BOARD OF COUNTY COMMISSIONERS LAND USE MEETING/PUBLIC HEARING

TUESDAY, APRIL 22, 2025

AGENDA

Tuesday, April 22, 2025	**2:30 PM**	**Hearing Room**

2:30 PM

1. Call to Order

a. Pledge of Allegiance

b. Attorney Certification of Agenda

c. Commissioners Disclosure for Items on This Agenda

2. Land Use Meeting Agenda Items

a. Fields Filing 1 Final Plat - Project File: SB2024-041.
Heather Scott, AICP, Principal Planner — *Department of Community Development*

Attachments: Staff Report - SB2024-041

3. Public Hearing Agenda Items

a. Adoption of Ordinance No. O-025-001, an Ordinance for the Regulation of Traffic and Parking, Repealing all Ordinances and Resolutions in Conflict Therewith, and Providing Penalties for Violation Thereof. Second and Final Reading.
Commander Alan Stanton — *Sheriff*

Attachments: Proposed Amendment to Traffic Ordinance FINAL

b. Struby Resurvey, Lots 7-11 - Rezoning - Project File: ZR2024-008.
Trevor Bedford, AICP, Senior Planner — *Department of Community Development*

Attachments: Staff Report - ZR2024-008

c. Resolution supplementing the 2025 Adopted Budget for the County of Douglas, Colorado to Recognize New Revenues received since Annual Budget Adoption, Appropriate Restricted, Committed, Assigned, and Unassigned Fund Balances in the Amount of $32,692,346.
Kimberly Hirsch, Assistant Budget Director — *Budget*

Attachments: Final Supplemental Packet

4. Adjournment

The Next Land Use Meeting / Public Hearing Will be Held on Tuesday, May 13, 2025 @ 2:30 p.m.

MEETING DATE: April 22, 2025

STAFF PERSON RESPONSIBLE: Heather Scott, AICP, Principal Planner

DESCRIPTION: Fields Filing 1 Final Plat - Project File: SB2024-041.

SUMMARY: The request is for approval of a final plat for 118 single-family detached residential lots, 14 tracts, and 5 public roads on 282.05 acres.

STAFF ASSESSMENT: Staff has evaluated the final plat request in accordance with Article 5 of the Subdivision Resolution. Should the Board find that the approval standards for the final plat are met, the following proposed conditions should be considered for inclusion in the motion:

1. Prior to plat recordation, the applicants shall pay $429,238.48 to Douglas County for cash-in-lieu of park land dedication.
2. Prior to plat recordation, the applicants shall pay $215,185.09 to the Douglas County School District for cash-in-lieu of school land dedication.
3. During construction activity within the development, the applicants, their successors, and assigns shall take all reasonable care to watch for historic resources, paleontological resources, and other cultural history resources and shall immediately notify Douglas County in the event of such discover.
4. Prior to recordation of the final plat, technical corrections to the plat exhibit shall be made to the satisfaction of Douglas County.
5. All statements and commitments made by the applicants or the applicants' representative during the public meeting and/or agreed to in writing and included in the public record have been relied upon by the Board of County Commissioners in approving the application; therefore, such approval is conditioned upon the applicants' full satisfaction of all such commitments and promises.

REVIEW:

Terence T Quinn - FYI	Notified - FYI	4/10/2025
Steven E Koster	Approve	4/10/2025
Jeff Garcia	Approve	4/16/2025
Andrew Copland	Approve	4/16/2025
Doug DeBord	Approve	4/16/2025
Samantha Hutchison - FYI	Notified - FYI	4/16/2025

ATTACHMENTS:

Staff Report - SB2024-041

Final Plat Staff Report

Date: April 9, 2025

To: Douglas County Board of County Commissioners

Through: Douglas J. DeBord, County Manager

From: Terence T. Quinn, AICP, Director of Community Development TQ

CC: Heather Scott, AICP, Principal Planner
Jeanette Bare, AICP, Planning Manager
Steven E. Koster, AICP, Assistant Director of Planning Services

Subject: **Fields Filing 1 – Final Plat**

Project File: **SB2024-041**

Board of County Commissioners Meeting: **April 22, 2025 @ 2:30 p.m.**

I. EXECUTIVE SUMMARY

The request is for approval of a final plat for 118 single-family detached residential lots, 14 tracts, and 5 public roads on 282.05 acres. The property is zoned Estate Residential (ER) and is located southeast of the Town of Parker, north of the intersection of Hilltop Road and Singing Hills Road. Lots range in size from 0.7 acres to 2.125 acres. Lots will be served by Parker Water and Sanitation District (PWSD). Access will occur via two new public roads connecting to Hilltop Road.

Fields Filing 1 is one of three final plats proposed within the 638.71-acre Fields Preliminary Plan. The proposed plat is located in the Northeast Subarea of the Douglas County 2040 Comprehensive Master Plan.

II. APPLICATION INFORMATION

A. Applicants

Toll Southwest LLC
7100 E. Belleview Avenue, Suite 200
Greenwood Village, Colorado 80111

Wallden - Hilltop, LLC
7199 N. Flintwood Road
Parker, Colorado 80138

B. Applicants' Representative
LJA Engineering, Inc.
1765 West 121st avenue, Suite 300
Westminster, Colorado 80234

C. Request
The applicants request approval of a final plat consisting of 118 single-family residential lots, 14 tracts, and public ROW on 282.052 acres.

D. Process
A final plat application is processed pursuant to Article 5 of the Subdivision Resolution. Article 5 states the intent of the process is "To provide for the review of the final engineering plans, the subdivision improvement agreement, public dedications, and other legal agreements."

Per Section 504.06 of the DCSR, "The Board shall evaluate the final plat, staff report, referral agency comments, applicant responses, and public comment and testimony, and shall approve, approve with conditions, continue, table for further study, or deny the final plat. The Board's action shall be based on the evidence presented; compliance with adopted County standards, regulations, and policies; and other guidelines."

E. Location
The project area is located in the northeast portion of Douglas County. The site is northeast of Hilltop Road, and southeast of the Town of Parker, more specifically north of the intersection of Hilltop and Singing Hills Road. The zoning map, aerial map, and 2040 CMP vicinity map highlighting site location and existing conditions are in the attachments.

F. Project Description
This final plat application is for 118 detached single-family residential lots. Proposed lots range in size from 0.7 acres to 2.125 acres. Each lot will be served by PWSD. South Metro Fire Rescue (SMFR) will serve the project and have reviewed and approved project.

Parker Water and Sanitation District will accept Tracts A and J proposed within the final plat area for water and sewer utility purposes. The Meadow Rock Homeowners Association will own and maintain Tracts B, C, D, E, F, K, and L for drainage, open space, and utility purposes. Tracts G, H, and I will be dedicated to the Hilltop Brothers, LLC for director parcel ownership purposes and are less than a quarter acre in size. The Fields Metro District No. 1 (Metro District) will own and maintain Tract M proposed within the final plat area for drainage and utilities purposes. Tract N will be dedicated to the County for roadside drainage and utility purposes. Stormwater facilities will be owned and maintained by the Metro District, with the County accepting standard backup drainage easements.

The final plat proposes five new public roads to provide access to the lots: Wild Geese Street, Hawk Flight Place, Plains Gold Drive, Coyote Track Lane, and Coyote Track Circle. There will be two main access points to Hilltop Road: Wild Geese Street will connect along the northwest side and Coyote Track Lane will connect at the proposed round-about at Singing Hills Road and Hilltop Road. Coyote Track Lane will temporarily access Hilltop Road north of the round-about until ROW improvements are made by the County. These roads will be public and accepted by the County via the final plat. Additional right-of-way for Hilltop Road and Singing Hills Road has been dedicated for future improvements.

The final plat exhibit and proposal conforms to the approved preliminary plan.

III. CONTEXT

A. Background

The site was rezoned from Agricultural One (A-1) to Estate Residential (ER) by the Board of County Commissioners (Board) on March 8, 2022. The Fields Preliminary Plan was approved on November 7, 2023, for 130 lots on 638.71 acres.

There are 3 final plats proposed for the Fields Preliminary Plan: Fields Filing 1, 2 and 3. Fields Filing 2 was recently approved for five 10-acre lots southwest of Hilltop Road. Fields Filing 3 is for the proposed 35-acre or greater lots on the east side of the preliminary plan. Fields Filing 1 is the subject of the current request before the Board.

For proposed Filing 1, the approved preliminary plan depicted 118 clustered lots, ranging from 0.7 to 2.125 acres in size. These lots were included in the Parker Water and Sanitation District (PWSD) for central water and sewer service provision. A Location and Extent application for a PWSD sewage lift station was approved by the Planning Commission in December of 2024.

B. Adjacent Land Uses and Zoning

The Fields Filing 1 final plat request is northeast of Hilltop Road and north of Singing Hills Road. The Bagnall Rural Residential subdivision in adjacent to the north with parcel sizes ranging from 5 acres to 37 acres. Tallman Gulch is adjacent to the west with parcels generally ranging from 1.5 to 2 acres in size. Proposed Fields Filing 3 is located to the east with lots sizes in excess of 35 acres and Fields Filing 2 is located southwest of the site with 10-acre lot sizes. The following table reflects those zone districts and land uses surrounding the PD.

Zoning and Land Use

Direction	Zoning	Land Use
North	Rural Residential	Residential - Bagnall
South	Estate Residential	Vacant Residential – Fields Filing 2 Residential - Hidden Village
East	Estate Residential	Vacant Residential – Proposed Fields Filing 3
West	Rural Residential	Residential – Tallman Gulch

IV. PHYSICAL SITE CHARACTERISTICS

A. Site Characteristics and Constraints

The site has been historically utilized for farming and ranching purposes. A rural homestead dwelling is developed on the property. Four major drainage channels diagonally traverse the site from south to north. These tributaries converge along the northwest side of the project site and ultimately drain to Cherry Creek. The site is bounded on the south by Singing Hills Road, west by Hilltop Road and by residential development to the north and west. The agricultural hay fields are located in the area of Filing 1 and there is an earthen berm that exists along the north side of Hilltop Road as part of a former railroad line. Vegetation in the site and along the intermittent drainage ways include ponderosa pine, mountain mahogany, yucca, cacti, grasses, and forbs.

B. Access

Two access points are proposed off of Hilltop Road: Wild Geese Street will connect along the northwest side and Coyote Track Lane will connect at the proposed round-about at Singing Hills Road and Hilltop Road. Public Works Engineering has reviewed and approved the traffic analysis for the Fields subdivision, including this final plat. Coyote Track Lane will temporarily access Hilltop Road north of the proposed Hilltop and Singing Hills Road roundabout.

The applicants have dedicated 19.414 acres of additional ROW to the County along the northeast side of Hilltop Road and on the north side of Singing Hills Road via special warranty deed. This ROW includes area for a future roundabout at the intersection of Hilltop Road and Singing Hills Road and acceleration and deceleration lanes at the two access points on Hilltop Road. Additionally, the five streets within the subdivision are dedicated to Douglas County as public roads.

C. Soils and Geology

The *CMP* Class 3 Hazards and Environmental Constraints map within the Douglas County 2040 CMP indicates there are no known constraints on the site. The applicants submitted a geotechnical due diligence report with the preliminary plan application. Colorado Geological Survey (CGS) reviewed the final plat request and had no objections with Fields Filing 1. CGS requested erosional setbacks to several lots to protect structures and improvements from channel erosion and scour, undercuttying, and slope failure, as those lots are close to Tallman Gulch and its tributaries. Further geological testing for all lots will be done at the time of building permit.

D. Drainage and Erosion

A Phase III Drainage Report and Geomorphology report as an attachment; a Grading, Erosion, Sediment Control (GESC) Plan; and construction plans were reviewed and accepted by Douglas County Engineering Services. The Metro District will own and maintain stormwater facilities, including the detention pond in Tract A, with the County to accept backup drainage easements via the final plat. Drainage Tracts B and D will be owned and maintained by the HOA. The major tributary through this site is located in Tract M and will be owned and maintained by the Metro District to reduce the overall impact to this drainageway.

E. Floodplain

While there are no mapped FEMA 100-year floodplain within the project area, there are several unmapped 100-year floodplains which have been identified on the preliminary plan exhibit, including portions of Tallman Gulch, Long Outfall, Doud Outfall and Goldsmith Outfall. Drainage notes have been added on the plat that clarifies the Fields Metro District #1 will be responsible for construction and maintenance of the drainage easements. It also allows a blanket easement to the County in the event such maintenance and repair are not performed by the system owner, to the satisfaction of Douglas County and allows the County the right to enter the site to perform all necessary work, at the applicants' expense, if the system fails.

F. Wildlife

The CMP Wildlife Resources map identifies the project site as moderate habitat value. The site is not located within a wildlife habitat conservation area, overland connection, wildlife movement corridor, or wildlife crossing area. The site development proposal preserves 117.91 acres of the site as contiguous open lands. Existing trees and shrubs along the drainageways will be preserved, with limited impacts to vegetation. Appropriate open space conservation methods will be evaluated with the final plat application.

G. Historic Preservation

Douglas County Historic Preservation reviewed the proposal and indicated no archaeological or historical sites have been identified on the site. The applicants will take all reasonable care to watch for historic and paleontological resources while excavating the land, and that if any artifacts are found, that these items be properly recorded, and that notification be provided to the proper authority.

V. PROVISION OF SERVICES

A. Schools

The Douglas County School District (DCSD) reviewed the final plat application during referral. The DCSD indicated that the 118 lots generated a school land dedication in the amount of 2.662 acres. Cash-in-lieu of $215,185.09 is required based on a land dedication appraisal of the property. DCSD fees are to be paid prior to recordation of the final plat.

B. Fire Protection

South Metro Fire Rescue (SMFR) provides fire and emergency medical services to the site and reviewed the request and had no concerns with the project.

C. Sheriff Services

The Douglas County Sheriff's Office (DCSO) will provide police protection to the site. Responses were not received from the DCSO or E911. The Office of Emergency Management reviewed the request and had no concerns with the project.

D. Water

Water service will be provided by PWSD. PWSD provided a will serve letter indicating its willingness and ability to serve the proposed 118 lots. Water rights underlying the clustered portion of the Fields property were conveyed to the district as a condition of annexation into the district. The Colorado Division of Water Resources reviewed the application and gave an opinion that "the water supply can be provided without causing injury is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory allocation approach, for the proposed uses is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision."

E. Sanitation

Sanitary sewer service will be provided by PWSD. The Douglas County Health Department provided a referral comment on the final plat and provided a favorable recommendation regarding the proposed method of sewage disposal at the time of preliminary plan.

F. Utilities

Area utility service providers were provided a referral on this application. Xcel Energy has no apparent conflict. CORE Electric Cooperative (CORE) reviewed the request and provided comments requesting 15-foot utility easements with Tracts E, G, H, and I. The applicants revised the final plat to address CORE's comments. PSCo did comment that they own existing natural gas distribution facilities along Hilltop Road and to complete the application process for new facilities. PSCo also requested Note 7 to be reworded to ensure no encroachments are allowed within their easements. The applicants revised the final plat to address PSCo's comments. No other utility provider issued comments on the application.

G. Dedications

The following dedications are anticipated at the time of final plat.

Dedicated Element	Purpose, Ownership, and Maintenance
Roads	Roads will be public and conveyed to Douglas County.
Tracts A & J	Dedicated to Parker Water and Sanitation District for water and sewer utility purposes.
Tracts B through F, K, & J	Dedicated to the HOA for drainage, open space, and utility purposes.
Tracts G, H, & I	Dedicated to Hilltop Brothers, LLC for director parcel ownership purposes.
Tract M	Dedicated for ownership and maintenance for drainage, open space, and utility purposes
Tract N	Dedicated to the County for roadside drainage and utility purposes
Drainage and Blanket Access Easements	Douglas County will accept secondary drainage easements for all drainage facilities
Utilities	Douglas County will accept general purpose utility easements.

H. Parks, Trails, and Open Space

The applicants are responsible for park land dedication or an equivalent cash-in-lieu fee. The applicants prepared a land dedication appraisal in accordance with Article 10 of the DCSR. The total park land dedication required for the 118 lots is 5.31 acres. Cash-in-lieu fees of $429,238.48 will be paid prior to recordation of the final plat.

I. Subdivision Improvements

The intent of the County's final plat process is "to provide for the review of the final engineering plans, the subdivision improvements agreement, public dedications, and other legal agreements." Per the *DCSR*, specific engineering reports, studies, and construction plans are required to be submitted and finally accepted or approved by Public Works Engineering with a final plat application. Cost estimates for the public and private improvements are generated from the approved construction plans and incorporated into the subdivision improvements agreement (SIA) for the plat. The SIA has been approved.

Required improvements for the Fields Filing 1 Final Plat include public roads, stormwater detention pond and subdivision facilities, dry and wet utilities, community, and fire hydrant improvements. All required engineering reports, studies, and construction plans for the final plat have been reviewed by Public Works Engineering with only minor technical corrections remaining. It is anticipated that the construction plans will be finally approved prior to the Board meeting on the final plat.

VI. PUBLIC NOTICE AND INPUT

Courtesy notices were mailed to abutting property owners. All referral agency comments are outlined in the Referral Agency Response Report attached to the staff report, and the applicants have provided responses to referral comments within a separate letter included in the staff report attachments. The Pinery HOA did comment on traffic impacts and requested that the traffic improvements be "designed and programed (funded) prior to or in conjunction with this project."

VII. STAFF ANALYSIS

Per Article 503 of the DCSR, a final plat may be approved upon the finding by the Board of County Commissioners that the following standards have been met:

503.01: Conforms with the goals, objectives, and policies of the Master Plan.
Staff Comment: The property is located within the Northeast Subarea as identified in Section 3 of the 2040 CMP. Goal 3-2 of the CMP states that the County should "Ensure that land use and design is compatible with the natural and rural character of the nonurban area". While approval criteria for most land use applications require a finding of compliance, consistency, or conformance with the 2040 CMP, "The competing values of the Plan must be balanced through the public review process to achieve the larger vision of the community." As such, the 2040 CMP acknowledges its own competing values, and that implementation can only be achieved through the balancing of community values during the review process.

Consistent with Policy 3-2A, the proposed land use represents logical infill, where 50% of parcel sizes are consistent with the proposed development and where site characteristic can generally support it. Tallman Gulch subdivision to the west and is zoned RR and lots sizes range from 1.5 to 2 acres. Objective 3-2A.1, encourages design to be of scale and character that complement the nonurban area and objective 3-2B encourages the development to conserve and showcase important natural and rural features. The 118 lots are clustered away from the drainage ways which allow the natural drainage to continue through the site. Policy 3-2B.1 suggests clustering, or other site design techniques, where appropriate to direct building away for environmentally and visually sensitive lands and policies in 3-2B encourage preservation and construction of drainageways and stormwater management facilities that complement the natural and rural landscape. Policies also encourage the preservation of vegetation, soils, and landforms by minimizing site disturbance and designs which minimize the use of resources to provide energy efficiency in both construction and operation. The four tributaries onsite have been set aside into tracts to minimize site disturbance and maintain the natural flow.

The Northeast subarea of the CMP supports logical infill, where approximately 50% of the property boundary is adjacent to parcels of sizes consistent with the proposed development. Policy 3-3E.2 states maximum gross density if one dwelling unit per 2.5 *acres. The gross density for the preliminary plan is one dwelling unit per 4.9 acres. Policy 3-3E.5 encourages site design to minimize the removal of vegetation and to use trees to screen development. The design places larger lots on the perimeter of the site to buffer the 1.5+ acre lots to the west. The Policy 3-3E.4 states that new development should take measures to protect the existing alluvial wells used in this area. The 118 lots are served by central water and sewer through PWSD, and CDWR states "the water supply can be provided without causing injury is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory allocation approach, for the proposed uses is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision."*

503.02: The final plat addresses the design elements established in Article 4, Section 404.
Staff Comment: The final plat is in conformance with the design elements. The 118 single-family residential lots are accessible to roads providing opportunities for vehicular and pedestrian access. The lots conform in size to those allowed within the ER zone district and are capable of meeting all other minimum zone district standards. The lots will be served by public water and sewer through PWSD. Off-street parking requirements can be met. Geotechnical recommendations from the applicants' geotechnical report will be implemented, and individual building analysis will occur at time of building permit for proposed dwellings. Drainage plans have been reviewed and approved. The applicants will assure archaeological, paleontological, or historic resources are identified during construction.

503.03: The final plat conforms with Section 18A, Water Supply Overlay District, of the Zoning Resolution.
Staff Comment: DCZR Section 1803A establishes approval standards to be used in the evaluation of land use applications reviewed under Section 18A. The water supply for this final plat was evaluated and found to be adequate at the time of preliminary plan approval. Updated water documentation was provided with the final plat indicated that no changes to the proposed water supply is proposed.

503.04: The final plat provides for a public wastewater collection and treatment system and, if other methods of wastewater collection and treatment are proposed, such systems comply with State and local laws and regulations.
Staff Comment: Parker Water and Sanitation District will provide sanitary service to the 118 single-family lots. Douglas County Health Department provided a favorable recommendation regarding the proposed method of wastewater disposal for the project.

503.05: The final plat identifies all areas of the proposed subdivision which may involve soil or topographical conditions presenting hazards or requiring special precautions and that the proposed uses of these areas are compatible with such conditions.
Staff Comment: The applicants will implement the recommendations of the geotechnical analysis reviewed and approved during the preliminary plan application. In addition,

standard geotechnical explorations of individual building sites will be required as part of the building permit process. CGS noted lots adjacent to Tallman Gulch may have erosional constraints. Engineering has reviewed and approved grading plans for the subdivision, and further geological testing for all lots will be done at the time of building permit. The applicants developed a wildfire mitigation plan which will be implemented prior to building permit issuance.

503.06: The final plat provides adequate drainage improvements.
Staff Comment: A Phase III Drainage Report with the required geomorphology subsection, and GESC plans, and report were submitted by the applicants and reviewed by Douglas County Engineering Services. The drainage design is acceptable. The County will accept secondary drainage easements within the development. The SIA and drainage construction plans have been reviewed by Engineering Services with minor technical corrections remaining and all engineering reports and plans have been approved.

503.07: The final plat provides adequate transportation improvements.
Staff Comment: The applicants' traffic analysis was reviewed and accepted by Douglas County Engineering at the time of preliminary plan approval. The applicants confirmed the findings of this analysis as part of the final plat request. Adequate road capacity for this and other Fields final plats will be available on both Hilltop Road and Singing Hills Road once County improvements are complete. Alternate road standards for the five roads within the development have been reviewed and approved. All necessary public ROW has been previously dedicated or dedicated with this final plat.

503.08: The final plat protects significant cultural, archaeological, natural, and historical resources and unique landforms.
Staff Comment: A Class II Survey of the proposed areas of development was accomplished at the time of preliminary plan approval, including the residential development areas. No significant cultural resources were found on the subject property. The applicants, their successors and assigns shall take all reasonable care to watch for historic resources, paleontological resources, and other cultural history resources and shall immediately notify Douglas County in the event of such discovery during construction activity.

503.09: The final plat has available all necessary services, including fire and police protection, recreation facilities, utility services, streets, and open space to serve the proposed subdivision.
Staff Comment: All such services are available to each parcel. Fire protection is provided by South Metro, and the Douglas County Sheriff's Office provides police protection. Utility service facilities are provided by CORE, Xcel, Comcast, and Century Link.

VIII. Staff Assessment

Staff has evaluated the final plat request in accordance with Article 5 of the Subdivision Resolution. Should the Board find that the approval standards for the final plat are met, the following proposed conditions should be considered for inclusion in the motion:

1. Prior to plat recordation, the applicants shall pay $429,238.48 to Douglas County for cash-in-lieu of park land dedication.

2. Prior to plat recordation, the applicants shall pay $215,185.09 to the Douglas County School District for cash-in-lieu of school land dedication.

3. During construction activity within the development, the applicants, their successors, and assigns shall take all reasonable care to watch for historic resources, paleontological resources, and other cultural history resources and shall immediately notify Douglas County in the event of such discover.

4. Prior to recordation of the final plat, technical corrections to the plat exhibit shall be made to the satisfaction of Douglas County.

5. All statements and commitments made by the applicants or the applicants' representative during the public meeting and/or agreed to in writing and included in the public record have been relied upon by the Board of County Commissioners in approving the application; therefore, such approval is conditioned upon the applicants' full satisfaction of all such commitments and promises.

ATTACHMENTS **PAGE**

Douglas County Colorado

Department of Community Development

www.douglas.co.us

Planning Services

LAND USE APPLICATION

Please fill in this application form completely. An incomplete application will not be processed.

Note: Neither the Planning Commission nor the Board of County Commissioners should be contacted regarding an open application.

OFFICE USE ONLY

PROJECT NAME: Fields Filing 1

PROJECT FILE #: SB2024-041

PROJECT TYPE: Final Plat & CD Application - Single Family Residential

MARKETING NAME: The Fields Filing No. 1

SITE ADDRESS: Northwest of the intersection of Hilltop Road and Singing Hills Road

OWNER(S):

Name(s): Toll Southwest LLC, a Delaware limited liability company, ATTN: Tim Westbrook

Address: 7100 E. Belleview Avenue, Suite 200, Greenwood Village, CO 80111

Phone: 720-679-0739

Email: twestbrook@tollbrothers.com

AUTHORIZED REPRESENTATIVE *(requires notarized letter of authorization if other than owner)*

Name: LJA Engineering, Inc

Address: 1765 West 121st Avenue, Suite 300, Westminster, CO 80234

Phone: 303-858-2347 or 281-844-5693

Email: klovelace@lja.com

PLANNING FEES: $700.00

ENGINEERING FEES: $5,000.00

TOTAL FEES: $5,700.00

RELATED PROJECTS:

LEGAL DESCRIPTION:

Subdivision Name: The Fields Filing No. 1

Filing #: 1 Lot #: Block #: Section #: 5 Township: 7S Range: 65W

STATE PARCEL NUMBER(S): 234705200002

ZONING:

Present Zoning: ER Proposed Zoning: NA Gross Acreage: 259.779

Gross Site Density (DU per AC): 2.2 # of Lots or Units Proposed: 118

SERVICE PROVIDERS:

Fire District: South Metro Fire Metro District: N/A Gas: Xcel Energy

Water: Parker Water & Sanitation Sewer: Parker Water & Sanitation Electric: CORE Electric Co-op

Roads: ☒ Public ☐ Private (please explain):

To the best of my knowledge, the information contained on this application is true and correct. ***I have received the County's information sheet regarding the Preble's Meadow Jumping Mouse.***

Applicant Signature

7/2/2024
Date

303.421.4224
www.LJA.com
1765 West 121st Avenue, Suite 300, Westminster, Colorado 80234

April 8, 2025

Submittal Narrative

Heather Scott, AICP - Principal Planner
Douglas County Department of Community Development
100 Third Street
Castle Rock, CO 80104

Re: The Fields Filing No. 1
Final Plat & Civil CD Application

Dear Ms. Scott:

Please accept this letter on behalf of Toll Brothers, the applicant for The Fields Filing No. 1. The intent of this letter is to outline the proposed Final Plat Application for the project. The project is located in unincorporated Douglas County within the approved Fields Preliminary Plan area. The project proposes to only plat a portion of the overall approved Preliminary Plan and the applicant does not have ownership of the remainder of the Preliminary Plan area.

Toll Brothers is seeking to plat 118 single-family detached residential lots, fourteen (14) tracts, and public right-of-way. The total area included in the project is ±282.053 acres and has a net density of 2.2 units per acre (excluding Hilltop Road ROW). The total open space area in the proposed plat is ±117.91 acres. Tracts A & J, associated with the proposed lift station and well-site dedication, will be dedicated to Parker Water & Sanitation District for ownership and maintenance. Tracts B, C, D, E, F, K, & L through E will be dedicated to the HOA for maintenance. Tracts G, H, I, and M will be dedicated to the Metro District for maintenance.

The project will be accessed off of Hilltop Road via two points of access. Main access along the northwest portion of the site and a temporary access on the southwest side of the property, which will be in place until a future roundabout at Hilltop Road and Singing Hills Road is constructed. It is understood that formal approval of the Final Plat cannot occur until the corresponding civil infrastructure plans are approved.

Easements proposed for the project will include a combination of easements to ensure proper access to proposed utilities. The local streets will typically provide a 15-ft front-lot utility easement, parallel to right-of-way, for both gas and electric facilities. The open space tracts will be dedicated to include the appropriate access, drainage, landscape, and utility uses. Separate drainage easements are identified for storm sewer pipe and detention pond facilities.

The Fields Filing No. 1 will be served by Parker Water and Sanitation District for potable water and wastewater as outlined in the approved Preliminary Plan. A lift station is required for sewer service and will require a separate Site Improvement Plan process with associated site construction documents. The lift station location and preliminary layout is included with this Final Application for reference only. All on-site storm sewer is public and is intended to be owned and maintained by Douglas County. Electric service will be provided by CORE Electric Co-op and gas service will be provided by Xcel Energy.

There is no land dedication proposed for schools and parks within the proposed plat.

The development of The Fields Filing No. 1 is desired to be phased into three (3) major phases in order to help support development timelines. It is the intent of the applicant that the phases will run consecutively without delay. A phasing plan has been provided for review prior to submittal of the full required SIA document.

In accordance with the Final Submittal Checklist, the following submittal items have been included:

1. Land Use Application
2. Narrative & Checklist
3. Engineering Submittal Form
4. Signed Letter of Authorization
5. Title Commitment
6. Final Plat
7. Closure Report
8. Water Packet
9. Traffic Conformance Letter

10a. Douglas County Construction Documents
10b. Parker Water & Sanitation District Construction Documents (including offsite force main)
10c. Parker Water & Sanitation District Lift Station Construction Plans (to be submitted at a later date)

11. Phase III Drainage Report
12. GESC Plans
13. GESC Report
14. Final Utility Report
15. *SIA Document* & Phasing Map

Note, all files listed above are numerically named with the included submittal and include the date of submittal as well.

Coordination is ongoing between IMEG & LJA regarding design of the Lift Station as well as between HDR & LJA regarding design of Hilltop Road.

The following outline the project's compliance with the goals and objectives the Comprehensive Master Plan and Northeast Subarea Plan:

Goal 3-2 - Ensure land use and design is Compatible with the natural and rural character of the nonurban area.

Objective 3-2A - Ensure the character and intensity of development is appropriate for the nonurban area.

Policy 3-2A.1 - Design should be of a scale and character that complements the nonurban area.

Response: The proposed project contains predominantly large lots that exceed one-half acre. Development improvements including overlot grading will be limited with open space areas remaining undisturbed except as needed to comply with Douglas County improvement requirements.

Policy 3-2B.3 - Encourage the preservation and construction of drainageways and stormwater management facilities that complement the natural and rural landscape.

Response: Existing prominent drainageways have been preserved to the greatest extent possible. Drainage and stormwater improvement areas will be reseeded with a regionally appropriate native seed mix adaptable to the existing soil conditions.

Policy 3-2B.4 - Preserve vegetation, soils, and landforms by minimizing site disturbance. Overlot grading is strongly discouraged in the nonurban areas, except as needed for clustering or to screen residential development.

Response: The proposed project contains predominantly large lots that exceed one-half acre. Development improvements including overlot grading will be limited with open space areas remaining undisturbed except as needed to comply with Douglas County improvement requirements.

Policy 3-2B.5 - Design landscape plantings to minimize water consumption and blend with native vegetation using existing, on-site trees and vegetation.

Response: Enhanced landscape areas will contain a mix of xeric trees, shrubs, and grasses in the form of native and non-native hardy species. Selected trees will be predominantly Ponderosa Pines which are native to this locality. A variety of native seed mixes shall be planted that are native to the region and appropriate for the project's soil conditions. Plant materials will provide year-round interest, habitat and foraging opportunities for local wildlife.

Policy 3-2B.6 - Grade disturbed slopes to blend with the natural terrain and revegetate with native grasses and vegetation.

Response: Proposed cut/fill areas will incorporate tapered slopes and mimic weathered topographic features to blend within adjacent undisturbed grade. Landscaped accent grading and berms provide visual interest at the project's entries and are consistent with adjacent landscape features in the project area.

Objective 3-2C - Preserve the visual integrity of significant ridgelines, road viewsheds, horizon lines, views of the mountain backdrop, and other important natural features.

Policy 3-2C.1 - Locate houses, utilities, and other structures away from important ridgelines and horizon lines.

Response: Proposed accent berms and associated landscape plantings adjacent to Hilltop Road, along the south property will provide partial visual screening of interior home sites. Existing views of Front Range Mountains will still be predominantly maintained from Hilltop Road.

Policy 3-2C.3 - Encourage residential site design and locations that complement the nonurban landscape and minimize the impact of road noise.

Response: Proposed homes will be set back from Hilltop Road more than 100 feet with landscape berms located in this setback area thereby reducing road noise impacts to future residents.

Goal 3-3 - Maintain the unique rural character of the Chatfield Valley (nonurban area), Cherry Valley, High Plateau, Indian Creek, Northeast, West Plum Creek, and Pike National Forest and Foothills Subareas.

Northeast Subarea

Objective 3-3E - Ensure development in the Northeast Subarea is consistent with this Plan.

Policy 3-3E.1 - A maximum gross density of one dwelling unit per 2.5 acres is supported in the Northeast Subarea where it is logical infill, where approximately 50 percent of the property boundary is adjacent to zoned lands or parcel sizes consistent with the proposed development, and where site characteristics can generally support it.

Response: The project's gross density does not exceed 2.5 dwelling units per acre. This density and proposed lot sizes are consistent with adjacent subdivisions.

Policy 3-3E.2 - A maximum gross density of one dwelling unit per 2.5 acres is supported in the Northeast Subarea where there is adequate public infrastructure to support the proposed development and where the other goals, objectives, and policies of the Plan have been met.

Policy 3-3E.3 - Encourage connections to central water and sewer district systems, when possible.

Response: The project's gross density does not 2.5 dwelling units per acre. The project will be serviced through water and sanitary utility mainlines within internal rights of way and easements and through off site points of connection. The project is located within the service area of dry utility service providers.

Policy 3-3E.5 - New development within the Northeast Subarea should be designed to minimize the removal of vegetation and to use trees and landforms to screen development, where possible. Additional trees and vegetation should be planted, where necessary and appropriate, to screen development.

303.421.4224
www.LJA.com
1765 West 121st Avenue, Suite 300, Westminster, Colorado 80234

Response: The project site has historically been used for agricultural use with limited significant existing vegetation on the property. Proposed accent berms and associated landscape plantings adjacent to Hilltop Road, along the south property will provide partial visual screening of interior home sites.

Policy 3-3E.6 - Maintain natural drainages for wildlife movement, where possible, and provide open space linkages within and between large-lot developments.

Response: The project includes multiple tracts of undisturbed, native areas that are suitable for wildlife movement. This includes Tract M along the entirety of the northern and eastern property boundaries which encompass Tallman Gulch and its drainage way.

Policy 3-3E.7 - Development along existing roads in the Northeast Subarea should be carefully sited and designed to minimize visual impacts, particularly of distant Front Range mountain views and open meadows.

Response: Proposed accent berms and associated landscape plantings adjacent to Hilltop Road, along the south property will provide partial visual screening of interior home sites. Accent berms, and homesites are setback from Hilltop Road to an extent that existing Front Range mountain views will be minimally impacted along Hilltop. Additionally, the site and associated development generally slope down and away from Hilltop Road, the high point of the project site.

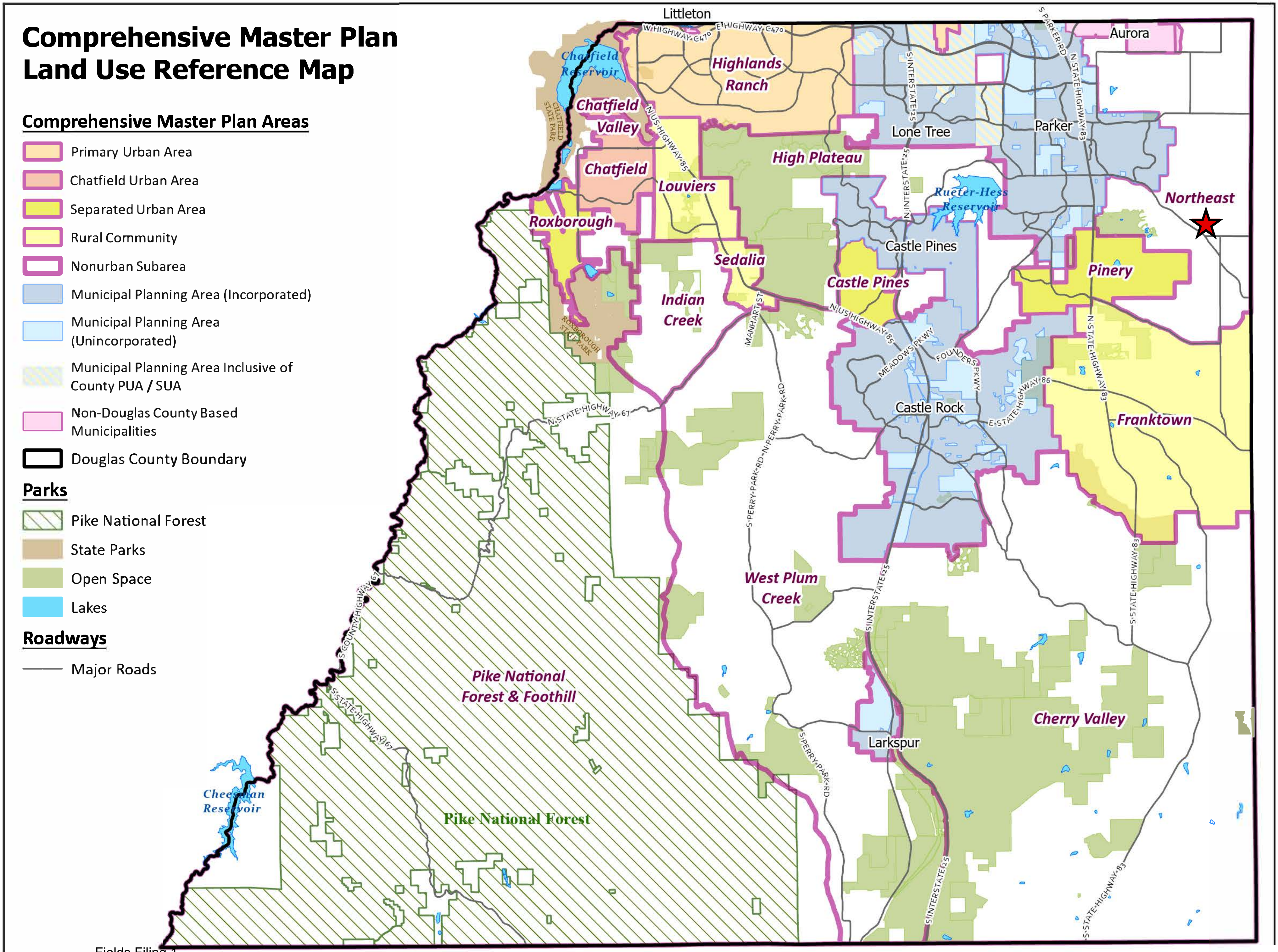
On behalf of Toll Brothers and the project team, thank you for your time and consideration in reviewing The Fields Filing No. 1 Final Plat application.

If you have any questions, please do not hesitate to call me at 303-858-2347.

Sincerely,

Kevin Lovelace, PE

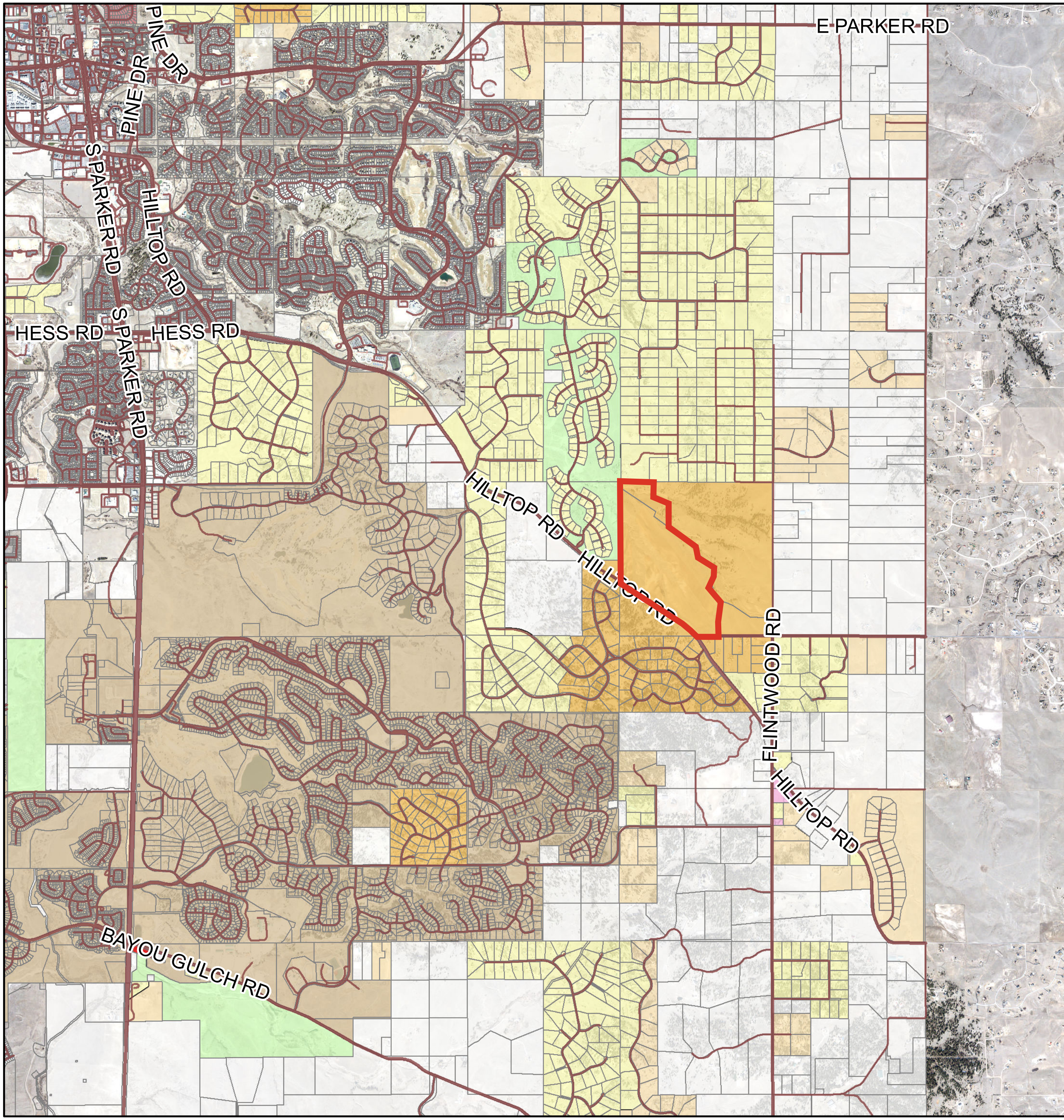
Senior Project Manager


Comprehensive Master Plan
Land Use Reference Map
Comprehensive Master Plan Areas
Primary Urban Area
Chatfield Urban Area
Separated Urban Area
Rural Community
Nonurban Subarea
Municipal Planning Area (Incorporated)
Municipal Planning Area (Unincorporated)
Municipal Planning Area Inclusive of County PUA / SUA
Non-Douglas County Based Municipalities
Douglas County Boundary
Parks
Pike National Forest
State Parks
Open Space
Lakes
Roadways
Major Roads
Littleton
Aurora
Chatfield Reservoir
Chatfield State Park
Highlands Ranch
Chatfield Valley
Chatfield
Lone Tree
Parker
High Plateau
Louviers
Rueter-Hess Reservoir
Northeast
Roxborough
Castle Pines
Sedalia
Castle Pines
Pinery
Indian Creek
Roxborough State Park
Castle Rock
Franktown
West Plum Creek
Pike National Forest & Foothill
Cherry Valley
Larkspur
Cheesman Reservoir
Pike National Forest
W HIGHWAY C470
E HIGHWAY C470
S PARKER RD
N STATE HIGHWAY 83
S INTERSTATE 25
N INTERSTATE 25
N US HIGHWAY 85
MANHART ST
MEADOWS PKWY
FOUNDERS PKWY
STATE HIGHWAY 86
E STATE HIGHWAY 86
N STATE HIGHWAY 67
N PERRY PARK RD
S PERRY PARK RD
S COUNTY HIGHWAY 67
S STATE HIGHWAY 67
S STATE HIGHWAY 83

FIELDS FILING 1

SB2024-041
ZONING MAP

N



LEGEND

- PROJECT SITE
- MAJOR ROADS
- OTHER ROADS

ZONE DISTRICT

- A1 - AGRICULTURAL ONE
- LRR - LARGE RURAL RESIDENTIAL
- RR - RURAL RESIDENTIAL
- ER - ESTATE RESIDENTIAL
- SR - SUBURBAN RESIDENTIAL
- MF - MULTIFAMILY
- LSB - LIMITED SERVICE BUSINESS
- B - BUSINESS
- C - COMMERCIAL
- LI - LIGHT INDUSTRIAL
- GI - GENERAL INDUSTRIAL
- CMTY - SEDALIA COMMUNITY
- D - SEDALIA DOWNTOWN
- HC - SEDALIA HIGHWAY COMMERCIAL
- MI - SEDALIA MIXED INDUSTRIAL
- PD - PLANNED DEVELOPMENT
- OS - OPEN SPACE CONSERVATION
- NF - NATIONAL FOREST

DOUGLAS COUNTY
COLORADO

FIELDS FILING 1

SB2024-041
AERIAL MAP

LEGEND

PROJECT SITE
MAJOR ROADS
OTHER ROADS

Date Saved: 8/9/2022 1:05:46 PM

DOUGLAS COUNTY COLORADO

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Addressing Analyst	08/15/2024	No Comment	No response necessary
Assessor	08/12/2024	Received: Tract F is currently owned by Wallden Hill Top LLC. There would need to either be a deed recorded to clear title or there needs to be a spot for Wallden Hill Top LLC to sign the plat under the Owner block. Please revise the dedication statement, particularly the last sentence, as it currently dedicates ALL parcels to Douglas County in fee simple absolute. The tract summary table declares the Metro District AND HOA as owners for Tracts B-E, but there is not spot for the HOA sign in acceptance of said tracts, AND there is no actual dedication of these tracts in either the dedication statement or the notes section. There is no dedication conveying ownership for any of the tracts in either the dedication statement or the notes section. As it stands, the parcels would not be conveyed and would remain in the ownership of Toll Southwest LLC. Advisory note: Lots 1-4 are not contained entirely within Fields 1-3 Metro Districts.	The tracts and dedication statements have been revised to include Wallden Hill Top LLC, Fields Metropolitan District 1, and the Meadow Rock HOA signature block. Notes 10 through 14 on the plat further delineates tract purposes, ownership, and maintenance obligations.
AT&T Long Distance - ROW	07/25/2024	No Comment	No response necessary
Building Services	07/29/2024	Received: Permit(s) required, please visit Douglas County's web site for requirements and call 303-660-7497 if you have any questions.	Applicant will obtain all necessary permits prior to any construction.
Building Services	08/02/2024	No Comment	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
CenturyLink	08/07/2024	Summary of Response: CenturyLink has reviewed your request to proceed with the requested encroachment as shown on Exhibit "A" within the proposed area to be vacated and has no objections providing, however, the following terms and conditions are agreed to, and met, by Requestor: 1. Locates must be performed by a state recognized organization (i.e., Call Before You Dig, Blue Stake, etc.). 2. A minimum of three feet of cover above any existing CenturyLink facilities is maintained at all times and the final grade provides for no less than three feet of cover. 3. If any CenturyLink facilities are damaged or require relocation as a result of said Encroachment, or the act of installing, maintaining or removing said Improvements, Landowner agrees to bear the cost of repair and/or relocation of said CenturyLink facilities. 4. No buildings or structures are to be placed within the Easement Tract other than those, if any, that are approved by this APPROVAL TO PROCEED. 5. If you require existing facilities to be moved, relocated, or removed, please contact me to coordinate the issuance of required Easement and/or Release Agreements to facilitate request. The issuance of this Letter does not constitute either acceptance or approval of moving, relocating or removing of facilities without first obtaining the needed Agreements. It is the intent and understanding of CenturyLink that this action shall not reduce our rights to any existing easements or rights we have on this site or in the area. See letter attached for detail.	Applicant will call for utility locates prior to any grading or construction.

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Cherry Creek Basin Water Quality Authority	07/25/2024	Received: the Authority will no longer routinely conduct a technical review and instead the Authority will defer to Douglas County's review and ultimate determination that the proposed development plans comply with Regulation 72.	No response necessary
Colorado Division of Water Resources	07/29/2024	Summary of Response: Our opinion that the water supply is adequate is based on our determination that the amount of water required annually to serve the subdivision is currently physically available, based on current estimated aquifer conditions. Our opinion that the water supply can be provided without causing injury is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory allocation approach, for the proposed uses is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision. See letter attached for detail.	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Colorado Geological Survey	08/19/2024	Summary of Response: CGS has no objection to the approval of the final plat for Filing No. 1. We offer the following comments and recommendations. Tallman Gulch is designated as a 100-year (1%) flood zone per FEMA (FIRM panel 08035C0202F, effective September 30, 2005), however, FEMA's floodplain study did not extend to the subject parcel. Lots 1 through 21 along the east side of Filing No. 1 and east of Coyote Track Lane encroach near these steep slopes. CGS recommends an erosional setback is established from the crest of the steeper slopes (30% or greater) associated with Tallman Gulch and its tributaries to protect structures and improvements from channel erosion and scour, undercutting, and slope failure. Setback lines should be clearly shown on the plat and development plans. Additionally, drainage gullies should be properly filled and compacted in accordance with RMG's recommendations. CGS agrees with RMG (page 4) that "…a final, detailed, Geotechnical Investigation should be completed after mass overlot grading is complete to verify the preliminary recommendations and provide final foundation recommendations for each individual lot in the subdivision." RMG's recommendations should be strictly followed during planning, design, and construction. See letter attached for detail.	The applicant provided an updated Geotechnical Study and CGS concurs with the findings. Site specific geotechnical investigations will be required at the time of building permit. Engineering has reviewed and approved a grading, drainage, and erosion control plans for the channels and all lots within the subdivision.
Comcast		No Response Received	No response necessary
CORE Electric Cooperative	08/14/2024	Received: CORE will require 15-foot utility easement added to Tracts E, G, H, and I.	The applicant added 15-foot utility easements on Tracts G, H, and I as requested .
Crest View Estates HOA		No Response Received	No response necessary
Douglas County Conservation District		No Response Received	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Douglas County Health Department	08/15/2024	Received: Based on the will-serve letter provided by Parker Water and Sanitation District, DCHD is providing a favorable recommendation regarding the proposed method of sewage disposal.	No response necessary
Douglas County School District RE 1		Summary of Response: DCSD has calculated the amount of school site land dedication required for students generated by this proposal. A total of 34 students are expected from the development requiring a total land dedication of 2.662-acres. Pursuant to Section 1004.05.3 of the Douglas County Subdivision Resolution, “The cash-in-lieu fee shall be equivalent to the full market value of the acreage required for school land dedication. Value shall be based on anticipated market value after completion of platting. The applicant shall submit a proposal for the cash-in-lieu fee and supply the information necessary for the Board to evaluate the adequacy of the proposal. Assuming the applicant agrees with the payment of these fee requirements, DCSD has no objection to approval of this application. See letter attached for detail.	Proposed condition #2 requires payment of cash-in-lieu of school fees prior to recordation of the final plat.
Elbert County Community & Development Services	08/15/2024	No Comment	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Engineering Services	08/19/2024	Summary of Response: Engineering has reviewed the above referenced submittal and have the following comments: Comment #1 - Right-of-way must be conveyed to the County prior to this plat being eligible for final approval since it was a condition agreed upon by the applicant during the public hearing. Comment #2 - Subdivision Improvements Agreement (SIA) will be required for this project. Comment #3 - review the final plat redlines, sewer and water red lines, and the construction plan red lines. See letter attached for detail.	Engineering reports, studies, and plans has been reviewed with only minor technical corrections remaining. The SIA has been approved.
Evans Ranch Association		No Response Received	No response necessary
Hidden Village POA		No Response Received	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Mile High Flood District	08/21/2024	Summary of Response: We have reviewed this referral only as it relates to a MHFD drainageway and for maintenance eligibility of storm drainage features, in this case: Tallman Gulch. MHFD staff have the following comments to offer: Plat Exhibit 1) Please show both edges of the stream corridor on the plat exhibit and label it as such. 2) Please help us to understand what the Metro District Boundary is and how it impacts the exiting drainageway corridor and future improvements. The Metro District Boundary includes some areas of the drainage corridor. 3) Please help us to understand if Douglas County will have easement access through Track B in the future for stream maintenance. Drainage Report 4) Please include the previously completed geomorphology report in the Drainage Report. Please also include discussion of Tallman Gulch in the Drainage Report, including findings from the geomorphology report and stream management corridor widths. 5) Please provide a figure in the Drainage Report that shows the contours and full stream corridor width near Lot 18 and 19. This will help us to understand if there is enough stream management corridor space for Tallman Gulch near these lots for stream maintenance and any future improvements. We appreciate the opportunity to review this proposal. Please feel free to reach out to me with any questions or concerns. See letter attached for detail.	The applicant worked with MHFD and PWE Engineering to resolve all drainage related issues. The geomorphology report was added as Appendix C in the drainage report and stream corridor information was added as Appendix D. A plat note requiring further geological study on slopes 30% or greater on Lots 1 through 21 to protect structures and improvements has been added to the plat. Note 9 on the plat clarifies the Fields Metro District #1 will be responsible for construction and maintenance of the drainage easements and provides a blanket easement to the County in the event such maintenance and repair are not performed by the system owner, to the satisfaction of Douglas County and the County shall have the right to enter the site to perform all necessary work, at the applicant's expense, if the system fails. Any necessary permits will be obtained at the time of building permit.

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Misty Pines HOA		No Response Received	No response necessary
Office of Emergency Management	07/23/2024	Received: OEM has no concerns with this project.	No response necessary
Parker Water & Sanitation District		No Response Received	No response necessary
Parker Water & Sanitation District	07/22/2024	Received: Please provide Parker Water with a full set of plans. Please send them directly rramsey@PWSD.org	The applicant provided plans to the district and will continue to work with them
Rural Water Authority of Douglas County		No Response Received	No response necessary
Sheriff's Office		No Response Received	No response necessary
Sheriff's Office E911		No Response Received	No response necessary
South Metro Fire Rescue	07/29/2024	Received: South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed Final Plat. Applicants and Contractors are encouraged to contact SMFR regarding the applicable permit requirements for the proposed project.	Applicant will obtain all necessary permits as part of the building permit process for the homes.
Spirit Ridge HOA		No Response Received	No response necessary
Sterling Tree Farm HOA		No Response Received	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
The Pinery HOA	08/19/2024	Received: Thank you for the opportunity to review the request for Final Plat SB2024-041 Fields Filing 1, with a total of 118 single family dwelling units. The impact of this project for The Pinery residents will be increased traffic at the intersection of Hilltop Road and Village Road/Crestview Dr. Village Drive and Hilltop Road intersection is a major access point, both to enter and exit The Pinery, supporting at least 800 homes. It is also understood that road improvements are planned for this location. It is important to know that these road improvements are designed and programed (funded) prior to or in conjunction with this project. The additional construction traffic created by the road construction/plat construction will only add an increase of accidents at this dangerous intersection. If you have any questions, feel free to contact The Pinery HOA at 303.841.8572 or arc@pinery.org.	The applicant will be responsible for improvements at both access points which they believe will help with traffic along Hilltop Road. Improvements to the intersection at Hilltop Road and Singing Hills Road are designed however they are not scheduled for construction at this time.
Town of Parker Development Review	07/24/2024	No Comment	No response necessary
Town of Parker Public Works		No Response Received	No response necessary
Wildfire Mitigation		No Response Received	No response necessary

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Xcel Energy-Right of Way & Permits	08/08/2024	Summary of Response: Please be aware PSCo owns and operates existing natural gas distribution facilities along Hilltop Road and Singing Hills Road. PSCo request Note 7 to read: Permanent structures, improvements, objects, buildings, wells, water meters and other objects that may interfere with the utility facilities or use thereof (Interfering Objects) shall not be permitted within said utility easements and the utility providers, as grantees, may remove any Interfering Objects at no cost to such grantees, including, without limitation, vegetation. Public Service Company of Colorado (PSCo) and its successors reserve the right to require additional easements and to require the property owner to grant PSCo an easement on its standard form. The property owner/developer/contractor must complete the application process for any new natural gas service. See letter attached for detail.	The applicant added the requested verbiage to Note 7. The applicant will call utility locate prior to any grading or construction.

From:	annb cwc64.com
To:	Heather Scott
Cc:	Pam Choy (pc2914@att.com); duanew cwc64.com; jt cwc64.com
Subject:	Singing Hills Rd Elizabeth, Colorado Douglas County eReferral #SB2024-041
Date:	Thursday, July 25, 2024 12:42:27 PM

Hi Heather,

This is in response to your eReferral with a utility map showing any buried AT&T Long Line Fiber Optics near Singing Hills Rd Elizabeth, Colorado. The Earth map shows the project area in red and based on the address and/or map you provided, there should be NO conflicts with the AT&T Long Lines, as we do not have facilities in that area.

Please feel free to contact us with any questions or concerns.

Ann Barnowski
Clearwater Consulting Group Inc
120 9th Avenue South
Suite 140
Nampa, ID 83651
Annb@cwc64.com

8/4/24

CenturyLink

SUBJECT: APPROVAL TO PROCEED WITH VACATE– P862770

Project Name & Location: VACATE Request – Hilltop Road & Singing Hills Road, Parker CO – SB2024-041

To Whom It May Concern:

Qwest Corporation d/b/a CenturyLink has reviewed your request to proceed with the requested encroachment as shown on Exhibit "A" ("Vacate"), said Exhibit "A" attached hereto and incorporated by this reference, within the proposed area to be vacated and has no objections providing, however, the following terms and conditions are agreed to, and met, by Requestor:

1. Locates must be performed by a state recognized organization (i.e. Call Before You Dig, Blue Stake, etc.).

2. A minimum of three feet of cover above any existing CenturyLink facilities is maintained at all times and the final grade provides for no less than three feet of cover.

3. If any CenturyLink facilities are damaged or require relocation as a result of said Encroachment, or the act of installing, maintaining or removing said Improvements, Landowner agrees to bear the cost of repair and/or relocation of said CenturyLink facilities.

4. No buildings or structures are to be placed within the Easement Tract other than those, if any, that are approved by this APPROVAL TO PROCEED.

5. If you require existing facilities to be moved, relocated, or removed, please contact me to coordinate the issuance of required Easement and/or Release Agreements to facilitate request. The issuance of this Letter does not constitute either acceptance or approval of moving, relocating or removing of facilities without first obtaining the needed Agreements.

It is the intent and understanding of CenturyLink that this action shall not reduce our rights to any existing easements or rights we have on this site or in the area.

If you have any questions or would like to discuss this action further, please contact Tom Hoopes at 407-592-1794 or Varina.Hoopes@lumen.com.

Sincerely yours,

/s/

CenturyLink Right of Way Team

EXHIBIT A

THE FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO
259.779 ACRES - 118 LOTS AND 9 TRACTS - SB-2024-XXX

OWNERSHIP AND DEDICATION

KNOW ALL MEN BY THESE PRESENTS THAT THE UNDERSIGNED, BEING THE OWNERS, AND/OR LIEN HOLDER OF THAT PART OF SECTION 5, TOWNSHIP 7 NORTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF FIRESTONE, COUNTY OF DOUGLAS, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS:

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5, BEING ASSUMED TO BEAR SOUTH 89°26'46" EAST, SAID LINE BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP ON 2" PIPE STAMPED "PLS 6935" AND ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A FOUND 2.5" ALUMINUM CAP ON 2" PIPE "PLS 6935" WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 5;

THENCE ALONG THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5,
SOUTH 89°26'46" EAST A DISTANCE OF 1.118.05 FEET;

THENCE SOUTH 00°21'43" EAST, A DISTANCE OF 273.50 FEET;
THENCE SOUTH 72°10'45" EAST, A DISTANCE OF 549.06 FEET;
THENCE SOUTH 00°27'53" EAST, A DISTANCE OF 636.91 FEET;
THENCE SOUTH 54°10'26" EAST, A DISTANCE OF 1,315.05 FEET;
THENCE SOUTH 54°54'12" EAST, A DISTANCE OF 282.82 FEET;
THENCE SOUTH 11°02'21" EAST, A DISTANCE OF 347.63 FEET;
THENCE SOUTH 46°36'35" EAST, A DISTANCE OF 692.86 FEET;
THENCE SOUTH 00°54'50" EAST, A DISTANCE OF 358.87 FEET;
THENCE SOUTH 30°46'30" WEST, A DISTANCE OF 372.83 FEET;
THENCE SOUTH 18°08'07" EAST, A DISTANCE OF 550.61 FEET;
THENCE SOUTH 11°00'15" WEST, A DISTANCE OF 761.48 FEET;
THENCE SOUTH 00°33'09" WEST, A DISTANCE OF 194.54 FEET;
THENCE NORTH 79°48'04" WEST, A DISTANCE OF 361.29 FEET;

THENCE SOUTH 86°45'22" WEST, A DISTANCE OF 401.36 FEET TO THE EAST LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 5;

THENCE ALONG SAID EAST LINE NORTH 00°25'43" EAST, A DISTANCE OF 293.65 FEET;
THENCE NORTH 89°34'24" WEST, A DISTANCE OF 133.73 FEET;
THENCE SOUTH 28°58'05" WEST, A DISTANCE OF 162.70 FEET;
THENCE NORTH 61°01'55" WEST, A DISTANCE OF 380.70 FEET;
THENCE NORTH 54°50'00" WEST, A DISTANCE OF 555.44 FEET;
THENCE NORTH 68°37'50" WEST, A DISTANCE OF 321.35 FEET;
THENCE NORTH 57°07'56" WEST, A DISTANCE OF 1,093.78 FEET;
THENCE NORTH 56°06'28" WEST, A DISTANCE OF 108.16 FEET;
THENCE NORTH 33°53'32" EAST, A DISTANCE OF 285.33 FEET;
THENCE NORTH 54°16'47" WEST, A DISTANCE OF 310.98 FEET;
THENCE SOUTH 89°23'59" WEST, A DISTANCE OF 228.55 FEET TO THE WEST LINE OF SAID SOUTHWEST QUARTER;
THENCE ALONG SAID WEST LINE NORTH 00°35'02" EAST, A DISTANCE OF 382.35 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 5;
THENCE ALONG THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5 NORTH 00°31'45" EAST, A DISTANCE OF 2,716.06 FEET TO THE POINT OF BEGINNING.

DEDICATION STATEMENT

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LAND DESCRIBED HEREIN, HAVE LAID OUT, SUBDIVIDED AND PLATTED SAID LANDS INTO LOTS, TRACTS, STREETS AND EASEMENTS AS SHOWN HEREON UNDER THE NAME AND SUBDIVISION OF "THE FIELDS FILING NO. 1". THE UTILITY EASEMENTS SHOWN HEREON ARE HEREBY DEDICATED FOR PUBLIC UTILITIES AND CABLE COMMUNICATION SYSTEMS AND OTHER PURPOSES AS SHOWN HEREON. THE ENTITIES RESPONSIBLE FOR PROVIDING THE SERVICES FOR WHICH THE EASEMENTS ARE ESTABLISHED ARE HEREBY GRANTED THE PERPETUAL RIGHT OF INGRESS AND EGRESS FROM AND TO ADJACENT PROPERTIES FOR INSTALLATION, MAINTENANCE AND REPLACEMENT OF UTILITY LINES AND RELATED FACILITIES. THE STREET AND EASEMENTS SHOWN HEREON ARE DEDICATED AND CONVEYED TO DOUGLAS COUNTY, CO. IN FEE SIMPLE ABSOLUTE, WITH MARKETABLE TITLE, FOR PUBLIC USES AND PURPOSES.

OWNER CERTIFICATE

OWNER: TOLL SOUTHWEST LLC, A DELAWARE LIMITED LIABILITY COMPANY

____
OWNER NAME

STATE OF COLORADO

COUNTY OF DOUGLAS

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF _______________ A.D., _________ BY ______________________
(NAME)

MY COMMISSION EXPIRES: ______________________________

____
NOTARY PUBLIC

TITLE VERIFICATION

WE______________________________, DO HEREBY CERTIFY THAT WE HAVE EXAMIED THE TITLE OF ALL LAND PLATTED HEREON AND THAT TITLE TO SUCH LAND IS IN THE DEDICATOR(S) FREE AND CLEAR OF ALL LIENS, TAXES AND ENCUMBRANCES.

BY:______________________________
NAME DATE

TITLE: ______________________________

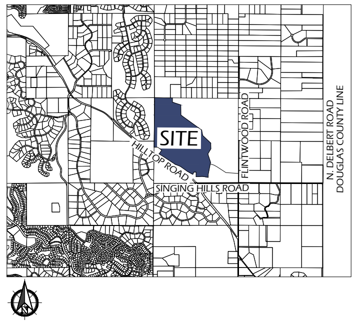
STATE OF COLORADO ______________________

COUNTY OF DOUGLAS______________________

ACKNOWLEDGED BEFORE ME THIS _______ DAY OF ___________ A.D. 2024 BY ______________________

MY COMMISSION EXPIRES: ______________________

____
NOTARY PUBLIC



VICINITY MAP
SCALE: 1" = 2000'

PLANING COMMISSION

THE FINAL PLAT SB-2024-XXX WAS REVIEWED BY THE PLANNING COMMISSION ON ______________________

______________________________ ______________________
PLANNING DIRECTOR, ON BEHALF OF THE PLANNING COMMISSION DATE

BOARD OF COUNTY COMMISSIONERS

THIS PLAT WAS APPROVED FOR FILING BY THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, CO, ON THE _____ DAY OF ___________________, 2024, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON. THE DEDICATIONS OF UTILITY EASEMENTS, ARE HEREBY ACCEPTED.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, CUTTERS, SIDEWALKS , ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES, AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE THE RESPONSIBILITY OF THE SUBDIVIDER AND NOT DOUGLAS COUNTY.

THIS ACCEPTANCE DOES NOT GUARANTEE THAT THE SOIL CONDITIONS, SUBSURFACE GEOLOGY, GROUNDWATER CONDITIONS OR FLOODING CONDITIONS OF ANY LOT SHOWN HEREON ARE SUCH THAT A BUILDING PERMIT, WELL PERMIT OR SEWAGE DISPOSAL PERMIT WILL BE ISSUED.

GENERAL NOTES

1. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
2. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY, COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE 18—4-508, C.R.S.
3. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY LJA SURVEYING TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHTS-OF-WAY, AND TITLE OF RECORD, LJA SURVEYING RELIED UPON THE TITLE COMMITMENT PREPARED BY LANDTITLE GUARANTEE COMPANY, COMMITMENT NUMBER 450-HS0832211-412, WITH A COMMITMENT DATE OF MAY 15, 2024 AT 12:00 A.M.
4. THE LINEAL UNIT USED IN THE PREPARATION OF THIS SURVEY IS THE U.S. SURVEY FOOT AS DEFINED BY THE UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.
5. BASIS OF BEARINGS: THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M. BEING ASSUMED TO BEAR SOUTH 89°26'46" EAST, SAID LINE BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP ON 2" PIPE STAMPED "PLS 6935" AND ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A FOUND 2.5" ALUMINUM CAP ON 2" PIPE "PLS 6935" WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.
6. FLOODPLAIN: THE SURVEYED PROPERTY IS LOCATED WITHIN ZONE X, OTHER AREAS — DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS IDENTIFIED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) ON FLOOD INSURANCE RATE MAP (FIRM) — MAP NUMBER 08035C0202F AND 08035C0204F WITH A MAP REVISED DATE OF OF SEPTEMBER 30, 2005.
7. UTILITY EASEMENTS: FIFTEEN FOOT (15') WIDE UTILITY EASEMENTS AS SHOWN HEREON ARE DEDICATED FOR THE INSTALLATION, MAINTENANCE AND REPLACEMENT OF ELECTRIC, GAS, TELEVISION, CABLE AND TELECOMMUNICATIONS FACILITIES. PERMANENT STRUCTURES SHALL NOT BE PERMITTED WITH SAID UTILITY EASEMENTS.
8. DRAINAGE EASEMENTS ARE DEDICATED TO DOUGLAS COUNTY AND SHALL REMAIN FREE OF OBSTRUCTION.

LAND USE SUMMARY CHART

TYPE	LOTS	SQ. FT.	ACRES	%
LOT AREA - RESIDENTIAL	118	5,375,580	123.406	47.5%
PUBLIC RIGHT-OF-WAY AREA		803,354	18.442	7.1%
TRACTS - (9)		5,137,051	117.930	45.4%
TOTALS		11,315,985	259.779	100%

TRACT SUMMARY CHART

TRACT	USE	OWNED	MAINTAINED	SQ. FT.	ACRES
TRACT A	LIFT STATION	P.W.S.D.	P.W.S.D.	41,478	0.952
TRACT B	DRAINAGE, OPEN SPACE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	3,808,663	87.435
TRACT C	DRAINAGE, OPEN SPACE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	116,433	2.673
TRACT D	DRAINAGE, OPEN SPACE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	1,091,169	25.050
TRACT E	DRAINAGE, OPEN SPACE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	39,308	0.902
TRACT F	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
TRACT G	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
TRACT H	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
TRACT I	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
			TOTAL AREA	5,137,051	117.930

DOUGLAS COUNTY CLERK AND RECORDER'S CERTIFICATE

THIS PLAT WAS FILED FOR RECORD IN THE OFFICE OF THE COUNTY CLEARK AND RECORDER OF DOUGLAS COUNTY AT

____M. ON THE _________ DAY OF _________, 202__.

RECEPTION NO. ______________________

DOUGLAS COUNTY CLERK AND RECORDER

BY: ______________________
DOUGLAS COUNTY SURVEYOR

SURVEYOR'S CERTIFICATE

I, MARK A. HALL, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PLAT TRULY AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE ON ___________ , 202__, BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON; THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:50,000 (SECOND ORDER); AND THAT SAID PLAT HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISIONS OR SURVEYING OF LAND AND ALL APPLICABLE PROVISIONS.

I ATTEST THE ABOVE ON THIS ______ DAY OF _____________ , 20___.

____
MARK A. HALL
COLORADO PLS NO. 36073
FOR AND ON BEHALF OF LJA SURVEYING, INC.
7800 E UNION AVE, SUITE 575,
DENVER, COLORADO 80237

DEVELOPER	CIVIL ENGINEER	SURVEYOR
TOLL BROTHERS, INC. 7100 E. BELLEVIEW AVE, SUITE 200 GREENWOOD VILLAGE, CO 80111 PHONE: (203) 913-8147 CONTACT: BRAD DIXON	LJA ENGINEERING, INC. 1765 WEST 121ST AVE, SUITE 300 WESTMINSTER, CO 80234 PHONE: (303) 421-4224 CONTACT: KEVIN LOVELACE	LJA SURVEYING, INC 7800 E. UNION AVE, SUITE 575 DENVER, CO 80237 PHONE: (303) 481-4016 CONTACT: MARK HALL

SHEET INDEX

SHEET	SHEET TITLE
1	COVER
2	OVERALL
3	LOT DETAILS
4	LOT DETAILS
5	LOT DETAILS

LJA SURVEYING
7800 E. Union Avenue
Suite 575
Denver, CO 80237
303-390-8510
www.lja.com

Date: 7/03/2024 | Job No.: 1097-0004 | Sheet: 1 of 5

I:\JOB FOLDERS\1097\1097-0004\SURVEY\06 CAD\PRODUCTION FILES\FINAL PLAT\1097-0004_THE FIELDS - COVER PRINTED ON: 7/3/2024 2:47 PM

From:	Manager
To:	Heather Scott
Subject:	RE: Douglas County eReferral (SB2024-041) Is Ready For Review
Date:	Thursday, July 25, 2024 12:40:14 PM

On behalf of Cherry Creek Basin Water Quality Authority, please see the below comment response and let me know if you have any questions.
Val Endyk
CCBWQA Administrative Assistant

The Cherry Creek Basin Water Quality Authority (Authority) acknowledges notification from Douglas County that the proposed development plans for SB2024-0041, Fields Filing 1 have been or will be reviewed by Douglas County for compliance with the applicable Regulation 72 construction and post-construction requirements. Based on the Authority's current policy, the Authority will no longer routinely conduct a technical review and instead the Authority will defer to Douglas County's review and ultimate determination that the proposed development plans comply with Regulation 72.
If a technical review of the proposed development plan is needed, please contact LandUseReferral@ccbwqa.org. The review may include consultation with the Authority's Technical Manager to address specific questions or to conduct a more detailed Land Use Review, if warranted.

-----Original Message-----
From: hscott@douglas.co.us <hscott@douglas.co.us>
Sent: Monday, July 22, 2024 10:00 AM
To: LandUseReferral <LandUseReferral@ccbwqa.org>
Subject: Douglas County eReferral (SB2024-041) Is Ready For Review

There is an eReferral for your review. Please use the following link to log on to your account:
https://apps.douglas.co.us/planning/projects/Login.aspx

Project Number: SB2024-041

Project Title: Fields Filing 1

Brief Description:

This Final Plat request is to subdivide 259.8 acres into 118 lots, nine tracts, and 18.45 acres of rights-of-way. The site is located northeast of Hilltop Road and north of Singing Hills Road.

This referral will close on August 19, 2024.

If you have any questions, please contact me.

Sincerely,

Heather Scott
Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104
303-660-7460 (main)
303-919-4801 (cell)

July 26, 2024

Heather Scott, AICP
Douglas County Department of Community Development
Transmitted via email: hscott@douglas.co.us

Re: Fields Filing 1
Project No. SB2024-041
Part of Sec. 5, Twp. 7 South, Rng. 65 West, 6th P.M.
Water Division 1, Water District 8
CDWR Assigned Referral No. 32423

Dear Heather Scott:

We have reviewed the referral to subdivide approximately 259.8 acres into 118 single-family lots, 9 tracts, and a public right-of-way. The proposed water supply is service provided by the Parker Water and Sanitation District ("District").

According to information previously provided to this office, this filing is part of The Fields Subdivision composed of 118 clustered single-family lots and 32 larger single-family lots on 638.7 acres for which our office last provided comments on September 11, 2023 (referral No. 28850). This office also provided comments on May 20, 2024 on Fields Filing 2, which proposed 5 10-acre single-family lots on a 60.5-acre portion of the development, for which the proposed water supply is individual on-lot wells operating pursuant to Division 1 Water Court case no. 11CW99 (referral no. 31339).

Water Supply Demand

According to the letter dated May 2, 2024 from the District, the water demand for Filing 1 is approximately 84 acre-feet/year for residential purposes and landscape irrigation. This estimate is based on a rate of 0.7 acre-feet/year per single-family equivalent (SFE) and 2 SFEs required for landscape irrigation.

Source of Water Supply

The proposed water supply is service provided by the District. According to the letter dated May 2, 2024, the District has a combination of decreed Denver Basin supplies, junior and senior tributary rights, and storage rights in the Rueter-Hess Reservoir which total 71,920 acre-feet/year. The anticipated yield of these rights in an average or dry year is 41,134 acre-feet/year, which exceeds the estimated buildout demand of 20,720 acre-feet/year.

The majority of the District's water supply is water from bedrock aquifers in the Denver Basin. The State Engineer's Office does not have evidence regarding the length of time for which this source will be a physically and economically viable source of water. According to section 37-90-137(4)(b)(I), C.R.S., "Permits issued pursuant to this subsection (4) shall allow withdrawals on the basis of an aquifer life of one hundred years." Based on this **allocation** approach, the annual amounts of water in the District's decrees are equal to one percent of the total amount, as determined by rules 8.A and 8.B of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7. Therefore, the water may be withdrawn in those annual amounts for a maximum of 100 years.

State Engineer's Office Opinion

Based upon the above and pursuant to section 30-28-136(1)(h)(I) and section 30-28-136(1)(h)(II), C.R.S., it is our opinion that the proposed water supply is **adequate** and can be provided **without causing injury** to decreed water rights.

Our opinion that the water supply is **adequate** is based on our determination that the amount of water required annually to serve the subdivision is currently physically available, based on current estimated aquifer conditions.

Our opinion that the water supply can be provided **without causing injury** is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory allocation approach, for the proposed uses is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision.

Our opinion is qualified by the following:

The Division 1 Water Court has retained jurisdiction over the final amount of water available pursuant to the District's decrees, pending actual geophysical data from the aquifer.

The amounts of water in the Denver Basin aquifer identified in this letter are calculated based on estimated current aquifer conditions. The source of water is from non-renewable aquifers, the allocations of which are based on a 100-year aquifer life. The county should be aware that the economic life of a water supply based on wells in a given Denver Basin aquifer may be less than the 100 years used for allocation due to anticipated water level declines. We recommend that the county determine whether it is appropriate to require development of renewable water resources for this subdivision to provide for a long-term water supply.

Additional Comment

The application materials indicate that stormwater detention structure(s) will be constructed as a part of this project. The Applicant should be aware that unless the structure can meet the requirements of a "storm water detention and infiltration facility" as defined in section 37-92-602(8), C.R.S., the structure may be subject to administration by this office. The Applicant should review DWR's *Administrative Statement Regarding the Management of Storm Water Detention Facilities and Post-Wildland Fire Facilities in Colorado*, attached, to ensure that the notification, construction and operation of the proposed structure meets statutory and administrative requirements. The Applicant is encouraged to use *Colorado Stormwater Detention and Infiltration Facility Notification Portal* to meet the notification requirements, located at https://maperture.digitaldataservices.com/gvh/?viewer=cswdif.

Please contact Wenli Dickinson at (303) 607-8206 or at Wenli.Dickinson@state.co.us with any questions.

Sincerely,

IComaniciu

Ioana Comaniciu, P.E.
Water Resource Engineer

Ec: District file

Attachment: *Administrative Statement Regarding the Management of Storm Water Detention Facilities and Post-Wildland Fire Facilities in Colorado*

DOUGLAS COUNTY
HEALTH DEPARTMENT COLORADO

08/15/2024

Heather Scott
Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104

RE: SB2024-041

Dear Heather Scott,

Thank you for the opportunity to review and comment on the request for final plat for 118 single-family residential lots. Douglas County Health Department (DCHD) staff have reviewed the application for compliance with applicable environmental and public health regulations. After reviewing the application, DCHD has the following comments:

Water and Sewer Service
A will-serve letter has been provided by Parker Water and Sanitation District. Based on this letter, DCHD is providing a favorable recommendation regarding the proposed method of sewage disposal.

Fugitive Dust - Developments of 25 acres and more than 6 months in duration
Exposure to air pollution is associated with a number of health problems including asthma, lung cancer, and heart disease. The Colorado Department of Public Health and Environment Air Pollution Control Division (APCD) regulates air emissions, including fugitive dust from developments of 25 acres or more that last at least 6 months. The applicant shall contact the APCD, at (303) 692-3100 for more information. Additional information is available at https://www.colorado.gov/pacific/sites/default/files/AP_Land-Development-Guidance-Document_1.pdf and https://www.colorado.gov/pacific/cdphe/specialty-apens.

Sincerely,

Jacob Deitz

cc: Skyler Sicard

August 19, 2024

Kevin Lovelace
Authorized Representative
LJA Engineering, Inc.
1765 West 121st Avenue, Suite 300
Westminster, CO 80234

File No. DV 24-322

Subj: Fields Filing No. 1

Dear Kevin,

Plan Review Summary:

Submitted to Engineering	-	7/22/24
Comments Sent Out	-	8/19/24

Engineering has reviewed the above referenced submittal and have the following comments:

Final Plat Comments

Comment #1-During the November 7, 2023 Board of County Commissioners Land Use Meeting/Public Hearing, the applicant's Attorney, David Foster, stated that the right-of-way requested by the County for the future widening of Hilltop Road will be conveyed to the County for public improvements along Hilltop Road (approximately 1-hour & 29-minutes into the hearing). While this final plat does not include the identified right-of-way, it must be conveyed to the County prior to this plat being eligible for final approval since it was a condition agreed upon by the applicant during the public hearing.

Comment #2-A Subdivision Improvements Agreement (SIA) will be required for this project. The applicant can get a copy of this document from our office or from the Douglas County website. When submitting this document, please provide us with 1-copy with original signatures. Please include a "letter of authorization" for whoever signs the agreement, and the cost estimate exhibits need to be signed by this individual as well. These documents will need to be submitted and approved prior to the approval of the final plat.

Comment #3-Please refer to the final plat redlines.

Sanitary Sewer & Water Comment

Comment #1-Please refer to the Sewer & Water redlines.

Construction Plan Comment

Comment #1-Pleaes refer to the construction plan redlines.

We cannot recommend approval of this final plat and/or construction plans until these comments have been addressed. If you have any questions, please give me a call.

Sincerely,

Chuck Smith
Development Review Engineer

cc: Heather Scott, AICP; Project Planner

DV24322

THE FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

259.779 ACRES - 118 LOTS AND 9 TRACTS - SB2024-041

OWNERSHIP AND DEDICATION

KNOW ALL MEN BY THESE PRESENTS THAT THE UNDERSIGNED, BEING THE OWNERS, AND/OR LIEN HOLDER OF THAT PART OF SECTION 5, TOWNSHIP 7 NORTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF FIRESTONE, COUNTY OF DOUGLAS, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS:

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5, BEING ASSUMED TO BEAR SOUTH 89°26'46" EAST, SAID LINE BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP ON 2" PIPE STAMPED "PLS 6935" AND ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A FOUND 2.5" ALUMINUM CAP ON 2" PIPE "PLS 6935" WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 5;

THENCE ALONG THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5,
SOUTH 89°26'46" EAST A DISTANCE OF 1.118.05 FEET;

THENCE SOUTH 00°21'43" EAST, A DISTANCE OF 273.50 FEET;
THENCE SOUTH 72°10'45" EAST, A DISTANCE OF 549.06 FEET;
THENCE SOUTH 00°27'53" EAST, A DISTANCE OF 636.91 FEET;
THENCE SOUTH 54°10'26" EAST, A DISTANCE OF 1,315.05 FEET;
THENCE SOUTH 54°54'12" EAST, A DISTANCE OF 282.82 FEET;
THENCE SOUTH 11°02'21" EAST, A DISTANCE OF 347.63 FEET;
THENCE SOUTH 46°36'35" EAST, A DISTANCE OF 692.86 FEET;
THENCE SOUTH 00°54'50" EAST, A DISTANCE OF 358.87 FEET;
THENCE SOUTH 30°46'30" WEST, A DISTANCE OF 372.83 FEET;
THENCE SOUTH 18°08'07" EAST, A DISTANCE OF 550.61 FEET;
THENCE SOUTH 11°00'15" WEST, A DISTANCE OF 761.48 FEET;
THENCE SOUTH 00°33'09" WEST, A DISTANCE OF 194.54 FEET;
THENCE NORTH 79°48'04" WEST, A DISTANCE OF 361.29 FEET;

THENCE SOUTH 86°45'22" WEST, A DISTANCE OF 401.36 FEET TO THE EAST LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 5;

THENCE ALONG SAID EAST LINE NORTH 00°25'43" EAST, A DISTANCE OF 293.65 FEET;
THENCE NORTH 89°34'24" WEST, A DISTANCE OF 133.73 FEET;
THENCE SOUTH 28°58'05" WEST, A DISTANCE OF 162.70 FEET;
THENCE NORTH 61°01'55" WEST, A DISTANCE OF 380.70 FEET;
THENCE NORTH 54°50'00" WEST, A DISTANCE OF 555.44 FEET;
THENCE NORTH 68°37'50" WEST, A DISTANCE OF 321.35 FEET;
THENCE NORTH 57°07'56" WEST, A DISTANCE OF 1,093.78 FEET;
THENCE NORTH 56°06'28" WEST, A DISTANCE OF 108.16 FEET;
THENCE NORTH 33°53'32" EAST, A DISTANCE OF 285.33 FEET;
THENCE NORTH 54°16'47" WEST, A DISTANCE OF 310.98 FEET;
THENCE SOUTH 89°23'59" WEST, A DISTANCE OF 228.55 FEET TO THE WEST LINE OF SAID SOUTHWEST QUARTER;
THENCE ALONG SAID WEST LINE NORTH 00°35'02" EAST, A DISTANCE OF 382.35 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 5;
THENCE ALONG THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5 NORTH 00°31'45" EAST, A DISTANCE OF 2,716.06 FEET TO THE POINT OF BEGINNING.

DEDICATION STATEMENT

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LAND DESCRIBED HEREIN, HAVE LAID OUT, SUBDIVIDED AND PLATTED SAID LANDS INTO LOTS, TRACTS, STREETS AND EASEMENTS AS SHOWN HEREON UNDER THE NAME AND SUBDIVISION OF "THE FIELDS FILING NO. 1". THE UTILITY EASEMENTS SHOWN HEREON ARE HEREBY DEDICATED FOR PUBLIC UTILITIES AND CABLE COMMUNICATION SYSTEMS AND OTHER PURPOSES AS SHOWN HEREON. THE ENTITIES RESPONSIBLE FOR PROVIDING THE SERVICES FOR WHICH THE EASEMENTS ARE ESTABLISHED ARE HEREBY GRANTED THE PERPETUAL RIGHT OF INGRESS AND EGRESS FROM AND TO ADJACENT PROPERTIES FOR INSTALLATION, MAINTENANCE AND REPLACEMENT OF UTILITY LINES AND RELATED FACILITIES. THE STREETS, TRACTS, PARCELS, AND EASEMENTS SHOWN HEREON ARE DEDICATED AND CONVEYED TO DOUGLAS COUNTY, CO. IN FEE SIMPLE ABSOLUTE, WITH MARKETABLE TITLE, FOR PUBLIC USES AND PURPOSES.

OWNER CERTIFICATE

OWNER: TOLL SOUTHWEST LLC, A DELAWARE LIMITED LIABILITY COMPANY

____
OWNER NAME

BY: ______________________________
NAME DATE

TITLE: ______________________________

STATE OF COLORADO

COUNTY OF DOUGLAS

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ______________ A.D., _________ BY ______________________
(NAME)

MY COMMISSION EXPIRES: ______________________________

____
NOTARY PUBLIC

TITLE VERIFICATION

WE______________________________, DO HEREBY CERTIFY THAT WE HAVE EXAMINED THE TITLE OF ALL LAND PLATTED HEREON AND THAT TITLE TO SUCH LAND IS IN THE DEDICATOR(S) FREE AND CLEAR OF ALL LIENS, TAXES AND ENCUMBRANCES.

COMPANY NAME: ______________________________

BY: ______________________________
NAME DATE

TITLE: ______________________________

STATE OF COLORADO ______________________________

COUNTY OF DOUGLAS______________________________

ACKNOWLEDGED BEFORE ME THIS ______ DAY OF ___________ A.D. 2024 BY ______________________________

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

VICINITY MAP

SCALE: 1" = 2000'

During the November 7, 2023 Board of County Commissioners Land Use Meeting / Public Hearing, the applicant's Attorney, David Foster, stated that the right-of-way requested by the County for future widening of Hilltop Road will be conveyed to the County for public improvements along Hilltop Road (1 hour and 29 minutes into the hearing). While this plat does not include the identified right-of-way, it must be conveyed to Douglas County prior to this plat being eligible for final acceptance since it was a condition agreed upon by the applicant during the public hearing.

PLANING COMMISSION

THE PRELIMINARY PLAN (SB2022-036) FOR THIS FINAL PLAT WAS REVIEWED BY THE PLANNING COMMISSION ON NOVEMBER 7, 2023

______________________________ ______________________________
PLANNING DIRECTOR, ON BEHALF OF THE PLANNING COMMISSION DATE

and Drainage Easements

BOARD OF COUNTY COMMISSIONERS

THIS PLAT WAS APPROVED FOR FILING BY THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, CO, ON THE _____ DAY OF ____________________, 2024, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON. THE DEDICATIONS OF STREETS, TRACTS, AND UTILITY EASEMENTS, ARE HEREBY ACCEPTED.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, GUTTERS, SIDEWALKS , ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES, AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE THE RESPONSIBILITY OF THE SUBDIVIDER AND NOT DOUGLAS COUNTY.

THIS ACCEPTANCE DOES NOT GUARANTEE THAT THE SOIL CONDITIONS, SUBSURFACE GEOLOGY, GROUNDWATER CONDITIONS OR FLOODING CONDITIONS OF ANY LOT SHOWN HEREON ARE SUCH THAT A BUILDING PERMIT, WELL PERMIT OR SEWAGE DISPOSAL PERMIT WILL BE ISSUED.

____
CHAIR, BOARD OF DOUGLAS COUNTY COMMISSIONERS

include the following note:
Drainage easements are hereby granted to Douglas County Across Tracts B - E in Fields Filing No. 1, (Subdivision) for the purpose of accessing, maintaining and repairing storm sewer management improvements, including but not limited to inlets, pipes, culverts, channels, ditches, hydraulic structures, riprap, detention basins, forebays, micropools, and water quality facilities (collectively, the Facilities). In the event the Fields Metropolitan District, its successors, and assigns (system owner) fails to satisfactorily maintain or repair said facilities. A blanket access easement over the subdivision is also granted to Douglas County, but only for the purpose of accessing the facilities in the event that the drainage easements do not provide adequate access. The maintenance and repair of the facilities located in the subdivision, as shown on the construction plans accepted by Douglas County or on the plat for the subdivision shall be the responsibility of the system owner.

see the next page for continuation

GENERAL NOTES

1. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
2. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY, COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE 18—4-508, C.R.S.
3. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY LJA SURVEYING TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHTS-OF-WAY, AND TITLE OF RECORD, LJA SURVEYING RELIED UPON THE TITLE COMMITMENT PREPARED BY LANDTITLE GUARANTEE COMPANY, COMMITMENT NUMBER 450-HS0832211-412, WITH A COMMITMENT DATE OF MAY 15, 2024 AT 12:00 A.M.
4. THE LINEAL UNIT USED IN THE PREPARATION OF THIS SURVEY IS THE U.S. SURVEY FOOT AS DEFINED BY THE UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.
5. BASIS OF BEARINGS: THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M. BEING ASSUMED TO BEAR SOUTH 89°26'46" EAST, SAID LINE BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP ON 2" PIPE STAMPED "PLS 6935" AND ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A FOUND 2.5" ALUMINUM CAP ON 2" PIPE "PLS 6935" WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.
6. FLOODPLAIN: THE SURVEYED PROPERTY IS LOCATED WITHIN ZONE X, OTHER AREAS — DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS IDENTIFIED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) ON FLOOD INSURANCE RATE MAP (FIRM) — MAP NUMBER 08035C0202F AND 08035C0204F WITH A MAP REVISED DATE OF OF SEPTEMBER 30, 2005.
7. UTILITY EASEMENTS: FIFTEEN FOOT (15') WIDE UTILITY EASEMENTS AS SHOWN HEREON ARE DEDICATED FOR THE INSTALLATION, MAINTENANCE AND REPLACEMENT OF ELECTRIC, GAS, TELEVISION, CABLE AND TELECOMMUNICATIONS FACILITIES. PERMANENT STRUCTURES SHALL NOT BE PERMITTED WITH SAID UTILITY EASEMENTS.
8. DRAINAGE EASEMENTS ARE DEDICATED TO DOUGLAS COUNTY AND SHALL REMAIN FREE OF OBSTRUCTION.

Primary

LAND USE SUMMARY CHART

TYPE	LOTS	SQ. FT.	ACRES	%
LOT AREA - RESIDENTIAL	118	5,375,580	123.406	47.5%
PUBLIC RIGHT-OF-WAY AREA		803,354	18.442	7.1%
TRACTS - (9)		5,137,051	117.930	45.4%
TOTALS		11,315,985	259.779	100%

TRACT SUMMARY CHART

TRACT	USE	OWNED	MAINTAINED	SQ. FT.	ACRES
TRACT A	LIFT STATION	P.W.S.D.	P.W.S.D.	41,478	0.952
TRACT B	DRAINAGE, OPEN SPACE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	3,808,663	87.435
TRACT C	DRAINAGE, OPEN SPACE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	116,433	2.673
TRACT D	DRAINAGE, OPEN SPACE, SIGNAGE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	1,091,169	25.050
TRACT E	DRAINAGE, OPEN SPACE, SIGNAGE, UTILITIES	HOA & METRO DISTRICT	HOA & METRO DISTRICT	39,308	0.902
TRACT F	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
TRACT G	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
TRACT H	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
TRACT I	METRO DISTRICT	HILLTOP LLC	METRO DISTRICT	10,000	0.230
			TOTAL AREA	5,137,051	117.930

DOUGLAS COUNTY CLERK AND RECORDER'S CERTIFICATE

I HEREBY CERTIFY THAT THIS PLAT WAS FILED IN MY OFFICE ON THIS DAY OF ________, 20__A.D., AT _____ A.M./P.M., AND WAS RECORDED AT RECEPTION NUMBER ________________.

____
DOUGLAS COUNTY CLERK AND RECORDER

SURVEYOR'S CERTIFICATE

I, MARK A. HALL, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PLAT TRULY AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE ON ____________ , 202__, BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON; THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:50,000 (SECOND ORDER); AND THAT SAID PLAT HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISIONS OR SURVEYING OF LAND AND ALL APPLICABLE PROVISIONS OF THE DOUGLAS COUNTY SUBDIVISION RESOLUTION. THIS CERTIFICATION IS BASED ON MY KNOWLEDGE, INFORMATION, AND BELIEF AND IS NOT A GUARANTY OR WARRANTY, EITHER EXPRESS OR IMPLIED.

I ATTEST THE ABOVE ON THIS ______ DAY OF ______________ , 20___.

____

MARK A. HALL
COLORADO PLS NO. 36073
FOR AND ON BEHALF OF LJA SURVEYING, INC.
7800 E UNION AVE, SUITE 575,
DENVER, COLORADO 80237

DEVELOPER
TOLL BROTHERS, INC.
7100 E. BELLEVIEW AVE, SUITE 200
GREENWOOD VILLAGE, CO 80111
PHONE: (203) 913-8147
CONTACT: BRAD DIXON

CIVIL ENGINEER
LJA ENGINEERING, INC.
1765 WEST 121ST AVE, SUITE 300
WESTMINSTER, CO 80234
PHONE: (303) 421-4224
CONTACT: KEVIN LOVELACE

SURVEYOR
LJA SURVEYING, INC
7800 E. UNION AVE, SUITE 575
DENVER, CO 80237
PHONE: (303) 481-4016
CONTACT: MARK HALL

Submit the Subdivision Improvements Agreement (SIA)

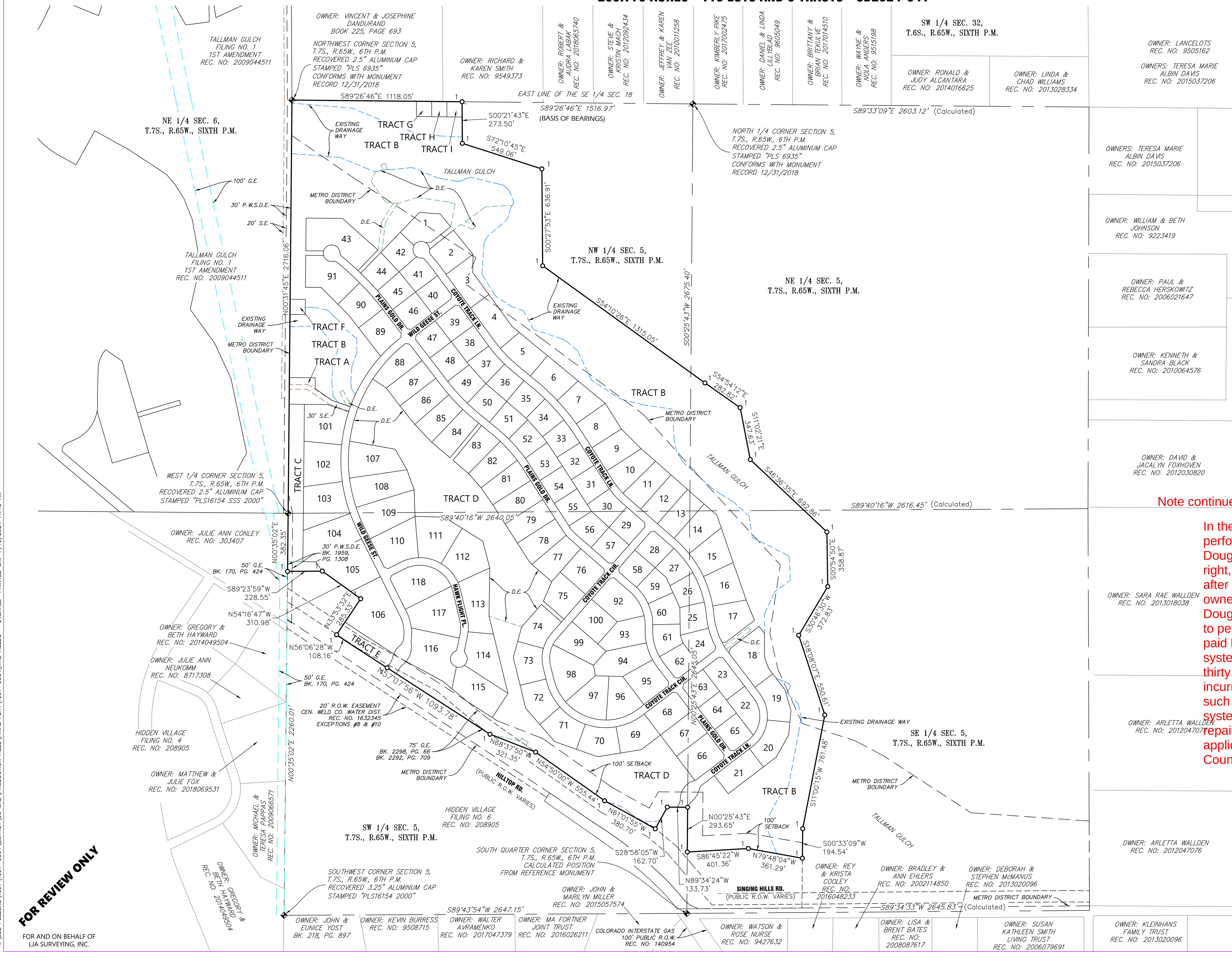
SHEET INDEX

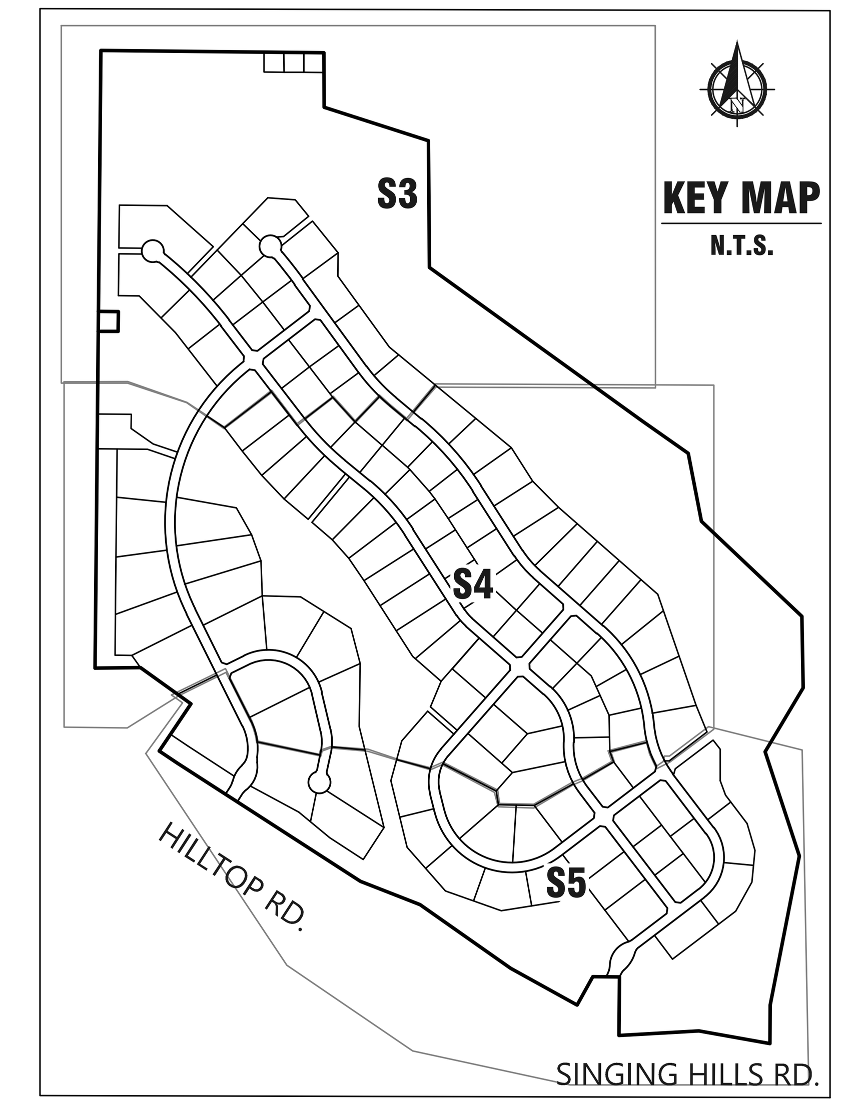
LJA SURVEYING
7800 E. Union Avenue
Suite 575
Denver, CO 80237
303-390-8510
www.lja.com

Date: 7/03/2024 Job No.: 1097-0004 Sheet: 1 of 5

THE FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M.,
COUNTY OF DOUGLAS, STATE OF COLORADO
259.779 ACRES - 118 LOTS AND 9 TRACTS - SB2024-041





MONUMENT SYMBOL LEGEND

- RECOVERED SECTION CORNER AS NOTED HEREON
- SET 18" LONG NO. 5 REBAR WITH 1-1/4" BLUE PLASTIC CAP STAMPED "LJA SURVEYING PLS 36073" FLUSH WITH GROUND
- RECOVERED #4 REBAR 1" YELLOW PLASTIC CAP STAMPED "LS 18982"
- BK. PG. BOOK AND PAGE

LEGEND

- # = BLOCK NUMBER
- S.E. = SANITARY SEWER EASEMENT HEREBY GRANTED
- D.E. = DRAINAGE EASEMENT HEREBY GRANTED
- D.U.E. = DRY UTILITY EASEMENT HEREBY GRANTED
- U.E. = UTILITY EASEMENT HEREBY GRANTED
- REC. NO: = RECEPTION NUMBER
- P.W.S.D.E. = PARKER WATER & SANITATION DISTRICT EASEMENT

Note continued:

In the event such maintenance and repair are not performed by the system owner, to the satisfaction of Douglas County, then Douglas County shall have the right, but not the obligation, to enter said subdivision, after ten (10) days prior written notice to the system owner, unless there is an emergency, in which case Douglas County shall give notice as soon as practicable, to perform all necessary work, the cost of which shall be paid by the system owner upon billing. in the event the system owner fails to reimburse Douglas County within thirty (30) days after submission of the bill for the costs incurred, Douglas County shall have the right to enforce such obligation by appropriate legal action. It is the system owner's responsibility to construct, maintain, and repair the facilities in a manner consistent with all applicable plans approved or accepted by Douglas County.

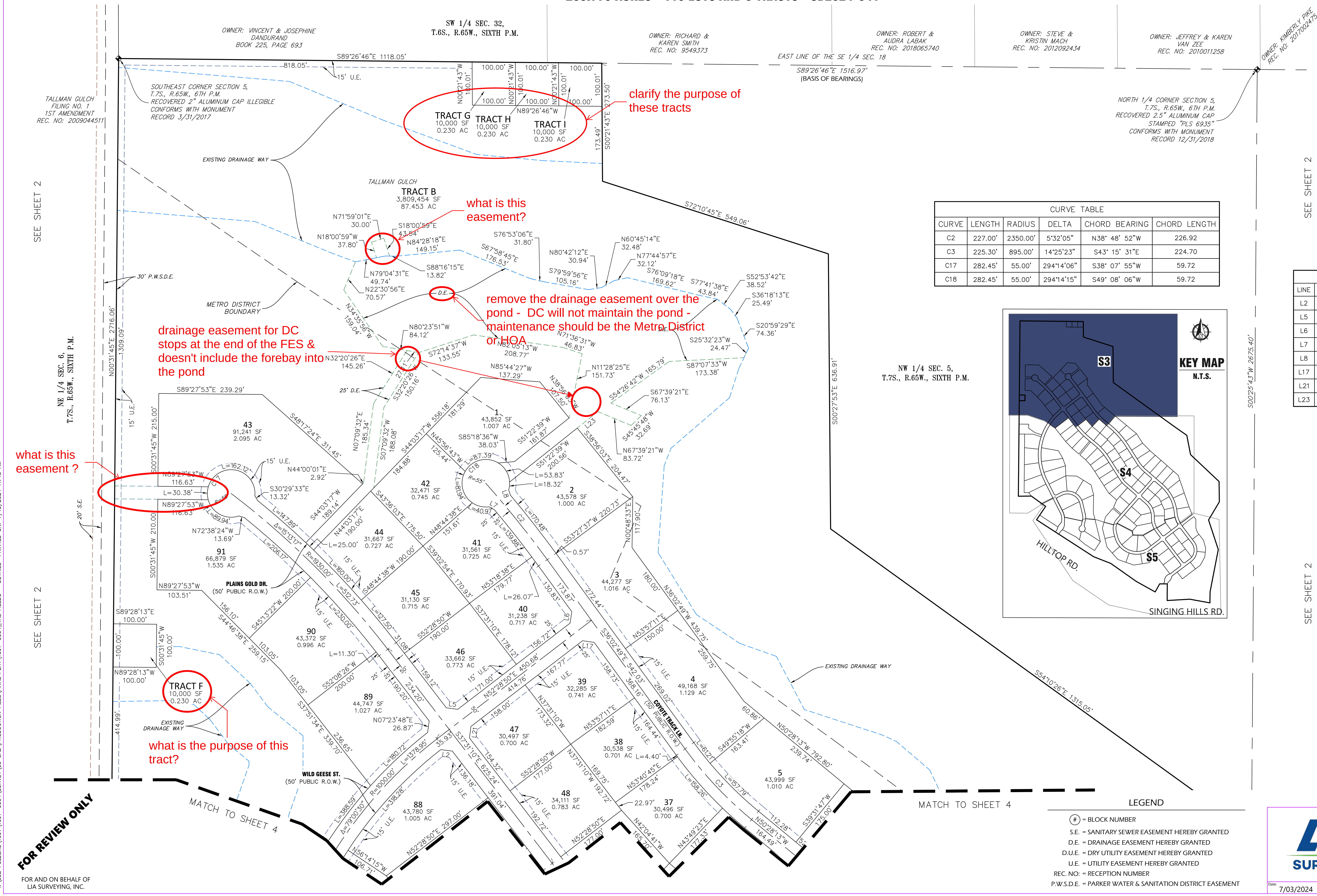
LJA SURVEYING
7800 E Union Avenue Suite 575 Denver, CO 80237 303-390-5810 www.lja.com

Date:	Job No:	Sheet:
7/03/2024	1097-0004	2 of 5

THE FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

259.779 ACRES - 118 LOTS AND 9 TRACTS - SB2024-041



CURVE TABLE

CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C2	227.00'	2350.00'	5°32'05"	N38° 48' 52"W	226.92
C3	225.30'	895.00'	14°25'23"	S43° 15' 31"E	224.70
C17	282.45'	55.00'	294°14'06"	S38° 07' 55"W	59.72
C18	282.45'	55.00'	294°14'15"	S49° 08' 06"W	59.72

LINE TABLE

LINE	BEARING	LENGTH
L2	N82°36'33"W	26.87'
L5	S82°31'10"E	26.87'
L6	N08°13'00"E	26.74'
L7	N61°41'39"W	13.65'
L8	S19°32'20"E	13.35'
L17	S81°47'00"E	27.00'
L21	N07°28'50"E	26.87'
L23	S51°22'39"W	60.81'

LEGEND

(#) = BLOCK NUMBER
S.E. = SANITARY SEWER EASEMENT HEREBY GRANTED
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REC. NO: = RECEPTION NUMBER
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FOR AND ON BEHALF OF LJA SURVEYING, INC.

LJA SURVEYING

7800 E. Union Avenue Suite 575 Denver, CO 80237 303-390-5810 www.lja.com

Date: 7/03/2024 Job No. 1097-0004 Sheet: 3 of 5

THE FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M.,
COUNTY OF DOUGLAS, STATE OF COLORADO
259.779 ACRES - 118 LOTS AND 9 TRACTS - SB2024-041

LINE TABLE

LINE	BEARING	LENGTH
L3	N03°45'13"W	26.87'
L9	N88°27'27"W	24.16'
L12	S86°14'47"W	26.87'
L15	S03°45'13"E	26.87'
L16	S86°14'47"W	26.87'
L18	S03°45'13"E	26.87'
L19	S86°14'47"W	26.87'
L20	N50°28'13"W	4.74'
L24	N71°28'12"W	20.04'
L25	N25°31'46"W	85.67'

CURVE TABLE

CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C1	109.68'	250.00'	25°08'09"	N00° 41' 39"W	108.80
C4	140.03'	500.00'	16°02'48"	S40° 43' 49"E	139.58
C7	255.53'	365.00'	40°06'40"	S17° 14' 25"E	250.34
C8	63.02'	225.00'	16°02'48"	S40° 43' 49"E	62.81
C22	279.55'	500.00'	32°02'03"	S21° 16' 44"E	275.93

LEGEND

- (#) = BLOCK NUMBER
- S.E. = SANITARY SEWER EASEMENT HEREBY GRANTED
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FOR REVIEW ONLY

FOR AND ON BEHALF OF LJA SURVEYING, INC.

LJA SURVEYING

7800 E. Union Avenue Suite 575 Denver, CO 80237 303-390-5810 www.lja.com

Date: 7/03/2024 | Job No.: 1097-0004 | Sheet: 4 of 5

I:\JOB FOLDERS\1097\1097-0004\SURVEY\06 CAD\PRODUCTION FILES\FINAL PLAT\1097-0004_THE FIELDS — DETAILS PRINTED ON: 7/18/2024 11:43 AM

THE FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

259.779 ACRES - 118 LOTS AND 9 TRACTS - SB2024-041

LINE TABLE		
LINE	BEARING	LENGTH
L1	S27°53'39"W	78.74'
L4	N82°17'45"W	26.87'
L9	N88°27'27"W	24.16'
L10	N82°16'37"W	26.88'
L11	S82°17'45"E	26.87'
L13	N11°50'56"E	26.12'
L14	S82°17'45"E	26.87'

LEGEND

- # = BLOCK NUMBER
- S.E. = SANITARY SEWER EASEMENT HEREBY GRANTED
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- REC. NO: = RECEPTION NUMBER
- P.W.S.D.E. = PARKER WATER & SANITATION DISTRICT EASEMENT

the County will have secondary easements over the drainageways and we need to delineate these easements as primary drainage easements - (typical comment for the primary easements)

CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C5	130.09'	300.00'	24°50'42"	S40° 19' 00"W	129.07
C6	215.98'	225.00'	55°00'00"	S13° 44' 47"W	207.79
C9	94.81'	150.00'	36°12'51"	S30° 57' 02"W	93.24
C10	34.95'	100.00'	20°01'27"	N22° 51' 20"E	34.77
C11	282.45'	55.00'	294°14'36"	S78° 07' 35"E	59.71
C12	32.37'	100.00'	18°32'55"	S42° 08' 32"W	32.23
C13	157.89'	150.00'	60°18'35"	N21° 15' 42"E	150.70
C14	22.39'	61.00'	21°01'50"	N63° 13' 10"E	22.26
C15	157.11'	125.00'	72°00'49"	N37° 43' 40"E	146.97
C16	45.68'	100.00'	26°10'24"	N14° 48' 27"E	45.28
C19	32.53'	50.00'	37°16'33"	S34° 03' 58"W	31.96
C20	105.01'	176.42'	34°06'13"	S32° 28' 48"W	103.47
C21	18.88'	50.00'	21°38'16"	S38° 42' 47"W	18.77
C22	279.55'	500.00'	32°02'03"	S21° 16' 44"E	275.93

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THE FIELDS FILING NO. 1

STREET & STORM SEWER CONSTRUCTION PLANS

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF DOUGLAS, STATE OF COLORADO

Add separate Douglas County Signage and Striping Supplemental plan sheets 1 - 4 to plan set. These Sheets are available on the Douglas County web site at:

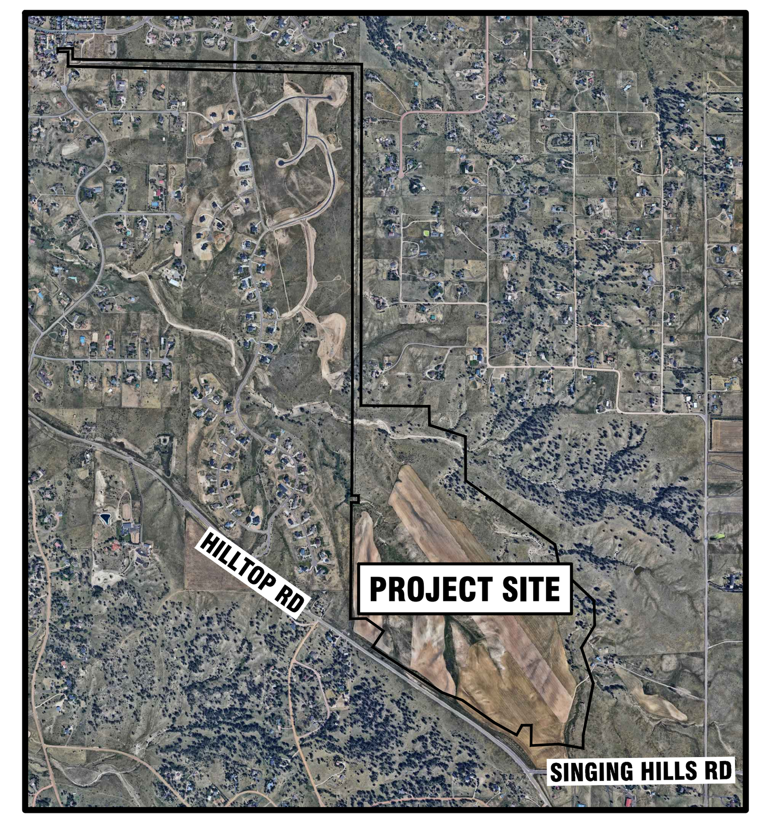
https://www.douglas.co.us/documents/rwd-exhibit-g-plan-sheets.pdf

LEGEND

- Property Line
- Right of Way Line
- Centerline
- Easement Line
- Lot Line
- Site Line
- Sight Distance Line
- Top of Embankment
- 100-YR W.S.E.
- Phase Line
- Prop. Asphalt Pavement
- Prop. Concrete Pavement
- Prop. Crushed Fines
- Ex. Asphalt Pavement
- Sight Distance Area
- Riprap
- Non-FEMA Floodplain Limits
- Sanitary Sewer Line
- Water Line
- Storm Sewer Line
- Fence
- Ex. Sanitary Line
- Ex. Water Line
- Ex. High Pressure Gas Line
- Ex. Telephone Line
- Ex. Overhead Electric
- Ex. Wood Fence
- Ex. Fence
- Sanitary Service Line
- Water Service Line
- Sanitary Sewer Manhole
- Fire Hydrant
- Thrust Block
- Water Valve
- Water Meter
- Storm Manhole
- Ex. Sanitary Sewer Manhole
- Ex. Water Valve
- Ex. Storm Manhole
- Ex. Street Light
- Ex. Sign
- Prop. Street Light
- Prop. Sign
- Proposed Major Contour (5280)
- Proposed Minor Contour
- Existing Major Contour (5280)
- Existing Minor Contour

GENERAL ABBREVIATIONS

A.E.	ACCESS EASEMENT
BKL	BIKE LANE
BL CONST	BASELINE OF CONSTRUCTION
BS	BOTTOM ELEVATION OF RISE
CE	CURB EXTENSION
CL	CENTERLINE
CT	CURB TRANSITION
CWN	CROWN
DBO	DESIGN BY OTHERS
DC	MEDIAN CURB & GUTTER
DEFLEC.	DEFLECTION
D.E.	DRAINAGE EASEMENT
D.U.E.	DRAINAGE & UTILITY EASEMENT
DW	DRIVEWAY
EOP	EDGE OF PAVEMENT
FES	FLARED END SECTION
FGB	FINISHED GROUND AT BOTTOM WALL ELEVATION
FGT	FINISHED GROUND AT TOP WALL ELEVATION
FH	FIRE HYDRANT
FL	FLOWLINE
FM	FORCE MAIN
FV	FIELD VERIFY
G	FINISHED GROUND
G.E.	GAS EASEMENT
GV	GATE VALVE
HP	HIGH POINT
LL	LOT LINE
LP	LOW POINT
MC	MOUNTABLE CURB & GUTTER
MH	MANHOLE
MSE	MECHANICALLY STABILIZED EARTH
P	PAVEMENT
P.A.E.	PUBLIC ACCESS EASEMENT
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCR	POINT OF CURB RETURN
PGL	PROFILE GRADE LINE
PP	POLYPROPYLENE
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
PWSD	PARKER WATER & SANITATION DISTRICT
R.O.W.	RIGHT OF WAY
RN	RECORDING NUMBER
S.E.	SANITARY EASEMENT
SEC	SECTION LINE
SL	SANITARY LINE
SS	SANITARY SERVICE
SW	SIDEWALK
TB	THRUST BLOCK
TC	TOP OF CURB
T.R.E.	TRANSPORTATION EASEMENT
TS	TOP ELEVATION OF RISER
U.E.	UTILITY EASEMENT
U.G.E	UTILITY & GAS EASEMENT
VC	VERTICAL CURB & GUTTER
VERT.	VERTICAL
W.E.	WATER EASEMENT
WL	WATER LINE
WS	WATER SERVICE
W.S.W.	WATER SURFACE ELEVATION
WV	WATER VALVE



VICINITY MAP
1" = 1000'

DEVELOPER
TOLL BROTHERS, INC.
7100 E. BELLEVIEW AVE, SUITE 200
GREENWOOD VILLAGE, CO 80111
PHONE: (203) 913-8147
CONTACT: BRAD DIXON

CIVIL ENGINEER
LJA ENGINEERING, INC.
1765 WEST 121ST AVE, SUITE 300
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CONTACT: KEVIN LOVELACE

SURVEYOR
LJA SURVEYING, INC
1765 WEST 121ST AVE, SUITE 300
WESTMINSTER, CO 80234
PHONE: (303) 358-7002
CONTACT: DEREK BROWN

PLANNER/LANDSCAPE
LJA ENGINEERING, INC.
1765 WEST 121ST AVE, SUITE 300
WESTMINSTER, CO 80234
PHONE: (303) 421-4224
CONTACT: JONAH WEISS

GEOTECHNICAL ENGINEER
CTL THOMPSON
1971 WEST 12TH AVE.
DENVER, CO 80204
PHONE: (303) 825-0777
CONTACT: ALAN J. LISOWY, P.E.

LIFTSTATION ENGINEER
IMEG CORP.
7600 E. ORCHARD RD, SUITE 250-S
GREENWOOD VILLAGE, CO 80111
PHONE: (303) 872-9031
CONTACT: GLENDON W. BERRETT, P.E.

AGENCY LIST

DOUGLAS COUNTY
100 THIRD STREET
CASTLE ROCK, CO 80104
PHONE: (303) 660-7460
CONTACT: CHUCK SMITH

PARKER WATER & SANITATION DISTRICT
19801 E. MAIN STREET
PARKER, CO 80138
PHONE: (303) 841-4627
CONTACT: JAROD BAYLIE

CORE ELECTRIC COOPERATIVE
5496 US-85
SEDALIA, CO 80135
PHONE: (800) 332-9540

Sheet List Table

Sheet List Table

ENGINEERING CERTIFICATION NOTE:

THESE CONSTRUCTION PLANS FOR THE FIELDS FILING NO. 1 WERE PREPARED BY ME (OR UNDER MY DIRECT SUPERVISION) IN ACCORDANCE WITH THE REQUIREMENTS OF DOUGLAS COUNTY'S ROADWAY DESIGN AND CONSTRUCTION STANDARDS, STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA, AND THE GRADING, EROSION AND SEDIMENT CONTROL MANUAL.

DYLAN HARDY, PE
LJA ENGINEERING

ASSISTANT DIRECTOR OF DEVELOPMENT REVIEW

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY DOUGLAS COUNTY FOR STREET AND DRAINAGE IMPROVEMENTS ONLY.

ENGINEERING DIVISION ACCEPTANCE BLOCK

BASIS OF BEARINGS:

THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF DOUGLAS, STATE OF COLORADO. ASSUMED TO BEAR SOUTH 89°26'46" EAST, BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP STAMPED "PLS 6935" AND BEING MONUMENTEDED ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP STAMPED "PLS 6935."

SITE BENCHMARK:

BENCHMARK IS A #5 REBAR WITH A 1.25-INCH ORANGE PLASTIC CAP, ON THE NORTHEAST SIDE OF HILLTOP ROAD, APPROXIMATELY 8.3 FEET NORTHEAST FROM EDGE OF PAVEMENT, APPROXIMATELY 527 FEET NORTH OF INTERSECTION OF HILLTOP ROAD AND SINGING HILLS ROAD.

NAVD 88 ELEV = 6478.67'

PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD. 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

1765 W. 121st Avenue
Suite 300
Westminster, CO 80234
303-421-4224 • www.lja.com

No.	Rev. Date:	Revision Type:
1		
2		
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4		
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6		

Designed: T.BS
Prepared: DL
Approved: DKH
Job No.: 1097-0004
Scale Horiz: N/A
Scale Vert: N/A
Sheet: 1 of 77
Date: July 3, 2024

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Street & Storm Sewer Construction Plans
Sheet Name: Cover Sheet

NOT FOR CONSTRUCTION

811
Know what's below.
Call before you dig.

No. 1

L:\JOB FOLDERS\1097\1097-0004\PROD\CD - STR-STM\M-COVER PRINTED ON: 7/18/2024 12:07 PM

DOUGLAS COUNTY STANDARD NOTES:

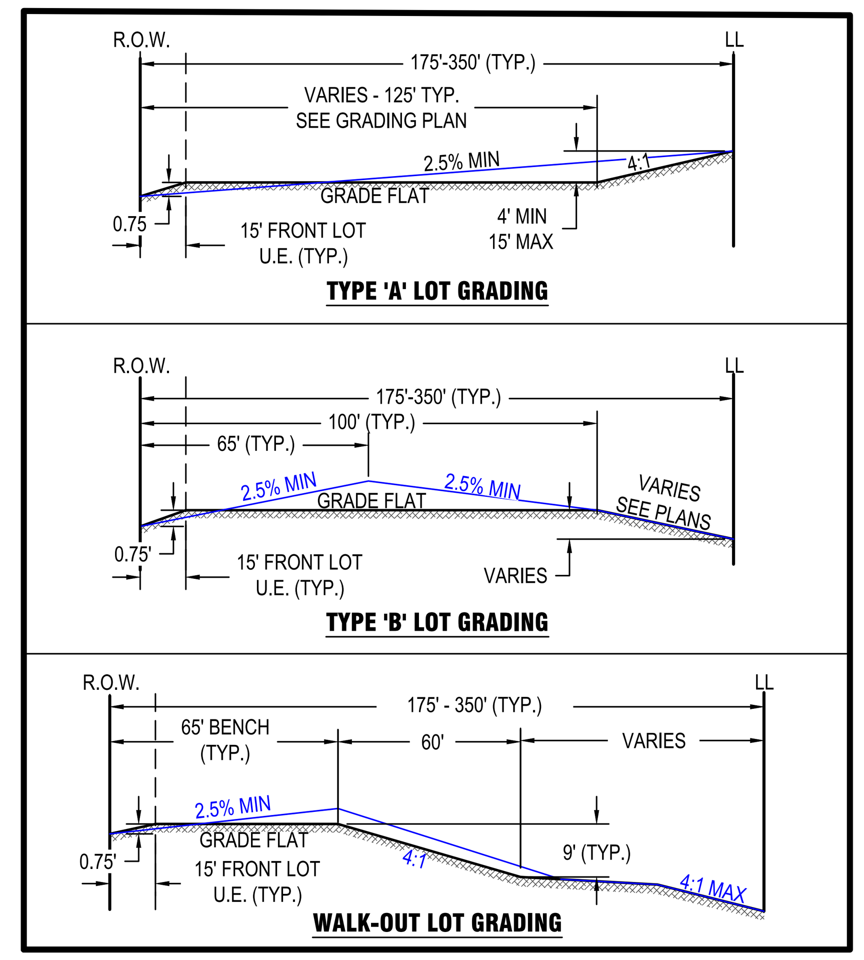
1. THE DOUGLAS COUNTY ENGINEERING DIRECTOR SIGNATURE AFFIXED TO THIS DOCUMENT INDICATES THE ENGINEERING DIVISION HAS REVIEWED THE DOCUMENT AND FOUND IT IN GENERAL CONFORMANCE WITH THE DOUGLAS COUNTY ROADWAY DESIGN AND CONSTRUCTION STANDARDS AND THE DOUGLAS COUNTY SUBDIVISION RESOLUTION OR OR ACCEPTED VARIANCES TO THOSE REGULATIONS. THE DOUGLAS COUNTY ENGINEERING DIRECTOR, THROUGH ACCEPTANCE OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY, OTHER THAN STATED ABOVE, FOR THE COMPLETENESS AND/OR ACCURACY OF THESE DOCUMENTS. THE OWNER AND ENGINEER UNDERSTAND THAT THE RESPONSIBILITY FOR THE ENGINEERING ADEQUACY OF THE FACILITIES DEPICTED IN THIS DOCUMENT LIES SOLELY WITH THE PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF COLORADO WHOSE STAMP AND SIGNATURE IS AFFIXED TO THIS DOCUMENT.
2. ALL CONSTRUCTION SHALL CONFORM TO DOUGLAS COUNTY STANDARDS. ANY CONSTRUCTION NOT SPECIFICALLY ADDRESSED BY THESE PLANS AND SPECIFICATIONS WILL BE BUILT IN COMPLIANCE WITH THE LATEST EDITION OF THE MOST STRINGENT OF THE FOLLOWING:
   - THE DOUGLAS COUNTY ROADWAY DESIGN AND CONSTRUCTION STANDARDS
   - THE COLORADO DEPARTMENT OF HIGHWAYS STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
   - THE COLORADO DEPARTMENT OF TRANSPORTATION M STANDARDS
3. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE DOUGLAS COUNTY ENGINEERING DIVISION AS APPLICABLE. THE COUNTY RESERVES THE RIGHT TO ACCEPT OF REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS.
4. THE CONTRACTOR SHALL NOTIFY THE DOUGLAS COUNTY ENGINEERING INSPECTION DIVISION, 303-660-7487, A MINIMUM OF 24-HOURS AND A MAXIMUM OF 72-HOURS PRIOR TO STARTING CONSTRUCTION. CONTRACTOR SHALL NOTIFY DOUGLAS COUNTY ENGINEERING INSPECTION WHEN WORKING OUTSIDE OF THE PUBLIC RIGHT-OF-WAY ON ANY FACILITY THAT WILL BE CONVEYED TO THE COUNTY, MILE HIGH FLOOD DISTRICT, OR OTHER SPECIAL DISTRICT FOR MAINTENANCE (STORM SEWER, ENERGY DISSIPATERS, DETENTION OUTLET STRUCTURES, OR OTHER DRAINAGE INFRASTRUCTURES. FAILURE TO NOTIFY THE ENGINEERING INSPECTION DIVISION TO ALLOW THEM TO INSPECT THE CONSTRUCTION MAY RESULT IN NON-ACCEPTANCE OF THE FACILITY/INFRASTRUCTURE BY THE COUNTY AND/OR URBAN DRAINAGE.
5. CONSTRUCTION WILL NOT BEGIN UNTIL ALL APPLICABLE PERMITS HAVE BEEN ISSUED. IF A DOUGLAS COUNTY ENGINEERING INSPECTOR IS NOT AVAILABLE AFTER PROPER NOTICE OF CONSTRUCTION ACTIVITY HAS BEEN PROVIDED, THE PERMITTEE MAY COMMENCE WORK IN THE INSPECTOR'S ABSENCE. HOWEVER, DOUGLAS COUNTY RESERVES THE RIGHT NOT TO ACCEPT THE IMPROVEMENT IF SUBSEQUENT TESTING REVEALS AN IMPROPER INSTALLATION.
6. THE LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ACTUAL CONSTRUCTION. FOR INFORMATION CONTACT: COLORADO 811, AT 1-800-922-1987 (WWW.COLORADO811.ORG).
7. THE CONTRACTOR SHALL HAVE ONE (1) COPY OF THE PLANS SIGNED BY THE DOUGLAS COUNTY ENGINEERING DIRECTOR, ONE (1) COPY OF THE ROADWAY DESIGN AND CONSTRUCTION STANDARDS, AS AMENDED, AND ALL APPLICABLE PERMITS AT THE JOB SITE AT ALL TIMES.
8. ALL PROPOSED STREET CUTS TO EXISTING PAVEMENT FOR UTILITIES, STORM SEWER OR FOR OTHER PURPOSES ARE LISTED AND REFERENCED BELOW:
   WATER TIE-INS SHEETS 16, 40
9. A TRAFFIC CONTROL PLAN, IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, SHALL BE SUBMITTED TO DOUGLAS COUNTY FOR ACCEPTANCE WITH THE RIGHT-OF-WAY USE AND CONSTRUCTION PERMIT APPLICATION. A RIGHT-OF-WAY USE AND CONSTRUCTION PERMIT WILL NOT BE ISSUED WITHOUT AN ACCEPTED TRAFFIC CONTROL PLAN FOR TRAFFIC CONTROL DURING CONSTRUCTION.
10. THE CONSTRUCTION PLANS SHALL BE CONSIDERED VALID FOR THREE (3) YEARS FROM THE DATE OF COUNTY ACCEPTANCE, AFTER WHICH TIME THESE PLANS SHALL BE VOID AND WILL BE SUBJECT TO RE-REVIEW AND RE-ACCEPTANCE BY DOUGLAS COUNTY.
11. DOUGLAS COUNTY STANDARD DETAILS SHALL NOT BE MODIFIED. ANY NON-STANDARD DETAILS WILL BE CLEARLY IDENTIFIED AS SUCH.
12. PAVING, INCLUDING CONSTRUCTION OF CURB AND GUTTER (WHEN USED), SHALL NOT START UNTIL A PAVEMENT DESIGN REPORT AND SUBGRADE COMPACTION TESTS ARE ACCEPTED BY THE ENIGNEERING INSPECTION DIVISION FOR ALL PUBLIC AND PRIVATE ROADS.
13. STANDARD DOUGLAS COUNTY HANDICAP RAMPS ARE TO BE CONSTRUCTED AT ALL CURB RETURNS AND AT MID-BLOCK LOCATIONS OPPOSITE OF ONE OF THE CURB RETURNS OF ALL "T" INTERSECTIONS AS IDENTIFIED ON THESE PLANS.
14. ALL STATIONING IS BASED ON CENTERLINE OF ROADWAYS UNLESS OTHERWISE NOTED.
15. ALL ELEVATIONS ARE ON UNITED STATES COAST AND GEODETIC SURVEY (USC&GS) (NAVD-88) DATUM WITH DATE. THE RANGE POINT OR MONUMENTS SHALL BE SHOWN ON CONTRUCTION DRAWINGS.
16. ALL STORM SEWER IMPROVEMENTS (PUBLIC AND PRIVATE) INCLUDING, BUT NOT LIMITED TO, INLETS, PIPES, CULVERTS, CHANNELS, DITCHES, HYDRAULIC STRUCTURES, RIPRAP, DETENTION BASINS, FOREBAYS, MICROPOOLS, AND WATER QUALITY FACILITIES REQUIRE PERMITTING AND INSPECTIONS. PLEASE CONTACT THE DOUGLAS COUNTY ENGINEERING INSPECTIONS DIVISION AT 303-660-7487 FOR PERMITTING REQUIREMENTS AND INSPECTIONS SCHEDULING.
17. TWO (2) MANHOLE ACCESS POINTS ARE REQUIRED ON ALL TYPE "R" CURB INLETS GREATER THAN OR EQUAL TO TEN (10) FEET IN LENGTH.
18. EPOXY COATED REBAR IS REQUIRED ON ALL DRAINAGE STRUCTURES.
19. DOUGLAS COUNTY REQUIRES CLASS D CONCRETE FOR ALL DRAINAGE STRUCTURES.
20. ALL RCP STORM SEWERS MUST USE ASTM C443 WATERTIGHT GASKETS PER THE CURRENT DOUGLAS COUNTY AND URBAN DRAINAGE DESIGN CRITERIA.
21. ALL RCP SHALL BE CLASS III STORM SEWER PIPE UNLESS OTHERWISE SPECIFIED.
22. JOINT RESTRAINTS ARE REQUIRED FOR A MINIMUM OF THE LAST TWO PIPE JOINTS AND FLARED END SECTION OF AN RCP OUTFALL.
23. PRECAST INLETS AND MANHOLE BASES ARE NOT ALLOWED.
24. TOE WALLS ARE REQUIRED ON FLARED END SECTIONS AT THE OUTLET END OF CULVERTS AND STORM SEWER OUTFALLS.
25. FILTER FABRIC IS REQUIRED UNDER ALL RIPRAP PADS.
26. THE PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF COLORADO, SIGNING THESE PLANS IS RESPONSIBLE FOR ENSURING THAT THE DETAILS INCLUDED ARE COMPATIBLE WITH THE STANDARD DOUGLAS COUNTY DETAILS CONTAINED IN THE LATEST VERSIONS OF THE CRITERIA MANUALS. THIS INCLUDES, BUT IS NOT LIMITED TO:
   - DOUGLAS COUNTY ROADWAY DESIGN AND CONSTRUCTION STANDARDS
   - DOUGLAS COUNTY STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA
   - DOUGLAS COUNTY GRADING, EROSION AND SEDIMENT CONTROL CRITERIA
   - CDOT M & S STANDARDS MUTCD
   - URBAN STORM DRAINAGE CRITERIA MANUAL VOLUMES 1,2 & 3
27. A TEMPORARY CONSTRUCTION ACCESS PERMIT FROM DOUGLAS COUNTY MAY BE REQUIRED FOR ANY PROJECT.

GENERAL NOTES:

1. AREAS OUTSIDE THE LIMITS OF CONSTRUCTION ARE SHOWN FOR INFORMATION ONLY.
2. ALIGNMENTS AND STATIONING ARE OFF THE BASELINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
3. FIELD VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. PROJECT ENGINEER SHALL BE IMMEDIATELY NOTIFIED OF CONFLICTS WITH EXISTING UTILITIES.
4. ALL UTILITIES ARE PROPOSED UNLESS OTHERWISE NOTED.
5. EXISTING UTILITIES SHALL BE PROTECTED AT ALL TIMES THROUGHOUT CONSTRUCTION UNLESS OTHERWISE SHOWN IN THESE PLANS.
6. EXISTING GAS LINE AND EXISTING FIBER OPTIC LINE SHALL BE PROTECTED AT ALL TIMES DURING CONSTRUCTION.
7. CONNECTIONS TO EXISTING CONCRETE CURB, GUTTER AND/OR SIDEWALK SHALL BE TO NEAREST JOINT.
8. FIRE HYDRANT FLANGE ELEVATION SHALL BE 6" ABOVE FINISHED GRADE ELEVATION.
9. ALL PROPOSED WATER MAIN PIPES SHALL BE C900 PVC.
10. SANITARY SEWER MAIN PIPES SHALL BE SDR-35 PVC UNLESS THE DEPTH IS OVER 20 FEET THEN THE PIPES SHALL BE SDR 26 PVC.
11. RIM AND TOP ELEVATIONS OF ALL EXISTING STRUCTURES (MANHOLES, VALVES, HYDRANTS, INLETS) SHALL BE ADJUSTED TO MATCH FINISH GRADE ELEVATIONS.
12. MAINTAIN 10' HORIZONTAL AND 18" VERTICAL MINIMUM SEPARATION BETWEEN ALL SANITARY SEWER MAINS, WATER MAINS, SERVICES AND UNDERDRAINS.
13. ANY SANITARY SEWER OR STORM DRAIN WITHIN 18" VERTICAL CLEARANCE OF WATER MAIN CROSSING OR WITH A WATER MAIN CROSSING BELOW SHALL BE ENCASED PER PARKER WATER & SANITATION DISTRICT UTILITY ENCASEMENT DETAIL.
14. WATERLINES ARE REQUIRED TO BE 4.5' BELOW FINISHED GRADE.
15. ALL SANITARY SERVICES SHALL BE 4" PVC AND SLOPED AT 2% MIN.
16. SERVICE LEAD INVERT ELEVATIONS AT THE PROPERTY LINE ARE BASED ON 2% MIN. SLOPE. CONTRACTOR MAY AT DIRECTION OF DEVELOPER INCREASE SLOPE.
17. ALL WATER SERVICES SHALL BE 3/4'' TYPE K COPPER.
18. PIPE LENGTHS ARE CALCULATED FROM THE CENTER OF MANHOLES AND INLET BOX STRUCTURES. SPECIFIED LENGTH OF PIPE INCLUDES THE LAYING LENGTH OF FLARED END SECTION.
19. PROVIDE WATER TIGHT JOINTS PER ASTM C443 AT ALL CIRCULAR STORM PIPE, ALL CURVILINEAR PP STORM PIPE SHALL BE REQUIRED TO HAVE DOUBLE GASKETED JOINTS .
20. CONTRACTORS SHALL MAINTAIN A MINIMUM OF 1% GRADE AT FLOW LINE INTO INLET.
21. FLOWLINE ELEVATION AT INLETS IS THEORETICAL. INLETS THROAT INVERT SHALL BE DETERMINED PER CURB SECTION DETAIL AND INLET DETAIL, WHICH RESULTS IN A THROAT INVERT OF 3" BELOW FL WHEN LOCATED WITHIN VERTICAL CURB & GUTTER, AND 4" BELOW FL WHEN LOCATED WITHIN MOUNTABLE CURB & GUTTER.
22. AT ALL POINTS WHERE PROPOSED UTILITIES CONNECT TO EXISTING, THE CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE, SLOPE, AND ELEVATION OF EXISTING UTILITIES. IF FIELD VERIFIED INFORMATION DIFFERS FROM THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY PROJECT CIVIL ENGINEER.
23. ALL FLARED END SECTIONS (FES) SHALL INCLUDE JOINT RESTRAINTS AND A CONCRETE CUT-OFF WALL PER THE DETAIL ON SHEET 68 OF THE FIELDS FILING NO. 1 STREET & STORM SEWER CONSTRUCTION PLANS.
24. CONTRACTOR TO ROTATE ALL SANITARY SEWER MANHOLES TO PROVIDE 1' MINIMUM CLEARANCE BETWEEN MANHOLE LID AND CURB AND GUTTER.

DOUGLAS COUNTY SIGNAGE AND STRIPING:

A. ALL TRAFFICE CONTROL DEVICES SHALL CONFORM TO THE MOST RECENT VERSION OF THE FEDERAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE "COLORADO SUPPLEMENTAL MUTCD," THE DOUGLAS COUNTY "ROADWAY DESIGN AND CONSTRUCTION STANDARDS MANUAL" AND THE "DOUGLAS COUNTY SIGNAGE AND STRIPING SUPPLEMENT." FURTHER SPECIFICATIONS AND ILLUSTRATIONS ARE LOCATED IN THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) "M AND S STANDARDS."
B. A FIELD INSPECTION OF LOCATION AND INSTALLATION OF ALL SIGNS & MARKINGS SHALL BE PERFORMED BY DOUGLAS COUNTY. ALL DISCREPEANCIES IDENTIFIED DURING THE FIELD INSPECTION MUST BE CORRECTED BEFORE THE TWO-YEAR WARRANTY PERIOD WILL BEGIN.
C. THE CONTRACTOR INSTALLING SIGNS SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES.
D. TYPE III LIGHTED BARRICADES SHALL BE SET AT ENDS OF ROADWAYS, SEPARATING FINISHED (AND/OR ACCEPTED) AND UNFINISHED CONSTRUCTION AREAS AND SHALL BE MAINTAINED BY THE CONTRACTOR/DEVELOPER. A "ROAD CLOSED AHEAD" WARNING SIGN SHALL BE INSTALLED APPROPRIATELY IN ADVANCE OF THE TYPE III BARRICADES.
E. SPECIAL CARE SHALL BE TAKEN IN SIGN LOCATION TO ENSURE AN UNOBSTRUCTED VIEW OF EACH SIGN.
F. WHERE STOP SIGN CONTROL IS APPROPRIATE, 36" STOP SIGNS SHALL BE USED FOR APPROACHES TO ANY ROADWAY THAT IS CLASSIFIED AS A COLLECTOR OR GREATER.
G. A 7-FOOT MINIMUM HEIGHT SHALL BE MAINTAINED FROM BOTTOM OF SIGN PANEL TO THE TOP GRADE OF SIDEWALK (AT TOP GRADE OF PAVEMENT EDGE WHERE NO SIDEWALK EXISTS).
H. DELINEATION OF ROADWAYS WITHOUT CURB AND GUTTER SHALL BE AS SPECIFIED IN THE CDOT "M AND S STANDARDS." SEE (SS-7) FOR RAISED MEDIAN SIGNS AND DELINEATION.
I. SIGNAGE AND STRIPING HAS BEEN DETERMINED BY INFORMATION AVAILABLE AT THE TIME OF REVIEW. PRIOR TO INITIATION OF THE ANY WARRANTY PERIOD, DOUGLAS COUNTY RESERVES THE RIGHT TO REQUIRE MODIFICATIONS TO EXISTING, OR INSTALLATION OF, ADDITIONAL SIGNAGE AND/OR PAVEMENT MARKING IF IT IS DETERMINED THAT AN UNFORESEEN SAFETY CONDITION WARRANTS SUCH MODIFICATION ACCORDING TO THE MUTCD OR THE CDOT M AND S STANDARDS. ALL SIGNAGE AND STRIPING SHALL FALL UNDER THE REQUIREMENTS OF THE TWO (2) YEAR WARRANTY PERIOD FOR NEW CONSTRUCTION. ADDITIONALLY ALL PAVEMENT MARKINGS SHALL NOT LIFT OR PEEL DURING THE FIRST YEAR AFTER INSTALLATION.
J. DIAMOND GRADE MATERIAL SHALL BE USED ON ALL STOP SIGNS AND OVERHEAD SIGNS. ALL OTHER ROADSIDE TRAFFIC CONTROL DEVICES SHALL BE HIGH INTENSITY PRIZMATIC RETROREFLECTIVE.
K. ALL PUBLIC ROAD STREET NAME SIGNS SHALL HAVE DOUGLAS COUNTY LOGO ON LEFT SIDE OF SIGN.
L. ALL REMOVED SIGNS SHALL BE RETURNED TO DOUGLAS COUNTY TRAFFIC SERVICES, CALL 303-663-6237 FOR DROP OFF LOCATION.
M. ALL PAVEMENT MARKING MATERIAL (INCLUDING WORDS AND SYMBOLS) SHALL BE AS FOLLOWS:
   METHYL-MYTHACRALATE (MMA), EPOXY PAINT, PREFORMED THERMOPLASTIC, INLAY TAPE (STAMARK OR APPROVED EQUIVALENT), WATERBORN TRAFFIC PAINT (PER CDOT SPECIFICATIONS), GLASS BEADS OR AS SPECIFIED BY ENGINEER. (SAND OR WATER BLAST CURING COMPOUND PRIOR TO INSTALLATION OF MARKINGS)
N. INSPECTION AND APPROVAL OF STRIPING AND CROSSWALK LAYOUT TO BE DONE BY DOUGLAS COUNTY ENGINEERING INSPECTION DEPARTMENT (CALL 303-660-7487) PRIOR TO APPLICATION OF FINAL STRIPING.



TYPE 'A' LOT GRADING

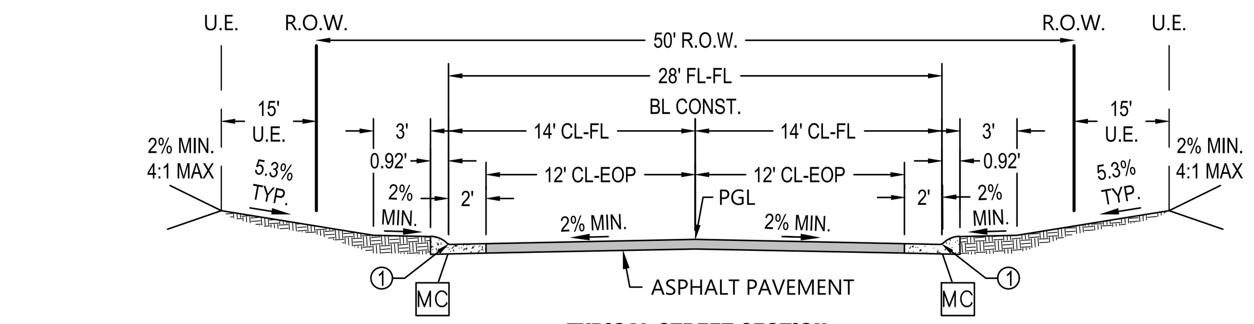
TYPE 'B' LOT GRADING

WALK-OUT LOT GRADING

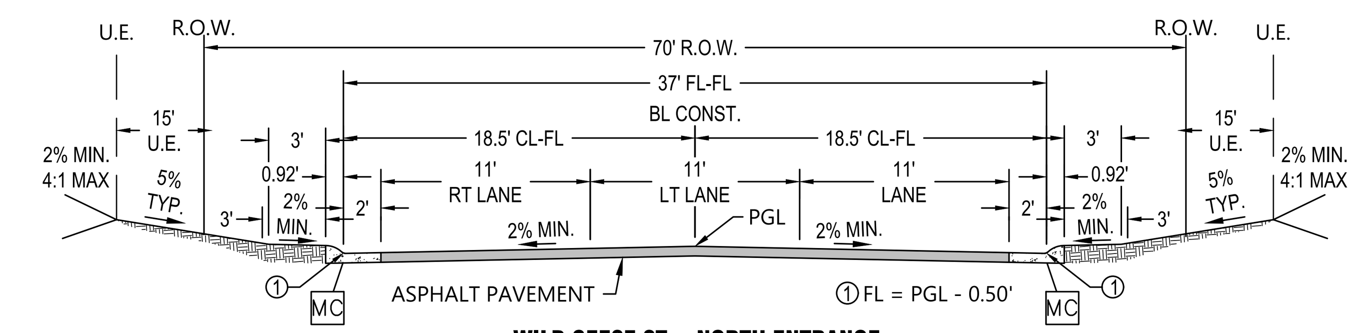
LOT TYPE

A	TYPE 'A' LOT
B	TYPE 'B' LOT
WO	WALK-OUT LOT
T	TRANSITIONAL LOT

MC 5" MOUNTABLE C&G
DC MEDIAN C&G

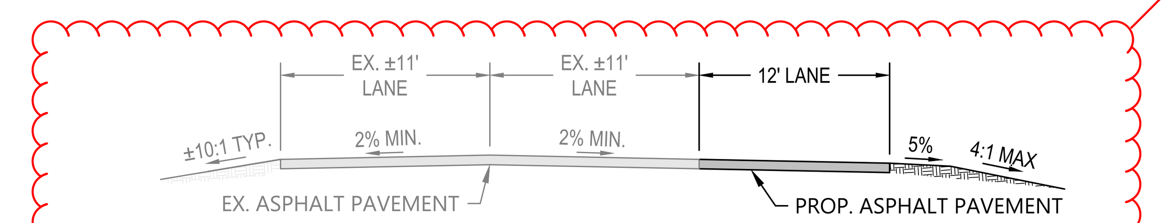


TYPICAL STREET SECTION ① FL = PGL - 0.41'
N.T.S.

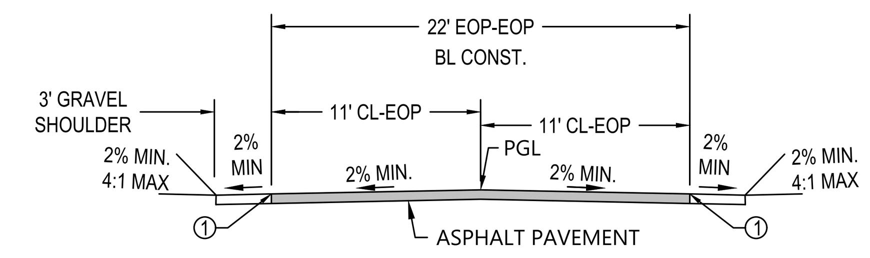


WILD GEESE ST. - NORTH ENTRANCE ① FL = PGL - 0.50'
N.T.S.

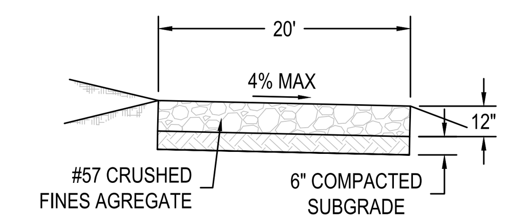
See comments on Sheet29 & 30



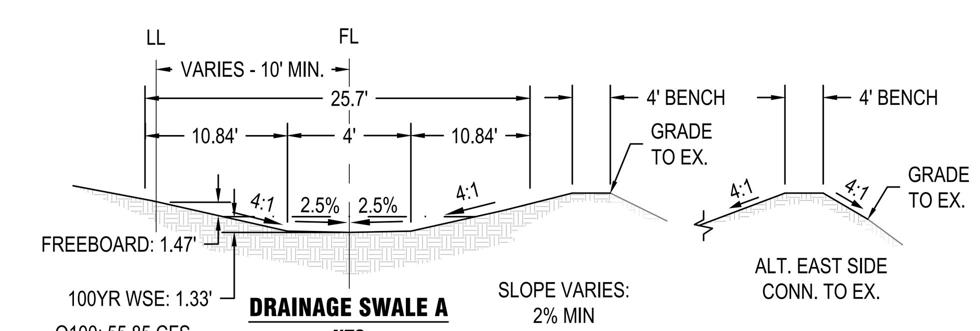
HILLTOP ROAD W/ LEFT TURN LANE (INTERIM)
N.T.S.



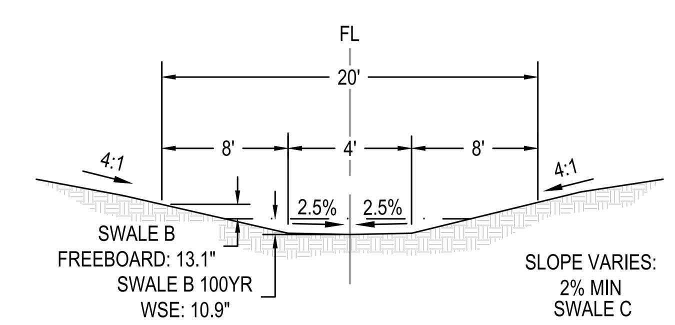
① EOP = PGL - 0.22'
COYOTE LANE WITH GRAVEL SHOULDER
N.T.S.



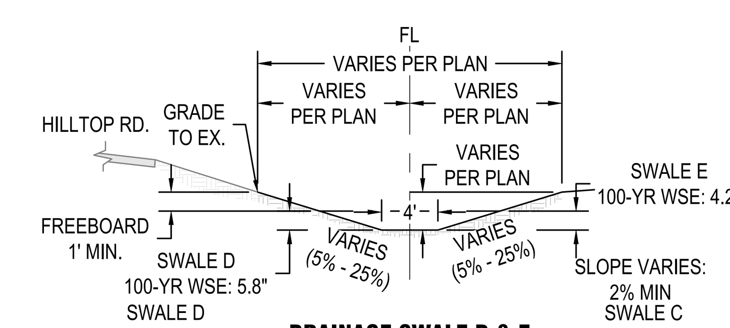
LIFTSTATION MAINTENANCE ACCESS PATH
N.T.S



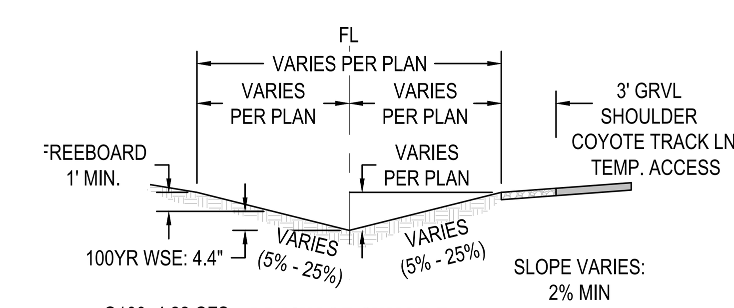
DRAINAGE SWALE A
NTS



DRAINAGE SWALE B & C
NTS



DRAINAGE SWALE D & E
NTS



DRAINAGE SWALE F
NTS

ASSISTANT DIRECTOR OF DEVELOPMENT REVIEW

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY DOUGLAS COUNTY FOR STREET AND DRAINAGE IMPROVEMENTS ONLY.

ENGINEERING DIVISION ACCEPTANCE BLOCK

1765 W. 121st Avenue
Suite 300
Westminster, CO 80234
303-421-4224 • www.lja.com

No.	Rev. Date:	Revision Type:
1		
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Designed: T.BS Prepared: DL Approved: DKH
Job No.: 1097-0004 Scale Horiz: N/A Scale Vert: N/A
Sheet: 2 of 77 Date: July 3, 2024

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Street & Storm Sewer Construction Plans
Sheet Name: Notes Sheet

NOT FOR CONSTRUCTION

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

No. 2

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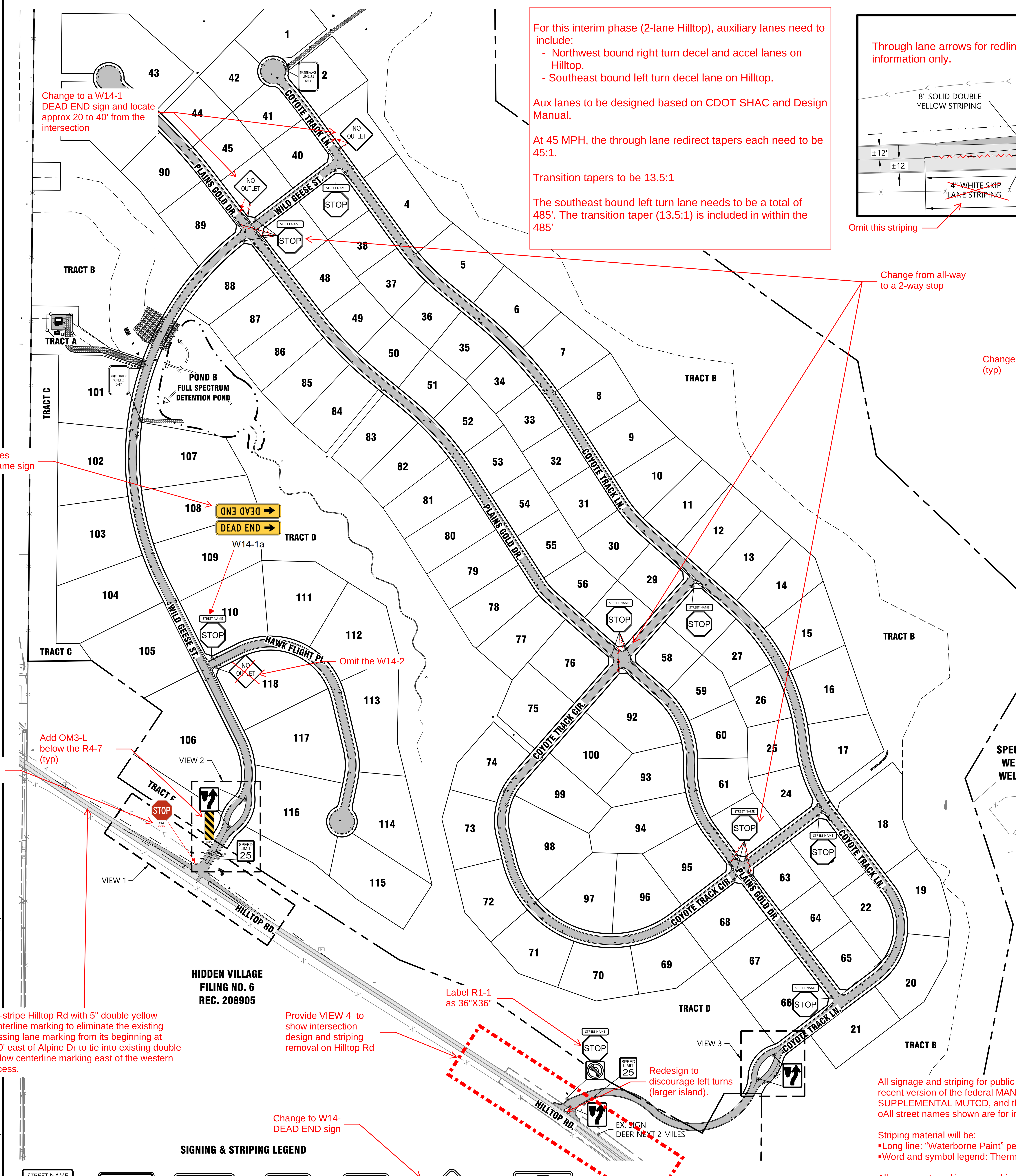


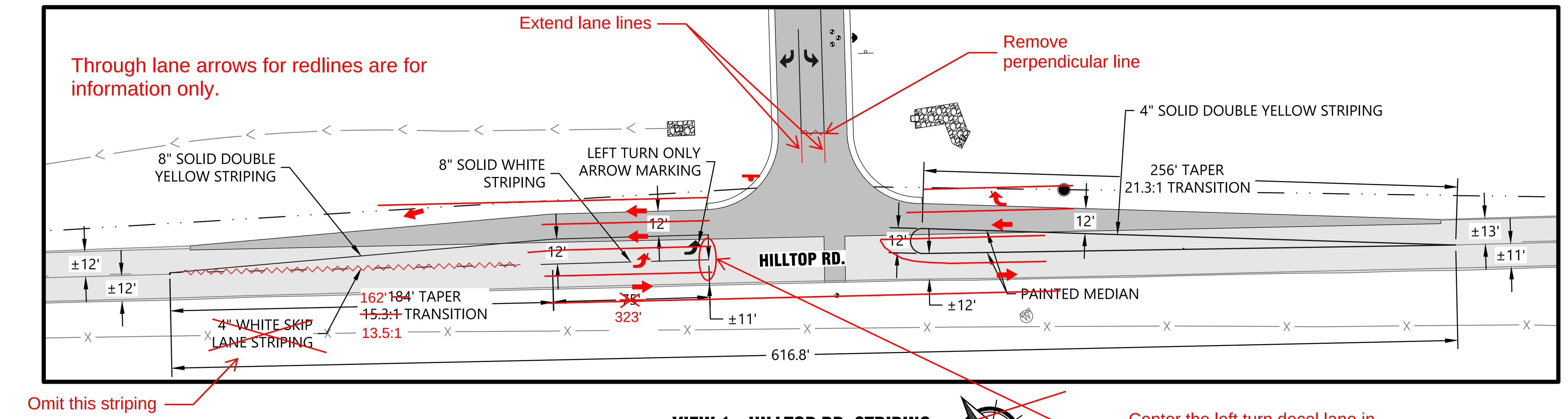
For this interim phase (2-lane Hilltop), auxiliary lanes need to include:
- Northwest bound right turn decel and accel lanes on Hilltop.
- Southeast bound left turn decel lane on Hilltop.

Aux lanes to be designed based on CDOT SHAC and Design Manual.

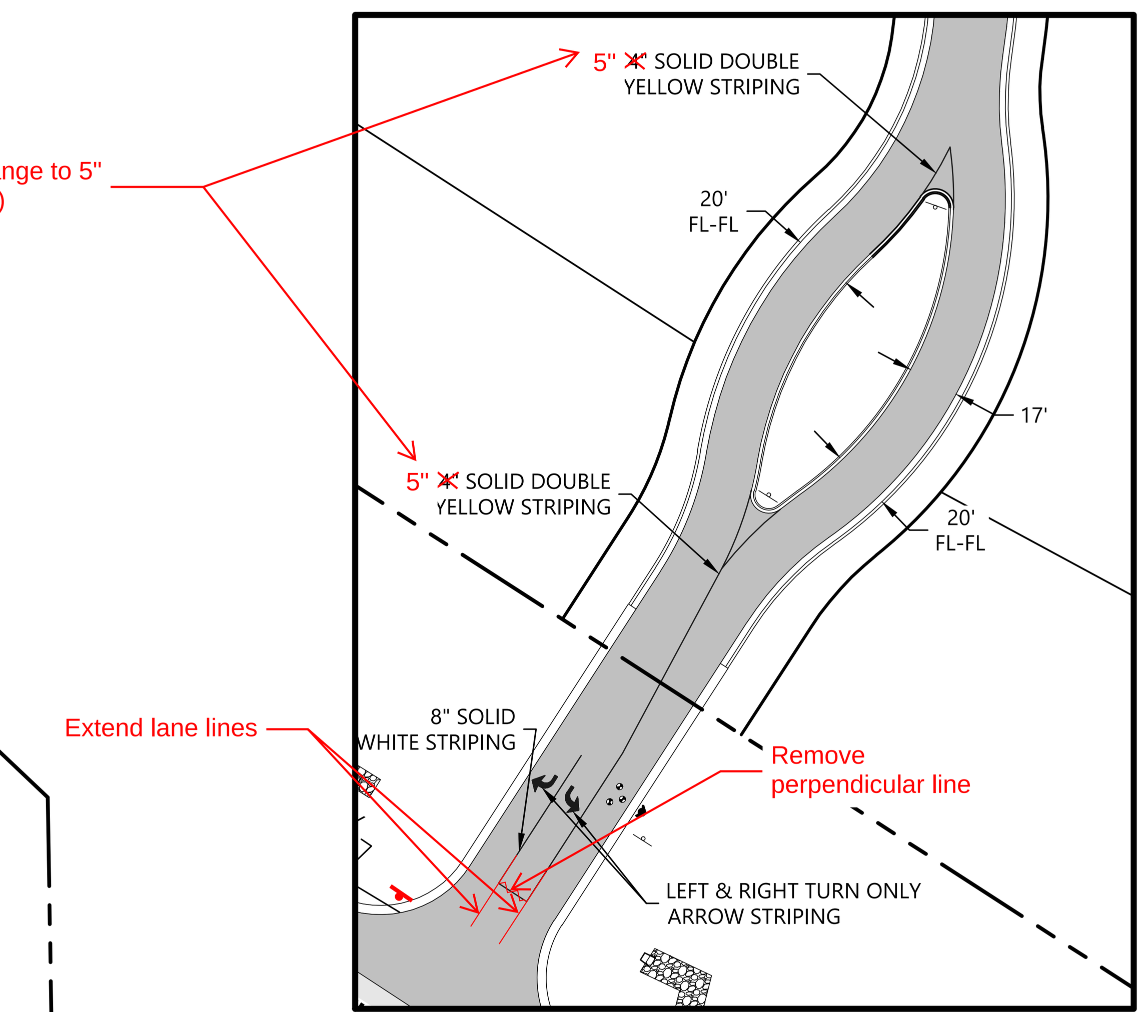
At 45 MPH, the through lane redirect tapers each need to be 45:1.

Transition tapers to be 13.5:1

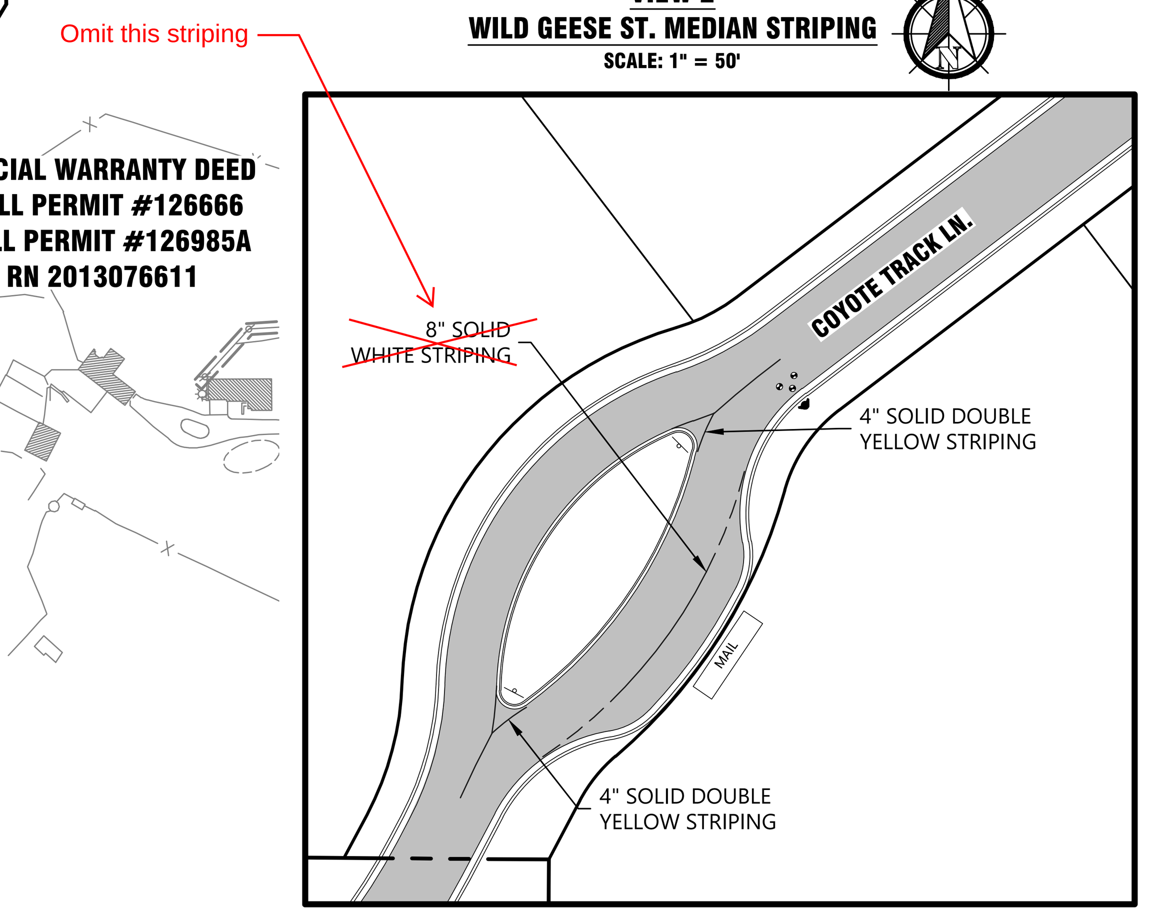
The southeast bound left turn lane needs to be a total of 485'. The transition taper (13.5:1) is included in within the 485'



VIEW 1 - HILLTOP RD. STRIPING
SCALE: 1" = 50'



VIEW 2
WILD GEESE ST. MEDIAN STRIPING
SCALE: 1" = 50'



VIEW 3
COYOTE TRACK LN. MEDIAN STRIPING
SCALE: 1" = 50'

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E. SPECIAL CARE SHALL BE TAKEN IN SIGN LOCATION TO ENSURE AN UNOBSTRUCTED VIEW OF EACH SIGN.
F. WHERE STOP SIGN CONTROL IS APPROPRIATE, 36" STOP SIGNS SHALL BE USED FOR APPROACHES TO ANY ROADWAY THAT IS CLASSIFIED AS A COLLECTOR OR GREATER.
G. A 7-FOOT MINIMUM HEIGHT SHALL BE MAINTAINED FROM BOTTOM OF SIGN PANEL TO THE TOP GRADE OF SIDEWALK (AT TOP GRADE OF PAVEMENT EDGE WHERE NO SIDEWALK EXISTS).
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L. ALL REMOVED SIGNS SHALL BE RETURNED TO DOUGLAS COUNTY TRAFFIC SERVICES, CALL 303-663-6237 FOR DROP OFF LOCATION.
M. ALL PAVEMENT MARKING MATERIAL (INCLUDING WORDS AND SYMBOLS) SHALL BE AS FOLLOWS:
METHYL-MYTHACRALATE (MMA), EPOXY PAINT, PREFORMED THERMOPLASTIC, INLAY TAPE (STAMARK OR APPROVED EQUIVALENT), WATERBORN TRAFFIC PAINT (PER CDOT SPECIFICATIONS), GLASS BEADS OR AS SPECIFIED BY ENGINEER. (SAND OR WATER BLAST CURING COMPOUND PRIOR TO INSTALLATION OF MARKINGS)
N. INSPECTION AND APPROVAL OF STRIPING AND CROSSWALK LAYOUT TO BE DONE BY DOUGLAS COUNTY ENGINEERING INSPECTION DEPARTMENT (CALL 303-660-7487) PRIOR TO APPLICATION OF FINAL STRIPING.

Remove notes A - N above

Use these notes for this sheet.

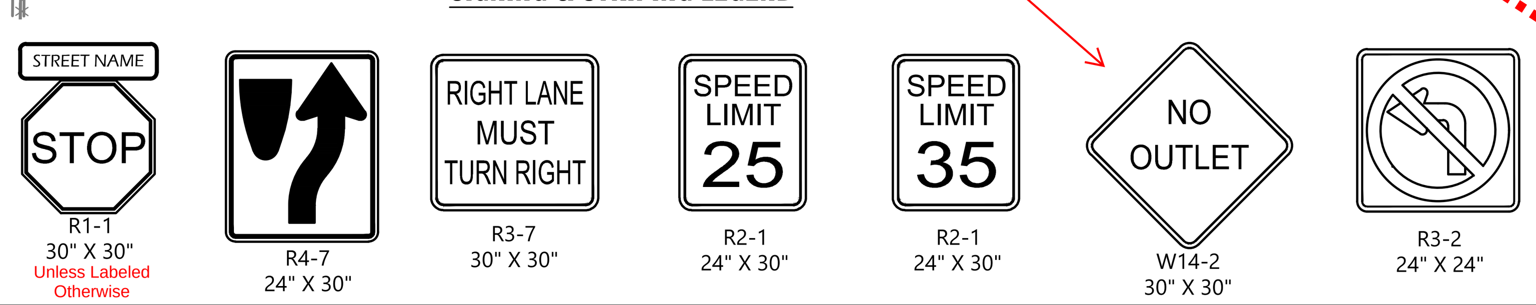
All signage and striping for public and/or private roadways, walkways or bicycle trails open to public travel shall conform to the most recent version of the federal MANUAL ON UNIFORM TRAFFFIC CONTROL DEVICES (MUTCD), the COLORADO SUPPLEMENTAL MUTCD, and the DOUGLAS COUNTY SIGNAGE AND STRIPING SUPPLEMENT
oAll street names shown are for information only. For accepted street names, refer to the recorded final plat for this subdivision.

Striping material will be:
▪Long line: "Waterborne Paint" per CDOT specifications with glass beads per Douglas County specifications.
▪Word and symbol legend: Thermoplastic

All pavement markings are subject to material changes due to season and\or weather. Temporary marking materials may be required. Specified final pavement marking materials shall be installed when season \ weather allow.

All sign posts installed in hardscape raised medians shall be installed using the Kleen Break Model 425 sign post coupler (part #XKB42520-G) from Xccessories Squared Development and Manufacturing Inc. Refer to Douglas County Standard Drawing SS-9. Prior to placement of any hardscape material, a 4" diameter PVC sleeve with a temporary cover shall be installed at all sign post and delineator locations.

SIGNING & STRIPING LEGEND



Add OM3-L to the legend

SCALE
0 50 100
1 inch = 100 ft.

ASSISTANT DIRECTOR OF DEVELOPMENT REVIEW

DATE

PUBLIC WORKS ENGINEERING DIRECTOR

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY DOUGLAS COUNTY FOR SIGNAGE AND STRIPING IMPROVEMENTS ONLY.

ENGINEERING DIVISION ACCEPTANCE BLOCK

LJA
1765 W. 121st Avenue
Suite 300
Westminster, CO 80234
303-421-4224 • www.lja.com

No.	Rev. Date:	Revision Type:
1		
2		
3		
4		
5		
6		

Designed: T.BS
Prepared: DL
Approved: DKH
Job No.: 1097-0004
Scale Horiz: 1" = 200'
Scale Vert: N/A
Sheet: 29 of 77
Date: July 3, 2024

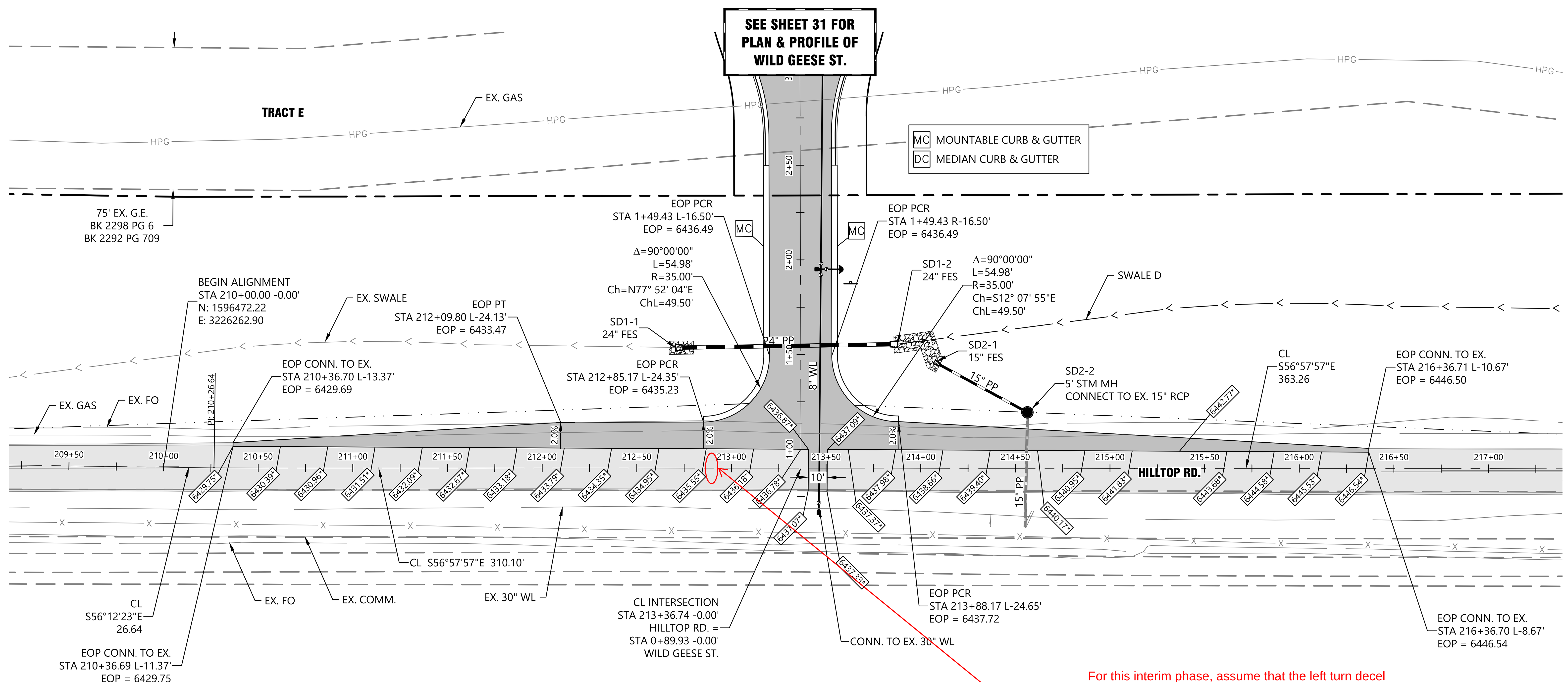
Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Street & Storm Sewer Construction Plans
Sheet Name: Signing & Striping Plan

NOT FOR CONSTRUCTION

811
Know what's below.
Call before you dig.

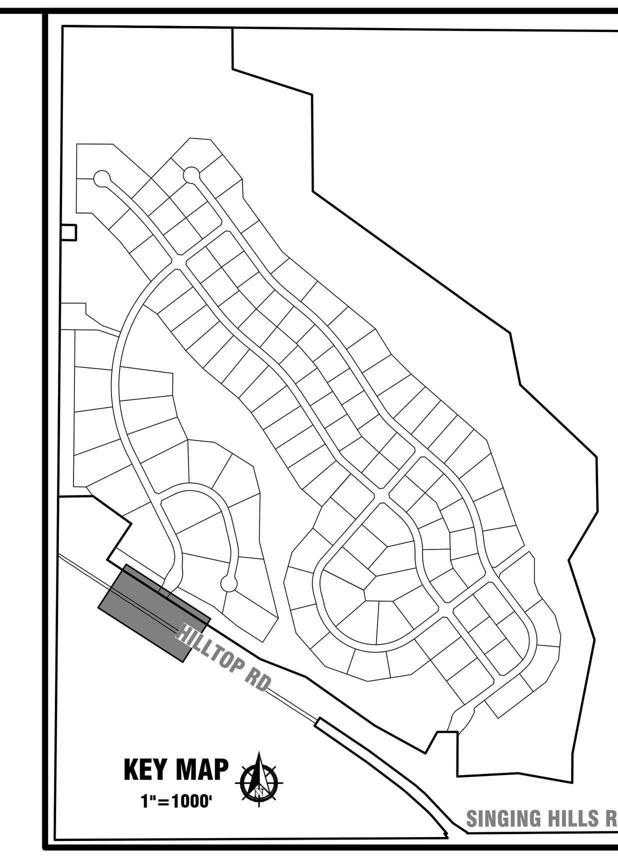
No. 29

PING PRINTED ON: 7/18/2024 12:16 PM
I:\JOB FOLDERS\1097\1097-0004\PROD\CD - STR



For this interim phase, assume that the left turn decel lane will be centered in existing road section and widen both sides to allow for:
- Northwest bound right turn decel and accel lanes on Hilltop.
- Southeast bound left turn decel lane on Hilltop.

Aux lanes to be designed based on SHAC and/or CDOT Design Manual.



NOTES:

1. SEE SHEET 2 FOR TYPICAL STREET SECTIONS.
2. SEE SHEET 1 FOR LEGEND AND GENERAL ABBREVIATIONS.
3. SEE STREET & STORM SEWER CONSTRUCTION PLANS FOR STREET & STORM SEWER PLAN AND PROFILES.
4. SEE SHEET 14 FOR UTILITY CROSSING INFORMATION.
5. CONTRACTOR TO ROTATE ALL SANITARY SEWER MANHOLES TO PROVIDE 1' MINIMUM CLEARANCE BETWEEN MANHOLE LID AND CURB AND GUTTER.

LJA
1765 W. 121st Avenue
Suite 300
Westminster, CO 80234
303-421-4224 • www.lja.com

No.	Rev. Date:	Revision Type:
1		
2		
3		
4		
5		
6		

Designed: T.BS
Prepared: WWB
Approved: DKH
Job No.: 1097-0004
Scale Horiz: 1" = 40'
Scale Vert: N/A
Sheet: 30 of 77
Date: July 3, 2024

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Street & Storm Sewer Construction Plans
Sheet Name: Hilltop Road Improvements Plan

NOT FOR CONSTRUCTION

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

No. 30

PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD. 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

40 0 20 40
SCALE
1 inch = 40 ft.

ASSISTANT DIRECTOR OF DEVELOPMENT REVIEW

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY DOUGLAS COUNTY FOR STREET AND DRAINAGE IMPROVEMENTS ONLY

ENGINEERING DIVISION ACCEPTANCE BLOCK

I:\JOB FOLDERS\1097\1097-0004\PROD\CD - STR-STM\PP - HILLTOP PRINTED ON: 7/18/2024 11:40 AM

620 Wilcox Street
Castle Rock, Colorado 80104

January 22, 2025

Heather Scott
Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104
303-660-7460 (main)
303-919-4801 (cell)

RE: Fields Filing 1 - Final Plat-2nd Submittal (SB2024-041)

Dear Ms. Scott,

Thank you for the opportunity to respond to the above referenced application. It is our understanding that the applicant is requesting approval of a final plat for 118 single family lots and 11 tracts over approximately 260 acres. The project site is located north of Singing Hills Road, west of Flintwood Road, and east of Hilltop Road.

On behalf of Douglas County School District, we have a couple comments regarding this application. DCSD has calculated the amount of school site land dedication required for students generated by the proposal. A total of 34 students are expected from the development requiring a total land dedication requirement of 2.662-acres.

CASH-IN-LIEU CALCULATION
STUDENT GENERATION

PROJECT NAME: THE FIELDS FILING 1-FINAL PLAT (SB2024-041)					
DU/	ACRES		DENSITY		
118	140.767		0.84		
			Generation	Number	
STUDENT GENERATION RATES	No. of DU's		Rate	of Students	
ELEMENTARY	118	X	0.52	61	
MIDDLE SCHOOL	118	X	0.15	18	
HIGH SCHOOL	118	X	0.29	34	
				Required	
			School	Land	
	Number		Acreage	Dedication	
SCHOOL LAND DEDICATION	of Students		Per Student	Acreage	
ELEMENTARY	61	X	0.018	1.104	
MIDDLE SCHOOL	18	X	0.030	0.531	
HIGH SCHOOL	34	X	0.030	1.027	
			TOTAL	2.662	

Pursuant to Section 1004.05.3 of the Douglas County Subdivision Resolution, "The cash-in-lieu fee shall be equivalent to the full market value of the acreage required for school land dedication. Value shall be based on anticipated market value after completion of platting. The applicant shall submit a proposal for the cash-in-lieu fee and supply the information necessary for the Board to evaluate the adequacy of the proposal. This information shall include at least one appraisal of the property by a qualified appraiser."

Assuming the applicant agrees with the payment of these fee requirements, DCSD has no objection to approval of this application. Thank you for your support of our mutual constituents

Sincerely,

Shavon Caldwell
Planning Manager, DCSD Planning & Construction
scaldwell2@dcsdk12.org
office: 303.387.0417
mobile: 720.428.1170

DCSD Student Generation and Land Dedication Calculations

CASH-IN-LIEU CALCULATION
STUDENT GENERATION

PROJECT NAME: THE FIELDS FILING 2-PRELIMINARY PLAN					
DU/	ACRES		DENSITY		
130	450.9		0.29		
			Generation	Number	
STUDENT GENERATION RATES	No. of DU's		Rate	of Students	
ELEMENTARY	130	X	0.54	70	
MIDDLE SCHOOL	130	X	0.15	20	
HIGH SCHOOL	130	X	0.31	40	
				130	
				Required	
			School	Land	
	Number		Acreage	Dedication	
SCHOOL LAND DEDICATION	of Students		Per Student	Acreage	
ELEMENTARY	70	X	0.018	1.264	
MIDDLE SCHOOL	20	X	0.030	0.585	
HIGH SCHOOL	40	X	0.030	1.209	
			TOTAL	3.058	

CASH-IN-LIEU CALCULATION
STUDENT GENERATION

PROJECT NAME: THE FIELDS FILING 2-FINAL PLAT					
DU/	ACRES		DENSITY		
5	57.63		0.09		
			Generation	Number	
STUDENT GENERATION RATES	No. of DU's		Rate	of Students	
ELEMENTARY	5	X	0.5	3	
MIDDLE SCHOOL	5	X	0.2	1	
HIGH SCHOOL	5	X	0.4	2	
				6	
				Required	
			School	Land	
	Number		Acreage	Dedication	
SCHOOL LAND DEDICATION	of Students		Per Student	Acreage	
ELEMENTARY	3	X	0.018	0.045	
MIDDLE SCHOOL	1	X	0.030	0.030	
HIGH SCHOOL	2	X	0.030	0.060	
			TOTAL	0.135	

From: Kelsey Lanham
To: Heather Scott
Subject: RE: [External] Douglas County eReferral (SB2024-041) Is Ready For Review
Date: Thursday, August 15, 2024 3:50:22 PM
Attachments: image001.png

Hi Heather,

The Elbert County Planning Department does not have any objections with this development. However, we did send the referral to our Public Works department for further review about the possible impacts on Singing Hills Road to the West, just past the Elbert/Douglas County border. If I have any feedback from PW or Road & Bridge, I will forward directly to you.

Let me know if you have any questions!
Best,

Kelsey Lanham
Elbert County Government
Planning Department
Land Use Planner
PO Box 7, 215 Comanche St, Kiowa, CO, 80117
Office (720) 639-5854   Cell (720) 618-2294
kelsey.lanham@elbertcounty-co.gov
http://www.elbertcounty-co.gov/
Please note County Offices are closed on Fridays.

From: hscott@douglas.co.us <hscott@douglas.co.us>
Sent: Monday, July 22, 2024 10:00 AM
To: CDS Department <CDS@elbertcounty-co.gov>
Subject: [External] Douglas County eReferral (SB2024-041) Is Ready For Review

There is an eReferral for your review. Please use the following link to log on to your account:
https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fapps.douglas.co.us%2Fplanning%2Fprojects%2FLogin.aspx&data=05%7C02%7Ccds%40elbertcounty-co.gov%7C74c84724e45c4e124ce808dcaa679ead%7C067e8f8435fb474e823a684960257032%7C1%7C0%7C638572609236973312%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=BxfBiGFwzAsSD02WoduJFARdqHbkvrPSBN1honKK5Xg%3D&reserved=0

Project Number: SB2024-041

Project Title: Fields Filing 1

Brief Description:

This Final Plat request is to subdivide 259.8 acres into 118 lots, nine tracts, and 18.45 acres of rights-of-way. The site is located northeast of Hilltop Road and north of Singing Hills Road.

This referral will close on August 19, 2024.

If you have any questions, please contact me.

Sincerely,

Heather Scott
Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104
303-660-7460 (main)
303-919-4801 (cell)

MILE HIGH FLOOD DISTRICT
2480 W. 26th Ave Suite 156-B | Denver, CO 80211
TEL 303 455 6277 | FAX 303 455 7880
www.mhfd.org

For MHFD staff use only.	
Project ID:	106664
Submittal ID:	10012891
MEP Phase:	Referral (1st)

August 21, 2024

To: Heather Scott (Douglas County)
Via email
Subject: MHFD Review Comments
Re: SB2024-041 – Fields Filing 1

This letter is in response to the request for our comments concerning the referenced project. We have reviewed this referral only as it relates to a MHFD drainageway and for maintenance eligibility of storm drainage features, in this case:

- Tallman Gulch

MHFD staff have the following comments to offer:

Plat Exhibit

1) Please show both edges of the stream corridor on the plat exhibit and label it as such.
2) Please help us to understand what the Metro District Boundary is and how it impacts the exiting drainageway corridor and future improvements. The Metro District Boundary includes some areas of the drainage corridor.
3) Please help us to understand if Douglas County will have easement access through Track B in the future for stream maintenance.

Drainage Report

4) Please include the previously completed geomorphology report in the Drainage Report. Please also include discussion of Tallman Gulch in the Drainage Report, including findings from the geomorphology report and stream management corridor widths.
5) Please provide a figure in the Drainage Report that shows the contours and full stream corridor width near Lot 18 and 19. This will help us to understand if there is enough stream management corridor space for Tallman Gulch near these lots for stream maintenance and any future improvements.

We appreciate the opportunity to review this proposal. Please feel free to reach out to me with any questions or concerns.

Sincerely,

Katie Kerstiens, P.E., CFM
Project Engineer, Mile High Flood District
kkerstiens@mhfd.org

For MHFD staff use only.	
Project ID:	106664
Submittal ID:	10012891
MEP Phase:	Referral (1st)

August 21, 2024

To: Heather Scott (Douglas County)
Via email
Subject: MHFD Review Comments
Re: SB2024-041 – Fields Filing 1

This letter is in response to the request for our comments concerning the referenced project. We have reviewed this referral only as it relates to a MHFD drainageway and for maintenance eligibility of storm drainage features, in this case:

- Tallman Gulch

MHFD staff have the following comments to offer:

Plat Exhibit

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5) Please provide a figure in the Drainage Report that shows the contours and full stream corridor width near Lot 18 and 19. This will help us to understand if there is enough stream management corridor space for Tallman Gulch near these lots for stream maintenance and any future improvements.

We appreciate the opportunity to review this proposal. Please feel free to reach out to me with any questions or concerns.

Sincerely,

Katie Kerstiens

Katie Kerstiens, P.E., CFM
Project Engineer, Mile High Flood District
kkerstiens@mhfd.org

LJA Responses:
1. A 40' Erosional setback is provided and shown/labeled on the Construction Plans. To maintain clarity of the legal linework and labeling, we request this information be referenced only on the Construction Plans and Drainage Exhibits instead of the Final Plat.
2. The existing drainage corridor includes an easement which will allow access for maintenance and future improvements through the Metro District Boundaries.
3. Yes. There is a drainage easement proposed through Tract B for access/maintenance and future improvements of the stream.
Drainage Responses:
4. The geomorphology report has been included in Appendix C in the drainage report.
5. An exhibit showing the full stream corridor width near Lots 18 & 19 has been included in Appendix D in the drainage report.

Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.285.6612**
violeta.ciocanu@xcelenergy.com

August 8, 2024

Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104

Attn: Heather Scott

Re: Fields Filing 1, Case # SB2024-041

Public Service Company of Colorado's (PSCo) Right of Way and Permits Referral Desk has reviewed the plan for **Fields Filing 1**. As always, thank you for the opportunity to take part in the review process. Please be aware PSCo owns and operates existing natural gas distribution facilities along Hilltop Road and Singing Hills Road.

PSCo request Note 7 to read:

> *Permanent structures, improvements, objects, buildings, wells, water meters and other objects that may interfere with the utility facilities or use thereof (Interfering Objects) shall not be permitted within said utility easements and the utility providers, as grantees, may remove any Interfering Objects at no cost to such grantees, including, without limitation, vegetation. Public Service Company of Colorado (PSCo) and its successors reserve the right to require additional easements and to require the property owner to grant PSCo an easement on its standard form.*

The property owner/developer/contractor must complete the application process for any new natural gas service via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details.

Additional easements may need to be acquired by separate document. The Designer must contact the appropriate Right-of-Way Agent.

Not ready to apply? Our Builder Developer Representatives can provide you with capacity and process information during the concept phase of a project. Contact us at *BDRCO@xcelenergy.com or learn more at* Building and Remodeling (xcelenergy.com)

As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.

Violeta Ciocanu (Chokanu)
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-285-6612 – Email: violeta.ciocanu@xcelenergy.com

August 23, 2024

Kevin Lovelace
JVA
1765 W. 121st Avenue, Ste 300
Westminster, CO 80234

RE: Fields Filing 1 (SB2024-041)

Additional Resubmittal LJA Responses:

1. **GESC Plan and Report are included with this resubmittal. It is the intent of the applicant to obtain an early grading permit, therefore we request early attention to the review/approval of the the GESC related items.**
2. **Due to a delay in responses related to channel plans/drainage, final channel plans and final design report related items are intended to be resubmittal on or before 9/27 in a separate submittal following on to this one. We appreciate your understanding as to the reasoning of this offset/delay.**
3. **We would like to start looking at anticipating potential County Commissioner's dates, and are currently looking at an 11/5 date. Does this seem feasible from Staff's perspective?**

Hello Kevin,

The 28-day referral period for Fields Filing 1 has concluded. Please review my comments below as well as red-marked documents attached with this letter along with the referral agency summary report. Please address the red marked comments and then provide the revised final plat drawings and associated documents.

Page One:

- The name of the project is only "Fields". Please remove "The" in the title.

  LJA Response: Removed "THE" from name.

- There are several red mark comments on the final plat document that need to be addressed.
  - Remove Town of Firestone in the ownership and dedication block, add the witness sentence and signature lines in the owner certificate, update the BCC block, and revise the clerk and recorder's certificate.

    LJA Response: Revised.

- Both the dedication statement and the BCC certificate should include all the roads to be dedicated: Plains Gold Drive, Wild Geese Street, Coyote Track Lane, Coyote Tract Circle, and Hawk Flight Place. Please review the Piney Lake Trails Final Plat (included with this letter) for clarification. Only include "parcels" in the dedication statement if they will be dedicated to the DC in fee simple. Remove "parcels" from the last sentence if the lots will be sold separately.

  LJA Response: Dedication statement & BCC certificate revised.

- The Assessor indicated Tract F is still owned by Wallden HillTop LLC. Review the comments from the DC Assessor for possible resolution.

  LJA Response: It is our understanding that Tract F ownership will be conveyed to Toll Southwest prior to recording of the Final Plat.

Pages Two thru Five:

- Label the setbacks from the floodplains/waterways to the closest lots.

  LJA Response: To maintain clarity of the plat linework and labeling, we request to show/label all information regarding the floodplain and waterways on the Construction Plans and Drainage Exhibits. CGS requested an erosional setback from the toe of the 30% slope. A 40' Erosional Setback is provided and shown on the revised Construction Plans. The nearest rear lot line to the existing floodplain extents is approx. 80'.

Narrative:

- There are several red mark comments in the narrative that should be addressed.
  LJA Response: Revised narrative per red mark comments. See redline responses provided.

Construction Drawings:

- Chuck Smith provided comments regarding construction drawings and ROW dedication directly to your team on Monday, August 19th.
  LJA Response: Plans were revised per comments received. See redline responses provided.

- Please coordinate the temporary access directly with Ben Pierce at 303-660-3349.
  LJA Response: The temporary access was revised per comments and coordination with Chris Martin and Chuck Smith. See redline responses.

As part of your resubmittal, please also submit a response letter to my attention indicating how each referral comment has been addressed. The revised exhibits and other documents should be submitted to my attention.

Because design review is a cumulative process, Douglas County Planning Services reserves the right to provide further comments based upon your resubmittal and the agency comments received through the official referral process. Feel free to contact me with any questions or concerns as they arise. I look forward to working with you on this application.

Sincerely,

Heather Scott

Heather Scott, AICP
Principal Planner

cc: Jeanette Bare, AICP, Planning Manager

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Addressing Analyst	08/15/2024	No Comment	Comment noted.
Assessor	08/12/2024	Received: Tract F is currently owned by Wallden Hill Top LLC. There would need to either be a deed recorded to clear title or there needs to be a spot for Wallden Hill Top LLC to sign the plat under the Owner block. Please revise the dedication statement, particularly the last sentence, as it currently dedicates ALL parcels to Douglas County in fee simple absolute. The tract summary table declares the Metro District AND HOA as owners for Tracts B-E, but there is not spot for the HOA sign in acceptance of said tracts, AND there is no actual dedication of these tracts in either the dedication statement or the notes section. There is no dedication conveying ownership for any of the tracts in either the dedication statement or the notes section. As it stands, the parcels would not be conveyed and would remain in the ownership of Toll Southwest LLC. Advisory note: Lots 1-4 are not contained entirely within Fields 1-3 Metro Districts.	**Plat Responses:** **1. It is our understanding that Tract F ownership will be conveyed to Toll Southwest prior to recording of the plat.** **2. Dedication has been revised to exclude Tracts & Parcels** **3. Addressed/added dedication and acceptance certificates**
AT&T Long Distance - ROW	07/25/2024	No Comment	No response necessary Comment noted.
Building Services	07/29/2024	Received: Permit(s) required, please visit Douglas County's web site for requirements and call 303-660-7497 if you have any questions.	**Comment noted. All permits shall be submitted upon CD approval.**
Building Services	08/02/2024	No Comment	No response necessary Comment noted.

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
CenturyLink	08/07/2024	Received: a CenturyLink has reviewed your request to proceed with the requested encroachment as shown on Exhibit "A" within the proposed area to be vacated and has no objections providing, however, the following terms and conditions are agreed to, and met, by Requestor: 1. Locates must be performed by a state recognized organization (i.e. Call Before You Dig, Blue Stake, etc.). 2. A minimum of three feet of cover above any existing CenturyLink facilities is maintained at all times and the final grade provides for no less than three feet of cover. 3. If any CenturyLink facilities are damaged or require relocation as a result of said Encroachment, or the act of installing, maintaining or removing said Improvements, Landowner agrees to bear the cost of repair and/or relocation of said CenturyLink facilities. 4. No buildings or structures are to be placed within the Easement Tract other than those, if any, that are approved by this APPROVAL TO PROCEED. 5. If you require existing facilities to be moved, relocated, or removed, please contact me to coordinate the issuance of required Easement and/or Release Agreements to facilitate request. The issuance of this Letter does not constitute either acceptance or approval of moving, relocating or removing of facilities without first obtaining the needed Agreements. It is the intent and understanding of CenturyLink that this action shall not reduce our rights to any existing easements or rights we have on this site or in the area	**Comments noted.** **1. Locates to be performed prior to construction.** **2. Noted min. 3' cover required.** **3. Noted developer/contractor responsible for repair/replacement costs for any damaged or relocated facilities.** **4. Noted no buildings or structures within easements.** **5. Contact noted.**

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Cherry Creek Basin Water Quality Authority	07/25/2024	Received: the Authority will no longer routinely conduct a technical review and instead the Authority will defer to Douglas County's review and ultimate determination that the proposed development plans comply with Regulation 72.	**Comment noted.**
Colorado Division of Water Resources	07/29/2024	Received: Our opinion that the water supply is adequate is based on our determination that the amount of water required annually to serve the subdivision is currently physically available, based on current estimated aquifer conditions. Our opinion that the water supply can be provided without causing injury is based on our determination that the amount of water that is legally available on an annual basis, according to the statutory allocation approach, for the proposed uses is greater than the annual amount of water required to supply existing water commitments and the demands of the proposed subdivision.	**Comment noted.**

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Colorado Geological Survey	08/19/2024	Received: CGS has no objection to the approval of the final plat for Filing No. 1. We offer the following comments and recommendations. Tallman Gulch is designated as a 100-year (1%) flood zone per FEMA (FIRM panel 08035C0202F, effective September 30, 2005), however, FEMA's floodplain study did not extend to the subject parcel. Lots 1 through 21 along the east side of Filing No. 1 and east of Coyote Track Lane encroach near these steep slopes. CGS recommends an erosional setback is established from the crest of the steeper slopes (30% or greater) associated with Tallman Gulch and its tributaries to protect structures and improvements from channel erosion and scour, undercutting, and slope failure. Setback lines should be clearly shown on the plat and development plans. Additionally, drainage gullies should be properly filled and compacted in accordance with RMG's recommendations. CGS agrees with RMG (page 4) that "…a final, detailed, Geotechnical Investigation should be completed after mass overlot grading is complete to verify the preliminary recommendations and provide final foundation recommendations for each individual lot in the subdivision." RMG's recommendations should be strictly followed during planning, design, and construction.	**Comments noted. 1. A 40' Erosional setback is provided and shown/labeled on the Construction Plans. To maintain clarity of the legal linework and labeling, we request this information be referenced only on the Construction Plans and Drainage Exhibits instead of the Final Plat. 2. Drainage gullies adjacent to the site are shown as filled. 3. Final geotech investigation shall be completed after overlot grading.**
Comcast		No Response Received	No response necessary **Comment noted.**
CORE Electric Cooperative	08/14/2024	Received: CORE will require 15-foot utility easement added to Tracts E, G, H, and I.	**Added 15' UE along specified tracts.**
Crest View Estates HOA		No Response Received	No response necessary **Comment noted.**

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Douglas County Conservation District		No Response Received	No response necessary **Comment noted.**
Douglas County Health Department	08/15/2024	Received: Based on the will-serve letter provided by Parker Water and Sanitation District, DCHD is providing a favorable recommendation regarding the proposed method of sewage disposal.	No response necessary **Comment noted.**
Douglas County School District RE 1		Received: comments are forth coming	
Elbert County Community & Development Services	08/15/2024	No Comment	No response necessary **Comment noted.**
Engineering Services	08/19/2024	Engineering has reviewed the above referenced submittal and have the following comments: Comment #1 - Right-of-way must be conveyed to the County prior to this plat being eligible for final approval since it was a condition agreed upon by the applicant during the public hearing. Comment #2 - Subdivision Improvements Agreement (SIA) will be required for this project. Comment #3 - review the final plat redlines, sewer and water red lines, and the construction plan red lines.	**Right-of-way to be dedicated to the county.** **SIA to be included with second subm.** **See comment responses on final plat, sewer and water, and construction plan redlines.**
Evans Ranch Association		No Response Received	No response necessary **Comment noted.**
Hidden Village POA		No Response Received	No response necessary **Comment noted.**

Mile High Flood District	08/21/2024	Received: We have reviewed this referral only as it relates to a MHFD drainageway and for maintenance eligibility of storm drainage features, in this case: Tallman Gulch. MHFD staff have the following comments to offer: Plat Exhibit 1) Please show both edges of the stream corridor on the plat exhibit and label it as such. 2) Please help us to understand what the Metro District Boundary is and how it impacts the exiting drainageway corridor and future improvements. The Metro District Boundary includes some areas of the drainage corridor. 3) Please help us to understand if Douglas County will have easement access through Track B in the future for stream maintenance. Drainage Report 4) Please include the previously completed geomorphology report in the Drainage Report. Please also include discussion of Tallman Gulch in the Drainage Report, including findings from the geomorphology report and stream management corridor widths. 5) Please provide a figure in the Drainage Report that shows the contours and full stream corridor width near Lot 18 and 19. This will help us to understand if there is enough stream management corridor space for Tallman Gulch near these lots for stream maintenance and any future improvements. We appreciate the opportunity to review this proposal. Please feel free to reach out to me with any questions or concerns.	**Plat Responses:** **1. A 40' Erosional setback is provided and shown/labeled on the Construction Plans. To maintain clarity of the legal linework and labeling, we request this information be referenced only on the Construction Plans and Drainage Exhibits instead of the Final Plat.** **2. The existing drainage corridor includes an easement which will allow access for maintenance and future improvements through the Metro District Boundaries.** **3. Yes. There is a drainage easement proposed through Tract B for access/maintenance and future improvements of the stream.** **Drainage Responses:** **4. The geomorphology report has been included in Appendix C in the drainage report.** **5. An exhibit showing the full stream corridor width near Lots 18 & 19 has been included in Appendix D in the drainage report.**

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Misty Pines HOA		No Response Received	No response necessary **Comment noted.**
Office of Emergency Management	07/23/2024	Received: OEM has no concerns with this project.	No response necessary **Comment noted.**
Parker Water & Sanitation District		No Response Received	No response necessary **Comment noted.**
Parker Water & Sanitation District	07/22/2024	Received: Please provide Parker Water with a full set of plans. Please send them directly rramsey@PWSD.org	**Plans have been revised per PWSD First Review. Responses to redlines are included with resubmittal.**
Rural Water Authority of Douglas County		No Response Received	No response necessary **Comment noted.**
Sheriff's Office		No Response Received	No response necessary **Comment noted.**
Sheriff's Office E911		No Response Received	No response necessary **Comment noted.**
South Metro Fire Rescue	07/29/2024	Received: South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed Final Plat. Applicants and Contractors are encouraged to contact SMFR regarding the applicable permit requirements for the proposed project.	**Comment noted. Applicant to coordinate with SMFR regarding applicable permits.**
Spirit Ridge HOA		No Response Received	No response necessary **Comment noted.**
Sterling Tree Farm HOA		No Response Received	No response necessary **Comment noted.**

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
The Pinery HOA	08/19/2024	Received: Thank you for the opportunity to review the request for Final Plat SB2024-041 Fields Filing 1, with a total of 118 single family dwelling units. The impact of this project for The Pinery residents will be increased traffic at the intersection of Hilltop Road and Village Road/Crestview Dr. Village Drive and Hilltop Road intersection is a major access point, both to enter and exit The Pinery, supporting at least 800 homes. It is also understood that road improvements are planned for this location. It is important to know that these road improvements are designed and programed (funded) prior to or in conjunction with this project. The additional construction traffic created by the road construction/plat construction will only add an increase of accidents at this dangerous intersection. If you have any questions, feel free to contact The Pinery HOA at 303.841.8572 or arc@pinery.org. Respectfully, Sonia Eyre Pinery Homeowners' Association, President	**Comment noted. While the timing of the future Hilltop Rd. expansion is unknown and delayed, Fields Filing 1 proposes lane improvements at both access points which should help traffic within Hilltop Rd.**
Town of Parker Development Review	07/24/2024	No Comment	No response necessary **Comment noted.**
Town of Parker Public Works		No Response Received	No response necessary **Comment noted.**
Wildfire Mitigation		No Response Received	No response necessary **Comment noted.**

Project Name: Fields Filing 1
Project File #: SB2024-041
Date Sent: 07/22/2024 **Date Due:** 08/19/2024

Agency	Date Received	Agency Response	Response Resolution
Xcel Energy-Right of Way & Permits	08/08/2024	Received: Please be aware PSCo owns and operates existing natural gas distribution facilities along Hilltop Road and Singing Hills Road. PSCo request Note 7 to read: Permanent structures, improvements, objects, buildings, wells, water meters and other objects that may interfere with the utility facilities or use thereof (Interfering Objects) shall not be permitted within said utility easements and the utility providers, as grantees, may remove any Interfering Objects at no cost to such grantees, including, without limitation, vegetation. Public Service Company of Colorado (PSCo) and its successors reserve the right to require additional easements and to require the property owner to grant PSCo an easement on its standard form. The property owner/developer/contractor must complete the application process for any new natural gas service	**Plat Responses:** **1. Note 7 on plat revised.**

Alternative Roadway Design Standards
for
The Fields Filing No. 1
Douglas County, Colorado

Prepared for:

Toll Brothers, Inc.
7100 E. Belleview Ave, Suite 200
Greenwood Village, CO 80111
Contact: Brad Dixon
Contact Email: bdixon@tollbrothers.com

By:

LJA ENGINEERING
1765 West 121st Avenue, Suite 300
Westminster, CO 80234
Contact: Kevin Lovelace
Contact Email: klovelace@lja.com

Date: November 27, 2024

Project Name

Project No.:	Co1097-0004
Document Title:	Alternative Roadway Design Standards - Fields
Document No.:	1
Revision:	1
Date:	11/27/2024
Client name:	Toll Brothers, Inc.
Client No:	1097
Project manager:	Kevin Lovelace, PE
Author:	Preston Visintainer, PE
QAQC manager:	Dylan Hardy, PE
File name:	I:\Job Folders\1097\1097-0004\Documents\Alternative Roadway Standards\Report\Alt Rdwy Stnd Rpt-Fields.docx

Document history and status

Revision	Date	Description	By	Review	Approved
1	11/27/2024		PAV		

APPROVED
WITH COMMENTS

SOUTH METRO
FIRE RESCUE
COLORADO

12/5/2024, 11:20:09 /
ALTMAT24-05290
Aaron Miller

Alternative Roadway Design Standards

Approvals

Engineer of Record Dylan Hardy, P.E. No. 63324	11/25/2024 Date
Fire Department Rich Conroy, Deputy Fire Marshal South Metro Fire Rescue	12/05/2024 Date
Public Works	Date
County Engineer	Date

Contents

1. General

The Fields Filing No. 1 is a proposed single family residential development project in Douglas County, Colorado. The site consists of approximately 259.6 acres with 118 proposed lots, ranging in size from 0.70 acres to 2.56 acres. The proposed layout consists of five local public streets (Wild Geese Street, Hawk Flight Place, Plains Gold Drive, Coyote Track Lane, and Coyote Track Circle) with a consistent section that differs from the standard street section for a Rural Local Type II Street provided by Douglas County. A separate Alternative Roadway Design Standard is required, which is intended to clarify the minimum acceptable standards of the alternate roadway section.

2. Proposed Alternate Roadway Section

2.1 Proposed Typical Section

The primary access points of the proposed development include Wild Geese Street and Coyote Track Lane. These streets both begin at Hilltop Road and extend into the site where they provide access to individual lots. All five proposed streets (Wild Geese Street, Hawk Flight Place, Plains Gold Drive, Coyote Track Lane, and Coyote Track Circle) will follow the same typical section based on a modified Type II Rural Local Street. The proposed typical section will consist of asphalt pavement, mountable curb and gutter with no sidewalk, a normal crown with 2% cross slope, and a 28' flowline to flowline width. The street section is located within public right-of-way and is to be maintained by Douglas County. Please refer to Figure 1 for the location of the proposed streets and Figure 2 for the proposed typical street sections. The Alternative Roadway Standards for the proposed typical street section are provided in Table 1.

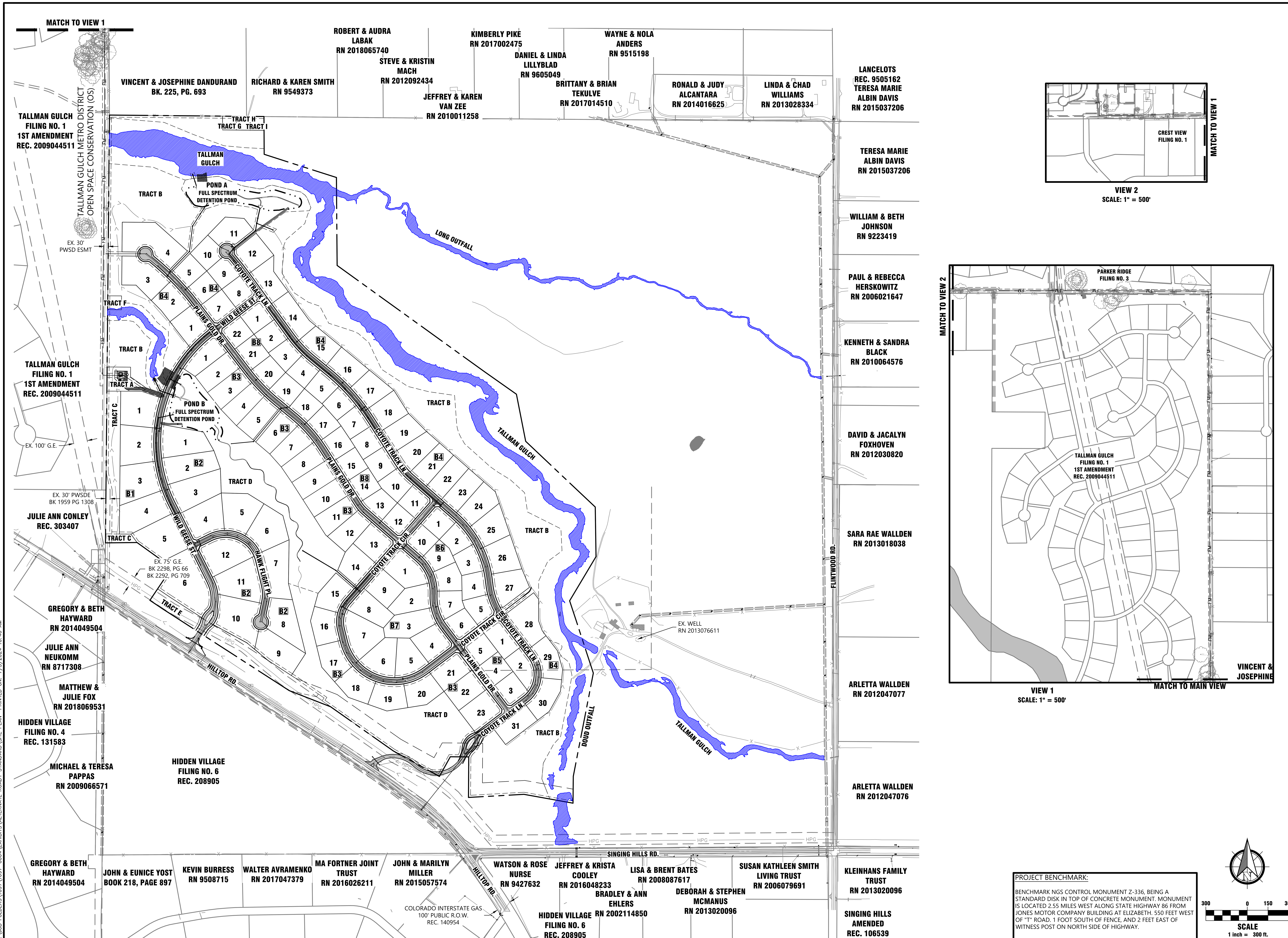
2.2 Roadway Drainage

Roadway drainage shall be in accordance with current Douglas County design criteria.

Table 1: Proposed Typical Section Roadway Standards

Design Standard	Proposed Typical Section
Posted speed Limit	25
Design Speed Limit	30
Max. Design Traffic Volume (Vehicles Per Day)	1,500
Min. Right-of-Way (feet)	50
Travel Lanes	2
Number of Travel Lanes	2
Curb & Walk	Mountable curb
Street Sections	24′ paved width, 2-2′ gutter pans, total is 28′ FL-FL
Clear Zone (feet)**	12
Street Section	28′ flowline to flowline with parking restriction to one side
HORIZONTAL CRITERIA	
Min. Centerline Curve Radii	225′
Curb/ Pavement Return Radii @ Arterial	N/A
Curb/Pavement Return Radii @ Collector	30′
Curb/Pavement Return Radii @ Local	25′
Curb Return Radii @ Local	20′ – 25′
VERTICAL CRITERIA	
K-Value Crest	19
K-Value Sag	37
Minimum VCL Crest	50
Minimum VCL Sag	50
Vertical Gradient	1%-6% 7% Mountainous
Max Int. Gradient	See Figure 4-8

Figure 1: Site Plan



1765 W. 121st Avenue
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Westminster, CO 80234
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No.	Rev. Date:	Revision Type:
1		
2		
3		
4		
5		
6		

Designed: TBS
Prepared: WK
Approved: DKH

Job No.: 1097-0004
Scale Horiz: 1" = 300'
Scale Vert: N/A

Sheet: 1 of 1
Date: July 3, 2024

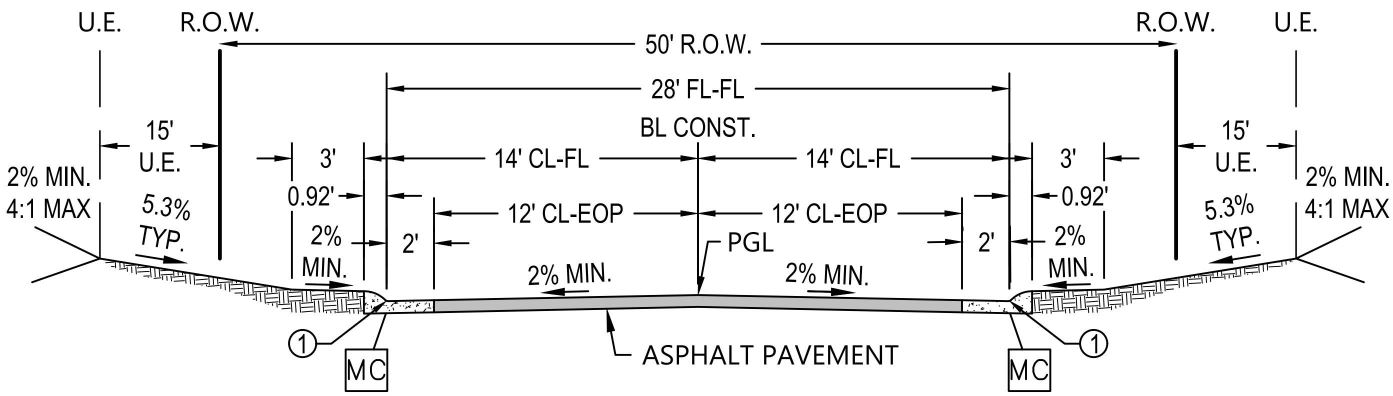
Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Alternate Roadway Section Exhibit
Sheet Name: Site Plan

811
Know what's below.
Call before you dig.

No. 1

I:\JOB FOLDERS\1097\1097-0004\EXHIBITS\ALTERNATE ROADWAY STANDARD\SITE PLAN PRINTED ON: 7/3/2024 10:40 AM

Figure 2: Proposed Typical Section



TYPICAL STREET SECTION
N.T.S.

1 FL = PGL - 0.41'

LJA
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The Fields Filing No. 1
Douglas County, Colorado
Alternate Roadway Typical Section

Prepared: PAV Approved: DKH	Horiz. Scale: NTS Vert. Scale: N/A	Job No.: 1097-0004 Date: July 3, 2024	Sheet: 1 of 1

Phase III Drainage Report
for
Fields Filing No. 1
Douglas County, Colorado

Prepared for:

Toll Brothers, Inc.
7100 E. Belleview Ave, Suite 200
Greenwood Village, CO 80111
Contact: Brad Dixon
Contact Email: bdixon@tollbrothers.com

By:

LJA ENGINEERING

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Westminster, CO 80234
Contact: Kevin Lovelace
Contact Email: klovelace@lja.com
cmiskell@lja.com

Date: January 9, 2025

Fields Filing No. 1

Project No.:	CO1097-0004
Document Title:	Drainage Report - Fields
Document No.:	1
Revision:	1
Date:	2024/07/03
Client name:	Toll Brothers, Inc.
Client No:	1097
Project manager:	Kevin Lovelace, PE
Author:	Colton Miskell, PE
QAQC manager:	Alaina Kneebone Marler, PE
File name:	I:\ILC Files\Master Documents\Drainage\Report\Drainage Report.docx

Document history and status

Revision	Date	Description	By	Review	Approved
1	2024/07/03	1st Submittal	CGM	AKM	CGM
2	2024/09/20	2nd Submittal	CGM	AKM	CGM
3	2024/11/26	3rd Submittal	CGM	AKM	CGM
4	2025/01/16	4th Submittal	CGM	AKM	CGM

CERTIFICATION OF ENGINEER

"This report and plan for the Phase III drainage design of Fields Filing No. 1 was prepared by me (or under my direct supervision) in accordance with the provisions of Douglas County Drainage Design and Technical Criteria for the owners thereof. I understand that Douglas County does not and will not assume liability for drainage facilities designed by others."

____________________________ ________________

Colton Miskell, PE Date
Registered Professional Engineer
State of Colorado No. 62326

CERTIFICATION OF DEVELOPER

Toll Brothers, Inc. hereby certifies that the drainage facilities for Fields Filing No. 1 shall be constructed according to the design presented in this report. I understand that Douglas County does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that Douglas County reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of Toll Brothers, Inc. guarantee that final drainage design review will absolve Toll Brothers, Inc. and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design."

____

Toll Brothers, Inc.

____________________________ ________________

Tim Westbrook Date

Contents

1. General Location & Description

1.1 Site Location

Fields Filing No. 1 is a proposed single-family residential subdivision located in Douglas County, Colorado. The site is situated within Section 5, Township 7 South, Range 65 West of the 6th Principal Meridian, Douglas County Colorado. It is directly adjacent and is situated north of Singing Hills Road. It is directly adjacent to and is northeast of Hilltop Road. See the Vicinity Map below for project location reference.

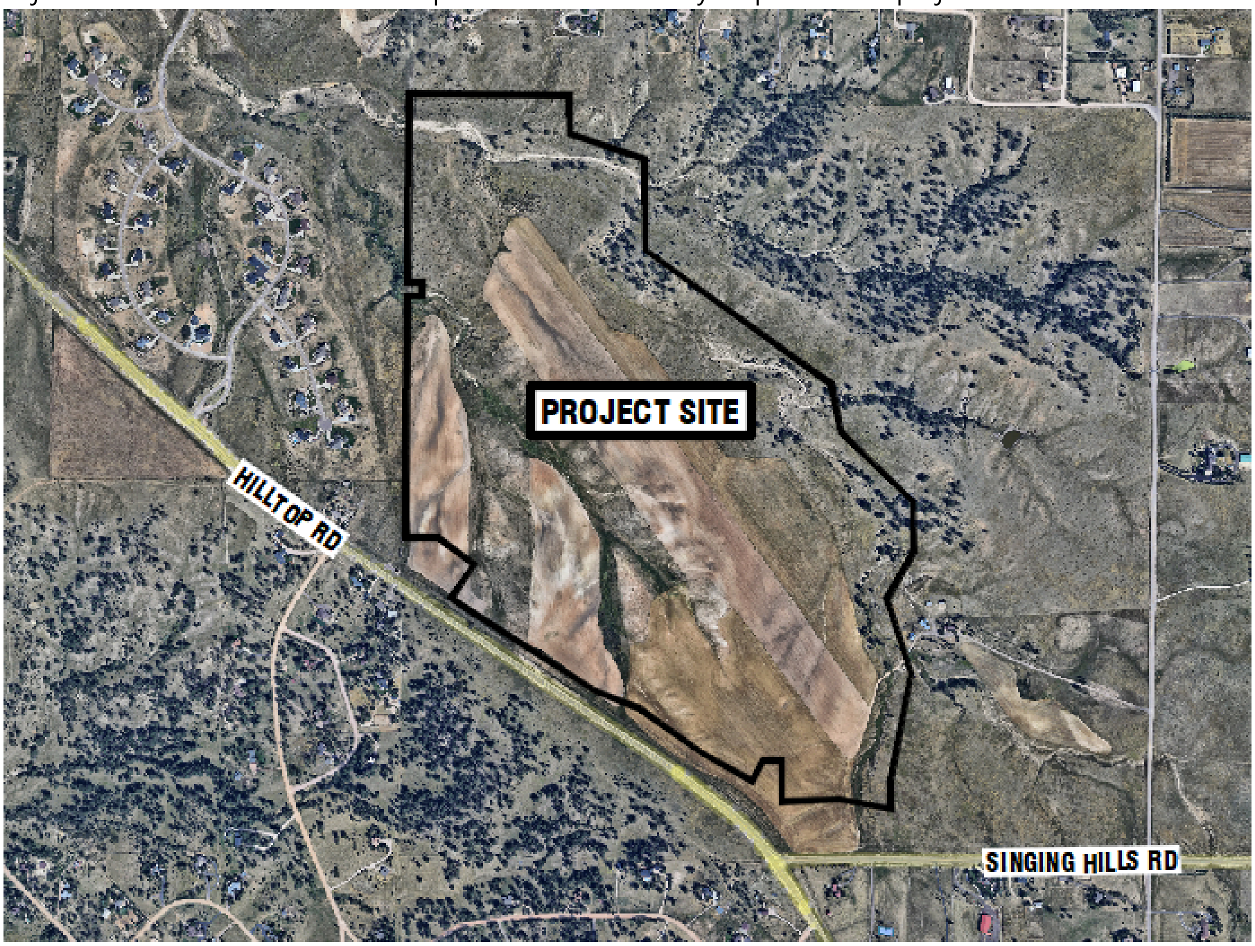

Figure 1 – Vicinity Map

Fields Filing No. 1 is proposed with Douglas County and is situated northeast of the intersection of Singing Hills Road and Hilltop Road. Hidden Village Filing No. 6 is situated to the south and southwest across from Singing Hills Road and Hilltop Road, respectively. Tallman Gulch Filing No. 1 is situated directly west of the project site.

1.2 Description of Property

The proposed project site consists of approximately 259.6 acres with 118 proposed lots, ranging in size from 0.70 acres to 2.56 acres. The existing topography of the proposed site consists of slopes around 2%-33% with approximately the western half of the site draining to the Goldsmith Outfall, and the eastern half of the site draining to the Tallman Gulch. Per the NRCS Soils Survey Map, provided in Appendix C, the site consists primarily of Type C and D Hydrologic Soil Groups, at 58%, with the remaining 37% of the site consisting of Type B Hydrologic Soils, and 5% of the site consisting of Type A Hydrologic Soils. Due to the majority of the site consisting of Type C and D Hydrologic Soil Groups, Soil Group Type C was used for the runoff calculations.

2. Drainage Basins & Sub-Basins

2.1 Major Drainage Basins

Tallman Gulch is situated on the east and northeast boundary of the site. Tallman Gulch serves as the main drainageway of the proposed development. Goldsmith Gulch flows through the site as well and is tributary to Tallman Gulch. Tallman Gulch is tributary to Sulphur Gulch and ultimately to Cherry Creek.

Tallman Gulch was most recently studied in the *Sulphur and Tallman Gulch Watersheds Outfall Systems Planning Study – Preliminary Design Report,* prepared by Kiowa Engineering Corporation, dated January 2001. The project site is located within the far upstream portion of Tallman Gulch. This OSP includes existing and future hydrology for Sulphur Gulch and Tallman Gulch watersheds. Excerpts from the OSP can be found in Appendix C.

Per the *Fields Development Geomorphological* Assessment, prepared by Ecological Resource Consultants, LLC, dated August 31, 2023, the Fields development is not anticipated to cause any adverse impacts. The Fields site grading and proposed swale placement behind Lots 2-21 will alter the drainage basin divide between Tallman Gulch and Goldsmith Gulch, resulting in less tributary flow to Tallman Gulch. Prior to development, Tallman Gulch experienced slow lateral migration naturally, estimated to be approximately one foot over the course of several years. While Tallman Gulch does experience natural lateral migration, the channel banks remain relatively stable. See Appendix C for a copy of the draft report.

The project site is not located within a regulatory 1% probability (100-year) floodplain. It is situated within unshaded Zone X as shown on the FEMA Firm Map panels 08035C0202F and 08035C0204F, dated September 30, 2005. The FEMA Firm Maps can be found in Appendix C.

There are no irrigation channels or wetlands on site.

2.2 Minor Drainage Basins

The Site has been divided into 4 major basins and 46 subbasins.

Major Basin A

Basin A is located in the eastern portion of the site and is serviced by the proposed Pond A. Basin A is approximately 76.84 acres that consists of single-family residential units, rural roadways, open space, swales, and a full spectrum detention pond. A storm system is proposed to extend from Pond A to collect the minor storm flows from Basin A. The major storm flows will be directed to the pond by means of the proposed storm system in combination with overland lows through the street Right-of-Ways (R.O.W.) where applicable. Refer to Appendix B for the detention pond calculations and refer to Table 2.1 for the Detention Pond A volume table and release rates. The Pond is proposed to outfall to Tallman Gulch, located north of the pond.

Basin A-1
Basin A-1 is located near the northeast boundary of the site and is found in Tract B. The basin consists mainly of Detention Pond A. Storm runoff from this basin sheet flows to the detention pond. Detention Pond A, a full spectrum detention pond, will outfall to the north to Tallman Gulch in the direction of the existing drainage pattern. The emergency overflow will outfall north into Tallman Gulch.

Basin A-2
Basin A-2 is located near the western boundary on the north half of the site and is found in Tract B. The basin consists of single-family residential lots, and open space areas. Storm runoff from this basin is collected within a swale and conveyed to Type D sump Inlet SA2-3. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Detention Pond A.

Basin A-3
Basin A-3 is located near the western boundary on the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collected at 10ft Type R sump Inlet SA2-5 located on the north half of Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel northeast to Detention Pond A.

Basin A-4
Basin A-4 is located near the western boundary on the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R sump Inlet SA2-6 located on the south half of Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel northeast to Detention Pond A.

Basin A-5
Basin A-5 is located in the center of the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R sump Inlet SA3-5A located on the north half of Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Detention Pond A.

Basin A-6
Basin A-6 is located in the center of the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R sump Inlet SA3-9 located at the southwest corner of the intersection of Coyote Track Lane and Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will overtop the crown and travel north to Inlet SA3-5A.

Basin A-7
Basin A-7 is located in the center of the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SA3-10 located at the southeast corner of the intersection of Coyoted Track Lane and Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-5A.

Basin A-8
Basin A-8 is located near the center of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R

on-grade Inlet SA3-14 located on the western half of Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-9.

Basin A-9

Basin A-9 is located near the center of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SA3-15 located on the eastern half of Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-10.

Basin A-10

Basin A-10 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SA3-19 located at the southwestern corner of the intersection of Coyote Track Circle and Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-14.

Basin A-11

Basin A-11 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SA3-20 located at the southeastern corner of the intersection of Coyote Track Circle and Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-15.

Basin A-12

Basin A-12 is located in the southeastern portion of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SA4-4 located at the southwestern corner of the intersection of Coyote Track Circle and Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-19.

Basin A-13

Basin A-13 is located in the southeastern portion of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SA4-3 located at the southeastern corner of the intersection of Coyote Track Circle and Coyote Track Lane. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-20.

Basin A-14

Basin A-14 is located in the southeastern portion of the site. The basin consists of single-family residential lots, paved areas and open space. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R on-grade Inlet SA4-7 located at the southwestern corner of the intersection of Coyote Track Circle and Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB5-13.

Basin A-15

Basin A-15 is located in the southeastern portion of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft

Type R on-grade Inlet SA4-6 located at the southwestern corner of the intersection of Coyote Track Circle and Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA3-19.

Basin A-16

Basin A-16 is located near the eastern boundary of the site. The basin consists of single-family residential lots and open space. Storm runoff from this basin is conveyed by a swale and collects at the Type D sump Inlet SA3-3. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Detention Pond A.

Major Basin B

Basin B is located in the center and southwestern portion of the site and is serviced by the proposed Pond B. Basin B is approximately 113.04 acres that consists of single-family residential units, the central naturalized channel, rural roadways, open space and a full spectrum detention pond. A storm system is proposed to extend from Pond B to collect the minor storm flows from Basin B. The major storm flows will be directed to the pond by means of the proposed storm system in combination with overland flows through the street Right-of-Ways where applicable. Refer to Appendix B for the detention pond calculations and refer to Table 2.2 for the Detention Pond B volume table and release rates. The pond is proposed to outfall to Goldsmith Outfall, located northwest of the pond.

Basin B-1

Basin B-1 is located in the center of the site. The basin consists of single-family residential lots, paved areas and open space. Storm runoff from this basin is conveyed by the proposed channel directly to Detention Pond B. Detention Pond B, a full spectrum detention pond, will outfall to the north to Goldsmith Outfall. The emergency overflow will outfall northwest into Goldsmith Outfall.

Basin B-2

Basin B-2 is located near the western boundary in the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R on-grade Inlet SB3-5 located on the east side of Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB2-2.

Basin B-3

Basin B-3 is located near the western boundary in the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R on-grade Inlet SB3-4 located on the west side of Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB2-4.

Basin B-4

Basin B-4 is located near the western boundary in the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SB3-9 located on the east side of Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB3-5.

Basin B-5

Basin B-5 is located near the western boundary in the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB3-8 located on the west side of Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB3-4.

Basin B-6

Basin B-6 is located near the southwestern corner of the site. The basin consists of single-family residential lots, paved areas and open space. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB3-12 located at the southeastern corner of the intersection of Hawk Flight Place and Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB3-9.

Basin B-7

Basin B-7 is located near the southwestern corner of the site. The basin consists of single-family residential lots, paved areas and open space. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB3-11 located at the southwestern corner of Hawk Flight Place and Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB3-8.

Basin B-8

Basin B-8 is located in the center of the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R sump Inlet SB2-2 located on the east side of Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will overtop the R.O.W. to Detention Pond B.

Basin B-9

Basin B-9 is located in the center of the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R sump Inlet SB2-4 located on the west side of Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will overtop the R.O.W. to Detention Pond B.

Basin B-10

Basin B-10 is located in the center of the north half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft type R on-grade Inlet SB2-8 located at the southwestern corner of the intersection of Wild Geese Street and Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel southwest to Inlet SB2-2.

Basin B-11

Basin B-11 is located in the center of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB2-9 located at the southeastern corner of the intersection of Wild Geese Street and Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SA2-5.

Basin B-12

Basin B-12 is located in the center of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SB6-3 located on the west side of Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB2-8.

Basin B-13

Basin B-13 is located in the center of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SB6-4 located on the east side of Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB2-9.

Basin B-14

Basin B-14 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R sump Inlet SB5-4 located on the north side of Coyote Track Circle. In the event of inlet clogging or a storm exceeding the major storm, the runoff will overtop the R.O.W. and travel northwest to the proposed channel and ultimately to Detention Pond B.

Basin B-15

Basin B-15 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 15ft Type R sump Inlet SB5-10 located on the south side of Coyote Track Circle. In the event of inlet clogging or a storm exceeding the major storm, the runoff will overtop the R.O.W. and travel northwest to the proposed channel and ultimately to Detention Pond B.

Basin B-16

Basin B-16 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB5-9 located on the south side of Coyote Track Circle. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB5-10.

Basin B-17

Basin B-17 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SB5-13 located on the southwestern corner of the intersection of Coyote Track Circle and Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel southwest to Inlet SB5-10.

Basin B-18

Basin B-18 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB5-14 located on the southeastern corner of the intersection of Coyote Track Circle and Plains Gold Drive. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel southwest to Inlet SB6-4.

Basin B-19

Basin B-19 is located near the southwest corner of the site. The basin consists of single-family residential lots, paved areas and open space. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB3-13 located on the southwestern corner of the intersection of

Hawks Flight Place and Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB3-9.

Basin B-20

Basin B-20 is located near the southwest corner of the site. The basin consists of single-family residential lots, paved areas and open space. Storm runoff from this basin is conveyed by curb and gutter and collects at the 5ft Type R on-grade Inlet SB3-14 located on the northwestern corner of the intersection of Hawks Flight Place and Wild Geese Street. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB3-9.

Basin B-21

Basin B-21 is located near the southeast corner of the site. The basin consists of open space and paved areas. Storm runoff from this basin is conveyed by an existing swale and collects at an existing culvert and piped north to the proposed channel and ultimately to Detention Pond B. In the event of culvert clogging or a storm exceeding the major storm, the runoff will travel north to the proposed channel.

Basin B-22

Basin B-22 is located offsite, to the south of the site and to the west of the intersection of Hilltop Road and Singing Hills Road. This basin consists of open space area. Storm runoff from this basin is conveyed by an existing roadside swale and collects at an existing culvert and piped north to Basin B-21. In the event of culvert clogging or a storm exceeding the major storm, the runoff will overtop Coyote Track Lane and travel north to Basin B-.

Basin B-23

Basin B-23 is located offsite, to the south of the site and to the northeast of the intersection of Hilltop Road and Singing Hills Road. This basin consists of paved area and open space. Storm runoff from this basin is conveyed by a proposed swale and collects at the proposed culvert SB7-2 and piped west to Basin B-21. In the event of culvert clogging or a storm exceeding the major storm, the runoff will overtop Hilltop Road and travel north to the proposed channel.

Basin B-24

Basin B-24 is located offsite, to the south of the site and to the northeast of the intersection of Hilltop Road and Singing Hills Road. This basin consists of paved area and open space. Storm runoff from this basin is conveyed by a proposed swale and collects at the proposed culvert SB7-2 and piped west to Basin B-21. In the event of culvert clogging or a storm exceeding the major storm, the runoff will overtop Hilltop Road and travel north to the proposed channel.

Basin B-25

Basin B-25 is located in the center of the south half of the site. The basin consists of single-family residential lots and paved areas. Storm runoff from this basin is conveyed by curb and gutter and collects at the 10ft Type R on-grade Inlet SB5-8 located on the north side of Coyote Track Circle. In the event of inlet clogging or a storm exceeding the major storm, the runoff will travel north to Inlet SB5-4.

Major Basin C

Basin C is located along the eastern and northern boundary of the site and is not tributary to an onsite detention pond. This basin is located within the project site boundary and is located within the Major Drainage Basin for Tallman Gulch. Basin C is approximately 69.07 acres that consists of entirely of open space area and Tallman Gulch. Runoff from the minor and major storm events will sheet flow to Tallman Gulch and will then be conveyed northwest. Tallman Gulch ultimately flows to Sulphur Gulch. Detention Pond A outfalls into Tallman Gulch. No improvements are proposed in this basin.

Major Basin D

Basin D is located along the western boundary of the site and is not tributary to an onsite detention pond. Basin D is approximately 33.52 acres that consists of the back of single-family residential units, paved area, the sanitary sewer lift station and open space. This major basin is proposed to have minimal improvements. Runoff from the minor and major storm events will sheet flow to Swales C and D and will be conveyed north to Goldsmith Outfall. Goldsmith Outfall flows northwest to Tallman Gulch and ultimately to Sulphur Gulch. Detention Pond B outfalls into Goldsmith Gulch.

Basin D-1

Basin D-1 is located along the western boundary in the north half of the site, is tributary to Goldsmith Outfall, and is not tributary to an onsite detention pond. This basin consists of a portion of the sanitary sewer lift station, open space and Goldsmith Outfall. Storm runoff from this basin sheet flows to the center of the basin to Goldsmith Outfall and ultimately to Tallman Gulch.

Basin D-2

Basin D-2 is along the western boundary in the south half of the site and is located north of Hilltop Road. This basin is tributary to Goldsmith Outfall and is not tributary to an onsite detention pond. This basin consists of a portion of the sanitary sewer lift station, residential lots, paved area from the north half of Hilltop Road, and open space. Storm runoff from this basin is conveyed by a proposed swale north to Goldsmith Gulch.

Basin D-3

Basin D-3 is located along the southern boundary of the site and is located north of Hilltop Road. This basin is tributary to Goldsmith Outfall and is not tributary to an onsite detention pond. This basin consists of paved area from the north half of Hilltop Road and open space. Storm runoff from this basin is conveyed by a proposed swale and collects at the proposed culvert SD1-2 and piped west to Basin D-2. In the event of culvert clogging or a storm exceeding the major storm, the runoff will overtop Wild Geese Street and travel west to Basin D-2.

Basin D-4

Basin D-4 is located south of the site and south of Hilltop Road. This basin is tributary to Goldsmith Outfall and is not tributary to an onsite detention pond. This offsite basin consists of paved area from the south half of Hilltop Road and open space. Storm runoff from this basin is conveyed by existing roadside swales and collects at an existing culvert and piped north to Culvert SD1-2. In the event of culvert clogging or a storm exceeding the major storm, the runoff will overtop Hilltop Road and travel north to Basin D-2 and D-3.

Basin Runoff Calculations - Direct Runoff

Project No.: 1097-0004
11/21/24

Basin ID	Inlet/Design Point	Total Area (Ac.)	Imp (%)	Tc (min)	Runoff Coeff. C_2	C_5	C_{100}	I_2	I_5	I_{100}	Q_5	Q_{100}
Developed												
A-1	A1	6.90	57%	11.8	0.46	0.50	0.72	2.68	3.62	6.57	12.46	32.51
A-2	Inlet SA2-3	7.62	35%	23.2	0.26	0.32	0.63	1.92	2.60	4.72	6.32	22.54
A-3	Inlet SA2-5	3.67	46%	15.5	0.35	0.41	0.67	2.37	3.20	5.81	4.77	14.30
A-4	Inlet SA2-6	1.48	49%	10.7	0.38	0.44	0.69	2.80	3.77	6.86	2.44	6.96
A-5	Inlet SA3-5A	3.27	47%	18.6	0.36	0.42	0.67	2.16	2.92	5.31	3.97	11.73
A-6	Inlet SA3-9	5.17	44%	19.4	0.33	0.39	0.66	2.12	2.86	5.19	5.76	17.78
A-7	Inlet SA3-10	1.84	48%	14.5	0.37	0.43	0.68	2.45	3.30	6.00	2.61	7.54
A-8	Inlet SA3-14	5.31	44%	17.5	0.34	0.40	0.66	2.23	3.01	5.47	6.31	19.29
A-9	Inlet SA3-15	1.55	48%	12.6	0.37	0.43	0.68	2.61	3.51	6.39	2.33	6.73
A-10	Inlet SA3-19	7.29	43%	19.5	0.33	0.39	0.66	2.11	2.85	5.18	8.09	24.99
A-11	Inlet SA3-20	1.68	47%	14.5	0.37	0.42	0.68	2.44	3.30	5.99	2.34	6.84
A-12	Inlet SA4-4	3.16	44%	15.1	0.33	0.39	0.66	2.40	3.24	5.89	4.00	12.32
A-13	Inlet SA4-3	2.11	49%	10.3	0.38	0.44	0.69	2.84	3.83	6.96	3.52	10.05
A-14	Inlet SA4-7	4.79	38%	11.0	0.28	0.34	0.64	2.76	3.73	6.78	6.10	20.73
A-15	Inlet SA4-6	0.88	49%	10.6	0.38	0.43	0.68	2.80	3.77	6.86	1.43	4.11
A-16	Inlet SA3-3	22.68	34%	23.9	0.25	0.32	0.62	1.90	2.56	4.65	18.30	65.91
Basin A	A1	79.39	42%	22.8	0.32	0.38	0.65	1.95	2.62	4.77	78.25	248.09
B-1	B1	48.88	35%	22.5	0.26	0.32	0.63	1.96	2.64	4.80	41.01	146.93
B-2	Inlet SB3-5	1.09	49%	10.5	0.38	0.43	0.68	2.81	3.79	6.89	1.78	5.12
B-3	Inlet SB3-4	3.49	43%	15.3	0.32	0.38	0.66	2.38	3.21	5.84	4.30	13.44
B-4	Inlet SB3-9	1.16	46%	15.2	0.36	0.41	0.67	2.39	3.23	5.87	1.55	4.61
B-5	Inlet SB3-8	1.48	42%	14.5	0.32	0.38	0.66	2.44	3.30	5.99	1.85	5.82
B-6	Inlet SB3-12	0.79	53%	9.1	0.42	0.47	0.70	2.98	4.02	7.30	1.48	4.05
B-7	Inlet SB3-11	2.63	44%	12.5	0.33	0.39	0.66	2.62	3.53	6.42	3.63	11.18
B-8	Inlet SB2-2	0.52	65%	8.3	0.52	0.56	0.75	3.07	4.14	7.53	1.21	2.93
B-9	Inlet SB2-4	1.18	50%	7.5	0.39	0.45	0.69	3.19	4.30	7.82	2.27	6.38
B-10	Inlet SB2-8	1.21	48%	12.7	0.37	0.43	0.68	2.60	3.50	6.37	1.81	5.24
B-11	Inlet SB2-9	2.97	43%	15.8	0.33	0.39	0.66	2.35	3.17	5.77	3.67	11.33
B-12	Inlet SB6-3	2.19	48%	12.8	0.38	0.43	0.68	2.59	3.49	6.34	3.29	9.49
B-13	Inlet SB6-4	5.73	44%	15.0	0.33	0.39	0.66	2.41	3.25	5.91	7.30	22.46
B-14	Inlet SB5-4	1.04	49%	10.5	0.38	0.43	0.68	2.82	3.80	6.91	1.70	4.90
B-15	Inlet SB5-10	8.88	41%	19.5	0.31	0.37	0.65	2.11	2.85	5.18	9.36	30.01
B-16	Inlet SB5-9	1.39	49%	11.7	0.38	0.43	0.68	2.69	3.63	6.61	2.19	6.28
B-17	Inlet SB5-13	3.79	44%	18.0	0.34	0.39	0.66	2.20	2.97	5.40	4.43	13.58
B-18	Inlet SB5-14	1.38	49%	11.9	0.38	0.43	0.68	2.67	3.60	6.54	2.15	6.17
B-19	Inlet SB3-17	5.00	43%	14.9	0.32	0.38	0.66	2.41	3.25	5.92	6.21	19.45
B-20	Inlet SB3-15	2.91	43%	17.6	0.33	0.39	0.66	2.22	3.00	5.45	3.38	10.49
B-21	B21	1.22	34%	9.9	0.26	0.32	0.62	2.88	3.88	7.06	1.50	5.38
B-22	B22	11.41	25%	23.0	0.18	0.24	0.59	1.94	2.61	4.75	7.19	31.82
B-23	FES SB7-2	2.70	35%	14.5	0.27	0.32	0.63	2.45	3.30	6.00	2.84	10.16
B-24	FES SB7-2	1.21	29%	15.7	0.22	0.27	0.60	2.35	3.17	5.77	1.05	4.22
B-25	Inlet SB5-8	3.89	39%	16.5	0.29	0.35	0.64	2.30	3.10	5.64	4.26	14.13
Basin B	B1	118.15	38%	38.8	0.29	0.34	0.64	1.42	1.92	3.49	77.88	263.21
C-1	C1	66.51	20%	30.3	0.14	0.20	0.57	1.65	2.23	4.06	29.38	152.63
D-1	D1	6.77	21%	9.1	0.14	0.20	0.57	2.97	4.00	7.28	5.52	28.03
D-2	D2	14.34	27%	16.8	0.20	0.26	0.60	2.28	3.07	5.59	11.31	47.70
D-3	FES SD1-2	3.32	28%	12.3	0.20	0.26	0.60	2.63	3.55	6.46	3.06	12.78
D-4	D4	9.09	24%	19.4	0.18	0.23	0.58	2.12	2.86	5.20	6.09	27.60
Basin D	D1	33.52	25%	27.1	0.18	0.24	0.59	1.77	2.38	4.33	19.17	85.18

3. Drainage Design Criteria

3.1 Regulations

This Phase III Drainage Report is in accordance with the Douglas County *Storm Drainage Design and Technical Criteria Manual* and the Mile High Flood District *Storm Drainage Criteria Manual.* These manuals were used as a guide for the hydraulic calculations.

3.2 Drainage Studies, Outfall Systems Plans, Site Constraints

Fields Filing No. 1 is included in the *Sulphur Gulch FHAD*, prepared by Merrick & Company, dated February 2021, and was previously studied in the approved *Phase II Drainage Report for Fields*, prepared by Rick Engineering, dated June 26, 2023. The proposed development is anticipated to be within full conformance and design constraints of the existing approved reports and constructed drainage infrastructure.

3.3 Hydrology

The rational method was utilized to calculate peak runoff values for drainage basins. Impervious coefficients were determined for each basin based on land use. Time of concentration was calculated by combining the initial time or overland flow time with the travel time in the swale, gutter, and storm sewer. The one-hour rainfall and time of concentrations were used to calculate rainfall intensities. Basin peak runoff calculations can be found in Appendix A.

Calculations were done for both the minor and major storm events. The minor storm is the 5-year event; the major storm is the 100-year event. Rainfall data for the minor and major storm events follow the Douglas County *Storm Drainage Design and Technical Criteria Manual* Table 6-1.

5-year P_1 = 1.43 in

100-year P_1 = 2.60 in

3.4 Hydraulics

The storm inlets were sized using the MHFD spreadsheet UF-Inlet v5.03. Standards Type R Inlets were used for the storm sewer located within public R.O.W. Inlets are proposed at low points and on-grade where minor storm runoff exceeds the street capacity. The major storm runoff will be directed to the ponds by the storm sewer system in combination with overland flows through the street Right-of-Ways where applicable. The storm sewer sizing and water surface profiles for this site were determined using StormCAD v8i software. The *Modeling Hydraulic and Energy Gradients in Storm Sewers: A Comparison of Computational Methods* MHFD Technical Paper was utilized in the hydraulic analysis for junction losses. The Manning's N value used was 0.011 due to the use of polypropylene as the pipe material. No additional head loss or junction losses were input when evaluating the bend of the storm pipes. Bentley Systems states on their website that the StormCAD software "does not account for any additional head loss due to the curvature because in most cases the increased head loss is negligible." Swale capacity calculations were performed using FlowMaster v8i, by Bentley Systems. Detailed hydraulic calculations for the streets, swales, inlets, and storm sewer can be found in Appendix B.

3.5 Water Quality Enhancement

Water quality for Major Basin A and B will be provided within two proposed full-spectrum detention ponds. The detention ponds were designed using the MHFD spreadsheet MHFD-Detention v4.06 and is in accordance with the *Douglas County Storm Drainage Design and Technical Criteria Manual* and the Excess Urban Runoff Volume (EURV) and the 100-year Detention Volume. Detailed hydraulic calculations for the detention ponds can be found in Appendix C.

4. Stormwater Management Facility Design

4.1 Stormwater Conveyance Facilities

Fields Filing No. 1 is designed per Douglas County Standards. Onsite runoff for Sub-Basins A1-B23 is conveyed through streets, swales, and grass-lined channels to Type R Inlets and area inlet design points throughout the site. The proposed storm systems is sized to convey the minor storm event without surcharging. Runoff in the 100-year storm event will be conveyed by a combination of street, swale, channel, and storm sewer for each basin to the full-spectrum detention ponds.

4.2 Stormwater Storage Facilities

Water quality and detention for the site is provided in two full-spectrum detention ponds. The proposed ponds are designed as Extended Detention Basins (EDBs) with an approximate drain time of 40-hours. The 2.5-ft deep micropool provides a location for the particulates to settle. The same orifice plate used for water quality is used to drain the EURV in approximately 72 hours. Close-mesh inlet grates are placed on the outlet structure and will be used for overflow of storm events larger than the EURV event. Inside of the outlet structure, an orifice plate and/or pipe limits the 100-year release rate of ≤90% of the historic release rate as is recommended in the current MHFD criteria. Colorado statute § 37-92-602 (8) requires that 97% of the 5-year storm event be drained within 72 hours and that 99% of rainfall in events larger than 5-year storm be released within 120 hours. The pond is designed to comply with the Colorado statute. The *Stormwater Detention and Infiltration Facility Notification* form will be submitted to the state after as-builts are constructed and approved. Pond Volume calculations can be found in Appendix C. Pond volume information can be found in the table below.

Pond Volume Summary				
Pond Volume Summary	Basin Area (ac,)	Basin Imp (%)	Vol. Req. (ac-ft)	Vol. Prov. (ac-ft)
Pond A	79.39	42%	6.59	7.22
Pond B	118.15	38%	9.20	9.75

Table 1 – Pond Volume Summary

Maintenance access is provided to the Detention Ponds A & B via an access path from Coyote Track Lane and Wild Geese Street, respectively. The proposed ponds are located within tracts that will be dedicated for drainage (maintenance access, construction and repair, etc) on the plat. Primary maintenance will be provided by the Owner.

The outlet structures for the detention ponds are sized to release the historic 100-year storm event in accordance with the MHFD full-spectrum detention facility design. The Pond A outlet structure is proposed to release to Tallman Gulch and the Pond B outlet structure is proposed to release to Goldsmith Outfall. The emergency overflows for Pond A and Pond B are sized to release the on-site undetained 100-year flow rate into the pond. The ponds outfall to low tail-water basins. These structures will provide energy dissipation for the pond outfalls and to help prevent scouring in the receiving channels. The path of the emergency overflow for Pond A is proposed to outfall entirely into Tallman Gulch. The path of the emergency overflow for Pond B is proposed to flow over Wild Geese Street and ultimately outfall into Goldsmith Outfall. Calculations for Detention Pond A and Pond B, the associated outlet structures and emergency overflows can be found in Appendix C. Pond 100-year release rates can be found in Table 2.

Detention Pond A Volume Table

	Required Vol. (ac-ft.)	Provided Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	N/A	6312.00	0.00
WQCV	1.225	1.234	6315.43	3.43
EURV	1.886	3.121	6316.82	4.82
100-yr	6.593	7.215	6318.89	6.89
Emergency Overflow Weir	N/A	N/A	6318.90	6.90
Emergency Overflow WSE	N/A	N/A	6319.85	7.85
Freeboard / Top of Pond	N/A	N/A	6321.00	9.00
			100-yr Allowable Release=	67.47
			100-yr Release=	64.06

Detention Pond B Volume Table

	Required Vol. (ac-ft.)	Provided Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	N/A	6342.65	0.00
WQCV	1.718	1.730	6346.71	4.06
EURV	2.437	4.172	6348.24	5.59
100-yr	9.201	9.746	6351.02	8.37
Emergency Overflow Weir	N/A	N/A	6351.85	9.20
Emergency Overflow WSE	N/A	N/A	6352.81	10.16
Freeboard / Top of Pond	N/A	N/A	6353.81	11.16
			100-yr Allowable Release=	133.91
			100-yr Release=	132.02

Table 2.1 & 2.2 – Pond Volume and Release Rates

Basins C and D are unable to be captured and conveyed to an onsite detention pond. These basins total 102.59 acres. Basins C only consists of Tallman Gulch and open space area with no impervious area; therefore, the runoff from this basin is expected to match the historic flow rate. Basin D mainly consists of open space area with a small portion of paved area from Coyote Track Lane, the north half of Hilltop Road, and a portion of the back of lots. Impervious area in this basin will be conveyed by a grass-lined Swale C and Swale D that is anticipated to provide water quality. Subsequently to the channelized flow in the swale, the runoff will sheet flow over an open space area with natural vegetation which will provide more water quality for this impervious area and will ultimately flow to Goldsmith Outfall.

A combination of MHFD-Detention v4.06 spreadsheet and Colorado Urban Hydrograph Procedure 2005 (CUHP), version 2.0.1, was used to model the flows in the portion of Goldsmith Gulch downstream of Detention Pond B. This portion of Goldsmith Gulch is located along the western boundary of the site. Based on discussions with the geomorphologist and to determine if improvements along this section of Goldsmith Gulch were necessary, micro storm events were analyzed in CUHP. The storm rainfall events were revised in the CUHP modeling to use the desired rainfall value as the 1-hour precipitation depth. Then the following rainfall depths were used in the 2-year design storm distribution.

- 0.10"
- 0.25"
- 0.50"
- 0.75"

There were two CUHP models run, the existing conditions run and the proposed conditions run. These two models were then compared to determine if the peak flow and volumetric flow for the proposed conditions was significantly larger than the existing conditions. Due to the volume of flow increasing in the proposed conditions combined with the concern for scouring in Goldsmith Gulch, improvements are being proposed. Refer to Table 3 for the comparison between existing and proposed flows and flow volumes in Goldsmith Gulch. The flow in Goldsmith Gulch was calculated using a combination of CUHP and the MHFD-Detention spreadsheet. The CUHP model was used to analyze the flows from Basin D, and the Detention Pond B release rates were taken from the MHFD-Detention spreadsheet. Refer to Table 4 for the proposed flows in the downstream portion of Goldsmith Gulch.

The flows for the portion of Goldsmith Gulch upstream of Detention Pond B have been calculated using the Rational Method. Refer to the routing calculations in Appendix A for those calculations.

CUHP RESULTS @ DP D1

Basin	Peak Flow - 2yr Storm Distribution (cfs)					Volume - 2yr Storm Distribution (ac-ft)				
	0.10-in	0.25-in	0.50-in	0.75-in	1.06-in	0.10-in	0.25-in	0.50-in	0.75-in	1.06-in
Basin G (Ex Conditions)*	0.002	0.34	19.42	42.75	75.99	0.00021	0.046	3.098	6.359	10.404
Basin D (Prop Conditions)**	0.73	1.275	4.759	9.09	14.00	0.00521	0.104	0.768	1.555	2.531
Difference	**36500.0%**	**375.0%**	**24.5%**	**21.3%**	**18.4%**	**2522.2%**	**224.5%**	**24.8%**	**24.5%**	**24.3%**

* = Existing Basin G includes Basin E & F from the Phase II Report

** = Peak flow includes WQCV release rate from Pond B (0.69cfs)

Table 3 – Comparison of Ex. vs Prop. flows in Goldsmith Gulch

CUHP RESULTS - Prop Flow in Goldmsith Gulch @ DP D1

Basin	Peak Flow (cfs)		
	2 year	5 year	100 year
Basin D	14.2	20.7	47.6
Basin B/Pond B	1.10	20.7	132.0
Total flow in Goldsmith Gulch	**15.3**	**41.4**	**179.6**

Table 4 – Proposed Flow in downstream portion of Goldsmith Gulch

4.3 Water Quality Enhancement Best Management Practices

The pond discussed in Section 4.2 has been designed in accordance with the Douglas County *Storm Drainage Design and Technical Criteria Manual* and the MHFD *Storm Drainage Criteria Manual Volumes 1, 2, and 3*. The Detention Pond is designed to detain the Water Quality Control Volume, Excess Urban Runoff Volume, and the 100-year Detention Volume. Basins not captured and routed to the full-spectrum detention ponds will sheet flow over native vegetation providing water quality enhancement.

4.4 Floodplain Modification

No floodplain modifications are proposed with this development.

4.5 Additional Permitting Requirements

Not applicable.

5. Conclusions

5.1 Compliance with Standards

The drainage design for Fields Filing No. 1 conforms to the Douglas County *Storm Drainage Design and Technical Criteria Manual* and the MHFD *Urban Storm Drainage Criteria Manuals,* and relevant nearby drainage reports.

5.2 Variances

<u>Variance 1 – Douglas County Storm Drainage Design and Technical Criteria Manual Section 9.2.1 Storm Sewer Pipe Material</u>
City criteria requires that storm sewer pipes located within public R.O.W. must be reinforced concrete pipe (RCP). Douglas County has allowed the use of polypropylene pipe (PP) within public R.O.W. during a trial period. Due to the limited width of the road, it is requested that the use of polypropylene be allowed within public R.O.W. and for the use of curvilinear pipe. The allowance of using curvilinear pipe within public R.O.W. would eliminate the need for several manholes, which would reduce the future maintenance requirements for the County. Refer to Appendix C for email correspondence with Douglas County.

<u>Variance 2 – StormCAD 100-year Tailwater Elevation</u>
It is requested that the 10-year water surface elevation (WSE) for Detention Pond B be used for the 100-year tailwater elevation in the StormCAD model, where applicable. The 100-year hydraulic grade line will still remain 1-ft or greater below finished grade, as required by Douglas County. The allowance of using the 10-year WSE for the StormCAD model would allow the storm sewer to be more shallow, as well as reduce the total required footprint of Detention Pond B.

5.3 Drainage Concept

The drainage facilities proposed in Fields Filing No. 1 are designed to effectively intercept and convey runoff produced by the development during the minor and major storm events. The onsite detention po nds will provide water quality treatment and detention for the developed tributary runoff within this development.

6. References

- Douglas County Stormwater Drainage Design and Technical Criteria Manual
- Mile High Flood District Drainage Criteria Manual Volumes 1, 2, & 3, current version
- Natural Resources Conservation Service Web Soil Survey, United States Department of Agriculture
- Federal Emergency Management Agency Flood Insurance Rate Map, Community Panel Number 08035C0204F
- Phase II Drainage Report for Fields, prepared by Rick Engineering, and dated June 26, 2023
- Sulphur Gulch Flood Hazard Area Delineation, prepared by Merrick & Company, and dated February 2021

Appendix A. Hydrologic Calculations

The Fields Filing No. 1

Basin Weighted Runoff Coefficient Calculations

Land Use Is Comprised of 3 Surface Characteristics:

NRCS Soil Group	C	Imperviousness	C_2	C_5	C_{10}	C_{100}
A	Single-Family	40%	0.30	0.36	0.43	0.65
B	Pavement	95%	0.79	0.81	0.83	0.87
C	Concrete	95%	0.79	0.81	0.83	0.87
D	Pond WSE	100%	0.83	0.85	0.87	0.89
E	Landscaping/Open Space	20%	0.14	0.20	0.28	0.57
F	Historic	5%	0.03	0.08	0.17	0.50

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Basin ID	Total Area (Ac.)	A Area (Ac.)	B Area (Ac.)	C Area (Ac.)	D Area (Ac.)	E Area (Ac.)	F Area (Ac.)	Weighted Imp. I (%)	Weighted Runoff Coefficients C_2	C_5	C_{10}	C_{100}
Developed - Interim												
A-1	6.90	0.83		0.15	2.84	3.08		57%	0.46	0.50	0.55	0.72
A-2	7.62	5.01		0.18		2.43		35%	0.26	0.32	0.39	0.63
A-3	3.67	2.90	0.39	0.09		0.29		46%	0.35	0.41	0.47	0.67
A-4	1.48	0.98	0.26	0.05		0.19		49%	0.38	0.44	0.49	0.69
A-5	3.27	2.52	0.40	0.09		0.27		47%	0.36	0.42	0.48	0.67
A-6	5.17	4.43	0.36	0.08		0.29		44%	0.33	0.39	0.45	0.66
A-7	1.84	1.23	0.30	0.07		0.25		48%	0.37	0.43	0.49	0.68
A-8	5.31	4.42	0.42	0.11		0.35		44%	0.34	0.40	0.46	0.66
A-9	1.55	1.03	0.25	0.06		0.21		48%	0.37	0.43	0.49	0.68
A-10	7.29	6.31	0.48	0.12		0.38		43%	0.33	0.39	0.45	0.66
A-11	1.68	1.06	0.27	0.07		0.29		47%	0.37	0.42	0.48	0.68
A-12	3.16	2.69	0.23	0.05		0.18		44%	0.33	0.39	0.45	0.66
A-13	2.11	1.07	0.43	0.10		0.50		49%	0.38	0.44	0.49	0.69
A-14	4.79	2.64	0.34	0.08		1.73		38%	0.28	0.34	0.41	0.64
A-15	0.88	0.56	0.15	0.04		0.12		49%	0.38	0.43	0.49	0.68
A-16	22.68	16.35		0.00		6.33		34%	0.25	0.32	0.38	0.62
Basin A	79.39	54.02	4.27	1.36	2.84	16.90	0.00	42%	0.32	0.38	0.44	0.65
B-1	48.88	25.63	0.15	0.00	2.42	20.69		35%	0.26	0.32	0.39	0.63
B-2	1.09	0.72	0.18	0.04		0.15		49%	0.38	0.43	0.49	0.68
B-3	3.49	3.10	0.18	0.04		0.16		43%	0.32	0.38	0.45	0.66
B-4	1.16	0.89	0.13	0.04		0.10		46%	0.36	0.41	0.47	0.67
B-5	1.48	1.28	0.08	0.02		0.10		42%	0.32	0.38	0.44	0.66
B-6	0.79	0.26	0.22	0.05		0.26		53%	0.42	0.47	0.52	0.70
B-7	2.63	2.11	0.22	0.05		0.24		44%	0.33	0.39	0.45	0.66
B-8	0.52	0.02	0.25	0.06		0.20		65%	0.52	0.56	0.61	0.75
B-9	1.18	0.70	0.24	0.06		0.19		50%	0.39	0.45	0.50	0.69
B-10	1.21	0.81	0.19	0.05		0.16		48%	0.37	0.43	0.49	0.68
B-11	2.97	2.55	0.20	0.05		0.17		43%	0.33	0.39	0.45	0.66
B-12	2.19	1.44	0.36	0.09		0.30		48%	0.38	0.43	0.49	0.68
B-13	5.73	4.91	0.41	0.10		0.32		44%	0.33	0.39	0.45	0.66
B-14	1.04	0.68	0.17	0.04		0.14		49%	0.38	0.43	0.49	0.68
B-15	8.88	8.51	0.19	0.04		0.15		41%	0.31	0.37	0.43	0.65
B-16	1.39	0.89	0.24	0.06		0.20		49%	0.38	0.43	0.49	0.68
B-17	3.79	2.40	0.45	0.12		0.81		44%	0.34	0.39	0.46	0.66
B-18	1.38	0.90	0.23	0.06		0.19		49%	0.38	0.43	0.49	0.68
B-19	5.00	4.30	0.29	0.06		0.33		43%	0.32	0.38	0.45	0.66
B-20	2.91	1.84	0.33	0.07		0.67		43%	0.33	0.39	0.45	0.66
B-21	1.22		0.24	0.00		0.98		34%	0.26	0.32	0.39	0.62
B-22	11.41		0.81	0.00		10.60		25%	0.18	0.24	0.32	0.59
B-23	2.70		0.53	0.00		2.17		35%	0.27	0.32	0.39	0.63
B-24	1.21		0.15	0.00		1.07		29%	0.22	0.27	0.35	0.60
B-25	3.89	2.51	0.25	0.06		1.07		39%	0.29	0.35	0.42	0.64
Basin B	118.15	66.45	6.70	1.16	2.42	41.42	0.00	38%	0.29	0.34	0.41	0.64
C-1	66.51		0.00			66.51		20%	0.14	0.20	0.28	0.57
Basin C	66.51					66.51		20%	0.14	0.20	0.28	0.57
D-1	6.77	0.24				6.53		21%	0.14	0.20	0.28	0.57
D-2	14.34	3.35	0.37	0.12		10.51		27%	0.20	0.26	0.33	0.60
D-3	3.32		0.33			2.99		28%	0.20	0.26	0.33	0.60
D-4	9.09		0.54			8.55		24%	0.18	0.23	0.31	0.58
Basin D	33.52	3.59	1.24	0.12	0.00	28.58	0.00	25%	0.18	0.24	0.32	0.59
Developed Imp.	596.51	248.10	24.45	5.27	10.53	308.16	0.00	33%	0.25	0.31	0.38	0.62
Ponds												
Pond A	79.39	54.02	4.27	1.36	2.84	16.90	0.00	42%	0.32	0.38	0.44	0.65
Pond B	118.15	66.45	6.70	1.16	2.42	41.42	0.00	38%	0.29	0.34	0.41	0.64
Forebay												
Forebay SA2-1	12.77	8.88	0.65	0.33	0.00	2.91	0.00	40%	0.30	0.36	0.42	0.65
Forebay SA3-2	59.73	44.31	3.62	0.88	0.00	10.92	0.00	40%	0.31	0.37	0.43	0.65
Forebay SB2-1	5.88	4.08	0.88	0.21	0.00	0.71	0.00	48%	0.37	0.42	0.48	0.68
Forebay SB3-1	18.55	14.50	1.65	0.39	0.00	2.02	0.00	44%	0.33	0.39	0.45	0.66

Time of Concentration

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11/26/24

Basin ID	C_5	Initial Flow Time T_i			Travel Time T_t							Tc Check				Final
		Length L_i (ft)	Slope S_i (%)	T_i (min)	Length L_t (ft)	Slope S_t (%)	Convey. Element	Convey. Coeff. K	Vel. (fps)	T_t (min)	Total T_c (min)	Imp. (dec)	Length L_t (ft)	Slope S_t (%)	$T_c = 26 - 17i + [Lt/\{60*(14i+9)*(S^{0.5})\}]$ (min)	T_c (min)
Developed																
A-1	0.50	300	10.28	8.7	630	2.88	Street	20	3.4	3.1	11.8	0.6	630	2.9	16.7	11.8
A-2	0.32	160	11.30	8.0	1855	0.50	Grassed Waterway	15	1.1	29.1	37.1	0.3	1855	0.5	23.2	23.2
A-3	0.41	200	3.10	12.2	485	1.50	Street	20	2.4	3.3	15.5	0.5	485	1.5	18.7	15.5
A-4	0.44	60	2.00	7.4	480	1.50	Street	20	2.4	3.3	10.7	0.5	480	1.5	18.0	10.7
A-5	0.42	190	2.00	13.6	540	0.79	Street	20	1.8	5.1	18.6	0.5	540	0.8	18.7	18.6
A-6	0.39	195	2.50	13.2	1065	1.92	Street	20	2.8	6.4	19.6	0.4	1065	1.9	19.4	19.4
A-7	0.43	70	2.00	8.1	1070	1.95	Street	20	2.8	6.4	14.5	0.5	1070	1.9	18.6	14.5
A-8	0.40	300	4.29	13.6	785	2.80	Street	20	3.3	3.9	17.5	0.4	785	2.8	19.0	17.5
A-9	0.43	70	2.00	8.1	905	2.77	Street	20	3.3	4.5	12.6	0.5	905	2.8	18.4	12.6
A-10	0.39	300	5.42	12.7	1005	1.52	Street	20	2.5	6.8	19.5	0.4	1005	1.5	19.5	19.5
A-11	0.42	60	2.00	7.6	975	1.36	Street	20	2.3	7.0	14.5	0.5	975	1.4	18.8	14.5
A-12	0.39	300	5.81	12.4	390	1.49	Street	20	2.4	2.7	15.1	0.4	390	1.5	18.9	15.1
A-13	0.44	15	2.00	3.7	1470	3.48	Street	20	3.7	6.6	10.3	0.5	1470	3.5	18.5	10.3
A-14	0.34	125	12.30	6.7	915	3.19	Street	20	3.6	4.3	11.0	0.4	915	3.2	20.2	11.0
A-15	0.43	65	2.00	7.7	480	1.86	Street	20	2.7	2.9	10.6	0.5	480	1.9	18.0	10.6
A-16	0.32	300	6.00	13.6	4780	2.42	Grassed Waterway	15	2.3	34.1	47.7	0.3	4780	2.4	23.9	23.9
Basin A	0.38	125	12.30	6.4	5750	2.78	Grassed Waterway	15	2.5	38.3	44.7	0.4	5750	2.8	22.8	22.8
B-1	0.32	300	4.00	15.5	3475	3.06	Grassed Waterway	15	2.6	22.1	37.6	0.3	3475	3.1	22.5	22.5
B-2	0.43	70	2.00	8.0	645	4.69	Street	20	4.3	2.5	10.5	0.5	645	4.7	18.1	10.5
B-3	0.38	300	5.62	12.7	680	4.65	Street	20	4.3	2.6	15.3	0.4	680	4.6	19.1	15.3
B-4	0.41	345	4.82	13.7	355	4.21	Street	20	4.1	1.4	15.2	0.5	355	4.2	18.3	15.2
B-5	0.38	265	3.96	13.4	300	5.14	Street	20	4.5	1.1	14.5	0.4	300	5.1	18.9	14.5
B-6	0.47	100	4.18	7.2	520	5.07	Street	20	4.5	1.9	9.1	0.5	520	5.1	17.3	9.1
B-7	0.39	300	6.66	11.8	130	2.99	Street	20	3.5	0.6	12.5	0.4	130	3.0	18.6	12.5
B-8	0.56	60	2.00	6.0	485	2.91	Street	20	3.4	2.4	8.3	0.6	485	2.9	15.3	8.3
B-9	0.45	30	2.00	5.1	470	2.81	Street	20	3.4	2.3	7.5	0.5	470	2.8	17.7	7.5
B-10	0.43	60	2.00	7.5	695	1.24	Street	20	2.2	5.2	12.7	0.5	695	1.2	18.5	12.7
B-11	0.39	190	4.90	10.5	720	1.28	Street	20	2.3	5.3	15.8	0.4	720	1.3	19.3	15.8

Time of Concentration

Project No.: 1097-0004
11/26/24

Basin ID	C_5	Initial Flow Time T_i: Length L_i (ft)	Slope S_i (%)	T_i (min)	Travel Time T_t: Length L_t (ft)	Slope S_t (%)	Convey. Element	Convey. Coeff. K	Vel. (fps)	T_t (min)	Total T_c (min)	Tc Check: Imp. (dec)	Length L_t (ft)	Slope S_t (%)	$T_c = 26 - 17i + [Lt/\{60*(14i+9)*(S^{0.5})\}]$ (min)	Final T_c (min)
Developed																
B-12	0.43	60	2.00	7.5	1240	3.72	Street	20	3.9	5.4	12.8	0.5	1240	3.7	18.4	12.8
B-13	0.39	190	4.90	10.4	1065	3.82	Street	20	3.9	4.5	15.0	0.4	1065	3.8	19.2	15.0
B-14	0.43	60	2.00	7.4	380	1.10	Street	20	2.1	3.0	10.5	0.5	380	1.1	18.1	10.5
B-15	0.37	300	2.00	18.2	770	3.09	Street	20	3.5	3.7	21.8	0.4	770	3.1	19.5	19.5
B-16	0.43	60	2.00	7.4	875	2.93	Street	20	3.4	4.3	11.7	0.5	875	2.9	18.2	11.7
B-17	0.39	300	10.37	10.2	1415	2.31	Street	20	3.0	7.8	18.0	0.4	1415	2.3	19.6	18.0
B-18	0.43	60	2.00	7.4	780	2.09	Street	20	2.9	4.5	11.9	0.5	780	2.1	18.3	11.9
B-19	0.38	240	12.74	8.7	930	1.54	Street	20	2.5	6.3	14.9	0.4	930	1.5	19.6	14.9
B-20	0.39	300	11.40	10.0	1100	1.44	Street	20	2.4	7.6	17.6	0.4	1100	1.4	19.7	17.6
B-21	0.32	100	8.21	7.1	465	3.30	Grassed Waterway	15	2.7	2.8	9.9	0.3	465	3.3	20.4	9.9
B-22	0.24	300	4.20	16.7	1600	2.74	Grassed Waterway	15	2.5	10.7	27.5	0.3	1600	2.7	23.0	23.0
B-23	0.32	145	8.57	8.4	845	2.35	Grassed Waterway	15	2.3	6.1	14.5	0.3	845	2.4	20.8	14.5
B-24	0.27	200	4.30	13.1	445	3.45	Grassed Waterway	15	2.8	2.7	15.7	0.3	445	3.4	21.4	15.7
B-25	0.35	300	9.24	11.2	1090	2.99	Street	20	3.5	5.3	16.5	0.4	1090	3.0	20.1	16.5
Basin B	Time of Concentration calculated on the Routing Spreadsheet															38.8
C-1	0.20	300	8.20	14.1	7780	2.03	Grassed Waterway	15	2.1	60.6	74.7	0.2	7780	2.0	30.3	30.3
D-1	0.20	80	21.14	5.3	650	3.51	Grassed Waterway	15	2.8	3.9	9.1	0.2	650	3.5	23.0	9.1
D-2	0.26	85	9.27	6.7	1710	3.56	Grassed Waterway	15	2.8	10.1	16.8	0.3	1710	3.6	22.6	16.8
D-3	0.26	75	10.30	6.1	855	2.34	Grassed Waterway	15	2.3	6.2	12.3	0.3	855	2.3	22.0	12.3
D-4	0.23	230	5.68	13.4	855	2.49	Grassed Waterway	15	2.4	6.0	19.4	0.2	855	2.5	22.6	19.4
Basin D	0.24	230	5.68	13.3	3915	0.94	Grassed Waterway	16	1.6	42.0	55.2	0.3	3915	0.9	27.1	27.1
Ponds																
Pond A	0.38	125	12	6.4	5750	3	Grassed Waterway	15	2.5	38.3	44.7	0.4	5750	2.8	22.8	22.8
Pond B	Time of Concentration calculated on the Routing Spreadsheet															38.8
Developed																
Forebay SA2-1	0.36	160	11.30	7.6	2060	1.91	Street	20	2.8	12.4	20.0	0.4	2060	1.9	21.0	20.0
Forebay SA3-2	0.37	125	12.30	6.5	5120	3.04	Street	20	3.5	24.5	30.9	0.4	5120	3.0	22.5	22.5
Forebay SB2-1	0.42	190	4.90	10.0	1265	2.44	Street	20	3.1	6.7	16.7	0.5	1265	2.4	18.7	16.7
Forebay SB3-1	0.39	300	11.40	9.9	2240	3.41	Street	20	3.7	10.1	20.0	0.4	2240	3.4	19.9	19.9

Basin Runoff Calculations - Direct Runoff

Project No.: 1097-0004

11/26/24

Basin ID	Inlet/Design Point	Total Area (Ac.)	Imp (%)	Tc (min)	Runoff Coeff. C_2	C_5	C_{100}	I_2	I_5	I_{100}	Q_5	Q_{100}
Developed												
A-1	A1	6.90	57%	11.8	0.46	0.50	0.72	2.68	3.62	6.57	12.46	32.51
A-2	Inlet SA2-3	7.62	35%	23.2	0.26	0.32	0.63	1.92	2.60	4.72	6.32	22.54
A-3	Inlet SA2-5	3.67	46%	15.5	0.35	0.41	0.67	2.37	3.20	5.81	4.77	14.30
A-4	Inlet SA2-6	1.48	49%	10.7	0.38	0.44	0.69	2.80	3.77	6.86	2.44	6.96
A-5	Inlet SA3-5A	3.27	47%	18.6	0.36	0.42	0.67	2.16	2.92	5.31	3.97	11.73
A-6	Inlet SA3-9	5.17	44%	19.4	0.33	0.39	0.66	2.12	2.86	5.19	5.76	17.78
A-7	Inlet SA3-10	1.84	48%	14.5	0.37	0.43	0.68	2.45	3.30	6.00	2.61	7.54
A-8	Inlet SA3-14	5.31	44%	17.5	0.34	0.40	0.66	2.23	3.01	5.47	6.31	19.29
A-9	Inlet SA3-15	1.55	48%	12.6	0.37	0.43	0.68	2.61	3.51	6.39	2.33	6.73
A-10	Inlet SA3-19	7.29	43%	19.5	0.33	0.39	0.66	2.11	2.85	5.18	8.09	24.99
A-11	Inlet SA3-20	1.68	47%	14.5	0.37	0.42	0.68	2.44	3.30	5.99	2.34	6.84
A-12	Inlet SA4-4	3.16	44%	15.1	0.33	0.39	0.66	2.40	3.24	5.89	4.00	12.32
A-13	Inlet SA4-3	2.11	49%	10.3	0.38	0.44	0.69	2.84	3.83	6.96	3.52	10.05
A-14	Inlet SA4-7	4.79	38%	11.0	0.28	0.34	0.64	2.76	3.73	6.78	6.10	20.73
A-15	Inlet SA4-6	0.88	49%	10.6	0.38	0.43	0.68	2.80	3.77	6.86	1.43	4.11
A-16	Inlet SA3-3	22.68	34%	23.9	0.25	0.32	0.62	1.90	2.56	4.65	18.30	65.91
Basin A	A1	79.39	42%	22.8	0.32	0.38	0.65	1.95	2.62	4.77	78.25	248.09
B-1	B1	48.88	35%	22.5	0.26	0.32	0.63	1.96	2.64	4.80	41.01	146.93
B-2	Inlet SB3-5	1.09	49%	10.5	0.38	0.43	0.68	2.81	3.79	6.89	1.78	5.12
B-3	Inlet SB3-4	3.49	43%	15.3	0.32	0.38	0.66	2.38	3.21	5.84	4.30	13.44
B-4	Inlet SB3-9	1.16	46%	15.2	0.36	0.41	0.67	2.39	3.23	5.87	1.55	4.61
B-5	Inlet SB3-8	1.48	42%	14.5	0.32	0.38	0.66	2.44	3.30	5.99	1.85	5.82
B-6	Inlet SB3-12	0.79	53%	9.1	0.42	0.47	0.70	2.98	4.02	7.30	1.48	4.05
B-7	Inlet SB3-11	2.63	44%	12.5	0.33	0.39	0.66	2.62	3.53	6.42	3.63	11.18
B-8	Inlet SB2-2	0.52	65%	8.3	0.52	0.56	0.75	3.07	4.14	7.53	1.21	2.93
B-9	Inlet SB2-4	1.18	50%	7.5	0.39	0.45	0.69	3.19	4.30	7.82	2.27	6.38
B-10	Inlet SB2-8	1.21	48%	12.7	0.37	0.43	0.68	2.60	3.50	6.37	1.81	5.24
B-11	Inlet SB2-9	2.97	43%	15.8	0.33	0.39	0.66	2.35	3.17	5.77	3.67	11.33
B-12	Inlet SB6-3	2.19	48%	12.8	0.38	0.43	0.68	2.59	3.49	6.34	3.29	9.49
B-13	Inlet SB6-4	5.73	44%	15.0	0.33	0.39	0.66	2.41	3.25	5.91	7.30	22.46
B-14	Inlet SB5-4	1.04	49%	10.5	0.38	0.43	0.68	2.82	3.80	6.91	1.70	4.90
B-15	Inlet SB5-10	8.88	41%	19.5	0.31	0.37	0.65	2.11	2.85	5.18	9.36	30.01
B-16	Inlet SB5-9	1.39	49%	11.7	0.38	0.43	0.68	2.69	3.63	6.61	2.19	6.28
B-17	Inlet SB5-13	3.79	44%	18.0	0.34	0.39	0.66	2.20	2.97	5.40	4.43	13.58
B-18	Inlet SB5-14	1.38	49%	11.9	0.38	0.43	0.68	2.67	3.60	6.54	2.15	6.17
B-19	Inlet SB3-17	5.00	43%	14.9	0.32	0.38	0.66	2.41	3.25	5.92	6.21	19.45
B-20	Inlet SB3-15	2.91	43%	17.6	0.33	0.39	0.66	2.22	3.00	5.45	3.38	10.49
B-21	B21	1.22	34%	9.9	0.26	0.32	0.62	2.88	3.88	7.06	1.50	5.38
B-22	B22	11.41	25%	23.0	0.18	0.24	0.59	1.94	2.61	4.75	7.19	31.82
B-23	FES SB7-2	2.70	35%	14.5	0.27	0.32	0.63	2.45	3.30	6.00	2.84	10.16
B-24	FES SB7-2	1.21	29%	15.7	0.22	0.27	0.60	2.35	3.17	5.77	1.05	4.22
B-25	Inlet SB5-8	3.89	39%	16.5	0.29	0.35	0.64	2.30	3.10	5.64	4.26	14.13
Basin B	B1	118.15	38%	38.8	0.29	0.34	0.64	1.42	1.92	3.49	77.88	263.21
C-1	C1	66.51	20%	30.3	0.14	0.20	0.57	1.65	2.23	4.06	29.38	152.63
D-1	D1	6.77	21%	9.1	0.14	0.20	0.57	2.97	4.00	7.28	5.52	28.03
D-2	D2	14.34	27%	16.8	0.20	0.26	0.60	2.28	3.07	5.59	11.31	47.70
D-3	FES SD1-2	3.32	28%	12.3	0.20	0.26	0.60	2.63	3.55	6.46	3.06	12.78
D-4	D4	9.09	24%	19.4	0.18	0.23	0.58	2.12	2.86	5.20	6.09	27.60
Basin D	D1	33.52	25%	27.1	0.18	0.24	0.59	1.77	2.38	4.33	19.17	85.18
Ponds												
Pond A	A1	79.39	42%	22.8	0.32	0.38	0.65	1.95	2.62	4.77	78.25	248.09
Pond B	B1	118.15	38%	38.8	0.29	0.34	0.64	1.42	1.92	3.49	77.88	263.21
Forebay												
Forebay SA2-1	Forebay SA2-1	12.77	40%	20.0	0.30	0.36	0.65	2.08	2.81	5.11	12.84	42.14
Forebay SA3-2	Forebay SA3-2	59.73	40%	22.5	0.31	0.37	0.65	1.96	2.64	4.81	57.65	186.56
Forebay SB2-1	Forebay SB2-1	5.88	48%	16.7	0.37	0.42	0.68	2.28	3.08	5.60	7.68	22.37
Forebay SB3-1	Forebay SB3-1	18.55	44%	19.9	0.33	0.39	0.66	2.09	2.82	5.13	20.55	63.14

$$\text{Intensity} = \frac{28.5 * P_1}{(10 + T_c)^{0.786}}$$

2 Year P_1 = 1.06

5 Year P_1 = 1.43

100 Year P_1 = 2.60

Design Storm: 5-Year

Storm Drainage System Design - Standard Form SF-3 - 5 Year Stom Event

Design Engineer: CGM

Project No.: 1097-0004

11/26/24

	Direct Runoff							Total Runoff					Street Capacity		Inlet			Captured	Bypass	Travel Time			
Design Point	Contributing Basins	Area (Ac)	C_5	Tc (min)	CA	Intensity (In/Hr)	Q_5 (cfs)	Carryover (cfs)	Tc (min)	Combined CA	Intensity (In/Hr)	Q_5 (cfs)	Slope (%)	Max Flow (cfs)	Type	Length (Type R)	Capacity (cfs)	Flow (cfs)	Flow (cfs)	Length (ft)	Velocity (fps)	T_T (min)	Remarks
Inlet SA4-7	A-14	4.79	0.34	11.0	1.64	3.73	6.10	0.00	11.0	1.64	3.73	6.10	2.10%	10.7	R	15	6.10	6.10	0.00				
Inlet SA4-6	A-15	0.88	0.43	10.6	0.38	3.77	1.43	0.00	10.6	0.38	3.77	1.43	2.10%	10.7	R	10	1.43	1.43	0.00	1005	2.5	6.8	Bypass flow to Inlet SA3-19
Inlet SA4-4	A-12	3.16	0.39	15.1	1.24	3.24	4.00	0.00	15.1	1.24	3.24	4.00	1.30%	8.4	R	10	3.99	3.99	0.01	1005	2.5	6.8	Bypass flow to Inlet SA3-19
Inlet SA4-3	A-13	2.11	0.44	10.3	0.92	3.83	3.52	0.00	10.3	0.92	3.83	3.52	1.30%	8.4	R	10	3.52	3.52	0.00				
FES SA4-1	A-14, A-15, A-12, A-13							15.05	26.7	4.17	2.40	10.02								3400	4.4	12.9	ToC taken from StormCAD and max. basin ToC Channel flow to Inlet SA3-3
Inlet SA3-19	A-10	7.29	0.39	19.5	2.84	2.85	8.09	0.01	19.5	2.84	2.85	8.10	2.30%	11.2	R	10	6.62	6.62	1.48	785	3.3	3.9	Bypass flow to Inlet SA3-14
Inlet SA3-20	A-11	1.68	0.42	14.5	0.71	3.30	2.34	0.00	14.5	0.71	3.30	2.34	2.30%	11.2	R	5	2.01	2.01	0.32	905	3.3	4.5	Bypass flow to Inlet SA3-15
Inlet SA3-14	A-8	5.31	0.40	17.5	2.10	3.01	6.31	1.48	23.4	2.10	2.58	7.79	2.80%	12.4	R	15	7.77	7.77	0.02	1065	2.8	6.4	Bypass flow to Inlet SA3-9
Inlet SA3-15	A-9	1.55	0.43	12.6	0.66	3.51	2.33	0.32	19.0	0.66	2.89	2.65	2.80%	12.4	R	5	2.18	2.18	0.47	1070	2.8	6.4	Bypass flow to Inlet SA3-10
Inlet SA3-9	A-6	5.17	0.39	19.4	2.02	2.86	5.76	0.02	24.0	2.02	2.55	5.78		SUMP	R	15	5.78	5.78	0.00				
Inlet SA3-10	A-7	1.84	0.43	14.5	0.79	3.30	2.61	0.47	19.0	0.79	2.89	3.08	1.30%	8.4	R	10	3.08	3.08	0.00				
Inlet SA3-5A	A-5	3.27	0.42	18.6	1.36	2.92	3.97	0.00	18.6	1.36	2.92	3.97		SUMP	R	15	5.78	3.97	0.00				
Inlet SA3-3	A-16	22.68	0.32	23.9	7.16	2.56	18.30	0.00	23.9	7.16	2.56	18.30											
Inlet SA3-3	A-14, A-15, A-12, A-13, A-16							33.35	39.5	11.33	1.90	21.48		SUMP	D		20.48	20.48	1.00				
Inlet SA2-6	A-4	1.48	0.44	10.7	0.65	3.77	2.44	1.68	18.8	0.65	2.91	4.11		SUMP	R	10	5.01	4.11	0.00				Bypass received from Inlet SA2-5
Inlet SA2-5	A-3	3.67	0.41	15.5	1.49	3.20	4.77	1.92	19.1	1.49	2.88	6.69		SUMP	R	10	5.01	5.01	1.68	480	2.4	3.3	Bypass received from Inlet SB2-9 Bypass flow to Inlet SA2-6
Inlet SA2-3	A-2	7.62	0.32	23.2	2.43	2.60	6.32	0.00	23.2	2.43	2.60	6.32			D		6.32	6.32	0.00				
Inlet SB5-14	B-18	1.38	0.43	11.9	0.60	3.60	2.15	0.00	11.9	0.60	3.60	2.15	2.10%	10.7	R	5	1.91	1.91	0.24	1065	3.9	4.5	Bypass flow to Inlet SB6-4
Inlet SB5-13	B-17	3.79	0.39	18.0	1.49	2.97	4.43	0.00	18.0	1.49	2.97	4.43	2.10%	10.7	R	10	4.37	4.37	0.06	770	3.5	3.7	Bypass flow to Inlet SB5-10
Inlet SB5-9	B-16	1.39	0.43	11.7	0.60	3.63	2.19	0.00	11.7	0.60	3.63	2.19	3.30%	13.4	R	5	1.94	1.94	0.25	770	3.5	3.7	Bypass flow to Inlet SB5-10
Inlet SB5-8	B-25	3.89	0.35	16.5	1.37	3.10	4.26	0.00	16.5	1.37	3.10	4.26	3.30%	13.4	R	10	4.24	4.24	0.02	380	2.1	3.0	Bypass flow to Inlet SB5-4
Inlet SB5-10	B-15	8.88	0.37	19.5	3.29	2.85	9.36	0.31	21.6	3.29	2.70	9.68		SUMP	R	15	5.78	5.78	3.89	380	2.1	3.0	Bypass received from Inlet SB5-13 Bypass flow to Inlet SB5-4
Inlet SB5-4	B-14	1.04	0.43	10.5	0.45	3.80	1.70	3.91	19.5	0.45	2.85	5.62		SUMP	R	15	5.78	5.62	0.00				Bypass received from Inlet SB5-8
FES SB5-1	B-18, B-17, B-16, B-25, B-15, B-14							23.85	31.9	7.80	2.16	16.85								1320	3.3	6.6	ToC taken from StormCAD and max. basin ToC Channel Flow to DP CH1

NOTE: The colored cells from Bypass and Carryover indicate the upstream and downstream inlets. Fore example, the green colored cell bypasses to the downstream inlet shown as Carryover in a green colored cell.

Design Storm: 5-Year

Design Engineer: CGM

Storm Drainage System Design - Standard Form SF-3 - 5 Year Stom Event

Project No.: 1097-0004

11/26/24

	Direct Runoff							Total Runoff					Street Capacity		Inlet			Captured	Bypass	Travel Time			
Design Point	Contributing Basins	Area (Ac)	C_5	Tc (min)	CA	Intensity (In/Hr)	Q_5 (cfs)	Carryover (cfs)	Tc (min)	Combined CA	Intensity (In/Hr)	Q_5 (cfs)	Slope (%)	Max Flow (cfs)	Type	Length (Type R)	Capacity (cfs)	Flow (cfs)	Flow (cfs)	Length (ft)	Velocity (fps)	T_T (min)	Remarks
Inlet SB6-4	B-13	5.73	0.39	15.0	2.25	3.25	7.30	0.24	16.5	2.25	3.10	7.54	1.60%	9.4	R	10	6.31	6.31	1.22	720	2.3	5.3	Bypass received from Inlet SB5-14 Bypass flow to Inlet SB2-9
Inlet SB6-3	B-12	2.19	0.43	12.8	0.94	3.49	3.29	0.00	12.8	0.94	3.49	3.29	1.60%	9.4	R	10	3.29	3.29	0.00				
FES SB6-1	B-13, B-12							9.60	32.3	3.19	2.15	6.85								1320	3.3	6.6	ToC taken from StormCAD and max. basin ToC Channel Flow to DP CH1
Inlet SB2-9	B-11	2.97	0.39	15.8	1.16	3.17	3.67	1.22	20.3	1.16	2.79	4.89	1.30%	8.4	R	5	2.97	2.97	1.92	485	2.4	3.3	Bypass received from Inlet SB6-4 Bypass flow to Inlet SA2-5
Inlet SB2-8	B-10	1.21	0.43	12.7	0.52	3.50	1.81	0.00	12.7	0.52	3.50	1.81	1.30%	8.4	R	5	1.69	1.69	0.12	485	3.4	2.4	Bypass flow to Inlet SB2-2
Inlet SB3-11	B-7	2.63	0.39	12.5	1.03	3.53	3.63	0.00	12.5	1.03	3.53	3.63	4.00%	14.8	R	5	2.60	2.60	1.03	300	4.5	1.1	Bypass flow to Inlet SB3-8
Inlet SB3-12	B-6	0.79	0.47	9.1	0.37	4.02	1.48	0.00	9.1	0.37	4.02	1.48	4.00%	14.8	R	5	1.45	1.45	0.03	355	4.1	1.4	Bypass flow to Inlet SB3-9
Inlet SB3-15	B-20	2.91	0.39	17.6	1.13	3.00	3.38	0.00	17.6	1.13	3.00	3.38	1.90%	10.2	R	5	2.49	2.49	0.89	355	4.1	1.4	Bypass flow to Inlet SB3-9
Inlet SB3-17	B-19	5.00	0.38	14.9	1.91	3.25	6.21	0.00	14.9	1.91	3.25	6.21	1.90%	10.2	R	5	3.49	3.49	2.72	355	4.1	1.4	Bypass flow to Inlet SB3-9
Inlet SB3-8	B-5	1.48	0.38	14.5	0.56	3.30	1.85	1.03	14.5	0.56	3.30	2.88	6.00%	14.1	R	5	2.30	2.30	0.58	680	4.3	2.6	Bypass received from Inlet SB3-11 Bypass flow to Inlet SB3-4
Inlet SB3-9	B-4	1.16	0.41	15.2	0.48	3.23	1.55	3.64	15.2	0.48	3.23	5.19	6.00%	14.1	R	10	4.99	4.99	0.20	645	4.3	2.5	Bypass received from Inlet SB3-12 Bypass flow to Inlet SB3-5
Inlet SB3-4	B-3	3.49	0.38	15.3	1.34	3.21	4.30	0.58	17.2	1.34	3.04	4.88	2.50%	11.7	R	15	4.88	4.88	0.00				Bypass received from Inlet SB3-8
Inlet SB3-5	B-2	1.09	0.43	10.5	0.47	3.79	1.78	0.20	17.6	0.47	3.00	1.98	2.50%	11.7	R	15	1.98	1.98	0.00				Bypass received from Inlet SB3-9
Inlet SB2-4	B-9	1.18	0.45	7.5	0.53	4.30	2.27	0.00	7.5	0.53	4.30	2.27		SUMP	R	10	5.01	2.27	0.00				
Inlet SB2-2	B-8	0.52	0.56	8.3	0.29	4.14	1.21	0.12	15.1	0.29	3.24	1.32		SUMP	R	10	5.01	1.32	0.00				Bypass received from Inlet SB2-8
D4	D-4	9.09	0.23	19.4	2.13	2.86	6.09	0.00	19.4	2.13	2.86	6.09		SUMP	FES			0.00	6.09				Bypass flow to FES SD1-2
FES SD1-2	D-3	3.32	0.26	12.3	0.86	3.55	3.06	6.09	12.3	0.86	3.55	9.14		SUMP	FES			0.00	9.14				Bypass received from D4 Bypass flow to D2
D2	D-2	14.34	0.26	16.8	3.68	3.07	11.31	9.14	16.8	3.68	3.07	20.46						0.00	20.46				Bypass received from FES SD1-2
FES SB7-2	B-23	2.70	0.32	14.5	0.86	3.30	2.84	0.00	14.5	0.86	3.30	2.84		SUMP	FES			2.84	0.00				
FES SB7-2	B-24	1.21	0.27	15.7	0.33	3.17	1.05	0.00	15.7	0.33	3.17	1.05		SUMP	FES			1.05	0.00				
FES SB7-2	B-23, B-24							3.89	15.7	1.19	3.17	3.78								540	3.4	2.6	Channelized Flow to DP B21
B22	B-22	11.41	0.24	23.0	2.75	2.61	7.19	0.00	23.0	2.75	2.61	7.19		SUMP	FES			0.00	7.19	92	3.4	0.5	Channelized Flow to DP B21
B21	B-21	1.22	0.32	9.9	0.39	3.88	1.50	10.97	23.4	4.33	2.58	12.47		SUMP	FES			0.00	12.47	2600	3.3	12.9	Channelized Flow to DP CH1
B1	B-1	48.88	0.32	22.5	15.53	2.64	41.01	0.00	36.4	15.53	2.00	41.01											
CH1	B-1, B-12, B-13, B-14, B-15, B-16, B-17, B-18, B-21, B-22, B-23, B-24, B-25							88.16	38.8	32.03	1.92	61.43								1320	3.3	6.6	

NOTE: The colored cells from Bypass and Carryover indicate the upstream and downstream inlets. Fore example, the green colored cell bypasses to the downstream inlet shown as Carryover in a green colored cell.

Design Storm: 100-Year

Storm Drainage System Design - Standard Form SF-3 - 100 Year Stom Event

Design Engineer: CGM

Project No.: 1097-0004

11/26/24

Design Point	Contributing Basins	Direct Runoff: Area (Ac)	C_{100}	Tc (min)	CA	Intensity (In/Hr)	Q_{100} (cfs)	Total Runoff: Carryover (cfs)	Tc (min)	Combined CA	Intensity (In/Hr)	Q_{100} (cfs)	Street Capacity: Slope (%)	Max Flow (cfs)	Inlet: Type	Length (Type R)	Capacity (cfs)	Captured Flow (cfs)	Bypass Flow (cfs)	Travel Time: Length (ft)	Velocity (fps)	T_T (min)	Remarks
Inlet SA4-7	A-14	4.79	0.64	11.0	3.06	6.78	20.73	0.00	11.0	3.06	6.78	20.73	2.10%	93.5	R	15	14.85	14.85	5.88	1415	3.0	7.8	Bypass flow to Inlet SB5-13
Inlet SA4-6	A-15	0.88	0.68	10.6	0.60	6.86	4.11	0.00	10.6	0.60	6.86	4.11	2.10%	93.5	R	10	4.10	4.10	0.01	1005	2.5	6.8	Bypass flow to Inlet SA3-19
Inlet SA4-4	A-12	3.16	0.66	15.1	2.09	5.89	12.32	0.00	15.1	2.09	5.89	12.32	1.30%	91.7	R	10	8.24	8.24	4.09	1005	2.5	6.8	Bypass flow to Inlet SA3-19
Inlet SA4-3	A-13	2.11	0.69	10.3	1.44	6.96	10.05	0.00	10.3	1.44	6.96	10.05	1.30%	91.7	R	10	7.40	7.40	2.65	975	2.3	7.0	Bypass flow to Inlet SA3-20
FES SA4-1	A-14, A-15, A-12, A-13							34.59	26.7	7.19	4.37	31.42								3400	4.4	12.9	ToC taken from StormCAD and max. basin ToC Channel flow to Inlet SA3-3
Inlet SA3-19	A-10	7.29	0.66	19.5	4.82	5.18	24.99	4.10	19.5	4.82	5.18	29.10	2.30%	90.9	R	10	12.42	12.42	16.68	785	3.3	3.9	Bypass flow to Inlet SA3-14
Inlet SA3-20	A-11	1.68	0.68	14.5	1.14	5.99	6.84	2.65	17.2	1.14	5.52	9.49	2.30%	90.9	R	5	4.02	4.02	5.47	905	3.3	4.5	Bypass flow to Inlet SA3-15
Inlet SA3-14	A-8	5.31	0.66	17.5	3.53	5.47	19.29	16.68	23.4	3.53	4.70	35.97	2.80%	85.7	R	15	19.69	19.69	16.28	1065	2.8	6.4	Bypass flow to Inlet SA3-9
Inlet SA3-15	A-9	1.55	0.68	12.6	1.05	6.39	6.73	5.47	19.0	1.05	5.25	12.20	2.80%	85.7	R	5	4.47	4.47	7.73	1070	2.8	6.4	Bypass flow to Inlet SA3-10
Inlet SA3-9	A-6	5.17	0.66	19.4	3.42	5.19	17.78	16.28	24.0	3.42	4.64	34.06		SUMP	R	15	40.63	34.06	0.00				
Inlet SA3-10	A-7	1.84	0.68	14.5	1.26	6.00	7.54	7.73	19.0	1.26	5.25	15.27	1.30%	91.7	R	10	9.16	9.16	6.11	540	1.8	5.1	Bypass flow to Inlet SA3-5A
Inlet SA3-5A	A-5	3.27	0.67	18.6	2.21	5.31	11.73	6.11	19.5	2.21	5.18	17.84		SUMP	R	15	40.63	17.84	0.00				
Inlet SA3-3	A-16	22.68	0.62	23.9	14.17	4.65	65.91	0.00	23.9	14.17	4.65	65.91											
Inlet SA3-3	A-14, A-15, A-12, A-13, A-16							100.50	39.5	21.36	3.45	73.66		SUMP	D		296.85	73.66	0.00				
Inlet SA2-6	A-4	1.48	0.69	10.7	1.01	6.86	6.96	6.78	18.8	1.01	5.29	13.73		SUMP	R	10	26.55	13.73	0.00				Bypass received from Inlet SA2-5
Inlet SA2-5	A-3	3.67	0.67	15.5	2.46	5.81	14.30	19.03	19.1	2.46	5.24	33.33		SUMP	R	10	26.55	26.55	6.78	480	2.4	3.3	Bypass received from Inlet SB2-9 Bypass flow to Inlet SA2-6
Inlet SA2-3	A-2	7.62	0.63	23.2	4.77	4.72	22.54	0.00	23.2	4.77	4.72	22.54		SUMP	D		92.86	22.54	0.00				
Inlet SB5-14	B-18	1.38	0.68	11.9	0.94	6.54	6.17	0.00	11.9	0.94	6.54	6.17	2.10%	93.5	R	5	3.34	3.34	2.84	1065	3.9	4.5	Bypass flow to Inlet SB6-4
Inlet SB5-13	B-17	3.79	0.66	18.0	2.51	5.40	13.58	5.88	18.0	2.51	5.40	19.46	2.10%	93.5	R	10	10.32	10.32	9.14	770	3.5	3.7	Bypass flow to Inlet SB5-10
Inlet SB5-9	B-16	1.39	0.68	11.7	0.95	6.61	6.28	0.00	11.7	0.95	6.61	6.28	3.30%	81.6	R	5	3.39	3.39	2.90	770	3.5	3.7	Bypass flow to Inlet SB5-10
Inlet SB5-8	B-25	3.89	0.64	16.5	2.50	5.64	14.13	0.00	16.5	2.50	5.64	14.13	3.30%	81.6	R	10	8.91	8.91	5.22	380	2.1	3.0	Bypass flow to Inlet SB5-4
Inlet SB5-10	B-15	8.88	0.65	19.5	5.79	5.18	30.01	12.04	21.6	5.79	4.91	42.06		SUMP	R	15	40.63	40.63	1.43	380	2.1	3.0	Bypass received from Inlet SB5-13 Bypass flow to Inlet SB5-4
Inlet SB5-4	B-14	1.04	0.68	10.5	0.71	6.91	4.90	6.65	19.5	0.71	5.18	11.54		SUMP	R	15	40.63	11.54	0.00				Bypass received from Inlet SB5-8
FES SB5-1	B-18, B-17, B-16, B-25, B-15, B-14							78.12	31.9	13.41	3.93	52.73								1320	3.3	6.6	ToC taken from StormCAD and max. basin ToC Channel Flow to DP CH1

NOTE: The colored cells from Bypass and Carryover indicate the upstream and downstream inlets. Fore example, the green colored cell bypasses to the downstream inlet shown as Carryover in a green colored cell.

Design Storm: 100-Year

Storm Drainage System Design - Standard Form SF-3 - 100 Year Stom Event

Design Engineer: CGM

Project No.: 1097-0004

11/26/24

Design Point	Contributing Basins	Direct Runoff: Area (Ac)	C_{100}	Tc (min)	CA	Intensity (In/Hr)	Q_{100} (cfs)	Total Runoff: Carryover (cfs)	Tc (min)	Combined CA	Intensity (In/Hr)	Q_{100} (cfs)	Street Capacity: Slope (%)	Max Flow (cfs)	Inlet: Type	Length (Type R)	Capacity (cfs)	Captured Flow (cfs)	Bypass Flow (cfs)	Travel Time: Length (ft)	Velocity (fps)	T_T (min)	Remarks
Inlet SB6-4	B-13	5.73	0.66	15.0	3.80	5.91	22.46	2.84	16.5	3.80	5.64	25.29	1.60%	101.4	R	10	11.64	11.64	13.65	720	2.3	5.3	Bypass received from Inlet SB5-14 Bypass flow to Inlet SB2-9
Inlet SB6-3	B-12	2.19	0.68	12.8	1.50	6.34	9.49	0.00	12.8	1.50	6.34	9.49	1.60%	101.4	R	10	7.20	7.20	2.29	695	2.2	5.2	Bypass flow to Inlet SB2-8
FES SB6-1	B-13, B-12							18.84	32.3	5.30	3.91	20.69								1320	3.3	6.6	ToC taken from StormCAD and max. basin ToC Channel Flow to DP CH1
Inlet SB2-9	B-11	2.97	0.66	15.8	1.97	5.77	11.33	13.65	20.3	1.97	5.08	24.98	1.30%	91.7	R	5	5.96	5.96	19.03	485	2.4	3.3	Bypass received from Inlet SB6-4 Bypass flow to Inlet SA2-5
Inlet SB2-8	B-10	1.21	0.68	12.7	0.82	6.37	5.24	2.29	18.0	0.82	5.40	7.53	1.30%	91.7	R	5	3.61	3.61	3.92	485	3.4	2.4	Bypass received from Inlet SB6-3 Bypass flow to Inlet SB2-2
Inlet SB3-11	B-7	2.63	0.66	12.5	1.74	6.42	11.18	0.00	12.5	1.74	6.42	11.18	4.00%	77.0	R	5	4.34	4.34	6.83	300	4.5	1.1	Bypass flow to Inlet SB3-8
Inlet SB3-12	B-6	0.79	0.70	9.1	0.55	7.30	4.05	0.00	9.1	0.55	7.30	4.05	4.00%	77.0	R	5	2.76	2.76	1.29	355	4.1	1.4	Bypass flow to Inlet SB3-9
Inlet SB3-15	B-20	2.91	0.66	17.6	1.92	5.45	10.49	0.00	17.6	1.92	5.45	10.49	1.90%	96.3	R	5	4.18	4.18	6.31	355	4.1	1.4	Bypass flow to Inlet SB3-9
Inlet SB3-17	B-19	5.00	0.66	14.9	3.29	5.92	19.45	0.00	14.9	3.29	5.92	19.45	1.90%	96.3	R	5	5.60	5.60	13.85	355	4.1	1.4	Bypass flow to Inlet SB3-9
Inlet SB3-8	B-5	1.48	0.66	14.5	0.97	5.99	5.82	6.83	14.5	0.97	5.99	12.65	6.00%	68.2	R	5	4.60	4.60	8.06	680	4.3	2.6	Bypass received from Inlet SB3-11 Bypass flow to Inlet SB3-4
Inlet SB3-9	B-4	1.16	0.67	15.2	0.78	5.87	4.61	21.46	15.2	0.78	5.87	26.07	6.00%	68.2	R	10	11.88	11.88	14.19	645	4.3	2.5	Bypass received from Inlet SB3-12 Bypass flow to Inlet SB3-5
Inlet SB3-4	B-3	3.49	0.66	15.3	2.30	5.84	13.44	8.06	17.2	2.30	5.53	21.50	2.50%	88.7	R	15	15.16	15.16	6.34	470	3.4	2.3	Bypass received from Inlet SB3-8 Bypass flow to Inlet SB2-4
Inlet SB3-5	B-2	1.09	0.68	10.5	0.74	6.89	5.12	14.19	17.6	0.74	5.46	19.31	2.50%	88.7	R	15	14.31	14.31	5.00	485	3.4	2.4	Bypass received from Inlet SB3-9 Bypass flow to Inlet SB2-2
Inlet SB2-4	B-9	1.18	0.69	7.5	0.82	7.82	6.38	6.34	17.7	0.82	5.45	12.72		SUMP	R	10	26.55	12.72	0.00				Bypass received from Inlet SB3-4
Inlet SB2-2	B-8	0.52	0.75	8.3	0.39	7.53	2.93	8.92	15.1	0.39	5.89	11.84		SUMP	R	10	26.55	11.84	0.00				Bypass received from Inlet SB2-8
D4	D-4	9.09	0.58	19.4	5.31	5.20	27.60	0.00	19.4	5.31	5.20	27.60		SUMP	FES		27.60	27.60	0.00	855	2.3	6.2	Pipe/Channelized Flow to FES SD1-2
FES SD1-2	D-3	3.32	0.60	12.3	1.98	6.46	12.78	0.00	25.6	1.98	4.47	12.78		SUMP	FES		12.78	12.78	0.00	1710	2.8	10.1	Bypass received from D4 Channelized Flow to DPD2
D2	D-2	14.34	0.60	16.8	8.54	5.59	47.70	0.00	22.4	8.54	4.82	47.70											
FES SB7-2	B-23	2.70	0.63	14.5	1.69	6.00	10.16	0.00	14.5	1.69	6.00	10.16		SUMP	FES		10.16	10.16	0.00				
FES SB7-2	B-24	1.21	0.60	15.7	0.73	5.77	4.22	0.00	15.7	0.73	5.77	4.22		SUMP	FES		4.22	4.22	0.00				
FES SB7-2	B-23, B-24							14.39	15.7	2.43	5.77	14.00								540	3.4	2.6	Channelized Flow to DP B21
B22	B-22	11.41	0.59	23.0	6.70	4.75	31.82	0.00	23.0	6.70	4.75	31.82		SUMP	FES			0.00	31.82	92	3.4	0.5	Channelized Flow to DP B21
B21	B-21	1.22	0.62	9.9	0.76	7.06	5.38	45.82	23.4	9.89	4.70	51.20		SUMP	FES			0.00	51.20	2600	3.3	12.9	Channelized Flow to DP CH1
B1	B-1	48.88	0.63	22.5	30.59	4.80	146.93	0.00	36.4	30.59	3.63	146.93											
CH1	B-1, B-12, B-13, B-14, B-15, B-16, B-17, B-18, B-21, B-22, B-23, B-24, B-25							317.37	38.8	61.62	3.49	214.84								1320	3.3	6.6	

NOTE: The colored cells from Bypass and Carryover indicate the upstream and downstream inlets. Fore example, the green colored cell bypasses to the downstream inlet shown as Carryover in a green colored cell.

Appendix B. Hydraulic Calculations

B1 Inlet Calculations

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SA4-7	Inlet SA4-6	Inlet SA4-4
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	6.1	1.4	4.0
Major Q_{Known} (cfs)	20.7	4.1	12.3

Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**6.1**	**1.4**	**4.0**
Major Total Design Peak Flow, Q (cfs)	**20.7**	**4.1**	**12.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	5.9	0.0	4.1

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SA4-3	Inlet SA3-19	Inlet SA3-20
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.5	8.1	2.3
Major Q_{Known} (cfs)	10.1	29.1	9.5

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.5**	**8.1**	**2.3**
Major Total Design Peak Flow, Q (cfs)	**10.1**	**29.1**	**9.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	1.5	0.3
Major Flow Bypassed Downstream, Q_b (cfs)	2.7	16.7	5.5

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SA3-14	Inlet SA3-15	Inlet SA3-9
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	7.8	2.7	5.8
Major Q_{Known} (cfs)	36.0	12.2	34.1

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**7.8**	**2.7**	**5.8**
Major Total Design Peak Flow, Q (cfs)	**36.0**	**12.2**	**34.1**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.5	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	16.3	7.7	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SA3-10	Inlet SA3-5A	Inlet SA2-6
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.1	4.0	4.1
Major Q_{Known} (cfs)	15.3	17.8	13.7

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.1**	**4.0**	**4.1**
Major Total Design Peak Flow, Q (cfs)	**15.3**	**17.8**	**13.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	6.1	N/A	N/A

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SA2-5
Site Type (Urban or Rural)	RURAL
Inlet Application (Street or Area)	STREET
Hydraulic Condition	In Sump
Inlet Type	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	6.7
Major Q_{Known} (cfs)	33.3

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)	
Percent Impervious	
NRCS Soil Type	

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

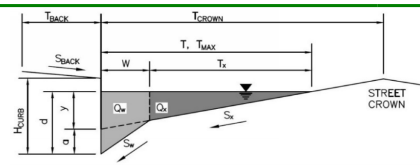
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**6.7**
Major Total Design Peak Flow, Q (cfs)	**33.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A

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

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

Project: The Fields F1
Inlet ID: Inlet SA4-7



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.6	5.6	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.2	4.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**9.8**	**9.8**	**cfs**
Flow Velocity within the Gutter Section	V =	6.4	6.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.6	2.6	

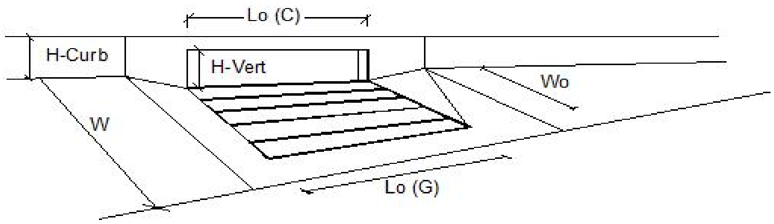
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	6.3	156.3	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.3	93.1	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.4	23.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	10.7	116.5	cfs
Average Flow Velocity Within the Gutter Section	V =	6.6	12.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.7	12.8	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.80	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**10.7**	**93.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.88	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	6.01	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.7**	**93.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.10 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 20.73 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



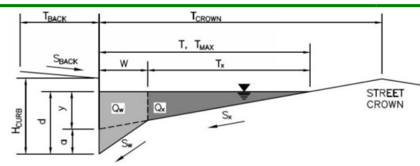
Design Information (Input) — CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	6.1	20.7	cfs
Water Spread Width	T =	11.4	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.3	6.1	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	1.3	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.514	0.317	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	3.0	14.1	cfs
Discharge within the Gutter Section W	Q_w =	3.1	6.6	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.54	0.85	sq ft
Velocity within the Gutter Section W	V_W =	5.8	7.7	fps
Water Depth for Design Condition	d_{LOCAL} =	8.3	10.1	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.138	0.093	ft/ft
Required Length L_T to Have 100% Interception	L_T =	12.73	28.49	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	12.73	15.00	ft
Interception Capacity	Q_i =	6.1	15.3	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L_e =	12.73	14.35	ft
Actual Interception Capacity	**Q_a =**	**6.1**	**14.8**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**5.9**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.1**	**14.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**72**	**%**

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

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

Project: The Fields F1

Inlet ID: Inlet SA4-6



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.6	5.6	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	4.2	4.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**9.8**	**9.8**	**cfs**
Flow Velocity within the Gutter Section	V =	6.4	6.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.6	2.6	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	6.3	156.3	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.3	93.1	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	4.4	23.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	10.7	116.5	cfs
Average Flow Velocity Within the Gutter Section	V =	6.6	12.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.7	12.8	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.80	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**10.7**	**93.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.88	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	6.01	inches

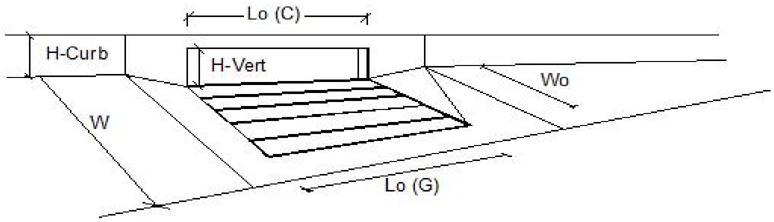
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.7**	**93.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.43 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.11 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

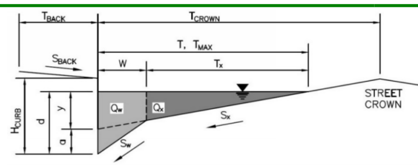


Design Information (Input) — CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	1.4	4.1	cfs
Water Spread Width	T =	5.4	9.6	ft
Water Depth at Flowline (outside of local depression)	d =	2.8	3.8	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.860	0.599	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.2	1.7	cfs
Discharge within the Gutter Section W	Q_w =	1.2	2.5	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.30	0.47	sq ft
Velocity within the Gutter Section W	V_W =	4.1	5.3	fps
Water Depth for Design Condition	d_{LOCAL} =	6.8	7.8	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.217	0.157	ft/ft
Required Length L_T to Have 100% Interception	L_T =	4.94	9.80	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	4.94	9.80	ft
Interception Capacity	Q_i =	1.4	4.1	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	4.94	9.38	ft
Actual Interception Capacity	**Q_a =**	**1.4**	**4.1**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**0.0**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.4**	**4.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**100**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA4-4



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.4	4.4	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	3.3	3.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**7.7**	**7.7**	**cfs**
Flow Velocity within the Gutter Section	V =	5.1	5.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.1	2.1	

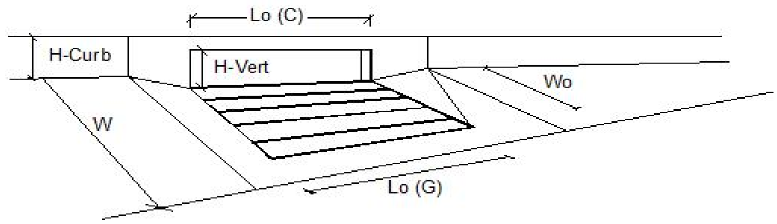
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	5.0	123.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.0	73.2	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	3.5	18.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	8.4	91.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.2	10.1	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	10.1	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**8.4**	**91.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	12.00	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.13	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.4**	**91.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.00 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.32 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

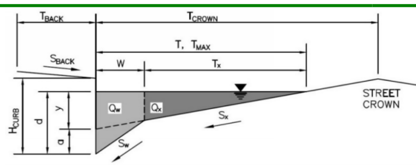


		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	4.0	12.3	cfs
Water Spread Width	T =	10.5	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.0	5.6	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.7	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.551	0.353	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.8	8.0	cfs
Discharge within the Gutter Section W	Q_w =	2.2	4.3	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.51	0.77	sq ft
Velocity within the Gutter Section W	V_W =	4.3	5.7	fps
Water Depth for Design Condition	d_{LOCAL} =	8.0	9.6	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.147	0.101	ft/ft
Required Length L_T to Have 100% Interception	L_T =	9.71	20.45	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	9.71	10.00	ft
Interception Capacity	Q_i =	4.0	8.6	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.38	9.38	ft
Actual Interception Capacity	**Q_a =**	**4.0**	**8.2**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**4.1**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.0**	**8.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**4.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**67**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SA4-3**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.4	4.4	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	3.3	3.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**7.7**	**7.7**	**cfs**
Flow Velocity within the Gutter Section	V =	5.1	5.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.1	2.1	

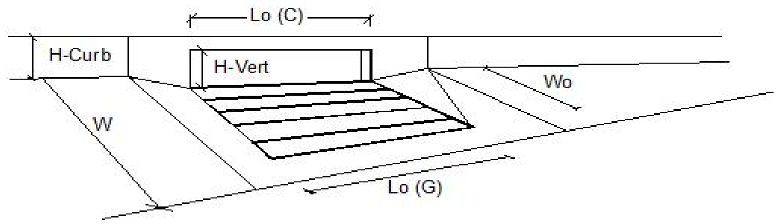
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	5.0	123.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.0	73.2	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	3.5	18.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	8.4	91.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.2	10.1	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	10.1	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**8.4**	**91.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	12.00	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.13	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.4**	**91.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.52 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.05 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

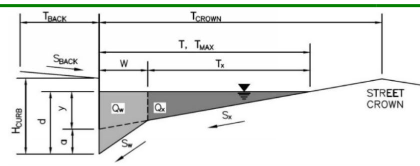


Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	3.5	10.1	cfs
Water Spread Width	T =	9.9	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.9	5.3	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.4	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.579	0.381	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.5	6.2	cfs
Discharge within the Gutter Section W	Q_w =	2.0	3.8	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.48	0.71	sq ft
Velocity within the Gutter Section W	V_W =	4.2	5.4	fps
Water Depth for Design Condition	d_{LOCAL} =	7.9	9.3	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o-GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.153	0.107	ft/ft
Required Length L_T to Have 100% Interception	L_T =	8.92	17.92	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	8.92	10.00	ft
Interception Capacity	Q_i =	3.5	7.7	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	8.92	9.38	ft
Actual Interception Capacity	**Q_a =**	**3.5**	**7.4**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**2.7**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.5**	**7.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**74**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-19



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.023	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.9	5.9	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.4	4.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**10.3**	**10.3**	**cfs**
Flow Velocity within the Gutter Section	V =	6.7	6.7	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.7	2.7	

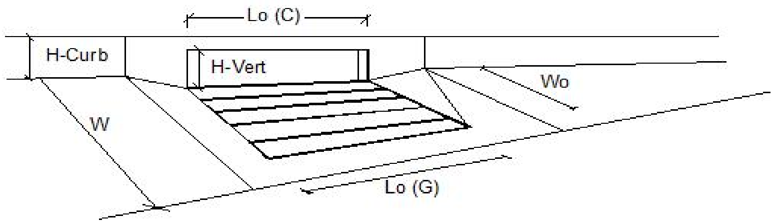
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	6.6	163.6	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.6	97.4	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.6	24.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.2	121.9	cfs
Average Flow Velocity Within the Gutter Section	V =	6.9	13.4	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.9	13.4	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.75	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**11.2**	**90.9**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	5.67	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.2**	**90.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 8.10 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 29.10 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

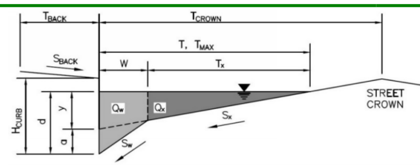


		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	8.1	29.1	cfs
Water Spread Width	T =	12.7	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.6	6.8	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	1.9	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.467	0.288	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	4.3	20.7	cfs
Discharge within the Gutter Section W	Q_w =	3.8	8.4	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.59	0.96	sq ft
Velocity within the Gutter Section W	V_W =	6.4	8.7	fps
Water Depth for Design Condition	d_{LOCAL} =	8.6	10.8	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.127	0.086	ft/ft
Required Length L_T to Have 100% Interception	L_T =	15.35	35.25	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	Q_i =	6.9	13.1	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.38	9.38	ft
Actual Interception Capacity	**Q_a =**	**6.6**	**12.4**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**1.5**	**16.7**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.6**	**12.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.5**	**16.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**82**	**43**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-20



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.023	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.9	5.9	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.4	4.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**10.3**	**10.3**	**cfs**
Flow Velocity within the Gutter Section	V =	6.7	6.7	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.7	2.7	

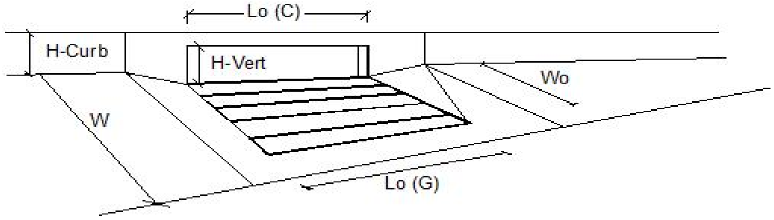
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	6.6	163.6	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.6	97.4	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.6	24.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.2	121.9	cfs
Average Flow Velocity Within the Gutter Section	V =	6.9	13.4	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.9	13.4	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.75	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**11.2**	**90.9**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.55	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	5.67	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.2**	**90.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.34 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.49 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

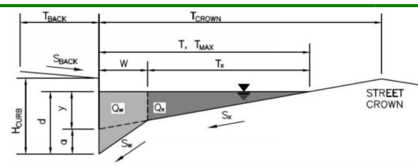


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)		Q_o =	2.3	9.5	cfs
Water Spread Width		T =	7.1	13.5	ft
Water Depth at Flowline (outside of local depression)		d =	3.2	4.8	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.747	0.438	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	0.6	5.3	cfs
Discharge within the Gutter Section W		Q_w =	1.7	4.2	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.37	0.63	sq ft
Velocity within the Gutter Section W		V_W =	4.7	6.6	fps
Water Depth for Design Condition		d_{LOCAL} =	7.2	8.8	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e		S_e =	0.192	0.121	ft/ft
Required Length L_T to Have 100% Interception		L_T =	6.74	17.05	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	5.00	5.00	ft
Interception Capacity		Q_i =	2.1	4.4	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.10	0.10	
Effective (Unclogged) Length		L_e =	4.50	4.50	ft
Actual Interception Capacity		**Q_a =**	**2.0**	**4.0**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.3**	**5.5**	**cfs**
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.0**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.3**	**5.5**	**cfs**
Capture Percentage = Q_a/Q_o		**C% =**	**86**	**42**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-14



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	6.5	6.5	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.8	4.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**11.3**	**11.3**	**cfs**
Flow Velocity within the Gutter Section	V =	7.4	7.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.0	3.0	

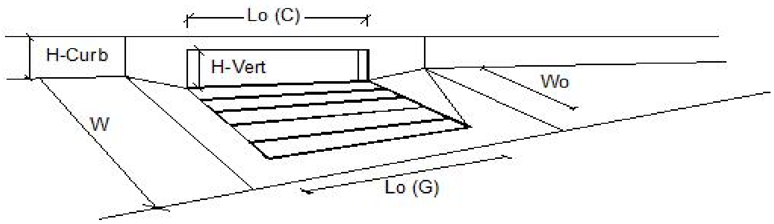
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	7.3	180.5	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	7.3	107.5	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	5.1	27.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	12.4	134.5	cfs
Average Flow Velocity Within the Gutter Section	V =	7.6	14.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.2	14.8	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.64	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**12.4**	**85.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	9.86	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	4.99	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.4**	**85.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.79 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 35.97 cfs on sheet 'Inlet Management'

INLETON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

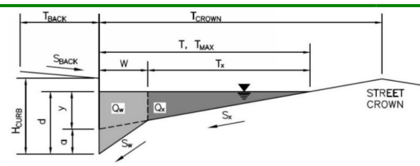


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)		Q_o =	7.8	36.0	cfs
Water Spread Width		T =	11.9	14.0	ft
Water Depth at Flowline (outside of local depression)		d =	4.4	7.0	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	2.2	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.493	0.277	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	4.0	26.0	cfs
Discharge within the Gutter Section W		Q_w =	3.8	10.0	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.56	1.01	sq ft
Velocity within the Gutter Section W		V_W =	6.8	9.9	fps
Water Depth for Design Condition		d_{LOCAL} =	8.4	11.0	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e		S_e =	0.133	0.084	ft/ft
Required Length L_T to Have 100% Interception		L_T =	14.91	40.27	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	14.91	15.00	ft
Interception Capacity		Q_i =	7.8	20.4	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoeff =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.04	0.04	
Effective (Unclogged) Length		L_e =	14.35	14.35	ft
Actual Interception Capacity		**Q_a =**	**7.8**	**19.7**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.0**	**16.3**	**cfs**
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**7.8**	**19.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**16.3**	**cfs**
Capture Percentage = Q_a/Q_o		**C% =**	**100**	**55**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-15



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	6.5	6.5	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.8	4.8	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**11.3**	**11.3**	**cfs**
Flow Velocity within the Gutter Section	V =	7.4	7.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.0	3.0	

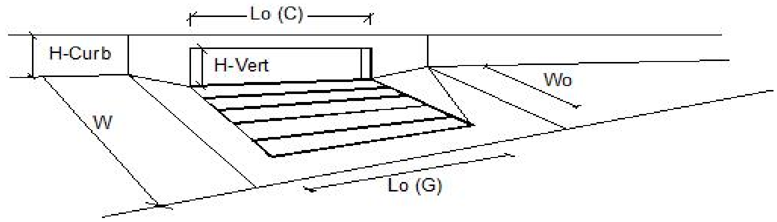
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	7.3	180.5	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	7.3	107.5	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	5.1	27.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	12.4	134.5	cfs
Average Flow Velocity Within the Gutter Section	V =	7.6	14.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.2	14.8	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.64	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**12.4**	**85.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	9.86	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	4.99	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.4**	**85.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.65 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.20 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.7	12.2	cfs
Water Spread Width	T =	7.2	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.2	5.0	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.1	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.741	0.411	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.7	7.2	cfs
Discharge within the Gutter Section W	Q_w =	2.0	5.0	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.37	0.66	sq ft
Velocity within the Gutter Section W	V_W =	5.3	7.6	fps
Water Depth for Design Condition	d_{LOCAL} =	7.2	9.0	inches

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

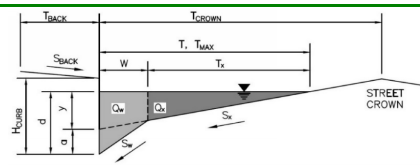
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.190	0.114	ft/ft
Required Length L_T to Have 100% Interception	L_T =	7.30	20.09	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	2.3	4.9	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**2.2**	**4.5**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.5**	**7.7**	**cfs**

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.2**	**4.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.5**	**7.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**82**	**37**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-9



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

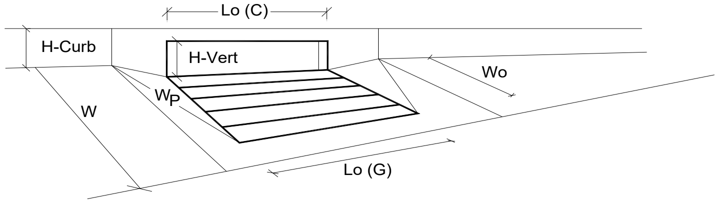
		Minor Storm	Major Storm	
Maximum Capacity for 1/2 Street based On Allowable Spread				
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

		Minor Storm	Major Storm	
Maximum Capacity for 1/2 Street based on Allowable Depth				
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

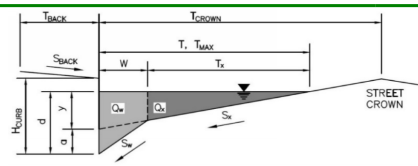


			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)			MINOR	MAJOR	
Clogging Coefficient for Multiple Units		Coef =	N/A	N/A	
Clogging Factor for Multiple Units		Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)			MINOR	MAJOR	
Interception without Clogging		Q_{wi} =	N/A	N/A	cfs
Interception with Clogging		Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)			MINOR	MAJOR	
Interception without Clogging		Q_{oi} =	N/A	N/A	cfs
Interception with Clogging		Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow			MINOR	MAJOR	
Interception without Clogging		Q_{mi} =	N/A	N/A	cfs
Interception with Clogging		Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)		**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)			MINOR	MAJOR	
Clogging Coefficient for Multiple Units		Coef =	1.31	1.31	
Clogging Factor for Multiple Units		Clog =	0.04	0.04	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)			MINOR	MAJOR	
Interception without Clogging		Q_{wi} =	6.0	51.0	cfs
Interception with Clogging		Q_{wa} =	5.8	48.8	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)			MINOR	MAJOR	
Interception without Clogging		Q_{oi} =	29.3	42.5	cfs
Interception with Clogging		Q_{oa} =	28.0	40.6	cfs
Curb Opening Capacity as Mixed Flow			MINOR	MAJOR	
Interception without Clogging		Q_{mi} =	12.4	43.3	cfs
Interception with Clogging		Q_{ma} =	11.8	41.4	cfs
Resulting Curb Opening Capacity (assumes clogged condition)		**Q_{Curb} =**	**5.8**	**40.6**	**cfs**
Resultant Street Conditions			MINOR	MAJOR	
Total Inlet Length		L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)		T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown		d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.72	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		**Q_a =**	**5.8**	**40.6**	**cfs**
WARNING: Inlet Capacity < Q Peak for Minor Storm		$Q_{PEAK\ REQUIRED}$ =	5.8	34.1	cfs

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-10



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft	
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft	
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches	
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft	
Gutter Width	W =	2.00	ft	
Street Transverse Slope	S_X =	0.020	ft/ft	
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft	
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft	
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.4	4.4	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	3.3	3.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**7.7**	**7.7**	**cfs**
Flow Velocity within the Gutter Section	V =	5.1	5.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.1	2.1	

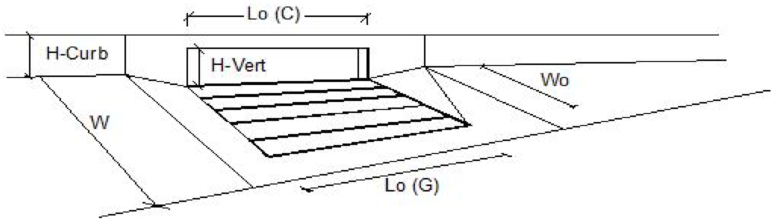
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	5.0	123.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.0	73.2	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	3.5	18.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	8.4	91.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.2	10.1	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	10.1	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**8.4**	**91.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	12.00	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.13	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.4**	**91.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.08 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 15.27 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

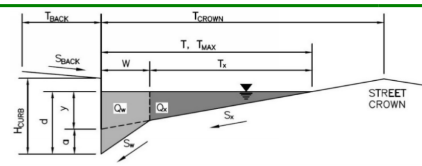


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)		Q_o =	3.1	15.3	cfs
Water Spread Width		T =	9.3	14.0	ft
Water Depth at Flowline (outside of local depression)		d =	3.8	6.0	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	1.1	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.610	0.325	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	1.2	10.3	cfs
Discharge within the Gutter Section W		Q_w =	1.9	5.0	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.46	0.83	sq ft
Velocity within the Gutter Section W		V_W =	4.1	6.0	fps
Water Depth for Design Condition		d_{LOCAL} =	7.8	10.0	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e		S_e =	0.160	0.095	ft/ft
Required Length L_T to Have 100% Interception		L_T =	8.16	23.51	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	8.16	10.00	ft
Interception Capacity		Q_i =	3.1	9.6	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.06	0.06	
Effective (Unclogged) Length		L_e =	8.16	9.38	ft
Actual Interception Capacity		**Q_a =**	**3.1**	**9.2**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.0**	**6.1**	**cfs**
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.1**	**9.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**6.1**	**cfs**
Capture Percentage = Q_a/Q_o		**C% =**	**100**	**60**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SA3-5A



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	42.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	42.0	42.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

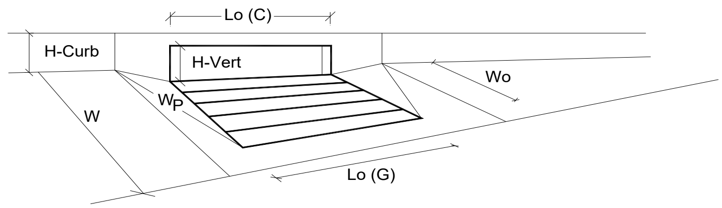
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	10.08	10.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	11.59	11.59	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	40.0	40.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.136	0.136	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



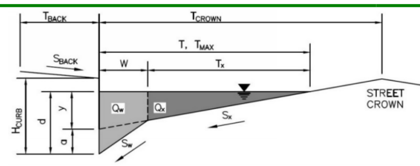
		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	
Clogging Factor for Multiple Units	Clog =	0.04	0.04	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	6.0	51.0	cfs
Interception with Clogging	Q_{wa} =	5.8	48.8	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	29.3	42.5	cfs
Interception with Clogging	Q_{oa} =	28.0	40.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	12.4	43.3	cfs
Interception with Clogging	Q_{ma} =	11.8	41.4	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.8**	**40.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	0.4	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.72	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.8**	**40.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	4.0	17.8	cfs

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

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

Project: The Fields F1

Inlet ID: Inlet SA2-6



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

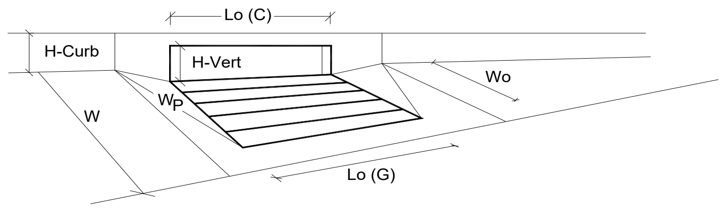
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

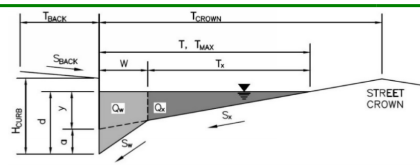


		MINOR	MAJOR	
Design Information (Input) — CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	5.3	37.3	cfs
Interception with Clogging	Q_{wa} =	5.0	35.0	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	28.3	cfs
Interception with Clogging	Q_{oa} =	18.3	26.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.5	30.2	cfs
Interception with Clogging	Q_{ma} =	8.9	28.3	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.0**	**26.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.87	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.0**	**26.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	4.1	13.7	cfs

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SA2-5**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

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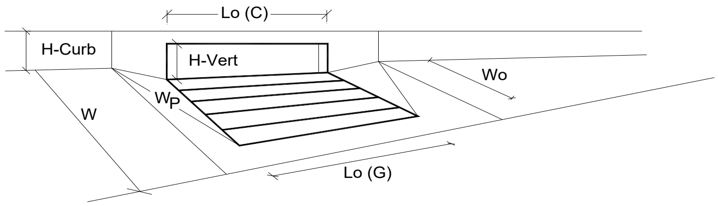

		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	5.3	37.3	cfs
Interception with Clogging	Q_{wa} =	5.0	35.0	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	28.3	cfs
Interception with Clogging	Q_{oa} =	18.3	26.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.5	30.2	cfs
Interception with Clogging	Q_{ma} =	8.9	28.3	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.0**	**26.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.87	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.0**	**26.6**	**cfs**
WARNING: Inlet Capacity < Q Peak for Minor and Major Storms	$Q_{PEAK\ REQUIRED}$ =	6.7	33.3	cfs

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB5-14	Inlet SB5-13	Inlet SB5-9
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.1	4.4	2.2
Major Q_{Known} (cfs)	6.2	19.5	6.3

Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.1**	**4.4**	**2.2**
Major Total Design Peak Flow, Q (cfs)	**6.2**	**19.5**	**6.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.2	0.1	0.3
Major Flow Bypassed Downstream, Q_b (cfs)	2.8	9.1	2.9

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB5-10	Inlet SB5-4	Inlet SB6-4
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	9.7	5.6	7.5
Major Q_{Known} (cfs)	42.1	11.5	25.3

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**9.7**	**5.6**	**7.5**
Major Total Design Peak Flow, Q (cfs)	**42.1**	**11.5**	**25.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	1.2
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	13.7

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB6-3	Inlet SB2-9	Inlet SB2-8
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.3	4.9	1.8
Major Q_{Known} (cfs)	9.5	25.0	7.5

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.3**	**4.9**	**1.8**
Major Total Design Peak Flow, Q (cfs)	**9.5**	**25.0**	**7.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	1.9	0.1
Major Flow Bypassed Downstream, Q_b (cfs)	2.3	19.0	3.9

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB3-12	Inlet SB3-11	Inlet SB3-8
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.5	3.6	2.9
Major Q_{Known} (cfs)	4.1	11.2	12.7

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.5**	**3.6**	**2.9**
Major Total Design Peak Flow, Q (cfs)	**4.1**	**11.2**	**12.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	1.0	0.6
Major Flow Bypassed Downstream, Q_b (cfs)	1.3	6.8	8.1

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB3-9	Inlet SB3-4	Inlet SB3-5
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.2	4.9	2.0
Major Q_{Known} (cfs)	26.1	21.5	19.3

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.2**	**4.9**	**2.0**
Major Total Design Peak Flow, Q (cfs)	**26.1**	**21.5**	**19.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.2	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	14.2	6.3	5.0

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB2-4	Inlet SB2-2	Inlet SB3-15
Site Type (Urban or Rural)	RURAL	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.3	1.3	3.4
Major Q_{Known} (cfs)	12.7	11.8	10.5

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.3**	**1.3**	**3.4**
Major Total Design Peak Flow, Q (cfs)	**12.7**	**11.8**	**10.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.9
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	6.3

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet SB3-17	Inlet SB5-8
Site Type (Urban or Rural)	RURAL	RURAL
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	6.9	4.3
Major Q_{Known} (cfs)	21.5	14.1

Bypass (Carry-Over) Flow from Upstream

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

Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

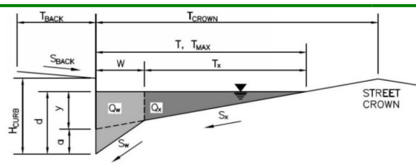
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**6.9**	**4.3**
Major Total Design Peak Flow, Q (cfs)	**21.5**	**14.1**
Minor Flow Bypassed Downstream, Q_b (cfs)	3.4	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	15.9	5.2

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB5-14**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.6	5.6	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	4.2	4.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**9.8**	**9.8**	**cfs**
Flow Velocity within the Gutter Section	V =	6.4	6.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.6	2.6	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	6.3	156.3	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.3	93.1	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	4.4	23.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	10.7	116.5	cfs
Average Flow Velocity Within the Gutter Section	V =	6.6	12.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.7	12.8	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.80	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**10.7**	**93.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.88	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	6.01	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.7**	**93.5**	**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 6.17 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

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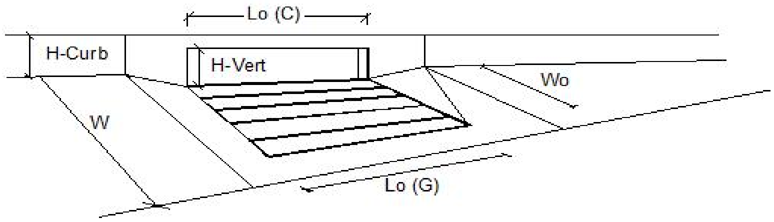
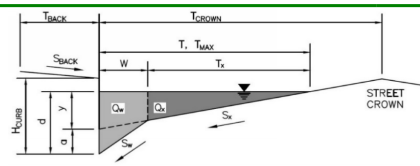


		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.1	6.2	cfs
Water Spread Width	T =	6.9	11.5	ft
Water Depth at Flowline (outside of local depression)	d =	3.2	4.3	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.758	0.511	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.5	3.0	cfs
Discharge within the Gutter Section W	Q_w =	1.6	3.2	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.36	0.55	sq ft
Velocity within the Gutter Section W	V_W =	4.5	5.8	fps
Water Depth for Design Condition	d_{LOCAL} =	7.2	8.3	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.194	0.137	ft/ft
Required Length L_T to Have 100% Interception	L_T =	6.39	12.83	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	2.0	3.6	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**1.9**	**3.3**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.2**	**2.8**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.9**	**3.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.2**	**2.8**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**89**	**54**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SB5-13



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.6	5.6	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.2	4.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**9.8**	**9.8**	**cfs**
Flow Velocity within the Gutter Section	V =	6.4	6.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.6	2.6	

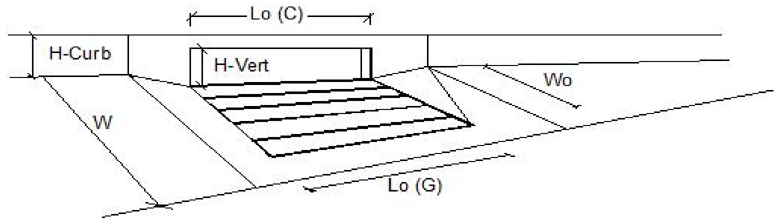
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	6.3	156.3	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.3	93.1	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.4	23.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	10.7	116.5	cfs
Average Flow Velocity Within the Gutter Section	V =	6.6	12.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.7	12.8	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.80	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**10.7**	**93.5**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.88	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	6.01	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.7**	**93.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.43 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 19.46 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

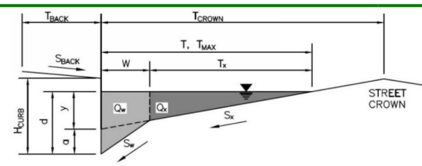


Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	4.4	19.5	cfs
Water Spread Width	T =	9.9	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.9	6.0	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	1.1	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.582	0.325	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.9	13.1	cfs
Discharge within the Gutter Section W	Q_w =	2.6	6.3	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.48	0.83	sq ft
Velocity within the Gutter Section W	V_W =	5.3	7.6	fps
Water Depth for Design Condition	d_{LOCAL} =	7.9	10.0	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.154	0.095	ft/ft
Required Length L_T to Have 100% Interception	L_T =	10.29	27.36	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	Q_i =	4.4	10.9	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.38	9.38	ft
Actual Interception Capacity	**Q_a =**	**4.4**	**10.3**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.1**	**9.1**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.4**	**10.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**9.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**99**	**53**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB5-9**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.033		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	7.1	7.1	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	5.2	5.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**12.3**	**12.3**	**cfs**
Flow Velocity within the Gutter Section	V =	8.1	8.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

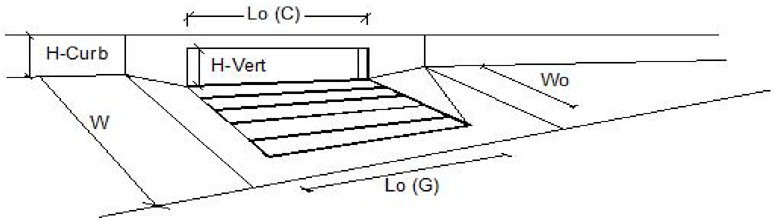
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	7.9	195.9	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	7.9	116.7	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	5.5	29.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	13.4	146.1	cfs
Average Flow Velocity Within the Gutter Section	V =	8.3	16.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.4	16.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.56	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**13.4**	**81.6**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	9.34	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	4.46	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.4**	**81.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.19 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 6.28 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

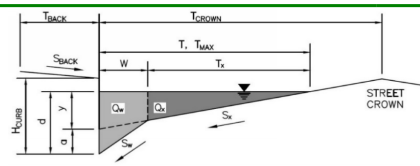


Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.2	6.3	cfs
Water Spread Width	T =	6.1	10.5	ft
Water Depth at Flowline (outside of local depression)	d =	3.0	4.0	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.810	0.554	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.4	2.8	cfs
Discharge within the Gutter Section W	Q_w =	1.8	3.5	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.33	0.51	sq ft
Velocity within the Gutter Section W	V_W =	5.4	6.9	fps
Water Depth for Design Condition	d_{LOCAL} =	7.0	8.0	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o-GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.206	0.147	ft/ft
Required Length L_T to Have 100% Interception	L_T =	6.45	12.87	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	2.0	3.7	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**1.9**	**3.4**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.3**	**2.9**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.9**	**3.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.3**	**2.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**88**	**54**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB5-10**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

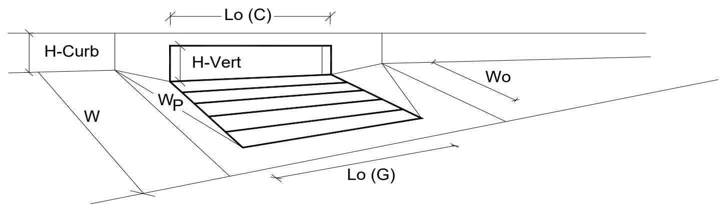
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLEET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

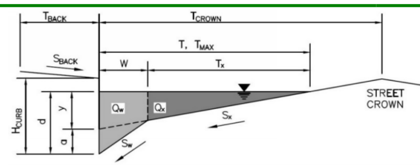


Design Information (Input)		MINOR	MAJOR	
Type of Inlet: CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	
Clogging Factor for Multiple Units	Clog =	0.04	0.04	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	6.0	51.0	cfs
Interception with Clogging	Q_{wa} =	5.8	48.8	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	29.3	42.5	cfs
Interception with Clogging	Q_{oa} =	28.0	40.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	12.4	43.3	cfs
Interception with Clogging	Q_{ma} =	11.8	41.4	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.8**	**40.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.72	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.8**	**40.6**	**cfs**
WARNING: Inlet Capacity < Q Peak for Minor and Major Storms	$Q_{PEAK\ REQUIRED}$ =	9.7	42.1	cfs

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB5-4**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

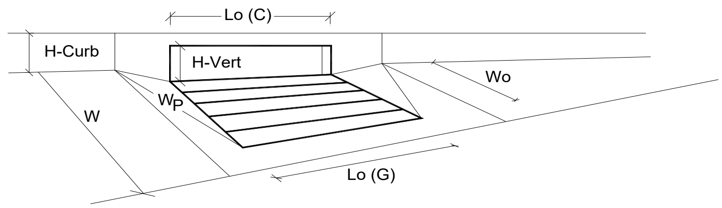
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

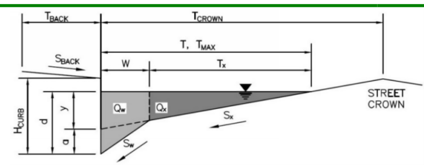


Design Information (Input)		MINOR	MAJOR	
Type of Inlet: CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.31	1.31	
Clogging Factor for Multiple Units	Clog =	0.04	0.04	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	6.0	51.0	cfs
Interception with Clogging	Q_{wa} =	5.8	48.8	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	29.3	42.5	cfs
Interception with Clogging	Q_{oa} =	28.0	40.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	12.4	43.3	cfs
Interception with Clogging	Q_{ma} =	11.8	41.4	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.8**	**40.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.72	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.8**	**40.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	5.6	11.5	cfs

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB6-4**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.9	4.9	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	3.6	3.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**8.6**	**8.6**	**cfs**
Flow Velocity within the Gutter Section	V =	5.6	5.6	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.3	2.3	

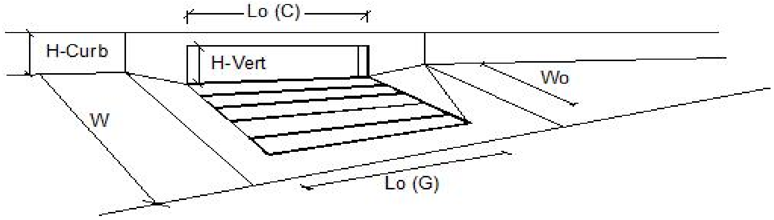
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	5.5	136.4	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.5	81.2	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	3.8	20.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	9.4	101.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.7	11.2	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.4	11.2	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**9.4**	**101.4**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	11.99	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.11	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.4**	**101.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 7.54 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 25.29 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

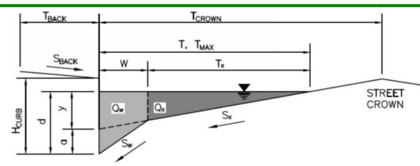


		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	7.5	25.3	cfs
Water Spread Width	T =	13.3	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.7	6.9	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	2.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.446	0.283	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	4.2	18.1	cfs
Discharge within the Gutter Section W	Q_w =	3.4	7.2	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.62	0.98	sq ft
Velocity within the Gutter Section W	V_W =	5.4	7.3	fps
Water Depth for Design Condition	d_{LOCAL} =	8.7	10.9	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.122	0.085	ft/ft
Required Length L_T to Have 100% Interception	L_T =	14.75	32.32	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.00	10.00	ft
Interception Capacity	Q_i =	6.6	12.3	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.38	9.38	ft
Actual Interception Capacity	**Q_a =**	**6.3**	**11.6**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**1.2**	**13.7**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.3**	**11.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.2**	**13.7**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**84**	**46**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SB6-3



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.9	4.9	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	3.6	3.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**8.6**	**8.6**	**cfs**
Flow Velocity within the Gutter Section	V =	5.6	5.6	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.3	2.3	

Maximum Capacity for 1/2 Street based on Allowable Depth

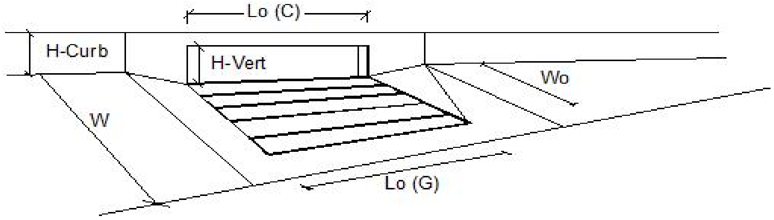
		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	5.5	136.4	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.5	81.2	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	3.8	20.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	9.4	101.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.7	11.2	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.4	11.2	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**9.4**	**101.4**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	11.99	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.11	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.4**	**101.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.29 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.49 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

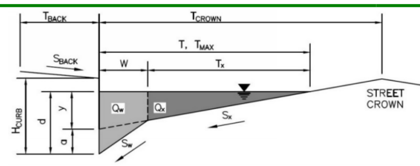


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)		Q_o =	3.3	9.5	cfs
Water Spread Width		T =	9.2	14.0	ft
Water Depth at Flowline (outside of local depression)		d =	3.7	5.0	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	0.1	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.618	0.407	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	1.3	5.6	cfs
Discharge within the Gutter Section W		Q_w =	2.0	3.9	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.45	0.67	sq ft
Velocity within the Gutter Section W		V_W =	4.5	5.8	fps
Water Depth for Design Condition		d_{LOCAL} =	7.7	9.0	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e		S_e =	0.162	0.113	ft/ft
Required Length L_T to Have 100% Interception		L_T =	8.50	17.18	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	8.50	10.00	ft
Interception Capacity		Q_i =	3.3	7.5	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.06	0.06	
Effective (Unclogged) Length		L_e =	8.50	9.38	ft
Actual Interception Capacity		**Q_a =**	**3.3**	**7.2**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.0**	**2.3**	**cfs**
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.3**	**7.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**2.3**	**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: **The Fields F1**
Inlet ID: **Inlet SB2-9**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread

		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.4	4.4	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	3.3	3.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**7.7**	**7.7**	**cfs**
Flow Velocity within the Gutter Section	V =	5.1	5.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.1	2.1	

Maximum Capacity for 1/2 Street based on Allowable Depth

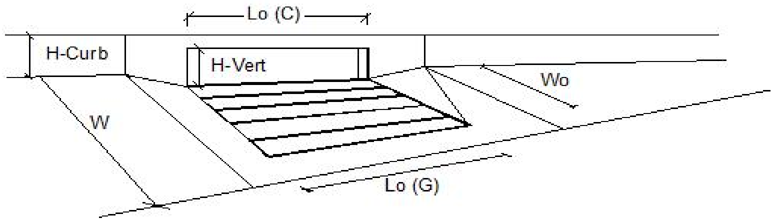
		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	5.0	123.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.0	73.2	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	3.5	18.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	8.4	91.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.2	10.1	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	10.1	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**8.4**	**91.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	12.00	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.13	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.4**	**91.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.89 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 24.98 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

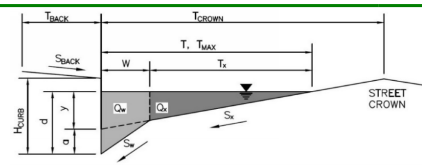


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)		Q_o =	4.9	25.0	cfs
Water Spread Width		T =	11.5	14.0	ft
Water Depth at Flowline (outside of local depression)		d =	4.3	7.1	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	2.2	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.509	0.276	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	2.4	18.1	cfs
Discharge within the Gutter Section W		Q_w =	2.5	6.9	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.55	1.01	sq ft
Velocity within the Gutter Section W		V_W =	4.5	6.8	fps
Water Depth for Design Condition		d_{LOCAL} =	8.3	11.1	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e		S_e =	0.137	0.083	ft/ft
Required Length L_T to Have 100% Interception		L_T =	11.10	32.05	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	5.00	5.00	ft
Interception Capacity		Q_i =	3.2	6.6	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.10	0.10	
Effective (Unclogged) Length		L_e =	4.50	4.50	ft
Actual Interception Capacity		**Q_a =**	**3.0**	**6.0**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**1.9**	**19.0**	**cfs**
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.0**	**6.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**1.9**	**19.0**	**cfs**
Capture Percentage = Q_a/Q_o		**C% =**	**61**	**24**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB2-8**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	4.4	4.4	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	3.3	3.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**7.7**	**7.7**	**cfs**
Flow Velocity within the Gutter Section	V =	5.1	5.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.1	2.1	

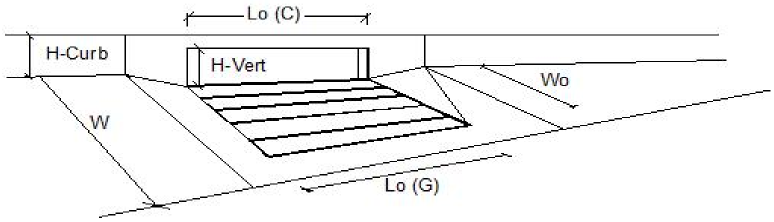
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	5.0	123.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	5.0	73.2	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	3.5	18.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	8.4	91.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.2	10.1	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.2	10.1	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	1.00	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**8.4**	**91.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	12.00	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	7.13	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.4**	**91.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.81 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.53 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

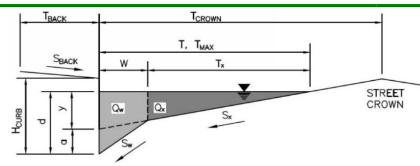


		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	1.8	7.5	cfs
Water Spread Width	T =	7.2	13.9	ft
Water Depth at Flowline (outside of local depression)	d =	3.2	4.8	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.740	0.429	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.5	4.3	cfs
Discharge within the Gutter Section W	Q_w =	1.3	3.2	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.37	0.64	sq ft
Velocity within the Gutter Section W	V_W =	3.6	5.0	fps
Water Depth for Design Condition	d_{LOCAL} =	7.2	8.8	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.190	0.118	ft/ft
Required Length L_T to Have 100% Interception	L_T =	5.75	14.78	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	1.8	3.9	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**1.7**	**3.6**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.1**	**3.9**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.7**	**3.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**3.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**94**	**48**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB3-12**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	7.8	7.8	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	5.7	5.7	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**13.5**	**13.5**	**cfs**
Flow Velocity within the Gutter Section	V =	8.9	8.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.6	3.6	

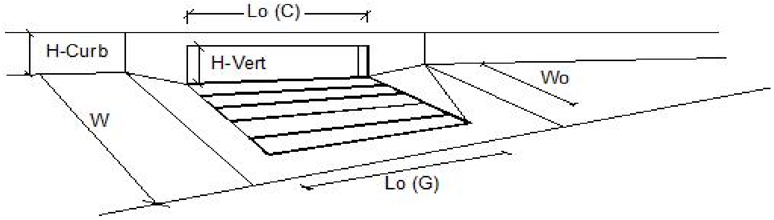
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	8.7	215.7	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	8.7	128.4	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	6.1	32.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	14.8	160.8	cfs
Average Flow Velocity Within the Gutter Section	V =	9.1	17.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.8	17.6	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.48	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**14.8**	**77.0**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	8.77	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	3.90	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.8**	**77.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.48 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 4.05 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



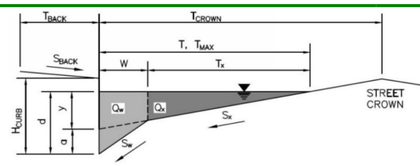
Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	1.5	4.1	cfs
Water Spread Width	T =	4.4	8.1	ft
Water Depth at Flowline (outside of local depression)	d =	2.6	3.5	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.924	0.680	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.1	1.3	cfs
Discharge within the Gutter Section W	Q_w =	1.4	2.8	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.26	0.41	sq ft
Velocity within the Gutter Section W	V_W =	5.2	6.7	fps
Water Depth for Design Condition	d_{LOCAL} =	6.6	7.5	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o-GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.232	0.176	ft/ft
Required Length L_T to Have 100% Interception	L_T =	5.05	9.59	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	1.5	3.0	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**1.5**	**2.8**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**1.3**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**2.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**98**	**68**	**%**

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

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

Project: The Fields F1

Inlet ID: Inlet SB3-11



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	7.8	7.8	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	5.7	5.7	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**13.5**	**13.5**	**cfs**
Flow Velocity within the Gutter Section	V =	8.9	8.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.6	3.6	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	8.7	215.7	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	8.7	128.4	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	6.1	32.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	14.8	160.8	cfs
Average Flow Velocity Within the Gutter Section	V =	9.1	17.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.8	17.6	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.48	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**14.8**	**77.0**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	8.77	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	3.90	inches

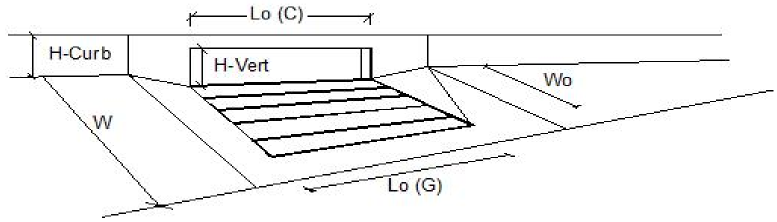
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.8**	**77.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.63 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 11.18 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	3.6	11.2	cfs
Water Spread Width	T =	7.7	12.9	ft
Water Depth at Flowline (outside of local depression)	d =	3.4	4.6	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.706	0.458	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.1	6.1	cfs
Discharge within the Gutter Section W	Q_w =	2.6	5.1	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.39	0.60	sq ft
Velocity within the Gutter Section W	V_W =	6.5	8.5	fps
Water Depth for Design Condition	d_{LOCAL} =	7.4	8.6	inches

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

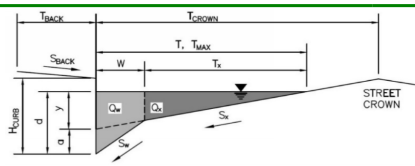
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.182	0.125	ft/ft
Required Length L_T to Have 100% Interception	L_T =	8.93	18.81	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	2.8	4.8	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**2.6**	**4.3**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**1.0**	**6.8**	**cfs**

Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.6**	**4.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.0**	**6.8**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**72**	**39**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB3-8**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.060	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	9.5	9.5	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	7.0	7.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**16.6**	**16.6**	**cfs**
Flow Velocity within the Gutter Section	V =	10.9	10.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	4.4	4.4	

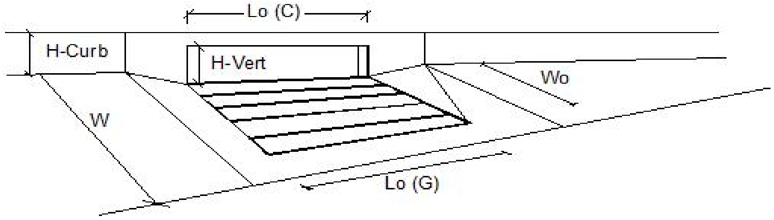
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	10.7	264.2	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	10.7	157.3	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	7.4	39.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	18.1	196.9	cfs
Average Flow Velocity Within the Gutter Section	V =	11.1	21.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	4.6	21.6	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	0.78	0.35	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**14.1**	**68.2**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.65	7.74	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	2.86	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.1**	**68.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.88 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 12.65 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

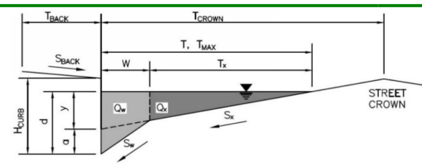


Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.9	12.7	cfs
Water Spread Width	T =	6.1	12.5	ft
Water Depth at Flowline (outside of local depression)	d =	3.0	4.5	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.0	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.816	0.472	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.5	6.7	cfs
Discharge within the Gutter Section W	Q_w =	2.4	6.0	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.33	0.59	sq ft
Velocity within the Gutter Section W	V_W =	7.2	10.2	fps
Water Depth for Design Condition	d_{LOCAL} =	7.0	8.5	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.207	0.128	ft/ft
Required Length L_T to Have 100% Interception	L_T =	7.65	20.28	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	2.5	5.1	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**2.3**	**4.6**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.6**	**8.1**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.3**	**4.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.6**	**8.1**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**80**	**36**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB3-9**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.060		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	9.5	9.5	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	7.0	7.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**16.6**	**16.6**	**cfs**
Flow Velocity within the Gutter Section	V =	10.9	10.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	4.4	4.4	

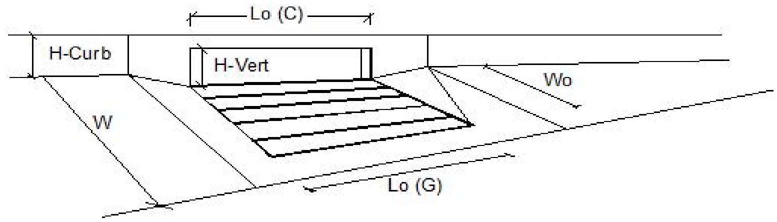
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	10.7	264.2	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	10.7	157.3	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	7.4	39.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	18.1	196.9	cfs
Average Flow Velocity Within the Gutter Section	V =	11.1	21.6	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	4.6	21.6	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	0.78	0.35	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**14.1**	**68.2**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	4.65	7.74	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	2.86	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.1**	**68.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 5.19 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 26.07 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

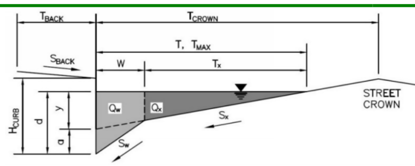


Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)		Q_o =	5.2	26.1	cfs
Water Spread Width		T =	8.3	14.0	ft
Water Depth at Flowline (outside of local depression)		d =	3.5	5.6	inches
Water Depth at Street Crown (or at T_{MAX})		d_{CROWN} =	0.0	0.7	inches
Ratio of Gutter Flow to Design Flow		E_o =	0.668	0.355	
Discharge outside the Gutter Section W, carried in Section T_x		Q_x =	1.7	16.8	cfs
Discharge within the Gutter Section W		Q_w =	3.5	9.2	cfs
Discharge Behind the Curb Face		Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W		A_W =	0.42	0.76	sq ft
Velocity within the Gutter Section W		V_W =	8.3	12.1	fps
Water Depth for Design Condition		d_{LOCAL} =	7.5	9.6	inches
Grate Analysis (Calculated)			MINOR	MAJOR	
Total Length of Inlet Grate Opening		L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow		$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition			MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Interception Capacity		Q_i =	N/A	N/A	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet		GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet		GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet		L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins		V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow		R_f =	N/A	N/A	
Interception Rate of Side Flow		R_x =	N/A	N/A	
Actual Interception Capacity		**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)		**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)			MINOR	MAJOR	
Equivalent Slope S_e		S_e =	0.173	0.101	ft/ft
Required Length L_T to Have 100% Interception		L_T =	11.22	32.69	ft
Under No-Clogging Condition			MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)		L =	10.00	10.00	ft
Interception Capacity		Q_i =	5.1	12.6	cfs
Under Clogging Condition			MINOR	MAJOR	
Clogging Coefficient		CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet		CurbClog =	0.06	0.06	
Effective (Unclogged) Length		L_e =	9.38	9.38	ft
Actual Interception Capacity		**Q_a =**	**5.0**	**11.9**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a		**Q_b =**	**0.2**	**14.2**	**cfs**
Summary			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.0**	**11.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.2**	**14.2**	**cfs**
Capture Percentage = Q_a/Q_o		**C% =**	**96**	**46**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB3-4**



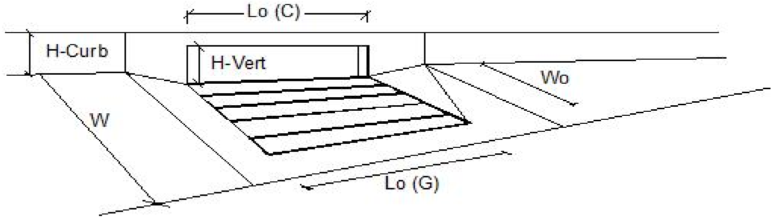
Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	6.2	6.2	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.5	4.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**10.7**	**10.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.9	2.9	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	6.9	170.5	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.9	101.5	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.8	25.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.7	127.1	cfs
Average Flow Velocity Within the Gutter Section	V =	7.2	14.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.0	14.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.70	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**11.7**	**88.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.25	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	5.38	inches
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.7**	**88.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.88 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 21.50 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

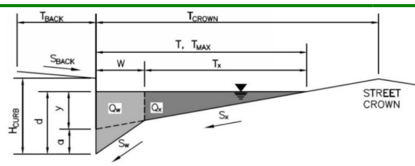


Design Information (Input) — CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	4.9	21.5	cfs
Water Spread Width	T =	9.9	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.9	6.0	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	1.1	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.579	0.324	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	2.1	14.5	cfs
Discharge within the Gutter Section W	Q_w =	2.8	7.0	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.48	0.84	sq ft
Velocity within the Gutter Section W	V_W =	5.8	8.3	fps
Water Depth for Design Condition	d_{LOCAL} =	7.9	10.0	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.153	0.094	ft/ft
Required Length L_T to Have 100% Interception	L_T =	10.94	29.12	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	10.94	15.00	ft
Interception Capacity	Q_i =	4.9	15.7	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L_e =	10.94	14.35	ft
Actual Interception Capacity	**Q_a =**	**4.9**	**15.2**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**6.3**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.9**	**15.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**6.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**71**	**%**

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

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

Project: The Fields F1
Inlet ID: Inlet SB3-5



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	6.2	6.2	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.5	4.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**10.7**	**10.7**	**cfs**
Flow Velocity within the Gutter Section	V =	7.0	7.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.9	2.9	

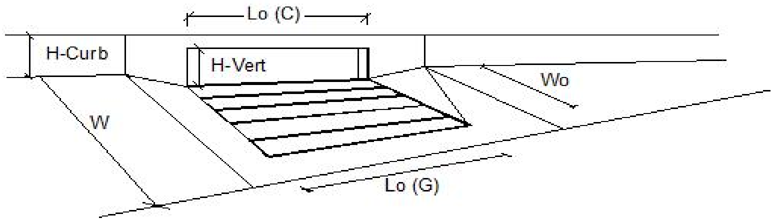
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	6.9	170.5	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.9	101.5	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.8	25.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	11.7	127.1	cfs
Average Flow Velocity Within the Gutter Section	V =	7.2	14.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.0	14.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.70	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**11.7**	**88.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	10.25	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	5.38	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.7**	**88.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.98 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 19.31 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

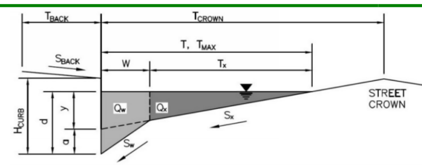


Design Information (Input) — CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	2.0	19.3	cfs
Water Spread Width	T =	6.3	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.0	5.8	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.9	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.801	0.337	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	0.4	12.8	cfs
Discharge within the Gutter Section W	Q_w =	1.6	6.5	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.34	0.80	sq ft
Velocity within the Gutter Section W	V_W =	4.7	8.1	fps
Water Depth for Design Condition	d_{LOCAL} =	7.0	9.8	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.204	0.097	ft/ft
Required Length L_T to Have 100% Interception	L_T =	6.05	27.17	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	6.05	15.00	ft
Interception Capacity	Q_i =	2.0	14.8	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.31	1.31	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.04	0.04	
Effective (Unclogged) Length	L_e =	6.05	14.35	ft
Actual Interception Capacity	**Q_a =**	**2.0**	**14.3**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**5.0**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.0**	**14.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.0**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**74**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB2-4**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

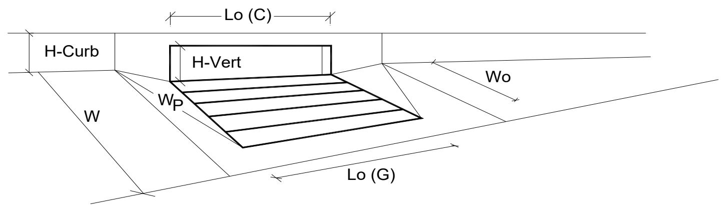
Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

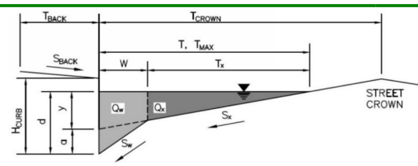


Design Information (Input)		MINOR	MAJOR	
Type of Inlet: CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	5.3	37.3	cfs
Interception with Clogging	Q_{wa} =	5.0	35.0	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	28.3	cfs
Interception with Clogging	Q_{oa} =	18.3	26.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.5	30.2	cfs
Interception with Clogging	Q_{ma} =	8.9	28.3	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.0**	**26.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.87	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.0**	**26.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	2.3	12.7	cfs

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

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

Project: The Fields F1
Inlet ID: Inlet SB2-2



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

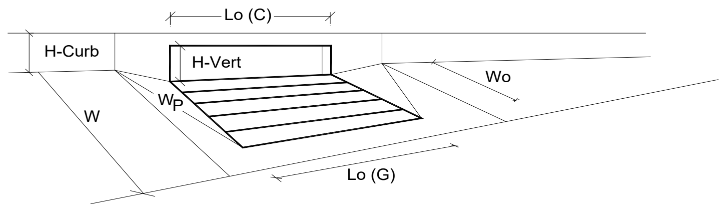
		Minor Storm	Major Storm	
Maximum Capacity for 1/2 Street based On Allowable Spread				
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression ($d_C - (W * S_x * 12)$)	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_T - Q_X - Q_{BACK}$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**SUMP**	**SUMP**	**cfs**
Flow Velocity within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	0.0	0.0	

		Minor Storm	Major Storm	
Maximum Capacity for 1/2 Street based on Allowable Depth				
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section ($Q_d - Q_X$)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	SUMP	SUMP	cfs
Average Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	SUMP	SUMP	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**SUMP**	**SUMP**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)

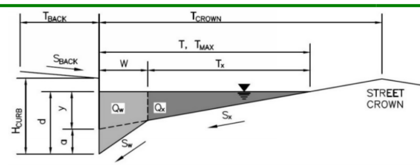


Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	4.00	4.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Grate Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	N/A	N/A	cfs
Interception with Clogging	Q_{wa} =	N/A	N/A	cfs
Grate Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	N/A	N/A	cfs
Interception with Clogging	Q_{oa} =	N/A	N/A	cfs
Grate Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	N/A	N/A	cfs
Interception with Clogging	Q_{ma} =	N/A	N/A	cfs
Resulting Grate Capacity (assumes clogged condition)	**Q_{Grate} =**	**N/A**	**N/A**	**cfs**
Curb Opening Flow Analysis (Calculated)		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.25	1.25	
Clogging Factor for Multiple Units	Clog =	0.06	0.06	
Curb Capacity as a Weir (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{wi} =	5.3	37.3	cfs
Interception with Clogging	Q_{wa} =	5.0	35.0	cfs
Curb Capacity as an Orifice (based on MHFD - CSU 2010 Study)		MINOR	MAJOR	
Interception without Clogging	Q_{oi} =	19.5	28.3	cfs
Interception with Clogging	Q_{oa} =	18.3	26.6	cfs
Curb Opening Capacity as Mixed Flow		MINOR	MAJOR	
Interception without Clogging	Q_{mi} =	9.5	30.2	cfs
Interception with Clogging	Q_{ma} =	8.9	28.3	cfs
Resulting Curb Opening Capacity (assumes clogged condition)	**Q_{Curb} =**	**5.0**	**26.6**	**cfs**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.00	10.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	14.5	43.7	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.1	7.1	inches
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.25	0.83	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.87	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.0**	**26.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.3	11.8	cfs

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

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

Project: The Fields F1
Inlet ID: Inlet SB3-15



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression ($T * S_x * 12$)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - ($W * S_x * 12$))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.4	5.4	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.0	4.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**9.3**	**9.3**	**cfs**
Flow Velocity within the Gutter Section	V =	6.1	6.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.5	2.5	

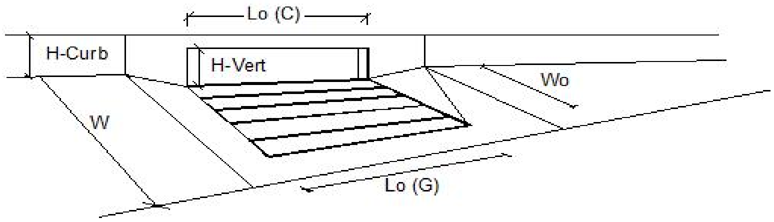
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	6.0	148.7	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.0	88.5	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.2	22.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	10.2	110.8	cfs
Average Flow Velocity Within the Gutter Section	V =	6.3	12.2	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.6	12.2	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.87	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**10.2**	**96.3**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	11.27	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	6.40	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.2**	**96.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 3.38 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 10.49 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

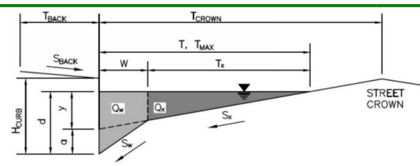


		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	3.4	10.5	cfs
Water Spread Width	T =	8.9	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.7	5.0	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.2	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.633	0.404	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.2	6.3	cfs
Discharge within the Gutter Section W	Q_w =	2.1	4.2	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.44	0.67	sq ft
Velocity within the Gutter Section W	V_W =	4.8	6.3	fps
Water Depth for Design Condition	d_{LOCAL} =	7.7	9.0	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.165	0.113	ft/ft
Required Length L_T to Have 100% Interception	L_T =	8.62	18.31	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	2.7	4.6	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**2.5**	**4.2**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.9**	**6.3**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.5**	**4.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.9**	**6.3**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**74**	**40**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB3-17**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	5.4	5.4	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	4.0	4.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**9.3**	**9.3**	**cfs**
Flow Velocity within the Gutter Section	V =	6.1	6.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.5	2.5	

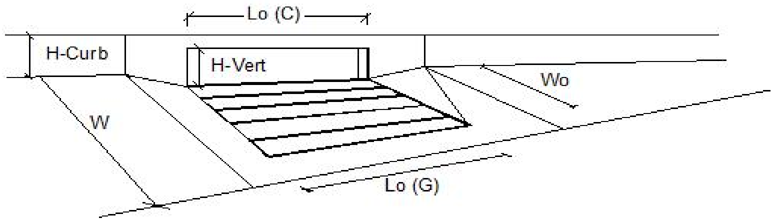
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\ TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	6.0	148.7	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	6.0	88.5	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	4.2	22.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	10.2	110.8	cfs
Average Flow Velocity Within the Gutter Section	V =	6.3	12.2	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.6	12.2	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.87	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**10.2**	**96.3**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	11.27	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	6.40	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.2**	**96.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 6.87 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 21.53 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)

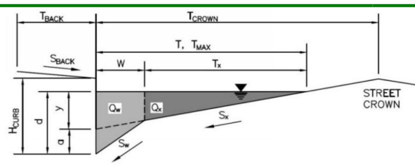


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	6.9	21.5	cfs
Water Spread Width	T =	12.3	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	4.5	6.3	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	1.4	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.480	0.308	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	3.6	14.9	cfs
Discharge within the Gutter Section W	Q_w =	3.3	6.6	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.58	0.88	sq ft
Velocity within the Gutter Section W	V_W =	5.7	7.5	fps
Water Depth for Design Condition	d_{LOCAL} =	8.5	10.3	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o\text{-}GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.130	0.091	ft/ft
Required Length L_T to Have 100% Interception	L_T =	13.80	29.19	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	5.00	5.00	ft
Interception Capacity	Q_i =	3.8	6.2	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.00	1.00	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.10	0.10	
Effective (Unclogged) Length	L_e =	4.50	4.50	ft
Actual Interception Capacity	**Q_a =**	**3.5**	**5.6**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**3.4**	**15.9**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.5**	**5.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**3.4**	**15.9**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**51**	**26**	**%**

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

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

Project: **The Fields F1**
Inlet ID: **Inlet SB5-8**



Gutter Geometry:				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	5.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	14.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.033		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	14.0	14.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☑	☑	

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (T * S_x * 12)	y =	3.36	3.36	inches
Vertical Depth between Gutter Lip and Gutter Flowline (W * S_w * 12)	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline (y + a)	d =	4.87	4.87	inches
Allowable Spread for Discharge outside the Gutter Section (T - W)	T_X =	12.0	12.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.425	0.425	
Discharge outside the Gutter Section, carried in Section T_X	Q_X =	7.1	7.1	cfs
Discharge within the Gutter Section (Q_T - Q_X - Q_{BACK})	Q_W =	5.2	5.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**12.3**	**12.3**	**cfs**
Flow Velocity within the Gutter Section	V =	8.1	8.1	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	3.3	3.3	

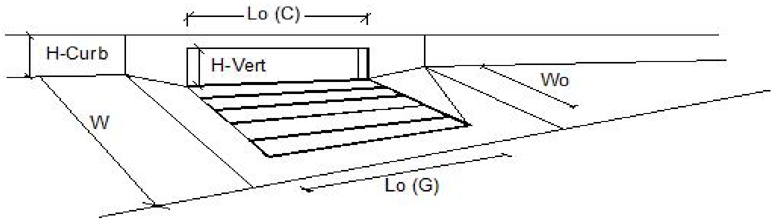
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	14.5	43.7	ft
Theoretical Spread for Discharge outside the Gutter Section (T - W)	$T_{X\,TH}$ =	12.5	41.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)	E_O =	0.409	0.130	
Theoretical Discharge outside the Gutter Section, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	7.9	195.9	cfs
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})	Q_X =	7.9	116.7	cfs
Discharge within the Gutter Section (Q_d - Q_X)	Q_W =	5.5	29.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	13.4	146.1	cfs
Average Flow Velocity Within the Gutter Section	V =	8.3	16.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.4	16.0	
Slope-Based Safety Factor for Minor/Major Storm depth reduction, d $\geq$ 6"	R =	1.00	0.56	
Max Flow based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**13.4**	**81.6**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.00	9.34	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.13	4.46	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.4**	**81.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 4.26 cfs on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design peak flow of 14.13 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



		MINOR	MAJOR	
Design Information (Input) — CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	4.0	4.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Design Discharge for Half of Street (from *Inlet Management*)	Q_o =	4.3	14.1	cfs
Water Spread Width	T =	8.7	14.0	ft
Water Depth at Flowline (outside of local depression)	d =	3.6	5.1	inches
Water Depth at Street Crown (or at T_{MAX})	d_{CROWN} =	0.0	0.2	inches
Ratio of Gutter Flow to Design Flow	E_o =	0.644	0.401	
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.5	8.5	cfs
Discharge within the Gutter Section W	Q_w =	2.7	5.7	cfs
Discharge Behind the Curb Face	Q_{BACK} =	0.0	0.0	cfs
Flow Area within the Gutter Section W	A_W =	0.44	0.68	sq ft
Velocity within the Gutter Section W	V_W =	6.3	8.3	fps
Water Depth for Design Condition	d_{LOCAL} =	7.6	9.1	inches
Grate Analysis (Calculated)		MINOR	MAJOR	
Total Length of Inlet Grate Opening	L =	N/A	N/A	ft
Ratio of Grate Flow to Design Flow	$E_{o-GRATE}$ =	N/A	N/A	
Under No-Clogging Condition		MINOR	MAJOR	
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Interception Capacity	Q_i =	N/A	N/A	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient for Multiple-unit Grate Inlet	GrateCoeff =	N/A	N/A	
Clogging Factor for Multiple-unit Grate Inlet	GrateClog =	N/A	N/A	
Effective (unclogged) Length of Multiple-unit Grate Inlet	L_e =	N/A	N/A	ft
Minimum Velocity Where Grate Splash-Over Begins	V_o =	N/A	N/A	fps
Interception Rate of Frontal Flow	R_f =	N/A	N/A	
Interception Rate of Side Flow	R_x =	N/A	N/A	
Actual Interception Capacity	**Q_a =**	**N/A**	**N/A**	**cfs**
Carry-Over Flow = Q_o-Q_a (to be applied to curb opening or next d/s inlet)	**Q_b =**	**N/A**	**N/A**	**cfs**
Curb Opening or Slotted Inlet Analysis (Calculated)		MINOR	MAJOR	
Equivalent Slope S_e	S_e =	0.168	0.112	ft/ft
Required Length L_T to Have 100% Interception	L_T =	9.94	22.07	ft
Under No-Clogging Condition		MINOR	MAJOR	
Effective Length of Curb Opening or Slotted Inlet (minimum of L, L_T)	L =	9.94	10.00	ft
Interception Capacity	Q_i =	4.3	9.4	cfs
Under Clogging Condition		MINOR	MAJOR	
Clogging Coefficient	CurbCoeff =	1.25	1.25	
Clogging Factor for Multiple-unit Curb Opening or Slotted Inlet	CurbClog =	0.06	0.06	
Effective (Unclogged) Length	L_e =	9.38	9.38	ft
Actual Interception Capacity	**Q_a =**	**4.2**	**8.9**	**cfs**
Carry-Over Flow = $Q_{b(GRATE)}$-Q_a	**Q_b =**	**0.0**	**5.2**	**cfs**
Summary		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.2**	**8.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.2**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**99**	**63**	**%**

Inlet Calculations for Type C or D Inlets

Structure ID: Inlet SA3-3
Inlet Type: D

Runoff to Inlet

Q_5:	20.48	cfs
Q_{100}:	73.66	cfs
Ponding WSE:	6341.50	
Grate Elev:	6336.16	
maximum available h:	5.34	ft
Type C or D Inlet?	D	(C or D)

Bars across Width:

Bar Width:	0.031	ft	3/8" Hex Round Bar
Distance between Bars:	0.667	ft	Bars @ 8" O.C.
Total Open Width:	0.635	ft	Open area between bars

Bars across Length:

Bar Width:	0.031	ft	4" x 3/8" Bearing Bars
Distance between Bars:	0.198	ft	Bars @ 2-3/8" O.C.
Total Open Length:	0.167	ft	Open area between bars

	Close Mesh (Pedestrian) Type C Grate:		Closed Mesh (Pedestrian) Type D Grate:	
Width:	2.92	ft	2.92	ft
Total Open Width:	2.764	ft	2.764	ft
Length:	2.79	ft	5.58	ft
Total No. of Open Areas:	13.0		26.0	
Total Open Length:	2.167	ft	4.333	ft

Clogging Factor:

$C = KC_0 / N$ (N - number of units)

Table 7-9. Clogging coefficient k for single and multiple units[1]

N for Grate Inlets or (L/5) for Curb-Openings	1	2	3	4	5	6	7	8	>8
K for Grate Inlet	1	1.5	1.75	1.88	1.94	1.97	1.98	1.99	2

K:	1.5	Clogging coefficient
C_0:	50%	Clogging factor for single grate
Type C Inlet No. of Open Areas:	26	
Effective No. Type C Inlets	2	

Clogging Factor: 0.38
use: 38%

Total Open Length w/ Clogging: 2.71 ft
Open Area w/ Clogging: 7.49 sf

Weir Flow:

$Q = 3Ph^{1.5}$ (P - perimeter)

$P = 2*\text{length} + 2*\text{width}$

$h = (Q / 3P)^{2/3}$

Required Q_5:	20.48	cfs	Required Q_{100}:	73.66	cfs
P:	10.94	ft	P:	10.94	ft
Required h_5:	0.73	ft	Required h_{100}:	1.71	ft
Actual h_5:	0.73	ft	Actual h_{100}:	4.34	ft
Actual Q_5:	20.48	cfs	Actual Q_{100}:	296.85	cfs

Orifice Flow:

$Q = 0.6A(64.4h)^{0.5}$

Open Area w/ Clogging:	7.49	sf	Open Area:	7.49	sf
h:	0.73	ft	h:	4.34	ft
Q_5:	30.79	cfs	Q_{100}:	75.08	cfs

Orifice Flow is greater than Weir Flow -----> Use Weir Flow

Inlet Calculations for Type C or D Inlets

Structure ID: Inlet SA2-3
Inlet Type: D

Runoff to Inlet

Q_5:	6.32	cfs
Q_{100}:	22.54	cfs
Ponding WSE:	6337.66	
Grate Elev:	6335.66	
maximum available h:	2.00	ft
Type C or D Inlet?	D	(C or D)

Bars across Width:

Bar Width:	0.031	ft	3/8" Hex Round Bar
Distance between Bars:	0.667	ft	Bars @ 8" O.C.
Total Open Width:	0.635	ft	Open area between bars

Bars across Length:

Bar Width:	0.031	ft	4" x 3/8" Bearing Bars
Distance between Bars:	0.198	ft	Bars @ 2-3/8" O.C.
Total Open Length:	0.167	ft	Open area between bars

	Close Mesh (Pedestrian) Type C Grate:		Closed Mesh (Pedestrian) Type D Grate:	
Width:	2.92	ft	2.92	ft
Total Open Width:	2.764	ft	2.764	ft
Length:	2.79	ft	5.58	ft
Total No. of Open Areas:	13.0		26.0	
Total Open Length:	2.167	ft	4.333	ft

Clogging Factor:

$C = KC_0 / N$ (N - number of units)

Table 7-9. Clogging coefficient k for single and multiple units[1]

N for Grate Inlets or (L/5) for Curb-Openings	1	2	3	4	5	6	7	8	>8
K for Grate Inlet	1	1.5	1.75	1.88	1.94	1.97	1.98	1.99	2

K:	1.5	Clogging coefficient
C_0:	50%	Clogging factor for single grate
Type C Inlet No. of Open Areas:	26	
Effective No. Type C Inlets	2	
Clogging Factor:	0.38	
use:	38%	
Total Open Length w/ Clogging:	2.71	ft
Open Area w/ Clogging:	7.49	sf

Weir Flow:

$Q = 3Ph^{1.5}$ (P - perimeter)

$P = 2*\text{length} + 2*\text{width}$

$h = (Q / 3P)^{2/3}$

Required Q_5:	6.32	cfs	Required Q_{100}:	22.54	cfs
P:	10.94	ft	P:	10.94	ft
Required h_5:	0.33	ft	Required h_{100}:	0.78	ft
Actual h_5:	0.33	ft	Actual h_{100}:	2.00	ft
Actual Q_5:	6.32	cfs	Actual Q_{100}:	92.86	cfs

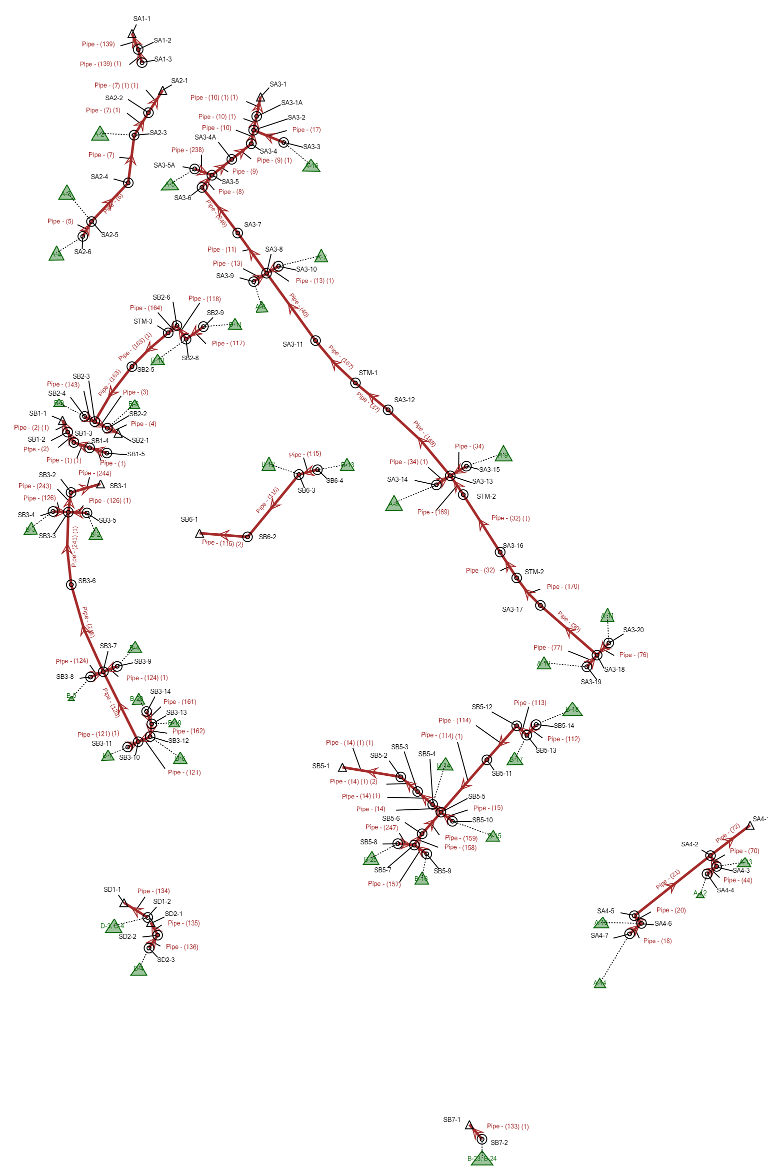
Orifice Flow:

$Q = 0.6A(64.4h)^{0.5}$

Open Area w/ Clogging:	7.49	sf	Open Area:	7.49	sf
h:	0.33	ft	h:	2.00	ft
Q_5:	20.81	cfs	Q_{100}:	50.97	cfs

Orifice Flow is greater than Weir Flow -----> Use Weir Flow

B2 StormCAD Model



5-Year Event

Catchment Table - Time: 0.00 hours

ID	Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
227	A-2	SA2-3	7.617	0.319	23.213	6.36
239	A-3	SA2-5	4.271	0.407	19.061	5.05
240	A-4	SA2-6	3.243	0.436	18.753	4.15
242	A-5	SA3-5A	3.274	0.415	18.615	4.00
243	A-6	SA3-9	5.803	0.390	23.953	5.82
244	A-7	SA3-10	2.488	0.428	18.988	3.10
245	A-8	SA3-14	7.605	0.395	23.422	7.83
246	A-9	SA3-15	1.762	0.429	19.047	2.20
247	A-10	SA3-19	5.964	0.389	19.511	6.66
248	A-11	SA3-20	1.451	0.421	14.517	2.03
249	A-12	SA4-4	3.148	0.392	15.059	4.03
250	A-13	SA4-3	2.107	0.436	10.257	3.55
251	A-14	SA4-7	4.794	0.341	10.959	6.15
252	A-15	SA4-6	0.876	0.434	10.646	1.45
241	A-16	SA3-3	34.229	0.315	39.538	20.61
253	B-2	SB3-5	1.530	0.431	17.636	1.99
254	B-3	SB3-4	4.192	0.383	17.155	4.92
255	B-4	SB3-9	3.741	0.413	15.156	5.03
256	B-5	SB3-8	1.832	0.381	14.526	2.32
257	B-6	SB3-13	0.778	0.465	9.074	1.46
258	B-7	SB3-12	1.883	0.392	12.473	2.63
261	B-8	SB2-2	0.727	0.563	15.056	1.34
262	B-9	SB2-4	1.182	0.446	7.484	2.29
263	B-10	SB2-8	1.130	0.427	12.684	1.70
264	B-11	SB2-9	2.732	0.389	20.265	2.99
265	B-12	SB6-3	2.192	0.430	12.808	3.32
266	B-13	SB6-4	5.192	0.392	16.472	6.37
267	B-14	SB5-4	4.562	0.432	19.498	5.66
268	B-15	SB5-10	5.792	0.370	21.627	5.83
269	B-16	SB5-9	1.228	0.435	11.663	1.96
270	B-17	SB5-13	3.739	0.393	17.977	4.40

5-Year Event

Catchment Table - Time: 0.00 hours

ID	Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
271	B-18	SB5-14	1.227	0.432	11.931	1.92
259	B-19	SB3-17	2.809	0.382	14.923	3.52
260	B-20	SB3-15	2.145	0.386	17.646	2.50
272	B-23, B-24	SB7-2	3.920	0.300	15.700	3.77
342	B-25	SB5-8	3.875	0.352	16.478	4.27
273	D-3, D-4	SD1-2	12.410	0.240	19.400	8.58
274	D-4	SD2-3	9.090	0.230	19.400	6.02

5-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
198	Pipe - (1)	SB1-5	SB1-4	42.0	41.3	6,341.15	6,340.53	0.015	20.70	10.72	6,342.54	6,341.54
199	Pipe - (1) (1)	SB1-4	SB1-3	42.0	67.3	6,337.30	6,336.29	0.015	20.70	10.72	6,338.69	6,337.25
322	Pipe - (2)	SB1-3	SB1-2	42.0	41.0	6,335.25	6,334.63	0.015	20.70	10.72	6,336.64	6,335.64
323	Pipe - (2) (1)	SB1-2	SB1-1	48.0	42.1	6,331.90	6,331.69	0.005	20.70	6.35	6,333.24	6,332.92
201	Pipe - (3)	SB2-3	SB2-2	30.0	19.0	6,345.07	6,344.88	0.010	5.65	1.15	6,348.59	6,348.59
202	Pipe - (4)	SB2-2	SB2-1	36.0	50.7	6,344.38	6,344.12	0.005	6.72	0.95	6,348.58	6,348.58
195	Pipe - (5)	SA2-6	SA2-5	18.0	28.0	6,346.15	6,345.86	0.010	4.15	6.39	6,346.93	6,346.48
196	Pipe - (6)	SA2-5	SA2-4	24.0	207.1	6,345.36	6,339.15	0.030	9.17	11.47	6,346.44	6,339.75
197	Pipe - (7)	SA2-4	SA2-3	24.0	186.7	6,336.01	6,329.29	0.036	9.09	12.22	6,337.09	6,329.87
207	Pipe - (7) (1)	SA2-3	SA2-2	30.0	103.1	6,324.43	6,322.11	0.022	14.61	12.40	6,325.71	6,322.87
208	Pipe - (7) (1) (1)	SA2-2	SA2-1	30.0	89.0	6,316.07	6,313.53	0.029	14.57	11.19	6,317.36	6,317.41
185	Pipe - (8)	SA3-6	SA3-5	36.0	61.6	6,350.02	6,348.79	0.020	24.76	12.69	6,351.63	6,349.87
315	Pipe - (9)	SA3-5	SA3-4A	36.0	100.4	6,343.59	6,341.59	0.020	28.07	13.13	6,345.31	6,342.69
316	Pipe - (9) (1)	SA3-4A	SA3-4	36.0	95.4	6,337.09	6,335.18	0.020	27.99	13.12	6,338.80	6,336.28
204	Pipe - (10)	SA3-4	SA3-2	36.0	53.5	6,329.74	6,328.67	0.020	27.92	13.11	6,331.45	6,329.84
318	Pipe - (10) (1)	SA3-2	SA3-1A	42.0	37.0	6,322.67	6,322.15	0.014	42.25	12.78	6,324.69	6,323.71
319	Pipe - (10) (1) (1)	SA3-1A	SA3-1	42.0	71.3	6,316.15	6,315.60	0.008	42.22	9.07	6,318.17	6,317.34
178	Pipe - (11)	SA3-8	SA3-7	36.0	192.6	6,358.48	6,356.56	0.010	25.10	9.91	6,360.10	6,357.73
176	Pipe - (13)	SA3-9	SA3-8	24.0	9.1	6,360.07	6,359.89	0.020	5.82	8.72	6,360.92	6,361.08
177	Pipe - (13) (1)	SA3-10	SA3-8	18.0	19.0	6,360.20	6,359.63	0.030	3.10	8.65	6,360.97	6,361.08
335	Pipe - (14)	SB5-5	SB5-4	36.0	9.0	6,406.76	6,406.56	0.023	16.42	11.86	6,408.06	6,407.58
336	Pipe - (14) (1)	SB5-4	SB5-3	36.0	100.6	6,403.36	6,401.05	0.023	21.76	12.85	6,404.86	6,401.96
161	Pipe - (14) (1) (1)	SB5-2	SB5-1	36.0	280.4	6,391.61	6,386.00	0.020	21.63	10.83	6,393.10	6,389.00
154	Pipe - (14) (1) (2)	SB5-3	SB5-2	36.0	98.5	6,396.22	6,394.00	0.023	21.69	12.74	6,397.71	6,394.92
338	Pipe - (15)	SB5-10	SB5-5	24.0	19.0	6,408.35	6,408.16	0.010	5.83	7.29	6,409.21	6,408.85
206	Pipe - (17)	SA3-3	SA3-2	30.0	126.6	6,330.71	6,328.18	0.020	20.61	12.22	6,332.25	6,329.15
331	Pipe - (18)	SA4-7	SA4-6	18.0	28.1	6,432.73	6,432.45	0.010	6.15	7.02	6,433.69	6,433.24

5-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
333	Pipe - (20)	SA4-6	SA4-5	18.0	38.3	6,432.25	6,431.68	0.015	7.56	8.59	6,433.31	6,433.19
132	Pipe - (21)	SA4-5	SA4-2	18.0	384.8	6,431.48	6,417.63	0.036	7.53	11.86	6,432.54	6,418.21
152	Pipe - (30)	SA3-18	SA3-17	18.0	293.0	6,404.22	6,397.92	0.021	8.42	10.10	6,405.34	6,398.64
162	Pipe - (32)	STM-2	SA3-16	18.0	119.3	6,393.84	6,390.56	0.028	8.26	11.01	6,394.95	6,391.22
163	Pipe - (32) (1)	SA3-16	STM-2	24.0	265.4	6,390.06	6,382.76	0.027	8.22	10.79	6,391.08	6,383.34
167	Pipe - (34)	SA3-15	SA3-13	18.0	19.0	6,380.62	6,380.24	0.020	2.20	6.78	6,381.64	6,381.65
168	Pipe - (34) (1)	SA3-14	SA3-13	18.0	9.0	6,380.42	6,380.24	0.020	7.83	9.61	6,381.50	6,381.65
171	Pipe - (37)	SA3-12	STM-1	24.0	164.5	6,369.35	6,366.97	0.014	17.24	10.42	6,370.85	6,368.01
175	Pipe - (40)	SA3-11	SA3-8	30.0	323.5	6,363.18	6,360.11	0.009	17.00	8.84	6,364.58	6,361.14
137	Pipe - (44)	SA4-4	SA4-3	18.0	28.0	6,419.22	6,418.80	0.015	4.03	7.27	6,420.17	6,420.23
138	Pipe - (70)	SA4-3	SA4-2	18.0	39.1	6,418.60	6,418.21	0.010	7.02	7.25	6,419.63	6,419.05
139	Pipe - (72)	SA4-2	SA4-1	24.0	193.8	6,415.36	6,413.42	0.010	13.55	7.52	6,416.69	6,414.54
153	Pipe - (76)	SA3-20	SA3-18	18.0	19.0	6,404.84	6,404.42	0.023	2.03	6.91	6,405.89	6,405.90
151	Pipe - (77)	SA3-19	SA3-18	18.0	9.0	6,404.62	6,404.42	0.023	6.66	9.67	6,405.86	6,405.90
326	Pipe - (112)	SB5-14	SB5-13	18.0	28.0	6,414.33	6,413.36	0.034	1.92	7.90	6,414.85	6,414.52
327	Pipe - (113)	SB5-13	SB5-12	18.0	48.1	6,413.16	6,412.68	0.010	5.99	6.94	6,414.11	6,413.78
329	Pipe - (114)	SB5-12	SB5-11	24.0	192.9	6,412.48	6,410.55	0.010	5.97	6.85	6,413.35	6,411.20
339	Pipe - (114) (1)	SB5-11	SB5-5	24.0	250.0	6,410.26	6,407.76	0.010	5.89	6.83	6,411.12	6,408.71
172	Pipe - (115)	SB6-4	SB6-3	18.0	41.1	6,366.15	6,365.73	0.010	6.37	7.07	6,367.12	6,366.52
173	Pipe - (116)	SB6-3	SB6-2	18.0	314.4	6,365.03	6,357.48	0.024	9.29	10.79	6,366.21	6,358.69
188	Pipe - (116) (2)	SB6-2	SB6-1	18.0	162.6	6,357.28	6,355.66	0.010	9.16	6.69	6,358.45	6,356.74
346	Pipe - (117)	SB2-9	SB2-8	18.0	28.0	6,356.53	6,356.25	0.010	2.99	5.78	6,357.19	6,357.18
347	Pipe - (118)	SB2-8	SB2-6	18.0	50.6	6,356.05	6,355.54	0.010	4.34	6.40	6,356.85	6,356.56
156	Pipe - (121)	SB3-13	SB3-11	18.0	19.7	6,393.51	6,393.31	0.010	1.46	4.71	6,394.22	6,394.24
157	Pipe - (121) (1)	SB3-12	SB3-11	18.0	9.0	6,395.08	6,394.81	0.030	2.63	8.25	6,395.69	6,395.24
349	Pipe - (123)	SB3-11	SB3-10	24.0	56.7	6,393.28	6,391.67	0.029	3.91	8.81	6,393.98	6,392.07
350	Pipe - (123) (1)	SB3-10	SB3-7	24.0	246.8	6,390.67	6,377.96	0.051	9.04	13.86	6,391.74	6,378.48
164	Pipe - (124)	SB3-8	SB3-7	18.0	9.0	6,380.84	6,380.46	0.042	2.32	8.99	6,381.42	6,380.84
165	Pipe - (124) (1)	SB3-9	SB3-7	18.0	19.0	6,380.84	6,380.46	0.020	5.03	8.58	6,381.70	6,381.09
191	Pipe - (126)	SB3-4	SB3-3	18.0	9.0	6,350.67	6,350.49	0.020	4.92	8.53	6,352.11	6,352.10

5-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
190	Pipe - (126) (1)	SB3-5	SB3-3	18.0	19.0	6,350.89	6,350.49	0.021	1.99	6.70	6,352.09	6,352.10
127	Pipe - (133) (1)	SB7-2	SB7-1	24.0	82.7	6,462.26	6,461.63	0.008	3.77	5.44	6,462.94	6,462.18
136	Pipe - (134)	SD1-2	SD1-1	24.0	115.7	6,428.68	6,425.47	0.028	8.58	9.71	6,429.72	6,426.12
135	Pipe - (135)	SD2-2	SD2-1	18.0	56.0	6,432.20	6,429.54	0.047	6.01	10.92	6,433.15	6,430.07
133	Pipe - (136)	SD2-3	SD2-2	15.0	49.9	6,434.56	6,432.40	0.043	6.02	12.06	6,435.55	6,432.97
209	Pipe - (139)	SA1-2	SA1-1	36.0	44.7	6,306.42	6,306.13	0.006	10.70	5.91	6,307.45	6,307.05
210	Pipe - (139) (1)	SA1-3	SA1-2	36.0	41.5	6,310.59	6,309.76	0.020	10.70	9.96	6,311.62	6,310.45
203	Pipe - (143)	SB2-4	SB2-3	24.0	9.1	6,345.68	6,345.57	0.013	2.29	0.73	6,348.61	6,348.61
144	Pipe - (157)	SB5-9	SB5-7	18.0	19.3	6,410.51	6,410.32	0.010	1.96	5.13	6,411.58	6,411.59
145	Pipe - (158)	SB5-7	SB5-6	18.0	53.4	6,410.12	6,409.58	0.010	5.93	6.95	6,411.06	6,410.33
146	Pipe - (159)	SB5-6	SB5-5	18.0	111.6	6,409.38	6,408.26	0.010	5.91	6.94	6,410.32	6,408.99
357	Pipe - (161)	SB3-15	SB3-14	18.0	19.0	6,394.95	6,394.76	0.010	2.50	5.50	6,395.87	6,395.88
355	Pipe - (161) (1)	SB3-16	SB3-14	18.0	91.2	6,399.03	6,394.76	0.047	3.52	10.51	6,399.75	6,395.88
354	Pipe - (161) (2)	SB3-17	SB3-16	18.0	9.9	6,399.33	6,399.23	0.011	3.52	6.61	6,400.05	6,399.82
193	Pipe - (163)	SB2-5	SB2-3	18.0	259.1	6,351.51	6,345.82	0.022	4.27	8.48	6,352.30	6,348.61
189	Pipe - (163) (1)	STM-3	SB2-5	18.0	192.5	6,355.13	6,353.10	0.011	4.32	6.52	6,355.92	6,353.70
184	Pipe - (164)	SB2-6	STM-3	18.0	19.8	6,355.34	6,355.13	0.011	4.33	6.53	6,356.13	6,355.78
174	Pipe - (167)	STM-1	SA3-11	24.0	226.6	6,366.97	6,363.68	0.014	17.14	10.41	6,368.46	6,364.72
169	Pipe - (168)	SA3-13	SA3-12	24.0	353.0	6,379.40	6,369.52	0.028	17.42	13.35	6,380.91	6,370.38
170	Pipe - (169)	STM-2	SA3-13	24.0	89.2	6,382.76	6,380.31	0.028	8.14	10.75	6,383.77	6,381.65
155	Pipe - (170)	SA3-17	STM-2	18.0	141.4	6,397.72	6,393.84	0.027	8.31	11.02	6,398.84	6,394.50
187	Pipe - (238)	SA3-5A	SA3-5	18.0	28.3	6,350.86	6,350.29	0.020	4.00	8.04	6,351.62	6,350.82
179	Pipe - (241) (1)	SB3-6	SB3-3	24.0	283.0	6,358.90	6,349.99	0.032	15.49	13.51	6,360.32	6,352.10
192	Pipe - (243)	SB3-3	SB3-2	30.0	76.9	6,349.46	6,347.15	0.030	21.97	14.40	6,351.05	6,348.82
194	Pipe - (244)	SB3-2	SB3-1	30.0	103.6	6,346.95	6,344.88	0.020	21.92	11.00	6,348.55	6,348.58
166	Pipe - (245)	SB3-7	SB3-6	24.0	362.3	6,375.96	6,359.66	0.045	15.66	15.43	6,377.39	6,360.38
180	Pipe - (246)	SA3-7	SA3-6	36.0	225.4	6,355.64	6,351.13	0.020	24.92	12.71	6,357.25	6,352.09
341	Pipe - (247)	SB5-8	SB5-7	18.0	9.6	6,411.48	6,411.34	0.015	4.27	7.90	6,412.27	6,411.97
356	Pipe - (248)	SB3-14	SB3-10	18.0	62.2	6,394.56	6,391.67	0.047	5.74	12.06	6,395.48	6,392.16

5-Year Event

Manhole Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Headloss Coefficient (Standard)
123	SA1-2	6,316.72	6,316.72	6,306.42	10.70	1.03	6,307.45	6,307.47	0.050
212	SA1-3	6,314.42	6,314.42	6,310.59	10.70	1.03	6,311.62	6,311.62	0.000
121	SA2-2	6,333.62	6,333.62	6,316.07	14.57	1.29	6,317.36	6,317.39	0.050
119	SA2-3	6,335.79	6,335.79	6,324.43	14.61	1.28	6,325.71	6,325.76	0.100
106	SA2-4	6,352.68	6,352.68	6,336.01	9.09	1.08	6,337.09	6,337.18	0.200
104	SA2-5	6,357.05	6,357.05	6,345.36	9.17	1.08	6,346.44	6,346.49	0.100
105	SA2-6	6,357.04	6,357.04	6,346.15	4.15	0.78	6,346.93	6,346.95	0.050
87	SA3-10	6,367.95	6,367.95	6,360.20	3.10	0.77	6,360.97	6,360.98	0.050
83	SA3-11	6,372.37	6,372.37	6,363.18	17.00	1.40	6,364.58	6,364.60	0.050
80	SA3-12	6,378.99	6,378.99	6,369.35	17.24	1.50	6,370.85	6,370.88	0.050
76	SA3-13	6,388.87	6,388.87	6,379.40	17.42	1.51	6,380.91	6,381.65	1.020
77	SA3-14	6,388.57	6,388.57	6,380.32	7.83	1.18	6,381.50	6,381.53	0.050
78	SA3-15	6,388.56	6,388.56	6,380.52	2.20	1.12	6,381.64	6,381.64	0.050
70	SA3-16	6,398.77	6,398.77	6,390.06	8.22	1.02	6,391.08	6,391.10	0.050
63	SA3-17	6,406.00	6,406.00	6,397.72	8.31	1.12	6,398.84	6,398.87	0.050
59	SA3-18	6,413.93	6,413.93	6,404.22	8.42	1.12	6,405.34	6,405.90	1.020
62	SA3-19	6,413.63	6,413.63	6,404.62	6.66	1.24	6,405.86	6,405.87	0.050
317	SA3-1A	6,333.21	6,333.21	6,316.15	42.22	2.02	6,318.17	6,318.17	(N/A)
117	SA3-2	6,338.91	6,338.91	6,322.67	42.25	2.02	6,324.69	6,325.54	1.020
61	SA3-20	6,413.63	6,413.63	6,404.84	2.03	1.05	6,405.89	6,405.89	0.050
118	SA3-3	6,336.18	6,336.18	6,330.71	20.61	1.54	6,332.25	6,332.28	0.050
113	SA3-4	6,346.76	6,346.76	6,329.74	27.92	1.71	6,331.45	6,331.73	0.400
314	SA3-4A	6,355.80	6,355.80	6,337.09	27.99	1.71	6,338.80	6,338.80	(N/A)
95	SA3-5	6,362.52	6,362.52	6,343.59	28.07	1.72	6,345.31	6,346.02	1.020
97	SA3-5A	6,361.54	6,361.54	6,350.86	4.00	0.76	6,351.62	6,351.64	0.050
94	SA3-6	6,363.46	6,363.46	6,350.02	24.76	1.61	6,351.63	6,352.48	1.320
89	SA3-7	6,366.01	6,366.01	6,355.64	24.92	1.61	6,357.25	6,357.28	0.050
85	SA3-8	6,368.26	6,368.26	6,358.48	25.10	1.62	6,360.10	6,361.08	1.520
86	SA3-9	6,367.99	6,367.99	6,360.07	5.82	0.85	6,360.92	6,360.94	0.050
46	SA4-2	6,427.19	6,427.19	6,415.36	13.55	1.33	6,416.69	6,417.28	1.020

5-Year Event

Manhole Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Headloss Coefficient (Standard)
44	SA4-3	6,426.91	6,426.91	6,418.60	7.02	0.54	6,419.63	6,420.23	1.320
45	SA4-4	6,426.91	6,426.91	6,419.22	4.03	0.60	6,420.17	6,420.18	0.050
38	SA4-5	6,440.17	6,440.17	6,431.48	7.53	1.06	6,432.54	6,433.19	1.320
37	SA4-6	6,441.08	6,441.08	6,432.25	7.56	1.07	6,433.31	6,433.34	0.050
36	SA4-7	6,441.14	6,441.14	6,432.73	6.15	0.96	6,433.69	6,433.71	0.050
321	SB1-2	6,344.10	6,344.10	6,331.90	20.70	1.34	6,333.24	6,333.24	(N/A)
108	SB1-3	6,354.28	6,354.28	6,335.15	20.70	1.49	6,336.64	6,336.67	0.050
107	SB1-4	6,353.13	6,353.13	6,337.30	20.70	1.39	6,338.69	6,338.72	0.050
218	SB1-5	6,345.25	6,345.25	6,341.15	20.70	1.39	6,342.54	6,342.54	0.000
109	SB2-2	6,350.89	6,350.89	6,344.38	6.72	4.21	6,348.58	6,348.59	0.050
110	SB2-3	6,351.20	6,351.20	6,345.07	5.65	3.52	6,348.59	6,348.61	1.020
111	SB2-4	6,350.89	6,350.89	6,345.51	2.29	3.10	6,348.61	6,348.61	0.050
102	SB2-5	6,357.58	6,357.58	6,351.51	4.27	0.79	6,352.30	6,352.31	0.050
93	SB2-6	6,364.34	6,364.34	6,355.34	4.33	0.79	6,356.13	6,356.56	1.320
91	SB2-8	6,365.03	6,365.03	6,356.05	4.34	0.80	6,356.85	6,357.18	1.020
92	SB2-9	6,365.03	6,365.03	6,356.53	2.99	0.66	6,357.19	6,357.20	0.050
348	SB3-10	6,403.21	6,403.21	6,390.67	9.04	1.07	6,391.74	6,391.74	(N/A)
64	SB3-11	6,404.64	6,404.64	6,392.37	3.91	1.61	6,393.98	6,394.24	1.020
66	SB3-12	6,404.34	6,404.34	6,395.08	2.63	0.61	6,395.69	6,395.70	0.050
65	SB3-13	6,404.55	6,404.55	6,393.51	1.46	0.71	6,394.22	6,394.25	0.640
351	SB3-14	6,403.61	6,403.61	6,394.56	5.74	0.92	6,395.48	6,395.88	1.020
68	SB3-15	6,402.89	6,402.89	6,394.95	2.50	0.92	6,395.87	6,395.87	0.050
352	SB3-16	6,404.78	6,404.78	6,399.03	3.52	0.72	6,399.75	6,399.80	0.200
353	SB3-17	6,404.64	6,404.64	6,399.33	3.52	0.72	6,400.05	6,400.06	0.050
103	SB3-2	6,357.32	6,357.32	6,346.95	21.92	1.60	6,348.55	6,348.82	0.400
100	SB3-3	6,359.23	6,359.23	6,349.46	21.97	1.59	6,351.05	6,352.10	1.520
101	SB3-4	6,358.92	6,358.92	6,350.67	4.92	1.44	6,352.11	6,352.11	0.050
99	SB3-5	6,358.92	6,358.92	6,350.89	1.99	1.20	6,352.09	6,352.10	0.050
88	SB3-6	6,367.83	6,367.83	6,358.90	15.49	1.42	6,360.32	6,360.37	0.070
73	SB3-7	6,389.32	6,389.32	6,375.96	15.66	1.43	6,377.39	6,378.26	1.320

5-Year Event

Manhole Table - Time: 0.00 hours

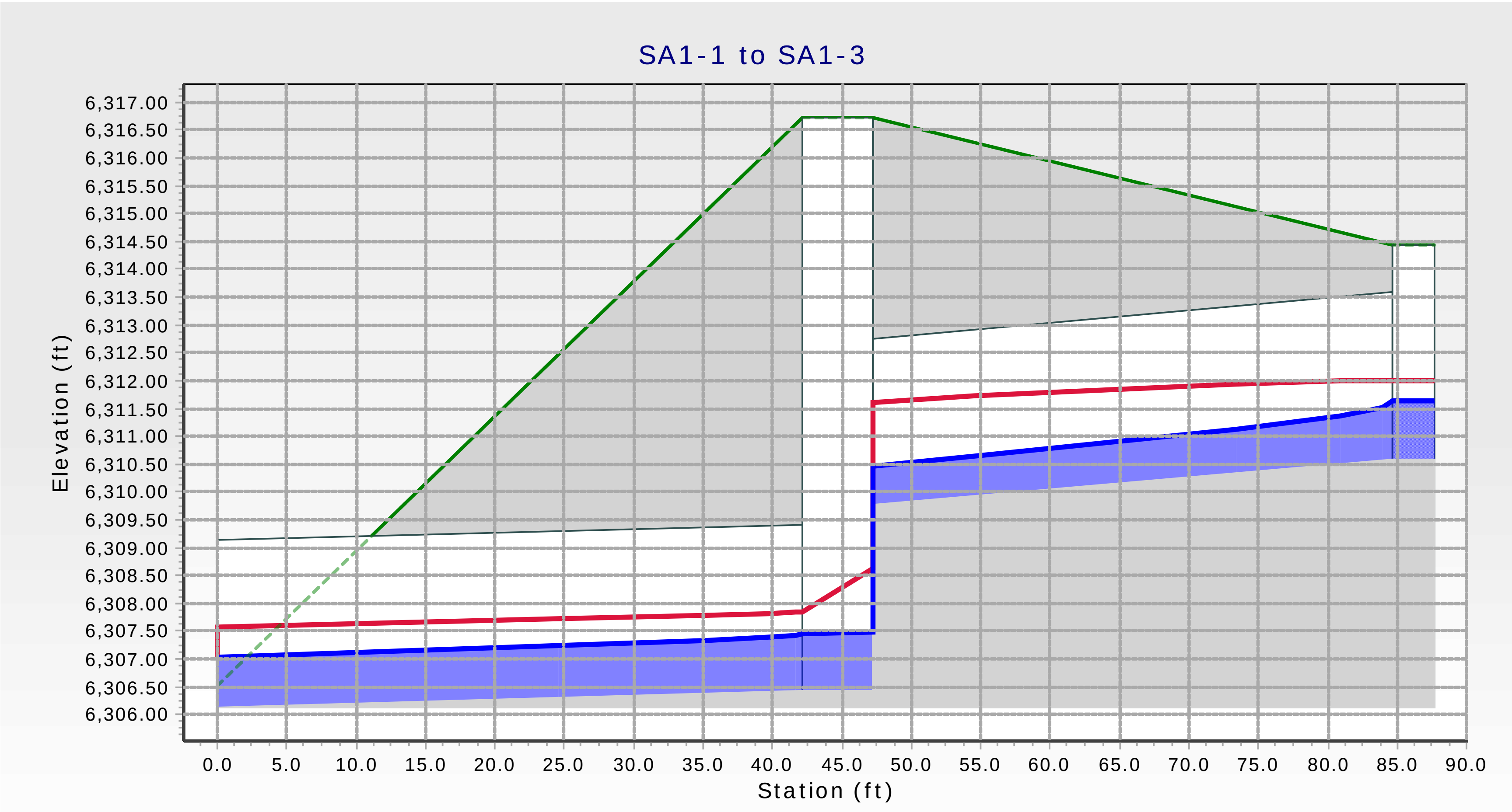
ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Headloss Coefficient (Standard)
75	SB3-8	6,389.01	6,389.01	6,380.84	2.32	0.58	6,381.42	6,381.43	0.050
74	SB3-9	6,389.01	6,389.01	6,380.84	5.03	0.86	6,381.70	6,381.72	0.050
337	SB5-10	6,415.82	6,415.82	6,408.35	5.83	0.86	6,409.21	6,409.22	0.050
328	SB5-11	6,418.97	6,418.97	6,410.26	5.89	0.86	6,411.12	6,411.14	0.050
50	SB5-12	6,421.36	6,421.36	6,412.48	5.97	0.87	6,413.35	6,413.78	1.320
49	SB5-13	6,422.34	6,422.34	6,413.16	5.99	0.95	6,414.11	6,414.52	1.020
48	SB5-14	6,422.34	6,422.34	6,414.33	1.92	0.52	6,414.85	6,414.86	0.050
69	SB5-2	6,400.09	6,400.09	6,391.61	21.63	1.49	6,393.10	6,393.16	0.100
60	SB5-3	6,409.49	6,409.49	6,396.22	21.69	1.49	6,397.71	6,397.74	0.050
334	SB5-4	6,415.82	6,415.82	6,403.36	21.76	1.50	6,404.86	6,404.89	0.050
54	SB5-5	6,416.13	6,416.13	6,406.76	16.42	1.30	6,408.06	6,408.71	1.320
53	SB5-6	6,417.65	6,417.65	6,409.38	5.91	0.94	6,410.32	6,410.35	0.070
51	SB5-7	6,419.38	6,419.38	6,410.12	5.93	0.94	6,411.06	6,411.59	1.320
340	SB5-8	6,419.32	6,419.32	6,411.48	4.27	0.79	6,412.27	6,412.29	0.050
52	SB5-9	6,419.21	6,419.21	6,410.51	1.96	1.07	6,411.58	6,411.59	0.050
96	SB6-2	6,370.74	6,370.74	6,357.28	9.16	1.17	6,358.45	6,358.69	0.400
82	SB6-3	6,373.74	6,373.74	6,365.03	9.29	1.18	6,366.21	6,366.45	0.400
81	SB6-4	6,374.15	6,374.15	6,366.15	6.37	0.97	6,367.12	6,367.14	0.050
226	SB7-2	6,464.26	6,464.26	6,462.26	3.77	1.74	6,462.94	6,462.94	0.000
224	SD1-2	6,430.68	6,430.68	6,428.68	8.58	1.04	6,429.72	6,429.72	0.000
40	SD2-2	6,439.79	6,439.79	6,432.20	6.01	0.95	6,433.15	6,433.15	0.000
225	SD2-3	6,435.90	6,435.90	6,434.56	6.02	0.99	6,435.55	6,435.55	0.000
221	STM-1	6,375.24	6,375.24	6,366.97	17.14	1.49	6,368.46	6,368.46	0.000
222	STM-2	6,391.36	6,391.36	6,382.76	8.14	1.02	6,383.77	6,383.77	0.000
345	STM-2	6,402.10	6,402.10	6,393.84	8.26	1.11	6,394.95	6,394.95	0.000
220	STM-3	6,363.59	6,363.59	6,355.13	4.32	0.79	6,355.92	6,355.92	0.000

5-Year Event

Outfall Table - Time: 0.00 hours

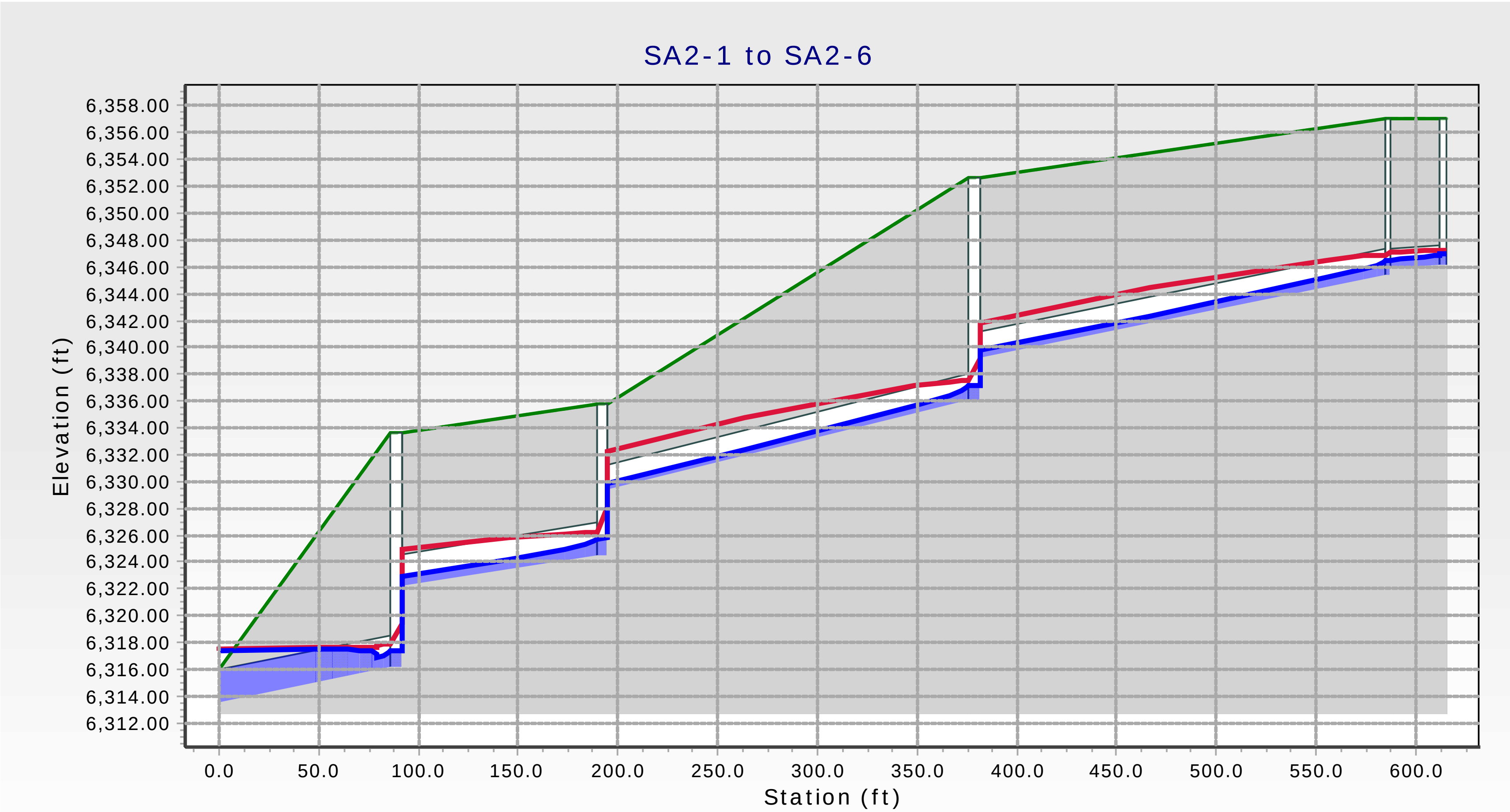
ID	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	System Flow Time (min)	Notes
32	SB7-1	6,462.44	6,460.83	0.00	6,462.18	3.74	15.953	18" FES
41	SD2-1	6,431.04	6,429.54	0.00	6,430.07	6.00	19.555	15" FES
43	SD1-1	6,427.47	6,426.00	0.00	6,426.12	8.54	19.599	24" FES
58	SA4-1	6,415.56	6,413.42	0.00	6,414.54	13.37	15.643	24" FES
72	SB5-1	6,389.00	6,389.00	0.00	6,389.00	21.40	22.374	24" FES
112	SB6-1	6,355.66	6,355.66	6,348.58	6,356.74	9.05	17.459	18" FES
120	SB1-1	6,331.90	6,331.90	0.00	6,332.92	20.70	0.343	48" FES
211	SA2-1	6,315.97	6,312.72	6,317.41	6,317.41	14.52	23.484	FOREBAY
213	SA1-1	6,306.51	6,306.51	0.00	6,307.05	10.70	0.195	36" FES
215	SA3-1	6,319.15	6,314.82	6,317.41	6,317.34	42.13	39.890	FOREBAY
216	SB3-1	6,345.21	6,343.40	6,348.58	6,348.58	21.83	19.073	30" FES
219	SB2-1	6,345.52	6,343.36	6,348.58	6,348.58	6.58	22.692	FOREBAY

5-Year Event



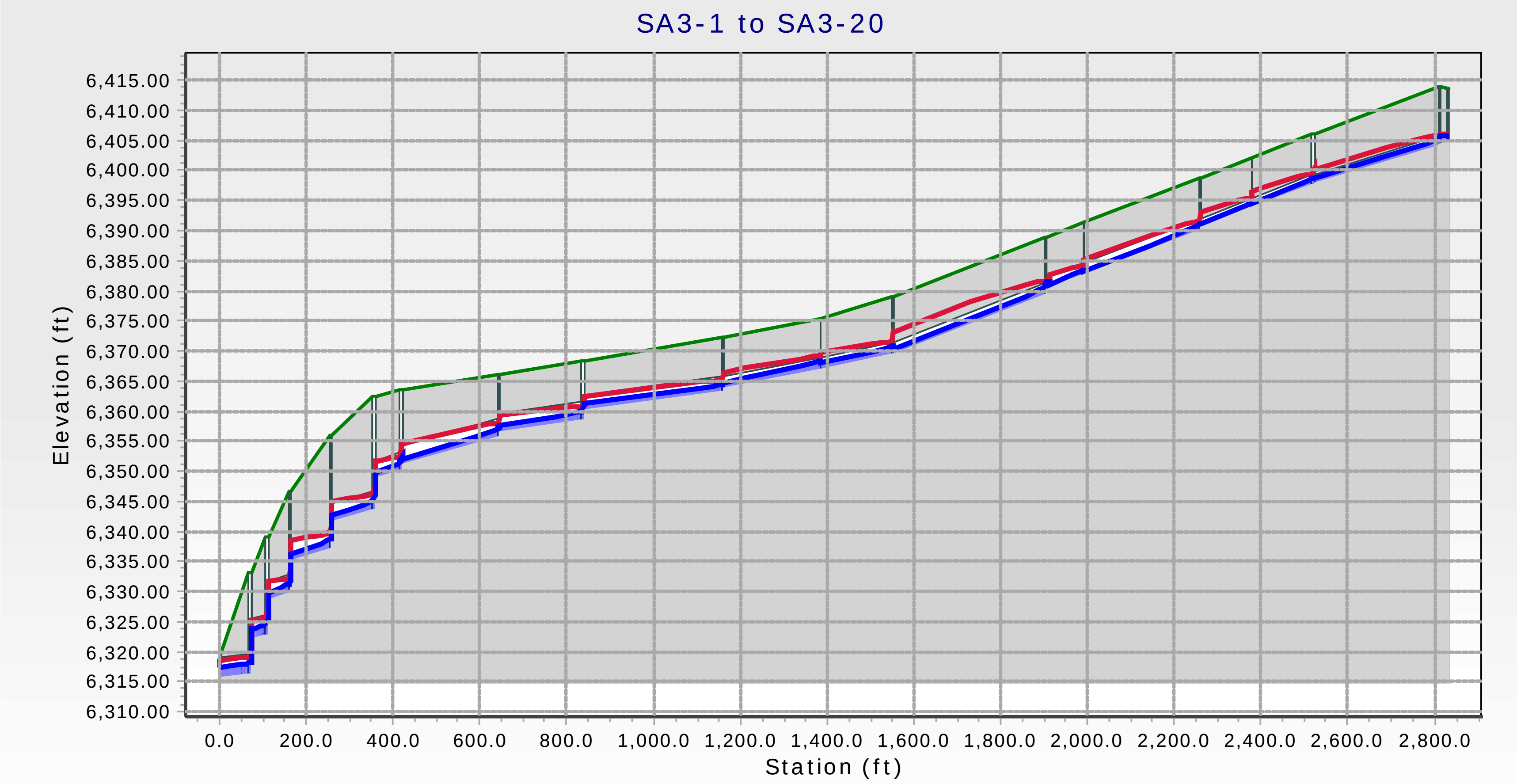
SA1-1 to SA1-3
6,317.00
6,316.50
6,316.00
6,315.50
6,315.00
6,314.50
6,314.00
6,313.50
6,313.00
6,312.50
6,312.00
6,311.50
6,311.00
6,310.50
6,310.00
6,309.50
6,309.00
6,308.50
6,308.00
6,307.50
6,307.00
6,306.50
6,306.00
Elevation (ft)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
Station (ft)

5-Year Event



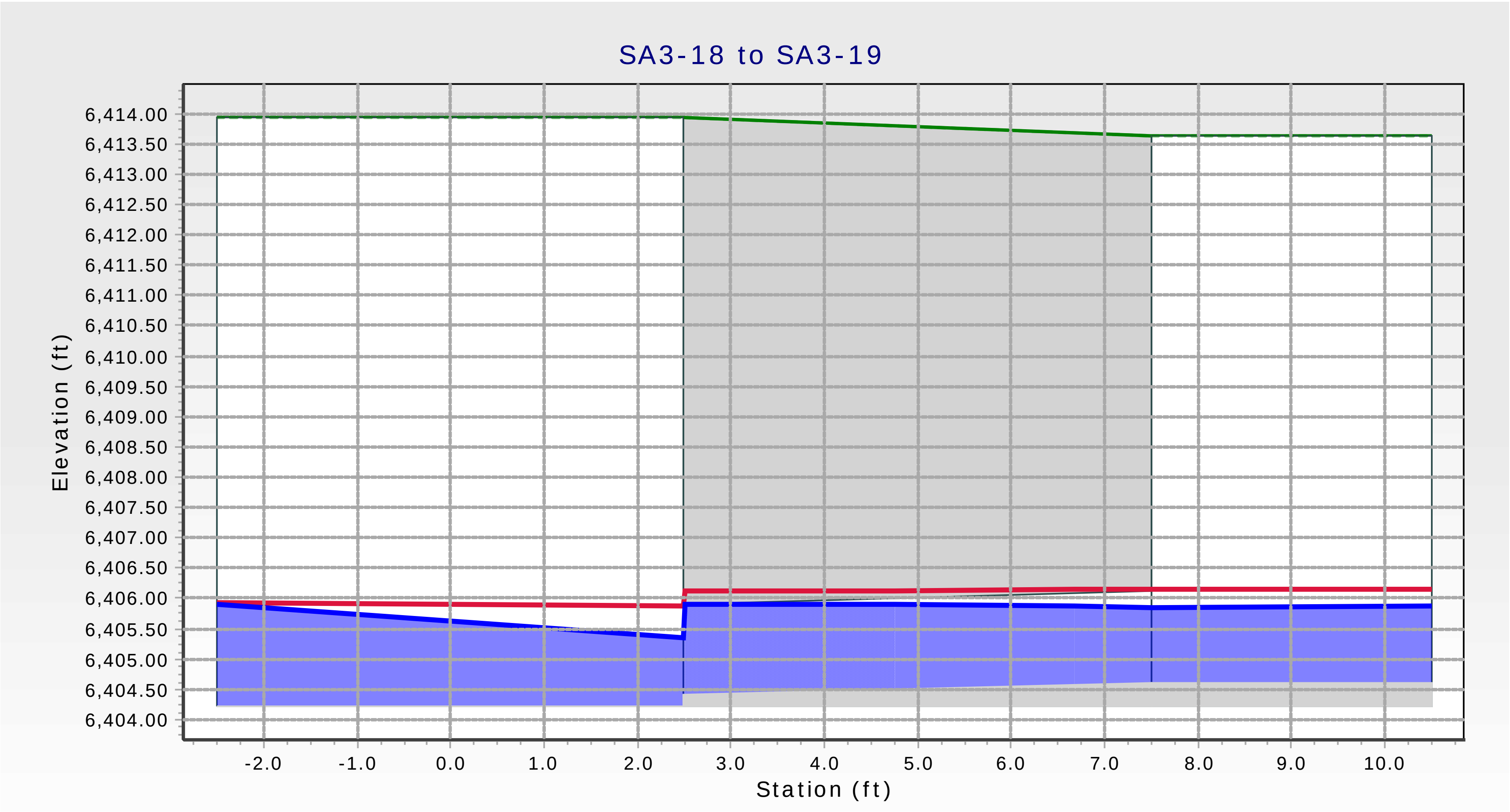
SA2-1 to SA2-6
Elevation (ft)
6,358.00
6,356.00
6,354.00
6,352.00
6,350.00
6,348.00
6,346.00
6,344.00
6,342.00
6,340.00
6,338.00
6,336.00
6,334.00
6,332.00
6,330.00
6,328.00
6,326.00
6,324.00
6,322.00
6,320.00
6,318.00
6,316.00
6,314.00
6,312.00
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
Station (ft)

5-Year Event

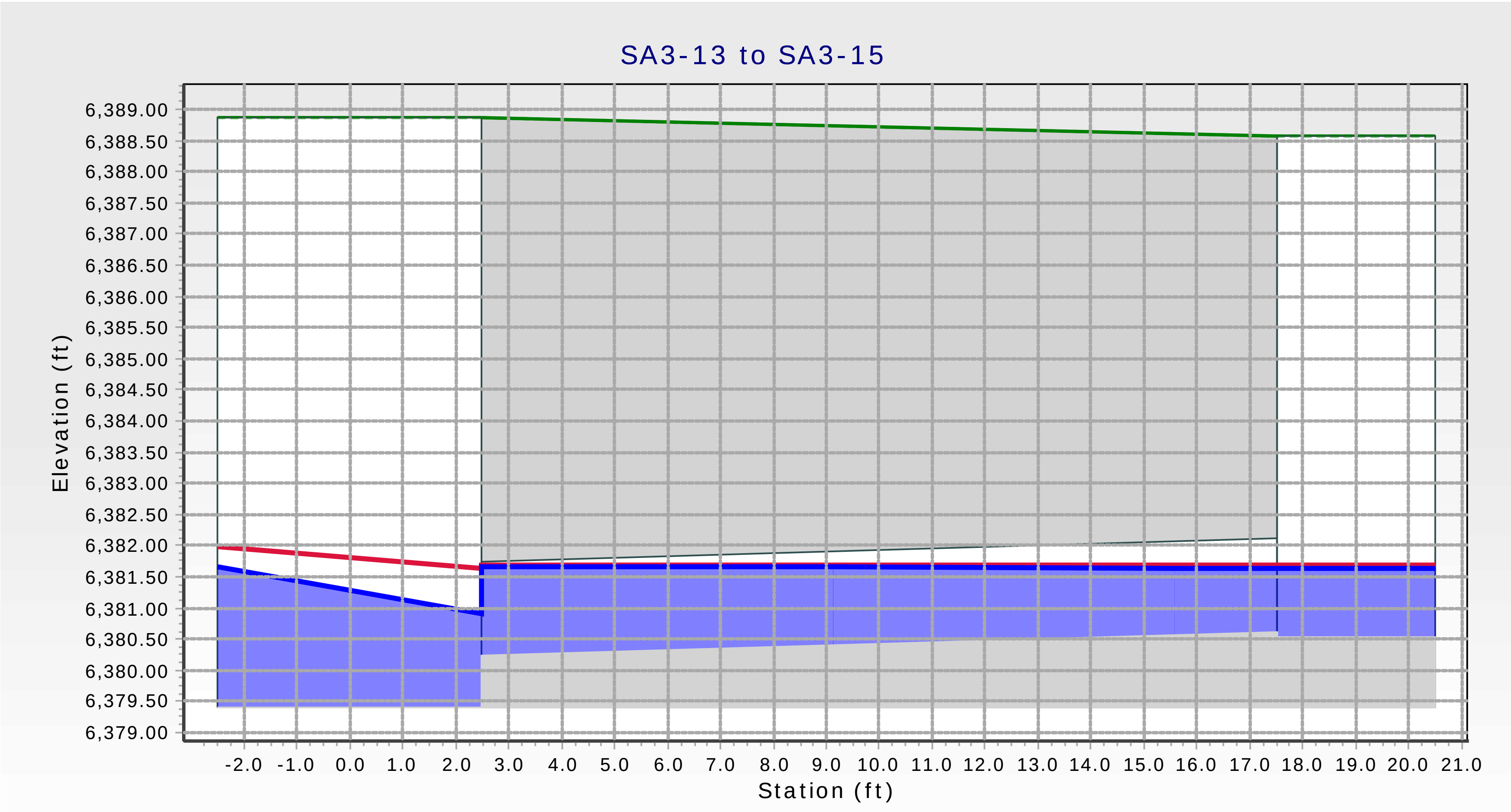


SA3-1 to SA3-20
Elevation (ft)
6,415.00
6,410.00
6,405.00
6,400.00
6,395.00
6,390.00
6,385.00
6,380.00
6,375.00
6,370.00
6,365.00
6,360.00
6,355.00
6,350.00
6,345.00
6,340.00
6,335.00
6,330.00
6,325.00
6,320.00
6,315.00
6,310.00
0.0
200.0
400.0
600.0
800.0
1,000.0
1,200.0
1,400.0
1,600.0
1,800.0
2,000.0
2,200.0
2,400.0
2,600.0
2,800.0
Station (ft)

5-Year Event

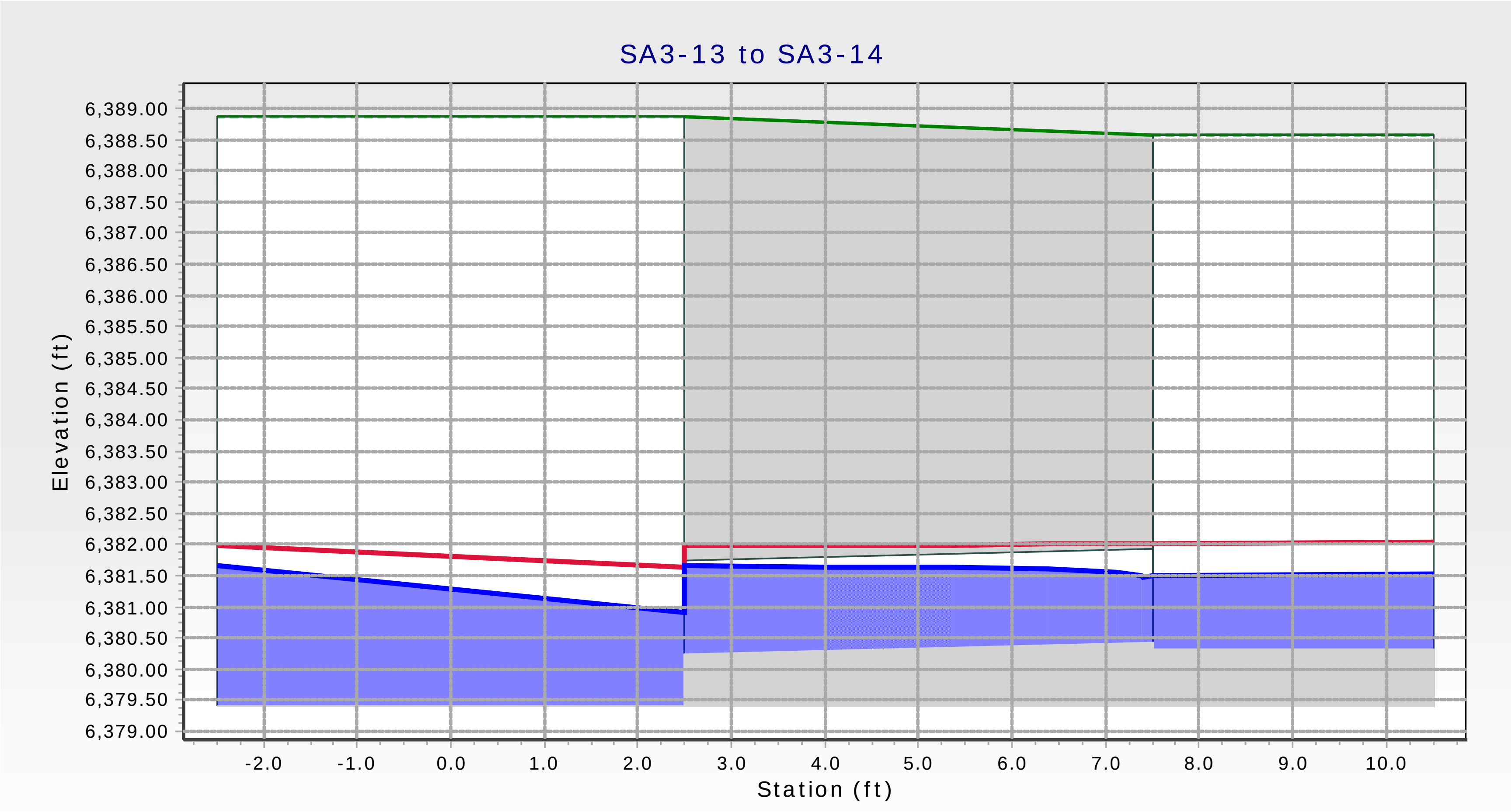

SA3-18 to SA3-19
6,414.00
6,413.50
6,413.00
6,412.50
6,412.00
6,411.50
6,411.00
6,410.50
6,410.00
6,409.50
6,409.00
6,408.50
6,408.00
6,407.50
6,407.00
6,406.50
6,406.00
6,405.50
6,405.00
6,404.50
6,404.00
Elevation (ft)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

5-Year Event



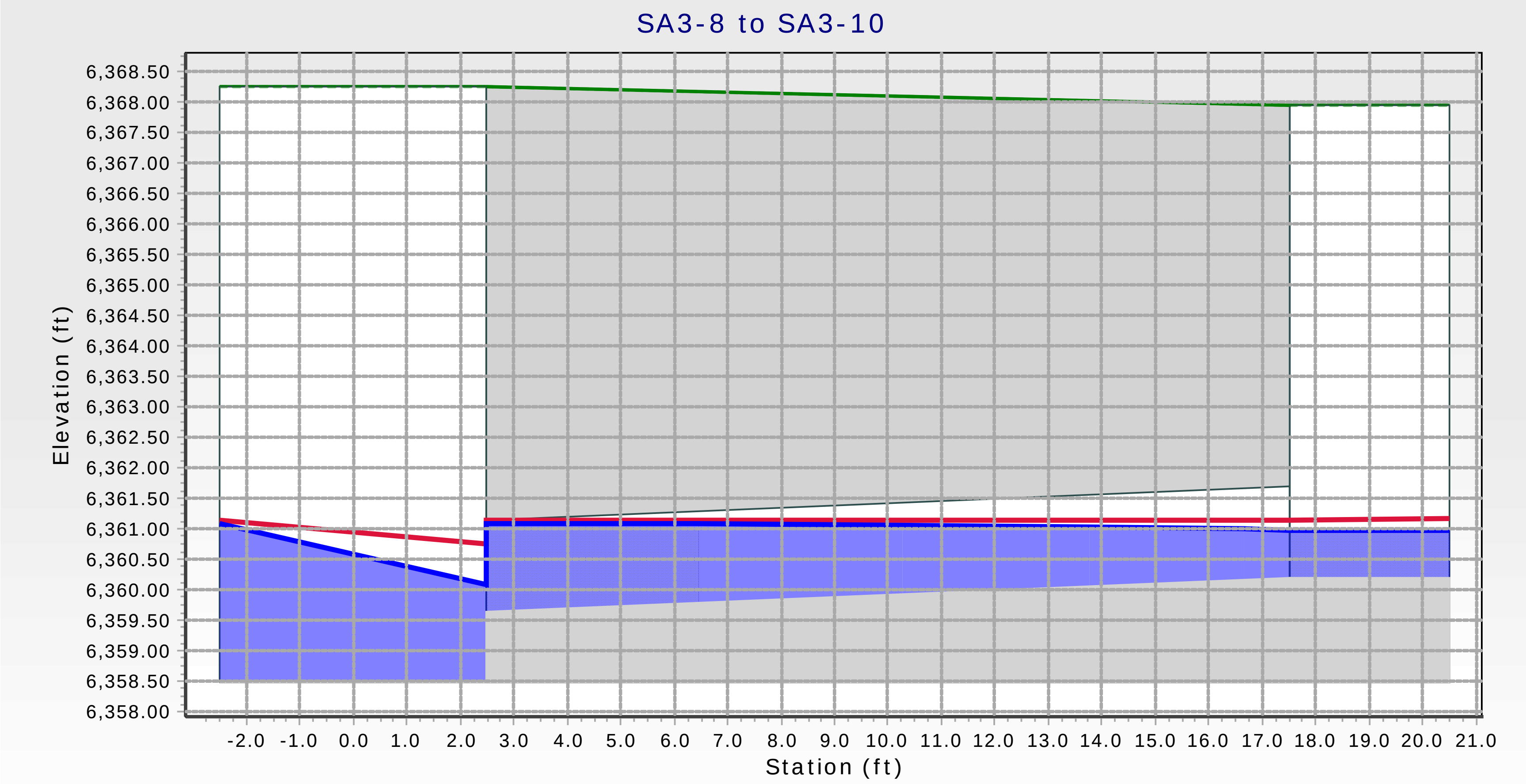
SA3-13 to SA3-15
Elevation (ft)
6,389.00
6,388.50
6,388.00
6,387.50
6,387.00
6,386.50
6,386.00
6,385.50
6,385.00
6,384.50
6,384.00
6,383.50
6,383.00
6,382.50
6,382.00
6,381.50
6,381.00
6,380.50
6,380.00
6,379.50
6,379.00
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0
Station (ft)

5-Year Event



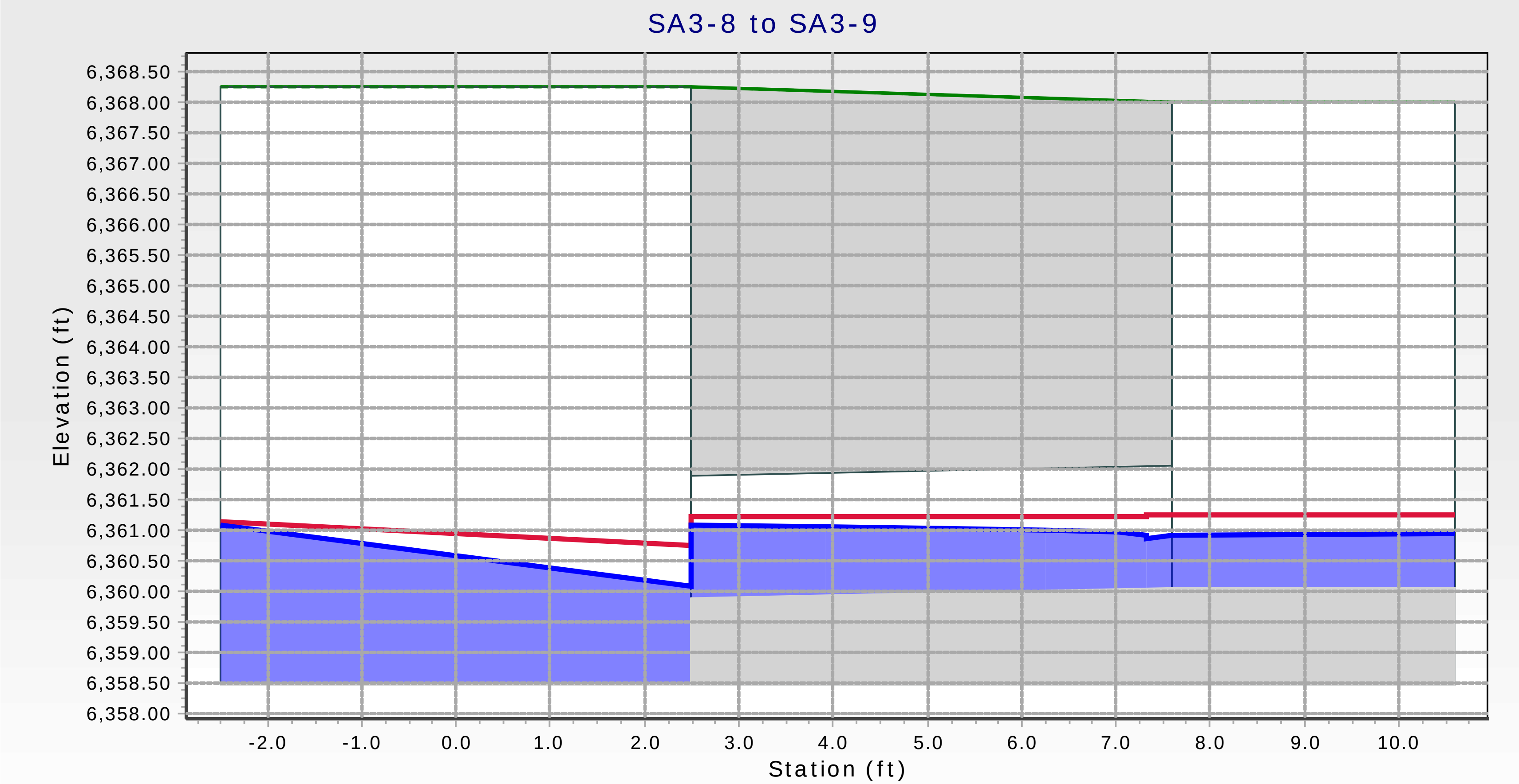
SA3-13 to SA3-14
Elevation (ft)
6,389.00
6,388.50
6,388.00
6,387.50
6,387.00
6,386.50
6,386.00
6,385.50
6,385.00
6,384.50
6,384.00
6,383.50
6,383.00
6,382.50
6,382.00
6,381.50
6,381.00
6,380.50
6,380.00
6,379.50
6,379.00
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

5-Year Event

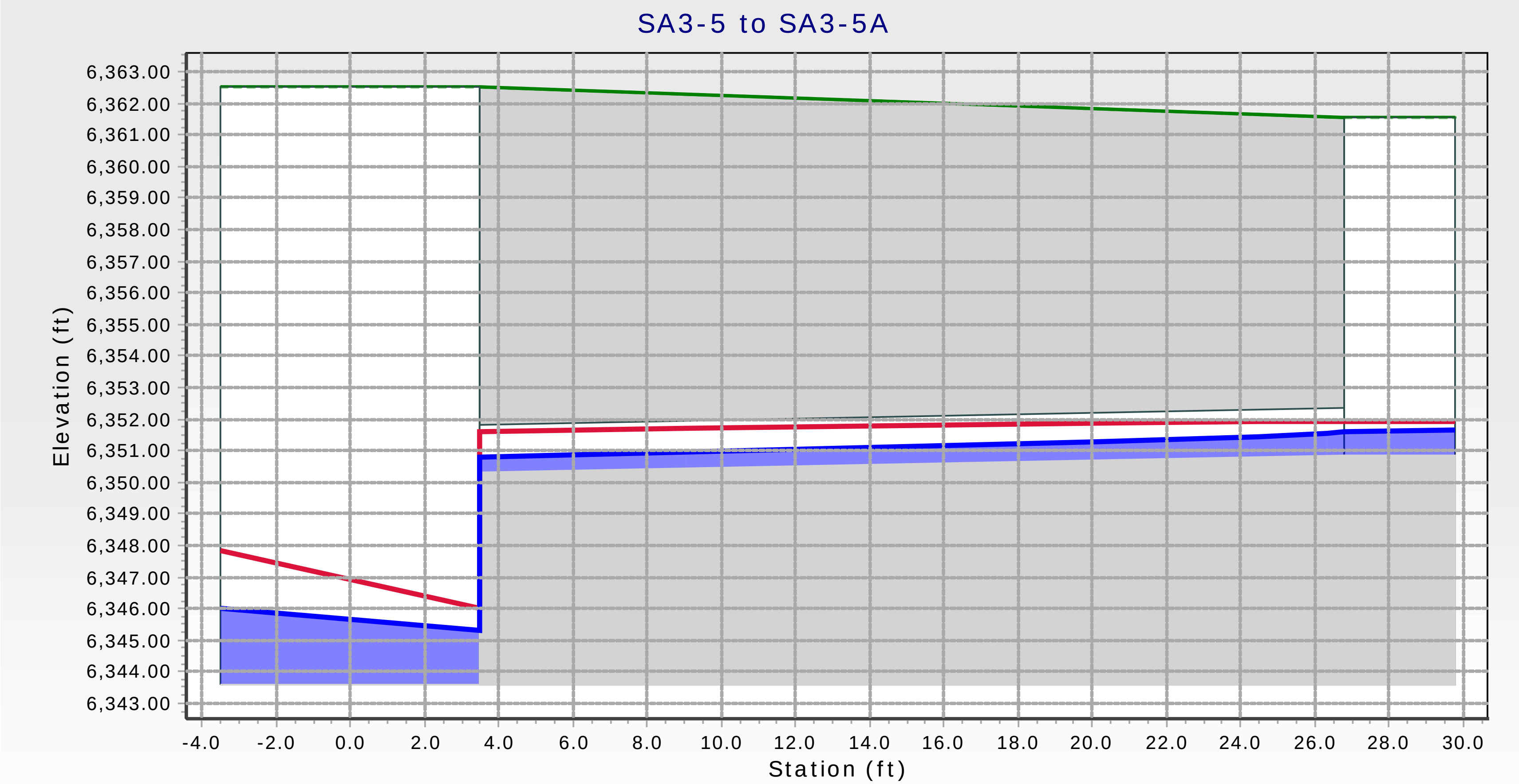


SA3-8 to SA3-10
6,368.50
6,368.00
6,367.50
6,367.00
6,366.50
6,366.00
6,365.50
6,365.00
6,364.50
6,364.00
6,363.50
6,363.00
6,362.50
6,362.00
6,361.50
6,361.00
6,360.50
6,360.00
6,359.50
6,359.00
6,358.50
6,358.00
Elevation (ft)
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0
Station (ft)

5-Year Event

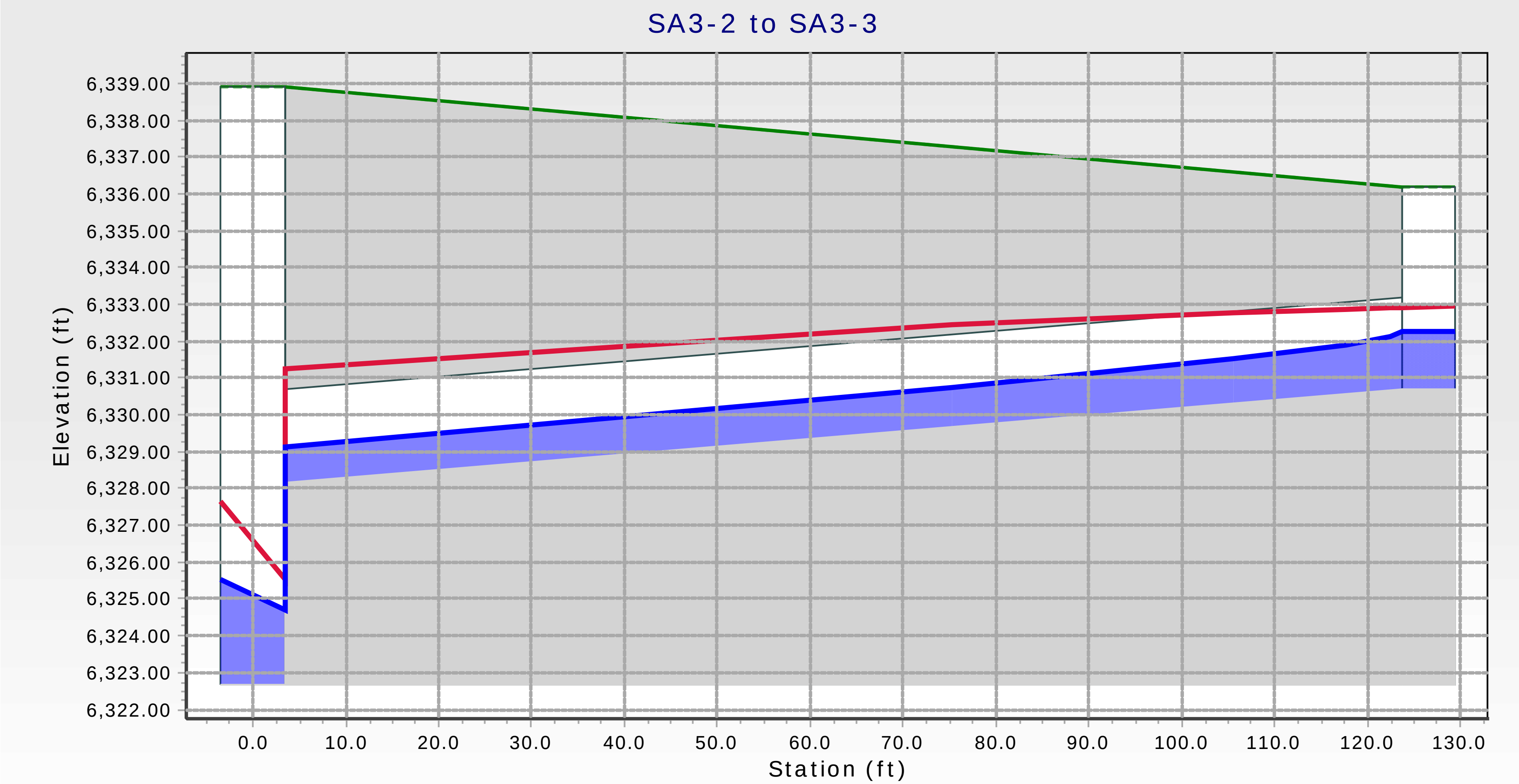

SA3-8 to SA3-9
Elevation (ft)
6,368.50
6,368.00
6,367.50
6,367.00
6,366.50
6,366.00
6,365.50
6,365.00
6,364.50
6,364.00
6,363.50
6,363.00
6,362.50
6,362.00
6,361.50
6,361.00
6,360.50
6,360.00
6,359.50
6,359.00
6,358.50
6,358.00
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

5-Year Event



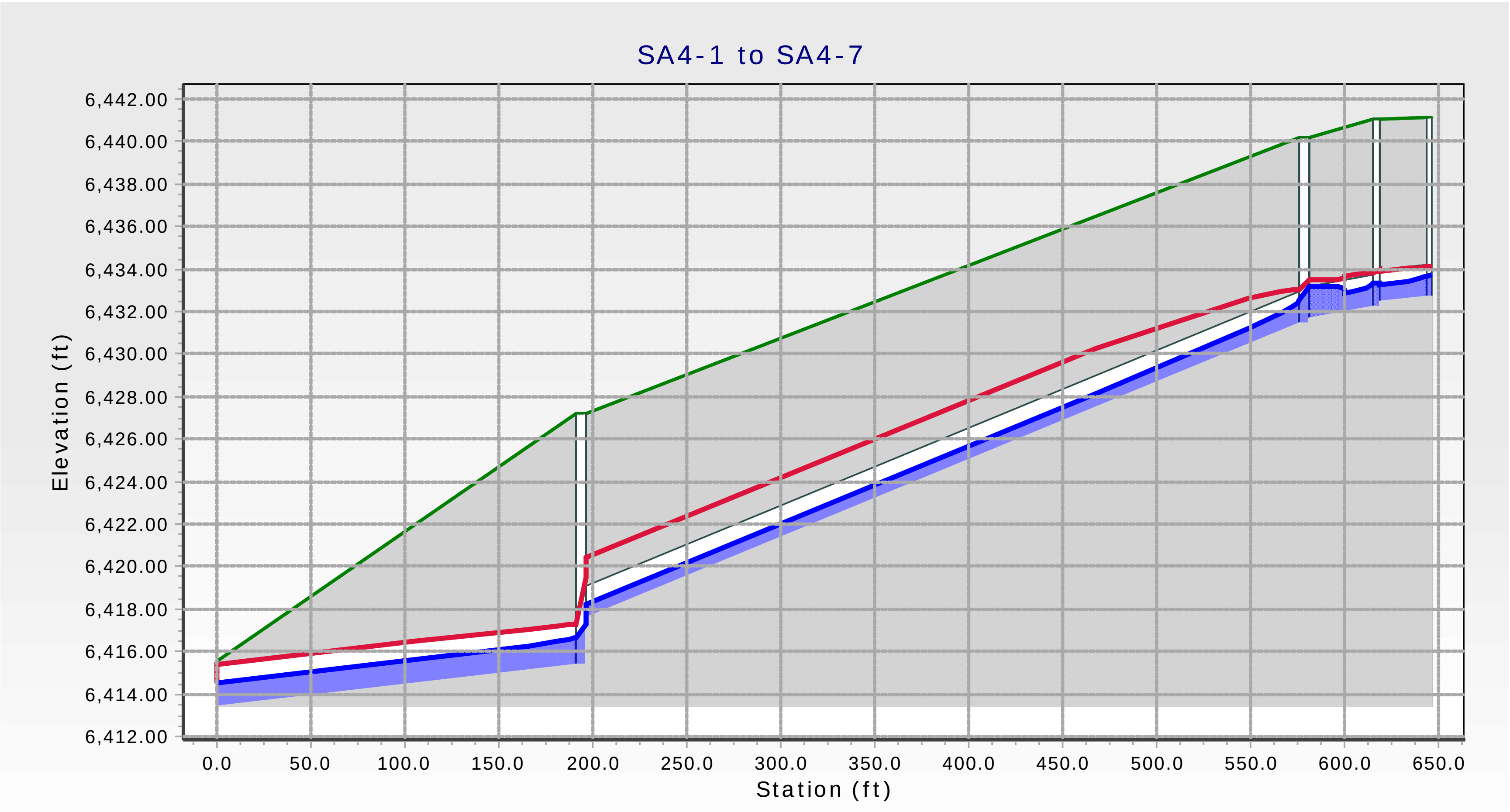
SA3-5 to SA3-5A
Elevation (ft)
6,363.00
6,362.00
6,361.00
6,360.00
6,359.00
6,358.00
6,357.00
6,356.00
6,355.00
6,354.00
6,353.00
6,352.00
6,351.00
6,350.00
6,349.00
6,348.00
6,347.00
6,346.00
6,345.00
6,344.00
6,343.00
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
Station (ft)

5-Year Event



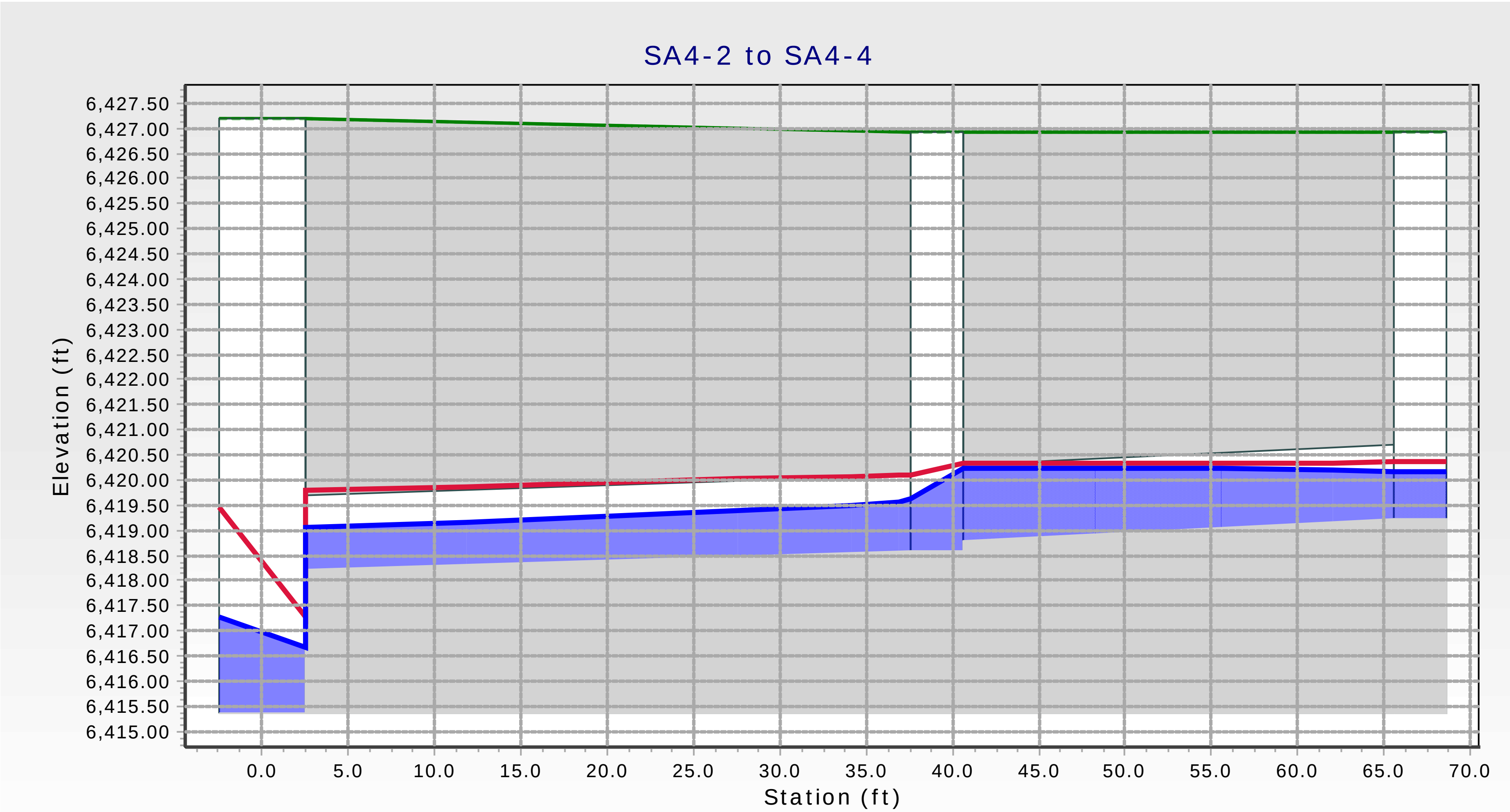
SA3-2 to SA3-3
Elevation (ft)
6,339.00
6,338.00
6,337.00
6,336.00
6,335.00
6,334.00
6,333.00
6,332.00
6,331.00
6,330.00
6,329.00
6,328.00
6,327.00
6,326.00
6,325.00
6,324.00
6,323.00
6,322.00
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
Station (ft)

5-Year Event



SA4-1 to SA4-7
6,442.00
6,440.00
6,438.00
6,436.00
6,434.00
6,432.00
6,430.00
6,428.00
6,426.00
6,424.00
6,422.00
6,420.00
6,418.00
6,416.00
6,414.00
6,412.00
Elevation (ft)
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
Station (ft)

5-Year Event


SA4-2 to SA4-4
Elevation (ft)
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6,427.00
6,426.50
6,426.00
6,425.50
6,425.00
6,424.50
6,424.00
6,423.50
6,423.00
6,422.50
6,422.00
6,421.50
6,421.00
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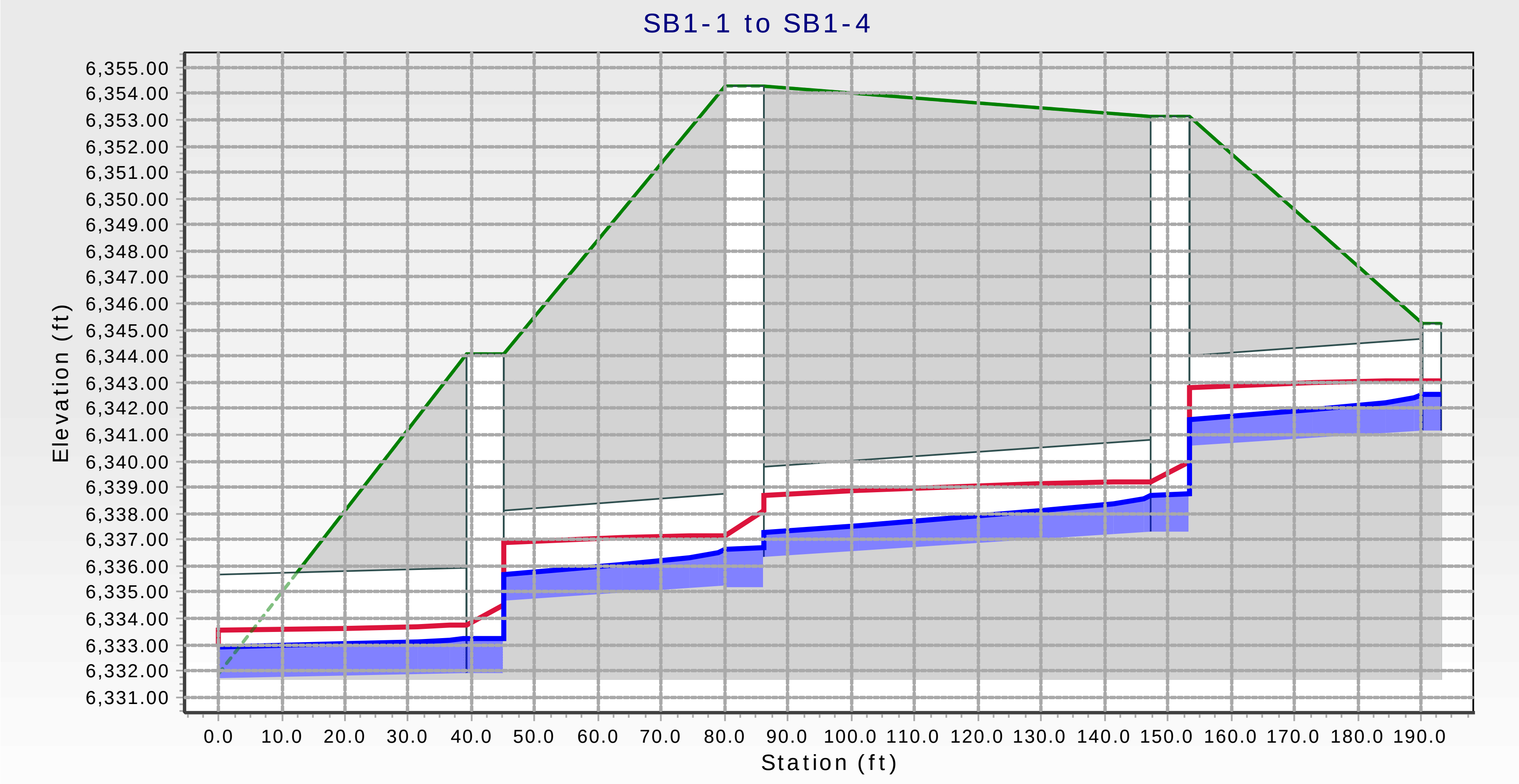
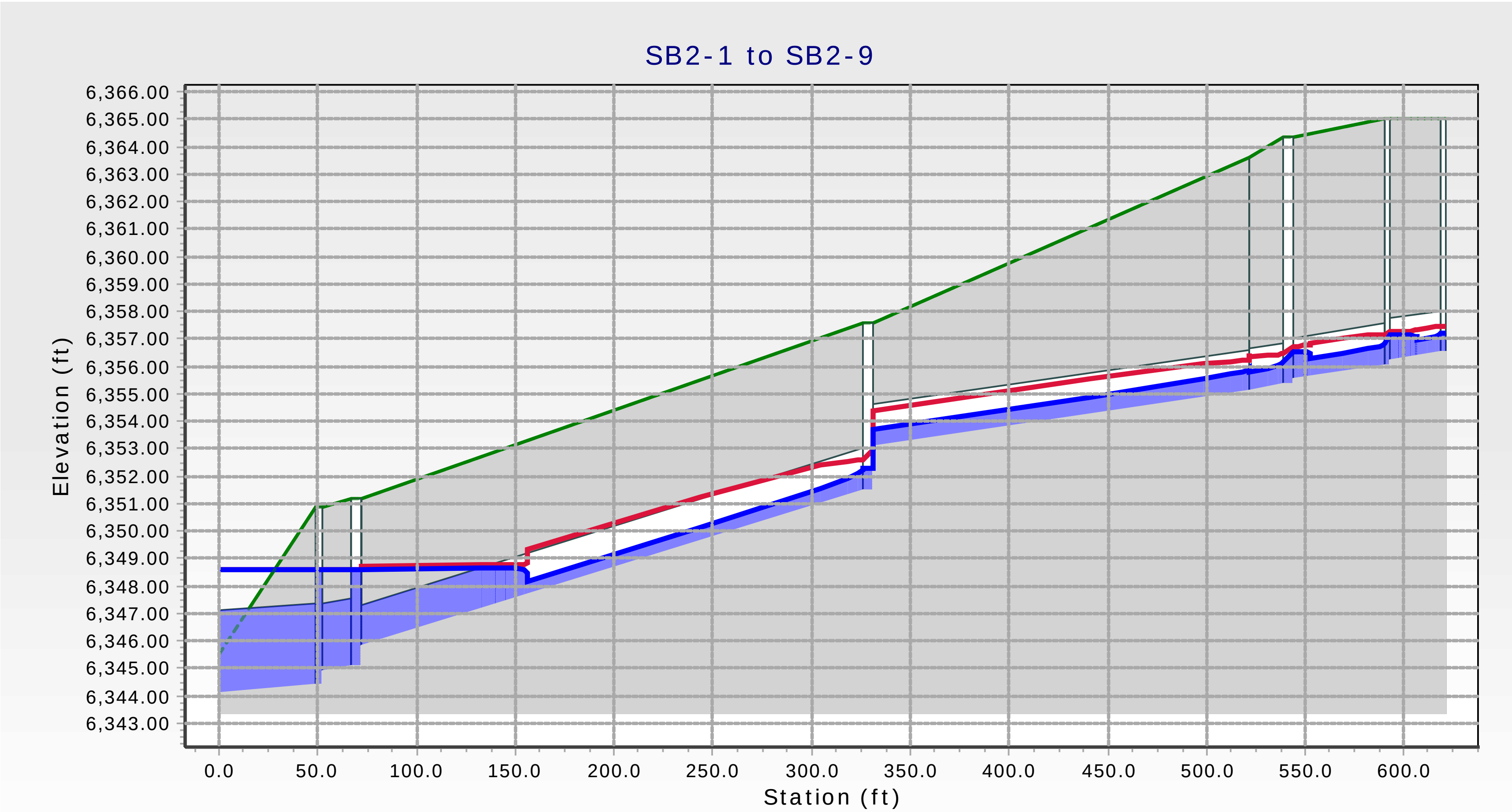
6,418.50
6,418.00
6,417.50
6,417.00
6,416.50
6,416.00
6,415.50
6,415.00
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
Station (ft)

5-Year Event



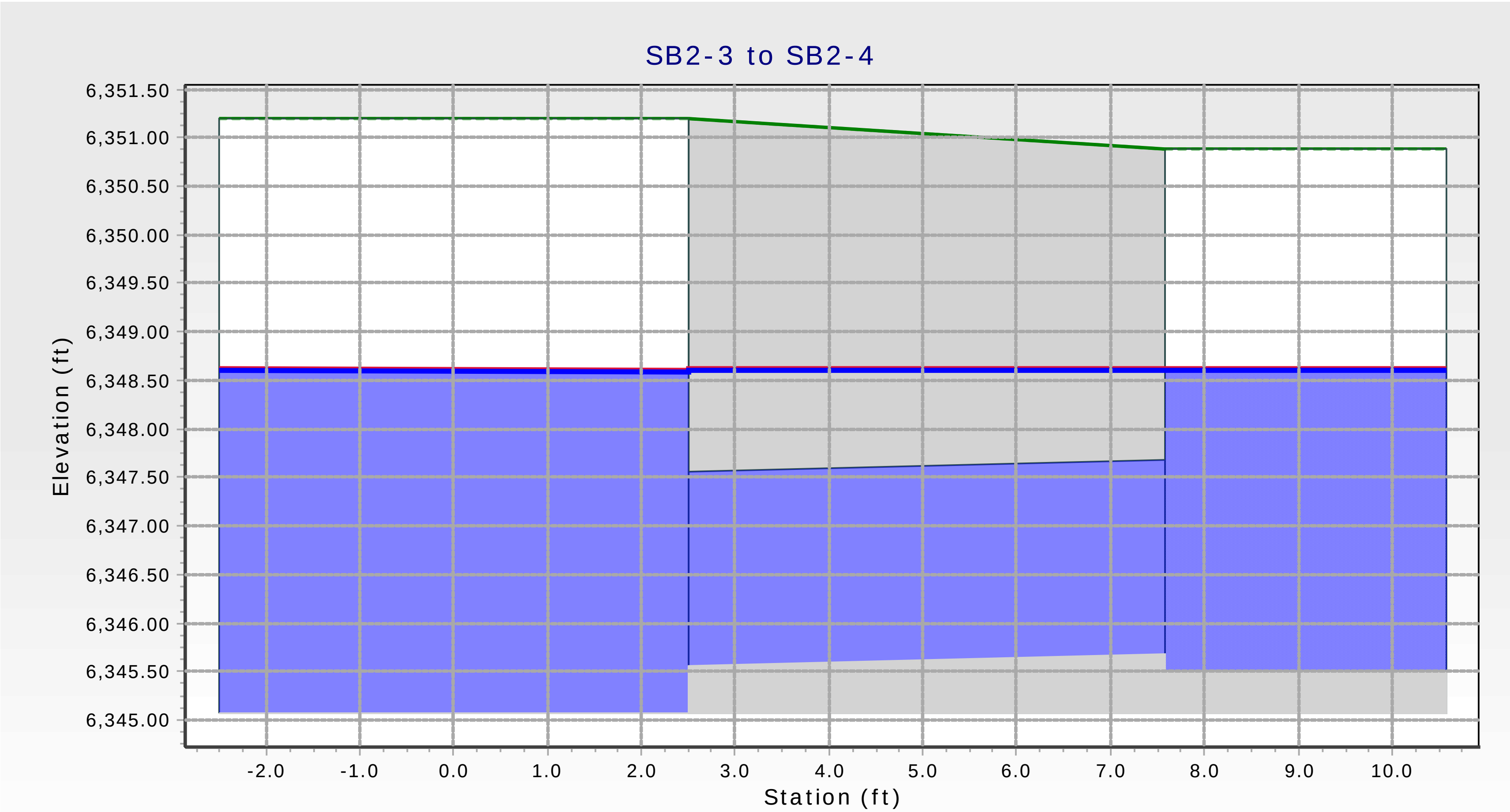
SB1-1 to SB1-4
6,355.00
6,354.00
6,353.00
6,352.00
6,351.00
6,350.00
6,349.00
6,348.00
6,347.00
6,346.00
6,345.00
6,344.00
6,343.00
6,342.00
6,341.00
6,340.00
6,339.00
6,338.00
6,337.00
6,336.00
6,335.00
6,334.00
6,333.00
6,332.00
6,331.00
Elevation (ft)
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0
Station (ft)

5-Year Event



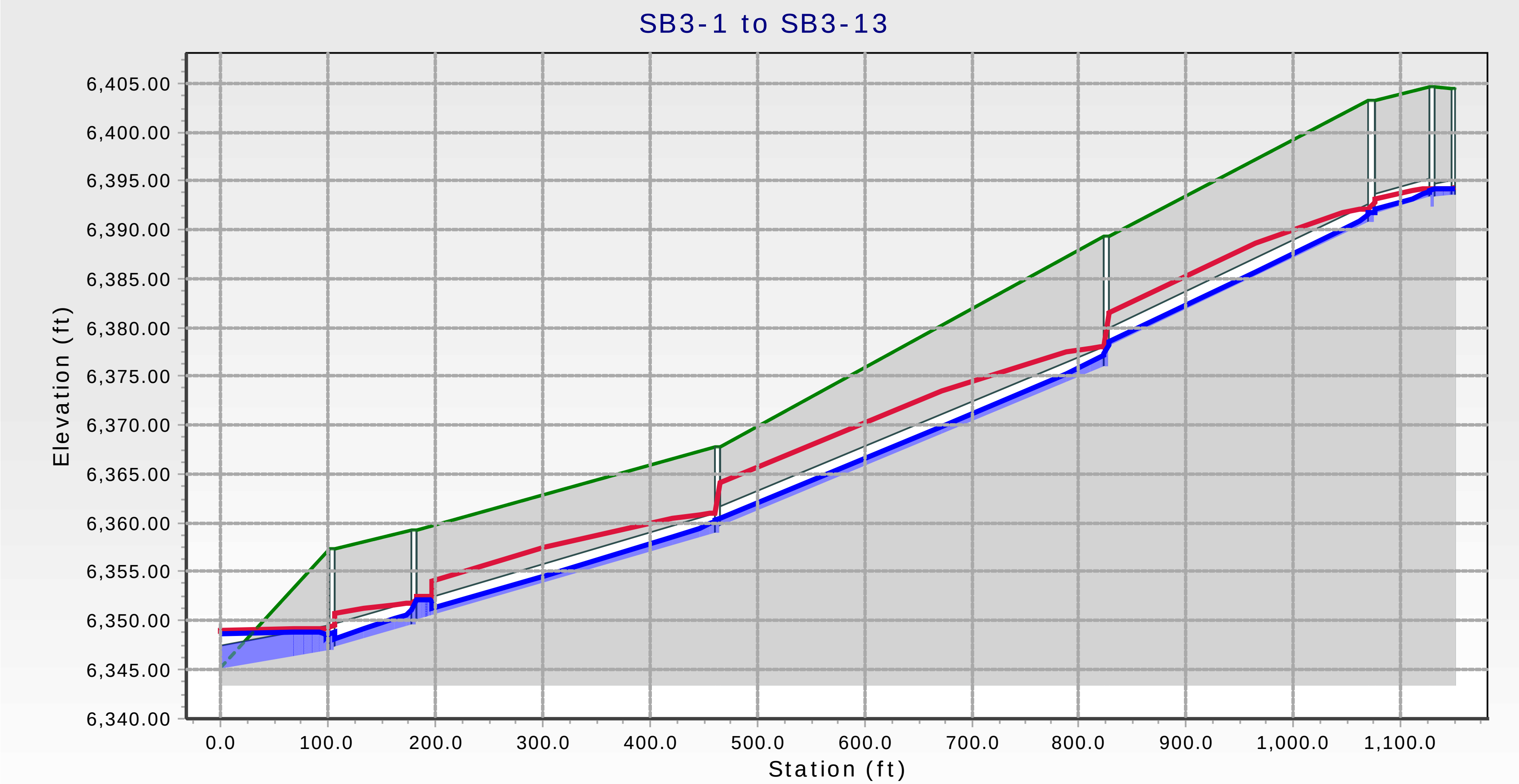
SB2-1 to SB2-9
6,366.00
6,365.00
6,364.00
6,363.00
6,362.00
6,361.00
6,360.00
6,359.00
6,358.00
6,357.00
6,356.00
6,355.00
6,354.00
6,353.00
6,352.00
6,351.00
6,350.00
6,349.00
6,348.00
6,347.00
6,346.00
6,345.00
6,344.00
6,343.00
Elevation (ft)
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
Station (ft)

5-Year Event



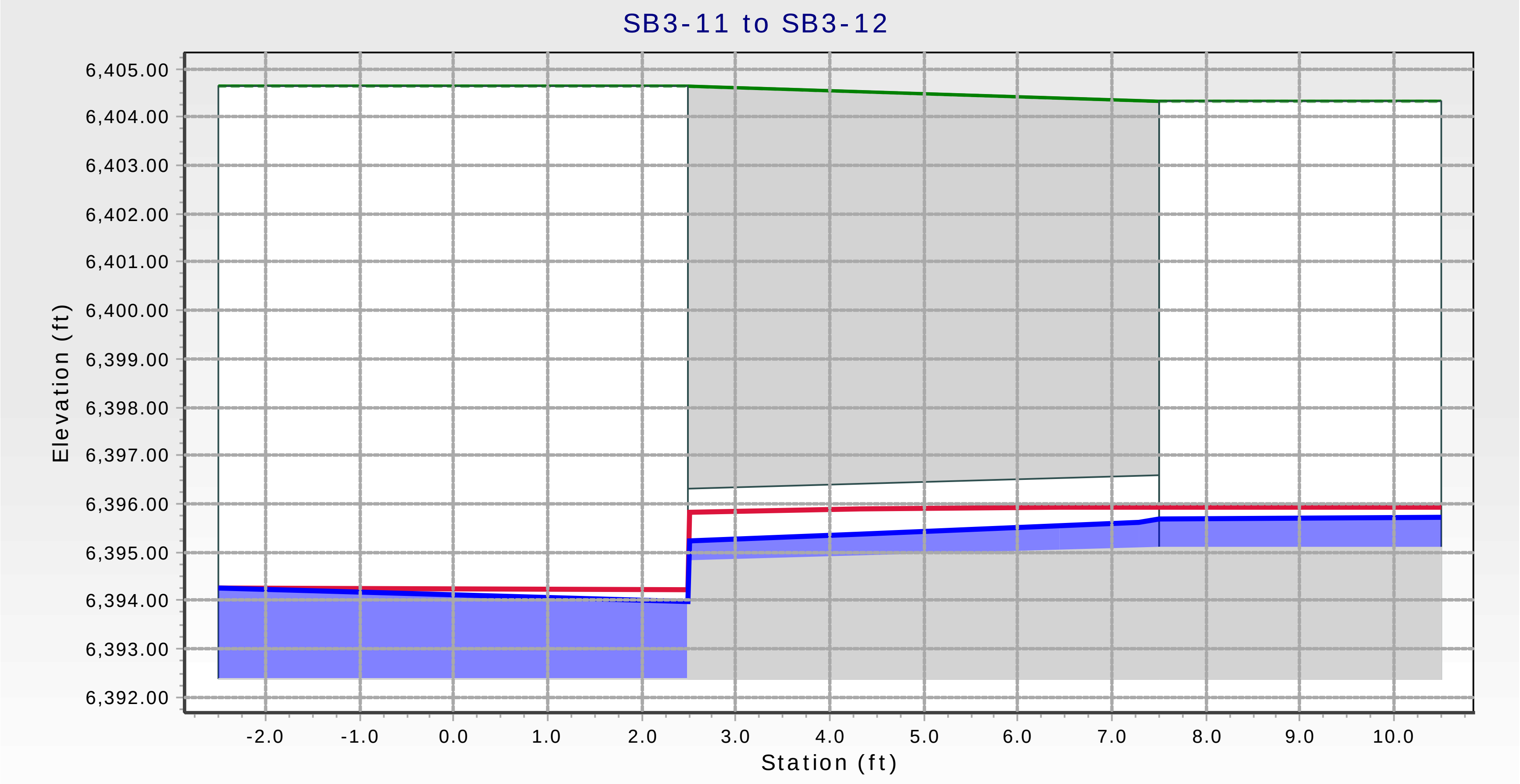
SB2-3 to SB2-4
6,351.50
6,351.00
6,350.50
6,350.00
6,349.50
6,349.00
6,348.50
6,348.00
6,347.50
6,347.00
6,346.50
6,346.00
6,345.50
6,345.00
Elevation (ft)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

5-Year Event



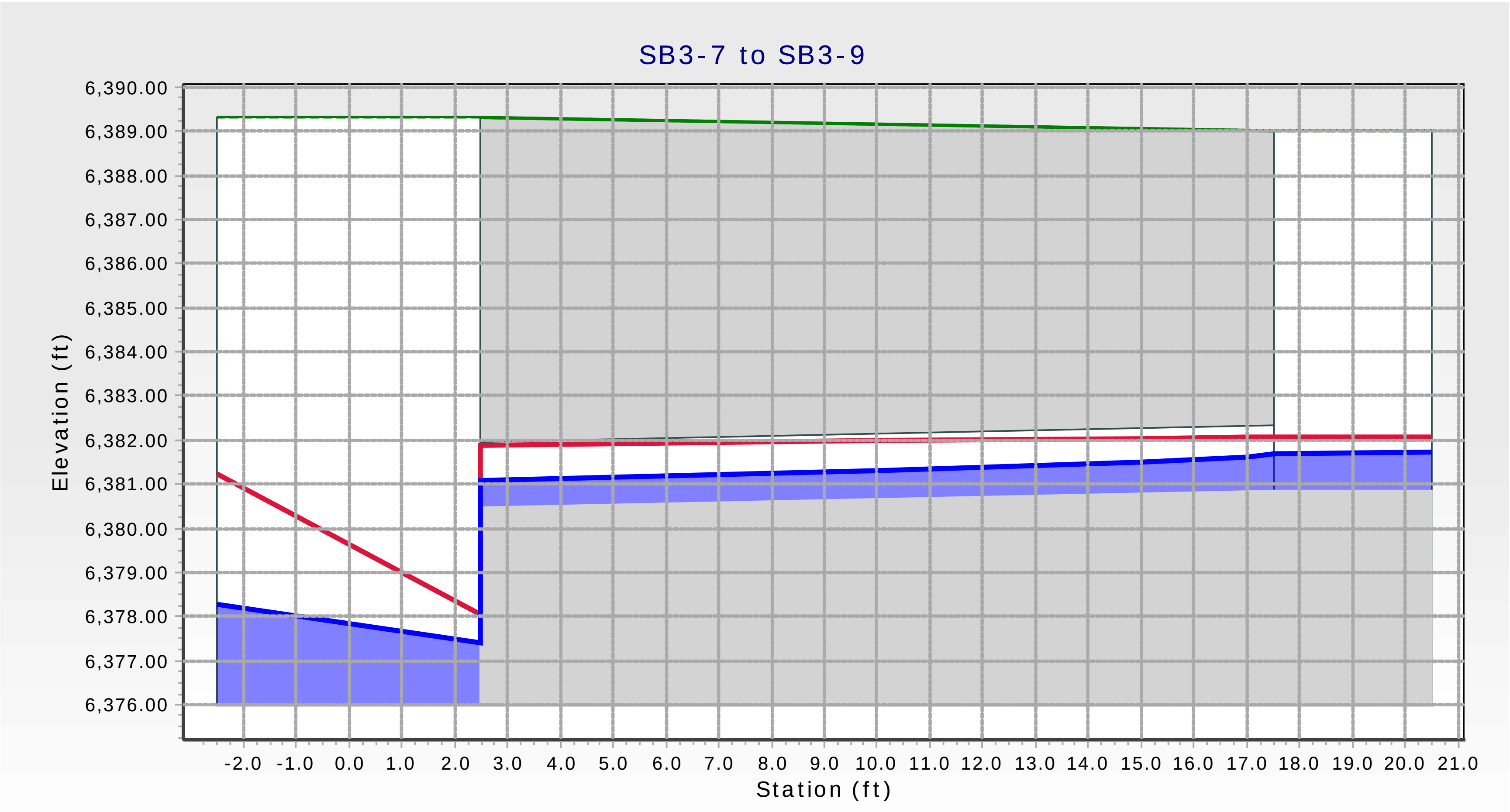
SB3-1 to SB3-13
Elevation (ft)
6,405.00
6,400.00
6,395.00
6,390.00
6,385.00
6,380.00
6,375.00
6,370.00
6,365.00
6,360.00
6,355.00
6,350.00
6,345.00
6,340.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
1,100.0
Station (ft)

5-Year Event

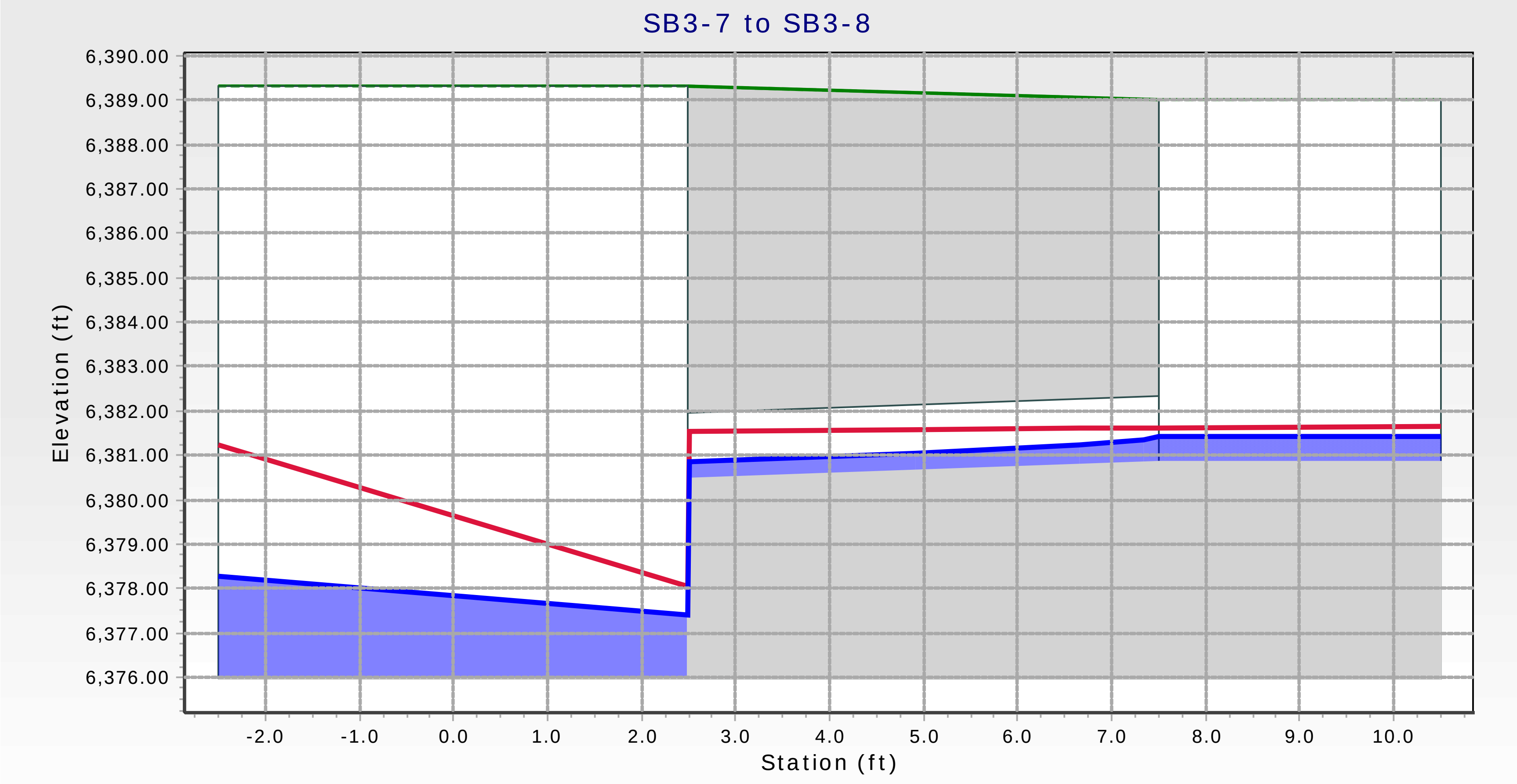


SB3-11 to SB3-12
6,405.00
6,404.00
6,403.00
6,402.00
6,401.00
6,400.00
6,399.00
6,398.00
6,397.00
6,396.00
6,395.00
6,394.00
6,393.00
6,392.00
Elevation (ft)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

5-Year Event

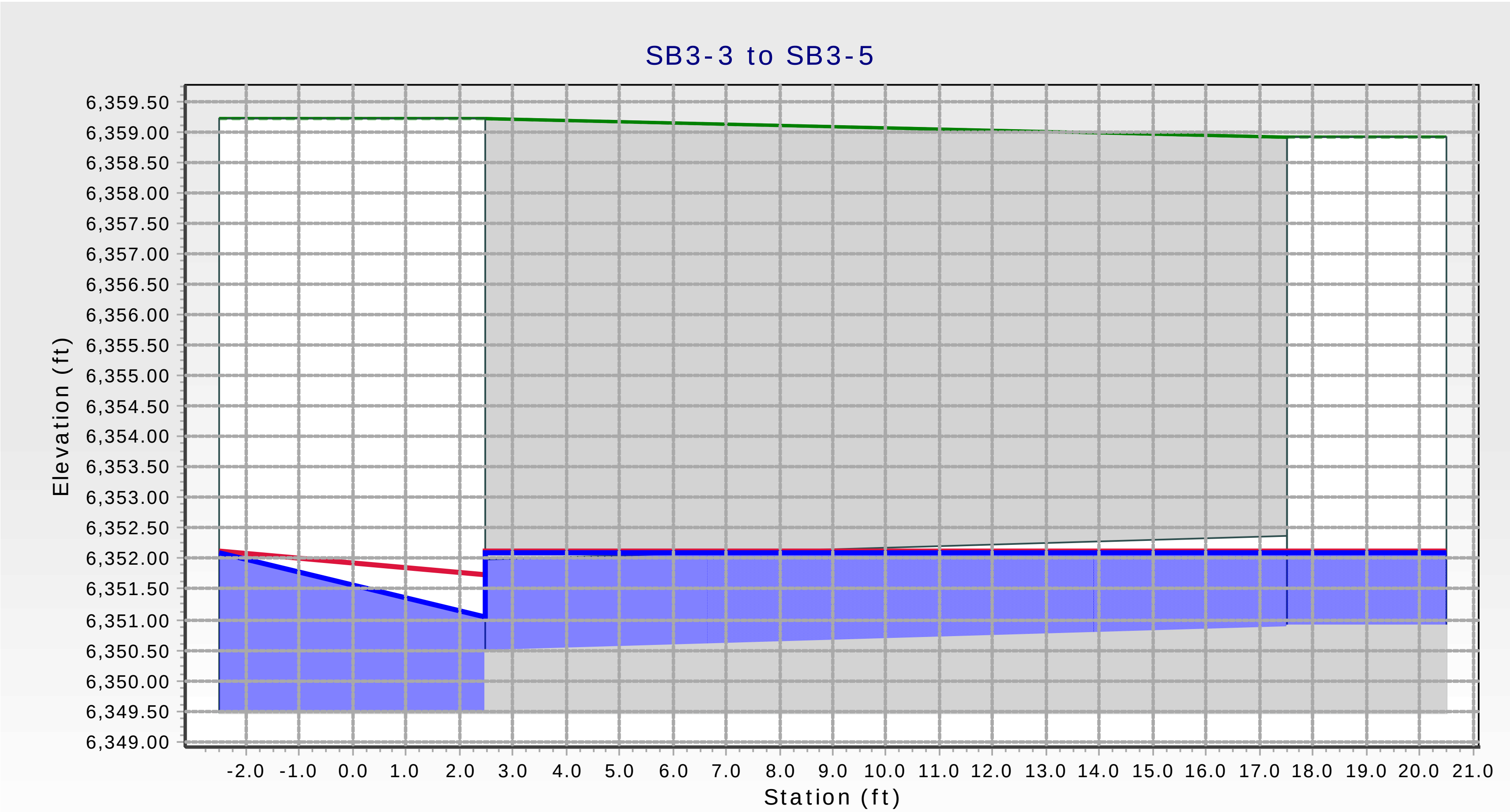

SB3-7 to SB3-9
6,390.00
6,389.00
6,388.00
6,387.00
6,386.00
6,385.00
6,384.00
6,383.00
6,382.00
6,381.00
6,380.00
6,379.00
6,378.00
6,377.00
6,376.00
Elevation (ft)
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0
Station (ft)

5-Year Event



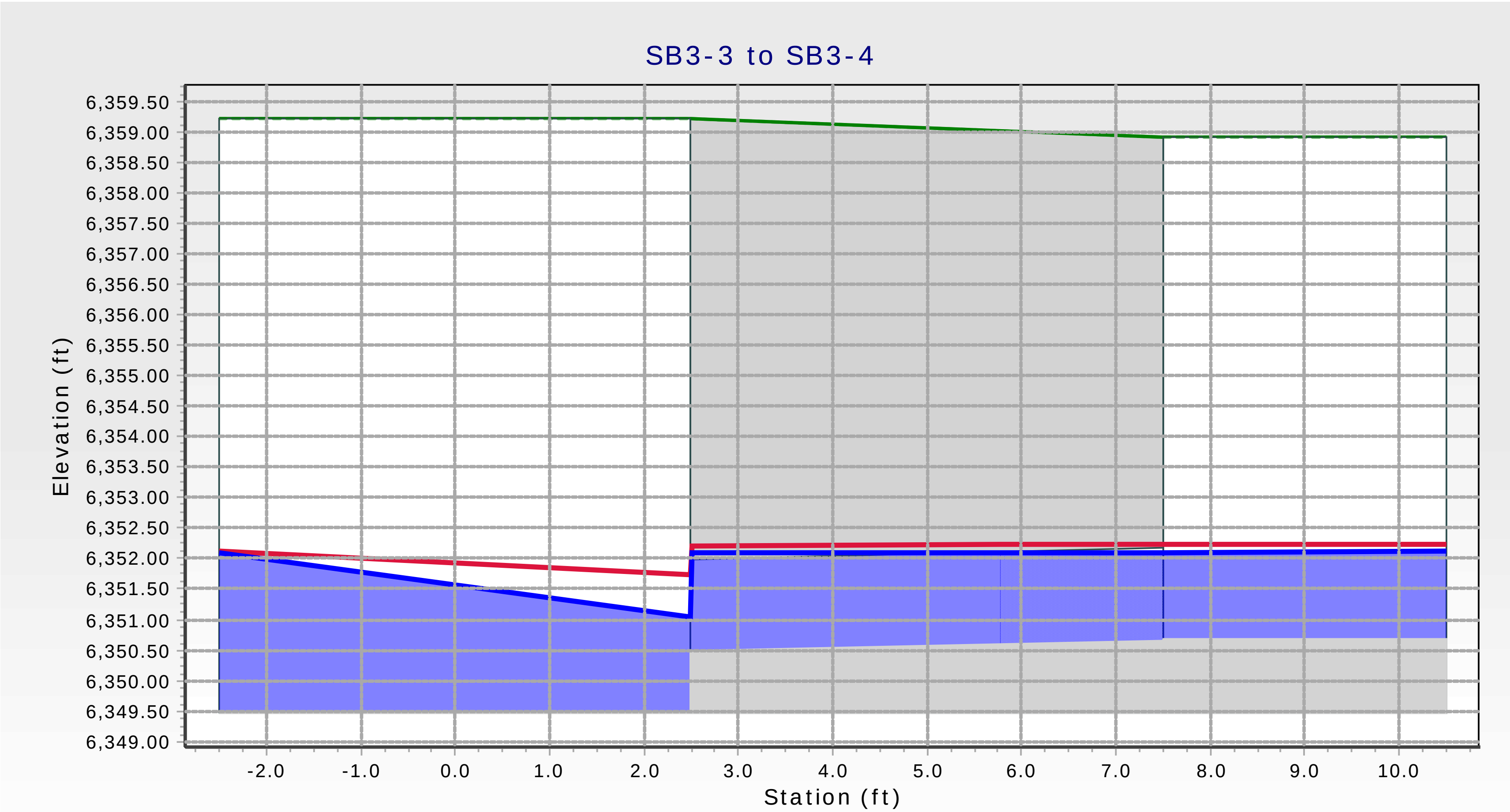
SB3-7 to SB3-8
6,390.00
6,389.00
6,388.00
6,387.00
6,386.00
6,385.00
6,384.00
6,383.00
6,382.00
6,381.00
6,380.00
6,379.00
6,378.00
6,377.00
6,376.00
Elevation (ft)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

5-Year Event



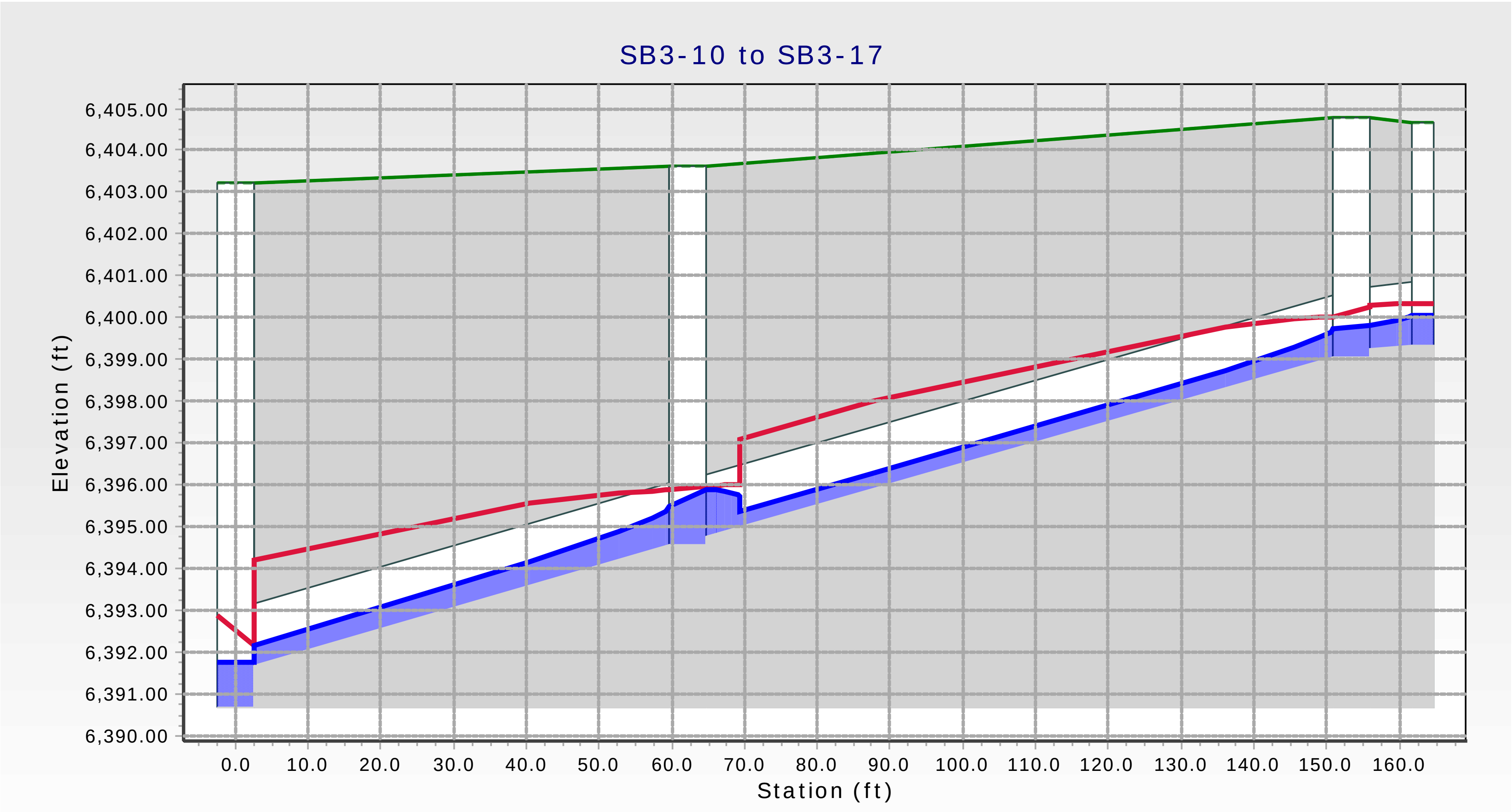
SB3-3 to SB3-5
6,359.50
6,359.00
6,358.50
6,358.00
6,357.50
6,357.00
6,356.50
6,356.00
6,355.50
6,355.00
6,354.50
6,354.00
6,353.50
6,353.00
6,352.50
6,352.00
6,351.50
6,351.00
6,350.50
6,350.00
6,349.50
6,349.00
Elevation (ft)
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0
Station (ft)

5-Year Event

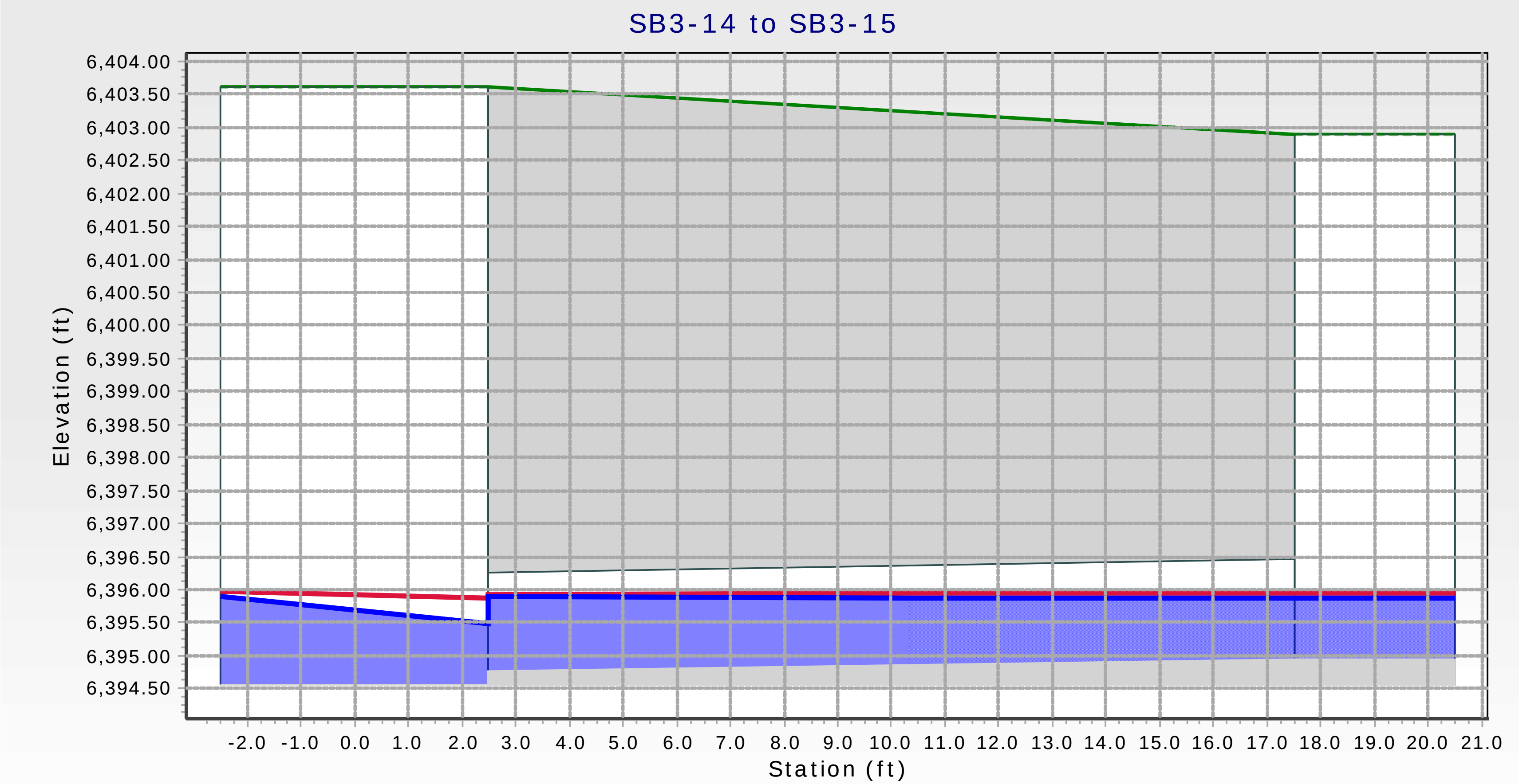


SB3-3 to SB3-4
6,359.50
6,359.00
6,358.50
6,358.00
6,357.50
6,357.00
6,356.50
6,356.00
6,355.50
6,355.00
6,354.50
6,354.00
6,353.50
6,353.00
6,352.50
6,352.00
6,351.50
6,351.00
6,350.50
6,350.00
6,349.50
6,349.00
Elevation (ft)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Station (ft)

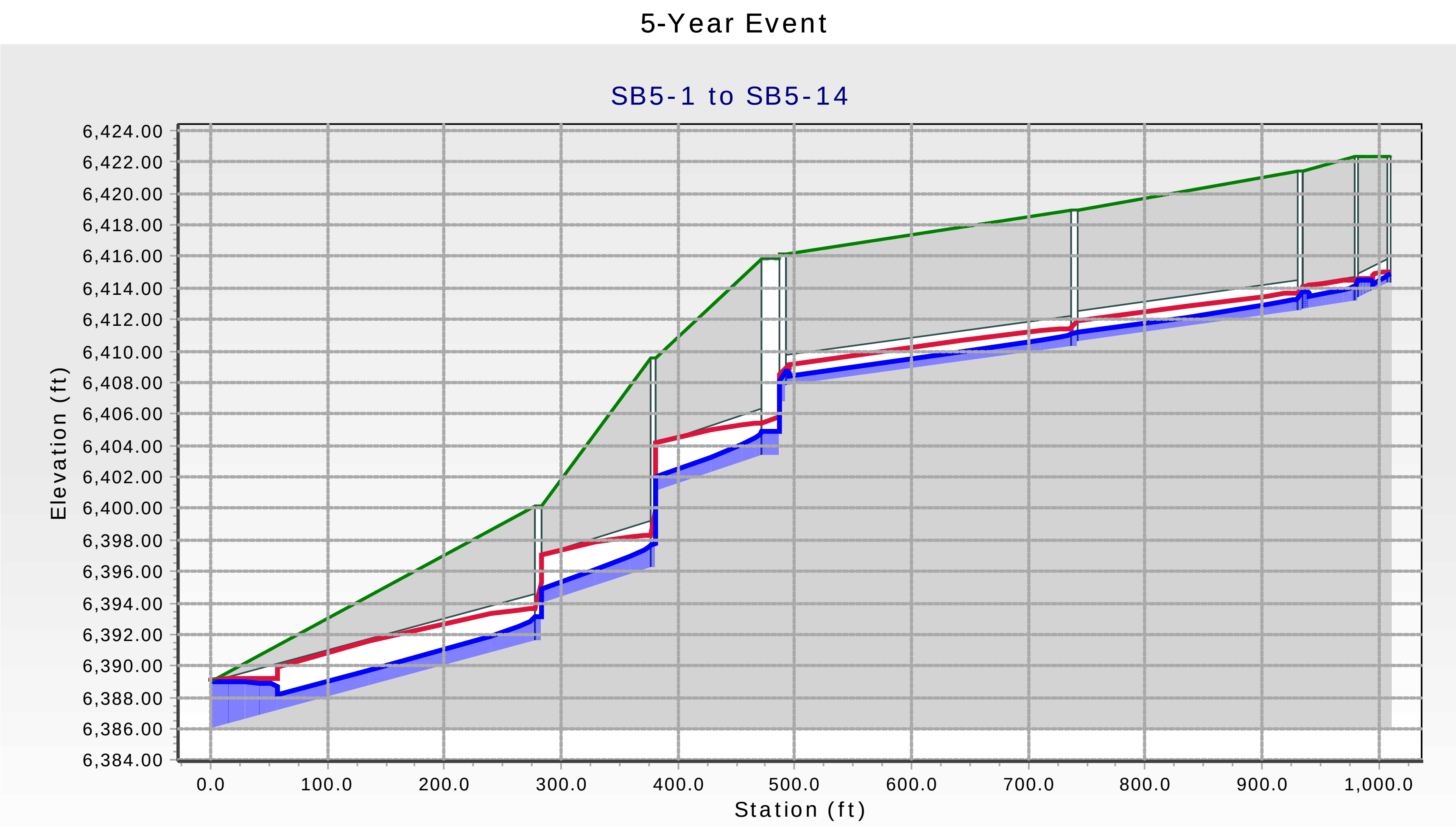
5-Year Event


SB3-10 to SB3-17
6,405.00
6,404.00
6,403.00
6,402.00
6,401.00
6,400.00
6,399.00
6,398.00
6,397.00
6,396.00
6,395.00
6,394.00
6,393.00
6,392.00
6,391.00
6,390.00
Elevation (ft)
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
Station (ft)

5-Year Event

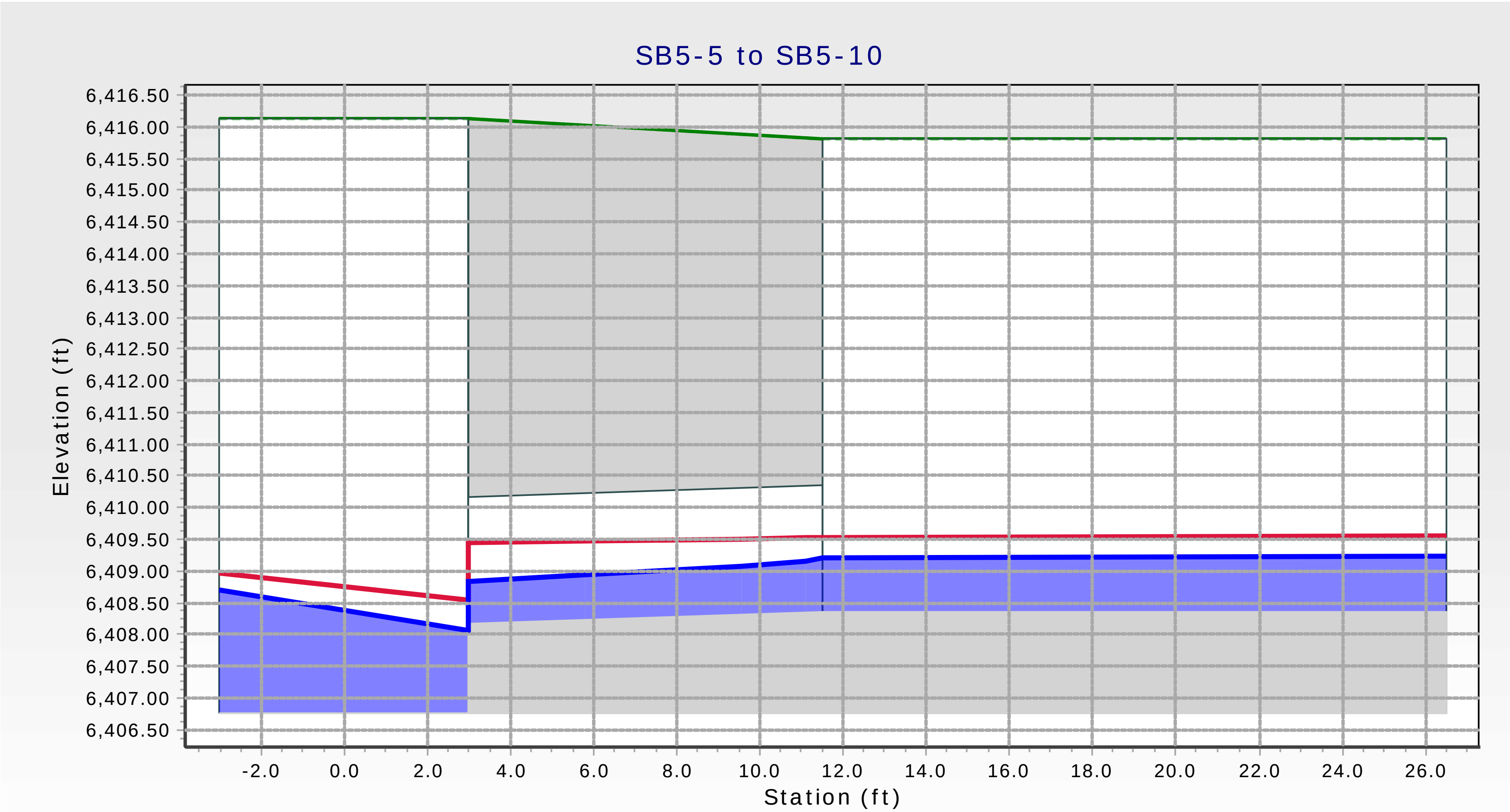


SB3-14 to SB3-15
Elevation (ft)
6,404.00
6,403.50
6,403.00
6,402.50
6,402.00
6,401.50
6,401.00
6,400.50
6,400.00
6,399.50
6,399.00
6,398.50
6,398.00
6,397.50
6,397.00
6,396.50
6,396.00
6,395.50
6,395.00
6,394.50
-2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0 21.0
Station (ft)

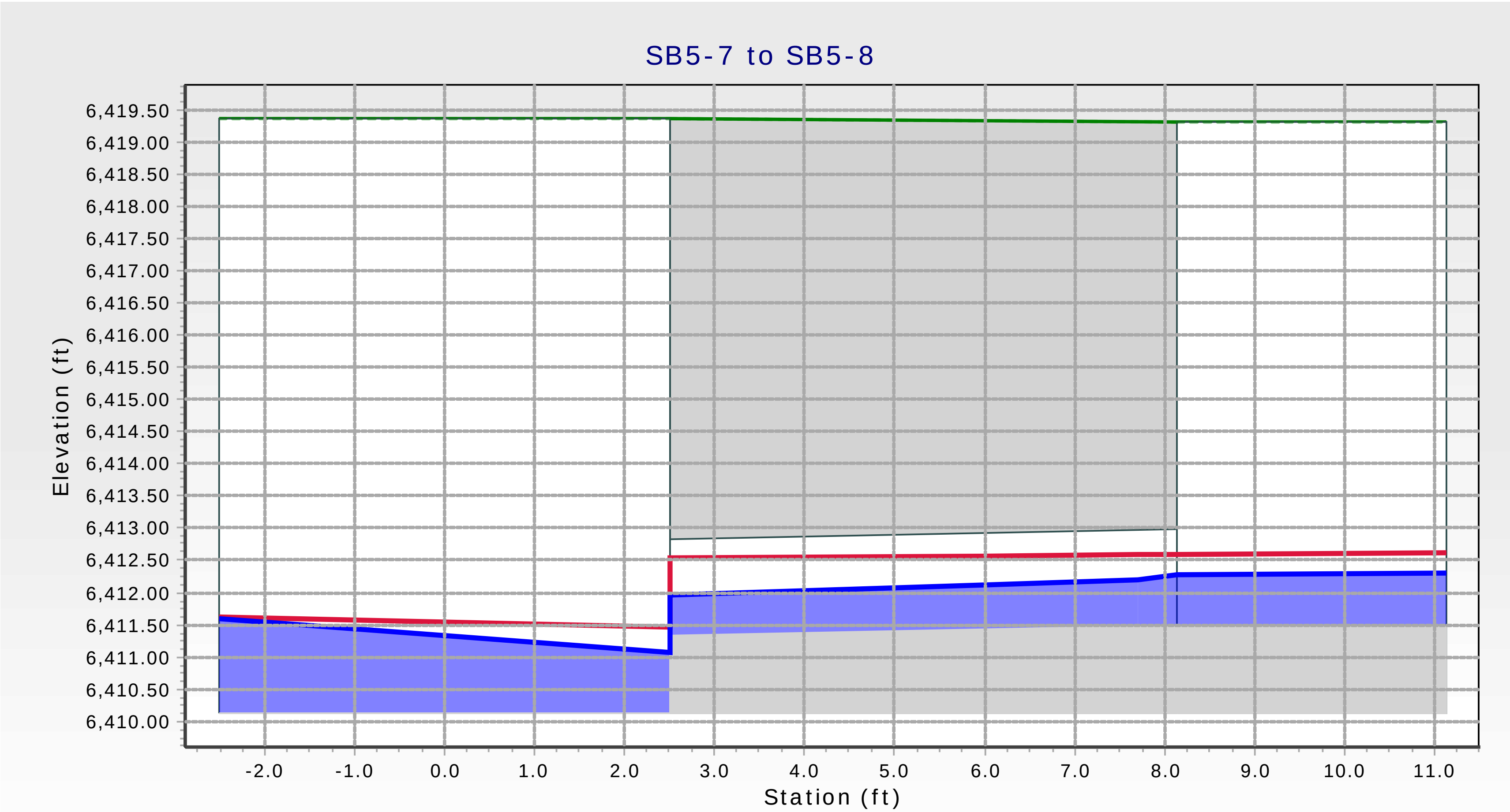


5-Year Event
SB5-1 to SB5-14
Elevation (ft)
6,424.00
6,422.00
6,420.00
6,418.00
6,416.00
6,414.00
6,412.00
6,410.00
6,408.00
6,406.00
6,404.00
6,402.00
6,400.00
6,398.00
6,396.00
6,394.00
6,392.00
6,390.00
6,388.00
6,386.00
6,384.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
Station (ft)

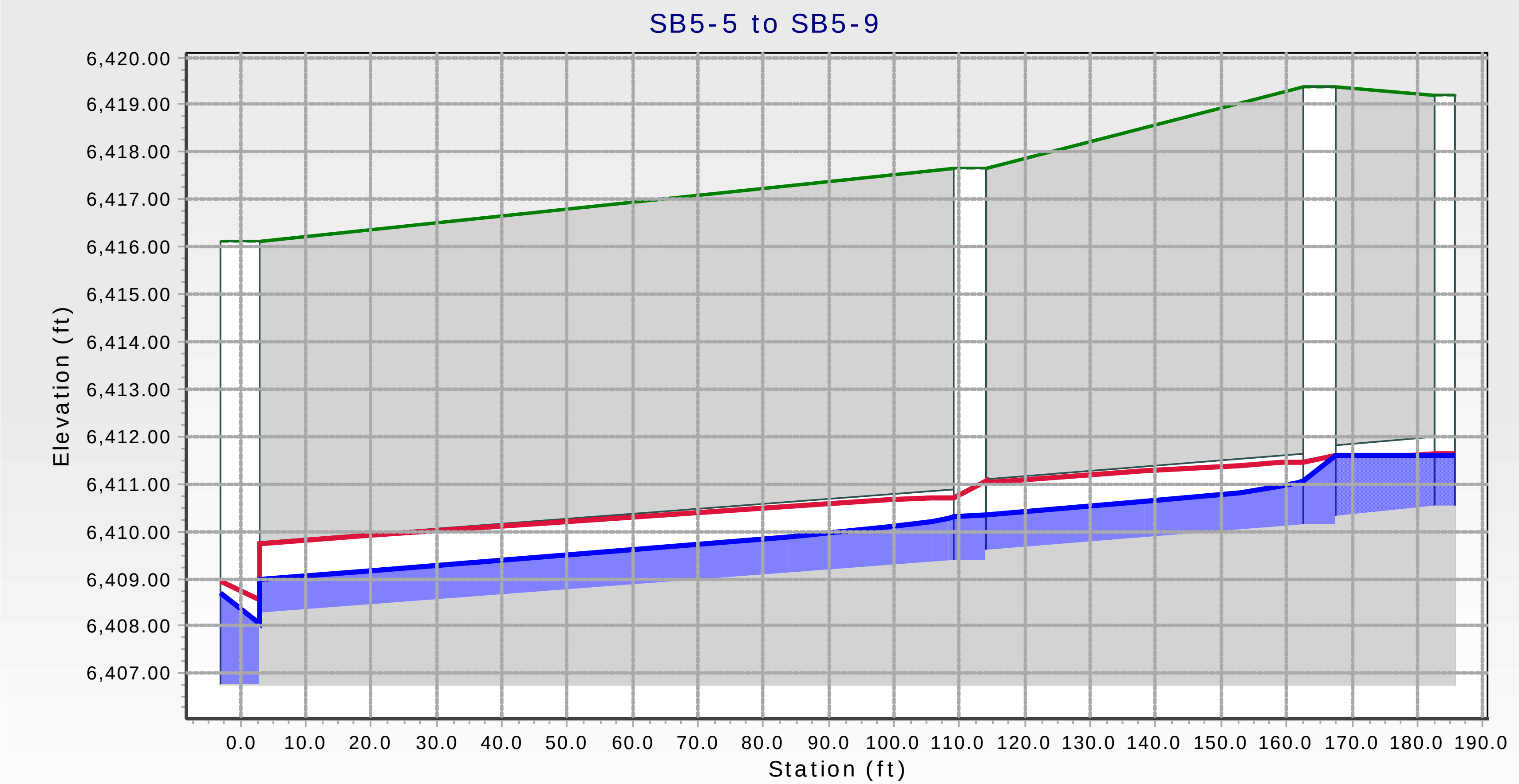
5-Year Event


SB5-5 to SB5-10
Elevation (ft)
6,416.50
6,416.00
6,415.50
6,415.00
6,414.50
6,414.00
6,413.50
6,413.00
6,412.50
6,412.00
6,411.50
6,411.00
6,410.50
6,410.00
6,409.50
6,409.00
6,408.50
6,408.00
6,407.50
6,407.00
6,406.50
-2.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
Station (ft)

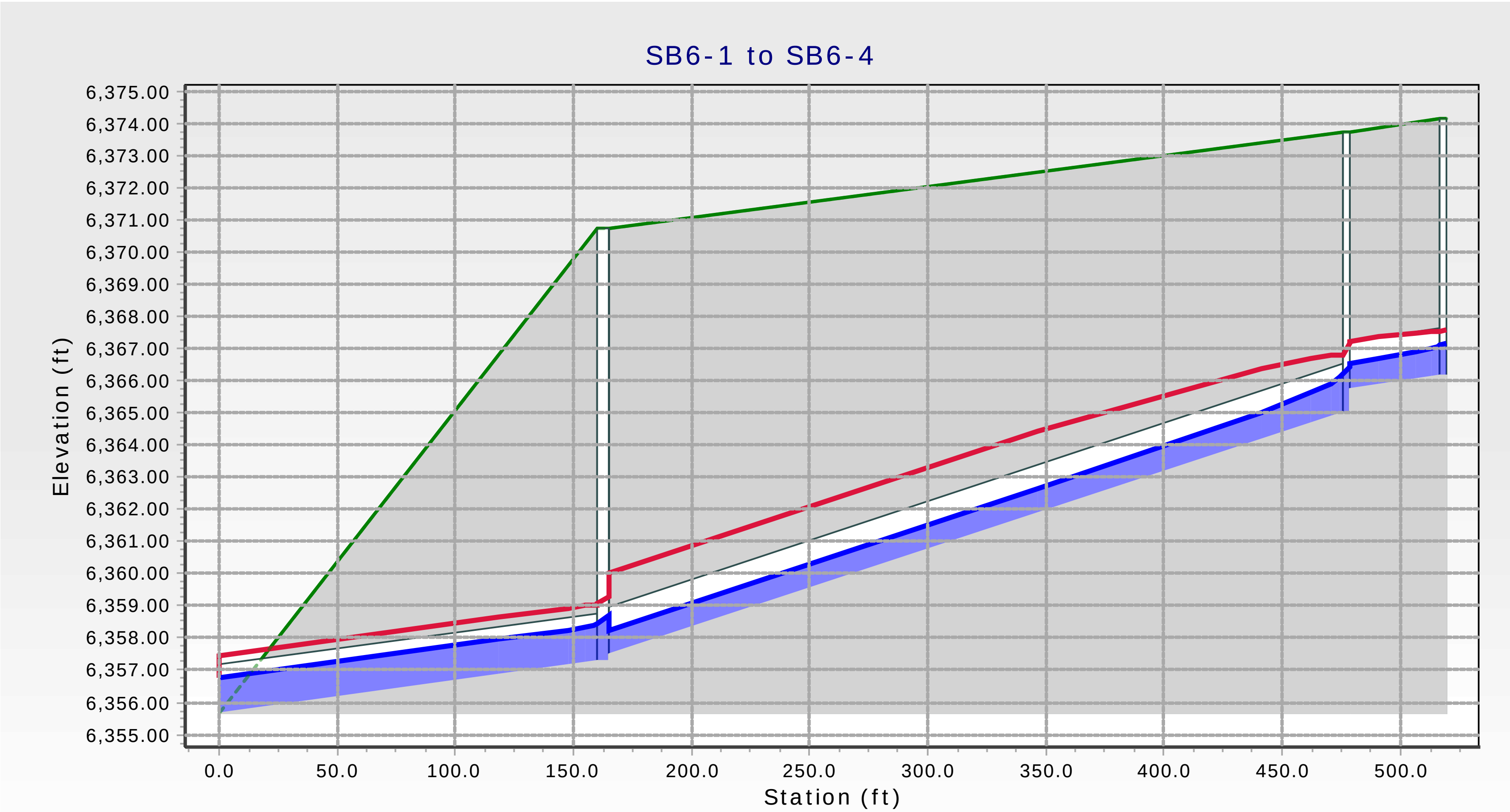
5-Year Event


SB5-7 to SB5-8
Elevation (ft)
6,419.50
6,419.00
6,418.50
6,418.00
6,417.50
6,417.00
6,416.50
6,416.00
6,415.50
6,415.00
6,414.50
6,414.00
6,413.50
6,413.00
6,412.50
6,412.00
6,411.50
6,411.00
6,410.50
6,410.00
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Station (ft)

5-Year Event

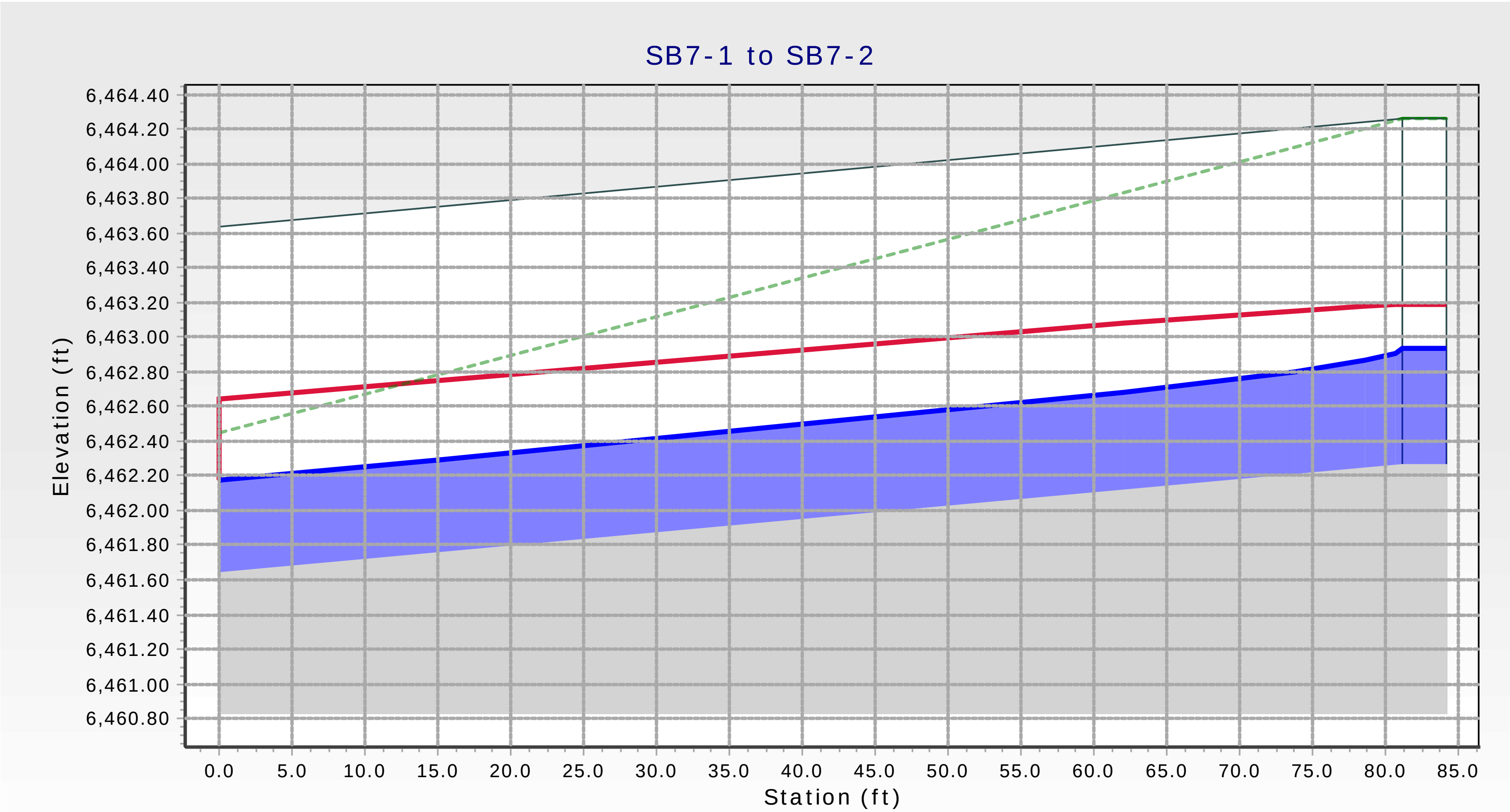

SB5-5 to SB5-9
Elevation (ft)
6,420.00
6,419.00
6,418.00
6,417.00
6,416.00
6,415.00
6,414.00
6,413.00
6,412.00
6,411.00
6,410.00
6,409.00
6,408.00
6,407.00
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
Station (ft)

5-Year Event



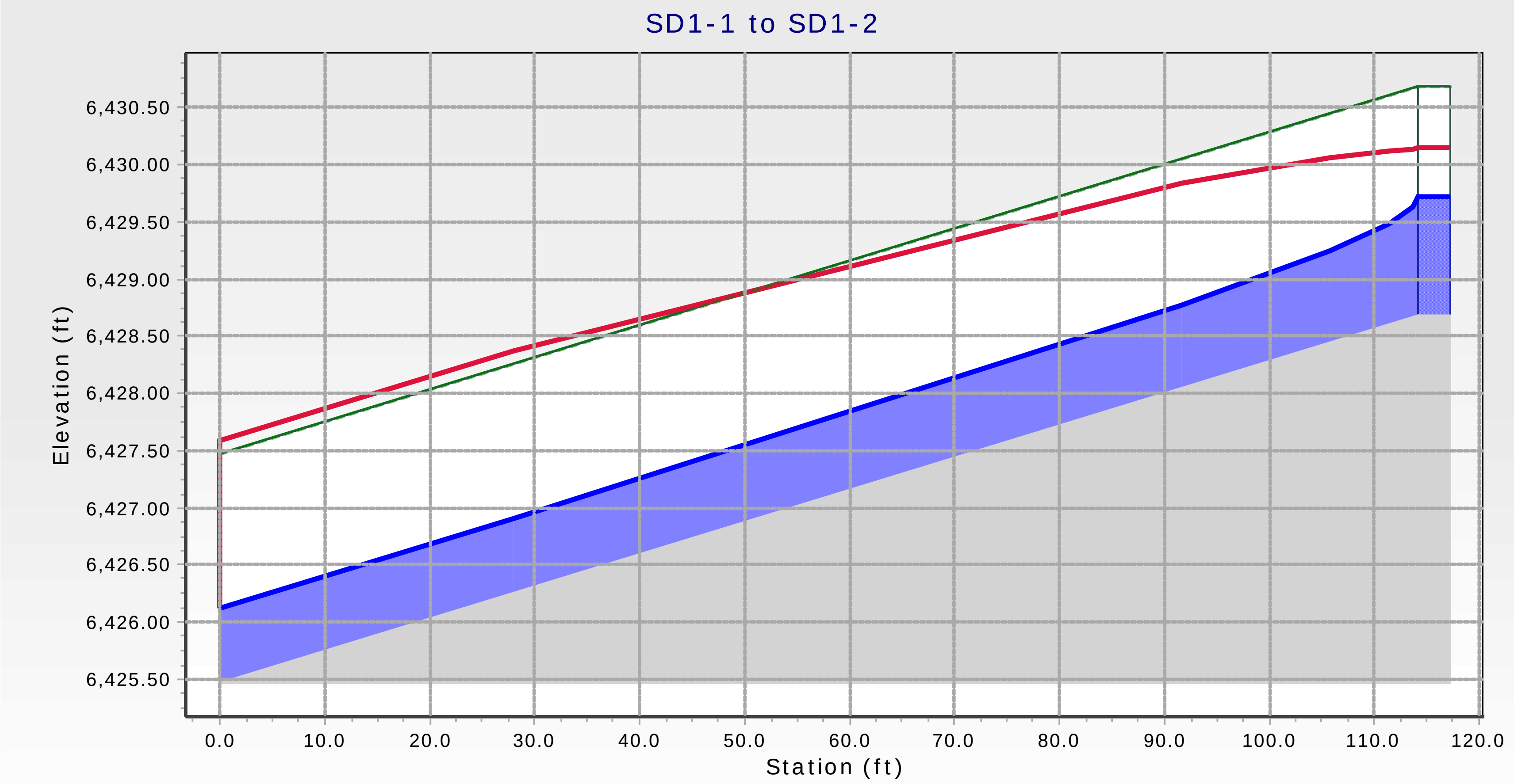
SB6-1 to SB6-4
6,375.00
6,374.00
6,373.00
6,372.00
6,371.00
6,370.00
6,369.00
6,368.00
6,367.00
6,366.00
6,365.00
6,364.00
6,363.00
6,362.00
6,361.00
6,360.00
6,359.00
6,358.00
6,357.00
6,356.00
6,355.00
Elevation (ft)
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
Station (ft)

5-Year Event

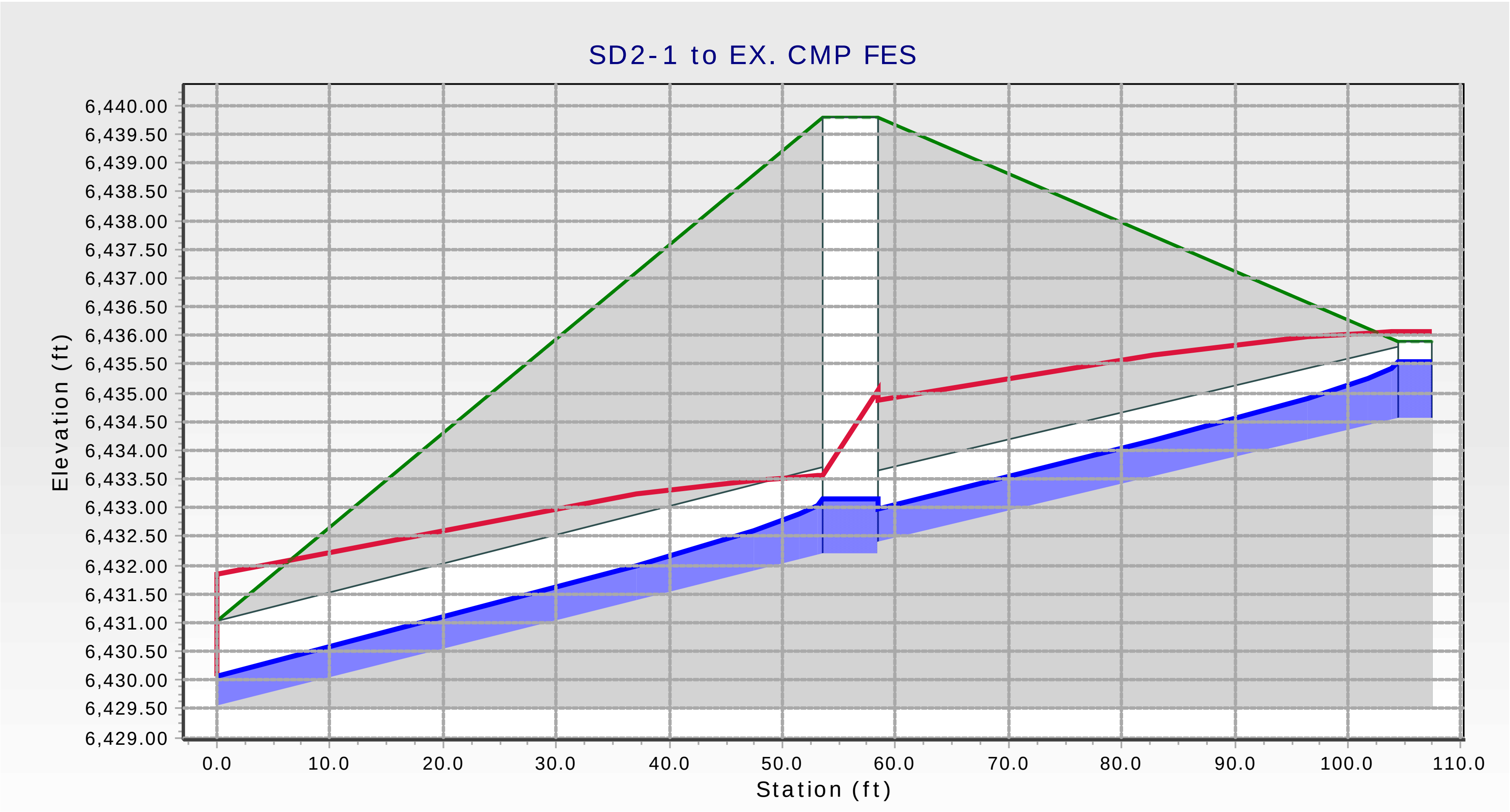


SB7-1 to SB7-2
6,464.40
6,464.20
6,464.00
6,463.80
6,463.60
6,463.40
6,463.20
6,463.00
6,462.80
6,462.60
6,462.40
6,462.20
6,462.00
6,461.80
6,461.60
6,461.40
6,461.20
6,461.00
6,460.80
Elevation (ft)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
Station (ft)

5-Year Event


SD1-1 to SD1-2
6,430.50
6,430.00
6,429.50
6,429.00
6,428.50
6,428.00
6,427.50
6,427.00
6,426.50
6,426.00
6,425.50
Elevation (ft)
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
Station (ft)

5-Year Event


SD2-1 to EX. CMP FES
6,440.00
6,439.50
6,439.00
6,438.50
6,438.00
6,437.50
6,437.00
6,436.50
6,436.00
6,435.50
6,435.00
6,434.50
6,434.00
6,433.50
6,433.00
6,432.50
6,432.00
6,431.50
6,431.00
6,430.50
6,430.00
6,429.50
6,429.00
Elevation (ft)
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
Station (ft)

100-Year Event

Catchment Table - Time: 0.00 hours

ID	Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
227	A-2	SA2-3	7.617	0.627	23.213	22.73
239	A-3	SA2-5	7.551	0.671	19.061	26.78
240	A-4	SA2-6	3.789	0.685	18.753	13.83
242	A-5	SA3-5A	5.104	0.675	19.522	17.99
243	A-6	SA3-9	11.082	0.662	23.953	34.32
244	A-7	SA3-10	2.558	0.681	18.988	9.23
245	A-8	SA3-14	6.304	0.665	23.422	19.85
246	A-9	SA3-15	1.250	0.682	19.047	4.51
247	A-10	SA3-19	3.622	0.662	19.511	12.52
248	A-11	SA3-20	1.075	0.678	17.222	4.06
249	A-12	SA4-4	2.109	0.663	15.059	8.30
250	A-13	SA4-3	1.551	0.685	10.257	7.46
251	A-14	SA4-7	3.435	0.638	10.959	14.98
252	A-15	SA4-6	0.873	0.684	10.646	4.13
241	A-16	SA3-3	34.194	0.625	39.500	74.33
253	B-2	SB3-5	3.841	0.683	17.636	14.43
254	B-3	SB3-4	4.162	0.658	17.155	15.27
255	B-4	SB3-9	3.003	0.674	15.156	11.98
256	B-5	SB3-8	1.167	0.658	14.526	4.64
257	B-6	SB3-13	0.539	0.700	9.074	2.78
258	B-7	SB3-12	1.021	0.663	12.473	4.38
261	B-8	SB2-2	2.684	0.749	15.056	11.94
262	B-9	SB2-4	3.380	0.690	17.657	12.82
263	B-10	SB2-8	0.983	0.681	18.008	3.64
264	B-11	SB2-9	1.772	0.662	20.265	6.01
265	B-12	SB6-3	1.662	0.682	12.808	7.25
266	B-13	SB6-4	3.111	0.663	16.472	11.73
267	B-14	SB5-4	3.260	0.683	19.498	11.63
268	B-15	SB5-10	12.698	0.652	21.627	40.95
269	B-16	SB5-9	0.749	0.685	11.663	3.42
270	B-17	SB5-13	2.876	0.664	17.977	10.40

100-Year Event

Catchment Table - Time: 0.00 hours

ID	Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
271	B-18	SB5-14	0.746	0.683	11.931	3.36
259	B-19	SB3-17	1.438	0.658	14.923	5.64
260	B-20	SB3-15	1.160	0.660	17.646	4.21
272	B-23, B-24	SB7-2	3.919	0.603	15.730	13.75
342	B-25	SB5-8	2.455	0.643	16.478	8.98
273	D-3, D-4	SD1-2	12.410	0.590	19.400	38.35
274	D-4	SD2-3	9.090	0.580	19.400	27.62

100-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
198	Pipe - (1)	SB1-5	SB1-4	42.0	41.3	6,341.15	6,340.53	0.015	131.60	17.14	6,344.47	6,343.52
199	Pipe - (1) (1)	SB1-4	SB1-3	42.0	67.3	6,337.30	6,336.29	0.015	131.60	17.14	6,340.62	6,339.20
322	Pipe - (2)	SB1-3	SB1-2	42.0	41.0	6,335.25	6,334.63	0.015	131.60	17.14	6,338.56	6,337.62
323	Pipe - (2) (1)	SB1-2	SB1-1	48.0	42.1	6,331.90	6,331.69	0.005	131.60	10.47	6,335.71	6,335.12
201	Pipe - (3)	SB2-3	SB2-2	30.0	19.0	6,345.07	6,344.88	0.010	20.75	4.23	6,349.11	6,349.07
202	Pipe - (4)	SB2-2	SB2-1	36.0	50.7	6,344.38	6,344.12	0.005	30.69	4.34	6,349.06	6,348.95
195	Pipe - (5)	SA2-6	SA2-5	18.0	28.0	6,346.15	6,345.86	0.010	13.83	7.83	6,347.93	6,347.58
196	Pipe - (6)	SA2-5	SA2-4	24.0	207.1	6,345.36	6,339.15	0.030	40.50	16.62	6,347.32	6,340.63
197	Pipe - (7)	SA2-4	SA2-3	24.0	186.7	6,336.01	6,329.29	0.036	40.28	17.91	6,337.97	6,330.68
207	Pipe - (7) (1)	SA2-3	SA2-2	30.0	103.1	6,324.43	6,322.11	0.022	59.19	17.83	6,326.81	6,323.90
208	Pipe - (7) (1) (1)	SA2-2	SA2-1	30.0	89.0	6,316.07	6,313.53	0.029	59.06	12.03	6,320.60	6,318.76
185	Pipe - (8)	SA3-6	SA3-5	36.0	61.6	6,350.02	6,348.79	0.020	77.70	17.05	6,352.77	6,350.94
315	Pipe - (9)	SA3-5	SA3-4A	36.0	100.4	6,343.59	6,341.59	0.020	93.09	17.65	6,346.46	6,343.90
316	Pipe - (9) (1)	SA3-4A	SA3-4	36.0	95.4	6,337.09	6,335.18	0.020	92.90	17.64	6,339.95	6,337.50
204	Pipe - (10)	SA3-4	SA3-2	36.0	53.5	6,329.74	6,328.67	0.020	92.71	17.64	6,332.60	6,331.09
318	Pipe - (10) (1)	SA3-2	SA3-1A	42.0	37.0	6,322.67	6,322.15	0.014	145.98	16.60	6,326.04	6,325.39
319	Pipe - (10) (1) (1)	SA3-1A	SA3-1	42.0	71.3	6,316.15	6,315.60	0.008	145.89	15.16	6,320.55	6,318.97
178	Pipe - (11)	SA3-8	SA3-7	36.0	192.6	6,358.48	6,356.56	0.010	78.52	12.71	6,361.24	6,359.03
176	Pipe - (13)	SA3-9	SA3-8	24.0	9.1	6,360.07	6,359.89	0.020	34.32	10.92	6,364.54	6,364.39
177	Pipe - (13) (1)	SA3-10	SA3-8	18.0	19.0	6,360.20	6,359.63	0.030	9.23	5.22	6,364.49	6,364.39
335	Pipe - (14)	SB5-5	SB5-4	36.0	9.0	6,406.76	6,406.56	0.023	63.22	17.15	6,409.32	6,408.76
336	Pipe - (14) (1)	SB5-4	SB5-3	36.0	100.6	6,403.36	6,401.05	0.023	74.21	17.81	6,406.07	6,402.97
161	Pipe - (14) (1) (1)	SB5-2	SB5-1	36.0	280.4	6,391.61	6,386.00	0.020	73.86	14.77	6,394.31	6,389.00

100-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
154	Pipe - (14) (1) (2)	SB5-3	SB5-2	36.0	98.5	6,396.22	6,394.00	0.023	74.03	17.66	6,398.93	6,395.94
338	Pipe - (15)	SB5-10	SB5-5	24.0	19.0	6,408.35	6,408.16	0.010	40.95	13.03	6,411.68	6,411.31
206	Pipe - (17)	SA3-3	SA3-2	30.0	126.6	6,330.71	6,328.18	0.020	74.33	15.14	6,333.63	6,330.63
331	Pipe - (18)	SA4-7	SA4-6	18.0	28.1	6,432.73	6,432.45	0.010	14.98	8.48	6,436.74	6,436.33
333	Pipe - (20)	SA4-6	SA4-5	18.0	38.3	6,432.25	6,431.68	0.015	19.02	10.76	6,436.24	6,435.34
132	Pipe - (21)	SA4-5	SA4-2	18.0	384.8	6,431.48	6,417.63	0.036	18.98	14.83	6,432.94	6,420.55
152	Pipe - (30)	SA3-18	SA3-17	18.0	293.0	6,404.22	6,397.92	0.021	16.32	11.65	6,405.65	6,399.03
162	Pipe - (32)	STM-2	SA3-16	18.0	119.3	6,393.84	6,390.56	0.028	16.06	12.89	6,395.26	6,391.58
163	Pipe - (32) (1)	SA3-16	STM-2	24.0	265.4	6,390.06	6,382.76	0.027	16.00	12.96	6,391.50	6,384.52
167	Pipe - (34)	SA3-15	SA3-13	18.0	19.0	6,380.62	6,380.24	0.020	4.51	2.55	6,384.29	6,384.27
168	Pipe - (34) (1)	SA3-14	SA3-13	18.0	9.0	6,380.42	6,380.24	0.020	19.85	11.23	6,384.50	6,384.27
171	Pipe - (37)	SA3-12	STM-1	24.0	164.5	6,369.35	6,366.97	0.014	38.26	12.18	6,374.36	6,370.99
175	Pipe - (40)	SA3-11	SA3-8	30.0	323.5	6,363.18	6,360.11	0.009	37.79	7.70	6,366.35	6,364.39
137	Pipe - (44)	SA4-4	SA4-3	18.0	28.0	6,419.22	6,418.80	0.015	8.30	4.70	6,422.61	6,422.49
138	Pipe - (70)	SA4-3	SA4-2	18.0	39.1	6,418.60	6,418.21	0.010	14.57	8.24	6,421.09	6,420.55
139	Pipe - (72)	SA4-2	SA4-1	24.0	193.8	6,415.36	6,413.42	0.010	31.00	9.87	6,419.01	6,415.30
153	Pipe - (76)	SA3-20	SA3-18	18.0	19.0	6,404.84	6,404.42	0.023	4.06	2.30	6,407.06	6,407.04
151	Pipe - (77)	SA3-19	SA3-18	18.0	9.0	6,404.62	6,404.42	0.023	12.52	7.09	6,407.14	6,407.04
326	Pipe - (112)	SB5-14	SB5-13	18.0	28.0	6,414.33	6,413.36	0.034	3.36	1.90	6,415.98	6,415.96
327	Pipe - (113)	SB5-13	SB5-12	18.0	48.1	6,413.16	6,412.68	0.010	13.18	7.46	6,415.08	6,414.54
329	Pipe - (114)	SB5-12	SB5-11	24.0	192.9	6,412.48	6,410.55	0.010	13.14	8.47	6,413.79	6,411.54
339	Pipe - (114) (1)	SB5-11	SB5-5	24.0	250.0	6,410.26	6,407.76	0.010	13.00	8.45	6,411.74	6,411.31
172	Pipe - (115)	SB6-4	SB6-3	18.0	41.1	6,366.15	6,365.73	0.010	11.73	6.64	6,370.20	6,369.83
173	Pipe - (116)	SB6-3	SB6-2	18.0	314.4	6,365.03	6,357.48	0.024	18.12	10.26	6,369.17	6,362.47
188	Pipe - (116) (2)	SB6-2	SB6-1	18.0	162.6	6,357.28	6,355.66	0.010	17.85	10.10	6,361.84	6,357.11
346	Pipe - (117)	SB2-9	SB2-8	18.0	28.0	6,356.53	6,356.25	0.010	6.01	3.40	6,358.13	6,358.06
347	Pipe - (118)	SB2-8	SB2-6	18.0	50.6	6,356.05	6,355.54	0.010	9.40	5.32	6,357.61	6,357.32
156	Pipe - (121)	SB3-13	SB3-11	18.0	19.7	6,393.51	6,393.31	0.010	2.78	5.66	6,394.56	6,394.57
157	Pipe - (121) (1)	SB3-12	SB3-11	18.0	9.0	6,395.08	6,394.81	0.030	4.38	9.55	6,395.88	6,395.39

100-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
349	Pipe - (123)	SB3-11	SB3-10	24.0	56.7	6,393.28	6,391.67	0.029	6.82	10.36	6,394.21	6,392.22
350	Pipe - (123) (1)	SB3-10	SB3-7	24.0	246.8	6,390.67	6,377.96	0.051	15.15	16.05	6,392.07	6,379.84
164	Pipe - (124)	SB3-8	SB3-7	18.0	9.0	6,380.84	6,380.46	0.042	4.64	10.99	6,381.67	6,381.03
165	Pipe - (124) (1)	SB3-9	SB3-7	18.0	19.0	6,380.84	6,380.46	0.020	11.98	10.69	6,382.15	6,381.52
191	Pipe - (126)	SB3-4	SB3-3	18.0	9.0	6,350.67	6,350.49	0.020	15.27	8.64	6,356.50	6,356.37
190	Pipe - (126) (1)	SB3-5	SB3-3	18.0	19.0	6,350.89	6,350.49	0.021	14.43	8.16	6,356.62	6,356.37
127	Pipe - (133) (1)	SB7-2	SB7-1	24.0	82.7	6,462.26	6,461.63	0.008	13.75	7.70	6,463.59	6,462.75
136	Pipe - (134)	SD1-2	SD1-1	24.0	115.7	6,428.68	6,425.47	0.028	38.35	13.66	6,430.62	6,427.18
135	Pipe - (135)	SD2-2	SD2-1	18.0	56.0	6,432.20	6,429.54	0.047	27.59	15.61	6,434.90	6,431.03
133	Pipe - (136)	SD2-3	SD2-2	15.0	49.9	6,434.56	6,432.40	0.043	27.62	22.50	6,441.43	6,434.90
209	Pipe - (139)	SA1-2	SA1-1	36.0	44.7	6,306.42	6,306.13	0.006	64.10	9.07	6,309.27	6,308.70
210	Pipe - (139) (1)	SA1-3	SA1-2	36.0	41.5	6,310.59	6,309.76	0.020	64.10	16.32	6,313.16	6,311.75
203	Pipe - (143)	SB2-4	SB2-3	24.0	9.1	6,345.68	6,345.57	0.013	12.82	4.08	6,349.41	6,349.39
144	Pipe - (157)	SB5-9	SB5-7	18.0	19.3	6,410.51	6,410.32	0.010	3.42	1.93	6,413.81	6,413.79
145	Pipe - (158)	SB5-7	SB5-6	18.0	53.4	6,410.12	6,409.58	0.010	11.88	6.73	6,412.86	6,412.37
146	Pipe - (159)	SB5-6	SB5-5	18.0	111.6	6,409.38	6,408.26	0.010	11.84	6.70	6,412.32	6,411.31
357	Pipe - (161)	SB3-15	SB3-14	18.0	19.0	6,394.95	6,394.76	0.010	4.21	6.35	6,396.39	6,396.37
355	Pipe - (161) (1)	SB3-16	SB3-14	18.0	91.2	6,399.03	6,394.76	0.047	5.64	12.03	6,399.95	6,396.37
354	Pipe - (161) (2)	SB3-17	SB3-16	18.0	9.9	6,399.33	6,399.23	0.011	5.64	7.51	6,400.25	6,400.01
193	Pipe - (163)	SB2-5	SB2-3	18.0	259.1	6,351.51	6,345.82	0.022	9.25	10.43	6,352.68	6,349.39
189	Pipe - (163) (1)	STM-3	SB2-5	18.0	192.5	6,355.13	6,353.10	0.011	9.35	7.88	6,356.31	6,354.05
184	Pipe - (164)	SB2-6	STM-3	18.0	19.8	6,355.34	6,355.13	0.011	9.36	7.89	6,356.52	6,356.15
174	Pipe - (167)	STM-1	SA3-11	24.0	226.6	6,366.97	6,363.68	0.014	38.06	12.11	6,370.99	6,366.40
169	Pipe - (168)	SA3-13	SA3-12	24.0	353.0	6,379.40	6,369.52	0.028	38.68	12.31	6,381.87	6,374.48
170	Pipe - (169)	STM-2	SA3-13	24.0	89.2	6,382.76	6,380.31	0.028	15.86	12.94	6,384.52	6,384.27
155	Pipe - (170)	SA3-17	STM-2	18.0	141.4	6,397.72	6,393.84	0.027	16.14	12.90	6,399.15	6,394.85
187	Pipe - (238)	SA3-5A	SA3-5	18.0	28.3	6,350.86	6,350.29	0.020	17.99	11.31	6,352.31	6,351.64
179	Pipe - (241) (1)	SB3-6	SB3-3	24.0	283.0	6,358.90	6,349.99	0.032	29.95	15.97	6,360.76	6,356.37
192	Pipe - (243)	SB3-3	SB3-2	30.0	76.9	6,349.46	6,347.15	0.030	58.37	11.89	6,353.03	6,351.91
194	Pipe - (244)	SB3-2	SB3-1	30.0	103.6	6,346.95	6,344.88	0.020	58.20	11.86	6,351.04	6,348.95

100-Year Event

Conduit Table - Time: 0.00 hours

ID	Label	Start Node	Stop Node	Diameter (in)	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
166	Pipe - (245)	SB3-7	SB3-6	24.0	362.3	6,375.96	6,359.66	0.045	30.23	18.34	6,377.83	6,360.70
180	Pipe - (246)	SA3-7	SA3-6	36.0	225.4	6,355.64	6,351.13	0.020	78.08	17.07	6,358.39	6,355.46
341	Pipe - (247)	SB5-8	SB5-7	18.0	9.6	6,411.48	6,411.34	0.015	8.98	5.08	6,413.83	6,413.79
356	Pipe - (248)	SB3-14	SB3-10	18.0	62.2	6,394.56	6,391.67	0.047	9.40	13.82	6,395.74	6,392.32

100-Year Event

Manhole Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Headloss Coefficient (Standard)
123	SA1-2	6,316.72	6,316.72	6,306.42	64.10	2.85	6,309.27	6,309.34	0.050
212	SA1-3	6,314.42	6,314.42	6,310.59	64.10	2.57	6,313.16	6,313.16	0.000
121	SA2-2	6,333.62	6,333.62	6,316.07	59.06	4.53	6,320.60	6,320.72	0.050
119	SA2-3	6,335.79	6,335.79	6,324.43	59.19	2.38	6,326.81	6,327.05	0.100
106	SA2-4	6,352.68	6,352.68	6,336.01	40.28	1.96	6,337.97	6,338.48	0.200
104	SA2-5	6,357.05	6,357.05	6,345.36	40.50	1.96	6,347.32	6,347.58	0.100
105	SA2-6	6,357.04	6,357.04	6,346.15	13.83	1.78	6,347.93	6,347.97	0.050
87	SA3-10	6,367.95	6,367.95	6,360.20	9.23	4.29	6,364.49	6,364.51	0.050
83	SA3-11	6,372.37	6,372.37	6,363.18	37.79	3.17	6,366.35	6,366.40	0.050
80	SA3-12	6,378.99	6,378.99	6,369.35	38.26	5.01	6,374.36	6,374.48	0.050
76	SA3-13	6,388.87	6,388.87	6,379.40	38.68	2.47	6,381.87	6,384.27	1.020
77	SA3-14	6,388.57	6,388.57	6,380.32	19.85	4.18	6,384.50	6,384.60	0.050
78	SA3-15	6,388.56	6,388.56	6,380.52	4.51	3.77	6,384.29	6,384.30	0.050
70	SA3-16	6,398.77	6,398.77	6,390.06	16.00	1.44	6,391.50	6,391.53	0.050
63	SA3-17	6,406.00	6,406.00	6,397.72	16.14	1.43	6,399.15	6,399.22	0.050
59	SA3-18	6,413.93	6,413.93	6,404.22	16.32	1.43	6,405.65	6,407.04	1.020
62	SA3-19	6,413.63	6,413.63	6,404.62	12.52	2.52	6,407.14	6,407.18	0.050
317	SA3-1A	6,333.21	6,333.21	6,316.15	145.89	4.40	6,320.55	6,320.55	(N/A)
117	SA3-2	6,338.91	6,338.91	6,322.67	145.98	3.37	6,326.04	6,329.77	1.020
61	SA3-20	6,413.63	6,413.63	6,404.84	4.06	2.22	6,407.06	6,407.07	0.050
118	SA3-3	6,336.18	6,336.18	6,330.71	74.33	2.92	6,333.63	6,333.81	0.050
113	SA3-4	6,346.76	6,346.76	6,329.74	92.71	2.86	6,332.60	6,333.71	0.400
314	SA3-4A	6,355.80	6,355.80	6,337.09	92.90	2.86	6,339.95	6,339.95	(N/A)
95	SA3-5	6,362.52	6,362.52	6,343.59	93.09	2.87	6,346.46	6,349.30	1.020
97	SA3-5A	6,361.54	6,361.54	6,350.86	17.99	1.45	6,352.31	6,352.39	0.050
94	SA3-6	6,363.46	6,363.46	6,350.02	77.70	2.75	6,352.77	6,355.46	1.320
89	SA3-7	6,366.01	6,366.01	6,355.64	78.08	2.75	6,358.39	6,358.49	0.050
85	SA3-8	6,368.26	6,368.26	6,358.48	78.52	2.76	6,361.24	6,364.39	1.520
86	SA3-9	6,367.99	6,367.99	6,360.07	34.32	4.47	6,364.54	6,364.63	0.050
46	SA4-2	6,427.19	6,427.19	6,415.36	31.00	3.65	6,419.01	6,420.55	1.020

100-Year Event

Manhole Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Headloss Coefficient (Standard)
44	SA4-3	6,426.91	6,426.91	6,418.60	14.57	2.00	6,421.09	6,422.49	1.320
45	SA4-4	6,426.91	6,426.91	6,419.22	8.30	3.04	6,422.61	6,422.63	0.050
38	SA4-5	6,440.17	6,440.17	6,431.48	18.98	1.46	6,432.94	6,435.34	1.320
37	SA4-6	6,441.08	6,441.08	6,432.25	19.02	3.99	6,436.24	6,436.33	0.050
36	SA4-7	6,441.14	6,441.14	6,432.73	14.98	4.01	6,436.74	6,436.80	0.050
321	SB1-2	6,344.10	6,344.10	6,331.90	131.60	3.81	6,335.71	6,335.71	(N/A)
108	SB1-3	6,354.28	6,354.28	6,335.15	131.60	3.42	6,338.56	6,338.71	0.050
107	SB1-4	6,353.13	6,353.13	6,337.30	131.60	3.32	6,340.62	6,340.77	0.050
218	SB1-5	6,345.25	6,345.25	6,341.15	131.60	3.32	6,344.47	6,344.47	0.000
109	SB2-2	6,350.89	6,350.89	6,344.38	30.69	4.68	6,349.06	6,349.07	0.050
110	SB2-3	6,351.20	6,351.20	6,345.07	20.75	4.04	6,349.11	6,349.39	1.020
111	SB2-4	6,350.89	6,350.89	6,345.51	12.82	3.90	6,349.41	6,349.42	0.050
102	SB2-5	6,357.58	6,357.58	6,351.51	9.25	1.17	6,352.68	6,352.71	0.050
93	SB2-6	6,364.34	6,364.34	6,355.34	9.36	1.18	6,356.52	6,357.32	1.320
91	SB2-8	6,365.03	6,365.03	6,356.05	9.40	1.56	6,357.61	6,358.06	1.020
92	SB2-9	6,365.03	6,365.03	6,356.53	6.01	1.60	6,358.13	6,358.14	0.050
348	SB3-10	6,403.21	6,403.21	6,390.67	15.15	1.40	6,392.07	6,392.07	(N/A)
64	SB3-11	6,404.64	6,404.64	6,392.37	6.82	1.84	6,394.21	6,394.57	1.020
66	SB3-12	6,404.34	6,404.34	6,395.08	4.38	0.80	6,395.88	6,395.90	0.050
65	SB3-13	6,404.55	6,404.55	6,393.51	2.78	1.06	6,394.56	6,394.61	0.640
351	SB3-14	6,403.61	6,403.61	6,394.56	9.40	1.18	6,395.74	6,396.37	1.020
68	SB3-15	6,402.89	6,402.89	6,394.95	4.21	1.44	6,396.39	6,396.39	0.050
352	SB3-16	6,404.78	6,404.78	6,399.03	5.64	0.92	6,399.95	6,400.02	0.200
353	SB3-17	6,404.64	6,404.64	6,399.33	5.64	0.92	6,400.25	6,400.27	0.050
103	SB3-2	6,357.32	6,357.32	6,346.95	58.20	4.09	6,351.04	6,351.91	0.400
100	SB3-3	6,359.23	6,359.23	6,349.46	58.37	3.57	6,353.03	6,356.37	1.520
101	SB3-4	6,358.92	6,358.92	6,350.67	15.27	5.83	6,356.50	6,356.56	0.050
99	SB3-5	6,358.92	6,358.92	6,350.89	14.43	5.73	6,356.62	6,356.67	0.050
88	SB3-6	6,367.83	6,367.83	6,358.90	29.95	1.86	6,360.76	6,360.87	0.070
73	SB3-7	6,389.32	6,389.32	6,375.96	30.23	1.87	6,377.83	6,379.84	1.320

100-Year Event

Manhole Table - Time: 0.00 hours

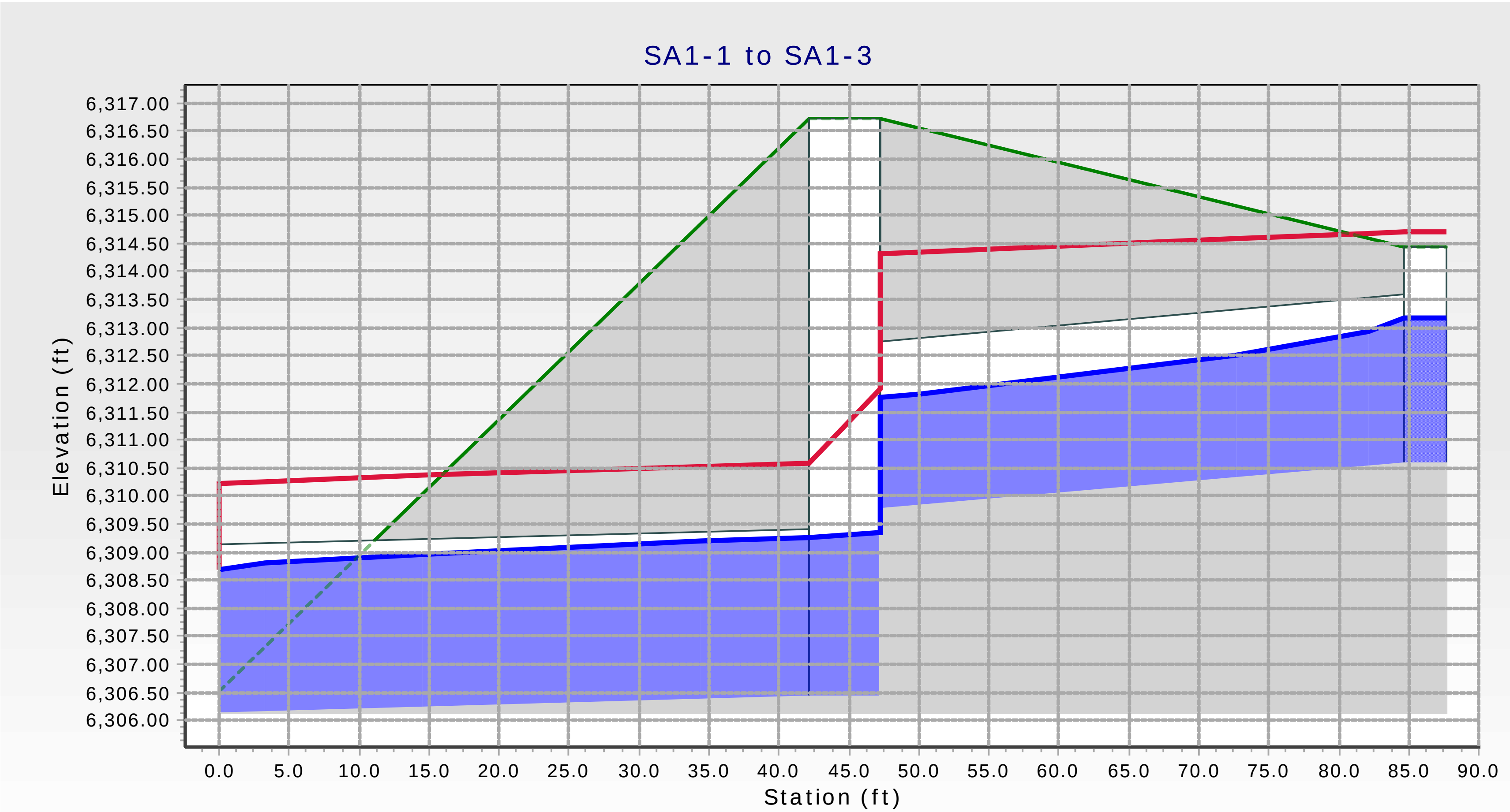
ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Headloss Coefficient (Standard)
75	SB3-8	6,389.01	6,389.01	6,380.84	4.64	0.83	6,381.67	6,381.69	0.050
74	SB3-9	6,389.01	6,389.01	6,380.84	11.98	1.31	6,382.15	6,382.19	0.050
337	SB5-10	6,415.82	6,415.82	6,408.35	40.95	3.33	6,411.68	6,411.81	0.050
328	SB5-11	6,418.97	6,418.97	6,410.26	13.00	1.48	6,411.74	6,411.76	0.050
50	SB5-12	6,421.36	6,421.36	6,412.48	13.14	1.31	6,413.79	6,414.54	1.320
49	SB5-13	6,422.34	6,422.34	6,413.16	13.18	1.92	6,415.08	6,415.96	1.020
48	SB5-14	6,422.34	6,422.34	6,414.33	3.36	1.65	6,415.98	6,415.99	0.050
69	SB5-2	6,400.09	6,400.09	6,391.61	73.86	2.70	6,394.31	6,394.50	0.100
60	SB5-3	6,409.49	6,409.49	6,396.22	74.03	2.71	6,398.93	6,399.02	0.050
334	SB5-4	6,415.82	6,415.82	6,403.36	74.21	2.71	6,406.07	6,406.17	0.050
54	SB5-5	6,416.13	6,416.13	6,406.76	63.22	2.56	6,409.32	6,411.31	1.320
53	SB5-6	6,417.65	6,417.65	6,409.38	11.84	2.94	6,412.32	6,412.37	0.070
51	SB5-7	6,419.38	6,419.38	6,410.12	11.88	2.74	6,412.86	6,413.79	1.320
340	SB5-8	6,419.32	6,419.32	6,411.48	8.98	2.35	6,413.83	6,413.85	0.050
52	SB5-9	6,419.21	6,419.21	6,410.51	3.42	3.30	6,413.81	6,413.81	0.050
96	SB6-2	6,370.74	6,370.74	6,357.28	17.85	4.56	6,361.84	6,362.47	0.400
82	SB6-3	6,373.74	6,373.74	6,365.03	18.12	4.14	6,369.17	6,369.83	0.400
81	SB6-4	6,374.15	6,374.15	6,366.15	11.73	4.05	6,370.20	6,370.23	0.050
226	SB7-2	6,464.26	6,464.26	6,462.26	13.75	2.12	6,463.32	6,463.32	0.000
224	SD1-2	6,430.68	6,430.68	6,428.68	38.35	1.94	6,430.62	6,430.62	0.000
40	SD2-2	6,439.79	6,439.79	6,432.20	27.59	2.70	6,434.90	6,434.90	0.000
225	SD2-3	6,435.90	6,435.90	6,434.56	27.62	1.34	6,435.90	6,435.90	0.000
221	STM-1	6,375.24	6,375.24	6,366.97	38.06	4.02	6,370.99	6,370.99	0.000
222	STM-2	6,391.36	6,391.36	6,382.76	15.86	1.76	6,384.52	6,384.52	0.000
345	STM-2	6,402.10	6,402.10	6,393.84	16.06	1.42	6,395.26	6,395.26	0.000
220	STM-3	6,363.59	6,363.59	6,355.13	9.35	1.18	6,356.31	6,356.31	0.000

100-Year Event

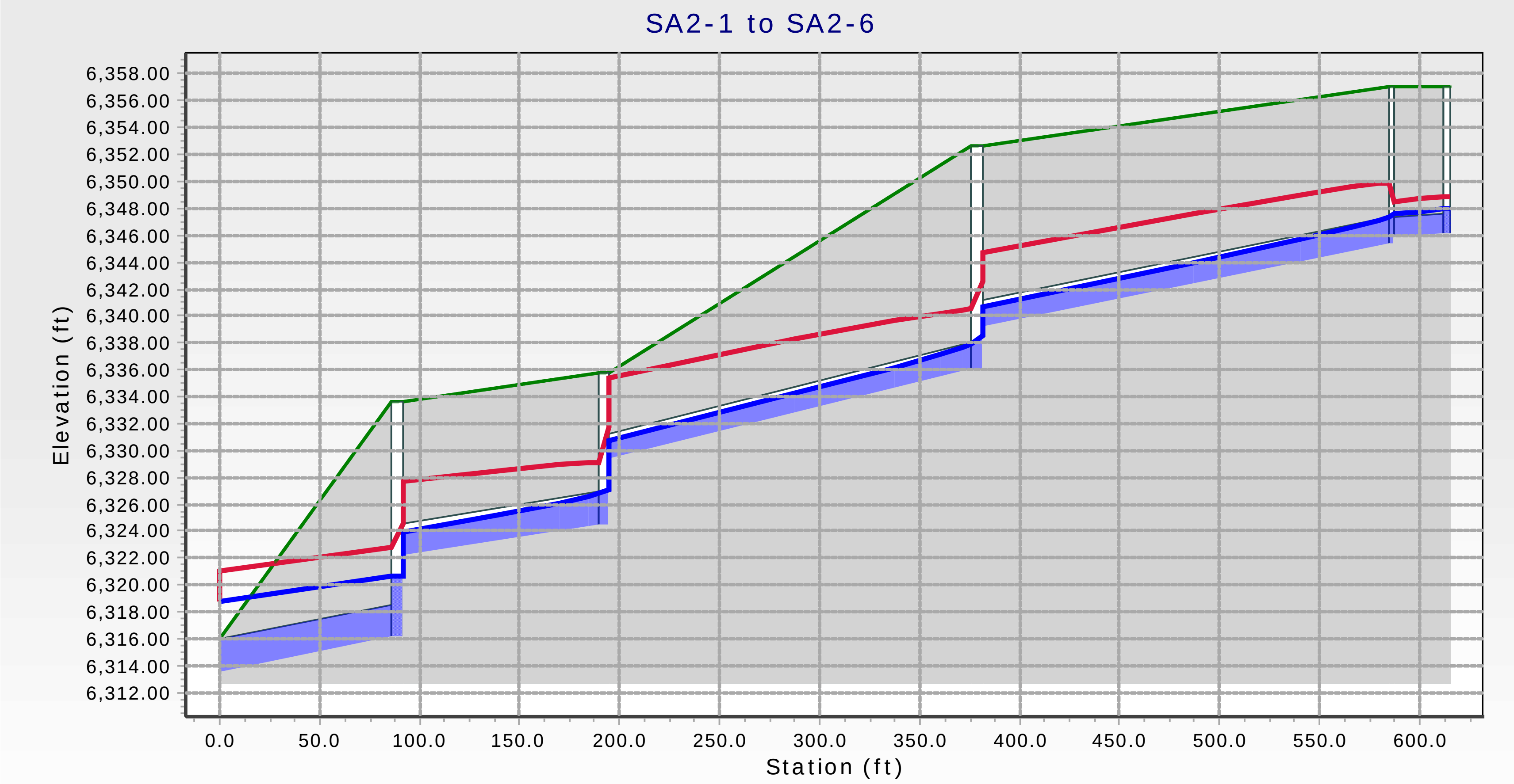
Outfall Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	System Flow Time (min)	Notes
32	SB7-1	6,462.44	6,460.83	0.00	6,462.75	13.67	15.909	18" FES
41	SD2-1	6,431.04	6,429.54	0.00	6,431.03	27.54	19.497	15" FES
43	SD1-1	6,427.47	6,426.00	0.00	6,427.18	38.21	19.541	24" FES
58	SA4-1	6,415.56	6,413.42	0.00	6,415.30	30.69	15.565	24" FES
72	SB5-1	6,389.00	6,389.00	0.00	6,389.00	73.29	22.164	24" FES
112	SB6-1	6,355.66	6,355.66	6,348.95	6,357.11	17.72	17.354	18" FES
120	SB1-1	6,331.90	6,331.90	0.00	6,335.12	131.60	0.212	48" FES
211	SA2-1	6,315.97	6,312.72	6,318.76	6,318.76	58.89	23.433	FOREBAY
213	SA1-1	6,306.51	6,306.51	0.00	6,308.70	64.10	0.124	36" FES
215	SA3-1	6,319.15	6,314.82	6,318.76	6,318.97	145.71	39.755	FOREBAY
216	SB3-1	6,345.21	6,343.40	6,348.95	6,348.95	57.97	18.905	30" FES
219	SB2-1	6,345.52	6,343.36	6,348.95	6,348.95	30.54	21.693	FOREBAY

100-Year Event



100-Year Event



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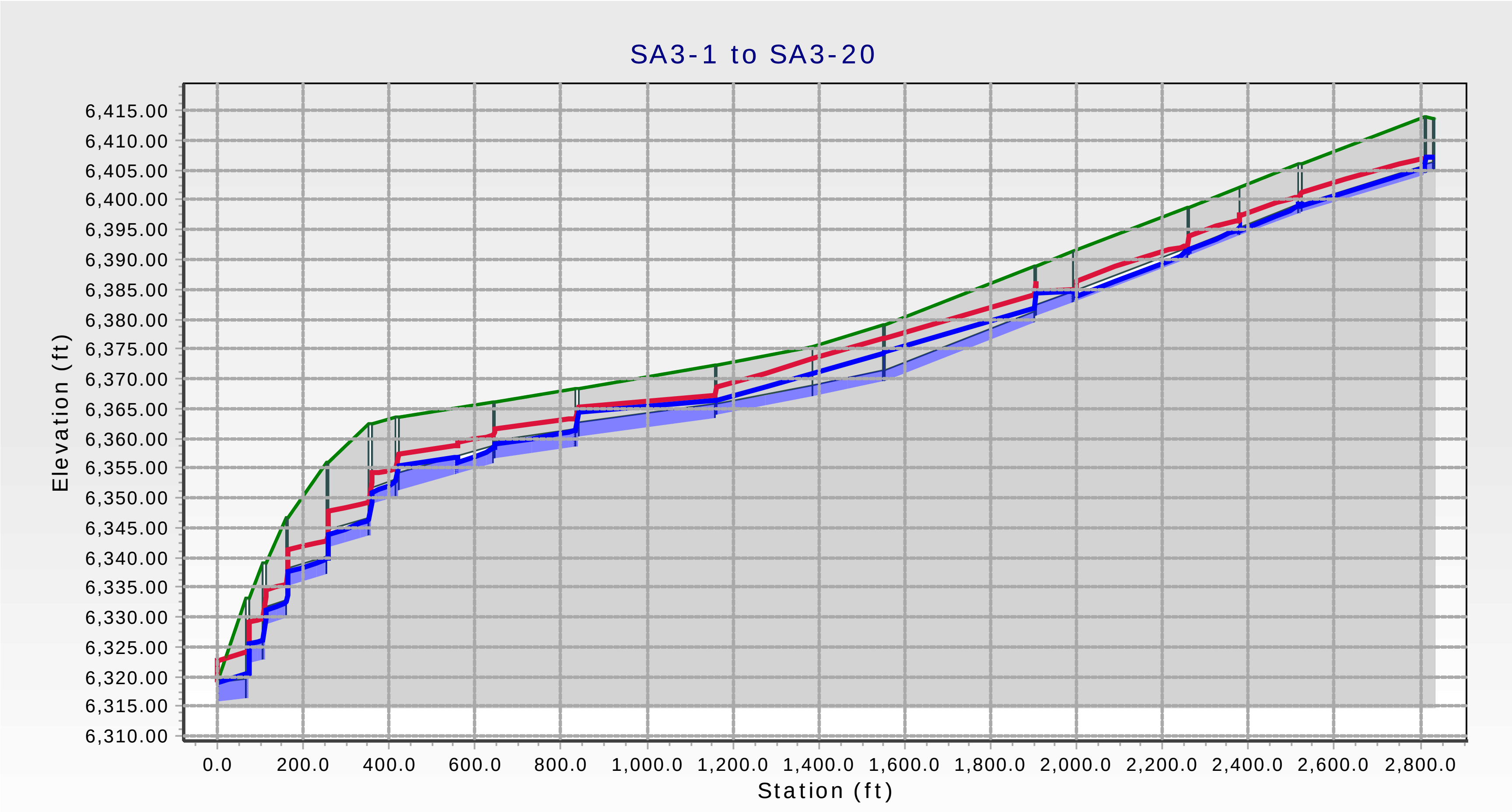

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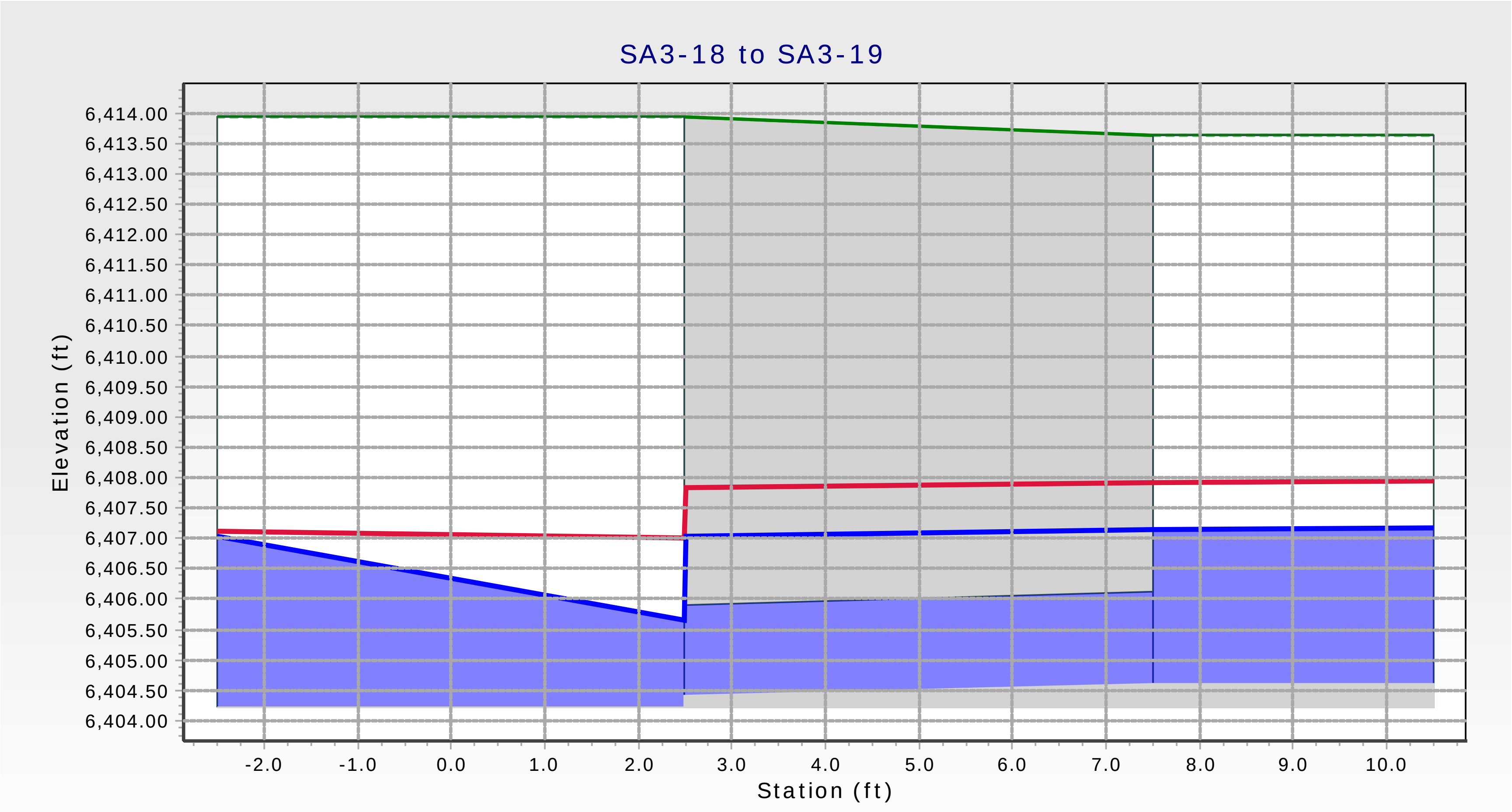

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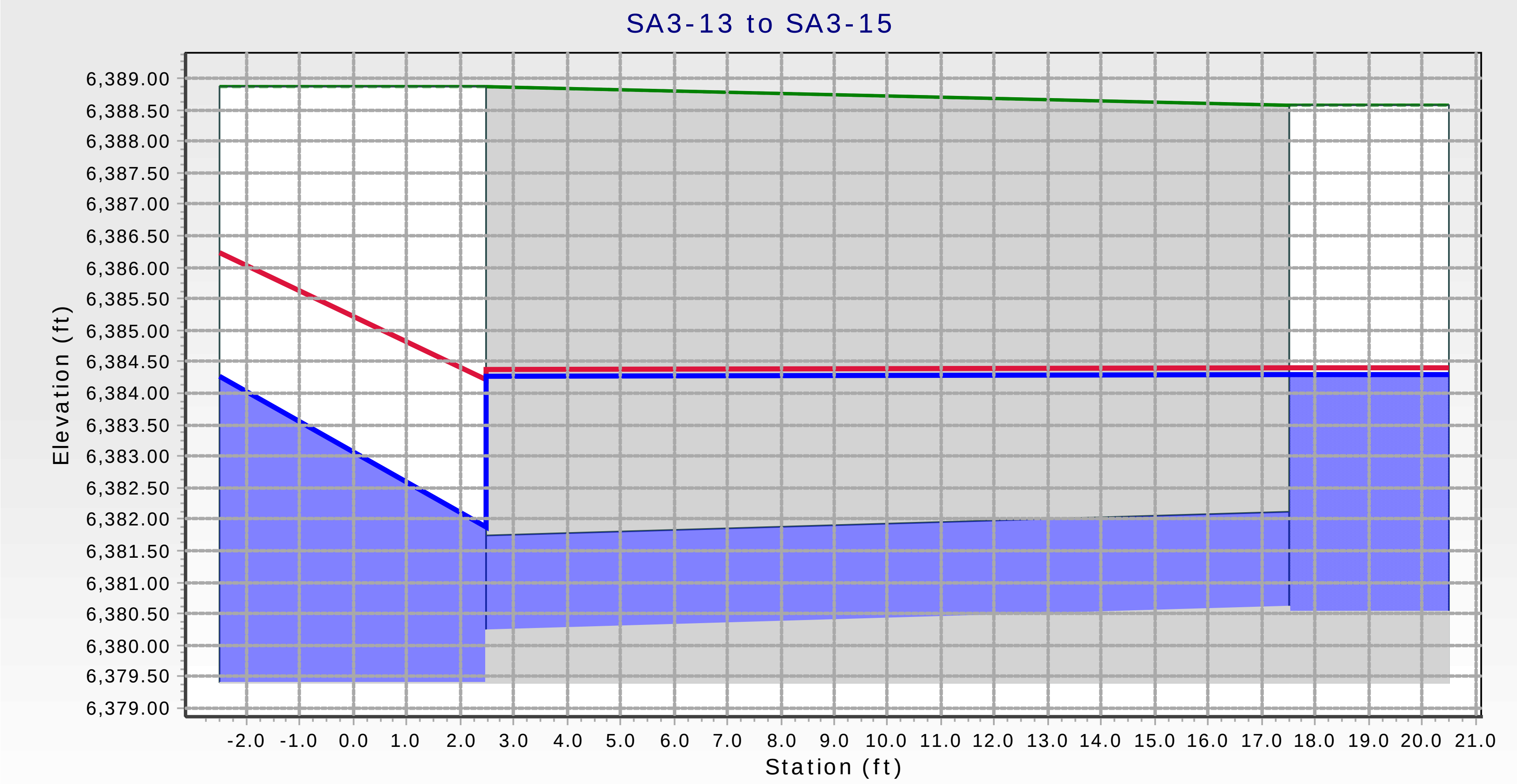

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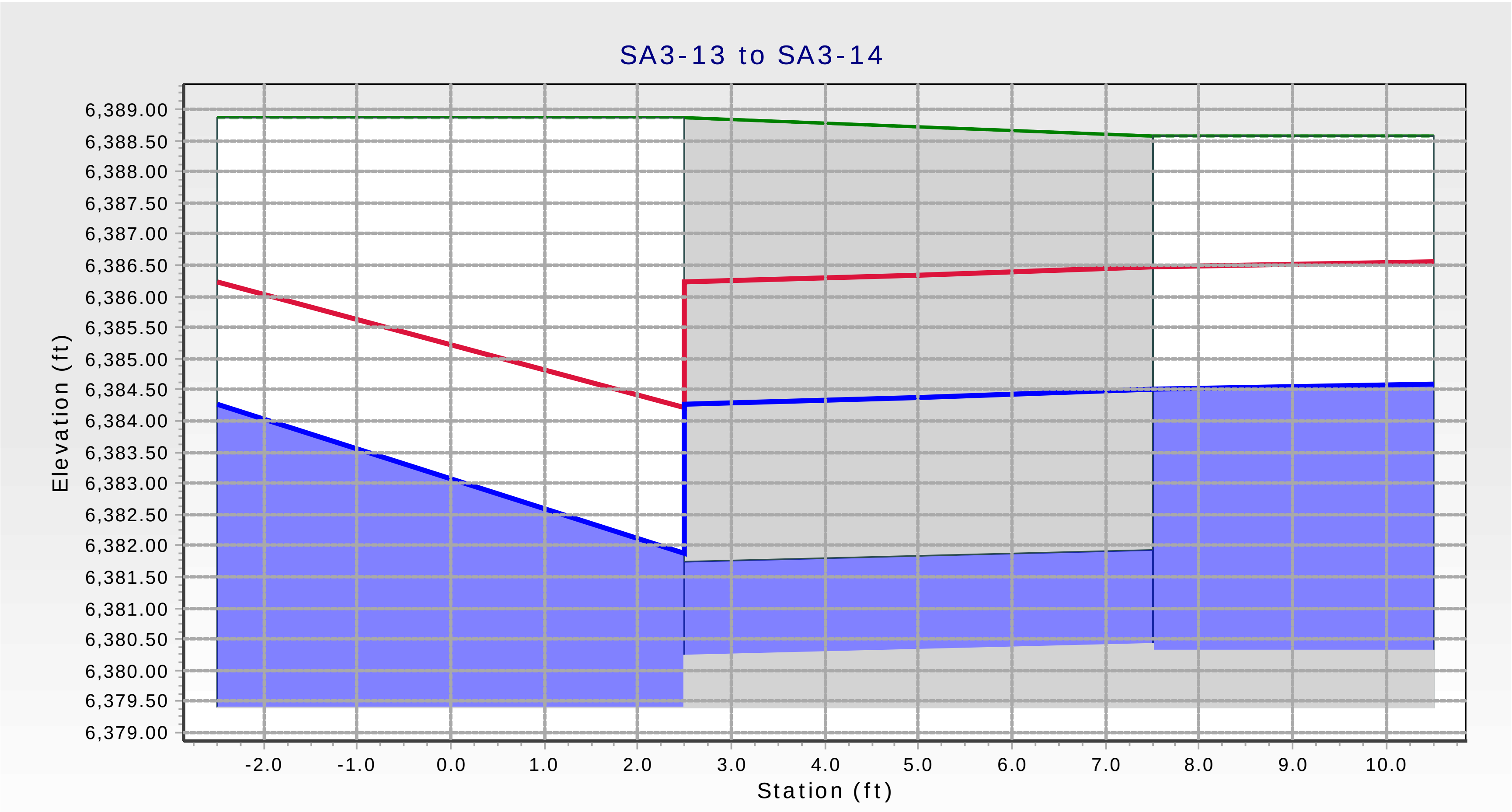
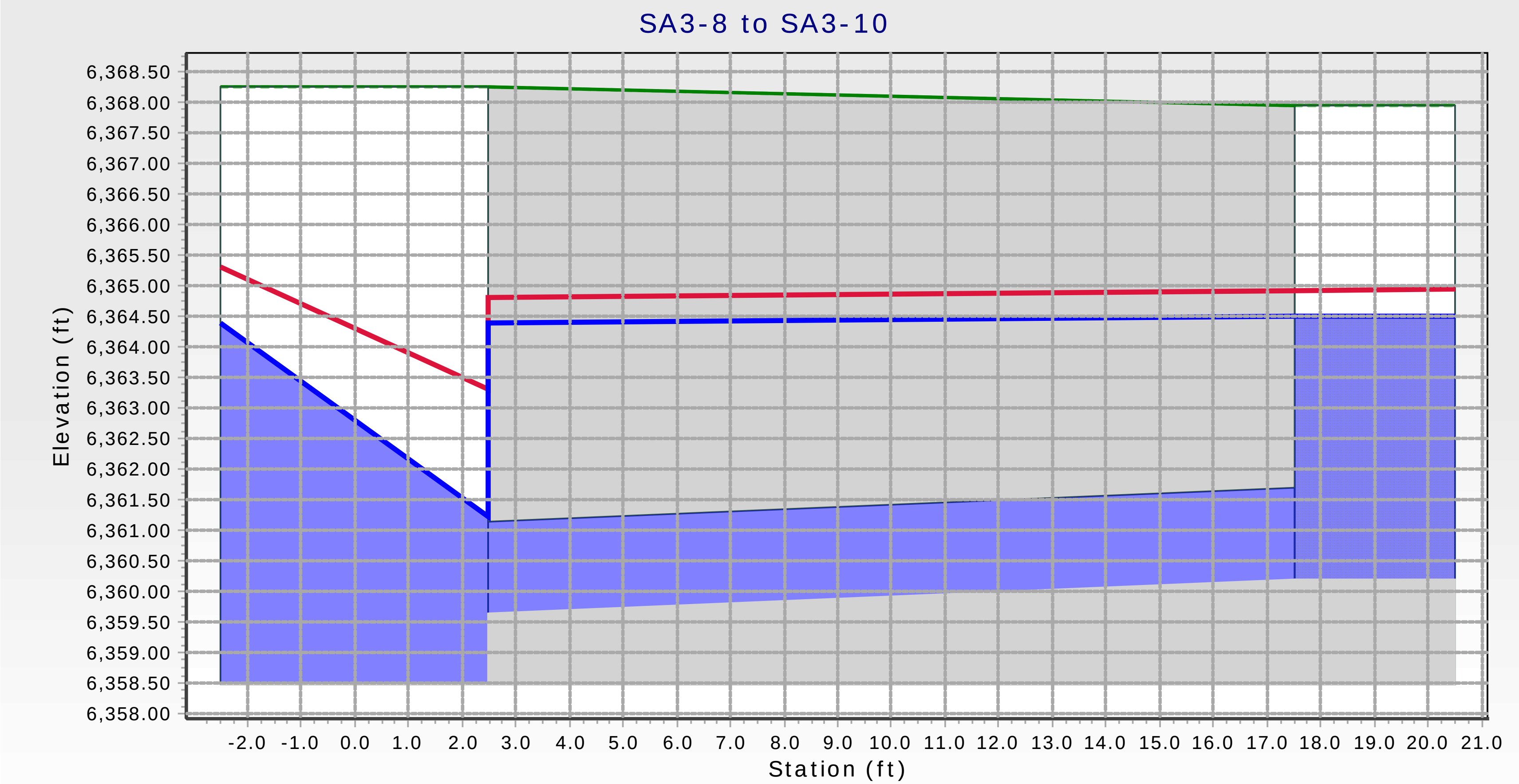


100-Year Event



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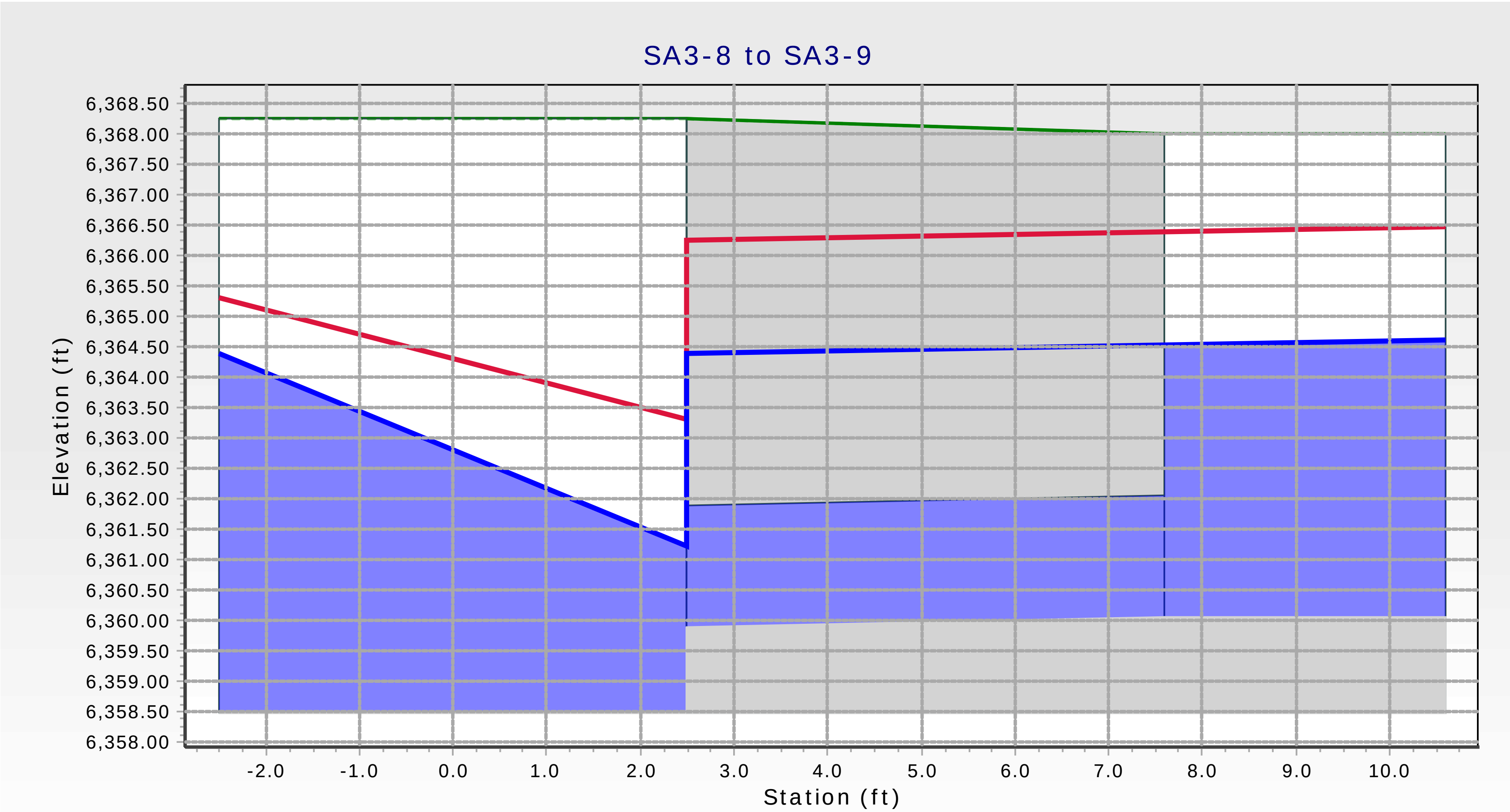
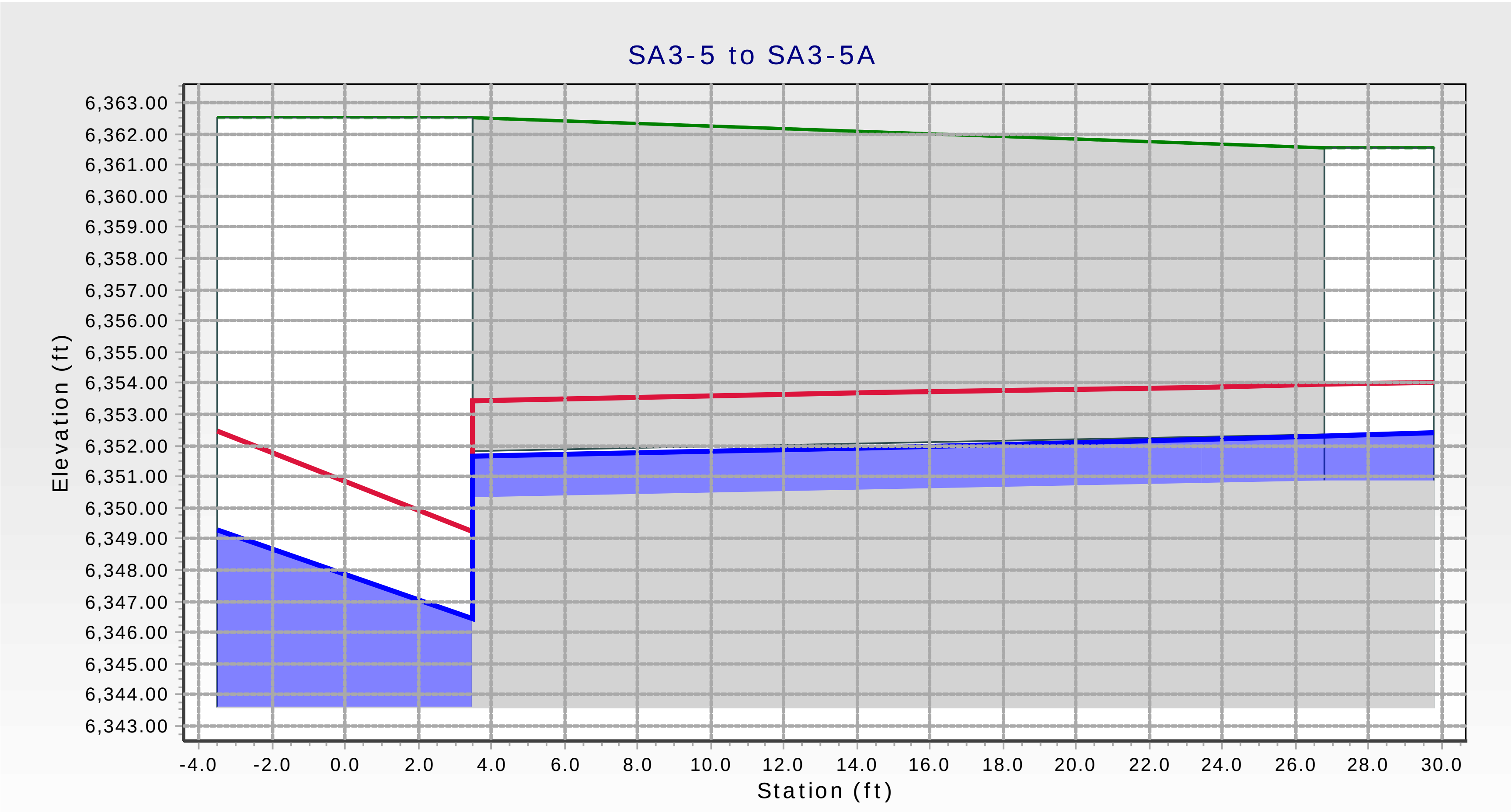
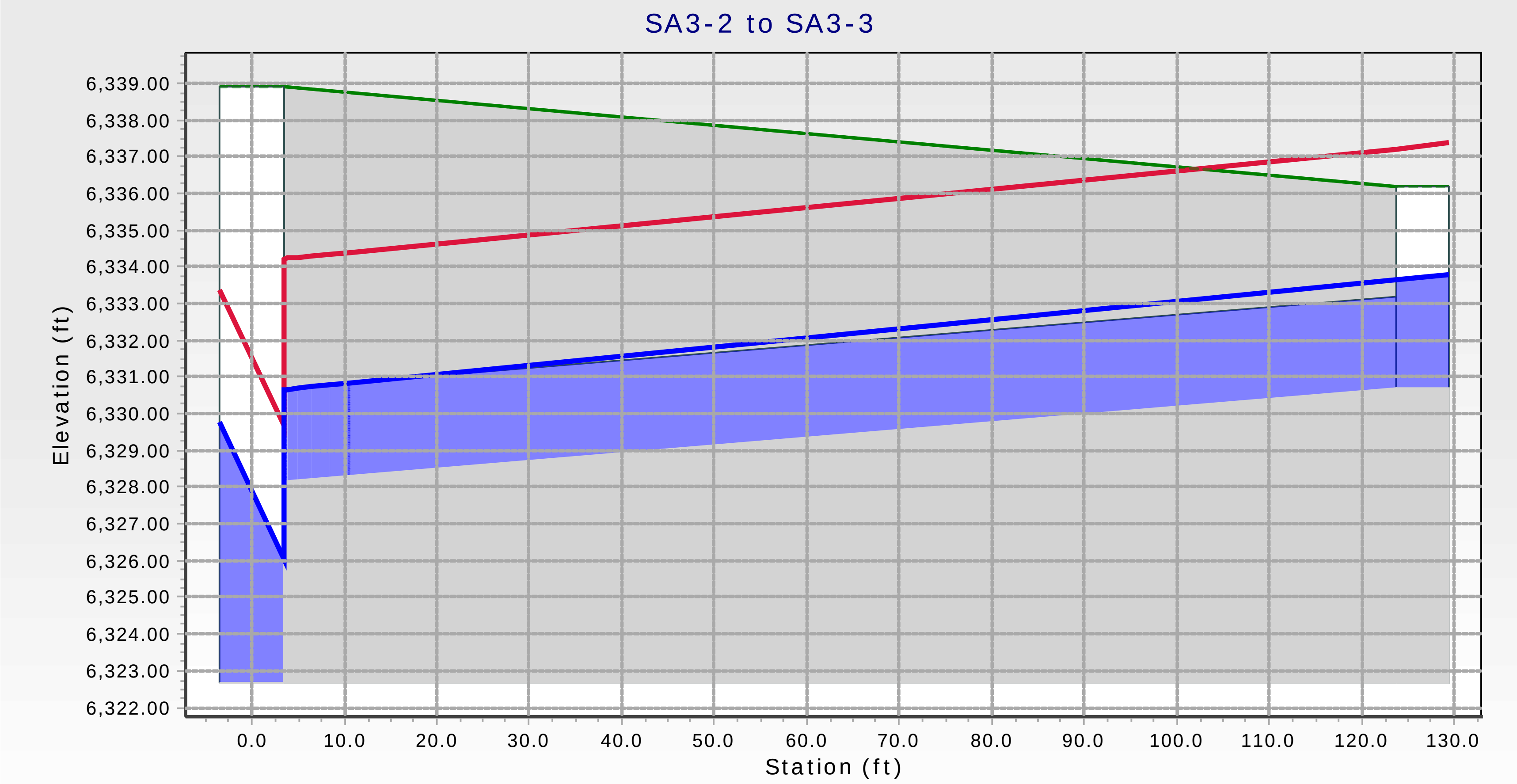


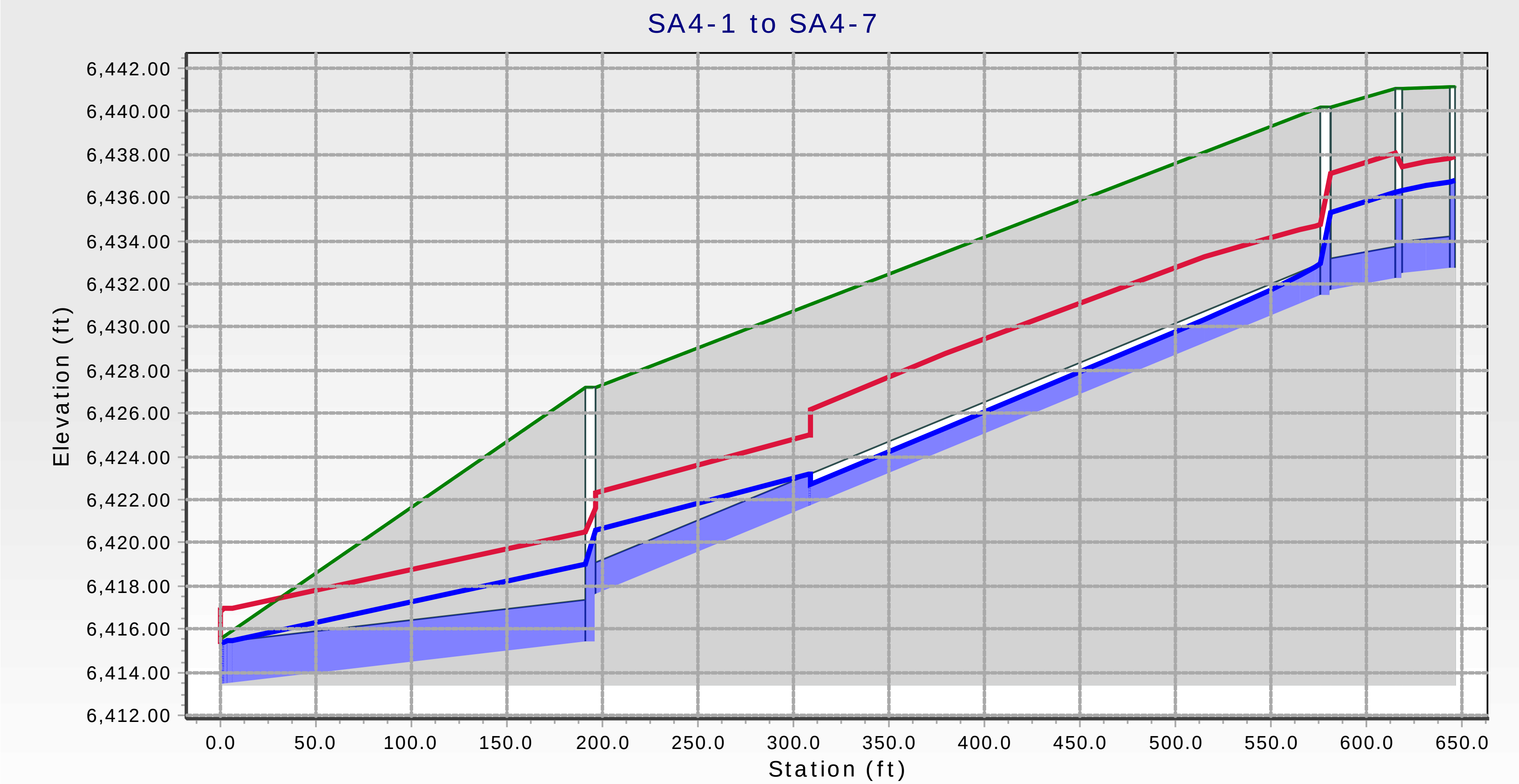
100-Year Event



100-Year Event



100-Year Event



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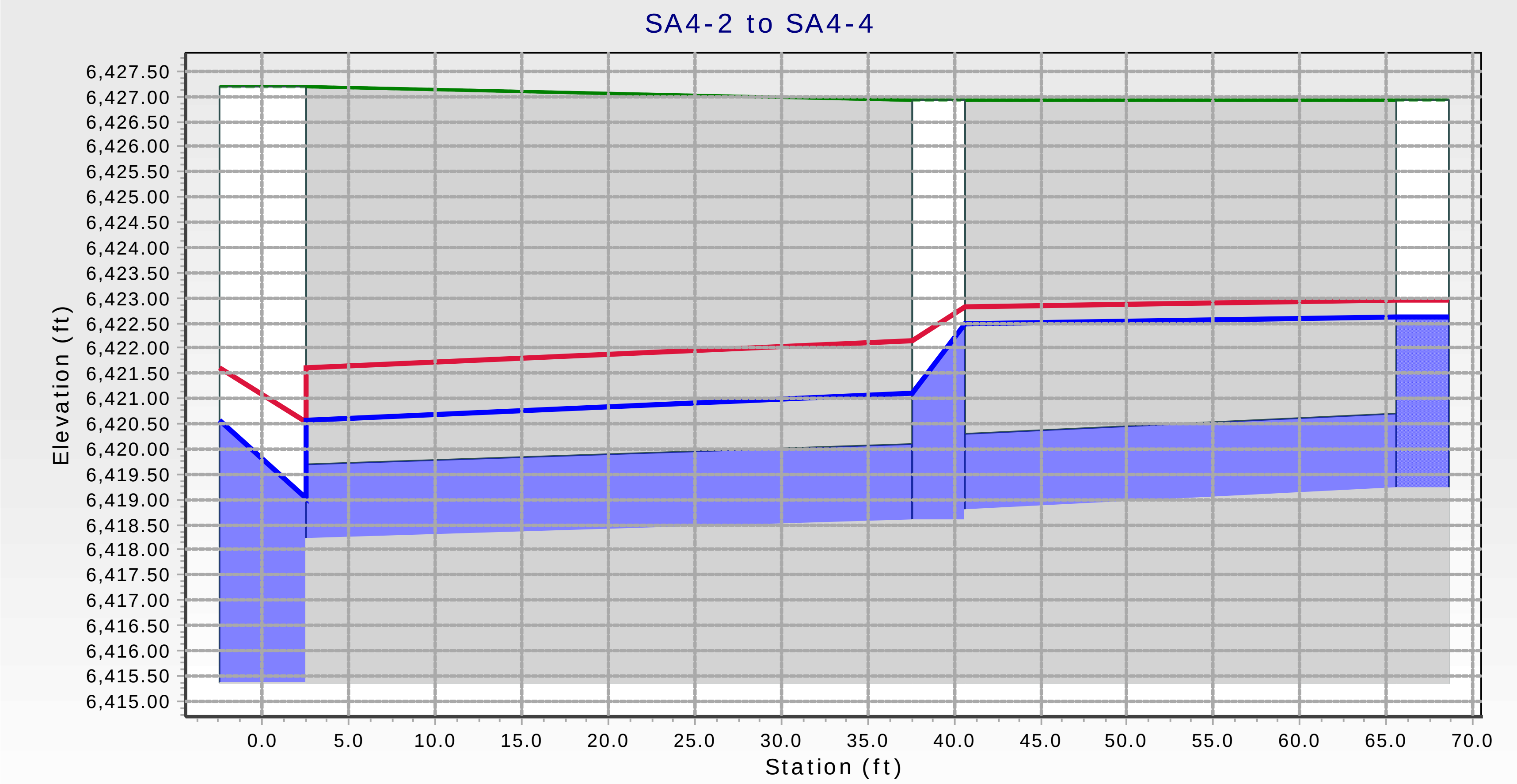

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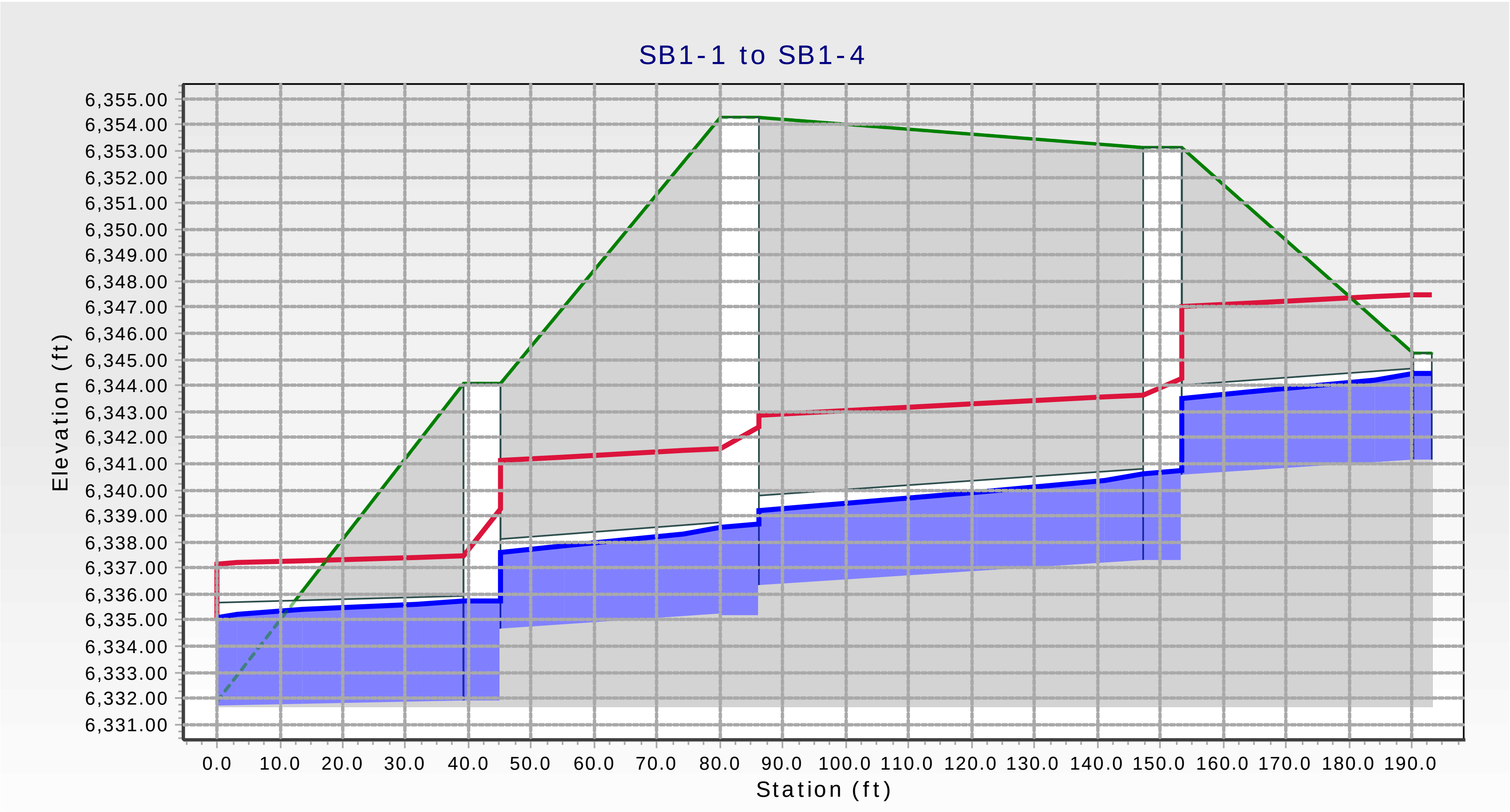

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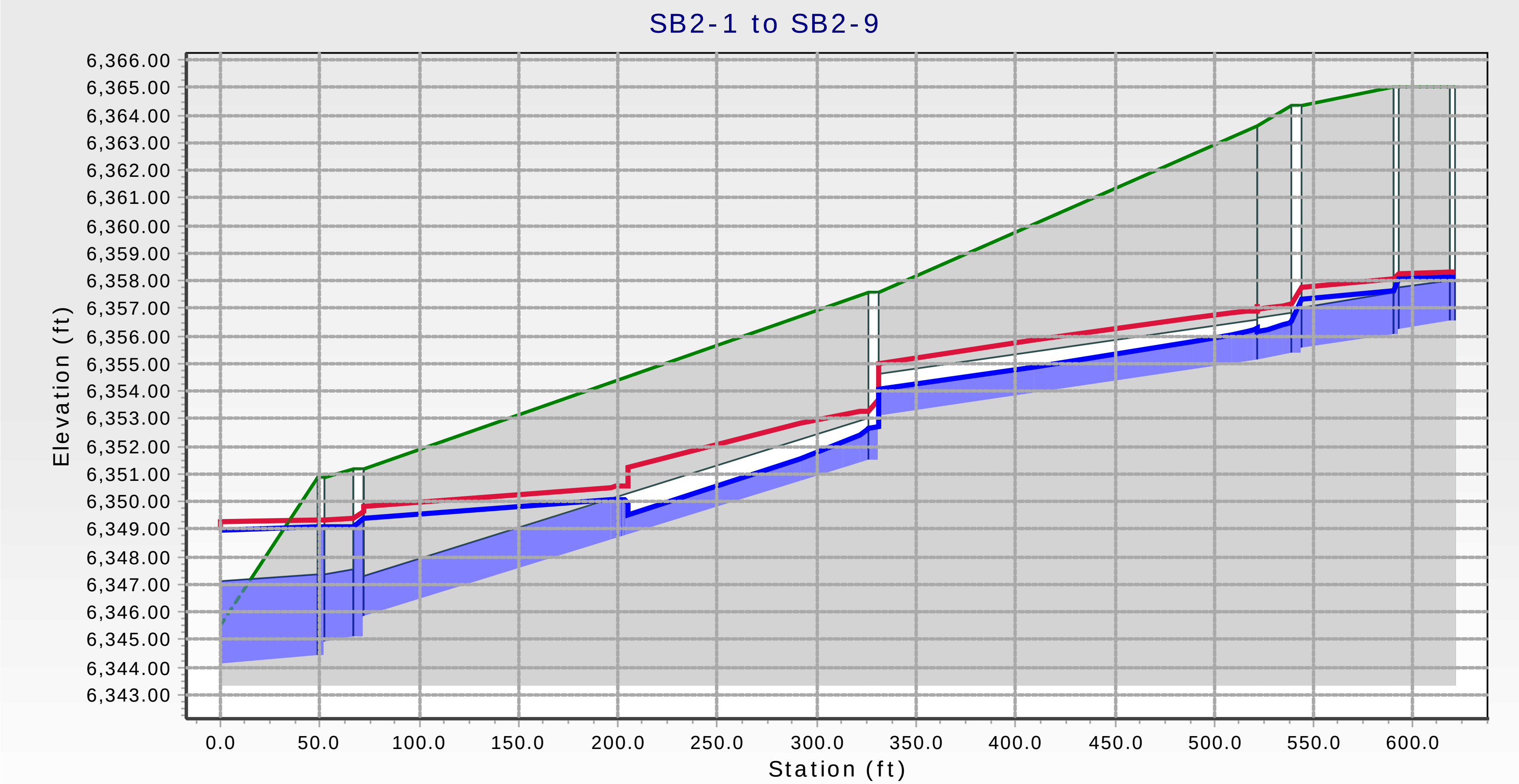

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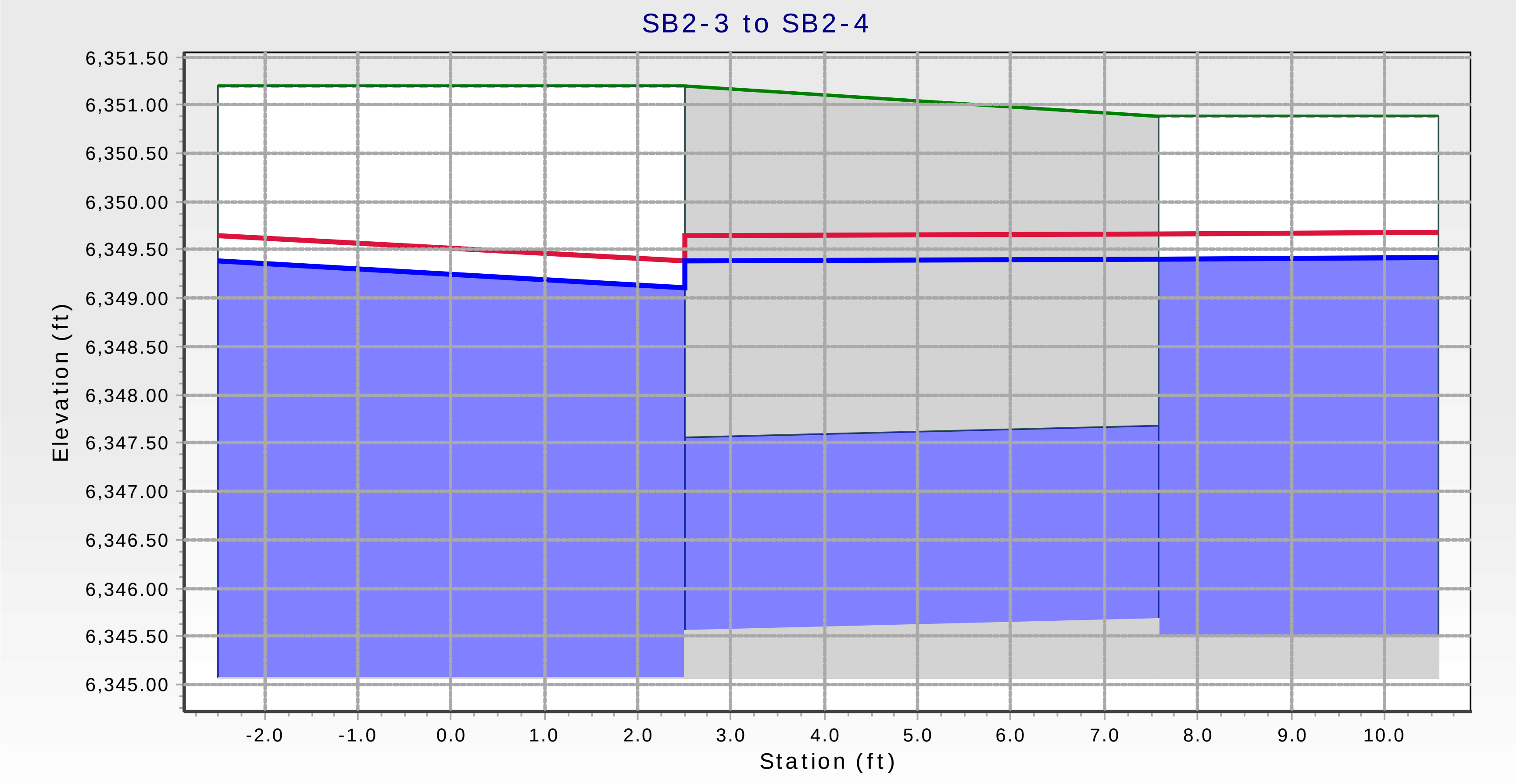
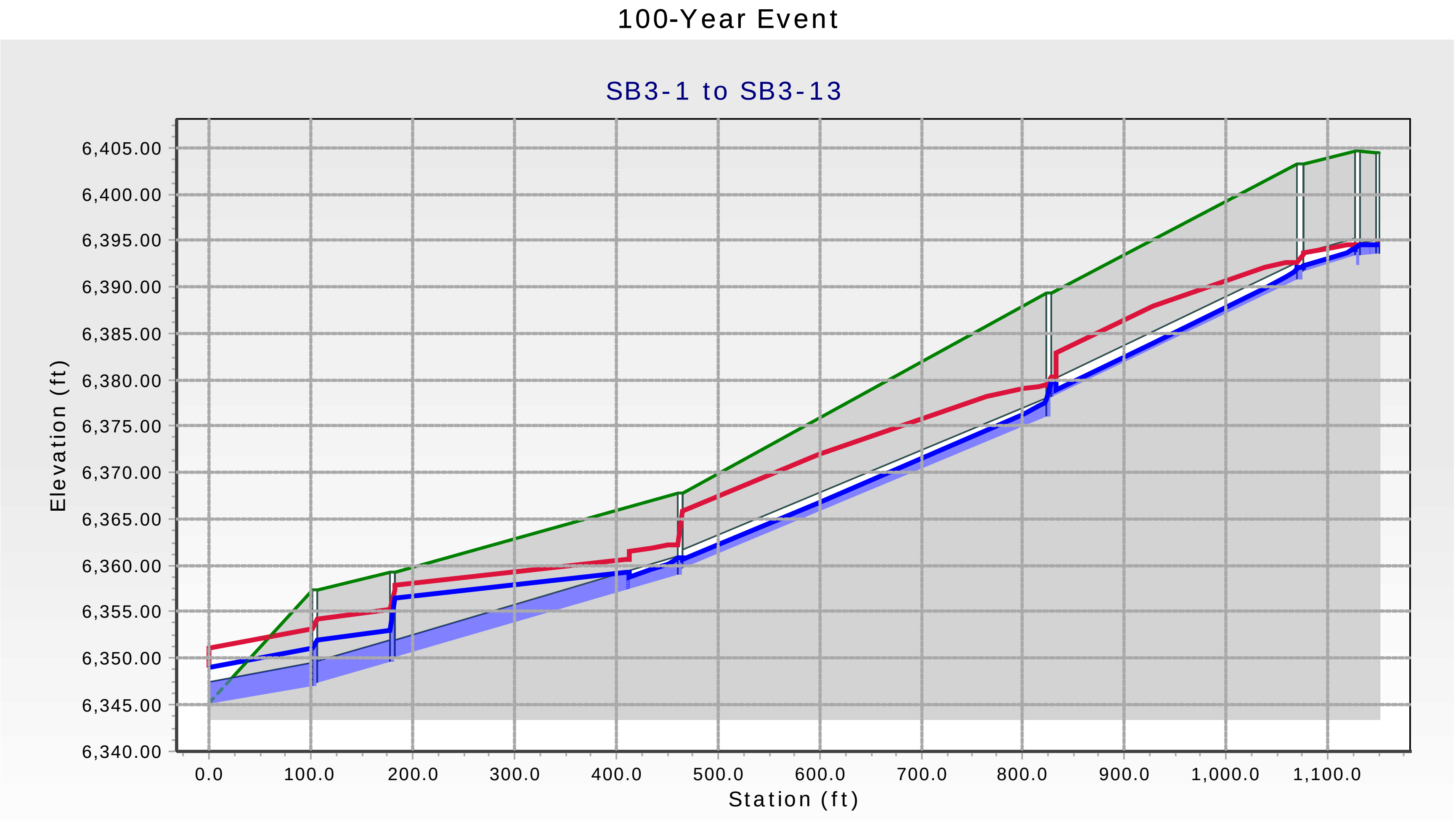
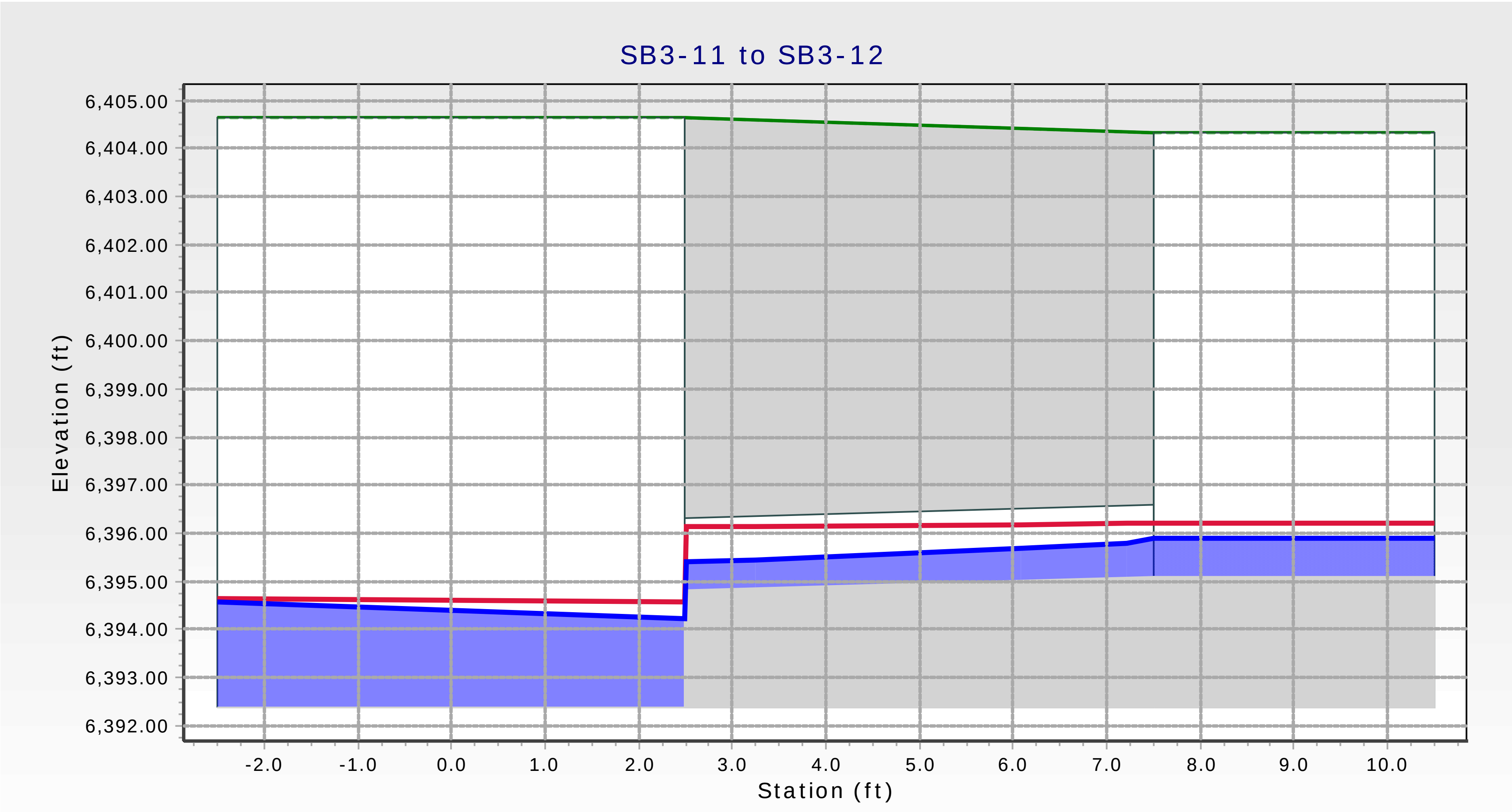
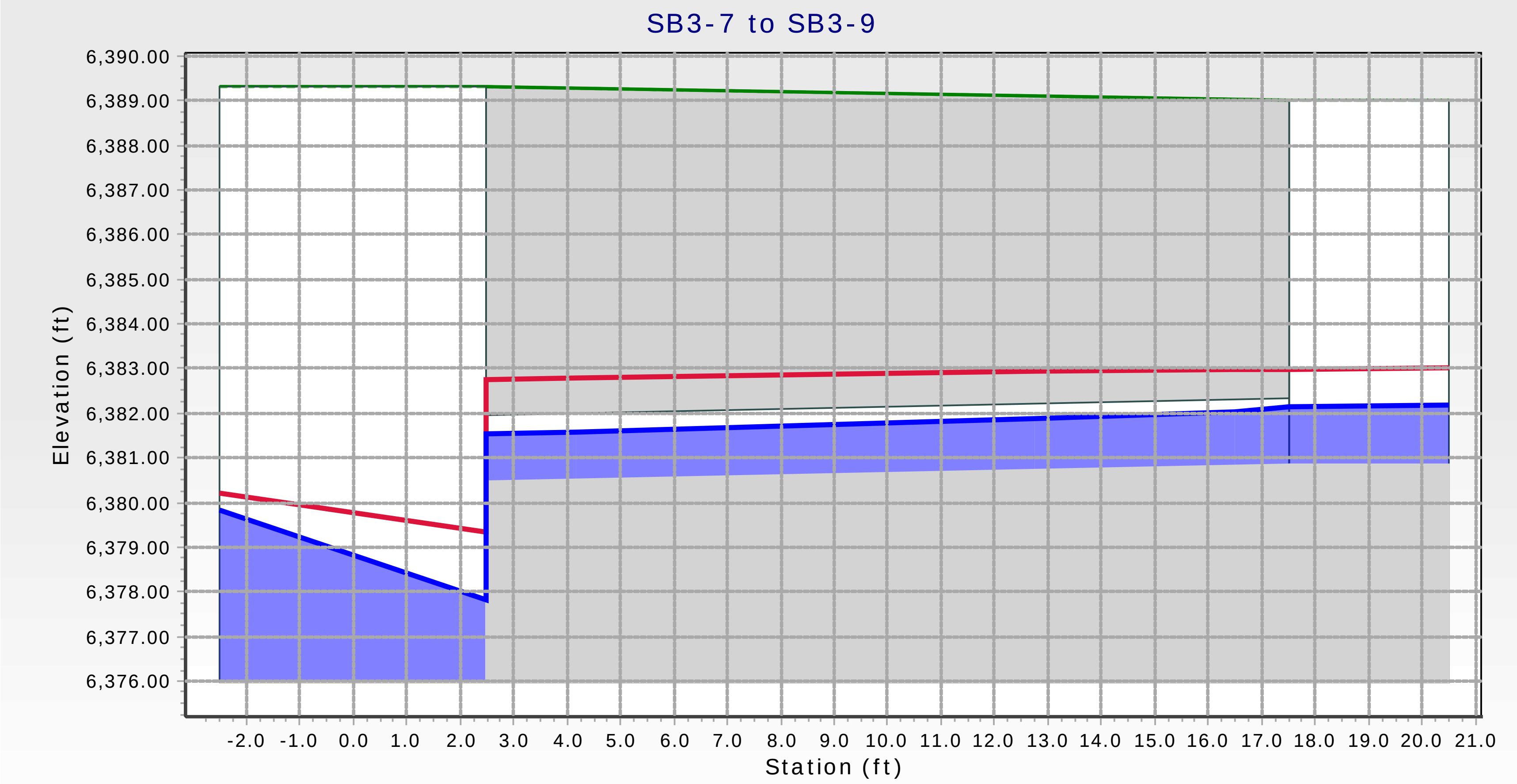



100-Year Event
SB3-1 to SB3-13
Elevation (ft)
6,405.00
6,400.00
6,395.00
6,390.00
6,385.00
6,380.00
6,375.00
6,370.00
6,365.00
6,360.00
6,355.00
6,350.00
6,345.00
6,340.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
1,100.0
Station (ft)

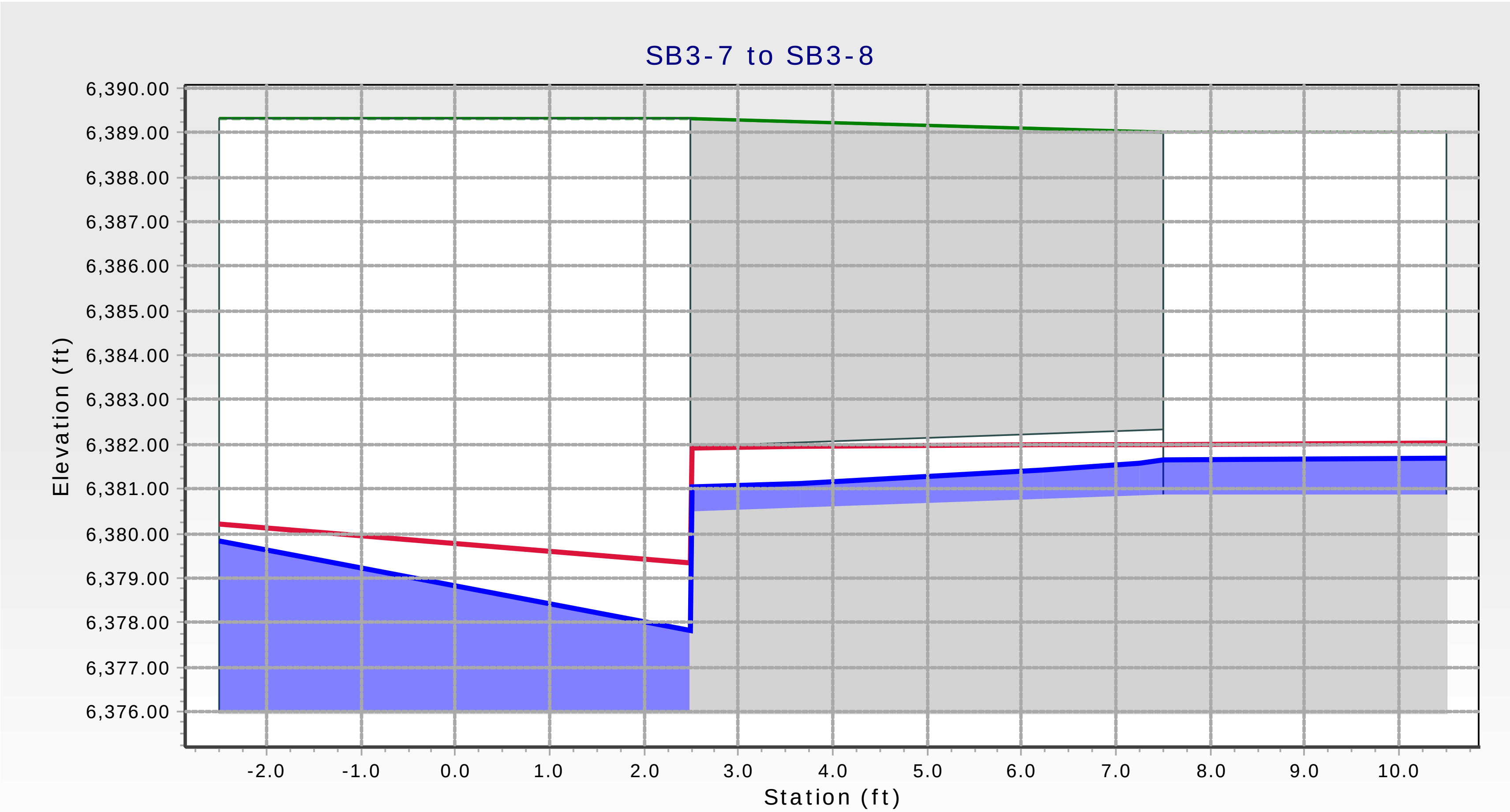
100-Year Event



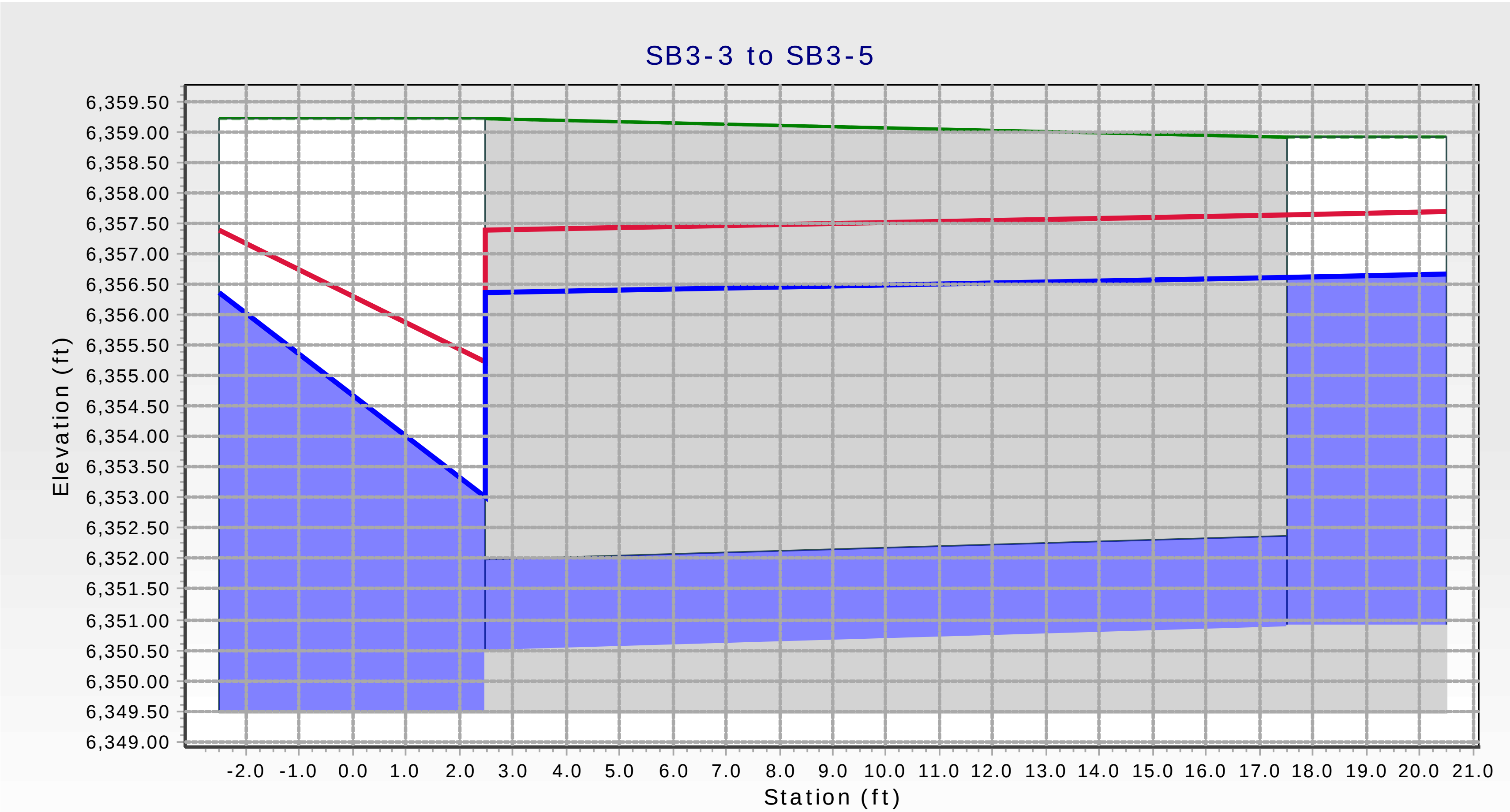
100-Year Event



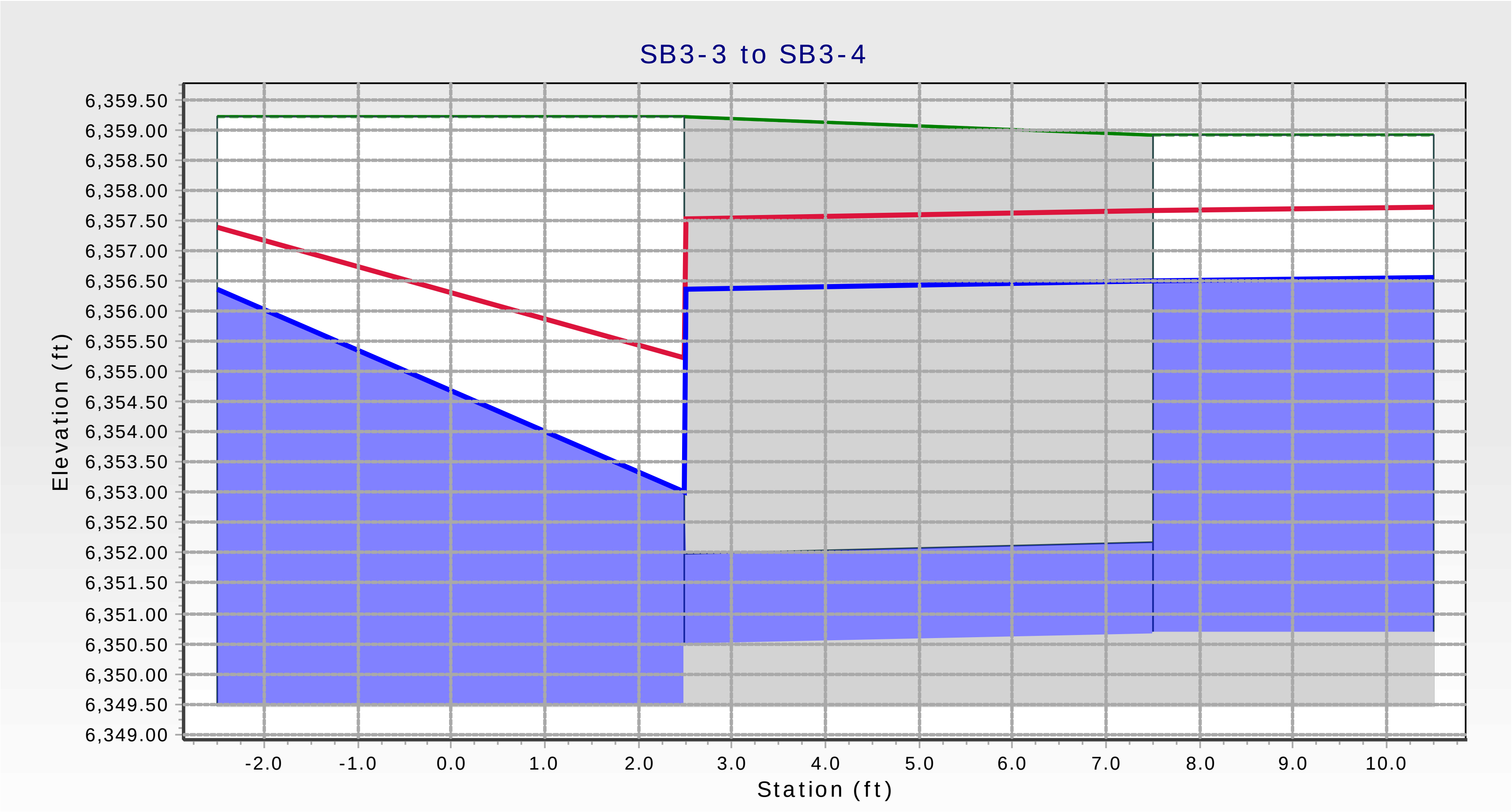
100-Year Event



100-Year Event



100-Year Event



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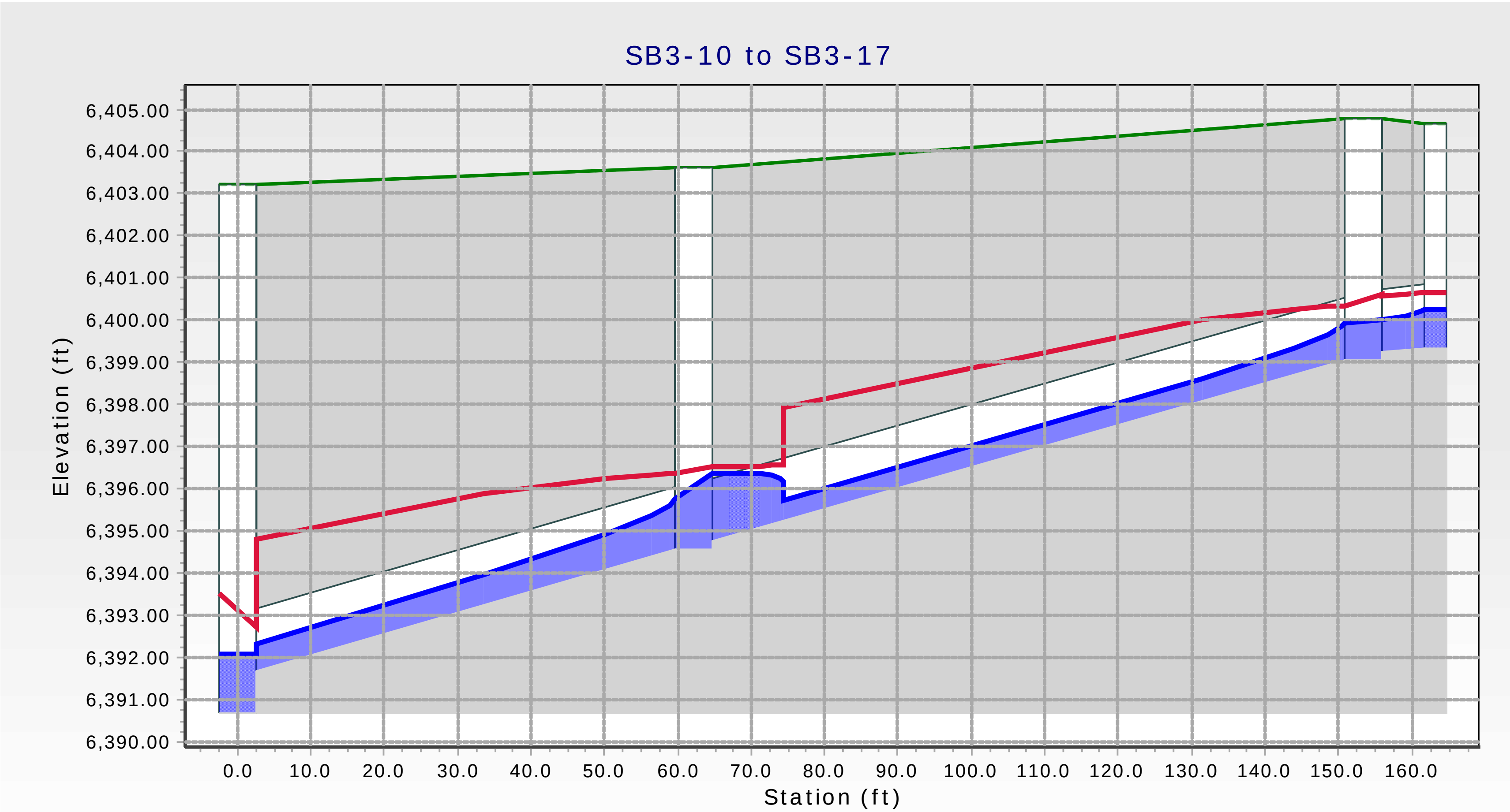

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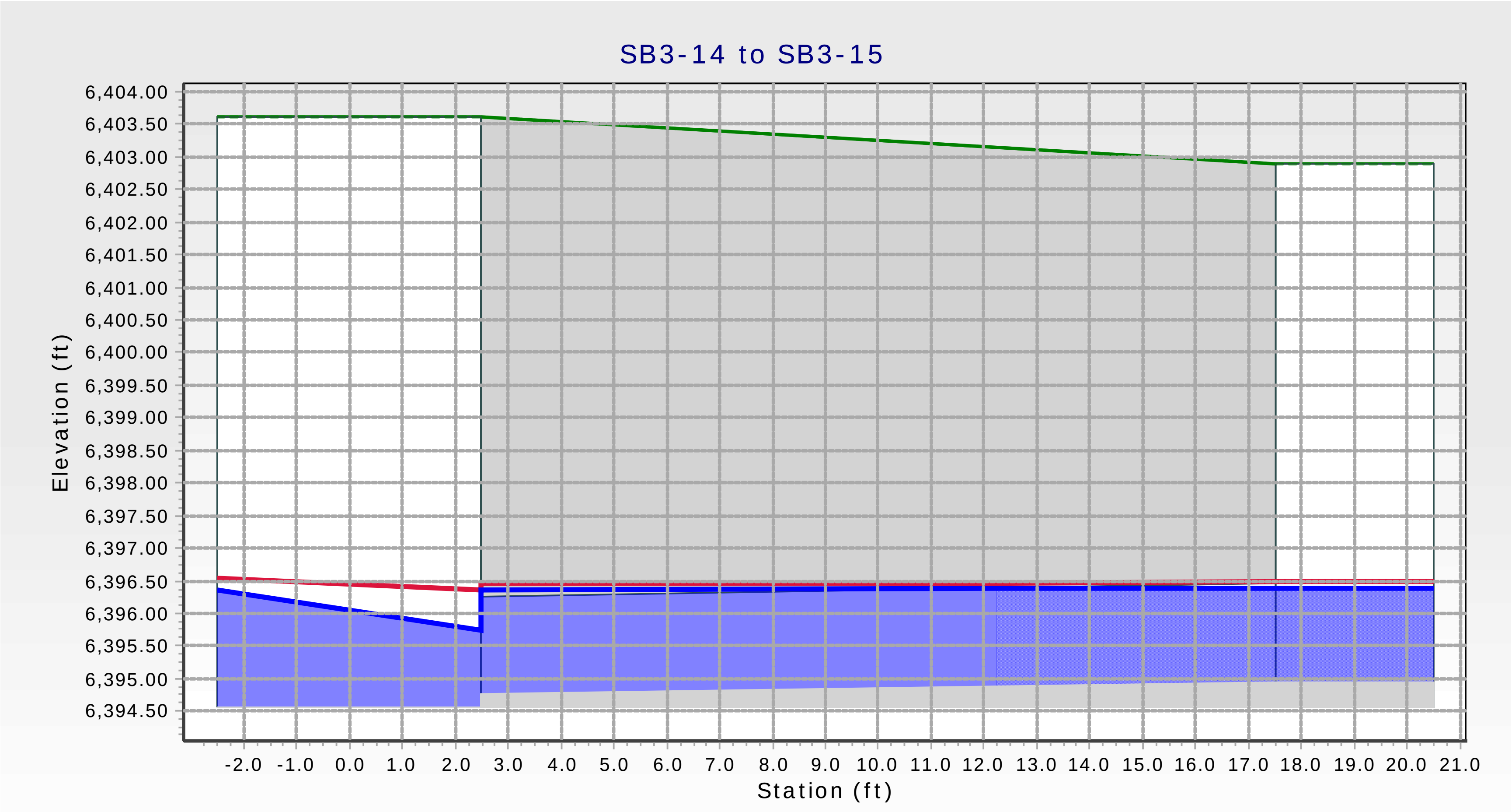
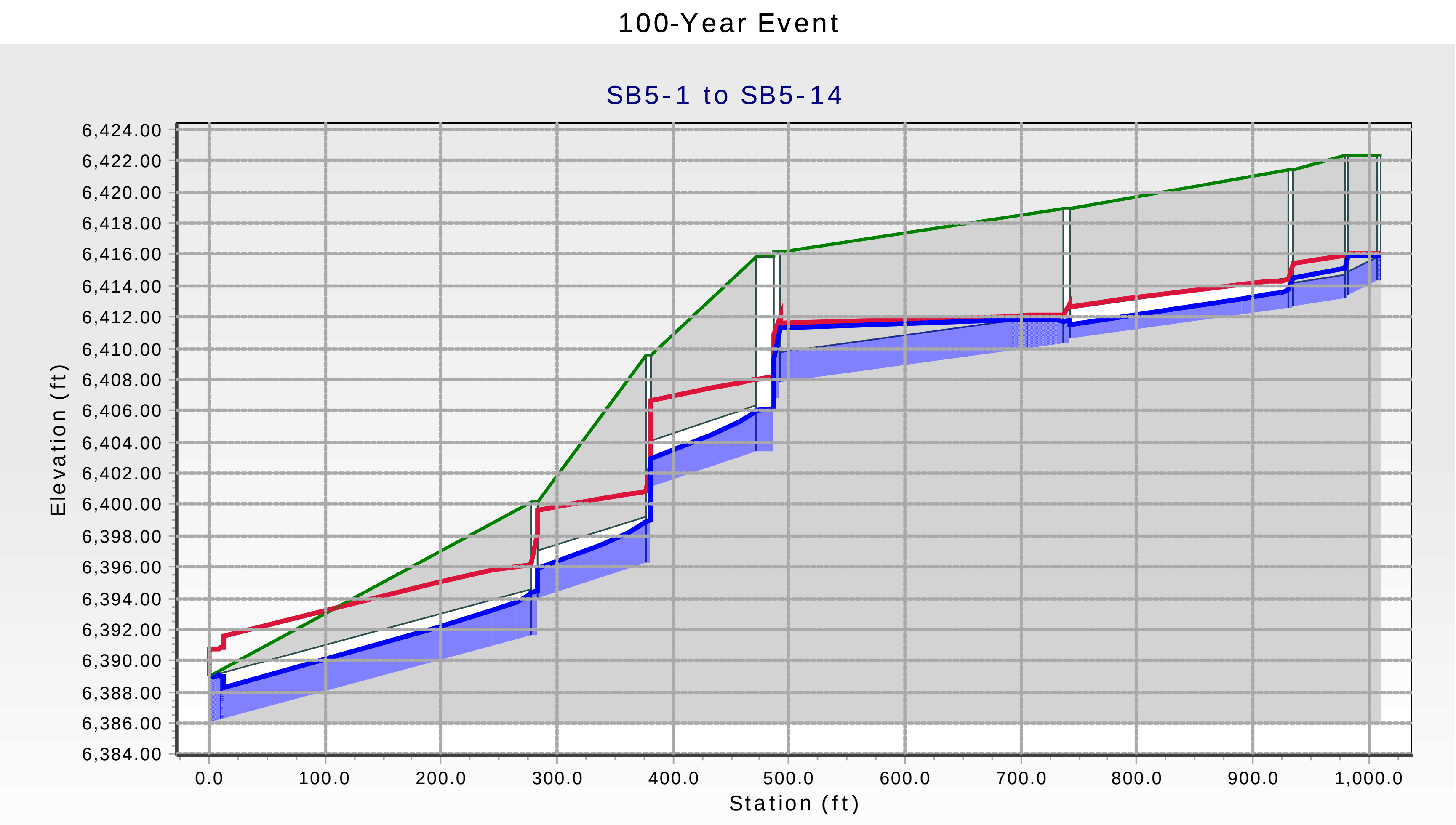
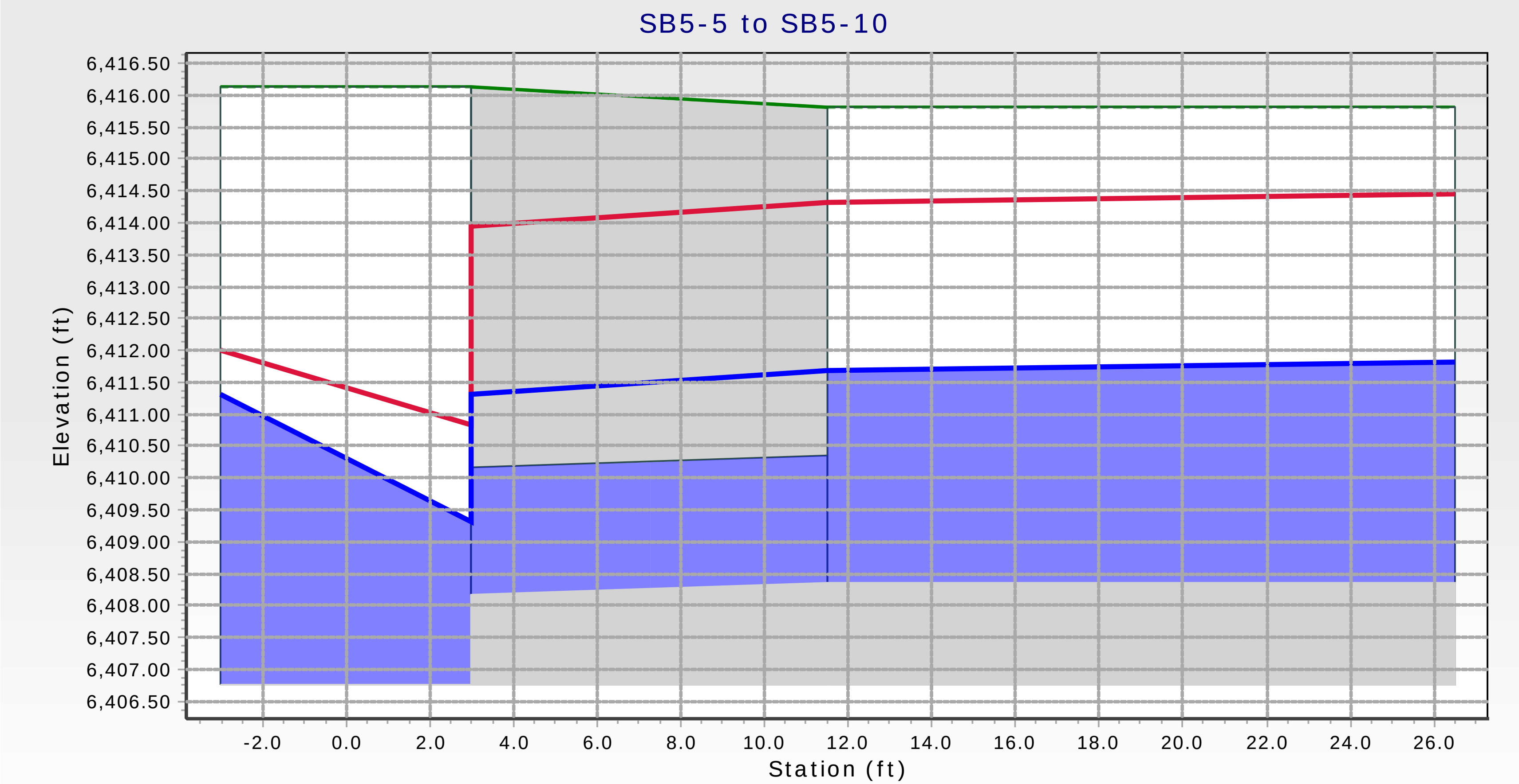
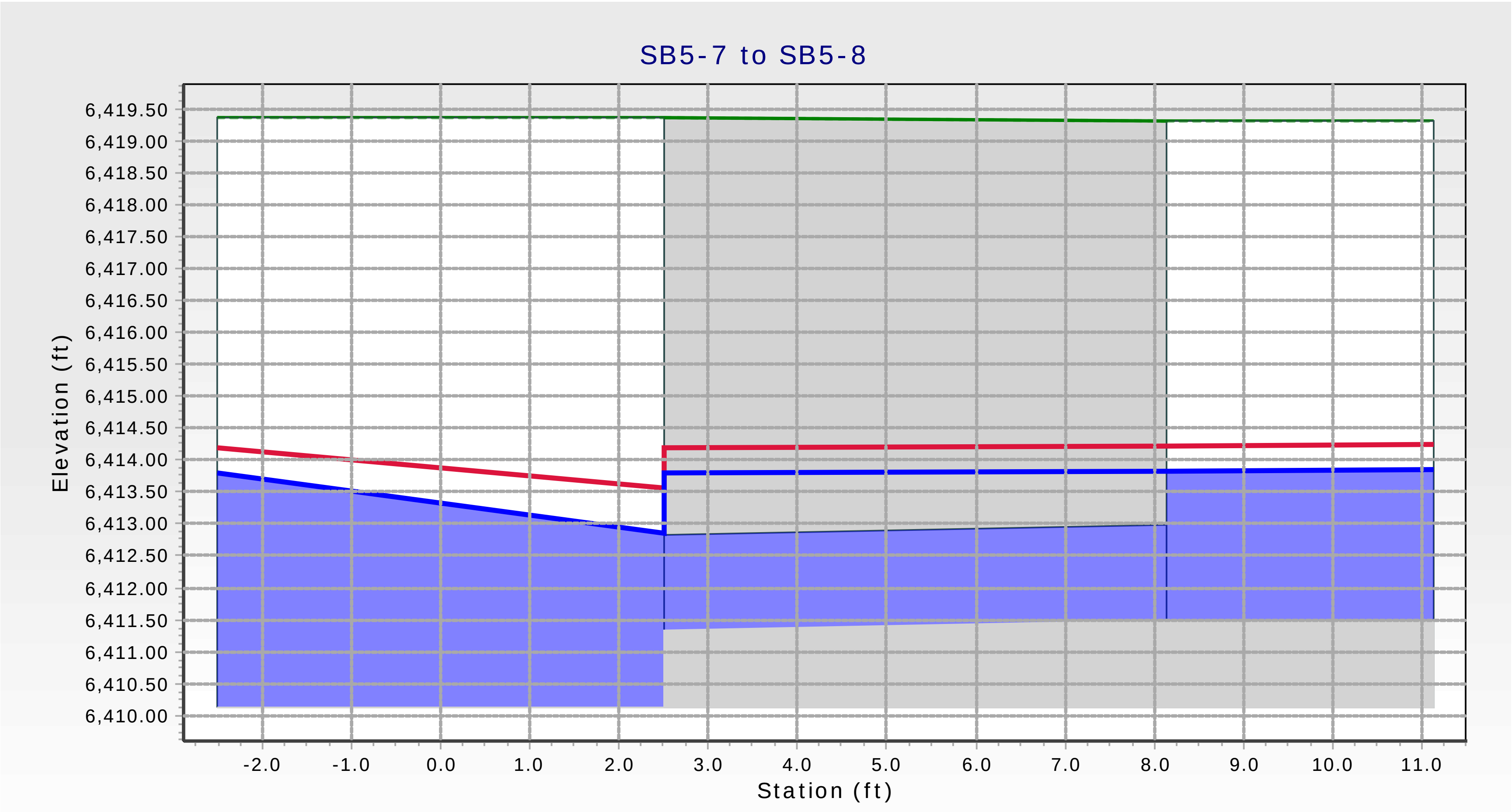



100-Year Event
SB5-1 to SB5-14
Elevation (ft)
6,424.00
6,422.00
6,420.00
6,418.00
6,416.00
6,414.00
6,412.00
6,410.00
6,408.00
6,406.00
6,404.00
6,402.00
6,400.00
6,398.00
6,396.00
6,394.00
6,392.00
6,390.00
6,388.00
6,386.00
6,384.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
Station (ft)

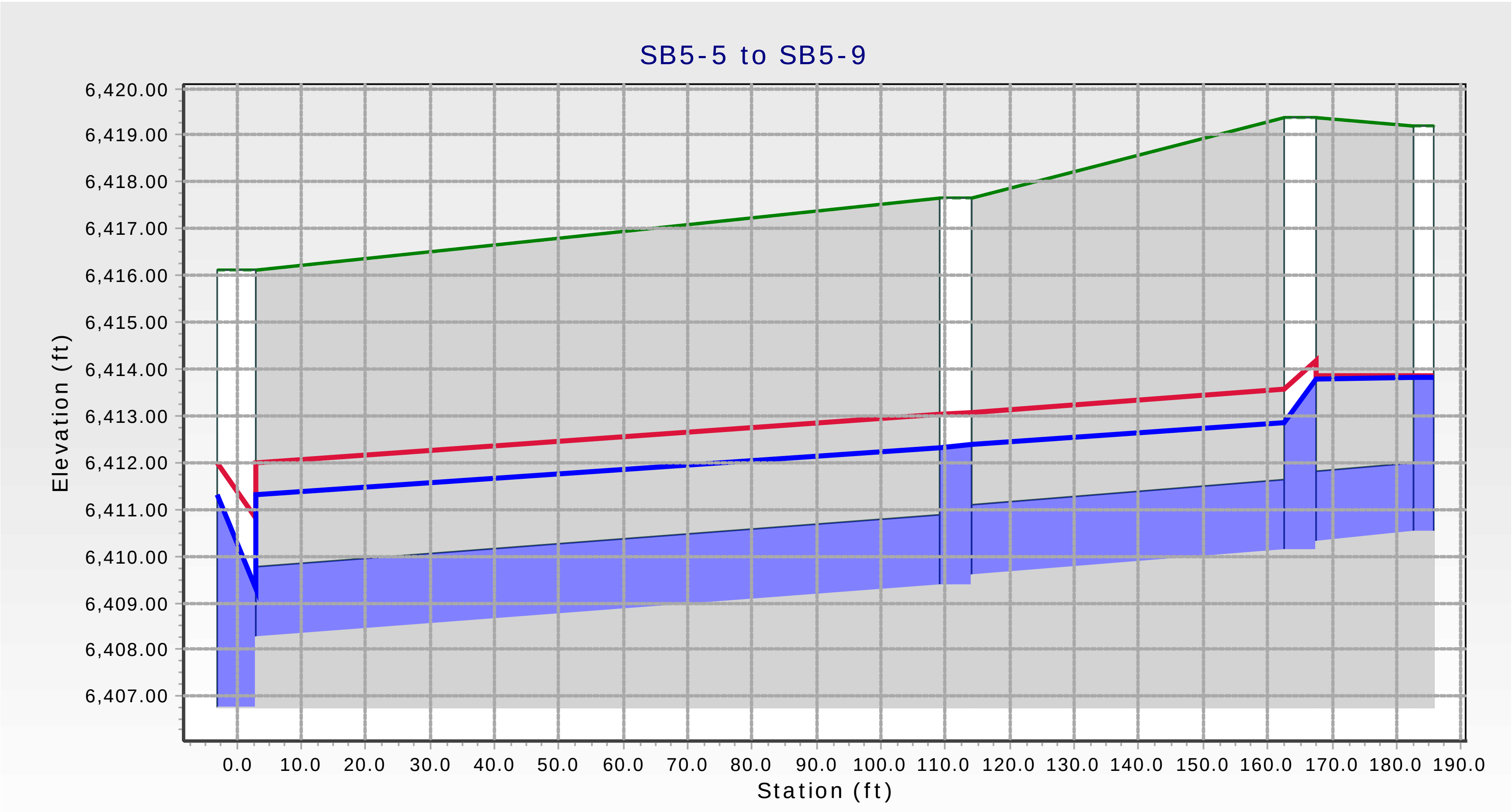
100-Year Event



100-Year Event



100-Year Event



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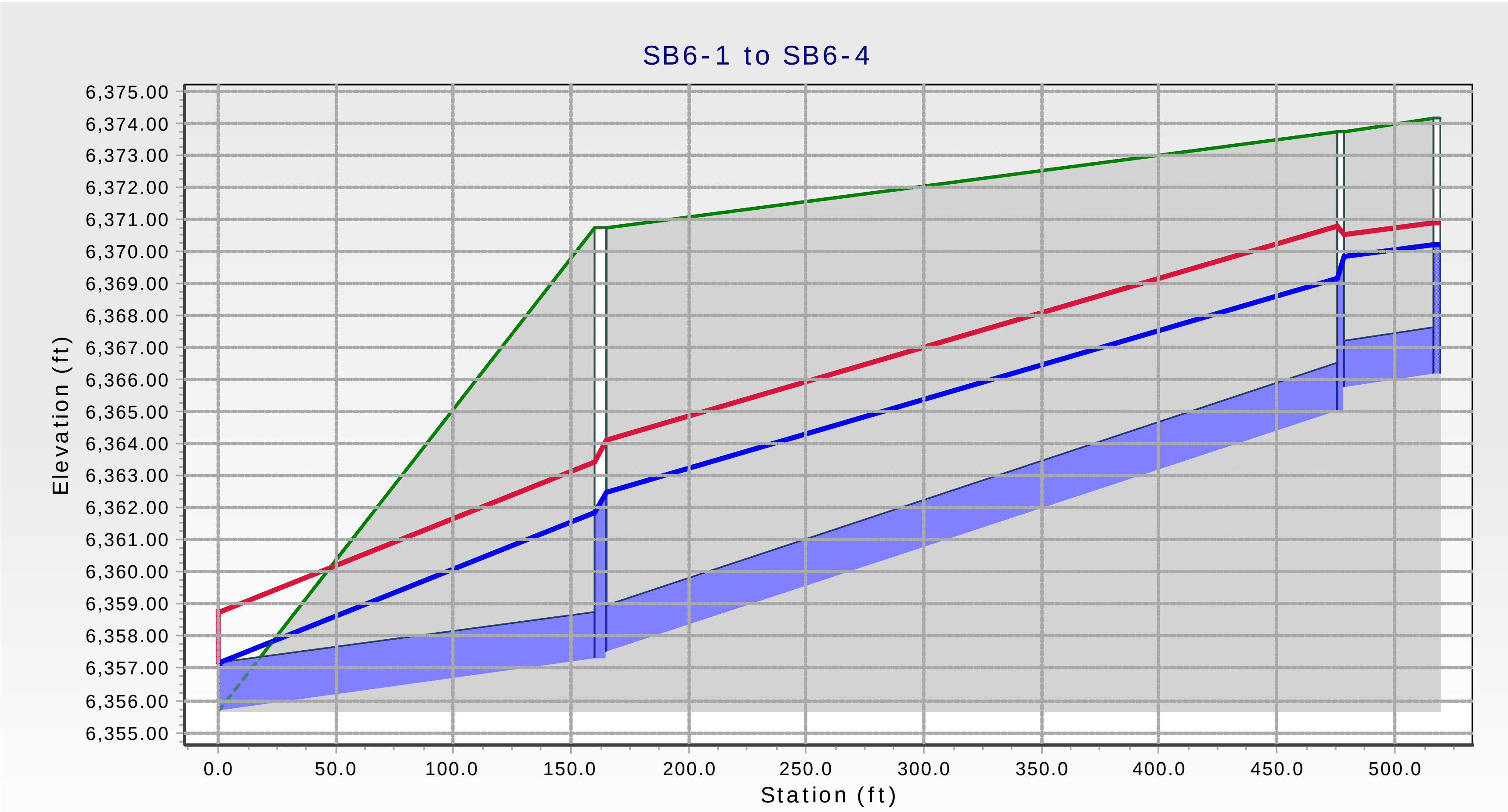

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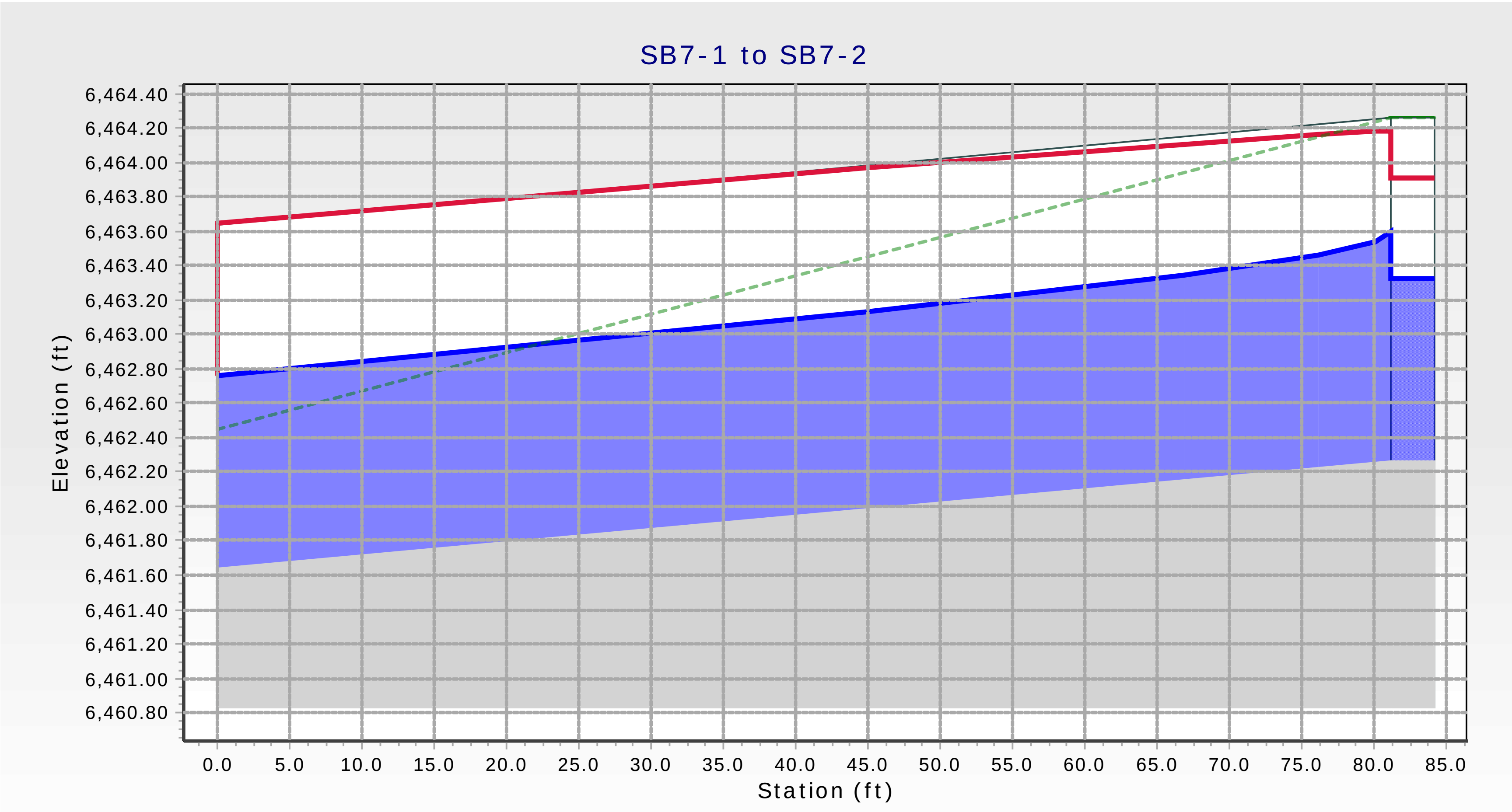

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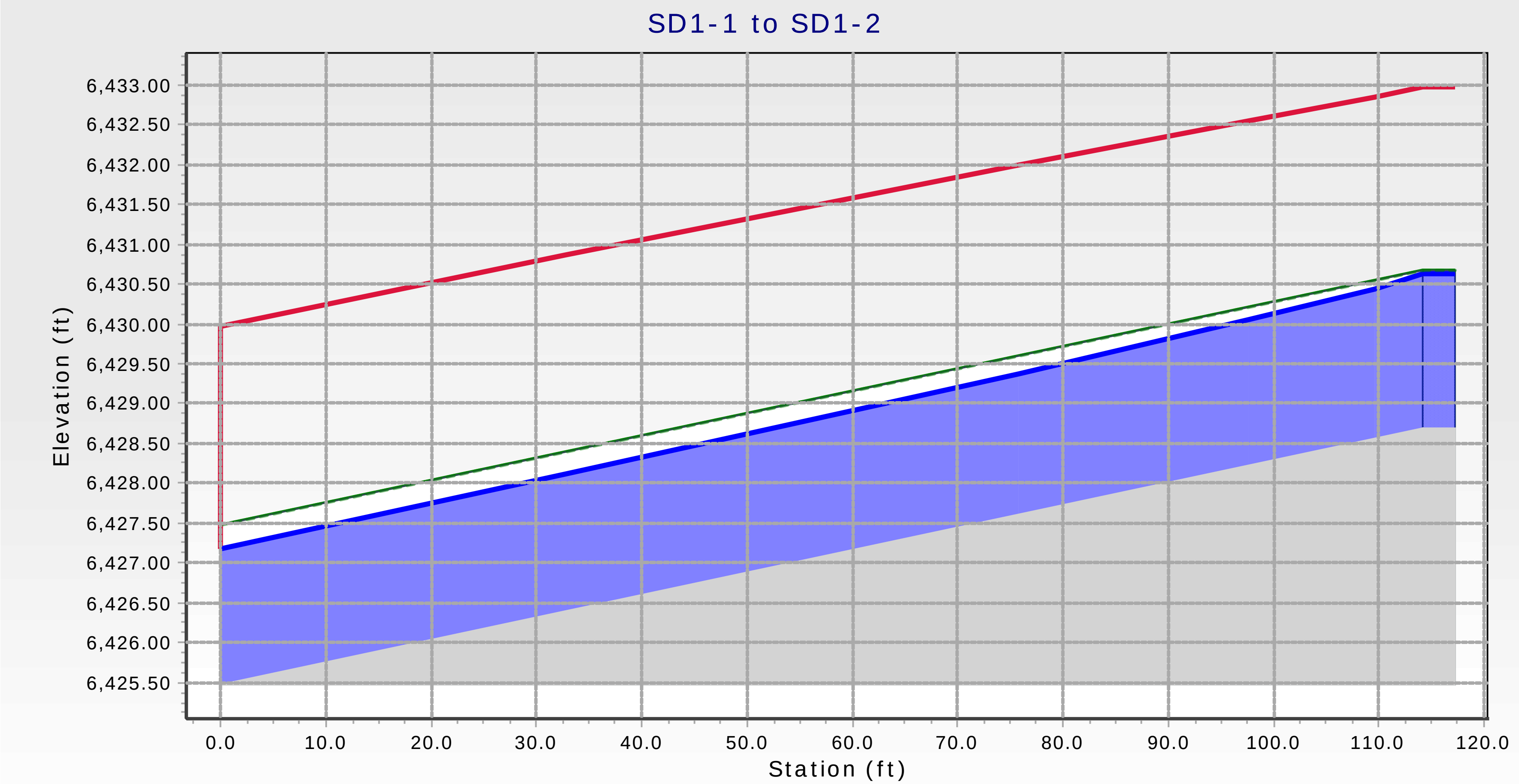
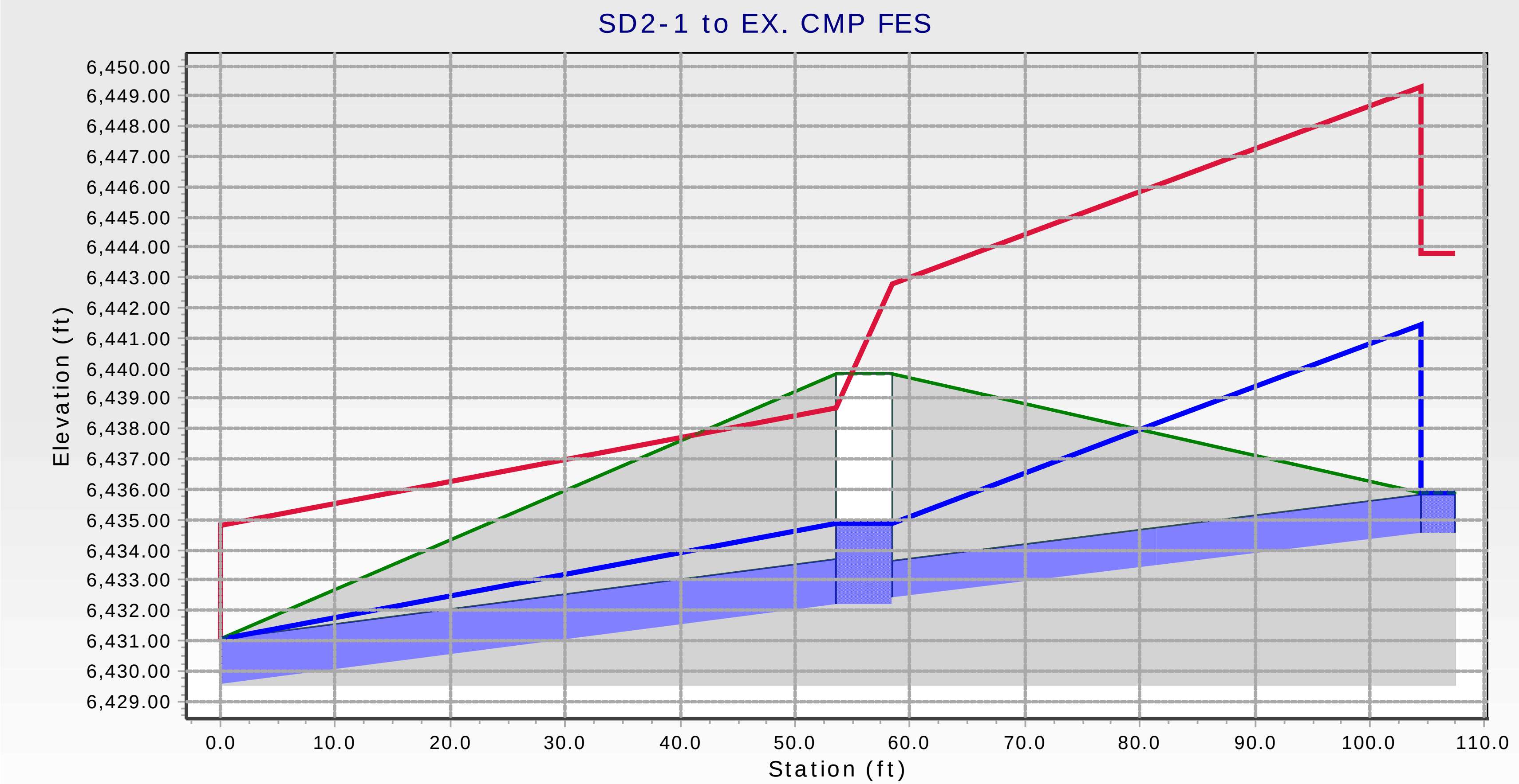


100-Year Event



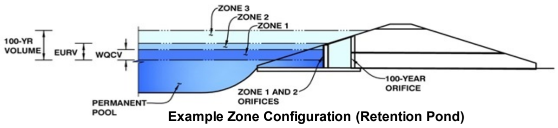
B3 Detention Ponds

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **The Fields Filing No. 1**

Basin ID: **Detention Pond A**



Example Zone Configuration (Retention Pond)

Depth Increment = | | ft

Watershed Information

Selected BMP Type =	**EDB**		**Note: L / W Ratio > 8**	
Watershed Area =	79.39	acres	**L / W Ratio = 9.2**	
Watershed Length =	5,640	ft		
Watershed Length to Centroid =	2,500	ft		
Watershed Slope =	0.028	ft/ft		
Watershed Imperviousness =	42.00%	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 =	Denver - Capitol Building			

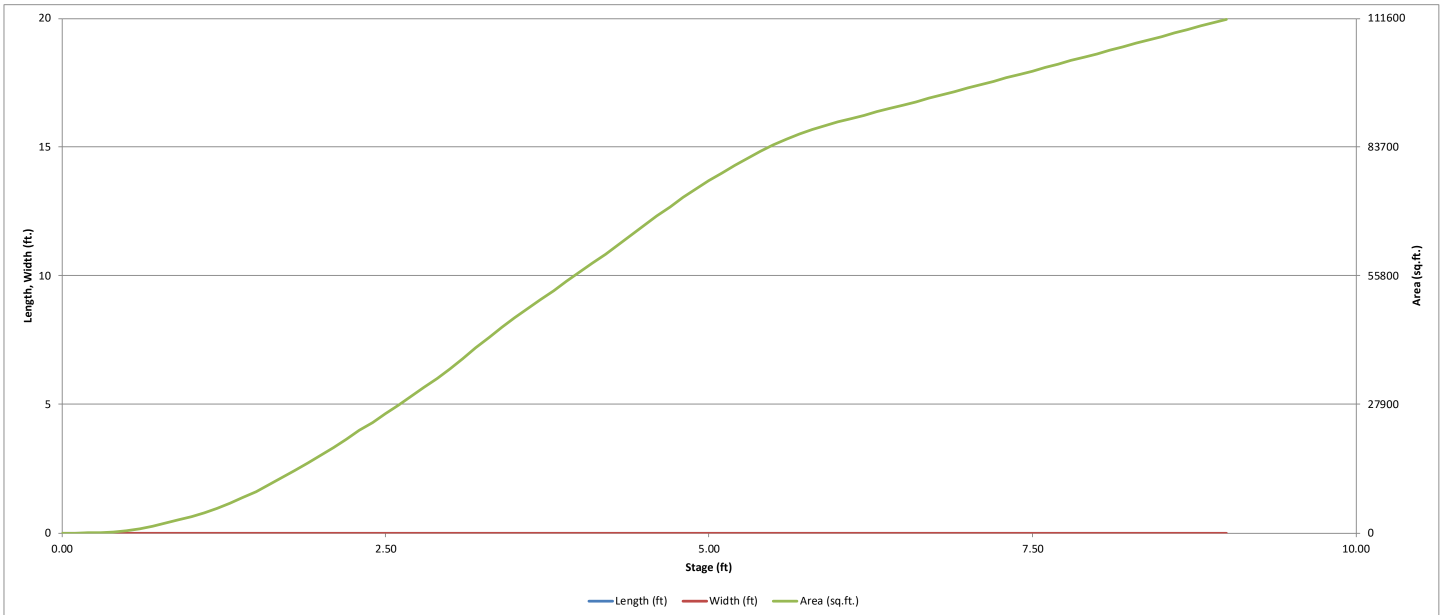
After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

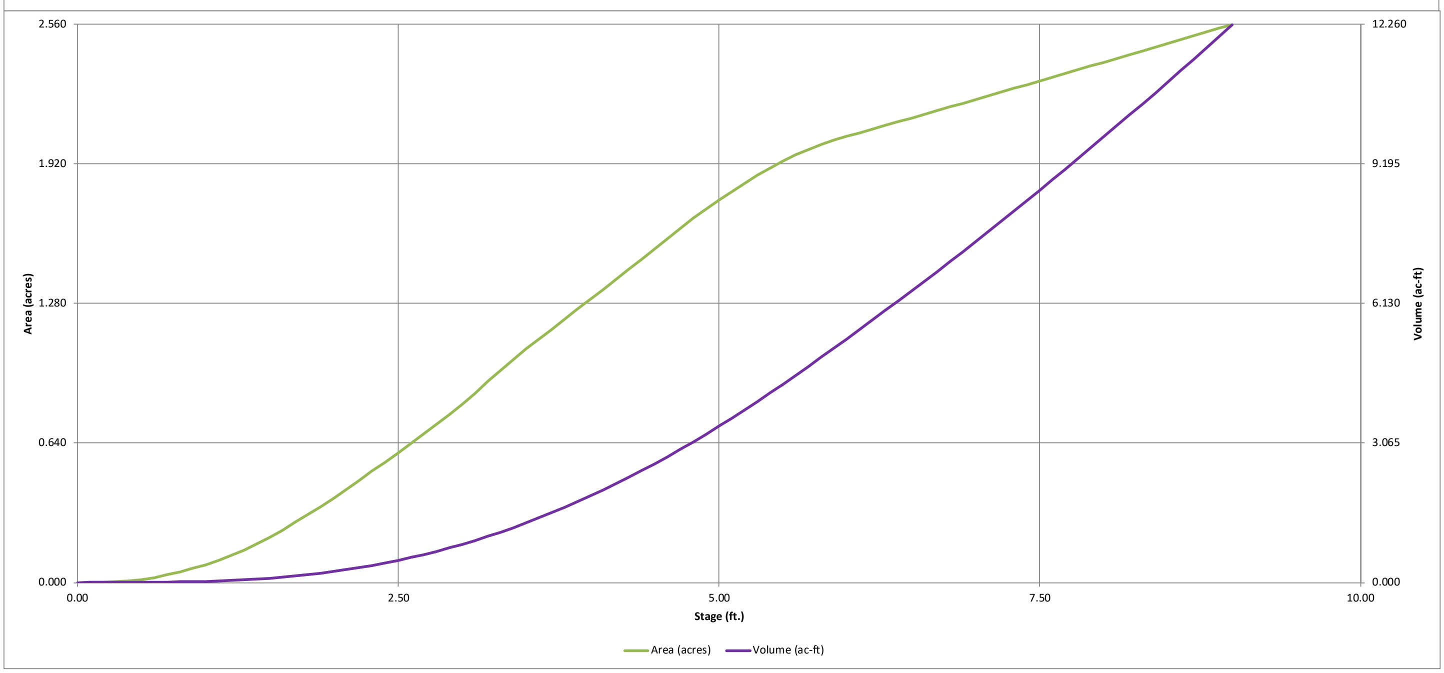
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.225	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.111	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	3.092	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	5.255	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	6.732	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	7.222	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	11.084	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	13.716	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	17.488	acre-feet		inches
Approximate 2-yr Detention Volume =	2.423	acre-feet		
Approximate 5-yr Detention Volume =	4.009	acre-feet		
Approximate 10-yr Detention Volume =	4.558	acre-feet		
Approximate 25-yr Detention Volume =	4.446	acre-feet		
Approximate 50-yr Detention Volume =	5.497	acre-feet		
Approximate 100-yr Detention Volume =	6.593	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.225	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.886	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	3.482	acre-feet
Total Detention Basin Volume =	6.593	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

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	--	--	--	5	0.000		
6,312.10	--	0.10	--	--	--	6	0.000	1	0.000
6,312.20	--	0.20	--	--	--	33	0.001	3	0.000
6,312.30	--	0.30	--	--	--	111	0.003	10	0.000
6,312.40	--	0.40	--	--	--	267	0.006	29	0.001
6,312.50	--	0.50	--	--	--	512	0.012	68	0.002
6,312.60	--	0.60	--	--	--	917	0.021	139	0.003
6,312.70	--	0.70	--	--	--	1,522	0.035	261	0.006
6,312.80	--	0.80	--	--	--	2,129	0.049	443	0.010
6,312.90	--	0.90	--	--	--	2,782	0.064	689	0.016
6,313.00	--	1.00	--	--	--	3,511	0.081	1,004	0.023
6,313.10	--	1.10	--	--	--	4,340	0.100	1,396	0.032
6,313.20	--	1.20	--	--	--	5,365	0.123	1,881	0.043
6,313.30	--	1.30	--	--	--	6,464	0.148	2,473	0.057
6,313.40	--	1.40	--	--	--	7,682	0.176	3,180	0.073
6,313.50	--	1.50	--	--	--	9,008	0.207	4,015	0.092
6,313.60	--	1.60	--	--	--	10,440	0.240	4,987	0.114
6,313.70	--	1.70	--	--	--	11,984	0.275	6,108	0.140
6,313.80	--	1.80	--	--	--	13,554	0.311	7,385	0.170
6,313.90	--	1.90	--	--	--	15,140	0.348	8,820	0.202
6,314.00	--	2.00	--	--	--	16,799	0.386	10,417	0.239
6,314.10	--	2.10	--	--	--	18,539	0.426	12,184	0.280
6,314.20	--	2.20	--	--	--	20,355	0.467	14,128	0.324
6,314.30	--	2.30	--	--	--	22,216	0.510	16,257	0.373
6,314.40	--	2.40	--	--	--	23,982	0.551	18,567	0.426
6,314.50	--	2.50	--	--	--	25,836	0.593	21,058	0.483
6,314.60	--	2.60	--	--	--	27,738	0.637	23,736	0.545
6,314.70	--	2.70	--	--	--	29,689	0.682	26,608	0.611
6,314.80	--	2.80	--	--	--	31,616	0.726	29,673	0.681
6,314.90	--	2.90	--	--	--	33,539	0.770	32,931	0.756
6,315.00	--	3.00	--	--	--	35,531	0.816	36,384	0.835
6,315.10	--	3.10	--	--	--	37,777	0.867	40,050	0.919
6,315.20	--	3.20	--	--	--	40,164	0.922	43,947	1.009
6,315.30	--	3.30	--	--	--	42,355	0.972	48,073	1.104
6,315.40	--	3.40	--	--	--	44,571	1.023	52,419	1.203
6,315.50	--	3.50	--	--	--	46,693	1.072	56,982	1.308
6,315.60	--	3.60	--	--	--	48,653	1.117	61,749	1.418
6,315.70	--	3.70	--	--	--	50,589	1.161	66,712	1.531
6,315.80	--	3.80	--	--	--	52,589	1.207	71,870	1.650
6,315.90	--	3.90	--	--	--	54,632	1.254	77,232	1.773
6,316.00	--	4.00	--	--	--	56,583	1.299	82,792	1.901
6,316.10	--	4.10	--	--	--	58,502	1.343	88,546	2.033
6,316.20	--	4.20	--	--	--	60,485	1.389	94,496	2.169
6,316.30	--	4.30	--	--	--	62,496	1.435	100,645	2.310
6,316.40	--	4.40	--	--	--	64,548	1.482	106,997	2.456
6,316.50	--	4.50	--	--	--	66,645	1.530	113,557	2.607
6,316.60	--	4.60	--	--	--	68,719	1.578	120,325	2.762
6,316.70	--	4.70	--	--	--	70,746	1.624	127,298	2.922
6,316.80	--	4.80	--	--	--	72,725	1.670	134,472	3.087
6,316.90	--	4.90	--	--	--	74,595	1.712	141,838	3.256
6,317.00	--	5.00	--	--	--	76,372	1.753	149,386	3.429
6,317.10	--	5.10	--	--	--	78,079	1.792	157,109	3.607
6,317.20	--	5.20	--	--	--	79,719	1.830	164,999	3.788
6,317.30	--	5.30	--	--	--	81,290	1.866	173,049	3.973
6,317.40	--	5.40	--	--	--	82,783	1.900	181,253	4.161
6,317.50	--	5.50	--	--	--	84,173	1.932	189,600	4.353
6,317.60	--	5.60	--	--	--	85,407	1.961	198,080	4.547
6,317.70	--	5.70	--	--	--	86,504	1.986	206,675	4.745
6,317.80	--	5.80	--	--	--	87,478	2.008	215,374	4.944
6,317.90	--	5.90	--	--	--	88,329	2.028	224,164	5.146
6,318.00	--	6.00	--	--	--	89,109	2.046	233,036	5.350
6,318.10	--	6.10	--	--	--	89,840	2.062	241,984	5.555
6,318.20	--	6.20	--	--	--	90,571	2.079	251,004	5.762
6,318.30	--	6.30	--	--	--	91,303	2.096	260,098	5.971
6,318.40	--	6.40	--	--	--	92,037	2.113	269,265	6.181
6,318.50	--	6.50	--	--	--	92,771	2.130	278,505	6.394
6,318.60	--	6.60	--	--	--	93,506	2.147	287,819	6.607
6,318.70	--	6.70	--	--	--	94,243	2.164	297,207	6.823
6,318.80	--	6.80	--	--	--	94,980	2.180	306,668	7.040
6,318.90	--	6.90	--	--	--	95,718	2.197	316,203	7.259
6,319.00	--	7.00	--	--	--	96,458	2.214	325,812	7.480
6,319.10	--	7.10	--	--	--	97,198	2.231	335,494	7.702
6,319.20	--	7.20	--	--	--	97,940	2.248	345,251	7.926
6,319.30	--	7.30	--	--	--	98,682	2.265	355,082	8.152
6,319.40	--	7.40	--	--	--	99,425	2.282	364,988	8.379
6,319.50	--	7.50	--	--	--	100,170	2.300	374,967	8.608
6,319.60	--	7.60	--	--	--	100,915	2.317	385,022	8.839
6,319.70	--	7.70	--	--	--	101,661	2.334	395,150	9.071
6,319.80	--	7.80	--	--	--	102,409	2.351	405,354	9.306
6,319.90	--	7.90	--	--	--	103,157	2.368	415,632	9.542
6,320.00	--	8.00	--	--	--	103,907	2.385	425,985	9.779
6,320.10	--	8.10	--	--	--	104,657	2.403	436,414	10.019
6,320.20	--	8.20	--	--	--	105,408	2.420	446,917	10.260
6,320.30	--	8.30	--	--	--	106,161	2.437	457,495	10.503
6,320.40	--	8.40	--	--	--	106,914	2.454	468,149	10.747
6,320.50	--	8.50	--	--	--	107,668	2.472	478,878	10.994
6,320.60	--	8.60	--	--	--	108,423	2.489	489,683	11.242
6,320.70	--	8.70	--	--	--	109,180	2.506	500,563	11.491
6,320.80	--	8.80	--	--	--	109,937	2.524	511,519	11.743
6,320.90	--	8.90	--	--	--	110,695	2.541	522,550	11.996
6,321.00	--	9.00	--	--	--	111,455	2.559	[illegible]	[illegible]


Length, Width (ft.)
Area (sq.ft.)
Stage (ft)
0
5
10
15
20
0
27900
55800
83700
111600
0.00
2.50
5.00
7.50
10.00
Length (ft)
Width (ft)
Area (sq.ft.)

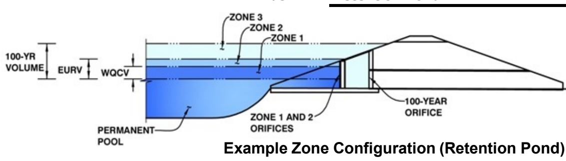

Area (acres)
Volume (ac-ft)
Stage (ft.)
0.000
0.640
1.280
1.920
2.560
0.000
3.065
6.130
9.195
12.260
0.00
2.50
5.00
7.50
10.00
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: The Fields Filing No. 1

Basin ID: Detention Pond A



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.43	1.225	Orifice Plate
Zone 2 (EURV)	4.82	1.886	Orifice Plate
Zone 3 (100-year)	6.60	3.482	Weir&Pipe (Restrict)
Total (all zones)		6.593	

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

			Calculated Parameters for Underdrain		
Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

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

			Calculated Parameters for Plate		
Centroid of Lowest Orifice =	0.08	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	4.81	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.08	2.00	3.60					
Orifice Area (sq. inches)	5.00	6.00	5.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected		Calculated Parameters for Vertical Orifice	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	ft^2
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				

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

	Zone 3 Weir	Not Selected		Calculated Parameters for Overflow Weir	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.83	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.08	N/A	feet
Overflow Weir Front Edge Length =	15.00	N/A	feet	Overflow Weir Slope Length =	5.15	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	11.94	N/A	
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	61.15	N/A	ft^2
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	30.58	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Restrictor	Not Selected		Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	5.12	N/A	ft^2
Outlet Pipe Diameter =	36.00	N/A	inches	Outlet Orifice Centroid =	1.14	N/A	feet
Restrictor Plate Height Above Pipe Invert =	24.50		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.94	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

			Calculated Parameters for Spillway		
Spillway Invert Stage=	6.90	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.95	feet
Spillway Crest Length =	43.00	feet	Stage at Top of Freeboard =	8.85	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	2.53	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	11.87	acre-ft

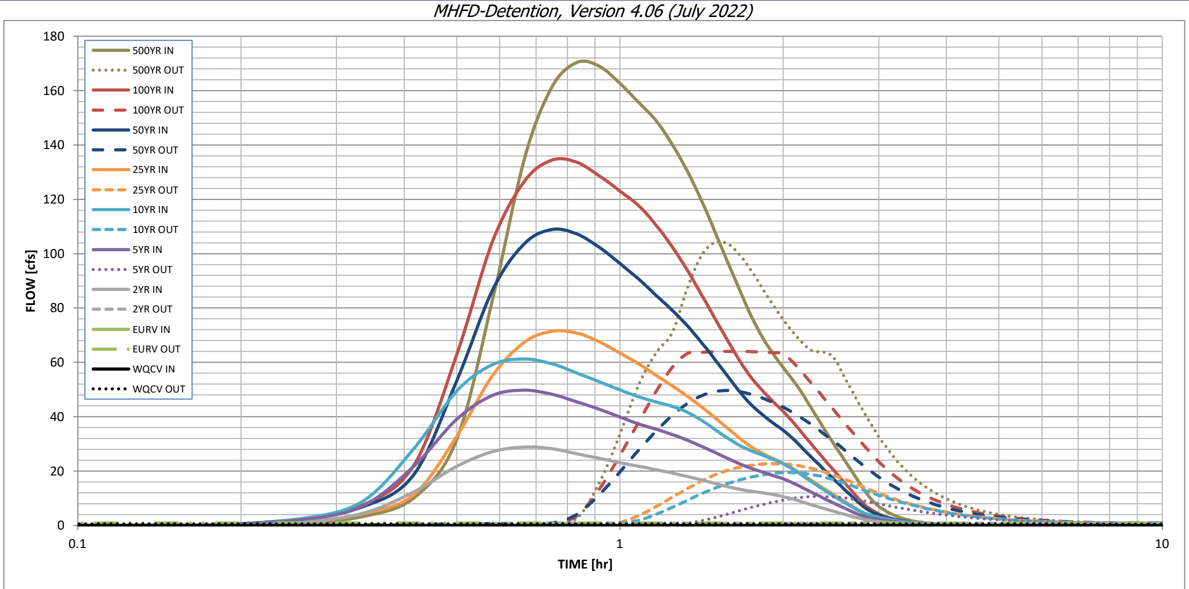
Routed Hydrograph Results

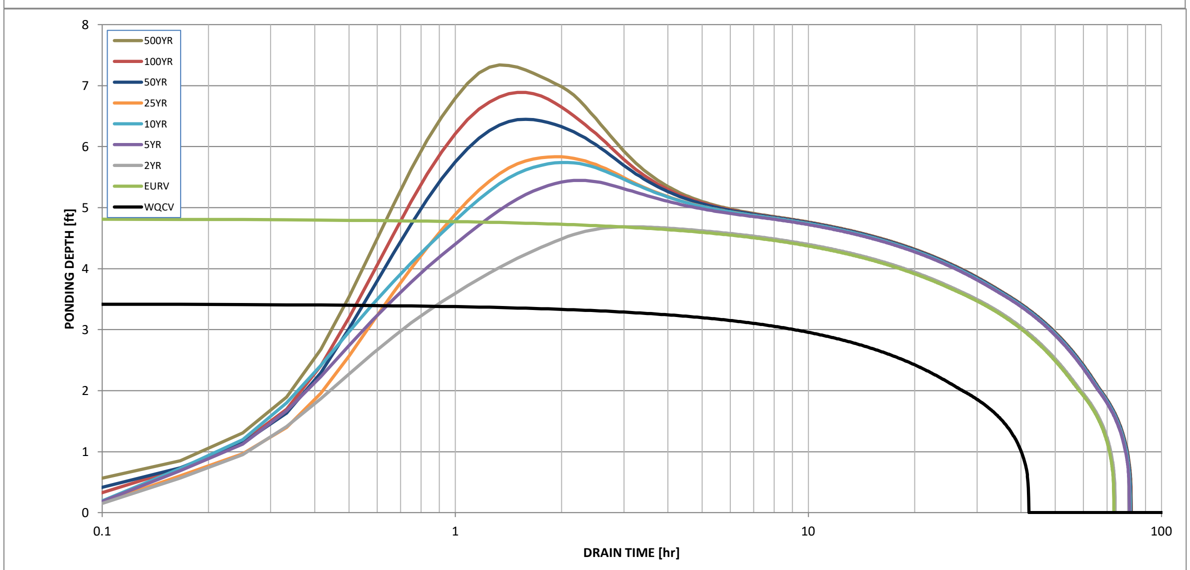
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

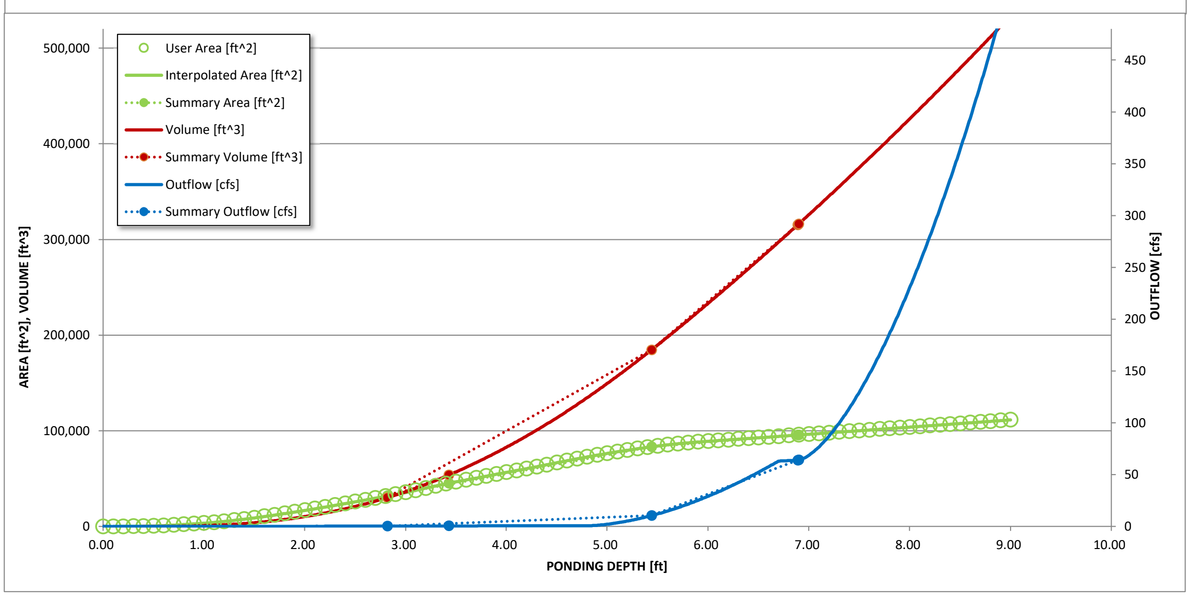
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	1.69	2.26	2.60	3.14
CUHP Runoff Volume (acre-ft) =	1.225	3.111	3.092	5.255	6.732	7.222	11.084	13.716	17.488
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.092	5.255	6.732	7.222	11.084	13.716	17.488
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	4.5	17.3	24.7	32.3	56.5	75.0	99.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.06	0.22	0.31	0.41	0.71	0.94	1.25
Peak Inflow Q (cfs) =	N/A	N/A	28.9	49.8	61.3	71.5	108.9	134.5	170.4
Peak Outflow Q (cfs) =	0.5	0.9	0.9	10.7	19.4	22.7	49.7	64.1	104.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.8	0.7	0.9	0.9	1.1
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.3	0.4	0.8	1.0	1.1
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) =	39	67	67	71	69	68	63	61	57
Time to Drain 99% of Inflow Volume (hours) =	**41**	71	71	77	77	76	74	73	71
Maximum Ponding Depth (ft) =	3.43	4.820	4.68	5.44	5.74	5.83	6.45	6.89	7.33
Area at Maximum Ponding Depth (acres) =	1.04	1.68	1.61	1.91	1.99	2.01	2.12	2.19	2.27
Maximum Volume Stored (acre-ft) =	1.234	3.121	2.890	4.237	4.804	5.005	6.266	7.215	8.220

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.07	0.43
	0:15:00	0.00	0.00	0.85	1.73	2.14	1.08	2.12	2.11	3.18
	0:20:00	0.00	0.00	4.28	6.88	8.62	4.18	6.65	7.26	10.12
	0:25:00	0.00	0.00	12.35	21.78	28.22	11.30	18.72	22.14	31.59
	0:30:00	0.00	0.00	21.73	39.07	49.38	32.78	53.17	62.88	83.66
	0:35:00	0.00	0.00	27.20	47.87	59.24	55.32	86.89	104.86	135.06
	0:40:00	0.00	0.00	28.88	49.77	61.26	67.41	103.73	126.71	161.46
	0:45:00	0.00	0.00	28.18	48.21	59.43	71.45	108.87	134.46	170.41
	0:50:00	0.00	0.00	26.39	45.47	56.06	70.75	107.20	133.58	168.93
	0:55:00	0.00	0.00	24.65	42.68	52.83	67.51	102.31	128.61	162.65
	1:00:00	0.00	0.00	23.11	39.89	49.89	63.43	96.40	123.05	155.64
	1:05:00	0.00	0.00	21.78	37.36	47.31	59.43	90.61	117.66	148.89
	1:10:00	0.00	0.00	20.52	35.37	45.43	55.24	84.65	110.47	140.07
	1:15:00	0.00	0.00	19.23	33.47	43.80	51.32	79.12	102.36	130.10
	1:20:00	0.00	0.00	17.96	31.32	41.58	47.45	73.31	93.69	119.22
	1:25:00	0.00	0.00	16.70	29.05	38.55	43.51	67.13	84.61	107.66
	1:30:00	0.00	0.00	15.45	26.77	35.23	39.53	60.86	75.95	96.58
	1:35:00	0.00	0.00	14.26	24.62	32.01	35.61	54.68	67.77	86.13
	1:40:00	0.00	0.00	13.25	22.60	29.32	31.91	48.90	60.27	76.65
	1:45:00	0.00	0.00	12.52	20.95	27.40	28.79	44.21	54.19	69.07
	1:50:00	0.00	0.00	11.99	19.58	25.83	26.47	40.66	49.52	63.17
	1:55:00	0.00	0.00	11.36	18.33	24.34	24.55	37.68	45.55	58.12
	2:00:00	0.00	0.00	10.62	17.14	22.75	22.87	35.03	42.00	53.60
	2:05:00	0.00	0.00	9.71	15.67	20.74	20.93	32.00	38.16	48.67
	2:10:00	0.00	0.00	8.67	13.99	18.47	18.78	28.64	34.06	43.38
	2:15:00	0.00	0.00	7.67	12.34	16.25	16.65	25.33	30.09	38.28
	2:20:00	0.00	0.00	6.72	10.77	14.15	14.62	22.17	26.37	33.49
	2:25:00	0.00	0.00	5.84	9.28	12.19	12.71	19.20	22.87	28.98
	2:30:00	0.00	0.00	5.00	7.89	10.37	10.89	16.38	19.51	24.67
	2:35:00	0.00	0.00	4.21	6.55	8.64	9.13	13.67	16.25	20.48
	2:40:00	0.00	0.00	3.44	5.28	7.02	7.44	11.07	13.09	16.44
	2:45:00	0.00	0.00	2.74	4.14	5.55	5.85	8.62	10.09	12.62
	2:50:00	0.00	0.00	2.15	3.24	4.43	4.39	6.43	7.42	9.30
	2:55:00	0.00	0.00	1.73	2.63	3.64	3.30	4.92	5.58	7.06
	3:00:00	0.00	0.00	1.43	2.18	3.02	2.55	3.85	4.28	5.45
	3:05:00	0.00	0.00	1.20	1.81	2.51	2.01	3.05	3.29	4.20
	3:10:00	0.00	0.00	1.02	1.51	2.09	1.60	2.42	2.53	3.24
	3:15:00	0.00	0.00	0.86	1.25	1.73	1.29	1.95	1.95	2.50
	3:20:00	0.00	0.00	0.72	1.04	1.42	1.04	1.56	1.50	1.92
	3:25:00	0.00	0.00	0.60	0.85	1.14	0.84	1.24	1.15	1.48
	3:30:00	0.00	0.00	0.50	0.68	0.91	0.68	0.99	0.92	1.18
	3:35:00	0.00	0.00	0.40	0.54	0.72	0.54	0.78	0.74	0.94
	3:40:00	0.00	0.00	0.32	0.43	0.56	0.43	0.62	0.59	0.75
	3:45:00	0.00	0.00	0.25	0.32	0.43	0.33	0.48	0.46	0.59
	3:50:00	0.00	0.00	0.19	0.24	0.32	0.25	0.36	0.35	0.44
	3:55:00	0.00	0.00	0.13	0.17	0.23	0.18	0.26	0.25	0.32
	4:00:00	0.00	0.00	0.09	0.11	0.15	0.13	0.18	0.17	0.21
	4:05:00	0.00	0.00	0.05	0.07	0.09	0.08	0.11	0.10	0.13
	4:10:00	0.00	0.00	0.03	0.04	0.05	0.04	0.06	0.05	0.06
	4:15:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ^{2}]	Area [acres]	Volume [ft ^{3}]	Volume [ac-ft]	Total Outflow [cfs]
WQCV	3.43	45,208	1.038	53,766	1.234	0.55
EURV	2.82	32,000	0.735	30,309	0.696	0.46
5-yr	5.44	83,339	1.913	184,575	4.237	10.56
100-yr	6.89	95,645	2.196	315,246	7.237	64.07
Spillway	6.90	95,718	2.197	316,203	7.259	64.12

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

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

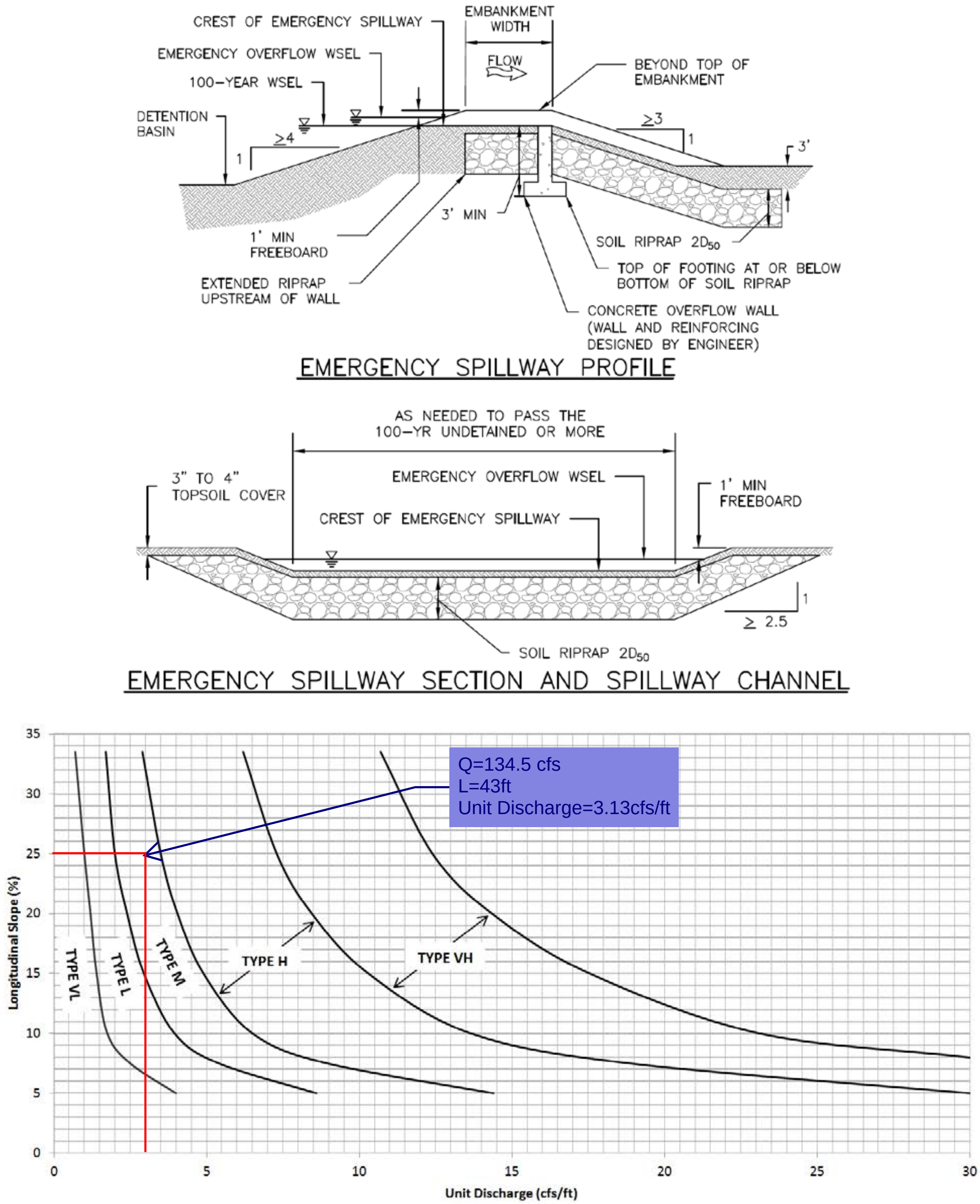


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

Worksheet for Pond A Emergency Overflow

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	134.50 cfs
Crest Elevation	6,318.85 ft
Tailwater Elevation	6,310.00 ft
Crest Surface Type	Gravel
Crest Breadth	10.00 ft
Crest Length	43.0 ft

Results	
Headwater Elevation	6,319.92 ft
Headwater Height Above Crest	1.07 ft
Tailwater Height Above Crest	-8.85 ft
Weir Coefficient	2.84 ft^(1/2)/s
Submergence Factor	1.000
Adjusted Weir Coefficient	2.84 ft^(1/2)/s
Flow Area	45.8 ft²
Velocity	2.93 ft/s
Wetted Perimeter	45.1 ft
Top Width	43.00 ft

$$H_a = \frac{(H + Y_n)}{2}$$ Equation 9-19

Where the maximum value of H_a shall not exceed H, and:

D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)

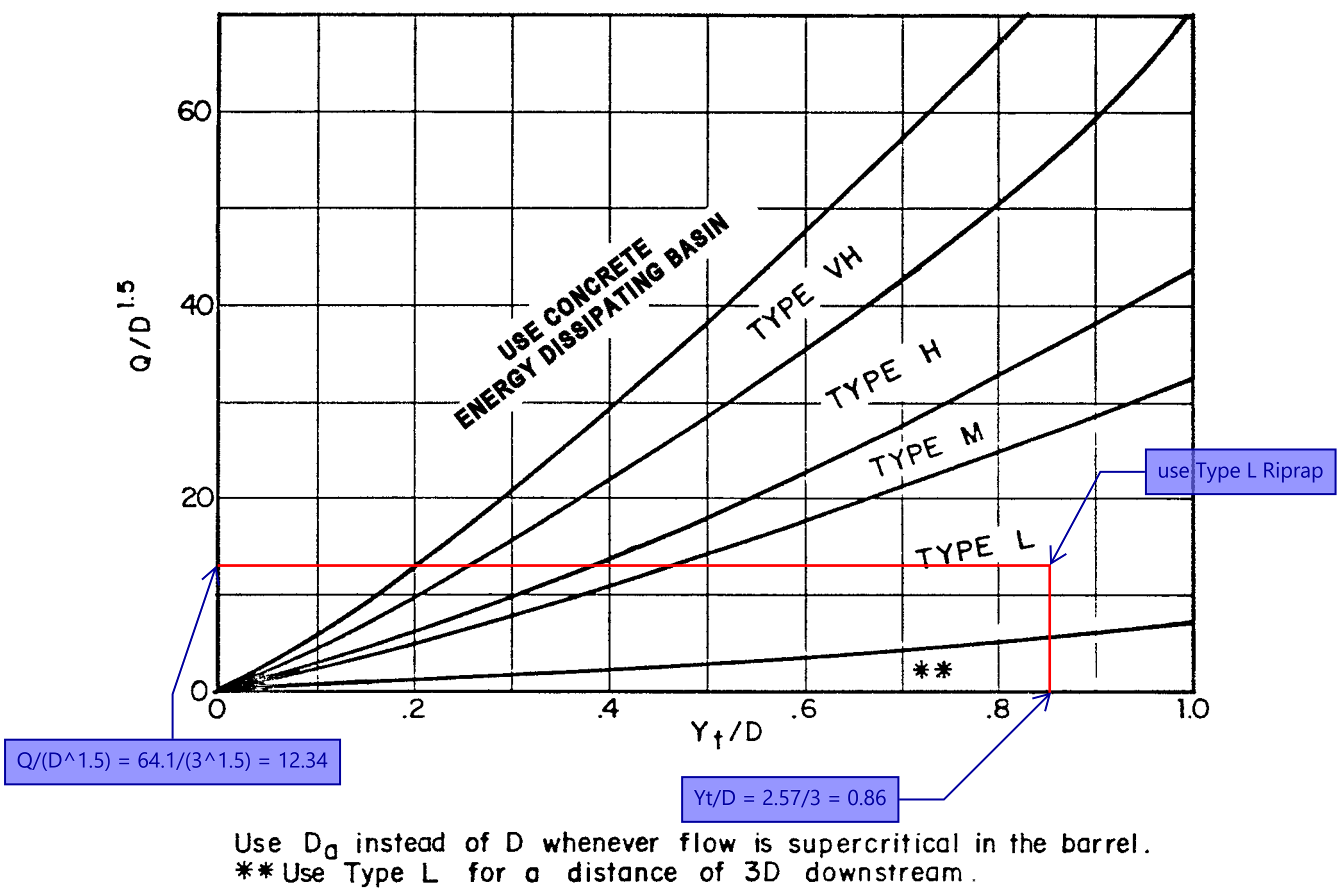


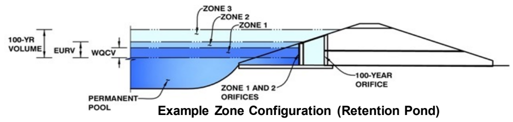
Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **The Fields Filing No. 1**

Basin ID: **Detention Pond B**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	118.15	acres
Watershed Length =	5,220	ft
Watershed Length to Centroid =	1,700	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	38.00%	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 =	Denver - Capitol Building	

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

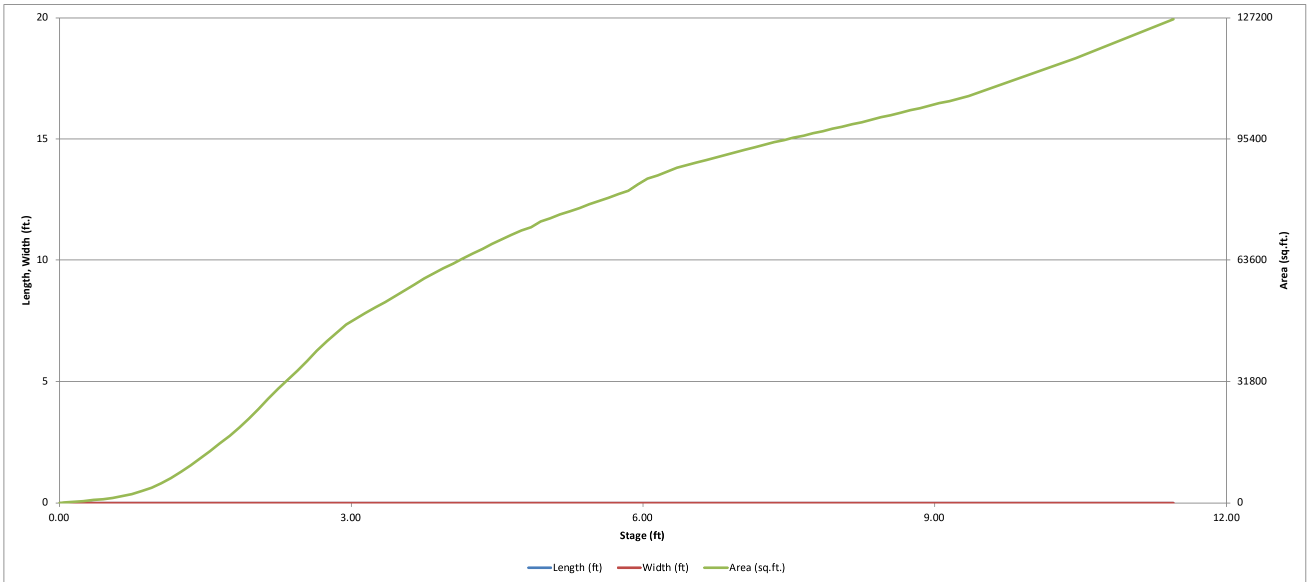
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.718	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.155	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	4.185	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	7.353	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	9.537	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	10.284	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	16.015	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	19.952	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	25.546	acre-feet		inches
Approximate 2-yr Detention Volume =	3.219	acre-feet		
Approximate 5-yr Detention Volume =	5.445	acre-feet		
Approximate 10-yr Detention Volume =	6.211	acre-feet		
Approximate 25-yr Detention Volume =	6.104	acre-feet		
Approximate 50-yr Detention Volume =	7.560	acre-feet		
Approximate 100-yr Detention Volume =	9.201	acre-feet		

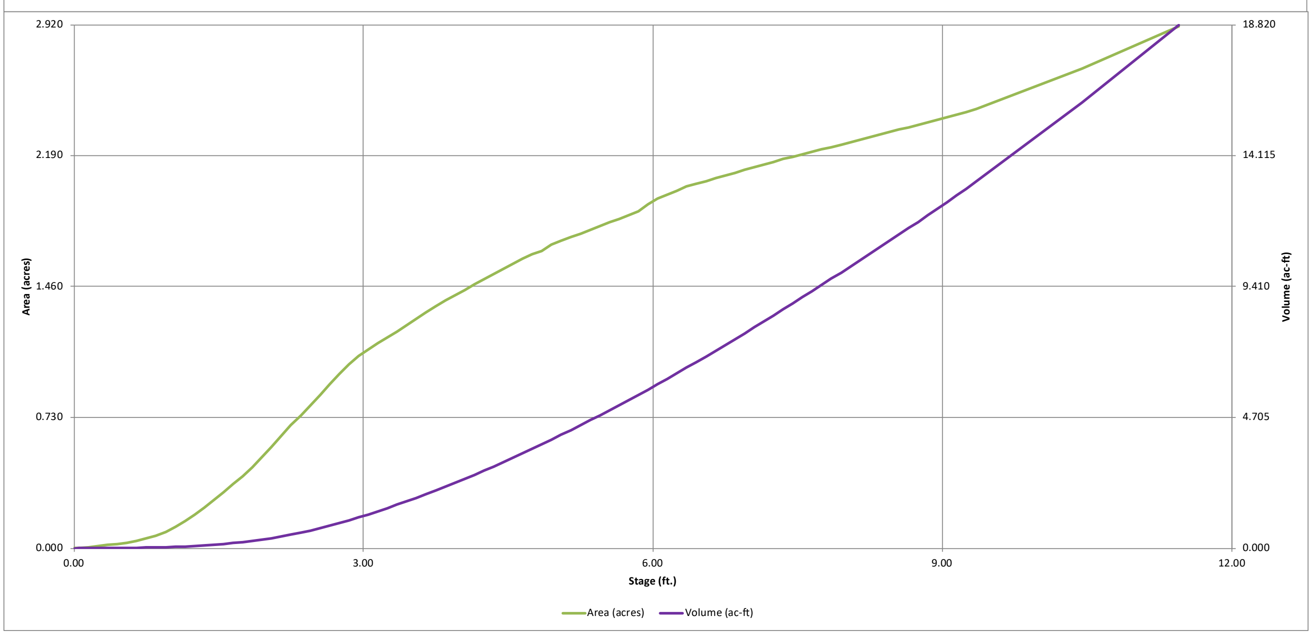
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.718	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.437	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	5.046	acre-feet
Total Detention Basin Volume =	9.201	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = ___ 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	--	--	--	10	0.000		
6,342.70	--	0.05	--	--	--	41	0.001	1	0.000
6,342.80	--	0.15	--	--	--	201	0.005	13	0.000
6,342.90	--	0.25	--	--	--	454	0.010	46	0.001
6,343.00	--	0.35	--	--	--	720	0.017	105	0.002
6,343.10	--	0.45	--	--	--	998	0.023	191	0.004
6,343.20	--	0.55	--	--	--	1,300	0.030	306	0.007
6,343.30	--	0.65	--	--	--	1,719	0.039	457	0.010
6,343.40	--	0.75	--	--	--	2,343	0.054	660	0.015
6,343.50	--	0.85	--	--	--	3,016	0.069	928	0.021
6,343.60	--	0.95	--	--	--	3,926	0.090	1,275	0.029
6,343.70	--	1.05	--	--	--	5,088	0.117	1,725	0.040
6,343.80	--	1.15	--	--	--	6,514	0.150	2,306	0.053
6,343.90	--	1.25	--	--	--	8,086	0.186	3,036	0.070
6,344.00	--	1.35	--	--	--	9,867	0.227	3,933	0.090
6,344.10	--	1.45	--	--	--	11,666	0.268	5,010	0.115
6,344.20	--	1.55	--	--	--	13,550	0.311	6,271	0.144
6,344.30	--	1.65	--	--	--	15,513	0.356	7,724	0.177
6,344.40	--	1.75	--	--	--	17,504	0.402	9,375	0.215
6,344.50	--	1.85	--	--	--	19,630	0.451	11,231	0.258
6,344.60	--	1.95	--	--	--	22,035	0.506	13,315	0.306
6,344.70	--	2.05	--	--	--	24,546	0.563	15,644	0.359
6,344.80	--	2.15	--	--	--	27,204	0.625	18,231	0.419
6,344.90	--	2.25	--	--	--	29,873	0.686	21,085	0.484
6,345.00	--	2.35	--	--	--	32,223	0.740	24,190	0.555
6,345.10	--	2.45	--	--	--	34,651	0.795	27,533	0.632
6,345.20	--	2.55	--	--	--	37,194	0.854	31,126	0.715
6,345.30	--	2.65	--	--	--	39,786	0.913	34,975	0.803
6,345.40	--	2.75	--	--	--	42,301	0.971	39,079	0.897
6,345.50	--	2.85	--	--	--	44,620	1.024	43,425	0.997
6,345.60	--	2.95	--	--	--	46,647	1.071	47,988	1.102
6,345.70	--	3.05	--	--	--	48,258	1.108	52,734	1.211
6,345.80	--	3.15	--	--	--	49,732	1.142	57,633	1.323
6,345.90	--	3.25	--	--	--	51,182	1.175	62,679	1.439
6,346.00	--	3.35	--	--	--	52,639	1.208	67,870	1.558
6,346.10	--	3.45	--	--	--	54,116	1.242	73,208	1.681
6,346.20	--	3.55	--	--	--	55,630	1.277	78,695	1.807
6,346.30	--	3.65	--	--	--	57,202	1.313	84,336	1.936
6,346.40	--	3.75	--	--	--	58,838	1.351	90,138	2.069
6,346.50	--	3.85	--	--	--	60,147	1.381	96,088	2.206
6,346.60	--	3.95	--	--	--	61,428	1.410	102,166	2.345
6,346.70	--	4.05	--	--	--	62,722	1.440	108,374	2.488
6,346.80	--	4.15	--	--	--	64,019	1.470	114,711	2.633
6,346.90	--	4.25	--	--	--	65,306	1.499	121,177	2.782
6,347.00	--	4.35	--	--	--	66,583	1.529	127,772	2.933
6,347.10	--	4.45	--	--	--	67,846	1.558	134,493	3.088
6,347.20	--	4.55	--	--	--	69,094	1.586	141,340	3.245
6,347.30	--	4.65	--	--	--	70,277	1.613	148,309	3.405
6,347.40	--	4.75	--	--	--	71,323	1.637	155,389	3.567
6,347.50	--	4.85	--	--	--	72,224	1.658	162,566	3.732
6,347.60	--	4.95	--	--	--	73,707	1.692	169,863	3.900
6,347.70	--	5.05	--	--	--	74,612	1.713	177,279	4.070
6,347.80	--	5.15	--	--	--	75,521	1.734	184,785	4.242
6,347.90	--	5.25	--	--	--	76,426	1.755	192,383	4.416
6,348.00	--	5.35	--	--	--	77,328	1.775	200,070	4.593
6,348.10	--	5.45	--	--	--	78,225	1.796	207,848	4.772
6,348.20	--	5.55	--	--	--	79,119	1.816	215,715	4.952
6,348.30	--	5.65	--	--	--	80,010	1.837	223,672	5.135
6,348.40	--	5.75	--	--	--	80,901	1.857	231,717	5.319
6,348.50	--	5.85	--	--	--	81,788	1.878	239,852	5.506
6,348.60	--	5.95	--	--	--	83,452	1.916	248,114	5.696
6,348.70	--	6.05	--	--	--	84,946	1.950	256,533	5.889
6,348.80	--	6.15	--	--	--	85,882	1.972	265,075	6.085
6,348.90	--	6.25	--	--	--	86,835	1.993	273,711	6.284
6,349.00	--	6.35	--	--	--	87,805	2.016	282,443	6.484
6,349.10	--	6.45	--	--	--	88,494	2.032	291,258	6.686
6,349.20	--	6.55	--	--	--	89,178	2.047	300,141	6.890
6,349.30	--	6.65	--	--	--	89,857	2.063	309,093	7.096
6,349.40	--	6.75	--	--	--	90,533	2.078	318,113	7.303
6,349.50	--	6.85	--	--	--	91,203	2.094	327,199	7.511
6,349.60	--	6.95	--	--	--	91,870	2.109	336,353	7.722
6,349.70	--	7.05	--	--	--	92,534	2.124	345,573	7.933
6,349.80	--	7.15	--	--	--	93,192	2.139	354,860	8.146
6,349.90	--	7.25	--	--	--	93,845	2.154	364,211	8.361
6,350.00	--	7.35	--	--	--	94,492	2.169	373,628	8.577
6,350.10	--	7.45	--	--	--	95,080	2.183	383,107	8.795
6,350.20	--	7.55	--	--	--	95,663	2.196	392,644	9.014
6,350.30	--	7.65	--	--	--	96,246	2.210	402,239	9.234
6,350.40	--	7.75	--	--	--	96,832	2.223	411,893	9.456
6,350.50	--	7.85	--	--	--	97,421	2.236	421,606	9.679
6,350.60	--	7.95	--	--	--	98,013	2.250	431,378	9.903
6,350.70	--	8.05	--	--	--	98,609	2.264	441,209	10.129
6,350.80	--	8.15	--	--	--	99,210	2.278	451,100	10.356
6,350.90	--	8.25	--	--	--	99,811	2.291	461,051	10.584
6,351.00	--	8.35	--	--	--	100,418	2.305	471,062	10.814
6,351.10	--	8.45	--	--	--	101,028	2.319	481,135	11.045
6,351.20	--	8.55	--	--	--	101,639	2.333	491,268	11.278
6,351.30	--	8.65	--	--	--	102,253	2.347	501,462	11.512
6,351.40	--	8.75	--	--	--	102,868	2.362	510,690	11.724
6,351.50	--	8.85	--	--	--	103,484	2.376	521,002	11.961
6,351.60	--	8.95	--	--	--	104,104	2.390	531,375	12.199
6,351.70	--	9.05	--	--	--	104,725	2.404	541,810	12.438
6,351.80	--	9.15	--	--	--	105,346	2.418	552,307	12.679
6,351.90	--	9.25	--	--	--	105,930	2.432	562,865	12.922
6,352.00	--	9.35	--	--	--	106,672	2.449	574,554	13.190


Length, Width (ft.)
Area (sq.ft.)
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

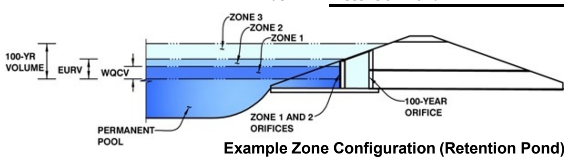

Area (acres)
Volume (ac-ft)
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **The Fields Filing No. 1**

Basin ID: **Detention Pond B**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.49	1.718	Orifice Plate
Zone 2 (EURV)	5.10	2.437	Orifice Plate
Zone 3 (100-year)	7.64	5.046	Weir&Pipe (Restrict)
Total (all zones)		9.201	

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

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

Calculated Parameters for Underdrain

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

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	5.10	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	N/A	sq. inches

Calculated Parameters for Plate

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

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	2.00	3.75					
Orifice Area (sq. inches)	7.00	7.50	8.00					

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

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	
Overflow Weir Front Edge Height, Ho =	5.11	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	20.00	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V
Horiz. Length of Weir Sides =	5.00	N/A	feet
Overflow Grate Type =	Close Mesh Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	6.36	N/A	feet
Overflow Weir Slope Length =	5.15	N/A	feet
Grate Open Area / 100-yr Orifice Area =	8.31	N/A	
Overflow Grate Open Area w/o Debris =	81.53	N/A	ft^2
Overflow Grate Open Area w/ Debris =	40.77	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	48.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	35.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	9.82	N/A	ft^2
Outlet Orifice Centroid =	1.62	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.05	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	9.25	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	80.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.96	feet
Stage at Top of Freeboard =	11.21	feet
Basin Area at Top of Freeboard =	2.86	acres
Basin Volume at Top of Freeboard =	18.11	acre-ft

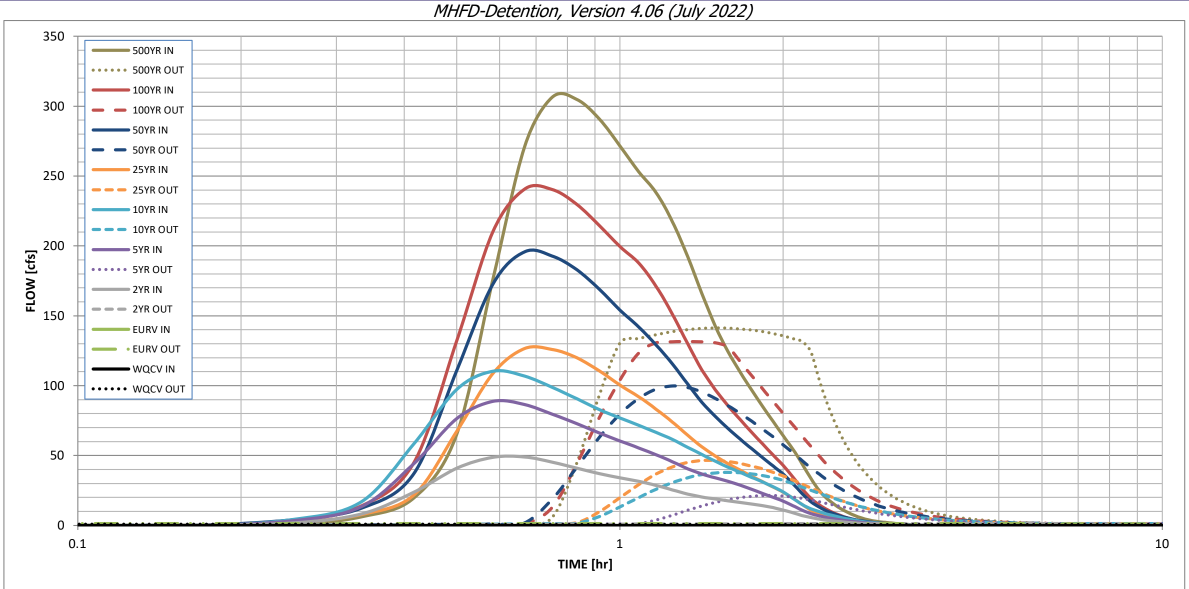
Routed Hydrograph Results

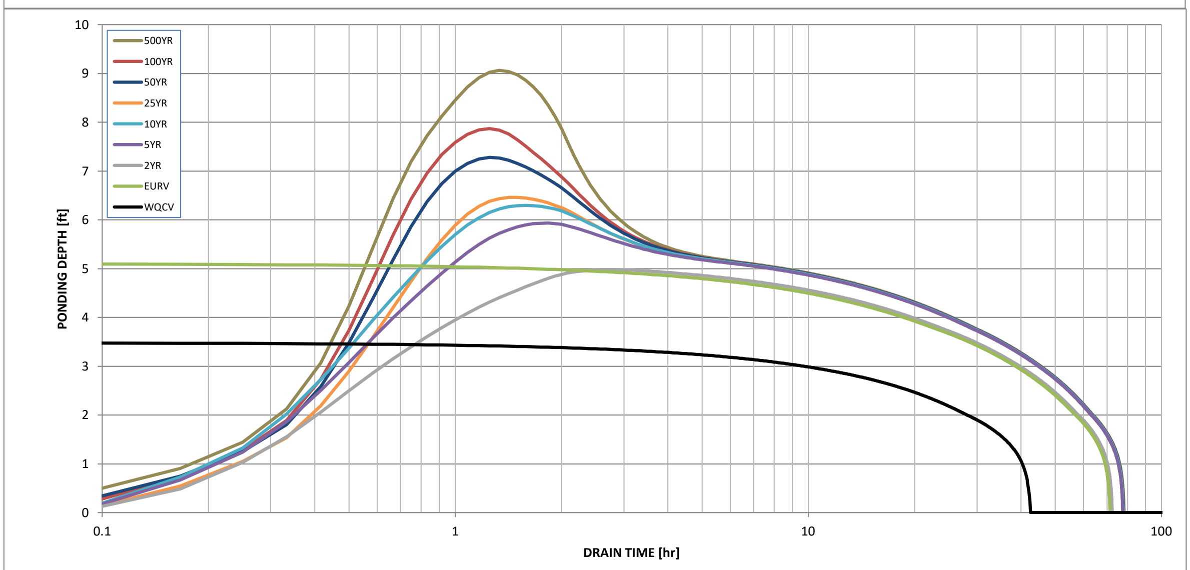
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

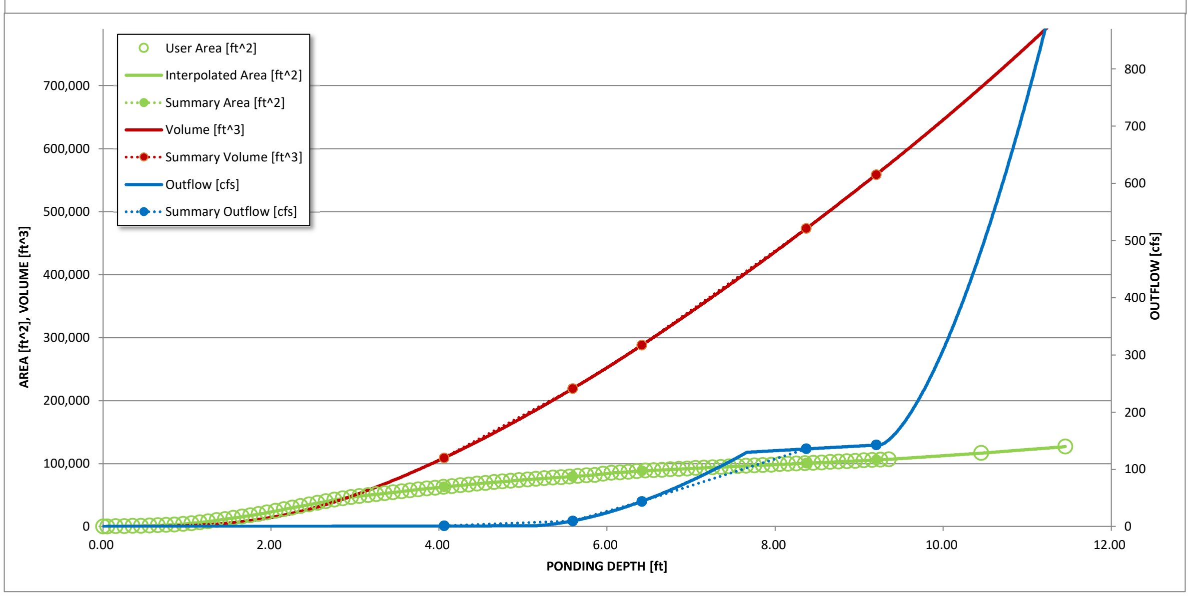
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	1.69	2.26	2.60	3.14
CUHP Runoff Volume (acre-ft) =	1.718	4.155	4.185	7.353	9.537	10.284	16.015	19.952	25.546
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	4.185	7.353	9.537	10.284	16.015	19.952	25.546
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	9.6	36.1	51.0	65.8	114.3	148.8	196.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.08	0.31	0.43	0.56	0.97	1.26	1.66
Peak Inflow Q (cfs) =	N/A	N/A	49.0	88.7	110.4	126.5	195.8	240.6	306.3
Peak Outflow Q (cfs) =	0.7	1.3	1.3	21.4	37.9	46.5	99.7	131.6	141.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.7	0.7	0.9	0.9	0.7
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.4	0.6	1.2	1.6	1.7
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) =	40	65	66	67	65	64	59	57	53
Time to Drain 99% of Inflow Volume (hours) =	**41**	69	70	74	73	73	70	69	67
Maximum Ponding Depth (ft) =	3.48	5.10	4.98	5.93	6.30	6.46	7.28	7.87	9.06
Area at Maximum Ponding Depth (acres) =	1.25	1.72	1.70	1.90	2.00	2.03	2.16	2.24	2.40
Maximum Volume Stored (acre-ft) =	1.718	4.156	3.933	5.639	6.363	6.686	8.404	9.701	12.462

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.13	0.85
	0:15:00	0.00	0.00	1.68	3.42	4.25	2.14	4.16	4.16	6.14
	0:20:00	0.00	0.00	8.10	13.34	16.86	7.82	12.30	13.97	19.57
	0:25:00	0.00	0.00	23.79	44.22	58.30	21.68	36.96	44.86	65.28
	0:30:00	0.00	0.00	40.83	76.38	97.30	67.26	110.85	132.02	176.00
	0:35:00	0.00	0.00	48.72	88.69	110.38	108.78	172.69	210.16	270.84
	0:40:00	0.00	0.00	48.97	86.49	106.80	126.46	195.81	240.63	306.32
	0:45:00	0.00	0.00	45.34	79.58	98.90	125.96	192.81	240.39	304.74
	0:50:00	0.00	0.00	40.89	72.80	90.50	119.83	182.82	229.58	290.70
	0:55:00	0.00	0.00	37.03	66.21	82.78	110.54	168.83	214.42	271.54
	1:00:00	0.00	0.00	34.02	60.49	76.83	100.38	154.14	199.57	253.05
	1:05:00	0.00	0.00	31.51	55.45	71.61	91.99	141.99	187.72	238.12
	1:10:00	0.00	0.00	28.57	50.60	66.47	83.15	129.06	171.04	217.26
	1:15:00	0.00	0.00	25.39	45.54	61.50	73.94	115.51	150.98	192.29
	1:20:00	0.00	0.00	22.48	40.50	55.91	64.57	101.09	129.94	165.85
	1:25:00	0.00	0.00	20.35	36.77	50.68	56.17	88.13	111.32	142.48
	1:30:00	0.00	0.00	18.84	33.97	45.95	49.67	77.95	97.09	124.34
	1:35:00	0.00	0.00	17.55	31.51	41.72	44.18	69.27	85.57	109.57
	1:40:00	0.00	0.00	16.40	28.74	37.91	39.44	61.70	75.62	96.75
	1:45:00	0.00	0.00	15.26	25.77	34.39	35.14	54.84	66.60	85.13
	1:50:00	0.00	0.00	14.13	22.89	31.06	31.20	48.53	58.24	74.36
	1:55:00	0.00	0.00	12.68	20.14	27.64	27.43	42.48	50.35	64.19
	2:00:00	0.00	0.00	11.03	17.42	23.87	23.79	36.71	42.95	54.68
	2:05:00	0.00	0.00	9.10	14.21	19.43	19.56	30.01	34.82	44.20
	2:10:00	0.00	0.00	7.15	10.94	15.03	15.04	22.94	26.43	33.51
	2:15:00	0.00	0.00	5.56	8.50	11.93	10.95	16.87	19.30	24.72
	2:20:00	0.00	0.00	4.43	6.82	9.73	8.25	12.92	14.53	18.72
	2:25:00	0.00	0.00	3.61	5.53	7.95	6.36	10.05	11.08	14.34
	2:30:00	0.00	0.00	2.96	4.50	6.47	4.97	7.88	8.42	10.94
	2:35:00	0.00	0.00	2.42	3.67	5.24	3.88	6.15	6.37	8.29
	2:40:00	0.00	0.00	1.96	2.96	4.17	3.04	4.79	4.75	6.19
	2:45:00	0.00	0.00	1.58	2.36	3.28	2.35	3.69	3.50	4.57
	2:50:00	0.00	0.00	1.28	1.86	2.55	1.81	2.82	2.62	3.42
	2:55:00	0.00	0.00	1.04	1.46	1.98	1.43	2.20	2.05	2.68
	3:00:00	0.00	0.00	0.84	1.15	1.55	1.13	1.73	1.64	2.13
	3:05:00	0.00	0.00	0.66	0.89	1.21	0.89	1.36	1.30	1.69
	3:10:00	0.00	0.00	0.51	0.67	0.92	0.68	1.04	1.01	1.30
	3:15:00	0.00	0.00	0.38	0.48	0.68	0.51	0.78	0.75	0.97
	3:20:00	0.00	0.00	0.26	0.33	0.47	0.37	0.55	0.53	0.68
	3:25:00	0.00	0.00	0.17	0.22	0.30	0.25	0.36	0.35	0.44
	3:30:00	0.00	0.00	0.10	0.13	0.17	0.15	0.21	0.20	0.26
	3:35:00	0.00	0.00	0.05	0.07	0.08	0.07	0.10	0.10	0.12
	3:40:00	0.00	0.00	0.02	0.02	0.02	0.03	0.03	0.03	0.04
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ^{2}]	Area [acres]	Volume [ft ^{3}]	Volume [ac-ft]	Total Outflow [cfs]
WQCV	4.06	62,852	1.443	109,002	2.502	0.98
EURV	5.59	79,475	1.824	218,887	5.025	9.88
5-yr	6.41	88,219	2.025	287,723	6.605	43.79
100-yr	8.37	100,540	2.308	473,072	10.860	135.78
Spillway	9.20	105,638	2.425	558,635	12.824	142.45

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

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

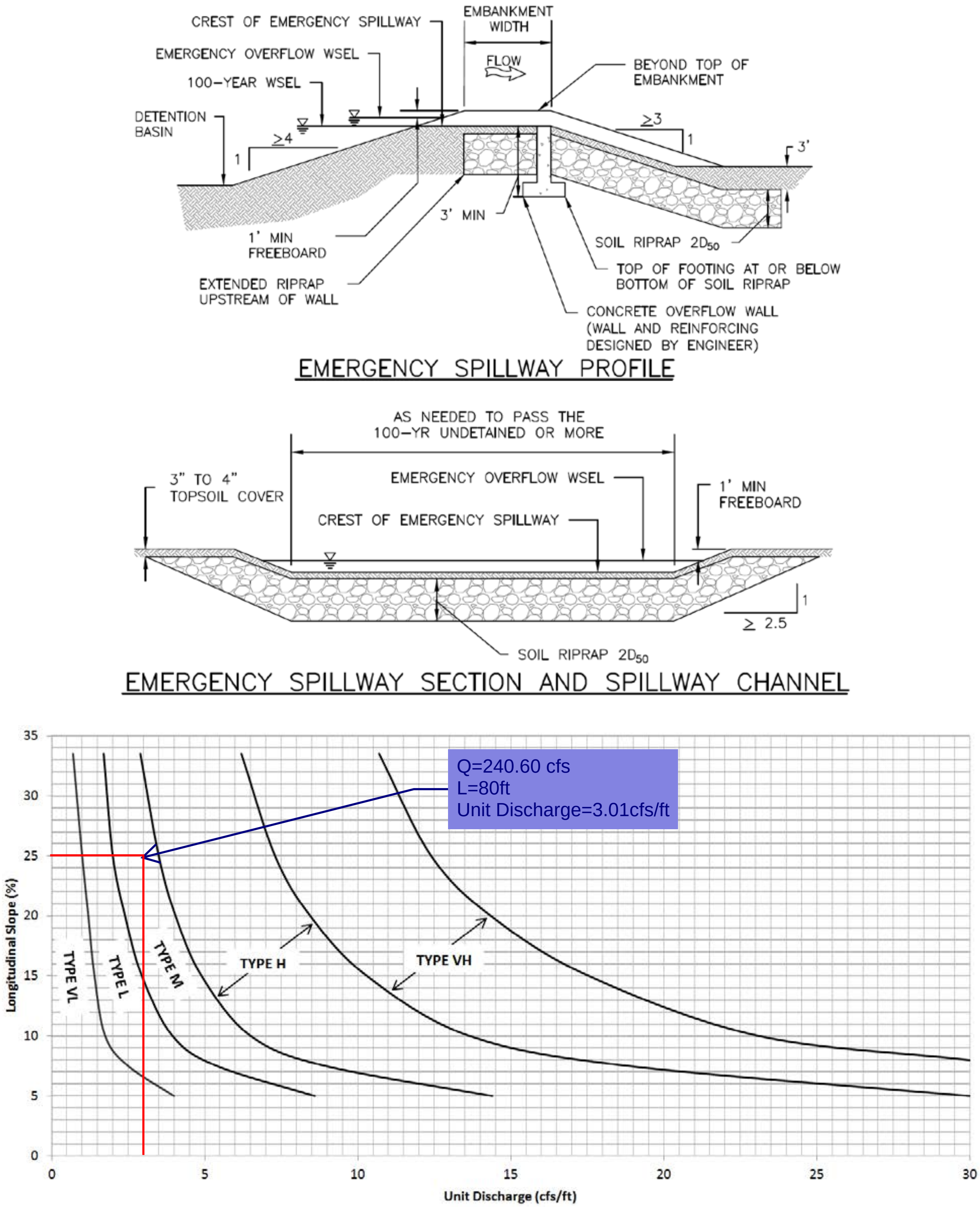


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

Worksheet for Pond B Emergency Overflow

Project Description	
Solve For	Headwater Elevation

Input Data	
Discharge	240.60 cfs
Crest Elevation	6,351.85 ft
Tailwater Elevation	6,340.00 ft
Crest Surface Type	Gravel
Crest Breadth	10.00 ft
Crest Length	80.0 ft

Results	
Headwater Elevation	6,352.89 ft
Headwater Height Above Crest	1.04 ft
Tailwater Height Above Crest	-11.85 ft
Weir Coefficient	2.84 ft^(1/2)/s
Submergence Factor	1.000
Adjusted Weir Coefficient	2.84 ft^(1/2)/s
Flow Area	83.2 ft²
Velocity	2.89 ft/s
Wetted Perimeter	82.1 ft
Top Width	80.00 ft

$$H_a = \frac{(H + Y_n)}{2}$$ Equation 9-19

Where the maximum value of H_a shall not exceed H, and:

D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)

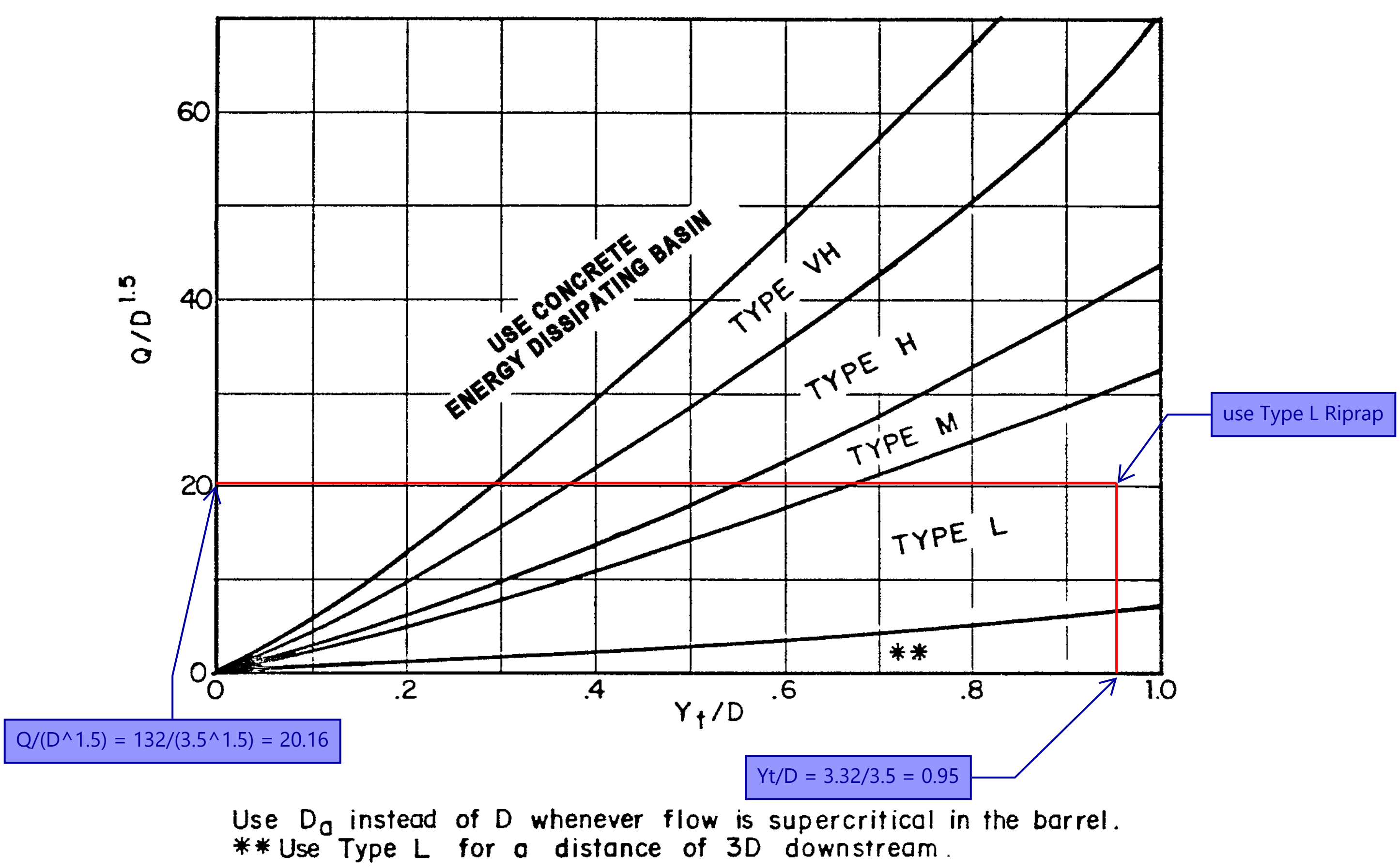


Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

B4 Miscellaneous Calculations

Worksheet for Swale A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.018 ft/ft
Discharge	55.85 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.75
0+10	0.05
0+12	0.00
0+15	0.05
0+26	2.75

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.75)	(0+26, 2.75)	0.040

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	16.0 in
Roughness Coefficient	0.040
Elevation	1.33 ft
Elevation Range	0.0 to 2.8 ft
Flow Area	12.6 ft²
Wetted Perimeter	15.0 ft
Hydraulic Radius	10.1 in
Top Width	14.67 ft
Normal Depth	16.0 in
Critical Depth	14.7 in
Critical Slope	0.026 ft/ft
Velocity	4.44 ft/s
Velocity Head	0.31 ft
Specific Energy	1.64 ft
Froude Number	0.844
Flow Type	Subcritical

Worksheet for Swale A

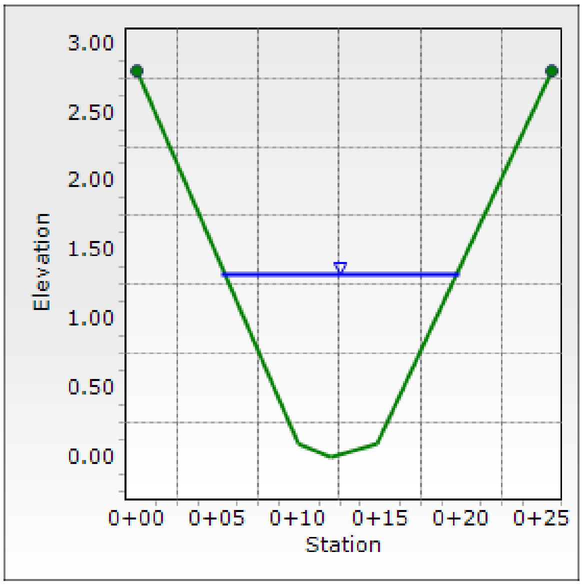
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	16.0 in
Critical Depth	14.7 in
Channel Slope	0.018 ft/ft
Critical Slope	0.026 ft/ft

Cross Section for Swale A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.018 ft/ft
Normal Depth	16.0 in
Discharge	55.85 cfs



Worksheet for Swale B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.018 ft/ft
Discharge	22.54 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.04
0+08	0.05
0+10	0.00
0+12	0.05
0+20	2.04

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.04)	(0+20, 2.04)	0.040

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	10.9 in
Roughness Coefficient	0.040
Elevation	0.91 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	6.5 ft²
Wetted Perimeter	11.1 ft
Hydraulic Radius	7.0 in
Top Width	10.89 ft
Normal Depth	10.9 in
Critical Depth	9.7 in
Critical Slope	0.029 ft/ft
Velocity	3.48 ft/s
Velocity Head	0.19 ft
Specific Energy	1.09 ft
Froude Number	0.795
Flow Type	Subcritical

Worksheet for Swale B

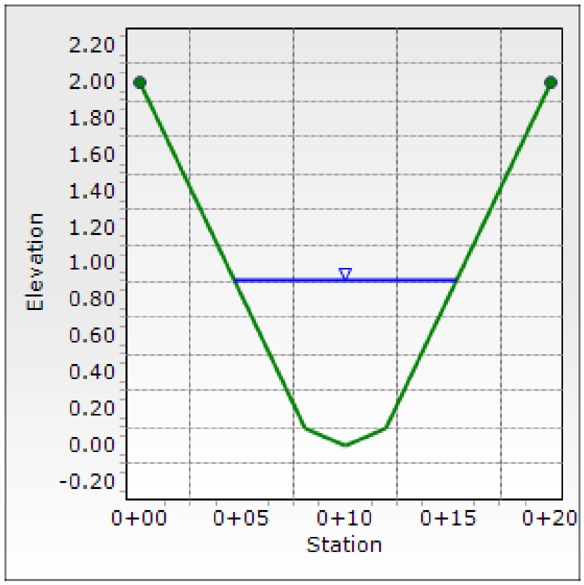
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	10.9 in
Critical Depth	9.7 in
Channel Slope	0.018 ft/ft
Critical Slope	0.029 ft/ft

Cross Section for Swale B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.018 ft/ft
Normal Depth	10.9 in
Discharge	22.54 cfs



Worksheet for Swale C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.018 ft/ft
Discharge	47.76 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.04
0+08	0.05
0+10	0.00
0+12	0.05
0+20	2.04

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.04)	(0+20, 2.04)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	15.5 in
Roughness Coefficient	0.040
Elevation	1.29 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	11.2 ft²
Wetted Perimeter	14.3 ft
Hydraulic Radius	9.4 in
Top Width	13.97 ft
Normal Depth	15.5 in
Critical Depth	14.2 in
Critical Slope	0.026 ft/ft
Velocity	4.25 ft/s
Velocity Head	0.28 ft
Specific Energy	1.57 ft
Froude Number	0.835
Flow Type	Subcritical

Worksheet for Swale C

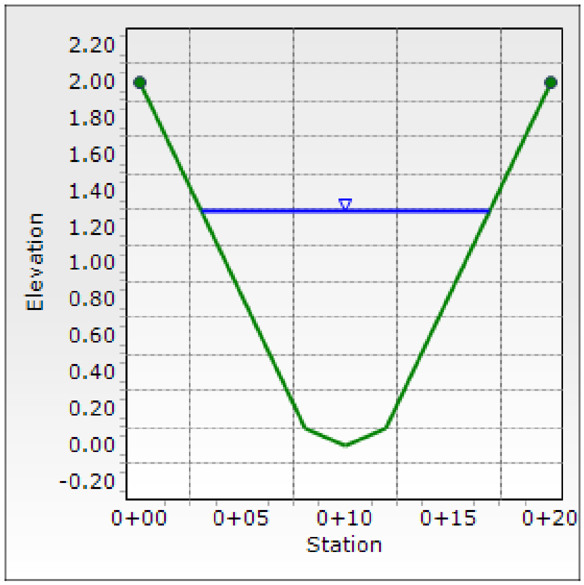
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	15.5 in
Critical Depth	14.2 in
Channel Slope	0.018 ft/ft
Critical Slope	0.026 ft/ft

Cross Section for Swale C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.018 ft/ft
Normal Depth	15.5 in
Discharge	47.76 cfs



Worksheet for Swale D

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.024 ft/ft
Left Side Slope	17.50 %
Right Side Slope	12.50 %
Bottom Width	4.00 ft
Discharge	12.78 cfs

Results	
Normal Depth	5.8 in
Flow Area	3.5 ft²
Wetted Perimeter	10.7 ft
Hydraulic Radius	3.9 in
Top Width	10.58 ft
Critical Depth	6.1 in
Critical Slope	0.019 ft/ft
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	0.69 ft
Froude Number	1.120
Flow Type	Supercritical

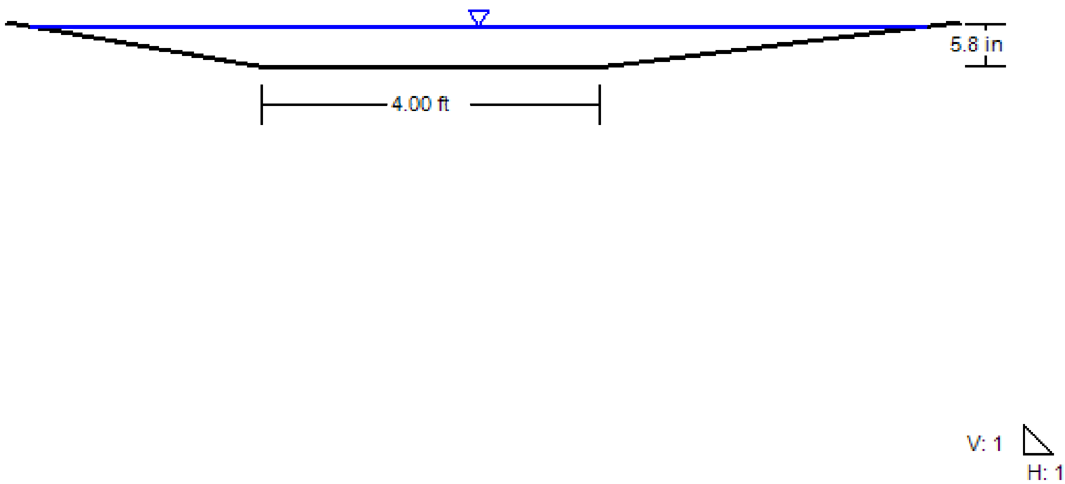
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.8 in
Critical Depth	6.1 in
Channel Slope	0.024 ft/ft
Critical Slope	0.019 ft/ft

Cross Section for Swale D

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.024 ft/ft
Normal Depth	5.8 in
Left Side Slope	17.50 %
Right Side Slope	12.50 %
Bottom Width	4.00 ft
Discharge	12.78 cfs



Worksheet for Swale E

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030
Channel Slope	0.031 ft/ft
Left Side Slope	14.60 %
Right Side Slope	8.40 %
Bottom Width	5.00 ft
Discharge	10.16 cfs

Results

Normal Depth	4.2 in
Flow Area	2.9 ft²
Wetted Perimeter	11.6 ft
Hydraulic Radius	3.0 in
Top Width	11.59 ft
Critical Depth	4.7 in
Critical Slope	0.020 ft/ft
Velocity	3.49 ft/s
Velocity Head	0.19 ft
Specific Energy	0.54 ft
Froude Number	1.225
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

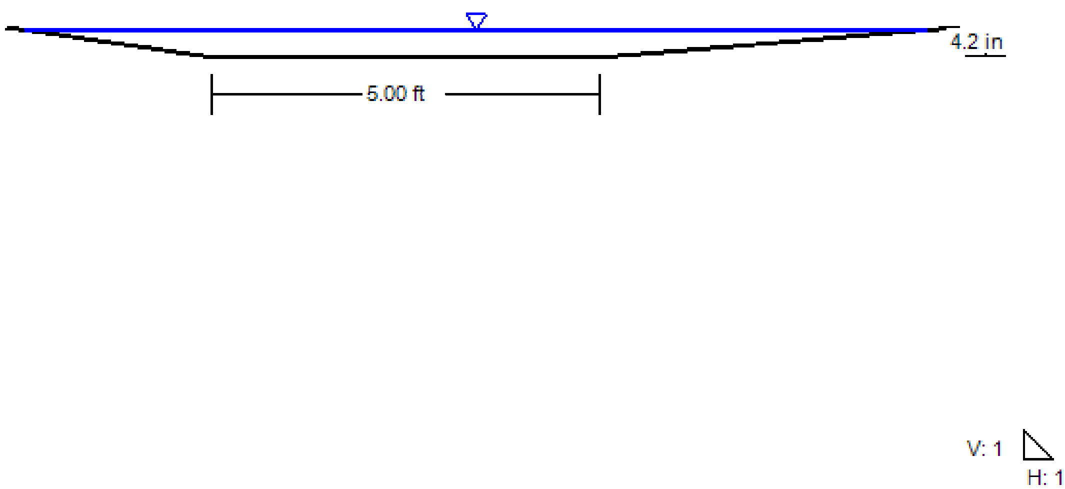
GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.2 in
Critical Depth	4.7 in
Channel Slope	0.031 ft/ft
Critical Slope	0.020 ft/ft

Cross Section for Swale E

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.031 ft/ft
Normal Depth	4.2 in
Left Side Slope	14.60 %
Right Side Slope	8.40 %
Bottom Width	5.00 ft
Discharge	10.16 cfs



Worksheet for Swale F

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.020 ft/ft
Left Side Slope	7.60 %
Right Side Slope	7.10 %
Discharge	4.22 cfs

Results	
Normal Depth	4.4 in
Flow Area	1.9 ft²
Wetted Perimeter	10.1 ft
Hydraulic Radius	2.2 in
Top Width	10.07 ft
Critical Depth	4.3 in
Critical Slope	0.023 ft/ft
Velocity	2.27 ft/s
Velocity Head	0.08 ft
Specific Energy	0.45 ft
Froude Number	0.930
Flow Type	Subcritical

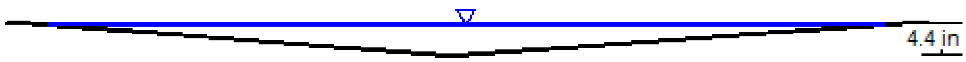
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

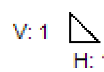
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	4.4 in
Critical Depth	4.3 in
Channel Slope	0.020 ft/ft
Critical Slope	0.023 ft/ft

Cross Section for Swale F

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.030
Channel Slope	0.020 ft/ft
Normal Depth	4.4 in
Left Side Slope	7.60 %
Right Side Slope	7.10 %
Discharge	4.22 cfs





Worksheet for Swale G

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.050 ft/ft
Discharge	30.68 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.04
0+08	0.05
0+10	0.00
0+12	0.05
0+20	2.04

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.04)	(0+20, 2.04)	0.040

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	9.9 in
Roughness Coefficient	0.040
Elevation	0.82 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	5.6 ft²
Wetted Perimeter	10.4 ft
Hydraulic Radius	6.4 in
Top Width	10.21 ft
Normal Depth	9.9 in
Critical Depth	11.3 in
Critical Slope	0.028 ft/ft
Velocity	5.49 ft/s
Velocity Head	0.47 ft
Specific Energy	1.29 ft
Froude Number	1.309
Flow Type	Supercritical

Worksheet for Swale G

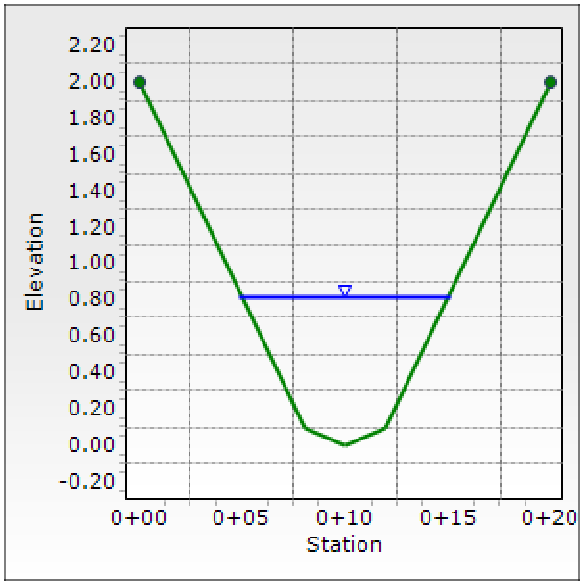
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.9 in
Critical Depth	11.3 in
Channel Slope	0.050 ft/ft
Critical Slope	0.028 ft/ft

Cross Section for Swale G

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.050 ft/ft
Normal Depth	9.9 in
Discharge	30.68 cfs



Project: The Fields Filing No. 1
Project Number: 1097-0004

Forebay Structure Sizing

Structure Description	Structure Name	Basins	Contributing Area	Imperviousness	Impervious Acres	Atributed WQCV	WQCV		%	Minimum Forebay Volume
			(Acres)	(%)	(Acres)	Watershed Inches	(Acre * ft)	(CF)		(CF)
Forebay SA2-1	SA2-1	A-2, A-3, A-4	12.77	40%	5.11	0.180	0.19	8337	3	250
Forebay SA3-1	SA3-1	A-5, A-6, A-7, A-8, A-9, A-10, A-11, A-12, A-13, A-14, A-15, & A-16	59.73	40%	23.89	0.180	0.90	38993	3	1170
Forebay SB2-1	SB2-1	B-8, B-9, B-10 & B-11	5.88	48%	2.82	0.201	0.10	4287	2	86
Forebay SB3-1	SB3-1	B-2, B-3, B-4, B-5, B-6, B-19 & B-20	18.55	44%	8.16	0.190	0.29	12816	3	384

Forebay	Maximum Forebay Height	100 Year Peak Flow*	Forebay Notch Release Rate (2% of Q_{100})	Trickle Channel Minimum Capacity	Minimum Opening Width	Opening Used
	(in)	(cfs)	(cfs)	(cfs)	(in)	(in)
Forebay SA2-1	18	59.61	1.19	1.19	4.8	5
Forebay SA3-1	30	163.17	3.26	3.26	4.0	4
Forebay SB2-1	18	29.03	0.58	0.58	4.0	4
Forebay SB3-1	18	51.77	1.04	1.04	0.6	1

* = These flows are taken from the StormCAD Model

Forebay Volume Capacity Check

	Depth	Area of Forebay	Forebay Volume Available	Minimum Forebay Volume Required
	(in)	(ft * ft)	(CF)	(CF)
Forebay SA2-1	18	169.16	254	250
Forebay SA3-1	30	474.85	1187	1170
Forebay SB2-1	18	73.85	111	86
Forebay SB3-1	18	260.08	390	384

Trickle Channel Sizing

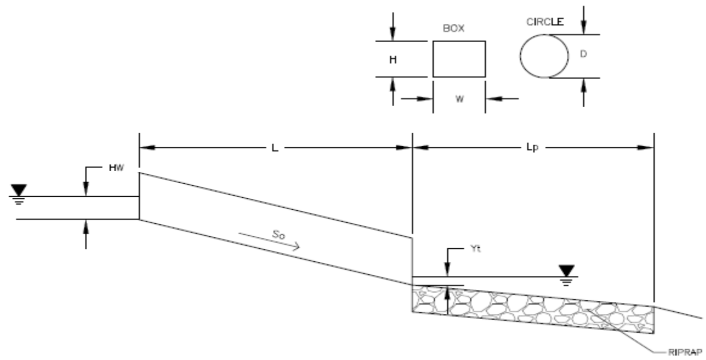
	100 Year Peak Flow	Trickle Channel Minimum Capacity	Provided Capacity
Flow to the Det. Pond	(cfs)	(cfs)	(cfs)
	163.17	3.26	3.98

Forebay Sizing	Forebay SA2-1	Forebay SA3-1	Forebay SB2-1	Forebay SB3-1	
Pipe Size	24	42	36	30	(in)
Impervious Acres	5.11	23.89	2.82	8.16	(acres)
Pipe Invert Elevation	6313.53	6315.6	6344.88	6344.88	(ft)
Forebay Drop at Pipe Invert	6312.78	6314.85	6344.13	6344.13	(ft)
Back Wall Width	48	84	72	60	(in)
Back Wall Height	48	75	66	57	(in)
Distance to Energy Disipation Block	18	24	24	22.5	(in)
Min Distance to Baffle Blocks Outer Face	50	63.5	59	54.5	(in)
Min Inside Length of Forebay	74	95	86	78.5	(in)
Energy Disipation Block Height	33.0	51.0	45.0	39.0	(in)
Baffle Block Height	12.0	21.0	18.0	15.0	(in)
Baffle Block Width & Length	8.0	10.5	9.0	8.0	(in)
Forebay Depth	18	30	18	18	(ft)
Forebay Max Height	18	30	18	18	(in)
Mimum Area Required	166.7	467.9	57.2	256.3	(ft*ft)
Minimum Volume Required	250.1	1170	86	384	(CF)
Forebay Area	169.16	474.85	73.85	260.08	(ft*ft)
Forebay Volume	253.74	1187.13	110.775	390.12	(CF)

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Oaks of Castle Rock Filing No. 2A
ID: FES SA1-1 - Low Tail-Water Basin



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

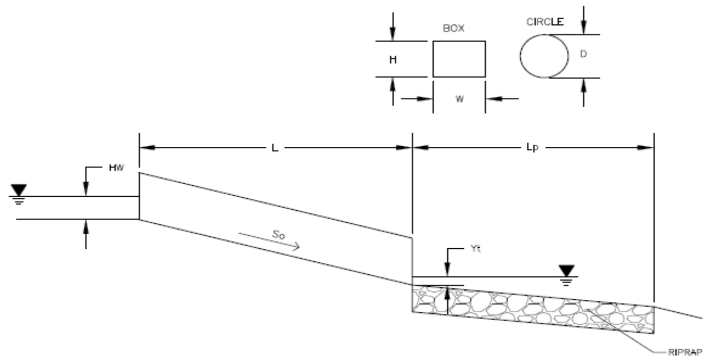
Design Information:			
Design Discharge	Q =	64.1	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	36	inches
Inlet Edge Type (Choose from pull-down list)		Beveled Edge (1.5:1)	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	6306.733	ft
Outlet Elevation **OR** Slope	Elev OUT =	6306.51	ft
Culvert Length	L =	57.6	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t, Elevation}$ =		ft
Max Allowable Channel Velocity	V =	7	ft/s

Calculated Results:			
Culvert Cross Sectional Area Available	A =	7.07	ft^2
Culvert Normal Depth	Y_n =	3.00	ft
Culvert Critical Depth	Y_c =	2.57	ft
Froude Number	Fr =	-	**Pressure flow!**
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.41	
Sum of All Loss Coefficients	k_s =	1.61	ft
Headwater:			
Inlet Control Headwater	HW_I =	4.50	ft
Outlet Control Headwater	HW_O =	4.62	ft
Design Headwater Elevation	**HW =**	**6311.36**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.54**	**HW/D > 1.5!**
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	4.11	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.20	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	3.38	
Flow Area at Max Channel Velocity	A_t =	9.16	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**16**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**8**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	-	ft
Minimum Theoretical Riprap Size	d_{50} min=	10	in
Nominal Riprap Size	d_{50} nominal=	12	in
MHFD Riprap Type	**Type =**	**M**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: **Oaks of Castle Rock Filing No. 2A**
ID: **FES SB1-1 - Low Tail-Water Basin**



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Design Information:

Design Discharge	Q =	132.0	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	42	inches
Inlet Edge Type (Choose from pull-down list)		Beveled Edge (1.5:1)	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	6331.01	ft
Outlet Elevation **OR** Slope	Elev OUT =	6330.8	ft
Culvert Length	L =	42.13	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t, Elevation}$ =		ft
Max Allowable Channel Velocity	V =	7	ft/s

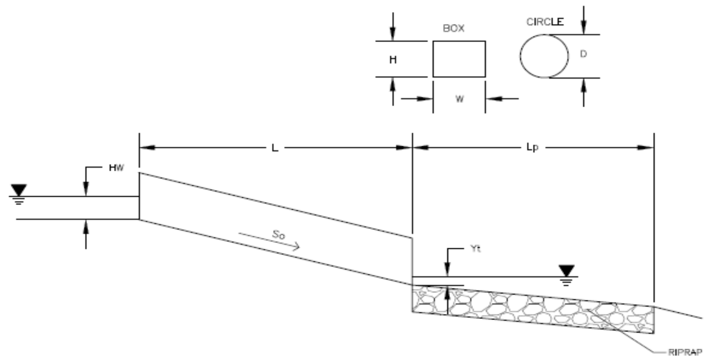
Calculated Results:

Culvert Cross Sectional Area Available	A =	9.62	ft^2
Culvert Normal Depth	Y_n =	3.50	ft
Culvert Critical Depth	Y_c =	3.32	ft
Froude Number	Fr =	-	**Pressure flow!**
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.25	
Sum of All Loss Coefficients	k_s =	1.45	ft
Headwater:			
Inlet Control Headwater	HW_I =	7.66	ft
Outlet Control Headwater	HW_O =	7.43	ft
Design Headwater Elevation	**HW =**	**6338.67**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**2.19**	**HW/D > 1.5!**
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	5.76	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.40	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	1.96	
Flow Area at Max Channel Velocity	A_t =	18.86	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**20**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**14**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	-	ft
Minimum Theoretical Riprap Size	d_{50} min=	17	in
Nominal Riprap Size	d_{50} nominal=	18	in
MHFD Riprap Type	**Type =**	**H**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: **Oaks of Castle Rock Filing No. 2A**
ID: **FES SA4-1**



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Design Information:

Design Discharge	Q =	30.99	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	24	inches
Inlet Edge Type (Choose from pull-down list)		Beveled Edge (1.5:1)	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	6415.36	ft
Outlet Elevation **OR** Slope	Elev OUT =	6413.42	ft
Culvert Length	L =	193.8	ft
Manning's Roughness	n =	0.011	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t,\ Elevation}$ =		ft
Max Allowable Channel Velocity	V =	7	ft/s

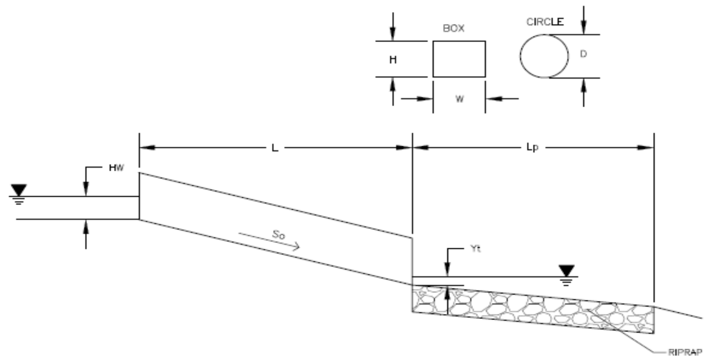
Calculated Results:

Culvert Cross Sectional Area Available	A =	3.14	ft^2
Culvert Normal Depth	Y_n =	2.00	ft
Culvert Critical Depth	Y_c =	1.88	ft
Froude Number	Fr =	-	**Pressure flow!**
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	1.71	
Sum of All Loss Coefficients	k_s =	2.91	ft
Headwater:			
Inlet Control Headwater	HW_I =	4.11	ft
Outlet Control Headwater	HW_O =	4.40	ft
Design Headwater Elevation	**HW =**	**6419.76**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**2.20**	**HW/D > 1.5!**
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	5.48	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	0.80	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	2.13	
Flow Area at Max Channel Velocity	A_t =	4.43	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**8**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**6**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	-	ft
Minimum Theoretical Riprap Size	d_{50} min=	9	in
Nominal Riprap Size	d_{50} nominal=	9	in
MHFD Riprap Type	**Type =**	**M**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Oaks of Castle Rock Filing No. 2A
ID: FES SB7-1



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Design Information:

Design Discharge	Q =	14.15	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	18	inches
Inlet Edge Type (Choose from pull-down list)		Beveled Edge (1.5:1)	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	6461.2	ft
Outlet Elevation **OR** Slope	Elev OUT =	6460.83	ft
Culvert Length	L =	75	ft
Manning's Roughness	n =	0.011	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t, Elevation}$ =		ft
Max Allowable Channel Velocity	V =	7	ft/s

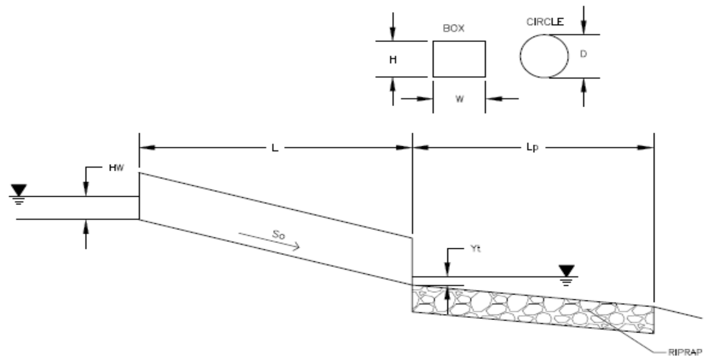
Calculated Results:

Culvert Cross Sectional Area Available	A =	1.77	ft^2
Culvert Normal Depth	Y_n =	1.50	ft
Culvert Critical Depth	Y_c =	1.39	ft
Froude Number	Fr =	-	**Pressure flow!**
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.97	
Sum of All Loss Coefficients	k_s =	2.17	ft
Headwater:			
Inlet Control Headwater	HW_I =	2.86	ft
Outlet Control Headwater	HW_O =	3.24	ft
Design Headwater Elevation	**HW =**	**6464.44**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**2.16**	**HW/D > 1.5!**
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	5.13	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	0.60	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	2.33	
Flow Area at Max Channel Velocity	A_t =	2.02	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**5**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**4**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	-	ft
Minimum Theoretical Riprap Size	d_{50} min=	6	in
Nominal Riprap Size	d_{50} nominal=	9	in
MHFD Riprap Type	**Type =**	**L**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Oaks of Castle Rock Filing No. 2A
ID: FES SD2-1



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Design Information:			
Design Discharge	Q =	27.58	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	15	inches
Inlet Edge Type (Choose from pull-down list)		Beveled Edge (1.5:1)	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	6431.87	ft
Outlet Elevation **OR** Slope	Elev OUT =	6430	ft
Culvert Length	L =	56	ft
Manning's Roughness	n =	0.011	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t,\ Elevation}$ =		ft
Max Allowable Channel Velocity	V =	7	ft/s

Calculated Results:			
Culvert Cross Sectional Area Available	A =	1.23	ft^2
Culvert Normal Depth	Y_n =	1.25	ft
Culvert Critical Depth	Y_c =	1.25	ft
Froude Number	Fr =	-	**Pressure flow!**
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.93	
Sum of All Loss Coefficients	k_s =	2.13	ft
Headwater:			
Inlet Control Headwater	HW_I =	15.35	ft
Outlet Control Headwater	HW_O =	16.06	ft
Design Headwater Elevation	**HW =**	**6447.93**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**12.85**	**HW/D > 1.5!**
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	15.79	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	0.50	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	1.82	
Flow Area at Max Channel Velocity	A_t =	3.94	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**13**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**9**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	-	ft
Minimum Theoretical Riprap Size	d_{50} min=	16	in
Nominal Riprap Size	d_{50} nominal=	18	in
MHFD Riprap Type	**Type =**	**H**	

B5 CUHP

CUHP SUBCATCHMENTS

Existing Conditions

Columns with this color heading are for required user-input
Columns with this color heading are for optional override values
Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
G	101	0.10in	0.2154688	0.378787879	0.78125	0.025	2.5	0.3	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

Proposed Conditions

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
B	101	0.10in	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	0.10in	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

Existing Conditions

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
G	101	0.25in	0.2154688	0.378787879	0.78125	0.025	2.5	0.3	0.1	3	0.5	0.0018	0

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
B	101	0.25in	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	0.25in	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	**EPA SWMM Target Node**	**Raingage**	**Area (mi^2)**	**Length to Centroid (mi)**	**Length (mi)**	**Slope (ft/ft)**	**Percent Imperviousness**	**Pervious**	**Impervious**	**Initial Rate (in/hr)**	**Decay Coefficient (1/seconds)**	**Final Rate (in/hr)**	**Level 0, 1, or 2**
G	101	0.50in	0.2154688	0.000378788	0.78125	0.025	2.5	0.3	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
B	101	0.50in	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	0.50in	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
G	101	0.75in	0.2154688	0.378787879	0.78125	0.025	2.5	0.3	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
B	101	0.75in	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	0.75in	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
G	101	2yr	0.2154688	0.378787879	0.78125	0.025	2.5	0.3	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

Proposed Conditions

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
B	101	2yr	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	2yr	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

Proposed Conditions

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								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
B	101	5yr	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	5yr	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

CUHP SUBCATCHMENTS

Proposed Conditions

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Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	**EPA SWMM Target Node**	**Raingage**	**Area (mi^2)**	**Length to Centroid (mi)**	**Length (mi)**	**Slope (ft/ft)**	**Percent Imperviousness**	**Pervious**	**Impervious**	**Initial Rate (in/hr)**	**Decay Coefficient (1/seconds)**	**Final Rate (in/hr)**	**Level 0, 1, or 2**
B	101	100yr	0.1846094	0.321969697	0.9886364	0.025	38	0.3	0.1	3	0.5	0.0018	0
D	102	100yr	0.052375	0.34280303	0.78125	0.037	25	0.35	0.1	3	0.5	0.0018	0

Existing Conditions - 0.10in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
G		0.154	0.223	43.6	8.98	22.7	6.34	15.0	148	500,577	0.00	9	120.0	0	9	0.00

Proposed Conditions - 0.10in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	0.00	1,847	115.0	1	1,847	0.00
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	0.00	227	120.0	0	227	0.00

Existing Conditions - 0.25in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
G		0.154	0.223	43.6	8.98	22.7	6.34	15.0	148	500,577	0.00	2,016	115.0	0	2,014	0.00

Proposed Conditions - 0.25in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	0.07	28,311	40.0	5	28,303	0.04
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	0.04	4,522	110.0	1	4,521	0.02

Existing Conditions - 0.50in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
G		0.154	0.223	43.6	8.98	22.7	6.34	15.0	148	500,577	0.27	135,050	70.0	19	134,952	0.14

Proposed Conditions - 0.50in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	0.34	144,564	45.0	28	144,526	0.23
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	0.27	33,453	110.0	4	33,449	0.12

Existing Conditions - 0.75in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
G		0.154	0.223	43.6	8.98	22.7	6.34	15.0	148	500,577	0.55	277,220	50.0	43	277,019	0.31

Proposed Conditions - 0.75in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	0.62	264,932	40.0	59	264,862	0.50
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	0.56	67,752	65.0	8	67,745	0.25

Existing Conditions - 1.06in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
G		0.154	0.223	43.6	8.98	22.7	6.34	15.0	148	500,577	0.91	453,512	45.0	76	453,182	0.55

Proposed Conditions - 1.06in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	0.97	414,189	35.0	97	414,079	0.82
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	0.91	110,283	50.0	14	110,271	0.42

Proposed Conditions - 1.43in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	1.38	592,334	35.0	138	592,177	1.17
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	1.32	161,045	50.0	21	161,028	0.62

Proposed Conditions - 2.60in

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
B		0.094	0.219	28.1	6.24	14.6	4.41	10.4	197	428,885	2.71	1,161,477	40.0	293	1,161,170	2.48
D		0.104	0.097	59.3	5.90	30.8	4.17	9.8	26	121,678	2.66	323,625	55.0	48	323,590	1.42

B6 Goldsmith Gulch Channel Improvements Memo

303.421.4224
www.LJA.com
1765 West 121st Avenue, Suite 300, Westminster, Colorado 80234

Memorandum

To: Douglas County Engineering

From: Hunter Teel, PE, CFM

Date: November 25, 2024

Re: Goldsmith Gulch Channel Improvements

As part of the Fields proposed single-family residential development project located in Douglas County, Colorado, the project proposes to improve Goldsmith Gulch in two separate sections. The Downstream section will improve from the downstream outfall of Pond B to the downstream property boundary, and the Upstream section will improve from the upstream most storm sewer outfall to the proposed Pond B downstream. These improvements include a series of small 1 foot drop structures and boulder cascades.

The purpose of this memo is to provide a hydraulic design addendum to the Phase III Drainage Report for Fields Filing No. 1 for the final design of the channel improvements to Goldsmith Gulch.

HYDROLOGY

The proposed hydrology for Goldsmith Gulch was analyzed in the Phase III Drainage Report for Fields Filing No. 1. For the Downstream section, the flows from the downstream design point D1 were used with Q_{100} as 180 cfs, Q_5 as 41 cfs, and Q_2 as 15 cfs, making 10% of the Q_{100} the controlling bankfull flow calculated at 18 cfs. For the Upstream section, the flows from the downstream design point CH1 were used with Q_{100} as 215 cfs, Q_5 as 61 cfs, and Q_2 as 37 cfs, making 70% of the Q_2 the controlling bankfull flow calculated at 26 cfs. These flows were utilized throughout the channel reaches for the hydraulic analysis below.

HYDRAULICS

Channel Design

The Douglas County Storm Drainage Design and Technical Criteria Manual and the Mile High Flood District (formerly known as UDFCD) Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3, were used as the drainage design criteria for the channel improvements. The natural longitudinal slope of the section of Goldsmith Gulch within the project area averages around 2.5%. Therefore, to best follow the MHFD maximum longitudinal slope guideline and to tie in the channel to the proposed pond, several various section types were selected for the improvements.

The established proposed improvements at the different sloped sections are small drop structures (1-foot drops with a 0.2% channel slope) and boulder cascades (6% slope). To simplify the design and constructability of the channel, it was determined that a single cross section size would be used for all the different sections. With the 0.2% section having the least possible conveyance capacity due to its slope, the typical cross section was sized based on both the bankfull flow and the Q_{100} using USACE

HEC-RAS version 6.2.

Using the typical channel cross section and the proposed sloped sections, the channel was designed through an iterative Civil3D design process. Once the Civil3D channel design was completed, the proposed channel grading was analyzed using HEC-RAS to confirm the channel's capacity and velocities. The water surface elevation and velocity results from the HEC-RAS analysis can be found in **Appendix A**. The 100-year floodplain for the proposed channel was delineated and is shown on the Goldsmith Gulch Channel Construction Plans.

Riprap Design

To adequately size the riprap for the boulder cascades, the NRCS Rock Chute Spreadsheet was utilized. The parameters in the spreadsheet were set to the largest 6% boulder cascade using the channel design parameters. A copy of this analysis is provided in **Appendix A**, demonstrating that Type M riprap (D_{50} of 12 inches) and an overall chute thickness of 24 inches is adequate.

CONCLUSION

This memo and the proposed channel improvements are in conformance with the Douglas County Storm Drainage Design and Technical Criteria Manual and is an addendum to the Phase III Drainage Report for Fields Filing No. 1. The proposed channel is designed to adequately convey the bankfull, 2-year, 5-year, and 100-year storm events.

The following enclosures accompany this memo report:

- Appendix A – Design Calculations
  - Summary of HEC-RAS Models
  - WSEL & Velocity Comparison
  - NRCS Rock Chute 6% Cascade Riprap Sizing

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CC: LJA– Kevin Lovelace, Colton Miskell, Dylan Hardy, Angus Tewnion

APPENDIX A

Summary of HEC-RAS Models			
Model Folder Name	**Plan Name**	**Plan/Geometry/Flow**	**Description**
HEC-RASv6.2	Proposed n=0.04 ND	Plan 02/Geo 02/Flow 02	Proposed Goldsmith Gulch capacity run with channel n value 0.04 and normal depth boundary condition.
	Proposed n=0.04 KnWSEL	Plan 03/Geo 02/Flow 03	Proposed Goldsmith Gulch capacity run with channel n value 0.04 and known water surface elevation boundary condition from Pond B.
	Proposed n=0.03 ND	Plan 01/Geo 01/Flow 02	Proposed Goldsmith Gulch velocity run with channel n value 0.03 and normal depth boundary condition.
	Proposed n=0.03 Mixed	Plan 04/Geo 01/Flow 02	Proposed Goldsmith Gulch velocity run with channel n value 0.03 and normal depth boundary condition ran in mixed flow regime.

WSEL & Velocity Comparison

Goldsmith Gulch HEC-RAS Output																			
River	Reach	River Station	Comments	Q Total (cfs)				Water Surface Elevation (ft)				Subcritical Velocity (ft/s)				Mixed Velocity (ft/s)			
				Bankfull	2-year	5-year	100-year	Bankfull	2-year	5-year	100-year	Bankfull	2-year	5-year	100-year	Bankfull	2-year	5-year	100-year
Goldsmith Gulch	Downstream	980	0.2% & 1' Drops	18	15	41	180	6331.49	6331.42	6331.88	6332.81	2.24	2.10	2.96	4.57	2.24	2.10	2.96	4.57
Goldsmith Gulch	Downstream	970	0.2% & 1' Drops	18	15	41	180	6331.41	6331.35	6331.79	6332.71	2.42	2.28	3.21	4.77	2.42	2.28	3.21	4.77
Goldsmith Gulch	Downstream	960	0.2% & 1' Drops	18	15	41	180	6331.14	6331.08	6331.44	6332.37	3.65	3.45	4.50	5.94	3.65	3.45	4.50	5.94
Goldsmith Gulch	Downstream	950	0.2% & 1' Drops	18	15	41	180	6330.49	6330.42	6330.89	6331.84	2.06	1.93	2.73	4.35	7.89	7.73	9.00	10.58
Goldsmith Gulch	Downstream	940	0.2% & 1' Drops	18	15	41	180	6330.45	6330.37	6330.84	6331.78	2.13	2.00	2.82	4.44	2.13	2.00	2.82	4.44
Goldsmith Gulch	Downstream	930	0.2% & 1' Drops	18	15	41	180	6330.39	6330.32	6330.78	6331.71	2.24	2.10	2.95	4.57	2.24	2.10	2.95	4.57
Goldsmith Gulch	Downstream	920	0.2% & 1' Drops	18	15	41	180	6330.31	6330.25	6330.69	6331.61	2.41	2.27	3.20	4.80	2.41	2.27	3.20	4.80
Goldsmith Gulch	Downstream	910	0.2% & 1' Drops	18	15	41	180	6330.03	6329.99	6330.35	6331.27	3.66	3.45	4.53	5.96	3.66	3.45	4.53	5.96
Goldsmith Gulch	Downstream	900	0.2% & 1' Drops	18	15	41	180	6329.39	6329.32	6329.79	6330.74	2.07	1.94	2.74	4.38	7.92	7.71	8.99	10.57
Goldsmith Gulch	Downstream	890	0.2% & 1' Drops	18	15	41	180	6329.35	6329.27	6329.74	6330.68	2.14	2.00	2.83	4.45	2.14	2.00	2.83	4.45
Goldsmith Gulch	Downstream	880	0.2% & 1' Drops	18	15	41	180	6329.29	6329.22	6329.68	6330.61	2.23	2.09	2.95	4.58	2.23	2.09	2.95	4.58
Goldsmith Gulch	Downstream	870	0.2% & 1' Drops	18	15	41	180	6329.21	6329.15	6329.59	6330.51	2.42	2.27	3.20	4.77	2.42	2.27	3.20	4.77
Goldsmith Gulch	Downstream	860	0.2% & 1' Drops	18	15	41	180	6328.94	6328.88	6329.25	6330.18	3.65	3.48	4.53	5.94	3.65	3.48	4.53	5.94
Goldsmith Gulch	Downstream	850	0.2% & 1' Drops	18	15	41	180	6328.29	6328.22	6328.69	6329.65	2.06	1.94	2.73	4.34	7.91	7.71	8.98	10.58
Goldsmith Gulch	Downstream	840	0.2% & 1' Drops	18	15	41	180	6328.25	6328.17	6328.64	6329.58	2.14	2.01	2.82	4.44	2.14	2.01	2.82	4.44
Goldsmith Gulch	Downstream	830	0.2% & 1' Drops	18	15	41	180	6328.19	6328.12	6328.58	6329.51	2.24	2.10	2.97	4.59	2.24	2.10	2.97	4.59
Goldsmith Gulch	Downstream	820	0.2% & 1' Drops	18	15	41	180	6328.11	6328.05	6328.48	6329.41	2.43	2.27	3.21	4.80	2.43	2.27	3.21	4.80
Goldsmith Gulch	Downstream	810	0.2% & 1' Drops	18	15	41	180	6327.84	6327.78	6328.15	6329.07	3.65	3.47	4.50	5.94	3.65	3.47	4.50	5.94
Goldsmith Gulch	Downstream	800	0.2% & 1' Drops	18	15	41	180	6327.19	6327.12	6327.59	6328.54	2.06	1.94	2.72	4.35	7.93	7.72	9.00	10.58
Goldsmith Gulch	Downstream	790	0.2% & 1' Drops	18	15	41	180	6327.14	6327.07	6327.54	6328.48	2.14	2.01	2.82	4.45	2.14	2.01	2.82	4.45
Goldsmith Gulch	Downstream	780	0.2% & 1' Drops	18	15	41	180	6327.09	6327.02	6327.48	6328.41	2.24	2.11	2.95	4.57	2.24	2.11	2.95	4.57
Goldsmith Gulch	Downstream	770	0.2% & 1' Drops	18	15	41	180	6327.01	6326.95	6327.39	6328.31	2.42	2.27	3.20	4.77	2.42	2.27	3.20	4.77
Goldsmith Gulch	Downstream	760	0.2% & 1' Drops	18	15	41	180	6326.74	6326.68	6327.05	6327.98	3.63	3.46	4.52	5.94	3.63	3.46	4.52	5.94
Goldsmith Gulch	Downstream	750	0.2% & 1' Drops	18	15	41	180	6326.09	6326.02	6326.50	6327.44	2.07	1.93	2.73	4.36	7.92	7.73	8.99	10.57
Goldsmith Gulch	Downstream	740	0.2% & 1' Drops	18	15	41	180	6326.04	6325.97	6326.44	6327.38	2.14	2.01	2.83	4.47	2.14	2.01	2.83	4.47
Goldsmith Gulch	Downstream	730	0.2% & 1' Drops	18	15	41	180	6325.99	6325.92	6326.38	6327.31	2.24	2.10	2.96	4.58	2.24	2.10	2.96	4.58
Goldsmith Gulch	Downstream	720	0.2% & 1' Drops	18	15	41	180	6325.91	6325.85	6326.29	6327.21	2.42	2.27	3.20	4.78	2.42	2.27	3.20	4.78
Goldsmith Gulch	Downstream	710	0.2% & 1' Drops	18	15	41	180	6325.64	6325.58	6325.95	6326.87	3.63	3.47	4.52	5.94	3.63	3.47	4.52	5.94
Goldsmith Gulch	Downstream	700	0.2% & 1' Drops	18	15	41	180	6325.00	6324.93	6325.40	6326.36	2.04	1.92	2.70	4.30	7.94	7.68	8.99	10.58
Goldsmith Gulch	Downstream	690	0.2% & 1' Drops	18	15	41	180	6324.96	6324.88	6325.35	6326.30	2.11	1.99	2.80	4.40	2.11	1.99	2.80	4.40
Goldsmith Gulch	Downstream	680	0.2% & 1' Drops	18	15	41	180	6324.90	6324.83	6325.29	6326.23	2.21	2.08	2.93	4.53	2.21	2.08	2.93	4.53
Goldsmith Gulch	Downstream	670	0.2% & 1' Drops	18	15	41	180	6324.83	6324.76	6325.21	6326.13	2.36	2.21	3.13	4.69	2.36	2.21	3.13	4.69
Goldsmith Gulch	Downstream	658	0.2% & 1' Drops	18	15	41	180	6324.54	6324.49	6324.85	6325.77	3.64	3.44	4.48	5.94	3.64	3.44	4.48	5.94
Goldsmith Gulch	Downstream	650	0.2% & 1' Drops	18	15	41	180	6324.02	6323.93	6324.42	6325.47	1.81	1.71	2.38	3.91	1.81	1.71	9.22	10.67
Goldsmith Gulch	Downstream	640	0.2% & 1' Drops	18	15	41	180	6323.99	6323.90	6324.39	6325.43	1.82	1.71	2.39	3.93	1.82	1.71	2.39	3.93
Goldsmith Gulch	Downstream	630	0.2% & 1' Drops	18	15	41	180	6323.96	6323.88	6324.37	6325.40	1.83	1.72	2.40	3.95	1.83	1.72	2.40	3.95
Goldsmith Gulch	Downstream	620	0.2% & 1' Drops	18	15	41	180	6323.94	6323.85	6324.34	6325.36	1.84	1.73	2.42	3.97	1.84	1.73	2.42	3.97
Goldsmith Gulch	Downstream	610	0.2% & 1' Drops	18	15	41	180	6323.91	6323.82	6324.31	6325.32	1.87	1.75	2.45	4.03	1.87	1.75	2.45	4.03
Goldsmith Gulch	Downstream	600	0.2% & 1' Drops	18	15	41	180	6323.88	6323.80	6324.28	6325.29	1.88	1.76	2.48	4.07	1.88	1.76	2.48	4.07
Goldsmith Gulch	Downstream	590	0.2% & 1' Drops	18	15	41	180	6323.85	6323.77	6324.25	6325.24	1.90	1.78	2.50	4.10	1.90	1.78	2.50	4.10
Goldsmith Gulch	Downstream	580	0.2% & 1' Drops	18	15	41	180	6323.81	6323.73	6324.22	6325.20	1.93	1.81	2.53	4.14	1.93	1.81	2.53	4.14
Goldsmith Gulch	Downstream	570	0.2% & 1' Drops	18	15	41	180	6323.78	6323.70	6324.18	6325.16	1.95	1.83	2.58	4.20	1.95	1.83	2.58	4.20
Goldsmith Gulch	Downstream	560	0.2% & 1' Drops	18	15	41	180	6323.74	6323.66	6324.15	6325.10	2.00	1.87	2.64	4.26	2.00	1.87	2.64	4.26
Goldsmith Gulch	Downstream	550	0.2% & 1' Drops	18	15	41	180	6323.70	6323.63	6324.10	6325.05	2.06	1.93	2.74	4.37	2.06	1.93	2.74	4.37
Goldsmith Gulch	Downstream	540	0.2% & 1' Drops	18	15	41	180	6323.65	6323.58	6324.05	6324.99	2.12	1.98	2.82	4.46	2.12	1.98	2.82	4.46
Goldsmith Gulch	Downstream	530	0.2% & 1' Drops	18	15	41	180	6323.60	6323.53	6323.99	6324.92	2.22	2.08	2.97	4.59	2.22	2.08	2.97	4.59
Goldsmith Gulch	Downstream	520	0.2% & 1' Drops	18	15	41	180	6323.53	6323.46	6323.90	6324.82	2.37	2.22	3.15	4.76	2.37	2.22	3.15	4.76
Goldsmith Gulch	Downstream	510	0.2% & 1' Drops	18	15	41	180	6323.41	6323.35	6323.77	6324.68	2.72	2.55	3.56	5.12	2.72	2.55	3.56	5.12
Goldsmith Gulch	Downstream	507	0.2% & 1' Drops	18	15	41	180	6323.23	6323.18	6323.55	6324.47	3.67	3.50	4.50	5.93	3.67	3.50	4.50	5.93
Goldsmith Gulch	Downstream	500	0.2% & 1' Drops	18	15	41	180	6322.72	6322.64	6323.13	6324.17	1.80	1.70	2.36	3.89	8.40	8.15	9.36	10.73
Goldsmith Gulch	Downstream	490	0.2% & 1' Drops	18	15	41	180	6322.69	6322.61	6323.10	6324.14	1.81	1.70	2.38	3.92	1.81	1.70	2.38	3.92
Goldsmith Gulch	Downstream	480	0.2% & 1' Drops	18	15	41	180	6322.67	6322.58	6323.07	6324.10	1.83	1.72	2.40	3.96	1.83	1.72	2.40	3.96
Goldsmith Gulch	Downstream	470	0.2% & 1' Drops	18	15	41	180	6322.64	6322.56	6323.05	6324.07	1.84	1.73	2.42	3.98	1.84	1.73	2.42	3.98
Goldsmith Gulch	Downstream	460	0.2% & 1' Drops	18	15	41	180	6322.61	6322.53	6323.02	6324.03	1.86	1.75	2.44	4.01	1.86	1.75	2.44	4.01
Goldsmith Gulch	Downstream	450	0.2% & 1' Drops	18	15	41	180	6322.58	6322.50	6322.99	6323.99	1.88	1.76	2.46	4.05	1.88	1.76	2.46	4.05
Goldsmith Gulch	Downstream	440	0.2% & 1' Drops	18	15	41	180	6322.55	6322.47	6322.96	6323.95	1.90	1.79	2.50	4.09	1.90	1.79	2.50	4.09
Goldsmith Gulch	Downstream	430	0.2% & 1' Drops	18	15	41	180	6322.52	6322.44	6322.92	6323.90	1.93	1.81	2.54	4.15	1.93	1.81	2.54	4.15
Goldsmith Gulch	Downstream	420	0.2% & 1' Drops	18	15	41	180	6322.48	6322.41	6322.89	6323.85	1.97	1.85	2.60	4.23	1.97	1.85	2.60	4.23
Goldsmith Gulch	Downstream	410	0.2% & 1' Drops	18	15	41	180	6322.44	6322.37	6322.85	6323.81	2.01	1.88	2.65	4.28	2.01	1.88	2.65	4.28
Goldsmith Gulch	Downstream	400	0.2% & 1' Drops	18	15	41	180	6322.40	6322.33	6322.81	6323.75	2.06	1.93	2.74	4.38	2.06	1.93	2.74	4.38
Goldsmith Gulch	Downstream	390	0.2% & 1' Drops	18	15	41	180	6322.36	6322.28	6322.76	6323.69	2.13	1.99	2.84	4.47	2.13	1.99	2.84	4.47
Goldsmith Gulch	Downstream	380	0.2% & 1' Drops	18	15	41	180	6322.30	6322.23	6322.69	6323.61	2.23	2.09	2.98	4.60	2.23	2.09	2.98	4.60
Goldsmith Gulch	Downstream	370	0.2% & 1' Drops	18	15	41	180	6322.23	6322.16	6322.61	6323.52	2.41	2.26	3.20	4.81	2.41	2.26	3.20	4.81
Goldsmith Gulch	Downstream	360	0.2% & 1' Drops	18	15	41	180	6322.10	6322.04	6322.45	6323.36	2.87	2.69	3.70	5.27	2.87	2.69	3.70	5.27
Goldsmith Gulch	Downstream	357	0.2% & 1' Drops	18	15	41	180	6321.94	6321.88	6322.25	6323.17	3.64	3.51	4.52	5.93	3.64	3.51	4.52	5.93
Goldsmith Gulch	Downstream	350	0.2% & 1' Drops	18	15	41	180	6321.30	6321.23	6321.71	6322.65	2.06	1.93	2.74	4.38	8.35	8.09	9.30	10.70
Goldsmith Gulch	Downstream	340	0.2% & 1' Drops	18	15	41	180	6321.26	6321.18	6321.65	6322.59	2.13	1.99	2.84	4.48	2.13	1.99	2.84	4.48
Goldsmith Gulch	Downstream	330	0.2% & 1' Drops	18	15	41	180	6321.20	6321.13	6321.59	6322.51	2.23	2.09	2.98	4.60	2.23	2.09	2.98	4.60
Goldsmith Gulch	Downstream	320	0.2% & 1' Drops	18	15	41	180	6321.12	6321.06	6321.50	6322.42	2.41	2.25	3.20	4.80	2.41	2.25	3.20	4.80
Goldsmith Gulch	Downstream	310	0.2% & 1' Drops	18	15	41	180	6320.99	6320.94	6321.35	6322.27	2.87	2.66	3.69	5.22	2.87	2.66	3.69	5.22
Goldsmith Gulch	Downstream	307	0.2% & 1' Drops	18	15	41	180	6320.84	6320.78	6321.15	6322.07	3.63	3.53	4.52	5.93	3.63	3.53	4.52	5.93
Goldsmith Gulch	Downstream	299	0.2% & 1' Drops	18	15	41	180	6320.22	6320.14	6320.62	6321.57	2.01	1.88	2.66	4.32	8.28	8.01	9.25	10.67
Goldsmith Gulch	Downstream	290	0.2% & 1' Drops	18	15	41	180	6320.17	6320.10	6320.57	6321.52	2.09	1.96	2.76	4.39	2.09	1.96	2.76	4.39
Goldsmith Gulch	Downstream	280	0.2% & 1' Drops	18	15	41	180	6320.12	6320.05	6320.52	6321.45	2.16	2.03	2.87	4.51	2.16	2.03	2.87	4.51
Goldsmith Gulch	Downstream	270	0.2% & 1' Drops	18	15	41	180	6320.06	6319.99	6320.45	6321.38	2.28	2.14	3.02	4.64	2.28	2.14	3.02	4.64
Goldsmith Gulch	Downstream	260	0.2% & 1' Drops	18	15	41	180	6319.98	6319.91	6320.34	6321.27	2.51	2.35	3.30	4.86	2.51	2.35	3.30	4.86
Goldsmith Gulch	Downstream	252	0.2% & 1' Drops	18	15	41	180	6319.72	6319.67	6320.04	6320.96	3.65	3.49	4.51	5.94	3.65	3.49	4.51	5.94
Goldsmith Gulch	Downstream	249	0.2% & 1' Drops	18	15	41	180	6319.27	6319.18	6319.68	6320.91	1.71	1.62	2.26	3.56	1.71	8.68	9.73	3.56
Goldsmith Gulch	Downstream	240	0.2% & 1' Drops	18	15	41	180	6319.25	6319.17	6319.66	6320.89	1.72	1.63	2.27	3.56	1.72	1.63	2.27	3.56
Goldsmith Gulch	Downstream	230	0.2% & 1' Drops	18	15	41	180	6319.23	6319.15	6319.64	6320.87	1.72	1.63	2.27	3.56	1.72	1.63	2.26	3.56
Goldsmith Gulch	Downstream	220	0.2% & 1' Drops	18	15	41	180	6319.21	6319.13	6319.62	6320.85	1.72	1.63	2.26	3.55	1.72	1.63	2.26	3.55
Goldsmith Gulch	Downstream	210	0.2% & 1' Drops	18	15	41	180	6319.20	6319.11	6319.60	6320.83	1.71	1.62	2.26	3.56	1.71	1.62	2.26	3.56
Goldsmith Gulch	Downstream	200	0.2% & 1' Drops	18	15	41	180	6319.17	6319.09	6319.58	6320.81	1.72	1.63	2.26	3.55	1.72	1.63	2.26	3.55
Goldsmith Gulch	Downstream	190	0.2% & 1' Drops	18	15	41	180	6319.16	6319.07	6319.56	6320.79	1.71	1.62	2.26	3.56	1.71	1.62	2.26	3.56
Goldsmith Gulch	Downstream	180	0.2% & 1' Drops	18	15	41	180	6319.13	6319.05	6319.54	6320.77	1.71	1.62	2.26	3.56	1.71	1.62	2.26	3.56

WSEL & Velocity Comparison

Goldsmith Gulch HEC-RAS Output																			
River	Reach	River Station	Comments	Q Total (cfs)				Water Surface Elevation (ft)				Subcritical Velocity (ft/s)				Mixed Velocity (ft/s)			
				Bankfull	2-year	5-year	100-year	Bankfull	2-year	5-year	100-year	Bankfull	2-year	5-year	100-year	Bankfull	2-year	5-year	100-year
Goldsmith Gulch	Upstream	1620	6% Cascade	26	37	61	215	6389.57	6389.73	6389.89	6390.39	3.57	3.29	3.74	5.60	5.54	3.29	7.02	10.40
Goldsmith Gulch	Upstream	1590	6% Cascade	26	37	61	215	6387.59	6387.74	6387.99	6388.86	4.05	4.40	5.02	6.21	6.19	10.03	7.76	10.41
Goldsmith Gulch	Upstream	1570	6% Cascade	26	37	61	215	6386.39	6386.54	6386.79	6387.64	4.07	4.39	4.99	6.30	6.16	6.43	8.13	11.46
Goldsmith Gulch	Upstream	1560	6% Cascade	26	37	61	215	6385.79	6385.93	6386.19	6387.03	4.01	4.43	4.91	6.30	6.22	6.90	8.14	11.75
Goldsmith Gulch	Upstream	1550	6% Cascade	26	37	61	215	6385.21	6385.35	6385.59	6386.55	3.99	4.40	4.90	6.31	6.14	6.91	8.07	11.90
Goldsmith Gulch	Upstream	1540	6% Cascade	26	37	61	215	6385.27	6385.45	6385.74	6386.65	2.05	2.28	2.54	4.18	2.05	2.28	2.54	11.49
Goldsmith Gulch	Upstream	1530	6% Cascade	26	37	61	215	6385.23	6385.41	6385.70	6386.60	2.14	2.39	2.64	4.31	2.14	2.39	2.64	4.31
Goldsmith Gulch	Upstream	1520	6% Cascade	26	37	61	215	6385.19	6385.37	6385.66	6386.54	2.25	2.53	2.75	4.46	2.25	2.53	2.75	4.46
Goldsmith Gulch	Upstream	1510	6% Cascade	26	37	61	215	6385.13	6385.31	6385.61	6386.46	2.40	2.71	2.89	4.65	2.40	2.71	2.89	4.65
Goldsmith Gulch	Upstream	1500	6% Cascade	26	37	61	215	6385.05	6385.22	6385.54	6386.36	2.65	2.97	3.13	4.94	2.65	2.97	3.13	4.94
Goldsmith Gulch	Upstream	1490	6% Cascade	26	37	61	215	6384.75	6384.88	6385.14	6385.98	4.02	4.46	4.96	6.29	4.02	4.46	4.96	6.29
Goldsmith Gulch	Upstream	1480	6% Cascade	26	37	61	215	6384.28	6384.42	6384.67	6385.52	4.02	4.43	4.94	6.28	6.10	6.58	7.37	9.04
Goldsmith Gulch	Upstream	1470	6% Cascade	26	37	61	215	6383.68	6383.82	6384.09	6384.92	4.04	4.42	4.95	6.31	6.17	6.87	7.88	10.22
Goldsmith Gulch	Upstream	1460	6% Cascade	26	37	61	215	6383.08	6383.22	6383.48	6384.30	3.99	4.43	4.90	6.30	6.19	6.93	8.04	10.96
Goldsmith Gulch	Upstream	1450	6% Cascade	26	37	61	215	6382.48	6382.63	6382.87	6383.73	4.07	4.38	4.97	6.32	6.16	6.92	8.06	11.28
Goldsmith Gulch	Upstream	1440	6% Cascade	26	37	61	215	6381.88	6382.02	6382.30	6383.12	4.02	4.43	4.88	6.26	6.17	6.97	8.10	11.58
Goldsmith Gulch	Upstream	1430	6% Cascade	26	37	61	215	6381.28	6381.42	6381.68	6382.52	4.03	4.39	4.90	6.28	6.21	6.94	8.14	11.79
Goldsmith Gulch	Upstream	1420	6% Cascade	26	37	61	215	6380.67	6380.82	6381.08	6381.92	4.05	4.39	5.01	6.30	6.21	6.94	8.14	11.92
Goldsmith Gulch	Upstream	1410	6% Cascade	26	37	61	215	6380.45	6380.62	6380.90	6381.79	2.57	2.90	3.29	4.88	2.57	6.94	8.14	12.00
Goldsmith Gulch	Upstream	1400	6% Cascade	26	37	61	215	6380.42	6380.60	6380.88	6381.76	2.23	2.51	2.77	4.45	2.23	2.51	2.77	10.23
Goldsmith Gulch	Upstream	1390	6% Cascade	26	37	61	215	6380.37	6380.55	6380.83	6381.69	2.36	2.68	2.92	4.65	2.36	2.68	2.92	4.65
Goldsmith Gulch	Upstream	1380	6% Cascade	26	37	61	215	6380.30	6380.47	6380.77	6381.60	2.57	2.91	3.15	4.92	2.57	2.91	3.15	4.92
Goldsmith Gulch	Upstream	1370	6% Cascade	26	37	61	215	6380.20	6380.36	6380.67	6381.46	3.00	3.35	3.65	5.64	3.00	3.35	3.65	5.64
Goldsmith Gulch	Upstream	1360	6% Cascade	26	37	61	215	6379.89	6380.03	6380.28	6381.13	4.01	4.39	4.96	6.29	4.01	4.39	4.96	6.29
Goldsmith Gulch	Upstream	1350	6% Cascade	26	37	61	215	6379.28	6379.43	6379.69	6380.52	4.08	4.39	4.97	6.29	6.75	7.24	7.92	9.56
Goldsmith Gulch	Upstream	1340	6% Cascade	26	37	61	215	6378.69	6378.83	6379.10	6379.93	4.04	4.40	4.97	6.29	6.02	6.89	8.04	10.49
Goldsmith Gulch	Upstream	1330	6% Cascade	26	37	61	215	6378.09	6378.23	6378.49	6379.33	4.04	4.43	4.99	6.30	6.18	6.96	8.07	11.08
Goldsmith Gulch	Upstream	1320	6% Cascade	26	37	61	215	6377.49	6377.62	6377.88	6378.72	4.01	4.46	4.99	6.24	6.16	6.91	8.07	11.41
Goldsmith Gulch	Upstream	1310	6% Cascade	26	37	61	215	6376.89	6377.03	6377.28	6378.12	4.01	4.43	4.96	6.27	6.19	6.89	8.13	11.67
Goldsmith Gulch	Upstream	1300	6% Cascade	26	37	61	215	6376.29	6376.44	6376.74	6377.50	4.01	4.37	4.51	6.20	6.20	6.94	8.13	11.74
Goldsmith Gulch	Upstream	1290	6% Cascade	26	37	61	215	6375.69	6375.83	6376.08	6376.94	4.01	4.40	5.03	6.28	6.20	6.91	8.14	11.80
Goldsmith Gulch	Upstream	1280	6% Cascade	26	37	61	215	6375.09	6375.23	6375.48	6376.33	4.01	4.39	4.87	6.31	6.20	6.90	8.12	11.96
Goldsmith Gulch	Upstream	1270	6% Cascade	26	37	61	215	6374.49	6374.63	6374.89	6375.72	4.01	4.41	4.96	6.30	6.20	6.95	8.12	12.03
Goldsmith Gulch	Upstream	1260	6% Cascade	26	37	61	215	6373.89	6374.03	6374.30	6375.12	4.03	4.39	4.95	6.29	6.20	6.93	8.13	12.09
Goldsmith Gulch	Upstream	1250	6% Cascade	26	37	61	215	6373.78	6373.95	6374.23	6375.15	2.19	2.46	2.83	4.48	2.19	2.46	2.83	12.04
Goldsmith Gulch	Upstream	1240	6% Cascade	26	37	61	215	6373.75	6373.93	6374.20	6375.11	2.13	2.40	2.74	4.45	2.13	2.40	2.74	9.93
Goldsmith Gulch	Upstream	1230	6% Cascade	26	37	61	215	6373.72	6373.89	6374.17	6375.07	2.16	2.44	2.77	4.45	2.16	2.44	2.77	4.45
Goldsmith Gulch	Upstream	1220	0.2% & 1' Drops	26	37	61	215	6373.68	6373.86	6374.13	6375.01	2.20	2.48	2.80	4.64	2.20	2.48	2.80	4.64
Goldsmith Gulch	Upstream	1210	0.2% & 1' Drops	26	37	61	215	6373.65	6373.82	6374.10	6374.96	2.24	2.52	2.83	4.68	2.24	2.52	2.83	4.68
Goldsmith Gulch	Upstream	1200	0.2% & 1' Drops	26	37	61	215	6373.61	6373.78	6374.06	6374.89	2.28	2.58	2.87	4.79	2.28	2.58	2.87	4.79
Goldsmith Gulch	Upstream	1190	0.2% & 1' Drops	26	37	61	215	6373.56	6373.74	6374.02	6374.82	2.35	2.65	2.93	4.95	2.35	2.65	2.93	4.95
Goldsmith Gulch	Upstream	1180	0.2% & 1' Drops	26	37	61	215	6373.51	6373.69	6373.97	6374.74	2.43	2.74	2.98	5.12	2.43	2.74	2.98	5.12
Goldsmith Gulch	Upstream	1170	0.2% & 1' Drops	26	37	61	215	6373.45	6373.62	6373.91	6374.69	2.54	2.87	3.07	4.85	2.54	2.87	3.07	4.85
Goldsmith Gulch	Upstream	1160	0.2% & 1' Drops	26	37	61	215	6373.36	6373.53	6373.84	6374.61	2.74	3.08	3.25	4.91	2.74	3.08	3.25	4.91
Goldsmith Gulch	Upstream	1150	0.2% & 1' Drops	26	37	61	215	6373.06	6373.20	6373.47	6374.29	4.03	4.43	4.97	5.99	4.03	4.43	4.97	5.99
Goldsmith Gulch	Upstream	1149	0.2% & 1' Drops	26	37	61	215	6372.50	6372.68	6372.96	6373.84	2.30	2.60	2.88	4.56	9.53	9.85	10.33	11.18
Goldsmith Gulch	Upstream	1140	0.2% & 1' Drops	26	37	61	215	6372.46	6372.64	6372.92	6373.80	2.35	2.66	2.94	4.58	2.35	2.66	2.94	4.58
Goldsmith Gulch	Upstream	1130	0.2% & 1' Drops	26	37	61	215	6372.41	6372.58	6372.87	6373.74	2.43	2.75	2.98	4.67	2.43	2.75	2.98	4.67
Goldsmith Gulch	Upstream	1120	0.2% & 1' Drops	26	37	61	215	6372.35	6372.52	6372.82	6373.66	2.54	2.87	3.07	4.83	2.54	2.87	3.07	4.83
Goldsmith Gulch	Upstream	1110	0.2% & 1' Drops	26	37	61	215	6372.26	6372.43	6372.74	6373.56	2.74	3.09	3.24	5.05	2.74	3.09	3.24	5.05
Goldsmith Gulch	Upstream	1100	0.2% & 1' Drops	26	37	61	215	6371.96	6372.10	6372.36	6373.20	4.04	4.38	5.00	6.27	4.04	4.38	5.00	6.27
Goldsmith Gulch	Upstream	1099	0.2% & 1' Drops	26	37	61	215	6371.40	6371.58	6371.85	6372.75	2.31	2.60	2.88	4.62	9.54	9.86	10.33	11.38
Goldsmith Gulch	Upstream	1090	0.2% & 1' Drops	26	37	61	215	6371.36	6371.54	6371.82	6372.69	2.35	2.65	2.92	4.70	2.35	2.65	2.92	9.43
Goldsmith Gulch	Upstream	1080	0.2% & 1' Drops	26	37	61	215	6371.31	6371.48	6371.77	6372.63	2.43	2.74	2.99	4.81	2.43	2.74	2.99	4.81
Goldsmith Gulch	Upstream	1070	0.2% & 1' Drops	26	37	61	215	6371.24	6371.42	6371.71	6372.55	2.54	2.87	3.06	4.92	2.54	2.87	3.06	4.92
Goldsmith Gulch	Upstream	1060	0.2% & 1' Drops	26	37	61	215	6371.16	6371.33	6371.64	6372.44	2.75	3.09	3.25	5.20	2.75	3.09	3.25	5.20
Goldsmith Gulch	Upstream	1050	0.2% & 1' Drops	26	37	61	215	6370.86	6371.00	6371.26	6372.10	4.01	4.38	4.99	6.24	4.01	4.38	4.99	6.24
Goldsmith Gulch	Upstream	1049	0.2% & 1' Drops	26	37	61	215	6370.30	6370.48	6370.75	6371.64	2.30	2.60	2.88	4.64	9.55	9.87	10.36	11.38
Goldsmith Gulch	Upstream	1040	0.2% & 1' Drops	26	37	61	215	6370.26	6370.44	6370.72	6371.59	2.35	2.66	2.93	4.74	2.35	2.66	2.93	9.40
Goldsmith Gulch	Upstream	1030	0.2% & 1' Drops	26	37	61	215	6370.21	6370.38	6370.67	6371.52	2.43	2.75	3.00	4.85	2.43	2.75	3.00	4.85
Goldsmith Gulch	Upstream	1020	0.2% & 1' Drops	26	37	61	215	6370.14	6370.32	6370.61	6371.44	2.55	2.88	3.08	5.02	2.55	2.88	3.08	5.02
Goldsmith Gulch	Upstream	1010	0.2% & 1' Drops	26	37	61	215	6370.06	6370.23	6370.54	6371.34	2.75	3.10	3.26	5.15	2.75	3.10	3.26	5.15
Goldsmith Gulch	Upstream	1000	0.2% & 1' Drops	26	37	61	215	6369.76	6369.90	6370.16	6371.00	4.02	4.39	4.97	6.22	4.02	4.39	4.97	6.22
Goldsmith Gulch	Upstream	999	0.2% & 1' Drops	26	37	61	215	6369.20	6369.38	6369.65	6370.48	2.31	2.60	2.89	4.79	9.57	9.88	10.36	11.36
Goldsmith Gulch	Upstream	990	0.2% & 1' Drops	26	37	61	215	6369.16	6369.34	6369.61	6370.44	2.36	2.66	2.92	4.64	2.36	2.66	2.92	9.42
Goldsmith Gulch	Upstream	980	0.2% & 1' Drops	26	37	61	215	6369.10	6369.28	6369.57	6370.40	2.44	2.76	3.00	4.50	2.44	2.76	3.00	4.50
Goldsmith Gulch	Upstream	970	0.2% & 1' Drops	26	37	61	215	6369.04	6369.21	6369.51	6370.34	2.57	2.89	3.10	4.57	2.57	2.89	3.10	4.57
Goldsmith Gulch	Upstream	960	0.2% & 1' Drops	26	37	61	215	6368.95	6369.12	6369.43	6370.24	2.78	3.11	3.28	4.80	2.78	3.11	3.28	4.80
Goldsmith Gulch	Upstream	951	0.2% & 1' Drops	26	37	61	215	6368.66	6368.80	6369.06	6369.92	4.00	4.41	4.98	6.00	4.00	4.41	4.98	6.00
Goldsmith Gulch	Upstream	949	0.2% & 1' Drops	26	37	61	215	6368.10	6368.28	6368.56	6369.45	2.30	2.59	2.88	4.59	9.47	9.79	10.28	11.25
Goldsmith Gulch	Upstream	940	0.2% & 1' Drops	26	37	61	215	6368.06	6368.24	6368.52	6369.40	2.35	2.65	2.92	4.65	2.35	2.65	2.92	4.65
Goldsmith Gulch	Upstream	930	0.2% & 1' Drops	26	37	61	215	6368.01	6368.19	6368.47	6369.33	2.43	2.74	2.99	4.80	2.43	2.74	2.99	4.80
Goldsmith Gulch	Upstream	920	0.2% & 1' Drops	26	37	61	215	6367.95	6368.12	6368.42	6369.25	2.54	2.87	3.08	4.96	2.54	2.87	3.08	4.96
Goldsmith Gulch	Upstream	910	0.2% & 1' Drops	26	37	61	215	6367.86	6368.03	6368.34	6369.14	2.74	3.08	3.25	5.23	2.74	3.08	3.25	5.23
Goldsmith Gulch	Upstream	900	0.2% & 1' Drops	26	37	61	215	6367.56	6367.70	6367.95	6368.80	4.02	4.41	4.98	6.24	4.02	4.41	4.98	6.24
Goldsmith Gulch	Upstream	899	0.2% & 1' Drops	26	37	61	215	6367.00	6367.18	6367.46	6368.34	2.29	2.59	2.88	4.65	9.58	9.88	10.37	11.38
Goldsmith Gulch	Upstream	890	0.2% & 1' Drops	26	37	61	215	6366.96	6367.14	6367.42	6368.28	2.35	2.66	2.93	4.71	2.35	2.66	2.93	9.41
Goldsmith Gulch	Upstream	880	0.2% & 1' Drops	26	37	61	215	6366.91	6367.09	6367.37	6368.22	2.43	2.75	2.99	4.77	2.43	2.75	2.99	4.77
Goldsmith Gulch	Upstream	870	0.2% & 1' Drops	26	37	61	215	6366.84	6367.02	6367.32	6368.14	2.54	2.87	3.08	4.96	2.54	2.87	3.08	4.96
Goldsmith Gulch	Upstream	860	0.2% & 1' Drops	26	37	61	215	6366.76	6366.93	6367.25	6368.02	2.75	3.09	3.25	5.27	2.75	3.09	3.25	5.27
Goldsmith Gulch	Upstream	850	0.2% & 1' Drops	26	37	61	215	6366.46	6366.60	6366.84	6367.72	4.02	4.42	4.96	6.16	4.02	4.42	4.96	6.16
Goldsmith Gulch	Upstream	849	0.2% & 1' Drops	26	37	61	215	6365.90	6366.08	6366.35	6367.17	2.29	2.59	2.90	5.01	9.59	9.89	10.37	11.34
Goldsmith Gulch	Upstream	840	0.2% & 1' Drops	26	37	61	215	6365.86	6366.04	6366.31	6367.12	2.35	2.65	2.93	4.98	2.35	2.65	2.93	9.36
Goldsmith Gulch	Upstream	830	0.2% & 1' Drops	26	37	61	215	6365.81	6365.99	6366.27	6367.05	2.43	2.75	2.99	5.07	2.43	2.75	2.99	5.07
Goldsmith Gulch	Upstream	820	0.2% & 1' Drops	26	37	61	215	6365.75	6365.92	6366.21	6366.95	2.55	2.87	3.07	5.36	2.55	2.87	3.07	5.36
Goldsmith Gulch	Upstream	810	0.2% & 1' Drops	26	37	61	215	6365.66	6365.83	6366.14	6366.87	2.75	3.10	3.26	5.32	2.75	3.10	3.26	5.32
Goldsmith Gulch	Upstream	800	0.2% & 1' Drops	26	37	61	215	6365.36	6365.50	6365.76	6366.58	4.01	4.40	4.97	5.99	4.01	4.40	4.97	5.99
Goldsmith Gulch	Upstream	799	0.2% & 1' Drops	26	37	61	215	6364.80	6364.98	6365.25	6366.09	2.30	2.60	2.90	4.79	9.60	9.90	10.37	11.13
Goldsmith Gulch	Upstream	790	0.2% & 1' Drops	26	37	61	215	6364.76	6364.94	6365.22	6366.05	2.34	2.64	2.90	4.64	2.34	2.64	2.90	9.21
Goldsmith Gulch	Upstream	780	0.2% & 1' Drops	26	37	61	215	6364.71	6364.89	6365.17	6366.00	2.43	2.74	2.95	4.59	2.43	2.74	2.95	4.59
Goldsmith Gulch	Upstream	770	0.2% & 1' Drops	26	37	61	215	6364.65	6364.82	6365.12	6365.93	2.54	2.87	3.06	4.68	2.54	2.87	3.06	4.68
Goldsmith Gulch	Upstream	760	0.2% & 1' Drops	26	37	61	215	6364.56	6364.73	6365.04	6365.83	2.74	3.08	3.25	4.90	2.74	3.08	3.25	4.90
Goldsmith Gulch	Upstream	750	0.2% & 1' Drops	26	37	61	215	6364.26	6364.40	6364.66	6365.49	4.03	4.42	4.97	6.14	4.03	4.42	4.97	6.14
Goldsmith Gulch	Upstream	749	0.2% & 1' Drops	26	37	61	215	6363.70	6363.88	6364.15	6365.03	2.30	2.60	2.89	4.65	9.57	9.89	10.37	11.27
Goldsmith Gulch	Upstream	740	0.2% & 1' Drops	26	37	61	215	6363.66	6363.83	6364.11	6364.97	2.36	2.67	2.95	4.80	2.36	2.67	2.95	9.28
Goldsmith Gulch	Upstream	730	0.2% & 1' Drops	26	37	61	215	6363.60	6363.78	6364.06	6364.90	2.45	2.77	3.02	4.93	2.45	2.77	3.02	4.93
Goldsmith Gulch	Upstream	720	0.2% & 1' Drops	26	37	61	215	6363.54	6363.71	6364.01	6364.82	2.57	2.90	3.11	5.08	2.57	2.90	3.11	5.08
Goldsmith Gulch	Upstream	710	0.2% & 1' Drops	26	37	61	215	6363.45	6363.62	6363.93	6364.69	2.79	3.14	3.31	5.52	2.79	3.14	3.31	5.52
Goldsmith Gulch	Upstream	701	0.2% & 1' Drops	26	37	61	215	6363.16	6363.30	6363.56	6364.39	4.04	4.39	4.97	6.24	4.04	4.39	4.97	6.24
Goldsmith Gulch	Upstream	698	0.2% & 1' Drops	26	37	61	215	6362.60	6362.77	6363.05	6363.81	2.31	2.61	2.94	5.26	9.30	9.67	10.17	11.19
Goldsmith Gulch	Upstream	690	0.2% & 1' Drops	26	37	61	215	6362.56	6362.74	6363.02	6363.77	2.35	2.65	2.93	5.12	2.35	2.65	2.93	9.45
Goldsmith Gulch	Upstream	680	0.2% & 1' Drops	26	37	61	215	6362.51	6362.68	6362.97	6363.70	2.43	2.75	2.99	5.14	2.43	2.75	2.99	5.14
Goldsmith Gulch	Upstream	670	0.2% & 1' Drops	26	37	61	215	6362.45	6362.62	6362.91	6363.61	2.55	2.88	3.09	5.36	2.55	2.88	3.09	5.36
Goldsmith Gulch	Upstream	660	0.2% & 1' Drops	26	37	61	215	6362.36	6362.53	6362.84	6363.51	2.74	3.08	3.26	5.72	2.74	3.08	3.26	5.72
Goldsmith Gulch	Upstream	650	0.2% & 1' Drops	26	37	61	215	6362.05	6362.20	6362.46	6363.29	4.05	4.40	4.94	5.72	4.05	4.40	4.94	5.72
Goldsmith Gulch	Upstream	649	0.2% & 1' Drops	26	37	61	215	6361.50	6361.68	6361.95	6362.73	2.31	2.60	2.89	4.78	9.46	9.80	10.29	10.99
Goldsmith Gulch	Upstream	640	0.2% & 1' Drops	26	37	61	215	6361.46	6361.64	6361.92	6362.71	2.35	2.65	2.86	4.41	2.35	2.65	2.86	9.32
Goldsmith Gulch	Upstream	630	0.2% & 1' Drops	26	37	61	215	6361.41	6361.59	6361.88	6362.66	2.42	2.73	2.92	4.40	2.42	2.73	2.92	4.40
Goldsmith Gulch	Upstream	620	0.2% & 1' Drops	26	37	61	215	6361.35	6361.52	6361.82	6362.60	2.54	2.87	3.05	4.42	2.54	2.87	3.05	4.42
Goldsmith Gulch	Upstream	610	0.2% & 1' Drops	26	37	61	215	6361.26	6361.43	6361.75	6362.52	2.74	3.09	3.26	4.59	2.74	3.09	3.26	4.59
Goldsmith Gulch	Upstream	600	0.2% & 1' Drops	26	37	61	215	6360.96	6361.10	6361.35	6362.19	4.03	4.39	4.91	5.94	4.03	4.39	4.91	5.94
Goldsmith Gulch	Upstream	590	6% Cascade	26	37	61	215	6360.37	6360.51	6360.77	6361.62	4.04	4.40	4.93	6.19	6.69	7.23	7.90	9.13
Goldsmith Gulch	Upstream	580	6% Cascade	26	37	61	215	6359.76	6359.91	6360.16	6361.00	4.05	4.39	4.91	6.26	6.02	6.88	8.04	10.35
Goldsmith Gulch	Upstream	570	6% Cascade	26	37	61	215	6359.17	6359.31	6359.56	6360.40	4.01	4.39	4.94	6.26	6.18	6.94	8.06	10.99
Goldsmith Gulch	Upstream	560	6% Cascade	26	37	61	215	6358.57	6358.72	6358.96	6359.80	4.00	4.37	4.98	6.30	6.16	6.93	8.07	11.38
Goldsmith Gulch	Upstream	550	6% Cascade	26	37	61	215	6358.28	6358.45	6358.73	6359.63	2.79	3.12	3.54	5.10	6.19	6.95	8.07	11.62
Goldsmith Gulch	Upstream	540	6% Cascade	26	37	61	215	6358.26	6358.44	6358.73	6359.62	2.14	2.39	2.63	4.33	2.14	2.39	2.63	10.26
Goldsmith Gulch	Upstream	530	6% Cascade	26	37	61	215	6358.21	6358.39	6358.69	6359.56	2.25	2.53	2.73	4.46	2.25	2.53	2.73	4.46
Goldsmith Gulch	Upstream	520	6% Cascade	26	37	61	215	6358.16	6358.33	6358.64	6359.49	2.40	2.70	2.87	4.65	2.40	2.70	2.87	4.65
Goldsmith Gulch	Upstream	510	6% Cascade	26	37	61	215	6358.08	6358.25	6358.57	6359.39	2.64	2.98	3.11	4.92	2.64	2.98	3.11	4.92
Goldsmith Gulch	Upstream	500	6% Cascade	26	37	61	215	6357.78	6357.93	6358.18	6359.01	4.03	4.37	4.95	6.31	4.03	4.37	4.95	6.31
Goldsmith Gulch	Upstream	490	6% Cascade	26	37	61	215	6357.36	6357.51	6357.77	6358.60	4.08	4.42	4.95	6.28	5.79	6.29	6.99	8.74
Goldsmith Gulch	Upstream	480	6% Cascade	26	37	61	215	6356.76	6356.90	6357.17	6358.02	4.05	4.46	4.96	6.17	6.18	6.85	7.80	10.13
Goldsmith Gulch	Upstream	470	6% Cascade	26	37	61	215	6356.16	6356.31	6356.56	6357.41	4.08	4.43	4.95	6.19	6.19	6.91	8.04	10.86
Goldsmith Gulch	Upstream	460	6% Cascade	26	37	61	215	6355.60	6355.76	6355.97	6356.80	4.03	4.39	4.93	6.20	6.20	6.90	8.12	11.32
Goldsmith Gulch	Upstream	450	6% Cascade	26	37	61	215	6355.64	6355.82	6356.10	6356.88	2.14	2.39	2.59	4.31	2.14	2.39	2.59	11.05
Goldsmith Gulch	Upstream	440	6% Cascade	26	37	61	215	6355.60	6355.78	6356.06	6356.83	2.25	2.53	2.67	4.27	2.25	2.53	2.67	4.27
Goldsmith Gulch	Upstream	430	6% Cascade	26	37	61	215	6355.54	6355.71	6356.01	6356.77	2.40	2.71	2.81	4.37	2.40	2.71	2.81	4.37
Goldsmith Gulch	Upstream	420	6% Cascade	26	37	61	215	6355.46	6355.63	6355.93	6356.69	2.65	2.99	3.12	4.60	2.65	2.99	3.12	4.60
Goldsmith Gulch	Upstream	410	6% Cascade	26	37	61	215	6355.29	6355.44	6355.71	6356.39	4.04	4.38	5.03	5.83	4.04	4.38	5.03	5.83
Goldsmith Gulch	Upstream	400	6% Cascade	26	37	61	215	6354.98	6355.12	6355.37	6356.21	4.01	4.40	4.97	5.93	4.03	4.77	5.49	6.83
Goldsmith Gulch	Upstream	390	6% Cascade	26	37	61	215	6354.37	6354.52	6354.78	6355.61	4.06	4.39	4.89	6.08	6.73	7.10	7.76	9.37
Goldsmith Gulch	Upstream	380	6% Cascade	26	37	61	215	6353.78	6353.91	6354.18	6355.01	4.03	4.46	4.96	6.27	6.01	6.88	7.98	10.40
Goldsmith Gulch	Upstream	370	6% Cascade	26	37	61	215	6353.18	6353.32	6353.57	6354.41	4.02	4.42	5.00	6.30	6.17	6.94	8.06	11.02
Goldsmith Gulch	Upstream	360	6% Cascade	26	37	61	215	6352.57	6352.72	6352.98	6353.81	4.05	4.41	4.91	6.28	6.15	6.93	8.09	11.43
Goldsmith Gulch	Upstream	350	6% Cascade	26	37	61	215	6351.97	6352.11	6352.38	6353.20	4.04	4.40	4.82	6.21	6.21	6.99	8.13	11.67
Goldsmith Gulch	Upstream	340	6% Cascade	26	37	61	215	6351.37	6351.51	6351.78	6352.61	4.04	4.42	4.92	6.26	6.17	6.87	8.10	11.75
Goldsmith Gulch	Upstream	330	6% Cascade	26	37	61	215	6350.77	6350.92	6351.17	6352.01	4.01	4.38	4.88	6.28	6.17	6.96	8.10	11.88
Goldsmith Gulch	Upstream	320	6% Cascade	26	37	61	215	6350.17	6350.31	6350.57	6351.40	4.02	4.39	4.98	6.27	6.23	6.96	8.14	11.98
Goldsmith Gulch	Upstream	310	6% Cascade	26	37	61	215	6349.57	6349.71	6349.97	6350.80	4.04	4.43	5.03	6.27	6.15	6.91	8.09	12.06
Goldsmith Gulch	Upstream	300	6% Cascade	26	37	61	215	6348.97	6349.11	6349.38	6350.99	4.03	4.39	4.85	6.26	6.20	6.95	8.12	12.02
Goldsmith Gulch	Upstream	290	6% Cascade	26	37	61	215	6348.58	6348.75	6349.12	6351.03	3.30	3.60	4.53	6.21	6.19	6.95	8.13	12.00
Goldsmith Gulch	Upstream	280	6% Cascade	26	37	61	215	6348.56	6348.74	6349.14	6351.04	2.20	2.47	2.75	4.32	2.20	2.47	2.75	10.97
Goldsmith Gulch	Upstream	270	6% Cascade	26	37	61	215	6348.50	6348.68	6349.12	6351.03	2.32	2.62	2.87	4.35	2.32	2.62	2.87	4.35
Goldsmith Gulch	Upstream	260	6% Cascade	26	37	61	215	6348.42	6348.59	6349.08	6351.02	2.51	2.82	3.09	4.55	2.51	2.82	3.09	4.55
Goldsmith Gulch	Upstream	250	6% Cascade	26	37	61	215	6348.13	6348.26	6349.04	6351.01	2.85	3.16	3.79	5.53	2.85	3.16	3.79	5.53

Rock Chute Design Data

(Version WI-July-2010, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Fields **County:** Douglas
Designer: HT **Checked by:** AT
Date: September 24, 2024 **Date:** 09/24/24

Input Geometry:

Upstream Channel		Chute		Downstream Channel	
Bw =	8.0 ft.	Bw =	8.0 ft.	Bw =	8.0 ft.
Side slopes =	4.0 (m:1)	Factor of safety =	1.50 (F_s) 1.2 Min	Side slopes =	4.0 (m:1)
Velocity n-value =	0.030	Side slopes =	4.0 (m:1) → 2.0:1 max.	Velocity n-value =	0.030
Bed slope =	0.0020 ft./ft.	Bed slope (16.7:1) =	0.060 ft./ft → 3.0:1 max.	Bed slope =	0.0020 ft./ft.
		Freeboard =	1.0 ft.		
		Outlet apron depth, d =	1.0 ft.	Base flow =	0.0 cfs

Note: n value = a) velocity n from waterway program or b) computed mannings n for channel

Design Storm Data (Table 2, FOTG, WI-NRCS Grade Stabilization Structure No. 410):

Apron elev. --- Inlet = 6379.3 ft. ------- Outlet 6372.6 ft. --- (H_{drop} = 5.7 ft.)

Note: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.

Q_{high} = Runoff from design storm capacity from Table 2, FOTG Standard 410

Q_5 = Runofff from a 5-year,24-hour storm.

***Input tailwater (Tw)*:** 0.06 1.50

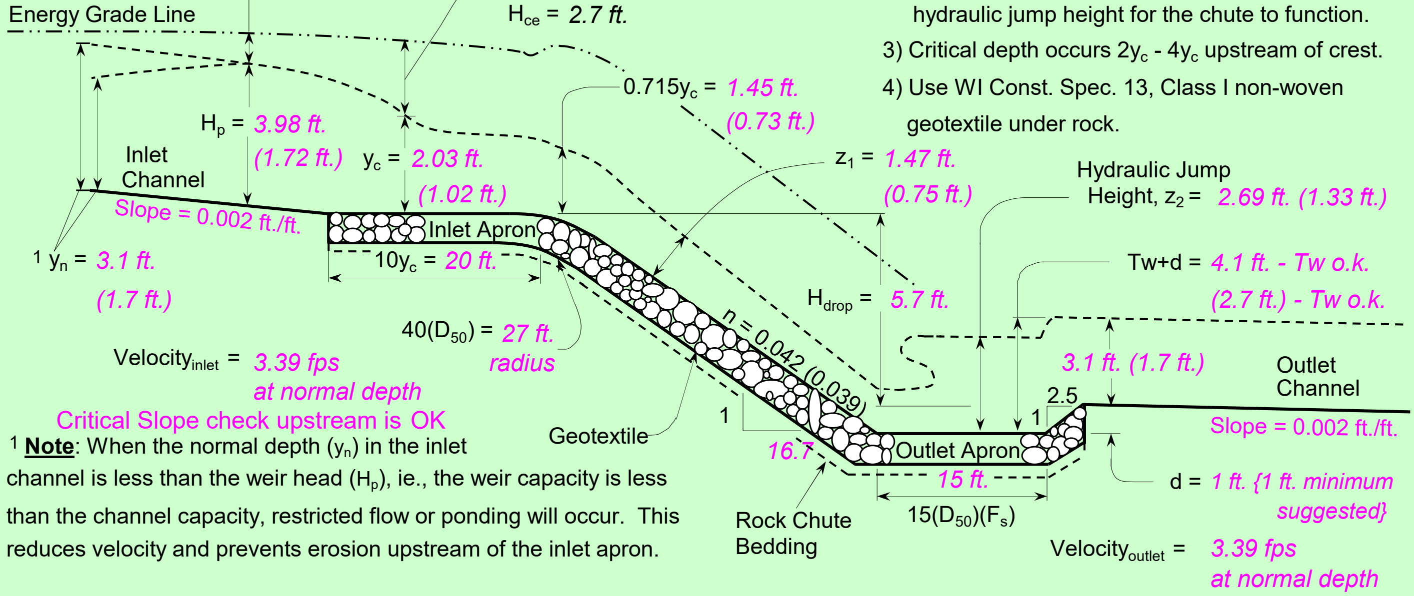
Q_{high} = 215.0 cfs High flow storm through chute → Tw (ft.) = Program

Q_5 = 61.0 cfs Low flow storm through chute → Tw (ft.) = Program

Profile and Cross Section (Output):

Starting Station = 0+00.0

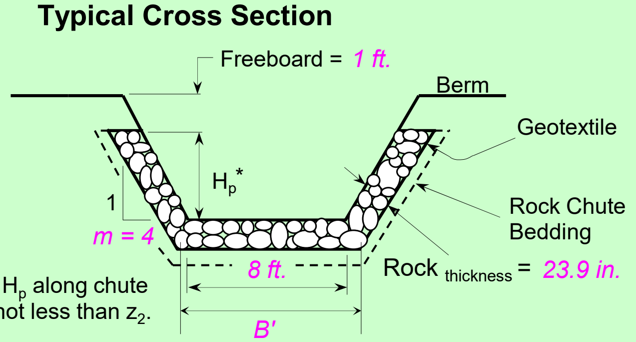
Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs $2y_c$ - $4y_c$ upstream of crest.
4) Use WI Const. Spec. 13, Class I non-woven geotextile under rock.



[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute

Typical Cross Section



* Use H_p along chute but not less than z_2.

	16.37 cfs/ft.	Equivalent unit discharge
F_S =	1.50	Factor of safety (multiplier)
z_1 =	1.47 ft.	Normal depth in chute
n-value =	0.042	Manning's roughness coefficient
$D_{50}(F_s)$ =	12 in.	Minimum Design D50*
$2(D_{50})(F_s)$ =	23.9 in.	Rock chute thickness
Tw + d =	4.1 ft.	Tailwater above outlet apron
z_2 =	2.69 ft.	Hydraulic jump height
***** The outlet**	**will**	***function adequately***

High Flow Storm Information

Appendix C. Referenced Information

C1 Soil Map

United States Department of Agriculture

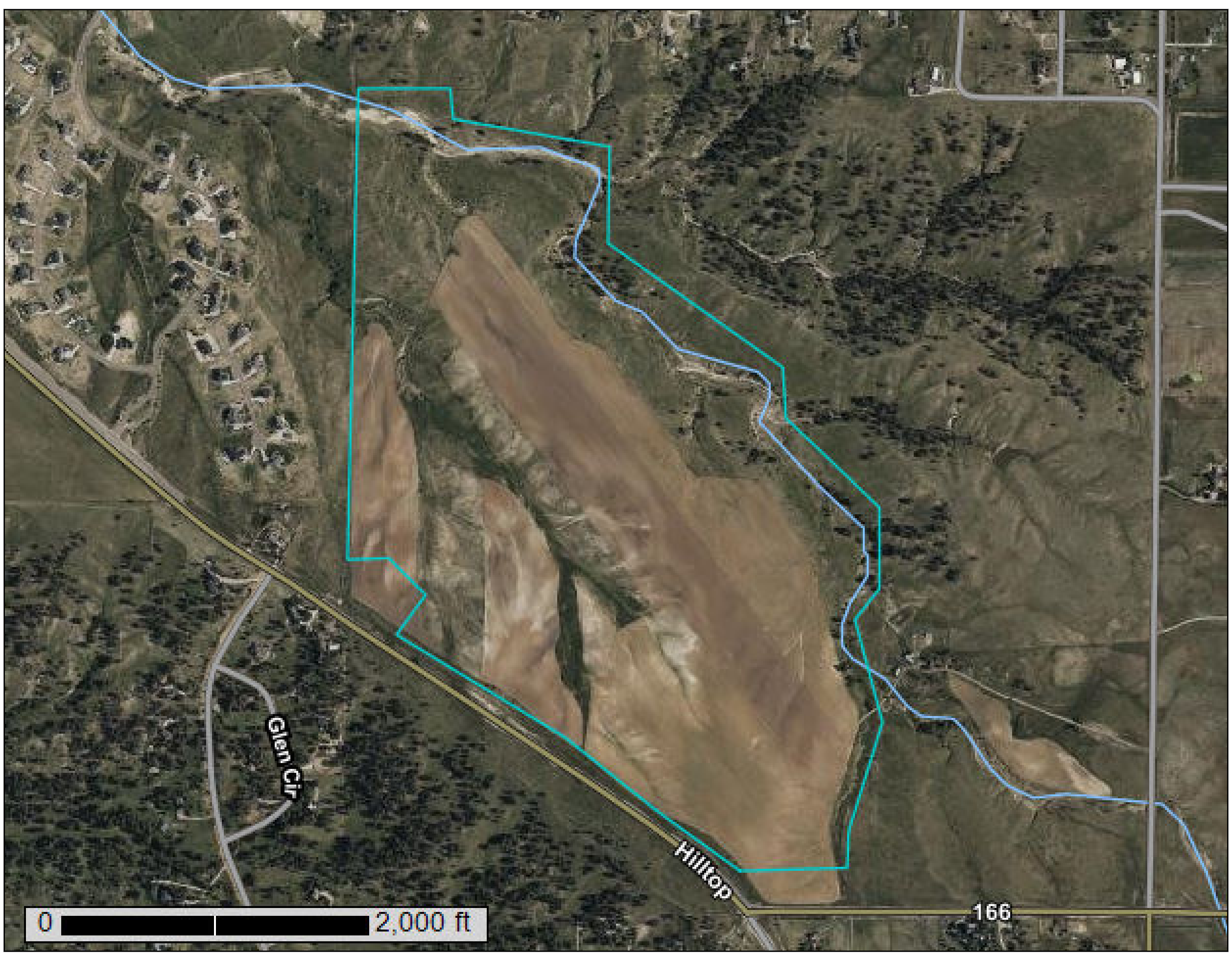
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Castle Rock Area, Colorado



May 2, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

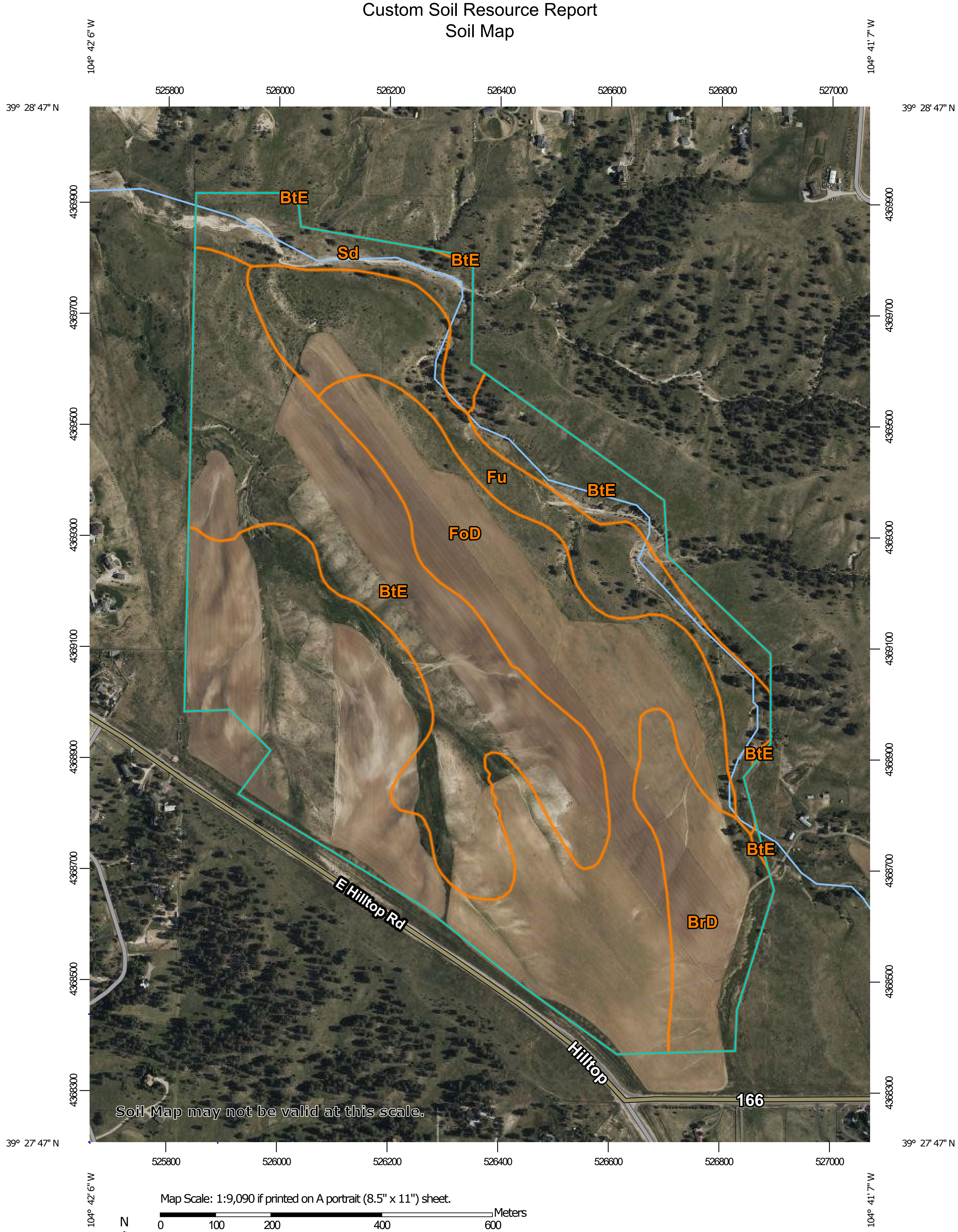
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:9,090 if printed on A portrait (8.5" x 11") sheet.

N

0 100 200 400 600 Meters

0 400 800 1600 2400 Feet

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 16, Aug 24, 2023

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
BrD	Bresser sandy loam, cool, 5 to 9 percent slopes	20.8	7.9%
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	77.9	29.4%
FoD	Fondis clay loam, 3 to 9 percent slopes	119.0	45.0%
Fu	Fondis-Kutch association	33.3	12.6%
Sd	Sandy alluvial land	13.4	5.1%
Totals for Area of Interest		**264.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Castle Rock Area, Colorado

BrD—Bresser sandy loam, cool, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2tlpk
Elevation: 5,500 to 6,960 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 100 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Bresser, cool, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bresser, Cool

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Tertiary aged alluvium derived from arkose

Typical profile

Ap - 0 to 5 inches: sandy loam
Bt1 - 5 to 8 inches: sandy loam
Bt2 - 8 to 27 inches: sandy clay loam
Bt3 - 27 to 36 inches: sandy loam
C - 36 to 80 inches: loamy coarse sand

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Ascalon

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Truckton

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

BtE—Bresser-Truckton sandy loams, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: jqy9
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Bresser and similar soils: 50 percent
Truckton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bresser

Setting

Landform: Terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 30 inches: sandy clay loam

H3 - 30 to 60 inches: loamy sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Description of Truckton

Setting

Landform: Terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkosic sedimentary rock

Typical profile

H1 - 0 to 4 inches: sandy loam
H2 - 4 to 19 inches: sandy loam
H3 - 19 to 60 inches: sandy loam

Properties and qualities

Slope: 10 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Newlin

Percent of map unit: 5 percent

Hydric soil rating: No

Blakeland

Percent of map unit: 5 percent
Hydric soil rating: No

Stapleton

Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

FoD—Fondis clay loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: jqyp
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Fondis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting

Landform: Mesas, buttes, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R049XB208CO - Clayey Foothill
Hydric soil rating: No

Minor Components

Kutch
Percent of map unit: 5 percent
Hydric soil rating: No

Englewood
Percent of map unit: 5 percent
Hydric soil rating: No

Denver
Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Fu—Fondis-Kutch association

Map Unit Setting
National map unit symbol: jqyq
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Fondis and similar soils: 50 percent
Kutch and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting
Landform: Valley sides, draws

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R049XB208CO - Clayey Foothill
Hydric soil rating: No

Description of Kutch

Setting

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-textured residuum weathered from calcareous shale

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 32 inches: clay
H3 - 32 to 36 inches: weathered bedrock

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R049XB208CO - Clayey Foothill
Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 5 percent
Hydric soil rating: No

Newlin

Percent of map unit: 5 percent
Hydric soil rating: No

Hilly gravelly land

Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Sd—Sandy alluvial land

Map Unit Setting

National map unit symbol: jr03
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Sandy alluvial land: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandy Alluvial Land

Setting

Landform: Drainageways, swales
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered alluvium derived from arkose

Typical profile

H1 - 0 to 20 inches: loamy sand
H2 - 20 to 60 inches: stratified sand to sandy loam

Properties and qualities

Slope: 1 to 5 percent
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: Frequent
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Loamy alluvial land

Percent of map unit: 8 percent
Hydric soil rating: No

Loamy alluvial land, dark surface

Percent of map unit: 8 percent
Hydric soil rating: No

Bresser

Percent of map unit: 4 percent
Hydric soil rating: No

Truckton

Percent of map unit: 4 percent
Hydric soil rating: No

Fluvaquentic haplustolls

Percent of map unit: 1 percent
Landform: Terraces
Hydric soil rating: Yes

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C2 FEMA FIRM

NOTES TO USERS

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

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

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 13. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane 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 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. An average offset between NAVD 88 and the National Geodetic Vertical Datum of 1929 (NGVD 29) has been computed for each Douglas County flooding source. This offset was then applied to the NGVD 29 flood elevations that were not revised during the creation of this countywide format FIRM. The offsets for each flooding source shown on this FIRM are shown in the Douglas County Vertical Datum Offset Table below. 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:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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. For information about additional control points maintained by Douglas County, please visit http://www.publicstaging.douglas.co.us/website/control/viewer.htm.

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 2003.

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 in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. 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.

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

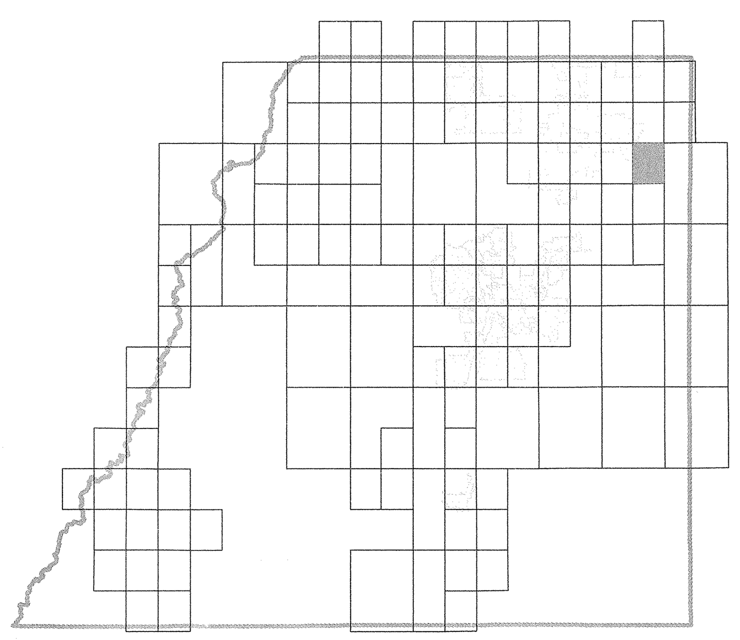
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

Douglas County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Baldwin Gulch	3.10	Newlin Gulch	3.14
Bayou Gulch	3.22	Plum Creek, Cross Section A to D	3.12
Big Dry Creek Tributary C	3.15	Section 34 Tributary	3.62
Carpenter Creek	3.93	Sellers Gulch	3.43
Cherry Creek, Cross Section BZ to CU	3.23	Sellers Gulch, Unnamed Tributary	3.39
East Plum Creek, Cross Section W to AY	3.26	Sulphur Gulch	3.13
East Plum Creek, Cross Section AZ to CZ	3.49	Tallman Gulch	3.16
East Plum Creek, Cross Section DA to EM	3.71	West Plum Creek, Cross Section W to AM	3.68
Glade Gulch	3.65		
Happy Canyon Creek	3.12		

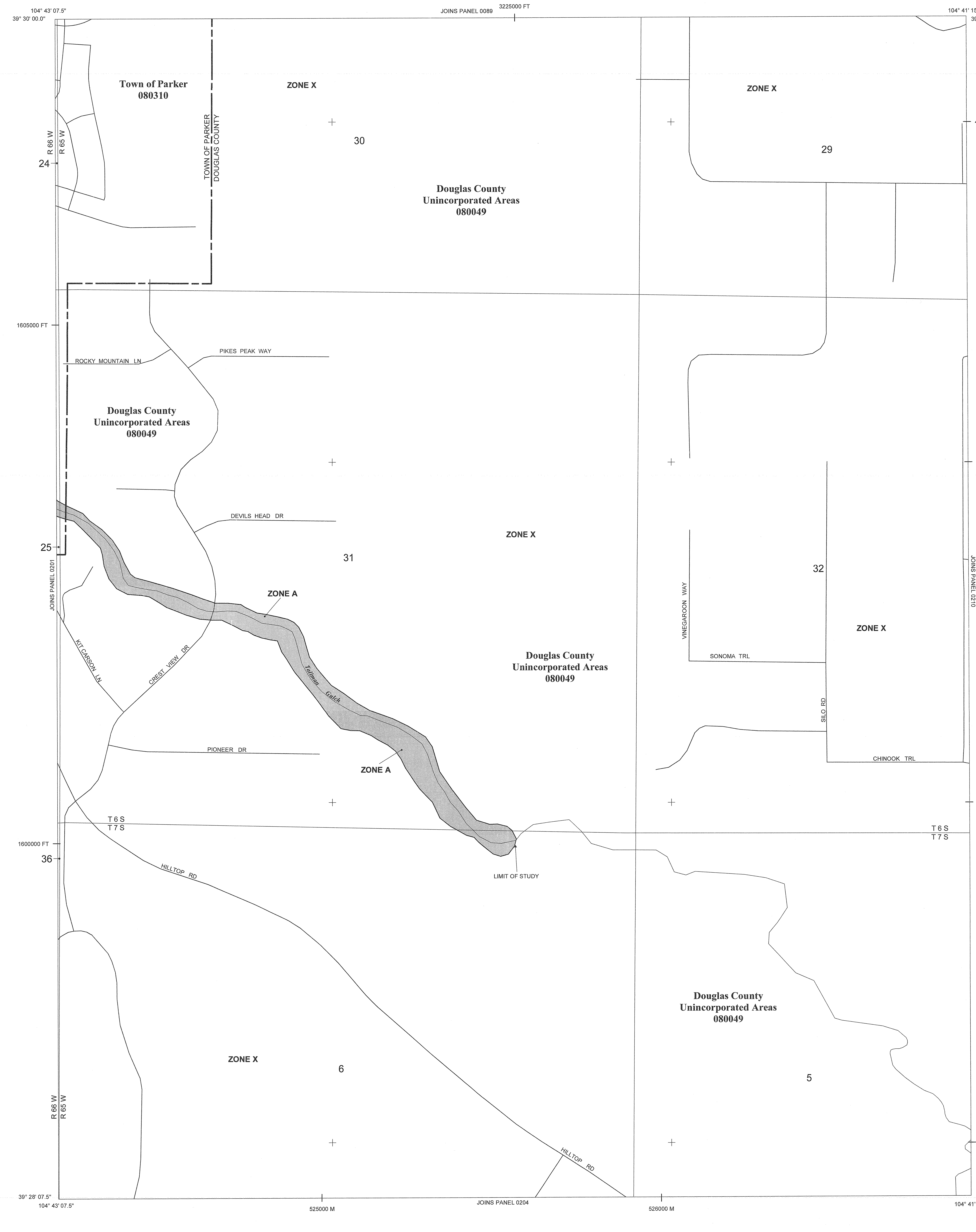
Example: To convert Baldwin Gulch elevations to NAVD 88, 3.10 feet were added to the NGVD 29 elevations.

Panel Location Map



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

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



LEGEND

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

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

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

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.

Floodplain boundary
Floodway boundary
Zone D 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
104° 50' 37.5" , 39° 30' 00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4276000 M	1000-meter Universal Transverse Mercator grid ticks, zone 13
3180000 FT	5000-foot ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 502), Lambert Conformal Conic projection
× KK6400	National Geodetic Survey bench mark (see explanation in Notes to Users section of this FIRM panel

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 30, 2005

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

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0202F

FIRM
FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 202 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
DOUGLAS COUNTY	080049	0202	F
PARKER, TOWN OF	080310	0202	F

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
08035C0202F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTES TO USERS

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

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

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 13. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane 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 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. An average offset between NAVD 88 and the National Geodetic Vertical Datum of 1929 (NGVD 29) has been computed for each Douglas County flooding source. This offset was then applied to the NGVD 29 flood elevations that were not revised during the creation of this countywide format FIRM. The offsets for each flooding source shown on this FIRM are shown in the Douglas County Vertical Datum Offset Table below. 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:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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. For information about additional control points maintained by Douglas County, please visit http://www.publicstaging.douglas.co.us/website/control/viewer.htm.

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 2003.

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 in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. 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.

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

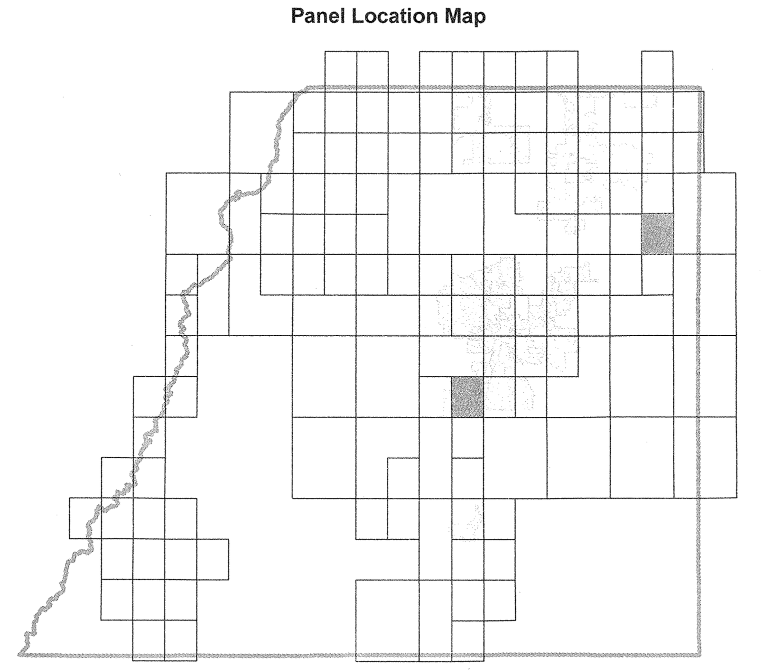
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

Douglas County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Baldwin Gulch	3.10	Newlin Gulch	3.14
Bayou Gulch	3.22	Plum Creek, Cross Section A to D	3.12
Big Dry Creek Tributary C	3.15	Section 34 Tributary	3.62
Carpenter Creek	3.93	Sellers Gulch	3.43
Cherry Creek, Cross Section BZ to CU	3.23	Sellers Gulch, Unnamed Tributary	3.39
East Plum Creek, Cross Section W to AY	3.26	Sulphur Gulch	3.13
East Plum Creek, Cross Section AZ to CZ	3.49	Tallman Gulch	3.16
East Plum Creek, Cross Section DA to EM	3.71	West Plum Creek, Cross Section W to AM	3.68
Glade Gulch	3.65		
Happy Canyon Creek	3.12		

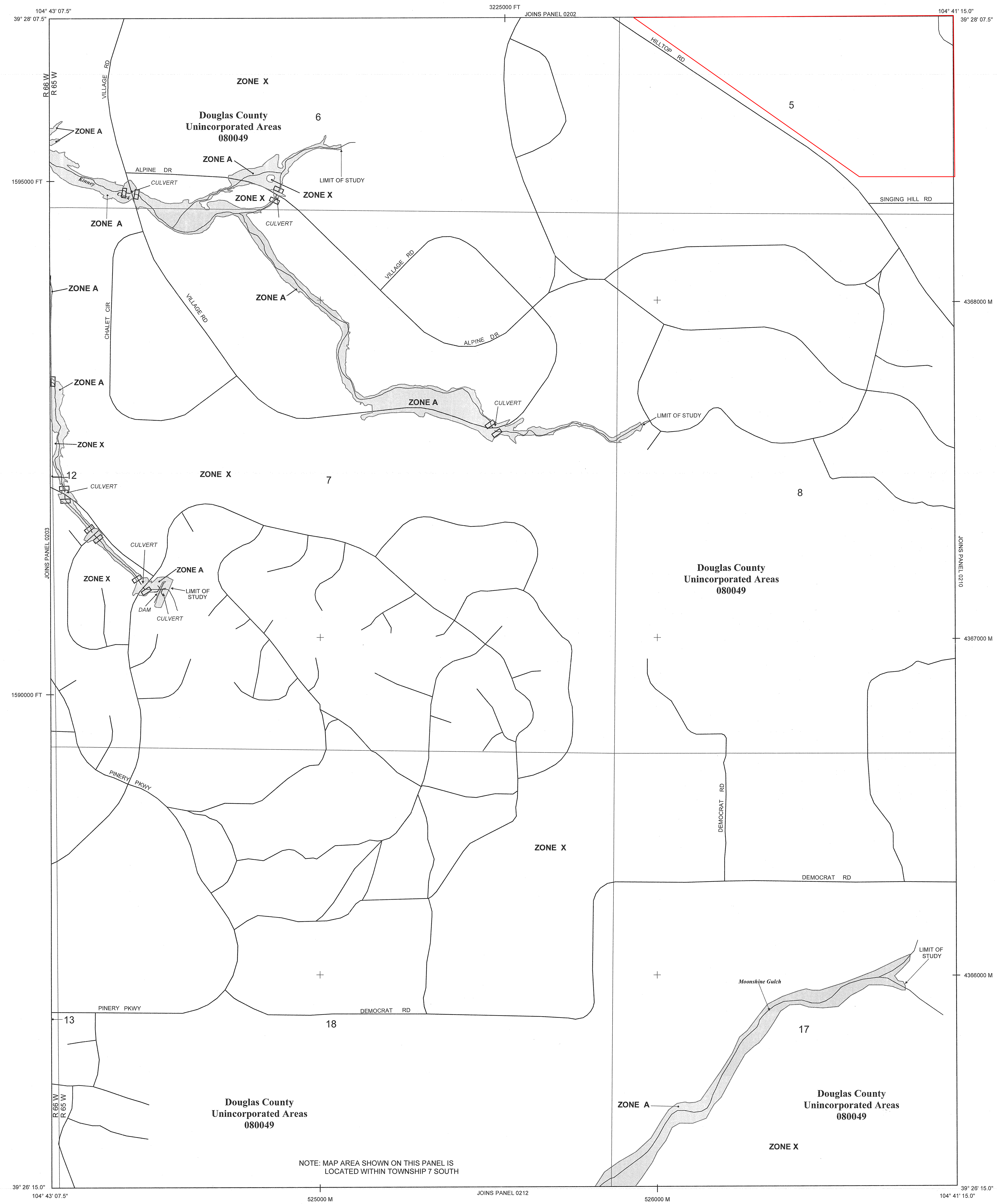
Example: To convert Baldwin Gulch elevations to NAVD 88, 3.10 feet were added to the NGVD 29 elevations.

Panel Location Map



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

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



LEGEND

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

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

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

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.

Floodplain boundary

Floodway boundary

Zone D 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

104° 50' 37.5" , 39° 30' 00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

4276000 M — 1000-meter Universal Transverse Mercator grid ticks, zone 13

3180000 FT — 5000-foot ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 502), Lambert Conformal Conic projection

KK6400 — National Geodetic Survey bench mark (see explanation in Notes to Users section of this FIRM panel

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 30, 2005

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

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0204F

FIRM
FLOOD INSURANCE RATE MAP
DOUGLAS COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 204 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
DOUGLAS COUNTY	080049	0204	F

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
08035C0204F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

Federal Emergency Management Agency

C3 Douglas County Criteria

DOUGLAS COUNTY
COLORADO

STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA MANUAL

AMENDED JULY 8, 2008

PREPARED IN COOPERATION WITH

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

ARAPAHOE COUNTY

TOWN OF CASTLE ROCK

CITY OF LONE TREE

CITY OF CENTENNIAL

AND MULLER ENGINEERING

Chapter. Table 6-1 indicates the one-hour design point rainfall values for each zone.

Zone 1 includes the area from the Douglas/Elbert County line west to the base of the foothills. **Zone 2** includes the area from the base of the foothills west to the South Platte River drainage basin line. **Zone 3** includes the area from the South Platte River drainage basin line west to the Douglas/Jefferson County line.

TABLE 6-1
1-HOUR POINT RAINFALL VALUES FOR DOUGLAS COUNTY (INCHES)

	2- YR	5-YR	10-YR	50-YR	100-YR
ZONE 1	1.06	1.43	1.66	2.26	2.60
ZONE 2	0.98	1.32	1.53	2.07	2.34
ZONE 3	0.72	1.05	1.26	1.78	2.05

If the watershed(s) for a specific project site lies within multiple rainfall zones, runoff calculations shall be based upon the rainfall data from the zone with the greatest precipitation depth. If the watershed is divided into smaller sub-watersheds, the rainfall depth that shall be used is from the zone where the majority of the sub-watershed area is located.

6.1.2 Intensity-Duration Curves. Rainfall intensity based on storm duration for a variety of storm return periods and for the three rainfall zones are shown in Figures 6-2, 6-3, and 6-4, respectively. These curves were developed using distribution factors provided in the NOAA Atlas and also provided in Table RA-4 of the *UDFCD Manual*.

6.1.3 Six-hour Rainfall. In order to use the Colorado Urban Hydrograph Procedure (CUHP), 2-, 3- or 6-hour rainfall distributions are required, depending on watershed area. Table RA-1 in the *UDFCD Manual* summarizes storm durations, area adjustments, and incremental rainfall depths to be used in CUHP based on watershed area. The UD-Raincurve Spreadsheet included in the *UDFCD Manual* shall be used to generate the rainfall distribution curves necessary for a CUHP model. In order to generate these distribution curves, the 1-hour and 6-hour rainfall depths for the design return periods are necessary. Since not all of Douglas County is located within UDFCD boundaries, the rainfall depth-duration-frequency curves provided in the *UDFCD Manual* do not provide rainfall values for the entire County. Therefore these values are provided in these *Criteria*. The 1-hour point values can be found in Table 6-1 of this chapter. The 6-hour point values are as follows:

TABLE 12-4
ROUGHNESS COEFFICIENTS

Channel Type	Roughness Coefficient (n) Minimum	Typical	Maximum
Natural Streams (top width at flood stage <100 feet)			
1. Streams on Plain			
a. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. Same as above, but more stones and weeds	0.030	0.035	0.040
c. Clean, winding, some pools and shoals	0.033	0.040	0.045
d. Same as above, but some weeds and stones	0.035	0.045	0.050
e. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. Same as c, but more stones	0.045	0.050	0.060
g. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain Streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages	see Jarrett's equation*		
a. Bottom: gravels, cobbles, and few boulders			
b. Bottom: cobbles with large boulders			
Major Streams (top width at flood stage > 100 feet)			
1. Regular section with no boulders or brush	0.025		0.060
2. Irregular and rough section	0.035		0.100
Grass Areas **	**Flow Depth = 0.1-1.5 ft		Flow Depth > 3.0 ft
1. Bermuda grass, buffalo grass, Kentucky bluegrass			
a. Mowed to 2 inches	0.035		0.030
b. Length = 4 to 6 inches	0.040		0.030
2. Good Stand, any grass			
a. Length = 12 inches	0.070		0.035
b. Length = 24 inches	0.100		0.035
3. Fair Stand, any grass			
a. Length = 12 inches	0.060		0.035
b. Length = 24 inches	0.070		0.035

*Jarrett's equation: $n = 0.39\, S_f^{\,0.38} R^{-0.16}$, where S_f equals friction slope and R equals the hydraulic radius.
** The n values shown for the Grassed Channel at the 0.1-1.5 ft depths represent average values for this depth range. Actual n values vary significantly within this depth range. For more information see the *Handbook of Channel Design for Soil and Water Conservation (SCS, 1954.)*

C4 Email Correspondence

July 30, 2024

Mr. Evan Fischgrund, P.E.
Regional Engineer, Southwest Region
Advanced Drainage Systems, Inc.
6800 Smith Road
Denver, CO 80207

Subject: Extension of Conditional Approval for Trial Period of Advanced Drainage Systems, Inc. HP Storm Polypropylene Pipe for Storm Drainage Applications in Unincorporated Douglas County

Dear Mr. Fischgrund:

Douglas County has agreed to administratively grant an extension to the Trial Period for ADS HP Storm Pipe applications within Douglas County. The Trial period will now run to **May 18, 2026,** instead of May 18, 2024.

Douglas County will allow the limited use of polypropylene pipe for storm sewer applications within the public Right-of-Way as an alternative to reinforced concrete pipe (RCP) for a trial period of two years. Douglas County currently requires that RCP be used within public easements and right-of-way, as outlined in Section 9.2.1 of the Douglas County Storm Drainage Design and Technical Criteria Manual. The following conditions and requirements will apply to the trial period:

- The use of polypropylene pipe for storm sewer applications will be limited to local and collector roadway classifications.
- Polypropylene pipe ranging in diameter form 18-inch to 60-inch will be allowed.
- Conformance with the following standards and/or specifications:
    - ASTM F2881 – Standard Specification for 12-to-60-inch (300 t0 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.
    - ASTM D2321 – Underground Installation for Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
    - ASTM F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

- ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- Colorado Department of Transportation (CDOT) Standard Plan M-603-4, Sheet 2

- Minimum and maximum pipe cover shall be based on CDOT M-603-4, Sheet 2.

- The minimum cover specified on CDOT M-603-4, Sheet 2, is based on the pipe strength and required installation and bedding conditions. The required minimum depth will likely be determined during the construction drawing review process and based on hydraulics and keeping the pipe a minimum depth below the pavement section. The pavement section includes surface material, base course, depth of moisture treatment and compaction, or excavation and replacement of subgrade material to mitigate for swelling soils.

- Transition to RCP at an upstream manhole prior to surface outfalls into detention facilities, open channels, swales, etc.

- Water-stop gasket/band at all inlets, manholes, or structure connections.

- Douglas County will require that deflection testing by use of a mandrel be completed by the contractor or an independent agency, approved by Douglas County, and paid for by the contractor or owner/developer. Deflection testing shall be done prior to paving and not less than thirty days after installation. The maximum allowable deflection shall not exceed 5% during the testing. Pipes 36-inch in diameter and larger may be entered and deflection levels measured directly. This allows for specific equipment such as Go/No Go sticks, cut to 95% of the inside diameter. If using a mandrel, it shall be a nine (or greater odd number) arm mandrel and shall be sized and inspected by the Douglas County Engineering Inspector prior to testing.

- Pipe through which the mandrel does not pass will be considered unacceptable, shall be re-laid, and then retested consistent with the testing requirements.

- Douglas County will require video inspection be completed by the contractor or an independent agency, approved by Douglas County, and paid for by the contractor or owner/developer. Video inspection will be required prior to initial and final warranty acceptance. Additional mandrel testing may be required if areas of concern are identified during the video inspection.

- Douglas County will require the contractor to coordinate with ADS representatives regarding on-site preconstruction consultation and site visits during construction. When Douglas County feels comfortable with contractor capability, proficiency, and/or Douglas County Inspections staff familiarity with installation practices, this requirement can be re-evaluated.

- Douglas County will allow the use of joint deflections up to 3 degrees of deflection within proposed storm lines in lieu of manholes on curved streets. The designer will need to coordinate with ADS pipe on the design of the joint deflections to replace manholes.

To our knowledge, the only manufacturer of polypropylene pipe is Advanced Drainage Systems, Inc. If another manufacturer can provide polypropylene pipe that meets the above referenced specifications, conditions, and requirements, that product may be allowed, as well.

Upon expiration of the trial period, Douglas County will evaluate the permanent acceptance of polypropylene pipe for storm sewer pipe applications. That evaluation will be based on, but not limited to, performance, proficiency of contractors, input of County Inspections staff, and any other relative considerations.

We look forward to beginning this trial period and working cooperatively with ADS, Inc., contractors, engineers, and developers to ensure successful installations and long-term performance.

Sincerely,

Janet R. Herman, P.E.
Public Works Director

Cc: Matt Williams, P.E., CFM, Assistant Director of Public Works Engineering
Dan Roberts, P.E., Assistant Director of Public Works Operations
Pete George, P.E., Engineering Inspections Supervisor
Art Griffith, P.E., Transportation Capital Improvements Project Manager
Sean Owens, P.E., Special Projects Manager

C5 Phase II Drainage Report for Field

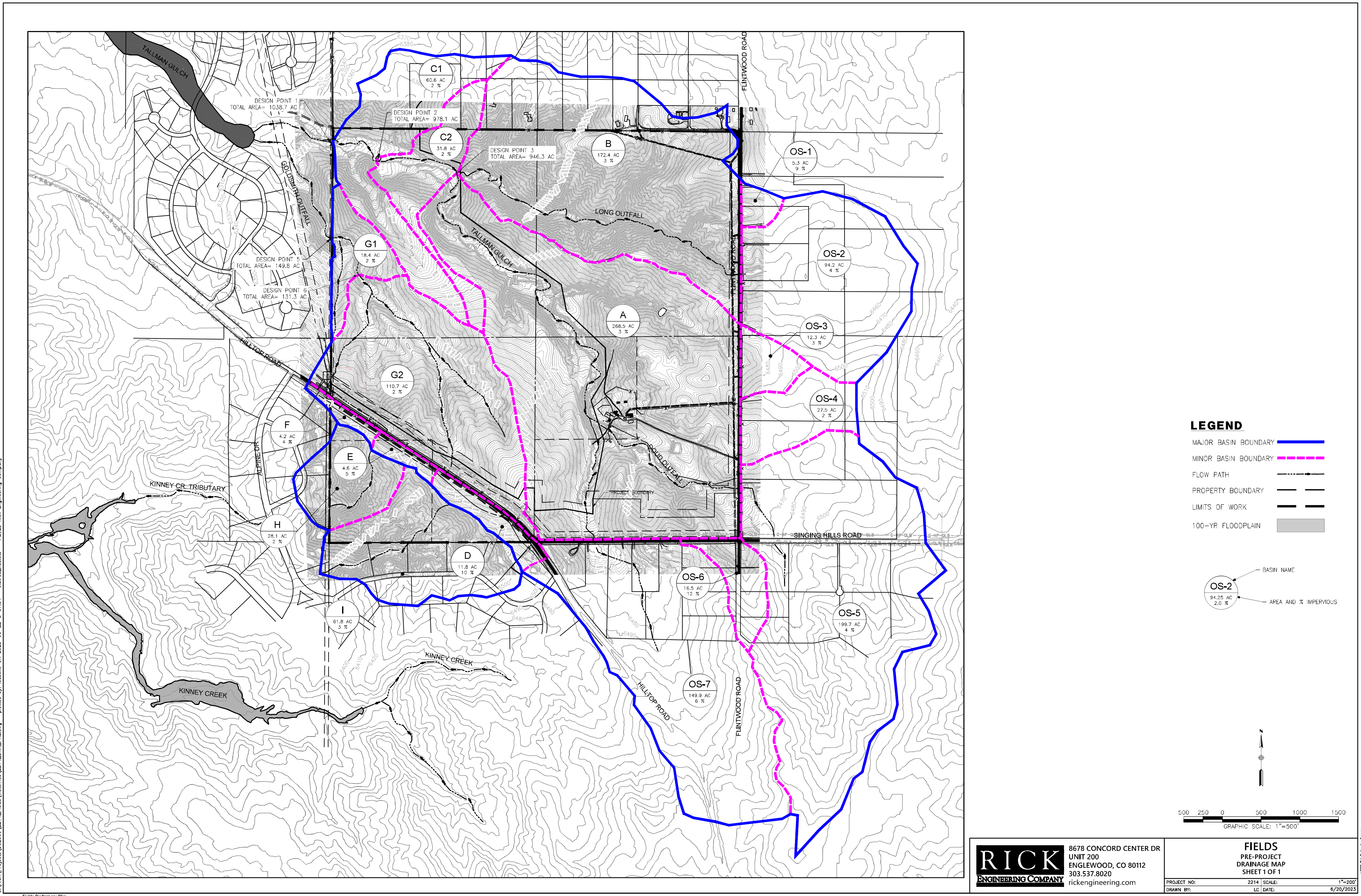
PHASE II DRAINAGE REPORT
FOR
FIELDS
DOUGLAS COUNTY, COLORADO

Job Number: D-2214

August 8, 2022
Revised: October 28, 2022
Revised: March 30, 2023
Revised: June 26, 2023

Appendix D
Maps

1. Existing Drainage Map
2. Proposed Drainage Map 1 – Major Basins
3. Proposed Drainage Map 2 – Sub-Basins

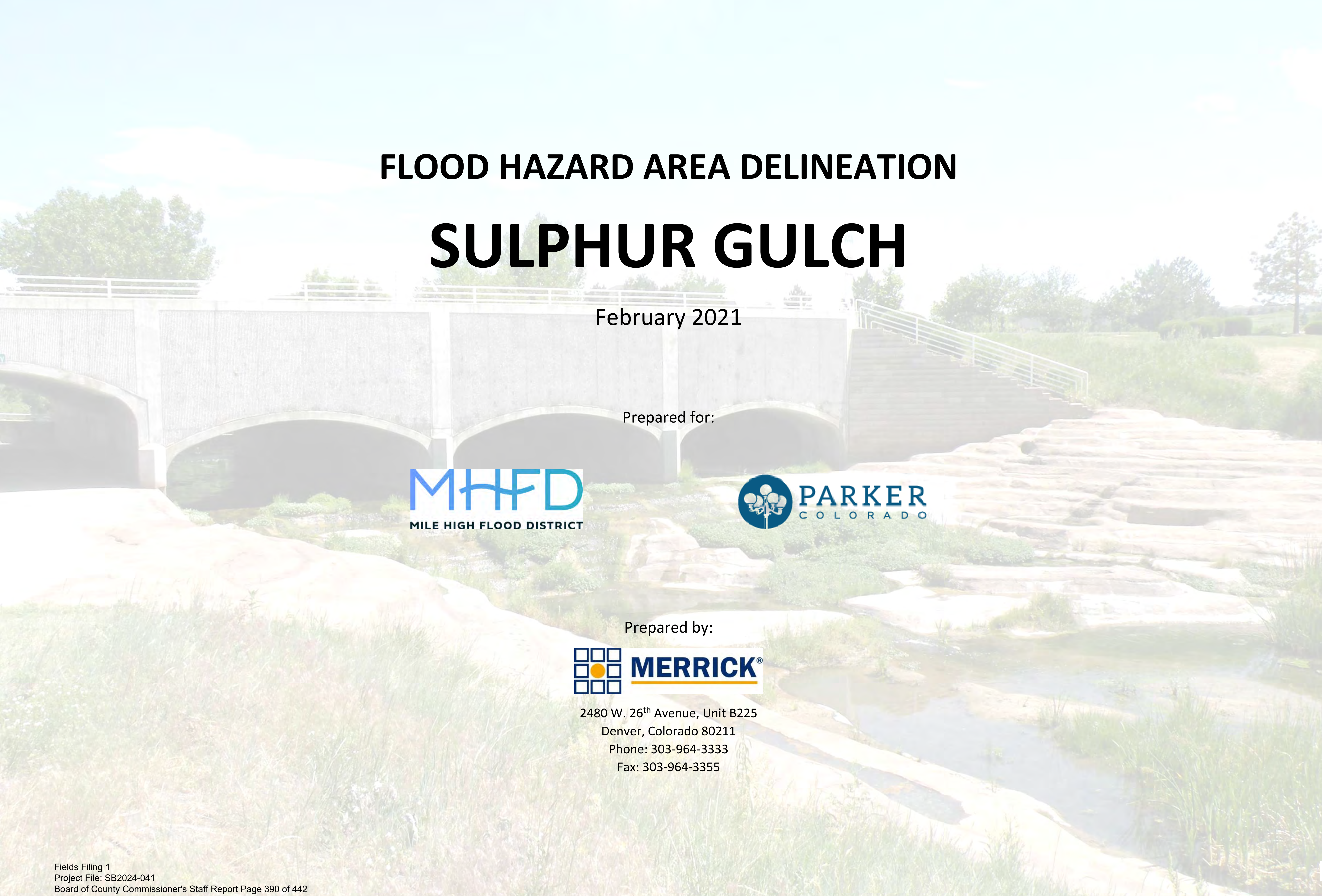


NOT FOR CONSTRUCTION – EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

Fields Preliminary Plan
Project File: SB2022-036
Board of County Commissioners' Revised Staff Report Page 218 of 244

222

C6 Sulphur Gulch FHAD



FLOOD HAZARD AREA DELINEATION

SULPHUR GULCH

February 2021

Prepared for:

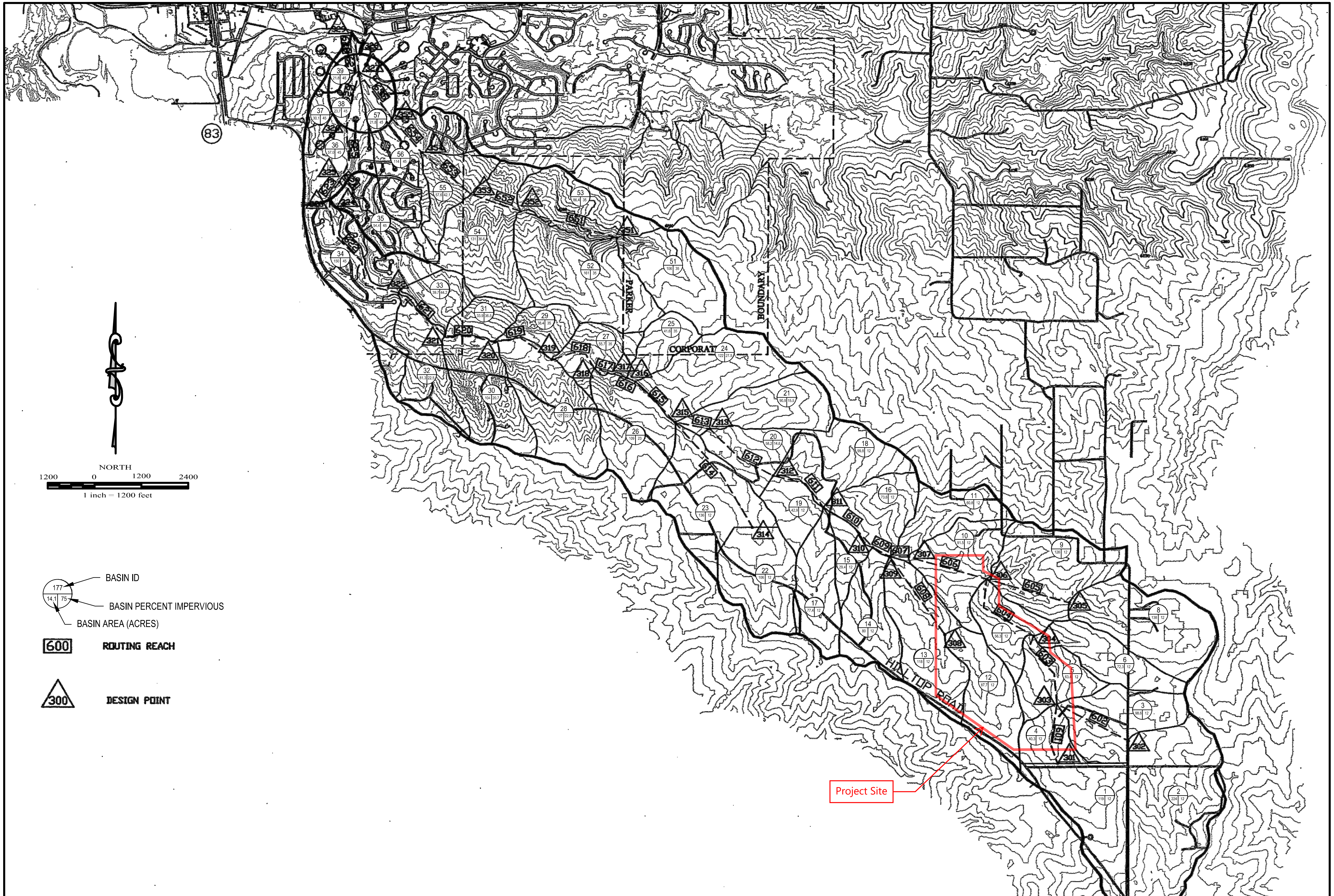
MHFD MILE HIGH FLOOD DISTRICT

PARKER COLORADO

Prepared by:

MERRICK®

2480 W. 26th Avenue, Unit B225
Denver, Colorado 80211
Phone: 303-964-3333
Fax: 303-964-3355



NOTE: FIGURE REFERENCED FROM SULPHUR AND TALLMAN GULCH OSP (2001)

MERRICK® & COMPANY

REVISIONS:

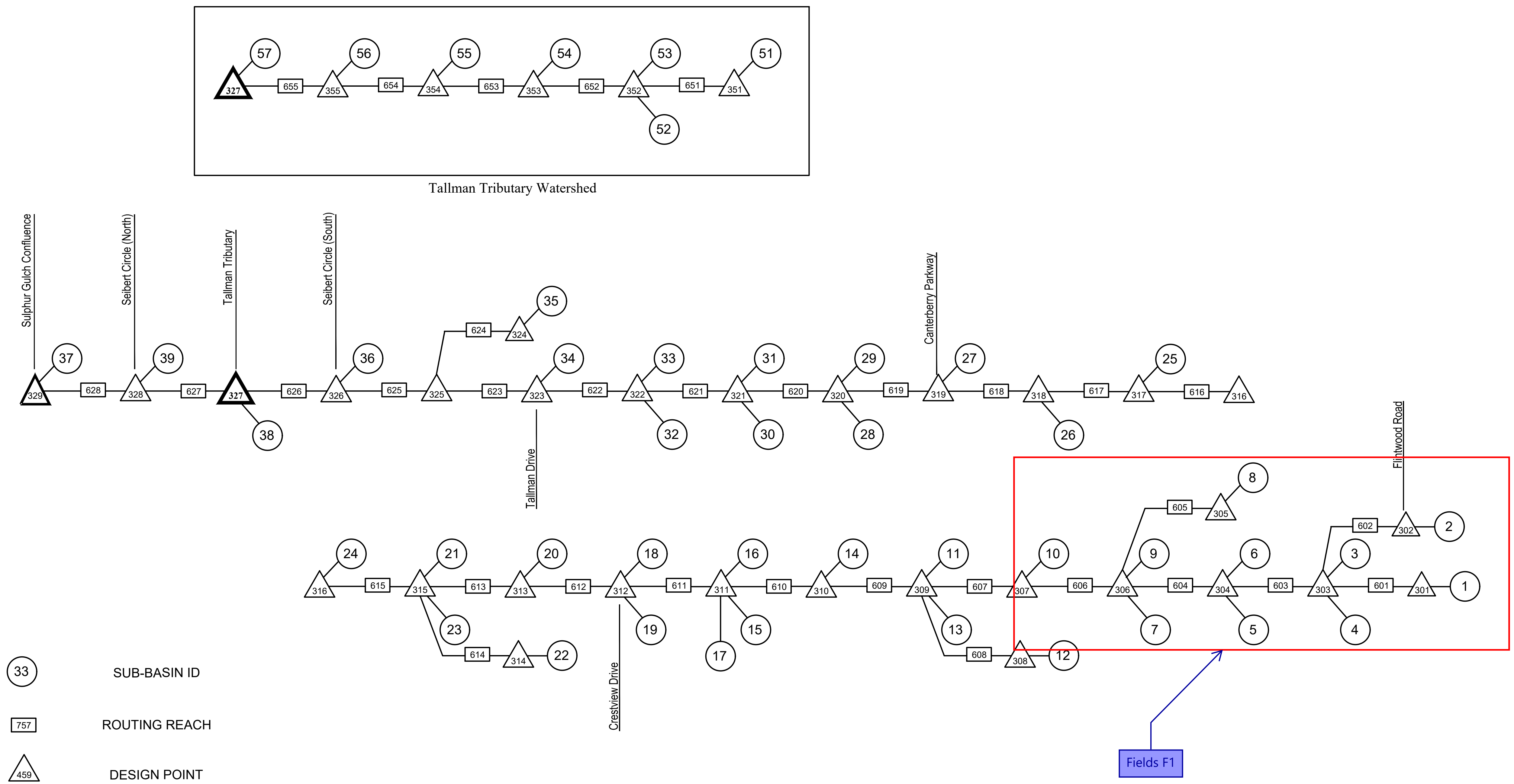
REV	REVISION DESCRIPTION	DATE	CHANGED BY	CHECKED BY	APPROVED BY

DESIGN BY:
DRAWN BY: JAG
CHECKED BY: BC
APPROVED BY:

SULPHUR - TALLMAN GULCH WATERSHEDS FHAD

SUBWATERSHED BOUNDARIES / SWMM ROUTING MAP

JOB NO: 65419417
DATE: May 2017
SHEET: B-3 (2 OF 2)



NOTE: FIGURE REFERENCED FROM SULPHUR AND TALLMAN GULCH OSP (2001)

MERRICK & COMPANY

REVISIONS:

REV	REVISION DESCRIPTION	DATE	CHANGED BY	CHECKED BY	APPROVED BY

DESIGN BY:
DRAWN BY: JAG
CHECKED BY: BC
APPROVED BY:

SULPHUR - TALLMAN GULCH WATERSHEDS FHAD

SWMM SCHEMATIC

JOB NO: 65419417

DATE: May 2017

SHEET: B-4 (2 OF 2)

400	JUNCTION	0.00	0.00	308.94	0 00:00	0.00
445	JUNCTION	0.07	1.24	474.98	0 00:40	1.24
438	JUNCTION	0.06	0.93	311.90	0 00:40	0.93
439	JUNCTION	0.10	1.31	229.29	0 00:57	1.31
442	JUNCTION	0.05	1.08	221.09	0 00:35	1.03
441	JUNCTION	0.00	0.00	215.96	0 00:00	0.00
454	JUNCTION	0.05	0.98	148.90	0 00:35	0.92
460	JUNCTION	0.92	1.69	172.62	0 01:14	1.69
451	JUNCTION	0.44	3.89	266.96	0 01:05	3.86
450	JUNCTION	0.22	2.53	339.54	0 00:50	2.48
457	JUNCTION	0.08	1.65	148.63	0 00:35	1.53
462	JUNCTION	1.11	1.24	217.93	0 03:26	1.24
37	JUNCTION	0.93	1.69	189.88	0 01:13	1.68
428	DIVIDER	0.19	2.00	282.36	0 00:28	2.00
434	DIVIDER	0.19	3.50	259.59	0 00:30	3.50
447	DIVIDER	0.19	2.50	185.36	0 00:24	2.50
435	DIVIDER	0.09	2.09	257.22	0 00:35	1.90
PineGulchDam	STORAGE	9.25	12.86	239.55	0 03:26	12.86
PineGulchPond	STORAGE	3.22	4.09	192.28	0 01:13	4.09
PaperFlowerPond	STORAGE	1.81	14.46	364.35	0 02:04	14.45

****

Node Inflow Summary

****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
301	JUNCTION	132.19	132.19	0 00:45	3.97	3.97	0.000
302	JUNCTION	251.31	251.31	0 00:50	7.46	7.46	0.000
303	JUNCTION	158.49	527.41	0 00:53	4.65	16.2	0.000
304	JUNCTION	133.23	633.89	0 01:02	4.61	20.9	0.000
305	JUNCTION	145.69	145.69	0 00:50	4.58	4.58	0.000
306	JUNCTION	237.07	933.98	0 01:06	6.13	31.7	0.000
307	JUNCTION	110.48	1006.14	0 01:11	3.07	34.8	0.000
308	JUNCTION	89.01	89.01	0 00:50	3.07	3.07	0.000
309	JUNCTION	165.69	1232.86	0 01:11	6.04	44	0.000
310	JUNCTION	84.84	1300.95	0 01:12	2.81	46.9	0.000
311	JUNCTION	191.02	1440.85	0 01:15	6.36	53.4	0.000
312	JUNCTION	153.34	1546.38	0 01:18	5.09	58.5	0.000
313	JUNCTION	64.55	1578.81	0 01:23	2.09	60.7	0.000
314	JUNCTION	147.54	147.54	0 00:45	3.93	3.93	0.000
315	JUNCTION	240.50	1848.12	0 01:23	8.29	73.1	-0.000
316	JUNCTION	152.54	1940.69	0 01:26	5.1	78.3	0.000
317	JUNCTION	74.37	1969.28	0 01:26	1.84	80.1	0.000
318	JUNCTION	139.30	2042.52	0 01:28	4.32	84.5	0.000
319	JUNCTION	91.40	2072.93	0 01:31	2.36	86.8	-0.000
320	JUNCTION	170.65	2144.52	0 01:37	6.52	93.8	0.000
321	JUNCTION	192.09	2172.60	0 01:46	5.33	99.1	0.000
322	JUNCTION	167.04	2216.28	0 01:49	5.01	104	0.000
325	JUNCTION	0.00	2209.34	0 02:03	0	114	0.000
323	JUNCTION	227.42	2202.71	0 02:02	6.57	111	0.000
324	JUNCTION	115.72	115.72	0 00:40	2.49	2.49	0.000
326	JUNCTION	123.08	2202.87	0 02:08	2.48	116	0.000
327	JUNCTION	79.80	2455.79	0 02:09	1.98	148	0.000
328	JUNCTION	58.06	2456.36	0 02:10	0.862	149	0.000
329	JUNCTION	35.18	2467.29	0 02:11	1.35	150	0.000
351	JUNCTION	177.28	177.28	0 00:40	4.67	4.67	0.000
352	JUNCTION	390.71	520.92	0 00:50	10.8	15.6	0.000
353	JUNCTION	262.36	716.67	0 00:54	5.66	21.3	0.000
354	JUNCTION	119.31	789.94	0 01:00	2.66	24.1	0.000
355	JUNCTION	263.73	941.27	0 01:02	5.32	29.5	0.000
401	JUNCTION	68.23	68.23	0 00:50	2.34	2.34	0.000
402	JUNCTION	166.57	166.57	0 00:45	4.53	4.53	0.000
403	JUNCTION	256.88	446.52	0 00:59	8.16	15.3	0.000
404	JUNCTION	480.82	480.82	0 00:55	17.7	17.7	0.000
405	JUNCTION	197.25	1084.19	0 01:09	8.4	41.6	0.000
406	JUNCTION	244.05	244.05	0 00:50	7.86	7.86	0.000
407	JUNCTION	192.75	432.71	0 00:55	7.33	15.2	0.000
408	JUNCTION	194.66	608.02	0 01:07	7.68	22.9	0.000
409	JUNCTION	161.62	748.12	0 01:10	5.73	28.7	0.000
410	JUNCTION	80.57	814.44	0 01:16	3.67	32.5	0.000
411	JUNCTION	0.00	1885.33	0 01:12	0	74.1	0.000
412	JUNCTION	228.07	2112.94	0 01:16	8.38	84.2	0.000
413	JUNCTION	252.54	2234.80	0 01:19	6.32	90.7	0.000
414	JUNCTION	87.53	87.53	0 00:45	2.34	2.34	0.000
415	JUNCTION	198.08	263.35	0 00:50	4.68	7.1	0.000
416	JUNCTION	112.52	112.52	0 00:45	3.13	3.13	0.000
417	JUNCTION	271.07	603.65	0 01:00	9.48	20	0.000
418	JUNCTION	211.24	783.63	0 01:08	7.6	27.8	-0.000
419	JUNCTION	0.00	554.00	0 02:04	0	40.5	0.000
420	JUNCTION	309.36	2937.10	0 01:23	9.86	143	0.000
421	JUNCTION	253.04	3040.05	0 01:26	6.56	150	-0.000
422	JUNCTION	35.71	35.71	0 00:45	0.972	0.972	0.000
423	JUNCTION	183.93	183.93	0 00:40	3.76	3.76	0.000
424	JUNCTION	329.11	524.82	0 00:55	11.8	16.7	0.000
425	JUNCTION	275.91	784.65	0 00:58	9.8	26.6	0.000
426	JUNCTION	158.56	921.01	0 01:02	4.82	31.5	0.000
234	JUNCTION	0.00	209.56	0 00:47	0	4.78	0.000
427	JUNCTION	151.25	1033.25	0 01:06	4.08	35.6	0.000
429	JUNCTION	109.51	4079.62	0 01:28	3.78	193	0.000
430	JUNCTION	104.51	104.51	0 00:35	1.93	1.93	0.000
431	JUNCTION	76.95	159.58	0 00:46	1.65	3.63	0.000
432	JUNCTION	70.99	70.99	0 00:40	1.91	1.91	0.000
433	JUNCTION	34.96	4184.68	0 01:32	0.874	199	0.000
436	JUNCTION	106.72	4283.35	0 01:34	3.2	208	0.000
440	JUNCTION	53.74	4370.02	0 01:37	1.25	215	0.000
443	JUNCTION	37.31	4384.49	0 01:40	0.792	217	0.000
444	JUNCTION	138.88	4396.63	0 01:43	3.13	220	0.000
448	JUNCTION	0.00	6309.61	0 01:54	0	374	0.000
452	JUNCTION	72.03	6377.85	0 01:56	1.38	393	0.000
453	JUNCTION	274.48	6394.29	0 01:59	5.75	398	0.000
456	JUNCTION	92.20	6404.58	0 02:00	1.56	401	0.000
458	JUNCTION	0.00	6408.75	0 02:00	0	401	0.000
459	JUNCTION	204.29	6427.16	0 02:05	5.51	407	0.000
400	JUNCTION	62.93	62.93	0 00:45	1.98	1.98	0.000
445	JUNCTION	64.48	64.48	0 00:40	1.61	1.61	0.000
438	JUNCTION	62.85	62.85	0 00:40	1.71	1.71	-0.000
439	JUNCTION	52.36	95.41	0 00:57	1.29	3.1	0.000
442	JUNCTION	68.10	68.10	0 00:35	1.41	1.41	0.000
441	JUNCTION	113.53	113.53	0 00:40	2.8	2.8	0.000
454	JUNCTION	38.42	38.42	0 00:35	0.778	0.778	0.000
460	JUNCTION	71.34	114.26	0 01:03	1.44	17.4	0.000
451	JUNCTION	179.94	319.65	0 01:05	5.19	11.9	0.000
450	JUNCTION	189.44	189.44	0 00:50	6.43	6.43	0.000
457	JUNCTION	39.54	39.54	0 00:35	0.786	0.786	0.000
462	JUNCTION	0.00	25.96	0 03:26	0	13.3	0.000
37	JUNCTION	0.00	80.65	0 01:13	0	16	0.000
428	DIVIDER	81.94	81.94	0 00:45	2.61	2.61	0.000
434	DIVIDER	181.81	181.81	0 00:40	4.13	4.13	0.000
447	DIVIDER	153.59	153.59	0 00:40	3.32	3.32	0.000
435	DIVIDER	62.74	62.74	0 00:35	1.2	1.2	0.000
PineGulchDam	STORAGE	130.51	409.86	0 01:07	3.29	15.2	0.006
PineGulchPond	STORAGE	266.29	266.31	0 00:35	4.26	17.4	0.031
PaperFlowerPond	STORAGE	326.30	984.42	0 01:22	12.2	40.5	0.018

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Node Surcharge Summary

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No nodes were surcharged.

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Node Flooding Summary

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No nodes were flooded.

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Storage Volume Summary

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Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PineGulchDam	986.930	18	0	0	1754.916	31	0 03:26	25.96
PineGulchPond	215.924	10	0	0	383.307	18	0 01:12	80.65
PaperFlowerPond	133.654	8	0	0	1609.308	95	0 02:04	554.00

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Link Flow Summary

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C7 Geomorphology Report

Technical Memorandum

Date: **August 31, 2023**

To: **Troy Bales/Shavger Rekani, Rick Engineering**

From: **Troy Thompson**

Re: **Geomorphological Assessment – Fields Development**

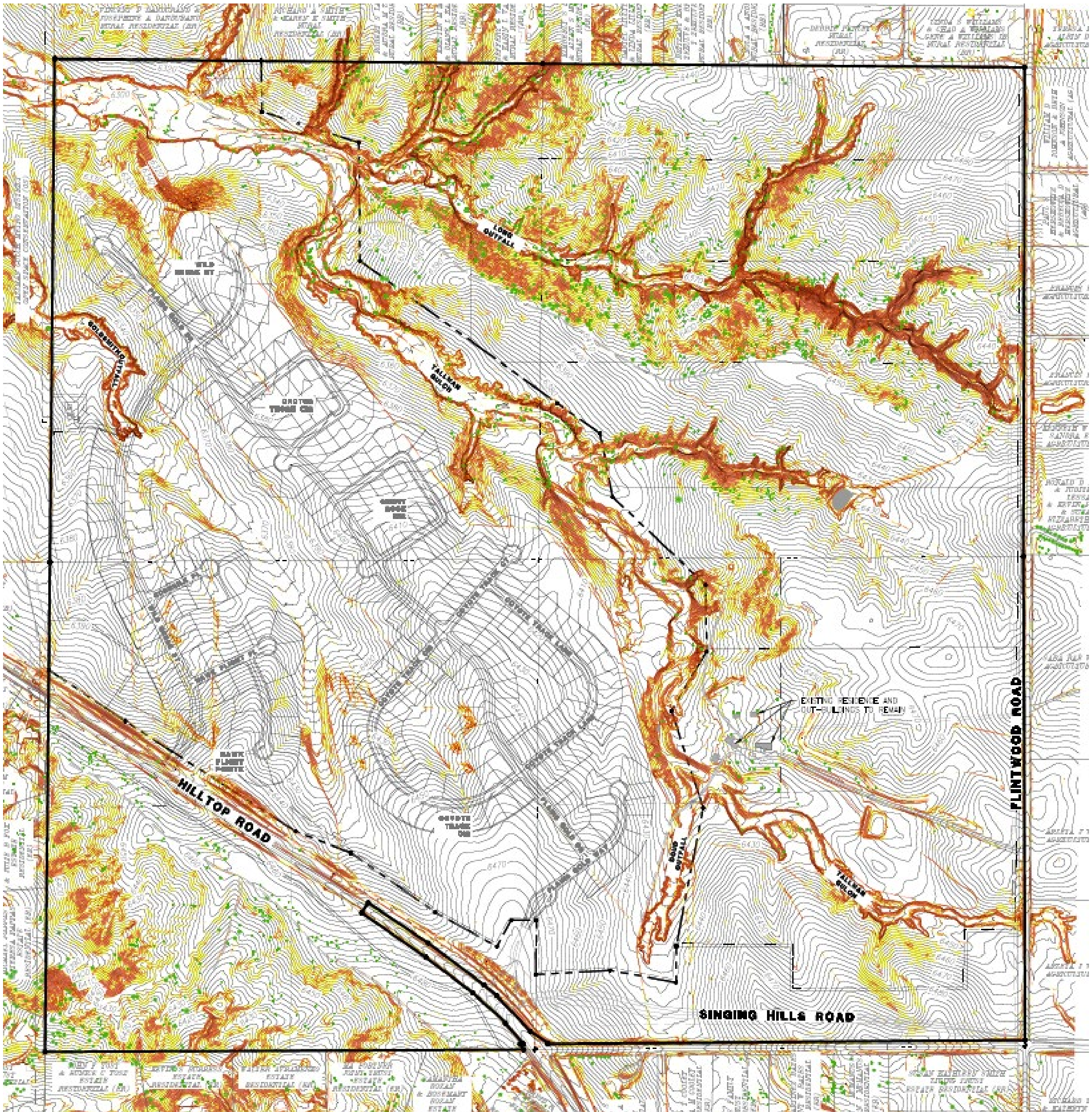
1.0 Introduction

Ecological Resource Consultants, LLC (ERC) was retained by Rick Engineering Company (Rick) to assist in an evaluation of the stability of streams within and adjacent to the proposed Fields development in Douglas County, Colorado. The proposed development consists of approximately 640 acres of generally undeveloped land that is bound by Flintwood Road to the east and Singling Hills Road to the south. Hilltop road crosses the southwest corner of the parcel.

Tallman Gulch is the largest drainage within the development parcel. Doud Outfall (in the southcentral portion of the parcel), an unnamed tributary (near the center of the parcel) and Long Outfall northwest portion of the parcel) all confluence with Tallman Gulch within the property. Goldsmith Gulch also traverses the western portion of the property and confluences with Tallman Gulch to the northeast of the project parcel. All drainages generally flow from southeast to northwest following topography.

Planned development includes 255 residential units and open space (Rick 2023a). Main development is planned to be isolated to between Hilltop Road to the south and Tallman Gulch to the north. An illustration of the site drainages, bounding roads and planned development from the project site plans is presented as **Figure 1** (Rick 2023b). This assessment was aimed at determining whether modifications to the channels are recommended as part of development.

Figure 1 – Fields Development Plan Setting



ERC was retained to assist with the evaluate the stability of existing drainages and assess whether the proposed development will impact these streams. It is important to note for context of this assessment that natural, healthy streams are ever evolving systems. Erosion and deposition are natural stream processes that occur in most environments. As such, this assessment considered conditions of the stream corridors and the likelihood that planned development will impact the natural dynamic balance of the systems and set them on a trajectory towards unnatural, unstable conditions.

Our assessment and conclusions are provided herein.

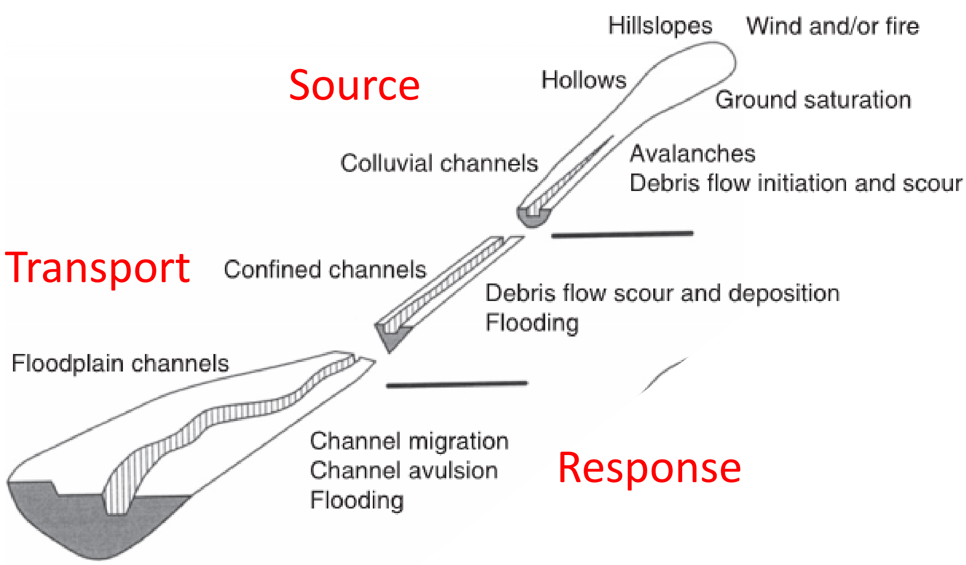
2.0 Existing Conditions

Existing conditions of the stream corridor coupled with changes in stressors on the system caused by planned development are the two main factors for predicting future responses of the system. In this section, existing conditions are summarized.

2.1 Geomorphologic Setting

One of the first items evaluated is the sediment regime of the streams within the property. Streams can either be considered as being a sediment source, an area where sediment is transported through or a response reach where deposition is more likely to occur. These three regimes are illustrated in **Figure 2** with source, transport and response zones identified.

Figure 2 – Sediment Regimes



All streams on the property are low order (1^{st} and 2^{nd}) headwater systems. Headwater streams are generally sediment sources that supply sediment to the downstream system. This is true for each of the streams through the site with evidence of channel erosion typical of a natural low order stream evident in each drainage. As source reaches, it can be expected that in existing and future conditions the streams through the site are more likely to be erosive than they are zones of deposition.

2.2 Stream Corridors

Photos and observations of the Tallman Gulch, Doud Outfall and Goldsmith Gulch drainages are presented below.

Tallman Gulch

PHOTO 1. The upstream segment of Tallman Gulch is stable. The small active channel is confined in some upstream areas.

PHOTO 2. Further downstream the drainage widens. Some steep, sandstone banks exist with both consolidated and unconsolidated materials observed. The channel area is vegetated and stable. Banks are highly erodible but will likely erode slowly. While erodible, the banks were generally stable; banks are expected to ravel over time primary due to natural wind and gravity forces.

PHOTO 3. Upstream of Goldsmith gulch. The corridor is wide and vegetated with grasses. Some amount of sand deposition was observed indicating that deposition was occurring within the source reach.

PHOTO 4. Downstream end of Tallman. Only a small defined drainage path was observed with the base of the generally wide drainage stable and vegetated. Signs of past bank erosion are observed, but steeper slopes have revegetated indicating limited active erosion. Overall, the channel was observed to be erodible but stable.

Doud Outfall

PHOTO 5. Facing upstream near confluence with Tallman Gulch. This tributary has high near vertical banks composed of sandstone with varying degrees of weathering. Banks appear to be more active in erosional processes than Tallman Gulch. The upstream end of the eroded drainage appears to be creeping upstream as the channel headcuts.

Goldsmith Gulch

PHOTO 6. Downstream end of Goldsmith Gulch. This section of channel appeared to be unstable. Banks are comprised of sand and sandstone with varying amounts of weathering. The steep banks were generally unvegetated indicating that they had eroded within the past several years.

2.3 Vegetation

Riparian Corridor Hydrologic Resiliency Assessment

The vegetation communities were evaluated in the riparian corridors of the drainages as well as in and along the erosional features. Vegetation was evaluated both for its current condition and for its potential resilience to changes in hydrology that could occur with site development. Vegetation was assessed to determine if the existing channels within Tallman Gulch, Goldsmith Outfall, Long Outfall, and Doud Outfall (drainages) in the site are currently sufficient to accommodate anticipated alteration to flows because of the development or whether improvements to the drainages are likely to be needed.

The riparian corridors in and along the drainages are comprised of two main vegetation communities; Ponderosa Pine / Alderleaf Mountain-mahogany Woodland (NatureServe 2023) in the areas dominated by shrub and tree cover, and Blue Grama Grassland (NatureServe 2023) in the riparian areas dominated by herbaceous cover. The uplands surrounding the riparian corridors are characterized by agricultural cropland either lying fallow with sparse cover crop or areas that are actively in cultivation. Descriptions of the communities within the riparian corridors characterizing the site are given below.

Ponderosa Pine / Alderleaf Mountain-mahogany Woodland

The Ponderosa Pine / Alderleaf Mountain-mahogany community occurs in the southern Rocky Mountains and upper plateaus of southern Utah, from 1700 to 2710 m (5570-8900 feet) elevation. This association is an open woodland with scattered ponderosa pine (*Pinus ponderosa*) trees, generally with less than 50% cover, over a matrix of shrubs. Rocky Mountain juniper (*Juniperus scopulorum*) and Gambel oak (*Quercus gambelii*) individuals occur sporadically. The community is strongly dominated by alderleaf Mountain-mahogany (*Cercocarpus montanus*) with skunkbush sumac (*Rhus trilobata*) and soapweed yucca (*Yucca glauca*) in areas with more sunlight. Herbaceous cover ranges from 10-70%, depending on shrub and tree density. Grasses are typically more abundant than forbs and include squirreltail bottlebrush (*Elymus elymoides*), purple threeawn (Aristada purpurea), sand dropseed (*Sporobolus cryptandrus*), Idaho fescue (*Festuca idahoensis*), blue grama (*Bouteloua gracilis*), and needle and thread grass (*Hesperostipa comata*). Forb species include buffalo bur (*Solanum rostratum*), broom snakeweed (*Gutierrezia sarothrae*), gray sagewort (*Artemisia ludoviciana*), hairy false goldenaster (*Heterotheca villosa),* curlycup gumweed *(Grindelia squarrosa),* annual sunflower (*Helianthus annuus*)*,* James' catseye (*Oreocarya suffruticosa*), and fringed sage *(Artemisia frigida)*.

<u>*Blue Grama Grassland*</u>

The Blue Grama Grassland community occurs in the intermountain western U.S. and is reported in Arizona, Colorado, New Mexico, Utah, and Wyoming. The vegetation is characterized by a moderate to dense (25-80% cover) herbaceous layer that is strongly dominated by the warm-season, perennial shortgrass blue grama. Associated grasses are sand dropseed, squirreltail bottlebrush (*Elymus elymoides*), slender wheatgrass (*Elymus trachycaulus*), little bluestem (*Schizachyrium scoparium*), sideoat grama (*Bouteloua curtipendula*), and the introduced annual grass smooth brome (*Bromus inermis*). Scattered buffalo bur (*Solanum rostratum*) shrubs. Surrounding the riparian corridors are characterized as gently rolling hills. This community generally occurs at elevations ranging from 1660 to 2780 m (5420-9115 feet). This community is very similar to the herbaceous vegetation exhibited in the Ponderosa Pine / Alderleaf Mountain-mahogany community but lacks the prominent shrub and tree layers.

PHOTO 7. View northwest at the Ponderosa Pine / Alderleaf Mountain-mahogany community with upland adapted plant species throughout the bottom of the drainage.

PHOTO 8. View southwest at the Ponderosa Pine / Alderleaf Mountain-mahogany community with sparse vegetation in the bottom of the drainage.

PHOTO 9. View northwest at the Blue Grama Grassland community.

PHOTO 10. View northeast at the Blue Grama Grassland community with upland adapted plant species.

PHOTO 11. View northwest at one of the isolated, pocket wetlands dominated by Nebraska sedge.

PHOTO 12. View northeast at an area where flows with increased velocity and bank erosion have destroyed some of the terrestrial vegetation.

Overall, the vegetative communities within the Fields Development site are dominated by upland plant species. The vegetation communities within the riparian corridors appeared stable within the context of the surrounding landscape. The vegetation communities are currently providing stability to the drainages. The majority of plant species within the drainages are graminoid species adapted to very dry soils and are unable to accommodate routine moisture, soil saturation, and surface flows within the drainages. Bare ground occurs throughout the site at the head cuts of erosional rills, along the banks of the drainages in areas where the alignment of the drainage turns more sharply than the relatively gentle sinuosity of the rest of the site, and at the drainage bottoms where flows increase in velocity causing localized loss of the terrestrial vegetation. Sparsely vegetated areas within the drainage bottoms occur sporadically throughout the site with some areas exhibiting a defined channel and others with upland adapted vegetation growing with varying degrees of cover (approximately 10-70%). Three small areas within Tallman Gulch appeared to have isolated, pocket wetlands dominated by Nebraska sedge (*Carex nebrascensis*) a hydrophytic species or wetland adapted species. These areas appeared to be anomalous in relationship to the overall site but may give some insight into how the vegetation community might change with a substantial increase in flow volumes and durations.

The substrates within the riparian corridors are a sandy and within the drainages classified by the U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey as Bresser-Truckton sandy loams, 5 to 25 percent slopes; Fondis-Kutch association; Stapleton-Bresser association; and Sandy alluvial land. None of these classifications are considered hydric soil and the drainage class ratings range from well drained to excessively drained. Non-hydric soils that are well-drained are not typically conducive to supporting wetland adapted vegetation. These soils drain relatively quickly allowing upland dominated vegetation communities to withstand most precipitation events and flows with short durations or that occur infrequently.

Based on existing conditions, the resiliency of the riparian vegetation is limited regarding increases in the hydrologic regime. The existing vegetation will likely not tolerate moderate to significant increases in hydrology (surface flows, inundation, and/or saturation) well. If hydrologic conditions increase moderately to significantly, the upland adapted vegetation communities will experience increased plant mortality creating conditions for the drainages to be prone to instability along the banks, increased erosion, and colonization by invasive weed species. Increases in plant mortality and the overall decrease in cover would result in a loss of soil stability from the reduction in root structures and an increase in flow velocities due to the reduction to the aerial portions of the plants in the drainages. If hydrologic conditions change only slightly and gradually over time, vegetation may withstand the changes or may naturally transition from upland species to more wetland tolerant species resulting in only limited increased erosion and invasive weed colonization potential. The frequency, duration, and magnitude of flows post-construction will heavily influence the ability of the existing upland vegetation to remain and provide stability within the Fields Development site drainages.

3.0 Historic Conditions

Review of historic conditions was completed to understand past channel changes that provide insight into expected future response. To accomplish this, changes in the length of the stream over time were compared to estimate headcut propagation. Average channel widths were evaluated to quantify lateral migration and effects of land use were considered. Results of these assessments are presented below.

3.1 Headcuts

Stream lengths over time were evaluated to estimate historic channel propagation. This was done by estimating the change in the upstream terminus of Goldsmith Gulch and a small tributary. Images from 1936, 1955, 1993, 2001, 2011 and 2021 were used for this assessment. Images from each of these years with the 2021 stream length overlaid are provided in **Appendix A**. As part of our assessment, we factored in apparent “shift” in imagery on the 1936 photo of approximately 60 feet. Conclusions from review of these six historical images spanning 85 years are summarized below.

- It appears that from 1936 to 2021 Goldsmith Gulch progressed upstream roughly 215 feet.
- This equates to an average annual upstream progression of approximately 2.5 feet per year.

- Review of the incremental images showed some differences in the upstream terminus of the gulch. This suggests that the headcut is progressing upstream at a slow rate and appears to not have been influenced significantly by finite, large precipitation events.
- The minor eroded area/tributary area from the west leads to Goldsmith Gulch has not progressed significantly from 1936 to 2022.

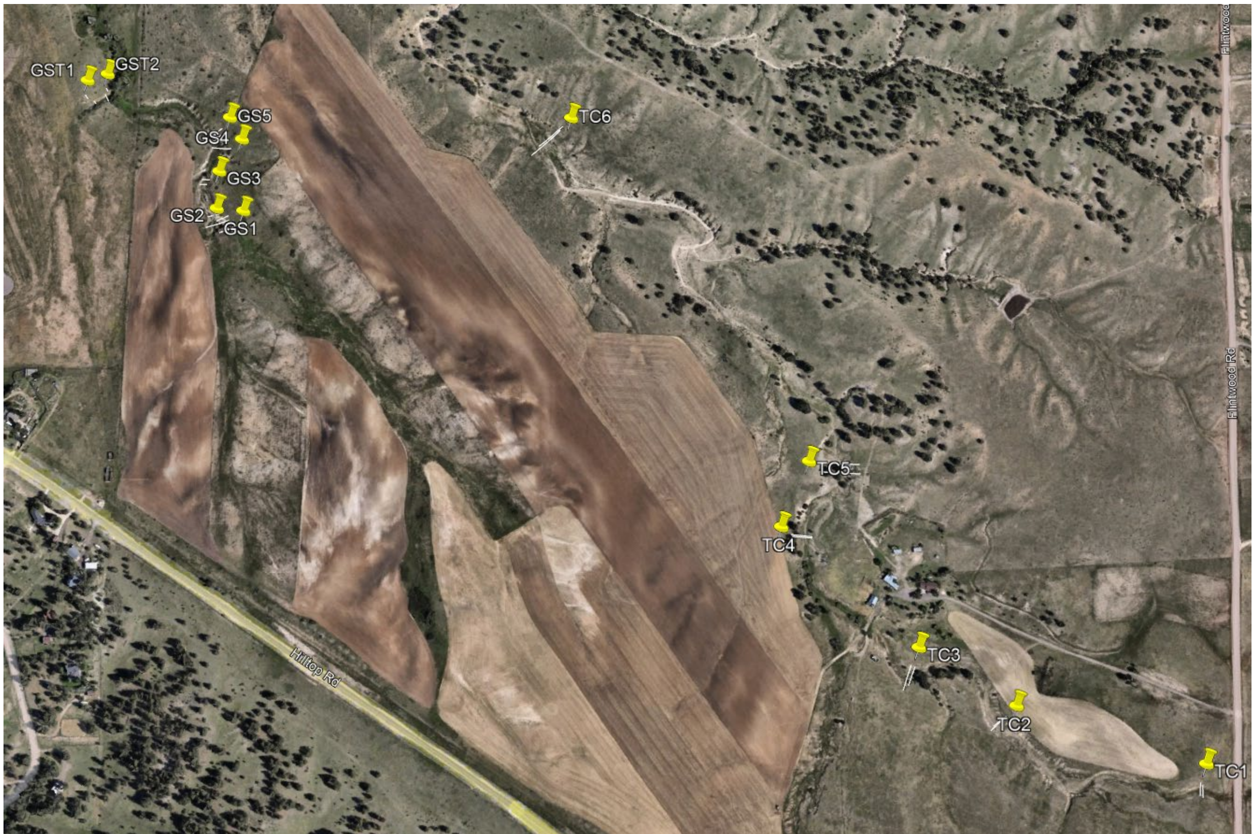
From these results, ERC believes that slow but continued progression of the headcut on Goldsmith Gulch is expected to occur naturally. If development increases flows into the drainage, headcut propagation is likely to accelerate.

3.2 Lateral Migration

To evaluate the likely extent and rate of lateral migration/erosion, the wide of the channel corridor at approximately the extents of the terrace were determined as they exist from the 2022 aerial at various locations along the length of the corridor using Google Earth. For this assessment ERC identified locations where lateral migration appears to have occurred and where photo quality was adequate to evaluate channel widths. By not including areas that appear to have remained stable we are presenting what is believed to be the worst conditions at the site.

The assessment included six locations on Tallman Creek, five locations on Goldsmith Gulch and two locations on a small tributary to Goldsmith Gulch immediately downstream of the property. While not part of the project area, the downstream tributary was included as indications of migration were noted and responses at this location provides information that is believed to be relevant to the site. The location of the sections on Tallman Creek (TC), Goldsmith Gulch (GS) and the tributary to Goldsmith Gulch (GST) that were evaluated are presented in **Figure 3**.

Figure 3 – Locations Where Lateral Migration Evaluated



Due to quality of imagery, the apparent widths were measured at locations from images in 2022 and 1955. Images are provided in **Appendix B**. Widths were only measured at locations where banks appeared “unstable” from the 2022 image and where the location of both banks can be reasonably inferred by the images. A comparison of measured widths is given in **Table 1**. Due to the resolution of the images (particularly the 1955 image), there is inherent uncertainty in the assessment. Comparing widths over this 67-year period does, however, is adequate to determine whether large scale changes have happened.

Table 1 – Comparison of Measured Channel Widths

Section ID	1955 Width (ft)	2022 Width (ft)	Difference (ft)	Avg Rate of Change (inch/yr)	% Change
TC1	62	59	-3	-0.5	-5%
TC2	75	87	+12	+2	+16%
TC3	95	123	+28	+5	+29%
TC4	102	96	-6	-1	-6%
TC5	174	194	+20	+4	+11%
TC6	151	186	+35	+6	+23%
GS1	96	117	+21	+4	+22%
GS2	66	70	+4	+0.7	+6%
GS3	36	38	-2	-0.4	-6%
GS4	89	100	+11	+2	+12%
GS5	59	69	+10	+2	+17%
GST1	24	17	-7	-1	-29%
GST2	19	40	+21	+4	+111%

For the six locations on Tallman Creek, changes in channel width were estimated to range from narrowing of 6 feet to widening of 35 feet. The average of the six Tallman Creek sections was 14 feet wider. For the five locations on Goldsmith Gulch, changes in channel width were estimated to range from 2 feet narrower to 21 feet wider. The average of the five Goldsmith Gulch sections was 9 feet wider. Of the two locations on the tributary, one appeared to be 7 feet narrower in 2022 while the other appeared to be 21 feet wider for an average of 7 feet wider.

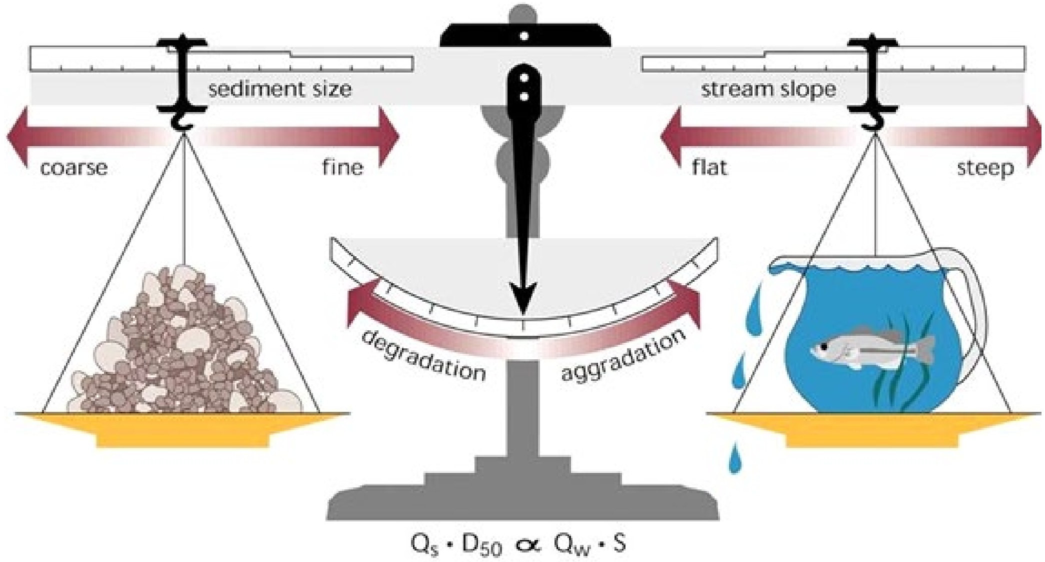
While there is error inherent in the method used for this assessment, we believe that results indicate that slow lateral migration can be expected naturally, and that the magnitude of migration is generally low (on the order of a foot every few years). This supports field observations that channel bank erosion occurs, but banks remain relatively stable. Absent an outside stressor, this trend is expected to continue. We expect that change that does occur will not be uniform from year to year but rather occur at distinct times associated with bank sloughing.

It is worth remembering that sections were only evaluated in locations where instability was observed. For this reason, results shown on the table likely indicate the amount of migration that can be anticipated in areas that are most prone to movement.

4.0 Anticipated Development Impacts on Stream Systems

Proposed development has the potential to alter conditions that may impact streams on the site and further downstream. Lanes Balance, provided as **Figure 4**, represents the main parameters that affect stream stability that could be altered by development.

Figure 4 – Lane's Balance



Flow – Changes in flow rates, volumes or timing have the potential to destabilize the existing streams. As presented above, streams in this area are generally degrading as indicated by widening and upstream propagation. This suggests that increases in flows are likely to result in more significant degradation. Decreases in flows may either reduce current degradation or lead to aggradation.

To evaluate changes in flows, existing and proposed drainage plans were compared. **Figure 5** shows existing basin boundaries while **Figure 6** illustrates boundaries after planned development. Comparison of the two figures leads to the following conclusions:

- The development does not alter the basin size or land use in Long Outfall drainage. As a result, no changes in flow are expected in this drainage.
- Development will alter the drainage basin divide between Doud Outfall and Goldsmith Gulch. As a result, the Doud Outfall drainage basin will reduce in size and no development is planned in the smaller basin. It is therefore expected that flows in Doud Outfall will decrease with development.
- Development will alter the drainage basin divide between Tallman Gulch and Goldsmith Gulch. As a result, the Tallman Gulch drainage basin upstream of its confluence with Long Outfall will reduce in size and no development is planned in the smaller basin. It is therefore expected that flows in Tallman Gulch upstream of its confluence with Long Outfall will decrease with development.
- Development will alter land use adjacent to Tallman Gulch between the confluence of Long Outfall and Goldsmith Gulch. This development will increase runoff and therefore increase flows in this segment of Tallman Gulch.
- The development will increase the size of the Goldsmith Gulch watershed by directing flows from parts of the current Tallman Gulch and Doud Outfall watersheds to Goldsmith Gulch. Significant development is planned within Goldsmith Gulch. Development coupled with an increased watershed size indicates that flows in Goldsmith Gulch will increase.

Figure 5 – Existing Drainage Boundaries

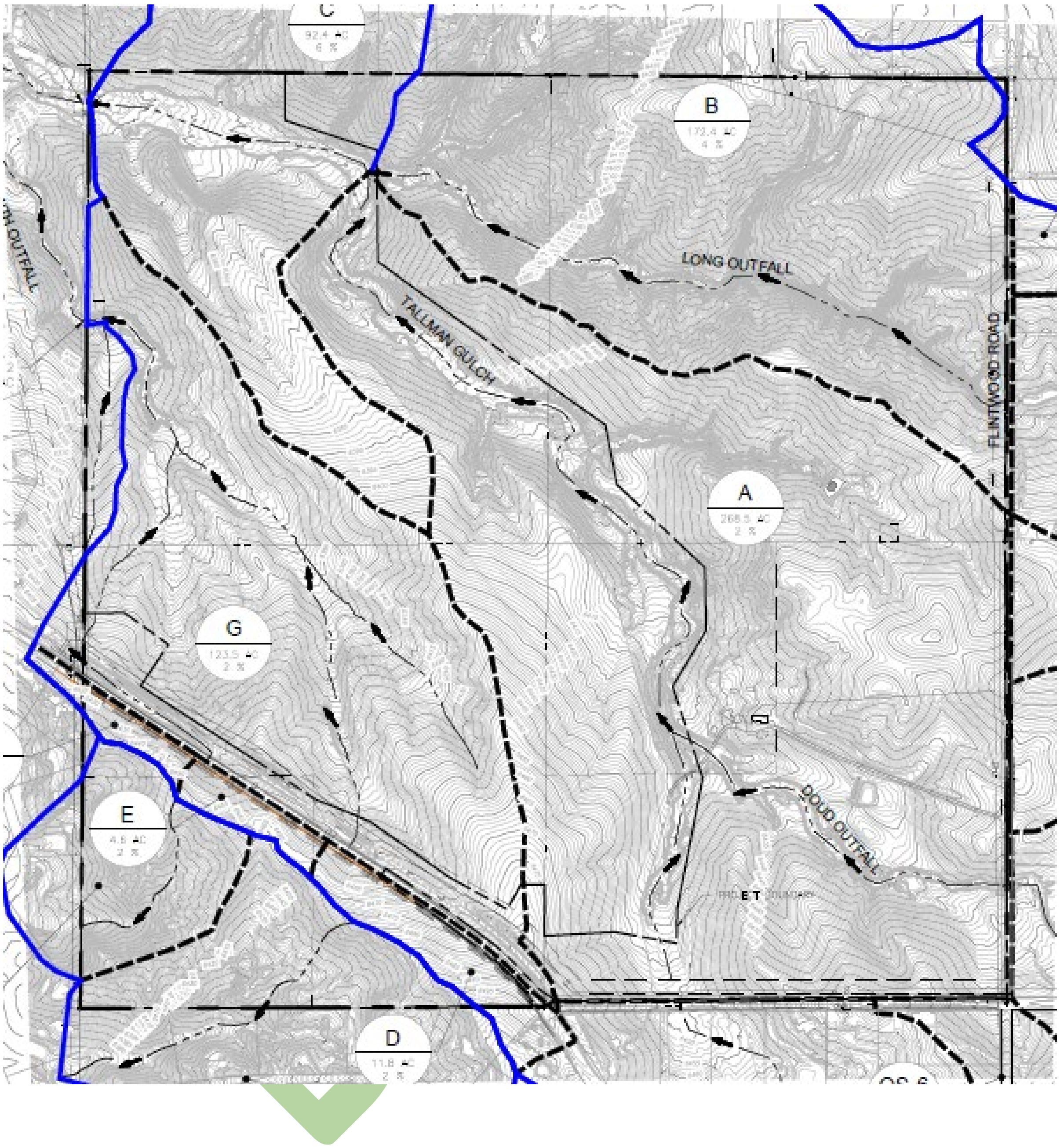
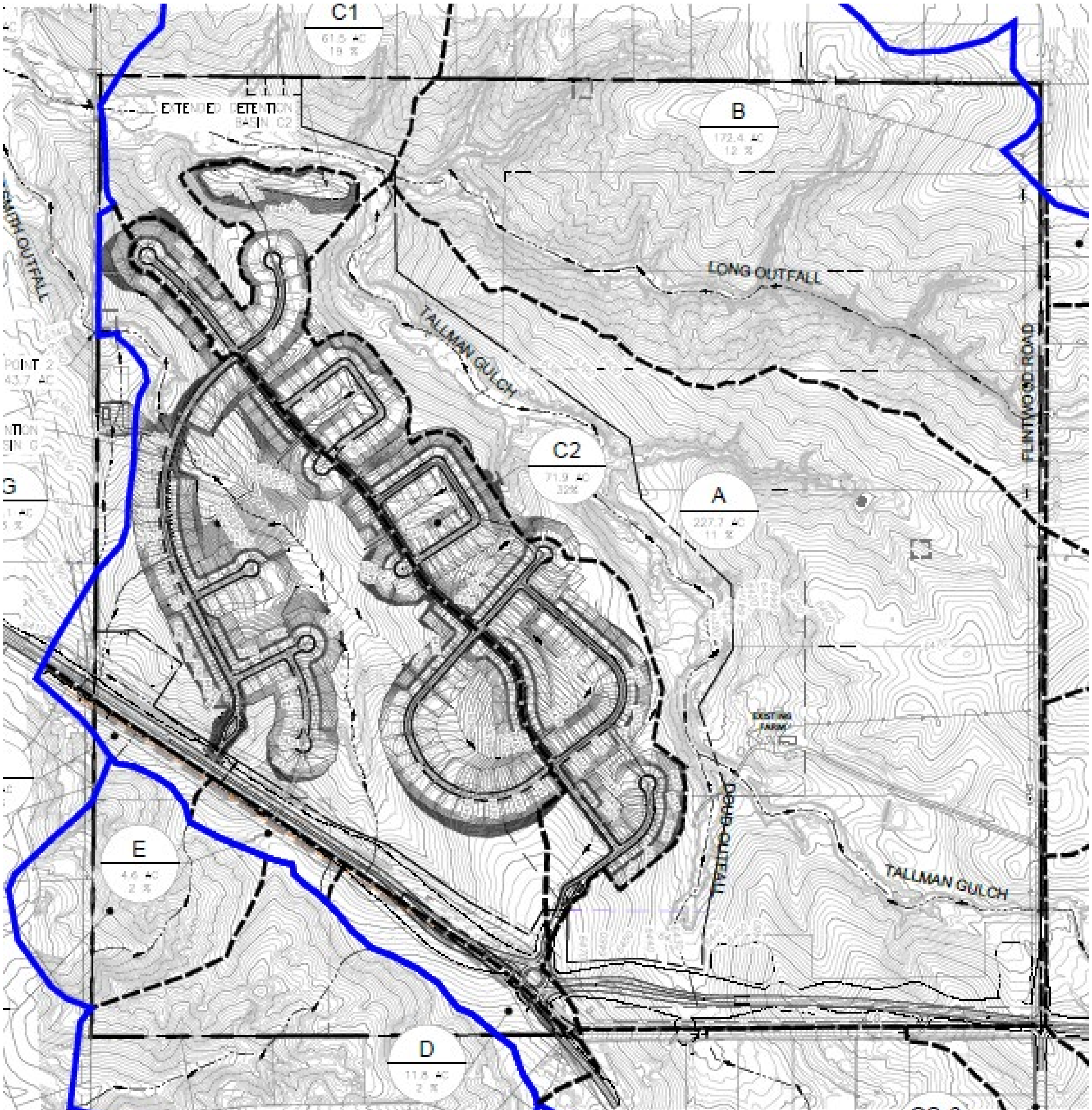


Figure 6 – Proposed Drainage Boundaries



Stream Slope, Sediment Size and Sediment Load

Long Outfall – no changes in stream slope, sediment size or sediment load are predicted.

Doud Outfall – no changes in stream slope or sediment size are anticipated. While the drainage basin will reduce, we do not anticipate this to result in a notable change in sediment load as sediment load is derived from banks in this headwater system. On-going bank erosion is not expected to change significantly with development.

Tallman Gulch Upstream of Long Outfall Confluence – no changes in stream slope or sediment size are anticipated. While the drainage basin will reduce, we do not anticipate this to result in a notable change in sediment load as sediment load is derived from banks in this headwater system. On-going bank erosion is not expected to change significantly with development.

Tallman Gulch from Long Outfall to Goldsmith Gulch Confluence – no changes in stream slope or sediment size are anticipated. Development adjacent to Tallman Gulch in this area may result in a slight decrease in sediment loading due to the planned extended detention basin capturing sediment, but this is not expected to materially alter the sediment load in this stream reach.

Goldsmith Gulch – Development will alter the course of Goldsmith Gulch and change sediment loading to the system. Final stream and development design will dictate exactly how these change, but it is expected that the stream slope will decrease and sediment loading will decrease due to stabilization of banks. Sediment size may or may not be altered.

Overall Expected Stream Responses

Based on observed field conditions, review of historic data, proposed site plans and our assessment of changes that could impact channel morphology, we expect the following responses.

Long Outfall – we changes are expected due to development. Natural stream processes including relatively slow on-going erosion are expected.

Doud Outfall – it is expected that the slight reduction in drainage area and corresponding slight reduction in flows will have a negligible impact on the drainage. Natural stream processes including relatively slow on-going erosion are expected. We do believe it will be important that runoff from the back side of lots that are adjacent to Doud Outfall be captured and routed away from Doud Outfall to prevent concentrated flows from running to Doud Outfall as this could cause significant erosion. Additionally, it is recommended that backyard lawn irrigation practices in these lots be managed as irrigation return flows could destabilize slopes in Doud Outfall.

Tallman Gulch Upstream of Long Outfall Confluence – it is expected that the slight reduction in drainage area and corresponding slight reduction in flows will have a negligible impact on the drainage. Natural stream processes including relatively slow on-going erosion are expected. We do believe it will be important that runoff from the back side of lots that are adjacent to Tallman Gulch be captured and routed away from Tallman Gulch to prevent concentrated flows from running to gulch as this could cause significant erosion. Additionally, backyard lawn irrigation practices that limit infiltration that could destabilize slopes in Tallman Gulch drainage should be implemented.

Tallman Gulch from Long Outfall to Goldsmith Gulch Confluence – Development adjacent to the stream in this segment is expected to increase flow volumes. The planned extended detention basin should limit changes to peak flow rates. Total flow changes in Tallman Gulch through this subreach are not expected to change considerably, but localized bank erosion may be a concern. It is recommended that attention be paid to any areas adjacent to the channel where vegetation is disturbed and where concentrated flows are released as these activities are likely to cause localized instability.

Goldsmith Gulch – Planned development in Goldsmith Gulch is expected to have a significant impact on the stream. While retention can be used to control peak flows, development will increase flow volumes significantly, particularly in response to smaller, more frequent storm events. In its existing state, anticipated flow increases would result in an unstable stream system. We believe that an engineered design of Goldsmith Gulch that addresses changes in flow will be required.

5.0 References

NatureServe 2023. NatureServe Explorer Central Database. Ecological Association Comprehensive Report. Available online at: http://explorer.natureserve.org. April.

Rick Engineering Company (Rick). 2023a. Preliminary Hydraulic Analysis Report for Tallman Gulch, Long Outfall, Doud Outfall and Goldsmith Outfall for the Fields Project Located in Douglas County, Colorado. January 10.

Rick Engineering Company (Rick). 2023b. Fields Site Plan – A Portion of Land Located in Section 5, Township 7 South, Range 65 West of the 6^{th} Principal Meridian. March 30.

Appendix A

Historic Aerial Imagery

Goldsmith Gulch and Minor Tributary

June 2021


Merryvale Trl
Joyce Homes
Grande River Ct
Image © 2023 Maxar Technologies

May 2011

December 2001

June 1993


Merryvale Trl
Joyce Homes
Grande River Ct
Image U.S. Geological Survey

December 1955

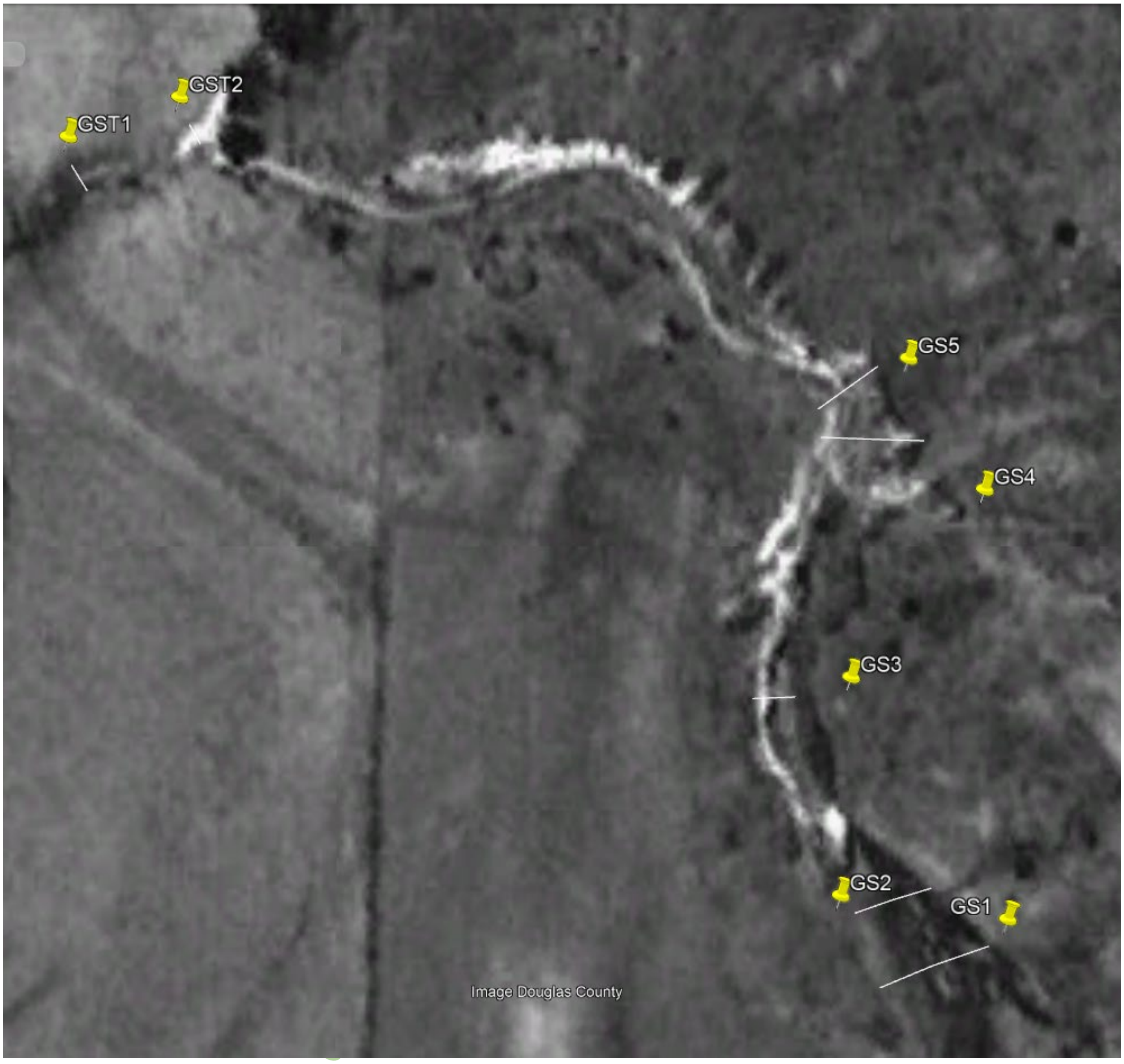
December 1936

Appendix B

Historic Stream Widths

2022 Image

1955 Image



From: Troy Bales
To: Heather Scott
Cc: Bradley Jackson; Jill Repella; Tom Clark; Robert Fitch; Kristofer Carlstedt
Subject: FW: Fields Development
Date: Friday, November 3, 2023 11:49:44 AM

Heather

As requested, See below for email from our geomorphologist on the latest plan

Troy

From: Troy Thompson <Troy@erccolorado.net>
Sent: Friday, November 3, 2023 10:39 AM
To: Brad Robenstein <BRobenst@douglas.co.us>
Cc: Troy Bales <tbales@rickengineering.com>
Subject: Fields Development

CAUTION: This email originated outside of Rick Engineering Company. Do not answer, select anything nor open attachments unless you are sure the contents are safe!

Brad,

I am writing as a follow up to the email that I sent to you this past April 14th on the Fields development, located along Tallman Gulch and Goldsmith Outfall. Previously ERC considered a site plan for this development dated March 30, 2023. Rick Engineering has indicated to us that the development plan for Fields has changed. Ecological Resource Consultants (ERC) has looked at the new development plan dated June 20, 2023 by Rick. Similar to our evaluation this past spring, we have once again reviewed the new plan to evaluate proposed lot locations relative to room required for stream corridors. We have not completed a detailed geomorphological assessment for the new layout at this time but instead have focused on lot locations. Again our preliminary assessment considered two major items: 1) historic corridor stability and 2) development stressors that could impact historic stability.

Historic Corridor Stability

Historic conditions considered for this evaluation are identical to what we presented back in April as this has not changed. Comments on historic stability from that email are provided again below for reference.

Historic aerial imagery of the site dating back to 1937 was evaluated and observations from our recent site visit/site photos were utilized for this assessment. We quantified changes in the width of the active corridor, progression of headcuts, corridor vegetation and observable stream conditions as a way to understand historic and current stability. We came away with the following observations:

- Headcutting has occurred on main tributaries over the roughly 85 year period. Headcutting appears to be an on-going process that has progressed at similar, generally stable rates. We did not observe windows in time where major cutting occurred. This suggests that headcutting is likely to continue with or without the development.

- Slight channel widening has occurred in both Tallman and Goldsmith. The rate of widening is slow and there are no signs that significant widening occurred in any one period. This suggests that minor widening is likely to continue.
- Headcutting and widening as they are currently occurring do not appear to pose a challenge to the current lot configurations.

Development Stressors

The biggest anticipated development stressors are the planned direct impacts on Goldsmith Gulch and the change in flows associated with development. Direct development impacts on Goldsmith Gulch will result in the need for modifications to the channel, as indicated on the current plans. Current plans show lots 73 to 84 and lots 107 to 115 are adjacent to the corridor. Open Space 3 (OS-3) is shown between the proposed channel alignment and these adjacent lots. ERC has not evaluated specifics of the proposed stream alignment at this point so we cannot comment on the specific planview or profile of the modified Goldsmith Gulch. We are, however, comfortable that the corridor width currently shown as OS-3 provides adequate room for this ultimate corridor.

The development plans will change the volume and rate of runoff. Plans will change the basin boundary between Tallman and Goldsmith so that the tributary area of Tallman is reduced while flows to Goldsmith will increase. Similar to our conclusions in April, the increase in flow volume in Goldsmith will increase the stream energy and therefore increase the sediment transport capacity (flow energy) in the stream. We believe that these increases in flow may necessitate specific design within the channel to degradation, however, we believe these improvements can be made within the existing corridor, which is facilitated by the planned lot layout.

Total flows to Tallman Gulch are expected to decrease with this plan as portions of the existing Tallman basin primarily along the proposed Coyote Track Lane will no longer drain to Tallman Gulch. Reduced flows are not expected to have an impact on stability of Tallman Gulch. As such, the lot lines shown on the June 2023 plan provide adequate room for the stream corridor. Key to ERC's conclusion that lot lines are sufficient and impacts are not expected in Tallman Gulch is the drainage swale that is illustrated along the back of lots 10 – 19. Per discussions with Rick Engineering this swale will capture flows from back lots and direct them to the detention basin west of the confluence of Tallman Gulch and Long Outfall. We believe that this drainage with critical to the stability of the system. If this swale is not included in the design or if it is not maintained in the future to provide adequate capacity then we would expect concentrated flows from the back lots to run down the steep side slopes towards Tallman Gulch. Concentrated flows in these areas would be very likely to cause erosion of the slopes which could migrate towards lots 10 – 19. For this reason ERC recommends that the design and maintenance of this facility be considered critical to the development.

We also think that irrigation practices on lots 10 – 19 will be critical to the stability of the area. Excessive irrigation on these lots could result in seepage occurring on the steep slopes between these lots and Tallman Gulch. Seepage has the potential to reduce slope stability and could lead to excessive erosion and slope migration. This potential issue could likely be mitigated through limitations to irrigated areas on these lots.

Please let me know if you have any questions about these conclusion.

Regards,
Troy

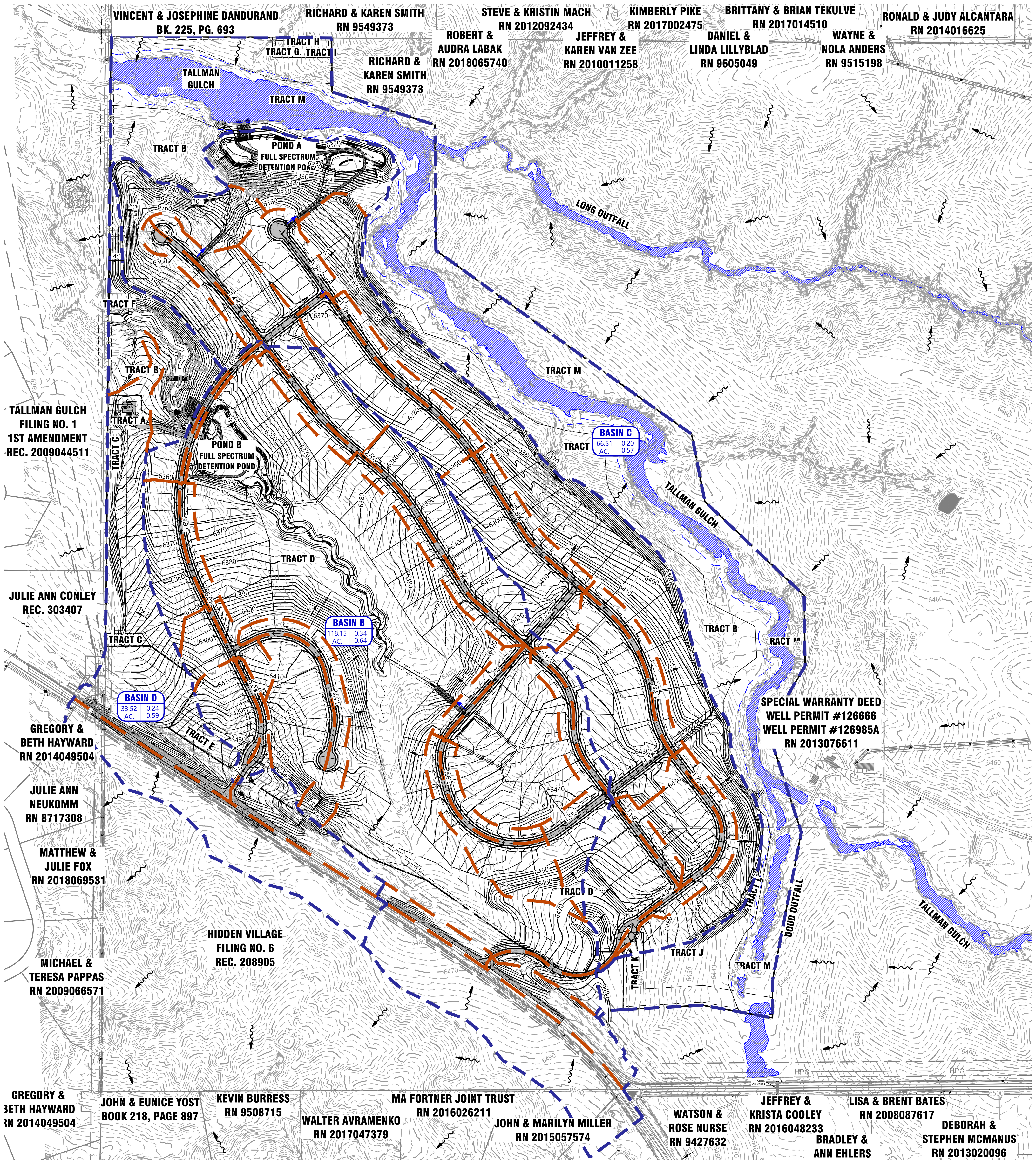
Troy Thompson, PE
President
Ecological Resource Consultants

ERC

225 Union Blvd, Suite 325 | Lakewood, CO 80228
303-679-4820 x 101
www.erccolorado.net

Appendix D. Drainage Maps

D1 Phase III Drainage Maps



Detention Pond A Volume Table				
	Required Vol. (ac-ft.)	Provided Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	N/A	6312.00	0.00
WQCV	1.225	1.234	6315.43	3.43
EURV	1.886	3.121	6316.82	4.82
100-yr	6.593	7.215	6318.89	6.89
Emergency Overflow Weir	N/A	N/A	6318.90	6.90
Emergency Overflow WSE	N/A	N/A	6319.85	7.85
Freeboard / Top of Pond	N/A	N/A	6321.00	9.00
			100-yr Allowable Release=	67.47
			100-yr Release=	64.06

Detention Pond B Volume Table				
	Required Vol. (ac-ft.)	Provided Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	N/A	6342.65	0.00
WQCV	1.718	1.718	6346.13	3.48
EURV	2.437	4.156	6347.75	5.10
100-yr	9.201	9.701	6350.52	7.87
Emergency Overflow Weir	N/A	N/A	6351.90	9.25
Emergency Overflow WSE	N/A	N/A	6352.86	10.21
Freeboard / Top of Pond	N/A	N/A	6353.81	11.16
			100-yr Allowable Release=	133.91
			100-yr Release=	131.59

Summary Runoff Table					
Design Point/Inlet	Tributary Basins	Tributary Area	Composite Imprev. %	Runoff (CFS)	
				5-Year	100-Year
A1	A-1	6.90	43	12.46	32.51
Inlet SA2-3	A-2	7.62	35	6.32	22.54
Inlet SA2-5	A-3	3.67	46	6.69	33.33
Inlet SA2-6	A-4	1.48	49	4.11	13.73
Inlet SA3-5A	A-5	3.27	47	3.97	17.84
Inlet SA3-9	A-6	5.17	44	5.78	34.06
Inlet SA3-10	A-7	1.84	48	3.08	15.27
Inlet SA3-14	A-8	5.31	44	7.79	35.97
Inlet SA3-15	A-9	1.55	48	2.65	12.20
Inlet SA3-19	A-10	7.29	43	8.10	29.10
Inlet SA3-20	A-11	1.68	47	2.34	9.49
Inlet SA4-4	A-12	3.16	44	4.00	12.32
Inlet SA4-3	A-13	2.11	49	3.52	10.05
Inlet SA4-7	A-14	4.79	38	6.10	20.73
Inlet SA4-6	A-15	0.88	49	1.43	4.11
Inlet SA3-3	A-16	22.68	34	18.30	65.91
B1	B-1	48.88	37	41.01	146.93
Inlet SB3-5	B-2	1.09	49	1.98	19.31
Inlet SB3-4	B-3	3.49	43	4.88	21.50
Inlet SB3-9	B-4	1.16	46	5.19	26.07
Inlet SB3-8	B-5	1.48	42	2.88	12.65
Inlet SB3-12	B-6	0.79	53	1.48	4.05
Inlet SB3-11	B-7	2.63	44	3.63	11.18
Inlet SB2-2	B-8	0.52	65	1.32	11.84
Inlet SB2-4	B-9	1.18	50	2.27	12.72
Inlet SB2-8	B-10	1.21	48	1.81	7.53
Inlet SB2-9	B-11	2.97	43	4.89	24.98
Inlet SB6-3	B-12	2.19	48	3.29	9.49
Inlet SB6-4	B-13	5.73	44	7.54	25.29
Inlet SB5-4	B-14	1.04	49	5.62	11.54
Inlet SB5-10	B-15	8.88	41	9.68	42.06
Inlet SB5-9	B-16	1.39	49	2.19	6.28
Inlet SB5-13	B-17	3.79	44	4.43	19.46
Inlet SB5-14	B-18	1.38	49	2.15	6.17
Inlet SB3-17	B-19	5.00	43	6.21	19.45
Inlet SB3-15	B-20	2.91	43	3.38	10.49
B21	B-21	1.22	34	1.50	5.38
B22	B-22	11.41	25	7.19	31.82
FES SB7-2	B-23, B-24	2.70	33	3.78	14.00
Inlet SB5-8	B-25	3.89	39	4.26	14.13
CH1	B-1, B-12, B-13, B-14, B-15, B-16, B-17, B-18, B-21, B-22, B-23, B-24, B-25	93.72	36	61.43	214.84
C1	C-1	66.51	20	77.88	152.63
D1	D-1	33.52	24	19.17	85.18
D2	D-2	14.34	27	20.46	47.70
FES SD1-2	D-3	3.32	28	9.14	12.78
D4	D-4	9.09	24	6.09	27.60
DP 301	--	--	--	--	132.19
DP 303	--	--	--	--	527.41
DP 304	--	--	--	--	633.89
DP 306	--	--	--	--	933.98
DP 307	--	--	--	--	1006.14

NOTE 1: Runoff values include carryover flow from upstream basins where applicable

NOTE 2: 100-yr flowrates for DP 301 to 30X are taken from the Sulphur Gulch FHAD

LEGEND

- Property Line
- Right of Way Line
- Centerline
- Swale Line
- Storm Sewer Line
- Ex. Storm Sewer Line
- Major Basin Boundary Line
- Minor Basin Boundary Line
- Proposed Major Contour
- Proposed Minor Contour
- Existing Major Contour
- Existing Minor Contour
- Flow Direction Arrow
- Emergency Overflow Arrow
- Drainage Basin ID
- Ex. Drainage Basin ID
- Ex. Asphalt Pavement
- Ex. Concrete Pavement
- Prop. Asphalt Pavement
- Prop. Concrete Pavement
- Prop. Mill & Overlay Asphalt
- Non-FEMA Floodplain

FINAL DRAINAGE NOTES:

1. THE STORM SEWER IS SIZED FOR THE 100-YEAR STORM EVENT.
2. ALL STORM SEWER SYSTEMS ARE PUBLIC UNLESS OTHERWISE NOTED.
3. SUMP INLETS ARE IDENTIFIED IN THE PLANS AS "(S.)".

PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD, 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

100 0 50 100
SCALE
1 inch = 100 ft.

LJA ENGINEERING
1765 W. 121st Avenue
Suite 300
Westminster, CO 80234
303-421-4224 • www.lja.com

Revision Type:
No. | Rev. Date:
1 2 3 4 5 6

Sheet: 1 of 6
Date: November 26, 2024
Job No.: 1097-0004
Scale Horiz: 1" = 100'
Scale Vert: N/A
Designed: T.BS
Prepared: CGM
Approved: DKH

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Overall Drainage Map

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No. 1

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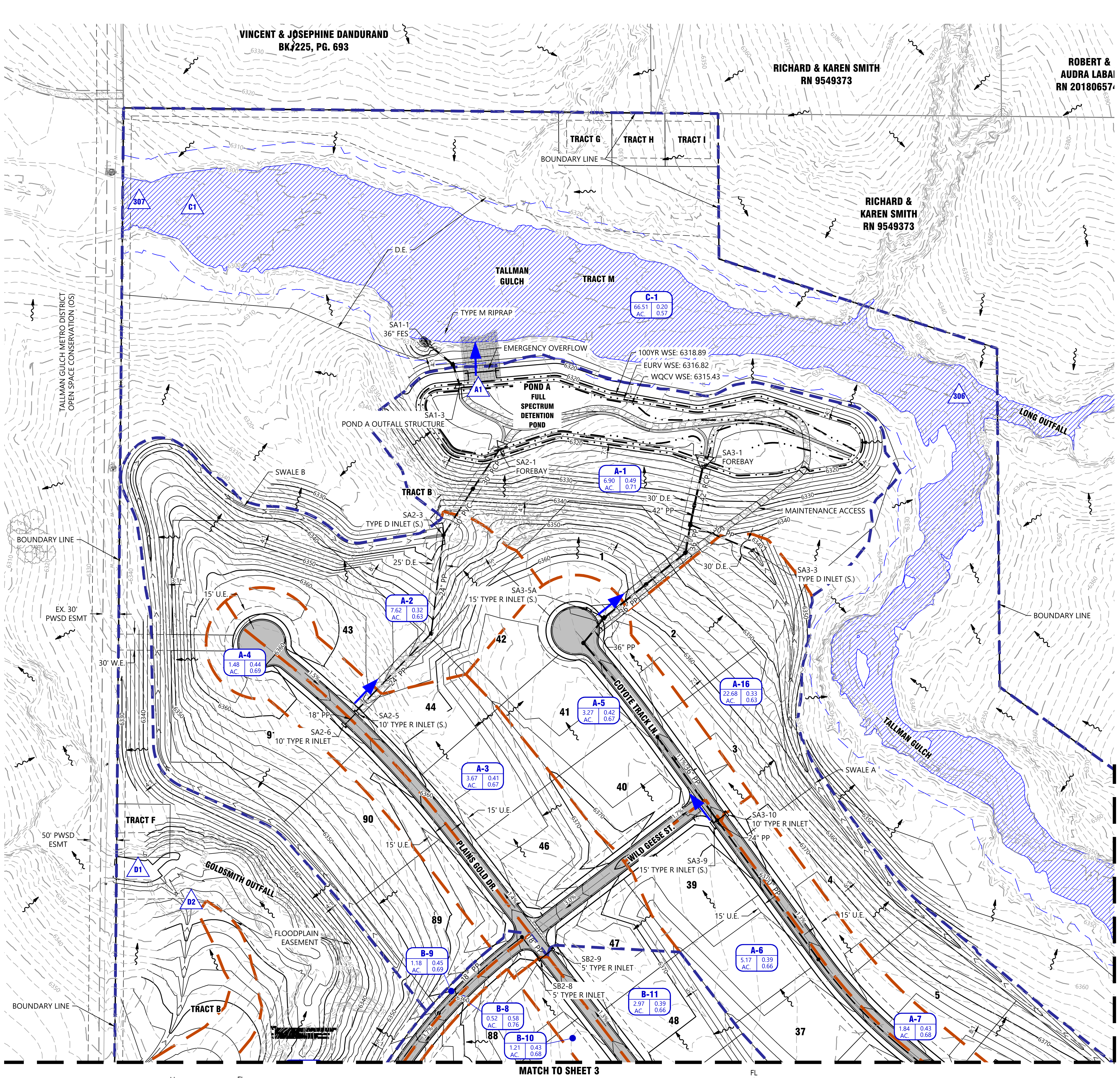

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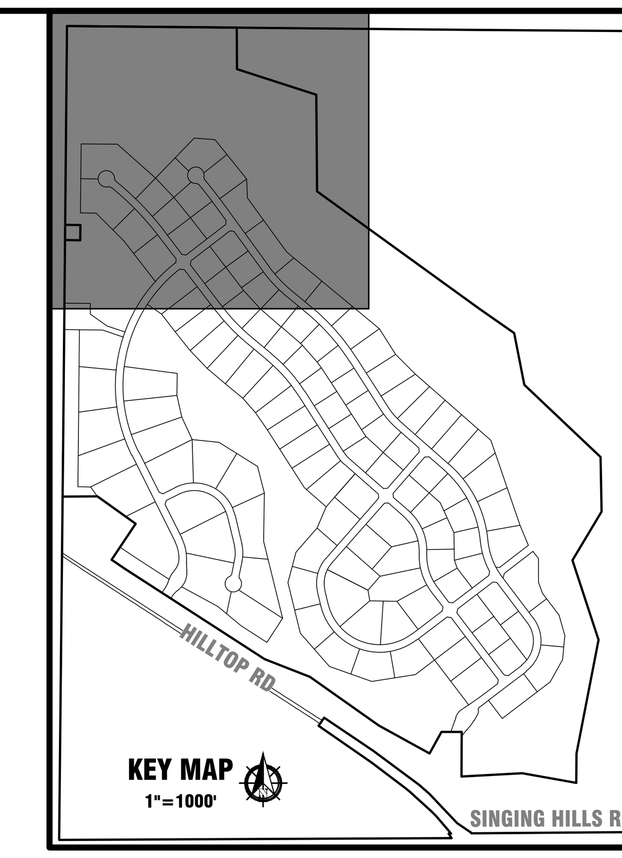

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Detention Pond A Volume Table

	Required Vol. (ac-ft.)	Provided Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	N/A	6312.00	0.00
WQCV	1.225	1.234	6315.43	3.43
EURV	1.886	3.121	6316.82	4.82
100-yr	6.593	7.215	6318.89	6.89
Emergency Overflow Weir	N/A	N/A	6318.90	6.90
Emergency Overflow WSE	N/A	N/A	6319.85	7.85
Freeboard / Top of Pond	N/A	N/A	6321.00	9.00
100-yr Allowable Release=				67.47
100-yr Release=				64.06

Summary Runoff Table

Design Point/Inlet	Tributary Basins	Tributary Area	Composite Imprev. %	Runoff (CFS) 5-Year	Runoff (CFS) 100-Year
A1	A-1	6.90	43	12.46	32.51
Inlet SA2-3	A-2	7.62	35	6.32	22.54
Inlet SA2-5	A-3	3.67	46	6.69	33.33
Inlet SA2-6	A-4	1.48	49	4.11	13.73
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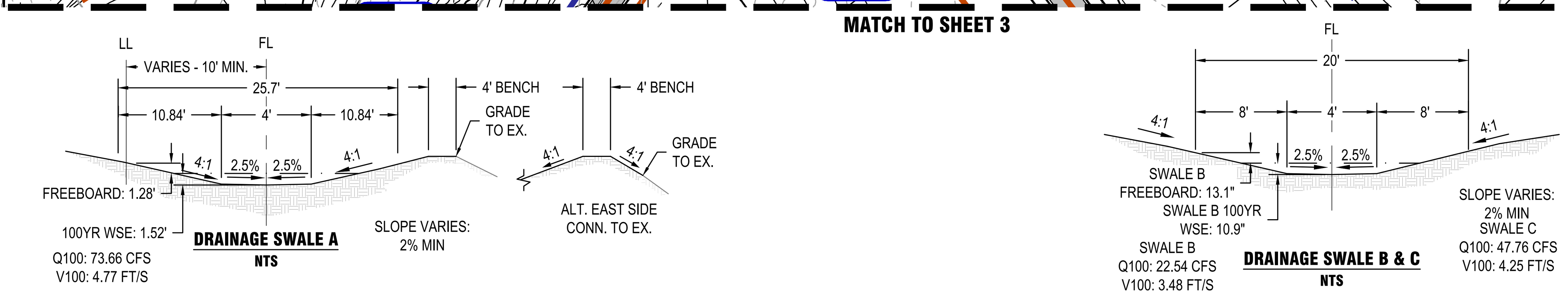
Inlet SA3-3	A-16	22.68	34	18.30	65.91
Inlet SB2-2	B-8	0.52	65	1.32	11.84
Inlet SB2-4	B-9	1.18	50	2.27	12.72
Inlet SB2-8	B-10	1.21	48	1.81	7.53
Inlet SB2-9	B-11	2.97	43	4.89	24.98

NOTE 1: Runoff values include carryover flow from upstream basins where applicable



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2		
3		
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5		
6		

Designed: T.BS
Prepared: CGM
Approved: DKH
Job No.: 1097-0004
Scale Horiz: 1" = 100'
Scale Vert: N/A
Sheet: 2 of 6
Date: November 26, 2024

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Final Drainage Map

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No. 2

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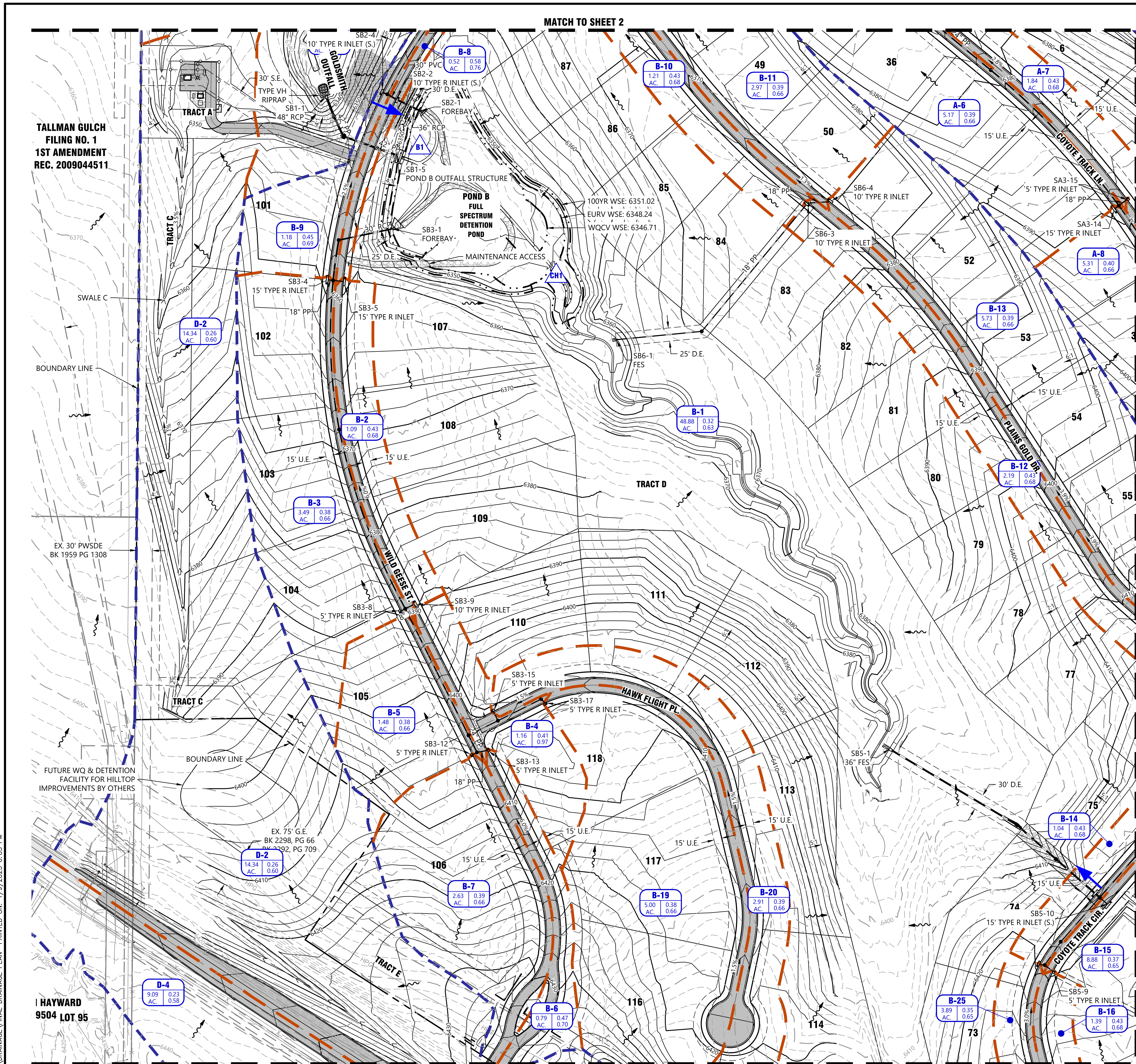

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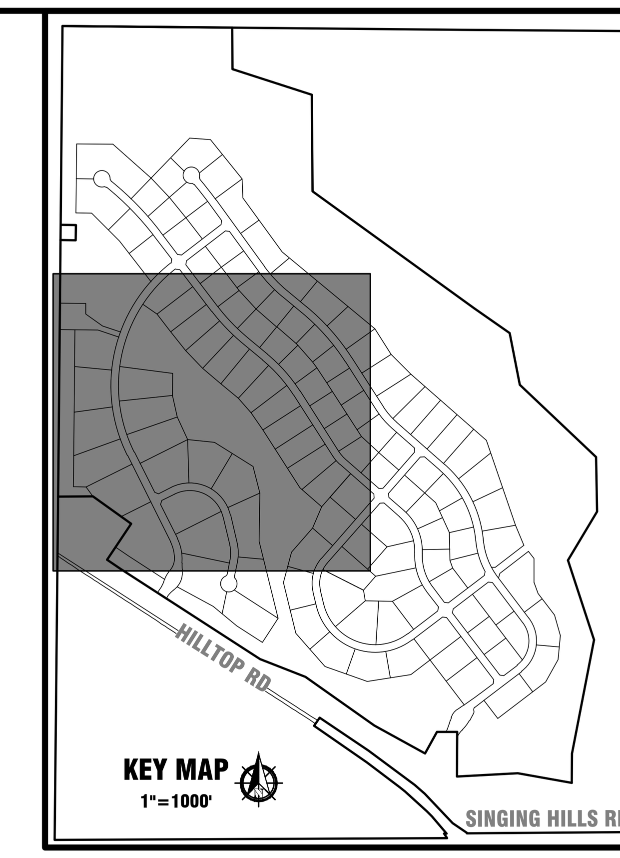

Detention Pond B Volume Table				
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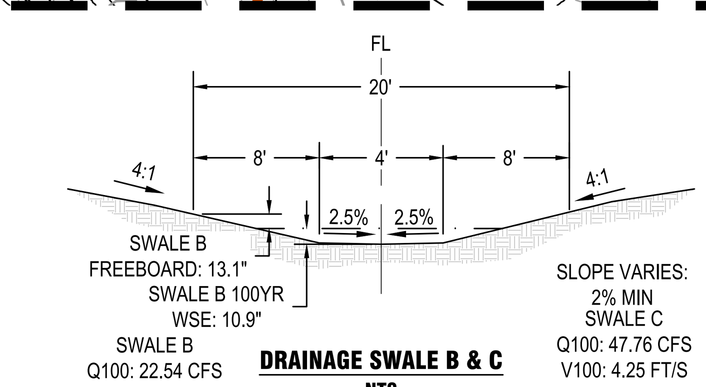
Inlet SB3-8	B-5	1.48	42	2.88	12.65
Inlet SB3-12	B-6	0.79	53	1.48	4.05
Inlet SB3-11	B-7	2.63	44	3.63	11.18
Inlet SB2-2	B-8	0.52	65	1.32	11.84
Inlet SB2-4	B-9	1.18	50	2.27	12.72
Inlet SB2-8	B-10	1.21	48	1.81	7.53
Inlet SB2-9	B-11	2.97	43	4.89	24.98
Inlet SB6-3	B-12	2.19	48	3.29	9.49
Inlet SB6-4	B-13	5.73	44	7.54	25.29
Inlet SB5-9	B-16	1.39	49	2.19	6.28
Inlet SB3-17	B-19	5.00	43	6.21	19.45
Inlet SB3-15	B-20	2.91	43	3.38	10.49
Inlet SB5-8	B-25	3.89	39	4.26	14.13
CH1	B-1, B-12, B-13, B-14, B-15, B-16, B-17, B-18, B-21, B-22, B-23, B-24, B-25	93.72	36	61.43	214.84
D1	D-1	6.77	24	29.38	28.03
D2	D-2	14.34	27	20.46	47.70
D4	D-4	9.09	24	6.09	27.60

NOTE 1: Runoff values include carryover flow from upstream basins where applicable



DRAINAGE SWALE B & C
NTS

PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD, 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

SCALE 100 0 50 100
1 inch = 100 ft.

LJA ENGINEERING
1765 W. 121st Avenue
Suite 300
Westminster, CO 80234
303-421-4224 • www.lja.com

No.	Rev. Date:	Revision Type:
1		
2		
3		
4		
5		
6		

Designed: T.BS
Prepared: CGM
Approved: DKH
Job No.: 1097-0004
Scale Horiz: 1" = 100'
Scale Vert: N/A
Sheet: 3 of 6
Date: November 26, 2024

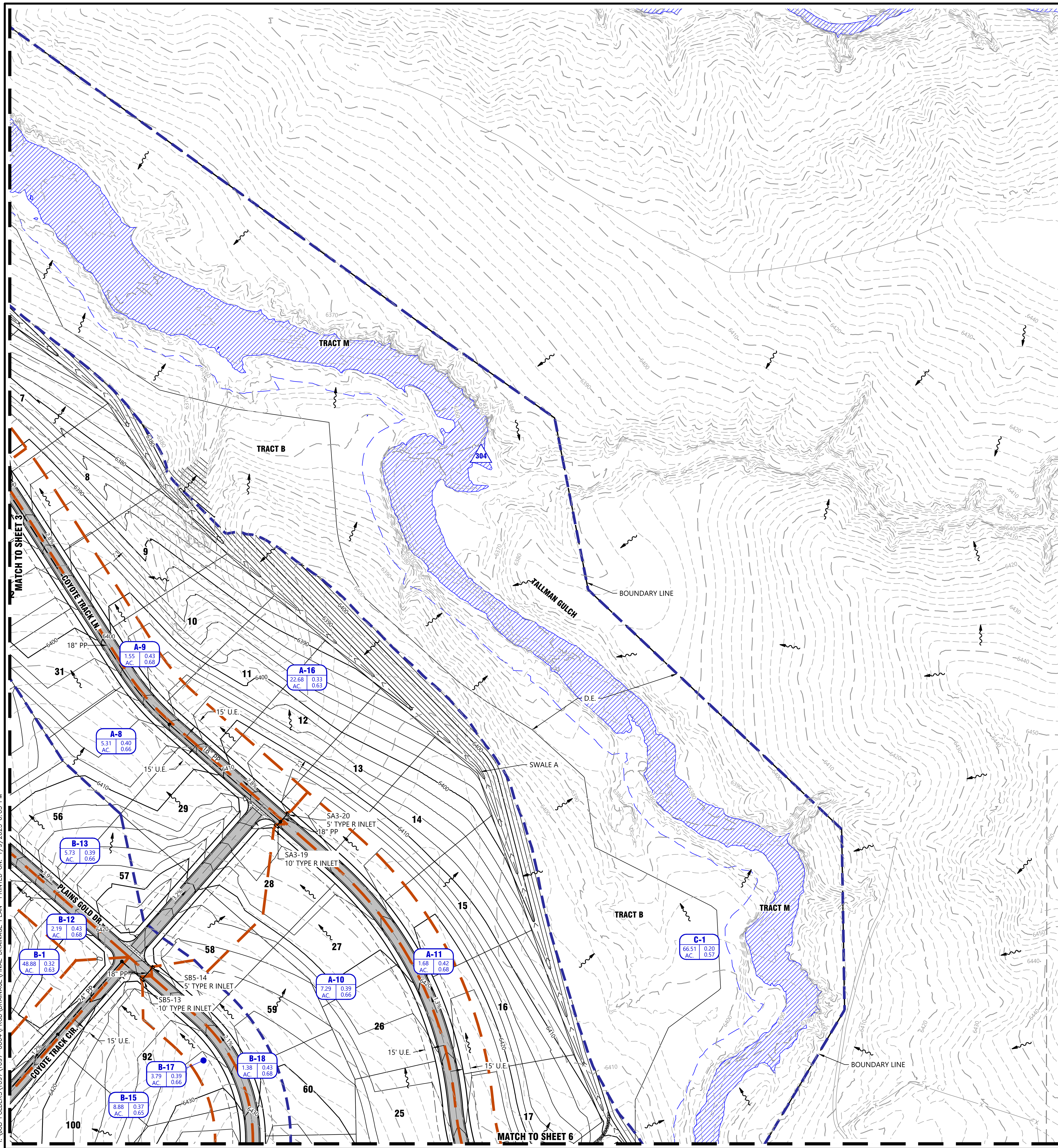
Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Final Drainage Map

NOT FOR CONSTRUCTION

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

No. 3

I:\JOB FOLDERS\1097\1097-0004\PROD\DRAINAGE\FINAL DRAINAGE PLAN PRINTED ON: 1/9/2025 6:03 PM



FINAL DRAINAGE NOTES:

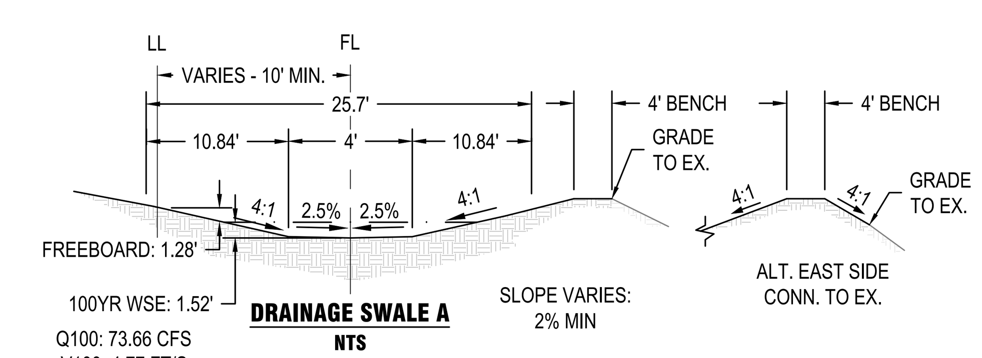
1. THE STORM SEWER IS SIZED FOR THE 100-YEAR STORM EVENT.
2. ALL STORM SEWER SYSTEMS ARE PUBLIC UNLESS OTHERWISE NOTED.
3. SUMP INLETS ARE IDENTIFIED IN THE PLANS AS "(S.)".

Summary Runoff Table

Design Point/Inlet	Tributary Basins	Tributary Area	Composite Imprev. %	Runoff (CFS) 5-Year	Runoff (CFS) 100-Year
Inlet SA3-14	A-8	5.31	44	7.79	35.97
Inlet SA3-15	A-9	1.55	48	2.65	12.20
Inlet SA3-19	A-10	7.29	43	8.10	29.10
Inlet SA3-20	A-11	1.68	47	2.34	9.49
Inlet SA3-3	A-16	22.68	34	18.30	65.91
Inlet SB6-3	B-12	2.19	48	3.29	9.49
Inlet SB6-4	B-13	5.73	44	7.54	25.29
Inlet SB5-4	B-14	1.04	49	5.62	11.54
Inlet SB5-10	B-15	8.88	41	9.68	42.06
Inlet SB5-13	B-17	3.79	44	4.43	19.46
Inlet SB5-14	B-18	1.38	49	2.15	6.17
DP 304	--	--	--	--	633.89

NOTE 1: Runoff values include carryover flow from upstream basins where applicable

NOTE 2: 100-yr flowrates for DP 301 to 30X are taken from the Sulphur Gulch FHAD



PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD, 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

SCALE
100 0 50 100
1 inch = 100 ft.

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No.	Rev. Date:	Revision Type:
1		
2		
3		
4		
5		
6		

Designed: T.BS
Prepared: CGM
Approved: DKH

Job No.: 1097-0004
Scale Horiz: 1" = 100'
Scale Vert: N/A

Sheet: 4 of 6
Date: November 26, 2024

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Final Drainage Map

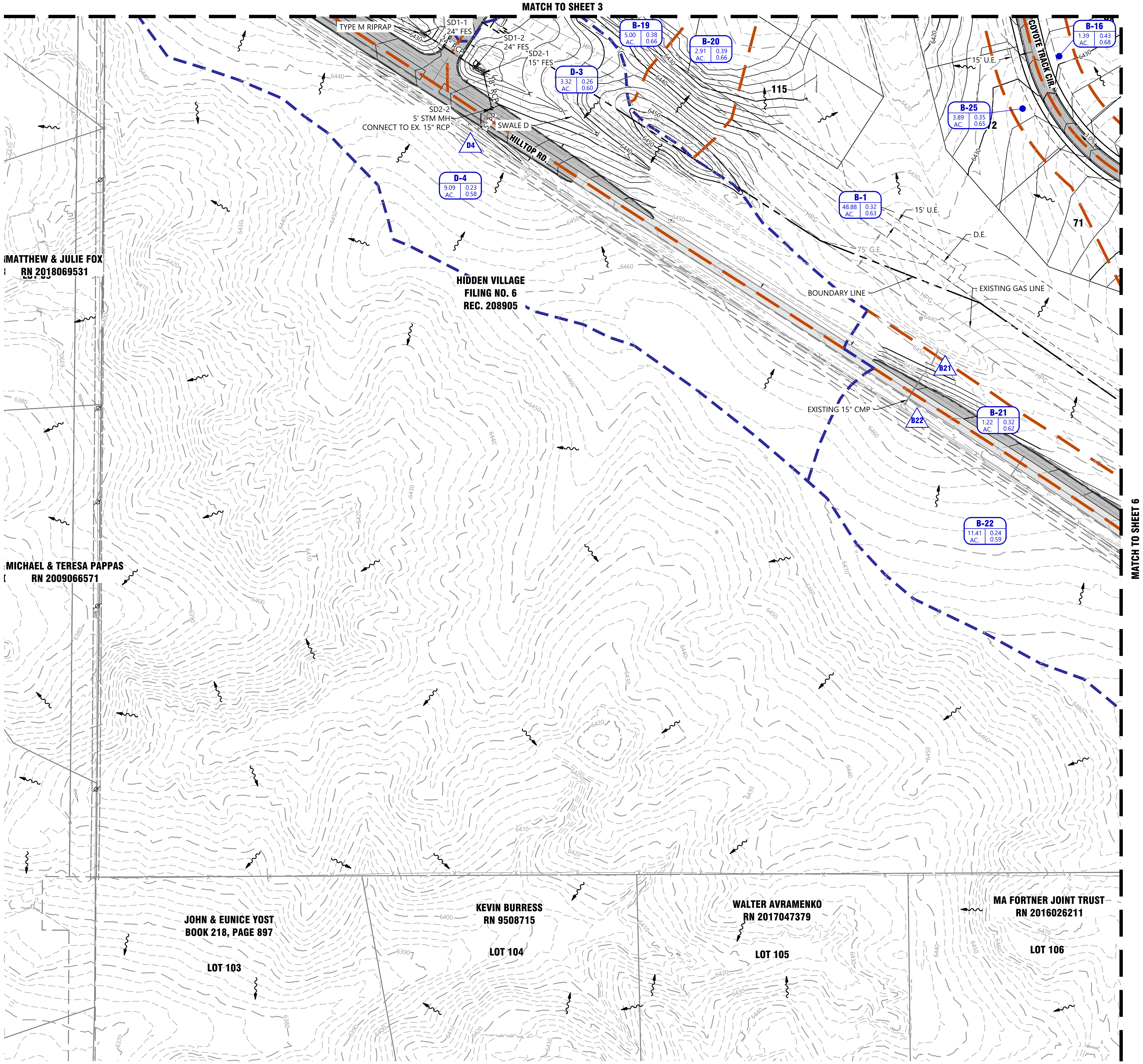
NOT FOR CONSTRUCTION

811
Know what's below.
Call before you dig.

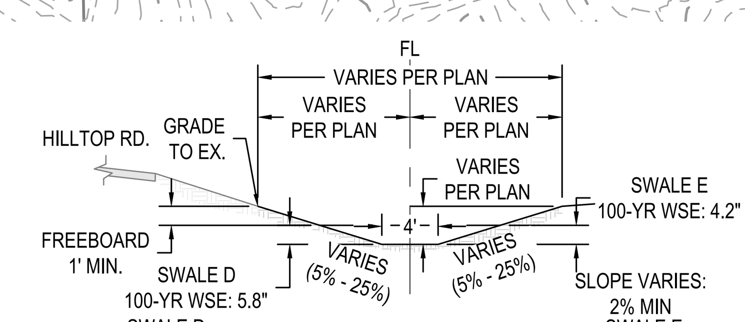
No. 4

I:\JOB FOLDERS\1097-0004\PROD\DRAINAGE\FINAL DRAINAGE PLAN PRINTED ON: 1/9/2025 6:03 PM

MATCH TO SHEET 3



MATCH TO SHEET 6



DRAINAGE SWALE D & E
NTS

FINAL DRAINAGE NOTES:

1. THE STORM SEWER IS SIZED FOR THE 100-YEAR STORM EVENT.
2. ALL STORM SEWER SYSTEMS ARE PUBLIC UNLESS OTHERWISE NOTED.
3. SUMP INLETS ARE IDENTIFIED IN THE PLANS AS "(S.)".

Summary Runoff Table

Design Point/Inlet	Tributary Basins	Tributary Area	Composite Imprev. %	Runoff (CFS) 5-Year	Runoff (CFS) 100-Year
B1	B-1	48.88	37	41.01	146.93
Inlet SB5-9	B-16	1.39	49	2.19	6.28
Inlet SB3-17	B-19	5.00	43	6.21	19.45
Inlet SB3-15	B-20	2.91	43	3.38	10.49
B21	B-21	1.22	34	1.50	5.38
B22	B-22	11.41	25	7.19	31.82
Inlet SB5-8	B-25	3.89	39	4.26	14.13
FES SD1-2	D-3	3.32	28	9.14	12.78
D4	D-4	9.09	24	6.09	27.60

NOTE 1: Runoff values include carryover flow from upstream basins where applicable

PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD, 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

100 0 50 100
SCALE
1 inch = 100 ft.

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No.	Rev. Date:	Revision Type:
1		
2		
3		
4		
5		
6		

Designed: T.BS
Prepared: CGM
Approved: DKH

Job No.: 1097-0004
Scale Horiz: 1" = 100'
Scale Vert: N/A

Sheet: 5 of 6
Date: November 26, 2024

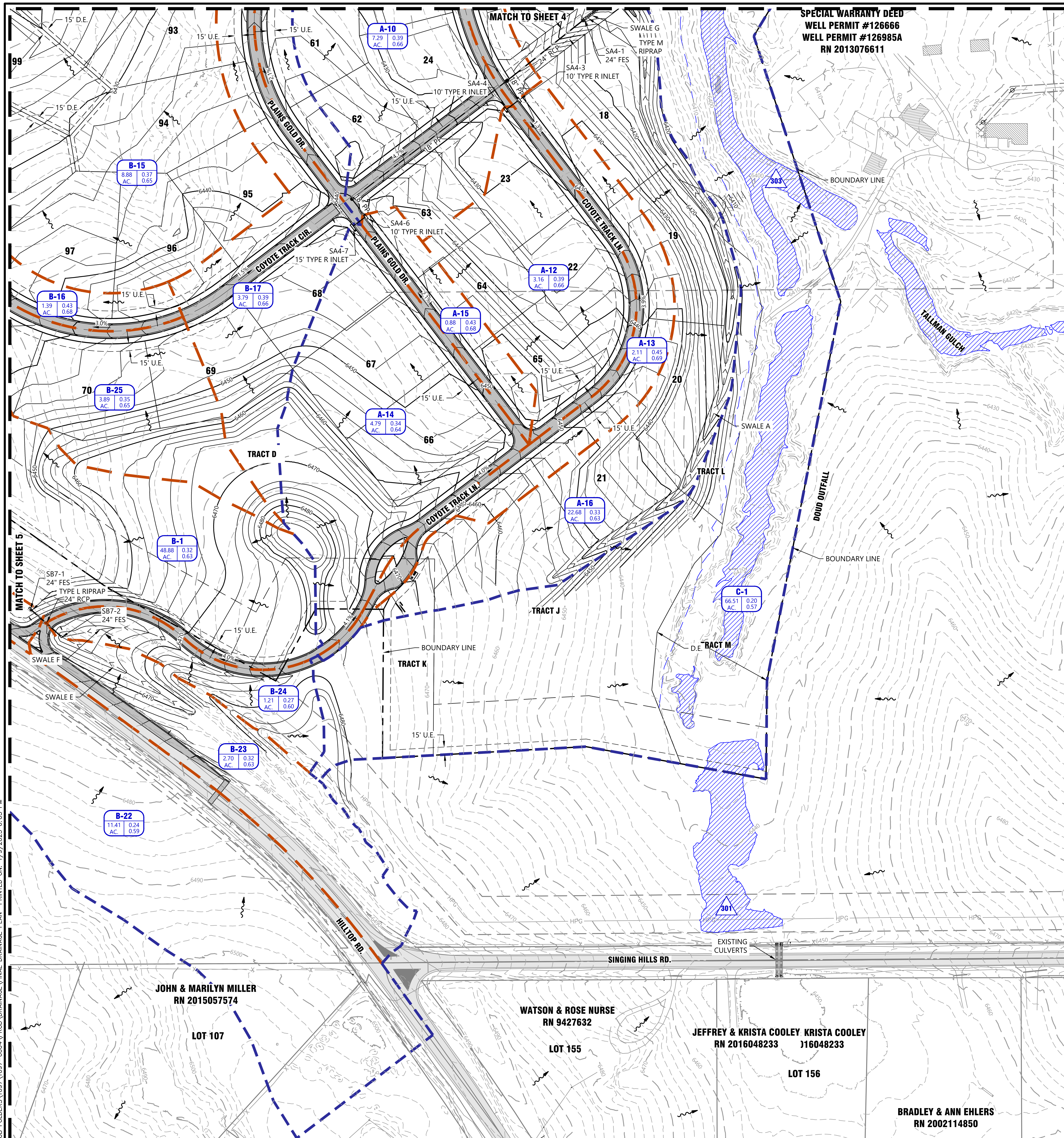
Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Final Drainage Map

NOT FOR CONSTRUCTION

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

No. 5

I:\JOB FOLDERS\1097\1097-0004\PROD\DRAINAGE\FINAL DRAINAGE PLAN PRINTED ON: 1/9/2025 6:03 PM



FINAL DRAINAGE NOTES:

1. THE STORM SEWER IS SIZED FOR THE 100-YEAR STORM EVENT.
2. ALL STORM SEWER SYSTEMS ARE PUBLIC UNLESS OTHERWISE NOTED.
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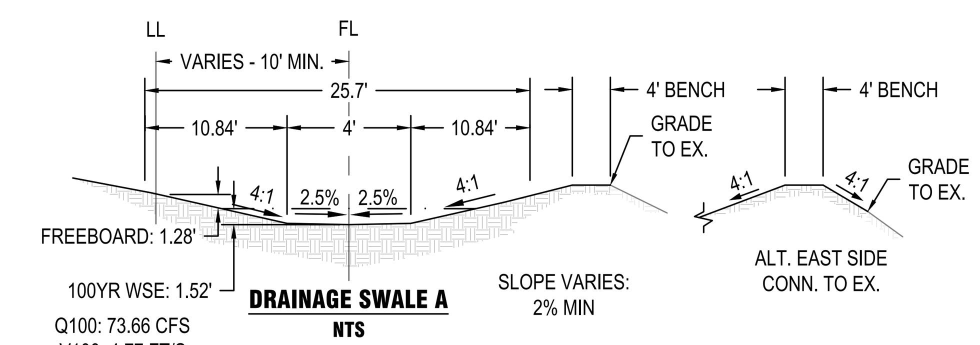
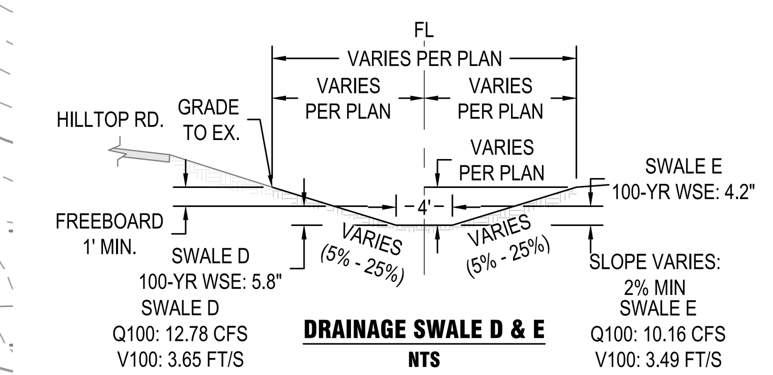
Summary Runoff Table

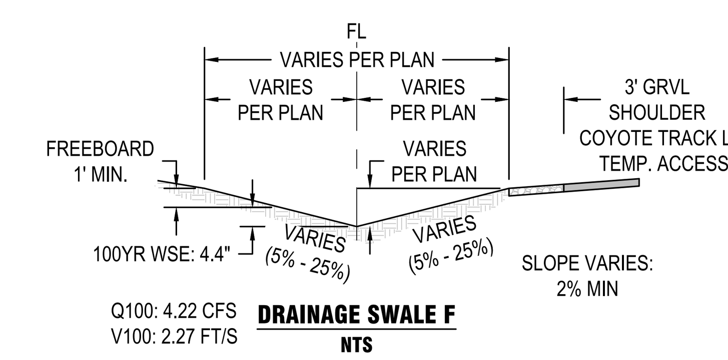
Design Point/Inlet	Tributary Basins	Tributary Area	Composite Imprev. %	Runoff (CFS) 5-Year	Runoff (CFS) 100-Year
Inlet SA3-19	A-10	7.29	43	8.10	29.10
Inlet SA3-20	A-11	1.68	47	2.34	9.49
Inlet SA4-4	A-12	3.16	44	4.00	12.32
Inlet SA4-3	A-13	2.11	49	3.52	10.05
Inlet SA4-7	A-14	4.79	38	6.10	20.73
Inlet SA4-6	A-15	0.88	49	1.43	4.11
Inlet SA3-3	A-16	22.68	34	18.30	65.91
A1	A-1	6.90	43	12.46	32.51
B1	B-1	48.88	37	41.01	146.93
Inlet SB5-10	B-15	8.88	41	9.68	42.06
Inlet SB5-9	B-16	1.39	49	2.19	6.28
Inlet SB5-13	B-17	3.79	44	4.43	19.46
Inlet SB5-14	B-18	1.38	49	2.15	6.17
B22	B-22	11.41	25	7.19	31.82
FES SB7-2	B-23, B-24	2.70	33	3.78	14.00
Inlet SB5-8	B-25	3.89	39	4.26	14.13
C1	C-1	66.51	20	77.88	152.63
DP 301	--	--	--	--	132.19
DP 303	--	--	--	--	527.41

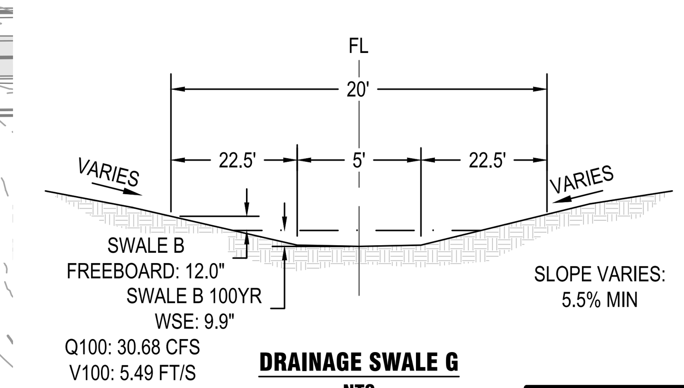
NOTE 1: Runoff values include carryover flow from upstream basins where applicable

NOTE 2: 100-yr flowrates for DP 301 to 30X are taken from the Sulphur Gulch FHAD









PROJECT BENCHMARK:

BENCHMARK NGS CONTROL MONUMENT Z-336, BEING A STANDARD DISK IN TOP OF CONCRETE MONUMENT. MONUMENT IS LOCATED 2.55 MILES WEST ALONG STATE HIGHWAY 86 FROM JONES MOTOR COMPANY BUILDING AT ELIZABETH. 550 FEET WEST OF "T" ROAD, 1 FOOT SOUTH OF FENCE, AND 2 FEET EAST OF WITNESS POST ON NORTH SIDE OF HIGHWAY.

NAVD 88 ELEV = 6612.35'

SCALE 1 inch = 100 ft.

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Suite 300
Westminster, CO 80234
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Sheet: 6 of 6
Date: November 26, 2024
Job No.: 1097-0004
Scale Horiz: 1" = 100'
Scale Vert: N/A
Designed: T.BS
Prepared: CGM
Approved: DKH

Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Final Drainage Map

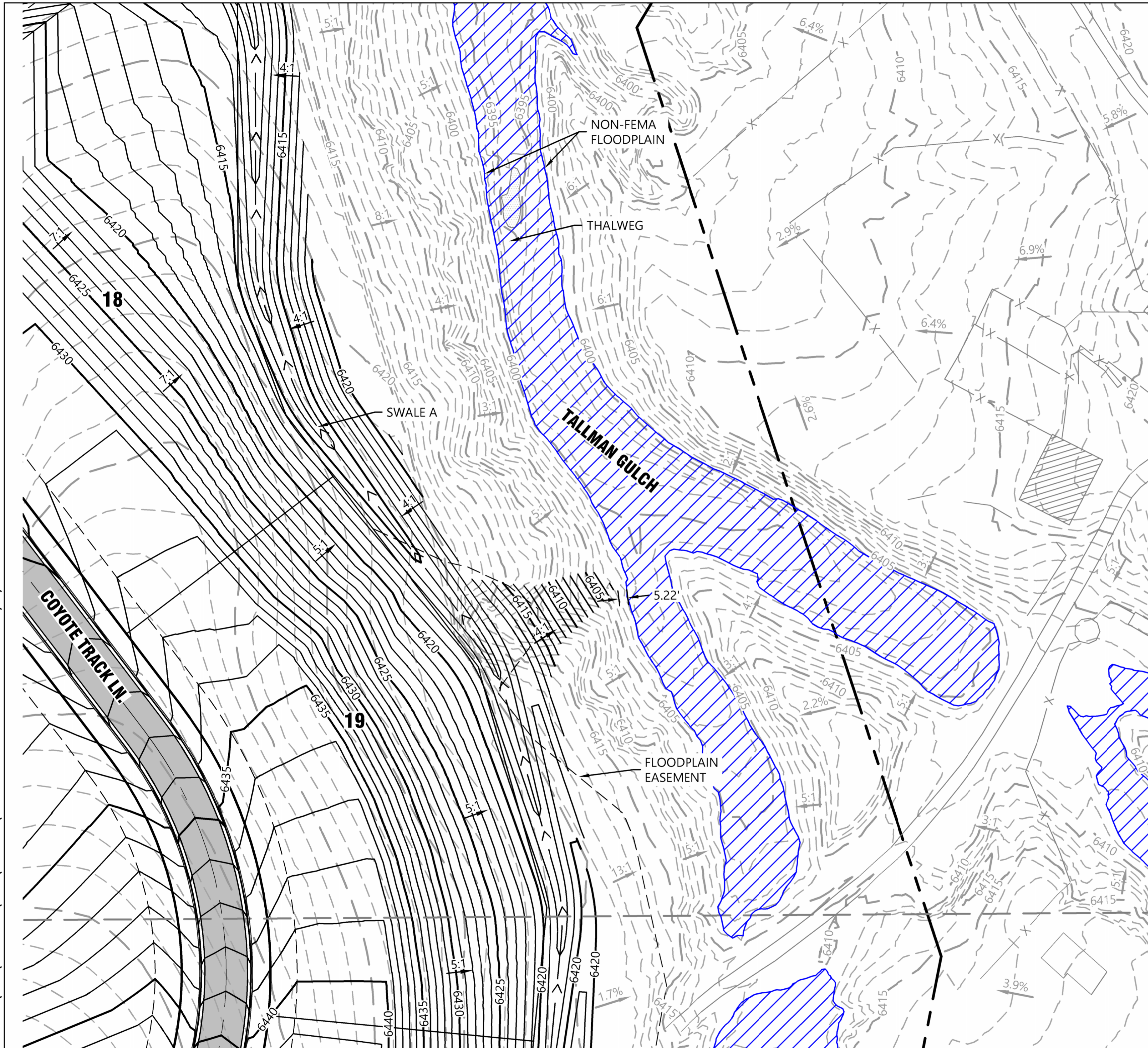
NOT FOR CONSTRUCTION

Know what's below. Call before you dig.

No. 6

I:\JOB FOLDERS\1097\1097-0004\PROD\DRAINAGE\FINAL DRAINAGE PLAN PRINTED ON: 1/9/2025 6:03 PM

D2 Tallman Gulch Exhibit



LEGEND

- Property Line
- Right of Way Line
- Centerline
- Swale Line
- Storm Sewer Line
- Ex. Storm Sewer Line
- Proposed Major Contour (5280)
- Proposed Minor Contour
- Existing Major Contour (5280)
- Existing Minor Contour
- Flow Direction Arrow
- Ex. Asphalt Pavement
- Ex. Concrete Pavement
- Prop. Asphalt Pavement
- Prop. Concrete Pavement
- Prop. Mill & Overlay Asphalt
- Non-FEMA Floodplain

SCALE
60 0 30 60
1 inch = 60 ft.

LJA

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Suite 300
Westminster, CO 80234
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Proj. Name: The Fields Filing No. 1
Location: Douglas County, Colorado
Plan Set: Final Drainage Maps
Sheet Name: Tallman Gulch Exhibit

Date: September 20, 2024
Job No.: 1097-0004
Scale H: 1" = 50'
Scale V: N/A
Prepared: CGM
Approved: CGM

811
Know what's below.
Call before you dig.

No. 1 of 1

I:\JOB FOLDERS\1097\1097-0004\PROD\DRAINAGE\TALLMAN GULCH EXHIBIT PRINTED ON: 9/17/2024 11:53 AM

FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

282.052 ACRES - 118 LOTS - 14 TRACTS / SB2024-041

OWNERSHIP AND DEDICATION

KNOW ALL MEN BY THESE PRESENTS THAT THE UNDERSIGNED, BEING THE OWNERS, AND/OR LIEN HOLDER OF THAT PART OF SECTION 5, TOWNSHIP 7 NORTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF DOUGLAS, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

THAT PORTION OF SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF DOUGLAS, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BASIS OF BEARINGS: BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 5, BEING ASSUMED TO BEAR SOUTH 89°26'46" EAST, SAID LINE BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP ON 2" PIPE (STAMPING ILLEGIBLE) AND ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A FOUND 2.5" ALUMINUM CAP ON 2" PIPE STAMPED "PLS 6935", WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 5;

THENCE ALONG SAID NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 5, SOUTH 89°26'46" EAST A DISTANCE OF 1,118.05 FEET;

THENCE DEPARTING SAID NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 5 AND ALONG THE FOLLOWING TWENTY-NINE (29) COURSES:

1) SOUTH 00°21'43" EAST A DISTANCE OF 273.50 FEET;
2) SOUTH 72°10'45" EAST A DISTANCE OF 549.06 FEET;
3) SOUTH 00°27'53" EAST A DISTANCE OF 636.91 FEET;
4) SOUTH 54°10'26" EAST A DISTANCE OF 1,315.05 FEET;
5) SOUTH 54°54'12" EAST A DISTANCE OF 282.82 FEET;
6) SOUTH 11°02'21" EAST A DISTANCE OF 347.63 FEET;
7) SOUTH 46°36'35" EAST A DISTANCE OF 692.86 FEET;
8) SOUTH 00°54'50" EAST A DISTANCE OF 358.87 FEET;
9) SOUTH 30°46'30" WEST A DISTANCE OF 372.83 FEET;
10) SOUTH 18°08'07" EAST A DISTANCE OF 550.61 FEET;
11) SOUTH 11°00'15" WEST A DISTANCE OF 761.48 FEET;
12) SOUTH 00°33'09" WEST A DISTANCE OF 521.58 FEET TO A POINT 30.00 FEET NORTH OF THE SOUTH LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 5;
13) ALONG A LINE PARALLEL WITH AND 30.00 FEET NORTH OF SAID SOUTH LINE OF THE SOUTHEAST QUARTER OF SECTION 5, SOUTH 89°34'33" WEST A DISTANCE OF 668.25 FEET;
14) NORTH 00°25'34" WEST A DISTANCE OF 4.31 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE NORTHEAST;
15) ALONG SAID NON-TANGENT CURVE CONCAVE NORTHEASTERLY A DISTANCE OF 113.13 FEET, SAID CURVE HAVING A RADIUS OF 185.42 FEET AND A CENTRAL ANGLE OF 34°57'27" (THE CHORD OF WHICH BEARS N 56°20'47" W, 111.38') TO THE BEGINNING OF A REVERSE CURVE CONCAVE TO THE SOUTHWEST;
16) ALONG SAID CURVE CONCAVE SOUTHWESTERLY A DISTANCE OF 267.50 FEET, SAID CURVE HAVING A RADIUS OF 1,616.44 FEET AND A CENTRAL ANGLE OF 09°28'54" (THE CHORD OF WHICH BEARS N 43°29'34" W, 267.19');
17) NORTH 48°58'46" WEST A DISTANCE OF 89.46 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTHWEST;
18) THENCE ALONG SAID CURVE CONCAVE SOUTHWESTERLY A DISTANCE OF 377.97 FEET, SAID CURVE HAVING A RADIUS OF 2,525.03 FEET AND A CENTRAL ANGLE OF 08°34'36" (THE CHORD OF WHICH BEARS N 53°16'04 W, 377.62')
19) NORTH 56°10'03" WEST A DISTANCE OF 388.64 FEET;
20) SOUTH 34°18'52" WEST A DISTANCE OF 34.05 FEET;
21) NORTH 56°36'57" WEST A DISTANCE OF 33.03 FEET;
22) NORTH 57°12'15" WEST A DISTANCE OF 229.95 FEET;
23) NORTH 57°10'50" WEST A DISTANCE OF 328.49 FEET;
24) NORTH 57°16'15" WEST A DISTANCE OF 292.22 FEET;
25) NORTH 56°51'26" WEST A DISTANCE OF 311.64 FEET;
26) NORTH 56°38'56" WEST A DISTANCE OF 240.99 FEET;
27) NORTH 57°02'23" WEST A DISTANCE OF 200.17 FEET;
28) NORTH 56°50'01" WEST A DISTANCE OF 249.55 FEET;
29) NORTH 55°49'43" WEST A DISTANCE OF 151.27 FEET TO A POINT ON THE WEST LINE OF SAID SOUTHWEST QUARTER OF SECTION 5;

THENCE ALONG SAID WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 5, NORTH 00°35'02" EAST A DISTANCE OF 754.65 FEET TO THE WEST QUARTER-SECTION CORNER OF SAID SECTION 5;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER OF SECTION 5, NORTH 00°31'45" EAST A DISTANCE OF 2,716.06 FEET TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 12,286,226 SQUARE FEET OR 282.053 ACRES, MORE OR LESS.

DEDICATION STATEMENT

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LAND DESCRIBED HEREIN, HAVE LAID OUT, SUBDIVIDED AND PLATTED SAID LANDS INTO LOTS, TRACTS, STREETS AND EASEMENTS AS SHOWN HEREON UNDER THE NAME AND SUBDIVISION OF "FIELDS FILING NO. 1". THE UTILITY EASEMENTS SHOWN HEREON ARE HEREBY DEDICATED FOR PUBLIC UTILITIES AND CABLE COMMUNICATION SYSTEMS AND OTHER PURPOSES AS SHOWN HEREON. THE ENTITIES RESPONSIBLE FOR PROVIDING THE SERVICES FOR WHICH THE EASEMENTS ARE ESTABLISHED ARE HEREBY GRANTED THE PERPETUAL RIGHT OF INGRESS AND EGRESS FROM AND TO ADJACENT PROPERTIES FOR INSTALLATION, MAINTENANCE AND REPLACEMENT OF UTILITY LINES AND RELATED FACILITIES. THE COYOTE TRACK LANE, COYOTE TRACK CIRCLE, HAWK FLIGHT PLACE, PLAINS GOLD DRIVE, WILD GEESE STREET, HILLTOP ROAD, TRACT N, AND EASEMENTS SHOWN HEREON ARE DEDICATED AND CONVEYED TO DOUGLAS COUNTY, CO. IN FEE SIMPLE ABSOLUTE, WITH MARKETABLE TITLE, FOR PUBLIC USES AND PURPOSES. UTILITY EASEMENTS, DRAINAGE AND BLANKET ACCESS EASEMENTS SHOWN ARE DEDICATED AND CONVEYED TO DOUGLAS COUNTY, COLORADO, FOR PUBLIC USES AND PURPOSES.

TRACTS B, C, D, E, F, G, H, I, K, AND L ARE HEREBY DEDICATED TO THE HOMEOWNER'S ASSOCIATION. SAID TRACTS WILL ALSO BE MAINTAINED BY THE HOMEOWNER'S ASSOCIATION.

TRACTS A AND J ARE HEREBY DEDICATED TO PARKER WATER & SANITATION DISTRICT. SAID TRACTS WILL ALSO BE MAINTAINED BY PARKER WATER & SANITATION DISTRICT.

TRACT M IS HEREBY DEDICATED TO FIELDS METRO DISTRICT NO. 1. SAID TRACT WILL ALSO BE MAINTAINED BY FIELDS METRO DISTRICT NO. 1.

TRACT N IS HEREBY DEDICATED TO DOUGLAS COUNTY. SAID TRACT WILL ALSO BE MAINTAINED BY DOUGLAS COUNTY.

OWNER CERTIFICATE

OWNER: TOLL SOUTHWEST, LLC, A DELAWARE LIMITED LIABILITY COMPANY

____________________ AS ____________________ OF TOLL SOUTHWEST LLC, A DELAWARE LIMITED
(PRINT NAME) (MEMBER)

LIABILITY COMPANY.

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ A.D., _________ BY ______________________________
(NAME)

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

OWNER: WALLDEN - HILL TOP, LLC, A COLORADO LIMITED LIABILITY COMPANY

____________________ AS ____________________ OF WALLDEN - HILL TOP, LLC, A COLORADO LIMITED
(PRINT NAME) (MEMBER)

LIABILITY COMPANY.

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ A.D., _________ BY ______________________________
(NAME)

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

VICINITY MAP
SCALE: 1" = 2000'

DEVELOPER	CIVIL ENGINEER	SURVEYOR
TOLL SOUTHWEST LLC 7100 E. BELLEVIEW AVE, SUITE 200 GREENWOOD VILLAGE, CO 80111 PHONE: (203) 913-8147 CONTACT: BRAD DIXON	LJA ENGINEERING, INC. 1765 WEST 121ST AVE, SUITE 300 WESTMINSTER, CO 80234 PHONE: (303) 421-4224 CONTACT: KEVIN LOVELACE	LJA SURVEYING, INC 7800 E. UNION AVE, SUITE 575 DENVER, CO 80237 PHONE: (303) 481-4016 CONTACT: MARK HALL

SURVEYOR'S CERTIFICATE

I, MARK A. HALL, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PLAT TRULY AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE ON ____________ , 202__, BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON; THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:50,000 (SECOND ORDER); AND THAT SAID PLAT HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISIONS OR SURVEYING OF LAND AND ALL APPLICABLE PROVISIONS OF THE DOUGLAS COUNTY SUBDIVISION RESOLUTION. THIS CERTIFICATION IS BASED ON MY KNOWLEDGE, INFORMATION, AND BELIEF AND IS NOT A GUARANTY OR WARRANTY, EITHER EXPRESS OR IMPLIED.

I ATTEST THE ABOVE ON THIS ______ DAY OF ______________ , 20___.

____
MARK A. HALL
COLORADO REGISTERED PLS NO. 36073
FOR AND ON BEHALF OF LJA SURVEYING, INC.
7800 E UNION AVE, SUITE 575,
DENVER, COLORADO 80237

PLANNING COMMISSION

THE PRELIMINARY PLAN (SB2022-036) FOR THIS FINAL PLAT WAS REVIEWED BY THE PLANNING COMMISSION ON NOVEMBER 7, 2023

______________________________ ______________
PLANNING DIRECTOR, ON BEHALF OF THE PLANNING COMMISSION DATE

BOARD OF COUNTY COMMISSIONERS

THIS PLAT WAS APPROVED FOR FILING BY THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, CO, ON THE _____ DAY OF ___________________, 2024, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON. THE DEDICATIONS OF TRACTS, UTILITY EASEMENTS, DRAINAGE AND BLANKET ACCESS EASEMENTS, COYOTE TRACK LANE, COYOTE TRACK CIRCLE, HAWK FLIGHT PLACE, PLAINS GOLD DRIVE, WILD GEESE STREET, HILLTOP ROAD, AND TRACT N ARE HEREBY ACCEPTED.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, GUTTERS, SIDEWALKS, ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES, AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE THE RESPONSIBILITY OF THE SUBDIVIDER AND NOT DOUGLAS COUNTY.

THIS ACCEPTANCE DOES NOT GUARANTEE THAT THE SOIL CONDITIONS, SUBSURFACE GEOLOGY, GROUNDWATER CONDITIONS OR FLOODING CONDITIONS OF ANY LOT SHOWN HEREON ARE SUCH THAT A BUILDING PERMIT, WELL PERMIT OR SEWAGE DISPOSAL PERMIT WILL BE ISSUED.

____
CHAIR, BOARD OF DOUGLAS COUNTY COMMISSIONERS

ACCEPTANCE CERTIFICATE

TRACTS A AND J ARE HEREBY DEDICATED TO PARKER WATER & SANITATION DISTRICT. SAID TRACTS WILL ALSO BE MAINTAINED BY PARKER WATER & SANITATION DISTRICT.

BY: ____________________ ______________
TITLE: DATE

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ , 20___ BY

____
(NAME)

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

TRACT M IS HEREBY DEDICATED TO THE FIELDS METROPOLITAN DISTRICT NO. 1. SAID TRACT WILL ALSO BE MAINTAINED BY THE FIELDS METROPOLITAN DISTRICT NO. 1.

BY: ____________________ ______________
TITLE: DATE

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ , 20___ BY

____
(NAME)

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

TRACTS G, H & I ARE HEREBY DEDICATED TO HILLTOP BROTHERS, LLC. SAID TRACTS WILL BE MAINTAINED BY THE FIELDS METROPOLITAN DISTRICT NO. 1.

BY: ____________________ ______________
TITLE: DATE

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ , 20___ BY

____
(NAME)

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

TRACTS B, C, D, E, F, K & L ARE HEREBY ACCEPTED FOR OWNERSHIP AND MAINTENANCE BY THE ____________________ DISTRICT/HOMEOWNER'S ASSOCIATION.

BY: ____________________ ______________
TITLE: DATE

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ , 20___ BY

____
(NAME)

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

TITLE VERIFICATION

WE______________________________, DO HEREBY CERTIFY THAT WE HAVE EXAMINED THE TITLE OF ALL LAND PLATTED HEREON AND THAT TITLE TO SUCH LAND IS IN THE DEDICATOR(S) FREE AND CLEAR OF ALL LIENS, TAXES AND ENCUMBRANCES.

COMPANY NAME: ______________________________

BY: ______________________________
NAME DATE

TITLE: ______________________________

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _______ DAY OF ____________

A.D. 2025 BY ______________________________

MY COMMISSION EXPIRES: ______________________________

WITNESS MY HAND AND OFFICIAL SEAL: ______________________________
NOTARY PUBLIC

LJA SURVEYING
7800 E. Union Avenue
Suite 575
Denver, CO 80237
303-390-8510
www.lja.com

Date:	Job No.:	Sheet:
4/3/2025	1097-0004	1 of 6

I:\JOB FOLDERS\1097\1097-0004\SURVEY\06_CAD\PRODUCTION FILES\FINAL PLAT\1097-0004_THE FIELDS – COVER PRINTED ON: 4/3/2025 11:23 AM

FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO
282.052 ACRES - 118 LOTS - 14 TRACTS / SB2024-041

SHEET INDEX

GENERAL NOTES

1. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

2. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY, COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE 18—4-508, C.R.S.

3. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY LJA SURVEYING TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHTS-OF-WAY, AND TITLE OF RECORD, LJA SURVEYING RELIED UPON THE TITLE REPORT PREPARED BY COMMONWEALTH LAND TITLE INSURANCE COMPANY, TITLE REPORT NUMBER 450-HS0832211-412, AMENDMENT NO. 1 WITH A EFFECTIVE DATE OF NOVEMBER 18, 2024 AT 12:00 A.M.

4. THE LINEAL UNIT USED IN THE PREPARATION OF THIS SURVEY IS THE U.S. SURVEY FOOT AS DEFINED BY THE UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.

5. BASIS OF BEARINGS: THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M. BEING ASSUMED TO BEAR SOUTH 89°26'46" EAST, SAID LINE BEING MONUMENTED ON THE WEST BY THE NORTHWEST CORNER OF SAID SECTION 5 BEING A 2.5" ALUMINUM CAP ON 2" PIPE STAMPED "PLS 6935" AND ON THE EAST BY THE NORTH QUARTER-SECTION CORNER OF SAID SECTION 5 BEING A FOUND 2.5" ALUMINUM CAP ON 2" PIPE "PLS 6935" WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.

6. FLOODPLAIN: THE SURVEYED PROPERTY IS LOCATED WITHIN ZONE X, OTHER AREAS — DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS IDENTIFIED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) ON FLOOD INSURANCE RATE MAP (FIRM) — MAP NUMBER 08035C0202F AND 08035C0204F WITH A MAP REVISED DATE OF OF SEPTEMBER 30, 2005.

7. UTILITY EASEMENTS: FIFTEEN FOOT (15') WIDE UTILITY EASEMENTS AS SHOWN HEREON ARE DEDICATED FOR THE INSTALLATION, MAINTENANCE AND REPLACEMENT OF ELECTRIC, GAS, TELEVISION, CABLE AND TELECOMMUNICATIONS FACILITIES. PERMANENT STRUCTURES, IMPROVEMENTS, OBJECTS, BUILDINGS, WELLS, WATER METERS AND OTHER OBJECTS THAT MAY INTERFERE WITH THE UTILITY FACILITIES OR USE THEREOF (INTERFERING OBJECTS) SHALL NOT BE PERMITTED WITHIN SAID UTILITY EASEMENTS AND THE UTILITY PROVIDERS, AS GRANTEES, MAY REMOVE ANY INTERFERING OBJECTS AT NO COST TO SUCH GRANTEES, INCLUDING, WITHOUT LIMITATION, VEGETATION. PUBLIC SERVICE COMPANY OF COLORADO (PSCO) AND ITS SUCCESSORS RESERVE THE RIGHT TO REQUIRE ADDITIONAL EASEMENTS AND TO REQUIRE THE PROPERTY OWNER TO GRANT PSCO AN EASEMENT ON ITS STANDARD FORM.

8. PRIMARY DRAINAGE EASEMENTS ARE DEDICATED TO DOUGLAS COUNTY AND SHALL REMAIN FREE OF OBSTRUCTION.

9. DRAINAGE EASEMENTS ARE HEREBY GRANTED TO DOUGLAS COUNTY ACROSS TRACTS B - E IN FIELDS FILING NO. 1, (SUBDIVISION) FOR THE PURPOSE OF ACCESSING, MAINTAINING AND REPAIRING STORM SEWER MANAGEMENT IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO INLETS, PIPES, CULVERTS, CHANNELS, DITCHES, HYDRAULIC STRUCTURES, RIPRAP, DETENTION BASINS, FOREBAYS, MICROPOOLS, AND WATER QUALITY FACILITIES (COLLECTIVELY, THE FACILITIES). IN THE EVENT THE FIELDS METROPOLITAN DISTRICT, ITS SUCCESSORS, AND ASSIGNS (SYSTEM OWNER) FAILS TO SATISFACTORILY MAINTAIN OR REPAIR SAID FACILITIES. A BLANKET ACCESS EASEMENT OVER THE SUBDIVISION IS ALSO GRANTED TO DOUGLAS COUNTY, BUT ONLY FOR THE PURPOSE OF ACCESSING THE FACILITIES IN THE EVENT THAT THE DRAINAGE EASEMENTS DO NOT PROVIDE ADEQUATE ACCESS. THE MAINTENANCE AND REPAIR OF THE FACILITIES LOCATED IN THE SUBDIVISION, AS SHOWN ON THE CONSTRUCTION PLANS ACCEPTED BY DOUGLAS COUNTY OR ON THE PLAT FOR THE SUBDIVISION SHALL BE THE RESPONSIBILITY OF THE SYSTEM OWNER. IN THE EVENT SUCH MAINTENANCE AND REPAIR ARE NOT PERFORMED BY THE SYSTEM OWNER, TO THE SATISFACTION OF DOUGLAS COUNTY, THEN DOUGLAS COUNTY SHALL HAVE THE RIGHT, BUT NOT THE OBLIGATION, TO ENTER SAID SUBDIVISION, AFTER TEN (10) DAYS PRIOR WRITTEN NOTICE TO THE SYSTEM OWNER, UNLESS THERE IS AN EMERGENCY, IN WHICH CASE DOUGLAS COUNTY SHALL GIVE NOTICE AS SOON AS PRACTICABLE, TO PERFORM ALL NECESSARY WORK, THE COST OF WHICH SHALL BE PAID BY THE SYSTEM OWNER UPON BILLING. IN THE EVENT THE SYSTEM OWNER FAILS TO REIMBURSE DOUGLAS COUNTY WITHIN THIRTY (30) DAYS AFTER SUBMISSION OF THE BILL FOR THE COSTS INCURRED, DOUGLAS COUNTY SHALL HAVE THE RIGHT TO ENFORCE SUCH OBLIGATION BY APPROPRIATE LEGAL ACTION. IT IS THE SYSTEM OWNER'S RESPONSIBILITY TO CONSTRUCT, MAINTAIN, AND REPAIR THE FACILITIES IN A MANNER CONSISTENT WITH ALL APPLICABLE PLANS APPROVED OR ACCEPTED BY DOUGLAS COUNTY.

10. OWNERSHIP AND MAINTENANCE OF TRACTS B, C, D, E, F, K, AND L SHALL BE TRANSFERRED TO THE HOMEOWNERS ASSOCIATION (HOA) IN ACCORDANCE WITH THE APPROVED SUBDIVISION IMPROVEMENTS AGREEMENT.

11. TRACTS A AND J SHALL BE OWNED AND MAINTAINED BY PARKER WATER AND SANITATION DISTRICT, ITS SUCCESSORS AND ASSIGNS, FOR WATER AND SEWER INFRASTRUCTURE AND IMPROVEMENTS.

12. TRACTS G, H, & I SHALL BE OWNED AND MAINTAINED BY THE FIELDS METROPOLITAN DISTRICT #1, ITS SUCCESSORS AND ASSIGNS, FOR (OPEN SPACE, UTILITIES, DRAINAGE, LANDSCAPING AND SIGHT DISTANCE). THE USE LISTED FOR UTILITIES IS NOT A GRANT OF BLANKET EASEMENT OVER THE TRACTS, UTILITY EASEMENTS ARE SHOWN HEREON OR DEFINED BY SEPARATE INSTRUMENT.

13. TRACT M SHALL BE OWNED AND MAINTAINED BY THE FIELDS METROPOLITAN DISTRICT #1 FOR (OPEN SPACE, UTILITIES, DRAINAGE).

14. TRACT N SHALL BE OWNED AND MAINTAINED BY DOUGLAS COUNTY FOR DRAINAGE AND UTILITIES.

15. PRIVATE DRAINAGE EASEMENTS SHOWN HEREON ON LOTS 93, 94, 98, 99 AND 100 ARE HEREBY DEDICATED TO THE HOMEOWNERS ASSOCIATION. SAID PRIVATE DRAINAGE EASEMENTS ARE TO REMAIN FREE OF OBSTRUCTIONS AND ARE TO BE MAINTAINED BY THE LOT OWNERS.

LAND USE SUMMARY CHART

TYPE	LOTS	SQ. FT.	ACRES	%
LOT AREA - RESIDENTIAL	118	5,328,837	122.333	43.4%
PUBLIC RIGHT-OF-WAY AREA		1,655,063	37.995	13.5%
TRACTS - (14)		5,302,327	121.725	43.2%
TOTALS		12,286,227	282.053	100%

TRACT SUMMARY CHART

TRACT	USE	OWNED	MAINTAINED	SQ. FT.	ACRES
TRACT A	LIFT STATION	P.W.S.D.	P.W.S.D.	41,478	0.952
TRACT B	DRAINAGE, OPEN SPACE, UTILITIES	HOA	HOA	1,391,187	31.937
TRACT C	DRAINAGE, OPEN SPACE, UTILITIES	HOA	HOA	116,433	2.673
TRACT D	DRAINAGE, OPEN SPACE, SIGNAGE, UTILITIES	HOA	HOA	1,113,397	25.560
TRACT E	DRAINAGE, OPEN SPACE, SIGNAGE, UTILITIES	HOA	HOA	58,336	1.339
TRACT F	OPEN SPACE	HOA	HOA	10,000	0.230
TRACT G	METRO DISTRICT DIRECTOR PARCEL, OPEN SPACE	HILLTOP BROTHERS, LLC	METRO DISTRICT	10,000	0.230
TRACT H	METRO DISTRICT DIRECTOR PARCEL, OPEN SPACE	HILLTOP BROTHERS, LLC	METRO DISTRICT	10,000	0.230
TRACT I	METRO DISTRICT DIRECTOR PARCEL, OPEN SPACE	HILLTOP BROTHERS, LLC	METRO DISTRICT	10,000	0.230
TRACT J	OPEN SPACE, UTILITIES	P.W.S.D.	P.W.S.D.	218,111	5.007
TRACT K	OPEN SPACE, SIGNAGE, UTILITIES	HOA	HOA	50,923	1.169
TRACT L	DRAINAGE, OPEN SPACE, UTILITIES	HOA	HOA	40,329	0.926
TRACT M	DRAINAGE, OPEN SPACE, UTILITIES	METRO DISTRICT	METRO DISTRICT	2,107,541	48.382
TRACT N	DRAINAGE, UTILITIES	DOUGLAS COUNTY	DOUGLAS COUNTY	124,594	2.860
			TOTAL AREA	5,302,327	121.725

HOMEOWNERS ASSOCIATION (HOA) CERTIFICATE

HOMEOWNERS ASSOCIATION: MEADOW ROCK HOA

______________________ AS ______________________ OF MEADOW ROCK HOMEOWNERS ASSOCIATION HOA
(PRINT NAME) (MEMBER)

STATE OF COLORADO)
) SS.
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS _____ DAY OF ________________ A.D., __________ BY ______________________________
(NAME)

MY COMMISSION EXPIRES: ____

WITNESS MY HAND AND OFFICIAL SEAL: ____
NOTARY PUBLIC

LJA SURVEYING
7800 E. Union Avenue
Suite 575
Denver, CO 80237
303-390-8510
www.lja.com

Date: 4/3/2025 | Job No.: 1097-0004 | Sheet: 2 of 6

FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

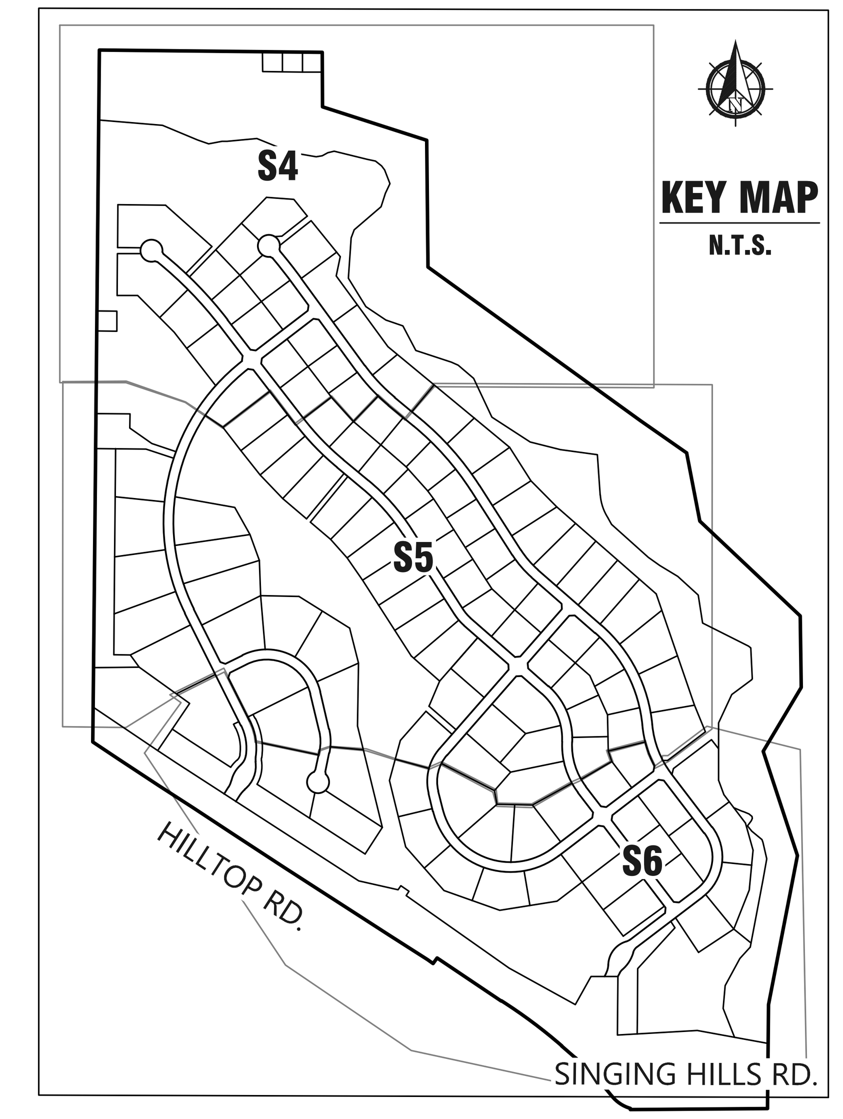
282.052 ACRES - 118 LOTS - 14 TRACTS / SB2024-041

SCALE
1 inch = 300 ft.

FOR AND ON BEHALF OF
LJA SURVEYING, INC.

KEY MAP

N.T.S.



MONUMENT SYMBOL LEGEND

- RECOVERED SECTION CORNER AS NOTED HEREON
- SET 18" LONG NO. 5 REBAR WITH 1-1/4" BLUE PLASTIC CAP STAMPED "LJA SURVEYING PLS 36073" FLUSH WITH GROUND
- RECOVERED #4 REBAR 1" YELLOW PLASTIC CAP STAMPED "LS 18982"
- BK. PG. BOOK AND PAGE

LINE TABLE		
LINE	BEARING	LENGTH
L24	N00°25'34"W	4.31'
L41	N48°58'46"W	89.46'
L42	N56°10'03"W	388.64'
L43	S34°18'52"W	34.05'
L44	N56°36'57"W	33.03'
L45	N57°12'15"W	229.95'
L46	N57°10'50"W	328.49'
L47	N57°16'15"W	292.22'
L48	N56°51'26"W	311.64'
L49	N56°38'56"W	240.99'
L50	N57°02'23"W	200.17'
L51	N56°50'01"W	249.55'
L52	N55°49'45"W	151.27'

CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C25	113.13'	185.42'	34°57'27"	N56° 20' 47"W	111.38
C26	267.50'	1616.42'	9°28'54"	N43° 29' 34"W	267.19
C27	377.97'	2525.02'	8°34'36"	N53° 16' 04"W	377.62

LEGEND

- # = BLOCK NUMBER
- S.E. = SANITARY SEWER EASEMENT HEREBY GRANTED
- D.E. = PRIMARY DRAINAGE EASEMENTS HEREBY DEDICATED TO DOUGLAS COUNTY
- D.U.E. = DRY UTILITY EASEMENT HEREBY GRANTED
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- P.W.S.D.E. = PARKER WATER & SANITATION DISTRICT EASEMENT

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7800 E Union Avenue
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Date:	Job No.:	Sheet:
4/3/2025	1097-0004	3 of 6

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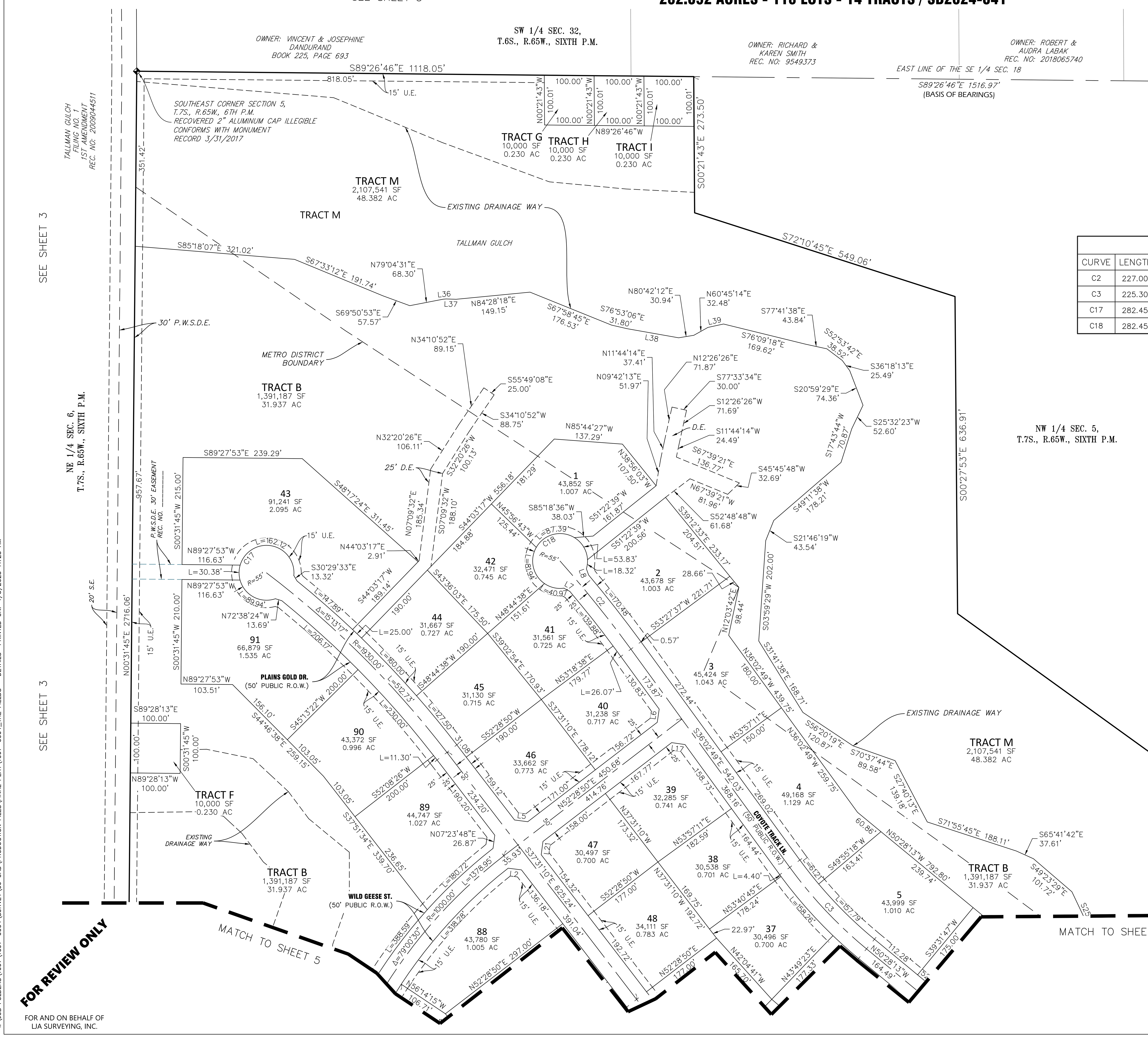
FIELDS FILING NO. 1

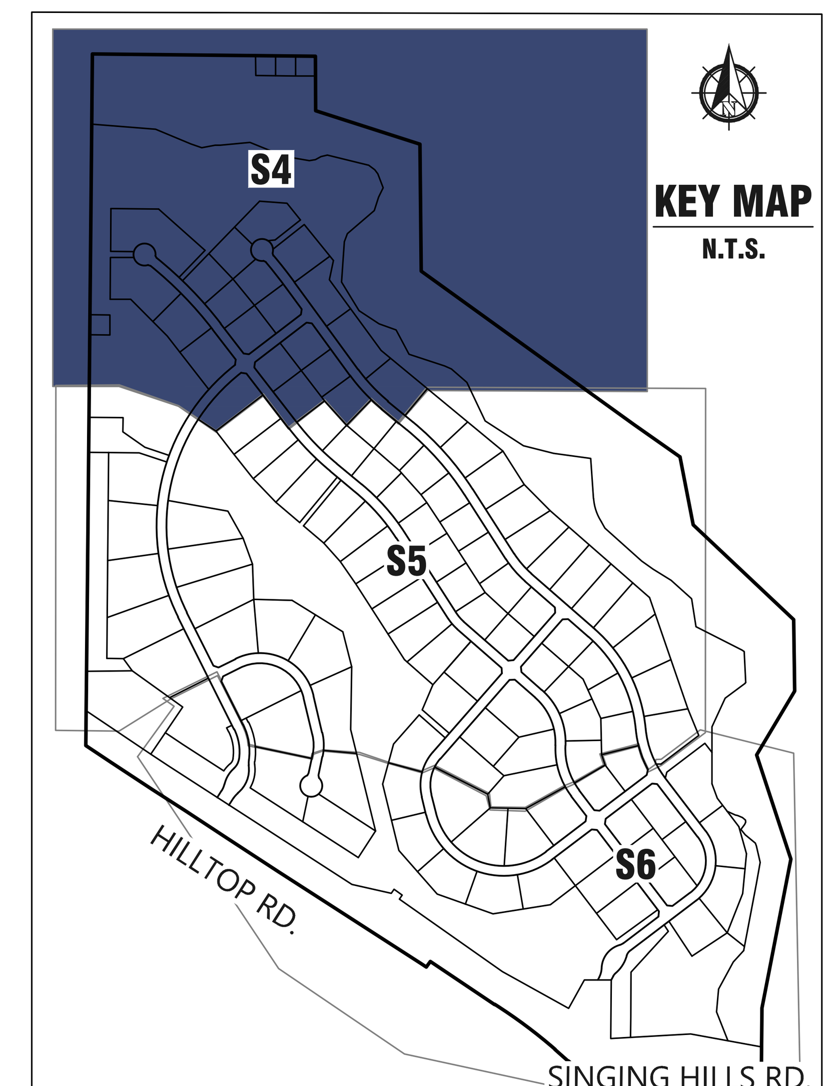
LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

282.052 ACRES - 118 LOTS - 14 TRACTS / SB2024-041



CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C2	227.00'	2350.00'	5°32'05"	N38° 48' 52"W	226.92
C3	225.30'	895.00'	14°25'23"	S43° 15' 31"E	224.70
C17	282.45'	55.00'	294°14'06"	S38° 07' 55"W	59.72
C18	282.45'	55.00'	294°14'15"	S49° 08' 06"W	59.72

LINE TABLE		
LINE	BEARING	LENGTH
L2	N82°36'33"W	26.87'
L5	S82°31'10"E	26.87'
L6	N08°13'00"E	26.74'
L7	N61°41'39"W	13.65'
L8	S19°32'20"E	13.35'
L17	S81°47'00"E	27.00'
L21	N07°28'50"E	26.87'
L36	N85°18'54"E	5.99'
L37	S88°16'15"E	19.93'
L38	S79°59'56"E	105.16'
L39	N77°44'57"E	32.12'



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FOR AND ON BEHALF OF LJA SURVEYING, INC.

LJA SURVEYING
7800 E. Union Avenue Suite 575 Denver, CO 80237 303-390-8510 www.lja.com

Date: 4/3/2025 | Job No.: 1097-0004 | Sheet: 4 of 6

FIELDS FILING NO. 1

LOCATED IN SECTION 5, TOWNSHIP 7 SOUTH, RANGE 65 WEST OF THE 6TH P.M., COUNTY OF DOUGLAS, STATE OF COLORADO

282.052 ACRES - 118 LOTS - 14 TRACTS / SB2024-041

LINE TABLE		
LINE	BEARING	LENGTH
L3	N03°45'13"W	26.87'
L9	N88°27'27"W	24.16'
L12	S86°14'47"W	26.87'
L15	S03°45'13"E	26.87'
L16	S86°14'47"W	26.87'
L18	S03°45'13"E	26.87'
L19	S86°14'47"W	26.87'
L20	N50°28'13"W	4.74'

CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C1	109.68'	250.00'	25°08'09"	N00° 41' 39"W	108.80
C4	140.03'	500.00'	16°02'48"	S40° 43' 49"E	139.58
C7	255.53'	365.00'	40°06'40"	S17° 14' 25"E	250.34
C8	63.02'	225.00'	16°02'48"	S40° 43' 49"E	62.81
C22	279.55'	500.00'	32°02'03"	S21° 16' 44"E	275.93
C24	123.74'	246.28'	28°47'17"	S18° 36' 55"E	122.45

LEGEND

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Date:	Job No.:	Sheet:
4/3/2025	1097-0004	5 of 6

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LINE TABLE		
LINE	BEARING	LENGTH
L1	S27°53'39"W	78.74'
L4	N82°17'45"W	26.87'
L9	N88°27'27"W	24.16'
L10	N82°16'37"W	26.88'
L11	S82°17'45"E	26.87'
L13	N11°50'56"E	26.12'
L14	S82°17'45"E	26.87'
L22	N07°42'15"E	26.87'
L23	N33°22'10"W	38.94'
L25	N37°17'45"W	58.35'
L26	S65°21'35"E	45.30'
L27	S77°21'19"E	12.62'
L28	S65°05'52"E	25.27'
L29	S52°05'11"E	20.90'
L30	S00°43'43"E	9.40'
L31	S20°55'45"W	13.39'
L32	S36°31'36"W	30.80'
L33	S37°17'45"E	33.94'
L34	S50°28'41"E	66.00'
L35	S22°05'35"E	15.41'
L40	S00°03'52"E	129.54'
L53	S01°21'12"E	43.46'
L54	S33°53'47"W	40.50'
L55	S73°17'19"W	35.49'

CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD BEARING	CHORD LENGTH
C5	130.09'	300.00'	24°50'42"	S40° 19' 00"W	129.07
C6	215.98'	225.00'	55°00'00"	S13° 44' 47"W	207.79
C9	53.25'	75.00'	40°40'37"	N28° 43' 09"E	52.13
C10	34.95'	100.00'	20°01'27"	N22° 51' 20"E	34.77
C11	282.45'	55.00'	294°14'36"	S78° 07' 35"E	59.71
C12	32.37'	100.00'	18°32'55"	S42° 08' 32"W	32.23
C13	22.61'	75.00'	17°16'26"	S00° 15' 23"E	22.53
C14	157.89'	150.00'	60°18'35"	N21° 15' 42"E	150.70
C15	157.11'	125.00'	72°00'49"	N37° 43' 40"E	146.97
C16	45.68'	100.00'	26°10'24"	N14° 48' 27"E	45.28
C19	32.53'	50.00'	37°16'33"	S34° 03' 58"W	31.96
C20	105.01'	176.42'	34°06'13"	S32° 28' 48"W	103.47
C21	18.88'	50.00'	21°38'16"	S38° 42' 47"W	18.77
C22	279.55'	500.00'	32°02'03"	S21° 16' 44"E	275.93
C23	94.81'	150.00'	36°12'51"	S30° 57' 02"W	93.24

FOR AND ON BEHALF OF LJA SURVEYING, INC.

LJA SURVEYING

7800 E Union Avenue, Suite 575, Denver, CO 80237, 303-390-5610, www.lja.com

Date: 4/3/2025 | Job No.: 1097-0004 | Sheet: 6 of 6

J:\JOB FOLDERS\1097\1097-0004\SURVEY\06 CAD\PRODUCTION FILES\FINAL PLAT\1097-0004_THE FIELDS - DETAILS PRINTED ON: 4/3/2025 11:23 AM

MEETING DATE: April 22, 2025

STAFF PERSON RESPONSIBLE: Commander Alan Stanton

DESCRIPTION: Adoption of Ordinance No. O-025-001, an Ordinance for the Regulation of Traffic and Parking, Repealing all Ordinances and Resolutions in Conflict Therewith, and Providing Penalties for Violation Thereof. Second and Final Reading.

SUMMARY: The Sheriff's Office has recommended that the Board Adopt Ordinance No. O-025-001, which incorporates the new provisions set forth in the Model Traffic Code for Colorado, 2025 Edition.

RECOMMENDED ACTION: Motion adopting Ordinance No. O-025-001, An Ordinance for the Regulation of Traffic and Parking, Repealing all Ordinances and Resolutions in Conflict Therewith, and Providing Penalties for Violation Thereof.

REVIEW:

Jeff Garcia	Approve	4/15/2025
Andrew Copland	Approve	4/15/2025
Doug DeBord	Approve	4/15/2025

ATTACHMENTS:

Proposed Amendment to Traffic Ordinance FINAL

ORDINANCE NO. O-025-00x
As Amended

THE BOARD OF COUNTY COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

AN ORDINANCE FOR THE REGULATION OF TRAFFIC AND PARKING; REPEALING ALL ORDINANCES AND RESOLUTIONS IN CONFLICT THEREWITH; AND PROVIDING PENALTIES FOR VIOLATION THEREOF.

WHEREAS, pursuant to C.R.S. § 30-15-401(1)(h), the Board of County Commissioners ("Board") is authorized to adopt ordinances to control and regulate the movement and parking of motor vehicles on public property; and

WHEREAS, pursuant to C.R.S. § 42-4-111(l)(a) and (c), the Board is authorized to regulate or prohibit the stopping, standing or parking of vehicles and to regulate traffic by means of Official Traffic Control Devices; and

WHEREAS, C.R.S. § 42-4-1210(1), provides that the owner or lessee of any private property available for public use in the unincorporated areas of a county may request in writing that specified areas on such property be designated by the Board for use only by authorized vehicles; and

WHEREAS, C.R.S. § 42-4-1210(1), further provides that said areas, upon acceptance in writing by the Board, shall be clearly marked by the owner or lessee with Official Traffic Control Devices, as defined in C.R.S. § 42-1-102(64); and

WHEREAS, C.R.S. § 42-4-1210(2), provides that it is unlawful for any person to park any vehicle other than an authorized vehicle in any area designated and marked for such use as provided therein; and

WHEREAS, C.R.S. § 42-4-110(1), authorizes all local authorities, including counties, to adopt by reference all or any part of a model traffic code; and

WHEREAS, the Board has previously adopted the 2020 edition of the "Model Traffic Code for Colorado" and desires to replace the 2020 edition with the recently published 2024 edition; and

WHEREAS, the Board has previously adopted the "Manual on Uniform Traffic Control Devices" as authorized by C.R.S. § 42-4-104, which addresses all aspects of "traffic control devices"; and

WHEREAS, the Board desires to adopt this ordinance establishing consolidated parking and traffic enforcement and establishing the current authorities and priorities thereof on which Douglas County will rely, hereby superseding and revoking all prior ordinances and resolutions inconsistent or overlapping herewith; now therefore,

BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF THE COUNTY OF DOUGLAS as follows:

PART I: GENERAL

Purpose. The purpose of this ordinance is to promote the general public welfare and safety by imposing and enforcing reasonable and necessary traffic and parking restrictions in the County.

Definitions. Unless otherwise specified or the context otherwise requires, the following words shall have the following meanings throughout this ordinance.

"Authorized Emergency Vehicle" means such vehicles of the fire department, police vehicles, ambulances, and other special-purpose vehicles as are publicly owned and operated by or for a governmental agency to protect and preserve life and property in accordance with state laws regulating emergency vehicles; said term also means such privately owned vehicles as are designated by the state motor vehicle licensing agency, necessary to the preservation of life and property, to be equipped and to operate as emergency vehicles in the manner prescribed by state law.

"Automobile" means any motor vehicle.

"County" means Douglas County, Colorado.

“Commercial Vehicle” means any vehicle as defined C.R.S. § 42-4-235(1)(a).

"Law Enforcement Officers" shall mean the Douglas County Sheriff, Undersheriff and his or her deputy sheriffs.

"Official Traffic Control Device" means all signs, signals, markings, and devices, not inconsistent with Title 42 of the Colorado Revised Statutes, placed or displayed by authority of a public body or official having jurisdiction, for the purpose of regulating warning, or guiding traffic.

"Owner" means a person who holds the legal title of a vehicle; or, if a vehicle is the subject of an agreement for tl1e conditional sale or lease thereof with the right of purchase upon performance of the conditions stated in the agreement and with an immediate right of possession vested in the conditional vendee or lessee or if a mortgagor of a vehicle is entitled to possession, then such conditional vendee or lessee or mortgagor shall be deemed the owner for purposes herein. The term also includes parties otherwise having lawful use or control or the right to use or control a vehicle for a period of thirty days or more.

"Park" or "parking" means the standing of a vehicle, whether occupied or not, other than very briefly for the purpose of and while actually engaged in loading or unloading property or passengers.

"Private Property" shall mean private property available for public use within the meaning of C.R.S. § 42-4-1210.

"Residential Parking Permit Area" means a contiguous or nearly contiguous residential area containing public streets more particularly described in Exhibit A, attached hereto and incorporated by reference herein, on which motor vehicle parking is prohibited at certain times, except for vehicles displaying a parking permit as provided in this ordinance.

"Stand" or "standing" means the halting of a vehicle, whether occupied or not, other than momentarily for the purpose of and while actually engaged in receiving or discharging passengers.

"Stop" or "stopping" means, when prohibited, any halting, even momentarily, of a vehicle, whether occupied or not, except when necessary to avoid conflict with other traffic or in compliance with the directions of a Law Enforcement Officer or Official Traffic Control Device.

"Vehicle" means any device which is capable of moving itself, or of being moved, from place to place upon wheels or endless tracks.

Enforcement. This ordinance shall be enforced by the Douglas County Sheriff.

Violation. It shall be unlawful for any person to violate any provision of this ordinance or to disobey any Official Traffic Control Devices referenced herein. In any prosecution for any violation of this ordinance wherein the identity of the violator is in question (such as parking citations issued when the driver of the vehicle is not present), there shall be a rebuttable presumption that the violation was committed by the Owner of the motor vehicle in which the violation occurred.

Disposition of Fines and Forfeitures. Unless otherwise provided by law, all fines and penalties, and the surcharge thereon, for the violation of this ordinance shall be paid into the treasury of Douglas County.

Surcharges. In addition to the fines and penalties prescribed in this ordinance, any person convicted of a violation of this ordinance shall be subject to the statutory surcharges of ten dollars ($10.00) for the Victims and Witnesses Assistance and Law Enforcement Fund, and ($22.00) for the Colorado Traumatic Brain Injury Trust Fund. Effective January 1, 2013, Colorado requires law enforcement to collect a $1 surcharge to supplement the Family-Friendly Court Program Cash Fund. These surcharges shall be paid to the clerk of the court by each person convicted of violating this ordinance. The clerk shall transmit the moneys to the respective funds in accordance with C.R.S. § 30-15-402(2).

Scope. This ordinance shall apply to every street, alley, sidewalk, driveway, park, and to every other public way or public place, or public parking area (except where such application is prohibited by C.R.S. § 30-15-401(9)(a) and § 42-4-111(1)), or private property as specifically designated herein, within the unincorporated territory of Douglas County and to all other areas designated herein. This ordinance shall in no way limit application and enforcement of any statutes of the State of Colorado but shall be in addition thereto.

Severability. If any part or parts of this ordinance are for any reason held to be invalid, such provision shall not affect the validity of the remaining portions of this ordinance. The Board of County Commissioners hereby declares that it would have passed this ordinance and each part or parts hereof, irrespective of the fact that any one part or parts be declared invalid.

Repeal. All ordinances and/or resolutions or parts or ordinances and/or resolutions inconsistent with provisions of this ordinance are hereby repealed, except that this repeal shall not affect or prevent the prosecution or punishment of any person for any act done or committed in violation of any ordinance hereby repealed prior to the effective date of this ordinance.

PART II: TRAFFIC

Section 1. **Adoption.** Pursuant C.R.S. §§ 42-4-110(1) and 30-15-401(1)(h), there is hereby adopted by reference Articles I and II, inclusive, of the 2024 edition of the "Model Traffic Code for Colorado," promulgated and published as such by the Colorado Department of Transportation, Traffic Safety Engineering Services, 2829 West Howard Place, Denver, Colorado 80204. The subject matter of the Model Traffic Code relates primarily to comprehensive traffic control regulations. The purpose of this ordinance is to provide a system of traffic regulations consistent with state law and generally conforming to similar regulations throughout the state and nation. Copies of the Model Traffic Code adopted herein are on file in the office of the Clerk and Recorder of Douglas County, Colorado, and may be inspected during regular business hours.

Section 2. **Deletions.** The 2024 edition of the Model Traffic Code is adopted as if set out at length save and except the following articles and/or sections which are declared to be inapplicable to Douglas County and are therefore expressly deleted:

(a) Section 107
(b) Section 203
(c) Section 228 (7)
(d) Section 233
(e) Section 235
(f) Section 238
(g) Section 239 (3) & (5.5)
(h) Section 507
(i) Section 508
(j) Section 509
(k) Section 510
(l) Section 607 (2)(b)
(m) Section 705 (2), (2.5), & (2.6)
(n) Section 714 (2)(b)
(o) Section 1008.5
(p) Section 1101 (12)(b)
(q) Section 1105
(r) Section 1401
(s) Section 1402
(t) Section 1402.5
(u) Section 1406 (1)(b)
(v) Section 1407 (3)(c)
(w) Section 1409
(x) Section 1412
(y) Section 1415
(z) Section 1701
(aa) Section 1705
(bb) Section 1706
(cc) Section 1707
(dd) Section 1709(6)
(ee) Section 1717
(ff) Section 18 Abandoned Vehicles
(gg) Section 1901
(hh) Section 1902
(ii) Section 1903
(jj) Section 1904

Section 3. **Penalty Assessment Procedure and Penalty Schedule**

(a) Any person who violates any of the provisions of this Part II commits a traffic infraction, pursuant to C.R.S. § 30-15-402(1). The penalty assessment procedure provided in C.R.S. § 16-2-201, shall be followed by the arresting officer for any such violation of this ordinance.

(b) The County hereby elects to have the provisions of C.R.S. § 42-2-127(5.5)(b), apply to violations of this ordinance. If a violator receives a penalty assessment notice for a violation of this ordinance, and such person pays the fine and surcharge for the violation on or before the date the payment is due, the points assessed for the violation are reduced as follows:

(1) for a violation having an assessment of three or more points, the points are reduced by two points;

(2) for a violation having an assessment of two points, the points are reduced by one point.

(c) For its schedule of fines and penalties, the County incorporates by this reference the schedule of fines and penalties set forth in C.R.S. § 42-4-1701(as that section may be amended), as those fines and penalties correspond to the sections of the Model Traffic Code adopted by this ordinance, for all cases wherein the alleged violator acknowledges guilt or liability, is found guilty by a court of competent jurisdiction, or has judgment entered against him/her. If the penalty assessment procedure is not used, and the alleged offender is found guilty, court costs may be assessed in addition to the fine and penalties set forth in C.R.S. § 42-4-1701, and surcharges.

(d) In the case of multiple traffic offenses involving aggressive driving, the applicable penalty or penalty assessment shall be doubled for each traffic offense. For purposes of this subsection, "aggressive driving" means committing any two or more of the following violations in a single act or series of acts in close proximity to another motor vehicle: 1) exceeding the speed limits (1101); 2) following too closely (1008); 3) failure to obey official traffic control devices (603, 604); 4) passing when not permitted / not safe (1004, 1005); 5) failure to give an adequate signal (903); 6) failure to yield right-of-way (701, 702, 703); and 7) unsafe lane change (1007).

(e) The imposition of any penalty imposed pursuant to this Part II shall not preclude impound where appropriate pursuant to Part IV.

PART III: PARKING

The restrictions, procedures and penalties provided in this Part III shall be in addition to those provided in Part II.

Section 1. Residential Parking Permit Areas

Purpose.

Sometimes persons in residential areas request assistance reducing hazardous traffic conditions resulting from nonresidents competing with residents to park their vehicles in certain residential areas; to protect those residential areas from polluted air, excessive noise, and refuse caused by the entry of nonresident vehicles; to protect residents from unreasonable burdens in gaining access to their residences; to preserve the character of residential areas; to promote efficiency in maintaining streets in residential areas in a clean and safe condition; to preserve the value of the property in residential areas; to promote traffic safety and the safety of children and other pedestrians in residential areas; and to promote the peace, comfort convenience, and welfare of all residents of the County.

Establishment.

The Board hereby establishes Residential Parking Permit Areas in the areas more particularly described in Exhibit A as may be amended from time to time by motion of the Board of County Commissioners, attached hereto and incorporated herein.

Parking Without Permit Prohibited.

It shall be unlawful for any motor vehicle to be parked on a public street within the Residential Parking Permit Areas, more particularly described in Exhibit A, as directed by the signage installed by the Division of Engineering Services, unless the vehicle properly displays a parking permit authorized by this ordinance.

Posting of Signs.

The Division of Engineering Services shall post appropriate signs within the areas more particularly described in Exhibit A, advising motorists of the days and hours when motor vehicle parking within said area shall be prohibited except by permit.

Penalty.

Any person who violates any of the provisions of this Section 1 on any public street or public facility commits a Class A Traffic Infraction, and upon conviction thereof, shall be punished by a fine of seventeen dollars ($17.00) for each separate violation. Any person who violates any of the provisions of this ordinance on any private road or private facility commits a Petty Offense, and upon conviction thereof, shall be punished by a fine of twenty-five dollars ($25.00) for each separate violation. The penalty assessment procedure provided in C.R.S. § 16-2-201, may be followed by the arresting officer for any such violation of this ordinance. In the event that a violation of the Part II exists which is outside the scope of this Part III, the violations may be treated as two separate violations and two penalties may be assessed. The penalties prescribed in this Part III shall not preclude impound where appropriate pursuant to Part IV.

Defenses.

It shall be a defense that the area was not properly marked with the relevant restriction at the time the violation notice is issued. It shall further be a defense that the violation was the result of direction of a Law Enforcement Officer or at the direction of an Official Traffic Control Device. It shall not be a defense to a violation otherwise contained herein if the property is improperly or not designated in the attached exhibits so long as the County was authorized to restrict and/or enforce parking restrictions in such area. It shall not be a defense that the Owner of the vehicle was not the person who placed the vehicle or allowed the vehicle to be placed in the restricted area(s) and such Owner shall be responsible for all violations involving the owner's vehicle(s). It shall not be a defense that an Official Traffic Control Device was not placed pursuant to a designated procedure so long as the location and nature of the restriction is clearly posted.

Permits.

A. The owner, owners, lessee or lessees of each residential unit within the residential parking permit area may be issued one or more permits which shall allow a motor vehicle to which it is affixed to be parked within the area without regard to the parking restrictions imposed by this ordinance. No more than three permits may be issued for each residential unit, unless good cause is shown for issuance of additional permits. A resident permit shall consist of a numbered decal which shall be permanently affixed to the lower left corner of the rear window of the motor vehicle.

B. The owner or owners of each residential unit within a parking permit area may also be issued up to five (5) visitor permits. A visitor permit shall allow the motor vehicle in which it is displayed to be parked within the area without regard to the parking restrictions imposed by this ordinance. A visitor permit shall be placed on the front dash of the motor vehicle.

C. Permits shall be issued by the Division of Engineering Services based on satisfactory evidence of residency within the area.

D. Temporary permits. A contractor may obtain, at no cost, a reasonable number of temporary permits for vehicles of the contractor and the contractor's employees for the period of time that the contractor is engaged in work within a residential parking zone, as specified on the permit.

E. Resident permits shall be numbered and shall not be transferable from one residence or vehicle to another.

F. Resident and visitor permits shall remain the property of the County. Where the maximum number of resident permits have been issued for a residential unit, a resident permit shall be voided by the County for each new resident permit issued.

Section 2. **Private Property Parking Restrictions**

Purpose.

Private Property owners may request that the Board may accept designation of specified areas for use only by authorized vehicles pursuant to C.R.S. § 42-4-1210. Upon acceptance in writing by the Board, the owner of such private property is required to clearly mark the area with Official Traffic Control Devices. Such areas are listed in Exhibit B, as may be amended from time to time by motion of the Board of County Commissioners, attached hereto and incorporated herein. Violations of such postings shall be a violation of this Part III.

Penalty.

Any person who violates any of the provisions of this Section 2 on any public street or public facility commits a Class A Traffic Infraction, and upon conviction thereof, shall be punished by a fine of seventeen dollars ($17.00) for each separate violation. Any person who violates any of the provisions of this ordinance on any private road or private facility commits a Petty Offense, and upon conviction thereof, shall be punished by a fine of twenty-five dollars ($25.00) for each separate violation. The penalty assessment procedure provided in C.R.S. § 16-2-201, may be followed by the arresting officer for any such violation of this ordinance. In the event that a violation of the Part II exists which is outside the scope of this Part III, the violations may be treated as two separate violations and two penalties may be assessed. The penalties prescribed in this Part III shall not preclude impound where appropriate pursuant to Part IV.

Defenses.

It shall be a defense that the area was not properly marked with the relevant restriction at the time the violation notice is issued. It shall further be a defense that the violation was the result of direction of a Law Enforcement Officer or at the direction of an Official Traffic Control Device.

Section 3. **<u>Commercial Vehicle Parking Restrictions</u>**

Purpose.

Within the areas designated by the Douglas County Comprehensive Master Plan, as may be amended from time to time, as Urban or Municipal Planning (Unincorporated) Areas, the parking of Commercial Vehicles on residential streets creates a safety and traffic hazard to the other residents of who live, park and travel on those residential streets. It blocks access, creates undue noise, increases air pollution, obstructs views and, in general, detracts from the residential character of residential neighborhoods. This section is adopted in order to protect the residents' safety, the safety of children and other pedestrians in the residential neighborhood, and to promote the peace, and welfare of residents of the County.

Designated as Urban or Municipal Planning (Unincorporated) Areas.

The Board of County Commissioners designates as Urban or Municipal Planning

(Unincorporated) Areas those areas listed on Exhibit C, as may be amended from time to time by motion of the Board of County Commissioners, attached hereto and incorporated herein.

Parking Prohibited.

It shall be unlawful for any Commercial Vehicle to be parked on a public street within the Areas designated in Exhibit C for any length of time. A violation of this section 3 is subject to the listed penalties listed below.

Penalty.

- Any person who violates any provisions of this Section 3 commits an infraction as defined under C.R.S. §30-15-402(1) and upon conviction thereof, shall be punished by a fine of not more than $1,000 for each separate violation of this Ordinance, plus a surcharge of $10 under C.R.S. §30-15-402(2). It shall be unlawful for any person to violate any provision of this ordinance referenced herein. In any prosecution for any violation of this ordinance wherein the identity of the violator is in question (such as citations issued when the driver of the vehicle is not present), there shall be a rebuttable presumption that the violation was committed by the Owner of the motor vehicle or trailer in which the violation occurred. Any person who violates any of the provisions of this Section 3 commits a traffic infraction and is punishable with a maximum fine of $1000 dollars.

- In accordance with this section, a penalty assessment may be issued and will carry a fine of $100 plus applicable fees and surcharges for a first offense, $100 plus applicable fees, and surcharges for a second offense, and $100 plus applicable fees and surcharges for a third offense within a 365-day period. Any subsequent violations within the 365-days are subject to a mandatory court appearance and is not eligible for the option of a penalty assessment.

- This applies to all cases wherein the alleged violator acknowledges guilt or liability, is found guilty by a court of competent jurisdiction, or has judgment entered against him/her. If the penalty assessment procedure is not authorized and/or used, and the alleged offender is found guilty, court costs may be assessed in addition to the fine and penalties set forth above.

- The imposition of any penalty imposed pursuant to this Section shall not preclude impound where appropriate pursuant to Part IV.

Defenses.

It shall be a defense that the vehicle was parked on a street that is not within a highly urbanized area designated on Exhibit C at the time of the violation. It shall further be a defense that the violation was the result of the direction of a Law Enforcement Officer or at the direction of an Official Traffic Control Device. It shall also be a defense that the Commercial Vehicle was, at the time of the violation, engaged in a service to a residence within the area such as loading and/or unloading a moving truck, critical service repair, such as power, water or emergency vehicles. It shall also be a defense that the owner of the vehicle is a tow truck driver under contract with a local law enforcement agency to provide emergency towing services and the driver was on an on-call status at the time of the violation. It shall not be a defense that the Owner of the vehicle was not the person who placed the vehicle, trailer, or allowed the vehicle, trailer to be placed in the restricted area(s) and such Owner shall be responsible for all violations involving the owner's vehicle(s).

Disposition of Fines and Forfeitures. Unless otherwise provided by law, all fines and penalties, and the surcharge thereon, for the violation of this ordinance shall be paid into the treasury of Douglas County.

Surcharges. In addition to the fines and penalties prescribed in this ordinance, any person convicted of a violation of this ordinance shall be subject to the statutory surcharges of ten dollars ($10.00) for the Victims and Witnesses Assistance and Law Enforcement Fund. Colorado requires law enforcement to collect a $1 surcharge to supplement the Family-Friendly Court Program Cash Fund. These surcharges shall be paid to the clerk of the court by each person convicted of violating this ordinance. The clerk shall transmit the monies to the respective funds in accordance with C.R.S. § 30-15-402(2).

Scope. This ordinance shall apply to every street, alley, sidewalk, driveway, park, and to every other public way or public place, or public parking area (except where such application is prohibited by C.R.S. § 30-15-401(9)(a) and § 42-4-111(1)). This ordinance shall in no way limit the application and enforcement of any statutes of the State of Colorado but shall be in addition thereto.

Severability. If any part or parts of this ordinance are for any reason held to be invalid, such provision shall not affect the validity of the remaining portions of this ordinance. The Board of County Commissioners hereby declares that it would have passed this ordinance and each part or parts hereof, irrespective of the fact that any one part or parts be declared invalid.

Section 4. **<u>Recreational Vehicles Parking Restrictions</u>**

Purpose.

Within the areas designated by the Douglas County Comprehensive Master Plan, as may be amended from time to time, as Urban or Municipal Planning (Unincorporated) Area, residents may, from time to time, have the need to temporarily park recreational vehicles and the like on the public streets by their house, a balance must be struck between this need and the rights of other residents to the quiet enjoyment of their property. This section is adopted in order to strike that balance.

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Designated of Heavily Urbanized Areas.

The Board of County Commissioners designates certain heavily urbanized areas listed on <u>Exhibit D,</u> as may be amended from time to time by motion of the Board of County Commissioners, attached hereto and incorporated herein.

Parking Prohibited.

It shall be unlawful for any recreational vehicle, camper, camper not on a truck, boat, mobile home, horse trailer or other trailer, motor home to be parked on any public road for longer than 72 hours within a seven-day period.

Penalty.

Any person who violates any of the provisions of this Part III on any public street or public facility commits a Class A Traffic Infraction, In accordance with this section, a penalty assessment may be issued and will carry a fine of Twenty-Five dollars ($25.00) plus applicable fees and surcharges for a first offense, Fifty dollars ($50.00) plus applicable fees and surcharges for a second offense, and One-Hundred dollars ($100) plus applicable fees and surcharges for a third or subsequent offense within a 365-day period. The penalty assessment procedure provided in C.R.S. § 16-2-201, may be followed by the officer for any such violation of this ordinance. In the event that a violation of the Part II exists which is outside the scope of this Part III, the violations may be treated as two separate violations and two penalties may be assessed. The penalties prescribed in this Part III shall not preclude impound where appropriate pursuant to Part IV.

Defenses.

It shall be a defense that the vehicle was parked on a street that is not within a highly urbanized area designated on Exhibit D at the time of the violation. It shall further be a defense that the violation was the result of the direction of a Law Enforcement Officer or at the direction of an Official Traffic Control Device. It shall not be a defense that, within that 72-hour period, the vehicle, trailer or camper was relocated to a different area of the public road within a one-mile radius of the original location of where it was parked.

Section 5. **Public Property Parking Restrictions**

The Director of Engineering Services or his/her designee shall have the authority to direct the installation of any "traffic control device" which is warranted in accordance with the Manual on Uniform Traffic Control Devices, as revised. Violations of such postings shall be a violation of this Part III.

PART IV: IMPOUNDS

In addition to the penalties and procedures set forth hereinabove, the Sheriff, or any person acting under his direction, is authorized to impound Vehicles, by means of towing or installation of an immobilizing device or "boot", under the following circumstances:

(a) if the registered Owner of said Vehicle has been issued three or more traffic or parking citations that remain outstanding. For purposes of this Part IV, "outstanding" shall mean that the Owner has: failed to pay the fine or penalty imposed under said citation by the date set forth in the citation and without prior authorization, failed to appear in court on the date set forth in the citation; or

(b) if the Vehicle has been abandoned on a public right-of-way. For purposes of this Part IV, a Vehicle shall be deemed "abandoned" if it is inoperative (regardless of registration status) or if, after an abandoned vehicle notice has been placed on the Vehicle requiring that it be moved, the Vehicle has not been removed within 72 hours; or

(c) if the Vehicle is illegally parked, for any length of time: (1) in a manner that obstructs any roadway or emergency access; (2) in a fire zone or in front of a fire hydrant; (3) in a manner that prevents any other Vehicle from being able to move; (4) in any area marked by appropriate signage as a tow away zone; or

(d) in any other circumstance where the sheriff or a person acting under his authority determines that it would be unsafe for the Vehicle to remain illegally parked.

The cost of recovering an impounded Vehicle shall be the responsibility of the Owner of the Vehicle and shall be in addition to any other fines or penalties that may otherwise apply.

PART V: CERTIFICATION

The Douglas County Clerk shall certify to the passage of this ordinance and shall have on file copies of this ordinance and the adopted Model Traffic Code available for inspection by the public during regular business hours.

PART VI: **EFFECTIVE DATE**

This ordinance shall be effective thirty (30) days after publication after adoption on second reading and shall apply to traffic offenses occurring or committed on or after said date.

INTRODUCED, READ, AND ADOPTED ON FIRST READING on __________, 2025 and ordered published in the DOUGLAS COUNTY NEWS-PRESS.

THE BOARD OF COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

By:____________________________
Abe Laydon, Chair

ATTEST:

____
Hayley Hall, Deputy Clerk

ADOPTED ON SECOND AND FINAL READING on ______________, 2025, and ordered published by reference to title only in the DOUGLAS COUNTY NEWS-PRESS.

THE BOARD OF COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

By:____________________________
Abe Laydon, Chair

ATTEST:

____
Hayley Hall, Deputy Clerk

CERTIFICATE

I hereby certify that the foregoing Ordinance No. 0-025-00x was introduced, read and adopted on first reading at the regular meeting of the Board of County Commissions of the County of Douglas on _________, 2025, and the same was published in full in the Douglas County News-Press, a newspaper of general circulation published in Douglas County, on _________, 2025, and thereafter was adopted on second and final reading, as amended, at a regular public hearing of the Board of County Commissioners of the County of Douglas on _________, 2025. Said ordinance was published in full on or before __________, 2025. Said ordinance shall become effective as of ___________, 2025.

____
Hayley Hall, Deputy Clerk

State of Colorado)
)ss.
County of Douglas)

Subscribed and sworn to before me this __, day of _______, 2025 by Hayley Hall, Deputy Clerk.

____
Notary Public

My commission expires: ____________________

CERTIFICATION

I, Hayley Hall, Douglas County Deputy Clerk, do hereby certify that the foregoing Ordinance No. 0-025-00x, entitled, **AN ORDINANCE FOR THE REGULATION OF TRAFFIC AND PARKING; REPEALING ALL ORDINANCES AND RESOLUTIONS IN CONFLICT THEREWITH; AND PROVIDING PENALTIES FOR VIOLATION THEREOF,** is a true, correct and complete copy from the records in my office, that said ordinance was duly adopted by the Board of County Commissioners of Douglas County and is in full force and effect.

____
Hayley Hall, Deputy Clerk

EXHIBIT A
RESIDENTIAL PARKING PERMIT AREAS

All or portions (as posted) of the following streets in Douglas County:

Highlands Ranch High School:
- East of the school:
  - Morning Glory Court
  - Morning Glory Place
  - Morning Glory Lane
  - Morning Glory Way
  - Weeping Willow Circle (as posted - Cresthill Lane to Morning Glory Way)
- West of the school:
  - Lark Sparrow Drive (as posted - Fallbrooke Drive to Sand Hill Way)
  - Sand Hill Court
  - Sand Hill Street
- South of the school:
  - Townsville Circle (as posted-9614 Townville Circle to Griffith Place)
  - Griffith Place (as posted - Newcastle Drive to Cresthill Lane)
  - Queenscliffe Drive (as posted - Townsville Circle to 9688 Queenscliffe Dr)
  - Queenscliffe Court
  - Canberra Dr (as posted- northbound from 9687 Canberra Dr, including the cul-de-sac)
  - Canberra Court
  - Parramatta Place (as posted- Queenscliffe Dr to Rockhampton Way)

Redstone Elementary
- South of the school:
  - Brady Place

Ponderosa High School
- North of the school:
  - Meadow View (as posted- to Pine Forest Lane on east and west end of Meadow View)
  - Tamarac Court
  - Red Oak Way (as posted-Meadow View to Pine Forest Lane)
  - Bur Oak Lane (as posted- Meadow View to Pine Forest Lane)
  - Honey Locust Court

Chaparal High School

South of the school (Stonegate Terrace Subdivision) bounded by Lincoln Avenue, Stonegate Parkway, Brookstone Drive and Chambers Road:

As posted:
Brookstone Drive
Onyx Drive
Greenstone Circle
Greenstone Lane
Hedgeway Drive
Crystallo Drive
Crystallo Court
Citrine Court
Alabaster Court
Malachite Court
Tourmaline Court
Verdigris Street
Alabaster Court

EXHIBIT B
PRIVATE PARKING RESTRICTED AREAS

Highlands Ranch Recreation Center at Northridge, 8801 South Broadway, Highlands Ranch, Colorado

Highlands Ranch Recreation Center at Southridge, 4800 McArthur Ranch Road, Highlands Ranch, Colorado.

Highlands Ranch Recreation Center at Eastridge, 9568 South University Boulevard, Highlands Ranch, Colorado.

Highlands Ranch Recreation Center at Westridge, 9650 South Foothills Canyon Boulevard, Highlands Ranch, Colorado.

Backcountry Parking Area, 11950 Monarch Blvd., Highlands Ranch, Colorado.

Pinewood Townhome Association, Inc. (Pinery) 6500 North Pinewood Drive

Athletic Club at Inverness 374 Inverness Drive South.

Hydrogen Components, Inc., 12420 North Dumont Way, Littleton, Colorado

Highlands Ranch Learning Center, 405 Dad Clark Drive, Highlands Ranch, Colorado.

AMC Highlands Ranch 24, 103 West Centennial Boulevard, Highlands Ranch,

Colorado Valor Christian High School, 3775 Grace Boulevard, Highlands Ranch,

Colorado

EXHIBIT C
DESIGNATED URBANIZED AND MUNICIPAL PLANNING AREAS

- Primary Urban Area (Highlands Ranch);
- Chatfield Urban Area;
- Roxborough SUA;
- Pinery SUA;
- Castle Pines SUA;
- Parker Municipal Planning Area (such as Stonegate, which remains unincorporated);
- Castle Rock Municipal Planning Area; and
- Lone Tree Municipal Planning Area

EXHIBIT D
RECREATIONAL VEHICLE PARKING RESTRICTION AREAS

- Primary Urban Area (Highlands Ranch);
- Chatfield Urban Area;
- Parker Municipal Planning Area (such as Stonegate, which remains unincorporated);

MEETING DATE:	April 22, 2025
STAFF PERSON RESPONSIBLE:	Trevor Bedford, AICP, Senior Planner
DESCRIPTION:	Struby Resurvey, Lots 7-11 - Rezoning - Project File: ZR2024-008.
SUMMARY:	The request is for approval of rezoning approximately 4.45 acres from General Industrial to Light Industrial in the Highway 85 area.
STAFF ASSESSMENT:	Staff has evaluated the rezoning request in accordance with the Douglas County Comprehensive Master Plan policies and Section 25 of the Douglas County Zoning Resolution. Should the Board of County Commissioners find that the approval criteria have been met, it may approve the rezoning of Struby Resurvey, Lots 7 - 11 to the Light Industrial zone district.

REVIEW:

Terence T Quinn - FYI	Notified - FYI	4/10/2025
Steven E Koster	Approve	4/10/2025
Jeff Garcia	Approve	4/16/2025
Andrew Copland	Approve	4/16/2025
Doug DeBord	Approve	4/16/2025
Samantha Hutchison - FYI	Notified - FYI	4/16/2025

ATTACHMENTS:

Staff Report - ZR2024-008

Rezoning Staff Report

Date: April 9, 2025

To: Douglas County Board of County Commissioners

Through: Douglas J. DeBord, County Manager

From: Terence T. Quinn, AICP, Director of Community Development TQ

CC: Trevor Bedford, AICP, Senior Planner
Curtis J. Weitkunat, AICP, Long Range Planning Manager
Steven E. Koster, AICP, Assistant Director of Planning Services

Subject: **Struby Resurvey, Lots 7-11 – Rezoning**

Project File: **ZR2024-008**

Planning Commission Hearing:	**April 7, 2025 @ 6:00 p.m.**
Board of County Commissioners Hearing:	**April 22, 2025 @ 2:30 p.m.**

I. Executive Summary

The request is for approval of rezoning approximately 4.45 acres from General Industrial (GI) to Light Industrial (LI) in the Highway 85 area. The property consists of five parcels used as a landscaping business. The proposed rezoning is intended to bring existing structures on site into compliance with the Douglas County Zoning Resolution (DCZR). The applicant is also processing a Site Improvement Plan (SIP) to bring the entire site into compliance.

At its public hearing on April 7, 2025, the Planning Commission unanimously recommended approval of the rezoning by a vote of 5 to 0.

II. Application Information

A. Applicant
Jim Lynch
13195 N Highland Circle
Littleton, CO 80125

B. Applicant's Representative
Joshua Stevens
Samuel Engineering
8450 E Crescent Parkway, Suite 200
Greenwood Village, CO 80111

C. Request

The applicant requests approval of a rezoning from GI to LI for approximately 4.45 acres in the Struby Resurvey subdivision.

D. Process

A rezoning application is processed pursuant to Section 2504 of the Douglas County Zoning Resolution (DCZR).

Per Section 2504.09, "The Board shall evaluate the rezoning request, staff report, referral agency comments, applicant responses, the Planning Commission recommendation, and public comment and testimony, and shall approve, approve with conditions, continue, table for further study, remand to the Planning Commission, or deny the rezoning request. The Board's action shall be based on the evidence presented, compliance with the adopted County standards, regulations, policies, and other guidelines."

E. Location

The project area is located northwest of the intersection of Carder Court and Highland Circle and north of the High Line Canal. The attached vicinity map, zoning map, and aerial map highlight site location and existing conditions.

III. CONTEXT

A. Background

The subject property consists of five parcels and is currently used for a landscaping business. Several buildings were constructed within the required 25-foot setback for a GI zoned property that abuts an LI zoned property. There is no required side setback between LI zoned properties. This rezoning would bring the structures into compliance with the setback. The applicant submitted a Site Improvement Plan Revision (SIP Revision) to show the structures and bring the site into compliance.

B. Adjacent Land Uses and Zoning

The subject property is primarily surrounded by General Industrial or Light Industrial Zoning. Surrounding uses are primarily industrial or commercial. Two established residential uses are located to the west of the subject property. The property is bound to the south by the High Line Canal, which is zoned Agricultural One.

Zoning and Land Use

Direction	Zoning	Land Use
North	General Industrial	Industrial and Commercial
South	Agricultural One	High Line Canal
East	Light Industrial	Industrial
West	General Industrial	Industrial and Residential

IV. PHYSICAL SITE CHARACTERISTICS

A. Site Characteristics and Constraints

The site is a developed industrial property used as a landscaping business. The property is bounded to the south by the High Line Canal.

B. Access

The property currently has five access points from Highland Circle. Access will continue to be evaluated through the SIP Revision process.

C. Drainage and Erosion

Engineering reviewed the Phase III Drainage Report and had no comments. Drainage will continue to be evaluated through the SIP Revision process.

D. Floodplain

No mapped 100-year floodplain is present on the site.

V. PROVISION OF SERVICES

A. Schools

The non-residential rezoning does not impact schools.

B. Fire Protection

South Metro Fire Rescue (SMFR) provides fire and emergency services for the property. The applicant provided a letter from SMFR confirming that services are provided to the property. SMFR responded to the referral request with no objection.

C. Sheriff Services

The Douglas County Sheriff's Office (DCSO) provides police protection to the site. DCSO responded to the referral request with no comments or concerns. Responses were not received from the Office of Emergency Management or E911.

D. Water

The property and existing structures on site are currently served by Northern Douglas County Water and Sanitation District. The applicant provided a letter from the District confirming that they serve the property. There is an additional existing well on site that may not be used for commercial purposes. The State Division of Water Resources confirmed that the well may remain on site.

E. Sanitation

The property and existing structures on site are currently served by Northern Douglas County Water and Sanitation District. The applicant provided a letter from the District confirming that they serve the property.

F. Utilities

Area utility service providers were provided a referral on this application. Xcel Energy responded noting existing facilities along property lines. Xcel stated no objection to the rezoning contingent upon their ability to maintain all existing rights without hindering the ability for future expansion. The applicant responded to Xcel's comments stating that they do not seek to change any of Xcel's rights and will work with Xcel during the SIP Revision process if any modifications, additional easements or permitting become necessary. No other utility provider issued comments on the application.

VI. PUBLIC NOTICE AND INPUT

In accordance with Section 2508 of the DCZR, public notice is required to be published in the Douglas County News-Press, mailed to abutting property owners, and posted on the site by the applicant.

Notifications of an application in process were sent to all abutting property owners. One abutting property owner responded with concerns about the site's operations but noted he was pleased to know the site was working to be brought into compliance. The comments are attached to the report.

VII. PLANNING COMMISSION HEARING

At a public hearing on April 7, 2025, the Planning Commission considered the applicant's request for approval of the rezoning. After presentations by staff and the applicant, the Planning Commission recommended approval of the application by a vote of 5 to 0.

VIII. STAFF ANALYSIS

The following criteria shall be considered by the Board of County Commissioners in the review of all rezoning applications:

2502.01: The application is in compliance with the requirements of this Resolution and the Douglas County Comprehensive Master Plan.
Staff Comment: The subject property is located within the Primary Urban Area (PUA) as identified by the Comprehensive Master Plan Land Use Map. The proposed rezoning is consistent with the policies of Section 2, Urban Land Uses. Policy 2-1A.2 is to "Prioritize the build-out of existing urban areas over approval of new urban development." This rezoning will help to allow the existing industrial use to remain within the urban area. Policy 2-6E.1 is to "Locate nonresidential development in the PUA, SUAs, Chatfield Urban Area, and the municipalities. Concentrate this development in nodes, clusters, or centers. Strip or isolated development is inconsistent with this Plan." This rezoning maintains an existing use in the industrial cluster off of Carder Court.

2502.02: The application is in compliance with all applicable statutory provisions.
Staff Comment: The application complies with applicable provisions of the Colorado Revised Statutes.

2502.03: Whether there has been a substantial change in the character of the neighborhood, since the land was last zoned.
Staff Comment: The area near the property generally has lighter industrial uses such as landscaping businesses. The rezoning from GI to LI ensures that uses on the subject property remain consistent with the pattern of development in the area.

2502.04: Whether the application demonstrates public facilities and services necessary to accommodate the proposed development will be available concurrently with the impacts of such development.
Staff Comment: The rezoning will not adversely impact the provision of public facilities and services. The site is currently developed and served by utilities. South Metro Fire Rescue and Douglas County Sheriff's Office provide emergency services to the site. All service providers will review the proposed SIP Revision.

2502.05: Whether the roadway capacity necessary to maintain the adopted roadway level-of-service for the proposed development will be available concurrently with the impacts of such development.
Staff Comment: The applicant provided a traffic report that was reviewed by Engineering Services without any comments or concerns. There were no concerns related to maintaining the adopted level-of-service and traffic will continue to be evaluated during the proposed SIP Revision.

2502.06: Whether the application is in conformance with Section 18A, Water Supply – Overlay District, herein.
Staff Comment: DCZR Section 1803A establishes approval standards to be used in the evaluation of land use application reviewed under Section 18A.

1803A.01: The applicant has demonstrated that the water rights can be used for the proposed purposes.
Staff Comment: The applicant has provided a letter from Northern Douglas County Water and Sanitation District that states water is currently provided on site and will continue to be provided.

1803A.02: The reliability of a renewable right has been analyzed and is deemed sufficient by the County based on its priority date within the Colorado System of Water Rights Administration.
Staff Comment: No new renewable water rights are proposed for this development under this application.

1803A.03: The Water Plan is deemed adequate and feasible by the County to ensure that water supply shortage will not occur due to variations in the hydrologic cycle.
Staff Comment: The provided documentation is adequate to ensure that the proposed water supply can serve the uses.

1803A.04: The Water Plan is sufficient to meet the demand applicable to the project based on the minimum water demand standards in Section 1805A herein.
Staff Comment: The existing district water supply meets the water demand standards for the uses.

2502.07: Whether the proposed rezoning is compatible with the surrounding land uses.
Staff Comment: The proposed rezoning is compatible with the surrounding land uses. The property is primarily surrounded by industrial uses. The existing use of a landscaping business is compatible with the proposed LI zoning.

2502.08: Whether the subject land is suitable for the intended use.
Staff Comment: The land is currently used as a landscaping business and the applicant intends to maintain this use on site after rezoning. The applicant will be required to complete a SIP Revision to ensure all requirements of the DCZR are met.

IX. STAFF ASSESSMENT

Staff has evaluated the rezoning request in accordance with the Douglas County Comprehensive Master Plan policies and Section 25 of the DCZR. Should the Board of County Commissioners find that the approval criteria have been met, it may approve the rezoning of Struby Resurvey, Lots 7 – 11 to the Light Industrial zone district.

ATTACHMENTS **PAGE**

LAND USE APPLICATION

Please fill in this application form completely. An incomplete application will not be processed.

Note: Neither the Planning Commission nor the Board of County Commissioners should be contacted regarding an open application.

OFFICE USE ONLY

PROJECT NAME: ______

PROJECT FILE #: ______

PLANNING FEES: ______

ENGINEERING FEES: ______

TOTAL FEES: ______

RELATED PROJECTS: ______

PROJECT TYPE: JPL Rezoning

MARKETING NAME: ______

SITE ADDRESS: 13195 N Highland Cir Littleton, CO 80125

OWNER(S):

Name(s): Jim Lynch

Address: 13195 N Highland Cir Littleton, CO 80125

Phone: 303-434-4364

Email: jim@jplcares.com

AUTHORIZED REPRESENTATIVE *(requires notarized letter of authorization if other than owner)*

Name: Ben Stone

Address: 8450 E Crescent Pkwy Suite 200, Greenwood Village, CO 80111

Phone: 303-567-7614

Email: bstone@samuelengineering.com

LEGAL DESCRIPTION:

Subdivision Name: Struby Resurvey

Filing #: ______ Lot #: 7-11 Block #: ______ Section #: 6 Township: 6S Range: 68W

STATE PARCEL NUMBER(S): 2229-060-01-001, 2229-060-01-002, 2229-060-01-003, 2229-060-01-004, 2229-060-01-005

ZONING:

Present Zoning: GI Proposed Zoning: LI Gross Acreage: 4.45

Gross Site Density (DU per AC): ______ # of Lots or Units Proposed: 5

SERVICE PROVIDERS:

Fire District: South Metro Fire Metro District: ______ Gas: Xcel

Water: Northern Douglas County Sewer: Northern Douglas County Electric: Xcel

Roads: ☒ Public ☐ Private (please explain): ______

To the best of my knowledge, the information contained on this application is true and correct. ***I have received the County's information sheet regarding the Preble's Meadow Jumping Mouse.***

______ Applicant Signature

10-23-2023 Date

PREBLE'S MEADOW JUMPING MOUSE

What is the Prebles' meadow jumping mouse?

The Preble's meadow jumping mouse is a rare mouse designated by the United States Fish and Wildlife Service as a "threatened species" under the Endangered Species Act. The federal threatened species designation prohibits the unlawful "take" of the Preble's meadow jumping mouse or its habitat.

Where does the mouse live?

The Preble's meadow jumping mouse lives primarily in heavily vegetated riparian habitats. In Douglas County, the mouse has been located in or near many drainages, including tributaries and the main stream reaches, of East and West Plum Creek. However, ***any*** stream reach or potential habitat within Douglas County may be subject to the requirements of the Endangered Species Act.

The mouse has also been found in Boulder, Elbert, El Paso, Jefferson and Larimer counties and in parts of Wyoming.

What activities may be considered a violation of the Endangered Species Act?

In its listing decision, the United States Fish and Wildlife Service identified activities that may result in violation of the Endangered Species Act to include:

1. Unauthorized or unpermitted collection, handling, harassing, or taking of the species;

ANY APPROVAL GIVEN BY DOUGLAS COUNTY DOES NOT OBVIATE THE NEED TO COMPLY WITH APPLICABLE FEDERAL, STATE, OR LOCAL LAWS AND/OR REGULATIONS.

2. Activities that directly or indirectly result in the actual death or injury death of the mouse, or that modify the known habitat of the species, thereby significantly modifying essential behavioral patterns (e.g., plowing, mowing, or cutting; conversion of wet meadow or riparian habitats to residential, commercial, industrial, recreational areas, or cropland; overgrazing; road and trail construction; water development or impoundment; mineral extraction or processing; off-highway vehicle use; and, hazardous material cleanup or bioremediation); and;

3. The application or discharge of agrichemicals, or other pollutants, and pesticides, onto plants, soil, ground water, or other surfaces in violation of label directions or any use following Service notification that such use, application or discharge is likely to harm the species; would be evidence of unauthorized use, application or discharge.

How to determine if a proposed activity would violate the Endangered Species Act.

Any questions regarding whether an activity will impact the Preble's meadow jumping mouse or its habitat should be directed to:

Liisa Niva
Fish and Wildlife Biologist
Ecological Services
Colorado Field Office
P.O.Box 25486, DFC (MS 65412)
Denver, CO 80225-0486
303-236-4773

Where to find more information on the Preble's meadow jumping mouse.

More information can be found at the US Fish and Wildlife Service website at:
https://ecos.fws.gov/ecp/species/4090

SAMUEL ENGINEERING
WE PROVIDE SOLUTIONS

8450 East Crescent Parkway, Suite 200
Greenwood Village, CO 80111

Phone: 303.714.4840
FAX: 303.714.4800

November 18, 2024

To: Department of Community Development
Attn: Rezoning
100 Third Street
Castle Rock, CO 80104
303-660-7460

PROJECT SUMMARY NARRATIVE

To Whom it may concern,

2506.01

The purpose of this request is to rezone Lots 7,8, 9, 10, and 11 of the Struby Resurvey subdivision from General Industrial to Light Industrial. It is a requisite step for our related Site Improvement Plan (SIP) which seeks to improve the site layout and bring the site into better compliance with storm water management. Additionally, the relate SIP includes permitting two existing buildings, identifying the location of future buildings, regrading the site, installing retaining walls, and installing two stormwater detention ponds.

2506.02

Lots 7-11 are owned by the following entities respectively; Lot 7, LLC, Lot 8, LLC, Lot Nine, LLC, Lot 10, LLC, and Lot 11 LLC. Each LLC maintains mineral rights to each property (See Title Work documents). Jim Lynch is an authorized member and representative of each LLC listed above. Jim is located at 13195 N Highland Cir, Littleton, CO 80125. Jim Lynch has also established Samuel Engineering, located at 8450 E Crescent Parkway Suite 200, Greenwood Village, CO 80111, as a representative for the applicant. Per the Colorado Department Water Resources, there is no current owner of the Water rights to the properties listed above. There however is a well permit for a constructed well in Lot 10 (Permit number 76858). Additionally, North Douglas County Water Supply and Sanitation District provides water and sanitation services to all existing structures in the above lots (See Will Serve Referral) and will continue to do so after rezoning and intended improvements identified in our related Site Improvement Plan.

2506.03-2506.04

The proposed development staging and time frame is dependent on the approval of the related SIP for this site. No immediate development will occur from the approval of this rezoning application alone. Furthermore, a subsequent Variance request will be made following the outcome of this Rezoning package. After approval of the Variance, the related SIP for this site will be resubmitted. Only after the SIP is approved will there be any significant development.

Following SIP approval, the site will be improved within 2 to 2 ½ years depending on the time it takes to attain required permits and construction delays. Generally, after attaining SIP approval, Storage containers from Lot 7 will be removed from the site within 3 months. Landscaping equipment and other landscaping material throughout Lots 8-11 will also be removed at this time. Following the removal of those items, Grading and Erosion and sediment controls will then be installed in a accordance with a Grading, Erosion, and Sediment Control Plan (to be submitted with the SIP) in the following 30 days. After which, stock piling fill material will occur in the next 30 days. From there, with proper permitting, grading will take place over the next 60 days. After which, with proper permitting, the storm water detention ponds will be constructed over the next 180 days. After the construction of the ponds, the proposed buildings in lots 7 and 8 be will be constructed with proper permits in the following 18 -21 months. During the timeframe outlined above, retroactive build permits will be pursued for the existing garage in Lot 10 and the existing cold storage building in Lot 9.

2506.05 – Existing Land Use

Rezoning Lots 7-11 from General Industrial to Light Industrial will have no ill effects as it relates to existing lands uses as well as abutting land uses. Lots 7-11 are used for general storage and equipment/material storage for the residing landscaping company, JPL Cares, specializing in commercial landscape maintenance. The principle uses of the existing lots are therefore more closely aligned with those of the Light Industrial. Specifically, the lot is used for as an Industrial operation which does not emit excessive amounts of dust, smoke, fumes, gas, noxious odors, or noise beyond the lot boundary. It contains a general office to facilitate the business of the landscaping company. The lots also contain a private parking lot for employees and customers. Lastly, the Lots contain product storage which does not contain hazardous material.

2506.05—Abutting Land uses

There are 5 different parcels of land that abut Lots 7-11. Immediately east of Lots 7-11 is state parcel 222906000023, owned by Wilkins II-A LLC, zoned for Light Industrial and contains the business of Green Valley Turf, a Sod Supplier. The rezoning of Lots 7-11 to Light Industrial would thus align with the property to the east as Green Valley Turf and JPLS Cares are closely related fields in the landscaping industry. Furthermore, it will have the benefit of vacating a 25’ setback from the shared property line. North of Lot 7 are state parcels 222906001009 and 222906001010. Parcel 222906001009 is owned by Solsbury Hill Land Company LLC and contains DBC Irrigation Supply. Parcel 222906001010 is owned by 2976 NFP LLC & NFP 2021 LLC and contains the following businesses; Jims Gym, Extreme Piano moving, and Ascent Systems. While both of these properties to the north are zoned for General Industrial, the rezoning of Lots 7-11 will not cause any detriment as the land use of those parcels reflect the same land uses as those listed for Light Industrial. Furthermore, both of these parcels are on a different grade than Lots 7-11, are not accessible from Lot 7 due to the grade difference, and are physically separated via a fence that spans the property line. Furthermore, the land use of Lots 7-11 will not change from its historical use. West of lots 7-11 is North Highland Circle, state parcel 222906499002, owned by Douglas County Board of County Commissioners, zoned for General Industrial, and contains the land use of a public road. For much the same reasons listed for above, rezoning should have no detrimental affect on this property. South of Lot 11 is High Line Canal, state parcel 222907000008, owned by the City of Denver, managed by Douglas County, zoned as Agricultural One, and has a recreational land use. Again, the land use of Lots 7-11 will not change as a result form the rezoning and thus there will not be and detrimental affect on this adjacent property.

2506.06

The site currently is being provided with sanitation and water service lines from the Northern Douglas County Water and Sanitation District and power and gas by Xcel Energy. These four utility services are all that is necessary for the site and its utility demands. The site is also serviced by the South Metro Fire District.

2506.07

The five lots (lots 7 through 11) that make up this project total 4.47 acres. The subject property has several buildings including office space, residential property, garages, shops, and storage buildings. Except for approach aprons to the shops and garages, the site is surfaced with gravel and road base. The property generally slopes uniformly from the southeast to the northwest at approximately 4%. There are no major or minor drainage ways on or adjacent to the property. There are no lakes or streams in the area of the site or the proposed development included in the related SIP for this site. The subject property is not located in a floodplain. While the High Line canal does abut the property to the south, the flow line for the canal is at a higher elevation than the property, therefore there is no risk of stormwater runoff from the site to infiltrate the canal. The site is also not in any Hazard areas as identified in Maps 8.1, “Class Three Hazards and Environmental Constraints,” 8.2, “Steeply Dipping Bedrock,” of the Douglas County Comprehensive Master plan. The only hazards the property presents, are those of contaminants from landscaping equipment and automobiles (such as oil) mixing with stormwater runoff as it flows away from the site. There are currently no measures on the site that mitigate this potential hazard. However, the stormwater detention ponds included in the related SIP for this site directly addresses and mitigates this potential hazard. This rezoning application contained herein thus enables that mitigation. The disapproval of this rezoning application will only ensure this potential hazard continues unmitigated.

2506.08

There are no anticipated impacts to the flora and fauna in and around the site due to the rezoning of the property. Because the land use of the site will not change as a result of this rezoning, there is no anticipated impacts to the flora and fauna in and around the site. However, provided this re-zoning application is approved, and the subsequent related SIP for this site is approved, a net benefit to the flora and fauna within and around the site is anticipated due to a significant improvement of the water quality of storm water run-off exiting the site. Additionally, the landscaping requirements for SIP approval will also improve the conditions of flora and fauna throughout the site.

2506.09 –Conformance with Douglas County Comprehensive Master Plan

While the site location has an address that identifies the property in Littleton Colorado, it is outside of Littleton's city limits and is thus part of Unincorporated Douglas County, In terms of the Douglas County Comprehensive Master Plan (CMP), it is included in the Primary Urban Area. Of the many goals of the Douglas County Comprehensive Master plan, development is encouraged in Primary Urban Area, there is an emphasis on improving and enhancing existing infrastructure (Goal 2-1), and there is an overall effort for improving environmental qualities (Section 8). Per Section 2 of the Douglas County CMP there is an overall goal of "Improve and Enhance the Existing Infrastructure; support healthy living; reduce vehicle miles travelled; maintain air quality standards; and conserve pen space." Within that goal contains policy 2-1A.2 "Prioritize the build out of existing urban areas over approval of new urban development." Allowing the approval of this rezone application would enable the related SIP for this site. The result of which conforms with the building out of existing urban areas and also conforms with improving and enhancing existing infrastructure, especially with the installation of two storm water detention ponds to significantly improve water quality. The installation of those two storm water detention ponds would also conform with Section 8 of the Dougals County CMP, specifically goal 8-5, "Maintain High Water Quality and Protect water resources" and policy 8-5B.1, "Require water quality monitoring and enhancement, where appropriate." Within the related SIP for this site, is an agreement to grant an easement from the lot property owners to Douglas County to maintain and monitor the installed detention ponds. Thus the installation of the two stormwater detention ponds along with the granted easement would significantly conform with Section 8 of the Dougals County CMP.

2506.09 Conformance with Denver Regional Council of Government's Metro Vision Plan

Douglas County is a member of the Denver Regional Council of Government (DRCOG). The Vision Plan produced by this Council has many themes and desired outcomes which encapsulate many of the goals, objectives, and policies included within the Douglas County CMP. As stated earlier, this rezoning application is a requisite step to the related SIP for this site. The approval of this rezoning package and subsequent approval of the related SIP will enable the resident company, JPL Cares, to better optimize the space in which it operates. The optimization, along with the construction of new buildings, will allow the company to increase its efficiency. An increase in efficiency will enable an increase to its capacity to provide services to additional clients in the commercial Landscape maintenance and management industry. The enabled growth will thus contribute to DRCOG Vision Plan's theme of "A Vibrant Regional Economy." Approval of this zoning package and subsequent related SIP will also conform with DRCOG Vision Plan's overarching theme of "An efficient and predictable development pattern," as it fits in with that themes subordinate objective of containing "urban development in locations designated for urban growth and services." Additionally, provided approval of this Rezoning package and related SIP, the installation of two stormwater detention ponds will conform with the DRCOG Vision Plan's overarching theme of " A safe and resilient natural and built environment" as there will be a direct increase in water quality of stormwater exiting the site thus supporting the outcome "The region has clean water and air, and lower greenhouse gas emission" through the pursued objective of improving "the efficient use and quality of the region's waters."

2506.09 Conformance with 1041 Regulations regarding New Communities

The rezoning of this site along with its related SIP is not applicable to the New Communities provisions within Douglas County 1041 Matters of State document. This site is not part of a planned new community. It is already contained within a developed subdivision that has water, sanitation, power, and fire suppression support provided.

2506.10

Please see the Phase III Drainage Report for the site as it pertains to our SIP submittal. Please take note that there are currently no stormwater best management practices in place on the site as it exists today. With the approval of this rezoning application, along with its related SIP, there will be significant improvements to the storm water management of the site.

2506.11

There are no recreational facilities, park sites, open space, or accessibility to such within the site, existing or proposed.

2506.12

The most significant recent change to the character of the neighborhood is the development of property to the site's east border, parcel 222906000023, currently owned by Wilkins II-A LLC, zoned for Light Industrial and contains the business of Green Valley Turf, a Sod Supplier. Between 2008 and 2010 this parcel was developed into the property that currently exists today. The resident business contained within of Lots 7-11 is JPL Cares, a commercial Landscape maintenance company. Rezoning Lots 7-11 into Light Industrial would match the developing character of the neighborhood as both JPL Cares and Green Valley Turf are active contributors to the landscaping industry.

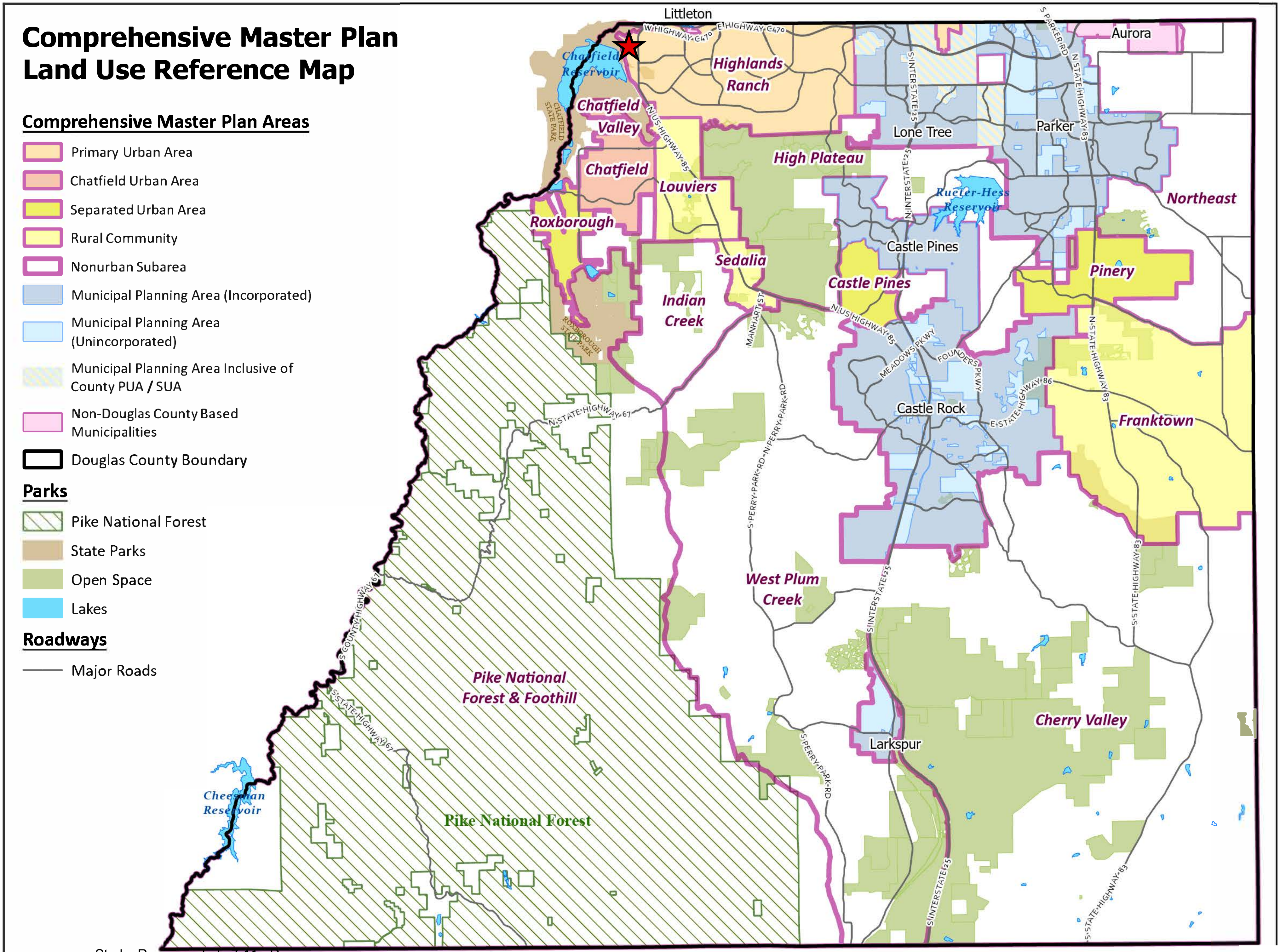
2506.13

There is currently a related SIP for this project submitted under project number: SP2024-028. This application is requisite step needed prior to resubmitting plans and documents for that SIP. There will be a subsequent Variance request following this submission. This request has however not been started as it depends on the outcome of this rezoning request.

Sincerely,

Joshua Stevens

Civil Engineer


Comprehensive Master Plan Land Use Reference Map
Comprehensive Master Plan Areas
Primary Urban Area
Chatfield Urban Area
Separated Urban Area
Rural Community
Nonurban Subarea
Municipal Planning Area (Incorporated)
Municipal Planning Area (Unincorporated)
Municipal Planning Area Inclusive of County PUA / SUA
Non-Douglas County Based Municipalities
Douglas County Boundary
Parks
Pike National Forest
State Parks
Open Space
Lakes
Roadways
Major Roads
Littleton
Aurora
Highlands Ranch
Chatfield Valley
Chatfield
Louviers
Roxborough
Sedalia
Indian Creek
High Plateau
Lone Tree
Parker
Rueter-Hess Reservoir
Northeast
Castle Pines
Pinery
Castle Rock
Franktown
West Plum Creek
Pike National Forest & Foothill
Pike National Forest
Cherry Valley
Larkspur
Cheesman Reservoir
Chatfield State Park
Roxborough State Park
W HIGHWAY C470
E HIGHWAY C470
N US HIGHWAY 85
S INTERSTATE 25
N INTERSTATE 25
S PARKER RD
N STATE HIGHWAY 83
S STATE HIGHWAY 83
N STATE HIGHWAY 67
S STATE HIGHWAY 67
S COUNTY HIGHWAY 67
MANHART ST
S PERRY PARK RD
N PERRY PARK RD
MEADOWS PKWY
FOUNDERS PKWY
E STATE HIGHWAY 86

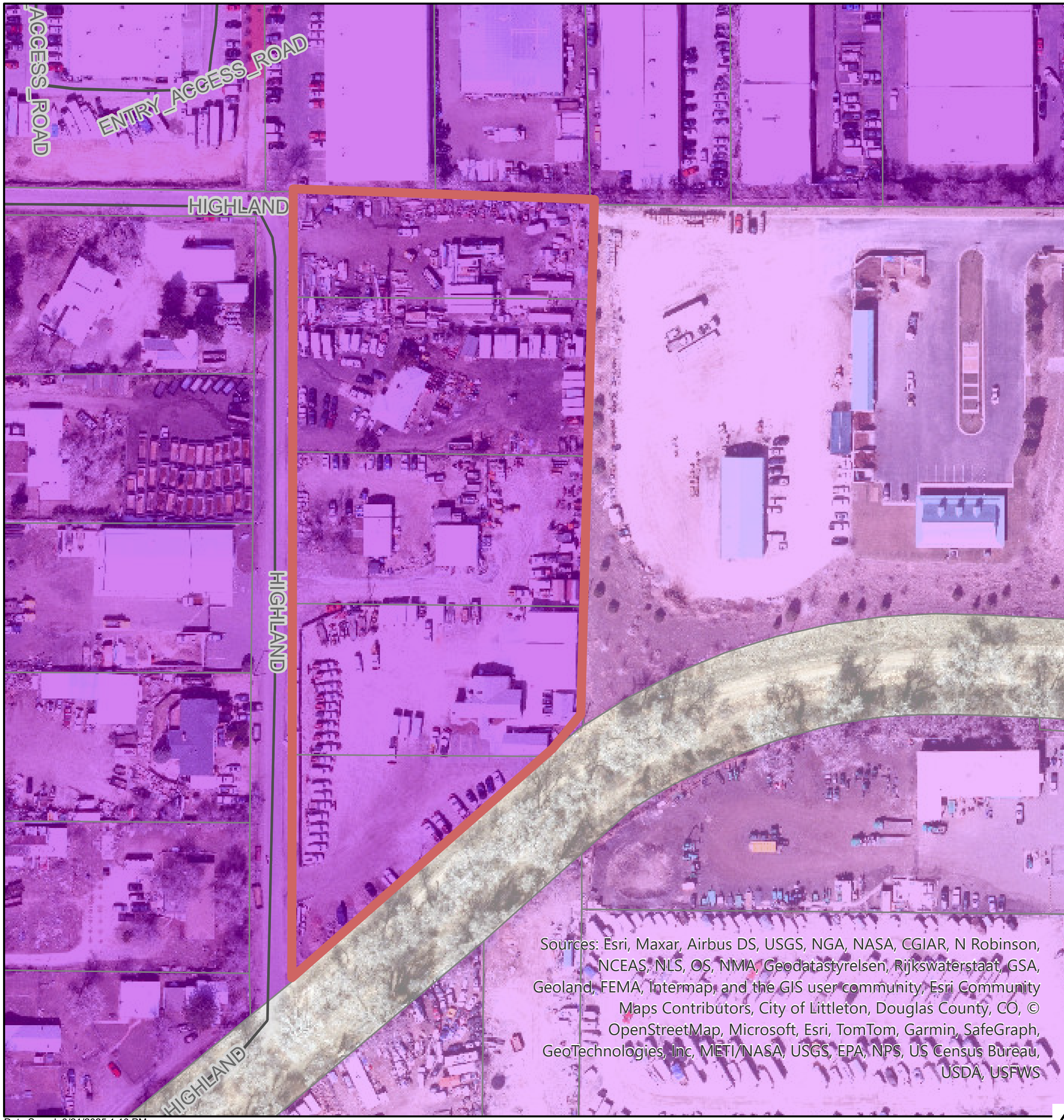
Struby Resurvey, Lots 7-11

ZR2024-008 Zoning Map

N

LEGEND

- Roads
- Major Roads
- Parcels - PARCELS
- A1 - AGRICULTURAL ONE
- LI - LIGHT INDUSTRIAL
- GI - GENERAL INDUSTRIAL



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DOUGLAS COUNTY COLORADO

Struby Resurvey, Lots 7-11

ZR2024-008
Aerial Map

N

LEGEND
- Roads
- Major Roads
- Parcels - PARCELS

Date Saved: 3/21/2025 1:18 PM

Source: https://apps.douglas.co.us/gisportal/apps/webappviewer/index.html?id=9cd173c692b7436891bd0 2c

DOUGLAS COUNTY COLORADO

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Addressing Analyst	01/08/2025	No Comment:	No response necessary
Arapahoe County Engineering Services Division		No Response Received:	No response necessary
Arapahoe County PWD/ Planning	01/09/2025	No Comment: Thank you for the opportunity to review and comment on this project. The Arapahoe County Planning Division has no comments; however, other departments and/or divisions may submit comments.	No response necessary
AT&T Long Distance - ROW		No Response Received:	No response necessary
Black Hills Energy		No Response Received:	No response necessary
Building Services	01/17/2025	No Comment:	No response necessary
CenturyLink		No Response Received:	No response necessary
Chatfield Community Association		No Response Received:	No response necessary
Colorado Division of Water Resources	01/17/2025	Received: See attached letter Summary: There is an existing well on site that is limited to residential uses.	The applicant confirmed with the Colorado Division of Water Resources that the existing well may remain on site as it is not used for commercial purposes.
Comcast		No Response Received:	No response necessary
CORE Electric Cooperative		No Response Received:	No response necessary
Douglas County Health Department	01/15/2025	No Comment: Thank you for the opportunity to review and comment on the Final Plat application. Douglas County Health Department (DCHD) staff have reviewed the application for compliance with applicable environmental and public health regulations. After Reviewing the application, DCHD has no comments. Please feel free to contact me at (720)907-4897 or smccain@douglas.co.us if you have any questions about our comments.	No response necessary
Douglas County Parks and Trails		No Response Received:	No response necessary
Douglas County School District RE 1		No Response Received:	No response necessary

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Engineering Services	01/28/2025	No Comment:	No response necessary
High Line Canal Conservancy		No Response Received:	No response necessary
Highlands Ranch Metro District	01/16/2025	Received: Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated. Ken Standen As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties. Thanks, Jon Klassen	Applicant acknowledged these requirements. Applicant does not expect any closures of the Highline Canal Trail and does not anticipate any increases in water or sewer needs.

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Highlands Ranch Water and Sanitation District	01/16/2025	Received: Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated. Ken Standen As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties. Thanks, Jon Klassen	Applicant acknowledged these requirements. Applicant does not expect any closures of the Highline Canal Trail and does not anticipate any increases in water or sewer needs.
Jefferson County Planning and Zoning		No Response Received:	No response necessary
Littleton	01/09/2025	No Comment:	No response necessary
Mile High Flood District		No Response Received:	No response necessary
Northern Douglas County Water & San District		No Response Received:	No response necessary
Office of Emergency Management		No Response Received:	No response necessary
Open Space and Natural Resources	01/09/2025	No Comment:	No response necessary
Rural Water Authority of Douglas County		No Response Received:	No response necessary
Sheriff's Office	01/28/2025	Received: Deputy Jeff Pelle, with the Douglas County Sheriff's Office, reviewed this project. I have no comments or concerns about it at this time.	No response necessary
Sheriff's Office E911		No Response Received:	No response necessary

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
South Metro Fire Rescue	01/14/2025	Received: South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed rezoning.	No response necessary
Xcel Energy-Right of Way & Permits	01/22/2025	Received: Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the request for the Struby Resurvey Rezone. Please be advised that Public Service Company has existing natural gas and electric distribution facilities along east and west properties' lines. Public Service Company has no objection to this proposed rezone, contingent upon PSCo's ability to maintain all existing rights and this amendment should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities, and that our current use/enjoyment of the area would continue to be an accepted use on the property and that it be "grandfathered" into these changes. The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details. Additional easements may need to be acquired by separate document for new facilities. As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.	Applicant acknowledged Xcel's requirements. Applicant will work with Xcel as needed during the Site Improvement Plan Revision as needed if easements or new service is needed. The rezoning application does not have any effect on Xcel's existing or future rights on the property.

January 16, 2025

Trevor Bedford
Douglas County Planning Services
Transmission via email: tbedford@douglas.co.us

Re: Case Number: ZR2024-008, Struby Resurvey Subdivision Lots 7-11
Update to the Site Improvement Plan and Rezoning
Part of the W ½ of the SE ¼ of the SE ¼ of Section 6, Twp. 6S, Rng. 68W, 6th P.M.
Water Division 1, Water District 8

Dear Trevor Bedford,

We have received your January 6, 2025 submittal concerning the Update to the Site Improvement Plan and Rezoning to accommodate changes to the site layout and a rezone from General Industrial to Light Industrial on 5 parcels located in the W ½ of the SE ¼ of the SE ¼ of Section 6, Twp. 6S, Rng. 68W, 6th P.M., Douglas County.

This referral does not appear to qualify as a "subdivision" as defined in section 30-28-101(10)(a), C.R.S. Therefore, pursuant to the State Engineer's March 4, 2005 and March 11, 2011 memorandums to county planning directors, this office will only perform a cursory review of the referral information and provide informal comments. The comments do not address the adequacy of the water supply plan for this project or the ability of the water supply plan to satisfy any County regulations or requirements. In addition, the comments provided herein cannot be used to

guarantee a viable water supply plan or infrastructure, the issuance of a well permit, or physical availability of water.

According to the application documents, water demand will not increase as a result of the proposed improvements and rezoning. The proposed water supplier is Northern Douglas County Water and Sanitation District ("District"). A letter from the District was included in the application documents, confirming that the parcels are located inside the District boundaries. Requirements for continued service from the District were outlined in the letter, including a requirement for the submittal of final construction plans for review.

A review of our records indicates well permit no. 76858 is located on Lot 10 of Struby Resurvey Subdivision. Well permit no. 76858 was decreed in Division 1 Water Court case no. W-4813 on January 17, 1975 as Black Well No. 1-Unregistered for domestic uses with a date of appropriation of October 6, 1952 and a flow rate of 0.033 CFS. **The use of this well is limited to those domestic uses in existence before May 8, 1972, and those same historical uses that have continued since that time [provided such uses are no greater than those uses allowed for a well permit pursuant to C.R.S. §37-92-602 (1) (which are: fire protection, ordinary household purposes inside not more than three single-family dwellings, the watering of poultry, domestic animals and livestock on a farm or ranch and the irrigation of not more than one acre of home gardens and lawns)].**

The application materials indicate that a stormwater detention structure may be a part of this project. The applicant should be aware that unless the structure can meet the requirements of a "storm water detention and infiltration facility" as defined in section 37-92-602(8), C.R.S., the structure may be subject to administration by this office. The applicant should review DWR's Administrative Statement Regarding the Management of Storm Water Detention Facilities and Post-Wildland Fire Facilities in Colorado to ensure that the notification, construction and

operation of the proposed structure meets statutory and administrative requirements. The Applicant is encouraged to use the Colorado Stormwater Detention and Infiltration Facility Notification Portal to meet the notification requirements.

Our office has no additional comments on the proposed project and rezoning application.

Please contact Mike Matz at 303-866-3581 x8241 or at michael.matz@state.co.us with any questions.

Sincerely,

Ioana Comaniciu, P.E.
Water Resources Engineer

Ec: Referral no. 32638
Well Permit No. 76858

DOUGLAS COUNTY PLANNING REFERRALS

REFERRAL NUMBER: ZR2024-008 DATE RECEIVED: 1/6/2025

PROJECT NAME: Rezone JPL Lots Carder Ct.

PLANNER:

DUE DATE: Jan 27, 2025

Parks & Parkways Manager
Dirk Ambrose

Natural Resource Manager
Nick Adamson

Director of Operations & Maintenance
Ken Standen

Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated.

Ken Standen

Director of Parks, Recreation & Open Space
Neil Alderson

Construction and Facilities Maintenance Manager
Tyler Ensign

Highlands Ranch Metropolitan District Highlands Ranch Water & Sanitation District
62 Plaza Drive Highlands Ranch CO 80129

Public Works Manager of Development Engineering
Forrest Dykstra

Director of Engineering & Public Works
Ryan Edwards

Public Works HR Water Project Engineer
Austin Long

No comment

Public Works HR Water Project Coordinator
Jon Klassen

As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties.

Thanks,

Jon Klassen
Project Manager

Finance Department

Highlands Ranch Metropolitan District Highlands Ranch Water & Sanitation District
62 Plaza Drive Highlands Ranch CO 80129

Highlands Ranch Metropolitan District   Highlands Ranch Water & Sanitation District
62 Plaza Drive Highlands Ranch CO 80129

Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: 303.285.6612
violeta.ciocanu@xcelenergy.com

January 22, 2025

Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104

Attn: Trevor Bedford

Re: Struby Resurvey, Lots 7-11, Case # ZR2024-008

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the request for the **Struby Resurvey Rezone**.

Please be advised that Public Service Company has *existing natural gas and electric distribution facilities along east and west properties' lines.* Public Service Company has no objection to this proposed rezone, contingent upon PSCo's ability to maintain all existing rights and this amendment should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities, and that our current use/enjoyment of the area would continue to be an accepted use on the property and that it be "grandfathered" into these changes.

The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details.

Additional easements may need to be acquired by separate document for new facilities.

As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.

Violeta Ciocanu (Chokanu)
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-285-6612 – Email: violeta.ciocanu@xcelenergy.com

DOUGLAS COUNTY
HEALTH DEPARTMENT COLORADO

January 15, 2025

Trevor Bedford
100 Third St.
Castle Rock, CO 80104

RE: ZR2024-008

Dear Mr. Bedford,

Thank you for the opportunity to review and comment on the Rezoning amendment application. Douglas County Health Department (DCHD) staff have reviewed the application for compliance with pertinent environmental and public health regulations. After reviewing the application, DCHD has no additional comments.

Please feel free to contact me at 720-907-4888 or bfreyer@douglas.co.us if you have any questions about our comments.

Sincerely,

B.Fr

Brent Freyer
Environmental Health Specialist II
Douglas County Health Department

DV 24-146

DOUGLAS COUNTY
COLORADO

www.douglas.co.us

Department of Community Development
Planning Services

REFERRAL RESPONSE REQUEST

Date Sent: January 6, 2025 Comments due by: **January 28, 2025**

Project Name:	Struby Resurvey, Lots 7-11
Project File #:	ZR2024-008
Project Summary:	The applicant is proposing to rezone approximately 4.45 acres from General Industrial to Light Industrial.

Information on the identified development proposal located in Douglas County is enclosed. Please review and comment in the space provided.

- [x] No Comment
- [ ] Please be advised of the following concerns:
- [ ] See letter attached for detail.

Agency: ENGINEERING	**Phone #:** 4318
Your Name: AL PETERSON	**Your Signature:** Al Peterson
(please print)	**Date:** 1/28/25

Agencies should be advised that failure to submit written comments prior to the due date, or to obtain the applicant's written approval of an extension, will result in written comments being accepted for informational purposes only.

Sincerely,

Trevor Bedford, AICP, Project Planner

Enclosure

100 Third Street, Castle Rock, Colorado 80104 • 303.660.7460 • Fax 303.660.9550

Trevor Bedford, AICP, Project Planner
Douglas County Department of Community Development, Planning Services
100 Third St
Castle Rock Co 80104
303.660.7460
303.660.9550 Fax

Project Name:	Struby resurvey, Lots 7-11
Project File #:	**ZR2024-008**
S Metro Review #	REFXRP25-00003
Review date:	January 14, 2025
Plan reviewer:	Aaron Miller 720.989.2246 aaron.miller@southmetro.org
Project Summary:	The applicant is proposing to rezone approximately 4.45 acres from General Industrial to Light Industrial.
Code Reference:	Douglas County Fire Code, 2018 International Fire Code, and 2021 International Building Code with amendments as adopted by Douglas County.

South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed rezoning.

SAMUEL ENGINEERING
WE PROVIDE SOLUTIONS

8450 East Crescent Parkway, Suite 200
Greenwood Village, CO 80111

Phone: 303.714.4840
FAX: 303.714.4800

February 18, 2025

Trevor Bedford, Senior Planner
Douglas County Department of Community Development
Planning Services Division
100 Third St., Castle Rock, CO 80104

RE: **Struby Resurvey, Lots 7-11, Project Number ZR2024-008 Response**

Dear Trevor,

Samuel Engineering, hereafter referred to as "Samuel", has reviewed the Review Referral Letter regarding project ZR2024-008, dated January 31, 2025. The following summarizes Samuel's response to the comments:

COMMENTS:

Douglas County Senior Planner:
Please note that the Colorado Division of Water Resources indicates that there is an active well on this site with limited allowed uses. This may be a conflict with services provided by Northern Douglas County Water and Sanitation District. Please clarify if there is an existing well on site and if so, whether it will be abandoned.

Response:

- *There is in indeed an active well on the site and is operated as permitted. Neither this rezoning application nor our related Site Improvement Plan (SIP), SP2024-028, call for increases in water or sanitation services from the Northern Douglas County Water and Sanitation District, therefore we do not anticipate a conflict. Please refer to the attached "Will Serve" Referral Letter sent from the Northern Douglas County Water and Sanitation District. We further acknowledge further coordination will be required on our related SP2024-028 SIP.*

Arapahoe County PWD/ Planning:
Thank you for the opportunity to review and comment on this project. The Arapahoe County Planning Division has no comments; however, other departments and/or divisions may submit comments.

Response:

- *Acknowledged.*

Arapahoe County Director of Operations and Maintenance:
Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail.

Response:

- *Acknowledged. A closure of the Highline Canal trail is not anticipated for this rezoning application.*

Arapahoe Public Works HR Water Project Coordinator:
As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties.
Response:
- *Acknowledged. There is no anticipated increase of water or sewer taps for this rezoning application.*

Highlands Ranch Water and Sanitation District:
Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail.
Response:
- *Acknowledged. A closure of the Highline Canal trail is not anticipated for this rezoning application.*

As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties.
Response:
- *Acknowledged. There is no anticipated increase of water or sewer taps for this rezoning application.*

Sheriff’s Office:
Deputy Jeff Pelle, with the Douglas County Sheriff's Office, reviewed this project. I have no comments or concerns about it at this time.
Response:
- *Acknowledged.*

South Metro Fire Rescue:
South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed rezoning
Response:
- *Acknowledged.*

Xcel Energy-Right of Way & Permits:
Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the request for the Struby Resurvey Rezone. Please be advised that Public Service Company has existing natural gas and electric distribution facilities along east and west properties' lines. Public Service Company has no objection to this proposed rezone, contingent upon PSCo's ability to maintain all existing rights and this amendment should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities, and that our current use/enjoyment of the area would continue to be an accepted use on the property and that it be "grandfathered" into these changes. The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details. Additional easements may need to be acquired by separate document for new facilities. As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.

Response:

- *Acknowledged. All Lot Owners do not object to or seek to change any existing rights that Xcel Energy currently has on the lots included in this rezoning application. This Rezoning application does not include requests for new service lines or modifications to existing service lines. For the related SIP, Samuel acknowledges and agrees to follow the required steps for any new gas or electric services or modifications to existing facilities through Xcel's portal and acknowledges new easements my need to be acquired with those requests. With that, Samuel acknowledges there is no objection to this rezoning application.*

Additionally, please see our comments contained within the Response Resolution Matrix column of the consolidated responses you provided in your referral letter.

Joshua Stevens, Civil Engineer
Samuel Engineering, Inc.

Attachments:

1. Referral Agency Response Report, with Samuel Comments
2. "Will Serve" Referral Letter, Northern Douglas County Water and Sanitation District
3. Referral Review Letter, Douglas County Department of Community Development

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Addressing Analyst	01/08/2025	No Comment:	
Arapahoe County Engineering Services Division		No Response Received:	
Arapahoe County PWD/ Planning	01/09/2025	No Comment: Thank you for the opportunity to review and comment on this project. The Arapahoe County Planning Division has no comments; however, other departments and/or divisions may submit comments.	Comment addressed in narrative above
AT&T Long Distance - ROW		No Response Received:	
Black Hills Energy		No Response Received:	
Building Services	01/17/2025	No Comment:	
CenturyLink		No Response Received:	
Chatfield Community Association		No Response Received:	
Colorado Division of Water Resources	01/17/2025	Received: See attached letter	Addressed in Narrative above
Comcast		No Response Received:	
CORE Electric Cooperative		No Response Received:	
Douglas County Health Department	01/15/2025	Received: See attached letter	No Comment to address
Douglas County Parks and Trails		No Response Received:	
Douglas County School District RE 1		No Response Received:	
Engineering Services	01/28/2025	No Comment:	
High Line Canal Conservancy		No Response Received:	

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Highlands Ranch Metro District	01/16/2025	Received: Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated. Ken Standen As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties. Thanks, Jon Klassen	Comment addressed in narrative above Comment addressed in Narrative Above.
Highlands Ranch Water and Sanitation District	01/16/2025	Received: Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated. Ken Standen As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties. Thanks, Jon Klassen	Comment addressed in narrative above Comment addressed in narrative above

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Jefferson County Planning and Zoning		No Response Received:	
Littleton	01/09/2025	No Comment:	
Mile High Flood District		No Response Received:	
Northern Douglas County Water & San District		No Response Received:	
Office of Emergency Management		No Response Received:	
Open Space and Natural Resources	01/09/2025	No Comment:	
Rural Water Authority of Douglas County		No Response Received:	
Sheriff's Office	01/28/2025	Received: Deputy Jeff Pelle, with the Douglas County Sheriff's Office, reviewed this project. I have no comments or concerns about it at this time.	Comment addressed in narrative above
Sheriff's Office E911		No Response Received:	
South Metro Fire Rescue	01/14/2025	Received: South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed rezoning.	Comment addressed in narrative above

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Xcel Energy-Right of Way & Permits	01/22/2025	Received: Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the request for the Struby Resurvey Rezone. Please be advised that Public Service Company has existing natural gas and electric distribution facilities along east and west properties' lines. Public Service Company has no objection to this proposed rezone, contingent upon PSCo's ability to maintain all existing rights and this amendment should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities, and that our current use/enjoyment of the area would continue to be an accepted use on the property and that it be "grandfathered" into these changes. The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details. Additional easements may need to be acquired by separate document for new facilities. As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.	Comment addressed in narrative above

Kennedy Jenks

October 13, 2023

Eric Pavlinek, epavlinek@douglas.co.us
Douglas County
Planning Services Division
100 Third Street, 2nd Floor
Castle Rock, Co 80104

RE: **JLP Site Improvement Plans for**
13195 North Highland Circle
Northern Douglas County Water and Sanitation District
Job No. 2346014*00

Eric:

On behalf of the Northern Douglas County Water and Sanitation District (NDC), we have reviewed the Site Plan referral for the referenced project. Our review of the referral documents is relevant only to water and sanitary sewer service and our comments are general in nature. The Site is located within the NDC boundaries, and NDC already provides water and sewer service to the existing buildings related to this address.

Final Construction Plans will need to be submitted to NDC by the engineer, Samuel Engineering, for the District's review. Any specific comments relative to the water and sanitary sewer main will be provided directly to the engineer. The project involves two new buildings, retaining walls, regrading, two detention ponds, outdoor storage, and re-zoning the property from general industrial to light industrial use. It is my understanding that there are no plans for additional water or wastewater needs for the improvements. We will review plans until all of NDC's comments are satisfactorily addressed during the submittal process, after which the plans will be approved for construction.

Please let me know if you have any questions.

Sincerely,

KENNEDY/JENKS CONSULTANTS

Aimée Chalus, P.E.
Project Manager

cc: Nic Carlson- NDC Manager
Ben Stone- Samuel Engineering

January 31, 2025

Joshua Stevens
jstevens@samuelengineering.com

RE: Struby Resurvey, Lots 7-11, Project Number ZR2024-008

Joshua,

Thank you for the submittal of the rezoning request for a proposed rezoning of Struby Resurvey, Lots 7-11 from General Industrial (GI) to Light Industrial (LI) Project Number ZR2024-008. The referral period has ended and letters and correspondence from referral agencies are attached to this letter. Depending on the response, it may be necessary to reach out to individual agencies to address their concerns.

1. Please note that the Colorado Division of Water Resources indicates that there is an active well on this site with limited allowed uses. This may be a conflict with services provided by Northern Douglas County Water and Sanitation District. Please clarify if there is an existing well on site and if so, whether it will be abandoned.

As part of your resubmittal, please also submit a response letter to my attention indicating how each comment has been addressed. If it was not necessary to address a comment, please provide an explanation to clarify.

Because design review is a cumulative process, Douglas County Planning Services reserves the right to provide further comments based upon your resubmittal. Feel free to contact me with any questions or concerns as they arise.

Sincerely,

Trevor Bedford, AICP | Senior Planner
Douglas County Department of Community Development
Planning Services Division
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303.814.4372 **Main** | 303.660.7460
Email tbedford@douglas.co.us

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Addressing Analyst	01/08/2025	No Comment:	
Arapahoe County Engineering Services Division		No Response Received:	
Arapahoe County PWD/ Planning	01/09/2025	No Comment: Thank you for the opportunity to review and comment on this project. The Arapahoe County Planning Division has no comments; however, other departments and/or divisions may submit comments.	
AT&T Long Distance - ROW		No Response Received:	
Black Hills Energy		No Response Received:	
Building Services	01/17/2025	No Comment:	
CenturyLink		No Response Received:	
Chatfield Community Association		No Response Received:	
Colorado Division of Water Resources	01/17/2025	Received: See attached letter	
Comcast		No Response Received:	
CORE Electric Cooperative		No Response Received:	
Douglas County Health Department	01/15/2025	Received: See attached letter	
Douglas County Parks and Trails		No Response Received:	
Douglas County School District RE 1		No Response Received:	
Engineering Services	01/28/2025	No Comment:	
High Line Canal Conservancy		No Response Received:	

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Highlands Ranch Metro District	01/16/2025	Received: Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated. Ken Standen As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties. Thanks, Jon Klassen	
Highlands Ranch Water and Sanitation District	01/16/2025	Received: Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated. Ken Standen As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties. Thanks, Jon Klassen	

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Jefferson County Planning and Zoning		No Response Received:	
Littleton	01/09/2025	No Comment:	
Mile High Flood District		No Response Received:	
Northern Douglas County Water & San District		No Response Received:	
Office of Emergency Management		No Response Received:	
Open Space and Natural Resources	01/09/2025	No Comment:	
Rural Water Authority of Douglas County		No Response Received:	
Sheriff's Office	01/28/2025	Received: Deputy Jeff Pelle, with the Douglas County Sheriff's Office, reviewed this project. I have no comments or concerns about it at this time.	
Sheriff's Office E911		No Response Received:	
South Metro Fire Rescue	01/14/2025	Received: South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed rezoning.	

Project Name: Struby Resurvey, Lots 7-11
Project File #: ZR2024-008
Date Sent: 01/06/2025 **Date Due:** 01/28/2025

Agency	Date Received	Agency Response	Response Resolution
Xcel Energy-Right of Way & Permits	01/22/2025	Received: Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the request for the Struby Resurvey Rezone. Please be advised that Public Service Company has existing natural gas and electric distribution facilities along east and west properties' lines. Public Service Company has no objection to this proposed rezone, contingent upon PSCo's ability to maintain all existing rights and this amendment should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities, and that our current use/enjoyment of the area would continue to be an accepted use on the property and that it be "grandfathered" into these changes. The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details. Additional easements may need to be acquired by separate document for new facilities. As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.	

January 16, 2025

Trevor Bedford
Douglas County Planning Services
Transmission via email: tbedford@douglas.co.us

Re: Case Number: ZR2024-008, Struby Resurvey Subdivision Lots 7-11
Update to the Site Improvement Plan and Rezoning
Part of the W ½ of the SE ¼ of the SE ¼ of Section 6, Twp. 6S, Rng. 68W, 6th P.M.
Water Division 1, Water District 8

Dear Trevor Bedford,

We have received your January 6, 2025 submittal concerning the Update to the Site Improvement Plan and Rezoning to accommodate changes to the site layout and a rezone from General Industrial to Light Industrial on 5 parcels located in the W ½ of the SE ¼ of the SE ¼ of Section 6, Twp. 6S, Rng. 68W, 6th P.M., Douglas County.

This referral does not appear to qualify as a “subdivision” as defined in section 30-28-101(10)(a), C.R.S. Therefore, pursuant to the State Engineer’s March 4, 2005 and March 11, 2011 memorandums to county planning directors, this office will only perform a cursory review of the referral information and provide informal comments. The comments do not address the adequacy of the water supply plan for this project or the ability of the water supply plan to satisfy any County regulations or requirements. In addition, the comments provided herein cannot be used to

guarantee a viable water supply plan or infrastructure, the issuance of a well permit, or physical availability of water.

According to the application documents, water demand will not increase as a result of the proposed improvements and rezoning. The proposed water supplier is Northern Douglas County Water and Sanitation District ("District"). A letter from the District was included in the application documents, confirming that the parcels are located inside the District boundaries. Requirements for continued service from the District were outlined in the letter, including a requirement for the submittal of final construction plans for review.

A review of our records indicates well permit no. 76858 is located on Lot 10 of Struby Resurvey Subdivision. Well permit no. 76858 was decreed in Division 1 Water Court case no. W-4813 on January 17, 1975 as Black Well No. 1-Unregistered for domestic uses with a date of appropriation of October 6, 1952 and a flow rate of 0.033 CFS. **<u>The use of this well is limited to those domestic uses in existence before May 8, 1972, and those same historical uses that have continued since that time [provided such uses are no greater than those uses allowed for a well permit pursuant to C.R.S. §37-92-602 (1) (which are: fire protection, ordinary household purposes inside not more than three single-family dwellings, the watering of poultry, domestic animals and livestock on a farm or ranch and the irrigation of not more than one acre of home gardens and lawns)].</u>**

The application materials indicate that a stormwater detention structure may be a part of this project. The applicant should be aware that unless the structure can meet the requirements of a "storm water detention and infiltration facility" as defined in section 37-92-602(8), C.R.S., the structure may be subject to administration by this office. The applicant should review DWR's Administrative Statement Regarding the Management of Storm Water Detention Facilities and Post-Wildland Fire Facilities in Colorado to ensure that the notification, construction and

operation of the proposed structure meets statutory and administrative requirements. The Applicant is encouraged to use the Colorado Stormwater Detention and Infiltration Facility Notification Portal to meet the notification requirements.

Our office has no additional comments on the proposed project and rezoning application.

Please contact Mike Matz at 303-866-3581 x8241 or at michael.matz@state.co.us with any questions.

Sincerely,

Ioana Comaniciu, P.E.
Water Resources Engineer

Ec: Referral no. 32638
Well Permit No. 76858

DOUGLAS COUNTY PLANNING REFERRALS

REFERRAL NUMBER: ZR2024-008 DATE RECEIVED: 1/6/2025

PROJECT NAME: Rezone JPL Lots Carder Ct.

PLANNER:

DUE DATE: Jan 27, 2025

Parks & Parkways Manager
Dirk Ambrose

Natural Resource Manager
Nick Adamson

Director of Operations & Maintenance
Ken Standen

Highlands Ranch Metro District must be made aware of any closures to portions of the Highline Canal trail that is adjacent to the property. Highlands Ranch Metro Districts maintains and patrols that section of the trail. Much appreciated.

Ken Standen

Director of Parks, Recreation & Open Space
Neil Alderson

Construction and Facilities Maintenance Manager
Tyler Ensign

Highlands Ranch Metropolitan District Highlands Ranch Water & Sanitation District
62 Plaza Drive Highlands Ranch CO 80129

Public Works Manager of Development Engineering
Forrest Dykstra

Director of Engineering & Public Works
Ryan Edwards

Public Works HR Water Project Engineer
Austin Long

No comment

Public Works HR Water Project Coordinator
Jon Klassen

As the wholesale water provider to Northern Douglas County Water and Sanitation District, please be advised that approval from the Highlands Ranch Water Board of Directors is required for any additional water or sewer taps requested to serve these properties.

Thanks,

Jon Klassen
Project Manager

Finance Department

Highlands Ranch Metropolitan District   Highlands Ranch Water & Sanitation District
62 Plaza Drive Highlands Ranch CO 80129

Highlands Ranch Metropolitan District Highlands Ranch Water & Sanitation District
62 Plaza Drive Highlands Ranch CO 80129

Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: 303.285.6612
violeta.ciocanu@xcelenergy.com

January 22, 2025

Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104

Attn: Trevor Bedford

Re: Struby Resurvey, Lots 7-11, Case # ZR2024-008

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the request for the **Struby Resurvey Rezone**.

Please be advised that Public Service Company has *existing natural gas and electric distribution facilities along east and west properties' lines.* Public Service Company has no objection to this proposed rezone, contingent upon PSCo's ability to maintain all existing rights and this amendment should not hinder our ability for future expansion, including all present and any future accommodations for natural gas transmission and electric transmission related facilities, and that our current use/enjoyment of the area would continue to be an accepted use on the property and that it be "grandfathered" into these changes.

The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details.

Additional easements may need to be acquired by separate document for new facilities.

As a safety precaution, PSCo would like to remind the developer to contact Colorado 811 for utility locates prior to construction.

Violeta Ciocanu (Chokanu)
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-285-6612 – Email: violeta.ciocanu@xcelenergy.com

January 15, 2025

Trevor Bedford
100 Third St.
Castle Rock, CO 80104

RE: ZR2024-008

Dear Mr. Bedford,

Thank you for the opportunity to review and comment on the Rezoning amendment application. Douglas County Health Department (DCHD) staff have reviewed the application for compliance with pertinent environmental and public health regulations. After reviewing the application, DCHD has no additional comments.

Please feel free to contact me at 720-907-4888 or bfreyer@douglas.co.us if you have any questions about our comments.

Sincerely,

B.Fr

Brent Freyer
Environmental Health Specialist II
Douglas County Health Department

DV 24-146

DOUGLAS COUNTY
COLORADO

www.douglas.co.us

Department of Community Development
Planning Services

REFERRAL RESPONSE REQUEST

Date Sent: January 6, 2025 Comments due by: **January 28, 2025**

Project Name:	Struby Resurvey, Lots 7-11
Project File #:	ZR2024-008
Project Summary:	The applicant is proposing to rezone approximately 4.45 acres from General Industrial to Light Industrial.

Information on the identified development proposal located in Douglas County is enclosed. Please review and comment in the space provided.

- [x] No Comment
- [ ] Please be advised of the following concerns:

- [ ] See letter attached for detail.

Agency: ENGINEERING	**Phone #:** 4318
Your Name: AL PETERSON	**Your Signature:** [signature]
(please print)	**Date:** 1/28/25

Agencies should be advised that failure to submit written comments prior to the due date, or to obtain the applicant's written approval of an extension, will result in written comments being accepted for informational purposes only.

Sincerely,

Trevor Bedford, AICP, Project Planner

Enclosure

100 Third Street, Castle Rock, Colorado 80104 • 303.660.7460 • Fax 303.660.9550

Trevor Bedford, AICP, Project Planner
Douglas County Department of Community Development, Planning Services
100 Third St
Castle Rock Co 80104
303.660.7460
303.660.9550 Fax

Project Name:	Struby resurvey, Lots 7-11
Project File #:	**ZR2024-008**
S Metro Review #	REFXRP25-00003
Review date:	January 14, 2025
Plan reviewer:	Aaron Miller 720.989.2246 aaron.miller@southmetro.org
Project Summary:	The applicant is proposing to rezone approximately 4.45 acres from General Industrial to Light Industrial.
Code Reference:	Douglas County Fire Code, 2018 International Fire Code, and 2021 International Building Code with amendments as adopted by Douglas County.

South Metro Fire Rescue (SMFR) has reviewed the provided documents and has no objection to the proposed rezoning.

SAMUEL ENGINEERING
WE PROVIDE SOLUTIONS

8450 East Crescent Parkway, Suite 200
Greenwood Village, CO 80111

Phone: 303.714.4840
FAX: 303.714.4800

March 3, 2025

Mike Matz
Colorado Division of Water Resources
1313 Sherman Street, Room 821
Denver, CO 802032

RE: **Case Number: ZR2024-008: Struby Resurvey, Lots 7-11**

Dear Mike,

Samuel Engineering, hereafter referred to as "Samuel", has reviewed prepared comments sent to Trevor Bedford regarding project ZR2024-008, dated January 16, 2025. Trevor, of Douglas County, has advised Samuel to reach out to this office to determine if the well operated under Permit number 76858 may still be used, if it requires to be re-permitted, or abandoned. We therefore request your office to provide resolution to this matter so that Douglas County can continue with our rezoning application.

Overall, it is Samuel's understanding that although an active well, permitted for domestic use, exists on site which is zoned for industrial use, the well and associated permit can continue to exist as long as water from the well is not used, drawn, or consumed for any of the commercial activities that occur on site. Below is more detail that formed our understanding. If your office can provide written confirmation of our understanding, we would greatly appreciate it. If our understanding of the matter is incorrect, please provide comments so that an eventual resolution to this matter can be achieved allowing our Rezoning application to continue with Douglas County.

Samuel:

- *The well operated under permit number 76858 is limited to domestic uses, pursuant to C.R.S. §37-92-602 (1). The domestic uses are further listed in the 16 Jan 2025 letter as "fire protection, ordinary household purposes inside not more than three single-family dwellings, the watering of poultry, domestic animals and livestock on a farm or ranch and the irrigation of not more than one acre of home gardens and lawns." As such, it is Samuel's understanding that the well on the property is considered an exempt well for domestic use. With that classification, it is Samuel's understanding that Guideline 2023-1 USES OF WATER FROM EXEMPT AND SMALL CAPACITY WELLS, as found on [Guidance Documents | Division of Water Resources], is applicable to this well. On page 5 of 17, section 2.1: Water use on property served by exempt and small capacity wells for which the permits do not list commercial use: the guidance states "Water from a well permitted for those non-commercial uses may be used at a property where commercial activity occurs, so long as no additional water will be diverted or consumed as a result of the business being conducted on the property. Specifically, employees (other than a party living in a single-family residence on the property) and customers cannot use water from the well, and the business cannot use water from the well for conducting business or to produce a product"*

  It is already established that the water supplier for these lots is the Northern Douglas County

Water and Sanitation District and they currently provide water and sewer services to the existing buildings on the site. It is also established that there are no plans for additional water or waste water needs for the improvements for this site or the rezoning of this site. It is therefore Samuels understanding that well permit 76858 may continue to exist in its current status, and the well does not need to be abandoned. With that, may the Water Resources office confirm that there is no need for the well to be re-permitted or abandoned given the commercial needs of the buildings on site, both existing and proposed, are served by the Northern Dougals County Water and Sanitation District.

We appreciate your time and consideration on this matter and look forward to your response.

Joshua Stevens, Civil Engineer
Samuel Engineering, Inc.

Attachments:

1. Page 5 of "Guideline 2023-1" Colorado Division of Water Resources
2. Email requiring resolution, Douglas County Department of Community Development
3. "Will Serve" Referral Letter, Northern Douglas County Water and Sanitation District
4. Response Letter to Douglas County, Case Number: ZR2024-008, Colorado Division of Water Resources

2.1 Water use on property served by exempt and small capacity wells for which the permits do not list commercial use

The following uses have no inherent commercial purpose inasmuch as they support activities and needs of the home: ordinary household purposes, watering poultry, watering domestic animals, and the irrigation of home gardens and lawns. Water from a well permitted for those non-commercial uses may be used at a property where commercial activity occurs, so long as no additional water will be diverted or consumed as a result of the business being conducted on the property. Specifically, employees (other than a party living in a single-family residence on the property) and customers cannot use water from the well, and the business cannot use water from the well for conducting business or to produce a product.[6]

Items 3 through 6 discuss individual types of exempt and small capacity well uses other than commercial. Where appropriate, additional clarification about commercial activity related to that type of use is provided.

3. Water for ordinary household purposes or normal operations associated with a single-family dwelling

The following applies to water use within a dwelling structure intended for occupation by not more than one family. A dwelling includes permanent provisions for living, sleeping, eating, cooking, and sanitation. The following occupancy situations all qualify as water use for ordinary household purposes inside one single-family dwelling:

- All or a part of the dwelling is occupied by owners, short- or long-term renters, or unrelated people with use equivalent to that of a single family. When a part of the dwelling is rented, such as only a bedroom and bathroom, and the renter is not allowed shared use of other parts of the home, such as the kitchen or living room, the dwelling use is not equivalent to that of a single family.
- Water may be used to supply a group home occupying a dwelling where the residents are children and/or adults and where caretakers or staff either live at the property or work at the property in shifts.
- Water may be used by nannies, health care workers, or other employees who provide services to residents of a dwelling and who may live in the dwelling or work there in shifts.[7]

When the well provides water to an auxiliary living space such as an accessory dwelling unit (ADU), refer to Guideline 2016-1 to determine if the auxiliary living space is considered a second single-family dwelling regardless of who is using the space. Generally, an auxiliary living space with a separate entry and kitchen facilities is considered a second single-family dwelling. Auxiliary living spaces rented on a short-term basis may qualify for small capacity or exempt

[6] Employees such as caretakers and nannies who function as part of the single-family dwelling, as specifically described in Section 3, may use water from the well.
[7] The Colorado Supreme Court and statute support that use of a single-family dwelling by such groups, where residents make their home, although staff may be paid to supervise and assist the residents, is a residential use. See *Double D Manor v. Evergreen Meadows*, 30-28-115(2)(b.5), 31-23-303(2)(b.5)

Joshua Stevens

From: Trevor Bedford <tbedford@douglas.co.us>
Sent: Wednesday, February 26, 2025 3:57 PM
To: Joshua Stevens; Sara Rabon
Cc: Mark Skelskey; Matt Bolling; skelskeym@gmail.com; Andrew Billings
Subject: RE: Samuel Engineering - JPL Cares Rezoning Package
Attachments: ZR2024-008 (Douglas).pdf

Good Afternoon Josh,

We do still need some more resolution on the well situation. Based on the State Engineer's comments, it looks like the well can only be used for three single family residences established before 1972. I'm not sure there is a use on site that aligns with that as we would consider anything on the site a commercial use. So you will need to reach out to the state engineer's office to determine if the well can still be used, if it has to be repermitted, or abandoned. I have their full comments attached, which has some contact information in it.

Thank you,

Trevor Bedford, AICP | Senior Planner
Douglas County Department of Community Development
Planning Services Division
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303.814.4372 **Main** | 303.660.7460
Email tbedford@douglas.co.us

From: Joshua Stevens <jstevens@samuelengineering.com>
Sent: Wednesday, February 19, 2025 7:24 AM
To: Trevor Bedford <tbedford@douglas.co.us>; Sara Rabon <srabon@samuelengineering.com>
Cc: Mark Skelskey <mskelskey@samuelengineering.com>; Matt Bolling <mbolling@samuelengineering.com>; skelskeym@gmail.com; Andrew Billings <abillings@samuelengineering.com>
Subject: RE: Samuel Engineering - JPL Cares Rezoning Package

Hi Trevor,
Please see our response to the Referral review letter you provided on 31 Jan 2025.

Please let us know if anything requires further resolution in order to proceed with the Rezoning process.

Thank you,

Josh Stevens
Civil Engineer
Direct: (303) 567-7599
Main: (303) 714-4840 I **Fax:** (303) 714-4800
Email: jstevens@samuelengineering.com
Web: www.samuelengineering.com

Kennedy Jenks

October 13, 2023

Eric Pavlinek, epavlinek@douglas.co.us
Douglas County
Planning Services Division
100 Third Street, 2nd Floor
Castle Rock, Co 80104

RE: **JLP Site Improvement Plans for**
13195 North Highland Circle
Northern Douglas County Water and Sanitation District
Job No. 2346014*00

Eric:

On behalf of the Northern Douglas County Water and Sanitation District (NDC), we have reviewed the Site Plan referral for the referenced project. Our review of the referral documents is relevant only to water and sanitary sewer service and our comments are general in nature. The Site is located within the NDC boundaries, and NDC already provides water and sewer service to the existing buildings related to this address.

Final Construction Plans will need to be submitted to NDC by the engineer, Samuel Engineering, for the District's review. Any specific comments relative to the water and sanitary sewer main will be provided directly to the engineer. The project involves two new buildings, retaining walls, regrading, two detention ponds, outdoor storage, and re-zoning the property from general industrial to light industrial use. It is my understanding that there are no plans for additional water or wastewater needs for the improvements. We will review plans until all of NDC's comments are satisfactorily addressed during the submittal process, after which the plans will be approved for construction.

Please let me know if you have any questions.

Sincerely,

KENNEDY/JENKS CONSULTANTS

Aimée Chalus

Aimée Chalus, P.E.
Project Manager

cc: Nic Carlson- NDC Manager
Ben Stone- Samuel Engineering

215 Union Boulevard, Suite 500 | Lakewood, CO 80228
303-985-3636 | AimeeChalus@kennedyjenks.com

COLORADO
Division of Water Resources
Department of Natural Resources

January 16, 2025

Trevor Bedford
Douglas County Planning Services
Transmission via email: tbedford@douglas.co.us

Re: Case Number: ZR2024-008, Struby Resurvey Subdivision Lots 7-11
Update to the Site Improvement Plan and Rezoning
Part of the W ½ of the SE ¼ of the SE ¼ of Section 6, Twp. 6S, Rng. 68W, 6th P.M.
Water Division 1, Water District 8

Dear Trevor Bedford,

We have received your January 6, 2025 submittal concerning the Update to the Site Improvement Plan and Rezoning to accommodate changes to the site layout and a rezone from General Industrial to Light Industrial on 5 parcels located in the W ½ of the SE ¼ of the SE ¼ of Section 6, Twp. 6S, Rng. 68W, 6th P.M., Douglas County.

This referral does not appear to qualify as a "subdivision" as defined in section 30-28-101(10)(a), C.R.S. Therefore, pursuant to the State Engineer's March 4, 2005 and March 11, 2011 memorandums to county planning directors, this office will only perform a cursory review of the referral information and provide informal comments. The comments do not address the adequacy of the water supply plan for this project or the ability of the water supply plan to satisfy any County regulations or requirements. In addition, the comments provided herein cannot be used to

guarantee a viable water supply plan or infrastructure, the issuance of a well permit, or physical availability of water.

According to the application documents, water demand will not increase as a result of the proposed improvements and rezoning. The proposed water supplier is Northern Douglas County Water and Sanitation District ("District"). A letter from the District was included in the application documents, confirming that the parcels are located inside the District boundaries. Requirements for continued service from the District were outlined in the letter, including a requirement for the submittal of final construction plans for review.

A review of our records indicates well permit no. 76858 is located on Lot 10 of Struby Resurvey Subdivision. Well permit no. 76858 was decreed in Division 1 Water Court case no. W-4813 on January 17, 1975 as Black Well No. 1-Unregistered for domestic uses with a date of appropriation of October 6, 1952 and a flow rate of 0.033 CFS. **The use of this well is limited to those domestic uses in existence before May 8, 1972, and those same historical uses that have continued since that time [provided such uses are no greater than those uses allowed for a well permit pursuant to C.R.S. §37-92-602 (1) (which are: fire protection, ordinary household purposes inside not more than three single-family dwellings, the watering of poultry, domestic animals and livestock on a farm or ranch and the irrigation of not more than one acre of home gardens and lawns)].**

The application materials indicate that a stormwater detention structure may be a part of this project. The applicant should be aware that unless the structure can meet the requirements of a "storm water detention and infiltration facility" as defined in section 37-92-602(8), C.R.S., the structure may be subject to administration by this office. The applicant should review DWR's Administrative Statement Regarding the Management of Storm Water Detention Facilities and Post-Wildland Fire Facilities in Colorado to ensure that the notification, construction and

operation of the proposed structure meets statutory and administrative requirements. The Applicant is encouraged to use the Colorado Stormwater Detention and Infiltration Facility Notification Portal to meet the notification requirements.

Our office has no additional comments on the proposed project and rezoning application.

Please contact Mike Matz at 303-866-3581 x8241 or at michael.matz@state.co.us with any questions.

Sincerely,

Ioana Comaniciu, P.E.
Water Resources Engineer

Ec: Referral no. 32638
Well Permit No. 76858

Joshua Stevens

From:	Matz - DNR, Michael <michael.matz@state.co.us>
Sent:	Tuesday, March 4, 2025 4:15 PM
To:	Joshua Stevens
Cc:	Matt Bolling; Andrew Billings
Subject:	Re: ZR2024-008-Resolution of existing well permit 76858

Good Afternoon Josh,

You are correct that domestic well permit no. 76858 may remain in-place without needing to be plugged & abandoned or re-permitted, despite it being located on a rezoned industrial lot.

A requirement for the well to be plugged and abandoned or re-permitted would only be required in other limited circumstances, such as the parcel being further subdivided and/or if the well was needed to serve the industrial lots for commercial or industrial uses. As you mentioned in your attached letter, the proposed water source for the site is Northern Douglas County Water and Sanitation District. As long as the well isn't used for purposes that exceed the allowable uses granted under the existing permit, the well can remain in place without any further action. We have no additional comments regarding the rezoning effort.

Please let me know if you have any follow up questions.

Best,

Mike Matz
Water Resources Engineer

COLORADO
Division of Water Resources
Department of Natural Resources

P 303.866.3581 x 8241
1313 Sherman Street, Room 821, Denver, CO 80203
michael.matz@state.co.us | www.colorado.gov/water

On Tue, Mar 4, 2025 at 1:47 PM Joshua Stevens <jstevens@samuelengineering.com> wrote:

> Hello Mike,
>
> My name is Josh Stevens, a Civil Engineer assigned to help rezone the Struby Resurvey Subdivision Lots 7-11.
>
> I received your contact information through the rezoning process via Douglas County.

Douglas County has instructed our firm to acquire resolution with your office for the well on site.

It is Samuel's understanding that the permit and well on site can continue to exist as long as water from the well is not used for commercial uses on site.

We are looking for written confirmation from your office to affirm that so we can continue our rezoning request.

Attached is a letter with our request.

Please let us know what is required for resolution on this matter.

Josh Stevens

Civil Engineer

Direct: (303) 567-7599

Main: (303) 714-4840 I **Fax:** (303) 714-4800

Email: jstevens@samuelengineering.com

Web: www.samuelengineering.com

From: TJ McKune <tj@pbmexcavating.com>
Sent: Tuesday, January 28, 2025 7:57 AM
To: Trevor Bedford
Subject: reply RE: Project File: ZR2024-008 comments as Landowner

Trevor-

Thank you so much for your follow up and detailed information. It is much more understood now. I am pleased to know that zoning and engineering is aware of this property,and that efforts are bring made to bring some of it in compliance.

TJ MCKUNE
PBM Holdings LLC

From: Trevor Bedford <tbedford@douglas.co.us>
Sent: Monday, January 27, 2025 3:34 PM
To: TJ McKune <tj@pbmexcavating.com>
Subject: RE: Project File: ZR2024-008 comments as Landowner

Good Afternoon,

Thank you for expressing your concerns about the property. I forwarded your email to our zoning enforcement team so that they are aware.
The property is in the process of a rezoning and a site improvement plan to rectify some of the zoning issues on the site including some structures built without a site improvement plan. As a part of the site improvement plan process, they are required to show calculations that they have sufficient parking for employees and company vehicles on site. This is something they are working on at the moment. Additionally, our engineering department will review a traffic study the applicant submitted.
The rezoning itself does not change uses or any of the structures on site, but is the first step they are taking towards the site plan approval.
Any new buildings or uses, or those that were placed on the property without approvals, will have to meet current zoning regulations. Any new building will have to meet current building code requirements. I am not certain how existing, unpermitted structures are dealt with by the building code. You could reach out to our building services department if you have any questions regarding that, or any questions about current adopted codes. They can be reached at dcbuilding@douglas.co.us or 303-660-7497.

I hope this answers your questions. Feel free to reach out if you have any further questions.

Thank you,

Trevor Bedford, AICP | Senior Planner
Douglas County Department of Community Development
Planning Services Division
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303.814.4372 **Main** | 303.660.7460
Email tbedford@douglas.co.us

From: TJ McKune <tj@pbmexcavating.com>
Sent: Monday, January 27, 2025 9:29 AM
To: Trevor Bedford <tbedford@douglas.co.us>
Subject: Project File: ZR2024-008 comments as Landowner

Good Morning Trevor-

PBM Holdings LLC owns the new building located at 13188 N Highland Cir,directly across from this proposed redevelopment project. Our Certificate of Occupancy was acquired in 2019.

This area has been very frustrating because there is varying non-conforming, and non-permitted activity, that surrounds us. There has been no enforcement by Douglas County Zoning, on some of these properties,which makes it hard to operate our own business at times.

At this time,one of the most difficult issues is the parking shortage, and excess traffic on the road, during the morning and evening hours. There is unbelievable truck and trailer, and vehicle activity, during the landscape season.

The traffic and parking in the ROW, in front of our property and behind our property, has definitely impacted our ability to access our business, at times. The employee parking is not adequate on the majority of properties on Highland Circle.

During the summer,there are many times our trucks can not gain access to our own entrance gates, because the sides of the road are filled with cars, used as employee parking. I have to literally “police” our own property’s parking spots ,due to neighboring landscape businesses oveflow of cars,during the busy season.

I would like to know what will be required, due to all the added traffic and parking shortages, with this zoning change and/or any future building projects.
In addition, we would like confrmation that any new building, or new business, will need to adhrere to 2025 Douglas County Building Code requirements, as well as current zoning restrictions.

Thank you for your consideration. I look forward to any follow up information,you would have regarding these matters, and this rezoning.

Tranga J. “TJ” McKune
PBM Holdings LLC
PBM Excavating Co

Kennedy Jenks

October 13, 2023

Eric Pavlinek, epavlinek@douglas.co.us
Douglas County
Planning Services Division
100 Third Street, 2nd Floor
Castle Rock, Co 80104

RE: **JLP Site Improvement Plans for**
13195 North Highland Circle
Northern Douglas County Water and Sanitation District
Job No. 2346014*00

Eric:

On behalf of the Northern Douglas County Water and Sanitation District (NDC), we have reviewed the Site Plan referral for the referenced project. Our review of the referral documents is relevant only to water and sanitary sewer service and our comments are general in nature. The Site is located within the NDC boundaries, and NDC already provides water and sewer service to the existing buildings related to this address.

Final Construction Plans will need to be submitted to NDC by the engineer, Samuel Engineering, for the District's review. Any specific comments relative to the water and sanitary sewer main will be provided directly to the engineer. The project involves two new buildings, retaining walls, regrading, two detention ponds, outdoor storage, and re-zoning the property from general industrial to light industrial use. It is my understanding that there are no plans for additional water or wastewater needs for the improvements. We will review plans until all of NDC's comments are satisfactorily addressed during the submittal process, after which the plans will be approved for construction.

Please let me know if you have any questions.

Sincerely,

KENNEDY/JENKS CONSULTANTS

Aimée Chalus

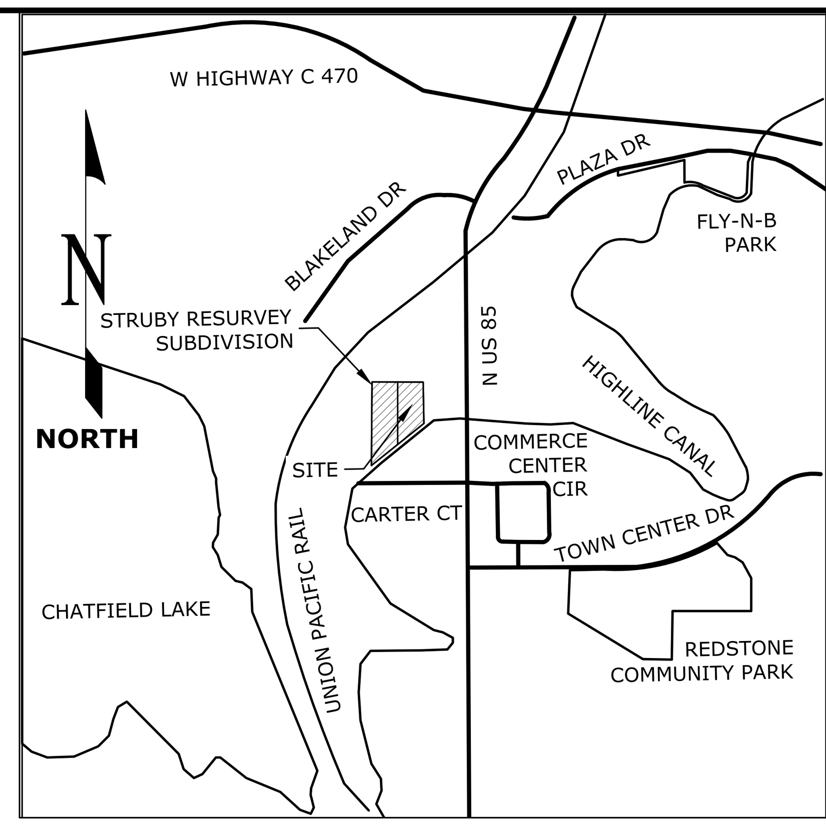
Aimée Chalus, P.E.
Project Manager

cc: Nic Carlson- NDC Manager
Ben Stone- Samuel Engineering

215 Union Boulevard, Suite 500 | Lakewood, CO 80228
303-985-3636 | AimeeChalus@kennedyjenks.com

q:\2021\2146025 ndc development review projects\pr15_2023_jlp site improvement\jlp site improvement plan referral.doc

JPL REZONING
ZONING PLAN
LOTS 7 THROUGH 11, STRUBY RESURVEY
4.45 ACRES
ZR2024-008



VICINITY MAP
(1"=1000')

DEVELOPER/OWNER
JPL CARES LANDSCAPING
Lot 7, LLC
Lot 8, LLC
Lot Nine, LLC
Lot 10, LLC
Lot 11, LLC
13196 NORTH HIGHLAND CIRCLE
LITTLETON, COLORADO

CIVIL ENGINEER
SAMUEL ENGINEERING
8450 E. CRECENT PKWY, STE 200
GREENWOOD VILLAGE, CO 80111
(303) 714-4840
CONTACT: MARK A. SKELSKEY, P.E.

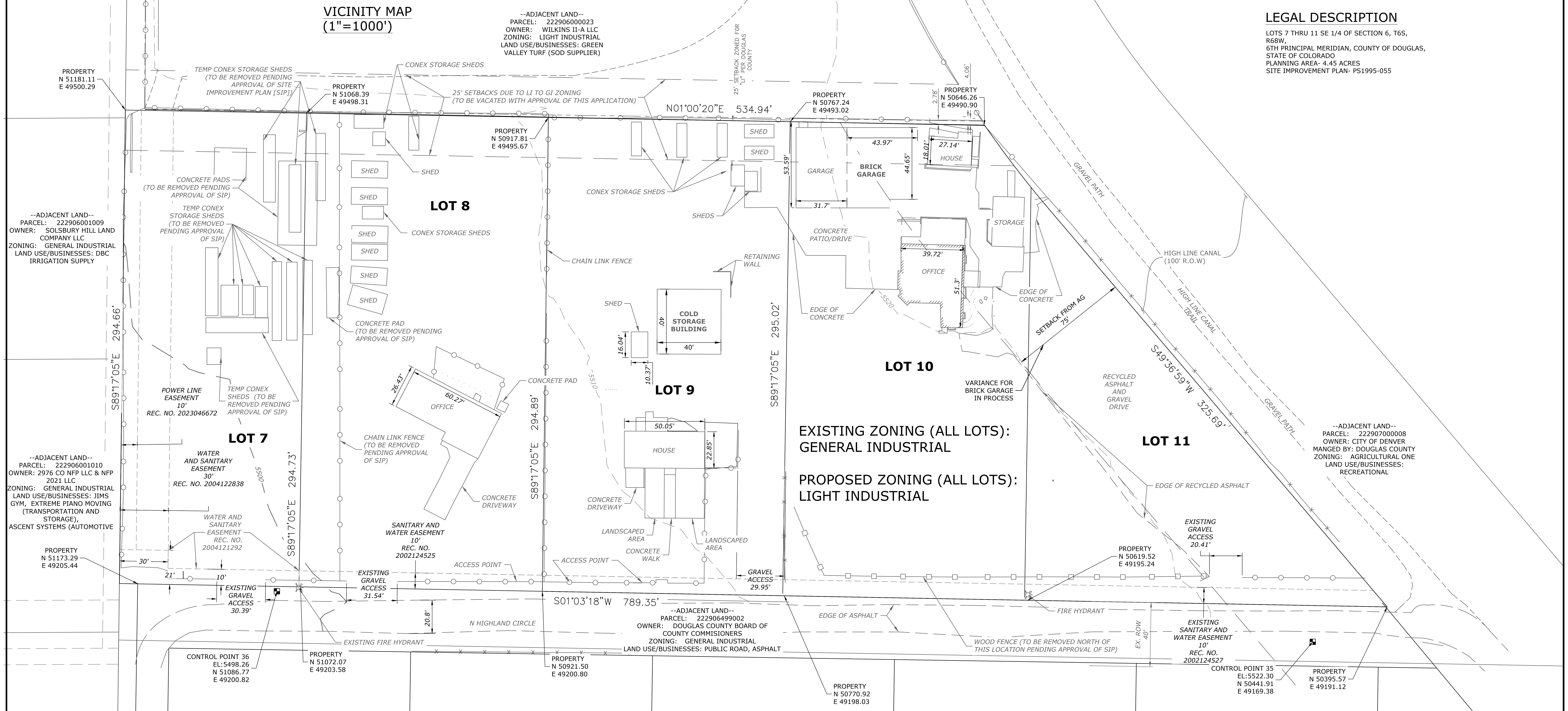
STRUCTURAL ENGINEER
SAMUEL ENGINEERING
8450 E. CRESCEN PKWY, STE 200
GREENWOOD VILLAGE, CO 80111
(303)714-4840
CONTACT: MATT BOLLING, P.E.

ARCHITECT
SAMUEL ENGINEERING
8450 E. CRESCENT PKWY, STE 200
GREENWOOD VILLAGE, CO 80111
(303)714-4840
CONTACT: ANDREW BILLINGS

ELECTRICAL ENGINEER
SAMUEL ENGINEERING
8450 E. CRESCENT PKWY, STE 200
GREENWOOD VILLAGE, CO 80111
(303)714-4840
CONTACT: RICHARD MORRIS, P.E.

SURVEYOR
PRECISION SURVEY & MAPPING, INC. 9145 E. KENYON AVE. SUITE 101, DENVER, CO., DATED 06/09/16. HORIZONTAL CONTROL BASED ON AN ASSUMED DATUM CARRIED FORWARD FROM THE PREVIOUS IMPROVEMENT SURVEY PLAT PREPARED BY PRECISION SURVEY & MAPPING, INC. IN 2014. VERTICAL CONTROL IS BASED ON NAVD 88 (GEOID 12A). DRAWING COORDINATES ARE MODIFIED TO GROUND.

LEGAL DESCRIPTION
LOTS 7 THRU 11 SE 1/4 OF SECTION 6, T6S, R68W,
6TH PRINCIPAL MERIDIAN, COUNTY OF DOUGLAS, STATE OF COLORADO
PLANNING AREA- 4.45 ACRES
SITE IMPROVEMENT PLAN- PS1995-055



LEGEND

PROPERTY LINE	WOODEN FENCE
EASEMENT LINE	EDGE OF GRAVEL
CHAIN LINK FENCE	CONTROL POINT, HYDRANT
SETBACK	MINOR EX CONTOUR
WIRE FENCE	MAJOR EX CONTOUR

NOTES

1. ALL STRUCTURES INCLUDED IN THIS DRAWING ARE INTENDED TO REMAIN UNLESS OTHERWISE NOTED.
2. COLD STORAGE BUILDING IS USED TO STORE EQUIPMENT DURING WINTER MONTHS WHEN OUTSIDE AIR TEMPERATURES ARE TOO COLD FOR THAT EQUIPMENT.
3. ALL SHEDS AND CONEX STORAGE UNITS ARE USED TO STORE VARIOUS EQUIPMENT AND LANDSCAPING MATERIALS.
4. THE HOUSE IN LOT 9 AND THE OFFICE IN LOT 8 ARE LEASED TO OTHER ENTITIES IN THE LANDSCAPING INDUSTRY. ALL OTHER STRUCTURES NOT INDICATED AS A SHED OR CONEX STORAGE UNIT ARE USED FOR OFFICES FOR JPL CARES.
5. EASEMENTS AND CONEX STORAGE CONTAINERS WERE DRAWN ONTO THIS EXHIBIT USING PUBLICLY AVAILABLE INFORMATION AND HAVE NOT BEEN VERIFIED WITH A SURVEYOR.

NORTH
0' 15' 30' 60' 90'
SCALE: 1" = 30'

SHEET 1 OF 1

SAMUEL
WE PROVIDE SOLUTIONS
8450 E. Crescent Parkway, Suite 200
Greenwood Village, CO 80111
Phone: 303.714.4840
Fax: 303.714.4800
Web: samuelengineering.com

Lot 7, LLC
Lot 8, LLC
Lot Nine, LLC
Lot 10, LLC
Lot 11, LLC

JPL SITE IMPROVEMENTS
13195 HIGHLANDS CIRCLE
LITTLETON, CO 80125

REV	DATE	ISSUED FOR
B	18 NOV 24	APPROVAL

CIVIL
REZONING EXHIBIT

PROJECT NUMBER	DATE
23094	18 NOV 2024

100-CE-100

DESIGNED	DRAWN	APPROVED
BS	JS	MAS

CAD File: S:\Projects\23094_JPL_Site_Imp\CAD\Civil\Drawings\NEW DRAWINGS AFTER OCT 2024 CHANGE ORDER\100-CE-100-REZONING.dwg
Plot Date: Tuesday, November 26, 2024 3:05:19 PM Plotted By: Joshua Stevens
CTB Used:

MEETING DATE:	April 22, 2025
STAFF PERSON RESPONSIBLE:	Kimberly Hirsch, Assistant Budget Director
DESCRIPTION:	Resolution supplementing the 2025 Adopted Budget for the County of Douglas, Colorado to Recognize New Revenues received since Annual Budget Adoption, Appropriate Restricted, Committed, Assigned, and Unassigned Fund Balances in the Amount of $32,692,346.

SUMMARY:

This resolution, through this 2nd supplemental budget, amends fiscal year 2025 Adopted Budget by increasing appropriations for new revenues via grants and reimbursements not anticipated in the 2025 Adopted Budget, and appropriated restricted, committed, assigned and unassigned fund balance for new 2025 initiatives. The breakdown by fund is as follows:

$19,325,150	General Fund
$7,301	Law Enforcement Authority Fund
$269,204	District Attorney JD23 Fund
$3,346,322	Infrastructure Fund
$532,414	Road Sales & Use Tax Fund
$4,256,425	Transportation Fund
$619,007	Justice Center Sales & Use Tax Fund
$360,000	Rueter-Hess Recreation Fund
$1,976,523	Parks & Open Space Sales & Use Tax Fund
$2,000,000	Capital Expenditures Fund
$32,692,346	**Total**

The total request for the second supplemental is for $32,692,346. The new amended budget for Douglas County will be $657,895,721 or a 8.1% increase to the 2025 adopted budget.

The total supplemental requests to date are $49,270,586 / Adopted Budget $608,625,135 = 8.1%

Within the BOCC packet, all funding requests have been identified, along with funding sources and description / nature of expenditure. Additionally, fund summaries documenting the ability to absorb individual appropriations have been provided as well.

RECOMMENDED ACTION:	Approve Attached Resolution

REVIEW:

Martha Marshall	Approve	4/10/2025
Jeff Garcia	Approve	4/16/2025
Andrew Copland	Approve	4/16/2025
Doug DeBord	Approve	4/16/2025

ATTACHMENTS:

Final Supplemental Packet

(ID # 3476)

THE BOARD OF COUNTY COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

Resolution supplementing the 2025 Adopted Budget for the County of Douglas, Colorado to Recognize New Revenues received since Annual Budget Adoption, Appropriate Restricted, Committed, Assigned, and Unassigned Fund Balances in the Amount of $32,692,346.

WHEREAS, the Board of County Commissioners adopted the 2025 annual County budget in accordance with Colorado law; and

WHEREAS, pursuant to section 29-1-109(1)(b), C.R.S., the Board of County Commissioners may authorize the expenditure of unanticipated revenues or revenues not assured at the time of the adoption of the budget by enacting a supplementary budget and appropriation; and

WHEREAS, notice of this supplemental appropriation has been published as provided by law and considered at a public meeting of the Board of County Commissioners held on Tuesday, April 22, 2025 at 100 Third Street, Castle Rock, Colorado, beginning at 2:30 PM or as soon thereafter as possible.

NOW, THEREFORE BE IT RESOLVED by the Board of County Commissioners of the County of Douglas, Colorado that the 2025 appropriations and budgets be supplemented as follows:

$19,325,150	General Fund
$7,301	Law Enforcement Authority Fund
$269,204	District Attorney JD23 Fund
$3,346,322	Infrastructure Fund
$532,414	Road Sales & Use Tax Fund
$4,256,425	Transportation Fund
$619,007	Justice Center Sales & Use Tax Fund
$360,000	Rueter-Hess Recreation Fund
$1,976,523	Parks & Open Space Sales & Use Tax Fund
$2,000,000	Capital Expenditures Fund
$32,692,346	**Total**

PASSED AND ADOPTED this 22nd day of April 2025, in Castle Rock, Douglas County, Colorado.

THE BOARD OF COUNTY COMMISSIONERS
OF THE COUNTY OF DOUGLAS, COLORADO

BY: ____________________________________

ABE LAYDON, Chair

ATTEST: ___________________________________
HAYLEY HALL, Clerk to the Board

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance		Description / Nature of Expenditure
GENERAL FUND - 100							
Administration - (Local Assistance and Tribal Consistency Fund - 861590)	Committed Fund Balance	10/03/22	$231,186	$0	$231,186	B	**$231,186** - New revenues received on 10/20/22 and 7/31/23 rolled into the committed fund balance of the General Fund. These funds need to be appropriated for spending authority purposes. These dollars are payable to counties that receive annual Payments in Lieu of Taxes (PILT), and can be broadly used for any governmental services.
Administration (Other General Fund - 19200)	Assigned Fund Balance		$1,300,000	$0	$1,300,000	D	**$1,300,000** - A transfer to Capital Expenditures Fund is being completed to ensure there is adequate funding to perform maintenance projects in county buildings in the future. There is no annual income stream to fund these operations; mill levy allocation no longer includes Capital Expenditure Fund.
Administration (Other General Fund - 19200)	Assigned Fund Balance		$150,150	$0	$150,150	D	**$150,150** - Assigned fund balance is being transferred to the District Attorney JD23 fund to cover the purchase of three vehicles. Douglas County is buying out the contract on the current leased vehicles, and it no longer makes fiscal sense to continue with the leasing terms.
Administration (Other General Fund - 19200)	Assigned Fund Balance		$119,054	$0	$119,054	D	**$119,054** - Assigned fund balance is being transferred to the District Attorney JD23 Fund to cover the associated costs of the following: new badges, new radios and encryption upgrades and ballistic equipment for 3 new positions, all of which total $56,787. Additionally, on-going expenditures being funded include: Software, range ammo, professional membership due, and training, $62,267.
Other General Fund (Water Initiatives - 890020)	Assigned Fund Balance	08/23/22	$350,871	$0	$350,871	C	**$350,871 -** Assigned fund balance is being requested for the Water Alternative Program. The Program assists homeowners and small domestic water providers in developing renewable water supply alternatives. If the Program process is met, the County will provide a feasibility analysis evaluating various renewable water supply options, infrastructure pre-design, and estimated project costs. In addition, the County will research potential financing mechanisms and offer recommendations to move the project forward. BOCC approved in the August 2022 supplemental appropriation. This funding, will help fund a water study cost to be completed in 2025 for $559,598.
Community Development - (Historic Preservation - 55400)	New Revenues		$17,275	$17,275	$0	A	**$17,275 -** New revenues to be received via Intergovernmental Agreement (IGA) with the Parker Water and Sanitation District to complete the restoration of a 100-year old wagon that will be displayed in the Parker water lobby for Douglas County residents and visitors. The IGA is a 50/50 split. Total Cost is $34,500, with DC portion coming from General Fund Contingency**.**
Community Development - (Historic Preservation - 55400)	New Revenues		$5,035	$5,035	$0	A	**$5,035 -** New revenues received on 1/31/25 need to be appropriated to offset costs associated with the Douglas County History Repository for preservation and accessibility of archaeological collections.
Community Development - (Park Maintenance - Cash-in-Lieu - 51125)	New Revenues		$1,679,009	$1,679,009	$0	A	**1,679,009 -** A transfer from the Parks Sales & Use Tax fund is being completed to offset maintenance operations across several parks throughout out Douglas County. The portion of the transfer not needed in 2025 will be placed in restricted fund balance for future expenditures.
Community Development - (Park Maintenance - 51100)	Unassigned Fund Balance		$144,000	$0	$144,000	C	**$144,000** - Unassigned fund balance is being requested to fund the annual seasonal temporary within the Parks department. Ten seasonal park technicians will be hired to help with the extra parks and trail maintenance due to significant rise in visitors over the summer months.
Community Development - (Transformational Homelessness - 802021)	New Revenues / Restricted Fund Balance	02/20/24	$1,062,795	$1,371,959	($309,164)	A/B	**$1,062,795** - New revenues to be received from the State of Colorado for the grant period 2/28/2024 - 9/30/2026. These funds will provide the funding required to expand the Homeless Engagement Assistance and Resource Team (HEART) from three to five units and will be also used to hire three Navigators. This will allow for increased (HEART) street outreach coverage on evenings and weekends. Grant matching of $943,800 of In-Kind match is required and will be met through Douglas County sheriff deputy salaries. Fund balance is being replenished with the request due to timing of reimbursable grant expenditures.
Community Development (DOJ - Byrne Discretionary - 802037)	New Revenues / Restricted Fund Balance	09/24/24	$860,429	$860,429	$0	A	**$860,429 -** New revenues to be received from the United States Department of Justice from the Byrne Discretionary Grants Program to support the operation of Homeless Engagement Assistance and Resource Team (HEART). Grant program covers Federal fiscal year 2024; June 2024 - July 2025.

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance		Description / Nature of Expenditure
Community Development (Strong Communities Grant - 802036)	New Revenues	08/27/24	$1,100,000	$1,100,000	$0	A	**$1,100,000** - New revenues received from the Colorado Division of Local Affairs (DOLA) via the Strong Communities Grant funds to support the infrastructure costs associated with the Tall Tales Ranch (TTR) project. This project will result in the development of 28 affordable housing units for this in Douglas County with intellectual and developmental disabilities. The housing units will be located in the City of Lone Tree and will be available to those individuals who earn less than 60% of the area median income.
Community Justice Services - (19700)	New Revenues		$232,418	$232,418	$0	A	**$232,418 -** New revenues received from the Colorado Division of Criminal Justice for the Community Corrections program. Grant funds will be allocated by the State of Colorado to Douglas County for the payment of defendants' costs associated with placement in community correction facilities across the State of Colorado. This includes, but is not limited to, fees and expenses related to housing, supervision, rehabilitation, and other associated program costs as determined necessary by the 23rd Judicial District Community Corrections Board.
Information Technology - (Technology Fund - 800900)	Assigned Fund Balance		$1,775,394	$0	$1,775,394	C	**$1,775,394 -** Assigned fund balance is being requested to be carried forward into 2025 for the Technology Fund. There are several IT projects which span multiple years prior to completion.
Information Technology - (Technology Fund - 800900)	Assigned Fund Balance		$6,500,000	$0	$6,500,000	D	**$6,500,000 -** Assigned fund balance is being appropriated to cover the expenditures related to the Microsoft Dynamics software implementation, $4M. and $2.5M for additional technology fund needs/requirements. These funds were reserved in fund balance during 2025 budget development.
Information Technology - (IT Infrastructure - 802009)	Assigned Fund Balance		$244,481	$0	$244,481	C	**$244,481 -** Assigned fund balance is being requested to be carried forward into 2025 for IT Infrastructure projects that span multiple years.
Administration - (Energy Efficiency & Conservation Block Grant - 802035)	New Revenues	02/24/24	$228,023	$241,260	($13,237)	A/B	**$228,023** - The Department of Energy has awarded Douglas County the Energy Efficiency and Conservation Equipment Rebate (EECBG). This allocation will be utilized to purchase electric equipment such as lawn mowers, blowers, and trimmers. The funding will also be used to purchase LED lights and fixtures for 8 DC facilities.
Mental Health (Community Mental Health SFY25 - 802034)	New Revenues	07/09/24	$263,957	$342,720	($78,763)	A/B	**$263,957** - $342,720 **n**ew grant revenues to be received from the Colorado Department of Human Services, Behavioral Health Administration, for the grant period July 1, 2024 through June 30, 2025. The Douglas County Co-Responder Program creates and fosters partnerships between behavioral health professionals and law enforcement. Co-Responder programs identify calls for police service where behavioral health (mental health and/or substance use) appear to be a relevant factor, and then provide effective responses to involve people in crisis and those with behavioral heath needs. The law enforcement officer and the behavioral health specialist's combined expertise aim to improve de-escalation of situations, deflect individuals away from involvement in the criminal justice system and/or unnecessary hospitalization, and link them to appropriate services. Fund balance will be replenished by $78,763 due to timing of reimbursement revenues.
Mental Health (HB22-1281 Community Investment Grant SFY 2025 - 802032)	New Revenues	06/11/24	$262,190	$266,773	($4,583)	A/B	**$262,190 -** $266,773 new grant revenues to be received from the Colorado Department of Human Services, Behavioral Health Administration for the Children, Youth and Family Behavioral Health Services for the grant period July 1, 2024 through June 30, 2025. This grant will fund Mental Health First Aid certification training for up to 1,600 constituents and County Staff, and MHFA training for six County staff and community partners. Douglas County is partnering with organizations who serve and support populations at-risk for poor mental health, suicidal ideation and attempts, death by suicide, and high utilization for hospitals and mental health reasons identified in local data. A 5% cash match is required of Douglas County, and will be met with budgeted in-kind service donations. Fund balance will be replenished by $4,583 due to timing of reimbursement revenues.

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance		Description / Nature of Expenditure
Mental Health (HB22-1281 Child Youth Family - 802031)	New Revenues	06/10/24	$152,371	$156,581	($4,210)	A/B	**$152,371 -** $156,581 new grant revenues to be received from the Colorado Department of Human Services, Behavioral Health Administration for the Children, Youth and Family Behavioral Health Services for the grant period July 1, 2024 through June 30, 2025. This grant will fund a Youth Care Compact Navigator, Parent Liaison, program research and development consultation, youth family stakeholder engagement during program development and the pilot phase, care coordination training for the partnering network of care, and expansion of the Julota to accommodate Youth Care Compact Services. A 5% cash match is required of Douglas County, and will be met with budgeted in-kind services of the Youth Care Resource Team. Fund balance will be replenished by $4,210 due to timing of reimbursement revenues.
Mental Health (Congressional Directed Spend - 861608)	New Revenues	09/24/24	$629,970	$629,970	$0	A	**$629,970 -** New grant revenues to be received from the Federal Substance Abuse and Mental Health Services Organization (SAMHSA) for the grant period ending September 29, 2025. This grant includes funding for the county's Youth Care Compact Navigator to support care coordination for youth and families, supportive mental/behavioral health services such as access to in-home and outpatient services, and enhancements to the Julota system used by both the Community Response Team (CRT) and Care Compact TCC) program. There is no required cash match.
Community Services (Senior Council - 41300)	Assigned Fund Balance		$5,878	$0	$5,878	B	**$5,878 -** Assigned fund balance is being requested to be carried forward into 2025 for the Douglas County Seniors' Council. The Seniors' Council plans to utilize funds for operating supplies, postage and delivery, printing and copying, newspaper notices and advertising, training or metro meetings and professional memberships and licenses.
Facilities - (County Emergency Preparedness - 19275)	Unassigned Fund Balance		$38,592	$0	$38,592	D	**$38,592 -** Unassigned fund balance is being requested to purchase 5,000 citizen disaster preparedness booklets. Over the last eleven years, nearly 28,000 guides have been distributed to residents at preparedness fairs, events, and through various jurisdictions and municipalities across Douglas County.
Facilities - (County Emergency Preparedness - 19275)	Unassigned Fund Balance		$40,000	$0	$40,000	D	**$40,000 -** Unassigned fund balance is being requested to purchase Veoci Emergency Management Software. This platform is designed for collaboration, continuity, and response software utilized by Offices of Emergency Management (OEM), Emergency Operations Centers (EOC), Incident Management Teams, and local governments. This expense will be an annual subscription, and will need to be included in future base budgets.
Facilities - (County Fair - 55250)	Assigned Fund Balance		$450,000	$0	$450,000	C	**$450,000 -** Assigned fund balance is being requested to augment the base budget of the Douglas County County Fair. Additional funding is needed to cover the expenditures related to services which will ensure the County Fair runs smoothly, meets public standards, and enhance the overall experience for attendees and exhibitors. Items being funded include: entertainment, rodeo committee, janitorial / parking services, stock contractor services, waste disposal, purse money, overtime, etc.
Sheriff - (Emergency Services Unit - 21750)	New Revenues		$60,000	$60,000	$0	A	**$60,000** - Reimbursement revenues of $60,000 is being requested at this time to allow the Emergency Services Unit to purchase additional supplies and equipment that are needed to enhance current operations.
Sheriff - (Emergency Services Unit - 21750)	New Revenues		$55,000	$55,000	$0	A	**$55,000 -** New reimbursement revenues are being recognized from the Colorado Department of Fire Prevention and Control (DFPC). The extra funding will allow staff the ability to cover unbudgeted salary and benefits for the Emergency Response Coordinator that was extended to ensure a seamless transition for new employee..
Sheriff - (Cooperator's Incidents - 21825)	New Revenues		$9,303	$9,303	$0	A	**$9,303 -** New reimbursement revenues are being recognized from the Colorado Department of Fire Prevention and Control (DFPC). The extra funding will allow staff the ability to cover operating/equipment/uniform/PPE replacements or additional needs for deployments in 2025.
Sheriff - (Major Crimes - 23150)	Unassigned Fund Balance		$1,206	$0	$1,206	C	**$1,206** – Proceeds from the sale of unclaimed property is being requested to help offset the cost of additional training within the Major Crimes department. Due to budget limitations, there has not been the ability to send detectives to many training sessions, all of which would greatly benefit the agency. In addition, training opportunities are very expensive, and the additional revenues will enable more staff to received additional classroom hours.

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance		Description / Nature of Expenditure
Sheriff - (State Criminal Alien Assistance Program - SCAAP - 803072)	New Revenues	03/12/24	$264,472	$0	$264,472	C	**$264,472 -** New revenues to be received from the Bureau of Justice Assistance, with the help of Justice Benefits, Inc. (JBI). These funds will offset the costs of personnel costs incurred for housing illegal aliens at the Douglas County Detention Facility. The BOCC approved this grant award at the March 12, 2024 business meeting.
Sheriff - (Law Enforcement Workforce - 802022)	New Revenues	01/09/24	$22,051	$85,283	($63,232)	A/C	**$25,051 -** New revenues to be received from the Division of Criminal Justice for the grant period January 1, 2024 thru December 31, 2025. Grant funding will provide cardiac screening to its First Responders due to the high risk of cardiac disease in the law enforcement profession and will also assist and alleviate the high financial stress of childcare for working families within the Sheriff's Office. Fund balance is being replenished by $63,232 for the PO roll that was approved by BOCC in March 2025.
Sheriff - (Prison SSA - 803068)	New Revenue / Restricted Fund Balance		$46,000	$1,200	$44,800	A/C	**$46,000 -** $44,800 is the remaining amount of unspent Prison SSA Incentive funds on December 31, 2024. An additional $1,200 has been received since budget adoption in 2025. These funds will be utilized in 2025 for the purchase of jail-related equipment items**.**
Sheriff - (CSV VIN Verifications - 800592)	Assigned Fund Balance		$54,210	$0	$54,210	C	**$54,210** is the portion of the VIN inspection fee revenues collected and remained unspent on December 31, 2024. These funds will be appropriated for the purchase of supplies, equipment and cell phone service needed for the Community Safety Volunteer Program.
Sheriff - (First Task Force - 23175)	Unassigned Fund Balance		$1,493	$0	$1,493	C	**$1,493** - New revenues were received in late 2024, and rolled into the General Fund fund balance at 12/31/24. The United States Secret Service (USSS) allocates money to the FIRST Task Force for equipment needs and overtime incurred throughout the year.
Sheriff - (Violent Crimes Enterprise Task Force - 23395)	New Revenues		$18,814	$18,814	$0	A	**$18,814 -** New revenues will be used to offset the overtime incurred while coordinating with local, state, and federal resources to conduct long-term, complex investigations of violent, gang related drug trafficking organizations. Funding is based on a calendar year basis.
Sheriff - (Restricted Booking Fees - Arapahoe/Douglas Mental Health/Training - 21525)	Restricted Fund Balance		$32,348	$0	$32,348	C	**$32,348** - carryover of restricted booking fees from 2024. In accordance with Colorado Revised Statues 30-1-104 (1) (n) and 30-1-119 the booking fees collected are to be used for: 1) 20% of funds are to be expended to administer a community-based treatment program for the treatment of offenders with mental illness or addiction and 2) 20% of funds are to be expended for the training expenses of law enforcement officers to meet the needs of the offenders with mental illness or addiction issues. These carryover funds will go towards a contribution to Arapahoe/Douglas Mental Health and provide funding for specific Special Medical Unit and critical incident training of detentions officers and other law enforcement officers in the County. Therefore, these revenues are dedicated revenues. Note: the remaining 60% is to defray costs associated with processing prisoners in and out of custody.
Sheriff - (Christmas for Kids - 802013)	Restricted Fund Balance		$2,657	$0	$2,657	C	**$2,657 -** Donations collected in prior years rolled into the General Fund fund balance at year's end. These dollars need to be appropriated for spending authority purposes. These donations will enable the Sheriff's Office to continue the annual Christmas for Kids Program for 2025**.**
Sheriff (FBI Joint Terrorism Task Force - 23360)	New Revenues		$19,224	$19,224	$0	A	**$19,224 -** New revenue will be used for overtime reimbursement to ensure that there is a robust capacity to deter, defeat, and respond vigorously to terrorism in the U.S. or against any U.S. interest. These reimbursements are limited to eligible officers' indirect expenses or officers' benefits such as retirement, social security, and similar related expenses. The cost reimbursement is for the period of October 1, 2024 through September 30, 2025.
Sheriff - (FBI Child Exploitation and Human Trafficking Task Force - 23361)	New Revenues		$22,052	$22,052	$0	A	**$22,052 -** New revenues will be used for overtime reimbursement as it relates to Denver Child Exploitation and Human Trafficking Task Force. The CEHTTF mission is to provide a rapid, proactive, and intelligence-driven investigative response to the sexual victimization of children, other crimes against children, and human trafficking within the FBI's jurisdiction; to identify and rescue victims of child exploitation and human trafficking; to reduce vulnerability of children and adults to sexual exploitation and abuse; to reduce the negative impact of domestic and international parental rights disputes; and to strengthen the capabilities of the FBI and federal, state, local, and international law enforcement through training, intelligence-sharing, technical support, and investigative assistance. The grant period for this overtime is October 1, 2024 through September 30, 2025.

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance		Description / Nature of Expenditure
Sheriff - (Front Range Drug Task Force - 23365)	New Revenues		$11,667	$11,667	$0	A	**$11,667 -** New revenues will be used to offset the overtime incurred while attempting to control mid to high-level drug trafficking organizations at the regional, state, and national level. Funding is based on a calendar year basis.
Sheriff - (RAVEN Task Force - 23367)	New Revenues		$9,688	$9,688	$0	A	**$9,688 -** New revenues will be used to offset the overtime incurred while coordinating with local, state, and federal resources to conduct long-term, complex investigations of violent, gang related drug trafficking organizations. Funding is based on a calendar year basis.
Sheriff - (Rocky Mountain Regional Computer Forensic Laboratory - RMRCFL - 23370)	New Revenues		$16,034	$16,034	$0	A	**$16,034 -** New revenues will be used for overtime reimbursements as it relates to performing digital forensic examinations of digital devices (computers, smart phones, and other connected tools. The overtime period is from October 2024 through September 30, 2025.
Sheriff (Drug Enforcement Authority - DEA - 23380)	New Revenue		$11,222	$11,222	$0	A	**$11,222 -** New revenues will be used for overtime reimbursement as it relates to the Drug Enforcement Administration (DEA) program. The DEA program incurred expenses as a result of its related activities as defined in the agreement between DEA and the Sheriff's Office. The DEA program is charged with the enforcement of the Controlled Substances Act as well as investigation of the highest level of domestic and international narcotics trafficking. The fiscal year for this overtime is October 1, 2024 through September 30, 2025.
Sheriff (FBI Safe Streets Fugitive Task Force - 23390)	New Revenues		$18,379	$18,379	$0	A	**$18,379 -** New revenue will be used for overtime reimbursement to address street gang and drug-related violence through the establishment of FBI-sponsored, long-term, proactive task forces focusing on violent gangs, crimes of violence, and the apprehension of violent fugitives. The cost reimbursement is for the period is October 1, 2024 through September 30, 2025**.**
Sheriff - (Mental Health Data Diversion Grant - 861060)	New Revenues	01/09/24	$366,502	$366,502	$0	A	**$366,502 -** New revenues received from the Colorado Department of Human Services Office of Civil and Forensic Mental Health and the Competency Fines Committee to fund the DCSO Mental Health Diversion Project. The grant award includes funding for ForceMetrics software, a new data analytical software platform that can search multiple sources of data and display that information in a single dashboard format. The grant period is from July 1, 2024 through August 31, 2025. There is no cash match required by Douglas County.
Sheriff - (DOLA Backcountry Search & Rescue Grant - 802040)	New Revenues	10/22/24	$11,343	$11,343	$0	A	**$11,343 -** New revenues received from the State of Colorado for the grant period September 1, 2024 through August 31, 2025. Funds were approved to purchase backcountry search and rescue related equipment, training and services.
Sheriff - (DOLA Backcountry Search & Rescue Grant - 803084)	New Revenues	11/19/24	$38,111	$38,111	$0	A	**$38,111 -** New revenues received from the State of Colorado for the grant period ending June 30, 2026. Funds were approved to purchase backcountry search and rescue related equipment, training and services.
Sheriff - (Correctional Treatment Board - 802028)	New Revenues	06/11/24	$19,753	$19,003	$750	A/B	**$19,753 -** $19,003 new revenues have been awarded by the Correction Treatment Board (CTB) for the grant period of July 1, 2024 through June 30, 2025. These funds will be used to provide transpiration, backpacks, recovery support items, housing, and educational materials for reintegration clients. $750 of restricted fund balance is being utilized due to timing of revenues received in prior year.
Sheriff - (Gray & Black Marijuana Enforcement 25-111 - 861062)	New Revenues	03/25/25	$39,500	$39,500	$0	A	**$39,500 -** New revenues to be spent on the costs associated with the investigation and prosecution (including large-scale operations, organized crimes, and operations that divert marijuana outside of Colorado) of unlicensed marijuana cultivation or distribution operations conducted in violation of state law. Grant period expires May 31, 2026.
Sheriff - (Preventing Identity Base Violence Grant Program - 802026)	New Revenues	08/13/24	$21,343	$23,433	($2,090)	A/B	**$23,433** - New revenues to be received from the Colorado Division of Homeland Security & Emergency Management. Funding is to provide annual financial assistance to the Douglas County Sheriff's Office to instruct and educate the many Houses of Worship that reside in Douglas County the teaching and training of basic safety measures to help prepare House of Worship for emergencies where law enforcement may be involved. Due to timing of revenue reimbursements, restricted fund balance of $2,090 is being replenished with this request.

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance		Description / Nature of Expenditure
Sheriff - (Peace Officer Counsel - 802024)	New Revenues	04/09/24	$153,030	$266,452	($113,422)	A/B	**$153,030 -** New grant revenues received from the Department of Local Affairs to provide on-scene response services to support peace officers handling of persons with mental health disorders and counseling services for peace officers. Due to timing of revenue reimbursements, fund balance will be replenished by $113,422 with this request. The grant cycle for the POMH is March 21, 2024 through June 30, 2026. The BOCC officially approved grant acceptance on 4/9/2024.
Sheriff - (Grey & Black Marijuana Enforcement Grant - 24-018 - 802023)	New Revenues	04/09/24	$14,421	$17,921	($3,500)	A/B	**$17,921 -** New revenues to be received from the Colorado Department of Local Affairs (DOLA) to assist local law enforcement agencies and district attorney's through local governments for the investigations and prosecutions of unlicensed marijuana cultivation and / or distribution operations. This grant period January 31, 2024 through May 31, 2026.
Sheriff - (Jail Based Behavioral Health Program - 802027)	New Revenues	06/11/24	$142,249	$432,275	($290,026)	A/B	**$142,249 -** New revenues to be received from the Office of Behavioral Health. This amendment #4 was approved and accepted by the BOCC on June 11, 2024. The program budget is allocated to provide mental health counseling, substance abuse counseling, competency enhancement, and re-entry services for qualifying inmates released from the Douglas County Detention Facility. The funding for this award is from July 2024, through June 2025. Fund balance is being replenished for the purchase order supplemental presented to the BOCC in March 2025 for $215,783.
TOTAL GENERAL FUND			***$19,325,150***	***$8,455,835***	***$10,869,315***		
					$8,455,835	***A***	***New Revenues***
					($581,181)	***B***	***Prior Year Fund Balance - Grant Related***
					$3,302,700	***C***	***Prior Year Fund Balance - Rollover of Unencumbered Funds***
					$8,147,796	***D***	***Prior Year Fund Balance - New Initiatives***

**** The new amended budget for the General Fund is $239,996,419***

LAW ENFORCEMENT AUTHORITY FUND - 220

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
Sheriff - (K-9 Unit)	New Revenues		$7,301	$7,301	$0	**$7,301 -** New revenues have been received from a private donor to be allocated to a new obstacle course and additional training supplies for the K-9 division of the Douglas County Sheriff Department.
			$7,301	***$7,301***	***$0***	

**** The new amended budget for the Law Enforcement Authority Fund is $40,004,755***

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure

DISTRICT ATTORNEY JD23 FUND - 223

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
District Attorney - 23rd Administration - 28100	New Revenue		$119,054	$119,054	$0	**$119,054** - New revenues via a transfer from the General Fund is needed to offset one-time costs of new badges, new radios and encryption upgrades and ballistic equipment for 3 new positions, all of which total $56,787. Additionally, on-going expenditures being funded include: Software, range ammo, professional membership due, and training, $62,267.
District Attorney - 23rd Administration - 28100	New Revenue		$150,150	$150,150	$0	**$150,150** - New revenues via a transfer from the General Fund to cover the purchase of three vehicles. Douglas County is buying out the contract on the current leased vehicles, and it no longer makes fiscal sense to continue with the leasing terms.
TOTAL DISTRICT ATTORNEY JD23 FUND - 223			***$269,204***	***$269,204***	***$0***	

**** The new amended budget for the District Attorney JD23 Fund is 14,568,586.***

INFRASTRUCTURE FUND - 225

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
CIP - US 85 Improvements	Committed Fund Balance		$3,450,000	$0	$3,450,000	**$3,450,000** - Revenues from the Colorado Department of Transportation (CDOT) as part of the Intergovernmental Agreement for the construction of US85 are being recognized at this time to appropriate additional spending authority for the US 85 Capital Improvement project. The US 85 Capital Improvement project is a multi-year project requiring partnering with CDOT and other agencies to improve transportation efforts in Douglas County. Revenues were received 12/16/24.
CIP - US 85 Improvements (HR Pkwy to C-470)	Committed Fund Balance		($144,743)	$0	($144,743)	**($103,678)** - During the 2024 annual budget preparation the outstanding capital improvement projects (CIP) were looked at in detail in order to estimate the funds that were not going to be used in the months of October – December 2024. These anticipated unspent funds were then recognized in the 2025 adopted budget. However, the listed projects progressed more than anticipated in 2024 causing too much budget to be re-appropriated in the 2025 budget adoption. This supplemental request will replenish fund balance and decrease the Transportation Fund appropriations by this amount.
CIP - Relocate W I25 Frontage Road	Committed Fund Balance		$41,065	$0	$41,065	
TOTAL INFRASTRUCTURE FUND - 225			***$3,346,322***	***$0***	***$3,346,322***	

**** The new amended budget for the Infrastructure Fund is $3,762,959***

ROAD SALES & USE TAX FUND - 230

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
CIP - (Waterton Road)	New Revenues		$33,293	$33,293	$0	**$33,293** - New revenues received from Sterling Ranch CAB for their contribution to the Waterton Road. These funds will go towards Waterton Road and Titan Parkway / US 85 Improvements.
CIP - (US 85 Plum Creek PD)	New Revenues		$499,121	$499,121	$0	**$499,121** - New construction developer advance revenues need to be recognized to continue to fund current and future portions of the US 85 Improvement CIP. The US 85 improvement is a multi-year project that started in 2022 and is anticipated to have transportation construction needs for the next ten years (through 2035).
TOTAL ROAD SALES & USE TAX FUND			***$532,414***	***$532,414***	***$0***	

**** The new amended budget for the Road Sales & Use Tax Fund is $99,709,349.***

Supplemental Appropriation - 2025 Budget Amendment

Resolution No. #02-25

For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
TRANSPORTATION FUND - 235						
CIP - (US Hwy 85 Improvements)	Assigned Fund Balance		$4,256,425	$0	$4,256,425	$4,256,425 - Revenues from the Colorado Department of Transportation (CDOT) as part of the Intergovernmental Agreement for the construction of US85 are being recognized at this time to appropriate additional spending authority for the US 85 Capital Improvement project. The US 85 Capital Improvement project is a multi-year project requiring partnering with CDOT and other agencies to improve transportation efforts in Douglas County.
TOTAL TRANSPORTATION FUND			***$4,256,425***	***$0***	***$4,256,425***	
**** The new amended budget for the Transportation Fund is $49,784,584***						
JUSTICE CENTER SALES & USE TAX FUND - 240						
JC - (Highlands Ranch Sheriff Substation - 870069)	Restricted Fund Balance		$32,802	$0	$32,802	**$32,802** - Restricted fund balance is being appropriated at this time to offset the purchase of exercise equipment (2-Rogue Monster Racks, 2-Rogue ECHO Bikes, 2-Rogue Cable Pulley Machines, 2-NordicTrak treadmills) that will be located at the Highlands Ranch Sheriff Substation in Highlands Ranch.
JC - (Simulcast - Decker's - 870053)	Restricted Fund Balance		$400,000	$0	$400,000	**$400,000** - Restricted fund balance is being requested to cover additional costs to complete fiber and power connections to the Decker's Tower.
JC - (EVOC Operations - 33225)	Restricted Fund Balance		$186,205	$0	$186,205	**$186,205 -** Restricted fund balance is being requested to cover expenses related to the EVOC Crack/Seal project that was delayed due to increased costs of materials.
TOTAL JUSTICE CENTER SALES & USE TAX FUND			***$619,007***	***$0***	***$619,007***	
**** The new amended budget for the Justice Center Sales & Use Tax Fund is $34,406,176.***						
RUETER-HESS RECREATION AREA FUND - 245						
Docks	Restricted Fund Balance		$250,000	$0	$250,000	**$250,000 -** Restricted fund balance is being requested for phase 1 of 2 for dock improvements at the reservoir. The fluctuating water level coupled with the rugged and unimproved shoreline at Rueter-Hess make it difficult for visitors to launch their watercraft and fish from the shore. Adding docks is a top priority to improve the customer experience.
Entrance Improvements	Restricted Fund Balance		$110,000	$0	$110,000	**$110,000 -** Restricted fund balance is being requested for entrance station and roadway improvements. Due to recent flooding damage, this project is being prioritized in 2025.
TOTAL RUETER-HESS RECREATION AREA FUND			***$360,000***	***$0***	***$360,000***	
**** The amended budget for the Rueter-Hess Recreation Area Fund is $1,543,935***						

Supplemental Appropriation - 2025 Budget Amendment
Resolution No. #02-25
For Adoption on April 22, 2025

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
Historic Resources	Restricted Fund Balance	01/28/25	$83,776	$0	$83,776	**$83,776 -** Restricted fund balance I needed to fulfill the contract between Douglas County and Interpret Site LLC. for professional consulting services related to the management of the County's History Repository. Contract approved by BOCC on 1/28/25
Historic Resources	Restricted Fund Balance		$4,522	$0	$4,522	**$4,522** - Restricted fund balance is being requested to continue to work for stabilization of two mammoth lower jaws at the Douglas County Repository. The contractor being utilized is Heather Finlyson.
Historic Resources	Restricted Fund Balance		$3,500	$0	$3,500	**$3,500** - Restricted fund balance is being requested to pay for the professional services of Elena Haverluk. This is for the exhibit of the timeline mural at the Parker Water and Sanitation District. Douglas County is partnering with the Town of Parker.
Historic Resources	Restricted Fund Balance		$23,920	$0	$23,920	**$23,920** - Restricted fund balance is being requested to complete the contract with Schuber Darden Architects for the restoration and stabilization services of historic structures, including the Evans Homestead Restoration. Contract was approved 8/15/24
Historic Resources - Spring Valley	Restricted Fund Balance	09/10/24	$161,410	$0	$161,410	**$141,410** - Restricted fund balance is being appropriated for the contract with Deep Roots Craftsmen to stabilize the Spring Valley Schoolhouse. This contingency amount rolled into the fund balance at year-end 2024. BOCC approved contract on 9/10/24.
Historic Resources - Miksch-Helmer Cabin	Restricted Fund Balance		$23,386	$0	$23,386	**$23,386** - Restricted fund balance is being appropriated for the contract with Empire Carpentry LLC to rehabilitate the Miksch-Helmer Cabin. The contingency amount rolled into the fund balance at year-end 2024. BOCC approved contract on 9/10/24.
Parks - Cash-in-Lieu	Restricted Fund Balance		$1,676,009	$0	$1,676,009	**$1,676,009** - Restricted fund balance from the collection of cash-in-lieu park funding is being transferred to the General Fund and will be tracked in the General Fund going forward.
TOTAL OPEN SPACE SALES & USE TAX FUND			***$1,976,523***	***$0***	***$1,976,523***	

**** The new amended budget for the Parks and Open Space Sales & Use Tax Fund is $12,497,245***

CAPITAL EXPENDITURES FUND - 330

Department (Division)	Source of Funding	Briefing Date to BOCC	Requested Expenditure Amount	New Revenue Received	Use of Fund Balance	Description / Nature of Expenditure
Facilities (Heroes Hall - Fairgrounds)	Transfer-In from General Fund	01/14/25	$400,000	$400,000	$0	**$400,000** is being transferred from the General Fund for the costs associated with construction documents for the planned Heroes Hall to be located at the Douglas County Fairgrounds.
Facilities (Future Expenditures / Fund Balance	Transfer-In from General Fund		$0	$1,300,000	($1,300,000)	**$1,300,000** is being transferred from the General Fund and being placed in fund balance for 2026 county-wide maintenance. There is no mill levy allocated to the Capital Expenditures Fund.
Facilities (Lansing Point)	Transfer-In from General Fund		$1,600,000	$1,600,000	$0	**$1,600,000** is being transferred from the General Fund for the costs associated with construction, FFE, improvements for the Lansing Point Facility (LP). Furniture and fixtures are being purchased for the department functions relocating in 2025 to the LP building.
TOTAL CAPITAL EXPENDITURES FUND			***$2,000,000***	***$3,300,000***	***($1,300,000)***	

**** The new amended budget for the Capital Expenditures Fund is $3,131,757.***

TOTAL ALL FUNDS - 2025 SUPPLEMENTAL			***$32,692,346***	***$12,564,754***	***$12,832,226***	

Douglas County Government
2025 Amended Budget Rollforward

Funds	2025 Adopted Budget	#25-01 Amended (3/25/25)	#25-02 Amended (4-22-25)	#25-03 Amended	#25-04 Amended	#25-05 Amended	Total Amended Budget	% Change Adopted Budget	Transfer In	Total Budget Appropriations
Revenues										
100 General	185,131,875		8,455,835				193,587,710	4.6%	32,132,871	225,720,581
200 Road & Bridge	67,268,000						67,268,000	0.0%		67,268,000
210 Human Services	58,420,423						58,420,423	0.0%	4,195,916	62,616,339
215 Developmental Disabilities	9,103,800						9,103,800	0.0%		9,103,800
217 DC Health Department	1,201,239						1,201,239	100.0%	2,106,435	3,307,674
220 Law Enforcement Authority	31,559,800		7,301				31,567,101	0.0%	7,774,019	39,341,120
221 Safety and Mental Health	7,823,600						7,823,600	100.0%	200,000	8,023,600
223 District Attorney JD23	1,719,211		269,204				1,988,415	15.7%	12,580,171	14,568,586
225 Infrastructure Fund	0						0	0.0%		0
230 Road Sales & Use Tax	46,245,200		532,414				46,777,614	1.2%		46,777,614
235 Transportation Infrastructure Sales & Use Tax	20,420,400						20,420,400	0.0%	0	20,420,400
240 Justice Center Sales & Use Tax	27,828,250						27,828,250	0.0%		27,828,250
245 Rueter-Hess Recreation	702,000						702,000	100.0%	250,000	952,000
250 Parks and Open Space Sales & Use Tax	19,229,209						19,229,209	0.0%	0	19,229,209
260 Conservation Trust	1,700,000						1,700,000	0.0%		1,700,000
265 Lincoln Station Sales Tax Improvement	50,000						50,000	0.0%		50,000
275 Waste Disposal	85,000						85,000	0.0%	0	85,000
280 Woodmoor Mountain	39,820						39,820	0.0%		39,820
295 Rocky Mountain HIDTA	1,104,204						1,104,204	0.0%		1,104,204
296 American Rescue Plan Act (ARPA)	0						0	100.0%		0
297 Property Tax Relief	0						0	0.0%		0
330 Capital Expenditures	0		3,300,000				3,300,000	0.0%		3,300,000
350 LID Capital Construction	85,200						85,200	0.0%		85,200
390 Capital Replacement	0						0	0.0%		0
410 Debt Service	0						0	0.0%		0
620 Employee Benefits Self-Insurance	2,569,900						2,569,900	0.0%		2,569,900
630 Liability and Property Self-Insurance	4,057,690						4,057,690	0.0%		4,057,690
640 Medical Insurance Self-Insurance	32,594,940						32,594,940	0.0%	2,000,000	34,594,940
Total All Funds	**518,939,761**	**0**	**12,564,754**	**0**	**0**	**0**	**531,504,515**	**2.4%**	**61,239,412**	**592,743,927**

	2025 Adopted Budget	#25-01 Amended (3/25/25)	#25-02 Amended (4-22-25)	#25-03 Amended	#25-04 Amended	#25-05 Amended	Adjustments	Total Amended Budget	% Change	Transfer Out	Total Budget Appropriations
Expenditures											
100 General	190,516,889	3,297,839	19,325,150					213,139,878	11.9%	26,856,541	239,996,419
200 Road & Bridge	79,987,699	4,689,973						84,677,672	5.9%	440,821	85,118,493
210 Human Services	62,713,834	11,233						62,725,067	0.0%		62,725,067
215 Developmental Disabilities	9,103,800							9,103,800	0.0%		9,103,800
217 DC Health Department	3,872,956	58,100						3,931,056	100.0%		3,931,056
220 Law Enforcement Authority	39,489,850	507,604	7,301					40,004,755	1.3%		40,004,755
221 Safety and Mental Health	7,930,644	39,067						7,969,711	0.5%		7,969,711
223 District Attorney JD23	14,299,382		269,204					14,568,586	1.9%		14,568,586
225 Infrastructure Fund	416,637		3,346,322					3,762,959	803.2%	0	3,762,959
230 Road Sales & Use Tax	98,426,935		532,414					98,959,349	0.5%	750,000	99,709,349
235 Transportation Infrastructure Sales & Use Tax	45,028,159		4,256,425					49,284,584	9.5%	500,000	49,784,584
240 Justice Center Sales & Use Tax	3,424,547	2,633,472	619,007					6,677,026	95.0%	27,729,150	34,406,176
245 Rueter-Hess Recreation	1,183,935		360,000					1,543,935	100.0%		1,543,935
250 Parks and Open Space Sales & Use Tax	7,854,494	2,416,228	1,976,523					12,247,245	55.9%	250,000	12,497,245
260 Conservation Trust	2,750,000	401,304						3,151,304	0.0%		3,151,304
265 Lincoln Station Sales Tax Improvement	50,000							50,000	0.0%		50,000
275 Waste Disposal	110,000							110,000	0.0%		110,000
280 Woodmoor Mountain	127,590							127,590	0.0%		127,590
295 Rocky Mountain HIDTA	1,079,304							1,079,304	0.0%	24,900	1,104,204
296 American Rescue Plan Act (ARPA)	0	2,401,507						2,401,507	100.0%		2,401,507
297 Property Tax Relief	0							0	0.0%		0
330 Capital Expenditures	1,033,450	98,307	2,000,000					3,131,757	203.0%		3,131,757
350 LID Capital Construction	2,500							2,500	0.0%	85,000	87,500
390 Capital Replacement								0	0.0%	603,000	603,000
410 Debt Service								0	0.0%		0
620 Employee Benefits Self-Insurance	2,569,900							2,569,900	0.0%	2,000,000	4,569,900
630 Liability and Property Self-Insurance	4,057,690	23,606						4,081,296	0.6%		4,081,296
640 Medical Insurance Self-Insurance	32,594,940							32,594,940	0.0%	2,000,000	34,594,940
Total All Funds	**608,625,135**	**16,578,240**	**32,692,346**	**0**	**0**	**0**		**657,895,721**	**8.1%**	**61,239,412**	**719,135,133**

Detailed explanations for each supplemental budget can be found at http://www.douglas.co.us/finance/ under the section titled "Budget Division".

General Fund (Fund 100)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 56,512,945**	**$ 35,180,366**	**$ 51,413,343**	**$ 51,413,343**	**$ 33,288,064**	**$ 59,694,526**
	Revenues						
2	*Taxes*	$ 98,407,099	$ 113,918,975	$ 113,918,975	$ 113,769,987	$ 139,056,500	$ 139,056,500
3	*Licenses and Permits*	9,679,154	7,775,825	7,775,825	8,972,885	8,481,700	8,481,700
4	*Intergovernmental*	5,862,577	510,750	14,727,983	7,429,909	1,986,750	1,986,750
5	*Charges for Services*	24,626,121	25,579,950	26,065,950	29,242,934	26,294,425	26,294,425
6	*Fines and Forfeits*	122,994	125,400	125,400	181,520	156,200	156,200
7	*Earnings on Investments*	11,076,365	7,250,000	7,250,000	15,929,449	6,500,000	6,500,000
8	*Donations and Contributions*	222,720	260,000	260,075	506,245	260,000	260,000
9	*Other Revenues*	8,288,447	579,400	1,976,940	7,759,701	2,396,300	2,396,300
	Transfers In:						
10	*Capital Replacement Fund*	372,000	990,000	990,000	990,000	603,000	603,000
11	*Road & Bridge Fund*	1,532,000	107,000	107,000	107,000	440,821	440,821
12	*Transportation Fund*	0	500,000	500,000	500,000	500,000	500,000
13	*Justice Center Sales Tax Fund*	28,050,540	27,452,725	27,452,725	26,663,462	27,729,150	27,729,150
14	*Road Sales Tax Fund-Engineering Svc*	500,000	750,000	750,000	750,000	750,000	750,000
15	*RMHIDTA*	24,900	24,900	24,900	24,900	24,900	24,900
16	*Liability and Property Insurance Fund*	858,537	0	0	0	0	0
17	*LID Capital Construction Fund*	0	744,000	894,000	894,000	85,000	85,000
18	*Medical Self-Insurance Fund*	0	0	0	0	2,000,000	2,000,000
19	*Total Transfers In*	*31,337,977*	*30,568,625*	*30,718,625*	*29,929,362*	*32,132,871*	*32,132,871*
20	*Supplemental #2 (04-22-25)*						*8,455,835*
21	***Total Revenues and Transfers In***	**$ 189,623,453**	**$ 186,568,925**	**$ 202,819,773**	**$ 213,721,993**	**$ 217,264,746**	**$ 225,720,581**
	Expenditures by Function						
22	*Personnel*	$ 118,555,703	$ 122,109,050	$ 127,573,763	$ 125,326,367	$ 133,829,689	$ 133,829,689
23	*Supplies*	7,616,538	7,578,947	7,714,278	7,887,968	7,638,134	7,638,134
24	*Controllable Assets*	425,284	742,378	762,877	407,675	1,180,378	1,180,378
25	*Purchased Services*	43,865,270	49,192,374	65,197,268	45,380,472	34,880,662	34,880,662
26	*Building Materials*	13,870	0	500	346	0	0
27	*Fixed Charges*	8,105,281	9,661,624	10,558,129	9,736,914	12,186,225	12,186,225
28	*Debt Service*	4,650,882	0	0	5,725,972	0	0
29	*Grants and Contributions*	3,404,403	801,470	2,723,578	2,355,684	986,470	986,470
30	*Intergovernmental Support*	541,108	601,338	614,238	592,929	603,548	603,548
31	*Interdepartmental Charges*	(9,600,975)	(9,281,849)	(9,281,849)	(11,547,502)	(11,494,167)	(11,494,167)
32	*Capital Outlay*	4,742,079	42,650	1,105,115	4,646,776	5,134,950	5,134,950
33	*Computer Equipment*	1,307,136	1,500,000	2,316,642	1,136,629	2,086,000	2,086,000
34	*Vehicle Replacements*	1,691,248	990,000	1,630,466	1,396,843	1,485,000	1,485,000
35	*Contingency*	0	1,000,000	812,412	0	2,000,000	2,000,000
	Transfers Out						
36	*To Law Enforcement Authority Fund*	4,077,865	4,385,100	3,136,400	2,923,400	7,774,019	7,774,019
37	*To Security and Mental Health Fund*	0	625,000	625,000	625,000	200,000	200,000
38	*To District Attorney Fund*	0	0	0	0	12,580,171	12,580,171
39	*To Capital Expenditures Fund*	552,162	0	88,000	88,000	0	0
40	*To Solid Waste Disposal Fund*	0	0	275,950	275,950	0	0
41	*To Human Services Fund*	2,741,013	3,460,366	3,490,366	3,858,140	4,195,916	4,195,916
42	*To Medical Self-Insurance Fund*	0	0	2,500,000	2,500,000	0	0
43	*To Health Fund*	2,034,188	2,123,247	2,123,247	2,123,247	2,106,435	2,106,435
44	*Total Transfers Out*	*9,405,228*	*10,593,713*	*12,238,963*	*12,393,737*	*26,856,541*	*26,856,541*
45	*Encumbrances Re-appropriated (Supplemental #01-25)*						*3,297,839*
46	*Supplemental #2 (04-22-25)*						*19,325,150*
47	***Total Expenditures and Transfers Out***	**$ 194,723,055**	**$ 195,531,695**	**$ 223,966,380**	**$ 205,440,810**	**$ 217,373,430**	**$ 239,996,419**
48	*Change In Fund Balance*	(5,099,602)	(8,962,770)	(21,146,607)	8,281,183	(108,684)	(14,275,838)
49	***Ending Fund Balance***	**$ 51,413,343**	**$ 26,217,596**	**$ 30,266,736**	**$ 59,694,526**	**$ 33,179,380**	**$ 45,418,688**
	Fund Balance Detail						
50	*Non-spendable Fund Balance*	*$ 4,281,147*	*$ 5,644,849*	*$ 4,281,147*	*$ 3,108,325*	*$ 4,281,147*	*$ 3,108,325*
51	*Restricted Fund Balance*	*12,133,311*	*10,288,983*	*11,509,233*	*19,686,825*	*11,379,319*	*14,261,091*
52	*Committed Fund Balance*	*4,583,029*	*425,778*	*0*	*3,724,698*	*5,000,000*	*5,516,004*
53	*Assigned Fund Balance - Required Per Policy*	*8,425,722*	*18,280,111*	*18,276,000*	*7,696,963*	*8,425,722*	*6,797,738*
54	*Assigned Fund Balance - Carry Forward*	*6,591,767*	*0*	*0*	*4,723,045*	*0*	*2,603,646*
55	*Assigned Fund Balance - Initiatives*	*7,649,000*	*1,650,000*	*6,900,000*	*20,625,000*	*6,500,000*	*15,325,000*
56	*Unassigned Fund Balance Available*	*18,671,882*	*9,834*	*222,870*	*2,065,887*	*15,706*	*(256,899)*
57	*Unrealized Gains & Losses Adjustment*	*(10,922,514)*	*(10,081,959)*	*(10,922,514)*	*(1,936,216)*	*(2,422,514)*	*(1,936,216)*
58	***Ending Fund Balance***	**$ 51,413,343**	**$ 26,217,596**	**$ 30,266,736**	**$ 59,694,526**	**$ 33,179,380**	**$ 45,418,688**

Douglas County Government
Law Enforcement Authority Fund (Fund 220)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 10,919,724**	**$ 6,639,382**	**$ 7,645,303**	**$ 7,645,303**	**$ 7,835,110**	**$ 8,457,982**
	Revenues						
2	*Taxes*	$ 21,871,329	$ 28,266,400	$ 28,266,400	28,141,359	$ 27,987,600	$ 27,987,600
3	*Intergovernmental*	100,874	0	108,555	65,857	0	0
4	*Charges for Services*	1,698,541	2,172,450	2,172,450	2,209,656	2,166,800	2,166,800
5	*Fines and Forfeits*	867,570	1,092,400	1,092,400	954,924	1,005,400	1,005,400
6	*Earnings on Investments*	412,025	100,000	100,000	630,060	400,000	400,000
7	*Donations and Contributions*						
8	*Miscellaneous Revenues*	83,515	43,300	43,300	4,681	0	0
9	*Other Financing Sources*	655,974	0	0	66,225	0	0
10	*Transfers In - General Fund*	4,077,865	4,385,100	4,385,100	2,923,400	7,774,019	7,774,019
11	*Supplemental Appropriation - #2 (4-22-25)*						*7,301*
12	***Total Revenues and Transfers In***	**$ 29,767,693**	**$ 36,059,650**	**$ 36,168,205**	**$ 34,996,161**	**$ 39,333,819**	**$ 39,341,120**
	Expenditures by Function						
13	*Personnel*	$ 25,902,072	$ 28,971,504	$ 29,080,059	27,773,772	$ 31,901,173	$ 31,901,173
14	*Supplies*	582,725	627,100	742,822	637,908	831,100	831,100
15	*Controllable Assets*	276,904	217,550	217,550	48,218	104,400	104,400
16	*Purchased Services*	628,014	864,950	954,050	673,574	997,700	997,700
17	*Fixed Charges*	2,776,943	2,984,390	2,982,390	2,957,271	3,000,377	3,000,377
18	*Debt Service*	132,652	0	0	137,548	0	0
19	*Grants and Contributions*	138,047	0	2,000	2,245	60,000	60,000
20	*Capital Outlay*	2,604,757	2,170,650	2,284,565	1,952,946	2,495,100	2,495,100
21	*Contingency*	0	175,000	114,693	0	100,000	100,000
22	*Encumbrances Re-appropriated (Supplemental #01-25)*						*507,604*
23	*Supplemental Appropriation - #2 (4-22-25)*						*7,301*
24	***Total Expenditures and Transfers Out***	**$ 33,042,114**	**$ 36,011,144**	**$ 36,378,129**	**$ 34,183,482**	**$ 39,489,850**	**$ 40,004,755**
25	*Change In Fund Balance*	(3,274,421)	48,506	(209,924)	812,679	(156,031)	(663,635)
26	***Ending Fund Balance***	**$ 7,645,303**	**$ 6,687,888**	**$ 7,435,379**	**$ 8,457,982**	**$ 7,679,079**	**$ 7,794,347**
	Fund Balance Detail						
27	*Non-spendable Fund Balance*	$ 17,392	$ 0	$ 17,392	$ 9,010	$ 17,392	$ 17,392
28	*Restricted Fund Balance - Required per policy*	6,983,306	6,449,352	6,983,306	7,520,700	6,983,306	7,364,669
29	*Restricted Available - Available*	430,174	238,536	434,681	928,272	678,381	412,286
30	*Committed Fund Balance*	*214,431*	*0*	*0*	*0*	*0*	*0*
31	*Assigned Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
32	***Ending Fund Balance***	**$ 7,645,303**	**$ 6,687,888**	**$ 7,435,379**	**$ 8,457,982**	**$ 7,679,079**	**$ 7,794,347**

Douglas County Government
District Attorney JD23 Fund (Fund 223)
Fund Summary

		2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 0**	**$ 0**
	Revenues		
2	*Intergovernmental*	$ 1,719,211	$ 1,719,211
3	*Fines & Forfeits*	0	0
4	*Earnings on Investments*	0	0
5	*Other Revenues*	0	0
6	Transfer-In General Fund	12,580,171	12,580,171
7	*Supplemental Appropriation - #2 (4-22-25)*		*269,204*
8	***Total Revenues and Transfers In***	**$ 14,299,382**	**$ 14,568,586**
	Expenditures by Function		
9	*Personnel*	$ 13,889,682	$ 13,879,682
10	*Supplies*	56,970	56,970
11	*Controllable Assets*	0	0
12	*Purchased Services*	278,480	288,480
13	*Fixed Charges*	19,250	19,250
14	*Intergovernmental Support*	0	0
15	*Capital*	55,000	55,000
16	*Contingency*	0	0
17	*Supplemental Appropriation - #2 (4-22-25)*		*269,204*
18	***Total Expenditures and Transfers Out***	**$ 14,299,382**	**$ 14,568,586**
19	*Change In Fund Balance*	0	0
20	***Ending Fund Balance***	**$ 0**	**$ 0**
	Fund Balance Detail		
21	*Non-spendable Fund Balance*	*$ 0*	*$ 0*
22	*Restricted Fund Balance - Required Per Policy*	*0*	*0*
23	*Restricted Fund Balance - Available*	*0*	*0*
24	*Committed Fund Balance*	*0*	*0*
25	*Assigned Fund Balance*	*0*	*0*
26	***Ending Fund Balance***	**$ 0**	**$ 0**

Douglas County Government
Infrastructure Fund (Fund 225)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$28,785,741**	**$558,645**	**$13,956,610**	**$13,956,610**	**$ 416,637**	**$ 3,762,959**
	Revenues						
2	*Taxes*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
3	*Licenses and Permits*	0	0	0	0	0	0
4	*Intergovernmental*	13,362,267	0	0	3,450,000	0	0
5	*Charges for Services*	0	0	0	0	0	0
6	*Fines and Forfeits*	0	0	0	0	0	0
7	*Earnings on Investments*	0	0	0	0	0	0
8	*Donations and Contributions*	0	0	0	0	0	0
9	*Other Revenues*	0	0	0	0	0	0
10	***Total Revenues and Transfers In***	**$ 13,362,267**	**$ 0**	**$ 0**	**$ 3,450,000**	**$ 0**	**$ 0**
	Expenditures by Function						
11	*Personnel*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
12	*Supplies*	0	0	0	0	0	0
13	*Purchased Services*	24,874	15,508	51,206	1,141	2,551	2,551
14	*Fixed Charges*	0	0	0	0	0	0
15	*Grants and Contributions*	0	0	0	0	0	0
16	*Intergovernmental Support Svcs.*	27,895,132	300,008	220,000	144,743	220,000	220,000
17	*Interdepartmental Charges*	0	0	0	0	0	0
18	*Capital Outlay*	271,393	243,129	323,137	135,500	194,086	194,086
19	*Contingency*	0	0	0	0	0	0
20	*Transfers Out - Infrastructure Fund*	0	0	13,362,267	13,362,267	0	0
21	*Supplemental Appropriation - #2 (4-22-25)*	0	0	0	0	0	*3,346,322*
22	***Total Expenditures and Transfers Out***	**$ 28,191,398**	**$ 558,645**	**$ 13,956,610**	**$ 13,643,651**	**$ 416,637**	**$ 3,762,959**
23	*Change In Fund Balance*	*(14,829,131)*	*(558,645)*	*(13,956,610)*	*(10,193,651)*	*(416,637)*	*(3,762,959)*
24	***Ending Fund Balance***	**$ 13,956,610**	**$ 0**	**$0**	**$ 3,762,959**	**$ 0**	**$ 0**
	Fund Balance Detail						
25	*Nonspendable Fund Balance*	*$ 0*	*$ 0*	*$ 0*	*$ 0*	*$ 0*	*$ 0*
26	*Restricted Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
27	*Committed Fund Balance*	*13,956,610*	*0*	*0*	*0*	*0*	*0*
28	*Assigned Fund Balance*	*0*	*0*	*0*	*3,762,959*	*0*	*0*
29	***Ending Fund Balance***	**$ 13,956,610**	**$ 0**	**$ 0**	**$ 3,762,959**	**$ 0**	**$ 0**

Douglas County Government
Road Sales and Use Tax Fund (Fund 230)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 86,340,186**	**$ 91,956,642**	**$ 105,668,807**	**$ 105,668,807**	**$ 96,605,934**	**$ 102,253,053**
	Revenues						
2	*Taxes*	$ 42,689,818	$ 43,212,360	$ 43,212,360	$ 42,681,098	$ 44,045,200	$ 44,045,200
3	*Intergovernmental*	12,076,449	0	624,652	682,112	0	0
4	*Earnings on Investments*	2,633,832	1,500,000	1,500,000	3,679,814	2,200,000	2,200,000
5	*Other Revenues*	3,303,759	0	2,361,844	3,476,726	0	0
6	*Transfers In*	0	0	0	0	0	0
7	*Supplemental Appropriation - #2 (4-22-25)*						*532,414*
8	***Total Revenues and Transfers In***	**$ 60,703,858**	**$ 44,712,360**	**$ 47,698,856**	**$ 50,519,750**	**$ 46,245,200**	**$ 46,777,614**
	Expenditures by Function						
9	*Personnel*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
10	*Supplies*	0	0	0	0	0	0
11	*Controllable Assets*	0	0	0	0	0	0
12	*Purchased Services*	3,660,422	0	2,948,000	2,660,058	2,820,000	2,820,000
13	*Building Materials*	0	0	0	0	0	0
14	*Fixed Charges*	0	0	0	0	0	0
15	*Debt Issuance*	0	0	0	0	0	0
16	*Grants, Contributions, Indemnities*	0	0	0	(0)	0	0
17	*Intergovernmental Support*	27,917,727	39,089,002	41,048,953	30,702,928	27,515,732	27,515,732
18	*Interdepartmental Charges*	0	0	0	0	0	0
19	*Capital Projects/Re-Appropriation*	9,297,088	66,472,127	64,138,493	10,972,115	68,091,203	68,091,203
20	*Contingency*	0	0	0	0	0	0
21	*Transfers Out:*						
22	To General Fund	500,000	750,000	750,000	750,000	750,000	750,000
23	To Infrastrure Fund	0	0	8,850,402	8,850,402	0	0
24	*Total Transfers Out*	*500,000*	*750,000*	*9,600,402*	*9,600,402*	*750,000*	*750,000*
25	*Supplemental Appropriation - #2 (4-22-25)*						*532,414*
26	***Total Expenditures and Transfers Out***	**$ 41,375,237**	**$ 106,311,129**	**$ 117,735,848**	**$ 53,935,503**	**$ 99,176,935**	**$ 99,709,349**
27	*Change In Fund Balance*	19,328,621	(61,598,769)	(70,036,992)	(3,415,754)	(52,931,735)	(52,931,735)
28	***Ending Fund Balance***	**$ 105,668,807**	**$ 30,357,873**	**$ 35,631,815**	**$ 102,253,053**	**$ 43,674,199**	**$ 49,321,318**
	Fund Balance Detail						
29	*Non-spendable Fund Balance*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
30	*Restricted Fund Balance - Required Per Policy*	*59,202,121*	*4,671,236*	*4,671,236*	*5,251,975*	*4,824,520*	*4,824,520*
31	*Restricted Fund Balance - Available*	*46,466,686*	*25,686,637*	*30,960,579*	*97,001,078*	*38,849,679*	*44,496,798*
32	*Committed Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
33	*Assigned Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
34	***Ending Fund Balance***	**$ 105,668,807**	**$ 30,357,873**	**$ 35,631,815**	**$ 102,253,053**	**$ 43,674,199**	**$ 49,321,318**

Douglas County Government
Transportation Infrastructure Sales and Use Tax Fund (Fund 235)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 37,889,406**	**$ 70,746,660**	**$ 37,294,937**	**$ 37,294,937**	**$ 34,561,751**	**$ 40,055,911**
	Revenues						
2	*Taxes*	$ 19,210,418	$ 19,445,600	$ 19,445,600	$ 19,206,494	$ 19,820,400	$ 19,820,400
3	*Intergovernmental*	3,303,906	0	0	4,256,425	0	0
4	*Earnings on Investments*	1,211,929	600,000	600,000	1,621,882	600,000	600,000
5	*Other Revenues*	0	0	0	0	0	0
6	*Transfers In*	0	0	24,095,367	22,212,669	0	0
7	***Total Revenues and Transfers In***	**$ 23,726,252**	**$ 20,045,600**	**$ 44,140,967**	**$ 47,297,470**	**$ 20,420,400**	**$ 20,420,400**
	Expenditures by Function						
8	*Personnel*	$0	$0	$0	$0	$0	$0
9	*Supplies*	0	0	0	0	0	0
10	*Controllable Assets*	0	0	0	0	0	0
11	*Purchased Services*	6,198	0	138,113	443,353	1,000,000	1,000,000
12	*Building Materials*	0	0	0	0	0	0
13	*Fixed Charges*	0	0	0	0	0	0
14	*Debt Issuance*	0	0	0	0	0	0
15	*Grants, Contributions, Indemnities*	0	0	0	0	0	0
16	*Intergovernmental Support*	24,314,523	8,600,000	46,451,327	43,593,144	3,200,000	3,200,000
17	*Interdepartmental Charges*	0	0	0	0	0	0
18	*Capital Projects / Re-Appropriation*	0	76,147,429	23,610,382	0	40,828,159	40,828,159
19	*Contingency*	0	0	0	0	0	0
20	*Transfer Out - General Fund*	0	500,000	500,000	500,000	500,000	500,000
21	*Supplemental Appropriation - #2 (4-22-25)*						*4,256,425*
22	***Total Expenditures and Transfers Out***	**$ 24,320,721**	**$ 85,247,429**	**$ 70,699,822**	**$ 44,536,497**	**$ 45,528,159**	**$ 49,784,584**
23	*Change In Fund Balance*	(594,469)	(65,201,829)	(26,558,855)	2,760,973	(25,107,759)	(29,364,184)
24	***Ending Fund Balance***	**$ 37,294,937**	**$ 5,544,831**	**$ 10,736,082**	**$ 40,055,911**	**$ 9,453,992**	**$ 10,691,727**
	Fund Balance Detail						
25	*Non-spendable Fund Balance*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
26	*Restricted Fund Balance - Required Per Policy*	*200,000*	*200,000*	*200,000*	*279,600*	*200,000*	*279,600*
27	*Restricted Fund Balance - Available*	*37,094,937*	*5,344,831*	*10,536,082*	*39,776,311*	*9,253,992*	*10,412,127*
28	*Committed Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
29	*Assigned Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
30	***Ending Fund Balance***	**$ 37,294,937**	**$ 5,544,831**	**$ 10,736,082**	**$ 40,055,911**	**$ 9,453,992**	**$ 10,691,727**

Douglas County Government
Justice Center Sales and Use Tax Fund (Fund 240)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 29,355,836**	**$ 14,262,107**	**$ 21,602,586**	**$ 21,602,586**	**$ 7,856,607**	**$ 16,514,219**
	Revenues						
2	*Taxes*	$26,681,135	$27,007,725	$27,007,725	$26,675,687	$27,528,250	$27,528,250
3	*Intergovernmental*	0	0	0	0	0	0
4	*Charges for Services*	70,005	0	0	66,325	0	0
5	*Earnings on Investments*	601,329	400,000	400,000	561,262	300,000	300,000
6	*Other Revenues*	40,000	0	0	0	0	0
7	***Total Revenues and Transfers In***	**$ 27,392,469**	**$ 27,407,725**	**$ 27,407,725**	**$ 27,303,274**	**$ 27,828,250**	**$ 27,828,250**
	Expenditures by Function						
8	*Supplies*	$88,396	$0	$58,500	$47,787	$0	$0
9	*Controllable Assets*	24,755	261,000	39,500	39,393	1,071,200	1,071,200
10	*Purchased Services*	201,572	0	74,608	59,816	0	0
11	*Building Materials*	0	0	0	0	0	0
12	*Fixed Charges*	393,084	471,891	500,391	493,176	547,747	547,747
13	*Debt Service (Lease Payment)*	0	0	0	0	0	0
14	*Grants, Contributions, Indemnities*	0	0	0	0	0	0
15	*Intergovernmental Support*	5,492	12,000	12,000	5,788	12,000	12,000
16	*Interdepartmental Charges*	0	0	0	0	0	0
17	*Capital Outlay*	6,381,880	6,821,537	12,945,125	5,082,220	1,693,600	1,693,600
18	*Contingency*	0	250,000	216,630	0	100,000	100,000
19	*Transfers Out:*						
20	To General Fund	28,050,540	27,452,725	27,452,725	26,663,462	27,729,150	27,729,150
21	*Total Transfers Out*	*28,050,540*	*27,452,725*	*27,452,725*	*26,663,462*	*27,729,150*	*27,729,150*
22	*Encumbrances Re-appropriated (Supplemental #01-25)*						*2,633,472*
23	*Supplemental Appropriation - #2 (4-22-25)*						*619,007*
24	***Total Expenditures and Transfers Out***	**$ 35,145,719**	**$ 35,269,153**	**$ 41,299,479**	**$ 32,391,641**	**$ 31,153,697**	**$ 34,406,176**
25	*Change In Fund Balance*	(7,753,250)	(7,861,428)	(13,891,754)	(5,088,367)	(3,325,447)	(6,577,926)
26	***Ending Fund Balance***	**$ 21,602,586**	**$ 6,400,679**	**$ 7,710,832**	**$ 16,514,219**	**$ 4,531,160**	**$ 9,936,293**
	Fund Balance Detail						
27	*Non-spendable Fund Balance*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
28	*Restricted Fund Balance - Required Per Policy*	*6,064,694*	*3,498,403*	*3,498,403*	*4,690,611*	*3,277,312*	*3,498,403*
29	*Restricted Fund Balance - Available*	*15,537,892*	*2,902,276*	*4,212,429*	*11,823,608*	*1,253,848*	*6,437,890*
30	*Committed Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
31	*Assigned Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
32	***Ending Fund Balance***	***$ 21,602,586***	***$ 6,400,679***	***$ 7,710,832***	***$ 16,514,219***	***$ 4,531,160***	***$ 9,936,293***

Douglas County Government
Rueter-Hess Recreation Area Fund (Fund 245)
Fund Summary

		2023 Audited Budget	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	$ 0	**$ 2,257,234**	**$ 2,313,518**	**$ 2,313,518**	**$ 1,932,545**	**$ 2,567,163**
	Revenues						
2	*Intergovernmental*	$ 2,413,628	$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000
3	*Charges for Services*	33,076	30,000	30,000	52,687	32,000	32,000
4	*Earnings on Investments*	33,049	15,000	15,000	96,843	50,000	50,000
5	*Other Revenues*	0	0	0	0	0	0
6	Transfer-In Parks & Open Space Fund	250,000	250,000	250,000	250,000	250,000	250,000
7	***Total Revenues and Transfers In***	**$ 2,729,753**	**$ 915,000**	**$ 915,000**	**$ 1,019,530**	**$ 952,000**	**$ 952,000**
	Expenditures by Function						
8	*Personnel*	$ 356,015	$ 721,476	$ 667,585	$ 623,985	$ 656,315	$ 656,315
9	*Supplies*	7,879	5,000	41,600	35,575	5,600	5,600
10	*Controllable Assets*	0	0	0	3,762	0	0
11	*Purchased Services*	40,383	53,000	44,310	46,546	60,000	60,000
12	*Building Materials*	0	0	0	0	0	0
13	*Fixed Charges*	11,958	16,500	38,500	37,217	44,020	44,020
14	*Intergovernmental Support*	0	0	0	0	0	0
15	*Capital*	0	0	550,581	18,800	368,000	368,000
16	*Contingency*	0	50,000	50,000	0	50,000	50,000
17	*Supplemental Appropriation - #2 (4-22-25)*						*360,000*
18	***Total Expenditures and Transfers Out***	**$ 416,235**	**$ 845,976**	**$ 1,392,576**	**$ 765,885**	**$ 1,183,935**	**$ 1,543,935**
19	*Change In Fund Balance*	2,313,518	69,024	(477,576)	253,645	(231,935)	(591,935)
20	***Ending Fund Balance***	**$ 2,313,518**	**$ 2,326,258**	**$ 1,835,942**	**$ 2,567,163**	**$ 1,700,610**	**$ 1,975,228**
	Fund Balance Detail						
21	*Non-spendable Fund Balance*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
22	*Restricted Fund Balance - Required Per Policy*	*170,681*	*81,000*	*81,000*	*81,000*	*81,000*	*81,000*
23	*Restricted Fund Balance - Available*	*2,142,837*	*2,245,258*	*1,754,942*	*2,486,163*	*1,619,610*	*1,894,228*
24	*Committed Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
25	***Ending Fund Balance***	**$ 2,313,518**	**$ 2,326,258**	**$ 1,835,942**	**$ 2,567,163**	**$ 1,700,610**	**$ 1,975,228**

Douglas County Government
Parks and Open Space Sales and Use Tax Fund (Fund 250)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Amended Budget
1	***Beginning Fund Balance***	**$ 33,822,255**	**$ 42,712,949**	**$ 49,512,339**	**$ 49,512,339**	**$ 45,258,195**	**$ 55,751,330**
	Revenues						
2	*Taxes*	$ 18,143,174	$ 18,365,254	$ 18,365,254	$ 18,139,467	$ 18,719,209	$ 18,719,209
3	*Intergovernmental*	0	0	381,060	6,434	0	0
4	*Charges for Services*	61,026	25,000	25,000	0	25,000	25,000
5	*Earnings on Investments*	1,985,141	400,000	400,000	3,003,252	400,000	400,000
6	*Other Revenues*	294,919	85,000	85,000	618,909	85,000	85,000
7	*Transfer In*						
8	*Parks Sales and Use Tax Fund*	5,886,615	0	0	0	0	0
9	*Debt Service*	91,815	0	0	0	0	0
10	*Total Transfers In*	*5,978,430*	*0*	*0*	*0*	*0*	*0*
11	***Total Revenues and Transfers In***	**$ 26,462,690**	**$ 18,875,254**	**$ 19,256,314**	**$ 21,768,061**	**$ 19,229,209**	**$ 19,229,209**
	Expenditures by Function						
12	*Personnel*	$ 982,320	$ 2,545,768	$ 2,545,768	$ 1,942,358	$ 2,380,738	$ 2,380,738
13	*Supplies*	153,828	595,330	595,330	164,221	423,330	423,330
14	*Controllable Assets*	1,166	12,000	12,000	36,168	0	0
15	*Purchased Services*	1,316,542	6,331,394	6,135,977	1,359,883	934,500	934,500
16	*Fixed Charges*	218,797	180,405	180,405	286,385	267,084	267,084
17	*Grants, Contributions, Indemnities*	0	2,810,000	8,310,000	5,500,000	0	0
18	*Intergovernmental Support*	4,105,176	3,678,050	3,678,050	4,332,072	3,748,842	3,748,842
19	*Capital Outlay*	3,707,901	365,000	3,019,225	1,483,297	0	0
20	*Vehicle Replacements*	36,875	210,000	297,681	174,687	0	0
21	*Contingency*	0	100,000	100,000	0	100,000	100,000
22	*Transfers Out:*						
23	*Rueter Hess Recreation Area*	250,000	250,000	250,000	250,000	250,000	250,000
24	*Total Transfers Out*	*250,000*	*250,000*	*250,000*	*250,000*	*250,000*	*250,000*
25	*Encumbrances Re-appropriated (Supplemental #01-25)*						*2,416,228*
26	*Supplemental Appropriation (#02-25 - April 22)*						*1,976,523*
27	***Total Expenditures and Transfers Out***	**$ 10,772,606**	**$ 17,077,947**	**$ 25,124,436**	**$ 15,529,070**	**$ 8,104,494**	**$ 12,497,245**
28	*Change In Fund Balance*	15,690,084	1,797,307	(5,868,122)	6,238,991	11,124,715	6,731,964
29	***Ending Fund Balance***	**$ 49,512,339**	**$ 44,510,256**	**$ 43,644,217**	**$ 55,751,330**	**$ 56,382,910**	**$ 62,483,294**
	Fund Balance Detail						
30	*Non-spendable Fund Balance*	$ 90	$ 0	$ 0	$ 0	$ 0	$ 0
31	*Restricted Fund Balance - Required Per Policy*	*777,783*	*12,061,186*	*2,245,753*	*1,462,109*	*875,449*	*1,131,617*
32	*Restricted Fund Balance - Available*	*48,734,466*	*32,449,070*	*41,398,464*	*54,289,221*	*55,507,461*	*61,351,677*
33	*Committed Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
34	*Assigned Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
35	***Ending Fund Balance***	**$ 49,512,339**	**$ 44,510,256**	**$ 43,644,217**	**$ 55,751,330**	**$ 56,382,910**	**$ 62,483,294**

Douglas County Government
Capital Expenditures Fund (Fund 330)
Fund Summary

		2023 Audited Actuals	2024 Adopted Budget	2024 Amended Budget	2024 Unaudited Actuals	2025 Adopted Budget	2025 Adopted Budget
1	***Beginning Fund Balance***	**$ 5,372,188**	**$ 3,464,000**	**$ 3,904,485**	**$ 3,904,485**	**$ 2,548,556**	**$ 2,837,049**
	Revenues						
2	*Taxes*	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
3	*Other Revenues*	43,212	0	0	26,350	0	0
	Transfers In:						
4	From General Fund	552,162	0	88,000	88,000	0	0
5	*Total Transfers In*	552,162	0	88,000	88,000	0	0
6	*Supplemental Appropriation - #2 (4-22-25)*						*3,300,000*
7	***Total Revenues and Transfers In***	**$ 595,374**	**$ 0**	**$ 88,000**	**$ 114,350**	**$ 0**	**$ 3,300,000**
	Expenditures by Function						
8	*Supplies and Purchased Services*	$267,395	$0	$177,458	$185,691	$0	$0
9	*Controllable Assets*	154,729	367,700	208,198	96,492	421,050	421,050
10	*Building Materials*	0	0	0	282	0	0
11	*Fixed Charges*	370	0	0	0	0	0
12	*Capital Improvements*						
13	Other General Governmental Buildings	391,461	403,000	399,142	379,698	159,900	159,900
14	Fairgrounds Improvements	106,300	68,500	69,625	64,324	197,500	197,500
15	Health & Human Services - Improvements	124,811	0	45,000	44,835	0	0
16	Public Works Facilities - Improvements	134,640	129,000	193,507	189,508	130,000	130,000
17	Miller Building	132,115	0	38,810	38,809	105,000	105,000
18	Park Meadows Ctr. - Improvements	73,000	20,000	19,310	19,310	0	0
19	Wilcox Building - Improvements	130,669	45,000	119,879	129,566	20,000	20,000
20	Historic Preservation Property	456,445	0	0	0	0	0
21	Wilcox Basement Training	91,142	0	0	0	0	0
22	Moore Road Facility	0	0	73,000	33,271	0	0
23	District 8 Capital Improvement	0	620,000	540,000	0	0	0
24	*Total Capital Improvements*	1,640,583	1,285,500	1,498,273	899,320	612,400	612,400
25	*Encumbrances Re-appropriated (Supplemental #01-25)*						*98,307*
26	*Supplemental Appropriation - #2 (4-22-25)*						*2,000,000*
27	***Total Expenditures and Transfers Out***	**$ 2,063,077**	**$ 1,653,200**	**$ 1,883,929**	**$ 1,181,786**	**$ 1,033,450**	**$ 3,131,757**
28	*Change in Fund Balance*	(1,467,703)	(1,653,200)	(1,795,929)	(1,067,436)	(1,033,450)	168,243
29	**Ending Fund Balance**	**$ 3,904,485**	**$ 1,810,800**	**$ 2,108,556**	**$ 2,837,049**	**$ 1,515,106**	**$ 3,005,292**
	Fund Balance Detail						
30	*Non-spendable Fund Balance*	*$ 0*	*$ 0*	*$ 0*	*$ 0*	*$ 0*	*$ 0*
31	*Restricted Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
32	*Committed Fund Balance*	*0*	*0*	*0*	*0*	*0*	*0*
33	*Assigned Fund Balance - Required Per Policy*	*50,000*	*50,000*	*50,000*	*1,083,450*	*50,000*	*50,000*
34	*Assigned Fund Balance - Road & Bridge*	*1,800,000*	*1,380,000*	*1,380,000*	*1,280,000*	*1,465,106*	*1,380,000*
35	*Assigned Fund Balance - Available*	*2,054,485*	*380,800*	*678,556*	*473,599*	*0*	*1,575,292*
36	***Ending Fund Balance***	**$ 3,904,485**	**$ 1,810,800**	**$ 2,108,556**	**$ 2,837,049**	**$ 1,515,106**	**$ 3,005,292**