PRELIMINARY DRAINAGE REPORT

GRANDVIEW RESERVE

El Paso County, Colorado

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

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

DATE:
August 11, 2021

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.

_____ _____

Charlene Durham, PE #36727 Date
For and on behalf of Galloway & Company, Inc.

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. Date
County Engineer/ECM Administrator

Conditions:

TABLE OF CONTENTS

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, Rex Road to the north, undeveloped land proposed as future development to the east, and undeveloped land to the south. A Vicinity Map is included in **Appendix A**.

This preliminary drainage report was the basis for the drainage facility design contained within the previously approved MDDP for the site prepared by HR Green. The site consists of approximately 182.61 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.

Table 1 - Precipitation Data

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

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 drainage ways the currently convey existing on & off-site flows through the site – these are the Main Stem (MS) and Main Stem Tributary Number 2 (MST). Both drainageways generally flow to the southeast to Highway 24, before crossing via existing drainage structures. Currently, these channels receive flows from two off-site basins, one from the west and the other from the north and are routed under Eastonville Road via existing pipe culverts.

An existing basin map has been prepared for this site to analyze the existing basins as well as the offsite basins contributing to the site. The existing map is included in **Appendix F** and basins are described below.

Basin EX-1 (105.72 AC, Q5 = 22.3 cfs, Q100 = 159.1 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)**.

Basin EX-2 (57.68 AC, Q5 = 13.1 cfs, Q100 = 93.4 cfs): Located on the northeast 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 2)**.

Basin EX-3 (23.35 AC, Q5 = 6.8 cfs, Q100 = 48.4 cfs): Located on the southeast 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)**.

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 is to be completed by others and a separate report for the major channels will be submitted for review.

3. 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. On-site 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.**

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 Drainage Basin and consists of six (6) basins. Site runoff will be collected via inlets & pipes and diverted to one of the five proposed full spectrum detention ponds. All necessary calculations can be found within the appendices of the report.

According to the DBPS, there are two major channels 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. There are no proposed major channel improvements for MS -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) WQCV Detention Ponds, Pond A, B, C, D, & E, to provide water quality treatment prior to discharging the runoff directly into either the MS or MST Channel.

As has been mentioned previously, the site is proposed to be 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.

The proposed institutional use area flows have not been included in this analysis. It is anticipated that the lot will not be developed until after construction of the proposed site. This area will need to submit a separate drainage report prior to development. Installation of a separate storm sewer system for the tract may be required. The development is responsible for ensuring the site drainage, once constructed, will not negatively impact any adjacent development. Water quality for this area will need to be included in the future site drainage design for the area.

Basin-1 (1.40 AC, Q5 = 4.8 cfs, Q100 = 9.7 cfs): Located on the northwest border of the site, Basin-1 contains the proposed Phase 1 improvements to Rex Rd. This drainage basin consists entirely of off-site areas tributary to 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 discharge directly into main stem tributary #2 channel. It is anticipated that these flows will be captured and treated further downstream when the next segment of Rex Rd. is constructed.

Basin A-1 (11.23 AC, Q5 = 3.9 cfs, Q100 = 27.5 cfs): Located on the northwest corner of the site, East of Eastonville Rd. & south of Rex Rd. This drainage basin is proposed future development to include an institutional site. Runoff from this basin will sheet flow from the northwest to the southeast, to a proposed CDOT Type 'C' inlet on the west side of Road V **(DP 1)**. Flows will then be routed under Road V, via 24" RCP, to the updated Main Stem Tributary 2 channel.

Basin A-2 (6.94 AC, Q5 = 13.2 cfs, Q100 = 29.7 cfs): Located on the north portion of the site, this basin consists of residential lots, Road G, Road V, and a portion of the north half of Road F. 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) CDOT Type 'R' inlet in sump conditions, located on the northeast side of the intersection of Road V and Road F **(DP 2)**.

Basin A-3 (0.34 AC, Q5 = 1.6 cfs, Q100 = 3.0 cfs): Located on the north portion of the site, this basin consists of a portion of the south half of Road F. Flows will be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the southeast side of the intersection of Road V and Road F **(DP 3)**.

Basin A-4 (10.15 AC, Q5 = 19.8 cfs, Q100 = 45.1 cfs): Located on the north portion of the site, this basin consists of residential lots, Road H, Road I, and a portion of the west half of Road F. 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) CDOT Type 'R' inlet in sump conditions, located on the west side of Road F **(DP 4),** between Road H and Road I.

Basin A-5 (0.34 AC, Q5 = 1.6 cfs, Q100 = 3.0 cfs): Located on the north portion of the site, this basin consists of a portion of the east half of Road F. Flows will be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the east side of Road F **(DP 5),** Just north of the intersection of Road M and Road F.

Basin A-6 (2.67 AC, Q5 = 4.7 cfs, Q100 = 11.5 cfs): Located centrally on the site, this basin consists of residential lots, Road N, and a portion of the south half of Road M. 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) CDOT Type 'R' inlet in sump conditions, located on the south side of Road M **(DP 6),** Just southeast of the intersection of Road N & Road M.

Basin A-7 (2.91 AC, Q5 = 2.3 cfs, Q100 = 8.4 cfs): Located centrally on the site, this basin consists of residential lots and a portion of the north half of Road M. 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) CDOT Type 'R' inlet in sump conditions, located on the north side of Road M **(DP 7),** Just northeast of the intersection of Road N & Road M.

Basin A-8 (6.31 AC, Q5 = 1.9 cfs, Q100 = 13.5 cfs): Located on the eastern limits of the site, adjacent to the proposed Main Stem Tributary #2 drainageway. This basin consists of a portion of an open area amenity and the proposed (private) Full Spectrum Detention Pond A. Runoff from this basin will sheet flow directly 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 a controlled rate, into the adjacent Main Stem Tributary #2 channel.

Basin B-1 (4.02 AC, Q5 = 6.6 cfs, Q100 = 16.0 cfs): Located on the western limits of the site, adjacent to Eastonville Road. This basin consists of residential lots and the southwest portion of Road J. 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) CDOT Type 'R' inlet in sump conditions, located at the end of the Cul-De-Sac of Road J **(DP 9)**.

Basin B-2 (7.58 AC, Q5 = 13.1 cfs, Q100 = 29.3 cfs): Located on the western limits of the site, partially adjacent to Eastonville Road. This basin consists of residential lots, the northwest portion of Road J, the southwestern portion of Road F, and western portion of Road K. 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) CDOT Type 'R' inlet in sump conditions, located south of Road K on the northwest side of Road F **(DP 10)**.

Basin B-3 (0.76 AC, Q5 = 3.1 cfs, Q100 = 6.0 cfs): Located on the western portion of the site, this basin consists of the south & east half portions of Road F. Flows will be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the north side of Road O **(DP 11)**, between Road K & Road I.

Basin B-4 (9.17 AC, Q5 = 16.0 cfs, Q100 = 35.5 cfs): Located centrally on the site. This basin consists of residential lots, the northwest portion of Road J, western portion of Road K, and north half of a portion of road I & south half of Road O. 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) CDOT Type 'R' inlet in sump conditions, located east of Road P on the northwest side of Road L **(DP 12)**.

Basin B-5 (2.57 AC, Q5 = 4.7 cfs, Q100 = 10.4 cfs): Located centrally on the site, adjacent to the north side of Main Stem channel. This basin consists of residential lots and the south portion of Road L. 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) CDOT Type 'R' inlet in sump conditions, located on the south side of Road L **(DP 13)**, southeast of Road P.

Basin B-6 (2.06 AC, Q5 = 3.9 cfs, Q100 = 8.8 cfs): Located centrally on the site. This basin consists of residential lots and the northwest portion of Road P. 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) CDOT Type 'R' inlet in sump conditions, located on the northwest side of Road P **(DP 14)**.

Basin B-7 (0.99 AC, Q5 = 2.4 cfs, Q100 = 5.3 cfs): Located centrally on the site. This basin consists of residential lots and the southeast portion of Road P. 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) CDOT Type 'R' inlet in sump conditions, located on the southeast side of Road P **(DP 15)**.

Basin B-8 (0.87 AC, Q5 = 0.4 cfs, Q100 = 2.6 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 a controlled rate, into the adjacent Main Stem channel.

Basin C-1 (34.69 AC, Q5 = 40.3 cfs, Q100 = 89.9 cfs): Located on the east portion of the site, this basin consists of residential lots, Road S, Road T, Road R and portions of Roads; J, O, M, & Q. 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) CDOT Type 'R' inlet in sump conditions, located on the northeast side of Road Q **(DP 17)**, northeast from Road U and Road Q intersection.

Basin C-2 (9.90 AC, Q5 = 12.9 cfs, Q100 = 29.8 cfs): Located centrally on the site, this basin consists of residential lots and portions of Roads L & Q. 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) CDOT Type 'R' inlet in sump conditions, located on the southeast side of Road Q **(DP 18)**, north from Road U and Road Q intersection.

Basin C-3 (0.50 AC, Q5 = 0.9 cfs, Q100 = 2.5 cfs): Located on the southeast portion of the site, this basin consists of landscape and half of Road U. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the west side of Road U **(DP 19)**.

Basin C-4 (1.61 AC, Q5 = 3.0 cfs, Q100 = 6.8 cfs): Located on the southeast portion of the site, this basin consists of residential lots and the south half of Road U. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the east side of Road U **(DP 20)**.

Basin C-5 (3.99 AC, Q5 = 1.3 cfs, Q100 = 9.4 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 a controlled rate, into the adjacent Main Stem channel.

Basin D-1 (2.46 AC, Q5 = 5.0 cfs, Q100 = 12.3 cfs): Located on the southwest portion of the site, adjacent to Eastonville Road. This basin consists of residential lots, a portion Road B, and the north half of Road A. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the west side of Road B **(DP 22)**, just north of the intersection of Road B & Road C.

Basin D-2 (0.75 AC, Q5 = 2.4 cfs, Q100 = 4.9 cfs): Located on the southwest portion of the site, this basin consists of residential lots and a portion of Road B. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in

sump conditions, located on the east side of Road B **(DP 23)**, just north of the intersection of Road B & Road C.

Basin D-3 (4.76 AC, Q5 = 9.1 cfs, Q100 = 21.5 cfs): Located on the southwest portion of the site, this basin consists of residential lots and a portion of Road B & Road C. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the west side of Road C **(DP 24)**.

Basin D-4 (4.74 AC, Q5 = 9.2 cfs, Q100 = 21.1 cfs): Located on the southwest portion of the site, this basin consists of residential lots and the east half of Road C. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the east side of Road C **(DP 25)**.

Basin D-5 (1.71 AC, Q5 = 0.7 cfs, Q100 = 4.8 cfs): Located on the southwest portion of the site, adjacent to the Main Stem channel. This basin consists of 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 a controlled rate, into the adjacent Main Stem channel.

Basin E-1 (6.86 AC, Q5 = 8.0 cfs, Q100 = 21.0 cfs): Located on the southern portion of the site, this basin consists of residential lots and a portion of Road D. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the east side of Road D **(DP 27)**, just north of the cul-de-sac.

Basin E-2 (11.66 AC, Q5 = 15.4 cfs, Q100 = 38.2 cfs): Located on the southern portion of the site, this basin consists of residential lots, all of Road E, the south half of Road A, and a portion of Roads; B, D & E. Runoff from this basin will sheet flow to the adjacent road. Flows will then be routed, via curb & gutter, to a proposed (public) CDOT Type 'R' inlet in sump conditions, located on the west side of Road D **(DP 28)**, just north of the Cul-De-Sac.

Basin E-3 (1.71 AC, Q5 = 0.6 cfs, Q100 = 4.6 cfs): Located on the southern portion of the site, adjacent to the south side of 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 29)**, via a concrete trickle channel, where it will eventually discharge, at a controlled rate, into the adjacent Main Stem channel.

VII. Storm Sewer System

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 five 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.

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

Five (5) Water Quality Capture Volume Detention Ponds will be provided for the proposed site. All of the proposed ponds are private and will be maintained by the HOA, 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 0.49 Ac-Ft & 1.090 Ac-Ft, respectively. The total required detention basin volume is 2.55 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 0.52 Ac-Ft & 1.47 Ac-Ft, respectively. The total required detention basin volume is 2.95 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 0.26 Ac-Ft & 0.57 Ac-Ft, respectively. The total required detention basin volume is 1.35 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 0.22 Ac-Ft & 0.55 Ac-Ft, respectively. The total required detention basin volume is 1.23 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 0.22 Ac-Ft & 0.48 Ac-Ft, respectively. The total required detention basin volume is 1.17 Ac-Ft.

IX. Proposed Channel Improvements

According to the DBPS, 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 -however, MST is proposed to be rerouted. The analysis for both drainage ways and design of MST were done by others and a separate report will be submitted for review.

X. Maintenance

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 HOA, once established, unless an agreement is reached stating otherwise.

XI. Wetlands Mitigation

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.

XII. Floodplain Statement

A portion of the project sit lies with Zone A Special Flood Hazard Area as defined by the FIRM Map number 08041C0552G effective December 7, 2018. A copy of the FIRM Panel is included in **Appendix A.**

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

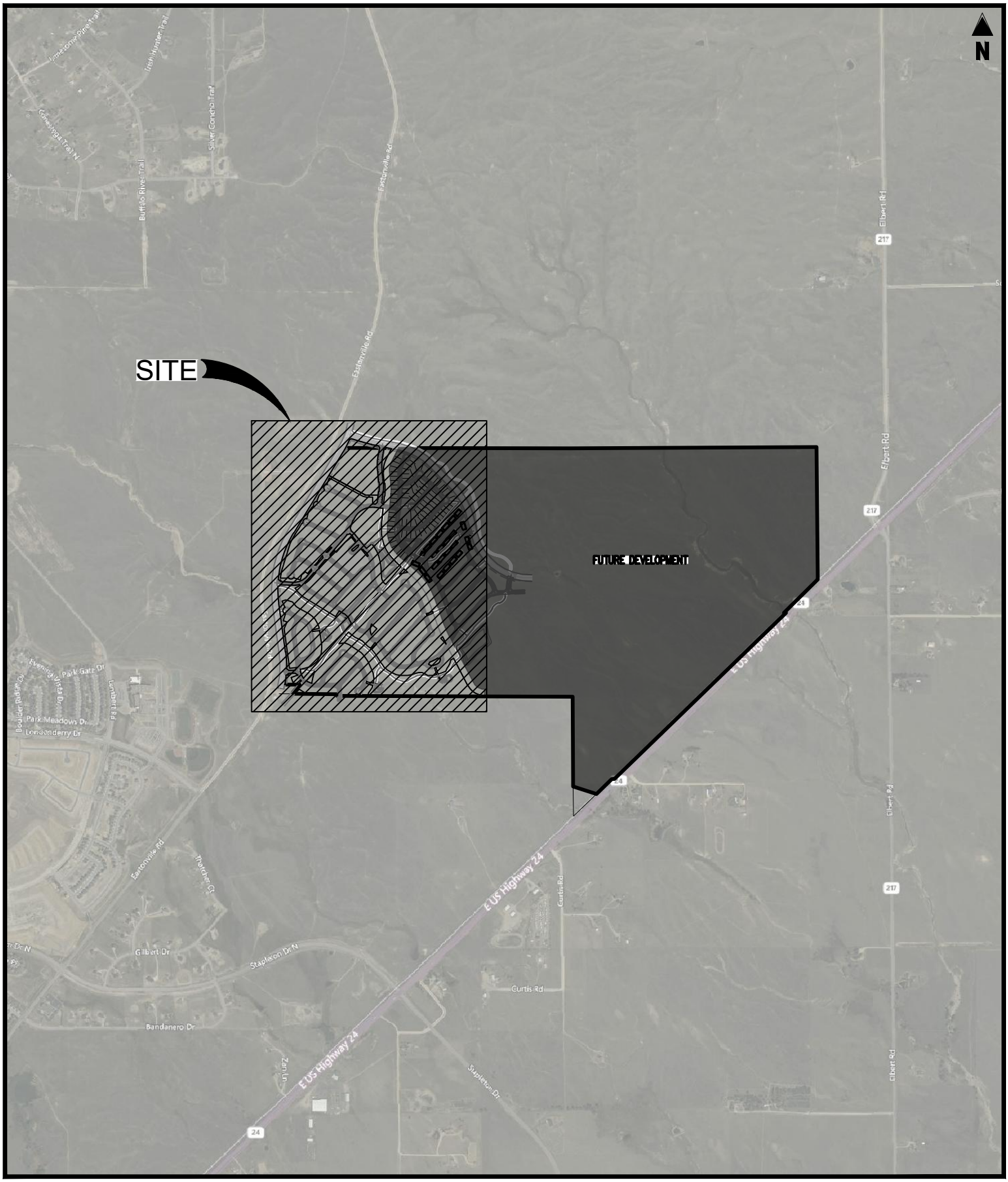
The Grandview Reserve residential subdivision lies within the Gieck Ranch Drainage Basin. Water quality for the site is provided in five on-site Full Spectrum Detention Ponds; Ponds A, B, C, D, & E. All drainage facilities within this report were sized according to the El Paso County Drainage Criteria Manuals. There are two major channels passing through the site Main Stem and Main Stem Tributary #2, which will be addressed by others in a channel improvement report. The five (5) WQCV ponds will be maintained by a newly established HOA. A Final Drainage Report will be submitted along with the final plat and construction drawings.

XV. References

1. *El Paso County Drainage Criteria Manual*, 2014.
2. *Drainage Criteria Manual, Volume 2*, City of Colorado Springs, May 2014.
3. *Urban Storm Drainage Criteria Manual*, Urban Drainage and Flood Control District, January 2016 (with current revisions).
4. *Gieck Ranch Drainage Basin Study (DBPS),* Drexel Barrell, October 2010 (Not adopted by County).
5. *Grandview Reserve Master Development Drainage Plan (MDDP),* HR Green, November 2020.

APPENDIX A

Exhibits and Figures



GRANDVIEW RESERVE

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EASTONVILLE RD

SCALE: 1"=2,000'

VICINITY MAP

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

Galloway

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

possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

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

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, 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 floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

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

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

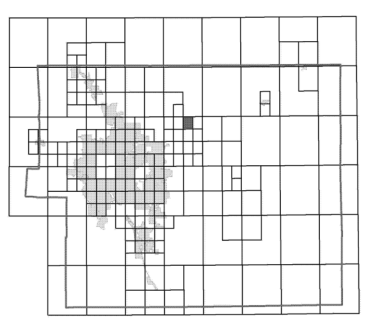
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

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

El Paso County Vertical Datum Offset Table

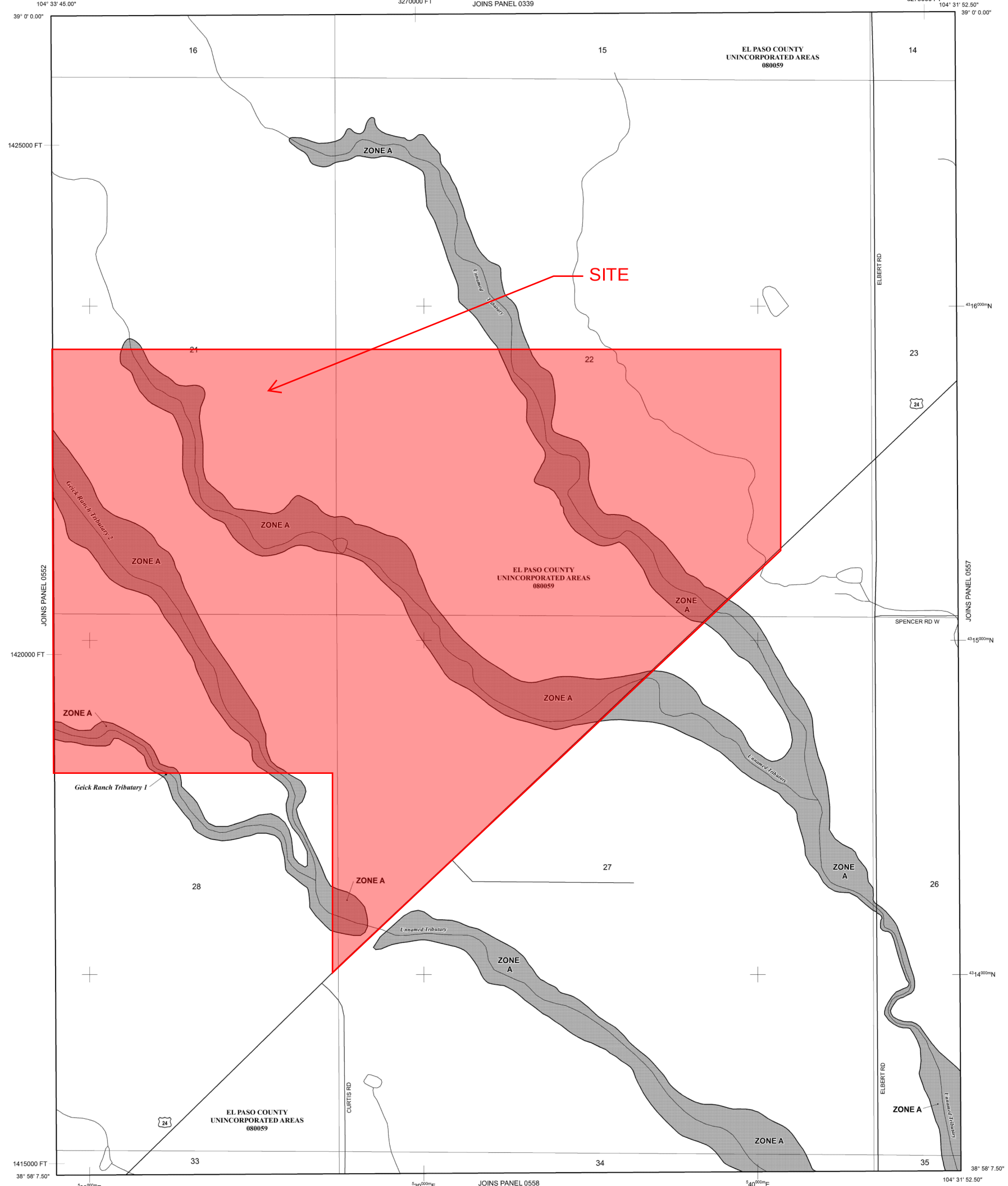
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



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.



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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

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

A — A	Cross section line
23 - - - - 23	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0556G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 556 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0556	G

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

MAP NUMBER
08041C0556G

MAP REVISED

possible updated or additional flood hazard information.

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

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The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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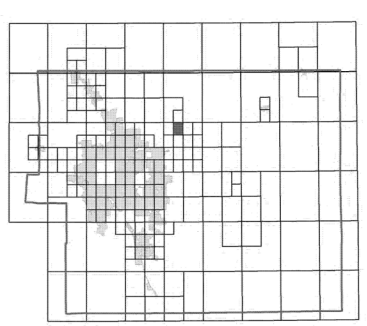

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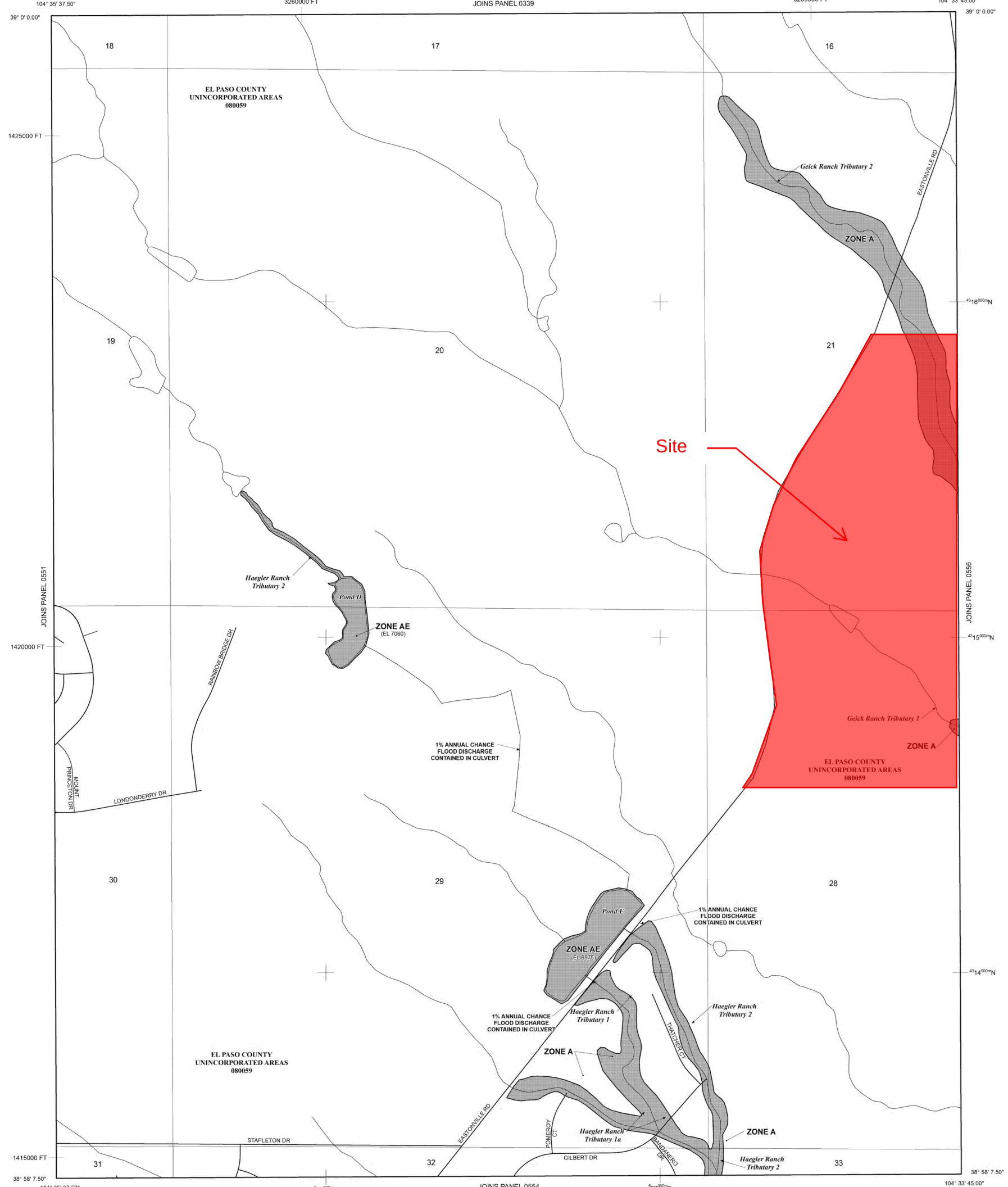

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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

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97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
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● M1.5	River Mile

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EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

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150 0 150 300 METERS

NFIP

PANEL 0552G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 552 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

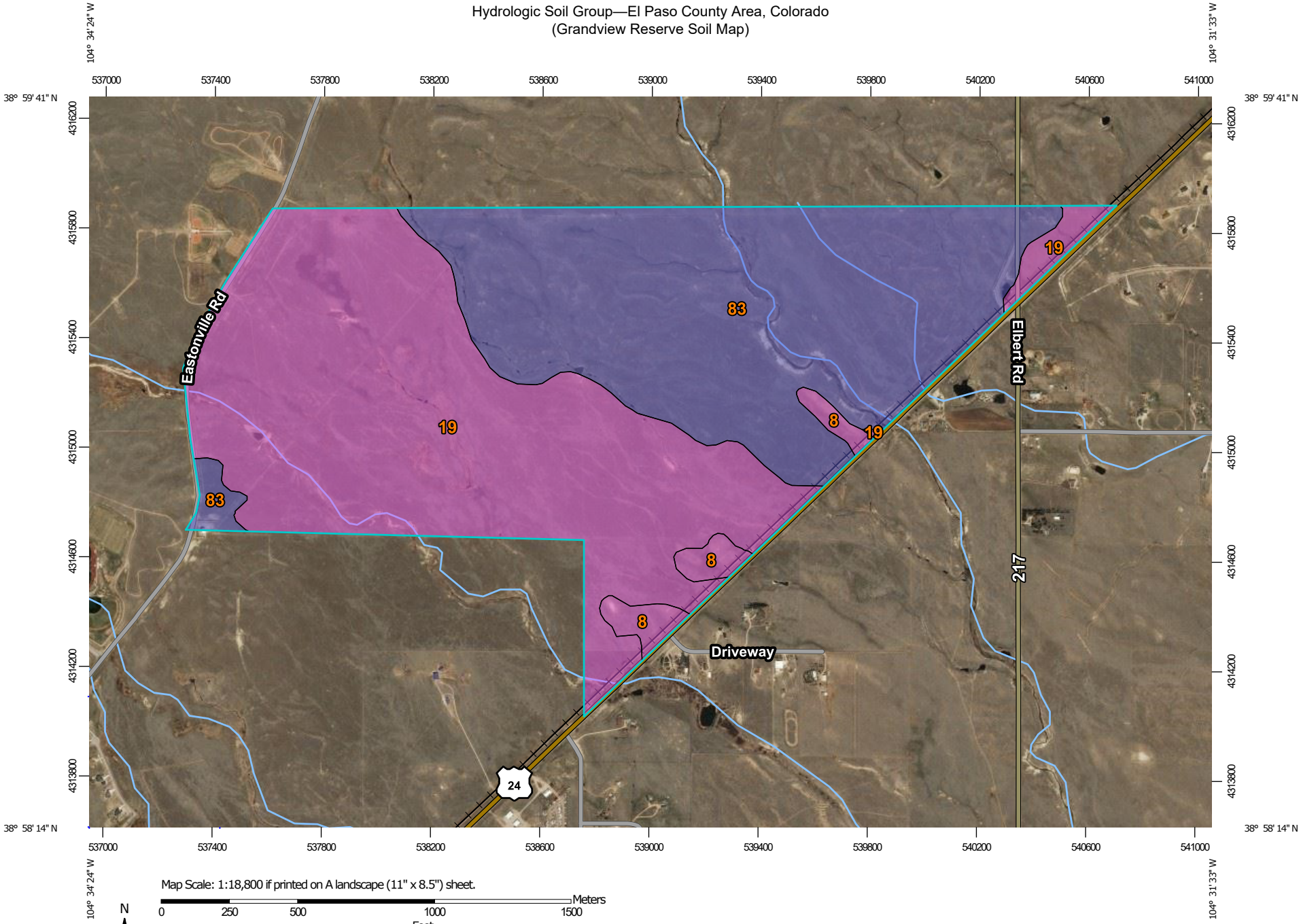
COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0552	G

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

MAP NUMBER
08041C0552G

MAP REVISED

Hydrologic Soil Group—El Paso County Area, Colorado
(Grandview Reserve Soil Map)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 17, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
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	B	385.4	44.9%
Totals for Area of Interest			**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

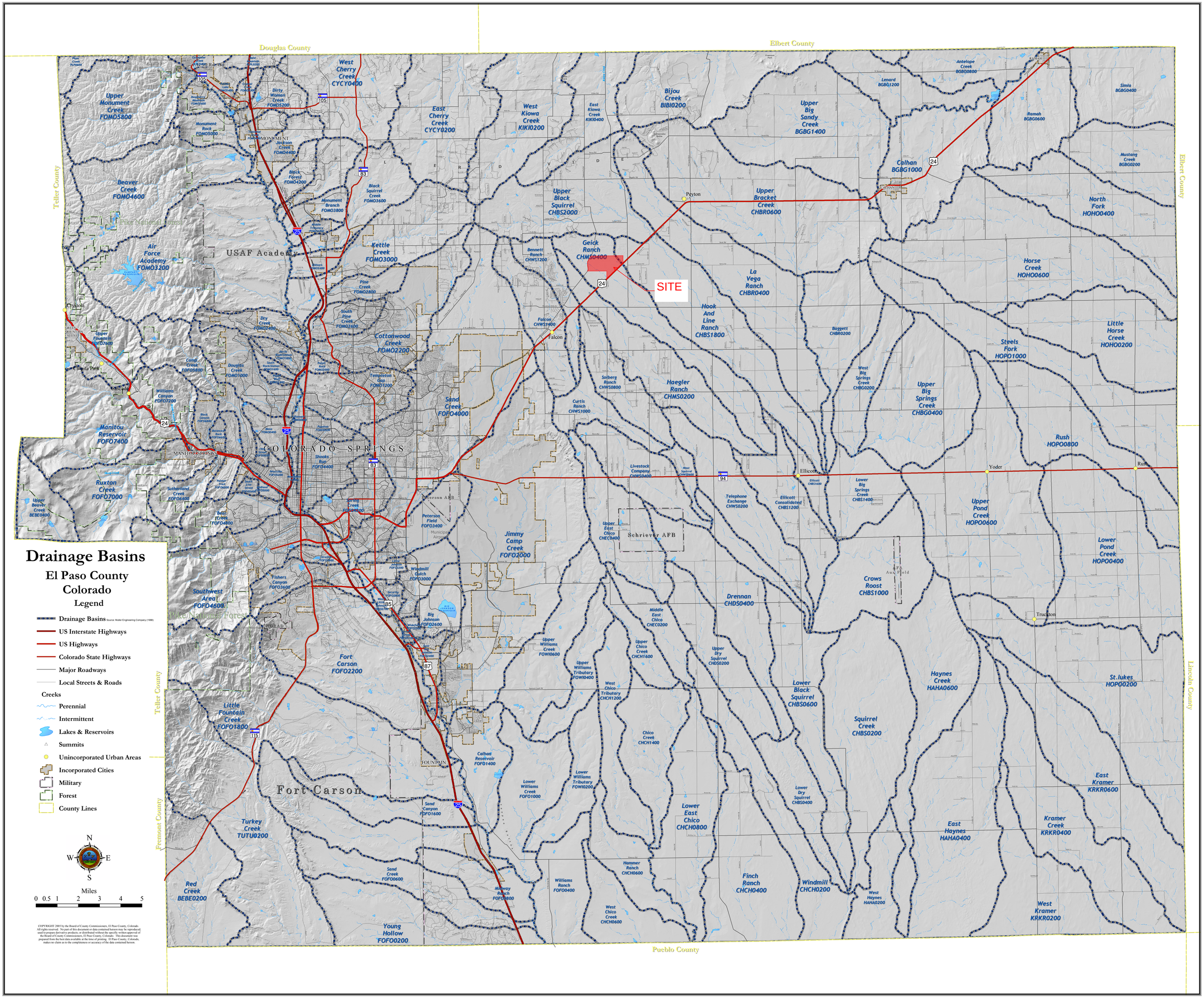
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B

MDDP & DBPS Sheet References


Douglas County
Elbert County
Teller County
Lincoln County
Pueblo County
Fremont County
SITE
Drainage Basins
El Paso County
Colorado
Legend
Drainage Basins Source: Muller Engineering Company (1998)
US Interstate Highways
US Highways
Colorado State Highways
Major Roadways
Local Streets & Roads
Creeks
Perennial
Intermittent
Lakes & Reservoirs
Summits
Unincorporated Urban Areas
Incorporated Cities
Military
Forest
County Lines
N
W
E
S
Miles
0 0.5 1 2 3 4 5
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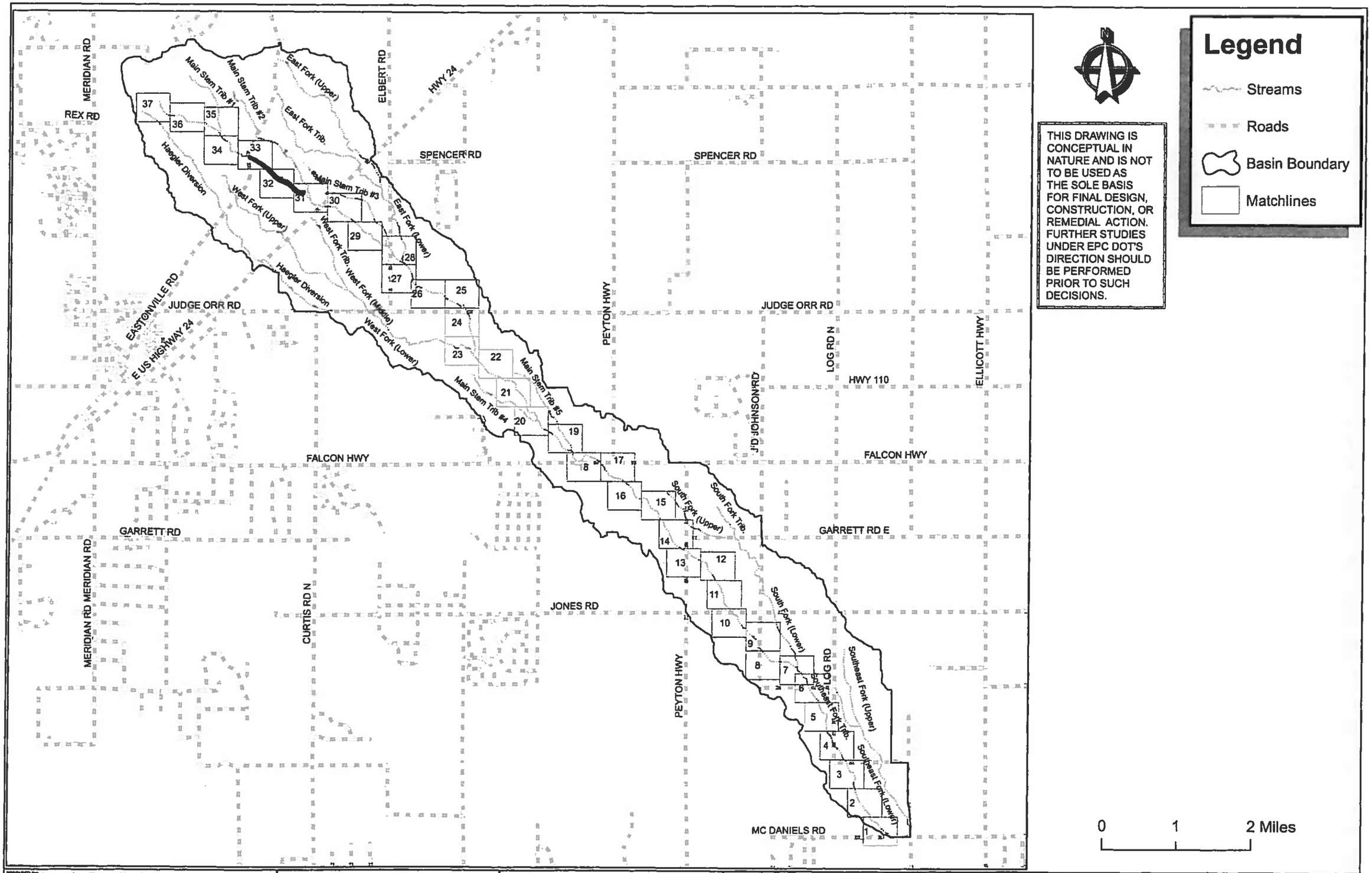
Upper Monument Creek FOMO5800
Monument Rock FOMO5000
Beaver Creek FOMO4600
Air Force Academy FOMO3200
USAF Academy
Pike National Forest
West Cherry Creek CYCY0400
Dirty Woman Creek FOMO5200
Jackson Creek FOMO4400
Black Forest FOMO4200
Monument Branch FOMO3800
Black Squirrel Creek FOMO3600
Kettle Creek FOMO3000
Pine Creek FOMO2800
South Pine Creek FOMO2600
Dry Creek FOMO2400
Cottonwood Creek FOMO2200
Templeton Gap FOMO1200
Douglas Creek FOMO1000
Cant Creek FOFO5800
Williams Canyon FOFO7200
Manitou Reservoir FOFO7400
Ruxton Creek FOFO7000
Upper Beaver Creek BEBE0400
Sutherland Creek FOFO6400
Bear Creek FOFO4800
Shooks Run FOFO4400
Spring Creek FOFO4000
Sand Creek FOFO4000
Peterson Field FOFO3400
Fishers Canyon FOFO3600
Southwest Area FOFO4600
Windmill Gulch FOFO3000
Big Johnson FOFO2600
Fort Carson FOFO2200
Little Fountain Creek FOFO1800
Turkey Creek TUTU0200
Red Creek BEBE0200
Sand Creek FOFO0600
Young Hollow FOFO0200
Sand Canyon FOFO1600
Calhan Reservoir FOFO1400
Lower Williams Creek FOFO1000
Upper Williams Creek FOWI0600
Upper Williams Tributary FOWI0400
Lower Williams Tributary FOWI0200
Williams Ranch FOFO0400
Midway Ranch FOFO0800
Upper Black Squirrel CHBS2000
Bennett Ranch CHWS1200
Geick Ranch CHMS0400
Falcon CHWS1400
Solberg Ranch CHWS0800
Curtis Ranch CHWS1000
Livestock Company CHWS0400
West Squirrel CHWS0600
Bijou Creek BIBI0200
East Kiowa Creek KIKI0400
West Kiowa Creek KIKI0200
East Cherry Creek CYCY0200
Upper Big Sandy Creek BGBG1400
Upper Bracket Creek CHBR0600
La Vega Ranch CHBR0400
Hook And Line Ranch CHBS1800
Baggett CHBR0200
Haegler Ranch CHMS0200
Telephone Exchange CHWS0200
Ellicott Consolidated CHBS1200
Ellicott CHBS1600
Lower Big Springs Creek CHBS1400
West Big Springs Creek CHBG0200
Upper Big Springs Creek CHBG0400
Upper Pond Creek HOPO0600
Lower Pond Creek HOPO0400
Rush HOPO0800
Little Horse Creek HOHO0200
Steels Fork HOPO1000
Horse Creek HOHO0600
North Fork HOHO0400
Calhan BGBG1000
Lenard BGBG1200
Antelope Creek BGBG0800
Ramah BGBG0600
Simla BGBG0400
Mustang Creek BGBG0200
Jimmy Camp Creek FOFO2000
Upper East Chico CHEC0400
Middle East Chico CHEC0200
Upper Chico Creek CHCH1600
Upper Dry Squirrel CHBS0200
Drennan CHBS0400
Crows Roost CHBS1000
Lower Black Squirrel CHBS0600
Squirrel Creek CHBS0200
Haynes Creek HAHA0600
St.lukes HOPO0200
East Kramer KRKR0600
Kramer Creek KRKR0400
West Kramer KRKR0200
East Haynes HAHA0400
West Haynes HAHA0200
Windmill CHCH0200
Finch Ranch CHCH0400
Lower East Chico CHCH0800
Lower Dry Squirrel CHBS0400
West Chico Tributary CHCH1200
Chico Creek CHCH1400
Hammer Ranch CHCH0600
West Chico Creek CHCH0600
Schriever AFB
Peyton
Falcon
Calhan
Ellicott
Yoder
Rush
Truckton
Ramah
Cascade
Chipita Park
Crystola
Manitou Springs
COLORADO SPRINGS
Peterson AFB
Fort Carson
FOUNTAIN
Pueblo County



PREPARED BY: Drexel, Barrell & Co. Engineers · Surveyors
1800 28TH STREET, BOULDER, COLORADO 80301 (303) 443-4338
2 S 7TH STREET, COLORADO SPRINGS, COLORADO 80905 (719) 258-6887
6813 W 4TH STREET, GREELEY, COLORADO 80634 (970) 351-9046
CONTACT: ROBERT BENNETT

PREPARED FOR: REALTY DEVELOPMENT SERVICES
25 NORTH TEJON STREET, SUITE 300
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1622

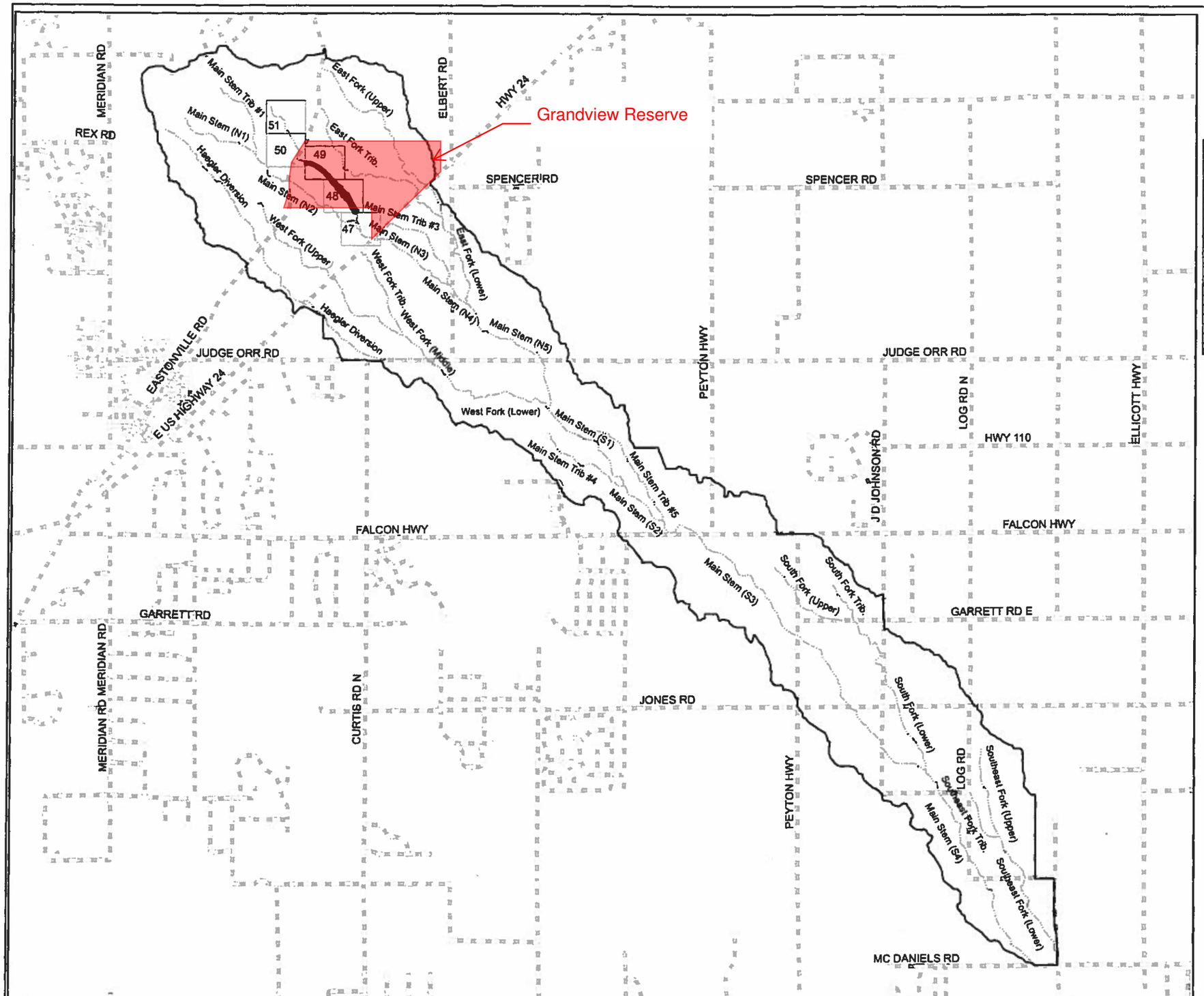
PROJECT INFO: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

DESIGNED BY: RJB
DRAWN BY: SLF
CHECKED BY: RJB

REVISION DESCRIPTIONS | DATE

DRAWING INFO: GIECK RANCH
KEY MAP
MAIN STEM

DATE:	JOB NO:	SET
AUGUST 2007	C7706-1	PL
SCALE: H: 1" = 6000' V:	DRAWING NO.: 6D 038	SHEET K1



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Legend

- Streams
- Roads
- Basin Boundary
- Matchlines

0 1 2 Miles

PREPARED BY: Drexel, Barrell & Co. Engineers · Surveyors
1890 30TH STREET, BOULDER, COLORADO 80301 (303) 442-4338
3 S 7TH STREET, COLORADO SPRINGS, COLORADO 80905 (719) 260-0887
4513 W 4TH STREET, GREELEY, COLORADO 80634 (970) 351-9646
CONTACT: ROBERT BENNETT

PREPARED FOR: REALTY DEVELOPMENT SERVICES
25 NORTH TEJON STREET, SUITE 300
COLORADO SPRINGS, COLORADO 80903
CONTACT: RAY O' SULLIVAN (719) 227-1022

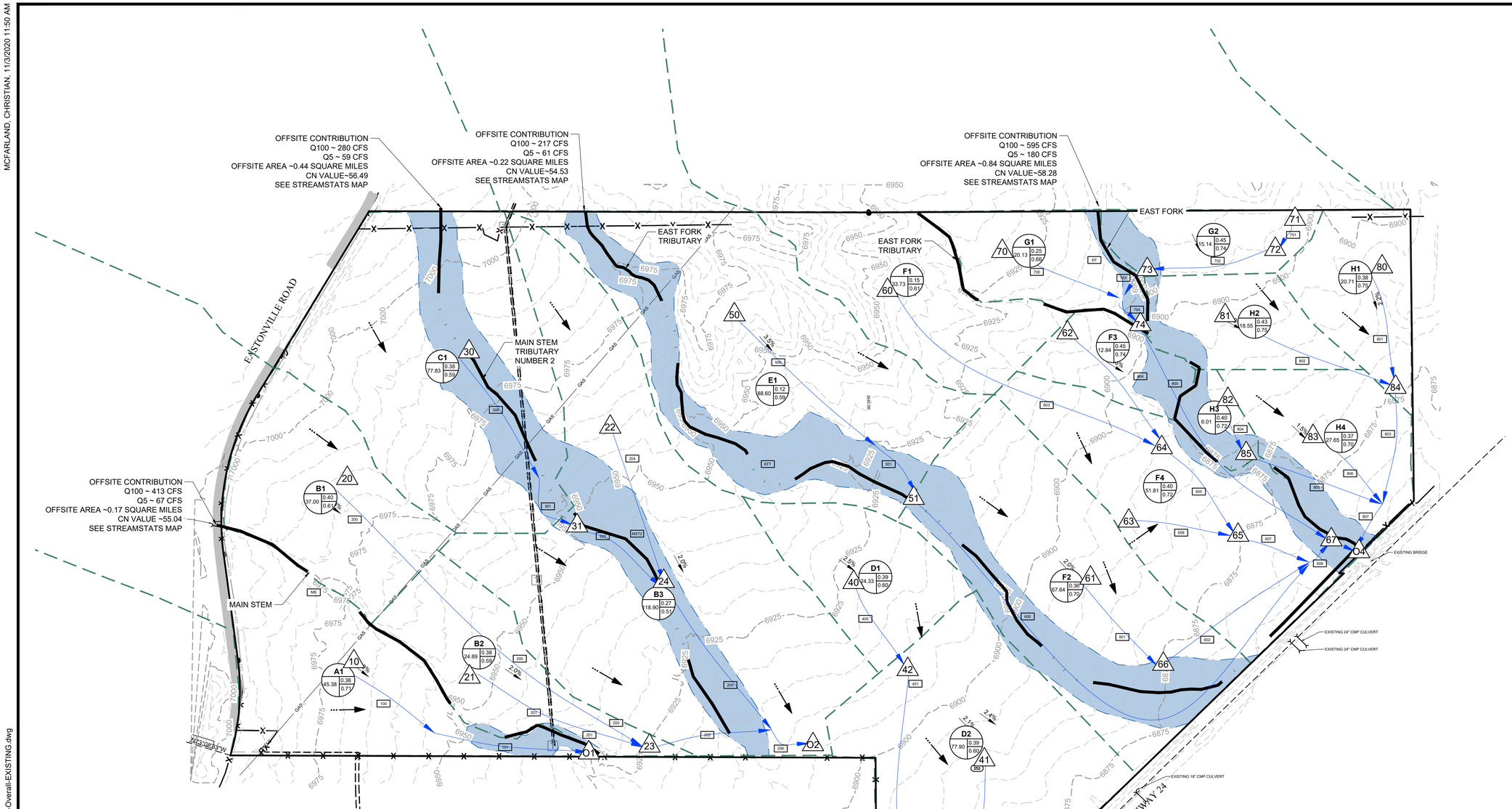
PROJECT INFO: GIECK RANCH
DRAINAGE BASIN PLANNING STUDY
EL PASO COUNTY, COLORADO

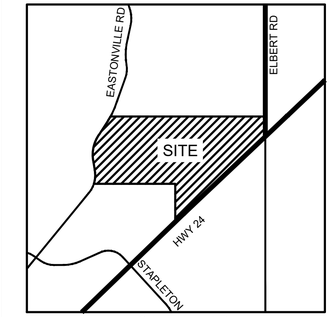
DESIGNED BY: RJB
DRAWN BY: BLF
CHECKED BY: RJB

REVISION DESCRIPTIONS | DATE

DRAWING INFO: GIECK RANCH
KEY MAP
MAIN STEM TRIBUTARY #2

DATE: AUGUST 2007
JOB NO: C7706-1
SET: PL
SCALE: H 1" = 6000' V
DRAWING NO.: 6D 038
SHEET: K5





VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100-YR FLOODWAY
- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION
- POTENTIAL WATER QUALITY LOCATION
- SWMM CONVEYANCE ELEMENT
- PROPOSED PEAK FLOW RATE (CFS)
- DESIGN POINT
- PROPOSED BASIN LABEL
- BASIN DESIGNATION
- AREA (AC.)
- C5
- C100

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

Basin	Design Point	5 Year Pre Development	100 Year Pre 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

NORTH

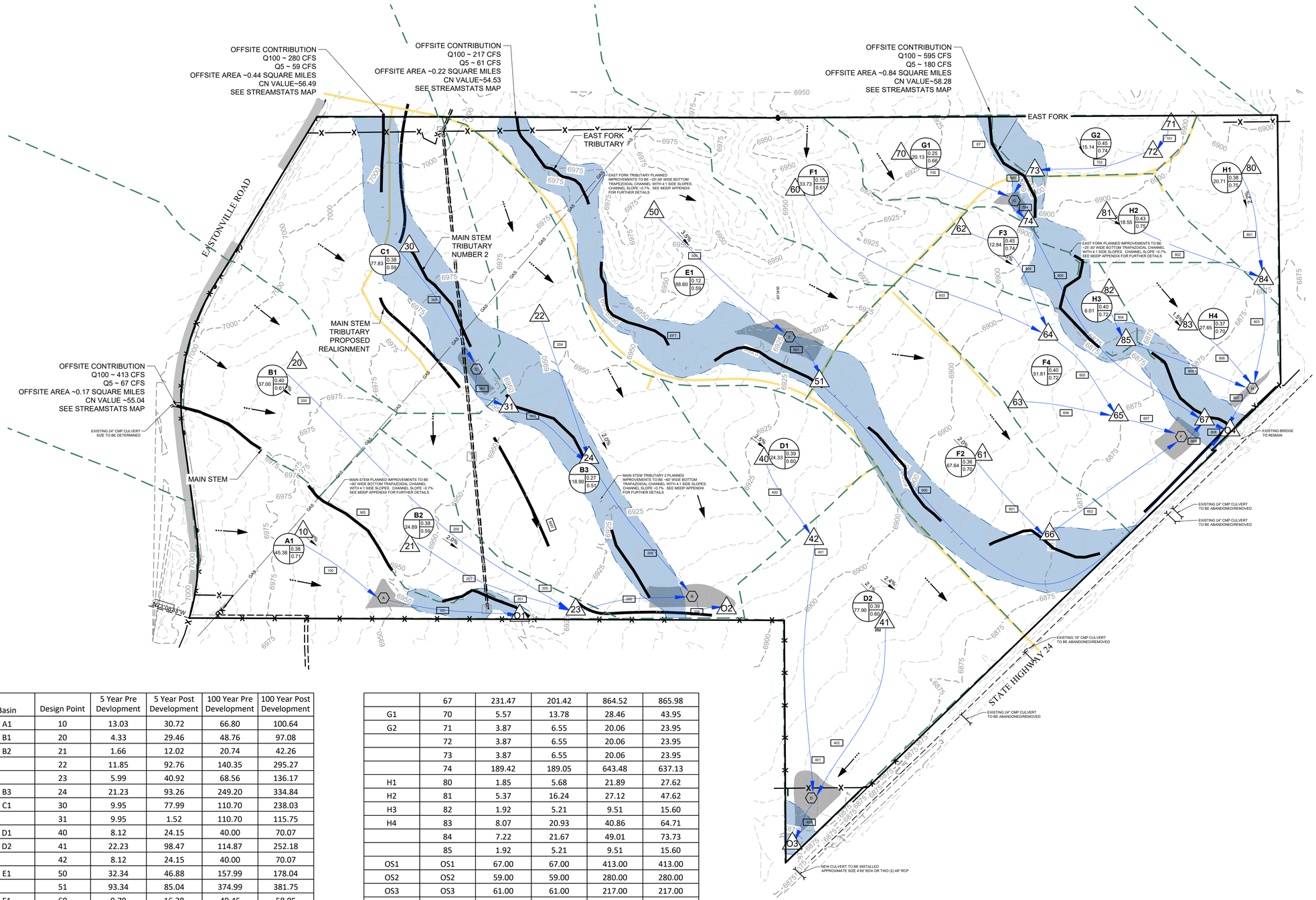
0 200
100

HRGreen

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

EXISTING EX1

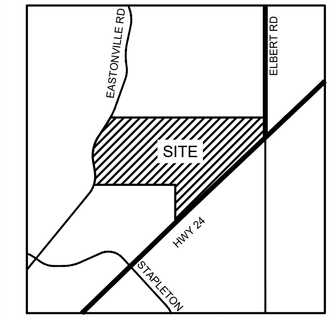
FIG.EX1



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	201.42	864.52	865.98
G1	70	5.57	13.78	28.46	43.95
G2	71	3.87	6.55	20.06	23.95
	72	3.87	6.55	20.06	23.95
	73	3.87	6.55	20.06	23.95
	74	189.42	189.05	643.48	637.13
H1	80	1.85	5.68	21.89	27.62
H2	81	5.37	16.24	27.12	47.62
H3	82	1.92	5.21	9.51	15.60
H4	83	8.07	20.93	40.86	64.71
	84	7.22	21.67	49.01	73.73
	85	1.92	5.21	9.51	15.60
OS1	OS1	67.00	67.00	413.00	413.00
OS2	OS2	59.00	59.00	280.00	280.00
OS3	OS3	61.00	61.00	217.00	217.00
OS4	OS4	180.00	180.00	595.00	595.00
	Outfall1	80.03	67.69	479.80	466.95
	Outfall2	85.96	61.68	597.41	536.11
	Outfall3	30.00	8.58	154.35	160.70*
	Outfall4	341.05	276.10	1335.77	1291.25

*THIS VALUE IS HIGHER THAN PRE-EXISTING AND WILL BE ADJUSTED TO MEET CRITERIA WITH THE PRELIMINARY DRAINAGE REPORT



VICINITY MAP

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED ROAD
- PROPERTY LINE
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ARROW
- EXISTING 100-YR FLOODWAY
- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- WATERSHED BOUNDARY
- MAJOR BASIN LINE
- 100YR ZONE A FLOODPLAIN
- PROPOSED DETENTION LOCATION — A
- POTENTIAL WATER QUALITY LOCATION — WQ
- SWMM CONVEYANCE ELEMENT — SWMM
- PROPOSED PEAK FLOW RATE (CFS) — 850
- DESIGN POINT — X
- PROPOSED BASIN LABEL — XX BASIN DESIGNATION; AREA (AC.) XX; XX C5; XX C100

LAND USE

- LOW DENSITY
- MEDIUM DENSITY
- HIGH/MED DENSITY
- HIGH DENSITY
- CHURCH
- COMMERCIAL
- ELEMENTARY SCHOOL
- COMMUNITY PARK

NOTES:

PRELIMINARY CHANNEL GEOMETRY (BY OTHERS)

MAIN STEM
BOTTOM WIDTH: 60'
SIDE SLOPES: 4:1

MAIN STEM TRIBUTARY 2
BOTTOM WIDTH: 60'
SIDE SLOPES: 4:1

EAST FORK TRIBUTARY 1 REACH 2
BOTTOM WIDTH: 38'
SIDE SLOPES: 4:1

EAST FORK TRIBUTARY 1 REACH 1
BOTTOM WIDTH: 25'
SIDE SLOPES: 4:1

NORTH
0 400
200

HRGreen

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

PROPOSED DR1

FIG.DR1

APPENDIX C

Hydrologic Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: EXISTING & PROPOSED

Subdivision: Grandview Reserve
Location: CO, El Paso County

Project Name: Grandview Subdivision PDR
Project No.: HRG01
Calculated By: NJA
Checked By: CMD
Date: 8/11/21

1	2	3	4	5	6	7	8	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Basins Total Weighted % Imp.**
		% Imp.	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	
EXISTING																							
EX-1	105.72	100	0	0	2	105.72	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
EX-2	57.68	100	0	0	2	57.68	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
EX-3	23.35	100	0	0	2	23.35	2	65	0	0	40	0	0	30	0	0	25	0	0	20	0	0	2
PROPOSED																							
Basin-1	1.4	100	1.13	80.5	2	0.27	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	80.9
A-1	11.23	100	0.00	0.0	2	11.23	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
A-2	6.94	100	2.47	35.6	2	1.37	0.4	65.0	2.88	27.0	40	0.22	1.3	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	64.3
A-3	0.34	100	0.34	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-4	10.15	100	1.85	18.2	2	0.77	0.2	65.0	7.44	47.6	40	0.09	0.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	66.4
A-5	0.34	100	0.34	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	2.67	100	0.72	27.0	2	0.67	0.5	65.0	0.45	11.0	40	0.73	10.9	30	0.10	1.1	25	0.00	0.0	20	0.00	0.0	50.5
A-7	2.91	100	0.28	9.6	2	2.23	1.5	65.0	0.40	8.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	20.0
A-8	6.31	100	0.00	0.0	2	6.31	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
B-1	4.02	100	0.74	18.4	2	1.09	0.5	65.0	2.19	35.4	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	54.3
B-2	7.58	100	1.57	20.7	2	0.74	0.2	65.0	5.14	44.1	40	0.13	0.7	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.7
B-3	0.76	100	0.76	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
B-4	9.17	100	2.03	22.1	2	0.73	0.2	65.0	6.41	45.4	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	67.7
B-5	2.57	100	0.51	19.8	2	0.13	0.1	65.0	1.93	48.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	68.7
B-6	2.06	100	0.27	13.1	2	0.00	0.0	65.0	1.79	56.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	69.6
B-7	0.99	100	0.27	27.3	2	0.00	0.0	65.0	0.72	47.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	74.6
B-8	0.87	100	0.00	0.0	2	0.87	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	34.69	100	6.81	19.6	2	2.05	0.1	65.0	24.10	45.2	40	1.51	1.7	30	0.22	0.2	25	0.00	0.0	20	0.00	0.0	66.8
C-2	9.90	100	1.59	16.1	2	1.34	0.3	65.0	6.58	43.2	40	0.00	0.0	30	0.39	1.2	25	0.00	0.0	20	0.00	0.0	60.8
C-3	0.50	100	0.19	38.0	2	0.31	1.2	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	39.2
C-4	1.61	100	0.23	14.3	2	0.11	0.1	65.0	1.27	51.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.7
C-5	3.99	100	0.00	0.0	2	3.99	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	2.46	100	0.43	17.5	2	0.59	0.5	65.0	1.44	38.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	56.0
D-2	0.75	100	0.36	48.0	2	0.00	0.0	65.0	0.39	33.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	81.8
D-3	4.76	100	0.91	19.1	2	0.61	0.3	65.0	3.01	41.1	40	0.23	1.9	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	62.4
D-4	4.74	100	0.67	14.1	2	0.34	0.1	65.0	3.73	51.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.3
D-5	1.71	100	0.00	0.0	2	1.71	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-1	6.86	100	0.87	12.7	2	1.63	0.5	65.0	2.32	22.0	40	2.04	11.9	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	47.1
E-2	11.66	100	2.42	20.8	2	1.85	0.3	65.0	3.40	19.0	40	3.99	13.7	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	53.8
E-3	1.71	100	0.00	0.0	2	1.71	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

Lot Type Identification:	
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)

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: EXISTING & PROPOSED

Subdivision: Grandview Reserve
Location: CO, El Paso County

Project Name: Grandview Subdivision PDR
Project No.: HRG01
Calculated By: NJA
Checked By: CMD
Date: 8/11/21

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
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Roofs**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Composite C_5**	**Composite C_{100}**
		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)**		
EXISTING																											
EX-1	105.72	0.90	0.96	0.00	0.09	0.36	105.72	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	57.68	0.90	0.96	0.00	0.09	0.36	57.68	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	0.20	0.44	0.00	0.09	0.36
EX-3	23.35	0.90	0.96	0.00	0.09	0.36	23.35	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
PROPOSED																											
Basin-1	1.40	0.90	0.96	1.13	0.09	0.36	0.27	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
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-2	6.94	0.90	0.96	2.47	0.09	0.36	1.37	0.73	0.81	0.00	0.45	0.59	2.88	0.30	0.50	0.22	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.53	0.67
A-3	0.34	0.90	0.96	0.34	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-4	10.15	0.90	0.96	1.85	0.09	0.36	0.77	0.73	0.81	0.00	0.45	0.59	7.44	0.30	0.50	0.09	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.50	0.64
A-5	0.34	0.90	0.96	0.34	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-6	2.67	0.90	0.96	0.72	0.09	0.36	0.67	0.73	0.81	0.00	0.45	0.59	0.45	0.30	0.50	0.73	0.25	0.47	0.10	0.22	0.46	0.00	0.20	0.44	0.00	0.43	0.60
A-7	2.91	0.90	0.96	0.28	0.09	0.36	2.23	0.73	0.81	0.00	0.45	0.59	0.40	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.22	0.45
A-8	6.31	0.90	0.96	0.00	0.09	0.36	6.31	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
B-1	4.02	0.90	0.96	0.74	0.09	0.36	1.09	0.73	0.81	0.00	0.45	0.59	2.19	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.44	0.60
B-2	7.58	0.90	0.96	1.57	0.09	0.36	0.74	0.73	0.81	0.00	0.45	0.59	5.14	0.30	0.50	0.13	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.51	0.64
B-3	0.76	0.90	0.96	0.76	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
B-4	9.17	0.90	0.96	2.03	0.09	0.36	0.73	0.73	0.81	0.00	0.45	0.59	6.41	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.52	0.65
B-5	2.57	0.90	0.96	0.51	0.09	0.36	0.13	0.73	0.81	0.00	0.45	0.59	1.93	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.52	0.65
B-6	2.06	0.90	0.96	0.27	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	0.51	0.64
B-7	0.99	0.90	0.96	0.27	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.72	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.57	0.69
B-8	0.87	0.90	0.96	0.00	0.09	0.36	0.87	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	34.69	0.90	0.96	6.81	0.09	0.36	2.05	0.73	0.81	0.00	0.45	0.59	24.10	0.30	0.50	1.51	0.25	0.47	0.22	0.22	0.46	0.00	0.20	0.44	0.00	0.51	0.64
C-2	9.90	0.90	0.96	1.59	0.09	0.36	1.34	0.73	0.81	0.00	0.45	0.59	6.58	0.30	0.50	0.00	0.25	0.47	0.39	0.22	0.46	0.00	0.20	0.44	0.00	0.47	0.61
C-3	0.50	0.90	0.96	0.19	0.09	0.36	0.31	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	0.40	0.59
C-4	1.61	0.90	0.96	0.23	0.09	0.36	0.11	0.73	0.81	0.00	0.45	0.59	1.27	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.49	0.63
C-5	3.99	0.90	0.96	0.00	0.09	0.36	3.99	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-1	2.46	0.90	0.96	0.43	0.09	0.36	0.59	0.73	0.81	0.00	0.45	0.59	1.44	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.44	0.60
D-2	0.75	0.90	0.96	0.36	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.39	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	0.77
D-3	4.76	0.90	0.96	0.91	0.09	0.36	0.61	0.73	0.81	0.00	0.45	0.59	3.01	0.30	0.50	0.23	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.48	0.63
D-4	4.74	0.90	0.96	0.67	0.09	0.36	0.34	0.73	0.81	0.00	0.45	0.59	3.73	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.49	0.63
D-5	1.71	0.90	0.96	0.00	0.09	0.36	1.71	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
E-1	6.86	0.90	0.96	0.87	0.09	0.36	1.63	0.73	0.81	0.00	0.45	0.59	2.32	0.30	0.50	2.04	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.38	0.56
E-2	11.66	0.90	0.96	2.42	0.09	0.36	1.85	0.73	0.81	0.00	0.45	0.59	3.40	0.30	0.50	3.99	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.43	0.60
E-3	1.71	0.90	0.96	0.00	0.09	0.36	1.71	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 Identification:	
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:
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

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

Subdivision: Grandview Reserve
Location: CO, El Paso County

Project Name: Grandview Subdivision PDR
Project No.: HRG01
Calculated By: NJA
Checked By: CMD
Date: 8/11/21

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			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 LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
EXISTING																	
EX-1	105.72	A	2.0	0.09	0.36	300	2.2	24.6	3603	2.2	15	2.2	26.9	51.5	3903.0	31.7	31.7
EX-2	57.68	A	2.0	0.09	0.36	300	1.7	27.1	2906	2.2	15	2.2	21.8	48.8	3206.0	27.8	27.8
EX-3	23.35	A	2.0	0.09	0.36	300	3.4	21.3	1029	2.2	15	2.2	7.7	29.0	1329.0	17.4	17.4
PROPOSED																	
Basin-1	1.40	A	80.9	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
A-1	11.23	A	2.0	0.09	0.36	100	10.0	8.6	907	5.0	20	4.5	3.4	12.0	1007.0	15.6	12.0
A-2	6.94	A	64.3	0.53	0.67	160	5.0	7.7	1143	2.4	20	3.1	6.1	13.9	1303.0	17.2	13.9
A-3	0.34	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-4	10.15	A	66.4	0.50	0.64	90	5.0	6.1	920	2.1	20	2.9	5.3	11.4	1010.0	15.6	11.4
A-5	0.34	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	2.67	A	50.5	0.43	0.60	207	10.0	8.2	340	1.7	20	2.6	2.2	10.4	547.0	13.0	10.4
A-7	2.91	A	20.0	0.22	0.45	327	5.0	17.0	351	3.3	20	3.6	1.6	18.7	678.0	13.8	13.8
A-8	6.31	A	2.0	0.09	0.36	250	5.0	17.1	857	5.0	20	4.5	3.2	20.3	1107.0	16.2	16.2
B-1	4.02	A	54.3	0.44	0.60	147	5.0	8.6	648	1.7	20	2.6	4.1	12.7	795.0	14.4	12.7
B-2	7.58	A	65.7	0.51	0.64	228	5.0	9.5	930	1.6	20	2.5	6.1	15.7	1158.0	16.4	15.7
B-3	0.76	A	100.0	0.90	0.96	18	2.0	1.2	721	1.0	20	2.0	6.0	7.2	739.0	14.1	7.2
B-4	9.17	A	67.7	0.52	0.65	72	2.0	7.2	1364	1.6	20	2.5	9.0	16.1	1436.0	18.0	16.1
B-5	2.57	A	68.7	0.52	0.65	124	2.0	9.4	899	2.1	20	2.9	5.2	14.6	1023.0	15.7	14.6
B-6	2.06	A	69.6	0.51	0.64	179	2.0	11.5	287	2.0	20	2.8	1.7	13.2	466.0	12.6	12.6
B-7	0.99	A	74.6	0.57	0.69	79	2.0	6.8	292	2.0	20	2.8	1.7	8.6	371.0	12.1	8.6
B-8	0.87	A	2.0	0.09	0.36	66	25.0	5.1	187	1.0	20	2.0	1.6	6.7	253.0	11.4	6.7
C-1	34.69	A	66.8	0.51	0.64	233	2.0	13.1	3978	1.3	20	2.3	29.1	42.2	4211.0	33.4	33.4
C-2	9.90	A	60.8	0.47	0.61	289	2.0	15.6	2124	1.5	20	2.4	14.5	30.0	2413.0	23.4	23.4
C-3	0.50	A	39.2	0.40	0.59	24	2.0	5.0	253	1.2	20	2.2	1.9	6.9	277.0	11.5	6.9
C-4	1.61	A	65.7	0.49	0.63	132	2.0	10.2	272	0.9	20	1.9	2.4	12.6	404.0	12.2	12.2
C-5	3.99	A	2.0	0.09	0.36	225	15.0	11.3	352	1.0	20	2.0	2.9	14.2	577.0	13.2	13.2
D-1	2.46	A	56.0	0.44	0.60	32	4.6	4.1	446	1.7	20	2.6	2.9	7.0	478.0	12.7	7.0
D-2	0.75	A	81.8	0.67	0.77	66	2.7	4.6	291	1.8	20	2.7	1.8	6.4	357.0	12.0	6.4
D-3	4.76	A	62.4	0.48	0.63	69	4.8	5.6	802	1.8	20	2.7	5.0	10.6	871.0	14.8	10.6
D-4	4.74	A	65.3	0.49	0.63	69	4.8	5.5	841	1.7	20	2.6	5.4	10.9	910.0	15.1	10.9
D-5	1.71	A	2.0	0.09	0.36	110	25.0	6.6	201	1.0	20	2.0	1.7	8.3	311.0	11.7	8.3
E-1	6.86	A	47.1	0.38	0.56	370	5.0	14.8	1283	1.3	20	2.3	9.4	24.2	1653.0	19.2	19.2
E-2	11.66	A	53.8	0.43	0.60	309	5.0	12.6	1364	1.9	20	2.8	8.2	20.9	1673.0	19.3	19.3
E-3	1.71	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

NOTES:

T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33), S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3: EXISTING & PROPOSED

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: NJA
Checked By: CMD
Date: 8/11/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		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)	
EXISTING																					
	1	EX-1	105.72	0.09	31.7	9.51	2.35	22.3				89.3									Sheet flow to Main Stem Tributary #2 Channel Total Flow - Incl. Offsite flow of Q(5)=67 cfs (from MDDP)
	2	EX-2	57.68	0.09	27.8	5.19	2.53	13.1				72.1									Sheet flow to Main Stem Channel Total Flow - Incl. Offsite flow of Q(5)=59 cfs (from MDDP)
	3	EX-3	23.35	0.09	17.4	2.10	3.23	6.8													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
PROPOSED																					
		Basin-1	1.40	0.74	7.0	1.04	4.64	4.8													
	1	A-1	11.23	0.09	12.0	1.01	3.82	3.9													
	2	A-2	6.94	0.53	13.9	3.68	3.59	13.2													
	3	A-3	0.34	0.90	5.0	0.31	5.10	1.6													
	4	A-4	10.15	0.50	11.4	5.08	3.90	19.8													
	5	A-5	0.34	0.90	5.0	0.31	5.10	1.6													
	6	A-6	2.67	0.43	10.4	1.15	4.05	4.7													
	7	A-7	2.91	0.22	13.8	0.64	3.60	2.3													
	8	A-8	6.31	0.09	16.2	0.57	3.35	1.9	16.2	11.74	3.35	39.3									Total of flows to Pond A
	9	B-1	4.02	0.44	12.7	1.77	3.72	6.6													
	10	B-2	7.58	0.51	15.7	3.87	3.39	13.1													
	11	B-3	0.76	0.90	7.2	0.68	4.59	3.1													
	12	B-4	9.17	0.52	16.1	4.77	3.35	16.0													
	13	B-5	2.57	0.52	14.6	1.34	3.51	4.7													
	14	B-6	2.06	0.51	12.6	1.05	3.74	3.9													
	15	B-7	0.99	0.57	8.6	0.56	4.34	2.4													
	16	B-8	0.87	0.09	6.7	0.08	4.70	0.4	16.1	14.12	3.35	47.3									Total of flows to Pond B
	17	C-1	34.69	0.51	33.4	17.69	2.28	40.3													
	18	C-2	9.90	0.47	23.4	4.65	2.78	12.9													
	19	C-3	0.50	0.40	6.9	0.20	4.66	0.9													
	20	C-4	1.61	0.49	12.2	0.79	3.78	3.0													
	21	C-5	3.99	0.09	13.2	0.36	3.66	1.3	33.4	23.69	2.28	54.0									Total of flows to Pond C
	22	D-1	2.46	0.44	7.0	1.08	4.65	5.0													
	23	D-2	0.75	0.67	6.4	0.50	4.77	2.4													
	24	D-3	4.76	0.48	10.6	2.28	4.01	9.1													

STANDARD FORM SF-3: EXISTING & PROPOSED

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: NJA
Checked By: CMD
Date: 8/11/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		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)	
	25	D-4	4.74	0.49	10.9	2.32	3.97	9.2													
	26	D-5	1.71	0.09	8.3	0.15	4.39	0.7	10.9	6.33	3.97	25.1									Total of flows to Pond D
	27	E-1	6.86	0.38	19.2	2.61	3.08	8.0													
	28	E-2	11.66	0.43	19.3	5.01	3.07	15.4													
	29	E-3	1.71	0.09	9.8	0.15	4.14	0.6	19.3	7.77	3.07	23.9									Total of flows to Pond E

STANDARD FORM SF-3: EXISTING & PROPOSED

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: NJA
Checked By: CMD
Date: 8/11/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		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)	
EXISTING																					
	1	EX-1	105.72	0.36	31.7	38.06	4.18	159.1				572.1									Sheet flow to Main Stem Tributary #2 Channel Total Flow - Incl. Offsite flow of Q(100)=413 cfs (from MDDP)
	2	EX-2	57.68	0.36	27.8	20.76	4.50	93.4				373.4									Sheet flow to Main Stem Channel Total Flow - Incl. Offsite flow of Q(100)=280 cfs (from MDDP)
	3	EX-3	23.35	0.36	17.4	8.41	5.75	48.4													Sheet flow offiste - outfalls to Main Stem Tributary #2 Channel
PROPOSED																					
		Basin-1	1.40	0.84	7.0	1.18	8.26	9.7													
	1	A-1	11.23	0.36	12.0	4.04	6.80	27.5													
	2	A-2	6.94	0.67	13.9	4.65	6.38	29.7													
	3	A-3	0.34	0.96	5.0	0.33	9.09	3.0													
	4	A-4	10.15	0.64	11.4	6.50	6.94	45.1													
	5	A-5	0.34	0.96	5.0	0.33	9.09	3.0													
	6	A-6	2.67	0.60	10.4	1.60	7.20	11.5													
	7	A-7	2.91	0.45	13.8	1.31	6.40	8.4													
	8	A-8	6.31	0.36	16.2	2.27	5.96	13.5	16.2	16.99	5.96	101.3									Total of flows to Pond A
	9	B-1	4.02	0.60	12.7	2.41	6.63	16.0													
	10	B-2	7.58	0.64	15.7	4.85	6.04	29.3													
	11	B-3	0.76	0.96	7.2	0.73	8.17	6.0													
	12	B-4	9.17	0.65	16.1	5.96	5.96	35.5													
	13	B-5	2.57	0.65	14.6	1.67	6.25	10.4													
	14	B-6	2.06	0.64	12.6	1.32	6.66	8.8													
	15	B-7	0.99	0.69	8.6	0.68	7.73	5.3													
	16	B-8	0.87	0.36	6.7	0.31	8.37	2.6	16.1	17.93	5.96	106.9									Total of flows to Pond B
	17	C-1	34.69	0.64	33.4	22.20	4.05	89.9													
	18	C-2	9.90	0.61	23.4	6.04	4.94	29.8													
	19	C-3	0.50	0.59	6.9	0.30	8.30	2.5													
	20	C-4	1.61	0.63	12.2	1.01	6.73	6.8													
	21	C-5	3.99	0.36	13.2	1.44	6.52	9.4	33.4	30.99	4.05	125.5									Total of flows to Pond C
	22	D-1	2.46	0.60	7.0	1.48	8.28	12.3													
	23	D-2	0.75	0.77	6.4	0.58	8.49	4.9													
	24	D-3	4.76	0.63	10.6	3.00	7.15	21.5													

STANDARD FORM SF-3: EXISTING & PROPOSED

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: NJA
Checked By: CMD
Date: 8/11/21

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
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
	25	D-4	4.74	0.63	10.9	2.99	7.07	21.1													
	26	D-5	1.71	0.36	8.3	0.62	7.81	4.8	10.9	8.67	7.07	61.3									Total of flows to Pond D
	27	E-1	6.86	0.56	19.2	3.84	5.48	21.0													
	28	E-2	11.66	0.60	19.3	7.00	5.46	38.2													
	29	E-3	1.71	0.36	9.8	0.62	7.37	4.6	19.3	11.46	5.46	62.6									Total of flows to Pond E

APPENDIX D

Hydraulic Computations

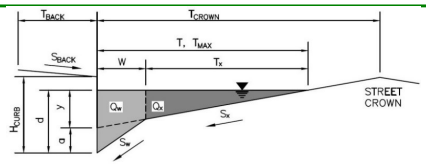
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **Grandview Reserve**

Inlet ID: **Inlet 1 (DP 2)**

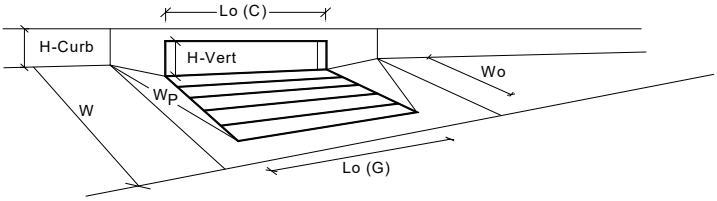


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.024		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

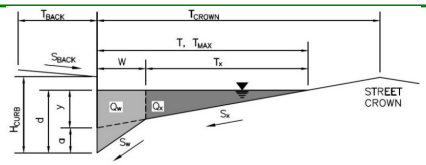


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	3	3	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**13.5**	**39.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	13.2	29.7	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 2 (DP 3)**

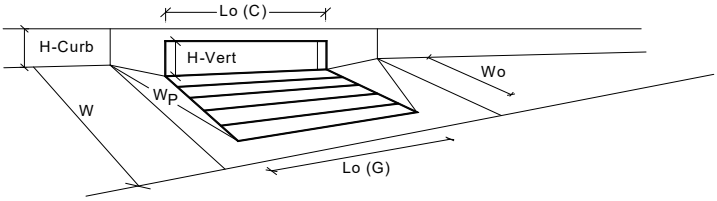


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.019		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

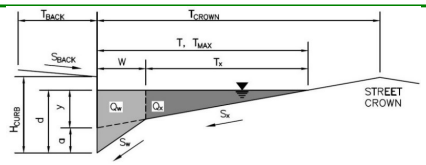


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	1.6	3.0	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 3 (DP4)**



Gutter Geometry:

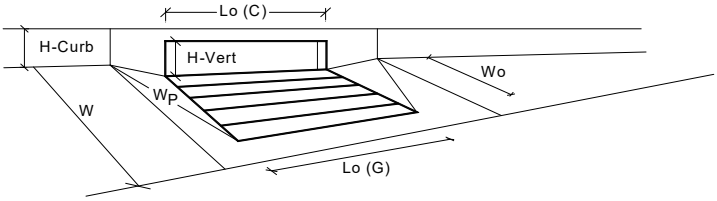
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.021	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

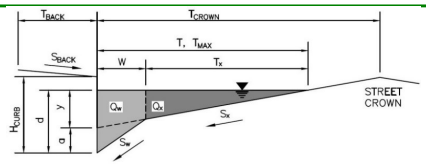


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	5	5	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**22.9**	**66.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	19.8	45.1	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 4 (DP 5)**

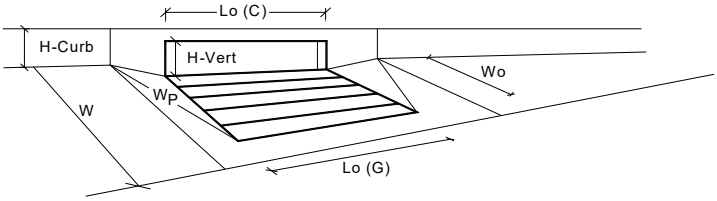


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.014		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

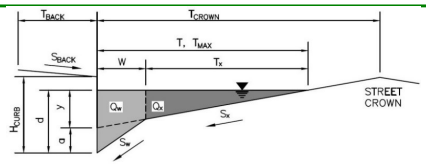


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	1.6	3.0	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 5 (DP 6)**



Gutter Geometry:

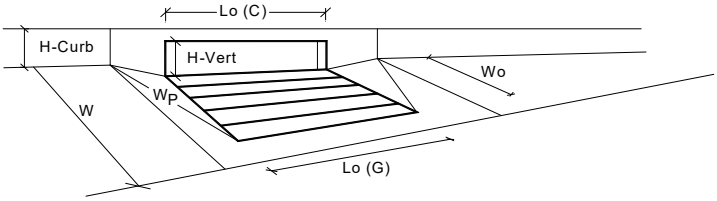
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.017	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

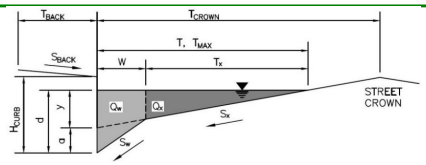


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	4.7	11.5	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 6 (DP 7)**



Gutter Geometry:

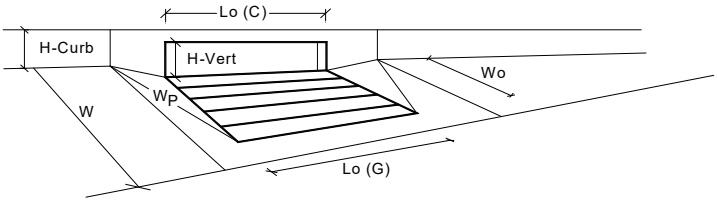
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.033	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

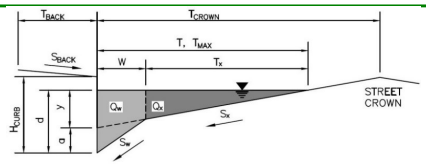


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.3	8.4	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 7 (DP 9)**

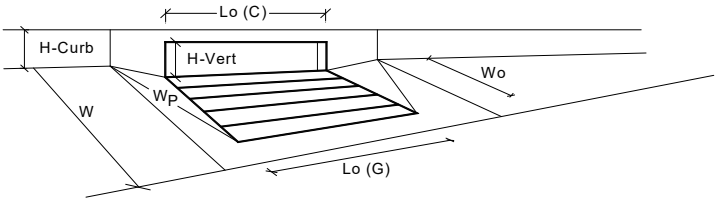


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.017		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

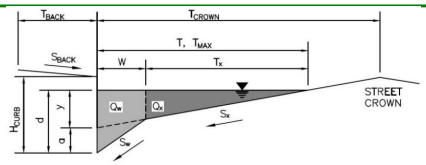


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	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 =**	**10.5**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	6.6	16.0	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 8 (DP 10)**

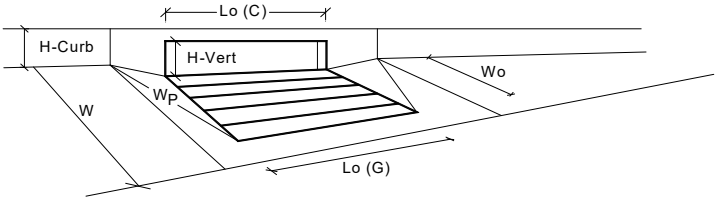


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.016		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

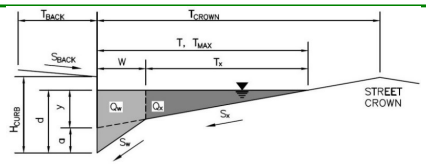


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	3	3	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**13.5**	**39.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	13.1	29.3	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 9 (DP 11)**



Gutter Geometry:

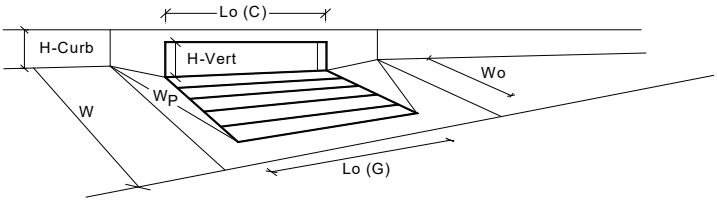
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.010	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

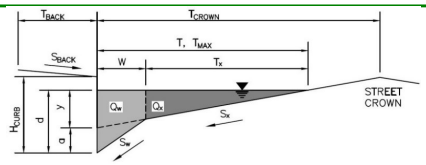


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	3.1	6.0	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 10 (DP 12)**



Gutter Geometry:

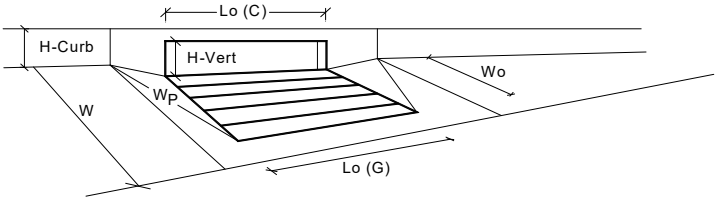
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.017	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

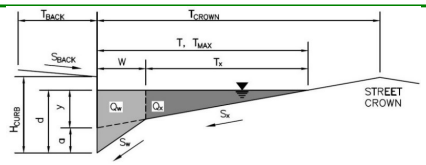


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	4	4	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**18.2**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	16.0	35.5	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 11 (DP 13)**

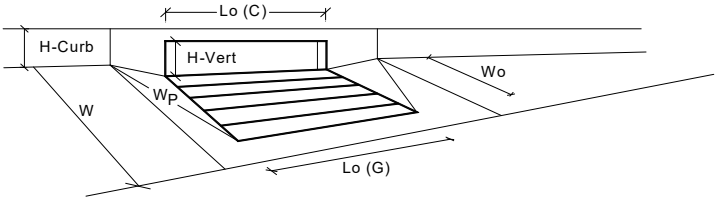


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.021		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

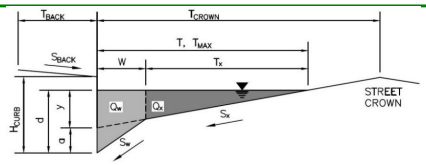


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	4.7	10.4	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 12 (DP 14)**



Gutter Geometry:

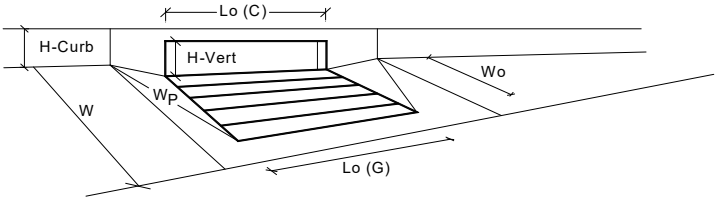
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

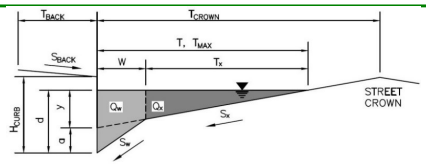


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	3.9	8.8	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 13 (DP 15)**

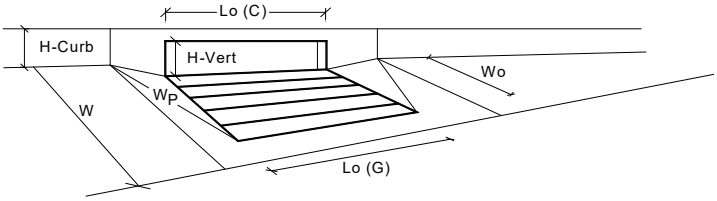


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

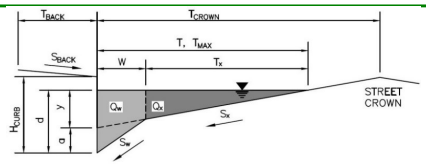


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.4	5.3	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 14 (DP 17)**



Gutter Geometry:

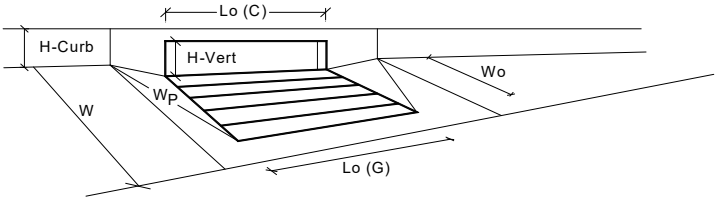
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.013	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

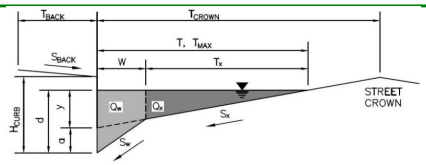


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	9	9	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**41.7**	**120.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	40.3	89.9	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 15 (DP 18)**



Gutter Geometry:

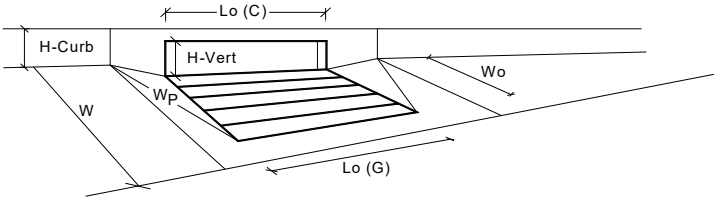
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.015	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

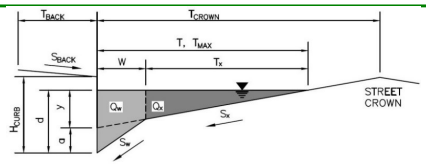


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	3	3	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**13.5**	**39.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	12.9	29.8	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 16 (DP 19)**



Gutter Geometry:

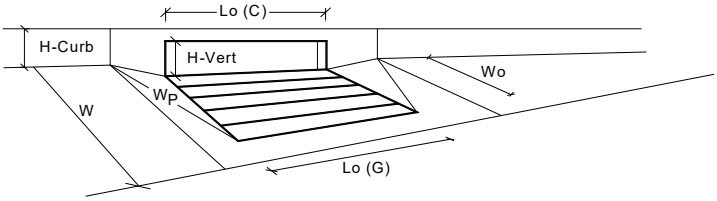
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.012	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

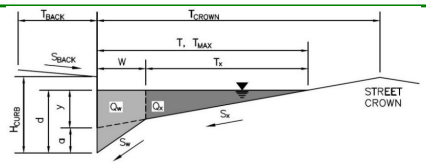


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	0.9	2.5	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 17 (DP 20)**



Gutter Geometry:

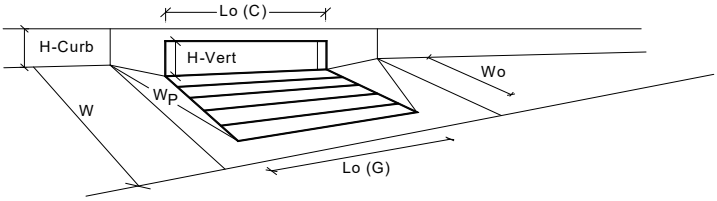
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.009	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

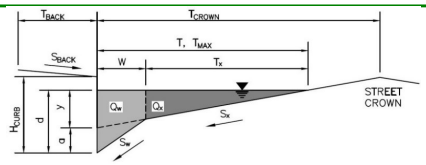


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	3.0	6.8	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 18 (DP 22)**



Gutter Geometry:

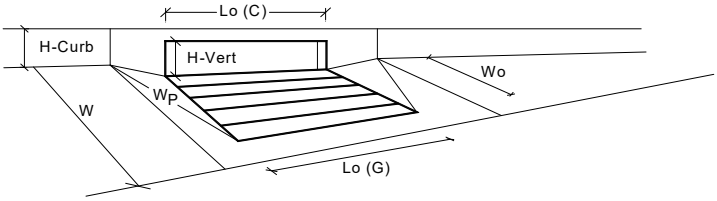
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.017	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

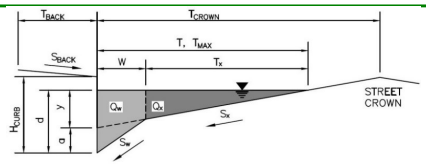


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
WARNING: Inlet Capacity less than Q Peak for Major Storm		$Q_{PEAK\ REQUIRED}$ =	5.1	12.3	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 19 (DP 23)**

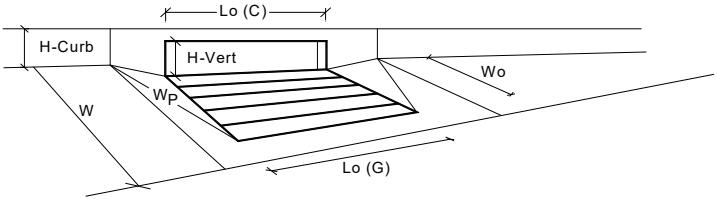


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		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_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

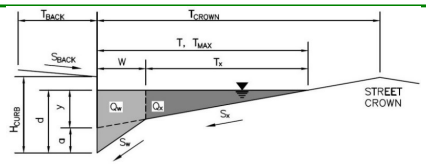


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.4**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.4	4.9	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 20 (DP 24)**

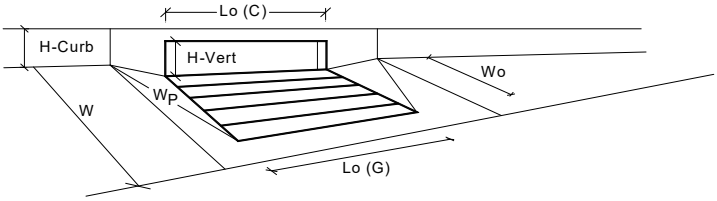


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		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_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

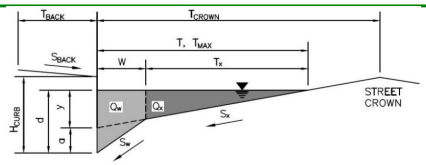


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	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 =**	**10.5**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	9.1	21.5	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 21 (DP 25)**

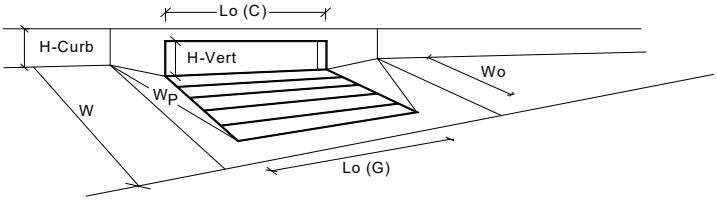


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.017		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

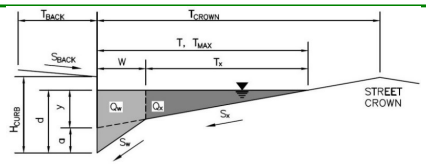


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	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 =**	**10.5**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	9.2	21.1	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 22 (DP 27)**



Gutter Geometry:

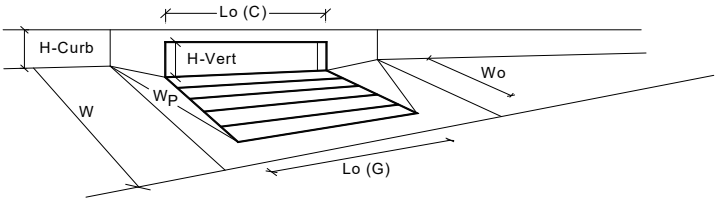
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.013	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

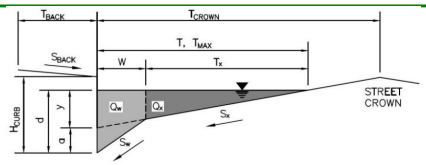


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	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 =**	**10.5**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	8.0	21.0	cfs

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

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

Project: **Grandview Reserve**
Inlet ID: **Inlet 23 (DP 28)**

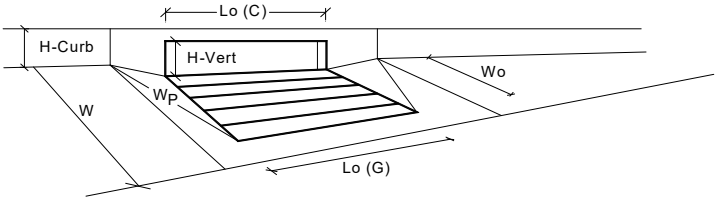


Gutter Geometry:

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} =	0.012		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.019		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	4	4	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
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} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.79	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 =**	**18.2**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	15.4	38.2	cfs

APPENDIX E

Water Quality Computations

Detention Pond Tributary Areas

Subdivision: Grandview Reserve
Location: CO, El Paso County

Project Name: Grandview Reserve
Project No.: HRG01
Calculated By: NJA
Checked By: CMD
Date: 8/11/21

Pond A

Basin	Area	% Imp
A-2	6.94	64.3
A-3	0.34	100
A-4	10.15	66.4
A-5	0.34	100
A-6	2.67	50.5
A-7	2.91	20
A-8	6.31	2
Total	**29.66**	**47.0**

Pond B

Basin	Area	% Imp
B-1	4.02	54.3
B-2	7.58	65.7
B-3	0.76	100
B-4	9.17	67.7
B-5	2.57	68.7
B-6	2.06	69.6
B-7	0.99	74.6
B-8	0.87	2
Total	**24.00**	**66.3**

Pond C

Basin	Area	% Imp
C-1	34.69	66.8
C-2	9.90	60.8
C-3	0.50	39.2
C-4	1.61	65.7
C-5	3.99	2
Total	**16.00**	**46.0**

Pond D

Basin	Area	% Imp
D-1	2.46	56
D-2	0.75	81.8
D-3	4.76	62.4
D-4	4.74	65.3
D-5	1.71	2
Total	**11.96**	**56.1**

Pond E

Basin	Area	% Imp
E-1	6.86	47.1
E-2	11.66	53.8
E-3	1.71	2
Total	**13.37**	**47.2**

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	**TJE**
Company:	**Galloway & Co.**
Date:	**August 12, 2021**
Project:	**Grandviewe Reserve**
Location:	**Pond A**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier		**A-2**	**A-3**	**A-4**	**A-5**	**A-6**	**A-7**	**A-8**						
Receiving Pervious Area Soil Type		Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam						
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)		6.940	0.340	10.150	0.340	2.670	2.910	6.310						
Directly Connected Impervious Area (DCIA, acres)		4.462	0.340	6.740	0.340	1.348	0.582	0.126						
Unconnected Impervious Area (UIA, acres)		0.000	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	0.000						
Separate Pervious Area (SPA, acres)		2.478	0.000	3.410	0.000	1.322	2.328	6.184						
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)		C	C	C	C	C	C	C						

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)		6.940	0.340	10.150	0.340	2.670	2.910	6.310						
Directly Connected Impervious Area (DCIA, %)		64.3%	100.0%	66.4%	100.0%	50.5%	20.0%	2.0%						
Unconnected Impervious Area (UIA, %)		0.0%	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%	0.0%						
Separate Pervious Area (SPA, %)		35.7%	0.0%	33.6%	0.0%	49.5%	80.0%	98.0%						
A_R (RPA / UIA)		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						
f / I for WQCV Event:		1.7	1.7	1.7	1.7	1.7	1.7	1.7						
f / I for 5-Year Event:		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						
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						
IRF for 5-Year Event:		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						
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}		64.3%	100.0%	66.4%	100.0%	50.5%	20.0%	2.0%						
Effective Imperviousness for WQCV Event:		64.3%	100.0%	66.4%	100.0%	50.5%	20.0%	2.0%						
Effective Imperviousness for 5-Year Event:		64.3%	100.0%	66.4%	100.0%	50.5%	20.0%	2.0%						
Effective Imperviousness for 100-Year Event:		64.3%	100.0%	66.4%	100.0%	50.5%	20.0%	2.0%						
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 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/A
100-Year Event CREDIT**: Reduce Detention By:	N/A	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	-63.5%	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**47.0%**
Total Site Effective Imperviousness for WQCV Event:	**47.0%**
Total Site Effective Imperviousness for 5-Year Event:	**47.0%**
Total Site Effective Imperviousness for 100-Year Event:	**47.0%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	**TJE**
Company:	**Galloway & Co.**
Date:	**July 29, 2021**
Project:	**Grandview Reserve**
Location:	**Pond B**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**B-1**	**B-2**	**B-3**	**B-4**	**B-5**	**B-6**	**B-7**	**B-8**						
Receiving Pervious Area Soil Type	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)	4.020	7.580	0.760	9.170	2.570	2.060	0.990	0.870						
Directly Connected Impervious Area (DCIA, acres)	2.183	4.980	0.760	6.208	1.766	1.434	0.739	0.017						
Unconnected Impervious Area (UIA, acres)	0.000	0.000	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	0.000	0.000						
Separate Pervious Area (SPA, acres)	1.837	2.600	0.000	2.962	0.804	0.626	0.251	0.853						
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C	C	C	C	C						

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	4.020	7.580	0.760	9.170	2.570	2.060	0.990	0.870						
Directly Connected Impervious Area (DCIA, %)	54.3%	65.7%	100.0%	67.7%	68.7%	69.6%	74.6%	2.0%						
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	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%	0.0%	0.0%						
Separate Pervious Area (SPA, %)	45.7%	34.3%	0.0%	32.3%	31.3%	30.4%	25.4%	98.0%						
A_R (RPA / UIA)	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						
f / I for WQCV Event:	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7						
f / I for 5-Year Event:	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						
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						
IRF for 5-Year Event:	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						
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	54.3%	65.7%	100.0%	67.7%	68.7%	69.6%	74.6%	2.0%						
Effective Imperviousness for WQCV Event:	54.3%	65.7%	100.0%	67.7%	68.7%	69.6%	74.6%	2.0%						
Effective Imperviousness for 5-Year Event:	54.3%	65.7%	100.0%	67.7%	68.7%	69.6%	74.6%	2.0%						
Effective Imperviousness for 100-Year Event:	54.3%	65.7%	100.0%	67.7%	68.7%	69.6%	74.6%	2.0%						
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 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/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-460.7%	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**64.5%**
Total Site Effective Imperviousness for WQCV Event:	**64.5%**
Total Site Effective Imperviousness for 5-Year Event:	**64.5%**
Total Site Effective Imperviousness for 100-Year Event:	**64.5%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	**TJE**
Company:	**Galloway & Co.**
Date:	**July 29, 2021**
Project:	**Grandview Reserve**
Location:	**Pond C**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**C-1**	**C-2**	**C-3**	**C-4**	**C-5**									
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam									
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	34.690	9.900	0.500	1.610	3.990									
Directly Connected Impervious Area (DCIA, acres)	23.173	6.019	0.196	1.058	0.080									
Unconnected Impervious Area (UIA, acres)	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									
Separate Pervious Area (SPA, acres)	11.517	3.881	0.304	0.552	3.910									
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C	C									

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	34.690	9.900	0.500	1.610	3.990									
Directly Connected Impervious Area (DCIA, %)	66.8%	60.8%	39.2%	65.7%	2.0%									
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
Separate Pervious Area (SPA, %)	33.2%	39.2%	60.8%	34.3%	98.0%									
A_R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000									
I_a Check	1.000	1.000	1.000	1.000	1.000									
f / I for WQCV Event:	1.7	1.7	1.7	1.7	1.7									
f / I for 5-Year Event:	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									
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	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									
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00									
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	66.8%	60.8%	39.2%	65.7%	2.0%									
Effective Imperviousness for WQCV Event:	66.8%	60.8%	39.2%	65.7%	2.0%									
Effective Imperviousness for 5-Year Event:	66.8%	60.8%	39.2%	65.7%	2.0%									
Effective Imperviousness for 100-Year Event:	66.8%	60.8%	39.2%	65.7%	2.0%									
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 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/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.1%	0.0%	-100.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**60.2%**
Total Site Effective Imperviousness for WQCV Event:	**60.2%**
Total Site Effective Imperviousness for 5-Year Event:	**60.2%**
Total Site Effective Imperviousness for 100-Year Event:	**60.2%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	**TJE**
Company:	**Galloway & Co.**
Date:	**July 29, 2021**
Project:	**Grandview Reserve**
Location:	**Pond D**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**D-1**	**D-2**	**D-3**	**D-4**	**D-5**									
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam									
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	2.460	0.750	4.760	4.740	1.710									
Directly Connected Impervious Area (DCIA, acres)	1.378	0.614	2.970	3.095	0.034									
Unconnected Impervious Area (UIA, acres)	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									
Separate Pervious Area (SPA, acres)	1.082	0.137	1.790	1.645	1.676									
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C	C									

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	2.460	0.750	4.760	4.740	1.710									
Directly Connected Impervious Area (DCIA, %)	56.0%	81.8%	62.4%	65.3%	2.0%									
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
Separate Pervious Area (SPA, %)	44.0%	18.2%	37.6%	34.7%	98.0%									
A_R (RPA / UIA)	0.000	0.000	0.000	0.000	0.000									
I_a Check	1.000	1.000	1.000	1.000	1.000									
f / I for WQCV Event:	1.7	1.7	1.7	1.7	1.7									
f / I for 5-Year Event:	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									
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	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									
IRF for 100-Year Event:	1.00	1.00	1.00	1.00	1.00									
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	56.0%	81.8%	62.4%	65.3%	2.0%									
Effective Imperviousness for WQCV Event:	56.0%	81.8%	62.4%	65.3%	2.0%									
Effective Imperviousness for 5-Year Event:	56.0%	81.8%	62.4%	65.3%	2.0%									
Effective Imperviousness for 100-Year Event:	56.0%	81.8%	62.4%	65.3%	2.0%									
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 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/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	0.0%	-234.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**56.1%**
Total Site Effective Imperviousness for WQCV Event:	**56.1%**
Total Site Effective Imperviousness for 5-Year Event:	**56.1%**
Total Site Effective Imperviousness for 100-Year Event:	**56.1%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	**TJE**
Company:	**Galloway & Co.**
Date:	**July 29, 2021**
Project:	**Grandview Reserve**
Location:	**Pond E**

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**E-**	**E-2**	**E-3**											
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam											
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	6.860	11.660	1.710											
Directly Connected Impervious Area (DCIA, acres)	3.231	6.273	0.034											
Unconnected Impervious Area (UIA, acres)	0.000	0.000	0.000											
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000											
Separate Pervious Area (SPA, acres)	3.629	5.387	1.676											
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C											

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	6.860	11.660	1.710											
Directly Connected Impervious Area (DCIA, %)	47.1%	53.8%	2.0%											
Unconnected Impervious Area (UIA, %)	0.0%	0.0%	0.0%											
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%											
Separate Pervious Area (SPA, %)	52.9%	46.2%	98.0%											
A_R (RPA / UIA)	0.000	0.000	0.000											
I_a Check	1.000	1.000	1.000											
f / I for WQCV Event:	1.7	1.7	1.7											
f / I for 5-Year Event:	0.5	0.5	0.5											
f / I for 100-Year Event:	0.3	0.3	0.3											
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	1.00	1.00	1.00											
IRF for 5-Year Event:	1.00	1.00	1.00											
IRF for 100-Year Event:	1.00	1.00	1.00											
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	47.1%	53.8%	2.0%											
Effective Imperviousness for WQCV Event:	47.1%	53.8%	2.0%											
Effective Imperviousness for 5-Year Event:	47.1%	53.8%	2.0%											
Effective Imperviousness for 100-Year Event:	47.1%	53.8%	2.0%											
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 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/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	-234.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**47.1%**
Total Site Effective Imperviousness for WQCV Event:	**47.1%**
Total Site Effective Imperviousness for 5-Year Event:	**47.1%**
Total Site Effective Imperviousness for 100-Year Event:	**47.1%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

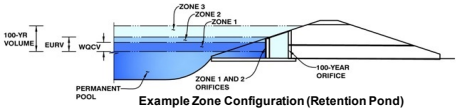
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Grandview - Pond A

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	29.66	acres
Watershed Length =	2,360	ft
Watershed Length to Centroid =	1,180	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	47.00%	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.

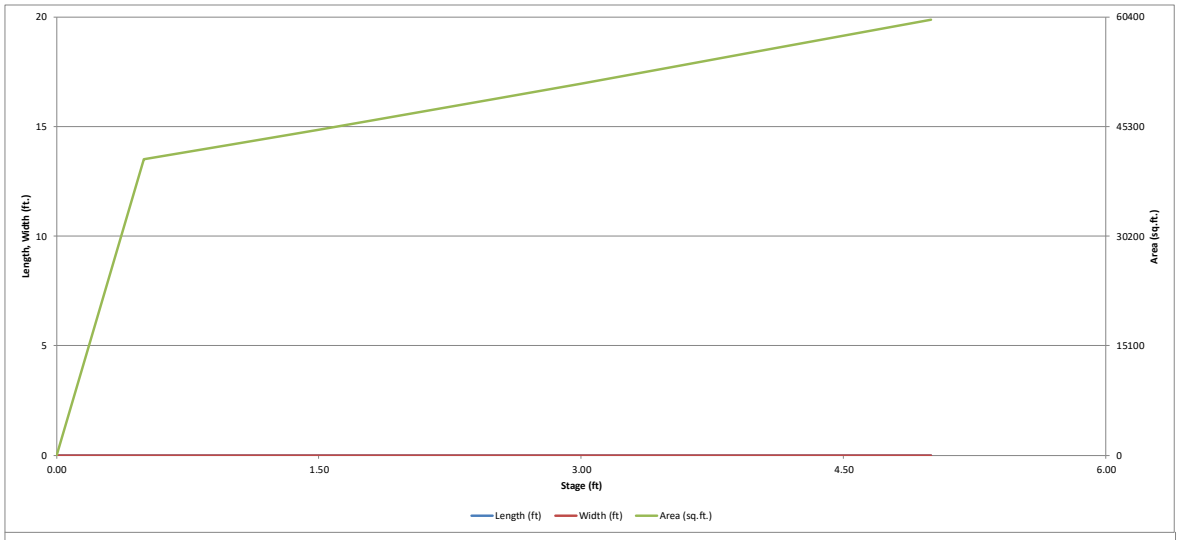
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.490	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.580	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.193	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.591	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.908	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.435	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.948	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.606	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	6.350	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	1.013	acre-feet		
Approximate 5-yr Detention Volume =	1.336	acre-feet		
Approximate 10-yr Detention Volume =	1.635	acre-feet		
Approximate 25-yr Detention Volume =	2.008	acre-feet		
Approximate 50-yr Detention Volume =	2.249	acre-feet		
Approximate 100-yr Detention Volume =	2.554	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.490	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.090	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.974	acre-feet
Total Detention Basin Volume =	2.554	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

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	35	0.001		
	--	0.50	--	--	--	40,768	0.936	10,198	0.234
	--	1.00	--	--	--	42,811	0.983	31,093	0.714
	--	1.50	--	--	--	44,876	1.030	53,015	1.217
	--	2.00	--	--	--	46,970	1.078	75,976	1.744
	--	2.50	--	--	--	49,084	1.127	99,990	2.295
	--	3.00	--	--	--	51,229	1.176	125,068	2.871
	--	3.50	--	--	--	53,393	1.226	151,224	3.472
	--	4.00	--	--	--	55,589	1.276	178,470	4.097
	--	4.50	--	--	--	57,803	1.327	206,818	4.748
	--	5.00	--	--	--	60,050	1.379	236,281	5.424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15
10
5
0
Length, Width (ft.)
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45300
30200
15100
0
Area (sq.ft.)
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1.50
3.00
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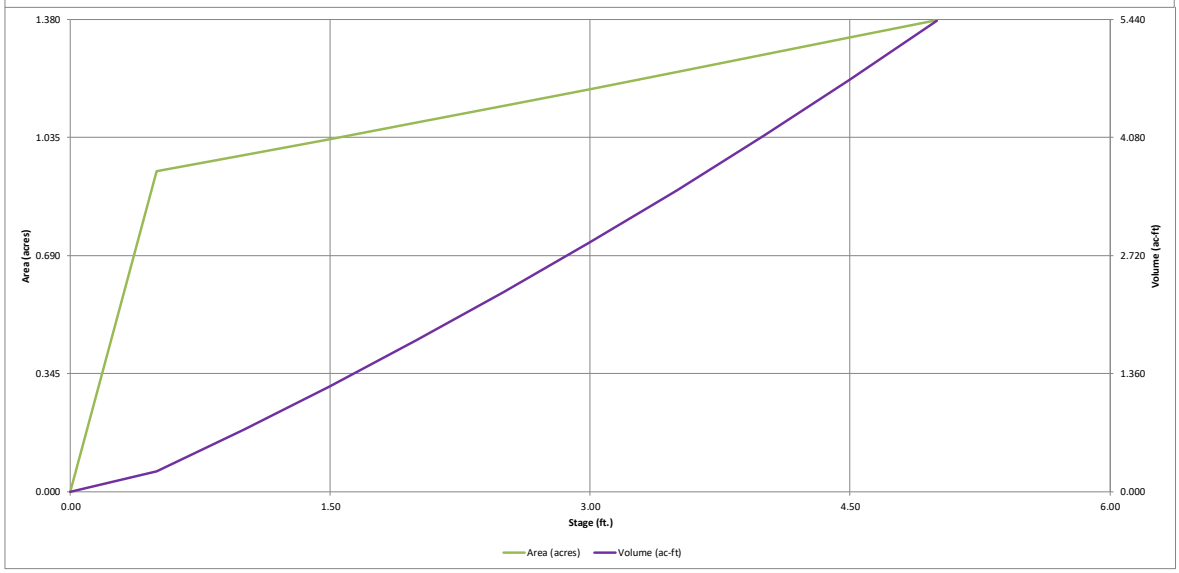
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)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Area (acres)
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Volume (ac-ft)
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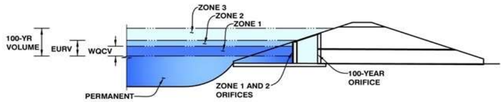
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Grandview - Pond B**

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	24.00	acres
Watershed Length =	1,700	ft
Watershed Length to Centroid =	850	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	66.30%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
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.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.519	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.986	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.457	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.909	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.271	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.739	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.199	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.755	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	6.074	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	1.293	acre-feet		
Approximate 5-yr Detention Volume =	1.689	acre-feet		
Approximate 10-yr Detention Volume =	2.034	acre-feet		
Approximate 25-yr Detention Volume =	2.445	acre-feet		
Approximate 50-yr Detention Volume =	2.692	acre-feet		
Approximate 100-yr Detention Volume =	2.946	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.519	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.467	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.960	acre-feet
Total Detention Basin Volume =	2.946	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

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	35	0.001		
	--	0.50	--	--	--	21,497	0.493	5,382	0.124
	--	1.00	--	--	--	22,562	0.518	16,396	0.376
	--	1.50	--	--	--	23,626	0.542	27,943	0.641
	--	2.00	--	--	--	24,691	0.567	40,023	0.919
	--	2.50	--	--	--	25,756	0.591	52,635	1.208
	--	3.00	--	--	--	26,822	0.616	65,779	1.510
	--	3.50	--	--	--	27,887	0.640	79,456	1.824
	--	4.00	--	--	--	28,952	0.665	93,666	2.150
	--	4.50	--	--	--	30,018	0.689	108,409	2.489
	--	5.00	--	--	--	31,084	0.714	123,684	2.839
	--	5.50	--	--	--	32,150	0.738	139,492	3.202
	--	6.00	--	--	--	33,216	0.763	155,834	3.577
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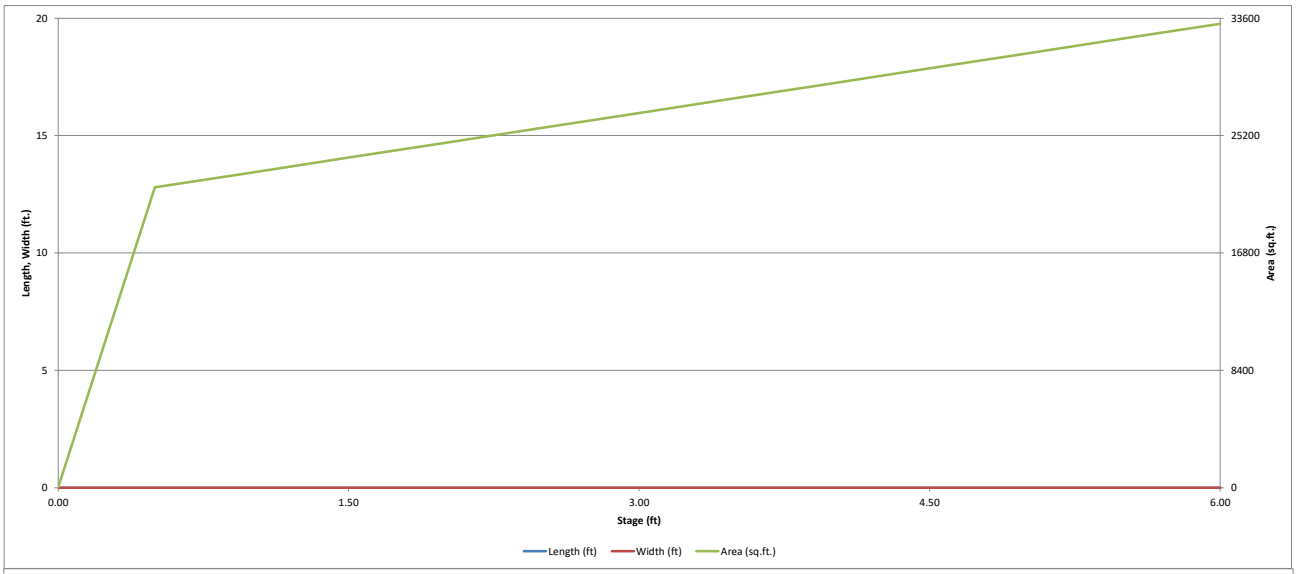
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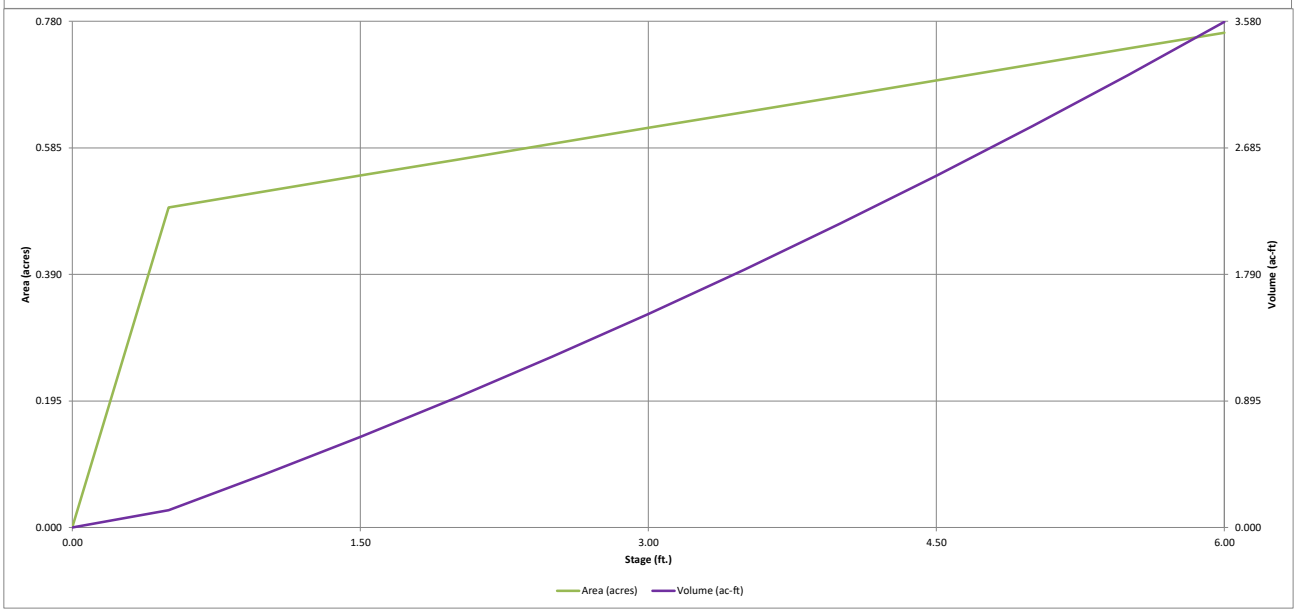
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)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Volume (ac-ft)
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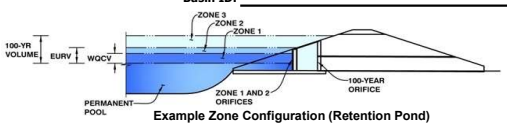
1.50
3.00
4.50
6.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Grandview - Pond C**

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**		**Note: L / W Ratio > 8**
Watershed Area =	16.00	acres	**L / W Ratio = 11.25**
Watershed Length =	2,800	ft	
Watershed Length to Centroid =	1,400	ft	
Watershed Slope =	0.020	ft/ft	
Watershed Imperviousness =	46.00%	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.

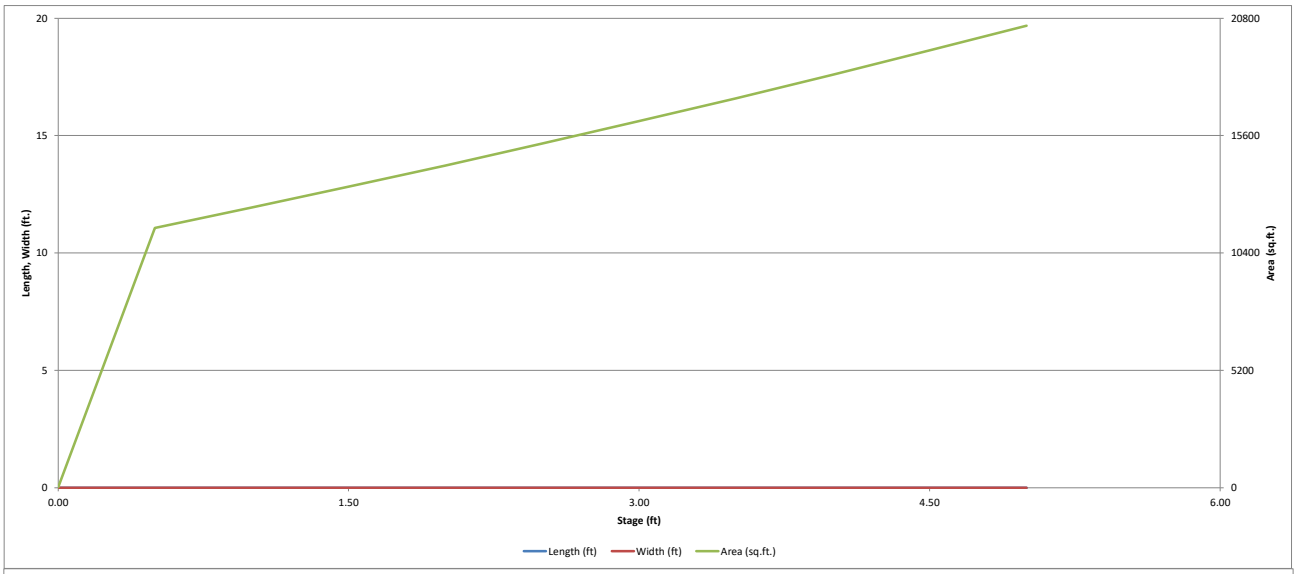
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.261	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.829	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.628	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.838	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.006	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.289	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.565	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	1.920	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	3.400	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.531	acre-feet		
Approximate 5-yr Detention Volume =	0.701	acre-feet		
Approximate 10-yr Detention Volume =	0.859	acre-feet		
Approximate 25-yr Detention Volume =	1.056	acre-feet		
Approximate 50-yr Detention Volume =	1.184	acre-feet		
Approximate 100-yr Detention Volume =	1.348	acre-feet		

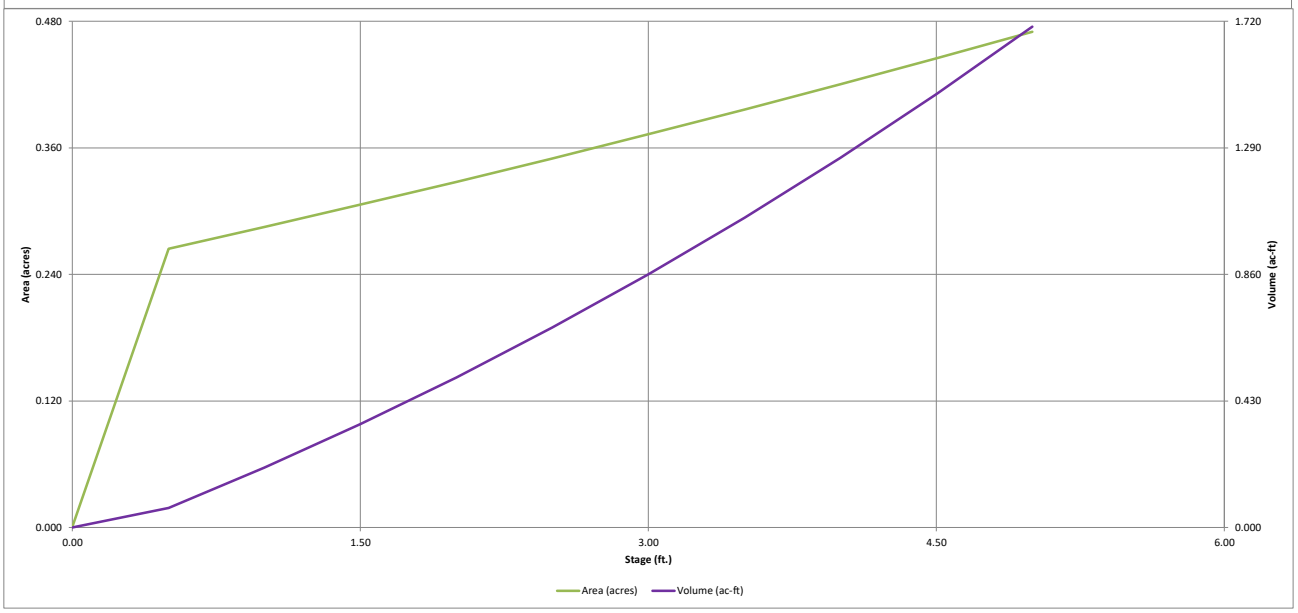
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.261	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.568	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.519	acre-feet
Total Detention Basin Volume =	1.348	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

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	35	0.001		
	--	0.50	--	--	--	11,520	0.264	2,888	0.066
	--	1.00	--	--	--	12,417	0.285	8,873	0.204
	--	1.50	--	--	--	13,333	0.306	15,310	0.351
	--	2.00	--	--	--	14,281	0.328	22,214	0.510
	--	2.50	--	--	--	15,247	0.350	29,596	0.679
	--	3.00	--	--	--	16,245	0.373	37,469	0.860
	--	3.50	--	--	--	17,261	0.396	45,845	1.052
	--	4.00	--	--	--	18,310	0.420	54,738	1.257
	--	4.50	--	--	--	19,376	0.445	64,159	1.473
	--	5.00	--	--	--	20,475	0.470	74,122	1.702


20
15
10
5
0
Length, Width (ft.)
20800
15600
10400
5200
0
Area (sq.ft.)
0.00
1.50
3.00
4.50
6.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

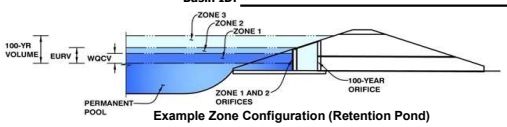

0.480
0.360
0.240
0.120
0.000
Area (acres)
1.720
1.290
0.860
0.430
0.000
Volume (ac-ft)
0.00
1.50
3.00
4.50
6.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Grandview - Pond D**

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	11.96	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	600	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	56.10%	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.

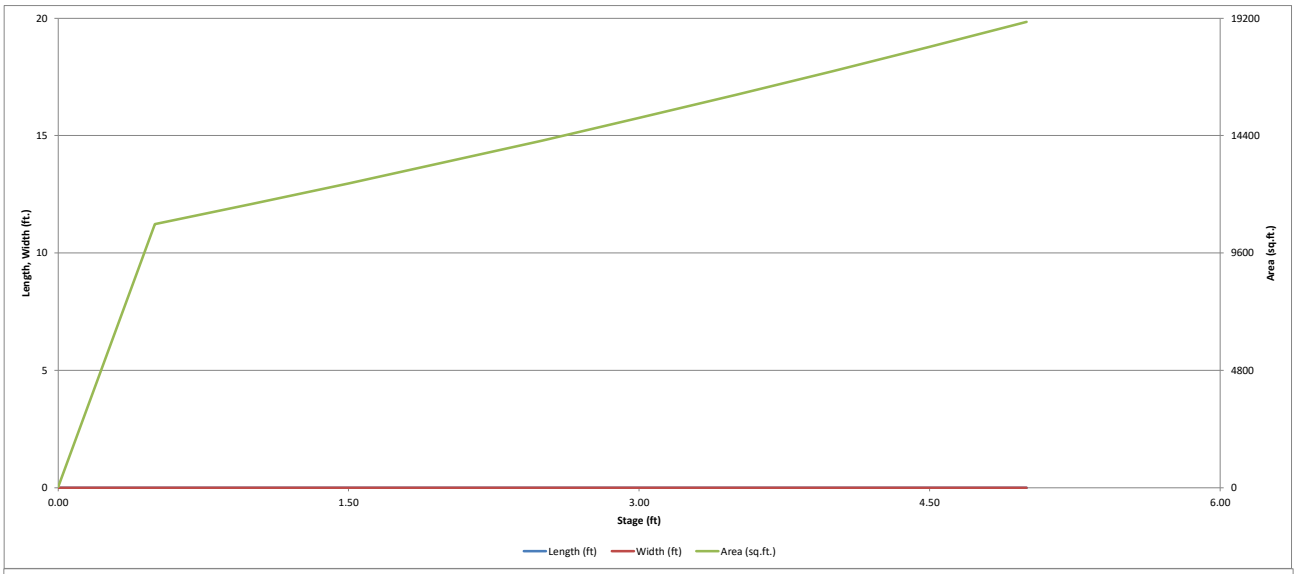
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.223	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.799	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.000	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.000	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.000	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.000	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.000	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.000	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	0.000	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.516	acre-feet		
Approximate 5-yr Detention Volume =	0.678	acre-feet		
Approximate 10-yr Detention Volume =	0.823	acre-feet		
Approximate 25-yr Detention Volume =	0.999	acre-feet		
Approximate 50-yr Detention Volume =	1.108	acre-feet		
Approximate 100-yr Detention Volume =	1.233	acre-feet		

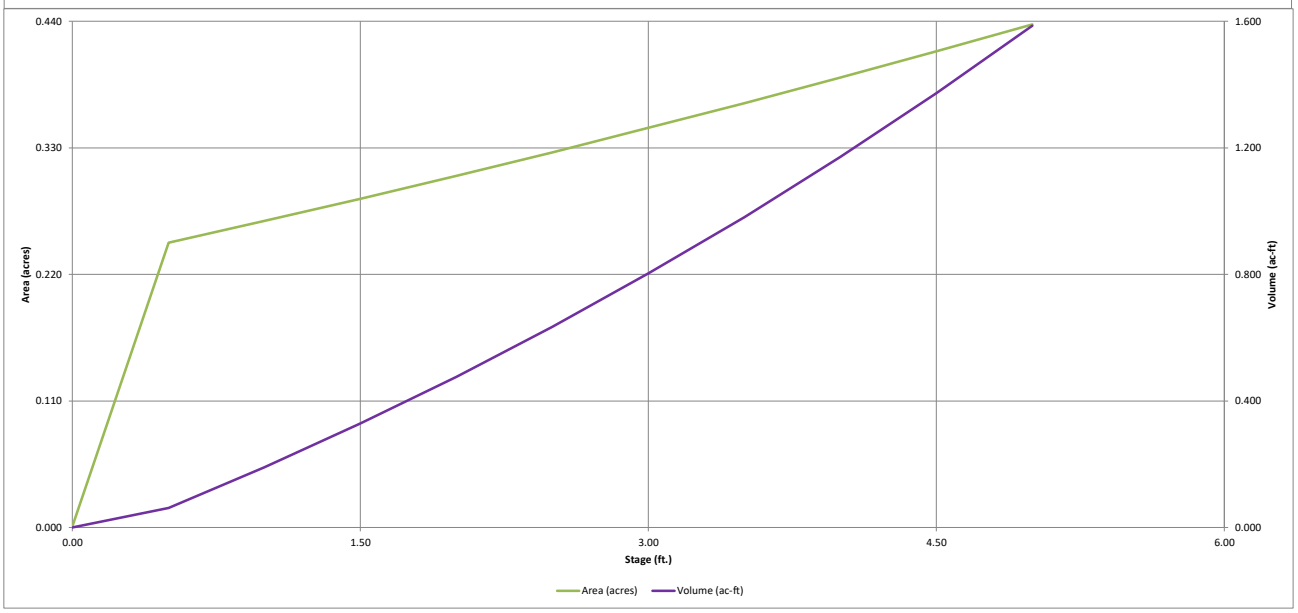
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.223	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.576	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.434	acre-feet
Total Detention Basin Volume =	1.233	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

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	35	0.001		
	--	0.50	--	--	--	10,786	0.248	2,705	0.062
	--	1.00	--	--	--	11,607	0.266	8,303	0.191
	--	1.50	--	--	--	12,446	0.286	14,316	0.329
	--	2.00	--	--	--	13,318	0.306	20,758	0.477
	--	2.50	--	--	--	14,207	0.326	27,639	0.635
	--	3.00	--	--	--	15,130	0.347	34,973	0.803
	--	3.50	--	--	--	16,069	0.369	42,773	0.982
	--	4.00	--	--	--	17,042	0.391	51,051	1.172
	--	4.50	--	--	--	18,031	0.414	59,819	1.373
	--	5.00	--	--	--	19,055	0.437	69,090	1.586


20
15
10
5
0
19200
14400
9600
4800
0
0.00
1.50
3.00
4.50
6.00
Length, Width (ft.)
Area (sq.ft.)
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

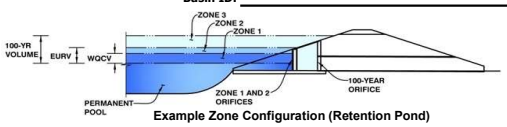

0.440
0.330
0.220
0.110
0.000
1.600
1.200
0.800
0.400
0.000
0.00
1.50
3.00
4.50
6.00
Area (acres)
Volume (ac-ft)
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Grandview - Pond E**

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	13.37	acres
Watershed Length =	1,800	ft
Watershed Length to Centroid =	900	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	47.20%	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.

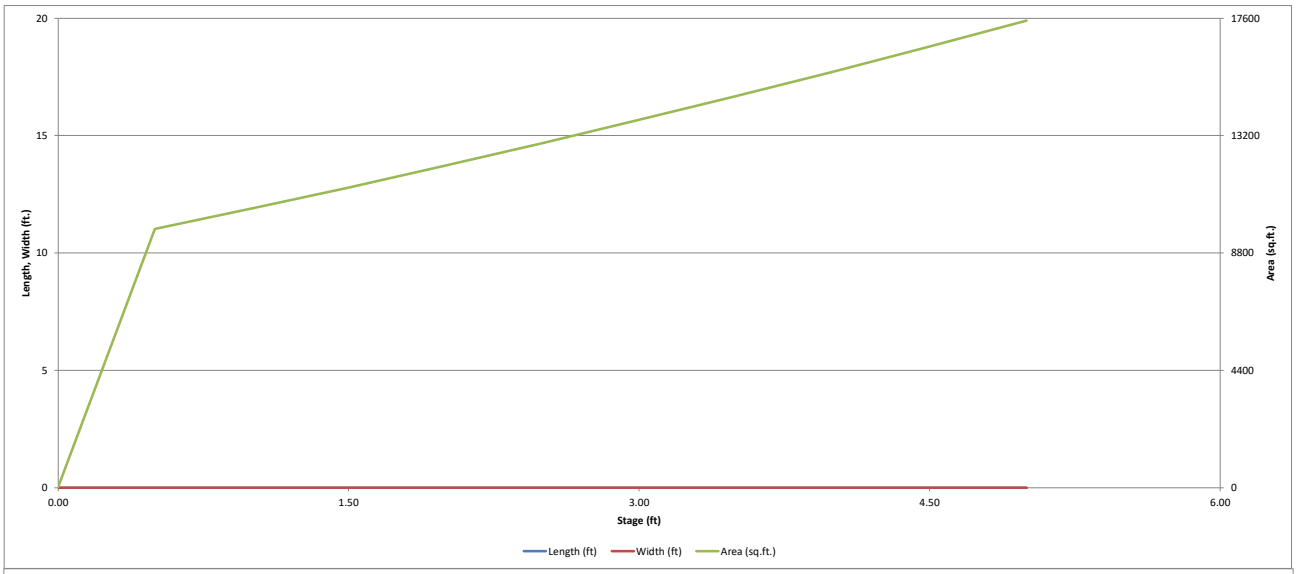
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.221	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.712	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.548	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.728	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.873	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.157	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.391	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	1.704	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	2.971	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.464	acre-feet		
Approximate 5-yr Detention Volume =	0.614	acre-feet		
Approximate 10-yr Detention Volume =	0.760	acre-feet		
Approximate 25-yr Detention Volume =	0.921	acre-feet		
Approximate 50-yr Detention Volume =	1.023	acre-feet		
Approximate 100-yr Detention Volume =	1.160	acre-feet		

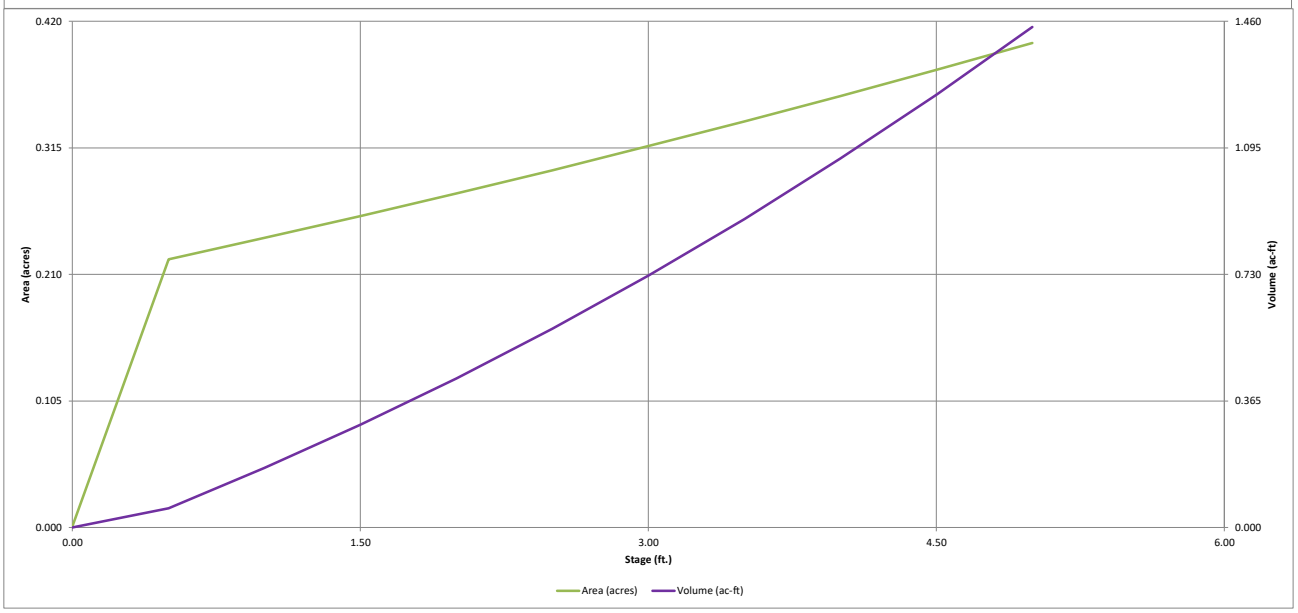
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.221	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.490	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.449	acre-feet
Total Detention Basin Volume =	1.160	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

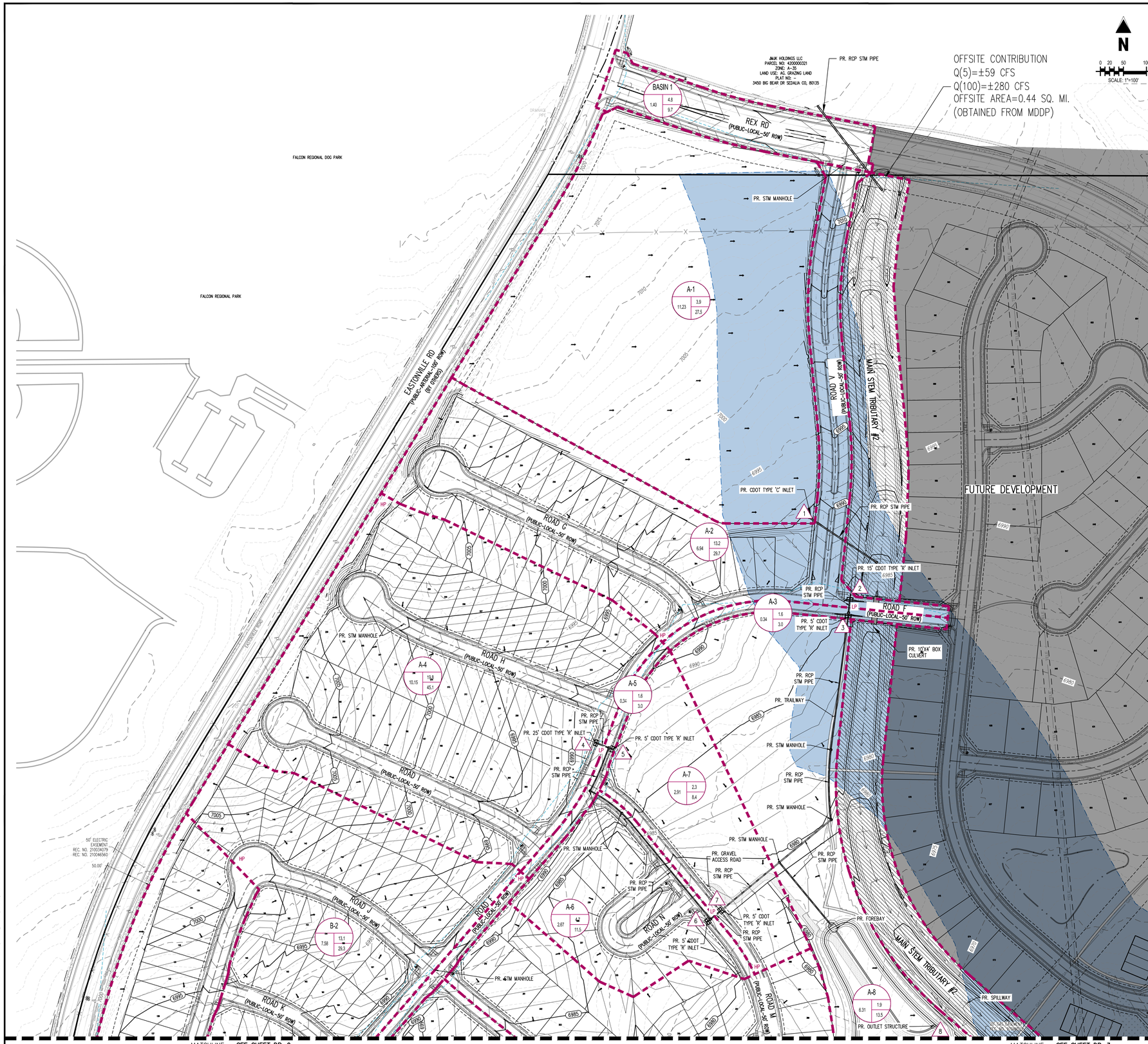
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	35	0.001		
	--	0.50	--	--	--	9,697	0.223	2,433	0.056
	--	1.00	--	--	--	10,467	0.240	7,474	0.172
	--	1.50	--	--	--	11,257	0.258	12,905	0.296
	--	2.00	--	--	--	12,077	0.277	18,738	0.430
	--	2.50	--	--	--	12,917	0.297	24,987	0.574
	--	3.00	--	--	--	13,788	0.317	31,663	0.727
	--	3.50	--	--	--	14,677	0.337	38,779	0.890
	--	4.00	--	--	--	15,599	0.358	46,348	1.064
	--	4.50	--	--	--	16,538	0.380	54,383	1.248
	--	5.00	--	--	--	17,511	0.402	62,895	1.444

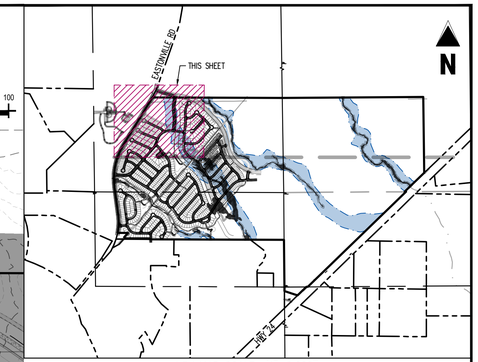

20
15
10
5
0
17600
13200
8800
4400
0
Length, Width (ft.)
Area (sq.ft.)
0.00
1.50
3.00
4.50
6.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)


0.420
0.315
0.210
0.105
0.000
1.460
1.095
0.730
0.365
0.000
Area (acres)
Volume (ac-ft)
0.00
1.50
3.00
4.50
6.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

APPENDIX F

Drainage Maps





KEY MAP SCALE: (1"=2,000')

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- PROPOSED STORM SEWER
- PROPOSED STORM STRUCTURES
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- CENTERLINE OF STREAM
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION (1)
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND (1.8)
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND (4.8)
- BASIN AREA IN ACRES (0.71)
- DESIGN POINT (1)
- DIRECTION OF RUNOFF
- PROPOSED ROADS (DESIGN BY OTHERS – DRAINAGE NOT PART)
- PROPOSED CHANNEL ALIGNMENT (DESIGN BY OTHERS – NOT PART)

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
Basin-1	1.40	4.8	9.7
A-1	11.23	3.9	27.5
A-2	6.94	13.2	29.7
A-3	0.34	1.6	3.0
A-4	10.15	19.8	45.1
A-5	0.34	1.6	3.0
A-6	2.67	4.7	11.5
A-7	2.91	2.3	8.4
A-8	6.31	1.9	13.5
B-1	4.02	6.6	16.0
B-2	7.58	13.1	29.3
B-3	0.76	3.1	6.0
B-4	9.17	16.0	35.5
B-5	2.57	4.7	10.4
B-6	2.06	3.9	8.8
B-7	0.99	2.4	5.3
B-8	0.87	0.4	2.6
C-1	34.69	40.3	89.9
C-2	9.90	12.9	29.8
C-3	0.50	0.9	2.5
C-4	1.61	3.0	6.8
C-5	3.99	1.3	9.4
D-1	2.46	5.0	12.3
D-2	0.75	2.4	4.9
D-3	4.76	9.1	21.5
D-4	4.74	9.2	21.1
D-5	1.71	0.7	4.8
E-1	6.86	8.0	21.0
E-2	11.66	15.4	38.2
E-3	1.71	0.6	4.6

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	3.9	27.5
2	13.2	29.7
3	1.9	3.0
4	19.8	45.1
5	1.6	3.0
6	4.7	11.5
7	2.3	8.4
8	39.3	101.3
9	6.6	16.0
10	13.1	29.3
11	3.1	6.0
12	16.0	35.5
13	4.7	10.4
14	3.9	8.8
15	2.4	5.3
16	47.3	106.9
17	40.3	89.9
18	12.9	29.8
19	0.9	2.5
20	3.0	6.8
21	54.0	125.5
22	5.0	12.3
23	2.4	4.9
24	9.1	21.5
25	9.2	21.1
26	25.1	61.3
27	8.0	21.0
28	15.4	38.2
29	23.9	62.6

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

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

PRELIMINARY DRAINAGE PLAN
GRANDVIEW RESERVE FILING NO. 1
FOR
HR GREEN, INC

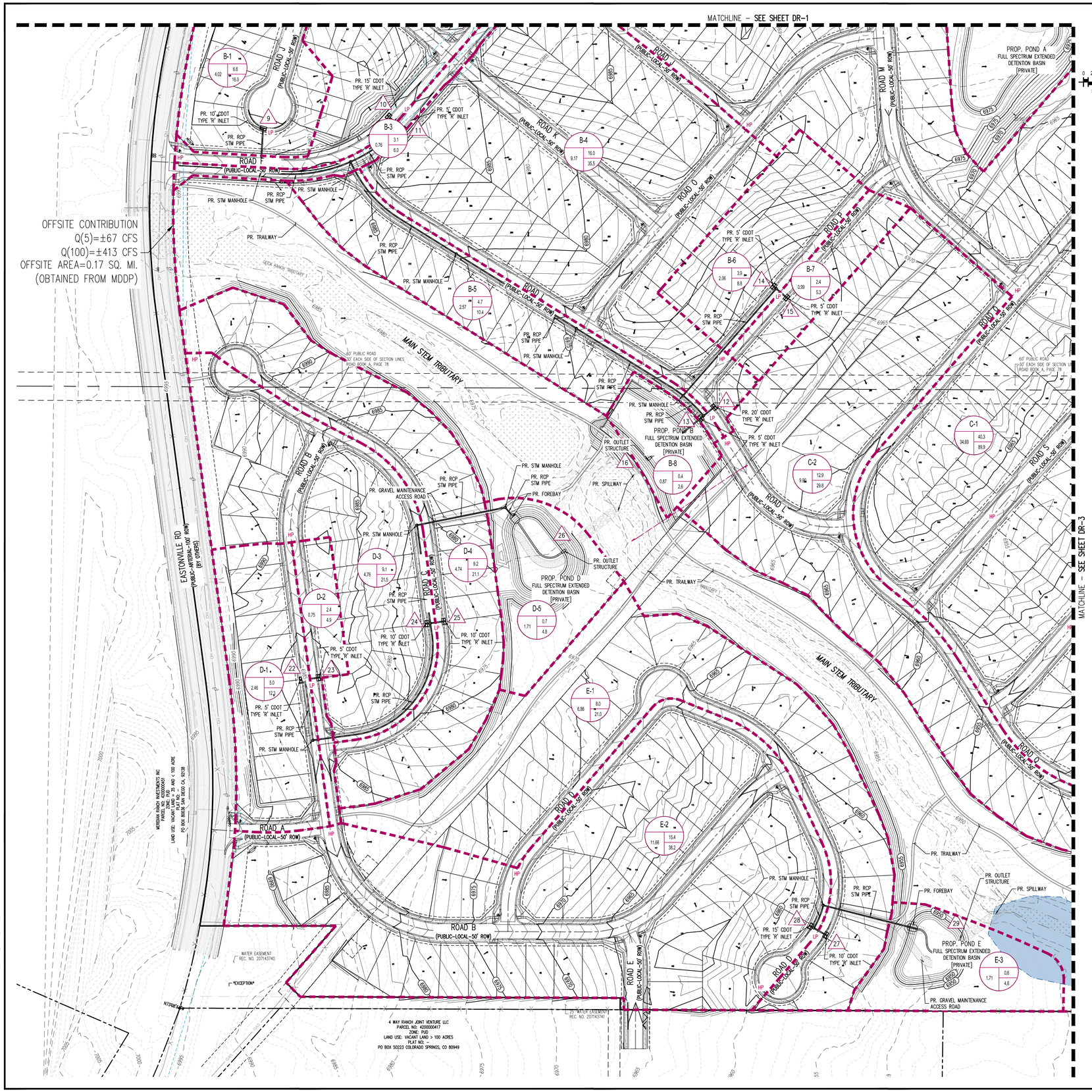
EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

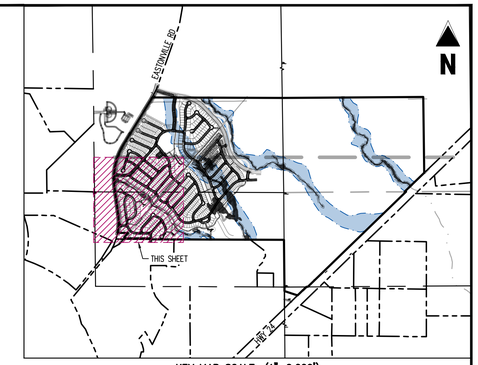
#	Date	Issue / Description	Init.
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	8/13/2021

PROPOSED DRAINAGE MAP

DR-1
Sheet 1 of 3





KEY MAP SCALE: (1"=2,000')

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- PROPOSED STORM SEWER
- PROPOSED STORM STRUCTURES
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- CENTERLINE OF STREAM
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION (1)
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND (1.8)
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND (4.8)
- BASIN AREA IN ACRES (0.71)
- DESIGN POINT (1)
- DIRECTION OF RUNOFF
- PROPOSED ROADS (DESIGN BY OTHERS – DRAINAGE NOT PART)
- PROPOSED CHANNEL ALIGNMENT (DESIGN BY OTHERS – NOT PART)

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
Basin-1	1.40	4.8	9.7
A-1	11.23	3.9	27.5
A-2	6.84	13.2	29.7
A-3	0.34	1.6	3.0
A-4	10.15	19.8	45.1
A-5	0.34	1.6	3.0
A-6	2.67	4.7	11.5
A-7	2.91	2.3	8.4
A-8	6.31	1.9	13.5
B-1	4.02	6.6	16.0
B-2	7.58	13.1	29.3
B-3	0.76	3.1	6.0
B-4	9.17	16.0	35.5
B-5	2.57	4.7	10.4
B-6	2.06	3.9	8.8
B-7	0.99	2.4	5.3
B-8	0.87	0.4	2.6
C-1	34.69	40.3	89.9
C-2	9.90	12.9	29.8
C-3	0.50	0.9	2.5
C-4	1.61	3.0	6.8
C-5	3.99	1.3	9.4
D-1	2.46	5.0	12.3
D-2	0.75	2.4	4.9
D-3	4.76	9.1	21.5
D-4	4.74	9.2	21.1
D-5	1.71	0.7	4.8
E-1	6.86	8.0	21.0
E-2	11.66	15.4	38.2
E-3	1.71	0.6	4.6

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	3.9	27.5
2	13.2	29.7
3	1.6	3.0
4	19.8	45.1
5	1.6	3.0
6	4.7	11.5
7	2.3	8.4
8	39.3	101.3
9	6.6	16.0
10	13.1	29.3
11	3.1	6.0
12	16.0	35.5
13	4.7	10.4
14	3.9	8.8
15	2.4	5.3
16	47.3	106.9
17	40.3	89.9
18	12.9	29.8
19	0.9	2.5
20	3.0	6.8
21	54.0	125.5
22	5.0	12.3
23	2.4	4.9
24	9.1	21.5
25	9.2	21.1
26	25.1	61.3
27	8.0	21.0
28	15.4	38.2
29	23.9	62.6

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PRELIMINARY DRAINAGE PLAN
GRANDVIEW RESERVE FILING NO. 1
FOR
HR GREEN, INC

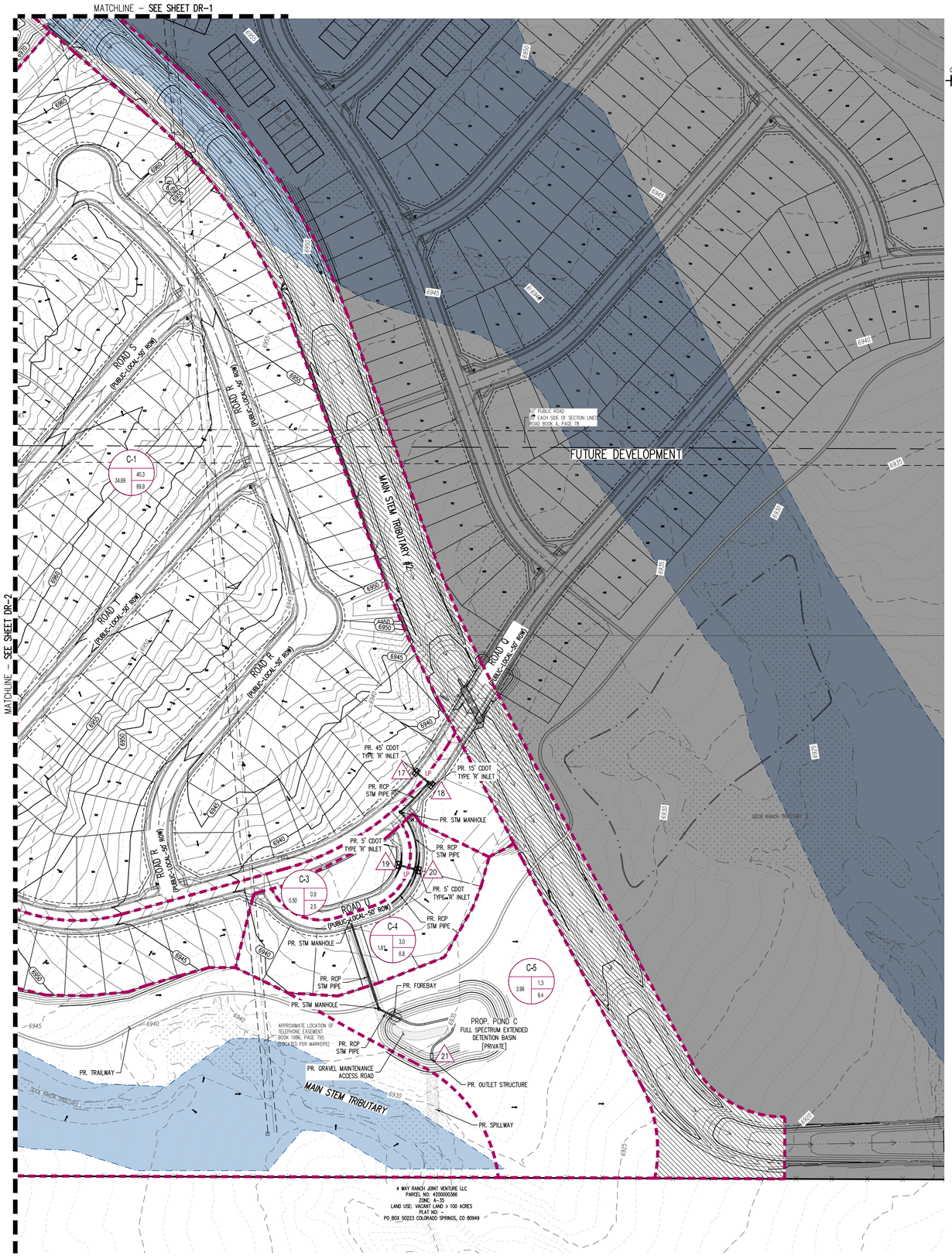
EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

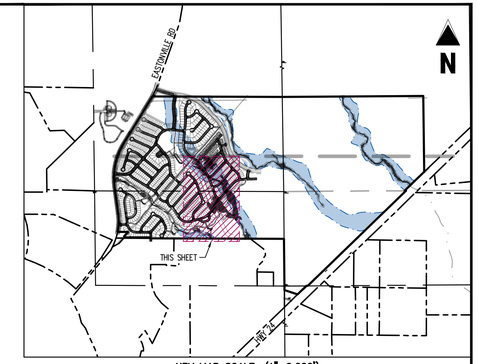
#	Date	Issue / Description	Init.

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	8/13/2021

PROPOSED DRAINAGE MAP

DR-2
Sheet 2 of 3





KEY MAP SCALE: (1"=2,000')

DRAINAGE LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- LOT BOUNDARY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- PROPOSED STORM SEWER
- PROPOSED STORM STRUCTURES
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- CENTERLINE OF STREAM
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF
- PROPOSED ROADS (DESIGN BY OTHERS – DRAINAGE NOT PART)
- PROPOSED CHANNEL ALIGNMENT (DESIGN BY OTHERS – NOT PART)

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
Basin-1	1.40	4.8	9.7
A-1	11.23	3.9	27.5
A-2	6.94	13.2	29.7
A-3	0.34	1.6	3.0
A-4	10.15	19.8	45.1
A-5	0.34	1.6	3.0
A-6	2.67	4.7	11.5
A-7	2.91	2.3	8.4
A-8	6.31	1.9	13.5
B-1	4.02	6.6	16.0
B-2	7.58	13.1	29.3
B-3	0.76	3.1	6.0
B-4	9.17	16.0	35.5
B-5	2.57	4.7	10.4
B-6	2.06	3.9	8.8
B-7	0.99	2.4	5.3
B-8	0.87	0.4	2.6
C-1	34.69	40.3	89.9
C-2	9.90	12.9	29.8
C-3	0.50	0.9	2.5
C-4	1.61	3.0	6.8
C-5	3.99	1.3	9.4
D-1	2.46	5.0	12.3
D-2	0.75	2.4	4.9
D-3	4.76	9.1	21.5
D-4	4.74	9.2	21.1
D-5	1.71	0.7	4.8
E-1	6.86	8.0	21.0
E-2	11.66	15.4	38.2
E-3	1.71	0.6	4.6

DESIGN POINT SUMMARY TABLE

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6	4.7	11.5
7	2.3	8.4
8	39.3	101.3
9	6.6	16.0
10	13.1	29.3
11	3.1	6.0
12	16.0	35.5
13	4.7	10.4
14	3.9	8.8
15	2.4	5.3
16	47.3	106.9
17	40.3	89.9
18	12.9	29.8
19	0.9	2.5
20	3.0	6.8
21	54.0	125.5
22	5.0	12.3
23	2.4	4.9
24	9.1	21.5
25	9.2	21.1
26	25.1	61.3
27	8.0	21.0
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29	23.9	62.8

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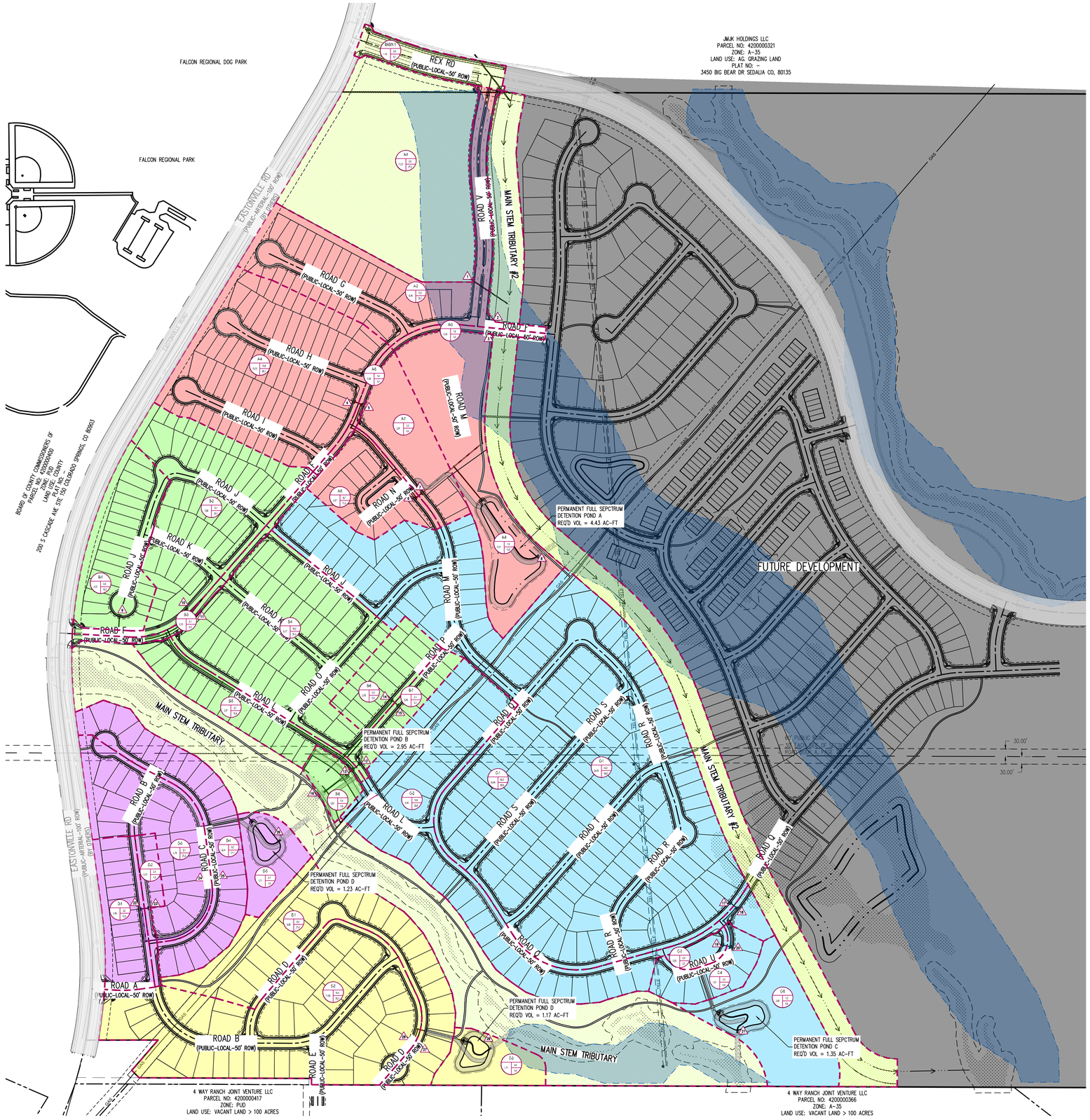
EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

#	Date	Issue / Description	Init.

Project No:	HRG 1.20
Drawn By:	TJE
Checked By:	GRD
Date:	8/13/2021

PROPOSED DRAINAGE MAP

DR-3
Sheet 3 of 3



N

0 20 50 100

SCALE: 1"=100'

DRAINAGE LEGEND

- PROPERTY LINE
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- CENTERLINE OF STREAM
- PROPOSED RIPRAP
- PROPOSED MAINTENANCE ACCESS

1 — BASIN DESIGNATION
1.2 — 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
4.3 — 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
0.71 — BASIN AREA IN ACRES

- FUTURE DEVELOPMENT (NOT PART)
- ROADWAY (DESIGN BY OTHERS – NOT PART)
- AREA TO BE DETAINED IN PBMP (POND A)
- AREA TO BE DETAINED IN PBMP (POND B)
- AREA TO BE DETAINED IN PBMP (POND C)
- AREA TO BE DETAINED IN PBMP (POND D)
- AREA TO BE DETAINED IN PBMP (POND E)
- AREA NOT TO BE DETAINED IN PBMP PER SECTION I.7.1.B.7 (LAND DISTURBANCE TO UNDEVELOPED LAND THAT WILL REMAIN UNDEVELOPED)
- AREA TO BE DETAINED IN FUTURE PBMP WITH THE REMAINDER OF THE REX RD DEVELOPMENT

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EL PASO COUNTY, PEYTON, CO 80831

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Project No:	HRG 1.20
Drawn By:	NJA
Checked By:	GRD
Date:	8/12/2021

WQ MAP

DR-4