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Grandview Reserve Phase 2
Preliminary Drainage Report

July 2024

HR Green Project No: 201662.202

Prepared For:

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EDARP Filing No.:

PUDSP236

Engineer's Statement:

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

_____ _____

Ken Huhn, P.E. Date

State of Colorado No. 54022

For and on behalf of HR Green Development, LLC

Owner/Developer's Statement:

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

By: _____ _____

Authorized Signature Date

Address: D.R. Horton

9555 S. Kingston Court

Englewood, CO

El Paso County Statement

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

_____

Joshua Palmer, P.E. Date

County Engineer/ECM Administrator

Conditions:

Table of Contents

Table of Contents 2
I. General Purpose, Location and Description 3
a. Purpose 3
b. Location 3
c. Description of Property 3
d. Floodplain Statement 4
II. Drainage Design Criteria 4
a. Drainage Criteria 4
III. Drainage Basins and Subbasins 5
a. Major Basin Description 5
b. Existing Subbasin Description 5
c. Proposed Subbasin Description 6
IV. Drainage Facility Design 10
a. General Concept 10
b. Water Quality & Detention 10
c. Inspection and Maintenance 11
V. Wetlands Mitigation 11
VI. Four Step Method to Minimize Adverse Impacts of Urbanization 11
VII. Drainage and Bridge Fees 12
VIII. Opinion of Probable Cost 12
IX. Hydraulic Grade Line Analysis 12
X. Summary 12
XI. Drawings 12
XII. References 13

Appendices

A. Vicinity Map, FEMA Map, NRCS Soil Survey
B. Hydrologic Analysis
C. Hydraulic Analysis
D. Water Quality and Detention Calculations
E. Reference Material
F. Drainage Maps

I. General Purpose, Location and Description

a. Purpose

The purpose of this Preliminary Drainage Report (PDR) for the Grandview Reserve Subdivision Phase 2 is to describe the onsite and offsite drainage patterns, size drainage infrastructure to safely capture and convey developed runoff to water quality and detention facilities, and to safely route detained stormwater to adequate outfalls.

b. Location

The Grandview Reserve Phase 2 site is located in unincorporated El Paso County, Colorado. The Phase 2 location (referred to as the site herein) is located northwest of Grandview Reserve Filings 1-4 and MST2, and southeast of the intersection of Eastonville Road & Rex Road.

The site lies within a tract of land within Sections 21 and 28, Township 12 South, Range 64 West of the 6th Principal Meridian, in El Paso County, State of Colorado. A Vicinity Map is included in **Appendix A**.

The site is bound by a segment of Rex Road to be developed with this project to the northeast and undeveloped land that has historically been used as ranching lands. The east of the site will be a future phase of the Grandview Reserve Subdivision. The south and west of the site is bound by Grandview Reserve Filings 1-4 and MST2. A vicinity map is presented in Appendix A.

The Gieck Ranch Tributary #2 “MST2” is a part of the Gieck Ranch Drainage Basin tributary to Black Squirrel Creek. The channel draining through the site is an ongoing project with associated CLOMR Report (PCD File No. is CDR228 with El Paso County). The Grandview Reserve improvements will follow any requirements of that report. There is another floodplain channel to the north of Rex Road that will not be disturbed by this phase of development and studied in a future project.

The existing surrounding platted developments include the Grandview Reserve Phase 1 Filings 1-4, and the Meridian Ranch Subdivision that is west of the site, on the west side of Eastonville Road.

c. Description of Property

The site is approximately 68.61 acres of proposed residential development with associated right of way, open space tracts, public improvements, and stormwater treatment infrastructure.

The existing groundcover and topography of the site is native grasses/weeds and exposed soil on gently rolling hillside with slopes ranging from 2% to 4%.

Per a NRCS soil survey, the site is made up of Type A Columbine gravelly sandy loam. Soils were hydraulically analyzed as 90% Type B to account for being disturbed in the proposed condition. The NRCS soil survey is presented in **Appendix A**.

There is one major drainageway through the site. The Gieck Ranch Tributary #2 (MST2 as referenced in the MDDP) traverses the site along its southwestern boundary and forms the southwest boundary for Phase 2. This drainageway generally flows from the northwest to the southeast towards Highway 24, before crossing through existing drainage infrastructure. The CLOMR report by HR Green for MST2 is ongoing and pending approval for this channel. Refer to the CLOMR report included in **Appendix E** for more specific design information regarding the MST2 channel. A tributary referred to as the East Fork Tributary (EFT) in the MDDP

traverses the site along its northeastern boundary and forms the northeast boundary for Phase 2 along Rex Road. The initial analysis of this drainage way has been performed by HR Green in conjunction with Phase 2. The analysis delineated the 100-yr floodplain and ensures the construction of Rex Road will not impact the floodplain. This channel will not be disturbed by this phase of development. A CLOMR report is not required by the County at this time.

There are no known irrigation facilities in the area.

There are no known existing utilities or other encumbrances on site.

d. Floodplain Statement

Based on FEMA Firm map 08041C0552G & 08041C0556G (eff. 12/7/2018), the site contains flood Zone A through the site which is part of the Gieck Ranch Tributary #2. See FEMA Firm Maps in **Appendix A**. This floodplain is being studied and revised in the Gieck Ranch Tributary # 2 CLOMR report. A copy of the current revised floodplain map is also provided in **Appendix A**. There is a Zone A floodplain northeast of the site which will not be altered with this project's improvements.

II. Drainage Design Criteria

a. Drainage Criteria

Hydrologic data and calculations were performed using Drainage Criteria Manual Volume 1 of El Paso County (EPCDCM), with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs Drainage Criteria Manual (CCSDCM), May 2014 revised January 2021.

Onsite drainage improvements are designed for the 5-year storm (minor event) and 100-year storm (major event) using rainfall values from the NOAA Atlas 14 Point Precipitation Frequency Data Server. Runoff was calculated per CCSDCM Section 6.3.0 - Rational Method. Private, full spectrum pond design was completed using the latest version of Mile High Flood District's (MHFD) UD-Detention per CCSDCM Section 13.3.2.1 – Private, full spectrum Detention. Detention pond allowable release rate will be limited to less than historic rates.

Rainfall Depths per NOAA Atlas 14		
Return Period (yr)	5	100
1-hr Rainfall Depth (in)	1.21	2.49

Storm sewer and inlet sizing shown is preliminary at this stage of the project. Calculations for the storm sewer system on site will be provided with the Final Drainage Report (FDR) for the project. The sizing methodology that will be used is per the methods described in EPCDCM Section III Chapter 7 – Street Drainage and Storm Water Inlets. Storm sewer sizing was performed per the methods described in EPCDCM Section III Chapter 8 – Storm Drains and Appurtenances.

This preliminary drainage report follows any recommendations and is in conformance with the previously approved MDDP for the site prepared by HR Green, "*Grandview Reserve Master Development Drainage Plan",* HR Green, August 2021 (MDDP).

III. Drainage Basins and Subbasins

a. Major Basin Description

The site is located within the Gieck Ranch Drainage Basin. The site's drainage characteristics were previously studied in the following reports:

1. "Gieck Ranch Drainage Basin Planning Study" prepared by Drexel, Barrel & Co, February 2010.
2. "Grandview Reserve Master Development Drainage Plan" prepared by HR Green, August 2021.
3. "Grandview Reserve Filing No. 1 Preliminary Drainage Report" prepared by Galloway & Company, Inc., September 2022.
4. "Grandview Reserve CLOMR REPORT" prepared by HR Green, November 22 2023

Gieck Ranch Drainage Basin is a 22.05 square mile watershed located in El Paso County, Colorado. Gieck Ranch Drainage Basin is tributary to Black Squirrel Creek which drains to the Arkansas River. The majority of the basin is undeveloped and rolling range land of 2% - 4% slopes.

The Grandview Reserve MDDP divided the site into 8 major drainage basins (A-H), where each basin is tributary to a full spectrum detention pond facility. The Grandview Reserve Phase 2 improvements are located in subbasins B3 and C1 of the MDDP.

There are no known existing irrigation facilities or other obstructions that could influence or will be influenced by local drainage characteristics. Proposed local drainage characteristics will continue to follow historic patterns. Offsite flows entering Phase 2 from Phase 1 are accounted for in the drainage calculations.

b. Existing Subbasin Description

The Grandview Reserve Phase 2 site drains from the northwest to the southeast slopes ranging from 2% - 4%. The site has historically drained into the Gieck Ranch Tributary #2 (the existing MST2).

The existing subbasins for the Grandview Reserve Phase 2 site were studied the approved MDDP for Grandview Reserve. This site is located within subbasins B3 and C1 of this report and are described as follows.

"Subbasin B3 is located between MS and EF and to the northeast of east of basin B2. The existing MST2 tributary runs through the basin. The site drains towards the southeast and towards Detention Pond B. Current planning documents call for high, medium-high, and medium density dwelling units along with a pocket park. The basin is 118.90 acres, with a composite impervious value of 49.42% and runoff rates for the 5 and 100 year of 92.76 cfs and 295.27 cfs respectively."

"Subbasin C1 is located to the northeast of east of basin B1 and the existing MST2 tributary runs through the middle of the basin. The basin drains towards the southeast and towards Detention Pond C. Current planning documents call for an institutional parcel, medium and high-density dwelling units and a pocket park. The basin is 77.83 acres, with a composite impervious value of 51.20% and runoff rates for the 5 and 100-year of 77.99 cfs and 238.03 cfs respectively."

A copy of the referenced pages of the approved MDDP has been included in **Appendix E** of this report. The proposed drainage conditions for this development will follow historic drainage patterns as described in the MDDP.

c. Proposed Subbasin Description

Description of Proposed Project

The proposed drainage conditions for the site generally follow historic drainage patterns. The site drains from the northwest to the southeast at slopes between 0.6% - 4%, into proposed public storm sewer systems via sheetflow/curb & gutter/channel flow which drain to proposed private extended detention basins for treatment and flood attenuation. The northwestern half of the site will drain to and be treated by "Pond A", and the southeastern half of the site will drain to and be treated by "Pond B". Both of these detention ponds will outfall into the rerouted channel MST2. Drainage from both ponds has been accounted for in the channel re-alignment design and is detailed in the CLOMR report.

There is no anticipated offsite flow that will enter the site.

Subbasins Tributary to and Treated by Pond A

Basin A1-A is 3.22 acres of landscaped area, townhome lot area, and the proposed full spectrum detention facility Pond A. Stormwater (Q_5 = 2.2 cfs Q_{100} = 8.5 cfs) is conveyed via grass swales in Tract A to the private detention facility, Pond A at DP16.1-A.

Basin A2-A is 1.23 acres of landscaped area and townhome lot area. Stormwater (Q_5 = 2.2 cfs Q_{100} = 5.2 cfs) is conveyed via grass swales in a rear yard swale to the public 12" RCP & open grate sump inlet at DP10-A.

Basin B1-A is 0.26 acres of right-of-way (ROW) area, asphalt parking lot, and townhome lot area. Stormwater (Q_5 = 0.8 cfs Q_{100} = 1.6 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP14-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin B2-A is 1.02 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 2.6 cfs Q_{100} = 5.3 cfs) is conveyed via curb and gutter in the public right-of-way to DP14-A, where flows combine with those of subbasin B1-A, B3-A, and B4-A. Runoff then follows patterns of subbasin B1-A and drains to a public type R sump inlet at DP14-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin B3-A is 0.89 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 2.8 cfs Q_{100} = 5.5 cfs) is conveyed via curb and gutter in the public right-of-way to DP19-A, where flows combine with those of subbasin B1-A, B2-A, and B4-A. Runoff then follows patterns of subbasin B1-A and drains to a public type R inlet at DP14-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin B4-A is 3. 67 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 8.2 cfs Q_{100} = 17.8 cfs) is conveyed via curb and gutter in the public right-of-way to DP9-A, where flows combine with those of DP8-A and are captured by a public type R inlet at DP14-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin C1-A is 0.63 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 1.6 cfs Q_{100} = 3.4 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP15-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin D1-A is 0.70 acres of landscaped area, asphalt parking lot, and townhome lot area. Stormwater (Q_5 = 1.3 cfs Q_{100} = 3.4 cfs) is conveyed via a swale to an open grate sump inlet at DP13-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin E1-A is 0.73 acres of right-of-way (ROW) area and landscaped area. Stormwater (Q_5 = 1.7 cfs Q_{100} = 3.7 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP8-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin E2-A is 2.56 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 6.2 cfs Q_{100} = 12.9 cfs) is conveyed via curb and gutter in the public right-of-way to DP9-A, where flows drain to a public type R sump inlet at DP14-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin E3-A is 0.97 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 2.4 cfs Q_{100} = 4.9 cfs) is conveyed via curb and gutter in the public right-of-way to DP12-A, where flows combine with those of subbasin E4-A and are captured by a Type R sump inlet. Flows are ultimately conveyed to Pond A via the proposed public storm sewer network.

Basin E4-A is 1.02 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 2.5 cfs Q_{100} = 5.2 cfs) is conveyed via curb and gutter in the public right-of-way to DP11-A, where flows combine with those of subbasin E3-A and are captured by a Type R sump inlet. Flows are ultimately conveyed to Pond A via the proposed public storm sewer network.

Basin F1-A is 0.46 acres of right-of-way (ROW) area, asphalt parking lot, landscaped area, and townhome lot area. Stormwater (Q_5 = 1.2 cfs Q_{100} = 2.5 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP7-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin H1-A is 2.25 acres of right-of-way (ROW) area, landscaped area, and a small amount of townhome lot area. Stormwater (Q_5 = 3.4 cfs Q_{100} = 8.4 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R inlet at DP5-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin H2-A is 1.94 acres of right-of-way (ROW) area, asphalt parking lot, landscaped area, and townhome lot area. Stormwater (Q_5 = 4.0 cfs Q_{100} = 8.7 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP6-A, combining with DP6-A and ultimately draining to Pond A via the proposed public storm sewer network.

Basin H3-A is 2.80 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 6.5 cfs Q_{100} = 13.5 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP6-A, combining with DP5-A and ultimately draining to Pond A via the proposed public storm sewer network.

Basin H4-A is 3.87 acres of right-of-way (ROW) area, landscaped area, and townhome lot area. Stormwater (Q_5 = 6.4 cfs Q_{100} = 14.9 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP2-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin J1-A is 1.50 acres of landscaped area, and townhome lot area. Stormwater (Q_5 = 1.6 cfs Q_{100} = 4.7 cfs) is conveyed via grass swale to an open grate inlet at DP4-A, ultimately draining to Pond A via the proposed public storm sewer network.

Basin K1-A is 1.75 acres of right-of-way (ROW) area, and landscaped area. Stormwater (Q_5 = 4.3 cfs Q_{100} = 8.8 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R inlet at DP1-A, and ultimately draining to Pond A via the proposed public storm sewer network.

Basin EA6 is 0.70 acres of right-of-way (ROW) area, and landscaped area. Stormwater (Q_5 = 3.2 cfs Q_{100} = 5.7 cfs) is conveyed via curb and gutter into subbasin K1-A at DP 35.1. Runoff continues to drain via curb and

gutter in the public right-of-way to a public type R inlet at DP1-A, and ultimately draining to Pond A via the proposed public storm sewer network. This drainage basin is per the Grandview Reserve Filing 1 PDR.

Basin EA7 is 0.65 acres of right-of-way (ROW) area, and landscaped area. Stormwater (Q_5 = 2.6 cfs Q_{100} = 4.8 cfs) is conveyed via curb and gutter into subbasin H5-A at DP 35.2. Runoff continues to drain via curb and gutter in the public right-of-way to a public type R inlet at DP2-A, and ultimately draining to Pond A via the proposed public storm sewer network. This drainage basin is per the Grandview Reserve Filing 1 PDR.

Subbasins Tributary to and Treated by Pond B

Basin A-B is 6.56 acres of landscaped area, duplex lot area, townhome lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 8.5 cfs Q_{100} = 21.1 cfs) is conveyed via curb and gutter in the public right-of-way to a type R at grade inlet at DP4-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin B-B is 3.55 acres of landscaped area and duplex lot area. Stormwater (Q_5 = 2.9 cfs Q_{100} = 9.4 cfs) is conveyed via grassed swale to a private open grate inlet at DP11-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin C-B is 1.53 acres of landscaped area, duplex lot area, townhome lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 2.9 cfs Q_{100} = 6.5 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R at grade inlet at DP5-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin D-B is 1.03 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 1.7 cfs Q_{100} = 4.1 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP2-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin E-B is 1.03 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 0.6 cfs Q_{100} = 2.7 cfs) is conveyed via swale to a private open grate sump inlet at DP19-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin F-B is 1.45 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 1.3 cfs Q_{100} = 4.2 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R at grade inlet at DP5-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin G-B is 2.15 acres of landscaped area and right-of-way (ROW) area. Stormwater (Q_5 = 4.0 cfs Q_{100} = 8.7 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R inlet at DP8-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin H-B is 4.12 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 5.1 cfs Q_{100} = 12.9 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R inlet at DP9-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin I-B is 0.76 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 1.5 cfs Q_{100} = 3.3 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R at grade inlet at DP12-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin J-B is 6.81 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 11.9 cfs Q_{100} = 26.2 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP13-B, and ultimately draining to Pond B via the proposed public storm sewer network.

Basin K-B is 1.12 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 2.1 cfs Q_{100} = 4.7 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R at grade inlet at DP1-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin L-B is 1.89 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 1.5 cfs Q_{100} = 5.3 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP13-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin M-B is 1.46 acres of landscaped area, duplex lot area, and right-of-way (ROW) area. Stormwater (Q_5 = 2.7 cfs Q_{100} = 5.9 cfs) is conveyed via curb and gutter in the public right-of-way to a public type R sump inlet at DP15-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin N-B is 3.00 acres of landscaped area, and duplex lot area. Stormwater (Q_5 = 1.6 cfs Q_{100} = 7.0 cfs) is conveyed via rear yard swales to a private open grate sump inlet at DP17-B, ultimately draining to Pond B via the proposed public storm sewer network.

Basin O-B is 1.59 acres of landscaped area which contains the proposed full spectrum detention facility Pond B. Stormwater (Q_5 = 0.6 cfs Q_{100} = 4.2 cfs) is conveyed via sheet flow to DP21-B in Pond B.

IV. Drainage Facility Design

a. General Concept

The proposed improvements will generally follow historic drainage patterns. Inlets will be placed at low points and in the public ROW where the street capacity would be exceeded. Stormwater from the development will be routed via a proposed public storm sewer system to full spectrum detention ponds which release runoff into MST2. All ponds and water quality features will discharge the design storms at less than rates specified in the Grandview reserve MDDP. Per DCM Section 2.5.3., release rates will not exceed historic runoff rates.

b. Water Quality & Detention

The proposed detention facility release rates for the minor and major storms have been taken from the approved Grandview Reserve MDDP. The Grandview Reserve Phase 2 project limits make up approximately 20.98 acres of subbasin C1 in the MDDP, and 41.54 acres of subbasin B3 in the MDDP. From the MDDP subbasin C1 was anticipated to drain to a future detention pond “C”, and B3 to a future detention pond “B”. Both of these ponds are planned to outfall into the MST2. The Grandview Reserve improvements propose two additional private full spectrum detention ponds at locations within subbasin C1 and B3 that outfall into the MST2. These detention ponds will provide water quality and stormwater detention for a portion of these two basins. The required minor (5 year storm) and major (100 year storm) storm release rates from these two ponds has been calculated as a portion of the total release rate from pond “B” and “C” per the MDDP based on the acreage of the site within these basins. The total tributary area to pond “C” in the MDDP is 77.63 acres and the minor and major release rates are 1.5 cfs & 120.2 cfs. Approximately 27% of the tributary area to pond “C” in the MDDP is comprised of phase two improvements that will drain to a separate detention pond on the phase 2 site, and outfall into the MST2. The calculated allowable release rate for the pond “C” portion of the site is 0.4 cfs & 32.5 cfs as a percentage of the total release rate. The total tributary area to pond “B” in the MDDP is 180.79 acres and the minor and major release rates are 2.6 cfs & 165.4 cfs. Approximately 23% of the tributary area to pond “B” in the MDDP is made up of phase two improvements that will drain to a separate detention pond on the phase 2 site. The calculated allowable release rate for the pond “B” portion of the site is 0.6 cfs & 38.0 cfs as a percentage of the total release rate.

The total allowable release rates for both proposed Ponds A & B on the Grandview Reserve Phase 2 Site is the sum of these two release rates. The result is a total allowable minor storm release rate of 1.0 cfs and an allowable major storm release of 70.5 cfs from the phase 2 improvements into the MST2 channel. These rates have been accounted for by the MDDP for release into the MST2.

The proposed release rate in the minor and major storm from the Grandview Reserve Pond A is 0.5 cfs and 11.5 cfs. The proposed release rate in the minor and major storm from the Grandview Reserve Pond B is 0.5 cfs and 18.2 cfs. The total release rate then from the Grandview Reserve Phase 2 site is 1.0 cfs in the minor storm and 19.7 cfs in the major storm. Both release rates in the minor and major storm events are less than or equal to the pre-development rates for the Grandview Reserve Phase 2 project.

Pond A (Full Spectrum Detention Basin)

Water quality and detention for Basins A-A through K-A is provided in Pond A; a private, full spectrum extended detention basin within Phase 2 of Grandview Reserve. A total of 31.95 acres at 49% composite imperviousness will be detained. The pond has been sized to provide water quality treatment, and detention for up to the 100-yr storm volume to be released at or below historic rates. The WQCV is 0.542 ac-ft, the EURV is 1.141 ac-ft, and the 100-year detention volume is 1.219 ac-ft. The WQCV, EURV and 100-year

storms are released in 41, 71 and 71 hours, respectively. A forebay is located at the outfall into the pond and a 4.0' trickle channel conveys flow towards the outlet structure. A 15' access and maintenance road is provided to the bottom of the pond to facilitate maintenance of the pond facilities. A 50' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Geick Ranch Tributary #2.

Pond B (Full Spectrum Detention Basin)

Water quality and detention for Basins A-B through O-B is provided in Pond B; a private, full spectrum extended detention basin within Phase 2 of Grandview Reserve. A total of 38.19 acres at 43% composite imperviousness will be detained. The pond has been sized to provide water quality treatment, and detention for up to the 100-yr storm volume to be released at or below historic rates. The WQCV is 0.597 ac-ft, the EURV is 1.410 ac-ft, and the 100-year detention volume is 1.410 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 72 and 72 hours, respectively. A forebay is located at the outfall into the pond and a 4.0' trickle channel conveys flow towards the outlet structure. A 15' access and maintenance road is provided to the bottom of the pond to facilitate maintenance of the pond facilities. A 26' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Geick Ranch Tributary #2.

c. Channel Improvements

The Gieck Ranch Tributary #2 is proposed to be rerouted. As part of this rerouting of the channel, offsite upstream tributary flows will be captured upstream from the proposed Rex Road extension and be conveyed via culvert to the rerouted channel along the Grandview Reserve Phase 2 western boundary. An analysis has been done for the channel with both existing and future condition flows as described within the Grandview Reserve CLOMR Report, HR Green; September 2021; revised January 2022 (CLOMR). Both scenarios, throughout the channel fall within the channel stability criteria. Channel improvement construction plans have been submitted to El Paso County for review as a separate project (#CDR228).

d. Inspection and Maintenance

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

All private detention ponds are to be owned and maintained by the Grandview Reserve Metropolitan District NO. 2 (DISTRICT), once established, unless an agreement is reached stating otherwise. Maintenance access for all full spectrum detention facilities will be provided from public Right-of-Way. Maintenance access for the drainageways will be provided through the proposed tracts.

V. Wetlands Mitigation

There is one existing wetlands on site associated with the Gieck Ranch Tributary #2. The wetlands are contained within the existing channel and classified as non-jurisdictional. The wetlands USACE determination will be provided with the Grandview Reserve CLOMR Report, HR Green; April 2022, which can be found in **Appendix E**. Wetlands maintenance will be the responsibility of the Grandview Reserve Metropolitan District No. 2.

VI. Four Step Method to Minimize Adverse Impacts of Urbanization

Step 1 – Reducing Runoff Volumes: Low impact development (LID) practices are utilized to reduce runoff at the source. In general, stormwater discharges are routed across pervious areas prior to capture in storm sewer. This practice promotes infiltration and reduces peak runoff rates. Rear and side yard swales are also being utilized in the design to promote infiltration from individual lot impervious areas. The Impervious Reduction Factor (IRF) method will be used in the final design and calculations provided with the FDR.

Step 2 – Treat and slowly release the WQCV: This step utilizes full spectrum water quality and detention to capture the WQCV and slowly release runoff from the site. Onsite full spectrum detention pond provides water quality treatment for the site. The WQCV is released over a period of 40 hours while the EURV is released over a period of 68-72 hours.

Step 3 – Stabilize stream channels: This step establishes practices to stabilize drainageways and provide scour protection at stormwater outfalls. Erosion protection is provided at all concentrated stormwater discharge points in the form of riprap pads.

Step 4 – Consider the need for source controls: No industrial or commercial uses are proposed within this development and therefore no source controls are proposed.

VII. Drainage and Bridge Fees

Gieck Ranch drainage basin has not been established as a fee basin within El Paso County. Therefore, no drainage basin fees are due at time of platting.

VIII. Opinion of Probable Cost

An engineer's opinion of probable cost will be provided with the Final Drainage Report (FDR) for the site.

IX. Hydraulic Grade Line Analysis

Hydraulic grade line analysis and final pipe sizes will be provided with the FDR for the site.

X. Summary

The Grandview Reserve Phase 2 site lies within the Gieck Ranch Drainage Basin. Water quality and detention for the site is provided in full spectrum water quality and detention ponds. There is one major drainageway that traverses the site: Gieck Ranch Tributary #2. The water quality and detention features ponds will be maintained by the Grandview Reserve Metropolitan District No. 2 (DISTRICT). All drainage facilities were sized per the El Paso County Drainage Criteria Manuals.

The development of this project will not adversely affect adjacent or downstream properties.

XI. Drawings

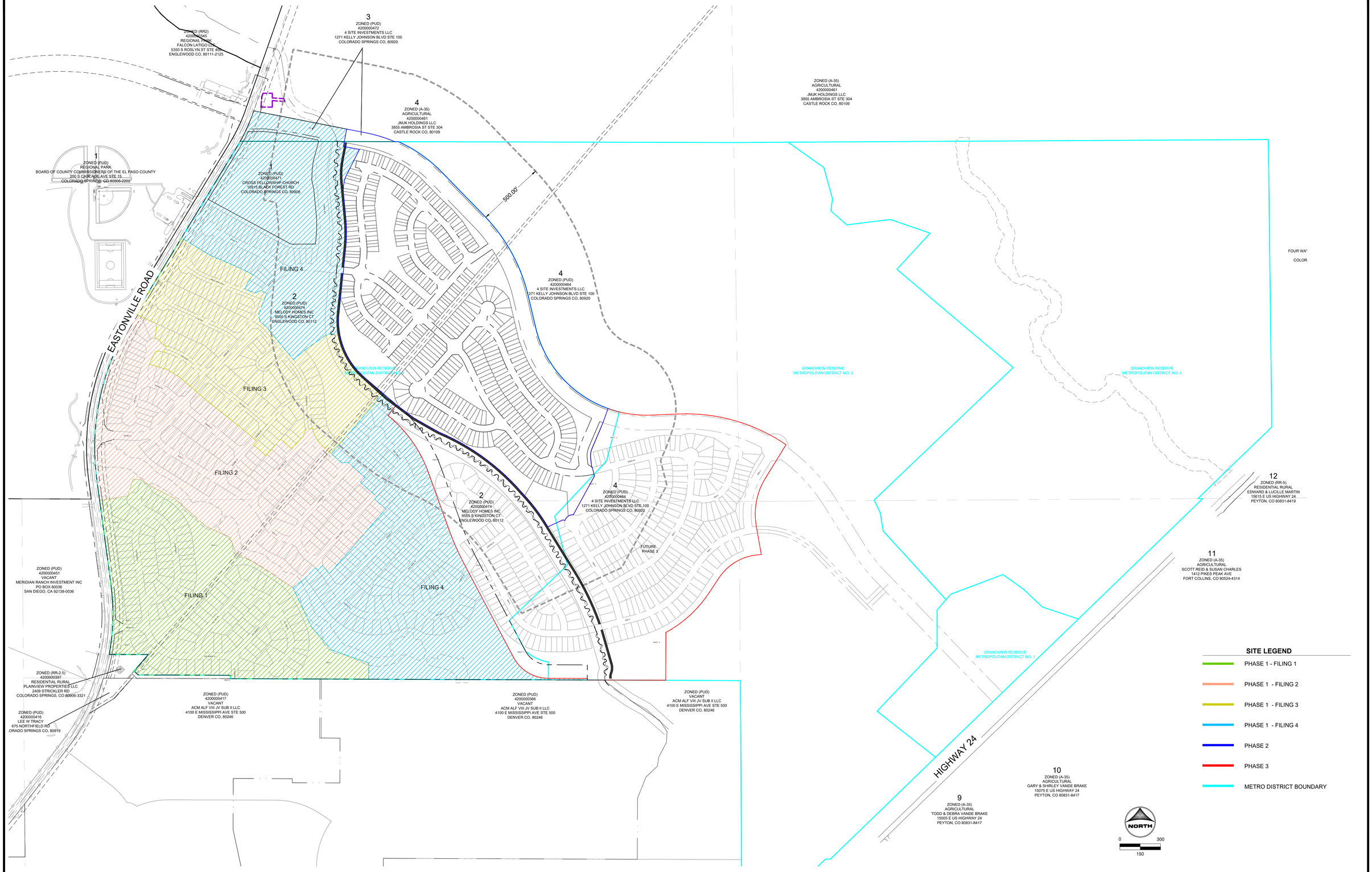
Refer to the appendices for vicinity and drainage basin maps.

XII. References

1. City of Colorado Springs – Drainage Criteria Manual, May 2014, Revised January 2021.
2. Drainage Criteria Manual of El Paso, Colorado, October 2018.
3. Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018.
4. “Gieck Ranch Drainage Basin Planning Study” prepared by Drexel, Barrel & Co, February 2010.
5. “Grandview Reserve Master Development Drainage Plan” prepared by HR Green, August 2021.
6. “Grandview Reserve Filing No. 1 Preliminary Drainage Report” prepared by Galloway & Company, Inc., September 2022.
7. “Grandview Reserve CLOMR REPORT” prepared by HR Green, March 2023

APPENDIX A – VICINITY MAP, PHOTOS, SOIL MAP, FEMA MAP

HERGER, DANIEL, 12/15/2023 9:06 AM



DRAWN BY:	DLH	JOB DATE:	----
APPROVED:	KMH	JOB NUMBER:	201662.2
CAD DATE:	12/15/2023		
CAD FILE:	J:\2020\201662\CAD\Dwgs\C\PUD_Phase_2_662.202\Exhibit\Vicinity_Map		

BAR IS ONE INCH ON OFFICIAL DRAWINGS.
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PKWY SUITE 230
COLORADO SPRINGS CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

GRANDVIEW RESERVE - PHASE 2
D.R. HORTON
EL PASO COUNTY, CO

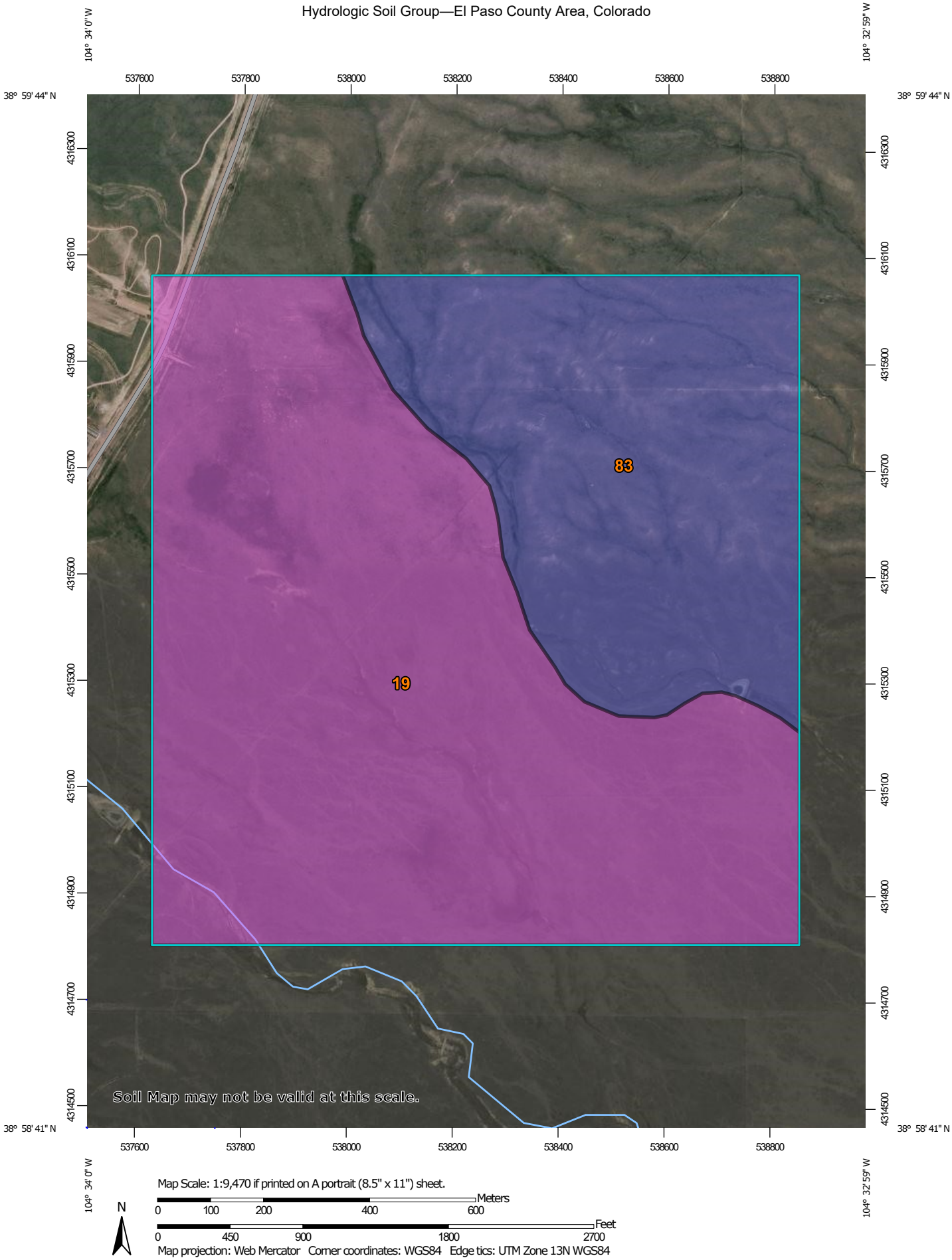
D·R·HORTON America's Builder

GRANDVIEW PHASE 2
VICINITY MAP

SHEET
MAP

1

HR GREEN Xrefs: xgl-1-arch dh01_PH2_PUD; xv-row-662; xv-row-F4; xc-row-F3; xc-row-F2; xc-row-F1-662.10; xc-row_PH2; 01-XC-channel; xc-row_PH3; xc-row_662.09; Eastonville; xv-dsgn_662; xc-filing-bndys


104° 34' 0" W
104° 32' 59" W
38° 59' 44" N
38° 58' 41" N
537600
537800
538000
538200
538400
538600
538800
4316300
4316100
4315900
4315700
4315500
4315300
4315100
4314900
4314700
4314500
83
19
Soil Map may not be valid at this scale.
Map Scale: 1:9,470 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 450 900 1800 2700
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022

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

Date(s) aerial images were photographed: Sep 11, 2018—Jun 12, 2021

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	254.0	66.5%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	127.8	33.5%
Totals for Area of Interest			**381.8**	**100.0%**

Description

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

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

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

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

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

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

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

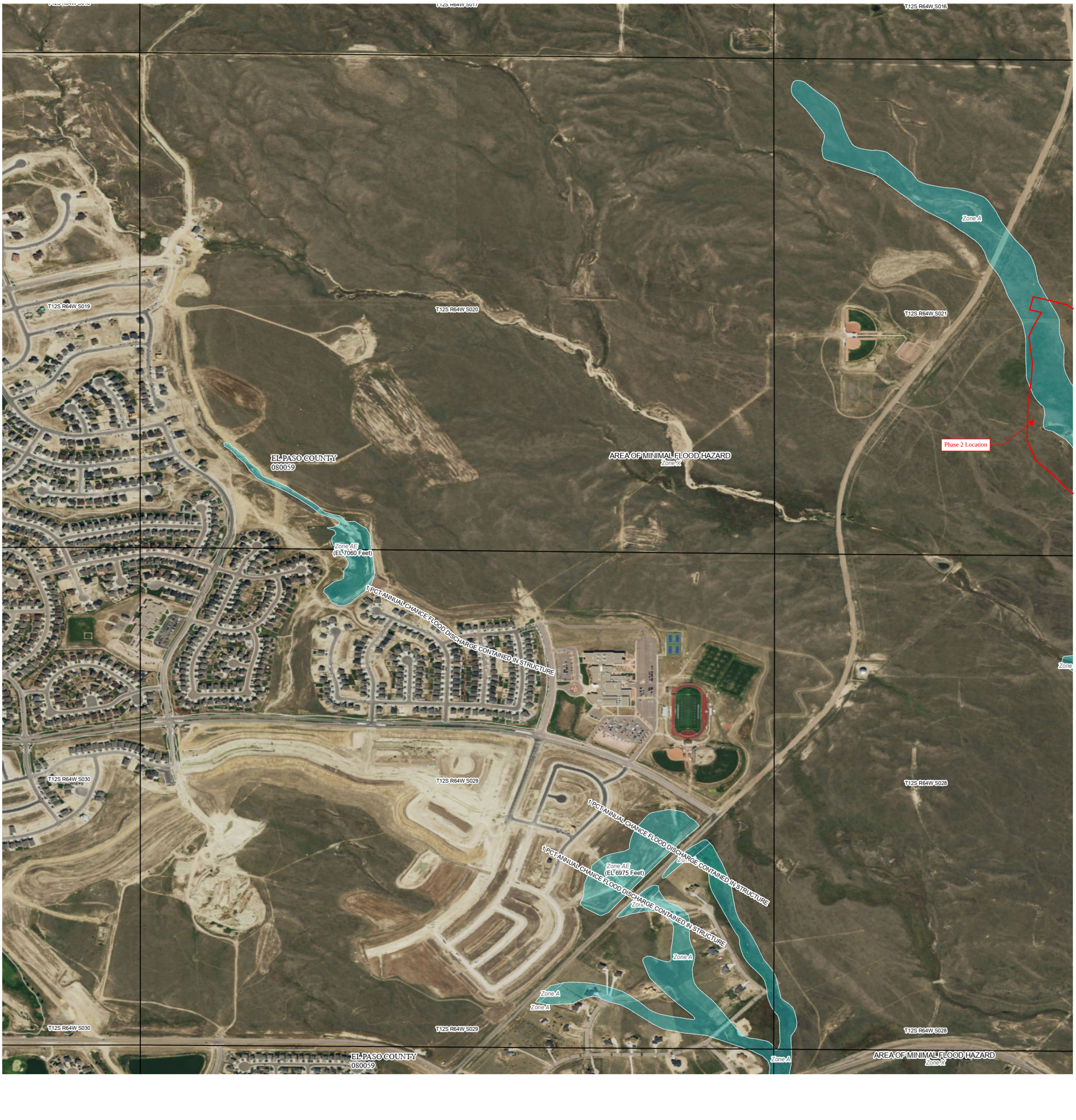
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

104°35'37.96"W 39°0'6.61"N



104°33'44.61"W 38°58'N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to 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.

Basemap information shown on this FIRM was provided in digital format by the United States Geological Survey (USGS). The basemap shown is the USGS National Map: Orthoimagery. Last refreshed October, 2020.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **12/14/2023 3:20 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 500 feet 1:6,000

0 250 500 1,000 1,500 2,000 Feet

0 50 100 200 300 400 Meters

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

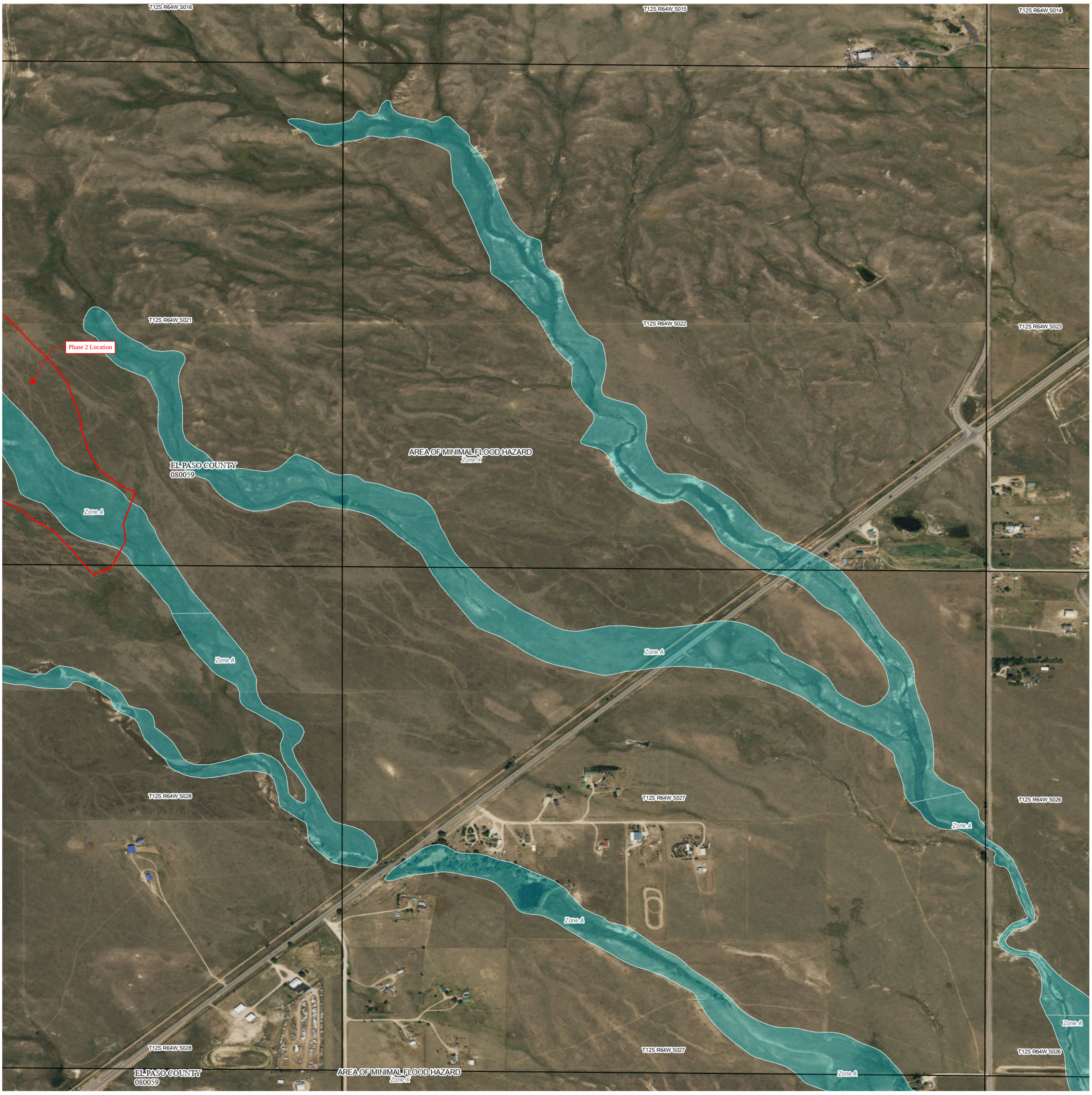
PANEL **552** OF **1275**

Panel Contains:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY	080059	0552

MAP NUMBER
08041C0552G
EFFECTIVE DATE
December 07, 2018

104°33'45.46"W 39°0'6.61"N



104°31'52.11"W 38°58'N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR DRAFT FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

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- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

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- 17.5 Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

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Basemap information shown on this FIRM was provided in digital format by the United States Geological Survey (USGS). The basemap shown is the USGS National Map: Orthoimagery. Last refreshed October, 2020.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **12/14/2023 3:22 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: No elevation features on this FIRM
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 500 feet 1:6,000

0 250 500 1,000 1,500 2,000 Feet

0 50 100 200 300 400 Meters

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

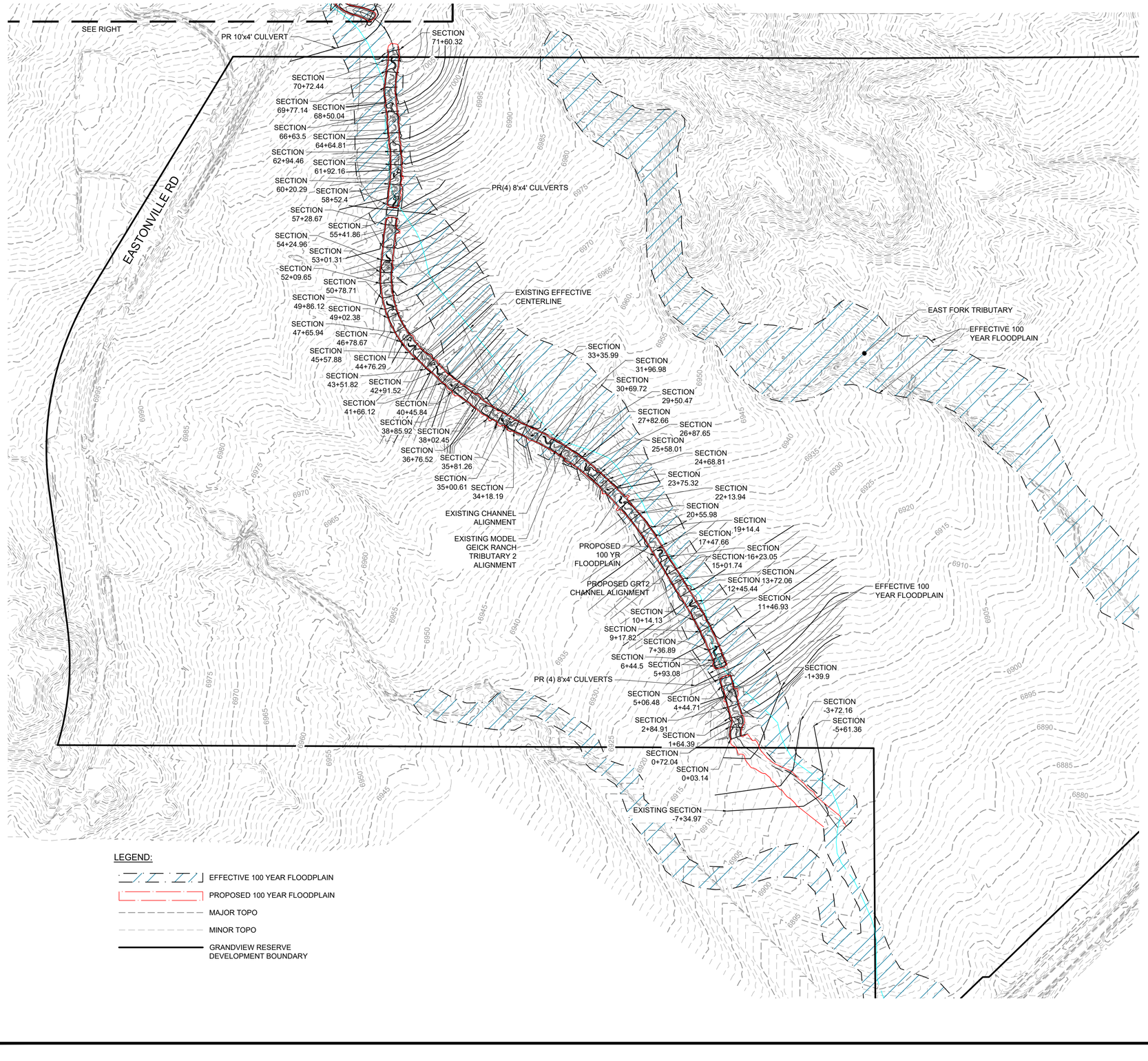
PANEL **556** OF **1275**

Panel Contains:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY	080059	0556

MAP NUMBER
08041C0556G
EFFECTIVE DATE
December 07, 2018

JONES, MATT, 11/30/2023 5:47 PM



LEGEND:

- EFFECTIVE 100 YEAR FLOODPLAIN
- PROPOSED 100 YEAR FLOODPLAIN
- MAJOR TOPO
- MINOR TOPO
- GRANDVIEW RESERVE DEVELOPMENT BOUNDARY

COLORADO LICENSED
GREGORY L. PAYNE
37081
11-29-2023
PROFESSIONAL ENGINEER

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.

   NAVD88

NORTH
0 300
150

HRGreen

Job No.:	201662
Prepared By:	SJF
Date:	11/30/2023

FLOODPLAIN EXHIBIT

FIG.2

HRGreen DRAWING PATH:\\hrgreen.com\HRG\Data\2020\201662.03\CAD\Dwgs_Exhibits\MT-2_Form_2_Part_C_TOPO.dwg

APPENDIX B – HYDROLOGIC CALCULATIONS

NOAA Atlas 14, Volume 8, Version 2
Location name: Peyton, Colorado, USA*
Latitude: 38.9877°, Longitude: -104.5596°
Elevation: 6971 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.239** (0.189-0.304)	**0.291** (0.230-0.371)	**0.382** (0.300-0.487)	**0.461** (0.360-0.591)	**0.576** (0.438-0.771)	**0.670** (0.497-0.906)	**0.769** (0.552-1.06)	**0.874** (0.602-1.24)	**1.02** (0.675-1.48)	**1.14** (0.731-1.67)
10-min	**0.350** (0.276-0.446)	**0.427** (0.337-0.544)	**0.559** (0.439-0.714)	**0.675** (0.528-0.866)	**0.844** (0.642-1.13)	**0.982** (0.728-1.33)	**1.13** (0.808-1.56)	**1.28** (0.881-1.82)	**1.49** (0.989-2.17)	**1.66** (1.07-2.44)
15-min	**0.427** (0.337-0.543)	**0.520** (0.410-0.663)	**0.681** (0.536-0.870)	**0.823** (0.643-1.06)	**1.03** (0.783-1.38)	**1.20** (0.888-1.62)	**1.37** (0.985-1.90)	**1.56** (1.07-2.22)	**1.82** (1.21-2.65)	**2.03** (1.30-2.98)
30-min	**0.607** (0.480-0.773)	**0.740** (0.583-0.942)	**0.967** (0.761-1.24)	**1.17** (0.912-1.50)	**1.46** (1.11-1.95)	**1.69** (1.26-2.29)	**1.94** (1.39-2.68)	**2.20** (1.51-3.12)	**2.56** (1.70-3.73)	**2.85** (1.83-4.19)
60-min	**0.774** (0.611-0.985)	**0.932** (0.735-1.19)	**1.21** (0.952-1.55)	**1.46** (1.14-1.88)	**1.84** (1.40-2.47)	**2.15** (1.60-2.92)	**2.49** (1.79-3.45)	**2.85** (1.96-4.05)	**3.35** (2.22-4.90)	**3.76** (2.42-5.54)
2-hr	**0.941** (0.749-1.19)	**1.12** (0.894-1.42)	**1.46** (1.15-1.84)	**1.76** (1.39-2.24)	**2.22** (1.71-2.97)	**2.61** (1.96-3.52)	**3.03** (2.20-4.19)	**3.49** (2.43-4.94)	**4.14** (2.78-6.02)	**4.68** (3.04-6.84)
3-hr	**1.03** (0.824-1.29)	**1.22** (0.973-1.53)	**1.57** (1.25-1.98)	**1.90** (1.50-2.40)	**2.41** (1.88-3.23)	**2.86** (2.16-3.85)	**3.34** (2.44-4.60)	**3.87** (2.72-5.47)	**4.64** (3.13-6.72)	**5.27** (3.44-7.67)
6-hr	**1.19** (0.961-1.48)	**1.40** (1.12-1.74)	**1.78** (1.43-2.23)	**2.16** (1.72-2.71)	**2.76** (2.17-3.67)	**3.28** (2.50-4.40)	**3.86** (2.85-5.29)	**4.50** (3.19-6.33)	**5.44** (3.70-7.84)	**6.21** (4.10-8.98)
12-hr	**1.38** (1.12-1.70)	**1.61** (1.30-1.98)	**2.05** (1.66-2.53)	**2.47** (1.99-3.07)	**3.14** (2.49-4.15)	**3.73** (2.87-4.96)	**4.38** (3.26-5.96)	**5.10** (3.64-7.12)	**6.14** (4.23-8.80)	**7.01** (4.67-10.1)
24-hr	**1.59** (1.30-1.95)	**1.86** (1.52-2.28)	**2.37** (1.93-2.90)	**2.84** (2.30-3.50)	**3.58** (2.86-4.66)	**4.22** (3.27-5.55)	**4.92** (3.69-6.62)	**5.68** (4.09-7.86)	**6.79** (4.71-9.65)	**7.70** (5.17-11.0)
2-day	**1.85** (1.53-2.24)	**2.17** (1.79-2.63)	**2.75** (2.26-3.34)	**3.28** (2.68-4.00)	**4.09** (3.28-5.26)	**4.78** (3.73-6.21)	**5.52** (4.17-7.36)	**6.33** (4.59-8.67)	**7.48** (5.23-10.5)	**8.42** (5.71-12.0)
3-day	**2.02** (1.68-2.44)	**2.38** (1.97-2.86)	**3.01** (2.48-3.64)	**3.58** (2.94-4.35)	**4.45** (3.58-5.68)	**5.18** (4.06-6.69)	**5.97** (4.52-7.90)	**6.81** (4.97-9.28)	**8.02** (5.63-11.2)	**8.99** (6.13-12.7)
4-day	**2.17** (1.81-2.61)	**2.55** (2.12-3.06)	**3.21** (2.66-3.86)	**3.81** (3.14-4.61)	**4.72** (3.80-6.00)	**5.48** (4.31-7.04)	**6.29** (4.79-8.30)	**7.17** (5.24-9.73)	**8.42** (5.93-11.8)	**9.42** (6.45-13.3)
7-day	**2.57** (2.16-3.06)	**2.97** (2.48-3.54)	**3.67** (3.06-4.39)	**4.31** (3.58-5.17)	**5.27** (4.28-6.64)	**6.08** (4.81-7.76)	**6.94** (5.32-9.09)	**7.87** (5.80-10.6)	**9.20** (6.53-12.8)	**10.3** (7.08-14.4)
10-day	**2.92** (2.46-3.46)	**3.35** (2.82-3.98)	**4.11** (3.44-4.89)	**4.79** (3.99-5.73)	**5.81** (4.73-7.28)	**6.66** (5.29-8.45)	**7.56** (5.82-9.85)	**8.53** (6.32-11.4)	**9.90** (7.06-13.7)	**11.0** (7.63-15.4)
20-day	**3.90** (3.31-4.57)	**4.50** (3.81-5.28)	**5.51** (4.65-6.49)	**6.37** (5.36-7.55)	**7.61** (6.22-9.37)	**8.60** (6.87-10.8)	**9.62** (7.44-12.4)	**10.7** (7.95-14.1)	**12.1** (8.71-16.6)	**13.3** (9.28-18.4)
30-day	**4.68** (3.99-5.46)	**5.42** (4.61-6.33)	**6.63** (5.63-7.76)	**7.64** (6.45-8.99)	**9.03** (7.39-11.0)	**10.1** (8.11-12.5)	**11.2** (8.70-14.3)	**12.3** (9.20-16.2)	**13.8** (9.95-18.7)	**14.9** (10.5-20.6)
45-day	**5.64** (4.84-6.55)	**6.52** (5.58-7.58)	**7.94** (6.77-9.25)	**9.09** (7.71-10.6)	**10.6** (8.73-12.8)	**11.8** (9.49-14.5)	**13.0** (10.1-16.4)	**14.1** (10.6-18.4)	**15.6** (11.3-21.0)	**16.7** (11.8-22.9)
60-day	**6.45** (5.55-7.46)	**7.42** (6.37-8.59)	**8.96** (7.68-10.4)	**10.2** (8.69-11.9)	**11.8** (9.74-14.2)	**13.1** (10.5-16.0)	**14.2** (11.1-17.9)	**15.4** (11.6-20.0)	**16.8** (12.2-22.6)	**17.9** (12.7-24.6)

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

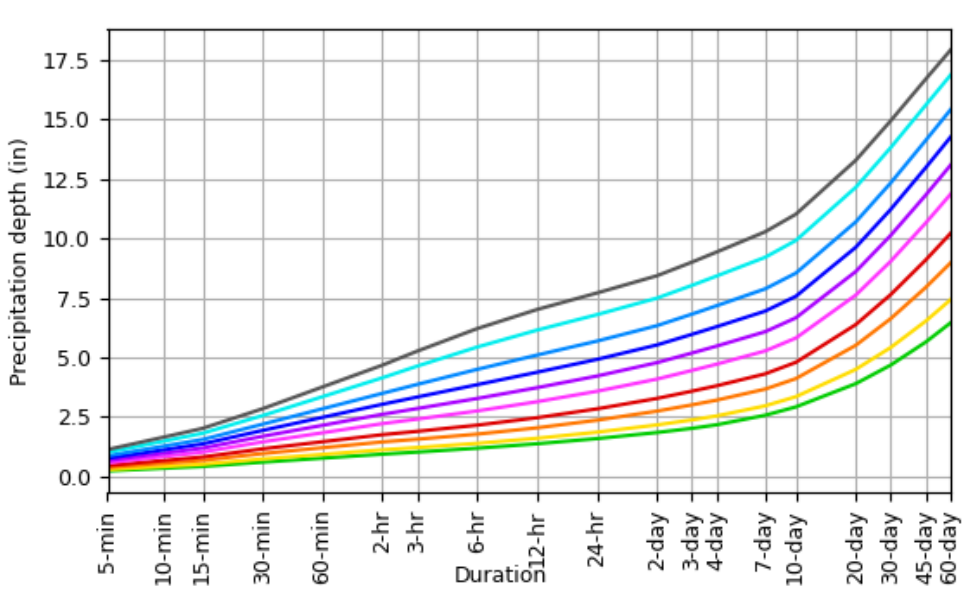
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

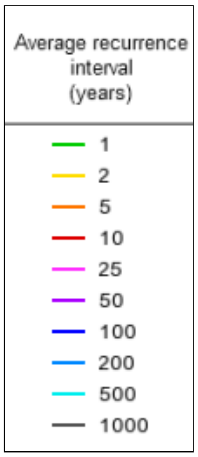
Please refer to NOAA Atlas 14 document for more information.

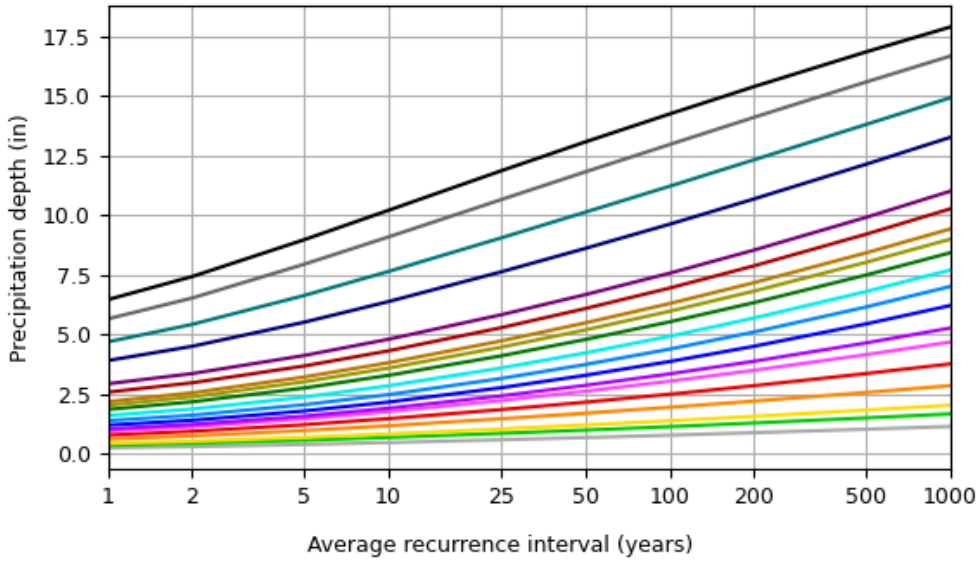
Back to Top

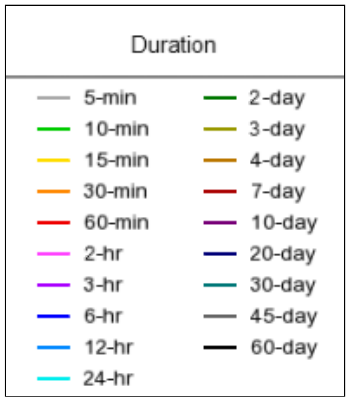
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 38.9877°, Longitude: -104.5596°









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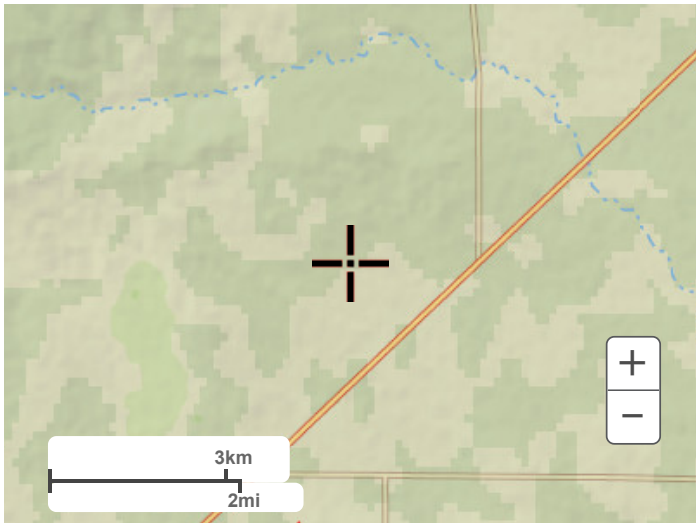
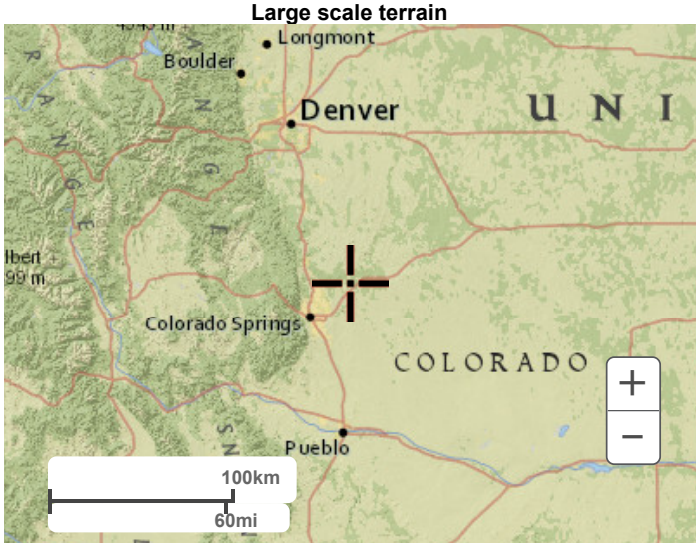
Back to Top

Maps & aerials

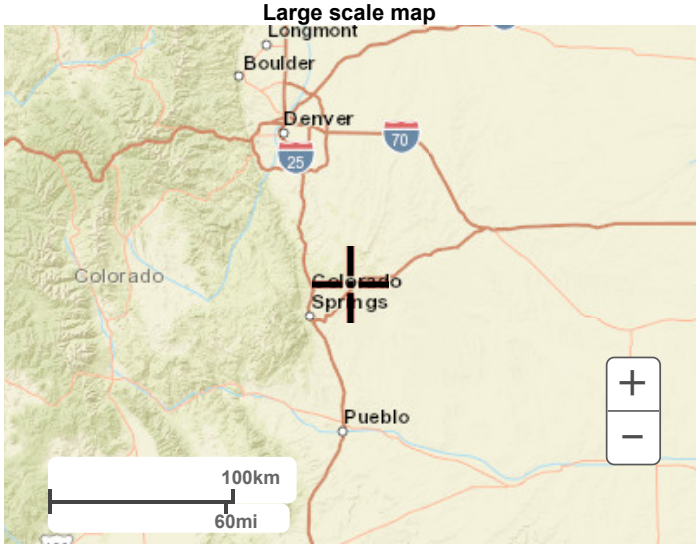
Small scale terrain



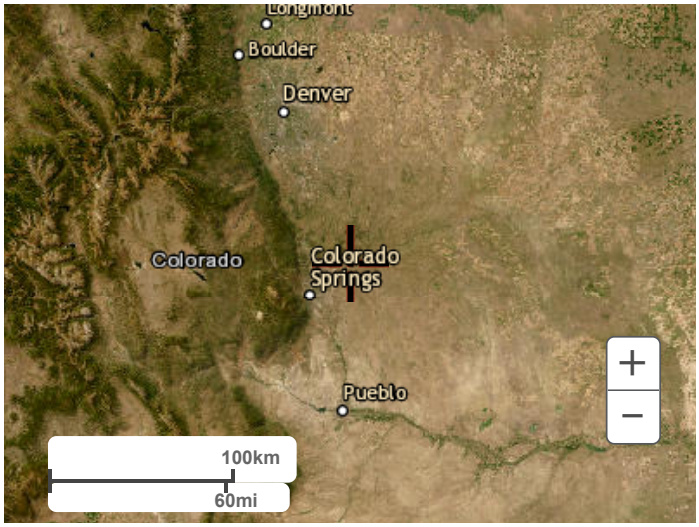
Large scale terrain



Large scale map



Large scale aerial



Back to Top

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
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Disclaimer

GRANDVIEW RESERVE (PHASE II-TOWNHOMES)
PROPOSED CONDITIONS
EL PASO COUNTY, CO

Calc'd by: CVW
Checked by: KH
Date: 7/14/2024

SOIL TYPE:	HSG A&B

COMPOSITE 'C' FACTORS

	LAND USE TYPE																	TOTAL	COMPOSITE IMPERVIOUSNESS & C FACTOR		
	Paved			Gravel			Lawns			Typical Townhome Lots			Minor Arterial ROW Typ.			Local ROW Typ.						
	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}				
	100	0.90	0.96	80	0.59	0.70	0	0.08	0.35	53	0.48	0.64	68	0.63	0.76	90	0.82	0.90				
BASIN	ACRES			ACRES			ACRES			ACRES			ACRES			ACRES			ACRES	%I	C_5	C_{100}
A1-A				0.14			2.42			0.66									3.22	14	0.18	0.42
A2-A							0.10			1.13									1.23	49	0.45	0.62
B1-A							0.03									0.23			0.26	79	0.73	0.83
B2-A							0.06			0.56						0.40			1.02	64	0.59	0.72
B3-A	0.09						0.04			0.39						0.37			0.89	71	0.65	0.77
B4-A							0.55			2.02						1.10			3.67	56	0.52	0.67
C1-A							0.00			0.44						0.19			0.63	64	0.58	0.72
D1-A							0.11			0.59									0.70	45	0.42	0.59
E1-A							0.03			0.55						0.15			0.73	59	0.54	0.68
E2-A							0.26			1.28						1.02			2.56	63	0.58	0.72
E3-A										0.68						0.29			0.97	64	0.58	0.72
E4-A										0.71						0.31			1.02	64	0.58	0.72
F1-A							0.00			0.32						0.14			0.46	64	0.58	0.72
H1-A							0.90			0.90						0.45			2.25	39	0.39	0.58
H2-A							0.19			1.26						0.49			1.94	57	0.53	0.68
H3-A										1.96						0.84			2.80	64	0.58	0.72
H4-A							0.97			1.35			1.55						3.87	46	0.44	0.62
J1-A							0.75			0.75									1.50	27	0.28	0.50
K1-A							0.00						1.75						1.75	68	0.63	0.76
EA6	0.70																		0.70	100	0.90	0.96
EA7	0.58						0.07												0.65	89	0.81	0.89
POND A	1.37			0.14			6.48			15.56			3.30			5.97			32.82	53	0.50	0.66

GRANDVIEW RESERVE (PHASE II-TOWNHOMES)

PROPOSED CONDITIONS

EL PASO COUNTY, CO

Calc'd by: CVW

Checked by: KH

Date: 7/14/2024

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	tc=(L/180)+10	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	tc max	tc design (min)
A1-A	0.18	3.22	100	2.8	11.9	7	529	2.9	1.2	7.3	19.2	13.5	13.5
A2-A	0.45	1.23	68	4.9	5.8	15	630	2.2	2.2	4.8	10.5	13.9	10.5
B1-A	0.73	0.26	41	0.5	5.4	20	340	0.6	1.5	3.7	9.1	12.1	9.1
B2-A	0.59	1.02	32	0.7	6.1	20	614	2.9	3.4	3.0	9.2	13.6	9.2
B3-A	0.65	0.89	42	2.9	3.8	20	544	2.9	3.4	2.7	6.5	13.3	6.5
B4-A	0.52	3.67	43	4.8	4.1	20	970	2.7	3.3	4.9	9.0	15.6	9.0
C1-A	0.58	0.63	53	2.9	4.8	20	318	0.6	1.5	3.4	8.3	12.1	8.3
D1-A	0.42	0.70	100	4.6	7.5	15	196	2.3	2.3	1.4	9.0	11.6	9.0
E1-A	0.54	0.73	41	1.0	6.6	20	186	1.0	2.0	1.5	8.2	11.3	8.2
E2-A	0.58	2.56	38	2.0	4.7	20	970	2.8	3.3	4.9	9.6	15.6	9.6
E3-A	0.58	0.97	68	2.0	6.2	20	627	2.6	3.2	3.2	9.4	13.9	9.4
E4-A	0.58	1.02	66	2.0	6.1	20	627	2.4	3.1	3.4	9.5	13.9	9.5
F1-A	0.58	0.46	63	2.0	6.0	20	230	1.0	2.0	1.9	7.9	11.6	7.9
H1-A	0.39	2.25	79	2.0	9.2	20	284	0.6	1.5	3.0	12.2	12.0	12.0
H2-A	0.53	1.94	41	0.8	7.3	20	667	2.0	2.8	3.9	11.2	13.9	11.2
H3-A	0.58	2.80	41	2.8	4.3	20	1246	2.5	3.2	6.6	10.9	17.1	10.9
H4-A	0.44	3.87	62	2.5	7.0	20	1246	3.0	3.5	6.0	13.0	17.3	13.0
J1-A	0.28	1.50	100	4.5	9.1	15	550	2.4	2.3	3.9	13.0	13.6	13.0
K1-A	0.63	1.75	45	3.4	3.8	20	1409	2.4	3.1	7.6	11.4	18.1	11.4
EA6	0.90	0.70	26	2.0	1.5	20	630	1.7	2.6	4.0	5.5	13.6	5.5
EA7	0.81	0.65	24	2.0	2.1	20	630	1.7	2.6	4.0	6.1	13.6	6.1

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*For buried riprap, select C_v value based on type of vegetative cover.

HRGreen

GRANDVIEW RESERVE (PHASE II-TOWNHOMES)
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: CVW
Checked by: KH
Date: 7/14/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)	
	35.1	EA6	0.70	0.90	5.5	0.63	5.02	3.2	5.5	0.63	5.02	**3.2**	3.2	0.63	2.4					1454	1.5	15.64	OFFSITE FLOWS FLOW TO DP 1-A
	35.2	EA7	0.65	0.81	6.1	0.53	4.88	2.6	6.1	0.53	4.88	**2.6**	2.6	0.53	2.4					1443	1.5	15.52	OFFSITE FLOWS FLOW TO DP 2-A
	1-A	K1-A	1.75	0.63	11.4	1.10	3.93	4.3	21.2	1.73	3.01	**5.2**				5.2	1.73	0.5	1.5	85	2.1	0.67	BASIN K1-A STORMWATER CAPTURED IN TYPE R INLET AT DP 1-A
	2-A	H4-A	3.87	0.44	13.0	1.70	3.74	6.4	21.6	2.23	2.97	**6.6**				6.6	2.23	0.5	1.5	6	2.1	0.04	BASIN H4-A STORMWATER CAPTURED IN TYPE R INLET AT DP 2-A
	2.1-A								21.8	3.96	2.96	**11.7**				11.7	3.96	0.5	2.0	360	2.9	2.04	DP 2.1A PIPED TO DP4.1A
	3-A	H3-A	2.80	0.58	10.9	1.63	4.01	6.5	10.9	1.63	4.01	**6.5**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN H3-A STORMWATER CONVEYED VIA CURB AND GUTTER AT DP 3-A, FLOW TO DP 5.1-A
	3.1-A								10.9	1.63	4.01	**6.5**											DP 3.1A PIPED TO DP 5.1A
	4-A	J1-A	1.50	0.28	13.0	0.42	3.73	1.6	13.0	0.42	3.73	**1.6**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN J1-A STORMWATER CAPTURED IN OPEN GRATE INLET AT DP 4-A
	4.1-A								23.9	4.38	2.82	**12.4**				12.4	4.38	0.5	2.0	63	2.9	0.36	DP 4.1-A PIPED TO DP 5.1-A
	5-A	H1-A	2.25	0.39	12.0	0.87	3.85	3.4	12.0	0.87	3.85	**3.4**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN H1-A CONVEYED VIA CURB AND GUTTER AT DP 5-A, CAPTURED IN TYPE R SUMP INLET AT DP 5-A, FLOW TO DP 5.1-A
	5.1-A								12.0	0.87	3.85	**3.4**											DP 5.1A PIPED TO DP 6.1A
	6-A	H2-A	1.94	0.53	11.2	1.02	3.95	4.0	11.2	1.02	3.95	**4.0**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN H2-A CAPTURED IN TYPE R SUMP INLET AT DP 6-A, FLOW TO DP 5.1A
	6.1-A	DP 4.1-A TC + TRAVEL TIME USED							24.2	7.90	2.80	**22.1**				22.1	7.90	0.5	3.0	320	4.7	1.13	
	7-A	F1-A	0.46	0.58	7.9	0.27	4.48	1.2	7.9	0.27	4.48	**1.2**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN F1-A CAPTURED IN TYPE R SUMP INLET AT DP 7-A
	7.1-A								7.9	0.27	4.48	**1.2**											DP 7.1-A PIPED TO 9.1A
	8-A	E1-A	0.73	0.54	8.2	0.39	4.43	1.7	8.2	0.39	4.43	**1.7**											BASIN E1-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 9-A
	9-A	B4-A E2-A	3.67 2.56	0.52 0.58	9.0 9.6	1.92 1.47	4.28 4.20	8.2 6.2	9.6	3.39	4.20	**14.2**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN E2-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 9-A
	9.1-A	DP 6.1-A TC + TRAVEL TIME USED							25.4	11.95	2.73	**32.7**				32.7	11.95	0.5	3.0	150	4.7	0.53	DP 9.1A PIPED TO DP 13.1-A
	10-A	A2-A	1.23	0.45	10.5	0.55	4.05	2.2	10.5	0.55	4.05	**2.2**				10.5	0.55	0.5	1.0	75	1.3	0.95	BASIN E6-A STORMWATER CONVEYED VIA CURB AND GUTTER AT DP 10-A, FLOW TO DP5-A
	10.1A								11.5	0.55	3.92	**2.2**											DP 10.1A PIPED TO DP 12.1-A
	11-A	E4-A	1.02	0.58	9.5	0.59	4.21	2.5	9.5	0.59	4.21	**2.5**											BASIN E4-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 12-A, FLOW TO DP 14-A
	12-A	E3-A	0.97	0.58	9.4	0.56	4.22	2.4	9.4	0.56	4.22	**2.4**											BASIN E3-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 12-A, FLOW TO DP 13-A
	12.1-A	DP 10.1-A TC USED							11.5	1.71	3.92	**6.7**				6.7	1.71	0.5	2.0	700	2.9		DP 12.1A PIPED TO DP 14.1-A
	13-A	D1-A	0.70	0.42	9.0	0.29	4.29	1.3	9.0	0.29	4.29	**1.3**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN D1-A STORMWATER CAPTURED IN OPEN GRATE MANHOLE AT DP 13-A, FLOW TO DP 13.1-A
	13.1-A								25.9	12.24	2.70	**33.1**				33.1	12.24	0.5	3.5	140	5.6	0.41	DP 13.1A PIPED TO DP 14.1-A
	14-A	B1-A B2-A B3-A	0.26 1.02 0.89	0.73 0.59 0.65	9.1 9.2 6.5	0.19 0.60 0.58	4.27 4.26 4.79	0.8 2.6 2.8	9.2	1.37	4.26	**5.8**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN B1-A, B2-A, B3-A, & BASIN B4-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 14-A, FLOW TO DP 16.1-A

HRGreen

GRANDVIEW RESERVE (PHASE II-TOWNHOMES)
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: CVW
Checked by: KH
Date: 7/14/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)	
	14.1-A								26.3	13.95	2.68	**37.4**				26.3	13.95	0.5	3.5	101	5.6	0.30	DP 14.1A PIPED TO DP 16.1-A
	14.2-A								9.2	1.37	4.26	**5.8**				PIPE TRAVEL TIME INSIGNIFICANT							DP 14.2A PIPED TO DP 16.1-A
	15-A	C1-A	0.63	0.58	8.3	0.37	4.42	1.6	8.3	0.37	4.42	**1.6**				1.6	0.37	0.5	1.5	29	2.1	0.23	BASIN C1-A STORMWATER CAPTURED IN TYPE R SUMP INILET AT DP 15-A
	15.1-A								8.3	0.37	4.42	**1.6**				PIPE TRAVEL TIME INSIGNIFICANT							DP 15.1A PIPED TO DP 16.1-A
	16.1-A	A1-A	3.22	0.18	13.5	0.59	3.68	2.2	26.3	16.28	2.68	**43.6**											**TOTAL FLOW INTO POND A**

HRGreen

GRANDVIEW RESERVE (PHASE II-TOWNHOMES)

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	CVW
Checked by:	KH
Date:	7/14/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	35.1	EA6	0.70	0.96	5.5	0.67	8.43	5.7	5.5	0.67	8.43	**5.7**	5.7	0.67	2.4					1454	1.5	15.64	OFFSITE FLOWS FLOW TO DP 1-A
	35.2	EA7	0.65	0.89	6.1	0.58	8.19	4.8	6.1	0.58	8.19	**4.8**	4.8	0.58	2.4					1443	1.5	15.52	OFFSITE FLOWS FLOW TO DP 2-A
	1-A	K1-A	1.75	0.76	11.4	1.33	6.60	8.8	21.2	2.00	5.04	**10.1**				10.1	2.00	0.5	1.5	85	2.1	0.67	BASIN K1-A STORMWATER CAPTURED IN TYPE R INLET AT DP 1-A
	2-A	H4-A	3.87	0.62	13.0	2.38	6.27	14.9	21.6	2.96	4.99	**14.8**				14.8	2.96	0.5	1.5	6	2.1	0.04	BASIN H4-A STORMWATER CAPTURED IN TYPE R INLET AT DP 2-A
	2.1-A								21.8	4.97	4.97	**24.7**				24.7	4.97	0.5	2.0	360	2.9	2.04	DP 2.1A PIPED TO DP4.1A
	3-A	H3-A	2.80	0.72	10.9	2.01	6.73	13.5	10.9	2.01	6.73	**13.5**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN H3-A STORMWATER CONVEYED VIA CURB AND GUTTER AT DP 3-A, FLOW TO DP 5.1-A
	3.1-A								10.9	2.01	6.73	**13.5**											DP 3.1A PIPED TO DP 5.1A
	4-A	J1-A	1.50	0.50	13.0	0.74	6.26	4.7	13.0	0.74	6.26	**4.7**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN J1-A STORMWATER CAPTURED IN OPEN GRATE INLET AT DP 4-A
	4.1-A								23.9	5.71	4.74	**27.1**				27.1	5.71	0.5	2.0	63	2.9	0.36	DP 4.1-A PIPED TO DP 5.1-A
	5-A	H1-A	2.25	0.58	12.0	1.30	6.47	8.4	12.0	1.30	6.47	**8.4**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN H1-A CONVEYED VIA CURB AND GUTTER AT DP 5-A, CAPTURED IN TYPE R SUMP INLET AT DP 5-A, FLOW TO DP 5.1-A
	5.1-A								12.0	1.30	6.47	**8.4**											DP 5.1A PIPED TO DP 6.1A
	6-A	H2-A	1.94	0.68	11.2	1.31	6.64	8.7	11.2	1.31	6.64	**8.7**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN H2-A CAPTURED IN TYPE R SUMP INLET AT DP 6-A, FLOW TO DP 5.1A
	6.1-A	**DP 4.1-A TC + TRAVEL TIME USED**							24.2	10.33	4.70	**48.6**				48.6	10.33	0.5	3.0	320	4.7	1.13	DP 6.1-A PIPED TO 9.1A
	7-A	F1-A	0.46	0.72	7.9	0.33	7.53	2.5	7.9	0.33	7.53	**2.5**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN F1-A CAPTURED IN TYPE R SUMP INLET AT DP 7-A
	7.1-A								7.9	0.33	7.53	**2.5**											DP 7.1-A PIPED TO 9.1A
	8-A	E1-A	0.73	0.68	8.2	0.50	7.44	3.7	8.2	0.50	7.44	**3.7**											BASIN E1-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 9-A
	9-A	B4-A	3.67	0.67	9.0	2.48	7.18	17.8	9.6	4.31	7.05	**30.3**				**PIPE TRAVEL TIME INSIGNIFICANT**							
		E2-A	2.56	0.72	9.6	1.83	7.05	12.9															BASIN E2-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 9-A
	9.1-A	**DP 6.1-A TC + TRAVEL TIME USED**							25.4	15.46	4.59	**70.9**				70.9	15.46	0.5	3.0	150	4.7	0.53	DP 9.1A PIPED TO DP 13.1-A
	10-A	A2-A	1.23	0.62	10.5	0.76	6.80	5.2	10.5	0.76	6.80	**5.2**				5.2	0.76	0.5	1.0	75	1.3	0.95	BASIN E6-A STORMWATER CONVEYED VIA CURB AND GUTTER AT DP 10-A, FLOW TO DP5-A
	10.1-A								11.5	0.76	6.58	**5.0**											DP 10.1A PIPED TO DP 12.1-A
	11-A	E4-A	1.02	0.72	9.5	0.73	7.06	5.2	9.5	0.73	7.06	**5.2**											BASIN E4-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 12-A, FLOW TO DP 14-A
	12-A	E3-A	0.97	0.72	9.4	0.70	7.08	4.9	9.4	0.70	7.08	**4.9**											BASIN E3-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 12-A, FLOW TO DP 13-A
	12.1-A	**DP 10.1-A TC USED**							11.5	2.19	6.58	**14.4**				14.4	2.19	0.5	2.0	700	2.9	3.97	DP 12.1A PIPED TO DP 14.1-A
	13-A	D1-A	0.70	0.59	9.0	0.42	7.21	3.0	9.0	0.42	7.21	**3.0**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN D1-A STORMWATER CAPTURED IN OPEN GRATE MANHOLE AT DP 13-A, FLOW TO DP 13.1-A
	13.1-A								25.9	15.88	4.54	**72.0**				72.0	15.88	0.5	3.5	140	5.6	0.41	DP 13.1A PIPED TO DP 14.1-A
	14-A	B1-A	0.26	0.83	9.1	0.22	7.17	1.6	9.2	1.64	7.15	**11.7**				**PIPE TRAVEL TIME INSIGNIFICANT**							BASIN B1-A, B2-A, B3-A, &
		B2-A	1.02	0.72	9.2	0.74	7.15	5.3															BASIN B4-A STORMWATER CAPTURED IN TYPE R SUMP INLET AT DP 14-A, FLOW TO DP 16.1-A
		B3-A	0.89	0.77	6.5	0.68	8.04	5.5															

HRGreen

GRANDVIEW RESERVE (PHASE II-TOWNHOMES)

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	CVW
Checked by:	KH
Date:	7/14/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	14.1-A								26.3	18.06	4.50	**81.2**				81.2	18.06	0.5	3.5	101	5.6	0.30	DP 14.1A PIPED TO DP 16.1-A
	14.2-A								9.2	1.64	7.15	**11.7**				PIPE TRAVEL TIME INSIGNIFICANT							DP 14.2A PIPED TO DP 16.1-A
	15-A	C1-A	0.63	0.72	8.3	0.45	7.42	3.4	8.3	0.45	7.42	**3.4**				3.4	0.45	0.5	1.5	29	2.1	0.23	BASIN C1-A STORMWATER CAPTURED IN TYPE R SUMP INILET AT DP 15-A
	15.1-A								8.3	0.45	7.42	3.4				PIPE TRAVEL TIME INSIGNIFICANT							DP 15.1A PIPED TO DP 16.1-A
	16.1-A	A1-A	3.22	0.42	13.5	1.37	6.18	8.5	26.3	20.15	4.50	**90.6**											**TOTAL FLOW INTO POND A**

GRANDVIEW RESERVE (PHASE II- DUPLEXES)
PROPOSED CONDITIONS
EL PASO COUNTY, CO

Calc'd by: CVW
Checked by: KH
Date: 7/14/2024

SOIL TYPE:	HSG A&B

COMPOSITE 'C' FACTORS

	LAND USE TYPE															TOTAL	COMPOSITE IMPERVIOUSNESS & C FACTOR		
	EPC LOCAL			Duplex			Lawns			EPC MINOR ARTERIAL			Townhome						
	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}				
	90	0.82	0.90	47	0.40	0.58	0	0.08	0.35	68	0.63	0.76	53	0.48	0.64				
BASIN	ACRES			ACRES			ACRES			ACRES			ACRES			ACRES	%I	C_5	C_{100}
A-B	0.66			3.94			1.31			0.00			0.66			6.56	43	0.39	0.57
B-B	0.00			1.78			1.78			0.00			0.00			3.55	24	0.24	0.47
C-B	0.38			1.07			0.08			0.00			0.08			1.53	58	0.51	0.68
D-B	0.41			0.21			0.41			0.00			0.00			1.03	45	0.44	0.62
E-B	0.00			0.26			0.77			0.00			0.00			1.03	12	0.16	0.41
F-B	0.00			0.73			0.73			0.00			0.00			1.45	24	0.24	0.47
G-B	0.00			0.00			0.38			1.77			0.00			2.15	56	0.53	0.69
H-B	0.00			1.65			1.24			1.24			0.00			4.12	39	0.37	0.57
I-B	0.15			0.61			0.00			0.00			0.00			0.76	56	0.48	0.64
J-B	1.70			5.11			0.00			0.00			0.00			6.81	58	0.51	0.66
K-B	0.22			0.90			0.00			0.00			0.00			1.12	56	0.48	0.64
L-B	0.19			0.38			1.32			0.00			0.00			1.89	18	0.22	0.45
M-B	0.29			1.17			0.00			0.00			0.00			1.46	56	0.48	0.64
N-B	0.00			0.75			2.25			0.00			0.00			3.00	12	0.16	0.41
O-B	0.00			0.00			1.59			0.00			0.00			1.18	0	0.11	0.47
Pond B	4.01			18.53			11.85			3.00			0.74			**38.13**	**39**		

HRGreen	**GRANDVIEW RESERVE (PHASE II- DUPLEXES)**	**Calc'd by:**	**CVW**
	PROPOSED CONDITIONS	**Checked by:**	**KH**
	EL PASO COUNTY, CO	**Date:**	**7/14/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	ΣQ_5 (cfs)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
A-B	0.39	6.56	100	2.0	10.4	20	1250	2.6	3.2	6.5	16.9	17.5	16.9
B-B	0.24	3.55	100	2.0	12.5	20	1030	2.6	3.2	5.3	17.8	16.3	16.3
C-B	0.51	1.53	100	2.0	8.5	20	930	2.6	3.2	4.8	13.3	15.7	13.3
D-B	0.44	1.03	100	2.0	9.6	20	540	2.6	3.2	2.8	12.4	13.6	12.4
E-B	0.16	1.03	100	2.0	13.7	15	225	2.9	2.6	1.5	15.1	11.8	11.8
F-B	0.24	1.45	100	2.0	12.5	20	430	2.0	2.8	2.5	15.0	12.9	12.9
G-B	0.53	2.15	30	2.0	4.5	20	1250	1.0	2.0	10.4	14.9	17.1	14.9
H-B	0.37	4.12	100	2.0	10.6	20	1250	1.0	2.0	10.4	21.0	17.5	17.5
I-B	0.48	0.76	100	2.0	9.0	20	385	2.3	3.0	2.1	11.1	12.7	11.1
J-B	0.51	6.81	100	2.0	8.7	20	1250	2.3	3.0	6.9	15.5	17.5	15.5
K-B	0.48	1.12	100	2.0	9.0	20	570	3.0	3.5	2.7	11.7	13.7	11.7
L-B	0.22	1.89	100	2.0	12.8	20	520	2.0	2.8	3.1	15.9	13.4	13.4
M-B	0.48	1.46	100	2.0	9.0	20	690	2.3	3.0	3.8	12.8	14.4	12.8
N-B	0.16	3.00	100	2.0	13.7	15	990	0.8	1.3	12.3	26.0	16.1	16.1
O-B	0.11	1.18	25	2.0	7.2	20	50	1.0	2.0	0.4	7.6	10.4	7.6

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

* For buried riprap, select C_v value based on type of vegetative cover.

HRGreen

GRANDVIEW RESERVE (PHASE II- DUPLEXES)

PROPOSED CONDITIONS

DESIGN STORM: 5-YEAR

Calc'd by:	CVW
Checked by:	KH
Date:	7/14/2024

			DIRECT RUNOFF						ΣQ_5 (cfs)				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	DP1-B	K-B	1.12	0.48	11.7	0.54	3.89	2.1	11.7	0.54	3.89	**2.1**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN K-B CAPTURED IN TYPE R AT GRADE INLET
	DP2-B	D-B	1.03	0.44	12.4	0.45	3.81	1.7	12.4	0.45	3.81	**1.7**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN D-B CAPTURED IN TYPE R AT GRADE INLET
	DP3-B				**DP1-B AND DP2-B**				12.4	1.00	3.81	**3.8**				12.4	1.00	0.5	2.0	78	5.1	0.26	COMBINES DP1-B & DP2-B
	DP4-B	A-B	6.56	0.39	16.9	2.53	3.35	8.5	16.9	2.53	3.35	**8.5**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN A-B CAPTURED IN TYPE R AT GRADE INLET
		C-B	1.53	0.51	13.3	0.79	3.70	2.9								PIPE TRAVEL TIME INSIGNIFICANT							
	DP5-B	F-B	1.45	0.24	12.9	0.35	3.74	1.3	13.3	1.14	3.70	**4.2**											BASIN C-B & BASIN F-B CAPTURED IN TYPE R AT GRADE INLET
	DP6-B				**DP4-B AND DP5-B**				16.9	3.67	3.35	**12.3**				12.3	3.67	0.5	2.0	45	5.1	0.15	COMBINES DP4-B & DP5-B
	DP7-B				**DP6-B AND DP3-B**				17.0	4.66	3.33	**15.5**				15.5	4.66	0.5	2.0	406	5.1	1.33	COMBINES DP3-B & DP6-B
	DP8-B	G-B	2.15	0.53	14.9	1.14	3.53	4.0	14.9	1.14	3.53	**4.0**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN G-B CAPTURED IN TYPE R SUMP INLET
	DP9-B	H-B	4.12	0.37	17.5	1.54	3.29	5.1	17.5	1.54	3.29	**5.1**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN H-B CAPTURED IN TYPE R SUMP INLET
	DP10-B				**DP8-B AND DP9-B**				17.5	2.68	3.29	**8.8**				8.8	2.68	0.5	2.0	650	5.1	2.13	COMBINES DP8-B & DP9-B
	DP11-B	B-B	3.55	0.24	16.3	0.85	3.40	2.9	16.3	0.85	3.40	**2.9**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN B-B CAPTURED IN OPEN GRATE SUMP INLET
	DP12-B	I-B	0.76	0.48	11.1	0.37	3.98	1.5	11.1	0.37	3.98	**1.5**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN I-B CAPTURED IN TYPE R AT GRADE INLET
		L-B	1.89	0.22	13.4	0.41	3.69	1.5								PIPE TRAVEL TIME INSIGNIFICANT							
	DP13-B	J-B	6.81	0.51	15.5	3.44	3.47	11.9	15.5	3.85	3.47	**13.4**											BASIN L-B & BASIN J-B CAPTURED IN TYPE R SUMP INLET
	DP14-B				**DP7-B, DP11-B, AND DP12-B**				18.3	5.88	3.22	**18.9**				18.9	5.88	0.5	3.0	133	5.1	0.44	COMBINES DP7-B, DP11-B, & DP12-B
	DP15-B	M-B	1.46	0.48	12.8	0.71	3.76	2.7	12.8	0.71	3.76	**2.7**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN M-B CAPTURED IN TYPE R SUMP INLET
	DP16-B				**DP13-B AND DP15-B**				15.5	4.56	3.47	**15.8**				15.8	4.56	0.5	3.0	120	6.7	0.30	COMBINES DP13-B & DP15-B
	DP17-B	N-B	3.00	0.16	16.1	0.48	3.42	1.6	16.1	0.48	3.42	**1.6**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN N-B CAPTURED IN OPEN GRATE SUMP INLET
	DP18-B				**DP14-B AND DP17-B**				18.3	6.36	3.22	**20.5**											COMBINES DP17-B & DP14-B
	DP19-B	E-B	1.03	0.16	11.8	0.16	3.88	0.6	11.8	0.16	3.88	**0.6**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN E-B CAPTURED IN OPEN GRATE SUMP INLET
	DB20-B				**DP16-B AND DP19-B**				15.8	4.72	3.44	**16.2**											COMBINES DP19-B & DP15-B
		DP18-B			18.3	6.36																	
		DP20-B			15.8	4.72																	
	DP21-B	O-B	1.18	0.11	7.6	0.13	4.53	0.6	18.3	11.21	3.22	**36.1**											**TOTAL FLOW TO BE DETAINED BY POND B**

HRGreen

GRANDVIEW RESERVE (PHASE II- DUPLEXES)

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	CVW
Checked by:	KH
Date:	7/14/2024

			DIRECT RUNOFF						ΣQ_5 (cfs)				STREET			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	DP1-B	K-B	1.12	0.64	11.7	0.72	6.54	4.7	11.7	0.72	6.54	**4.7**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN K-B CAPTURED IN TYPE R AT GRADE INLET
	DP2-B	D-B	1.03	0.62	12.4	0.63	6.39	4.1	12.4	0.63	6.39	**4.1**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN D-B CAPTURED IN TYPE R AT GRADE INLET
	DP3-B	DP1-B AND DP2-B							12.4	1.36	6.39	**8.7**				8.7	1.36	0.5	2.0	78	5.1	0.26	COMBINES DP1-B & DP2-B
	DP4-B	A-B	6.56	0.57	16.9	3.75	5.62	21.1	16.9	3.75	5.62	**21.1**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN A-B CAPTURED IN TYPE R AT GRADE INLET
	DP5-B	C-B F-B	1.53 1.45	0.68 0.47	13.3 12.9	1.04 0.67	6.21 6.28	6.5 4.2	13.3	1.72	6.21	**10.7**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN C-B & BASIN F-B CAPTURED IN TYPE R AT GRADE INLET
	DP6-B	DP4-B AND DP5-B							16.9	5.47	5.62	**30.7**				30.7	5.47	0.5	2.0	45	5.1	0.15	COMBINES DP4-B & DP5-B
	DP7-B	DP6-B AND DP3-B							17.0	6.83	5.60	**38.2**				38.2	6.83	0.5	2.0	406	5.1	1.33	COMBINES DP3-B & DP6-B
	DP8-B	G-B	2.15	0.69	14.9	1.48	5.92	8.7	14.9	1.48	5.92	**8.7**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN G-B CAPTURED IN TYPE R SUMP INLET
	DP9-B	H-B	4.12	0.57	17.5	2.33	5.52	12.9	17.5	2.33	5.52	**12.9**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN H-B CAPTURED IN TYPE R SUMP INLET
	DP10-B	DP8-B AND DP9-B							17.5	3.80	5.52	**21.0**				21.0	3.80	0.5	2.0	650	5.1	2.13	COMBINES DP8-B & DP9-B
	DP11-B	B-B	3.55	0.47	16.3	1.65	5.70	9.4	16.3	1.65	5.70	**9.4**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN B-B CAPTURED IN OPEN GRATE SUMP INLET
	DP12-B	I-B	0.76	0.64	11.1	0.49	6.67	3.3	11.1	0.49	6.67	**3.3**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN I-B CAPTURED IN TYPE R AT GRADE INLET
	DP13-B	L-B J-B	1.89 6.81	0.45 0.66	13.4 15.5	0.85 4.49	6.19 5.82	5.3 26.2	15.5	5.35	5.82	**31.1**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN L-B & BASIN J-B CAPTURED IN TYPE R SUMP INLET
	DP14-B	DP7-B, DP11-B, AND DP12-B							18.3	8.97	5.41	**48.5**				48.5	8.97	0.5	3.0	133	6.7	0.33	COMBINES DP7-B, DP11-B, & DP12-B
	DP15-B	M-B	1.46	0.64	12.8	0.94	6.32	5.9	12.8	0.94	6.32	**5.9**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN M-B CAPTURED IN TYPE R SUMP INLET
	DP16-B	DP13-B AND DP15-B							15.5	6.29	6.32	**39.7**				39.7	6.29	0.5	0.5	3	2.0	0.02	COMBINES DP13-B & DP15-B
	DP17-B	N-B	3.00	0.41	16.1	1.22	5.74	7.0	16.1	1.22	5.74	**7.0**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN N-B CAPTURED IN OPEN GRATE SUMP INLET
	DP18-B	DP14-B AND DP17-B							18.3	10.19	5.41	**55.1**											COMBINES DP17-B & DP14-B
	DP19-B	E-B	1.03	0.41	11.8	0.42	6.51	2.7	11.8	0.42	6.51	**2.7**				PIPE TRAVEL TIME INSIGNIFICANT							BASIN E-B CAPTURED IN OPEN GRATE SUMP INLET
	DP20-B	DP16-B AND DP19-B							15.6	6.71	5.82	**39.0**											COMBINES DP19-B & DP15-B
	DP21-B	DP18-B DP20-B O-B	1.18	0.47	18.3 15.6 7.6	10.19 6.71 0.56	7.61	4.2	18.3	17.45	5.41	**94.3**											**TOTAL FLOW TO BE DETAINED BY POND B**

APPENDIX C – HYDRAULIC CALCULATIONS
(TO BE PROVIDED WITH FDR)

APPENDIX D – WATER QUALITY & DETENTION

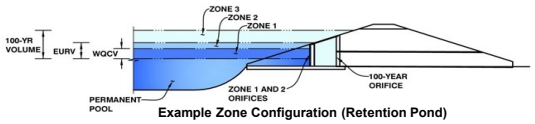
Note: Calculations provided are preliminary only and are subject to revisions and additional review at time of Final Drainage Report.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Grandview Reserve - Phase 2

Basin ID: Pond A



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	31.95	acres
Watershed Length =	2,977	ft
Watershed Length to Centroid =	1,283	ft
Watershed Slope =	0.018	ft/ft
Watershed Imperviousness =	49.00%	percent
Percentage Hydrologic Soil Group A =	10.0%	percent
Percentage Hydrologic Soil Group B =	90.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.542	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.683	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.93 in.) =	1.097	acre-feet	0.93 inches
5-yr Runoff Volume (P1 = 1.21 in.) =	1.555	acre-feet	1.21 inches
10-yr Runoff Volume (P1 = 1.46 in.) =	2.105	acre-feet	1.46 inches
25-yr Runoff Volume (P1 = 1.84 in.) =	3.229	acre-feet	1.84 inches
50-yr Runoff Volume (P1 = 2.15 in.) =	4.044	acre-feet	2.15 inches
100-yr Runoff Volume (P1 = 2.49 in.) =	5.086	acre-feet	2.49 inches
500-yr Runoff Volume (P1 = 3.35 in.) =	7.451	acre-feet	3.35 inches
Approximate 2-yr Detention Volume =	0.975	acre-feet	
Approximate 5-yr Detention Volume =	1.377	acre-feet	
Approximate 10-yr Detention Volume =	1.878	acre-feet	
Approximate 25-yr Detention Volume =	2.293	acre-feet	
Approximate 50-yr Detention Volume =	2.506	acre-feet	
Approximate 100-yr Detention Volume =	2.902	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.542	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.141	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.219	acre-feet
Total Detention Basin Volume =	2.902	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

6965.67

Depth Increment = 1.00 ft

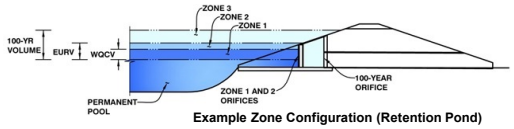
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	10	0.000		
6966	--	0.33	--	--	--	592	0.014	99	0.002
	--	1.50	--	--	--	11,497	0.264	7,171	0.165
	--	2.50	--	--	--	24,552	0.564	25,196	0.578
	--	3.50	--	--	--	34,874	0.801	54,909	1.261
	--	4.50	--	--	--	44,697	1.026	94,694	2.174
	--	5.50	--	--	--	53,878	1.237	143,982	3.305
6,972.17	--	6.50	--	--	--	62,472	1.434	202,157	4.641

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Grandview Reserve - Phase 2

Basin ID: Pond A



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.44	0.542	Orifice Plate
Zone 2 (EURV)	4.00	1.141	Orifice Plate
Zone 3 (100-year)	5.17	1.219	Weir&Pipe (Restrict)
Total (all zones)		2.902	

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

Underdrain Orifice Invert Depth = [ ] ft (distance below the filtration media surface)

Underdrain Orifice Diameter = [ ] inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = [ ] ft^2

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)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)

Depth at top of Zone using Orifice Plate = 4.00 ft (relative to basin bottom at Stage = 0 ft)

Orifice Plate: Orifice Vertical Spacing = 16.10 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	1.33	2.67					
Orifice Area (sq. inches)	2.60	4.00	4.00					

	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 =	4.02	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	5.00	N/A	feet
Overflow Grate Type =	Type C 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 =	4.02	N/A	feet
Overflow Weir Slope Length =	5.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	7.41	N/A	
Overflow Grate Open Area w/o Debris =	17.40	N/A	ft^2
Overflow Grate Open Area w/ Debris =	8.70	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 =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	16.80		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	2.35	N/A	ft^2
Outlet Orifice Centroid =	0.78	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.98	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage= 5.16 ft (relative to basin bottom at Stage = 0 ft)

Spillway Crest Length = 50.00 feet

Spillway End Slopes = 4.00 H:V

Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway

Spillway Design Flow Depth= 0.51 feet

Stage at Top of Freeboard = 6.67 feet

Basin Area at Top of Freeboard = 1.43 acres

Basin Volume at Top of Freeboard = 4.64 acre-ft

Routed Hydrograph Results

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

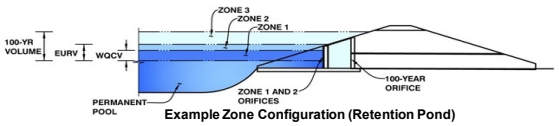
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.93	1.21	1.46	1.84	2.15	2.49	3.35
CUHP Runoff Volume (acre-ft) =	0.542	1.683	1.097	1.555	2.105	3.229	4.044	5.086	7.451
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.097	1.555	2.105	3.229	4.044	5.086	7.451
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	1.0	4.1	13.5	19.0	26.7	42.5
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.03	0.13	0.42	0.60	0.84	1.33
Peak Inflow Q (cfs) =	N/A	N/A	11.2	16.0	22.1	36.9	46.3	57.7	83.7
Peak Outflow Q (cfs) =	0.3	0.5	0.4	0.5	2.9	12.9	20.6	24.3	58.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.7	1.0	1.1	0.9	1.4
Structure Controlling Flow =	Plate	Plate	Plate	Plate	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	N/A	0.1	0.7	1.2	1.4	1.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	66	55	65	69	65	62	59	55
Time to Drain 99% of Inflow Volume (hours) =	**41**	71	59	69	76	74	73	71	68
Maximum Ponding Depth (ft) =	2.44	4.00	3.18	3.73	4.20	4.55	4.75	5.15	5.52
Area at Maximum Ponding Depth (acres) =	0.55	0.91	0.72	0.85	0.96	1.03	1.08	1.16	1.24
Maximum Volume Stored (acre-ft) =	0.545	1.689	1.009	1.451	1.867	2.215	2.426	2.874	3.330

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: Grandview Reserve Phase 2

Basin ID: Pond B



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	38.19	acres
Watershed Length =	2,173	ft
Watershed Length to Centroid =	1,171	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	43.00%	percent
Percentage Hydrologic Soil Group A =	10.0%	percent
Percentage Hydrologic Soil Group B =	90.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.597	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.743	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.93 in.) =	1.132	acre-feet	0.93	inches
5-yr Runoff Volume (P1 = 1.21 in.) =	1.625	acre-feet	1.21	inches
10-yr Runoff Volume (P1 = 1.46 in.) =	2.255	acre-feet	1.46	inches
25-yr Runoff Volume (P1 = 1.84 in.) =	3.602	acre-feet	1.84	inches
50-yr Runoff Volume (P1 = 2.15 in.) =	4.563	acre-feet	2.15	inches
100-yr Runoff Volume (P1 = 2.49 in.) =	5.816	acre-feet	2.49	inches
500-yr Runoff Volume (P1 = 3.35 in.) =	8.622	acre-feet	3.35	inches
Approximate 2-yr Detention Volume =	0.999	acre-feet		
Approximate 5-yr Detention Volume =	1.422	acre-feet		
Approximate 10-yr Detention Volume =	1.981	acre-feet		
Approximate 25-yr Detention Volume =	2.446	acre-feet		
Approximate 50-yr Detention Volume =	2.680	acre-feet		
Approximate 100-yr Detention Volume =	3.152	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.597	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.145	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.410	acre-feet
Total Detention Basin Volume =	3.152	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

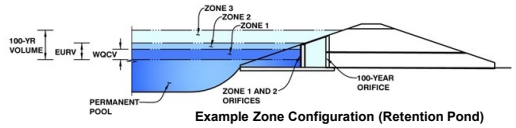
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
6931.67 **Top of Micropool**	--	0.00	--	--	--	10	0.000		
6932	--	0.33	--	--	--	100	0.002	18	0.000
6933	--	1.33	--	--	--	27,759	0.637	13,947	0.320
6934	--	2.33	--	--	--	31,266	0.718	43,460	0.998
6935	--	3.33	--	--	--	34,890	0.801	76,538	1.757
6,936.00	--	4.33	--	--	--	38,648	0.887	113,306	2.601
6937	--	5.50	--	--	--	42,535	0.976	160,799	3.691
6,938.00	--	6.00	--	--	--	47,426	1.089	183,289	4.208
6939	--	7.00	--	--	--	52,297	1.201	233,150	5.352

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Grandview Reserve Phase 2

Basin ID: Pond B



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.76	0.597	Orifice Plate
Zone 2 (EURV)	3.32	1.145	Orifice Plate
Zone 3 (100-year)	4.94	1.410	Weir&Pipe (Restrict)
Total (all zones)		3.152	

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

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	
Underdrain Orifice Diameter =		inches	

Calculated Parameters for Underdrain

Underdrain Orifice Area =		ft^2
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)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	
Depth at top of Zone using Orifice Plate =	3.32	ft (relative to basin bottom at Stage = 0 ft)	
Orifice Plate: Orifice Vertical Spacing =	13.30	inches	
Orifice Plate: Orifice Area per Row =	4.01	sq. inches (use rectangular openings)	

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.785E-02	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	1.11	2.21					
Orifice Area (sq. inches)	4.01	4.01	4.01					

	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 =	3.33	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	6.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Grate Type =	Type C 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 =	3.33	N/A	feet
Overflow Weir Slope Length =	6.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.49	N/A	
Overflow Grate Open Area w/o Debris =	25.06	N/A	ft^2
Overflow Grate Open Area w/ Debris =	12.53	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 =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	30.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	22.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	3.86	N/A	ft^2
Outlet Orifice Centroid =	1.02	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.06	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.80	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	26.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.92	feet
Stage at Top of Freeboard =	6.72	feet
Basin Area at Top of Freeboard =	1.17	acres
Basin Volume at Top of Freeboard =	5.02	acre-ft

Routed Hydrograph Results

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

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.93	1.21	1.46	1.84	2.15	2.49	3.35
CUHP Runoff Volume (acre-ft) =	0.597	1.743	1.132	1.625	2.255	3.602	4.563	5.816	8.622
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.132	1.625	2.255	3.602	4.563	5.816	8.622
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	1.6	6.5	20.7	29.1	40.4	63.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.04	0.17	0.54	0.76	1.06	1.67
Peak Inflow Q (cfs) =	N/A	N/A	13.4	19.4	27.8	48.4	61.3	77.1	112.6
Peak Outflow Q (cfs) =	0.3	0.6	0.4	0.5	4.6	20.2	32.1	37.1	79.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.7	1.0	1.1	0.9	1.2
Structure Controlling Flow =	Plate	Plate	Plate	Plate	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	N/A	0.2	0.8	1.3	1.5	1.6
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	68	56	66	70	67	64	61	55
Time to Drain 99% of Inflow Volume (hours) =	**40**	72	59	70	75	74	73	72	69
Maximum Ponding Depth (ft) =	1.76	3.32	2.41	3.04	3.55	3.96	4.20	4.76	5.40
Area at Maximum Ponding Depth (acres) =	0.67	0.80	0.72	0.78	0.82	0.86	0.88	0.92	0.97
Maximum Volume Stored (acre-ft) =	0.602	1.749	1.055	1.521	1.935	2.279	2.478	2.990	3.594

APPENDIX E – REFERENCES

HRGreen

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Only relevant sheets
from this report provided

Grandview Reserve
Master Development Drainage Plan

August 2021

HR Green Project No: 191850

Prepared For:

4 SITE INVESTMENTS, LLC

Mr. Peter Martz or Paul Howard

1271 Kelly Johnson Blvd., Ste. 100

Colorado Springs, CO 80920

719-499-8416

Prepared By:

HR Green Development, LLC

Contact: Chris McFarland, PE

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720-602-4956

Subbasin Description

The entire site drains in a south easterly direction and is divided into 8 major drainage basins and a total of 18 subbasins together as described below.

- Subbasin A1 is located in the southwestern corner of the site, to the south and west of MS. The basin drains towards the southeast to proposed detention pond A. Current planning documents call for medium density dwelling units and a small pocket park. The basin is 37.00 acres, with a composite impervious value of 35.22% and runoff rates for the 5 and 100 year of 30.72 cfs and 100.64 cfs respectively. The pond will discharge at predevelopment rates and into MS via the ponds outlet structure.
- Subbasin B1 is located between MS and MST2 to the east of subbasin A1. The basin drains towards the southeast and towards subbasin B2. Current planning documents call for medium density dwelling units and some parkland area. The basin is 37.00 acres, with a composite impervious value of 45.00% and runoff rates for the 5 and 100 year of 29.46 cfs and 97.08 cfs respectively.
- Subbasin B2 is located between MS and MST2 to the northeast of subbasin A1. The basin drains towards the southeast and towards Detention Pond B. Current planning documents call for medium density dwelling units. The basin is 24.89 acres, with a composite impervious value of 43.26% and runoff rates for the 5 and 100 year of 12.02 cfs and 42.26 cfs respectively.
- Subbasin B3 is located between MS and EF and to the northeast of east of basin B2. The existing MST2 tributary runs through the basin. The site drains towards the southeast and towards Detention Pond B. Current planning documents call for high, medium-high, and medium density dwelling units along with a pocket park. The basin is 118.90 acres, with a composite impervious value of 49.42% and runoff rates for the 5 and 100 year of 92.76 cfs and 295.27 cfs respectively.
- Subbasin C1 is located to the northeast of east of basin B1 and the existing MST2 tributary runs through the middle of the basin. The basin drains towards the southeast and towards Detention Pond C. Current planning documents call for an institutional parcel, medium and high density dwelling units and a pocket park. The basin is 77.83 acres, with a composite impervious value of 51.20% and runoff rates for the 5 and 100 year of 77.99 cfs and 238.03 cfs respectively.
- Subbasin D1 is located between MS and MST2 to the east of Basin B3 and adjacent to the MST2 channel. The basin drains towards the southeast and towards drainage basin D2. Current planning documents call for medium density dwelling units along with a pocket park. The basin is 24.33 acres, with a composite impervious value of 53.89% and runoff rates for the 5 and 100 year of 24.15 cfs and 70.07 cfs respectively.
- Subbasin D2 is located between MS and MST2 to the south of basins D1 and B3. The basin drains towards the southwest and towards detention pond D. Current planning documents call for high density dwelling units along with a pocket park and a commercial parcel. The basin is 77.90 acres, with a composite impervious value of 62.10% and runoff rates for the 5 and 100 year of 98.47 cfs and 252.18 cfs respectively.
- Subbasin E1 is located just east of EFT along the northern portion of the site. The basin drains towards the southeast and towards basins F3 and F4. Current planning documents call for low

slope, length, shape, impervious area, pervious depression storage area, and various infiltration rates. Tabular hydrographs are then computed and can be used in EPA SWMM. The CUHP results are included within Appendix B.

EPA SWMM was used to determine flow routing via the kinematic wave method. Subbasins were routed to their respective design points and detention ponds for both the developed and predeveloped condition to determine peak runoff amounts for the 5-year and 100-year storm events. Information from these models along with information and calculations performed in the Colorado Springs BMP spreadsheets was used to determine pond sizing calculations and release rates.

c. Basin Hydrology

A summary of the flows for both the predeveloped and developed cases for each basin, subbasin and Pond are found on next page along with the full computation found in Appendix B.

SWMM Basin and Pond Summary						
Basin Description	**Basin Area (ac)**	**% Impervious**	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**	**5 Year Pond Volume (ac-ft)**	**100 Year Pond Volume (ac-ft)**
A1	45.38	35.22%	30.72	100.64		
			Pond A		1.83	3.50
B1	37.00	45.00%	29.46	97.08		
B2	24.89	43.26%	12.02	42.26		
B3	118.90	49.42%	92.76	295.27		
			Pond B		5.90	19.00
C1	77.83	51.20%	77.99	238.03		
			Pond C		3.91	6.87
D1	24.33	44.14%	24.15	70.07		
D2	77.90	62.10%	98.47	252.18		
			Pond D		6.61	10.19
E1	88.60	19.54%	46.88	178.04		
			Pond E		1.96	2.44
F1	33.73	25.00%	16.28	58.95		
F2	67.64	51.39%	60.11	170.90		
F3	12.84	45.00%	11.36	32.93		
F4	51.81	46.54%	42.32	124.89		
			Pond F		7.38	12.62
G1	20.13	36.52%	13.78	43.95		
G2	15.14	25.00%	6.55	23.95		
			Pond G		0.72	2.03
H1	20.71	24.49%	5.68	27.62		
H2	18.55	43.68%	16.24	47.62		
H3	6.01	40.57%	5.21	15.60		
H4	27.65	38.24%	20.93	64.71		
			Pond H		2.93	6.17

IV. Hydraulic Analysis

a. Major Drainageways

In general, the site runoff flows towards the 4 major drainageways and in a southeasterly direction. These basins are described in more detail below:

Main Stem

The Main Stem (MS) is in the southwestern portion of the site. Offsite flows collect and are conveyed under Eastonville Road via a culvert. MS travels in a southeasterly direction and combines with the Main Stem Tributary #2 (MST2) just off site where it is then conveyed past Highway 24 via a culvert. An existing breached stock pond exists in the approximate center point of the channel within the site. Jurisdictional wetlands exist within this channel and the area is within a Zone A floodplain towards the southern portion of the site. This channel sees only intermittent flows at this time however once development occurs there may be a more constant baseflow.

Proposed improvements for MS include the removal of the breached stock pond berm and regrading of the affected stretch of channel to restore its historic state. Proposed flow rates through MS are not to exceed historic flowrates and as such, the remainder of the channel is to remain in its current state sans any preemptive check structures; modeling indicates the channel shall remain stable despite the removal of the existing berm.

Main Stem Tributary #2

MST2 crosses Eastonville road via an existing culvert and flows through the site in a southeasterly direction. Portions of this channel are within a mapped floodplain as shown in the existing FIRM Panel. Per a July email from the USACE this drainage channel was preliminarily determined to be a non-jurisdictional waters/wetland.

Proposed improvements for MST2 include the realignment of the channel, generally shifting the channel towards the west to accommodate the proposed land plan. There is to be a dedicated 100’ corridor in which the valley will meander. Preliminary analysis indicates the valley will have an average width of approximately 63’ at the elevation necessary to meet freeboard requirements; initial sizing approximates the bankfull width to be 6.8’. The valley and channel thalweg will generally follow the same profile, with some deviation as the bankfull channel meanders through the valley in turn decreasing the low flow channels average slope. The average valley profile is to be approximately 1% with a series of grade control structures to both decrease elevation and dissipate energy to meet natural channel criteria as outline in El Paso County criteria and agreed upon channel parameters.

East Fork Tributary

The East Fork tributary (EFT) crosses the north property line and flows are conveyed through the site via a natural channel. The channel has been mapped as a Zone A floodplain per the existing FIRM panel; it appears any hydraulic effects of the crossing at Eastonville Road was not accounted for in the floodplain delineation. While the current floodplain delineation shows the channel continuing through Highway 24, there is no existing crossing for this section of the drainage channel below Highway 24 and instead the flows are conveyed to the northeast towards the East Fork Upper (EF). Per a July email from the USACE this drainage channel was preliminarily determined to be a non-jurisdictional waters/wetland.

VI. Selected Plan

a. Plan Hydrology

This MDDP schematically addressed on-site and off-site drainage patterns using the existing topography and proposed land use plan for the overall drainage design. Individual preliminary and final drainage reports will better define the planning areas as the site is developed. These reports will include inlet design, storm sewer hydraulics, street design and other requirements typical of more detailed drainage reports.

The overall site is divided into 8 separate major basins, basins A-H and contribute to individual detention ponds for each major basin. Basin sizes range from 35 acres to 181 acres in size. Basins A, B, C and D drain and eventually discharge into the Main Stem and Main Stem Tributary #2. Basins E, F, G, and H drain towards the East Fork Drainage channel.

The sub-basins are described in additional detail above.

b. Detention Ponds

The site plans propose the construction of 8 separate full spectrum detention facilities.

- Pond A is located in the southwest corner of the site and discharges into the Main Stem drainageway. The pond is planned to store a maximum of 4.05 ac-ft during the 100 year event and have a peak outflow of 55.9 cfs which is slightly below the pre development peak outflow of 57.1 cfs. The 5 year storage volume is 2.46 ac-ft with a peak outflow of 3.7 cfs.

- Pond B is located to the east of Pond A and the Main Stem and discharges into the Main Stem Tributary #2. The pond is planned to store a maximum of 16.60 ac-ft during the 100 year event and have a peak outflow of 165.4 cfs which is slightly above the pre development peak outflow of 164.2 cfs. The 5 year storage volume is 8.44 ac-ft with a peak outflow of 2.6 cfs.

- Pond C is located near the center of the western portion of the site near the existing Main Stem Tributary #2. The pond discharges into a revised open channel to be designed and discharges to the Main Stem Tributary #2 which merges with the Main Stem Tributary just off site. The pond is planned to store a maximum of 6.91 ac-ft during the 100 year event and have a peak outflow of 119.2 cfs which is slightly below the pre development peak outflow of 120.2 cfs. The 5 year storage volume is 4.07 ac-ft with a peak outflow of 1.5 cfs.

- Pond D is located near the southern portion of the site adjacent to Highway 24. The pond discharges into the Main Stem right after the Main Stem and Main Stem Tributary #2 merge. The pond is planned to store a maximum of 9.41 ac-ft during the 100 year event and have a peak outflow of 154.4 cfs which equals the predevelopment peak flow rate. The 5 year storage volume is 6.28 ac-ft with a peak outflow of 2.0 cfs.

- Pond E is located in the middle of the site just east of the East Fork drainage way. The pond discharges into the East Fork drainageway. The pond is planned to store a maximum of 2.40 ac-ft during the 100 year event and have a peak outflow of 163.4 cfs which is greater than the pre

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HRGreen DRAWING PATH:J:\2019\191897.01\CAD\Dwgs\Exhibits\00-Drainage Basins-Overall-EXISTING.dwg

OFFSITE CONTRIBUTION
Q100 ~ 280 CFS
Q5 ~ 59 CFS
OFFSITE AREA ~0.44 SQUARE MILES
CN VALUE~56.49
SEE STREAMSTATS MAP

OFFSITE CONTRIBUTION
Q100 ~ 217 CFS
Q5 ~ 61 CFS
OFFSITE AREA ~0.22 SQUARE MILES
CN VALUE~54.53
SEE STREAMSTATS MAP

OFFSITE CONTRIBUTION
Q100 ~ 595 CFS
Q5 ~ 180 CFS
OFFSITE AREA ~0.84 SQUARE MILES
CN VALUE~58.28
SEE STREAMSTATS MAP

OFFSITE CONTRIBUTION
Q100 ~ 413 CFS
Q5 ~ 67 CFS
OFFSITE AREA ~0.17 SQUARE MILES
CN VALUE ~55.04
SEE STREAMSTATS MAP

EASTONVILLE ROAD

EAST FORK

EAST FORK TRIBUTARY

MAIN STEM TRIBUTARY NUMBER 2

MAIN STEM

EXISTING 24" CMP CULVERT

EXISTING 24" CMP CULVERT

EXISTING 18" CMP CULVERT

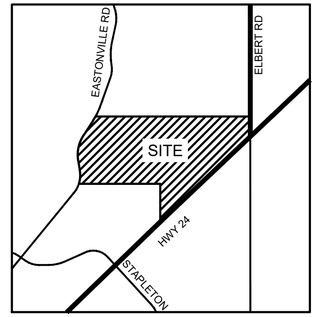
EXISTING 24" CMP CULVERT

STATE HIGHWAY 24

EXISTING BRIDGE

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

Basin	Design Point	5 Year Pre Devlopment	100 Year Pre Development
	66	16.46	86.73
	67	51.47	269.52
G1	70	5.57	28.46
G2	71	3.87	20.06
	72	3.87	20.06
	73	3.87	20.06
	74	9.42	48.48
H1	80	1.85	21.89
H2	81	5.37	27.12
H3	82	1.92	9.51
H4	83	8.07	40.86
	84	7.22	49.01
	85	1.92	9.51
OS1	OS1	67.00	413.00
OS2	OS2	59.00	280.00
OS3	OS3	61.00	217.00
OS4	OS4	180.00	595.00
	Outfall1	80.03	479.80
	Outfall2	85.96	597.41
	Outfall3	30.00	154.35
	Outfall4	341.05	1335.77



VICINITY MAP

LEGEND:

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

LAND USE

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

NOTES:

NORTH

0 200

100

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

EXISTING EX1

FIG.EX1

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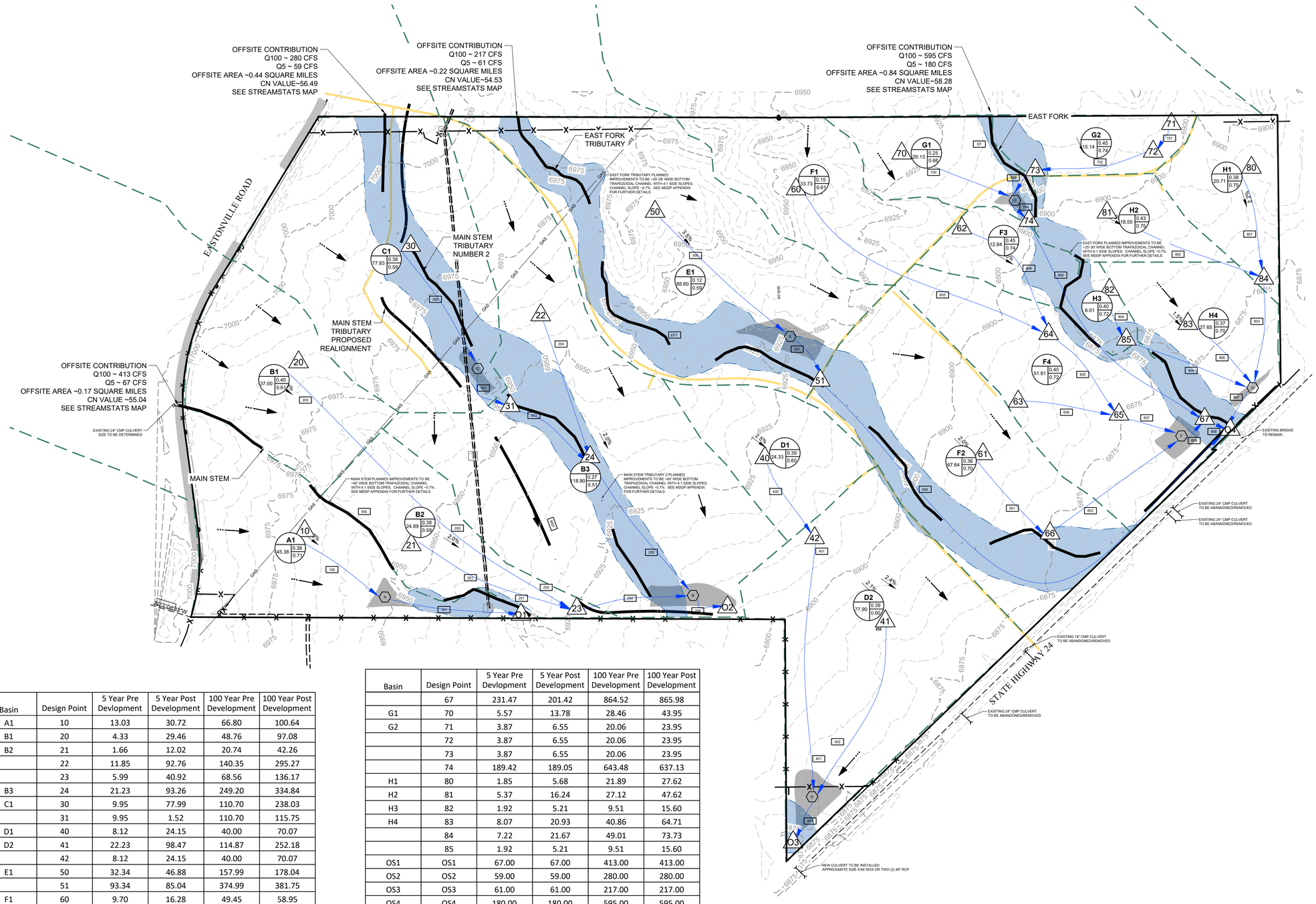
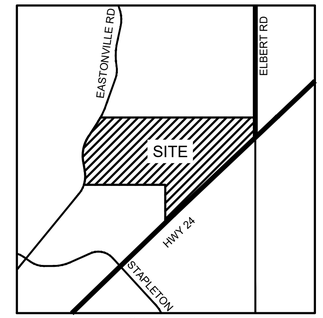


Basin	Design Point	5 Year Pre Devlopment	5 Year Post Development	100 Year Pre Development	100 Year Post Development
A1	10	13.03	30.72	66.80	100.64
B1	20	4.33	29.46	48.76	97.08
B2	21	1.66	12.02	20.74	42.26
	22	11.85	92.76	140.35	295.27
	23	5.99	40.92	68.56	136.17
B3	24	21.23	93.26	249.20	334.84
C1	30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

Basin	Design Point	5 Year Pre Devlopment	5 Year Post Development	100 Year Pre Development	100 Year Post Development
	67	231.47	201.42	864.52	865.98
G1	70	5.57	13.78	28.46	43.95
G2	71	3.87	6.55	20.06	23.95
	72	3.87	6.55	20.06	23.95
	73	3.87	6.55	20.06	23.95
	74	189.42	189.05	643.48	637.13
H1	80	1.85	5.68	21.89	27.62
H2	81	5.37	16.24	27.12	47.62
H3	82	1.92	5.21	9.51	15.60
H4	83	8.07	20.93	40.86	64.71
	84	7.22	21.67	49.01	73.73
	85	1.92	5.21	9.51	15.60
OS1	OS1	67.00	67.00	413.00	413.00
OS2	OS2	59.00	59.00	280.00	280.00
OS3	OS3	61.00	61.00	217.00	217.00
OS4	OS4	180.00	180.00	595.00	595.00
	Outfall1	80.03	67.69	479.80	466.95
	Outfall2	85.96	61.68	597.41	536.11
	Outfall3	30.00	8.58	154.35	160.70
	Outfall4	341.05	276.10	1335.77	1291.25



VICINITY MAP

LEGEND:

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

LAND USE

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

NOTES:

PRELIMINARY CHANNEL GEOMETRY (BY OTHERS)

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

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

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

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

NORTH
0 400
200

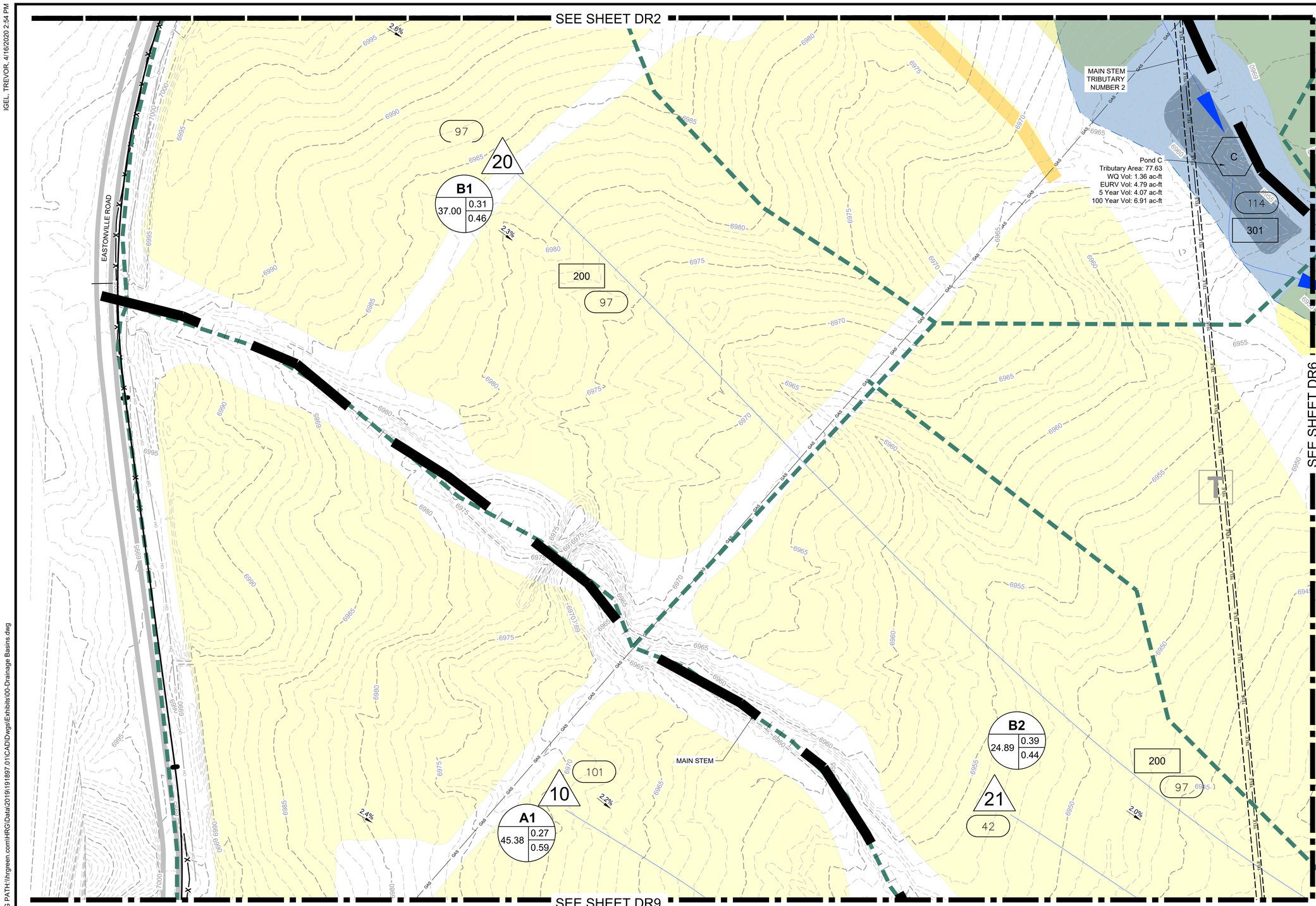
HRGreen

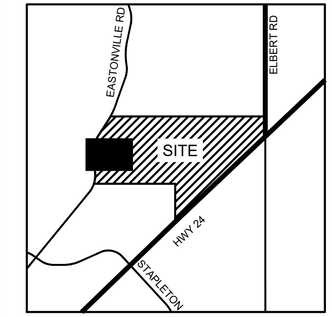
Job No.:	191897.01
Prepared By:	TBI
Date:	04/14/2020

PROPOSED DR1

FIG.DR1

HRGreen DRAWING PATH:J:\2019\191897.01\CAD\Dwgs\Exhibits\00-Drainage Basins-Overall.dwg





VICINITY MAP

LEGEND:

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

LAND USE

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

NOTES:

NORTH

0 50 100

HRGreen

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

PROPOSED DR5

FIG.DR5

IGEL, TREVOR, 4/16/2020 2:54 PM

HRGreen DRAWING PATH:\\hrgreen.com\HRG\Data\2019\191897.01\CAD\Dwgs\Exhibits\00-Drainage Basins.dwg

IGEL, TREVOR, 4/16/2020 2:57 PM

SEE SHEET DR6

SEE SHEET DR9

SEE SHEET DR11

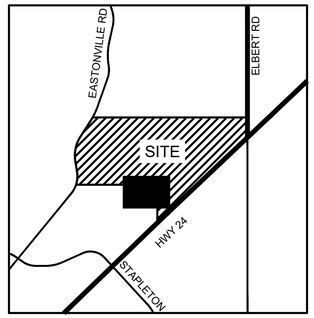
MAIN STEM TRIBUTARY NUMBER 2

Pond B
Tributary Area: 180.79
WQ Vol: 2.41 ac-ft
EURV Vol: 5.73 ac-ft
5 Year Vol: 6.04 ac-ft
100 Year Vol: 15.28 ac-ft

205
267
200
42
97
201
54
23
O1
202
136
B
164
206
O2
101
401
69
402
252

1.5%
2.2%
1.8%
1.7%

6935 6930 6925 6920 6915 6910 6905 6900 6895 6890 6885



VICINITY MAP

LEGEND:

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

LAND USE

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

NOTES:

NORTH

0 100
50

HRGreen

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

PROPOSED DR10

FIG.DR10

HRGreen DRAWING PATH:\\hrgreen.com\HRG\Data\2019\191897.01\CAD\Dwgs\Exhibits\00-Drainage Basins.dwg

HRGreen

HRGREEN.COM

Only relevant sheets from this report provided

Eastonville Road – Londonderry Dr. to Rex Rd.
Segment 2 Improvements
Stationing 47+00.00 – 79+31.62

Final Drainage Report

January 2024

HR Green Project No: 201662.08

Prepared For:

D.R. Horton

Contact: Riley Hillen, P.E.

9555 S. Kingston Ct.

Englewood, CO 80112

Prepared By:

HR Green Development, LLC

Contact: Colleen Monahan, P.E., LEED AP

cmonahan@hrgreen.com

(719) 394-2433

pavement roadway with 4' wide sand shoulders and weedy swales located on both sides of the roadway. Offsite stormwater is bypassed under the road through a series of existing culverts.

The proposed improvements from Rex Road south to the southern property line of the proposed Grandview Reserve Filing 1 include removal of the 26' wide temporary pavement and replacing the road with a Modified Urban Minor Arterial Roadway Cross-Section consisting of 48' pavement and Type A EPC curb (53' back of curb to back of curb). This includes Basins EA1-EA11.

Refer to the Eastonville Road Segment 1 improvements FDR for subbasin information and calculations south of subbasins EA10 & EA11.

Eastonville Road Basins

Basin EA1 is 0.22 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.7 cfs Q_{100} = 1.3 cfs) is conveyed in curb and gutter to DP2. Flows at DP2 are captured in a 5' Type R sump inlet (Public) and piped to Pond A Sand Filter. Basin EA1 will be detained Pond A Sand Filter.

Basin EA2 is 0.25 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.8 cfs Q_{100} = 1.5 cfs) is conveyed in curb and gutter to DP3. Flows at DP3 are captured in a 5' Type R sump inlet (Public) and piped to Pond A. Basin EA2 will be detained Pond A Sand Filter.

Basin EA3 is 0.20 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.7 cfs Q_{100} = 1.4 cfs) is conveyed in curb and gutter to DP5. Flows at DP5 are captured in a 10' Type R sump inlet (Public) and piped to DP9.1. Basin EA3 will not be detained per the Meridian Ranch MDDP as this basin has been over-detained within Meridian Ranch.

Basin EA4 is 0.17 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 0.5 cfs Q_{100} = 1.1 cfs) is conveyed in curb and gutter to DP6. Flows at DP6 are captured in a 5' Type R sump inlet (Public) and piped to DP9.1. Basin EA4 will not be detained per the Meridian Ranch MDDP as this basin has been over-detained within Meridian Ranch.

Basin EA5 is 0.16 acres of undeveloped area and includes Pond A Sand Filter. Stormwater (Q_5 = 0.1 cfs Q_{100} = 0.4 cfs) is flows directly into Pond A Sand Filter.

Basin EA6 is 0.70 acres of undeveloped area that will be future roadway (Rex Road) once the Grandview Filing 1 development is constructed. Stormwater (Q_5 = 3.1 cfs Q_{100} = 5.5 cfs) is conveyed in a swale to DP10: Temporary Sediment Basin #1 (TSB #1). TSB #1 has been sized for the paved area of the roundabout and the future paved area of Rex Road within Basin EA6. The swale will be removed with the construction of Rex Road curb and gutter. Basin EA6 will be detained in TSB #1.

Basin EA7 is 0.65 acres of undeveloped area that will be future roadway (Rex Road) once the Grandview Filing 1 development is constructed. Stormwater (Q_5 = 2.5 cfs Q_{100} = 4.7 cfs is conveyed in a swale to DP10: Temporary Sediment Basin #1 (TSB #1). TSB #1 has been sized for the paved area of the roundabout and the future paved area of Rex Road within Basin EA7. The swale will be removed with the construction of Rex Road curb and gutter. Basin EA7 will be detained in TSB #1.

Basin EA8 is 2.08 acres of proposed roadway (Modified Urban Minor Arterial Roadway Cross-Section). Stormwater (Q_5 = 5.0 cfs Q_{100} = 9.0 cfs) is conveyed in curb and gutter to DP14. Flows at DP14 are captured in a 10' Type R sump inlet (Public) and piped to Pond B. Basin EA8 will be detained Pond B Full Spectrum Detention Basin.

HRGreen	**EASTONVILLE ROAD SEG 2**	**Calc'd by:**	**SPC**
	PROPOSED CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**2/2/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
EA1	0.22	73	0.8	1.5
EA2	0.25	72	0.9	1.7
EA3	0.20	70	0.7	1.3
EA4	0.17	65	0.5	1.1
EA5	0.16	0	0.1	0.4
EA6	0.70	100	3.2	5.3
EA7	0.65	89	2.6	4.8
EA8	2.08	99	5.2	8.8
EA9	2.99	63	5.0	10.4
EA10	0.16	75	0.6	1.1
EA11	0.15	67	0.5	1.0
*G18	321.53	-	28.3	365.2
*FG36	18.88	-	1.7	18.8
OS3	1.00	2	0.3	2.2
OS4	9.60	9	4.8	21.6
*G16	131.26	-	6.1	112.1
*G06	832.70	-	22.4	491.0
OS7	11.42	2	3.6	24.4

* AREA AND Q TAKEN FROM THE SANCTUARY FILING 1 FDR

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
1	G18	28.3	365.2
2	FG36	1.7	18.8
2.1	EA1	0.8	1.5
3	G16	6.1	112.1
3.1	EA2, DP2.1	1.6	3.2
4	G06	22.4	491.0
4.1	EA5, DP3.1	1.7	3.4
5	EA3	0.7	1.3
6	DP5, EA4	1.2	2.4
6.1	DP6, DP8	2.9	22.4
7	OS3	0.3	2.2
8	DP2, DP7	2.0	21.0
9	DP6.1	2.9	22.4
10	EA6, EA7	5.6	9.9
11	OS4, DP9	7.5	44.0
12	OS7	3.6	24.4
13	DP2, DP12	26.0	515.3
14	EA8	5.2	8.8
15	EA9	5.0	10.4
15.1	DP14, DP15	10.2	19.1
16.1	EA10	0.6	1.1
17.1	EA11	0.5	1.0

EASTONVILLE ROAD SEG 2
PROPOSED CONDITIONS
EL PASO COUNTY, CO

Calc'd by: SPC

Checked by: CM

Date: 11/27/2023

SOIL TYPE: HSG A&B

COMPOSITE 'C' FACTORS

	LAND USE TYPE															TOTAL	COMPOSITE IMPERVIOUSNESS & C FACTOR		
	Paved			Historic Flow Analysis-- Greenbelts, Agriculture			Lawns			Land Use Undefined			Land Use Undefined						
	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5	C_{100}				
	100	0.90	0.96	2	0.09	0.36	0	0.08	0.35	0	0.00	0.00	0	0.00	0.00				
BASIN	ACRES			ACRES			ACRES			ACRES			ACRES			ACRES	%I	C_5	C_{100}
EA1	0.16						0.06									0.22	73	0.68	0.79
EA2	0.18						0.07									0.25	72	0.67	0.79
EA3	0.14						0.06									0.20	70	0.65	0.78
EA4	0.11						0.06									0.17	65	0.61	0.74
EA5	0.00						0.16									0.16	0	0.08	0.35
EA6	0.70						0.00									0.70	100	0.90	0.96
EA7	0.58						0.07									0.65	89	0.81	0.89
EA8	2.06						0.02									2.08	99	0.89	0.95
EA9	1.88						1.11									2.99	63	0.60	0.73
EA10	0.12						0.04									0.16	75	0.70	0.81
EA11	0.10						0.05									0.15	67	0.63	0.76
G18																321.53			
FG36																18.88			
OS3				1.00												1.00	2	0.09	0.36
OS4	0.70			8.90												9.60	9	0.15	0.40
G16																131.26			
G06																832.70			
OS7				11.42												11.42	2	0.09	0.36
Pond A	0.34			0.00			0.29									0.63	54	0.52	0.68

HRGreen	**EASTONVILLE ROAD SEG 2**	**Calc'd by:**	**SPC**
	PROPOSED CONDITIONS	**Checked by:**	**CM**
	EL PASO COUNTY, CO	**Date:**	**2/2/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)
EA1	0.68	0.22	34	2.0	3.6	20	137	1.4	2.4	1.0	5.0
EA2	0.67	0.25	34	2.0	3.6	20	60	1.4	2.4	0.4	5.0
EA3	0.65	0.20	34	2.0	3.8	20	126	1.4	2.4	0.9	5.0
EA4	0.61	0.17	34	2.0	4.2	20	126	3.8	3.9	0.5	5.0
EA5	0.08	0.16	20	2.0	6.6	20	20	33.0	11.5	0.0	6.7
EA6	0.90	0.70	26	2.0	1.5	20	630	1.7	2.6	4.0	5.5
EA7	0.81	0.65	24	2.0	2.1	20	630	1.7	2.6	4.0	6.1
EA8	0.89	2.08	26	2.0	1.5	20	2500	0.7	1.7	24.9	26.4
EA9	0.60	2.99	26	2.0	3.7	20	2500	0.7	1.7	24.9	28.6
EA10	0.70	0.16	26	2.0	3.0	20	157	0.6	1.5	1.7	5.0
EA11	0.63	0.15	26	2.0	3.5	20	157	0.6	1.5	1.7	5.2
G18											
FG36											
OS3	0.09	1.00	220	2.1	21.4	10	345	2.3	1.5	3.8	25.2
OS4	0.15	9.60	153	3.1	14.8	10	1124	2.5	1.6	11.8	26.6
G16											
G06											
OS7	0.09	11.42	200	11.6	11.6	10	675	3.4	1.8	6.1	17.7

FORMULAS:

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L}}{S^{0.33}} \qquad V = C_v S_w^{0.5}$$

Table 6-7. Conveyance Coefficient, C_v

Type of Land Surface	C_v
Heavy meadow	2.5
Tillage/field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

* For buried riprap, select C_v value based on type of vegetative cover.

Grandview Reserve CLOMR Report

Introduction

This report was prepared by HR Green to support the submission of MT-2 forms and documents in a request for a Conditional Letter of Map Revision (CLOMR) for channel improvements along Geick Ranch Tributary 2. This request impacts the current delineation of the 100-year boundary on Flood Insurance Rate Maps (FIRMs) 08041C0552G and 08041C0556G.

Grandview Reserve is located in Falcon, Colorado within El Paso County and contains approximately 776 acres within the south half of section 21 and 22 and the north half of section 27 and 28, Township 12 South, and Range 66 West of the Sixth Principal Meridian in Ela Paso County, Colorado.

Grandview Reserve (GVR) falls within the Gieck Ranch Drainage Basin which covers approximately 22 square miles. This drainage basin is tributary to Black Squirrel Creek and joins said creek just to the south of Ellicott, CO about 18 miles to the south. Black Squirrel Creek eventually drains to the Arkansas River in Pueblo Colorado. Much of the Gieck Ranch Drainage basin is undeveloped and consists of rural farmland. The Gieck Ranch Drainage basin lies north of the Haegler Ranch drainage basin. The channels through the Grandview property can all be described as gently sloping drainages that roll through the site towards the creeks to which they are tributary.

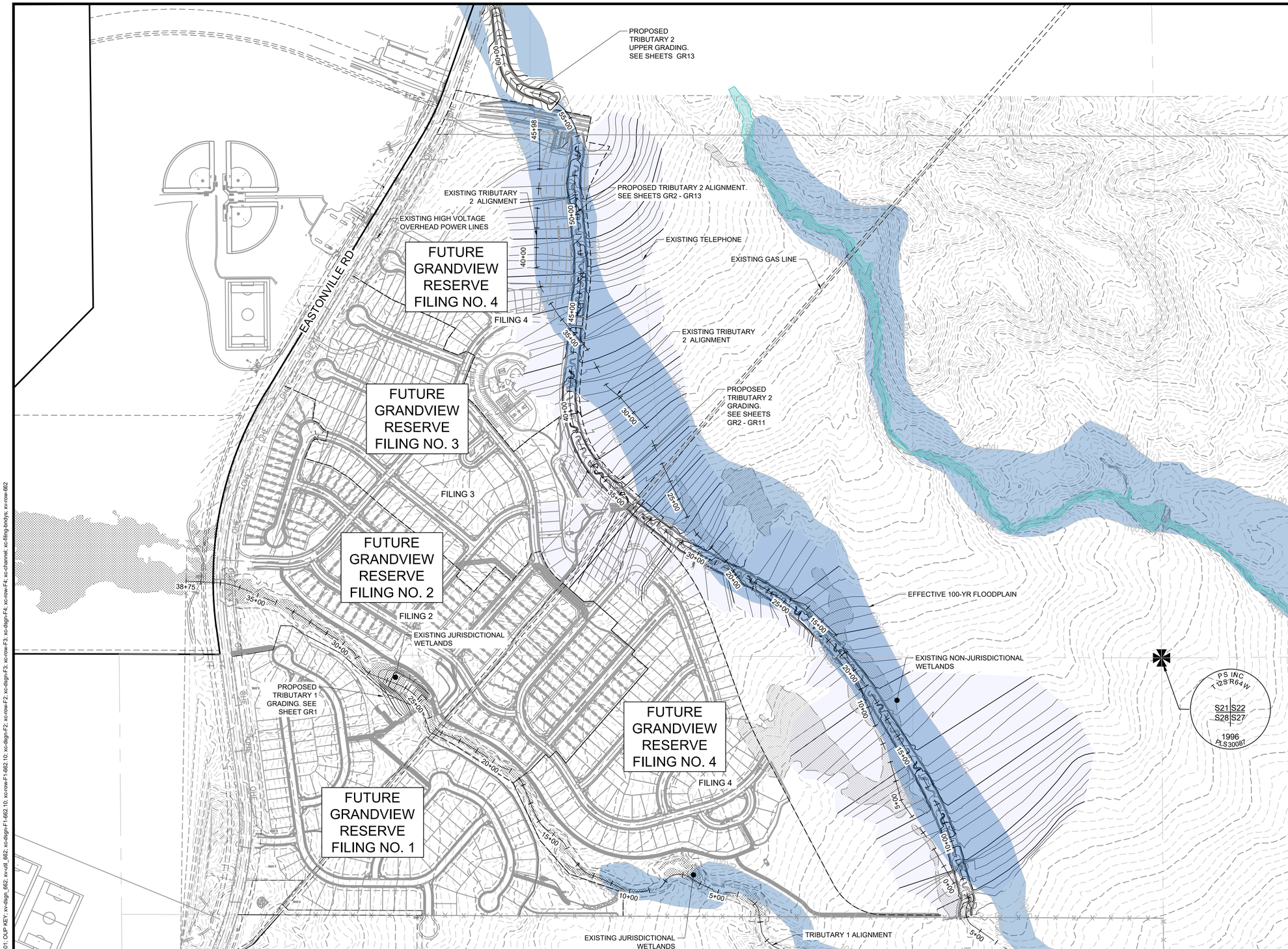
Per the NRCS web soil survey, the site is made up entirely of Type A and B soils. The majority of which are Type B soils. The vegetation found within Grandview Reserve consists of wetland communities in the floodplain with a transitional area to shortgrass prairie communities that dominate the site. The primary species found in the shortgrass prairie regions include little bluestem, blue grama, and buffalograss. The transitional area between the wetlands and shortgrass prairie includes patches of snowberry, and wood's rose. There are a few plains cottonwoods along the main channels. The area has historically been heavily grazed and there are weeds throughout the site. Weeds found onsite include Canada thistle, Russian thistle, common mullein and yellow toadflax spp.

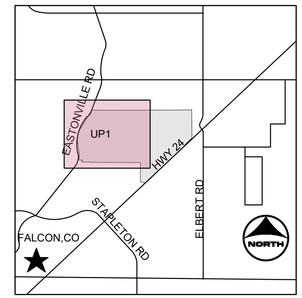
Observations of the existing channels suggest that they are at equilibrium with their watershed flows; evidence including relatively stable bank full channels, adequate floodplain (above bank full channel elevations) and in-tact plant communities that would be expected in this type of reach support the notion that the reach is in equilibrium.

At present, the preliminary analysis and design of Geick Ranch Tributary 2 (GRT2) has been completed. Proposed improvements for Geick Ranch Tributary 2 include refinement of the existing channel alignment and a stabilizing natural stream design that will allow a more predictable floodplain. There is to be a dedicated 100' wide corridor in which the channel valley will meander. The valley is the area needed to fully contain the 100-year event. Preliminary analysis indicates the valley will have an average width of approximately 63'; initial sizing approximates the bank full width to be 8.8' – 13.8'. The valley and channel thalweg will generally follow the same profile, with some deviation as the bank full channel meanders through the valley in turn decreasing the low flow channels average slope. The average valley profile is to be approximately 0.9% with a series of grade control structures to both decrease elevation and dissipate energy to meet natural channel criteria as outlined in El Paso County criteria.

Hydrology

El Paso County criteria states that all developments are required to detain storm flows down to their historic peaks. For this reason GRT2 has been designed using the flows that drain to it in the existing conditions.





KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- EXISTING EASEMENT
- EXISTING GAS LINE
- EXISTING TELEPHONE LINE
- EXISTING FENCE LINE
- EXISTING SECTION LINE
- EXISTING SWALE
- EXISTING OVERHEAD ELECTRIC
- EXISTING TELEPHONE POLE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED 100-YR FLOODPLAIN
- EXISTING 100-YR FLOODPLAIN
- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.
2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PANZA 37081 07-26-22 PROFESSIONAL ENGINEER

DRAWN BY: TBI	JOB DATE: 5/22/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
APPROVED: GLP	JOB NUMBER: 201662.03		
CAD DATE: 3/8/2024			
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\OUP			

NO.	DATE	BY	REVISION DESCRIPTION

HRGreen

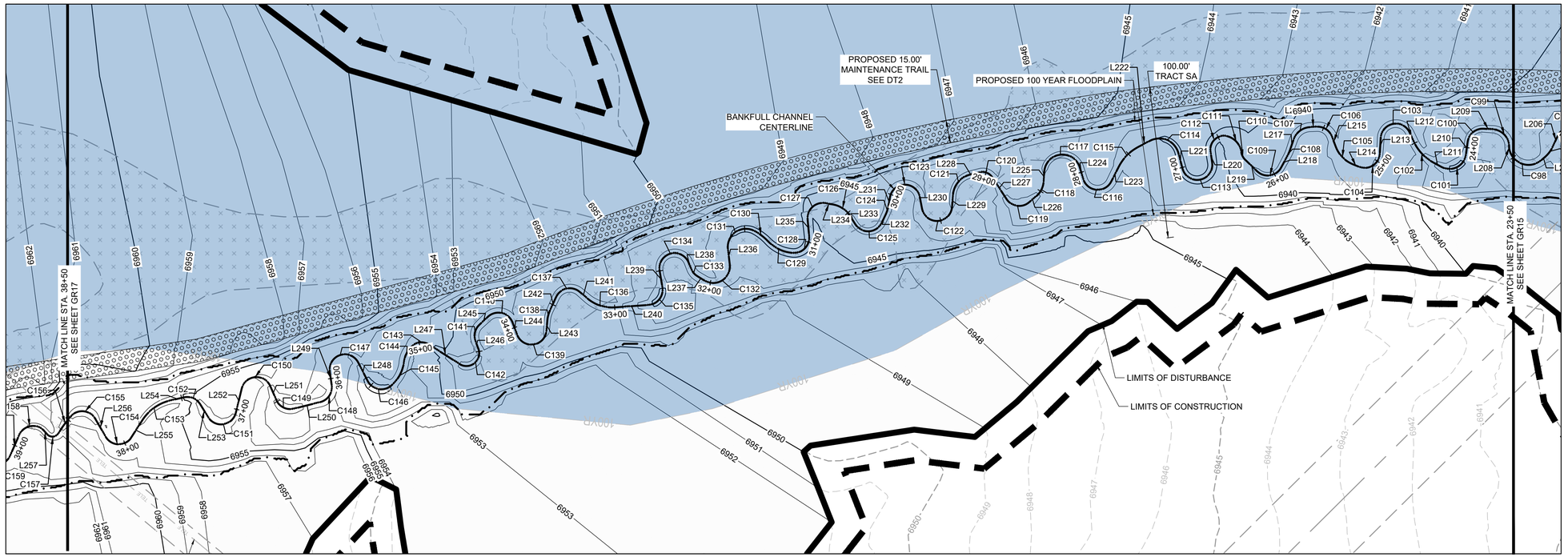
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
OVERALL UTILITY PLAN

SHEET UP1 04

HR GREEN Xrefs: xgt-1-dh01; OUP KEY: xv-dsgn_662; xv-util_662; xc-dsgn-F1-662.10; xc-row-F1-662.10; xc-dsgn-F2; xc-row-F2; xc-dsgn-F3; xc-row-F3; xc-dsgn-F4; xc-row-F4; xc-channel; xc-filing-bndys; xv-row-662



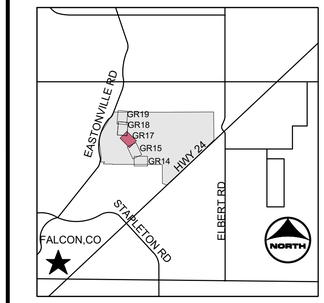
TRIBUTARY 2 UPSTREAM | TRIBUTARY 2 UPSTREAM | TRIBUTARY 2 UPSTREAM | TRIBUTARY 2 UPSTREAM

LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L208	1.73		N41° 53' 24.03"E	
C99	17.18	11.42	N1° 13' 02.63"E	15.61
L209	6.08		N41° 50' 45.40"W	
C100	14.93	10.00	N84° 36' 57.43"W	13.58
L210	8.40		S52° 36' 50.54"W	
C101	21.26	11.00	N72° 00' 20.89"W	18.10
L211	6.02		N16° 37' 32.32"W	
C102	19.50	30.00	N1° 59' 34.48"E	19.16
L212	6.39		N20° 36' 40.80"E	
C103	26.57	10.00	N55° 30' 50.85"W	19.42
L213	10.38		S48° 21' 37.51"W	
C104	19.05	10.00	N77° 03' 24.45"W	16.30
L214	4.49		N22° 28' 26.42"W	
C105	16.30	20.00	N0° 52' 04.01"E	15.85
L215	7.35		N24° 12' 34.43"E	
C106	12.68	10.00	N12° 07' 40.58"W	11.85
L216	4.63		N48° 27' 55.60"W	
C107	14.10	12.00	N82° 08' 01.06"W	13.31
L217	7.48		S64° 11' 53.48"W	
C108	5.01	30.06	S68° 58' 34.98"W	5.00
L218	8.03		S73° 31' 44.52"W	
C109	18.41	10.00	N53° 43' 58.80"W	15.92
L219	10.16		N0° 59' 42.13"W	
C110	6.71	8.87	N15° 30' 59.41"E	6.55
C111	15.56	12.49	N1° 33' 53.25"E	14.58
C112	17.28	9.02	S88° 33' 46.47"W	14.76
L220	6.95		S36° 36' 49.17"W	
C113	30.29	10.00	N56° 37' 28.74"W	19.97
L221	10.63		N30° 08' 14.43"E	

LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C114	23.32	13.00	N21° 15' 09.13"W	20.32
L222	8.89		N72° 38' 32.69"W	
C115	18.57	30.00	S89° 37' 21.45"W	18.28
L223	10.97		S71° 53' 15.59"W	
C116	23.85	10.00	N39° 46' 52.01"W	18.59
L224	7.78		N28° 32' 58.51"E	
C117	33.50	12.00	N51° 25' 50.20"W	23.63
L225	6.48		S48° 35' 21.08"W	
C118	11.32	14.00	S71° 45' 22.12"W	11.02
L226	6.19		N85° 04' 36.85"W	
C119	16.12	10.01	N38° 54' 34.31"W	14.43
L227	18.94		N11° 39' 57.18"E	
C120	8.87	7.66	N28° 37' 10.59"W	8.39
L228	5.88		N57° 56' 20.06"W	
C121	19.07	15.00	S85° 38' 25.55"W	17.81
L229	7.91		S49° 13' 09.23"W	
C122	28.76	10.00	N48° 23' 34.94"W	19.82
L230	7.92		N33° 59' 40.88"E	
C123	27.69	10.00	N45° 19' 19.11"W	19.65
L231	6.44		S55° 21' 40.89"W	
C124	5.15	20.00	S62° 44' 22.73"W	5.14
L232	6.17		S70° 07' 03.81"W	
C125	21.42	10.00	N48° 30' 32.07"W	17.56
L233	6.32		N12° 51' 50.87"E	
C126	14.36	17.00	N11° 20' 32.97"W	13.94
L234	4.96		N35° 32' 56.81"W	
C127	18.28	10.00	N87° 55' 40.41"W	15.84
L235	11.09		S39° 41' 37.22"W	
C128	18.49	10.13	N87° 52' 25.26"W	16.03

LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C129	17.56	25.25	N18° 38' 53.36"W	17.21
C130	12.52	34.40	N9° 02' 14.74"W	12.45
C131	24.08	11.98	N80° 39' 48.26"W	20.23
L236	10.86		S38° 07' 07.02"W	
C132	24.70	11.00	N77° 33' 02.36"W	19.83
L237	5.56		N13° 13' 11.74"W	
C133	6.28	10.00	N4° 46' 29.57"E	6.18
L238	4.58		N22° 46' 10.88"E	
C134	29.21	10.00	N60° 55' 11.65"W	19.88
L239	11.08		S35° 23' 25.82"W	
C135	16.69	10.00	S83° 12' 10.72"W	14.82
L240	22.46		N48° 59' 05.72"W	
C136	19.46	25.00	N26° 41' 15.43"W	18.97
L241	6.51		N4° 23' 25.15"W	
C137	18.49	10.00	N57° 22' 01.09"W	15.97
L242	9.62		S69° 39' 22.97"W	
C138	6.95	20.00	S59° 42' 29.37"W	6.91
L243	6.80		S49° 45' 35.79"W	
C139	26.96	10.00	N52° 59' 53.73"W	19.51
L244	8.77		N24° 14' 35.42"E	
C140	19.62	10.00	N31° 58' 39.54"W	16.62
L245	7.77		N88° 11' 54.49"W	
C141	11.68	10.00	S58° 20' 24.97"W	11.03
L246	4.56		S24° 52' 44.43"W	
C142	20.88	8.44	S89° 22' 23.65"W	15.95
L247	24.22		N12° 38' 45.62"W	
C143	11.75	8.95	N44° 25' 39.16"W	10.92
C144	14.21	17.19	S72° 27' 21.39"W	13.81
C145	17.07	24.50	S74° 40' 14.78"W	16.72

LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C146	18.13	10.00	N34° 01' 03.83"W	15.75
L248	13.71		N17° 55' 53.54"E	
C147	28.09	10.00	N62° 32' 31.87"W	19.72
L249	9.08		S36° 59' 02.72"W	
C148	14.66	10.00	S78° 58' 38.11"W	13.38
L250	17.98		N59° 01' 48.57"W	
C149	14.28	10.00	N18° 08' 03.26"W	13.10
L251	9.68		N21° 32' 16.30"E	
C150	24.93	10.00	N49° 52' 37.35"W	18.96
L252	16.41		S58° 42' 29.00"W	
C151	23.51	10.00	N53° 56' 30.21"W	18.46
L253	10.05		N13° 24' 30.57"E	
C152	12.41	10.00	N22° 09' 24.69"W	11.63
L254	9.00		N57° 43' 19.96"W	
C153	24.24	30.00	N80° 52' 06.53"W	23.58
L255	13.93		S77° 44' 49.86"W	
C154	19.03	10.00	N39° 33' 47.95"W	16.29
L256	13.71		N14° 57' 35.33"E	
C155	16.88	10.00	N33° 23' 36.03"W	14.95



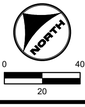
KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- SECTION LINE
- EXISTING EASEMENT
- EXISTING FENCE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 5250 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- CONSTRUCTION EASEMENT
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- LIMITS OF DISTURBANCE
- PROPOSED 100-YR FLOODPLAIN
- EFFECTIVE 100-YR FLOODPLAIN
- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL
- PROPOSED MAINTENANCE TRAIL

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.
2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33



811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PAYNE 37081 PROFESSIONAL ENGINEER 12-04-23

DRAWN BY: ACH | JOB DATE: 11/29/2023
APPROVED: GLP | JOB NUMBER: 201662.03
CAD DATE: 11/30/2023
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\GRADING

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

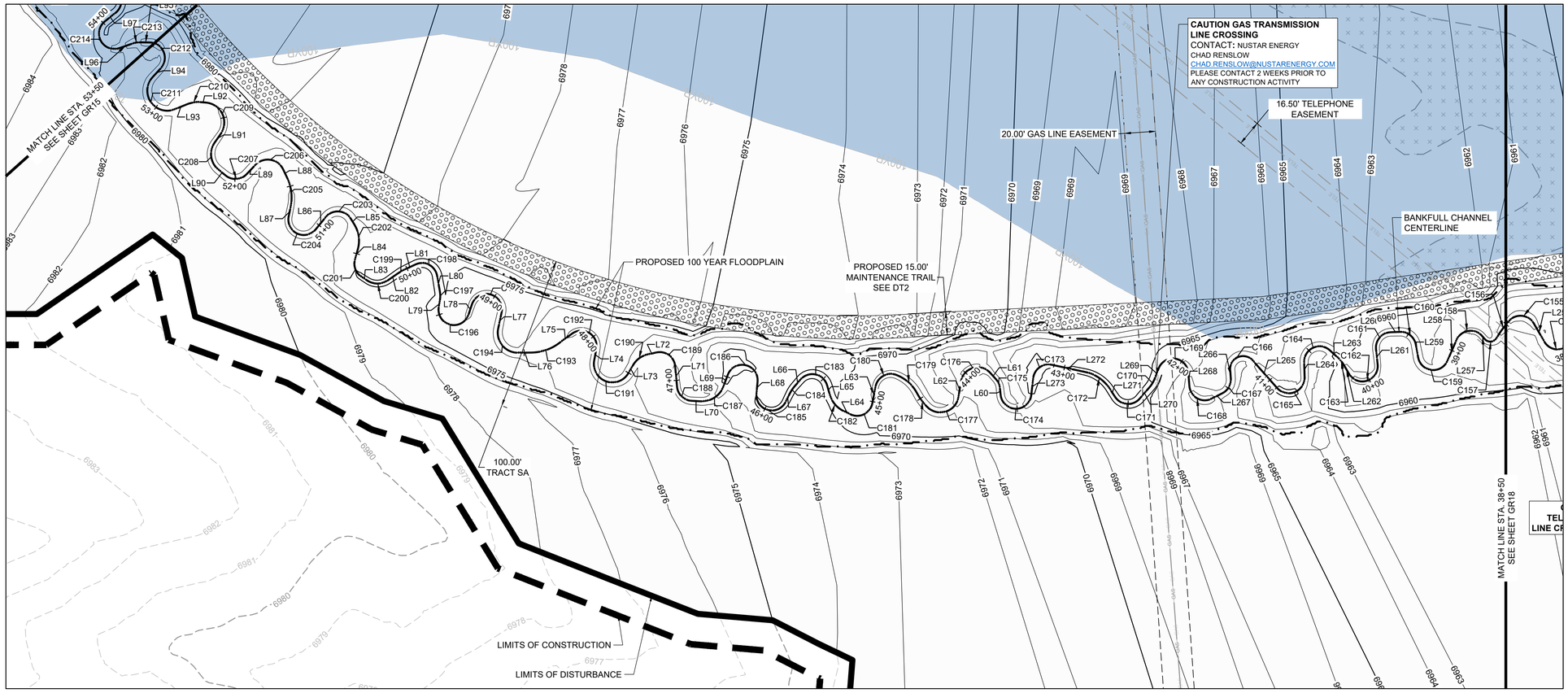
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

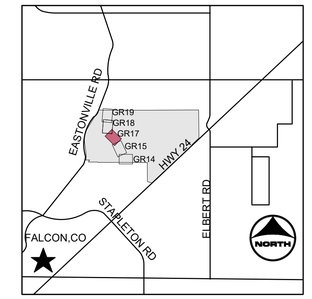
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

SHEET GR16 | 20

HR GREEN Xrefs: xg1-ut001; GRADING KEY: HRG1 20X_EBase; xv-dsgn_662; xc-dsgn-662.10; xc-dsgn-F1-662.10; xc-row-F1-662.10; xc-row-662.10; xc-dsgn-F2; xc-row-F2; xv-util_662; xv-row-662; xc-dsgn-F3; xc-row-F3; xc-dsgn-F4; 01-XC-INITIAL-EC; xc-row-F4; xc-dsgn-PH2; xc-dsgn-PH3; 01-XC-channel; (0)_XV-Row; 01-XC-PR_100YR_FP_DELINEATION





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2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33

TRIBUTARY 2 UPSTREAM

LINE # / CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C156	15.76	60.71	S82° 15' 15.94"W	15.72
C157	9.19	4.73	N48° 26' 22.95"W	7.81
L257	3.58		N3° 04' 06.31"E	
C158	19.37	10.00	N58° 30' 53.78"W	16.48
L258	14.86		S68° 36' 16.40"W	
C159	24.92	10.00	N36° 46' 43.51"W	18.95
L259	8.54		N34° 36' 24.38"E	
C160	14.25	10.00	N6° 12' 38.24"W	13.07
L260	6.03		N47° 01' 39.20"W	
C161	16.43	10.00	S85° 53' 35.89"W	14.65
L261	9.89		S38° 48' 50.97"W	
C162	27.21	10.00	N63° 13' 46.48"W	19.56
L262	6.59		N14° 43' 35.02"E	
C163	6.02	20.00	N6° 06' 03.29"E	6.00
L263	7.20		N2° 31' 29.50"W	
C164	23.46	10.00	N69° 43' 47.95"W	18.44
L264	9.75		S43° 03' 53.60"W	
C165	25.51	10.26	N64° 27' 12.24"W	19.43
L265	24.22		N3° 28' 47.39"E	
C166	20.88	8.44	N74° 30' 03.34"W	15.95
L266	4.56		S41° 00' 17.45"W	
C167	11.68	10.00	S74° 27' 57.98"W	11.03

TRIBUTARY 2 UPSTREAM

LINE # / CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L267	7.77		N72° 04' 21.48"W	
C168	19.62	10.00	N15° 51' 06.52"W	16.62
L268	8.77		N40° 22' 08.43"E	
C169	26.96	10.00	N36° 52' 20.72"W	19.51
L269	6.80		S65° 53' 08.80"W	
C170	6.95	20.00	S75° 50' 02.38"W	6.91
L270	9.62		S85° 46' 55.98"W	
C171	18.49	10.00	N41° 14' 28.08"W	15.97
L271	6.51		N11° 44' 07.86"E	
C172	19.46	25.00	N10° 33' 42.42"W	18.97
L272	22.46		N32° 51' 32.70"W	
C173	16.69	10.00	N80° 40' 16.27"W	14.82
L273	11.08		S51° 30' 58.83"W	
C174	29.21	10.00	N44° 47' 38.64"W	19.88
L60	4.58		N38° 53' 43.89"E	
C175	6.28	10.00	N20° 54' 02.58"E	6.18
L61	5.56		N2° 54' 21.27"E	
C176	24.70	11.00	N61° 25' 29.35"W	19.83
L62	10.86		S54° 14' 40.03"W	
C177	24.08	11.98	N64° 32' 15.25"W	20.23
C178	12.52	34.40	N7° 05' 18.27"E	12.45
C179	17.56	25.25	N2° 31' 20.35"W	17.21

TRIBUTARY 2 UPSTREAM

LINE # / CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C180	18.49	10.13	N71° 44' 52.25"W	16.03
L63	11.09		S55° 49' 10.23"W	
C181	18.28	10.00	N71° 48' 07.40"W	15.84
L64	4.96		N19° 25' 23.80"W	
C182	14.36	17.00	N4° 47' 00.04"E	13.94
L65	6.32		N28° 59' 23.88"E	
C183	21.42	10.00	N32° 22' 59.06"W	17.56
L66	6.17		S86° 14' 36.82"W	
C184	5.15	20.00	S78° 51' 55.74"W	5.14
L67	6.44		S71° 29' 13.91"W	
C185	27.69	10.00	N29° 11' 46.10"W	19.65
L68	7.92		N50° 07' 13.89"E	
C186	28.76	10.00	N32° 16' 01.93"W	19.82
L69	7.91		S65° 20' 42.25"W	
C187	19.07	15.00	N78° 14' 01.44"W	17.81
L70	5.88		N41° 48' 47.05"W	
C188	14.23	10.00	N1° 03' 38.55"W	13.06
L71	13.81		N39° 41' 29.96"E	
C189	16.83	10.01	N10° 00' 57.74"W	14.91
L72	6.19		N58° 12' 37.69"W	
C190	11.32	14.00	N81° 22' 38.72"W	11.02
L73	6.48		S75° 27' 20.25"W	

TRIBUTARY 2 UPSTREAM

LINE # / CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C191	33.50	12.00	N24° 33' 51.04"W	23.63
L74	7.78		N55° 24' 57.68"E	
C192	23.85	10.00	N12° 54' 52.85"W	18.59
L75	10.97		N81° 14' 45.25"W	
C193	18.57	30.00	N63° 30' 39.38"W	18.28
L76	8.89		N45° 46' 33.52"W	
C194	23.32	13.00	N5° 36' 50.04"E	20.32
L77	10.63		N57° 00' 13.60"E	
C195	30.29	10.00	N29° 45' 29.57"W	19.97
L78	6.95		S63° 28' 48.34"W	
C196	29.92	10.00	N30° 47' 54.08"W	19.94
L79	4.15		N54° 55' 22.26"E	
C197	6.25	18.00	N44° 58' 12.97"E	6.22
L80	10.16		N35° 01' 04.53"E	
C198	18.41	10.00	N17° 43' 12.15"W	15.92
L81	8.03		N70° 27' 28.82"W	
C199	5.01	30.06	N75° 00' 38.36"W	5.00
L82	7.48		N79° 47' 19.86"W	
C200	14.10	12.00	N46° 07' 14.40"W	13.31
L83	4.63		N12° 27' 08.94"W	
C201	12.68	10.00	N23° 53' 06.07"E	11.85
L84	7.35		N60° 13' 21.09"E	

TRIBUTARY 2 UPSTREAM

LINE # / CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C202	16.30	20.00	N36° 52' 50.66"E	15.85
L85	4.49		N13° 32' 20.24"E	
C203	19.05	10.00	N41° 02' 37.80"W	16.30
L86	10.38		S84° 22' 24.17"W	
C204	26.57	10.00	N19° 30' 04.19"W	19.42
L87	6.39		N56° 37' 27.46"E	
C205	19.50	30.00	N38° 00' 21.14"E	19.16
L88	6.02		N19° 23' 14.34"E	
C206	21.26	11.00	N35° 59' 34.23"W	18.10
L89	8.40		S88° 37' 37.20"W	
C207	14.93	10.00	N48° 36' 10.78"W	13.58
L90	6.08		N5° 49' 58.75"W	
C208	19.45	13.00	N37° 02' 16.06"E	17.69
L91	6.84		N79° 54' 30.86"E	
C209	27.37	13.00	N19° 35' 19.50"E	22.59
L92	3.27		N40° 43' 51.79"W	
C210	9.28	20.00	N54° 01' 48.85"W	9.20
L93	8.27		N67° 19' 45.91"W	
C211	35.19	13.00	N10° 12' 28.14"E	25.39
L94	7.78		N87° 44' 40.12"E	
C212	23.02	10.00	N21° 47' 21.49"E	18.26

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PAYNE 37061 PROFESSIONAL ENGINEER 12-11-20

NORTH 0 40 20

DRAWN BY:	ACH	JOB DATE:	11/29/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\GRADING		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

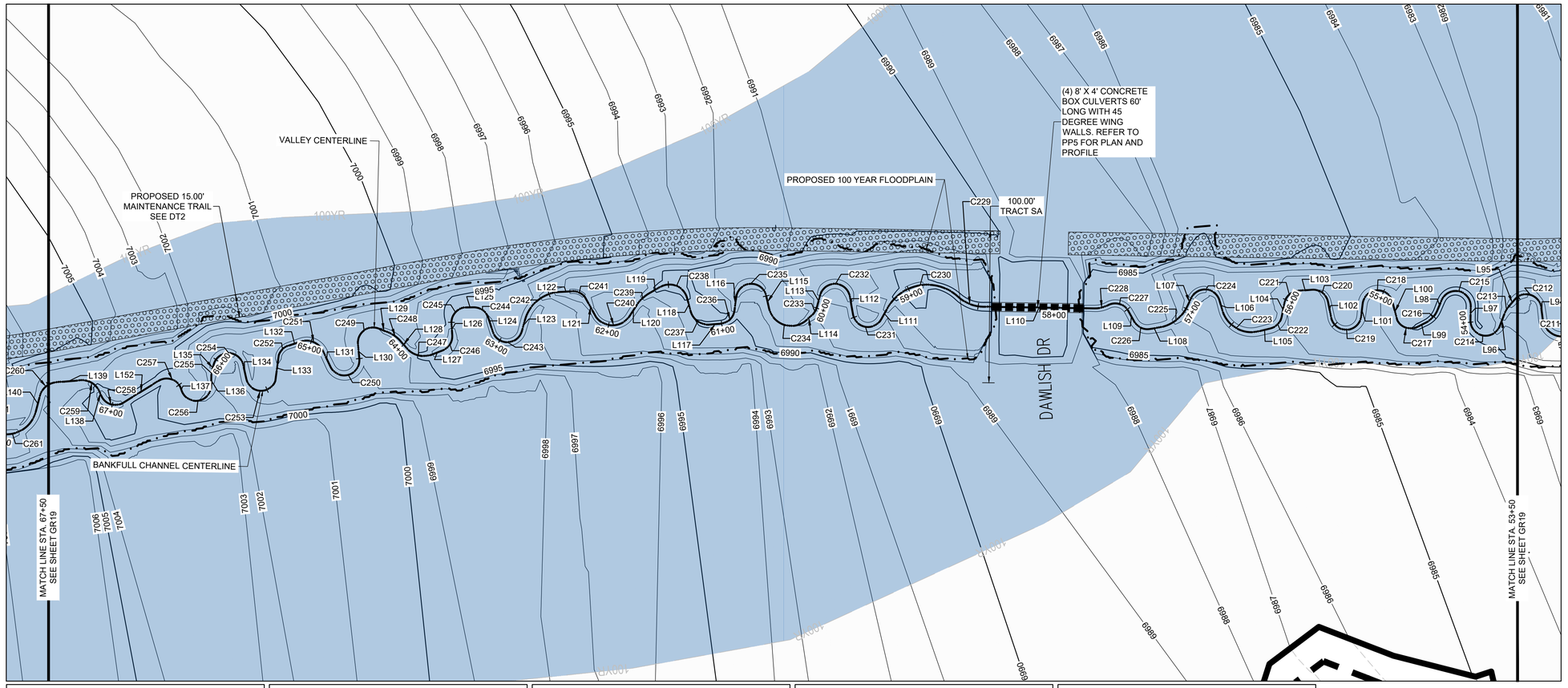
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

SHEET GR17 | 21

HR GREEN Xrefs: xgt-t-db01_GRADING KEY; HRG1.20X_EBase; xv-dsgn_662; xc-dsgn-F3; xc-crow-F3; xc-crow-F4; xc-dsgn-F4; 01-XC-INITIAL-EC; xc-crow-PH2; xc-dsgn-PH2; xc-dsgn-PH3; 01-XC-channel; (1)_XV-Row; 01-XC-PR_100YR_FP_DELINEATION



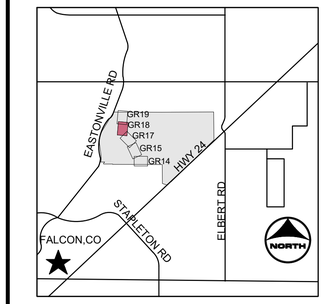
TRIBUTARY 2 UPSTREAM				
LINE # CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L95	5.17		N44° 09' 57.14"W	
C213	6.98	20.00	N54° 09' 33.54"W	6.94
L96	8.04		N64° 09' 09.93"W	
C214	28.01	10.00	N16° 04' 45.78"E	19.71
L97	9.02		S83° 41' 18.51"E	
C215	27.69	10.00	N16° 58' 58.63"E	19.65
L98	7.09		N62° 20' 44.23"W	
C216	11.33	16.00	N42° 04' 06.40"W	11.09
L99	6.19		N21° 47' 27.14"W	
C217	15.51	10.00	N22° 38' 51.73"E	14.00
L100	11.78		N80° 12' 45.19"E	
C218	28.61	10.00	N3° 46' 45.22"E	19.80
L101	8.42		N78° 10' 24.49"W	
C219	28.24	10.00	N2° 43' 43.88"E	19.75
L102	10.54		N83° 37' 52.24"E	
C220	14.48	10.00	N42° 08' 43.05"E	13.25
L103	9.11		N0° 39' 32.79"E	
C221	12.97	10.00	N36° 30' 06.87"W	12.08
L104	9.22		N73° 39' 45.15"W	
C222	11.31	10.00	N41° 16' 14.49"W	10.71
L105	7.94		N8° 52' 43.84"W	
C223	30.67	20.00	N35° 03' 26.18"E	27.75

TRIBUTARY 2 UPSTREAM				
LINE # CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L106	6.69		N78° 59' 36.19"E	
C224	24.18	10.00	N9° 42' 54.27"E	18.71
L107	5.63		N59° 33' 47.65"W	
C225	24.74	25.02	N32° 09' 09.97"W	23.74
L108	6.03		N3° 48' 42.59"W	
C226	12.18	10.00	N31° 04' 04.22"E	11.44
L109	7.66		N65° 56' 51.04"E	
C227	15.54	10.00	N21° 25' 50.86"E	14.02
C228	9.09	18.00	N8° 36' 52.18"W	9.00
L110	73.49		N5° 51' 24.97"E	
C229	18.19	25.00	N26° 42' 11.88"E	17.79
C230	54.03	30.00	N4° 02' 38.02"W	47.02
L111	8.57		N55° 38' 14.84"W	
C231	24.53	10.00	N14° 38' 23.93"E	18.83
L112	12.12		N84° 55' 01.43"E	
C232	26.99	10.00	N7° 35' 33.85"E	19.51
L113	8.04		N69° 43' 52.36"W	
C233	6.99	12.00	N53° 02' 49.83"W	6.89
L114	4.55		N36° 21' 48.50"W	
C234	31.01	15.00	N22° 51' 23.94"E	25.77
L115	8.57		N82° 04' 36.38"E	
C235	27.86	10.00	N2° 16' 03.64"E	19.68

TRIBUTARY 2 UPSTREAM				
LINE # CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L116	8.98		N77° 32' 29.10"W	
C236	13.59	10.00	N38° 36' 17.81"W	12.57
L117	7.25		N0° 19' 53.48"E	
C237	16.68	12.00	N40° 09' 12.75"E	15.37
L118	8.96		N79° 58' 33.23"E	
C238	21.88	12.00	N27° 44' 22.92"E	18.97
L119	8.16		N24° 29' 46.28"W	
C239	11.91	25.00	N38° 08' 52.11"W	11.80
L120	7.82		N51° 47' 57.21"W	
C240	26.65	13.48	N1° 49' 28.09"E	22.51
L121	15.08		N66° 02' 17.32"E	
C241	9.50	10.00	N29° 12' 46.81"E	9.14
L122	8.34		N2° 00' 28.98"E	
C242	31.18	25.00	N33° 43' 31.88"W	29.20
L123	7.80		N69° 27' 32.74"W	
C243	25.58	10.00	N3° 49' 59.88"E	19.16
L124	9.62		N77° 07' 32.51"E	
C244	12.73	10.00	N40° 39' 52.64"E	11.89
L125	4.77		N4° 12' 10.94"E	
C245	16.25	10.00	N42° 20' 24.85"W	14.52
L126	7.68		N88° 53' 00.63"W	
C246	12.69	10.00	N52° 31' 59.36"W	11.85

TRIBUTARY 2 UPSTREAM				
LINE # CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L127	7.41		N16° 10' 58.09"W	
C247	18.38	15.00	N18° 55' 33.27"E	17.25
L128	6.36		N54° 02' 04.63"E	
C248	9.39	20.00	N40° 35' 03.09"E	9.30
L129	7.15		N27° 08' 01.54"E	
C249	20.51	10.00	N31° 37' 14.85"W	17.10
L130	9.76		S89° 37' 28.76"W	
C250	27.90	10.00	N10° 27' 09.67"W	19.69
L131	11.50		N69° 28' 12.96"E	
C251	17.33	12.00	N28° 06' 25.18"E	15.86
L132	8.67		N13° 15' 22.59"W	
C252	9.13	10.00	N39° 24' 31.73"W	8.82
L133	17.18		N77° 27' 43.71"W	
C253	25.62	10.00	N9° 01' 06.61"E	19.17
L134	9.39		N82° 24' 48.02"E	
C254	26.62	10.00	N6° 09' 26.70"E	19.43
L135	4.72		N70° 05' 54.62"W	
C255	2.40	10.00	N76° 59' 14.73"W	2.40
L136	7.28		N83° 52' 34.84"W	
C256	28.51	10.00	N2° 12' 50.31"W	19.79
L137	0.10		N79° 26' 54.22"E	
C257	18.54	10.00	N26° 20' 13.82"E	16.00

TRIBUTARY 2 UPSTREAM				
LINE # CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L152	27.44		N26° 46' 26.58"W	
C258	16.95	10.00	N21° 46' 36.50"E	14.99
L138	3.84		N70° 19' 39.57"E	
C259	14.65	12.00	N35° 21' 09.72"E	13.76
L139	16.46		N0° 22' 41.14"E	



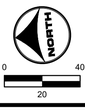
KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- SECTION LINE
- EXISTING EASEMENT
- EXISTING FENCE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 5250 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- CONSTRUCTION EASEMENT
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- LIMITS OF DISTURBANCE
- PROPOSED 100-YR FLOODPLAIN
- EFFECTIVE 100-YR FLOODPLAIN
- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL
- PROPOSED MAINTENANCE TRAIL

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.
2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33



811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PAYNE 37081 PROFESSIONAL ENGINEER 12-01-23

DRAWN BY:	ACH	JOB DATE:	11/29/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\GRADING		

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NO.	DATE	BY	REVISION DESCRIPTION

HRGreen

HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

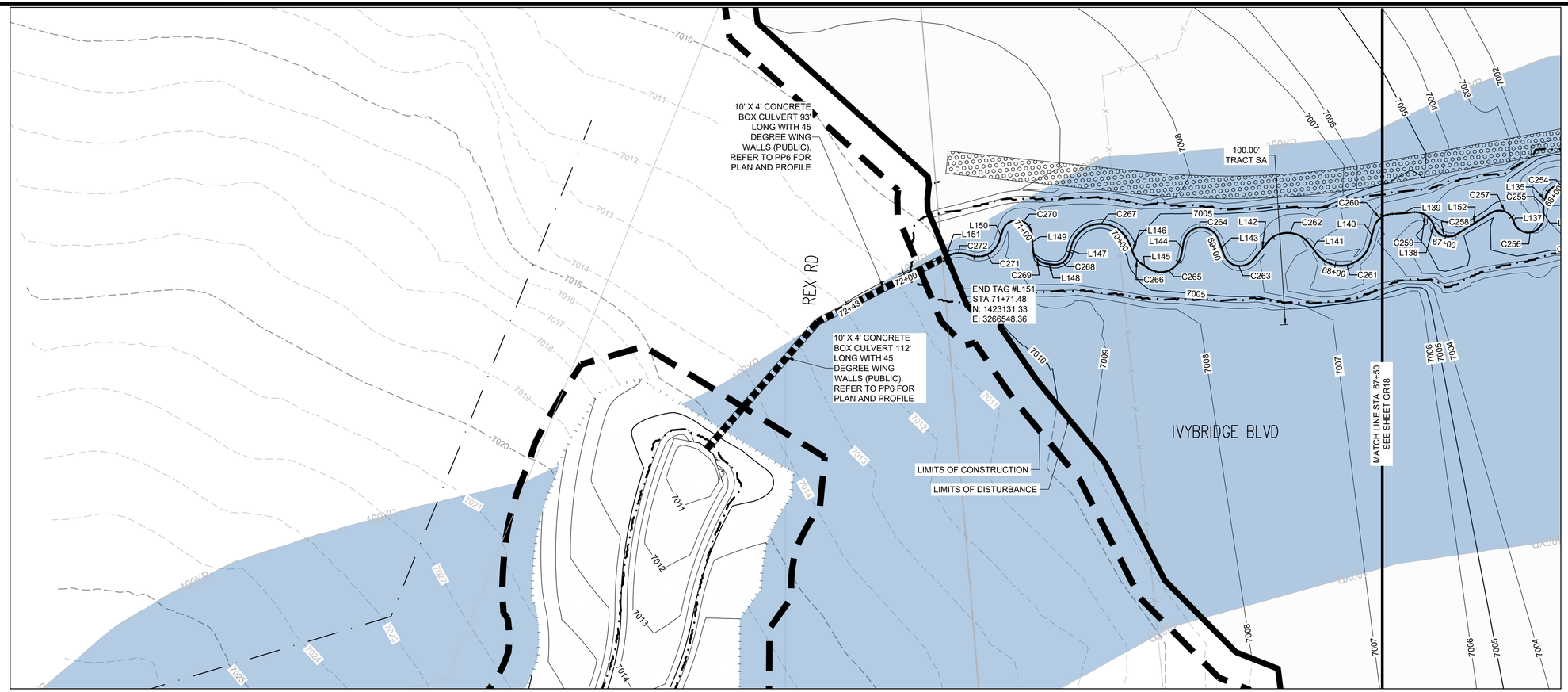
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

SHEET GR18

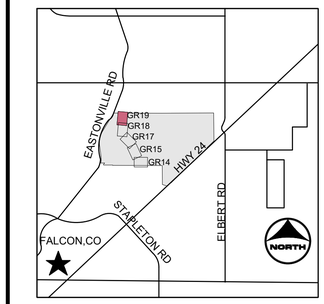
22

HR GREEN Xrefs: xgl-1-dfn01; GRADING KEY: HRG1 20X_EBase: xv-dsgn_662; xc-dsgn-662.10; xc-dsgn-F1-662.10; xc-row-F1-662.10; xc-row-662.10; xc-dsgn-F2; xv-util_662; xv-row-662; xc-dsgn-F3; xc-row-F3; xc-row-F4; xc-dsgn-F4; 01-XC-INITIAL-EC; xc-row-PH2; xc-dsgn-PH2; xc-dsgn-PH3; 01-XC-channel; (1)_XV-Row; 01-XC-PR_100YR_FP_DELINEATION



TRIBUTARY 2 UPSTREAM				
LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
C260	14.80	12.00	N34° 56' 39.85"W	13.88
L140	10.77		N70° 15' 59.85"W	
C261	44.55	20.00	N6° 27' 33.85"W	35.89
L141	8.98		N57° 20' 52.15"E	
C262	29.24	18.00	N10° 48' 15.97"E	26.13
L142	16.23		N45° 31' 56.12"W	
C263	24.34	11.44	N9° 01' 06.38"E	20.00
L143	11.94		N74° 50' 42.15"E	
C264	31.22	12.00	N0° 18' 44.36"E	23.13
L144	8.82		N74° 13' 13.43"W	
C265	27.28	14.00	N18° 24' 07.71"W	23.16
L145	7.63		N38° 57' 54.40"E	
C266	5.69	10.00	N55° 15' 07.16"E	5.61
L146	6.73		N71° 32' 18.85"E	
C267	53.21	20.40	N5° 38' 58.70"E	39.35
L147	5.41		N68° 39' 59.99"W	
C268	14.28	10.00	N27° 44' 59.82"W	13.10
L148	4.50		N13° 10' 00.36"E	
C269	13.50	10.00	N51° 50' 51.43"E	12.50
L149	10.57		S89° 28' 17.51"E	
C270	27.53	10.00	N11° 39' 24.20"E	19.62

TRIBUTARY 2 UPSTREAM				
LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L150	7.19		N67° 12' 54.10"W	
C271	24.50	15.00	N20° 25' 45.98"W	21.86
C272	14.98	18.00	N2° 31' 05.79"E	14.55
L151	3.20		N21° 19' 11.62"W	



KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- SECTION LINE
- EXISTING EASEMENT
- EXISTING FENCE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 5250 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- CONSTRUCTION EASEMENT
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- LIMITS OF CONSTRUCTION
- LIMITS OF DISTURBANCE
- PROPOSED 100-YR FLOODPLAIN
- EFFECTIVE 100-YR FLOODPLAIN
- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL
- PROPOSED MAINTENANCE TRAIL

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.
2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PAZ 37081 12-01-23 PROFESSIONAL ENGINEER

DRAWN BY:	ACH	JOB DATE:	11/29/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\GRADING		

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NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

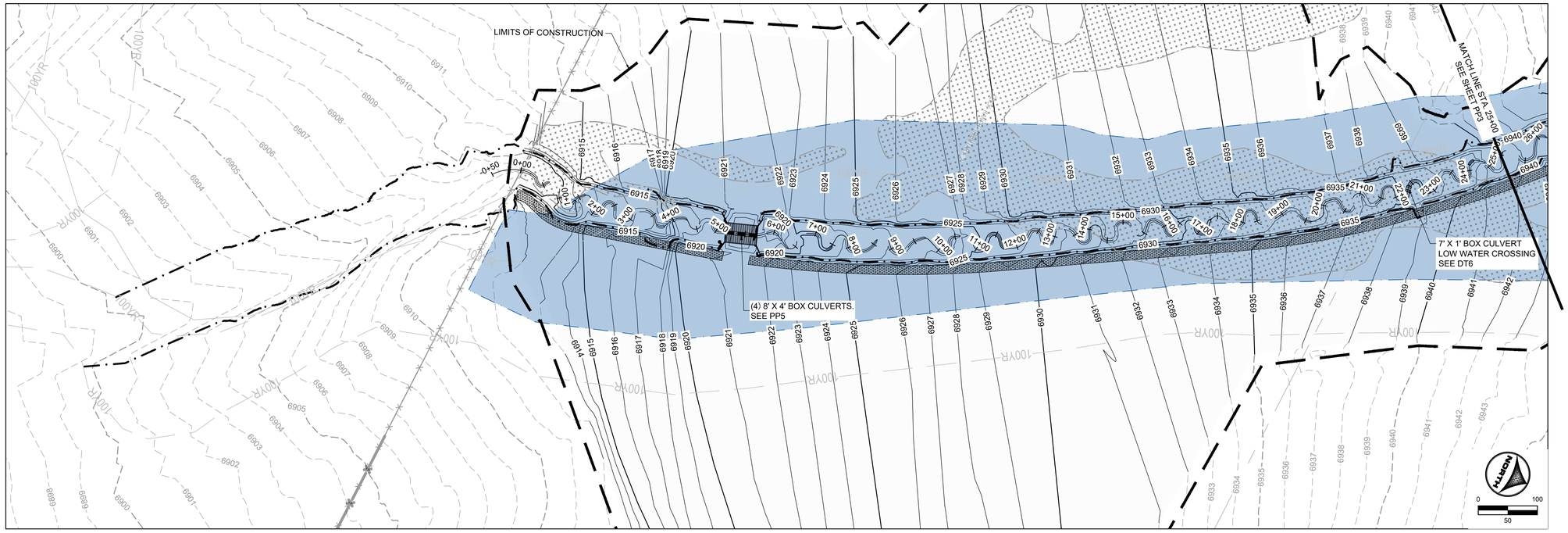
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

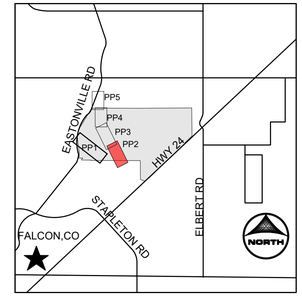
CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

SHEET GR19

23

HR GREEN Xrefs: xg:1-dft01 GRADING KEY; HRG1 20X_EBase; xc-dsgn_662; xc-dsgn-662 10; xc-dsgn-F1-662 10; xc-row-F1-662 10; xc-row-662 10; xc-dsgn-F2; xc-row-F2; xx-util_662; xx-row-662; xc-dsgn-F3; xc-row-F3; xc-row-F4; xc-dsgn-F4; 01-XC-INITIAL-EC; xc-row-PH2; xc-dsgn-PH2; xc-dsgn-PH3; 01-XC-channel; (01_XV-Row; 01-XC-PR_100YR_FP_DELINEATION





KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- SECTION LINE
- EXISTING EASEMENT
- EXISTING FENCE
- 5250 EXISTING MAJOR CONTOUR
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- LIMITS OF CONSTRUCTION
- PROPOSED 100-YR FLOODPLAIN
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- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL
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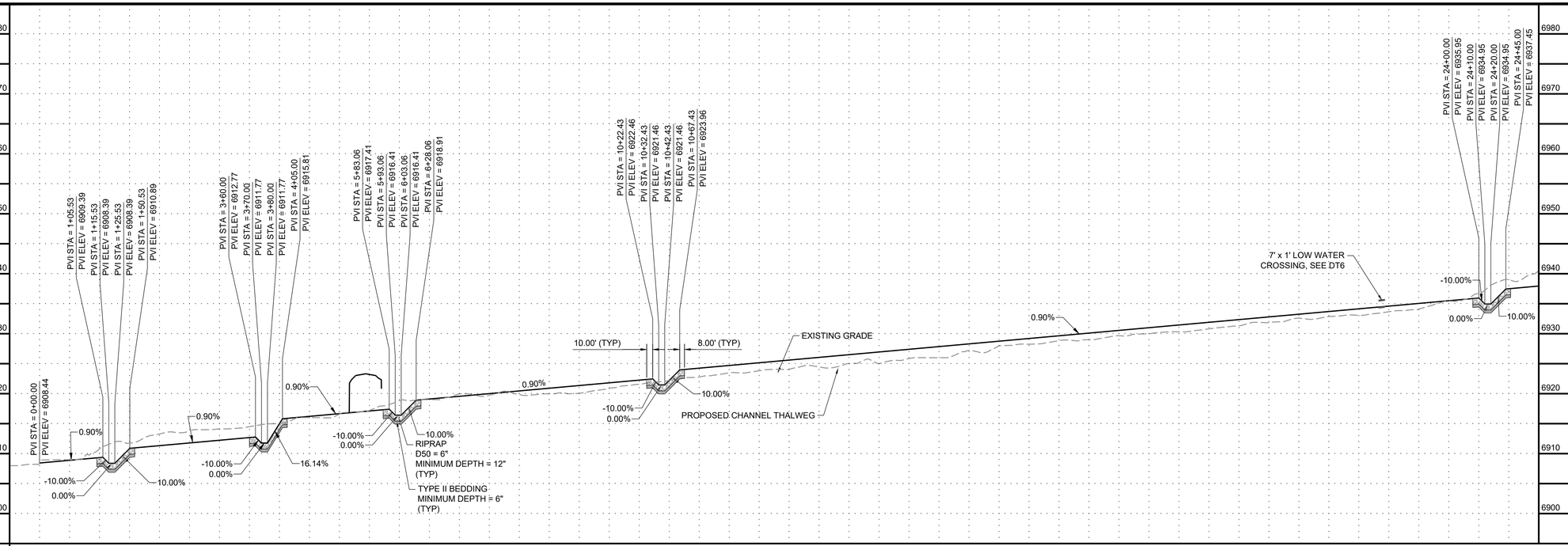

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.
2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33
3. ALIGNMENT NOT FOR USE IN CONSTRUCTION. REFER TO NORTHINGS AND EASTINGS
4. PLAN SET APPROVAL APPLIES TO THE LIMITS OF CONSTRUCTION. PLEASE SEE GRANDVIEW FILING NUMBER 1 PLAN SET FOR GRADING OUTSIDE OF THE CHANNEL LIMITS OF CONSTRUCTION.
5. TRIBUTARY 1 TO BE CONSTRUCTED WITH FILING 1 (AREA SOUTH OF TRIBUTARY 1), TRIBUTARY 2 TO BE CONSTRUCTED WITH FILING 2 (AREA NORTH OF TRIBUTARY 1 AND SOUTHWEST OF TRIBUTARY 2), BOX CULVERTS/CROSSINGS ALONG TRIBUTARY 2 TO BE CONSTRUCTED WITH TRIBUTARY IMPROVEMENTS.

HORIZONTAL 0 100 VERTICAL 0 10
50 5

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. LAZ 37081 PROFESSIONAL ENGINEER 11.7.23

DRAWN BY:	TBI	JOB DATE:	11/30/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\PLAN AND PROFILE		

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NO.	DATE	BY	REVISION DESCRIPTION

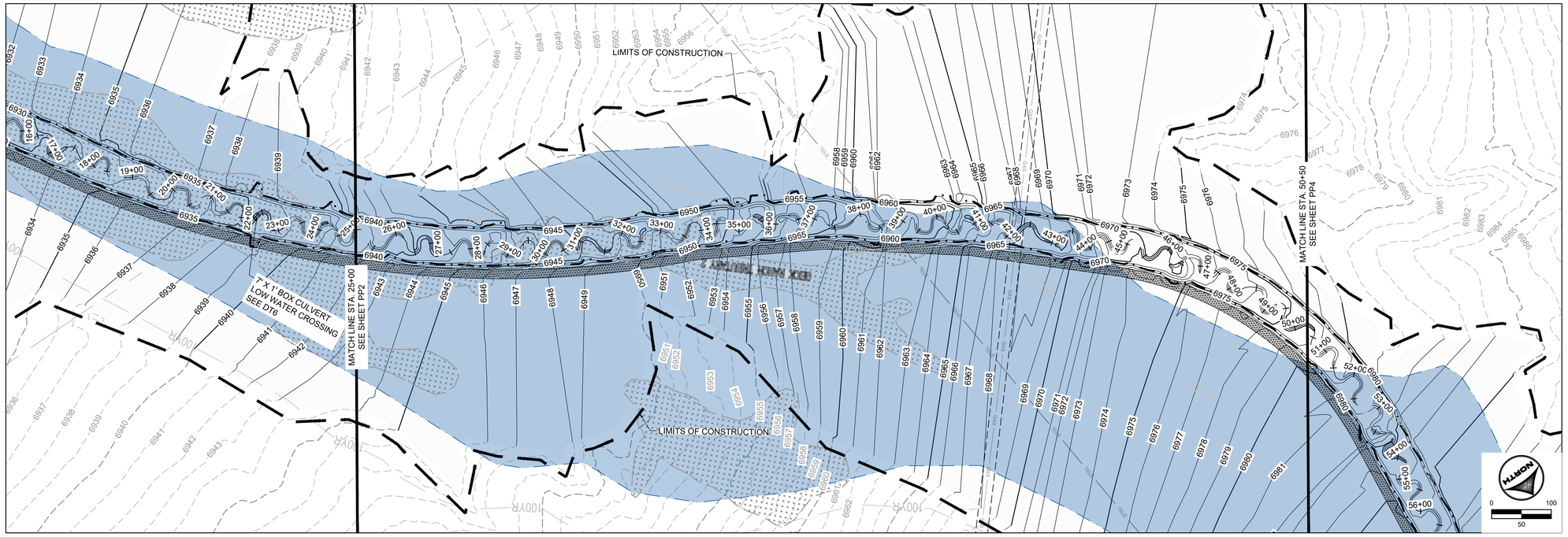
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

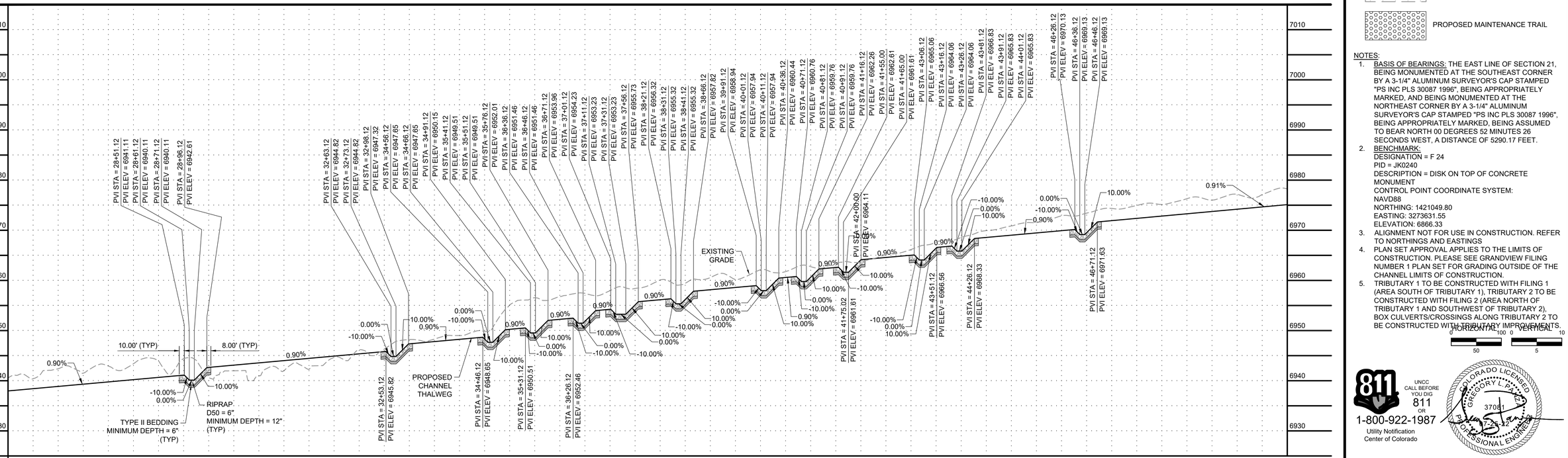
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

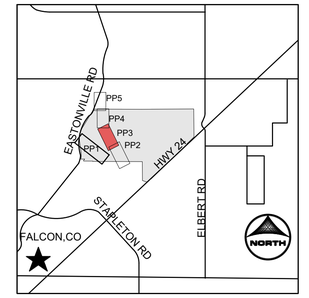
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP2 | 31

HR GREEN Xrefs: xg1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662.10; xc-dsgn-F1-662.10; xc-cnw-F1-662.10; xv-cnw-662; xc-row-F2; xc-dsgn-F2; xc-dsgn-F3; xv-cnw-F3; xc-dsgn-F4; xc-row-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-row-PH2; xc-row-PH3; 01_XC_RIPRAP; 01_XV-Row; 01-XC-channel







KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- SECTION LINE
- EXISTING EASEMENT
- X X X EXISTING FENCE
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NOTES:

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HORIZONTAL 0 50 100 VERTICAL 0 5 10

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. JIA 37081 PROFESSIONAL ENGINEER

DRAWN BY:	TBI	JOB DATE:	11/30/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\PLAN AND PROFILE		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

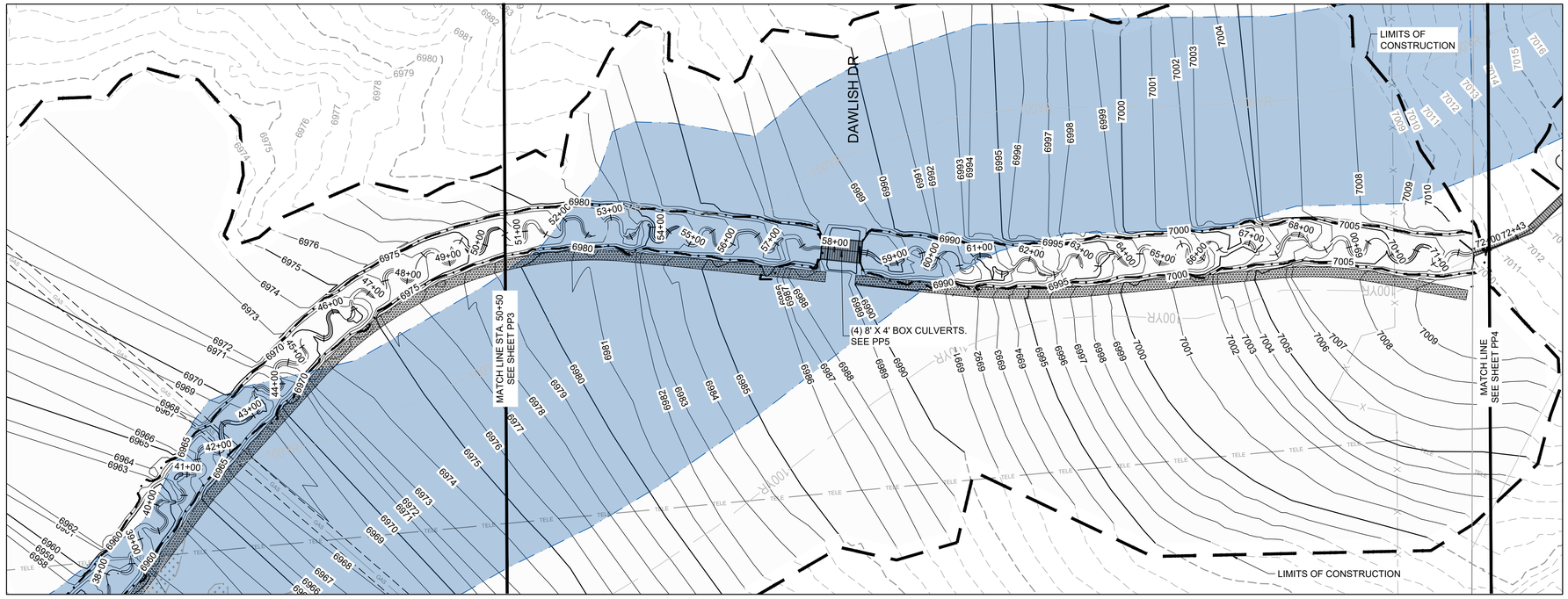
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

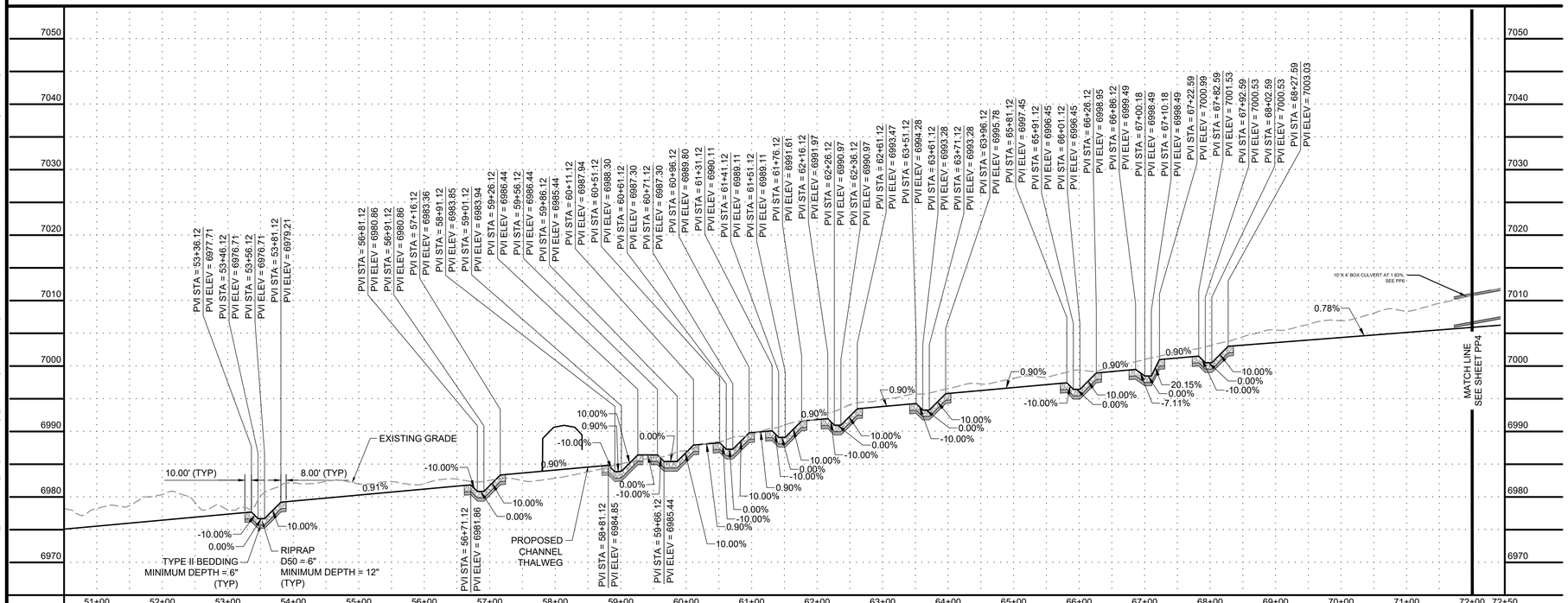
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

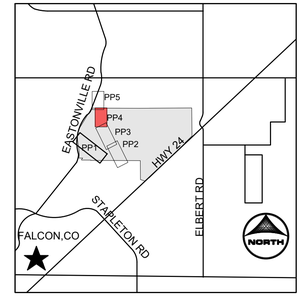
SHEET PP3

32

HR GREEN Xrefs: xg1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662.10; xc-dsgn-F1-662.10; xv-row-F1-662.10; xv-row-662; xc-row-F2; xc-dsgn-F2; xc-dsgn-F3; xv-row-F3; xc-dsgn-F4; xv-row-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xv-row-PH2; xv-row-PH3; 01_XC_RIPRAP; 01_XV-Row; 01-XC-channel







KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- SECTION LINE
- EXISTING EASEMENT
- EXISTING FENCE
- 5250 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- PROPOSED 100-YR FLOODPLAIN
- EFFECTIVE 100-YR FLOODPLAIN
- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL
- PROPOSED MAINTENANCE TRAIL

NOTES:

1. BASIS OF BEARINGS: THE EAST LINE OF SECTION 21, BEING MONUMENTED AT THE SOUTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, AND BEING MONUMENTED AT THE NORTHEAST CORNER BY A 3-1/4" ALUMINUM SURVEYOR'S CAP STAMPED "PS INC PLS 30087 1996", BEING APPROPRIATELY MARKED, BEING ASSUMED TO BEAR NORTH 00 DEGREES 52 MINUTES 26 SECONDS WEST, A DISTANCE OF 5290.17 FEET.
2. BENCHMARK:
   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33
3. ALIGNMENT NOT FOR USE IN CONSTRUCTION. REFER TO NORTHINGS AND EASTINGS
4. PLAN SET APPROVAL APPLIES TO THE LIMITS OF CONSTRUCTION. PLEASE SEE GRANDVIEW FILING NUMBER 1 PLAN SET FOR GRADING OUTSIDE OF THE CHANNEL LIMITS OF CONSTRUCTION.
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NORTH
0 100
50
HORIZONTAL 0 100 50
VERTICAL 0 10 5

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PAZ 37081 PROFESSIONAL ENGINEER

DRAWN BY:	TBI	JOB DATE:	11/30/2023
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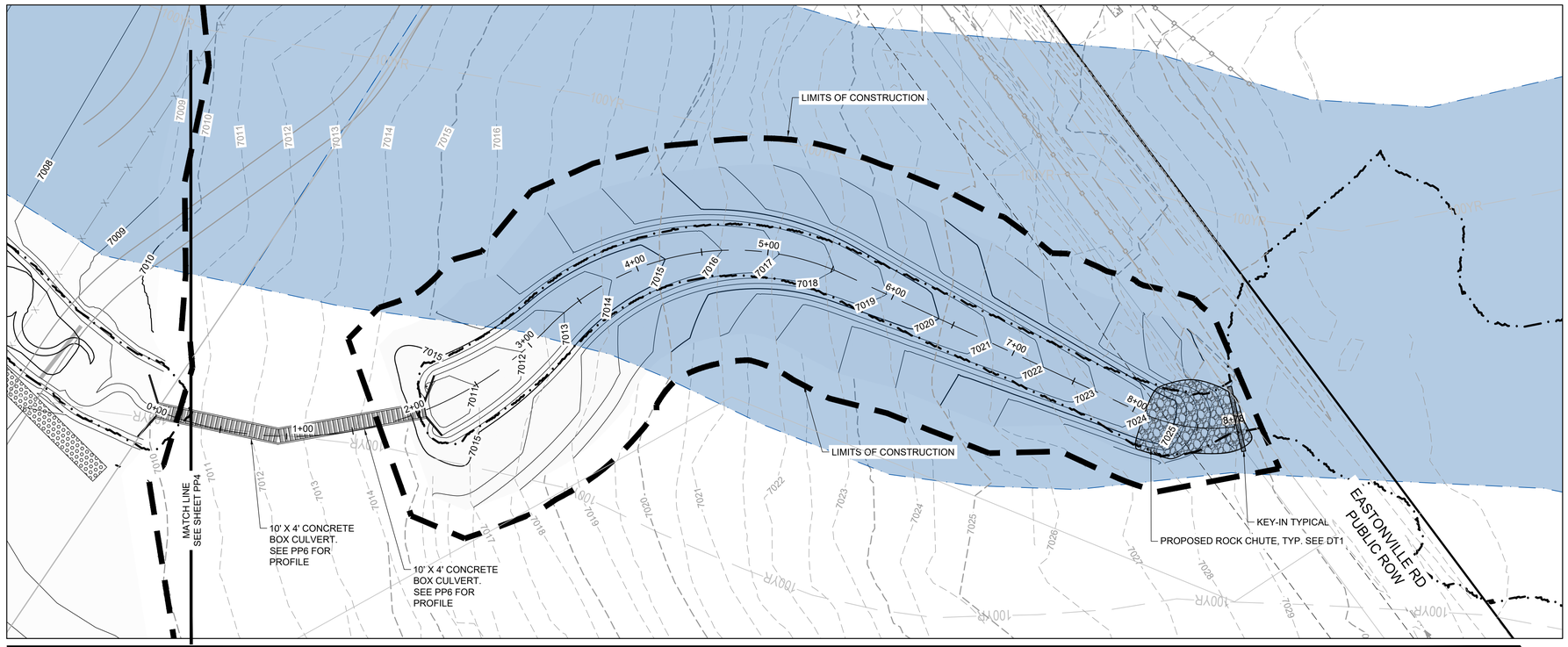
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

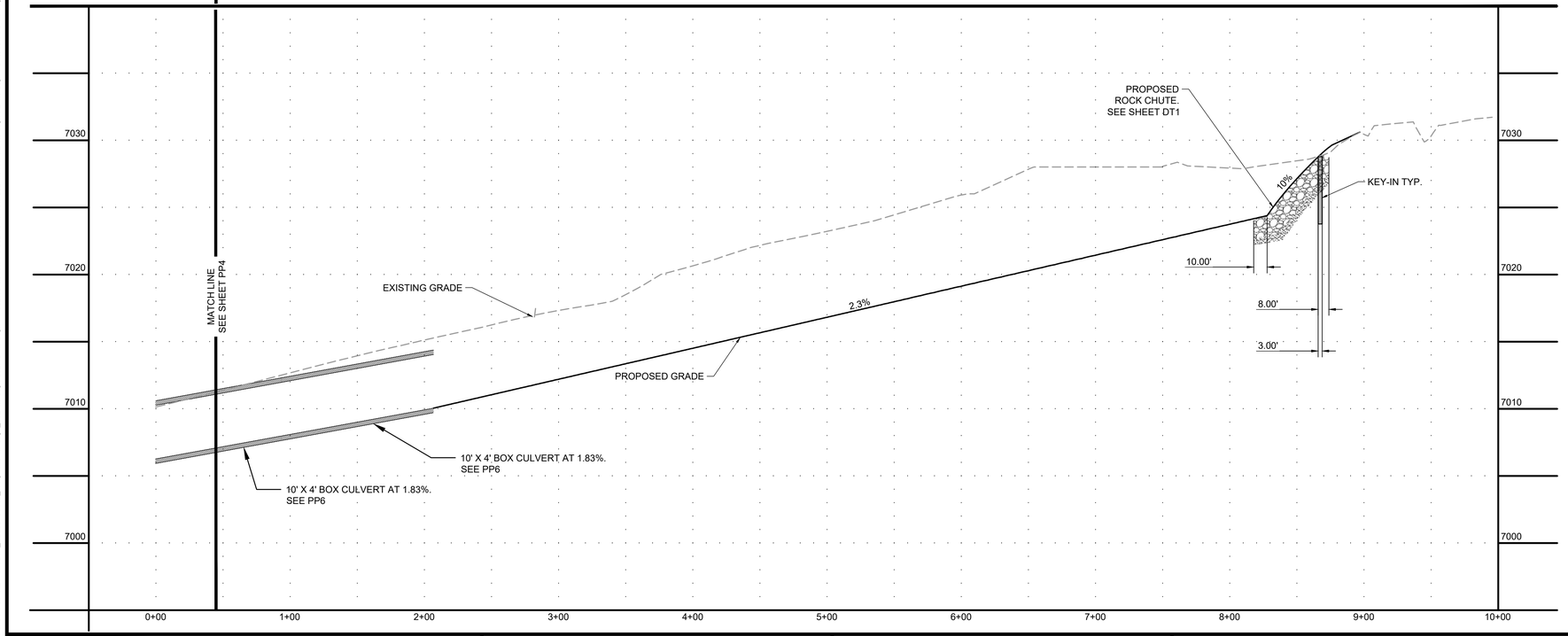
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

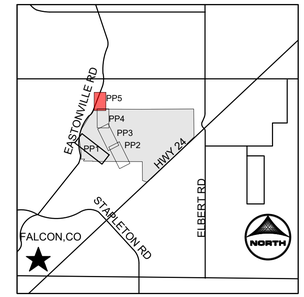
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP4 33

HR GREEN Xrefs: xgl-i-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662.10; xc-dsgn-F1-662.10; xc-xsw-F1-662.10; xc-xsw-662; xc-row-F2; xc-dsgn-F2; xc-dsgn-F3; xc-xsw-F3; xc-dsgn-F4; xc-xsw-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-row-PH2; xc-row-PH3; 01_XC_RIPRAP; 01_XV-Row; 01-XC-channel







KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- SECTION LINE
- EXISTING EASEMENT
- X X X EXISTING FENCE
- 5250 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- PROPOSED 100-YR FLOODPLAIN
- EFFECTIVE 100-YR FLOODPLAIN
- EXISTING WETLANDS - JURISDICTIONAL
- EXISTING WETLANDS - NONJURISDICTIONAL
- PROPOSED MAINTENANCE TRAIL

NOTES:

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   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM: NAVD88
   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33
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NORTH
0 50
25

HORIZONTAL 0 50 25
VERTICAL 0 5 2.5

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. PAGE 37081 PROFESSIONAL ENGINEER 7-25-22

DRAWN BY:	TBI
APPROVED:	GLP
CAD DATE:	11/30/2023
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\PLAN AND PROFILE
JOB DATE:	11/30/2023
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NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

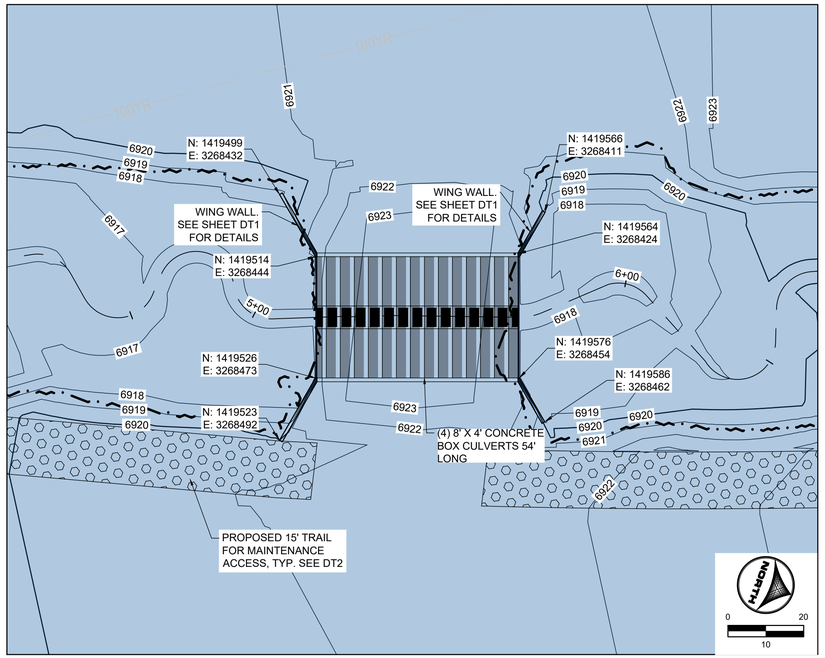
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

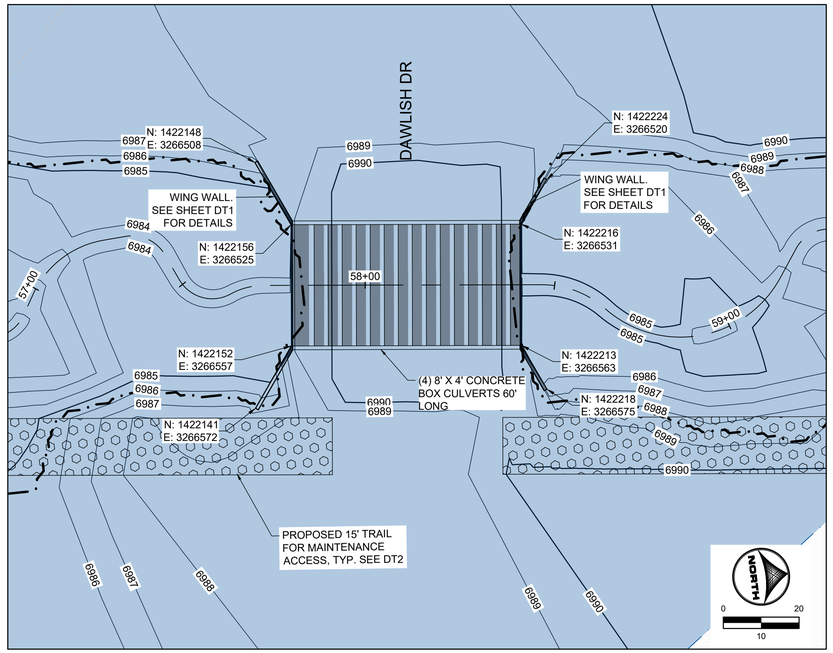
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP5

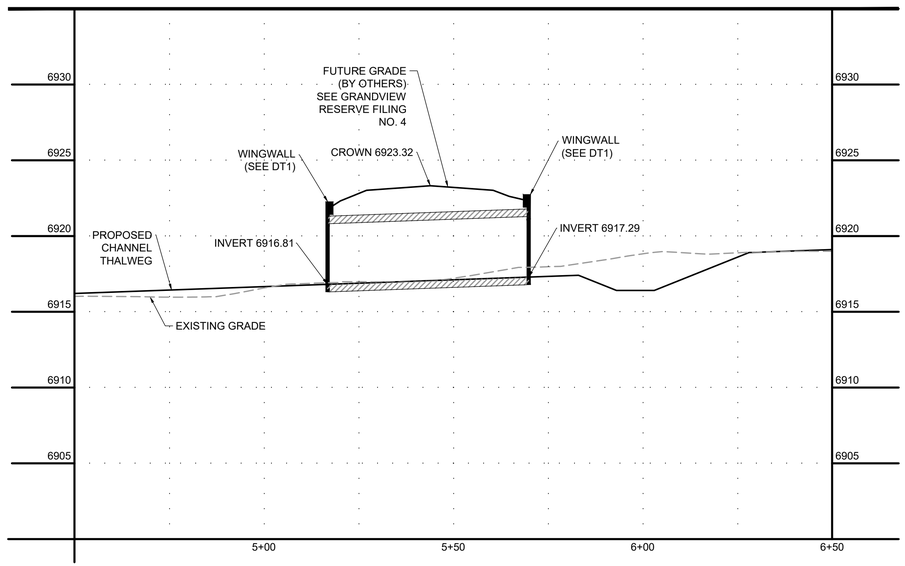
34

HR GREEN Xrefs: xgf-1-dh01; P&P KEY; HRG1X_EBase; 01-XC_Wtgwalls; xv-dsgn_662; xc-dsgn-662; 10; xc-dsgn-F1-662; 10; xc-row-F1-662; 10; xv-row-662; xc-row-F2; xv-dsgn-F2; xc-dsgn-F3; xc-row-F3; xc-dsgn-F4; xv-row-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-fillingbndys; 01-XC-INITIAL-EC; xc-row-PH2; xc-dsgn-PH3; 01_XC_RIPRAP; 01_XV-Row; 01-XC-channel

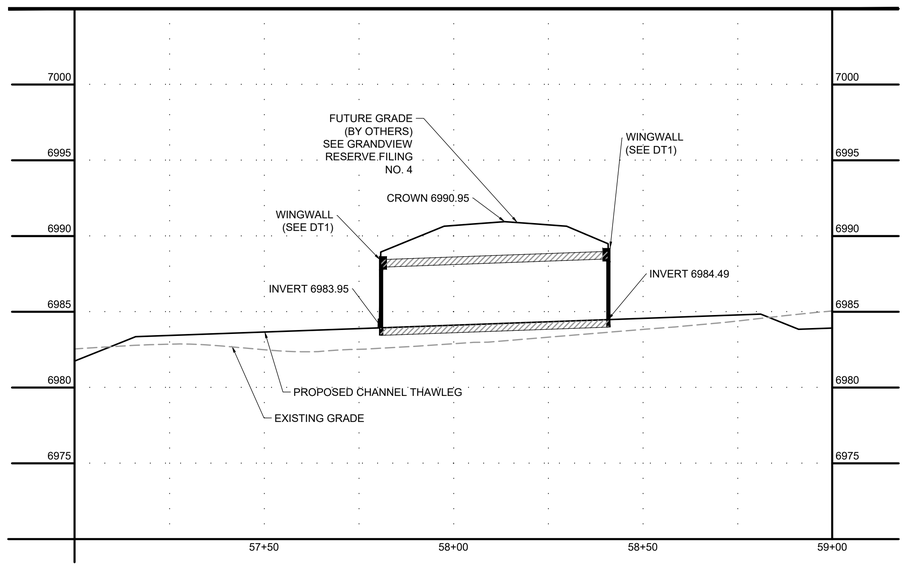




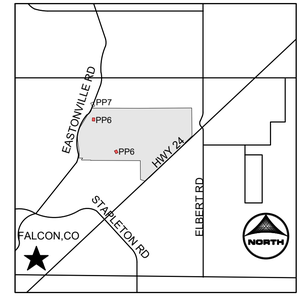
ROAD G CULVERT CROSSING



DAWLISH DR CULVERT CROSSING



HORIZONTAL 0 20 10 VERTICAL 0 5 2.5



KEYMAP

PROJECT LEGEND:

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811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

COLORADO LICENSED GREGORY L. ARP 37081 PROFESSIONAL ENGINEER 11-24-23

DRAWN BY:	TBI	JOB DATE:	11/30/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
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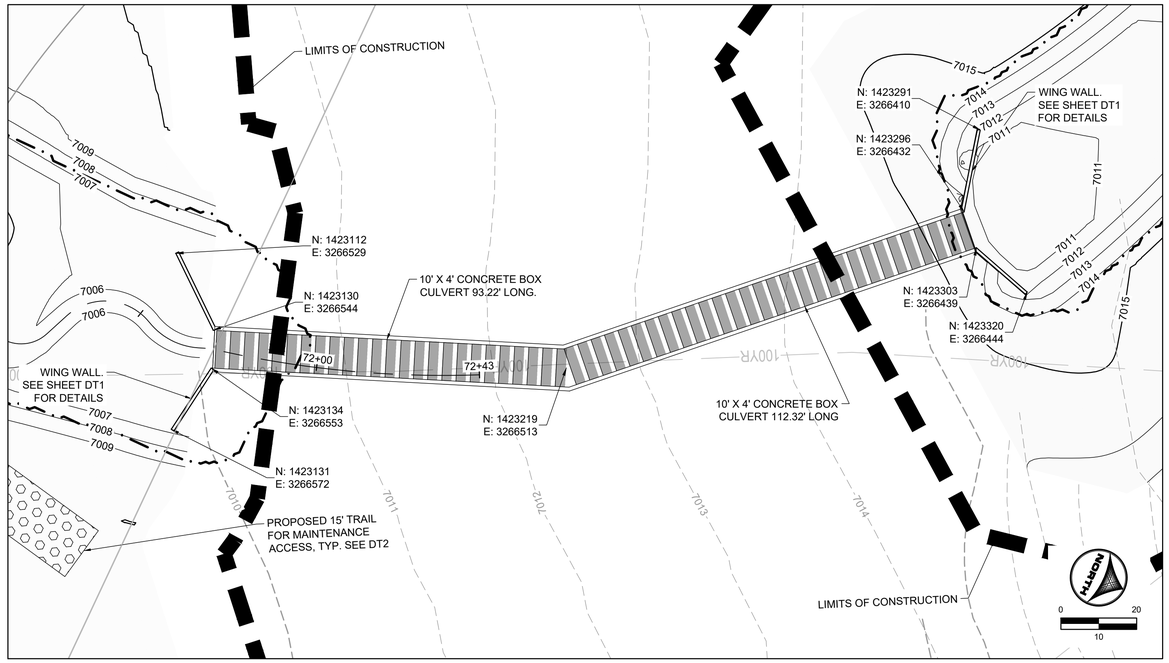
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS

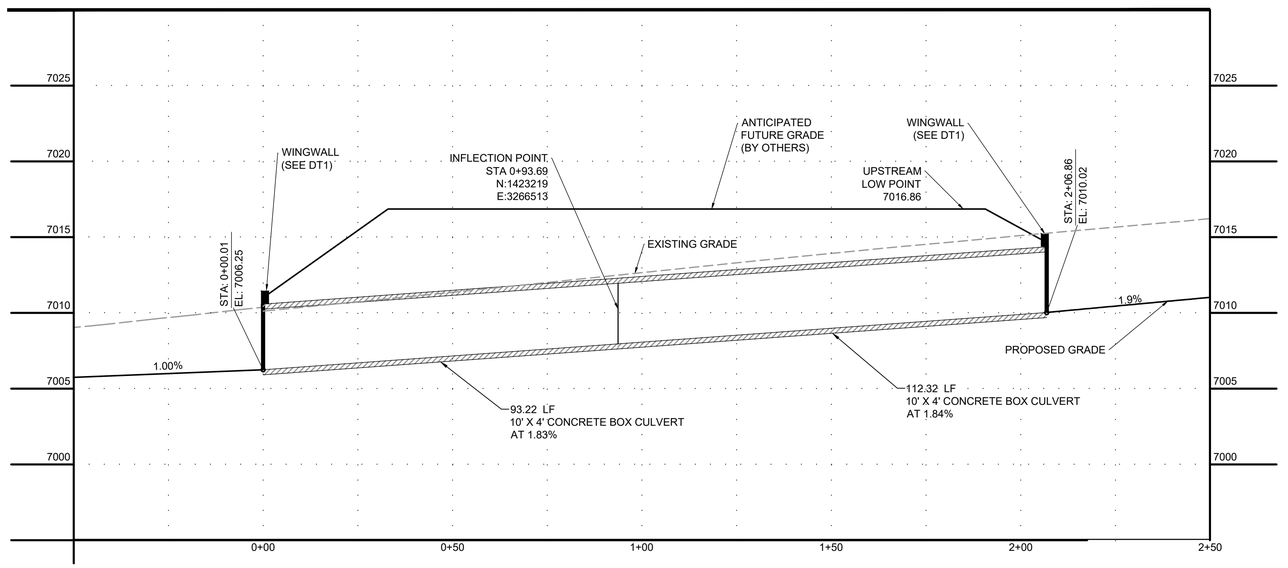
DRAINAGE CULVERTS PLAN AND PROFILE

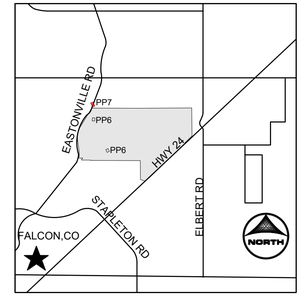
SHEET PP6 35

HR GREEN Xrefs: xgl-1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_682; xc-dsgn-682 10; xc-dsgn-F1-662 10; xc-vow-F1-662 10; xv-vow-662; xc-row-F2; xc-dsgn-F2; xc-dsgn-F3; xv-row-F3; xv-dsgn-F4; xc-row-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-row-PH2; xc-row-PH5; 01_XC_RIPRAP; 01_XV-Row; 01-XC-channel



REX ROAD CULVERT CROSSING





KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- 5250 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- SECTION LINE
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COLORADO LICENSED GREGORY L. PAYNE 37081 PROFESSIONAL ENGINEER 11-24-23

HORIZONTAL 0 20 10 VERTICAL 0 5 2.5

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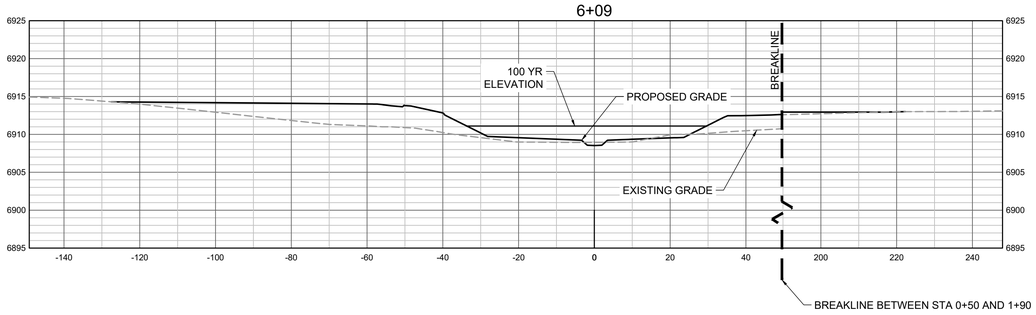
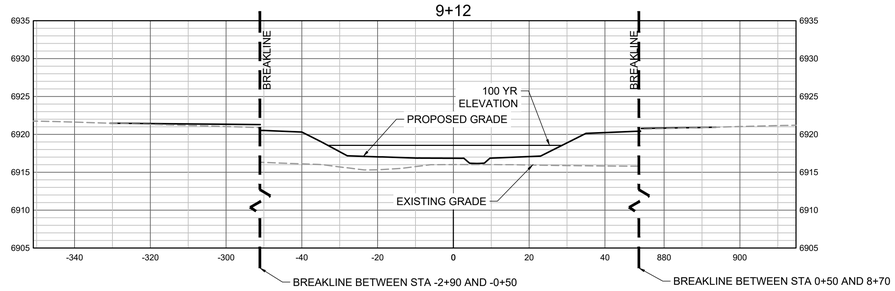
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

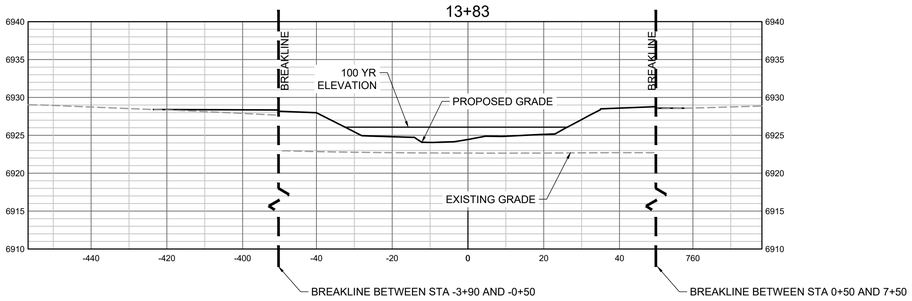
CONSTRUCTION DOCUMENTS
DRAINAGE CULVERT PLAN AND PROFILE

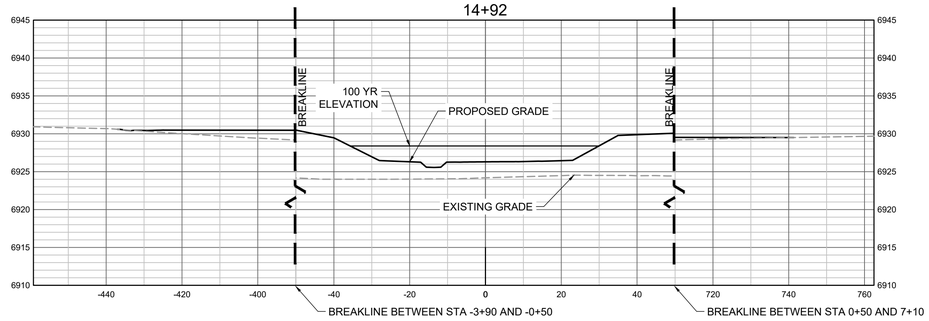
SHEET PP7 36

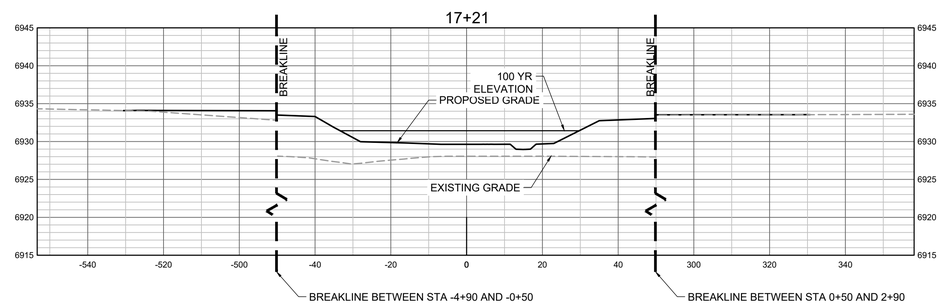
HR GREEN Xrefs: xgl-1-dh01; P&P KEY: HRGIX_EBase; 01-XC_Wingwalls; xv-dsgn_682; xc-dsgn-682.10; xc-dsgn-F1-662.10; xc-vow-F1-662.10; xc-vow-662; xc-row-PH2; xc-dsgn-F2; xc-dsgn-F3; xc-vow-F3; xc-dsgn-F4; xc-row-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-row-PH3; 01_XC_RIPRAP_01_XV-Row; 01-XC-channel

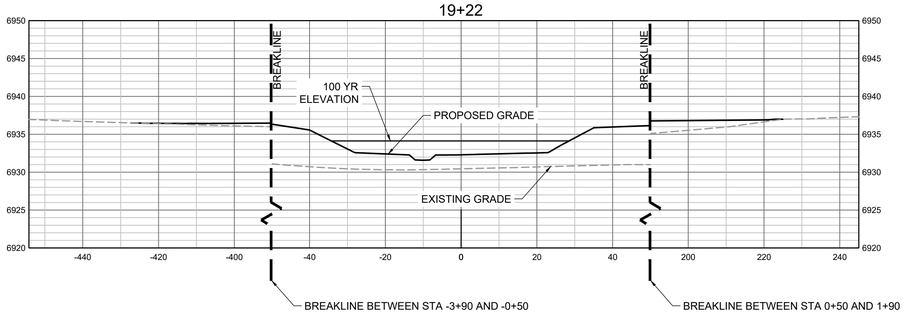


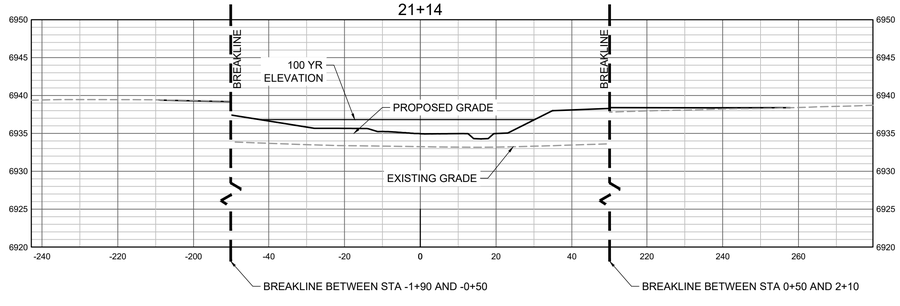


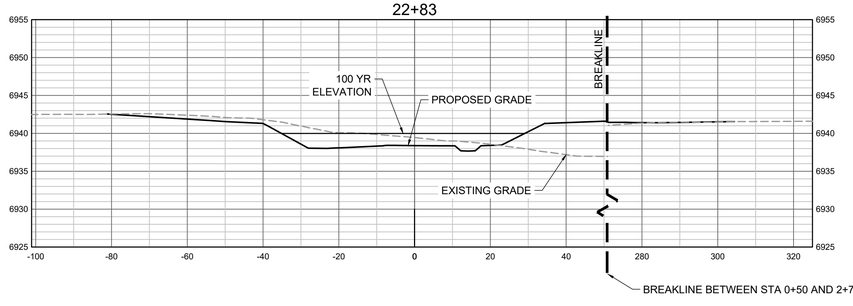












PROPOSED GRADES TO TIE INTO GRANDVIEW RESERVE FILING 1. REFER TO THE GRANDVIEW RESERVE FILING 1 PLAN SET FOR CONTINUATION OF GRADING THAT IS BEING TIED INTO OUTSIDE OF CHANNEL GRADING LIMITS.

HORIZONTAL 0 10 20 VERTICAL 0 5 10

HR GREEN Xrefs: xgt-1-dh01; 01-XC-PR_100YR_FP_DELINEATION

DRAWN BY: TBI	JOB DATE: 11/30/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
APPROVED: GLP	JOB NUMBER: 201662.03		
CAD DATE: 11/30/2023			
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\CROSS SECTIONS			

NO.	DATE	BY	REVISION DESCRIPTION

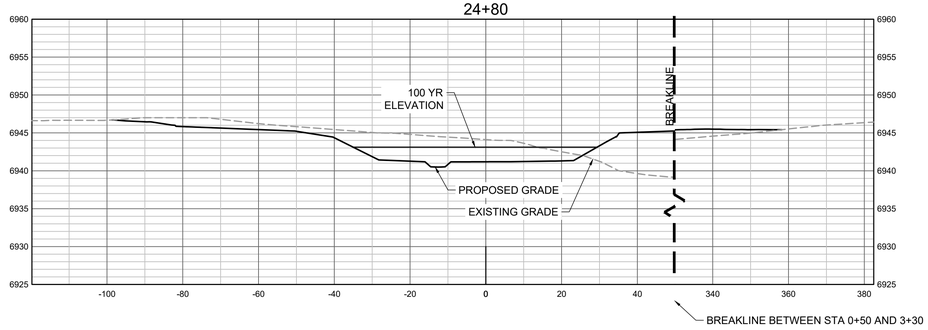
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

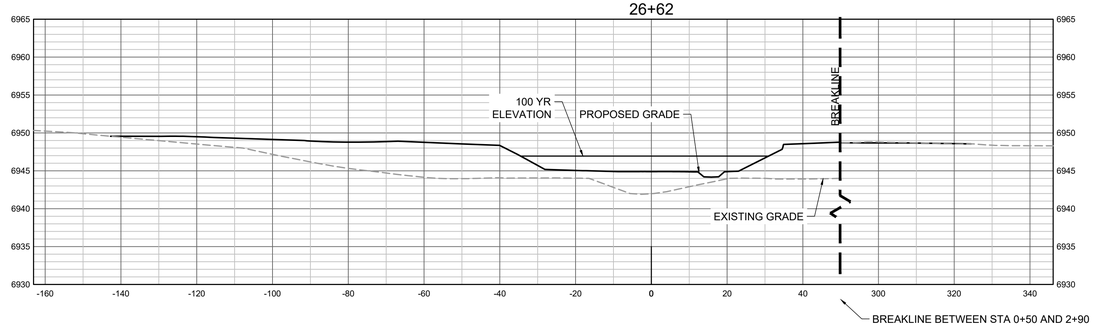
CONSTRUCTION DOCUMENTS
TRIBUTARY 2 CROSS SECTIONS

SHEET CS1

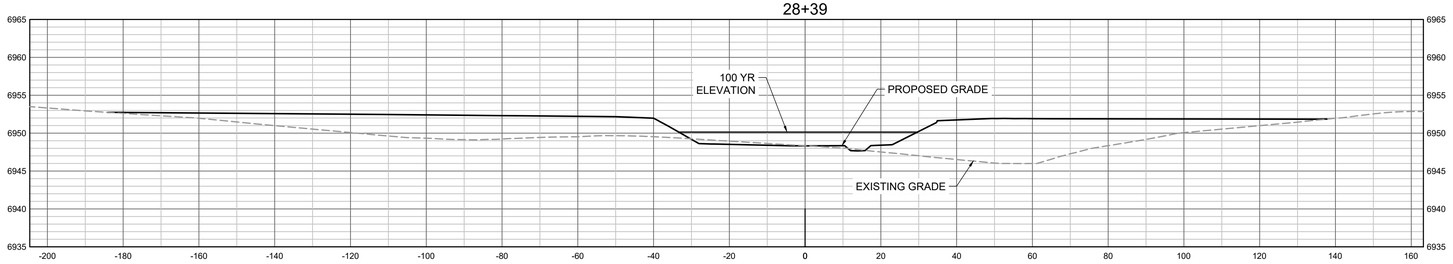
24+80



26+62



28+39



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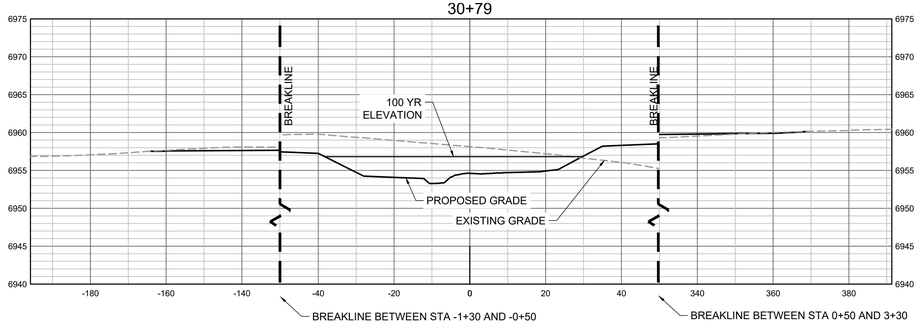
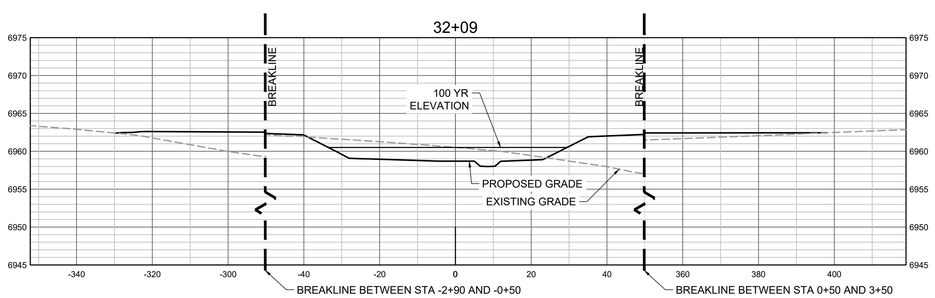
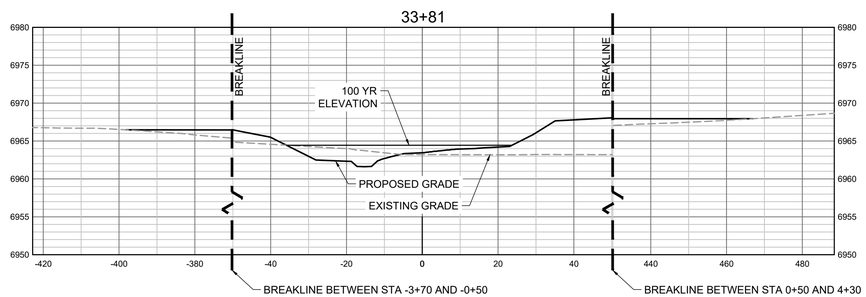


32+09



33+81



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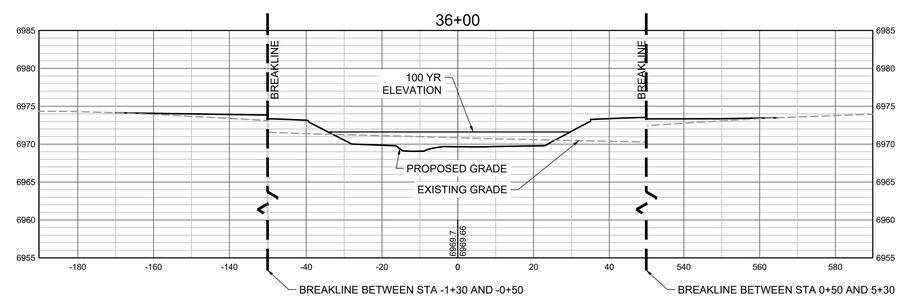


PROPOSED GRADES TO TIE INTO GRANDVIEW RESERVE FILING 1. REFER TO THE GRANDVIEW RESERVE FILING 1 PLAN SET FOR CONTINUATION OF GRADING THAT IS BEING TIED INTO OUTSIDE OF CHANNEL GRADING LIMITS.

HORIZONTAL 0 20 10 VERTICAL 0 10 5

DRAWN BY: TBI JOB DATE: 11/30/2023
APPROVED: GLP JOB NUMBER: 201662.03
CAD DATE: 11/30/2023
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\CROSS SECTIONS

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

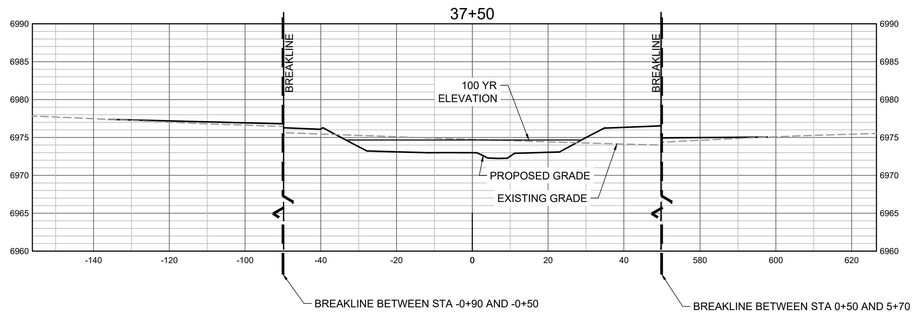
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

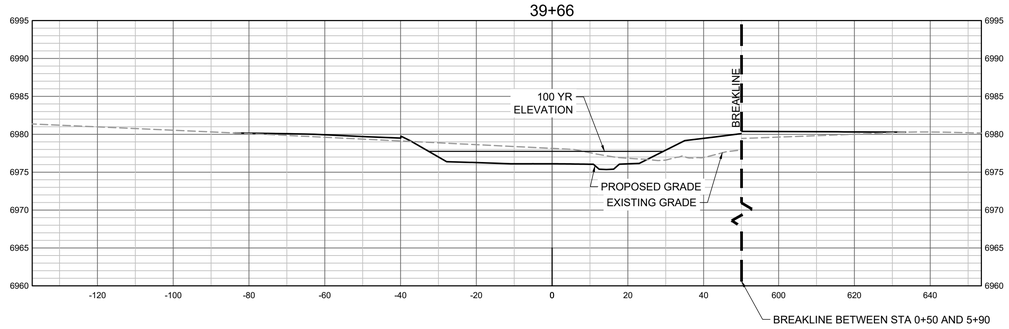
CONSTRUCTION DOCUMENTS
TRIBUTARY 2 CROSS SECTIONS

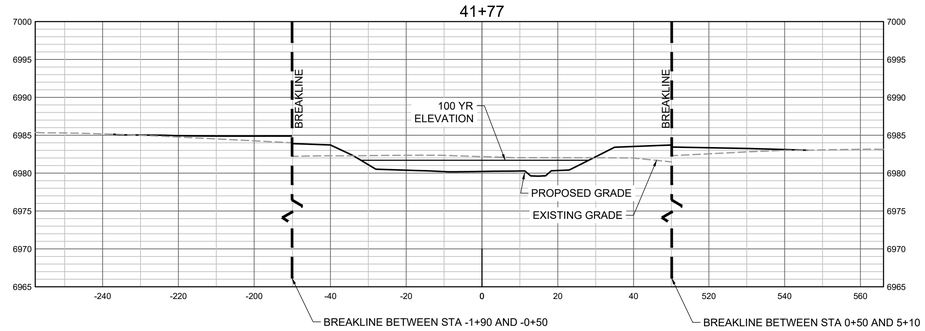
SHEET CS2

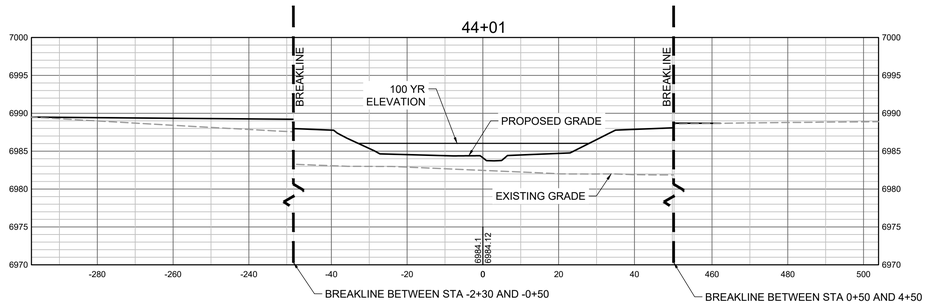
38

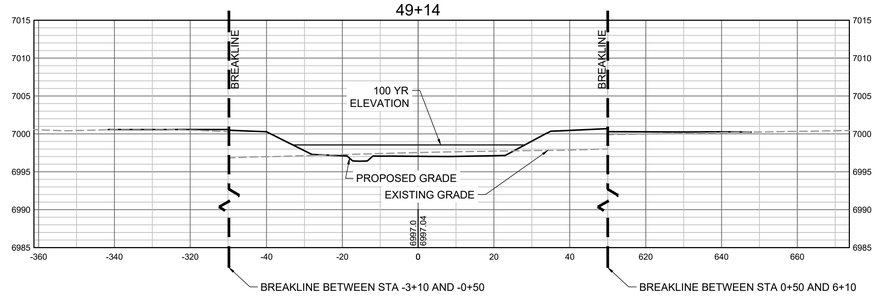
HR GREEN Xrefs: xgt-1-dh01; 01-XC-PR_100YR_FP_DELINEATION

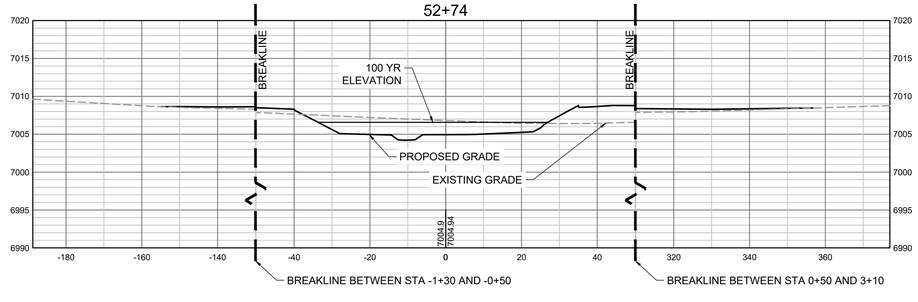


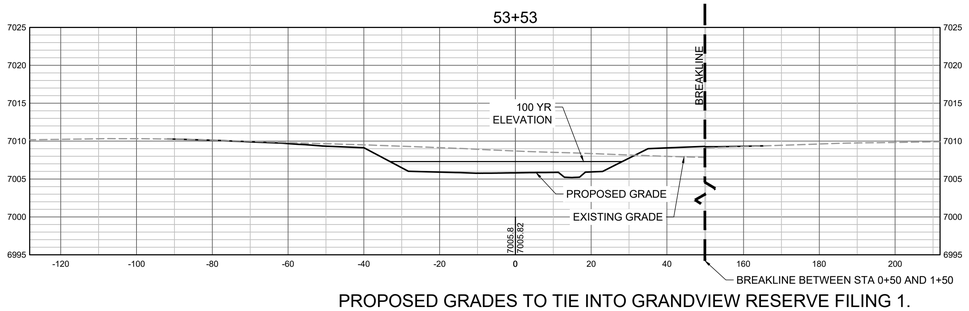












PROPOSED GRADES TO TIE INTO GRANDVIEW RESERVE FILING 1. REFER TO THE GRANDVIEW RESERVE FILING 1 PLAN SET FOR CONTINUATION OF GRADING THAT IS BEING TIED INTO OUTSIDE OF CHANNEL GRADING LIMITS.

HORIZONTAL 0 20 40 — VERTICAL 0 10 20

DRAWN BY:	TBI	JOB DATE:	11/30/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\CROSS SECTIONS		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

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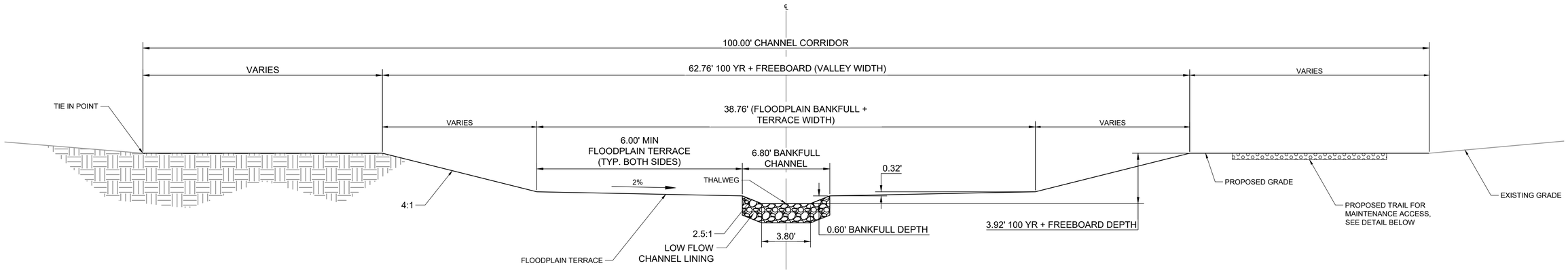
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 CROSS SECTIONS

SHEET CS3

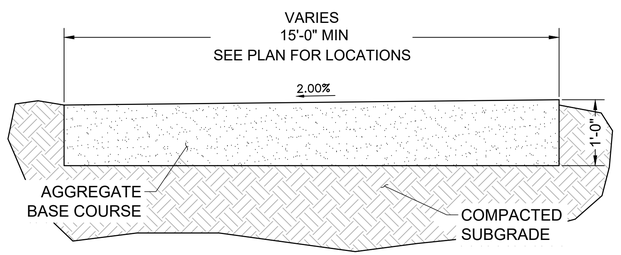
HR GREEN Xrefs: xgt-1-dh01_01-XC-PR_100YR_FP_DELINEATION



TYPICAL CROSS SECTION – TRIBUTARY 2

SCALE: N.T.S.

NOTES:
1. BANKFULL CHANNEL MAY SHIFT LEFT OR RIGHT WITHIN THE BANKFULL +TERRACE WIDTH SO LONG AS THE MINIMUM FLOOD PLAIN TERRACE WIDTH OF 6' IS MAINTAINED ON BOTH SIDES.
2. VALLEY WIDTH MAY SHIFT WITHIN THE 100' CHANNEL CORRIDOR.
3. SEE PROFILES FOR ELEVATION AT THALWEG.



MAINTENANCE ROAD TYPICAL SECTION

SCALE: NTS

DRAWN BY:	TBI	JOB DATE:	5/10/2023
APPROVED:	GLP	JOB NUMBER:	201662.03
CAD DATE:	11/30/2023		
CAD FILE:	J:\2020\201662.03\CAD\Dwgs\C\DETAILS		

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 — 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

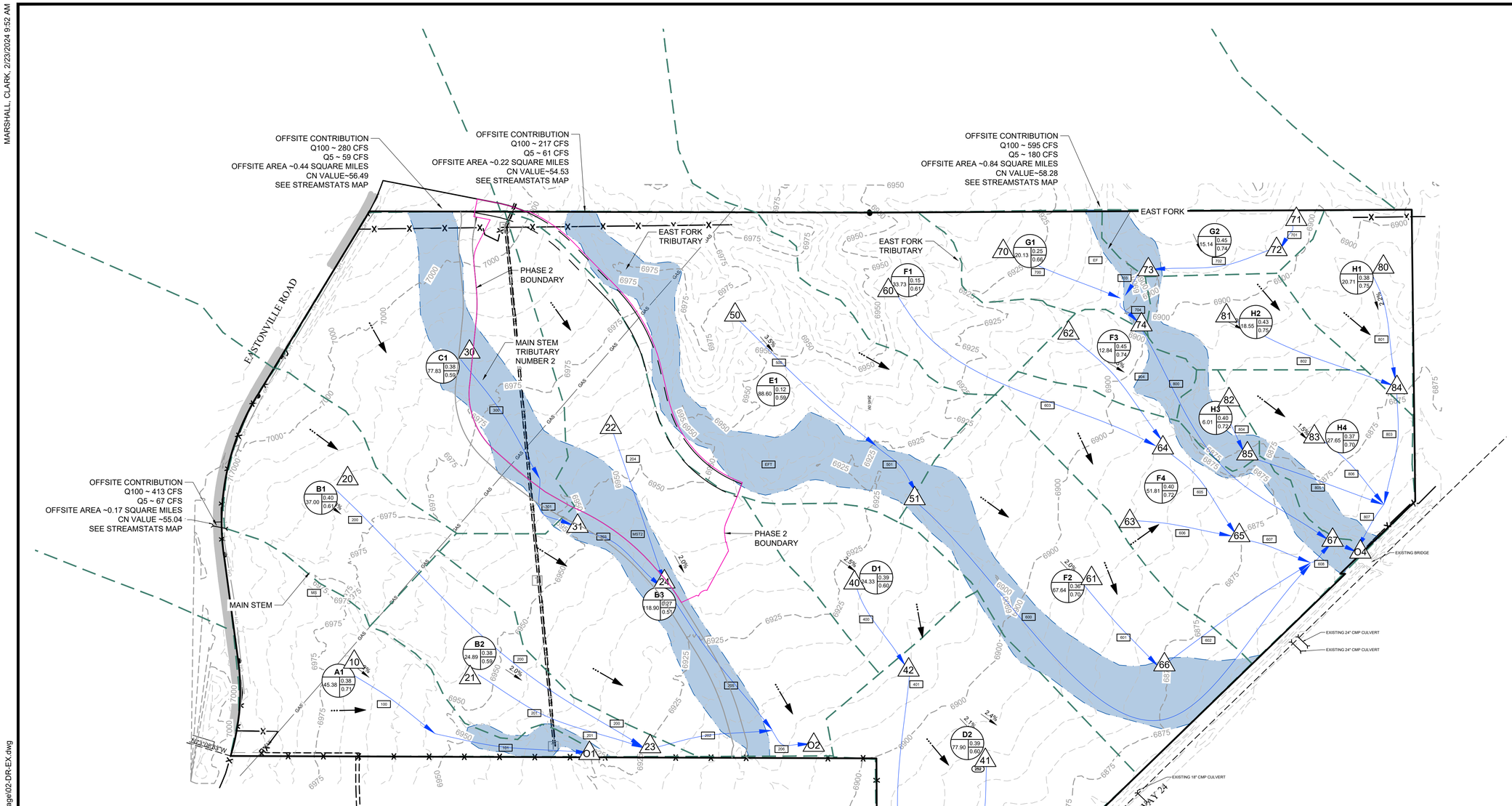
CONSTRUCTION DOCUMENTS
DETAILS

SHEET DT2

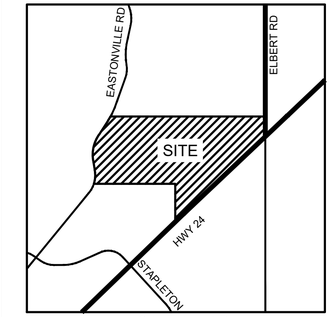
41

HR GREEN Xrefs: xgt-1-dh01

APPENDIX F – DRAINAGE MAPS



Basin	Design Point	5 Year Pre Devlopment	100 Year Pre Development
A1	10	13.03	66.80
B1	20	4.33	48.76
B2	21	1.66	20.74
	22	11.85	140.35
	23	5.99	68.56
B3	24	21.23	249.20
C1	30	9.95	110.70
	31	9.95	110.70
D1	40	8.12	40.00
D2	41	22.23	114.87
	42	8.12	40.00
E1	50	32.34	157.99
	51	93.34	374.99
F1	60	9.70	49.45
F2	61	16.46	86.73
F3	62	3.65	18.42
F4	63	12.98	67.82
	64	13.35	67.87
	65	26.04	135.62
	66	16.46	86.73
	67	231.47	864.52
G1	70	5.57	28.46
G2	71	3.87	20.06
	72	3.87	20.06
	73	3.87	20.06
	74	189.42	643.48
H1	80	1.85	21.89
H2	81	5.37	27.12
H3	82	1.92	9.51
H4	83	8.07	40.86
	84	7.22	49.01
	85	1.92	9.51
OS1	OS1	67.00	413.00
OS2	OS2	59.00	280.00
OS3	OS3	61.00	217.00
OS4	OS4	180.00	595.00
	Outfall1	80.03	479.80
	Outfall2	85.96	597.41
	Outfall3	30.00	154.35
	Outfall4	341.05	1335.77



VICINITY MAP

LEGEND:

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

LAND USE

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

NOTES:

NORTH

0 100 200

HRGreen

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

EXISTING EX1

FIG.EX1

MARSHALL, CLARK, 2/23/2024 9:52 AM

HRGreen DRAWING PATH:J:\2020\201662\CAD\Dwgs\C\PUD_Phase_2_662.202\Drainage\02-DR-EX.dwg

HUHN, KEN, 7/30/2024 1:25 PM

RECEIVING PBMP	PBMP TRIBUTARY AREA (AC)	TRIBUTARY SUBBASINS
POND A	31.95	(A1 to K1)-A, EA6, EA7
POND B	38.19	(A to O)-B

NOTE THERE ARE NO PROPOSED SUBBASINS EXCLUDED FROM TREATMENT BY THE PROPOSED PBMPs.

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q5 (cfs)	Q100 (cfs)
A1-A	3.22	14	2.2	8.5
A2-A	1.23	49	2.2	5.2
B1-A	0.26	79	0.8	1.6
B2-A	1.02	64	2.6	5.3
B3-A	0.89	71	2.8	5.5
B4-A	3.67	56	8.2	17.8
C1-A	0.63	64	1.6	3.4
D1-A	0.70	45	1.3	3.0
E1-A	0.73	59	1.7	3.7
E2-A	2.56	63	6.2	12.9
E3-A	0.97	64	2.4	4.9
E4-A	1.02	64	2.5	5.2
EA6	0.46	64	1.2	2.5
H1-A	2.25	39	3.4	8.4
H2-A	1.94	57	4.0	8.7
H3-A	2.80	64	6.5	13.5
H4-A	3.87	46	6.4	14.9
J1-A	1.50	27	1.6	4.7
K1-A	1.75	68	4.3	8.8
EA6	0.70	100	3.2	5.7
EA7	0.65	89	2.6	4.8
A-B	6.56	43	8.5	21.1
B-B	3.55	24	2.9	9.4
C-B	1.53	58	2.9	6.5
D-B	1.03	45	1.7	4.1
E-B	1.03	12	0.6	2.7
F-B	1.45	24	1.3	4.2
G-B	2.15	56	4.0	8.7
H-B	4.12	39	5.1	12.9
I-B	0.76	56	1.5	3.3
J-B	6.81	58	11.9	26.2
K-B	1.12	56	2.1	4.7
L-B	1.89	18	1.5	5.3
M-B	1.46	56	2.7	5.9
N-B	3.00	12	1.6	7.0
O-B	1.59	0	0.6	4.2

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	SQ5 (cfs)	SQ100 (cfs)
1-A	DP35.1, K1-A	5.2	10.1
2-A	DP 35.2, H4-A	6.6	14.8
2.1-A	DPS 1-A, 2-A	11.7	24.7
3-A	H3-A	6.5	13.5
3.1-A	DP 3-A	6.5	13.5
4-A	J1-A	1.6	4.7
4.1-A	DPS 2.1-A, 4-A	12.4	27.1
5-A	H1-A	3.4	8.4
5.1-A	DP 5-A	3.4	8.4
6-A	H2-A	4.0	8.7
6.1-A	DPS 3.1A, 4.1A, 5.1A, 6-A	22.1	48.6
7-A	F1-A	1.2	2.5
7.1-A	DP 7-A	1.2	2.5
8-A	E1-A	1.7	3.7
9-A	E2-A, B4-A	14.2	30.3
9.1-A	DPS 6.1A, 7.1A, 8-A, 9-A	32.7	70.9
10-A	A2-A	2.2	5.2
10.1-A	DP 10-A	2.2	5.0
11-A	E4-A	2.5	5.2
12-A	E3-A	2.4	4.9
12.1-A	DPS 10.1A, 11-A, 12-A	6.7	14.4
13-A	D1-A	1.3	3.0
13.1-A	DPS 9.1A, 13-A	33.1	72.0
14-A	B1-A, B2-A, B3-A	5.8	11.7
14.1-A	DPS 12.1-A, 13.1-A	37.4	81.2
14.2-A	DP 14-A	5.8	11.7
15-A	C1-A	1.6	3.4
15.1-A	DP 15-A	1.6	3.4
16.1-A	A1-A, 14.1-A, 14.2-A, 15.1-A	43.6	90.6
35.1	EA6	3.2	5.7
35.2	EA7	2.6	4.8
DP1-B	K-B	2.1	4.7
DP2-B	D-B	1.7	4.1
DP3-B	DPs 1-B, 2-B	3.8	8.7
DP4-B	A-B	8.5	21.1
DP5-B	C-B	4.2	10.7
DP6-B	DPs 4-B, 5-B	12.3	30.7
DP7-B	DPs 3-B, 6-B	15.5	38.2
DP8-B	G-B	4.0	8.7
DP9-B	H-B	5.1	12.9
DP10-B	DPs 8-B, 9-B	8.8	21.0
DP11-B	B-B	2.9	9.4
DP12-B	I-B	1.5	3.3
DP13-B	J-B, L-B	13.4	31.1
DP14-B	DPs 7-B, 11-B, 12-B	18.9	48.5
DP15-B	M-B	2.7	5.9
DP16-B	DPs 13-B, 15-B	15.8	39.7
DP17-B	N-B	1.6	7.0
DP18-B	DPs 14-B, 17-B	20.5	55.1

SUBBASINS EA6 & EA7 ARE PER THE GRANDVIEW RESERVE FILING 1 PDR

4
ZONED (A-35)
AGRICULTURAL
4200000461
JMJK HOLDINGS LLC
3855 AMBROSIA ST STE 304
CASTLE ROCK CO, 80109

POTENTIAL FUTURE ACCESS POINT FOR ADJACENT PROPERTY (BY OTHERS)

4
ZONED (PUD)
4200000464
4 SITE INVESTMENTS LLC
1271 KELLY JOHNSON BLVD STE 100
COLORADO SPRINGS CO, 80920

EX. 20' GAS ESMT.

100 YR (PER HRG 2024 STUDY)

REX ROAD

CRUMPETS LN

ROAD 5

ROONEY PL

SLIGO TERR

DAWLISH DR

DOWNPATRICK WY

EDENVALE 2A PL

CAUSEWAY CIR

DUNLOE DR

GRANGE TR

LISMORE LN

GRANDVIEW PHASE 1 BOUNDARY

LIMITS OF PHASE 2 IMPROVEMENTS

GIECK RANCH TRIBUTARY #2 (MST2)

PHASE 1 FILING 4

FUTURE AMENITY CENTER

FUTURE PHASE 3

PR STORM MH (PUBLIC, TYP)

PR STORM INLET (PUBLIC, TYP)

PR RCP STM PIPE (PUBLIC, TYP)

PR SWALE

PR F.S.D. POND A

PR F.S.D. POND B

100' DRAINAGE CHANNEL

PR POND OUTFALL

MAINTENANCE PATH

TRACT A

TRACT B

TRACT C

TRACT D

LEGEND:

PROPOSED MAJOR CONTOUR	5250
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	5250
EXISTING MINOR CONTOUR	
PROPOSED STORM SEWER	
PROPOSED DRAINAGE SWALE	
PROPERTY LINE	
SUBPHASE LINE	
PROPOSED FLOW DIRECTION	
EXISTING FLOW DIRECTION	
PROPOSED DRAINAGE BASIN	
DESIGN POINT	BASIN DESIGNATION
PROPOSED BASIN LABEL	11 / 1.25 BASIN DESIGNATION / AREA (AC.)
LOCAL HIGH POINT	
LOCAL LOW POINT	

NORTH
0 100
50

DRAWN BY: CVW	JOB DATE: 7/29/24	BAR IS ONE INCH ON OFFICIAL DRAWINGS.	
APPROVED: KMH	JOB NUMBER: 201662	0 1"	
CAD DATE: 7/30/2024		IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD FILE: J:\2020\201662\CAD\Dwgs\C\PUD_Phase_2_662.202\Drainage\02-DR			

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - COLORADO SPRINGS
1975 RESEARCH PKWY SUITE 230
COLORADO SPRINGS CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

GRANDVIEW RESERVE - PHASE 2
D.R. HORTON
EL PASO COUNTY, CO

GRANDVIEW PHASE 2
PROPOSED DRAINAGE CONDITIONS

SHEET DRN 1

HR GREEN Xrefs: xc-row-662, xv-dsgn_662, xc-row-PH2, 01-XC-channel, xc-dsgn-PH2, xc-row-F1-662.10, xc-row-F4, xc-row-F3, xc-row-F2, drain_map_legend, xc-row-PH3, xgl-1-arch dh01_PH2_PUD