Soleana Place

Phase II Drainage Report SDP26-xxxx

IMEG #20002764.00

Prepared for:

Alexander Place Investors LLC
c/o Lenn Haffeman
1313 Evalena Road
Castle Rock, CO 80108

Prepared by:

IMEG
7600 E. Orchard Road, Suite 250-S
Greenwood Village, CO 80111
Rick Rome P.E. LEED AP
303-796-6067
Rick.a.rome@imegcorp.com

September 2026

ENGINEERS CERTIFICATION

I affirm that this report and plan for the Phase II drainage design of Alexander Place SDP was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others.

Rick Rome P.E.
Registered Professional Engineer State
Of Colorado No. 35103
(Affix Seal)

+

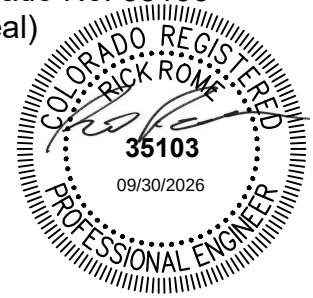


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Soleana Place SDP
Phase II Drainage Report

GENERAL LOCATION AND DESCRIPTION

A. Site Location

The project is located in the south half of the north half of Section 26 T7S R67W 6th PM and includes a combination of platted and unplatted lands. The northern part of the site is Lot 4 of the Cooperhook Mainplace subdivision. The south half is unplatted lands at 382 Alexander Place. The property is bounded on the east by unplatted land addressed at 604 Alexander Place. The Diamond Ridge subdivision is located approximately 1400 lf west of the property. The Monta Vista Subdivision is located immediately adjacent to the property on the west. Town of Castle Rock Open space is located immediately south of the property. IMEG is the consultant providing civil engineering services.

B. Description of Property and Land Use

The property encompasses approximately 15.82 acres that generally slopes from east to west at grades ranging from 2% to 20% in the buildable areas. The proposed development plan calls for medium density single family residential lots.

Ground cover for the property includes scrub oaks, native grasses, and rock outcroppings. Site development will include over lot grading activities to optimize the use of available space and views from the subdivision. The site development is provided in coordination with the Soleana Subdivision located north of the property and includes road and utility connections that offer reciprocal access and services for both developments.

Soils on site are Kutch Sandy Loams. These soils are generally consistent with hydrologic soil group D.

The project area is historically tributary to East Plum Creek along the path identified as Plum Creek Tributary C. This path crosses the property draining from the southeast corner of the site to the northeast corner of the property. The outfall drains through the Cooper Hook development through a 72” storm sewer that is part of the Tributary C to Plum Creek as modeled in the Flood Hazard Area Delineation and Master plan prepared for the Town of Castle Rock.

The site is in zone X as noted on FIRM Panel 08035C0186G Revised March 16, 2016. There are no irrigation ditches or canals adjacent to or impacted by this project. There is a designated FEMA floodplain that begins approximately 2500 feet west of the project boundary. The FHAD for Tributary C identifies flood limits along the southern boundary of the property.

Development of the project includes 50 single-family medium density detached lots. These sites are planned to coordinate with the access utilities and drainage facilities proposed with the Soleana subdivision to the north of the property. For this analysis, we have assumed impervious coverage with the development based on this anticipated use.

Access and circulation for the project includes connections to the road and utility network at the intersection of Via Soleana and Alexander Place with a planned connection to Soleana at Luminera Court. The subdivision is tributary to a shared extended dry basin located at the west end of the property that will be constructed with the Soleana subdivision.

DRAINAGE BASIN AND SUB-BASINS

A. Major Drainage Basins

Major Basins

The project site is located within the Plum Creek watershed and is described in the Tributary C and D Watershed Master Plan prepared by RESPEC (October 2014). The property is located within Sub-Basin 106, which encompasses approximately 97.5 acres and was historically estimated to have 6.0% impervious coverage. This basin includes the 15.52-acre Alexander Place PDP Amendment 1 development area. Site design and drainage analysis have considered adjacent and downstream development, including the Cooperhook/Mainplace and Monta Vista subdivisions.

Sub-Basin 107

Sub-Basin 106 receives runoff from Sub-Basin 107, which represents the upper reaches of the tributary watershed. This basin is bounded by local ridgelines along the eastern and southern watershed limits. Land ownership within Sub-Basin 107 consists of:

- 28.7 acres of open space owned by the Town of Castle Rock (21.2 acres and 7.5 acres)
- Approximately 15 acres of privately owned, unincorporated land
- 7.9 acres within the Soleana Filing 1 development, proposed as dedicated open space
- 2.1 acres of existing large-lot residential development within Diamond Ridge

Sub-Basin 107 encompasses a total drainage area of 53.7 acres and has an estimated 5% impervious coverage. No changes to this watershed are proposed as part of the Alexander Place Amendment 1 development.

Watershed Description

The watershed evaluated in this report includes the project site and surrounding tributary areas extending from Cooperhook Lots 1 and 2 on the west to the ridgeline adjacent to Diamond Ridge Estates on the east. The southern boundary generally follows the property line between the site and

the Town of Castle Rock's Metzler Ranch Open Space, while the ultimate southern watershed limit is defined by an existing ridgeline located approximately 800 to 1,300 feet south of the property.

The northern project boundary is contiguous with the Soleana Subdivision. The upstream watershed area includes Basins B, C, and D, as identified in the Soleana Subdivision Phase III Drainage Report (Reference 4). Runoff generally flows westward and ultimately concentrates within a proposed extended detention basin serving the upper reaches of Tributary C of the Plum Creek watershed, providing regional detention for Basins 106 and 107.

This analysis also considers adjacent lands, including dedicated open space, existing commercial properties, and existing residential development within and adjacent to the Town of Castle Rock.

Development Area

The development site is located within the upper reaches of Tributary C to Plum Creek (RESPEC Basin 106). The study area includes:

- Cooperhook Lot 4, as platted
- The Cooperhook property immediately adjacent to the Soleana Subdivision
- An unplatted 8.4-acre parcel south of Cooperhook, referred to herein as the Martinez Property (Martinez Real Estate Company, LLC)
- The Thornton Property, consisting of unincorporated and unplatted land located south and east of the project site. This property is not being disturbed with this development.

In addition, the Town of Castle Rock owns Tract D of Metzler Ranch, which comprises approximately 49.8 acres of open space and trail corridors located in the uppermost portion of the watershed.

B. Sub Basins

Basin A generally represents the proposed development area and is subdivided into twelve minor drainage basins for storm sewer collection. Lot imperviousness was calculated assuming 55% impervious coverage, while parks, open space, and native landscape areas were assigned 5% impervious coverage.
The grading concept directs runoff generally westward toward Pond 2, which was previously sized as part of the Soleana development to accommodate the ultimate developed impervious areas tributary to the basin.

Basin E generally corresponds to FHAD Basin 107, which is tributary to the Alexander Place Amendment 1 site at Design Point 1. Runoff from this undeveloped tributary area will be collected through a double type D inclined inlet and conveyed through the project using the proposed storm sewer system allowing tributary runoff to pass through the site to Pond 2.

Basins B and C represent developed areas within the Soleana subdivision that discharge to Pond 2 through a common forebay structure. The drainage criteria, basin parameters, and design assumptions for these basins are documented in the Soleana Phase III Drainage Report. No surface irrigation facilities are affected by the drainage patterns evaluated in this analysis. Runoff from the study area ultimately flows west to Plum Creek, located approximately one mile west of the project site.

The design of the major drainage facilities presented herein is based on the approved drainage design and detention assumptions established for Pond 2 in the Soleana Final Drainage Report. Basins A, B, and C are located within Sub-Basin 106, as identified in the Town of Castle Rock FHAD and Tributary C Master Plan studies. Basin E represents an existing hillside drainage area within Sub-Basin 107 that will remain in its current condition and will not be altered by the proposed development. Off-site flows originating from the Diamond Ridge subdivision are treated as pass-through flows within the drainage analysis.

Final watershed imperviousness values will be refined during preparation of the Phase III Drainage Report and subsequent entitlement reviews by the Town of Castle Rock. Impervious percentages will be updated in accordance with the current Mile High Flood District (MHFD) Urban Storm Drainage Criteria Manual guidance. For purposes of this Phase II Drainage Report, the following composite imperviousness assumptions were used:

- Open Space: 5%
- Custom Residential Lots: 35%
- Semi-Custom Residential Areas: 55%
- Commercial Areas: 85%

B. Minor Drainage Basins

Basin A

Basin A represents the proposed development area and is divided into twelve minor drainage sub-basins. The sub-basins were established based on the preliminary grading plan and anticipated inlet locations that will be further refined during Phase II and Phase III design. Stormwater collected within Basin A will be conveyed through the proposed storm sewer system to Pond 2.

Two off-site tributary areas are also considered in the drainage analysis and are described below.

Basin E

Basin E represents a refinement of Tributary C Basin 107 as identified in the FHAD and Tributary C Master Plan studies and confirmed in the Soleana Phase III Drainage Report. The basin consists primarily of existing undeveloped hillside areas that discharge toward the project site.

Basin M

Basin M1 represents a portion of the Metzler Ranch area that is tributary to the project site and consists of sloping undeveloped terrain. Runoff from this basin will be collected in a surface channel and directed to the ROW between lots 38 and 39 in a concrete channel.

Additional sub-basins identified within the Montana Vista Drainage Report include Basins M2 and M3. These areas consist of undeveloped open space and an existing commercial property. The commercial property includes a storm sewer system that discharges directly to the Plum Creek outfall, bypassing the detention facilities evaluated in this report. As a result, these areas are considered non-tributary to the project drainage system.

Basins B and C

Basins B and C represent developed drainage basins within the Soleana subdivision that discharge directly to Pond 2, which serves both the Soleana and proposed Soleana Place developments. Basin characteristics, hydrologic parameters, and supporting calculations are presented in the Soleana Phase III Drainage Study and were utilized as the basis for this analysis.

C. Existing Stormwater Conveyance and Detention

Stormwater runoff from the upper reaches of Plum Creek Tributary C is currently conveyed through existing drainage channels and ultimately discharged to the proposed location of Pond 2. Pond 2 is located within Sub-Basin 106 and is designed as a regional detention facility serving both Basins 106 and 107.

The tributary area to Pond 2 encompasses approximately 162 acres with an assumed ultimate composite imperviousness of 19%, reflecting anticipated future development conditions. The detention analysis includes runoff from the following tributary properties:

- Soleana Subdivision
- Cooperhook Property
- Martinez Property
- Approximately 7.0 acres reserved for future semi-custom residential development

All remaining tributary areas are assumed to remain in an undeveloped condition for purposes of the detention analysis.

Pond 2 is proposed as an extended detention basin (EDB) serving the upper reaches of Tributary C within the Plum Creek watershed. The basin outfall is designed to discharge into an existing 72-inch reinforced concrete pipe (RCP) that conveys flows westward through the existing commercial development corridor.

Pond 2 Detention Summary

Event	Storage Volume (ac-ft)	Release Rate	Maximum Depth
WQCV	1.05	40-hour drain time / 0.80 cfs	3.08 ft
EURV	1.12	59-hour drain time / 1.30 cfs	4.69 ft
100-Year + 0.5 WQCV	9.21	222.8 cfs	10.85 ft

The detention volumes and release rates are based on the regional detention criteria established for the upper Tributary C watershed and provide capacity for both existing and anticipated future development within Basins 106 and 107.

DRAINAGE DESIGN CRITERIA

A. Regulations

This analysis was prepared in accordance with the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual and the Town of Castle Rock Temporary Erosion and Sediment Control Manual. Supplemental guidance was obtained from the Mile High Flood District (MHFD) Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3, including published worksheets for stormwater detention and inlet capacity analyses..

B. Drainage Studies, Master Plans, and Site Constraints

The drainage design incorporates recommendations and requirements identified in the following documents:

- Tributary C and D Watershed Master Plan
- Tributary C and D Flood Hazard Area Delineation (FHAD) Reports
- Alexander Place Preliminary Drainage Report, PDP26-0001 (Reference 8)
- Soleana Subdivision Phase III Drainage Report (Reference 3)
- Montana Vista Lot 7 / Cooperhook-Mainplace Filing No. 1 Phase III Drainage Report (Reference 5)

These studies establish the regional drainage framework, identify off-site tributary flows affecting the project area, and provide the basis for the regional detention and conveyance concepts evaluated in this report.

C. Hydrology

Hydrologic analyses for the project were performed using the Rational Method for sizing the proposed storm sewer and minor drainage conveyance systems. Due to the size of the overall watershed, Rational Method results were compared with a Colorado Urban Hydrograph

Procedure (CUHP) evaluation of the regional basin to verify watershed response characteristics and major storm routing assumptions.
The CUHP analysis was utilized to evaluate watershed time of concentration and peak flow characteristics for major storm events, while local basin runoff calculations were used for preliminary inlet and street flow evaluations.

D. Hydraulics

Hydraulic evaluations of the proposed storm drainage system were performed at a conceptual level for the 5-year and 100-year design storm events.
Detailed storm sewer system modeling will be completed during subsequent design phases using Bentley StormCAD software. Inlet capacity analyses will be performed in accordance with MHFD procedures and documented using the applicable inlet capacity worksheets as part of the Phase III drainage design.

E. Water Quality Enhancement

Water quality treatment is based on a combination of source-control practices and regional detention facilities. Project planning has incorporated measures intended to reduce stormwater pollutant loading, including:

- Minimizing directly connected impervious areas where feasible.
- Evaluating alternative paving materials and surface treatments.
- Preserving and enhancing drought-tolerant landscaped areas.
- Promoting efficient irrigation and water conservation practices.

Additional water quality enhancement is provided through the regional detention facilities serving the project area and adjacent developments. These facilities promote sediment removal through settling processes within forebays and micropool outlet structures prior to discharge from the detention basin.
Runoff originating from the Thornton Property and Metzler Ranch open space area may require localized drainage improvements where concentrated flows currently occur. Potential measures may include:

- Rock check structures
- Stabilized swales or channels
- Localized channel armoring

These improvements would be intended to manage off-site runoff prior to conveyance through the development using the proposed storm sewer systems.
Consistent with the project Water Efficiency Plan, water quality mitigation emphasizes source-control practices, reduction of directly connected impervious areas, and opportunities for infiltration and filtration through landscaped areas. No proprietary or structural water quality treatment devices are proposed as part of this Phase II drainage concept.

STORMWATER MANAGEMENT FACILITY DESIGN

A. Regulations

This drainage analysis was prepared in accordance with the requirements of the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual and the Town's applicable stormwater quality regulations. Supplemental guidance was obtained from the Mile High Flood District (MHFD) Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3.

B. Stormwater Conveyance Facilities

Stormwater runoff from the proposed development is conveyed through a combination of curb-and-gutter roadways, storm sewer inlets, and underground storm sewer infrastructure that discharges to a regional detention facility.
The storm sewer system is designed to capture and convey minor storm runoff through a network of inlets and pipelines. During major storm events, a portion of the runoff is permitted to bypass individual inlets and be conveyed within the street section to downstream collection points in accordance with Town of Castle Rock and MHFD design criteria.
Pond 2 serves as the regional detention facility for the upper Tributary C watershed. The basin was designed as an extended detention facility that provides:

- Water Quality Capture Volume (WQCV) storage and release
- Excess Urban Runoff Volume (EURV) detention
- 100-year storm peak flow attenuation

Water quality treatment is achieved through the use of forebays, extended detention storage, and outlet structures designed to promote sediment removal and energy dissipation in accordance with MHFD criteria. Access and maintenance facilities for Pond 2 were incorporated into the approved Soleana Phase III drainage design.
Pond 2 discharges through an existing 72-inch reinforced concrete pipe (RCP) located within the adjacent commercial development. This outfall serves as the regional drainage connection for the upper portions of Basin 106 and combines flows from both residential and commercial tributary areas.
An emergency overflow pathway is provided adjacent to the detention basin outlet structure. Overflow runoff is conveyed along the historic Tributary C drainage corridor through portions of the commercial development before being intercepted and conveyed by the existing storm sewer system.

C. Stormwater Storage Facilities

Stormwater detention requirements were evaluated on a regional basis by analyzing the full tributary watershed contributing to Pond 2.
The detention design includes runoff from:

- Soleana Subdivision

- Cooperhook Property
- Martinez Property
- Tributary Basin 107, as identified in the Tributary C FHAD and Watershed Master Plan

Detention volumes and outlet characteristics were previously established as part of the Soleana drainage design and include capacity for anticipated future development within the regional watershed. The proposed Alexander Place improvements utilize the available regional detention capacity without modifying the approved detention concept.

D. Water Quality Enhancement Best Management Practices

The drainage analysis includes five primary tributary areas identified as Basins A, B, C, E, and M.

Basins A, B, C, and E discharge to Pond 2, where runoff receives both water quality treatment and peak flow attenuation prior to release. Historic drainage from these basins ultimately flows to Tributary C and Plum Creek through the existing downstream storm sewer system.

Pond 2 provides sufficient storage capacity to accommodate the contributing drainage areas while restricting discharge rates to approximate historic release conditions. This design approach minimizes impacts to downstream drainage facilities and existing open channel systems.

The proposed improvements incorporate the Town of Castle Rock's four-step water quality management approach as described below.

Step 1: Reduce Runoff Volume

Where feasible, future builders and property owners should incorporate site design features that reduce directly connected impervious areas and promote infiltration.

Potential practices include:

- Directing roof drainage onto landscaped areas prior to discharge to the street.
- Utilizing turf, mulch, or other pervious landscape treatments to promote infiltration.
- Considering permeable or partially permeable hardscape materials where permitted by site and geotechnical conditions.
- Incorporating rain gardens or low-impact development (LID) features as part of individual lot landscaping plans.

Because the lots are proposed as semi-custom residential lots, final implementation of these measures will occur during future lot-specific design and permitting.

Step 2: Provide Water Quality Capture Volume and Flood Control Through Full-Spectrum Detention

Pond 2 was designed to provide:

- Water Quality Capture Volume (WQCV) detention
- Excess Urban Runoff Volume (EURV) detention
- 100-year storm detention

The facility utilizes staged outlet controls and overflow structures to provide extended detention, promote settling of suspended sediment, and attenuate post-development peak flows. The detention design is consistent with MHFD recommendations for full-spectrum detention.

Step 3: Utilize Stream and Drainageway Stabilization Techniques

The project receives runoff from Basin E through an existing drainage corridor that follows established drainage easements and lot boundaries. Opportunities for physical improvements within these privately owned drainage corridors are limited.

As a result, the primary mitigation strategy focuses on reducing runoff volumes through detention and controlled release while maintaining existing drainage patterns.

Runoff from the upper portions of Basin 106 will be conveyed to the regional Pond 2 facility prior to discharge through the existing 72-inch outfall system, which ultimately crosses Interstate 25 and discharges to a tributary of Plum Creek.

Step 4: Source Control

Potential pollutant sources associated with the proposed residential development are typical of suburban land uses and may include:

- Vehicle-related pollutants
- Fertilizers
- Herbicides and pesticides
- Household waste materials

During construction, erosion and sediment control measures will be implemented in accordance with the Town of Castle Rock Temporary Erosion and Sediment Control requirements and associated permitting requirements.

No wetlands or Waters of the United States were identified within the project area.

All public storm sewer infrastructure is proposed within public rights-of-way or dedicated tracts, providing adequate access for inspection and maintenance. Maintenance access to Pond 2 is provided from Alexander Place and Via Soleana through access easements established as part of the Soleana Phase III improvements.

E. Floodplain Modification

The proposed development includes storm sewer and surface overflow conveyance systems designed to safely route runoff from upstream tributary areas, including Basin 107.

Although published floodplain mapping does not extend into the upper reaches of Basin 107, the drainage analysis utilizes the existing swale and drainage corridor as the primary conveyance path for design storm events. The proposed improvements maintain historic drainage patterns while providing controlled conveyance through the development.

F. Additional Permitting Requirements

The project is not located within or adjacent to a FEMA-designated floodplain and does not impact identified wetlands or Waters of the United States. Accordingly, no federal wetland permits or floodplain development permits are anticipated for this project.

The development will be subject to applicable stormwater discharge permit requirements during construction and must comply with Town of Castle Rock erosion control and stormwater management regulations.

A review of the Preble's Meadow Jumping Mouse Critical Habitat Mapping for Unit 9 (West Plum Creek) indicates that no designated riparian conservation zones or critical habitat areas will be impacted by the proposed development. Supporting documentation is included in Appendix D.

CONCLUSIONS

A. *Compliance with Standards*

This analysis was developed in compliance with the Town of Castle Rock Stormwater criteria and includes site-specific revisions proposed for the improvement of offsite drainage conditions. The approach for stormwater detention is to regionalize the improvements to optimize the use of space in the overall watershed and to make the expenditure of resources as efficient as possible.

B. *Variances*

This report does not include variance requests,

C. *Drainage Concept*

This report builds on design concepts previously identified that allow for shared detention planned for assumed future conditions that accommodate previously approved development in Basin 106, this proposed development and future off site improvements that will be consistent with the proposed residential development in the area.

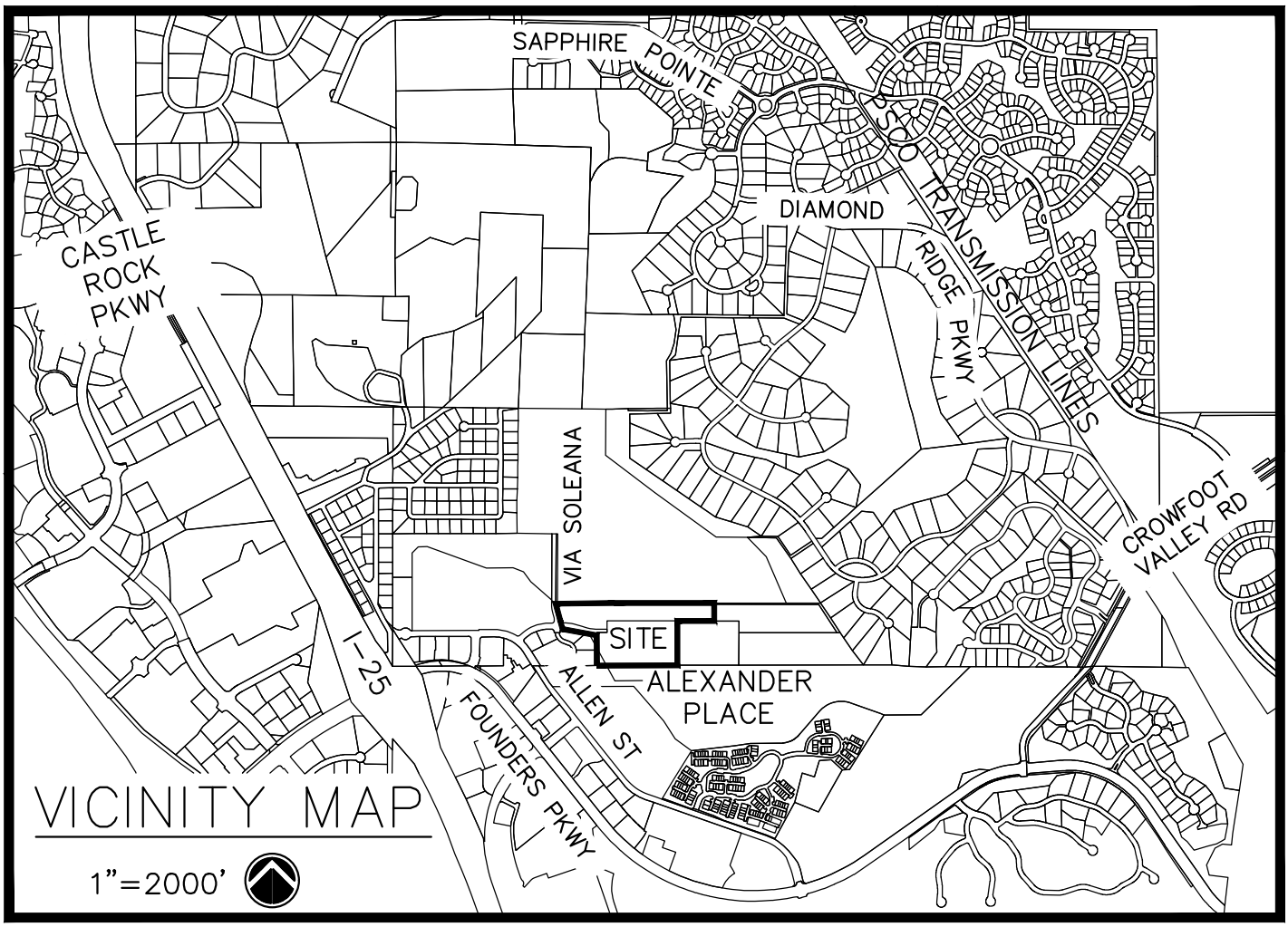
REFERENCES

1. Storm Drainage Design and Technical Criteria Manual, Town of Castle Rock, June 2019
2. Mile High Flood District Urban Storm Drainage Criteria Manual Volumes 1, 2 and 3
3. Phase III Drainage Report for Cooper Hook/Main Place Filing No. 1, Galloway Romero & Associates, August 2001
4. Phase III Drainage Report Soleana Subdivision, IMEG May 2026
5. Phase III Drainage Report for Monta Vista Lot 7, Cooperhook/Mainplace Filing No. 1 David Archer & Associates February 2014
6. FIRM Panel number 08035C0186G Douglas County Colorado Dated March 16, 2016.
7. Flood Hazard Area Delineation Tributary C and D Watersheds – Respec, October 2014
8. Preliminary Drainage Report PDP26-0001 Alexander Place PDP Amendment 1 – IMEG July 2026

Appendix A

Related Graphs Figures and Tables

- Vicinity Map
- FIRM Pannel
- FHAD Excerpts
- SCS soil survey


SAPPHIRE POINTE
DIAMOND RIDGE PKWY
500' TRANSMISSION LINES
CASTLE ROCK PKWY
VIA SOLEANA
CROWFOOT VALLEY RD
SITE
ALEXANDER PLACE
ALLEN ST
FOUNDERS PKWY
I-25
VICINITY MAP
1"=2000'

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 shown on 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 Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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 Floodway Data table shown on this FIRM.

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 provided by the Douglas County GIS Department and the Town of Castle Rock GIS Department. Additional input was provided by the City of Lone Tree and Town of Parker. These data are current as of 2010.

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 **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.

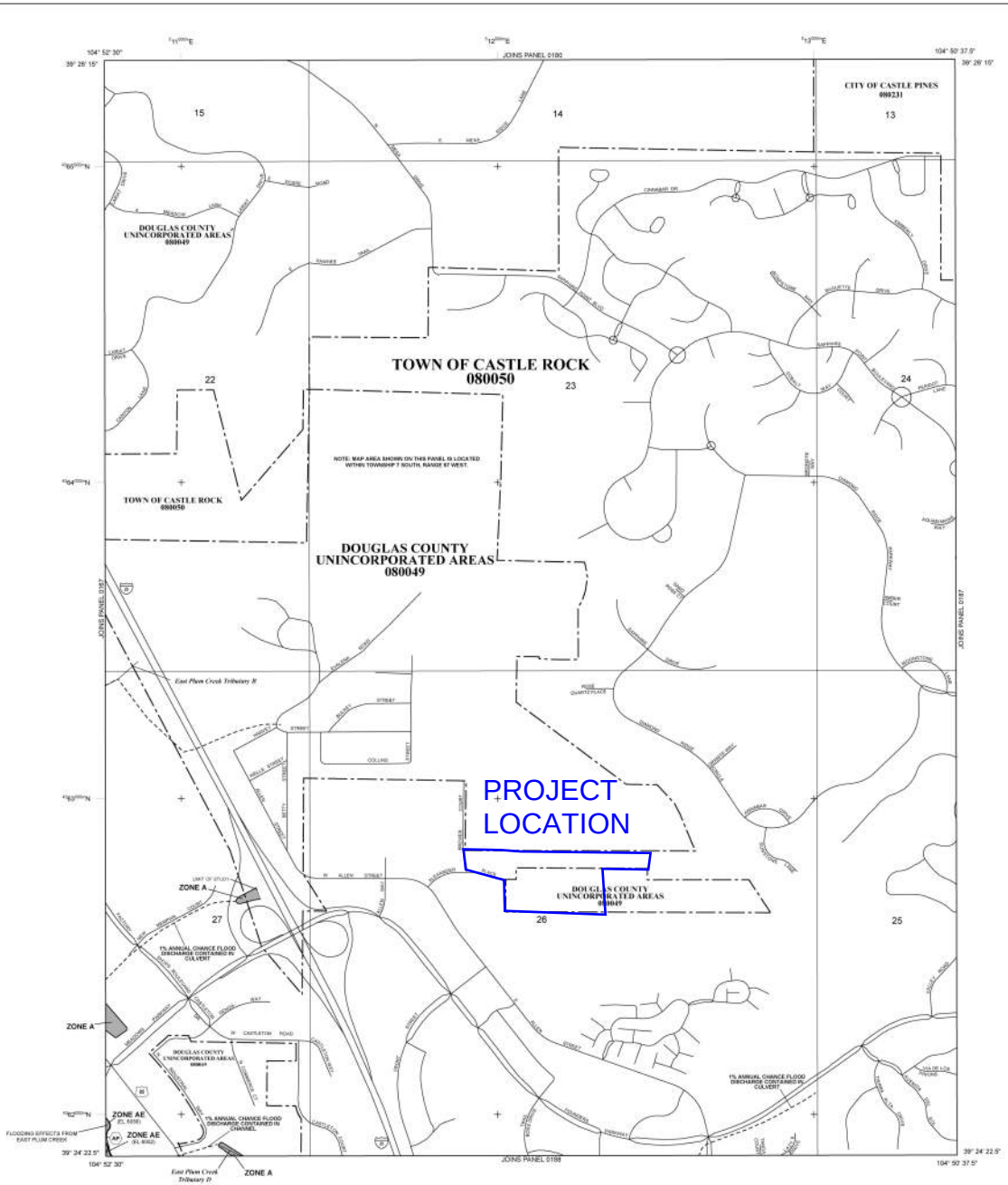
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

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.



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, AR/A, 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 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

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

1000-meter Universal Transverse Mercator grid values, zone 13

DX510 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

SEPTEMBER 30, 2015

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

MARCH 16, 2016: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, to incorporate previously-issued letters of map revision.

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0186G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 186 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

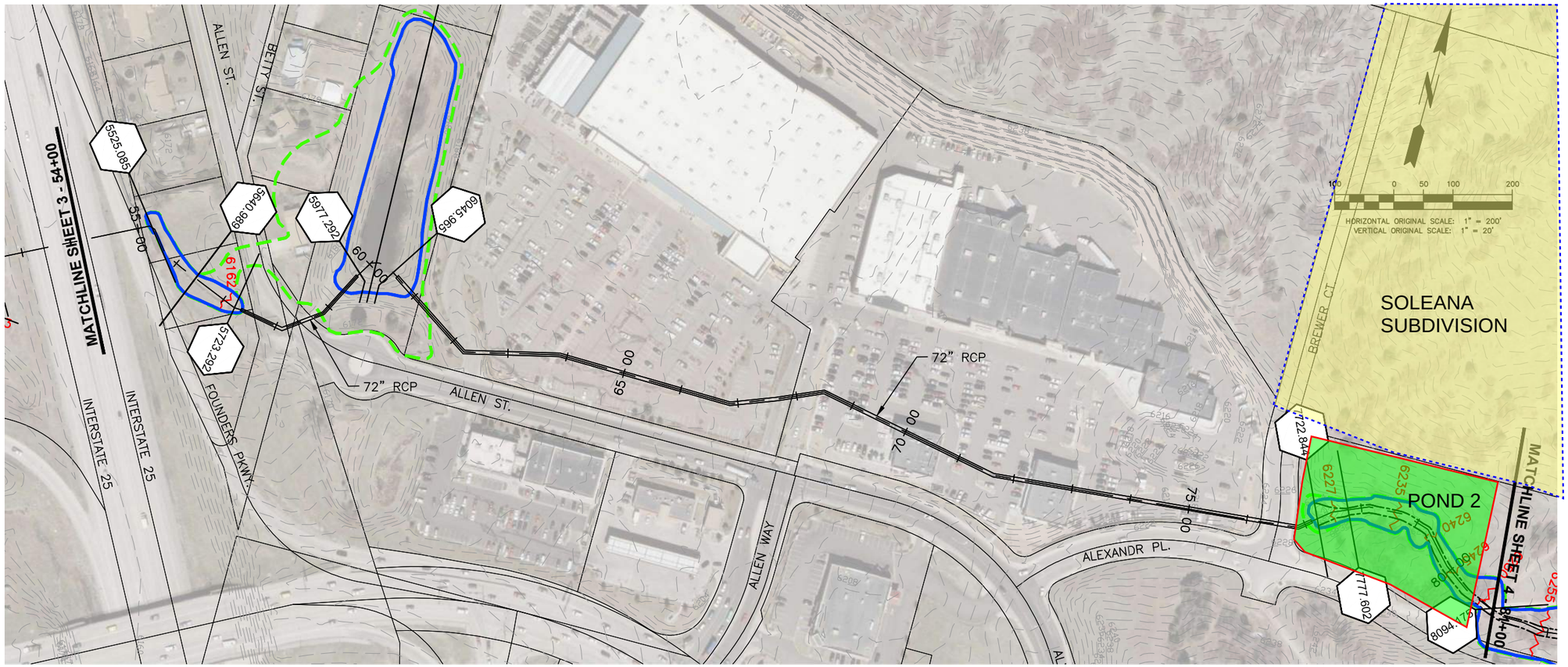
CONTAINS:

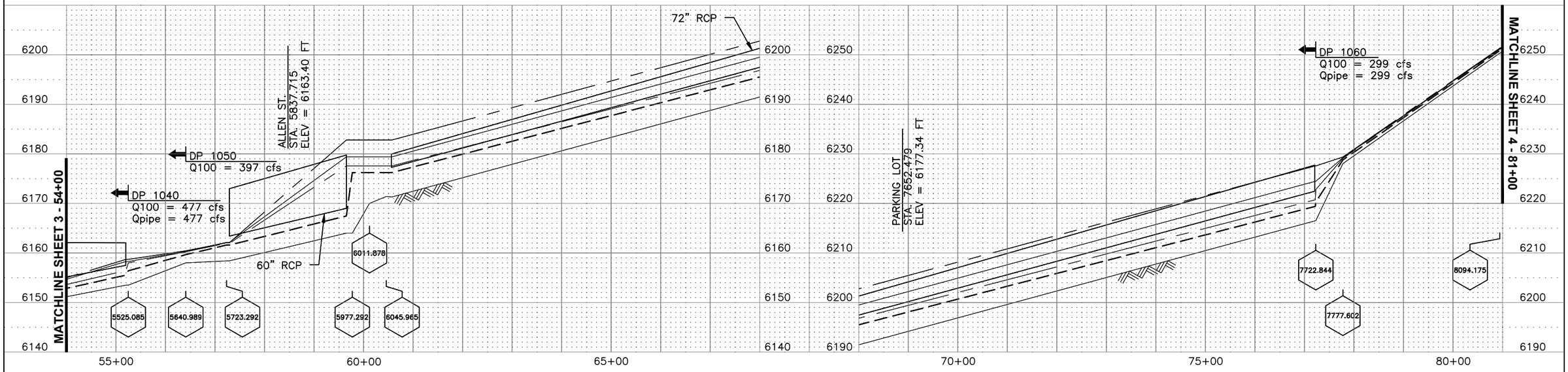
COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0186	G
DOUGLAS COUNTY	080049	0186	G
CASTLE PINES, CITY OF	080231	0186	G

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

MAP NUMBER
08035C0186G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency





NO.	DATE	DESCRIPTION	BY

DESIGNED WPF DATE 7/8/13
DRAWN ACT DATE 7/8/13
CHECKED RCO DATE 7/8/13

RESPEC WATER & NATURAL RESOURCES
720 S. COLORADO BLVD. SUITE 410S
DENVER, CO 80246
PH: (303) 757-3655

PROJECT NO. _____

TOWN OF CASTLE ROCK COLORADO

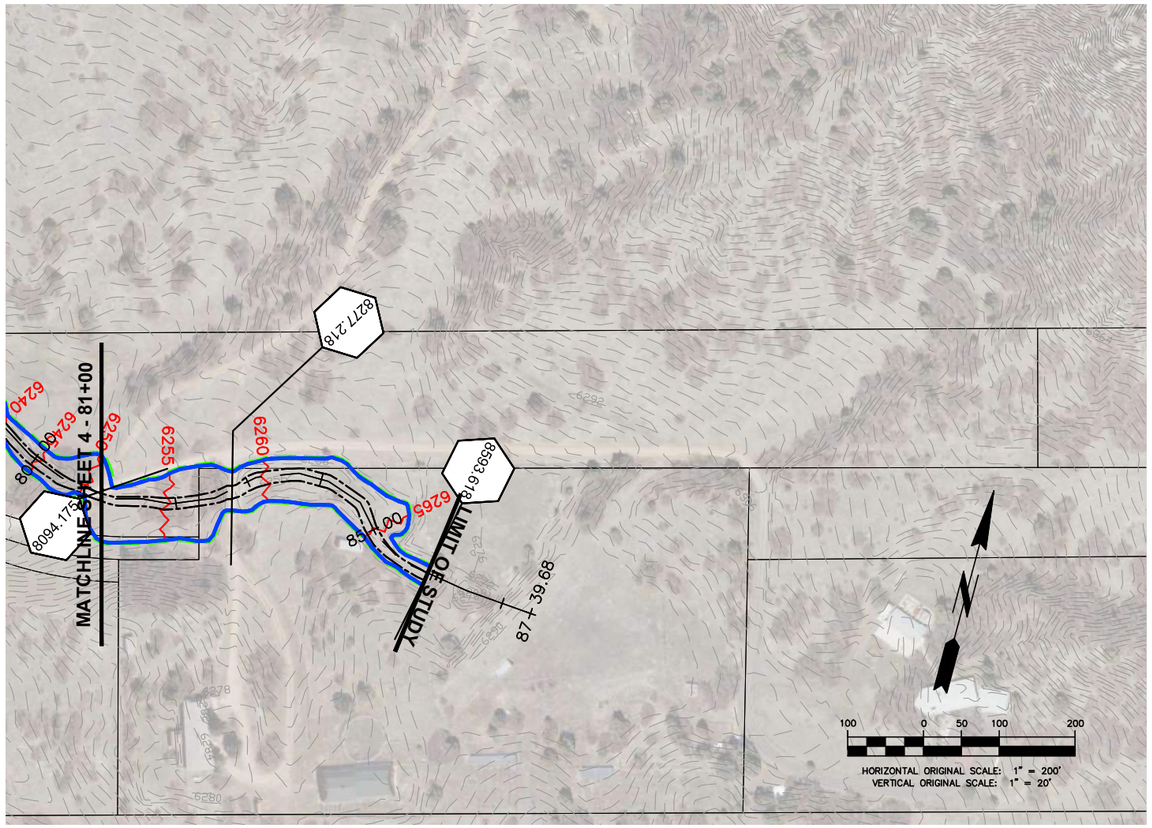
TOWN OF CASTLE ROCK

TRIBUTARY C FLOOD HAZARD AREA DELINEATION

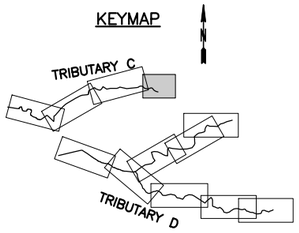
PLAN AND PROFILE 54+00 TO 81+00

FIGURE 3 OF 4

NAME: Z:\Castle Rock\TCR Planning Studies\CAD\Dwg-Fhad\Tributary C FHAD P & P.dwg
PLOT DATE: Jul 25, 2014 9:26am



KEYMAP

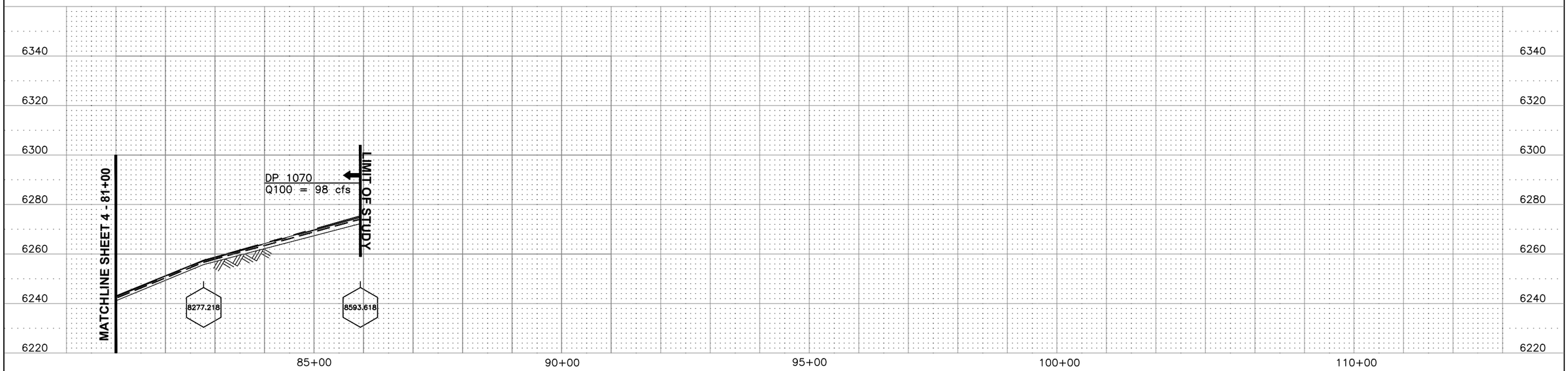


PLAN LEGEND

- XXXX — CROSS SECTION
- 100–YEAR FLOODPLAIN
- 500–YEAR FLOODPLAIN
- FLOODWAY
- BFE
- EXISTING CONTOURS

PROFILE LEGEND

- XXXX — CROSS SECTION
- 500–YEAR FLOODPLAIN
- 100–YEAR FLOODPLAIN
- 50–YEAR FLOODPLAIN
- 10–YEAR FLOODPLAIN
- EXISTING GROUND



NO.	DATE	DESCRIPTION	BY

DESIGNED WPF DATE 7/8/13
DRAWN ACT DATE 7/8/13
CHECKED RCO DATE 7/8/13

RESPEC WATER & NATURAL RESOURCES
720 S. COLORADO BLVD. SUITE 410S
DENVER, CO 80246
PH: (303) 757–3655

PROJECT NO. _____

TOWN OF CASTLE ROCK COLORADO

TOWN OF CASTLE ROCK

TRIBUTARY C FLOOD HAZARD AREA DELINEATION

PLAN AND PROFILE 81+00 TO 85+93.62

FIGURE 4 OF 4

NAME: Z:\Castle Rock\TCR Planning Studies\CAD\Dwg-Fhad\Tributary C FHAD P & P.dwg
PLOT DATE: Jul 25, 2014 9:27am



Map Scale: 1:2,490 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 18, Aug 29, 2025

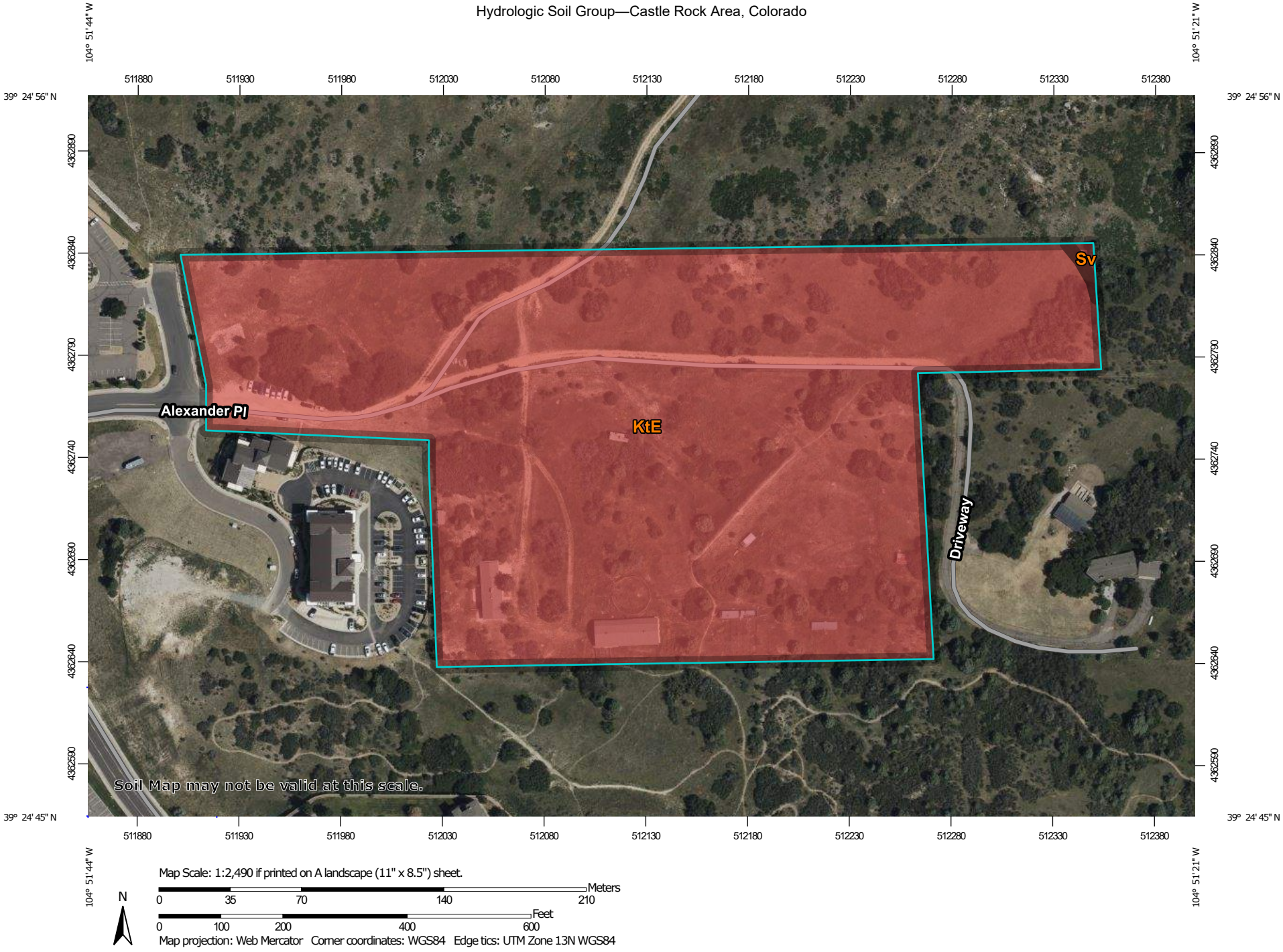
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
KtE	Kutch sandy loam, 5 to 20 percent slopes	16.0	99.8%
Sv	Stony steep land	0.0	0.2%
Totals for Area of Interest		**16.1**	**100.0%**



Map Scale: 1:2,490 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

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 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 18, Aug 29, 2025

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	16.0	99.8%
Sv	Stony steep land	D	0.0	0.2%
Totals for Area of Interest			**16.1**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B

Hydrologic Calculations

- Historic Basins
- Phase 2 Rational Calculations

STANDARD FORM SF-2

REFERENCE MHFD TABLE 6-2

Runoff Calculations

Time of Concentration

Watercourse Coefficient

Heavy Meadow	2.5	Short Grass Pasture & Lawns	7.0	Grassed Waterway	15.0
Tillage/field	5.0	Nearly Bare Ground	10.0	Paved Area & Shallow Gutter	20.0

	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN POINT	DRAIN BASIN	AREA ac.	% I	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	EQ 6-5	min.
h1	E	57.05	11.1%	0.13												40.0
h2	HA	13.80	13.0%	0.14	100	2.0	13.9	530	6.0	20.0	4.9	1.8	15.7	630	24.2	15.7
h3	B	28.59	31.5%	0.29	100	2.0	11.7	530	6.0	20.0	4.9	1.8	13.5	630	21.0	43.1
h4	C	53.46	17.0%	0.17	100	2.0	13.5	530	6.0	20.0	4.9	1.8	15.3	630	23.5	43.1
h5	M1	1.82	5.0%	0.08	100	2.0	14.9	530	6.0	20.0	4.9	1.8	16.7	630	25.6	16.7
h6	M2	7.89	5.0%	0.08	100	2.0	14.9	1220	4.0	2.5	0.5	40.7	55.6	1320	26.3	26.3
h7	M3	3.67	85.0%	0.73	50	4.0	3.0	457	3.0	20.0	3.5	2.2	5.2	507	11.8	5.2

STANDARD FORM SF-3
REFERENCE: MHFD Volume 1

Runoff Calculations

Rainfall Depth-Duration-Frequency (1-hr) = 1.43

(Rational Method Procedure)

Design Storm 5 Year

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
h1	E	57.05	0.13	40.0	7.15	1.88	13.5					
h2	HA	13.80	0.14	15.7	1.95	3.18	6.2					
h3	B	28.59	0.29	43.1	8.34	1.80	15.0					
h4	C	53.46	0.17	43.1	9.26	1.80	16.6					
h5	M1	1.82	0.08	16.7	0.14	3.08	0.4					
h6	M2	7.89	0.08	26.3	0.60	2.42	1.4					
h7	M3	3.67	0.73	5.2	2.67	4.80	12.8					

STANDARD FORM SF-3
REFERENCE: MHFD Volume 1

Runoff Calculations *Rainfall Depth-Duration-Frequency (1-hr) =* 2.60

(Rational Method Procedure)

Design Storm 100 Year

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
h1	E	57.05	0.53	40.0	30.20	3.42	103.4					
h2	HA	13.80	0.54	15.7	7.41	5.78	42.8					
h3	B	28.59	0.61	43.1	17.52	3.27	57.2					
h4	C	53.46	0.55	43.1	29.58	3.27	96.6					
h5	M1	1.82	0.50	16.7	0.92	5.60	5.2					
h6	M2	7.89	0.50	26.3	3.98	4.40	17.5					
h7	M3	3.67	0.83	5.2	3.05	8.73	26.6					

Percent Impervious Calculations

Runoff Calculations

		5%	35%	85%	55%		
DESIGN POINT	DRAIN BASIN	Open Space	SFH 0-3	Impervious	SFH 3-5	Total Area ac.	Composite I
1	E	2182871			302418	57.05	11.1%
2	A1				82286	1.89	55.0%
3	A2				6947	0.16	55.0%
4	A3				62486	1.43	55.0%
5	A4	4225			18927	0.53	45.9%
6	M1	79376				1.82	5.0%
7	A5				93652	2.15	55.0%
8	A6	2390			50544	1.22	52.7%
9	A7	27058			68175	2.19	40.8%
10	A8	5114			41007	1.06	49.5%
11	A9				86384	1.98	55.0%
15	A10			20647		0.47	85.0%
15	A11				32438	0.74	55.0%
15	A12	87022		15104	6632	2.50	19.2%
12	B	311556	683463	0	250370	28.59	31.5%
13	C	1423761	870176		34601	53.46	17.0%
14	M2	343614				7.89	5.0%
15	M3			159853		3.67	85.0%

STANDARD FORM SF-2

REFERENCE MHFD TABLE 6-2

Runoff Calculations

Time of Concentration

Watercourse Coefficient

Heavy Meadow	2.5	Short Grass Pasture & Lawns	7.0	Grassed Waterway	15.0
Tillage/field	5.0	Nearly Bare Ground	10.0	Paved Area & Shallow Gutter	20.0

	SUB-BASIN DATA				INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN POINT	DRAIN BASIN	AREA ac.	% I	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	EQ 6-5	min.
1	E	57.05	11.1%	0.13												40.0
2	A1	1.89	55.0%	0.48	130	2.0	10.2	530	5.5	20.0	4.7	1.9	12.1	660	16.9	12.1
3	A2	0.16	55.0%	0.48	50	2.0	6.3	150	4.0	20.0	4.0	0.6	6.9	200	16.7	6.9
4	A3	1.43	55.0%	0.48	140	2.0	10.6	330	2.0	20.0	2.8	1.9	12.5	470	17.0	12.5
5	A4	0.53	45.9%	0.41	70	2.0	8.4	330	2.0	20.0	2.8	1.9	10.3	400	18.5	10.3
6	M1	1.82	5.0%	0.08	100	2.0	14.9	340	6.0	2.5	0.6	9.3	24.2	440	25.5	24.2
7	A5	2.15	55.0%	0.48	130	2.0	10.2	600	2.0	20.0	2.8	3.5	13.7	730	17.2	13.7
8	A6	1.22	52.7%	0.46	130	2.0	10.5	470	2.0	20.0	2.8	2.8	13.3	600	17.5	13.3
9	A7	2.19	40.8%	0.37	200	2.0	15.1	680	6.0	20.0	4.9	2.3	17.4	880	19.5	17.4
10	A8	1.06	49.5%	0.44	150	2.0	11.8	350	2.0	20.0	2.8	2.1	13.9	500	18.0	13.9
11	A9	1.98	55.0%	0.48	140	2.0	10.6	410	6.0	20.0	4.9	1.4	12.0	550	16.9	12.0
15	A10	0.47	85.0%	0.73	100	2.0	5.4	370	6.0	20.0	4.9	1.3	6.7	470	11.7	6.7
15	A11	0.74	55.0%	0.48	120	2.0	9.8	370	6.0	20.0	4.9	1.3	11.1	490	16.8	11.1
15	A12	2.50	19.2%	0.19	100	2.0	13.2	350	6.0	15.0	3.7	1.6	14.8	450	23.0	14.8
12	B	28.59	31.5%	0.29												43.1
13	C	53.46	17.0%	0.17												43.1
14	M2	7.89	5.0%	0.08	100	2.0	14.9	1220	4.0	2.5	0.5	40.7	55.6	1320	26.3	26.3
15	M3	3.67	85.0%	0.73	50	4.0	3.0	457	3.0	20.0	3.5	2.2	5.2	507	11.8	5.2

STANDARD FORM SF-3
REFERENCE: MHFD Volume 1

Runoff Calculations

Rainfall Depth-Duration-Frequency (1-hr) = 1.43

(Rational Method Procedure)

Design Storm 5 Year

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
1	E	57.05	0.13	40.0	7.15	1.88	13.5					
2	A1	1.89	0.48	12.1	0.91	3.58	3.3					
3	A2	0.16	0.48	6.9	0.08	4.41	0.3	12.1	0.99	4.41	4.4	A1 & A2
4	A3	1.43	0.48	12.5	0.69	3.52	2.4					
5	A4	0.53	0.41	10.3	0.22	3.82	0.8	12.5	1.90	3.52	6.7	A1 thru A4
6	M1	1.82	0.08	24.2	0.14	2.54	0.4					
7	A5	2.15	0.48	13.7	1.04	3.38	3.5	24.2	1.18	2.54	3.0	M1 & A5
								40.0	10.23	1.88	19.3	E thru A5
8	A6	1.22	0.46	13.3	0.56	3.43	1.9					
9	A7	2.19	0.37	17.4	0.80	3.02	2.4					
10	A8	1.06	0.44	13.9	0.46	3.37	1.6	40.0	12.06	1.88	22.7	E thru A8
11	A9	1.98	0.48	12.0	0.96	3.59	3.4	40.0	13.02	1.88	24.5	E thru A9
15	A10	0.47	0.73	6.7	0.34	4.47	1.5	40.0	13.36	1.88	25.2	E thru A10
15	A11	0.74	0.48	11.1	0.36	3.72	1.3	40.0	13.72	1.88	25.8	E thru A11
15	A12	2.50	0.19	14.8	0.48	3.27	1.6	40.0	14.20	1.88	26.7	E thru A12
12	B	28.59	0.29	43.1	8.34	1.80	15.0					Soleana
13	C	53.46	0.17	43.1	9.26	1.80	16.6					Soleana
14	M2	7.89	0.08	26.3	0.60	2.42	1.4					Offsite Not Tributary
15	M3	3.67	0.73	5.2	2.67	4.80	12.8	26.3	3.27	2.42	7.9	M2, M3 Offsite Not Tributary

STANDARD FORM SF-3
REFERENCE: MHFD Volume 1

Runoff Calculations *Rainfall Depth-Duration-Frequency (1-hr) =* 2.60

(Rational Method Procedure)

Design Storm 100 Year

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
1	E	57.05	0.53	40.0	30.20	3.42	103.4					
2	A1	1.89	0.71	12.1	1.34	6.51	8.7					
3	A2	0.16	0.71	6.9	0.11	8.02	0.9	12.1	1.45	6.51	9.5	A1 & A2
4	A3	1.43	0.71	12.5	1.02	6.40	6.5					
5	A4	0.53	0.67	10.3	0.36	6.94	2.5	12.5	2.83	6.40	18.1	A1 thru A4
6	M1	1.82	0.50	24.2	0.92	4.62	4.2					
7	A5	2.15	0.71	13.7	0.73	6.15	4.5	24.2	1.65	4.62	7.6	M1 & A5
								40.0	34.67	3.42	118.7	E thru A5
8	A6	1.22	0.70	13.3	0.85	6.24	5.3					
9	A7	2.19	0.65	17.4	1.42	5.49	7.8					
10	A8	1.06	0.69	13.9	0.73	6.12	4.4	40.0	37.67	3.42	129.0	E thru A8
11	A9	1.98	0.71	12.0	1.41	6.53	9.2	40.0	39.08	3.42	133.8	E thru A9
15	A10	0.47	0.83	6.7	0.39	8.12	3.2	40.0	39.47	3.42	135.1	E thru A10
15	A11	0.74	0.71	11.1	0.53	6.75	3.6	40.0	40.00	3.42	136.9	E thru A11
15	A12	2.50	0.56	14.8	1.40	5.94	8.3	40.0	41.40	3.42	141.7	E thru A12
12	B	28.59	0.61	43.1	17.52	3.27	57.2					Soleana
13	C	53.46	0.55	43.1	29.58	3.27	96.6					Soleana
14	M2	7.89	0.50	26.3	3.98	4.40	17.5					Offsite Not Tributary
15	M3	3.67	0.83	5.2	3.05	8.73	26.6	26.3	7.03	4.40	31.0	M2, M3 Offsite Not Tributary

Appendix C

Hydraulic Calculations

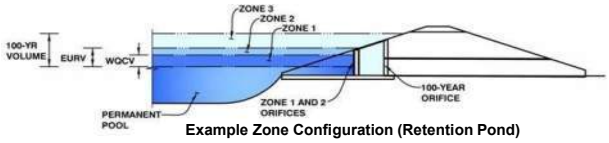
- Pond 2 Calculations
- Inlet Calculations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Soleana Subdivision**

Basin ID: **Pond 2 Sub Basins 106 and 107 Masterplan adjuisted for Future Development sites**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	162.00	acres
Watershed Length =	3,270	ft
Watershed Length to Centroid =	1,490	ft
Watershed Slope =	0.060	ft/ft
Watershed Imperviousness =	19.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	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) =	1.505	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	2.695	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	3.144	acre-feet	1.06 inches
5-yr Runoff Volume (P1 = 1.43 in.) =	7.100	acre-feet	1.43 inches
10-yr Runoff Volume (P1 = 1.66 in.) =	9.967	acre-feet	1.66 inches
25-yr Runoff Volume (P1 = 1.69 in.) =	11.219	acre-feet	inches
50-yr Runoff Volume (P1 = 2.26 in.) =	18.825	acre-feet	2.26 inches
100-yr Runoff Volume (P1 = 2.6 in.) =	24.335	acre-feet	2.60 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	31.841	acre-feet	inches
Approximate 2-yr Detention Volume =	2.011	acre-feet	
Approximate 5-yr Detention Volume =	4.077	acre-feet	
Approximate 10-yr Detention Volume =	4.913	acre-feet	
Approximate 25-yr Detention Volume =	5.098	acre-feet	
Approximate 50-yr Detention Volume =	6.347	acre-feet	
Approximate 100-yr Detention Volume =	8.460	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.505	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.190	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	6.517	acre-feet
Total Detention Basin Volume =	9.212	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	

Depth Increment = 1.00 ft

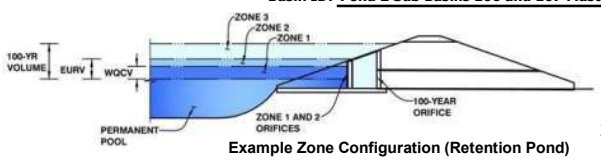
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	150	0.003		
6223	--	1.00	--	--	--	22,604	0.519	11,377	0.261
6224	--	2.00	--	--	--	26,038	0.598	35,698	0.820
6225	--	3.00	--	--	--	29,250	0.671	63,342	1.454
6226	--	4.00	--	--	--	32,562	0.748	94,248	2.164
6227	--	5.00	--	--	--	35,976	0.826	128,517	2.950
6228	--	6.00	--	--	--	39,489	0.907	166,249	3.817
6229	--	7.00	--	--	--	43,103	0.990	207,545	4.765
6230	--	8.00	--	--	--	46,818	1.075	252,506	5.797
6231	--	9.00	--	--	--	50,633	1.162	301,231	6.915
6232	--	10.00	--	--	--	54,549	1.252	353,822	8.123
6233	--	11.00	--	--	--	58,566	1.344	410,380	9.421
	--		--	--	--				
	--		--	--	--				
	--		--	--	--			

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **Soleana Subdivision**

Basin ID: **Pond 2 Sub Basins 106 and 107 Masterplan adjusted for Future Development sites**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.08	1.505	Orifice Plate
Zone 2 (EURV)	4.69	1.190	Orifice Plate
3 (100+1/2WQCV)	10.85	6.517	Weir&Pipe (Restrict)
Total (all zones)		9.212	

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

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

Calculated Parameters for Underdrain

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	5.250E-02	ft²
Depth at top of Zone using Orifice Plate =	4.45	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	18.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	7.56	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

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	1.50	3.00					
Orifice Area (sq. inches)	7.56	7.56	7.56					

	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)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft²
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.19	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.19	N/A	feet
Overflow Weir Front Edge Length =	15.00	N/A	feet	Overflow Weir Slope Length =	15.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	9.85	N/A	
Horiz. Length of Weir Sides =	15.00	N/A	feet	Overflow Grate Open Area w/o Debris =	156.60	N/A	ft²
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	78.30	N/A	ft²
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	15.90	N/A	ft²
Outlet Pipe Diameter =	54.00	N/A	inches	Outlet Orifice Centroid =	2.25	N/A	feet
Restrictor Plate Height Above Pipe Invert =	54.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	10.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.68	feet
Spillway Crest Length =	45.00	feet	Stage at Top of Freeboard =	13.18	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.34	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	9.42	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

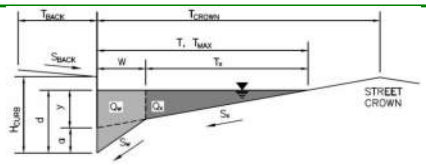
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

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	1.06	1.43	1.66	1.69	2.26	2.60	3.14
CUHP Runoff Volume (acre-ft) =	1.505	2.695	3.144	7.100	9.967	11.219	18.825	24.335	31.841
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.144	7.100	9.967	11.219	18.825	24.335	31.841
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	22.1	80.2	112.9	138.5	242.3	309.8	407.1
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.14	0.49	0.70	0.86	1.50	1.91	2.51
Peak Inflow Q (cfs) =	N/A	N/A	48.8	110.8	143.9	171.6	278.3	348.7	449.3
Peak Outflow Q (cfs) =	0.8	1.3	1.4	61.7	98.1	135.7	196.7	222.8	288.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	0.9	1.0	0.8	0.7	0.7
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.4	0.6	0.9	1.2	1.4	1.5
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) =	44	55	59	54	50	48	39	35	30
Time to Drain 99% of Inflow Volume (hours) =	**47**	59	63	62	61	60	56	53	49
Maximum Ponding Depth (ft) =	3.08	4.69	4.98	5.92	6.19	6.43	7.85	9.72	11.00
Area at Maximum Ponding Depth (acres) =	0.68	0.80	0.82	0.90	0.92	0.94	1.06	1.23	1.34
Maximum Volume Stored (acre-ft) =	1.508	2.698	2.926	3.735	3.981	4.214	5.626	7.763	9.421

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

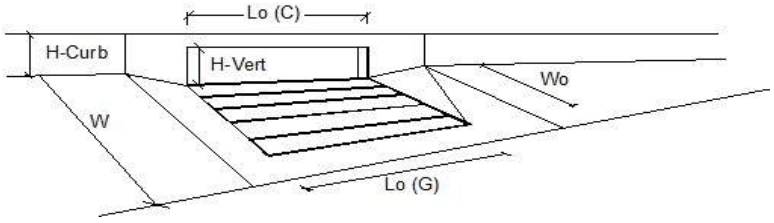
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.3**	**9.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.30 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 8.70 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



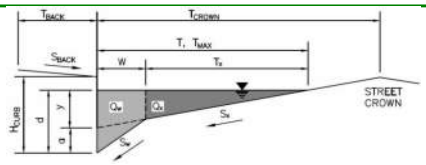
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**2.4**	**4.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.9**	**4.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**72**	**51**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

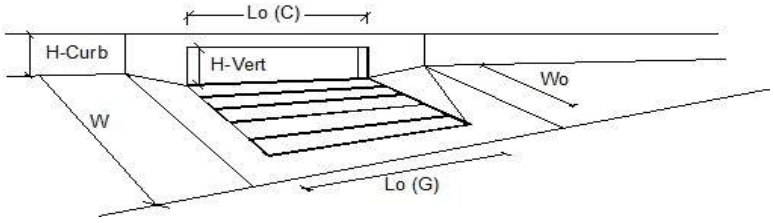
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.3**	**8.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.23 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 5.16 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



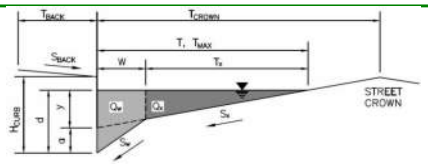
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**0.9**	**3.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**1.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**75**	**62**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A3**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	15.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

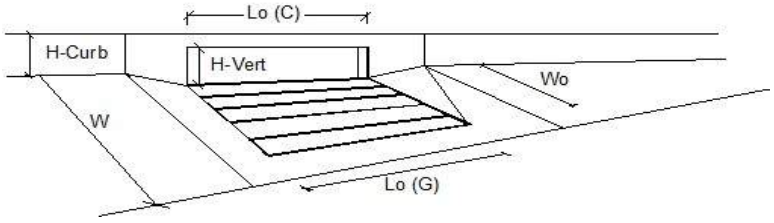
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.2	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.9**	**7.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.40 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 6.50 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



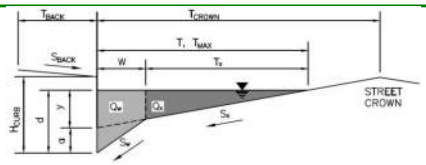
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**2.1**	**4.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**2.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**89**	**68**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A4**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	15.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

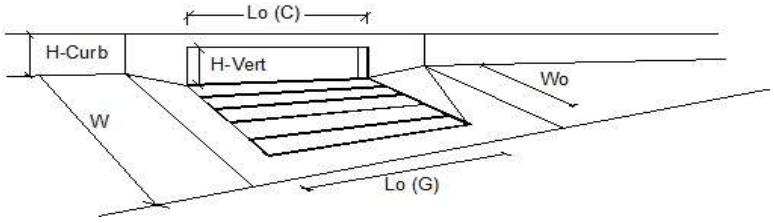
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.9**	**5.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.06 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.57 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



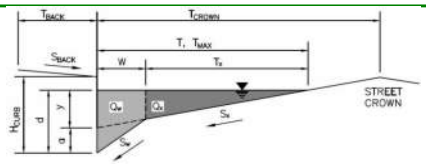
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**1.1**	**3.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**76**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

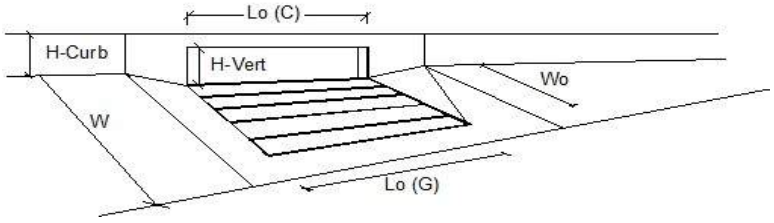
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.1	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**4.2**	**4.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.50 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.50 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



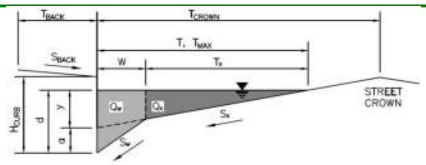
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**3.2**	**3.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**0.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**90**	**85**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A6**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

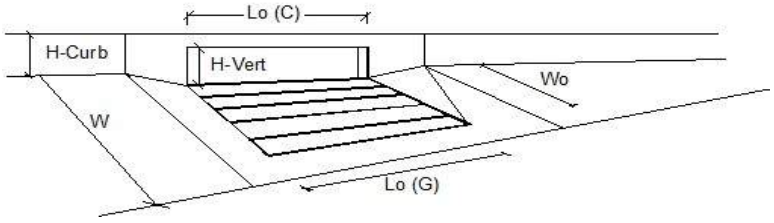
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.3	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.9**	**7.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.20 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.10 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



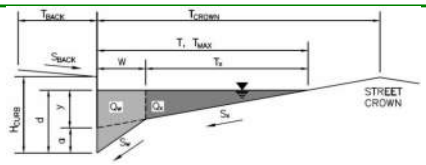
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**2.0**	**4.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.2**	**2.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**91**	**66**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A7**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

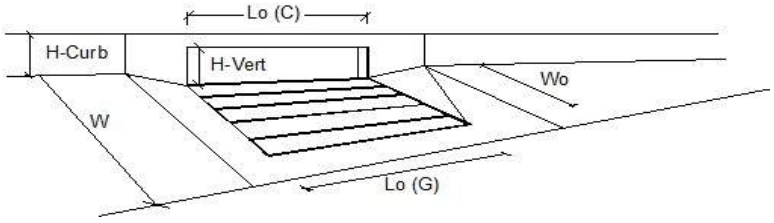
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.7	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.9**	**10.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.60 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



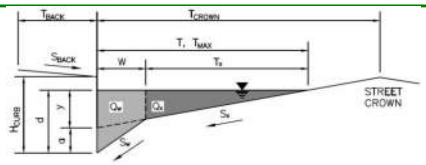
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**2.3**	**5.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**4.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**88**	**58**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

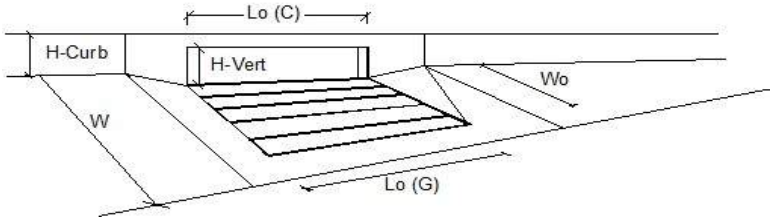
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.5	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.9**	**9.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.92 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 8.71 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



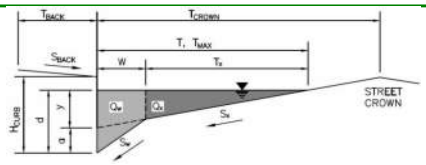
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**1.8**	**5.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**3.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**94**	**61**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A9**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

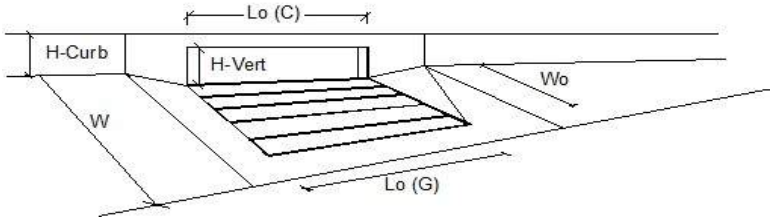
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.8	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.9**	**11.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.71 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 11.15 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



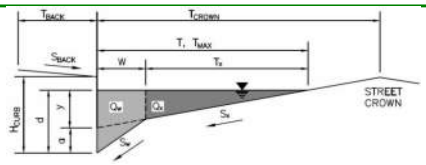
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT/Denver 13 Combination)	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**2.9**	**6.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.8**	**5.2**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**77**	**54**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A10**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.060	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

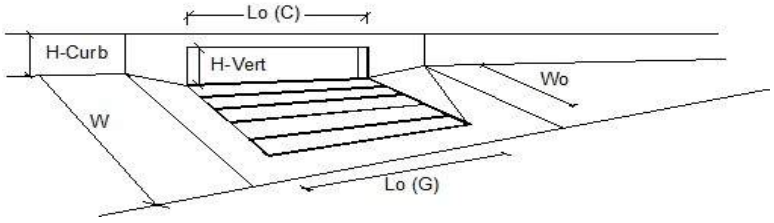
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.2**	**10.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.62 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 6.55 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



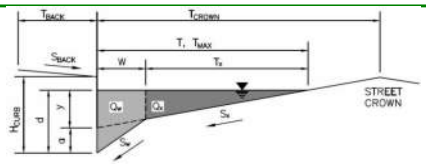
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT/Denver 13 Combination)	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**1.1**	**3.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.5**	**3.5**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**70**	**46**	**%**

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

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

Project: **Soleana Filing 2**
Inlet ID: **Inlet A11**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	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 =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.060	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

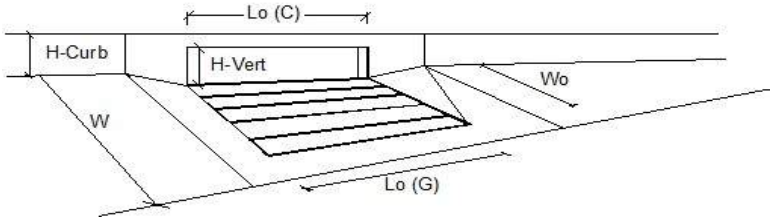
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.2**	**10.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.15 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 8.78 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 6.00 (August 2025)



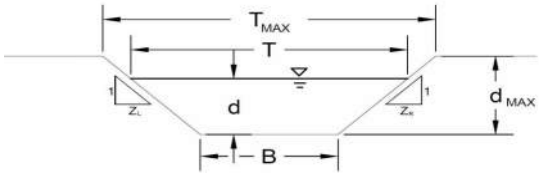
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q_a =**	**1.5**	**3.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.6**	**5.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**71**	**43**	**%**

AREA INLET IN A SWALE

Soleana Filing 2

Inlet E1



This worksheet uses the NRCS vegetal retardance method to determine Manning's n for grass-lined channels.

An override Manning's n can be entered for other channel materials.

Analysis of Trapezoidal Channel (Grass-Lined uses SCS Method)

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.020	
Channel Invert Slope	S_O =	0.0100	ft/ft
Bottom Width	B =	6.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Sloe	Z2 =	4.00	ft/ft

Check one of the following soil types:

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

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

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**30.00**	**30.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**3.00**	**3.00**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**585.7**	**585.7**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**3.00**	**3.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**13.0**	**100.0**	**cfs**
Water Depth	d =	**0.44**	**1.31**	**ft**

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'

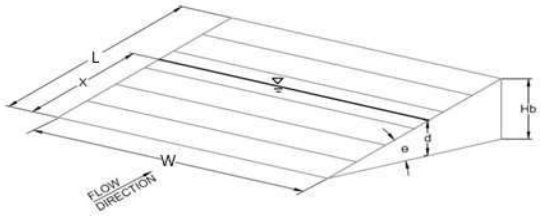
AREA INLET IN A SWALE

Soleana Filing 2

Inlet E1

Inlet Design Information (Input)

Type of Inlet: CDOT TYPE D (Parallel & Depressed) — Inlet Type = CDOT TYPE D (Parallel & Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	30.00	degrees
Width of Grate	W =	6.00	ft
Length of Grate	L =	3.00	ft
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	1.50	ft
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.75	
Orifice Coefficient	C_o =	0.50	
Weir Coefficient	C_w =	1.61	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.44	2.31	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**31.9**	**59.7**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**40.3**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**60**	**%**

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Appendix D

Exhibits

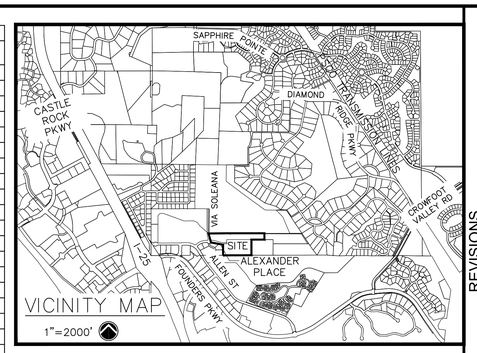
- Phase II Drainage Map
- Historic Basin Map
- Critical Habitat Exhibit
- TCR Checklist

NOTE:
STORM SEWER DESIGN WILL BE REVIEWED WITH THE SDP SUBMITTAL
ACCESS FOR DETENTION POND MAINTENANCE WILL BE PROVIDED PER SECTION 13.6.1 OF THE STORM WATER CRITERIA MANUAL
A STABLE WORKING BENCH MUST BE PROVIDED TO THE TOP OF THE OUTLET STRUCTURE AND SPILLWAY; A WORKING BENCH, NOT EXCEEDING 10%, SHOULD ALSO BE PROVIDED TO THE BOTTOM OF THE OUTLET STRUCTURE AND FOREBAY(S).

DETENTION SUMMARY	
	POND 2
WQCV	1.505 AC FT
DEPTH	3.08 FT
RELEASE	47 HR 0.80 CFS
EURV	1.19 AC FT
DEPTH	4.69 FT
RELEASE	59 HR 1.3 CFS
100 YEAR	6.517 AC FT
TOTAL	9.212 AC FT
DEPTH	10.85 FT
RELEASE	222.8 CFS

RUNOFF SUMMARY TABLE

DESIGN POINT	BASIN	AREA	Q5 BASIN	Q5 CUMULATIVE	Q 100 BASIN	Q 100 CUMULATIVE	STRUCTURE
1	E	57.05	13.5		103.4		Culvert
2	A1	1.89	3.3		8.7		Inlet
3	A2	0.16	0.3	4.4	0.9	9.5	Inlet
4	A3	1.43	2.4		6.5		Inlet
5	A4	0.53	0.8	6.7	2.5	18.1	Inlet
6	M1	1.82	0.4		4.2		Direct
7	A5	2.15	3.5	3.0	4.5	7.6	Inlet
				19.3	0.0	118.7	
8	A6	1.22	1.9		5.3		Inlet
9	A7	2.19	2.4		7.8		Inlet
10	A8	1.06	1.6	22.7	4.4	129.0	Inlet
11	A9	1.98	3.4	24.5	9.2	133.8	Inlet
15	A10	0.47	1.5	25.2	3.2	135.1	Inlet
15	A11	0.74	1.3	25.8	3.6	136.9	Inlet
15	A12	2.50	1.6	26.7	8.3	141.7	Pond 2
12	B	28.59	15.0		57.2		Pond 2
13	C	53.46	16.6		96.6		Pond 2
14	M2	7.89	1.4		17.5		DIRECT
15	M3	3.67	12.8	7.9	26.6	31.0	DIRECT



VICINITY MAP
1"=2000'

100 50 0 100 200
SCALE: 1" = 100'

A = BASIN DESIGNATION
B = AREA IN ACRES
I = % IMPERVIOUSNESS
D = DESIGN POINT DESIGNATION

EXISTING CONTOURS (2' INTERVAL)
PROPOSED CONTOURS (2' INTERVAL)
STORM SEWER
BASIN BOUNDARY

REVISIONS	
No.	DESCRIPTION
	DATE

IMEG
7600 E Orchard Rd
Suite 250-S
Greenwood Village, CO 80111
PH: 303.796.8500
www.imegcorp.com

ALEXANDER PLACE PDP AMENDMENT 1
CASTLE ROCK, CO
PHASE 2 DRAINAGE MAP

IMEG Project No:	2002764.00
File Name:	20002764.00 Filing 2 Phase II Drainage Exhibit.dwg
Field Book No:	
Drawn By:	RAR
Checked By:	TCG
Date:	8/12/2022
	1
Sheet	1 of 1

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Wednesday, September 30, 2026 8:59:09 AM
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REFER TO THE PHASE III SOLEANA DRAINAGE REPORT FOR NORTHERN LIMITS OF BASINS B AND C

DIAMOND RIDGE SUBDIVISION

MIRRO LLC

VIA SOLEANA

DESCANSIA ST

LUMINERA COURT

BRISA WAY

FLAMECREST TRAIL

TOWN OF CASTLE ROCK

LOT 2 COOPERHOOK/ MAINPLACE

POND 2

PLUM CREEK TRIB C FHAD LIMITS

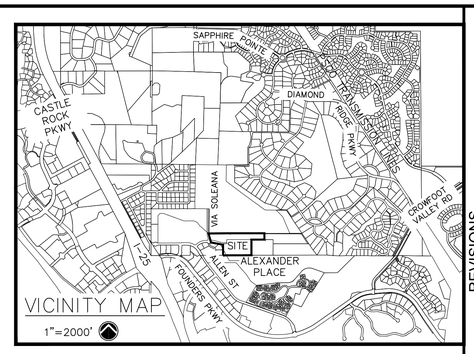
ALEXANDER PLACE

MONTA VISTA OFFICES

THORNTON LIVING TRUST

DIAMOND RIDGE SUBDIVISION

RUNOFF SUMMARY TABLE								
DESIGN POINT	BASIN	AREA	Q5 BASIN	Q5 CUMULATIVE	Q 100 BASIN	Q 100 CUMULATIVE	REMARKS	STRUCTURE
1	E	57.05	13.5		103.4		Basin 107	Trib C
2	HA	13.80	6.2		42.8		Development Area	Trib C
12	B	28.59	15.0		57.2		Soleana	Pond 2
13	C	53.46	16.6		96.6		Soleana	Pond 2
6	M1	1.82	0.4		5.2			Direct
14	M2	7.89	1.4		17.5			Direct
15	M3	3.67	12.8		26.6			Direct



VICINITY MAP

1"=2000'

A = BASIN DESIGNATION
B = AREA IN ACRES
I = % IMPERVIOUSNESS

D = DESIGN POINT DESIGNATION

EXISTING CONTOURS (5' INTERVAL)
PROPOSED CONTOURS (2' INTERVAL)
STORM SEWER
BASIN BOUNDARY

100 50 0 100 200

SCALE: 1" = 100'

DETENTION SUMMARY	
	POND 2
WQCV	1.505 AC FT
DEPTH	3.08 FT
RELEASE	47 HR 0.80 CFS
EURV	1.19 AC FT
DEPTH	4.69 FT
RELEASE	59 HR 1.3 CFS
100 YEAR	6.517 AC FT
TOTAL	9.212 AC FT
DEPTH	10.85 FT
RELEASE	222.8 CFS

No.	DESCRIPTION	DATE
	REVISIONS	

IMEG
PH: 303.796.9500
www.imegcorp.com
7600 E Orchard Rd
Suite 250-S
Greenwood Village, CO 80111

ALEXANDER PLACE PDP AMENDMENT 1

CASTLE ROCK, CO

PHASE 1 HISTORIC DRAINAGE MAP

IMEG Project No: 2002764.00

File Name: 20002764.00 Filing 2 Phase I Historic Drainage Exhibit.dwg

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Field Book No:

Drawn By: RAR

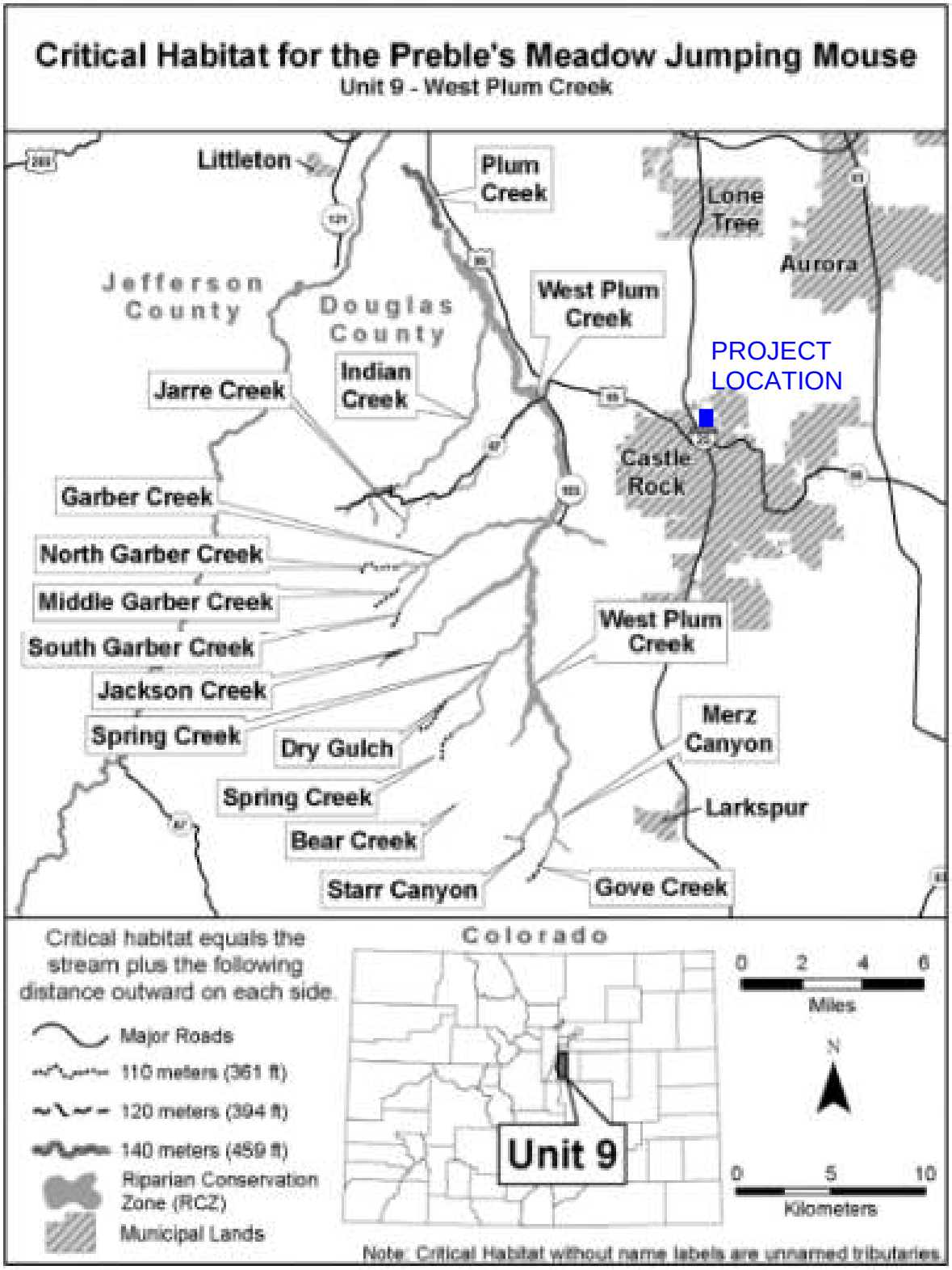
Checked By: TCG

Date: 5/8/26

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Sheet 1 of 1

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Critical Habitat for the Preble's Meadow Jumping Mouse
Unit 9 - West Plum Creek
Littleton
Plum Creek
Lone Tree
Aurora
Jefferson County
Douglas County
West Plum Creek
PROJECT LOCATION
Jarre Creek
Indian Creek
Castle Rock
Garber Creek
North Garber Creek
Middle Garber Creek
South Garber Creek
Jackson Creek
Spring Creek
Dry Gulch
West Plum Creek
Merz Canyon
Spring Creek
Larkspur
Bear Creek
Starr Canyon
Gove Creek
Critical habitat equals the stream plus the following distance outward on each side.
Major Roads
110 meters (361 ft)
120 meters (394 ft)
140 meters (459 ft)
Riparian Conservation Zone (RCZ)
Municipal Lands
Colorado
Unit 9
0 2 4 6
Miles
N
0 5 10
Kilometers
Note: Critical Habitat without name labels are unnamed tributaries.