EPC STORMWATER REVIEW COMMENTS ARE SHOWN IN ORANGE BOXES WITH BLACK TEXT

Early Grading Permit - Final Drainage Report

Winsome Subdivision Filing No. 3
El Paso County, Colorado

Prepared for:
Joe DesJardin
Winsome, LLC
1864 Woodmoor Drive, Suite 100
Monument, CO 80132

Prepared by:
Kimley-Horn and Associates, Inc.
2 North Nevada Avenue, Suite 300
Colorado Springs, Colorado 80903
(719) 453-0180
Contact: Brice Hammersland, P.E.

PCD File No. SF-21-XXX

Revise to EGP-21-005

Project #: 196106001

Prepared: December 10, 2021

Kimley»Horn

CERTIFICATION

DESIGN ENGINEER'S STATEMENT

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

SIGNATURE (Affix Seal): ____

Brice Hammersland, P.E.
Colorado P.E. No. 56012 Date

OWNER/DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all of the requirements specified in this Drainage Report and Plan.

____
Name of Developer

____
Authorized Signature Date

____
Printed Name

____
Title

____
Address:

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.

____ ______________________

Jennifer Irvine, P.E. Date
County Engineer/ ECM Administrator

Conditions:

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INTRODUCTION

PURPOSE AND SCOPE OF STUDY

The purpose of this Final Drainage Report (FDR) is to provide the hydrologic and hydraulic calculations and to document and finalize the drainage design methodology in support of the proposed Early Grading permit for the Winsome Subdivision ("the Project") Filing No. 3 ("the Site") for Winsome LLC. The Project is located within the jurisdictional limits of El Paso County ("the County"). Thus, the guidelines for the hydrologic and hydraulic design components were based on the criteria for the County and City of Colorado Springs, described below.

LOCATION

The Project is located approximately 17 miles west of Monument, Colorado within Township 11 South, Range 65 West of the 6th Principal Meridian, County of El Paso, State of Colorado (the "Site"). More specifically, the Site is located northwest of Winsome Filing No. 2, which is located north of Hodgen Road, and west of Meridian Road. A vicinity map has been provided in the **Appendix A** of this report.

The Site is currently owned by Winsome, LLC and will be developed by Winsome, LLC.

DESCRIPTION OF PROPERTY

The Project is located on approximately 768 acres of land consisting of vacant land with native vegetation and is classified as "Pasture, grassland or range" per Table 6-6 of the City of Colorado Springs Drainage Criteria Manual. Filing No 3 consists of 38 5-acre residential lots. The Site does not currently provide water quality or detention for the Project area. The existing land use is undeveloped vacant land. This Filing consist of 349.5 acres and will have a disturbance of approximately 31.6 acres.

The existing topography consists of slopes ranging from 1% to 16%. The West Kiowa Creek ("the Creek") runs along the south side of Filing 3.

NRCS soil data is available for this Site and it has been noted that soils onsite USCS Type B and Type C. The NRCS soil data can be found in **Appendix D**. known irrigation facilities within the Site.

revise to temp sediment pond.

Improvements will consist of mowing, clearing and grubbing, weed control, paved access road construction, roadway grading, three detention ponds, roadside ditches, culverts, drainage swales, native seeding and a proposed channel to convey flows to the water quality pond.

The Site proposes to plat 38 lots for single family development, as well as provide the grading, roadway and drainage improvements.

An updated Topographic field survey was completed for the Project by Edward-James Surveying, Inc. dated November 3th, 2020 and is the basis for design for the drainage improvements.

DRAINAGE BASINS

Revise. Site improvements/disturbance includes the bridge crossings w/in the floodplain.

Also as a reminder on the FDR for the Fil 3 final plat application make sure to update the FEMA floodplain paragraph to describe the agreement PCD and the developer has to restrict certain lots from obtaining a CO until the LOMR is completed.

MAJOR BASIN DESCRIPTIONS

A preliminary drainage report was comp… was previously completed by The Vertex Co… pproved Preliminary Drainage Report prepared b… o. 3 final design.

The Site improvements are located … plain as determined by the Flood Insurance R… ve date, December 7, 2018 (see **Appendix A**) … MR) was submitted and approved under Winsome Filing No. 1, FEMA Case No.19-08-0185R (see **Appendix D**). The floodplain is located along the southeast side of Filing No. 3 and the site improvements are located outside of the floodplain limits. Refer to **Appendix D** for the CLOMR application approval letter from FEMA for Case No. 19-08-0185R.

The Project is located within El Paso County's West Kiowa Creek Drainage Basin.

EXISTING SUB-BASIN DESCRIPTIONS

Per the approved Preliminary Drainage Report prepared by The Vertex Companies (PDR). The Site was divided into 6 subbasins A, G, H, I, J, and K. Drainage flows from northwest to southeast overland over vacant land to the West Kiowa Creek. Below is a description of the existing sub-basins.

confirm basin acreage for highlighted areas

Sub-Basin A

Per the approved PDR sub-basin, A consists of an area of 915.4 acres, located in the southwest corner of the property. Drainage flows overland from the northwest to southeast and into the West Kiowa Creek. Runoff during the 5-year and 100-year events are 87.10 cfs and 585.9 cfs respectively. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-Basin G

Per the approved PDR sub-basin G consists of an on-site area of 107.6 acres, located in the center of the western portion of the property. Drainage flows overland from the northwest to southeast into the West Kiowa Creek. Runoff during the 5-year and 100-year events are 45.30 cfs and 199.0 cfs respectively. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-basin H

Per the approved PDR sub-basin H consists of an on-site area of 121.8 acres, located in the center of the north portion of the property. Drainage flows overland from northwest to southeast to the West Kiowa Creek. Runoff during the 5-year and 100-year events are 34.80 cfs and 197.2 cfs respectively. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-basin I

Per the approved PDR sub-basin I consists of an on-site area of 37.5 acres, located in the north portion of the property. Drainage flows overland from northwest to southeast to the West Kiowa Creek. Runoff during the 5-year and 100-year events are 26.40 cfs and 88.5 cfs respectively. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-basin J

Per the approved PDR sub-basin J consists of an on-site area of 10.1 acres, located in the northwest corner of the property. Drainage flows overland from south to north and outfall offsite. Runoff during the 5-year and 100-year events are 3.40 cfs and 19.9 cfs respectively. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Sub-basin K

Per the approved PDR sub-basin K consists of an on-site area of 17.8 acres, located in the north portion of the property. Drainage flows overland from south to north and outfall offsite. Runoff during the 5-year and 100-year events are 12.90 cfs and 45.1 cfs respectively. Refer to **Appendix D** for the Existing Conditions Drainage Map.

Offsite flows entering the Site from sub-basin G will be conveyed through the Site following historical drainage paths and outfall to West Kiowa Creek. Offsite flows from sub-basin G will be routed to Water Quality Pond 1 and detained on site.

Excerpts from the approved PDR for the Existing Drainage Conditions are included in the **Appendix D** of this report for reference.

PROPOSED HEC-HMS SUB-BASIN DESCRIPTIONS

For the proposed condition, stormwater will generally maintain historic flow patterns from northwest to southeast. The proposed roadways will alter some of the existing flow paths. The roadway ditches will capture runoff from the roadways and direct flows back to the existing flow paths, which will ultimately outfall to Water Quality Pond 1, Pond 1, Pond 2 or Pond 4. To determine the design flows for the proposed culverts the existing basins were broken out and design points were created at each culvert crossing location.

For Filing No. 3 the proposed basins has been divided into 25 larger sub-basins for the HEC-HMS model.

Sub-Basin A2A is an offsite basin on the northwest side of Filing No. 3. Runoff from this basin will be directed to design point A2A where it will be directed to Basin A3B. This sub-basin has an area of 28.13 acres. The curve number for Sub-Basin A2A is 65.43. The basin will generate runoff of 5.3 cfs and 47.1 cfs in the minor and major storm event.

Sub-Basin A2B is an offsite basin on the northwest side of Filing No. 3. Runoff from this basin will be directed to design point A2B where it will be directed to Basin A3A. This sub-basin has an area of 8.87 acres. The curve number for Sub-Basin A2B is 69.78. The basin will generate runoff of 2.3 cfs and 20.3 cfs in the minor and major storm event.

Sub-Basin A3A consists of large residential lots and a portion of roadway. Runoff from this basin will be directed to design point A3A where it will be directed to Swale A3A and into the proposed culvert A3A to subbasin G2A. This sub-basin has an area of 8.25 acres. The curve number for Sub-Basin A3A is 73.04. The basin will generate runoff of 5.7 cfs and 25.8 cfs in the minor and major storm event.

Sub-Basin A3B consists of large residential lots and a portion of roadway. Runoff from this basin will be directed to design point A3B where it outfalls into West Kiowa Creek. This sub-basin has an area of 13.22 acres. The curve number for Sub-Basin A3B is 74.30. The basin will generate runoff of 9.1 cfs and 42.6 cfs in the minor and major storm event.

Roadway WQ is required before discharging into waters of the state (typ.).

Sub-Basin A3C consists of large residential lots in the southwest corner of the site. Runoff from this basin will be directed to design point A3C where it will be directed to outfall in West Kiowa Creek. This sub-basin has an area of 11.66 acres. The curve number for Sub-Basin A3C is 77.23. The basin will generate runoff of 10.4 cfs and 40.5 cfs in the minor and major storm event. Flows from this sub-basin are not required to be conveyed to a water quality facility according to Appendix I Section 1.7.1.B of El Paso County's Engineering Construction Manual (ECM). The sub-basin is identified as a large lot single family area with an impervious cover under 20 percent under Section 1.7.1.B, number 5.

Sub-Basin G1 consists of large residential lots along the west boundary of the site. Runoff from this basin will be directed to design point G1 where it will be directed to the southeast in culvert G1 to subbasin G2A. This sub-basin has an area of 24.79 acres. The curve number for Sub-Basin G1 is 67.58. The basin will generate runoff of 3.1 cfs and 40.1 cfs in the minor and major storm event.

add to include "portion of roadway". Update other sub-basin descriptions that includes roadway such as: G2B, H1, H2, H3A, H3B, H4, etc.

Sub-Basin G2A consists of several portions of 4 large reside[illegible]r Way. Runoff from this basin will be directed to design point G2A w[illegible] Water Quality Pond 1 which will outfall to West Kiowa Creek. This [illegible] 18.60 acres. The curve number for Sub-Basin G2A is 74.20. The basi[illegible]2.9 cfs and 59.9 cfs in the minor and major storm event.

label channel on figure

Sub-Basin G2B consists of portions of 2 large residential lots e[illegible]ff from this basin will be directed to Channel X where it will drain into th[illegible]ich will outfall into West Kiowa Creek. This sub-basin has an area of 2[illegible]ber for Sub-Basin G2B is 74.24. The basin will generate runoff of 2.6 cfs and 9.6 cfs in the minor and major storm event.

Sub-Basin H1 consists of portions of 2 large residential lots in the northwest corner of the site. Runoff from this basin will be directed to culvert H1 then to subbasin H4. This sub-basin has an area of 13.76 acres. The curve number for Sub-Basin H1 is 70.03. The basin will generate runoff of 4.6 cfs and 33.0 cfs in the minor and major storm event.

Sub-Basin H2 consists of 8 large residential lots north of Alamar Way in the center of the northern portion of the site. Runoff from this basin will flow southeast to culvert H2 and into sub-basin H6B. This sub-basin has an area of 39.09 acres. The curve number for Sub-Basin H2 is 64.93. The basin will generate runoff of 8.9 cfs and 65.2 cfs in the minor and major storm event.

Sub-Basin H3A consists of portions of large residential lots and of an undeveloped area north of the site. Runoff from this basin will be directed to culvert H3 and into sub-basin H7B. This sub-basin has an area of 3.08 acres. The curve number for Sub-Basin H3A is 71.60. The basin will generate runoff of 1.3 cfs and 8.0 cfs in the minor and major storm event.

Sub-Basin H3B cons[illegible]esidential lots and of an undeveloped area north of the site. Runoff from[illegible]d to culvert I1 by a roadside ditch. This sub-basin has an area of 2.7[illegible]ber for Sub-Basin H3B is 72.02. The basin will generate runoff of 1.[illegible]nor and major storm event.

Revise naming to match the drainage map (temporary sediment basin 1). Typical for all.

Sub-Basin H4 consists of portions of large residential lots. Runoff from this basin will be directed to Reach H1 and into sub-basin Detention Pond 1 which outfalls to West Kiowa Creek. This sub-basin has an area of 27.00 acres. The curve number for Sub-Basin H4 is 74.44. The basin will generate runoff of 15.4 cfs and 73.6 cfs in the minor and major storm event.

Sub-Basin H5A consists of portions of large residential lots. Runoff from this basin will be directed to design point H5A and outfall to West Kiowa Creek. This sub-basin has an area of 9.03 acres. The curve number for Sub-Basin H5A is 75.95. The basin will generate runoff of 6.2 cfs and 27.0 cfs in the minor and major storm event. Flows from this sub-basin are not required to be conveyed to a water quality facility according to Appendix I Section 1.7.1.B of El Paso County's Engineering Construction Manual (ECM). The sub-basin is identified as a large lot single family area with an impervious cover under 20 percent under Section 1.7.1.B, number 5.

Sub-Basin H5B consists of portions of large residential lots, south of Alamar Way in the center of the site. Runoff from this basin will be directed to design point H5B and outfall to West Kiowa Creek. This sub-basin has an area of 10.48 acres. The curve number for Sub-Basin H5B is 73.76. The basin will generate runoff of 5.6 cfs and 29.0 cfs in the minor and major storm event. Flows from this sub-basin are not required to be conveyed to a water quality facility according to Appendix I Section 1.7.1.B of El Paso County's Engineering Construction Manual (ECM). The sub-basin is identified as a large lot single family area with an impervious cover under 20 percent under Section 1.7.1.B, number 5.

Sub-Basin H6A consists of portions of large residential lots, south of Alamar Way. Runoff from this basin will be directed to design point H6A and outfall to West Kiowa Creek. This sub-basin has an area of 16.64 acres. The curve number for Sub-Basin H6A is 75.56. The basin will generate runoff of 11.6 cfs and 51.1 cfs in the minor and major storm event. Flows from this sub-basin are not required to be conveyed to a water quality facility according to Appendix I Section 1.7.1.B of El Paso County's Engineering Construction Manual (ECM). The sub-basin is identified as a large lot single family area with an impervious cover under 20 percent under Section 1.7.1.B, number 5.

Sub-Basin H6B consists of portions of large residential lots, south of Alamar Way. Runoff from this basin will be directed through Reach H2 into Detention Pond 2 and outfall to West Kiowa Creek. This sub-basin has an area of 15.96 acres. The curve number for Sub-Basin H6B is 76.47. The basin will generate runoff of 15.5 cfs and 57.1 cfs in the minor and major storm event. Portions of roadway within H6B and H2 require WQ

Sub-Basin H7A consists of large residential lots, southwest of the intersection at Alamar Way and Twinkle Star Lane. Runoff from this basin will sheet flow into a roadside ditch to the Pond 4 Culvert. This sub-basin has an area of 8.50 acres. The curve number for Sub-Basin H7A is 72.92. The basin will generate runoff of 6.1 cfs and 27.1 cfs in the minor and major storm event.

label on figure and discuss flow path from culvert

Sub-Basin H7B consists of large residential lots, south of Alamar Way. Runoff from this basin will be directed through Reach H3 to design point H7B to culvert H7. This sub-basin has an area of 17.35 acres. The curve number for Sub-Basin H7B is 71.39. The basin will generate runoff of 7.8 cfs and 49.5 cfs in the minor and major storm event.

Update to Twinkling Star

Sub-Basin H8 consists of a portion of a large residential lot, east of Alamar Way in the east portion of the site. Runoff from this basin will sheet flow to design point H8 and outfall to West Kiowa Creek. This sub-basin has an area of 8.46 acres. The curve number for Sub-Basin H8 is 75.69. The basin will generate runoff of 6.7 cfs and 26.5 cfs in the minor and major storm event. The roadway portions within in this basin will be directed through a roadside ditch and drain to Detention Pond 4 to provide adequate water quality treatment.

Sub-Basin H9 consists of portions of 2 large residential lots, east of Alamar Way in the east portion of the site. Runoff from this basin will be directed to design point H9 and outfall to West Kiowa Creek. This sub-basin has an area of 6.85 acres. The curve number for Sub-Basin H9 is

Discuss where flows ultimately go after culvert I1

72.27. The basin will generate runoff of 3.2 cfs and 16.9 cfs in the minor and major storm event. The roadway portions within in this basin will be directed through a roadside ditch and drain to Detention Pond 4 to provide adequate water quality treatment.

Sub-Basin I1 consists of portions of
Star Lane intersection. Runoff from
This sub-basin has an area of 6.82
basin will generate runoff of 5.9 cfs a

update to identify the residential lot portion is excluded from WQ.

If the road section of the basin doesn't drain into DP H9, it seems the basin boundary should be updated so that it's a part of basin H8 instead.

Sub-Basin I2 consists of portions of
portion of the site. Runoff from this
outfall to West Kiowa Creek. This su
Sub-Basin I2 is 72.89. The basin will generate runoff of 8.2 cfs and 39.1 cfs in the minor and major storm event. Runoff reduction is being accounted for to meet water quality requirements for the roadway runoff within this basin. Refer to the runoff reduction section for additional information.

For basins draining directly offsite (J1 & K1) include a narrative comparing historic vs developed flow and provide justification why flood control storage is not required.

Explain how the developed condition results in lower runoff compared to existing condition.

Sub-Basin J1 consist … thwest corner of the site. Runoff from this basi … e. This sub-basin has an area of 10.14 acres. … basin will generate runoff of 2.1 cfs and 13.0 c … m this sub-basin are not required to be convey … ix I Section 1.7.1.B of El Paso County's Engin … in is identified as a large lot single family area … Section 1.7.1.B, number 5.

Sub-Basin K1 consists of portions of 4 large residential lots, north of Alamar Way in the northeast portion of the site. Runoff from this basin will be directed to design point K1 and flow offsite. This sub-basin has an area of 17.50 acres. The curve number for Sub-Basin K1 is 69.56. The basin will generate runoff of 4.5 cfs and 40.7 cfs in the minor and major storm event. Flows from this sub-basin are not required to be conveyed to a water quality facility according to Appendix I Section 1.7.1.B of El Paso County's Engineering Construction Manual (ECM). The sub-basin is identified as a large lot single family area with an impervious cover under 20 percent under Section 1.7.1.B, number 5.

Basin B3, B4, B2, C2, C3, C4, D5, and D6 are shown within the drainage map however were accounted for in Winsome Filing No.1 Final Drainage Report approved, May 15, 2019.

DRAINAGE DESIGN CRITERIA

DEVELOPMENT CRITERIA REFERENCE

The proposed storm facilities are designed to be in compliance with the City of Colorado Springs and El Paso County "Drainage Criteria Manual (DCM)" dated October 2018 ("the MANUAL"), El Paso County "Engineering Criteria Manual" ("the Engineering Manual"), Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014 ("the Colorado Springs MANUAL").

Site drainage is not significantly impacted by such constraints as utilities or existing development.

A preliminary drainage report was completed for the overall Winsome subdivision. This was previously completed by The Vertex Companies. This Final Drainage Report used the approved Preliminary Drainage Report prepared by The Vertex Companies (PDR) for the Site's final design.

HYDROLOGIC CRITERIA

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the proposed drainage analysis per the MANUAL. Table 6-2 of the Colorado Springs MANUAL is the source for rainfall data for the 5-year and 100-year design storm events. Design runoff was calculated using the NRCS curve number method for developed conditions as established in the MANUAL. This aligns with what was completed in the PDR. The NRCS curve number method was used for existing conditions and proposed conditions due to the on-site and off-site basins containing more than 130 acres. Per the PDR the runoff curve numbers for the existing and proposed drainage basins used the curve numbers in DCM. The PDR developed the following values for the 2 ½ and 5 acre lots in **Table 1** below. These values were also used for the final design in this report.

Table 1: *Values Extrapolated per the PDR*

		Soil Type			
Lot Size (Acres)	**% Imp**	**A**	**B**	**C**	**D**
5	7	N/A	60	72	77

The rainfall depths that were determined in the PDR were also used for the final design. The rainfall depths utilized the Frontal Storm which produced higher design flows. See **Table 2** below for the Frontal Storm rainfall values.

Table 2: *Frontal Storm Rainfall Depths*

	Duration (HRS)	
Storm Event	**1 HR**	**24 HR**
5 Year	1.5	2.7
100 Year	2.52	4.6

Calculations for the composite curve numbers are included in the **Appendix B**.

The proposed impervious values were determined in the PDR and were utilized in this report for the final design.

The Site is providing one water quality pond and three full spectrum detention ponds as the Site is not significantly increasing the imperviousness of the Site, the Project is maintaining the historic drainage patterns as much as possible and not significantly increasing developed flows.

There are no additional provisions selected or deviations from the criteria in both the MANUAL and Colorado Springs MANUAL.

Provide an explanation on how HEC-HMS and the temporary sediment basin sizing are tied together.

HYDRAULIC CRITE...

Applicable design me... the proposed temporary sediment basins, culverts, and drainage channels, which includes the use of HEC-HMS, UD-Culvert and FlowMaster, V8i software. Temporary sediment basin sizing calculations can be found in **Appendix C**.

Proposed drainage features on-site have been analyzed and sized for the following design storm events:

- Major Storm: 100-year Storm Event

For the stormwater modeling for the Site was completed utilizing the NRCS Curve Number Method as required by the City of Colorado Springs. The HEC-HMS peak flows were determined to size the proposed culverts and channels. The same assumptions were kept from the PDR for the time of concentration calculations. **Table 3** below outlines these assumptions from the PDR:

Table 3: *Time of Concentration Assumptions*

	Shape	Side Slope	Depth (ft)	Wetted Perimeter (ft)	Cross Sectional Area (sq. ft.)
< 100 Acre Basin Channels	Triangular	4:1	4	32.98	64
>100 Acre Basin Channels	Triangular	4:1	3	24.74	36

For the conveyance flow paths the same assumptions and method was carried through from the PDR. These flow paths were for between the basin and the main channels and used 3 profiles. Per the PDR the 3 profiles utilized are as follows: “triangular profiles were used for the majority of the conveyance channels, larger branching tributaries with an 8 ft bottom, and the main channels were modeled as trapezoidal with a 20 ft bottom.”

Four temporary sediment basins and one permanent sediment basin (H5B) are proposed in order to capture eroded or disturbed soil transported in storm runoff prior to discharge form the site.

Temporary Sediment Basin ID	Tributary Basin Area (Acres)	TSB Volume (Ac-ft)
WQ1	21.4	2.01
1		2.54
2		1.51
4		2.44
H5B	10.3	0.97

Include a narrative stating TSB outlet perforation is sized with an emptying time of approximately 72 hrs.

- **Orifice Plate or Riser Pipe**: Follow the design criteria for Full Spectrum Detention outlets in the EDB Fact Sheet provided in Chapter 4 of this manual for sizing of outlet perforations with an emptying time of approximately 72 hours. In lieu of the trash rack, pack uniformly sized 1½ - to 2-inch gravel in front of the plate or surrounding the riser pipe. This gravel will need to be cleaned out frequently during the construction period as sediment accumulates within it. The gravel pack will need to be removed and disposed of following construction to reclaim the basin for use as a permanent detention facility. If the basin will be used as a permanent extended detention basin for the site, a trash rack will need to be installed once contributing drainage areas have been stabilized and the gravel pack and accumulated sediment have been removed.

HEC-HM... ...endix **B** and **Append**...

Revise. These are missing from appendix C. This may be more appropriate to be included with the Filing 3 FDR when there's a street construction drawing to reference.

As such, Staff recommends revising the narrative to note roadside ditch hydraulic analysis will be included with the final drainage report for Filing 3.

NOTE: part of the hydraulic analysis will be to identify the velocities of sections of the roadside ditches and identify specific erosion protection if velocities exceed permissible velocities of native grass.

Contact the review engineer to discuss.

C… ry flows to the temporary sediment basins. Th… es, with equal 4:1 side slopes. It should be m… ng in existing onsite drainage channels. As pa… ented to stabilize the existing head cuts. In ad… nal channel improvements are proposed for ch… on potential to those channel sections. The pr… portions of the channels, rock sills, riprap ro… The approach with the proposed channel im… r channels H1-B, H4, H1-A, and H5B allows fo… For channel H5B which has a high density of tr… ning length of the channel will remain as is, du… he reach. A permeant sediment basin for ch… st Kiowa Creek. The other area with a high tr… nnels (H1-B, H4, and H1-A). At this location th… -grading, rock sills and riprap rock chutes. Th… provided in the **Appendix C** and channel de… e Maps. Refer to **Appendix E** for the head cu…

Roadside ditches are provided along the proposed roadways to route flows to the proposed culverts. The roadside ditches are sized to convey the major event flow. The majority of the roadside ditches have been designed to have an average depth of approximately 3 feet, a v-ditch, a left-side slope of 4:1, and a right-side slope of 4:1. Roadside ditch sizing and capacity calculations are provided in the **Appendix C**.

Culverts were sized to convey flows from the ditches and channels, underneath the Site's paved roads. The proposed culverts range in diameter from 24" to 48" and have been designed to convey the 100-year storm event. Culvert calculations are provided in the **Appendix C** and culvert locations are provided in the Proposed Drainage Maps.

THE FOUR STEP PROCESS

The Project was designed in accordance with the four-step process to minimize adverse impacts of urbanization, as outlined in Chapter 1 Section 4.0 of the Colorado Springs MANUAL.

revise reference to Engineering Criteria Manual Appendix I Section I.7.2. and update the 4-step process

Step 1. Employ Runoff Reduction Practices- The project is proposing a low-density … at will be designed to minimize the impact to the current … proposed paved roadways will increase the Site's impervious … ches and channels will be constructed to slow down the runoff … peaks. The three full spectrum detention ponds will be used to … aintain flows discharging off site at or below historic levels. For … d Twinkling Star Lane runoff reduction has been employed by … downhill side of the road and sending stormwater that contacts the road across a receiving previous area

provide runoff reduction calculations

Step 2. Implement BMPs That Provide a Water Quality Capture Volume with Slow Release –Permanent water quality measures and detention facilities will be necessary for the Project. Temporary water quality and erosion control measures will be provided during construction to prevent sediment laden water from discharging from the Site. Water quality measures are being used for all stormwater that contacts roadways.

Step 3 Stabilize Drainageways– Stabilizing proposed roadside ditches, swales, and channels by designing them with slopes that control the flow rates. Placement of riprap upstream and downstream of culverts to help reduce erosion of the roadside ditches. Existing drainage ways have been graded to reduce the velocity of the water to minimize erosion. The existing natural channels have been analyzed for width and velocity for the 100-year storm event. Easements are proposed to accommodate the full width of the

1. Staff is assuming the locations of the temporary sediment basins will eventually be converted to the permanent wq/detention. Therefore, add a subsection describing the intent to convert these and state that permanent WQ/Detention pond design will finalized with the Final Drainage Report associated with the Filing 3 final plat application.

2. Provide a description regarding the two RBC bridge structure such as noting this is being submitted concurrently and reviewed as a separate standalone project.
- Reference the report and the PCD File No (if available) for the hydraulic analysis of the bridge.

Is the start of the early grading predicated in the approval of the bridge plans or is there a contingency plan for crossing the creek in the interim? Provide an explanation.

3. Similar to the previous two item, provide a narrative regarding the West Kiowa Creek channel stabilization, describe when the analysis and work will be provided.

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MS method
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n be found

SPECIFIC DETAILS

The existing conditions of the Site have flows conveying from the northwest to southeast and discharging in the West Kiowa Creek. Runoff conditions for the Site were developed utilizing the previously referenced Hydrologic Criteria per the approved PDR for the Winsome subdivision. The proposed development looks to preserve the natural drainage patterns as much as possible.

A Proposed Drainage Conditions Map and hydrologic calculations are included in the **Appendix B, Appendix C,** and **Appendix E** of this report for reference.

The Site will disturb more than 1 acre and will require a Colorado Discharge Permit System (CDPS) General Permit for Stormwater Discharge Associated with Construction Activities from the Colorado Department of Public Health and Environment (CDPHE).

There are no current drainage and bridge fees for the Project as the West Kiowa Creek Drainage Basin is not part of the El Paso County Drainage Basin Fee Program.

DRIVEWAY CULVERTS

Culverts were analyzed and sized for dri[...] ditch crossing from the roadways. Design assumptions were ma[...] a max slope of 2%. Refer to **Appendix C** for the driveway culvert cal[...]

Remove and identify that these will be provided with the Final Drainage Report for Filing 3.

Remember, this FDR is for the early grading request.

EXISTING MINOR DRAINAGE CHA[...]

The existing drainage channels within Fi[...]termine top widths for proposed easements and velocities for e[...]g of existing drainage

Kimley»Horn

channels H1-A, H1-B, H3, and H4 will be proposed as part of this Filing 3. All existing channels are fully vegetated and channels H1-A, H1-B, H3, and H4 will be reseeded as part of this Filing. Four channels will require lining due to velocities exceeding 5 fps per MHFD criteria. Channel H1-A, H1-B, H5B, and H3 will require additional improvements due to the head cutting occurring within the channels. These channels are discussed in the hydraulic criteria section. Swale A3A, Swale I1 and the Water Quality Channel will be lined with Turf Reinforcement Mat or approved equal to reduce the potential of erosion within the channel. The Turf Reinforcement Mat material and performance specifications reflect an unvegetated maximum allowable velocity of 9 fps. Refer to **Appendix C** for the channel calculations, maximum allowable velocity criteria per MHFD and Turf Reinforcement Mat.

SUMMARY

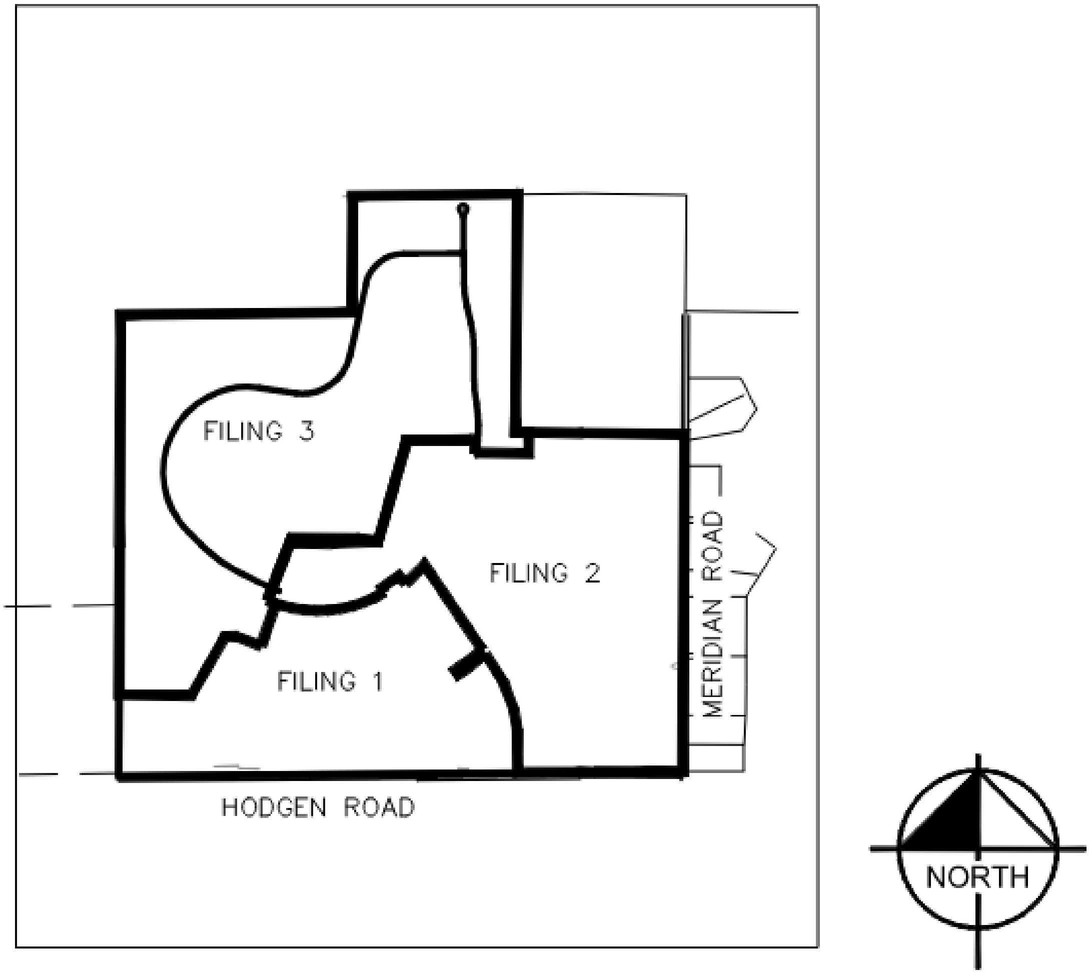
The proposed drainage design is to maintain the historic drainage patterns, the overall imperviousness and release rates for the Site. Runoff from the Site will flow overland to existing El Paso County drainage basins: The West Kiowa Creek Basin. The basin ultimately discharges to the West Kiowa Creek. The drainage design presented within this report conforms to the criteria presented in both the MANUAL and the Colorado Springs MANUAL. Additionally, the Site runoff and storm drain facilities will not adversely affect the downstream and surrounding developments, including West Kiowa Creek.

REFERENCES

1. City of Colorado Springs "Drainage Criteria Manual (DCM) Volume 1", dated May, 2014
2. El Paso County "Drainage Criteria Manual", dated October 31, 2018
3. El Paso County "Engineering Criteria Manual" Revision 6, dated December 13, 2016
4. Chapter 6 and Section 3.2.1. of Chapter 13-City of Colorado Springs Drainage Criteria Manual, May 2014.
5. Urban Drainage and Flood Control District Drainage Criteria Manual (UDFCDCM), Vol. 1, prepared by Wright-McLaughlin Engineers, June 2001, with latest revisions.
6. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C0507F and 08041C0530F, Effective Date March 17, 1997, prepared by the Federal Emergency Management Agency (FEMA).
7. Winsome Subdivision Preliminary Drainage Report (PDR), prepared by The Vertex Companies, Inc, May 15, 2019. PCD File No. SP-18-006.
8. Request For Conditional Letter of Map Revision For West Kiowa Creek, prepared by The Vertex Companies, Inc., July 1,2019. FEMA Case No. 19-08-0185R.

APPENDIX

APPENDIX A: FIGURES



VICINITY MAP

1"=2,000'

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

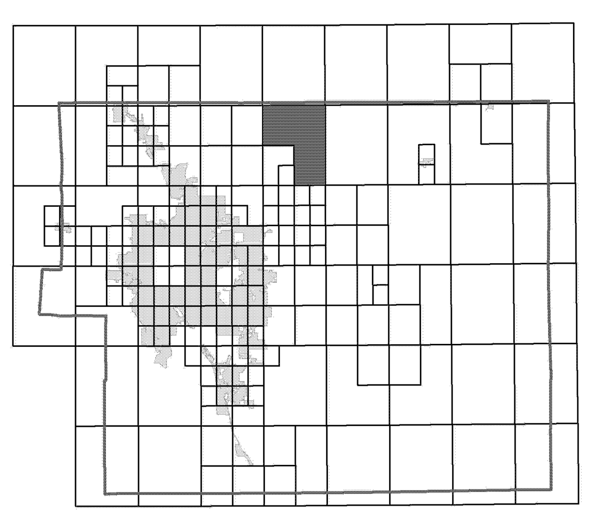
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

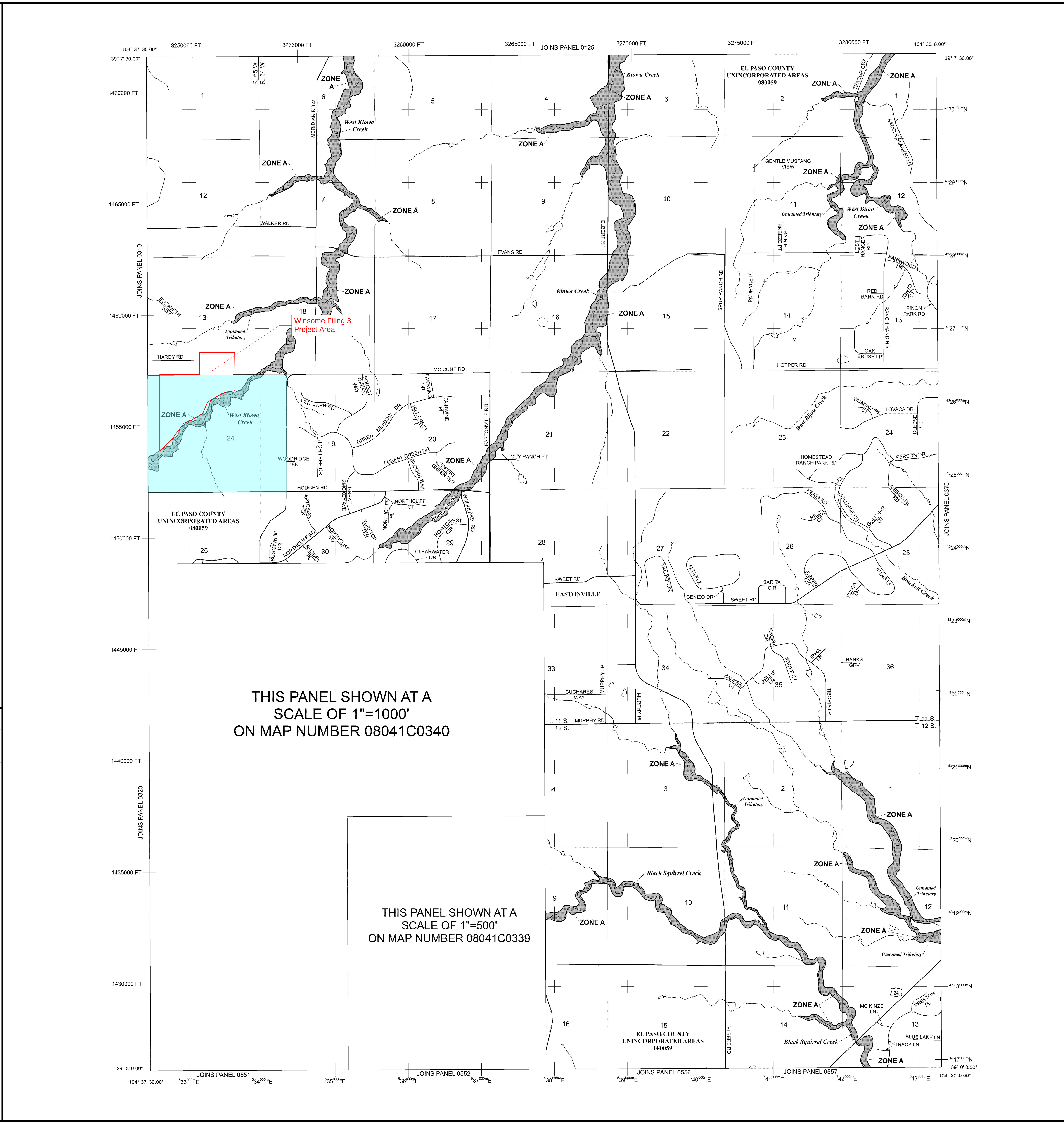
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A —— A	Cross section line
23 - - - - 23	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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

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

MAP SCALE 1" = 2000'

FEET: 1000 0 2000 4000
METERS: 600 0 600 1200

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0350G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 350 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0350	G

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

MAP NUMBER
08041C0350G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

USDA

United States Department of Agriculture

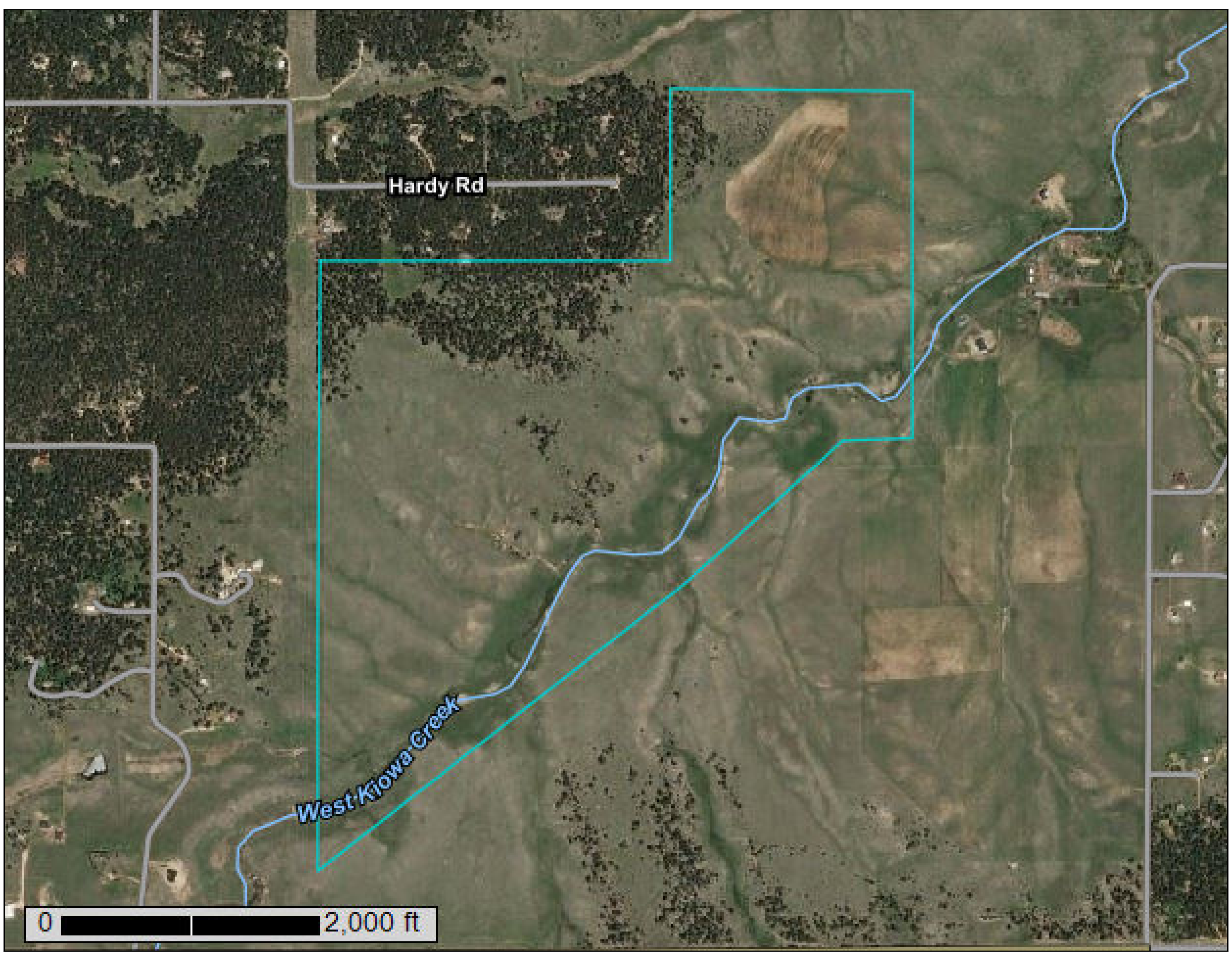
NRCS

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

El Paso County Area, Colorado



September 30, 2021

Preface

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

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

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

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

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

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

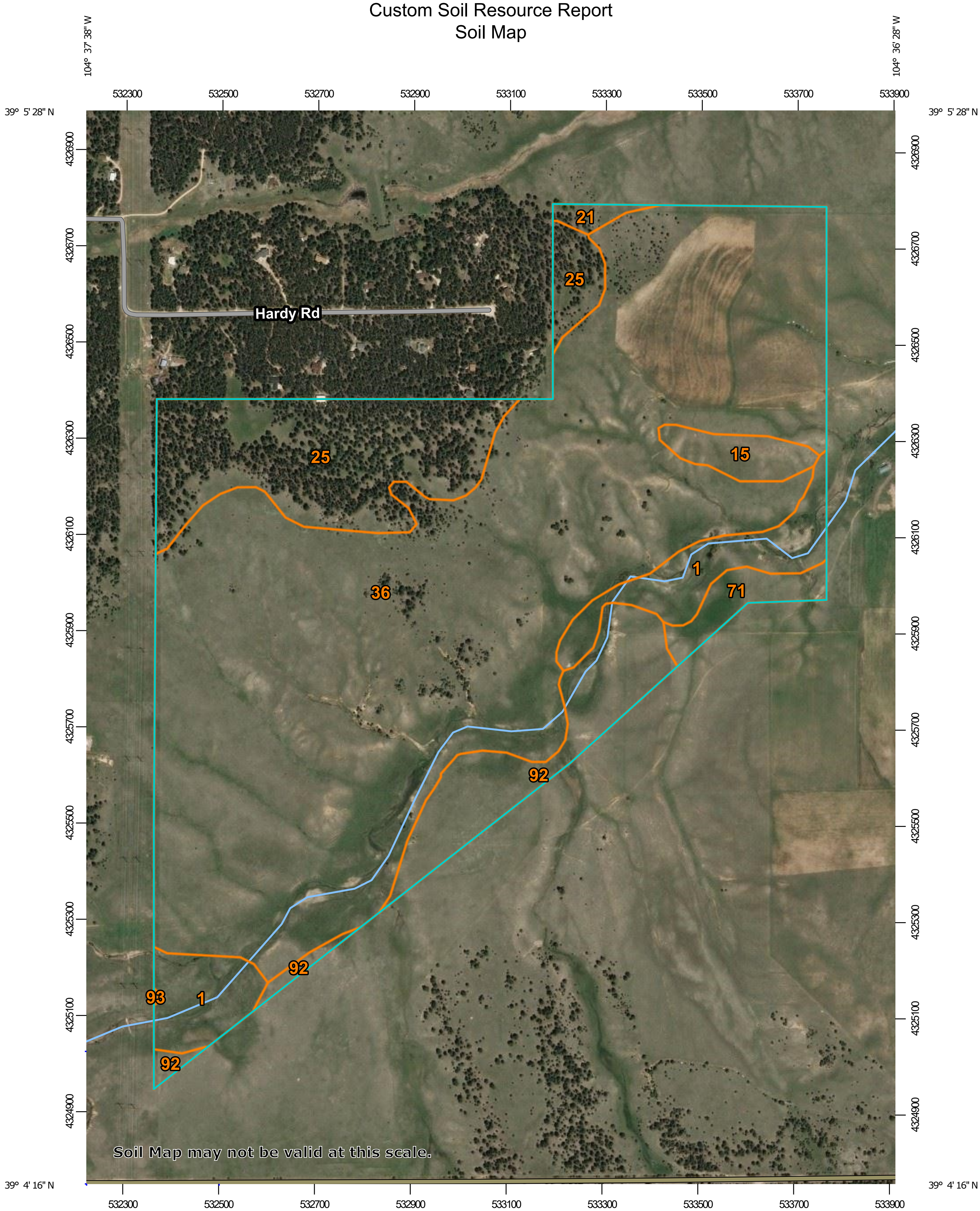
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

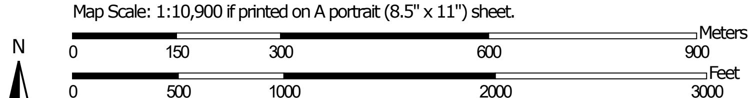
Soil Map

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

Soil Map



Map Scale: 1:10,900 if printed on A portrait (8.5" x 11") sheet.



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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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
1	Alamosa loam, 1 to 3 percent slopes	23.6	6.5%
15	Brussett loam, 3 to 5 percent slopes	6.0	1.6%
21	Cruckton sandy loam, 1 to 9 percent slopes	1.8	0.5%
25	Elbeth sandy loam, 3 to 8 percent slopes	46.0	12.6%
36	Holderness loam, 8 to 15 percent slopes	255.9	70.3%
71	Pring coarse sandy loam, 3 to 8 percent slopes	6.3	1.7%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	24.2	6.7%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	0.1	0.0%
Totals for Area of Interest		**363.9**	**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.

El Paso County Area, Colorado

1—Alamosa loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3670
Elevation: 7,200 to 7,700 feet
Farmland classification: Prime farmland if irrigated and reclaimed of excess salts and sodium

Map Unit Composition

Alamosa and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alamosa

Setting

Landform: Flood plains, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 6 inches: loam
Bt - 6 to 14 inches: clay loam
Btk - 14 to 33 inches: clay loam
Cg1 - 33 to 53 inches: sandy clay loam
Cg2 - 53 to 60 inches: sandy loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D
Ecological site: R048AY241CO
Hydric soil rating: Yes

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

15—Brussett loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 367k
Elevation: 7,200 to 7,500 feet
Frost-free period: 115 to 125 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Brussett and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brussett

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits

Typical profile

A - 0 to 8 inches: loam
BA - 8 to 12 inches: loam
Bt - 12 to 26 inches: clay loam
Bk - 26 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 5 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 (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

21—Cruckton sandy loam, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 367s
Elevation: 7,200 to 7,600 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 42 to 46 degrees F
Frost-free period: 110 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Cruckton and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cruckton

Setting

Landform: Flats, hills
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 11 inches: sandy loam
Bt - 11 to 28 inches: sandy loam
C - 28 to 60 inches: loamy coarse sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 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 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

25—Elbeth sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 367x
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Elbeth and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elbeth

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam
E - 3 to 23 inches: loamy sand
Bt - 23 to 68 inches: sandy clay loam
C - 68 to 74 inches: sandy clay loam

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 (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 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

36—Holderness loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 3689
Elevation: 7,200 to 7,400 feet
Farmland classification: Not prime farmland

Map Unit Composition

Holderness and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Holderness

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from arkose

Typical profile

A - 0 to 9 inches: loam
Bt - 9 to 43 inches: clay loam
C - 43 to 60 inches: gravelly sandy clay loam

Properties and qualities

Slope: 8 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 low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

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

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition
Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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: 3 to 8 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): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

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
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Hills, alluvial fans
Landform position (three-dimensional): Side slope, crest
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
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: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Alluvial fans, hills
Landform position (three-dimensional): Side slope, crest
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: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

93—Tomah-Crowfoot complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 36bb
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
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Alluvial fans, hills
Landform position (three-dimensional): Side slope, crest
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
C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 8 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 (0.60 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: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Hills, alluvial fans
Landform position (three-dimensional): Side slope, crest
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: 8 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 (0.60 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): 6e
Hydrologic Soil Group: B
Ecological site: R049XB216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

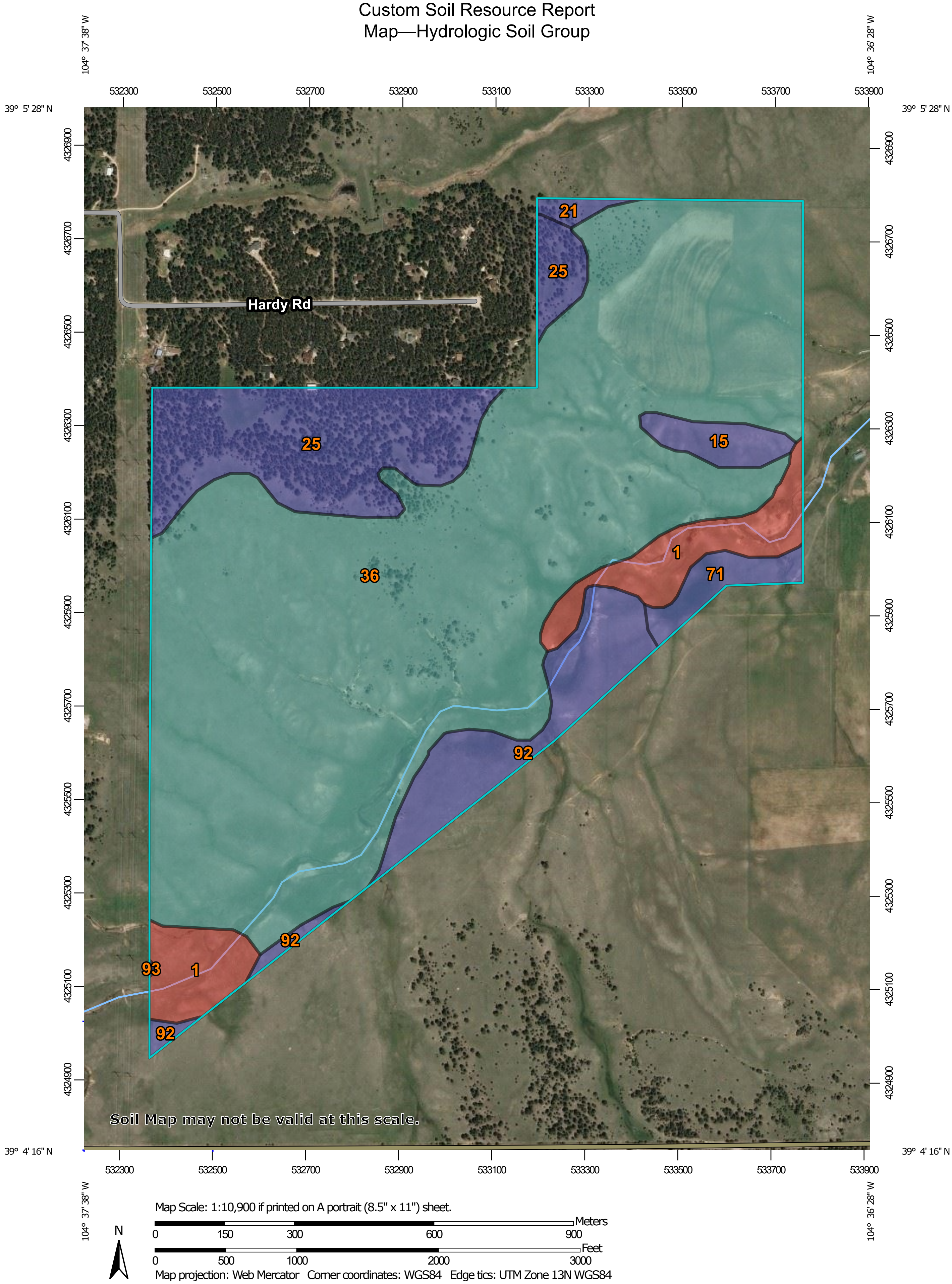
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Alamosa loam, 1 to 3 percent slopes	D	23.6	6.5%
15	Brussett loam, 3 to 5 percent slopes	B	6.0	1.6%
21	Cruckton sandy loam, 1 to 9 percent slopes	B	1.8	0.5%
25	Elbeth sandy loam, 3 to 8 percent slopes	B	46.0	12.6%
36	Holderness loam, 8 to 15 percent slopes	C	255.9	70.3%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	6.3	1.7%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	B	24.2	6.7%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	0.1	0.0%
Totals for Area of Interest			**363.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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APPENDIX B: HYDROLOGY

Kimley»Horn

Revise label to "Concentrated Flow"

update reference based on City Drainage Criteria Manual (2014).

Pre vs. Post Runoff Analysis
Time of Concentration

* NOTES TO USER

Project Information

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Minimum Time of Concentration 5.0 minutes
2YR-24HR Rainfall, P2 2.10

Equations Used

SHEET FLOW EQN	LAG TIME EQN	MANNINGS EQN	SHEET FLOW EQN
$T_t = \frac{\ell}{3,600V}$	$T_{lag} = 0.6 \cdot t_c$ (Eq. 6-13)	$V = \frac{1.49 r^{\frac{2}{3}} s^{\frac{1}{2}}}{n}$	$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$
EQ 15-1 per NRCS part 630 Hydrology National Engineering Handbook Ch. 13	EQ 6-13 per NRCS TR-55 Urban Hydrology for Small Watersheds	EQ 15-10 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15	EQ 15-8 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

Post-Development

Drainage Area: A2A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.021	0.10	2.10						8.58	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	1284.00	0.029			U				2.75	7.79	
CHANNEL	T3 CHANNEL FLOW	200.00	0.03	0.04		U	64.00	32.98	1.94	9.87	0.34	
							Post-Development Time of Concentration, A2A				16.70	10.02

Post-Development

Drainage Area: A2B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.021	0.10	2.10						8.58	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	940.00	0.029			U				2.75	5.70	
CHANNEL	T3 CHANNEL FLOW	404.00	0.03	0.04		U	64.00	32.98	1.94	9.87	0.68	
							Post-Development Time of Concentration, A2B				14.96	8.98

Post-Development

Drainage Area: A3A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.057	0.10	2.10						5.74	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	890.00	0.050			U				3.61	4.11	
CHANNEL	T3 CHANNEL FLOW	520.00	0.04	0.04		U	64.00	32.98	1.94	11.59	0.75	
							Post-Development Time of Concentration, A3A				10.60	6.36

Post-Development

Drainage Area: A3B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.070	0.10	2.10						5.30	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	150.00	0.070			U				4.27	0.59	
CHANNEL	T3 CHANNEL FLOW	960.00	0.05	0.04		U	64.00	32.98	1.94	12.96	1.23	
							Post-Development Time of Concentration, A3B				10.00	6.00

Kimley»Horn

Pre vs. Post Runoff Analysis
Time of Concentration

* NOTES TO USER

Project Information

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Minimum Time of Concentration 5.0 minutes
2YR-24HR Rainfall, P2 2.10

Equations Used

SHEET FLOW EQN

$$T_t = \frac{\ell}{3{,}600V}$$

EQ 15-1 per NRCS part 630 Hydrology National Engineering Handbook Ch. 13

LAG TIME EQN

$$T_{lag} = 0.6 \cdot t_c \quad \text{(Eq. 6-13)}$$

EQ 6-13 per NRCS TR-55 Urban Hydrology for Small Watersheds

MANNINGS EQN

$$V = \frac{1.49 r^{\frac{2}{3}} s^{\frac{1}{2}}}{n}$$

EQ 15-10 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

SHEET FLOW EQN

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

EQ 15-8 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

Post-Development

Drainage Area: A3C

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.064	0.10	2.10						5.49	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	275.00	0.006			U				1.25	3.67	
CHANNEL	T3 CHANNEL FLOW	554.00	0.01	0.04		U	64.00	32.98	1.94	4.49	2.06	
							Post-Development Time of Concentration, A3C				11.22	6.73

Post-Development

Drainage Area: G1

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.030	0.10	2.10						17.91	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	539.00	0.048			U				3.52	2.56	
CHANNEL	T3 CHANNEL FLOW	620.00	0.04	0.04		U	64.00	32.98	1.94	11.74	0.88	
							Post-Development Time of Concentration, G1				21.34	12.80

Post-Development

Drainage Area: G2A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.080	0.10	2.10						5.02	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	20.00	0.080			U				4.56	0.07	
CHANNEL	T3 CHANNEL FLOW	1240.00	0.04	0.04		U	64.00	32.98	1.94	11.59	1.78	
							Post-Development Time of Concentration, G2A				10.00	6.00

Post-Development

Drainage Area: G2B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	67.00	0.040	0.10	2.10						4.81	
CHANNEL	T3 CHANNEL FLOW	750.00	0.06	0.04		U	64.00	32.98	1.94	14.20	0.88	
							Post-Development Time of Concentration, G2B				10.00	6.00

Post-Development

Drainage Area: H1

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	250.00	0.049	0.10	2.10						12.77	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	450.00	0.058			U				3.88	1.93	
CHANNEL	T3 CHANNEL FLOW	225.00	0.06	0.04		U	64.00	32.98	1.94	14.20	0.26	
							Post-Development Time of Concentration, H1				14.96	8.98

Kimley»Horn

Pre vs. Post Runoff Analysis
Time of Concentration

* NOTES TO USER

Project Information

Project Name:	Winsome Filing 3		
KHA Project #:	196106001		
Designed by:	TOS	Date:	12/9/2021
Revised by:		Date:	
Checked by:	BAH	Date:	12/8/2021
Minimum Time of Concentration	5.0	minutes	
2YR-24HR Rainfall, P2	2.10		

Equations Used

SHEET FLOW EQN

$$T_t = \frac{\ell}{3,600V}$$

EQ 15-1 per NRCS part 630 Hydrology National Engineering Handbook Ch. 13

LAG TIME EQN

$$T_{lag} = 0.6 \cdot t_c \quad \text{(Eq. 6-13)}$$

EQ 6-13 per NRCS TR-55 Urban Hydrology for Small Watersheds

MANNINGS EQN

$$V = \frac{1.49 r^{\frac{2}{3}} s^{\frac{1}{2}}}{n}$$

EQ 15-10 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

SHEET FLOW EQN

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

EQ 15-8 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

Post-Development

Drainage Area: H2

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.140	0.10	2.10						9.67	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	1000.00	0.030			U				2.79	5.97	
CHANNEL	T3 CHANNEL FLOW	516.00	0.04	0.04		U	64.00	32.98	1.94	10.84	0.79	
							Post-Development Time of Concentration, H2				16.43	9.86

Post-Development

Drainage Area: H3A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.055	0.10	2.10						14.05	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	50.00	0.076			U				4.45	0.19	
							Post-Development Time of Concentration, H3A				14.24	8.54

Post-Development

Drainage Area: H3B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	266.00	0.046	0.10	2.10						13.71	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	334.00	0.014			U				1.91	2.92	
							Post-Development Time of Concentration, H3B				16.62	9.97

Post-Development

Drainage Area: H4

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.050	0.10	2.10						14.60	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	270.00	0.045			U				3.42	1.32	
CHANNEL	T3 CHANNEL FLOW	802.00	0.05	0.04		U	64.00	32.98	1.94	13.22	1.01	
							Post-Development Time of Concentration, H4				16.92	10.15

Post-Development

Drainage Area: H5A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.078	0.10	2.10						12.22	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	830.00	0.070			U				4.27	3.24	
CHANNEL	T3 CHANNEL FLOW		0.06	0.04		U	64.00	32.98	1.94	14.20	0.00	
							Post-Development Time of Concentration, H5A				15.46	9.28

Kimley»Horn

Pre vs. Post Runoff Analysis
Time of Concentration

* NOTES TO USER

Project Information

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Minimum Time of Concentration 5.0 minutes
2YR-24HR Rainfall, P2 2.10

Equations Used

SHEET FLOW EQN

$$T_t = \frac{\ell}{3{,}600V}$$

EQ 15-1 per NRCS part 630 Hydrology National Engineering Handbook Ch. 13

LAG TIME EQN

$$T_{lag} = 0.6 \cdot t_c \quad \text{(Eq. 6-13)}$$

EQ 6-13 per NRCS TR-55 Urban Hydrology for Small Watersheds

MANNINGS EQN

$$V = \frac{1.49 r^{\frac{2}{3}} s^{\frac{1}{2}}}{n}$$

EQ 15-10 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

SHEET FLOW EQN

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

EQ 15-8 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

Post-Development
Drainage Area: H5B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.070	0.10	2.10						12.76	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	450.00	0.080			U				4.56	1.64	
CHANNEL	T3 CHANNEL FLOW	500.00	0.05	0.04		U	64.00	32.98	1.94	12.96	0.64	
							Post-Development Time of Concentration, H5B				15.05	9.03

Post-Development
Drainage Area: H6A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.090	0.10	2.10						11.54	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	650.00	0.080			U				4.56	2.37	
							Post-Development Time of Concentration, H6A				13.91	8.35

Post-Development
Drainage Area: H6B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	42.00	0.040	0.10	2.10						3.31	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	710.00	0.060			U				3.95	3.00	
CHANNEL	T3 CHANNEL FLOW	825.00	0.04	0.04		U	64.00	32.98	1.94	11.59	1.19	
							Post-Development Time of Concentration, H6B				10.00	6.00

Post-Development
Drainage Area: H7A

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	37.00	0.050	0.10	2.10						2.74	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	546.00	0.040			U				3.23	2.82	
CHANNEL	T3 CHANNEL FLOW	1177.00	0.05	0.04		U	64.00	32.98	1.94	12.96	1.51	
							Post-Development Time of Concentration, H7A				10.00	6.00

Post-Development
Drainage Area: H7B

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	100.00	0.076	0.10	2.10						5.13	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	180.00	0.076			U				4.45	0.67	
CHANNEL	T3 CHANNEL FLOW	1320.00	0.06	0.04		U	64.00	32.98	1.94	14.20	1.55	
							Post-Development Time of Concentration, H7B				10.00	6.00

Kimley»Horn

Pre vs. Post Runoff Analysis
Time of Concentration

* NOTES TO USER

Project Information

Project Name:	Winsome Filing 3		
KHA Project #:	196106001		
Designed by:	TOS	Date:	12/9/2021
Revised by:		Date:	
Checked by:	BAH	Date:	12/8/2021
Minimum Time of Concentration	5.0	minutes	
2YR-24HR Rainfall, P2	2.10		

Equations Used

SHEET FLOW EQN

$$T_t = \frac{\ell}{3{,}600V}$$

EQ 15-1 per NRCS part 630 Hydrology National Engineering Handbook Ch. 13

LAG TIME EQN

$$T_{lag} = 0.6 \cdot t_c \quad \text{(Eq. 6-13)}$$

EQ 6-13 per NRCS TR-55 Urban Hydrology for Small Watersheds

MANNINGS EQN

$$V = \frac{1.49 r^{\frac{2}{3}} s^{\frac{1}{2}}}{n}$$

EQ 15-10 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

SHEET FLOW EQN

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

EQ 15-8 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

Post-Development

Drainage Area: H8

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.080	0.10	2.10						12.09	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	600.00	0.080			U				4.56	2.19	
							Post-Development Time of Concentration, H8				14.29	8.57

Post-Development

Drainage Area: H9

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.036	0.10	2.10						16.65	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	300.00	0.060			U				3.95	1.27	
CHANNEL	T3 CHANNEL FLOW	230.00	0.10	0.04		U	64.00	32.98	1.94	18.33	0.21	
							Post-Development Time of Concentration, H9				18.12	10.87

Post-Development

Drainage Area: I1

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.038	0.10	2.10						16.29	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	65.00	0.038			U				3.14	0.34	
CHANNEL	T3 CHANNEL FLOW	526.00	0.04	0.04		U	64.00	32.98	1.94	11.74	0.75	
							Post-Development Time of Concentration, I1				17.38	10.43

Post-Development

Drainage Area: I2

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.040	0.10	2.10						15.96	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	140.00	0.030			U				2.79	0.84	
							Post-Development Time of Concentration, I2				16.79	10.08

Post-Development

Drainage Area: J1

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	244.00	0.065	0.10	2.10						11.14	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	395.00	0.110			U				5.35	1.23	
CHANNEL	T3 CHANNEL FLOW		0.00	0.04		U	64.00	32.98	1.94	2.46	0.00	
							Post-Development Time of Concentration, J1				12.37	7.42

Kimley»Horn

Pre vs. Post Runoff Analysis
Time of Concentration

* NOTES TO USER

Project Information

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Checked by: BAH Date: 12/8/2021
Minimum Time of Concentration 5.0 minutes
2YR-24HR Rainfall, P2 2.10

Equations Used

SHEET FLOW EQN

$$T_t = \frac{\ell}{3{,}600V}$$

EQ 15-1 per NRCS part 630 Hydrology National Engineering Handbook Ch. 13

LAG TIME EQN

$$T_{lag} = 0.6 \cdot t_c \quad \text{(Eq. 6-13)}$$

EQ 6-13 per NRCS TR-55 Urban Hydrology for Small Watersheds

MANNINGS EQN

$$V = \frac{1.49 r^{\frac{2}{3}} s^{\frac{1}{2}}}{n}$$

EQ 15-10 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

SHEET FLOW EQN

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

EQ 15-8 per NRCS part 630 Hydrology National Engineering Handbook Ch. 15

Post-Development

Drainage Area: K1

		Flow Length, L (ft)	Slope, s (ft/ft)	Manning's Roughness Coefficient, n	Two-year, 24-hr rainfall, P2 (in)	Paved or Unpaved	Cross Sectional Area of Flow, A (ft^2)	Wetted Perimeter, pw (ft)	Hydraulic radius, r (ft)	Average Velocity, V (ft/s)**	Travel Time, Tt (min)	Lag Time (min)
SHEET	T1 SHEET FLOW	300.00	0.083	0.10	2.10						11.92	
SHALLOW CONCENTRATED	T2 SHALLOW CONCENTRATED FLOW	390.00	0.043			U				3.34	1.94	
							Post-Development Time of Concentration, K1				13.86	8.32

Kimley»Horn

Pre vs. Post Runoff Analysis

Composite CN and Crat

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Post-Development					
Drainage Area: A2A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
RESIDENTIAL	5 acre (7% imp.)	B	60.00	15.39	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	12.74	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - A2A		65.43		28.13	0.528

Post-Development					
Drainage Area: A2B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
RESIDENTIAL	5 acre (7% imp.)	B	60.00	1.64	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	7.23	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - A2B		69.78		8.87	0.433

Post-Development					
Drainage Area: A3A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.43	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	7.82	
COMPOSITE SCS CURVE NUMBER - A3A		73.04		8.25	0.369

Post-Development					
Drainage Area: A3B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.12	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	9.09	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	4.01	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - A3B		74.30		13.22	0.346

Post-Development					
Drainage Area: A3C					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	2.95	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	8.71	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - A3C		77.23		11.66	0.295

Post-Development					
Drainage Area: G1					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.24	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	10.03	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	0.83	
WOODS	WOODS, Fair condition (grass cover 50 to 75%)	B	60.00	9.08	
WOODS	WOODS, Fair condition (grass cover 50 to 75%)	C	73.00	4.61	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - G1		67.58		24.79	0.480

Kimley»Horn

Pre vs. Post Runoff Analysis

Composite CN and Crat

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Post-Development					
Drainage Area: G2A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.28	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	13.28	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	5.04	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - G2A		74.20		18.60	0.348

Post-Development					
Drainage Area: G2B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.31	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	2.46	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.00	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - G2B		74.24		2.77	0.347

Post-Development					
Drainage Area: H1					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.32	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	10.65	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	2.79	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H1		70.03		13.76	0.428

Post-Development					
Drainage Area: H2					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.65	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	24.64	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	12.91	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.89	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H2		64.93		39.09	0.540

Post-Development					
Drainage Area: H3A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.16	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	1.18	
WOODS	WOODS, Fair condition (grass cover 50 to 75%)	B	60.00	0.87	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.87	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H3A		71.60		3.08	0.397

Post-Development					
Drainage Area: H3B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.18	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	1.16	
WOODS	WOODS, Fair condition (grass cover 50 to 75%)	B	60.00	0.69	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.69	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H3B		72.02		2.71	0.388

Kimley»Horn

Pre vs. Post Runoff Analysis

Composite CN and Crat

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Post-Development					
Drainage Area: H4					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.25	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	18.06	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	8.69	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H4		74.44		27.00	0.343

Post-Development					
Drainage Area: H5A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	3.93	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	5.10	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H5A		75.95		9.03	0.317

Post-Development					
Drainage Area: H5B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	7.85	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	2.63	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H5B		73.76		10.48	0.356

Post-Development					
Drainage Area: H6A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	8.17	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	8.47	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H6A		75.56		16.64	0.323

Post-Development					
Drainage Area: H6B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.64	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	8.48	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	4.73	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	D	84.00	2.11	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H6B		76.47		15.96	0.308

Post-Development					
Drainage Area: H7A					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.63	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	6.17	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	0.88	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.82	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H7A		72.92		8.50	0.371

Kimley»Horn

Pre vs. Post Runoff Analysis

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Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Revised by: Date:
Checked by: BAH Date: 12/8/2021

Post-Development					
Drainage Area: H7B					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.31	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	14.64	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	1.77	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.63	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H7B		71.39		17.35	0.401

Post-Development					
Drainage Area: H8					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	B	89.00	0.23	
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.22	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	1.72	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	0.49	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	B	69.00	0.77	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	D	84.00	2.13	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	2.90	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H8		75.69		8.46	0.321

See comment on page 9 and adjust accordingly

Post-Development					
Drainage Area: H9					
COVER DESCRIPTION	HYDROLOGIC COND COVER TYP		ER	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (includ			0.23	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	6.39	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	0.23	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - H9		72.27		6.85	0.384

Post-Development					
Drainage Area: I1					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.93	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	5.89	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.00	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - I1		74.72		6.82	0.338

Post-Development					
Drainage Area: I2					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	C	92.00	0.65	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	14.12	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.03	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - I2		72.89		14.80	0.372

Post-Development					
Drainage Area: J1					
COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
IMPERVIOUS	Paved; open ditches (including right-of-way)	B	89.00	0.00	
RESIDENTIAL	5 acre (7% imp.)	B	60.00	10.14	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - J1		60.00		10.14	0.667

Kimley»Horn

Pre vs. Post Runoff Analysis

Composite CN and Crat

Project Name:	Winsome Filing 3		
KHA Project #:	196106001		
Designed by:	TOS	Date:	12/9/2021
Revised by:		Date:	
Revised by:		Date:	
Checked by:	BAH	Date:	12/8/2021

Post-Development

Drainage Area: K1

COVER DESCRIPTION	HYDROLOGIC CONDITION OR COVER TYPE	HYDROLOGIC SOIL GROUP	SCS CURVE NUMBER (CN)	AREA, A (ac.)	Initial Abstraction (in)
RESIDENTIAL	5 acre (7% imp.)	B	60.00	3.56	
RESIDENTIAL	5 acre (7% imp.)	C	72.00	13.94	
AGRICULTURAL	Pasture, grassland or range (Fair Condition)	C	79.00	0.00	
CUTSOM					
COMPOSITE SCS CURVE NUMBER - K1		69.56		17.50	0.438

C Value Table

Project Name: Winsome Filing 3
KHA Project #: 196106001
Designed by: TOS Date: 12/9/2021
Revised by: Date:
Revised by: Date:
Checked by: BAH Date: 12/8/2021

		Hydrologic Soil Type				
Land Cover	**Imp %**	**A**	**B**	**C**	**D**	**Source**
5 acre Residential Lot	7%	51.0	60.0	72.0	77.0	Winsome PDR
Pasture, grassland or range (Fair Condition)	2%	49.0	69.0	79.0	84.0	El Paso County DCM Table 6-10
Woods (Fair Condition)	2%	36.0	60.0	73.0	79.0	El Paso County DCM Table 6-10
Roadway, paved w/ ROW	100%	83.0	89.0	92.0	93.0	El Paso County DCM Table 6-10

Imperviousness Table

Project Name: Winsome Filing 3

KHA Project #: 196106001

Designed by: TOS Date: 12/9/2021

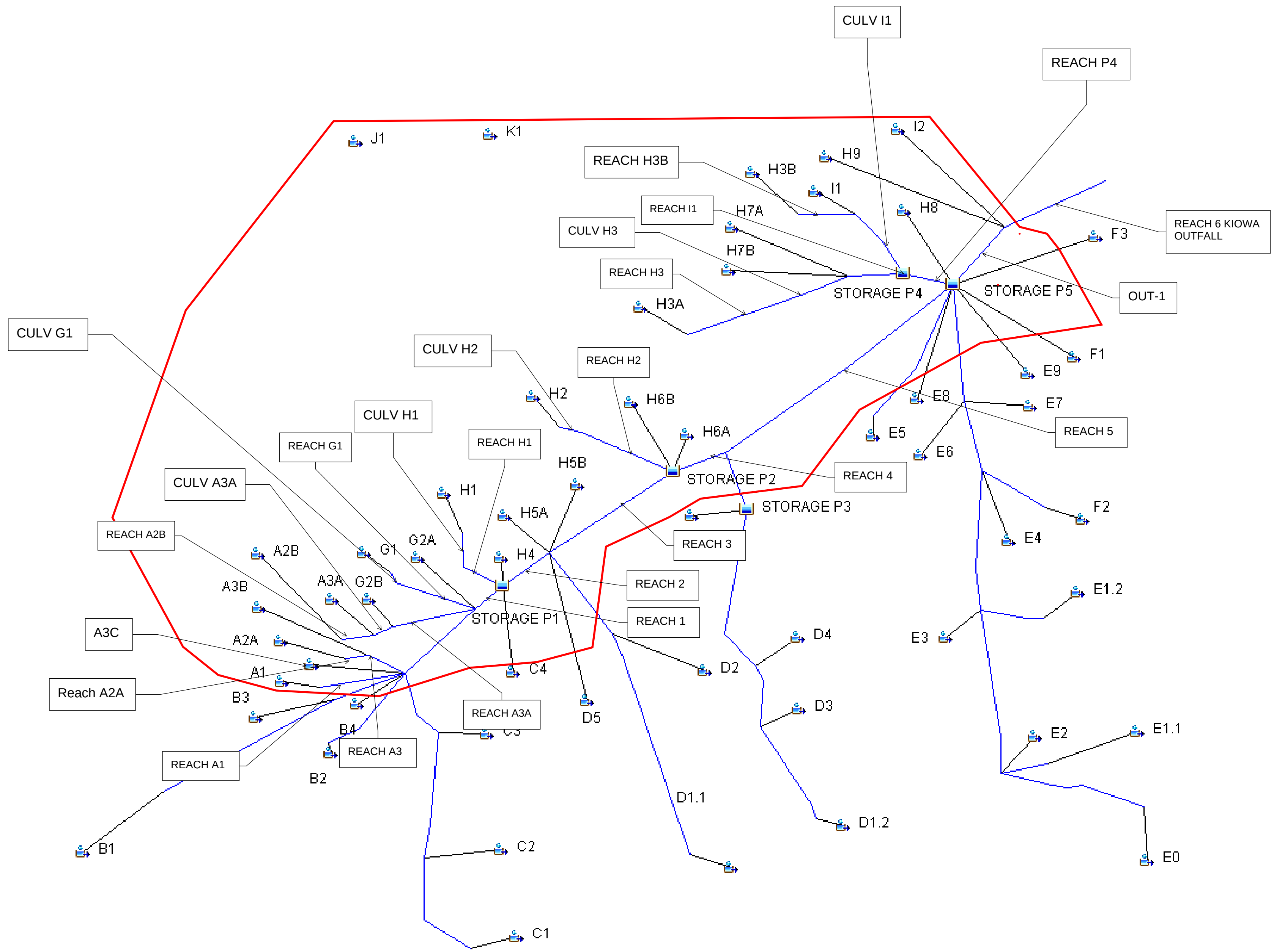
Checked by: BAH Date: 12/8/2021

		Impervious Areas				
Basin	**Area (ac)**	*Historic Flow Analysis (2%)*	*5-acre Residential (7%)*	*Roadway (100%)*	**Modified Area for UD-Detention**	**Imperviousness %**
WQ Pond 1						
A2B	8.87	0.00	8.87	0.00		7.0%
A3A	8.25	0.00	7.82	0.43		11.8%
G2A	18.60	5.04	13.28	0.28		7.0%
G2B	2.77	0.00	2.46	0.31		17.4%
G1	24.79	13.69	10.85	0.24		5.1%
Total	63.28			1.26		2%*
Pond 1						
H1	13.76	0.0%	97.7%	2.3%	--	9.2%
H4	27.00	32.2%	66.9%	0.9%	--	6.3%
Total	40.76				45.5	7.2%
Pond 2						
H6B	15.96	42.8%	53.1%	4.0%	--	8.6%
H2	39.09	2.3%	96.1%	1.7%	--	8.4%
Total	55.05				67.90	8.5%
Pond 4						
H3A	3.08	56.6%	38.4%	5.1%	--	8.9%
H3B	2.71	50.9%	42.6%	6.5%		10.5%
H7A	8.50	9.6%	82.9%	7.4%	--	13.4%
H7B	17.35	3.6%	94.6%	1.8%	--	8.5%
I1	6.82	0.0%	86.4%	13.6%	--	19.6%
Total	38.45				59.25	11.7%

*: WQ Pond only treats roadway runoff.

Basin ID	Area	Imperviousness %
A2A	28.13	7.0%
A2B	8.87	7.0%
A3A	8.25	11.8%
A3B	13.22	6.3%
A3C	11.66	3.3%
G1	24.79	5.1%
G2A	18.60	7.0%
G2B	2.77	17.4%
H1	13.76	9.2%
H2	39.09	8.4%
H3A	3.08	8.9%
H3B	2.71	10.5%
H4	27.00	6.3%
H5A	9.03	4.2%
H5B	10.48	5.7%
H6A	16.64	4.5%
H6B	15.96	8.6%
H7A	8.50	13.4%
H7B	17.35	8.5%
H8	8.46	8.5%
H9	6.85	10.1%
I1	6.82	19.6%
I2	14.80	11.1%
J1	10.14	7.0%
K1	17.50	7.0%

PROPOSED CONDITIONS HEC-HMS LAYOUT
WINSOME FILING NO. 3



Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Start of Run: 26Feb2019, 00:00 Basin Model: Proposed Basins
End of Run: 27Feb2019, 12:00 Meteorologic Model: Prop Basins 5yr
Compute Time: 09Dec2021, 07:54:44 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
A1	1.3529000	84.1	26Feb2019, 12:26	13.7
A2A	0.0439531	5.3	26Feb2019, 12:03	0.4
A2B	0.0138594	2.3	26Feb2019, 12:04	0.2
A3A	0.0128906	5.7	26Feb2019, 12:01	0.3
A3B	0.0206563	9.1	26Feb2019, 12:01	0.3
A3C	0.0182187	10.7	26Feb2019, 12:02	0.3
BOX CULVERT 1	7.8720139	370.1	26Feb2019, 12:43	80.0
BOX CULV 2	8.8550872	408.4	26Feb2019, 12:49	91.5
B1	5.9948000	286.7	26Feb2019, 12:42	60.5
B2	0.0204688	3.3	26Feb2019, 12:07	0.3
B3	0.0857813	6.8	26Feb2019, 12:15	0.9
B4	0.0648125	5.5	26Feb2019, 12:16	0.7
CLV E4	0.1670157	26.6	26Feb2019, 12:11	3.1
CULV A3A	0.0267500	7.0	26Feb2019, 12:03	0.4
CULV B2	0.0204688	3.3	26Feb2019, 12:07	0.3
CULV C2	0.2892200	23.8	26Feb2019, 12:16	2.9
CULV C3	0.3143763	26.5	26Feb2019, 12:18	3.3
CULV D2	0.3593700	31.5	26Feb2019, 12:18	3.9
CULV D3	0.1423438	13.2	26Feb2019, 12:19	1.8
CULV D4	0.1959376	18.8	26Feb2019, 12:19	2.7
CULV E1.1	0.0592188	4.9	26Feb2019, 12:16	0.6
CULV E1.2	0.0238750	5.0	26Feb2019, 12:08	0.5
CULV E1.5	0.0136094	2.7	26Feb2019, 12:08	0.2
CULV E2	0.0768907	7.3	26Feb2019, 12:13	1.0
CULV E5	0.0210938	3.9	26Feb2019, 12:08	0.4
CULV F2	0.0068750	2.2	26Feb2019, 12:03	0.2
CULV G1	0.0387188	3.1	26Feb2019, 12:05	0.3

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
CULV H1	0.0217031	4.6	26Feb2019, 12:04	0.3
CULV H2	0.0610938	8.9	26Feb2019, 12:03	0.7
CULV H3	0.0048125	1.4	26Feb2019, 12:04	0.1
CULV I1	0.0148907	6.6	26Feb2019, 12:06	0.4
CULV-E3	0.1317032	18.6	26Feb2019, 12:09	2.2
CULV-Pond4	0.0452031	14.7	26Feb2019, 12:02	0.8
C1	0.2542200	21.0	26Feb2019, 12:14	2.6
C2	0.0350000	3.1	26Feb2019, 12:11	0.4
C3	0.0251563	3.8	26Feb2019, 12:09	0.4
C4	0.0371875	1.9	26Feb2019, 12:16	0.2
D1.1	0.2520300	20.8	26Feb2019, 12:14	2.5
D1.2	0.0779688	5.8	26Feb2019, 12:18	0.8
D2	0.1073400	11.8	26Feb2019, 12:12	1.4
D3	0.0643750	8.1	26Feb2019, 12:15	1.0
D4	0.0535938	7.8	26Feb2019, 12:10	0.9
D5	0.0200000	0.8	26Feb2019, 12:10	0.1
D6	0.0653125	4.4	26Feb2019, 12:15	0.6
EX CULV C1	0.2542200	21.0	26Feb2019, 12:14	2.6
EX CULV D1.1	0.2520300	20.8	26Feb2019, 12:14	2.5
EX CULV D1.2	0.0779688	5.8	26Feb2019, 12:18	0.8
EX CULV E0	0.0592188	4.9	26Feb2019, 12:14	0.6
E0	0.0592188	4.9	26Feb2019, 12:14	0.6
E1.1	0.0136094	2.7	26Feb2019, 12:08	0.2
E1.2	0.0238750	5.0	26Feb2019, 12:08	0.5
E2	0.0040625	2.3	26Feb2019, 11:56	0.1
E3	0.0309375	7.6	26Feb2019, 12:06	0.7
E4	0.0284375	6.3	26Feb2019, 12:09	0.7
E5	0.0210938	3.9	26Feb2019, 12:08	0.4
E6	0.0144609	2.7	26Feb2019, 12:03	0.2
E7	0.0159688	3.3	26Feb2019, 12:05	0.3
E8	0.0246594	5.2	26Feb2019, 11:59	0.4

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
E9	0.0059688	0.3	26Feb2019, 11:55	0.0
F1	0.0501563	8.1	26Feb2019, 12:07	0.8
F2	0.0068750	2.2	26Feb2019, 12:03	0.2
F3	0.0150313	3.4	26Feb2019, 12:04	0.3
G1	0.0387188	3.1	26Feb2019, 12:05	0.3
G2A	0.0290625	12.9	26Feb2019, 12:01	0.5
G2B	0.0043281	2.6	26Feb2019, 12:00	0.1
H1	0.0217031	4.6	26Feb2019, 12:04	0.3
H2	0.0610938	8.9	26Feb2019, 12:03	0.7
H3A	0.0048125	1.4	26Feb2019, 12:03	0.1
H3B	0.0042344	1.3	26Feb2019, 12:05	0.1
H4	0.0421875	15.4	26Feb2019, 12:05	0.6
H5A	0.0141094	6.2	26Feb2019, 12:04	0.2
H5B	0.0163750	5.6	26Feb2019, 12:04	0.2
H6A	0.0260000	11.6	26Feb2019, 12:03	0.4
H6B	0.0249375	15.5	26Feb2019, 12:01	0.5
H7A	0.0132812	6.2	26Feb2019, 12:01	0.3
H7B	0.0271094	8.0	26Feb2019, 12:01	0.4
H8	0.0132187	6.7	26Feb2019, 12:03	0.3
H9	0.0107813	3.3	26Feb2019, 12:05	0.2
I1	0.0106563	6.0	26Feb2019, 12:05	0.4
I2	0.0231250	8.3	26Feb2019, 12:05	0.5
J1	0.0158438	2.1	26Feb2019, 12:00	0.2
K1	0.0273438	4.5	26Feb2019, 12:03	0.3
OUT-1	9.2427547	420.3	26Feb2019, 12:52	97.1
REACH A1	1.3529000	83.8	26Feb2019, 12:31	13.7
Reach E3.1	0.0238750	5.0	26Feb2019, 12:11	0.5
Reach H3	0.0048125	1.3	26Feb2019, 12:10	0.1
Reach-A2A	0.0439531	5.2	26Feb2019, 12:07	0.4
Reach-A2B	0.0138594	2.2	26Feb2019, 12:10	0.2
Reach-A3	0.0439531	5.2	26Feb2019, 12:09	0.4

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Reach-A3A	0.0310781	9.6	26Feb2019, 12:03	0.6
Reach-B1	5.9948000	286.6	26Feb2019, 12:46	60.5
Reach-B2	0.0204688	3.3	26Feb2019, 12:15	0.3
Reach-B3	6.0805813	288.7	26Feb2019, 12:50	61.4
Reach-B4-3	0.3143763	26.5	26Feb2019, 12:19	3.3
Reach-C1	0.2542200	20.9	26Feb2019, 12:17	2.6
Reach-C2	0.2892200	23.8	26Feb2019, 12:20	2.9
Reach-D1.1	0.2520300	20.7	26Feb2019, 12:20	2.5
Reach-D3	0.0779688	5.7	26Feb2019, 12:24	0.8
Reach-D4	0.1423438	13.2	26Feb2019, 12:24	1.8
Reach-D5	0.3593700	31.4	26Feb2019, 12:22	3.9
Reach-D6	0.1959376	18.7	26Feb2019, 12:23	2.7
Reach-E1.1	0.0592188	4.9	26Feb2019, 12:15	0.6
Reach-E2	0.0592188	4.9	26Feb2019, 12:18	0.6
Reach-E3	0.0768907	7.3	26Feb2019, 12:18	1.0
Reach-E4	0.1317032	18.6	26Feb2019, 12:13	2.2
Reach-E6	0.0210938	3.8	26Feb2019, 12:13	0.4
Reach-E6-2	0.1974454	30.3	26Feb2019, 12:15	3.6
Reach-E7	0.1670157	26.6	26Feb2019, 12:14	3.1
Reach-F2	0.0068750	2.2	26Feb2019, 12:08	0.2
Reach-G1	0.0387188	3.0	26Feb2019, 12:11	0.3
Reach-H1	0.0217031	4.6	26Feb2019, 12:09	0.3
Reach-H2	0.0610938	8.9	26Feb2019, 12:05	0.7
Reach-H3B	0.0042344	1.2	26Feb2019, 12:13	0.1
Reach-I1	0.0148907	6.5	26Feb2019, 12:10	0.4
Reach-P3	0.2612501	21.0	26Feb2019, 12:30	3.2
Reach-P4	0.0600938	6.3	26Feb2019, 12:20	1.0
Reach-1	7.9708733	371.6	26Feb2019, 12:45	81.3
Reach-2	8.0719514	376.2	26Feb2019, 12:48	82.3
Reach-3	8.4818058	390.9	26Feb2019, 12:48	86.8
Reach-4	8.5938371	393.9	26Feb2019, 12:50	88.3

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Reach-5	8.8550872	408.4	26Feb2019, 12:50	91.5
Reach-6 Kiowa Outfall	9.2766610	420.7	26Feb2019, 12:52	97.7
STORAGE P1	0.0638906	8.6	26Feb2019, 12:16	0.9
STORAGE P2	0.0860313	10.6	26Feb2019, 12:11	1.1
STORAGE P3	0.2612501	21.0	26Feb2019, 12:29	3.2
STORAGE P4	0.0600938	6.3	26Feb2019, 12:20	1.0
STORAGE P5	0.2431986	6.7	26Feb2019, 13:03	3.2

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: A1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	84.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12
Precipitation Volume:	195.2 (AC-FT)	Direct Runoff Volume:	13.7 (AC-FT)
Loss Volume:	181.5 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	13.7 (AC-FT)	Discharge Volume:	13.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: A2A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	5.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	6.3 (AC-FT)	Direct Runoff Volume:	0.4 (AC-FT)
Loss Volume:	5.9 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Subbasin: A2B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	2.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.0 (AC-FT)	Direct Runoff Volume:	0.2 (AC-FT)
Loss Volume:	1.8 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: A3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	5.7 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.9 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	1.6 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: A3B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	9.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.0 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	2.7 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: A3C

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	10.7 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.6 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	2.4 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Reach: CULV A3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	7.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:01
Peak Discharge:	7.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:03
Inflow Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: CULV G1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	3.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:04
Peak Discharge:	3.1 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:05
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: CULV H1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	4.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	4.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:04
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: CULV H2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	8.9 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	8.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:03
Inflow Volume:	0.7 (AC-FT)	Discharge Volume:	0.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: CULV H3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1.4 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	1.4 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:04
Inflow Volume:	0.1 (AC-FT)	Discharge Volume:	0.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: CULV I1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	6.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:04
Peak Discharge:	6.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:06
Inflow Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: CULV-Pond4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	14.8 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:00
Peak Discharge:	14.7 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:02
Inflow Volume:	0.8 (AC-FT)	Discharge Volume:	0.8 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: G1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	3.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	5.6 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	5.3 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: G2A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	12.9 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	4.2 (AC-FT)	Direct Runoff Volume:	0.5 (AC-FT)
Loss Volume:	3.7 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.5 (AC-FT)	Discharge Volume:	0.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Subbasin: G2B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	2.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	0.6 (AC-FT)	Direct Runoff Volume:	0.1 (AC-FT)
Loss Volume:	0.5 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.1 (AC-FT)	Discharge Volume:	0.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Subbasin: H1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	4.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.1 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	2.8 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	8.9 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	8.8 (AC-FT)	Direct Runoff Volume:	0.7 (AC-FT)
Loss Volume:	8.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.7 (AC-FT)	Discharge Volume:	0.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	1.4 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	0.7 (AC-FT)	Direct Runoff Volume:	0.1 (AC-FT)
Loss Volume:	0.6 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.1 (AC-FT)	Discharge Volume:	0.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H3B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	1.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	0.6 (AC-FT)	Direct Runoff Volume:	0.1 (AC-FT)
Loss Volume:	0.5 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.1 (AC-FT)	Discharge Volume:	0.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Subbasin: H4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	15.4 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	6.1 (AC-FT)	Direct Runoff Volume:	0.6 (AC-FT)
Loss Volume:	5.5 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.6 (AC-FT)	Discharge Volume:	0.6 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H5A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	6.2 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.0 (AC-FT)	Direct Runoff Volume:	0.2 (AC-FT)
Loss Volume:	1.8 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H5B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	5.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.4 (AC-FT)	Direct Runoff Volume:	0.2 (AC-FT)
Loss Volume:	2.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H6A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	11.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.8 (AC-FT)	Direct Runoff Volume:	0.4 (AC-FT)
Loss Volume:	3.4 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H6B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	15.5 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.6 (AC-FT)	Direct Runoff Volume:	0.5 (AC-FT)
Loss Volume:	3.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.5 (AC-FT)	Discharge Volume:	0.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H7A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	6.2 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.9 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	1.6 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H7B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	8.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.9 (AC-FT)	Direct Runoff Volume:	0.4 (AC-FT)
Loss Volume:	3.5 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: H8

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	30Nov2021, 13:26:30	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	6.4 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.9 (AC-FT)	Direct Runoff Volume:	0.2 (AC-FT)
Loss Volume:	1.7 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3   Simulation Run: Prop Basin 5yr
Subbasin: H9

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	3.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.6 (AC-FT)	Direct Runoff Volume:	0.2 (AC-FT)
Loss Volume:	1.4 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: I1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	6.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.5 (AC-FT)	Direct Runoff Volume:	0.4 (AC-FT)
Loss Volume:	1.2 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: I2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	8.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.3 (AC-FT)	Direct Runoff Volume:	0.5 (AC-FT)
Loss Volume:	2.9 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.5 (AC-FT)	Discharge Volume:	0.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: J1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	2.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.3 (AC-FT)	Direct Runoff Volume:	0.2 (AC-FT)
Loss Volume:	2.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Subbasin: K1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	4.5 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.9 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	3.6 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Reach: OUT-1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	420.3 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	420.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:5
Inflow Volume:	97.1 (AC-FT)	Discharge Volume:	97.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reservoir: STORAGE P1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	19.5 (CFS)	Date/Time of Peak Inflow:	26Feb2019, 12:0
Peak Discharge:	8.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:1
Inflow Volume:	0.9 (AC-FT)	Peak Storage:	0.5 (AC-FT)
Discharge Volume	0.9 (AC-FT)	Peak Elevation:	7325.1 (FT)

Project: Winsome_Fil_3   Simulation Run: Prop Basin 5yr

Reservoir: STORAGE P2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	23.6 (CFS)	Date/Time of Peak Inflow:	26Feb2019, 12:0
Peak Discharge:	10.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:1
Inflow Volume:	1.3 (AC-FT)	Peak Storage:	0.6 (AC-FT)
Discharge Volume	1.1 (AC-FT)	Peak Elevation:	7303.6 (FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reservoir: STORAGE P4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	18.8 (CFS)	Date/Time of Peak Inflow:	26Feb2019, 12:0
Peak Discharge:	6.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:2
Inflow Volume:	1.2 (AC-FT)	Peak Storage:	0.6 (AC-FT)
Discharge Volume	1.0 (AC-FT)	Peak Elevation:	7293.6 (FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	371.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	371.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	81.3 (AC-FT)	Discharge Volume:	81.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Reach: Reach-2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	376.4 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	376.2 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	82.4 (AC-FT)	Discharge Volume:	82.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	391.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	390.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	86.8 (AC-FT)	Discharge Volume:	86.8 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	393.9 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4(
Peak Discharge:	393.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:5(
Inflow Volume:	88.3 (AC-FT)	Discharge Volume:	88.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-5

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	408.4 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	408.4 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:5
Inflow Volume:	91.5 (AC-FT)	Discharge Volume:	91.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Reach: Reach-6 Kiowa Outfall

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	420.8 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:5
Peak Discharge:	420.7 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:5
Inflow Volume:	97.7 (AC-FT)	Discharge Volume:	97.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: REACH A1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	30Nov2021, 13:26:30	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	84.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:2
Peak Discharge:	83.8 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:3
Inflow Volume:	13.7 (AC-FT)	Discharge Volume:	13.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-A2A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	5.3 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	5.2 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:07
Inflow Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3   Simulation Run: Prop Basin 5yr

Reach: Reach-A2B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	2.3 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	2.2 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:10
Inflow Volume:	0.2 (AC-FT)	Discharge Volume:	0.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Reach: Reach-A3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	5.2 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:06
Peak Discharge:	5.2 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:09
Inflow Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-A3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	9.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:01
Peak Discharge:	9.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:03
Inflow Volume:	0.6 (AC-FT)	Discharge Volume:	0.6 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-G1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	3.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:04
Peak Discharge:	3.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:11
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-H1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	4.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	4.6 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:09
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-H2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	8.9 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	8.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:05
Inflow Volume:	0.7 (AC-FT)	Discharge Volume:	0.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach H3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1.4 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	1.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:10
Inflow Volume:	0.1 (AC-FT)	Discharge Volume:	0.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr

Reach: Reach-H3B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1.3 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:04
Peak Discharge:	1.2 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:13
Inflow Volume:	0.1 (AC-FT)	Discharge Volume:	0.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basin 5yr
Reach: Reach-I1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	6.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:05
Peak Discharge:	6.5 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:10
Inflow Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3   Simulation Run: Prop Basin 5yr
Reach: Reach-P4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 5yr
Compute Time:	09Dec2021, 07:54:44	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	6.3 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:19
Peak Discharge:	6.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:20
Inflow Volume:	1.0 (AC-FT)	Discharge Volume:	1.0 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
A1	1.35	402.8	26Feb2019, 12:28	40.2
A2A	0.04	47.1	26Feb2019, 12:04	1.7
A2B	0.01	20.3	26Feb2019, 12:03	0.7
A3A	0.01	25.8	26Feb2019, 12:00	0.9
A3B	0.02	42.6	26Feb2019, 11:59	1.5
A3C	0.02	40.8	26Feb2019, 12:00	1.6
BOX CULVERT 1	7.87	1689.6	26Feb2019, 12:42	237.8
BOX CULV 2	8.86	1872.8	26Feb2019, 12:44	279.2
B1	5.99	1289.0	26Feb2019, 12:44	178.0
B2	0.02	17.2	26Feb2019, 12:09	0.9
B3	0.09	49.3	26Feb2019, 12:17	3.2
B4	0.06	46.3	26Feb2019, 12:17	2.9
CLV E4	0.17	117.6	26Feb2019, 12:12	8.1
CULV A3A	0.03	40.9	26Feb2019, 12:03	1.6
CULV B2	0.02	17.2	26Feb2019, 12:09	0.9
CULV C2	0.29	120.4	26Feb2019, 12:18	8.4
CULV C3	0.31	134.2	26Feb2019, 12:19	9.6
CULV D2	0.36	170.8	26Feb2019, 12:18	11.8
CULV D3	0.14	64.0	26Feb2019, 12:20	5.1
CULV D4	0.20	92.3	26Feb2019, 12:19	7.5
CULV E1.1	0.06	24.6	26Feb2019, 12:17	1.7
CULV E1.2	0.02	21.4	26Feb2019, 12:10	1.3
CULV E1.5	0.01	16.6	26Feb2019, 12:08	0.8
CULV E2	0.08	36.6	26Feb2019, 12:14	2.8
CULV E5	0.02	18.4	26Feb2019, 12:10	1.1
CULV F2	0.01	8.6	26Feb2019, 12:05	0.4
CULV G1	0.04	40.0	26Feb2019, 12:07	1.5

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
CULV H1	0.02	33.0	26Feb2019, 12:03	1.1
CULV H2	0.06	65.5	26Feb2019, 12:04	2.5
CULV H3	0.00	8.0	26Feb2019, 12:02	0.3
CULV I1	0.01	25.8	26Feb2019, 12:05	1.3
CULV-E3	0.13	84.6	26Feb2019, 12:11	6.0
CULV-Pond4	0.05	81.0	26Feb2019, 12:01	2.8
C1	0.25	105.6	26Feb2019, 12:16	7.4
C2	0.04	16.1	26Feb2019, 12:13	1.0
C3	0.03	19.1	26Feb2019, 12:11	1.1
C4	0.04	19.1	26Feb2019, 12:18	1.2
D1.1	0.25	105.2	26Feb2019, 12:16	7.4
D1.2	0.08	28.2	26Feb2019, 12:20	2.3
D2	0.11	69.8	26Feb2019, 12:14	4.4
D3	0.06	38.1	26Feb2019, 12:17	2.9
D4	0.05	38.6	26Feb2019, 12:12	2.4
D5	0.02	15.0	26Feb2019, 12:12	0.7
D6	0.07	28.1	26Feb2019, 12:17	1.9
EX CULV C1	0.25	105.6	26Feb2019, 12:16	7.4
EX CULV D1.1	0.25	105.2	26Feb2019, 12:16	7.4
EX CULV D1.2	0.08	28.2	26Feb2019, 12:20	2.3
EX CULV E0	0.06	24.6	26Feb2019, 12:16	1.7
E0	0.06	24.6	26Feb2019, 12:16	1.7
E1.1	0.01	16.6	26Feb2019, 12:08	0.8
E1.2	0.02	21.4	26Feb2019, 12:10	1.3
E2	0.00	8.9	26Feb2019, 11:56	0.3
E3	0.03	33.7	26Feb2019, 12:07	1.8
E4	0.03	27.0	26Feb2019, 12:10	1.7
E5	0.02	18.4	26Feb2019, 12:10	1.1
E6	0.01	14.1	26Feb2019, 12:05	0.6
E7	0.02	16.2	26Feb2019, 12:07	0.8
E8	0.02	25.6	26Feb2019, 12:01	1.0

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
E9	0.01	5.8	26Feb2019, 11:56	0.1
F1	0.05	36.6	26Feb2019, 12:09	2.1
F2	0.01	8.6	26Feb2019, 12:04	0.4
F3	0.02	14.5	26Feb2019, 12:06	0.7
G1	0.04	40.1	26Feb2019, 12:07	1.5
G2A	0.03	59.9	26Feb2019, 11:59	2.1
G2B	0.00	9.6	26Feb2019, 11:59	0.4
H1	0.02	33.0	26Feb2019, 12:03	1.1
H2	0.06	65.7	26Feb2019, 12:04	2.5
H3A	0.00	8.0	26Feb2019, 12:02	0.3
H3B	0.00	6.9	26Feb2019, 12:04	0.3
H4	0.04	73.6	26Feb2019, 12:04	3.0
H5A	0.01	27.0	26Feb2019, 12:03	1.1
H5B	0.02	29.0	26Feb2019, 12:03	1.1
H6A	0.03	51.1	26Feb2019, 12:02	2.0
H6B	0.02	57.1	26Feb2019, 11:59	2.3
H7A	0.01	27.1	26Feb2019, 11:59	1.0
H7B	0.03	49.8	26Feb2019, 12:00	1.5
H8	0.01	26.5	26Feb2019, 12:02	1.1
H9	0.01	16.9	26Feb2019, 12:05	0.7
I1	0.01	20.3	26Feb2019, 12:04	1.0
I2	0.02	39.1	26Feb2019, 12:04	1.6
J1	0.02	13.0	26Feb2019, 12:02	0.5
K1	0.03	40.7	26Feb2019, 12:02	1.3
OUT-1	9.24	1958.3	26Feb2019, 12:45	297.3
REACH A1	1.35	402.3	26Feb2019, 12:31	40.2
Reach E3.1	0.02	21.4	26Feb2019, 12:12	1.3
Reach H3	0.00	8.0	26Feb2019, 12:07	0.3
Reach-A2A	0.04	47.1	26Feb2019, 12:07	1.7
Reach-A2B	0.01	20.1	26Feb2019, 12:07	0.7
Reach-A3	0.04	46.9	26Feb2019, 12:08	1.7

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Reach-A3A	0.03	49.3	26Feb2019, 12:04	2.0
Reach-B1	5.99	1288.9	26Feb2019, 12:46	178.0
Reach-B2	0.02	17.2	26Feb2019, 12:14	0.9
Reach-B3	6.08	1301.2	26Feb2019, 12:48	181.2
Reach-B4-3	0.31	134.2	26Feb2019, 12:19	9.6
Reach-C1	0.25	105.5	26Feb2019, 12:18	7.4
Reach-C2	0.29	120.3	26Feb2019, 12:20	8.4
Reach-D1.1	0.25	105.1	26Feb2019, 12:20	7.4
Reach-D3	0.08	28.2	26Feb2019, 12:24	2.3
Reach-D4	0.14	64.0	26Feb2019, 12:23	5.1
Reach-D5	0.36	170.6	26Feb2019, 12:20	11.8
Reach-D6	0.20	92.2	26Feb2019, 12:22	7.5
Reach-E1.1	0.06	24.6	26Feb2019, 12:17	1.7
Reach-E2	0.06	24.5	26Feb2019, 12:19	1.7
Reach-E3	0.08	36.6	26Feb2019, 12:17	2.8
Reach-E4	0.13	84.5	26Feb2019, 12:14	6.0
Reach-E6	0.02	18.4	26Feb2019, 12:13	1.1
Reach-E6-2	0.20	137.3	26Feb2019, 12:14	9.5
Reach-E7	0.17	117.5	26Feb2019, 12:14	8.1
Reach-F2	0.01	8.6	26Feb2019, 12:08	0.4
Reach-G1	0.04	40.0	26Feb2019, 12:10	1.5
Reach-H1	0.02	32.8	26Feb2019, 12:06	1.1
Reach-H2	0.06	65.4	26Feb2019, 12:06	2.5
Reach-H3B	0.00	6.8	26Feb2019, 12:09	0.3
Reach-I1	0.01	25.7	26Feb2019, 12:09	1.3
Reach-P3	0.26	79.0	26Feb2019, 12:37	9.4
Reach-P4	0.06	52.9	26Feb2019, 12:11	3.8
Reach-1	7.97	1694.5	26Feb2019, 12:43	243.3
Reach-2	8.07	1713.7	26Feb2019, 12:44	248.5
Reach-3	8.48	1782.7	26Feb2019, 12:43	263.2
Reach-4	8.59	1796.4	26Feb2019, 12:44	269.7

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Reach-5	8.86	1872.3	26Feb2019, 12:44	279.2
Reach-6 Kiowa Outfall	9.23	1959.5	26Feb2019, 12:45	299.6
STORAGE P1	0.06	72.2	26Feb2019, 12:11	4.1
STORAGE P2	0.09	78.7	26Feb2019, 12:09	4.6
STORAGE P3	0.26	79.0	26Feb2019, 12:36	9.4
STORAGE P4	0.06	52.9	26Feb2019, 12:11	3.8
STORAGE P5	0.24	73.4	26Feb2019, 12:32	10.3

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: A1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	402.8 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12
Precipitation Volume:	331.6 (AC-FT)	Direct Runoff Volume:	40.2 (AC-FT)
Loss Volume:	291.4 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	40.2 (AC-FT)	Discharge Volume:	40.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: A2A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	47.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12
Precipitation Volume:	10.8 (AC-FT)	Direct Runoff Volume:	1.7 (AC-FT)
Loss Volume:	9.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.7 (AC-FT)	Discharge Volume:	1.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: A2B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	20.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.4 (AC-FT)	Direct Runoff Volume:	0.7 (AC-FT)
Loss Volume:	2.7 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.7 (AC-FT)	Discharge Volume:	0.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: A3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	25.8 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.2 (AC-FT)	Direct Runoff Volume:	0.9 (AC-FT)
Loss Volume:	2.2 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.9 (AC-FT)	Discharge Volume:	0.9 (AC-FT)

Project: Winsome_Fil_3   Simulation Run: Prop Basins 100 yr

Subbasin: A3B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	42.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 11:
Precipitation Volume:	5.1 (AC-FT)	Direct Runoff Volume:	1.5 (AC-FT)
Loss Volume:	3.6 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.5 (AC-FT)	Discharge Volume:	1.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: A3C

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	40.8 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	4.5 (AC-FT)	Direct Runoff Volume:	1.6 (AC-FT)
Loss Volume:	2.8 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.6 (AC-FT)	Discharge Volume:	1.6 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: CULV A3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	41.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	40.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:03
Inflow Volume:	1.6 (AC-FT)	Discharge Volume:	1.6 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: CULV G1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	40.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:06
Peak Discharge:	40.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:07
Inflow Volume:	1.5 (AC-FT)	Discharge Volume:	1.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: CULV H1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	33.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	33.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:03
Inflow Volume:	1.1 (AC-FT)	Discharge Volume:	1.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: CULV H2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	65.7 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	65.5 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:04
Inflow Volume:	2.5 (AC-FT)	Discharge Volume:	2.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: CULV H3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	8.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:01
Peak Discharge:	8.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:02
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: CULV I1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	25.8 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:04
Peak Discharge:	25.8 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:05
Inflow Volume:	1.3 (AC-FT)	Discharge Volume:	1.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: CULV-Pond4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	81.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 11:59
Peak Discharge:	81.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:01
Inflow Volume:	2.8 (AC-FT)	Discharge Volume:	2.8 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: G1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	40.1 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:
Precipitation Volume	9.5 (AC-FT)	Direct Runoff Volume:	1.5 (AC-FT)
Loss Volume:	8.0 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.5 (AC-FT)	Discharge Volume:	1.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: G2A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	59.9 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 11:
Precipitation Volume:	7.1 (AC-FT)	Direct Runoff Volume:	2.1 (AC-FT)
Loss Volume:	5.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	2.1 (AC-FT)	Discharge Volume:	2.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Subbasin: G2B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	9.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 11:
Precipitation Volume:	1.1 (AC-FT)	Direct Runoff Volume:	0.4 (AC-FT)
Loss Volume:	0.7 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.4 (AC-FT)	Discharge Volume:	0.4 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	33.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	5.3 (AC-FT)	Direct Runoff Volume:	1.1 (AC-FT)
Loss Volume:	4.2 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.1 (AC-FT)	Discharge Volume:	1.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	65.7 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12
Precipitation Volume:	15.0 (AC-FT)	Direct Runoff Volume:	2.5 (AC-FT)
Loss Volume:	12.5 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	2.5 (AC-FT)	Discharge Volume:	2.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	8.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.2 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	0.9 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H3B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	6.9 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	1.0 (AC-FT)	Direct Runoff Volume:	0.3 (AC-FT)
Loss Volume:	0.8 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Subbasin: H4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	73.6 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12
Precipitation Volume:	10.3 (AC-FT)	Direct Runoff Volume:	3.0 (AC-FT)
Loss Volume:	7.3 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	3.0 (AC-FT)	Discharge Volume:	3.0 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H5A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	27.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.5 (AC-FT)	Direct Runoff Volume:	1.1 (AC-FT)
Loss Volume:	2.3 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.1 (AC-FT)	Discharge Volume:	1.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H5B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	29.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	4.0 (AC-FT)	Direct Runoff Volume:	1.1 (AC-FT)
Loss Volume:	2.9 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.1 (AC-FT)	Discharge Volume:	1.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H6A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	51.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	6.4 (AC-FT)	Direct Runoff Volume:	2.0 (AC-FT)
Loss Volume:	4.3 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	2.0 (AC-FT)	Discharge Volume:	2.0 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Subbasin: H6B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	57.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 11:
Precipitation Volume:	6.1 (AC-FT)	Direct Runoff Volume:	2.3 (AC-FT)
Loss Volume:	3.8 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	2.3 (AC-FT)	Discharge Volume:	2.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H7A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	27.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 11:
Precipitation Volume:	3.3 (AC-FT)	Direct Runoff Volume:	1.0 (AC-FT)
Loss Volume:	2.3 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.0 (AC-FT)	Discharge Volume:	1.0 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H7B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	49.8 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	6.6 (AC-FT)	Direct Runoff Volume:	1.5 (AC-FT)
Loss Volume:	5.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.5 (AC-FT)	Discharge Volume:	1.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H8

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	26.5 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.2 (AC-FT)	Direct Runoff Volume:	1.1 (AC-FT)
Loss Volume:	2.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.1 (AC-FT)	Discharge Volume:	1.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: H9

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	16.9 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.6 (AC-FT)	Direct Runoff Volume:	0.7 (AC-FT)
Loss Volume:	2.0 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.7 (AC-FT)	Discharge Volume:	0.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: I1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	20.3 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	2.6 (AC-FT)	Direct Runoff Volume:	1.0 (AC-FT)
Loss Volume:	1.6 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.0 (AC-FT)	Discharge Volume:	1.0 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: I2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	39.1 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	5.7 (AC-FT)	Direct Runoff Volume:	1.6 (AC-FT)
Loss Volume:	4.1 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.6 (AC-FT)	Discharge Volume:	1.6 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Subbasin: J1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	13.0 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	3.9 (AC-FT)	Direct Runoff Volume:	0.5 (AC-FT)
Loss Volume:	3.4 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	0.5 (AC-FT)	Discharge Volume:	0.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Subbasin: K1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Discharge:	40.7 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:
Precipitation Volume:	6.7 (AC-FT)	Direct Runoff Volume:	1.3 (AC-FT)
Loss Volume:	5.4 (AC-FT)	Baseflow Volume:	0.0 (AC-FT)
Excess Volume:	1.3 (AC-FT)	Discharge Volume:	1.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: OUT-1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1958.4 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1958.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	297.4 (AC-FT)	Discharge Volume:	297.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reservoir: STORAGE P1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	105.0 (CFS)	Date/Time of Peak Inflow:	26Feb2019, 12:0
Peak Discharge:	72.2 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:1
Inflow Volume:	4.2 (AC-FT)	Peak Storage:	1.4 (AC-FT)
Discharge Volume:	4.1 (AC-FT)	Peak Elevation:	7327.2 (FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reservoir: STORAGE P2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	110.8 (CFS)	Date/Time of Peak Inflow:	26Feb2019, 12:0
Peak Discharge:	78.7 (CFS)	Date/Time of Peak Discharge:	26Feb2019, 12:0
Inflow Volume:	4.8 (AC-FT)	Peak Storage:	1.5 (AC-FT)
Discharge Volume:	4.6 (AC-FT)	Peak Elevation:	7305.6 (FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reservoir: STORAGE P4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	97.4 (CFS)	Date/Time of Peak Inflow:	26Feb2019, 12:0
Peak Discharge:	52.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:1
Inflow Volume:	4.1 (AC-FT)	Peak Storage:	1.8 (AC-FT)
Discharge Volume	3.8 (AC-FT)	Peak Elevation:	7295.4 (FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-6 Kiowa Outfall

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1959.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1959.5 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	299.6 (AC-FT)	Discharge Volume:	299.6 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1694.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1694.5 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	243.3 (AC-FT)	Discharge Volume:	243.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1714.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1713.7 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	248.5 (AC-FT)	Discharge Volume:	248.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1782.7 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1782.7 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	263.2 (AC-FT)	Discharge Volume:	263.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1796.6 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1796.4 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	269.8 (AC-FT)	Discharge Volume:	269.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-5

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	1872.8 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:4
Peak Discharge:	1872.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:4
Inflow Volume:	279.2 (AC-FT)	Discharge Volume:	279.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: REACH A1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	402.8 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:2
Peak Discharge:	402.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:3
Inflow Volume:	40.2 (AC-FT)	Discharge Volume:	40.2 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-A2A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	47.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	47.1 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:07
Inflow Volume:	1.7 (AC-FT)	Discharge Volume:	1.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-A2B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	20.3 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	20.1 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:07
Inflow Volume:	0.7 (AC-FT)	Discharge Volume:	0.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-A3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	47.1 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:06
Peak Discharge:	46.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:08
Inflow Volume:	1.7 (AC-FT)	Discharge Volume:	1.7 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-A3A

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	49.5 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	49.3 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:04
Inflow Volume:	2.0 (AC-FT)	Discharge Volume:	2.0 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-G1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	40.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:06
Peak Discharge:	40.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:10
Inflow Volume:	1.5 (AC-FT)	Discharge Volume:	1.5 (AC-FT)

Project: Winsome_Fil_3   Simulation Run: Prop Basins 100 yr

Reach: Reach-H1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	33.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:02
Peak Discharge:	32.8 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:06
Inflow Volume:	1.1 (AC-FT)	Discharge Volume:	1.1 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach-H2

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	65.5 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	65.4 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:06
Inflow Volume:	2.5 (AC-FT)	Discharge Volume:	2.5 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr

Reach: Reach H3

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	8.0 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:01
Peak Discharge:	8.0 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:07
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-H3B

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	6.9 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:03
Peak Discharge:	6.8 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:09
Inflow Volume:	0.3 (AC-FT)	Discharge Volume:	0.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-I1

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	25.8 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:04
Peak Discharge:	25.7 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:09
Inflow Volume:	1.3 (AC-FT)	Discharge Volume:	1.3 (AC-FT)

Project: Winsome_Fil_3 Simulation Run: Prop Basins 100 yr
Reach: Reach-P4

Start of Run:	26Feb2019, 00:00	Basin Model:	Proposed Basins
End of Run:	27Feb2019, 12:00	Meteorologic Model:	Prop Basins 100yr
Compute Time:	09Dec2021, 07:54:11	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow:	52.9 (CFS)	Date/Time of Peak Inflow	26Feb2019, 12:10
Peak Discharge:	52.9 (CFS)	Date/Time of Peak Discharge	26Feb2019, 12:11
Inflow Volume:	3.8 (AC-FT)	Discharge Volume:	3.8 (AC-FT)

APPENDIX C: HYDRAULICS

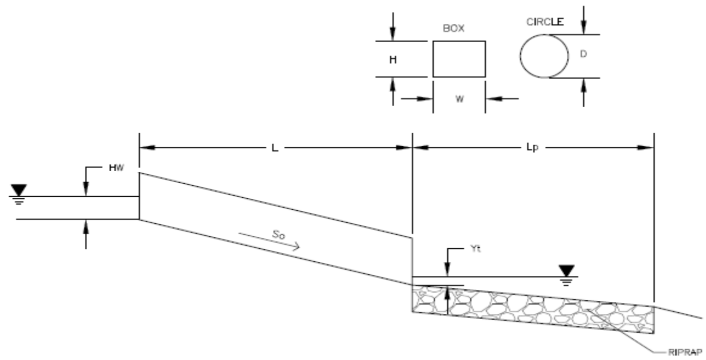
Culvert Summary											
Culvert ID	Flows (cfs)	HW/D Ratio	Diameter (in)	Length (ft)	Min Width (ft)	Width (ft)	D50 Type	D50 Size (in)	D50 Thickness (in)	Normal Depth in Pipe (ft)	Upstream Headwater Elevation (ft)
A3A	40.9	1.11	36	19	7	11	L	9	18	1.36	7346.61
G1	40.0	1.09	36	19	7	11	L	9	18	1.30	7378.88
H1	33.0	1.36	30	17	7	10	L	9	18	1.08	7395.55
H2	65.5	1.18	42	27	10	12	M	12	24	1.30	7339.25
H3	8.0	1.21	18	6	3	8	VL	6	12	0.78	7376.50
H5B	29.0	1.24	30	15	6	10	L	9	18	1.47	7318.10
I1	25.8	1.1	30	14	6	9	VL	6	12	1.08	7355.76
Pond 4	81.0	1.08	48	Forebay Used for Energy Dissipation						1.60	7299.85

provide the specific culvert analysis for these roadway culverts. The only ones attached are for a general driveway culvert

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing 3
ID: Culvert A3A



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	40.9	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	36	inches
Inlet Edge Type (Choose from pull-down list)	Square Edge with Headwall		
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7343.28	ft
Outlet Elevation **OR** Slope	So =	0.021	ft/ft
Culvert Length	L =	118.5	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	$Y_{t,\ Elevation}$ =		ft
Max Allowable Channel Velocity	V =	5	ft/s

Calculated Results:

Culvert Cross Sectional Area Available	A =	7.07	ft^2
Culvert Normal Depth	Y_n =	1.36	ft
Culvert Critical Depth	Y_c =	2.08	ft
Froude Number	Fr =	2.27	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.85	
Sum of All Loss Coefficients	k_s =	2.35	ft
Headwater:			
Inlet Control Headwater	HW_I =	3.33	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	**HW =**	**7346.61**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.11**	

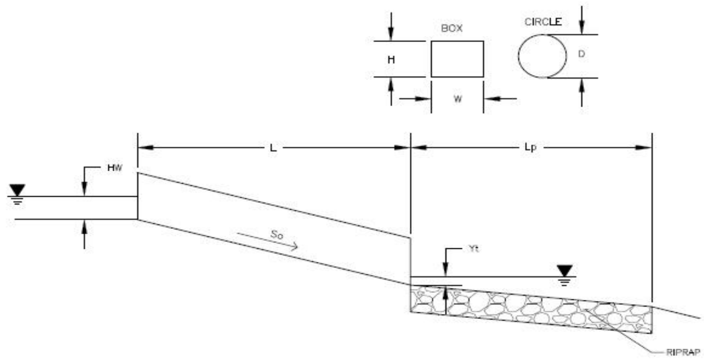
Outlet Control Headwater Approximation Method Inaccurate for Low Flow - Backwater Calculations Required

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	2.62	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.20	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.89	
Flow Area at Max Channel Velocity	A_t =	8.18	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**19**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**7**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	2.18	ft
Minimum Theoretical Riprap Size	d_{50} min=	7	in
Nominal Riprap Size	d_{50} nominal=	9	in
MHFD Riprap Type	**Type =**	**L**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing 3
ID: Culvert G1



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	40	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	36	inches
Inlet Edge Type (Choose from pull-down list)		Square Edge with Headwall	
OR:			
Box Culvert:		OR	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7375.61	ft
Outlet Elevation OR Slope	So =	0.02	ft/ft
Culvert Length	L =	115	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 =	7.07	ft^2
Culvert Normal Depth	Y_n =	1.30	ft
Culvert Critical Depth	Y_c =	2.06	ft
Froude Number	Fr =	2.41	Supercritical!
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.70	
Sum of All Loss Coefficients	k_s =	2.20	ft
Headwater:			
Inlet Control Headwater	HW_I =	3.27	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	HW =	7378.88	ft
Headwater/Diameter OR Headwater/Rise Ratio	HW/D =	1.09	

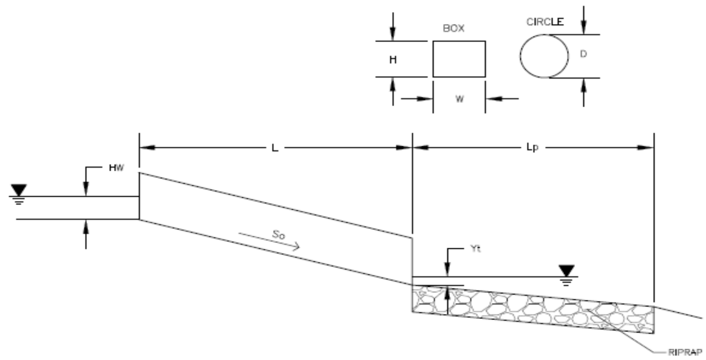
Outlet Control Headwater Approximation Method Inaccurate for Low Flow - Backwater Calculations Required

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	2.57	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.20	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.97	
Flow Area at Max Channel Velocity	A_t =	8.00	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	L_p =	19	ft
Width of Riprap Protection at Downstream End	T =	7	ft
Adjusted Diameter for Supercritical Flow	Da =	2.15	ft
Minimum Theoretical Riprap Size	d_{50} min=	7	in
Nominal Riprap Size	d_{50} nominal=	9	in
MHFD Riprap Type	Type =	L	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: **Winsome Filing 3**
ID: **Culvert H1**



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	33	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	30	inches
Inlet Edge Type (Choose from pull-down list)		Square Edge with Headwall	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7392.13	ft
Outlet Elevation **OR** Slope	So =	0.0369	ft/ft
Culvert Length	L =	100	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 =	4.91	ft^2
Culvert Normal Depth	Y_n =	1.08	ft
Culvert Critical Depth	Y_c =	1.95	ft
Froude Number	Fr =	3.18	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.78	
Sum of All Loss Coefficients	k_s =	2.28	ft
Headwater:			
Inlet Control Headwater	HW_I =	3.42	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	**HW =**	**7395.55**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.37**	

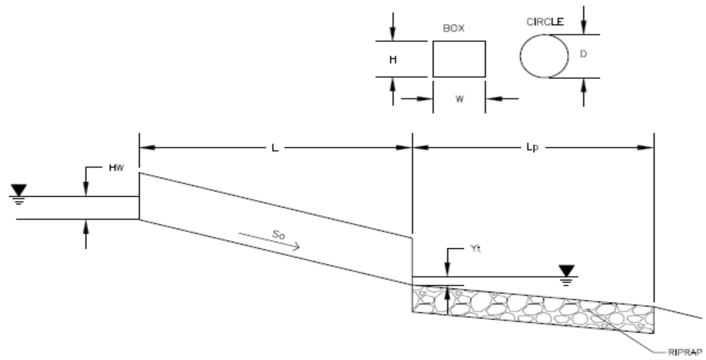
Outlet Control Headwater Approximation Method Inaccurate for Low Flow - Backwater Calculations Required

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	3.34	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.00	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.08	
Flow Area at Max Channel Velocity	A_t =	6.60	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	L_p **=**	**17**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**7**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	1.79	ft
Minimum Theoretical Riprap Size	d_{50} min=	8	in
Nominal Riprap Size	d_{50} nominal=	9	in
MHFD Riprap Type	**Type =**	**L**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing 3
ID: Culvert H2



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	65.5	cfs

Circular Culvert:

Barrel Diameter in Inches	D =	42	inches
Inlet Edge Type (Choose from pull-down list)	Square Edge with Headwall		

OR:

Box Culvert: **OR**

Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			

Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7335.12	ft
Outlet Elevation **OR** Slope	So =	0.0411	ft/ft
Culvert Length	L =	154	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 =	9.62	ft^2
Culvert Normal Depth	Y_n =	1.30	ft
Culvert Critical Depth	Y_c =	2.54	ft
Froude Number	Fr =	3.60	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.77	
Sum of All Loss Coefficients	k_s =	2.27	ft

Headwater:

Inlet Control Headwater	HW_I =	4.13	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	**HW =**	**7339.25**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.18**	

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

Outlet Protection:

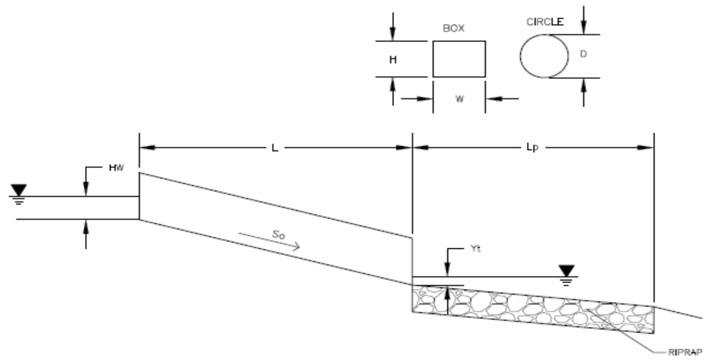
Flow/(Diameter^2.5)	Q/D^2.5 =	2.86	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.40	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.57	
Flow Area at Max Channel Velocity	A_t =	13.10	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	$\mathbf{L_p}$ **=**	**27**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**10**	**ft**

Adjusted Diameter for Supercritical Flow	Da =	2.40	ft
Minimum Theoretical Riprap Size	d_{50} min=	9	in
Nominal Riprap Size	d_{50} nominal=	12	in
MHFD Riprap Type	**Type =**	**M**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing 3
ID: Culvert H3



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	8	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	18	inches
Inlet Edge Type (Choose from pull-down list)		Square Edge with Headwall	
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7374.69	ft
Outlet Elevation **OR** Slope	So =	0.0173	ft/ft
Culvert Length	L =	92	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 =	0.78	ft
Culvert Critical Depth	Y_c =	1.10	ft
Froude Number	Fr =	1.93	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	1.42	
Sum of All Loss Coefficients	k_s =	2.92	ft
Headwater:			
Inlet Control Headwater	HW_I =	1.81	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	**HW =**	**7376.50**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.21**	

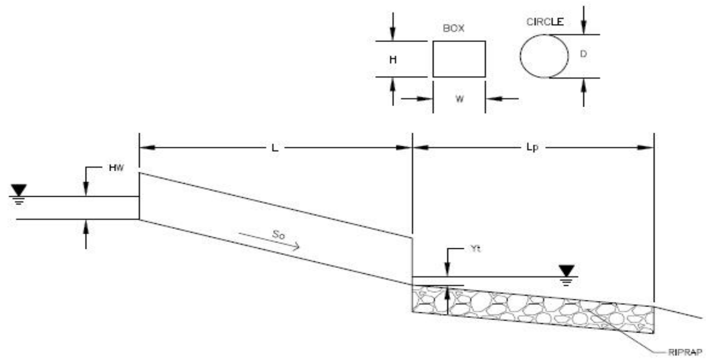
Outlet Control Headwater Approximation Method Inaccurate for Low Flow - Backwater Calculations Required

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	2.90	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	0.60	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.51	
Flow Area at Max Channel Velocity	A_t =	1.60	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	L_p **=**	**6**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**3**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	1.14	ft
Minimum Theoretical Riprap Size	d_{50} min=	4	in
Nominal Riprap Size	d_{50} nominal=	6	in
MHFD Riprap Type	**Type =**	**VL**	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing 3
ID: Culvert H5B



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

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	29	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	30	inches
Inlet Edge Type (Choose from pull-down list)		Square Edge Projecting	
OR:			
Box Culvert:		OR	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7315	ft
Outlet Elevation OR Slope	So =	0.01	ft/ft
Culvert Length	L =	74	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

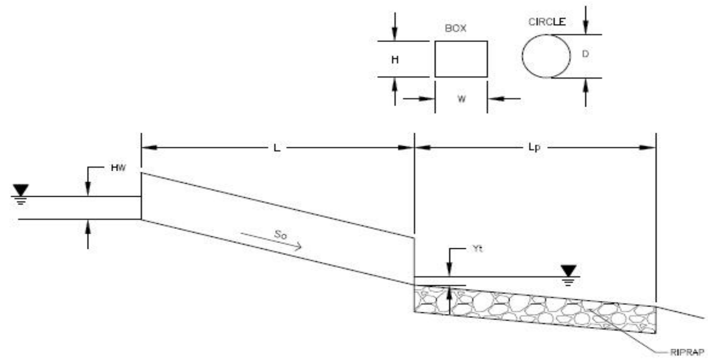
Calculated Results:

Culvert Cross Sectional Area Available	A =	4.91	ft^2
Culvert Normal Depth	Y_n =	1.47	ft
Culvert Critical Depth	Y_c =	1.84	ft
Froude Number	Fr =	1.54	Supercritical!
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.58	
Sum of All Loss Coefficients	k_s =	1.78	ft
Headwater:			
Inlet Control Headwater	HW_I =	3.10	ft
Outlet Control Headwater	HW_O =	2.39	ft
Design Headwater Elevation	HW =	7318.10	ft
Headwater/Diameter OR Headwater/Rise Ratio	HW/D =	1.24	
Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	2.93	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.00	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.47	
Flow Area at Max Channel Velocity	A_t =	5.80	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	L_p =	15	ft
Width of Riprap Protection at Downstream End	T =	6	ft
Adjusted Diameter for Supercritical Flow	Da =	1.98	ft
Minimum Theoretical Riprap Size	d_{50} min=	7	in
Nominal Riprap Size	d_{50} nominal=	9	in
MHFD Riprap Type	Type =	L	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing 3
ID: Culvert I1



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	25.8	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	30	inches
Inlet Edge Type (Choose from pull-down list)	Square Edge with Headwall		
OR:			
Box Culvert:		OR	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7353	ft
Outlet Elevation OR Slope	So =	0.0222	ft/ft
Culvert Length	L =	99	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 =	4.91	ft^2
Culvert Normal Depth	Y_n =	1.08	ft
Culvert Critical Depth	Y_c =	1.73	ft
Froude Number	Fr =	2.46	Supercritical!
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.77	
Sum of All Loss Coefficients	k_s =	2.27	ft
Headwater:			
Inlet Control Headwater	HW_I =	2.76	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	HW =	7355.76	ft
Headwater/Diameter OR Headwater/Rise Ratio	HW/D =	1.10	

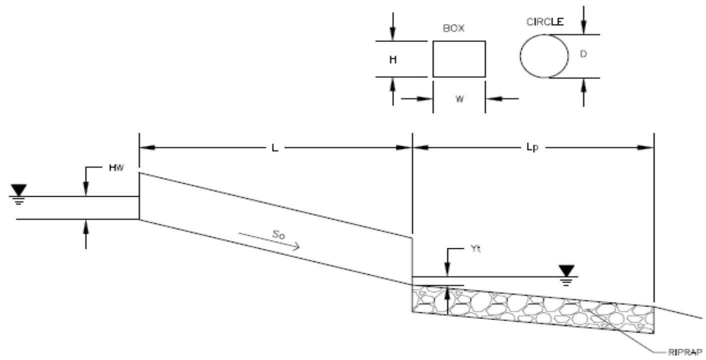
Outlet Control Headwater Approximation Method Inaccurate for Low Flow - Backwater Calculations Required

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	2.61	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.00	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	4.91	
Flow Area at Max Channel Velocity	A_t =	5.16	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	L_p =	14	ft
Width of Riprap Protection at Downstream End	T =	6	ft
Adjusted Diameter for Supercritical Flow	Da =	1.79	ft
Minimum Theoretical Riprap Size	d_{50} min=	6	in
Nominal Riprap Size	d_{50} nominal=	6	in
MHFD Riprap Type	Type =	VL	

DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Winsome Filing No 3
ID: Culvert Pond 4



Soil Type:
Choose One:
○ Sandy
◉ Non-Sandy

Supercritical Flow! Using Adjusted Diameter to calculate protection type.

Design Information:

Design Discharge	Q =	81	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	48	inches
Inlet Edge Type (Choose from pull-down list)	Square Edge with Headwall		
OR:			
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	H (Rise) =		ft
Barrel Width (Span) in Feet	W (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	# Barrels =	1	
Inlet Elevation	Elev IN =	7295.54	ft
Outlet Elevation **OR** Slope	So =	0.024	ft/ft
Culvert Length	L =	144	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 =	12.57	ft^2
Culvert Normal Depth	Y_n =	1.60	ft
Culvert Critical Depth	Y_c =	2.73	ft
Froude Number	Fr =	2.80	**Supercritical!**
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	0.60	
Sum of All Loss Coefficients	k_s =	2.10	ft
Headwater:			
Inlet Control Headwater	HW_I =	4.31	ft
Outlet Control Headwater	HW_O =	N/A	ft
Design Headwater Elevation	**HW =**	**7299.85**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**1.08**	

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

Outlet Protection:			
Flow/(Diameter^2.5)	Q/D^2.5 =	2.53	$ft^{0.5}/s$
Tailwater Surface Height	Y_t =	1.60	ft
Tailwater/Diameter	Yt/D =	0.40	
Expansion Factor	1/(2*tan(Θ)) =	5.02	
Flow Area at Max Channel Velocity	A_t =	16.20	ft^2
Width of Equivalent Conduit for Multiple Barrels	W_{eq} =	-	ft
Length of Riprap Protection	**L_p =**	**31**	**ft**
Width of Riprap Protection at Downstream End	**T =**	**11**	**ft**
Adjusted Diameter for Supercritical Flow	Da =	2.80	ft
Minimum Theoretical Riprap Size	d_{50} min=	9	in
Nominal Riprap Size	d_{50} nominal=	12	in
MHFD Riprap Type	**Type =**	**M**	

DRIVEWAY CULVERT SIZING TABLE				
Lot	**100 yr. Flow (cfs)**	**Culvert size (in)**	**Anticipated Driveway Location**	**Notes**
1	N/A	N/A	N/A	N/A
2	41	36	East side of lot	Cross Swale A3A
3	41	36	East side of lot	Cross Swale A3A
4	<10	18	East side of lot	Cross roadside ditch
5	<10	18	South side of lot	Cross roadside ditch
6	<10	18	South side of lot	Cross roadside ditch
7	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A
9	<10	18	South side of lot	Corss roadside ditch
10	<10	18	South side of lot	Cross roadside ditch
11	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A
13	<10	18	South side of lot	Cross roadside ditch
14	<10	18	East side of lot	Cross roadside ditch
15	<10	18	East side of lot	Cross roadside ditch
16	<10	18	South side of lot	Cross roadside ditch
17	<10	18	South side of lot	Cross roadside ditch
18	<10	18	East side of lot	Cross roadside ditch
19	<10	18	East side of lot	N/A
20	<10	18	West side of lot	N/A
21	<10	18	West side of lot	N/A
22	<10	18	West side of lot	N/A
23	20	24	West side of lot	Cross roadside ditch
24	20	24	West side of lot	Cross roadside ditch
25	27	30	East side of lot	Cross roadside ditch
26	<10	18	North side of lot	Cross roadside ditch
27	<10	18	North side of lot	Cross roadside ditch
28	<10	18	West side of lot	Cross roadside ditch
29	<10	18	North side of lot	Cross roadside ditch
30	<10	18	North side of lot	Cross roadside ditch
31	<10	18	North side of lot	Cross roadside ditch

Remove the driveway summary table and supporting culvert analysis from the early grading application (EGP215). This will be reviewed approved with the Final Drainage Report associated with the future final plat application. See comment on page 13.

NOTE: The roadway culvert analysis needs to remain with this early grading FDR since these are proposed to be installed at this time.

DRIVEWAY CULVERT SIZING TABLE

Lot	100 yr. Flow (cfs)	Culvert size (in)	Anticipated Driveway Location	Notes
32	<10	18	North side of lot	Cross roadside ditch
33	<10	18	North side of lot	Cross roadside ditch
34	<10	18	North side of lot	Cross roadside ditch
35	<10	18	West side of lot	Cross roadside ditch
36	<10	18	West side of lot	Cross roadside ditch
37	<10	18	West side of lot	Cross roadside ditch
38	<10	18	West side of lot	Cross roadside ditch

*Culvert sizing is based on flows in roadside ditch. If driveways cross natural channels an engineering site plan would be required.

Generic Driveway Culvert Sizing Table*

Culvert Diameter (in)	Allowable Flow (cfs)
18	10
24	20
30	30
36	50
42	70

*See Generic Driveway Culvert Sizing calculations for Hw/D and culvert slope assumptions for each culvert size.

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 10 cfs

Maximum Flow: 100 cfs

Table 28 - Summary of Culvert Flows at Crossing: General Driveway-18in

Headwater Elevation (ft)	Total Discharge (cfs)	Driveway Culvert 18in Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7388.00	0.00	0.00	0.00	1
7390.26	10.00	10.00	0.00	1
7392.71	20.00	17.08	2.91	10
7393.05	30.00	17.78	12.20	5
7393.30	40.00	18.30	21.69	5
7393.52	50.00	18.73	31.22	4
7393.72	60.00	19.12	40.84	4
7393.90	70.00	19.48	50.50	4
7394.07	80.00	19.79	60.15	3
7394.23	90.00	20.09	69.87	3
7394.39	100.00	20.37	79.62	3
7392.50	16.61	16.61	0.00	Overtopping

Rating Curve Plot for Crossing: General Driveway-18in

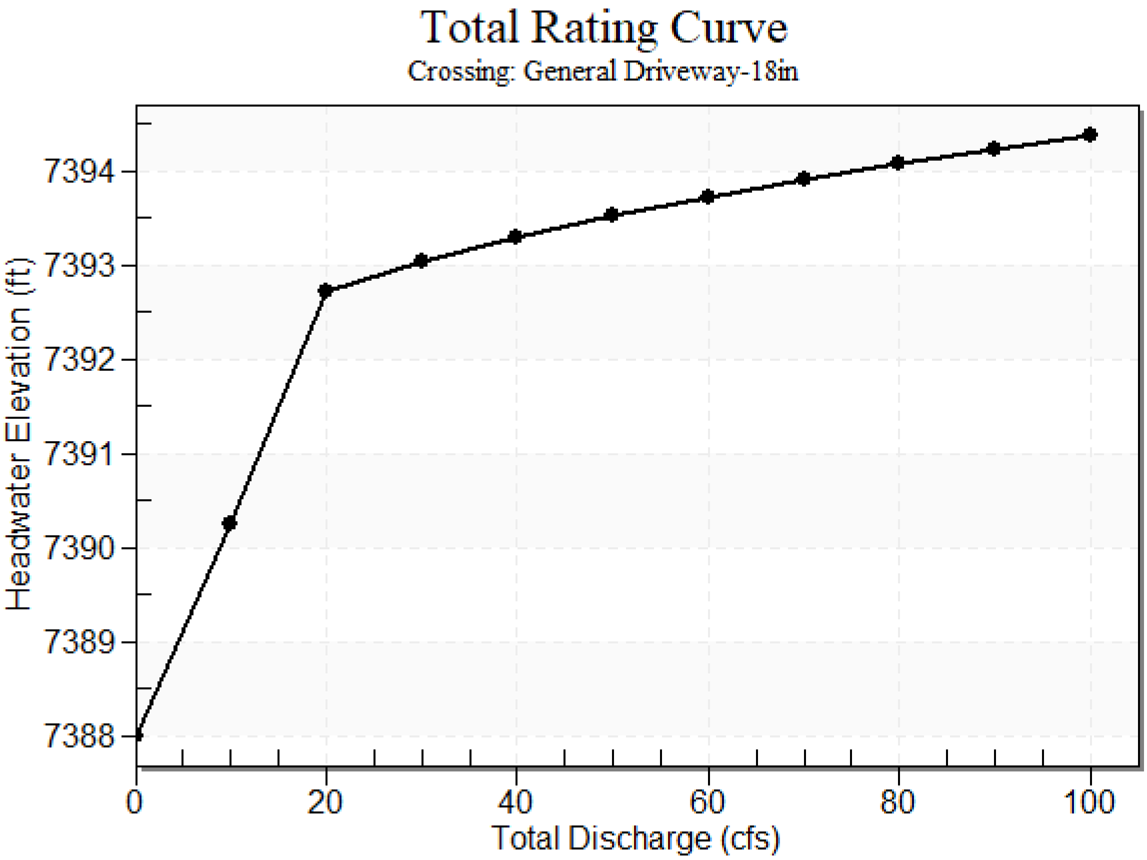


Table 29 - Culvert Summary Table: Driveway Culvert 18in

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)
0.00	0.00	7388.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	7390.26	2.256	1.995	5-S2n	0.900	1.219	1.033	0.907	7.709	3.039
20.00	17.08	7392.71	4.713	3.730	7-M2c	1.500	1.382	1.382	1.176	10.031	3.614
30.00	17.78	7393.05	5.046	3.943	7-M2t	1.500	1.308	1.369	1.369	10.507	4.000
40.00	18.30	7393.30	5.300	4.124	4-FFf	1.500	1.492	1.500	1.525	10.354	4.298
50.00	18.73	7393.52	5.520	4.393	4-FFf	1.500	1.500	1.500	1.658	10.601	4.544
60.00	19.12	7393.72	5.720	4.633	4-FFf	1.500	1.500	1.500	1.776	10.821	4.756
70.00	19.48	7393.90	5.905	4.853	4-FFf	1.500	1.500	1.500	1.882	11.021	4.943
80.00	19.79	7394.07	6.071	5.051	4-FFf	1.500	1.500	1.500	1.978	11.197	5.111
90.00	20.09	7394.23	6.233	5.240	4-FFf	1.500	1.500	1.500	2.067	11.367	5.264
100.00	20.37	7394.39	6.388	5.419	4-FFf	1.500	1.500	1.500	2.151	11.526	5.404

****

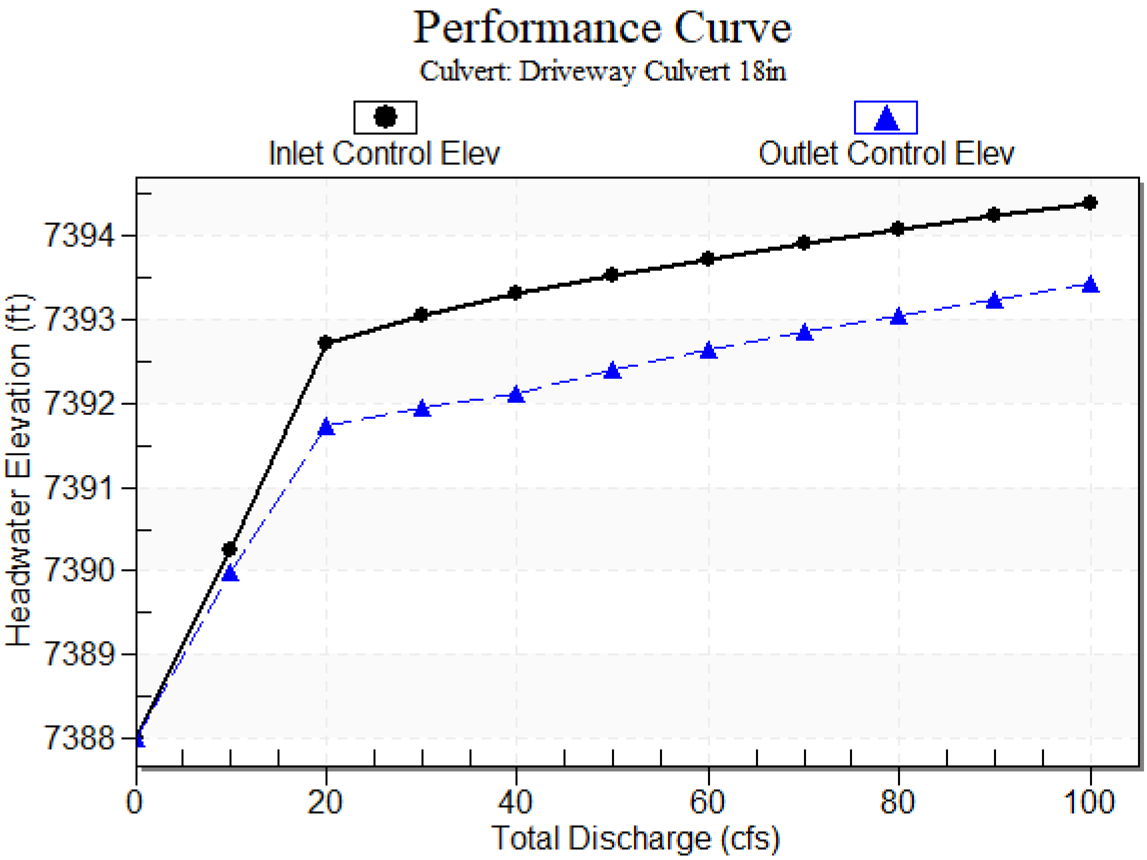
Straight Culvert

Inlet Elevation (invert): 7388.00 ft,   Outlet Elevation (invert): 7387.80 ft

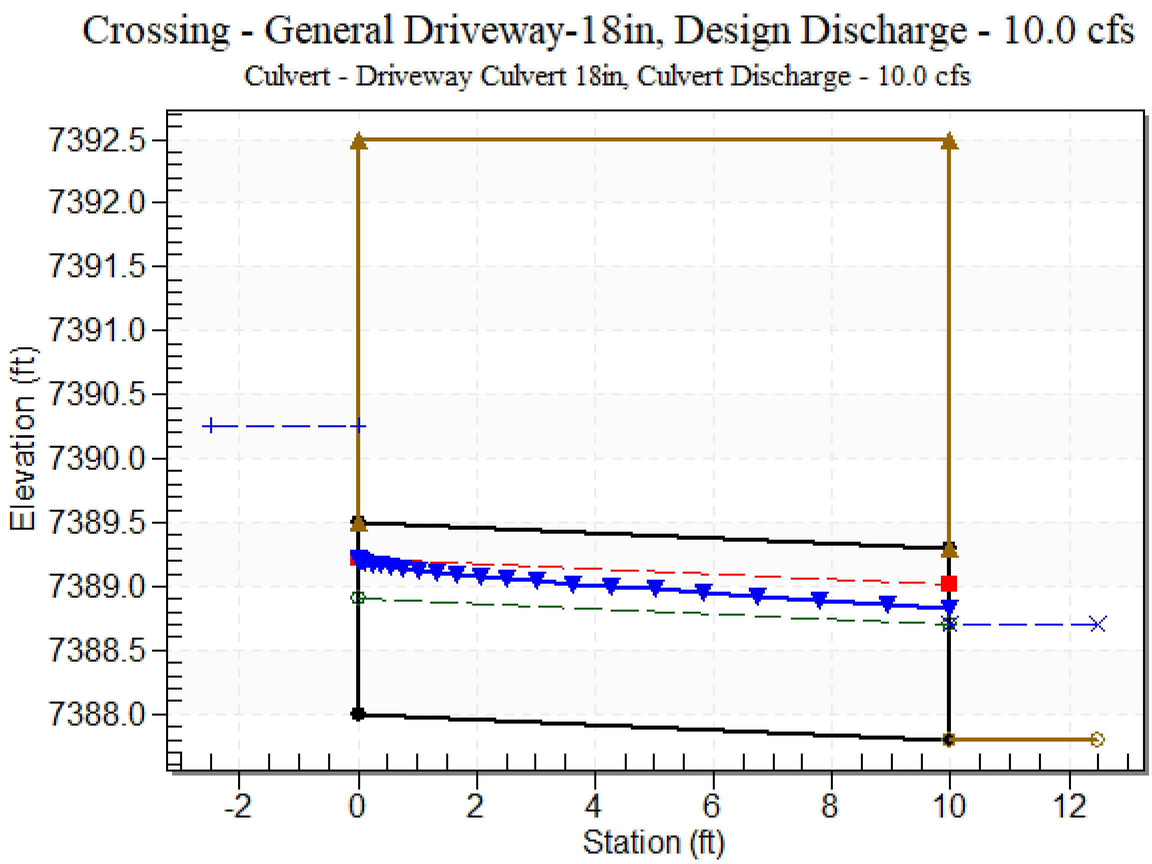
Culvert Length: 10.00 ft,   Culvert Slope: 0.0200

****

Culvert Performance Curve Plot: Driveway Culvert 18in



Water Surface Profile Plot for Culvert: Driveway Culvert 18in



Site Data - Driveway Culvert 18in

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7388.00 ft

Outlet Station: 10.00 ft

Outlet Elevation: 7387.80 ft

Number of Barrels: 1

Culvert Data Summary - Driveway Culvert 18in

Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 30 - Downstream Channel Rating Curve (Crossing: General Driveway-18in)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	7387.80	0.00	0.00	0.00	0.00
10.00	7388.71	0.91	3.04	1.13	0.80
20.00	7388.98	1.18	3.61	1.47	0.83
30.00	7389.17	1.37	4.00	1.71	0.85
40.00	7389.33	1.53	4.30	1.90	0.87
50.00	7389.46	1.66	4.54	2.07	0.88
60.00	7389.58	1.78	4.76	2.22	0.89
70.00	7389.68	1.88	4.94	2.35	0.90
80.00	7389.78	1.98	5.11	2.47	0.91
90.00	7389.87	2.07	5.26	2.58	0.91
100.00	7389.95	2.15	5.40	2.68	0.92

Tailwater Channel Data - General Driveway-18in

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0400

Channel Invert Elevation: 7387.80 ft

Roadway Data for Crossing: General Driveway-18in

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 ft

Crest Elevation: 7392.50 ft

Roadway Surface: Paved

Roadway Top Width: 10.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 20 cfs

Maximum Flow: 100 cfs

Table 31 - Summary of Culvert Flows at Crossing: General Driveway-24in

Headwater Elevation (ft)	Total Discharge (cfs)	Driveway Culvert 24in Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7388.00	0.00	0.00	0.00	1
7389.69	10.00	10.00	0.00	1
7390.92	20.00	20.00	0.00	1
7392.93	30.00	30.00	0.00	1
7393.41	40.00	31.91	8.05	5
7393.68	50.00	32.92	17.07	5
7393.91	60.00	33.75	26.20	4
7394.11	70.00	34.48	35.49	4
7394.30	80.00	35.10	44.87	4
7394.47	90.00	35.68	54.30	4
7394.63	100.00	36.19	63.77	3
7393.00	30.27	30.27	0.00	Overtopping

Rating Curve Plot for Crossing: General Driveway-24in

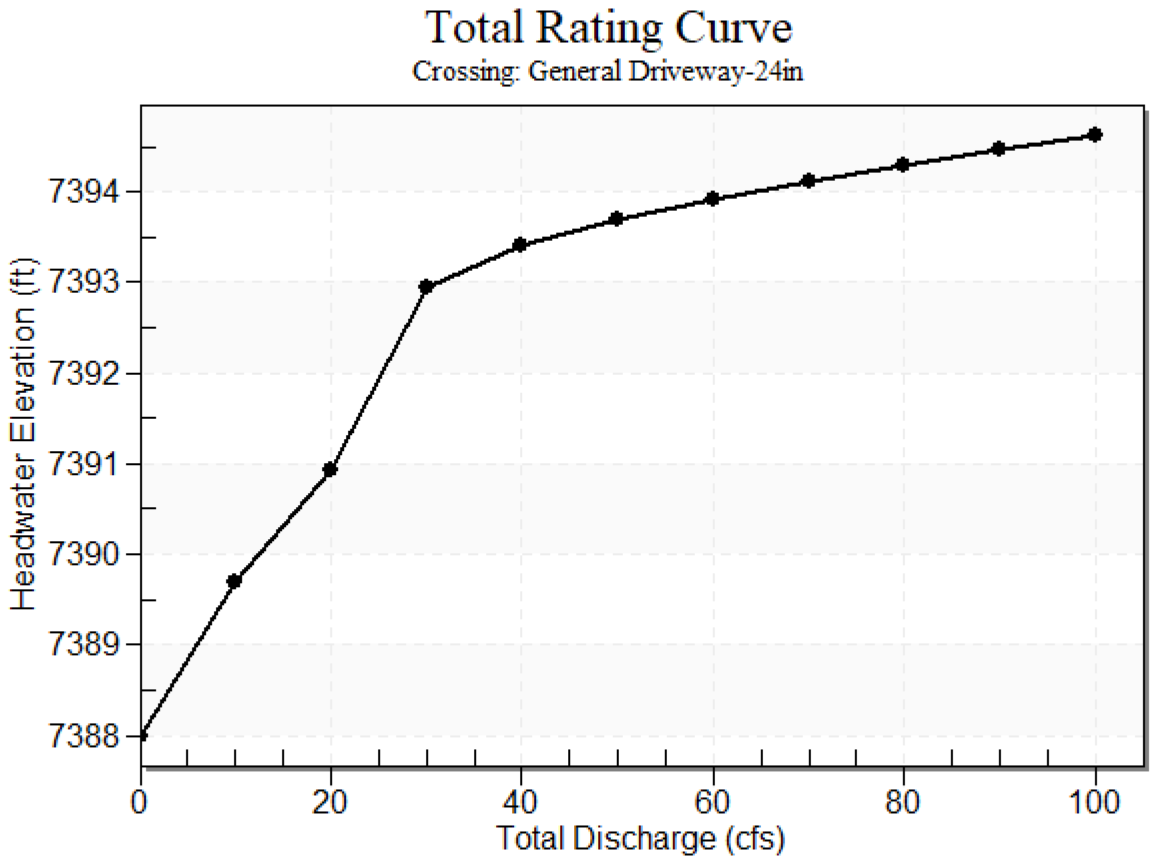


Table 32 - Culvert Summary Table: Driveway Culvert 24in

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)
0.00	0.00	7388.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	7389.69	1.686	1.187	1-S2n	0.767	1.131	0.915	0.907	7.140	3.039
20.00	20.00	7390.92	2.924	2.625	5-S2n	1.144	1.606	1.370	1.176	8.719	3.614
30.00	30.00	7392.93	4.934	4.030	5-S2n	1.535	1.862	1.724	1.369	10.421	4.000
40.00	31.91	7393.41	5.415	4.345	5-S2n	1.631	1.889	1.786	1.525	10.776	4.298
50.00	32.92	7393.68	5.682	4.518	5-S2n	1.692	1.900	1.822	1.658	10.961	4.544
60.00	33.75	7393.91	5.907	4.665	5-S2n	1.758	1.909	1.858	1.776	11.095	4.756
70.00	34.48	7394.11	6.111	4.794	3-M2t	2.000	1.874	1.882	1.882	11.244	4.943
80.00	35.10	7394.30	6.298	4.926	7-M2t	2.000	1.840	1.978	1.978	11.195	5.111
90.00	35.68	7394.47	6.474	5.119	4-FFf	2.000	1.817	2.000	2.067	11.357	5.264
100.00	36.19	7394.63	6.632	5.297	4-FFf	2.000	1.778	2.000	2.151	11.520	5.404

****

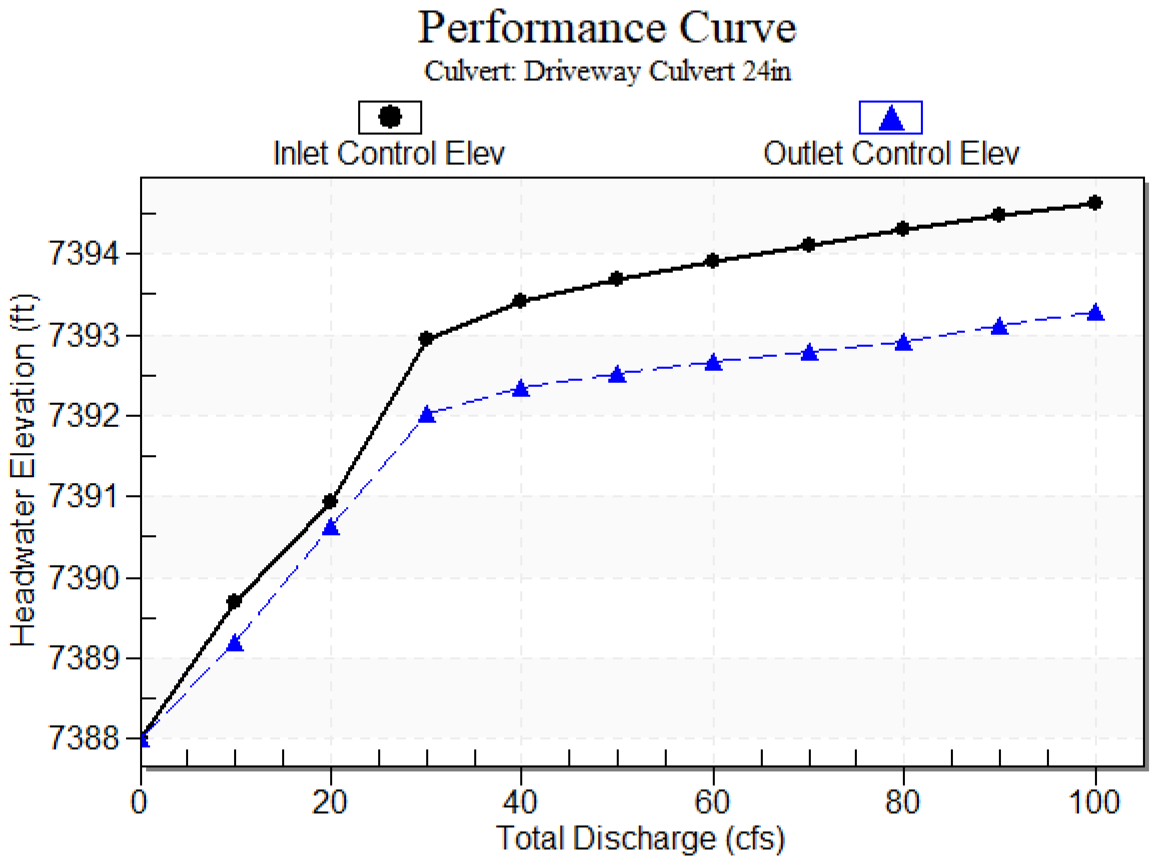
Straight Culvert

Inlet Elevation (invert): 7388.00 ft,   Outlet Elevation (invert): 7387.80 ft

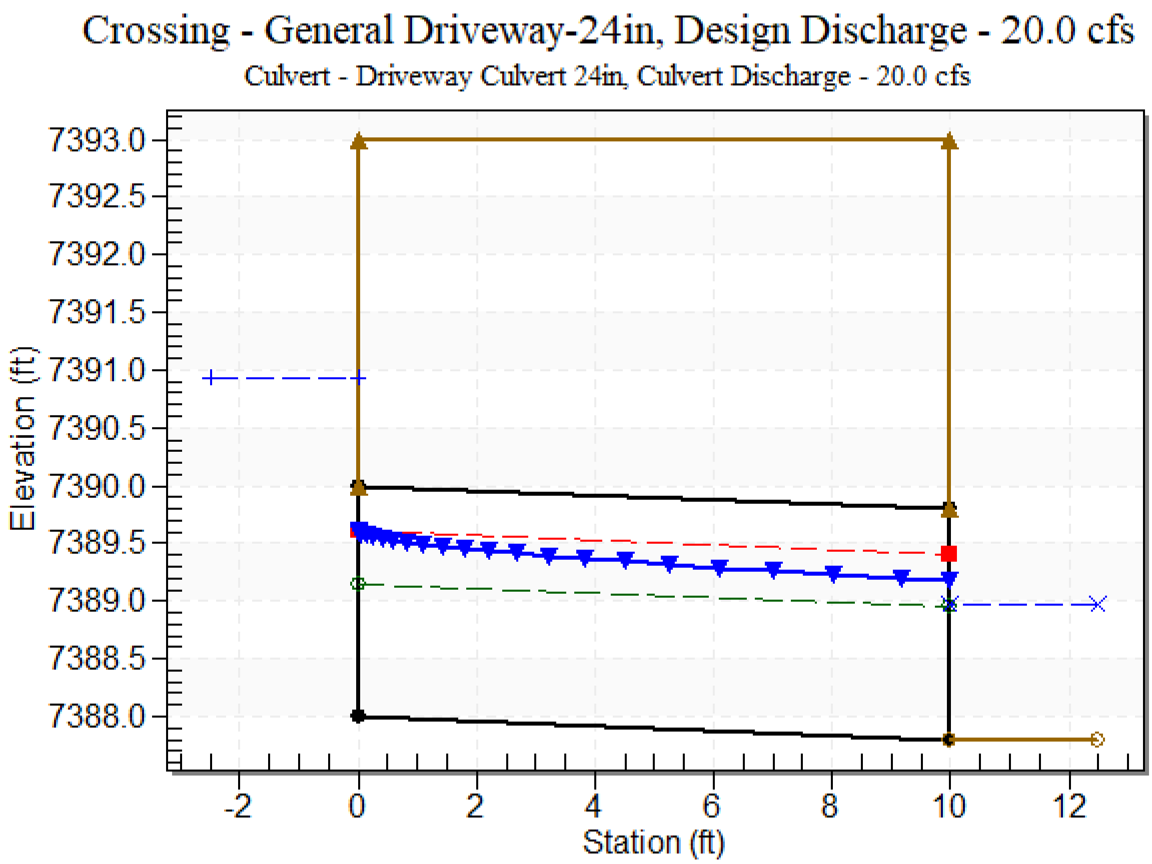
Culvert Length: 10.00 ft,   Culvert Slope: 0.0200

****

Culvert Performance Curve Plot: Driveway Culvert 24in



Water Surface Profile Plot for Culvert: Driveway Culvert 24in



Site Data - Driveway Culvert 24in

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7388.00 ft

Outlet Station: 10.00 ft

Outlet Elevation: 7387.80 ft

Number of Barrels: 1

Culvert Data Summary - Driveway Culvert 24in

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 33 - Downstream Channel Rating Curve (Crossing: General Driveway-24in)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	7387.80	0.00	0.00	0.00	0.00
10.00	7388.71	0.91	3.04	1.13	0.80
20.00	7388.98	1.18	3.61	1.47	0.83
30.00	7389.17	1.37	4.00	1.71	0.85
40.00	7389.33	1.53	4.30	1.90	0.87
50.00	7389.46	1.66	4.54	2.07	0.88
60.00	7389.58	1.78	4.76	2.22	0.89
70.00	7389.68	1.88	4.94	2.35	0.90
80.00	7389.78	1.98	5.11	2.47	0.91
90.00	7389.87	2.07	5.26	2.58	0.91
100.00	7389.95	2.15	5.40	2.68	0.92

Tailwater Channel Data - General Driveway-24in

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0400

Channel Invert Elevation: 7387.80 ft

Roadway Data for Crossing: General Driveway-24in

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 ft

Crest Elevation: 7393.00 ft

Roadway Surface: Paved

Roadway Top Width: 10.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 30 cfs

Maximum Flow: 100 cfs

Table 34 - Summary of Culvert Flows at Crossing: General Driveway-30in

Headwater Elevation (ft)	Total Discharge (cfs)	Driveway Culvert 30in Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7388.00	0.00	0.00	0.00	1
7389.49	10.00	10.00	0.00	1
7390.30	20.00	20.00	0.00	1
7391.14	30.00	30.00	0.00	1
7392.27	40.00	40.00	0.00	1
7393.60	50.00	49.05	0.92	10
7393.94	60.00	51.10	8.87	5
7394.19	70.00	52.55	17.44	5
7394.41	80.00	53.76	26.20	4
7394.60	90.00	54.84	35.13	4
7394.78	100.00	55.83	44.15	4
7393.50	48.44	48.44	0.00	Overtopping

Rating Curve Plot for Crossing: General Driveway-30in

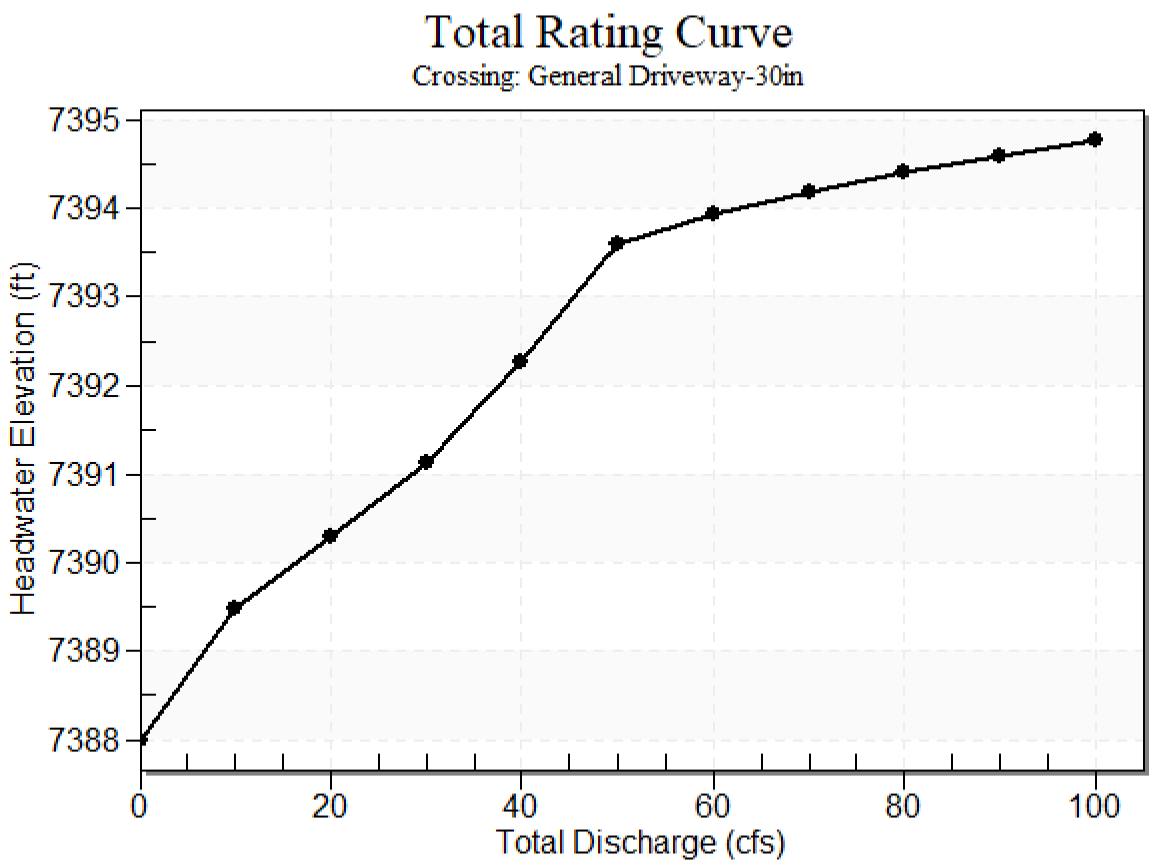


Table 35 - Culvert Summary Table: Driveway Culvert 30in

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)
0.00	0.00	7388.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	7389.49	1.489	0.959	1-S2n	0.702	1.056	0.843	0.907	6.874	3.039
20.00	20.00	7390.30	2.301	1.728	1-S2n	1.011	1.518	1.253	1.176	8.121	3.614
30.00	30.00	7391.14	3.142	2.590	5-S2n	1.274	1.867	1.585	1.369	9.144	4.000
40.00	40.00	7392.27	4.268	3.756	5-S2n	1.524	2.129	1.866	1.525	10.180	4.298
50.00	49.05	7393.60	5.599	4.662	5-S2n	1.761	2.287	2.082	1.658	11.232	4.544
60.00	51.10	7393.94	5.942	4.885	5-S2n	1.819	2.313	2.126	1.776	11.488	4.756
70.00	52.55	7394.19	6.192	5.047	5-S2n	1.861	2.330	2.156	1.882	11.674	4.943
80.00	53.76	7394.41	6.407	5.186	5-S2n	1.899	2.342	2.182	1.978	11.829	5.111
90.00	54.84	7394.60	6.603	5.311	5-S2n	1.933	2.353	2.204	2.067	11.974	5.264
100.00	55.83	7394.78	6.785	5.428	5-S2n	1.966	2.361	2.224	2.151	12.103	5.404

****

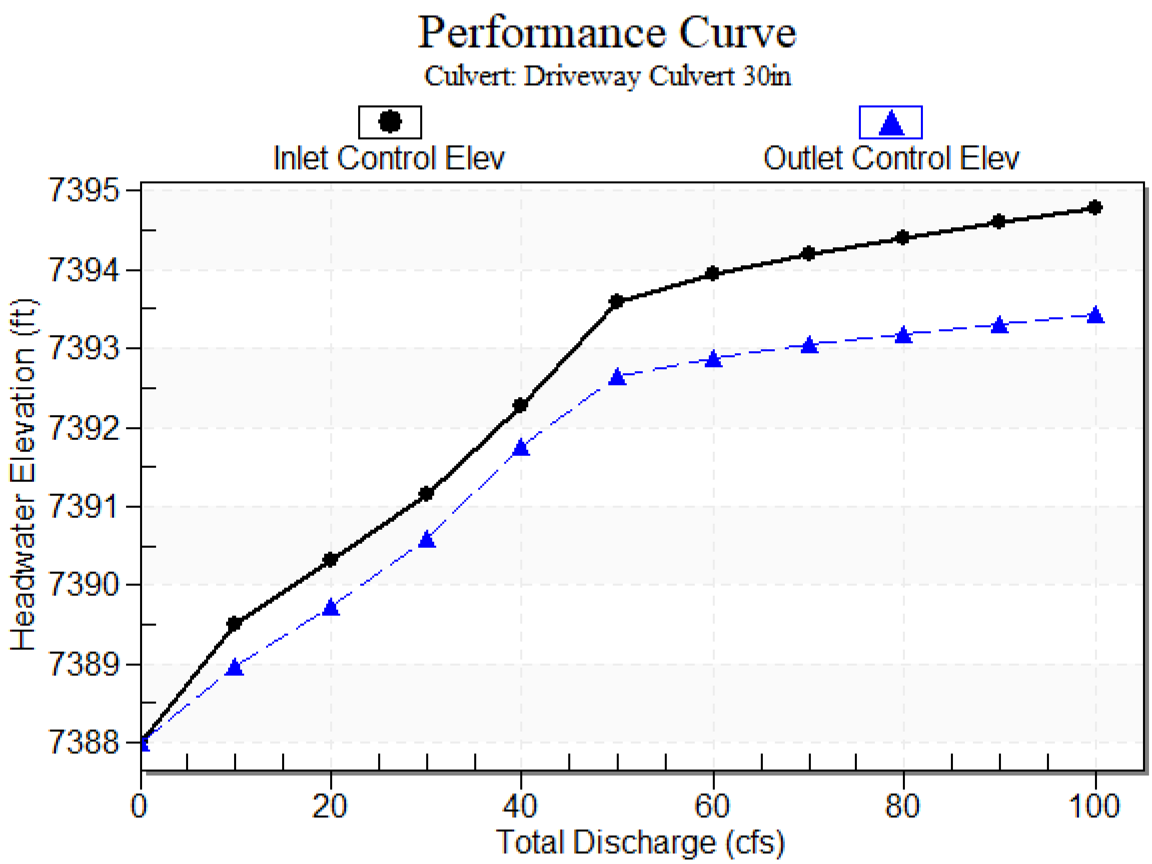
Straight Culvert

Inlet Elevation (invert): 7388.00 ft,   Outlet Elevation (invert): 7387.80 ft

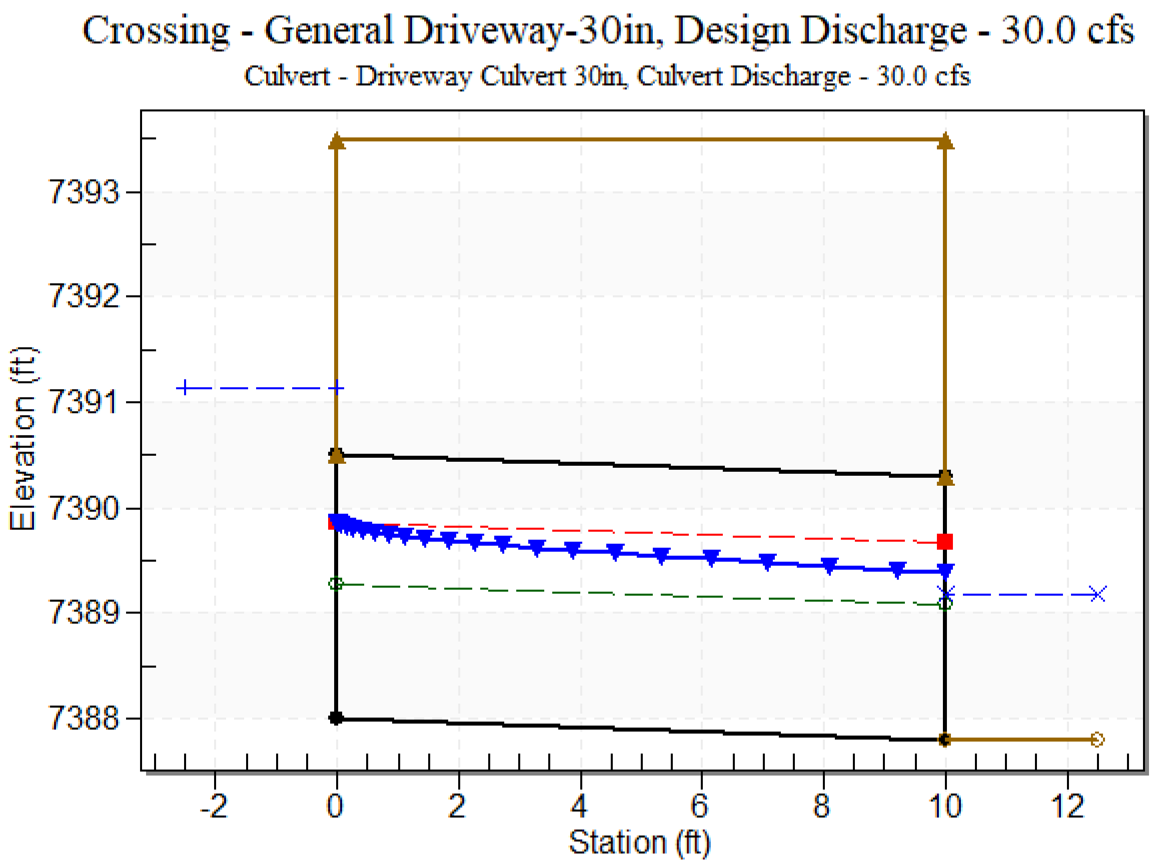
Culvert Length: 10.00 ft,   Culvert Slope: 0.0200

****

Culvert Performance Curve Plot: Driveway Culvert 30in



Water Surface Profile Plot for Culvert: Driveway Culvert 30in



Site Data - Driveway Culvert 30in

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7388.00 ft

Outlet Station: 10.00 ft

Outlet Elevation: 7387.80 ft

Number of Barrels: 1

Culvert Data Summary - Driveway Culvert 30in

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 36 - Downstream Channel Rating Curve (Crossing: General Driveway-30in)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	7387.80	0.00	0.00	0.00	0.00
10.00	7388.71	0.91	3.04	1.13	0.80
20.00	7388.98	1.18	3.61	1.47	0.83
30.00	7389.17	1.37	4.00	1.71	0.85
40.00	7389.33	1.53	4.30	1.90	0.87
50.00	7389.46	1.66	4.54	2.07	0.88
60.00	7389.58	1.78	4.76	2.22	0.89
70.00	7389.68	1.88	4.94	2.35	0.90
80.00	7389.78	1.98	5.11	2.47	0.91
90.00	7389.87	2.07	5.26	2.58	0.91
100.00	7389.95	2.15	5.40	2.68	0.92

Tailwater Channel Data - General Driveway-30in

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0400

Channel Invert Elevation: 7387.80 ft

Roadway Data for Crossing: General Driveway-30in

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 ft

Crest Elevation: 7393.50 ft

Roadway Surface: Paved

Roadway Top Width: 10.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 50 cfs

Maximum Flow: 100 cfs

Table 37 - Summary of Culvert Flows at Crossing: General Driveway-36in

Headwater Elevation (ft)	Total Discharge (cfs)	Driveway Culvert 36in Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7388.00	0.00	0.00	0.00	1
7389.36	10.00	10.00	0.00	1
7390.07	20.00	20.00	0.00	1
7390.67	30.00	30.00	0.00	1
7391.27	40.00	40.00	0.00	1
7391.97	50.00	50.00	0.00	1
7392.82	60.00	60.00	0.00	1
7393.85	70.00	70.00	0.00	1
7394.33	80.00	74.20	5.79	6
7394.59	90.00	76.31	13.68	5
7394.81	100.00	78.06	21.90	4
7394.00	71.34	71.34	0.00	Overtopping

Rating Curve Plot for Crossing: General Driveway-36in

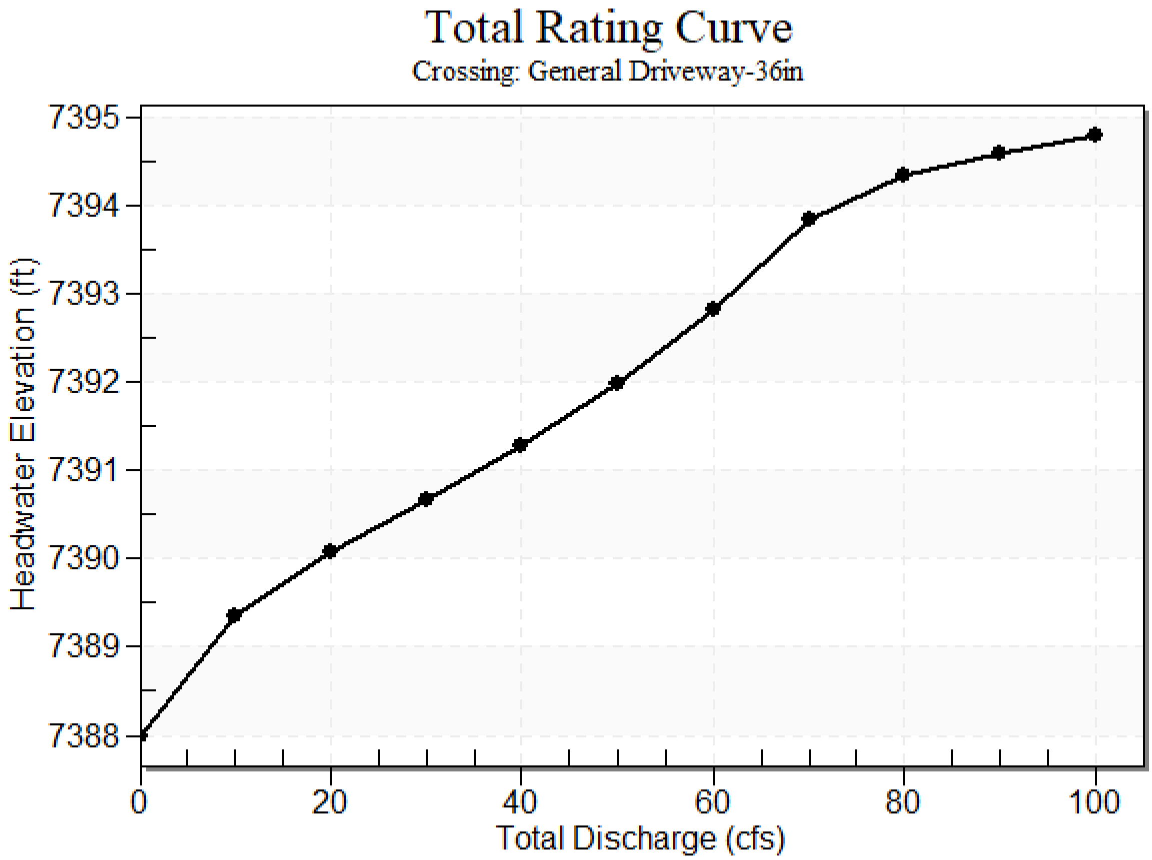


Table 38 - Culvert Summary Table: Driveway Culvert 36in

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)
0.00	0.00	7388.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	7389.36	1.359	0.849	1-S2n	0.658	1.000	0.792	0.907	6.697	3.039
20.00	20.00	7390.07	2.073	1.430	1-S2n	0.937	1.435	1.172	1.176	7.820	3.614
30.00	30.00	7390.67	2.671	2.014	1-S2n	1.161	1.774	1.478	1.369	8.653	4.000
40.00	40.00	7391.27	3.272	2.641	5-S2n	1.362	2.059	1.743	1.525	9.388	4.298
50.00	50.00	7391.97	3.971	3.672	5-S2n	1.551	2.301	1.981	1.658	10.100	4.544
60.00	60.00	7392.82	4.823	4.309	5-S2n	1.735	2.501	2.193	1.776	10.837	4.756
70.00	70.00	7393.85	5.849	5.023	5-S2n	1.922	2.657	2.382	1.882	11.631	4.943
80.00	74.20	7394.33	6.333	5.345	5-S2n	2.002	2.710	2.454	1.978	11.989	5.111
90.00	76.31	7394.59	6.588	5.512	5-S2n	2.044	2.733	2.489	2.067	12.176	5.264
100.00	78.06	7394.81	6.805	5.653	5-S2n	2.078	2.751	2.517	2.151	12.332	5.404

****

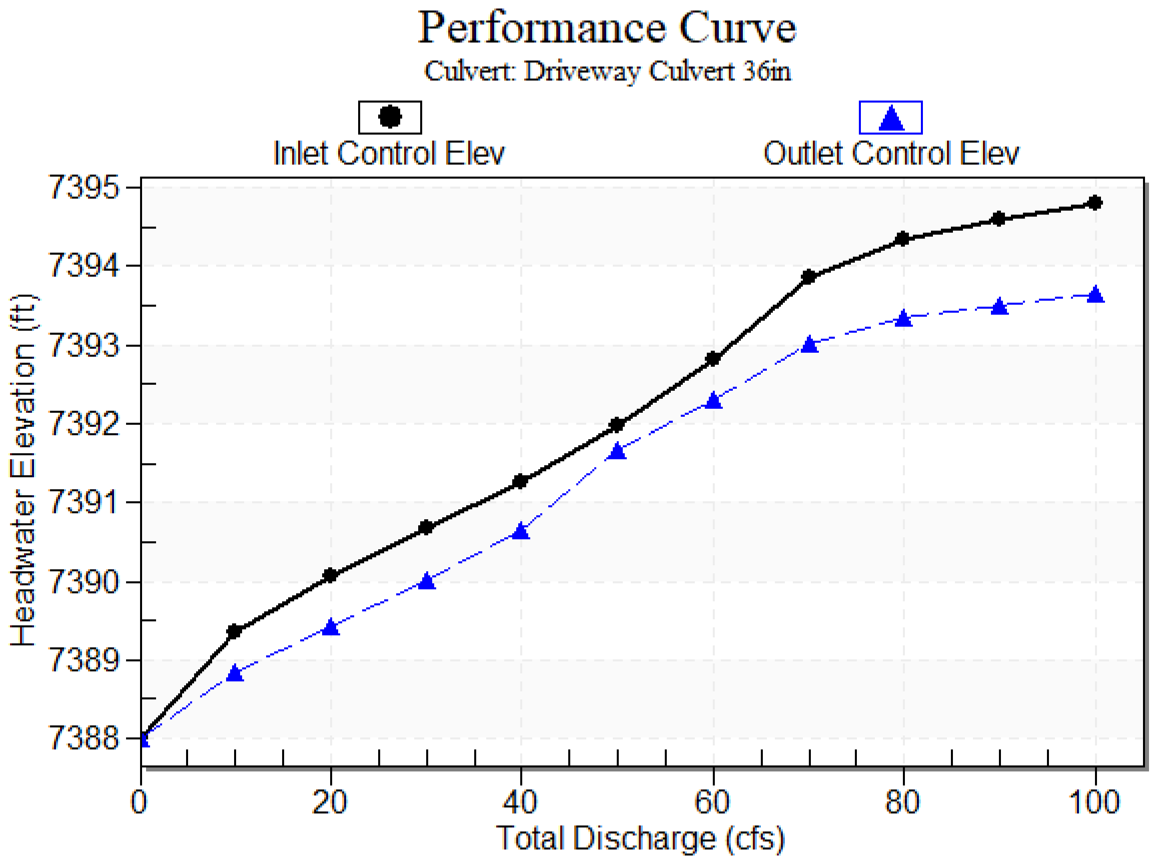
Straight Culvert

Inlet Elevation (invert): 7388.00 ft,   Outlet Elevation (invert): 7387.80 ft

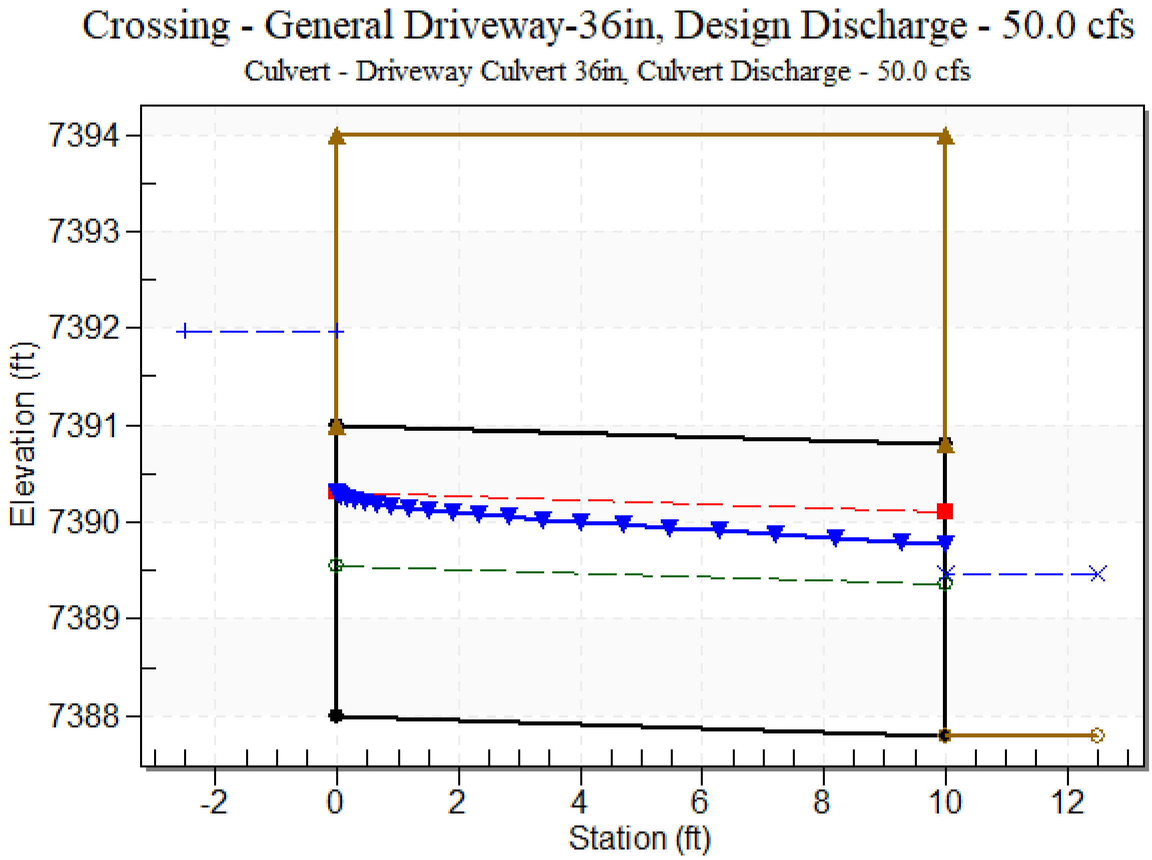
Culvert Length: 10.00 ft,   Culvert Slope: 0.0200

****

Culvert Performance Curve Plot: Driveway Culvert 36in



Water Surface Profile Plot for Culvert: Driveway Culvert 36in



Site Data - Driveway Culvert 36in

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7388.00 ft

Outlet Station: 10.00 ft

Outlet Elevation: 7387.80 ft

Number of Barrels: 1

Culvert Data Summary - Driveway Culvert 36in

Barrel Shape: Circular

Barrel Diameter: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 39 - Downstream Channel Rating Curve (Crossing: General Driveway-36in)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	7387.80	0.00	0.00	0.00	0.00
10.00	7388.71	0.91	3.04	1.13	0.80
20.00	7388.98	1.18	3.61	1.47	0.83
30.00	7389.17	1.37	4.00	1.71	0.85
40.00	7389.33	1.53	4.30	1.90	0.87
50.00	7389.46	1.66	4.54	2.07	0.88
60.00	7389.58	1.78	4.76	2.22	0.89
70.00	7389.68	1.88	4.94	2.35	0.90
80.00	7389.78	1.98	5.11	2.47	0.91
90.00	7389.87	2.07	5.26	2.58	0.91
100.00	7389.95	2.15	5.40	2.68	0.92

Tailwater Channel Data - General Driveway-36in

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0400

Channel Invert Elevation: 7387.80 ft

Roadway Data for Crossing: General Driveway-36in

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 ft

Crest Elevation: 7394.00 ft

Roadway Surface: Paved

Roadway Top Width: 10.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 70 cfs

Maximum Flow: 100 cfs

Table 40 - Summary of Culvert Flows at Crossing: General Driveway-42in

Headwater Elevation (ft)	Total Discharge (cfs)	Driveway Culvert 42in Discharge (cfs)	Roadway Discharge (cfs)	Iterations
7388.00	0.00	0.00	0.00	1
7389.29	10.00	10.00	0.00	1
7389.90	20.00	20.00	0.00	1
7390.45	30.00	30.00	0.00	1
7390.93	40.00	40.00	0.00	1
7391.39	50.00	50.00	0.00	1
7391.88	60.00	60.00	0.00	1
7392.42	70.00	70.00	0.00	1
7393.05	80.00	80.00	0.00	1
7393.76	90.00	90.00	0.00	1
7394.55	100.00	99.71	0.28	7
7394.50	99.18	99.18	0.00	Overtopping

Rating Curve Plot for Crossing: General Driveway-42in

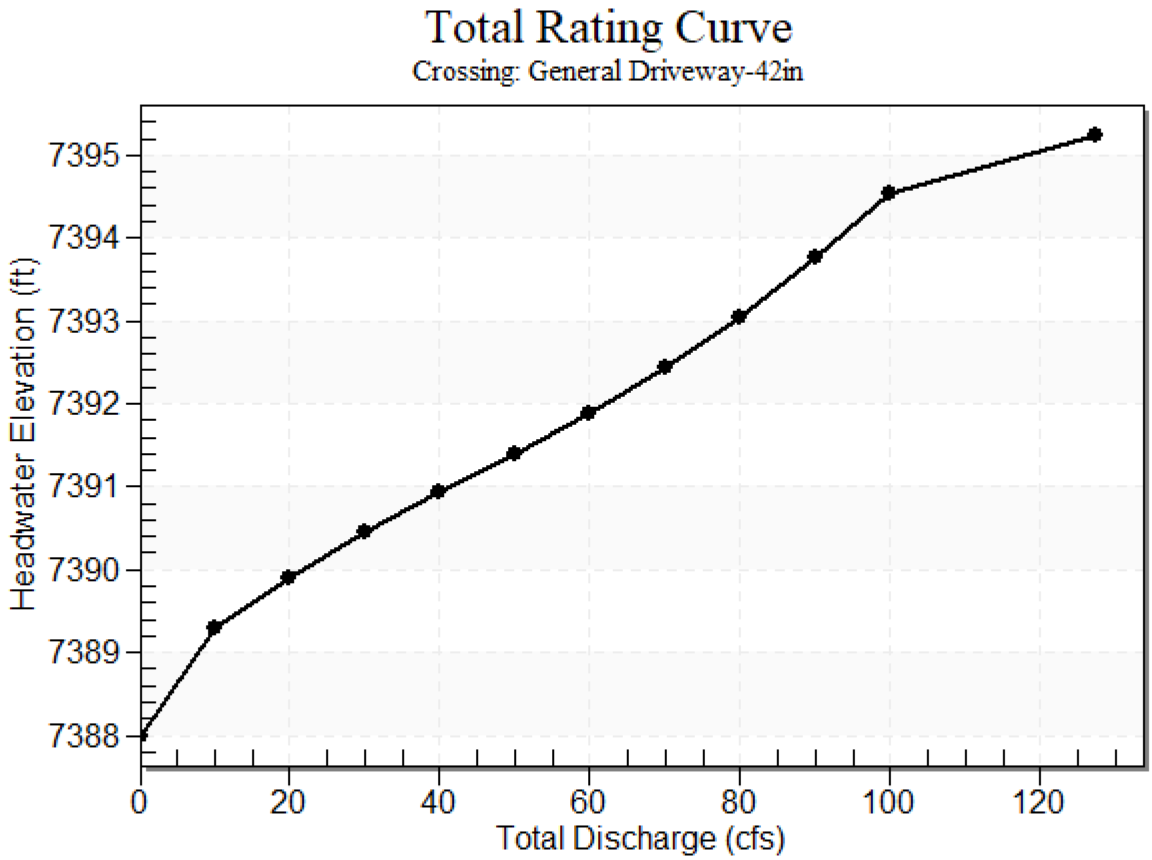


Table 41 - Culvert Summary Table: Driveway Culvert 42in

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)
0.00	0.00	7388.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
10.00	10.00	7389.29	1.292	0.783	1-S2n	0.628	0.957	0.754	0.907	6.564	3.039
20.00	20.00	7389.90	1.896	1.274	1-S2n	0.885	1.369	1.111	1.176	7.620	3.614
30.00	30.00	7390.45	2.448	1.727	1-S2n	1.089	1.692	1.397	1.369	8.370	4.000
40.00	40.00	7390.93	2.927	2.185	1-S2n	1.268	1.967	1.646	1.525	8.996	4.298
50.00	50.00	7391.39	3.390	2.663	1-S2n	1.431	2.210	1.870	1.658	9.561	4.544
60.00	60.00	7391.88	3.878	3.168	5-S2n	1.584	2.427	2.075	1.776	10.097	4.756
70.00	70.00	7392.42	4.424	3.703	5-S2n	1.731	2.622	2.265	1.882	10.628	4.943
80.00	80.00	7393.05	5.047	4.620	5-S2n	1.875	2.794	2.441	1.978	11.167	5.111
90.00	90.00	7393.76	5.761	5.139	5-S2n	2.017	2.943	2.603	2.067	11.729	5.264
100.00	99.71	7394.55	6.545	5.682	5-S2n	2.156	3.065	2.747	2.151	12.309	5.404

****

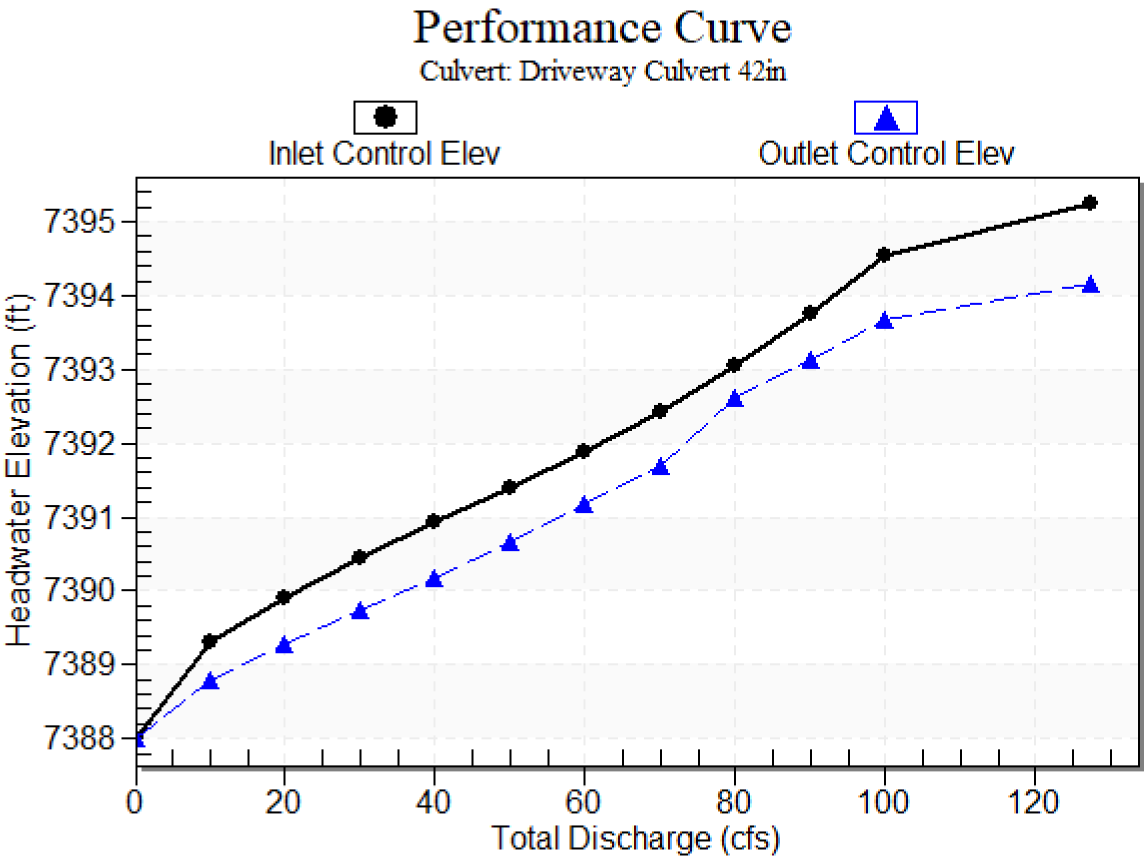
Straight Culvert

Inlet Elevation (invert): 7388.00 ft,   Outlet Elevation (invert): 7387.80 ft

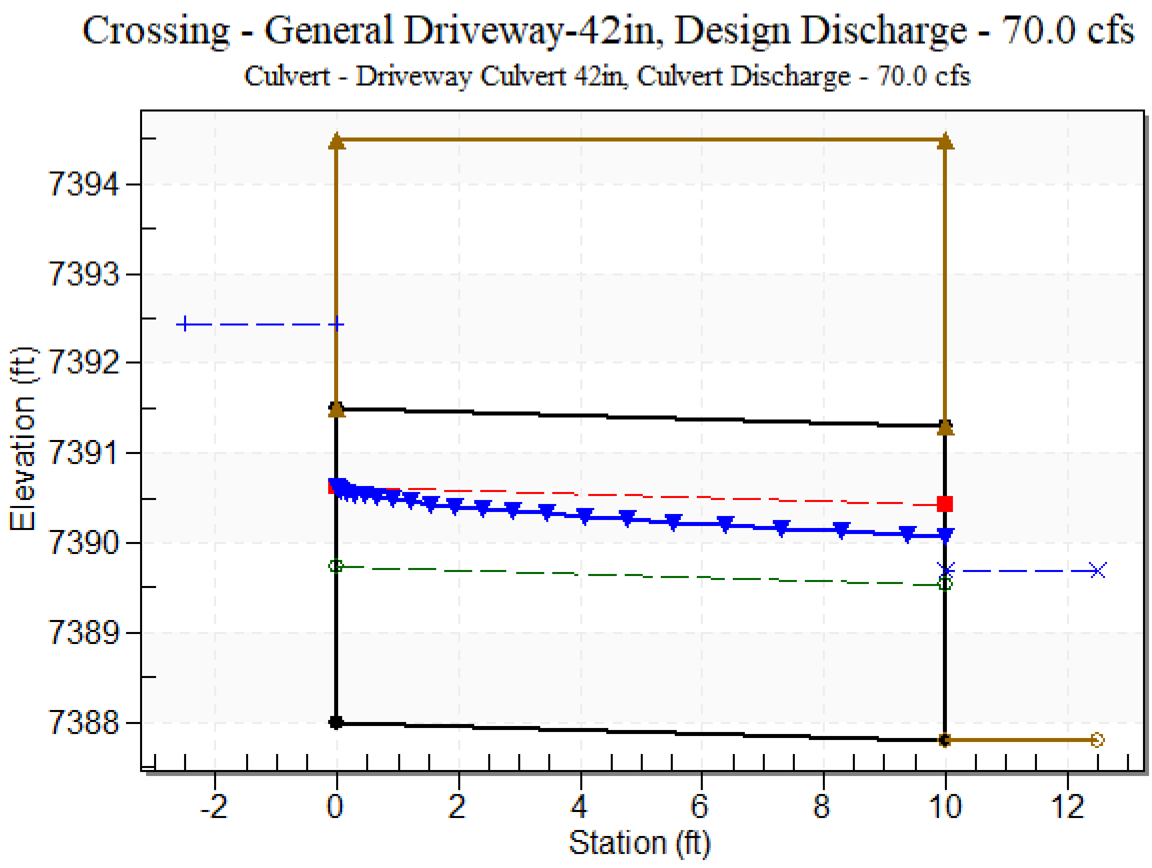
Culvert Length: 10.00 ft,   Culvert Slope: 0.0200

****

Culvert Performance Curve Plot: Driveway Culvert 42in



Water Surface Profile Plot for Culvert: Driveway Culvert 42in



Site Data - Driveway Culvert 42in

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 7388.00 ft

Outlet Station: 10.00 ft

Outlet Elevation: 7387.80 ft

Number of Barrels: 1

Culvert Data Summary - Driveway Culvert 42in

Barrel Shape: Circular

Barrel Diameter: 3.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: None

Table 42 - Downstream Channel Rating Curve (Crossing: General Driveway-42in)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	7387.80	0.00	0.00	0.00	0.00
10.00	7388.71	0.91	3.04	1.13	0.80
20.00	7388.98	1.18	3.61	1.47	0.83
30.00	7389.17	1.37	4.00	1.71	0.85
40.00	7389.33	1.53	4.30	1.90	0.87
50.00	7389.46	1.66	4.54	2.07	0.88
60.00	7389.58	1.78	4.76	2.22	0.89
70.00	7389.68	1.88	4.94	2.35	0.90
80.00	7389.78	1.98	5.11	2.47	0.91
90.00	7389.87	2.07	5.26	2.58	0.91
100.00	7389.95	2.15	5.40	2.68	0.92

Tailwater Channel Data - General Driveway-42in

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0400

Channel Invert Elevation: 7387.80 ft

Roadway Data for Crossing: General Driveway-42in

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 ft

Crest Elevation: 7394.50 ft

Roadway Surface: Paved

Roadway Top Width: 10.00 ft

CHANNEL FLOWS SUMMARY				
Reach/Channel ID	Contributing Basins	Tributary Area (ac)	Flows (cfs)	Headcutting
EX_Reach G1	G1+G2A	43.39	100.0	
EX_Reach H1-A	H1+H4	40.76	106.6	X
Prop_Reach H1-A	H1+H4	40.76	106.6	
EX_Reach H1-B	H1+29% of H4	21.59	54.3	X
Prop_Reach H1-B	H1+29% of H4	21.59	54.3	
EX_Reach H2	H2	16.00	57.1	
EX_Reach H3	H3A+H7B	18.77	57.8	X
Prop_Reach H3	H3A+H7B	18.77	57.8	X
Prop_Reach H3B	H3B+25% of I1	4.40	12.0	
EX_Reach H4	23% of H4	6.21	16.9	X
EX_Reach H5B	H5B	10.48	29.0	X
Prop_Reach I1	H3B+I1	9.50	25.7	
Prop_Swale A3A	A2B+A3A	17.20	46.1	
Prop_WQ Channel	A2B+A3A+G2B	20.00	55.7	

Worksheet for EX_Reach G1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.040 ft/ft
Discharge	100.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+25	7,367.99
0+87	7,360.00
1+16	7,357.46
1+30	7,357.78
1+45	7,358.60
1+97	7,363.04
2+20	7,365.99

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+25, 7,367.99)	(2+20, 7,365.99)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	11.4 in
Roughness Coefficient	0.040
Elevation	7,358.41 ft
Elevation Range	7,357.5 to 7,368.0 ft
Flow Area	20.1 ft²
Wetted Perimeter	36.5 ft
Hydraulic Radius	6.6 in
Top Width	36.48 ft
Normal Depth	11.4 in
Critical Depth	12.3 in
Critical Slope	0.028 ft/ft
Velocity	4.98 ft/s
Velocity Head	0.39 ft
Specific Energy	1.34 ft

Worksheet for EX_Reach G1

Results		
Froude Number	1.185	
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	11.4	in
Critical Depth	12.3	in
Channel Slope	0.040	ft/ft
Critical Slope	0.028	ft/ft

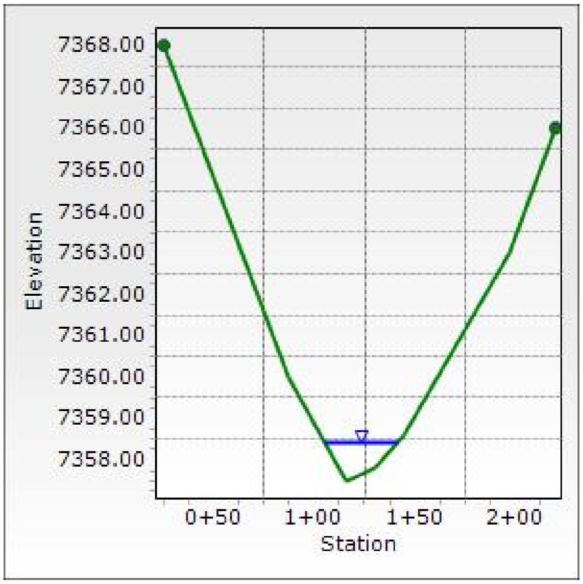
Cross Section for EX_Reach G1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.040 ft/ft
Normal Depth	11.4 in
Discharge	100.00 cfs



Worksheet for EX_Reach H1-A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.043 ft/ft
Discharge	106.60 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	7,363.31
1+08	7,331.99
1+16	7,331.15
1+24	7,331.66
2+75	7,360.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 7,363.31)	(2+75, 7,360.00)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	14.9 in
Roughness Coefficient	0.040
Elevation	7,332.39 ft
Elevation Range	7,331.2 to 7,363.3 ft
Flow Area	16.6 ft²
Wetted Perimeter	22.0 ft
Hydraulic Radius	9.1 in
Top Width	21.78 ft
Normal Depth	14.9 in
Critical Depth	16.8 in
Critical Slope	0.025 ft/ft
Velocity	6.40 ft/s
Velocity Head	0.64 ft
Specific Energy	1.88 ft
Froude Number	1.291
Flow Type	Supercritical

Worksheet for EX_Reach H1-A

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	14.9 in
Critical Depth	16.8 in
Channel Slope	0.043 ft/ft
Critical Slope	0.025 ft/ft

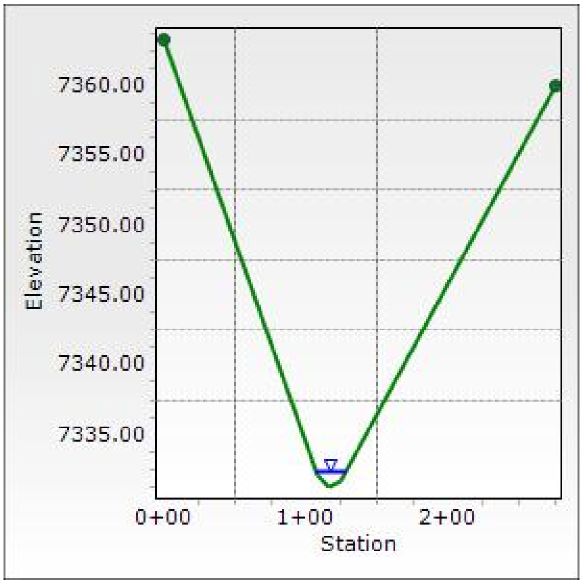
Cross Section for EX_Reach H1-A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.043 ft/ft
Normal Depth	14.9 in
Discharge	106.60 cfs



Worksheet for Prop_WQ Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.036
Channel Slope	0.031 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	6.00 ft
Discharge	55.70 cfs

Results

Normal Depth	11.8 in
Flow Area	9.8 ft²
Wetted Perimeter	14.1 ft
Hydraulic Radius	8.3 in
Top Width	13.86 ft
Critical Depth	13.0 in
Critical Slope	0.021 ft/ft
Velocity	5.71 ft/s
Velocity Head	0.51 ft
Specific Energy	1.49 ft
Froude Number	1.199
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.8 in
Critical Depth	13.0 in
Channel Slope	0.031 ft/ft
Critical Slope	0.021 ft/ft

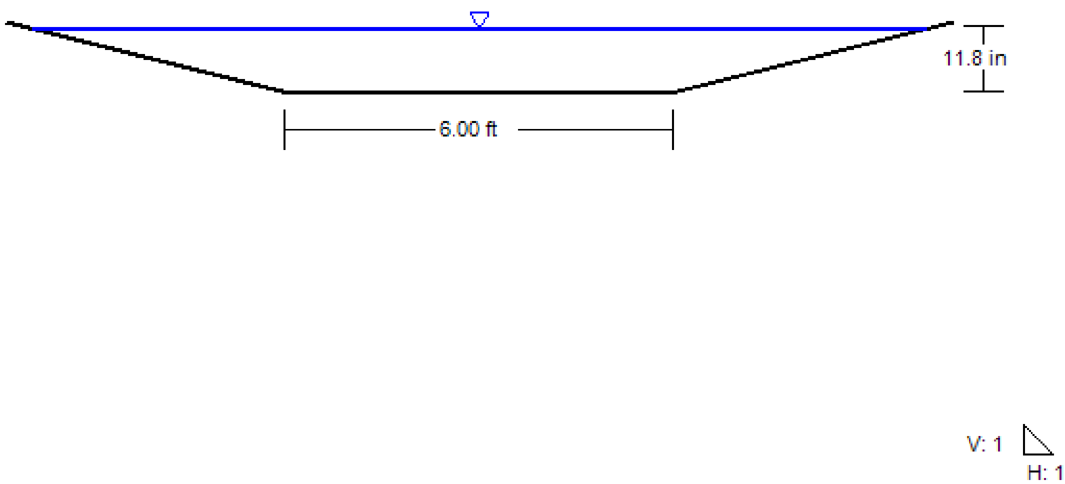
Cross Section for Prop_WQ Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.036
Channel Slope	0.031 ft/ft
Normal Depth	11.8 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	6.00 ft
Discharge	55.70 cfs



Worksheet for EX_Reach H3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.060 ft/ft
Discharge	57.80 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	7,323.16
0+25	7,319.99
0+51	7,312.54
0+58	7,310.46
0+70	7,309.11
0+79	7,310.18
0+94	7,316.14
1+12	7,319.73
1+76	7,326.41

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 7,323.16)	(1+76, 7,326.41)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	12.7 in
Roughness Coefficient	0.040
Elevation	7,310.17 ft
Elevation Range	7,309.1 to 7,326.4 ft
Flow Area	9.8 ft²
Wetted Perimeter	18.6 ft
Hydraulic Radius	6.3 in
Top Width	18.50 ft
Normal Depth	12.7 in
Critical Depth	14.6 in
Critical Slope	0.027 ft/ft
Velocity	5.92 ft/s

Worksheet for EX_Reach H3

Results

Velocity Head	0.54	ft
Specific Energy	1.60	ft
Froude Number	1.436	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

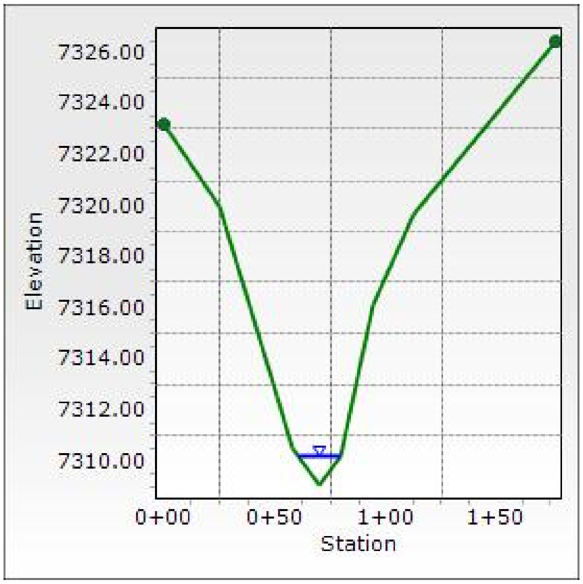
GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.7	in
Critical Depth	14.6	in
Channel Slope	0.060	ft/ft
Critical Slope	0.027	ft/ft

Cross Section for EX_Reach H3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.060 ft/ft
Normal Depth	12.7 in
Discharge	57.80 cfs



Worksheet for Prop_Reach I1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.080 ft/ft
Discharge	25.70 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+75	7,330.96
0+85	7,328.37
1+01	7,333.54

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+75, 7,330.96)	(1+01, 7,333.54)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	12.6 in
Roughness Coefficient	0.040
Elevation	7,329.42 ft
Elevation Range	7,328.4 to 7,333.5 ft
Flow Area	3.9 ft²
Wetted Perimeter	7.7 ft
Hydraulic Radius	6.0 in
Top Width	7.37 ft
Normal Depth	12.6 in
Critical Depth	15.3 in
Critical Slope	0.029 ft/ft
Velocity	6.65 ft/s
Velocity Head	0.69 ft
Specific Energy	1.74 ft
Froude Number	1.620
Flow Type	Supercritical

GVF Input Data

Worksheet for Prop_Reach I1

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

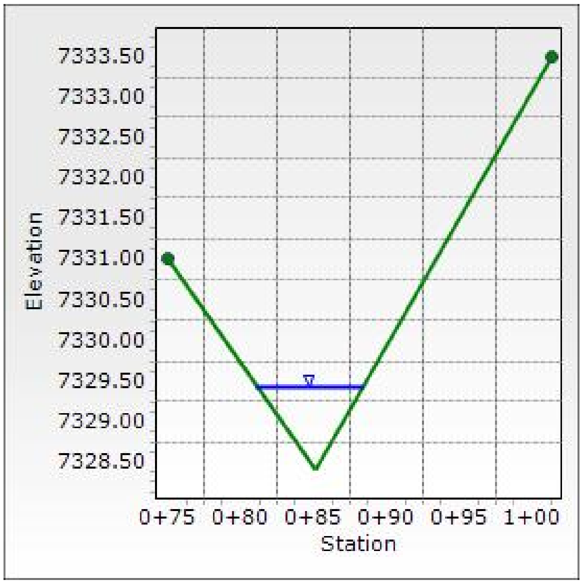
GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	12.6 in
Critical Depth	15.3 in
Channel Slope	0.080 ft/ft
Critical Slope	0.029 ft/ft

Cross Section for Prop_Reach I1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.080 ft/ft
Normal Depth	12.6 in
Discharge	25.70 cfs



Worksheet for Prop_Swale A3A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.042 ft/ft
Discharge	46.10 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+19	7,373.99
0+78	7,367.48
0+97	7,372.70

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+19, 7,373.99)	(0+97, 7,372.70)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	14.1 in
Roughness Coefficient	0.040
Elevation	7,368.66 ft
Elevation Range	7,367.5 to 7,374.0 ft
Flow Area	8.7 ft²
Wetted Perimeter	15.1 ft
Hydraulic Radius	6.9 in
Top Width	14.84 ft
Normal Depth	14.1 in
Critical Depth	15.2 in
Critical Slope	0.028 ft/ft
Velocity	5.29 ft/s
Velocity Head	0.43 ft
Specific Energy	1.61 ft
Froude Number	1.216
Flow Type	Supercritical

GVF Input Data

Worksheet for Prop_Swale A3A

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

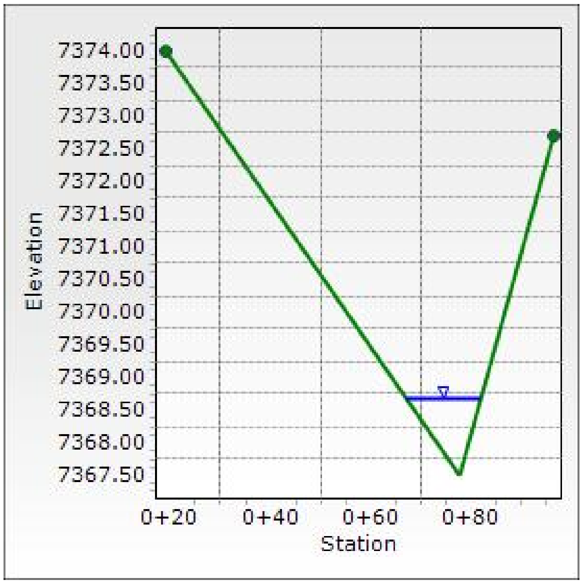
GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	14.1 in
Critical Depth	15.2 in
Channel Slope	0.042 ft/ft
Critical Slope	0.028 ft/ft

Cross Section for Prop_Swale A3A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.042 ft/ft
Normal Depth	14.1 in
Discharge	46.10 cfs



Worksheet for EX_Reach H1-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.050 ft/ft
Discharge	54.30 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+04	7,369.03
0+55	7,359.99
0+73	7,349.57
0+84	7,346.68
1+01	7,351.01
1+17	7,359.46
1+59	7,364.84

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+04, 7,369.03)	(1+59, 7,364.84)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	17.4 in
Roughness Coefficient	0.040
Elevation	7,348.13 ft
Elevation Range	7,346.7 to 7,369.0 ft
Flow Area	8.3 ft²
Wetted Perimeter	11.7 ft
Hydraulic Radius	8.4 in
Top Width	11.38 ft
Normal Depth	17.4 in
Critical Depth	19.7 in
Critical Slope	0.026 ft/ft
Velocity	6.57 ft/s
Velocity Head	0.67 ft
Specific Energy	2.12 ft

Worksheet for EX_Reach H1-B

Results	
Froude Number	1.359
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	17.4 in
Critical Depth	19.7 in
Channel Slope	0.050 ft/ft
Critical Slope	0.026 ft/ft

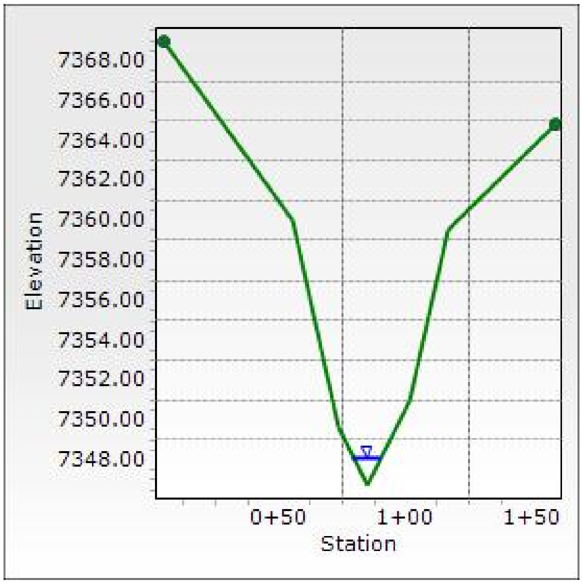
Cross Section for EX_Reach H1-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.050 ft/ft
Normal Depth	17.4 in
Discharge	54.30 cfs



Worksheet for EX_Reach H2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.038 ft/ft
Discharge	57.10 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	7,329.99
0+43	7,321.99
0+68	7,319.99
0+93	7,316.97
0+99	7,316.75
1+14	7,317.99
1+79	7,329.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 7,329.99)	(1+79, 7,329.38)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	11.0 in
Roughness Coefficient	0.040
Elevation	7,317.67 ft
Elevation Range	7,316.8 to 7,330.0 ft
Flow Area	12.1 ft²
Wetted Perimeter	23.2 ft
Hydraulic Radius	6.3 in
Top Width	23.07 ft
Normal Depth	11.0 in
Critical Depth	11.7 in
Critical Slope	0.028 ft/ft
Velocity	4.71 ft/s
Velocity Head	0.34 ft
Specific Energy	1.26 ft

Worksheet for EX_Reach H2

Results	
Froude Number	1.144
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	11.0 in
Critical Depth	11.7 in
Channel Slope	0.038 ft/ft
Critical Slope	0.028 ft/ft

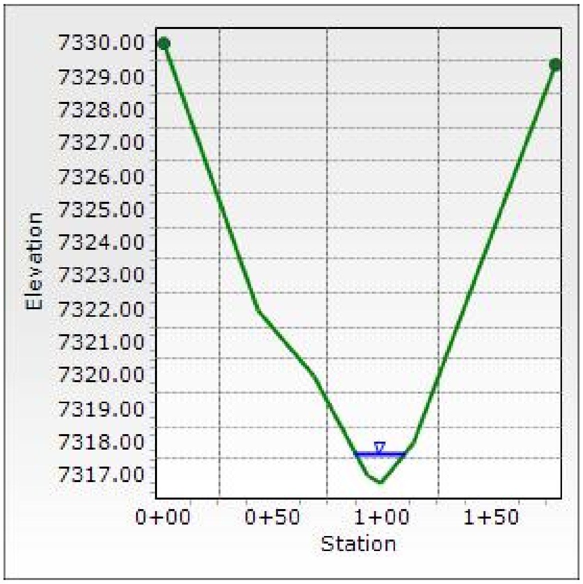
Cross Section for EX_Reach H2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.038 ft/ft
Normal Depth	11.0 in
Discharge	57.10 cfs



Worksheet for EX_Reach H5B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.050 ft/ft
Discharge	29.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	7,342.00
0+35	7,337.99
0+42	7,335.99
0+58	7,327.33
0+64	7,325.99
0+74	7,323.97
0+90	7,325.33
1+02	7,329.70
1+16	7,337.99
1+34	7,341.97

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 7,342.00)	(1+34, 7,341.97)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	10.3 in
Roughness Coefficient	0.040
Elevation	7,324.83 ft
Elevation Range	7,324.0 to 7,342.0 ft
Flow Area	6.2 ft²
Wetted Perimeter	14.4 ft
Hydraulic Radius	5.1 in
Top Width	14.29 ft
Normal Depth	10.3 in
Critical Depth	11.4 in
Critical Slope	0.030 ft/ft

Worksheet for EX_Reach H5B

Results	
Velocity	4.71 ft/s
Velocity Head	0.34 ft
Specific Energy	1.21 ft
Froude Number	1.265
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	10.3 in
Critical Depth	11.4 in
Channel Slope	0.050 ft/ft
Critical Slope	0.030 ft/ft

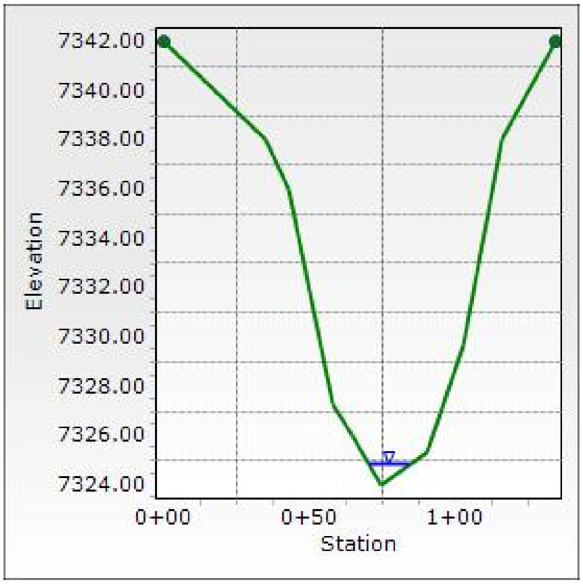
Cross Section for EX_Reach H5B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.050 ft/ft
Normal Depth	10.3 in
Discharge	29.00 cfs



Worksheet for EX_Reach H4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.068 ft/ft
Discharge	16.91 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+36	7,357.99
0+66	7,353.99
0+82	7,343.34
0+86	7,341.99
0+92	7,340.90
1+01	7,342.10
1+05	7,344.37
1+16	7,355.99
1+20	7,357.99

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+36, 7,357.99)	(1+20, 7,357.99)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	8.8 in
Roughness Coefficient	0.040
Elevation	7,341.64 ft
Elevation Range	7,340.9 to 7,358.0 ft
Flow Area	3.4 ft²
Wetted Perimeter	9.4 ft
Hydraulic Radius	4.4 in
Top Width	9.29 ft
Normal Depth	8.8 in
Critical Depth	10.2 in
Critical Slope	0.032 ft/ft
Velocity	4.94 ft/s

Worksheet for EX_Reach H4

Results	
Velocity Head	0.38 ft
Specific Energy	1.12 ft
Froude Number	1.434
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.8 in
Critical Depth	10.2 in
Channel Slope	0.068 ft/ft
Critical Slope	0.032 ft/ft

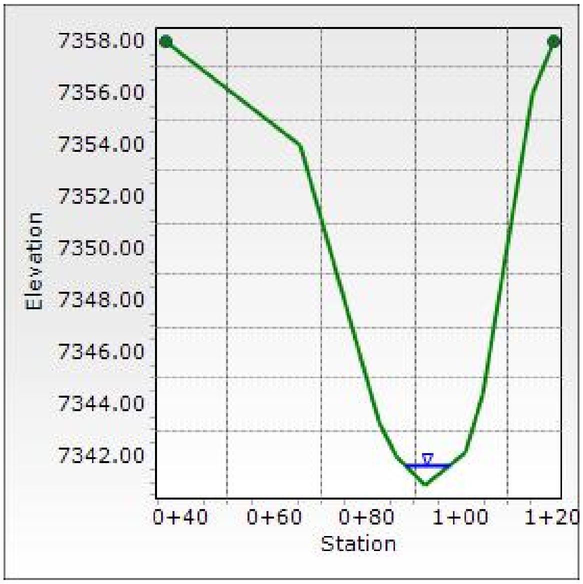
Cross Section for EX_Reach H4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.068 ft/ft
Normal Depth	8.8 in
Discharge	16.91 cfs



Worksheet for PROP_Reach H3B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Channel Slope	0.042	ft/ft
Discharge	12.00	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+60	7,374.12
0+66	7,372.11
0+76	7,374.63

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+60, 7,374.12)	(0+76, 7,374.63)	0.040

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	10.7	in
Roughness Coefficient	0.040	
Elevation	7,373.00	ft
Elevation Range	7,372.1 to 7,374.6 ft	
Flow Area	2.8	ft²
Wetted Perimeter	6.5	ft
Hydraulic Radius	5.1	in
Top Width	6.24	ft
Normal Depth	10.7	in
Critical Depth	11.3	in
Critical Slope	0.032	ft/ft
Velocity	4.32	ft/s
Velocity Head	0.29	ft
Specific Energy	1.18	ft
Froude Number	1.142	
Flow Type	Supercritical	

GVF Input Data

Worksheet for PROP_Reach H3B

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	10.7 in
Critical Depth	11.3 in
Channel Slope	0.042 ft/ft
Critical Slope	0.032 ft/ft

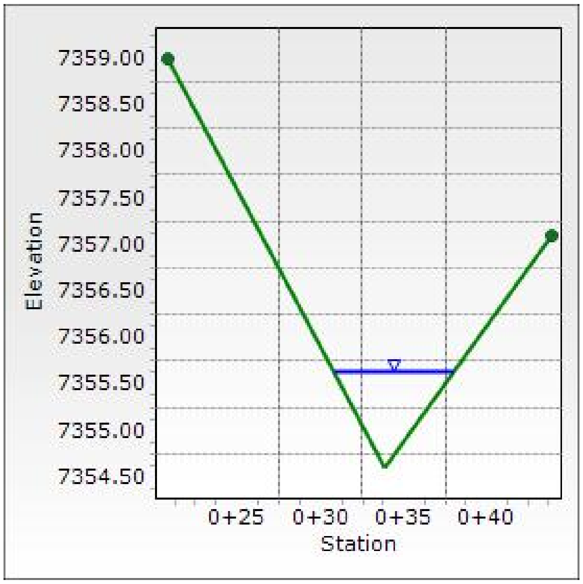
Cross Section for PROP_Reach H3B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.042 ft/ft
Normal Depth	12.2 in
Discharge	17.20 cfs



Worksheet for Prop_Reach H1-A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.013 ft/ft
Discharge	106.60 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	7,363.31
1+08	7,331.99
1+16	7,331.15
1+24	7,331.66
2+75	7,360.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 7,363.31)	(2+75, 7,360.00)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	19.3 in
Roughness Coefficient	0.040
Elevation	7,332.76 ft
Elevation Range	7,331.2 to 7,363.3 ft
Flow Area	25.2 ft²
Wetted Perimeter	25.3 ft
Hydraulic Radius	12.0 in
Top Width	24.99 ft
Normal Depth	19.3 in
Critical Depth	16.8 in
Critical Slope	0.025 ft/ft
Velocity	4.23 ft/s
Velocity Head	0.28 ft
Specific Energy	1.89 ft
Froude Number	0.743
Flow Type	Subcritical

Worksheet for Prop_Reach H1-A

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

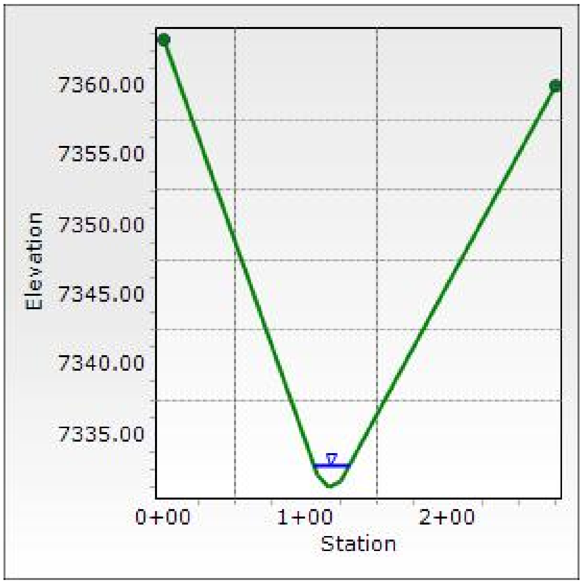
GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	19.3 in
Critical Depth	16.8 in
Channel Slope	0.013 ft/ft
Critical Slope	0.025 ft/ft

Cross Section for Prop_Reach H1-A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.013 ft/ft
Normal Depth	19.3 in
Discharge	106.60 cfs



Worksheet for Prop_Reach H3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	0.032 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	12.00 ft
Discharge	57.80 cfs

Results

Normal Depth	9.3 in
Flow Area	11.7 ft²
Wetted Perimeter	18.4 ft
Hydraulic Radius	7.7 in
Top Width	18.22 ft
Critical Depth	9.8 in
Critical Slope	0.027 ft/ft
Velocity	4.92 ft/s
Velocity Head	0.38 ft
Specific Energy	1.15 ft
Froude Number	1.081
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

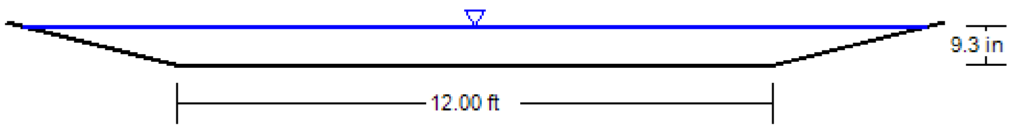
GVF Output Data

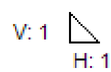
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.3 in
Critical Depth	9.8 in
Channel Slope	0.032 ft/ft
Critical Slope	0.027 ft/ft

Cross Section for Prop_Reach H3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.032 ft/ft
Normal Depth	9.3 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	12.00 ft
Discharge	57.80 cfs





Worksheet for Prop_Reach H1-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	0.025 ft/ft
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	12.00 ft
Discharge	54.30 cfs

Results

Normal Depth	9.6 in
Flow Area	12.2 ft²
Wetted Perimeter	18.6 ft
Hydraulic Radius	7.9 in
Top Width	18.43 ft
Critical Depth	9.4 in
Critical Slope	0.027 ft/ft
Velocity	4.44 ft/s
Velocity Head	0.31 ft
Specific Energy	1.11 ft
Froude Number	0.960
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

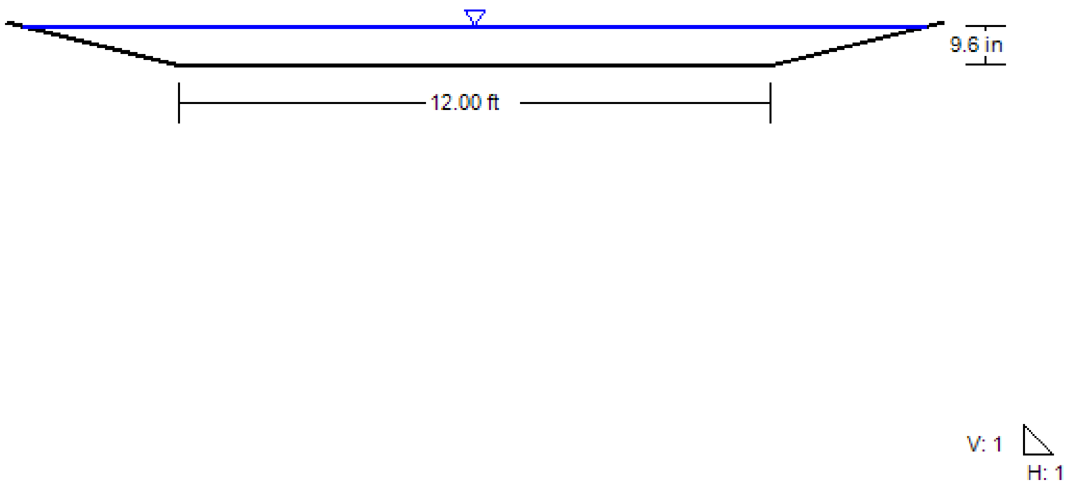
GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	9.6 in
Critical Depth	9.4 in
Channel Slope	0.025 ft/ft
Critical Slope	0.027 ft/ft

Cross Section for Prop_Reach H1-B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.025 ft/ft
Normal Depth	9.6 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	12.00 ft
Discharge	54.30 cfs



Temporary Sediment Basin Calculations

	MHFD SC-7 Fact Sheet					
Temporary Sediment Basin ID	Basin Storage Volume (cf/acre)	Additional Storage Voume (cf/acre)	Tributary Area (ac)	TSB Volume (cf)	TSB Volume (ac-ft)	Proposed Pond Volume @ TSB Location (ac-ft)
WQ1	3600	500	21.4	87740	2.01	0.39
1	3600	500	27.0	110700	2.54	3.22
2	3600	500	16.0	65600	1.51	3.22
4	3600	500	25.9	106190	2.44	4.76
H5B	3600	500	10.3	42230	0.97	N/A

Revise. Required volume should not be less than the provided volume or N/A

You may want to create another table or footnote identifying H5B is a permanent sediment basin

Design Data and Test Results

Excel PP5-12™

Specifications

A variety of test methods are utilized to determine performance and conformance values for Rolled Erosion Control Products (RECPs). Information within this document is presented to provide conformance values and recommended design values. Test results obtained for the Excel PP5-12 Turf Reinforcement Mat (TRM) and general design values are presented in Tables 1-4. For specific information detailing testing protocols, results and application of design values, refer to document number WE_EXCEL_PERF_GEN.

Table 1 - Bench Scale Testing / NTPEP

Test Method	Condition	Result
ASTM D7101 Bench Scale Rainfall and Rainsplash Test	2 in per hour	14.53
	4 in per hour	5.59
	6 in per hour	4.82
ASTM D7207 Bench Scale Shear Resistance Test	3.0 psf (145 PA)	0.5 in (12 mm)
ASTM D7322 Bench Scale Vegetation Establishment Test	Top Soil, Fescue, 21 Day Incubation	661 %
NTPEP Report Number	ECP-2016-03-008	

Table 3 - Recommended Design Values*

Design Value	Unvegetated	Vegetated
Typical RUSLE Cover Factor (C Factor)**	0.03	N/A
Maximum Slope Gradient (RUSLE)	1H : 1V	N/A
Max Allowable Velocity (0.5 in (12mm) soil loss)***	9.0 ft/s (2.7 m/s)	15.0 ft/s (4.6 m/s)
Max Allowable Shear Stress (0.5 in (12mm) soil loss)***	2.8 psf (134 PA)	12.0 psf (575 PA)
CF_{veg}/CF_{TRM}	N/A	0.26

C Factor value compliant with ASTM D6459. * Shear Stress and Velocity values compliant with ASTM D6460.

Table 2 - Texas Transportation Institute (TTI) Results

Class	Test Condition	Result
A	< 3H:1 Clay Slope Test	N/A
B	< 3H:1 Sand Slope Test	N/A
C	> 3H:1 Clay Slope Test	N/A
D	> 3H:1 Sand Slope Test	N/A
E	2 psf Partially Vegetated Channel Test	Approved
F	4 psf Partially Vegetated Channel Test	Approved
G	6 psf Partially Vegetated Channel Test	Approved
H	8 psf Partially Vegetated Channel Test	Approved

Table 4 - HEC-15 Resistance to Flow Values

Design Value	Unvegetated
Manning's n @ Tau$_{lower}$ (0.7 psf (34 PA))	0.027
Manning's n @ Tau$_{mid}$ (1.4 psf (67 PA))	0.027
Manning's n @ Tau$_{upper}$ (2.8 psf (134 PA))	0.027

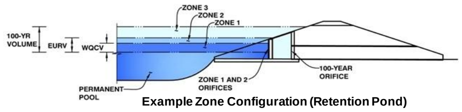
*Recommended Design Values are based on results of standardized industry full-scale testing and may not be applicable for all field conditions. For most accurate computation of field performance, consult Excel Erosion Design (EED) at www.westernexcelsior.com.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Winsome Filing 3

Basin ID: H5B



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB			
Watershed Area =	10.48	acres		
Watershed Length =	792	ft		
Watershed Length to Centroid =	396	ft		
Watershed Slope =	0.060	ft/ft		
Watershed Imperviousness =	5.70%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	0.0%	percent		
Percentage Hydrologic Soil Groups C/D =	100.0%	percent		
Target WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			

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

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.036	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.048	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.178	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.381	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.573	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	0.840	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.050	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	1.344	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	1.882	acre-feet		inches
Approximate 2-yr Detention Volume =	0.037	acre-feet		
Approximate 5-yr Detention Volume =	0.116	acre-feet		
Approximate 10-yr Detention Volume =	0.170	acre-feet		
Approximate 25-yr Detention Volume =	0.202	acre-feet		
Approximate 50-yr Detention Volume =	0.204	acre-feet		
Approximate 100-yr Detention Volume =	0.300	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.036	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.012	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.252	acre-feet
Total Detention Basin Volume =	0.300	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	700	0.016		
7318	--	2.00	--	--	--	1,563	0.036	2,263	0.052
7320	--	4.00	--	--	--	2,371	0.054	6,197	0.142
7322	--	6.00	--	--	--	3,710	0.085	12,278	0.282
7324	--	8.00	--	--	--	5,477	0.126	21,465	0.493
7326	--	10.00	--	--	--	8,059	0.185	35,001	0.804
7327	--	11.00	--	--	--	9,549	0.219	43,805	1.006
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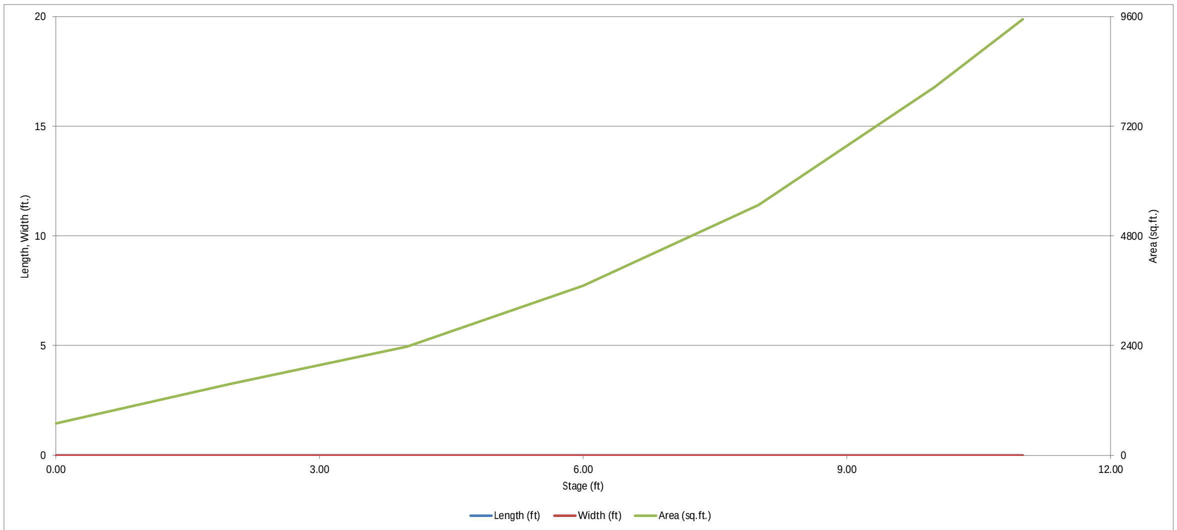
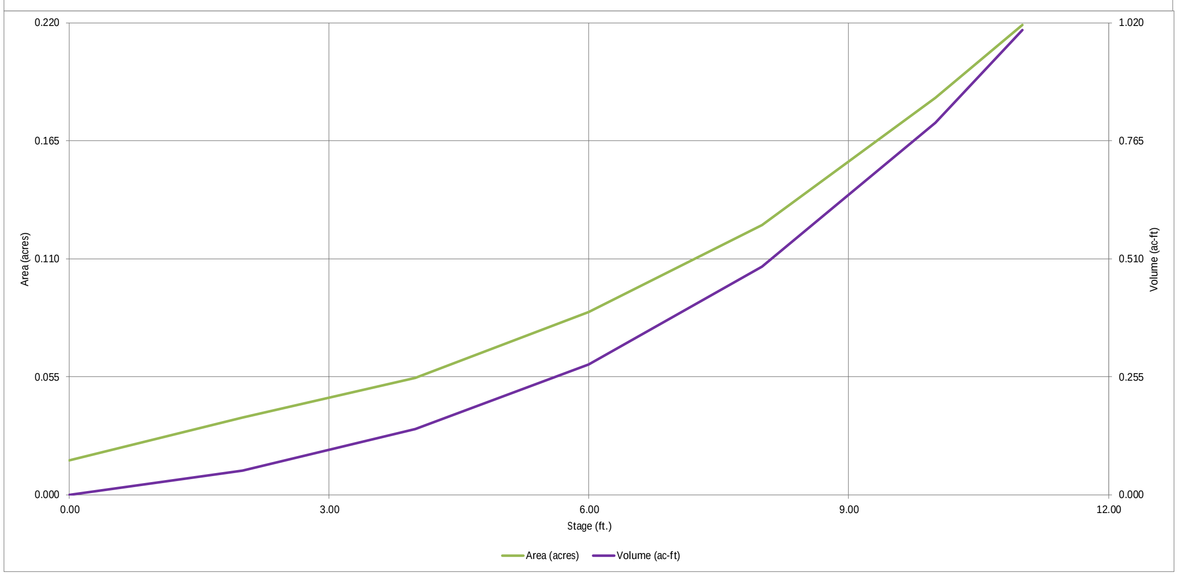
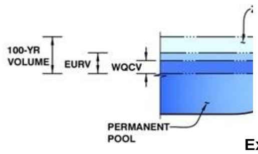
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)





- **Orifice Plate or Riser Pipe**: Follow the design criteria for Full Spectrum Detention outlets in the EDB Fact Sheet provided in Chapter 4 of this manual for sizing of outlet perforations with an emptying time of approximately 72 hours. In lieu of the trash rack, pack uniformly sized 1½ - to 2-inch gravel in front of the plate or surrounding the riser pipe. This gravel will need to be cleaned out frequently during the construction period as sediment accumulates within it. The gravel pack will need to be removed and disposed of following construction to reclaim the basin for use as a permanent detention facility. If the basin will be used as a permanent extended detention basin for the site, a trash rack will need to be installed once contributing drainage areas have been stabilized and the gravel pack and accumulated sediment have been removed.



Example Zone Configuration (Retention Pond)

Zone 3 (100-year)	6.21	0.252	Weir&Pipe (Restrict)
Total (all zones)		0.300	

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

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

Calculated Parameters for Underdrain

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

Calculated Parameters for Plate

Invert of Lowest Orifice =	0.00	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 =	1.52	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	8.80	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.51	1.01					
Orifice Area (sq. inches)	0.28	0.31	0.31					

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

User Input: Vertical Orifice (Circular or Rectangular)

Calculated Parameters for Vertical Orific

Explain this worksheet in the narrative. The outlet structure does not match & the volume does not match the GEC plans or Temp Sediment Basin Calculation in pg 279 of this report.

Also, the MHFD SC-7 fact sheet noted the riser pipe should be designed following the FSD with an emptying time of approximately 72 hrs. The drain time for this permanent pond seem too fast to allow sediment to settle.

		Not Selected	Not Selected
elative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A
elative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A
es			

/Trapezoidal Weir (and No Outlet Pipe)

Calculated Parameters for Overflow Wei

		Zone 3 Weir	Not Selected
elative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.60	N/A
	Overflow Weir Slope Length =	0.59	N/A
	Grate Open Area / 100-yr Orifice Area =	0.70	N/A
	Overflow Grate Open Area w/o Debris =	1.23	N/A
	Overflow Grate Open Area w/ Debris =	0.62	N/A

ar Orifice)

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plat

					Zone 3 Restrictor	Not Selected
			stance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.75	N/A
Restrictor Plate Height Above Pipe Invert =	18.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage=	9.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.46	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	10.46	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.20	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.89	acre-ft

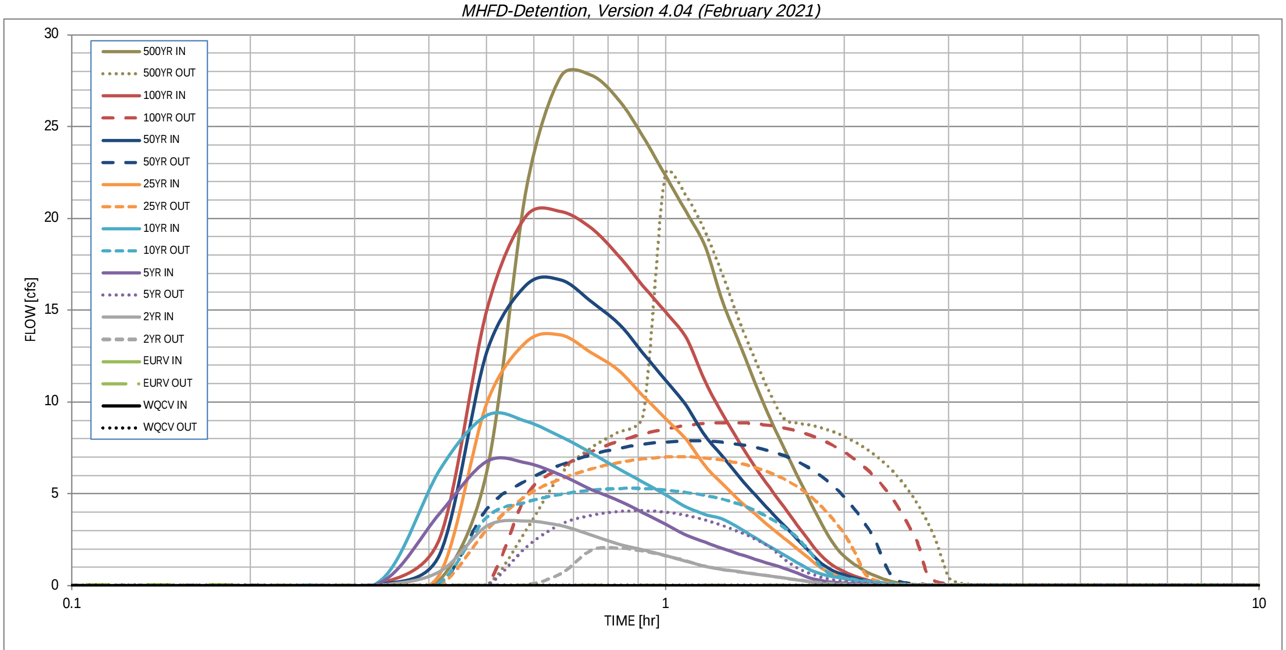
Routed Hydrograph Results

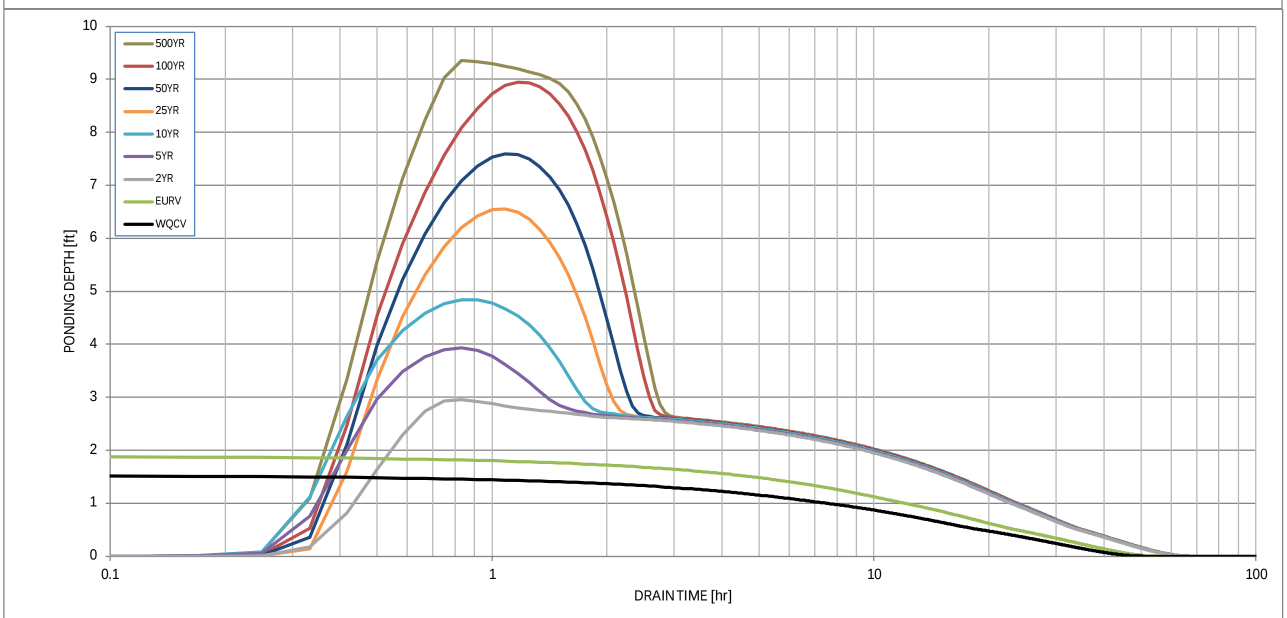
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

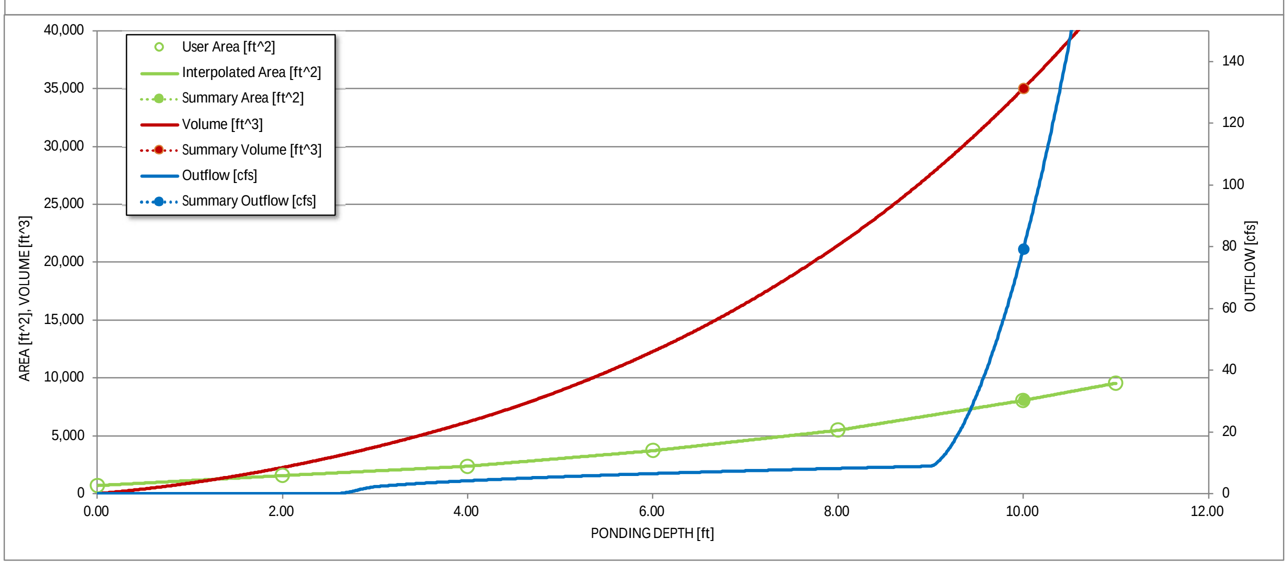
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.036	0.048	0.178	0.381	0.573	0.840	1.050	1.344
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.178	0.381	0.573	0.840	1.050	1.344
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	3.1	6.3	8.8	13.3	16.3	20.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.30	0.61	0.84	1.27	1.55	1.91
Peak Inflow Q (cfs) =	N/A	N/A	3.5	6.8	9.2	13.6	16.6	20.4
Peak Outflow Q (cfs) =	0.0	0.0	2.0	4.1	5.3	7.0	7.9	8.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.6	0.5	0.5	0.4
Structure Controlling Flow =	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	1.62	3.3	4.2	5.6	6.3	7.1
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	41	44	43	32	26	21	18	14
Time to Drain 99% of Inflow Volume (hours) =	45	49	53	47	42	37	33	30
Maximum Ponding Depth (ft) =	1.53	1.89	2.95	3.93	4.84	6.56	7.60	8.95
Area at Maximum Ponding Depth (acres) =	0.03	0.03	0.04	0.05	0.07	0.10	0.12	0.15
Maximum Volume Stored (acre-ft) =	0.036	0.048	0.090	0.138	0.193	0.332	0.443	0.624

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 OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:15:00	0.00	0.00	0.01	0.02	0.02	0.01	0.02	0.02	0.02
	0:20:00	0.00	0.00	0.04	0.22	0.34	0.03	0.08	0.13	0.32
	0:25:00	0.00	0.00	0.76	3.95	6.31	0.62	1.70	2.57	6.14
	0:30:00	0.00	0.00	3.22	6.76	9.25	9.89	12.67	14.93	21.56
	0:35:00	0.00	0.00	3.52	6.68	8.94	13.26	16.35	20.13	27.72
	0:40:00	0.00	0.00	3.26	6.03	8.11	13.64	16.64	20.36	27.80
	0:45:00	0.00	0.00	2.74	5.24	7.22	12.68	15.45	19.46	26.46
	0:50:00	0.00	0.00	2.27	4.64	6.37	11.72	14.29	17.97	24.48
	0:55:00	0.00	0.00	1.94	3.98	5.64	10.36	12.68	16.34	22.31
	1:00:00	0.00	0.00	1.63	3.35	4.95	9.10	11.19	14.90	20.36
	1:05:00	0.00	0.00	1.34	2.76	4.28	7.96	9.82	13.51	18.46
	1:10:00	0.00	0.00	1.05	2.36	3.88	6.51	8.15	11.12	15.45
	1:15:00	0.00	0.00	0.88	2.02	3.62	5.54	7.04	9.35	13.20
	1:20:00	0.00	0.00	0.75	1.72	3.13	4.64	5.90	7.79	11.02
	1:25:00	0.00	0.00	0.64	1.45	2.60	3.89	4.93	6.46	9.12
	1:30:00	0.00	0.00	0.52	1.19	2.12	3.20	4.06	5.31	7.49
	1:35:00	0.00	0.00	0.41	0.95	1.68	2.59	3.28	4.27	6.01
	1:40:00	0.00	0.00	0.30	0.68	1.27	2.00	2.54	3.29	4.64
	1:45:00	0.00	0.00	0.20	0.43	0.88	1.45	1.84	2.39	3.36
	1:50:00	0.00	0.00	0.10	0.26	0.64	0.93	1.20	1.60	2.29
	1:55:00	0.00	0.00	0.06	0.18	0.49	0.61	0.82	1.08	1.60
	2:00:00	0.00	0.00	0.04	0.13	0.39	0.43	0.58	0.77	1.17
	2:05:00	0.00	0.00	0.03	0.10	0.30	0.29	0.41	0.52	0.81
	2:10:00	0.00	0.00	0.02	0.07	0.22	0.19	0.28	0.34	0.55
	2:15:00	0.00	0.00	0.02	0.05	0.16	0.13	0.19	0.21	0.36
	2:20:00	0.00	0.00	0.01	0.04	0.12	0.08	0.12	0.12	0.21
	2:25:00	0.00	0.00	0.01	0.02	0.08	0.05	0.08	0.06	0.12
	2:30:00	0.00	0.00	0.01	0.02	0.05	0.03	0.05	0.04	0.08
	2:35:00	0.00	0.00	0.01	0.01	0.03	0.02	0.03	0.03	0.05
	2:40:00	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.04
	2:45:00	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.02	0.03
	2:50:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02
	2:55:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ^{2}]	Area [acres]	Volume [ft ^{3}]	Volume [ac-ft]	Total Outflow [cfs]
	10.00	8,059	0.185	35,001	0.804	79.19

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

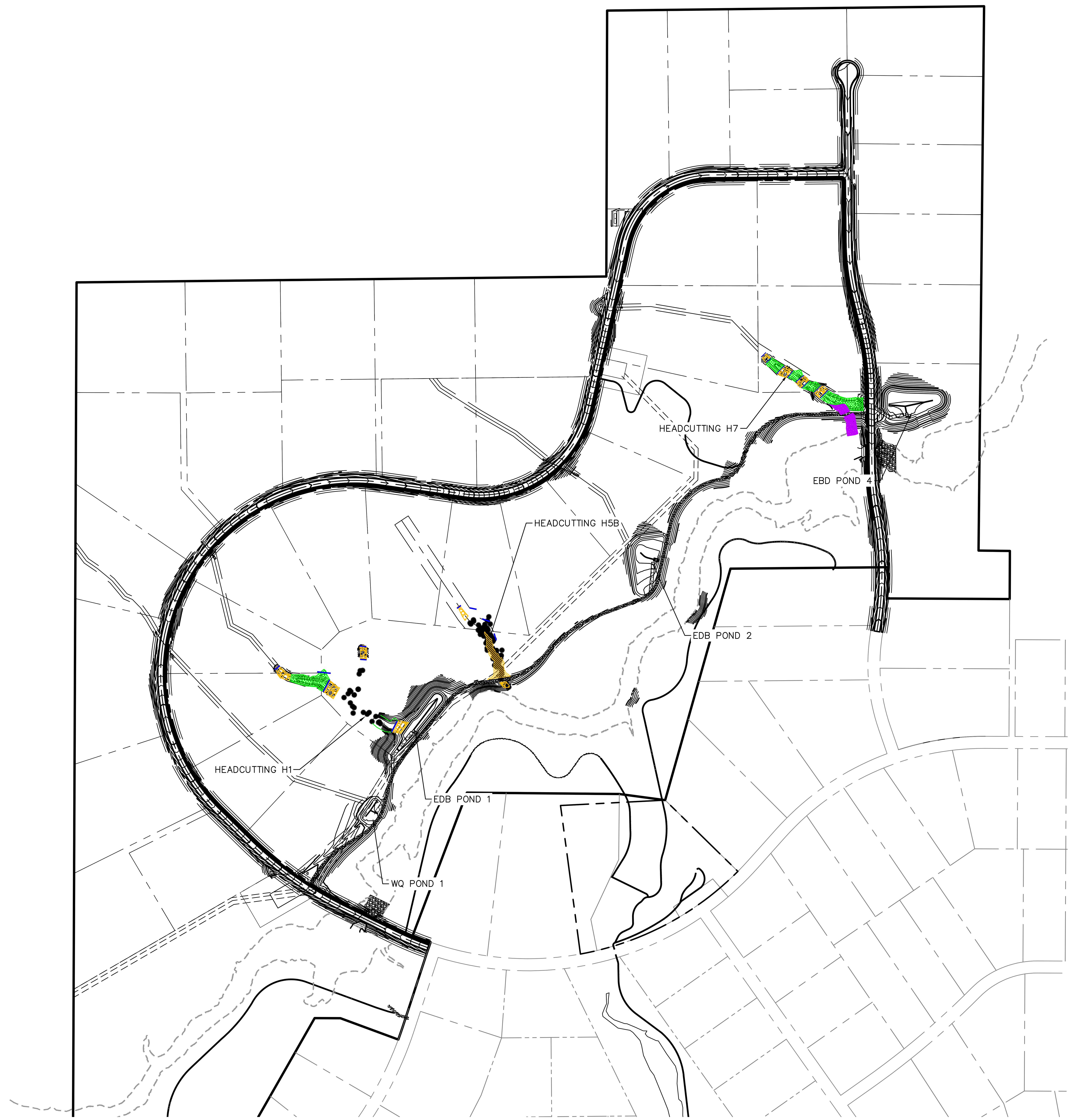
Rock Sill Calculations

Equations Used:

$$d_{50} \geq \left[\frac{VS^{0.17}}{4.5(G_s - 1)^{0.66}} \right]^2$$

Eqn 8-11 USDCM Vol. 1 Section 8.1.1

Rock Sill ID	V (fps)	S (ft/ft)	Min d50 (ft)	Min d50 (in)	d50 Used (in)	Width (ft)	Length (ft)
1	Match Rock Chute Design						
2	3.22	0.07	0.12	2.91	9.00	2.00	70.00
3	Match Rock Chute Design						
4	Match Rock Chute Design						
5	Match Rock Chute Design						
6	Match Rock Chute Design						
7	5	0.1	0.33	5.95	9.00	2.00	36.00
8	5	0.1	0.33	5.95	9.00	2.00	40.00
9	5	0.1	0.33	5.95	9.00	2.00	35.00
10	Match Rock Chute Design						
11	Match Rock Chute Design						
12	Match Rock Chute Design						
13	Match Rock Chute Design						



LEGEND

- TURF REENFORCEMENT MATTING (TRM) OR ROCK RIPRAP PROTECTED CHANNEL 10%–16% SLOPES
- RIPRAP GRADE CONTROL STRUCTURE 2'–4' DROP AT 4:1
- REGRADE AREA TO VEGETATED SWALE VEGETATION W/ COIR MATTING (BIODEGRADABLE) ~2.0% SLOPES
- ROCK CHUTE 4:1 MAX SLOPES
- ROCK SILL
- CHANNEL PLUG/ BACKFILL ABANDONED CHANNEL

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

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
© 2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

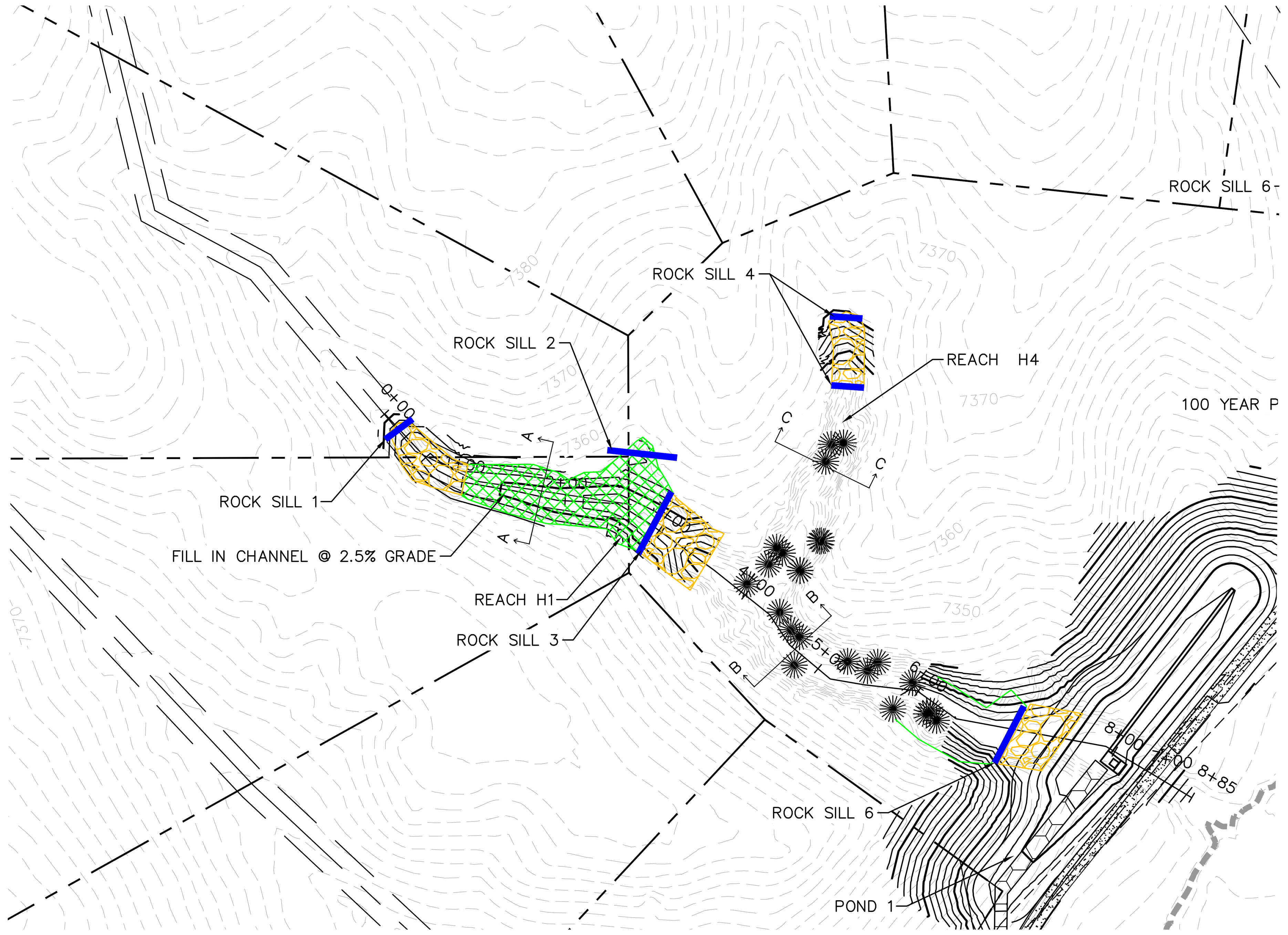
WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

HEADCUTTING EXHIBIT OVERALL

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

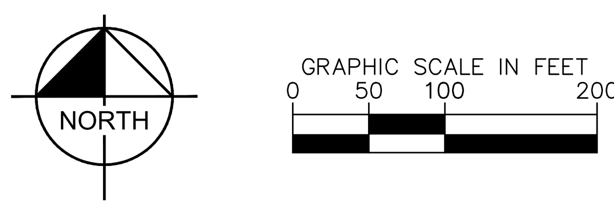
SHEET
1.18

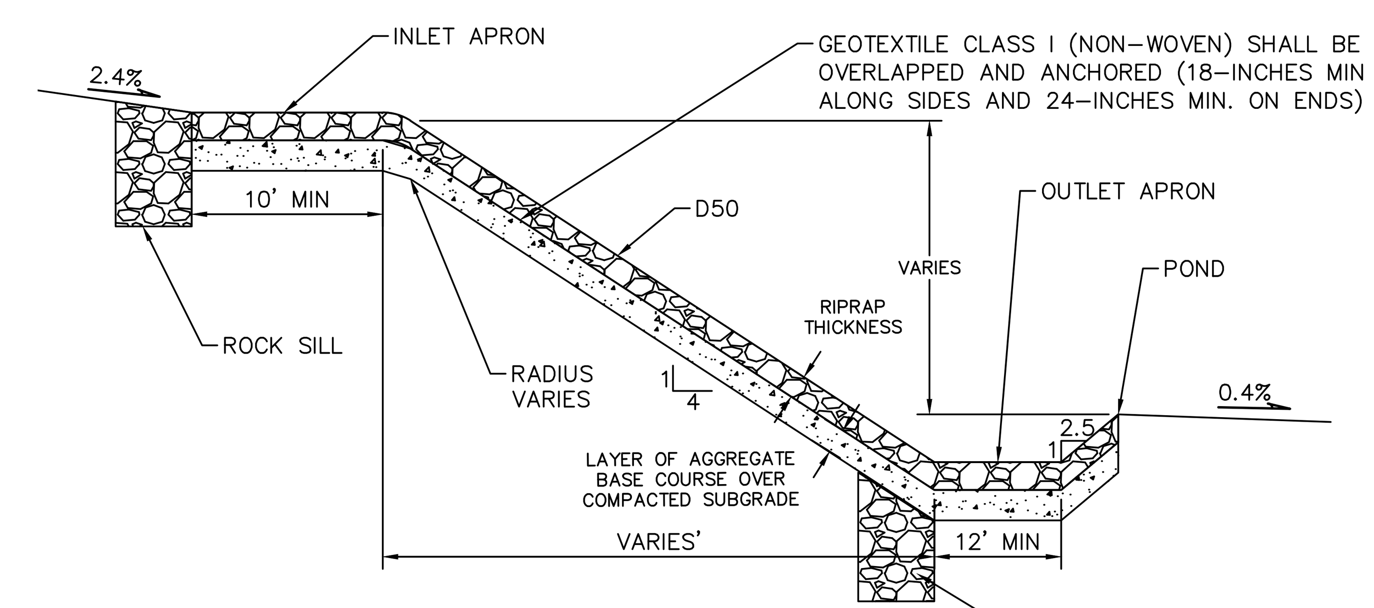


H1 HEADCUTTING MAIN CHANNEL

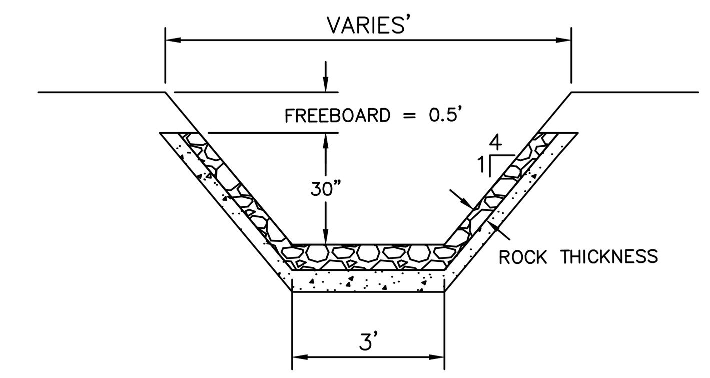
LEGEND

- REGRADE AREA TO VEGETATED SWALE VEGETATION W/ COIR MATTING (BIODEGRADABLE) ~2.0% SLOPES
- ROCK CHUTE 4:1 MAX SLOPES
- ROCK SILL

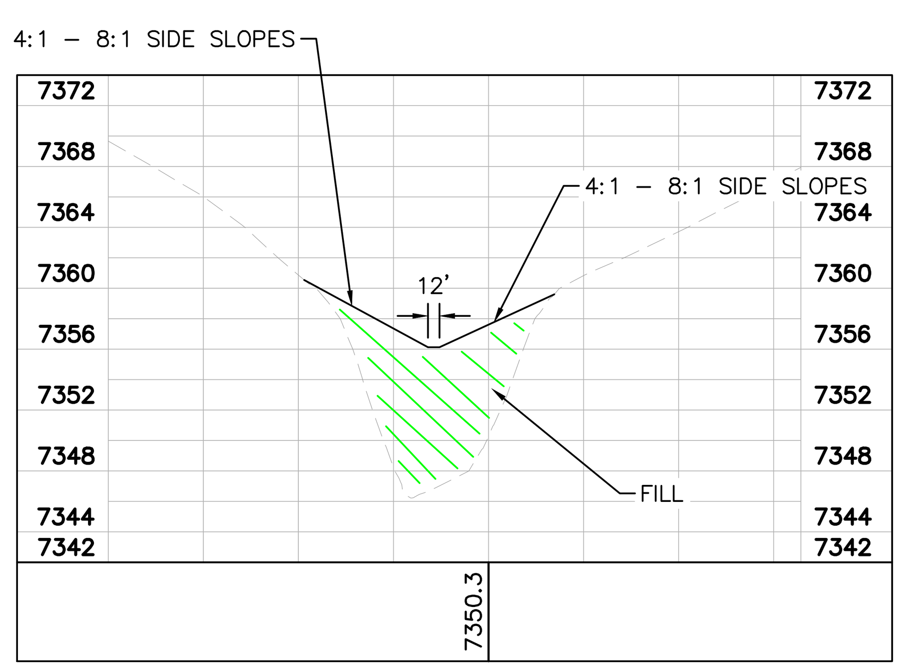




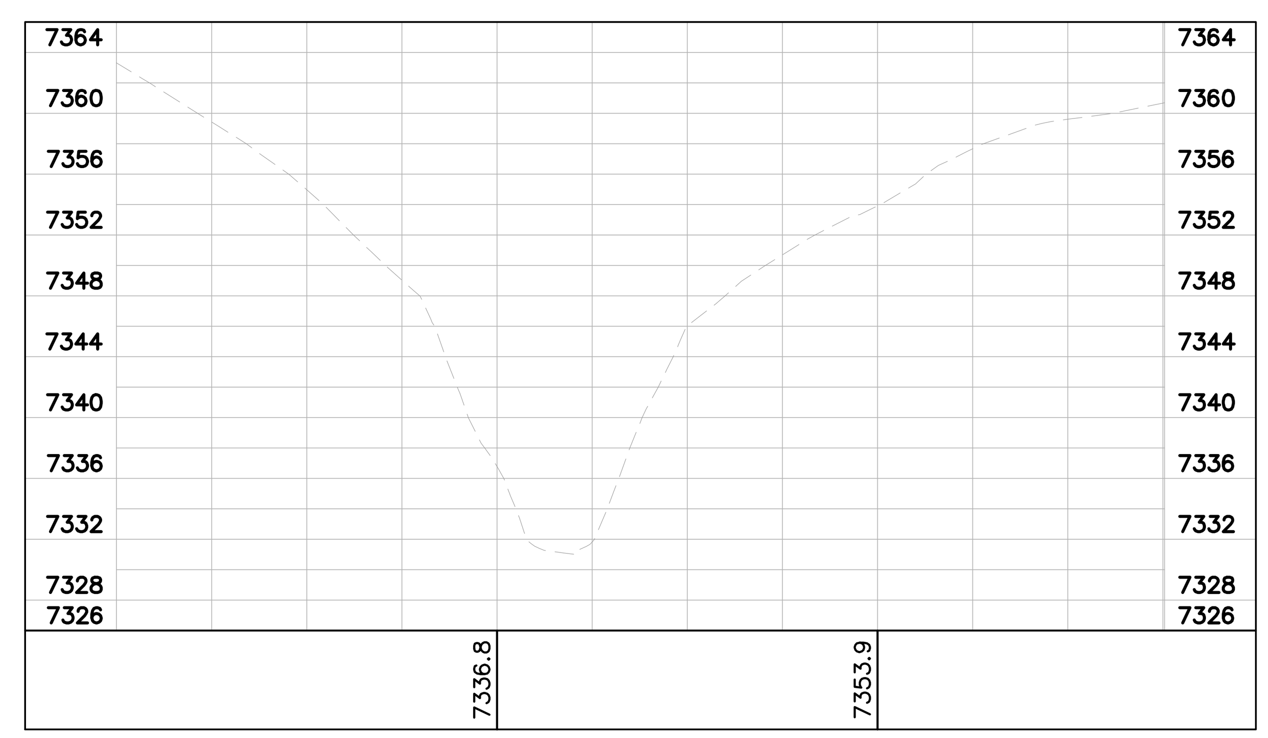
ROCK CHUTE PROFILE



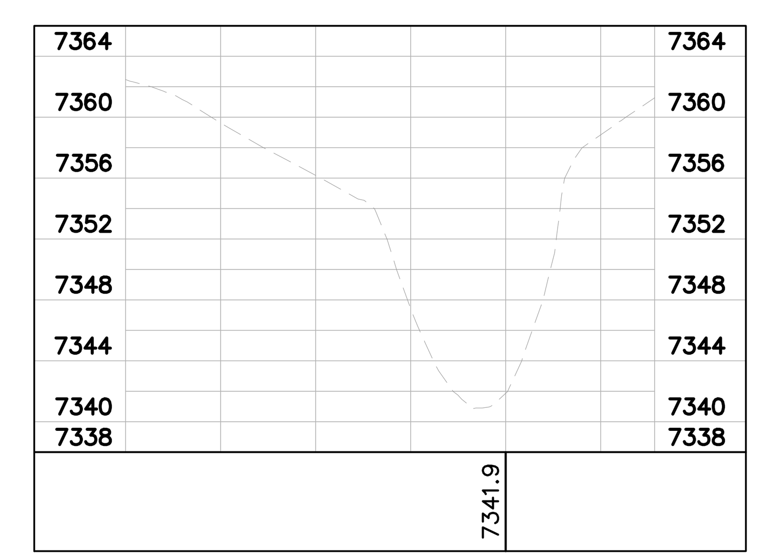
ROCK CHUTE CROSS SECTION



EX. CROSS SECTION A–A



EX CROSS SECTION B–B



EX CROSS SECTION C–C

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

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
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2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

HEADCUTTING EXHIBIT REACH H1

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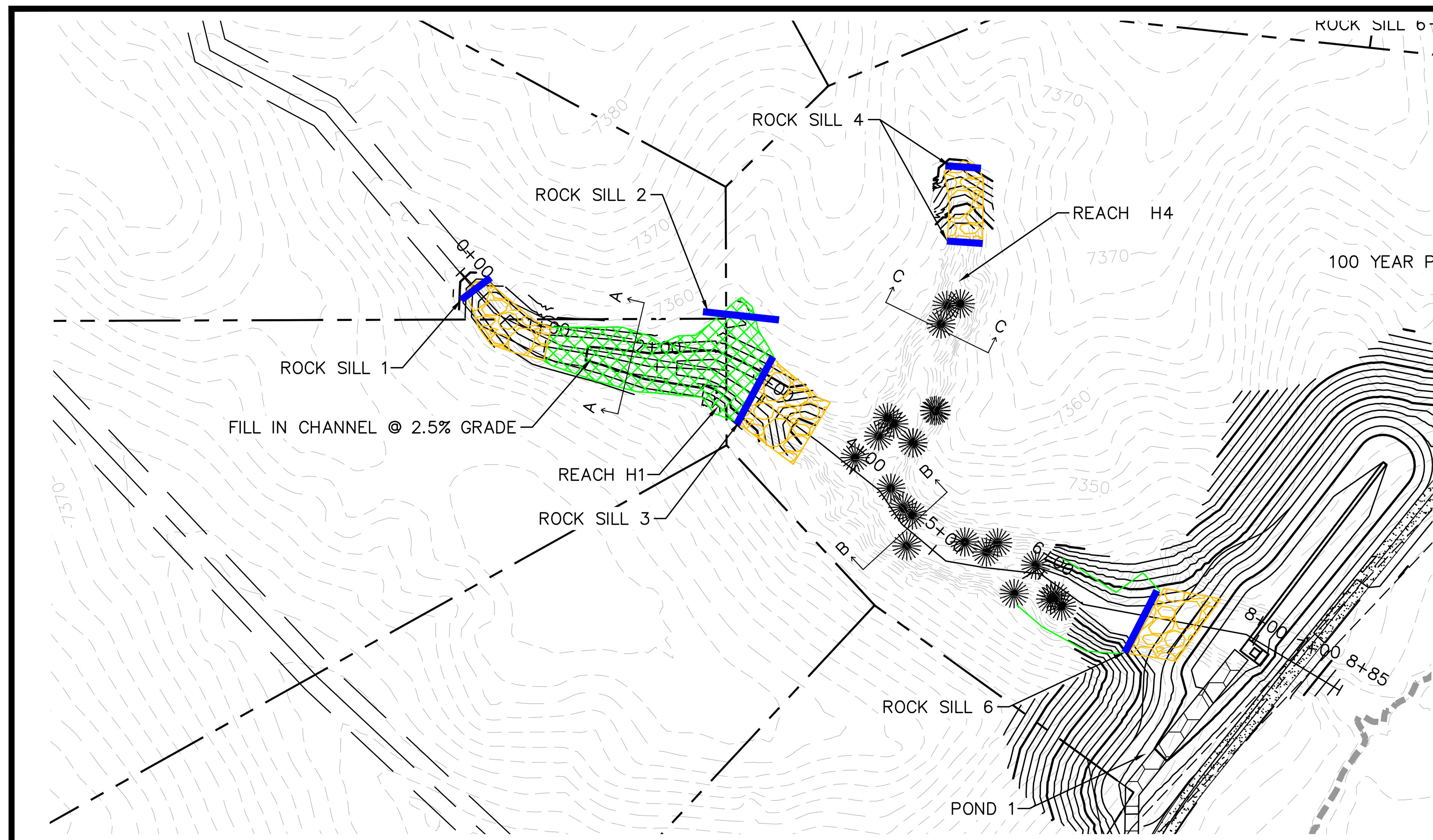
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET
1.19



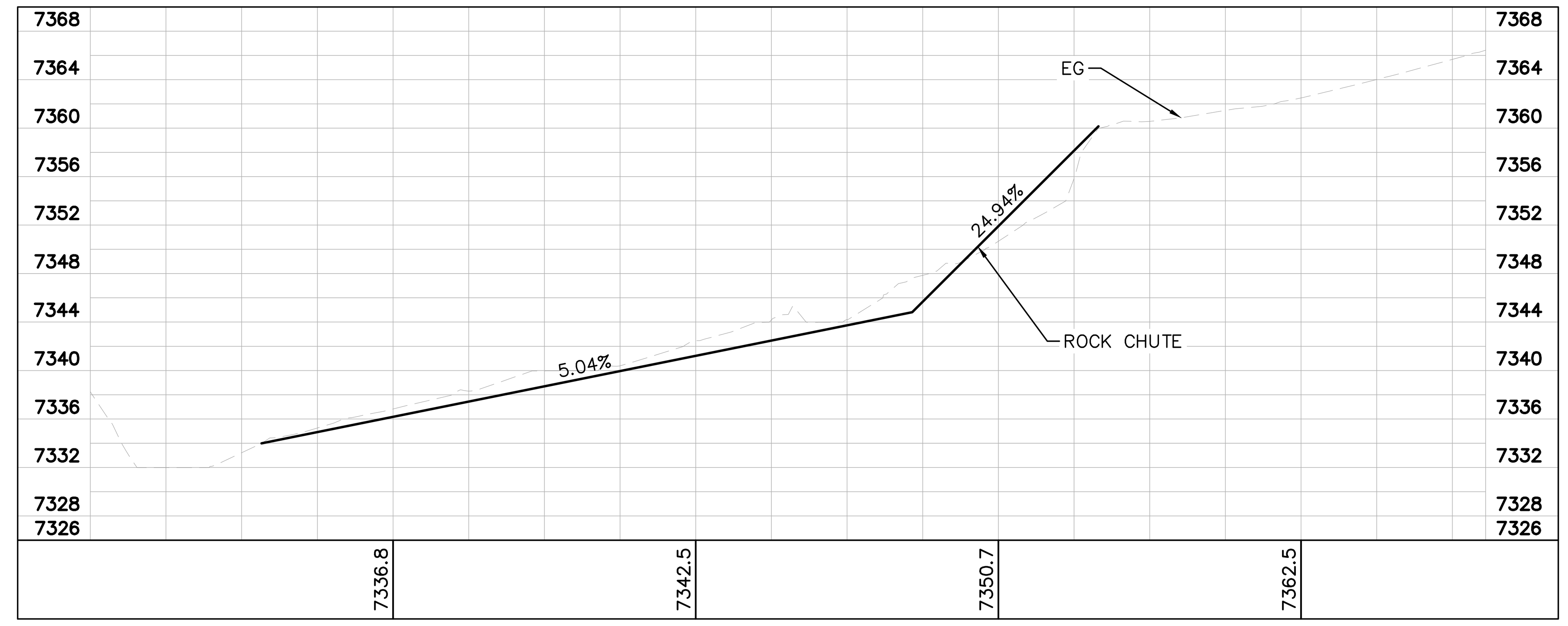
H1 HEADCUTTING MAIN CHANNEL

LEGEND

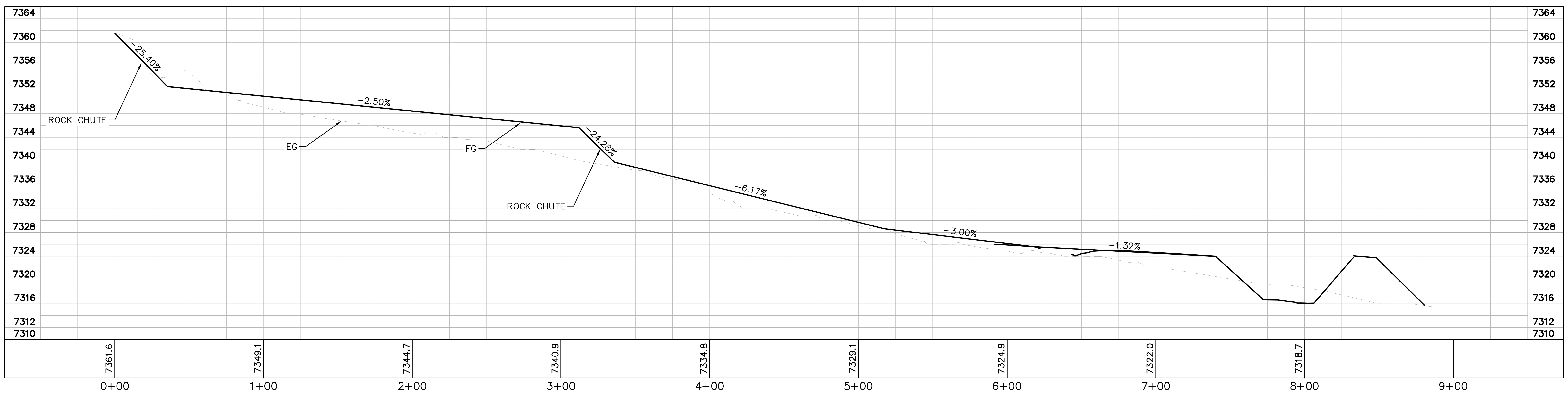
- ROCK CHUTE 4:1 MAX SLOPES
- ROCK SILL
- REGRADE AREA TO VEGETATED SWALE VEGETATION W/ COIR MATTING (BIODEGRADABLE) ~2.0% SLOPES

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200



REACH H4 CENTERLINE PROFILE



REACH H1 CENTERLINE PROFILE

Know what's below. Call before you dig.

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

NO.	REVISION	BY	DATE	APPR.

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WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

HEADCUTTING EXHIBIT REACH H1

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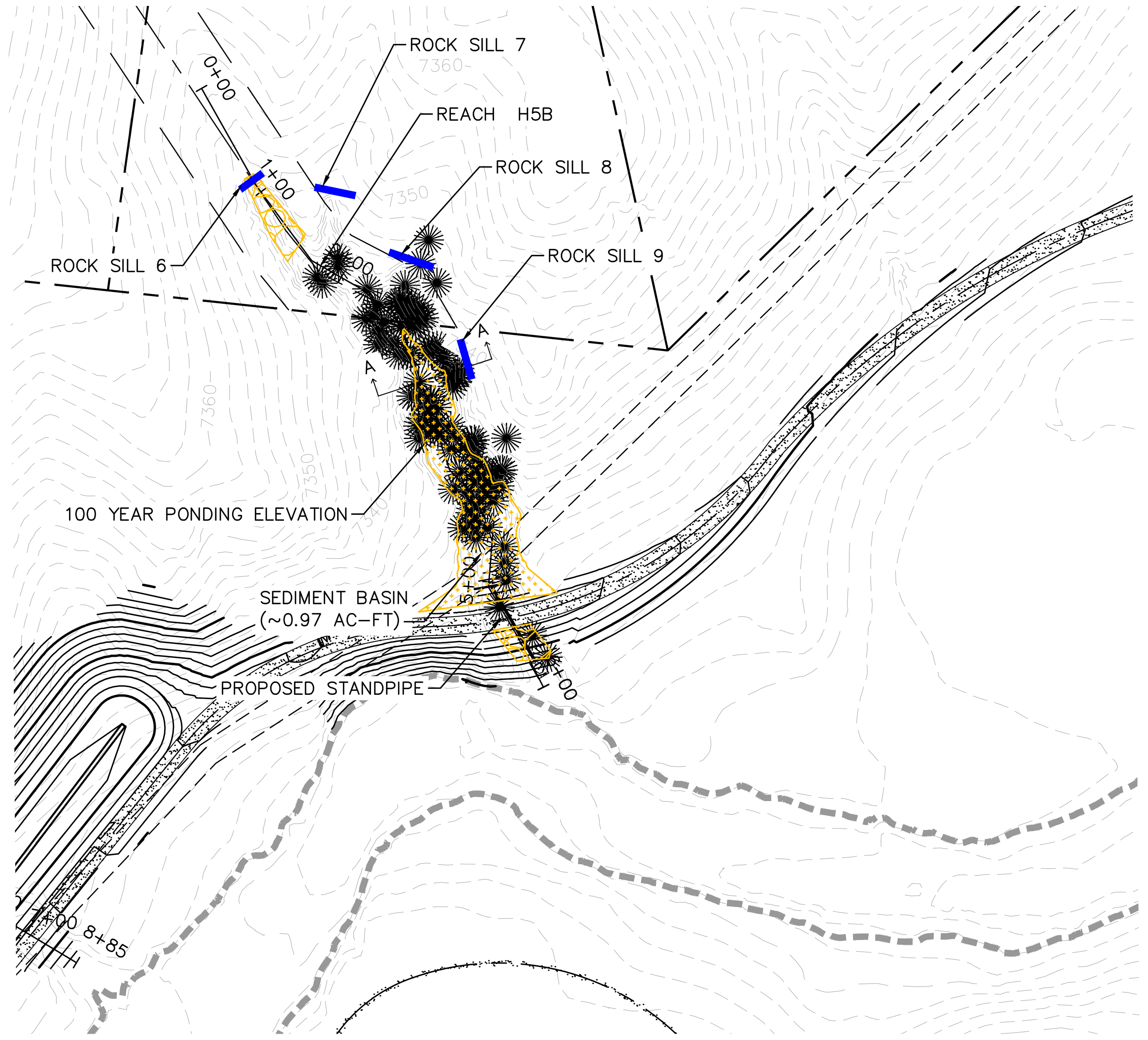
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET
1.20

\\kimley-horn.com\mt_den1\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Early Grading Package\EG_Headcutting_Exhibit.dwg O'Donnell-Sloan, Theresa 12/10/2021 12:18 PM

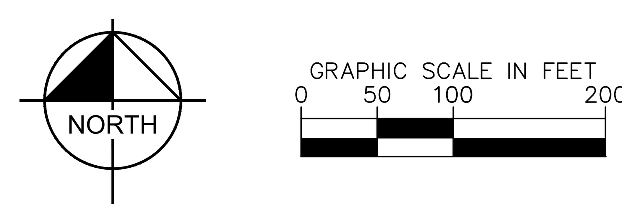


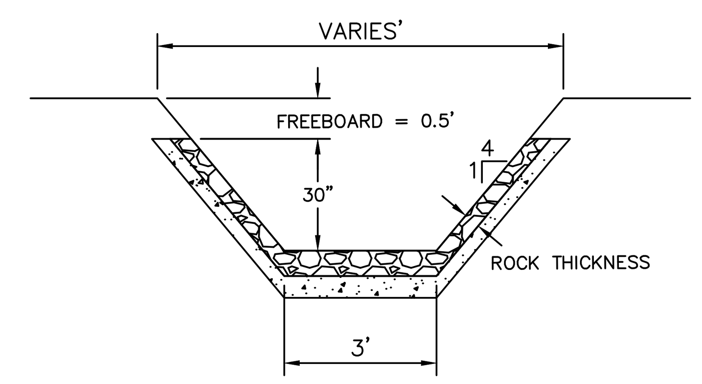
H5B HEADCUTTING MAIN CHANNEL

LEGEND

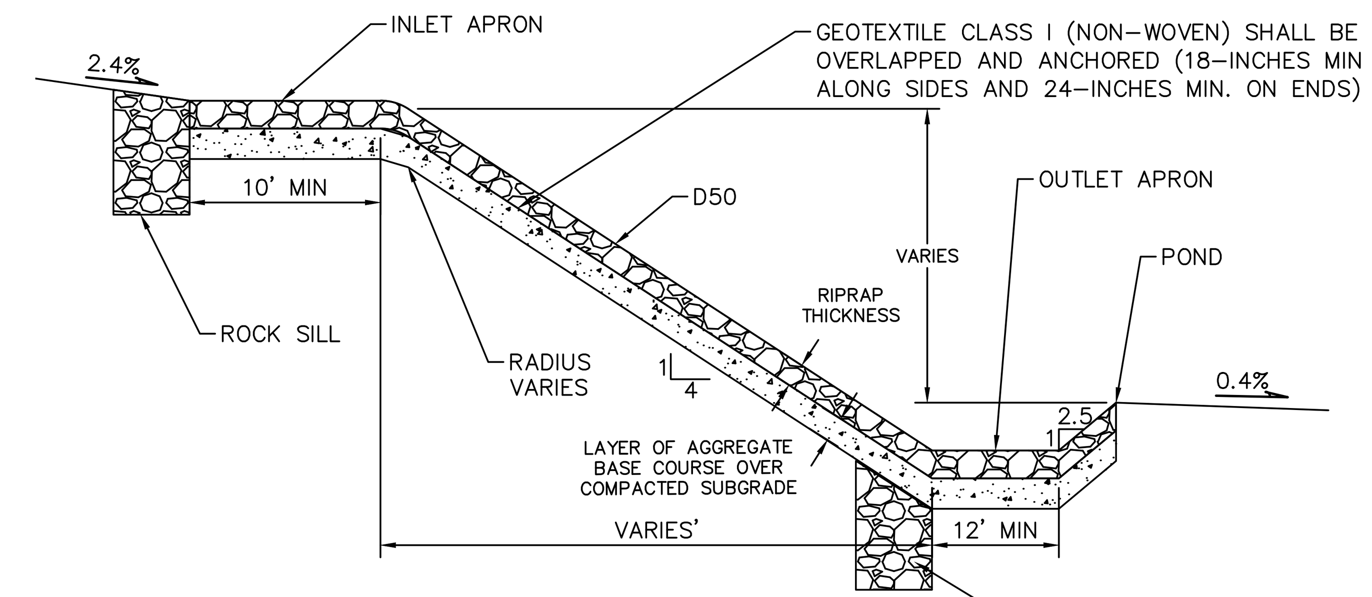
ROCK CHUTE 4:1 MAX SLOPES

ROCK SILL

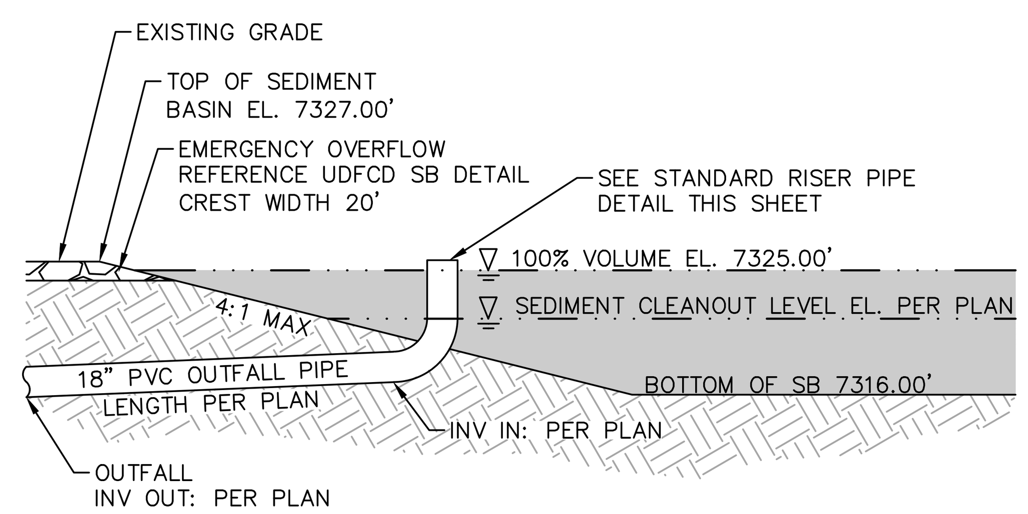




ROCK CHUTE CROSS SECTION

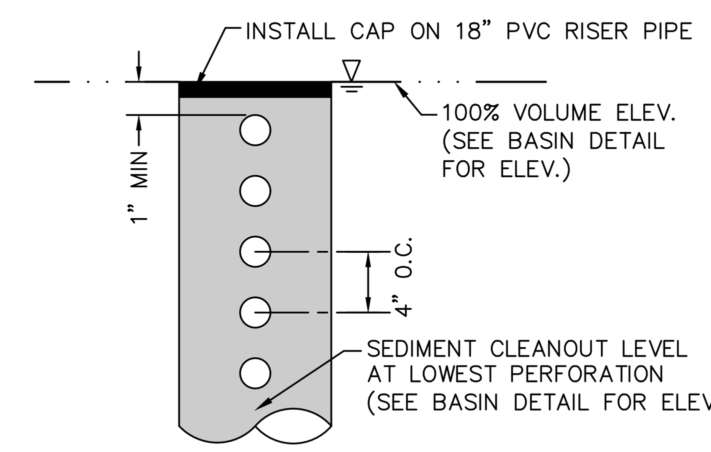


ROCK CHUTE PROFILE



SEDIMENT BASIN DETAIL

N.T.S.

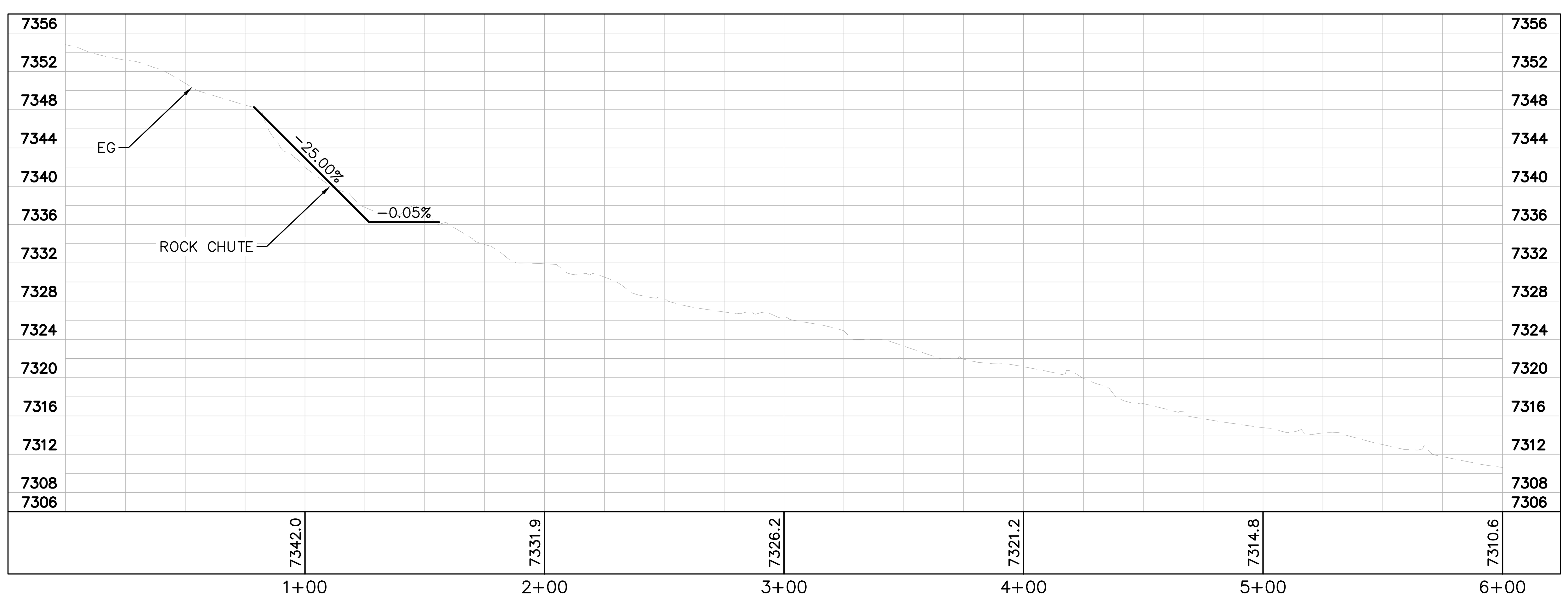


RISER PIPE	# OF COLUMNS	# OF ROWS	HOLE DIAMETER
SB	1	3	9/16"

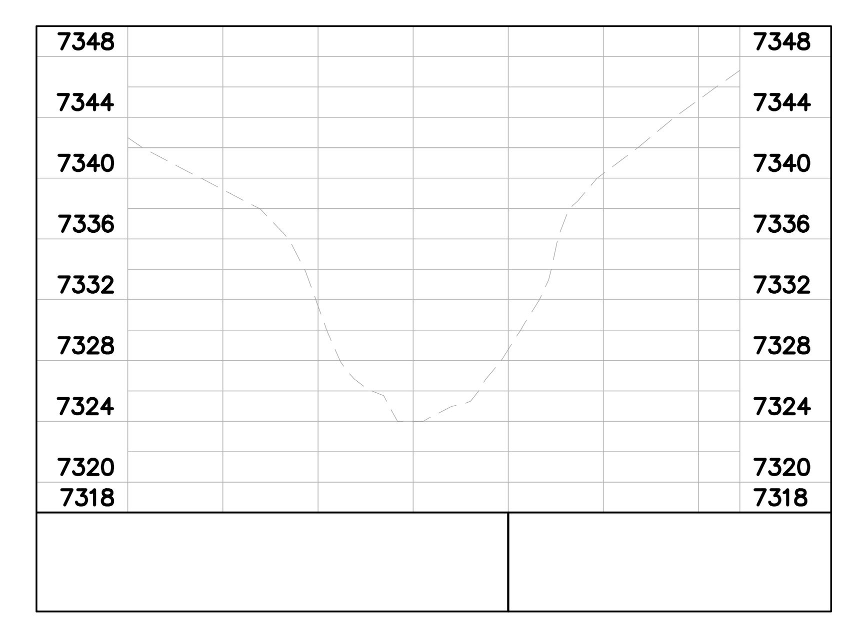
*REFER TO FINAL DRAINAGE REPORT FOR WINSOEM FILING NO. 3 DATED 12/09/21 FOR CALCULATIONS

STANDARD RISER PIPE DETAIL

N.T.S.



REACH H5B CENTERLINE PROFILE



CROSS SECTION A-A

Know what's below. Call before you dig.

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\\kimley-horn.com\mt_den1\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Early Grading Package\EG_Headcutting_Exhibit.dwg O'Donnell-Sloan, Theresa 12/10/2021 12:18 PM

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
© 2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

WINSOME FILING NO. 3
EL PASO COUNTY, COLORADO
CONSTUCTION DOCUMENTS

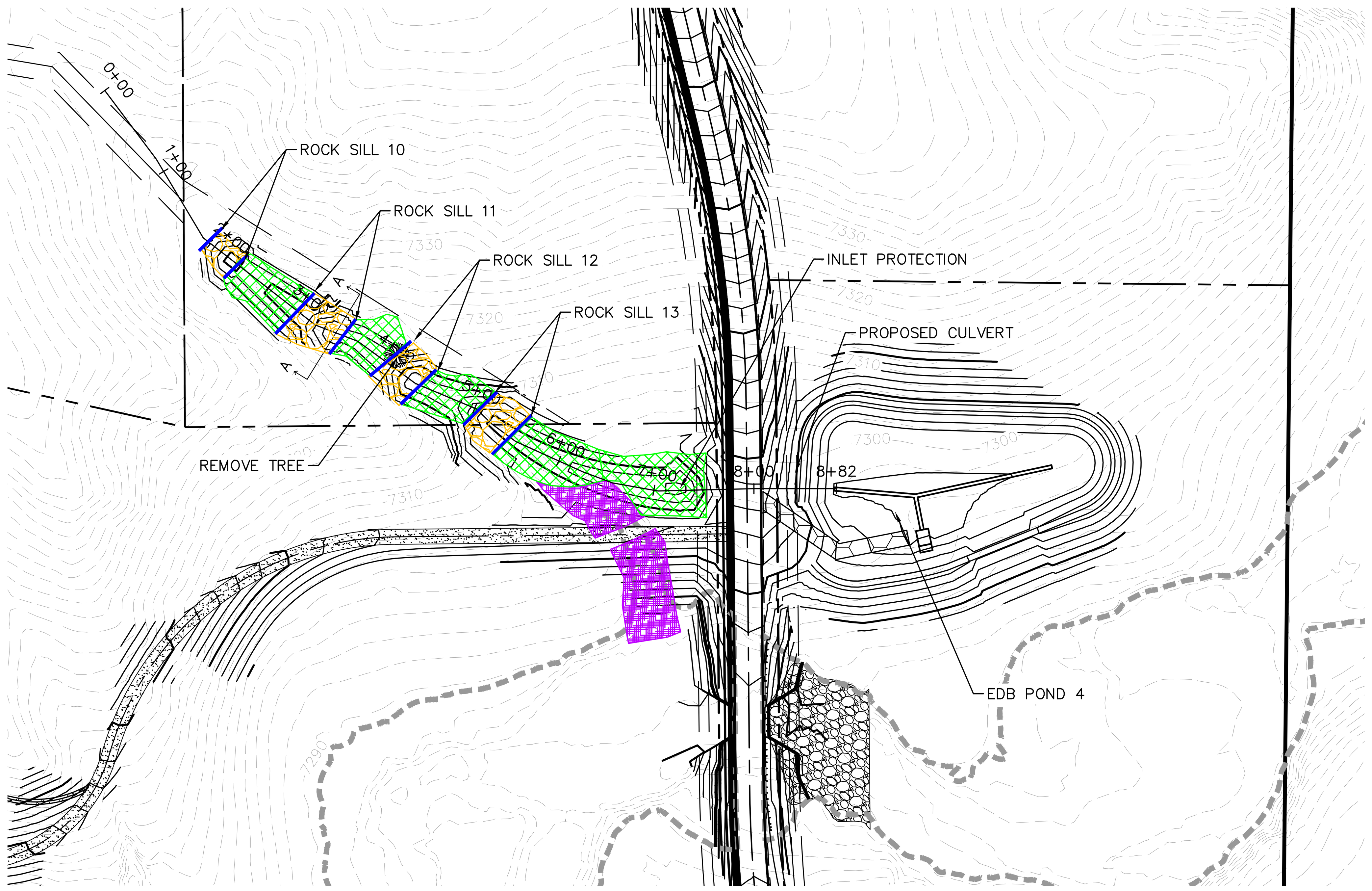
HEADCUTTING EXHIBIT REACH H5B

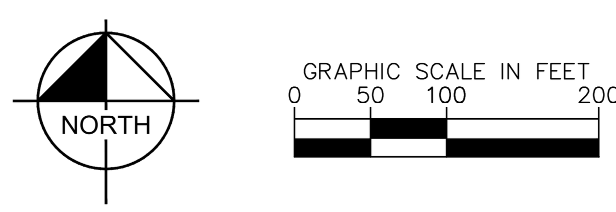
PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO. 196106001

SHEET

1.21

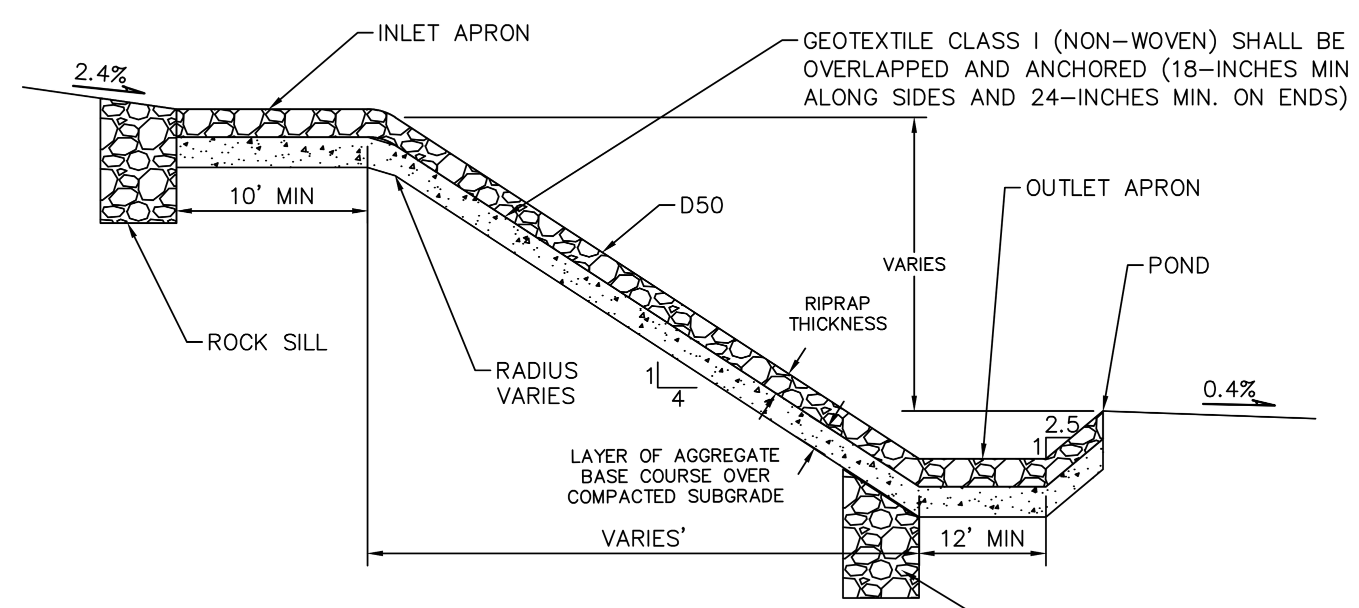




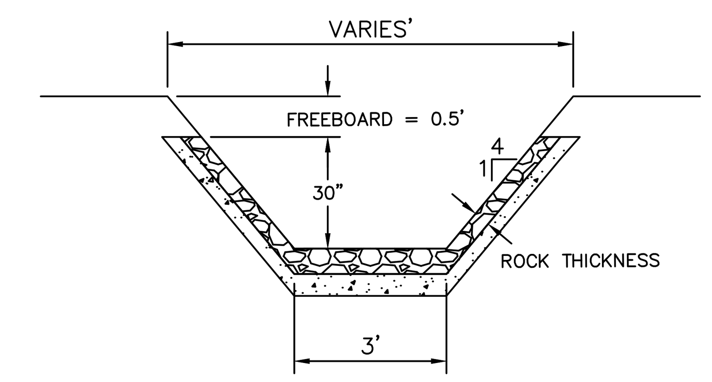
H3 HEADCUTTING MAIN CHANNEL

LEGEND

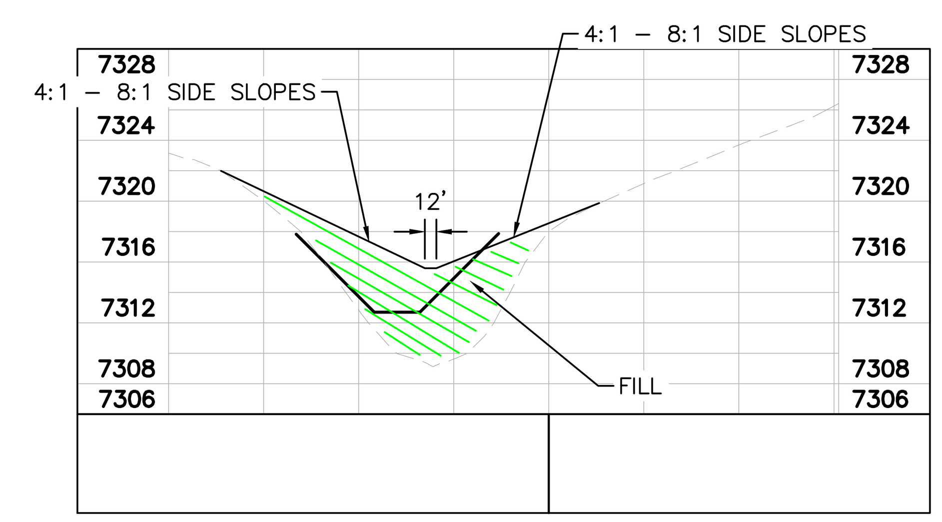
- TURF REENFORCEMENT MATTING (TRM) OR ROCK RIPRAP PROTECTED CHANNEL 10%–16% SLOPES
- RIPRAP GRADE CONTROL STRUCTURE 2'–4' DROP AT 4:1
- REGRADE AREA TO VEGETATED SWALE VEGETATION W/ COIR MATTING (BIODEGRADABLE) ~2.0% SLOPES
- ROCK CHUTE 4:1 MAX SLOPES
- ROCK SILL
- CHANNEL PLUG/ BACKFILL ABANDONED CHANNEL



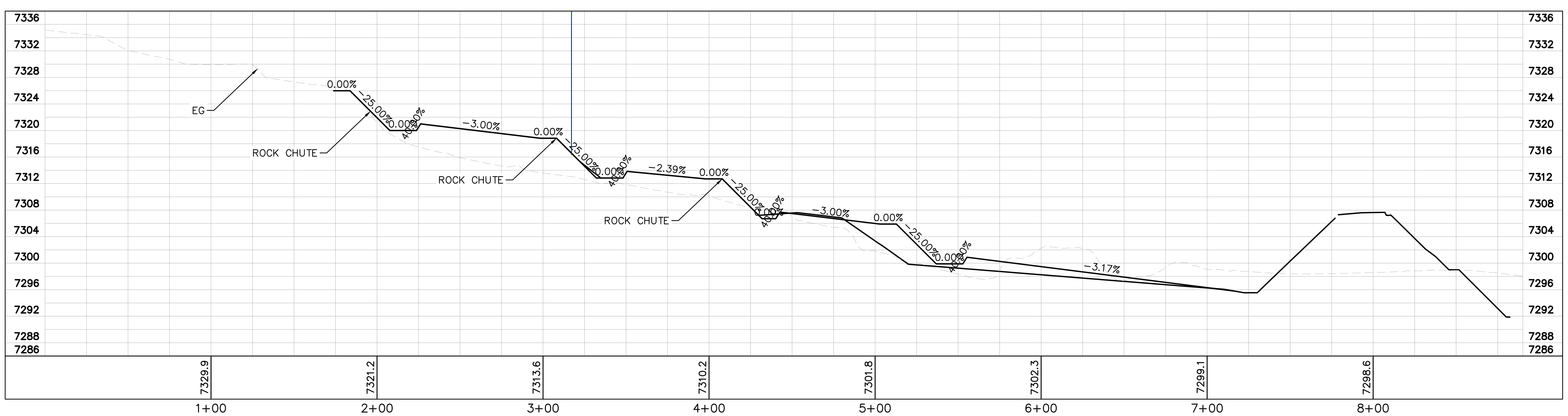
ROCK CHUTE PROFILE



ROCK CHUTE CROSS SECTION



CROSS SECTION A–A



REACH H3 CENTERLINE PROFILE

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

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

\\kimley-horn.com\mt_den1\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Early Grading Package\EG_Headcutting_Exhibit.dwg O'Donnell–Sloan, Theresa 12/10/2021 12:18 PM

NO.	REVISION	BY	DATE	APPR.

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EL PASO COUNTY, COLORADO
CONSTRUCTION DOCUMENTS

HEADCUTTING EXHIBIT REACH H3

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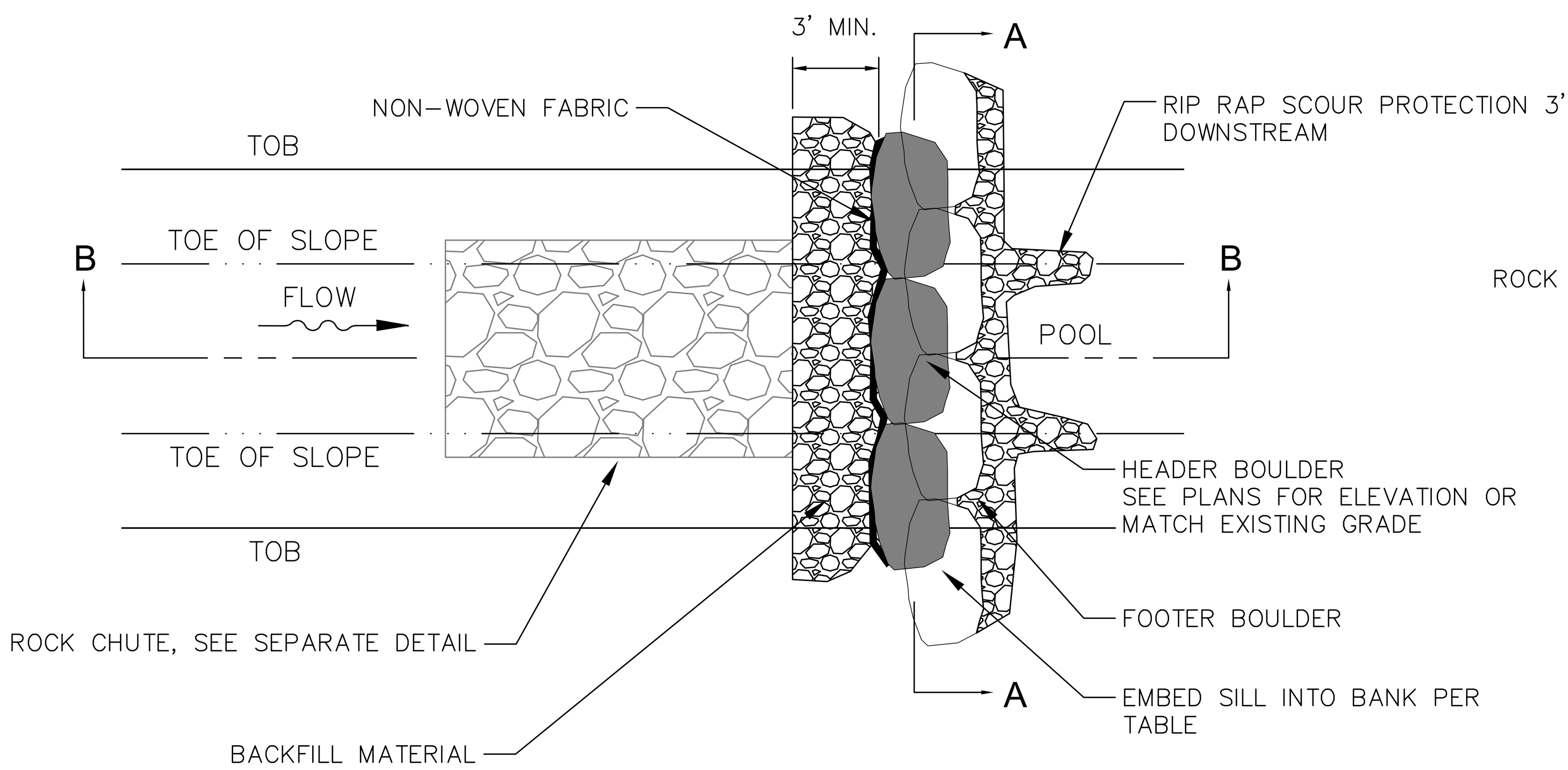
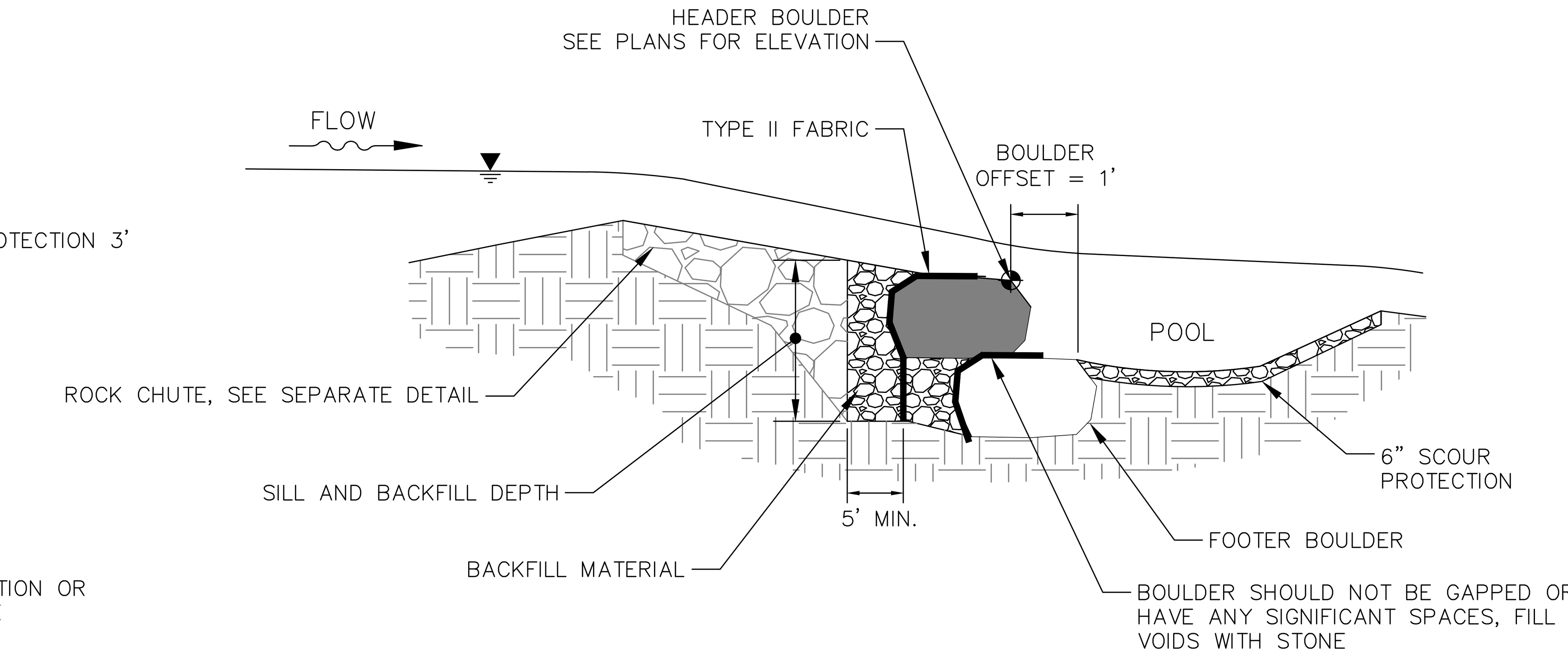
PROJECT NO.
196106001

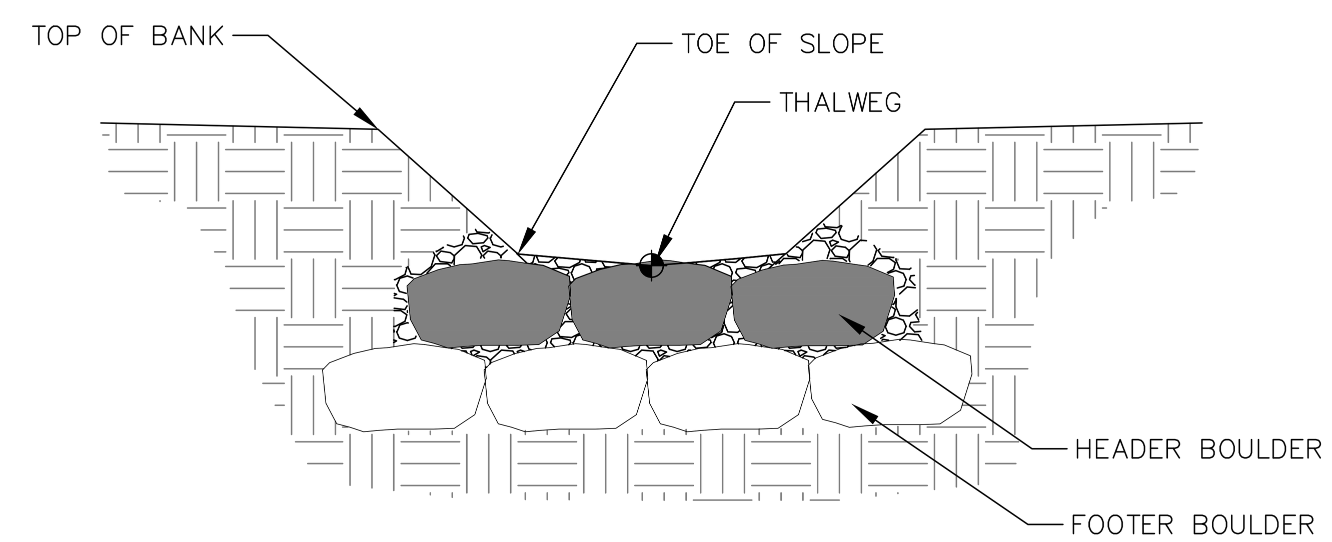
SHEET
1.22



ROCK SILL PLAN VIEW



SECTION B–B



SECTION A–A

NOTES:

1. A BOULDER SILL MAY BE USED ALONE OR IN COMBINATION WITH A ROCK CHUTE.
2. NO PART OF THE SILL SHALL BE PLACED ABOVE THE ELEVATION OF THE UPSTREAM AND/OR ADJACENT CHANNEL BED.
3. A FOOTER BOULDER IS NOT REQUIRED IF THE HEADER BOULDER DEPTH EXCEEDS SPECIFIED SILL DEPTH.
4. THE ROCK SILL IS GENERALLY CONSTRUCTED AS FOLLOWS:
   A. OVER–EXCAVATE CHANNEL BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE HEADER AND FOOTER BOULDERS.
   B. PLACE FOOTER BOULDERS. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
   C. INSTALL FILTER FABRIC.
   D. PLACE BACKFILL MATERIAL BEHIND THE FOOTER BOULDERS.
   E. INSTALL HEADER BOULDERS ON TOP OF AND SET SLIGHTLY BACK FROM THE FOOTER BOULDERS (SUCH THAT PART OF THE HEADER BOULDER IS RESTING ON THE BACKFILL MATERIAL). HEADER BOULDERS SHALL SPAN THE SEAMS OF THE FOOTER BOULDERS. THERE SHALL NOT BE A SEAM IN THE CENTER OF THE STREAM BED (AT THE THALWEG). THERE SHALL BE NO GAPS BETWEEN BOULDERS OR THALWEG SEAM BETWEEN HEADERS.
   F. PLACE BACKFILL MATERIAL BEHIND HEADER BOULDERS ENSURING THAT ANY VOIDS BETWEEN THE BOULDERS ARE FILLED.

DESIGN VARIABLES

BOULDER DIMENSIONS	24" MIN
BACKFILL MATERIAL [1]	D50 = 9"
SILL AND BACKFILL DEPTH	5'
EMBEDDED LENGTH INTO BANK	2'

[1] WELL MIXED GRADATION 80% STONE, AND 20% EARTH) OF THE SPECIFIED MATERIALS: D50 = 9", D_MAX =18", D_MIN = 2".

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NO. | REVISION | BY | DATE | APPR.

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EL PASO COUNTY, COLORADO
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HEADCUTTING EXHIBIT DETAILS

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Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196106001
SHEET
1.23

\\kimley-horn.com\mt_den1\COS_Civil\196106001_Winsome Filing No. 3\CADD\PlanSheets\Early Grading Package\EG_Headcutting_Exhibit.dwg O'Donnell-Sloan, Theresa 12/10/2021 12:18 PM

APPENDIX D: REFERENCES

VERTEX

Winsome Subdivision
17480 Meridian Road North
Colorado Springs, Colorado 80924

Preliminary Drainage Report

MAY 15, 2019

PREPARED FOR:
PT McCune, LLC
Joseph W DesJardin
1864 Woodmoor Drive
Suite 100
Monument, Colorado 80132

PREPARED BY:
The Vertex Companies, Inc.
2420 W. 26th Avenue, Suite 100-D
Denver, Colorado 80211
PHONE: 303-623-9116

VERTEX Project: 49388
PCD File No. SP-18-006
FEMA Case No: 19-08-0185R

Jason Priddy
Project Engineer

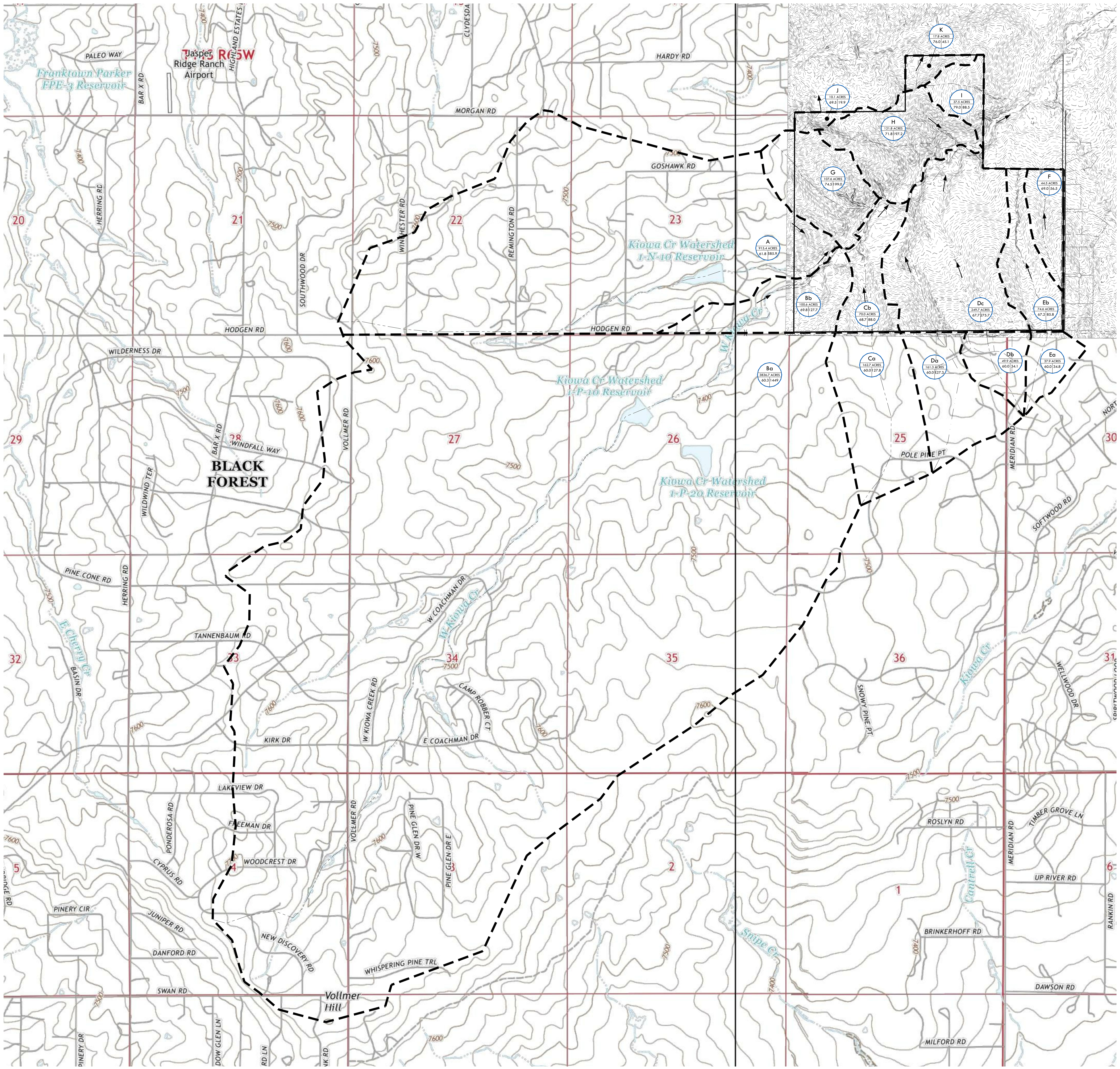
Lance VanDemark, P.E.
Project Manager

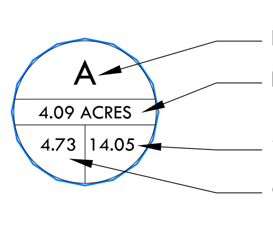
10.0 DRAINAGE PLANS

PRELIMINARY PLAN SET

WINSOME SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO





EXISTING STORMWATER RUNOFF TABLE

BASIN	BASIN AREA (ACRES)	CURVE NUMBER	Q_{100}
A	915.4	61.8	585.9
Ba	3836.7	60.3	1448.9
Bb	100.6	69.8	127.7
Ca	162.7	60.0	127.8
Cb	70.0	68.7	88.0
Da	161.3	60.0	127.3
Db	49.9	60.0	34.1
Dc	249.7	67.7	275.7
Ea	37.9	60.0	34.8
Eb	74.6	67.2	85.8
F	44.5	69.0	56.6
G	107.6	74.5	199.0
H	121.8	71.8	197.2
I	37.5	79.0	88.5
J	10.1	69.5	19.9
K	17.8	76.0	45.1
	5998.1		

LEGEND

PROPERTY BOUNDARY LINE
EXISTING CONTOUR
DRAINAGE BASIN BOUNDARY
DRAINAGE BASIN FLOW PATH
BASIN NAME
DRAINAGE BASIN SIZE
100-YEAR RUNOFF
CURVE NUMBER
FLOW ARROWS

PCD FILE NO SP-18-006

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Main: 303.623.9116 I VERTEXENG.COM

COLORADO LICENSED 5/16/19 43911

EXISTING DRAINAGE PLAN - OVERALL

SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

NO.	REVISIONS
1	1/11/19 PRELIMINARY RESUBMITTAL
2	3/8/19 PRELIMINARY RESUBMITTAL
3	4/11/19 PRELIMINARY RESUBMITTAL
4	5/10/19 PRELIMINARY RESUBMITTAL
5	
6	
7	
8	
9	
10	

DATE: 1/11/19
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C1.1

PRELIMINARY PLAN SET

WINSOME SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO

E1 MAIN OUTFALL+E5+E6+E7 Q5=408.6CFS Q100=2470.0CFS

E2 OFFSITE FLOW Q5=3.4CFS Q100=19.9CFS

E3 OFFSITE FLOW Q5=12.9CFS Q100=45.1CFS

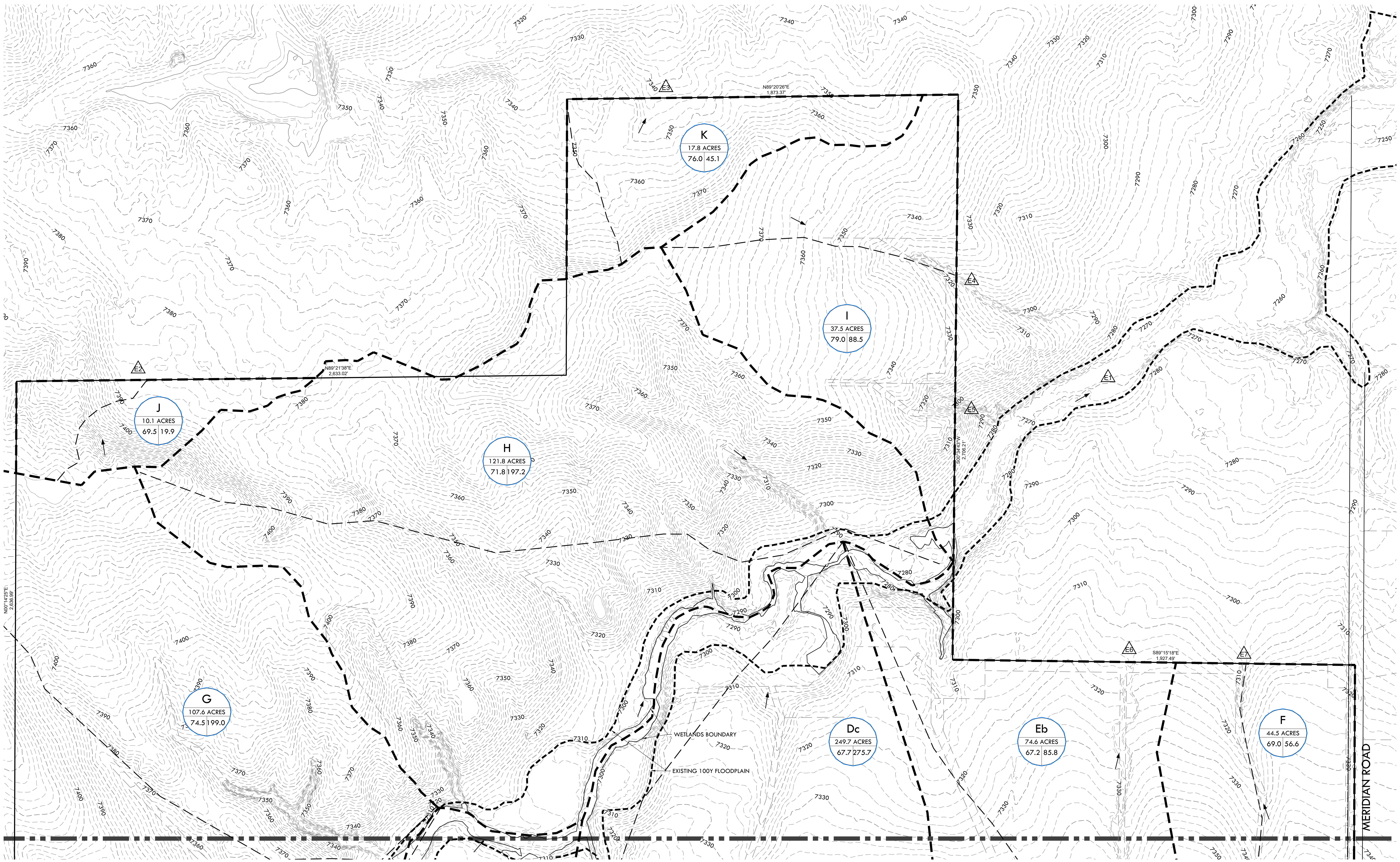
E4 + E5 OFFSITE FLOW Q5=26.4CFS Q100=88.5CFS

E6 OFFSITE FLOW Q5=9.4CFS Q100=85.8CFS

E7 OFFSITE FLOW Q5=6.6CFS Q100=56.6CFS

NOTES:

1. EXISTING FLOODPLAIN AS SHOWN BASED ON FIRM MAP #08041C0350G PANEL 350 REVISED 12/7/2018, GENERATED BY GRAPHICAL OVERLAY.



MATCH LINE - SEE SHEET C1.3 - EXISTING DRAINAGE PLAN - SOUTH

PCD FILE NO SP-18-006

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COLORADO LICENSED 5/16/19 43911

EXISTING DRAINAGE PLAN - NORTH

SITE: 17480 MERIDIAN ROAD, ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC, 1864 WOODMORE DR, SUITE 100, MONUMENT, COLORADO 80132

NO.	REVISIONS
1	1/11/19 PRELIMINARY RESUBMITTAL
2	3/8/19 PRELIMINARY RESUBMITTAL
3	4/11/19 PRELIMINARY RESUBMITTAL
4	5/10/19 PRELIMINARY RESUBMITTAL
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DATE: 1/11/19
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C1.2

PRELIMINARY PLAN SET

WINSOME SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO

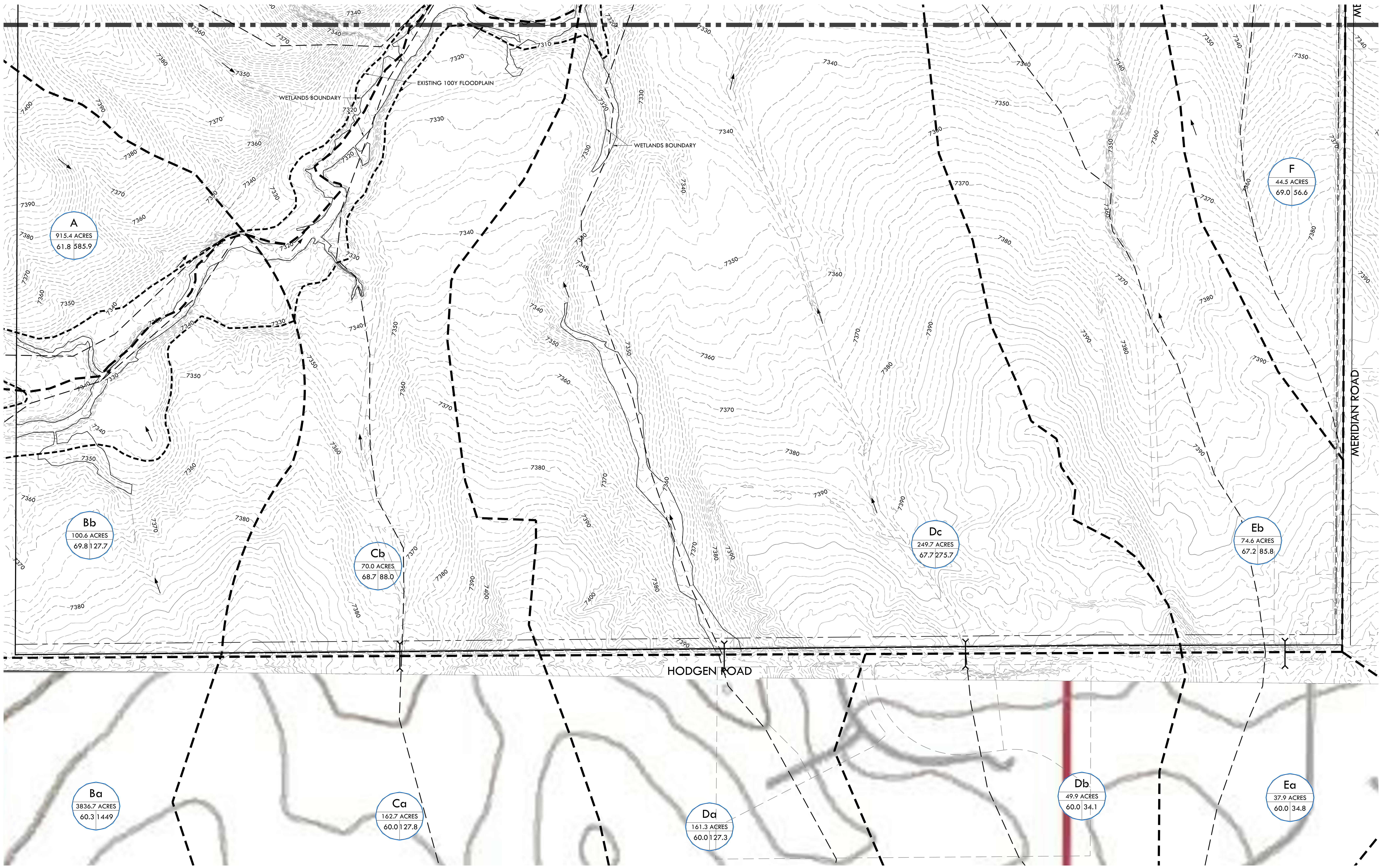
0' 200' 400'

COLORADO 811
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

NOTES:

1. EXISTING FLOODPLAIN AS SHOWN BASED ON FIRM MAP #08041C0350G PANEL 350 REVISED 12/7/2018, GENERATED BY GRAPHICAL OVERLAY.

MATCH LINE - SEE SHEET C1.2 - EXISTING DRAINAGE PLAN - NORTH



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COLORADO LICENSED ... 5/16/19 43911

EXISTING DRAINAGE PLAN - SOUTH

SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

NO.	REVISIONS
1	1/11/19 PRELIMINARY RESUBMITTAL
2	3/8/19 PRELIMINARY RESUBMITTAL
3	4/11/19 PRELIMINARY RESUBMITTAL
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DATE: 1/11/19
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

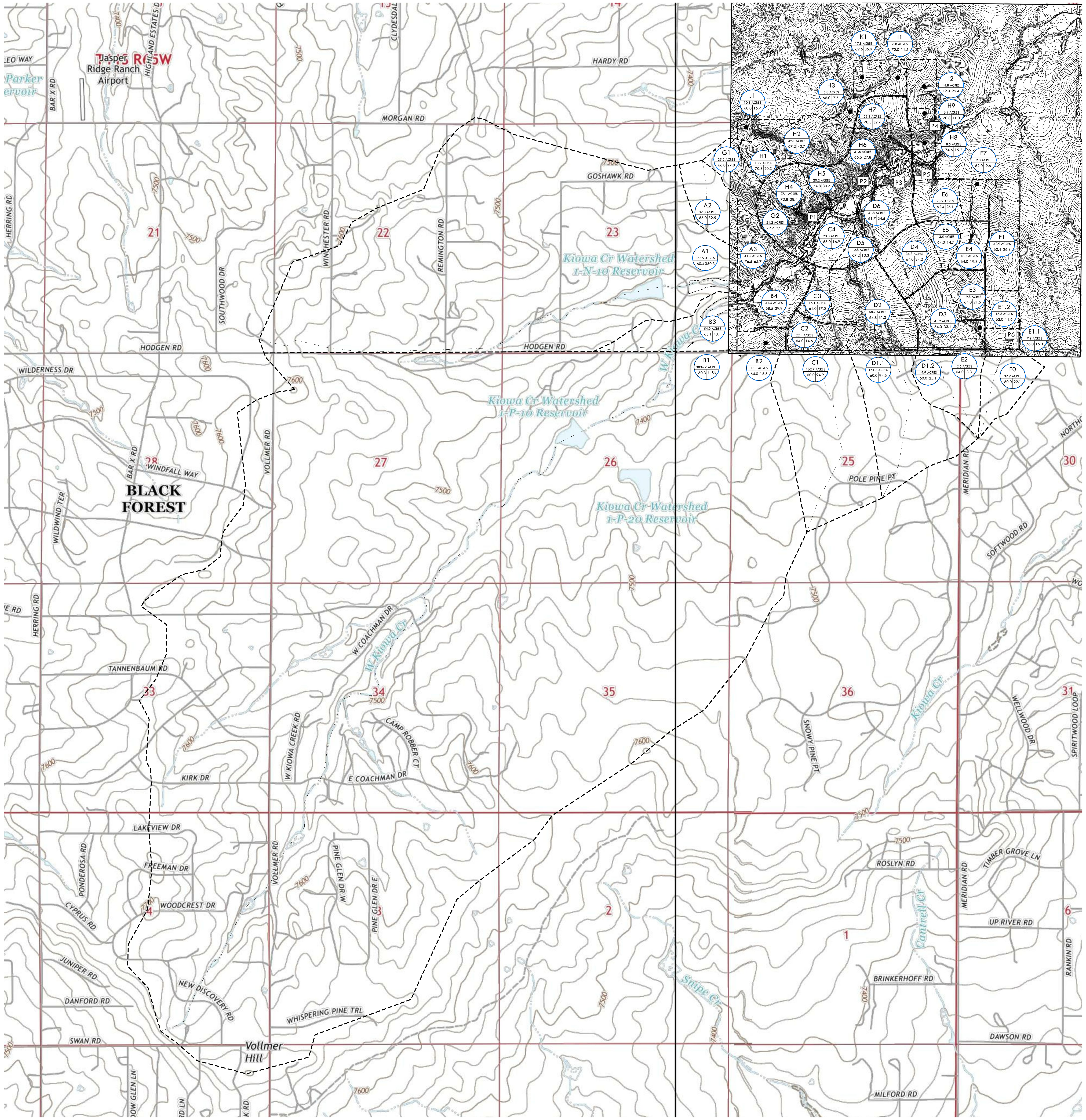
C1.3

PCD FILE NO SP-18-006

PRELIMINARY PLAN SET

WINSOME SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO



PROPOSED STORMWATER RUNOFF			
BASIN	BASIN AREA (ACRES)	CURVE NUMBER	Q_{100}
A1	865.9	60.4	350.3
A2	37.0	66.0	32.5
A3	41.5	76.5	65.7
B1	3836.7	60.3	1107.9
B2	13.1	64.0	15.5
B3	54.9	65.1	43.1
B4	41.5	68.5	39.9
C1	162.7	60.0	94.9
C2	22.4	64.0	14.6
C3	16.1	64.0	17.0
C4	23.8	65.0	16.9
D1.1	161.3	60.0	94.6
D1.2	49.9	60.0	25.1
D2	68.7	64.8	61.3
D3	41.2	64.0	33.1
D4	34.3	64.0	34.2
D5	12.8	67.2	13.3
D6	41.8	61.7	24.5
E0	37.9	60.0	22.1
E1.1	7.9	76.0	16.3
E1.2	16.3	62.0	11.6
E2	2.6	64.0	3.3
E3	19.8	64.0	21.5
E4	18.2	64.0	19.3
E5	13.5	64.0	14.7
E6	28.9	62.4	26.1
E7	9.8	62.0	9.6
F1	42.9	60.4	26.8
G1	25.2	66.0	27.8
G2	21.2	72.7	27.3
H1	13.9	70.8	20.3
H2	39.1	67.2	40.7
H3	5.8	66.0	7.5
H4	27.1	73.8	38.4
H5	20.2	74.8	30.7
H6	31.6	66.6	27.8
H7	25.8	70.5	32.7
H8	8.5	74.6	15.2
H9	6.9	70.8	11.0
I1	6.8	72.0	11.5
I2	14.8	72.0	25.4
J1	10.1	69.5	15.7
K1	17.8	76.0	35.9
	5998.2		

DETENTION POND SUMMARY		
POND NUMBER	PROPOSED VOLUME	FLOW EXITING POND
1	8.0 AC-FT	31.9 CFS
2	7.4 AC-FT	35.1 CFS
3	7.1 AC-FT	126.8 CFS
4	1.5 AC-FT	30.6 CFS
5	9.7 AC-FT	120.0 CFS
6	4.0 AC-FT	18.0 CFS

COLORADO 811 KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

LEGEND

- PROPERTY BOUNDARY LINE
- 5540 PROPOSED CONTOUR
- 5540 EXISTING CONTOUR
- DRAINAGE BASIN BOUNDARY
- DRAINAGE BASIN FLOW PATH
- A — BASIN NAME
- 4.09 ACRES — DRAINAGE BASIN SIZE
- 14.05 — 100-YEAR RUNOFF
- 4.73 — CURVE NUMBER
- FLOW ARROWS

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COLORADO LICENSED PROFESSIONAL ENGINEER LANCE PATRICK VANDEMARK 5/16/19 43911

PROPOSED DRAINAGE PLAN - OVERALL

SITE: 17480 MERIDIAN ROAD, ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC, 1864 WOODMORE DR, SUITE 100, MONUMENT, COLORADO 80132

NO.	REVISIONS
1	1/11/19 PRELIMINARY RESUBMITTAL
2	3/8/19 PRELIMINARY RESUBMITTAL
3	4/11/19 PRELIMINARY RESUBMITTAL
4	5/10/19 PRELIMINARY RESUBMITTAL
5	5/16/19 PRELIMINARY RESUBMITTAL
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DATE: 1/11/19
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C2.1

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Thursday, May 16, 2019 1:56:29 PM

PRELIMINARY PLAN SET

WINSOME SUBDIVISION

A PARCEL OF PROPERTY LOCATED IN SECTIONS 13 & 24, TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AND IN THE WEST HALF OF THE WEST HALF OF SECTION 19, TOWNSHIP 11 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO

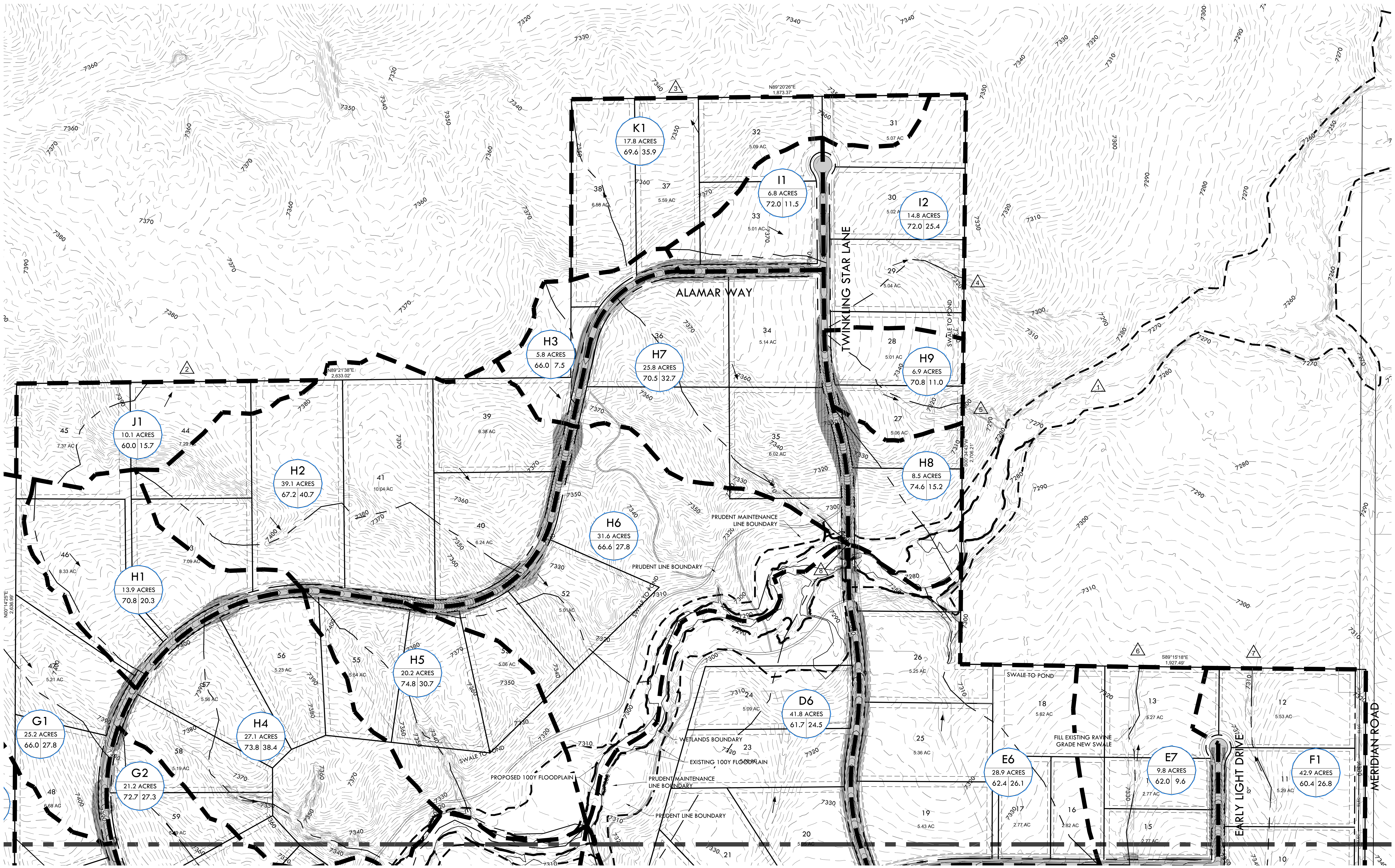
0' 200' 400'

P1 OUTFALL Q5=1.5CFS Q100=31.9CFS
P2 OUTFALL Q5=0.9CFS Q100=35.1CFS
P3 OUTFALL Q5=1.4CFS Q100=126.8CFS
P4 OUTFALL Q5=1.3CFS Q100=30.6CFS
P5 OUTFALL Q5=1.9CFS Q100=120.0CFS
P6 OUTFALL Q5=0.7CFS Q100=18.0CFS

1 MAIN OUTFALL Q5=447.4CFS Q100=2437.3CFS
2 OFFSITE FLOW Q5=3.1CFS Q100=19.9CFS
3 OFFSITE FLOW Q5=12.9CFS Q100=45.1CFS
4 OFFSITE FLOW DIRECTED TO POND P4
5 P4 OUTFALL Q5=1.3CFS Q100=30.6CFS
6 OFFSITE FLOW DIRECTED TO POND P5
7 OFFSITE FLOW DIRECTED TO POND P5
8 BOX CULVERT 2 Q100=2321.1CFS

NOTES:

1. EXISTING FLOODPLAIN AS SHOWN BASED ON FIRM MAP #08041C0350G PANEL 350 REVISED 12/7/2018, GENERATED BY GRAPHICAL OVERLAY.



MATCH LINE - SEE SHEET C2.3 - PROPOSED DRAINAGE PLAN - SOUTH

PCD FILE NO SP-18-006

P:\Shared\Projects\49000-49999\49300-49399\49388 McCune Ranch\06-Engineering\Vertex Drawings\PD\49388-PD-Drainage_Proposed - ZOOM.dwg
Thursday, May 16, 2019 1:32:27 PM

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COLORADO LICENSED 5/16/19 43911

PROPOSED DRAINAGE PLAN - NORTH

SITE: 17480 MERIDIAN ROAD
ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC
1864 WOODMORE DR, SUITE 100
MONUMENT, COLORADO 80132

NO.	REVISIONS
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2	3/8/19 PRELIMINARY RESUBMITTAL
3	4/11/19 PRELIMINARY RESUBMITTAL
4	5/10/19 PRELIMINARY RESUBMITTAL
5	5/16/19 PRELIMINARY RESUBMITTAL
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8	
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10	

DATE: 1/11/19
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C2.2

PRELIMINARY PLAN SET

WINSOME SUBDIVISION

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COLORADO 811 KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

0' 200' 400'

P1 OUTFALL Q5=1.5CFS Q100=31.9CFS

P2 OUTFALL Q5=0.9CFS Q100=35.1CFS

P3 OUTFALL Q5=1.4CFS Q100=126.8CFS

P4 OUTFALL Q5=1.3CFS Q100=30.6CFS

P5 OUTFALL Q5=1.9CFS Q100=120.0CFS

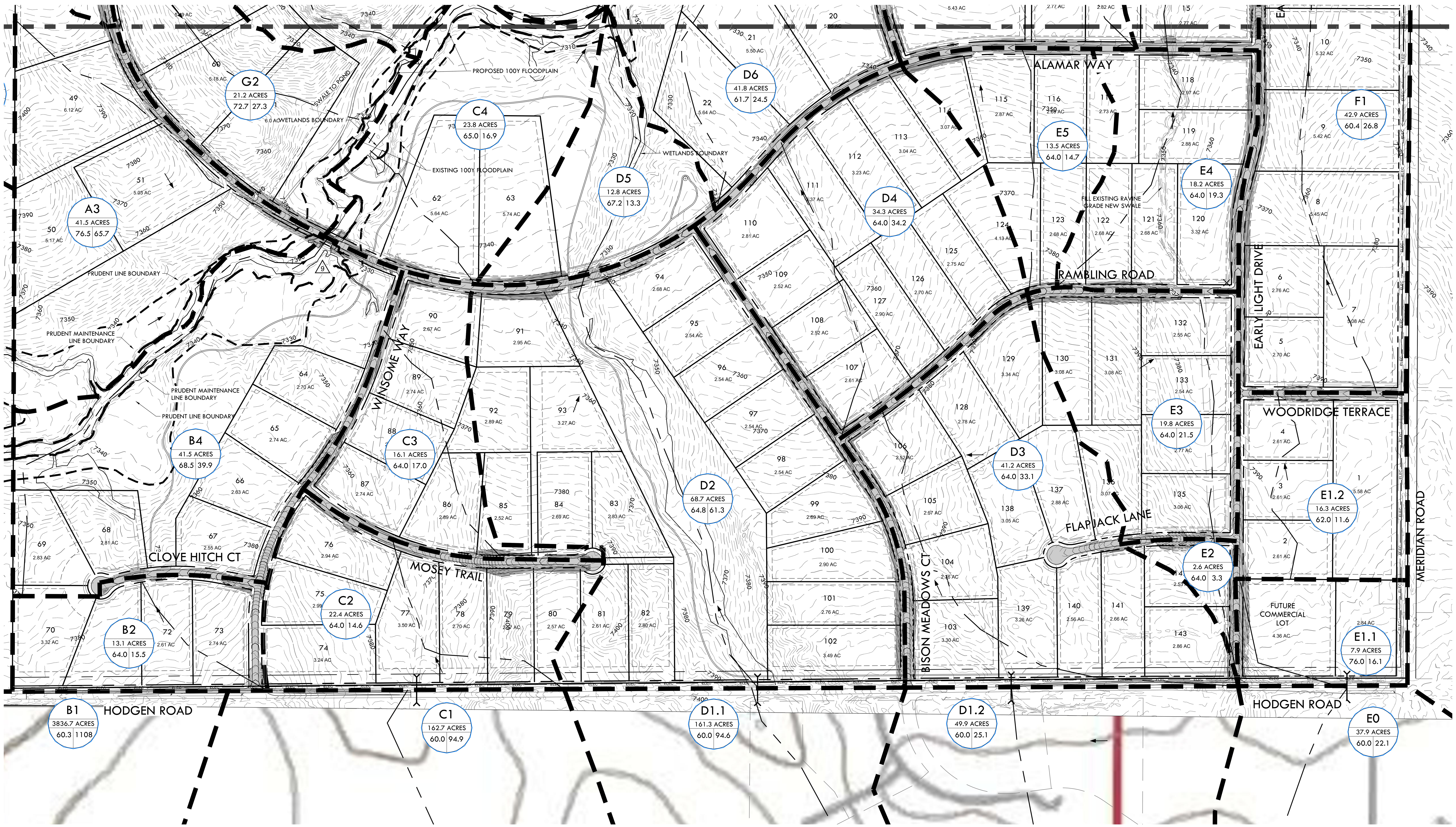
P6 OUTFALL Q5=0.7CFS Q100=18.0CFS

9 BOX CULVERT 1 Q100=2062.2CFS

NOTES:

1. EXISTING FLOODPLAIN AS SHOWN BASED ON FIRM MAP #08041C0350G PANEL 350 REVISED 12/7/2018, GENERATED BY GRAPHICAL OVERLAY.

MATCH LINE - SEE SHEET C2.2 - PROPOSED DRAINAGE PLAN - NORTH



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COLORADO LICENSED 43911 5/16/19

PROPOSED DRAINAGE PLAN - SOUTH

SITE: 17480 MERIDIAN ROAD ELBERT, COLORADO 80106

FOR: PT MCCUNE, LLC 1864 WOODMORE DR, SUITE 100 MONUMENT, COLORADO 80132

NO.	REVISIONS
1	1/11/19 PRELIMINARY RESUBMITTAL
2	3/8/19 PRELIMINARY RESUBMITTAL
3	4/11/19 PRELIMINARY RESUBMITTAL
4	5/10/19 PRELIMINARY RESUBMITTAL
5	5/16/19 PRELIMINARY RESUBMITTAL
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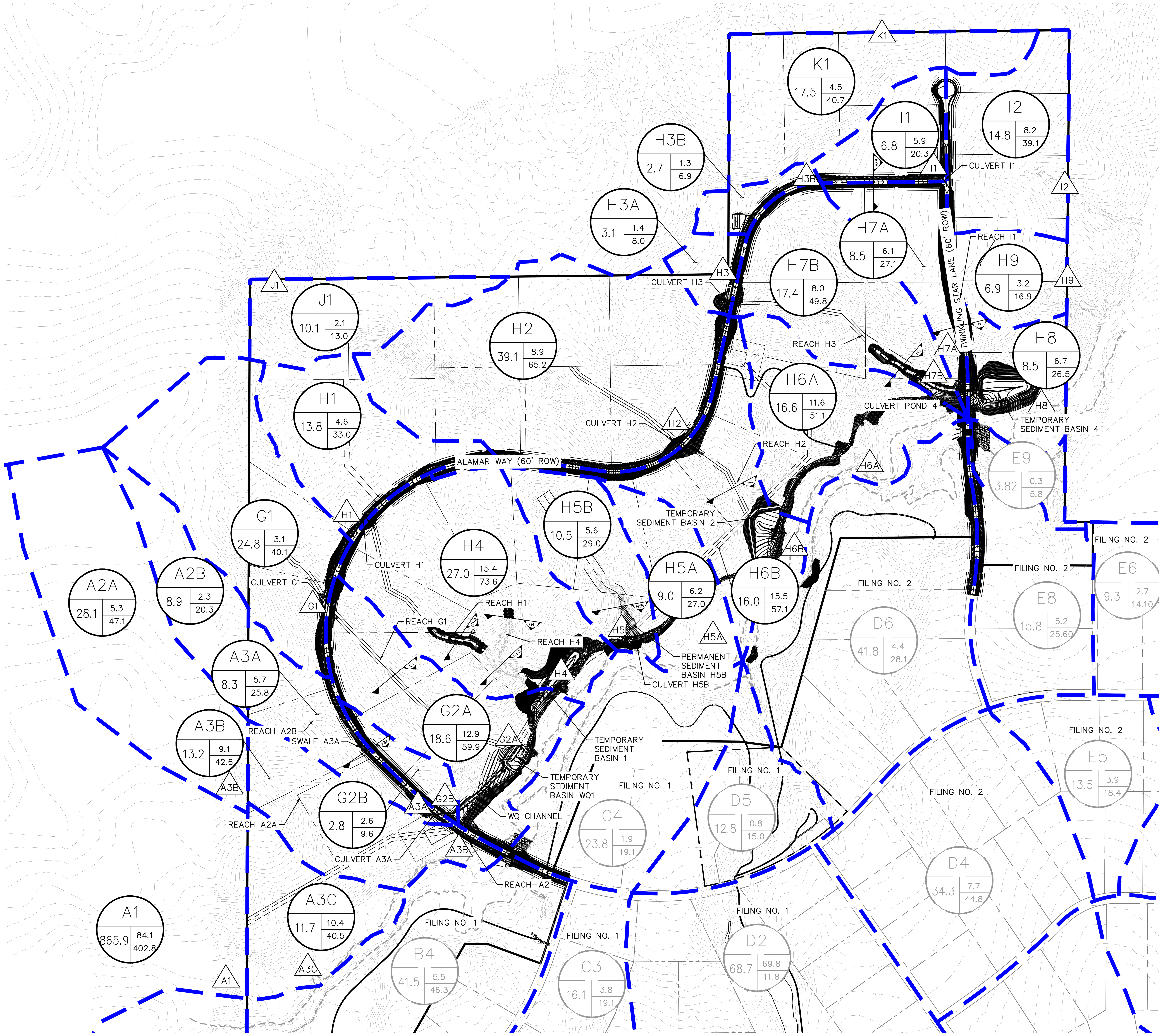
DATE: 1/11/19
DRAWN BY: JCP
CHECKED BY: LPV
JOB #: 49388

C2.3

PCD FILE NO SP-18-006

APPENDIX E: DRAINAGE MAPS



LEGEND

DRAINAGE BASIN AREAS

FILING 3 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

FILING 1&2 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

E0 CULVERT DESIGN POINT

EXISTING CONTOURS

PROPOSED CONTOURS

FLOW ARROW

E4 CHANNEL CROSS SECTION

DEVELOPED RUNOFF					
Design Point	Basin	Direct Runoff (CFS)		Routed Flowrates (CFS)	
		Q5	Q100	Q5	Q100
A2A	A2A	5.3	47.1		
A3B	A2A+A3B	9.1	42.6		
A2B	A2B	2.3	20.3		
A3A	A3A+A2B	5.7	25.6	8.0	45.9
G2B	G2B	2.6	9.6		
G1	G1	3.1	40.1		
G2A	G2A+G1	12.9	59.9	16.0	100
WQ Pond	DP_G2B+DP_G2A+DP_A3A			24.0	145.9
H1	H1	4.6	33		
H4	H1+H4	15.4	73.6	20.0	106.6
Pond 1				20.0	106.6
H5B	H5B	5.6	29		
H5A	H5A	6.2	27		
H2	H2	8.9	65.7		
H6B	H6B+H2	15.5	57.1	24.4	122.8
Pond 2				24.4	122.8
H6A	H6A	11.6	51.1		
H3A	H3A	1.4	8.0		
H7B	H3A+H7B	8.0	49.8	9.4	57.8
H3B	H3B	1.3	6.9		
I1	I1+H3B	5.9	20.3	7.2	27.2
H7A	H7A	6.1	27.1		
Pond 4	DP_H7A+DP_H7B+DP_I1			20.0	97.2
OUT-1				420	1958
Reach 6-Kiowa				420	1959

NORTH

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DRAWN BY: JRH
CHECKED BY: KRK
DATE: 9/3/2021

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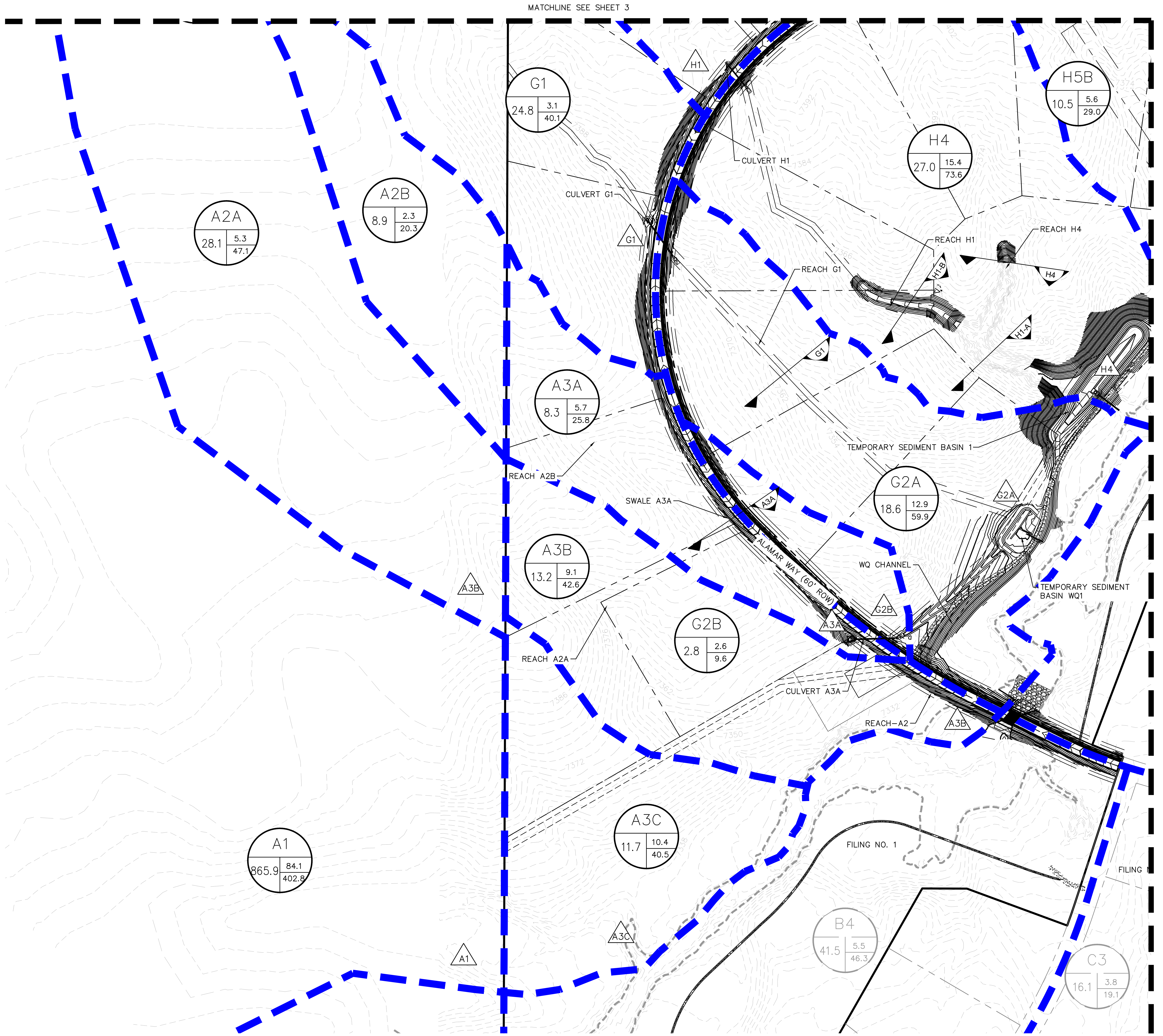

LEGEND

DRAINAGE BASIN AREAS

FILING 3 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

FILING 1&2 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

E0 CULVERT DESIGN POINT

EXISTING CONTOURS

PROPOSED CONTOURS

FLOW ARROW

E4 CHANNEL CROSS SECTION

DEVELOPED RUNOFF					
Design Point	Basin	Direct Runoff (CFS)		Routed Flowrates (CFS)	
		Q5	*Q100*	*Q5*	*Q100*
A2A	A2A	5.3	47.1		
A3B	A2A+A3B	9.1	42.6		
A2B	A2B	2.3	20.3		
A3A	A3A+A2B	5.7	25.6	8.0	45.9
G2B	G2B	2.6	9.6		
G1	G1	3.1	40.1		
G2A	G2A+G1	12.9	59.9	16.0	100
WQ Pond	DP_G2B+DP_G2A+DP_A3A			24.0	145.9
H1	H1	4.6	33		
H4	H1+H4	15.4	73.6	20.0	106.6
Pond 1				20.0	106.6
H5B	H5B	5.6	29		
H5A	H5A	6.2	27		
H2	H2	8.9	65.7		
H6B	H6B+H2	15.5	57.1	24.4	122.8
Pond 2				24.4	122.8
H6A	H6A	11.6	51.1		
H3A	H3A	1.4	8.0		
H7B	H3A+H7B	8.0	49.8	9.4	57.8
H3B	H3B	1.3	6.9		
I1	I1+H3B	5.9	20.3	7.2	27.2
H7A	H7A	6.1	27.1		
Pond 4	DP_H7A+DP_H7B+DP_I1			20.0	97.2
OUT-1				420	1958
Reach 6-Kiowa				420	1959

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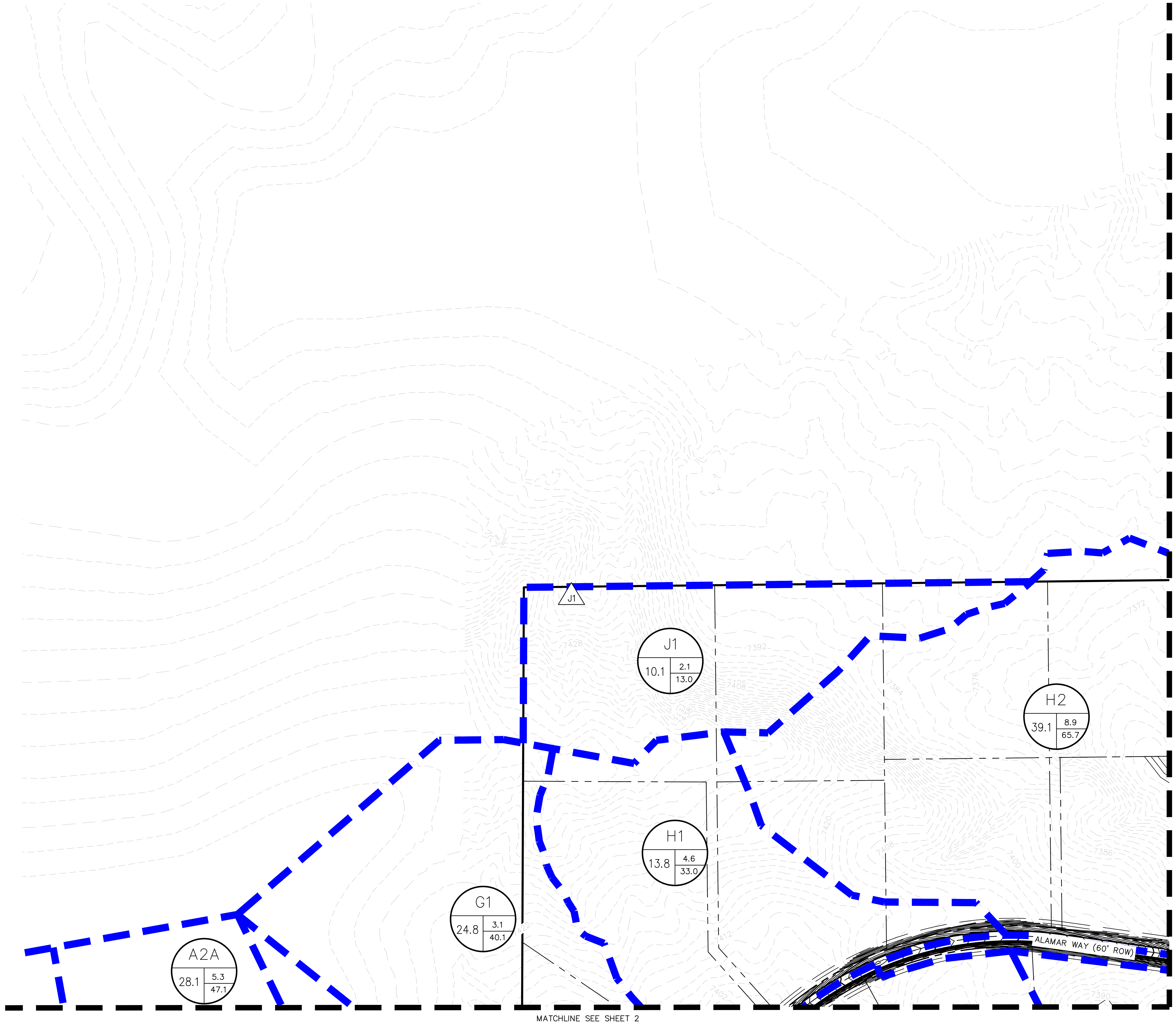

LEGEND

DRAINAGE BASIN AREAS

FILING 3 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

FILING 1&2 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

E0 CULVERT DESIGN POINT

EXISTING CONTOURS

PROPOSED CONTOURS

FLOW ARROW

E4 CHANNEL CROSS SECTION

DEVELOPED RUNOFF					
Design Point	Basin	Direct Runoff (CFS)		Routed Flowrates (CFS)	
		Q5	*Q100*	*Q5*	*Q100*
A2A	A2A	5.3	47.1		
A3B	A2A+A3B	9.1	42.6		
A2B	A2B	2.3	20.3		
A3A	A3A+A2B	5.7	25.6	8.0	45.9
G2B	G2B	2.6	9.6		
G1	G1	3.1	40.1		
G2A	G2A+G1	12.9	59.9	16.0	100
WQ Pond	DP_G2B+DP_G2A+DP_A3A			24.0	145.9
H1	H1	4.6	33		
H4	H1+H4	15.4	73.6	20.0	106.6
Pond 1				20.0	106.6
H5B	H5B	5.6	29		
H5A	H5A	6.2	27		
H2	H2	8.9	65.7		
H6B	H6B+H2	15.5	57.1	24.4	122.8
Pond 2				24.4	122.8
H6A	H6A	11.6	51.1		
H3A	H3A	1.4	8.0		
H7B	H3A+H7B	8.0	49.8	9.4	57.8
H3B	H3B	1.3	6.9		
I1	I1+H3B	5.9	20.3	7.2	27.2
H7A	H7A	6.1	27.1		
Pond 4	DP_H7A+DP_H7B+DP_I1			20.0	97.2
OUT-1				420	1958
Reach 6-Kiowa				420	1959

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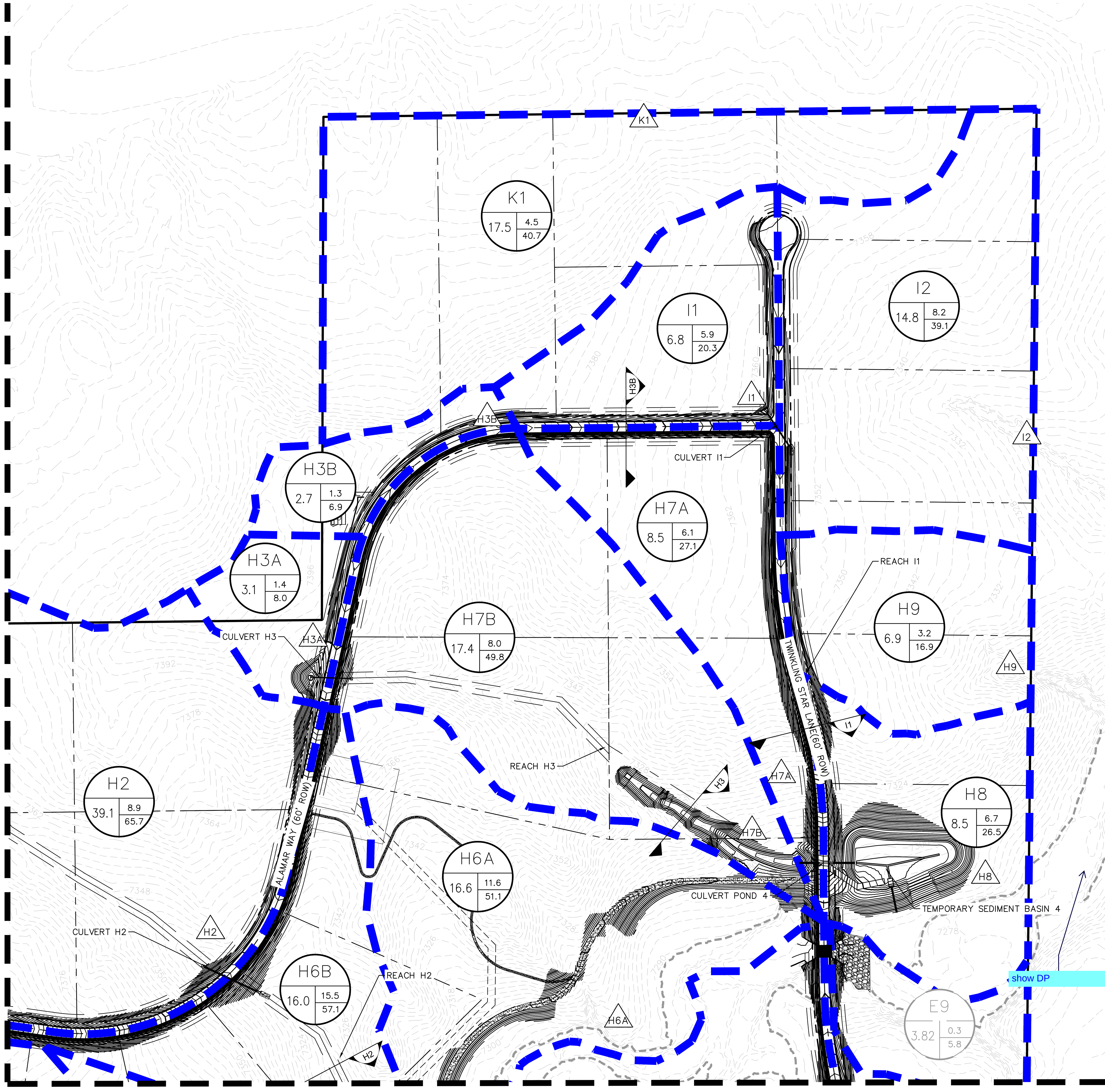

LEGEND

DRAINAGE BASIN AREAS

FILING 3 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
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FILING 1&2 BASINS
A – HEC–HMS BASINS
B – BASIN ACREAGE
C – 5–YR RUNOFF
D – 100–YR RUNOFF

E0 CULVERT DESIGN POINT

EXISTING CONTOURS

PROPOSED CONTOURS

FLOW ARROW

E4 CHANNEL CROSS SECTION

DEVELOPED RUNOFF

Design Point	Basin	Direct Runoff (CFS) Q5	Direct Runoff (CFS) Q100	Routed Flowrates (CFS) Q5	Routed Flowrates (CFS) Q100
A2A	A2A	5.3	47.1		
A3B	A2A+A3B	9.1	42.6		
A2B	A2B	2.3	20.3		
A3A	A3A+A2B	5.7	25.6	8.0	45.9
G2B	G2B	2.6	9.6		
G1	G1	3.1	40.1		
G2A	G2A+G1	12.9	59.9	16.0	100
WQ Pond	DP_G2B+DP_G2A+DP_A3A			24.0	145.9
H1	H1	4.6	33		
H4	H1+H4	15.4	73.6	20.0	106.6
Pond 1				20.0	106.6
H5B	H5B	5.6	29		
H5A	H5A	6.2	27		
H2	H2	8.9	65.7		
H6B	H6B+H2	15.5	57.1	24.4	122.8
Pond 2				24.4	122.8
H6A	H6A	11.6	51.1		
H3A	H3A	1.4	8.0		
H7B	H3A+H7B	8.0	49.8	9.4	57.8
H3B	H3B	1.3	6.9		
I1	I1+H3B	5.9	20.3	7.2	27.2
H7A	H7A	6.1	27.1		
Pond 4	DP_H7A+DP_H7B+DP_I1			20.0	97.2
OUT-1				420	1958
Reach 6-Kiowa				420	1959

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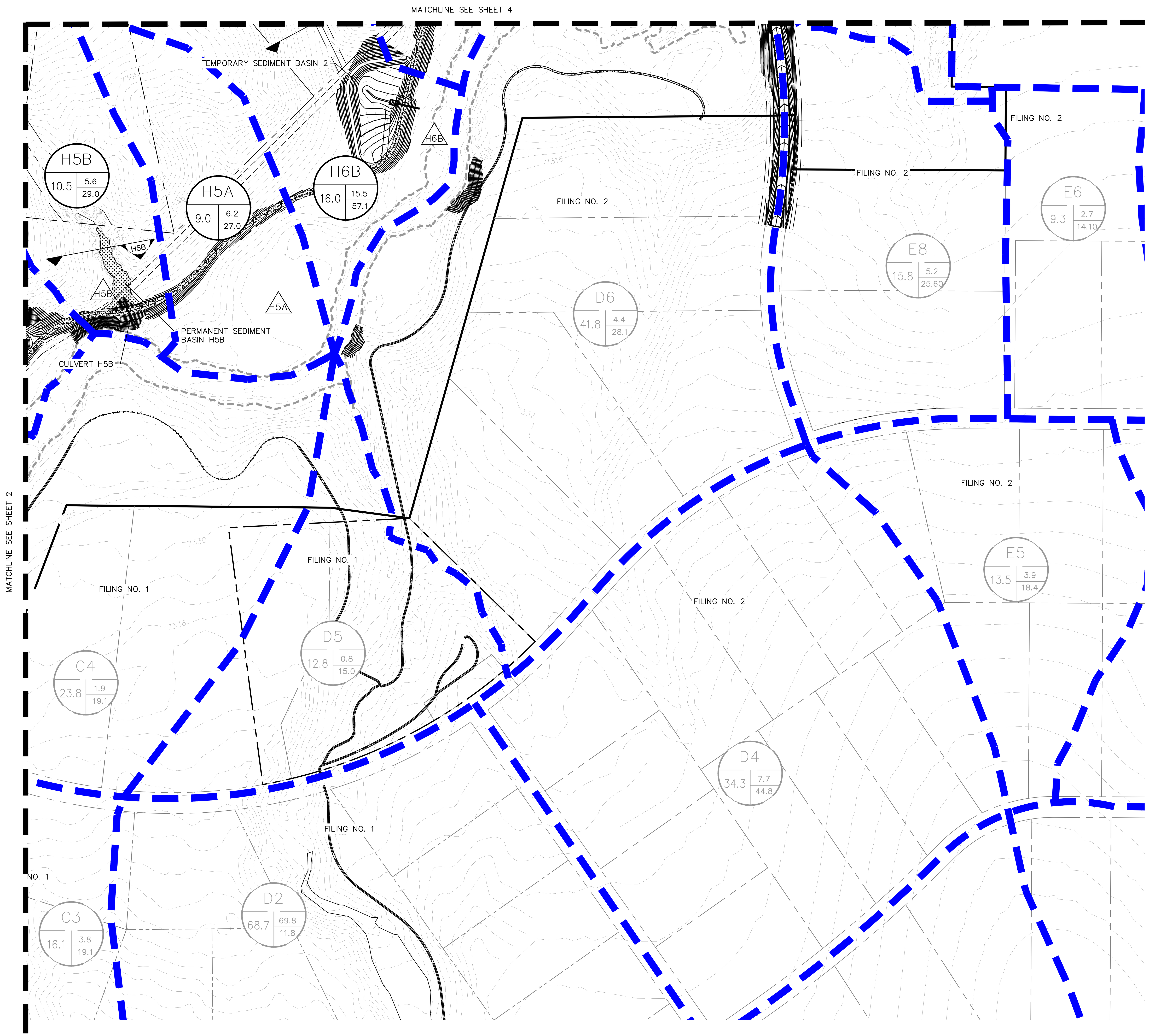

LEGEND

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E0 CULVERT DESIGN POINT

EXISTING CONTOURS

PROPOSED CONTOURS

FLOW ARROW

E4 CHANNEL CROSS SECTION

DEVELOPED RUNOFF					
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A3B	A2A+A3B	9.1	42.6		
A2B	A2B	2.3	20.3		
A3A	A3A+A2B	5.7	25.6	8.0	45.9
G2B	G2B	2.6	9.6		
G1	G1	3.1	40.1		
G2A	G2A+G1	12.9	59.9	16.0	100
WQ Pond	DP_G2B+DP_G2A+DP_A3A			24.0	145.9
H1	H1	4.6	33		
H4	H1+H4	15.4	73.6	20.0	106.6
Pond 1				20.0	106.6
H5B	H5B	5.6	29		
H5A	H5A	6.2	27		
H2	H2	8.9	65.7		
H6B	H6B+H2	15.5	57.1	24.4	122.8
Pond 2				24.4	122.8
H6A	H6A	11.6	51.1		
H3A	H3A	1.4	8.0		
H7B	H3A+H7B	8.0	49.8	9.4	57.8
H3B	H3B	1.3	6.9		
I1	I1+H3B	5.9	20.3	7.2	27.2
H7A	H7A	6.1	27.1		
Pond 4	DP_H7A+DP_H7B+DP_I1			20.0	97.2
OUT-1				420	1958
Reach 6-Kiowa				420	1959

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