Final Drainage Report
Amendment No. 1
Beacon Lite Road Stockpile
El Paso County, Colorado

Prepared for:

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March 8, 2026

October 20, 2026

EDARP File No. CDR261

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 El Paso County for drainage reports and said report is in conformity with the 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.

Signature: _____ Date: Oct. 21, 2026

Raymond Perez, III, PE
Registered Professional Engineer State of Colorado

DEVELOPER'S STATEMENT:

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

Name of Owner/Developer: Donald Cannella

Authorized Signature: _____ Date: Oct. 21, 2026

Title: Owner

Address: 6275 Lake Shore Court
Colorado Springs, CO 80915

EL PASO COUNTY:

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.

_____ _____

County Engineer – Joshua J. Palmer, P.E. Date

Conditions:

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I. INTRODUCTION

A. Purpose

The purpose of this Final Drainage Report Amendment No. 1 for the Beacon Lite Road Stockpile project (hereinafter referred to as the "Project") is to identify drainageways, locations of culverts, open channels (i.e. – swales) and drainage areas contained within and adjacent to the proposed development and quantify and evaluate the impacts of stormwater runoff generated by construction of the stockpile area. This amended report is being submitted to account for additional stockpile locations.

B. Drainage Basin Planning Study

There is no known master drainage study on file that encompasses the entire project area (Bald Mountain watershed).

C. General Project Description

This project is in El Paso County, Colorado. Access to the site is from Beacon Lite Road. It is located in Section 2, Township 11 south, Range 67 west of the 6th Principal Meridian. A vicinity map is provided below in Figure 1 on the following page.

Figure 1 – Vicinity Map

(Source: Google Earth Imagery 2019)



The Project goal is to construct a single soil material stockpile. The proposed development area is currently undeveloped. The site is bounded to the north by existing Palmer-Divide Road, to the east by Interstate 25, to the west by Beacon Lite Road and to the south by undeveloped land and large lot residential parcels.

D. Data Sources

General

The site base mapping (including topography) and structure inventory was provided by Bear Creek Surveying, Inc. (now Colorado ILC Surveying). The field survey was conducted in the fall of 2025. The overall base mapping topography was provided by the Colorado Water Conservation Board (CWCB) digital elevation model (DEM), Merrick 2026 data. To date there have been no environmental or geotechnical studies performed for the Project. Soils information is provided in section II.B.

E. Applicable Criteria and Standards

The hydrologic and hydraulic analysis performed in this report utilizes The City of Colorado Springs Drainage Criteria Volumes 1 (revised January 2021) & 2 (revised December 2020), hereinafter referred to as the CSDCM. Also, the El Paso County Drainage Criteria Manual volume 1 updates were incorporated. Stormwater runoff was determined using the Rational Method and was calculated for existing and proposed conditions for the 5-yr (minor) and 100-yr (major) recurrences.

II. PROJECT CHARACTERISTICS

A. Drainage Basin Planning Study Compliance

There is no Drainage Basin Planning Study of record that encompasses this project.

B. Land Features

1. Vegetation

Ground cover primarily consists of bare ground, sparse vegetation, and trees.

2. Soils

The general topography of the land slopes to the east. According to the Natural Resources Conservation Service (NRCS), the soils in this area can be classified as a Hydrologic Soil Group (HSG) Type B. This is used to predict storm water runoff rates. A soils report and map describing the HSG and other soils properties are provided in Appendix A.

3. Water Quality

There are no known existing water quality features located on the property.

4. Floodplain

Per the Flood Insurance Rate Map Numbers 08041C0065G, El Paso County, Colorado, Revised December 7, 2018, Federal Emergency Management Agency (FEMA) no portion of the Beacon Lite Road stockpile site lies within the designated 100year floodplain. A FIRMette of the project area is included in Appendix A.

C. Existing and Proposed Land Uses

Presently, the site is unplatted and consists of undeveloped land. The proposed use is for stockpiling soil material and will remain unplatted.

III. HYDROLOGIC ANALYSIS

A. Methodology

1. Method of Analysis

   Storm sewer sizing for this project uses the Rational Method as recommended by the DCM for the minor (5 year) and major (100 year) storms for drainage basins less than 100-acres in size.

   The Rational Method uses the following equation:

   Q=C*I*A
   Where:
   Q = Maximum runoff rate in cubic feet per second (cfs)
   C = Runoff coefficient
   I = Average rainfall intensity (inches/hour)
   A = Area of drainage sub-basin (acres)

2. Runoff Coefficient

   Coefficients from Table 6-6 of the EPC DCM Volume 1 update for developed land were utilized in the Rational Method calculations. See Appendix B for more information.

3. Time of Concentration

   The time of concentration consists of the initial time of overland flow and the travel time in a hydraulic conveyance feature to a design point or similar location of interest. A minimum time of concentration of 5 minutes is utilized for urban development.

4. Rainfall Intensity

   The hypothetical rainfall depths for the 1-hour storm duration were taken from Table 6-2 of the Colorado Springs Drainage Criteria Manual.

B. Existing Conditions

This project is located in the Bald Mountain major drainage basin. It is our understanding there is no Drainage Basin Planning Study (DBPS) on file that encompasses this project. Therefore, this project area is considered "unstudied" from a master drainage analysis perspective.

Stormwater runoff from the project generally flows to the east discharging into State of Colorado Interstate 25 right-of-way or via an existing 42" RCP which outfalls on the east side of the interstate. The existing conditions topography for the site has been separated into seven (7) basins. Refer to the existing conditions maps D1 and D2 in Appendix D. Please note that the existing conditions in this report reflects the original proposed conditions, i.e. – built/building per original CD's.

Design Point 3x (formerly design point 3) (Q5=2.7cfs, Q100=13.2cfs) flows are generated from basins X1, X2a and X3 (formerly A, B1 and C). Basin X1 (formerly basin A) (Q5=1.0cfs, Q100=7.6cfs) consists of the existing stockpile itself. Runoff from this basin travels overland easterly to a proposed swale along the east side. This swale routes runoff to a temporary sediment basin (TSB) which was sized during the construction document preparation phase utilizing the Mile-High Flood District (MHFD) sediment basin sizing design detail SC-7. The tributary area to the TSB is basin X1 (formerly basin A) (4.2acres). The TSB sizing is based on water quality capture components for smaller storms, not the major storm events. Therefore, it will overtop and direct flows to the proposed detention pond via an overflow spillway with a width of 20ft, 4:1 side slopes, with 1.2ft of freeboard provided. It will be constructed of type "L" soil riprap. Basin X2a (formerly basin B1) Q5=0.2cfs, Q100=1.3cfs) consists of the stockpiles fill slope on the south side as well as a portion of the maintenance access roadway. Runoff flows easterly into the pond directly. Basin X3 (formerly basin C) (Q5=1.8cfs, Q100=5.2cfs) consists of existing forested and range land. Runoff flows easterly and is collected by perimeter swales around the stockpile at the toes of slope. These swales convey flows to Design Point 5x (formerly Design Point 5) where an existing 18" RCP storm pipe has been installed to route stormwater under the stockpile to the existing pond. At the downstream end of the culvert there is a concrete forebay. The forebay is 5' wide x 5' long with 12" high walls.

A private extended detention basin (EDB) exists at this location (Design Point 3x, formerly basin 3). This facility is for flood control only. The percent impervious of the developed site is 0% (per EPC DCM land use values for lawn/pasture/meadow/forest). To reduce flows to historic values (or less), runoff needs to be detained and released slowly so the peak flows do not exceed allowable rates of discharge. Runoff for the disturbed areas of the project do not need to be treated via a full-spectrum detention approach as all disturbed areas will be fully revegetated at the conclusion of the project. All areas are therefore classified as "self-treating" Separate Pervious Areas (aka - SPA's). The ponds'

tributary area equals 7.32 acres (basins X1, X2a and X3) – formerly – A, B1 and C. The pond facility will provide ~0.39ac-ft of detention volume whereas only ~0.14ac-ft is required. The reason the pond was made so large was to reduce the peak flow rate release value to less than historic to ensure additional flow is not being added to the downstream systems in place. The EDB has a forebay, a maintenance access road, concrete trickle channel, micro pool and an outlet structure. These items will be modified accordingly as the pond is expanded. Refer to CD set for additional information. The EDB has a rip rap emergency overflow spillway in the event the outlet structure becomes entirely clogged and another 100yr event passes. The spillway has a width of 20', 4:1 side slopes and will be constructed of type "L" soil riprap. A minimum of 1.0' of freeboard has been provided. The spillway will be situated such that any overflow will be directed to the low point where the 42" RCP (existing) is currently located. Refer to the design calculations in Appendix B for additional pond design information. Refer to the Grading and Erosion Control construction documents for the stockpile, TSB design plan, and pond plan with associated details.

Design Point 5x (formerly Design Point 5) (Q5=1.8cfs, Q100=5.2cfs) flows are generated from basin X3. Basin X3 (formerly basin C) consist of existing forested and range land. Runoff flows easterly and is collected by perimeter swales around the stockpile at the toes of slope. These swales convey flows to Design Point 5x (formerly design point 5) where an 18" RCP storm pipe was installed to route stormwater to the existing detention pond. (Refer to Design Point 3x (formerly Design Point 3) discussion re: pond design)

Design Point 6ax (formerly design point 6a) (Q5=2.8cfs, Q100=14.9cfs) flows are generated from basin X4 (formerly basin D). Basin X4 (Q5=2.8cfs, Q100=14.9cfs) consists of existing forest and range land as well as a portion of Beacon Lite Road. Runoff from this basin travels easterly overland to the west side of the existing stockpile. It is intercepted by a swale created by stockpile placement and routed north and east around the stockpile. A rundown/riprap energy dissipation pad 12' by 50' will be constructed to dissipate energy to prevent erosion from concentrated flow (i.e. – the swale). This feature was modeled using the USDA Rock Chute design methodology spreadsheet. Although the slope of the feature (~6%) is not very steep at all, we feel that this chute design with an outlet apron at the bottom end has provided adequate energy dissipation so as not to erode downstream receiving swales. Energy dissipation has been provided and yields a downstream apron exit velocity of ~5fps. The ground cover has vegetation and is non-erosive (i.e. – 7fps max velocity).

Design Point 6bx (formerly design point 6b) (Q5=3.0cfs, Q100=16.0cfs) flows are generated from Design Point 6ax (formerly design point 6a) (Q5=2.8cfs, Q100=14.9cfs) and basin X5 (formerly basin E). Basin X5 (Q5=0.2cfs, Q100=1.7cfs) consists of the stockpile fill slope on the north and east sides. This

sheet flow combines with runoff from basin X4 (formerly basin D) as it enters state right-of-way. The 100yr runoff peak flow is decreasing by 5.7cfs when compared with original existing conditions design point 6bx (formerly design point 1) with the 5yr runoff peak decreasing by 0.7cfs. See table below for a design point (and total site) release comparison summary. Additionally, it is unclear as to where the runoff is captured and conveyed after discharging into the interstate right-of-way. At first glance it appears to be conveyed in a riprap lined swale along the west side of the southbound on ramp to Design Point 2a1 (formerly 4a1). However, the existing topography provided shows a low-lying area to the north where flow is assumed to overtop the ramp and collect in the gore areas in the southwest corner of the interchange. Field data for the CDOT storm system has not been collected to date. Conversation between the owners representative and CDOT resulted in mandating no flows in excess of historic will be allowed to discharge from the project. The design contained herein and on the construction documents reflects less flow being discharged from the site. Therefore, this system will not be impacted as a result of this project development and does not need to be identified.

Design Point 2a1 (formerly design point 4a1) (Q5=0.1cfs, Q100=7.4cfs) flows are the release rates from the detention pond. Flow is discharged onto a proposed riprap energy dissipation pad prior to being routed to Design Point 2a3 (formerly 4a3).

Design Point 2a2 (no former design point reference) (Q5=24.5cfs, Q100=111.6cfs) flows are generated from basin X2b (formerly basin B2). Basin X2b (Q5=24.5cfs, Q100=111.6cfs) consists of undeveloped land and portions or Beacon Lite Road and interstate 25. Runoff from this basin travels to Design Point 2a2 and then towards Design Point 2a3 (formerly 4a2)

Design Point 2a3 (formerly Design Point 4a2) (Q5=24.3cfs, Q100=113.1cfs) flows are generated from basins X1 (formerly A), X2a (formerly B1), X2b (formerly B2) (described above) and basin X3 (formerly C). Runoff from Design Points 2a1 (formerly 4a1) and 2a2 (no prior reference) combine at this location and travel easterly to an existing 42" RCP which outfalls on the east side of Interstate 25 into the basin delineated as X44 (formerly X4). This area of Interstate 25 was previously studied in a report titled "Interstate 25 South Express Lanes: Castle Rock to Monument (The Gap) Hydrology and Hydraulics Report", dated December 2020, prepared by CH2M. See Appendix C excerpts. At this location in the report (mile post 163.22), the crossing was analyzed. There are noticeable differences in the basin delineations comparing this project with the CDOT report, likely due to the source of information used for the terrain model being different. The accuracy of the basin geometry in this report is assumed to be better since the basin lines delineated are in sync with the contour data from the CWCB.

The Gap report states a flow for the 100yr storm at this location to be 93cfs. This is 24cfs below the value determined in this report. There are several factors behind this difference such as basin area, time of concentration, and runoff coefficients. The basin area is different as noted above due to a differing level of accuracy derived from more detailed mapping. The time of concentration per CDOT methodology is based on a longer overland flow path (500' max) versus EPC maximum length of 300' for rural areas. Runoff coefficients were also different in comparison. In summary, two different methodologies and approaches based on different base information yields different results. At this design point location, when using the existing conditions flow values, the outfall pipe is not able to capture the full amount of Q100=117cfs, with ~13cfs overtopping. For downstream analysis, it has been assumed to be fully captured to be conservative for downstream analysis. See Appendix B calculations.

Design Point 2b (Q5=8.5cfs, Q100=18.0cfs) flows are generated by basin X33 (formerly basin X3). Basin X33 (Q5=8.5cfs, Q100=18.0cfs) consists of interstate 25, roadside swale and a portion of Monument Hill Road. Runoff from this basin sheet flows into the roadside swale and travels northerly to Design Point 2b where it is captured by an existing dual CDOT type C inlet. For the purposes of this analysis, it is assumed all of the flow is captured, which is conservative. In the event of flowby of the inlet, runoff will enter into basin X55 (formerly basin X5) and then route towards Design Point 2d.

Design Point 2c (Q5=32.7cfs, Q100=136.6cfs) flows are generated from Design Point 2a3 (formerly 4a2) and 2b along with basin X4 (formerly basin D). Basin X44 (formerly basin X4) (Q5=7.8cfs, Q100=30.5cfs) consists of an open vacant field and a portion of Monument Hill Road. Runoff from this basin generally flows northerly into a broad grass swale which combines with flows from Design Points 2a3 (formerly 4a2) and 2b. Runoff is directed to an existing 48" RCP culvert beneath Monument Hill Road. Flow is conveyed beneath Monument Hill Road towards Design Point 2d, an existing 48" RCP culvert beneath County Line Road. No overtopping will occur.

Design Point 2d (Q5=37.7cfs, Q100=149.4cfs) flows are generated from Design Point 2c flows and basin X55. Basin X55 (Q5=7.0cfs, Q100=17.7cfs) consists of interstate 25 main line, off ramp, County Line Road, and a gore area composed of native grasses. Runoff is directed to an existing 48" RCP culvert under County Line Road. Flow is captured and conveyed northerly to the northeast quadrant of the interchange. No overtopping will occur.

The project across the interstate in the southeast quadrant of the interchange is called Monument Ridge East. There was a drainage study of this area which was approved in 2024 which analyzed some of the same crossings of the interstate and

Monument Hill Road. This analysis is more detailed and refined than the MDDP study, but comparison information is shown in the proposed conditions narrative below.

C. Proposed Conditions

Stormwater runoff from the project after the stockpile is constructed generally flows to the east like it does during existing conditions discharging into State of Colorado Interstate 25 right-of-way or via an existing 42" RCP which outfalls on the east side of the interstate. Utilizing the proposed grading for the site, ten (10) basins have been delineated. Refer to the developed conditions maps D3 and D4 in Appendix D.

Design Point 1 (Q5=2.9cfs, Q100=9.4cfs) flows are generated from basin C1. Basin C1 (Q5=2.9cfs, Q100=9.4cfs) consists of proposed stockpile additions on the south and north sides of the existing access roadway, west of the newly constructed stockpile. Runoff from this basin travels overland easterly to a proposed swale along the west side of the existing stockpile. This swale routes runoff to a proposed 18" RCP culvert pipe which transports runoff to a temporary sediment basin (TSB).

Design Point 2 (Q5=3.6cfs, Q100=15.1cfs) flows are generated from basins C1 and C2(Q5=0.8cfs, Q100=6.2cfs) consists of proposed stockpile additions on the west side of the existing newly constructed stockpile. Currently, this basin consist of existing forested land. Also, a TSB is proposed on the east side for treatment during the construction period until such time as the site is vegetated and stabilized. Runoff from this basin travels overland easterly to a proposed swale along the west and south sides of the existing stockpile. Additionally, unconcentrated sheet flow will be routed directly into the TSB for some portions of the basin. The swales route runoff to the TSB and then once it overtops, it will go over the spillway and to Design Point 2. The overflow spillway will have a width of 24ft, 4:1 side slopes, with 1.0ft of freeboard provided. It will be constructed of type "L" soil riprap. Design Point 2 is at the end of an existing 18" RCP culvert which will be retrofitted by adding a manhole with an inlet grate lid at the upstream location of the pipe to capture flows and route them to the pond.

Design Point 3 (Q5=4.3cfs, Q100=21.9cfs) flows are generated from basins A, B1, C1 and C2 (C1 and C2 have been described above). Basin A (Q5=1.0cfs, Q100=7.6cfs) consists of the existing stockpile itself. Runoff from this basin travels overland easterly to a proposed swale along the east side. This swale routes runoff to a temporary sediment basin (TSB) which was sized during the construction document preparation phase utilizing the Mile-High Flood District (MHFD) sediment basin sizing design detail SC-7. The tributary area to the TSB is basin A (6.6acres). The TSB sizing is based on water quality capture components

for smaller storms, not the major storm events. Therefore, it will overtop and direct flows to the existing detention pond via an overflow spillway with a width of 24ft, 4:1 side slopes, with 1.2ft of freeboard provided. It will be constructed of type "L" soil riprap. Basin B1 (Q5=0.3cfs, Q100=2.0cfs) flows are generated primarily by the access road and fill slope from a portion of the new stockpile (located in basin C2) and the existing stockpile (basin A). Runoff from basin B1 is routed to the existing pond via an access roadside swale directly into the expanded pond facility. Basin C1 and C2 runoff as described above, consists of a portion of a proposed stockpile on the west side of the existing stockpile. Runoff is routed from basins C1 and C2 from the pipe described above to the pond. At the downstream end of the culvert there is a concrete forebay. The forebay has a 5' wide x 5' long with 12" high walls. The release (0.10cfs) notch is 2.8 inches wide. There is an existing flood control pond in the form of a private extended detention basin (EDB) at this location (Design Point 3) – Pond A. This facility is for flood control only. To reduce flows to historic values (or less), runoff needs to be detained in the facility. Runoff for the disturbed areas of the project do not need to be treated via a full-spectrum detention approach as all disturbed areas will be fully revegetated at the conclusion of the project. All areas are therefore classified as "self-treating" Separate Pervious Areas (aka - SPA's). The ponds' tributary area equals 11.75 acres (basins A, B1, C1 and C2). Every effort has been made to stay away from the existing wetlands, utilize the existing pond A volume as well as minimize construction changes of the outlet structure. The expanded pond will provide ~0.68ac-ft (an increase of 0.29ac-ft of storage) of detention volume whereas only ~0.24ac-ft is required. The reason the pond was made so large was to reduce the peak flow rate release value to less than historic to ensure additional flow is not being added to the downstream systems in place. The EDB will utilize the existing forebay, a maintenance access road, concrete trickle channel, micro pool and the outlet structure. The EDB will have a new rip rap emergency overflow spillway in the event the outlet structure becomes entirely clogged and another 100yr event passes. The spillway will have a width of 20', 4:1 side slopes and will be constructed of type "L" soil riprap. A minimum of 1.0' of freeboard will be provided. The spillway will be situated such that any overflow will be directed to the low point where the 42" RCP (existing) is currently located. Refer to the design calculations in Appendix B for additional pond design information. Refer to the Grading and Erosion Control construction documents for the stockpile, TSB design plan, and pond plan with the corresponding details.

Design Point 4a1 (Q5=0.1cfs, Q100=7.4cfs) flows are the release rates from detention pond A. Flow is discharged onto a proposed riprap energy dissipation pad prior to being routed to Design Point 4a2, the sites' outfall.

Design Point 4a2 (Q5=25.1cfs, Q100=117.0cfs) flows are generated from basin B2 (Q5=19.9cfs, Q100=86.3cfs), Basin B3 (Q5=4.0cfs, Q100=20.9cfs) and Design Point 4a1 pond outflow (Q5=0.1cfs, Q100=7.4cfs) and Design Point 4a5 pond outflow (Q5=2.1cfs, Q100=6.3cfs). Basin B2 consists of undeveloped land and

portions or Beacon Lite Road and interstate 25. Basin B2 has been reduced in size from the existing conditions with the addition of the improvements (south site). Basin B3 (described below) consists of undeveloped land. Due to the location of the stockpile, there is a temporary inter-basin flow transfer which will remain until such time as the stockpile is removed and the site is developed. The acreage for this basin transfer is ~4.2acres of land. Refer to basin transfer exhibit in Appendix B. Once redeveloped, the final design effort will determine what on-site permanent detention and flow attenuation is required and what long-term impacts to the downstream system there will be, if any. The 100yr runoff peak flow is decreasing by 0.2cfs when compared with existing conditions design point 2a3. In the existing condition there is 11.6cfs overtopping and during the proposed condition 7.5cfs overtops. There are no planned improvements at the 42" RCP inflow point. The pipe and the overflow will remain as they have been historically. The overflow path is to the north into the gore area. In the unlikely event a second storm passes, and the detention pond is full, and the flow is routed over the emergency spillway ~3.5cfs additional flow will be routed to the existing 42" RC basin transfer of runoff. This additional flow will overtop as overtopping.

Design Point 4a3 (Q5=4.0cfs, Q100=20.9cfs) (new stockpi original stockpile locations) flows are generated from basir Q100=20.9cfs) consisting of undeveloped land. Runoff fro northerly ultimately reaching the proposed access road to culvert will route flows beneath the road and outfall to the r separated from the area which must be treated so as to no increases TSB's and pond sizes. Flow is then routed to D RCP site outfall under interstate 25.

previous comment: how is this conveyed to 4a2 and how will erosion be prevented due to this now concentrated flow.

Please address the above in the narrative. Analysis has not been provided showing that the new concentrated flow will not cause erosion downstream. Consider a level spreader to mitigate the concentrated flows.

Design Point 4a4 (Q5=2.4cfs, Q100=8.5cfs) flows are generated from basins B4 and B5. Basin B4 (Q5=1.6cfs, Q100=7.2cfs) consists of the proposed stockpile while B5 is the pond itself. Runoff from basin B4 basin travels overland in a northwesterly direction to a proposed swale along the west side. This swale routes runoff to a temporary sediment basin (TSB) which was sized during the construction document preparation phase utilizing the Mile-High Flood District (MHFD) sediment basin sizing design detail SC-7. The tributary area to the TSB is basin B4 (3.5 acres). Therefore, it will overtop and direct flows to the proposed detention pond via an overflow spillway with a width of 16ft, 4:1 side slopes, with 1.0ft of freeboard provided. It will be constructed of type "L" soil riprap. Basin B4 (Q5=1.6cfs, Q100=7.2cfs) flows are generated primarily by the pad and the access road and fill slope from a portion of the new stockpile. Runoff from basin B4 is routed to the proposed pond via an access roadside swale directly into the TSB. Runoff is routed from basin B4 via overland flow and swales at the toe of the fill slope embankment. These swales convey flows to Design Point 4a4, Pond B. There is a proposed flood control pond in the form of a private extended detention basin

(EDB) at this location (Design Point 4a4) – Pond B. This facility is for flood control only. To reduce flows to historic values (or less), runoff needs to be detained in the facility. Runoff for the disturbed areas of the project do not need to be treated via a full-spectrum detention approach as all disturbed areas will be fully revegetated at the conclusion of the project. All areas are therefore classified as "self-treating" Separate Pervious Areas (aka - SPA's). The ponds' tributary area equals 3.76 acres (basin B4). This proposed pond will provide ~0.10ac-ft of detention volume. The EDB will utilize a forebay, a maintenance access road, micro pool and the outlet structure. The EDB will have a new rip rap emergency overflow spillway in the event the outlet structure becomes entirely clogged and another 100yr event passes. The spillway will have a width of 20', 4:1 side slopes and will be constructed of type "L" soil riprap. A minimum of 1.0' of freeboard will be provided. The spillway will be situated such that any overflow will be directed the north so it can travel to the low point where the 42" RCP (existing) is currently located. Refer to the design calculations in Appendix B for additional pond design information. Refer to the Grading and Erosion Control construction documents for the stockpile, TSB design plan, and pond plan with the corresponding details.

Design Point 4a5 (Q5=2.1cfs, Q100=6.5cfs) flows are generated by basins B4 and B5, the pond itself. Basin B5 (Q5=1.3cfs, Q100=2.2cfs) runoff is captured in the proposed pond, and detaining flow at released rates needed to attenuate the peak flows so as not to overwhelm the existing system capacity downstream at the site outfall location which routes flow under the interstate to the east side. (Refer to Design Point 4a2 for a continuation of the last segment prior to the roadway crossing).

Design Point 4b (Q5=8.5cfs, Q100=18.0cfs) flows are generated from basin X33. Basin X33 (Q5=8.5cfs, Q100=18.0cfs) consists of Interstate 25 pavement and roadside areas. Runoff from this basin generally flows northerly in a grass swale which combines with flows from Design Points 4a2. Runoff is directed to an existing 48" RCP culvert beneath Monument Hill Road (Design Point 4c).

Design Point 4c (Q5=29.8cfs, Q100=136.1cfs) flows are generated from Design Point 4a2 and 4b along with basin X44. Basin X44 (Q5=7.8cfs, Q100=30.5cfs) consists of an open vacant field and a portion of Monument Hill Road. Runoff from this basin generally flows northerly into a broad grass swale which combines with flows from Design Points 4a2 and 4b. Runoff is directed to an existing 48" RCP culvert beneath Monument Hill Road. Flow is conveyed beneath Monument Hill Road towards Design Point 4d, an existing 48" RCP culvert beneath County Line Road. No overtopping will occur.

Design Point 4d (Q5=37.2cfs, Q100=149.0cfs) flows are generated from Design Point 4c flows and basin X55. Basin X55 (Q5=7.0cfs, Q100=17.7cfs) consists of interstate 25 main line, off ramp, County Line Road, and a gore area composed of native grasses. Runoff is directed to an existing 48" RCP culvert under County Line Road. Flow is captured and conveyed northerly to the northeast quadrant of the interchange as it does historically. No overtopping will occur.

As stated above, similar crossing locations were studied in a prior report for the development across the interstate, Monument Ridge East. A comparison is shown below:

Beacon Stockpile Design Point (Existing)	Q100 (cfs)	Beacon Stockpile Design Point (Proposed)	Q100 (cfs)	MRE MDDP Design Point (Existing)	Q100 (cfs)
2a3	117.2	4a2	117.0	7	113.3
2c	136.6	4c	125.3	8	137.4
2d	149.4	4d	136.1	9	151.4

Design Point 5 – not used.

Design Point 6a (Q5=1.5cfs, Q100=7.3cfs) flows are generated from basin D. Basin D (Q5=1.5cfs, Q100=7.3cfs) consists of existing forest and range land as well as a portion of Beacon Lite Road. Basin D has been reduced in size since a portion is now being constructed as a stockpile addition with that area being routed to the south, Design Point 2. Runoff from this basin travels easterly overland to the north side of the proposed stockpile. It will then be intercepted by a swale created by stockpile placement and routed north and east around the stockpile. This swale will be lined with Turf Reinforcement Mat (TRM) to prevent erosion. A rundown/riprap energy dissipation pad 12' by 50' will be constructed to dissipate energy to prevent erosion from concentrated flow (i.e. – the swale). Previously this was designed with approximately twice the amount of flow, so is therefore a conservative approach since the flow value has been reduced. This feature was modeled using the Rock Chute design methodology spreadsheet. Although the slope of the feature (~6%) is not very steep at all, we feel that this chute design with an outlet apron at the bottom end will provide adequate energy dissipation so as not to erode downstream receiving swales. Energy dissipation has been provided and yields a downstream apron exit velocity of ~5fps. The ground cover has vegetation and is non-erosive (i.e. – 7fps max velocity).

Design Point 6b (Q5=1.5cfs, Q100=8.1cfs) flows are generated from basin D (Q5=1.5cfs, Q100=7.3cfs) and basin E. Basin E (Q5=0.1cfs, Q100=0.7cfs) consists of the existing stockpile fill slope on the north and east sides. This sheet flow combines with runoff from basin D as it enters state right-of-way. The 100yr runoff peak flow is decreasing by 2.1cfs when compared with existing conditions design point 1 with the 5yr runoff peak decreasing by 1.4cfs. See table below for a design point (and total site) release comparison summary. As is indicated in the table, after this site is developed as noted herein, there will be a net reduction of 1.5cfs and 2.3cfs for the 5yr and 100yr storms respectively at the very downstream end of this analysis.

Release Comparison Summary

Design Point	*Flow (cfs)*		*Comments*
	Q5	*Q100*	
1	**2.9**	**9.4**	Decreased flow rates entering CDOT ROW east of stockpile site
6b	**1.5**	**7.3**	
Net Change	**-1.4**	**-2.1**	
2a3	**25.2**	**117.2**	Decreased flow rates entering CDOT ROW at southeast corner of stockpile site at 42" culvert
4a2	**25.1**	**117.0**	
Net Change	**-0.1**	**-0.2**	
2b	**8.5**	**18.0**	Equal flow rates at this location. Basin remains the same as proposed initial construction.
4b	**8.5**	**18.0**	
Net Change	**0.0**	**0.0**	
2c	**32.7**	**136.6**	Decreased flow rates at this location
4c	**29.8**	**125.3**	
Net Change	**-2.9**	**-11.3**	
2d	**37.7**	**149.4**	Decreased flow rates at this location
4d	**34.1**	**136.1**	
Net Change	**-3.6**	**-13.3**	
Existing (1 and 2a3)	**28.1**	**126.6**	**Total flow leaving the project site has Decreased as a result of the planned improvements**
Proposed (6b and 4a2)	**26.6**	**124.3**	
Net Change	**-1.5**	**-2.3**	

IV. HYDRAULIC ANALYSIS

The project site is being developed at this time for soil material stockpiling only. The proposed pipes, swales, sediment basin and pond are all temporary in nature. All of these features will be removed when the subject parcel develops in the future. The proposed pipes and swales have been designed for the 100-year storm event.

V. MAINTENANCE REQUIREMENTS

The on-site detention pond and storm sewer outlined in this report shall be owned and maintained by the owner of the property. Regular maintenance of stormwater facilities is essential to ensure long term functionality and effectiveness. The temporary sediment basin, storm pipes and detention pond should be inspected regularly, and after significant rainstorms, to verify functionality, document erosion, and remove sediment and debris.

VI. GRADING AND EROSION CONTROL PLANS

Grading and Erosion Control Plans will be submitted separately.

VII. DRAINAGE FEES

Bald Mountain drainage basin has drainage fees of $13,262 per impervious acre. However, no platting is occurring at this time, therefore no fees are due.

VIII. CONSTRUCTION COST OPINION

Trickle Channel	60	LF	$80.00	$4,800.00
Forebay	1	EA	$1,200.00	$1,200.00
6" PVC	100	LF	$35.00	$3,500.00
18" Reinforced Concrete Pipe	337	LF	$88.00	$29,656.00
18" FES	1	EA	$528.00	$528.00
Pond Outfall Structure	1	EA	$9,000.00	$9,000.00
Rip Rap, d50 size from 6" to 24	473	TONS	$112.00	$52,976.00
			Sub-Total	$101,660.00
			20% Contingency	$20,332.00
			TOTAL	**$121,992.00**

IX. SUMMARY

This Final Drainage Report Amendment No. 1 for the Beacon Lite Road Stockpile project was prepared using the City of Colorado Springs Drainage Criteria Manuals and the El Paso County DCM Volume 1 updates. Temporary stormwater quality is provided by three proposed temporary sediment basins located on-site. Two flood control only detention ponds are provided for peak flow attenuation. Site runoff, storm drain, and associated appurtenances will not adversely affect the downstream and surrounding developments.

X. REFERENCES

1. Drainage Criteria Manual, Volume I (revised January 2021) and Volume II (revised December 2020), City of Colorado Springs
2. El Paso County Drainage Criteria Manual Volume 1 update, El Paso County Municode web site
3. El Paso County Engineering Criteria Manual, Drainage Criteria Manual Volume 2, Appendix I.
4. Monument Ridge East, Master Development Drainage Plan, 2024, PRC Engineering
5. Flood Insurance Rate Map Numbers 08041C0065G and 0804C0276G, El Paso County, Colorado, Revised December 7, 2018, Federal Emergency Management Agency (FEMA)
6. Web Soil Survey, Natural Resources Conservation Service (NRCS)

Appendix A

SOILS/FEMA MAPS

United States Department of Agriculture

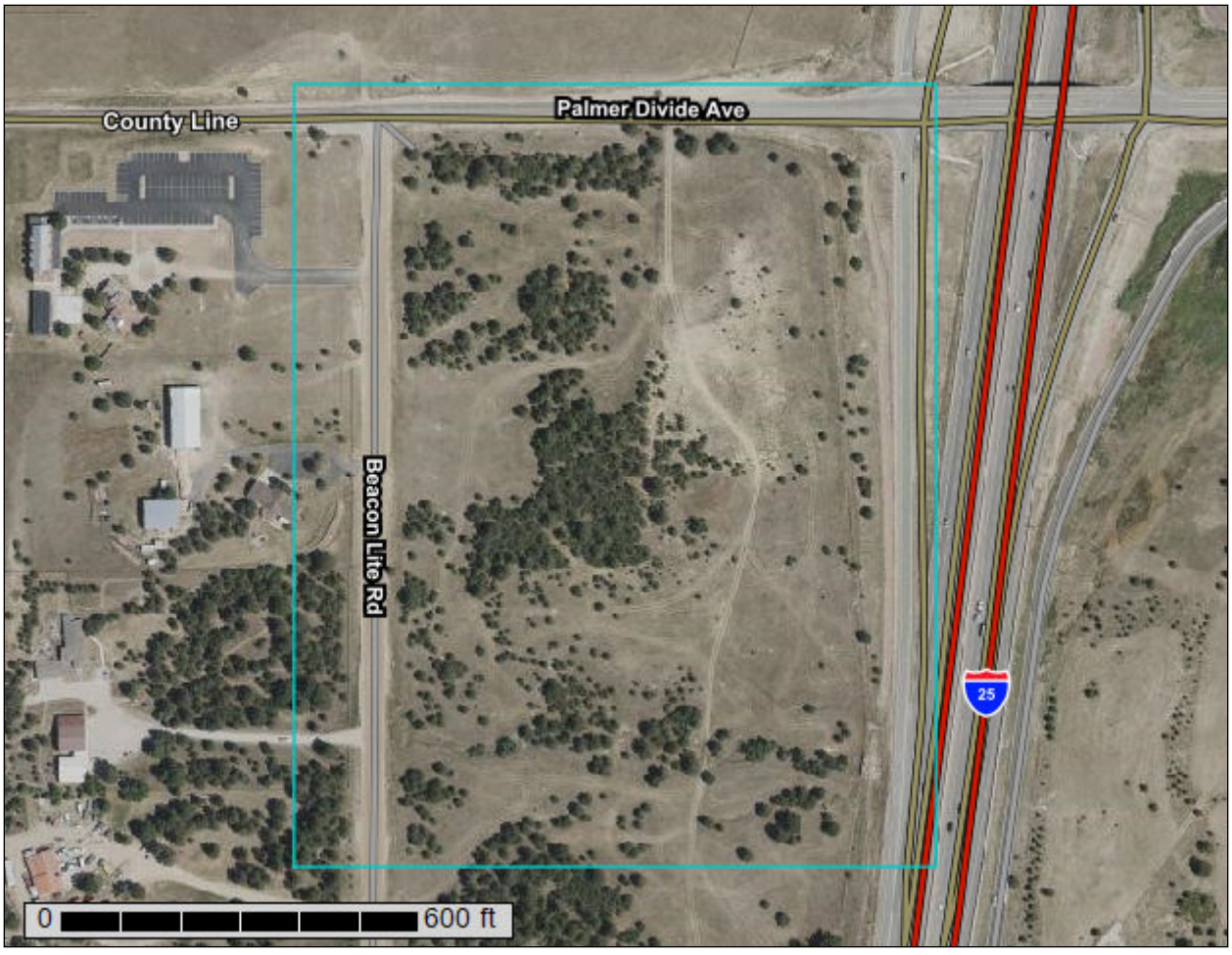
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Castle Rock Area, Colorado, and El Paso County Area, Colorado

Beacon Lite Road Stockpile



January 1, 2026

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,550 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 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: Castle Rock Area, Colorado
Survey Area Data: Version 18, Aug 29, 2025

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 23, Aug 29, 2025

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

MAP LEGEND

MAP INFORMATION

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

Date(s) aerial images were photographed: Jul 23, 2024—Aug 4, 2024

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PpE	Peyton-Pring-Crowfoot sandy loams, 5 to 25 percent slopes	1.3	4.1%
PrE2	Peyton-Pring-Crowfoot complex, 3 to 15 percent slopes, eroded	1.9	5.8%
Subtotals for Soil Survey Area		**3.2**	**10.0%**
Totals for Area of Interest		**32.6**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
69	Peyton-Pring complex, 8 to 15 percent slopes	21.5	65.9%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	7.9	24.1%
Subtotals for Soil Survey Area		**29.4**	**90.0%**
Totals for Area of Interest		**32.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Castle Rock Area, Colorado

PpE—Peyton-Pring-Crowfoot sandy loams, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: jqzn
Elevation: 6,500 to 8,000 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 115 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 40 percent
Crowfoot and similar soils: 25 percent
Pring and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

Landform: Ridges, valley sides
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered alluvium derived from arkose

Typical profile

H1 - 0 to 11 inches: sandy loam
H2 - 11 to 30 inches: sandy clay loam
H3 - 30 to 40 inches: sandy loam
H4 - 40 to 60 inches: sandy loam

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Ridges, valley sides

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from arkosic sedimentary rock

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 19 inches: loamy sand
H3 - 19 to 32 inches: gravelly sandy clay loam
H4 - 32 to 43 inches: gravelly sandy loam
H5 - 43 to 60 inches: coarse sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Base slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkosic sedimentary rock

Typical profile

H1 - 0 to 12 inches: sandy loam
H2 - 12 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 5 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Minor Components

Brussett
Percent of map unit: 3 percent
Hydric soil rating: No

Jarre
Percent of map unit: 3 percent
Hydric soil rating: No

Tomah
Percent of map unit: 3 percent
Hydric soil rating: No

Aquic haploborolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

PrE2—Peyton-Pring-Crowfoot complex, 3 to 15 percent slopes, eroded

Map Unit Setting
National map unit symbol: jqzp
Elevation: 6,500 to 8,000 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 115 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition
Peyton, eroded, and similar soils: 40 percent
Pring, eroded, and similar soils: 25 percent
Crowfoot, eroded, and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton, Eroded

Setting
Landform: Mesas, plateaus
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered alluvium derived from arkose

Typical profile

H1 - 0 to 11 inches: sandy loam
H2 - 11 to 30 inches: sandy clay loam
H3 - 30 to 40 inches: sandy loam
H4 - 40 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Description of Pring, Eroded

Setting

Landform: Mesas, plateaus
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkosic sedimentary rock

Typical profile

H1 - 0 to 12 inches: gravelly sandy loam
H2 - 12 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Description of Crowfoot, Eroded

Setting

Landform: Mesas, plateaus
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from arkosic sedimentary rock

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 19 inches: loamy sand
H3 - 19 to 32 inches: gravelly sandy clay loam
H4 - 32 to 43 inches: gravelly sandy loam
H5 - 43 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Kippen

Percent of map unit: 8 percent
Hydric soil rating: No

Truckton

Percent of map unit: 7 percent
Hydric soil rating: No

El Paso County Area, Colorado

69—Peyton-Pring complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 369g
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 45 percent
Pring and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam
Bt - 12 to 25 inches: sandy clay loam
BC - 25 to 35 inches: sandy clay loam
C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 8 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile
A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 15 percent
Hydric soil rating: No

Pleasant
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 36b9
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition
Tomah and similar soils: 50 percent
Crowfoot and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Alluvial fans, hills
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose and/or residuum weathered from arkose

Typical profile

A - 0 to 10 inches: loamy sand
E - 10 to 22 inches: coarse sand
Bt - 22 to 48 inches: stratified coarse sand to sandy clay loam
C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Hills, alluvial fans
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 12 inches: loamy sand
E - 12 to 23 inches: sand
Bt - 23 to 36 inches: sandy clay loam
C - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 15 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

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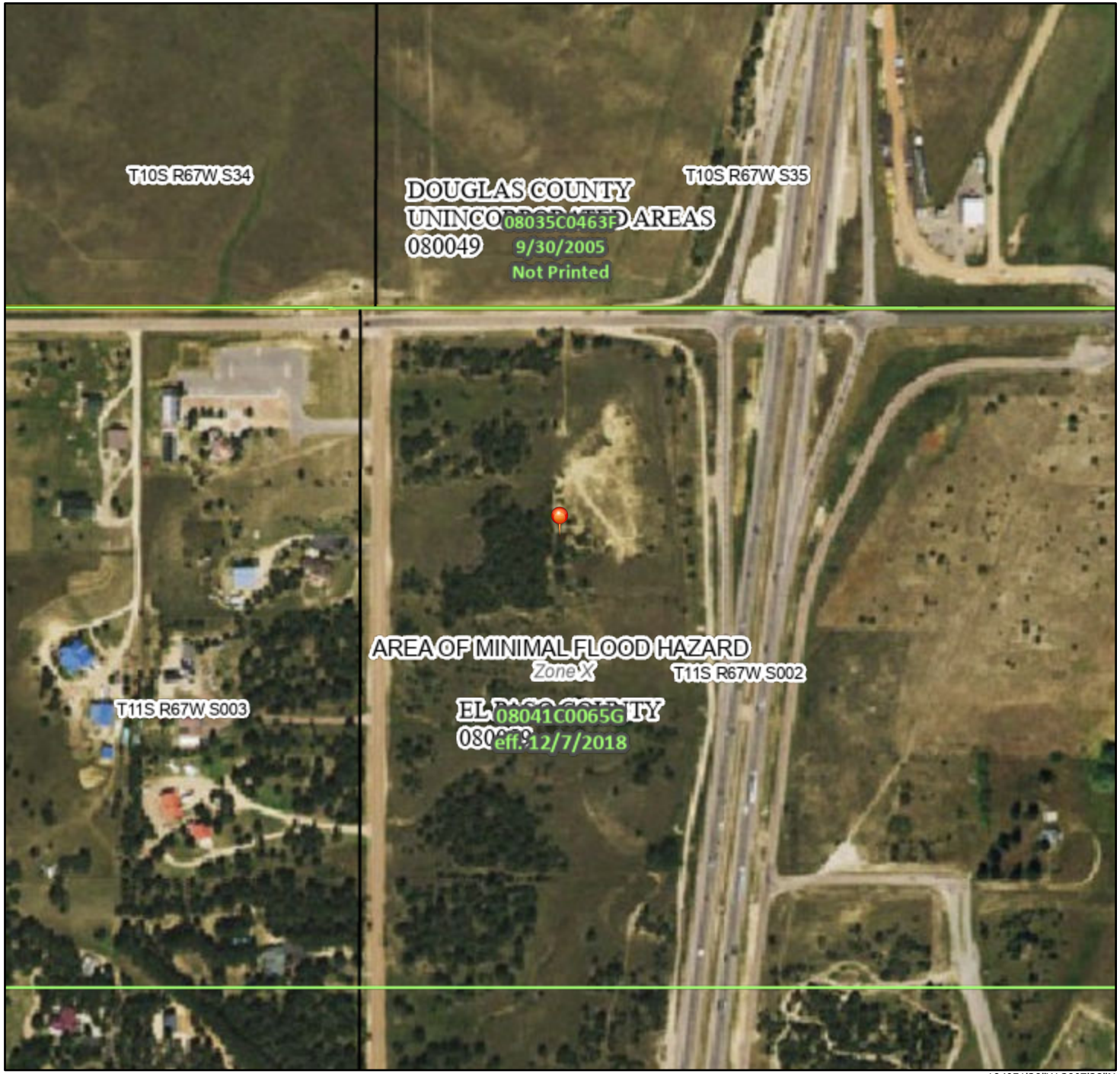
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National Flood Hazard Layer FIRMette

FEMA

104°52'16"W 39°7'56"N



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

1:6,000

104°51'39"W 39°7'28"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

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Appendix B

CALCULATIONS

BEACON LITE ROAD STOCKPILE
FINAL DRAINAGE REPORT
(Composite Runoff Coefficients)

Basin	Basin Area (acres)	Land Use	Sub-Basin (5yr)		Composite C_5	Sub-Basin (100yr)		Composite C_{100}
			C_5	Area (acres)		C_{100}	Area (acres)	
X1	4.21	Lawn	0.08	4.21	0.08	0.35	4.21	0.35
X2a	0.61	Pasture/Meadow/Forest	0.08	0.61	0.08	0.35	0.61	0.35
X2b	58.06	Streets - Paved	0.90	2.84	0.15	0.96	2.84	0.40
		Streets - Gravel	0.59	1.74		0.70	1.74	
		Roof	0.73	0.99		0.81	0.99	
		Pasture/Meadow/Forest	0.08	52.49		0.35	52.49	
X3	2.50	Lawn	0.08	2.50	0.08	0.35	2.50	0.35
X4	7.03	Streets - Gravel	0.59	0.56	0.12	0.70	0.56	0.38
		Lawn	0.08	6.47		0.35	6.47	
X5	0.55	Lawn	0.08	0.55	0.08	0.35	0.55	0.35
X33	2.92	Streets - Paved	0.90	1.72	0.56	0.96	1.72	0.71
		Pasture/Meadow/Forest	0.08	1.20		0.35	1.20	
X44	13.16	Streets - Paved	0.90	1.42	0.18	0.96	1.42	0.43
		Streets - Gravel	0.59	0.40		0.70	0.40	
		Pasture/Meadow/Forest	0.08	11.34		0.35	11.34	
X55	5.31	Streets - Paved	0.90	1.91	0.37	0.96	1.91	0.57
		Lawn	0.08	3.40		0.35	3.40	
A	4.21	Lawn	0.08	4.21	0.08	0.35	4.21	0.35
B1	0.98	Pasture/Meadow/Forest	0.08	0.98	0.08	0.35	0.98	0.35
B2	43.82	Streets - Paved	0.90	2.84	0.16	0.96	2.84	0.41
		Streets - Gravel	0.59	0.81		0.70	0.81	
		Roof	0.73	0.99		0.81	0.99	
		Pasture/Meadow/Forest	0.08	39.18		0.35	39.18	
B3	10.95	Streets - Gravel	0.59	0.93	0.12	0.70	0.93	0.38
		Pasture/Meadow/Forest	0.08	10.02		0.35	10.02	
B4	3.49	Streets - Gravel	0.59	0.47	0.15	0.70	0.47	0.40
		Lawn	0.08	3.02		0.35	3.02	
B4 (Road)	0.42	Streets - Gravel	0.59	0.31	0.46	0.70	0.31	0.61
		Lawn	0.08	0.11		0.35	0.11	
B5	0.27	Pond	0.90	0.27	0.90	0.96	0.27	0.96
C1	3.70	Streets - Gravel	0.59	0.38	0.13	0.70	0.38	0.39
		Pasture/Meadow/Forest	0.08	3.32		0.35	3.32	
C2	2.86	Pasture/Meadow/Forest	0.08	2.86	0.08	0.35	2.86	0.35
D	3.31	Streets - Gravel	0.59	0.37	0.14	0.70	0.37	0.39
		Lawn	0.08	2.94		0.35	2.94	
E	0.55	Lawn	0.08	0.55	0.08	0.35	0.55	0.35

BEACON LITE ROAD STOCKPILE
FINAL DRAINAGE REPORT
(Basin Runoff)

				Overland Flow				Channel Flow					Travel Time (T_t)	Intensity		Total Flows	
Basin	Area Total (acres)	C_5	C_{100}	C_5	Length (ft)	Slope (ft/ft)	T_C (min)	Length (ft)	Slope (ft/ft)	Cv	Velocity (fps)	T_t (min)	TOTAL* (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
X1	4.21	0.08	0.35	0.08	180	0.061	13.6	645	0.012	15	1.6	6.5	20.1	3.1	5.2	**1.0**	**7.6**
X2a	0.61	0.08	0.35	0.08	225	0.091	13.3	390	0.062	15	3.7	1.7	15.1	3.5	5.9	**0.2**	**1.3**
X2b	58.06	0.15	0.40	0.15	300	0.077	15.2	1480	0.044	15	3.1	7.8	23.0	2.9	4.8	**24.5**	**111.6**
X3	2.50	0.20	0.35	0.20	284	0.088	13.4	245	0.032	15	2.7	1.5	14.9	3.5	5.9	**1.8**	**5.2**
X4	7.03	0.12	0.38	0.12	300	0.077	15.6	258	0.054	15	3.5	1.2	16.8	3.3	5.6	**2.8**	**14.9**
X5	0.55	0.08	0.35	0.08	25	0.400	2.7						5.0	5.2	8.7	**0.2**	**1.7**
X33	2.92	0.56	0.71	0.56									5.0	5.2	8.7	**8.5**	**18.0**
X44	13.16	0.18	0.43	0.18	230	0.078	12.7	810	0.027	15	2.5	5.5	18.2	3.2	5.4	**7.8**	**30.4**
X55	5.31	0.37	0.57	0.37	100	0.040	8.3	1115	0.032	15	2.7	6.9	15.2	3.5	5.9	**7.0**	**17.8**

				Overland Flow				Channel Flow					Travel Time (T_t)	Intensity		Total Flows	
Basin	Area Total (acres)	C_5	C_{100}	C_5	Length (ft)	Slope (ft/ft)	T_C (min)	Length (ft)	Slope (ft/ft)	Cv	Velocity (fps)	T_t (min)	TOTAL* (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
A	4.21	0.08	0.35	0.08	180	0.061	13.6	645	1.2%	15	1.6	6.5	20.1	3.1	5.2	**1.0**	**7.6**
B1	0.98	0.08	0.35	0.08	225	0.091	13.3	390	0.062	15	3.7	1.7	15.1	3.5	5.9	**0.3**	**2.0**
B2	43.82	0.16	0.41	0.16	300	0.077	15.0	1480	0.044	15	3.1	7.8	22.9	2.9	4.8	**19.9**	**86.3**
B3	10.95	0.12	0.38	0.12	300	0.152	12.4	626	0.072	15	4.0	2.6	21.4	3.0	5.0	**4.0**	**20.9**
B4	3.49	0.15	0.40	0.15	290	0.035	19.4	121	0.050	15	3.4	0.6	20.0	3.1	5.2	**1.6**	**7.2**
B4 (road only for 12" sizing)	0.42	0.46	0.61	0.46	80	0.056	5.9	265	0.040	15	3.0	1.5	7.4	4.6	7.7	**0.9**	**2.0**
B5	0.27	0.90	0.96	0.90	290	0.035	4.1						5.0	5.2	8.7	**1.3**	**2.2**
C1	3.70	0.20	0.39	0.20	140	0.079	9.7	385	0.062	15	3.7	1.7	11.4	3.9	6.6	**2.9**	**9.4**
C2	2.86	0.08	0.35	0.08	175	0.100	11.4	390	0.054	15	3.5	1.9	13.3	3.7	6.2	**0.8**	**6.2**
D	3.31	0.14	0.39	0.14	300	0.077	15.4	256	0.054	15	3.5	1.2	16.6	3.4	5.7	**1.5**	**7.3**
E	0.55	0.04	0.35	0.04	25	0.400	2.8						5.0	5.2	8.7	**0.1**	**1.7**

* 5 MINUTE TIME OF CONCENTRATION - MINIMUM

BEACON LITE ROAD STOCKPILE
FINAL DRAINAGE REPORT
(Surface Routing)

					Intensity		*Flow*		
Design Point	***Contributing Basins***	***Equivalent CA_5***	***Equivalent CA_{100}***	***Routed T_C***	***I_5***	***I_{100}***	***Q_5***	***Q_{100}***	***Comments***
1	C1	0.74	1.43	11.4	3.9	6.6	**2.9**	**9.4**	flow to proposed 18" RCP
2	C1,C2	0.97	2.43	13.3	3.7	6.2	**3.6**	**15.1**	flow to proposed sump inlet
3	C1,C2,A,B1	1.38	4.25	20.1	3.1	5.2	**4.3**	**21.9**	flow to pond A
4a1	Pond A Out	(see pond calculations)					**0.1**	**7.4**	
4a2	B2,B3,Pond B Out, Pond A Out	(Routed flows)					**23.7**	**110.3**	flow to existing 42" RCP
4a3	B3	1.35	4.16	21.4	3.0	5.0	**4.0**	**20.9**	flow to proposed 24" RCP
4a4	B4,B5	0.76	1.65	20.0	3.1	5.2	**2.4**	**8.5**	flow to pond B
4a5	Pond B Out	(see pond calculations)					**2.1**	**6.5**	
4b	X33	1.64	2.07	5.0	5.2	8.7	**8.5**	**18.0**	flow to existing type C inlet
4c	B2,B3,Pond B Out, Pond A Out,X33,X44	(Routed flows)					**29.8**	**125.3**	flow to existing 48" RCP
4d	B2,B3,Pond B Out, Pond A Out,X33,X44,X55	(Routed flows)					**34.1**	**136.1**	flow to existing 48" RCP
5	(Not Used)								
6a	D	0.45	1.29	16.6	3.4	5.7	**1.5**	**7.3**	flow to energy dissipator
6b	D,E	0.48	1.48	18.0	3.2	5.5	**1.5**	**8.1**	discharge flow to CDOT ROW

You don't need to say "(Disturbed)" here because all areas shown on these calcs should be for disturbed areas in each basin. So please delete "(Disturbed)" and update all SPA area numbers to only include the areas of disturbance in each basin.

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Designer: REP
Company: PRC Engineering
Date: October 20, 2026
Project: Beacon Lite Road Stockpile - NORTH
Location: El Paso Cty

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.60 inches
Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	SPA	SPA	SPA	SPA	SPA	SPA	SPA					
Area ID	Basin A	Basin B1	Basin C1	Basin C2	Basin D (Disturbed)	Basin E	Basin B2 (Disturbed)					
Downstream Design Point ID	3	3	C2	3	6b	6b	6b					
Downstream BMP Type	EDB	EDB	EDB	EDB	None	None	None					
DCIA (ft²)	--	--	--	--	--	--	--					
UIA (ft²)	--	--	--	--	--	--	--					
RPA (ft²)	--	--	--	--	--	--	--					
SPA (ft²)	183,388	42,688	161,172	124,581	26,572	23,958	5,227					
HSG A (%)	0%	0%	0%	0%	0%	0%	0%					
HSG B (%)	100%	100%	100%	100%	100%	100%	100%					
HSG C/D (%)	0%	0%	0%	0%	0%	0%	0%					
Average Slope of RPA (ft/ft)	--	--	--	--	--	--	--					
UIA:RPA Interface Width (ft)	--	--	--	--	--	--	--					

CALCULATED RUNOFF RESULTS

Area ID	Basin A	Basin B1		Basin C2		Basin E	Basin B2 (Disturbed)					
UIA:RPA Area (ft²)	--	--	--	--	--	--	--					
L / W Ratio	--	--	--	--	--	--	--					
UIA / Area	--	--	--	--	--	--	--					
Runoff (in)	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Runoff (ft³)	0	0	0	0	0	0	0					
Runoff Reduction (ft³)	9169	2134	8059	6229	1329	1198	261					

CALCULATED WQCV RESULTS

Area ID	Basin A	Basin B1	Basin C1	Basin C2	Basin D (Disturbed)	Basin E	Basin B2 (Disturbed)					
WQCV (ft³)	0	0	0	0	0	0	0					
WQCV Reduction (ft³)	0	0	0	0	0	0	0					
WQCV Reduction (%)	0%	0%	0%	0%	0%	0%	0%					
Untreated WQCV (ft³)	0	0	0	0	0	0	0					

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	3	3	C2	3	6b							
DCIA (ft²)	0	0	0	0	0							
UIA (ft²)	0	0	0	0	0							
RPA (ft²)	0	0	0	0	0							
SPA (ft²)	350,657	350,657	161,172	350,657	55,757							
Total Area (ft²)	350,657	350,657	161,172	350,657	55,757							
Total Impervious Area (ft²)	0	0	0	0	0							
WQCV (ft³)	0	0	0	0	0							
WQCV Reduction (ft³)	0	0	0	0	0							
WQCV Reduction (%)	0%	0%	0%	0%	0%							
Untreated WQCV (ft³)	0	0	0	0	0							

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft²)	1,268,900
Total Impervious Area (ft²)	0
WQCV (ft³)	0
WQCV Reduction (ft³)	0
WQCV Reduction (%)	0%
Untreated WQCV (ft³)	0

Update inputted SPA areas per my comment on the previous page.

Unresolved comment from Review 5:
What about Basins B2 and B3? There is disturbances in those areas that arent trib to the pond that appear that they could be treated via SPAs.

Review 7 update: You have now included B3, but are still missing B2. I see that B2 is now on the previous page for the North area, but the area inputted (5,227) is not close to the total disturbed area of B2 North + B2 South, which is around 3,900 + 20,300 = 24,200. Please measure the B2 South disturbance and include it as an SPA on this sheet.

Design F

U

Designer:	REP
Company:	PRC Engineering
Date:	October 20, 2026
Project:	Beacon Lite Road Stockpile - SOUTH
Location:	El Paso Cty

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth	0.60	inches
Depth of Average Runoff Producing Storm, d_6 =	0.43	inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	SPA	SPA	SPA										
Area ID	Basin B3	Basin B4	Basin B5										
Downstream Design Point ID	4a2	Pond B	Pond B										
Downstream BMP Type	None	EDB	EDB										
DCIA (ft^2)	--	--	--										
UIA (ft^2)	--	--	--										
RPA (ft^2)	--	--	--										
SPA (ft^2)	476,982	152,024	11,761										
HSG A (%)	0%	0%	0%										
HSG B (%)	100%	100%	100%										
HSG C/D (%)	0%	0%	0%										
Average Slope of RPA (ft/ft)	--	--	--										
UIA:RPA Interface Width (ft)	--	--	--										

CALCULATED RUNOFF RESULTS

Area ID	Basin B3	Basin B4											
UIA:RPA Area (ft^2)	--	--	--										
L / W Ratio	--	--	--										
UIA / Area	--	--	--										
Runoff (in)	0.00	0.00	0.00										
Runoff (ft^3)	0	0	0										
Runoff Reduction (ft^3)	23849	7601	588										

CALCULATED WQCV RESULTS

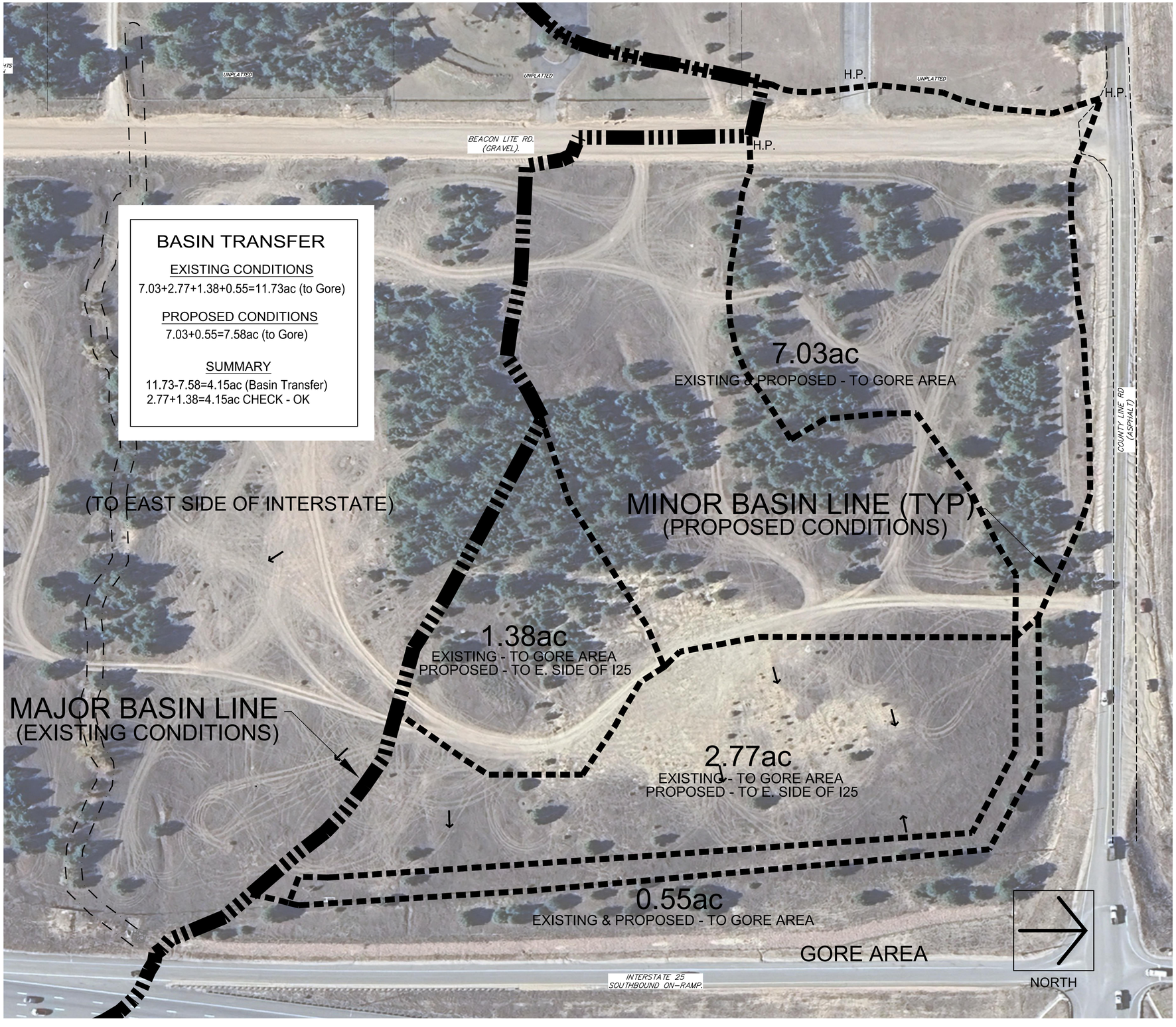
Area ID	Basin B3	Basin B4	Basin B5										
WQCV (ft^3)	0	0	0										
WQCV Reduction (ft^3)	0	0	0										
WQCV Reduction (%)	0%	0%	0%										
Untreated WQCV (ft^3)	0	0	0										

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	4a2	Pond B											
DCIA (ft^2)	0	0											
UIA (ft^2)	0	0											
RPA (ft^2)	0	0											
SPA (ft^2)	476,982	163,785											
Total Area (ft^2)	476,982	163,785											
Total Impervious Area (ft^2)	0	0											
WQCV (ft^3)	0	0											
WQCV Reduction (ft^3)	0	0											
WQCV Reduction (%)	0%	0%											
Untreated WQCV (ft^3)	0	0											

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	640,767
Total Impervious Area (ft^2)	0
WQCV (ft^3)	0
WQCV Reduction (ft^3)	0
WQCV Reduction (%)	0%
Untreated WQCV (ft^3)	0



BASIN TRANSFER EXHIBIT

NOT TO SCALE

BEACON LITE ROAD STOCKPILE

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904
PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

El Paso County, CO

• BASIN TRANSFER EXHIBIT

issued 7/30/26

BT1

sheet number

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

Stockpile Swale - East Q is 66% of Basin A Q100

Triangular

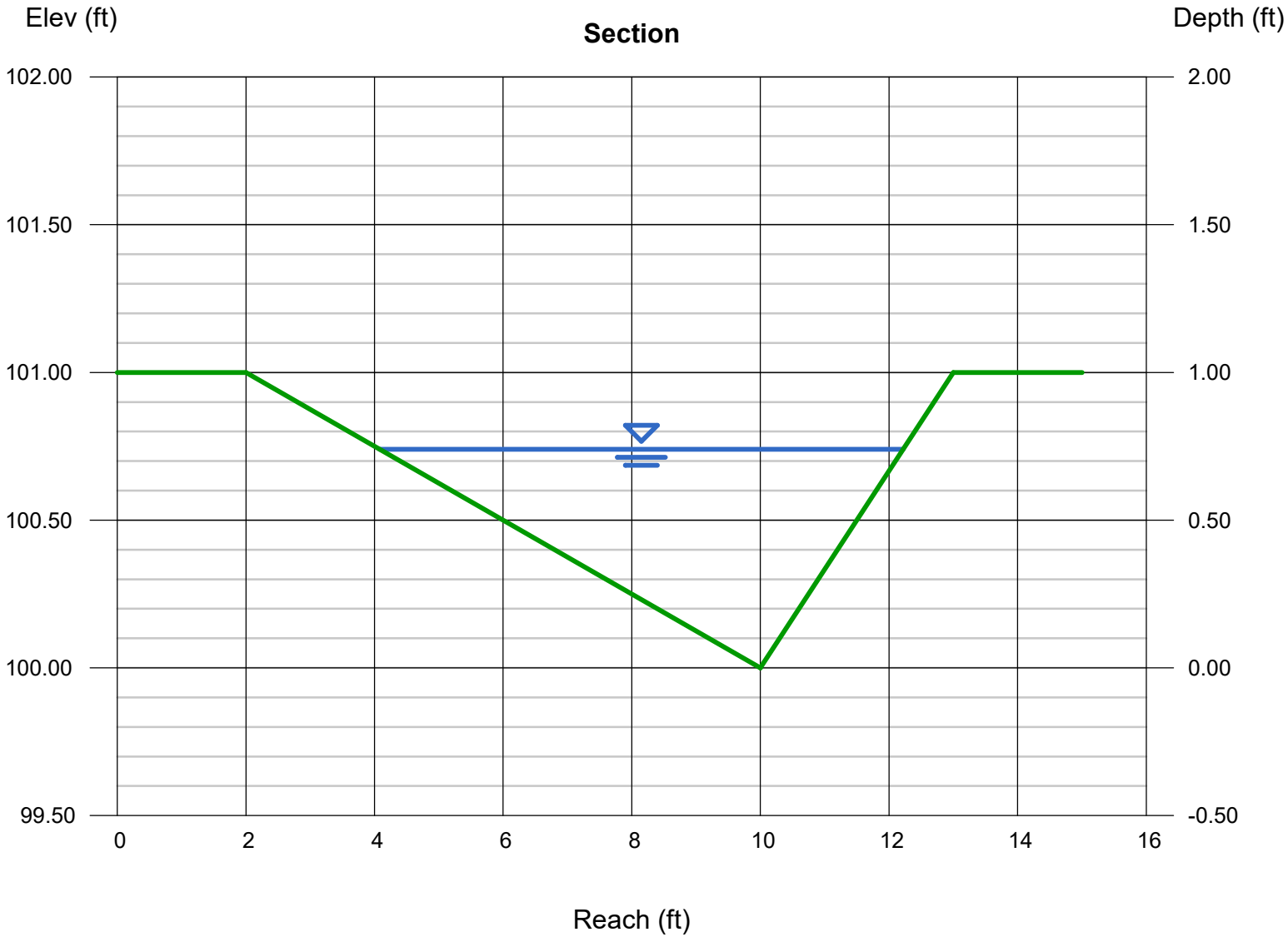
Side Slopes (z:1)	= 8.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.30
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.02

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 5.020
Area (sqft)	= 3.01
Velocity (ft/s)	= 1.67
Wetted Perim (ft)	= 8.31
Crit Depth, Yc (ft)	= 0.56
Top Width (ft)	= 8.14
EGL (ft)	= 0.78



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

Stockpile Swale - West Q is 34% of Basin A Q100

Triangular

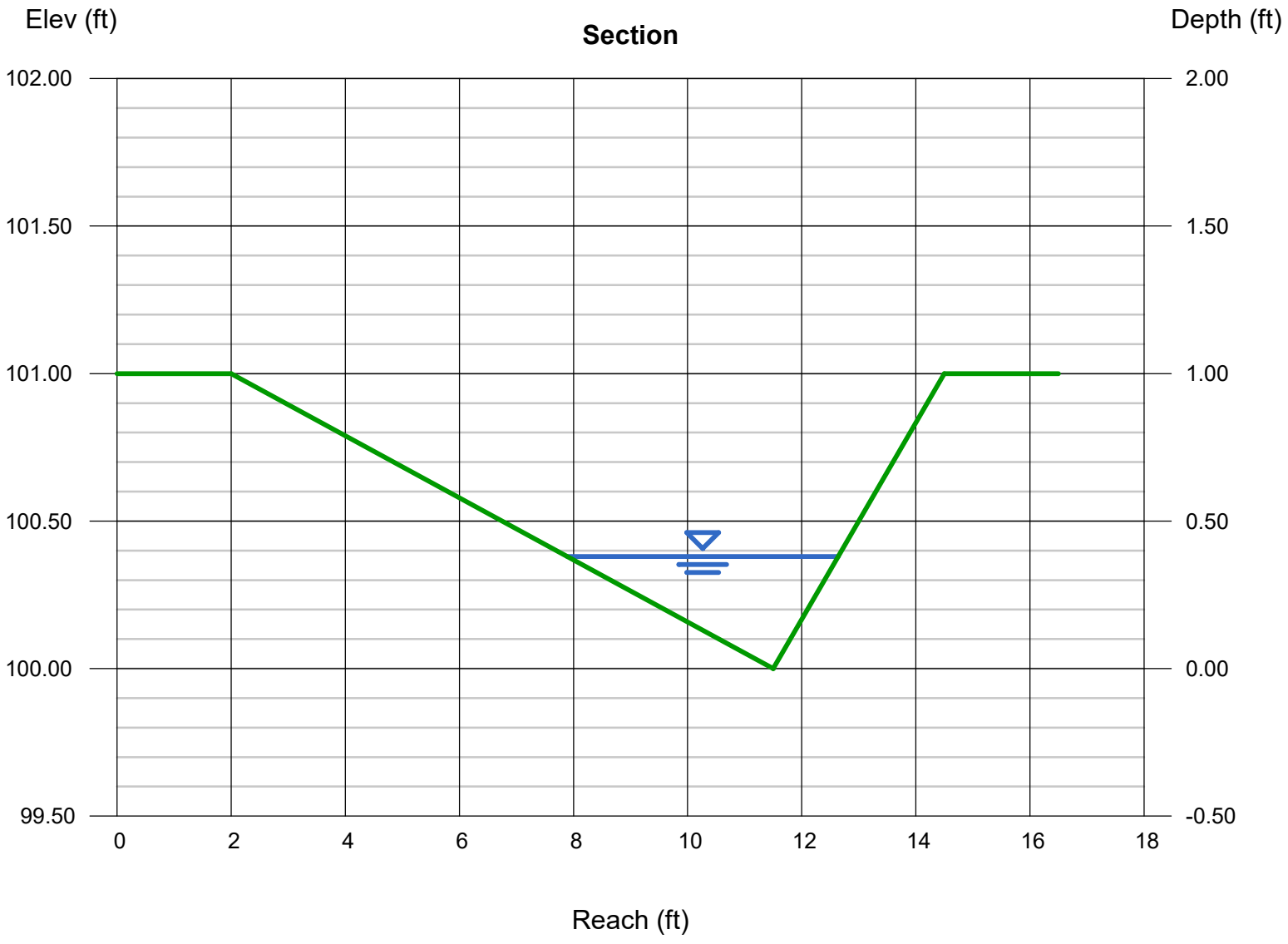
Side Slopes (z:1)	= 9.50, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 10.00
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.58

Highlighted

Depth (ft)	= 0.38
Q (cfs)	= 2.580
Area (sqft)	= 0.90
Velocity (ft/s)	= 2.86
Wetted Perim (ft)	= 4.83
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 4.75
EGL (ft)	= 0.51



Rock Chute Design Data

(Version 4.01 - 04/23/03, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: TSB Rundown - East
Designer: REP
Date: 3/7/2026

County: EL Paso
Checked by: ICM
Date: 02/23/26

Input Channel Geometry

→ Inlet Channel	→ Chute		→ Outlet Channel
Bw = 0.0 ft.	Bw = 0.0 ft.		Bw = 10.0 ft.
Side slopes = 3.0 (m:1)	Factor of safety = 1.20 (F_s)		Side slopes = 50.0 (m:1)
n-value = 0.030	Side slopes = 8.0 (m:1)	→ 2.0:1 max.	n-value = 0.050
Bed slope = 0.0130 ft./ft.	Bed slope (6:1) = 0.167 ft./ft.	→ 2.5:1 max.	Bed slope = 0.0050 ft./ft.
Freeboard = 0.4 ft.	Outlet apron depth, d = 1.0 ft.		Base flow = 5.0 cfs

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 4.2 acres Rainfall = ○ 0 - 3 in. ○ 3 - 5 in. ◉ 5+ in.

Apron elev. --- Inlet = 7330.0 ft. --- Outlet = 7325.0 ft. --- (H_{drop} = 4 ft.)

Chute capacity = Q5-year
Total capacity = Q10-year
Minimum capacity (based on a 5-year, 24-hour storm with a 5+ inch rainfall)

Q_{high} = 5.0 cfs High flow storm through chute → Tw (ft.) = Program

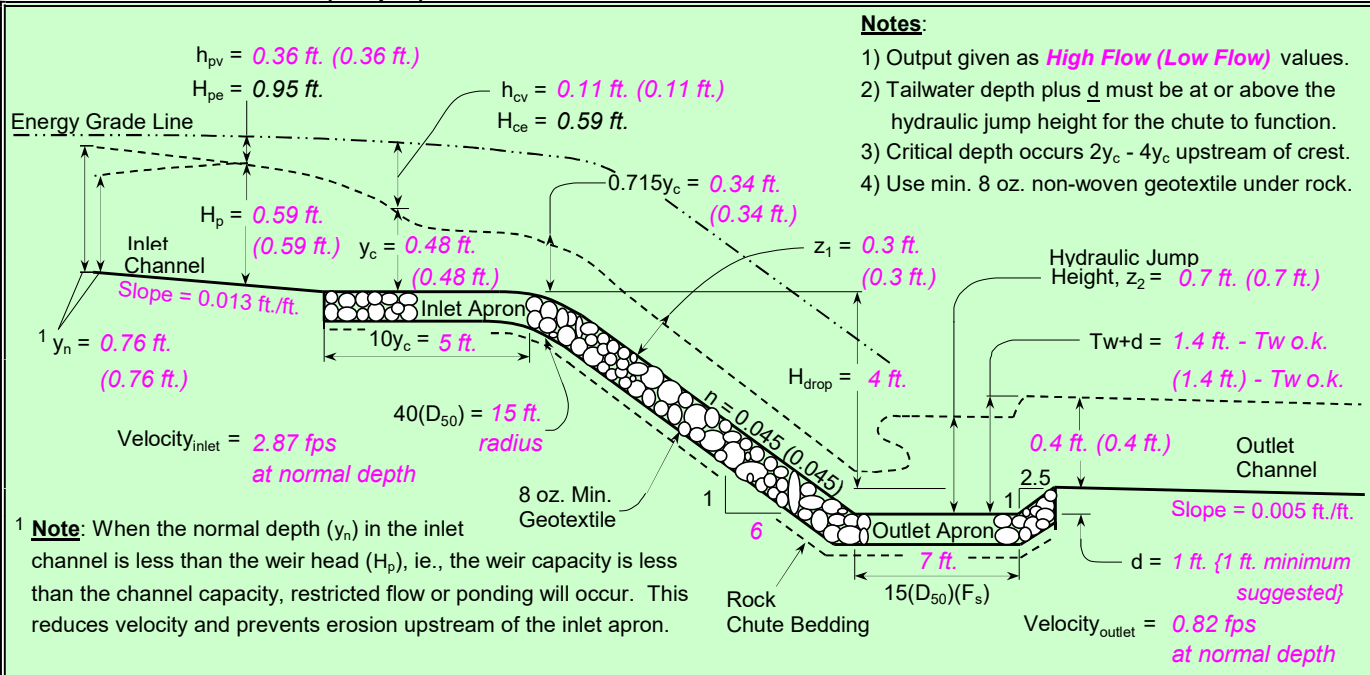
Q_{low} = 5.0 cfs Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

0.17

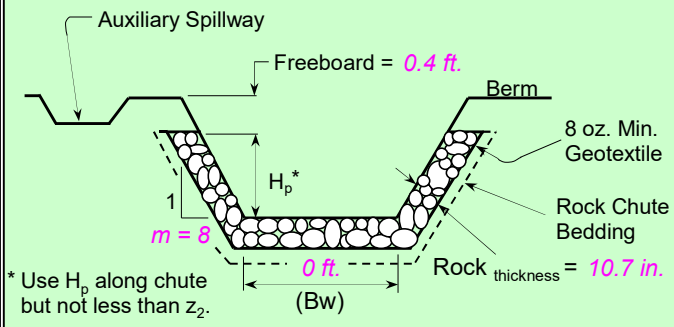
Profile and Cross Section (Output)



Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.
4) Use min. 8 oz. non-woven geotextile under rock.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



Typical Cross Section

q_t =	1.86 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.3 ft.	Normal depth in chute
n-value =	0.045	Manning's roughness coefficient
$D_{50}(F_s)$ =	5.3 in. (11 lbs. - 50% round / 50% angular)	
$2(D_{50})(F_s)$ =	10.7 in.	Rock chute thickness
Tw + d =	1.4 ft.	Tailwater above outlet apron
z_2 =	0.7 ft.	Hydraulic jump height
*** The outlet	will	*function adequately*

High Flow Storm Information

Rock Chute Design Data

(Version 4.01 - 04/23/03, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: TSB Rundown - West **County:** EL Paso
Designer: REP **Checked by:** ICM
Date: 3/7/2026 **Date:** 03/07/26

Input Channel Geometry

→ Inlet Channel	→ Chute	→ Outlet Channel
Bw = 0.0 ft.	Bw = 0.0 ft.	Bw = 10.0 ft.
Side slopes = 3.0 (m:1)	Factor of safety = 1.20 (F_s)	Side slopes = 50.0 (m:1)
n-value = 0.030	Side slopes = 8.0 (m:1) → 2.0:1 max.	n-value = 0.050
Bed slope = 0.1000 ft./ft.	Bed slope (6:1) = 0.167 ft./ft. → 2.5:1 max.	Bed slope = 0.0050 ft./ft.
Freeboard = 0.6 ft.	Outlet apron depth, d = 1.0 ft.	Base flow = 2.8 cfs

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 4.2 acres Rainfall = ○ 0 - 3 in. ○ 3 - 5 in. ◉ 5+ in.

Apron elev. --- Inlet = 7330.0 ft. --- Outlet = 7325.0 ft. --- (H_{drop} = 4 ft.)

Chute capacity = Q5-year
Total capacity = Q10-year
Minimum capacity (based on a 5-year, 24-hour storm with a 5+ inch rainfall)

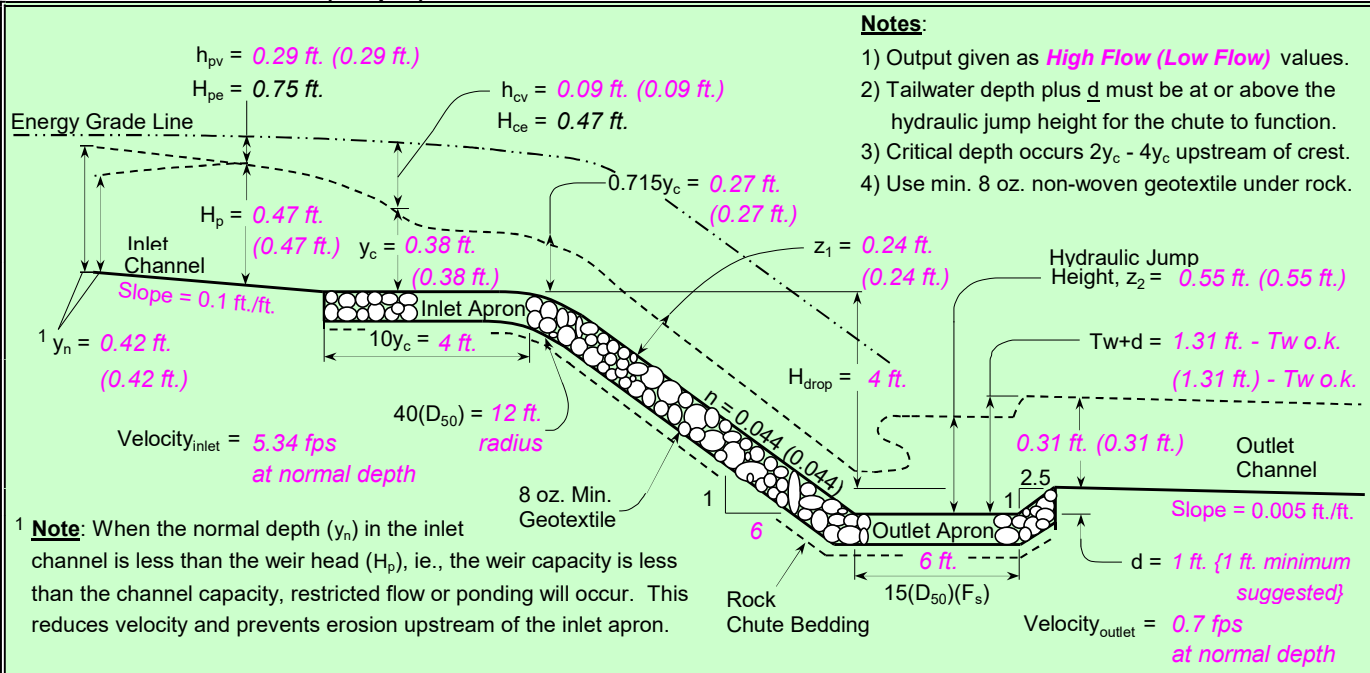
Q_{high} = 2.8 cfs High flow storm through chute → Tw (ft.) = Program 0.17

Q_{low} = 2.8 cfs Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

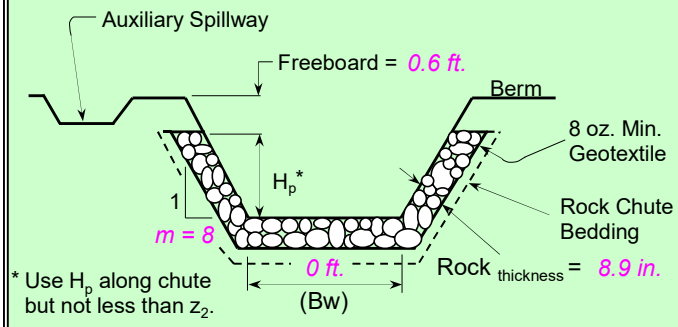
Profile and Cross Section (Output)



Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.
4) Use min. 8 oz. non-woven geotextile under rock.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



q_t =	1.31 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.24 ft.	Normal depth in chute
n-value =	0.044	Manning's roughness coefficient
D_{50}(F_s) =	4.4 in. (6 lbs. - 50% round / 50% angular)	
2(D_{50})(F_s) =	8.9 in.	Rock chute thickness
Tw + d =	1.31 ft.	Tailwater above outlet apron
z_2 =	0.55 ft.	Hydraulic jump height
*** The outlet	will	function adequately

Typical Cross Section **High Flow Storm Information**

Rock Chute Design Data

(Version 4.01 - 04/23/03, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Rundown/Energy Dissipation- North
Designer: REP
Date: 3/8/2026

County: EL Paso
Checked by: ICM
Date: 03/08/26

Input Channel Geometry

→ Inlet Channel	→ Chute		→ Outlet Channel
Bw = 0.0 ft.	Bw = 6.0 ft.		Bw = 12.0 ft.
Side slopes = 3.0 (m:1)	Factor of safety = 1.20 (F_s)		Side slopes = 3.0 (m:1)
n-value = 0.030	Side slopes = 3.0 (m:1)	→ 2.0:1 max.	n-value = 0.030
Bed slope = 0.0141 ft./ft.	Bed slope (18.2:1) = 0.055 ft./ft.	→ 2.5:1 max.	Bed slope = 0.0340 ft./ft.
Freeboard = 0.4 ft.	Outlet apron depth, d = 1.0 ft.		Base flow = 14.9 cfs

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 7.0 acres Rainfall = ○ 0 - 3 in. ◉ 3 - 5 in. ○ 5+ in.

Apron elev. --- Inlet = 7332.6 ft. --- Outlet = 7330.7 ft. --- (H_{drop} = 0.9 ft.)

Chute capacity = Q5-year
Total capacity = Q10-year
Minimum capacity (based on a 5-year, 24-hour storm with a 3 - 5 inch rainfall)

Q_{high} = 14.9 cfs High flow storm through chute → Tw (ft.) = Program

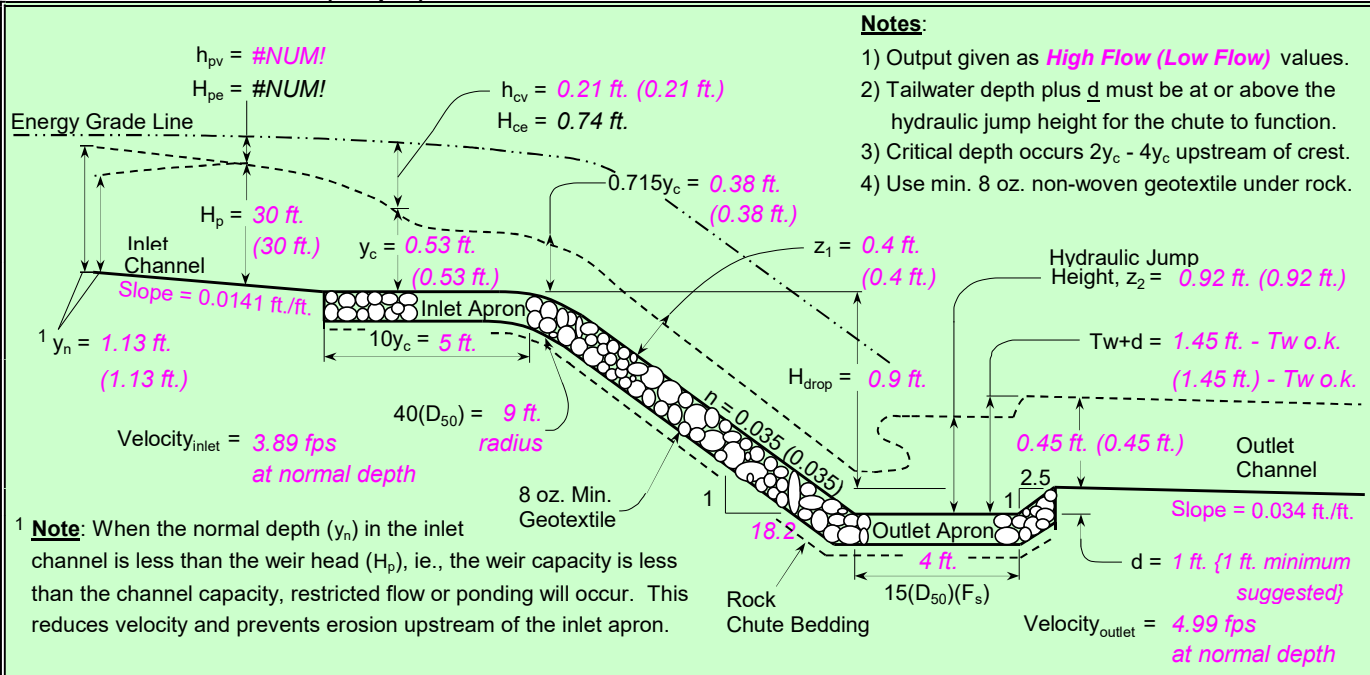
Q_{low} = 14.9 cfs Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

0.06

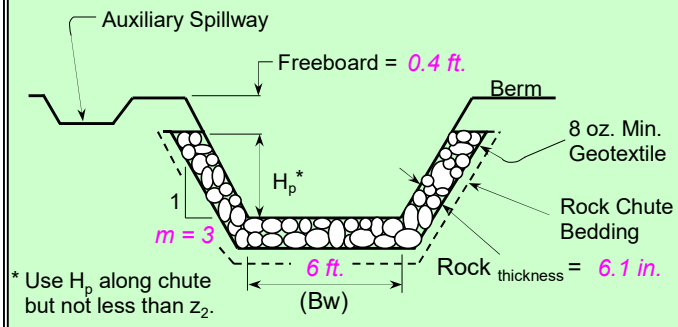
Profile and Cross Section (Output)



Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.
4) Use min. 8 oz. non-woven geotextile under rock.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



* Use H_p along chute but not less than z_2.

Typical Cross Section

q_t =	2.16 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.4 ft.	Normal depth in chute
n-value =	0.035	Manning's roughness coefficient
$D_{50}(F_s)$ =	3.1 in. (2 lbs. - 50% round / 50% angular)	
$2(D_{50})(F_s)$ =	6.1 in.	Rock chute thickness
Tw + d =	1.45 ft.	Tailwater above outlet apron
z_2 =	0.92 ft.	Hydraulic jump height
*** ***The outlet***	***will***	***function adequately***

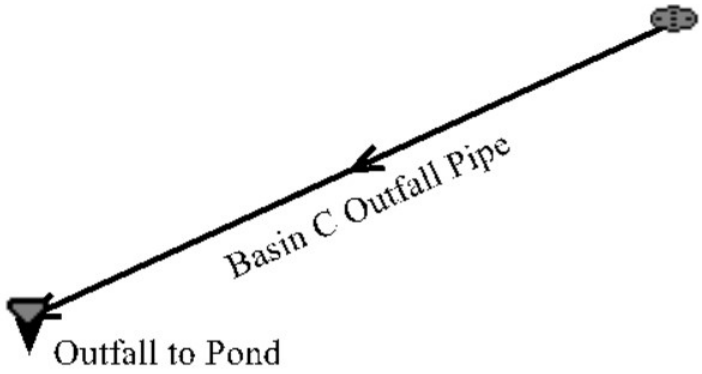
High Flow Storm Information

HYDRAULIC GRADE LINE CALCULATIONS

3/8/26

System: Basin C Outfall Pipe – 5yr Storm Event

Diagram:



Calculations:

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.00
Maximum Rural Overland Len. (ft): 0
Maximum Urban Overland Len. (ft): 0
Used UDFCD Tc. Maximum: No

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.00
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 7317.35

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	**Ground Elevation (ft)**	**Total Known Flow (cfs)**	**Local Contribution (cfs)**	**Drainage Area (Ac.)**	**Runoff Coefficient**	**5yr Coefficient**	**Overland Length (ft)**	**Overland Slope (%)**	**Gutter Length (ft)**	**Gutter Velocity (fps)**
Outfall to Pond	7320.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basin C Outfall Pipe	7345.10	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
Outfall to Pond	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Basin C Outfall Pipe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Manning s n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
Basin C Outfall Pipe	284.60	7317.00	5.2	7331.72	0.013	0.00	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition	Flow (cfs)	Surcharged Length (ft)	Comment
Basin C Outfall Pipe	23.95	13.56	6.06	3.45	3.34	7.97	3.19	Supercritical	1.80	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	Peak Flow (cfs)	Cross Section	Rise	Span	Rise	Span	Rise	Span	Area (ft^2)	Comment
Basin C Outfall Pipe	1.80	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	Exceeds max. Depth/Rise

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.

- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

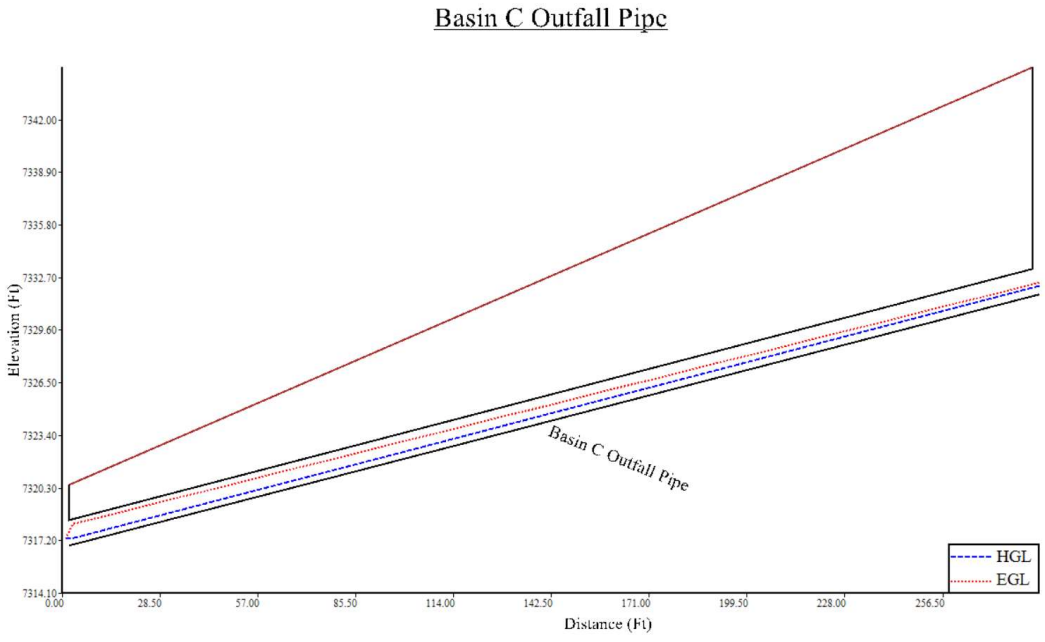
Grade Line Summary:

Tailwater Elevation (ft): 7317.35

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
Basin C Outfall Pipe	7317.00	7331.72	0.00	0.00	7317.35	7332.22	7318.26	14.14	7332.41

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Profile:



System: Basin C Outfall Pipe – 100yr Storm Event

Calculations:

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.00
Maximum Rural Overland Len. (ft): 0
Maximum Urban Overland Len. (ft): 0
Used UDFCD Tc. Maximum: No

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.00
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 7317.48

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)

Outfall to Pond	7320.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basin C Outfall Pipe	7345.10	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
Outfall to Pond	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Basin C Outfall Pipe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.20	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	**Sewer Length (ft)**	**Downstream Invert (ft)**	**Slope (%)**	**Upstream Invert (ft)**	**Manning s n**	**Bend Loss**	**Lateral Loss**	**Cross Section**	**Rise (ft or in)**	**Span (ft or in)**
Basin C Outfall Pipe	284.60	7317.00	5.2	7331.72	0.013	0.00	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	**Flow (cfs)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Froude Number**	**Flow Condition**	**Flow (cfs)**	**Surcharged Length (ft)**	**Comment**

Basin C Outfall Pipe	23.95	13.56	10.54	4.84	5.70	10.83	3.25	Supercritical	5.20	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
Basin C Outfall Pipe	5.20	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	Exceeds max. Depth/Rise

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

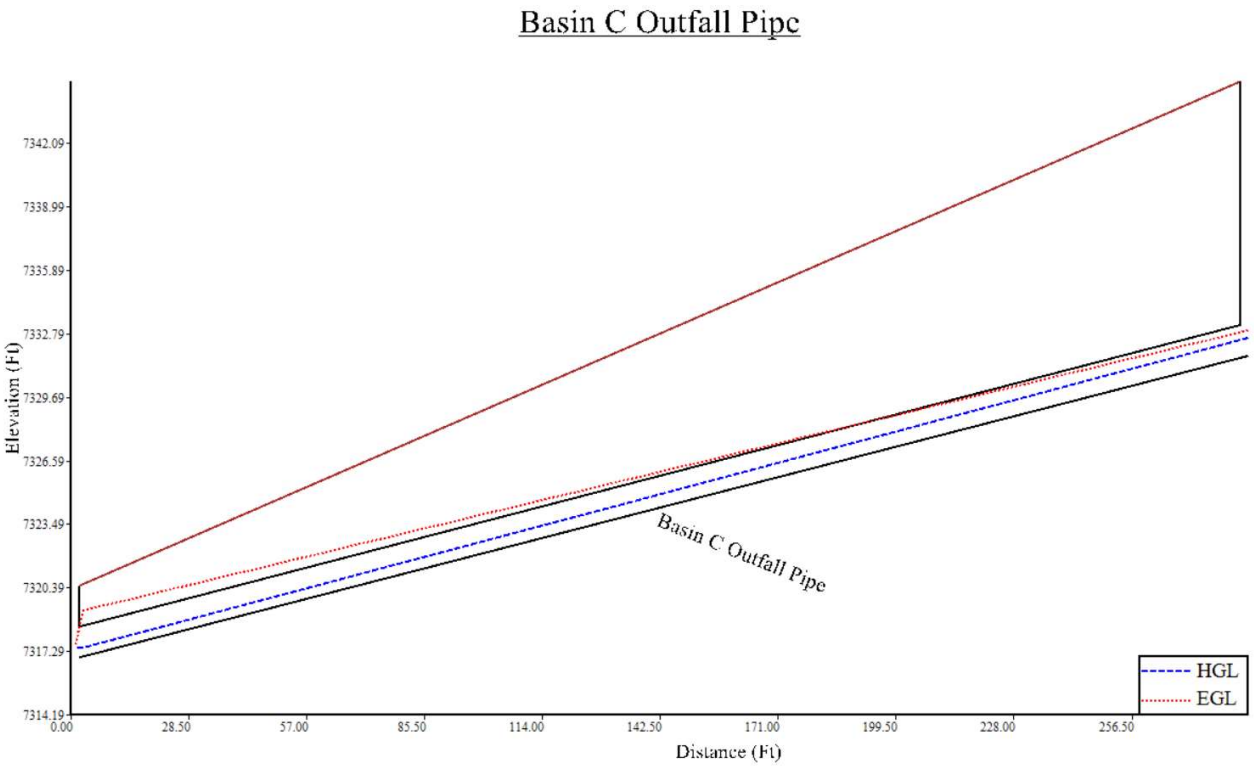
Grade Line Summary:

Tailwater Elevation (ft): 7317.48

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
Basin C Outfall Pipe	7317.00	7331.72	0.00	0.00	7317.48	7332.60	7319.30	13.67	7332.96

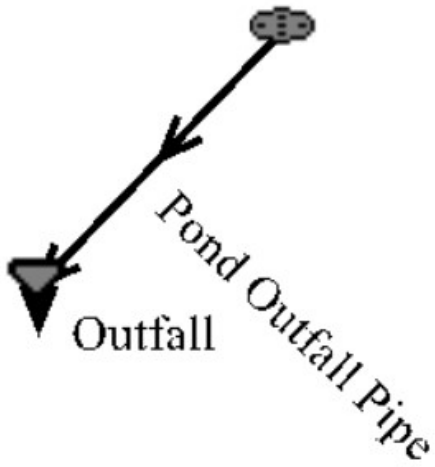
- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Profile:



System: Pond Outfall – 5yr Storm Event

Diagram:



Calculations:

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.00
Maximum Rural Overland Len. (ft): 0
Maximum Urban Overland Len. (ft): 0
Used UDFCD Tc. Maximum: No

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.00
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 7311.40

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
Outfall	7312.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pond Outfall Pipe	7315.67	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	Comment
Outfall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pond Outfall Pipe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	Sewer Length (ft)	Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Manning s n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
Pond Outfall Pipe	57.53	7311.30	2.1	7312.50	0.013	0.00	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	**Flow (cfs)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Froude Number**	**Flow Condition**	**Flow (cfs)**	**Surcharged Length (ft)**	**Comment**
Pond Outfall Pipe	15.21	8.61	1.39	1.59	1.04	2.43	1.77	Supercritical	0.10	0.00	Velocity is Too Low

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
Pond Outfall Pipe	0.10	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	Exceeds max. Depth/Rise

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

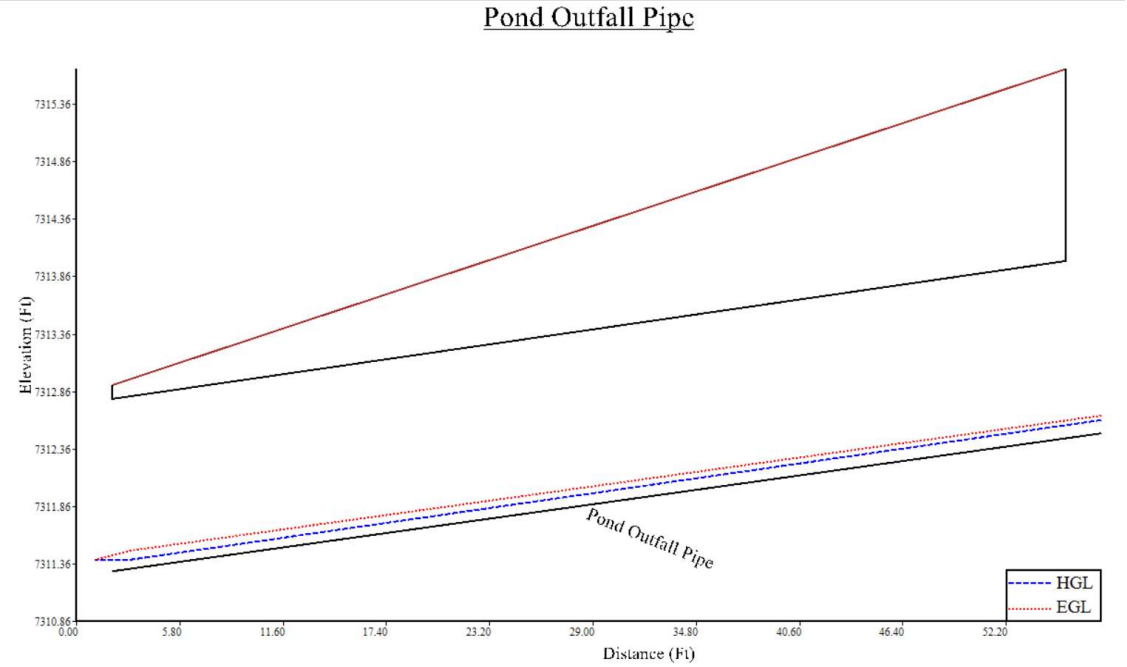
Tailwater Elevation (ft): 7311.40

	Invert Elev.	Downstream Manhole Losses	HGL	EGL

Element Name	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
Pond Outfall Pipe	7311.30	7312.50	0.00	0.00	7311.40	7312.62	7311.48	1.18	7312.66

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Profile:



System: Pond Outfall – 100yr Storm Event

Calculations:

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.00
Maximum Rural Overland Len. (ft): 0
Maximum Urban Overland Len. (ft): 0
Used UDFCD Tc. Maximum: No

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.00
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 3.0

Backwater Calculations:

Tailwater Elevation (ft): 7311.85

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
Outfall	7312.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Pond Outfall Pipe	7315.67	4.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
Outfall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pond Outfall Pipe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.30	

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	**Sewer Length (ft)**	**Downstream Invert (ft)**	**Slope (%)**	**Upstream Invert (ft)**	**Manning s n**	**Bend Loss**	**Lateral Loss**	**Cross Section**	**Rise (ft or in)**	**Span (ft or in)**
Pond Outfall Pipe	57.53	7311.30	2.1	7312.50	0.013	0.00	0.00	CIRCULAR	18.00 in	18.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	**Flow (cfs)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Froude Number**	**Flow Condition**	**Flow (cfs)**	**Surcharged Length (ft)**	**Comment**
Pond Outfall Pipe	15.21	8.61	9.54	4.52	6.55	7.40	2.06	Supercritical	4.30	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
Pond Outfall Pipe	4.30	CIRCULAR	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	18.00 in	1.77	Exceeds max. Depth/Rise

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

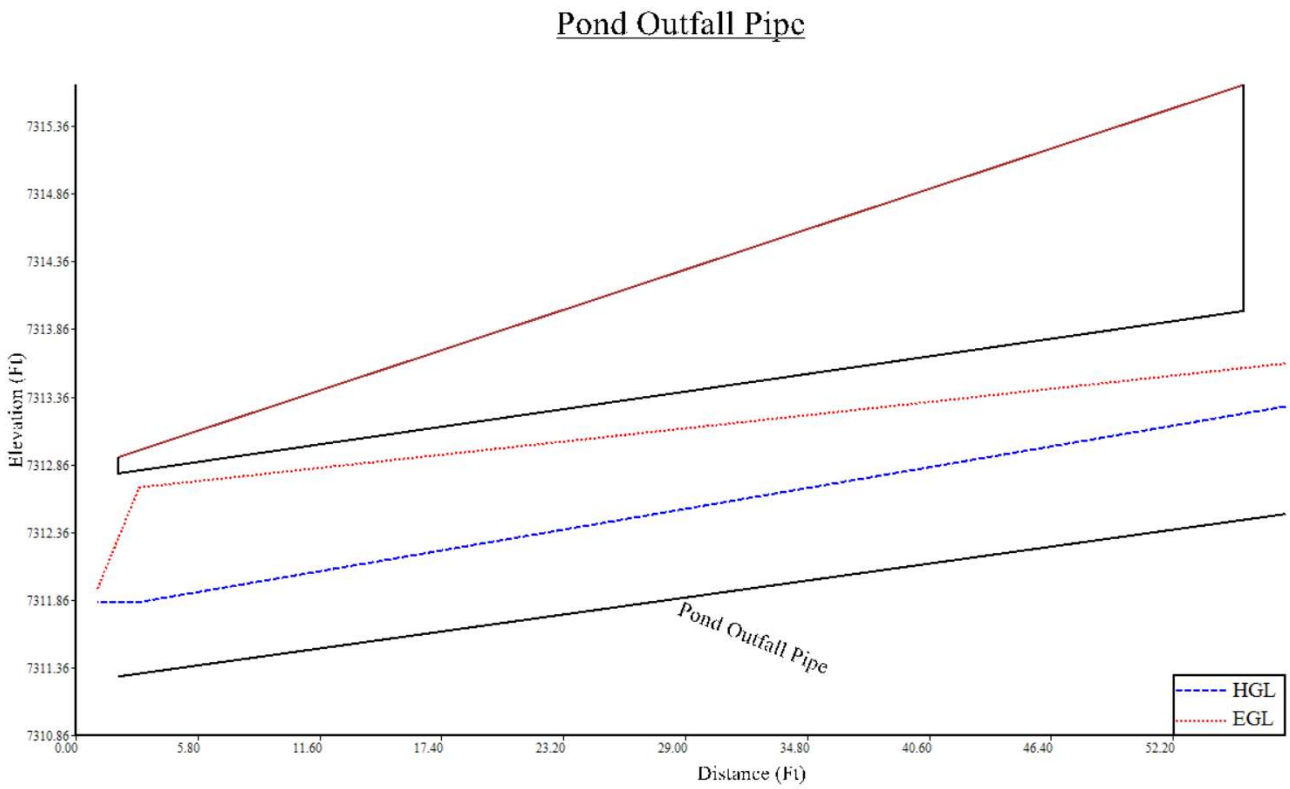
Tailwater Elevation (ft): 7311.85

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
Pond Outfall Pipe	7311.30	7312.50	0.00	0.00	7311.85	7313.29	7312.70	0.92	7313.61

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).

- Friction loss is always Upstream EGL - Downstream EGL.

Profile(s):



Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Designer: REP
Company: PRC Engineering
Date: March 7, 2026
Project: Beacon Lite Road Stockpile - FOREBAY DESIGN
Location: El Paso Cty, CO

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a — I_a = 2.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.020

C) Contributing Watershed Area — Area = 2.500 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — d_6 = 0.60 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area$) — V_{DESIGN} = ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$) — $V_{DESIGN\ OTHER}$ = 0.004 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = ac-ft

I) NRCS Hydrologic Soil Groups of Tributary Watershed
- i) Percentage of Watershed consisting of Type A Soils — HSG_A = 0 %
- ii) Percentage of Watershed consisting of Type B Soils — HSG_B = 100 %
- iii) Percentage of Watershed consisting of Type C/D Soils — $HSG_{C/D}$ = 0 %

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = 1.68 * i^{1.28}$
For HSG B: $EURV_B = 1.36 * i^{1.08}$
For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$
— $EURV_{DESIGN}$ = 0.004 ac-ft

K) User Input of Excess Urban Runoff Volume (EURV) Design Volume (Only if a different EURV Design Volume is desired) — $EURV_{DESIGN\ USER}$ = ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations: — Riprap Rundowns

5. Forebay

A) Minimum Forebay Volume
(V_{FMIN} = 0% of the WQCV) — V_{FMIN} = 0.00000 ac-ft — **A FOREBAY MAY NOT BE NECESSARY FOR THIS SIZE SITE**

B) Actual Forebay Volume — V_F = 0.0006 ac-ft

C) Forebay Depth
(D_F = 12 inch maximum) — D_F = 12.0 in

D) Forebay Discharge

i) Undetained 100-year Peak Discharge — Q_{100} = 5.20 cfs

ii) Forebay Discharge Design Flow
($Q_F = 0.02 * Q_{100}$) — Q_F = 0.10 cfs

E) Forebay Discharge Design

Choose One
- ○ Berm With Pipe
- ◉ Wall with Rect. Notch
- ○ Wall with V-Notch Weir

Flow too small for berm w/ pipe

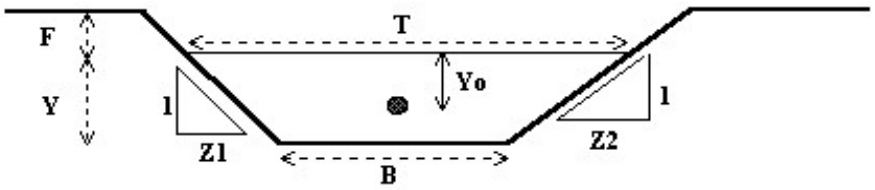
F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = in

G) Rectangular Notch Width — Calculated W_N = 2.8 in

Normal Flow Analysis - Trapezoidal Channel

Project: Beacon Lite Road Stockpile

Channel ID: Trickle Channel Qt = 1% of Q100 (7.6cfs) = 0.08cfs; 4.64cfs>0.08cfs, OK



Design Information (Input)			
Channel Invert Slope	So =	0.0050	ft/ft
Manning's n	n =	0.015	
Bottom Width	B =	2.00	ft
Left Side Slope	Z1 =	1.17	ft/ft
Right Side Slope	Z2 =	1.17	ft/ft
Freeboard Height	F =	0.00	ft
Design Water Depth	Y =	**0.50**	ft

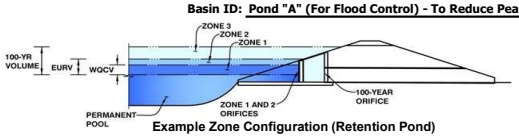
Normal Flow Condtion (Calculated)			
Discharge	**Q =**	**4.64**	cfs
Froude Number	**Fr =**	**0.99**	
Flow Velocity	**V =**	**3.59**	fps
Flow Area	A =	1.29	sq ft
Top Width	T =	3.17	ft
Wetted Perimeter	P =	3.54	ft
Hydraulic Radius	R =	0.37	ft
Hydraulic Depth	D =	0.41	ft
Specific Energy	Es =	0.70	ft
Centroid of Flow Area	Yo =	0.23	ft
Specific Force	Fs =	0.05	kip

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Beacon Lite Road Stockpile

Basin ID: Pond "A" (For Flood Control) - To Reduce Peak Flow to Historic Values (or less)



Example Zone Configuration (Retention Pond)

Watershed Information — **Flood Control Only**

Selected BMP Type =	**No BMP**	
Watershed Area =	11.75	acres
Watershed Length =	910	ft
Watershed Length to Centroid =	520	ft
Watershed Slope =	0.046	ft/ft
Watershed Imperviousness =	2.59%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	N/A	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) =	0.000	acre-feet	0.000	acre-feet
Excess Urban Runoff Volume (EURV) =	0.000	acre-feet	0.000	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.093	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.262	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.440	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.785	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.008	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	1.341	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	1.930	acre-feet		inches
Approximate 2-yr Detention Volume =	0.014	acre-feet		
Approximate 5-yr Detention Volume =	0.025	acre-feet		
Approximate 10-yr Detention Volume =	0.117	acre-feet		
Approximate 25-yr Detention Volume =	0.183	acre-feet		
Approximate 50-yr Detention Volume =	0.179	acre-feet		
Approximate 100-yr Detention Volume =	0.243	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (10-year) =	0.117	acre-feet
Zone 2 Volume (50-year - Zone 1) =	0.061	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.065	acre-feet
Total Detention Basin Volume =	0.243	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	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	

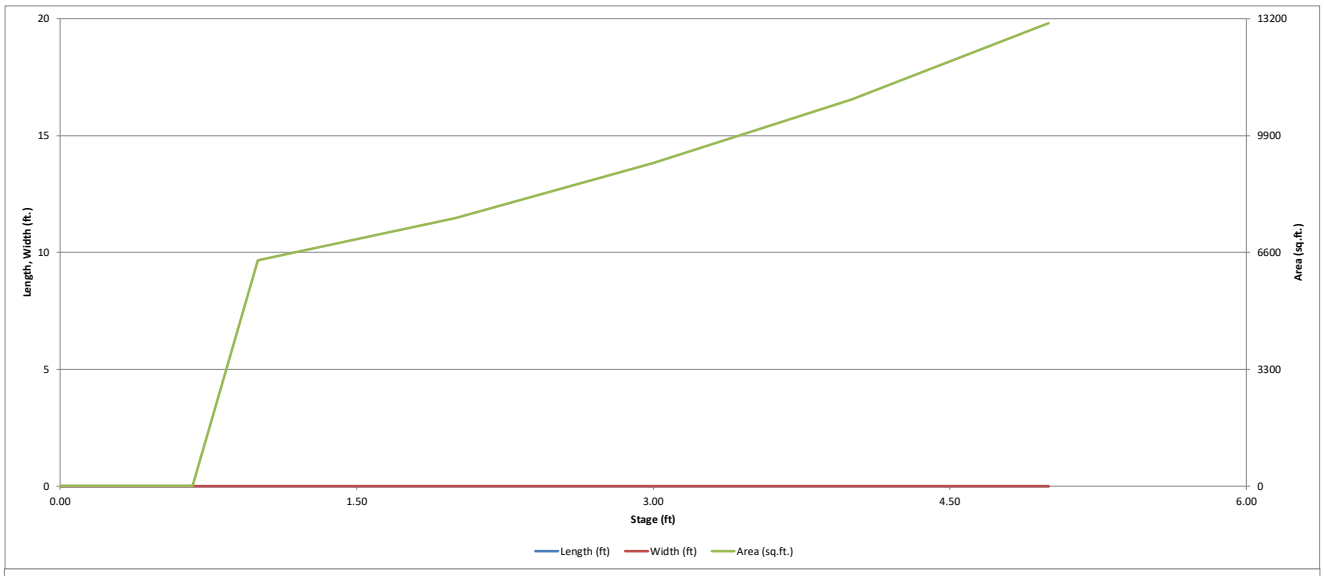
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	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

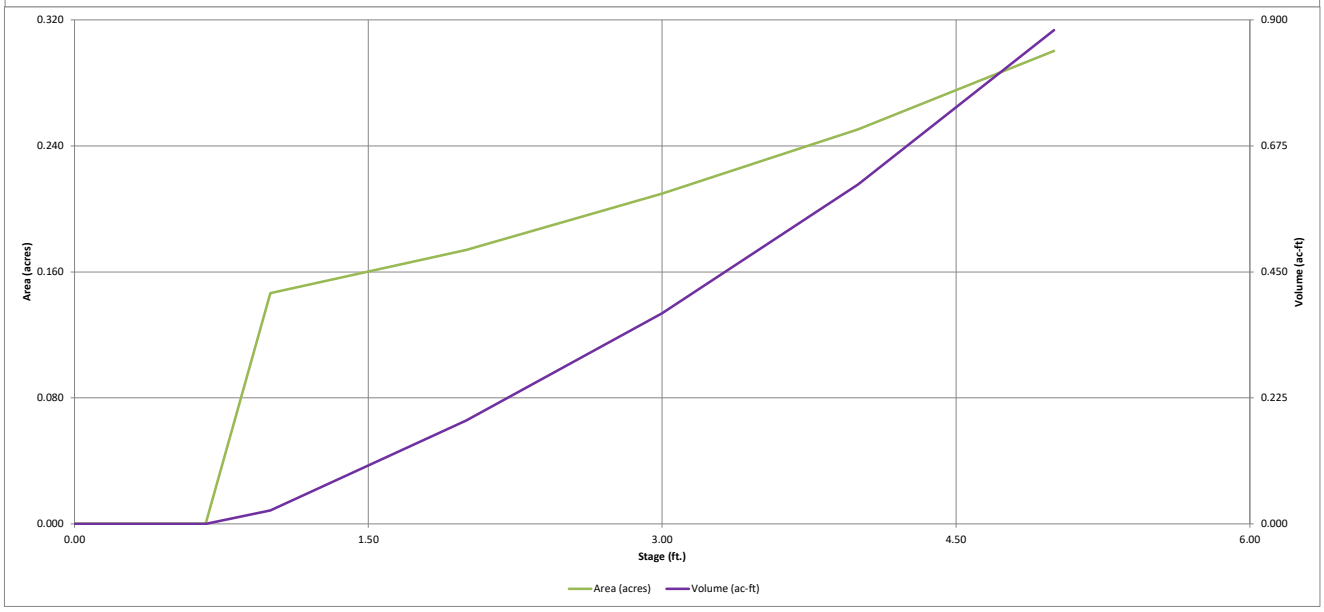
Depth Increment = ft

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)
Media Surface	--	0.00	--	--	--	10	0.000		
7315.67	--	0.67	--	--	--	10	0.000	7	0.000
7316	--	1.00	--	--	--	6,381	0.146	1,061	0.024
7317	--	2.00	--	--	--	7,574	0.174	8,038	0.185
7318	--	3.00	--	--	--	9,128	0.210	16,389	0.376
7319	--	4.00	--	--	--	10,918	0.251	26,412	0.606
7320	--	5.00	--	--	--	13,080	0.300	38,411	0.882

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



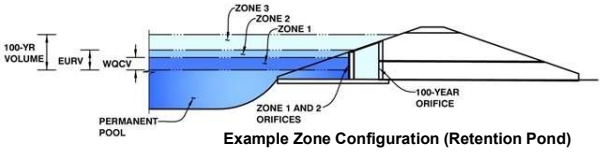


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **Beacon Lite Road Stockpile**

Basin ID: **Pond "A" (For Flood Control) - To Reduce Peak Flow to Historic Values (or less)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (10-year)	1.61	0.117	Circular Orifice
Zone 2 (50-year)	1.97	0.061	Circular Orifice
Zone 3 (100-year)	2.33	0.065	Weir&Pipe (Restrict)
Total (all zones)		0.243	

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 Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

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

Invert of Lowest Orifice =	N/A	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	N/A	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	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 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 1 Circular	Zone 2 Circular			Zone 1 Circular	Zone 2 Circular	
Invert of Vertical Orifice =	0.00	1.62	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.01	0.02	ft^2
Depth at top of Zone using Vertical Orifice =	2.04	2.50	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.04	0.08	feet
Vertical Orifice Diameter =	1.00	2.00	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 =	2.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.50	N/A	feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	2.50	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	13.07	N/A	
Horiz. Length of Weir Sides =	2.50	N/A	feet	Overflow Grate Open Area w/o Debris =	7.91	N/A	ft^2
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	3.96	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 =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.61	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.33	N/A	feet
Restrictor Plate Height Above Pipe Invert =	6.75		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.32	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.32	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.27	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	5.59	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.30	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.88	acre-ft

Calculated Parameters for Spillway

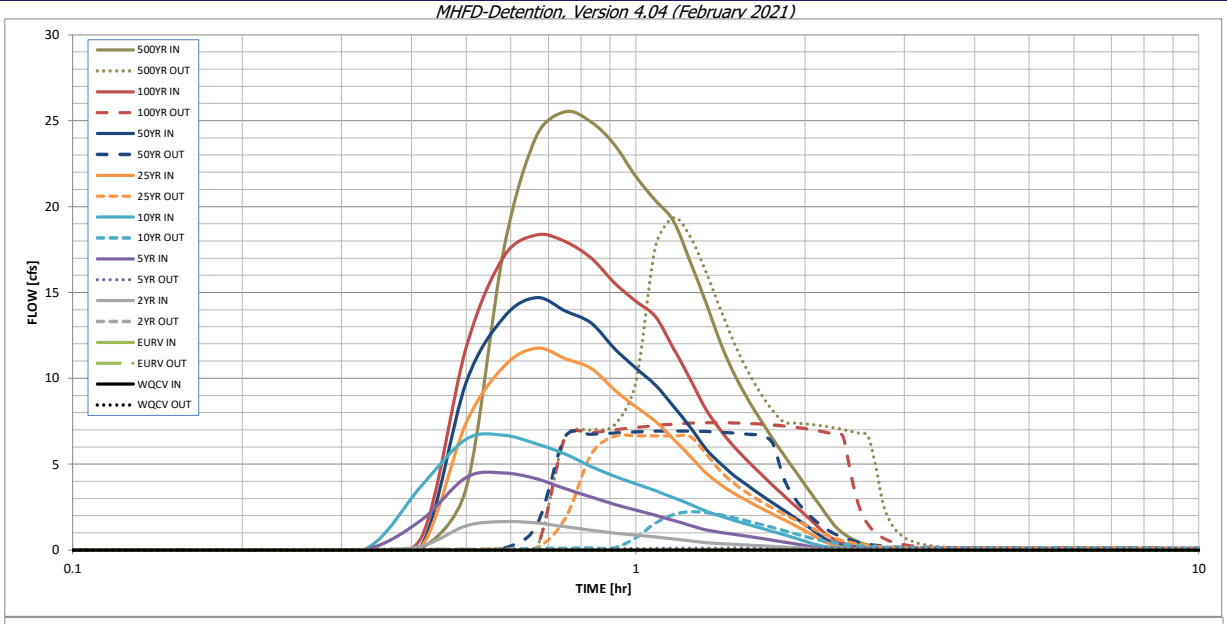
Routed Hydrograph Results

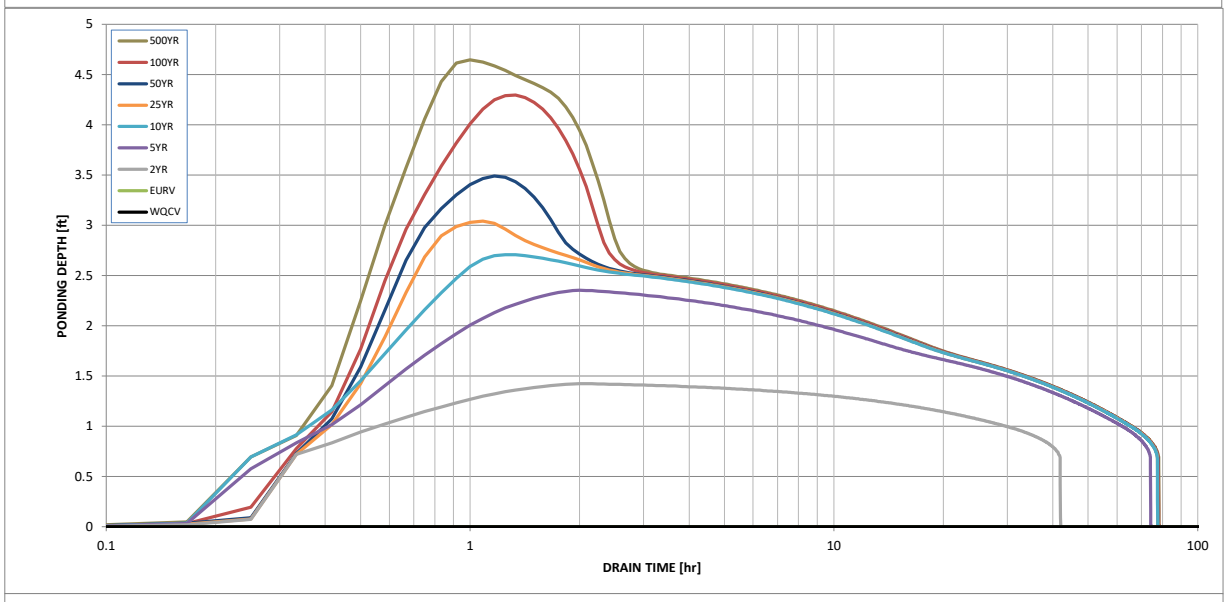
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

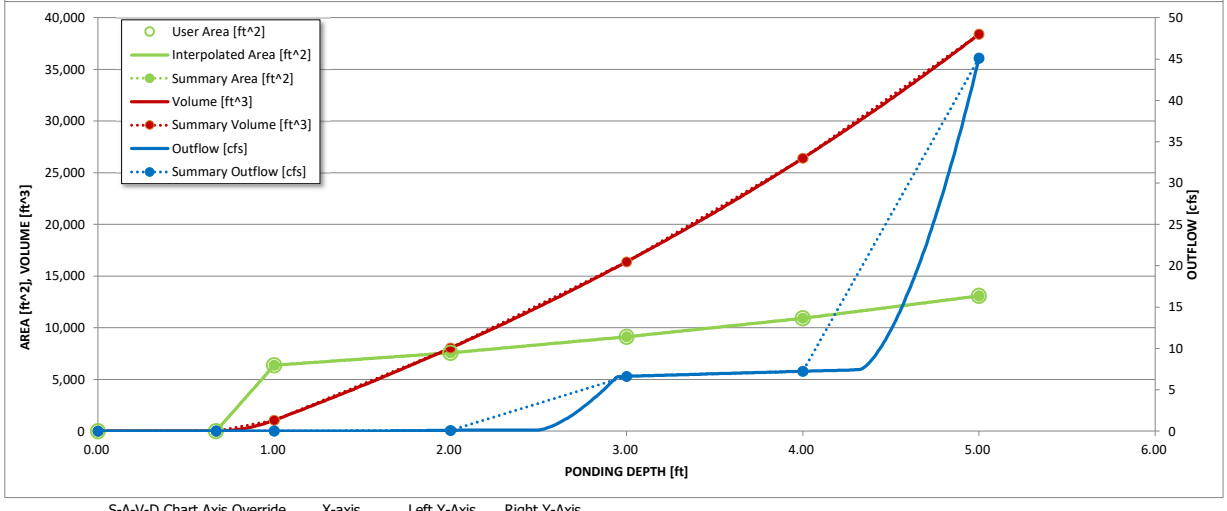
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.000	0.000	0.093	0.262	0.440	0.785	1.008	1.341	1.930
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.093	0.262	0.440	0.785	1.008	1.341	1.930
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	1.6	4.4	6.6	11.7	14.6	18.3	25.5
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.14	0.38	0.56	0.99	1.25	1.56	2.17
Peak Inflow Q (cfs) =	N/A	N/A	1.7	4.5	6.7	11.7	14.7	18.4	25.5
Peak Outflow Q (cfs) =			0.0	0.1	2.2	6.7	6.9	7.4	19.3
Ratio Peak Outflow to Predevelopment Q =			N/A	0.0	0.3	0.6	0.5	0.4	0.8
Structure Controlling Flow =			Vertical Orifice 1	Vertical Orifice 2	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =			N/A	N/A	0.3	0.8	0.9	0.9	0.9
Max Velocity through Grate 2 (fps) =			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =			41	70	71	66	63	59	51
Time to Drain 99% of Inflow Volume (hours) =			42	73	75	74	73	71	68
Maximum Ponding Depth (ft) =			1.42	2.35	2.71	3.04	3.49	4.30	4.65
Area at Maximum Ponding Depth (acres) =			0.16	0.19	0.20	0.21	0.23	0.27	0.28
Maximum Volume Stored (acre-ft) =			0.088	0.248	0.315	0.385	0.484	0.681	0.777

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







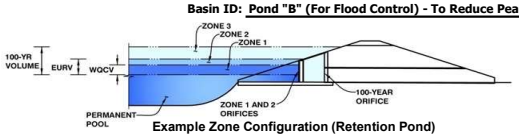
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Beacon Lite Road Stockpile

Basin ID: Pond "B" (For Flood Control) - To Reduce Peak Flow to Historic Values (or less)



Example Zone Configuration (Retention Pond)

Watershed Information — **Flood Control Only**

Selected BMP Type =	**No BMP**	
Watershed Area =	3.76	acres
Watershed Length =	395	ft
Watershed Length to Centroid =	190	ft
Watershed Slope =	0.063	ft/ft
Watershed Imperviousness =	17.18%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	N/A	hours
Location for 1-hr Rainfall Depths =	User Input	

Note: L / W Ratio < 1

L / W Ratio = 0.95

Steep Slope > 0.06 ft/f

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) =	0.000 acre-feet	0.000	acre-feet
Excess Urban Runoff Volume (EURV) =	0.000 acre-feet	0.000	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.069 acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.132 acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.192 acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.293 acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	0.364 acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	0.464 acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.649 acre-feet		inches
Approximate 2-yr Detention Volume =	0.043 acre-feet		
Approximate 5-yr Detention Volume =	0.064 acre-feet		
Approximate 10-yr Detention Volume =	0.109 acre-feet		
Approximate 25-yr Detention Volume =	0.138 acre-feet		
Approximate 50-yr Detention Volume =	0.146 acre-feet		
Approximate 100-yr Detention Volume =	0.182 acre-feet		

Define Zones and Basin Geometry

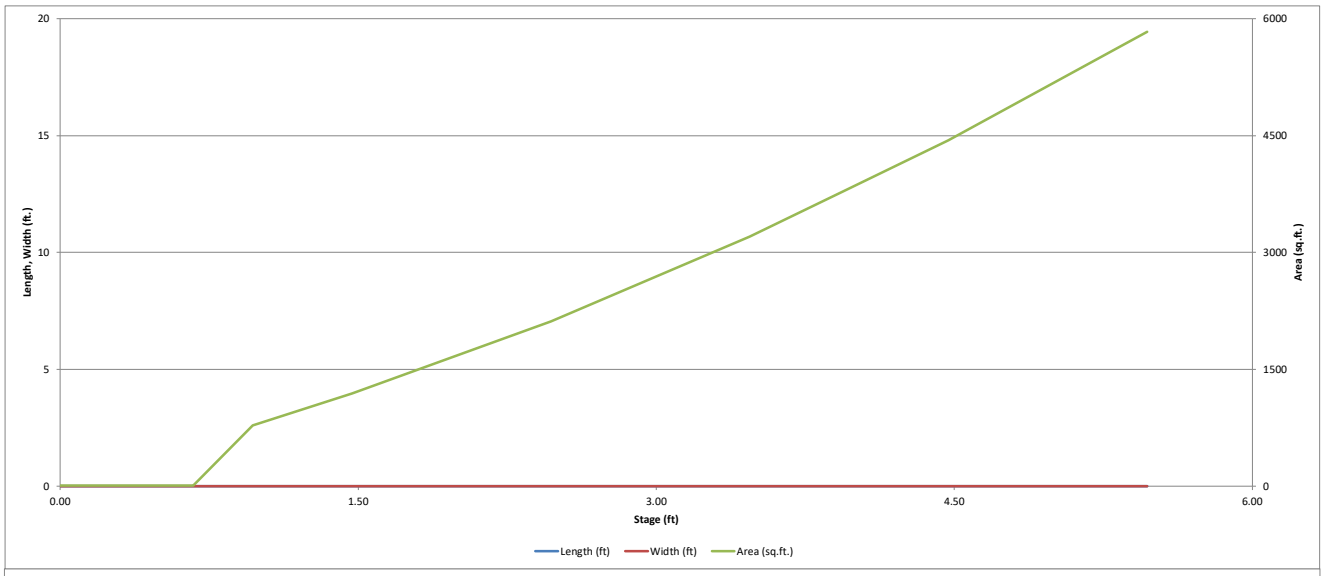
Zone 1 Volume (10-year) =	0.109	acre-feet
Zone 2 Volume (50-year - Zone 1) =	0.037	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.036	acre-feet
Total Detention Basin Volume =	0.182	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention 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

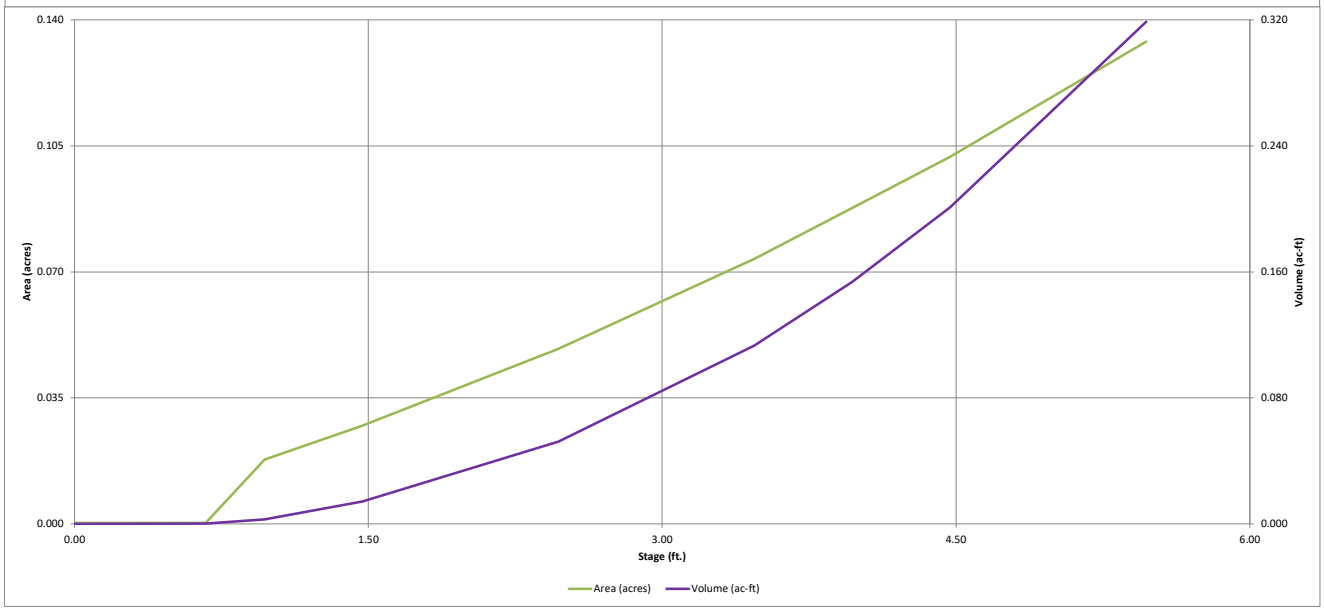
Depth Increment = ft

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)
Media Surface	--	0.00	--	--	--	10	0.000		
7322.2	--	0.67	--	--	--	10	0.000	7	0.000
7322.5	--	0.97	--	--	--	780	0.018	125	0.003
7323	--	1.47	--	--	--	1,190	0.027	618	0.014
7324	--	2.47	--	--	--	2,116	0.049	2,271	0.052
7325	--	3.47	--	--	--	3,205	0.074	4,931	0.113
7325.5	--	3.97	--	--	--	3,820	0.088	6,687	0.154
7326	--	4.47	--	--	--	4,440	0.102	8,752	0.201
7327	--	5.47	--	--	--	5,834	0.134	13,889	0.319

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



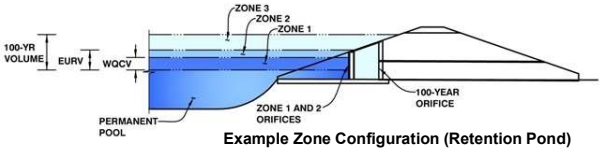


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **Beacon Lite Road Stockpile - Amendment No. 1**

Basin ID: **Pond "B" (For Flood Control) - To Reduce Peak Flow to Historic Values (or less)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (10-year)	3.41	0.109	Circular Orifice
Zone 2 (50-year)	3.89	0.037	Circular Orifice
Zone 3 (100-year)	4.28	0.036	Weir&Pipe (Restrict)
Total (all zones)		0.182	

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 Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

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

Invert of Lowest Orifice =	N/A	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	N/A	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	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 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 1 Circular	Zone 2 Circular			Zone 1 Circular	Zone 2 Circular	
Invert of Vertical Orifice =	0.00	1.00	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.00	0.00	ft^2
Depth at top of Zone using Vertical Orifice =	1.50	2.25	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.02	0.02	feet
Vertical Orifice Diameter =	0.40	0.40	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 =	2.25	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.25	N/A	feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	2.50	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	10.42	N/A	
Horiz. Length of Weir Sides =	2.50	N/A	feet	Overflow Grate Open Area w/o Debris =	7.91	N/A	ft^2
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	3.96	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 =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.76	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.39	N/A	feet
Restrictor Plate Height Above Pipe Invert =	8.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.46	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.30	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.26	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	4.56	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.10	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.21	acre-ft

Calculated Parameters for Spillway

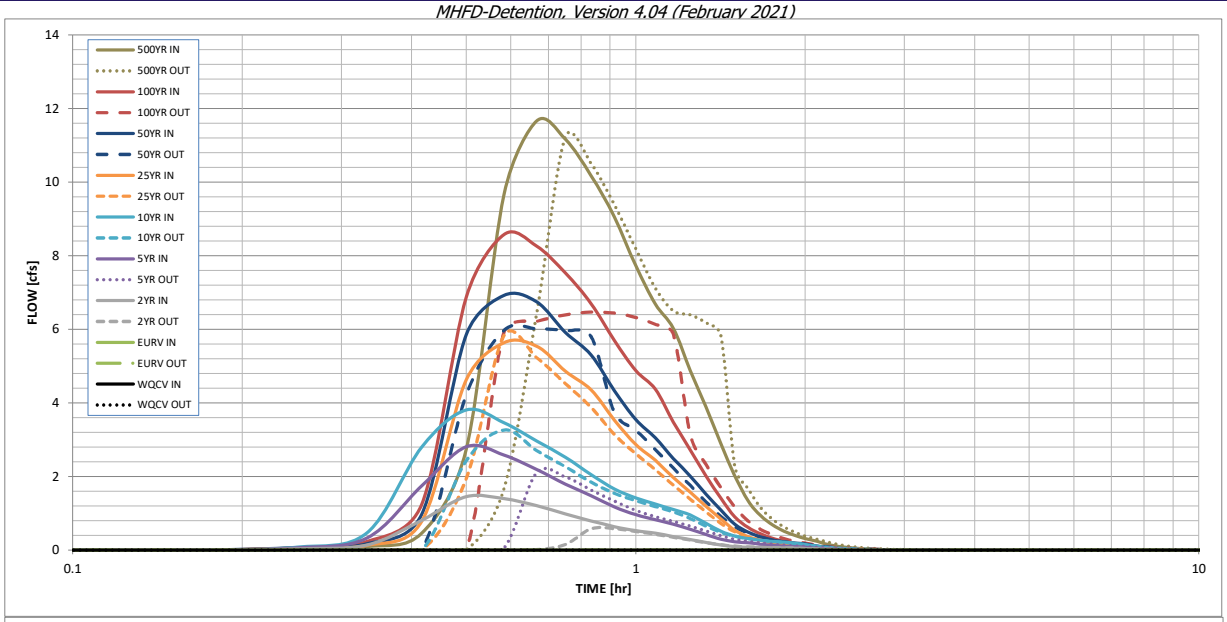
Routed Hydrograph Results

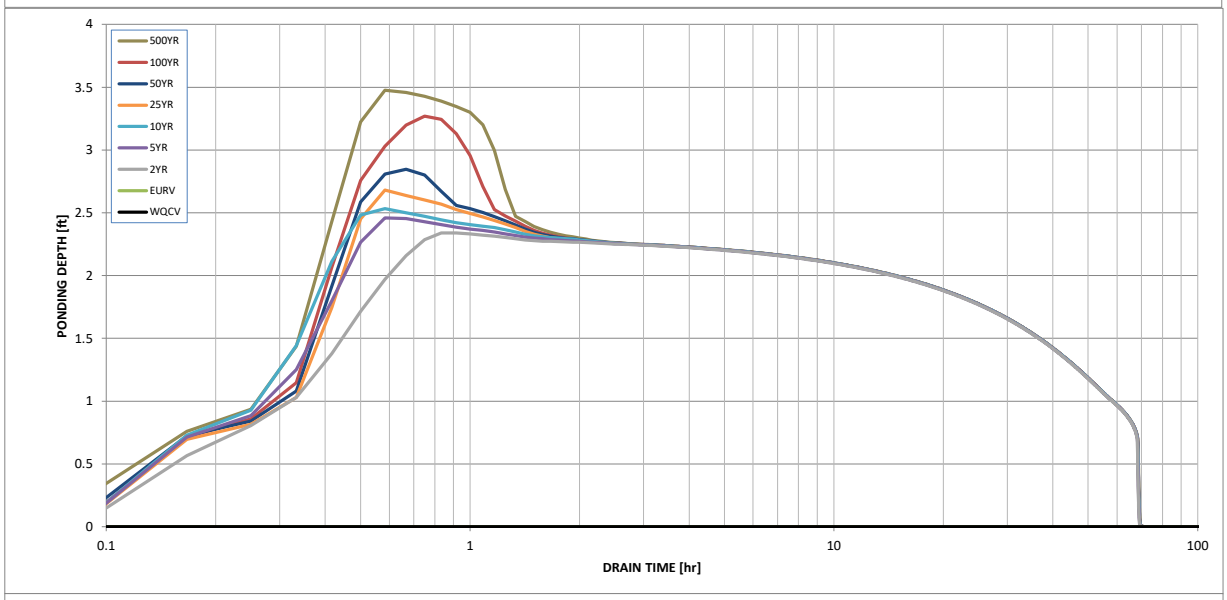
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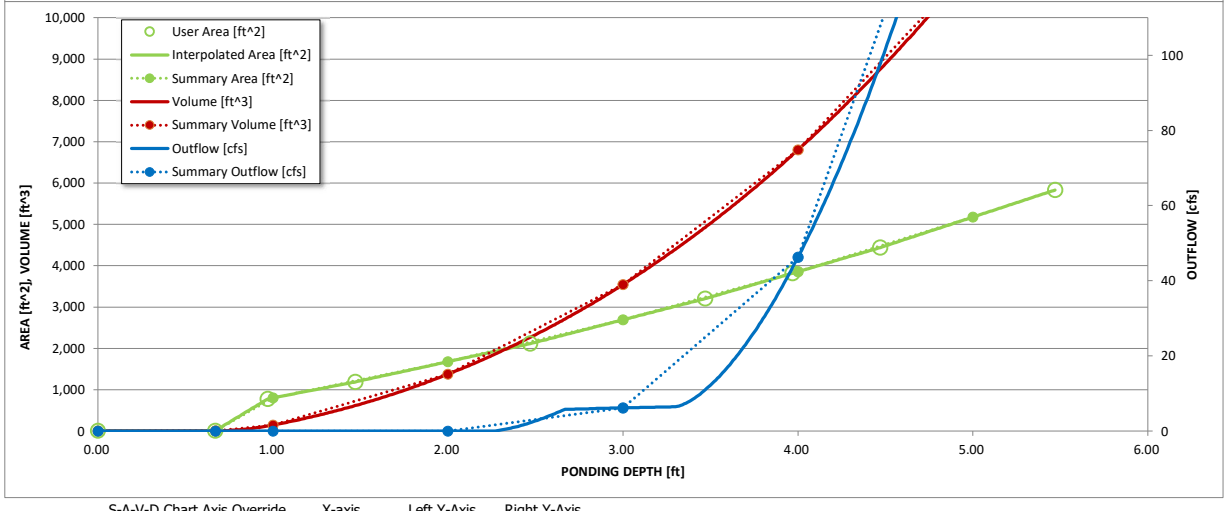
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.000	0.000	0.069	0.132	0.192	0.293	0.364	0.464	0.649
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.069	0.132	0.192	0.293	0.364	0.464	0.649
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.7	2.0	2.9	4.8	6.1	7.7	10.7
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.19	0.52	0.78	1.29	1.62	2.05	2.85
Peak Inflow Q (cfs) =	N/A	N/A	1.5	2.8	3.8	5.6	6.9	8.6	11.7
Peak Outflow Q (cfs) =			0.6	2.1	3.3	5.8	6.0	6.5	11.2
Ratio Peak Outflow to Predevelopment Q =			N/A	1.1	1.1	1.2	1.0	0.8	1.0
Structure Controlling Flow =			Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =			0.07	0.3	0.4	0.7	0.8	0.8	0.8
Max Velocity through Grate 2 (fps) =			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =			62	57	53	47	43	39	30
Time to Drain 99% of Inflow Volume (hours) =			67	65	63	60	58	55	51
Maximum Ponding Depth (ft) =			2.34	2.46	2.53	2.68	2.85	3.27	3.48
Area at Maximum Ponding Depth (acres) =			0.05	0.05	0.05	0.05	0.06	0.07	0.07
Maximum Volume Stored (acre-ft) =			0.046	0.052	0.055	0.063	0.072	0.098	0.113

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)





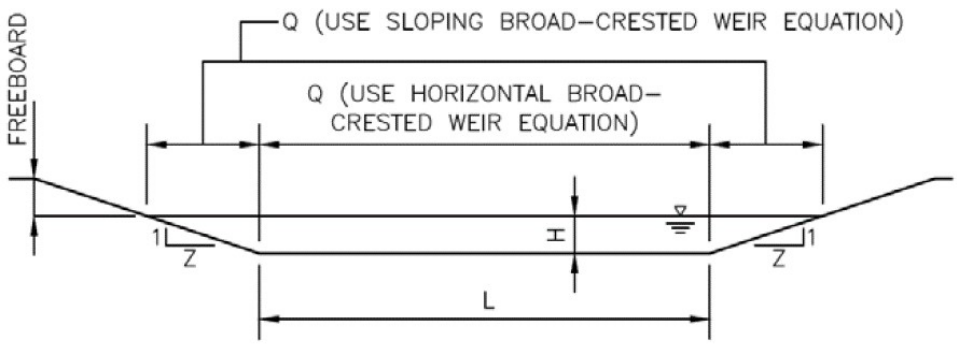


S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

EMERGENCY OVERFLOW SPILLWAY CALCULATIONS

TRAPEZOIDAL BROAD-CRESTED WEIR

Project: **Beacon Lite Road Stockpile - TSB**
Date: 3/7/2026
By: REP



Weir Type	**Equations**
Horizontal Broad-Crested	Q=Cbcw*L*H^1.5
Sloping Broad-Crested (one side)	Q=(2/5)*Cbcw*Z*H^2.5

Input (Yellow cells)

Discharge (cfs)	7.60	Q
Side Slopes (Horizontal:vertical)	4	Z
Horizontal Weir Coefficient	3.0	Cbcw
Sloping Weir Coefficient	3.0	Cbcw
Crest Length (ft)	20	L
Crest Elevation	7328.54	
Embankment Elevation	7330.00	

Output (Blue Cells)

Head Above Weir Crest (ft)	0.25	H
Freeboard (ft)	1.21	

Notes:

1. Urban Storm Drainage Criteria Manual: Volume 2 Section 5.14.2 methodology.
2. Horizontal broad crested weir and sloping broad crested weir equations used.
3. Weir coefficients can vary from 2.6 to 3.0, 3.0 is generally used. See HEC-22 for additional information.

rev 11/26/23

Figure 13-12c. Emergency Spillway Protection

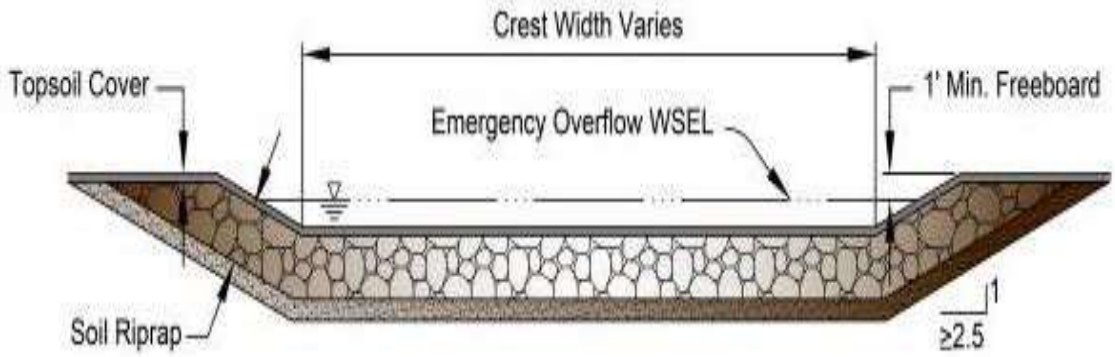
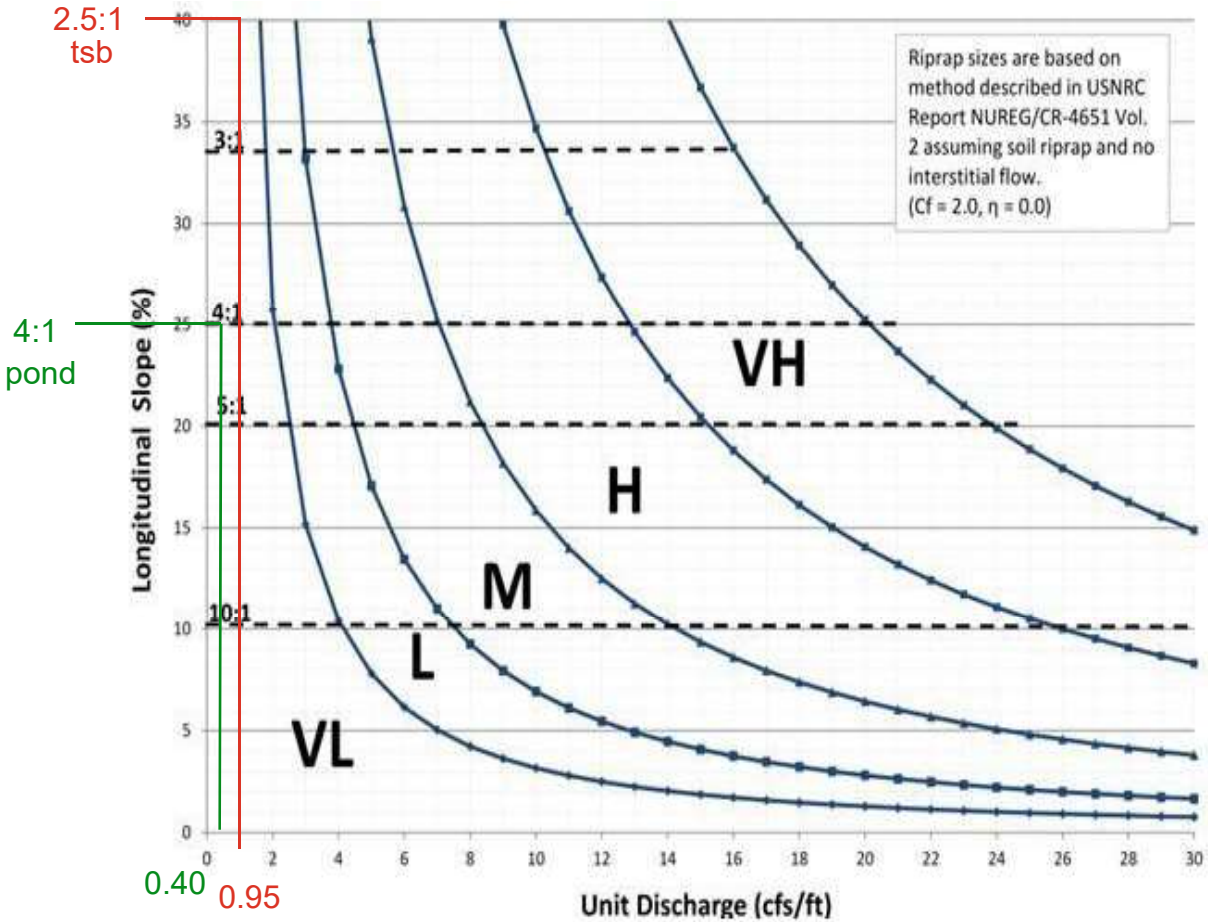


Figure 13-12d. Riprap Types for Emergency Spillway Protection



USE TYPE "L" (CONSERVATIVE VALUE)

USE TYPE "L" (CONSERVATIVE VALUE)

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

DP 2a3 - ex 42inch RCP

Invert Elev Dn (ft)	=	7305.66
Pipe Length (ft)	=	295.00
Slope (%)	=	1.47
Invert Elev Up (ft)	=	7310.00
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

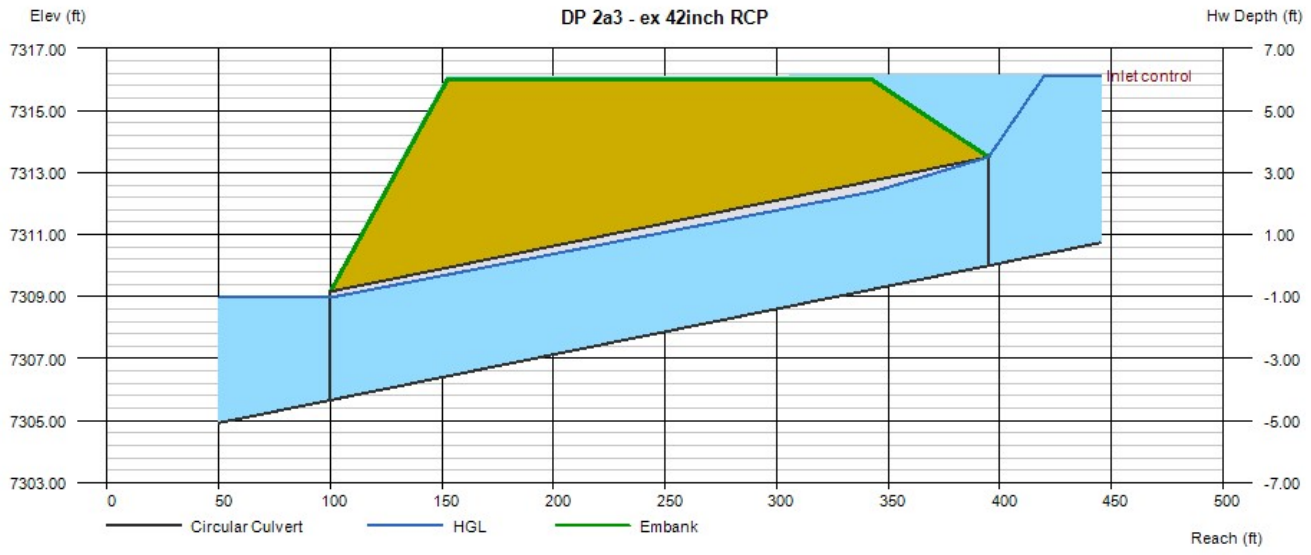
Top Elevation (ft)	=	7316.00
Top Width (ft)	=	190.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	117.20
Qmax (cfs)	=	117.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	117.20
Qpipe (cfs)	=	104.50
Qovertop (cfs)	=	12.70
Veloc Dn (ft/s)	=	11.10
Veloc Up (ft/s)	=	11.55
HGL Dn (ft)	=	7308.97
HGL Up (ft)	=	7313.12
Hw Elev (ft)	=	7316.13
Hw/D (ft)	=	1.75
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

DP 2c - 48inch RCP Q100

Invert Elev Dn (ft)	=	7273.38
Pipe Length (ft)	=	76.00
Slope (%)	=	3.45
Invert Elev Up (ft)	=	7276.00
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

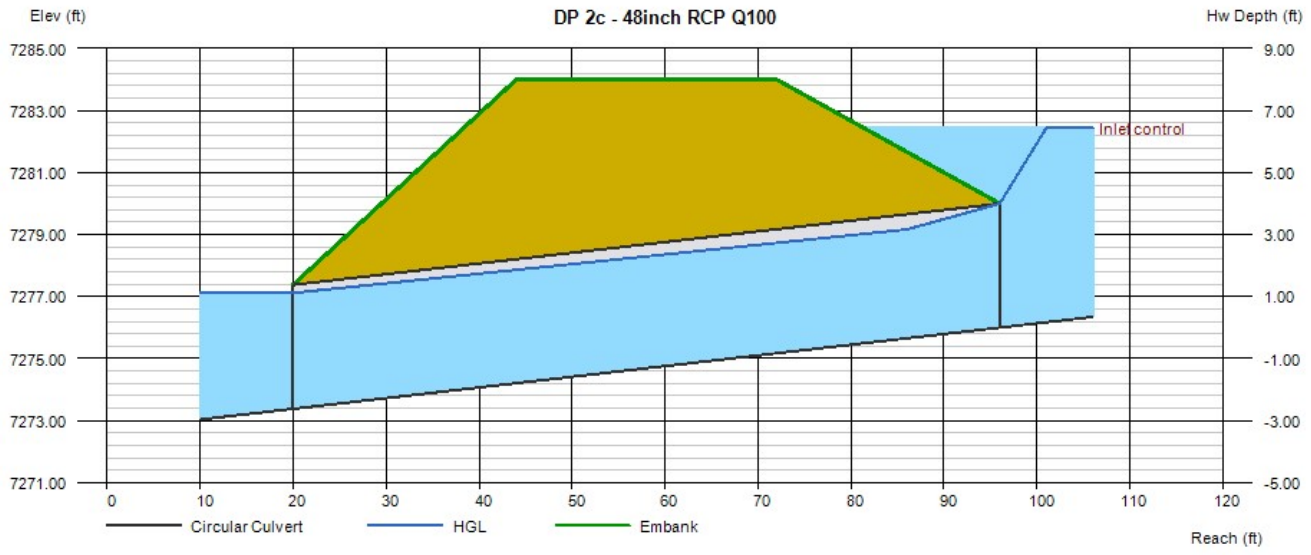
Top Elevation (ft)	=	7284.00
Top Width (ft)	=	28.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	136.60
Qmax (cfs)	=	136.60
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	136.60
Qpipe (cfs)	=	136.60
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	11.18
Veloc Up (ft/s)	=	11.78
HGL Dn (ft)	=	7277.12
HGL Up (ft)	=	7279.48
Hw Elev (ft)	=	7282.44
Hw/D (ft)	=	1.61
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

DP 2D - 48inch RCP Q100

Invert Elev Dn (ft)	=	7267.93
Pipe Length (ft)	=	170.00
Slope (%)	=	2.87
Invert Elev Up (ft)	=	7272.81
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

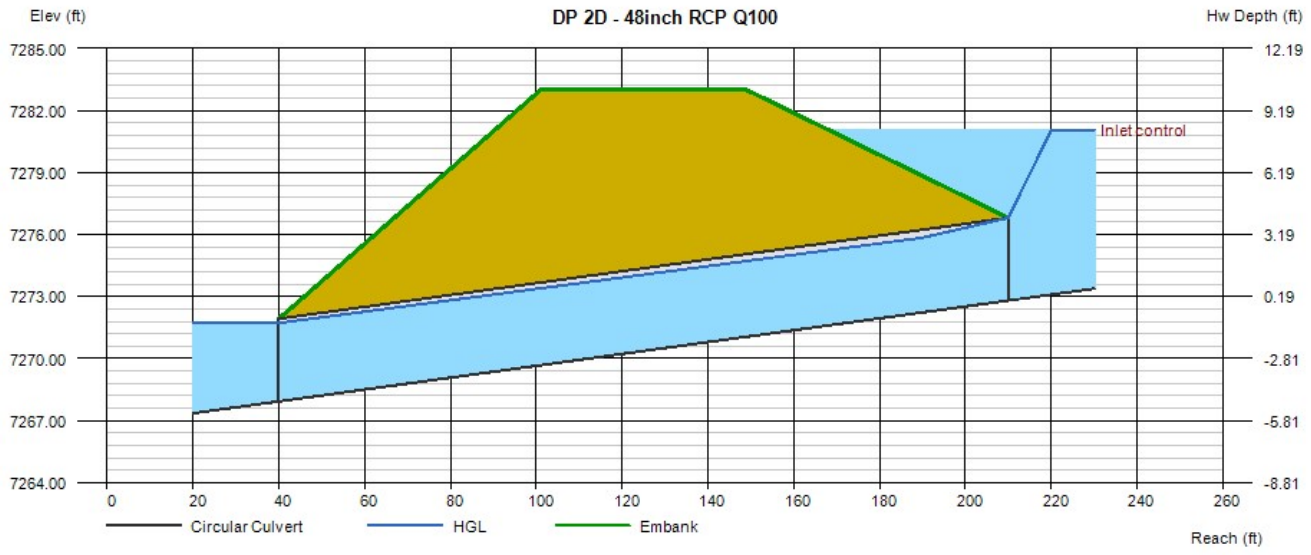
Top Elevation (ft)	=	7283.00
Top Width (ft)	=	48.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	149.40
Qmax (cfs)	=	149.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	149.40
Qpipe (cfs)	=	149.40
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	12.12
Veloc Up (ft/s)	=	12.57
HGL Dn (ft)	=	7271.73
HGL Up (ft)	=	7276.40
Hw Elev (ft)	=	7281.06
Hw/D (ft)	=	2.06
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

DP 4a2 - ex 42inch RCP Q100

Invert Elev Dn (ft)	=	7305.66
Pipe Length (ft)	=	295.00
Slope (%)	=	1.47
Invert Elev Up (ft)	=	7310.00
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

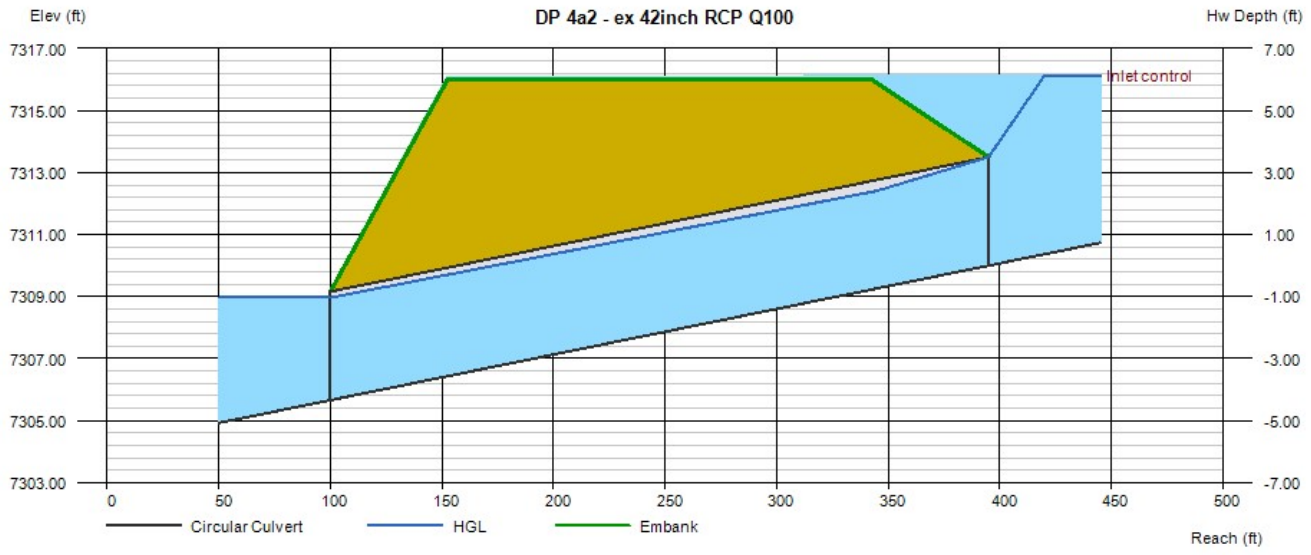
Top Elevation (ft)	=	7316.00
Top Width (ft)	=	190.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	116.00
Qmax (cfs)	=	116.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	116.00
Qpipe (cfs)	=	104.40
Qovertop (cfs)	=	11.60
Veloc Dn (ft/s)	=	11.09
Veloc Up (ft/s)	=	11.54
HGL Dn (ft)	=	7308.97
HGL Up (ft)	=	7313.11
Hw Elev (ft)	=	7316.12
Hw/D (ft)	=	1.75
Flow Regime	=	Inlet Control



Culvert Report

DP 4c - 48inch RCP

Invert Elev Dn (ft)	=	7273.38
Pipe Length (ft)	=	76.00
Slope (%)	=	3.45
Invert Elev Up (ft)	=	7276.00
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

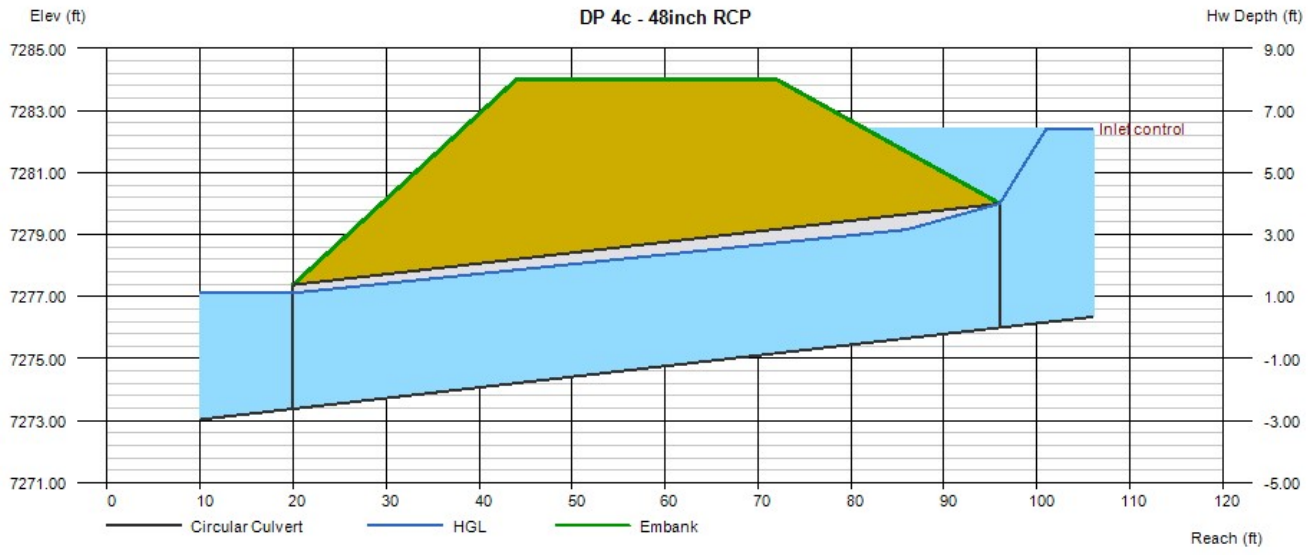
Top Elevation (ft)	=	7284.00
Top Width (ft)	=	28.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	136.10
Qmax (cfs)	=	136.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	136.10
Qpipe (cfs)	=	136.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	11.15
Veloc Up (ft/s)	=	11.75
HGL Dn (ft)	=	7277.12
HGL Up (ft)	=	7279.47
Hw Elev (ft)	=	7282.41
Hw/D (ft)	=	1.60
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

DP 4D - 48inch RCP Q100

Invert Elev Dn (ft)	=	7267.93
Pipe Length (ft)	=	170.00
Slope (%)	=	2.87
Invert Elev Up (ft)	=	7272.81
Rise (in)	=	48.0
Shape	=	Circular
Span (in)	=	48.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

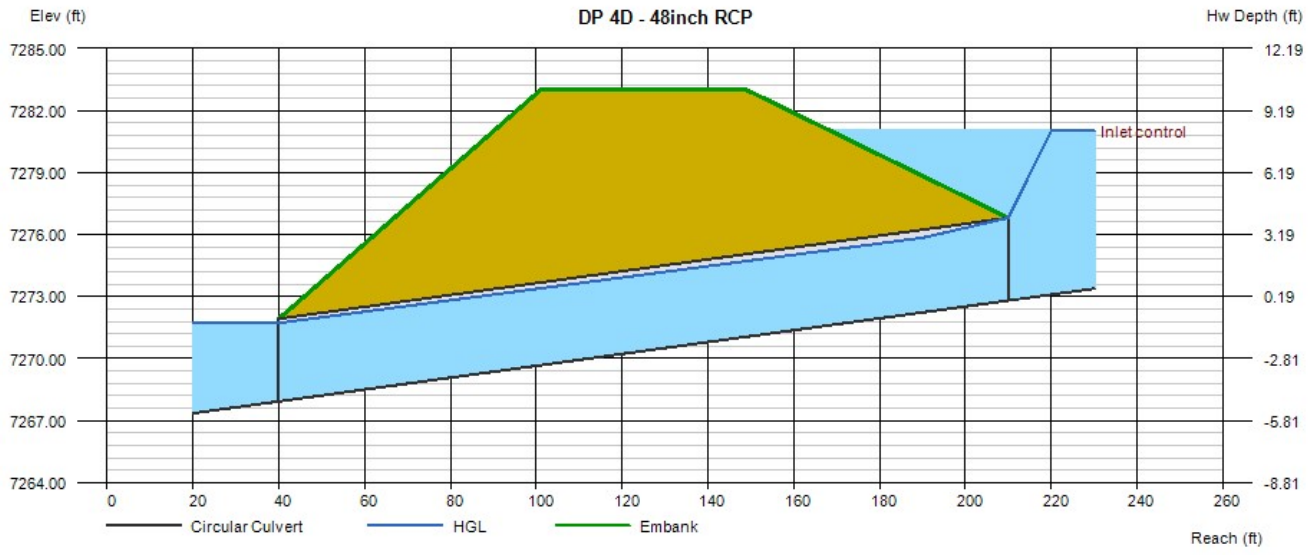
Top Elevation (ft)	=	7283.00
Top Width (ft)	=	48.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	149.00
Qmax (cfs)	=	149.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	149.00
Qpipe (cfs)	=	149.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	12.10
Veloc Up (ft/s)	=	12.55
HGL Dn (ft)	=	7271.72
HGL Up (ft)	=	7276.40
Hw Elev (ft)	=	7281.03
Hw/D (ft)	=	2.05
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Saturday, Mar 7 2026

Design Point 5 18inch Culvert Outfall to Pond

Invert Elev Dn (ft)	=	7317.00
Pipe Length (ft)	=	284.60
Slope (%)	=	5.17
Invert Elev Up (ft)	=	7331.71
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

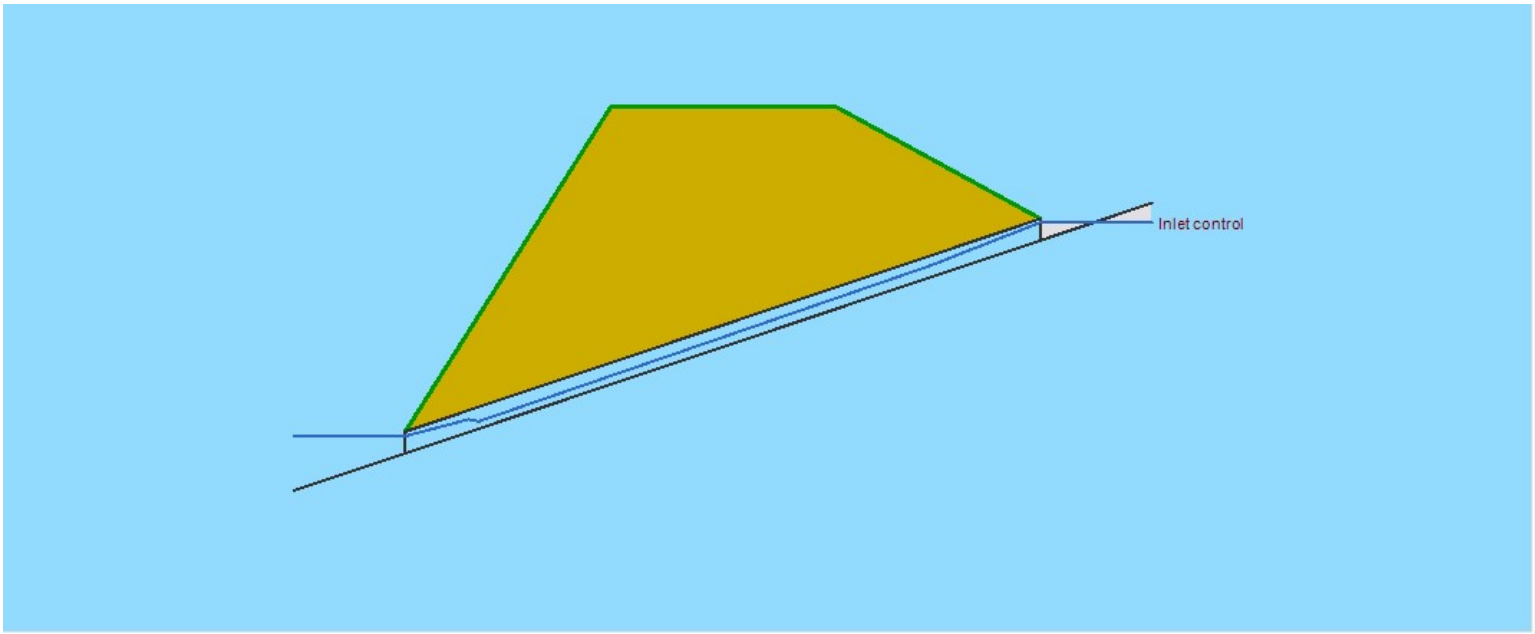
Top Elevation (ft)	=	7341.00
Top Width (ft)	=	100.00
Crest Width (ft)	=	100.00

Calculations

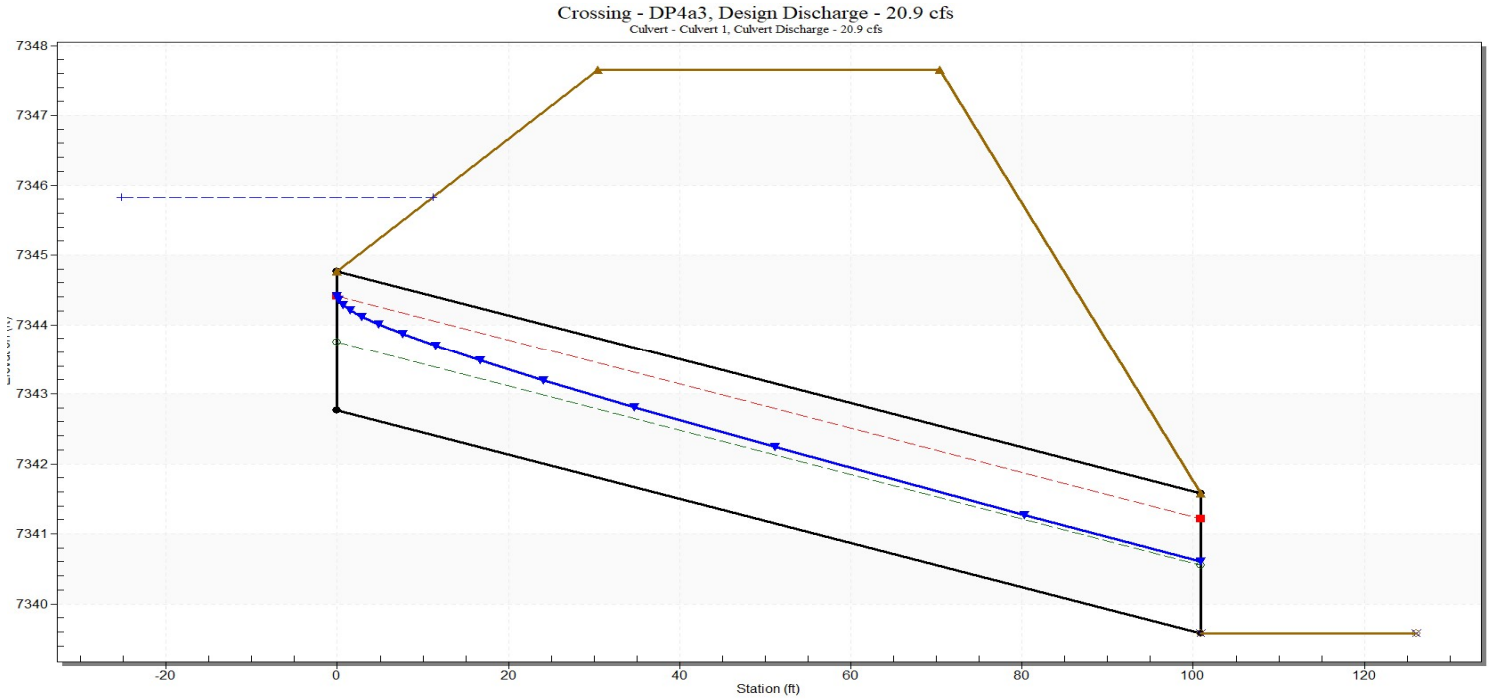
Qmin (cfs)	=	5.20
Qmax (cfs)	=	5.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	5.20
Qpipe (cfs)	=	5.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.46
Veloc Up (ft/s)	=	4.84
HGL Dn (ft)	=	7318.19
HGL Up (ft)	=	7332.59
Hw Elev (ft)	=	7332.95
Hw/D (ft)	=	0.83
Flow Regime	=	Inlet Control



Culvert Crossing: DP4a3



Culvert Summary Table - Culvert 1

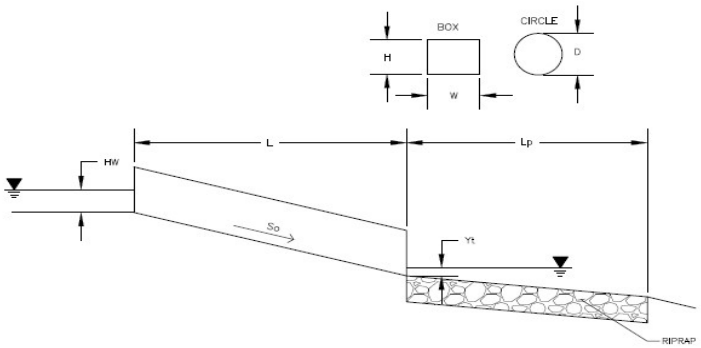
Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
4.00	4.00	7343.72	0.95	0.0*	1-S2n	0.41	0.70	0.41	0.00	8.67	0.00
5.69	5.69	7343.94	1.17	0.0*	1-S2n	0.49	0.84	0.49	0.00	9.61	0.00
7.38	7.38	7344.15	1.38	0.0*	1-S2n	0.56	0.97	0.56	0.00	10.35	0.00
9.07	9.07	7344.34	1.57	0.0*	1-S2n	0.62	1.08	0.62	0.00	10.97	0.00
10.76	10.76	7344.53	1.76	0.0*	1-S2n	0.68	1.18	0.70	0.00	11.01	0.00
12.45	12.45	7344.71	1.94	0.0*	1-S2n	0.73	1.27	0.76	0.00	11.33	0.00
14.14	14.14	7344.90	2.13	0.0*	5-S2n	0.78	1.35	0.78	0.00	12.41	0.00
15.83	15.83	7345.10	2.33	0.0*	5-S2n	0.83	1.43	0.87	0.00	12.07	0.00
17.52	17.52	7345.32	2.55	0.0*	5-S2n	0.88	1.51	0.92	0.00	12.48	0.00
19.21	19.21	7345.56	2.79	0.09	5-S2n	0.93	1.58	0.97	0.00	12.69	0.00
20.90	20.90	7345.83	3.06	0.39	5-S2n	0.97	1.64	1.02	0.00	12.90	0.00

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: **Beacon Lite Road Stockpile**

ID: **Pond Outfall Pipe (Tailwater Assumed 0ft depth - Conservative Design)**



Soil Type:
Choose One:
(•) Sandy
( ) Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	4.4	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	18	inches
Inlet Edge Type (Choose from pull-down list)		Grooved Edge Projecting	
OR:		**OR**	
Box Culvert:			
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	12.5	ft
Outlet Elevation **OR** Slope	Elev OUT =	11.3	ft
Culvert Length	L =	57.5	ft
Manning's Roughness	n =	0.012	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t,\ Elevation}$ =		ft
Max Allowable Channel Velocity	V =	5	ft/s

Calculated Results:

Culvert Cross Sectional Area Available	A =	1.77	ft^2
Culvert Normal Depth	Y_n =	0.53	ft
Culvert Critical Depth	Y_c =	0.80	ft
Froude Number	Fr =	2.23	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.89	
Sum of All Loss Coefficients	k_s =	2.09	ft
Headwater:			
Inlet Control Headwater	HW_I =	1.14	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	**HW =**	**13.64**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**0.76**	

Outlet Control Headwater Approximation Method Inaccurate for Low Flow - Backwater Calculations Required

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	1.60	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	0.60	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	6.13	
Flow Area at Max Channel Velocity	A_t =	0.88	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**5**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**3**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	1.01	ft
Minimum Theoretical Riprap Size	d_{50} min=	2	in
Nominal Riprap Size	d_{50} nominal=	6	in
MHFD Riprap Type	**Type =**	**VL**	

Appendix C

Historic Report Excerpts

Final Design

Interstate 25 South Express Lanes:

Castle Rock to Monument (The Gap)

Hydrology and Hydraulics Report

Prepared For:

CDOT Region 1 Hydraulics

7328 S. Revere Parkway, Suite 204A

Centennial, CO 80112

CH2M Project No.: 680954

CDOT Project No.: C 0252-475

CDOT Project Code: 22589

December 2020

Prepared By:

9191 Jamaica Street
Englewood, Colorado 80112

Contact:
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(719) 477 4942
troy.slocum@jacobs.com

Design Frequency

The 50-year design storm was used in rural areas to size the cross culvert and drainage system for the Project per CDOT DDM Table 7.2. The 100-year storm was used in urban areas, at FEMA floodplains, and as a check storm event. Existing cross culverts and drainage systems must either meet CDOT criteria or be upsized to pass the design flow rates. The 5-year design storm was used to design the drainage structures at the super-elevated locations and analyze ditch flows. The 500-year flow was used for scour analysis for the wildlife crossings in packages 2 and 3. Design frequencies for the various aspects of the Project are summarized in Table 2 below.

Table 2: Summary of design frequencies*

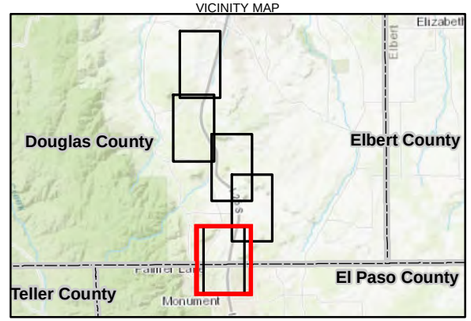
Drainage Type	**Frequency**
Cross Drainage	
Interstate – Design	50- and 100-year
Interstate – Check (Major)	100-year
Storm Drains	
Design	5- and 10-year
Check (Major)	50- and 100-year (sag)
Outlet Protection	
Design	10-year
Check	N/A
Wildlife Crossings	
Low flow	2-year
Design	100-year
Bridge Scour	500-year
Ditches	
Design	5- and 10-year
Check (Major)	50- and 100-year

*Modified from CDOT Table 7.2 for project specific design frequencies

Hydrologic Discharge



VICINITY MAP



LEGEND

- Milepost
- Culvert Crossing
- East Plum Creek Bridge
- County Boundary
- Match Line
- National Hydrography Dataset Flowline
- Direction of Flow
- Proposed Basin Area
- 161.65 Basin Name/Milepost of Crossing Culvert

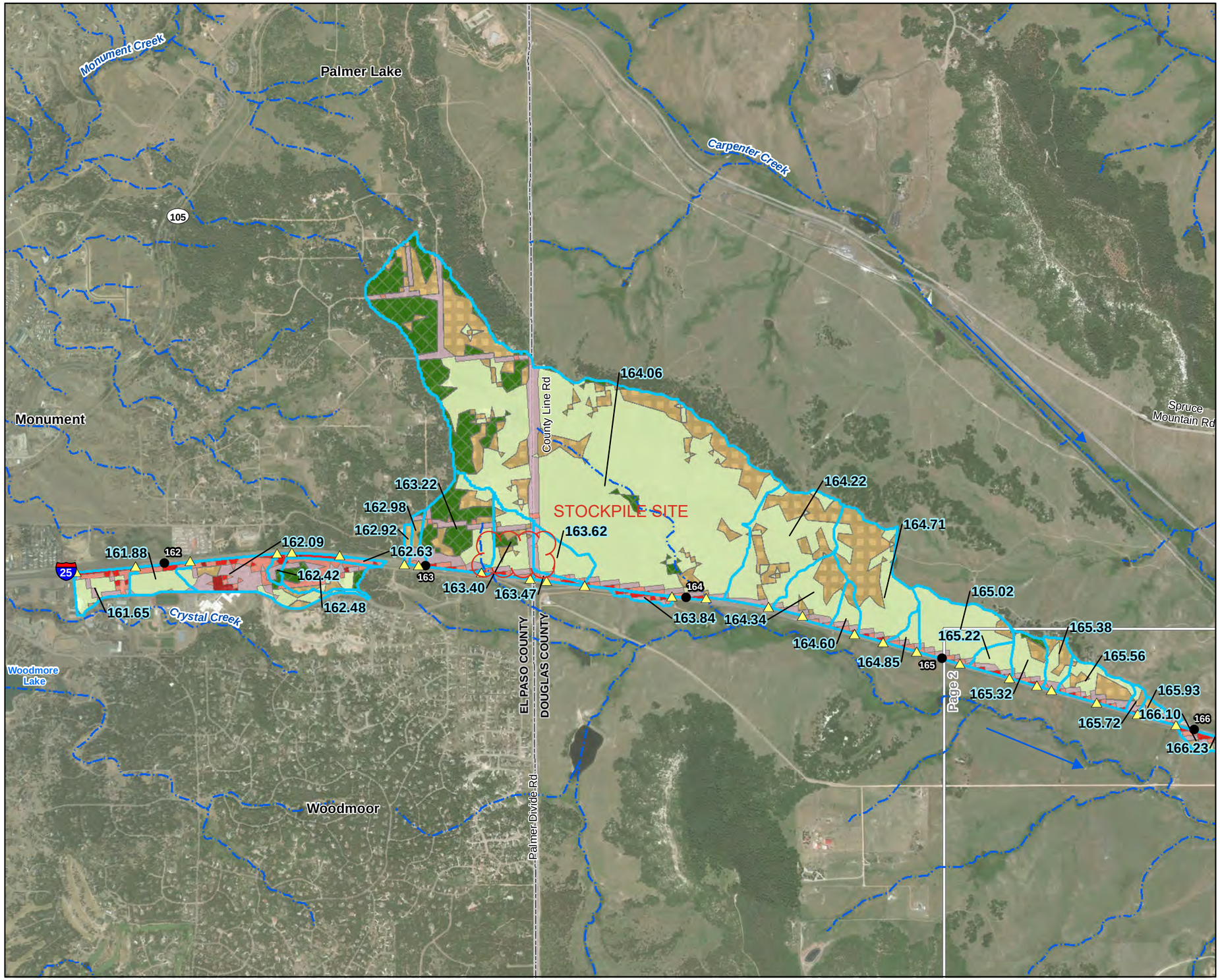
Source:
- National Hydrography Dataset - USGS 2017

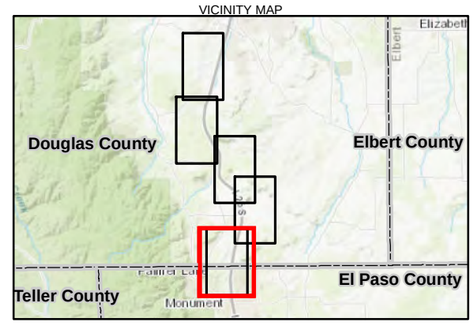
N

0 2,000
Feet

PAGE 1
Proposed Drainage Basin Map
I-25 South GAP Project
February 2018

COLORADO Department of Transportation





LEGEND

- Milepost
- Culvert Crossing
- East Plum Creek Bridge
- County Boundary
- Match Line
- National Hydrography Dataset Flowline
- Direction of Flow
- Proposed Basin Area
- 161.65 Basin Name/Milepost of Crossing Culvert

Land Cover

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Rock/Sand/Clay)
- Deciduous Forest
- Evergreen Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Cultivated Crops
- Emergent Herbaceous Wetlands

Source:
- National Land Cover Database, 2011
- National Hydrography Dataset - USGS 2017

N

0 2,000
Feet

PAGE 1
Proposed Condition Land Cover Map
I-25 South GAP Project
February 2018

COLORADO Department of Transportation

Project: I-25 Gap Package 2
Description: Hydrology Summary

Project No. 680954
Calculated by: JC

Station	MP	Area (ac)	C and CN								Point Precipitation (in) and Rainfall Intensity (in/hr)													Flows (cfs)				Method Used
			NRCS Soil Type A	NRCS Soil Type B	NRCS Soil Type C	NRCS Soil Type D	C5	C10	C50	C100	Tc (mins)	1hr (5yr)	1hr (10yr)	1hr (50yr)	1hr (100yr)	6hr (5yr)	6hr (10 yr)	6hr (50yr)	6hr (100yr)	I5	I10	I50	I100	Q5	Q10	Q50	Q100	
1023+79.32	161.65	17	0.0%	100.0%	0.0%	0.0%	0.40	0.46	0.61	0.66	22									2.7	3.1	4.2	4.9	18	24	43	53	Rational
1035+79.11	161.88	15	0.0%	100.0%	0.0%	0.0%	0.22	0.29	0.49	0.56	23									2.6	3.0	4.1	4.7	9	13	30	39	Rational
1046+77.58	162.09	36	0.0%	100.0%	0.0%	0.0%	0.53	0.58	0.69	0.73	17									3.1	3.6	4.8	5.6	58	74	119	145	Rational
1064+28.94	162.42	6	0.0%	100.0%	0.0%	0.0%	0.72	0.75	0.81	0.83	14									3.3	3.8	5.2	6.0	14	17	25	30	Rational
1067+21.01	162.48	22	0.0%	100.0%	0.0%	0.0%	0.42	0.47	0.62	0.67	17									3.1	3.6	4.9	5.6	29	38	67	84	Rational
1076+82.00	162.63	2	0.0%	100.0%	0.0%	0.0%	0.82	0.84	0.87	0.88	7									4.5	5.2	7.1	8.1	8	10	14	16	Rational
1089+62.37	162.92	2	0.0%	100.0%	0.0%	0.0%	0.32	0.38	0.55	0.62	10									3.9	4.5	6.1	7.0	3	4	8	11	Rational
1092+78.52	162.98	6	0.0%	100.0%	0.0%	0.0%	0.41	0.47	0.61	0.66	11									3.7	4.3	5.9	6.7	8	11	20	25	Rational
1105+44.92	163.22	52	0.0%	100.0%	0.0%	0.0%	0.17	0.24	0.45	0.53	41									1.9	2.2	2.9	3.4	16	26	69	93	Rational
1115+28.73	163.40	25	0.0%	90.8%	9.2%	0.0%	0.25	0.32	0.51	0.58	33									2.1	2.5	3.4	3.9	13	20	43	56	Rational
1118+56.83	163.47	3	0.0%	0.0%	100.0%	0.0%	0.85	0.87	0.88	0.89	16									3.2	3.7	5.0	5.8	7	9	12	14	Rational
1126+28.34	163.62	19	0.0%	0.0%	100.0%	0.0%	0.20	0.28	0.49	0.56	36									2.0	2.3	3.2	3.6	7	12	29	38	Rational
1143+92.72	163.84	4	0.0%	0.0%	100.0%	0.0%	0.86	0.87	0.88	0.89	6									4.5	5.3	7.2	8.3	16	19	26	31	Rational
1151+02.46	164.06	569	6.1%	34.5%	59.4%	0.0%	0.07	0.15	0.39	0.47	163	1.4	1.7	2.3	2.6	2.0	2.2	3.0	3.4					114	166	391	524	CUHP
1163+64.23	164.22	77	1.7%	0.0%	98.3%	0.0%	0.06	0.15	0.40	0.49	41									1.9	2.2	2.9	3.4	9	25	90	127	Rational
1170+31.60	164.34	29	0.0%	0.0%	100.0%	0.0%	0.15	0.23	0.46	0.54	23									2.6	3.0	4.1	4.7	11	21	55	74	Rational
1181+30.82	164.60	8	0.0%	0.0%	100.0%	0.0%	0.25	0.32	0.52	0.59	14									3.4	3.9	5.3	6.1	7	11	23	30	Rational
1186+90.10	164.71	61	0.0%	0.0%	100.0%	0.0%	0.07	0.16	0.41	0.50	13									3.5	4.0	5.5	6.3	15	40	139	194	Rational
1194+30.67	164.85	6	0.0%	0.0%	100.0%	0.0%	0.33	0.39	0.57	0.63	14									3.4	3.9	5.4	6.2	7	10	19	24	Rational
1204+30.36	165.02	43	0.0%	0.0%	88.4%	11.6%	0.11	0.20	0.44	0.52	35									2.1	2.4	3.3	3.7	10	21	62	85	Rational
1213+60.46	165.22	9	0.0%	0.0%	99.4%	0.6%	0.28	0.36	0.54	0.61	15									3.2	3.7	5.1	5.8	9	13	26	34	Rational
1219+31.34	165.32	15	0.0%	0.0%	56.9%	43.1%	0.17	0.25	0.47	0.55	27									2.4	2.8	3.8	4.3	6	10	27	36	Rational
1222+39.78	165.38	10	0.0%	0.0%	52.2%	47.8%	0.13	0.22	0.45	0.53	25									2.5	2.9	4.0	4.6	3	7	18	25	Rational
1231+80.46	165.56	21	0.0%	0.0%	91.6%	8.4%	0.25	0.32	0.52	0.59	14									3.3	3.9	5.3	6.0	17	26	57	74	Rational
1240+27.41	165.72	3	0.0%	6.8%	93.2%	0.0%	0.35	0.41	0.58	0.64	7									4.5	5.2	7.0	8.1	5	7	13	17	Rational
1248+25.89	165.93	113	0.0%	0.5%	83.5%	16.1%	0.20	0.28	0.49	0.57	22									2.7	3.1	4.2	4.9	60	99	235	312	Rational
1257+28.19	166.10	6	0.0%	79.9%	20.1%	0.0%	0.52	0.57	0.68	0.72	11									3.7	4.3	5.9	6.8	12	15	25	30	Rational
1264+71.53	166.23	8	0.0%	100.0%	0.0%	0.0%	0.38	0.44	0.59	0.65	13									3.5	4.1	5.5	6.4	10	14	25	32	Rational
1281+21.32	166.55	14	0.0%	100.0%	0.0%	0.0%	0.35	0.41	0.57	0.63	18									3.0	3.5	4.7	5.5	14	19	37	47	Rational
1294+82.22	166.80	24	0.0%	100.0%	0.0%	0.0%	0.34	0.40	0.57	0.63	20									2.8	3.3	4.5	5.1	23	32	61	78	Rational
1308+17.72	167.06	10	82.9%	17.1%	0.0%	0.0%	0.56	0.58	0.65	0.68	23									2.6	3.0	4.1	4.7	15	18	27	33	Rational
1341+65.46	167.53	10	48.7%	49.3%	0.0%	2.0%	0.59	0.62	0.69	0.72	17									3.1	3.5	4.8	5.5	19	23	34	42	Rational
1345+28.24	167.74	1968	28.6%	19.3%	37.8%	14.3%	0.04	0.10	0.29	0.38	336	1.4	1.7	2.3	2.6	2.0	2.2	3.0	3.4					162	233	856	1213	CUHP

Project: I-25 Gap Package 2
Description: Hydrologic Rational Calculations

Project No. 680954
Calculated by: JC

Station	MP	Crossing Type	Area (ac)	OL Length (ft)	OL Slope (ft/ft)	Channel Length (ft)	Channel Slope (ft/ft)	Impervious Area	SC A (ac)	SC B (ac)	SC C (ac)	SC D (ac)	K
1023+79.32	161.65	Full-I	16.6	450	0.060	1219	0.036	49.9%	0.0	16.6	0.0	0.0	15
1035+79.11	161.88	Full-I	14.7	390	0.080	1367	0.043	29.0%	0.0	14.7	0.0	0.0	15
1046+77.58	162.09	Full-I	35.9	300	0.140	2587	0.051	64.2%	0.0	35.9	0.0	0.0	20
1064+28.94	162.42	Ditch	6.0	167	0.007	1215	0.048	85.2%	0.0	6.0	0.0	0.0	20
1067+21.01	162.48	Full	22.4	500	0.130	1558	0.068	51.5%	0.0	22.4	0.0	0.0	20
1076+82.00	162.63	Ditch	2.2	101	0.038	867	0.044	96.2%	0.0	2.2	0.0	0.0	20
1089+62.37	162.92	Full	2.5	70	0.090	732	0.108	40.2%	0.0	2.5	0.0	0.0	15
1092+78.52	162.98	Full-I	5.6	150	0.100	1039	0.048	50.4%	0.0	5.6	0.0	0.0	20
1105+44.92	163.22	Full-I	51.9	500	0.110	2482	0.034	22.0%	0.0	51.9	0.0	0.0	7
1115+28.73	163.40	Full-I	25.1	390	0.040	2316	0.036	31.3%	0.0	22.8	2.3	0.0	15
1118+56.83	163.47	Ditch	2.7	120	0.004	581	0.003	100.0%	0.0	0.0	2.7	0.0	20
1126+28.34	163.62	Full-I	18.8	500	0.120	2011	0.043	19.6%	0.0	0.0	18.8	0.0	7
1143+92.72	163.84	Ditch	4.1	65	0.125	1172	0.042	100.0%	0.0	0.0	4.1	0.0	20
1163+64.23	164.22	Full	76.5	500	0.100	3062	0.119	3.1%	1.3	0.0	75.2	0.0	7
1170+31.60	164.34	Full	29.1	500	0.120	1255	0.221	13.9%	0.0	0.0	29.1	0.0	7
1181+30.82	164.60	Full-I	8.4	183	0.070	1159	0.181	26.0%	0.0	0.0	8.4	0.0	15
1186+90.10	164.71	Full	61.0	32	0.116	557	0.026	4.1%	0.0	0.0	61.0	0.0	7
1194+30.67	164.85	Full-I	6.2	200	0.080	1106	0.110	35.5%	0.0	0.0	6.2	0.0	15
1204+30.36	165.02	Full	43.4	500	0.080	1901	0.091	9.0%	0.0	0.0	38.4	5.0	7
1213+60.46	165.22	Full-I	9.5	286	0.080	972	0.142	30.4%	0.0	0.0	9.4	0.1	15
1219+31.34	165.32	Full	14.9	371	0.110	1690	0.104	16.4%	0.0	0.0	8.5	6.4	7
1222+39.78	165.38	Full-I	10.4	221	0.100	1690	0.104	11.3%	0.0	0.0	5.4	5.0	7
1231+80.46	165.56	Full-I	20.8	500	0.170	905	1.789	26.1%	0.0	0.0	19.0	1.7	15
1240+27.41	165.72	Full-I	3.2	124	0.220	606	0.285	38.6%	0.0	0.2	3.0	0.0	15
1248+25.89	165.93	Full-I	113.1	400	0.131	1922	0.333	20.0%	0.0	0.5	94.4	18.2	7
1257+28.19	166.10	Full-I	6.1	228	0.050	779	0.163	62.4%	0.0	4.9	1.2	0.0	20
1264+71.53	166.23	Full-I	7.7	320	0.110	745	0.146	47.2%	0.0	7.7	0.0	0.0	15
1281+21.32	166.55	Full-I	13.5	385	0.080	1339	0.125	43.6%	0.0	13.5	0.0	0.0	15
1294+82.22	166.80	Full-I	24.2	480	0.110	1908	0.121	42.4%	0.0	24.2	0.0	0.0	15
1308+17.72	167.06	Full-I	10.2	393	0.015	1402	0.017	71.0%	8.4	1.7	0.0	0.0	20
1341+65.46	167.53	Full-I	10.4	290	0.060	1045	0.011	72.7%	5.0	5.1	0.0	0.2	20

Station	MP	C_5-A	C_5-B	C_5-C	C_5-D	C_5-agg
1023+79.32	161.65	0.35	0.40	0.44	0.44	0.40
1035+79.11	161.88	0.18	0.22	0.27	0.27	0.22
1046+77.58	162.09	0.49	0.53	0.56	0.56	0.53
1064+28.94	162.42	0.70	0.72	0.73	0.73	0.72
1067+21.01	162.48	0.37	0.42	0.46	0.46	0.42
1076+82.00	162.63	0.82	0.82	0.82	0.82	0.82
1089+62.37	162.92	0.27	0.32	0.36	0.36	0.32
1092+78.52	162.98	0.36	0.41	0.45	0.45	0.41
1105+44.92	163.22	0.12	0.17	0.22	0.22	0.17
1115+28.73	163.40	0.20	0.24	0.29	0.29	0.25
1118+56.83	163.47	0.86	0.86	0.85	0.85	0.85
1126+28.34	163.62	0.11	0.15	0.20	0.20	0.20
1143+92.72	163.84	0.86	0.86	0.86	0.86	0.86
1163+64.23	164.22	0.01	0.02	0.06	0.06	0.06
1170+31.60	164.34	0.07	0.10	0.15	0.15	0.15
1181+30.82	164.60	0.15	0.20	0.25	0.25	0.25
1186+90.10	164.71	0.01	0.03	0.07	0.07	0.07
1194+30.67	164.85	0.23	0.28	0.33	0.33	0.33
1204+30.36	165.02	0.04	0.06	0.11	0.11	0.11
1213+60.46	165.22	0.19	0.24	0.28	0.28	0.28
1219+31.34	165.32	0.09	0.12	0.17	0.17	0.17
1222+39.78	165.38	0.05	0.08	0.13	0.13	0.13
1231+80.46	165.56	0.15	0.20	0.25	0.25	0.25
1240+27.41	165.72	0.26	0.31	0.35	0.35	0.35
1248+25.89	165.93	0.11	0.15	0.20	0.20	0.20
1257+28.19	166.10	0.47	0.52	0.55	0.55	0.52
1264+71.53	166.23	0.33	0.38	0.42	0.42	0.38
1281+21.32	166.55	0.30	0.35	0.39	0.39	0.35
1294+82.22	166.80	0.29	0.34	0.38	0.38	0.34
1308+17.72	167.06	0.56	0.59	0.62	0.62	0.56
1341+65.46	167.53	0.57	0.61	0.63	0.63	0.59

Station	MP	C_{10}-A	C_{10}-B	C_{10}-C	C_{10}-D	C_{10}-agg
1023+79.32	161.65	0.37	0.46	0.50	0.50	0.46
1035+79.11	161.88	0.19	0.29	0.35	0.35	0.29
1046+77.58	162.09	0.50	0.58	0.61	0.61	0.58
1064+28.94	162.42	0.71	0.75	0.76	0.76	0.75
1067+21.01	162.48	0.38	0.47	0.51	0.51	0.47
1076+82.00	162.63	0.83	0.84	0.84	0.84	0.84
1089+62.37	162.92	0.28	0.38	0.43	0.43	0.38
1092+78.52	162.98	0.37	0.47	0.50	0.50	0.47
1105+44.92	163.22	0.13	0.24	0.29	0.29	0.24
1115+28.73	163.40	0.21	0.31	0.36	0.36	0.32
1118+56.83	163.47	0.87	0.87	0.87	0.87	0.87
1126+28.34	163.62	0.12	0.22	0.28	0.28	0.28
1143+92.72	163.84	0.87	0.87	0.87	0.87	0.87
1163+64.23	164.22	0.01	0.08	0.16	0.16	0.15
1170+31.60	164.34	0.08	0.17	0.23	0.23	0.23
1181+30.82	164.60	0.17	0.27	0.32	0.32	0.32
1186+90.10	164.71	0.02	0.09	0.16	0.16	0.16
1194+30.67	164.85	0.24	0.34	0.39	0.39	0.39
1204+30.36	165.02	0.05	0.13	0.20	0.20	0.20
1213+60.46	165.22	0.20	0.30	0.36	0.36	0.36
1219+31.34	165.32	0.09	0.19	0.25	0.25	0.25
1222+39.78	165.38	0.06	0.15	0.22	0.22	0.22
1231+80.46	165.56	0.17	0.27	0.32	0.32	0.32
1240+27.41	165.72	0.27	0.37	0.42	0.42	0.41
1248+25.89	165.93	0.12	0.22	0.28	0.28	0.28
1257+28.19	166.10	0.49	0.56	0.59	0.59	0.57
1264+71.53	166.23	0.34	0.44	0.48	0.48	0.44
1281+21.32	166.55	0.31	0.41	0.45	0.45	0.41
1294+82.22	166.80	0.30	0.40	0.45	0.45	0.40
1308+17.72	167.06	0.57	0.63	0.66	0.66	0.58
1341+65.46	167.53	0.59	0.65	0.67	0.67	0.62

Station	MP	C_{50}-A	C_{50}-B	C_{50}-C	C_{50}-D	C_{50}-agg
1023+79.32	161.65	0.45	0.61	0.64	0.64	0.61
1035+79.11	161.88	0.27	0.49	0.54	0.54	0.49
1046+77.58	162.09	0.57	0.69	0.71	0.71	0.69
1064+28.94	162.42	0.75	0.81	0.81	0.81	0.81
1067+21.01	162.48	0.46	0.62	0.65	0.65	0.62
1076+82.00	162.63	0.84	0.87	0.86	0.86	0.87
1089+62.37	162.92	0.37	0.55	0.59	0.59	0.55
1092+78.52	162.98	0.45	0.61	0.64	0.64	0.61
1105+44.92	163.22	0.21	0.45	0.50	0.50	0.45
1115+28.73	163.40	0.29	0.50	0.55	0.55	0.51
1118+56.83	163.47	0.87	0.89	0.88	0.88	0.88
1126+28.34	163.62	0.19	0.44	0.49	0.49	0.49
1143+92.72	163.84	0.88	0.89	0.88	0.88	0.88
1163+64.23	164.22	0.05	0.35	0.41	0.41	0.40
1170+31.60	164.34	0.14	0.41	0.46	0.46	0.46
1181+30.82	164.60	0.25	0.47	0.52	0.52	0.52
1186+90.10	164.71	0.06	0.35	0.41	0.41	0.41
1194+30.67	164.85	0.33	0.53	0.57	0.57	0.57
1204+30.36	165.02	0.10	0.38	0.44	0.44	0.44
1213+60.46	165.22	0.28	0.50	0.54	0.54	0.54
1219+31.34	165.32	0.16	0.42	0.47	0.47	0.47
1222+39.78	165.38	0.12	0.39	0.45	0.45	0.45
1231+80.46	165.56	0.25	0.47	0.52	0.52	0.52
1240+27.41	165.72	0.35	0.54	0.58	0.58	0.58
1248+25.89	165.93	0.19	0.44	0.49	0.49	0.49
1257+28.19	166.10	0.56	0.68	0.70	0.70	0.68
1264+71.53	166.23	0.43	0.59	0.62	0.62	0.59
1281+21.32	166.55	0.40	0.57	0.61	0.61	0.57
1294+82.22	166.80	0.39	0.57	0.60	0.60	0.57
1308+17.72	167.06	0.63	0.73	0.74	0.74	0.65
1341+65.46	167.53	0.64	0.73	0.75	0.75	0.69

Station	MP	C_{100}-A	C_{100}-B	C_{100}-C	C_{100}-D	C_{100}-agg
1023+79.32	161.65	0.50	0.66	0.69	0.69	0.66
1035+79.11	161.88	0.34	0.56	0.60	0.60	0.56
1046+77.58	162.09	0.61	0.73	0.75	0.75	0.73
1064+28.94	162.42	0.77	0.83	0.83	0.83	0.83
1067+21.01	162.48	0.51	0.67	0.70	0.70	0.67
1076+82.00	162.63	0.86	0.88	0.88	0.88	0.88
1089+62.37	162.92	0.42	0.62	0.65	0.65	0.62
1092+78.52	162.98	0.50	0.66	0.69	0.69	0.66
1105+44.92	163.22	0.28	0.53	0.57	0.57	0.53
1115+28.73	163.40	0.35	0.57	0.61	0.61	0.58
1118+56.83	163.47	0.89	0.90	0.89	0.89	0.89
1126+28.34	163.62	0.26	0.52	0.56	0.56	0.56
1143+92.72	163.84	0.89	0.90	0.89	0.89	0.89
1163+64.23	164.22	0.13	0.44	0.50	0.50	0.49
1170+31.60	164.34	0.22	0.49	0.54	0.54	0.54
1181+30.82	164.60	0.31	0.55	0.59	0.59	0.59
1186+90.10	164.71	0.14	0.45	0.50	0.50	0.50
1194+30.67	164.85	0.39	0.59	0.63	0.63	0.63
1204+30.36	165.02	0.18	0.47	0.52	0.52	0.52
1213+60.46	165.22	0.35	0.57	0.61	0.61	0.61
1219+31.34	165.32	0.24	0.50	0.55	0.55	0.55
1222+39.78	165.38	0.20	0.48	0.53	0.53	0.53
1231+80.46	165.56	0.31	0.55	0.59	0.59	0.59
1240+27.41	165.72	0.41	0.61	0.64	0.64	0.64
1248+25.89	165.93	0.27	0.52	0.57	0.57	0.57
1257+28.19	166.10	0.60	0.72	0.74	0.74	0.72
1264+71.53	166.23	0.48	0.65	0.68	0.68	0.65
1281+21.32	166.55	0.45	0.63	0.66	0.66	0.63
1294+82.22	166.80	0.44	0.63	0.66	0.66	0.63
1308+17.72	167.06	0.66	0.76	0.78	0.78	0.68
1341+65.46	167.53	0.68	0.77	0.78	0.78	0.72

Project: I-25 Gap Package 2
Description: Hydrologic Rational Calculations

Project No. 680954
Calculated by: JC

Station	MP	t_i (min)	t_t (min)	t_c (min)	t_c, 6-5 (min)	t_c (min)	I: 5-yr (in/hr)	I: 10-yr (in/hr)	I: 50-yr (in/hr)	I: 100-yr (in/hr)
1023+79.32	161.65	15	7	22	24	22	2.7	3.1	4.2	4.9
1035+79.11	161.88	16	7	23	29	23	2.6	3.0	4.1	4.7
1046+77.58	162.09	7	10	17	26	17	3.1	3.6	4.8	5.6
1064+28.94	162.42	10	5	14	16	14	3.3	3.8	5.2	6.0
1067+21.01	162.48	12	5	17	23	17	3.1	3.6	4.9	5.6
1076+82.00	162.63	3	3	7	13	7	4.5	5.2	7.1	8.1
1089+62.37	162.92	6	2	8	22	10	3.9	4.5	6.1	7.0
1092+78.52	162.98	7	4	11	22	11	3.7	4.3	5.9	6.7
1105+44.92	163.22	17	32	49	41	41	1.9	2.2	2.9	3.4
1115+28.73	163.40	19	14	33	36	33	2.1	2.5	3.4	3.9
1118+56.83	163.47	6	9	16	17	16	3.2	3.7	5.0	5.8
1126+28.34	163.62	16	23	39	36	36	2.0	2.3	3.2	3.6
1143+92.72	163.84	2	5	6	13	6	4.5	5.3	7.2	8.3
1163+64.23	164.22	20	21	41	41	41	1.9	2.2	2.9	3.4
1170+31.60	164.34	17	6	23	28	23	2.6	3.0	4.1	4.7
1181+30.82	164.60	11	3	14	25	14	3.4	3.9	5.3	6.1
1186+90.10	164.71	5	8	13	31	13	3.5	4.0	5.5	6.3
1194+30.67	164.85	10	4	14	24	14	3.4	3.9	5.4	6.2
1204+30.36	165.02	20	15	35	35	35	2.1	2.4	3.3	3.7
1213+60.46	165.22	13	3	15	24	15	3.2	3.7	5.1	5.8
1219+31.34	165.32	15	12	27	31	27	2.4	2.8	3.8	4.3
1222+39.78	165.38	12	12	25	32	25	2.5	2.9	4.0	4.6
1231+80.46	165.56	13	1	14	22	14	3.3	3.9	5.3	6.0
1240+27.41	165.72	5	1	7	21	7	4.5	5.2	7.0	8.1
1248+25.89	165.93	14	8	22	27	22	2.7	3.1	4.2	4.9
1257+28.19	166.10	9	2	11	17	11	3.7	4.3	5.9	6.8
1264+71.53	166.23	11	2	13	20	13	3.5	4.1	5.5	6.4
1281+21.32	166.55	13	4	18	23	18	3.0	3.5	4.7	5.5
1294+82.22	166.80	14	6	20	25	20	2.8	3.3	4.5	5.1
1308+17.72	167.06	17	9	26	23	23	2.6	3.0	4.1	4.7
1341+65.46	167.53	9	8	17	22	17	3.1	3.5	4.8	5.5

Project: I-25 Gap Package 2
Description: Hydrologic Rational Calculations

Project No. 680954
Calculated by: JC

Station	MP	Q: 5-yr (cfs)	Q: 10-yr (cfs)	Q: 50-yr (cfs)	Q: 100-yr (cfs)
1023+79.32	161.65	18	24	43	53
1035+79.11	161.88	9	13	30	39
1046+77.58	162.09	58	74	119	145
1064+28.94	162.42	14	17	25	30
1067+21.01	162.48	29	38	67	84
1076+82.00	162.63	8	10	14	16
1089+62.37	162.92	3	4	8	11
1092+78.52	162.98	8	11	20	25
1105+44.92	163.22	16	26	69	93
1115+28.73	163.40	13	20	43	56
1118+56.83	163.47	7	9	12	14
1126+28.34	163.62	7	12	29	38
1143+92.72	163.84	16	19	26	31
1163+64.23	164.22	9	25	90	127
1170+31.60	164.34	11	21	55	74
1181+30.82	164.60	7	11	23	30
1186+90.10	164.71	15	40	139	194
1194+30.67	164.85	7	10	19	24
1204+30.36	165.02	10	21	62	85
1213+60.46	165.22	9	13	26	34
1219+31.34	165.32	6	10	27	36
1222+39.78	165.38	3	7	18	25
1231+80.46	165.56	17	26	57	74
1240+27.41	165.72	5	7	13	17
1248+25.89	165.93	60	99	235	312
1257+28.19	166.10	12	15	25	30
1264+71.53	166.23	10	14	25	32
1281+21.32	166.55	14	19	37	47
1294+82.22	166.80	23	32	61	78
1308+17.72	167.06	15	18	27	33
1341+65.46	167.53	19	23	34	42

Project: I-25 Gap Package 2
Description: Hydrology Elevation Data

Project No. 680954
Calculated by: JC

Station	MP	Crossing Type	Overland US (ft)	Overland DS (ft)	Overland Length (ft)	Overland Slope (ft/ft)	Channel US (ft)	Channel DS (ft)	Channel Length (ft)	Channel Slope (ft/ft)
1023+79.32	161.65	Full-I			450	0.060	7157	7113	1219	0.036
1035+79.11	161.88	Full-I			390	0.080	7192	7133	1367	0.043
1046+77.58	162.09	Full-I			300	0.140			2587	0.051
1064+28.94	162.42	Ditch	7312.65	7311.44	167	0.007	7311	7253	1215	0.048
1067+21.01	162.48	Full			500	0.130	7373	7267	1558	0.068
1076+82.00	162.63	Ditch	7353.42	7349.56	101	0.038	7350	7311	867	0.044
1089+62.37	162.92	Full			70	0.090			732	0.108
1092+78.52	162.98	Full-I	7388	7378	150	0.100	7402	7352	1039	0.048
1105+44.92	163.22	Full-I			500	0.110			2482	0.034
1115+28.73	163.4	Full-I			390	0.040	7379	7296	2316	0.036
1118+56.83	163.47	Ditch	7295.72	7295.19	120	0.004	7295	7294	581	0.003
1126+28.34	163.62	Full-I	7352	7344	500	0.120	7378	7292	2011	0.043
1143+92.72	163.84	Ditch	7271	7263	65	0.125	7281	7232	1172	0.042
1151+02.46	164.06	Full			500	0.090			11986	0.021
1163+64.23	164.22	Full			500	0.100			3062	0.119
1170+31.60	164.34	Full	7253	7234	500	0.120	7301	7162	1255	0.221
1181+30.82	164.6	Full-I			183	0.070	7270	7165	1159	0.181
1186+90.10	164.71	Full	7167	7163	32	0.116	7163	7156	557	0.026
1194+30.67	164.85	Full-I			200	0.080	7209	7148	1106	0.110
1204+30.36	165.02	Full			500	0.080			1901	0.091
1213+60.46	165.22	Full-I			286	0.080	7195	7126	972	0.142
1219+31.34	165.32	Full			371	0.110			1690	0.104
1222+39.78	165.38	Full-I			221	0.100			1690	0.104
1231+80.46	165.56	Full-I			500	0.170	7918	7109	905	1.789
1240+27.41	165.72	Full-I			124	0.220	7199	7113	606	0.285
1248+25.89	165.93	Full-I			400	0.131	7209	7095	1922	0.333
1257+28.19	166.1	Full-I			228	0.050	7136	7073	779	0.163
1264+71.53	166.23	Full-I			320	0.110	7098	7043	745	0.146
1281+21.32	166.55	Full-I			385	0.080	7098	7014	1339	0.125
1294+82.22	166.8	Full-I			480	0.110	7070	6955	1908	0.121
1308+17.72	167.06	Full-I	6961	6955	393	0.015	6948	6936	1402	0.017
1341+65.46	167.53	Full-I			290	0.060	6910	6904	1045	0.011
1345+28.24	167.74	Full			500	0.090			21226	0.015

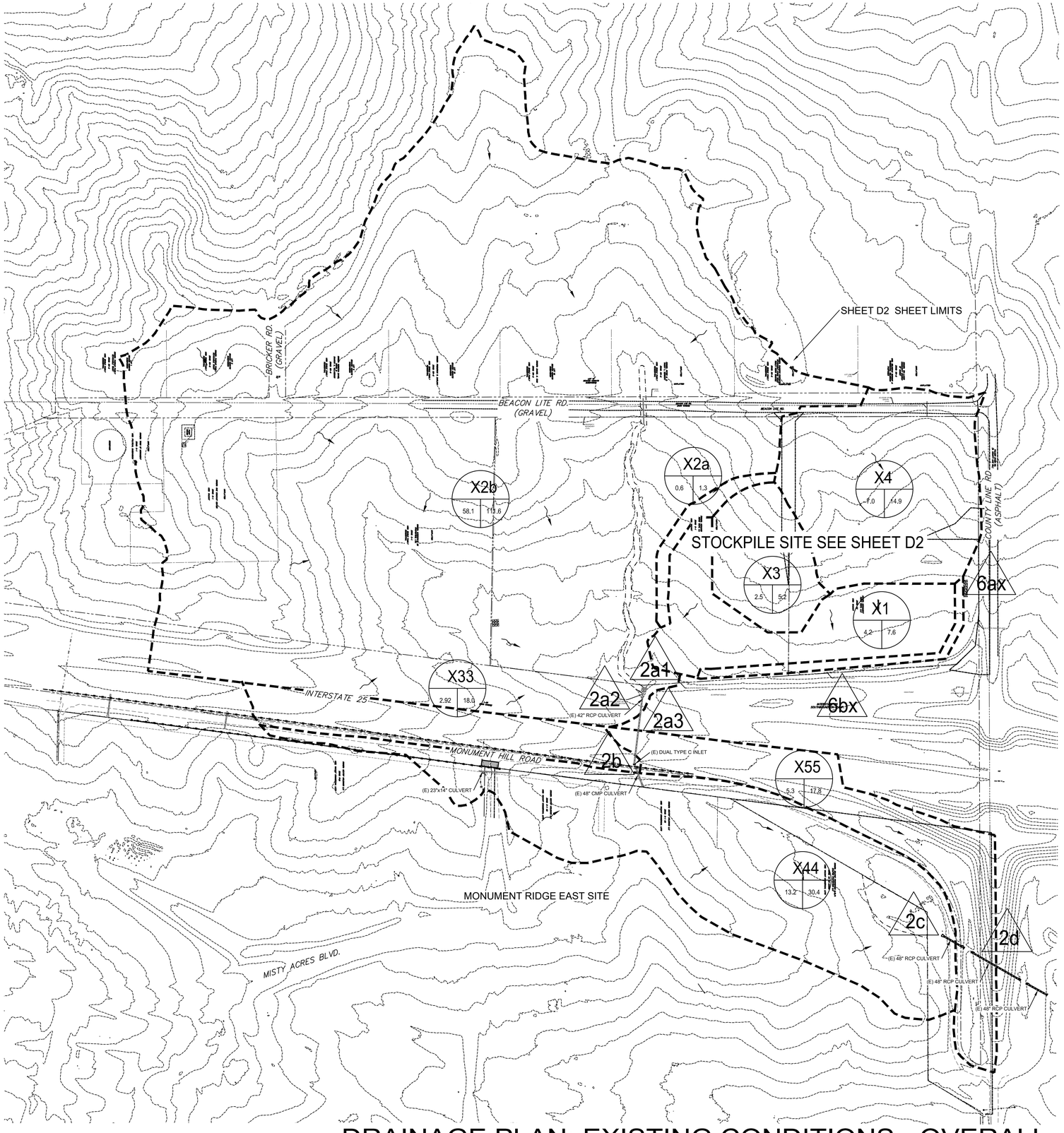
I-25 GAP
Culvert Analysis Summary-Package 2

STATION	MILEPOST	CULVERT ID	EXISTING DESIGN HW/D	PROPOSED CONDITION	EXISTING CULVERT SIZE	PROPOSED CULVERT SIZE	CULVERT TYPE	OVERTOPPING ELEVATION (FT)	50-YEAR (DESIGN)						100-YEAR (REVIEW)	
									FLOW "Q" (CFS)	HW ELEV (FT)	HW (FT)	D (FT)	HW/D	HW/D CRITERIA MAX LIMIT	FLOW "Q" (CFS)	HW ELEV (FT)
1023+56.90	161.65		1.78	REPLACE	30"	36"	RCP	7116.55	43	N/A	N/A	3.0	N/A	N/A	53	N/A
1035+79.08	161.88		1.26	EXTEND DOWN	30"	30"	RCP	7138.05	30	7134.15	3.14	2.5	1.26	2.0	39	7135.14
1041+75.76	162.00	025A162090BL	N/A	NEW CULVERT	N/A	24", 48", 54"	RCP	7205.51	14	N/A	N/A	4.5	N/A	N/A	16	N/A
1046+77.58	162.09		2.38	LEAVE AS-IS	42"	N/A	RCP	7176.07	119	7174.91	8.34	3.5	2.38	1.7	145	7176.13
1064+27.96	162.42		N/A	REPLACE	24"	24"	RCP	7255.63	25	N/A	N/A	2.0	N/A	N/A	30	N/A
1067+44.32	162.48		8.32	REPLACE	24"	36"	RCP	7267.02	67	7252.62	5.51	3.0	1.84	1.7	84	7254.68
1076+81.98	162.63		1.05	REPLACE UP	24"	24"	RCP	7314.17	14	N/A	N/A	2.0	N/A	N/A	16	N/A
1089+71.03	162.92		N/A	ABANDON	24"	N/A	RCP	N/A	N/A	N/A	N/A	2.0	N/A	N/A	N/A	N/A
1093+15.74	162.98		1.45	REPLACE	24"	36"	RCP	7353.61	28	7351.08	2.53	3.0	0.84	1.7	36	7351.55
1105+44.91	163.22		1.25	EXTEND	42"	42"	RCP	7316.56	69	7312.64	4.38	3.5	1.25	1.7	93	7314.26
1109+26.14	163.29		2.83	REPLACE	18"	18"	RCP	7306.69	26	7306.92	4.12	1.5	2.75	2.0	30	7306.97
1114+72.60	163.40		4.44	LEAVE AS-IS	24"	N/A	RCP	7323.30	43	7317.43	8.88	2.0	4.44	2.0	56	7322.92
1115+08.81	163.40		1.14	LEAVE AS-IS	36"	N/A	RCP	7316.16	43	7293.78	3.42	3.0	1.14	1.7	56	7294.78
1115+29.09	163.40		1.77	REPLACE	30"	36"	RCP	7299.74	43	N/A	N/A	3.0	N/A	N/A	56	N/A
1117+33.42	163.41		0.54	LEAVE AS-IS	24"	N/A	RCP	7316.57	5	7289.35	1.08	2.0	0.54	2.0	6	7289.48
1121+49.39	163.45		0.95	REPLACE	24"	24"	RCP	7296.23	12	N/A	N/A	2.0	N/A	N/A	14	N/A
1125+59.23	163.62		1.43	REPLACE	24"	36"	RCP	7293.70	34	N/A	N/A	3.0	N/A	N/A	39	N/A
1143+92.69	163.84		1.99	EXTEND	24"	24"	RCP	7236.70	26	7234.43	3.98	2.0	1.99	2.0	31	7235.59
1163+97.85	164.22		1.64	REPLACE	42"	42"	RCP	7186.31	90	N/A	N/A	3.5	N/A	N/A	127	N/A
1170+31.64	164.34		1.45	REPLACE UP	36"	36"	RCP	7179.18	55	7167.62	4.33	3.0	1.44	1.7	74	7169.56
1181+30.40	164.60		1.69	REPLACE	24"	36"	RCP	7166.87	23	N/A	N/A	3.0	N/A	N/A	30	N/A
1187+30.94	164.71	025A164710BL	0.56	EXTEND	6'x7'	6'x7'	CBC	7159.04	139	7149.92	3.90	7.0	0.56	1.2	194	7150.91
1194+31.30	164.85		1.38	REPLACE	24"	24"	RCP	7149.76	19	7148.31	2.77	2.0	1.39	2.0	24	7149.16
1203+30.36	165.02		1.67	EXTEND	36"	36"	RCP	7137.77	62	7130.02	4.98	3.0	1.66	1.7	85	7132.72
1213+60.06	165.22		1.14	REPLACE	24"	36"	RCP	7128.81	26	N/A	N/A	3.0	N/A	N/A	34	N/A
1219+31.37	165.32		0.64	EXTEND	42"	42"	RCP	7124.45	27	7120.43	2.46	3.5	0.70	1.7	36	7120.96
1222+39.83	165.38		1.30	EXTEND	24"	24"	RCP	7122.06	18	7118.83	2.60	2.0	1.30	2.0	25	7120.03
1231+80.48	165.56		1.50	EXTEND	36"	36"	RCP	7116.60	57	7112.64	4.50	3.0	1.50	1.7	74	7114.40
1240+28.08	165.72		1.00	REPLACE UP	24"	24"	RCP	7114.93	25	N/A	N/A	2.0	N/A	N/A	29	N/A
1243+96.73	165.82		N/A	NEW CULVERT	N/A	24"	RCP	7110.90	13	N/A	N/A	2.0	N/A	N/A	15	N/A
1248+28.83	165.93	025A165930BL	0.78	EXTEND	6'x7'	6'x7'	CBC	7102.61	235	7098.74	5.56	7.0	0.79	1.2	312	7099.96
1257+28.23	166.10		1.90	EXTEND	24"	24"	RCP	7076.92	25	7075.39	3.79	2.0	1.90	2.0	30	7076.50
1264+28.51	166.23		1.07	EXTEND	30"	30"	RCP	7060.17	25	7044.36	2.68	2.5	1.07	2.0	32	7045.00
1281+22.74	166.55		3.43	REPLACE	24"	36"	RCP	7021.35	37	7018.36	3.03	3.0	1.01	1.7	47	7019.02
1294+17.77	166.80		1.64	REPLACE DOWN	36"	36"	RCP	6962.42	61	6957.50	4.92	3.0	1.64	1.7	78	6959.38
1308+17.66	167.06		2.13	REPLACE	24"	36"	RCP	6937.02	27	6935.63	2.50	3.0	0.83	1.7	33	6935.98
1322.01.46	167.35		N/A	NEW CULVERT	N/A	24"	RCP	6912.23	15	N/A	N/A	2.0	N/A	N/A	17	N/A
1323+31.29	167.35		N/A	ABANDON	21"	N/A	CSP	N/A	N/A	N/A	N/A	1.8	N/A	N/A	N/A	N/A

Notes:
HW = Headwater
D = Depth
HW/D = "N/A": Culverts have inlets as entrance structures, thus HW/D does not apply

Appendix D

DRAINAGE PLANS – AMENDMENT NO. 1



DRAINAGE PLAN: EXISTING CONDITIONS - OVERALL

SCALE : 1" = 150'

BEACON LITE ROAD STOCKPILE

NORTH

0 75 150 300

GENERAL NOTES

1. EXISTING TOPOGRAPHY BASED ON COLORADO WATER CONSERVATION BOARD (CWCB) DIGITAL ELEVATION MODEL (DEM), MERRICK OCTOBER 2016.
2. EXISTING CONTOURS ARE AT A 5' INTERVAL.

LEGEND

X — BASIN ID

#.# — Q100 FLOW

BASIN AREA (ACRES)

— DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
X1	4.21	1.0	7.6
X2a	0.61	0.2	1.3
X2b	58.06	24.5	111.6
X3	2.50	1.8	5.2
X4	7.03	2.8	14.9
X5	0.55	0.2	1.7
X33	2.92	8.5	18.0
X44	13.16	7.8	30.4
X55	5.31	7.0	17.8
A	4.21	1.0	7.6
B1	0.98	0.3	2.0
B2	43.82	19.9	86.3
B3	10.95	4.0	20.9
B4	3.49	1.6	7.2
B5	0.27	1.3	2.2
C1	3.70	2.9	9.4
C2	2.86	0.8	6.2
D	3.31	1.5	7.3
E	0.55	0.1	1.7

DESIGN POINT SUMMARY

Design Point	Flow Q_5	Flow Q_{100}	Comments
3X	4.3	21.9	flow to pond A
2a1	0.1	7.4	flow to existing 42" RCP
2a2	24.5	111.6	flow to existing 42" RCP
2a3	25.2	117.2	flow to existing 42" RCP
2b	8.5	18.0	flow to existing 48" RCP
2c	32.7	136.6	flow to existing 48" RCP
2d	37.7	149.4	flow to existing 48" RCP
6ax	1.5	7.3	flow to energy dissipator
6bx	1.5	8.1	discharge flow to CDOT ROW

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

PRC ENGINEERING

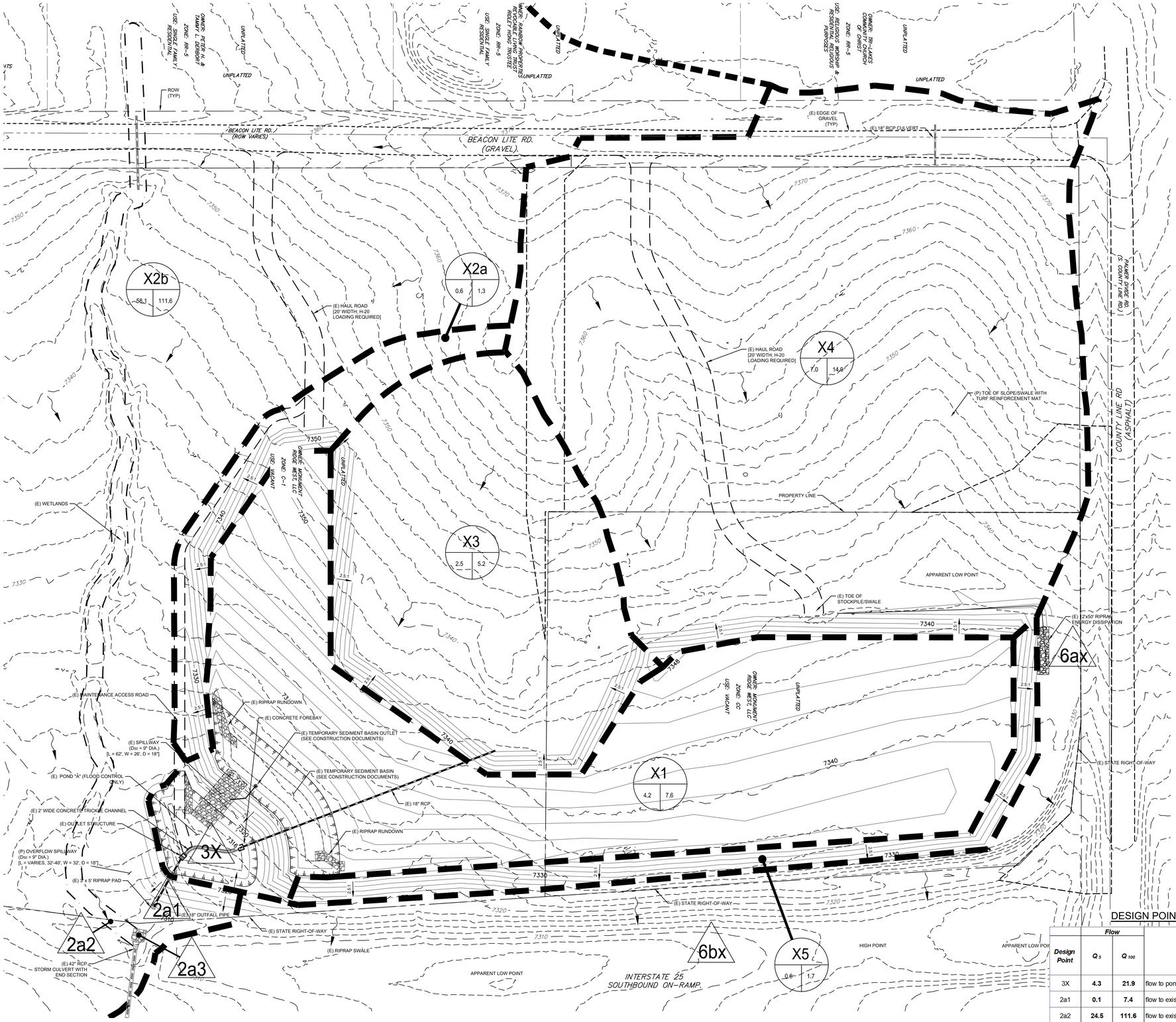
BEACON LITE ROAD STOCKPILE

El Paso County, CO

DRAINAGE PLAN:
EXISTING CONDITIONS - OVERALL

issued 10/19/26

D10
sheet number



DRAINAGE PLAN: EXISTING CONDITIONS - SITE (NORTH)

SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

GENERAL NOTES

1. EXISTING TOPOGRAPHY PROVIDED BY BEAR CREEK SURVEYING, INC. VIA DRONE.
2. EXISTING CONTOURS ARE AT A 2' INTERVAL.
3. AERIAL IMAGERY FROM GOOGLE EARTH 11/2025.

LEGEND

X — BASIN ID

#.# — Q100 FLOW

BASIN AREA (ACRES)

\# — DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	RIPRAP
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

NORTH

0 25 50 100

DESIGN POINT SUMMARY

Design Point	Flow Q_5	Flow Q_{100}	Comments
3X	**4.3**	**21.9**	flow to pond A
2a1	**0.1**	**7.4**	flow to existing 42" RCP
2a2	**24.5**	**111.6**	flow to existing 42" RCP
2a3	**25.2**	**117.2**	flow to existing 42" RCP
6ax	**2.8**	**14.9**	flow to energy dissipator
6bx	**3.0**	**16.0**	discharge flow to CDOT ROW

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
X1	4.21	**1.0**	**7.6**
X2a	0.61	**0.2**	**1.3**
X2b	58.06	**24.5**	**111.6**
X3	2.50	**1.8**	**5.2**
X4	7.03	**2.8**	**14.9**
X5	0.55	**0.2**	**1.7**
X33	2.92	**8.5**	**18.0**
X44	13.16	**7.8**	**30.4**
X55	5.31	**7.0**	**17.8**
A	4.21	**1.0**	**7.6**
B1	0.98	**0.3**	**2.0**
B2	43.82	**19.9**	**86.3**
B3	10.95	**4.0**	**20.9**
B4	3.49	**1.6**	**7.2**
B5	0.27	**1.3**	**2.2**
C1	3.70	**2.9**	**9.4**
C2	2.86	**0.8**	**6.2**
D	3.31	**1.5**	**7.3**
E	0.55	**0.1**	**1.7**

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

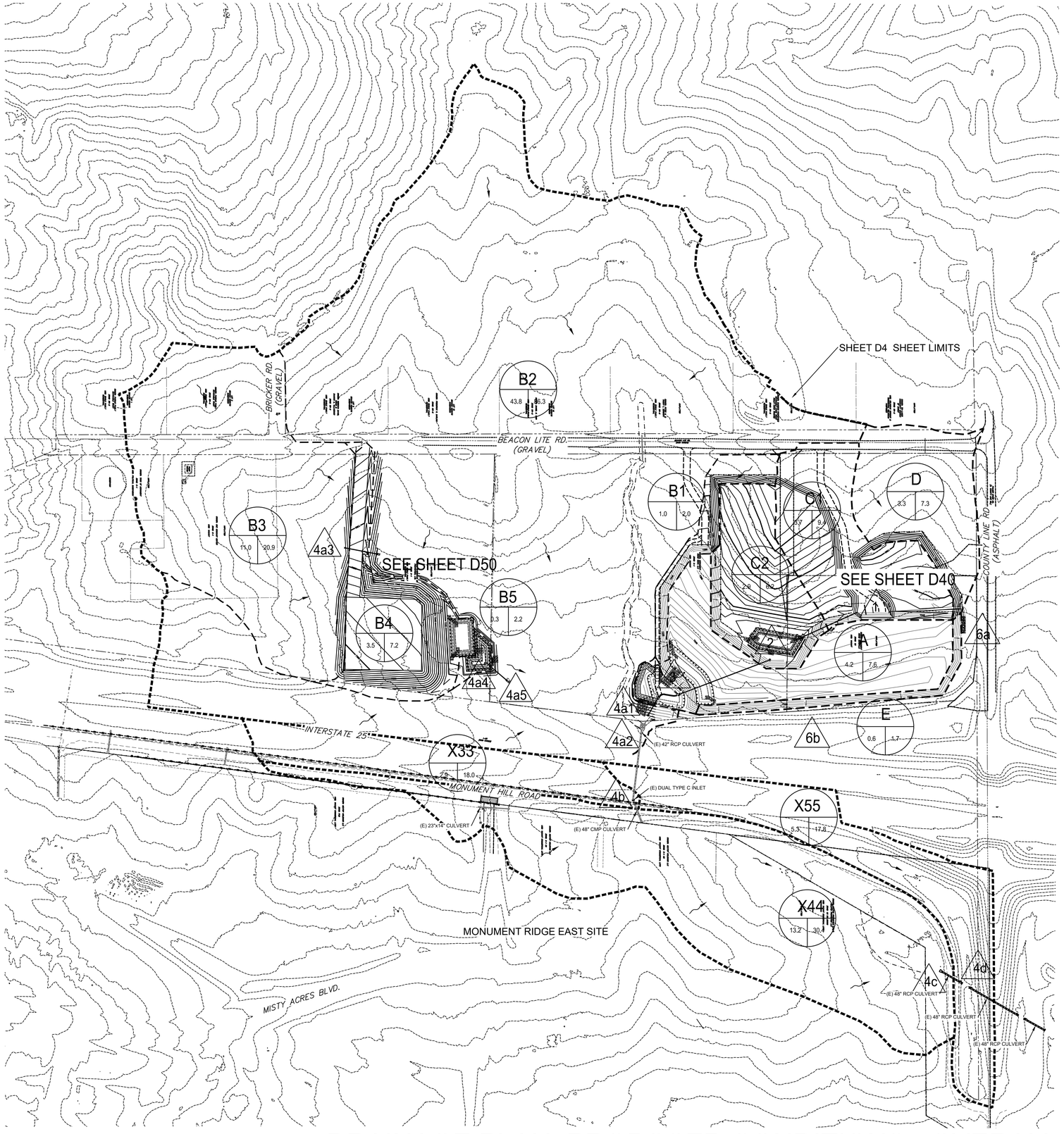
El Paso County, CO

DRAINAGE PLAN: EXISTING CONDITIONS - SITE

issued	10/20/26

D20

sheet number



DRAINAGE PLAN: PROPOSED CONDITIONS - OVERALL

SCALE: 1" = 150'

BEACON LITE ROAD STOCKPILE

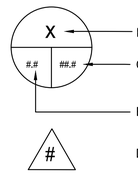
NORTH

0 75 150 300

GENERAL NOTES

1. EXISTING TOPOGRAPHY BASED ON COLORADO WATER CONSERVATION BOARD (CWCB) DIGITAL ELEVATION MODEL (DEM), MERRICK OCTOBER 2016.
2. EXISTING CONTOURS ARE AT A 5' INTERVAL.

LEGEND



EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
X1	4.21	1.0	7.6
X2a	0.61	0.2	1.3
X2b	58.06	24.5	111.6
X3	2.50	1.8	5.2
X4	7.03	2.8	14.9
X5	0.55	0.2	1.7
X33	2.92	8.5	18.0
X44	13.16	7.8	30.4
X55	5.31	7.0	17.8
A	4.21	1.0	7.6
B1	0.98	0.3	2.0
B2	43.82	19.9	86.3
B3	10.95	4.0	20.9
B4	3.49	1.6	7.2
B5	0.27	1.3	2.2
C1	3.70	2.9	9.4
C2	2.86	0.8	6.2
D	3.31	1.5	7.3
E	0.55	0.1	1.7

DESIGN POINT SUMMARY

Design Point	Q_5	Q_{100}	Comments
1	2.9	9.4	flow to proposed 18" RCP
2	3.6	15.1	flow to proposed sump inlet
3	4.3	21.9	flow to pond A
4a1	0.1	7.4	pond outflow
4a2	25.1	117.0	flow to existing 42" RCP
4a3	4.0	20.9	flow to proposed 24" RCP
4a4	2.4	8.5	flow to pond B
4a5	2.1	6.3	pond outflow
4b	8.5	18.0	flow to existing type C inlet
4c	29.8	125.3	flow to existing 48" RCP
4d	34.1	136.1	flow to existing 48" RCP
5			No Longer Used
6a	1.5	7.3	flow to energy dissipator
6b	1.5	8.1	discharge flow to CDOT ROW

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904
PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

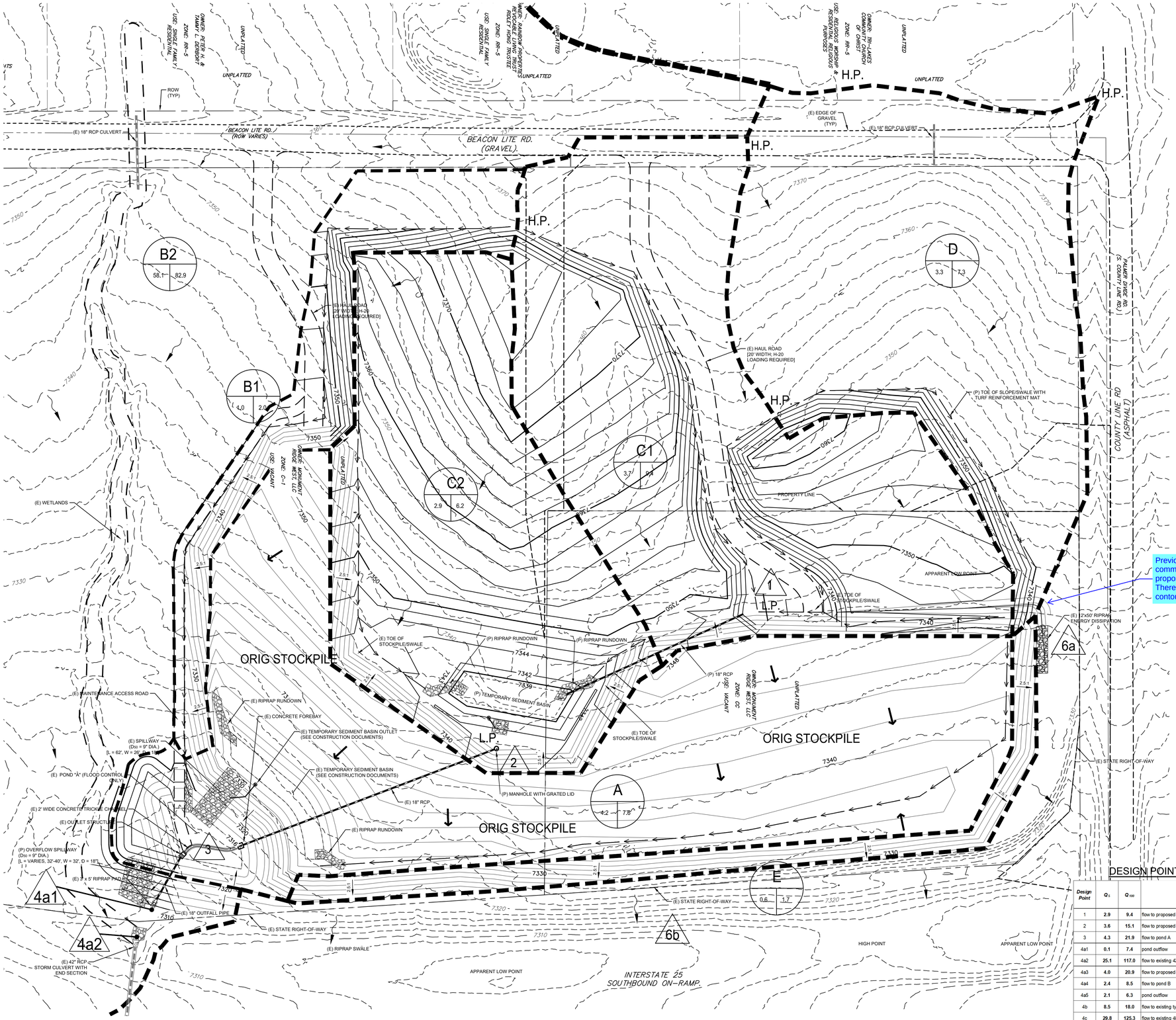
El Paso County, CO

DRAINAGE PLAN:
PROPOSED CONDITIONS - OVERALL

issued 10/20/26

D30

sheet number



GENERAL NOTES

1. EXISTING TOPOGRAPHY PROVIDED BY BEAR CREEK SURVEYING, INC. VIA DRONE.
2. ALL CONTOURS REFLECT EXISTING CONDITIONS AND PROPOSED DRAINAGE PATTERNS. PROPOSED CONTOURS ARE TO TOP OF THE FINISHED PAVING AND GRADING AREAS.
3. AERIAL IMAGERY FROM GOOGLE EARTH 11/2025.

LEGEND

X — BASIN ID
#.# — Q100 FLOW
BASIN AREA (ACRES)
— DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

DESIGN POINT SUMMARY

Design Point	Q_5	Q_{100}	Comments
1	2.9	9.4	flow to proposed 18" RCP
2	3.6	15.1	flow to proposed sump inlet
3	4.3	21.9	flow to pond A
4a1	0.1	7.4	pond outflow
4a2	25.1	117.0	flow to existing 42" RCP
4a3	4.0	20.9	flow to proposed 24" RCP
4a4	2.4	8.5	flow to pond B
4a5	2.1	6.3	pond outflow
4b	8.5	18.0	flow to existing type C inlet
4c	29.8	125.3	flow to existing 48" RCP
4d	34.1	136.1	flow to existing 48" RCP
5			No Longer Used
6a	1.5	7.3	flow to energy dissipator
6b	1.5	8.1	discharge flow to CDOT ROW

DESIGN POINT SUMMARY

Basin	Area Total (acres)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
X1	4.21	1.0	7.6
X2a	0.61	0.2	1.3
X2b	58.06	24.5	111.6
X3	2.50	1.8	5.2
X4	7.03	2.8	14.9
X5	0.55	0.2	1.7
X33	2.92	8.5	18.0
X44	13.16	7.8	30.4
X55	5.31	7.0	17.8
A	4.21	1.0	7.6
B1	0.98	0.3	2.0
B2	43.82	19.9	86.3
B3	10.95	4.0	20.9
B4	3.49	1.6	7.2
B5	0.27	1.3	2.2
C1	3.70	2.9	9.4
C2	2.86	0.8	6.2
D	3.31	1.5	7.3
E	0.55	0.1	1.7

DRAINAGE PLAN: PROPOSED CONDITIONS - SITE (NORTH)

SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

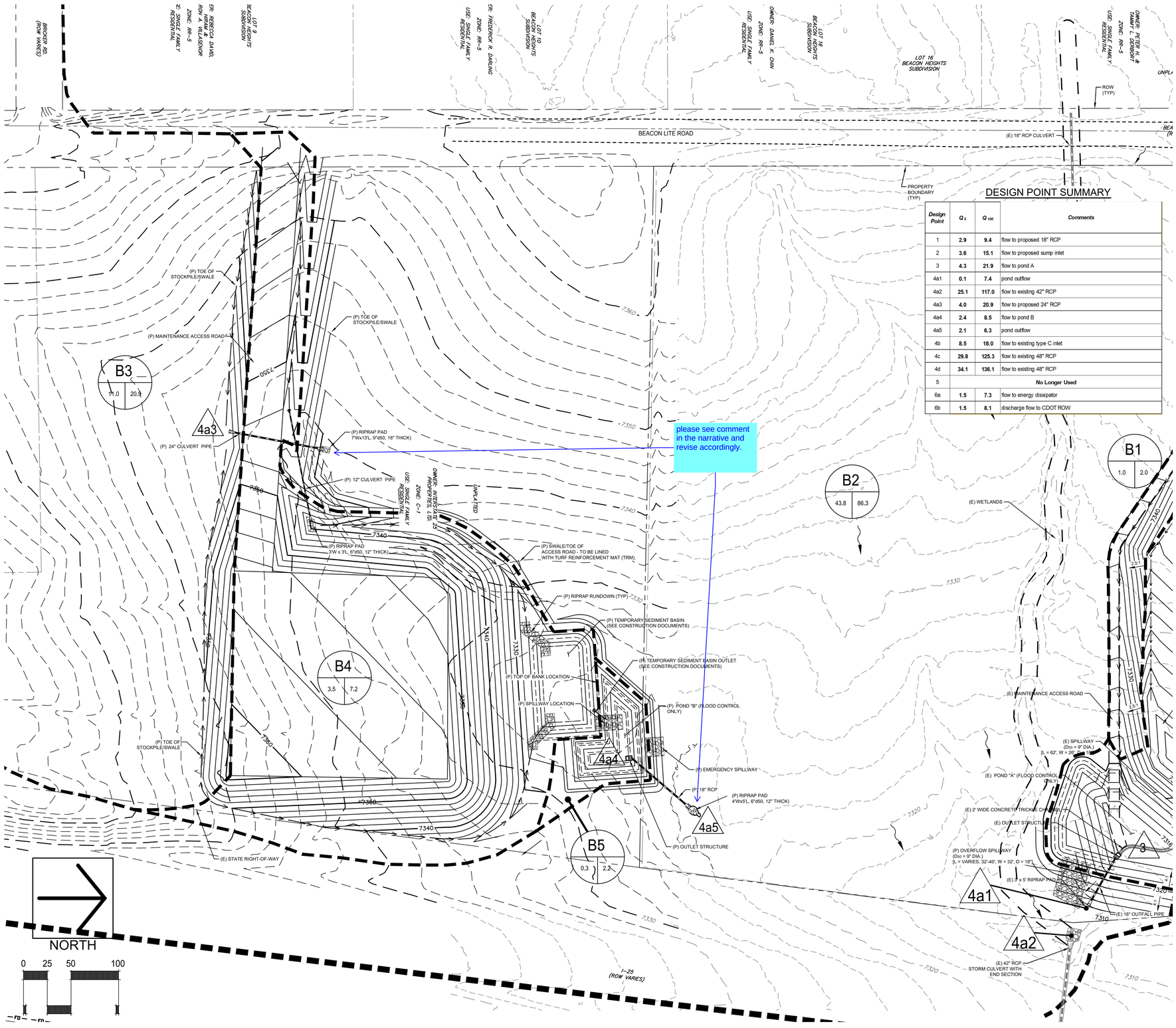
PRC ENGINEERING

BEACON LITE ROAD STOCKPILE
El Paso County, CO

DRAINAGE PLAN:
PROPOSED CONDITIONS - SITE (NORTH)

issued 10/19/26

D40
sheet number



DRAINAGE PLAN: PROPOSED CONDITIONS - SITE (SOUTH)

SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

GENERAL NOTES

1. EXISTING TOPOGRAPHY PROVIDED BY BEAR CREEK SURVEYING, INC. VIA DRONE.
2. ALL CONTOURS REFLECT EXISTING CONDITIONS AND PROPOSED DRAINAGE PATTERNS. PROPOSED CONTOURS ARE TO TOP OF THE FINISHED PAVING AND GRADING AREAS.
3. AERIAL IMAGERY FROM GOOGLE EARTH 11/2025.

LEGEND

X — BASIN ID
#.# (Q100 FLOW) ##.# — BASIN AREA (ACRES)
— DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

DESIGN POINT SUMMARY

Design Point	Q_5	Q_{100}	Comments
1	2.9	9.4	flow to proposed 18" RCP
2	3.6	15.1	flow to proposed sump inlet
3	4.3	21.9	flow to pond A
4a1	0.1	7.4	pond outflow
4a2	25.1	117.0	flow to existing 42" RCP
4a3	4.0	20.9	flow to proposed 24" RCP
4a4	2.4	8.5	flow to pond B
4a5	2.1	6.3	pond outflow
4b	8.5	18.0	flow to existing type C inlet
4c	29.8	125.3	flow to existing 48" RCP
4d	34.1	136.1	flow to existing 48" RCP
5	No Longer Used		
6a	1.5	7.3	flow to energy dissipator
6b	1.5	8.1	discharge flow to CDOT ROW

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
X1	4.21	1.0	7.6
X2a	0.61	0.2	1.3
X2b	58.06	24.5	111.6
X3	2.50	1.8	5.2
X4	7.03	2.8	14.9
X5	0.55	0.2	1.7
X33	2.92	8.5	18.0
X44	13.16	7.8	30.4
X55	5.31	7.0	17.8
A	4.21	1.0	7.6
B1	0.98	0.3	2.0
B2	43.82	19.9	86.3
B3	10.95	4.0	20.9
B4	3.49	1.6	7.2
B5	0.27	1.3	2.2
C1	3.70	2.9	9.4
C2	2.86	0.8	6.2
D	3.31	1.5	7.3
E	0.55	0.1	1.7

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

El Paso County, CO

DRAINAGE PLAN:
PROPOSED CONDITIONS - SITE (SOUTH)

issued	10/20/26

D50
sheet number

Appendix E

DRAINAGE PLANS – FDR APPROVED



DRAINAGE PLAN: EXISTING CONDITIONS - OVERALL

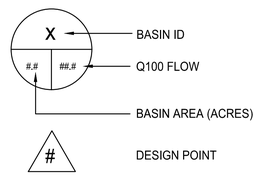
SCALE : 1" = 150'

BEACON LITE ROAD STOCKPILE

GENERAL NOTES

1. EXISTING TOPOGRAPHY BASED ON COLORADO WATER CONSERVATION BOARD (CWCB) DIGITAL ELEVATION MODEL (DEM), MERRICK OCTOBER 2016.
2. EXISTING CONTOURS ARE AT A 5' INTERVAL.

LEGEND



EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Total Flows Q_5 (c.f.s.)	Total Flows Q_{100} (c.f.s.)
X1	11.67	**3.7**	**21.7**
X2a	3.32	**0.9**	**6.5**
X2b	57.98	**24.4**	**111.5**
X3	2.92	**8.5**	**18.0**
X4	13.16	**7.8**	**30.5**
X5	5.25	**7.0**	**17.7**

DESIGN POINT SUMMARY

Design Point	Contributing Basins	Flow Q_5	Flow Q_{100}
1	X1	**3.7**	**21.7**
2a1	X2a	**0.9**	**6.5**
2a2	X2b	**24.5**	**111.6**
2a3	X2a,X2b	**25.2**	**117.2**
2b	X3	**8.5**	**18.0**
2c	X2a,X2b,X3,X4	**32.7**	**136.6**
2d	X2a,X2b,X3,X4,X5	**37.7**	**149.4**

NORTH

0 75 150 300

BEACON LITE ROAD STOCKPILE

El Paso County, CO

- DRAINAGE PLAN: EXISTING CONDITIONS - OVERALL

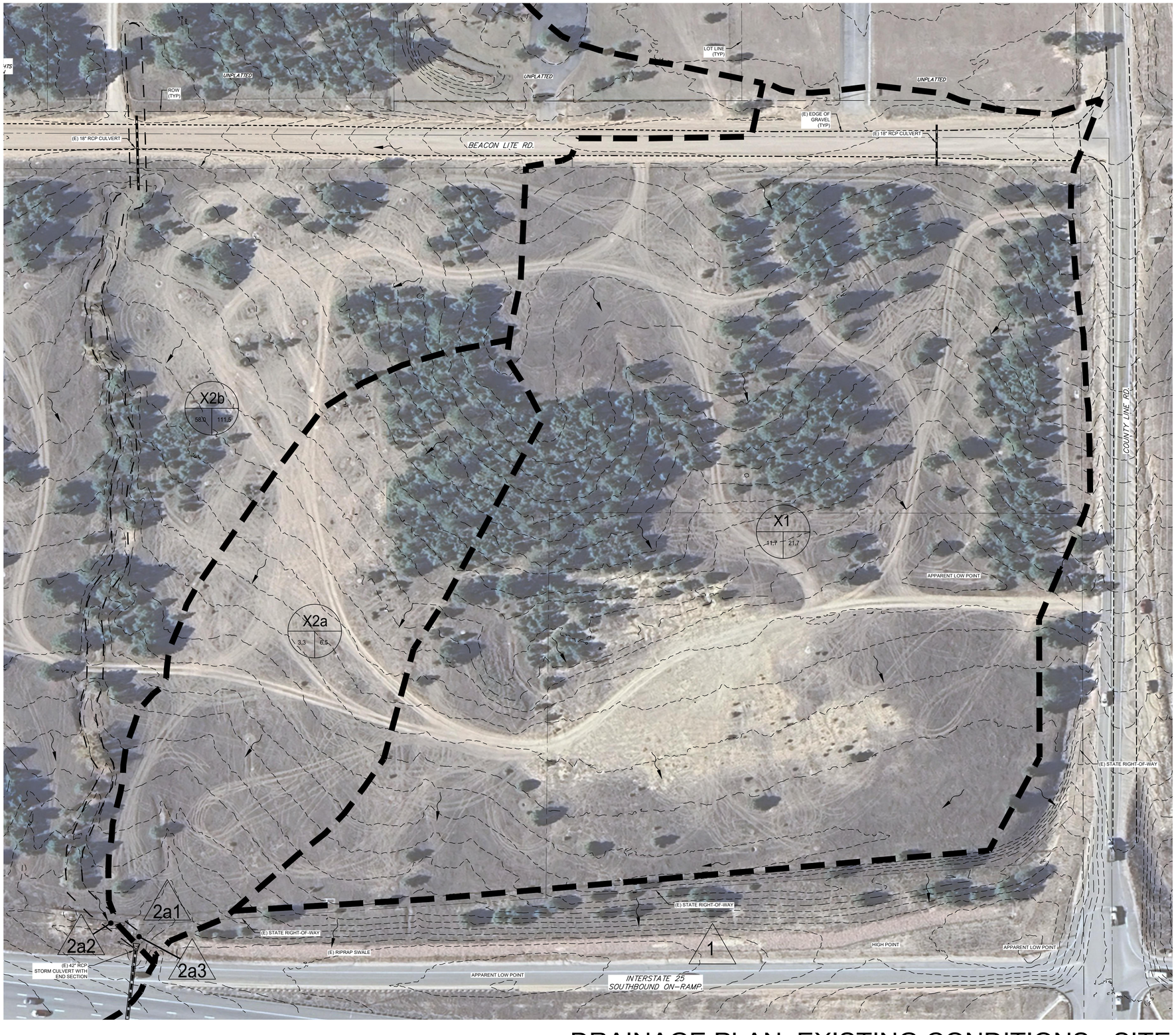
issued 3/7/26

D1

sheet number

ORIGINAL MAP (FOR REFERENCE ONLY)

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904
PRC ENGINEERING



DRAINAGE PLAN: EXISTING CONDITIONS - SITE

SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

GENERAL NOTES

1. EXISTING TOPOGRAPHY PROVIDED BY BEAR CREEK SURVEYING, INC. VIA DRONE.
2. EXISTING CONTOURS ARE AT A 2' INTERVAL.
3. AERIAL IMAGERY FROM GOOGLE EARTH 11/2025.

LEGEND

X — BASIN ID

#.# | ##.# — Q100 FLOW

BASIN AREA (ACRES)

\# — DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	RIPRAP
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Total Flows Q_5 (c.f.s.)	Total Flows Q_{100} (c.f.s.)
X1	11.67	3.7	21.7
X2a	3.32	0.9	6.5
X2b	57.98	24.4	111.5
X3	2.92	8.5	18.0
X4	13.16	7.8	30.5
X5	5.25	7.0	17.7

DESIGN POINT SUMMARY

Design Point	Contributing Basins	Flow Q_5	Flow Q_{100}
1	X1	3.7	21.7
2a1	X2a	0.9	6.5
2a2	X2b	24.5	111.6
2a3	X2a,X2b	25.2	117.2
2b	X3	8.5	18.0
2c	X2a,X2b,X3,X4	32.7	136.6
2d	X2a,X2b,X3,X4,X5	37.7	149.4

NORTH

0 25 50 100

ORIGINAL MAP (FOR REFERENCE ONLY)

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

El Paso County, CO

DRAINAGE PLAN: EXISTING CONDITIONS - SITE

issued	3/7/26

D2

sheet number



DRAINAGE PLAN: PROPOSED CONDITIONS - OVERALL

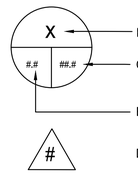
SCALE : 1" = 150'

BEACON LITE ROAD STOCKPILE

GENERAL NOTES

1. EXISTING TOPOGRAPHY BASED ON COLORADO WATER CONSERVATION BOARD (CWCB) DIGITAL ELEVATION MODEL (DEM), MERRICK OCTOBER 2016.
2. EXISTING CONTOURS ARE AT A 5' INTERVAL.

LEGEND



EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Total Flows Q_5 (c.f.s.)	Total Flows Q_{100} (c.f.s.)
A	4.21	1.0	7.6
B1	0.61	0.2	1.3
B2	58.06	24.5	111.6
C	2.50	1.8	5.2
D	7.03	2.8	14.9
E	0.55	0.2	1.7

DESIGN POINT SUMMARY

Design Point	Contributing Basins	Flow Q_5	Flow Q_{100}
3	A,B1,C	2.7	13.2
4a1	Pond Out	0.1	4.4
4a2	Pond Out,B2	24.6	116.0
4b	X3	8.5	18.0
4c	Pond Out,B2,X3,X4	32.1	136.1
4d	Pond Out,B2,X3,X4,X5	37.2	149.0
5	C	1.8	5.2
6a	D	2.8	14.9
6b	D,E	3.0	16.0

NORTH

0 75 150 300

ORIGINAL MAP (FOR REFERENCE ONLY)

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

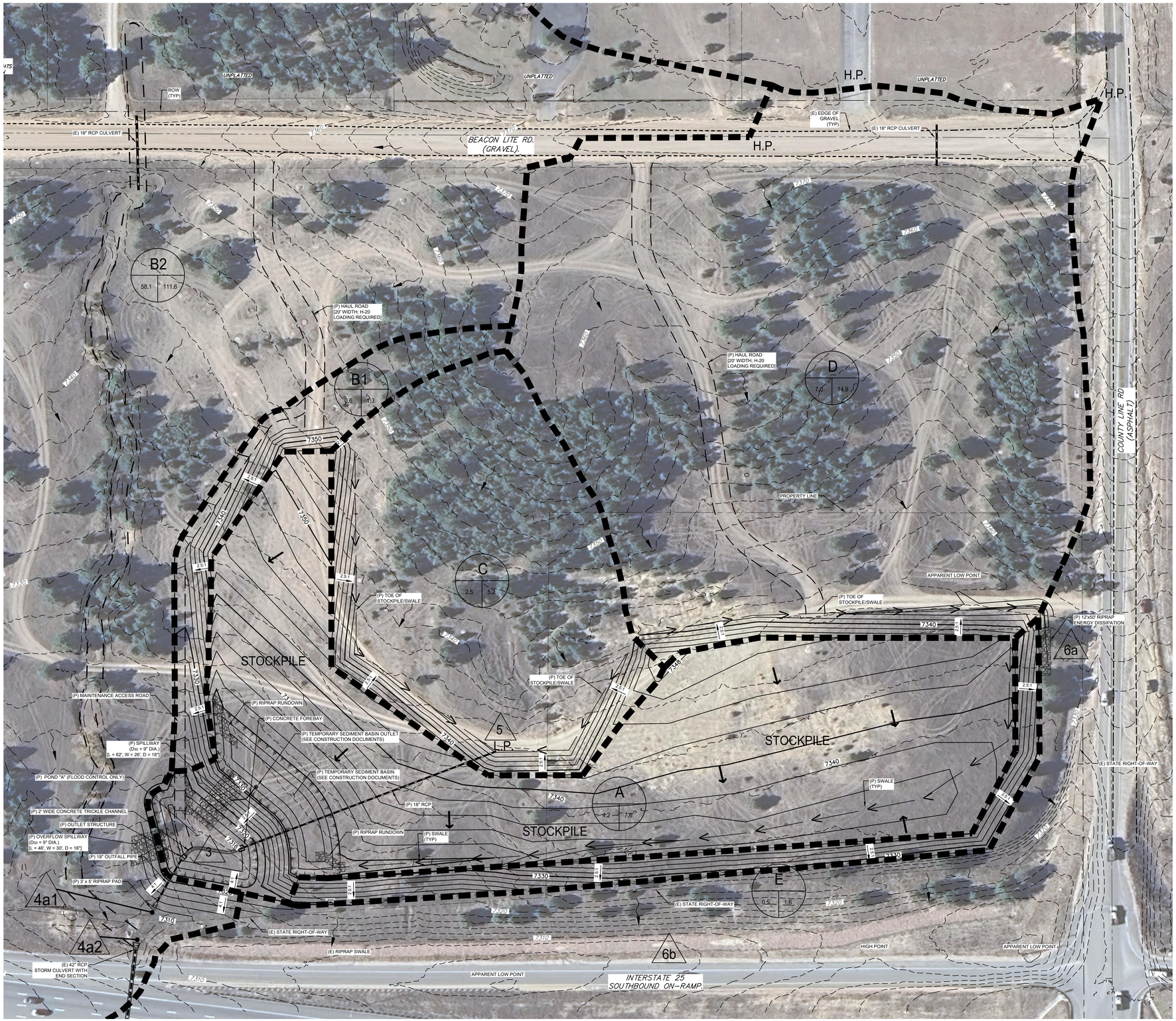
BEACON LITE ROAD STOCKPILE

El Paso County, CO

DRAINAGE PLAN:
PROPOSED CONDITIONS - OVERALL

issued 3/7/26

D1
sheet number



DRAINAGE PLAN: PROPOSED CONDITIONS - SITE

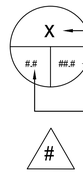
SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

GENERAL NOTES

1. EXISTING TOPOGRAPHY PROVIDED BY BEAR CREEK SURVEYING, INC. VIA DRONE.
2. ALL CONTOURS REFLECT EXISTING CONDITIONS AND PROPOSED DRAINAGE PATTERNS. PROPOSED CONTOURS ARE TO TOP OF THE FINISHED PAVING AND GRADING AREAS.
3. AERIAL IMAGERY FROM GOOGLE EARTH 11/2025.

LEGEND



BASIN ID

Q100 FLOW

BASIN AREA (ACRES)

DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

BASIN RUNOFF SUMMARY

Basin	Area Total (acres)	Total Flows Q_5 (c.f.s.)	Total Flows Q_{100} (c.f.s.)
A	4.21	1.0	7.6
B1	0.61	0.2	1.3
B2	58.06	24.5	111.6
C	2.50	1.8	5.2
D	7.03	2.8	14.9
E	0.55	0.2	1.7

DESIGN POINT SUMMARY

Design Point	Contributing Basins	Flow Q_5	Flow Q_{100}
3	A,B1,C	2.7	13.2
4a1	Pond Out	0.1	4.4
4a2	Pond Out,B2	24.6	116.0
4b	X3	8.5	18.0
4c	Pond Out,B2,X3,X4	32.1	136.1
4d	Pond Out,B2,X3,X4,X5	37.2	149.0
5	C	1.8	5.2
6a	D	2.8	14.9
6b	D,E	3.0	16.0

NORTH

0 25 50 100

ORIGINAL MAP (FOR REFERENCE ONLY)

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

El Paso County, CO

DRAINAGE PLAN: PROPOSED CONDITIONS - SITE

issued 3/7/26

D4

sheet number

This is my approximate area measurement for the area of disturbance in Basin B2 North, just for reference to go with my comment on the Runoff Reduction calcs on PDF page 50-51 of the FDR.

3,804 sf

B2 43.8 86.3

B1 4.0 2.0

C1 3.7 9.4

C2 2.9 6.2

D 3.3 7.3

A 4.2 7.8

E 0.6 1.8

BEACON LITE RD. (GRAVEL)

UNPLATTED

H.P.

COUNTY LINE RD (ASPHALT)

STOCKPILE

TSB

POND 3

5 L.P.

6b L.P.

6b INTERSTATE 25 SOUTHBOUND ON-RAMP.

DRAINAGE LEGEND

X — BASIN ID

#.## ##.# — Q100 FLOW

BASIN AREA (ACRES)

\# — DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

RUNOFF REDUCTION LEGEND

LIMITS OF DISTURBANCE	
SEPARATE PERVIOUS AREA (TO POND)	11.75AC
SEPARATE PERVIOUS AREA (OFF-SITE)	3.84AC

Add a value here for total LOD-North so it's clearly shown that you have provided SPAs for all the entire LOD.

SPAs are only needed for areas of disturbance . Please remove SPA shading from areas outside of the proposed LOD.

And update the Runoff Reduction calcs in the FDR accordingly.

Please revise this "off-site" label. It is a misnomer because the areas are onsite. I think you just mean to say that they are not trib to the pond. Revise the label accordingly.

NORTH

0 25 50 100

Add "SPAs" at the end of this heading to clarify.

Revise to "Pond A".

Revise to I.6.3.A.1.a

Revise all references to App I.6.1.B.#

Water Quality Treatment Summary Table (NORTH)

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	WQ Treatment: Area Trib to Pond 1 (ac)	WQ Treatment: Disturbed Area Treated via Runoff Reduction (ac)	WQ Exclusions: Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	WQ Exclusions: Disturbed Area Excluded from WQ per ECM App I.7.1.B (ac)	WQ Exclusions: Applicable WQ Exclusions (App I.7.1.B)
A	4.21	4.21	4.21				
B1	0.98	0.98	0.98				
B2	43.82	0.62				0.62	ECM App I.7.1.B.7
C1	3.70	1.15	3.70				
C2	2.86	1.72	2.86				
D	3.31	0.27				0.27	ECM App I.7.1.B.7
E	0.55	0.55				0.55	ECM App I.7.1.B.7
Total	59.43	9.50	11.75	0.00	0.00	1.44	

Min Required Area to Receive WQ (ac)	Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)	Total Proposed Disturbed Area Excluded from WQ (ac)	Net Treatment (ac)
8.06	9.50	11.75	1.44	3.69

This column should match the areas being treated via SPAs shown on your Runoff Reduction calcs

Where are these areas? They would need to be delineated with a different color of shading. I think you meant to have these in the Runoff Reduction column because that's where they were with the last submittal and the FDR approved in March. Remember that this exclusion B.7 did not apply to this stockpile, and that's why you were utilizing SPAs to show WQ treatment.

RUNOFF REDUCTION PLAN (NORTH)

SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

PRC ENGINEERING
1685 W. UINTAH STREET, SUITE 114
COLORADO SPRINGS, CO 80904

PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

El Paso County, CO

◆ RUNOFF REDUCTION PLAN (NORTH)

issued 10/20/26

RR1

sheet number

Note: this sheet is brand new with this submittal, so this is my first time reviewing it, thus the many new comments.

DRAINAGE LEGEND

- X — BASIN ID
- #.## / ##.# — Q100 FLOW
- BASIN AREA (ACRES)
- # — DESIGN POINT

EXISTING	(E)
PROPOSED	(P)
CURB AND GUTTER	C&G
PUBLIC	PUB
PRIVATE	PVT
INLET PROTECTION	IP
BASIN BOUNDARY	
PROPERTY BOUNDARY	
RIGHT-OF-WAY	
PROPERTY LINE	
(E) CONTOUR, INDEX	7350
(E) CONTOUR	
(P) CONTOUR, INDEX	7350
(P) CONTOUR	
LIMITS OF CONSTRUCTION/ LIMITS OF DISTURBANCE	
(E) STORM SEWER	
(P) STORM SEWER	
(P) RIPRAP	
(E) DIRECTION OF OVERLAND FLOW	
(P) DIRECTION OF OVERLAND FLOW	

Add a value here for total LOD-South so it's clearly shown that you have provided SPAs for all the entire LOD.

RUNOFF REDUCTION LEGEND

LIMITS OF DISTURBANCE	
SEPARATE PERVIOUS AREA (TO POND)	3.76AC
SEPARATE PERVIOUS AREA (OFF-SITE)	10.95AC

NOTE: REFER TO POND 1 TABLE FOR BASIN B2 INFO.

SPAs are only needed for areas of disturbance . Please remove SPA shading from areas outside of the proposed LOD.

And update the Runoff Reduction calcs in the FDR accordingly.

Pond A? But just delete this note and include the B2 South area in this Legend since i think that's what you will end up doing on the RR calc sheets (ie: breaking up B2 into South and North sections). It'll be cleaner that way.

BEACON LITE ROAD

ACCESS ROAD

B3 — 11.0 / 20.9

B2 — 43.8 / 86.3

B4 — 3.5 / 7.2

B5 — 0.3 / 2.2

STOCKPILE

TSB

POND

This is my approximate area measurement for the area of disturbance in Basin B2 South, just for reference to go with my comment on the Runoff Reduction calcs on PDF page 51 of the FDR.

84,265 SF

NORTH

0 25 50 100

Revise to "Pond B"

Add "SPAs" at the end of this heading to clarify.

Revise to I.6.3.A.1.a

Revise all references to App I.6.1.B.#

Water Quality Treatment Summary Table (SOUTH)

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	WQ Treatment: Area Trib to Pond 2 (ac)	WQ Treatment: Disturbed Area Treated via Runoff Reduction (ac)	WQ Exclusions: Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	WQ Exclusions: Disturbed Area Excluded from WQ per ECM App I.7.1.B (ac)	Applicable WQ Exclusions (App I.7.1.B)
B3	10.95	0.35				0.35	ECM App I.7.1.B.7
B4	3.49		3.49				
B5	0.27		0.27				
Total	14.71	0.35	3.76	0.00	0.00	0.35	

Min Required Area to Receive WQ (ac)	Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)	Total Proposed Disturbed Area Excluded from WQ (ac)	Net Treatment (ac)
0.00	0.35	3.76	0.35	3.76

This column should match the areas being treated via SPAs shown on your Runoff Reduction calcs

Where are these areas? They would need to be delineated with a different color of shading. I think you meant to have these in the Runoff Reduction column because that's where they were with the last submittal and the FDR approved in March. Remember that this exclusion B.7 did not apply to this stockpile, and that's why you were utilizing SPAs to show WQ treatment.

RUNOFF REDUCTION PLAN (NORTH)

SCALE : 1" = 50'

BEACON LITE ROAD STOCKPILE

South

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PRC ENGINEERING

BEACON LITE ROAD STOCKPILE

El Paso County, CO

RUNOFF REDUCTION PLAN (SOUTH)

issued 10/20/26

RR2

sheet number