EPC STORMWATER REVIEW COMMENTS IN ORANGE BOXES WITH BLACK TEXT

HRGreen

A final drainage report for the early grading will need to be submitted with the project.

Grandview Reserve Phase 3
Preliminary Drainage Report

March 2024

HR Green Project No: 201662.203

Prepared For:

D.R. Horton

Contact: Riley Hillen, P.E.

9555 S. Kingston Ct.

Englewood, CO 80112

Prepared By:

HR Green Development, LLC

Contact: Ken Huhn, P.E.

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(630) 602-4965

PUDSP241

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:

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I. General Purpose, Location and Description

a. Purpose

The purpose of this Preliminary Drainage Report (PDR) for the Grandview Reserve Subdivision Phase 3 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 3 site is located in unincorporated El Paso County, Colorado. The Phase 3 location (referred to as the site herein) is located west of Grandview Reserve Filings 1-4 and MST2, south of Grandview Reserve Phase 2, and east of Rex Road.

The site lies within a tract of land within Sections 21, 22, 27 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 east and undeveloped land that has historically been used as ranching lands. The northwest of the site is bound by Phase 2 of the subdivision. The 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” (Channel B) 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 and the 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 studies as a future project.

The existing surrounding platted developments include the Grandview Reserve Phase 1 Filings 1-4 and Grandview Reserve Phase 2.

c. Description of Property

The site is approximately 102.82 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. The NRCS soil survey is presented in **Appendix A**.

There is one major drainageway through the site. The Gieck Ranch Tributary #2 (MST2 in the MDDP) traverses through the site and divides it in two. The 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. Gieck Ranch Tributary #3 (future Channel C) traverses the site along its northeastern boundary and forms the northeast boundary for Phase 3 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. No fill will be placed in this channel in 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, November 2020 (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, March 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 3 improvements are located in subbasins B3 and D1 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. The offsite flows entering Phase 3 from Phase 2 have been accounted for in the drainage calculations.

b. Existing Subbasin Description

The Grandview Reserve Phase 3 site drains from the northwest to the southeast slopes ranging from 2% - 4%. The majority of the site has historically drained into the Gieck Ranch Tributary #2 (existing MST2), with portions draining to East Fork Tributary (EFT).

The existing subbasins for the Grandview Reserve Phase 3 site were studied in the approved MDDP for Grandview Reserve. This site is located within subbasins B3 and D1 of this report and are described as follows.

Is there an existing pond?

"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 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."

A copy 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.

If this is proposed conditions, please move to that section of report.

When referencing existing ponds please clarify what EDARP project number the facility was constructed under.

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 sheet flow/curb & gutter/channel flow which drain to proposed private extended detention basins for treatment and flood attenuation.

The northeastern corner of the site will drain to and be treated by "Pond R", which will outfall in the EFT, henceforth being referred to as "Channel C". Although the tributary area of Pond R would historically drain to MST2, it will now outfall in Channel C. The increase in discharge volume to Channel C will be negligible as a significant tributary area of Phase 2 Pond A and Pond B historically drained to Channel C and will now outfall into MST2. A comparison of the drainage areas is overlayed on the existing drainage map. Any increase in volume entering the channel will be mitigated with slope stabilization measures.

The west and south portions of the site will drain to and be treated by two separate detention ponds, "Pond F," and "Pond C." Both Pond F and Pond C will outfall into the rerouted channel MST2, henceforth being referred to as "Channel B." Drainage from both of these ponds has been accounted for in the channel re-alignment design and is detailed in the CLOMR report.

The 25.0 acre future school site will remain undeveloped and will not be accounted for in this report.

Please clearly state that WQ and/or detention will need to be provided on the 25 ac site if true. It needs to be explicitly if the aforementioned ponds will be able to treat the school site and provide WQ.

There are minor offsite flows from Phase 2 which are accounted for.

Subbasins Tributary to and Treated by Pond R

Basin R-A1 is 2.16 acres of landscaped area and 50' lots area. Stormwater (Q_5 = 1.7 cfs Q_{100} = 6.0 cfs) is conveyed via grass swales in Tracts E and D to a private type-C inlet at DP R-1, and ultimately draining to Pond R via the proposed public storm sewer network.

Basin R-A2 is 1.58 acres of El Paso County (EPC) Local right-of-way (ROW), landscaped area and 50' lots area. Stormwater (Q_5 = 2.8 cfs Q_{100} = 6.0 cfs) is conveyed via curb and gutter to a type R inlet at DP R-2 and ultimately drains to Pond R via the proposed public storm sewer network. Flowby from DP R-2 (Q_5 = 0.0 cfs Q_{100} = 1.0 cfs) will be captured by future development.

Basin R-B is 4.19 acres of EPC Local ROW area, landscaped area, and 35' lots area. Stormwater (Q_5 = 6.1 cfs Q_{100} = 14.7 cfs) is conveyed via curb and gutter to a type R inlet at DP R-3 and ultimately drains to Pond R via the proposed public storm sewer network. Flowby from DP R-3 is captured at DP R-6 sump inlet.

Basin R-C is 2.90 acres of EPC Local ROW area, and 35' lots area. Stormwater (Q_5 = 5.4 cfs Q_{100} = 12.0 cfs) is conveyed via curb and gutter to a type R sump inlet at DP R-4 and ultimately drains to Pond R via the proposed public storm sewer network. In the event of inlet clogging, stormwater will overtop the curb and flow via an overflow swale to Rex Road.

Basin R-D is 5.53 acres of EPC Minor Arterial ROW area, landscaped area, and 35' lots area. Stormwater (Q_5 = 7.2 cfs Q_{100} = 17.7 cfs) is conveyed via curb and gutter to a type R inlet at DP R-5. Flowby stormwater from Grandview Phase 2 Basin G-B, H-B is also captured at DP R-5 and ultimately drains to Pond R via the proposed public storm sewer network. Flowby from DP R-5 is captured at DP R-6 sump inlet.

will there be any negative impacts/erosion due to the bypass flow leaving the site without development downstream in the interim before the future development is in place.

Basin R-E is 1.81 acres of EPC Local ROW area, 35' lots area. Stormwater (Q_5 = 3.3 cfs Q_{100} = 7.4 cfs) is conveyed via curb and gutter to a type R sump inlet at DP R-6 and ultimately drains to Pond R via the proposed public storm sewer network.

Basin R-F is 0.81 acres of EPC Local ROW area and landscaped area. Stormwater (Q_5 = 1.8 cfs Q_{100} = 4.0 cfs) is conveyed via curb and gutter to a type R inlet at DP R-7 and ultimately drains to Pond R via the proposed public storm sewer network.

sump?

Basin R-G is 1.80 acres of landscaped detention facility area. Stormwater (Q_5 = 0.6 cfs Q_{100} = 4.3 cfs) is conveyed via sheet flow in Tract C and flows directly into Pond R at DP R-8.

Missing Basin R-H, please include

<u>Subbasins Tributary to and Treated by Pond F</u>

Basin F-A is 4.58 acres of EPC Local ROW area, landscaped area, and 35' lots area. Stormwater (Q_5 = 7.0 cfs Q_{100} = 15.8 cfs) is conveyed via curb and gutter to a type R sump inlet at DP F-1 and ultimately drains to Pond F via the proposed public storm sewer network.

Basin F-B is 3.76 acres of EPC Local ROW area and 40' lots area. Stormwater (Q_5 = 7.0 cfs Q_{100} = 15.2 cfs) is conveyed via curb and gutter to a type R sump inlet at DP F-2 and ultimately drains to Pond F via the proposed public storm sewer network.

Basin F-C1 is 2.08 acres of EPC Local ROW area, landscaped area, and 40' lots area. Stormwater (Q_5 = 4.0 cfs Q_{100} = 8.9 cfs) is conveyed via curb and gutter to a type R inlet at DP F-3 and ultimately drains to Pond F via the proposed public storm sewer network. Flowby from DP F-3 will flow to DP F-5 via curb and gutter.

Basin F-C2 is 3.64 acres of EPC Local ROW area and 40' lots area. Stormwater (Q_5 = 6.9 cfs Q_{100} = 14.6 cfs) is conveyed via curb and gutter to a type R inlet at DP F-5 and ultimately drains to Pond F via the proposed public storm sewer network. Flowby from DP F-5 is captured in DP F-7 sump inlet.

Basin F-C3 is 1.33 acres of EPC Local ROW, landscaped area, and 40' lots area. Stormwater (Q_5 = 2.9 cfs Q_{100} = 6.0 cfs) is conveyed via curb and gutter to a type R inlet at DP F-4 and ultimately drains to Pond F via the proposed public storm sewer network. Flowby from DP F-4 is routed to DP F-5.

Basin F-D is 3.13 acres of EPC Local ROW, landscaped area, and 50' lots area. Stormwater (Q_5 = 4.2 cfs Q_{100} = 10.4 cfs) is conveyed via curb and gutter to a type R inlet at DP F-6 and ultimately drains to Pond F via the proposed public storm sewer network. Flowby from DP F-6 is captured in DP F-7 sump inlet.

Basin F-E is 4.42 acres of EPC Local ROW, landscaped area, 35' lots area, 40' lots area, and 50' lots area. Stormwater (Q_5 = 7.7 cfs Q_{100} = 17.4 cfs) is conveyed via curb and gutter to a type R sump inlet at DP F-7 and ultimately drains to Pond F via the proposed public storm sewer network. In the event of inlet clogging, stormwater from DP F-7 is permitted to overtop the crown of the road and be captured at DP R-8 sump inlet.

Basin F-F is 0.94 acres of EPC Local ROW, landscaped area, and 50' lots area. Stormwater (Q_5 = 1.9 cfs Q_{100} = 4.1 cfs) is conveyed via curb and gutter to a type R sump inlet at DP F-8 and ultimately drains to Pond F via the proposed public storm sewer network. In the event of inlet clogging, stormwater at DP F-8 will overtop the curb and follow an overflow swale to Pond F.

Basin F-G is 0.80 acres of landscaped area and 50' lots area. Stormwater (Q_5 = 0.9 cfs Q_{100} = 2.6 cfs) is conveyed via sheet flow and drains directly to Pond F at DP F-9.

See comments on drainage map, there is a portion of F-G that does not drain to Pond F

Basin F-H is 1.95 acres of landscaped detention facility area. Stormwater (Q_5 = 0.6 cfs Q_{100} = 4.5 cfs) is conveyed via sheet flow and drains directly to Pond F at DP F-10.

C-L is not entirely undeveloped. Discuss potential applicable exclusions.

Basin F-I is 1.03 acres of undeveloped area. Stormwater (Q_5 = 0.4 cfs Q_{100} = 2.8 cfs) follows historic drainage patterns and sheet flows offsite at DP F-11.

Subbasins Tributary to and Treated by Pond C

Basin C-A is 3.43 acres of EPC Local ROW area, landscaped area, and 50' lots area. Stormwater (Q_5 = 3.7 cfs Q_{100} = 10.5 cfs) is conveyed via curb and gutter to a type R inlet at DP C-1 and ultimately drains to Pond C via the proposed public storm sewer network. Flowby from DP C-1 will flow to DP C-3 via curb and gutter.

Basin C-B is 4.54 acres of EPC Local ROW area, landscaped area,40' lots area, and 50' lots area. Stormwater (Q_5 = 6.1 cfs Q_{100} = 15.6 cfs) is conveyed via curb and gutter to a type R inlet at DP C-2 and ultimately drains to Pond C via the proposed public storm sewer network. Flowby from DP C-2 will flow to DP C-4 via curb and gutter.

Basin C-C is 2.30 acres of EPC Local ROW area, landscaped area, and 50' lots area. Stormwater (Q_5 = 3.6 cfs Q_{100} = 8.4 cfs) is conveyed via curb and gutter to a type R inlet at DP C-3 and ultimately drains to Pond C via the proposed public storm sewer network. Flowby from DP C-3 is captured by CP C-7 sump inlet.

Basin C-D is 1.88 acres of EPC Local ROW and 40' lots area. Stormwater (Q_5 = 3.8 cfs Q_{100} = 8.1 cfs) is conveyed via curb and gutter to a type R inlet at DP C-4 and ultimately drains to Pond C v public storm sewer network. Flowby from DP C-4 is captured by CP C-7 sump inlet.

From map, it appears flowby from DP C-6 would to go DP C-8, not 7

Basin C-E is 2.30 acres of EPC Local ROW and 40' lots area. Stormwater (Q_5 = 4.7 cfs Q_{100} = 10.2 cfs) is conveyed via curb and gutter to a type R inlet at DP C-5 and ultimately drains to Pond C via the proposed public storm sewer network. Flowby from DP C-5 is captured by CP C-7 sump inlet.

Basin C-F is 2.85 acres of EPC Local ROW, landscaped area, and 40' lots area. Stormwater (Q_5 = 5.2 cfs Q_{100} = 11.6 cfs) is conveyed via curb and gutter to a type R inlet at DP C-6 and ultimately drains to Pond C via the proposed public storm sewer network. Flowby from DP C-6 is captured by CP C-7 sump inlet.

Basin C-G is 1.64 acres of EPC Local ROW, landscaped area, 40' lots area, and 50' lots area. Stormwater (Q_5 = 3.1 cfs Q_{100} = 7.1 cfs) is conveyed via curb and gutter to a type R sump inlet at DP C-7 and ultimately drains to Pond C via the proposed public storm sewer network. In the event of inlet clogging, stormwater from DP C-7 is permitted to overtop the crown of the road and be captured at DP C-8 sump inlet.

Please revise to match proposed drainage map

Basin C-H is 0.49 acres of EPC Local ROW, landscaped area, and 40' lots area. Stormwater (Q_5 = 1.2 cfs Q_{100} = 2.6 cfs) is conveyed via curb and gutter to a type R sump inlet at DP C-8 and ultimately drains to Pond C via the proposed public storm sewer network. In the event of inlet clogging, stormwater at DP C-8 will overtop the curb and follow an overflow swale to Pond F.

Basin C-I is 0.65 acres of landscaped area. Stormwater (Q_5 = 0.2 cfs Q_{100} = 1.4 cfs) is conveyed via swale flow and sheet flow at DP C-9 and drains directly into Pond C.

Basin C-J is 0.81 acres of landscaped area and 40' lots area. Stormwater (Q_5 = 1.0 cfs Q_{100} = 2.9 cfs) is conveyed via sheet flow at DP C-10 and drains directly into Pond C.

Offsite Basins C1 - C14 is 43.50 acres of Grandview Filing 4 subdivision. Stormwater (Q_5 = 50.5 cfs Q_{100} = 107.4 cfs) is conveyed via offsite storm network and trickle channel flow at DP C-11 and flows directly into Pond C.

Basin C-K is 2.77 acres of landscaped detention facility area. Stormwater (Q_5 = 0.8 cfs Q_{100} = 6.1 cfs) is conveyed via trickle channel flow at DP C-12 and drains directly into Pond C.

C-L is not entirely undeveloped. Discuss potential applicable exclusions.

Basin C-L is 0.50 acres of undeveloped area. Stormwater (Q_5 = 0.2 cfs Q_{100} = 1.3 cfs) follows historic drainage patterns and sheet flows offsite at DP C-13.

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 a full spectrum detention pond which release runoff into Channel B and Channel C. All ponds and water quality features will discharge the design storms at less than rates specified in the Grandview reserve MDDP.

b. Water Quality & Detention

Please be aware: the water quality ponds and calcs were reviewed for general compliance but will be reviewed with more scrutiny in the final design phase once final design plans are provided.

Pond R (Full Spectrum Detention Basin)

Water quality and detention for Basins RA-1 through R-G is provided in Pond R; a private, full spectrum extended detention basin within Phase 3 of Grandview Reserve. A total of 19.29 acres at 42% 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 0.298 ac-ft, the EURV is 0.897 ac-ft, and the 100-year detention volume is 1.373 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 72 and 77 hours, respectively. A forebay is located at the outfall into the pond and a 6.0' 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 9' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Channel C.

Pond F (Full Spectrum Detention Basin)

Water quality and detention for Basins F-A through F-I is provided in Pond F; a private, full spectrum extended detention basin within Phase 3 of Grandview Reserve. A total of 26.63 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 0.461 ac-ft, the EURV is 1.540 ac-ft, and the 100-year detention volume is 2.353 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 71 and 74 hours, respectively. A forebay is located at the outfall into the pond and a 6.0' 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 30.0' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Channel B.

Pond C (Full Spectrum Detention Basin)

Water quality and detention for offsite Basins C1- C14, and onsite Basins C-A through C-K is provided in Pond F; a private, full spectrum extended detention basin majority within Phase 3 of Grandview Reserve, and partially within Filing 4 of Grandview Reserve. A total of 67.16 acres at 53% 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 1.209 ac-ft, the EURV is 4.205 ac-ft, and the 100-year detention volume is 6.247 ac-ft. The WQCV, EURV and 100-year storms are released in 40, 71 and 72 hours, respectively. A forebay is located at the outfall into the pond and a 6.0' 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 75.0' emergency overflow spillway is provided that conveys the developed, peak 100-yr flow rate with 1.0' of freeboard towards Channel B.

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

In the MDDP Summary submitted with the Sketch Plan (SKP-20-001) it is noted that due to the increased volume of flow, low impact design should be taken into account for design of each filing. Please include additional information on where and how this is being accomplished within such a high density area.

Step 1 – Reducing Runoff Volumes: L at the source. In general, stormwater dis 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.

Address/discuss any exclusions proposed and the 25 ac future school site. Will this site be accounted for with the EDBs or will WQCV treatment be required on site? We just want an understanding of all WQ quality strategies proposed, including any areas like the school that are not being addressed with the proposed ponds.

Also add what drainage basins are not trib to any ponds and applicable exclusions to Step 2 so it is clear how all the disturbed areas are planned to be treated.

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.

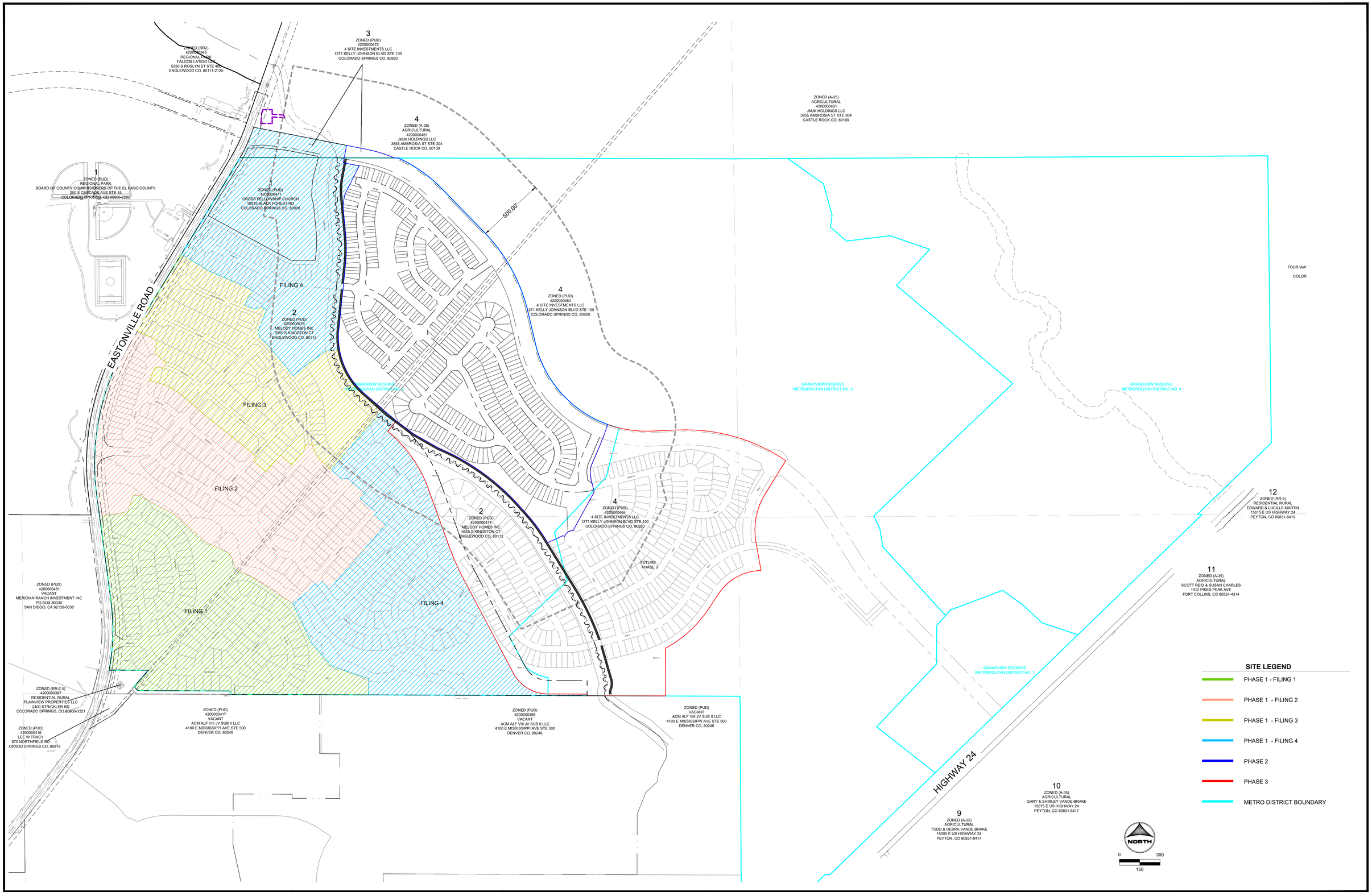
XI. Drawings

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

HR GREEN X:\efs_xgl-1-arch dh01_PH2_PUD; xv-row-662; xc-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

DRAWN BY: DLH	JOB DATE: ----	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"	
APPROVED: KMH	JOB NUMBER: 201662.2	IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD DATE: 12/15/2023			
CAD FILE: J:\2020\201662\CAD\Dwgs\C\PUD_Phase_2_662.202\Exhibit\Vicinity_Map			

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

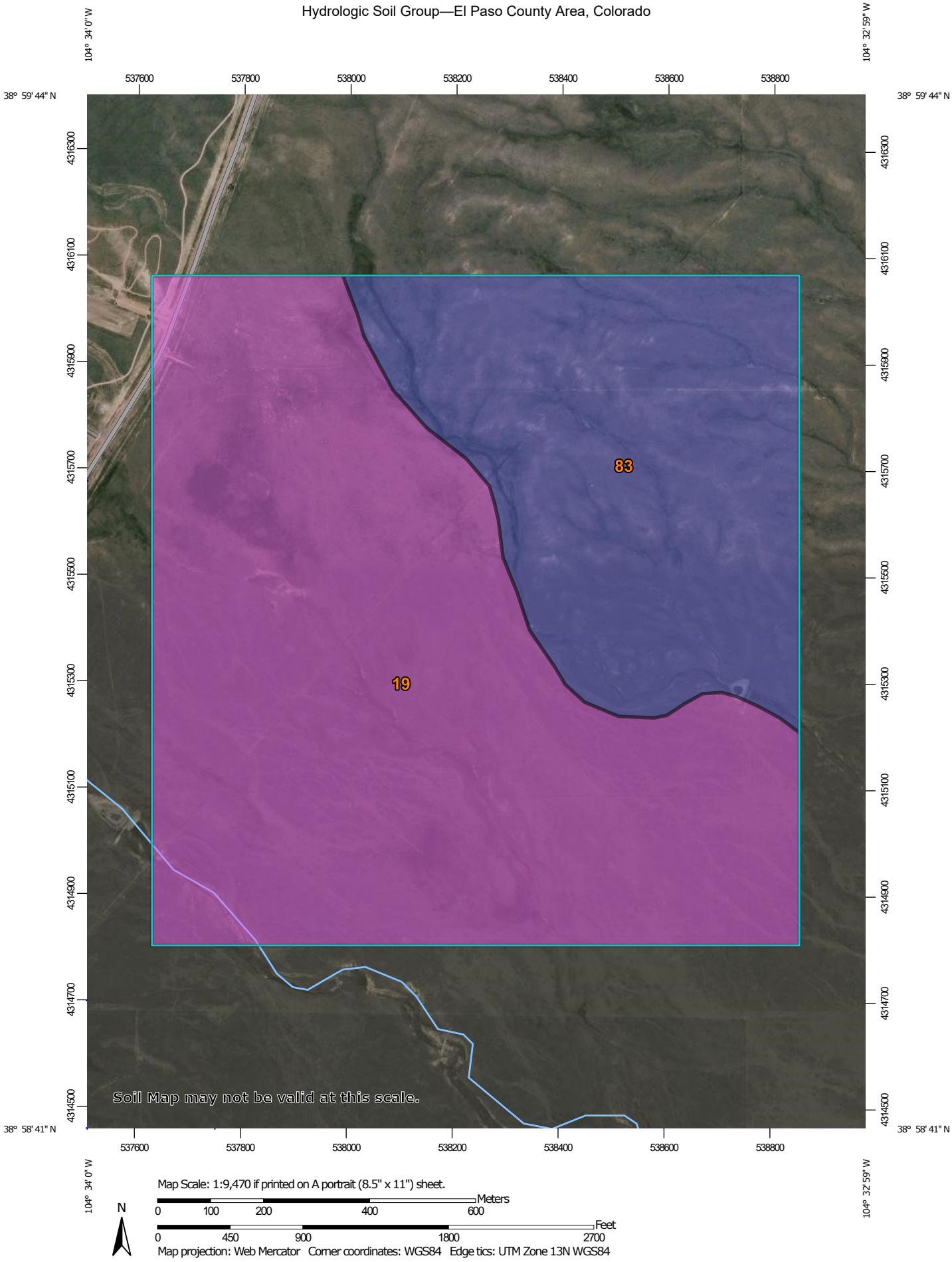
D·R·HORTON America's Builder

GRANDVIEW PHASE 2
VICINITY MAP

SHEET
MAP

1

Hydrologic Soil Group—El Paso County Area, Colorado



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
- 8 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

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

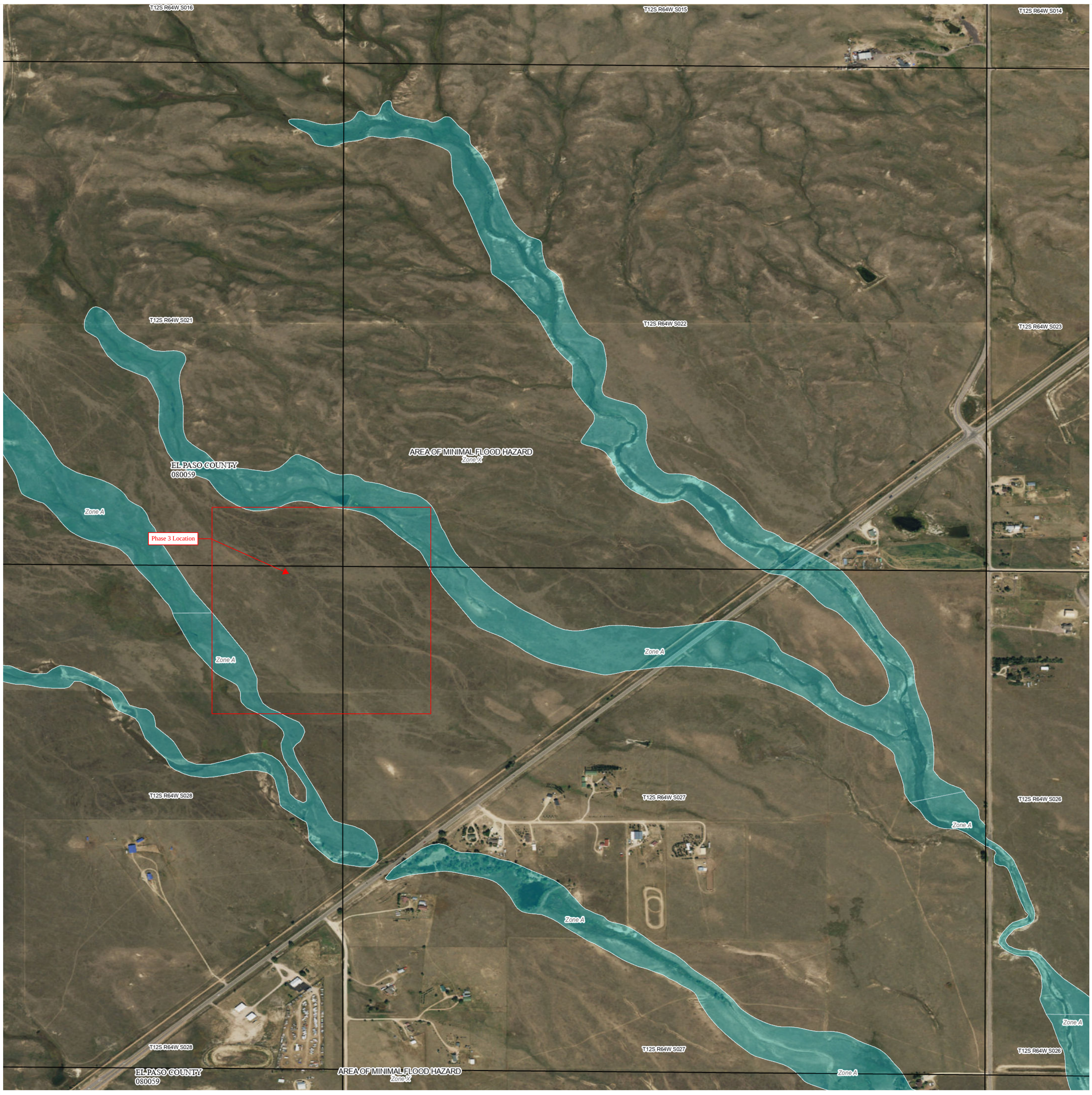
PANEL 552 OF 1275

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*
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OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
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GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
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OTHER FEATURES
- B 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
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- Jurisdiction Boundary

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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

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

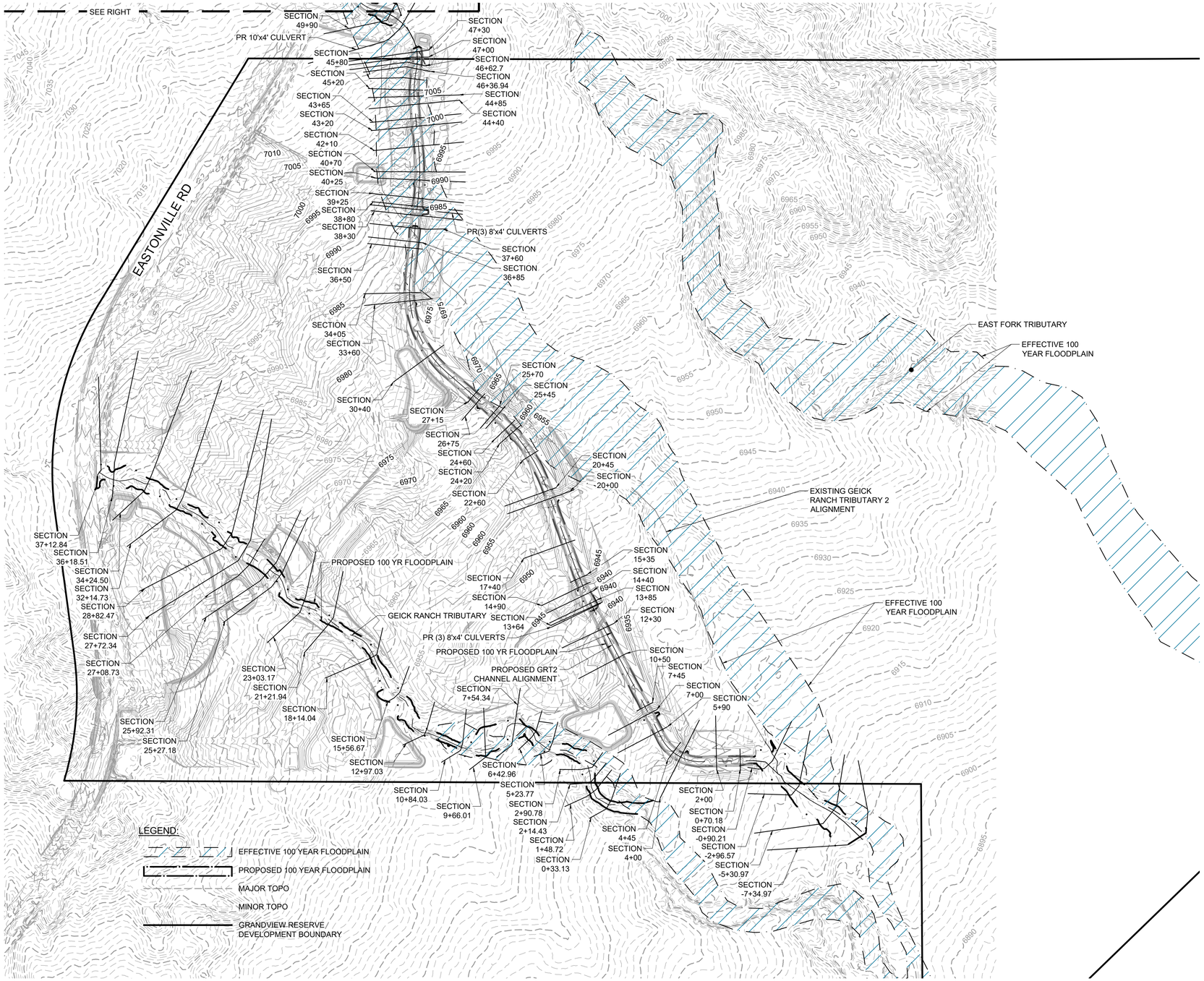
PANEL **556** OF **1275**

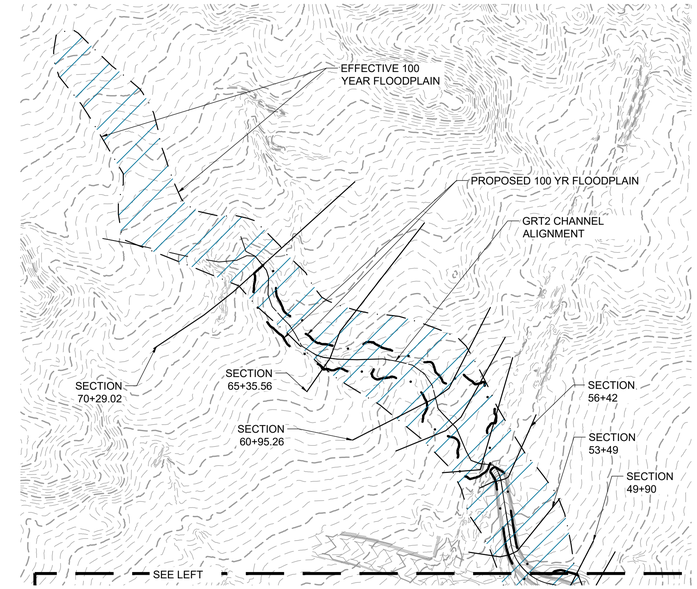
Panel Contains:

COMMUNITY	NUMBER	PANEL
EL PASO COUNTY	080059	0556

MAP NUMBER
08041C0556G
EFFECTIVE DATE
December 07, 2018

HOOD, ANDREW, 3/21/2023 4:25 PM





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

0 150 300

HRGreen

Job No.:	201662
Prepared By:	SJF
Date:	3/21/2023

FLOODPLAIN EXHIBIT

FIG.2

HRGreen DRAWING PATH:J:\2020\201662.03\CAD\Dwgs_Exhibits\MT-2_Form_2_Part_C_TOPO.dwg

APPENDIX B – HYDROLOGIC CALCULATIONS

Hydrology spreadsheets (existing & proposed) missing from appendix, please include

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.

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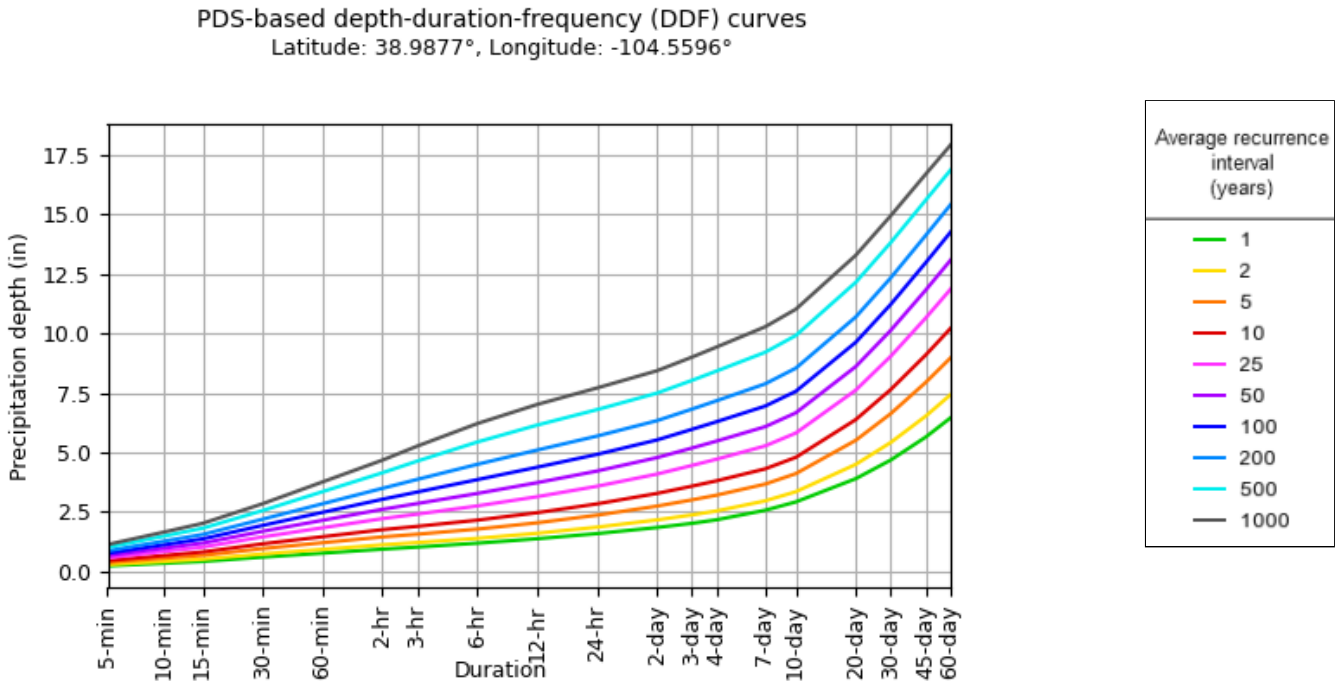
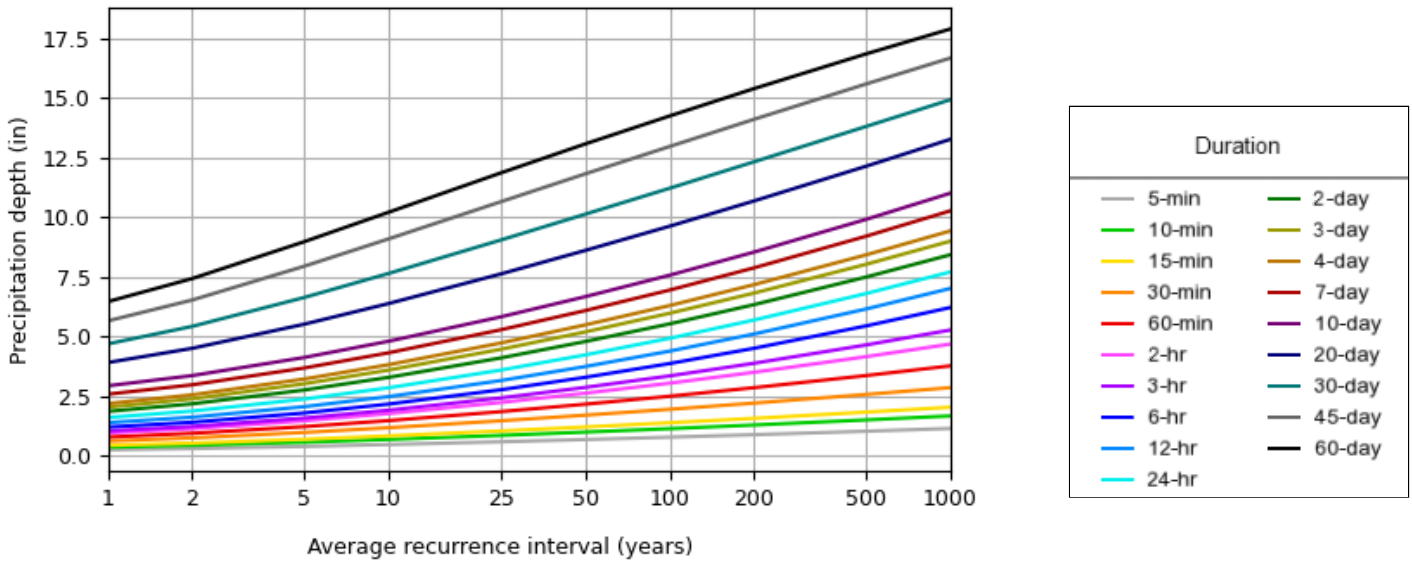
PF graphical





NOAA Atlas 14, Volume 8, Version 2 Created (GMT): Tue Sep 5 16:10:04 2023

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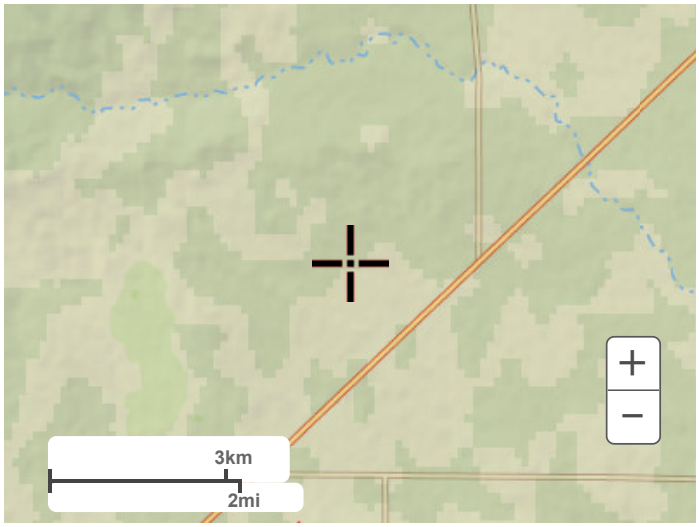
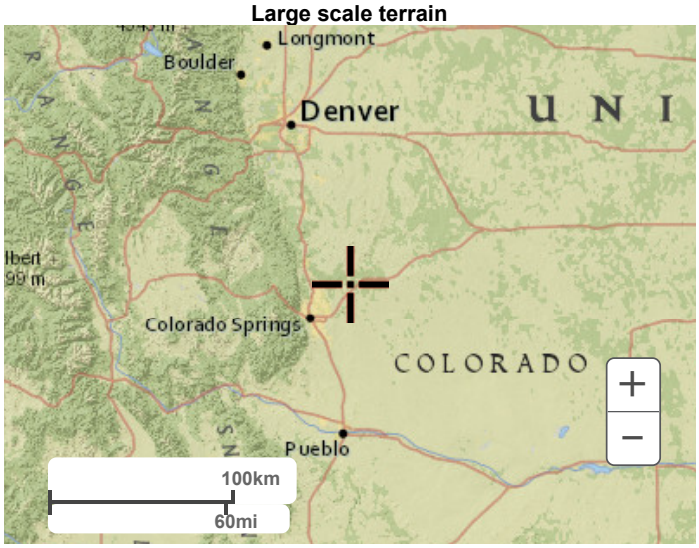
Maps & aerials

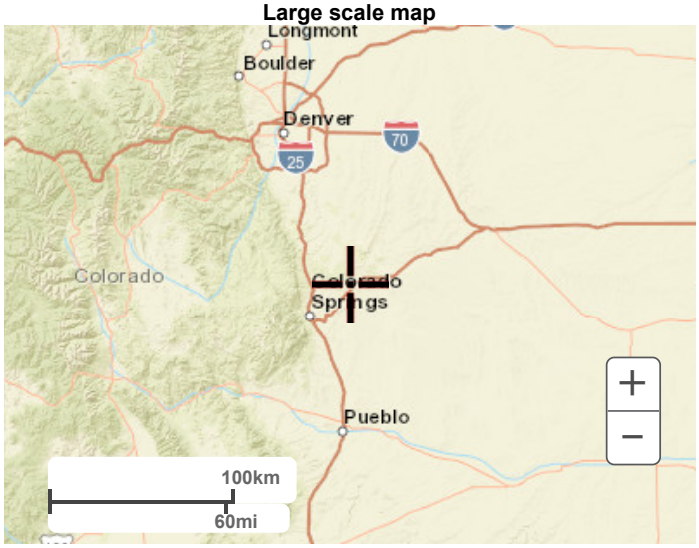
Small scale terrain



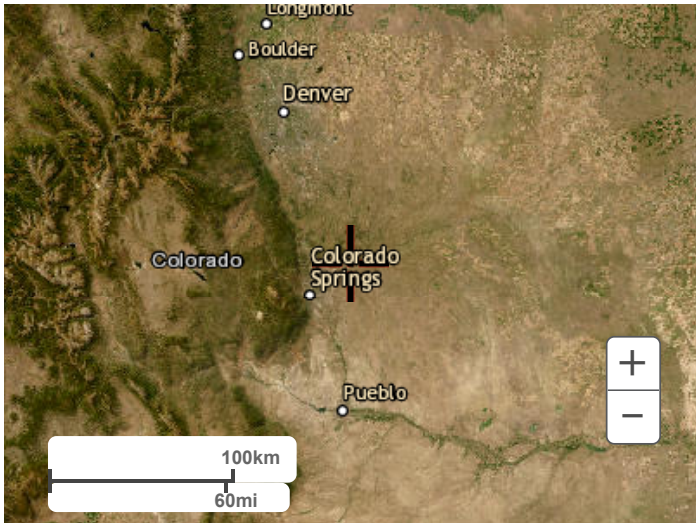
Large scale terrain



Large scale map



Large scale aerial



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

Disclaimer

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

APPENDIX D – WATER QUALITY & DETENTION

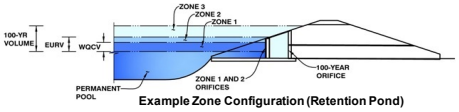
Not required with this PUDSP, but with the FDR please also provide trickle channel calcs, forebay calcs, spillway calcs etc. Any other EDB component calcs will be needed at the Final Plat Stage. These are not needed at the moment and in general all WQ calcs will be reviewed in more detail with the Final Plat stage.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Grandview-PHASE 3**

Basin ID: **POND C**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	67.53	acres
Watershed Length =	1,890	ft
Watershed Length to Centroid =	1,050	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	53.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

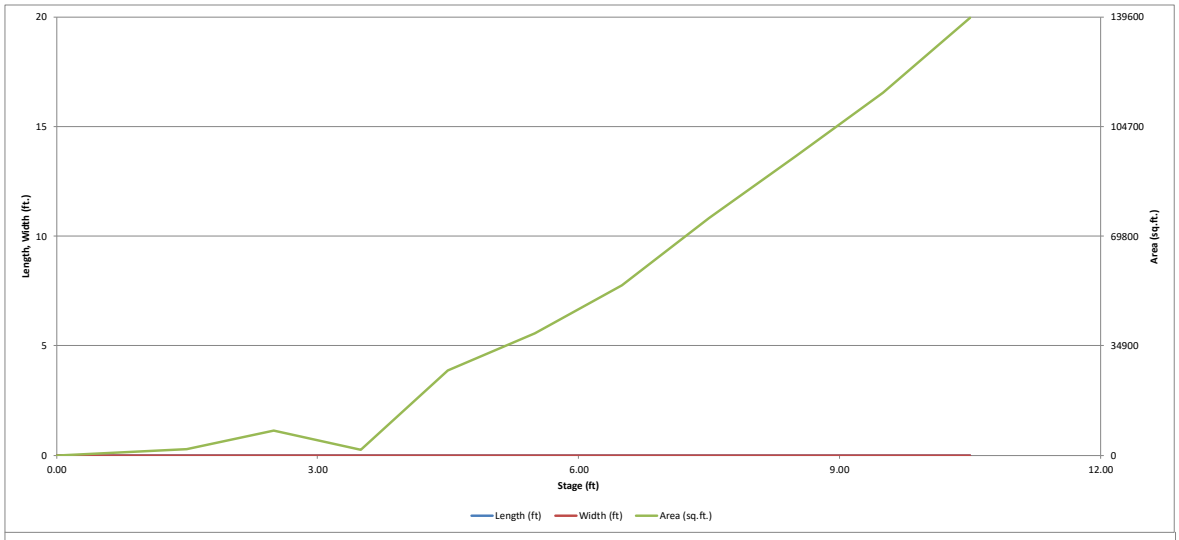
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.208	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.195	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.93 in.) =	2.379	acre-feet	0.93	inches
5-yr Runoff Volume (P1 = 1.21 in.) =	3.190	acre-feet	1.21	inches
10-yr Runoff Volume (P1 = 1.46 in.) =	4.011	acre-feet	1.46	inches
25-yr Runoff Volume (P1 = 1.84 in.) =	5.462	acre-feet	1.84	inches
50-yr Runoff Volume (P1 = 2.15 in.) =	6.932	acre-feet	2.15	inches
100-yr Runoff Volume (P1 = 2.49 in.) =	8.780	acre-feet	2.49	inches
500-yr Runoff Volume (P1 = 3.35 in.) =	13.395	acre-feet	3.35	inches
Approximate 2-yr Detention Volume =	2.114	acre-feet		
Approximate 5-yr Detention Volume =	2.867	acre-feet		
Approximate 10-yr Detention Volume =	3.609	acre-feet		
Approximate 25-yr Detention Volume =	4.851	acre-feet		
Approximate 50-yr Detention Volume =	5.606	acre-feet		
Approximate 100-yr Detention Volume =	6.488	acre-feet		

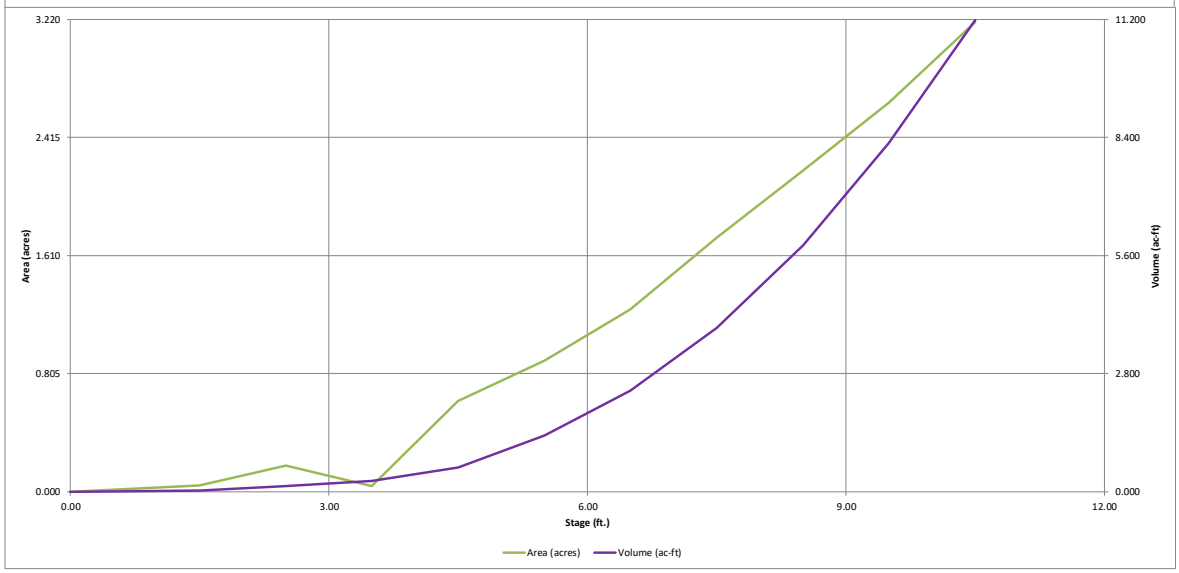
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.208	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.987	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.293	acre-feet
Total Detention Basin Volume =	6.488	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)
6910.5	**Top of Micropool**	--	0.00	--	--	--	0	0.000		
	6912	--	1.50	--	--	--	1,805	0.041	1,354	0.031
	6913	--	2.50	--	--	--	7,751	0.178	6,132	0.141
	6914	--	3.50	--	--	--	1,650	0.038	10,832	0.249
	6915	--	4.50	--	--	--	26,906	0.618	25,110	0.576
	6916	--	5.50	--	--	--	38,893	0.893	58,009	1.332
	6917	--	6.50	--	--	--	54,061	1.241	104,486	2.399
	6918	--	7.50	--	--	--	75,492	1.733	169,263	3.886
	6919	--	8.50	--	--	--	95,279	2.187	254,648	5.846
	6920	--	9.50	--	--	--	115,443	2.650	360,009	8.265
	6921	--	10.50	--	--	--	139,514	3.203	487,488	11.191


20
15
10
5
0
Length, Width (ft.)
139600
104700
69800
34900
0
Area (sq.ft.)
0.00
3.00
6.00
9.00
12.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

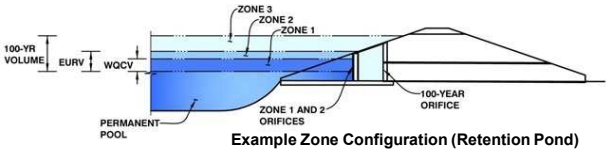

3.220
2.415
1.610
0.805
0.000
Area (acres)
11.200
8.400
5.600
2.800
0.000
Volume (ac-ft)
0.00
3.00
6.00
9.00
12.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Grandview-PHASE 3**

Basin ID: **POND C**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	5.36	1.208	Orifice Plate
Zone 2 (EURV)	7.68	2.987	Circular Orifice
Zone 3 (100-year)	8.79	2.293	Weir&Pipe (Restrict)
Total (all zones)		6.488	

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 =	7.68	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	2.85	sq. inches (diameter = 1-7/8 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.979E-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	1.79	3.57					
Orifice Area (sq. inches)	2.85	2.85	2.85					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	5.36	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	7.68	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	4.50	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected	
Vertical Orifice Area =	0.11	N/A	ft^2
Vertical Orifice Centroid =	0.19	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 =	7.70	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	8.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	8.00	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 =	7.70	N/A	feet
Overflow Weir Slope Length =	8.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	16.29	N/A	
Overflow Grate Open Area w/o Debris =	44.54	N/A	ft^2
Overflow Grate Open Area w/ Debris =	22.27	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.00	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 =	19.50		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	2.73	N/A	ft^2
Outlet Orifice Centroid =	0.88	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.25	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	8.70	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	75.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.79	feet
Stage at Top of Freeboard =	10.49	feet
Basin Area at Top of Freeboard =	3.19	acres
Basin Volume at Top of Freeboard =	11.13	acre-ft

Routed Hydrograph Results

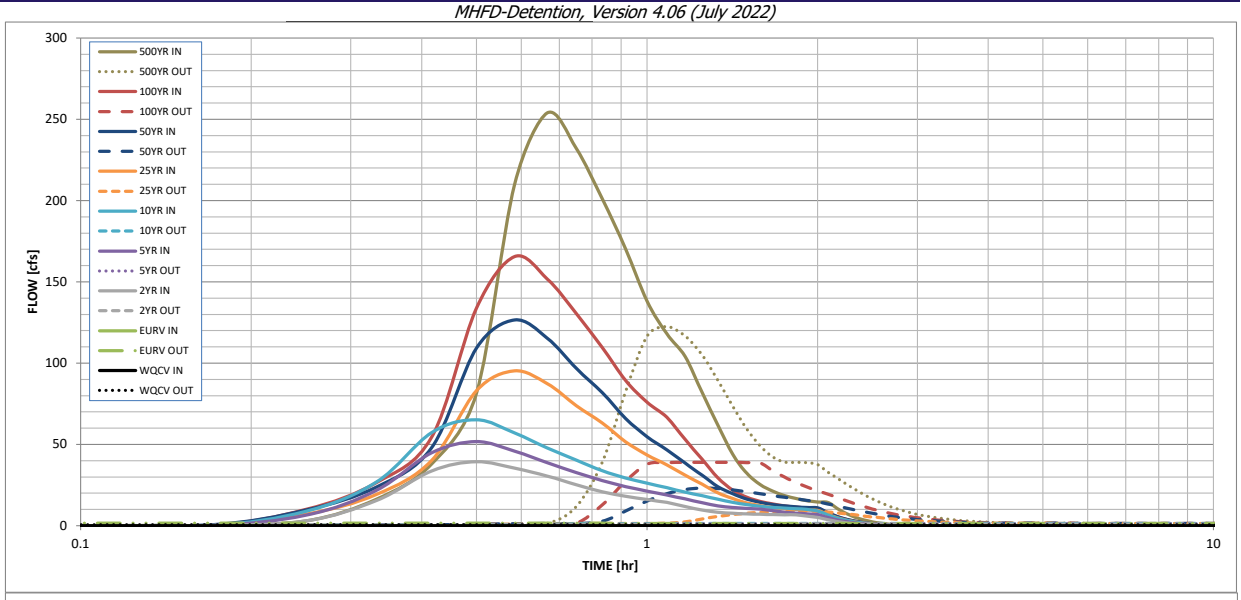
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

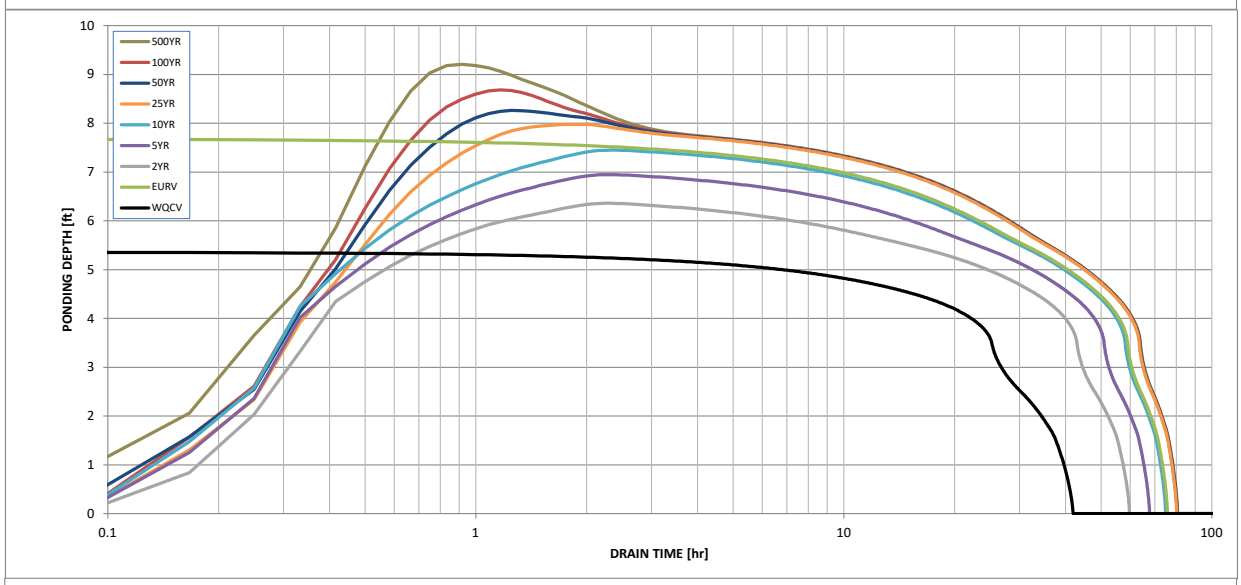
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.93	1.21	1.46	1.84	2.15	2.49	3.35
CUHP Runoff Volume (acre-ft) =	1.208	4.195	2.379	3.190	4.011	5.462	6.932	8.780	13.395
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.379	3.190	4.011	5.462	6.932	8.780	13.395
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.5	1.0	5.6	22.9	44.9	96.8
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.01	0.01	0.08	0.34	0.66	1.43
Peak Inflow Q (cfs) =	N/A	N/A	39.4	51.7	65.1	95.2	126.5	165.5	253.9
Peak Outflow Q (cfs) =	0.5	1.5	1.1	1.3	1.4	8.9	23.1	39.0	122.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	2.4	1.5	1.6	1.0	0.9	1.3
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 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	N/A	0.2	0.5	0.8	0.9
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) =	37	65	52	59	64	67	66	63	59
Time to Drain 99% of Inflow Volume (hours) =	**40**	71	56	63	70	74	73	72	69
Maximum Ponding Depth (ft) =	5.36	7.68	6.36	6.94	7.44	7.97	8.26	8.68	9.20
Area at Maximum Ponding Depth (acres) =	0.85	1.81	1.19	1.46	1.70	1.95	2.07	2.27	2.51
Maximum Volume Stored (acre-ft) =	1.209	4.205	2.216	2.992	3.783	4.750	5.313	6.247	7.490

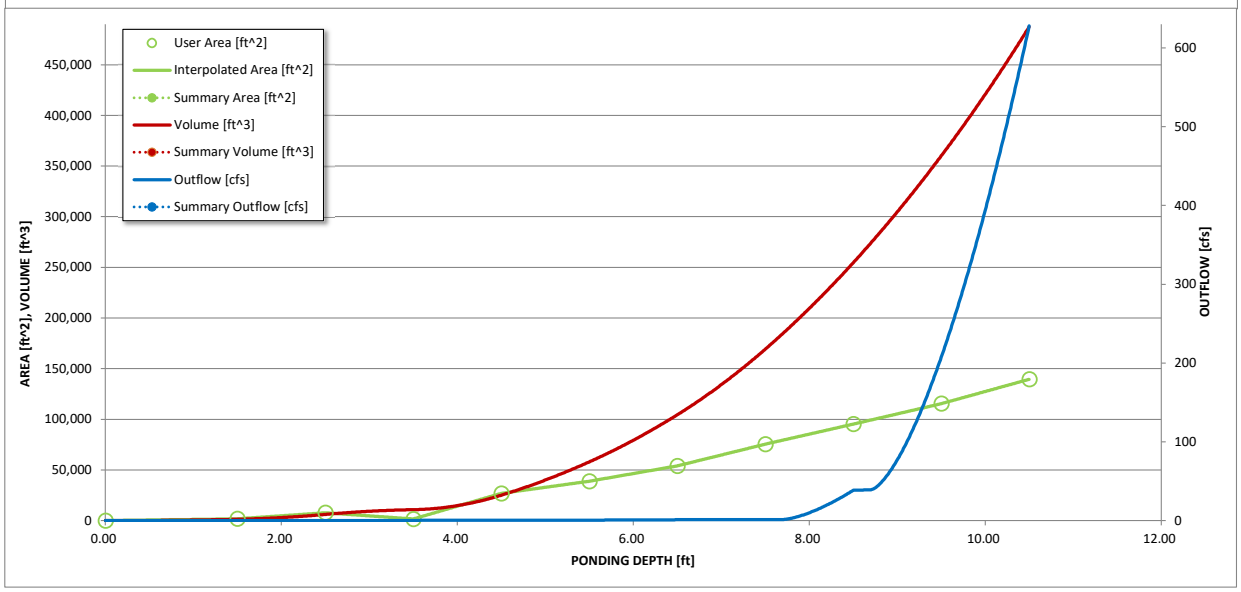
For the Final Drainage Report, please discuss this increase and/or adjust pond design to get this closer to 1. Ok as is for the PUDSP.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







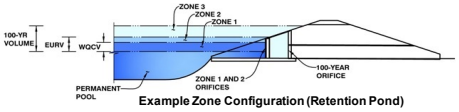
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **GRANDVIEW - PHASE 3**

Basin ID: **POND F (SOUTHEAST PHASE 3)**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	26.63	acres
Watershed Length =	2,000	ft
Watershed Length to Centroid =	1,000	ft
Watershed Slope =	0.018	ft/ft
Watershed Imperviousness =	50.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

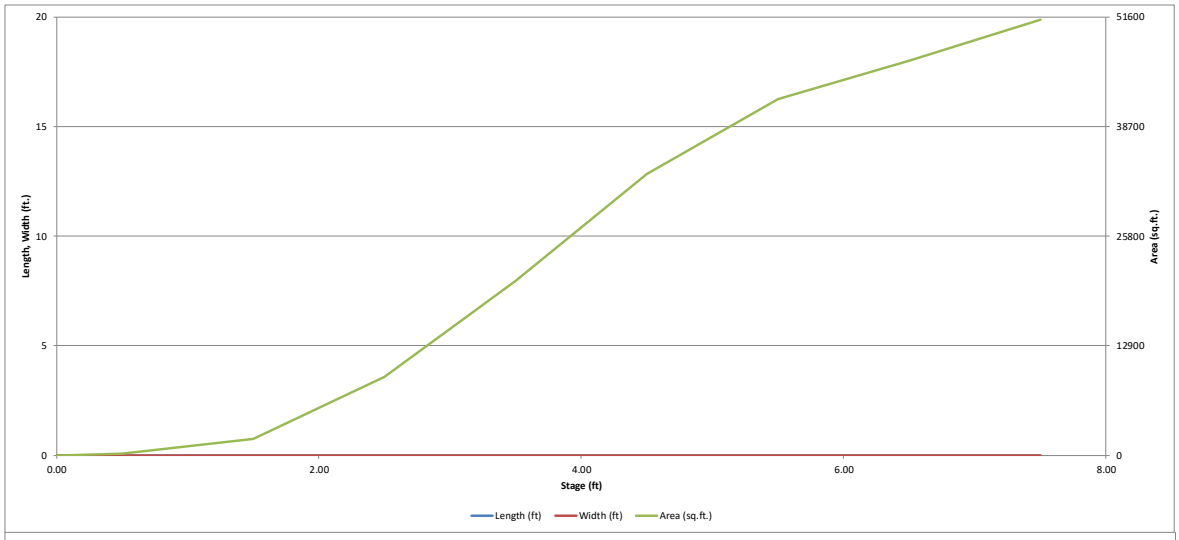
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.458	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.535	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.93 in.) =	0.871	acre-feet	0.93	inches
5-yr Runoff Volume (P1 = 1.21 in.) =	1.172	acre-feet	1.21	inches
10-yr Runoff Volume (P1 = 1.46 in.) =	1.478	acre-feet	1.46	inches
25-yr Runoff Volume (P1 = 1.84 in.) =	2.029	acre-feet	1.84	inches
50-yr Runoff Volume (P1 = 2.15 in.) =	2.601	acre-feet	2.15	inches
100-yr Runoff Volume (P1 = 2.49 in.) =	3.327	acre-feet	2.49	inches
500-yr Runoff Volume (P1 = 3.35 in.) =	5.141	acre-feet	3.35	inches
Approximate 2-yr Detention Volume =	0.772	acre-feet		
Approximate 5-yr Detention Volume =	1.048	acre-feet		
Approximate 10-yr Detention Volume =	1.323	acre-feet		
Approximate 25-yr Detention Volume =	1.785	acre-feet		
Approximate 50-yr Detention Volume =	2.069	acre-feet		
Approximate 100-yr Detention Volume =	2.411	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.458	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.078	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.876	acre-feet
Total Detention Basin Volume =	2.411	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 = 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)
6911.5	**Top of Micropool**	--	0.00	--	--	--	0	0.000		
	6912	--	0.50	--	--	--	200	0.005	50	0.001
	6913	--	1.50	--	--	--	1,891	0.043	1,095	0.025
	6914	--	2.50	--	--	--	9,182	0.211	6,632	0.152
	6915	--	3.50	--	--	--	20,549	0.472	21,497	0.494
	6916	--	4.50	--	--	--	33,087	0.760	48,315	1.109
	6917	--	5.50	--	--	--	41,903	0.962	85,810	1.970
	6918	--	6.50	--	--	--	46,500	1.067	130,012	2.985
	6919	--	7.50	--	--	--	51,345	1.179	178,934	4.108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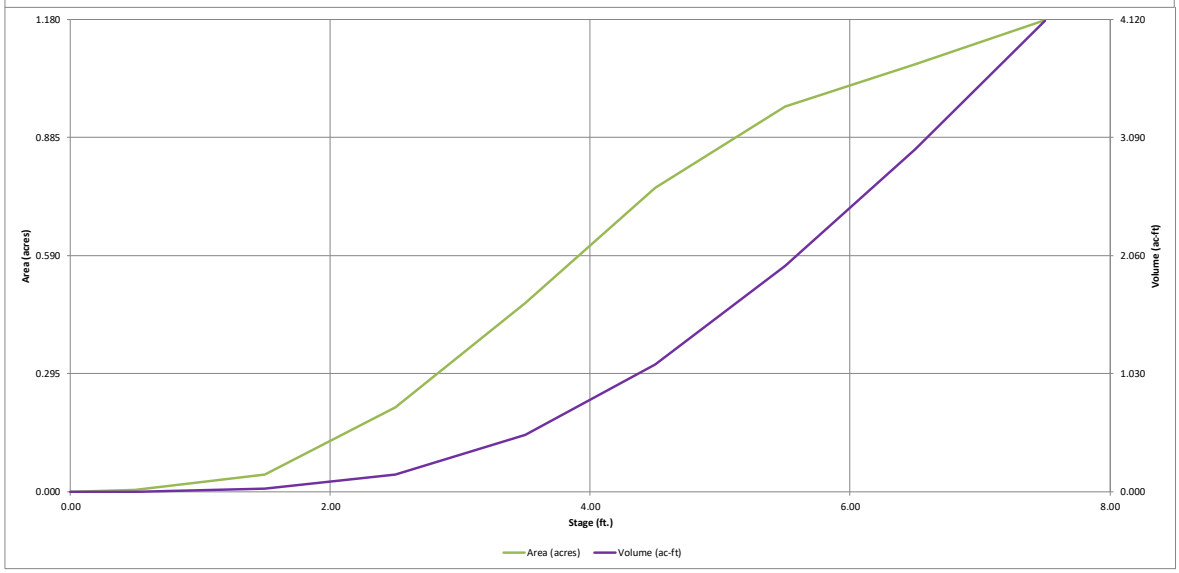
15
10
5
0
Length, Width (ft.)
51600
38700
25800
12900
0
Area (sq.ft.)
0.00
2.00
4.00
6.00
8.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)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0.885
0.590
0.295
0.000
Area (acres)
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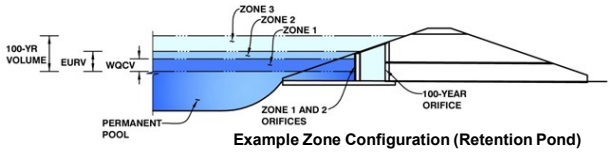
3.090
2.060
1.030
0.000
Volume (ac-ft)
0.00
2.00
4.00
6.00
8.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **GRANDVIEW - PHASE 3**

Basin ID: **POND F (SOUTHEAST PHASE 3)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.43	0.458	Orifice Plate
Zone 2 (EURV)	5.03	1.078	Circular Orifice
Zone 3 (100-year)	5.95	0.876	Weir&Pipe (Restrict)
Total (all zones)		2.411	

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	9.097E-03	ft^2
Depth at top of Zone using Orifice Plate =	3.43	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	13.40	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.31	sq. inches (diameter = 1-1/4 inches)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.14	2.29					
Orifice Area (sq. inches)	1.31	1.31	1.31					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Circular	Not Selected			Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	3.43	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.05	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	5.03	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.13	N/A	feet
Vertical Orifice Diameter =	3.00	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.10	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.10	N/A	feet
Overflow Weir Front Edge Length =	5.67	N/A	feet	Overflow Weir Slope Length =	2.92	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	12.62	N/A	
Horiz. Length of Weir Sides =	2.92	N/A	feet	Overflow Grate Open Area w/o Debris =	11.52	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	5.76	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.91	N/A	ft^2
Outlet Pipe Diameter =	21.00	N/A	inches	Outlet Orifice Centroid =	0.41	N/A	feet
Restrictor Plate Height Above Pipe Invert =	8.50		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.38	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.90	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.60	feet
Spillway Crest Length =	30.00	feet	Stage at Top of Freeboard =	7.50	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.18	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	4.11	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

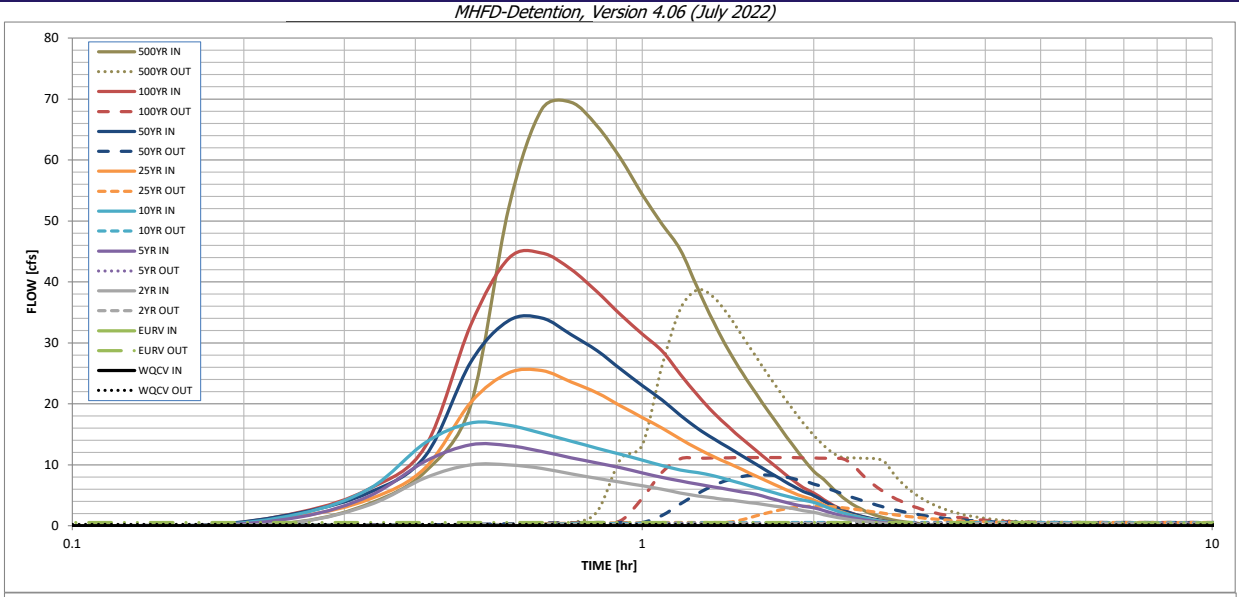
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

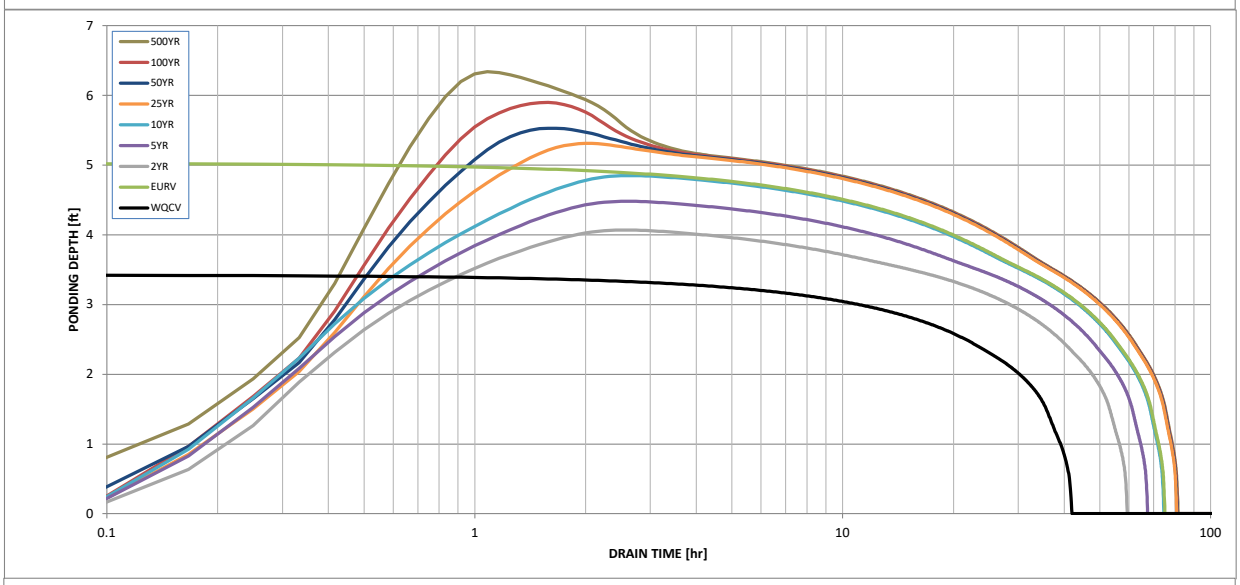
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.93	1.21	1.46	1.84	2.15	2.49	3.35
CUHP Runoff Volume (acre-ft) =	0.458	1.535	0.871	1.172	1.478	2.029	2.601	3.327	5.141
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.871	1.172	1.478	2.029	2.601	3.327	5.141
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.1	0.3	1.4	5.9	11.9	26.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.01	0.01	0.05	0.22	0.45	0.99
Peak Inflow Q (cfs) =	N/A	N/A	10.0	13.3	16.9	25.4	34.1	44.7	69.5
Peak Outflow Q (cfs) =	0.2	0.5	0.4	0.5	0.5	3.2	8.3	11.2	38.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	3.4	2.1	2.3	1.4	0.9	1.5
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.2	0.7	0.9	0.9
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	66	53	60	66	70	68	66	61
Time to Drain 99% of Inflow Volume (hours) =	**40**	71	57	64	70	76	75	74	72
Maximum Ponding Depth (ft) =	3.43	5.03	4.07	4.48	4.85	5.31	5.53	5.90	6.34
Area at Maximum Ponding Depth (acres) =	0.45	0.87	0.63	0.75	0.83	0.92	0.96	1.00	1.05
Maximum Volume Stored (acre-ft) =	0.461	1.540	0.803	1.087	1.379	1.782	1.989	2.353	2.805

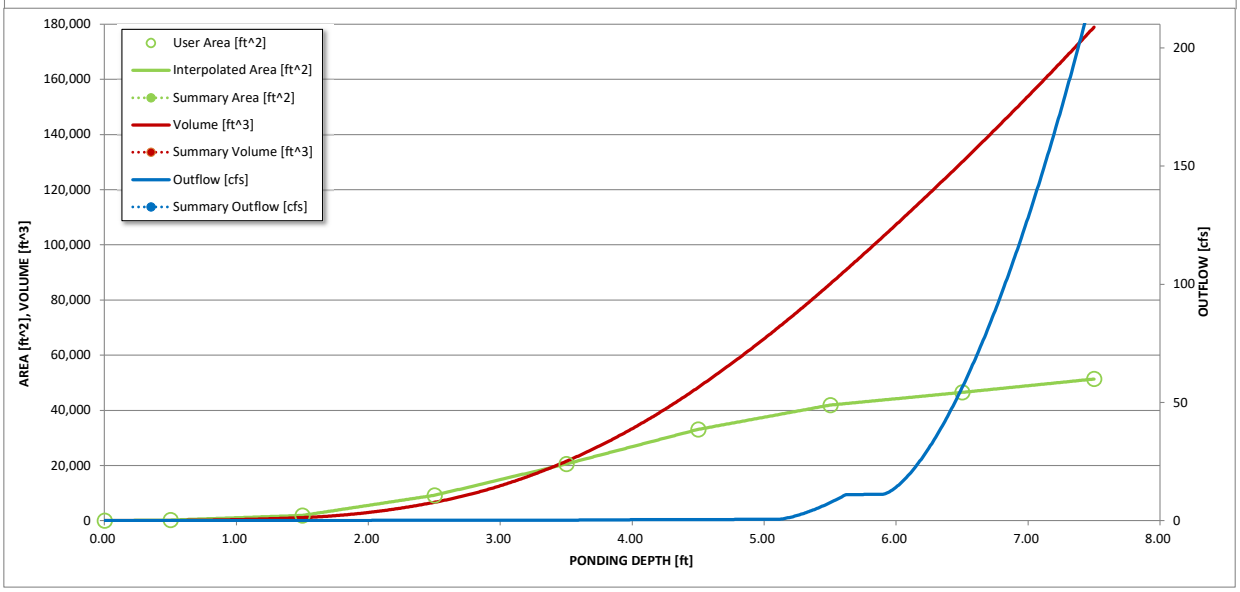
For the Final Drainage Report, please discuss this increase and/or adjust pond design to get this closer to 1. These all should be red, was the spreadsheet modified? Ok as is for the PUDSP.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







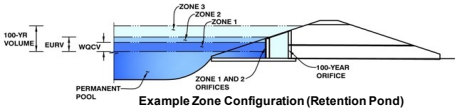
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **GRANDVIEW - PHASE 3**

Basin ID: **POND R (REX RD ENTRANCE)**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	19.29	acres
Watershed Length =	1,500	ft
Watershed Length to Centroid =	1,000	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	42.00%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

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

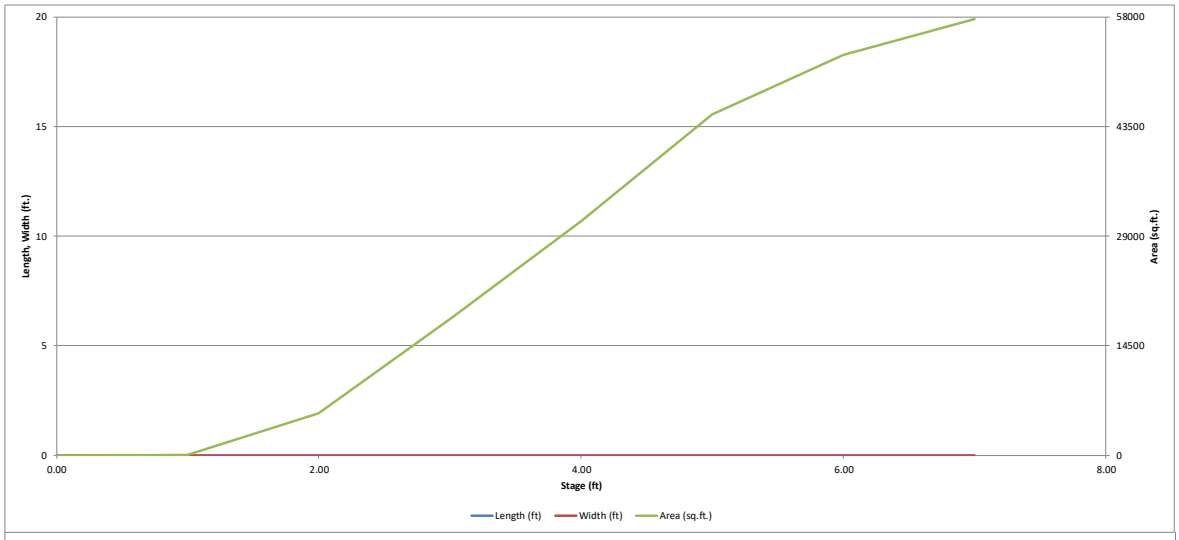
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.298	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.890	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.675	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.905	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.089	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.420	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.743	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.164	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	3.074	acre-feet		inches
Approximate 2-yr Detention Volume =	0.568	acre-feet		
Approximate 5-yr Detention Volume =	0.751	acre-feet		
Approximate 10-yr Detention Volume =	0.924	acre-feet		
Approximate 25-yr Detention Volume =	1.143	acre-feet		
Approximate 50-yr Detention Volume =	1.288	acre-feet		
Approximate 100-yr Detention Volume =	1.485	acre-feet		

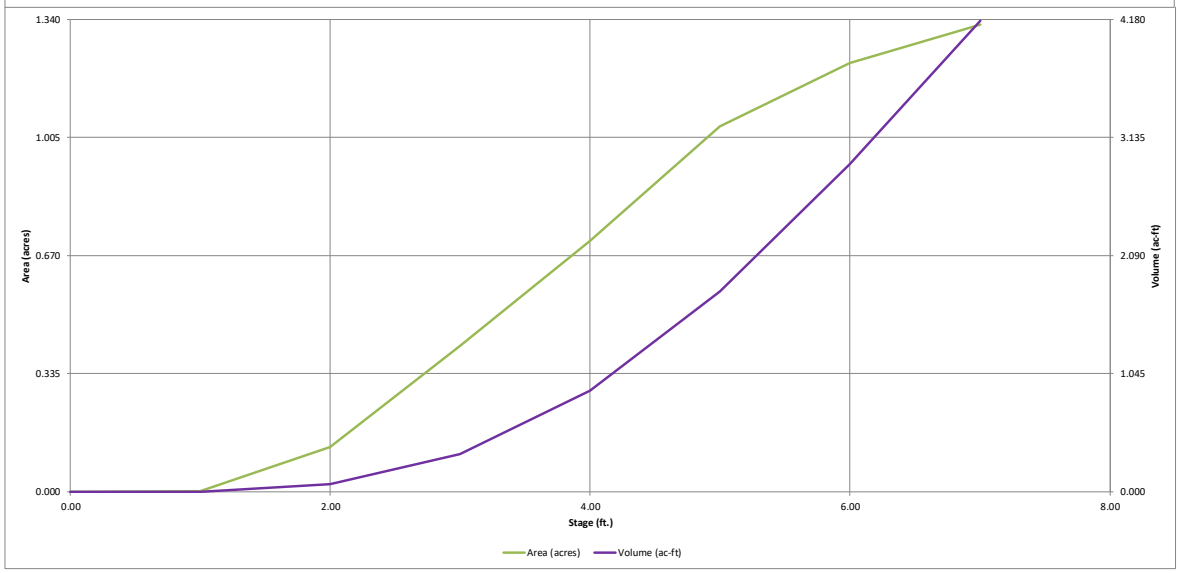
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.298	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.592	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.596	acre-feet
Total Detention Basin Volume =	1.485	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)
6909	**Top of Micropool**	--	0.00	--	--	--	0	0.000		
	6910	--	1.00	--	--	--	50	0.001	25	0.001
	6911	--	2.00	--	--	--	5,520	0.127	2,810	0.065
	6912	--	3.00	--	--	--	18,000	0.413	14,570	0.334
	6913	--	4.00	--	--	--	30,967	0.711	39,053	0.897
	6914	--	5.00	--	--	--	45,118	1.036	77,096	1.770
	6915	--	6.00	--	--	--	53,000	1.217	126,155	2.896
	6916	--	7.00	--	--	--	57,768	1.326	181,539	4.168


20
15
10
5
0
Length, Width (ft.)
58000
43500
29000
14500
0
Area (sq.ft.)
0.00
2.00
4.00
6.00
8.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)


1.340
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0.335
0.000
Area (acres)
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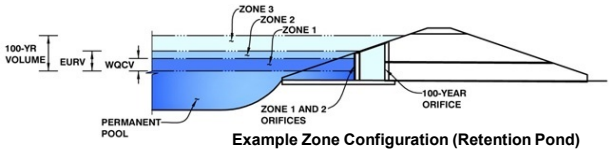
2.090
1.045
0.000
Volume (ac-ft)
0.00
2.00
4.00
6.00
8.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: GRANDVIEW - PHASE 3

Basin ID: POND R (REX RD ENTRANCE)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.91	0.298	Orifice Plate
Zone 2 (EURV)	4.00	0.592	Orifice Plate
Zone 3 (100-year)	4.72	0.596	Weir&Pipe (Restrict)
Total (all zones)		1.485	

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 =	N/A	inches
Orifice Plate: Orifice Area per Row =	N/A	sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.33	2.67	3.00				
Orifice Area (sq. inches)	1.08	1.08	1.08	3.15				

	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 =	4.10	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	0%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	4.10	N/A	feet
Overflow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	13.56	N/A	
Overflow Grate Open Area w/o Debris =	11.14	N/A	ft^2
Overflow Grate Open Area w/ Debris =	11.14	N/A	ft^2

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	8.50		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.82	N/A	ft^2
Outlet Orifice Centroid =	0.41	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.52	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.60	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	9.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.85	feet
Stage at Top of Freeboard =	6.45	feet
Basin Area at Top of Freeboard =	1.26	acres
Basin Volume at Top of Freeboard =	3.44	acre-ft

Routed Hydrograph Results

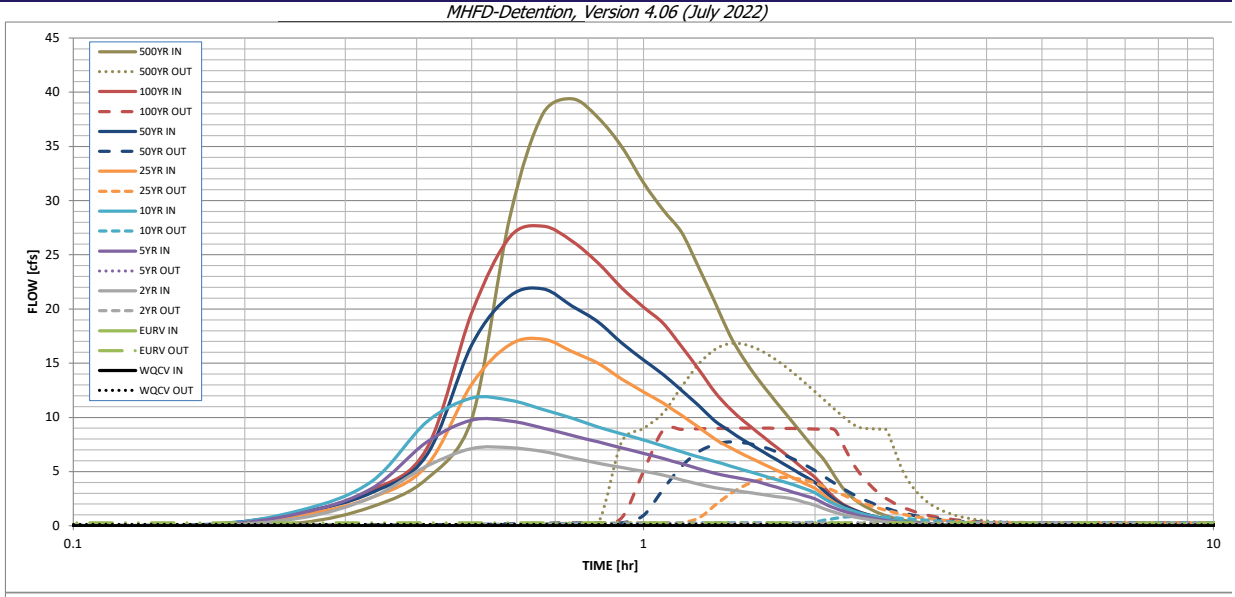
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

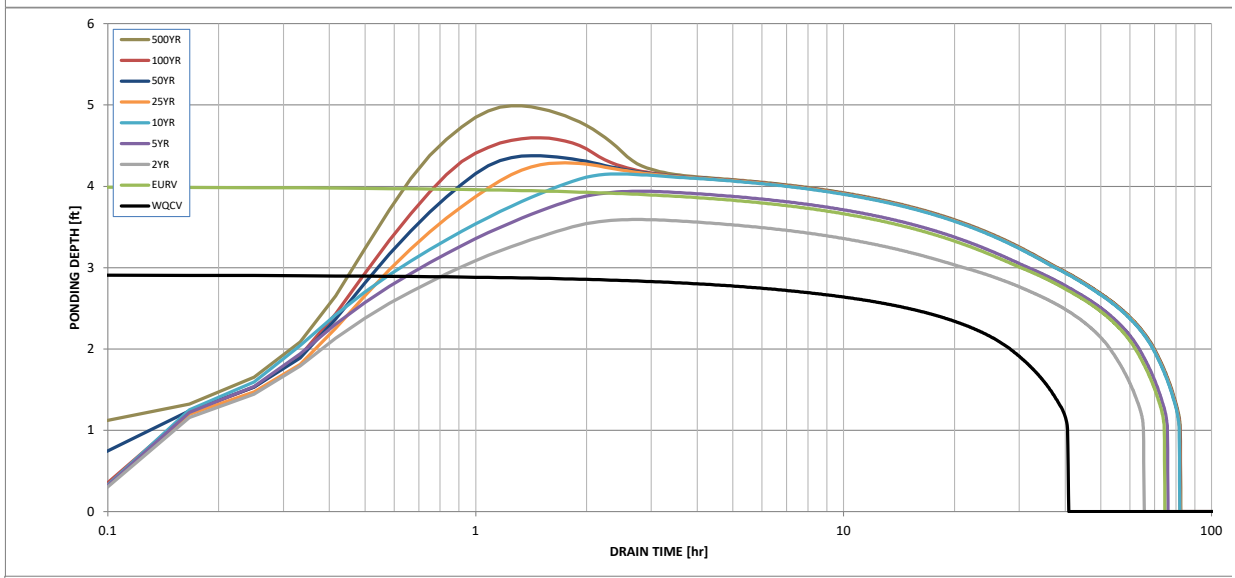
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.298	0.890	0.675	0.905	1.089	1.420	1.743	2.164	3.074
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.675	0.905	1.089	1.420	1.743	2.164	3.074
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	0.3	2.7	5.4	9.1	16.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.14	0.28	0.47	0.86
Peak Inflow Q (cfs) =	N/A	N/A	7.2	9.7	11.8	17.2	21.9	27.6	39.4
Peak Outflow Q (cfs) =	0.1	0.3	0.2	0.3	0.9	4.5	7.7	9.0	16.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.3	2.9	1.6	1.4	1.0	1.0
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	0.4	0.6	0.8	0.8
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	68	61	70	75	73	72	70	66
Time to Drain 99% of Inflow Volume (hours) =	**40**	72	64	73	79	78	78	77	75
Maximum Ponding Depth (ft) =	2.91	4.00	3.59	3.94	4.15	4.29	4.37	4.59	4.99
Area at Maximum Ponding Depth (acres) =	0.39	0.71	0.59	0.69	0.76	0.80	0.83	0.90	1.03
Maximum Volume Stored (acre-ft) =	0.298	0.897	0.624	0.848	1.007	1.108	1.182	1.373	1.749

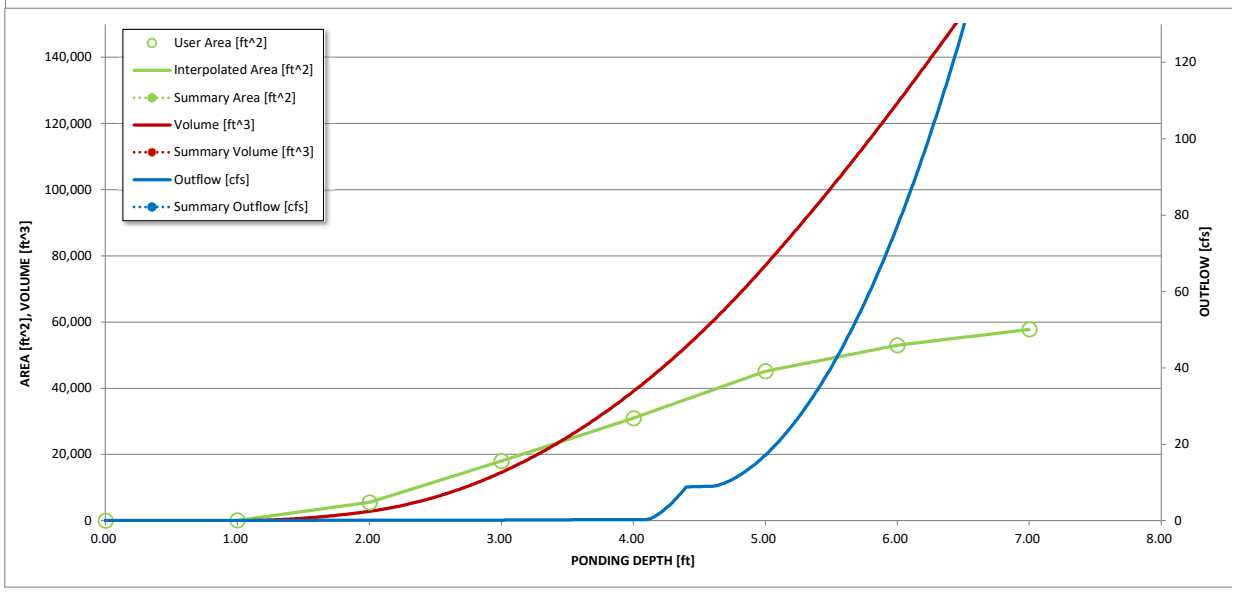
For the Final Drainage Report, please discuss this increase and/or adjust pond design to get this closer to 1. These all should be red, was the spreadsheet modified? Ok as is for the PUDSP.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







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

APPENDIX E – REFERENCES

HRGreen

HRGREEN.COM

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

cmcfarland@hrgreen.com

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

These basins along with the offsite basins which lie east of Eastonville Road contribute flows onto the site through the major tributaries. Estimate oncoming flows for each tributary are as follows:

Offsite Flow Summary		
Tributary	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**
Main Stem	36	628
Main Stem Tributary 2	8	122
East Fork Tributary*	56	116
East Fork*	175	357

*Flows from Gieck Ranch DBPS, Oct 2010

As hydraulic analysis continues for the channels, these offsite flows will be used to size the channels for proper conveyance of the flow however it should be noted that the flows mentioned for the Main Stem and Main Stem Tributary 2 assume proper conveyance of the flow through (below or above) Eastonville Road. Due to the unknown nature of these conditions at the time of buildout, a probable scenario of the split flows will require analysis and agreed upon flow rates to each channel will be required. Currently some of the flow shown going to the Main Stem Tributary 2 may be diverted into the Main Stem. Previous analysis done by JR Engineering assumed approximately 160 additional cfs going to the Main Stem Tributary #2 during the 100-year event and as such it is recommended the following flows be used for analysis of the oncoming offsite flows:

Revised Offsite Flow Summary		
Tributary	**5 Year Peak Runoff (cfs)**	**100 Year Peak Runoff (cfs)**
Main Stem**	67	413
Main Stem Tributary 2**	59	280
East Fork Tributary*	61	217
East Fork*	180	595

*Flows from Gieck Ranch DBPS, Oct 2010

**Flows from 4 Way Ranch LOMR, Mar 2004

Please note that the preliminary drainage reports will be required to reconcile any differences between the various reports done for these channels.

b. Methodology

Design rainfall was determined utilizing figures from the NOAA Atlas 14, Volume 8, Version 2 to determine the 5-year and 100-year rainfall values for 1, 6 and 24-hour events. The 1-hour rainfall depths are 1.22 and 2.50 in/hr respectively, 6 hour 1.79 and 3.87 in/hr respectively and 2.36 and 4.90 in/hr for the 24 hour event. The rainfall values were then used as inputs into the Colorado Urban Hydrograph Procedure (CUHP) spreadsheets to determine runoff values for both pre-development and post-development site.

CUHP is an evolution of the Snyder unit hydrograph and is calibrated for use along the Colorado Front Range. 1 Hour rainfall amounts are input into the program to produce a storm hyetograph that is then uses to calculate a storm hydrograph for each basin depending on the subbasins properties including

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.

Per SWMM modeling the current velocities will require channel stabilization. The EFT channel is to be engineered later in the design which will likely include a combination of channel widening, lowering of slope facilitated by the implementation of drop structures to meet non erosive velocity requirements. Bank stabilization, should it be necessary, may include coir rolls, erosion control blankets, live willow staking, soil lifts and/or other measures to ensure successful bank stabilization. The drainageway will require further analysis and design which will be completed as the project progresses.

East Fork Upper

The EF crosses the north property line approximately 1500' east of the EFT crossing. The flow through the site is via a natural channel and travels in a southeasterly direction. The channel is mapped as a Zone A floodplain, and the channel crosses Highway 24 via an existing shallow bridge. The current floodplain delineation shows EF and EFT eventually merging approximately 1750' southeast of the site, however, as mentioned above Highway 24 blocks the flow of the EFT and flows are conveyed northeast to the EF bridge crossing.

Per SWMM modeling the current velocities will require channel stabilization. The EF channel is to be engineered later in the design which will likely include a combination of channel widening, lowering of slope facilitated by the implementation of drop structures to meet non erosive velocity requirements. Bank stabilization, should it be necessary, may include coir rolls, erosion control blankets, live willow staking, soil lifts and/or other measures to ensure successful bank stabilization. The drainageway will require further analysis and design which will be completed as the project progresses.

V. Environmental Evaluations

a. Significant existing or potential wetland and riparian areas impacts

As part of this work, the developer has engaged Ecosystem Services, LLC (ECOS) to perform environmental studies of the site that will be submitted with the planning documents. Major information from this report related to the wetlands shows that two of the tributaries through the site, the Main Stem and the East Fork contain jurisdictional wetlands and the other two tributaries, the East Fork Tributary and the Main Stem Tributary #2 are non-jurisdictional wetlands.

At this time, only minor improvements to the jurisdictional channels are proposed. These stream improvements will be made with keeping the natural habitat intact and the natural function of these channels as it is to maintain the wetland habitat. The non-jurisdictional channels will be modified, and the design of those channels is forthcoming.

b. Stormwater quality considerations and proposed practices

As part of the development, full spectrum detention facilities will be installed to provide water quality for the development. The facilities will be designed using El Paso County criteria and provide stormwater quality by slowing the release of stormwater captured by the ponds and allowing solids to settle out. Additionally, when possible, the revised drainage channels, which were not jurisdictional wetlands, will be used to convey stormwater via a natural channel. Stormwater must be treated before entering the natural channels. The natural channel will provide a pervious means to transport stormwater and provide some water quality benefits as well.

On site practices for the homes, schools, churches, and other buildings should use means such that impervious areas drain across pervious area to allow for infiltration during the minor events. This would

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.

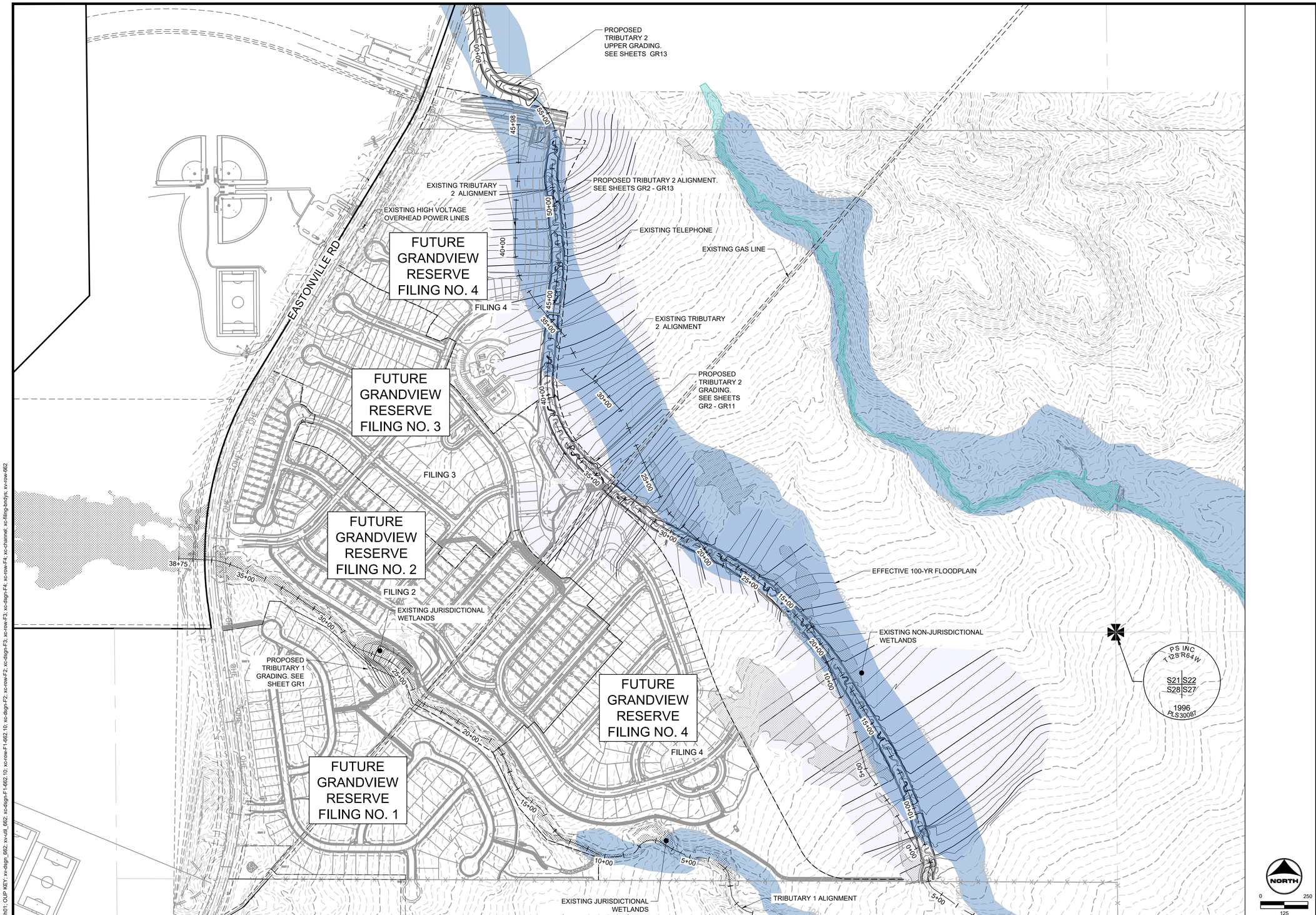
Per the NRCS web soil survey, the site is made up entirely of Type A and B soils. The majority of which are Type B soils. The vegetation found within Grandview Reserve consists of wetland communities in the floodplain with a transitional area to shortgrass prairie communities that dominate the site. 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.

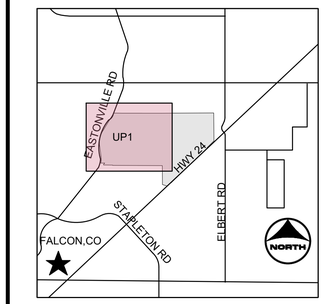
Observations of the existing channels suggest that they are at equilibrium with their watershed flows; evidence including relatively stable bank full channels, adequate floodplain (above bank full channel elevations) and in-tact plant communities that would be expected in this type of reach support the 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. PAGE 37081 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

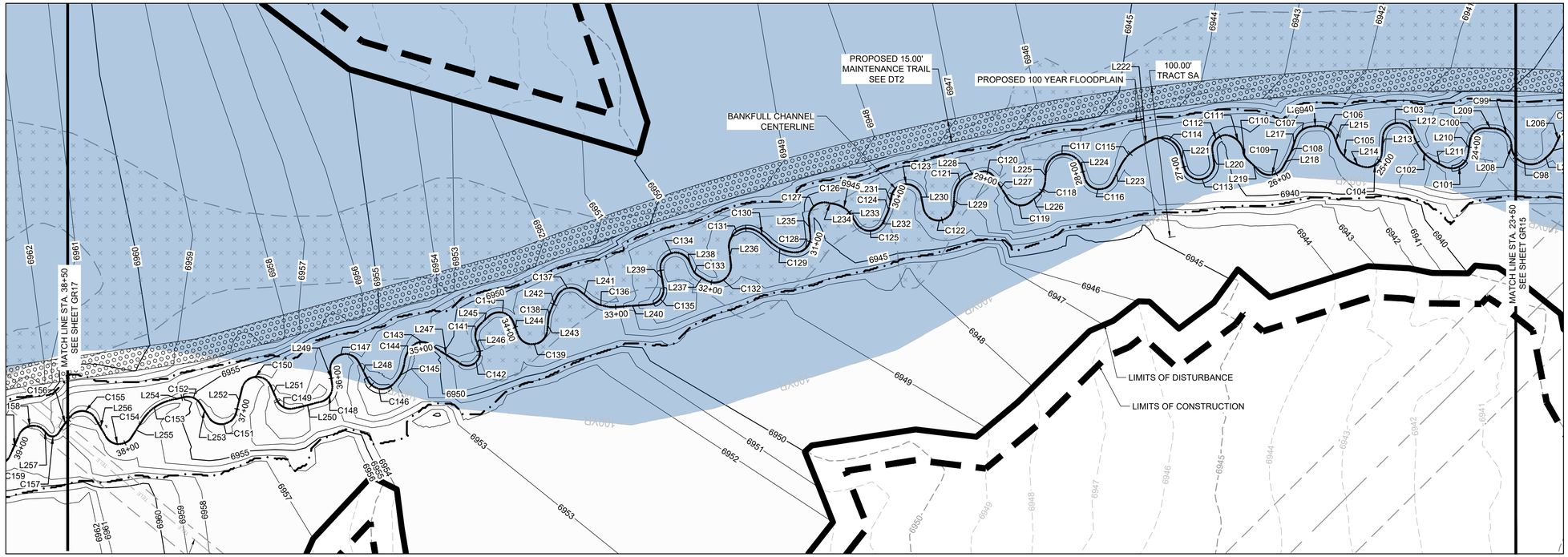
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

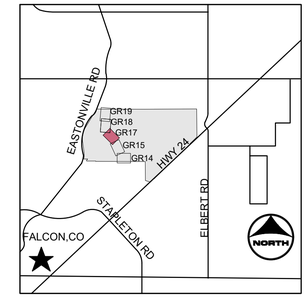
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
OVERALL UTILITY PLAN

SHEET UP1 | 04

HR GREEN Xrefs: xgf-1-dh01; OUP KEY: xv-dsgn_662; xv-utl_662; xc-dsgn-F1-662.10; xc-crxw-F1-662.10; xc-dsgn-F2; xc-crxw-F2; xc-dsgn-F3; xc-crxw-F3; xc-dsgn-F4; xc-crxw-F4; xc-channel; xc-filing-bndys; xv-crxw-662





KEYMAP

PROJECT LEGEND:

- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
- SECTION LINE
- EXISTING EASEMENT
- EXISTING FENCE
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 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.
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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

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	

TRIBUTARY 2 UPSTREAM

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

TRIBUTARY 2 UPSTREAM

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

TRIBUTARY 2 UPSTREAM

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

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 2-24-23

NORTH 0 20 40

DRAWN BY: ACH	JOB DATE: 11/29/2023	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\GRADING			

NO.	DATE	BY	REVISION DESCRIPTION

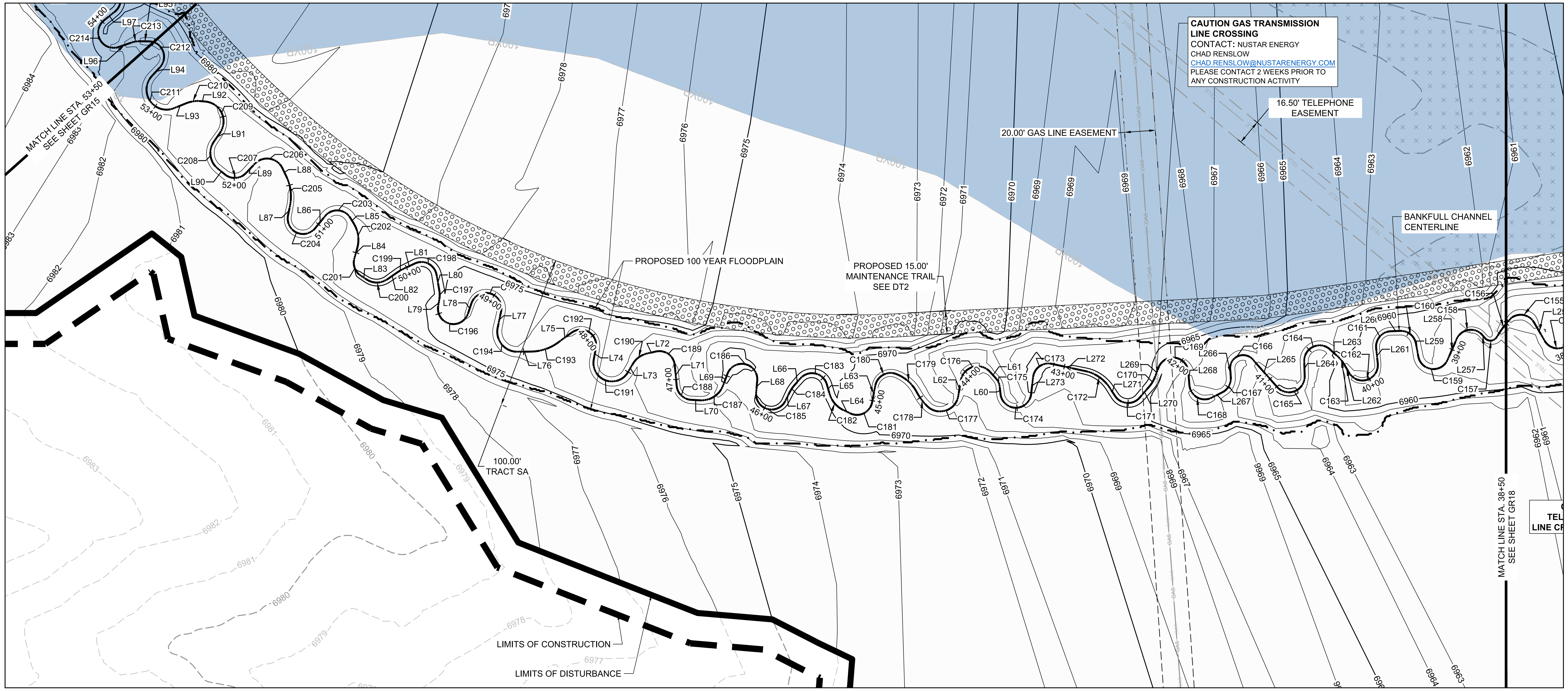
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

SHEET GR16 | 20

HR GREEN Xrefs: xgl-1-dfn01; GRADING KEY: HRG1 20X_EBase; xx-dsgn_662; xx-dsgn-662 10; xx-dsgn-F1-662 10; xx-row-F1-662 10; xx-row-662 10; xx-dsgn-F2; xx-row-F2; xx-util_662; xx-row-662; xx-dsgn-F3; xx-row-F3; xx-dsgn-F4; 01-XC-INITIAL-EC; xx-row-PH2; xx-dsgn-PH2; 01-XC-channel; 01_XV-Row; 01-XC-PR_100YR_FP_DELINEATION



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

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

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 12-01-23 PROFESSIONAL ENGINEER

NORTH
0 20 40

HR GREEN Xrefs: xgt-1-dh01; GRADING KEY; HRG1.20X_EBase; xv-dsgn_662; xc-dsgn-662.10; xc-row-662.10; xc-dsgn-F1-662.10; xc-row-F1-662.10; xc-row-F2; 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; 01_XV-Row; 01-XC-PR_100YR_FP_DELINEATION

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

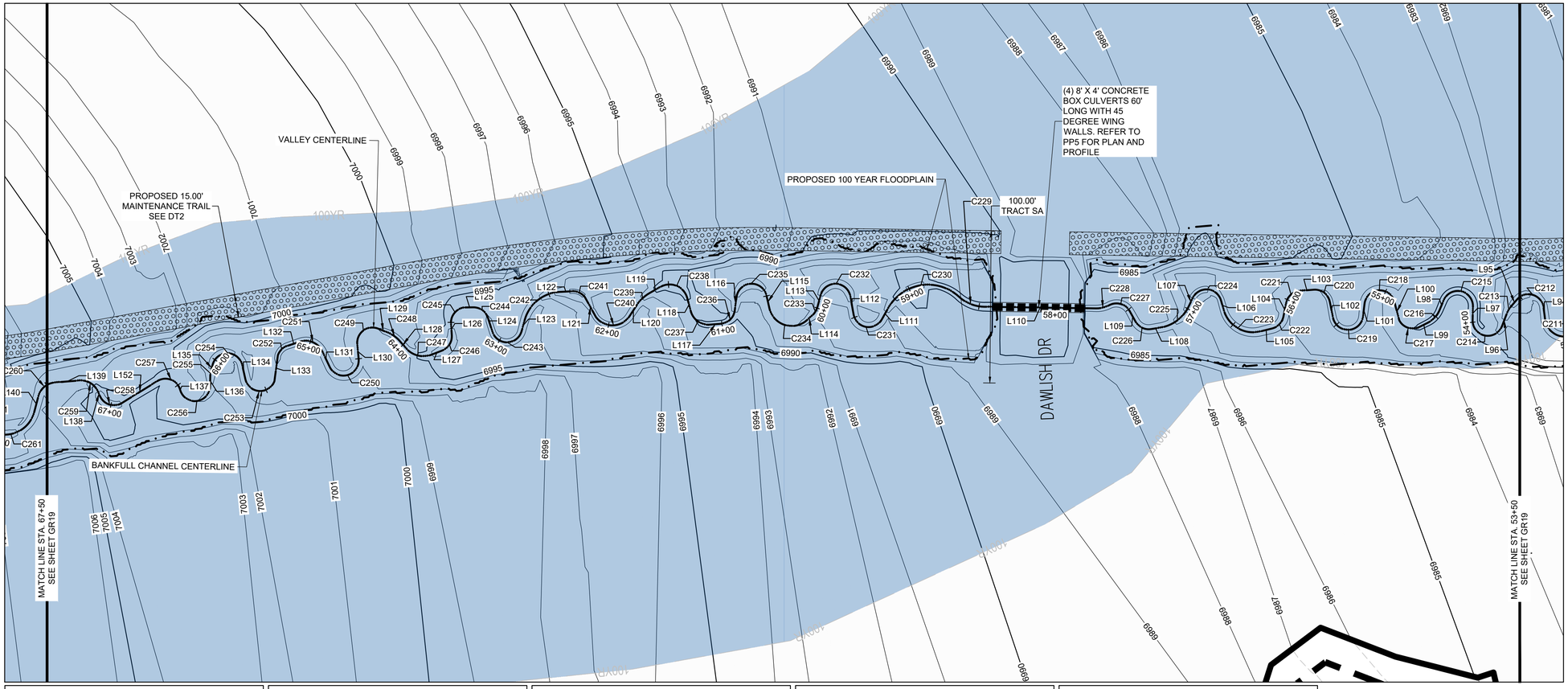
BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 — 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

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



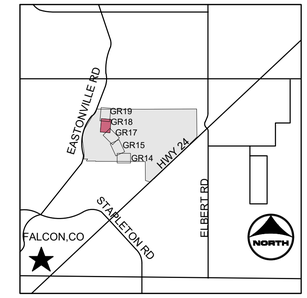
TRIBUTARY 2 UPSTREAM				
LINE #/ CURVE#	LENGTH	RADIUS	LNE/CHORD DIRECTION	CHORD LENGTH
L95	5.17		N44° 09' 57.14"W	
C213	6.98	20.00	N54° 09' 33.54"W	6.94
L96	8.04		N64° 09' 09.93"W	
C214	28.01	10.00	N16° 04' 45.78"E	19.71
L97	9.02		S83° 41' 18.51"E	
C215	27.69	10.00	N16° 58' 58.63"E	19.65
L98	7.09		N62° 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
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 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

NORTH
0 40
20

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

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

DRAWN BY: ACH	JOB DATE: 11/29/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"	
APPROVED: GLP	JOB NUMBER: 201662.03	IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD DATE: 11/30/2023			
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\GRADING			

NO.	DATE	BY	REVISION DESCRIPTION

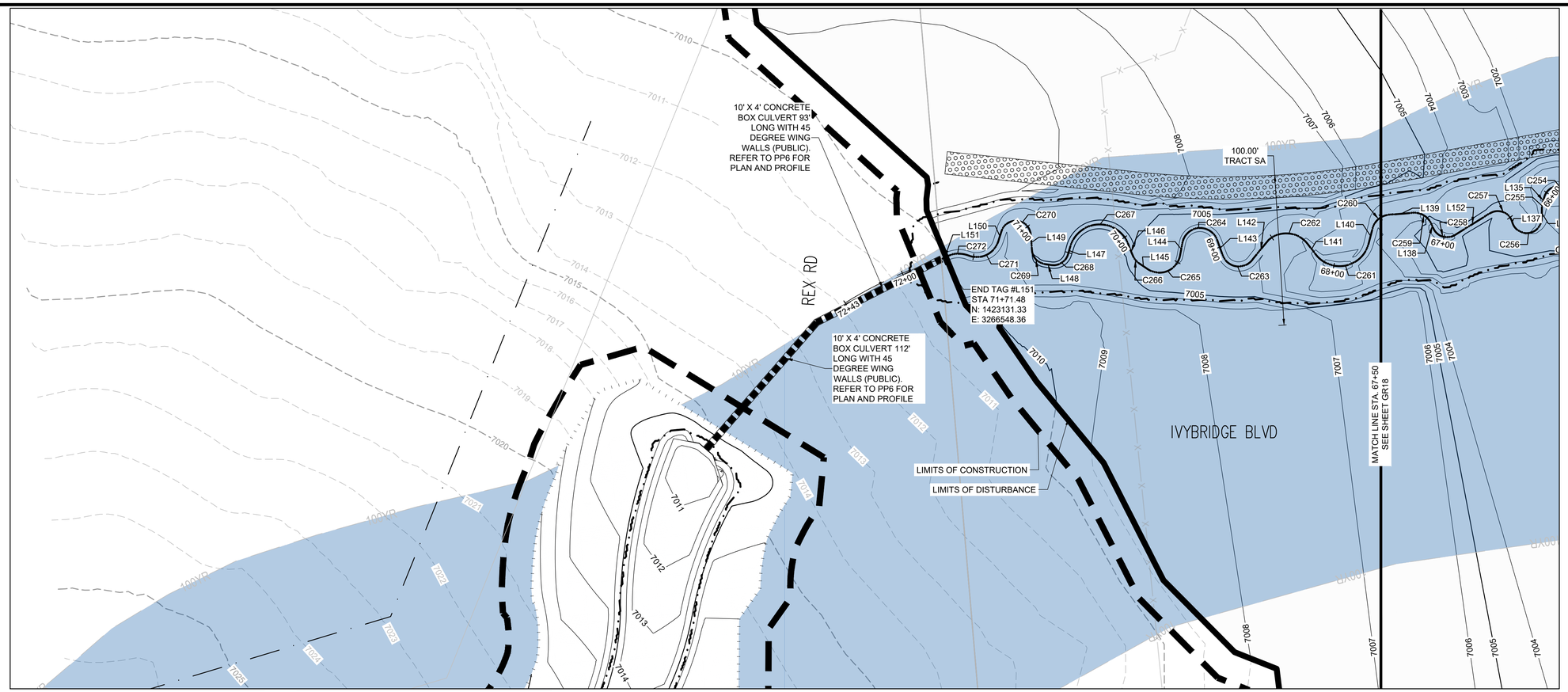
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

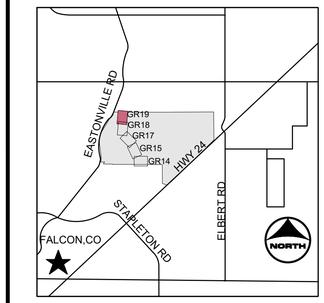
SHEET GR18

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; xc-row-F2; xv-util_662; xv-row-662; xc-dsgn-F3; xc-row-F3; 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



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
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- CONSTRUCTION EASEMENT
- FLOW ARROW
- LIMITS OF CONSTRUCTION
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- PROPOSED 100-YR FLOODPLAIN
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- EXISTING WETLANDS - NONJURISDICTIONAL
- PROPOSED MAINTENANCE TRAIL

NOTES:

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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

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

0 20 40

DRAWN BY: ACH	JOB DATE: 11/29/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"	
APPROVED: GLP	JOB NUMBER: 201662.03	IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD DATE: 11/30/2023			
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\GRADING			

NO.	DATE	BY	REVISION DESCRIPTION

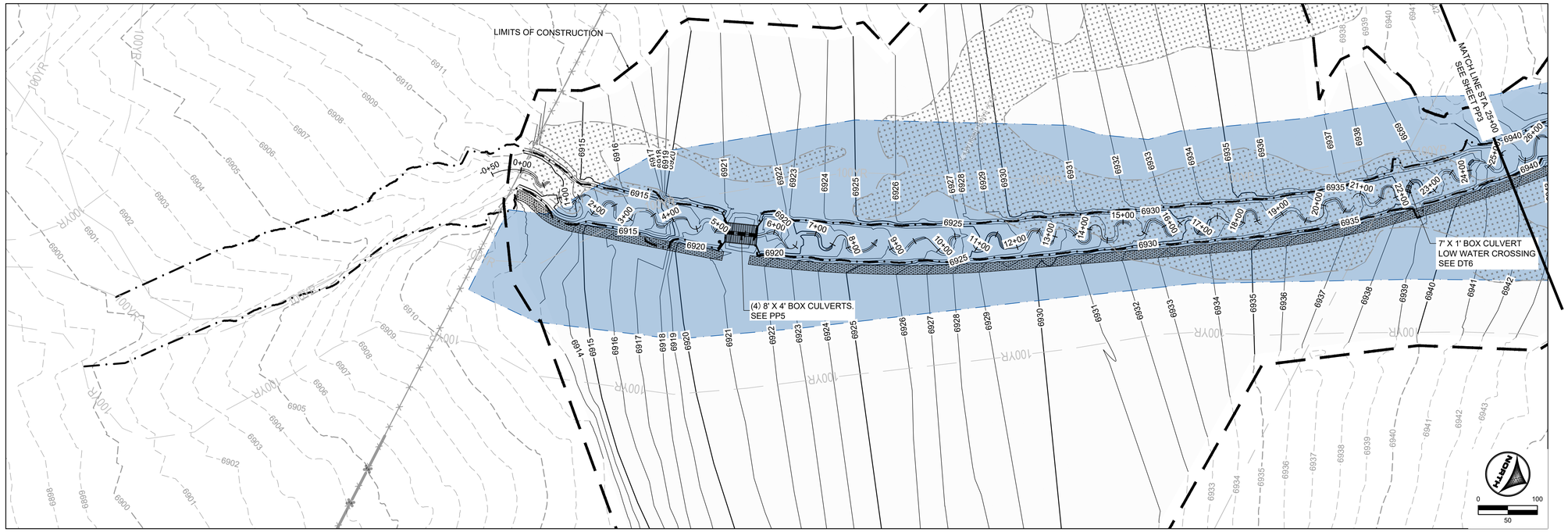
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

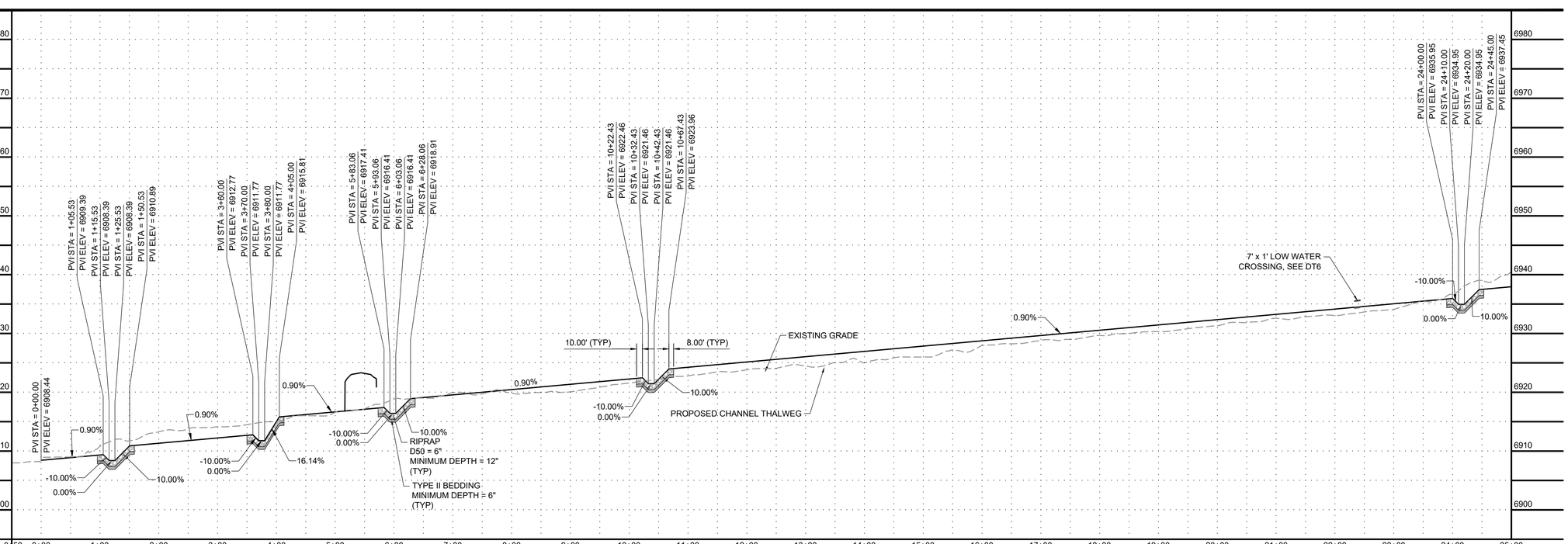
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 BANKFULL GRADING

SHEET GR19 23

HR GREEN Xrefs: xg1-afh01, 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-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
- X — X — X — EXISTING FENCE
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- EXISTING MINOR CONTOUR
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   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 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. HAZE 37081 PROFESSIONAL ENGINEER 12-12-23

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\PLAN AND PROFILE			

NO.	DATE	BY	REVISION DESCRIPTION

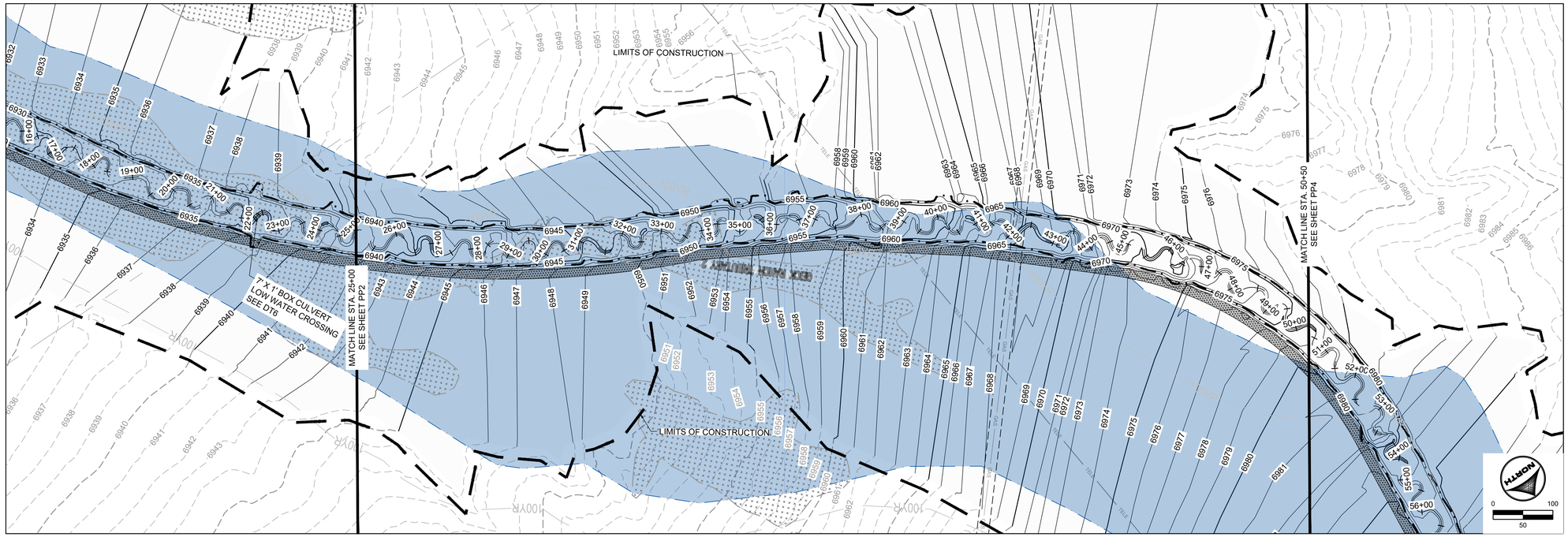
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

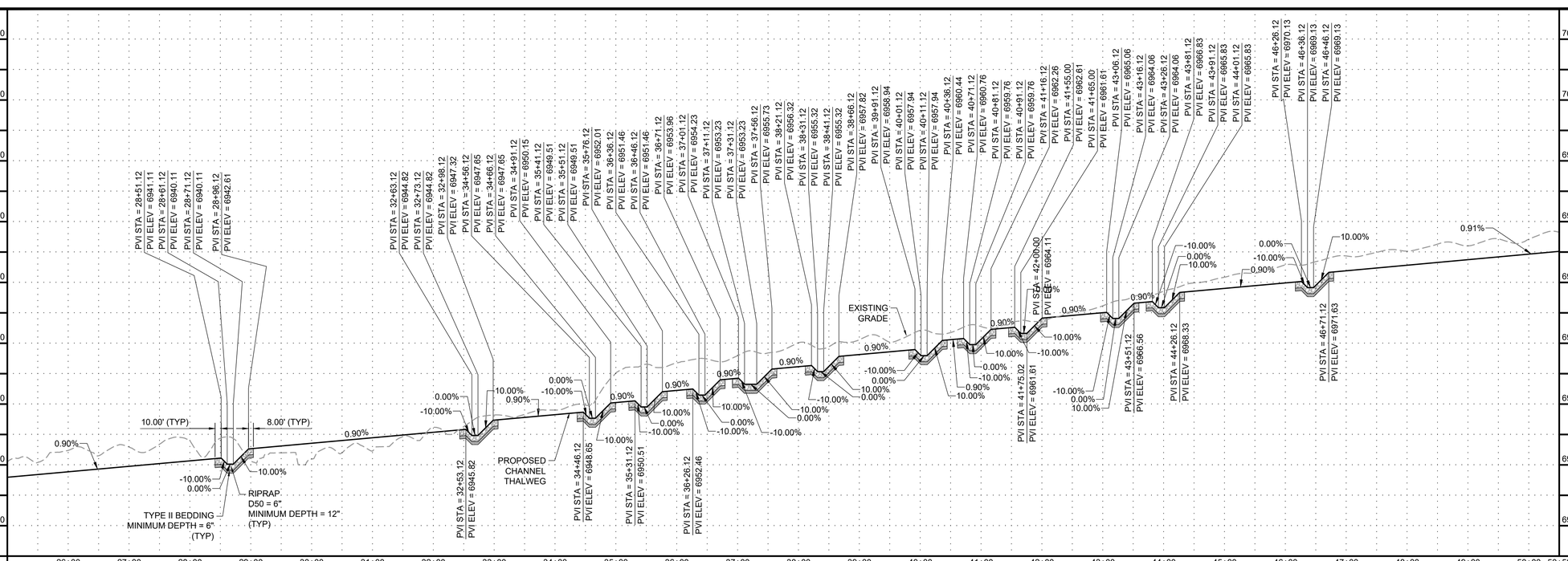
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

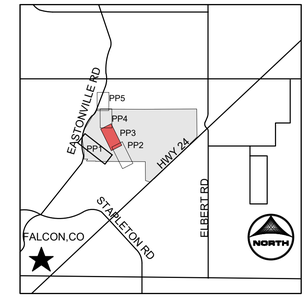
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP2

HR GREEN Xrefs: xgr-1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662.10; xc-crsv-F1-662.10; xv-crsv-662; xc-crsv-F2; xc-dsgn-F2; xc-dsgn-F3; xv-crsv-F3; xc-dsgn-F4; xc-crsv-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-crsv-PH2; xc-crsv-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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- FLOW ARROW
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- PROPOSED 100-YR FLOODPLAIN
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- EXISTING WETLANDS - JURISDICTIONAL
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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 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. LAZ 37081 PROFESSIONAL ENGINEER

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			
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NO.	DATE	BY	REVISION DESCRIPTION

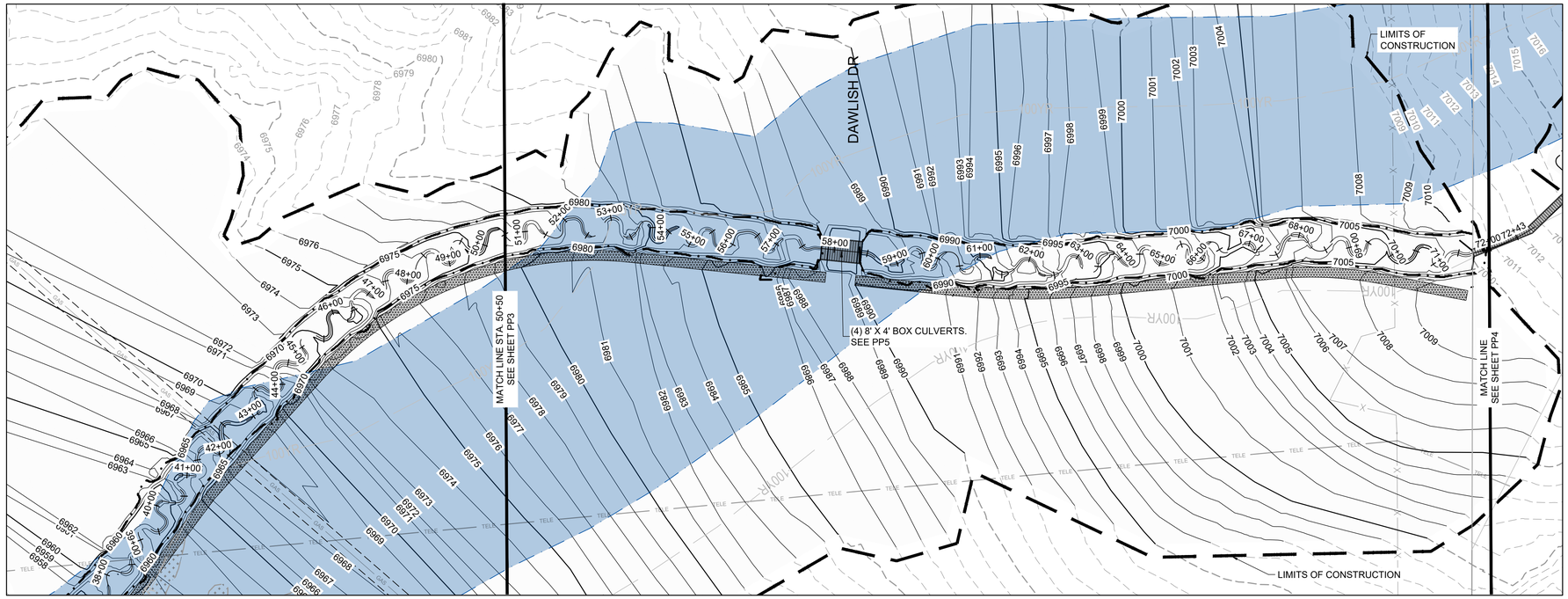
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

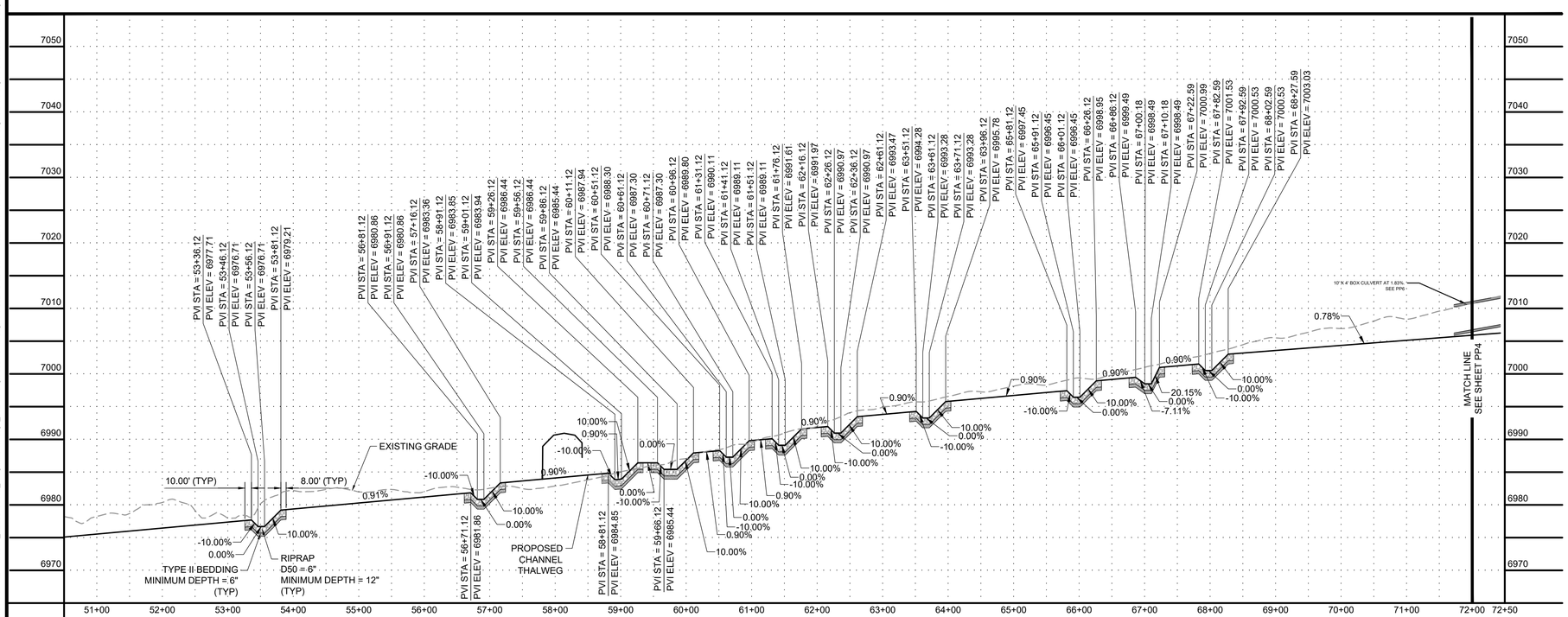
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

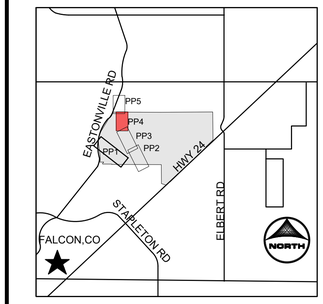
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP3 32

HR GREEN Xrefs: xgf-1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662.10; xc-crow-F1-662.10; xc-crow-662; xc-crow-F2; xc-dsgn-F2; xc-dsgn-F3; xc-crow-F3; xc-dsgn-F4; xc-crow-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-crow-PH2; xc-crow-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
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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
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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	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\PLAN AND PROFILE			

NO.	DATE	BY	REVISION DESCRIPTION

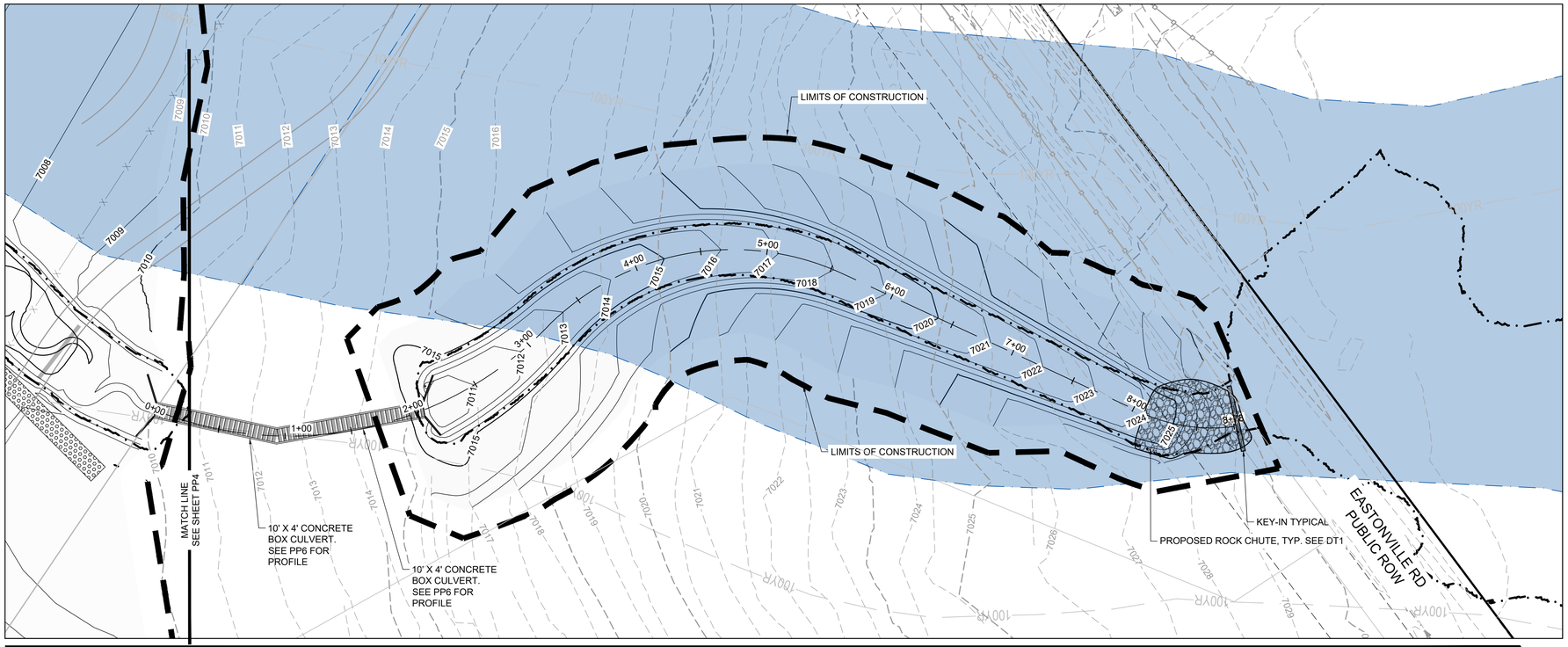
HRGreen
HR GREEN - DENVER
5613 DTC PARKWAY SUITE 950
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

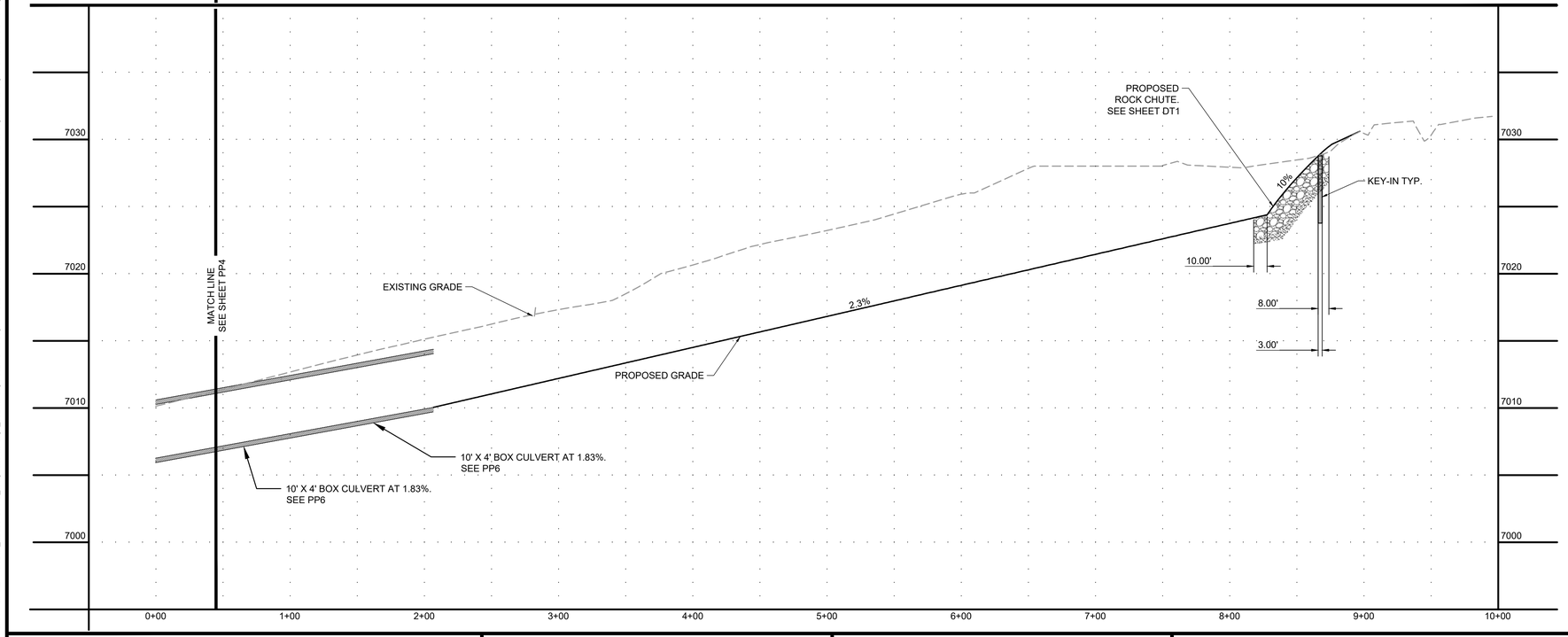
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

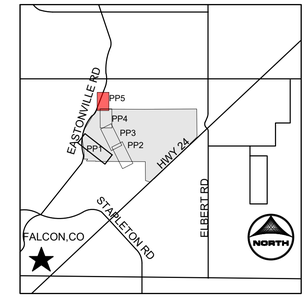
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP4

HR GREEN Xrefs: xgl-1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662.10; xc-dsgn-F1-662.10; xc-crow-F1-662.10; xc-crow-662; xc-crow-F2; xc-dsgn-F2; xc-dsgn-F3; xc-crow-F3; xc-dsgn-F4; xc-crow-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-crow-PH2; xc-crow-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:

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.

NORTH

0 50
25

HORIZONTAL 0 50 25
VERTICAL 0 5 2.5

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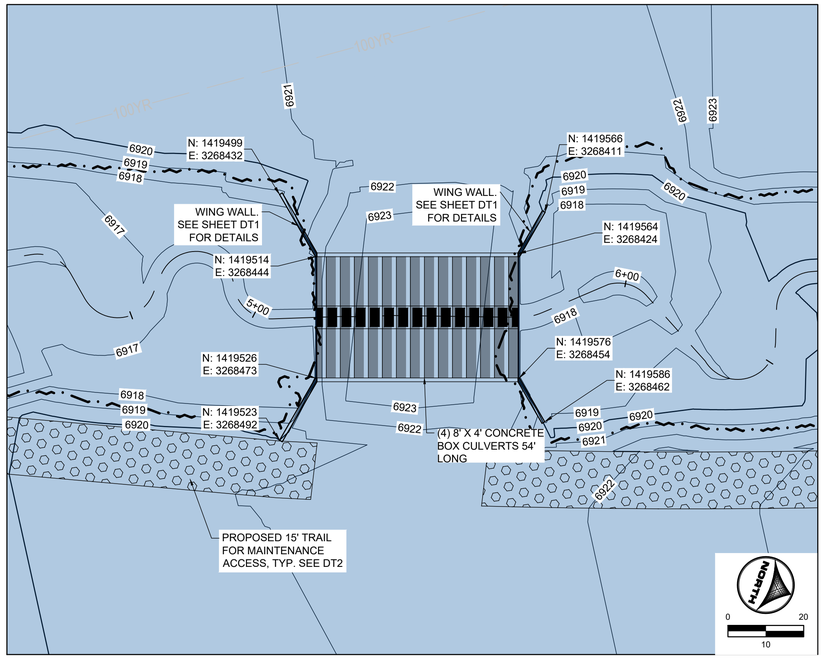
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

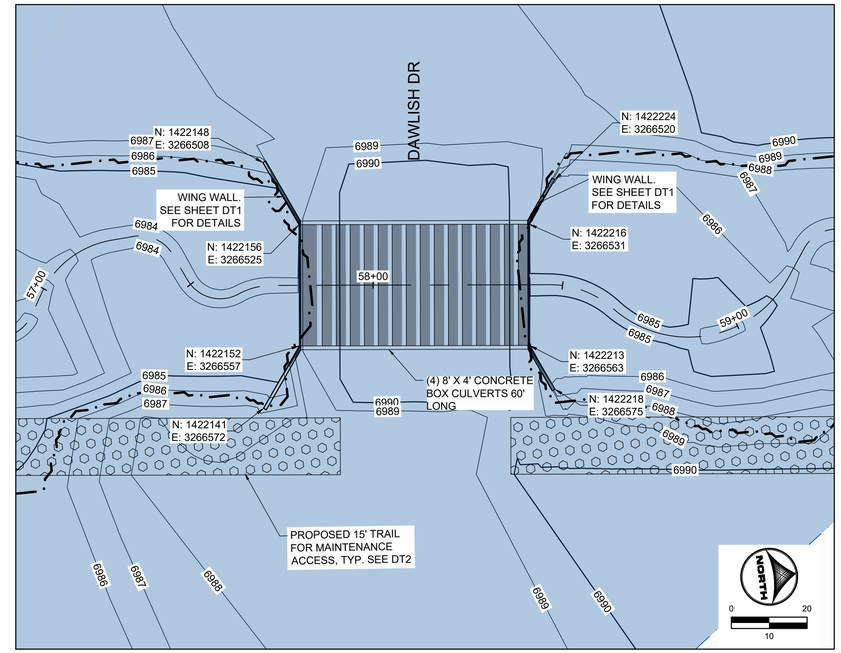
CONSTRUCTION DOCUMENTS
DRAINAGE TRIBUTARY 2 PLAN AND PROFILE

SHEET PP5

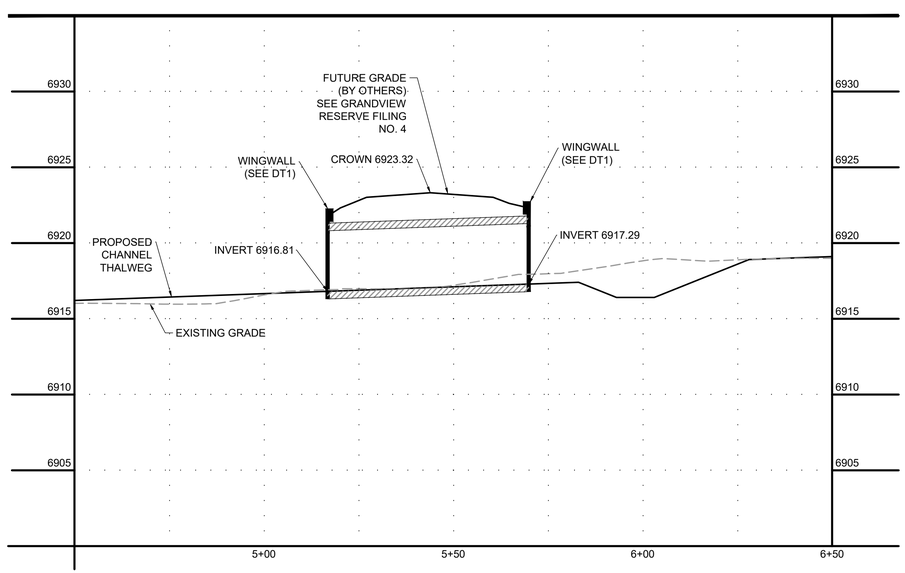
HR GREEN Xrefs: xgf-1-dh01; PAP KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_662; xc-dsgn-662; 10; xc-dsgn-F1-662; 10; xc-row-F1-662; 10; xv-row-662; xc-row-F2; xc-dsgn-F2; xc-dsgn-F3; xc-row-F3; xc-dsgn-F4; xc-row-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-row-PH2;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

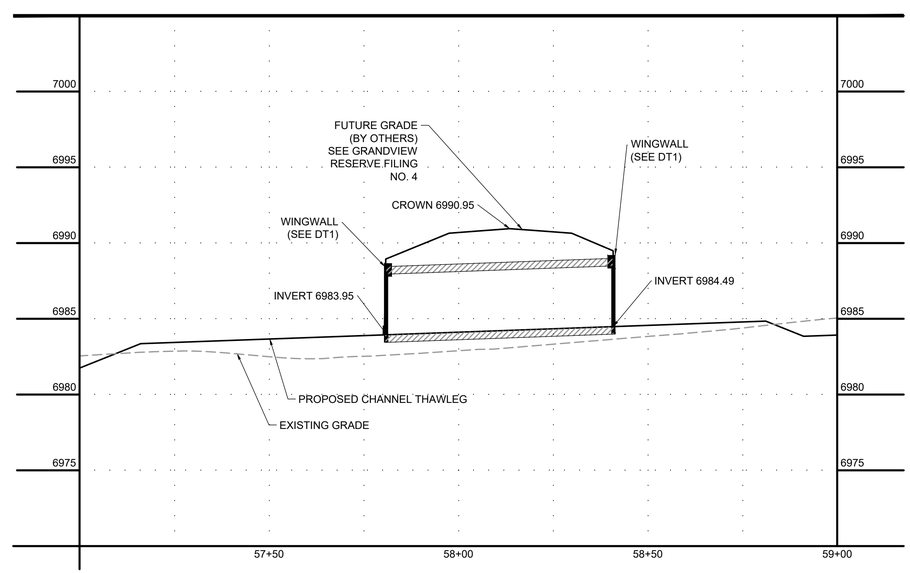


ROAD G CULVERT CROSSING

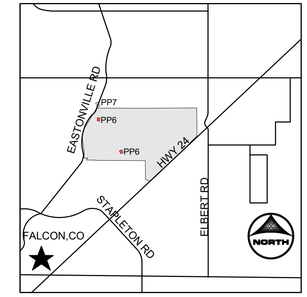


DAWLISH DR CULVERT CROSSING





HORIZONTAL 0 20 10 VERTICAL 0 5 2.5



KEYMAP

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- PROPERTY LINE
- ROAD CENTERLINE
- RIGHT-OF-WAY LINE
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- PROPOSED MINOR CONTOUR
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- LIMITS OF CONSTRUCTION
- PROPOSED 100-YR FLOODPLAIN
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   DESIGNATION = F 24
   PID = JK0240
   DESCRIPTION = DISK ON TOP OF CONCRETE MONUMENT
   CONTROL POINT COORDINATE SYSTEM:
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   NORTHING: 1421049.80
   EASTING: 3273631.55
   ELEVATION: 6866.33
3. ALIGNMENT NOT FOR USE IN CONSTRUCTION. REFER TO NORTHINGS AND EASTINGS
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COLORADO LICENSED GREGORY L. ... 37081 PROFESSIONAL ENGINEER

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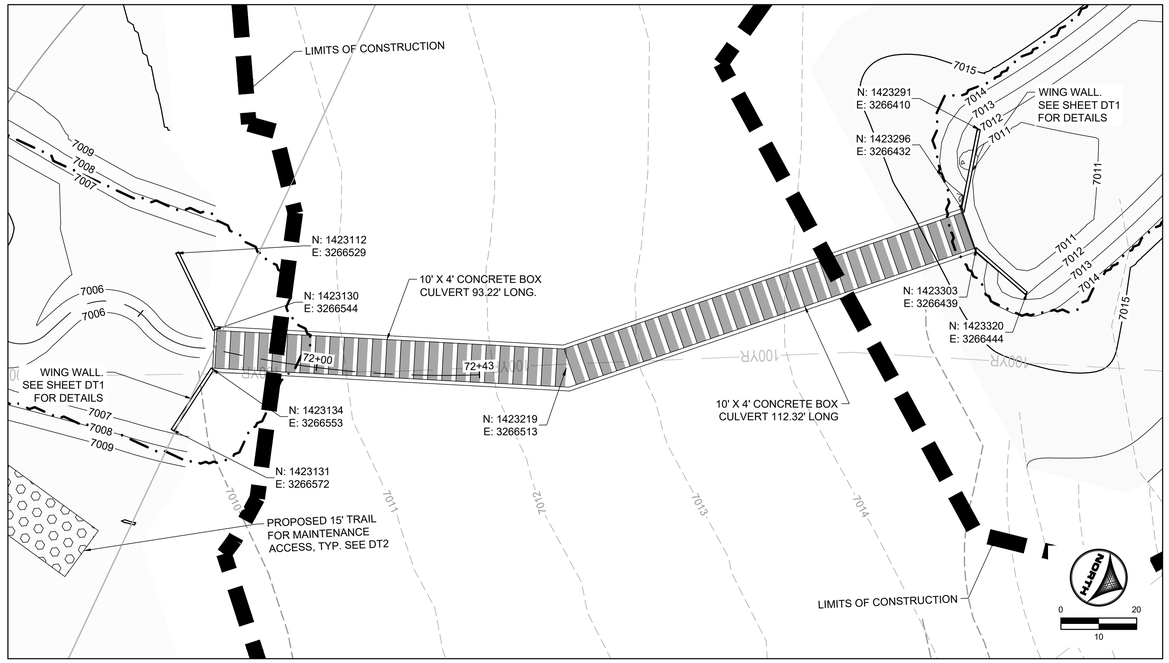
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

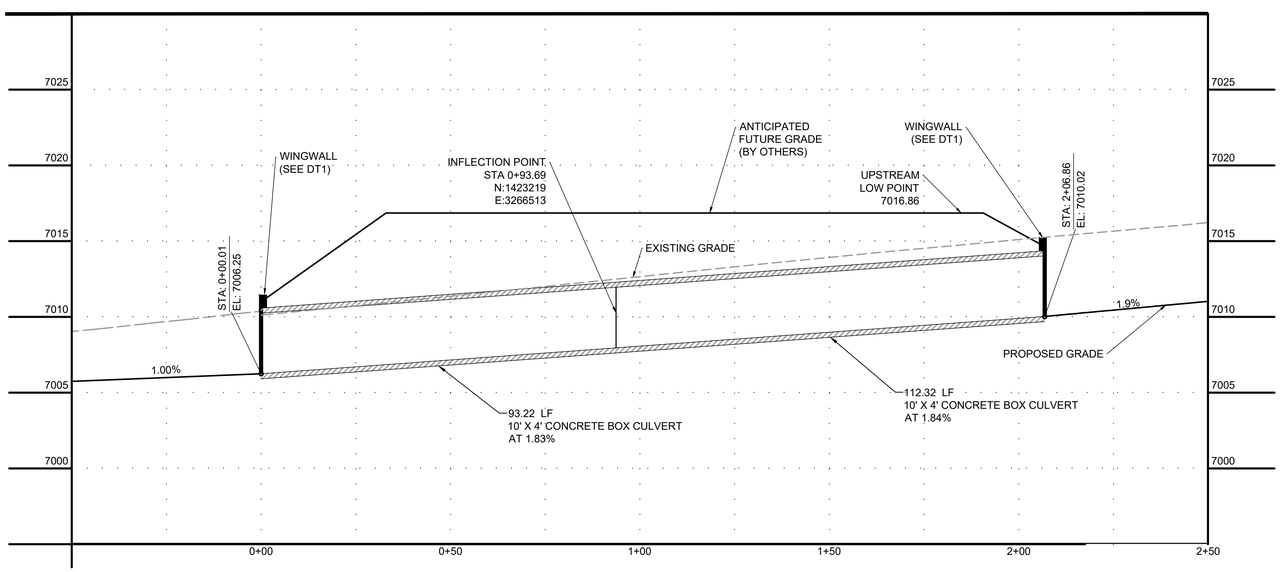
CONSTRUCTION DOCUMENTS
DRAINAGE CULVERTS PLAN AND PROFILE

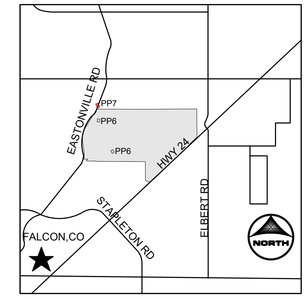
SHEET PP6

HR GREEN Xrefs: xgd-1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_682; xc-dsgn-682 10; xc-dsgn-F1-682 10; xc-crw-F1-682 10; xv-crw-682; xc-crw-F2; xc-dsgn-F2; xc-dsgn-F3; xc-crw-F3; xc-dsgn-F4; xc-crw-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



REX ROAD CULVERT CROSSING





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COLORADO LICENSED PROFESSIONAL ENGINEER GREGORY L. HAZ 37081 12-12-23

HORIZONTAL 0 10 20 VERTICAL 0 2.5 5

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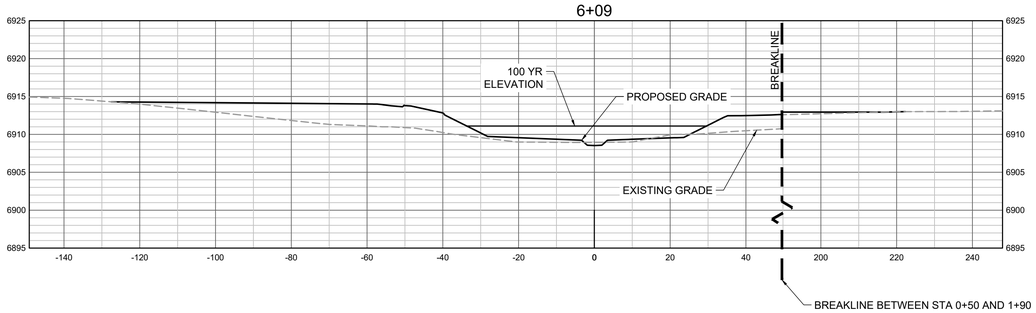
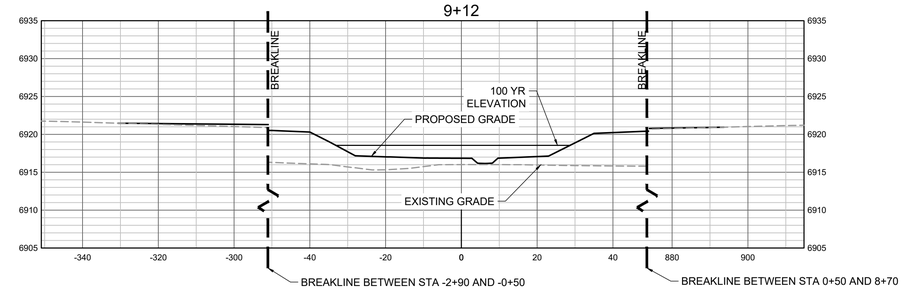
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

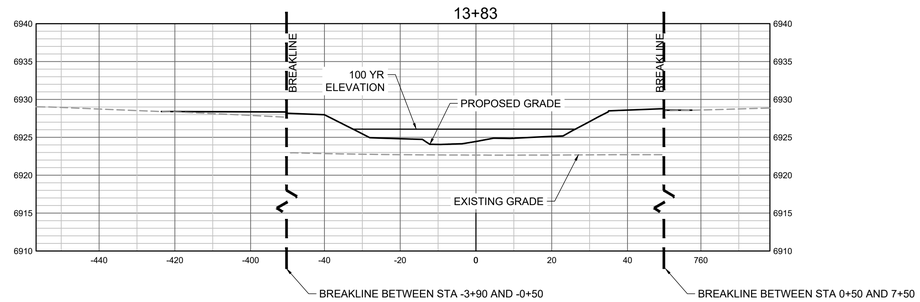
CONSTRUCTION DOCUMENTS
DRAINAGE CULVERT PLAN AND PROFILE

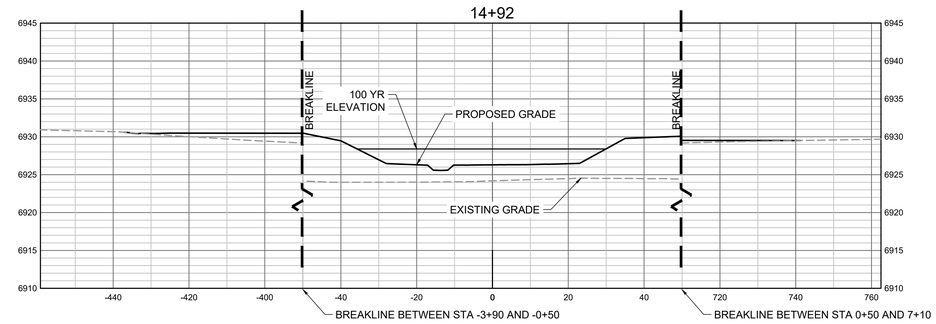
SHEET PP7

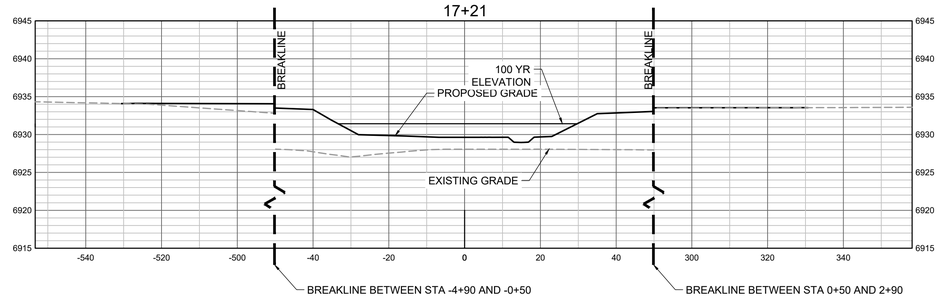
HR GREEN Xrefs: xgl-1-dh01; P&P KEY: HRG1X_EBase; 01-XC_Wingwalls; xv-dsgn_682; xc-dsgn-682 10; xc-dsgn-F1-682 10; xc-crw-F1-682 10; xv-crw-682; xc-crw-F2; xc-dsgn-F2; xc-dsgn-F3; xc-crw-F3; xc-dsgn-F4; xc-crw-F4; 01-XC-PR_100YR_FP_DELINEATION; xc-channel; xc-filing-bndys; 01-XC-INITIAL-EC; xc-crw-PH2; xc-crw-PH3; 01_XC_RIPRAP; 01_XV-Row; 01-XC-channel

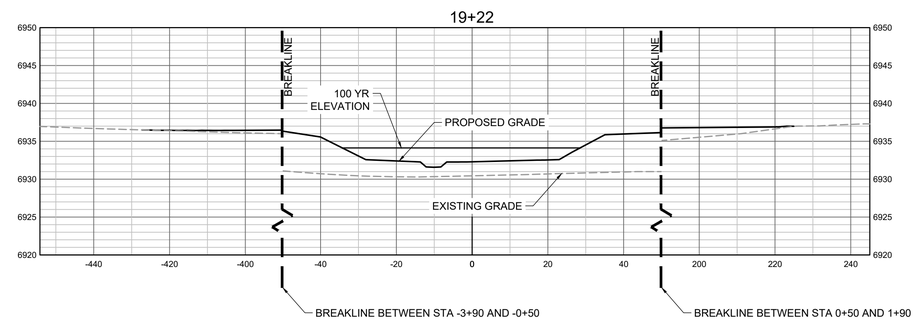


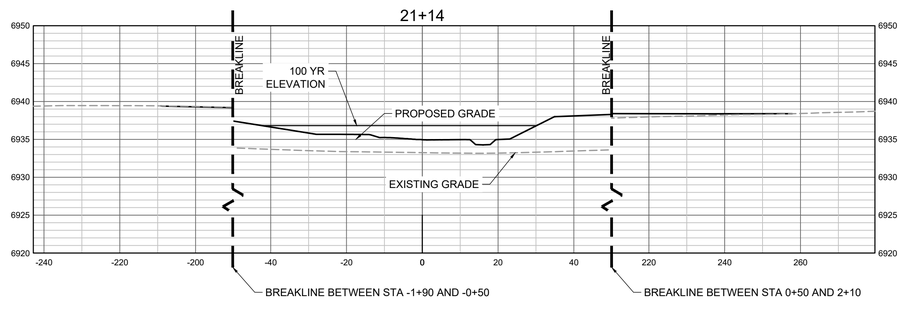


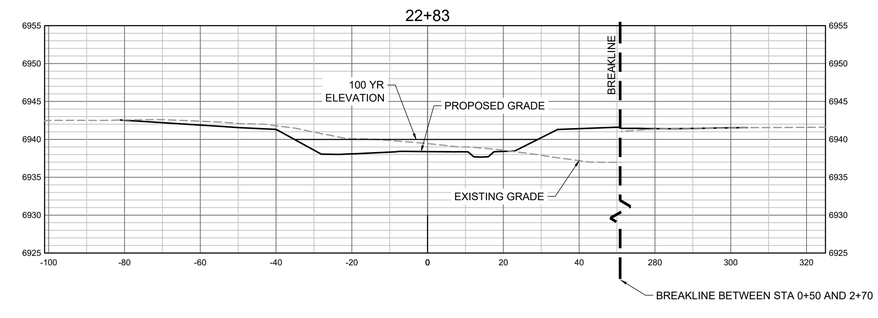












PROPOSED GRADES TO TIE INTO GRANDVIEW RESERVE FILING 1. REFER TO THE GRANDVIEW RESERVE FILING 1 PLAN SET FOR CONTINUATION OF GRADING THAT IS BEING TIED INTO OUTSIDE OF CHANNEL GRADING LIMITS.

HORIZONTAL 0 10 20 VERTICAL 0 5 10

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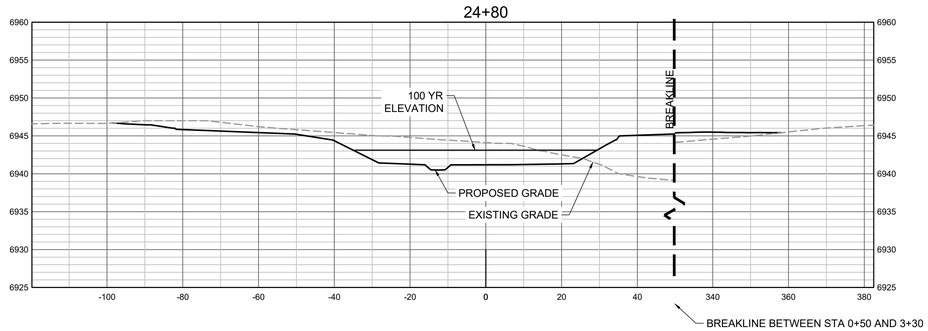
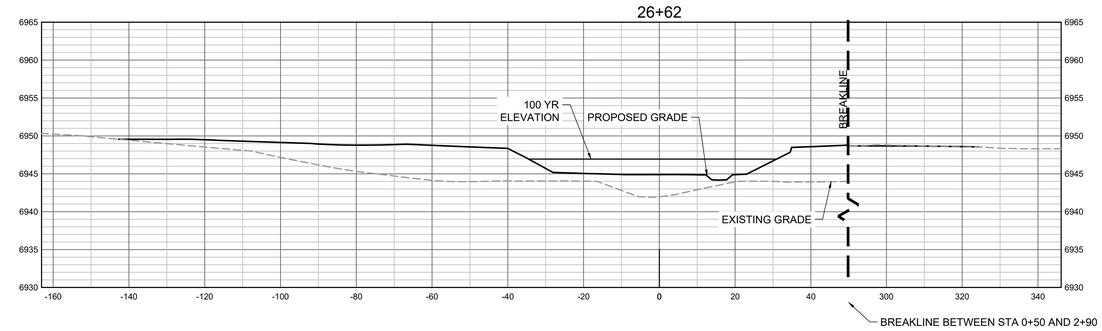
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

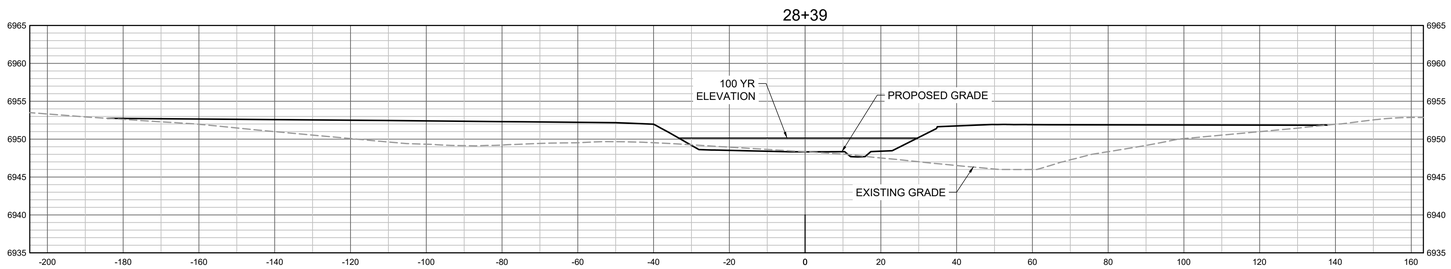
CONSTRUCTION DOCUMENTS
TRIBUTARY 2 CROSS SECTIONS

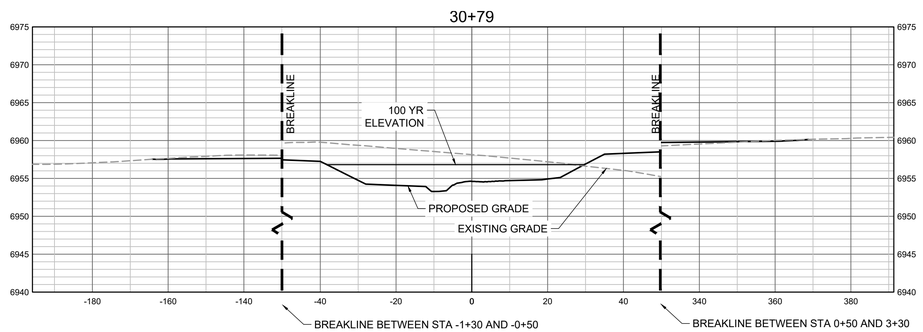
SHEET CS1

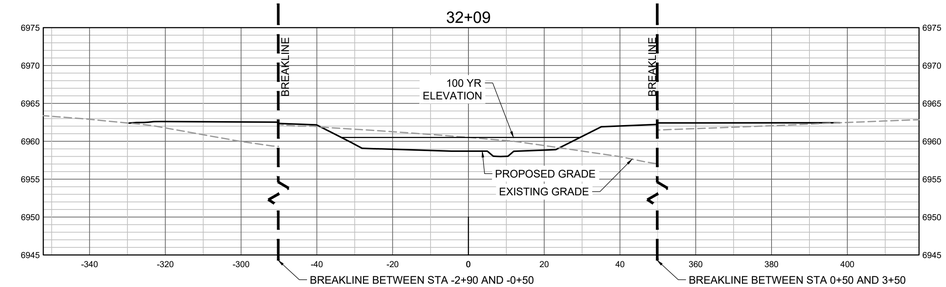
HR GREEN Xrefs: xgt-1-db01_01-XC-PR_100YR_FP_DELINEATION

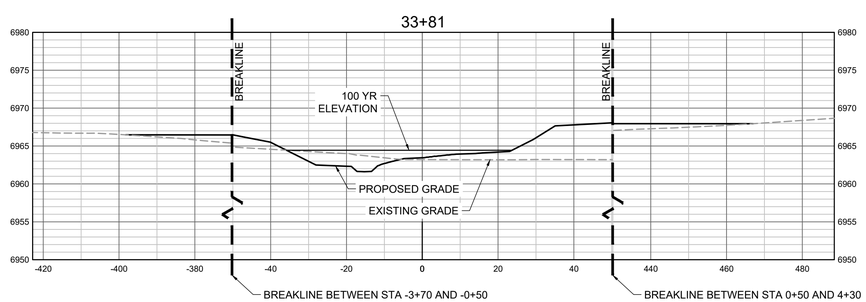


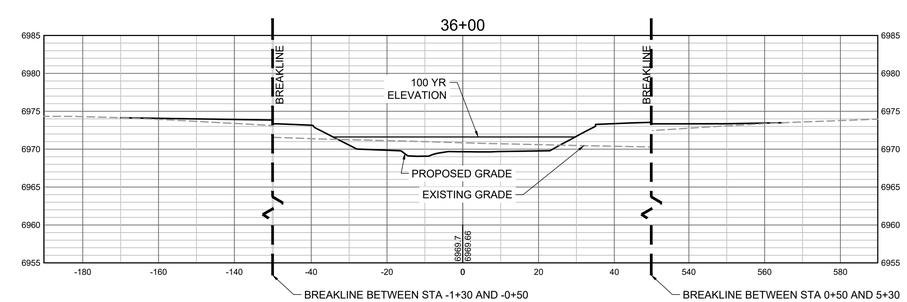












PROPOSED GRADES TO TIE INTO GRANDVIEW RESERVE FILING 1. REFER TO THE GRANDVIEW RESERVE FILING 1 PLAN SET FOR CONTINUATION OF GRADING THAT IS BEING TIED INTO OUTSIDE OF CHANNEL GRADING LIMITS.

HORIZONTAL 0 10 20 VERTICAL 0 5 10

DRAWN BY: TBI	JOB DATE: 11/30/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"	
APPROVED: GLP	JOB NUMBER: 201662.03	IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
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
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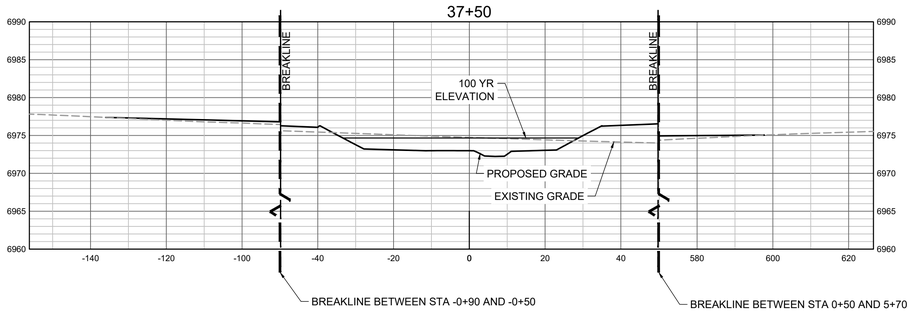
DENVER CO 80111
PHONE: 720.602.4999
FAX: 713.965.0044

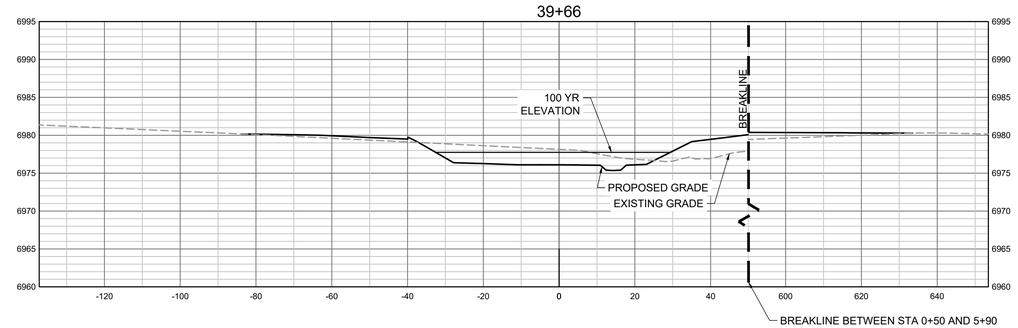
GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

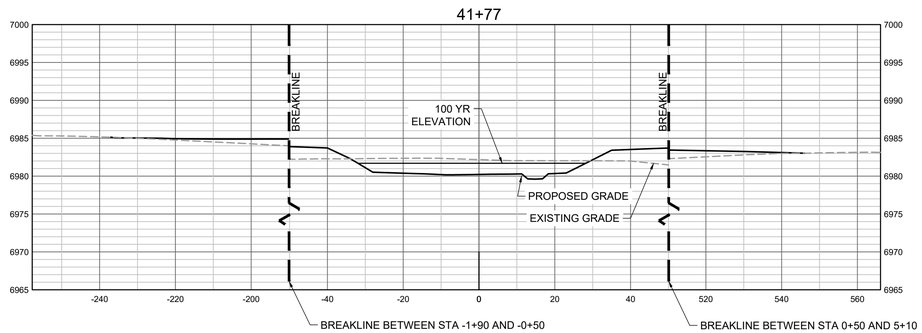
CONSTRUCTION DOCUMENTS
TRIBUTARY 2 CROSS SECTIONS

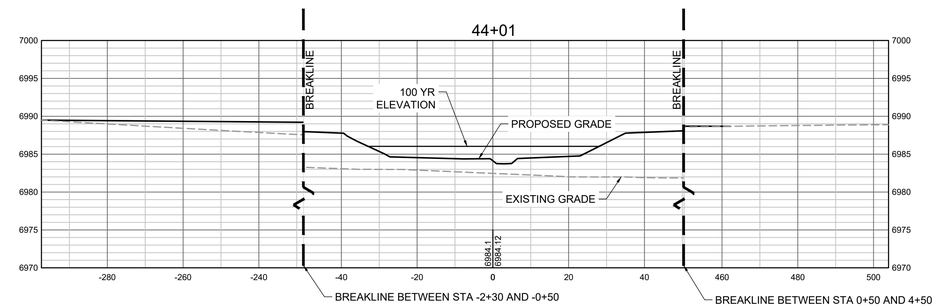
SHEET CS2

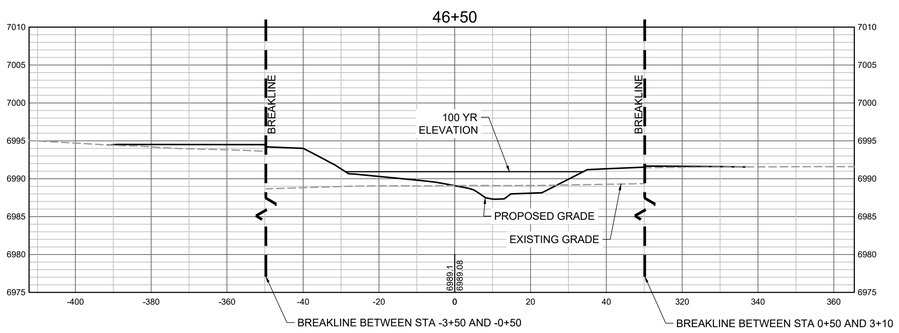
HR GREEN Xrefs: xgt-1-db01; 01-XC-PR_100YR_FP_DELINEATION

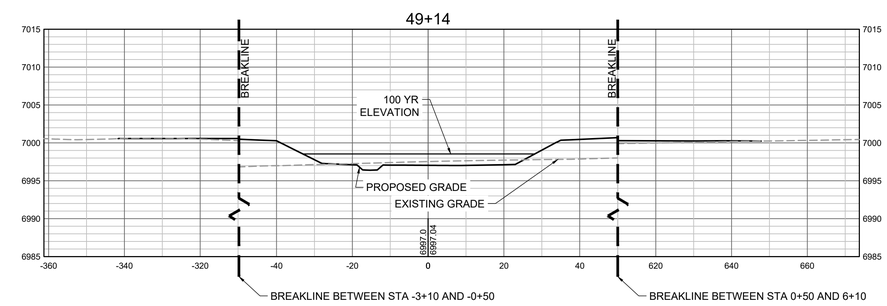


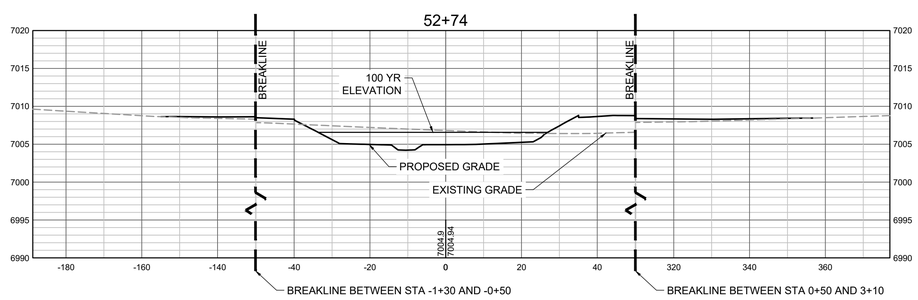


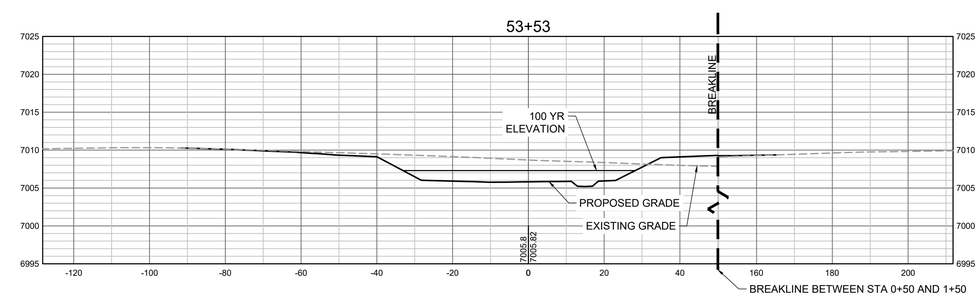












PROPOSED GRADES TO TIE INTO GRANDVIEW RESERVE FILING 1. REFER TO THE GRANDVIEW RESERVE FILING 1 PLAN SET FOR CONTINUATION OF GRADING THAT IS BEING TIED INTO OUTSIDE OF CHANNEL GRADING LIMITS.

HORIZONTAL 0 10 20 VERTICAL 0 5 10

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

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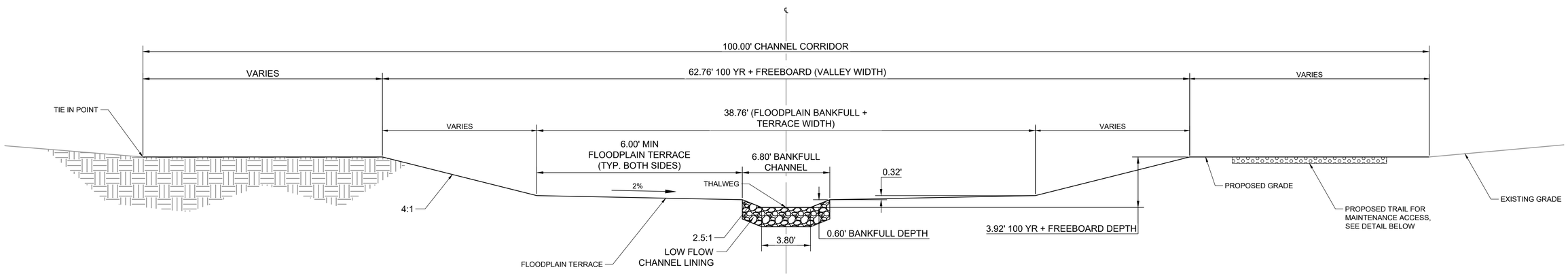
PHONE: 720.602.4999
FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
TRIBUTARY 2 CROSS SECTIONS

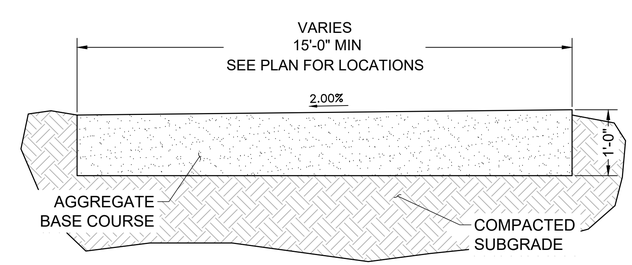
SHEET CS3

HR GREEN Xrefs: xgt-1-db01; 01-XC-PR_100YR_FP_DELINEATION



TYPICAL CROSS SECTION – TRIBUTARY 2

SCALE: N.T.S.



MAINTENANCE ROAD TYPICAL SECTION

SCALE: NTS

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.

DRAWN BY: TBI	JOB DATE: 5/10/2023	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"	
APPROVED: GLP	JOB NUMBER: 201662.03	IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD DATE: 11/30/2023			
CAD FILE: J:\2020\201662.03\CAD\Dwgs\C\DETAILS			

NO.	DATE	BY	REVISION DESCRIPTION

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DENVER CO 80111
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FAX: 713.965.0044

GRANDVIEW RESERVE
DR HORTON
FALCON, COLORADO

CONSTRUCTION DOCUMENTS
DETAILS

SHEET DT2

HR GREEN Xrefs: xgt-1-db01

HRGreen	GRANDVIEW - BASIN C	Calc'd by:	NQJ
	PROPOSED CONDITIONS	Checked by:	
	LOCATION: COLORADO SPRINGS, COLORADO	Date:	2/29/2024

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
C1	4.53	65	8.2	18.0
C2	2.71	65	4.8	10.6
C3	2.47	65	4.7	10.3
C4	3.09	65	4.5	9.8
C5	3.13	65	4.7	10.4
C6	0.81	45	1.0	2.6
C7	6.07	65	7.7	17.0
C8	5.11	65	7.4	16.2
C9	3.50	65	5.5	12.1
C10	3.97	66	6.3	13.6
C11	3.64	67	5.9	12.9
C12	0.46	65	0.9	2.0
C13	1.66	65	2.9	6.4
C14	2.37	65	4.2	9.3
C15	1.69	65	3.9	8.7

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
20	C1	8.2	18.0
21	C2	4.8	10.6
21.1	C1-C2	10.3	17.7
22	C3	4.7	10.3
22.1	DP21.1 & C3	17.9	25.3
23	C4	4.5	11.4
24	C5	5.0	14.7
24.1	DP22.1, DP23 & DP24	23.4	44.1
25	C6	1.0	2.6
26	DP25 & C7	11.5	22.0
27	C8	7.4	16.2
27.1	DP26-27	16.5	25.4
28	C9	5.5	12.1
28.1	DP27.1 & DP28	20.8	34.6
29.1	DP24.1 & DP28.1	40.2	73.0
30	C10	6.3	13.6
30.1	DP29.1 & DP30	44.8	91.1
31	C11	5.9	12.9
31.1	DP30.1 & DP31	46.0	97.6
32	C12	0.9	2.0
32.1	DP31.1 & DP32	46.4	98.4
33	C13	2.9	6.4
33.1	DP32.1 & DP33	48.1	102.3
34	DP33.1 & C14	50.5	107.4
35	C15	3.9	8.7

HRGreen	**GRANDVIEW - BASIN C**									**Calc'd by:**	**NQJ**										
	PROPOSED CONDITIONS									**Checked by:**											
	LOCATION: COLORADO SPRINGS, COLORADO									**Date:**	**2/29/2024**										

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED	1/8 AC RESIDENTIAL	NEIGHBORHOOD AREAS	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED			1/8 AC RESIDENTIAL			NEIGHBORHOOD AREAS			COMPOSITE IMPERVIOUSNESS & C		
	ACRES						%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}
C1	0.00	0.00	4.53	0.00	4.53	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C2	0.00	0.00	2.71	0.00	2.71	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C3	0.00	0.00	2.47	0.00	2.47	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C4	0.00	0.00	3.09	0.00	3.09	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C5	0.00	0.00	3.13	0.00	3.13	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C6	0.26	0.00	0.55	0.00	0.81	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	45	0.33	0.52
C7	0.00	0.00	6.07	0.00	6.07	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C8	0.00	0.00	5.11	0.00	5.11	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C9	0.00	0.00	3.50	0.00	3.50	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C10	0.00	0.17	3.80	0.00	3.97	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	66	0.47	0.61
C11	0.00	0.17	3.47	0.00	3.64	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	67	0.47	0.61
C12	0.00	0.00	0.46	0.00	0.46	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C13	0.00	0.00	1.66	0.00	1.66	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C14	0.00	0.00	2.37	0.00	2.37	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
C15	0.00	0.00	1.69	0.00	1.69	A/B	2	0.09	0.36	100	0.90	0.96	65	0.45	0.59	70	0.53	0.68	65	0.45	0.59
POND C					**43.52**														**64.9**		
TOTAL BASIN C					**45.21**														**64.9**		

HRGreen	GRANDVIEW - BASIN C	Calc'd by:	NQJ
	PROPOSED CONDITIONS	Checked by:	
	LOCATION: COLORADO SPRINGS, COLORADO	Date:	2/29/2024

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)
C1	0.45	4.53	65	3.0	6.7	20	680	1.80	2.7	4.2	10.9
C2	0.45	2.71	55	2.0	7.0	20	680	1.80	2.7	4.2	11.2
C3	0.45	2.47	55	2.0	7.0	20	350	1.50	2.4	2.4	9.4
C4	0.45	3.09	150	2.0	11.6	20	820	1.00	2.0	6.8	18.4
C5	0.45	3.13	110	2.0	9.9	20	820	1.00	2.0	6.8	16.8
C6	0.33	0.81	161	3.0	12.3	15	110	2.00	2.1	0.9	13.2
C7	0.45	6.07	150	2.0	11.6	20	1300	0.80	1.8	12.1	23.7
C8	0.45	5.11	110	2.0	9.9	20	930	0.80	1.8	8.7	18.6
C9	0.45	3.50	110	2.0	9.9	20	570	0.80	1.8	5.3	15.2
C10	0.47	3.97	150	2.0	11.2	20	770	1.50	2.4	5.2	16.5
C11	0.47	3.64	110	3.0	8.4	20	1050	1.50	2.4	7.1	15.5
C12	0.45	0.46	90	2.0	9.0	20	5	2.00	2.8	0.0	9.0
C13	0.45	1.66	110	2.0	9.9	20	250	1.40	2.4	1.8	11.7
C14	0.45	2.37	230	10.0	8.4	15	250	1.00	1.5	2.8	11.2
C15	0.45	1.69	50	25.0	2.9	15	200	2.00	2.1	1.6	5.0

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 - BASIN C

PROPOSED CONDITIONS

DESIGN STORM: 5-YEAR

Calc'd by: NQJ
Checked by:
Date: 2/29/2024

			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	
													0.5	0.11	1.0					820	2.0	6.83	DP20 FLOWBY, C&G FLOW TO DP24
	20	C1	4.53	0.45	10.9	2.04	4.00	8.2								7.7	1.92	2.0	2.0	28	10.2	0.05	BASIN C1 CAPTURED IN 15' TYPE R ONGRADE @ DP20, PIPE TO DP21.1
	21	C2	2.71	0.45	11.2	1.22	3.95	4.8								4.8	1.21	2.0	2.0	5	10.2	0.01	BASIN C2 CAPTURED IN 15' TYPE R ONGRADE @ DP21, PIPE TO DP21.1
	21.1								17.7	3.14	3.27	10.3				10.3	3.14	2.0	2.0				COMBINED DP20 & DP21, PIPE TO DP22.1
	22	C3	2.47	0.45	9.4	1.11	4.22	4.7								4.7	1.11	2.0	2.0				BASIN 3 CAPTURED IN 15' TYPE R ONGRADE @ DP22, PIPE TO DP22.1
	22.1								9.4	4.25	4.22	17.9				17.9	4.25	1.0	2.0	820	7.2	1.90	COMBINED DP21.1 & DP22, PIPE TO DP24.1
	23	C4	3.09	0.45	18.4	1.39	3.21	4.5								4.5	1.39	2.0	2.0	5	10.2	0.01	BASIN C4 CAPTURED IN 15' TYPE R ONGRADE @ DP24, PIPE TO DP24.1
	24	C5	3.13	0.45	16.8	1.41	3.36	4.7	17.7	1.52	3.27	5.0				5.0	1.52	2.0	2.0	28	10.2	0.05	DP20 FLOWBY & BASIN C5 CAPTURED IN 15' TYPE R ONGRADE @ DP24, PIPE TO DP24.1
	24.1								17.8	7.16	3.27	23.4				23.4	7.16	2.0	2.0	53	10.2	0.09	COMBINED DP22.1, DP23 & DP24, PIPE TO DP29.1
													1.0	0.27	0.8					605	1.8	5.64	BASIN C6 FLOW @ DP25, C&G FLOW TO DP26
	25	C6	0.81	0.33	13.2	0.27	3.71	1.0															
													1.8	0.47	1.5					1050	2.4	7.14	DP26 FLOWBY, C&G FLOW TO DP31
	26	C7	6.07	0.45	23.7	2.73	2.84	7.7	23.7	3.00	2.84	11.5				9.7	2.53	2.0	2.0	5	10.2	0.01	DP17, DP18, DP25 & BASIN C7 CAPTURED IN 15' TYPE R ONGRADE @ DP26, PIPE TO DP27.1
													0.2	0.05	1.5					270	2.4	1.84	DP27 FLOWBY, C&G FLOW TO DP28
	27	C8	5.11	0.45	18.6	2.30	3.20	7.4								7.2	2.25	2.0	2.0	18	10.2	0.03	BASIN C8 FLOW CAPTURED IN 15' TYPE R ONGRADE, PIPE TO DP27.1
	27.1								23.7	4.78	2.83	16.5				16.5	4.78	2.0	2.0	265	10.2	0.43	COMBINED DP26 & DP27, PIPE TO DP28.1
													0.4	0.07	1.5					780	2.4	5.31	DP28 FLOWBY, C&G FLOW TO DP30
	28	C9	3.50	0.45	15.2	1.58	3.50	5.5	20.4	1.62	3.06	8.0				7.6	1.55	2.0	2.0	30	10.2	0.05	DP27 FLOWBY & BASIN C9 CAPTURED IN 15' TYPE R ON GRADE @ DP28, PIPE TO DP28.1
	28.1								24.1	6.33	2.81	20.8				20.8	6.33	2.0	2.0	490	10.2	0.80	COMBINED DP27.1 & DP29, PIPE TO DP29.1
	29.1								24.9	13.49	2.76	40.2				40.2	13.49	2.0	2.0	335	10.2	0.55	COMBINED DP28.1 & DP24.1, PIPE TO DP30.1
	30	C10	3.97	0.47	16.5	1.86	3.38	6.3	25.7	1.94	2.71	8.3				8.3	1.94	2.0	2.0	30	10.2	0.05	DP28 FLOWBY & BASIN C10 FLOW CAPTURED IN 20' TYPE R SUMP @ DP30, PIPE TO DP30.1
	30.1								25.8	15.43	2.71	44.8				44.8	15.43	2.0	2.0	5	10.2	0.01	COMBINED DP29.1 & DP20, PIPE TO DP31.1
	31	C11	3.64	0.47	15.5	1.71	3.47	5.9	30.8	2.19	2.44	8.3				8.3	2.19	2.0	2.0				DP26 FLOWBY & BASIN C11 CAPTURED IN 20' TYPE R SUMP @ DP31, PIPE TO DP31.1
	31.1								30.8	17.62	2.44	46.0				46.0	17.62	2.0	2.0	90	10.2	0.15	COMBINED DP30.1 & DP31, PIPE TO DP32.1
	32	C12	0.46	0.45	9.0	0.21	4.29	0.9								0.9	0.21	2.0	2.0				BASIN 32 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP32.1
	32.1								31.0	17.82	2.43	46.4				46.4	17.82	2.0	2.0	32	10.2	0.05	COMBINED DP31.1 & DP32, PIPE TO DP33.1
	33	C13	1.66	0.45	11.7	0.75	3.90	2.9								2.9	0.75	2.0	2.0				BASIN C13 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP33.1
	33.1								31.0	18.57	2.43	48.1				48.1	18.57	2.0	2.0	170	10.2	0.28	COMBINED DP32.1 & DP33, PIPE TO POND C
	34	C14	2.37	0.45	11.2	1.07	3.96	4.2	31.3	19.64	2.42	50.5											**TOTAL FLOW ENTERING POND C**
	35	C15	1.69	0.45	5.0	0.76	5.17	3.9															BASIN C15 FLOW, FOLLOWS HISTORIC DRAINAGE PATTERNS TOWARDS DP35

HRGreen

GRANDVIEW - BASIN C

PROPOSED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by: NQJ

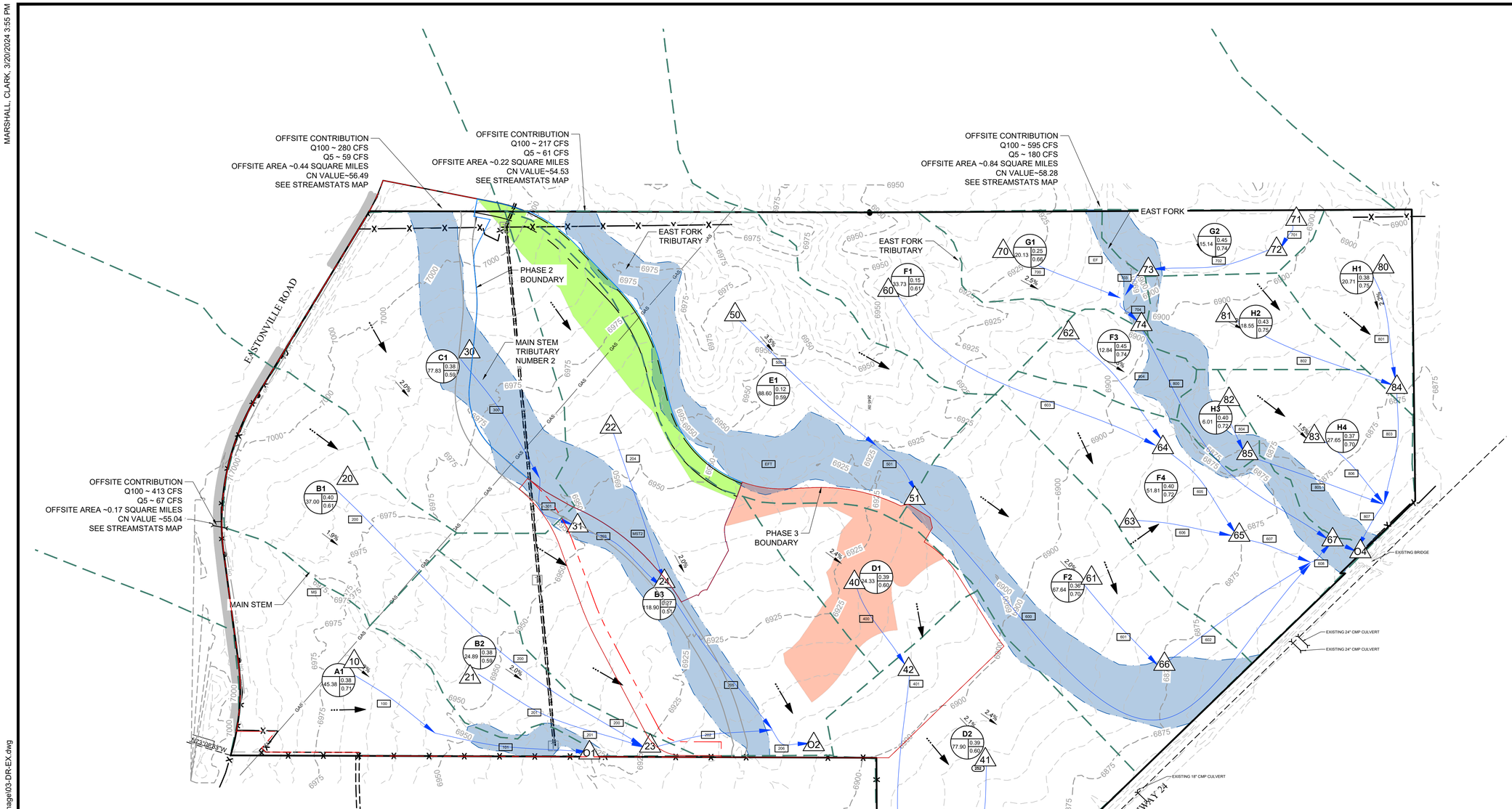
Checked by:

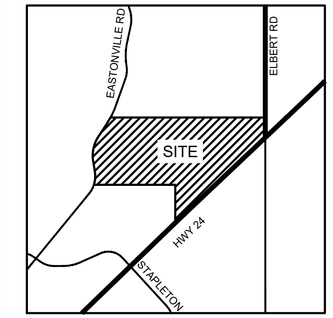
Date: 2/29/2024

			DIRECT RUNOFF						TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
STREET		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)	
	20	C1	4.53	0.59	10.9	2.67	6.72	18.0					5.6	0.83	1.0	12.4	1.85	2.0	2.0	820	2.0	6.83	DP20 FLOWBY, C&G FLOW TO DP24
																				28	10.2	0.05	BASIN C1 CAPTURED IN 15' TYPE R ONGRADE @ DP20, PIPE TO DP21.1
	21	C2	2.71	0.59	11.2	1.60	6.64	10.6					1.4	0.21	1.5	9.2	1.39	2.0	2.0	350	2.4	2.38	DP21 FLOWBY, C&G FLOW TO DP22
																				5	10.2	0.01	BASIN C2 CAPTURED IN 15' TYPE R ONGRADE @ DP21, PIPE TO DP21.1
	21.1								17.7	3.23	5.49	17.7				17.7	3.23	2.0	2.0				COMBINED DP20 & DP21, PIPE TO DP22.1
	22	C3	2.47	0.59	9.4	1.46	7.09	10.3	9.4	1.67	7.09	11.8	2.0	0.29	1.0	9.8	1.38	2.0	2.0	820	2.0	6.83	DP22 FLOWBY, C&G FLOW TO DP23
																							DP21 FLOWBY & BASIN 3 CAPTURED IN 15' TYPE R ONGRADE @ DP22, PIPE TO DP22.1
	22.1								17.7	4.61	5.49	25.3				25.3	4.61	1.0	2.0	820	7.2	1.90	COMBINED DP21.1 & DP22, PIPE TO DP24.1
	23	C4	3.09	0.59	18.4	1.82	5.39	9.8	18.4	2.11	5.39	11.4	1.8	0.33	0.5	9.6	1.78	2.0	2.0	350	1.4	4.12	DP23 FLOWBY, C&G FLOW TO DP30
																				5	10.2	0.01	DP22 FLOWBY & BASIN C4 CAPTURED IN 15' TYPE R ONGRADE @ DP24, PIPE TO DP24.1
	24	C5	3.13	0.59	16.8	1.85	5.63	10.4	17.7	2.67	5.49	14.7	3.6	0.65	0.5	11.1	2.02	2.0	2.0	350	1.4	4.12	DP24 FLOWBY, C&G FLOW TO DP30
																				28	10.2	0.05	DP20 FLOWBY & BASIN C5 CAPTURED IN 15' TYPE R ONGRADE @ DP24, PIPE TO DP24.1
	24.1								19.6	8.42	5.23	44.1				44.1	8.42	2.0	2.0	53	10.2	0.09	COMBINED DP22.1, DP23 & DP24, PIPE TO DP29.1
	25	C6	0.81	0.52	13.2	0.42	6.23	2.6					2.6	0.42	0.8					605	1.8	5.64	BASIN C6 FLOW @ DP25, C&G FLOW TO DP26
	26	C7	6.07	0.59	23.7	3.58	4.76	17.0	23.7	4.00	4.76	22.0	8.2	1.49	1.5	13.8	2.51	2.0	2.0	1050	2.4	7.14	DP26 FLOWBY, C&G FLOW TO DP31
																				5	10.2	0.01	DP17, DP18, DP25 & BASIN C7 CAPTURED IN 15' TYPE R ONGRADE @ DP26, PIPE TO DP27.1
	27	C8	5.11	0.59	18.6	3.01	5.37	16.2					4.4	0.82	1.5	11.8	2.20	2.0	2.0	270	2.4	1.84	DP27 FLOWBY, C&G FLOW TO DP28
																				18	10.2	0.03	BASIN C8 FLOW CAPTURED IN 15' TYPE R ONGRADE, PIPE TO DP27.1
	27.1								23.7	4.70	4.76	25.4				25.4	4.70	2.0	2.0	265	10.2	0.43	COMBINED DP26 & DP27, PIPE TO DP28.1
	28	C9	3.50	0.59	15.2	2.07	5.87	12.1	20.4	2.88	5.13	17.8	5.4	0.87	1.5	12.4	2.01	2.0	2.0	780	2.4	5.31	DP28 FLOWBY, C&G FLOW TO DP30
																				30	10.2	0.05	DP27 FLOWBY & BASIN C9 CAPTURED IN 15' TYPE R ON GRADE @ DP28, PIPE TO DP28.1
	28.1								24.1	6.71	4.71	34.6				34.6	6.71	2.0	2.0	490	10.2	0.80	COMBINED DP27.1 & DP29, PIPE TO DP29.1
	29.1								24.9	15.13	4.63	73.0				73.0	15.13	2.0	2.0	335	10.2	0.55	COMBINED DP28.1 & DP24.1, PIPE TO DP30.1
	30	C10	3.97	0.61	16.5	2.41	5.67	13.6	25.7	4.26	4.55	22.4				22.4	4.26	2.0	2.0	30	10.2	0.05	DP23, DP24 & DP28 FLOWBY & BASIN C10 FLOW CAPTURED IN 20' TYPE R SUMP @ DP30, PIPE TO DP30.1
	30.1								25.8	19.39	4.55	91.1				91.1	19.39	2.0	2.0	5	10.2	0.01	COMBINED DP29.1 & DP20, PIPE TO DP31.1
	31	C11	3.64	0.61	15.5	2.21	5.82	12.9	30.8	3.70	4.09	18.2				18.2	3.70	2.0	2.0				DP26 FLOWBY & BASIN C11 CAPTURED IN 20' TYPE R SUMP @ DP31, PIPE TO DP31.1
	31.1								30.8	23.09	4.09	97.6				97.6	23.09	2.0	2.0	90	10.2	0.15	COMBINED DP30.1 & DP31, PIPE TO DP32.1
	32	C12	0.46	0.59	9.0	0.27	7.20	2.0								2.0	0.27	2.0	2.0				BASIN 32 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP32.1
	32.1								31.0	23.37	4.08	98.4				98.4	23.37	2.0	2.0	32	10.2	0.05	COMBINED DP31.1 & DP32, PIPE TO DP33.1
	33	C13	1.66	0.59	11.7	0.98	6.54	6.4								6.4	0.98	2.0	2.0				BASIN C13 CAPTURED IN 5' TYPE R SUMP, PIPE TO DP33.1
	33.1								31.0	24.34	4.08	102.3				102.3	24.34	2.0	2.0	170	10.2	0.28	COMBINED DP32.1 & DP33, PIPE TO POND C
	34	C14	2.37	0.59	11.2	1.40	6.65	9.3	31.3	25.74	4.06	107.4											**TOTAL FLOW ENTERING POND C**
	35	C15	1.69	0.59	5.0	1.00	8.68	8.7															BASIN C15 FLOW, FOLLOWS HISTORIC DRAINAGE PATTERNS TOWARDS DP35

APPENDIX F – DRAINAGE MAPS

MARSHALL, CLARK, 3/20/2024 3:55 PM





VICINITY MAP

LEGEND:

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

LAND USE

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

NOTES:

- DRAINAGE AREA REROUTED AWAY FROM CHANNEL C= 16.1 ac
- DRAINAGE AREA REROUTED TOWARD CHANNEL C = 21.2 ac

Basin	Design Point	5 Year Pre Development	100 Year Pre Development
A1	10	13.03	66.80
B1	20	4.33	48.76
B2	21	1.66	20.74
	22	11.85	140.35
	23	5.99	68.56
B3	24	21.23	249.20
C1	30	9.95	110.70
	31	9.95	110.70
D1	40	8.12	40.00
D2	41	22.23	114.87
	42	8.12	40.00
E1	50	32.34	157.99
	51	93.34	374.99
F1	60	9.70	49.45
F2	61	16.46	86.73
F3	62	3.65	18.42
F4	63	12.98	67.82
	64	13.35	67.87
	65	26.04	135.62

	66	16.46	86.73
	67	231.47	864.52
G1	70	5.57	28.46
G2	71	3.87	20.06
	72	3.87	20.06
	73	3.87	20.06
	74	189.42	643.48
H1	80	1.85	21.89
H2	81	5.37	27.12
H3	82	1.92	9.51
H4	83	8.07	40.86
	84	7.22	49.01
	85	1.92	9.51
OS1	OS1	67.00	413.00
OS2	OS2	59.00	280.00
OS3	OS3	61.00	217.00
OS4	OS4	180.00	595.00
	Outfall1	80.03	479.80
	Outfall2	85.96	597.41
	Outfall3	30.00	154.35
	Outfall4	341.05	1335.77

Refer to this a the pre-development map and then include an existing analysis of the phase 3 area undeveloped, but with Filings 1-4 & Phase 2 developed

NORTH

0 200
100

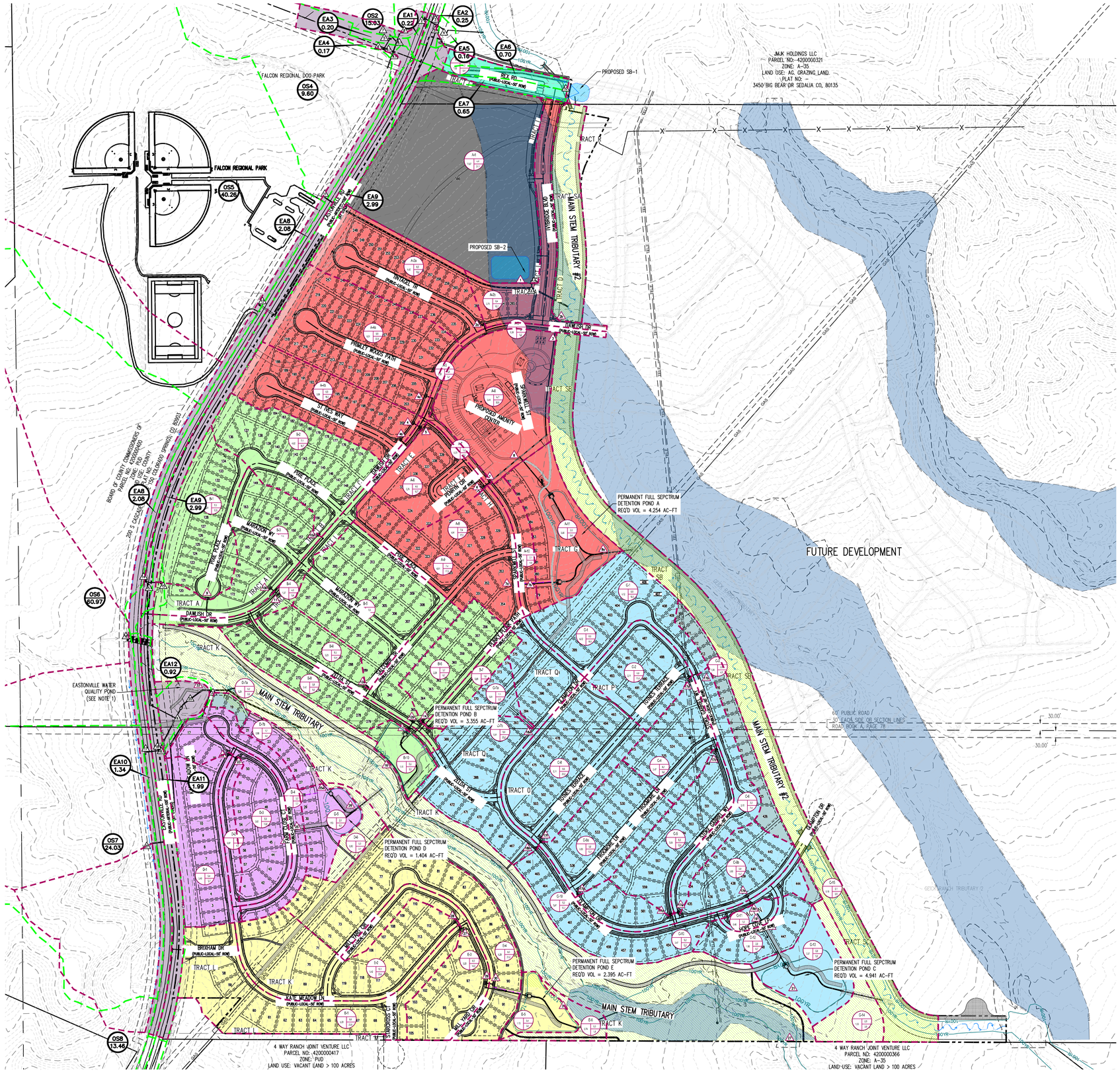
HRGreen

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

EXISTING EX1

FIG.EX1

HRGreen DRAWING PATH:J:\2020\201662\CAD\Dwgs\CIP\JD_Phase_3_662.203\Drainage\03-DR-EX.dwg



N

0 20 50 100

SCALE: 1"=100'

DRAINAGE LEGEND

- PROPERTY LINE
- PROPOSED ROAD CENTERLINE
- BASIN BOUNDARY LINE
- EXISTING WETLANDS
- EXISTING LIMITS OF WETLAND
- EXISTING WETLAND SETBACK
- EXISTING FEMA FLOOD PLAIN, ZONE A
- CENTERLINE OF STREAM
- PROPOSED RIPRAP
- PROPOSED MAINTENANCE ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- FUTURE DEVELOPMENT (NOT PART – TSB PROVIDED)
- ROADWAY (DESIGN BY OTHERS – SEE NOTE 1)
- AREA TO BE DETAINED IN PBMP (POND A)
- AREA TO BE DETAINED IN PBMP (POND B)
- AREA TO BE DETAINED IN PBMP (POND C)
- AREA TO BE DETAINED IN PBMP (POND D)
- AREA TO BE DETAINED IN PBMP (POND E)
- AREA NOT TO BE DETAINED IN PBMP PER SECTION I.7.1.B.7 (LAND DISTURBANCE TO UNDEVELOPED LAND THAT WILL REMAIN UNDEVELOPED)
- AREA TO BE DETAINED IN FUTURE PBMP WITH THE REMAINDER OF THE REX RD DEVELOPMENT – TSB PROVIDED
- AREA WHERE WATER QUALITY IS ACHIEVED THROUGH RUNOFF REDUCTION (ROOF DRAINS & IMPERVIOUS SURFACES NOT PERMITTED ON BACK OF THESE LOTS)
- AREA TO BE DETAINED IN PUBLIC PBMP (EASTONVILLE ROAD)

NOTES:

1. EASTONVILLE ROAD AND THE WESTERN PORTION OF REX ROAD AT EASTONVILLE IS TO BE CONSTRUCTED CONCURRENTLY WITH THIS DEVELOPMENT. DRAINAGE FOR THESE AREAS WILL BE CAPTURED AND TREATED BY OFFSITE INFRASTRUCTURE AND PONDS AS DESCRIBED IN THE "FINAL DRAINAGE REPORT FOR EASTONVILLE ROAD FROM FUTURE REX ROAD TO LONDONDERRY DRIVE", BY HR GREEN, MARCH 2022. BASIN SHOWN ARE FOR REFERENCE ONLY.

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

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

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

EASTONVILLE RD
EL PASO COUNTY, PEYTON, CO 80831

#	Date	Issue / Description	Init.

Project No:	HRG 1.20
Drawn By:	NJA
Checked By:	GRD
Date:	9/9/2022

WQ MAP

DR-4

MARSHALL, CLARK, 3/20/2024 4:36 PM

RECEIVING PBMP	PBMP TRIBUTARY AREA (AC)	TRIBUTARY SUBBASINS
POND R	21.2	R-A1 to R-H, G-B, H-B
POND F	27.7	F-A to F-I
POND C	26.5	C-A to C-L, C-14

NOTE: THE ONLY PROPOSED AREA NOT TREATED BY A PBMP IS THE FUTURE SCHOOL LOT. THE SCHOOL WILL PROVIDE ITS OWN DRAINAGE ANALYSIS

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMPERVIOUS	Q_5 (cfs)	Q_{100} (cfs)
R-A1	2.16	17	1.7	6.0
R-A2	1.58	53	2.8	6.0
R-B	4.19	43	6.1	14.7
R-C	2.90	52	5.4	12.0
R-D	5.53	39	7.2	17.7
R-E	1.81	50	3.3	7.4
R-F	0.81	51	1.8	4.0
R-G	1.80	0	0.6	4.3
R-H	0.46	51	1.0	2.2
F-A	4.58	49	7.0	15.8
F-B	3.76	59	7.0	15.2
F-C1	2.08	57	4.0	8.9
F-C2	3.64	62	6.9	14.6
F-C3	1.33	65	2.9	6.0
F-D	3.13	39	4.2	10.4
F-E	4.42	51	7.7	17.4
F-F	0.94	54	1.9	4.1
F-G	0.80	30	0.9	2.6
F-H	1.95	0	0.6	4.5
F-I	1.03	0	0.4	2.8
C-A	3.43	29	3.7	10.5
C-B	4.54	37	6.1	15.6
C-C	2.30	45	3.6	8.4
C-D	1.88	59	3.8	8.1
C-E	2.30	60	4.7	10.2
C-F	2.60	58	5.2	11.3
C-G	1.64	51	3.1	7.1
C-H	0.49	62	1.2	2.6
C-I	0.90	0	0.3	1.9
C-J	0.81	33	1.0	2.9
C-K	2.77	0	0.8	6.1
C-L	0.50	0	0.2	1.3

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)
R-1	RA-1	1.7	6.0
R-2	RA-2	4.3	11.6
R-3	R-B	6.1	14.7
R-3.1	DP R-1,2,3	8.7	22.1
R-4	R-C	5.4	12.0
R-5	R-D	10.6	24.5
R-5.1	DP R-4,5	9.4	21.2
R-6	R-E, DP R-3,5	5.0	16.0
R-6.1	DP R-5.1,6	22.0	56.7
R-7	R-F	23.3	59.4
R-8	DP R-6,1,7	22.4	59.9
R-9	R-H	1.0	2.2
F-1	F-A	7.0	15.8
F-2	F-B	7.0	15.2
F-2.1	DP F-1,2,3	13.4	29.7
F-3	F-C1	4.0	8.9
F-4	F-C3	2.9	6.0
F-5	F-C2	6.9	16.3
F-6	F-D	4.2	10.4
F-6.1	DP F-4,5,6	13.2	22.6
F-6.2	DP F-2.1,6.1	25.5	50.2
F-7	F-E, DP F-5,6	7.2	21.7
F-7.1	DP F-6.2, 7	32.0	70.5
F-8	F-F, DP F-7.1	33.5	73.7
F-9	F-G	0.9	2.6
F-10	F-H, DP F-8,9	34.5	78.9
F-11	F-I	0.4	2.8
C-1	C-A	3.7	10.5
C-2	C-B	6.1	15.6
C-2.1	DP C-1,2	9.5	14.6
C-3	C-C, DP C-1	3.7	12.2
C-4	C-D, DP C-2	3.6	15.3
C-4.1	DP C-2.1,3,4	7.1	28.3
C-5	C-E	4.7	10.2
C-6	C-F	5.2	11.3
C-6.1	DP C-5,6	6.9	10.2
C-6.2	CP C-4.1,6.1	13.1	37.1
C-7	C-G, DP C-3,4,5	5.6	24.5
C-7.1	DP C-6.2,7	17.7	26.8
C-8	C-H, DP C-6	3.4	9.4
C-8.1	DP C-7.1,8	20.0	35.4
C-9	C-I	0.3	1.9
C-10	C-J, DP C-8.1,9	20.5	37.5
C-11	Offsite C-14	50.5	107.4
C-12	DP C-10,11	57.7	123.5
C-13	C-L	0.2	1.3

DRAWN BY: CBM	JOB DATE: 3/20/2024	BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"	
APPROVED: KMH	JOB NUMBER: 201662	IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.	
CAD DATE: 3/20/2024			
CAD FILE: J:\2020\201662\CAD\Dwgs\C\PUD_Phase_3_662.203\Drainage\03_DR			

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 3
D.R. HORTON
EL PASO COUNTY, CO

D·R·HORTON America's Builder

GRANDVIEW PHASE 3
PROPOSED DRAINAGE MAP

SHEET DR 1

HR GREEN Xrefs: xc-row-PH3; xc-dsgn-PH3; xc-row-PH2; 01-XC-channel; xgt-1-arch dh01_PH3_PUD; xc-dsgn-F4; xc-row-F4; xc-dsgn-PH2; drain_map_legend