FINAL DRAINAGE REPORT

VISTA WEST SUBDIVISION

LOCATED IN THE SOUTHWEST QUARTER OF SECTION 26,
TOWNSHIP 2 NORTH, RANGE 64 WEST OF THE 6TH P.M.
TOWN OF KEENESBURG
COUNTY OF WELD
STATE OF COLORADO

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June 30, 2021

BASELINE
Engineering · Planning · Surveying

CERTIFICATION

This report for the final design of the Vista West Subdivision was prepared by me or under my direct supervision in accordance with the provisions of the Town of Keenesburg and Weld County criteria. I understand that the Town of Keenesburg and its designated city authority do not and will not assume liability for drainage facilities designed by others.

_____
Signature

_____
Colorado P.E. License No.

_____
Seal and Date

Table of Contents

Introduction

Site Location

1. The property is located in the southwest quarter of Section 26, Township 2 North, Range 64 West of the 6th Principal Meridian, Town of Keenesburg, County Weld, State of Colorado.

2. The property is bounded to the north by residential lots, to the east Cedar Street which is lined with residential houses, to the south by undeveloped land, and to the southwest by a parcel of undeveloped land and by County Road 16 to the northwest.

3. The proposed site is currently zoned as R-1 for single family residential development. A PUD overlay is being requested for the property.

Site Description

1. For the purposes of this report, the developed property shall be referred to as “Basin P”, which has been broken into 13 smaller basins; P1-P13. Historical drainage basins for the property shall be referred to as “Basin H1”. Onsite drainage basins that drain off the property shall be referred to as “Basin PO”, which has been broken into 3 smaller basins; PO1 to PO3. There is one offsite drainage basin that will drain onto the property referred to as basin OS1. Right-of-way drainage basins on the west half of Cedar Street shall be referred to as “Basin ROW”, which has been broken up into 3 smaller basins; ROW1-ROW3. Basin ROW2 will drain onto the site and be detained within the detention pond. The total area for the property is 31.55 acres.

2. Historical ground cover for the on-site basin consists of native grasses which generally slope from the northwest corner of the site to the southeast corner. On-site hydraulic soil grouping is primarily a type ‘C’ (Weld loam) and a type ‘B’ (Colby loam). The type ‘C’ hydraulic soil grouping was used for drainage calculations as a conservative approach. A soil map for the entire drainage basin developed using the online NRCS Web Soil Survey mapping tool can be found in **Appendix A**.

3. The site slopes gradually towards the southeast with slopes ranging from 1.8% to 10%. There is an existing irrigation pond at the center of the site and an existing wetland area to the south of the site.

Proposed Project Description

1. The proposed improvements consist of single-family residential homes with lot sizes varying from 5,500 SF to 8,400 SF. Additional improvements include the associated roadways, trail system, community park, open space, and a proposed detention pond.

2. Flood Hazard and Drainage Studies Relevant to the Site

A. The site is not within a flood hazard area according to FEMA FIRM Map No. 08123C2157E revised January 20, 2016 (see ***Appendix A***).

Historic Drainage System

Major Basin

1. The existing site is within a larger drainage basin that ultimately reaches Lost Creek via surface flow.

2. The site is not located within a FEMA delineated flood zone.

3. See the Drainage Plans (***Appendix C***) for existing and proposed contours. Runoff drainage patterns for the on-site basins and the off-site basins were defined based on ground topography surveyed using GPS and conventional survey methods.

Sub-Basin and Site Drainage

1. Historically the site generally drains from its northwest corner towards the southeast corner. In historic conditions, all the flows are transmitted overland via sheet flow across the property. The hydrologic analysis and hydraulic design for the site is based on the criteria established in the Urban Storm Drainage Criteria Manual (Mile High Flood District, 2017/2018) as well as the Town of Keenesburg. The Rational Method was used to calculate peak runoff flows for the sub-basins (refer to forms SF-2 and SF-3 in ***Appendix B***). Runoff flows were analyzed for the 5-yr and 100-yr storms.

Proposed (Developed) Drainage System

Criteria

1. The regulations, guidelines and drainage design criteria used for this report are those contained within the Urban Storm Drainage Criteria Manual, Volumes 1, 2 and 3 (**Reference 1&2**).

Hydrology Criteria

1. In accordance with MHFD criteria, the design storms analyzed for this site were the 5-year storm (minor storm) and the 100-year storm (major storm). One-hour rainfalls of 1.14 and 2.65 inches have been used for the 5-Year and 100-Year runoff calculations respectively using the NOAA Atlas 14 Point Precipitation Frequency Estimates (**Reference 6**) for the Vista West Subdivision site. Refer to ***Appendix A*** for supporting information.

2. The peak discharge for sizing the onsite storm sewer and for the street capacity calculations was calculated using the following Rational Method formula:

   Q = CIA

   Where:
   Q = peak discharge (cfs)
   C = runoff coefficient
   I = rainfall intensity (inches/hour)
   A = drainage area (acres)

   See **Appendix B** for Rational Method flow calculations.

   These flows were routed through the site using the UDFCD SF-3 form to determine the total flow at respective design points. See ***Appendix B*** for routing spreadsheets.

Hydraulic Criteria

1. The MHFD Full-Spectrum Detention method was used to determine the required detention volume for this project.

2. Stormwater quality and detention for the on-site detention pond will be provided using the MHFD methods for full spectrum detention in accordance with the Mile High Flood District Detention Basin Design Workbook (MHFD-Detention, Version 4.04). In coordination with the Town of Keenesburg the maximum allowable 100-year release rate for a full spectrum detention facility shall be no greater than the predevelopment 100-year storm water discharge of the upstream watershed. The predevelopment 100-year unit discharge for specific soil types per acre of tributary catchment varies based on the watershed slope and watershed shape. The peak unit flow rate is based on one-hour precipitation depth from NOAA Atlas 14, watershed flow path slope, watershed flow path length, the tributary area, and coefficients dependent on event frequency tables for a soil with a hydraulic soil grouping of 'C'. Please refer to the EURV and 100-year detention volume calculations in ***Appendix B*** of this report.

3. The 100-yr release rate for the proposed detention pond was calculated as 46.5 cfs. However, the proposed detention pond does not capture all onsite flows. Proposed basins PO flow offsite and cannot vertically drain to the proposed pond. The total off-site flows from the basins that are not captured by the detention pond are 20.17 cfs for the 100-yr storm. There are offsite flows from basin OS1 and ROW2 that will drain to and be detained within the proposed detention pond totaling 4.94 cfs. To counteract the total flow not routed through the pond from the site, the pond outlet structure has been restricted which has been detailed in the detention portion of this report.

4. The proposed detention pond will be installed with the initial phase of construction. The detention pond has been designed based on the Town Criteria specified below and will act as a permanent stormwater facility that will remain in place.

5. Storm sewers will be installed for the proposed site and for the proposed detention pond outfall. The proposed storm sewer is discussed in more detail in the applicable section.

Variance from Criteria

1. This project has no requests for variances from criteria.

Runoff

1. The developed site will consist of 16 basins consisting of single-family residences with piped roof drainage and associated private driveways, proposed roadways and right-of-way improvements, and the open space & trail network. The site will consist of public streets with curb & gutter, infrastructure, and open space tracts. The Rational Method was used for this analysis, and design storm frequencies of 5-yr and 100-yr storms were (see ***Appendix B***).

2. The majority of stormwater runoff from the project site will be directed to the proposed detention pond which will be located along the south property line of the site. Stormwater will be conveyed to the pond by surface flow or a proposed storm sewer network. The pond will provide full-spectrum detention and will outfall directly to the existing surface to the south of the site and overland flow in its historical fashion to the existing wetland areas south of the site. A 4-foot-wide concrete trickle channel and outlet structure will be designed for the pond. A Restrictor plate for the outlet structure was designed to release the runoff from the 100-year storm at a controlled rate in accordance with Urban Storm Drainage Criteria Manual Volume 2, Storage Chapter (**Reference 1**). This design can be found in **Appendix B**. The pond has an emergency spillway which has been designed to spill to the south of the proposed site. The pond has been sized for compensatory storage for the runoff that is not detained on site. The 100-year release rate of the detention pond has been restricted by reducing the release rate by 15.23 cfs in order to account for the 20.17 cfs that will not be detained by the pond and will flow offsite, and the 4.94 cfs off offsite flow that will be detained within the detention pond. The pond has been sized for entirety of the development.

3. The pond is sized based on the contributing impervious area which determined the water quality capture volume (Excess Urban Runoff Volume - EURV) plus the 100 year detention volumes.

4. Developed runoff onsite follows the typical pattern in which roof drainage will be collected in gutters and piped into downspouts. Flows will then sheet flow across landscaped areas and be conveyed into the curb and gutter system in the proposed

roadways. Flows will then enter into the proposed storm sewer network and ultimately be conveyed to the detention pond at the south of the site for all basins except for Basins PO.

Flows from Basin P will flow to the proposed local streets curb and gutter and continue into the proposed storm sewer system. Flows will then outfall into the proposed detention pond at design point 13. These flows will be detained and released following the criteria stated in the Detention section of this report. These flows will ultimately outfall on the south end of the site, and flow to the existing floodplain located south of the property.

Flows from Basin PO will flow onto Cedar Street and be conveyed offsite. The proposed detention pond release rate has been restricted to account for offsite flows from basin PO. Flows from basin PO1 will outfall at the northeast corner of the site onto Cedar Street. Flows from basin PO2 & PO3 will outfall at the southeast corner of the site onto Cedar Street.

Flows from Basin OS will flow onto the site at the northwest corner of the property and be captured in a Type 'C' inlet, where it will be captured by the proposed storm sewer system for the site. Flows will then outfall into the proposed detention pond at design point 13. These flows will be detained and released following the criteria stated in the Detention section of this report. These flows will ultimately outfall on the south end of the site, and flow to the existing floodplain located south of the property.

Flow from Basin ROW will flow into the proposed curb and gutter system on the west half of Cedar Street and follow historical drainage patterns. Except for basin ROW2, which will flow onto the site, and be captured within the proposed storm sewer system. Flows will then outfall into the proposed detention pond at design point 13. These flows will be detained and released following the criteria stated in the Detention section of this report. These flows will ultimately outfall on the south end of the site, and flow to the existing floodplain located south of the property.

Curb & gutter, storm sewer pipe, and inlet design calculations can be found in **Appendix B**.

5. Offsite flows from the vacant land to the west of the site has been accounted for as Basin OS1 within the SF2&3. Flows from this basin are anticipated to flow onto the site and have been accounted for in the calculations for Basin OS1 in **Appendix B**. These flows have been accounted for within the detention pond.

Detention

1. The structural BMP to be utilized for water quality will be a Full Spectrum Detention Basin.

2. The required and provided volumes for the Excess Urban Runoff (EURV) and 100-yr stages are as follows:
    A. Required WQCV = 0.572 acre-ft
    B. Required EURV volume = 1.122 acre-ft.
    C. Required 100-yr volume = 1.512 acre-ft.

    These calculations include the mandatory one-foot of freeboard. One foot of freeboard is provided above the emergency overflow water surface elevation (WSEL).

3. The WQCV water surface elevation will be 4943.18, the EURV water surface elevation will be 4945.91, and the 100-year water surface elevation will be 4948.49.

4. The release rates for the 100-yr (31.27 CFS) is based the maximum allowable 100-year release rate, equal the predevelopment discharge for the upstream watershed. The 100-year release has been restricted from 46.5 cfs down to 31.27 cfs to account for the offsite flows from basins PO1-3 that cannot be conveyed to the proposed pond and offsite flows being detained within the proposed pond from basins OS1 and ROW2.

5. The release rate for the 100 year storm will be controlled with an orifice plate inside the outlet structure.

6. A 4 ft. wide concrete trickle channel with a 0.5% longitudinal slope has been incorporated into the pond design to promote drainage of the pond.

7. The pond will be graded with a minimum pond bottom slope of 2% toward the trickle channel.

8. Excess stormwater will pass through the pond, overtop the berm and spill to the south of the site and maintain historic drainage patterns from there.

9. The emergency overflow for the pond has been designed to be 90-feet in length at elevation 4948.5 and will be protected with Type 'VL' riprap for the entire length.

10. The outlet structure and 100-yr restrictor plate will is designed to provide appropriate release rates ***(***see MHFD spreadsheet in ***Appendix C)***. The outlet structure will consist of an orifice plate containing a vertical column of small, equally spaced orifices. The proposed orifice plate will consist of four rows of 1-3/4" inch diameter orifices spaced 12.1 inches apart. The ground at the outfall of the pipe from the detention pond will be protected from erosion with the installation of a riprap pad. The riprap is type VL which is sized to handle the flows that will be released from the detention pond (see calculation for sizing of riprap pad in ***Appendix C***).

Streets

1. Street capacity for the minor storm was based on flows not overtopping the curb and gutter for all private streets on-site. Flows in local streets can spread to the crown of the street in major storm events. The spread criteria control the flow depth for the Residential Collector Street that runs through the site. Refer to ***Appendix B*** for calculations.

Storm Sewer System

1. The MHFD drainage criteria requires that the minor storm be conveyed into the storm system with no curb overtopping, and flow may spread to the crown of the street, while the major storm shall be conveyed into the system with a depth less than or equal to 12" above the gutter flowline. Depth of ponding at the storm inlets has been limited to the curb height, except at storm inlets A06 & A07 where ponding depth was permitted to the crown of the street. The major storm criterion has been met and the adjacent buildings have been sufficiently graded so that a 100-yr storm will not have any negative impacts.

2. The MHFD drainage criteria requires that the minor storm be conveyed within the storm sewer pipe, while the major storm shall be conveyed in the roadway with a depth less than or equal to 12" above the gutter flowline. This criterion has been met, refer to ***Appendix B*** for calculations.

3. All proposed storm sewer located within the Town of Keenesburg's Right Of Way has been sized to meet a minimum standard of 18" RCP.

Conclusions

Compliance with Applicable Code

The drainage conveyance and detention volume has been designed in compliance with The Town of Keenseburg design standards, and the MHFD manual.

Flood Hazard

No floodplains shall be impacted by this project.

Impact of the Improvements

i. This proposed development will provide sedimentation and filtration of runoff through a proposed Full Spectrum Detention pond and controlled release rates for the WQCV and 100-yr events meeting UDFCD release rates for the soil type to mimic predeveloped release rates. The proposed street improvements along Cedar Street will provide curb and gutter for major and minor storm flows.

ii. The 100-yr release rate for the proposed detention pond was calculated as 46.5 cfs. However, the detention pond does not capture all offsite flows. Proposed basins PO1-P03 have offsite flows not directed to the pond. The pond release has been restricted

to account for the offsite flows and should have no negative affect downstream of the development.

Maintenance of Improvements

i. The proposed improvements shall be maintained in order to ensure runoff is appropriately routed. The property owners shall be responsible for the maintenance of all drainage infrastructure on their property up to the edge of the sidewalk or roadway. The Town of Keenesburg has the right to enter an owner's property in order to maintain the drainage infrastructure when deemed fit.

ii. The proposed detention pond shall be maintained by the Homeowners Association. The maintenance responsibility will eventually be transferred to a metropolitan district once one is established.

References

1. *Urban Storm Drainage Criteria Manual, Volumes 1 & 2*; Urban Drainage and Flood Control District, Denver, CO. Updated March 2017, with updates on September 2017.

2. *Urban Storm Drainage Criteria Manual, Volumes 3*; Urban Drainage and Flood Control District, Denver, CO. November 2010, with updates on April 2018.

3. *Weld County Engineering and Construction Guidelines*; Weld County, CO. April 2012, with updates on July 2017.

4. *Natural Resources Conservation Center Web Soil Survey, United States Department of Agriculture, site visited May 2021.*

5. *Federal Emergency Management Agency Flood Insurance Rate Map, Community-Panel Number 08123C2157E revised January 20, 2016.*

6. *NOAA's National Weather Service, Hydrometeorological Design Studies Center, Precipitation Frequency Data Server (PFDS), site visited November 2020.*

APPENDIX

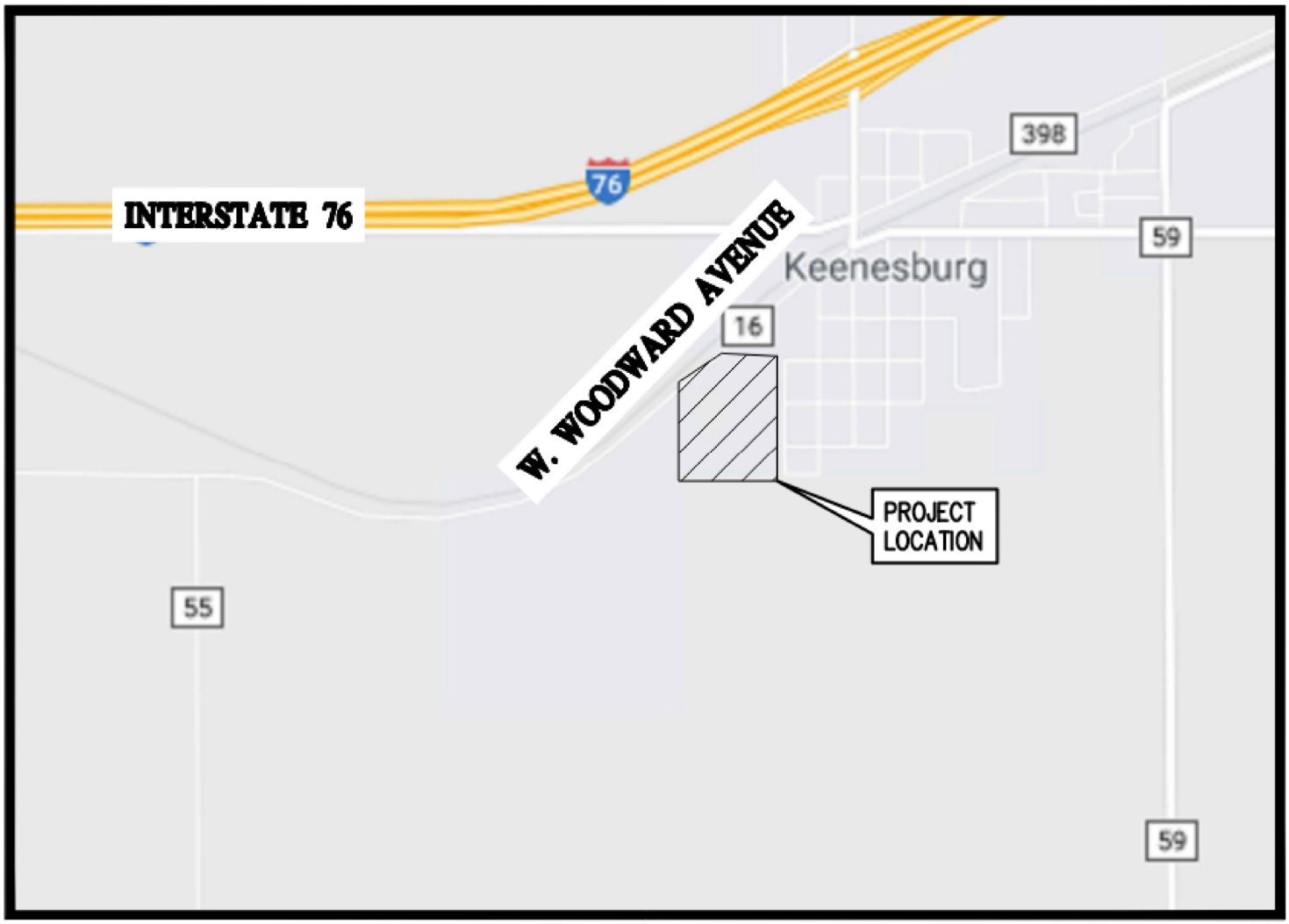
Appendix A:

Vicinity Map

Hydrologic Soils Group

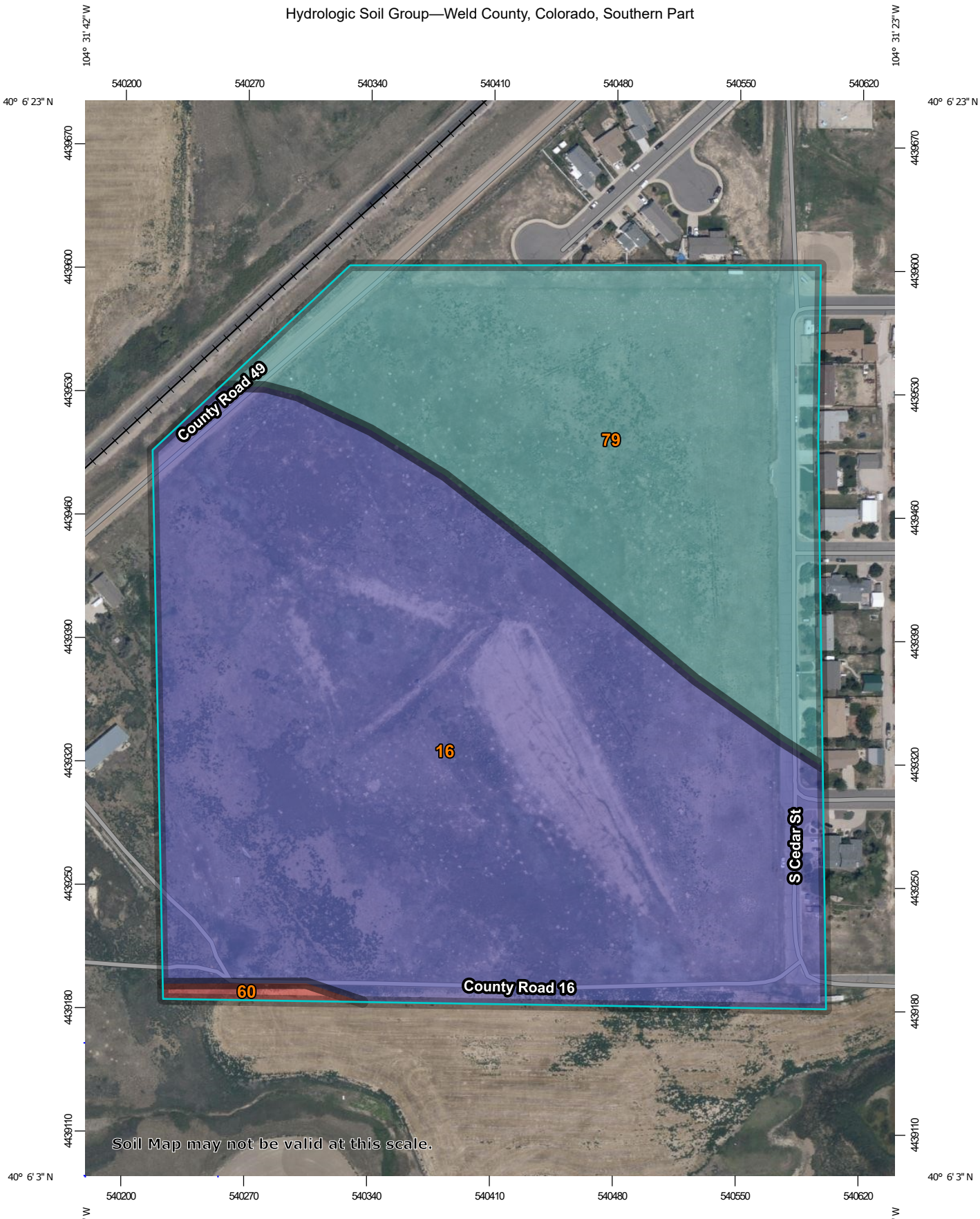
FIRM Map

NOAA Atlas Rainfall Data



VICINITY MAP

SCALE: 1" = 1000'



Map Scale: 1:2,970 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 40 80 160 240

Feet
0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Weld County, Colorado, Southern Part
Survey Area Data: Version 19, Jun 5, 2020

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

Date(s) aerial images were photographed: Jul 19, 2018—Aug 10, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
16	Colby loam, 3 to 5 percent slopes	B	24.8	65.3%
60	Shingle-Renohill complex, 3 to 9 percent slopes	D	0.2	0.6%
79	Weld loam, 1 to 3 percent slopes	C	12.9	34.1%
Totals for Area of Interest			**37.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

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

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

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

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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 derived from NAIP Orthophotography produced with a one meter ground resolution from photography dated 2013.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

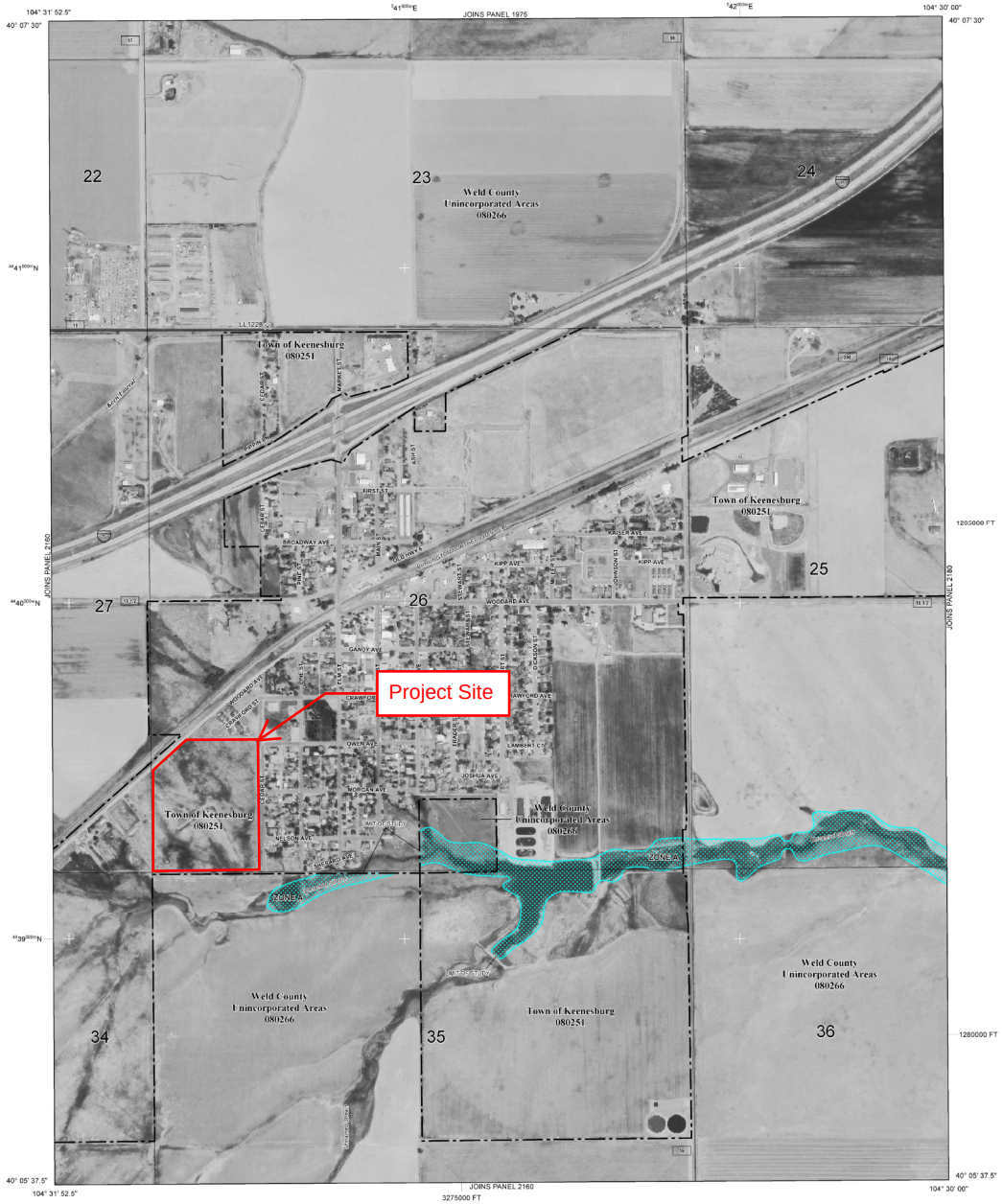
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result,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

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

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

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

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



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH AND RANGE 64 WEST.

LEGEND

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

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

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas 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.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A — A: Cross section line
- 23 — 23: Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT — 5000-foot ticks: Colorado State Plane Central Zone (FIPS Zone 0502), Lambert Conformal Conic projection
- 4°99'00" N — 1000-meter Universal Transverse Mercator grid values, zone 13
- 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
January 20, 2016

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2157E

FIRM

FLOOD INSURANCE RATE MAP

WELD COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 2157 OF 2250
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KEENESBURG, TOWN OF	080251	2157	E
WELD COUNTY	080266	2157	E

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
08123C2157E

EFFECTIVE DATE
JANUARY 20, 2016

Federal Emergency Management Agency

NOAA Atlas 14, Volume 8, Version 2
Location name: Keenesburg, Colorado, USA*
Latitude: 40.1002°, Longitude: -104.5274°
Elevation: 4950.78 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.242 (0.194-0.306)	0.295 (0.235-0.372)	0.393 (0.312-0.497)	0.486 (0.384-0.618)	0.633 (0.491-0.853)	0.760 (0.571-1.03)	0.900 (0.651-1.25)	1.05 (0.729-1.50)	1.28 (0.847-1.86)	1.46 (0.937-2.13)
10-min	0.355 (0.283-0.447)	0.431 (0.344-0.544)	0.575 (0.457-0.728)	0.712 (0.563-0.905)	0.927 (0.718-1.25)	1.11 (0.836-1.51)	1.32 (0.953-1.83)	1.54 (1.07-2.19)	1.87 (1.24-2.73)	2.14 (1.37-3.13)
15-min	0.433 (0.346-0.546)	0.526 (0.420-0.664)	0.702 (0.557-0.887)	0.869 (0.686-1.10)	1.13 (0.876-1.52)	1.36 (1.02-1.84)	1.61 (1.16-2.23)	1.88 (1.30-2.68)	2.28 (1.51-3.32)	2.61 (1.67-3.81)
30-min	0.581 (0.464-0.733)	0.704 (0.561-0.888)	0.936 (0.743-1.18)	1.16 (0.914-1.47)	1.51 (1.17-2.04)	1.81 (1.36-2.46)	2.15 (1.56-2.98)	2.52 (1.74-3.59)	3.06 (2.03-4.46)	3.51 (2.25-5.12)
60-min	0.714 (0.570-0.900)	0.857 (0.684-1.08)	1.14 (0.902-1.44)	1.41 (1.11-1.79)	1.84 (1.43-2.50)	2.23 (1.68-3.03)	2.65 (1.92-3.69)	3.13 (2.17-4.46)	3.82 (2.54-5.58)	4.40 (2.82-6.42)
2-hr	0.847 (0.681-1.06)	1.01 (0.812-1.26)	1.34 (1.07-1.67)	1.66 (1.32-2.09)	2.18 (1.71-2.93)	2.64 (2.01-3.56)	3.16 (2.31-4.35)	3.73 (2.61-5.27)	4.58 (3.07-6.63)	5.29 (3.42-7.65)
3-hr	0.923 (0.746-1.15)	1.09 (0.883-1.36)	1.44 (1.16-1.79)	1.78 (1.42-2.23)	2.34 (1.85-3.14)	2.84 (2.17-3.82)	3.41 (2.51-4.68)	4.04 (2.84-5.68)	4.97 (3.35-7.15)	5.75 (3.74-8.26)
6-hr	1.09 (0.885-1.34)	1.27 (1.04-1.57)	1.65 (1.34-2.04)	2.02 (1.63-2.51)	2.64 (2.10-3.50)	3.19 (2.45-4.24)	3.80 (2.82-5.17)	4.50 (3.19-6.25)	5.52 (3.76-7.85)	6.37 (4.18-9.06)
12-hr	1.29 (1.06-1.58)	1.52 (1.25-1.86)	1.95 (1.59-2.39)	2.36 (1.92-2.90)	3.01 (2.40-3.91)	3.57 (2.76-4.67)	4.18 (3.12-5.59)	4.86 (3.47-6.66)	5.85 (4.01-8.20)	6.66 (4.42-9.37)
24-hr	1.53 (1.27-1.85)	1.81 (1.49-2.19)	2.31 (1.90-2.80)	2.76 (2.26-3.36)	3.44 (2.75-4.39)	4.02 (3.12-5.17)	4.63 (3.48-6.10)	5.30 (3.81-7.15)	6.24 (4.31-8.63)	7.01 (4.69-9.76)
2-day	1.74 (1.45-2.09)	2.10 (1.75-2.52)	2.70 (2.24-3.25)	3.22 (2.65-3.88)	3.96 (3.16-4.95)	4.55 (3.55-5.75)	5.15 (3.88-6.67)	5.79 (4.18-7.68)	6.66 (4.63-9.06)	7.34 (4.96-10.1)
3-day	1.91 (1.60-2.27)	2.27 (1.90-2.71)	2.88 (2.40-3.44)	3.40 (2.82-4.09)	4.15 (3.33-5.16)	4.75 (3.72-5.97)	5.36 (4.06-6.89)	6.00 (4.36-7.91)	6.88 (4.81-9.30)	7.56 (5.14-10.3)
4-day	2.04 (1.71-2.42)	2.40 (2.01-2.85)	3.01 (2.52-3.58)	3.53 (2.94-4.23)	4.28 (3.45-5.30)	4.88 (3.84-6.11)	5.50 (4.18-7.04)	6.15 (4.49-8.07)	7.03 (4.93-9.46)	7.72 (5.28-10.5)
7-day	2.33 (1.97-2.75)	2.72 (2.30-3.21)	3.37 (2.83-3.98)	3.92 (3.28-4.65)	4.69 (3.80-5.74)	5.30 (4.20-6.57)	5.92 (4.53-7.50)	6.57 (4.82-8.53)	7.43 (5.25-9.90)	8.11 (5.58-10.9)
10-day	2.58 (2.19-3.03)	3.00 (2.55-3.52)	3.69 (3.12-4.34)	4.27 (3.59-5.04)	5.07 (4.12-6.16)	5.69 (4.52-7.00)	6.32 (4.86-7.95)	6.96 (5.13-8.98)	7.82 (5.55-10.3)	8.47 (5.86-11.4)
20-day	3.31 (2.84-3.85)	3.81 (3.26-4.43)	4.61 (3.93-5.37)	5.26 (4.46-6.16)	6.15 (5.03-7.37)	6.82 (5.46-8.29)	7.49 (5.80-9.30)	8.15 (6.06-10.4)	9.02 (6.46-11.8)	9.66 (6.76-12.8)
30-day	3.90 (3.36-4.51)	4.47 (3.84-5.17)	5.37 (4.60-6.23)	6.10 (5.20-7.10)	7.08 (5.82-8.42)	7.82 (6.29-9.42)	8.53 (6.64-10.5)	9.23 (6.90-11.7)	10.1 (7.29-13.1)	10.8 (7.59-14.2)
45-day	4.61 (3.99-5.30)	5.29 (4.57-6.08)	6.35 (5.47-7.32)	7.20 (6.16-8.33)	8.31 (6.86-9.81)	9.14 (7.38-10.9)	9.92 (7.76-12.1)	10.7 (8.02-13.4)	11.6 (8.42-14.9)	12.3 (8.72-16.1)
60-day	5.20 (4.51-5.95)	5.97 (5.18-6.84)	7.19 (6.21-8.25)	8.15 (7.00-9.39)	9.40 (7.77-11.0)	10.3 (8.35-12.3)	11.2 (8.76-13.6)	12.0 (9.03-14.9)	13.0 (9.43-16.6)	13.7 (9.73-17.8)

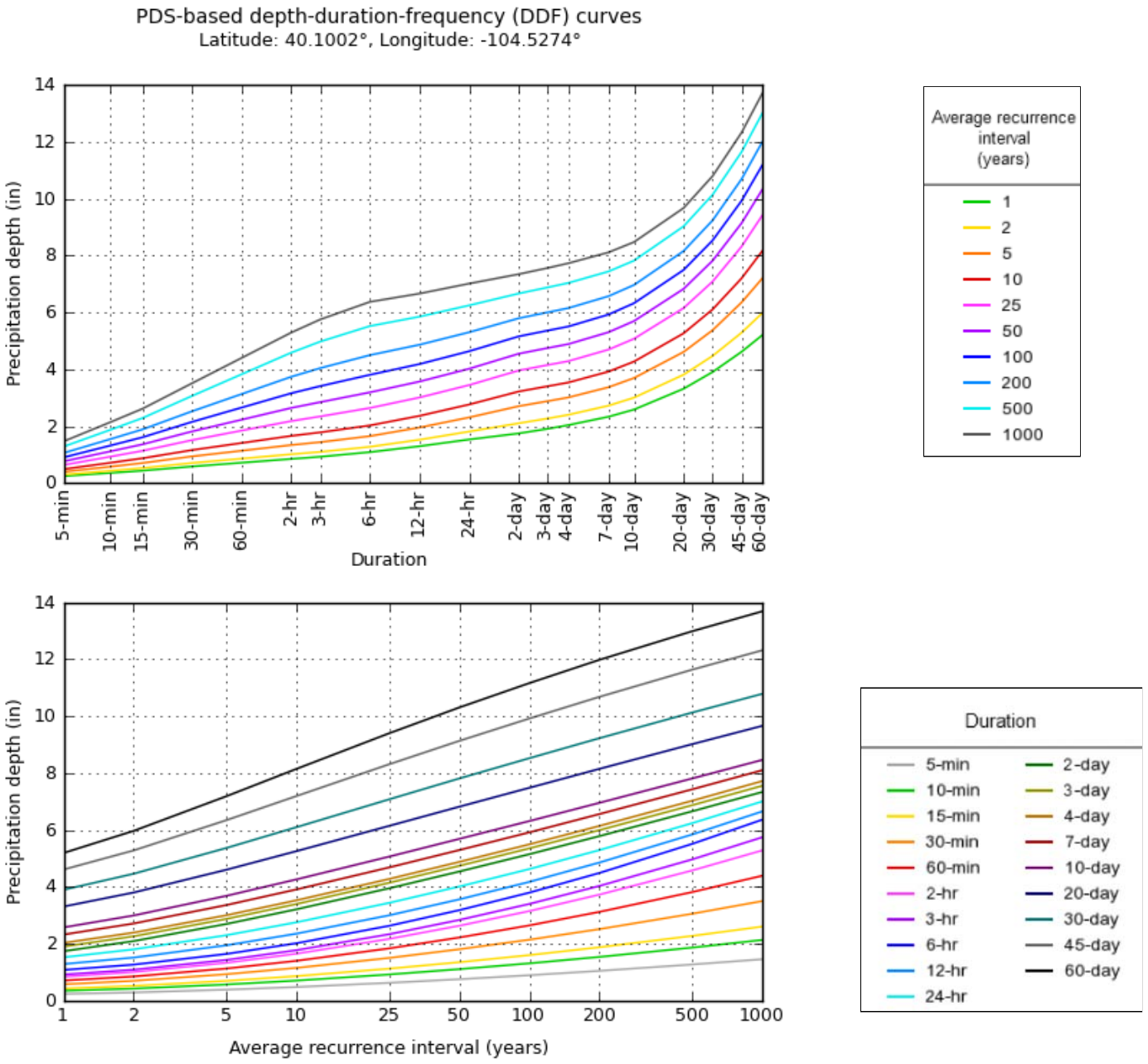
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



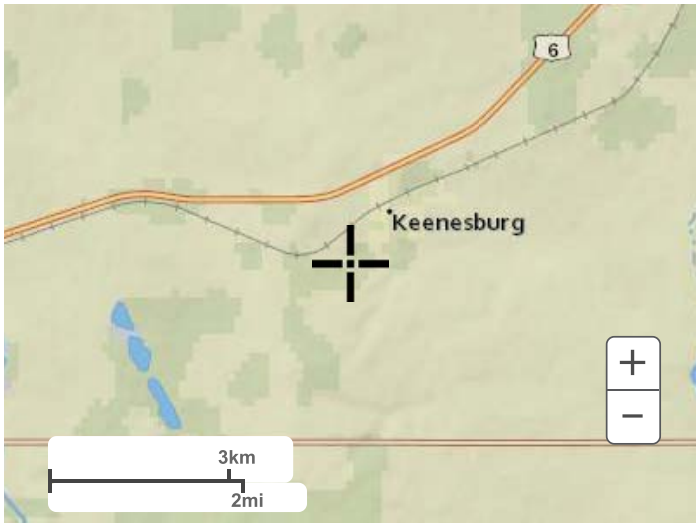
NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Mon Nov 2 20:32:47 2020

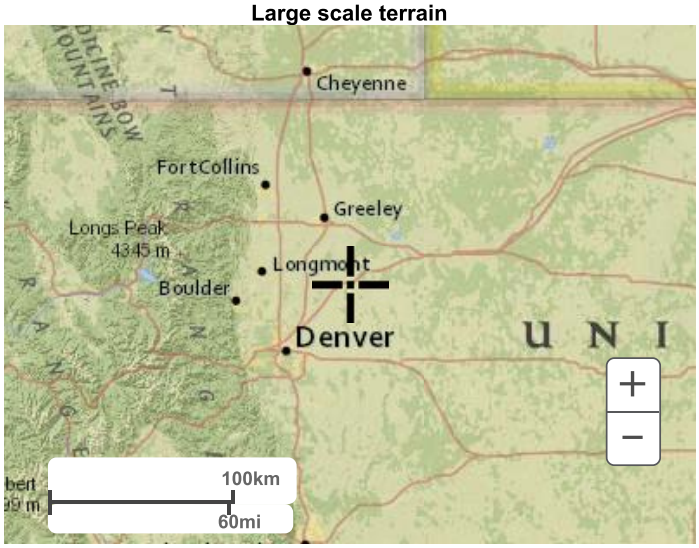
Back to Top

Maps & aerials

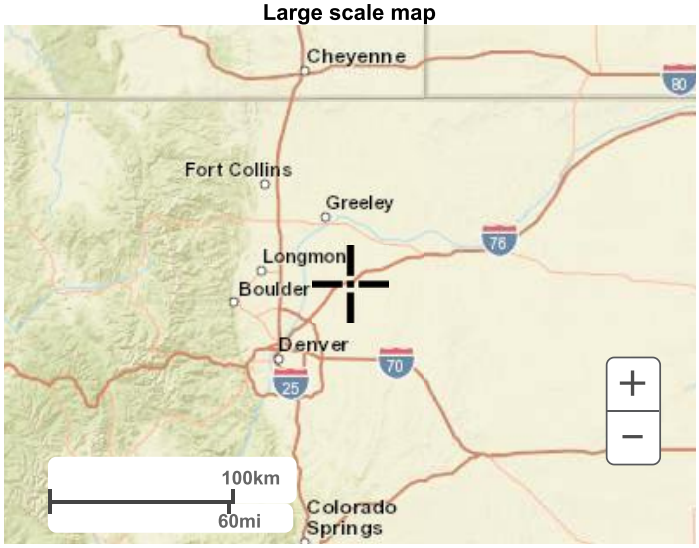
Small scale terrain



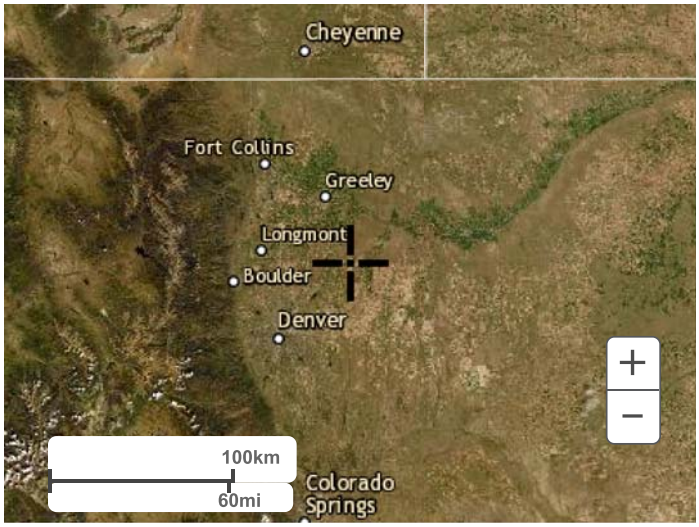
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix B:

Hydrologic and Hydraulic Computations

Detention Pond Calculations

BASELINE
Engineering · Planning · Surveying

PROJECT: Vista West - Keenesburg
JOB NO.: 3490
CALC. BY: SPC
DATE: 6/23/2021

= FORMULA CELLS
= USER INPUT CELLS

Project Location
User Input

IDF Rainfall Data

T_d	P_1: 1-hour Rainfall Depths (inches)	
	Minor Storm	**Major Storm**
	5-Year	100-Year
Minutes	**1.14**	**2.65**
5	3.87	8.99
10	3.08	7.17
20	2.24	5.21
30	1.79	4.16
40	1.50	3.49
50	1.30	3.02
60	1.15	2.68
120	0.71	1.65

Equation 5-1 $I=(28.5*P_1)/(10+T_d)^{\wedge 0.786}$

I = rainfall intensity (inches per hour)

P_1 = 1-hour point rainfall depth (inches)

T_d = storm duration (minutes)

Reference:

1) Urban Drainage and Flood Control District - Urban Storm Drainage Criteria Manual Volume 1, 2017
2) NOAA Atlas 14, Volume 8, Version 2
http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co

PROJECT: Vista West - Keenesburg
JOB NO.: 3490
CALC. BY: SPC
DATE: 6/26/2021

= FORMULA CELLS
= USER INPUT CELLS

Project Location
User Input

IDF Rainfall Data

T_d	P_1: 1-hour Rainfall Depths (inches)	
	Minor Storm	**Major Storm**
	5-Year	100-Year
Minutes	**1.14**	**2.65**
5	3.87	8.99
10	3.08	7.17
20	2.24	5.21
30	1.79	4.16
40	1.50	3.49
50	1.30	3.02
60	1.15	2.68
120	0.71	1.65

Equation 5-1 $I=(28.5*P_1)/(10+T_d)^{\wedge 0.786}$

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http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co

PROJECT: Vista West - Keenesburg
JOB NO.: 3490
CALC. BY: SPC
DATE: 6/26/2021

Impervious Percentages - from Urban Drainage Table 6-3

Historic flow analysis	2%
Paved	100%
Drive and walks	90%
Roofs	90%

Lawns, clayey soil	2%
50' X 110' Lots	56%
60' X 110' Lots	57%
80' X 120' Lots	60%

SOIL TYPE: C or D (use equation from Table 6-4)

= FORMULA CELLS
= USER INPUT CELLS

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values					Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{100}**	**Historic flow analysis**	**Paved**	**Drive and walks**	**Roofs**	**Lawns, clayey soil**	**50' X 110' Lots**	**60' X 110' Lots**	**80' X 120' Lots**
50' X 110' LOT	0.13	56%	0.44	0.50	0.55	0.72			0.01	0.07	0.05			
60' X 110' LOT	0.15	57%	0.44	0.51	0.56	0.72			0.01	0.09	0.06			
80' X 120' LOT	0.22	60%	0.47	0.53	0.58	0.73			0.01	0.14	0.07			
H	31.55	2%	0.01	0.05	0.15	0.49	31.55							
P	28.02	54%	0.41	0.48	0.53	0.70	0.00	4.92	1.18	0.00	6.12	8.60	6.24	0.96
P1	4.64	63%	0.50	0.56	0.60	0.74		1.18	0.22		0.47	2.26	0.51	
P2	0.85	50%	0.38	0.44	0.50	0.69		0.30	0.03		0.36	0.15		
P3	1.12	65%	0.51	0.56	0.61	0.75		0.27	0.07		0.09	0.70		
P4	2.89	57%	0.44	0.50	0.55	0.72		0.23	0.09		0.20	2.37		
P5	0.87	66%	0.52	0.57	0.62	0.75		0.23	0.06		0.07		0.52	
P6	1.44	63%	0.49	0.55	0.60	0.74		0.54	0.04		0.28	0.59		
P7	1.48	50%	0.38	0.45	0.50	0.69		0.25	0.07		0.41	0.75		
P8	3.71	63%	0.50	0.55	0.60	0.74		0.73	0.18		0.22	1.79	0.79	

PROJECT: Vista West - Keenesburg
JOB NO.: 3490
CALC. BY: SPC
DATE: 6/26/2021

Impervious Percentages - from Urban Drainage Table 6-3

Historic flow analysis	2%
Paved	100%
Drive and walks	90%
Roofs	90%

Lawns, clayey soil	2%
50' X 110' Lots	56%
60' X 110' Lots	57%
80' X 120' Lots	60%

SOIL TYPE: C or D (use equation from Table 6-4)

= FORMULA CELLS
= USER INPUT CELLS

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values					Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{100}**	**Historic flow analysis**	**Paved**	**Drive and walks**	**Roofs**	**Lawns, clayey soil**	**50' X 110' Lots**	**60' X 110' Lots**	**80' X 120' Lots**
P9	2.47	60%	0.46	0.52	0.57	0.73		0.55	0.14		0.40		1.37	
P10	0.96	60%	0.47	0.53	0.58	0.73								0.96
P11	1.28	61%	0.47	0.53	0.58	0.73		0.28	0.07		0.18		0.75	
P12	1.06	63%	0.49	0.55	0.60	0.74		0.17	0.05		0.06		0.79	
P13	5.24	24%	0.17	0.23	0.31	0.58		0.17	0.16		3.39		1.52	
PO1-3	3.53	57%	0.44	0.50	0.55	0.72	0.00	0.59	0.13	0.00	0.65	0.00	0.46	1.70
PO1	0.48	39%	0.29	0.36	0.42	0.64		0.14	0.03		0.28			0.03
PO2	1.13	59%	0.46	0.52	0.57	0.72		0.05	0.02		0.07			0.99
PO3	1.91	60%	0.47	0.53	0.58	0.73		0.40	0.08		0.29		0.46	0.67
OS1	1.14	2%	0.01	0.05	0.15	0.49	1.14							
TOTAL SITE (BASIN P & OS)	31.55	54%	0.42	0.48	0.53	0.71	0.00	5.51	1.31	0.00	6.77	8.60	6.70	2.66

PROJECT: Vista West - Keenesburg
JOB NO.: 3490
CALC. BY: SPC
DATE: 6/26/2021

Impervious Percentages - from Urban Drainage Table 6-3

Historic flow analysis	2%
Paved	100%
Drive and walks	90%
Roofs	90%

Lawns, clayey soil	2%
50' X 110' Lots	56%
60' X 110' Lots	57%
80' X 120' Lots	60%

SOIL TYPE: C or D (use equation from Table 6-4)

= FORMULA CELLS
= USER INPUT CELLS

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values					Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{100}**	**Historic flow analysis**	**Paved**	**Drive and walks**	**Roofs**	**Lawns, clayey soil**	**50' X 110' Lots**	**60' X 110' Lots**	**80' X 120' Lots**
ROW	0.89	80%	0.65	0.69	0.73	0.81	0.00	0.60	0.13	0.00	0.17	0.00	0.00	0.00
ROW1	0.07	74%	0.59	0.64	0.68	0.79		0.05	0.00		0.02			
ROW2	0.28	80%	0.65	0.69	0.73	0.81		0.19	0.04		0.05			
ROW3	0.54	81%	0.66	0.70	0.73	0.82		0.36	0.08		0.10			
DET POND (BASIN P & ROW2,3,4)	28.84	54%	0.42	0.48	0.54	0.71	0.00	5.47	1.30	0.00	6.27	8.60	6.24	0.96

BASELINE
Engineering · Planning · Surveying

STANDARD FORM SF-2

TIME OF CONCENTRATION SUMMARY

Calculated By: SPC
Date: 6/26/2021

Project: Vista West - Keenesburg
Job No.: 3490
Checked By: xxxxxxxxx

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)				FINAL t_c	REMARKS
Basin	i	C_5	AREA	LENGTH	SLOPE	t_i	LENGTH	Cv	SLOPE	VEL.	t_t	COMP.	TOT. LENGTH	S_o	tc (Equation 6-5)		
			Ac	Ft	%	Min	Ft		%	FPS	Min	t_c	Ft	%	Min	Min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
H	0.02	0.05	31.55	300	3.70	21.29	1,238	5	1.7	0.65	31.65	52.9	1,538	2.09	44.8	44.76	
P1	0.63	0.56	4.64	18	2.0	3.32	1,043	20	1.5	2.5	7.0	10.3	1,061	1.54	23.2	10.3	
P2	0.50	0.44	0.85	18	2.0	4.00	381	20	0.9	1.9	3.3	7.3	399	0.95	21.8	7.3	
P3	0.65	0.56	1.12	67	5.0	4.66	349	20	0.8	1.8	3.2	7.8	416	1.51	18.2	7.8	
P4	0.57	0.50	2.89	177	5.0	8.46	255	20	1.4	2.3	1.8	10.3	432	2.84	18.9	10.3	
P5	0.66	0.57	0.87	67	5.0	4.56	283	20	1.5	2.5	1.9	6.5	350	2.20	17.0	6.5	
P6	0.63	0.55	1.44	18	2.0	3.35	508	20	3.5	3.7	2.3	5.6	526	3.40	18.0	5.6	
P7	0.50	0.45	1.48	122	5.0	7.66	492	20	1.8	2.7	3.1	10.7	614	2.43	21.6	10.7	
P8	0.63	0.55	3.71	67	5.0	4.74	935	20	1.8	2.7	5.8	10.5	1,002	2.04	21.8	10.5	
P9	0.60	0.52	2.47	18	2.0	3.51	574	20	1.6	2.5	3.8	7.4	592	1.56	20.4	7.4	
P10	0.60	0.53	0.96	120	5.0	6.66							120	5.00	16.3	6.7	
P11	0.61	0.53	1.28	122	5.0	6.65	278	20	0.7	1.6	2.9	9.5	400	1.98	18.4	9.5	
P12	0.63	0.55	1.06	120	5.0	6.42	281	2	0.7	0.2	28.8	35.2	401	1.96	18.0	18.0	

Calculated By: SPC
Date: 6/26/2021

Job No.: 3490
Checked By: xxxxxxxxxx

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)				FINAL t_c	REMARKS
Basin	i	C_5	AREA	LENGTH	SLOPE	t_i	LENGTH	Cv	SLOPE	VEL.	t_t	COMP.	TOT. LENGTH	S_o	tc (Equation 6-5)		
			Ac	Ft	%	Min	Ft		%	FPS	Min	t_c	Ft	%	Min	Min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
P13	0.24	0.23	5.24	300	2.3	20.74	443	15	1.9	2.1	3.6	24.3	743	2.05	29.0	24.3	
PO1	0.39	0.36	0.48	18	2.0	4.54	177	20	2.8	3.3	0.9	5.4	195	2.68	20.7	5.4	
PO2	0.59	0.52	1.13	120	2.0	9.18		20					120	2.00	16.8	9.2	
PO3	0.60	0.53	1.91	24	2.0	4.03	507	20	2.0	2.8	3.0	7.0	531	1.99	19.4	7.0	
OS1	0.02	0.05	1.14	243	4.7	17.71	206	15	2.0	2.1	1.6	19.3	449	3.46	30.0	19.3	
ROW1	0.74	0.64	0.07	18	2.0	2.79	96	20	0.8	1.8	0.9	3.7	114	1.02	14.4	5.0	
ROW2	0.80	0.69	0.28	18	2.0	2.47	381	20	0.7	1.7	3.8	6.2	399	0.77	16.1	6.2	
ROW3	0.81	0.70	0.54	35	1.6	3.68	749	20	2.0	2.8	4.5	8.1	784	1.94	16.8	8.1	

Equation 6-3 $t_i=((0.395(1.1-C_5)SQRT(L))/(S_o\text{^}0.33))$

Equation 6-5 $t_c=(26-17i)+(L_t/(60(14i+9)SQRT(S_o)))$

= FORMULA CELLS

= USER INPUT CELLS

NRCS Conveyance Factor K Table - Cv Value	
Heavy Meadow	2.5
Tillage/Field	5
Short Pasture and Lawns	7
Nearly Bare Ground	10
Grassed Waterway	15
Paved Areas and Shallow Paved Swales	20

Calculated By: SPC
Date: 6/26/2021
Checked By: xxxxxxxxxx
5-Year 1-hour rainfall= 1.14

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: Vista West - Keenesburg
Job No.: 3490
Design Storm: 5-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE						REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)	LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
H	0	0	31.55	0.05	44.8	1.62	1.40	**2.3**													
P1	1	1	4.64	0.56	10.3	2.58	3.04	**7.8**													
P2	2	1	0.85	0.44	7.3	0.38	3.45	**1.3**													
P3	3	1	1.12	0.56	7.8	0.63	3.38	**2.1**													
P4	4	1	2.89	0.50	10.3	1.45	3.05	**4.4**													
P5	5	1	0.87	0.57	6.5	0.50	3.59	**1.8**													
P6	6	1	1.44	0.55	5.6	0.79	3.74	**3.0**													
P7	7	1	1.48	0.45	10.7	0.66	3.00	**2.0**													
P8	8	1	3.71	0.55	10.5	2.06	3.02	**6.2**													
P9	9	1	2.47	0.52	7.4	1.29	3.45	**4.5**													
P10	10	1	0.96	0.53	6.7	0.51	3.56	**1.8**													
P11	11	1	1.28	0.53	9.5	0.68	3.15	**2.1**													
P12	12	1	1.06	0.55	18.0	0.58	2.36	**1.4**													
P13	13	1	5.24	0.23	24.3	1.21	2.02	**2.4**													
PO1	14	0	0.48	0.36	5.4	0.17	3.78	**0.7**													
PO2	15	0	1.13	0.52	9.2	0.58	3.19	**1.9**													
PO3	16	0	1.91	0.53	7.0	1.01	3.50	**3.5**													
OS1	17	1	1.14	0.05	19.3	0.06	2.28	**0.1**													
ROW1	18	0	0.07	0.64	5.0	0.04	3.87	**0.2**													
ROW2	19	1	0.28	0.69	6.2	0.20	3.63	**0.7**													
ROW3	20	0	0.54	0.70	8.1	0.38	3.33	**1.3**													

Calculated By: SPC
Date: 6/26/2021
Checked By: xxxxxxxxxx
100-Year 1-hour rainfall= 2.65

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: Vista West - Keenesburg
Job No.: 3490
Design Storm: 100-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE						REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)	LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
H	0	0	31.55	0.49	44.8	15.53	3.25	**50.4**													
P1	1	1	4.64	0.74	10.3	3.45	7.07	**24.4**													
P2	2	1	0.85	0.69	7.3	0.58	8.02	**4.7**													
P3	3	1	1.12	0.75	7.8	0.84	7.85	**6.6**													
P4	4	1	2.89	0.72	10.3	2.07	7.09	**14.7**													
P5	5	1	0.87	0.75	6.5	0.66	8.36	**5.5**													
P6	6	1	1.44	0.74	5.6	1.07	8.70	**9.3**													
P7	7	1	1.48	0.69	10.7	1.02	6.97	**7.1**													
P8	8	1	3.71	0.74	10.5	2.76	7.03	**19.4**													
P9	9	1	2.47	0.73	7.4	1.80	8.02	**14.4**													
P10	10	1	0.96	0.73	6.7	0.70	8.28	**5.8**													
P11	11	1	1.28	0.73	9.5	0.94	7.31	**6.9**													
P12	12	1	1.06	0.74	18.0	0.78	5.50	**4.3**													
P13	13	1	5.24	0.58	24.3	3.05	4.69	**14.3**													
PO1	14	0	0.48	0.64	5.4	0.31	8.79	**2.7**													
PO2	15	0	1.13	0.72	9.2	0.82	7.41	**6.1**													
PO3	16	0	1.91	0.73	7.0	1.40	8.14	**11.4**													
OS1	17	1	1.14	0.49	19.3	0.56	5.31	**3.0**													
ROW1	18	0	0.07	0.79	5.0	0.05	8.99	**0.5**													
ROW2	19	1	0.28	0.81	6.2	0.23	8.45	**2.0**													
ROW3	20	0	0.54	0.82	8.1	0.44	7.74	**3.4**													

PROJECT: Vista West - Keenesburg
JOB NO.: 3490
CALC. BY: SPC
DATE: 6/26/2021

BASELINE
Engineering · Planning · Surveying

RUNOFF SUMMARY

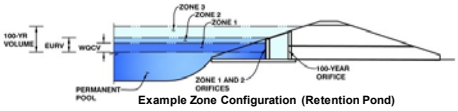
BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
H	0	31.55	2%	0.05	0.49	2.27	50.43			
P1	1	4.64	63%	0.56	0.74	7.85	24.44			
P2	2	0.85	50%	0.44	0.69	1.30	4.68			
P3	3	1.12	65%	0.56	0.75	2.14	6.61			
P4	4	2.89	57%	0.50	0.72	4.42	14.70			
P5	5	0.87	66%	0.57	0.75	1.81	5.51			
P6	6	1.44	63%	0.55	0.74	2.97	9.31			
P7	7	1.48	50%	0.45	0.69	1.99	7.12			
P8	8	3.71	63%	0.55	0.74	6.22	19.40			
P9	9	2.47	60%	0.52	0.73	4.46	14.40			
P10	10	0.96	60%	0.53	0.73	1.80	5.79			
P11	11	1.28	61%	0.53	0.73	2.15	6.87			
P12	12	1.06	63%	0.55	0.74	1.37	4.31			
P13	13	5.24	24%	0.23	0.58	2.44	14.30			
PO1	14	0.48	39%	0.36	0.64	0.65	2.75			
PO2	15	1.13	59%	0.52	0.72	1.86	6.06			
PO3	16	1.91	60%	0.53	0.73	3.53	11.36			
OS1	17	1.14	2%	0.05	0.49	0.13	2.99			
ROW1	18	0.07	74%	0.64	0.79	0.17	0.49			
ROW2	19	0.28	80%	0.69	0.81	0.72	1.95			
ROW3	20	0.54	81%	0.70	0.82	1.25	3.40			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Vista West - Keenesburg

Basin ID:



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	31.55	acres
Watershed Length =	1,970	ft
Watershed Length to Centroid =	589	ft
Watershed Slope =	0.014	ft/ft
Watershed Imperviousness =	54.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	34.0%	percent
Percentage Hydrologic Soil Groups C/D =	66.0%	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) =	0.572	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.693	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	1.108	acre-feet	0.86 inches
5-yr Runoff Volume (P1 = 1.14 in.) =	1.649	acre-feet	1.14 inches
10-yr Runoff Volume (P1 = 1.41 in.) =	2.276	acre-feet	1.41 inches
25-yr Runoff Volume (P1 = 1.84 in.) =	3.530	acre-feet	1.84 inches
50-yr Runoff Volume (P1 = 2.23 in.) =	4.576	acre-feet	2.23 inches
100-yr Runoff Volume (P1 = 2.65 in.) =	5.820	acre-feet	2.65 inches
500-yr Runoff Volume (P1 = 3.13 in.) =	7.153	acre-feet	3.13 inches
Approximate 2-yr Detention Volume =	1.024	acre-feet	
Approximate 5-yr Detention Volume =	1.548	acre-feet	
Approximate 10-yr Detention Volume =	1.959	acre-feet	
Approximate 25-yr Detention Volume =	2.418	acre-feet	
Approximate 50-yr Detention Volume =	2.703	acre-feet	
Approximate 100-yr Detention Volume =	3.206	acre-feet	

Define Zones and Basin Geometry

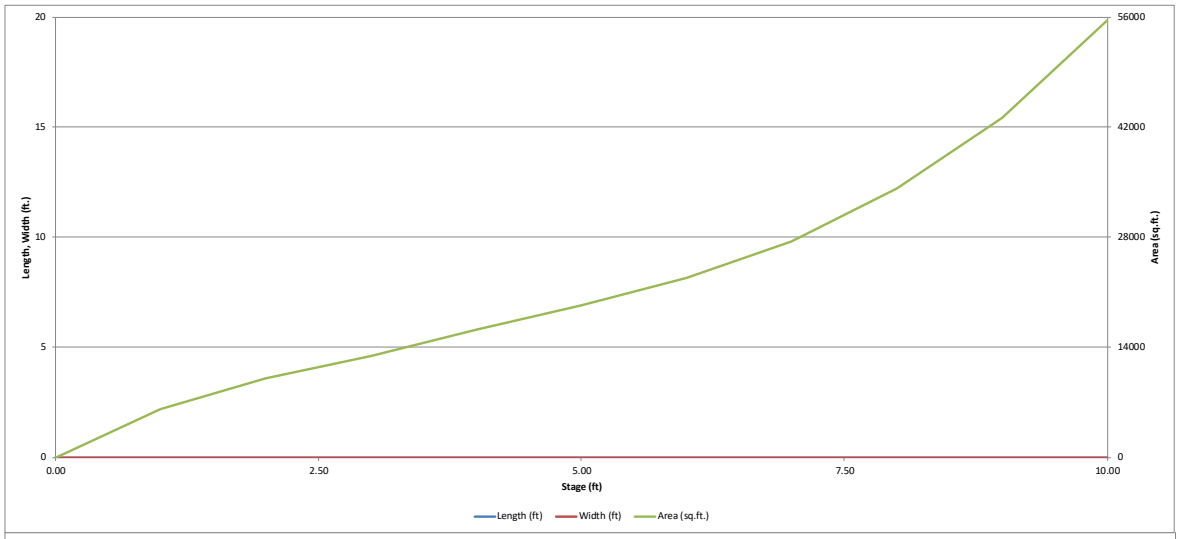
Zone 1 Volume (WQCV) =	0.572	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.122	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.512	acre-feet
Total Detention Basin Volume =	3.206	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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

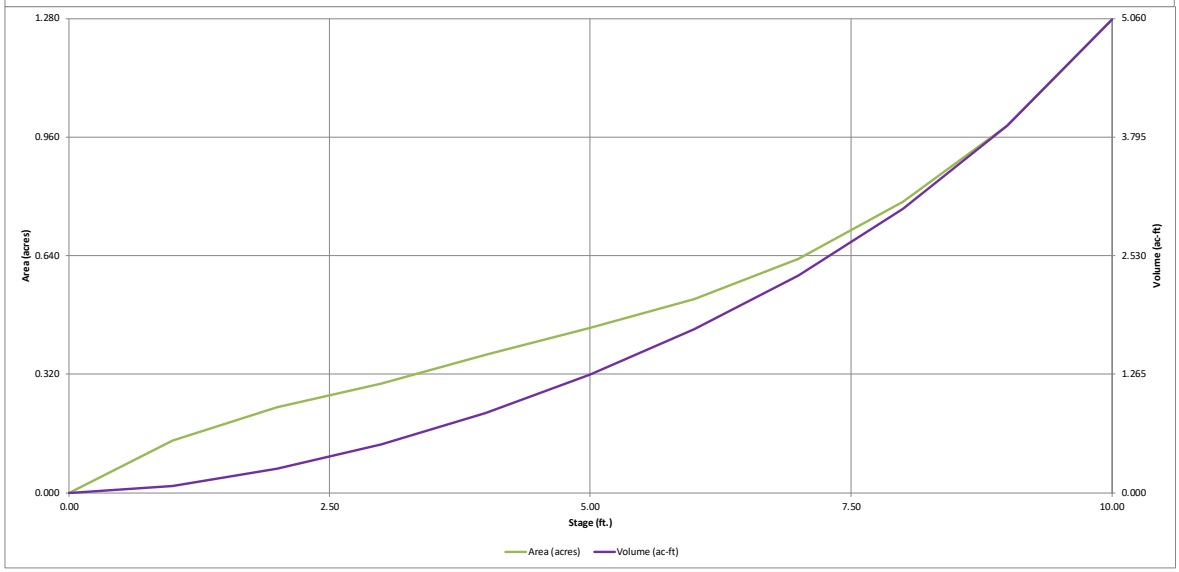
Depth Increment = 4,940.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
4941	--	1.00	--	--	--	6,116	0.140	3,058	0.070
4,942.00	--	2.00	--	--	--	10,023	0.230	11,127	0.255
4,943.00	--	3.00	--	--	--	12,844	0.295	22,561	0.518
4,944.00	--	4.00	--	--	--	16,251	0.373	37,108	0.852
4,945.00	--	5.00	--	--	--	19,345	0.444	54,906	1.260
4,946.00	--	6.00	--	--	--	22,798	0.523	75,978	1.744
4,947.00	--	7.00	--	--	--	27,485	0.631	101,119	2.321
4,948.00	--	8.00	--	--	--	34,233	0.786	131,978	3.030
4,949.00	--	9.00	--	--	--	43,179	0.991	170,684	3.918
4,950.00	--	10.00	--	--	--	55,635	1.277	220,091	5.053

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



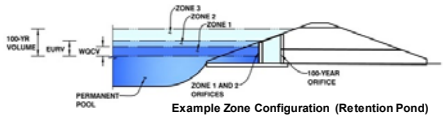


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Vista West - Keenesburg

Basin ID:



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.18	0.572	Orifice Plate
Zone 2 (EURV)	5.91	1.122	Circular Orifice
Zone 3 (100-year)	8.22	1.512	Weir&Pipe (Restrict)
Total (all zones)		3.206	

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

			Calculated Parameters for Underdrain		
Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft²
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

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

			Calculated Parameters for Plate		
Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.729E-02	ft²
Depth at top of Zone using Orifice Plate =	3.18	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	12.10	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	2.49	sq. inches (diameter = 1-3/4 inches)	Elliptical Slot Area =	N/A	ft²

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.06	2.12					
Orifice Area (sq. inches)	2.49	2.49	2.49					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Circular	Not Selected		Calculated Parameters for Vertical Orifice	Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	3.18	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.02	N/A	ft²
Depth at top of Zone using Vertical Orifice =	5.92	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.07	N/A	feet
Vertical Orifice Diameter =	1.75	N/A	inches				

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Zone 3 Weir	Not Selected		Calculated Parameters for Overflow Weir	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.92	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.92	N/A	feet
Overflow Weir Front Edge Length =	10.66	N/A	feet	Overflow Weir Slope Length =	2.92	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	9.31	N/A	
Horiz. Length of Weir Sides =	2.92	N/A	feet	Overflow Grate Open Area w/o Debris =	21.66	N/A	ft²
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	10.83	N/A	ft²
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Restrictor	Not Selected		Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.07	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	2.33	N/A	ft²
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	0.78	N/A	feet
Restrictor Plate Height Above Pipe Invert =	16.66		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.97	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

			Calculated Parameters for Spillway		
Spillway Invert Stage=	8.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.49	feet
Spillway Crest Length =	90.00	feet	Stage at Top of Freeboard =	9.99	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.27	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	5.04	acre-ft

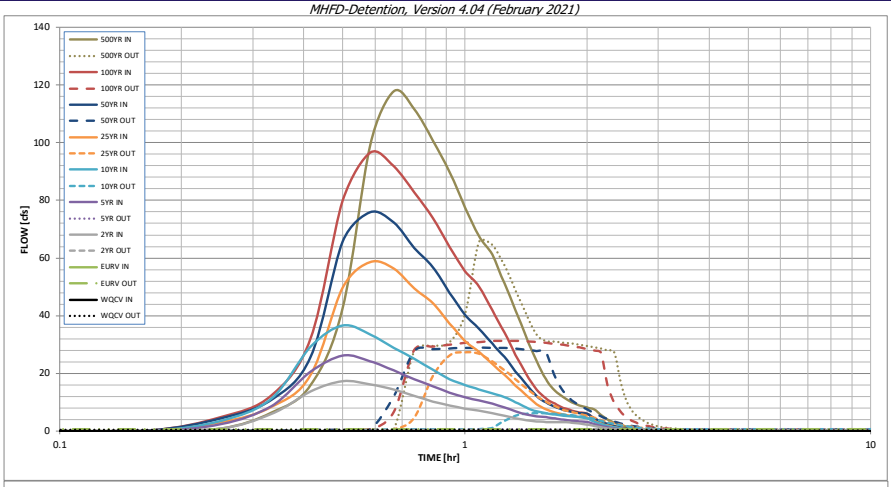
Routed Hydrograph Results *The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).*

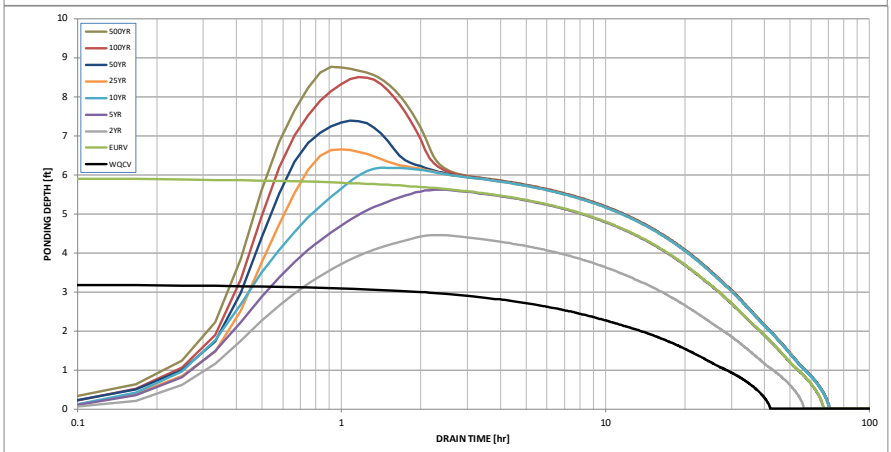
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.41	1.84	2.23	2.65	3.13
CUHP Runoff Volume (acre-ft) =	0.572	1.693	1.108	1.649	2.276	3.530	4.576	5.820	7.153
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.108	1.649	2.276	3.530	4.576	5.820	7.153
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	3.0	8.5	23.5	33.6	46.5	59.5
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.09	0.27	0.74	1.06	1.47	1.88
Peak Inflow Q (cfs) =	N/A	N/A	17.3	26.2	36.5	58.6	75.9	96.5	117.8
Peak Outflow Q (cfs) =	0.4	0.7	0.5	0.7	6.2	27.3	28.9	31.27	65.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.7	1.2	0.9	0.7	1.1
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.3	1.2	1.3	1.4	1.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	57	49	57	57	53	50	47	45
Time to Drain 99% of Inflow Volume (hours) =	**40**	63	53	63	65	62	61	59	57
Maximum Ponding Depth (ft) =	3.18	5.91	4.44	5.61	6.17	6.65	7.37	8.49	8.75
Area at Maximum Ponding Depth (acres) =	0.31	0.52	0.40	0.49	0.54	0.59	0.69	0.89	0.94
Maximum Volume Stored (acre-ft) =	0.572	1.697	1.023	1.541	1.835	2.101	2.565	3.440	3.668

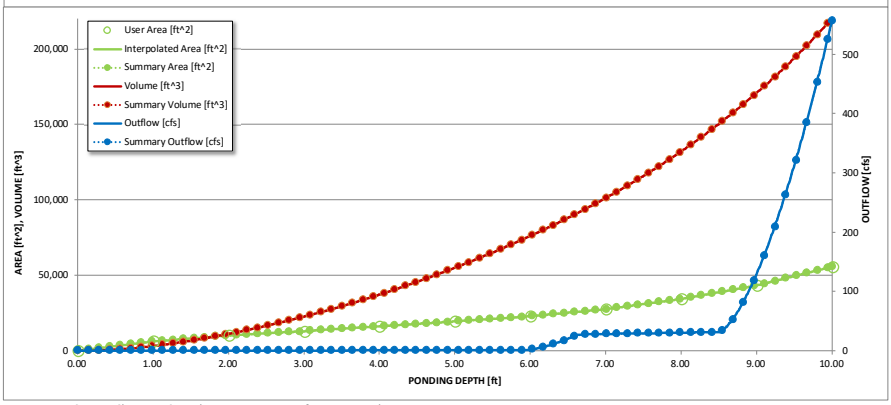
OFFSITE FLOWS = 20.17
OFFSITE FLOWS TO POND= 4.94
RELEASE RATE = 46.5+4.94-20.17

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.23	0.96
	0:15:00	0.00	0.00	0.87	2.40	3.61	3.03	4.47	4.84	6.34
	0:20:00	0.00	0.00	5.88	8.71	11.23	8.31	10.76	12.39	15.90
	0:25:00	0.00	0.00	13.73	20.64	29.23	19.40	25.76	32.20	42.70
	0:30:00	0.00	0.00	17.33	26.16	36.54	49.77	65.61	79.96	99.01
	0:35:00	0.00	0.00	16.17	24.27	33.50	58.58	75.90	96.50	117.80
	0:40:00	0.00	0.00	14.34	20.99	28.91	56.29	72.31	91.75	111.62
	0:45:00	0.00	0.00	12.19	18.03	25.06	49.51	63.53	82.86	100.77
	0:50:00	0.00	0.00	10.30	15.60	21.26	44.35	56.90	73.90	89.80
	0:55:00	0.00	0.00	8.80	13.24	18.00	37.34	47.99	63.88	77.63
	1:00:00	0.00	0.00	7.82	11.65	15.96	31.26	40.33	55.48	67.59
	1:05:00	0.00	0.00	7.12	10.53	14.52	27.40	35.50	50.22	61.23
	1:10:00	0.00	0.00	6.17	9.53	13.18	23.25	30.31	41.84	51.16
	1:15:00	0.00	0.00	5.27	8.23	11.85	19.57	25.67	34.20	42.01
	1:20:00	0.00	0.00	4.45	6.88	10.06	15.77	20.64	26.48	32.50
	1:25:00	0.00	0.00	3.78	5.79	8.10	12.47	16.26	19.82	24.31
	1:30:00	0.00	0.00	3.37	5.15	6.87	9.40	12.24	14.51	17.89
	1:35:00	0.00	0.00	3.17	4.82	6.16	7.58	9.88	11.34	14.05
	1:40:00	0.00	0.00	3.07	4.32	5.68	6.46	8.39	9.43	11.70
	1:45:00	0.00	0.00	3.01	3.92	5.33	5.74	7.41	8.08	10.04
	1:50:00	0.00	0.00	2.96	3.63	5.09	5.23	6.73	7.15	8.90
	1:55:00	0.00	0.00	2.61	3.42	4.81	4.91	6.28	6.50	8.09
	2:00:00	0.00	0.00	2.30	3.17	4.36	4.68	5.96	6.03	7.51
	2:05:00	0.00	0.00	1.75	2.41	3.30	3.55	4.51	4.49	5.59
	2:10:00	0.00	0.00	1.30	1.77	2.40	2.58	3.26	3.26	4.05
	2:15:00	0.00	0.00	0.96	1.30	1.74	1.88	2.37	2.38	2.95
	2:20:00	0.00	0.00	0.70	0.94	1.26	1.37	1.72	1.75	2.17
	2:25:00	0.00	0.00	0.50	0.66	0.90	0.97	1.22	1.25	1.55
	2:30:00	0.00	0.00	0.35	0.46	0.64	0.68	0.86	0.88	1.09
	2:35:00	0.00	0.00	0.24	0.32	0.45	0.49	0.61	0.62	0.77
	2:40:00	0.00	0.00	0.15	0.21	0.29	0.33	0.41	0.41	0.51
	2:45:00	0.00	0.00	0.09	0.13	0.17	0.19	0.24	0.25	0.30
	2:50:00	0.00	0.00	0.04	0.06	0.08	0.10	0.12	0.12	0.15
	2:55:00	0.00	0.00	0.01	0.02	0.03	0.03	0.04	0.04	0.05
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships

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

Stage - Storage Description	Stage [ft]	Area [ft²]	Area [acres]	Volume [ft³]	Volume [ac-ft]	Total Outflow [cfs]
BOTTOM	0.00	0	0.000	0	0.000	0.00
	0.14	856	0.020	60	0.001	0.03
	0.28	1,712	0.039	240	0.005	0.04
	0.42	2,569	0.059	539	0.012	0.05
	0.56	3,425	0.079	959	0.022	0.06
	0.70	4,281	0.098	1,498	0.034	0.07
	0.84	5,137	0.118	2,157	0.050	0.08
	0.98	5,994	0.138	2,937	0.067	0.08
	1.12	6,585	0.151	3,820	0.088	0.11
	1.26	7,132	0.164	4,780	0.110	0.13
	1.40	7,679	0.176	5,817	0.134	0.15
	1.54	8,226	0.189	6,930	0.159	0.16
	1.68	8,773	0.201	8,120	0.186	0.17
	1.82	9,320	0.214	9,386	0.215	0.18
	1.96	9,867	0.227	10,730	0.246	0.20
	2.10	10,305	0.237	12,144	0.279	0.21
	2.24	10,700	0.246	13,614	0.313	0.24
	2.38	11,095	0.255	15,140	0.348	0.27
	2.52	11,490	0.264	16,721	0.384	0.29
	2.66	11,885	0.273	18,357	0.421	0.30
	2.80	12,280	0.282	20,049	0.460	0.32
	2.94	12,674	0.291	21,795	0.500	0.33
	3.08	13,116	0.301	23,599	0.542	0.35
	3.22	13,593	0.312	25,469	0.585	0.36
	3.36	14,070	0.323	27,405	0.629	0.40
	3.50	14,547	0.334	29,409	0.675	0.42
	3.64	15,024	0.345	31,479	0.723	0.45
	3.78	15,501	0.356	33,615	0.772	0.46
	3.92	15,978	0.367	35,819	0.822	0.48
	4.06	16,437	0.377	38,089	0.874	0.50
	4.20	16,870	0.387	40,420	0.928	0.52
	4.34	17,303	0.397	42,812	0.983	0.53
	4.48	17,736	0.407	45,265	1.039	0.55
	4.62	18,169	0.417	47,778	1.097	0.56
	4.76	18,602	0.427	50,352	1.156	0.58
	4.90	19,036	0.437	52,987	1.216	0.59
	5.04	19,483	0.447	55,683	1.278	0.60
	5.18	19,967	0.458	58,444	1.342	0.62
	5.32	20,450	0.469	61,273	1.407	0.63
	5.46	20,933	0.481	64,170	1.473	0.64
	5.60	21,417	0.492	67,135	1.541	0.65
	5.74	21,900	0.503	70,167	1.611	0.66
	5.88	22,384	0.514	73,267	1.682	0.68
	6.02	22,892	0.526	76,435	1.755	2.07
	6.16	23,548	0.541	79,685	1.829	5.84
	6.30	24,204	0.556	83,028	1.906	10.96
	6.44	24,860	0.571	86,462	1.985	17.13
	6.58	25,516	0.586	89,989	2.066	24.19
	6.72	26,173	0.601	93,607	2.149	27.48
	6.86	26,829	0.616	97,317	2.234	27.80
	7.00	27,485	0.631	101,119	2.321	28.12
	7.14	28,430	0.653	105,033	2.411	28.43
	7.28	29,374	0.674	109,079	2.504	28.73
	7.42	30,319	0.696	113,258	2.600	29.04
	7.56	31,264	0.718	117,569	2.699	29.34
	7.70	32,209	0.739	122,012	2.801	29.64
	7.84	33,153	0.761	126,587	2.906	29.93
	7.98	34,098	0.783	131,295	3.014	30.23
	8.12	35,307	0.811	136,150	3.126	30.51
	8.26	36,559	0.839	141,181	3.241	30.80
	8.40	37,811	0.868	146,387	3.361	31.09
	8.54	39,064	0.897	151,768	3.484	33.53
	8.68	40,316	0.926	157,325	3.612	52.40
	8.82	41,569	0.954	163,057	3.743	81.35
	8.96	42,821	0.983	168,964	3.879	117.81
	9.10	44,425	1.020	175,064	4.019	160.63
	9.24	46,168	1.060	181,406	4.165	209.14
	9.38	47,912	1.100	187,991	4.316	262.87
	9.52	49,656	1.140	194,821	4.472	321.50
	9.66	51,400	1.180	201,895	4.635	384.77
	9.80	53,144	1.220	209,213	4.803	452.50
	9.94	54,888	1.260	216,775	4.976	524.50
TOP	10.00	55,635	1.277	220,091	5.053	556.64

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

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

VISTA WEST SUBDIVISION STORM SEWER CALCS

File Name ..... 3490 - 100-YR STORM MODEL.SPF

Project Options

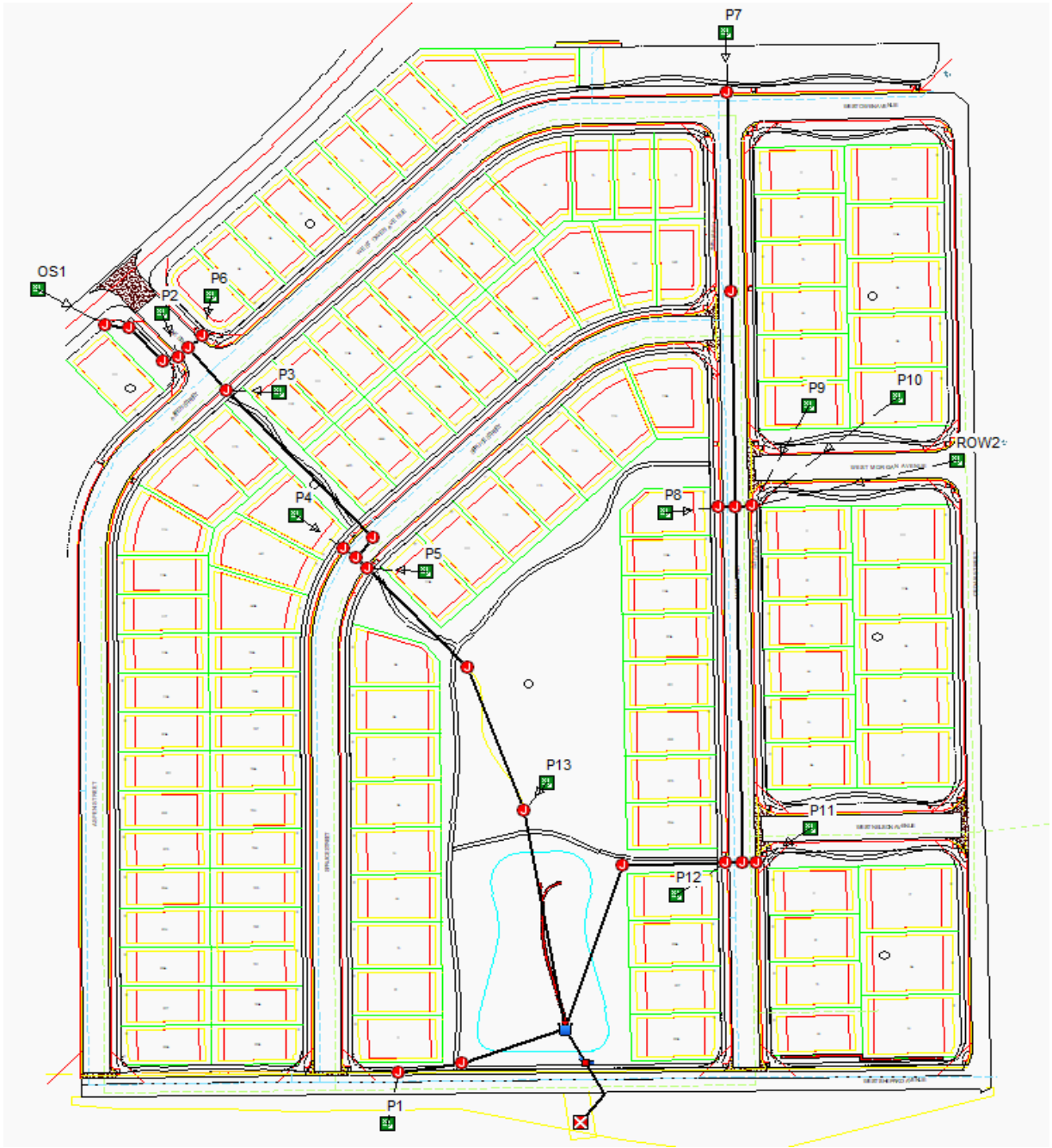
Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	User-Defined
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	YES

Analysis Options

Start Analysis On	Jun 24, 2021	00:00:00
End Analysis On	Jul 01, 2021	00:00:00
Start Reporting On	Jun 24, 2021	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Rainfall Details

Return Period..... 100 year(s)


P7
OS1
P6
P2
P3
P9
P10
ROW2
P4
P8
P5
P13
P11
P12
P1

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	OS1	1.14	0.4900	1.71	0.84	0.96	2.97	0 00:19:18
2	P1	4.64	0.7400	1.22	0.90	4.19	24.33	0 00:10:18
3	P10	0.96	0.7300	0.92	0.67	0.64	5.79	0 00:06:42
4	P11	1.28	0.7300	1.16	0.85	1.08	6.83	0 00:09:30
5	P12	1.06	0.7400	1.65	1.22	1.30	4.32	0 00:18:00
6	P13	5.24	0.5800	1.90	1.10	5.78	14.26	0 00:24:18
7	P2	0.85	0.6900	0.98	0.68	0.58	4.71	0 00:07:18
8	P3	1.12	0.7500	1.03	0.77	0.86	6.60	0 00:07:48
9	P4	2.89	0.7200	1.22	0.88	2.54	14.74	0 00:10:18
10	P5	0.87	0.7500	0.90	0.68	0.59	5.44	0 00:06:30
11	P6	1.44	0.7400	0.82	0.61	0.88	9.29	0 00:05:36
12	P7	1.48	0.6900	1.24	0.86	1.27	7.13	0 00:10:42
13	P8	3.71	0.7400	1.23	0.91	3.38	19.30	0 00:10:30
14	P9	2.47	0.7300	0.98	0.71	1.76	14.42	0 00:07:24
15	ROW2	0.28	0.8100	0.87	0.70	0.20	1.92	0 00:06:12

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-02	Pipe	STM MH C01	OUTLET STRUCTURE	81.89	4942.58	4941.35	1.5000	24.000	0.0130	24.32	27.73	0.88	7.94	2.00	1.00	837.00	SURCHARGED
2	Pipe - (20) (1)	Pipe	STM MH A03	STM INLET A02	20.17	4942.08	4941.98	0.5000	36.000	0.0130	42.44	47.16	0.90	6.00	3.00	1.00	542.00	SURCHARGED
3	Pipe - (21)	Pipe	STM INLET A02	STM MH A01	124.83	4941.98	4941.36	0.5000	36.000	0.0130	44.67	47.16	0.95	6.32	3.00	1.00	599.00	SURCHARGED
4	Pipe - (22)	Pipe	STM MH A01	OUTLET STRUCTURE	76.59	4941.36	4940.97	0.5100	36.000	0.0130	44.67	47.60	0.94	6.84	3.00	1.00	968.00	SURCHARGED
5	Pipe - (23)	Pipe	STM INLET B07	STM MH B06	259.93	4958.01	4948.98	3.4700	24.000	0.0130	18.59	42.16	0.44	7.69	1.52	0.76	0.00	Calculated
6	Pipe - (24)	Pipe	STM MH B06	STM MH B04	33.32	4948.78	4948.61	0.5000	24.000	0.0130	18.59	16.00	1.16	5.92	2.00	1.00	8.00	SURCHARGED
7	Pipe - (25)	Pipe	STM MH B04	STM INLET B03	20.17	4948.41	4948.31	0.5000	24.000	0.0130	30.01	16.00	1.88	9.55	2.00	1.00	5.00	SURCHARGED
8	Pipe - (26)	Pipe	STM INLET B03	STM FES B02	174.66	4948.11	4947.24	0.5000	30.000	0.0130	34.02	29.00	1.17	8.50	1.90	0.76	0.00	> CAPACITY
9	Pipe - (27)	Pipe	STM FES B01	OUTLET STRUCTURE	94.79	4943.04	4940.89	2.2700	30.000	0.0130	37.02	61.77	0.60	10.50	2.50	1.00	256.00	SURCHARGED
10	Pipe - (28)	Pipe	STM INLET C02	STM MH C01	49.27	4943.77	4942.58	2.4200	24.000	0.0130	24.32	35.16	0.69	7.74	2.00	1.00	114.00	SURCHARGED
11	Pipe - (30)	Pipe	STM INLET B05	STM MH B04	20.17	4951.78	4951.38	2.0000	18.000	0.0130	14.74	14.86	0.99	8.76	1.49	0.99	0.00	Calculated
12	Pipe - (32) (1)	Pipe	STM MH A05	STM MH A03	461.18	4945.17	4942.08	0.6700	36.000	0.0130	35.73	54.58	0.65	5.65	2.91	0.97	0.00	Calculated
13	Pipe - (35)	Pipe	STM MH A05	Out-1Pipe - (35)	20.16	4945.17	4945.57	-2.0000	18.000	0.0130	19.12	14.86	1.29	10.82	1.50	1.00	9.00	SURCHARGED
14	Pipe - (36)	Pipe	STM MH A05	Out-1Pipe - (36)	20.26	4945.17	4945.57	-2.0000	18.000	0.0130	21.18	14.86	1.43	11.98	1.50	1.00	8.00	SURCHARGED
15	Pipe - (39)	Pipe	STM INLET A04	STM MH A03	20.17	4943.35	4942.95	1.9800	18.000	0.0130	6.84	14.79	0.46	4.95	1.50	1.00	680.00	SURCHARGED
16	Pipe - (40)	Pipe	STM INLET B09	STM MH B08	22.61	4959.88	4959.43	2.0000	18.000	0.0130	9.28	14.86	0.62	6.61	1.50	1.00	2.00	SURCHARGED
17	Pipe - (41)	Pipe	STM MH B08	STM INLET B07	68.83	4958.35	4958.01	0.5000	18.000	0.0130	13.83	7.43	1.86	9.05	1.27	0.85	0.00	> CAPACITY
18	Pipe - (42)	Pipe	STM INLET B10	STM MH B08	17.72	4958.44	4958.35	0.5000	18.000	0.0130	5.85	7.43	0.79	3.38	1.50	1.00	5.00	SURCHARGED
19	Pipe - (43)	Pipe	STM MH A05	STM MH A08	274.98	4945.89	4950.03	-1.5100	18.000	0.0130	6.92	12.89	0.54	6.55	1.14	0.76	0.00	Calculated
20	Pipe - (43) (1)	Pipe	STM MH A08	STM MH A09	255.18	4950.03	4953.66	-1.4200	18.000	0.0130	7.06	12.54	0.56	7.07	0.83	0.55	0.00	Calculated
21	Pipe - (50)	Pipe	STM MH B11	STM INLET B10	18.71	4958.78	4958.69	0.5000	15.000	0.0130	2.93	4.57	0.64	3.56	1.25	1.00	5.00	SURCHARGED
22	Pipe - (53)	Pipe	STM MH B12	STM MH B11	58.22	4959.07	4958.78	0.5000	15.000	0.0130	2.94	4.57	0.64	3.08	1.25	1.00	4.00	SURCHARGED
23	Pipe - (55)	Pipe	STM INLET B13	STM MH B12	29.87	4959.22	4959.07	0.5000	15.000	0.0130	2.95	4.57	0.65	2.95	1.25	1.00	4.00	SURCHARGED
24	SWALE	Channel	STM FES B02	STM FES B01	194.61	4947.24	4943.04	2.1600	36.000	0.0320	33.91	315.30	0.11	4.13	1.75	0.58	0.00	
25	Outlet-01	Outlet	OUTLET STRUCTURE	Out-1Pipe - (29)		4939.93	4939.26				6.16							

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	Out-1Pipe - (35)	4945.57	4950.41	4.84	4950.41	0.00	30.00	40.06
2	Out-1Pipe - (36)	4945.57	4950.41	4.84	4950.41	0.00	30.00	40.04
3	STM FES B01	4943.04	4948.50	5.46	4948.50	0.00	0.00	29.53
4	STM FES B02	4947.24	4953.24	6.00	4953.24	0.00	0.00	36.00
5	STM INLET A02	4941.97	4949.32	7.35	4949.32	0.00	30.00	52.05
6	STM INLET A04	4943.35	4949.31	5.96	4949.31	0.00	30.00	53.52
7	STM INLET B03	4948.11	4956.94	8.83	4956.94	0.00	30.00	75.93
8	STM INLET B05	4951.78	4956.95	5.17	4956.95	0.00	30.00	44.03
9	STM INLET B07	4958.01	4964.01	6.00	4964.01	0.00	30.00	48.00
10	STM INLET B09	4959.88	4964.94	5.06	4964.94	0.00	30.00	42.67
11	STM INLET B10	4958.44	4964.94	6.50	4964.94	0.00	30.00	59.97
12	STM INLET B13	4959.22	4962.23	3.01	4962.23	0.00	8.50	21.08
13	STM INLET C02	4943.43	4948.50	5.07	4948.50	0.00	16.52	32.76
14	STM MH A01	4941.34	4950.99	9.65	4950.99	0.00	10.50	79.56
15	STM MH A03	4942.07	4949.26	7.19	4949.26	0.00	10.50	50.19
16	STM MH A05	4945.17	4950.35	5.19	4950.35	0.00	10.50	26.22
17	STM MH A08	4950.03	4954.40	4.37	4954.40	0.00	10.50	34.42
18	STM MH A09	4953.66	4958.72	5.06	4958.72	0.00	30.00	42.70
19	STM MH B04	4948.41	4956.87	8.46	4956.87	0.00	10.50	47.91
20	STM MH B06	4948.78	4957.00	8.22	4957.00	0.00	10.50	72.29
21	STM MH B08	4958.35	4964.81	6.46	4964.81	0.00	10.50	46.55
22	STM MH B11	4958.78	4965.51	6.72	4965.51	0.00	5.50	65.67
23	STM MH B12	4959.07	4967.48	8.41	4967.48	0.00	5.50	85.87
24	STM MH C01	4942.58	4949.00	6.42	4949.00	0.00	5.50	53.04

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Out-1Pipe - (35)	19.30	19.30	4950.45	4.88	0.04	0.00	4945.58	0.01	0 00:10	0 00:10	0.00	0.00
2	Out-1Pipe - (36)	21.18	21.18	4950.18	4.61	0.00	0.23	4945.58	0.01	0 00:07	0 00:00	0.00	0.00
3	STM FES B01	38.88	14.26	4946.18	3.14	0.00	2.32	4943.30	0.26	0 00:33	0 00:00	0.00	0.00
4	STM FES B02	34.02	0.00	4948.54	1.30	0.00	4.70	4947.24	0.00	0 00:08	0 00:00	0.00	0.00
5	STM INLET A02	44.72	4.32	4946.10	4.13	0.00	3.22	4942.47	0.50	0 00:37	0 00:00	0.00	0.00
6	STM INLET A04	6.83	6.83	4946.72	3.37	0.00	2.59	4943.56	0.21	0 00:11	0 00:00	0.00	0.00
7	STM INLET B03	34.01	5.44	4951.10	2.99	0.00	5.84	4948.11	0.00	0 00:08	0 00:00	0.00	0.00
8	STM INLET B05	14.74	14.74	4954.19	2.41	0.00	2.77	4951.79	0.01	0 00:10	0 00:00	0.00	0.00
9	STM INLET B07	18.73	6.60	4959.04	1.03	0.00	4.96	4958.01	0.00	0 00:08	0 00:00	0.00	0.00
10	STM INLET B09	9.28	9.28	4962.41	2.53	0.00	2.53	4959.88	0.00	0 00:05	0 00:00	0.00	0.00
11	STM INLET B10	5.84	4.71	4962.00	3.56	0.00	2.94	4958.44	0.00	0 00:05	0 00:00	0.00	0.00
12	STM INLET B13	2.97	2.97	4962.24	3.02	0.01	0.00	4959.23	0.01	0 00:05	0 00:05	0.00	0.00
13	STM INLET C02	24.32	24.32	4947.02	3.59	0.00	1.48	4943.92	0.49	0 00:10	0 00:00	0.00	0.00
14	STM MH A01	44.67	0.00	4946.09	4.75	0.00	4.90	4942.03	0.69	0 00:38	0 00:00	0.00	0.00
15	STM MH A03	42.40	0.00	4946.52	4.45	0.00	2.74	4942.55	0.48	0 00:11	0 00:00	0.00	0.00
16	STM MH A05	39.02	0.00	4947.98	2.81	0.00	2.37	4945.19	0.02	0 00:11	0 00:00	0.00	0.00
17	STM MH A08	7.06	0.00	4950.81	0.78	0.00	3.59	4950.03	0.00	0 00:11	0 00:00	0.00	0.00
18	STM MH A09	7.12	7.12	4954.54	0.88	0.00	4.18	4953.66	0.00	0 00:10	0 00:00	0.00	0.00
19	STM MH B04	29.94	0.00	4952.86	4.45	0.00	4.01	4948.42	0.01	0 00:08	0 00:00	0.00	0.00
20	STM MH B06	18.59	0.00	4953.61	4.83	0.00	3.40	4948.79	0.01	0 00:08	0 00:00	0.00	0.00
21	STM MH B08	13.80	0.00	4961.81	3.46	0.00	3.00	4958.35	0.00	0 00:05	0 00:00	0.00	0.00
22	STM MH B11	2.94	0.00	4962.07	3.29	0.00	3.44	4958.79	0.01	0 00:05	0 00:00	0.00	0.00
23	STM MH B12	2.95	0.00	4962.23	3.16	0.00	5.25	4959.08	0.01	0 00:05	0 00:00	0.00	0.00
24	STM MH C01	24.32	0.00	4946.10	3.52	0.00	2.90	4942.93	0.35	0 00:40	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	SWALE	194.61	4947.24	0.00	4943.04	0.00	4.20	2.1600	Triangular	3.000	24.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	SWALE	33.91	0 00:08	315.30	0.11	4.13	0.79	1.75	0.58	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-02	81.89	4942.58	0.00	4941.35	1.42	1.23	1.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	Pipe - (20) (1)	20.17	4942.08	0.01	4941.98	0.01	0.10	0.5000	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	Pipe - (21)	124.83	4941.98	0.01	4941.36	0.02	0.62	0.5000	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	Pipe - (22)	76.59	4941.36	0.02	4940.97	1.04	0.39	0.5100	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	Pipe - (23)	259.93	4958.01	0.00	4948.98	0.20	9.03	3.4700	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	Pipe - (24)	33.32	4948.78	0.00	4948.61	0.20	0.17	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	Pipe - (25)	20.17	4948.41	0.00	4948.31	0.20	0.10	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	Pipe - (26)	174.66	4948.11	0.00	4947.24	0.00	0.87	0.5000	CIRCULAR	30.000	30.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	Pipe - (27)	94.79	4943.04	0.00	4940.89	0.96	2.15	2.2700	CIRCULAR	30.000	30.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	Pipe - (28)	49.27	4943.77	0.34	4942.58	0.00	1.19	2.4200	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	Pipe - (30)	20.17	4951.78	0.00	4951.38	2.97	0.40	2.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	Pipe - (32) (1)	461.18	4945.17	0.00	4942.08	0.01	3.09	0.6700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	Pipe - (35)	20.16	4945.17	0.00	4945.57	0.00	-0.40	-2.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	Pipe - (36)	20.26	4945.17	0.00	4945.57	0.00	-0.41	-2.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	Pipe - (39)	20.17	4943.35	0.00	4942.95	0.88	0.40	1.9800	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	Pipe - (40)	22.61	4959.88	0.00	4959.43	1.08	0.45	2.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
17	Pipe - (41)	68.83	4958.35	0.00	4958.01	0.00	0.34	0.5000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
18	Pipe - (42)	17.72	4958.44	0.00	4958.35	0.00	0.09	0.5000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	Pipe - (43)	274.98	4945.89	0.72	4950.03	0.00	-4.14	-1.5100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	Pipe - (43) (1)	255.18	4950.03	0.00	4953.66	0.00	-3.63	-1.4200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	Pipe - (50)	18.71	4958.78	0.00	4958.69	0.25	0.09	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	Pipe - (53)	58.22	4959.07	0.00	4958.78	0.00	0.29	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	Pipe - (55)	29.87	4959.22	0.00	4959.07	0.00	0.15	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-02	24.32	0 00:10	27.73	0.88	7.94	0.17	2.00	1.00	837.00		SURCHARGED
2	Pipe - (20) (1)	42.44	0 00:09	47.16	0.90	6.00	0.06	3.00	1.00	542.00		SURCHARGED
3	Pipe - (21)	44.67	0 00:09	47.16	0.95	6.32	0.33	3.00	1.00	599.00		SURCHARGED
4	Pipe - (22)	44.67	0 00:09	47.60	0.94	6.84	0.19	3.00	1.00	968.00		SURCHARGED
5	Pipe - (23)	18.59	0 00:07	42.16	0.44	7.69	0.56	1.52	0.76	0.00		Calculated
6	Pipe - (24)	18.59	0 00:07	16.00	1.16	5.92	0.09	2.00	1.00	8.00		SURCHARGED
7	Pipe - (25)	30.01	0 00:08	16.00	1.88	9.55	0.04	2.00	1.00	5.00		SURCHARGED
8	Pipe - (26)	34.02	0 00:08	29.00	1.17	8.50	0.34	1.90	0.76	0.00		> CAPACITY
9	Pipe - (27)	37.02	0 00:09	61.77	0.60	10.50	0.15	2.50	1.00	256.00		SURCHARGED
10	Pipe - (28)	24.32	0 00:10	35.16	0.69	7.74	0.11	2.00	1.00	114.00		SURCHARGED
11	Pipe - (30)	14.74	0 00:10	14.86	0.99	8.76	0.04	1.49	0.99	0.00		Calculated
12	Pipe - (32) (1)	35.73	0 00:10	54.58	0.65	5.65	1.36	2.91	0.97	0.00		Calculated
13	Pipe - (35)	19.12	0 00:10	14.86	1.29	10.82	0.03	1.50	1.00	9.00		SURCHARGED
14	Pipe - (36)	21.18	0 00:07	14.86	1.43	11.98	0.03	1.50	1.00	8.00		SURCHARGED
15	Pipe - (39)	6.84	0 00:09	14.79	0.46	4.95	0.07	1.50	1.00	680.00		SURCHARGED
16	Pipe - (40)	9.28	0 00:05	14.86	0.62	6.61	0.06	1.50	1.00	2.00		SURCHARGED
17	Pipe - (41)	13.83	0 00:05	7.43	1.86	9.05	0.13	1.27	0.85	0.00		> CAPACITY
18	Pipe - (42)	5.85	0 00:07	7.43	0.79	3.38	0.09	1.50	1.00	5.00		SURCHARGED
19	Pipe - (43)	6.92	0 00:11	12.89	0.54	6.55	0.70	1.14	0.76	0.00		Calculated
20	Pipe - (43) (1)	7.06	0 00:11	12.54	0.56	7.07	0.60	0.83	0.55	0.00		Calculated
21	Pipe - (50)	2.93	0 00:20	4.57	0.64	3.56	0.09	1.25	1.00	5.00		SURCHARGED
22	Pipe - (53)	2.94	0 00:19	4.57	0.64	3.08	0.32	1.25	1.00	4.00		SURCHARGED
23	Pipe - (55)	2.95	0 00:19	4.57	0.65	2.95	0.17	1.25	1.00	4.00		SURCHARGED

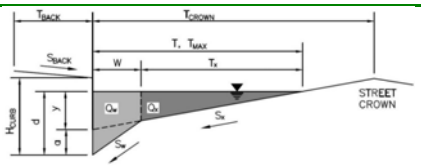
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **ASPEN ST. BASIN P2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**6.5**	**16.3**	**cfs**

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

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

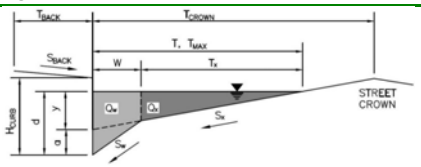
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **WEST SHEPARD AVE BASIN P1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	12.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	27.0	ft
Gutter Width	W =	3.00	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 =	0.050	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	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} =	21.0	27.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.7	7.6	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**12.0**	**52.5**	**cfs**

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

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

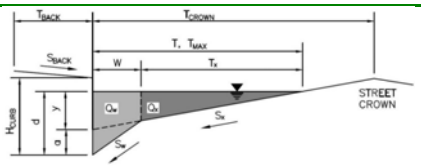
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **ASPEN ST. BASIN P3**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**6.5**	**16.3**	**cfs**

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

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

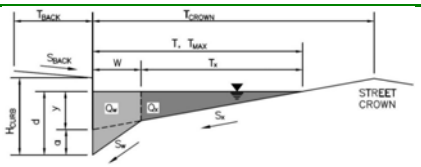
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **SPRUCE ST. BASIN P4**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**8.0**	**19.9**	**cfs**

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

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

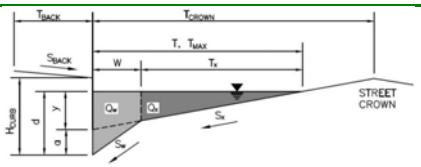
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **SPRUCE ST. BASIN P5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**8.0**	**19.9**	**cfs**

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

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

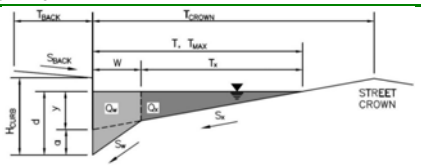
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **WEST OWEN AVE. BASIN P6**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**6.5**	**16.3**	**cfs**

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

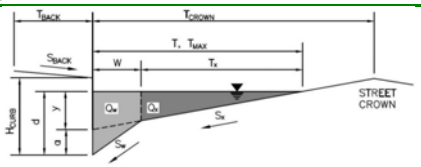
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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: **VISTA WEST SUBDIVISION**
Inlet ID: **WEST OWEN AVE. BASIN P7**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.023	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**9.8**	**24.4**	**cfs**

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

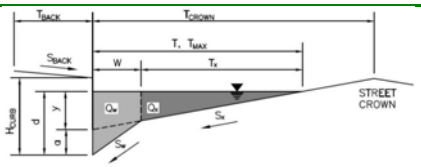
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **MAPLE ST. BASIN P8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.017	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**8.5**	**21.1**	**cfs**

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

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

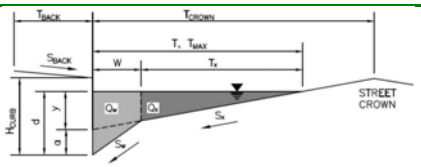
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **MAPLE ST. BASIN P9**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.017	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**8.4**	**21.0**	**cfs**

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

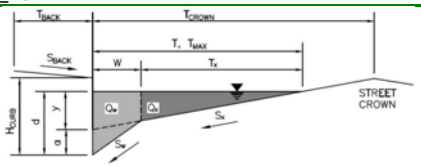
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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: **VISTA WEST SUBDIVISION**
Inlet ID: **CEDAR ST BASIN P10_ROW2**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.007	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**5.4**	**13.6**	**cfs**

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

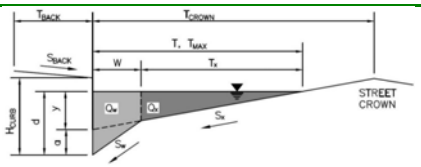
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **MAPLE ST. BASIN P11**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.005	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**4.6**	**11.5**	**cfs**

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

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

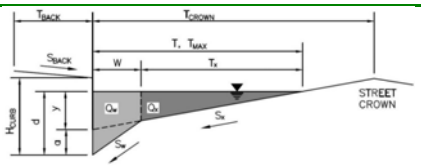
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **MAPLE ST. BASIN P12**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.005	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**4.6**	**11.5**	**cfs**

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

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

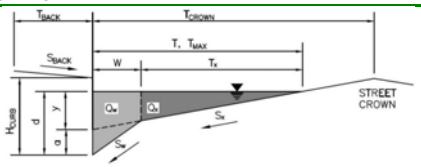
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **WEST OWEN AVE. BASIN PO1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.0**	**22.5**	**cfs**

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

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

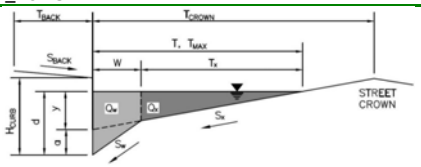
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **CEDAR ST. BASIN PO2_ROW3**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.037	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**12.5**	**23.0**	**cfs**

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

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

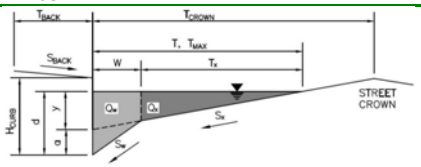
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **W SHEPARD AVE. BASIN PO3**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.0**	**22.5**	**cfs**

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

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

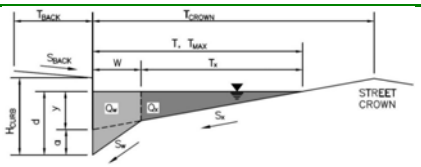
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET B10 BASIN P2**



Gutter Geometry:

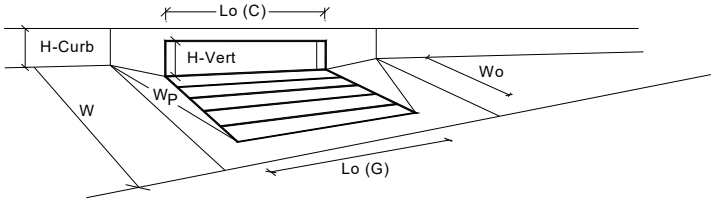
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.3	4.7	cfs

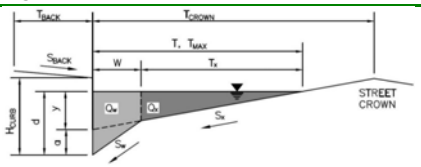
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET B07 BASIN P3**



Gutter Geometry:

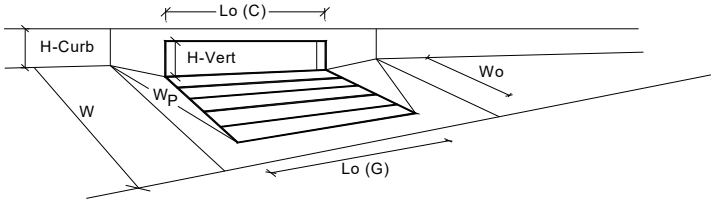
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.1	6.6	cfs

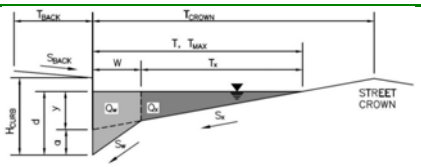
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET B05 BASIN P4**



Gutter Geometry:

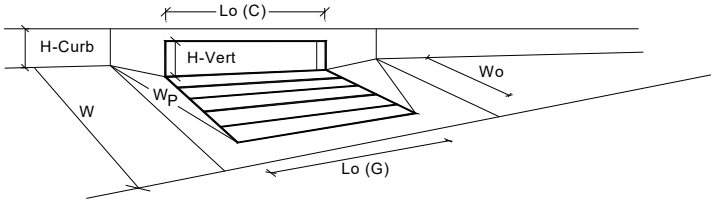
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.83	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 =**	**4.8**	**27.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.4	14.7	cfs

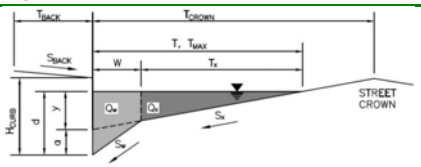
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET B03 BASIN P5**



Gutter Geometry:

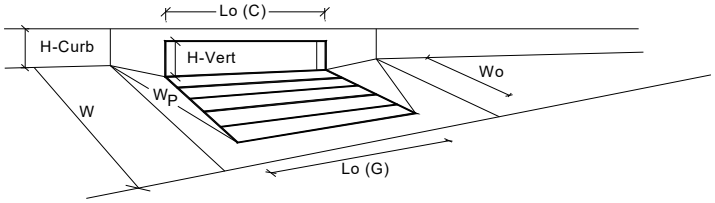
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.8	5.5	cfs

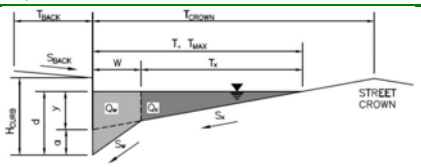
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET B09 BASIN P6**



Gutter Geometry:

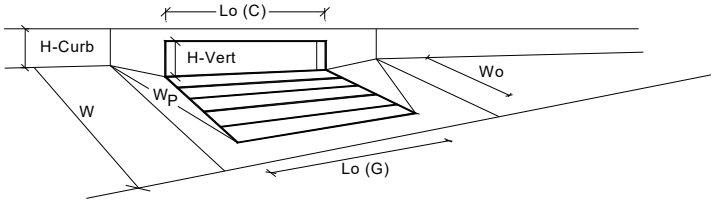
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.0	9.3	cfs

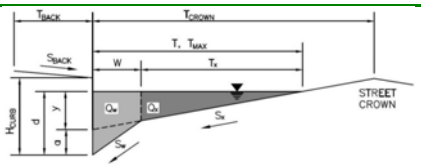
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET A09 BASIN P7**



Gutter Geometry:

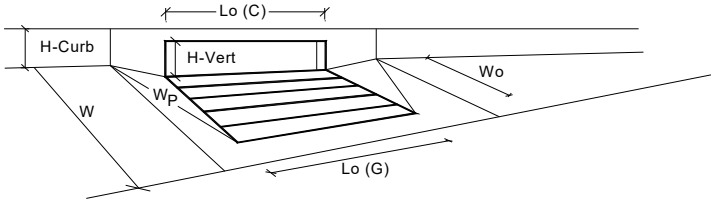
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.0	7.1	cfs

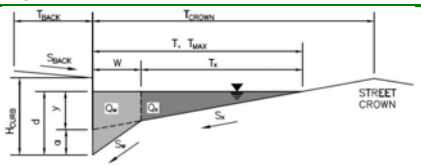
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET A07 BASIN P8**



Gutter Geometry:

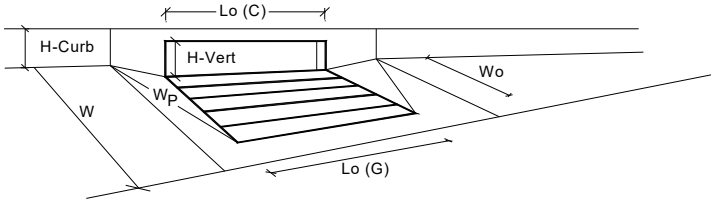
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	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) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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} =	0.34	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.91	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 =**	**8.3**	**27.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	6.2	19.4	cfs

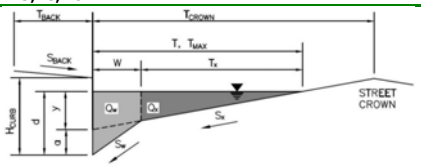
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: VISTA WEST SUBDIVISION

Inlet ID: STM INLET A06 BASIN P9,10,ROW2



Gutter Geometry:

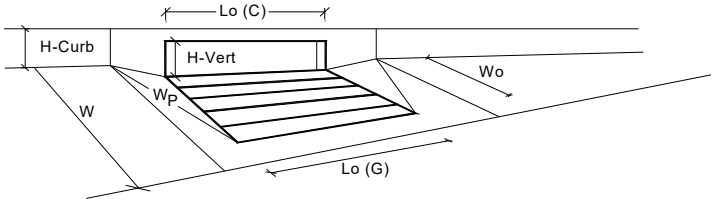
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	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) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	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} =	0.35	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.91	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 =**	**8.5**	**27.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	7.0	22.1	cfs

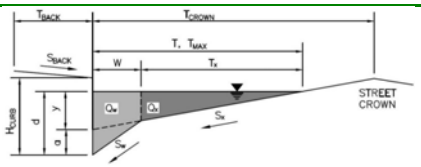
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: VISTA WEST SUBDIVISION

Inlet ID: STM INLET A04 BASIN P11



Gutter Geometry:

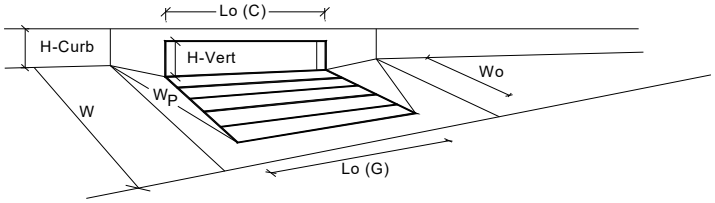
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.2	6.9	cfs

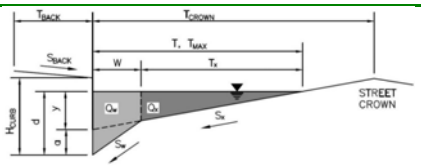
MHFD-Inlet, Version 5.01 (April 2021)

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

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

Project: **VISTA WEST SUBDIVISION**

Inlet ID: **STM INLET A02 BASIN P12**



Gutter Geometry:

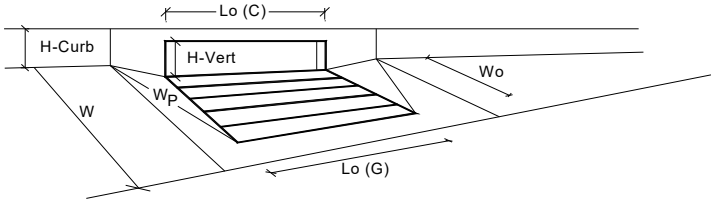
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.2	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.050	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.50	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	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 =	0.063	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} =	12.5	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.5	5.8	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)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.50	4.50	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.5	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} =	0.25	0.88	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.58	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 =**	**3.5**	**13.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.4	4.3	cfs

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INLET CAPACITY

PROJECT NAME: Vista West - Keenesburg
PROJECT NUMBER: 3,490.00
CALCULATED BY: SPC
CHECKED BY: MLL

DATE: 6/29/2021

C_O = 0.67
g = 32.2

BASIN ID	INLET TYPE	UNCLOGGED OPEN AREA (SQFT)	100-YR FLOW (CFS)	CLOGGING (%)	CLOGGED OPEN AREA (SQFT)	PONDING HEAD REQUIRED (FT)	PROVIDED PONDING DEPTH (FT)	PROVIDED INLET CAPACITY (CFS)
B13 (OS1)	CDOT TYPE C	6.3	2.99	50	3.15	0.03	0.78	15.0
C02(P1)	CDOT TYPE D	11.5	24.44	50	5.75	0.62	0.67	25.3

PER UDFCD CHAPTER 7 SECTION 3.2.7 VOLUME 1

The hydraulic capacity of grate, curb-opening, and slotted inlets operating as orifices is expressed as:

$$Q_i = C_o A_o (2gd)^{0.5}$$

Equ

Where:

Q_i = inlet capacity (cfs)
C_o = orifice discharge coefficient
A_o = orifice area (ft^2)
d = characteristic depth (ft) as defined in Table 7-8
g = 32.2 ft/sec^2.

Values for C_o and A_o are presented in Table 7-8 for different types of inlets.

	C_o	A_0[4]	Orifice Equation Valid for	Definition of Terms
Grate Inlet	0.67	Clear opening area[5]	$d > 1.79(A_o/L_w)$	d = Depth of water over grate (ft)
Curb-opening Inlet (depressed or undepressed, horizontal orifice throat[6])	0.67	$(h)(L)$	$d_i > 1.4h$	$d = d_i - (h/2)$ (ft) d_i = Depth of water at curb opening (ft) h = Height of curb opening (ft)
Slotted Inlet	0.80	$(L)(W)$	$d > 0.40$ ft	L = Length of slot (ft) W = Width of slot (ft) d = Depth of water over slot (ft)

[4] The orifice area should be reduced where clogging is expected.
[5] The ratio of clear opening area to total area is 0.8 for P-1-7/8-4 and reticuline grates, 0.9 for P-1-7/8 and 0.6 for P-1-1/8 grates. Curved vane and tilt bar grates are not recommended at sump locations unless in combination with curb openings.
[6] See Figure 7-12 for other types of throats.

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Project Name: Vista West - Keenesburg
Project Number: 3490
Calculated By: SPC
Checked By: MLL
Date: 6/26/2021

For use when channel slopes are between 2% and 10%.

This method is one of the approved methods by UDFCD and is described in the *Design of Rock Chutes* by K.M. Robinson, C.E. Rice, and K.C. Kadavy (1998)

Input Parameters:

	SI Units		Metric	
Flow (Q) =	96.5	cfs	2.733	m^3/s
Flow per unit crest width (q) =	1.93	cfs/ft	0.179	$m^3/s/m$
Bed Slope (S) =	0.02	ft/ft	0.02	m/m
Channel Bottom Width (B) =	50	ft	15.24	m
Channel Side Slopes (Z) =	0.25	ft/ft	0.25	m/m

The calculated D_{50} for the riprap is as follows:

$$D_{50} = \left[\frac{(qS^{1.5})}{9.76E-7}\right]^{1/1.89}$$

D_{50} = 1.1 in 27.3 mm

Per UDFCD the size calculated should be increased by 30%:

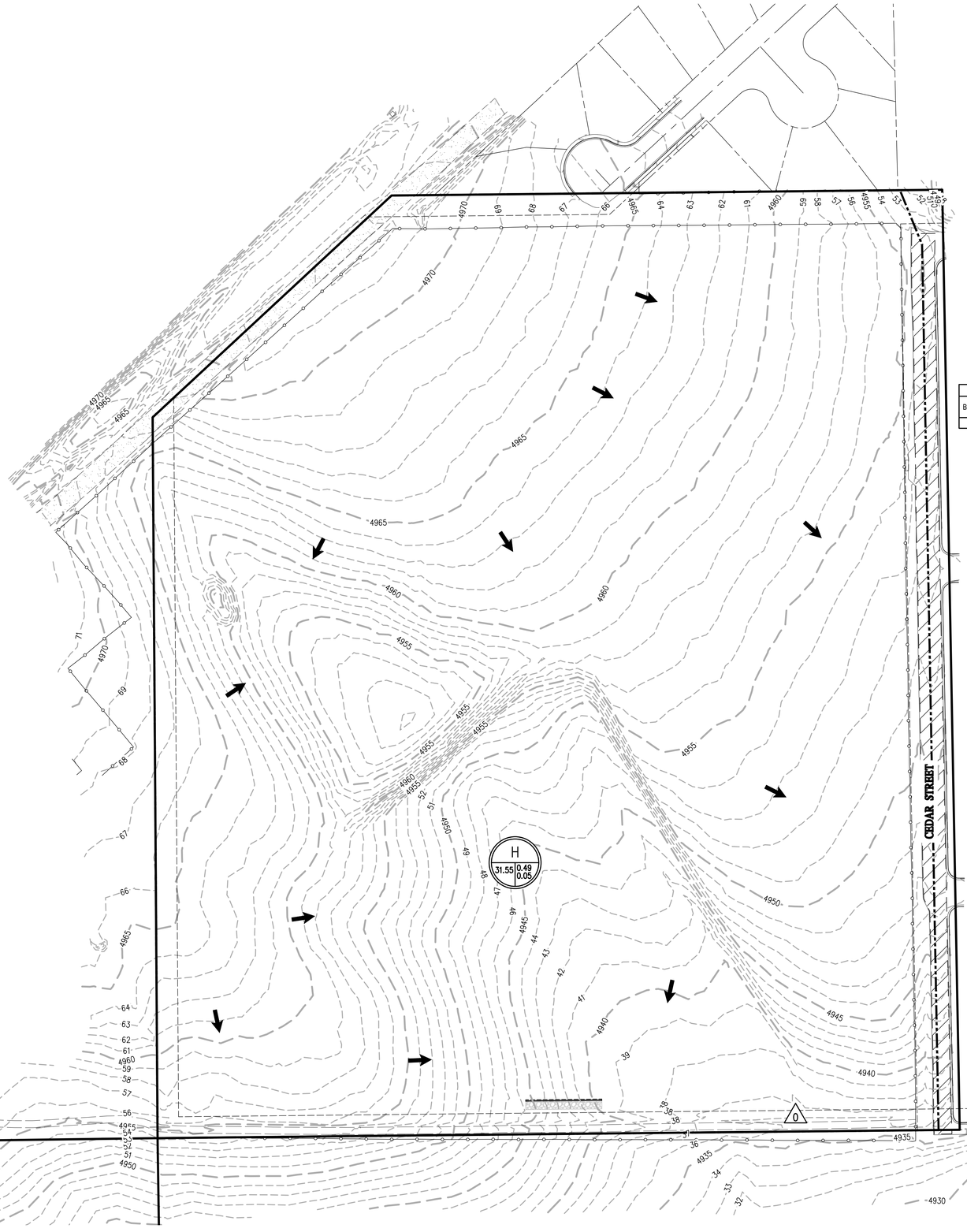
D_{50} with 30% Increase = 1.40 in

Per UDFCD the increased size should also have a 1.5 Factor of Safety applied:

D_{50} with S.F. applied =	3	in
UDFCD Riprap Type =	Type VL	
Design D_{50} =	6	in
Mannings n =	0.034	
Minimum Mantle Thickness =	12	in
Minimum Length of Apron =	7.5	ft

Appendix C:

Drainage Plans



LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
		LOT LINE
81	81	MINOR CONTOUR (1' INTERVAL)
5280	5280	MAJOR CONTOUR (5' INTERVAL)

EXISTING SYMBOLS	PROPOSED SYMBOLS	
		TRAILS/SIDEWALKS
		DEVELOPED DRAINAGE BASIN
	0	DESIGN POINT DESIGNATION

A= DEVELOPED BASIN ID
B= DEVELOPED BASIN AREA (ACRES)
C= DEVELOPED 100YR COEFFICIENT
D= DEVELOPED 5YR COEFFICIENT

RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
H	0	31.55	2%	0.05	0.49	2.27	50.43			

N

GRAPHIC SCALE
80 0 80 160
(IN FEET)
1 INCH = 80 FT

1 DNG1 EXISTING OVERALL DRAINAGE PLAN

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DESIGNED BY SPC | DRAWN BY JRJ | CHECKED BY MLL

REVISION DESCRIPTION	PREPARED BY	DATE

MSP COMPANIES

TOWN OF KEENESBURG — WELD COUNTY

VISTA WEST SUBDIVISION

EXISTING OVERALL DRAINAGE PLAN

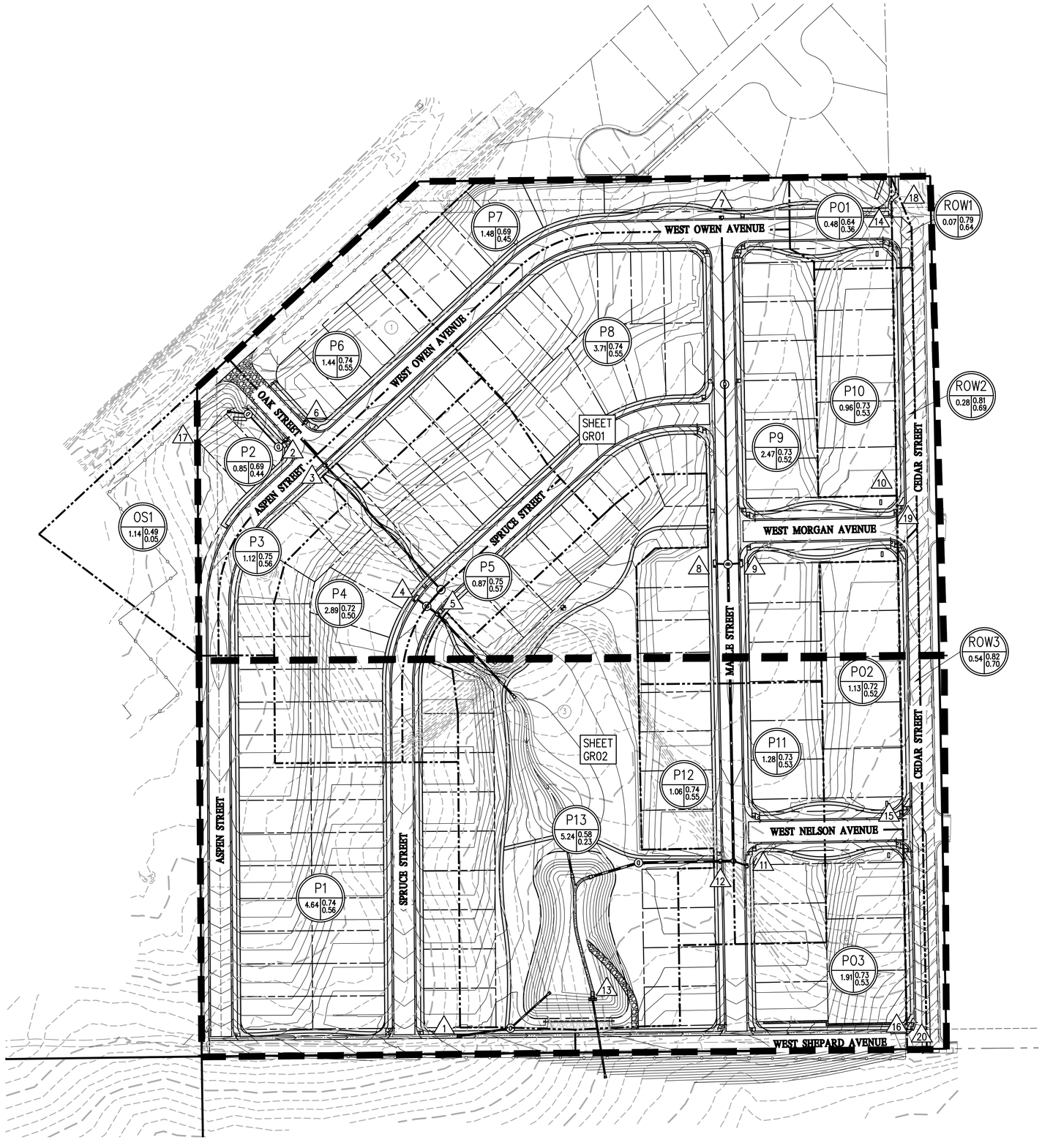
PREPARED UNDER THE DIRECT SUPERVISION OF

PRELIMINARY NOT FOR CONSTRUCTION

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	06/28/2021
DRAWING SIZE	24" X 36"
SURVEY FIRM	FLATIRONS
SURVEY DATE	10/02/2020
JOB NO.	C03490
DRAWING NAME	3490 Drainage Plans.dwg
SHEET	01 OF 4

DNG1



LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
		LOT LINE
81	81	MINOR CONTOUR (1' INTERVAL)
5280	5280	MAJOR CONTOUR (5' INTERVAL)

EXISTING SYMBOLS	PROPOSED SYMBOLS	
		TRAILS/SIDEWALKS
		DEVELOPED DRAINAGE BASIN
	0	DESIGN POINT DESIGNATION

A= DEVELOPED BASIN ID
B= DEVELOPED BASIN AREA (ACRES)
C= DEVELOPED 100YR COEFFICIENT
D= DEVELOPED 5YR COEFFICIENT

RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS) Q5	LOCAL (CFS) Q100	ACCUMULATIVE (CFS) Q5	ACCUMULATIVE (CFS) Q100	Notes
H	0	31.55	2%	0.05	0.49	2.27	50.43			
P1	1	4.64	63%	0.56	0.74	7.85	24.44			
P2	2	0.85	50%	0.44	0.69	1.30	4.68			
P3	3	1.12	65%	0.56	0.75	2.14	6.61			
P4	4	2.89	57%	0.50	0.72	4.42	14.70			
P5	5	0.87	66%	0.57	0.75	1.81	5.51			
P6	6	1.44	63%	0.55	0.74	2.97	9.31			
P7	7	1.48	50%	0.45	0.69	1.99	7.12			
P8	8	3.71	63%	0.55	0.74	6.22	19.40			
P9	9	2.47	60%	0.52	0.73	4.46	14.40			
P10	10	0.96	60%	0.53	0.73	1.80	5.79			
P11	11	1.28	61%	0.53	0.73	2.15	6.87			
P12	12	1.06	63%	0.55	0.74	1.37	4.31			
P13	13	5.24	24%	0.23	0.58	2.44	14.30			
PO1	14	0.48	39%	0.36	0.64	0.65	2.75			
PO2	15	1.13	59%	0.52	0.72	1.86	6.06			
PO3	16	1.91	60%	0.53	0.73	3.53	11.36			
OS1	17	1.14	2%	0.05	0.49	0.13	2.99			
ROW1	18	0.07	74%	0.64	0.79	0.17	0.49			
ROW2	19	0.28	80%	0.69	0.81	0.72	1.95			
ROW3	20	0.54	81%	0.70	0.82	1.25	3.40			

N

GRAPHIC SCALE
80 0 80 160
(IN FEET)
1 INCH = 80 FT

1 DNG2 PROPOSED OVERALL DRAINAGE PLAN

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PREPARED BY DATE

REVISION DESCRIPTION

WELD COUNTY

TOWN OF KEENESBURG

MSP COMPANIES

VISTA WEST SUBDIVISION

PROPOSED OVERALL DRAINAGE PLAN

PREPARED UNDER THE DIRECT SUPERVISION OF

PRELIMINARY NOT FOR CONSTRUCTION

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	06/28/2021
DRAWING SIZE	24" X 36"
SURVEY FIRM: FLATIRONS	SURVEY DATE: 10/02/2020
JOB NO.	C03490
DRAWING NAME: 3490 Drainage Plans.dwg	
SHEET 02 OF 4	

DNG2

LEGEND

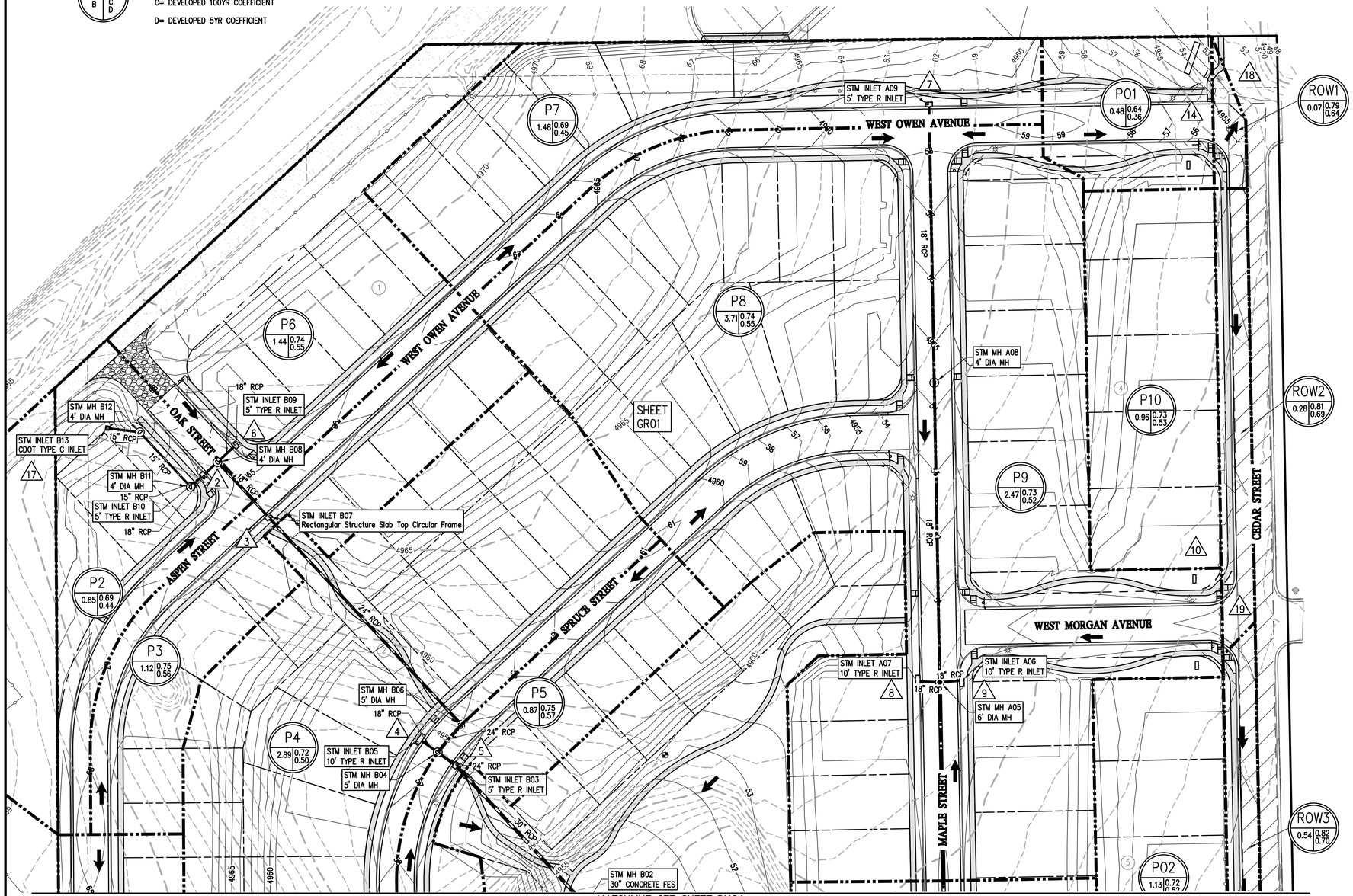
EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
		LOT LINE
81	81	MINOR CONTOUR (1' INTERVAL)
5280	5280	MAJOR CONTOUR (5' INTERVAL)

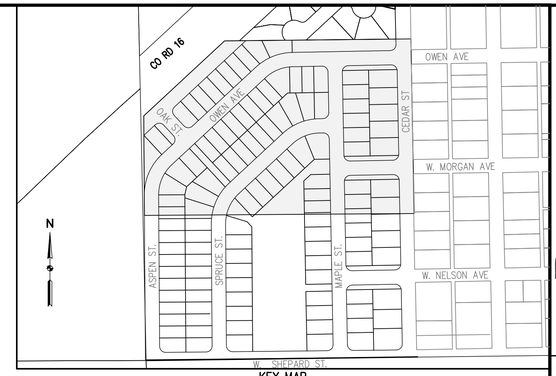
EXISTING SYMBOLS	PROPOSED SYMBOLS	
		TRAILS/SIDEWALKS
		DEVELOPED DRAINAGE BASIN
1		DESIGN POINT DESIGNATION

A= DEVELOPED BASIN ID
B= DEVELOPED BASIN AREA (ACRES)
C= DEVELOPED 100YR COEFFICIENT
D= DEVELOPED 5YR COEFFICIENT

RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS) Q5	LOCAL (CFS) Q100	ACCUMULATIVE (CFS) Q5	ACCUMULATIVE (CFS) Q100	Notes
H	0	31.55	2%	0.05	0.49	2.27	50.43			
P1	1	4.64	63%	0.56	0.74	7.85	24.44			
P2	2	0.85	50%	0.44	0.69	1.30	4.68			
P3	3	1.12	65%	0.56	0.75	2.14	6.61			
P4	4	2.89	57%	0.50	0.72	4.42	14.70			
P5	5	0.87	66%	0.57	0.75	1.81	5.51			
P6	6	1.44	63%	0.55	0.74	2.97	9.31			
P7	7	1.48	50%	0.45	0.69	1.99	7.12			
P8	8	3.71	63%	0.55	0.74	6.22	19.40			
P9	9	2.47	60%	0.52	0.73	4.46	14.40			
P10	10	0.96	60%	0.53	0.73	1.80	5.79			
P11	11	1.28	61%	0.53	0.73	2.15	6.87			
P12	12	1.06	63%	0.55	0.74	1.37	4.31			
P13	13	5.24	24%	0.23	0.58	2.44	14.30			
PO1	14	0.48	39%	0.36	0.64	0.65	2.75			
PO2	15	1.13	59%	0.52	0.72	1.86	6.06			
PO3	16	1.91	60%	0.53	0.73	3.53	11.36			
OS1	17	1.14	2%	0.05	0.49	0.13	2.99			
ROW1	18	0.07	74%	0.64	0.79	0.17	0.49			
ROW2	19	0.28	80%	0.69	0.81	0.72	1.95			
ROW3	20	0.54	81%	0.70	0.82	1.25	3.40			





KEY MAP
1"=300'

N

GRAPHIC SCALE
50 0 50 100
(IN FEET)
1 INCH = 50 FT

1 DNG3 PROPOSED DRAINAGE PLAN

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DRAWN BY JRJ
CHECKED BY MLL

REVISION DESCRIPTION	PREPARED BY	DATE

MSP COMPANIES
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PROPOSED DRAINAGE PLAN
TOWN OF KEENESBURG — WELD COUNTY

PREPARED UNDER THE DIRECT SUPERVISION OF
PRELIMINARY NOT FOR CONSTRUCTION
FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	06/28/2021
DRAWING SIZE	24" X 36"
SURVEY FIRM	FLATIRONS
SURVEY DATE	10/02/2020
JOB NO.	C03490
DRAWING NAME	3490 Drainage Plans.dwg
SHEET	03 OF 4

DNG3

N:\co\3490 - Summerfield - Keenesburg\Drawings\Drainage Plans\3490 Drainage Plans.dwg, 6/29/2021 5:19:45 PM, Sean Callahan

LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
		LOT LINE
81	81	MINOR CONTOUR (1' INTERVAL)
5280	5280	MAJOR CONTOUR (5' INTERVAL)

EXISTING SYMBOLS	PROPOSED SYMBOLS	
		TRAILS/SIDEWALKS
		DEVELOPED DRAINAGE BASIN
	1	DESIGN POINT DESIGNATION

A= DEVELOPED BASIN ID

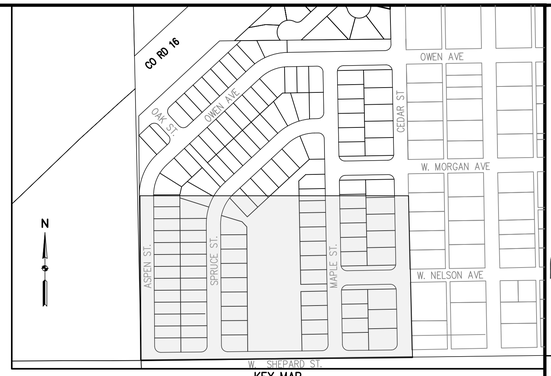
B= DEVELOPED BASIN AREA (ACRES)

C= DEVELOPED 100YR COEFFICIENT

D= DEVELOPED 5YR COEFFICIENT

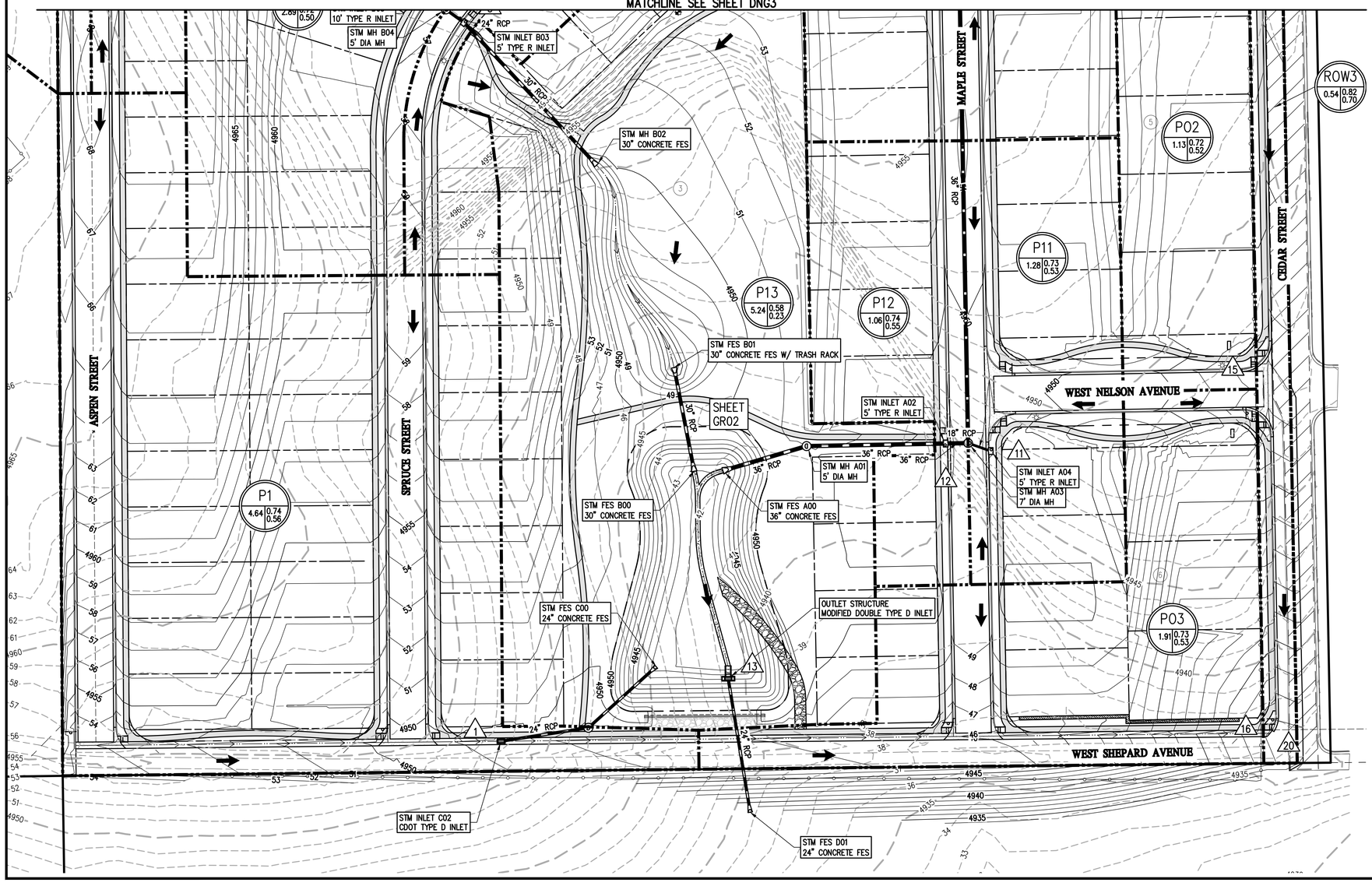
RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS) Q5	LOCAL (CFS) Q100	ACCUMULATIVE (CFS) Q5	ACCUMULATIVE (CFS) Q100	Notes
H	0	31.55	2%	0.05	0.49	2.27	50.43			
P1	1	4.64	63%	0.56	0.74	7.85	24.44			
P2	2	0.85	50%	0.44	0.69	1.30	4.68			
P3	3	1.12	65%	0.56	0.75	2.14	6.61			
P4	4	2.89	57%	0.50	0.72	4.42	14.70			
P5	5	0.87	66%	0.57	0.75	1.81	5.51			
P6	6	1.44	63%	0.55	0.74	2.97	9.31			
P7	7	1.48	50%	0.45	0.69	1.99	7.12			
P8	8	3.71	63%	0.55	0.74	6.22	19.40			
P9	9	2.47	60%	0.52	0.73	4.46	14.40			
P10	10	0.96	60%	0.53	0.73	1.80	5.79			
P11	11	1.28	61%	0.53	0.73	2.15	6.87			
P12	12	1.06	63%	0.55	0.74	1.37	4.31			
P13	13	5.24	24%	0.23	0.58	2.44	14.30			
PO1	14	0.48	39%	0.36	0.64	0.65	2.75			
PO2	15	1.13	59%	0.52	0.72	1.86	6.06			
PO3	16	1.91	60%	0.53	0.73	3.53	11.36			
OS1	17	1.14	2%	0.05	0.49	0.13	2.99			
ROW1	18	0.07	74%	0.64	0.79	0.17	0.49			
ROW2	19	0.28	80%	0.69	0.81	0.72	1.95			
ROW3	20	0.54	81%	0.70	0.82	1.25	3.40			



KEY MAP
1"=300'

MATCHLINE SEE SHEET DNG3



N

GRAPHIC SCALE
50 0 50 100
(IN FEET)
1 INCH = 50 FT

1 DNG4 | DNG4 PROPOSED DRAINAGE PLAN

Know what's **below.** **Call** before you dig.

BASELINE
Engineering · Planning · Surveying
102 N. RUBEY DRIVE, SUITE 210 · GOLDEN, COLORADO, 80403
P: 3033403866 · F: 3033403869 · www.baselinecorp.com

DESIGNED BY SPC | DRAWN BY JRJ | CHECKED BY MLL

PREPARED BY | DATE

REVISION DESCRIPTION

MSP COMPANIES

WELD COUNTY

TOWN OF KEENESBURG

VISTA WEST SUBDIVISION

PROPOSED DRAINAGE PLAN

PREPARED UNDER THE DIRECT SUPERVISION OF

PRELIMINARY NOT FOR CONSTRUCTION

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	06/28/2021
DRAWING SIZE	24" X 36"
SURVEY FIRM FLATIRONS	SURVEY DATE 10/02/2020
JOB NO.	C03490
DRAWING NAME 3490 Drainage Plans.dwg	
SHEET 04 OF 4	

DNG4