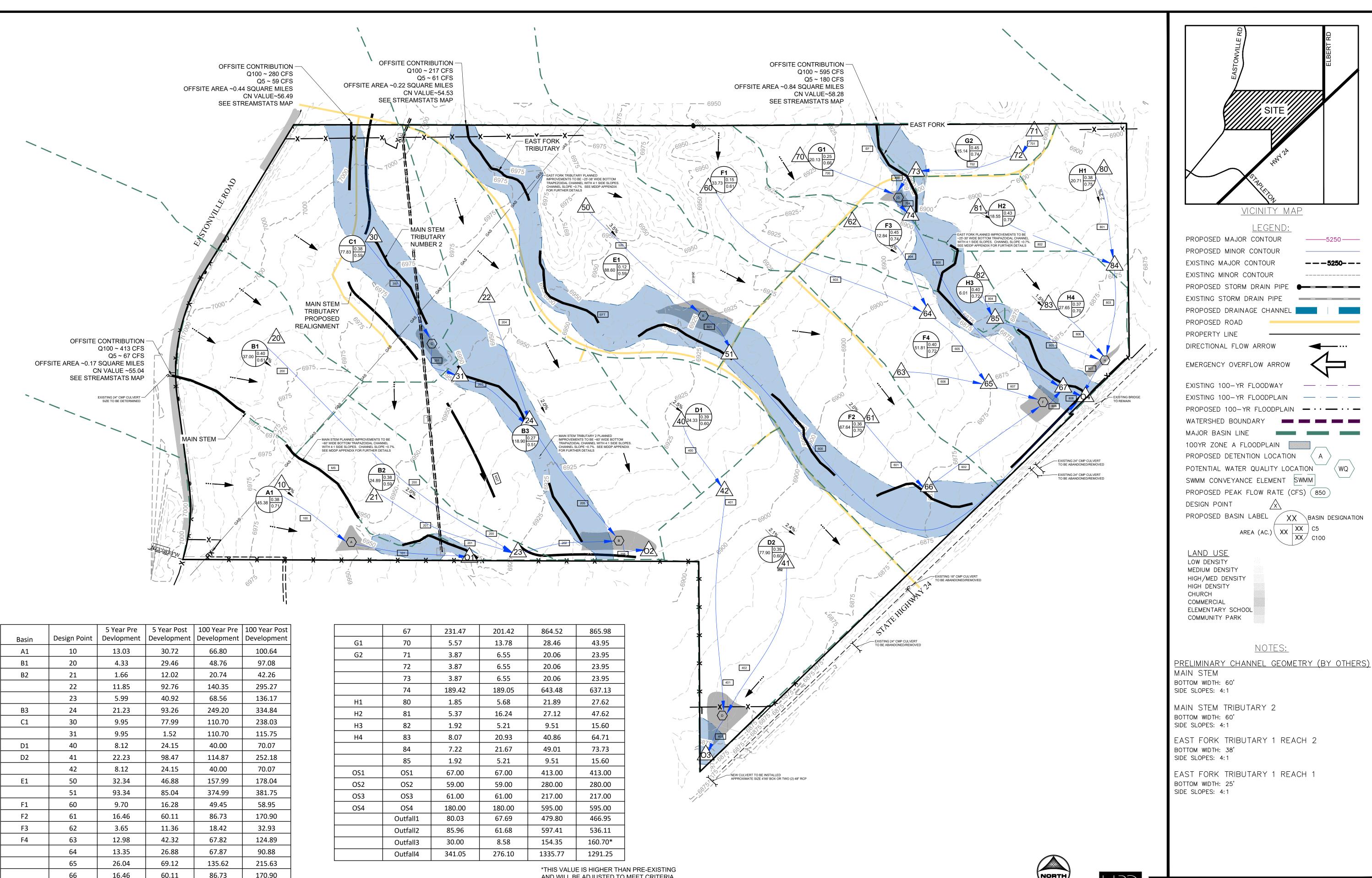
		5 Year Pre	100 Year Pre				
Basin	Design Point	Devlopment	Development				
A1	10	13.03	66.80				
B1	20	4.33	48.76				
B2	21	1.66	20.74				
	22	11.85	140.35				
	23	5.99	68.56				
B3	24	21.23	249.20				
C1	30	9.95	110.70				
	31	9.95	110.70				
D1	40	8.12	40.00				
D2	41	22.23	114.87				
	42	8.12	40.00				
E1	50	32.34	157.99				
	51	93.34	374.99				
F1	60	9.70	49.45				
F2	61	16.46	86.73				
F3	62	3.65	18.42				
F4	63	12.98	67.82				
	64	13.35	67.87				
	65	26.04	135.62				

	66	16.46	86.73
	67	231.47	864.52
G1	70	5.57	28.46
G2	71	3.87	20.06
	72	3.87	20.06
	73	3.87	20.06
	74	189.42	643.48
H1	80	1.85	21.89
H2	81	5.37	27.12
H3	82	1.92	9.51
H4	83	8.07	40.86
	84	7.22	49.01
	85	1.92	9.51
OS1	OS1	67.00	413.00
OS2	OS2	59.00	280.00
OS3	OS3	61.00	217.00
OS4	OS4	180.00	595.00
	Outfall1	80.03	479.80
	Outfall2	85.96	597.41
	Outfall3	30.00	154.35
	Outfall4	341.05	1335.77

04/14/202

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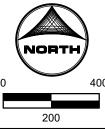




Basin	Design Point	5 Year Pre Devlopment	5 Year Post Development	100 Year Pre Development	100 Year Post Development	
A1	10	13.03	30.72	66.80	100.64	
B1	20	4.33	29.46	48.76	97.08	
B2	21	1.66	12.02	20.74	42.26	
	22	11.85	92.76	140.35	295.27	
	23	5.99	40.92	68.56	136.17	
B3	24	21.23	93.26	249.20	334.84	
C1	30	9.95	77.99	110.70	238.03	
	31	9.95	1.52	110.70	115.75	
D1	40	8.12	24.15	40.00	70.07	
D2	41	22.23	98.47	114.87	252.18	
	42	8.12	24.15	40.00	70.07	
E1	50	32.34	46.88	157.99	178.04	
	51	93.34	85.04	374.99	381.75	
F1	60	9.70	16.28	49.45	58.95	
F2	61	16.46	60.11	86.73	170.90	
F3	62	3.65	11.36	18.42	32.93	
F4	63	12.98	42.32	67.82	124.89	
	64	13.35	26.88	67.87	90.88	
	65	26.04	69.12	135.62	215.63	
	66	16.46	60.11	86.73	170.90	

	67	231.47
G1	70	5.57
G2	71	3.87
	72	3.87
	73	3.87
	74	189.42
H1	80	1.85
H2	81	5.37
Н3	82	1.92
H4	83	8.07
	84	7.22
	85	1.92
OS1	OS1	67.00
OS2	OS2	59.00
OS3	OS3	61.00
OS4	OS4	180.00
	Outfall1	80.03
	Outfall2	85.96
	Outfall3	30.00
	Outfall4	341.05

AND WILL BE ADJUSTED TO MEET CRITERIA WITH THE PRELIMINARY DRAINAGE REPORT



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HRGreen	

Job No.:	191897.01	
Prepared By:	TBI	
Date:	04/14/2020	

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APPENDIX C Hydrologic Computations

	2 Total Area (ac) 108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	nty 3	ed/Gravel Ro: Area (ac) 0 0 0 0 0 0 0 0	Weighted % Imp. 0 0 0 0 0 0 0	6	Provie existi basin ⁷ wns/Undevelo Area (ac)	8 Ped Weighted % Imp.	site	13 idential - 1/8 Area (ac)	14 Acre Weighted % Imp.	15 Res % Imp.	16 idential - 1/4 .	17 Acre	18	19	20		P Calc Ch	roject No.: ulated By: lecked By: Date:	HRG01 TJE BAS	Subdivision	26	27
I Basin ID OS-W OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-1 OS-2	2 Total Area (ac) 108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	3 Por Imp. 100 100 100 100 100 100 100 100	Area (ac)	Weighted % Imp. 0 0 0 0 0 0 0	6 Lav % Imp.	existi basin ⁷ wns/Undevelo Area (ac)	8 Ped Weighted % Imp.	12 Resi	idential - 1/8	Acre Weighted					19	20		Calc Ch	ulated By: lecked By: Date:	TJE BAS 3/1/22	25	20	
EXISTING OS-NW OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	5% Imp. 100 100 100 100 100 100 100	Area (ac)	Weighted % Imp. 0 0 0 0 0 0 0	6 Lav % Imp.	7 wns/Undevelo Area (ac)	8 ped Weighted % Imp.	12 Resi	idential - 1/8	Acre Weighted					19	20		Ch	ecked By: Date:	BAS 3/1/22	25	20	
EXISTING OS-NW OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	5% Imp. 100 100 100 100 100 100 100	Area (ac)	Weighted % Imp. 0 0 0 0 0 0 0	6 Lav % Imp.	7 wns/Undevelo Area (ac)	8 ped Weighted % Imp.	12 Resi	idential - 1/8	Acre Weighted					19	20			Date:	3/1/22	25	20	27
EXISTING OS-NW OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	5% Imp. 100 100 100 100 100 100 100	Area (ac)	Weighted % Imp. 0 0 0 0 0 0 0	6 Lav % Imp. 2 2 2	7 wns/Undevelo Area (ac) 16.18	8 Weighted % Imp.	Res	idential - 1/8	Acre Weighted					19	20					25	20	27
EXISTING OS-NW OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	5% Imp. 100 100 100 100 100 100 100	Area (ac)	Weighted % Imp. 0 0 0 0 0 0 0	% Imp.	Area (ac)	Weighted % Imp.	Res	idential - 1/8	Acre Weighted					19	20				24	25	20	27
EXISTING OS-NW OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	5% Imp. 100 100 100 100 100 100 100	Area (ac)	Weighted % Imp. 0 0 0 0 0 0 0	% Imp.	Area (ac)	Weighted % Imp.	Res	idential - 1/8	Acre Weighted		idential - 1/4	Acro				21	22	23	7.4			
EXISTING OS-NW OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	108.8 105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100 100 100 100	0 0 0 0 0 0 0	% Imp. 0 0 0 0 0 0 0	2 2 2 2	16.18	% Imp.	% Imp.	Area (ac)		% Imn		un	Resi	dential - 1/3 A	cre	Res	idential - 1/2	Acre	Re	sidential - 1 A	cre	Basins Total
OS-W OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-1 OS-2	105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100 100 100	0 0 0 0 0	0 0 0 0 0 0	2					% Imp.		Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted	Weighted %
OS-W OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-1 OS-2	105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100 100 100	0 0 0 0 0	0 0 0 0	2					-			76 mp.			⁷ 6 Imp.			76 Imp.			% Imp.	Imp.
OS-NW EX-1 EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-1 OS-2	105.72 16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100 100 100	0 0 0 0 0	0 0 0 0	2						r					- I							55*
EX-2 EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	16.18 46.06 64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100 100 100	0 0 0 0 0	0 0 0 0	2																		56*
EX-3 EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	64.34 2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100 100	0 0 0 0	0 0 0 0	2	46.06	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
EX-4 EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	2.68 26.15 31.53 1.22 3.28 2.31 3.02	100 100 100 100	0 0 0	0		-	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
EX-5 EX-6 PROPOSED Basin-1 OS-1 OS-2	26.15 31.53 1.22 3.28 2.31 3.02	100 100 100	0	0	2	64.34	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
EX-6 PROPOSED Basin-1 OS-1 OS-2	31.53 1.22 3.28 2.31 3.02	100	0			2.68	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
Basin-1 OS-1 OS-2	1.22 3.28 2.31 3.02	100	· · ·	0	2	26.15 31.53	2	65 65	0	0	40 40	0	0	30 30	0	0	25 25	0	0	20 20	0	0	2 2
Basin-1 OS-1 OS-2	3.28 2.31 3.02			U	4	51.55	4	03	0	0	40	0	U	50	0	U	23	0	U	20	0	U	2
OS-1 OS-2	3.28 2.31 3.02		0.98	80.3	2	0.24	0.4	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	80.7
	3.02	100	2.35	71.6	2	0.93	0.6	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	72.2
OS-3		100	1.35	58.4	2	0.96	0.8	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.2
		100	1.90	62.9	2	1.12	0.7	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	63.6
OS-4 A-1	3.00 11.23	100	1.68 0.00	56.0 0.0	2	1.32 11.23	0.9 2.0	65.0 65.0	0.00	0.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	56.9 2.0
A-1 A-2a	4.21	100	0.00	0.0	2	0.00	0.0	65.0	4.21	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
A-2b	2.75	100	1.80	65.5	2	0.00	0.0	65.0	0.95	22.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	88.0
A-3	0.36	100	0.36	100.0	2	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	100.0 65.0
A-4a A-4b	6.05 3.81	100	0.00	0.0	2	0.00	0.0	65.0 65.0	6.05 3.81	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0
A-5	0.35	100	0.35	100.0	2	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	100.0
A-6 A-7	2.76 0.23	100	0.00 0.23	0.0 100.0	2	0.00	0.0	65.0 65.0	2.76 0.00	65.0 0.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 100.0
A-/ A-8	5.44	100	4.06	74.5	2	1.39	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	75.0
A-9	4.91	100	0.00	0.0	2	0.00	0.0	65.0	4.91	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
A-10 A-11	1.02 3.56	100	0.00	0.0	2	0.00 2.77	0.0	65.0 65.0	1.02 0.79	65.0 14.4	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 16.0
B-1	3.33	100	0.00	0.0	2	0.00	0.0	65.0	3.33	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-2	4.51	100	0.00	0.0	2	0.00	0.0	65.0	4.51	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-3 B-4	4.05 1.35	100	0.00	0.0 77.8	2	0.00 0.30	0.0	65.0 65.0	4.05	65.0 0.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 78.2
B-5	5.12	100	0.00	0.0	2	0.00	0.4	65.0	5.12	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-6	2.28	100	0.00	0.0	2	0.00	0.0	65.0	2.28	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-7 B-8	0.89 3.23	100	0.00	0.0	2	0.00	0.0	65.0 65.0	0.89 3.23	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 65.0
B-9	2.42	100	0.00	0.0	2	0.00	0.0	65.0	2.42	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-10	1.10	100	0.00	0.0	2	1.10	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
C-1 C-2	4.12 2.71	100	0.00	0.0	2	0.00	0.0	65.0 65.0	4.12	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 65.0
C-3	1.56	100	0.00	0.0	2	0.00	0.0	65.0	1.56	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
C-4 C-5	2.47 3.09	100	0.00	0.0	2	0.00	0.0	65.0	2.47 3.09	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 65.0
C-6	2.1	100	0.00	0.0	2	0.00	0.0	65.0 65.0	2.10	65.0 65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
C-7	6.72	100	0.00	0.0	2	0.00	0.0	65.0	6.72	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
C-8 C-9a	5.11 3.5	100	0.00	0.0	2	0.00	0.0	65.0	5.11 3.50	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0 65.0
C-9a C-9b	3.69	100	0.00	0.0	2	0.00	0.0	65.0 65.0	3.69	65.0 65.0	40	0.00	0.0	30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0
C-10	3.51	100	0.00	0.0	2	0.00	0.0	65.0	3.51	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
C-11 C-12	0.46	100	0.00	0.0	2	0.00	0.0	65.0 65.0	0.46	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 65.0
C-12 C-13	2.37	100	0.00	0.0	2	2.37	2.0	65.0	0.00	0.0	40 40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
C-14	1.53	100	0.00	0.0	2	1.53	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
D-1 D-2	2.98 0.87	100 100	0.00	0.0	2	0.00	0.0	65.0	2.98 0.87	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25	0.00	0.0	20 20	0.00	0.0	65.0 65.0
D-2 D-3	3.66	100	0.00	0.0	2	0.00	0.0	65.0 65.0	3.66	65.0	40	0.00	0.0	30	0.00	0.0	25 25	0.00	0.0	20	0.00	0.0	65.0
D-4	2.00	100	0.00	0.0	2	0.00	0.0	65.0	2.00	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
D-5 D-6	1.53 0.83	100	0.00	0.0	2	0.71 0.83	0.9	65.0	0.82	34.8	40 40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20 20	0.00	0.0	35.7 2.0
D-6 D-7	0.83	100	0.00	0.0	2	0.83	2.0 0.5	65.0 65.0	0.00	0.0 49.8	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20	0.00	0.0	2.0
E-1	5.13	100	0.00	0.0	2	0.00	0.0	65.0	5.13	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
E-2 E-3	5.42 3.20	100 100	0.00	0.0	2	0.00	0.0	65.0 65.0	5.42 3.20	65.0 65.0	40 40	0.00	0.0	30 30	0.00	0.0	25 25	0.00	0.0	20 20	0.00	0.0	65.0 65.0
E-3 E-4	6.28	100	0.00	0.0	2	0.00	0.0	65.0	6.28	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
E-5	1.13	100	0.00	0.0	2	1.13	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
E-6	0.74	100	0.00	0.0	2	0.74	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00		2.0

Lot Type Ide	entification:
Lot Size (SF)	Lot Size (Acre)
0 - 8,167	1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES: % Impervious values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001) *: Taken from NRCS Curve Numbers within HR Green MDDP

Subdivision:Grandview ReserveLocation:CO, El Paso County

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
		Pav	ed/Gravel R	oads	La	wns/Undevel			Roofs			idential - 1/8		Resi	dential - 1/4			idential - 1/3			idential - 1/2			sidential - 1 A			Composite
Basin ID	Total Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	C ₅	C ₁₀₀	Area (ac)	Composite C ₅	C ₁₀₀
EXISTING	100.0		1	1		1	· · · · · · ·			i	-		1			1		1	1		1	. I		1	1		55.044
OS-W OS-NW	108.8 105.72																										55.04* 56.49*
EX-1	16.18	0.90	0.96	0.00	0.09	0.36	16.18	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-2	46.06	0.90	0.96	0.00	0.09	0.36	46.06	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-3 EX-4	64.34 2.68	0.90	0.96	0.00	0.09	0.36	64.34 2.68	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00 0.00	0.20	0.44	0.00	0.09	0.36
EX-5	26.15	0.90	0.96	0.00	0.09	0.36	26.15	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-6 PROPOSED	31.53	0.90	0.96	0.00	0.09	0.36	31.53	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
Basin-1	1.22	0.90	0.96	0.98	0.09	0.36	0.24	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.74	0.84
OS-1	3.28	0.90	0.96	2.35	0.09	0.36	0.93	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.67	0.79
OS-2 OS-3	2.31 3.02	0.90	0.96	1.35	0.09	0.36	0.96	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.56	0.71 0.74
OS-4	3.00	0.90	0.96	1.68	0.09	0.36	1.32	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.54	0.74
A-1	11.23	0.90	0.96	0.00	0.09	0.36	11.23	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
A-2a A-2b	4.21 2.75	0.90	0.96	0.00 1.80	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	4.21 0.95	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45 0.74	0.59 0.83
A-3	0.36	0.90	0.96	0.36	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.90	0.96
A-4a A-4b	6.05 3.81	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	6.05 3.81	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59 0.59
A-4b A-5	0.35	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
A-6	2.76	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.76	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
A-7 A-8	0.23	0.90	0.96	0.23 4.06	0.09	0.36	0.00 1.39	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.90	0.96
A-9	4.91	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	4.91	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
A-10	1.02	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.02	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
A-11 B-1	3.56 3.33	0.90	0.96	0.00	0.09	0.36	2.77 0.00	0.73	0.81	0.00	0.45	0.59	0.79 3.33	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00 0.00	0.20	0.44	0.00	0.17 0.45	0.41 0.59
B-2	4.51	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	4.51	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
B-3 B-4	4.05	0.90	0.96	0.00	0.09	0.36	0.00 0.30	0.73	0.81	0.00	0.45	0.59	4.05	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45 0.72	0.59 0.83
B-4 B-5	5.12	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	5.12	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.72	0.85
B-6	2.28	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.28	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
B-7 B-8	0.89 3.23	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.89 3.23	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
B-9	2.42	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.42	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
B-10	1.10	0.90	0.96	0.00	0.09	0.36	1.10	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
C-1 C-2	4.12 2.71	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	4.12	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00 0.00	0.20	0.44	0.00	0.45	0.59 0.59
C-3	1.56	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.56	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
C-4 C-5	2.47 3.09	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.47 3.09	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59 0.59
C-6	2.10	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.10	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
C-7	6.72	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	6.72	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
C-8 C-9a	5.11 3.50	0.90	0.96	0.00	0.09	0.36	0.00	0.73 0.73	0.81	0.00	0.45	0.59 0.59	5.11 3.50	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00 0.00	0.20	0.44	0.00	0.45	0.59 0.59
C-9b	3.69	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	3.69	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
C-10 C-11	3.51 0.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	3.51	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59 0.59
C-11 C-12	1.79	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.79	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
C-13	2.37	0.90	0.96	0.00	0.09	0.36	2.37	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
C-14 D-1	1.53 2.98	0.90	0.96	0.00	0.09	0.36	1.53 0.00	0.73	0.81	0.00	0.45	0.59	0.00 2.98	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00 0.00	0.20	0.44	0.00	0.09 0.45	0.36 0.59
D-2	0.87	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.87	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
D-3 D-4	3.66 2.00	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	3.66	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59 0.59
D-4 D-5	1.53	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.82	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.43	0.39
D-6	0.83	0.90	0.96	0.00	0.09	0.36	0.83	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
D-7 E-1	1.80 5.13	0.90	0.96	0.00	0.09	0.36	0.42 0.00	0.73	0.81	0.00	0.45	0.59	1.38 5.13	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.37 0.45	0.54 0.59
E-2	5.42	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	5.42	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
E-3	3.20	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	3.20	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
E-4 E-5	6.28 1.13	0.90	0.96	0.00	0.09	0.36	0.00 1.13	0.73 0.73	0.81	0.00	0.45	0.59 0.59	6.28 0.00	0.30	0.50	0.00	0.25	0.47 0.47	0.00	0.22	0.46	0.00 0.00	0.20	0.44	0.00	0.45 0.09	0.59 0.36
E-6	0.74	0.90	0.96	0.00	0.09	0.36	0.74	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36

Lot Type Ide	entification:
Lot Size (SF)	Lot Size (Acre)
0 - 8,167	= 1/8 Acre</th
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:

C values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001) Coeffficients use HSG A&B soils - Refer to "Appendix A: Exhibits and Figures" for soil map *: SCS Curve Number from HR Green MDDP

Project Name: Grandview Subdivision PDR Project No.: HRG01 Calculated By: TJE Checked By: BAS Date: 3/1/22

STANDARD FORM SF-2: EXISTING & PROPOSED TIME OF CONCENTRATION

Subc	ubdivision: Grandview Reserve Project Na										Name:	e: Grandview Subdivision PDR						
L							ect No.:											
												Calcula		TJE				
												Checl	ked By:	BAS			\frown	
1	2	3	4	5	6	7	8	9	10	11	12	13	Date:	3/1/22	16	17	18	
	-	SUB-BA				INITL	AL/OVER	LAND			RAVEL TI				Te CHECK			
DAGIN		DAT		6			(T _i)				(T,)			COMP	(T _c)		FINAL	
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C ₅	C ₁₀₀	L (FT)	S (%)	T _i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T _t (MIN)	COMP. T _c (MIN)	TOTAL LENGTHAT	Calculated T _c (MIN)	T _e (MIN)	
EXISTING	()	Toollo or only	(,-)			()	(,,,)	(()	(, ;)		()	((()	(
OS-W OS-NW															\vee			
EX-1	16.18	A	2.0	0.09	0.36	300	3.3	21.6	1433	2.5	15	2.4	10.0	31.6	1732.7	19.6	19.6	
EX-2	46.06	A	2.0	0.09	0.36	300	2.5	23.6	3127	2.0	15	2.1	24.7	48.3	3427.0	29.0	29.0	
EX-3 EX-4	64.34 2.68	A A	2.0 2.0	0.09	0.36	300 300	3.2 2.5	21.7 23.8	3964 462	2.1 2.4	15 15	2.2	30.4	52.1	4263.6 762.3	33.7	33.7	
EX-5	26.15	A	2.0	0.09	0.36	300	3.1	22.1	2121	2.3	15	2.3	15.6	37.7	2420.8	23.4	23.4	
EX-6 PROPOSEI	31.53	A	2.0	0.09	0.36	300	3.6	20.9	1488	2.1	15	2.2	11.4	32.3	1788.5	19.9	19.9	
Basin-1	1.22	A	80.7	0.74	0.84	46	2.0	3.5	556	1.8	20	2.7	3.5	7.0	602.0	13.3	7.0	
OS-1	3.28	A	72.2	0.67	0.79	48	3.0	3.8	1795	1.3	20	2.3	13.1	16.9	1843.0	20.2	16.9	
OS-2 OS-3	2.31 3.02	A	59.2 63.6	0.56	0.71 0.74	45	4.0	4.2	1426 1050	1.4	20 20	2.4	10.0	14.2	1471.0 1084.0	18.2	14.2	
OS-4	3.00	А	56.9	0.54	0.70	34	2.0	4.7	1020	1.4	20	2.4	7.2	11.9	1054.0	15.9	11.9	
A-1	11.23	A	2.0	0.09	0.36	50 50	10.0	6.1 4.9	957 742	5.0 2.5	20 20	4.5	3.6	9.6	1007.0	15.6 14.4	9.6	
A-2a A-2b	4.21 2.75	A A	65.0 88.0	0.45 0.74	0.59 0.83	250	5.0	4.9	300	2.5	20	3.2	3.9	8.8	792.0	14.4	8.8 9.9	
A-3	0.36	A	100.0	0.90	0.96	18	2.0	1.2	560	1.9	20	2.8	3.4	4.6	578.0	13.2	5.0	
A-4a A-4b	6.05 3.81	A	65.0 65.0	0.45	0.59	230	2.0	14.3 9.4	700 770	2.5 2.5	20 20	3.2 3.2	3.7	18.0	930.0 870.0	15.2	15.2	
A-5	0.35	A	100.0	0.90	0.96	18	2.0	1.2	332	1.4	20	2.4	2.3	3.6	350.0	11.9	5.0	
A-6 A-7	2.76	A	65.0 100.0	0.45	0.59	217 36	4.5	10.6	310 340	1.0	20 20	2.0	2.6	13.2	527.0 376.0	12.9	12.9	
A-7 A-8	5.44	A	75.0	0.90	0.96	250	2.0	9.4	340	2.3	20	2.8	1.9	3.4	550.0	12.1	5.0	
A-9	4.91	А	65.0	0.45	0.59	160	2.0	11.9	950	1.5	20	2.4	6.5	18.4	1110.0	16.2	16.2	
A-10 A-11	1.02 3.56	A A	65.0 16.0	0.45 0.17	0.59 0.41	18 450	3.0	3.5	450 718	1.0	20	2.0	3.8	7.3 27.1	468.0 1168.0	12.6	7.3	
B-1	3.33	A	65.0	0.45	0.41	210	3.5	11.4	560	1.0	20	2.6	3.6	14.9	770.0	14.3	14.3	
B-2	4.51	A	65.0	0.45	0.59	230	3.0	12.5	611	2.5	20	3.2	3.2	15.7	841.0	14.7	14.7	
B-3 B-4	4.05	A	65.0 78.2	0.45 0.72	0.59 0.83	34 10	2.0	5.5	680 700	2.7	20 20	3.3	3.4 5.8	9.0 7.0	714.0 710.0	14.0	9.0 7.0	
B-5	5.12	A	65.0	0.45	0.59	60	1.0	9.2	946	1.7	20	2.6	6.0	15.3	1006.0	15.6	15.3	
B-6 B-7	2.28 0.89	A A	65.0 65.0	0.45	0.59	186 62	3.0	11.3 6.5	480 509	1.0	20 20	2.0	4.0 4.2	15.3	666.0 571.0	13.7	13.7	
B-8	3.23	A	65.0	0.45	0.59	177	5.0	9.3	700	2.0	20	2.8	4.2	13.4	877.0	13.2	13.4	
B-9	2.42	A	65.0	0.45	0.59	152	3.0	10.2	800	2.4	20	3.1	4.3	14.5	952.0	15.3	14.5	
B-10 C-1	1.10 4.12	A	2.0 65.0	0.09	0.36	66 65	25.0	5.1	187 1077	1.0 2.0	20 20	2.0	1.6	6.7	253.0 1142.0	11.4	6.7	
C-2	2.71	А	65.0	0.45	0.59	55	2.0	7.0	620	1.9	20	2.8	3.7	10.8	675.0	13.8	10.8	
C-3 C-4	1.56 2.47	A	65.0 65.0	0.45	0.59	77 194	4.0	6.6 13.2	0 345	0.0	20 20	0.0	0.0	6.6	77.0 539.0	10.4	6.6 13.0	
C-4 C-5	3.09	A	65.0	0.45	0.59	38	4.0	4.6	761	1.5	20	2.0	6.3	13.7	799.0	13.0	13.0	
C-6	2.10	A	65.0	0.45	0.59	61	3.0	6.4	1176	1.0	20	2.0	9.8	16.2	1236.5	16.9	16.2	
C-7 C-8	6.72 5.11	A	65.0 65.0	0.45	0.59	35 58	4.0	4.4	1278 834	1.7	20 20	2.6	8.2 5.5	12.6	1313.0 892.0	17.3	12.6	
C-9a	3.50	A	65.0	0.45	0.59	193	2.0	13.1	570	0.7	20	1.7	5.7	18.8	763.0	14.2	14.2	
C-9b C-10	3.69	A	65.0 65.0	0.45	0.59	160	3.0	10.4	665 1084	2.0	20 20	2.8	3.9	14.4	825.0 1206.0	14.6	14.4	
C-10 C-11	0.46	A	65.0	0.45	0.59	26	2.0	4.8	1084	0.5	20	1.4	1.8	6.6	1208.0	10.7	6.6	
C-12	1.79	A	65.0	0.45	0.59	160	4.0	9.5	200	0.5	20	1.4	2.4	11.8	360.0	12.0	11.8	
C-13 C-14	2.37	A	2.0	0.09	0.36	225 300	15.0	11.3 18.7	352	1.0	20 10	2.0	2.9	14.2	577.0 300.0	13.2	13.2	
D-1	2.98	A	65.0	0.45	0.59	170	1.0	15.5	715	1.0	20	2.0	6.0	21.5	885.0	14.9	14.9	
D-2	0.87	A	65.0	0.45	0.59	10 140	2.0	3.0	700	1.3	20 20	2.3	5.1	8.1	710.0	13.9	8.1	
D-3 D-4	3.66	A	65.0 65.0	0.45	0.59	50	3.0	9.8 5.8	660 750	2.2	20	2.8	4.4	13.5	800.0 800.0	14.4	13.5	
D-5	1.53	A	35.7	0.28	0.48	110	25.0	5.4	201	1.0	20	2.0	1.7	7.1	311.0	11.7	7.1	
D-6 D-7	0.83	A	2.0	0.09	0.36	300	5.0	18.7	0 855	0.0	10	0.0	0.0	18.7	300.0 930.0	11.7	11.7	
E-1	5.13	A	65.0	0.45	0.59	25	4.0	3.7	1360	3.3	20	3.6	6.2	12.5	1385.0	17.7	10.0	
E-2	5.42	A	65.0	0.45	0.59	20	2.0	4.2	1250	3.5	20	3.7	5.6	9.8	1270.0 975.0	17.1	9.8	
E-3 E-4	3.20 6.28	A A	65.0 65.0	0.45	0.59 0.59	10 305	2.0 7.0	3.0	965 1125	1.5	20 20	2.4	6.6 7.4	9.6	975.0	15.4	9.6 17.9	
E-5	1.13	A	2.0	0.09	0.36	127	25.0	7.1	315	1.0	20	2.0	2.6	9.8	442.0	12.5	9.8	
E-6	0.74	A	2.0	0.09	0.36	350	2.0	27.5	113	2.0	10	1.4	1.3	28.8	463.0	12.6	12.6	

the computed value needs to be used for existing conditions if it's higher than the Tc check (the area isn't urbanized yet)

NOTES:

$$\begin{split} T_i &= (0.395^*(1.1-C_3)^*(L)^{0.5})/((S)^{0.33}), \ S \ in \ fi/ft \\ T_i &= L/60V \ (Velocity + Trom Fig. 501) \\ Velocity + V &= V^{0.5} \ S, \ S, \ S \ in \ fi/ft \\ T_c \ Check &= 10 + L/180 \\ For \ Urbanized basins a minimum \ T_e \ of 5.0 \ minutes is required. \\ For non-arbanized basins a minimum \ T_e \ of 1.0.0 \ minutes is required. \end{split}$$

Not checked on this review

STORM DRAINAGE SYSTEM DESIGN (RATIONAL METHOD PROCEDURE)

Subdivision Location		lview Rese							-						Projec		HRG(Subdivis	ion PE	R
Design Storm									-						hecke	d By:)			
	_														-						
				DIRE	CT RUI	NOFF		1		FOTAL	RUNOF	F	STR	EET		PIPE	-	TRA	VEL TI	ME	
STREET	esign Point	asin ID	Area (Ac)	unoff Coeff.	c (min)	*A (Ac)	(in/hr)	(cfs)	c (min)	*A (Ac)	(in/hr)	(cfs)	lope (%)	treet Flow (cfs)	esign Flow (cfs)	lope (%)	ipe Size (inches)	ength (ft)	elocity (fps)	Tt (min)	REMARKS
EXISTING		<u> </u>		~	н		<u> </u>		<u> </u>				S	S	Ц	S				Į.	
		OS-W	108.80									67.0									Sheet flow to Main Stem Channel Total Flow - Q(5)=67 cfs (from MDDP)
		OS-NW	105.72																		Sheet flow to Main Stem Tributary #2 Channel
		EX-1	16.18	0.09	19.6	1.46	3.04	4.4				59.0									Total Flow - Q(5)=59 cfs (from MDDP) Sheet flow to Main Stem Channel
	1	EX-2	46.06	0.09	29.0	4.15	2.47	10.3											$\left \right $		Total Flow - Incl. Offsite flow of Q(5)=67 cfs (from MDDP) Sheet flow to Main Stem Channel
	2											77.3									Total Flow - Incl. Offsite flow of Q(5)=67 cfs (from MDDP)
	3	EX-3	64.34	0.09	33.7	5.79	2.27	13.1													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	4	EX-4	2.68	0.09	14.2	0.24	3.54	0.8													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	5	EX-5	26.15	0.09	23.4	2.35	2.77	6.5													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
		EX-6	31.53	0.09	19.9	2.84	3.02	8.6													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	6																				Total Existing Flow Leaving Property offsite - outfalls to Main Stem
	7								33.7	16.8	2.3	164.2									Tributary #2 Channel
PROPOSED	-	•						•		•											
	1	Basin-1	1.22	0.74	7.0	0.90	4.64	4.2							1						East Leg of Rex Road Intersection
	1	A-1	11.23	0.09	9.6	1.01	4.16	4.2											+		Institutional Tract
	2a	A-2a	4.21	0.45	8.8	1.89	4.29	8.1													Basin will have own water quality & detention pond On-Grade 15' CDOT Type R Inlet (0.4 cfs bypass to DP 2b)
	_	A-2b	2.75	0.74	9.9	2.04	4.13	8.4													
	2b											8.8									Sump 20' CDOT Type R Inlet (Receives 0.4 cfs upstream bypass)
	3	A-3	0.36	0.90	5.0	0.32	5.10	1.6													Sump 5' CDOT Type R Inlet
	4a	A-4a	6.05	0.45	15.2	2.72	3.44	9.4													On-Grade 10' CDOT Type R Inlet (2.9 cfs bypass to DP 2)
	4b 4	A-4b	3.81	0.45	13.5	1.71	3.63	6.2				4.2									On-Grade 10' CDOT Type R Inlet (1.3 cfs bypass to DP 2)
	5	A-5	0.35	0.90	5.0	0.32	5.10	1.6				4.2									Sump 15' CDOT Type R Inlet (Receives 4.2 cfs upstream bypass) Sump 5' CDOT Type R Inlet
	6	A-6	2.76	0.45	12.9	1.24	3.70	4.6													On-Grade 10' CDOT Type R Inlet (0.4 cfs bypass to DP 7a)
	7	A-7	0.23	0.90	5.0	0.21	5.10	1.1													On-Grade 5' CDOT Type R Inlet (0.1 cfs bypass to DP 7b)
	8	A-8	5.44	0.69	11.2	3.75	3.93	14.7													Proposed Amenitity Center - Assumed 75% Imperviousness
	0																				Proposed Ameniaty Center - Assumed 7576 imperviousness
	7a	A-9	4.91	0.45	16.2	2.21	3.34	7.4				7.8									Sump 20' CDOT Type R Inlet (Receives 0.4 cfs upstream bypass)
	7b	A-10	1.02	0.45	7.3	0.46	4.59	2.1				2.2									Sump 5' CDOT Type R Inlet (Receives 0.1 cfs upstream bypass)
	8a	A-11	3.56	0.17	16.5	0.61	3.31	2.0	16.5	17.48	3.31	57.9									Total of Flows to Pond A
	9	B-1	3.33	0.45	14.3	1.50	3.54	5.3	10.5	17.40	5.51	51.9									Sump 10' CDOT Type R Inlet
	10a	B-2	4.51	0.45	14.7	2.03	3.50	7.1													On-Grade 10' CDOT Type R Inlet (1.5 cfs bypass to DP 10b)
		B-3	4.05	0.45	9.0	1.82	4.27	7.8											$\left \right $		
	10b 11	B-4	1.35	0.72	7.0	0.97	4.63	4.5				9.3									Sump 20' CDOT Type R Inlet (Receives 1.5 cfs of upstream bypass) Sump 10' CDOT Type R Inlet
																					· · · · ·
	12a	B-5	5.12	0.45	15.3	2.30	3.43	7.9													On-Grade 10' CDOT Type R Inlet (2.0 cfs bypass to DP 12b)
	14	B-6	2.28	0.45	13.7	1.03	3.61	3.7													On-Grade 10' CDOT Type R Inlet (0.1 cfs bypass to DP 12b)

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

 Subdivision:
 Grandview Reserve

 Location:
 CO, El Paso County
 Design Storm: 5-Year

Project Name:	Grandview Subdivision PDR
Project No.:	HRG01
Calculated By:	TJE
Checked By:	BAS
Date:	3/1/22

									Date: 3/1/22												
				DIRI	ECT RUI	NOFF			,	FOTAL	RUNOF	F	STR	REET		PIPE		TRAV	/EL T	ME	
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	15	B-7	0.89	0.45	10.7	0.40	3.99	1.6													On-Grade 10' CDOT Type R Inlet (0.0 cfs bypass to DP 12b)
	12b	B-8	3.23	0.45	13.4	1.45	3.64	5.3				7.4									Sump 20' CDOT Type R Inlet (Receives 2.1 cfs of upstream bypass)
	13	B-9 B-10	2.42	0.45	14.5 6.7	0.10	3.52 4.70	3.8 0.5													Sump 10' CDOT Type R Inlet
	16 17b	C-1	4.12	0.45	13.0	1.85	3.69	6.8	15.3	12.69	3.43	43.5									Total of flows to Pond B On-Grade 15' CDOT Type R (0.1 cfs bypass to DP 17e)
	17a	C-2	2.71	0.45	10.8	1.22	3.99	4.9													On-Grade 15' CDOT Type R (1.7 cfs bypass to DP 17c)
		C-3	1.56	0.45	6.6	0.70	4.73	3.3													Sheet Flows off-site east
	17c	C-4 C-5	2.47	0.45	13.0	1.11	3.69	4.1				5.8									Receives 1.7 cfs of Bypass from DP 17a On-Grade 15' CDOT Type R (0.0 cfs bypass to DP 17d) Receives 0.0 cfs of Bypass from DP 17c
	17d	C-6	2.10	0.45	16.2	0.95	3.34	3.2				5.5									On-Grade 15' CDOT Type R (0.0 cfs bypass to DP 17h) Receives 0.1 cfs of Bypass from DP 17b
	17e 17f	C-8	5.11	0.45	12.7	2.30	3.73	8.6				3.3									On-Grade 15' CDOT Type R (0.0 cfs bypass to DP 17h) On-Grade 15' CDOT Type R (0.6 cfs bypass to DP 17g)
	17g	C-9a	3.50	0.45	14.2	1.58	3.54	5.6				6.2									Receives 0.6 cfs of Bypass from DP 17f On-Grade 15' CDOT Type R (0.0 cfs bypass to DP 17h)
	17h 18a	C-9b C-7	3.69 6.72	0.45	14.4	1.66 3.02	3.53 3.74	5.9				5.9									Sump 20' CDOT Type R (Receives 0.0 cfs of upstream bypass)
	_	C-10	3.51	0.45	12.0	1.58	3.31	5.2													On-Grade 15' CDOT Type R (1.7 cfs bypass to DP 18b)
	18b 19	C-11	0.46	0.45	6.6	0.21	4.72	1.0				6.9 1.0									Sump 15' CDOT Type R (Receives 1.7 cfs of upstream bypass)
	20	C-12	1.79	0.45	11.8	0.81	3.84	3.1				3.1									Sump 5' CDOT Type R (Receives 0.0 cfs of upstream bypass) Sump 5' CDOT Type R (Receives 0.0 cfs of upstream bypass)
	21a 21b	C-13 C-14	2.37	0.09	13.2	0.21	3.66	0.8	16.5	18.59	3.31	61.5									Total combined flows to Pond C
	216	D-1	2.98	0.09	11.7 14.9	0.14	3.47	4.6													Un-developed area - Sheet flows to MS 2 On-Grade 10' CDOT Type R Inlet (0.4 cfs bypass to DP 24)
	23	D-2	0.87	0.45	8.1	0.39	4.42	1.7													On-Grade 10' CDOT Type R Inlet (0.0 cfs bypass to DP 24)
	24	D-3	3.66	0.45	13.5	1.65	3.63	6.0				6.4									Receives 0.4 cfs of upstream bypass Sump 15' CDOT Type R Inlet
	25	D-4 D-5	2.00	0.45	10.3 7.1	0.90	4.06	3.7													Sump 10' CDOT Type R Inlet
	26	D-5	0.83	0.28	11.7	0.43	3.86	0.3	14.9	4.71	3.47	16.3									Total of flows to Pond D Un-developed area - Sheet flows to MS
	25a	D-7	1.80	0.37	12.5	0.67	3.75	2.5								-					Sheet flows to Channel and Conveyed to Pond D
	27	E-1	5.13	0.45	10.0	2.31	4.10	9.5													On-Grade 15' CDOT Type R Inlet (0.9 cfs bypass to DP 29)
	28	E-2	5.42	0.45	9.8	2.44	4.13 4.17	10.1												On-Grade 15' CDOT Type R Inlet (1.2 cfs bypass to DP 29)	
	29	E-3 E-4	3.20 6.28	0.45	9.6 17.9	2.83	3.18	6.0 9.0				8.1									Receives 2.1 cfs of upstream bypass Sump 15' CDOT Type R Inlet Sump 20' CDOT Type R Inlet
HRG01 Pr. Drainage Cales xlsm									I				1								Page 2 of 3 - 3/3/2022

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

														Pro	ject N	ame:	Grand	view S	Subdivi	sion PD	R
Subdivision:	Grand	view Rese	erve												Projec	t No.:	HRG()1			
Location:	CO, E	l Paso Co	unty											Cal	culate	d By:	TJE				
Design Storm:	5-Yea	r												0	hecke	d By:	BAS				
																Date:	3/1/22	2			
	-			DIDI		NOFE			,	DOT 1 Y	DUNCE	-	OTT	-		DIDE		mn i i	CODE OF		
				DIRI	ECT RU	NOFF				TOTAL	RUNOF	F.	STR	EET	-	PIPE		TRA	VEL T	IME	
STREET	gn Point	n ID	t (Ac)	off Coeff.	(min)	. (Ac)	(in/hr)	(cfs)	(min)	. (Ac)	(in/hr)	(cfs)	Slope (%)	et Flow (cfs)	sign Flow (cfs)	e (%)	Size (inches)	gth (ft)	city (fps)	(min)	REMARKS
	Desi	Basi	Area	Run	Tc (i	C*A	I (in	0 (c	Tc (i	C*A	I (in	Q (c	Slop	Stree	Desi	Slope	Pipe	Leng	Velc	Tt (1	
	31	E-5	1.13	0.09	9.8	0.10	4.14	0.4	17.9	9.12	3.18	29.0									Total of flows to Pond E
		E-6	0.74	0.09	12.6	0.07	3.74	0.3													Un-developed area - Sheet flows to MS
	32	OS-1	3.28	0.67	16.9	2.20	3.27	7.2													Prelim Eastonvill Rd. Flows - NW Segment
	33 34	OS-2	2.31	0.56	14.2	1.29	3.55	4.6	16.9	3.49	3.27	11.4									Prelim Eastonvill Rd. Flows - NE Segment Total Prelim Flows to North Eastonville Rd. Pond
	35	OS-3	3.02	0.60	11.6	1.81	3.86	7.0													Prelim Eastonvill Rd. Flows - SW Segment
	36 37	OS-4	3.00	0.54	11.9	1.62	3.82	6.2	11.9	3.43	3.82	13.1									Prelim Eastonvill Rd. Flows - SE Segment Total Prelim Flows to South Eastonville Rd. Pond

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

																Name:			Subdivi	sion P	DR
Subdivision									-							ct No.:		01			
Location: Design Storm:			ounty						-							ed By: ed By:					
Design Storm.	100-1	car							-							Date:		2			
	1	r		DID	FOT DU	NOFE				TOTAL	DUNOE	F	GT	REET	1				VEL T	ME	
			-		ECT RU	NOFF	1			TOTAL	RUNOF	F	51			PIPE	\sim	IKA	VEL I	IVIE	
STREET	Design Point	3asin ID	vrea (Ac)	tunoff Coeff.	Tc (min)	C*A (Ac)	(in/hr)	Q (cfs)	c (min)	C*A (Ac)	(in/hr)	Q (cfs)	lope (%)	treet Flow (cfs)	Jesign Flow (cfs	lope (%)	ipe Size (inches	ength (ft)	/elocity (fps)	ſt (min)	REMARKS
EXISTING		<u> </u>				0							01			0					
		OS-W	108.80									413.0									Sheet flow to Main Stem Channel Total Flow - Q(100)=413 cfs (from MDDP)
		OS-NW	105.72												-						Sheet flow to Main Stem Tributary #2 Channel
		EX-1	16.18	0.36	19.6	5.82	5.42	31.5				280.0									Total Flow - Q(100)=280 cfs (from MDDP) Sheet flow to Main Stem Channel
	1																				Total Flow - Incl. Offsite flow of Q(100)=413 cfs (from MDDP)
	2	EX-2	46.06	0.36	29.0	16.58	4.39	72.8				485.8									Sheet flow to Main Stem Channel Total Flow - Incl. Offsite flow of Q(100)=413 cfs (from MDDP)
	3	EX-3	64.34	0.36	33.7	23.16	4.03	93.3	-												Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	4	EX-4	2.68	0.36	14.2	0.96	6.31	6.1													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	5	EX-5	26.15	0.36	23.4	9.41	4.94	46.5													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	6	EX-6	31.53	0.36	19.9	11.35	5.37	60.9													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
	7								33.7	67.28	4.03	964.1									Total Existing Flow Leaving Property offsite - outfalls to Main Stem Tributary #2 Channel
PROPOSED		•		•					•						•	·		•			
	1	Basin-1	1.22	0.84	7.0	1.02	8.26	8.4	1	1			1		1	1		1			East Leg of Rex Road Intersection
	1	A-1	11.23	0.36	9.6	4.04	7.40	29.9							<u> </u>						Institutional Tract
	·																				Basin will have own water quality & detention pond
	2a	A-2a	4.21	0.59	8.8	2.48	7.64	18.9													On-Grade 15' CDOT Type R Inlet (6.1 cfs bypass to DP 2b)
	2b	A-2b	2.75	0.83	9.9	2.28	7.34	16.7				22.8									Sump 20' CDOT Type R Inlet (Receives 6.1 cfs upstream bypass)
	3	A-3	0.36	0.96	5.0	0.35	9.09	3.2													Sump 5' CDOT Type R Inlet
	4a	A-4a	6.05	0.59	15.2	3.57	6.13	21.9													On-Grade 10' CDOT Type R Inlet (12.2 cfs bypass to DP 2)
	4b 4	A-4b	3.81	0.59	13.5	2.25	6.46	14.5				19.6									On-Grade 10' CDOT Type R Inlet (7.4 cfs bypass to DP 2) Sump 15' CDOT Type R Inlet (Receives 19.6 cfs upstream bypass)
	5	A-5	0.35	0.96	5.0	0.34	9.09	3.1													Sump 5' CDOT Type R Inlet
	6	A-6	2.76	0.59	12.9	1.63	6.58	10.7													On-Grade 10' CDOT Type R Inlet (3.8 cfs bypass to DP 7a)
	7	A-7	0.23	0.96	5.0	0.22	9.09	2.0													On-Grade 5' CDOT Type R Inlet (0.4 cfs bypass to DP 7b)
	8	A-8	5.44	0.81	11.2	4.41	6.99	30.8													Proposed Amenitity Center - Assumed 75% Imperviousness
	7a	A-9	4.91	0.59	16.2	2.90	5.95	17.3				21.1									Sump 20' CDOT Type R Inlet (Receives 3.8 cfs upstream bypass)
	7b	A-10	1.02	0.59	7.3	0.60	8.17	4.9				5.3									Sump 5' CDOT Type R Inlet (Receives 0.4 cfs upstream bypass)
	8a	A-11	3.56	0.41	16.5	1.46	5.90	8.6	16.5	22.49	5.90	132.7									Total of Flows to Pond A
	9	B-1	3.33	0.59	14.3	1.96	6.30	12.3													Sump 10' CDOT Type R Inlet
	10a	B-2	4.51	0.59	14.7	2.66	6.22	16.5													On-Grade 10' CDOT Type R Inlet (8.0 cfs bypass to DP 10b)
	10b	B-3	4.05	0.59	9.0	2.39	7.61	18.2				26.2									Sump 15' CDOT Type R Inlet (Receives 8.0 cfs of upstream bypass)
	11	B-4	1.35	0.83	7.0	1.12	8.25	9.2							1						Sump 10' CDOT Type R Inlet
	12a	B-5	5.12	0.59	15.3	3.02	6.11	18.5													On-Grade 10' CDOT Type R Inlet (9.5 cfs bypass to DP 12b)
	14	B-6	2.28	0.59	13.7	1.35	6.42	8.7	1	1	l		1					1			On-Grade 10' CDOT Type R Inlet (2.5 cfs bypass to DP 12b)

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

 Subdivision:
 Grandview Reserve

 Location:
 CO, El Paso County
 Design Storm: 100-Year

Project Name:	Grandview Subdivision PDR
Project No.:	HRG01
Calculated By:	TJE
Checked By:	BAS
Date:	3/1/22

		DIRECT RUNOFF						TOTAL RUNOFF							TRA	VEL T					
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	15	B-7	0.89	0.59	10.7	0.53	7.10	3.8													On-Grade 10' CDOT Type R Inlet (0.1 cfs bypass to DP 12b)
	12b	B-8	3.23	0.59	13.4	1.91	6.48	12.4				24.5									Sump 20' CDOT Type R Inlet (Receives 12.1 cfs of upstream bypass)
	13	B-9	2.42	0.59	14.5	1.43	6.26	9.0													Sump 10' CDOT Type R Inlet
	16 17b	B-10 C-1	1.10 4.12	0.36	6.7	0.40 2.43	8.37 6.57	3.3	15.3	16.77	6.11	102.5									Total of flows to Pond B On-Grade 15' CDOT Type R (4.3 cfs bypass to DP 17e)
	17a	C-2	2.71	0.59	10.8	1.60	7.10	11.4													On-Grade 15' CDOT Type R (11.2 cfs bypass to DP 17c)
		C-3	1.56	0.59	6.6	0.92	8.42	7.7													Sheet Flows off-site east
	17c	C-4	2.47	0.59	13.0	1.46	6.57	9.6				13.9									Receives 4.3 cfs of Bypass from DP 17a On-Grade 15' CDOT Type R (7.4 cfs bypass to DP 17d)
	17d	C-5 C-6	3.09 2.10	0.59	11.0	1.82	7.04 5.94	7.4				20.2									Receives 7.4 cfs of Bypass from DP 17c On-Grade 15' CDOT Type R (7.0 cfs bypass to DP 17h) Receives 4.3 cfs of Bypass from DP 17b
	17e 17f	C-0	5.11	0.59	12.7	3.01	6.63	20.0				11.7									On-Grade 15' CDOT Type R (2.0 cfs bypass to DP 17h) On-Grade 15' CDOT Type R (6.9 cfs bypass to DP 17h)
	17	C-9a	3.50	0.59	14.2	2.07	6.31	13.1				20.0									Receives 6.9 cfs of Bypass from DP 17f
	17g 17h	C-9b	3.69	0.59	14.4	2.18	6.29	13.7				20.0 29.5									On-Grade 15' CDOT Type R (6.8 cfs bypass to DP 17h) Sump 20' CDOT Type R (Receives 15.8 cfs of upstream bypass)
	18a	C-7	6.72	0.59	12.6	3.96	6.65	26.3													On-Grade 15' CDOT Type R (11.2 cfs bypass to DP 18b)
	18b	C-10 C-11	3.51 0.46	0.59	16.5 6.6	2.07 0.27	5.90 8.41	12.2 2.3				23.4									Sump 15' CDOT Type R (Receives 11.2 cfs of upstream bypass)
	19	C-12	1.79	0.59	11.8	1.06	6.83	7.2				2.3									Sump 5' CDOT Type R (Receives 0.0 cfs of upstream bypass)
	20	C-13	2.37	0.36	13.2	0.85	6.52	5.5				7.2									Sump 5' CDOT Type R (Receives 0.0 cfs of upstream bypass)
	21a 21b	C-14	1.53	0.36	11.7	0.55	6.87	3.8	16.5	24.94	5.90	147.1									Total combined flows to Pond C Un-developed area - Sheet flows to MS 2
	22	D-1	2.98	0.59	14.9	1.76	6.18	10.9													On-Grade 10' CDOT Type R Inlet (4.0 cfs bypass to DP 24)
	23	D-2 D-3	0.87	0.59	8.1	0.51	7.88 6.46	4.0													On-Grade 10' CDOT Type R Inlet (0.2 cfs bypass to DP 24) Receives 4.2 cfs of upstream bypass
	24 25	D-3	2.00	0.59	10.3	1.18	7.23	8.5				18.2									Sump 15' CDOT Type R Inlet
	_	D-5	1.53	0.48	7.1	0.73	8.24	6.0	14.0	6.24	6 10	20.2									
	26	D-6	0.83	0.36	11.7	0.30	6.87	2.1	14.9	6.34	6.18	39.2									Total of flows to Pond D Un-developed area - Sheet flows to MS
	25a	D-7	1.80	0.54	12.5	0.97	6.67	6.5													Sheet flows to Channel and Conveyed to Pond D
	27	E-1 E-2	5.13	0.59	9.8	3.03	7.30	22.1												On-Grade 15' CDOT Type R Inlet (8.3 cfs bypass to DP 29) On-Grade 15' CDOT Type R Inlet (9.3 cfs bypass to DP 29)	
	-	E-2 E-3	3.20	0.59	9.6	1.89	7.43	14.0													Receives 17.6 cfs of upstream bypass
	29 30	E-4	6.28	0.59	17.9	3.71	5.66	21.0				31.6									Sump 15' CDOT Type R Inlet Sump 20' CDOT Type R Inlet

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

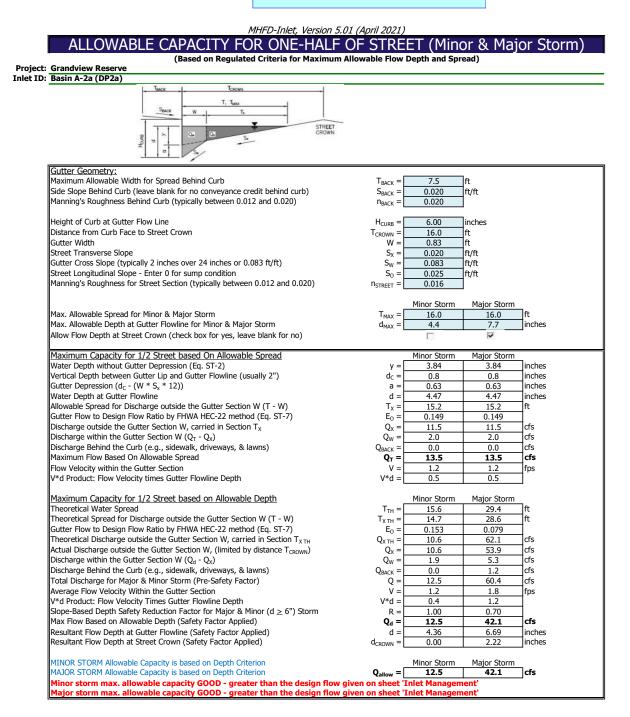
														Pro	oject N	ame:	Grand	view S	ubdivi	sion P.	DR
Subdivision:	Grand	view Res	serve												Projec	t No.:	HRG)1			
Location:	CO, E	l Paso Co	ounty											Cal	culate	d By:	TJE				
Design Storm:	100-Y	ear							•					0	hecke	d By:	BAS				
]	Date:	3/1/22	2			
	DIRECT RUNOFF																				
				DIR	ECT RU	NOFF			1	TOTAL	RUNOF	F	ST	REET		PIPE		TRAV	VEL T	IME	
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	31	E-5	1.13	0.36	9.8	0.41	7.37	3.0	17.9	12.24	5.66	69.3									Total of flows to Pond E
		E-6	0.74	0.36	12.6	0.27	6.66	1.8													Un-developed area - Sheet flows to MS
	32	OS-1	3.28	0.79	16.9	2.59	5.83	15.1													Prelim Eastonvill Rd. Flows - NW Segment
	33 34	OS-2	2.31	0.71	14.2	1.64	6.31	10.3	16.9	4.23	5.83	24.7									Prelim Eastonvill Rd. Flows - NE Segment Total Prelim Flows to North Eastonville Rd. Pond
	35	OS-3	3.02	0.74	11.6	2.23	6.88	15.3													Prelim Eastonvill Rd. Flows - SW Segment
	36 37	OS-4	3.00	0.70	11.9	2.10	6.81	14.3	11.9	4.33	6.81	29.5									Prelim Eastonvill Rd. Flows - SE Segment Total Prelim Flows to South Eastonville Rd. Pond

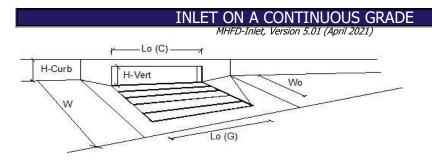
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APPENDIX D

Hydraulic Computations

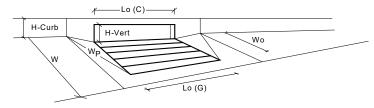
Inlets not checked in detail with this review.





Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	linches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L ₀ =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =	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 = 0.3)	C _f -C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	ц г с =	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	Q ₀ =	8.1	18.9	lcfs
Water Spread Width	Q₀ = T =	13.2	16.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.8	5.0	linches
		0.0	0.5	linches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =			Inches
Ratio of Gutter Flow to Design Flow	E ₀ =	0.183	0.130	4,
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	6.6	16.4	cfs
Discharge within the Gutter Section W	Q _w =	1.5	2.5	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.23	0.32	sq ft
Velocity within the Gutter Section W	V _W =	6.3	7.8	fps
Water Depth for Design Condition	d _{LOCAL} =	6.8	8.0	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	$E_{o-GRATE} =$	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	7
Interception Rate of Side Flow	R _x =	N/A	N/A	7
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	7
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	$V_0^{-e} =$	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_0 - 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)	₹B	MINOR	MAJOR	
Equivalent Slope S_{ρ} (based on grate carry-over)	S _e =	0.087	0.068]ft/ft
Required Length L_T to Have 100% Interception	L _T =	18.41	31.80	T _{ft}
Under No-Clogging Condition	-1 - I	MINOR	MAJOR	⊣
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00	Πft
Interception Capacity	Q _i =	7.7	12.9	cfs
Under Clogging Condition	Qi =	MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	7
55 5				-
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	4.
Effective (Unclogged) Length	L _e =	14.34	14.34	ft
Actual Interception Capacity	Qa =	7.7	12.8	cfs
Carry-Over Flow = $Q_{b(GRATE)}$ - Q_a	Q _b =	0.4	6.1	cfs
<u>Summary</u>	- 1	MINOR	MAJOR	٦.
Total Inlet Interception Capacity	Q =	7.7	12.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.4	6.1	cfs
Capture Percentage = Q_a/Q_o =	C% =	95	68	%

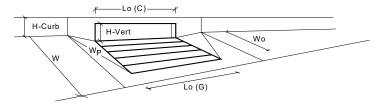
ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				
Grandview Reserve			,	
Basin A-2b (DP2b)				
SBACK T, TMAX				
STREET CROWN				
B D S CHOWN				
I O S				
V				
Gutter Geometry:			1.	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Benind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020]	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	V =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016	1	
			-	
	-	Minor Storm	Major Storn	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Majar Charm	
Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	Major Storm 3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	т _х =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
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	2
Theoretical Water Spread	т _{тн} =Г	15.6	29.4	
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	т _н = Т _{хтн} =	15.0	29.4	-
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.153	0.079	\dashv
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	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 ($Q_d - Q_x$)	$\tilde{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 \geq 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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	_



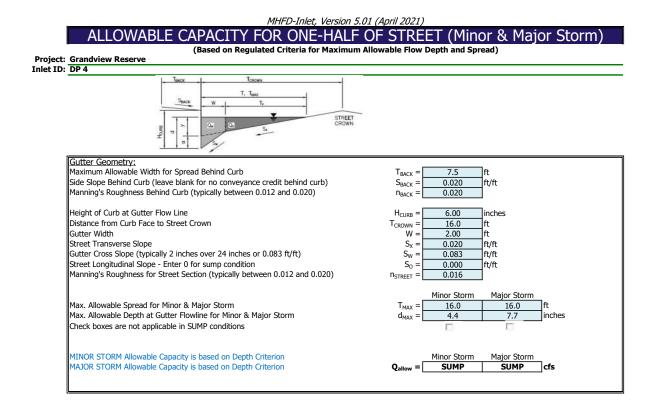
	<u>mation (Input)</u>	CDOT Type R Curb Opening	-	MINOR	MAJOR	-
Type of Inlet		<i>"</i>	Type =		Curb Opening	
		continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of U	nit Inlets (Grate o	r Curb Opening)	No =	4	4	
Water Depth	at Flowline (outsi	de of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Inform	nation		_	MINOR	MAJOR	Verride Depths
Length of a L	Init Grate		$L_{0}(G) =$	N/A	N/A	feet
Width of a Ur	nit Grate		W ₀ =	N/A	N/A	feet
		(typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	1
		ate (typical value 0.50 - 0.70)	$C_f(G) =$	N/A	N/A	
		value 2.15 - 3.60)	$C_{w}(G) =$	N/A	N/A	-
		al value 0.60 - 0.80)	$C_{0}(G) = C_{0}(G) = C_{0}(G)$	N/A	N/A	-
	g Information			MINOR	MAJOR	
	Init Curb Opening		$L_{0}(C) = [$	5.00	5.00	feet
	tical Curb Opening	a in Inchos		6.00	6.00	linches
	b Orifice Throat i		H _{vert} =	6.00	6.00	linches
			H _{throat} =			
	at (see USDCM F		Theta =	63.40	63.40	degrees
		(typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
		rb Opening (typical value 0.10)	$C_{f}(C) =$	0.10	0.10	_
		(typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	_
		nt (typical value 0.60 - 0.70)	$C_{o}(C) =$	0.67	0.67	
Grate Flow	Analysis (Calcula	ted)	_	MINOR	MAJOR	_
Clogging Coe	fficient for Multipl	e Units	Coef =	N/A	N/A	
Clogging Fac	or for Multiple Ur	its	Clog =	N/A	N/A	1
Grate Capac	ity as a Weir (b	ased on Modified HEC22 Method)		MINOR	MAJOR	-
	without Clogging		Q _{wi} =	N/A	N/A	lcfs
	with Clogging		Q _{wa} =	Ń/A	N/A	cfs
		based on Modified HEC22 Method)		MINOR	MAJOR	
	without Clogging		Q _{oi} =	N/A	N/A	lcfs
Interception			$Q_{oa} =$	N/A	N/A	cfs
	ity as Mixed Flo		Qoa - L	MINOR	MAJOR	
	without Clogging	<u>vv</u>	o – [N/A	N/A	lcfs
			Q _{mi} =			
Interception			$Q_{ma} =$	N/A N/A	N/A N/A	cfs cfs
		mes clogged condition)	Q _{Grate} =	MINOR	MAJOR	LIS
	ng Flow Analysis		а с Г			7
	fficient for Multipl		Coef =	1.33	1.33	4
	or for Multiple Ur		Clog =	0.03	0.03	
		sed on Modified HEC22 Method)	-	MINOR	MAJOR	-
	without Clogging		Q _{wi} =	10.0	35.4	cfs
Interception			Q _{wa} =	9.7	34.3	cfs
Curb Openir	ng as an Orifice	(based on Modified HEC22 Method)	_	MINOR	MAJOR	_
Interception	without Clogging		Q _{oi} =	33.6	43.9	cfs
Interception			Q _{oa} =	32.5	42.4	cfs
	ng Capacity as M	lixed Flow		MINOR	MAJOR	-
	without Clogging		Q _{mi} =	17.0	36.7	cfs
	with Clogging		Q _{ma} =	16.5	35.5	lcfs
		ty (assumes clogged condition)	Q _{curb} =	9.7	34.3	cfs
	reet Conditions	cy (assumes dogged condition)	Cuib	MINOR	MAJOR	1
Total Inlet Le			L = [20.00	20.00	lfeet
		bacad an atract geometry from shours)				ft.>T-Crown
		based on street geometry from above)	· -	15.6	29.4	
Resultant Flo	w Depth at Street	Crown	d _{CROWN} =	0.0	3.2	inches
		(Colordoted)				
		uction (Calculated)		MINOR	MAJOR	٦.
Depth for Gra			d _{Grate} =	N/A	N/A	ft
	rb Opening Weir I		d _{Curb} =	0.29	0.57	ft
Combination	Inlet Performance	e Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	
Curb Opening	Performance Re	duction Factor for Long Inlets	RF _{Curb} =	0.67	0.88	1
		iction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	7
		5	c.ate			-
Grated Inice						
				MINOR	MAJOR	
	tercention Canaci	y (assumes clogged condition)	Q _a = [MINOR 9.7	MAJOR 34.3	cfs

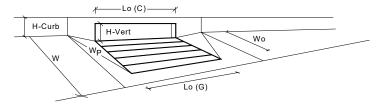
Warning 1: Dimension entered is not a typical dimension for inlet type specified.

(Based on Regulated Criteria for Maximum Allo			or & Ma ead)	,
Grandview Reserve				
Basin A-3 (DP3)				
Seace W I T.				
STREET CROWN				
S S				
I O Sa				
Gutter Geometry: Maximum Allowable Width for Savard Babind Curb	т _Г	7.5	ام	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020	π/π	
Manning's Roughness benind carb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016	1	
			•	
	-	Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	$T_{MAX} =$	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions				
Maximum Canadity for 1/2 Streat based On Allowable Canad		Min en Chauma	Maiau Chauna	
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	y =[Minor Storm 3.84	Major Storm 3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y – d _C =	2.0	2.0	inches
Gutter Depression (d _c - (W * S_x * 12))	a =	1.51	1.51	linches
Water Depth at Gutter Flowline	d =	5.35	5.35	linches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	14.0	14.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = 1$	0.372	0.372	-
Discharge outside the Gutter Section W, carried in Section T_{χ}	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 Streat bacad on Allowable Danth		Minor Cham	Maio: Ch-	
Maximum Capacity for 1/2 Street based on Allowable Depth	т Г	Minor Storm	Major Storm	
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)	T _{TH} =	<u>11.9</u> 9.9	25.7 23.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	Т _{х тн} = Е ₀ =	0.497	0.228	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{x TH}$	с _о = Q _{х тн} =	0.497	0.228	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_{X TH} = Q_X =$	0.0	0.0	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_{\rm X} = Q_{\rm W} = 1$	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.0	
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	QBACK -	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	v =	0.0	0.0	
V*d Product: Flow Velocity Times Gutter Flowline Depth	v*d =	0.0	0.0	1.62
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	SUMP	SUMP	1
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
	L			—
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	<u> </u>
MAJOR STORM Allowable Capacity is based on Depth Criterion		SUMP	SUMP	cfs



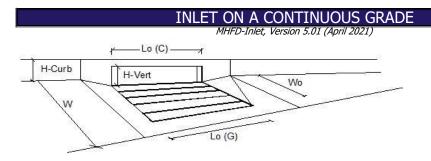
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		MINOR	MAJOR	Verride Depths
Length of a Unit Grate	L ₀ (G) =	N/A	N/A	lfeet
Width of a Unit Grate	W ₀ =	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)	$C_{0}(G) = C_{0}(G) = C_{0}(G)$	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	linches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	linches
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	1
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_{0}(C) =$	0.67	0.67	1
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	7
Clogging Factor for Multiple Units	Clog =	N/A	N/A	1
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	7
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} =	2.7	10.1	cfs
Interception with Clogging	Q _{wa} =	2.4	9.1	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	Q _{oi} =	8.4	11.0	cfs
Interception with Clogging	Q _{oa} =	7.6	9.9	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q _{mi} =	4.4	9.8	cfs
Interception with Clogging	Q _{ma} =	4.0	8.8	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{Curb} =	2.4	8.8	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 =	11.9	25.7	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	2.3	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} =	0.20	0.47	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.56	0.98	_
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 =	2.4	8.8	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$	1.6	3.0	cfs





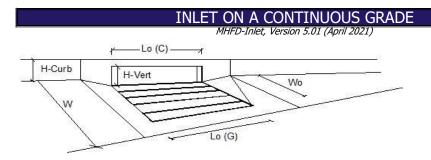
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	1
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	linches
Number of Unit Inlets (Grate or Curb Opening)	No =	3	3	-
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		MINOR	MAJOR	Verride Depths
Length of a Unit Grate	L ₀ (G) =	N/A	N/A	lfeet
Width of a Unit Grate	W ₀ =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	1
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	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_{0}(G) =$	N/A	N/A	1
Curb Opening Information	-0(-)	MINOR	MAJOR	4
Length of a Unit Curb Opening	L _o (C) =	5.00	5.00	lfeet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	linches
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)	$C_{w}(C) = C_{w}(C)$	3.60	3.60	1
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_{0}(C) = C_{0}(C) = C_{0}(C)$	0.67	0.67	1
Grate Flow Analysis (Calculated)	0()	MINOR	MAJOR	1
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)	ciug – L	MINOR	MAJOR	1
Interception without Clogging	Q _{wi} =	N/A	N/A	lcfs
Interception with Clogging	$Q_{wa} =$	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)	Rwa	MINOR	MAJOR	
Interception without Clogging	Q _{oi} =	N/A	N/A	cfs
Interception with Clogging	$Q_{oa} =$	N/A	N/A	lcfs
Grate Capacity as Mixed Flow	Q _{0a} – [MINOR	MAJOR	
Interception without Clogging	Q _{mi} =	N/A	N/A	lcfs
Interception with Clogging	$Q_{ma} = $	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	Q _{ma} =	N/A	N/A	cfs
Curb Opening Flow Analysis (Calculated)	Colate	MINOR	MAJOR	10.0
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	7
Clogging Factor for Multiple Units	Clog =	0.04	0.04	-
Curb Opening as a Weir (based on Modified HEC22 Method)	ciog – L	MINOR	MAJOR	4
Interception without Clogging	Q _{wi} =	5.4	26.6	lcfs
Interception with Clogging		5.2	25.5	lcfs
Curb Opening as an Orifice (based on Modified HEC22 Method)	Q _{wa} – L	MINOR	MAJOR	
Interception without Clogging	Q _{oi} =	25.2	32.9	lcfs
Interception without clogging	$Q_{oa} = $	24.1	31.5	cfs
Curb Opening Capacity as Mixed Flow	Q _{0a} – [MINOR	MAJOR	
Interception without Clogging	o - [10.9	27.5	cfs
Interception with Clogging	Q _{mi} = Q _{ma} =	10.9	27.3	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{ma} = Q _{curb} =	5.2	20.3 25.5	cfs
Resultant Street Conditions	Curb -	MINOR	MAJOR	10.0
Total Inlet Length	L = [15.00	15.00	lfeet
		15.00	25.7	ft.>T-Crown
Resultant Street Flow Spread (based on street geometry from above) Resultant Flow Depth at Street Crown	· -	0.0	25.7	linches
	d _{CROWN} =	0.0	2.3	
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} =	0.20	0.47	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.67	0.88	
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 =	5.2	25.5	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$	4.2	19.6	cfs

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				
Grandview Reserve			,	
Basin A-4a (DP4a)				
the second secon				
Gutter Geometry:	т _Г	75	ام	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} = S _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020		
······································	BACK	01020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 Manning's Roughness for Street Section (typically between 0.012 and 0.020)	S ₀ =	0.025	ft/ft	
ויישראוויו איז איזענערוובאז וטר שניכנ שכנוטרו (נאווינשוע שנושפרו 10.012 מום 0.020)	n _{street} =	0.010	1	
		Minor Storm	Major Storn	า
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			4	
Maximum Canacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	Major Storn 3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y – d _c =	0.8	0.8	inches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	Q _X =	11.5	11.5	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _w =	2.0	2.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Maximum Flow Based On Allowable Spread	$Q_{BACK} =$	0.0 13.5	0.0 13.5	cfs cfs
Flow Velocity within the Gutter Section	Q _T = V =	1.2	1.2	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	v = V*d =	0.5	0.5	
	-			
Maximum Capacity for 1/2 Street based on Allowable Depth	- r	Minor Storm	Major Storn	
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)		15.6	29.4	ft ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	Т _{х тн} = E ₀ =	<u>14.7</u> 0.153	28.6 0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	⊂ ₀ = Q _{X TH} =	10.6	62.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	$Q_X = Q_X = Q_X$	10.0	53.9	
Discharge within the Gutter Section W ($Q_d - Q_x$)	$Q_{W} =$	1.9	5.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.2	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	12.5	60.4	cfs
Average Flow Velocity Within the Gutter Section	v =	1.2	1.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.2	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	1.00	0.70	⊣ .
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	12.5	42.1	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.36	6.69	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.22	inches
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	า
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} = [12.5	42.1	cfs



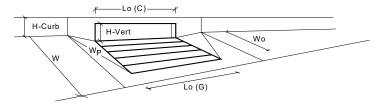
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	linches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =	N/A	N/A	- Ift
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)	Cr-C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	UFC =	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	Q ₀ =	9.4	21.9	lcfs
Water Spread Width	Q₀ = T =	9.4	16.0	ft
•	· · ·			-1·*
Water Depth at Flowline (outside of local depression)	d =	4.0	5.3	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	0.8	inches
Ratio of Gutter Flow to Design Flow	E ₀ =	0.172	0.123	4.
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	7.8	19.2	cfs
Discharge within the Gutter Section W	Q _w =	1.6	2.7	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.25	0.34	sq ft
Velocity within the Gutter Section W	V _W =	6.6	8.1	fps
Water Depth for Design Condition	d _{LOCAL} =	7.0	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-GRATE} =	N/A	N/A	7
Under No-Clogging Condition	· · · · · ·	MINOR	MAJOR	-
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	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	- L	MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	-
Effective (unclogged) Length of Multiple-unit Grate Inlet		N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V _o =	N/A	N/A N/A	fps
Interception Rate of Frontal Flow		/	N/A N/A	
	R _f =	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_0 - 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)	- T	MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S _e =	0.083	0.065	ft/ft
Required Length L_T to Have 100% Interception	L _T = [20.29	34.90	_ft
Under No-Clogging Condition		MINOR	MAJOR	-
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	$Q_i =$	6.6	10.0	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 =	6.5	9.7	cfs
Carry-Over Flow = $Q_{b(GRATE)}$ - Q_a	$Q_{\rm b} =$	2.9	12.2	cfs
Summary	<u></u>	MINOR	MAJOR	•
Total Inlet Interception Capacity	Q =[6.5	9.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	2.9	12.2	cfs
Capture Percentage = Q_a/Q_a =	Qь – С% =	69	44	
$Cupture + creentage = Q_2/Q_0 =$	C /0 -			1 / 9

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum Al				
Grandview Reserve		bepen und opi	cuu)	
Basin A-4b (DP4b)				
A C C C C C C C C C C C C C C C C C C C				
Gutter Geometry:	- F	7.5	10	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} = n _{BACK} =	0.020		
	HBACK -	0.020	J	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.025	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016]	
		Minor Storm	Major Storn	h
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			2	
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))	d _c = a =	0.8	0.8	inches inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	u = T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	$\overline{Q}_{x} = $	11.5	11.5	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_W = $	2.0	2.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	$\mathbf{Q}_{\mathrm{T}} =$	13.5	13.5	cfs
Flow Velocity within the Gutter Section	V =	1.2	1.2	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.5	0.5	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	2
Theoretical Water Spread	т _{тн} =Г	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	т _{х тн} =	14.7	29.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	-1"
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	10.6	62.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _x =	10.6	53.9	cfs
Discharge within the Gutter Section W ($Q_d - Q_x$)	Q _w =	1.9	5.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.2	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	12.5	60.4	cfs
Average Flow Velocity Within the Gutter Section	v =[1.2	1.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.2	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	1.00	0.70	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$Q_d =$	12.5	42.1	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.36	6.69	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.22	inches
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	า
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	12.5	42.1	cfs



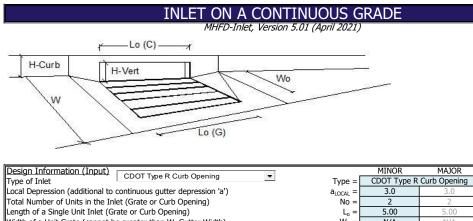
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	-ft -
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_0 =$		N/A	
	₩₀ = Cr-G =	N/A	N/A N/A	- ^{III}
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)				-
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C _f -C =	0.10 MINOR	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'	0	-	MAJOR	lcfs
Design Discharge for Half of Street (from <i>Inlet Management</i>)	$Q_0 =$	6.7	15.7	
Water Spread Width	T =	12.3	16.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.6	4.7	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	0.2	inches
Ratio of Gutter Flow to Design Flow	E _o =	0.198	0.140	_
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	5.4	13.5	cfs
Discharge within the Gutter Section W	Q _w =	1.3	2.2	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.22	0.30	sq ft
Velocity within the Gutter Section W	V _W =	6.1	7.4	fps
Water Depth for Design Condition	d _{LOCAL} =	6.6	7.7	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-GRATE} =	N/A	N/A	7
Under No-Clogging Condition		MINOR	MAJOR	_
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	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	7
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	
Minimum Velocity Where Grate Splash-Over Begins	V _o =	N/A	N/A N/A	fps
Interception Rate of Frontal Flow	v _o – R _f =	N/A	N/A N/A	
Interception Rate of Side Flow	$R_{f} = R_{x}$	N/A N/A	N/A N/A	-
			/	
Actual Interception Capacity	Q _a =	N/A	N/A	cfs
Carry-Over Flow = $Q_0 - Q_a$ (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)	c	MINOR	MAJOR	
Equivalent Slope S _e (based on grate carry-over)	S _e =	0.092	0.071	ft/ft
Required Length L_T to Have 100% Interception	L _T =	16.26	28.26	_ft
Under No-Clogging Condition	. 1	MINOR	MAJOR	٦.
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	$Q_i = [$	5.5	8.5	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 =	5.4	8.3	cfs
Carry-Over Flow = $Q_{b(GRATE)}$ - Q_a	Q _b =	1.3	7.4	cfs
Summary		MINOR	MAJOR	_
Total Inlet Interception Capacity	Q =	5.4	8.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	1.3	7.4	cfs
Capture Percentage = Q_a/Q_a =	C% =	80	53	%

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				
Grandview Reserve				
Basin A-5 (DP5)				
Seace W 1 To				
STREET CROWN				
P S				
± 0 5.				
/				
Gutter Geometry: Maximum Allounda Width for Savard Babind Curb	т _Г	7.5	٦	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020		
naming's Roughness berning curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	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 ₀ =	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} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} = [4.4	7.7	inches
Check boxes are not applicable in SUMP conditions				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Nater Depth without Gutter Depression (Eq. ST-2)	y =[3.84	3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	2.0	2.0	linches
Gutter Depression (d_c - (W * S _x * 12))	a =	1.51	1.51	linches
Nater Depth at Gutter Flowline	d =	5.35	5.35	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	14.0	14.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E _O =	0.372	0.372	
Discharge outside the Gutter Section W, carried in Section T_{χ}	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
/*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} = [11.9	25.7	
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	т _{и =}	9.9	23.7	
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.497	0.228	\dashv
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_{\rm X} =$	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	$Q_W = 1$	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
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 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				



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		R Curb Opening	1
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.3	5.6	inches
Grate Information	ronding Deptit = L	MINOR	MAJOR	Verride Depths
Length of a Unit Grate	L ₀ (G) =	N/A	N/A	lfeet
Width of a Unit Grate	W ₀ =	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)	$C_{0}(G) =$	N/A	N/A	-
Curb Opening Information		MINOR	MAJOR	4
Length of a Unit Curb Opening	$L_0(C) = $	5.00	5.00	lfeet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	linches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	linches
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)	$C_{w}(C) = C_{w}(C) = C_{w}(C)$	3.60	3.60	1
Curb Opening Orifice Coefficient (typical value 2.5 5.7)	$C_{0}(C) = C_{0}(C) = C_{0}(C)$	0.67	0.67	-
Grate Flow Analysis (Calculated)	-0 (-/	MINOR	MAJOR	1
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	7
Clogging Factor for Multiple Units	Clog =	N/A	N/A	-
Grate Capacity as a Weir (based on Modified HEC22 Method)	ciug – L	MINOR	MAJOR	
Interception without Clogging	Q _{wi} =	N/A	N/A	lcfs
Interception with load clogging		N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)	Qwa - L	MINOR	MAJOR	
Interception without Clogging	$Q_{oi} = \int$	N/A	N/A	lcfs
Interception with Clogging	$Q_{oa} = $	N/A	N/A	cfs
Grate Capacity as Mixed Flow	Q _{0a} – [MINOR	MAJOR	
Interception without Clogging	Q _{mi} = [N/A	N/A	lcfs
Interception with load clogging	$Q_{ma} =$	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	Q _{ma} =	N/A	N/A	cfs
Curb Opening Flow Analysis (Calculated)	Colate	MINOR	MAJOR	10.0
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	7
Clogging Factor for Multiple Units	Clog =	0.10	0.10	-
Curb Opening as a Weir (based on Modified HEC22 Method)	ciug – L	MINOR	MAJOR	4
Interception without Clogging	Q _{wi} =	2.6	5.1	lcfs
Interception with Clogging	Q _{wa} =	2.3	4.6	lcfs
Curb Opening as an Orifice (based on Modified HEC22 Method)	Qwa - L	MINOR	MAJOR	
Interception without Clogging	Q _{oi} =	8.3	9.4	lcfs
Interception with Ologging	$Q_{01} = Q_{02} = $	7.5	8.5	cfs
Curb Opening Capacity as Mixed Flow	- Coa - C	MINOR	MAJOR	1
Interception without Clogging	Q _{mi} = [4.3	6.4	lcfs
Interception without clogging	Q _{mi} = Q _{ma} =	3.9	5.8	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{ma} =	2.3	4.6	cfs
Resultant Street Conditions	-Curb	MINOR	MAJOR	
Total Inlet Length	L = [5.00	5.00	Ifeet
Resultant Street Flow Spread (based on street geometry from above)		11.5	17.0	ft.>T-Crown
Resultant Flow Depth at Street Crown	· -	0.0	0.2	linches
	d _{CROWN} =	0.0	1 0.2	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	a _ F	N/A	MAJOR N/A	Πft
Depth for Curb Opening Weir Equation	d _{Grate} = d _{Curb} =	0.19	0.30	Ift
				- "·
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.55	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	
		MINOD	MAJOD	
	• 「	MINOR	MAJOR	7.50
Total Inlet Interception Capacity (assumes clogged condition)	Q _a =	2.3 1.6	4.6 3.1	cfs cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	Q PEAK REQUIRED =	1.0	J 3.1	lu s

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				iju stor
Grandview Reserve	owable Flow	Sepur and Spr	eauj	
Basin A-6 (DP6)				
Gutter Geometry:			1.	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020]	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 =	0.020	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	$S_0 =$	0.005	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.010	1.910	
	SINCE		-	
	_	Minor Storm	Major Storr	<u>n</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.6	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storr	~
Water Depth without Gutter Depression (Eq. ST-2)	v = [3.84	3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	linches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	linches
Water Depth at Gutter Flowline	d =	4.47	4.47	linches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = [$	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	$Q_x = [$	7.3	7.3	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_W = $	1.3	1.3	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 =	8.5	8.5	cfs
Flow Velocity within the Gutter Section	V =	0.8	0.8	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.3	0.3	
Maximum Canacity for 1/2 Street based on Allowable Donth		Minor Charm	Major Charm	n
Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Water Spread	т. — Г	Minor Storm	Major Storr	n Ift
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = т	16.7 15.8	29.4 28.6	
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	Т _{х тн} = E ₀ =	0.142	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	8.2	39.3	cfs
Actual Discharge outside the Gutter Section W, (limited in Section T_{XTH}	$Q_X TH = Q_X = Q_X TH$	8.2	39.5	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_{W} = $	1.4	3.4	
Discharge Behind the Cutte Section $W(Q_d = Q_X)$	Q _{BACK} =	0.0	0.7	
Total Discharge for Major & Minor Storm (Pre-Safety Factor)		9.5	38.2	
Average Flow Velocity Within the Gutter Section	v = [0.8	1.2	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.3	0.7	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm		1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	9.5	38.2	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)		4.63	7.68	
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.17	3.22	inches
MINOR STORM Allowable Capacity is based on Spread Criterion	_	Minor Storm	Major Storr	
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	8.5	38.2	cfs

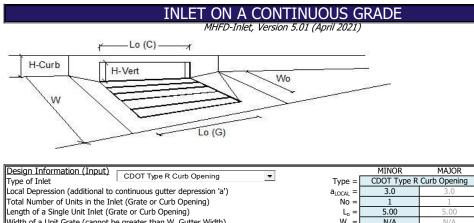


Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	N/A	N/A	ft	
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C _f -G =	N/A	N/A		
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C _f -C =	0.10	0.10		
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR		
Total Inlet Interception Capacity	Q =	4.2	6.9	cfs	
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.4	3.8	cfs	
Capture Percentage = O_a/O_a =	C% =	92	64	∃%	

inches

ft

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				Joi - 0001
Grandview Reserve			,	
Basin A-7 (DP7)				
Stack W I T.				
STREET				
P T T T				
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	1,1,1	
			-	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	2.00	ft	
Street Transverse Slope Gutter Cross Slope (hupically 2 inches over 24 inches or 0.083 ft/ft)	S _X =	0.020	ft/ft	
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition	S _W = S ₀ =	0.083	ft/ft ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016		
	··SIREEI -	0.010	-	
		Minor Storm	Major Storn	<u>1</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	า
Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	3.84	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 =	5.35	5.35	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _X =	14.0	14.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.372	0.372	cfs
Discharge outside the Gutter Section W, carried in Section T_x Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_X = Q_W = $	58.7 34.8	58.7 34.8	crs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _W = Q _{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	$\mathbf{Q}_{T} = \mathbf{I}$	93.5	93.5	cfs
Flow Velocity within the Gutter Section	V =	48.0	48.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	21.4	21.4	<u> </u>
Maximum Canadity for 1/2 Chroat based on Allowable Double		Minor Ci	Mail Ci	
Maximum Capacity for 1/2 Street based on Allowable Depth	т _Г	Minor Storm	Major Storn	
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = Т _{х тн} =	<u>11.9</u> 9.9	25.7	ft ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.497	0.228	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{XTH} =	23.1	239.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _X =	23.1	217.0	cfs
Discharge within the Gutter Section W ($Q_d - Q_x$)	$Q_W =$	22.8	70.7	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	7.4	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	45.9	295.0	cfs
Average Flow Velocity Within the Gutter Section	V =	40.6	63.4	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	14.8	40.6	_
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	0.13	0.04	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	6.2	10.8	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) Resultant Flow Depth at Street Crown (Safety Factor Applied)	d =	2.43	2.89	inches inches
עלטונערוג דוטאי שבארון מו סורבנ גוטאיו (סמוכנץ Factor Applieu)	d _{CROWN} =	0.00	0.00	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	า
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	6.2	10.8	cfs

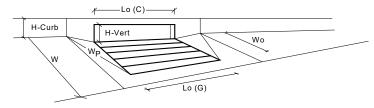


Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	N/A	N/A	ft	
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_{f}-G =$	N/A	N/A		
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C _f -C =	0.10	0.10		
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR		
Total Inlet Interception Capacity	Q =	1.0	1.6	cfs	
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.1	0.4	cfs	
Capture Percentage = Ω_{1}/Ω_{2} =	C% -	95	81	0 %	

inches

ft

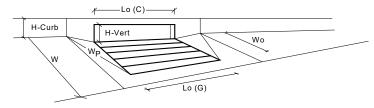
(Based on Regulated Criteria for Maximum All				jor Stor
Grandview Reserve	Swable How	Depth and Spi	eau)	
Basin A-9(DP7a)				
TBACK TCROWN -				
SBACK W I T,				
TREET CROWN				
Htte				
Gutter Geometry:	-			
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020	ft/ft	
vianning's Roughness Benind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	ft	
Street Transverse Slope Sutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _X =	0.020	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	S _W = S ₀ =	0.083	ft/ft ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.000		
			1	
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Check boxes are not applicable in SUMP conditions	d _{MAX} =	4.4	7.7	inches
		1	A-1.	
Maximum Capacity for 1/2 Street based On Allowable Spread	г	Minor Storm	Major Storm	
Nater Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))	d _C = a =	0.8	0.8	inches inches
Nater Depth at Gutter Flowline	d =	4.47	4.47	linches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	Q _X =	0.0	0.0	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _W =	0.0	0.0	cfs cfs
Maximum Flow Based On Allowable Spread	$Q_{BACK} = \mathbf{Q}_T = \mathbf{Q}_T$	0.0 SUMP	0.0 SUMP	
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
/*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 Starm	
Theoretical Water Spread	Т _{тн} = [15.6	Major Storm 29.4	l Ift
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{XTH} =$	14.7	29.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	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) Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q _{BACK} = Q =	0.0	0.0	cfs cfs
Average Flow Velocity Within the Gutter Section	Q - V =	0.0	0.0	fps
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	ı
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	SUMP	SUMP	cfs



Design Information (Input)	CDOT Type R Curb Opening	-	MINOR	MAJOR	_
Type of Inlet		Type =	CDOT Type R	1 3	
	continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate o	r Curb Opening)	No =	4	4	
Water Depth at Flowline (outsi	de of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		_	MINOR	MAJOR	Verride Depths
Length of a Unit Grate		$L_{0}(G) =$	N/A	N/A	feet
Width of a Unit Grate		W ₀ =	N/A	N/A	feet
Area Opening Ratio for a Grate	(typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	1
Clogging Factor for a Single Gr		$C_f(G) =$	N/A	N/A	-
Grate Weir Coefficient (typical		$C_{w}^{-}(G) =$	N/A	N/A	-
Grate Orifice Coefficient (typical		$C_{0}(G) = C_{0}(G) = C_{0}(G)$	N/A	N/A	-
Curb Opening Information		C ₀ (C) = [MINOR	MAJOR	
Length of a Unit Curb Opening		$L_{0}(C) = [$	5.00	5.00	feet
Height of Vertical Curb Openin		$H_{vert} =$	6.00	6.00	linches
Height of Curb Orifice Throat i			6.00	6.00	linches
		H _{throat} =			
Angle of Throat (see USDCM F		Theta =	63.40	63.40	degrees
	(typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
	rb Opening (typical value 0.10)	$C_{f}(C) =$	0.10	0.10	_
Curb Opening Weir Coefficient		C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficien		$C_{o}(C) =$	0.67	0.67	
Grate Flow Analysis (Calcula	ited)		MINOR	MAJOR	
Clogging Coefficient for Multipl	e Units	Coef =	N/A	N/A	7
Clogging Factor for Multiple Ur	nits	Clog =	N/A	N/A	1
	ased on Modified HEC22 Method)		MINOR	MAJOR	_
Interception without Clogging	······	Q _{wi} =	N/A	N/A	lcfs
Interception with Clogging		Q _{wa} =	N/A	N/A	cfs
	based on Modified HEC22 Method)	Rwa	MINOR	MAJOR	
Interception without Clogging	bused on Modified Theezz Methody	Q _{oi} =	N/A	N/A	lcfs
Interception with Clogging			N/A N/A	N/A N/A	cfs
		Q _{oa} =			
Grate Capacity as Mixed Flo	W	о Г	MINOR	MAJOR	7.6
Interception without Clogging		Q _{mi} =	N/A	N/A	cfs
Interception with Clogging		Q _{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assu		Q _{Grate} =	N/A	N/A	cfs
Curb Opening Flow Analysis		-	MINOR	MAJOR	_
Clogging Coefficient for Multipl		Coef =	1.33	1.33	
Clogging Factor for Multiple Ur		Clog =	0.03	0.03	
Curb Opening as a Weir (ba	sed on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging		Q _{wi} =	10.0	35.4	cfs
Interception with Clogging		Q _{wa} =	9.7	34.3	cfs
	(based on Modified HEC22 Method)		MINOR	MAJOR	
Interception without Clogging	·	$Q_{oi} = [$	33.6	43.9	lcfs
Interception with Clogging		$Q_{oa} =$	32.5	42.4	cfs
Curb Opening Capacity as M	lived Flow		MINOR	MAJOR	_ ∽
Interception without Clogging		Q _{mi} = [17.0	36.7	cfs
			17.0	35.5	cfs
Interception with Clogging	ity (new man along and sen this)	Q _{ma} = Q_{curb} =	9.7	35.5 34.3	
	ity (assumes clogged condition)	Curb -	_		LIS
Resultant Street Conditions			MINOR	MAJOR	٦.
Total Inlet Length		L =	20.00	20.00	feet
	based on street geometry from above)	T =	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street	Crown	d _{CROWN} =	0.0	3.2	inches
		_			
Low Head Performance Red	uction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A]ft
Depth for Curb Opening Weir B	Equation	d _{Curb} =	0.29	0.57	lft l
	e Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	1
Curb Opening Performance Re		RF _{Curb} =	0.67	0.72	1
Grated Inlet Performance Redu			N/A	N/A	4
Grateu Iniet Performance Reut		RF _{Grate} =	IN/A	IN/A	_
			MINOD	MAJOR	
.		• 「	MINOR	MAJOR	7-6-
ILLOTAL Inlet Interception Capaci	ty (assumes clogged condition)	Q _a =	9.7	34.3	cfs
	Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$	7.8	21.1	cfs

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

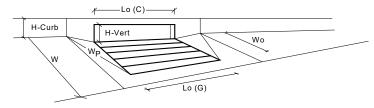
(Based on Regulated Criteria for Maximum Al	lowable Flow	Depth and Spr	ead)	-
Grandview Reserve			-	
Basin A-10(DP7b)				
- DAVE				
Stack W I Tr				
STREET CROWN				
BE D S				
S-				
Gutter Geometry: Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	lft	
Side Slope Behind Curb (leave blank 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		
	BACK L	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 Manning's Roughness for Street Section (typically between 0.012 and 0.020)	S ₀ =	0.000	ft/ft	
Maining's Roughness for Suleet Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = $	0.016	1	
		Minor Storm	Major Storm	ı
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions	-			
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	v – ľ	Minor Storm 3.84	Major Storm 3.84	inches
Varial Depth between Gutter Lip and Gutter Flowline (usually 2")	y = d _C =	0.8	0.8	inches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_{χ}	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) Maximum Flow Based On Allowable Spread	Q _{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread Flow Velocity within the Gutter Section	Q _T = V =	SUMP 0.0	SUMP 0.0	cfs
V*d Product: Flow Velocity times Gutter Flowline Depth	v = V*d =	0.0	0.0	fps
a model now velocity times outer nowine beptin	• u - [0.0	0.0	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	ı
Theoretical Water Spread	T _{TH} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	<u> </u>
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	$Q_{XTH} =$	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 cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q _{BACK} =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	Q = V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	v = V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} = \mathbf{I}$	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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	



Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	7
Type of Inlet	Type =		Curb Opening	4
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	4
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.3	8.0	inches
Grate Information	-	MINOR	MAJOR	Verride Depths
Length of a Unit Grate	$L_{0}(G) =$	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	1
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_f(G) =$	N/A	N/A	1
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	00(0) L	MINOR	MAJOR	_
Length of a Unit Curb Opening	$L_{0}(C) = $	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		6.00	6.00	linches
	H _{vert} =			
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
1 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)	$C_{0}(C) =$	0.67	0.67	1
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	7
Clogging Factor for Multiple Units	Clog =	N/A	N/A	-
Grate Capacity as a Weir (based on Modified HEC22 Method)	clog – L	MINOR	MAJOR	
Interception without Clogging	o _[N/A	N/A	cfs
	Q _{wi} =			
Interception with Clogging	Q _{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)	- T	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	7
Clogging Factor for Multiple Units	Clog =	0.10	0.10	-
Curb Opening as a Weir (based on Modified HEC22 Method)	clog – L	MINOR	MAJOR	_
Interception without Clogging	Q _{wi} =	3.6	10.8	lcfs
				cfs
Interception with Clogging	Q _{wa} =	3.2	9.7	CTS
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	٦.
Interception without Clogging	Q _{oi} =	8.3	11.2	cfs
Interception with Clogging	Q _{oa} =	7.5	10.1	cfs
Curb Opening Capacity as Mixed Flow	_	MINOR	MAJOR	_
Interception without Clogging	Q _{mi} =	5.1	10.2	cfs
Interception with Clogging	Q _{ma} =	4.6	9.2	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{Curb} =	3.2	9.2	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 =	15.2	30.7	ft.>T-Crown
Resultant Flow Depth at Street Crown		0.0	3.5	linches
	d _{CROWN} =	0.0	3.5	
Level Land Developmenter Deduction (C-to-to-to-to-to-to-to-to-to-to-to-to-to-		MINOD	MARCO	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	7.
Depth for Grate Midwidth	d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d _{Curb} =	0.29	0.60	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.55	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	1.00	1.00	1
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	1
	··· Grate –	,	,,,.	_
		MINOR	MAJOR	
Total Inlet Interception Capacity (accuracy closed condition)	0 – [[]	3.2	9.2	cfs
Total Inlet Interception Capacity (assumes clogged condition) Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$\mathbf{Q}_{\mathbf{a}} = \mathbf{Q}_{\mathbf{p} \in \mathbf{A} \times \mathbf{R} \in \mathbf{Q} \cup \mathbf{R} \in \mathbf{Q}}$	2.2	5.3	cfs
		,,	. 53	

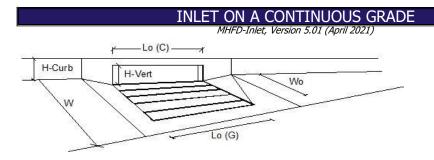
Warning 1: Dimension entered is not a typical dimension for inlet type specified.

(Based on Regulated Criteria for Maximum Allo		ET (Min Depth and Spi		
Grandview Reserve				
Basin B-1 (DP 9)				
T. T				
Succe W T,				
STREET CROWN				
B P CROWN				
f a s				
111 19				
Gutter Geometry:	-			
Aaximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
ide Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Ianning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020		
leight of Curb at Gutter Flow Line	u _[6.00	linches	
Distance from Curb Face to Street Crown	H _{CURB} =		ft	
Sutter Width	T _{CROWN} = W =	<u>16.0</u> 0.83	ft	
itreet Transverse Slope	vv = S _x =	0.83	ft/ft	
Sutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_X = S_W = 1$	0.020	ft/ft	
treet Longitudinal Slope - Enter 0 for sump condition	S ₀ =	0.000	ft/ft	
Ianning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016	1.7.10	
	JINEEL		-	
		Minor Storm	Major Storm	1
1ax. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Iax. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
heck boxes are not applicable in SUMP conditions				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Vater Depth without Gutter Depression (Eq. ST-2) 'ertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y = d _C =	<u>3.84</u> 0.8	3.84	inches inches
Sutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Vater Depth at Gutter Flowline	d =	4.47	4.47	linches
Nowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = 1$	0.149	0.149	
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
Iaximum Flow Based On Allowable Spread	Q _T =	SUMP	SUMP	cfs
low Velocity within the Gutter Section	V =	0.0	0.0	fps
*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	
lavimum Canacity for 1/2 Street based on Allowable Denth		Minor Charry	Major Charm	
<u>Iaximum Capacity for 1/2 Street based on Allowable Depth</u> heoretical Water Spread	т _Г	Minor Storm	Major Storm	ı Tft
heoretical water Spread 'heoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = т –	15.6 14.7	29.4 28.6	-ft
Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	Т _{х тн} = E ₀ =	0.153	0.079	''
heoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	$Q_{XTH} =$	0.155	0.079	cfs
ctual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	$Q_{XTH} = Q_{X} =$	0.0	0.0	cfs
vischarge within the Gutter Section W ($Q_d - Q_x$)	$Q_{\rm W} =$	0.0	0.0	cfs
vischarge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.0	
otal Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	0.0	0.0	cfs
verage Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
lope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	SUMP	SUMP	1
lax Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} = \begin{bmatrix} \\ \\ \\ \end{bmatrix}$	SUMP	SUMP	cfs
tesultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
esultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =			inches
	-			
INOR STORM Allowable Capacity is based on Depth Criterion	-	Minor Storm	Major Storm	
IAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	SUMP	SUMP	cfs



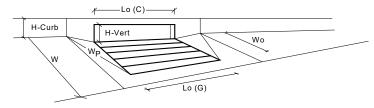
Design Information (Input) CDOT Type R Curb Opening	т Г	MINOR	MAJOR	7
Type of Inlet	Type =		Curb Opening	inches
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	4
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information	_	MINOR	MAJOR	Verride Depthe
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	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_{o}(G) =$	N/A	N/A	1
Curb Opening Information	-0(-)	MINOR	MAJOR	_
Length of a Unit Curb Opening	$L_{0}(C) =$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	$H_{vert} =$	6.00	6.00	linches
Height of Curb Orifice Throat in Inches		6.00	6.00	linches
5	H _{throat} =	63.40	63.40	-
Angle of Throat (see USDCM Figure ST-5)	Theta =			degrees feet
1 Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	reet
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		N/A	N/A	lcfs
Grate Capacity as Mixed Flow	Q _{oa} =	MINOR	MAJOR	
	о Г			7-6-
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} =	6.1	20.2	cfs
Interception with Clogging	Q _{wa} =	5.7	18.9	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	-
Interception without Clogging	Q _{oi} =	16.8	21.9	cfs
Interception with Clogging	$Q_{oa} =$	15.7	20.6	cfs
Curb Opening Capacity as Mixed Flow	-coa -	MINOR	MAJOR	· -
Interception without Clogging	Q _{mi} =	9.4	19.6	lcfs
Interception with Clogging	Q _{mi} = Q _{ma} =	8.8	19.0	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{ma} = Q _{Curb} =	5.7	18.3	cfs
	Curb -			C13
Resultant Street Conditions		MINOR	MAJOR	74.
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	. T=	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	3.2	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} =	0.29	0.57	_ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	1
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.82	1.00	1
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	1
	Grate -	in/A	11/7	_
		MINOR	MAJOR	
Total Inlat Intercontian Connects (accurate days days days	~ 「			
Total Inlet Interception Capacity (assumes clogged condition)	Q _a =	5.7	18.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$	5.3	12.3	cfs

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				
Grandview Reserve				
Basin B-2 (DP 10a)				
Stack W T.				
STREET CROWN				
BENT DI CALL				
± o Sa				
Gutter Geometry:	- r		7.0	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	_	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	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} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	ı
Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _c =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12))	a =[0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _X =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	<u> </u>
Discharge outside the Gutter Section W, carried in Section T_X	Q _X =	10.3	10.3	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _w =	1.8	1.8	cfs cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Maximum Flow Based On Allowable Spread	Q _{BACK} =	0.0 12.1	0.0	
Flow Velocity within the Gutter Section	Q _T = V =	1.1	1.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.4	0.4	
a riodael riow velocity times dater riowine bepar	• • • -[0.1	0.1	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	1
Theoretical Water Spread	T _{TH} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	9.5	55.6	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	$Q_X =$	9.5	48.2	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	Q _w =	1.7	4.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	$Q_{BACK} =$	0.0	1.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.2	54.0	cfs
Average Flow Velocity Within the Gutter Section	V =	1.1	1.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm Max Flow Based on Allowable Depth (Safety Factor Applied)	R =	1.00	0.83	cfs
	$Q_d =$	11.2	45.0	
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) Resultant Flow Depth at Street Crown (Safety Factor Applied)	d =	4.36	7.17	inches inches
Container i low Deput at Succe Crown (Sarety Factor Applieu)	d _{CROWN} =	0.00	2.70	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	ı
		11.2	45.0	



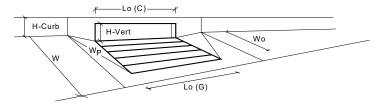
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	-	Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L ₀ =	5.00	5.00	
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	N/A	N/A	-lft -
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 = 0.3)	C _f -C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	4 C - I	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	$Q_0 = \int$	7.1	16.5	lcfs
Water Spread Width	τ=	13.1	16.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.8	5.0	linches
Water Depth at Flowing (outside of local depression) Water Depth at Street Crown (or at T_{MAX})	· · ·	0.0	0.5	linches
Ratio of Gutter Flow to Design Flow	d _{CROWN} = E ₀ =	0.184	0.132	
Discharge outside the Gutter Section W, carried in Section T_x		5.8	14.3	cfs
	Q _x =		2.2	
Discharge within the Gutter Section W	Q _w =	<u>1.3</u> 0.0	0.0	cfs cfs
Discharge Behind the Curb Face	$Q_{BACK} =$			
Flow Area within the Gutter Section W	A _W =	0.23 5.7	0.31 6.9	sq ft
Velocity within the Gutter Section W	V_w =			fps
Water Depth for Design Condition	d _{LOCAL} =	6.8	8.0	inches
Grate Analysis (Calculated)	F	MINOR	MAJOR	۹.
Total Length of Inlet Grate Opening	_ L=	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o-GRATE} = $	N/A	N/A	
Under No-Clogging Condition	., г	MINOR	MAJOR	٦,
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_0 - 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 =	0.087	0.068	_ft/ft
Required Length L_T to Have 100% Interception	L _T = [16.94	29.21	_ft
Under No-Clogging Condition	-	MINOR	MAJOR	_
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	$Q_i =$	5.7	8.7	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 =	5.6	8.5	cfs
Carry-Over Flow = $Q_{h(GRATE)}$ - Q_a	Q _b =	1.5	8.0	cfs
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	Q =[5.6	8.5	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	1.5	8.0	cfs
Capture Percentage = Q_a/Q_0 =	C% =	78	52	%

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum Allo				
Grandview Reserve	wable now	Depth and Spi	eau)	
Basin B-3 (DP 10b)				
- TBACK TCHOWN				
Stack W I T.				
STREET CROWN				
P S				
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020]	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = L$	0.016	J	
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	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 =[3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline		4.47	4.47	inches ft
Allowable Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	T _X = E ₀ =	15.2 0.149	15.2 0.149	- ''
Discharge outside the Gutter Section W, carried in Section T_x	$Q_{\rm X} =$	0.0	0.0	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$\vec{Q}_{W} = \vec{Q}_{W}$	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} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{XTH} =$	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.153	0.079	-
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH} Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _{X TH} =	0.0	0.0	cfs cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_X = Q_W = $	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Qw = 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 \geq 6") Storm	R =	SUMP	SUMP	4.
Max Flow Based on Allowable Depth (Safety Factor Applied)	$Q_d =$	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) Resultant Flow Depth at Street Crown (Safety Factor Applied)	d =			inches inches
Acounter now peper at succe crowin (sarcey ractor Applica)	d _{CROWN} =		1	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	SUMP	SUMP	cfs



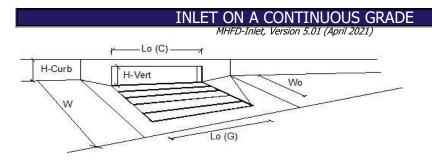
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	-
Type of Inlet	Type =		Curb Opening	4
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	4	4	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information	-	MINOR	MAJOR	Verride Dept
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	7
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_{o}(G) =$	N/A	N/A	1
Curb Opening Information		MINOR	MAJOR	-
Length of a Unit Curb Opening	$L_{0}(C) = [$	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
1 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)		0.10	0.10	
	$C_{f}(C) =$			-
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	4
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	4
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	lcfs
Grate Capacity as Mixed Flow	-cua _	MINOR	MAJOR	7
Interception without Clogging	Q _{mi} =	N/A	N/A	lcfs
Interception with Clogging	$Q_{ma} = $	N/A	N/A	
Resulting Grate Capacity (assumes clogged condition)	Q _{Grate} =	N/A	N/A	cfs
Curb Opening Flow Analysis (Calculated)	Colate	MINOR	MAJOR	10.0
Clogging Coefficient for Multiple Units	Coef =	1.33	1.33	7
Clogging Factor for Multiple Units	Clog =	0.03	0.03	-
Curb Opening as a Weir (based on Modified HEC22 Method)	ciug – L	MINOR	MAJOR	
	o _ [10.0		lcfs
Interception without Clogging	Q _{wi} =		35.4	
Interception with Clogging	Q _{wa} =	9.7	34.3	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	٦.
Interception without Clogging	Q _{oi} =	33.6	43.9	cfs
Interception with Clogging	Q _{oa} =	32.5	42.4	cfs
Curb Opening Capacity as Mixed Flow	_	MINOR	MAJOR	_
Interception without Clogging	Q _{mi} =	17.0	36.7	cfs
Interception with Clogging	Q _{ma} =	16.5	35.5	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{Curb} =	9.7	34.3	cfs
Resultant Street Conditions	•	MINOR	MAJOR	
Total Inlet Length	L = [20.00	20.00	feet
Resultant Street Flow Spread (based on street geometry from above)	т=Г	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	3.2	linches
	CROWN -	0.0	J.2	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d _ [N/A	N/A	٦ft
	d _{Grate} =			
Depth for Curb Opening Weir Equation	d _{Curb} =	0.29	0.57	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	4
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.67	0.88	4
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	
		MINOR	MAJOR	_
Total Inlet Interception Capacity (assumes clogged condition)	Q _a = [9.7	34.3	cfs
	Q PEAK REQUIRED =	9.3	26.2	cfs

(Based on Regulated Criteria for Maximum Alle				jor Stor
Grandview Reserve				
Basin B-4 (DP 11)				
Seace W I T				
STREET CROWN				
P P S				
I of Sal				
v/				
Gutter Geometry: Maximum Alloughla Width for Sarand Bakind Curb	[0.0	ام	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	8.0	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020	π/π	
daming's Roughness benniti curb (typically between 0.012 and 0.020)	n _{BACK} =	0.015	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = $	0.016	1	
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	11.5	17.0	l Tft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	6.0	8.0	inches
Check boxes are not applicable in SUMP conditions	-MAX L			
		A		
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Nater Depth without Gutter Depression (Eq. ST-2)	y =	2.76	4.08	inches
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	2.0	2.0	inches
Sutter Depression (d_c - (W * S_x * 12))	a =	1.51	1.51	inches
Nater Depth at Gutter Flowline Allowable Spread for Discharge outside the Gutter Section W (T - W)	d = T _X =	4.27 9.5	5.59 15.0	inches ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = $	0.511	0.350	
Discharge outside the Gutter Section W, carried in Section T_x	$Q_{\rm X} =$	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
Naximum Flow Based On Allowable Spread	$Q_T =$	SUMP	SUMP	cfs
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	
Anvinum Connaite for 1/2 Church based or Allowable Double		Min en Ci	Maia Ci	
Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Water Spread	т.,_Г	Minor Storm	Major Storm 27.0	ı Tft
Preoretical water Spread Fheoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = Т _{х тн} =	18.7 16.7	27.0	
Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E _O =	0.318	0.216	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	0.0	0.210	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 ($Q_d - Q_X$)	$Q_W^{q_X} =$	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
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	_
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	SUMP	SUMP	<u> </u>
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)	$d_{CROWN} = L$			inches
INOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	



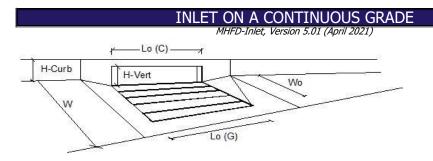
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	- I
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.3	5.6	inches
Grate Information	ronding bepar =	MINOR	MAJOR	Override Depths
Length of a Unit Grate	L ₀ (G) =	N/A	N/A	lfeet
Width of a Unit Grate	W ₀ =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	I
Clogging Factor for a Single Grate (typical values 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)	$C_0(G) =$	N/A	N/A	┥ ║
Curb Opening Information	-0(-)	MINOR	MAJOR	-
Length of a Unit Curb Opening	$L_{0}(C) = [$	5.00	5.00	lfeet
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 _n =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_f(C) =$	0.10	0.10	- 1
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)	$C_{0}(C) =$	0.67	0.67	╡ ║
Grate Flow Analysis (Calculated)		MINOR	MAJOR	<u> </u>
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	ן ר
Clogging Factor for Multiple Units	Clog =	N/A	N/A	╡ ║
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	- 1
Interception without Clogging	Q _{wi} =	N/A	N/A	lcfs
Interception with Clogging	$Q_{wa} = $	N/A	N/A	lcfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)	Civia L	MINOR	MAJOR	
Interception without Clogging	Q _{oi} =	N/A	N/A	lcfs
Interception with Clogging	$Q_{oa} =$, N/A	N/A	lcfs
Grate Capacity as Mixed Flow	coa L	MINOR	MAJOR	
Interception without Clogging	Q _{mi} =	N/A	N/A	lcfs
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	ן ר
Clogging Factor for Multiple Units	Clog =	0.06	0.06	1
Curb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	-
Interception without Clogging	Q _{wi} =	4.2	9.3	cfs
Interception with Clogging	Q _{wa} =	3.9	8.7	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	-
Interception without Clogging	Q _{oi} =	16.6	18.9	Cfs
Interception with Clogging	$Q_{oa} =$	15.6	17.7	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	-
Interception without Clogging	Q _{mi} =	7.7	12.3	cfs
Interception with Clogging	Q _{ma} =	7.3	11.5	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{Curb} =	3.9	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)	т =	11.5	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} =	0.19	0.30	ft l
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.40	0.53	1
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.81	0.91	ן ו
	RF _{Grate} =	N/A	N/A	1 1
	NI Grate = I			
	Ki Grate –	,		
	Ki Grate – L	MINOR	MAJOR	
Grated Inlet Performance Reduction Factor for Long Inlets Total Inlet Interception Capacity (assumes clogged condition)	Q _a =	,	MAJOR 8.7	cfs

ALLOWABLE CAPACITY FOR ONE-HALF ((Based on Regulated Criteria for Maximum Al				,
Grandview Reserve			-	
Basin B-5 (DP 12a)				
T, Tuxx I				
SBACK W T				
STREET				
2 > Qu Qu S STREET CROWN				
2 1 +				
11-1 1				
Gutter Geometry: Maximum Allowable Width for Ground Babind Curb	т _Г	7 5	٦	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} = n _{BACK} =	0.020		
	HBACK -	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	ft	
Street Transverse Slope	S _X =	0.020	ft/ft	
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition	S _W = S ₀ =	0.083	ft/ft ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.020		
	JINEEL		-	
	-	Minor Storm	Major Storm	n
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} = [4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)				
Maximum Capacity for 1/2 Street based On Allowable Spread	_	Minor Storm	Major Storn	n
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _c =	0.8	0.8	inches
Gutter Depression (d _C - (W * S _x * 12)) Water Depth at Gutter Flowline	a = d =	0.63 4.47	0.63	inches inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	и – Т _х =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_X	Q _X =	10.3	10.3	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _W =	1.8	1.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	$Q_{BACK} =$	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread Flow Velocity within the Gutter Section	Q _T = V =	12.1 1.1	12.1 1.1	cfs fps
V*d Product: Flow Velocity times Gutter Flowline Depth	v = V*d =	0.4	0.4	
			•	
Maximum Capacity for 1/2 Street based on Allowable Depth	-	Minor Storm	Major Storn	
Theoretical Water Spread	T _{TH} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	T _{X TH} =	14.7	28.6	ft
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Е ₀ = Q _{X TH} =	0.153 9.5	0.079 55.6	cfs
Actual Discharge outside the Gutter Section W, (limited in Section T_{XTH}	$Q_X TH = Q_X =$	9.5	48.2	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_W^{2x} =$	1.7	4.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.2	54.0	cfs
Average Flow Velocity Within the Gutter Section	V =	1.1	1.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	V*d = R =	0.4	1.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6^{-}$) Storm Max Flow Based on Allowable Depth (Safety Factor Applied)	R = $Q_d = $	1.00 11.2	0.83 45.0	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	• v a − d =	4.36	7.17	linches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.70	inches
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	n



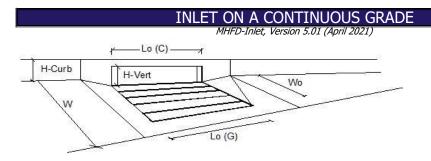
$\begin{split} & Type f last control (Control Control Con$	Design Information (Input)		MINOR	MAJOR	
Lical Depression (additional to continuous gutter depression 'a) Total Number of Units in the Intel (Grate or Curb Opening) Length of a Single Unit Intel (Grate or Curb Opening) We of a Vinit Grate (Grate or Curb Opening) U, = Street Numa (Carbo Opening) V, = Street Numa (Carbo Opening) V, = Street Numa (Carbo Opening) V, = Street Numa (Carbo Opening) V, = Nin A NUA Street Numa (Cirb Opening (Nyma in Value = 0.1) C-C = V, A NUA NUA Street Numine (Outside of local depression) Viater Depth at Street (Carbo Opening (Nyma in Value = 0.1) C-C = Street Numa (Nyma in Value = 0.1) C-C = V, A NUA Numa (Nyma in Value = 0.1) C-C = Numa (Nyma in Value = 0.1) C-C		Type =			
Total Number of Units in the Inite (Grate or Curb Opening) With of a Unit Number of Curb Opening) With or a Single Unit Curb Queening (typical min, value = 0.5) Street Hydraulitics (S. 4. 2. 4. Allowable Street Charactive) With or a Single Unit Curb Opening (typical min, value = 0.5) Street Hydraulitics (S. 4. 2. 4. Allowable Street Charactive) Design Discharge for Half of Street (from <i>Inlet Management</i>) Water Spread With Water Spread With Water Spread With Water Depth at Flowline (outside of local depression) Water Depth at Flowline (outside of local depth at Plot (Intervation) Minitory Mator (linches
Length of a Single Unit Intel (Grate or Curb Opening) $\begin{tabular}{ c c c c c c } L_{q} = \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$					
With of unit Grate (cannot be greater than W, Gutter With) W, = N/A N/A N/A Clogging Factor for a Single Unit Grate (typical min, value = 0.1) C-C = 0.10 0.10 Street Mydraulics: OK - O < Allowable Street Capacity'		-			ff
Clogging Factor, for a Single Unit Grate (typical min, value = 0.1) C-C = N/A NA Cargoning Factor, for a Single Unit Grate (typical min, value = 0.1) C-C = 0.10 0.10 Street, Hydraulics; OK 0. < Allowable Street Capacity;					
Clocing Factor for a Single Unit Curb Dening (typical min, value = 0.1) C-C = 0.10 0.10 Street Hubral Units: SK 0-C - Klowable Street Canacity: Design Discharge for Half of Street (from Inlet Management) Water Depth at Street (from Inlet Management) Water Depth at Street (from Inlet Management) Water Depth at Street (rown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Water Depth at Street Cown (or at T _{NN}) Discharge outside the Gutter Section W Care = 0.177 0.126 Discharge thin the Gutter Section W Water Depth for Design Condition Water Depth for Design Condition Water Depth for Design Condition Grate Analysis Claiculated) Total Length of Design Condition Winnum Velocity Where Grate Splash-Over Begins Minnum Velocity Mere Grate Splash-Over Begins Mi					
Street Hvdraulics: OK - 0 < Allowable Street Canacity MINOR MAIOR Design Discharge for Half of Street (from Inlet Management) $Q_1 =$ 7.9 18.5 6's Water Spread Width T = 13.6 16.0 ft Water Depth at Street Crown (or at Tww) $Q_2 =$ 0.0 0.7 11.6 5 Discharge outside the Gutter Section W, Carrel in Section Tx $Q_2 =$ 6.5 16.2 cfs Discharge within the Gutter Section W $Q_4 =$ 0.0 0.0 cfs Discharge within the Gutter Section W $Q_{acc} =$ 0.2 0.33 sq t Velocity within the Gutter Section W $Q_{acc} =$ 0.8 2.1 inches Total Length of Talet Grate Opening HINOR MAIOR MAIOR Velocity within the Gutter Section W $Q_a =$ N/A N/A MAIOR Total Length of Talet Grate Opening L HINOR MAIOR MAIOR Total Length of Talet Grate Opening R N/A N/A M/A M/A Minimum Velocity Where Grate Splash-Over Begins V_a = N/A N/A N/A MAIOR <td></td> <td></td> <td></td> <td></td> <td>-</td>					-
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Clogging Coefficient for Multiple-unit Grate InletGrateCoef =N/AN/AClogging Factor for Multiple-unit Grate InletGrateClog =N/AN/AEffective (unclogged) Length of Multiple-unit Grate Inlet $L_e =$ N/AN/AInterception Rate of Frontal Flow $V_o =$ N/AN/AftInterception Rate of Side Flow $R_r =$ N/AN/AN/AActual Interception Capacity $Q_a =$ N/AN/AKCarry-Over Flow = $Q_a - Q_a$ (to be applied to curb opening or next d/s inlet) $\mathbf{O}_h =$ N/AN/AcfsCurb or Slotted Inlet Opening Analysis (Calculated)MINORMAIORFt/ftEquivalent Slope Se (based on grate carry-over)Se =0.0840.066ft/ftUnder No-Clogging Condition $L_T =$ 10.0010.00ftInterception CapacityQa =0.060.060.06Under Cloaging ConditionCurbCoef =1.251.25Clogging Factor for Multiple-unit Curb Opening or Slotted InletCurbCoef =1.251.25Clogging GoefficientCurbCoef =1.251.251.25Clogging Factor for Multiple-unit Curb Opening or Slotted InletCurbCoef =1.251.25Clogging GoefficientCurbCoef =1.251.251.25Clogging Factor for Multiple-unit Curb Opening or Slotted InletCurbCoef =1.251.25Clogging GoefficientCurbCoef =1.251.251.25Clogging GoefficientCurbCoef =1.251.25		$Q_i =$,	,	_cfs
Clogging Factor for Multiple-unit Grate Inlet Effective (unclogged) Length of Multiple-unit Grate Inlet Minimum Velocity Where Grate Splash-Over Begins Interception Rate of Frontal Flow Interception Rate of Frontal Flow Interception Capacity Carry-Over Flow = $Q_n - Q_n$ (to be applied to curb opening or next d/s inlet) Curb or Slotted Inlet Opening Analysis (Calculated) Equivalent Slope S _e (based on grate carry-over) Required Length L _T to Have 100% Interception Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet (minimum of L, L _T) Interception Capacity Q ₁ = $\frac{10.00}{10.00}$ ft Interception Capacity Q ₂ = $\frac{10.00}{10.00}$ ft Interception Capacity Q ₁ = $\frac{10.00}{10.00}$ ft Interception Capacity Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet (minimum of L, L _T) Interception Capacity Q ₁ = $\frac{10.25}{1.25}$ $\frac{1.25}{1.25}$ Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbCoef = $\frac{1.25}{1.25}$ $\frac{1.25}{1.25}$ Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbCoef = $\frac{1.25}{1.25}$ $\frac{1.25}{1.25}$ Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbCoef = $\frac{1.25}{1.25}$ $\frac{1.25}{1.25}$ Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbCoef = $\frac{1.25}{1.25}$ $\frac{1.25}{1.25}$ Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbCoef = $\frac{1.25}{1.25}$ $\frac{1.25}{1.25}$ Clog = $\frac{1.20}{1.25}$ $\frac{9.9}{1.25}$ $\frac{1.5}{1.5}$ Carry-Over Flow = $\frac{0.06}{0.06}$ $\frac{10.66}{0.06}$ Fifective (Unclogged) Length Actual Interception Capacity Q ₀ = $\frac{5.9}{1.0}$ $\frac{9.0}{1.00}$ $\frac{10.00}{1.00}$ $\frac{10.00}{1.$					-
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Interception Rate of Side Flow $R_x =$ N/A N/A Actual Interception Capacity $Q_a =$ N/A N/A N/A Carry-Over Flow = $Q_a \cdot Q_a$ (to be applied to curb opening or next d/s inlet) $Q_b =$ N/A N/A Curb or Slotted Inlet Opening Analysis (Calculated)MINORMAJOREquivalent Slope S _e (based on grate carry-over) $S_e =$ 0.084 0.066 Required Length L _T to Have 100% Interception $L_T =$ 18.17 31.40 Interception Capacity $Q_i =$ 6.0 9.2 cfs Under Clogging Condition $MINOR$ MAJOREffective Length of Curb Opening or Slotted Inlet (minimum of L, L_T) $L =$ 10.00 10.00 Interception Capacity $Q_i =$ 6.0 9.2 cfs Under Clogging CoefficientCurbCoef = 1.25 1.25 Clogging Factor for Multiple-unit Curb Opening or Slotted InletCurbCoef = 1.25 1.25 Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet $CurbCoef =$ 0.06 0.06 Effective (Unclogged) Length $L_e =$ 9.37 9.37 ft Actual Interception Capacity $Q_a =$ 5.9 9.0 cfs SummaryMINORMAJOR $MAJOR$ $MAJOR$ Total Inlet Interception Capacity $Q_e =$ 5.9 9.0 cfs Cutal Interception Capacity $Q_e =$ 5.9 9.0 cfs Cotal Inter Carry-Over Flow (flow bypassing inlet) $Q_b =$ 2.0 9.5 cfs					fps
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Equivalent Slope Se (based on grate carry-over)Se = 0.084 0.066ft/ftRequired Length L _T to Have 100% Interception $L_T = 18.17 31.40$ ftUnder No-Clogging Condition $MINOR$ MAIOREffective Length of Curb Opening or Slotted Inlet (minimum of L, L _T)L = 10.00 10.00ftInterception CapacityQi = 6.0 9.2cfsUnder Clogging ConditionMINORMAIORClogging CoefficientCurbCoef = 1.25 1.25crsClogging Factor for Multiple-unit Curb Opening or Slotted InletCurbClog = 0.06 0.06cfsEffective (Unclogged) LengthLe 9.37 9.37ftActual Interception CapacityQa = 5.9 9.0cfsCarry-Over Flow = $Q_{hrGRATE}$ - Q_a Qh = 2.0 9.5cfsSummaryMINORMAIORTotal Inlet Carry-Over Flow (flow bypassing inlet)Qb = 2.09.5cfs		Q _b =			cfs
Required Length L _T to Have 100% Interception $L_T =$ 18.1731.40ftUnder No-Clogging ConditionEffective Length of Curb Opening or Slotted Inlet (minimum of L, L _T)L =10.0010.00ftInterception CapacityQi =6.09.2cfscfsUnder Clogging CoefficientCurbCoef =1.251.251.25Clogging Factor for Multiple-unit Curb Opening or Slotted InletCurbCoef =0.060.060.06Effective (Unclogged) LengthLe =9.379.37ftActual Interception CapacityQa =5.99.0cfsCarry-Over Flow = $Q_{hrGRATE} \cdot Q_a$ Qb =2.09.5cfsSummaryMINORMAIORMAIORCost fieldCarry-Over Flow (flow bypassing inlet)Cp =Total Inlet Carry-Over Flow (flow bypassing inlet)Qb =2.09.5cfs					_
Under No-Clogging Condition MINOR MAJOR Effective Length of Curb Opening or Slotted Inlet (minimum of L, L _T) L = 10.00 10.00 ft Interception Capacity Q ₁ = 6.0 9.2 cfs Under Cloaging 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 = 5.9 9.0 cfs Carry-Over Flow = Q _{bricgarre} -Q _n Q _h = 2.0 9.5 cfs Summary Total Inlet Interception Capacity Q = 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) Q b 2.0 9.5 cfs	Equivalent Slope S _e (based on grate carry-over)	S _e =	0.084	0.066	_ft/ft
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L _T) L = 10.00 10.00 ft Interception Capacity $Q_i =$ 6.0 9.2 cfs Under Cloaging Coefficient CurbCoef = 1.25 1.25 Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbCoef = 9.37 9.37 Carry-Over Flow = Q _{NCRATE} -Q _a Qa = 5.9 9.0 cfs Summary MINOR MAJOR MAJOR Total Inlet Interception Capacity Q = 5.9 9.0 cfs Cotal Inlet Carry-Over Flow (flow bypassing inlet) Qb = 2.0 9.5 cfs	Required Length L _T to Have 100% Interception	L _T =	18.17	31.40	ft
Interception Capacity $Q_i = 6.0$ 9.2 cfs Under Cloaging ConditionMINORMAJORClogging CoefficientCurbCoef = 1.25 1.25 Cloaging Factor for Multiple-unit Curb Opening or Slotted InletCurbClog = 0.06 0.06 Effective (Uncloaged) Length $L_e =$ 9.37 9.37 ftActual Interception Capacity $Q_a =$ 5.9 9.0 cfsSummary $Q_h =$ 2.0 9.5 cfsTotal Inlet Interception Capacity $Q_e =$ 5.9 9.0 cfsCotal Inlet Carry-Over Flow (flow bypassing inlet) $Q_b =$ 2.0 9.5 cfs	Under No-Clogging Condition			MAJOR	_
Under Clogging Coefficient MINOR MAJOR Clogging Coefficient CurbCoef = 1.25 1.25 Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbColog = 0.06 0.06 Effective (Unclogged) Length L_e = 9.37 9.37 ft Actual Interception Capacity Q_a = 5.9 9.0 cfs Carry-Over Flow = $Q_{hrGRATE} \cdot Q_a$ Q_b = 2.0 9.5 cfs Summary MINOR MAIOR MAIOR Total Inlet Interception Capacity Q_a = 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) Q_b = 2.0 9.5 cfs	Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
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 Qa = 5.9 9.0 cfs Summary Qb = 2.0 9.5 cfs Total Inlet Interception Capacity Q = 5.9 9.0 cfs Control Inlet Carry-Over Flow (flow bypassing inlet) Qb = 2.0 9.5 cfs	Interception Capacity	$Q_i =$	6.0	9.2	cfs
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 = 5.9 9.0 cfs Carry-Over Flow = $Q_{hrGPATF1}$ - Q_a Q_h = 2.0 9.5 cfs Summary MINOR MAJOR Total Inlet Interception Capacity Q_e = 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) Q_b = 2.0 9.5 cfs	Under Clogging Condition		MINOR	MAJOR	
Effective (Unclogged) Length $L_e =$ 9.37 9.37 ftActual Interception Capacity $Q_a =$ 5.9 9.0 cfs Carry-Over Flow = $Q_{hrGRATE} \cdot Q_a$ $Q_b =$ 2.0 9.5 cfs SummaryMINORMAJORTotal Inlet Interception Capacity $Q =$ 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) $Q_b =$ 2.0 9.5 cfs	Clogging Coefficient	CurbCoef =	1.25	1.25	7
Actual Interception Capacity $Q_a =$ 5.9 9.0 cfs Carry-Over Flow = $Q_{hIGRATE} \cdot Q_a$ $Q_b =$ 2.0 9.5 cfs Summary MINOR MAJOR Total Inlet Interception Capacity $Q =$ 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) $Q_b =$ 2.0 9.5 cfs	Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Actual Interception Capacity $Q_a =$ 5.9 9.0 cfs Carry-Over Flow = $Q_{hIGRATE} \cdot Q_a$ $Q_h =$ 2.0 9.5 cfs Summary MINOR MAJOR Total Inlet Interception Capacity $Q =$ 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) $Q_b =$ 2.0 9.5 cfs	Effective (Unclogged) Length	L, =	9.37	9.37	ft
Carry-Over Flow = $Q_{brGRATE1}$ - Q_a Q_b = 2.0 9.5 cfs SummaryMINORMAJORTotal Inlet Interception Capacity Q = 5.9 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) Q_b = 2.0 9.5 cfs	Actual Interception Capacity		5.9	9.0	cfs
SummaryMINORMAJORTotal Inlet Interception CapacityQ = 5.99.0cfsTotal Inlet Carry-Over Flow (flow bypassing inlet)Qb = 2.09.5cfs	Carry-Over Flow = $Q_{h(GRATE)}$ - Q_a				cfs
Total Inlet Interception Capacity $Q = 5.9$ 9.0 cfs Total Inlet Carry-Over Flow (flow bypassing inlet) $Q_b = 2.0$ 9.5 cfs			MINOR	MAJOR	
Total Inlet Carry-Over Flow (flow bypassing inlet) $Q_b = 2.0 9.5$ cfs		0 =	5.9	9.0	cfs
	Total Inlet Carry-Over Flow (flow bypassing inlet)	-			

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				Joi 3001
Grandview Reserve	owable now	Depth and Spi	eau)	
Basin B-6 (DP 14)				
- TBACK - TCROWN				
T, Taxx				
Suck W T,				
STREET				
I I I S				
/				
Gutter Geometry: Maximum Allounda Width for Savard Babind Curb	т _Г	7.5	٦	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} = n _{BACK} =	0.020		
	HBACK -	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.020	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016	J	
		Minor Storm	Major Storn	h
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			2	
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches inches
Gutter Depression (d _c - (W * S _x * 12)) Water Depth at Gutter Flowline	a = d =	0.63	0.63	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	u = T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	\dashv
Discharge outside the Gutter Section W, carried in Section T_X	$Q_x =$	10.3	10.3	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_{W} =$	1.8	1.8	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 =	12.1	12.1	cfs
Flow Velocity within the Gutter Section	V =	1.1	1.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.4	0.4	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	Т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{х тн} =	9.5	55.6	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _X =	9.5	48.2	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q _w =	1.7	4.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.2	54.0	cfs
Average Flow Velocity Within the Gutter Section	V =	1.1	1.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.0	_
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm Max Flow Based on Allowable Depth (Safety Factor Applied)	R =	1.00 11.2	0.83	cfs
Max Flow Based on Allowable Depth (Sarety Factor Applied) Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	Q _d =	4.36	45.0 7.17	inches
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) Resultant Flow Depth at Street Crown (Safety Factor Applied)	d = d _{CROWN} =	4.36	2.70	inches
	ACROWN -	0.00	2.70	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	า
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} = [11.2	45.0	cfs



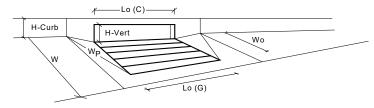
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CDOT Type R Curb Opening		MINOR	MAJOR	_
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of 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 Inlet Management)	$Q_o =$	3.7	8.7	cfs
Water Spread Width	T =[10.2	14.1	ft
Water Depth at Flowline (outside of local depression)	d =	3.1	4.0	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 ₀ =	0.240	0.170	7
Discharge outside the Gutter Section W, carried in Section T,	$Q_x =$	2.8	7.2	cfs
Discharge within the Gutter Section W	$Q_w = 1$	0.9	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	0.25	sq ft
Velocity within the Gutter Section W	V _w =	4.8	5.9	fps
Water Depth for Design Condition	d _{LOCAL} =	6.1	7.0	linches
Grate Analysis (Calculated)	$u_{IOCAI} = I$	MINOR	MAJOR	linches
Total Length of Inlet Grate Opening	L =[N/A	N/A	∃ft
			N/A N/A	
Ratio of Grate Flow to Design Flow	$E_{o-GRATE} = [$	N/A		
Under No-Clogging Condition	r	MINOR	MAJOR	٦.
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	7
Actual Interception Capacity	$Q_a =$	N/A	N/A	cfs
Carry-Over Flow = Q_0 - 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 Se (based on grate carry-over)	S _e =	0.107	0.082	∃ft/ft
Required Length L _T to Have 100% Interception	L _T =	11.03	19.34	T _{ft}
Under No-Clogging Condition	-, [MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =[10.00	10.00	Tft
Interception Capacity	Q _i =	3.6	6.4	lcfs
Under Clogging Condition	Qi - [MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.25	1.25	-
		0.06		-
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =		0.06 9.37	-L
Effective (Unclogged) Length	L _e =	9.37		ft
Actual Interception Capacity	Q _a =	3.6	6.2	cfs
Carry-Over Flow = $Q_{h(GRATE)}$ - Q_a	Q _b =	0.1	2.5	cfs
Summary	_ r	MINOR	MAJOR	٦.
Total Inlet Interception Capacity	Q =	3.6	6.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.1	2.5	cfs
Capture Percentage = Q_a/Q_o =	C% =	98	71	%

$ \frac{1}{12} \frac{1}{1} $	ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All			or & Ma	Joi 3001
Two: </th <th>Grandview Reserve</th> <th>owable How</th> <th>Depth and Sp</th> <th>leady</th> <th></th>	Grandview Reserve	owable How	Depth and Sp	leady	
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Tax Flow Based on Allowable Depth (Safety Factor Applied) $Q_d = 11.2$ 45.0 cfs Lesultant Flow Depth at Gutter Flowline (Safety Factor Applied) $d = 4.36$ 7.17 inches Lesultant Flow Depth at Street Crown (Safety Factor Applied) $d = 0.00$ 2.70 inches MINOR STORM Allowable Capacity is based on Depth Criterion Minor Storm Major Storm	Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm				-
tesultant Flow Depth at Gutter Flowline (Safety Factor Applied) $d = \frac{4.36}{0.00}$ 7.17 inches tesultant Flow Depth at Street Crown (Safety Factor Applied) $d_{CROWN} = \frac{0.00}{0.00}$ 2.70 inches IINOR STORM Allowable Capacity is based on Depth Criterion Minor Storm Major Storm	Max Flow Based on Allowable Depth (Safety Factor Applied)				cfs
Inches Minor Storm Major Storm	Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)				inches
	Resultant Flow Depth at Street Crown (Safety Factor Applied)	-			
		-			-
	MINOR STORM Allowable Capacity is based on Depth Criterion	• •			



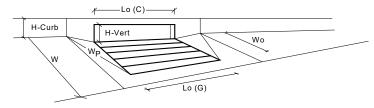
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	linches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =		N/A	- Int
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 = 0.3)	C _f =G = C _f =C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	- J-D	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	Q _o =	1.6	3.8	lcfs
Water Spread Width	Q₀ - T =	7.3	10.3	ft
Water Depth at Flowline (outside of local depression)	d = 1	2.4	3.1	linches
		0.0	0.0	linches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =			Inches
Ratio of Gutter Flow to Design Flow	E ₀ =	0.339	0.238	
Discharge outside the Gutter Section W, carried in Section T_x	$Q_x =$	1.1	2.9	cfs
Discharge within the Gutter Section W	Q _w =	0.5	0.9	cfs
Discharge Behind the Curb Face	$Q_{BACK} =$	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.14	0.19	sq ft
Velocity within the Gutter Section W	V _w =	4.0	4.9	fps
Water Depth for Design Condition	d _{LOCAL} =	5.4	6.1	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	$E_{o-GRATE} =$	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	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	7
Effective (unclogged) Length of Multiple-unit Grate Inlet	L _e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	$V_0 = $	N/A	N/A	fps
Interception Rate of Frontal Flow	R _f =	N/A	N/A	1.
Interception Rate of Side Flow	R _x =	N/A	N/A	1
Actual Interception Capacity	$Q_a =$	N/A	N/A	cfs
Carry-Over Flow = $Q_0 - Q_a$ (to be applied to curb opening or next d/s inlet)	$Q_{\rm h} = $	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 =	0.143	0.106	∃ft/ft
Required Length LT to Have 100% Interception	L _T =	6.31	11.23	ft
Under No-Clogging Condition	· L	MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =[6.31	10.00	lft
Interception Capacity	$Q_i =$	1.6	3.7	lcfs
Under Clogging Condition		MINOR	MAJOR	→
Clogging Coefficient	CurbCoef =	1.25	1.25	7
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	4
Effective (Unclogged) Length	$L_e =$	9.37	9.37	
Actual Interception Capacity	$\mathbf{Q}_{a} =$	1.6	3.7	cfs
Carry-Over Flow = $Q_{b/GRATE}$ - Q_a	$Q_a = Q_b =$	0.0	0.1	cfs
Summary	Q b = 1	MINOR	MAJOR	1010
Total Inlet Interception Capacity	Q =[1.6	3.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)		0.0	0.1	cfs
Capture Percentage = Q_a/Q_a =	Qь = С% =	100	97	Cfs %
$ Capture rescentage = Q_a/Q_0 =$	L% =	100	97	70

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				
Grandview Reserve		bepen und opi	cuu)	
Basin B-8 (DP 12b)				
- TBACK TCHOWN				
- T, Taax -				
SBACK W Ta				
STREET CROWN				
P P S CROWN				
111-1/				
Gutter Geometry: Maximum Allowable Width for Savand Bakind Curb	[75	ام	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} = n _{BACK} =	0.020		
	HBACK -	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = L$	0.016	J	
		Minor Storm	Major Storn	1
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions	-			
Manimum Cana aits for 1/2 Churat based On Allowable Canad		M: CI	M : Ci	
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	v =[Minor Storm 3.84	Major Storm 3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _c =	0.8	0.8	linches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
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) Maximum Flow Based On Allowable Spread	Q _{BACK} =	0.0 SUMP	0.0 SUMP	cfs cfs
Flow Velocity within the Gutter Section	Q _T = V =	0.0	0.0	fps
/*d Product: Flow Velocity times Gutter Flowline Depth	v*d =	0.0	0.0	
· · · · · · · · · · · · · · · · · · ·	- L			
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	_T _{TH} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	T _{X TH} =	14.7	28.6	ft
Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	E ₀ =	0.153	0.079	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _{X TH} = Q _X =	0.0	0.0	lcfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_{\rm X} = Q_{\rm W} = 1$	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.0	
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 \geq 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} = \begin{bmatrix} \\ \\ \\ \\ \end{bmatrix}$	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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Depth Criterion		THIOL STOLL		<u>. </u>



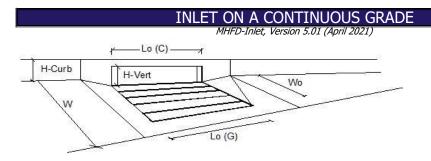
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	-
Type of Inlet	Type =		Curb Opening	4
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	4	4	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information	-	MINOR	MAJOR	Verride Dept
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	7
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	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$\ddot{C}_{o}(G) =$	N/A	N/A	1
Curb Opening Information	-0(-)	MINOR	MAJOR	
Length of a Unit Curb Opening	$L_{0}(C) = [$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	linches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	linches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
		2.00	2.00	feet
	W _p =			Teel
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	4
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	
Grate Capacity as Mixed Flow	Qoa - L	MINOR	MAJOR	
Interception without Clogging	o _[N/A	N/A	lcfs
	Q _{mi} =			cfs
Interception with Clogging	$Q_{ma} =$	N/A	N/A	
Resulting Grate Capacity (assumes clogged condition)	Q _{Grate} =	N/A	N/A	cis
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	-
Clogging Coefficient for Multiple Units	Coef =	1.33	1.33	4
Clogging Factor for Multiple Units	Clog =	0.03	0.03	
Curb Opening as a Weir (based on Modified HEC22 Method)	-	MINOR	MAJOR	_
Interception without Clogging	Q _{wi} =	10.0	35.4	cfs
Interception with Clogging	Q _{wa} =	9.7	34.3	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)	-	MINOR	MAJOR	_
Interception without Clogging	Q _{oi} =	33.6	43.9	cfs
Interception with Clogging	$Q_{oa} =$	32.5	42.4	cfs
Curb Opening Capacity as Mixed Flow	-coa	MINOR	MAJOR	-
Interception without Clogging	Q _{mi} =	17.0	36.7	lcfs
Interception with Clogging	Q _{ma} =	16.5	35.5	
Resulting Curb Opening Capacity (assumes clogged condition)	$Q_{ma} =$	9.7	34.3	cfs
Resultant Street Conditions	-ccurb -	MINOR	MAJOR	10.0
				Track
Total Inlet Length		20.00	20.00	feet
Resultant Street Flow Spread (based on street geometry from above)	, T=	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	3.2	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} =	0.29	0.57	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	7
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.67	0.88	1
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	1
character and the reduction ractor for Long fillets	Grate -	1975	11/5	
		MINOR	MAJOR	
Total Inlat Intercontion Conscipu (accurace classed condition)	n – [[]	9.7	MAUOR 34.3	cfs
Total Inlet Interception Capacity (assumes clogged condition)	$\mathbf{Q}_{\mathbf{a}} = \mathbf{Q}_{\mathbf{p} \in \mathbf{A} \in \mathbf{R} \in \mathbf{Q} \cup \mathbf{R} \in \mathbf{Q}}$	<u>9.7</u> 8.0	26.0	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		8.0	1 26.0	

Grandview Reserve Basin B-9 (DP 13) Totage: Transmitter of the system of	$T_{BACK} = \begin{bmatrix} T_{BACK} = \\ S_{BACK} = \\ n_{BACK} = \end{bmatrix}$ $H_{CURB} = \begin{bmatrix} T_{CROWN} = \\ W = \\ S_{W} = \\ T_{MAX} = \end{bmatrix}$	7.5 0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0 4.4	ft ft/ft inches ft ft/ft ft/ft ft/ft ft/ft 16.0 7.7	
Toreer Street Transverse Slope Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Spread for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Flowline (usually 2") <th>$S_{BACK} = \begin{bmatrix} \\ n_{BACK} = \end{bmatrix}$$H_{CURB} = \begin{bmatrix} \\ T_{CROWN} = \end{bmatrix}$$W = \\ S_X = \\ S_W = \\ S_O = \\ n_{STREET} = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$</th> <th>0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0</th> <th>ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0</th> <th></th>	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} = \end{bmatrix}$ $H_{CURB} = \begin{bmatrix} \\ T_{CROWN} = \end{bmatrix}$ $W = \\ S_X = \\ S_W = \\ S_O = \\ n_{STREET} = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
T. Two T. Two T. Two T. Two T. Two T. Two Cutter Geometry: Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Gutter Width Street Transverse Slope Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Wertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (dc, - (W * S_x * 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} = \end{bmatrix}$ $H_{CURB} = \begin{bmatrix} \\ T_{CROWN} = \end{bmatrix}$ $W = \\ S_X = \\ S_W = \\ S_O = \\ n_{STREET} = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
The test of the second of the	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} = \end{bmatrix}$ $H_{CURB} = \begin{bmatrix} \\ T_{CROWN} = \end{bmatrix}$ $W = \\ S_X = \\ S_W = \\ S_O = \\ n_{STREET} = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
THEFT CROWN Gutter Geometry: Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Gutter Width Street Transverse Slope Gutter Cypically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Up and Gutter Flowline (usually 2") Gutter Depression (dc - (W * S_* 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} = \end{bmatrix}$ $H_{CURB} = \begin{bmatrix} \\ T_{CROWN} = \end{bmatrix}$ $W = \\ S_X = \\ S_W = \\ S_O = \\ n_{STREET} = \begin{bmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
Gutter Geometry: Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Gutter Width Street Transverse Slope Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Mater Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Cow Star (Ur S x * 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} T_{CROWN} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix}$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
Sutter Geometry: Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Sutter Width Street Transverse Slope Sutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Mater Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Sutter Depression (d _c - (W * S _x * 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} T_{CROWN} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix}$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
Maximum Allowable Width for Spread Behind Curb Side Stope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Sutter Width Street Transverse Slope Sutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Spread for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Nater Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Sutter Depression (d _c - (W * S _x * 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} T_{CROWN} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix}$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
Maximum Allowable Width for Spread Behind Curb Side Stope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Sutter Width Street Transverse Slope Sutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Spread for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Nater Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Sutter Depression (d _c - (W * S _x * 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} T_{CROWN} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix}$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020) Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Gutter Width Street Transverse Slope Sutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Spread for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Mater Depth without Gutter Depression (Eq. ST-2) /etrical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))	$S_{BACK} = \begin{bmatrix} \\ n_{BACK} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} T_{CROWN} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \begin{bmatrix} H_{CURB} \\ - \end{bmatrix} \end{bmatrix}$	0.020 0.020 6.00 16.0 0.83 0.020 0.083 0.000 0.016 Minor Storm 16.0	ft/ft inches ft ft ft/ft ft/ft ft/ft ft/ft Major Storm 16.0	
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Street Longitudinal Slope - Enter 0 for sump condition Aanning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Vater Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))	$S_0 = \begin{bmatrix} \\ n_{STREET} = \end{bmatrix}$ $T_{MAX} = \begin{bmatrix} \end{bmatrix}$	0.000 0.016 Minor Storm 16.0	ft/ft Major Storm 16.0	
Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))	n _{STREET} = [0.016 Minor Storm 16.0	Major Storm	
Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) (ertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))	T _{MAX} =	Minor Storm 16.0	16.0	
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))		16.0	16.0	
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))		16.0	16.0	
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))				
Check boxes are not applicable in SUMP conditions Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2) Vertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression ($d_c - (W * S_x * 12)$)	GMAX - L		. //	inches
Maximum Capacity for 1/2 Street based On Allowable Spread Vater Depth without Gutter Depression (Eq. ST-2) Vartical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d_c - (W * S _x * 12))		Г		
Vater Depth without Gutter Depression (Eq. ST-2) /ertical Depth between Gutter Lip and Gutter Flowline (usually 2") Gutter Depression (d _c - (W * S _x * 12))		1,	A	
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2") Sutter Depression (d _c - (W * S _x * 12))		Minor Storm	Major Storm	1
Sutter Depression (d_c - (W * S _x * 12))	y =	3.84	3.84	inches
	d _C =	0.8	0.8	inches
	a =	0.63	0.63	inches
Vater Depth at Gutter Flowline	_ d =	4.47	4.47	linches
Nowable Spread for Discharge outside the Gutter Section W (T - W) Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$T_X =$	15.2	15.2	ft
Discharge outside the Gutter Section W, carried in Section T_x	$E_0 =$	0.149	0.149	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _X = Q _W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Qw = Q _{BACK} =	0.0	0.0	cfs
faximum Flow Based On Allowable Spread	$Q_{BACK} =$	SUMP	SUMP	cfs
low Velocity within the Gutter Section	V =	0.0	0.0	fps
/*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} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	T _{X TH} =	14.7	28.6	ft
Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH} Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _{X TH} =	0.0	0.0	cfs cfs
Social Discharge outside the Gutter Section W, (limited by distance Γ_{CROWN}) Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_X =$	0.0		
Discharge within the Gutter Section w $(Q_d - Q_X)$ Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _W =	0.0	0.0	
Fotal Discharge for Major & Minor Storm (Pre-Safety Factor)	Q _{BACK} = Q =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	Q = V =	0.0	0.0	
/*d Product: Flow Velocity Times Gutter Flowline Depth	v = V*d =	0.0	0.0	-1 ¹⁴⁵
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm	R =	SUMP	SUMP	-
Hax Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} = \mathbf{I}$	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)				linches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =			inches
				_
IINOR STORM Allowable Capacity is based on Depth Criterion IAJOR STORM Allowable Capacity is based on Depth Criterion	-	Minor Storm SUMP	Major Storm	cfs



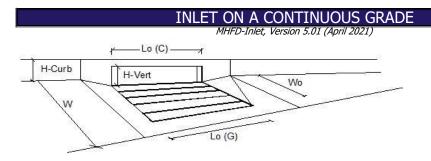
	Design Information (Input) CDOT Type R Curb Opening	т Г	MINOR	MAJOR Curb Opening	7
	Type of Inlet	Type =		Curb Opening	inches
	Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
	Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	4
	Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
	Grate Information	_	MINOR	MAJOR	Verride Depth
	Length of a Unit Grate	$L_{o}(G) =$	N/A	N/A	feet
N	Width of a Unit Grate	W _o =	N/A	N/A	feet
A	Area Opening Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	7
	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	1
	Grate Orifice Coefficient (typical value 0.60 - 0.80)	C _o (G) =	N/A	N/A	-
	Curb Opening Information	-0(-)	MINOR	MAJOR	
	Length of a Unit Curb Opening	$L_0(C) =$	5.00	5.00	feet
	Height of Vertical Curb Opening in Inches	$H_{vert} =$	6.00	6.00	linches
	Height of Curb Orifice Throat in Inches		6.00	6.00	linches
	5	H _{throat} =	63.40	63.40	-
	Angle of Throat (see USDCM Figure ST-5)	Theta =			degrees feet
	Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	reet
	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	-
I	Interception without Clogging	Q _{wi} =	N/A	N/A	cfs
I	Interception with Clogging	Q _{wa} =	N/A	N/A	cfs
	Grate Capacity as a Orifice (based on Modified HEC22 Method)	-Cwa	MINOR	MAJOR	
	Interception without Clogging	Q _{oi} =	N/A	N/A	cfs
	Interception with Clogging	$Q_{oa} =$	N/A	N/A	lcfs
	Grate Capacity as Mixed Flow	Q _{oa} – L	MINOR	MAJOR	
		о Г			7-6-
	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	_
I	Interception without Clogging	Q _{wi} =	6.1	20.2	cfs
I	Interception with Clogging	Q _{wa} =	5.7	18.9	cfs
	Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	-
	Interception without Clogging	Q _{oi} =	16.8	21.9	Cfs
	Interception with Clogging	Q _{oa} =	15.7	20.6	cfs
	Curb Opening Capacity as Mixed Flow	-coa —	MINOR	MAJOR	→ ··-
	Interception without Clogging	Q _{mi} =	9.4	19.6	lcfs
	Interception with Clogging	Q _{mi} = Q _{ma} =	8.8	19.0	cfs
	Resulting Curb Opening Capacity (assumes clogged condition)	$Q_{ma} =$ $Q_{curb} =$	5.7	18.3 18.3	cfs
	Resultant Street Conditions	Curb -	MINOR	MAJOR	13
					74.
	Total Inlet Length		10.00	10.00	feet
	Resultant Street Flow Spread (based on street geometry from above)	, T =	15.6	29.4	ft.>T-Crown
∏ F	Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	3.2	inches
. ∥.					
	Low Head Performance Reduction (Calculated)	-	MINOR	MAJOR	-
10	Depth for Grate Midwidth	d _{Grate} =	N/A	N/A	ft
	Depth for Curb Opening Weir Equation	d _{Curb} =	0.29	0.57	ft
	Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	
0			0.82	1.00	7
		$KF_{Curb} = I$	0.02		
	Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} = RF _{Grate} =	N/A	N/A	
		RF _{Curb} = RF _{Grate} =		N/A	
	Curb Opening Performance Reduction Factor for Long Inlets		N/A		
	Curb Opening Performance Reduction Factor for Long Inlets			N/A MAJOR 18.3]]cfs

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum Al				
Grandview Reserve				
Basin C-1 (DP 17b)				
Succe W T, Taux Succe W T, Taux T, T, Taux T, T, Taux T, T, T				
Gutter Geometry:			1.	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020]	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	V =	0.83	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 ₀ =	0.005	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016	1	
			-	
	-	Minor Storm	Major Storn	<u>1</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			V	
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	1
Water Depth without Gutter Depression (Eq. ST-2)	v = [3.84	3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _c =	0.8	0.8	inches
Gutter Depression (d_c - (W * S_x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_{χ}	Q _X =	11.5	11.5	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _w =	2.0	2.0	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 =	13.5	13.5	cfs
Flow Velocity within the Gutter Section	V =	1.2	1.2	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =[0.5	0.5	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	10.6	62.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _x =	10.6	53.9	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	Q _w =	1.9	5.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.2	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	12.5	60.4	cfs
Average Flow Velocity Within the Gutter Section	v =	1.2	1.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.2	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	1.00	0.70	
Max Flow Based on Allowable Depth (Safety Factor Applied)	Q _d =	12.5	42.1	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.36	6.69	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.22	inches
MINOR STORM Allowable Canacity is based on Donth Criterion		Minor Storm	Major Storm	•
MINOR STORM Allowable Capacity is based on Depth Criterion	_	Minor Storm 12.5	Major Storm	<u>I</u>



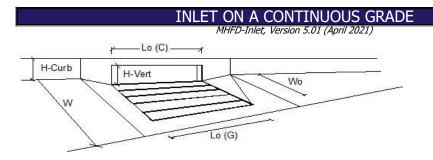
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =	N/A	N/A	- Ift
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C _r -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	UFC -	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	Q _o =	6.8	16.0	lcfs
Water Spread Width	Q₀ - T =	12.3	16.0	- dis Ift
Water Depth at Flowline (outside of local depression)	d =	3.6	4.7	linches
	-	0.0	0.3	linches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =			
Ratio of Gutter Flow to Design Flow	E ₀ =	0.196	0.139	-6-
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	5.5	13.8	cfs
Discharge within the Gutter Section W	Q _w =	1.3	2.2	cfs
Discharge Behind the Curb Face	$Q_{BACK} =$	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.22	0.30	sq ft
Velocity within the Gutter Section W	V _w =	6.1	7.5	fps
Water Depth for Design Condition	d _{LOCAL} =	6.6	7.7	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-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	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	7
Effective (unclogged) Length of Multiple-unit Grate Inlet	L, =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	N/A	N/A	fps
Interception Rate of Frontal Flow	R _f =	N/A	N/A	1.
Interception Rate of Side Flow	R _x =	N/A	N/A	1
Actual Interception Capacity	Q _a =	N/A	N/A	cfs
Carry-Over Flow = Q_0 - Q_a (to be applied to curb opening or next d/s inlet)	0 _b =	N/A	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)	E 12	MINOR	MAJOR	
Equivalent Slope S_{e} (based on grate carry-over)	S _e =	0.091	0.071	_ft/ft
Required Length L_T to Have 100% Interception	L _T =	16.42	28.60	- Ift
Under No-Clogging Condition	-1-1	MINOR	MAJOR	_ ,
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00]ft
Interception Capacity	Q _i =	6.7	11.8	cfs
Under Clogging Condition	Qi - [MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	7
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	-
Effective (Unclogged) Length	$L_e =$	14.34	14.34	
Actual Interception Capacity		6.7	14.34 11.7	cfs
	$Q_a =$		4.3	
Carry-Over Flow = $Q_{b(GRATF)}$ - Q_a	Q _b =	0.1		cfs
Summary	^ 1	MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	6.7	11.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.1	4.3	cfs
Capture Percentage = Q_a/Q_o =	C% =	98	73	%

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				
Grandview Reserve Basin C-2 (DP 17a)				
T, T _{MAX}				
STREET CROWN				
P T T				
0 5				
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	н – Г	6.00	Tinchoc	
Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown	H _{CURB} = T _{CROWN} =	<u> </u>	inches ft	
Gutter Width	W =	0.83	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 ₀ =	0.025	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} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	linches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			1	
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	v =[Minor Storm 3.84	Major Storm 3.84	1 linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y = d _C =	0.8	0.8	linches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _X =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_X	$Q_X =$	11.5	11.5	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _W =	2.0	2.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Maximum Flow Based On Allowable Spread	Q _{BACK} =	0.0 13.5	0.0	cfs cfs
Flow Velocity within the Gutter Section	Q _T = V =	1.2	1.2	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	v = V*d =	0.5	0.5	
	· L		•	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T _{TH} =	15.6	29.4	ft ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eg. ST-7)	T _{X TH} =	14.7 0.153	28.6	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Е ₀ = Q _{X TH} =	10.6	62.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_X = $	10.6	53.9	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_W = $	1.9	5.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.2	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	12.5	60.4	cfs
Average Flow Velocity Within the Gutter Section	V =	1.2	1.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.2	_
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm	R =	1.00	0.70	<u> </u>
Max Flow Based on Allowable Depth (Safety Factor Applied)	$Q_d =$	12.5	42.1	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) Resultant Flow Depth at Street Crown (Safety Factor Applied)	d =	4.36	6.69	inches inches
Container now Deput at Succe Crown (Sarety Factor Applieu)	d _{CROWN} =[0.00	2.22	
MINOR STORM Allowable Capacity is based on Depth Criterion	-	Minor Storm	Major Storm	<u>1</u>
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	12.5	42.1	cfs



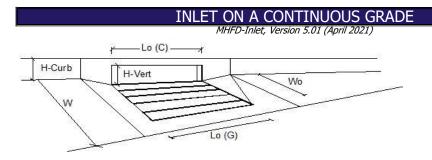
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =	N/A	N/A	- Ift
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_{f}-G =$	N/A	N/A	-"
	C _f -C =	0.10	0.10	-
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	Cf=C =	MINOR	MAJOR	
Street Hydraulics: OK - Q < Allowable Street Capacity'	0 -1	11.3	26.3	lcfs
Design Discharge for Half of Street (from <i>Inlet Management</i>)	Q ₀ = T =			
Water Spread Width	·	15.0	16.0	
Water Depth at Flowline (outside of local depression)	d =	4.2	5.6	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	1.1	inches
Ratio of Gutter Flow to Design Flow	E _o =	0.160	0.116	
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	9.5	23.3	cfs
Discharge within the Gutter Section W	Q _w =	1.8	3.0	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.26	0.36	sq ft
Velocity within the Gutter Section W	V _w =	6.9	8.5	fps
Water Depth for Design Condition	d _{LOCAL} =	7.2	8.6	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-GRATE} =	N/A	N/A	1
Under No-Clogging Condition	o divite	MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	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	Qi - [MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A N/A	-
Effective (unclogged) Length of Multiple-unit Grate Inlet		N/A N/A	N/A N/A	-ft
		N/A	N/A N/A	
Minimum Velocity Where Grate Splash-Over Begins	V _o =	/		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_0 - Q_a (to be applied to curb opening or next d/s inlet)	Q _b =	<u>N/A</u>	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	-
Equivalent Slope S_e (based on grate carry-over)	S _e =	0.078	0.062	_ft/ft
Required Length L_T to Have 100% Interception	L _T = [22.86	39.13	_ft
Under No-Clogging Condition		MINOR	MAJOR	_
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00	ft
Interception Capacity	$Q_i =$	9.6	15.3	cfs
Under Clogging Condition		MINOR	MAJOR	_
Clogging Coefficient	CurbCoef =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	7
Effective (Unclogged) Length	L _e =	14.34	14.34	ft
Actual Interception Capacity	Qa =	9.6	15.1	cfs
Carry-Over Flow = $Q_{h(GRATE)} - Q_a$	$\dot{\mathbf{Q}}_{\mathbf{b}} =$	1.7	11.2	cfs
Summary	<u> </u>	MINOR	MAJOR	·
Total Inlet Interception Capacity	Q =	9.6	15.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	1.7	11.2	cfs
Capture Percentage = Q_a/Q_a =	Qь – С% =	85	57	%
$ cupture creating = Q_2/Q_0 =$	C 70 - 1	0.5		1 / 2

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				ijor Stor
Grandview Reserve		Deptil and Spi	eau)	
Basin C-4 (DP 17c)				
There is a construction of the construction of				
Gutter Geometry:	т _Г	75]م	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	V =	0.83	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 =	0.020	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	S ₀ =	0.020	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016	1 7.1	
			-	
	_	Minor Storm	Major Storn	<u>n</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			-	
Maximum Canadity for 1/2 Street based On Allowable Spread		Minor Charm	Major Charm	
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	v = [Minor Storm 3.84	Major Storn 3.84	linches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y = d _C =	0.8	0.8	inches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	linches
Water Depth at Gutter Flowline	d =	4.47	4.47	linches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = 1$	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T _x	$Q_x = $	10.3	10.3	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _w =	1.8	1.8	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 =	12.1	12.1	cfs
Flow Velocity within the Gutter Section	V =	1.1	1.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.4	0.4	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	т _{тн} =Г	15.6	29.4	ll Ift
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	-
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	9.5	55.6	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _X =	9.5	48.2	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$\vec{Q}_{W} = \vec{P}$	1.7	4.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.2	54.0	cfs
Average Flow Velocity Within the Gutter Section	v =	1.1	1.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	1.00	0.83	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$Q_d = [$	11.2	45.0	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.36	7.17	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.70	inches
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} = [Minor Storm 11.2	Major Storn 45.0	n cfs



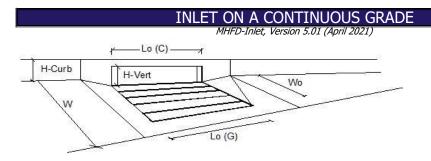
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	-	Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L ₀ =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$\overline{W_{o}} = $	N/A	N/A	
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'	90-1	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	$Q_o = [$	5.8	20.8	lcfs
Water Spread Width	τ=	12.1	16.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.5	5.4	linches
Water Depth at Flowing (outside of local depression) Water Depth at Street Crown (or at T_{MAX})	d _{CROWN} =	0.0	0.9	linches
Ratio of Gutter Flow to Design Flow	$U_{CROWN} = E_0 = I$	0.200	0.121	
Discharge outside the Gutter Section W, carried in Section T_v		4.7	18.3	cfs
5	Q _x =	1.2	2.5	
Discharge within the Gutter Section W	Q _w =	0.0	0.0	cfs cfs
Discharge Behind the Curb Face	$Q_{BACK} =$			
Flow Area within the Gutter Section W	A _W =	0.22	0.34	sq ft
Velocity within the Gutter Section W		5.4	7.3	fps
Water Depth for Design Condition	d _{LOCAL} =	6.5	8.4	inches
Grate Analysis (Calculated)	F	MINOR	MAJOR	٦۵
Total Length of Inlet Grate Opening	_ L=	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o-GRATE} = $	N/A	N/A	
Under No-Clogging Condition	., г	MINOR	MAJOR	7.
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	N/A	N/A	fps
Interception Rate of Frontal Flow	$R_{f} =$	N/A	N/A	4
Interception Rate of Side Flow	R _x =	N/A	N/A	4.
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_0 - 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 =	0.093	0.064	_ft/ft
Required Length L _T to Have 100% Interception	L _T = [14.91	33.79	_ft
Under No-Clogging Condition	_	MINOR	MAJOR	_
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	14.91	15.00	ft
Interception Capacity	Q _i =	5.8	13.6	cfs
Under Clogging Condition	_	MINOR	MAJOR	_
Clogging Coefficient	CurbCoef =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L _e =	14.34	14.34	ft
Actual Interception Capacity	Q _a =	5.8	13.4	cfs
Carry-Over Flow = $Q_{b(GRATE)}$ - Q_a	Q _b =	0.0	7.4	cfs
Summary		MINOR	MAJOR	_
Total Inlet Interception Capacity	Q =[5.8	13.4	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.0	7.4	cfs
Capture Percentage = Q_a/Q_0 =	C% =	100	64	%

Grandview Reserve Basin C-S (DP 17d)SummMinor StarmMax. Allowable Spread for Minor & Major StormMax. Allowable Spread for Minor & Major StormMax. Allowable Spread for Minor & Major StormMax. SummMajor StormMax. SummMagior StormMax. SummMagior StormMax. Summ </th <th>(Based on Regulated Criteria for Maximum A</th> <th></th> <th></th> <th></th> <th>ajor Stor</th>	(Based on Regulated Criteria for Maximum A				ajor Stor
SummGutter Geometry: Maximum Allowable Width for Spread Behind Curb Site Sope Behind Curb (typically between 0.012 and 0.020)Taxicx = 7.5 The Summer Street Colspan= 0.020The Summer S	Grandview Reserve		bepen and opi	cuu)	
SubscriptionGutter Geometry:Gutter Geometry:SubscriptionSubscriptionSide Slope Behind Curb (bynically between 0.012 and 0.020)Height of Curb at Gutter Flow LineDistance from Curb Face to Street CrownGutter WithStreet Transverse SlopeGutter With Street CrownMinor Street Section (typically between 0.012 and 0.020)Minor Street Section (
Maximum AllowableTexc:7.5ftSide Slope Behind Curb (lave blank for no conveyance credit behind curb) $T_{Secc} = 0.020$ ft/ftManning's Roughness Behind Curb (typically between 0.012 and 0.020) $T_{Maxc} = 0.020$ ft/ftHeight of Curb at Gutter Flow Line $H_{CurBl} = 0.020$ ft/ftDistance from Curb Face to Street Crown $T_{Curb Rec} = 0.020$ ft/ftGutter Width $V = 0.83$ ftStreet Transverse Slope $S_x = 0.020$ ft/ftStreet Longitudinal Slope - Enter 0 for sump condition $S_y = 0.003$ ft/ftManing's Roughness for Street Section (typically between 0.012 and 0.020) $S_y = 0.016$ ft/ftMax. Allowable Spread for Minor & Major Storm $T_{Max} = 1.4.4$ 7.7 incheMax Malowable Copt at Street Crown (check box for yes, leave blank for no) $T_{Max} = 0.63$ 0.63 incheMaximum Capacity for 1/2 Street based On Allowable Spread $y = 3.84$ 3.84 incheMater Depth without Gutter Depression (fc, $(Y + S_1 + 2)$) $a = 0.63$ 0.63 incheMaximum Capacity for 1/2 Street based on Allowable Spread $Y = 15.2$ 15.2 incheMaximum Capacity for 1/2 Street based on Allowable Spread $Y = 15.5$ 15.2 incheDischarge outside the Gutter Section W (T - W) $T_x = 15.5$ 15.2 incheGutter Poression (fc, $(Y + 2)$ S_y $S_y = 0.00$ 0.0 incheDischarge outside the Gutter Section W (T - W) $T_x = 15.5$ 10.5 ftMaximum Capacity for 1/2 Street based	Seece T, Teaco STREET				
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Manning's Roughness Behind Curb (typically between 0.012 and 0.020) $n_{BCK} = 0.020$ Height of Curb at Gutter Flow Line $H_{CURB} = 6.00$ inchesDistance from Curb Face to Street Crown $T_{CROW} = 0.83$ ftGutter Width $W = 0.83$ ftStreet Transverse Stope $S_0 = 0.015$ ft/ftStreet Longitudinal Stope - Enter 0 for sump condition $S_0 = 0.015$ ft/ftMax. Allowable Spread for Minor & Major Storm $S_0 = 0.015$ ft/ftMax. Allowable Spread for Minor & Major Storm $T_{MAK} = 4.4$ 7.7 Max. Mlowable Depth at Gutter Flowline for Minor & Major Storm $T_{MAK} = 4.4$ 7.7 Maximum Capacity for 1/2 Street based On Allowable SpreadMinor StormMinor StormMatter Depth without Gutter Depression ($G_1 - 0.01$ $S_1 + 4.4$ 7.4 Vertical Depth at Street Crown (check box for yes, leave blank for no) $Winor Storm$ Minor StormMaxer Depth at Street Crown (check box for yes, leave blank for no) $Winor Storm$ Minor StormMaxer Depth at Gutter Flowline (usually 2'') $a = 0.63$ 0.63 incheAltowable Spread for Discharge outside the Gutter Section W (T - W) $T_X = 15.2$ 15.2 15.2 Discharge outside the Gutter Section W ($Q_1 - Q_2$) $Q_0 = 0.63$ 0.61 0.64 Discharge outside the Gutter Section W ($Q_1 - Q_2$) $Q_0 = 0.63$ 0.63 incheDischarge outside the Gutter Section W ($Q_1 - Q_2$) $Q_0 = 0.63$ 0.63 incheDischarge outside the Gutter Section W ($Q_1 - Q_2$) $Q_0 = 0.63$ $0.$					
Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown Gutter Width Street Transverse Slope Gutter Toxs Slope (typically 2 inches over 24 inches or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sum condition Manning's Roughness for Street Section (typically between 0.012 and 0.020) Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Max. Allowable Spread for J1/2 Street based On Allowable Spread Mater Depth at Gutter Flowline (suully 2") Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Discharge eutiside the Gutter Section V (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Elocharge outside the Gutter Section V (Q ₁ - Q ₂) Discharge eutiside the Gutter Section W (Q ₁ - Q ₃) Discharge eutiside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge eutiside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge entistic the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (Q ₁ - Q ₃) Discharge outside the Gutter Section W (G ₁ - Q ₃) Discharge outside the Gutter Section W (G ₁ - Q ₁) Discharge outside the Gutter Section W (G ₁ - Q ₃) Di				ITT/IT	
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Allowable Spread for Discharge outside the Gutter Section W (T - W) $T_x =$ 15.2 15.2 ftGutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) $E_0 =$ 0.149 0.149 0.149 Discharge within the Gutter Section W (Qr - Qx) $Q_x =$ 8.9 8.9 cfs Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_w =$ 1.6 1.6 cfs Maximum Flow Based On Allowable Spread $V =$ 0.0 0.0 cfs Flow Velocity within the Gutter Section $V =$ 0.4 0.4 0.4 Maximum Capacity for $1/2$ Street based on Allowable Depth $V^*d =$ 0.4 0.4 Theoretical Water Spread $T_{TH} =$ 15.6 29.4 ftMinor Storm Or Discharge outside the Gutter Section W (T - W) $T_{XTH} =$ 14.7 28.6 ftGutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) $E_0 =$ 0.153 0.079 ftTheoretical Discharge outside the Gutter Section W, carried in Section T_{XTH} $Q_x =$ 8.2 48.1 cfsActual Discharge outside the Gutter Section W, carried in Section T_{XTH} $Q_x =$ 8.2 48.1 cfsDischarge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_W =$ 1.5 4.1 cfsDischarge Nubin the Gutter Section W (Qa - Qa) $Q_w =$ 0.0 0.9 cfs Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_W =$ 0.5 4.1 cfs Discharge Behind the Curb (e.g., sidewalk, drive					inches
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Discharge outside the Gutter Section W, carried in Section T _x Discharge within the Gutter Section W (Q ₁ - Q _x) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Maximum Flow Based On Allowable Spread Flow Velocity within the Gutter Section V*d Product: Flow Velocity times Gutter Flowline Depth Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Discharge outside the Gutter Section W (T - W) Gutter Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Theoretical Discharge outside the Gutter Section W, carried in Section T _{x TH} Actual Discharge outside the Gutter Section W, climited by distance T _{CROWN}) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Discharge Flow Velocity Within the Gutter Section W, (limited by distance T _{CROWN}) Discharge Flow Velocity Within the Gutter Section W (Q ₂ - Q ₃) Discharge Flow Velocity Within the Gutter Section V*d Product: Flow Velocity Within the Gutter Section V = 0.9 Discharge for Major & Minor Storm (Pre-Safety Factor) Average Flow Velocity Within the Gutter Flowline Depth V*d Product: Flow Velocity Times Gutter Flowline Depth V*d Product: Flow Velocity Times Gutter Flowline Depth Max Flow Based on Allowable Depth (Safety Factor Applied) Discharge Add on Allowable Depth (Safety Factor Applied) Que = 0.7 Add = 0.7 A					ft
Discharge within the Gutter Section W $(Q_T - Q_X)$ Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Maximum Flow Based On Allowable Spread Flow Velocity within the Gutter Section W (T - W) Gutter Flow Velocity times Gutter Flowline Depth Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Theoretical Discharge outside the Gutter Section W, Carried in Section T _{X TH} Actual Discharge outside the Gutter Section W, (Limited by distance T _{CROWN}) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Total Discharge for Major & Minor Storm (Pre-Safety Factor) Average Flow Velocity Times Gutter Flowline Depth Y*d Product: Flow Velocity Times Gutter Flowline Depth Maximum Capacity For Major & Minor Storm (Pre-Safety Factor) Average Flow Velocity Times Gutter Flowline Depth Stope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq 6^{or}$) Storm Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d = 9.7$ 46.8 Cfs					<u> </u>
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Maximum Flow Based On Allowable Spread Flow Velocity within the Gutter Section Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Water Spread Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Theoretical Discharge outside the Gutter Section W, carried in Section T _{X TH} Actual Discharge outside the Gutter Section W, carried in Section T _{X TH} Actual Discharge outside the Gutter Section W, (Imited by distance T _{CROWN}) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Total Discharge for Major & Minor Storm (Pre-Safety Factor) Average Flow Velocity Within the Gutter Section V*d Product: Flow Velocity Times Gutter Flowline Depth Stope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm Max Flow Based on Allowable Depth (Safety Factor Applied) Que 9.7 466.8 cfs					
Maximum Flow Based On Allowable Spread $Q_T =$ 10.510.5cfsFlow Velocity within the Gutter SectionV*dII <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
Flow Velocity within the Gutter Section $V =$ 1.01.0fpsV*d Product: Flow Velocity times Gutter Flowline Depth $V^*d =$ 0.4 0.4 0.4 Maximum Capacity for 1/2 Street based on Allowable Depth $V^*d =$ 0.4 0.4 0.4 Theoretical Water SpreadTTH = $1.5.6$ 29.4 ftTheoretical Discharge outside the Gutter Section W (T - W) $T_{TH} =$ $1.5.6$ 29.4 ftGutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) $E_0 =$ 0.153 0.079 Theoretical Discharge outside the Gutter Section W, carried in Section Tx TH $Q_{XTH} =$ 8.2 48.1 cfsActual Discharge outside the Gutter Section W, (limited by distance T _{CROWN}) $Q_w =$ 1.5 4.1 cfsDischarge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_{WE} =$ 0.0 0.9 cfsDischarge Flow Velocity Within the Gutter Section $V =$ 0.9 1.4 fpsV*d Product: Flow Velocity Times Gutter Flowline Depth $V^*d =$ 0.3 0.9 fpsSlope-Based Opeth Safety Reduction Factor for Major & Minor (d $\ge 6^\circ)$ Storm $R =$ 1.00 1.00 fpsMax Flow Based on Allowable Depth (Safety Factor Applied) $Q_d =$ 9.7 46.8 cfs					
V*d Product: Flow Velocity times Gutter Flowline DepthV*d = 0.4 0.4 Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Water SpreadMinor StormMajor StormTheoretical Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH} $T_{TH} =$ 15.6 29.4 Actual Discharge outside the Gutter Section W, carried in Section T_{XTH} $Q_{XTH} =$ 8.2 48.1 cfsDischarge within the Gutter Section W (Q _a - Q _X) $Q_W =$ 1.5 4.1 cfsDischarge for Major & Minor Storm (Pre-Safety Factor) $Q_W =$ 1.5 4.1 cfsAverage Flow Velocity Times Gutter Flowline Depth $Winor (d \ge 6'')$ Storm $V^*d =$ 0.3 0.9 Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d =$ 9.7 46.8 cfs					
Maximum Capacity for 1/2 Street based on Allowable DepthMaior StormTheoretical Water Spread $T_{TH} = 15.6$ 29.4It heoretical Spread for Discharge outside the Gutter Section W (T - W) $T_{X TH} = 14.7$ 28.6Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) $E_0 = 0.153$ 0.079Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X TH}$ $E_0 = 0.153$ 0.079Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN}) $Q_X = 8.2$ 48.1cfsDischarge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_W = 1.5$ 4.1cfsTotal Discharge for Major & Minor Storm (Pre-Safety Factor) $Q = 9.7$ 46.8cfsAverage Flow Velocity Within the Gutter Section $V = 0.9$ 1.4fpsV*d Product: Flow Velocity Times Gutter Flowline Depth $V*d = 0.3$ 0.91.00Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d = 9.7$ 46.8cfs					
Theoretical Water SpreadT _{TH} =15.629.4ftTheoretical Spread for Discharge outside the Gutter Section W (T - W)T _{X TH} =15.629.4ftGutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)T _{X TH} =14.728.6ftGutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)E _O =0.1530.079Theoretical Discharge outside the Gutter Section W, carried in Section T _{X TH} & & & & & & & & & & & & & & & & & & &	· · · · · · · · · · · · · · · · · · ·	· .	-	ļ	
Theoretical Spread for Discharge outside the Gutter Section W (T - W) $T_{XTH} =$ 14.728.6ftGutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7) $E_0 =$ 0.1530.079Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH} $Q_{XTH} =$ 8.248.1cfsActual Discharge outside the Gutter Section W, (limited by distance T_{CROWN}) $Q_X =$ 8.241.7cfsDischarge within the Gutter Section W ($Q_a - Q_A$) $Q_W =$ 1.54.1cfsDischarge for Major & Minor Storm (Pre-Safety Factor) $Q_B =$ 9.746.8cfsAverage Flow Velocity Within the Gutter Section Tellowine Depth $V^*d =$ 0.30.91.4fpsSlope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6^{"}$) StormR1.001.001.00Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d =$ 9.746.8cfs		-	Minor Storm	Major Storn	<u>n</u>
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)E_0 = 0.153 0.079Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X TH}$ Q_{X TH}R_248.1cfsActual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})Q_X =8.241.7cfsDischarge within the Gutter Section W (Q_d - Q_X)Q_W =1.54.1cfsDischarge Behind the Curb (e.g., sidewalk, driveways, & lawns)Q_BACK =0.00.9cfsTotal Discharge for Major & Minor Storm (Pre-Safety Factor)Q9.746.8cfsAverage Flow Velocity Within the Gutter SectionV =0.91.4fpsV*d Product: Flow Velocity Times Gutter Flowline DepthV*d =0.30.9Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") StormR =1.001.00Max Flow Based on Allowable Depth (Safety Factor Applied)Q_d =9.746.8cfs					
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X TH}$ Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN}) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Total Discharge for Major & Minor Storm (Pre-Safety Factor) Average Flow Velocity Within the Gutter Section Theorem Composition of the Section V and the Gutter Section Provided for Major & Minor Storm (Pre-Safety Factor) Average Flow Velocity Times Gutter Flowline Depth Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq 6^{"}$) Storm Max Flow Based on Allowable Depth (Safety Factor Applied) Queta Section V and the Section Composition of the S					ft
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN}) $Q_X =$ 8.2 41.7 cfsDischarge within the Gutter Section W ($Q_d - Q_X$) $Q_W =$ 1.5 4.1 cfsDischarge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_{BACK} =$ 0.0 0.9 cfsTotal Discharge for Major & Minor Storm (Pre-Safety Factor) $Q =$ 9.7 46.8 cfsAverage Flow Velocity Within the Gutter Section $V =$ 0.9 1.4 fpsV*d Product: Flow Velocity Times Gutter Flowline Depth $V*d =$ 0.3 0.9 1.6 Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm $R =$ 1.00 1.00 Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d =$ 9.7 46.8 cfs					<u> </u>
Discharge within the Gutter Section W $(Q_d - Q_x)$ $Q_W =$ 1.5 4.1 cfsDischarge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_{BACK} =$ 0.0 0.9 cfsTotal Discharge for Major & Minor Storm (Pre-Safety Factor) $Q =$ 9.7 46.8 cfsAverage Flow Velocity Within the Gutter Section $V =$ 0.9 1.4 fpsYed Product: Flow Velocity Times Gutter Flowline Depth $V*d =$ 0.3 0.9 1.4 Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6^n$) Storm $R =$ 1.00 1.00 Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d =$ 9.7 46.8 cfs					
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) $Q_{BACK} =$ 0.0 0.9 cfsTotal Discharge for Major & Minor Storm (Pre-Safety Factor) $Q =$ 9.7 46.8 cfsAverage Flow Velocity Within the Gutter Section $V =$ 0.9 1.4 fpsV*d Product: Flow Velocity Times Gutter Flowline Depth $V*d =$ 0.3 0.9 1.4 Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq 6^{"}$) StormR = 1.00 1.00 Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d =$ 9.7 46.8 cfs					
Total Discharge for Major & Minor Storm (Pre-Safety Factor) $Q = 9.7$ 46.8cfsAverage Flow Velocity Within the Gutter Section $V = 0.9$ 1.4fpsV*d Product: Flow Velocity Times Gutter Flowline Depth $V*d = 0.3$ 0.9Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq 6^{"}$) Storm $R = 1.00$ 1.00Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d = 9.7$ 46.8cfs					
Average Flow Velocity Within the Gutter Section $V = 0.9$ 1.4 fpsV*d Product: Flow Velocity Times Gutter Flowline Depth $V*d = 0.3$ 0.9 Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm $R = 1.00$ 1.00 Max Flow Based on Allowable Depth (Safety Factor Applied) $Q_d = 9.7$ 46.8cfs					
V*d Product: Flow Velocity Times Gutter Flowline DepthV*d = 0.3 0.9 Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") StormR = 1.00 1.00 Max Flow Based on Allowable Depth (Safety Factor Applied) \mathbf{Q}_d = 9.7 46.8 \mathbf{cfs}			-		
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") StormR =1.001.00Max Flow Based on Allowable Depth (Safety Factor Applied)Qd =9.746.8cfs					
Max Flow Based on Allowable Depth (Safety Factor Applied) Qd = 9.7 46.8 cfs					
					cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) d = 4.36 7.68 inche			-		inches
	Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00		inches
		-			_
MINOR STORM Allowable Capacity is based on Depth Criterion Minor Storm Major Storm Major Storm Major Storm Qallow = 9.7 46.8 cfs	MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storr	n



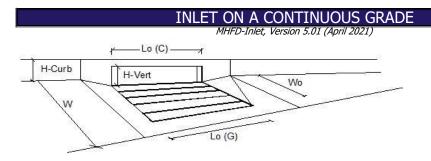
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	linches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =		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 = 0.3)	C _f -C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	Cf=C = [MINOR	MAJOR	
	0 -1	-		lcfs
Design Discharge for Half of Street (from <i>Inlet Management</i>)	Q ₀ = T =	5.5 12.5	20.2	ft
Water Spread Width	, i i i i i i i i i i i i i i i i i i i		16.0	
Water Depth at Flowline (outside of local depression)	d =	3.6	5.6	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	1.1	inches
Ratio of Gutter Flow to Design Flow	E ₀ =	0.193	0.116	4,
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	4.4	17.9	cfs
Discharge within the Gutter Section W	Q _w =	1.1	2.3	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.22	0.36	sq ft
Velocity within the Gutter Section W	V _W =	4.8	6.5	fps
Water Depth for Design Condition	d _{LOCAL} =	6.6	8.6	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-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	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	7
Effective (unclogged) Length of Multiple-unit Grate Inlet	L, =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	N/A	N/A	fps
Interception Rate of Frontal Flow	R _f =	N/A	N/A	1.
Interception Rate of Side Flow	R _x =	N/A	N/A	1
Actual Interception Capacity	Q _a =	N/A	N/A	cfs
Carry-Over Flow = Q_0 - Q_a (to be applied to curb opening or next d/s inlet)	$\hat{\mathbf{Q}}_{\mathbf{b}} =$	N/A	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)	L U 1	MINOR	MAJOR	10.0
Equivalent Slope S_e (based on grate carry-over)	S _e =	0.090	0.062]ft/ft
Required Length L_T to Have 100% Interception	-e L _T =	14.40	33.15	- Ift
Under No-Clogging Condition	-1-1	MINOR	MAJOR	⊣
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	14.40	15.00	Tft
Interception Capacity	Q _i =	5.5	13.4	
Under Clogging Condition	Qi - [MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	٦
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	-
Effective (Unclogged) Length		14.34	14.34	ft
Actual Interception Capacity	L _e =	<u>14.34</u> 5.5	14.54 13.2	cfs
	Q _a =			
$Carry-Over Flow = Q_{h(GRATE)} - Q_a$	Q _b =	0.0	7.0	cfs
Summary	-	MINOR	MAJOR	7.4
Total Inlet Interception Capacity	Q =	5.5	13.2	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.0	7.0	cfs
Capture Percentage = Q_a/Q_a =	C% =	100	65	%

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				
Grandview Reserve			-	
Basin C-6 (DP 17e)				
SBACK W I T.				
SBACK W T,				
STREET				
P P S				
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v/				
Gutter Geometry: Maximum Allounda Width for Savard Babind Curb	т _Г	7.5	٦	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020		
naming's Roughness benniti curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.015	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016		
	- r	Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Clowin (check box for yes, leave blank for ho)		1	19	
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	1
Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d_c - (W * S_x * 12))	a =[0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	$T_{X} =$	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	<u> </u>
Discharge outside the Gutter Section W, carried in Section T_X	$Q_X =$	8.9	8.9	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$) Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _W =	<u>1.6</u> 0.0	1.6	cfs cfs
Maximum Flow Based On Allowable Spread	$Q_{BACK} = $ $Q_T = $	10.5	10.5	
Flow Velocity within the Gutter Section	V =	1.0	1.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	v = V*d =	0.4	0.4	
	· L	-		
Maximum Capacity for 1/2 Street based on Allowable Depth	-	Minor Storm	Major Storm	
Theoretical Water Spread	_T _{TH} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{XTH} =$	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = $	0.153	0.079	\dashv
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	8.2	48.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_X =$	8.2	41.7	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	Q _w =	1.5	4.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns) Total Discharge for Major & Minor Storm (Pre-Safety Factor)	$Q_{BACK} =$	0.0	0.9	cfs cfs
Average Flow Velocity Within the Gutter Section	Q = V =	0.9	46.8	fps
V*d Product: Flow Velocity Within the Gutter Section V*d Product: Flow Velocity Times Gutter Flowline Depth	v = V*d =	0.9	0.9	\dashv ^{'ps}
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	v∾u = R =	1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	9.7	46.8	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	v a – d =	4.36	7.68	linches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	3.22	inches
	c.town			
MINOR STORM Allowable Capacity is based on Depth Criterion	-	Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	9.7	46.8	cfs

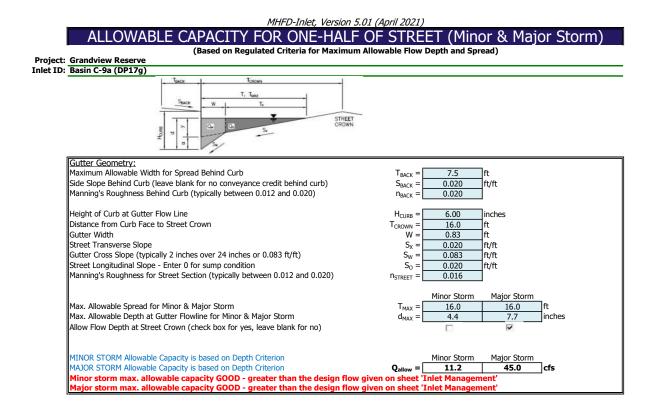


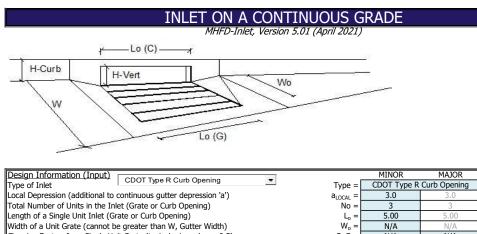
Design Information (Input)	_	MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	linches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	Ц _о = W _о =		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)	Cf-C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	Cf=C =	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	0 -			lcfs
	Q _o = T =	3.3 10.3	11.7	ft
Water Spread Width			16.0	
Water Depth at Flowline (outside of local depression)	d =	3.1	4.6	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	0.2	inches
Ratio of Gutter Flow to Design Flow	E ₀ =	0.237	0.142	- ,
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	2.5	10.1	cfs
Discharge within the Gutter Section W	Q _w =	0.8	1.7	cfs
Discharge Behind the Curb Face	$Q_{BACK} =$	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.19	0.29	sq ft
Velocity within the Gutter Section W	V _W =	4.2	5.7	fps
Water Depth for Design Condition	d _{LOCAL} =	6.1	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-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_0 - 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 Se (based on grate carry-over)	S _e =	0.106	0.072]ft/ft
Required Length L_T to Have 100% Interception	L _T =	10.30	23.52	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.30	15.00	ft
Interception Capacity	$Q_i =$	3.3	9.8	cfs
Under Clogging Condition		MINOR	MAJOR	-
Clogging Coefficient	CurbCoef =	1.31	1.31	7
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	7
Effective (Unclogged) Length	L _e =	14.34	14.34	ft
Actual Interception Capacity	$\mathbf{Q}_{a}^{-e} =$	3.3	9.7	cfs
Carry-Over Flow = $Q_{h(GRATE)}$ - Q_a	$Q_{\rm b} =$	0.0	2.0	cfs
Summary	X 0	MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	3.3	9.7	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	0.0	2.0	cfs
Capture Percentage = Q_a/Q_o =	Q₀ = C% =	100	83	%
	570 -	1VV		

ALLOWABLE CAPACITY FOR ONE-HALF O (Based on Regulated Criteria for Maximum All				
Grandview Reserve				
Basin C-8 (DP 17f)				
T. Tux Stack W Ts Stack W Ts CROWN				
Gutter Geometry:	-	7.5	10	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020	ft/ft	
	n _{BACK} =	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.022	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016	1	
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			2	
			1.000	
Maximum Capacity for 1/2 Street based On Allowable Spread	-	Minor Storm	Major Storn	
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12)) Water Depth at Gutter Flowline	a = d =	0.63	0.63	inches inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	u = T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	$\overline{Q}_{x} = $	10.8	10.8	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_{W} = $	1.9	1.9	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 =	12.7	12.7	cfs
Flow Velocity within the Gutter Section	V =	1.2	1.2	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.4	0.4	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{XTH} =$	14.7	29.4	
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	-1
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	10.0	58.3	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _X =	10.0	50.6	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	Q _w =	1.8	5.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.1	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.8	56.6	cfs
Average Flow Velocity Within the Gutter Section	V =	1.1	1.7	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.4	1.1	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm Max Flow Based on Allowable Depth (Safety Factor Applied)	R = Q d =	1.00 11.8	0.77 43.8	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	Q d =d =	4.36	6.96	linches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.49	inches
······································	CROWIN	0.00		
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	11.8	43.8	cfs



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W ₀ =		N/A	
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 = 0.3)	C _f -C =	0.10	0.10	-
Street Hydraulics: OK - Q < Allowable Street Capacity'	Cf=C =	MINOR	MAJOR	
Design Discharge for Half of Street (from <i>Inlet Management</i>)	0 -1	-	1	lcfs
	Q ₀ = T =	8.6	20.0	
Water Spread Width	, i i i i i i i i i i i i i i i i i i i	13.8	16.0	
Water Depth at Flowline (outside of local depression)	d =	3.9	5.2	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	0.7	inches
Ratio of Gutter Flow to Design Flow	E ₀ =	0.174	0.125	-
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	7.1	17.5	cfs
Discharge within the Gutter Section W	Q _w =	1.5	2.5	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.24	0.33	sq ft
Velocity within the Gutter Section W	V _w =	6.1	7.5	fps
Water Depth for Design Condition	d _{LOCAL} =	6.9	8.2	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-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	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	7
Effective (unclogged) Length of Multiple-unit Grate Inlet	L, =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	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	1
Actual Interception Capacity	Q _a =	N/A	N/A	cfs
Carry-Over Flow = Q_0 - Q_a (to be applied to curb opening or next d/s inlet)	$\mathbf{Q}_{\mathbf{b}}^{\mathbf{a}} =$	N/A	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)	E 11	MINOR	MAJOR	
Equivalent Slope S_e (based on grate carry-over)	S _e =	0.083	0.065	_ft/ft
Required Length L_T to Have 100% Interception	L _T =	19.17	32.97	ft
Under No-Clogging Condition	= - [MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L _T)	L =[15.00	15.00	Tft
Interception Capacity	Q _i =	8.0	13.3	lcfs
Under Clogging Condition	Qi - [MINOR	MAJOR	
Clogging Coefficient	CurbCoef =	1.31	1.31	7
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	-
Effective (Unclogged) Length		14.34	14.34	
Actual Interception Capacity	L _e =	<u>14.34</u> 8.0	14.54 13.1	cfs
	Q _a =	0.6	6.9	crs
Carry-Over Flow = $Q_{h/GRATE}$ - Q_a	Q _b =			us
Summary	^ 1	MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	8.0	13.1	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.6	6.9	cfs
Capture Percentage = Q_a/Q_o =	C% =	93	66	%

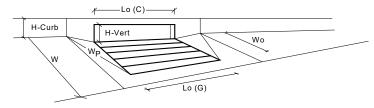




Length of a Single Unit Inlet (Grate or Curb Opening)	L _o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_{f}-G =$	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_{f}-C =$	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Street Hydraulics: OK - Q < Allowable Street Capacity' Total Inlet Interception Capacity	Q =[MINOR 6.2	MAJOR 13.1	cfs
	Q = Q _b =			cfs cfs

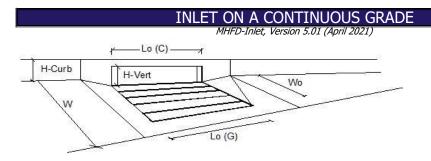
inches

(Based on Regulated Criteria for Maximum Allow Grandview Reserve Basin C-9b (DP17h)				
Teach Tcachen Seach T, Taax W Tr				
SBACK W T.				
The street crown				
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	lft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	SBACK =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1,0,10	
	La concerte La		1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	ft	
Street Transverse Slope	S _X =	0.018	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016]	
	- r	Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	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 =[3.46	3.46	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _c =	0.8	0.8	inches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.65	0.65	inches
Water Depth at Gutter Flowline	d =	4.10	4.10	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	т _х =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.151	0.151	1
Discharge outside the Gutter Section W, carried in Section T_{χ}	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	Т _{тн} = [17.2	32.6]ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	16.4	31.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.140	0.071	7
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	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 \geq 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 Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	Minor Storm SUMP	Major Storm SUMP	cfs



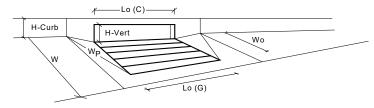
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	-
Type of Inlet	Type =		Curb Opening	4
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	4	4	_
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information	-	MINOR	MAJOR	Verride Deptr
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	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	Č _o (G) =	N/A	N/A	1
Curb Opening Information	-0(-/ [MINOR	MAJOR	_
Length of a Unit Curb Opening	$L_0(C) = $	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	$H_{vert} =$	6.00	6.00	linches
Height of Curb Orifice Throat in Inches		6.00	6.00	linches
5	H _{throat} =			_
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees feet
1 Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	reet
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	4
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)	Civia L	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	Q _{0a} – L	MINOR	MAJOR	
	о Г			7-6-
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 =	1.33	1.33	4
Clogging Factor for Multiple Units	Clog =	0.03	0.03	
Curb Opening as a Weir (based on Modified HEC22 Method)	_	MINOR	MAJOR	_
Interception without Clogging	Q _{wi} =	10.0	35.4	cfs
Interception with Clogging	Q _{wa} =	9.7	34.3	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	-
Interception without Clogging	Q _{oi} =	33.6	43.9	lcfs
Interception with Clogging	$Q_{oa} =$	32.5	42.4	cfs
Curb Opening Capacity as Mixed Flow	-cua L	MINOR	MAJOR	7
Interception without Clogging	Q _{mi} =	17.0	36.7	lcfs
Interception with Clogging		16.5	35.5	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{ma} = Q_{Curb} =	<u> </u>	35.5 34.3	cfs
	Curb -			03
Resultant Street Conditions	. г	MINOR	MAJOR	- .
Total Inlet Length	L =	20.00	20.00	feet
Resultant Street Flow Spread (based on street geometry from above)	. T=	17.2	32.6	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.3	3.6	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} =	0.29	0.57	- Ift
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	1
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.67	0.88	1
Grated Inlet Performance Reduction Factor for Long Inlets		N/A	N/A	-
Grated milet Performance Reduction Factor for Long Inlets	RF _{Grate} =	IN/A	IN/A	_
		MINOR		
		MINOR	MAJOR	- -
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	9.7	34.3	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$	5.9	29.5	cfs

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum Al				,
Grandview Reserve			-	
Basin C-7 (DP 18a)				
SBACK T, TMAX				
STREET				
S C C C C C C C C C C C C C C C C C C C				
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	lft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	SBACK =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1	
			-	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	ft	
Street Transverse Slope Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _X =	0.020	ft/ft ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	S _W = S ₀ =	0.083	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.022		
	JINEET L		-	
	_	Minor Storm	Major Storn	<u>n</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	n
Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d_c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline Allowable Spread for Discharge outside the Gutter Section W (T - W)	_d =	4.47	4.47	inches ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	T _X = E ₀ =	15.2 0.149	15.2 0.149	
Discharge outside the Gutter Section W, carried in Section T_x	$Q_X =$	10.8	10.8	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_{W} =$	1.9	1.9	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 =	12.7	12.7	cfs
Flow Velocity within the Gutter Section	V =[1.2	1.2	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.4	0.4	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	10.0	58.3	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _X =	10.0	50.6	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	Q _W =	1.8	5.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.1	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q = V =	11.8	56.6	cfs
Average Flow Velocity Within the Gutter Section V*d Product: Flow Velocity Times Gutter Flowline Depth	V = V*d =	<u>1.1</u> 0.4	1.7	fps
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	v≁a = R =	1.00	0.77	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	11.8	43.8	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	t a d =	4.36	6.96	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	2.49	inches
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Charry	Maion Charm	
		Minor Storm	Major Storn	0



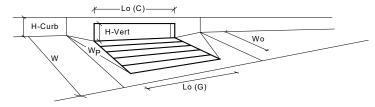
Local Depression (additional to continuous gutter depression 'a') $a_{LOCAL} =$ 3.0 3.0 inchesTotal Number of Units in the Inlet (Grate or Curb Opening)No = 3 3 3 ftLength of a Single Unit Inlet (Grate or Curb Opening)Lo = 5.00 5.00 ftWidth of a Unit Grate (cannot be greater than W, Gutter Width) $W_o =$ N/A N/A N/A Clogging Factor for a Single Unit Grate (typical min. value = 0.5) $C_{r}-C =$ 0.10 0.10 Street Hydraulics: OK - Q < Allowable Street Capacity'	
Total Number of Units in the Inlet (Grate or Curb Opening)No =33Length of a Single Unit Inlet (Grate or Curb Opening)Lo = 5.00 5.00 ftWidth of a Unit Grate (cannot be greater than W, Gutter Width)Wo = N/A N/A ftClogging Factor for a Single Unit Grate (typical min. value = 0.5) $C_{r}-G$ N/A N/A ftClogging Factor for a Single Unit Grate (typical min. value = 0.1) $C_{r}-C$ 0.10 0.10 Street Hydraulics: OK - Q < Allowable Street Capacity'Design Discharge for Half of Street (from Inlet Management) Q_o 11.3 26.3 Water Spread WidthT 15.3 16.0 ftWater Depth at Flowline (outside of local depression)d 4.3 5.7 inches	
Length of a Single Unit Inlet (Grate or Curb Opening)Lo5.005.00ftWidth of a Unit Grate (cannot be greater than W, Gutter Width)WoN/AN/AftClogging Factor for a Single Unit Grate (typical min. value = 0.5)Cr-G =N/AN/ACloqaique Factor for a Single Unit Curb Opening (typical min. value = 0.1)Cr-C =0.100.10Street Hydraulics: OK - O < Allowable Street Capacity'	
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) $C_{\Gamma}G =$ N/A N/A ft Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1) $C_{\Gamma}C =$ 0.10 0.10 Street Hydraulics: OK - O < Allowable Street Capacity'	
Clogging Factor for a Single Unit Grate (typical min. value = 0.5) $C_{\Gamma}G =$ N/A N/A Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1) $C_{\Gamma}C =$ 0.10 0.10 Street Hydraulics: OK - Q < Allowable Street Capacity'	
Cloquing Factor for a Single Unit Curb Opening (typical min. value = 0.1) $C_{\Gamma}C$ = 0.10 0.10 Street Hydraulics: OK - Q < Allowable Street Capacity' MINOR MAJOR Design Discharge for Half of Street (from Inlet Management) Q_0 = 11.3 26.3 cfs Water Spread Width T = 15.3 16.0 ft Water Depth at Flowline (outside of local depression) d = 4.3 5.7 inches	
Street Hydraulics: OK - Q < Allowable Street Capacity' MINOR MAJOR Design Discharge for Half of Street (from Inlet Management) $Q_o = 11.3$ 26.3 cfs Water Spread Width T = 15.3 16.0 ft Water Depth at Flowline (outside of local depression) d = 4.3 5.7 inches	
Design Discharge for Half of Street (from Inlet Management) $Q_o = 11.3$ 26.3cfsWater Spread WidthT = 15.316.0ftWater Depth at Flowline (outside of local depression)d = 4.35.7inches	
Water Spread WidthT =15.316.0ftWater Depth at Flowline (outside of local depression)d = 4.3 5.7 inches	
Water Depth at Flowline (outside of local depression) $d = 4.3$ 5.7	
water Depth at Street Crown (or at I_{MAX}) $d_{CROWN} = 0.0$ 1.3 inches	
Ratio of Gutter Flow to Design Flow $E_0 = 0.156 0.113$	
Discharge outside the Gutter Section W, carried in Section T_x $Q_x = 9.5$ 23.3 cfs	
Discharge within the Gutter Section W Q _w = <u>1.8</u> <u>3.0</u> cfs	
Discharge Behind the Curb Face Q _{BACK} = 0.0 0.0 cfs	
Flow Area within the Gutter Section W $A_W = 0.27 0.37$ sq ft	
Velocity within the Gutter Section W $V_W = 6.6$ 8.1 fps	
Water Depth for Design Condition d _{IOCAI} = 7.3 8.7 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-GRATE} = N/A N/A	
Under No-Clogging Condition MINOR MAJOR	
Minimum Velocity Where Grate Splash-Over Begins $V_0 = N/A N/A$ fps	
Interception Rate of Frontal Flow R _f = N/A N/A	
Interception Rate of Side Flow $P_{x} = N/A N/A$	
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 $J_{\mu} = N/A - N/A$ ft	
Linearth (integrated in the second integrated in the second integrated in the second integrated integrated integrated in the second integrated	
The rest of the second	
Interception Rate of Side Flow $R_{x} = N/A N/A$	
Interception reaction of the movement of the movement $V_{A} = \frac{1}{V/A}$ $\frac{1}{V/A}$ $\frac{1}{V/A}$ dctual Interception Capacity $Q_{a} = N/A$ N/A cfs	
Carry-Over Flow = $Q_0 - Q_0$ (to be applied to curb opening or next d/s inlet) $Q_0 = \frac{V/A}{V/A} + \frac{V/A}{V/A} + \frac{V/A}{Cfs}$	
$Carry over Flow = Q_n - [N/A] N/A Carry over a constrained of next dys finet) Q_h - [N/A] N/A Carry over Flow = Q_n - [N/A] N/A Carry over a constrained of next dys finet) N/A Carry ov$	
Under No-Clogging Condition MINOR MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T) L = 15.00 15.00 ft	
Interception Capacity $Q_i = 9.6$ 15.3 cfs	
Under Clogging Condition MINOR MAJOR	
Clogging Coefficient CurbCoef = 1.31 1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet CurbClog = 0.04 0.04	
Effective (Unclogged) Length $L_e = 14.34$ 14.34 ft	
Actual Interception Capacity $Q_a = 9.6$ 15.1cfs	
Carry-Over Flow = $Q_{h}(GRATE)$ - Q_{a} Q_{b} = 1.7 11.2 cfs	
Summary MINOR MAJOR	
Total Inlet Interception Capacity Q = 9.6 15.1 cfs	
Total Inlet Carry-Over Flow (flow bypassing inlet) Qb = 1.7 11.2 cfs	
Capture Percentage = Q_a/Q_a = C% = 85 57 %	

(Based on Regulated Criteria for Maximum All				jor Stor
Grandview Reserve			,	
Basin C-10 (DP 18b)				
TEACK TCROWN				
T, Tuux				
Stack W Ta				
STREET CROWN				
B P Q Q S CROWN				
2				
111 1 7				
Gutter Geometry:			7-	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016]	
Max. Allowable Spread for Minor & Major Storm	т _Г	Minor Storm	Major Storm	ו ft
Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	T _{MAX} = d _{MAX} =	16.0 4.4	16.0 7.7	inches
Check boxes are not applicable in SUMP conditions	u _{MAX} – [
		1.2	<i>J</i> = 1;	
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	<u>1</u>
Nater Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d _c - (W * S_x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W) Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	T _X =	15.2 0.149	15.2	ft
Discharge outside the Gutter Section W, carried in Section T_x	E ₀ = Q _X =	0.149	0.149	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_{\rm X} = Q_{\rm W} = 1$	0.0	0.0	crs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	$\mathbf{Q}_{T} =$	SUMP	SUMP	cfs
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	
	-			
Maximum Capacity for 1/2 Street based on Allowable Depth	- r	Minor Storm	Major Storm	
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)		15.6	29.4	ft ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	Т _{х тн} = Е ₀ =	14.7 0.153	28.6 0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{x TH}$	⊏ ₀ = Q _{X тн} =	0.153	0.079	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_{X TH} = Q_{X} =$	0.0	0.0	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	$Q_{\rm X} = Q_{\rm W} = 1$	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)	QBACK =	0.0	0.0	cfs
Average Flow Velocity Within the Gutter Section	v =	0.0	0.0	fps
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	<u> </u>
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	
		wunor Storm	Water Storm	1



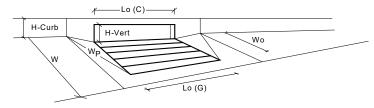
Design Information (Input)	CDOT Type R Curb Opening	-	MINOR	MAJOR	-
Type of Inlet		Type =	CDOT Type R		-
	continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate of	r Curb Opening)	No =	3	3	
Water Depth at Flowline (outs	de of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		-	MINOR	MAJOR	Verride Depths
Length of a Unit Grate		L ₀ (G) =	N/A	N/A	feet
Width of a Unit Grate		W ₀ =	N/A	N/A	feet
Area Opening Ratio for a Grat	e (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	1
	rate (typical value 0.50 - 0.70)	$C_f(G) =$	N/A	N/A	-
Grate Weir Coefficient (typical		$C_{w}(G) = C_{w}(G) = C_{w}(G)$	N/A	N/A	-
Grate Orifice Coefficient (typical		$C_{0}(G) = C_{0}(G) $	N/A N/A	N/A N/A	4
		C ₀ (G) = [,	_
Curb Opening Information			MINOR	MAJOR	76
Length of a Unit Curb Opening		$L_{o}(C) =$	5.00	5.00	feet
Height of Vertical Curb Openir		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat		H _{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM F		Theta =	63.40	63.40	degrees
	(typically the gutter width of 2 feet)	$W_p =$	2.00	2.00	feet
Clogging Factor for a Single C	urb 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	1
Curb Opening Orifice Coefficie		$C_{o}(C) =$	0.67	0.67	1
Grate Flow Analysis (Calcula			MINOR	MAJOR	•
Clogging Coefficient for Multip		Coef =	N/A	N/A	٦
Clogging Factor for Multiple U		Clog =	N/A N/A	N/A N/A	4
		clog = [
	ased on Modified HEC22 Method)	- T	MINOR	MAJOR	٦.
Interception without Clogging		Q _{wi} =	N/A	N/A	cfs
Interception with Clogging		Q _{wa} =	N/A	N/A	cfs
	(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 Flo	w	coa L	MINOR	MAJOR	_
Interception without Clogging	<u> </u>	Q _{mi} =	N/A	N/A	lcfs
Interception with Clogging		$Q_{ma} = $	N/A	N/A	cfs
		$Q_{ma} =$ $Q_{Grate} =$	N/A N/A	N/A N/A	cfs
Resulting Grate Capacity (assu Curb Opening Flow Analysis		CGrate -	MINOR	MAJOR	
		с f. Г	-		7
Clogging Coefficient for Multip		Coef =	1.31	1.31	-
Clogging Factor for Multiple U		Clog =	0.04	0.04	
	sed on Modified HEC22 Method)	-	MINOR	MAJOR	-
Interception without Clogging		Q _{wi} =	7.5	26.6	cfs
Interception with Clogging		Q _{wa} =	7.2	25.4	cfs
Curb Opening as an Orifice	(based on Modified HEC22 Method)		MINOR	MAJOR	-
Interception without Clogging	·*	$Q_{oi} = [$	25.2	32.9	cfs
Interception with Clogging		Q _{oa} =	24.1	31.5	cfs
Curb Opening Capacity as N	lived Flow	-coa — L	MINOR	MAJOR	→
Interception without Clogging		Q _{mi} =	12.8	27.5	lcfs
					lcfs
Interception with Clogging	the foregoing a second se		12.2 7.2	26.3 25.4	
	ity (assumes clogged condition)	Q _{Curb} =			us
Resultant Street Conditions			MINOR	MAJOR	7
Total Inlet Length		L = [15.00	15.00	feet
	based on street geometry from above)	T =	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Stree	: Crown	d _{CROWN} =	0.0	3.2	inches
		_			
Low Head Performance Rec	uction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	· -	d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir	Equation	d _{Curb} =	0.29	0.57	ft
	e Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	417
	duction Factor for Long Inlets		0.41	0.72	4
		RF _{Curb} =			4
Grated Inlet Performance Red	uction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	1
		-	MINOR	MAJOR	-
Total Inlet Interception Capac	ty (assumes clogged condition)	Q _a =	7.2	25.4	cfs
	• Minor and Major Storms(>Q PEAK)	Q PEAK REQUIRED =	6.9	23.4	cfs

(Based on Regulated Criteria for Maximum All				jor Stor
Grandview Reserve			,	
Basin C-11 (DP 19)				
- TRACK - TCROWN -				
T, Twax				
SBACK W T.				
STREET CROWN				
B D CROWN				
2 1 1 2 -				
114 12				
Gutter Geometry:			1.	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020]	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016]	
Max. Allowable Spread for Minor & Major Storm	т "Г	Minor Storm 16.0	Major Storm 16.0	1 Ift
Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	T _{MAX} = d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions	u _{MAX} – [
		6	,	
Maximum Capacity for 1/2 Street based On Allowable Spread	-	Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
/ertical 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
Nater Depth at Gutter Flowline Allowable Spread for Discharge outside the Gutter Section W (T - W)	d =	5.35	5.35	inches ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	T _X = E ₀ =	<u>14.0</u> 0.372	14.0 0.372	
Discharge outside the Gutter Section W, carried in Section T_x	$Q_X =$	0.0	0.372	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_W = $	0.0	0.0	
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
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =[0.0	0.0	
Maximum Canacity for 1/2 Streat bacad on Allowable Death		Minor Cham	Mair: Ch-	
Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Water Spread	т _{тн} =[Minor Storm 11.9	Major Storm 25.7	1 Ift
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{XTH} = T_{TH}$	9.9	23.7	
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.497	0.228	\dashv
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	0.0	0.220	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 ($Q_d - Q_X$)	$\vec{Q}_{W} = \vec{Q}_{W}$	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
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	h
anon or or an microable capacity is based on Depth Chterion	_	CHILDE STOLLE	major storn	



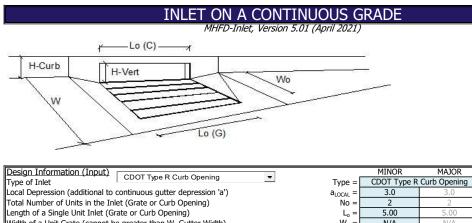
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	1
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	linches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		MINOR	MAJOR	Verride Depths
Length of a Unit Grate	L ₀ (G) =	N/A	N/A	lfeet
Width of a Unit Grate	W ₀ =	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 ₀ (G) =	N/A	N/A	4
Curb Opening Information		MINOR	MAJOR	4
Length of a Unit Curb Opening	$L_0(C) = $	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	linches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	linches
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	1
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_{0}(C) = $	0.67	0.67	1
Grate Flow Analysis (Calculated)	/	MINOR	MAJOR	•
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	7
Clogging Factor for Multiple Units	Clog =	N/A	N/A	1
Grate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	4
Interception without Clogging	Q _{wi} =	N/A	N/A	lcfs
Interception with Clogging	Q _{wa} =	N/A	N/A	cfs
Grate Capacity as a Orifice (based on Modified HEC22 Method)	Civia L	MINOR	MAJOR	
Interception without Clogging	$Q_{0i} = [$	N/A	N/A	cfs
Interception with Clogging	$Q_{oa} =$	N/A	N/A	cfs
Grate Capacity as Mixed Flow	coa L	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	7
Clogging Factor for Multiple Units	Clog =	0.10	0.10	1
Curb Opening as a Weir (based on Modified HEC22 Method)	-	MINOR	MAJOR	-
Interception without Clogging	Q _{wi} =	2.7	10.1	cfs
Interception with Clogging	Q _{wa} =	2.4	9.1	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)	-	MINOR	MAJOR	-
Interception without Clogging	Q _{oi} =	8.4	11.0	cfs
Interception with Clogging	Q _{oa} =	7.6	9.9	cfs
Curb Opening Capacity as Mixed Flow	_	MINOR	MAJOR	_
Interception without Clogging	Q _{mi} =	4.4	9.8	cfs
Interception with Clogging	Q _{ma} =	4.0	8.8	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{Curb} =	2.4	8.8	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)	Т = [11.9	25.7	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	2.3	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} =	0.20	0.47	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.56	0.98	
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 =	2.4	8.8	cfs
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$	1.0	2.3	cfs

(Based on Regulated Criteria for Maximum All				jor Stor
Grandview Reserve	omable rion	bepen and opi	cuu)	
Basin C-12 (DP 20)				
TEACK - TCHOWN -				
SBACK W I To				
STREET CROWN				
The second secon				
Gutter Geometry:			_	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 Manning's Roughness for Street Section (typically between 0.012 and 0.020)	S ₀ =	0.000 0.016	ft/ft	
naming 5 reaginess for Successed on (typically between 0.012 and 0.020)	n _{street} =	0.010	1	
		Minor Storm	Major Storm	<u>1</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	1
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12)) Water Depth at Gutter Flowline	a = d =	0.63 4.47	0.63	inches inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	т _х =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_{χ}	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) Maximum Flow Based On Allowable Spread	Q _{BACK} =	0.0	0.0	cfs cfs
Flow Velocity within the Gutter Section	Q _T = V =	SUMP 0.0	SUMP 0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	v = V*d =	0.0	0.0	
	Ľ			
Maximum Capacity for 1/2 Street based on Allowable Depth	- r	Minor Storm	Major Storm	ı Tft
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = Т _{х тн} =	15.6 14.7	29.4 28.6	-ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 =$	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	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*d Product: Flow Velocity Times Gutter Flowline Depth	V = V*d =	0.0	0.0	fps
V [*] d Product: Flow Velocity Times Gutter Flowline Depth Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	v≁a = R =	SUMP	SUMP	-
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)			1	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =			inches
MINOR STORM Allowable Canacity is based on Donth Criterion		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	1



.90) - 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method)	$Type = \\ a_{icci} = \\ No = \\ No = \\ Ponding Depth = \\ C_{0} (G) = \\ C_{r} (C) = \\ C_$	3.00 1 4.4 MINOR N/A N/A N/A N/A N/A N/A MINOR S.00 6.00 7.00 0.10 3.60 0.67 MINOR N/A	Curb Opening 3.00 1 7.7 MAJOR N/A N/A N/A N/A N/A N/A MAJOR 0.10 3.60 0.67 MAJOR N/A N/A MAJOR N/A N/A MAJOR N/A N/A N/A N/A N/A N/A N/A N/A	inches inches ✓ Override Depth: feet feet inches inches degrees feet cfs cfs cfs cfs cfs cfs cfs
90) - 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{aligned} \text{No} &= \\ \text{Ponding Depth} &= \\ \\ \text{L}_{o} (\text{G}) &= \\ \\ \text{W}_{o} &= \\ \\ \text{A}_{ratio} &= \\ \\ \text{C}_{r} (\text{G}) &= \\ \\ \text{C}_{w} (\text{G}) &= \\ \\ \text{C}_{w} (\text{G}) &= \\ \\ \text{C}_{w} (\text{G}) &= \\ \\ \text{H}_{vert} &= \\ \\ \text{H}_{trroat} &= \\ \\ \text{H}_{trroat} &= \\ \\ \text{H}_{trroat} &= \\ \\ \text{H}_{trroat} &= \\ \\ \text{H}_{wro} &= \\ \\ \text{C}_{w} (\text{C}) &= \\ \\ \text{C}_{w} (\text{C}) &= \\ \\ \text{C}_{w} (\text{C}) &= \\ \\ \text{Coef} &= \\ \\ \text{Clog} &= \\ \\ \\ \text{Coef} &= \\ \\ \\ \text{Q}_{wi} &= \\ \\ \\ \\ \text{Q}_{wi} &= \\ \\ \\ \\ \\ \\ \text{Q}_{oi} &= \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	1 4.4 MINOR N/A N/A N/A N/A N/A MINOR 5.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00	1 7.7 MAJOR N/A N/A N/A N/A N/A N/A MAJOR 0.00 6.00 6.00 6.00 6.00 6.00 6.00 6.0	inches ✓ Override Depth: feet feet inches inches degrees feet cfs cfs cfs cfs cfs cfs cfs
1.90) - 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{l} \mbox{Ponding Depth} = \left[\begin{array}{c} L_{o} \left(G \right) = \\ W_{o} = \\ A_{ratio} = \\ C_{r} \left(G \right) = \\ C_{w} \left(G \right) = \\ C_{o} \left(G \right) = \\ C_{o} \left(G \right) = \\ C_{o} \left(G \right) = \\ H_{vert} = \\ H_{vert} = \\ H_{vora} = \\ C_{r} \left(C \right) = \\ C_{v} \left(C \right) = \\ C_{v} \left(C \right) = \\ C_{o} \left(C \right) = \\ C$	4.4 MINOR N/A N/A N/A N/A N/A MINOR 5.00 6.00 7.00 8.00 0.10 7.00 8.00 7.00	MAJOR N/A N/A N/A N/A N/A N/A MAJOR 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A N/A N/A N/A	Override Depth: feet feet inches inches degrees feet Cfs cfs cfs cfs
1.90) - 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$ \begin{array}{c} L_{o}\left(G\right) = \\ W_{o} = \\ W_{o} = \\ C_{r}\left(G\right) = \\ C_{v}\left(G\right) = \\ C_{o}\left(G\right) = \\ C_{o}\left(G\right) = \\ L_{o}\left(C\right) = \\ H_{vert} = \\ H_{throat} = \\ W_{o} = \\ C_{r}\left(C\right) = \\ C_{o}\left(C\right) = \\ $	MINOR N/A N/A N/A N/A N/A N/A N/A MINOR 5.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00	MAJOR N/A N/A N/A N/A N/A N/A MAJOR 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A N/A N/A N/A	Override Depth: feet feet inches inches degrees feet Cfs cfs cfs cfs
- 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{split} W_{o} &= \\ A_{ratio} &= \\ C_{f} & (G) &= \\ C_{w} & (G) &= \\ C_{o} & (G) &= \\ C_{o} & (G) &= \\ H_{vert} &= \\ H_{troat} &= \\ H_{troat} &= \\ H_{troat} &= \\ C_{f} & (C) &= \\ C_{w} & (C) &= \\ C_{w} & (C) &= \\ C_{o} & (C) &= \\ C_$	N/A N/A N/A N/A N/A N/A N/A S.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00	N/A N/A N/A N/A N/A N/A N/A MAJOR N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	feet feet inches inches degrees feet cfs cfs cfs cfs
- 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{split} W_{o} &= \\ A_{ratio} &= \\ C_{f} & (G) &= \\ C_{w} & (G) &= \\ C_{o} & (G) &= \\ C_{o} & (G) &= \\ H_{vert} &= \\ H_{troat} &= \\ H_{troat} &= \\ H_{troat} &= \\ C_{f} & (C) &= \\ C_{w} & (C) &= \\ C_{w} & (C) &= \\ C_{o} & (C) &= \\ C_$	N/A N/A N/A N/A N/A N/A MINOR 5.00 6.00 6.00 6.00 6.00 6.00 6.00 6.00	N/A N/A N/A N/A N/A MAJOR 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6.3.40 2.00 0.10 3.60 0.67 MAJOR N/A N/A MAJOR N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	feet inches inches degrees feet cfs cfs cfs cfs cfs
- 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} A_{ratio} = \\ C_r\left(G\right) = \\ C_w\left(G\right) = \\ C_o\left(G\right) = \\ C_o\left(G\right) = \\ L_0\left(C\right) = \\ H_{vet} = \\ H_{vet} = \\ H_{vere} = \\ H_{vere} = \\ C_{v}\left(C\right) = \\ C_{v}\left(C\right) = \\ C_{v}\left(C\right) = \\ C_{o}\left(C\right) = \\ Coef = \\ Clog = \\ Clog = \\ Q_{wa} = \\ Q_{wa} = \\ Q_{oa} = \\ Q_{oa} = \\ Q_{oa} = \\ Q_{mi} = \\ Q_{$	N/A N/A N/A N/A MINOR 5.00 6.00 6.00 6.00 6.3.40 2.00 0.10 3.60 0.67 MINOR N/A N/A N/A N/A N/A N/A N/A MINOR N/A N/A	N/A N/A N/A N/A MAJOR 5.00 6.00 6.00 6.00 63.40 2.00 0.10 3.60 0.67 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	feet inches inches degrees feet cfs cfs cfs cfs cfs
- 0.70) idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} C_{r}\left(G\right) = \\ C_{w}\left(G\right) = \\ C_{o}\left(G\right) = \\ C_{o}\left(G\right) = \\ H_{vert} = \\ H_{throat} = \\ Theta = \\ C_{v}\left(C\right) = \\ C_{v}\left(C\right) = \\ C_{o}\left(C\right) = \\ C_{o}\left$	N/A N/A N/A MINOR 5.00 6.00 6.00 6.00 6.00 0.63.40 2.00 0.10 3.60 0.67 MINOR N/A N/A N/A N/A N/A N/A N/A N/A N/A	N/A N/A N/A MAJOR 5.00 6.00 6.00 63.40 2.00 0.10 0.67 MAJOR N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
idth of 2 feet) lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} C_{r}\left(G\right) = \\ C_{w}\left(G\right) = \\ C_{o}\left(G\right) = \\ C_{o}\left(G\right) = \\ H_{vert} = \\ H_{throat} = \\ Theta = \\ C_{v}\left(C\right) = \\ C_{v}\left(C\right) = \\ C_{o}\left(C\right) = \\ C_{o}\left$	N/A N/A N/A MINOR 5.00 6.00 6.00 6.00 0.10 3.60 0.67 MINOR N/A N/A N/A N/A MINOR N/A MINOR N/A MINOR N/A N/A	N/A N/A MAJOR 5.00 6.00 6.00 63.40 2.00 0.10 3.60 0.67 MAJOR N/A N/A MAJOR N/A N/A N/A N/A N/A N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} C_{o} \left(G \right) = \left[\begin{array}{c} L_{o} \left(C \right) = \\ H_{vert} = \\ H_{trrot} = \\ H_{ttrot} = \\ Theta = \\ W_{o} = \\ C_{v} \left(C \right) = \\ C_{w} \left(C \right) = \\ C_{w} \left(C \right) = \\ C_{o} \left(C \right) = \\ \end{array} \right] \end{array}$	N/A MINOR 5.00 6.00 63.40 2.00 0.10 3.60 0.67 MINOR N/A N/A N/A N/A N/A MINOR N/A N/A N/A N/A N/A N/A N/A	N/A MAJOR 5.00 6.00 6.00 63.40 2.00 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A N/A N/A N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} C_{o} \left(G \right) = \left[\begin{array}{c} L_{o} \left(C \right) = \\ H_{vert} = \\ H_{trrot} = \\ H_{ttrot} = \\ Theta = \\ W_{o} = \\ C_{v} \left(C \right) = \\ C_{w} \left(C \right) = \\ C_{w} \left(C \right) = \\ C_{o} \left(C \right) = \\ \end{array} \right] \end{array}$	N/A MINOR 5.00 6.00 63.40 2.00 0.10 3.60 0.67 MINOR N/A N/A N/A N/A N/A MINOR N/A N/A N/A N/A N/A N/A N/A	N/A MAJOR 5.00 6.00 6.00 63.40 2.00 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A N/A N/A N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} L_{o}\left(C\right) = \\ H_{vert} = \\ H_{troot} = \\ Theta = \\ W_{p} = \\ C_{f}\left(C\right) = \\ C_{w}\left(C\right) = \\ C_{w}\left(C\right) = \\ C_{o}\left(C\right) = \\ Coef = \\ Clog = \\ Q_{wi} = \\ Q_{wi} = \\ Q_{wi} = \\ Q_{oi} = \\ Q_{oi} = \\ Q_{oi} = \\ Q_{mi} = \\ \end{array}$	MINOR 5.00 6.00 6.00 0.10 3.60 0.67 MINOR N/A N/A MINOR N/A N/A MINOR N/A MINOR N/A MINOR N/A MINOR N/A	MAJOR 5.00 6.00 6.00 6.01 0.02 0.10 3.60 0.67 MAJOR N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{aligned} H_{vert} &= \\ H_{troat} &= \\ H_{troat} &= \\ Theta &= \\ W_0 &= \\ C_r & (C) &= \\ C_w & (C) &= \\ C_w & (C) &= \\ C_0 & (C) &= \\ Cos &= \\ Q_{vta} &= \\ Q_{vta} &= \\ Q_{ot} &= \\$	5.00 6.00 63.40 2.00 0.10 3.60 0.67 MINOR N/A N/A MINOR N/A N/A MINOR N/A MINOR N/A	5.00 6.00 6.00 63.40 2.00 0.10 3.60 0.67 MAJOR N/A N/A MAJOR N/A N/A MAJOR N/A N/A N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{aligned} H_{vert} &= \\ H_{troat} &= \\ H_{troat} &= \\ Theta &= \\ W_0 &= \\ C_r & (C) &= \\ C_w & (C) &= \\ C_w & (C) &= \\ C_0 & (C) &= \\ Cos &= \\ Q_{vta} &= \\ Q_{vta} &= \\ Q_{ot} &= \\$	6.00 6.00 6.3.40 2.00 0.10 3.60 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	6.00 6.00 63.40 2.00 0.10 3.60 0.67 MAJOR N/A N/A MAJOR N/A N/A N/A N/A N/A N/A	inches inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{l} H_{throat} = \\ Theta = \\ W_{p} = \\ C_{q} \left(C\right) = \\ C_{w} \left(C\right) = \\ C_{w} \left(C\right) = \\ Cog = \\ Clog = \\ Qog = \\ Qwi = \\ Qwi = \\ Qog = \\ Q$	6.00 63.40 2.00 0.10 3.60 0.67 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	6.00 63.40 2.00 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A N/A N/A N/A N/A	inches degrees feet cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$Theta = \\ W_o = \\ C_f (C) = \\ C_w (C) = \\ C_o (C) = \\ Coef = \\ Clog = \\ Q_{wa} = \\ Q_{wa} = \\ Q_{ca} = \\ Q_{ca} = \\ Q_{cn} = \\ Q_{mi} = \\ Q_{$	63.40 2.00 0.10 3.60 0.67 MINOR N/A MINOR N/A MINOR N/A MINOR N/A MINOR N/A	63.40 2.00 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A N/A N/A N/A N/A	degrees feet cfs cfs cfs cfs cfs cfs cfs
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{split} W_{p} &= \\ C_{f}\left(C\right) &= \\ C_{w}\left(C\right) &= \\ C_{o}\left(C\right) &= \\ C_{o}\left(C\right) &= \\ Coef &= \\ Clog &= \\ Q_{wi} &= \\ Q_{wa} &= \\ Q_{wa} &= \\ Q_{oi} &= \\ Q_{oa} &= \\ Q_{oi} &= \\ Q_{oa} &= \\ Q_{mi} &= \\ \\ Q_{mi} &= \\ \\ Q_{mi} &= \\$	2.00 0.10 3.60 0.67 N/A N/A N/A MINOR N/A MINOR N/A MINOR N/A	2.00 0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A	freet cris cris cris cris cris cris
lue 0.10) 0.70) C22 Method) IEC22 Method)	$\begin{array}{c} C_{f}\left(C\right) =\\ C_{w}\left(C\right) =\\ C_{o}\left(C\right) =\end{array} \end{array}$ $\begin{array}{c} Coef =\\ Clog =\\ Q_{wi} =\\ Q_{wa} =\\ Q_{oa} =\\ Q_{oa} =\\ Q_{oa} =\\ Q_{mi} =\end{array}$	0.10 3.60 0.67 MINOR N/A MINOR N/A MINOR N/A MINOR N/A	0.10 3.60 0.67 MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A	cfs cfs cfs cfs cfs cfs
0.70) C22 Method) IEC22 Method)	$\begin{array}{c} C_{w}\left(C\right)=\\ C_{o}\left(C\right)=\\ \end{array}\\ \begin{array}{c} Coef=\\ Clog=\\ \\ Q_{wi}=\\ \\ Q_{wa}=\\ \\ Q_{oi}=\\ \\ Q_{oa}=\\ \\ Q_{mi}=\\ \end{array}$	3.60 0.67 N/A N/A MINOR N/A MINOR N/A MINOR N/A MINOR N/A	3.60 0.67 N/A N/A MAJOR N/A MAJOR N/A N/A N/A N/A N/A	_cfs _cfs _cfs _cfs
0.70) C22 Method) IEC22 Method)	$C_{o}(C) = \begin{bmatrix} \\ Coef \\ Clog \\ \end{bmatrix} = \begin{bmatrix} \\ Q_{wi} \\ Q_{wa} \\ \end{bmatrix} = \begin{bmatrix} \\ Q_{ci} \\ Q_{co} \\ \end{bmatrix}$ $Q_{ci} = \begin{bmatrix} \\ Q_{co} \\ \end{bmatrix}$ $Q_{mi} = \begin{bmatrix} \\ \end{bmatrix}$	0.67 MINOR N/A MINOR N/A MINOR N/A MINOR N/A MINOR N/A	0.67 MAJOR N/A N/A MAJOR N/A MAJOR N/A MAJOR N/A MAJOR N/A	_cfs _cfs _cfs _cfs
C22 Method) IEC22 Method)	$Coef = \\Clog = \begin{bmatrix} \\ Q_{wi} \\ Q_{wa} \end{bmatrix} = \begin{bmatrix} \\ Q_{wa} \\ Q_{oi} \end{bmatrix} = \begin{bmatrix} \\ Q_{oi} \\ Q_{oi} \end{bmatrix} = \begin{bmatrix} \\ Q_{$	MINOR N/A N/A MINOR N/A MINOR N/A MINOR N/A	MAJOR N/A N/A N/A N/A MAJOR N/A N/A MAJOR N/A	_cfs _cfs _cfs _cfs
IEC22 Method)	$Clog = \begin{bmatrix} Q_{wi} \\ Q_{wa} \end{bmatrix} = \begin{bmatrix} Q_{oi} \\ Q_{oa} \end{bmatrix} = \begin{bmatrix} Q_{oa} \\ Q_{oa} \end{bmatrix} = \begin{bmatrix} Q_{oa} \end{bmatrix}$	N/A N/A MINOR N/A MINOR N/A N/A MINOR N/A	N/A N/A MAJOR N/A MAJOR N/A N/A MAJOR N/A	_cfs _cfs _cfs _cfs
IEC22 Method)	$Clog = \begin{bmatrix} Q_{wi} \\ Q_{wa} \end{bmatrix} = \begin{bmatrix} Q_{oi} \\ Q_{oa} \end{bmatrix} = \begin{bmatrix} Q_{oa} \\ Q_{oa} \end{bmatrix} = \begin{bmatrix} Q_{oa} \end{bmatrix}$	N/A MINOR N/A N/A MINOR N/A MINOR N/A	N/A MAJOR N/A N/A MAJOR N/A MAJOR N/A	_cfs _cfs _cfs _cfs
IEC22 Method)	$\begin{array}{l} Q_{wi} = \\ Q_{wa} = \\ Q_{oi} = \\ Q_{oa} = \\ Q_{mi} = \end{array}$	MINOR N/A N/A MINOR N/A MINOR N/A	MAJOR N/A N/A MAJOR N/A N/A MAJOR N/A	_cfs _cfs _cfs _cfs
IEC22 Method)	$\begin{array}{l} Q_{wi} = \\ Q_{wa} = \\ Q_{oi} = \\ Q_{oa} = \\ Q_{mi} = \end{array}$	MINOR N/A N/A MINOR N/A MINOR N/A	MAJOR N/A N/A MAJOR N/A N/A MAJOR N/A	_cfs _cfs _cfs _cfs
·	$Q_{wa} = \begin{bmatrix} \\ Q_{ol} = \\ Q_{oa} = \end{bmatrix}$ $Q_{mi} = \begin{bmatrix} \\ \end{bmatrix}$	N/A MINOR N/A N/A MINOR N/A	N/A MAJOR N/A N/A MAJOR N/A	_cfs _cfs _cfs _cfs
·	$Q_{wa} = \begin{bmatrix} \\ Q_{ol} = \\ Q_{oa} = \end{bmatrix}$ $Q_{mi} = \begin{bmatrix} \\ \end{bmatrix}$	N/A MINOR N/A N/A MINOR N/A	N/A MAJOR N/A N/A MAJOR N/A	_cfs _cfs _cfs _cfs
·	Q _{oi} = [Q _{oa} = [Q _{mi} = [MINOR N/A N/A MINOR N/A	MAJOR N/A N/A MAJOR N/A	cfs cfs cfs
·	$Q_{oa} = [$ $Q_{mi} = [$	N/A N/A MINOR N/A	N/A N/A MAJOR N/A	cfs cfs
	$Q_{oa} = [$ $Q_{mi} = [$	N/A MINOR N/A	N/A MAJOR N/A	cfs cfs
	Q _{mi} =	MINOR N/A	MAJOR N/A	cfs
	Q _{mi} = Q _{ma} =	N/A	N/A	
	Q _{mi} = Q _{ma} =			
	Q _{ma} = [
	_ [™] _ ⊢	N/A	N/A	cfs
)	Q _{Grate} =	N/A	N/A	cfs
	r	MINOR	MAJOR	-
	Coef =	1.00	1.00	
	Clog =	0.10	0.10	
22 Method)	-	MINOR	MAJOR	_
	Q _{wi} =	3.7	10.1	cfs
	Q _{wa} =	3.4	9.1	cfs
HEC22 Method)		MINOR	MAJOR	_
<u>.</u>	Q _{oi} =	8.4	11.0	cfs
	Q _{oa} =	7.6	9.9	cfs
	-coa -	MINOR	MAJOR	
	Q _{mi} =	5.2	9.8	lcfs
	Q _{mi} = Q _{ma} =	4.7	8.8	
ondition)	Q _{ma} = Q _{Curb} =	3.4	8.8	
onuid0H)	Curb -			
	. г	MINOR	MAJOR	
	L =	5.00	5.00	feet
etry from above)	T =	15.6	29.4	ft.>T-Crown
	d _{CROWN} =	0.0	3.2	inches
	-	MINOR	MAJOR	_
	d _{Grate} =	N/A	N/A	ft
	d _{Curb} =	0.29	0.57	ft
		0.56	0.98	7
Long Inlets				1
				-
g Inlets				
g Inlets	KF _{Grate} =			
g Inlets	Kr _{Grate} = [MINOP	MAIOD	
g Inlets	RF _{Grate} = [Q _a = [MINOR 3.4	MAJOR 8.8	cfs
	Long Inlets Ig Inlets	d _{Curb} = Long Inlets RF _{Combination} =	$d_{Curb} = \frac{0.29}{0.29}$ Long Inlets RF _{Combination} = 0.56 in Inlets RF _{Curb} = 1.00	$d_{Curb} = \frac{0.29 0.57}{0.29 0.56}$ $g \text{ Inlets} \qquad RF_{Curb} = \frac{0.56 0.98}{1.00 1.00}$ $RF_{Grate} = \frac{N/A N/A}{0.000}$

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				
Grandview Reserve		bepen and opi	cuuj	
Basin D-1 (DP 22)				
TBACK - TCROWN -				
Stuck W I Tr				
STREET CROWN				
Berg P				
Cuttor Coorectory				
Gutter Geometry: Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	Tft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020		
			-	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	ft	
Street Transverse Slope Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _X =	0.020	ft/ft	
Sutter Cross Slope (typically 2 incres over 24 incres or 0.083 ft/ft) Street Longitudinal Slope - Enter 0 for sump condition	S _W = S ₀ =	0.083	ft/ft ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.010		
	SINCEI		-	
	-	Minor Storm	Major Storn	<u>n</u>
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	n
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression ($d_c - (W * S_x * 12)$)	a =	0.63	0.63	inches
Water Depth at Gutter Flowline Allowable Spread for Discharge outside the Gutter Section W (T - W)	d = T _x =	4.47	4.47	inches ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$I_X = E_0 = I$	<u>15.2</u> 0.149	15.2 0.149	
Discharge outside the Gutter Section W, carried in Section T_X	$Q_X =$	7.3	7.3	dcfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_w = 1$	1.3	1.3	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 =	8.5	8.5	cfs
Flow Velocity within the Gutter Section	V =	0.8	0.8	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.3	0.3	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{х тн} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\text{TH}}$	Q _{х тн} =	6.7	39.3	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _X =	6.7	34.1	cfs
Discharge within the Gutter Section W ($Q_d - Q_X$)	Q _w =	1.2	3.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	$Q_{BACK} =$	0.0	0.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q = V =	7.9	38.2	cfs
Average Flow Velocity Within the Gutter Section V*d Product: Flow Velocity Times Gutter Flowline Depth	V = V*d =	0.8	0.7	fps
Slope-Based Depth Safety Reduction Factor for Major & Minor (d > 6") Storm	v∾u = R =	1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} =$	7.9	38.2	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.36	7.68	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	3.22	inches
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} = [Minor Storm 7.9	Major Storn 38.2	n cfs

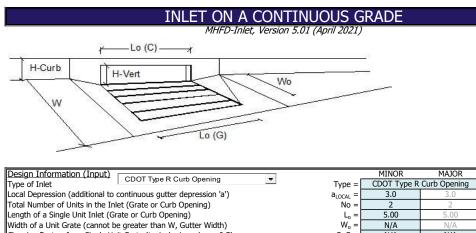


Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	N/A	N/A	ft	
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C _f -G =	N/A	N/A		
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C _f -C =	0.10	0.10		
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR		
Total Inlet Interception Capacity	Q =	4.2	6.9	cfs	
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b =	0.4	4.0	cfs	
Capture Perceptage = Ω_{-}/Ω_{-} =	C% -	92	64	0 %	

inches

ft

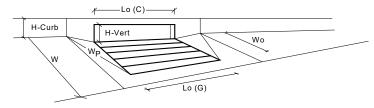
ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum Al				.joi-3001
Grandview Reserve		bepen and op	leady	
Basin D-2 (DP 23)				
- TBACK TCROWN				
T, Taxx				
SBACK W T,				
STREET CROWN				
*				
111 19				
Gutter Geometry:			-	
Naximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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 Cutter Flow Line	ц _Г	6.00	Tinchoc	
Height of Curb at Gutter Flow Line Distance from Curb Face to Street Crown	H _{CURB} =	<u>6.00</u> 16.0	inches ft	
Sutter Width	T _{CROWN} = W =	0.83	ft	
Street Transverse Slope	$VV = S_x = I$	0.83	ft/ft	
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _W =	0.020	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	S ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.010		
			-	
		Minor Storm	Major Storn	n
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)			-	
Maximum Canacity for 1/2 Street based On Allowable Spread		Minor Charm	Majar Charm	~
Maximum Capacity for 1/2 Street based On Allowable Spread Nater Depth without Gutter Depression (Eq. ST-2)	v =[Minor Storm 3.84	Major Storn 3.84	n linches
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y = d _C =	0.8	0.8	inches
Sutter Depression (d _c - (W * S _x * 12))	a =	0.63	0.63	inches
Nater Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	т _х =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	-
Discharge outside the Gutter Section W, carried in Section T_{χ}	Q _x =	7.3	7.3	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	Q _W =	1.3	1.3	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 =	8.5	8.5	cfs
low Velocity within the Gutter Section	V =	0.8	0.8	fps
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.3	0.3	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	Т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	т _{х тн} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	-17
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	6.7	39.3	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T _{CROWN})	Q _x =	6.7	34.1	cfs
Discharge within the Gutter Section W ($Q_d - Q_x$)	$Q_W =$	1.2	3.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	7.9	38.2	cfs
Average Flow Velocity Within the Gutter Section	V =	0.8	1.2	fps
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.3	0.7	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm	R =	1.00	1.00	<u> </u>
Max Flow Based on Allowable Depth (Safety Factor Applied)	$Q_d =$	7.9	38.2	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.36	7.68	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	$d_{CROWN} = L$	0.00	3.22	inches
INOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	n
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	7.9	38.2	cfs



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	
	Q =[MINOR 1.7	MAJOR 3.8	cfs
Street Hydraulics: OK - Q < Allowable Street Capacity'	Q = [Q _b =	-		cfs cfs

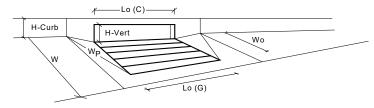
inches

(Based on Regulated Criteria for Maximum All				ijor Stor
Grandview Reserve	owable now	Depth and Spi	cauj	
Basin D-3 (DP 24)				
Teacer Succe W Te				
Gutter Geometry:		7.5	10	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb) Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Benning Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{street} =	0.016		
		Minor Chain	Mair: Chi	
Max Allowable Spread for Minor & Major Storm	т_Г	Minor Storm	Major Storn	n ft
Max. Allowable Spread for Minor & Major Storm Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	T _{MAX} =	<u>16.0</u> 4.4	16.0 7.7	inches
	d _{MAX} =			Inches
Check boxes are not applicable in SUMP conditions				
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storn	n
Water Depth without Gutter Depression (Eq. ST-2)	y = [3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _c =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _X =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_{χ}	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
/*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 Storn	n
Theoretical Water Spread	т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	т _{х тн} =	14.7	28.6	
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{х тн} =	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 \geq 6") Storm	R =	SUMP	SUMP	-1
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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	n



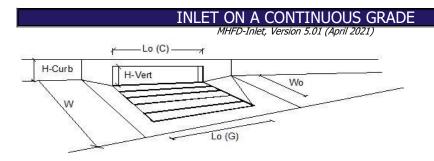
Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R		4
	o continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate of		No =	3	3	
Water Depth at Flowline (outs	ide of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		_	MINOR	MAJOR	Verride Depths
Length of a Unit Grate		$L_{0}(G) =$	N/A	N/A	feet
Width of a Unit Grate		W ₀ =	N/A	N/A	feet
Area Opening Ratio for a Grate	e (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	1
	rate (typical value 0.50 - 0.70)	$C_{f}(G) =$	N/A	N/A	-
Grate Weir Coefficient (typical		$C_{w}(G) =$	N/A	N/A	-
Grate Orifice Coefficient (typic		$C_{0}(G) = C_{0}(G) = C_{0}(G)$	N/A	N/A	-
Curb Opening Information		C ₀ (O) = [MINOR	MAJOR	
Length of a Unit Curb Opening		L (C) - [5.00	5.00	feet
		$L_{o}(C) =$			
Height of Vertical Curb Openin		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat i		H _{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM F		Theta =	63.40	63.40	degrees
	(typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
Clogging Factor for a Single C	urb 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	1
Curb Opening Orifice Coefficie		$C_{0}^{W}(C) =$	0.67	0.67	1
Grate Flow Analysis (Calcula		/	MINOR	MAJOR	•
Clogging Coefficient for Multip		Coef =	N/A	N/A	7
Clogging Factor for Multiple U		Clog =	N/A N/A	N/A	-
		ciog = L	MINOR	MAJOR	
	ased on Modified HEC22 Method)	а Г			7.0
Interception without Clogging		Q _{wi} =	N/A	N/A	cfs
Interception with Clogging		Q _{wa} =	N/A	N/A	cfs
	(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 Flo	W		MINOR	MAJOR	-
Interception without Clogging		Q _{mi} =	N/A	N/A	lcfs
Interception with Clogging		Q _{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assu	umos claggad condition)	Q _{Grate} =	N/A	N/A	cfs
Curb Opening Flow Analysis		Colate	MINOR	MAJOR	
Clogging Coefficient for Multip		Coef =	1.31	1.31	7
Clogging Factor for Multiple U		Clog =	0.04	0.04	-
		ciog = L			
	ased on Modified HEC22 Method)	- T	MINOR	MAJOR	
Interception without Clogging		Q _{wi} =	7.5	26.6	cfs
Interception with Clogging		Q _{wa} =	7.2	25.4	cfs
Curb Opening as an Orifice	(based on Modified HEC22 Method)	_	MINOR	MAJOR	_
Interception without Clogging		Q _{oi} =	25.2	32.9	cfs
Interception with Clogging		Q _{oa} =	24.1	31.5	cfs
Curb Opening Capacity as N	lixed Flow		MINOR	MAJOR	-
Interception without Clogging		Q _{mi} =	12.8	27.5	cfs
Interception with Clogging			12.0	26.3	cfs
	ity (assumes clogged condition)	Q _{ma} = Q _{curb} =	7.2	20.3 25.4	
		Curb –			113
Resultant Street Conditions			MINOR	MAJOR	٦.
Total Inlet Length		L =	15.00	15.00	feet
	based on street geometry from above)	T =	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street	t Crown	d _{CROWN} =	0.0	3.2	inches
		_			
Low Head Performance Rec	luction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	٦ft
Depth for Curb Opening Weir	Equation	d _{Curb} =	0.29	0.57	
	e Reduction Factor for Long Inlets		0.29	0.72	- ``
		RF _{Combination} =			-
	duction Factor for Long Inlets	RF _{Curb} =	0.67	0.88	4
Grated Inlet Performance Red	uction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	_
		-	MINOR	MAJOR	_
Total Inlat Intercontian Connei	ty (assumes clogged condition)	Q _a = [7.2	25.4	cfs
Total Thet Interception Capaci				18.2	

(Based on Regulated Criteria for Maximum Allo				jor Stor
Grandview Reserve	wable now	Depth and Spi	eau)	
Basin D-4 (DP 25)				
Gutter Geometry:			•	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 =	0.020	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	$S_0 = $	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.016	1 7 12	
· · · · · ·			-	
	-	Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions				
Maximum Canacity for 1/2 Street based On Allowable Spread		Minor Chorne	Majar Charm	
Maximum Capacity for 1/2 Street based On Allowable Spread Water Depth without Gutter Depression (Eq. ST-2)	y =[Minor Storm 3.84	Major Storm 3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	y – d _C =	0.8	0.8	inches
Gutter Depression ($d_c - (W * S_x * 12)$)	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	linches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T _X =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	0.0	0.0	lcfs
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
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	
Maximum Capacity for 1/2 Street based on Allowable Donth		Minor Ctorm	Major Starm	
Maximum Capacity for 1/2 Street based on Allowable Depth Theoretical Water Spread	т_Г	Minor Storm 15.6	Major Storm 29.4	∃ft
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = Т _{х тн} =	15.6	29.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	і _{хтн} = E ₀ =	0.153	0.079	"
Theoretical Discharge outside the Gutter Section W, carried in Section T_{xTH}	$Q_{XTH} =$	0.155	0.079	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_X TH = Q_X = Q$	0.0	0.0	cfs
Discharge within the Gutter Section W ($Q_d - Q_x$)	$Q_{\rm X} = Q_{\rm W} = 1$	0.0	0.0	cfs
Discharge Behind the Curte (e.g., sidewalk, driveways, & lawns)	Qw = Q _{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	QBACK -	0.0	0.0	
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 ($d \ge 6$ ") Storm	R =	SUMP	SUMP	
Max Flow Based on Allowable Depth (Safety Factor Applied)	$\mathbf{Q}_{d} = \mathbf{I}$	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	- d	55Pir		linches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =			linches
······································	CROWN		1	· ••
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	SUMP	SUMP	cfs



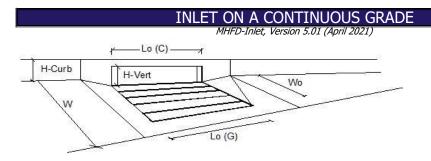
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	7
Type of Inlet	Type =		Curb Opening	la ale a a
Local Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information	_	MINOR	MAJOR	Verride 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	1
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_{f}(G) =$	N/A	N/A	1
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_{w}(G) =$	N/A	N/A	1
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_{o}(G) =$	N/A	N/A	1
Curb Opening Information	-0(-)	MINOR	MAJOR	4
Length of a Unit Curb Opening	$L_{0}(C) =$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	$H_{vert} =$	6.00	6.00	linches
Height of Curb Orifice Throat in Inches		6.00	6.00	linches
5	H _{throat} =	63.40	63.40	-
Angle of Throat (see USDCM Figure ST-5)	Theta =			degrees feet
1 Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	reet
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)	Civid L	MINOR	MAJOR	
Interception without Clogging	Q _{oi} =	N/A	N/A	cfs
Interception with Clogging	$Q_{oa} =$	N/A	N/A	lcfs
Grate Capacity as Mixed Flow	Q _{oa} – L	MINOR	MAJOR	
	о Г			7.4
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	1
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} =	6.1	20.2	cfs
Interception with Clogging	Q _{wa} =	5.7	18.9	cfs
Curb Opening as an Orifice (based on Modified HEC22 Method)		MINOR	MAJOR	-
Interception without Clogging	Q _{oi} =	16.8	21.9	cfs
Interception with Clogging	Q _{oa} =	15.7	20.6	cfs
Curb Opening Capacity as Mixed Flow	-coa —	MINOR	MAJOR	
Interception without Clogging	Q _{mi} =	9.4	19.6	lcfs
Interception with Clogging	Q _{mi} =	8.8	19.0	lcfs
Resulting Curb Opening Capacity (assumes clogged condition)	Q _{ma} = Q _{Curb} =	5.7	18.3 18.3	cfs
	Curb -			
Resultant Street Conditions		MINOR	MAJOR	٦.
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	. T=	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street Crown	d _{CROWN} =	0.0	3.2	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} =	0.29	0.57	ft
Combination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	1
Curb Opening Performance Reduction Factor for Long Inlets	RF _{Curb} =	0.82	1.00	1
Grated Inlet Performance Reduction Factor for Long Inlets	RF _{Grate} =	N/A	N/A	1
orace intervention and conclusion ractor for long inters	Grate -	11/1	11/1	4
		MINOR	MAJOR	
Total Talet Intercention Connects (accurate days days days	• 「	5.7	MAJOR 18.3] of o
Total Inlet Interception Capacity (assumes clogged condition) Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	Q _a =			cfs cfs
	$Q_{PEAK REQUIRED} =$	3.7	8.5	ICTE

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum Al				
Grandview Reserve	iowable i iow	Depth and Spi	eau)	
Basin E-1 (DP 27)				
Tonore Sever T, Texceen T,				
Gutter Geometry:			1-	
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S _{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown				
Jistance from Curb Face to Street Crown Gutter Width	T _{CROWN} = W =	16.0	ft H	
Sutter width Street Transverse Slope	-	0.83	ft ft/ft	
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S _X = S _W =	0.020	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	$S_0 =$	0.083	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n _{STREET} =	0.033		
	SIKEEL -	0.010	-	
		Minor Storm	Major Storn	n
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)	_		2	
Maximum Capacity for 1/2 Street based On Allowable Spread	r	Minor Storm	Major Storn	
Nater Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12)) Nater Depth at Gutter Flowline	a = d =	0.63	0.63	inches inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	u = T _X =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = 1$	0.149	0.149	''
Discharge outside the Gutter Section W, carried in Section T_X	$Q_{x} =$	13.2	13.2	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_{W} = $	2.3	2.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	0.0	Cfs
Maximum Flow Based On Allowable Spread	$\mathbf{Q}_{\mathrm{T}} =$	15.5	15.5	cfs
Flow Velocity within the Gutter Section	v =	1.4	1.4	fps
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.5	0.5	
	-			
Maximum Capacity for 1/2 Street based on Allowable Depth	-	Minor Storm	Major Storn	
Theoretical Water Spread	T _{TH} =	15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	T _{X TH} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	-
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{X TH} =	12.2	71.4	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _X =	12.2	61.9	cfs
Discharge within the Gutter Section W ($Q_d - Q_x$)	Qw =	2.2	6.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.3	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	14.4	69.4	cfs
Average Flow Velocity Within the Gutter Section	V =	1.4	2.1	fps
/*d Product: Flow Velocity Times Gutter Flowline Depth Flowe-Based Depth Safety Reduction Factor for Major & Minor ($d > 6$ ") Storm	V*d = R =	0.5	1.3	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \ge 6$ ") Storm Max Flow Based on Allowable Depth (Safety Factor Applied)		1.00 14.4	0.56 38.8	cfs
Nax Flow Based on Allowable Depth (Safety Factor Applied) Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	$\mathbf{Q}_{d} =$			crs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied) Resultant Flow Depth at Street Crown (Safety Factor Applied)	d = d _{CROWN} =	4.36	6.15 1.68	inches
	CROWN -	0.00	1.00	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	n



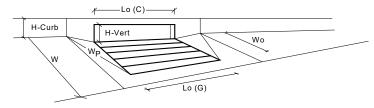
Decian Information (Input)		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening Type of Inlet Image: Contract of the second sec	Type =		Curb Opening	-
Local Depression (additional to continuous gutter depression 'a')	·· •	3.0	3.0	linches
	a _{LOCAL} = No =	3	3	
Total Number of Units in the Inlet (Grate or Curb Opening) Length of a Single Unit Inlet (Grate or Curb Opening)		5.00	5.00	ft
	$L_0 =$		5.00 N/A	- 1
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W _o =	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'	о Г	MINOR	MAJOR	٦. ا
Design Discharge for Half of Street (from <i>Inlet Management</i>)	$Q_0 =$	9.5	22.1	cfs
Water Spread Width	T =	13.3	16.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.8	5.0	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	0.6	inches
Ratio of Gutter Flow to Design Flow	$E_o =$	0.181	0.130	_
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	7.8	19.3	cfs
Discharge within the Gutter Section W	Q _w =	1.7	2.9	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.23	0.32	sq ft
Velocity within the Gutter Section W	V _w =	7.3	9.0	fps
Water Depth for Design Condition	d _{LOCAL} =	6.8	8.0	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-GRATE} =	N/A	N/A	1
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	-1. I
Interception Rate of Side Flow	R _x =	N/A	N/A	1
Interception Capacity	$\hat{Q}_i =$	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	ן ר
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	-1'25
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_0 - Q_a (to be applied to curb opening or next d/s inlet)	$Q_a = Q_b =$	N/A	N/A	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)	Q b = 1	MINOR	MAJOR	
Equivalent Slope S_{e} (based on grate carry-over)	S _e =	0.086	0.067	∃ft/ft
Required Length L_{T} to Have 100% Interception		20.35	35.08	ft ft
Under No-Clogging Condition	$L_T = [$	MINOR	MAJOR	_"`
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L _T)	L =[15.00	15.00	∃ft
		8.6	15.00	cfs
Interception Capacity	$Q_i = [$	MINOR	MAJOR	Jus
Under Clogging Condition	CurbCoef =			ר I
Clogging Coefficient	-	1.31	1.31	-
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	-
Effective (Unclogged) Length	$L_e =$	14.34	14.34	ft
Actual Interception Capacity	Q _a =	8.6	13.8	cfs
$Carry-Over Flow = Q_{h(GRATE)} - Q_a$	Q _b =	0.9	8.3	cfs
<u>Summary</u>	- T	MINOR	MAJOR	ا ۔
Total Inlet Interception Capacity	Q =	8.6	13.8	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet) Capture Percentage = Q_a/Q_a =	Q _b = C% =	0.9 90	8.3 63	cfs %

ALLOWABLE CAPACITY FOR ONE-HALF C (Based on Regulated Criteria for Maximum All				Joi 3001
Grandview Reserve	owable now	Deptil and Spi	eauj	
Basin E-2 (DP 28)				
- TBACK - TCROWN -				
T, Taxx				
Suck W T,				
STREET				
I I Sal				
Gutter Geometry:	F	7 5	٦	
Maximum Allowable Width for Spread Behind Curb Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	T _{BACK} =	7.5	ft ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	S _{BACK} = n _{BACK} =	0.020		
	HBACK -	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	linches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.035	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = $	0.016	1	
		Minor Storm	Major Storn	.
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		Π	7	
		A 1		
Maximum Capacity for 1/2 Street based On Allowable Spread	-	Minor Storm	Major Storn	
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C = a =	0.8	0.8	inches
Gutter Depression (d _c - (W * S _x * 12)) Nater Depth at Gutter Flowline	a = d =	0.63	0.63	inches inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	u = T _x =	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = $	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	13.6	13.6	cfs
Discharge within the Gutter Section W ($Q_T - Q_X$)	$Q_W =$	2.4	2.4	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 =	16.0	16.0	cfs
Flow Velocity within the Gutter Section	V =	1.5	1.5	fps
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.5	0.5	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storn	n
Theoretical Water Spread	Т _{тн} = [15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	т _{х тн} =	19.0	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	Q _{х тн} =	12.6	73.5	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q _X =	12.6	63.8	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q _w =	2.3	6.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q _{BACK} =	0.0	1.4	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	14.8	71.4	cfs
Average Flow Velocity Within the Gutter Section	V =	1.4	2.2	fps
/*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.5	1.4	_
Slope-Based Depth Safety Reduction Factor for Major & Minor (d \geq 6") Storm Max Flow Based on Allowable Depth (Safety Factor Applied)	R = Q d =	1.00 14.8	0.53 38.1	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	Q _d = d =	4.36	6.04	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d _{CROWN} =	0.00	1.57	inches
	-ckowin -	0.00	1.57	
MINOR STORM Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storn	1
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q _{allow} =	14.8	38.1	cfs



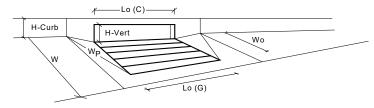
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =		Curb Opening	
Local Depression (additional to continuous gutter depression 'a')	a _{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_0 =$	5.00	5.00	-ft -
Width of a Unit Grate (cannot be greater than W, Gutter Width)	$W_0 =$		N/A	
	$C_{f}-G =$	N/A	N/A N/A	- ^{III}
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)				-
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'	0	MINOR	MAJOR	٦,
Design Discharge for Half of Street (from <i>Inlet Management</i>)	$Q_0 =$	10.1	23.6	cfs
Water Spread Width	T =	13.4	16.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.9	5.1	inches
Water Depth at Street Crown (or at T _{MAX})	d _{CROWN} =	0.0	0.6	inches
Ratio of Gutter Flow to Design Flow	E _o =	0.179	0.128	_
Discharge outside the Gutter Section W, carried in Section T_x	Q _x =	8.3	20.6	cfs
Discharge within the Gutter Section W	Q _w =	1.8	3.0	cfs
Discharge Behind the Curb Face	Q _{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A _W =	0.24	0.32	sq ft
Velocity within the Gutter Section W	V _w =	7.6	9.3	fps
Water Depth for Design Condition	d _{LOCAL} =	6.9	8.1	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-GRATE} =	N/A	N/A	7
Under No-Clogging Condition		MINOR	MAJOR	_
Minimum Velocity Where Grate Splash-Over Begins	V ₀ =	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	~ I	MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoef =	N/A	N/A	7
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	-
Effective (unclogged) Length of Multiple-unit Grate Inlet		N/A	N/A N/A	- _{ft}
Minimum Velocity Where Grate Splash-Over Begins	V _o =	N/A	N/A N/A	fps
Interception Rate of Frontal Flow	v _o – R _f =	N/A	N/A N/A	
Interception Rate of Side Flow	$R_f = R_x = 1$	N/A N/A	N/A N/A	-
			,	
Actual Interception Capacity	Q _a =	N/A	N/A	cfs
Carry-Over Flow = Q_0 - Q_a (to be applied to curb opening or next d/s inlet)	Q _b =	N/A	<u>N/A</u>	cfs
Curb or Slotted Inlet Opening Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S _e (based on grate carry-over)	S _e =	0.085	0.067	ft/ft
Required Length L_T to Have 100% Interception	L _T = [21.17	36.56	_ft
Under No-Clogging Condition	,	MINOR	MAJOR	٦.
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	15.00	15.00	ft
Interception Capacity	Q _i =	9.0	14.5	cfs
Under Clogging Condition		MINOR	MAJOR	_
Clogging Coefficient	CurbCoef =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L _e =	14.34	14.34	ft
Actual Interception Capacity	Q _a =	8.9	14.3	cfs
Carry-Over Flow = $Q_{b(GRATE)}$ - Q_a	$Q_{\rm b} =$	1.2	9.3	cfs
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	Q =	8.9	14.3	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	1.2	9.3	cfs
Capture Percentage = Q_a/Q_c =	C% =	88	61	- %
3.0 3.0	2,10			

(Based on Regulated Criteria for Maximum Allo	wable Flow	Depth and Spi	read)	
Grandview Reserve		Deptil and Opi	cuu)	
Basin E-3 (DP 29)				
- Твиск - Тсязим -				
T, T _{MAX}				
SBACK W Tu				
STREET				
# > Q. Q. STREET CROWN				
2 P +				
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	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	1	
Height of Curb at Gutter Flow Line	$H_{CURB} = $	6.00	inches	
Distance from Curb Face to Street Crown	$T_{CROWN} =$	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = $	0.016	1	
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	т _Г	16.0	16.0	l Tft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	T _{MAX} = d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions	GMAX - L			
		6	,	
Maximum Capacity for 1/2 Street based On Allowable Spread	_	Minor Storm	Major Storm	1
Water Depth without Gutter Depression (Eq. ST-2)	y =[3.84	3.84	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d _c - (W * S_x * 12))	a =	0.63	0.63	inches
Water Depth at Gutter Flowline	d =	4.47	4.47	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	$T_X =$	15.2	15.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.149	0.149	\dashv
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) Maximum Flow Based On Allowable Spread	Q _{BACK} =	0.0	0.0	cfs
•	Q _T = V =	SUMP	SUMP	cfs
Flow Velocity within the Gutter Section V*d Product: Flow Velocity times Gutter Flowline Depth	V = V*d =	0.0	0.0	fps
v a riodaci. How velocity limes dutter flowline Depth	v·u =[0.0	0.0	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	ı
Theoretical Water Spread	Т _{тн} =[15.6	29.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	T _{X TH} =	14.7	28.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E ₀ =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	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 \geq 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 Allowable Capacity is based on Depth Criterion		Minor Storm	Major Storm	



	cDOT Type R Curb Opening		MINOR	MAJOR	-
	pe of Inlet	Type =		Curb Opening	4
	cal Depression (additional to continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
	mber of Unit Inlets (Grate or Curb Opening)	No =	4	4	
	ater Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	7.7	inches
	ate Information	-	MINOR	MAJOR	Verride Deptr
	ngth of a Unit Grate	$L_{o}(G) =$	N/A	N/A	feet
	dth of a Unit Grate	W _o =	N/A	N/A	feet
	ea Opening Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	
Clo	ogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_{f}(G) =$	N/A	N/A	
Gra	ate Weir Coefficient (typical value 2.15 - 3.60)	C _w (G) =	N/A	N/A	7
Gra	ate Orifice Coefficient (typical value 0.60 - 0.80)	$C_{o}(G) =$	N/A	N/A	7
Cur	rb Opening Information		MINOR	MAJOR	-
Len	ngth of a Unit Curb Opening	$L_{0}(C) = [$	5.00	5.00	feet
	ight of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	inches
	ight of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	inches
	gle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
	le Width for Depression Pan (typically the gutter width of 2 feet)	$W_p =$	2.00	2.00	feet
	baging Factor for a Single Curb Opening (typical value 0.10)		0.10	0.10	
		$C_{f}(C) =$			-
	rb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w(C) =$	3.60	3.60	4
	rb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_{o}(C) =$	0.67	0.67	
	ate Flow Analysis (Calculated)	-	MINOR	MAJOR	-
	ogging Coefficient for Multiple Units	Coef =	N/A	N/A	4
	ogging Factor for Multiple Units	Clog =	N/A	N/A	
	ate Capacity as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	_
	rerception without Clogging	Q _{wi} =	N/A	N/A	cfs
Inte	erception with Clogging	Q _{wa} =	N/A	N/A	cfs
Gra	ate Capacity as a Orifice (based on Modified HEC22 Method)	· -	MINOR	MAJOR	-
Inte	rerception without Clogging	Q _{oi} =	N/A	N/A	cfs
	erception with Clogging	Q _{oa} =	N/A	N/A	lcfs
	ate Capacity as Mixed Flow	-coa L	MINOR	MAJOR	
	erception without Clogging	Q _{mi} =	N/A	N/A	lcfs
	reception with Clogging	$Q_{ma} = $	N/A	N/A	lcfs
		Q _{ma} =	N/A	N/A N/A	
Res Cu	sulting Grate Capacity (assumes clogged condition) Irb Opening Flow Analysis (Calculated)	CGrate -	MINOR	MAJOR	
		с f. Г			7
	ogging Coefficient for Multiple Units	Coef =	1.33	1.33	-
	ogging Factor for Multiple Units	Clog =	0.03	0.03	
	rb Opening as a Weir (based on Modified HEC22 Method)		MINOR	MAJOR	٦.
	terception without Clogging	Q _{wi} =	10.0	35.4	cfs
	erception with Clogging	Q _{wa} =	9.7	34.3	cfs
	rb Opening as an Orifice (based on Modified HEC22 Method)	_	MINOR	MAJOR	_
Inte	erception without Clogging	Q _{oi} =	33.6	43.9	cfs
Inte	erception with Clogging	Q _{oa} =	32.5	42.4	cfs
	rb Opening Capacity as Mixed Flow		MINOR	MAJOR	_
	rerception without Clogging	Q _{mi} =	17.0	36.7	cfs
	reception with Clogging	Q _{ma} =	16.5	35.5	
	sulting Curb Opening Capacity (assumes clogged condition)	Q _{Curb} =	9.7	34.3	cfs
	esultant Street Conditions	ccarb	MINOR	MAJOR	1 -
	tal Inlet Length	L = [20.00	20.00	feet
	sultant Street Flow Spread (based on street geometry from above)	L = _ T = [15.6	20.00	ft.>T-Crown
	sultant Flow Depth at Street Crown	-	0.0	3.2	inches
Res	Suitant Flow Deput at Street Crown	d _{CROWN} =	0.0	3.2	
	un lies d Deufermannen De duetien (Col., L. L. 1)				
	w Head Performance Reduction (Calculated)		MINOR	MAJOR	٦.
	pth for Grate Midwidth	d _{Grate} =	N/A	N/A	ft
Dep		- h	0.29	0.57	ft
Dep	pth for Curb Opening Weir Equation	d _{Curb} =			
Dep Dep		$u_{Curb} =$ RF _{Combination} =	0.41	0.72	
Dep Dep Cor	pth for Curb Opening Weir Equation			0.72 0.88	-
Dep Dep Con Cur	, pth for Curb Opening Weir Equation mbination Inlet Performance Reduction Factor for Long Inlets	RF _{Combination} = RF _{Curb} =	0.41		-
Dep Dep Con Cur	, pth for Curb Opening Weir Equation mbination Inlet Performance Reduction Factor for Long Inlets rb Opening Performance Reduction Factor for Long Inlets	RF _{Combination} =	0.41 0.67	0.88	
Dep Dep Con Cur	, pth for Curb Opening Weir Equation mbination Inlet Performance Reduction Factor for Long Inlets rb Opening Performance Reduction Factor for Long Inlets	RF _{Combination} = RF _{Curb} =	0.41 0.67 N/A	0.88 N/A	
Dep Dep Con Cur Gra	, pth for Curb Opening Weir Equation mbination Inlet Performance Reduction Factor for Long Inlets rb Opening Performance Reduction Factor for Long Inlets	RF _{Combination} = RF _{Curb} =	0.41 0.67	0.88	

(Based on Regulated Criteria for Maximum Alle				jor Stor
Grandview Reserve			-	
Basin E-4 (DP 30)				
SEACK W I Tr				
STREET CROWN				
The second secon				
Gutter Geometry: Maximum Allowable Width for Spread Behind Curb	T _{BACK} =	7.5	lft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	SBACK =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n _{BACK} =	0.020		
	HBACK -	0.020	1	
Height of Curb at Gutter Flow Line	H _{CURB} =	6.00	inches	
Distance from Curb Face to Street Crown	T _{CROWN} =	16.0	ft	
Gutter Width	W =	0.83	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 ₀ =	0.000	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{\text{STREET}} = $	0.016	1	
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T _{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d _{MAX} =	4.4	7.7	inches
Check boxes are not applicable in SUMP conditions	-MAX L			
		A		
Maximum Capacity for 1/2 Street based On Allowable Spread	-	Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.84	3.84	inches
/ertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d _C =	0.8	0.8	inches
Gutter Depression (d_c - (W * S_x * 12))	a =	0.63	0.63	inches
Nater Depth at Gutter Flowline Allowable Spread for Discharge outside the Gutter Section W (T - W)	d = T _X =	4.47	4.47	inches ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	$E_0 = $	0.149	0.149	
Discharge outside the Gutter Section W, carried in Section T_x	$Q_{\rm X} =$	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
/*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	
Varianum Canadin far 1/2 Church haard All		Min en Ci	Maria Ci	
Maximum Capacity for 1/2 Street based on Allowable Depth	т_Г	Minor Storm	Major Storm	
Theoretical Water Spread Theoretical Spread for Discharge outside the Gutter Section W (T - W)	Т _{тн} = Т _{х тн} =	15.6 14.7	29.4 28.6	ft ft
Sutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E _O =	0.153	0.079	
Theoretical Discharge outside the Gutter Section W, carried in Section T_{XTH}	с _о = Q _{х тн} =	0.155	0.079	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	$Q_X TH = Q_X = $	0.0	0.0	
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 \geq 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				



Design Information (Input)	CDOT Type R Curb Opening	_	MINOR	MAJOR	_
Type of Inlet	,, , , , , , , , , , , , , , , , , , ,	Type =	CDOT Type R		-
	continuous gutter depression 'a' from above)	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or	Curb Opening)	No =	4	4	
Water Depth at Flowline (outsid	le of local depression)	Ponding Depth =	4.4	7.7	inches
Grate Information		-	MINOR	MAJOR	Verride Depths
Length of a Unit Grate		L ₀ (G) =	N/A	N/A	feet
Width of a Unit Grate		W ₀ =	N/A	N/A	feet
Area Opening Ratio for a Grate	(typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	1
Clogging Factor for a Single Gra		$C_f(G) =$	N/A	N/A	-
Grate Weir Coefficient (typical)		$C_{w}(G) = C_{w}(G) = C_{w}(G)$	N/A	N/A	-
Grate Orifice Coefficient (typical		$C_{0}(G) = C_{0}(G) = C_{0}(G)$	N/A N/A	N/A	-
Curb Opening Information	1 value 0.00 - 0.00)	C ₀ (G) = [MINOR	,	_
				MAJOR	lfeet
Length of a Unit Curb Opening		$L_{o}(C) =$	5.00	5.00	
Height of Vertical Curb Opening		H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat ir		H _{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Fi		Theta =	63.40	63.40	degrees
	(typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
	rb 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	7
Curb Opening Orifice Coefficier		C ₀ (C) =	0.67	0.67	1
Grate Flow Analysis (Calcula			MINOR	MAJOR	•
Clogging Coefficient for Multiple		Coef =	N/A	N/A	7
Clogging Factor for Multiple Un		Clog =	N/A N/A	N/A	-
	ised on Modified HEC22 Method)	clog = L	MINOR	MAJOR	
	ised on Modified TIEC22 Method	о Г			7-6-
Interception without Clogging		Q _{wi} =	N/A	N/A	cfs
Interception with Clogging		Q _{wa} =	N/A	N/A	cfs
	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	N		MINOR	MAJOR	-
Interception without Clogging	_	Q _{mi} =	N/A	N/A	lcfs
Interception with Clogging		Q _{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assur	mes clogged condition)	Q _{Grate} =	N/A	N/A	cfs
Curb Opening Flow Analysis	(Calculated)	Coluce	MINOR	MAJOR	
Clogging Coefficient for Multiple		Coef =	1.33	1.33	7
Clogging Factor for Multiple Un		Clog =	0.03	0.03	-
		ciug = L			_
	sed on Modified HEC22 Method)	о Г	MINOR	MAJOR	7-6-
Interception without Clogging		Q _{wi} =	10.0	35.4	cfs
Interception with Clogging		Q _{wa} =	9.7	34.3	cfs
	based on Modified HEC22 Method)	_	MINOR	MAJOR	_
Interception without Clogging		Q _{oi} =	33.6	43.9	cfs
Interception with Clogging		Q _{oa} =	32.5	42.4	cfs
Curb Opening Capacity as M	ixed Flow		MINOR	MAJOR	-
Interception without Clogging		Q _{mi} =	17.0	36.7	cfs
Interception with Clogging		Q _{ma} =	16.5	35.5	lcfs
Resulting Curb Opening Capacit	a (assumes clogged condition)	Q _{ma} =	9.7	34.3	cfs
Resultant Street Conditions	y (assumes clogged condition)	Curb -	MINOR	MAJOR	
		. г			76
Total Inlet Length		L =	20.00	20.00	feet
	based on street geometry from above)	T =	15.6	29.4	ft.>T-Crown
Resultant Flow Depth at Street	Crown	d _{CROWN} =	0.0	3.2	inches
Low Head Performance Redu	uction (Calculated)		MINOR	MAJOR	_
Depth for Grate Midwidth		d _{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir E	quation	d _{Curb} =	0.29	0.57	ft
	Reduction Factor for Long Inlets	RF _{Combination} =	0.41	0.72	1
Curb Opening Performance Rec		RF _{Curb} =	0.67	0.88	4
Grated Inlet Performance Redu			N/A	0.88 N/A	4
Grateu Iniel Performance Redu	CUONT ACTOR TOT LONG THEIS	RF _{Grate} =	IN/A	IN/A	4
			MINOD	MAJOD	
			MINOR	MAJOR	7.
ITotal Inlet Interception Capacit	y (assumes clogged condition)	Q_a =	9.7 9.0	34.3 21.0	cfs cfs
	Minor and Major Storms(>Q PEAK)	$Q_{PEAK REQUIRED} =$			

	Worksheet for	Basin D	-7 Swale
Project Description			
Friction Method	Manning Formula		
Solve For	Normal Depth		
Input Data			
Roughness Coefficient		0.035	
Channel Slope		0.02000	ft/ft
Left Side Slope		3.00	ft/ft (H:V)
Right Side Slope		3.00	ft/ft (H:V)
Bottom Width		1.00	ft
Discharge		7.30	ft³/s
Results			
Normal Depth		0.71	ft
Flow Area		2.22	ft ²
Wetted Perimeter		5.49	ft
Hydraulic Radius		0.40	ft
Top Width		5.26	ft
Critical Depth		0.67	ft
Critical Slope		0.02558	ft/ft
Velocity		3.28	ft/s
Velocity Head		0.17	ft
Specific Energy		0.88	ft
Froude Number		0.89	
Flow Type	Subcritical		
GVF Input Data			
Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	
GVF Output Data			
Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Downstream Velocity		Infinity	ft/s
Upstream Velocity		Infinity	ft/s
Normal Depth		0.71	ft
Critical Depth		0.67	ft
Channel Slope		0.02000	ft/ft
-			

Worksheet for Basin D-7 Swale

 Bentley Systems, Inc.
 Haestad Methods Sol External Operations
 External Operation
 External Operation<

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Worksheet for Basin D-7 Swale

GVF Output Data

Critical Slope

0.02558 ft/ft

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APPENDIX E Water Quality Computations

Detention Pond Tributary Areas

Subdivision:Grandview ReserveLocation:CO, El Paso County

Project Name:	Grandview Reserve
Project No.:	HRG01
Calculated By:	TJE
Checked By:	BAS
Date:	3/1/22

Pond A		
Basin	Area	% Imp
A-2a	4.21	65
A-2b	2.75	88
A-3	0.36	100
A-4a	6.05	65
A-4b	3.81	65
A-5	0.35	100
A-6	2.76	65
A-7	0.23	100
A-8	5.44	75
A-9	4.91	65
A-10	1.02	65
A-11	3.56	16
Total	35.45	64.3

Pond B

Basin	Area	% Imp
B-1	3.33	65
B-2	4.51	65
B-3	4.05	65
B-4	1.35	78.2
B-5	5.12	65
B-6	2.28	65
B-7	0.89	65
B-8	3.23	65
B-9	2.42	65
B-10	1.10	2
Total	28.28	63.2

Pon	d	C
1 011	u	C

Basin	Area	% Imp
C-1	4.12	65
C-2	2.71	65
C-3	1.56	65
C-4	2.47	65
C-5	3.09	65
C-6	2.10	65
C-7	6.72	65
C-8	5.11	65
C-9a	3.50	65
C-9b	3.69	65
C-10	3.51	65
C-11	0.46	65
C-12	1.79	65
C-13	2.37	2
Total	43.20	61.5

Pond D

Basin	Area	% Imp
D-1	2.98	65
D-2	0.87	65
D-3	3.66	65
D-4	2.00	65
D-5	1.53	35.7
D-7	1.80	50.3
Total	12.84	59.4

Pond E

Basin	Area	% Imp
E-1	5.13	65
E-2	5.42	65
E-3	3.20	65
E-4	6.28	65
E-5	1.13	2
Total	21.16	61.6

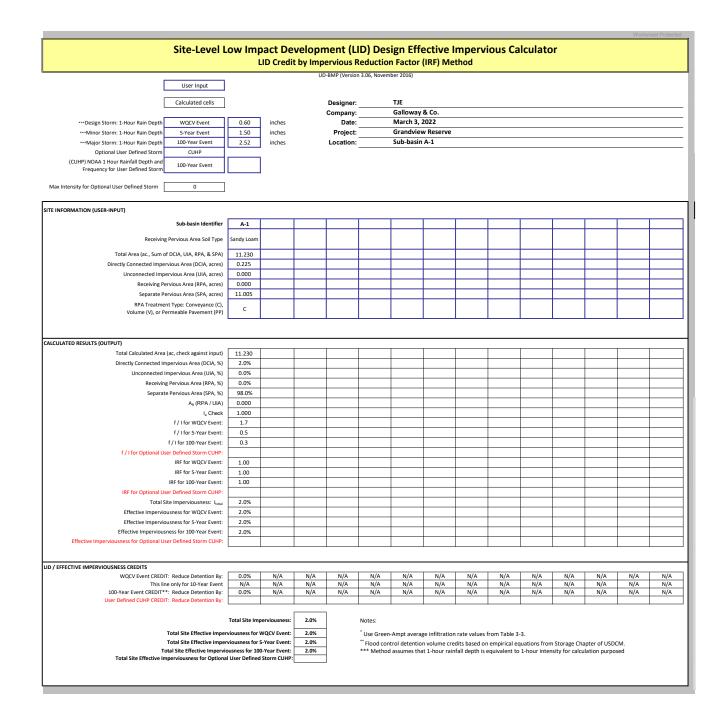
Site	e-Level L			•	•	•	•		•	ious Ca	Iculato	r			
		I	LID Credi					(IRF) Me	thod						
				UD	-BMP (Versior	n 3.06, Novem	ber 2016)								
Us	er Input														
Calcu	ulated cells				Designer:		TJE								
					Company:		Galloway	& Co.							
***Design Storm: 1-Hour Rain Depth WQ	QCV Event	0.60	inches		Date:		March 3, 2	2022							
***Minor Storm: 1-Hour Rain Depth 5-Ye	ear Event	1.50	inches		Project:		Grandviev	we Reserve							
***Major Storm: 1-Hour Rain Depth 100-1	Year Event	2.52	inches		Location:		Pond A								
Optional User Defined Storm	CUHP														
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	Year Event														
Max Intensity for Optional User Defined Storm	0														
TE INFORMATION (USER-INPUT)															
Sub-t	basin Identifier		A-2a	A-2b	A-3	A-4a	A-4b	A-5	A-6	A-7	A-8	A-9	A-10	A-11	
Receiving Pervious	s Area Soil Type		Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	
Total Area (ac., Sum of DCIA, UI	IA. RPA. & SPA1		4.210	2.750	0.360	6.050	3.810	0.350	2,760	0.230	5,440	4.910	1.020	3.560	
Directly Connected Impervious Are			2.736	2.420	0.360	3.933	2.477	0.350	1.794	0.230	4.080	3.192	0.663	0.570	
Unconnected Impervious Ar			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Receiving Pervious Ar			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Separate Pervious Ar	rea (SPA, acres)		1.474	0.330	0.000	2.117	1.333	0.000	0.966	0.000	1.360	1.718	0.357	2.990	
RPA Treatment Type: C Volume (V), or Permeable			с	с	с	с	с	с	с	с	с	с	с	с	
Total Calculated Area (ac, check Directly Connected Impervious	Area (DCIA, %)		4.210 65.0%	2.750 88.0%	0.360	6.050 65.0%	3.810 65.0%	0.350	2.760 65.0%	0.230	5.440 75.0%	4.910 65.0%	1.020 65.0%	3.560 16.0%	
Unconnected Imperviou			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Receiving Pervious			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Separate Pervious	ł		35.0%	12.0% 0.000	0.0%	35.0%	35.0%	0.0%	35.0%	0.0%	25.0%	35.0%	35.0%	84.0%	
	A _R (RPA / UIA)		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	1.000	0.000	
f/Ifo	or WQCV Event:		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.7	1.000	1.7	
	or 5-Year Event:		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	LOO-Year Event:		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
f / I for Optional User Define	d Storm CUHP:														
IRF fo	or WQCV Event:		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
	or 5-Year Event:		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
	LOO-Year Event:		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
IRF for Optional User Define			65.00/	00.00	400.05	65.001	65.00/	400.001	65.00	400.001	75.00/	65.00	CT 001	45.000	
Total Site Imperv			65.0% 65.0%	88.0% 88.0%	100.0%	65.0%	65.0% 65.0%	100.0% 100.0%	65.0% 65.0%	100.0%	75.0% 75.0%	65.0% 65.0%	65.0% 65.0%	16.0%	
Effective Imperviousness fo Effective Imperviousness fo			65.0%	88.0% 88.0%	100.0%	65.0% 65.0%	65.0%	100.0%	65.0% 65.0%	100.0%	75.0%	65.0% 65.0%	65.0%	16.0%	
Effective Imperviousness for 1	ł		65.0%	88.0%	100.0%	65.0%	65.0%	100.0%	65.0%	100.0%	75.0%	65.0%	65.0%	16.0%	
Effective Imperviousness for Optional User Define			05.0%	00.076	100.076	05.076	05.0%	100.076	05.0%	100.076	75.0%	05.0%	05.0%	10.0%	
O / EFFECTIVE IMPERVIOUSNESS CREDITS WOCV Event CREDIT: Reduce	e Detention By:	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N//
This line only for	r 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N//
100-Year Event CREDIT**: Reduce User Defined CUHP CREDIT: Reduce		N/A	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	N/#
		Total Site Im	perviousness:	64.3%]	Notes:									
Total Site	e Effective Imperv	iousness for	WQCV Event:	64.3%	1	* Use Green	-Ampt average	ge infiltration	rate values	from Table ?	-3.				
Total Site					4		. unbr aveid	5~ mmu au01	are values		J.				
Total Site	e Effective Imperv	iousness for	5-Year Event:	64.3%		Flood con	trol detentio	n volume cre	dits based or	n empirical eq	uations from	Storage Cha	apter of USD	CM.	

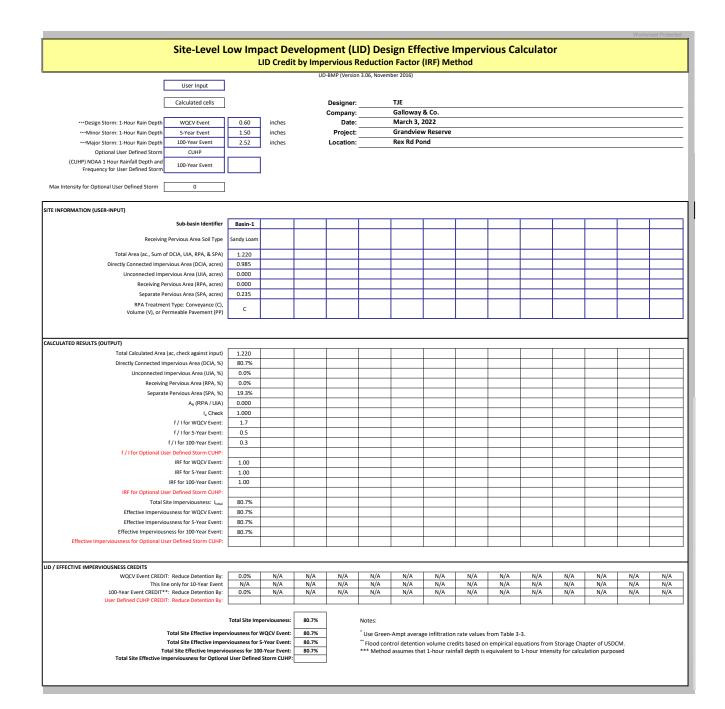
Site-Level		LID Credi	•	•		•		•						
		LID Creat					(IRF) We	τησα						
User Input			UD	-BMP (Versior	1 3.06, Noverr	iber 2016)								
Oser input														
Calculated cells				Designer:		TJE								
				Company:		Galloway								
***Design Storm: 1-Hour Rain Depth WQCV Event	0.60	inches		Date:		March 3,								
***Minor Storm: 1-Hour Rain Depth 5-Year Event	1.50	inches		Project:		Grandviev	w Reserve							
***Major Storm: 1-Hour Rain Depth 100-Year Event Optional User Defined Storm CUHP	2.52	inches		Location:		Pond B								
(CUHP) NOAA 1 Hour Bainfall Donth and		1												
Frequency for User Defined Storm														
Aax Intensity for Optional User Defined Storm 0														
Aax Intensity for Optional User Defined Storm 0														
EINFORMATION (USER-INPUT)														
Sub-basin Identifier	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10				
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam				
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	3.330	4.510	4.050	1.350	E 130	2.280	0.890	2 220	2.420	1.100				-
Directly Connected Impervious Area (DCIA, acres)	2.165	2.932	2.633	1.350	5.120 3.328	1.482	0.890	3.230 2.100	1.573	0.022				
Unconnected Impervious Area (UCA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022				
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Separate Pervious Area (SPA, acres)	1.166	1.579	1.418	0.294	1.792	0.798	0.312	1.131	0.847	1.078				
RPA Treatment Type: Conveyance (C),	c	с	с	с	с	с	с	с	с	с				
Volume (V), or Permeable Pavement (PP)	Ĺ	Ľ	Ľ	Ľ	Ľ	Ľ	Ľ	Ľ	Ľ	Ĺ				
CULATED RESULTS (OUTPUT)				1			1						1	-
Total Calculated Area (ac, check against input)	3.330	4.510	4.050	1.350	5.120	2.280	0.890	3.230	2.420	1.100				
Directly Connected Impervious Area (DCIA, %)	65.0%	65.0%	65.0%	78.2%	65.0%	65.0%	65.0%	65.0%	65.0%	2.0%				
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				
Receiving Pervious Area (RPA, %) Separate Pervious Area (SPA, %)	35.0%	35.0%	35.0%	21.8%	35.0%	35.0%	35.0%	35.0%	35.0%	98.0%				
Separate Pervious Area (SPA, %) A _R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				-
A _R (KFA / UA)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000				
f/I for WQCV Event:	1.7	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000				
f / I for 5-Year Event:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
f / I for 100-Year Event:	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3				
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
IRF for 5-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
IRF for Optional User Defined Storm CUHP:													1	
Total Site Imperviousness: Itotal	65.0%	65.0%	65.0%	78.2%	65.0%	65.0%	65.0%	65.0%	65.0%	2.0%		ļ		-
Effective Imperviousness for WQCV Event:	65.0%	65.0%	65.0%	78.2%	65.0%	65.0%	65.0%	65.0%	65.0%	2.0%				
Effective Imperviousness for 5-Year Event: Effective Imperviousness for 100-Year Event:	65.0% 65.0%	65.0% 65.0%	65.0% 65.0%	78.2%	65.0% 65.0%	65.0% 65.0%	65.0%	65.0% 65.0%	65.0% 65.0%	2.0%				
	65.0%	65.0%	65.0%	/8.2%	65.0%	65.0%	65.0%	65.0%	65.0%	2.0%				
Effective Imperviousness for Ontional User Defined Storm CUHP	L	1	1	1	1	1	1	1		1	1	1	1	
Effective Imperviousness for Optional User Defined Storm CUHP:														
				1										
/ EFFECTIVE IMPERVIOUSNESS CREDITS	0.771	0.55	0.711		0.0%	0.0%	0.0% N/A	0.0% N/A	0.0% N/A	0.0% N/A	N/A N/A	N/A N/A	N/A N/A	N//
/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%										N//
/ EFFECTIVE IMPERVIOUSNESS CREDITS	0.0% N/A 0.0%	0.0% N/A 0.0%	0.0% N/A 0.0%	0.0% N/A 0.0%	N/A 0.0%	N/A 0.0%	0.0%	0.0%	0.0%	-364.4%	N/A	N/A	N/A	11//
/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By: This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A						N/A		N/A	IN/F
/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By: This line only for 10-Year Event 100-Year Event CREDIT**: Reduce Detention By:	N/A 0.0%	N/A 0.0%	N/A 0.0%	N/A	N/A						N/A		N/A	
/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By: This line only for 10-Year Event 100-Year Event CREDIT**: Reduce Detention By:	N/A 0.0%	N/A	N/A	N/A	N/A						N/A		N/A	N//
/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By: This line only for 10-Year Event 100-Year Event CREDIT**: Reduce Detention By:	N/A 0.0% Total Site Im	N/A 0.0%	N/A 0.0%	N/A	N/A 0.0% Notes:		0.0%	0.0%	0.0%	-364.4%	N/A		N/A	
/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By: This line only for 10-Year Event 100-Year Event CREDIT**: Reduce Detention By: User Defined CUHP CREDIT: Reduce Detention By:	N/A 0.0% Total Site Im rviousness for	N/A 0.0% perviousness: WQCV Event: 5-Year Event:	N/A 0.0% 63.2%	N/A	N/A 0.0% Notes: * Use Green	0.0%	0.0% ge infiltration n volume cre	0.0%	0.0% from Table 3 n empirical ee	-364.4%	n Storage Cha	N/A	см.	

÷.	ite-Level L	ow Im	hact De	velopn	nent (I I	D) Des	ign Fff	ective I	mnerv	ious Ca	Iculato	r			
	ILE-LEVEI L		ID Credit	•		•	•		•	ious ca	iculato	"			
			ID Creun						liiou						
	Unerland			UD	-BMP (Versior	1 3.06, Novem	ber 2016)								
	User Input														
Cal	lculated cells				Designer:		TJE								
					Company:		Galloway								
••••Design Storm: 1-Hour Rain Depth V	WQCV Event	0.60	inches		Date:		March 3, 2								
	5-Year Event	1.50	inches		Project:		Grandviev	w Reserve							
	00-Year Event	2.52	inches		Location:		Pond C								
Optional User Defined Storm	CUHP														
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	00-Year Event														
Max Intensity for Optional User Defined Storm	0														
TE INFORMATION (USER-INPUT)															
	ıb-basin Identifier	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9a	C-9b	C-10	C-11	C-12	C-13
	ous Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Lo
Total Area (ac., Sum of DCIA,		4.120	2.710	1.560	2.470	3.090	2.100	6.720	5.110	3.500	3.690	3.510	0.460	1.790	2.370
Directly Connected Impervious A		2.678	1.762	1.014	1.606	2.009	1.365	4.368	3.322	2.275	2.399	2.282	0.299	1.164	0.047
Unconnected Impervious		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Receiving Pervious		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Separate Pervious		1.442	0.949	0.546	0.865	1.082	0.735	2.352	1.789	1.225	1.292	1.229	0.161	0.627	2.323
RPA Treatment Type Volume (V), or Permeab		c	с	с	с	с	с	с	c	с	с	с	с	с	с
ALCULATED RESULTS (OUTPUT)											1				
Total Calculated Area (ac, ch		4.120	2.710	1.560	2.470	3.090	2.100	6.720	5.110	3.500	3.690	3.510	0.460	1.790	2.370
Directly Connected Impervio		65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	2.0%
Unconnected Impervi		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	ous Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Separate Pervio	ious Area (SPA, %) A _R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	I _a Check	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
f/1	I for WQCV Event:	1.7	1.000	1.7	1.7	1.7	1.000	1.7	1.000	1.000	1.000	1.000	1.7	1.000	1.7
	I for 5-Year Event:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	or 100-Year Event:	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
f / I for f / I for Optional User Defi		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.00	0.3
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f / I fo f / L for Optional User Defi IRF IRF IRF for Optional User Defi Total Stie Imp Effective Imperviousness Effective Imperviousness Effective Imperviousness Effective Imperviousness for Optional User Defi D / EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Redi This Iline only. 100-Year Event CREDIT*: Redi User Defined CUHP CREDIT: Redi Total St	ined Storm CUHP: for WQCV Event: for 5-Year Event: ined Storm CUHP: hereit test soft of 5-Year Event: ined Storm CUHP: for VQCV Event: ined Storm CUHP: for 10-Year Event: for 10-Year Event: for 10-Year Event: for 10-Year Event: for 10-Year Event: Store Detention By: Use Detention By: Use Detention By: Site Effective Imperies Site Effective Imperies a Effective Imperies	1.00 1.00 1.00 1.00 5.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% Total Site Important Site Construction of the second	1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% everviousness: WQCV Event: 5-Year Event: 0-Year Event:	1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 65.0% 65.0% 65.0% 65.0%	1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% Notes: * Use Green ** Flood con	1.00 1.00 1.00 65.0% 65.0% 65.0% 0.0% N/A 0.0%	1.00 1.00 1.00 65.0% 65.0% 65.0% 0.0% N/A 0.0% 0.0%	1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0%	1.00 1.00 1.00 65.0% 65.0% 65.0% 0.0% N/A 0.0% 1.00 0.0%	1.00 1.00 65.0% 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0%	1.00 1.00 1.00 65.0% 65.0% 65.0% 0.0% N/A 0.0%	1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.1%	1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.00 1.00 1.00 2.0% 2.0% 2.0% 2.0% 0.0%

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		LID Credi					(IRF) Me	thod						
			UD	-BMP (Versior	3.06, Novem	ber 2016)								
User Input														
Calculated cells				Designer:		TJE								
				Company:		Galloway								
***Design Storm: 1-Hour Rain Depth WQCV Event	0.60	inches		Date:		March 3, 2								
***Minor Storm: 1-Hour Rain Depth 5-Year Event	1.50	inches		Project:		Grandviev	v Reserve							
***Major Storm: 1-Hour Rain Depth 100-Year Event	2.52	inches		Location:		Pond D								
Optional User Defined Storm CUHP (CUHP) NOAA 1 Hour Rainfall Depth and 200 Year French		1												
Frequency for User Defined Storm														
Max Intensity for Optional User Defined Storm 0														
E INFORMATION (USER-INPUT)														
Sub-basin Identifier	D-1	D-2	D-3	D-4	D-5	D-7								
Developed a contraction of the														
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam								
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	2.980	0.870	3.660	2.000	1.530	1.800								
Directly Connected Impervious Area (DCIA, acres)	1.937	0.566	2.379	1.300	0.546	0.905								
Unconnected Impervious Area (UIA, acres)	0.000	0.000	0.000	0.000	0.000	0.000								
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000								
Separate Pervious Area (SPA, acres)	1.043	0.305	1.281	0.700	0.984	0.895								
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	с	С	с	с	с	С								
LCULATED RESULTS (OUTPUT) Total Calculated Area (ac, check against input) Directly Connected Impervious Area (DCIA, %)	2.980 65.0%	0.870	3.660 65.0%	2.000 65.0%	1.530 35.7%	1.800 50.3%								
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								
														-
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								
Separate Pervious Area (SPA, %)	35.0%	35.0%	35.0%	35.0%	0.0% 64.3%	0.0% 49.7%								
Separate Pervious Area (SPA, %) A _R (RPA / UIA)	35.0% 0.000	35.0% 0.000	35.0% 0.000	35.0% 0.000	0.0% 64.3% 0.000	0.0% 49.7% 0.000								
Separate Pervious Area (SPA, %)	35.0%	35.0%	35.0%	35.0%	0.0% 64.3%	0.0% 49.7%								
Separate Pervious Area (SPA, %) A _R (RPA / UIA) I _a Check	35.0% 0.000 1.000	35.0% 0.000 1.000	35.0% 0.000 1.000	35.0% 0.000 1.000	0.0% 64.3% 0.000 1.000	0.0% 49.7% 0.000 1.000								
Separate Pervious Area (SPA, %) A _R (RPA / UIA) I ₂ Check f / I for WQCV Event:	35.0% 0.000 1.000 1.7	35.0% 0.000 1.000 1.7	35.0% 0.000 1.000 1.7	35.0% 0.000 1.000 1.7	0.0% 64.3% 0.000 1.000 1.7	0.0% 49.7% 0.000 1.000 1.7								
Separate Pervious Area (SPA, %) A ₆ (RPA / UIA) I ₆ Check f / I for WQCV Event: f / I for S-Year Event: f / I for 100-Year Event: f / I for 100-Year Event: f / I for Optional User Defined Storm CUHP:	35.0% 0.000 1.000 1.7 0.5 0.3	35.0% 0.000 1.000 1.7 0.5 0.3	35.0% 0.000 1.000 1.7 0.5 0.3	35.0% 0.000 1.000 1.7 0.5 0.3	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3								
Separate Pervious Area (SPA, %) A _e (RPA / UM) I _o Check f / I for WCV Event: f / I for 5-Year Event: f / I for 5-Year Event: f / I for Optional User Defined Storm CUHP: IRF for WQCV Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00								
Separate Pervious Area (SPA, %) A _e (RPA / UA) I _e Obeck f / I for WCCV Event: f / I for S-Year Event: f / I for 30-Year Event: f / I for Optional User Defined Storm CUHP: IRF for WCCV Event: IRF for S-Year Event: IRF for S-Year Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00								
Separate Pervious Area (SPA, %) A _e (RPA / UIA) I _e Check f / I for WQCV Event: f / I for 100-Year Event: f / I for 100-Year Event: IRF for WQCV Event: IRF for SVear Event: IRF for 100-Year Event: IRF for 100-Year Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00								
Separate Pervious Area (SPA, %) A _e (RPA / UIA) I _e Check f / I for WQCV Event: f / I for S-Year Event: f / I for 100-Year Event: f / I for Optional User Defined Storm CUHP: IRF for S-Year Event: IRF for 100-Year Event: IRF for 100-Year Event: IRF for Optional User Defined Storm CUHP:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00								
Separate Pervious Area (SPA, %) A _e (RPA / UIA) I _e Check f / I for WQCV Event: f / I for 100-Year Event: f / I for 100-Year Event: IRF for WQCV Event: IRF for SVear Event: IRF for 100-Year Event: IRF for 100-Year Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00								
Separate Pervious Area (SPA, %) A _e (RPA / UM) I _o Check f / I for WCCV Event: f / I for S-Year Event: f / I for S-Year Event: f / I for OVCV Event: IRF for WCCV Event: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for Optional USE Pelined Storm CUHP: Total Site Imperviousness: I _{butal}	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 								
Separate Pervious Area (SPA, %) A _e (RPA / UA) I _e Obeck f / I for WCCV Event: f / I for S-Year Event: f / I for S-Year Event: f / I for OD/Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for OD/Year Event: Total Site Imperviousness: I _{ugal} Effective Imperviousness: I _{ugal}	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 50.3%								
Separate Pervious Area (SPA, %) A _e (RPA / UIA) I _e Check f / I for WQCV Event: f / I for S-Year Event: f / I for 100-Year Event: f / I for 100-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for Optional User Defined Storm CUHP: Total Site Imperviousness for WGCV Event: Effective Imperviousness for S-Year Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 35.7% 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 50.3% 50.3%								
Separate Pervious Area (SPA, %) A ₄ (RPA / UA) I ₅ Check I ₇ / for WCCV Event: I ₇ / for S-Year Event: I ₇ / for OPtional User Defined Storm CUPP: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: Effective Imperviousness for S-Year Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 35.7% 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 50.3% 50.3%								
Separate Pervious Area (SPA, %) A _u (RPA / UA) I _u Check // I for WCCV Event: // I for S-Year Event: // I for JOY-Var Event: // I for Optional User Defined Storm CUHP: IRF for JOY-Var Event: IRF for JOY-Var Event: IRF for JOY-Var Event: IRF for Dytomal User Defined Storm CUHP: Total Site Imperviousness for WQCV Event: Effective Imperviousness for 100-Year Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 35.7% 35.7% 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 50.3% 50.3% 50.3%								
Separate Pervious Area (SPA, %) A _k (RPA / UA) I _k Orbeck I _k Check I _k Thor WCX Vexen: I _k Thor S-Year Event: I _k Thor Optional User Defined Storm CUHP: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: IRF for S-Year Event: Effective Imperviousness for S-Year Event: Effective Imperviousness for S-Year Event: IRF Interviousness for Optional User Defined Storm CUHP:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 35.7% 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 50.3% 50.3%	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
Separate Pervious Area (SPA, %) A _k (RPA/UM) I _k Check I _k Chor VOLV Event: I _k Chor Svear Event: I _R For Svear Event: I _R For VQCV Event I _R For 100-Year Event: I _R For 100-Year Event: I _R For Optional User Defined Storm CUHP: Total Site Imperviousness for VQCV Event: Effective Imperviousness for 100-Year Event: Effective Imperviousness for Optional User Defined Storm CUHP: D/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 0.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 1.00 35.7% 35.7% 35.7%	0.0% 49.7% 0.000 1.70 0.5 0.3 1.00 1.00 1.00 1.00 1.00 1.00 1.00								N/A
Separate Pervious Area (SPA, %) A _a (RPA / UA) A _a (RPA / UA) I _b Check (/ 1 for WOCV Event: f / 1 for S-Year Event: f / 1 for 200-Year Event: IRF for Optional User Defined Storm CUHP: IRF for S-Year Event: IRF for S-Year Event: IRF for Optional User Defined Storm CUHP: Total Site Imperviousness for S-Year Event: Effective Imperviousness for S-Year Event: Effective Imperviousness for S-Year Event: Effective Imperviousness for S-Year Event: Effective Imperviousness for JO-Year Event: DO-Year Event CREDIT: Reduce Detention By: This line only for JO-Year Event 100-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: This Imperviousness for JO-Year Event IDO-Year Event CREDIT: Reduce Detention By: IDO-Year Event CRE	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% N/A 0.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 1.00 35.7% 35.7% 35.7% 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 50.3% 50.3% 50.3% 50.3%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/.
Separate Pervious Area (SPA, %) A, (RPA / UA) I, Check // I for WOCV Event: // I for SYear Event: // I for JOY Vear Event: // I for OVOV Far Event: IRF for OVOV Event: IRF for OVVEAR Event: IRF for OVVEAR Event: IRF for OVVEAR Event: IRF for OVVEAR Event: Effective Imperviousness for SY-Bar Event: Effective Imperviousness for VOVVE Event: Ide Vove Interviousness for VOVVE Event: Ide Culty CREDIT: Reduce Detention By: User Defined CUHP CREDIT: Reduce Detention By:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% N/A	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% N/A	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 65.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	0.0% 64.3% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 1.00 35.7% 35.7% 35.7% 35.7% 35.7%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 50.3% 50.3% 50.3% 50.3%	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A	N/A	N/A	N//
Separate Pervious Area (SPA, %) A _a (RPA / UA) A _a (RPA / UA) I _b Check (f / I for WCCV Event: f / I for S-Year Event: f / I for OPVear Event: IRF for OPVear Event: IRF for VCV Event: IRF for OPVear Event: IRF for OPVear Event: IRF for OPVear Event: IRF for OPVear Event: Effective Imperviousness for S-Year Event: Effective Imperviousness for JO-Year Event: Effective Imperviousness for JO-Year Event: Effective Imperviousness for JO-Year Event: Effective Imperviousness for Optional User Defined Storm CUHP: D/ EFFECTIVE IMPERVIOUSNESS CREDITS WQCV Event CREDIT: Reduce Detention By: Tis line on fy OU-Year Event 100-Year Event CREDIT**: Reduce Detention By: Tis line on fy OU-Year Event	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 7.7 0.5 0.3 0.0% 0.0% 0.0% N/A 0.0% 0.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 65.0% 65.0% 9 0.0% N/A 0.0% WQCV Event:	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0%	35.0% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	0.0% 64.3% 0.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 35.7% 35.7% 35.7% 35.7% 0.0% N/A 0.0% N/A 0.0%	0.0% 49.7% 0.000 1.000 1.7 0.5 0.3 1.00 1.00 1.00 1.00 1.00 50.3% 50.3% 50.3% 50.3%	N/A N/A	N/A N/A	N/A N/A	N/A N/A -3.	N/A N/A	N/A N/A	N/A N/A	N//

		•		•	nent (L ervious F	•	•		•						
			LID Credi						ethod						
User Ing	t			UD	D-BMP (Version	n 3.06, Novem	ber 2016)								
Osering	л														
Calculated	cells				Designer:		TJE								
					Company:		Galloway								
***Design Storm: 1-Hour Rain Depth WQCV Ev		0.60	inches		Date:		March 3,								
***Minor Storm: 1-Hour Rain Depth 5-Year Ev		1.50	inches		Project:		Grandviev	v Reserve							
••••Major Storm: 1-Hour Rain Depth 100-Year E Optional User Defined Storm CUHP	/ent	2.52	inches		Location:		Pond E								
(CUHP) NOAA 1 Hour Painfall Donth and			1												
Frequency for User Defined Storm	/ent														
Max Intensity for Optional User Defined Storm 0															
E INFORMATION (USER-INPUT)															
Sub-basin	dentifier	E-1	E-2	E-3	E-4	E-5									
Receiving Pervious Area	Joil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam									
Total Area (ac., Sum of DCIA, UIA, RPA	ι, & SPA)	5.130	5.420	3.200	6.280	1.130									
Directly Connected Impervious Area (DC	,,	3.335	3.523	2.080	4.082	0.023									
Unconnected Impervious Area (U		0.000	0.000	0.000	0.000	0.000									
Receiving Pervious Area (RF		0.000	0.000	0.000	0.000	0.000									
Separate Pervious Area (SF		1.796	1.897	1.120	2.198	1.107									
RPA Treatment Type: Convey Volume (V), or Permeable Paver		с	с	с	с	с									
LCULATED RESULTS (OUTPUT)															
Total Calculated Area (ac, check again	st input)	5.130	5.420	3.200	6.280	1.130									
Directly Connected Impervious Area	DCIA, %)	65.0%	65.0%	65.0%	65.0%	2.0%									
Unconnected Impervious Area		0.0%	0.0%	0.0%	0.0%	0.0%									
Receiving Pervious Area		0.0%	0.0%	0.0%	0.0%	0.0%									
Separate Pervious Area		35.0%	35.0%	35.0%	35.0%	98.0%									
A _R (R	PA / UIA)	0.000	0.000	0.000	0.000	0.000									
	Oharda	1.000	1 000	1 000		1 000									
f / I for WO	I _a Check	1.000	1.000	1.000	1.000	1.000									
f / I for WQ f / I for 5-Ye	V Event:	1.7	1.7	1.7	1.7	1.7									
f / I for WQ f / I for 5-Ye f / I for 100-Ye	CV Event: ar Event:														
f / I for 5-Ye f / I for 100-Ye	CV Event: ar Event: ar Event:	1.7 0.5	1.7 0.5	1.7 0.5	1.7 0.5	1.7 0.5									
f / I for 5-Ye	CV Event: ar Event: ar Event: m CUHP:	1.7 0.5	1.7 0.5	1.7 0.5	1.7 0.5	1.7 0.5									
f / I for 5-Ye f / I for 100-Ye f / I for Optional User Defined Stor	CV Event: ar Event: ar Event: m CUHP: CV Event:	1.7 0.5 0.3	1.7 0.5 0.3	1.7 0.5 0.3	1.7 0.5 0.3	1.7 0.5 0.3									
f / I for 5-Ye f / I for 100-Ye f / I for Optional User Defined Stor IRF for WQt	EV Event: ar Event: ar Event: m CUHP: EV Event: ar Event:	1.7 0.5 0.3 1.00	1.7 0.5 0.3 1.00	1.7 0.5 0.3 1.00	1.7 0.5 0.3 1.00	1.7 0.5 0.3 1.00									
f / I for 5-Ye f / I for 100-Ye f / I for Optional User Defined Stor IRF for VQu IRF for 5-Ye	EV Event: ar Event: ar Event: m CUHP: EV Event: ar Event: ar Event:	1.7 0.5 0.3 1.00 1.00	1.7 0.5 0.3 1.00 1.00	1.7 0.5 0.3 1.00 1.00	1.7 0.5 0.3 1.00 1.00	1.7 0.5 0.3 1.00 1.00									
f / I for 5-Ye f / I for 10-Ye f / I for Optional User Defined Stor IRF for WQi IRF for S-Ye IRF for 20-Ye IRF for Optional User Defined Stor Total Site Imperviousr	CV Event: ar Event: ar Event: m CUHP: CV Event: ar Event: ar Event: m CUHP: ess: I _{total}	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 2.0%									
f / I for 5-Ye f / I for 100-Ye f / I for 100-Ye I f / I for Optional User Defined Stor I RF for Ye I RF for Ye I RF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for WQ	V Event: ar Event: ar Event: m CUHP: V Event: ar Event: ar Event: m CUHP: ess: I _{total} V Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0%									
f / I for 5-Ye f / I for 100-Ye f / I for Optional User Defined Stor IRF for S-Ye IRF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for V/Qi Effective Imperviousness for 5-Ye	V Event: ar Event: ar CUHP: V Event: ar Event: ar Event: ar Event: ess: I _{total} V Event: ar Event: ar Event: ar Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0% 2.0%									
f / I for 5-Ye f / I for 100-Ye f / I for Optional User Defined Stor IRF for WQU IRF for 5-Ye IRF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for WQU Effective Imperviousness for 5-Ye Effective Imperviousness for 5-Ye	V Event: ar Event: ar Event: m CUHP: V Event: ar Event: ar Event: ar Event: ess: I _{total} V Event: ar Event: ar Event: ar Event: ar Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0%									
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f / I for 5-Ye f / I for 10-Ye f / I for 10-Ye IRF for WQi IRF for WQi IRF for S-Ye IRF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for 5-Ye Effective Imperviousness for 10-Ye Effective Imperviousness for 10-Ye	V Event: ar Event: ar Event: m CUHP: V Event: ar Event: ar Event: ar Event: ess: I _{total} V Event: ar Event: ar Event: ar Event: ar Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0% 2.0%									
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f / 1 for 5-Ye f / 1 for 100-Ye f / 1 for 100-Ye IRF for QDIonal User Defined Stor IRF for AVQi IRF for 3-Ye IRF for QDIonal User Defined Stor Total Site Impervious Effective Imperviousness for VOV Effective Imperviousness for 5-Ye Effective Imperviousness for 100-Ye Effective Imperviousness for 100-Ye Effective Imperviousness for 100-Ye Effective Imperviousness for ODIONE Effective Imperviousness for ODIONE Effective Imperviousness for ODIONE Effective Imperviousness for ODIONE D / EFFECTIVE IMPERVIOUSNESS CREDITS WC/C VEVent CREDIT: Reduce Deter	EV Event: ar Eve	1.7 0.5 0.3 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 5.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0% 2.0% 0.0%	N/A	N/A				N/A	N/A	N/A N/A	
f / 1 for 5.ve f / 1 for 10.ve f / 1 for 100.ve f / 1 for Optional User Defined Stor IRF for WQU IRF for S.ve IRF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for 5.ve Effective Imperviousness for 10.ve Effective Imperviousness for 10.ve Effective Imperviousness for 5.ve Effective Imperviousness for 5.ve UQCV Event CREDIT: Reduce Dette This line only for 10.vr	EV Event: ar Event: ar Event: T Event: ar Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 2.0% 2.0% 2.0% 2.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N//
f / 1 for 5-Ye f / 1 for 100-Ye f / 1 for Optional User Defined Stor IRF for VQU IRF for S-Ye IRF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for VQU Effective Imperviousness for 5-Ye Effective Imperviousness for 100-Ye Effective Imperviousness for 100-Ye Effective Imperviousness for 100-Ye Effective Imperviousness for 2010-Ye Effective Imperviousness for 2010-Ye WC/V Event CREDIT: Reduce Dete	EV Event: ar Event: ar Event: W Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event thion By: the Event ar Event ar Event ar Event	1.7 0.5 0.3 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 5.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0% 2.0% 0.0%									N//
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f / 1 for 5.ve f / 1 for 10.ve f / 1 for 10.ve f / 1 for Optional User Defined Stor IRF for VQU IRF for 5.ve IRF for Optional User Defined Stor Total Ste Impervious Effective Imperviousness for 100-ve Effective Imperviousness for 0.ptional User Defined Stor Ve Effective Imperviousness for Optional User Defined Stor Total Stor Ve Effective Imperviousness for Optional User Defined Stor Ve Effective Imperviousness for 0.ptional User Defined Stor Total Interviousness for 0.ptional User Defined Stor Ve Ffective Imperviousness for 0.ptional User Defined Stor Ve Ffective Imperviousness for 0.ptional User Defined Stor Ve Ffective Imperviousness for 0.ptional User Defined Stor	EV Event: ar Event: ar Event: W Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event: ar Event thion By: the Event ar Event ar Event ar Event	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 2.0% 2.0% 2.0% 2.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
f / 1 for 5.ve f / 1 for 10.ve f / 1 for Optional User Defined Star IRF for VQU IRF for S.ve IRF for Optional User Defined Star Total Site Impervious Effective Imperviousness for 50.ve Effective Imperviousness for 100.ve Effective Imperviousness for 100.ve D / EffectTVE IMPERVIOUSNESS CREDITS INGUE VEWENT CREDIT: Reduce Dete User Defined CUHP CREDIT: Reduce Dete User Defined CUHP CREDIT: Reduce Dete	V Event: ar Event: ar Event: ar Event: v Event: v Event: ar Event: ar Event: ar Event: v Event: ar E	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 0.0% N/A 0.0% Total Site Imy viousness for	1.7 0.5 0.3 1.00 1.00 65.0% 65.0% 65.0% 0.0% N/A 0.0% Perviousness: WQCV Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% 61.6% 61.6%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0% 2.0% 2.0% 0.0% N/A -354.7% Notes:	N/A N/A -Ampt averaş	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A
f / 1 for 5.ve f / 1 for 10.ve f / 1 for 0ptional User Defined Stor IRF for WQU IRF for S-Ve IRF for Optional User Defined Stor Total Site Impervious Effective Imperviousness for 50-Ve Effective Imperviousness for 10.ve Effective Imperviousness for 10.ve USCV Event CREDIT: Reduce Dete User Defined CUHP CREDIT: Reduce Dete	V Event: ar Event: to UHP: the ar Event: the ar Event: th	1.7 0.5 0.3 1.00 1.00 1.00 5.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 0.0% N/A 0.0% N/A 0.0% Store Vent: 5-Year Event:	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0% 65.0% 65.0% 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 1.00 65.0% 65.0% 65.0%	1.7 0.5 0.3 1.00 1.00 2.0% 2.0% 2.0% 2.0% 2.0% 2.0% 2.0% 2	N/A N/A -Ampt averag	N/A N/A ge infiltratio	N/A N/A	N/A N/A from Table 3 n empirical e	N/A N/A	N/A	N/A N/A	N/A N/A	N/A





DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

	Project: Grandview	- Pond A
	Basin ID:	
100-1701		
VOLUME EURY WOCY		100-YEAR
PERMANENT	ZONE 1 AND 2 ORIFICES	ORIFICE
	xample Zone Configurati	on (Retention Pond)

Watershed Information

tersneu miormation		
Selected BMP Type =	EDB	
Watershed Area =	35.45	acres
Watershed Length =	2,360	ft
Watershed Length to Centroid =	1,180	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	64.90%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

uic	embedded colorado orban nyaro	graphinoccua	10.	Optional U
Water Q	uality Capture Volume (WQCV) =	0.750	acre-feet	
Exces	s Urban Runoff Volume (EURV) =	2.854	acre-feet	
2-yr	Runoff Volume (P1 = 1.19 in.) =	2.109	acre-feet	1.19
5-)	r Runoff Volume (P1 = 1.5 in.) =	2.766	acre-feet	1.50
10-yr	Runoff Volume (P1 = 1.75 in.) =	3.293	acre-feet	1.75
25	5-yr Runoff Volume (P1 = 2 in.) =	3.982	acre-feet	2.00
50-yr	Runoff Volume (P1 = 2.25 in.) =	4.658	acre-feet	2.25
100-yr	Runoff Volume (P1 = 2.52 in.) =	5.480	acre-feet	2.52
500-yr	Runoff Volume (P1 = 3.68 in.) =	8.908	acre-feet	3.68
Appr	oximate 2-yr Detention Volume =	1.856	acre-feet	
Appr	oximate 5-yr Detention Volume =	2.427	acre-feet	
Appro	ximate 10-yr Detention Volume =	2.926	acre-feet	
Appro	ximate 25-yr Detention Volume =	3.521	acre-feet	
Appro	ximate 50-yr Detention Volume =	3.880	acre-feet	
Approx	imate 100-yr Detention Volume =	4.254	acre-feet	

Define Zones and Basin Geometry

enne zones and basin deonied y		
Zone 1 Volume (WQCV) =	0.750	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.104	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.400	acre-feet
Total Detention Basin Volume =	4.254	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

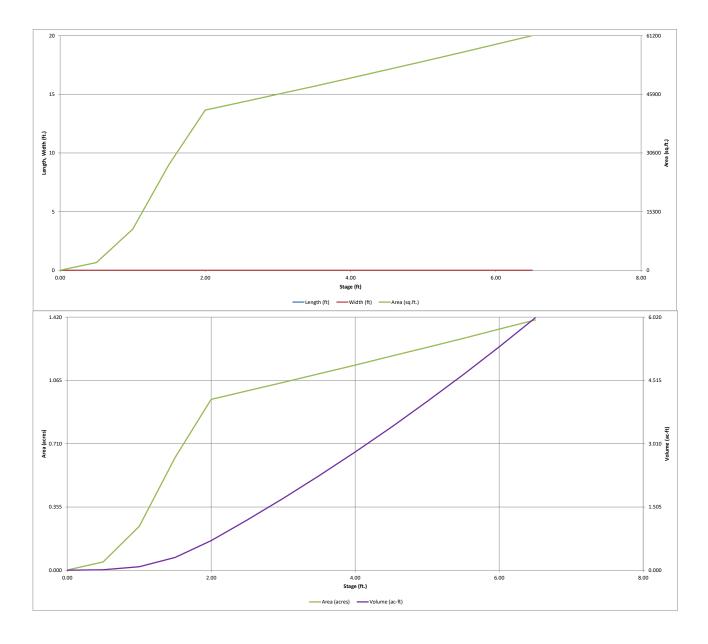
Calculated Total Basin Volume (V_{total}) = user

ft³ acre-feet

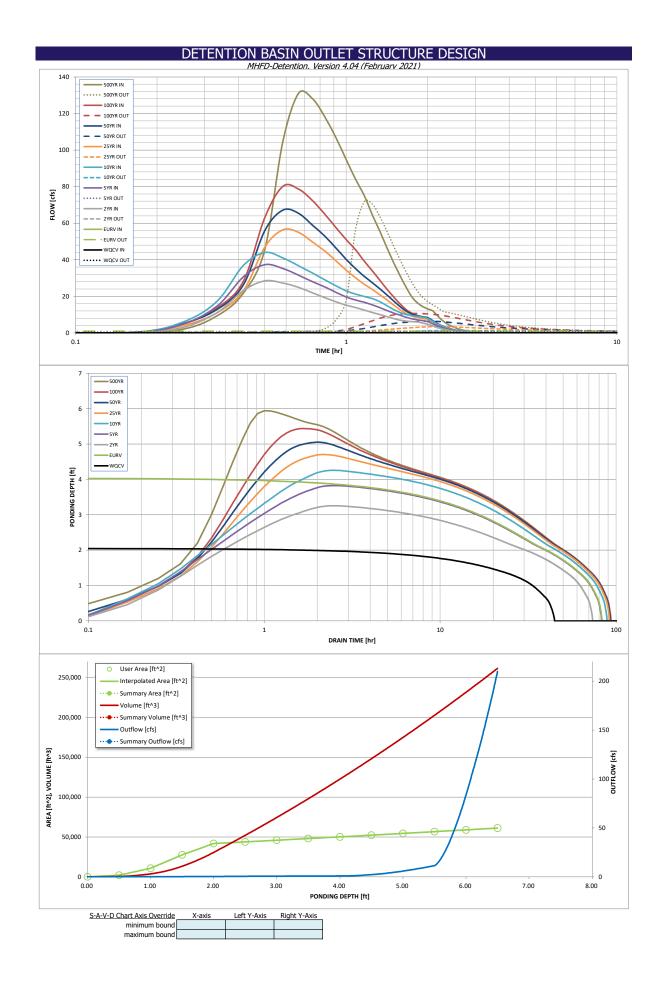
	Depth Increment =	0.50	ft Optional		1		Optional			
d)	Stage - Storage Description	Stage (ft)	Override Stage (ft)	Length (ft)	Width (ft)	Area (ft ²)	Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)
	Top of Micropool		0.00				35	0.001		
	6971		0.50				2,047	0.047	520	0.012
	6072		1.00				10,771 27,585	0.247	3,725	0.086
	6972		1.50 2.00				41,785	0.633	13,313 30,656	0.306
	6973		2.50				43,839	1.006	52,062	1.195
			3.00				45,918	1.054	74,501	1.710
	6974		3.50				48,022	1.102	97,986	2.249
	6075		4.00				50,151	1.151	122,529	2.813
	6975		4.50 5.00				52,306 54,486	1.201	148,144 174,842	3.401 4.014
	6976		5.50				56,691	1.301	202,636	4.652
			6.00				58,921	1.353	231,538	5.315
	6977		6.50				61,176	1.404	261,562	6.005
al User Overrides										
acre-feet acre-feet										
19 inches										
50 inches										
75 inches										
00 inches										
25 inches										
52 inches 68 inches										

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



			<u>DASIN UU</u>	ILE <u>I SIRU</u>	CTURE DE				
Project	Grandview - Pond	МН		ision 4.04 (Februar					
Basin ID:		~							
ZONE 3				Estimated	Estimated				
				Stage (ft)	Volume (ac-ft)	Outlet Type			
VOLUME EURY WOCY			Zone 1 (WQCV)	2.05	0.750	Orifice Plate]		
	100-YEAR ORIFICE		Zone 2 (EURV)	4.04	2.104	Rectangular Orifice	1		
PERMANENT ORIFICES	ORIFICE		Zone 3 (100-year)	5.20	1.400	Weir&Pipe (Restrict)			
POOL Example Zone	Configuration (Re	tention Pond)	. , ,	Total (all zones)	4.254		1		
User Input: Orifice at Underdrain Outlet (typical	y used to drain WQ	CV in a Filtration BN	<u>4P)</u>			1	Calculated Parame	ters for Underdrain	
Underdrain Orifice Invert Depth =	N/A	ft (distance below	the filtration media	surface)	Under	drain Orifice Area =	N/A	ft²	
Underdrain Orifice Diameter =	N/A	inches			Underdrai	n Orifice Centroid =	N/A	feet	
User Input: Orifice Plate with one or more orific Invert of Lowest Orifice =	0.00		to drain WQCV and bottom at Stage =			ice Area per Row =	Calculated Parame 1.979E-02	<u>ters for Plate</u> ft ²	
Depth at top of Zone using Orifice Plate =	2.05	• •	bottom at Stage = bottom at Stage =	•	-	iptical Half-Width =	N/A	feet	
Orifice Plate: Orifice Vertical Spacing =	8.20	inches	- bottom ut Stuge	010		ical Slot Centroid =	N/A	feet	
Orifice Plate: Orifice Area per Row =	2.85	sq. inches (diamete	er = 1-7/8 inches)			Elliptical Slot Area =	N/A	ft ²	
			. ,			•	,	1	
User Input: Stage and Total Area of Each Orific		-		1	1	Т	1	1	Ъ
	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)	4
Stage of Orifice Centroid (ft)		0.70	1.40						+
Orifice Area (sq. inches)	2.85	2.85	2.85						J
	Row 9 (optional)	Pour 10 (antions)	Pour 11 (antions)	Row 12 (optional)	Pow 12 (antian-I)	Bow 14 (antion-1)	Bow 15 (antions)	Dow 16 (antion-1)	1
Stago of Orifico Controid (ft)		Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)	1
Stage of Orifice Centroid (ft) Orifice Area (sq. inches)									1
onnee Area (sq. menes)									1
User Input: Vertical Orifice (Circular or Rectang	ular)						Calculated Parame	ters for Vertical Ori	fice
	Zone 2 Rectangula	Not Selected					Zone 2 Rectangula	Not Selected]
Invert of Vertical Orifice =	2.05	N/A		n bottom at Stage =		rtical Orifice Area =	0.06	N/A	ft ²
Depth at top of Zone using Vertical Orifice =	4.04	N/A		n bottom at Stage =	0 ft) Vertica	I Orifice Centroid =	0.06	N/A	feet
Vertical Orifice Height =	1.50	N/A	inches						
			i in ala a a						
Vertical Orifice Width =	6.00		inches						
		Outlet Pine OR Rec		al Weir (and No Out	tlet Pine)		Calculated Parame	ters for Overflow W	leir
Vertical Orifice Width =	r Sloped Grate and			al Weir (and No Out	tlet Pipe)		Calculated Parame		/ <u>eir</u>
User Input: Overflow Weir (Dropbox with Flat c		Not Selected	tangular/Trapezoida			e Upper Edge, H _r =	Zone 3 Weir	Not Selected	/eir
	r Sloped Grate and Zone 3 Weir		tangular/Trapezoida	al Weir (and No Ou bottom at Stage = 0 fi) Height of Grat	e Upper Edge, H _t = Veir Slope Length =	r]
User Input: Overflow Weir (Dropbox with Flat c Overflow Weir Front Edge Height, Ho =	r Sloped Grate and Zone 3 Weir 4.04	Not Selected N/A	tangular/Trapezoid ft (relative to basin t	bottom at Stage = 0 fl) Height of Grat Overflow V		Zone 3 Weir 4.79	Not Selected N/A	feet
User Input: Overflow Weir (Dropbox with Flat or Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length =	r Sloped Grate and Zone 3 Weir 4.04 3.00	Not Selected N/A N/A	tangular/Trapezoid ft (relative to basin t feet	bottom at Stage = 0 fl Gi	e) Height of Grat Overflow V rate Open Area / 10	Veir Slope Length =	Zone 3 Weir 4.79 3.09 3.74 6.46	Not Selected N/A N/A	feet
User Input: Overflow Weir (Dropbox with Flat or Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope Horiz. Length of Weir Sides = Overflow Grate Type =	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate	Not Selected N/A N/A N/A N/A N/A	tangular/Trapezoid ft (relative to basin t feet H:V feet	bottom at Stage = 0 fl Gi Ov	e) Height of Grat Overflow V rate Open Area / 10 verflow Grate Open	Veir Slope Length = 00-yr Orifice Area =	Zone 3 Weir 4.79 3.09 3.74	Not Selected N/A N/A N/A	feet feet
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides =	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00	Not Selected N/A N/A N/A N/A	tangular/Trapezoid ft (relative to basin t feet H:V	bottom at Stage = 0 fl Gi Ov	e) Height of Grat Overflow V rate Open Area / 10 verflow Grate Open	Veir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 4.79 3.09 3.74 6.46	Not Selected N/A N/A N/A N/A	feet feet ft ²
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % =	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50%	Not Selected N/A N/A N/A N/A N/A N/A	tangular/Trapezoid ft (relative to basin t feet H:V feet %	bottom at Stage = 0 fl Gi ດາ	Height of Grat Overflow V rate Open Area / 10 verflow Grate Oper Overflow Grate Ope	Veir Slope Length = 00-yr Orifice Area = 1 Area w/o Debris = en Area w/ Debris =	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23	Not Selected N/A N/A N/A N/A N/A	feet feet ft ² ft ²
User Input: Overflow Weir (Dropbox with Flat or Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope Horiz. Length of Weir Sides = Overflow Grate Type =	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re	tangular/Trapezoid ft (relative to basin t feet H:V feet %	bottom at Stage = 0 fl Gi ດາ	Height of Grat Overflow V rate Open Area / 10 verflow Grate Oper Overflow Grate Ope	Veir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/	Not Selected N/A N/A N/A N/A N/A Elow Restriction Pl	feet feet ft ² ft ²
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected	tangular/Trapezoidi ft (relative to basin t feet H:V feet % ectangular Orifice)	bottom at Stage = 0 ff Gi O' C	c) Height of Grat Overflow V rate Open Area / 11 verflow Grate Open Overflow Grate Open Overflow Grate Ope	Veir Slope Length = 00-yr Orifice Area = 1 Area w/o Debris = 2 Area w/ Debris = 2 Area w/ Debris = 2 Area Parameter	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected	feet feet ft ² ft ² ft ²
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe =	r Sloped Grate and. Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% C(circular Orifice, R Zone 3 Restrictor 0.25	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	tangular/Trapezoid: ft (relative to basin t feet H:V feet % ectangular Orifice) ft (distance below ba	bottom at Stage = 0 fl Gi ດາ	t) Height of Grat Overflow V rate Open Area / 11 verflow Grate Oper Overflow Grate Oper <u>C</u> = 0 ft) C	Veir Slope Length = 00-yr Orifice Area = Area w/o Debris = en Area w/ Debris = alculated Parameter Nutlet Orifice Area =	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.73	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A	feet feet ft ² ft ² ft ²
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter =	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected	tangular/Trapezoidi ft (relative to basin t feet H:V feet % ectangular Orifice) ft (distance below ba inches	bottom at Stage = 0 ff Gi O C asin bottom at Stage =	c) Height of Grat Overflow Y rate Open Area / 10 verflow Grate Open Overflow Grate Open Overflow Grate Ope C = 0 ft) C	Veir Slope Length = 00-yr Orifice Area = Area w/o Debris = in Area w/ Debris = alculated Parameter Nutlet Orifice Area = t Orifice Centroid =	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected	feet feet ft ² ft ² ft ²
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe =	r Sloped Grate and. Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	tangular/Trapezoid: ft (relative to basin t feet H:V feet % ectangular Orifice) ft (distance below ba	bottom at Stage = 0 ff Gi O C asin bottom at Stage =	c) Height of Grat Overflow Y rate Open Area / 10 verflow Grate Open Overflow Grate Open Overflow Grate Ope C = 0 ft) C	Veir Slope Length = 00-yr Orifice Area = Area w/o Debris = en Area w/ Debris = alculated Parameter Nutlet Orifice Area =	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.73	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A	feet feet ft ² ft ² ft ²
User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter =	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 17.00	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	tangular/Trapezoidi ft (relative to basin t feet H:V feet % ectangular Orifice) ft (distance below ba inches	bottom at Stage = 0 ff Gi O C asin bottom at Stage =	c) Height of Grat Overflow Y rate Open Area / 10 verflow Grate Open Overflow Grate Open Overflow Grate Ope C = 0 ft) C	Veir Slope Length = 00-yr Orifice Area = Area w/o Debris = in Area w/ Debris = alculated Parameter Nutlet Orifice Area = t Orifice Centroid =	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A N/A	feet feet ft ² ft ² ft ²
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User Input: Overflow Weir (Dropbox with Flat of Overflow Weir Front Edge Height, Ho = Overflow Weir Grate Slope = Horiz. Length of Weir Grate Slope Horiz. Length of Weir Grate Slope Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = CUHP Runoff Volume (arce-ft) = One-Hour Rainfall Depth (in) = CUHP Redevelopment Peak Q (cfs) = Predevelopment Unit Peak Flow, q (cfs/arce) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Time to Drain 99% of Inflow Volume (hours) = Time to Drain 99% of Inflow Volume (hours)	r Sloped Grate and Zone 3 Weir 4.04 3.00 4.00 3.00 Type C Grate 50% C(Circular Orifice, R Zone 3 Restrictor 0.25 18.00 17.00 Trapezoidal) 5.50 60.00 4.00 1.00 Trapezoidal) 7 <i>The user can over</i> WQCV N/A 0.750 N/A 0.750 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or R N/A N/A N/A ft (relative to basin feet H:V feet ide the default CUH EURV N/A 2.854 N/A	tangular/Trapezoidi ft (relative to basin t feet H:V feet distance below basin inches inches inches bottom at Stage = 10 bottom at Stage = 119 2.109 2.109 0.2 0.2 0.01 28.5 0.8 N/A Vertical Orifice 1 N/A N/A N/A 64 69	bottom at Stage = 0 ff Gi Ov Casin bottom at Stage = Half-Cent = 0 ft)	 Height of Grat Overflow V rate Open Area / 10 verflow Grate Open Overflow Grate Open C C <l< td=""><td>Veir Slope Length = 20-yr Orifice Area = A rea w/o Debris = an Area w/ Debris = alculated Parameter Nutlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = Design Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard = Cop of Freeboard = Cop of Freeboard = 2.00 3.982 3.982 4.9 0.14 56.4 3.4 0.7 0.7 0.4 N/A 78 85</td><td>Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73 2.67 Calculated Parame 0.57 7.07 1.40 6.00 frographs table (Co. 50 Year 2.25 4.658 9.9 0.28 67.1 6.4 0.6 Overflow Weir 1 0.8 N/A 78 85</td><td>Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A</td><td>F). F). 500 Year radians F). 500 Year 3.68 8.908 43.0 1.21 1.31.1 71.8 1.7 Spillway 2.5 N/A 70 82</td></l<>	Veir Slope Length = 20-yr Orifice Area = A rea w/o Debris = an Area w/ Debris = alculated Parameter Nutlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = Design Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard = Cop of Freeboard = Cop of Freeboard = 2.00 3.982 3.982 4.9 0.14 56.4 3.4 0.7 0.7 0.4 N/A 78 85	Zone 3 Weir 4.79 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73 2.67 Calculated Parame 0.57 7.07 1.40 6.00 frographs table (Co. 50 Year 2.25 4.658 9.9 0.28 67.1 6.4 0.6 Overflow Weir 1 0.8 N/A 78 85	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	F). F). 500 Year radians F). 500 Year 3.68 8.908 43.0 1.21 1.31.1 71.8 1.7 Spillway 2.5 N/A 70 82



DETENTION BASIN OUTLET STRUCTURE DESIGN Outflow Hydrograph Workbook Filename:

						th inflow hydrog				CUIUD
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]		50 Year [cfs]	100 Year [cfs]	
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.03	2.01
	0:15:00 0:20:00	0.00	0.00	2.98	4.84	6.01	4.04 10.97	5.10	4.94	9.29
	0:25:00	0.00	0.00	11.08 23.17	14.67 30.62	17.31 36.83	22.92	12.83 26.21	13.68 28.19	21.63 45.46
	0:30:00	0.00	0.00	28.50	37.33	44.00	46.89	55.86	62.97	104.50
	0:35:00	0.00	0.00	27.28	35.17	41.02	56.36	67.15	80.13	131.14
	0:40:00	0.00	0.00	24.87	31.53	36.67	54.99	65.39	78.64	128.15
	0:45:00	0.00	0.00	21.92	28.05	32.75	49.70	58.94	72.37	118.25
	0:50:00	0.00	0.00	19.29	25.12	29.06	44.82	52.96	64.98	106.76
	0:55:00	0.00	0.00	17.03	22.20	25.74	39.41	46.40	57.57	94.76
	1:00:00 1:05:00	0.00	0.00	15.15	19.65	22.96	34.34	40.23	51.00	84.00
	1:10:00	0.00	0.00	13.89 12.49	17.95 16.74	21.18 19.90	30.12 26.57	35.11 30.87	45.41 39.18	74.97 64.47
	1:15:00	0.00	0.00	11.16	15.34	19.90	23.71	27.45	33.86	55.30
	1:20:00	0.00	0.00	9.98	13.75	17.01	20.77	23.98	28.60	46.32
	1:25:00	0.00	0.00	8.85	12.20	14.79	17.97	20.66	23.78	38.18
	1:30:00	0.00	0.00	7.79	10.79	12.74	15.15	17.36	19.55	31.09
[1:35:00	0.00	0.00	6.92	9.65	11.09	12.57	14.33	15.79	24.76
	1:40:00	0.00	0.00	6.38	8.49	10.04	10.46	11.83	12.65	19.52
	1:45:00	0.00	0.00	6.11	7.66	9.43	9.11	10.28	10.68	16.36
	1:50:00	0.00	0.00	5.97	7.10	9.03	8.31	9.35	9.50	14.41
	1:55:00 2:00:00	0.00	0.00	5.38	6.68	8.59	7.79	8.77	8.73	13.10
	2:05:00	0.00	0.00	4.79	6.22	7.94	7.43	8.36	8.19	12.17
	2:10:00	0.00	0.00	3.84 2.96	5.02 3.86	6.39 4.92	6.01 4.60	6.75 5.16	6.52 4.90	9.62 7.18
	2:15:00	0.00	0.00	2.28	2.97	3.78	3.52	3.95	3.70	5.38
	2:20:00	0.00	0.00	1.75	2.27	2.87	2.68	3.00	2.81	4.08
	2:25:00	0.00	0.00	1.33	1.72	2.16	2.02	2.27	2.13	3.08
	2:30:00	0.00	0.00	1.00	1.27	1.61	1.50	1.68	1.59	2.30
	2:35:00	0.00	0.00	0.74	0.93	1.19	1.11	1.24	1.18	1.71
	2:40:00	0.00	0.00	0.54	0.68	0.89	0.83	0.93	0.89	1.28
	2:45:00	0.00	0.00	0.38	0.48	0.63	0.60	0.67	0.64	0.92
	2:50:00	0.00	0.00	0.24	0.33	0.42	0.41	0.46	0.44	0.62
	2:55:00	0.00	0.00	0.14	0.20	0.26	0.26	0.29	0.27	0.38
	3:00:00 3:05:00	0.00	0.00	0.07	0.11	0.13	0.14	0.15	0.14	0.20
	3:10:00	0.00	0.00	0.03	0.05	0.05	0.08	0.06	0.06	0.08
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00 4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
]	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00 4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ļ	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00 5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00 5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00 5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ²]	Area [acres]	Volume [ft ³]	Volume [ac-ft]	Total Outflow [cfs]	
							For best results, include the
							stages of all grade slope
							changes (e.g. ISV and Floor) from the S-A-V table on
							Sheet 'Basin'.
							4
							Also include the inverts of all outlets (e.g. vertical orifice,
							overflow grate, and spillway
							overflow grate, and spillway where applicable).
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MHFD-Detention, Version 4.04 (February 2021)

Pr	oject: Grandview - Pond B
Bas	in ID:
	2011 2 20
POOL Example	Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB					
Watershed Area =	28.28	acres				
Watershed Length =	1,700	ft				
Watershed Length to Centroid =	850	ft				
Watershed Slope =	0.020	ft/ft				
Watershed Imperviousness =	64.20%	percent				
Percentage Hydrologic Soil Group A =	100.0%	percent				
Percentage Hydrologic Soil Group B =	0.0%	percent				
Percentage Hydrologic Soil Groups C/D =	0.0%	percent				
Target WQCV Drain Time =	40.0	hours				
Location for 1-hr Rainfall Depths = User Input						

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

the embedded colorado orban nyaro	graphinioceau		Optional U
Water Quality Capture Volume (WQCV) =	0.592	acre-feet	
Excess Urban Runoff Volume (EURV) =	2.245	acre-feet	
2-yr Runoff Volume (P1 = 1.19 in.) =	1.658	acre-feet	1.19
5-yr Runoff Volume (P1 = 1.5 in.) =	2.175	acre-feet	1.50
10-yr Runoff Volume (P1 = 1.75 in.) =	2.590	acre-feet	1.75
25-yr Runoff Volume (P1 = 2 in.) =	3.137	acre-feet	2.00
50-yr Runoff Volume (P1 = 2.25 in.) =	3.674	acre-feet	2.25
100-yr Runoff Volume (P1 = 2.52 in.) =	4.327	acre-feet	2.52
500-yr Runoff Volume (P1 = 3.68 in.) =	7.052	acre-feet	3.68
Approximate 2-yr Detention Volume =	1.460	acre-feet	
Approximate 5-yr Detention Volume =	1.909	acre-feet	
Approximate 10-yr Detention Volume =	2.303	acre-feet	
Approximate 25-yr Detention Volume =	2.773	acre-feet	
Approximate 50-yr Detention Volume =	3.057	acre-feet	
Approximate 100-yr Detention Volume =	3.355	acre-feet	

Define Zones and Basin Geometry

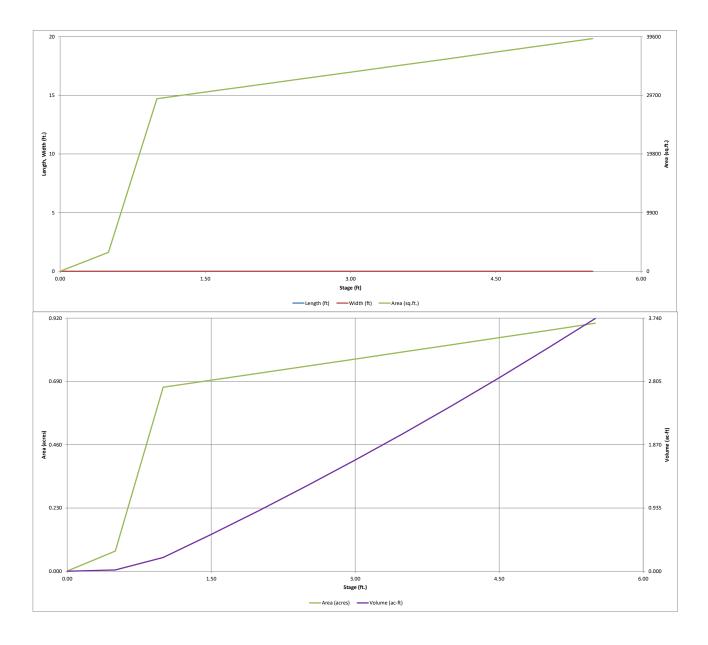
chine zones and basin deomedy		
Zone 1 Volume (WQCV) =	0.592	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.653	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.110	acre-feet
Total Detention Basin Volume =	3.355	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	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
Colordate d Total Deale Maluera (M. 1)		a sure for at

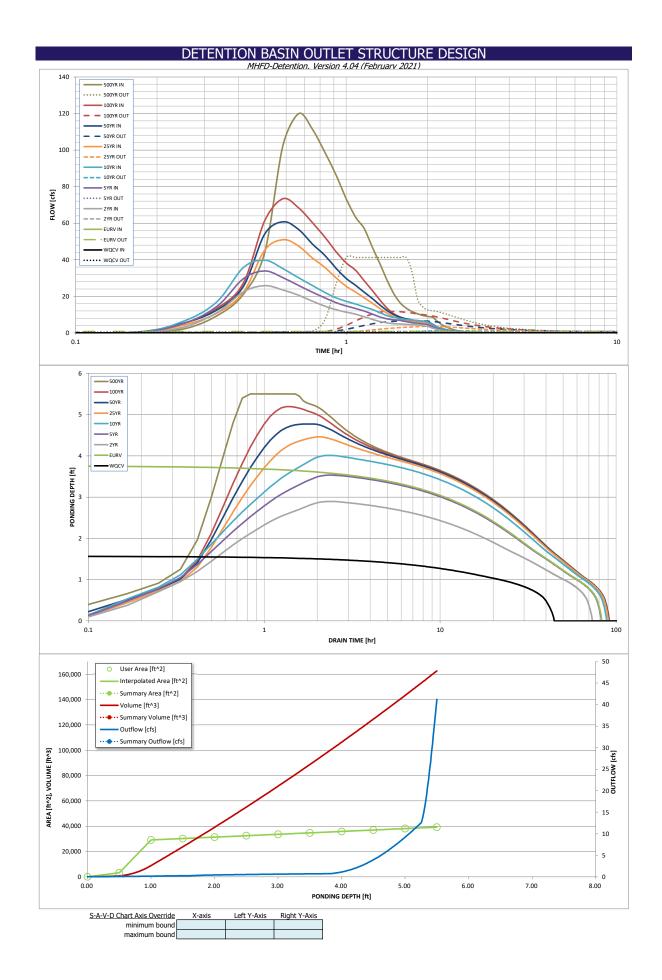
Calculated Total Basin Volume (V_{total}) = user

acre-feet

	Depth Increment =	0.50	ft				Optional			
d)	Stage - Storage	Stage	Optional Override	Length	Width	Area	Override	Area	Volume	Volume
	Description	(ft)	Stage (ft)	(ft)	(ft)	(ft ²)	Area (ft ²)	(acre)	(ft 3)	(ac-ft)
	Top of Micropool		0.00				35	0.001	800	0.019
	6964		1.00				3,203 29,135	0.669	809 8,894	0.019
	0504		1.50				30,250	0.694	23,740	0.204
	6965		2.00				31,366	0.720	39,144	0.899
			2.50				32,485	0.746	55,107	1.265
	6966		3.00				33,606	0.771	71,629	1.644
			3.50				34,729	0.797	88,713	2.037
	6967		4.00 4.50				35,856 36,987	0.823	106,360 124,570	2.442 2.860
	6968		5.00				38,126	0.875	124,570	3.291
	6968.5		5.50				39,275	0.902	162,698	3.735
al User Overrides										
acre-feet acre-feet										
19 inches										
50 inches										
75 inches										
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68 inches										
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MHFD-Detention, Version 4.04 (February 2021)





DETENTION BASIN OUTLET STRUCTURE DESIGN Outflow Hydrograph Workbook Filename:

	The user can o	verride the calcu	lated inflow hyd	lrographs from t	his workbook wi	th inflow hydrog	raphs developed	l in a separate pr	ogram.	
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.04	2.10
	0:15:00	0.00	0.00	3.12	5.08	6.29	4.23	5.28	5.16	9.38
	0:20:00	0.00	0.00	11.10 22.43	14.55 29.65	17.11 35.73	10.80 22.18	12.57 25.29	13.48 27.23	21.07 43.95
	0:30:00	0.00	0.00	25.88	33.87	39.78	45.24	54.14	61.34	102.23
	0:35:00	0.00	0.00	23.48	30.21	35.16	50.99	60.80	73.32	119.91
	0:40:00	0.00	0.00	20.59	25.95	30.11	47.49	56.55	68.34	111.46
	0:45:00	0.00	0.00	17.37	22.25	25.97	40.94	48.58	60.30	98.87
	0:50:00	0.00	0.00	14.67 12.68	19.22 16.55	22.13 19.18	35.95 30.13	42.50 35.41	52.43 44.46	86.49 73.33
	1:00:00	0.00	0.00	11.36	14.74	17.30	25.51	29.79	38.28	63.34
	1:05:00	0.00	0.00	10.30	13.31	15.75	22.37	26.02	34.22	56.90
	1:10:00	0.00	0.00	8.77	11.93	14.22	19.15	22.17	28.36	46.74
	1:15:00	0.00	0.00	7.35	10.30	12.78	16.26	18.74	23.10	37.66
	1:20:00	0.00	0.00	6.19	8.73	11.04	13.24	15.17	17.84	28.73
	1:30:00	0.00	0.00	5.43 5.03	7.68	9.41 8.41	10.75 8.74	12.22 9.89	13.46 10.46	21.35 16.40
	1:35:00	0.00	0.00	4.82	6.82	7.78	7.52	8.48	8.72	13.50
	1:40:00	0.00	0.00	4.70	6.16	7.32	6.76	7.61	7.66	11.68
	1:45:00	0.00	0.00	4.62	5.61	7.00	6.25	7.03	6.93	10.42
	1:50:00	0.00	0.00	4.56	5.22	6.77	5.91	6.64	6.44	9.57
	1:55:00 2:00:00	0.00	0.00	3.99 3.50	4.93 4.57	6.44 5.86	5.67 5.50	6.38 6.19	6.08 5.85	8.95 8.56
	2:05:00	0.00	0.00	2.63	3.44	4.39	4.16	4.67	4.40	6.42
	2:10:00	0.00	0.00	1.92	2.49	3.17	3.00	3.37	3.18	4.62
	2:15:00	0.00	0.00	1.39	1.80	2.28	2.17	2.43	2.31	3.35
	2:20:00	0.00	0.00	1.00	1.28	1.64	1.56	1.75	1.67	2.42
	2:25:00 2:30:00	0.00	0.00	0.70	0.89	1.15	1.09	1.22	1.17	1.69
	2:35:00	0.00	0.00	0.47	0.60	0.80	0.76	0.85	0.81	1.17 0.81
	2:40:00	0.00	0.00	0.18	0.26	0.33	0.33	0.37	0.35	0.51
	2:45:00	0.00	0.00	0.09	0.14	0.18	0.19	0.21	0.20	0.28
	2:50:00	0.00	0.00	0.04	0.06	0.07	0.08	0.09	0.08	0.11
	2:55:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
	3:00:00 3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00 3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00 4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00 4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00 4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00 5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00 5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00 5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00 6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ²]	Area [acres]	Volume [ft ³]	Volume [ac-ft]	Total Outflow [cfs]	
							For best results, include the
							stages of all grade slope
							changes (e.g. ISV and Floor) from the S-A-V table on
							Sheet 'Basin'.
							_
							Also include the inverts of all
							outlets (e.g. vertical orifice,
							overflow grate, and spillway, where applicable).
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Project:	Grandview - Pond C
Basin ID:	
	AND 1 100 YEAR OWFICE
	Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB					
Watershed Area =	43.20	acres				
Watershed Length =	1,890	ft				
Watershed Length to Centroid =	1,050	ft				
Watershed Slope =	0.020	ft/ft				
Watershed Imperviousness =	62.00%	percent				
Percentage Hydrologic Soil Group A =	100.0%	percent				
Percentage Hydrologic Soil Group B =	0.0%	percent				
Percentage Hydrologic Soil Groups C/D =	0.0%	percent				
Target WQCV Drain Time =	40.0	hours				
Location for 1-hr Rainfall Depths = User Input						

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

the embedded Colorado Urban Hydro	graph Procedu	ure.	Optional Use	r Overrid
Water Quality Capture Volume (WQCV) =	0.875	acre-feet		acre-fe
Excess Urban Runoff Volume (EURV) =	3.280	acre-feet		acre-fe
2-yr Runoff Volume (P1 = 1.19 in.) =	2.439	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	3.207	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	3.822	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.648	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	5.461	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	6.456	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	10.609	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	2.129	acre-feet		
Approximate 5-yr Detention Volume =	2.787	acre-feet		
Approximate 10-yr Detention Volume =	3.367	acre-feet		
Approximate 25-yr Detention Volume =	4.064	acre-feet		
Approximate 50-yr Detention Volume =	4.487	acre-feet		
Approximate 100-yr Detention Volume =	4.941	acre-feet		

Define Zones and Basin Geometry

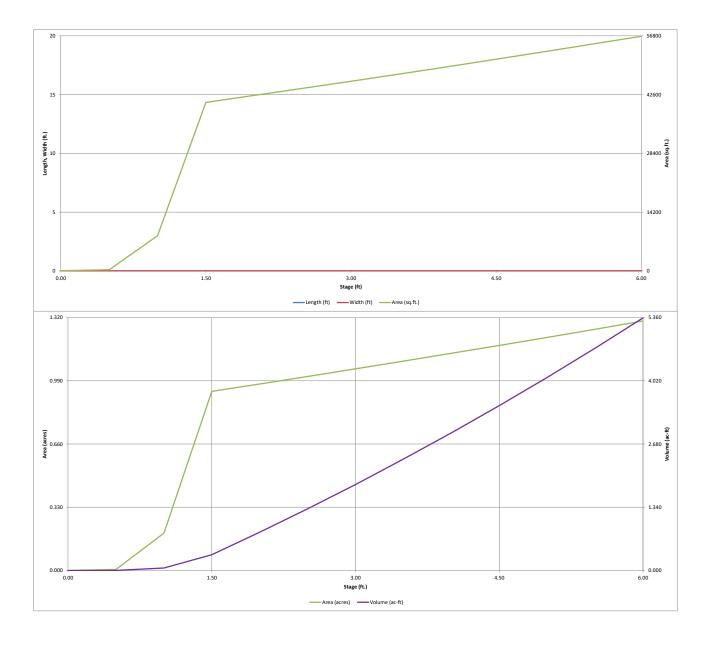
The Lones and Basin Besined)		
Zone 1 Volume (WQCV) =	0.875	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.405	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.661	acre-feet
Total Detention Basin Volume =	4.941	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	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 Pacin Volume (V) =		acro foot

Calculated Total Basin Volume (V_{total}) = user

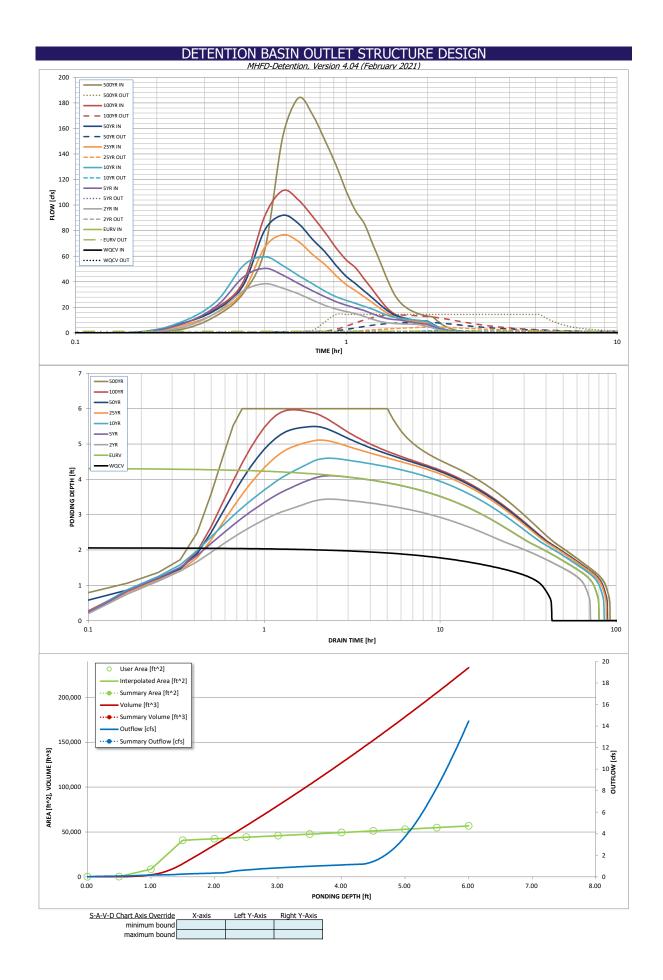
acre-feet

	Depth Increment = Stage - Storage Description	0.50 Stage (ft)	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				35	0.001		
-	6927		0.50				246	0.006	70	0.002
			1.00				8,508	0.195	2,258	0.052
	6928		1.50				40,729	0.935	14,567	0.334
			2.00				42,406	0.974	35,351	0.812
-	6929		2.50				44,107	1.013	56,979	1.308
-	6020		3.00				45,833	1.052	79,464	1.824
-	6930		3.50				47,584	1.092	102,818 127,054	2.360
-	6021		4.00				49,360	1.133	-	2.917
-	6931		4.50 5.00				51,160 52,986	1.174 1.216	152,184 178,221	3.494 4.091
-	6932		5.50				54,836	1.259	205,176	4.710
-	6932.5		6.00				56,711	1.302	233,063	5.350
-	000210		0.00				50,711	1.502	233,003	5.550
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	DE	: LEN LION	BASIN OU	ILEI SIRU	CTURE DE	SIGN			
Declaration	Grandview - Pond	МН		sion 4.04 (Februar					
Basin ID:		<u> </u>							
ZONE 3				Estimated	Estimated				
100-YR				Stage (ft)	Volume (ac-ft)	Outlet Type	_		
VOLUME EURY WOCY			Zone 1 (WQCV)	2.07	0.875	Orifice Plate]		
	100-YEAR ORIFICE		Zone 2 (EURV)	4.32	2.405	Rectangular Orifice	1		
PERMANENT ORIFICES			Zone 3 (100-year)	5.69	1.661	Weir&Pipe (Restrict)			
POOL Example Zone	Configuration (Re	tention Pond)		Total (all zones)	4.941		1		
Jser Input: Orifice at Underdrain Outlet (typicall	<u>y used to drain WQ</u>	CV in a Filtration BN	<u>1P)</u>			-	Calculated Parame	ters for Underdrain	
Underdrain Orifice Invert Depth =	N/A		the filtration media	surface)		drain Orifice Area $=$	N/A	ft²	
Underdrain Orifice Diameter =	N/A	inches			Underdrair	n Orifice Centroid =	N/A	feet	
Icor Input: Orifico Plato with and or more orific	oc or Elliptical Clot \	Noir (typically used	to drain WOCV and	d/or EUDV/ in a codir	montation RMD)		Coloridate d Demana	have fair Diata	
Jser Input: Orifice Plate with one or more orifice Invert of Lowest Orifice =		1	bottom at Stage =			ice Area per Row =	Calculated Parame	ft ²	
Depth at top of Zone using Orifice Plate =	2.07		bottom at Stage =		-	iptical Half-Width =	N/A	feet	
Orifice Plate: Orifice Vertical Spacing =	8.30	inches	5	,		ical Slot Centroid =	N/A	feet	
Orifice Plate: Orifice Area per Row =	3.10	sq. inches (diamete	er = 2 inches)		E	Iliptical Slot Area =	N/A	ft²	
Jser Input: Stage and Total Area of Each Orifice				Pow 4 (antional)	Bow E (antianal)	Dow 6 (antianal)	Bow 7 (antional)	Dow 9 (antions)	1
Stage of Orifice Centroid (ft)	Row 1 (required) 0.00	Row 2 (optional) 0.69	Row 3 (optional) 1.38	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)	-
Orifice Area (sq. inches)	3.10	3.10	3.10						1
Unite Area (sq. IICIES)	5.10	3.10	3.10						1
	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)									
Jser Input: Vertical Orifice (Circular or Rectang	ula v)						Coloulated Devenue	have for Vertical Ori	Fina
user input: vertical Onlice (Circular or Rectange	Zone 2 Rectangular	Not Selected	1				Calculated Parame Zone 2 Rectangular		
Invert of Vertical Orifice =	2.10	N/A	ft (relative to basir	n bottom at Stage =	()ft) Ve	rtical Orifice Area =	0.08	N/A	ft ²
Depth at top of Zone using Vertical Orifice =	4.32	N/A		bottom at Stage = bottom at Stage =		Orifice Centroid =	0.08	N/A	feet
Vertical Orifice Height =	2.00	N/A	inches	· socioli al stage			0.00	,.	1.000
Vertical Orifice Width =			inches						
Jser Input: Overflow Weir (Dropbox with Flat o	r Sloped Grate and		tangular/Trapezoid	al Weir (and No Out	tlet Pipe)		Calculated Parame	ters for Overflow W	<u>/eir</u>
	Zone 3 Weir	Not Selected					Zone 3 Weir	Not Selected]
Overflow Weir Front Edge Height, Ho =	Zone 3 Weir 4.33	Not Selected N/A	ft (relative to basin b	<u>al Weir (and No Out</u> bottom at Stage = 0 ft) Height of Grat	e Upper Edge, H _t =	Zone 3 Weir 5.08	Not Selected N/A	feet
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length =	Zone 3 Weir 4.33 3.00	Not Selected N/A N/A	ft (relative to basin t feet	bottom at Stage = 0 ft) Height of Grat Overflow W	/eir Slope Length =	Zone 3 Weir 5.08 3.09	Not Selected N/A N/A]
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope =	Zone 3 Weir 4.33 3.00 4.00	Not Selected N/A N/A N/A	ft (relative to basin t feet H:V	bottom at Stage = 0 ft Gr) Height of Grat Overflow W rate Open Area / 10	/eir Slope Length = 00-yr Orifice Area =	Zone 3 Weir 5.08 3.09 3.74	Not Selected N/A N/A N/A	feet feet
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides =	Zone 3 Weir 4.33 3.00 4.00 3.00	Not Selected N/A N/A N/A N/A	ft (relative to basin t feet	bottom at Stage = 0 ft Gr Ov) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 5.08 3.09 3.74 6.46	Not Selected N/A N/A N/A N/A	feet feet ft ²
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope =	Zone 3 Weir 4.33 3.00 4.00	Not Selected N/A N/A N/A	ft (relative to basin t feet H:V	bottom at Stage = 0 ft Gr Ov) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open	/eir Slope Length = 00-yr Orifice Area =	Zone 3 Weir 5.08 3.09 3.74	Not Selected N/A N/A N/A	feet feet
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type =	Zone 3 Weir 4.33 3.00 4.00 3.00 Type C Grate	Not Selected N/A N/A N/A N/A N/A	ft (relative to basin t feet H:V feet	bottom at Stage = 0 ft Gr Ov) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 5.08 3.09 3.74 6.46	Not Selected N/A N/A N/A N/A	feet feet ft ²
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % =	Zone 3 Weir 4.33 3.00 4.00 3.00 Type C Grate 50% C(Circular Orifice, Re	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re	ft (relative to basin t feet H:V feet %	bottom at Stage = 0 ft Gr Ov) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Ope	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris =	Zone 3 Weir 5.08 3.09 3.74 6.46 3.23 s for Outlet Pipe w/	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl	feet feet ft ² ft ²
Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = Jser Input: Outlet Pipe w/ Flow Restriction Plate	Zone 3 Weir 4.33 3.00 4.00 3.00 Type C Grate 50% t (Circular Orifice, R Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected	ft (relative to basin t feet H:V feet % ectangular Orifice)	bottom at Stage = 0 ft Gr Ov C	 Height of Grate Overflow W Tate Open Area / 10 verflow Grate Open Overflow Grate Open Overflow Grate Open Cate 	/eir Slope Length =)0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter	Zone 3 Weir 5.08 3.09 3.74 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected	feet feet ft ² ft ²
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Overflow Weir Front Edge Height, Ho = Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Inflow Hydrograph Neume (arcert) = CUHP Runoff Volume (arcert) = CUHP Predevelopment Peak Q (cfs) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 2 (fps) =	Zone 3 Weir 4.33 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, Rr Zone 3 Restrictor 0.25 18.00 17.00 Trapezoidal) 6.00 60.00 4.00 1.00 The user can oven WQCV N/A 0.875 N/A N/A N/A N/A N/A N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or Rr Not Selected N/A N/A R/A R/A R/A R/A R/A R/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N	ft (relative to basin t feet H:V feet % ectangular Orifice) ft (distance below ba inches inches hottom at Stage = hottom at Stage = 2 Year 1.19 2.439 0.3 0.01 38.5 1.0 N/A Vertical Orifice 1 N/A	bottom at Stage = 0 ft Gr Ov asin bottom at Stage = Half-Cent = 0 ft)	 Height of Grati Overflow W rate Open Area / 10 verflow Grate Open ceitow Grate Open<!--</td--><td>leir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = t orifice Centroid = tor Plate on Pipe = lesign Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard = Cop of Freeboard</td><td>Zone 3 Weir 5.08 3.09 3.74 6.46 3.23 S for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73 2.67 Calculated Parame 0.70 7.70 1.30 5.35 drographs table (Con 5.461 15.1 0.35 92.1 8.2 0.5 Overflow Weir 1 1.0 N/A</td><td>Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A</td><td>feet feet ft² ft² ft² feet radians <i>(f²)</i> feet radians <i>(f²)</i> feet radians <i>(f²)</i> feet radians <i>(f²)</i> feet radians</td>	leir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = t orifice Centroid = tor Plate on Pipe = lesign Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard = Cop of Freeboard	Zone 3 Weir 5.08 3.09 3.74 6.46 3.23 S for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73 2.67 Calculated Parame 0.70 7.70 1.30 5.35 drographs table (Con 5.461 15.1 0.35 92.1 8.2 0.5 Overflow Weir 1 1.0 N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	feet feet ft ² ft ² ft ² feet radians <i>(f²)</i> feet radians <i>(f²)</i> feet radians <i>(f²)</i> feet radians <i>(f²)</i> feet radians
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = One-Hour Rainfall Depth (in) = CUHP Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = CUHP Predevelopment Peak Q (cfs) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Ratio Peak Outflow D (cfs) = Ratio Peak Outflow D (cfs) = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 2 (fps) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) =	Zone 3 Weir 4.33 3.00 4.00 3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 17.00 Trapezoidal) 6.00 60.00 60.00 60.00 60.00 1.00 7 M/A N/A N/A N/A N/A N/A N/A N/A N	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A N/A N/A ft (relative to basin feet H:V feet EURV N/A 3.280 N/A	ft (relative to basin t feet H:V feet % ectangular Orifice) ft (distance below basi inches inches bottom at Stage = 1.19 2.439 2.439 0.3 0.3 0.01 38.5 1.0 N/A Vertical Orifice 1 N/A N/A 65 69	bottom at Stage = 0 ft Gr Ov C asin bottom at Stage = Half-Cent = 0 ft) 1.50 3.207 0.6 0.01 50.5 1.1 1.9 Vertical Orifice 1 N/A N/A N/A 72 76	 Height of Grati Overflow W rate Open Area / 10 verflow Grate Open Ca Ca a 0 ft) O Outle cral Angle of Restrict Spillway D Stage at Basin Area at Basin Area at Basin Area at Basin Area at a.822 a.821 a.822 a.823 a.823 a.824 a.824 a.825 a.825 a.825 a.826 a.826 a.827 a.827 a.828 a.828 a.828 a.822 a.822 a.823 a.824 a.825 a.825 a.825 a.825 a.826 a.827 a.827 a.828 a.828 a.828 a.829 a.829 a.829 a.820 a.820 a.821 b.821 	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/o Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = to rifice Centroid = tor Plate on Pipe = lesign Flow Depth= Top of Freeboard = Top of Freeboard = 2.00 4.648 4.648 7.6 0.18 76.8 4.6 0.6 Overflow Weir 1 0.5 N/A 77 83	Zone 3 Weir 5.08 3.09 3.74 6.46 3.23 5 for Outlet Pipe w/ Zone 3 Restrictor 1.73 0.73 2.67 Calculated Parame 0.70 7.70 1.30 5.35 frographs table (Con 5.461 15.1 0.35 92.1 8.2 0.5 Overflow Weir 1 1.0 N/A 76 84	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	feet feet ft ² ft ² ft ² feet radians 500 Year 3.68 10.609 64.6 1.50 183.9 14.5 0.2 N/A 2.0 N/A 2.0 N/A 3.64



DETENTION BASIN OUTLET STRUCTURE DESIGN Outflow Hydrograph Workbook Filename:

[in a separate pro		CUUD
	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]		50 Year [cfs]	100 Year [cfs]	-
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.05	3.03
-	0:15:00	0.00	0.00	4.50	7.31	9.07	6.10	7.64	7.45 19.79	13.68
	0:25:00	0.00	0.00	16.20 32.99	21.30 43.59	25.08 52.63	15.85 32.60	18.48 37.19	40.01	30.99 64.90
	0:30:00	0.00	0.00	38.46	50.54	59.57	66.90	80.41	91.32	153.70
	0:35:00	0.00	0.00	34.96	45.17	52.67	76.83	92.11	111.40	183.89
	0:40:00	0.00	0.00	30.52	38.60	44.85	71.51	85.56	103.98	170.98
	0:45:00	0.00	0.00	25.69	32.96	38.52	61.41	73.22	91.28	150.97
	0:50:00	0.00	0.00	21.61	28.38	32.71	53.60	63.65	78.96	131.50
	0:55:00	0.00	0.00	18.64	24.41	28.30	44.80	52.84	66.61	110.93
-	1:00:00 1:05:00	0.00	0.00	16.67	21.68	25.45	37.79	44.27	57.12	95.46
	1:10:00	0.00	0.00	15.06 12.78	19.49 17.39	23.08 20.74	33.00 28.13	38.48 32.64	50.86 42.01	85.47 69.97
-	1:15:00	0.00	0.00	12.78	14.97	18.57	23.73	27.38	33.91	55.77
	1:20:00	0.00	0.00	8.95	12.67	16.05	19.21	22.02	25.96	42.09
ļ	1:25:00	0.00	0.00	7.92	11.22	13.78	15.50	17.59	19.35	30.81
	1:30:00	0.00	0.00	7.37	10.47	12.35	12.71	14.36	15.11	23.79
ļ	1:35:00	0.00	0.00	7.08	10.02	11.42	10.97	12.36	12.67	19.67
ļ	1:40:00	0.00	0.00	6.91	9.06	10.75	9.89	11.12	11.14	17.01
r	1:45:00 1:50:00	0.00	0.00	6.79 6.70	8.25 7.66	10.28 9.94	9.15 8.66	10.29 9.74	10.11 9.40	15.20 13.96
-	1:55:00	0.00	0.00	5.89	7.66	9.94	8.66	9.74	9.40 8.89	13.96
	2:00:00	0.00	0.00	5.15	6.71	8.62	8.08	9.08	8.57	12.52
-	2:05:00	0.00	0.00	3.89	5.07	6.47	6.15	6.91	6.51	9.49
ĺ	2:10:00	0.00	0.00	2.81	3.65	4.63	4.39	4.93	4.66	6.77
	2:15:00	0.00	0.00	2.02	2.62	3.32	3.16	3.54	3.36	4.88
	2:20:00	0.00	0.00	1.44	1.85	2.37	2.26	2.53	2.41	3.50
	2:25:00	0.00	0.00	1.00	1.27	1.65	1.57	1.76	1.68	2.42
-	2:30:00	0.00	0.00	0.67	0.86	1.13	1.08	1.21	1.16	1.67
-	2:35:00 2:40:00	0.00	0.00	0.43	0.58	0.76	0.74	0.82	0.79	1.13
-	2:45:00	0.00	0.00	0.25	0.36	0.46	0.46	0.51 0.27	0.49	0.69
	2:50:00	0.00	0.00	0.05	0.08	0.09	0.10	0.11	0.10	0.13
	2:55:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.01
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	3:15:00 3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	4:05:00 4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	4:30:00 4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00 4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ļ	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	5:15:00 5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ļ	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	5:40:00 5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ł	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ²]	Area [acres]	Volume [ft ³]	Volume [ac-ft]	Total Outflow [cfs]	
							For best results, include the
							stages of all grade slope
							changes (e.g. ISV and Floor) from the S-A-V table on
							Sheet 'Basin'.
							_
							Also include the inverts of all
							outlets (e.g. vertical orifice,
							overflow grate, and spillway, where applicable).
							-
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							_
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							-
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							1
						1	1
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							4
							4
						1	1
]
							4
						+	-
							1
]
							4
							-
							1
							-

MHFD-Detention, Version 4.04 (February 2021)

Project:	Grandview - Pond D
Basin ID:	
	2 ONE 1 1 OND 2 OB YEAR OWFICE
POOL Example Zone	Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	12.84	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	600	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	59.40%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

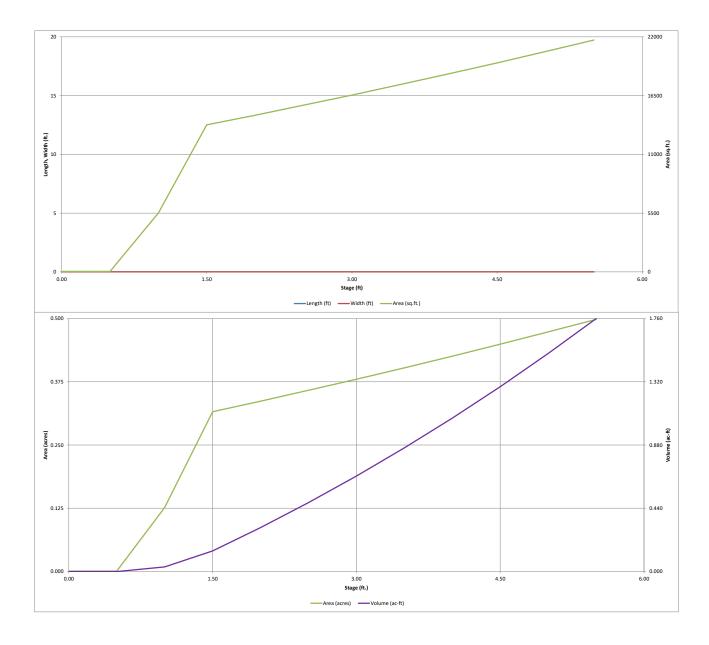
ale embedded colorado orban nydro	graphinoceau	ic.	Optional U
Water Quality Capture Volume (WQCV) =	0.251	acre-feet	
Excess Urban Runoff Volume (EURV) =	0.923	acre-feet	
2-yr Runoff Volume (P1 = 1.19 in.) =	0.678	acre-feet	1.19
5-yr Runoff Volume (P1 = 1.5 in.) =	0.894	acre-feet	1.50
10-yr Runoff Volume (P1 = 1.75 in.) =	1.066	acre-feet	1.75
25-yr Runoff Volume (P1 = 2 in.) =	1.304	acre-feet	2.00
50-yr Runoff Volume (P1 = 2.25 in.) =	1.538	acre-feet	2.25
100-yr Runoff Volume (P1 = 2.52 in.) =	1.827	acre-feet	2.52
500-yr Runoff Volume (P1 = 3.68 in.) =	3.032	acre-feet	3.68
Approximate 2-yr Detention Volume =	0.598	acre-feet	
Approximate 5-yr Detention Volume =	0.784	acre-feet	
Approximate 10-yr Detention Volume =	0.949	acre-feet	
Approximate 25-yr Detention Volume =	1.148	acre-feet	
Approximate 50-yr Detention Volume =	1.270	acre-feet	
Approximate 100-yr Detention Volume =	1.404	acre-feet	

Define Zones and Basin Geometry

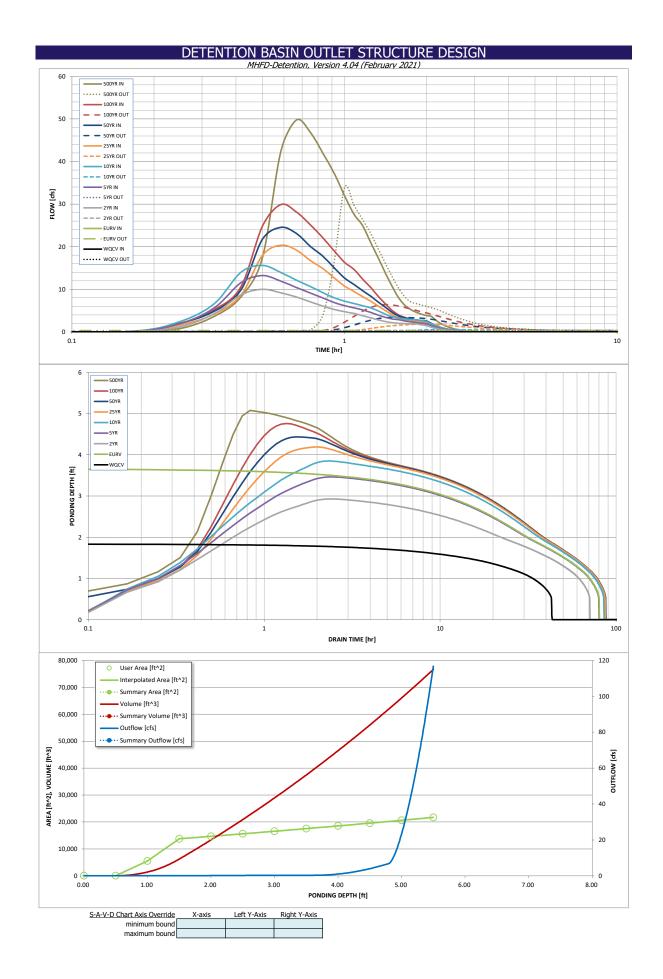
enne zones and basin deonied y		
Zone 1 Volume (WQCV) =	0.251	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.672	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.481	acre-feet
Total Detention Basin Volume =	1.404	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	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

NNo		Depth Increment =	0.50	ft		1	Optional			
Portione	d)	Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)		Override			Volume (ac-ft)
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				2.00			14,669	0.337	13,331	0.306
		6971		2.50		 	15,600	0.358	20,899	0.480
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MHFD-Detention, Version 4.04 (February 2021)



	DE	TENTION	BASIN OUT	LET STRU	CTURE DE	SIGN			
Project	Grandview - Pond	МН	FD-Detention, Vers						
Basin ID:	dianaview - Polia								
ZONE 3				Estimated	Estimated				
				Stage (ft)	Volume (ac-ft)	Outlet Type			
VOLUME EURV WOCY		-	Zone 1 (WQCV)		0.251	Orifice Plate			
	100-YEAR		Zone 2 (EURV)		0.672	Circular Orifice			
PERMANENT ORIFICES	ORIFICE		Zone 3 (100-year)		0.481	Weir&Pipe (Restrict)			
	Configuration (Re	tention Pond)	2011e 5 (100-year)	Total (all zones)	1.404	Weirdripe (Result)			
User Input: Orifice at Underdrain Outlet (typicall	v used to drain WO	CV in a Filtration B	MP)		1.404]	Calculated Parame	ters for Underdrain	
Underdrain Orifice Invert Depth =	N/A	1	the filtration media	surface)	Under	Irain Orifice Area =	N/A	ft ²	
Underdrain Orifice Diameter =	N/A	inches		Surface)		Orifice Centroid =	N/A	feet	
	,	1						-	
User Input: Orifice Plate with one or more orific	es or Elliptical Slot	Neir (typically used	to drain WQCV and	d/or EURV in a sedir	<u>mentation BMP)</u>		Calculated Parame	ters for Plate	
Invert of Lowest Orifice =	0.00	ft (relative to basir	bottom at Stage =	• 0 ft)	WQ Orifi	ce Area per Row =	6.597E-03	ft ²	
Depth at top of Zone using Orifice Plate =	1.84	· ·	bottom at Stage =	= 0 ft)		ptical Half-Width =	N/A	feet	
Orifice Plate: Orifice Vertical Spacing =	7.10	inches				ical Slot Centroid =	N/A	feet	
Orifice Plate: Orifice Area per Row =	0.95	sq. inches (diamet	er = 1-1/16 inches)		E	lliptical Slot Area =	N/A	ft²	
	- D (
User Input: Stage and Total Area of Each Orifice				Pow / (optional)	Pow E (optional)	Pow 6 (optional)	Pow 7 (ontional)	Pow 9 (ontional)	1
Stage of Outling Contu-11 (A)	Row 1 (required)	Row 2 (optional) 0.61	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)	1
Stage of Orifice Centroid (ft) Orifice Area (sq. inches)	0.00	0.61	0.95						1
Ornice Area (sq. inches)	0.95	0.55	0.55						L
	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)	1
Stage of Orifice Centroid (ft)	(optional)		(optional)			(optional)	is (optional)		1
Orifice Area (sq. inches)									1
				•					-
Jser Input: Vertical Orifice (Circular or Rectangu	ular)		_				Calculated Parame	ters for Vertical Ori	fice
	Zone 2 Circular	Not Selected					Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	1.84	N/A		bottom at Stage =		tical Orifice Area =	0.02	N/A	ft ²
Depth at top of Zone using Vertical Orifice =	3.66	N/A	- ·	bottom at Stage =	0 ft) Vertica	Orifice Centroid =	0.09	N/A	feet
Vertical Orifice Diameter =	2.10	N/A	inches						
User Input: Overflow Weir (Dropbox with Flat o	r Clanad Crata and	Outlat Dina OD Dag	tangular/Trangzoid	al Wair (and No Out	tlat Dina)		Calculated Darama	tors for Overflow M	loir
User Input. Overnow weir (Dropbox with Flat o	Zone 3 Weir	Not Selected			<u>liet ripe)</u>			ters for Overflow W	1
Overflow Weir Front Edge Height, Ho =	3.67	N/A	ft (relative to basin h	oottom at Stage = 0 ft) Height of Grate	e Upper Edge, H _t =	Zone 3 Weir 4.42	Not Selected N/A	feet
Overflow Weir Front Edge Length =	3.00	N/A	feet	ottom at Stage = 0 h) Height of olda				icci
Overflow Weir Grate Slope =		,,,,			Overflow W	leir Slone Length =	3.09		feet
	4.00	N/A	1 _{H·V}	G		/eir Slope Length = 00-vr Orifice Area =	3.09 9.78	N/A	feet
-	4.00	N/A N/A	H:V feet		rate Open Area / 10	00-yr Orifice Area =	9.78	N/A N/A	
Horiz. Length of Weir Sides = Overflow Grate Type =	4.00 3.00 Type C Grate	N/A	H:V feet	Ov		0-yr Orifice Area = Area w/o Debris =		N/A	ft ²
Horiz. Length of Weir Sides =	3.00		+	Ov	rate Open Area / 10 verflow Grate Open	0-yr Orifice Area = Area w/o Debris =	9.78 6.46	N/A N/A N/A	
Horiz. Length of Weir Sides = Overflow Grate Type =	3.00 Type C Grate	N/A N/A	feet	Ov	rate Open Area / 10 verflow Grate Open	0-yr Orifice Area = Area w/o Debris =	9.78 6.46	N/A N/A N/A	ft ²
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % =	3.00 Type C Grate 50%	N/A N/A N/A	feet %	Ov	rate Open Area / 10 verflow Grate Open Overflow Grate Ope	0-yr Orifice Area = Area w/o Debris =	9.78 6.46 3.23	N/A N/A N/A N/A	ft² ft²
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % =	3.00 Type C Grate 50%	N/A N/A N/A	feet %	Ov	rate Open Area / 10 verflow Grate Open Overflow Grate Ope	00-yr Orifice Area = Area w/o Debris = n Area w/ Debris =	9.78 6.46 3.23	N/A N/A N/A N/A	ft² ft²
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % =	3.00 Type C Grate 50%	N/A N/A N/A estrictor Plate, or R	feet % ectangular Orifice)	Ov	rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u>	00-yr Orifice Area = Area w/o Debris = n Area w/ Debris =	9.78 6.46 3.23 s for Outlet Pipe w/	N/A N/A N/A / Flow Restriction Pl	ft² ft²
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate	3.00 Type C Grate 50% C(circular Orifice, R Zone 3 Restrictor 0.25 18.00	N/A N/A N/A estrictor Plate, or R Not Selected	feet % ectangular Orifice)	Ov C	rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O	00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameters	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor	N/A N/A N/A / Flow Restriction PI Not Selected	ft ² ft ²
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe =	3.00 Type C Grate 50% Circular Orifice, R Zone 3 Restrictor 0.25 18.00	N/A N/A N/A estrictor Plate, or R Not Selected N/A	feet % ectangular Orifice) ft (distance below ba	O) C	rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O	00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid =	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66	N/A N/A N/A / Flow Restriction Pl Not Selected N/A	ft ² ft ² <u>ate</u> ft ²
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert =	3.00 Type C Grate 50% c(Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20	N/A N/A N/A estrictor Plate, or R Not Selected N/A	feet % ectangular Orifice) ft (distance below ba inches	O) C	rate Open Area / 10 verflow Grate Open Overflow Grate Open <u>Ca</u> = 0 ft) O Outlet	00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid =	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37	N/A N/A N/A / Flow Restriction Pl Not Selected N/A N/A N/A	ft ² ft ² <u>ate</u> ft ² feet
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Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage=	3.00 Type C Grate 50% (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20 Trapezoidal) 4.80	N/A N/A N/A Not Selected N/A N/A ft (relative to basir	feet % ectangular Orifice) ft (distance below ba inches	O) C asin bottom at Stage = Half-Cent	rate Open Area / 10 verflow Grate Open Overflow Grate Open <u>Ca</u> = 0 ft) O Outlet cral Angle of Restric Spillway D	0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = esign Flow Depth=	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37 <u>Calculated Parame</u> 0.29	N/A N/A N/A N/A N/A V Selected N/A N/A N/A ters for Spillway feet	ft ² ft ² <u>ate</u> ft ² feet
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Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes =	3.00 Type C Grate 50% (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20 Trapezoidal) 4.80 60.00 4.00	N/A N/A N/A Not Selected N/A N/A ft (relative to basir feet H:V	feet % ectangular Orifice) ft (distance below ba inches inches	O) C asin bottom at Stage = Half-Cent	rate Open Area / 10 verflow Grate Open Overflow Grate Open Ca = 0 ft) O Outlea cral Angle of Restric Spillway D Stage at T Basin Area at T	0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = esign Flow Depth= Fop of Freeboard = Fop of Freeboard =	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37 <u>Calculated Parame</u> 0.29 6.09 0.50	N/A N/A N/A N/A N/A N/A N/A N/A ters for Spillway feet feet acres	ft ² ft ² <u>ate</u> ft ² feet
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = Jser Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = Jser Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length =	3.00 Type C Grate 50% (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20 Trapezoidal) 4.80 60.00	N/A N/A N/A Not Selected N/A N/A ft (relative to basir feet	feet % ectangular Orifice) ft (distance below ba inches inches	O) C asin bottom at Stage = Half-Cent	rate Open Area / 10 verflow Grate Open Overflow Grate Open Ca = 0 ft) O Outlea cral Angle of Restric Spillway D Stage at T Basin Area at T	0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter: utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = esign Flow Depth= Fop of Freeboard =	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37 <u>Calculated Parame</u> 0.29 6.09 0.50	N/A N/A N/A N/A N/A N/A N/A N/A ters for Spillway feet	ft ² ft ² <u>ate</u> ft ² feet
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Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = None-Hour Rainfall Depth (in) = CUHP Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = CUHP Predevelopment Peak Q (cfs) = Predevelopment Preak Q (cfs) = Peak Inflow Q (cfs) = Peak Outflow to Predevelopment Q Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) =	3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20 Trapezoidal) 4.80 60.00 4.00 1.00 7.00 7.20	N/A N/A N/A N/A N/A N/A N/A N/A N/A It (relative to basir feet H:V feet Fide the default CU/I EURV N/A	feet 9% ft (distance below ba inches inches n bottom at Stage = HP hydrographs and 2 Year 1.19 0.678 0.678 0.1 10.0 0.3 N/A Vertical Orifice 1 N/A N/A 65	Ov Casin bottom at Stage = Half-Cent = 0 ft) =	rate Open Area / 10 verflow Grate Open Verflow Grate Open Verflow Grate Open Car a of the open Stage at T Basin Area at T Basin Volume at T Basin Volume at T Basin Volume at T Car Car Car Car Car Car Car Car	0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter: utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = esign Flow Depth= Fop of Freeboard = fop of Freeboard = fop of Freeboard = 20 of Freeboard = 0.017 20.4 1.9 0.9 Overflow Weir 1 0.2 N/A 76	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37 Calculated Parame 0.29 6.09 0.50 1.76 1.76 1.538 1.538 4.3 0.33 24.5 3.4 0.8 Overflow Weir 1 0.5 N/A 75	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	<i>F).</i> 500 Yee 3.68 3.032 18.0 1.40 49.8 3.3.8 1.9 9 Spillwa 1.0 N/A 6
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = One-Hour Rainfall Depth (in) = CUHP Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = CUHP Predevelopment Peak Q (cfs) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Inflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) =	3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20 Trapezoidal) 4.80 60.00 4.00 1.00 7.00 7.20	N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A N/A ft (relative to basir feet H:V feet ride the default CUI EURV N/A 0.923 N/A	feet % ectangular Orifice) ft (distance below ba inches inches h bottom at Stage = 4P hydrographs and 2 Year 1.19 0.678 0.678 0.78 0.01 10.0 0.3 N/A Vertical Orifice 1 N/A N/A 65 68	Ov c asin bottom at Stage = Half-Cent = 0 ft)	rate Open Area / 10 verflow Grate Open overflow Grate Open overflow Grate Open (2) (2) (2) (2) (2) (2) (2) (2)	0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter: utlet Orifice Area = to rifice Centroid = tor Plate on Pipe = esign Flow Depth= Fop of Freeboard = Fop of Freeboard = 20 of Treeboard = 2.00 1.304 2.1 0.17 20.4 1.9 0.9 Overflow Weir 1 0.2 N/A 76	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37 Calculated Parame 0.29 6.09 0.50 1.76 Vographs table (Con 50 Year 2.25 1.538 1.538 1.538 1.538 4.3 0.33 24.5 3.4 0.8 Overflow Weir 1 0.5 N/A 75 82	N/A N/A N/A N/A N/A Not Selected N/A ters for Spillway feet acres 0.54 29.9 6.4 0.9 <td< td=""><td><i>f</i>t² <i>f</i>t² <i>f</i>t² <i>f</i>eet <i>radians 5</i>00 Yea <i>s</i>00 Yea <i>s</i>0 Yea</td></td<>	<i>f</i> t ² <i>f</i> t ² <i>f</i> t ² <i>f</i> eet <i>radians 5</i> 00 Yea <i>s</i> 0 Yea
Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = None-Hour Rainfall Depth (in) = CUHP Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = CUHP Predevelopment Peak Q (cfs) = Predevelopment Preak Q (cfs) = Peak Inflow Q (cfs) = Peak Outflow to Predevelopment Q Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) =	3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 7.20 Trapezoidal) 4.80 60.00 4.00 1.00 7.00 7.20	N/A N/A N/A N/A N/A N/A N/A N/A N/A It (relative to basir feet H:V feet Fide the default CU/I EURV N/A	feet % fectangular Orifice) ft (distance below ba inches inches h bottom at Stage = <i>HP hydrographs anc</i> 2 Year 1.19 0.678 0.678 0.1 10.0 0.3 N/A Vertical Orifice 1 N/A N/A 65	Ov Casin bottom at Stage = Half-Cent = 0 ft) =	rate Open Area / 10 verflow Grate Open Verflow Grate Open Verflow Grate Open Car a of the open Stage at T Basin Area at T Basin Volume at T Basin Volume at T Basin Volume at T Car Car Car Car Car Car Car Car	0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter: utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = esign Flow Depth= Fop of Freeboard = fop of Freeboard = fop of Freeboard = 20 of Freeboard = 0.017 20.4 1.9 0.9 Overflow Weir 1 0.2 N/A 76	9.78 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 0.66 0.35 1.37 Calculated Parame 0.29 6.09 0.50 1.76 1.76 1.538 1.538 4.3 0.33 24.5 3.4 0.8 Overflow Weir 1 0.5 N/A 75	N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	 ft² ft² ft² feet radians <i>F).</i> 500 Yea 3.68 3.032 3.032 18.0 - 9 Spillway 1.0 N/A 66



DETENTION BASIN OUTLET STRUCTURE DESIGN Outflow Hydrograph Workbook Filename:

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]		50 Year [cfs]	100 Year [cfs]	
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.01	0.82
	0:15:00	0.00	0.00	1.22	1.98	2.45	1.65	2.06	2.02	3.65
	0:20:00	0.00	0.00	4.31	5.64	6.63	4.18	4.87	5.23	8.19
-	0:25:00	0.00	0.00	8.70	11.54	13.98	8.62	9.84	10.58	17.32
-	0:30:00	0.00	0.00	10.01	13.22	15.60	17.92	21.71	24.78	42.24
-	0:35:00	0.00	0.00	9.20 8.20	11.94 10.43	13.96 12.15	20.35 19.20	24.52 23.11	29.86 28.16	49.75 46.81
-	0:45:00	0.00	0.00	7.05	9.10	10.66	16.73	20.05	25.10	41.98
-	0:50:00	0.00	0.00	6.06	7.98	9.22	14.90	17.79	22.09	37.24
	0:55:00	0.00	0.00	5.26	6.90	8.00	12.68	15.04	19.01	32.03
	1:00:00	0.00	0.00	4.73	6.16	7.24	10.77	12.68	16.36	27.62
	1:05:00	0.00	0.00	4.35	5.64	6.68	9.50	11.13	14.66	24.94
	1:10:00	0.00	0.00	3.80	5.17	6.16	8.28	9.65	12.38	20.87
-	1:15:00	0.00	0.00	3.28	4.57	5.62	7.20	8.36	10.37	17.27
-	1:20:00	0.00	0.00	2.81	3.92 3.39	4.91 4.12	6.02 4.99	6.95 5.73	8.29 6.50	13.66 10.55
-	1:30:00	0.00	0.00	2.42	3.39	3.57	4.99	4.54	4.98	7.94
	1:35:00	0.00	0.00	2.02	2.85	3.27	3.31	3.74	3.96	6.22
	1:40:00	0.00	0.00	1.96	2.57	3.07	2.91	3.28	3.38	5.25
	1:45:00	0.00	0.00	1.91	2.35	2.92	2.66	2.99	3.01	4.60
	1:50:00	0.00	0.00	1.88	2.19	2.82	2.49	2.80	2.77	4.16
-	1:55:00	0.00	0.00	1.66	2.06	2.68	2.38	2.67	2.59	3.85
-	2:00:00	0.00	0.00	1.47	1.92	2.45	2.30	2.58	2.47	3.63
-	2:05:00 2:10:00	0.00	0.00	1.12	1.46	1.87	1.76	1.97	1.86	2.72
-	2:15:00	0.00	0.00	0.84	1.09 0.81	1.39	1.30 0.96	1.46	1.37	1.99 1.48
-	2:20:00	0.00	0.00	0.46	0.60	0.76	0.50	0.80	0.76	1.40
-	2:25:00	0.00	0.00	0.34	0.43	0.55	0.52	0.58	0.55	0.79
	2:30:00	0.00	0.00	0.24	0.30	0.39	0.37	0.41	0.39	0.56
	2:35:00	0.00	0.00	0.17	0.21	0.28	0.27	0.30	0.28	0.41
	2:40:00	0.00	0.00	0.11	0.15	0.19	0.18	0.21	0.20	0.28
	2:45:00	0.00	0.00	0.07	0.09	0.12	0.12	0.13	0.12	0.18
-	2:50:00	0.00	0.00	0.03	0.05	0.06	0.07	0.07	0.07	0.09
-	3:00:00	0.00	0.00	0.01	0.02	0.03	0.03	0.03	0.03	0.04
	3:05:00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
ľ	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00 3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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[4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	4:15:00 4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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ļ	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	4:35:00 4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	4:55:00 5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	5:20:00 5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ŀ	5:45:00 5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
t i i	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ²]	Area [acres]	Volume [ft ³]	Volume [ac-ft]	Total Outflow [cfs]	
							For best results, include the
							stages of all grade slope
							changes (e.g. ISV and Floor) from the S-A-V table on
							Sheet 'Basin'.
							_
							Also include the inverts of all
							outlets (e.g. vertical orifice,
							overflow grate, and spillway, where applicable).
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							4
							4
						1	1
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							4
						+	-
							1
]
							4
							-
							1
							-

MHFD-Detention, Version 4.04 (February 2021)

Project: Grandview - Pond E	
Basin ID:	
	1
POOL Example Zone Configuration (Retention Pond)	

Watershed Information

ccisiica miorinadon		
Selected BMP Type =	EDB	
Watershed Area =	21.16	acres
Watershed Length =	1,800	ft
Watershed Length to Centroid =	900	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	61.60%	percent
Percentage Hydrologic Soil Group A =	90.0%	percent
Percentage Hydrologic Soil Group B =	10.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

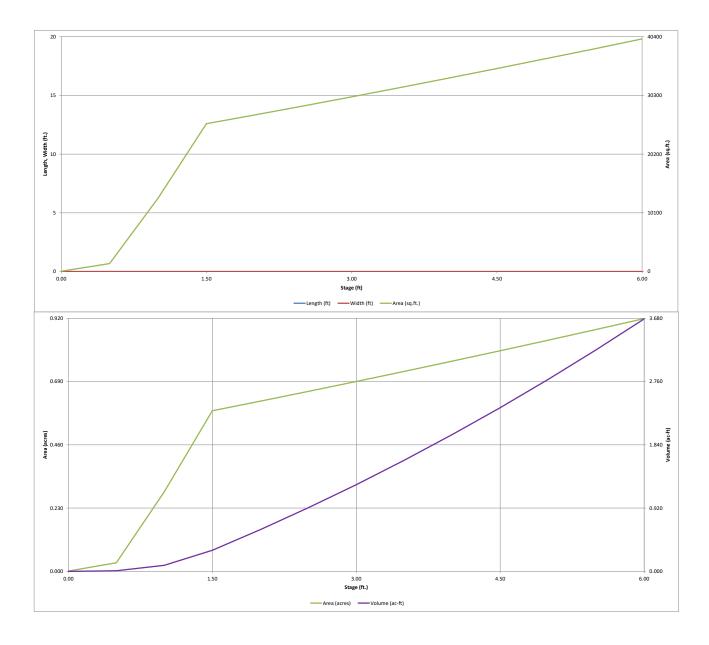
are embedded colorado orban nyaro	graphinioceau		Optional U
Water Quality Capture Volume (WQCV) =	0.426	acre-feet	
Excess Urban Runoff Volume (EURV) =	1.576	acre-feet	
2-yr Runoff Volume (P1 = 1.19 in.) =	1.195	acre-feet	1.19
5-yr Runoff Volume (P1 = 1.5 in.) =	1.568	acre-feet	1.50
10-yr Runoff Volume (P1 = 1.75 in.) =	1.867	acre-feet	1.75
25-yr Runoff Volume (P1 = 2 in.) =	2.322	acre-feet	2.00
50-yr Runoff Volume (P1 = 2.25 in.) =	2.722	acre-feet	2.25
100-yr Runoff Volume (P1 = 2.52 in.) =	3.227	acre-feet	2.52
500-yr Runoff Volume (P1 = 3.68 in.) =	5.285	acre-feet	3.68
Approximate 2-yr Detention Volume =	1.040	acre-feet	
Approximate 5-yr Detention Volume =	1.366	acre-feet	
Approximate 10-yr Detention Volume =	1.661	acre-feet	
Approximate 25-yr Detention Volume =	1.982	acre-feet	
Approximate 50-yr Detention Volume =	2.176	acre-feet	
Approximate 100-yr Detention Volume =	2.395	acre-feet	

Define Zones and Basin Geometry

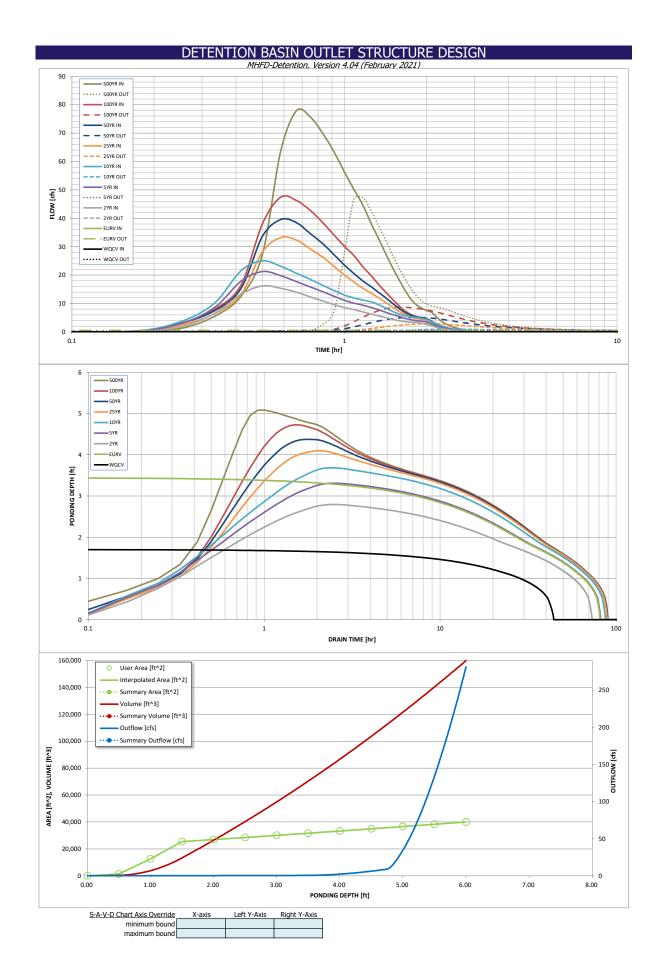
enne zones and basin deonied y		
Zone 1 Volume (WQCV) =	0.426	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.150	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.819	acre-feet
Total Detention Basin Volume =	2.395	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	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 =	0.50	ft Optional				Optional			
d)	Stage - Storage Description	Stage (ft)	Override Stage (ft)	Length (ft)	Width (ft)	Area (ft ²)	Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)
	Top of Micropool		0.00				35	0.001	()	(22.13)
			0.50				1,362	0.031	349	0.008
	6947		1.00				12,615	0.290	3,843	0.088
	6948		1.50 2.00				25,422 26,944	0.584 0.619	13,352 26,443	0.307
			2.50				28,490	0.654	40,302	0.925
	6949		3.00				30,062	0.690	54,940	1.261
	6050		3.50				31,660	0.727	70,370	1.615
	6950		4.00 4.50				33,282 34,931	0.764	86,606 103,659	1.988 2.380
	6951		5.00				36,604	0.840	121,543	2.790
			5.50				38,303	0.879	140,270	3.220
	6952		6.00				40,027	0.919	159,852	3.670
al User Overrides										
acre-feet										
acre-feet										
19 inches 50 inches										
75 inches										
00 inches										
25 inches 52 inches										
68 inches										
								1		
									-	

MHFD-Detention, Version 4.04 (February 2021)



	DE	TENTION	BASIN OU	ILEI SIRU	CIURE DE				
Droject	Grandview - Pond	МН		sion 4.04 (Februar					
Basin ID:		-							
ZONE 3				Estimated	Estimated				
100-YR				Stage (ft)	Volume (ac-ft)	Outlet Type			
VOLUME EURY WOCV			Zone 1 (WQCV)	1.71	0.426	Orifice Plate]		
	100-YEAR ORIFICE		Zone 2 (EURV)	3.45	1.150	Rectangular Orifice			
PERMANENT ORIFICES			Zone 3 (100-year)	4.52	0.819	Weir&Pipe (Restrict)			
POOL Example Zone	Configuration (Re	tention Pond)		Total (all zones)	2.395		1		
User Input: Orifice at Underdrain Outlet (typical	<u>y used to drain WQ</u>	CV in a Filtration BN	<u>1P)</u>			-	Calculated Parame	ters for Underdrain	L
Underdrain Orifice Invert Depth =	N/A	ft (distance below	the filtration media	surface)		drain Orifice Area $=$		ft ²	
Underdrain Orifice Diameter =	N/A	inches			Underdrair	n Orifice Centroid =	N/A	feet	
Llass Innuts, Ouifice Dista with and as more ouific	ee en Elliptical Clat)	Noix (trunianly used		d/an EUDV/ in a codi	montation RMD)				
User Input: Orifice Plate with one or more orific Invert of Lowest Orifice =	0.00	ft (relative to basin	-			ice Area per Row =	Calculated Parame 1.215E-02	ft ²	
Depth at top of Zone using Orifice Plate =	1.71	ft (relative to basin	-		-	iptical Half-Width =		feet	
Orifice Plate: Orifice Vertical Spacing =	6.80	inches	5			ical Slot Centroid =	N/A	feet	
Orifice Plate: Orifice Area per Row =	1.75	sq. inches (diamete	er = 1-1/2 inches)		E	Iliptical Slot Area =	N/A	ft²	
User Input: Stage and Total Area of Each Orific		-		Pour 4 (antional)	Bow E (antional)	Dow 6 (antianal)	Bow 7 (antional)	Dow 9 (antians)	1
Stage of Orifice Centroid (ft)	Row 1 (required) 0.00	Row 2 (optional) 0.57	Row 3 (optional) 1.14	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)	-
Orifice Area (sq. inches)		1.75	1.14						
office Area (sq. inclus)	1.75	1.75	1.75						
	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)									
							<u></u>		<u>~</u>
User Input: Vertical Orifice (Circular or Rectang		Not Selected	1				Calculated Parame		<u>fice</u>
Invert of Vertical Orifice =	Zone 2 Rectangula 1.75	N/A	ft (relative to bacir	n bottom at Stage =	0ft) Vo	rtical Orifice Area =	Zone 2 Rectangular 0.04	Not Selected	ft ²
Depth at top of Zone using Vertical Orifice =	3.45	N/A N/A		bottom at Stage = bottom at Stage =		I Orifice Centroid =	0.04	N/A N/A	feet
Vertical Orifice Height =	1.50	N/A	inches	i bottom at Stage =	vertica		0.00		Jiece
Vertical Orifice Width =	4.00		inches						
User Input: Overflow Weir (Dropbox with Flat o	r Sloped Grate and	Outlet Pine OR Rec	tangular/Transzoid						
				al Weir (and No Out	<u>tlet Pipe)</u>		Calculated Parame	ters for Overflow W	<u>/eir</u>
	Zone 3 Weir	Not Selected		al Weir (and No Out			Zone 3 Weir	Not Selected]
Overflow Weir Front Edge Height, Ho =	Zone 3 Weir 3.45	Not Selected N/A	ft (relative to basin l	al Weir (and No Out) Height of Grate	e Upper Edge, H _t =	Zone 3 Weir 4.20	Not Selected N/A	feet
Overflow Weir Front Edge Length =	Zone 3 Weir 3.45 3.00	Not Selected N/A N/A	ft (relative to basin I feet	pottom at Stage = 0 ft) Height of Grate Overflow W	/eir Slope Length =	Zone 3 Weir 4.20 3.09	Not Selected N/A N/A]
Overflow Weir Front Edge Length = Overflow Weir Grate Slope =	Zone 3 Weir 3.45 3.00 4.00	Not Selected N/A N/A N/A	ft (relative to basin I feet H:V	pottom at Stage = 0 ft Gr	e) Height of Grate Overflow W rate Open Area / 10	/eir Slope Length = 00-yr Orifice Area =	Zone 3 Weir 4.20 3.09 5.77	Not Selected N/A N/A N/A	feet feet
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides =	Zone 3 Weir 3.45 3.00 4.00 3.00	Not Selected N/A N/A N/A N/A	ft (relative to basin I feet	oottom at Stage = 0 ft Gr Ov	e) Height of Grate Overflow W rate Open Area / 10 verflow Grate Open	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 4.20 3.09 5.77 6.46	Not Selected N/A N/A N/A N/A	feet feet ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope =	Zone 3 Weir 3.45 3.00 4.00	Not Selected N/A N/A N/A	ft (relative to basin I feet H:V	oottom at Stage = 0 ft Gr Ov	e) Height of Grate Overflow W rate Open Area / 10 verflow Grate Open	/eir Slope Length = 00-yr Orifice Area =	Zone 3 Weir 4.20 3.09 5.77	Not Selected N/A N/A N/A	feet feet
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate	Not Selected N/A N/A N/A N/A N/A	ft (relative to basin l feet H:V feet	oottom at Stage = 0 ft Gr Ov	e) Height of Grate Overflow W rate Open Area / 10 verflow Grate Open	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 4.20 3.09 5.77 6.46	Not Selected N/A N/A N/A N/A	feet feet ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50%	Not Selected N/A N/A N/A N/A N/A N/A	ft (relative to basin l feet H:V feet %	oottom at Stage = 0 ft Gr Ov	 Height of Grate Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Open 	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/	Not Selected N/A N/A N/A N/A N/A	feet feet ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected	ft (relative to basin l feet H:V feet %	oottom at Stage = 0 ft Gr Ov	c) Height of Grate Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Open Overflow Grate Ope	/eir Slope Length =)0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = <u>User Input: Outlet Pipe w/ Flow Restriction Plate</u> Depth to Invert of Outlet Pipe =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below bi	oottom at Stage = 0 ft Gr Ov	t) Height of Grate Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Open <u>Ca</u> = 0 ft) O	/eir Slope Length =)0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = <u>User Input: Outlet Pipe w/ Flow Restriction Plate</u> Depth to Invert of Outlet Pipe = Outlet Pipe Diameter =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% C(circular Orifice, R Zone 3 Restrictor 0.25 18.00	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below b inches	oottom at Stage = 0 ft Gr OV C asin bottom at Stage =	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O Outled	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below bi	oottom at Stage = 0 ft Gr OV C asin bottom at Stage =	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O Outled	/eir Slope Length =)0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% 20ne 3 Restrictor 0.25 18.00 10.90	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below b inches	oottom at Stage = 0 ft Gr OV C asin bottom at Stage =	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O Outled	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A N/A	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = <u>User Input: Outlet Pipe w/ Flow Restriction Plate</u> Depth to Invert of Outlet Pipe = Outlet Pipe Diameter =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% 20ne 3 Restrictor 0.25 18.00 10.90	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or R Not Selected N/A	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below be inches inches	bottom at Stage = 0 ft Gr Ov C asin bottom at Stage = Half-Cent	 Height of Grate Overflow W verflow Grate Open Area / 10 verflow Grate Open Overflow Grate Ope Can Can Can Can Can Can Can Can Can Can	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 <u>Calculated Parame</u>	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A N/A	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% 20ne 3 Restrictor 0.25 18.00 10.90 Trapezoidal)	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or Re N/A N/A N/A N/A	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below be inches inches	bottom at Stage = 0 ft Gr Ov C asin bottom at Stage = Half-Cent	 Height of Grate Overflow W rate Open Area / 10 verflow Grate Open Open Grate Open Carrier Open C	/eir Slope Length =)0-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 Calculated Parame 0.40	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A N/A N/A	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage=	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or R/ Not Selected N/A N/A ft (relative to basin	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below be inches inches	bottom at Stage = 0 ft Gr Ov C asin bottom at Stage = Half-Cent	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Open Overflow Grate Ope Ca = 0 ft) O Outled tral Angle of Restrict Spillway D Stage at T	<pre>/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = t orifice Centroid = tor Plate on Pipe = vesign Flow Depth=</pre>	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 Calculated Parame 0.40 6.15	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A N/A N/A ters for Spillway feet	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75 60.00 4.00	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected N/A N/A ft (relative to basin feet	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below be inches inches	bottom at Stage = 0 ft Gr Ov C asin bottom at Stage = Half-Cent	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O Outled tral Angle of Restrict Spillway D Stage at T Basin Area at T	/eir Slope Length = 20-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = ctor Plate on Pipe = lesign Flow Depth= Top of Freeboard =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 Calculated Parame 0.40 6.15 0.92	Not Selected N/A N/A N/A N/A N/A Flow Restriction Pl Not Selected N/A N/A N/A N/A ters for Spillway feet feet	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75 60.00 4.00	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or R N/A N/A estrictor Plate, or R N/A N/A ft (relative to basin feet H:V	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below be inches inches	bottom at Stage = 0 ft Gr Ov C asin bottom at Stage = Half-Cent	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Ope <u>Ca</u> = 0 ft) O Outled tral Angle of Restrict Spillway D Stage at T Basin Area at T	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = tor Plate on Pipe = lesign Flow Depth= Top of Freeboard = Top of Freeboard =	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 Calculated Parame 0.40 6.15 0.92	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A ters for Spillway feet feet acres	feet feet ft ² ft ² ft ²
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75 60.00 4.00 1.00	Not Selected N/A N/A N/A N/A N/A N/A estrictor Plate, or Re Not Selected N/A N/A ft (relative to basin feet H:V feet	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below b inches inches inches	oottom at Stage = 0 ft Gi OV C asin bottom at Stage = Half-Cent = 0 ft)	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Open Car = 0 ft) O Uttlet tral Angle of Restrict Spillway D Stage at T Basin Area at T Basin Volume at T	<pre>/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = t orifice Centroid = t or Plate on Pipe = esign Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard =</pre>	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 <u>Calculated Parame</u> 0.40 6.15 0.92 3.67	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A ters for Spillway feet feet acres acre-ft	feet feet ft ² ft ² ft ² ft ² fteet feet radians
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75 60.00 4.00 1.00	Not Selected N/A N/A N/A N/A N/A estrictor Plate, or R N/A N/A estrictor Plate, or R N/A N/A ft (relative to basin feet H:V	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below b inches inches inches	oottom at Stage = 0 ft Gi OV C asin bottom at Stage = Half-Cent = 0 ft)	c) Height of Grat Overflow W rate Open Area / 10 verflow Grate Open Overflow Grate Open Car = 0 ft) O Uttlet tral Angle of Restrict Spillway D Stage at T Basin Area at T Basin Volume at T	<pre>/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = t orifice Centroid = t or Plate on Pipe = esign Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard =</pre>	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 <u>Calculated Parame</u> 0.40 6.15 0.92 3.67	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A ters for Spillway feet feet acres acre-ft	feet feet ft ² ft ² ft ² ft ² fteet feet radians
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Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = One-Hour Rainfall Depth (in) = CUHP Runoff Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = Inflow Hydrograph Volume (acre-ft) = CUHP Runoff Volume (acre) = OPTIONAL Override Predevelopment Peak Q (cfs) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% c (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75 60.00 4.00 1.00 The user can over: N/A N/A N/A N/A N/A N/A N/A N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or Rr Not Selected N/A N/A R/A R/A R/A R/A R/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N	ft (relative to basin I feet H:V feet % ft (distance below be inches inches bottom at Stage = h bottom at Stage = 2 Year 1.19 1.195 1.195 0.1 0.1 16.2 0.5 N/A Vertical Orifice 1 N/A Vertical Orifice 1 N/A 69 2.79	asin bottom at Stage = 0 ft Gi ON asin bottom at Stage = Half-Cent = 0 ft) # runoff volumes by 5 Year 1.50 1.568 0.3 0.01 21.2 0.5 2.0 Vertical Orifice 1 N/A 77 3.31	 Height of Gratt Overflow Weir 1 vate Open Area / 10 verflow Grate Open Cate open <licate li="" open<=""> Cate open <licate li="" open<=""></licate></licate>	leir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/ Debris = n Area w/ Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = ttor Plate on Pipe = lesign Flow Depth= Top of Freeboard = Top of Freeboard = Top of Freeboard = Cop of Freeboard = 2.322 2.322 4.6 0.22 3.3.2 2.9 0.6 Overflow Weir 1 0.4 N/A 76 83 4.10	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 S for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 Calculated Parame 0.40 6.15 0.92 3.67 SO Year 2.25 2.722 2.722 2.722 7.6 0.36 39.6 39.6 5.1 0.7 Overflow Weir 1 0.7 N/A 75 82 4.37	Not Selected N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	F). feet feet ft ² ft ² feet radians F). 500 Year 3.68 5.285 5.285 2.8.3 1.34 77.9 47.3 1.7 Spillway 1.7 N/A 66 79 5.08
Overflow Weir Front Edge Length = Overflow Weir Grate Slope = Horiz. Length of Weir Sides = Overflow Grate Type = Debris Clogging % = User Input: Outlet Pipe w/ Flow Restriction Plate Depth to Invert of Outlet Pipe = Outlet Pipe Diameter = Restrictor Plate Height Above Pipe Invert = User Input: Emergency Spillway (Rectangular or Spillway Invert Stage= Spillway Crest Length = Spillway Crest Length = Spillway End Slopes = Freeboard above Max Water Surface = CUHP Runoff Volume (acre-ft) = Inflow Hydrograph Neume (acre-ft) = CUHP Predevelopment Peak Q (cfs) = Predevelopment Unit Peak Flow, q (cfs/acre) = Peak Outflow Q (cfs) = Ratio Peak Outflow to Predevelopment Q = Structure Controlling Flow = Max Velocity through Grate 1 (fps) = Max Velocity through Grate 1 (fps) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) = Time to Drain 97% of Inflow Volume (hours) =	Zone 3 Weir 3.45 3.00 4.00 3.00 Type C Grate 50% 2 (Circular Orifice, R Zone 3 Restrictor 0.25 18.00 10.90 Trapezoidal) 4.75 60.00 4.00 1.00 7he user can over WQCV N/A N/A N/A N/A N/A N/A N/A N/A	Not Selected N/A N/A N/A N/A N/A N/A N/A estrictor Plate, or R N/A N/A ft (relative to basin feet H:V feet ide the default CUH EURV N/A 1.576 N/A	ft (relative to basin l feet H:V feet % ectangular Orifice) ft (distance below be inches inches bottom at Stage = // hydrographs and 2 Year 1.195 1.195 1.195 0.1 0.01 16.2 0.5 N/A Vertical Orifice 1 N/A N/A 65 69	bottom at Stage = 0 ft Gr Ov asin bottom at Stage = Half-Cent Half-Cent = 0 ft) 1.50 1.568 0.3 0.01 21.2 0.5 2.0 Vertical Orifice 1 N/A N/A 72 77	 Height of Grate Overflow Wrate Open Area / 10 verflow Grate Open Overflow Grate Open Care e 0 ft) O Outlet tral Angle of Restrict Spillway D Stage at T Basin Area Area Area Area Area Area Area Area	/eir Slope Length = 00-yr Orifice Area = Area w/o Debris = n Area w/o Debris = alculated Parameter utlet Orifice Area = t Orifice Centroid = to rifice Centroid = tor Plate on Pipe = lesign Flow Depth= Top of Freeboard = Top of Freeboard = 200 2.322 2.322 4.6 0.22 33.2 2.9 0.6 Overflow Weir 1 0.4 N/A 76 83	Zone 3 Weir 4.20 3.09 5.77 6.46 3.23 s for Outlet Pipe w/ Zone 3 Restrictor 1.12 0.52 1.78 Calculated Parame 0.40 6.15 0.92 3.67 frographs table (Con 50 Year 2.25 2.722 2.722 7.6 0.36 39.6 5.1 0.7 Overflow Weir 1 0.7 N/A 75 82	Not Selected N/A N/A N/A N/A N/A N/A N/A Flow Restriction PI Not Selected N/A N/A N/A N/A ters for Spillway feet feet acres acre-ft umns W through A 100 Year 2.52 3.227 3.227 3.227 11.8 0.56 47.4 8.7 0.7 Overflow Weir 1 1.3 N/A 73 82	F). For the second sec



DETENTION BASIN OUTLET STRUCTURE DESIGN Outflow Hydrograph Workbook Filename:

	The user can o	verride the calcu	lated inflow hyd	lrographs from t	his workbook wi	th inflow hydrog	raphs developed	i in a separate pro	ogram.	
[SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.02	1.20
	0:15:00	0.00	0.00	1.78	2.90	3.59	2.42	3.03	2.95	5.45
	0:20:00	0.00	0.00	6.45 13.28	8.51 17.82	10.03 21.49	6.34 13.18	7.40	7.91 16.39	12.47 27.11
	0:30:00	0.00	0.00	16.20	21.25	25.03	28.11	33.61	38.01	63.71
	0:35:00	0.00	0.00	15.36	19.79	23.11	33.22	39.56	47.43	77.87
	0:40:00	0.00	0.00	13.99	17.73	20.64	32.38	38.49	46.28	75.62
	0:45:00	0.00	0.00	12.32	15.79	18.47	29.14	34.53	42.70	69.89
	0:50:00	0.00	0.00	10.87 9.62	14.17 12.52	16.39 14.53	26.31 23.03	31.06 27.12	38.47 34.04	63.30 56.31
	1:00:00	0.00	0.00	8.57	11.09	14.33	20.03	23.53	30.14	50.09
	1:05:00	0.00	0.00	7.85	10.13	11.96	17.53	20.54	26.85	44.83
	1:10:00	0.00	0.00	7.04	9.46	11.25	15.40	17.99	23.03	38.35
	1:15:00	0.00	0.00	6.31	8.67	10.59	13.73	15.97	19.89	32.91
	1:20:00	0.00	0.00	5.66	7.78	9.61	12.01	13.93	16.77	27.53
	1:30:00	0.00	0.00	5.04 4.45	6.92 6.13	8.36 7.22	10.40 8.76	12.01 10.08	13.97 11.50	22.73 18.52
	1:35:00	0.00	0.00	3.94	5.47	6.28	7.27	8.32	9.29	14.74
ĺ	1:40:00	0.00	0.00	3.61	4.77	5.66	6.02	6.84	7.42	11.58
	1:45:00	0.00	0.00	3.44	4.30	5.31	5.19	5.87	6.18	9.59
	1:50:00	0.00	0.00	3.36	3.99	5.08	4.70	5.31	5.45	8.36
	1:55:00 2:00:00	0.00	0.00	3.01 2.68	3.75 3.50	4.83 4.45	4.40 4.19	4.96 4.72	4.98 4.64	7.54
	2:05:00	0.00	0.00	2.08	2.79	3.55	3.34	3.76	3.65	5.41
	2:10:00	0.00	0.00	1.66	2.15	2.74	2.57	2.88	2.75	4.04
	2:15:00	0.00	0.00	1.28	1.67	2.11	1.97	2.21	2.08	3.03
	2:20:00	0.00	0.00	0.99	1.28	1.61	1.50	1.69	1.58	2.29
	2:25:00	0.00	0.00	0.75	0.97	1.22	1.14	1.28	1.20	1.74
	2:30:00 2:35:00	0.00	0.00	0.57	0.72	0.91	0.85	0.95	0.90	1.30 0.97
	2:40:00	0.00	0.00	0.31	0.39	0.51	0.05	0.53	0.51	0.37
	2:45:00	0.00	0.00	0.22	0.28	0.36	0.35	0.39	0.37	0.53
	2:50:00	0.00	0.00	0.14	0.19	0.25	0.24	0.27	0.25	0.36
	2:55:00	0.00	0.00	0.09	0.12	0.15	0.15	0.17	0.16	0.22
	3:00:00 3:05:00	0.00	0.00	0.04	0.07	0.08	0.08	0.09	0.09	0.12
	3:10:00	0.00	0.00	0.02	0.03	0.03	0.04	0.04	0.04	0.05
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00 3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ļ	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00 4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ļ	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00 4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00 4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00 5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00 5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00 5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00 6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ²]	Area [acres]	Volume [ft ³]	Volume [ac-ft]	Total Outflow [cfs]	
							For best results, include the
							stages of all grade slope
							changes (e.g. ISV and Floor) from the S-A-V table on
							Sheet 'Basin'.
							_
							Also include the inverts of all
							outlets (e.g. vertical orifice,
							overflow grate, and spillway, where applicable).
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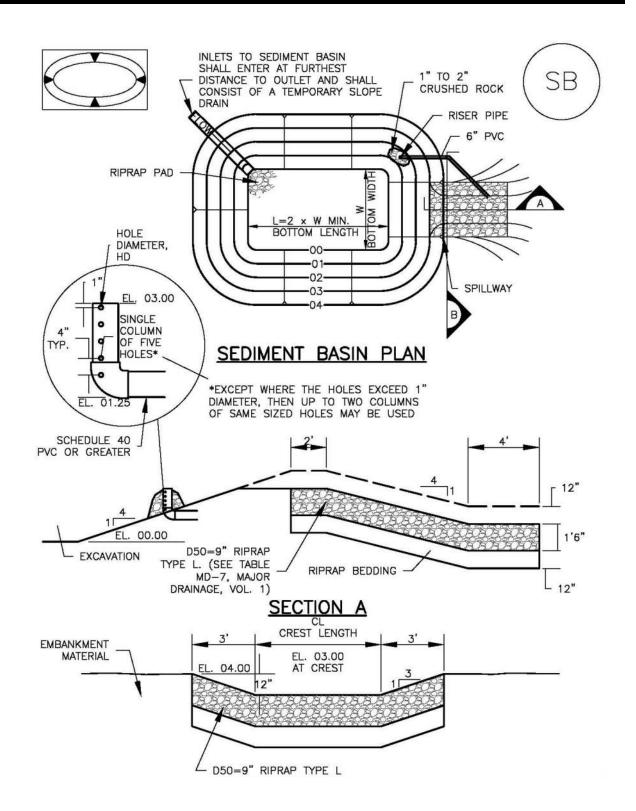


TABLE SB-1. SI	TABLE SB-1. SIZING INFORMATION FOR STANDARD SEDIMENT BASIN								
Upstream Drainage Area (rounded to nearest acre), (ac)	Basin Bottom Width (W), (ft)	Spillway Crest Length (CL), (ft)	Hole Diameter (HD), (in)						
1	12 <u>k</u> 21	2	⁹ √12 ¹³ ∕16						
2	28	3							
J 4	33 1/2	5	9/6						
5	38 1/2	8	2 % 2} ₃₂ 2} ₃₂ 23 ₃₂ 27 ₃₂ 27 ₃₂ 78 1516 3} ₃₂						
6	43	9	21/32						
7	47 <i>1</i> /4	11	25/32						
8	51	12	²⁷ /32						
9	55	13	7/8						
10	58 1/4	15	15/16						
11	61 64	16 18	3/32						
13	67 1/2	19	1 1/						
14	70 1/2	21	1 X6						
15	73 1/4	22	1 ½ 1 ¾						

SEDIMENT BASIN INSTALLATION NOTES

- 1. SEE PLAN VIEW FOR:
 - -LOCATION OF SEDIMENT BASIN.

-TYPE OF BASIN (STANDARD BASIN OR NONSTANDARD BASIN).

-FOR STANDARD BASIN, BOTTOM WIDTH W, CREST LENGTH CL, AND HOLE DIAMETER, HD.

-FOR NONSTANDARD BASIN, SEE CONSTRUCTION DRAWINGS FOR DESIGN OF BASIN INCLUDING RISER HEIGHT H, NUMBER OF COLUMNS N, HOLE DIAMETER HD AND PIPE DIAMETER D.

2. FOR STANDARD BASIN, BOTTOM DIMENSION MAY BE MODIFIED AS LONG AS BOTTOM AREA IS NOT REDUCED.

3. SEDIMENT BASINS SHALL BE INSTALLED PRIOR TO ANY OTHER LAND-DISTURBING ACTIVITY THAT RELIES ON ON BASINS AS AS A STORMWATER CONTROL.

4. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL FREE OF DEBRIS, ORGANIC MATERIAL, AND ROCKS OR CONCRETE GREATER THAN 3 INCHES AND SHALL HAVE A MINIMUM OF 15 PERCENT BY WEIGHT PASSING THE NO. 200 SIEVE.

5. EMBANKMENT MATERIAL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.

6. PIPE SCH 40 OR GREATER SHALL BE USED.

7. THE DETAILS SHOWN ON THESE SHEETS PERTAIN TO STANDARD SEDIMENT BASIN(S) FOR DRAINAGE AREAS LESS THAN 15 ACRES. SEE CONSTRUCTION DRAWINGS FOR EMBANKMENT, STORAGE VOLUME, SPILLWAY, OUTLET, AND OUTLET PROTECTION DETAILS FOR ANY SEDIMENT BASIN(S) THAT HAVE BEEN INDIVIDUALLY DESIGNED FOR DRAINAGE AREAS LARGER THAN 15 ACRES.

Also provide the MHFD calculation sheets for this design to verify drain times.

TABLE SB-1. S	ZING INFORMATION FO	OR STANDARD SEDIMENT	BASIN
Upstream Drainage Area (rounded to nearest acre), (ac)	Basin Bottom Width (W), (ft)	Spillway Crest Length (CL), (ft)	Hole Diameter (HD), (in)
1 2 3 4 5 6 7 8 9 10 11	12 ½ 21 28 33 ½ 38 ½ 43 47 ¼ 51 55 58 ¼ 61	2 3 5 6 8 9 11 12 13 15	932 13/6 12 9/6 21/32 23/32 25/32 27/32 27/32 78 15/6 31/2
12	64	18	1
13 14 15	67 ½ 70 ½ 73 ¼	21 22	1 K6 1 K8 1 K8

SEDIMENT BASIN INSTALLATION NOTES

- 1. SEE PLAN VIEW FOR:
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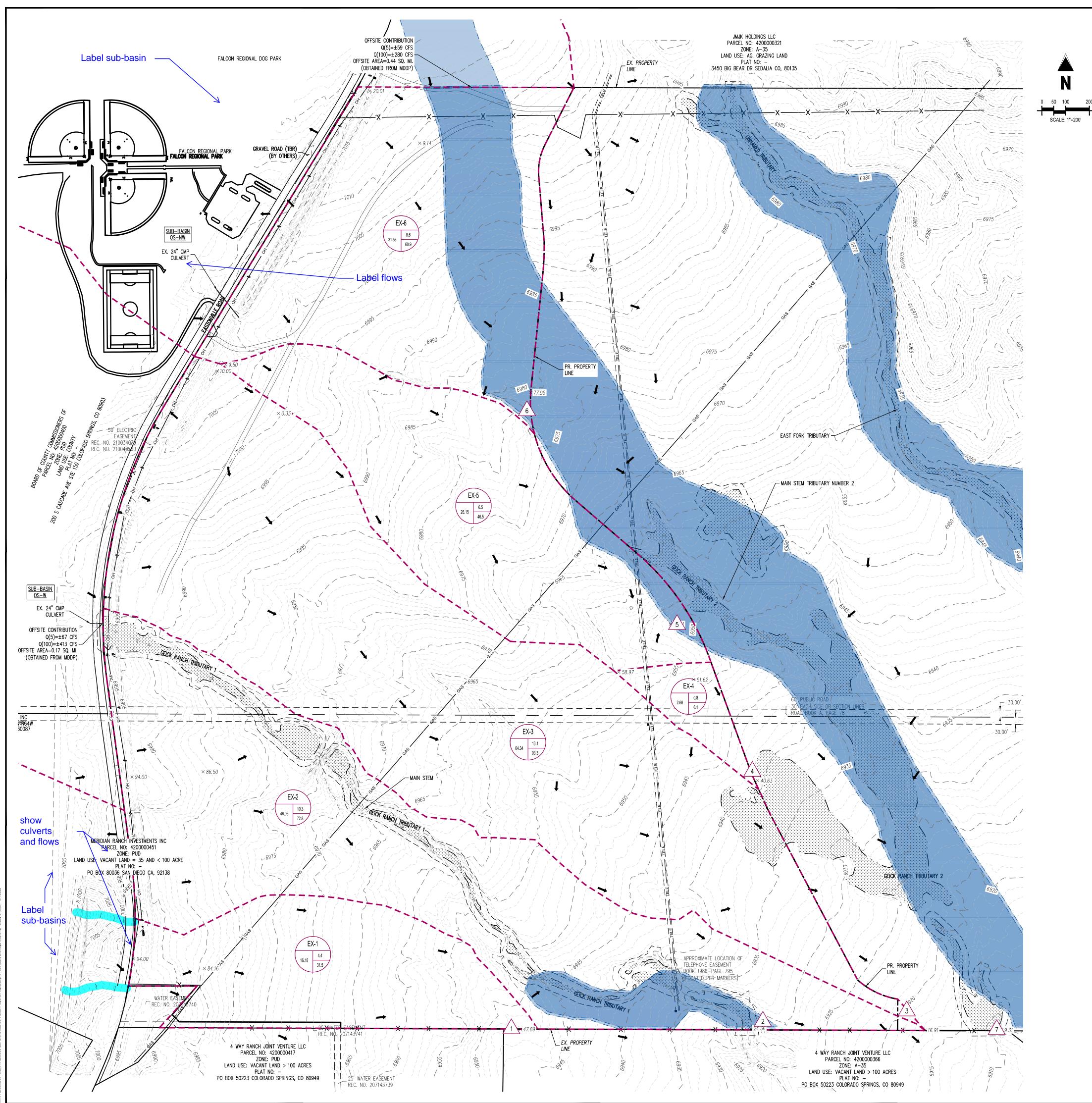
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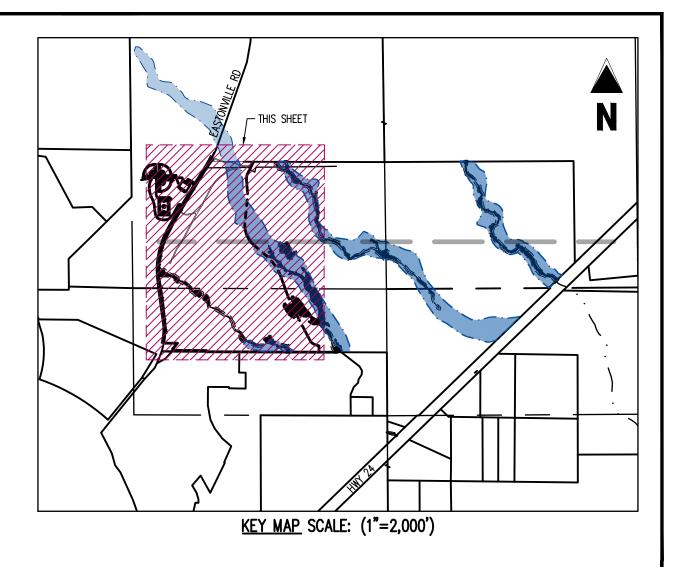
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APPENDIX F

Drainage Maps





Galloway 6162 S. Willow Drive, Suite 320 Greenwood Village, CO 80111

303.770.8884 GallowayUS.com

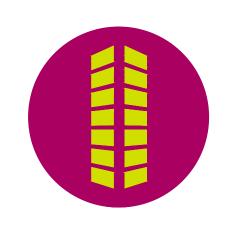


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DRAINAGE LEGEND

	EXISTING PROPERTY LINE	
	PROPOSED PROPERTY LINE	
— — —6485— — —	EXISTING MAJOR CONTOUR	
	EXISTING MINOR CONTOUR	
	BASIN BOUNDARY LINE	
	-BASIN DESIGNATION	
	-5-YEAR RUNOFF IN CUBIC FEET PER SECOND	
0.71 4.8	-100-YEAR RUNOFF IN CUBIC FEET PER SECOND	
<u> </u>	—BASIN AREA IN ACRES	
$\underline{\land}$	DESIGN POINT	
	DIRECTION OF RUNOFF	
	EXISTING BOUNDARY EASEMENT	
TELE	EXISTING TELEPHONE LINE	
ОН	EXISTING POWER LINE	
XX	EXISTING FENCE	
GAS	EXISTING GAS LINE	
	EXISTING WETLANDS	
<u> </u>	EXISTING LIMITS OF WETLAND	
	EXISTING WETLAND SETBACK	
	EXISTING FEMA FLOOD PLAIN, ZONE A	

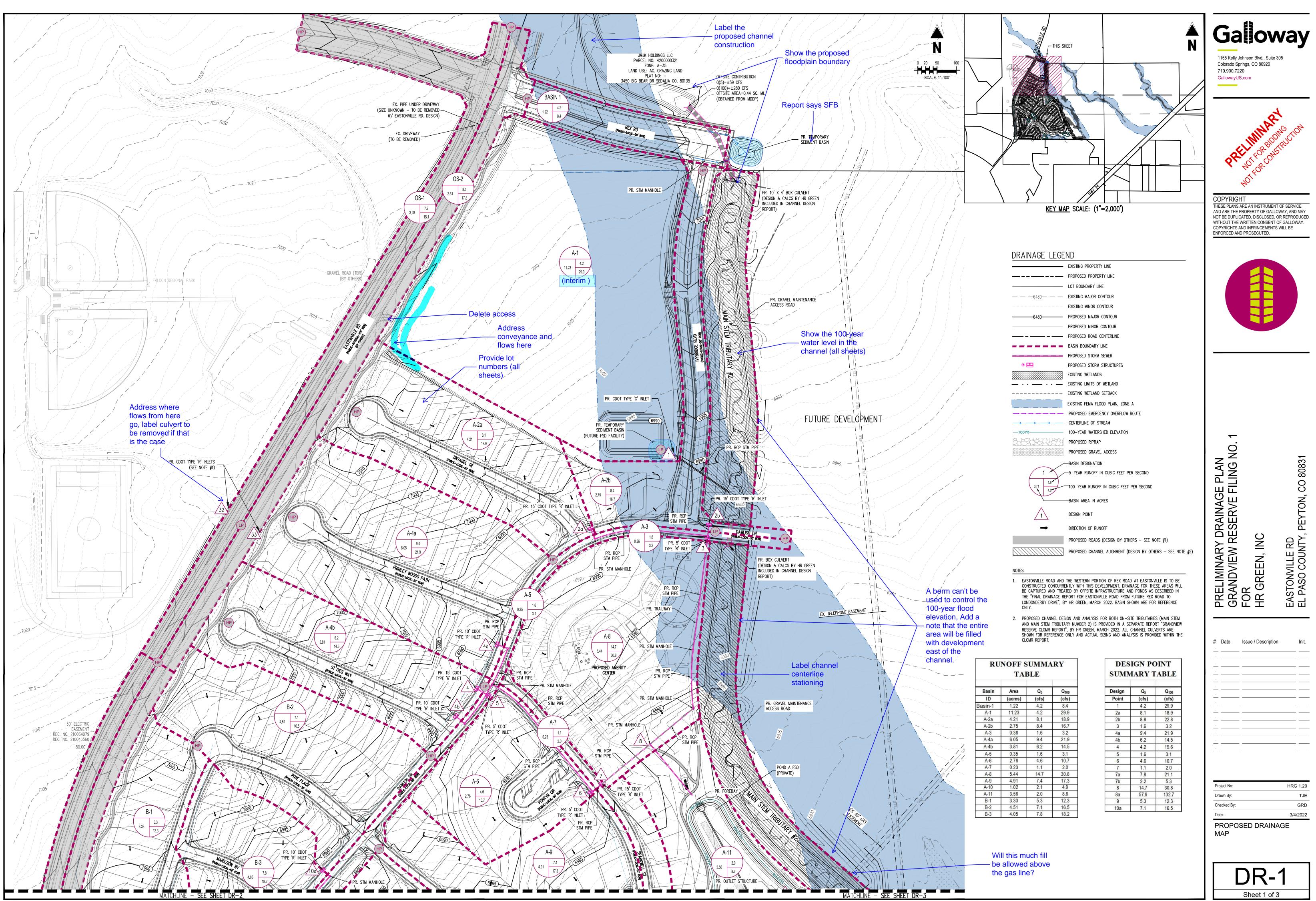
RU	NOFF S TAF		RY		IGN PC IARY T	
Basin	Area	Q ₅	Q ₁₀₀	Design	Q 5	Q ₁₀₀
ID	(acres)	(cfs)	(cfs)	Point	(cfs)	(cfs)
EX-1	16.18	4.4	31.5	1	4.4	31.5
EX-2	46.06	10.3	72.8	2	77.3	485.8
EX-3	64.34	13.1	93.3	3	13.1	93.3
EX-4	2.68	0.8	6.1	4	0.8	6.1
EX-5	26.15	6.5	46.5	5	6.5	46.5
EX-6	31.53	8.6	60.9	6	8.6	60.9
				7	164.2	964.1

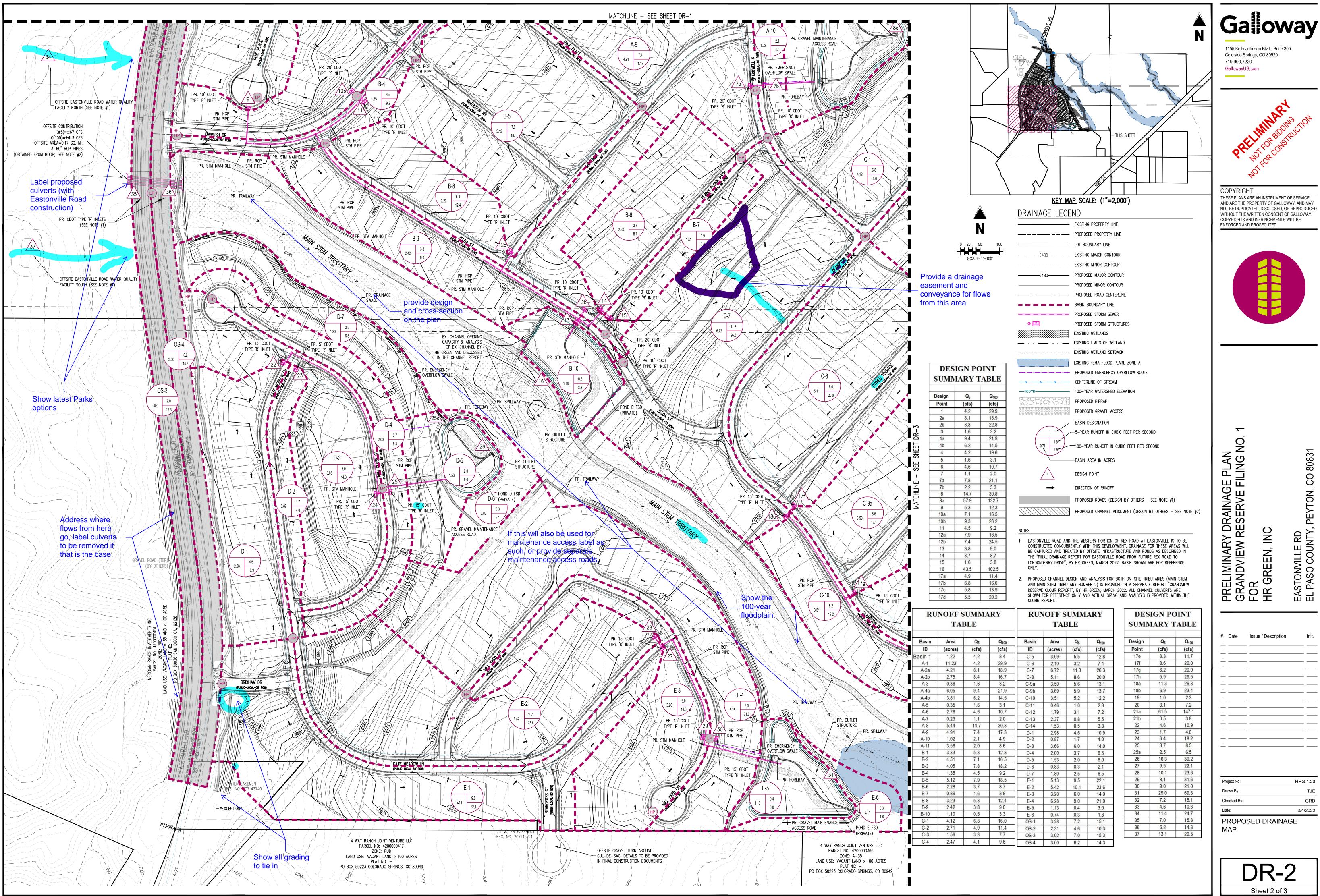


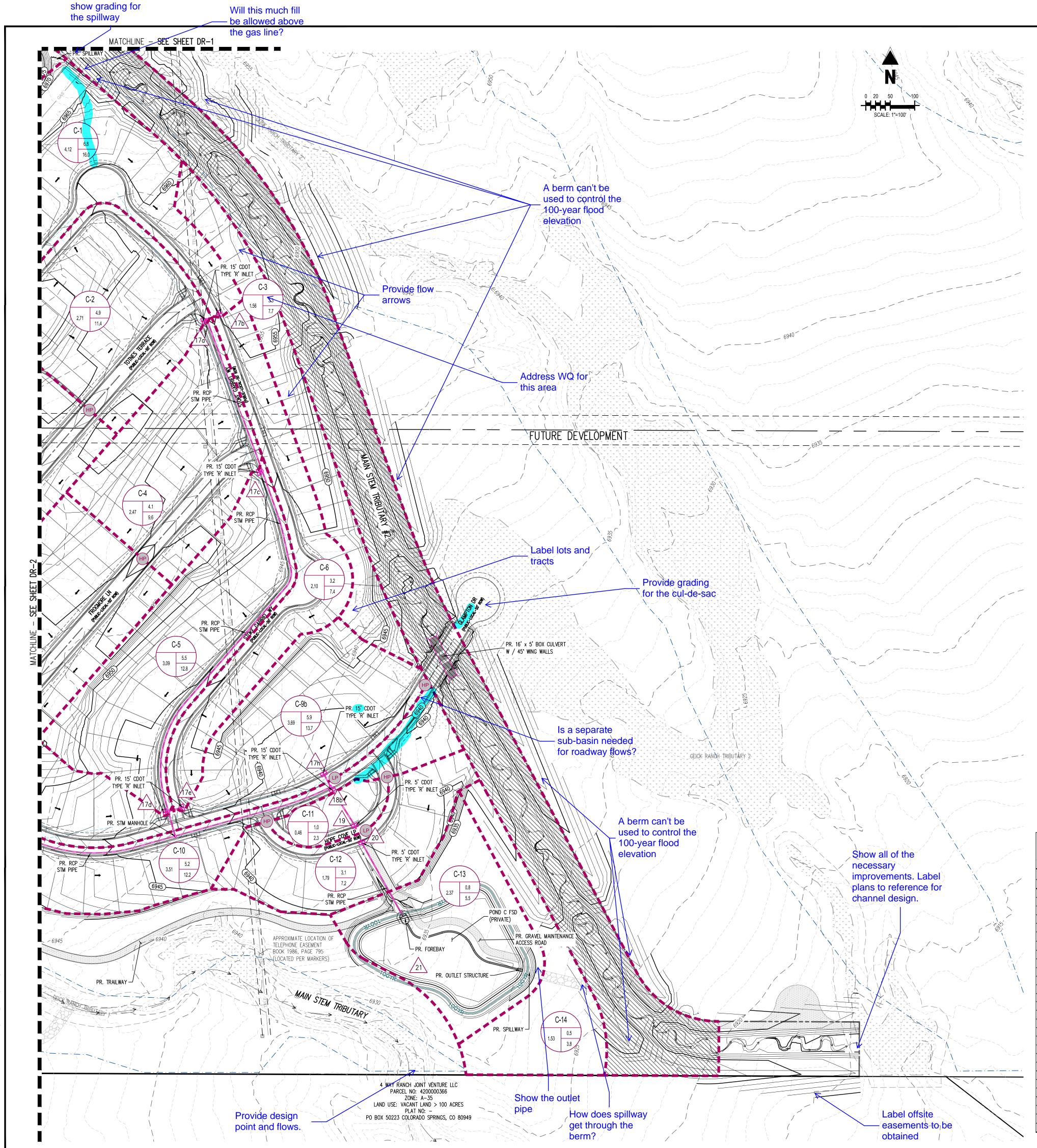
PRELIMINARY DRAINAGE PLAN GRANDVIEW RESERVE	FOR HR GREEN, INC	EASTONVILLE RD EL PASO COUNTY, PEYTON, CO 80831
# Date 	Issue / Description	Init.
- - - - -		
- - - -		

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	3/1/2022
EXISTING DRAINAGE MAP	



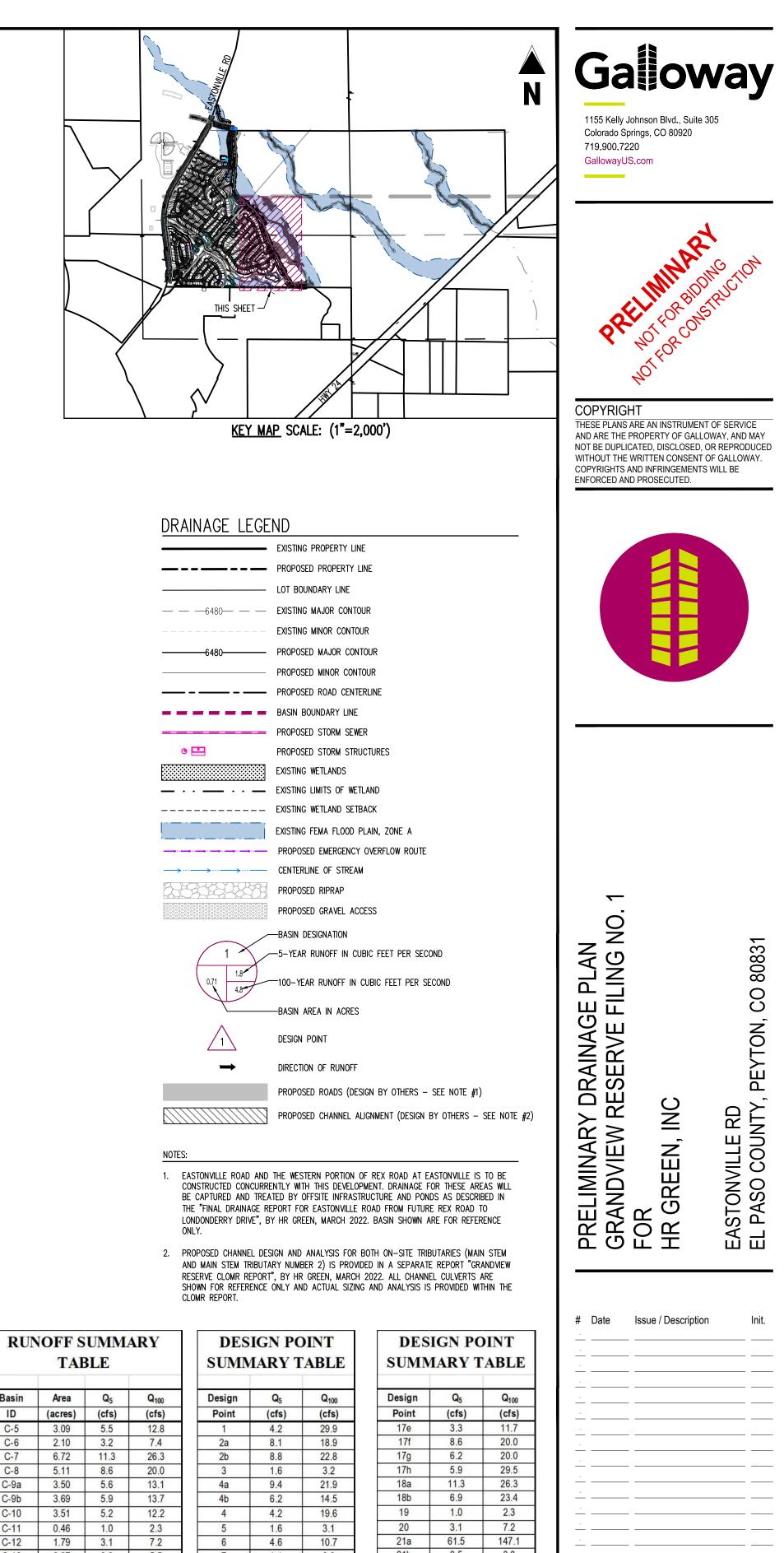






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RUNOFF SUMMARY TABLE			
Basin	Area	Q5	Q ₁₀₀
ID	(acres)	(cfs)	(cfs)
Basin-1	1.22	4.2	8.4
A-1	11.23	4.2	29.9
A-2a	4.21	8.1	18.9
A-2b	2.75	8.4	16.7
A-3	0.36	1.6	3.2
A-4a	6.05	9.4	21.9
A-4b	3.81	6.2	14.5
A-5	0.35	1.6	3.1
A-6	2.76	4.6	10.7
A-7	0.23	1.1	2.0
A-8	5.44	14.7	30.8
A-9	4.91	7.4	17.3
A-10	1.02	2.1	4.9
A-11	3.56	2.0	8.6
B-1	3.33	5.3	12.3
B-2	4.51	7.1	16.5
B-3	4.05	7.8	18.2
B-4	1.35	4.5	9.2
B-5	5.12	7.9	18.5
B-6	2.28	3.7	8.7
B-7	0.89	1.6	3.8
B-8	3.23	5.3	12.4
B-9	2.42	3.8	9.0
B-10	1.10	0.5	3.3
C-1	4.12	6.8	16.0
C-2	2.71	4.9	11.4
C-3	1.56	3.3	7.7
C-4	2.47	4.1	9.6



Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	3/4/2022
PROPOSED DRAINAGE	

PROPOSED DRAINAG

DR-3 Sheet 3 of 3

7 1.1 2.0 7a 7.8 21.1 10.9 7b 2.2 5.3 8 14.7 30.8 14.0 8a 57.9 132.7 8.5 9 5.3 12.3 10a 7.1 16.5 2.1 10b 9.3 26.2 4.5 9.2 11 7.9 18.5 12a 7.4 24.5 12b 13 3.8 9.0 14 3.7 8.7 15 1.6 3.8 16 43.5 102.5

17a 4.9 11.4

17b 6.8 16.0

17c 5.8 13.9

17d 5.5 20.2

21b 0.5 3.8 22 4.6 10.9 23 1.7 4.0 24 6.4 18.2 3.7 8.5 25 2.5 25a 6.5 26 16.3 39.2 9.5 27 22.1 10.1 23.6 8.1 31.6 9.0 21.0 29.0 69.3 7.2 15.1 4.6 10.3 33 11.4 24.7 34 7.0 15.3 35 36 6.2 14.3 37 13.1 29.5

RUNOFF SUMMARY Basin Area Q₅ ID (acres) (cfs) (cfs) C-5 3.09 5.5 C-6 2.10 3.2 C-7 C-8 5.11 8.6 20.0 C-9a C-9b C-10 3.51 5.2 C-11 C-12 1.79 3.1 C-13 2.37 0.8 5.5 C-14 1.53 0.5 3.8 D-1 2.98 4.6 D-2 0.87 1.7 4.0 D-3 3.66 6.0 D-4 2.00 3.7 D-5 1.53 2.0 6.0 D-6 0.83 0.3 D-7 1.80 2.5 6.5 E-1 5.13 9.5 22.1 E-2 5.42 10.1 23.6 E-3 3.20 6.0 14.0 E-4 6.28 9.0 21.0 E-5 1.13 0.4 3.0 E-6 0.74 0.3 1.8 OS-1 3.28 7.2 15.1 OS-2 2.31 4.6 10.3 OS-3 3.02 7.0 15.3 OS-4 3.00 6.2 14.3