Galloway

~~FINAL~~ DRAINAGE REPORT

BENT GRASS RESIDENTIAL SUBDIVISION

FILING NO. 2

~~(SF-19-014)~~

Preliminary Drainage Report.
EGP-19-005

El Paso County, Colorado

Please consider naming this a preliminary drainage report (PDR) since we need a drainage report to accompany a EGP submittal. Then several of our comments can be addressed in the FDR. For the Final Plat submittal.
Identify it as Shown above.

PREPARED FOR:
Challenger Homes
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
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DATE:
July 2019
Revised October 2019

Engineering Review

11/18/2019 2:39:50 PM
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EPC Planning & Community Development Department

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 Drainage Criteria Manual for the City of Colorado Springs and El Paso County. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

COLORADO LICENSED
SCOTT MICHAEL BROWN
45900
PROFESSIONAL ENGINEER

Scott Brown, PE 45900 — Date
For and on behalf of Galloway & Company, Inc.

10/21/2019

DEVELOPER'S CERTIFICATION

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

By:________________________________ ________________
Date

Address: Challenger Homes
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

DEVELOPER'S CERTIFICATION

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 Adminstrator

Conditions:

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I. Purpose

The intent of the developer is to develop the residential portion of the Bent Grass Subdivision. The purpose of this Final Drainage Report is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site, and to identify which types of drainage facilities will be needed and where they will be located. This report will remain in general compliance with the previously approved MDDP for the site prepared by Galloway & Company.

II. General Description

The project is a single-family residential development located in the Falcon area of El Paso County, Colorado. The site is located in the Northwest ¼ and Southwest ¼ of Section 1, Township 13S, Range 65W, of the Sixth Principal Meridian, County of El Paso, State of Colorado. The subject property is located to the south of The Meadows Filing No. 3; west of Bent Grass Residential Filing No. 1; north of Latigo Business Center Filing No 1, undeveloped property, and the Mountain View Electric Association; and east of The Meadows Filing No. 2. A Vicinity Map is included in Appendix A.

A Planned Unit Development Plan Amendment has already been approved for the site, PUD-14-002. This Development Plan is the basis for the drainage facility design contained within this MDDP. The site consists of approximately 103.4 acres and includes 309 dwelling units.

The existing soil types within the proposed site as determined by the NRCS Web Soil Survey for El Paso County Area consist of Columbine gravelly sandy loam, Blakeland-Fluvaquentic Haplaquolls, and Blakeland loamy sand. All soils are defined as having a hydrologic soil group of A. See the soils map included in Appendix A.

III. Previous Reports

The proposed site has been included in multiple drainage studies in the past. The following is a composite list of the existing reports pertaining to this site analysis.

1. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
2. *Master Development Drainage Plan – Bent Grass Residential Subdivison*, by Galloway & Company, May 2019.
3. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
4. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
5. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
6. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
7. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
8. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.

9. *Final Drainage Letter Report for Lot 1, Latigo Business Center Filing No. 1*, by Colorado Design Concepts, April 2005.
10. *Final Drainage and Erosion Control for The Meadows Filing Three Subdivision* , by LADD Engineering, July 2000.

IV. Drainage Criteria

Hydrology calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

The drainage calculations were based on the criteria manual Figure 6-5 and IDF equations to determine the intensity, and are listed in Table 1 below.

Table 1 - Precipitation Data

Return Period	One Hour Depth (in).	Intensity (in/hr)
5-year	1.50	5.17
100-year	2.52	8.68

The rational method was used to calculate peak flows as the tributary areas are less than 100 acres. The rational method has been proven to be accurate for basins of this size and is based on the following formula:

$Q = CIA$

Where:

Q = Peak Discharge (cfs)
C = Runoff Coefficient
I = Runoff intensity (inches/hour)
A = Drainage area (acres)

The runoff coefficients are calculated based on land use, percent imperviousness, and design storm for each basin, as shown in the drainage criteria manual (Table 6-6). Composite percent impervious and C values were calculated using the residential, streets, roofs, and lawns coefficients found in Table 6-6 of the manual.

The 100-year event was used as the major storm event for pipes and inlets. The 5-year event was used as the minor event.

For the preliminary design of the channels HEC-RAS version 5.0.3 was utilized. The model was prepared to evaluate velocity, Froude number, and channel depth. Additionally, the model was utilized to size the culverts under Bent Grass Meadows Parkway. A Manning's n value of 0.045 was utilized for the channel which is appropriate for a bunch type native grass that is anticipated within the full channel section. The channels were designed to have a maximum depth of 5' per the criteria manual and have a maximum velocity of 5 ft/s with a maximum Froude number of 0.6.

The UD-Detention spreadsheet was utilized for sizing the water quality orifices on the proposed water quality portion of the regional detention pond. This spreadsheet was also utilized for the design of the proposed on-site water quality ponds, Pond (North) and Pond (South).

HEC-HMS will be utilized to analyze the hydrology of the overall basin and verify that no changes in release rates have occurred to the regional detention pond with it's addition of water quality.

UD-Inlet was utilized to calculate both the street capacities and the inlet capacities.

StormCAD was utilized to size the storm sewer systems.

V. Existing Drainage Conditions

The site is contained fully within one major drainage basin; the West Falcon Tributary. The site does border the Middle Falcon Tributary along the eastern edge of the property. The site generally drains from north to south with an average slope of 2% outside of the channel. The rational method was used to analyze the individual basins within the site because their size permits it. Excerpts from the DBPS are included in Appendix A.

In addition to the DBPS, The Ranch MDDP to the north and west of the site has revisited their existing conditions as well as existing conditions from the site directly to the north of them. Several detention ponds have been created within the Paint Brush Hills Subdivision which revise the offsite flow entering the site within the major drainageway. This is taken into account with The Ranch MDDP. While The Ranch is still in design stage they are proposing detention ponds within their site to release at historic rates. This will revise the flow rates in their designed section of the channel to below the rates that are identified within the DBPS. A HEC-HMS model will be prepared with subsequent submittals updating the existing flow rates within the channel (as well as the proposed flow rates).

Per the DBPS the site lies within the basins, WT200, WT210, and WT220. These basins connect to channel reaches RWT202, RWT204, and RWT210. Both the RWT204 and RWT210 sections of channel currently exist and appear as a drainageway when visiting the site. Reach RWT202 appears to be a shallow overland flow through the project site. It is nearly unrecognizable through the site from a visual standpoint.

The existing channels have been visually inspected via a site walk and all appear in really good condition. There are no signs of scour within the bottoms of the channel. There are small areas that are incised or sloughing at the top of bank of the channel. These areas are less than 12" in height.

There is a small depression at the north end of the site, it appears to be the remnants of an old stock pond. It provides no detention or water quality for the upstream area. It will be removed with the development of this site.

There is an existing sediment pond located to the east of the site, on what is known as the "School Site." This sediment pond was designed with the FDR Addendum for Bent Grass Residential Filing 1 and works for existing conditions. A permanent pond will need to be provided upon development of this site. Drainage basins OS-5 and OS-6 in the provided Proposed Drainage Maps (Appendix G) represent these areas.

A historic basin map has been prepared for this site to analyze the existing basins as well as the offsite basins contributing to the site. The historic map is included in Appendix G and basins are described below.

Basin A-1 (5.42 AC, Q_5 = 2.2 cfs, Q_{100} = 12.4cfs): is associated with the northeastern portion of the proposed site. The basin is currently undeveloped. Runoff from the basin generally flows to the southeast, into the property to the east.

Basin A-2 (18.00 AC, Q_5 = 5.3 cfs, Q_{100} = 35.4 cfs): is associated with the northeastern portion of the proposed site. The basin is currently undeveloped. Runoff from the basin generally flows to the southwest into the existing channel.

Basin A-3 (19.59 AC, Q_5 = 6.0 cfs, Q_{100} = 40.7 cfs): is associated with the northwestern portion of the proposed site. The basin is currently undeveloped. Runoff from the basin generally flows to the south toward the Latigo Business Center Filing No. 1.

Basin B-1 (35.53 AC, Q_5 = 9.6 cfs, Q_{100} = 64.2 cfs): is associated with the southeastern portion of the proposed site. The basin is currently undeveloped. Runoff from the basin generally flows to the south offsite.

Basin B-2 (4.51 AC, Q_5 = 1.5 cfs, Q_{100} = 10.0 cfs): is associated with a portion of the middle of the site. The basin is currently undeveloped. Runoff from the basin generally flows to the southeast into the existing channel.

Basin B-3 (16.18 AC, Q_5 = 7.8 cfs, Q_{100} = 36.9 cfs): is associated with the southwestern portion of the proposed site. The basin is currently undeveloped. Runoff from the basin generally flows to the southeast into the existing channel.

VI. Four Step Process

The Four Step Process is used to minimize the adverse impacts of urbanization and is a vital component of developing a balanced, sustainable project. Below identifies the approach to the four-step process:

1. Employ Runoff Reduction Practices

The proposed development uses Low Impact Development (LID) practices to reduce runoff at the source. Rather than creating point discharges that are directly connected to impervious areas, runoff is routed through pervious areas to promote infiltration. Grass buffers and swales are used where practical.

2. Implement BMPs That Provide a Water Quality Capture Volume with Slow Release

This step utilizes formalized water quality capture volume to slow the release of runoff from the site. Pond WU will be modified to provide EURV and WQCV for its entire tributary area. The EURV volume will release in 72 hours, while the WQCV will release in no less than 40 hours. On-site water quality control volume detention ponds will provide water quality treatment prior to the runoff being released into the channel.

3. Stabilize Drainageways

This step implements stabilization to channels to accommodate developed flows while protecting infrastructure and controlling sediment loading from erosion in the drainageways. Erosion protection in the form of riprap pads at all outfall points to the channel to prevent scouring of the channel from point discharges. A HEC-RAS model has been created and used to evaluate the stability of the existing and proposed channels. It has been determined that given that the channel is stable in its current state and the proposed velocities and Froude numbers are similar to those in the existing channel, no improvements will be made to the channel at this time. This will be further discussed later in this report.

See comment on drainage map concerning channel improvements.

4. Implement Site Specific and Other Source Control BMPs

Source control BMPs for homeowners include the use of garages as the primary area where pollutants can be stored. The single-family detached homes provide garages which can act as storage areas. The proposed development does not include outdoor storage or the potential for introduction of contaminants to the city's MS4, thus no targeted source control BMPs are necessary. The biggest source control BMP is public education which can be found on the City of Colorado Springs website and discuss topics such as: pet waste, car washing, lawn care, fall leaves, and snow melt and deicer.

VII. Proposed Drainage Conditions

There has been very minor change to the overall Falcon Area Basin delineation with the proposed condition. A small portion of the site that previously went to the Middle Tributary has been revised to come into the site and a small portion of the site that was previously within the West Tributary has been designed to drain into the Middle Tributary. This will be discussed with the individual basins. All necessary calculations can be found within the appendices of the report.

According to the DBPS, there are two channels that run through the site. As was discussed within the Existing Conditions portion of the report both the RWT202 and RWT204 run through the site. The RWT202 channel will be rerouted on the north end, prior to entering the site, to flow in the existing RWT204 channel. The proposed development will drain to the RWT204 channel, which becomes RWT210 further south in the site. Because Bent Grass Meadows Parkway is being constructed, (2) 16' x 6' concrete box culverts for RWT204 will be installed with this project. This will be installed in its ultimate location.

The DBPS alternative that was approved shows a small sub regional pond (SR3) to provide EURV for a portion of the tributary area. The basin analysis provided in the DBPS shows no decrease in either the 2-year or the 100-year events through this point. It has been discussed with El Paso County to provide detention ponds that only treat the Water Quality Capture Volume (WQCV) but in lieu of that revise the existing detention pond WU South to provide water quality for the entire tributary area. This modification will be discussed later in the report.

The site will provide WQCV Detention Ponds to provide water quality treatment prior to discharging the runoff directly into the West Tributary channel RWT204.

As has been mentioned previously the site is proposed to be single family residential. The site has been designed to provide a large lot buffer between the existing large lots to the north and west of the site and the proposed site. Beyond this buffer the majority of the site is smaller approximately 1/8 acre lots.

Basin OS-1 (32.28 AC, Q5 = 15.1 cfs, Q100 = 65.1 cfs): a basin that is associated with The Meadows Filing No. 3 lots 7, 10, 11, 12, 13, 14, 15, 16, and 17. Runoff from this basin sheet flows south to the northern property line of the site to Proposed Swale - A that will convey flows directly to the existing RWT204.

Basin A-1 (2.70 AC, Q5 = 3.3 cfs, Q100 = 8.6 cfs): a basin that is in the northeast corner of the site. It encompasses single-family residential lots (Type A and B) along Ansley Court. Runoff will flow from each lot onto Ansley Court where proposed mountable curb and gutter will convey flows to **DP-1**. Flows will then be conveyed West by mountable curb and gutter to DP-2.

Basin A-2 (1.19 AC, Q5 = 1.5 cfs, Q100 = 4.1 cfs): a basin that is in the northeast area of the site. It encompasses single-family residential lots (Type A) along Berwyn Court. Runoff will flow from each lot onto Berwyn Court where proposed mountable curb and gutter will convey flows to **DP- 2**. Flows will then be conveyed South by mountable curb and gutter to DP-3.

Basin A-3 (1.57 AC, Q5 = 2.0 cfs, Q100 = 5.0 cfs): a basin that is in the northeast area of the site. It encompasses single-family residential lots (Type A and B) along Niebrara Drive and Berwyn Court. Runoff will flow from each lot onto Niebrara Drive and Berwyn Court where proposed mountable curb and gutter will convey flows to **DP-3**. Flows will then be conveyed West by a proposed cross pan to DP-4.

Basin A-4 (2.24 AC, Q5 = 2.9 cfs, Q100 = 7.5 cfs): a basin that is in the northeast area of the site. It encompasses single-family residential lots (Type A and B) along Berwyn Court and a small portion of Willmore Drive. Runoff will flow from each lot onto Berwyn Court where proposed mountable curb and gutter will convey flows to **DP-4**. Flows will then be conveyed West along Bent Grass Meadows Drive by curb and gutter to DP-8.

Basin E-1 (1.71 AC, Q5 = 3.6 cfs, Q100 = 7.6 cfs): a basin that is in the center of the site and encompasses a portion of Bent Grass Meadows Drive. A high point on the far East of the basin forces water to flow to a low point at **DP-8**, which represents a 20’ CDOT Type R sump inlet, which conveys stormwater via proposed 36” RCP storm sewer to the north water quality detention pond. Emergency overflow will spill over the crown of the road and enter into a proposed 10’ CDOT Type R sump inlet represented by DP-7.

Basin D-2 (3.19 AC, Q5 = 3.9 cfs, Q100 = 5.7 cfs): a basin that is in the northwest area of the site. It is undeveloped and covered in native grasses, weeds, rock, and shrubs. Runoff from this basin sheet flows from North to South along grades between 2.5 and 6.5 percent. Small portions of the basin will flow directly into RWT202. Most of this basin sheet flows from north to south and collects at **DP-5**. Flows will then be conveyed East by a proposed cross pan to DP-6.

Basin D-1 (12.49 AC, Q5 = 13.7 cfs, Q100 = 36.6 cfs): a basin that is in the northwest area of the site. It is undeveloped and covered in native grasses, weeds, rock, and shrubs. Runoff from this basin sheet flows from North to South along grades between 2.5 and 6.5 percent. Small portions of the basin will flow directly into RWT204. Most of this basin sheet flows from north to south and collects at **DP-6**. Flows will then be conveyed East along Bent Grass Meadows Drive by curb and gutter to DP-8.

Basin E-2 (0.68 AC, Q5 = 2.4 cfs, Q100 = 4.6 cfs): a basin that is in the center of the site and encompasses a portion of Bent Grass Meadows Drive. A high point on the far West of the basin forces water to flow to a low point at **DP-8**, which represents a 20’ CDOT Type R sump inlet, which conveys stormwater via a proposed 36” RCP storm sewer to the north water quality detention pond. Emergency overflow will spill over the crown of the road and enter into a proposed 10’ CDOT Type R sump inlet represented by DP-7.

Basin E-3 (0.78 AC, Q5 = 2.9 cfs, Q100 = 5.3 cfs): a basin that is in the center of the site and encompasses a portion of Bent Grass Meadows Drive. A high point on the far West of the basin forces water to flow to a low point at **DP-7**, which represents a 10’ CDOT Type R sump inlet, which conveys stormwater via a proposed 24” storm sewer to **DP-8**. This inlet receives emergency overflow from DP-8.

Basin B-3 (0.46 AC, Q5 = 1.1 cfs, Q100 = 2.3 cfs): a basin that is in the North-central area of the site. It encompasses the fronts of two single family Type A lots, and a large portion of Silky Thread Road. Runoff will flow form each lot onto Silky Thread Road where proposed mountable curb and gutter will convey flows west into temporary Proposed Swale - B. Flows will continue West and then South to **DP-14** where it will enter the north water quality detention pond.

Basin B-4 (1.19 AC, Q5 = 0.4 cfs, Q100 = 2.5 cfs): a basin that is in the North-central area of the site, and a portion of The Meadows Filing No. 3 lot 13. Runoff from this basin sheet flows until it is intercepted by temporary Proposed Swale - B just West of Silky Thread Road. Once intercepted, flows will be routed West and then South to **DP-14** into the north water quality detention pond.

Basin B-1 (4.46 AC, Q5 = 6.6 cfs, Q100 = 14.0 cfs): a basin that is in the northeast area of the site. It encompasses single-family residential Type A lots along Thedford Court and Willmore Drive. Runoff will flow from each lot onto the street where proposed mountable curb and gutter will convey flows South and then West to **DP-11**.

Basin B-2 (1.17 AC, Q5 = 2.0 cfs, Q100 = 4.3 cfs): a basin that is in the northeast area of the site. It encompasses the fronts of single-family residential Type B lots along Willmore Drive. Runoff will flow from each lot onto the street where proposed mountable curb and gutter will convey flows West to **DP-12**.

Basin B-5 (1.56 AC, Q5 = 0.5 cfs, Q100 = 3.7 cfs): a basin that is in the northeast area of the site. It is undeveloped and covered in native grasses, weeds, rock, and shrubs. Runoff from this basin sheet flows from North to South along grades around 2 percent. Runoff will be intercepted by temporary Proposed Swale B and C that will convey flows to **DP-14** into the north water quality detention pond.

Basin B-6 (0.62 AC, Q5 = 0.2 cfs, Q100 = 1.5 cfs): a basin that is in the northeast area of the site adjacent to RWT204. It encompasses the proposed north water quality detention pond. Runoff will sheet flow directly into the pond. The pond will outfall to RWT204.

Basin C-5 (7.86 AC, Q5 = 10.9 cfs, Q100 = 24.9 cfs): a basin that is in the southeast area of the site. It encompasses single-family residential lots, Type A lots along Feather Reed Drive and Avena Road. Runoff will flow from each lot onto the street where proposed mountable curb and gutter will convey flows West and then South to a proposed on-grade 15’ CDOT Type R inlet, **DP-16**. Captured flow will convey stormwater via a proposed 24” RCP storm sewer to DP-17. By-pass flow will continue down Feather Reed Drive to DP-18 where 5 yr. and 100 yr. flows will be completely captured by a 20’ CDOT Type R sump inlet.

Basin C-6 (5.54 AC, Q5 = 6.9 cfs, Q100 = 16.9 cfs): a basin that is in the southeast area of the site. It encompasses single-family residential lots, Type A lots along the North portion of Feather Reed Drive and Type A lots along the South portion of Feather Reed Drive. Runoff will flow from each lot onto Feather Reed Drive where proposed mountable curb and gutter will convey flows West and then South to a proposed on-grade 10’ CDOT Type R inlet, **DP-17**. Captured flow will convey stormwater via a proposed

30" RCP storm sewer to DP-19A. By-pass flow will continue down Feather Reed Drive to DP-19 where 5 yr. and 100 yr. flows will be completely captured by a 20' CDOT Type R sump inlet.

Basin C-3 (2.38 AC, Q5 = 3.4 cfs, Q100 = 7.9 cfs): a basin that is in the southeast area of the site. It encompasses single-family residential lots, Type A lots along Berwyn Drive. Runoff will flow from each lot onto the street where proposed mountable curb and gutter will convey flows West to a proposed 20' CDOT Type R sump inlet, **DP-18**. 5 yr. and 100 yr. flows will be completely captured and then conveyed via a proposed 30" RCP storm sewer to DP-19.

Basin C-4 (3.61 AC, Q5 = 5.2 cfs, Q100 = 12.0 cfs): a basin that is in the southeast area of the site. It encompasses single-family residential lots, Type A lots along Bossett Drive. Runoff will flow from each lot onto the street where proposed mountable curb and gutter will convey flows West to a proposed 20' CDOT Type R sump inlet, **DP-18**. 5 yr. and 100 yr. flows will be completely captured and then conveyed via a proposed 30" RCP storm sewer to DP-19.

Basin C-1 (1.35 AC, Q5 = 2.6 cfs, Q100 = 5.8 cfs): a basin that is associated with Bent Grass Residential Filing No. 1 lots 58, 59, 60, 61, 62, 63, 64, 65, and 66. It encompasses the rears of single-family residential lots. Runoff will flow West from each lot into a proposed swale which will convey flows South to Avena Road. Then, proposed mountable curb and gutter will convey flows West and will be routed through basin C-2 along Berwyn Drive to **DP-19**.

Basin C-2 (7.81 AC, Q5 = 8.1 cfs, Q100 = 20.9 cfs): a basin that is in the Southeast corner of the site. It encompasses fronts of single-family residential Type B lots. Runoff will flow from each lot onto Berwyn Drive where proposed mountable curb and gutter will convey flows South and then West to a proposed 20' CDOT Type R sump inlet, **DP-19**, where 5 yr. and 100 yr. flows will be completely captured and then conveyed via a proposed 42" RCP storm sewer pipe to outfall the south water quality detention pond.

Basin C-7 (0.76 AC, Q5 = 0.3 cfs, Q100 = 1.8 cfs): a basin that is in the South-central area of the site adjacent to RWT204 and RWT 210. It encompasses the proposed south water quality detention pond. Runoff will sheet flow directly into the pond. The pond will outfall to RWT210.

Basin C-8 (0.92 AC, Q5 = 0.3 cfs, Q100 = 2.2 cfs): a basin that is in the South-central area of the site adjacent to RWT204 and RWT 210. It encompasses the rears of single-family residential Type B lots. Runoff will sheet flow West directly into RWT204 and RWT210.

Basin OS-2 (20.08 AC, Q5 = 9.1 cfs, Q100 = 43.5 cfs): a basin that is associated with The Meadows Filing No. 2 lots 1, 2, 3, 4, 5, and 6. Runoff from this basin sheet flows from the Northwest to the Southeast until crossing the West property line of the site. The runoff will continue to sheet flow in the same manner through basins D-4 and D-3 until intercepted by Proposed Swale - D on the southern property line of the site. Collected flows will then be routed East to **DP-23** where 5 yr. and 100 yr. flows will be captured by a CDOT Type D area inlet. Flows will then be conveyed by a 36" RCP storm drain piped underneath Bent Grass Meadows Drive out falling into Proposed Swale - E that will route flows South to DP-26 and then East by Proposed Swale – F ultimately outfalling into RWT210.

Basin OS-3 (10.62 AC, Q5 = 4.7 cfs, Q100 = 22.6 cfs): a basin that is associated with The Meadows Filing No. 1 lot 11 and The Meadows Filing No. 2 lots 1 and 2. Runoff from this basin sheet flows from the Northwest to the Southeast until crossing the West property line of the site. The runoff will continue to sheet flow in the same manner through basin D-4 until intercepted by Proposed Swale - D on the southern property line of the site. Collected flows will then be routed East to **DP-23** where 5 yr. and 100

No more than one acre of developed area can outfall into the channel including the new road (bent grass) yr. flows will be captured by a CDOT Type D area inlet. Flows will then be conveyed by a 36" RCP storm drain piped underneath Bent Grass Meadows Drive out-falling into Proposed Swale – E that will route flows South to DP-26 and then ultimately East by Proposed Swale – F into RWT210.

Basin D-4 (9.53 AC, Q5 = 7.1 cfs, Q100 = 23.2 cfs): a basin that is in the West area of the site. Runoff from this basin sheet flows from the Northwest to the Southeast. The runoff be intercepted by Proposed Swale – D on the southern property line of the site. Collected flows will then be routed East to **DP-23** where 5 yr. and 100 yr. flows will be captured by a CDOT Type D area inlet. Flows will then be conveyed by a 36" RCP storm drain piped underneath Bent Grass Meadows Drive out-falling into Proposed Swale – E that will route flows South to DP-26 and then ultimately East by Proposed Swale – F into RWT210.

Basin D-3 (9.16 AC, Q5 = 9.4 cfs, Q100 = 26.2 cfs): a basin that is in the West area of the site. Runoff from this basin sheet flows from the Northwest to the Southeast. A large portion of the runoff will be intercepted by Proposed Swale – D on the southern property line of the site. Collected flows in the swale will then be routed East to **DP-23** where 5 yr. and 100 yr. flows will be captured by a CDOT Type D area inlet. Flows will then be conveyed by a 36" RCP storm drain piped underneath Bent Grass Meadows Drive out-falling into Proposed Swale – E that will route flows South to DP-26 and then East by Proposed Swale – F into RWT210. The rest of flow from the basin sheet flow onto Bent Grass Meadows Drive where proposed curb and gutter will convey flows South where the 5 yr. and 100 yr. flows will be captured by a proposed 25' CDOT Type R on-grade inlet, **DP-24**. Captured flow will be routed by a 24" RCP storm drain piped to DP-25.

Basin E-4 (0.91 AC, Q5 = 3.0 cfs, Q100 = 5.7 cfs): a basin that is in the Southwest area of the site and encompasses a portion of Bent Grass Meadows Drive. Runoff from this basin is almost immediately captured by proposed curb and gutter and then routed South where the 5 yr. and 100 yr. flows will be captured by a proposed 25' CDOT Type R on-grade inlet, **DP-24**. Captured flow will be routed by a 24" RCP storm drain piped to DP-25.

Basin E-5 (0.89 AC, Q5 = 3.3 cfs, Q100 = 6.1 cfs): a basin that is in the Southwest area of the site and encompasses a portion of Bent Grass Meadows Drive. Runoff from this basin is almost immediately captured by proposed curb and gutter and then routed South where the 5 yr. and 100 yr. flows will be captured by a proposed 25' CDOT Type R on-grade inlet, **DP-25**. Captured flow will be routed by a 24" RCP storm drain piped to an outfall at DP-26. Flows will then be routed East by Proposed Swale – F until out-falling into RWT210.

Basin F-1 (0.44 AC, Q5 = 0.6 cfs, Q100 = 1.7 cfs): a basin that is in the Northeast corner of the site. It encompasses the rears of single-family residential Type B lots. Runoff from the basin will follow historical patterns East onto a future school site.

Basin F-2 (0.55 AC, Q5 = 1.8 cfs, Q100 = 3.7 cfs): a basin that is in the east side of the site. It encompasses a portion of Bent Grass Meadows Parkway. There is a high point in the road causing a portion of the road to drain east into the existing roadway. Bent Grass Residential Filing No. 1 had two basins accounting for this condition (Basins A and B with a total area of 0.38 acres). The anticipated flow rate from these two basins was 1.3 cfs in the 5-year event and 2.6 cfs in the 100-year event. The proposed runoff from the proposed slightly exceeds the anticipated runoff in the Filing No. 1 Report.

Basin G-1 (0.98 AC, Q5 = 0.3 cfs, Q100 = 2.3 cfs): a basin that is in the South-east corner of the site. It encompasses the rears of single-family residential Type B lots. Runoff will follow historical patterns and sheet flow South off-site.

No more than one acre of developed area can outfall into the channel including the new road (bent grass)

Basin H-1 (0.31 AC, Q5 = 1.1 cfs, Q100 = 2.1 cfs): a basin that is associated with Latigo Business Center Filing No. 1 lot 1. It encompasses a portion of Bent Grass Meadows Parkway South of the proposed (2) 25' CDOT Type R Inlets on site.

Basin OS-5 (14.13 AC, Q5 = 4.9 cfs, Q100 = 27.5 cfs): a basin that is associated with Bent Grass Filing No. 1. Runoff from this basin sheet flows from the North to the South into basin OS-6 and an existing sediment pond.

Basin OS-6 (5.38 AC, Q5 = 8.8 cfs, Q100 = 19.3 cfs): a basin that is associated with Bent Grass Filing No. 1. Runoff from this basin sheet flows from the North to South to an existing sediment pond. This sediment pond works in existing conditions. A permanent pond will need to be provided upon development of this site.

VIII. Proposed Water Quality Detention Ponds

Two Water Quality Capture Volume Detention Ponds will be provided for the proposed site. One will be provided for the area north of Bent Grass Meadows Drive and the other will be provided for the area to the south. Both ponds are private. These detention ponds will only provide water quality. The EURV and 100-year volumes will be conveyed via the emergency overflow weir. The water quality volume release will be controlled with an orifice plate that will release in 40 hours. The north water quality pond will release into RWT204 and the south will release into RWT210.

We recommend the outlet pipe (s) convey the flows up to 100 yr so the overflow path does not need to have permanent armoring.

IX. Proposed Channel Improvements

As can be seen in the drainage maps the proposed Filing No. 2 does not encroach into the existing channel for the RWT204 reach. It is desired to leave the channel in its existing condition if the channel can be proven to be stable. In the future when the remainder of the site is developed the RWT204 channel will be consolidated into a smaller designed cross section and will be relocated to within a tract. It will be realigned off of its current alignment.

The future channel and the existing channel do not align at this location. Therefore, a small amount of grading is proposed to direct runoff from the existing channel to the proposed culvert location. After outfalling to the south of Bent Grass Meadows Parkway there is another small section of grading to direct flows back to the existing channel. The radii of these bends were designed such that super elevation/increased velocities are not expected.

The future channel design is anticipated to have a series of Grouted Sloping Boulder Drops within it.

Reviewing the HEC-RAS model prepared for the conditions proposed by this report will show that the existing and proposed conditions have similar velocities and Froude numbers. Given that the channel is stable in its current state it is proposed to not provide improvements to the channel at this time.

Riprap protection will be provided at the individual outfalls from the site into the channel to prevent scouring from the point discharges.

Future filings will need to review the channel for necessary improvements if the ultimate channel is not constructed at such time.

At this time the RWT202 reach will be rerouted on the north end of the site and directed into the existing RWT204 reach. This has been modeled in the HEC-RAS model to ensure that the channel will still be stable with this additional flow.

The MDDP identifies the use of check structures for the RWT210 channel downstream of the site. Again, due to the existing stability of the channel and the minor increase in flows velocities and Froude numbers have only slightly changed. For the purposes of this Filing it is proposed to leave the channel as is and install the proposed improvements with subsequent filings.

The channel design flow rates have previously been established using HEC-HMS in the DBPS. The site has been analyzed using the Rational method. The HEC-HMS model for the basin has been obtained from El Paso County and has been revised accordingly for the developed site. It was necessary to break apart the basin into a couple of smaller basins in order to accurately design the crossings of Bent Grass Meadows Parkway. The DBPS also shows the pond SR3 which has been removed with this project, so it was necessary to remove it from the model.

In addition to the changes made with this project several changes have been made upstream of the Bent Grass Subdivision. The Ranch MDDP has added detention ponds for their project and has corrected several of the other offline ponds near the northern end of their site. In addition to the ponds the DBPS had identified a flow diversion from the Falcon Watershed into the Sand Creek Watershed. This diversion has been corrected with The Ranch MDDP. The updated HEC-HMS model is necessary because the DBPS hydrology has now been superseded by The Ranch design.

The Ranch MDDP has also investigated the connection from The Ranch site through the Meadows Filing No. 3 to the Bent Grass site. It has been identified that the existing homes within the Meadows do not have the adequate drainage improvements to convey storm water through the subdivision. The drainage path through the Meadows is incorrectly identified and allowed homes built closer to the flow path than should have been allowed. In addition, several culverts were erroneously constructed restricting the flow path through the subdivision.

The conclusion of The Ranch MDDP is that major channel improvements are necessary through the Meadows subdivision. They state that multiple meetings have taken place with El Paso County regarding this issue and funding for the improvements is being discussed.

X. Proposed Regional Pond Improvements

As has been previously mentioned the DBPS identified a pond named SR3 at the junction of RWT202 and RWT204 near the south end of the Bent Grass Residential Subdivision. The purpose of this pond was to provide EURV for a portion of the tributary area, it was identified to have a volume of 1 acre-foot. It has been discussed with El Paso County to not construct this pond. In its place will be two on-site WQCV detention ponds. In addition, Pond WU will be modified to provide water quality for the entire tributary area. It is not understood how the 1 ac-ft volume for pond SR3 was generated. The onsite water quality ponds proposed have a total 0.85 ac-ft volume. If pond SR3 was truly online and provided EURV for the entire tributary area the volume would far exceed the 1 ac-ft volume that was required. In general as the undeveloped areas develop and are now required to provide onsite water quality this will aide in detaining the lower event storms which will aide in the stability of the existing channel in small storm events.

Utilizing the areas and percent impervious values from the future models in the DBPS it was determined that pond WU has a tributary area of 3.58 square miles and a 7.33% impervious. Utilizing the WQCV equations contained with the Criteria it has been determined that a volume of 9.764 ac-ft is required for the entire tributary area. This volume exceeds the volume for the 5-year event per the DBPS.

The stage storage data for the pond was taken from the DBPS and it was found that the required volume exceeds the front edge of the existing outlet structure on the pond. It is proposed to raise the front edge of the existing outlet to provide the required water quality capture volume. The existing orifices on the fact of the outlet structure will be covered to prevent release through them and a new rectangular hole will be cut through the existing wall. An orifice plate with square orifices will be installed to release the WQCV. A well screen will be installed on the face of the outlet structure. A small micro pool will be proposed directly in front of the orifice plate in an effort to reduce clogging of the well screen. The revised HEC-HMS model prepared for the channel flow rates will review the pond function and release rates when prepared.

In reviewing the pond and in discussions with El Paso County the inlet to Pond WU has washed out and is in need of repair. As part of the proposed improvements to the pond the washed out embankment will be repaired. Not much discussion or design can be located regarding the original embankment. In discussions with the County it is understood that there are multiple areas of wetlands in the area. While the majority of the West Tributary should be directed through Pond WU there are two 18" pipes to the east of the embankment that allow flows to pass from the West Tributary into the existing wetlands to maintain them. The embankment is designed such that flows will back up prior to entering Pond WU and will pass through the existing pipes to the east.

Site investigations have identified that a large reason the embankment failed was improper erosion protection. It is apparent that as the embankment was overtopped it began scourging under the riprap placed on the downhill side of the embankment. Given enough time or a large enough storm it was able to dislodge a section of the protection and the embankment washed out.

It is proposed to fill the washed out area of the embankment back to match the existing grades around it. The 18" pipe through the embankment will be replaced. The purpose of this pipe is to drain the area just upstream of the embankment since the dual pipes to the east are higher than that point. Riprap will be re-established on the downstream side of the embankment. In addition it is proposed to riprap the top of the embankment to protect it from scour. A cutoff wall will also be installed through the full length of the embankment from the top of the embankment to just below the toe of slope on the downstream side. The cutoff wall should be installed on downstream side of the top of the embankment. It is proposed to install a portion of the cutoff wall as sheet pipes. This will be through the area of the embankment that is still existing to avoid reconstructing the entire embankment. In the are where the washout occurred and where the pipe will be passing through the cutoff wall it is proposed to do a concrete cutoff wall. The concrete wall should be cast around the sheet pipe wall on both ends to prevent flows cutting between the walls and creating a failure.

XI. Maintenance

The proposed channels are to be public facilities. After completion of construction and upon the Board of County Commissioners acceptance the channels will be owned and maintained by El Paso County along with all drainage facilities within the public Right-of-Way.

El Paso County will not accept a channel for maintenance until channel design report is accepted, the channel is fully improved and access roads etc. are provided. Also, you stated Channel RWT204 is going to need to be a realigned. Please indicate, what needs to occur with the flood plain administrator in order to do this. A LOMR or just a floodplain development permit?

XII. Wetlands Mitigation

No wetlands are located on site.

XIII. Floodplain Statement

A portion of the project site lies within Zone AE Special Flood Hazard Area as defined by the FIRM Map number 08041C0553G effective December 7, 2018. A copy of the FIRM Panel is included in Appendix A.

The portion of channel that has a floodplain designation is only the RWT210 and RWT204 portions of the channel. It is unknown why the western channel, RWT202 is unmapped since it is the larger contributor regarding flow rates. Discussions have occurred with PPRBD and a no rise certificate will be required for the existing channel. Models have been obtained from FEMA which show that the FEMA discharges are higher than the DBPS. Therefore the culvert crossing at Bent Grass Meadows Parkway has been sized per the FEMA flows and not the DBPS. The no rise certification will be provided under a separate report.

XIV. Drainage/Bridge Fees and Credits/Reimbursements

The site lies within the Falcon Drainage Basin. The DBPS was approved in 2013 and has drainage and bridge fees associated with the basin.

The subdivision has a total area of 50.795 acres.

The percent impervious for the subdivision has been calculated with this report to be approximately 39 percent.

50.795 acres x 39% = 19.81 Impervious Acres

The following calculations are based on the 2019 Falcon Basin drainage/bridge fees:

Drainage Fees

$29,622 x 19.81 Imp. Acres = <u>$586,811.82</u>

Bridge Fees

$4,069 x 19.81 Imp. Acres = <u>$80,606.89</u>

Per discussions with El Paso County the fees may be offset by the cost of regional improvements. The regional improvements would include channel, detention pond modification, and pond inlet repair costs. Below is a table of the reimbursable costs limited to those shown in the Falcon DBPS.

Item	Quantity	Unit	Unit Cost	Cost
Channel Improvements				
30" Grouted Boulders	33	SY	$ 190.00	$ 6,270.00
Soil Rip Rap - Type M	20.8	CY	$ 70.00	$ 1,456.00
6' Cutoff Wall - Concrete	35	CY	$ 600.00	$ 21,000.00

Subtotal				$ 28,726.00
Regional Pond Improvements (Public)				
18" RCP Storm Drain (Public)	126	LF	$ 54.00	$ 6,804.00
18" FES	2	EA	$ 920.00	$ 1,840.00
3' Concrete Headwall	2	CY	$ 600.00	$ 1,200.00
13' Cutoff Wall - Concrete	60	CY	$ 600.00	$ 36,000.00
13' Cutoff Wall - Steel Reinforcement	6380	LBS	$ 0.90	$ 5,742.00
13' Sheet Pile Cutoff Wall	155	LF	$ 620.00	$ 96,100.00
Rip Rap - Type VH	2260	CY	$ 85.00	$ 192,100.00
Pond Modification to Full Spectrum	1	LS	$ 60,000.00	$ 60,000.00
Subtotal				$ 399,786.00
Total (Public)				$ 428,512.00
Contingency			10%	$ 42,851.20
Grand Total (Public)				$ 471,363.20

Below is a cost estimate for the improvements proposed with this filing.

Item	Quantity	Unit	Unit Cost	Cost
Storm Drain Improvements (Public)				
10' CDOT Type R Inlet (Public)	10	EA	$ 8,000.00	$ 80,000.00
15' CDOT Type R Inlet (Public)	3	EA	$ 9,800.00	$ 29,400.00
CDOT Type D Area Inlet (Public)	1	EA	$ 7,900.00	$ 7,900.00
5' Manhole - Type II (Public)	1	EA	$ 4,700.00	$ 4,700.00
24" RCP Storm Drain (Public)	137	LF	$ 70.00	$ 9,590.00
30" RCP Storm Drain (Public)	122	LF	$ 95.00	$ 11,590.00
36" RCP Storm Drain (Public)	245	LF	$ 110.00	$ 26,950.00
42" RCP Storm Drain (Public)	50	LF	$ 140.00	$ 7,000.00
24" FES	1	EA	$ 970.00	$ 970.00
36" FES	1	EA	$ 1,610.00	$ 1,610.00
18" FES	2	EA	$ 1,700.00	$ 3,400.00
Subtotal				$ 183,110.00
Culvert (Concrete Box Culvert) (Public)				
6' x 12' Concrete Box Culvert	266	LF	$ 1,600.00	$ 425,600.00
30" Grouted Boulders	164	SY	$ 190.00	$ 31,160.00
Soil Rip Rap - Type M	52.44	CY	$ 70.00	$ 3,670.80
Headwalls - Concrete	35	CY	$ 600.00	$ 21,000.00
Wingwalls - Concrete	60	CY	$ 600.00	$ 36,000.00
Headwalls - Steel Reinforcement	1300	LBS	$ 0.90	$ 1,170.00
Wingwalls - Steel Reinforcement	4430	LBS	$ 0.90	$ 3,987.00
Subtotal				$ 522,587.80

WQCV Detention Ponds (Private)						
Pond (North)	1	EA	$	80,000.00	$	80,000.00
Pond (South)	1	EA	$	80,000.00	$	80,000.00
Subtotal					$	160,000.00
Total					$	865,697.80
Contingency				10%	$	86,569.78
Grand Total					$	952,267.58

XV. Conclusion

The Bent Grass Residential Subdivision lies within the West Tributary of the Falcon Area Watershed. Recommendations are made within this report to establish and stabilize multiple drainageways through the project site. Detention for the site is provided in two on-site WQCV ponds and a regional pond that will be modified to provide water quality for the entire tributary area. Recommendations are also given for re-establishing the inlet to the regional pond. All drainage facilities within this report were sized according to the Drainage Criteria Manuals. All of the channel corridors will be publicly owned and maintained and shall be the responsibility of El Paso County. Upon development of the individual parcels within the Bent Grass Residential Subdivision, separate Final Drainage Reports will be required to be submitted and approved by El Paso County.

XVI. References

1. *City of Colorado Springs/County of El Paso Drainage Criteria Manual*, October 1991.
2. *Drainage Criteria Manual, Volume 2*, City of Colorado Springs, November 2002.
3. *Urban Storm Drainage Criteria Manual*, Urban Drainage and Flood Control District, January 2016 (with current revisions).
4. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
5. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
6. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
7. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
8. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
9. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
10. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.

APPENDIX A

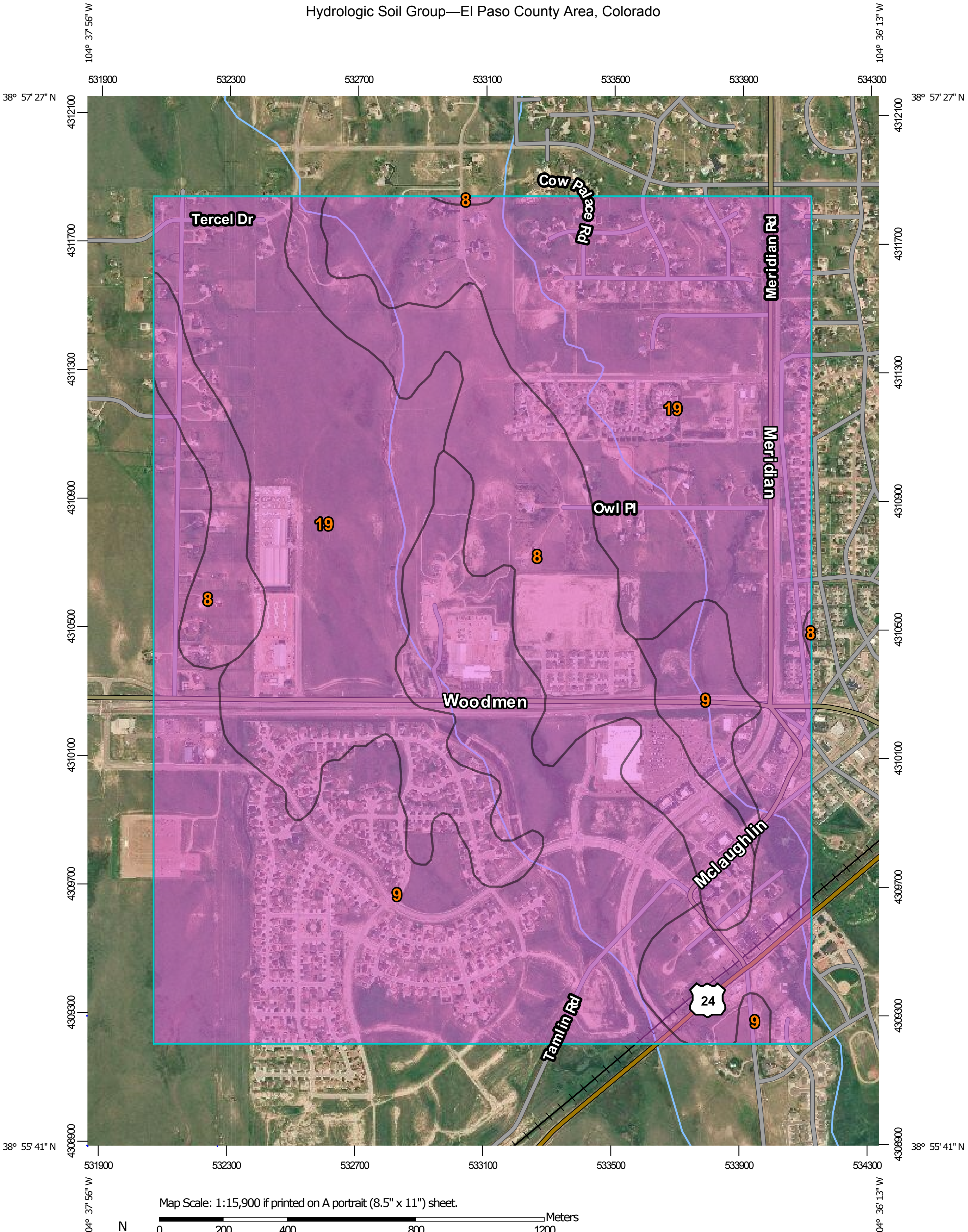
Exhibits and Figures

BENT GRASS
-
BENT GRASS MEADOWS DRIVE
SCALE: 1" = 2,000'

VICINITY MAP

Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	RGD
Date:	04/02/2019

Galloway
1755 Telstar Drive, Suite 107
Colorado Springs, CO 80920
719.900.7220 • GallowayUS.com



Map Scale: 1:15,900 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

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

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 16, Sep 10, 2018

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

Date(s) aerial images were photographed: Jun 7, 2016—Aug 17, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	214.3	16.0%
9	Blakeland-Fluvaquentic Haplaquolls	A	465.8	34.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	662.6	49.3%
Totals for Area of Interest			**1,342.6**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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.

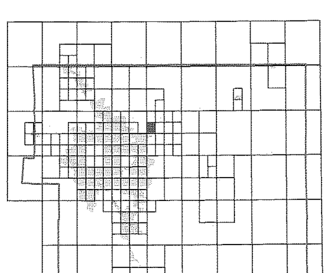
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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

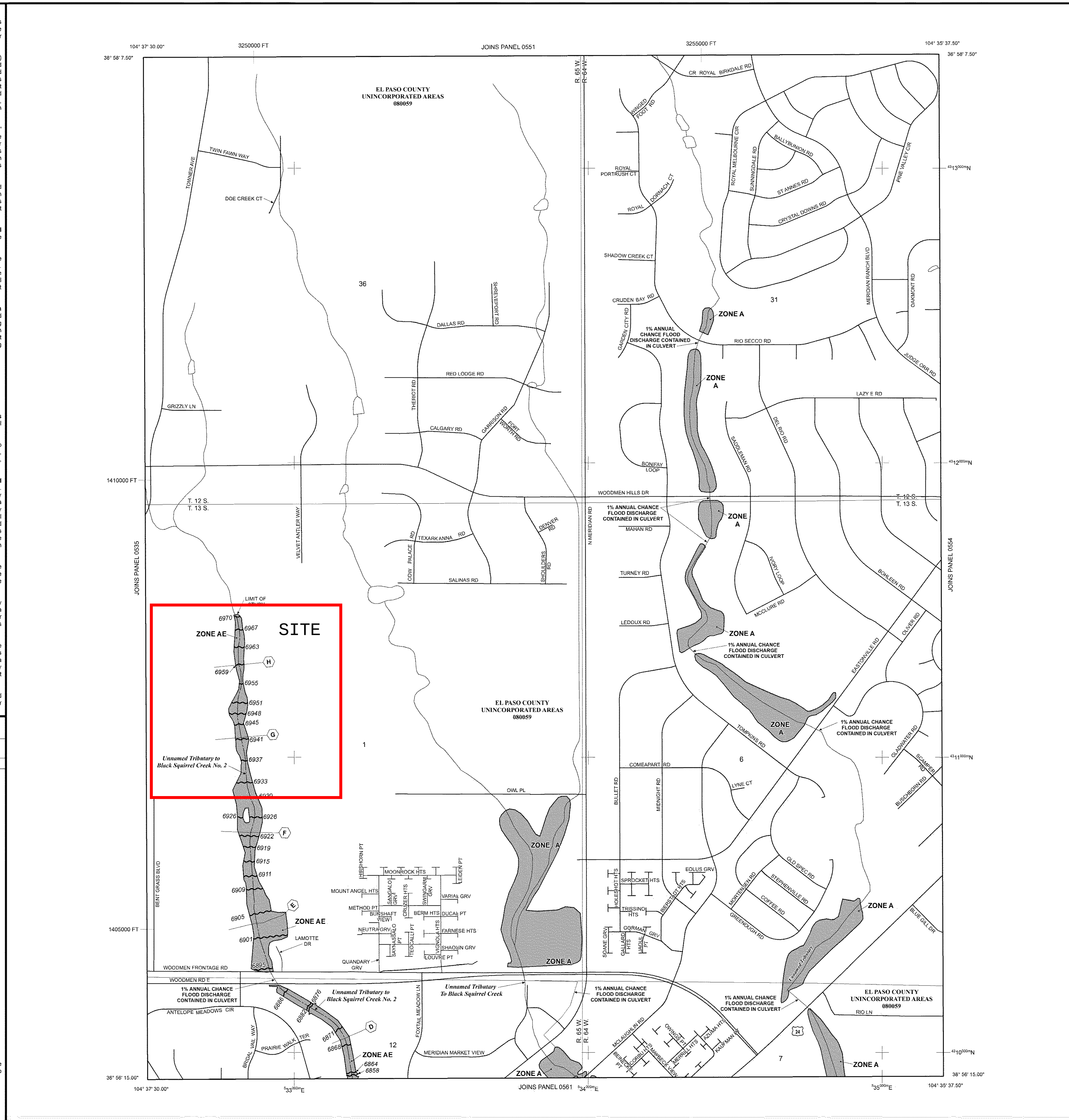
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0553G

NATIONAL FLOOD INSURANCE PROGRAM

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

PANEL 553 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0553	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
08041C0553G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

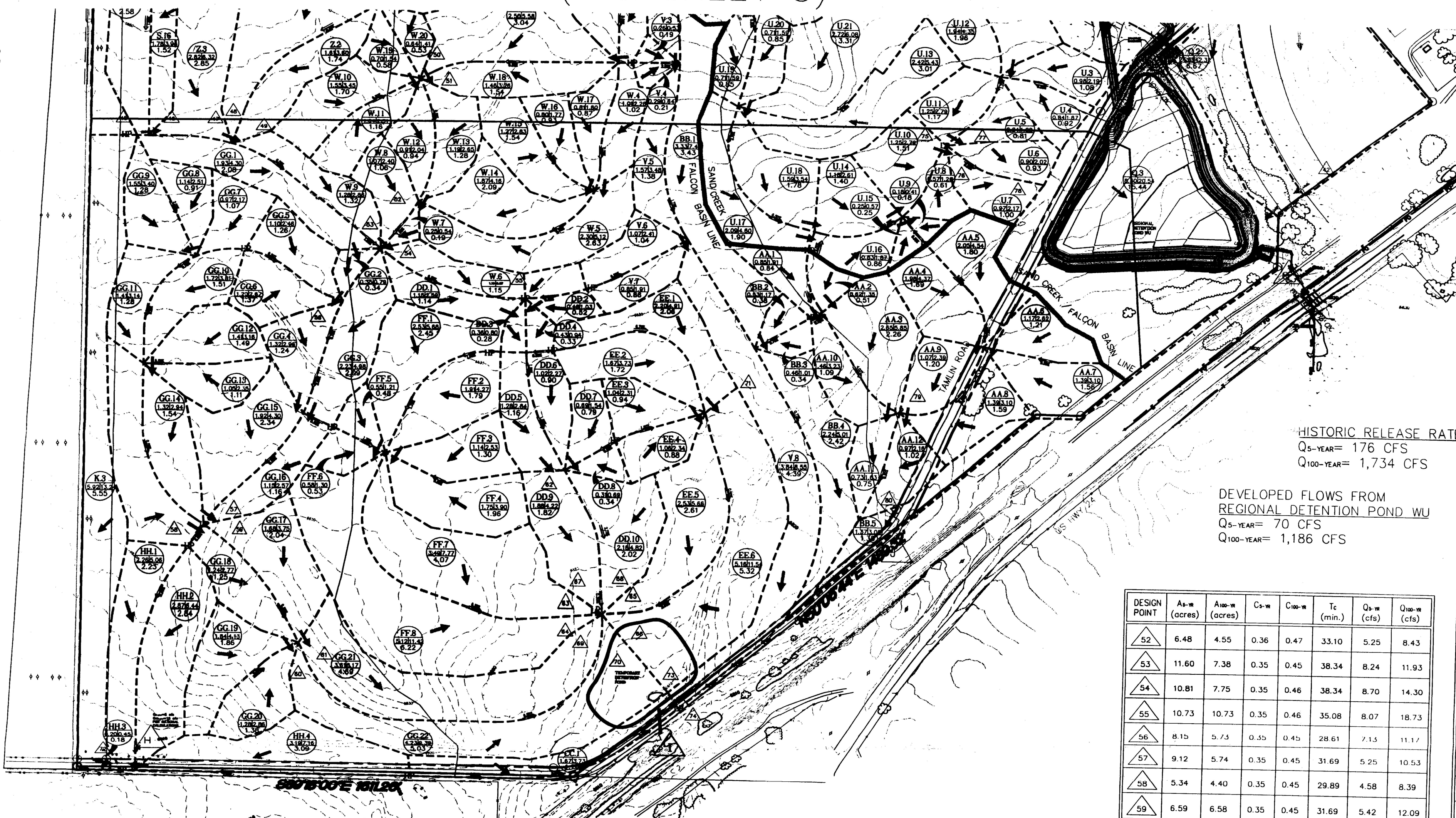
FINAL DRAINAG
FALCON HIGHL

N

1"=100'

100 0 100 200

(SEE SHEET 3)



HISTORIC RELEASE RATES
$Q_{5\text{-YEAR}}$= 176 CFS
$Q_{100\text{-YEAR}}$= 1,734 CFS

DEVELOPED FLOWS FROM
REGIONAL DETENTION POND WU
$Q_{5\text{-YEAR}}$= 70 CFS
$Q_{100\text{-YEAR}}$= 1,186 CFS

DEVELOPED FLOWS FROM
TEMP. DETENTION POND
$Q_{5\text{-YEAR}}$= 49.70 CFS
$Q_{100\text{-YEAR}}$= 126.74 CFS

HISTORIC RELEASE RATES
$Q_{5\text{-YEAR}}$= 64.50 CFS
$Q_{100\text{-YEAR}}$= 159.70 CFS

DESIGN POINT	$A_{5\text{-YR}}$ (acres)	$A_{100\text{-YR}}$ (acres)	$C_{5\text{-YR}}$	$C_{100\text{-YR}}$	T_c (min.)	$Q_{5\text{-YR}}$ (cfs)	$Q_{100\text{-YR}}$ (cfs)
52	6.48	4.55	0.36	0.47	33.10	5.25	8.43
53	11.60	7.38	0.35	0.45	38.34	8.24	11.93
54	10.81	7.75	0.35	0.46	38.34	8.70	14.30
55	10.73	10.73	0.35	0.46	35.08	8.07	18.73
56	8.15	5.73	0.35	0.45	28.61	7.13	11.17
57	9.12	5.74	0.35	0.45	31.69	5.25	10.53
58	5.34	4.40	0.35	0.45	29.89	4.58	8.39
59	6.59	6.58	0.35	0.45	31.69	5.42	12.09
60	6.67	6.57	0.35	0.45	33.52	5.25	11.64
61	6.46	6.37	0.35	0.45	33.52	5.09	11.64
62	6.14	3.97	0.35	0.46	28.11	6.08	9.01
63	6.58	6.58	0.35	0.45	32.94	5.30	11.87
64	6.58	6.58	0.35	0.45	32.94	5.30	11.87
65	4.91	3.11	0.35	0.45	24.03	4.66	6.59
66	4.80	3.07	0.35	0.45	24.03	4.53	6.51

DESIGN POINT	$A_{5\text{-YR}}$ (acres)	$A_{100\text{-YR}}$ (acres)
67	5.30	5.24
68	5.24	5.24
69	16.51	16.51
70	16.51	16.51
71	7.99	5.79
72	8.34	8.34
73	21.57	21.57
74	21.57	21.57
75	17.68	17.63
76	6.11	6.19
77	6.11	6.19
78	7.39	7.39
79	7.30	7.30
80	8.23	8.23

URS
9960 FE
COLORAD
(719) 53

FIGURE

FALCON DRAINAGE BASIN PLANNING STUDY

SELECTED PLAN REPORT

FINAL - SEPTEMBER 2015

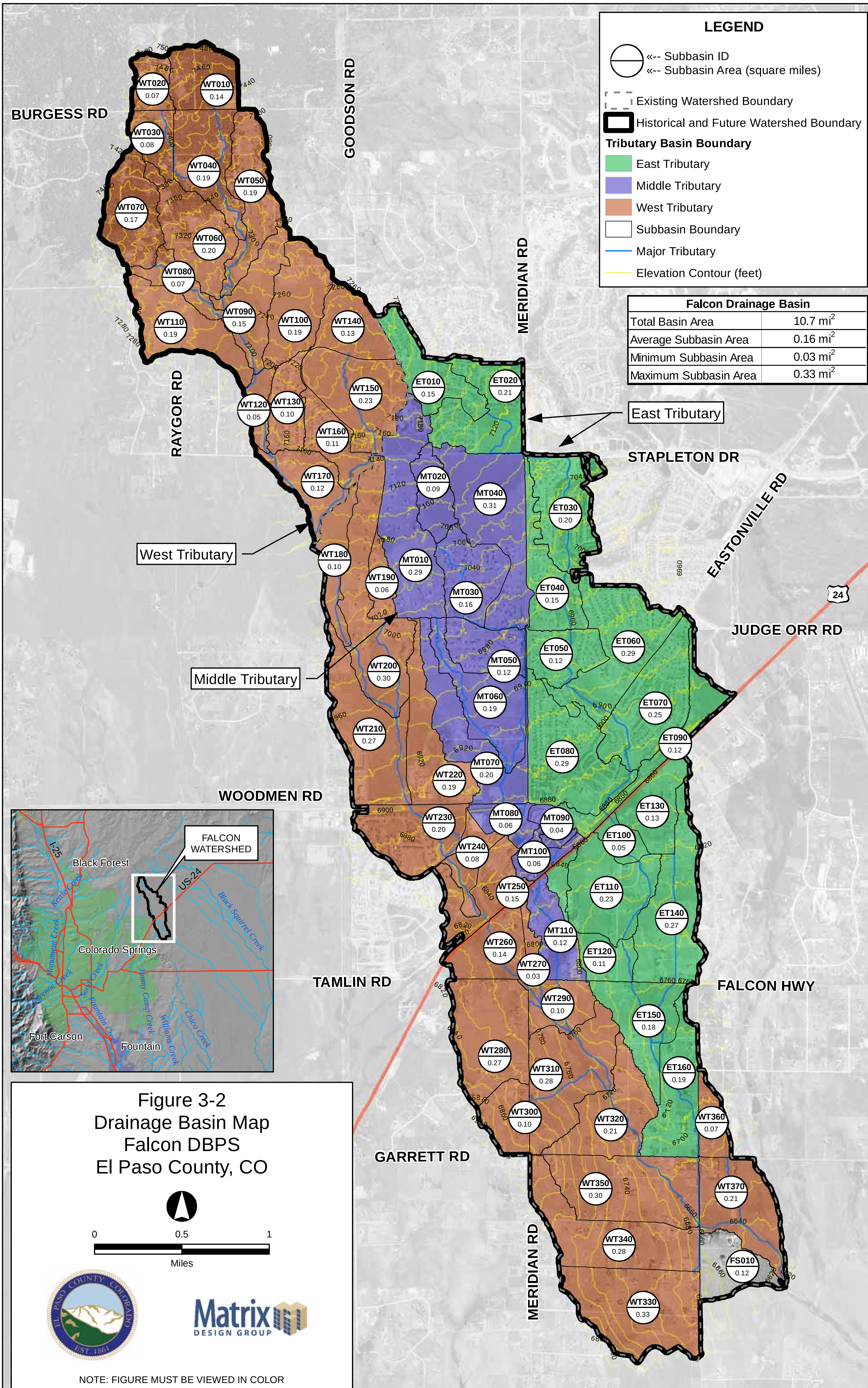
Prepared for:

El Paso County Public Services Department
3275 Akers Drive
Colorado Springs, CO 80922

Prepared By:

Matrix Design Group
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920

Matrix Project No. 10.122.003



Falcon Drainage Basin	
Total Basin Area	10.7 mi^2
Average Subbasin Area	0.16 mi^2
Minimum Subbasin Area	0.03 mi^2
Maximum Subbasin Area	0.33 mi^2

Figure 3-2
Drainage Basin Map
Falcon DBPS
El Paso County, CO

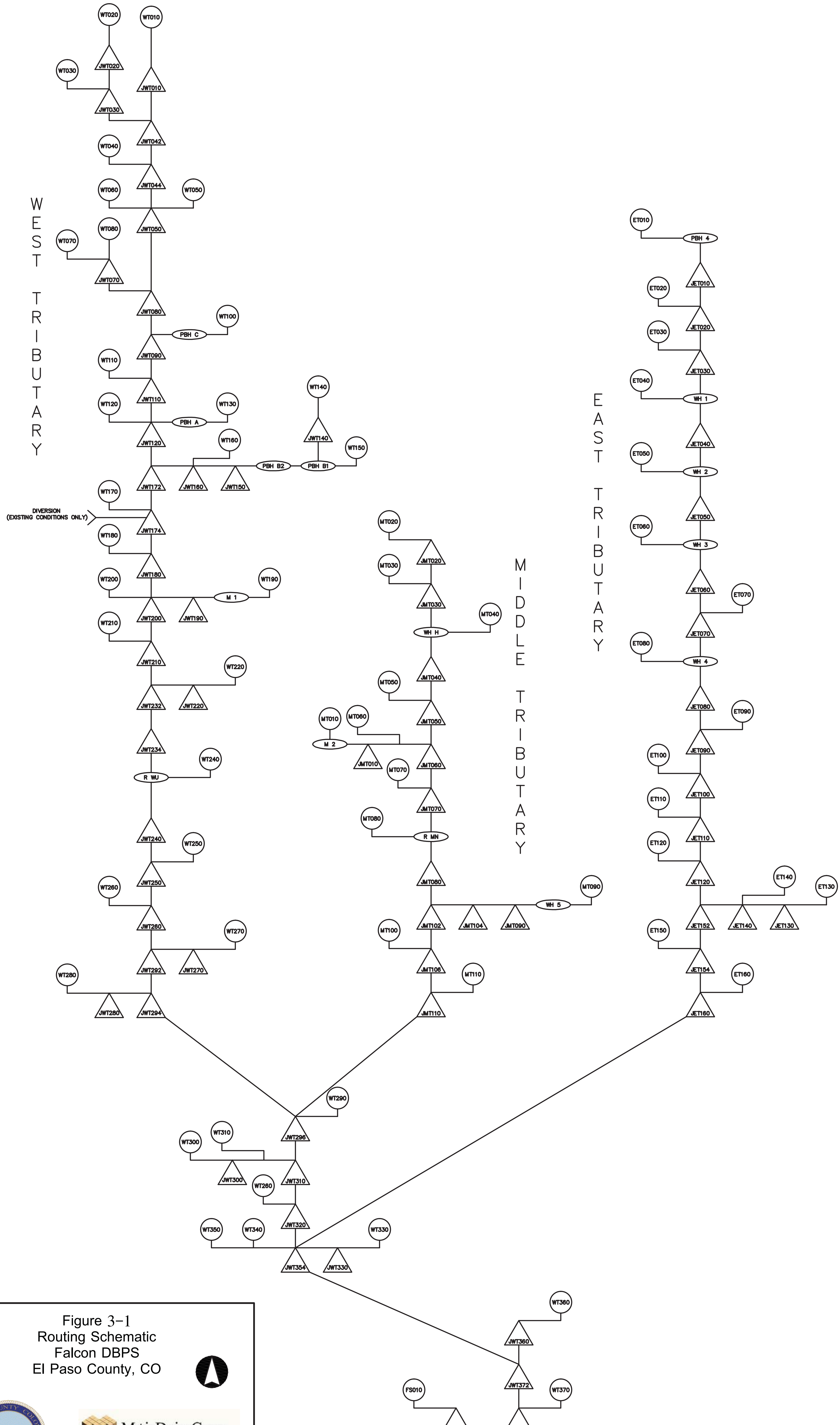
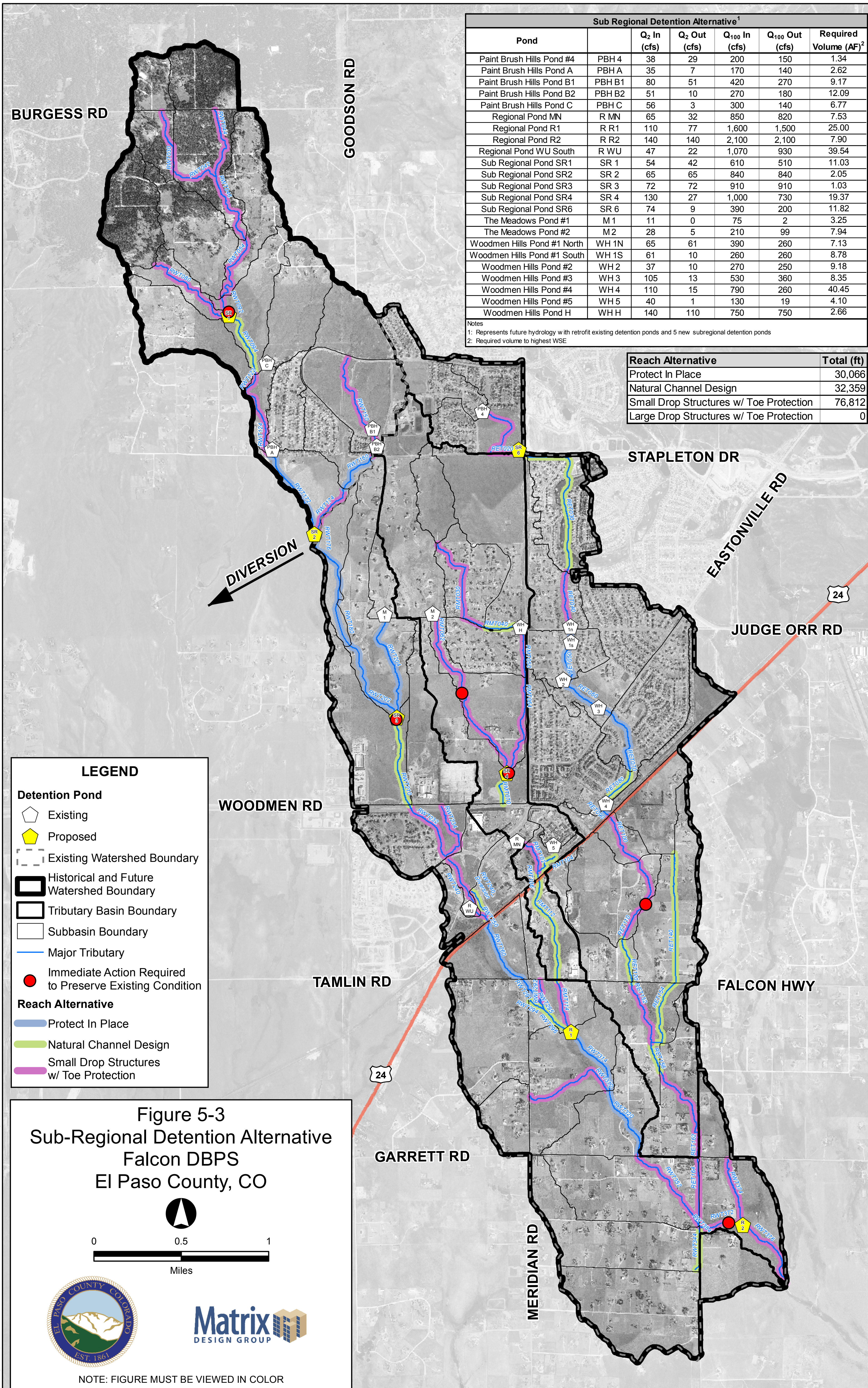


Figure 3-1
Routing Schematic
Falcon DBPS
El Paso County, CO

DRAWING NOT TO SCALE



Sub Regional Detention Alternative[1]						
Pond		Q_2 In (cfs)	Q_2 Out (cfs)	Q_{100} In (cfs)	Q_{100} Out (cfs)	Required Volume (AF)[2]
Paint Brush Hills Pond #4	PBH 4	38	29	200	150	1.34
Paint Brush Hills Pond A	PBH A	35	7	170	140	2.62
Paint Brush Hills Pond B1	PBH B1	80	51	420	270	9.17
Paint Brush Hills Pond B2	PBH B2	51	10	270	180	12.09
Paint Brush Hills Pond C	PBH C	56	3	300	140	6.77
Regional Pond MN	R MN	65	32	850	820	7.53
Regional Pond R1	R R1	110	77	1,600	1,500	25.00
Regional Pond R2	R R2	140	140	2,100	2,100	7.90
Regional Pond WU South	R WU	47	22	1,070	930	39.54
Sub Regional Pond SR1	SR 1	54	42	610	510	11.03
Sub Regional Pond SR2	SR 2	65	65	840	840	2.05
Sub Regional Pond SR3	SR 3	72	72	910	910	1.03
Sub Regional Pond SR4	SR 4	130	27	1,000	730	19.37
Sub Regional Pond SR6	SR 6	74	9	390	200	11.82
The Meadows Pond #1	M 1	11	0	75	2	3.25
The Meadows Pond #2	M 2	28	5	210	99	7.94
Woodmen Hills Pond #1 North	WH 1N	65	61	390	260	7.13
Woodmen Hills Pond #1 South	WH 1S	61	10	260	260	8.78
Woodmen Hills Pond #2	WH 2	37	10	270	250	9.18
Woodmen Hills Pond #3	WH 3	105	13	530	360	8.35
Woodmen Hills Pond #4	WH 4	110	15	790	260	40.45
Woodmen Hills Pond #5	WH 5	40	1	130	19	4.10
Woodmen Hills Pond H	WH H	140	110	750	750	2.66

Notes
1: Represents future hydrology with retrofit existing detention ponds and 5 new subregional detention ponds
2: Required volume to highest WSE

Reach Alternative	Total (ft)
Protect In Place	30,066
Natural Channel Design	32,359
Small Drop Structures w/ Toe Protection	76,812
Large Drop Structures w/ Toe Protection	0

LEGEND

Detention Pond

- Existing
- Proposed
- Existing Watershed Boundary
- Historical and Future Watershed Boundary
- Tributary Basin Boundary
- Subbasin Boundary
- Major Tributary
- Immediate Action Required to Preserve Existing Condition

Reach Alternative

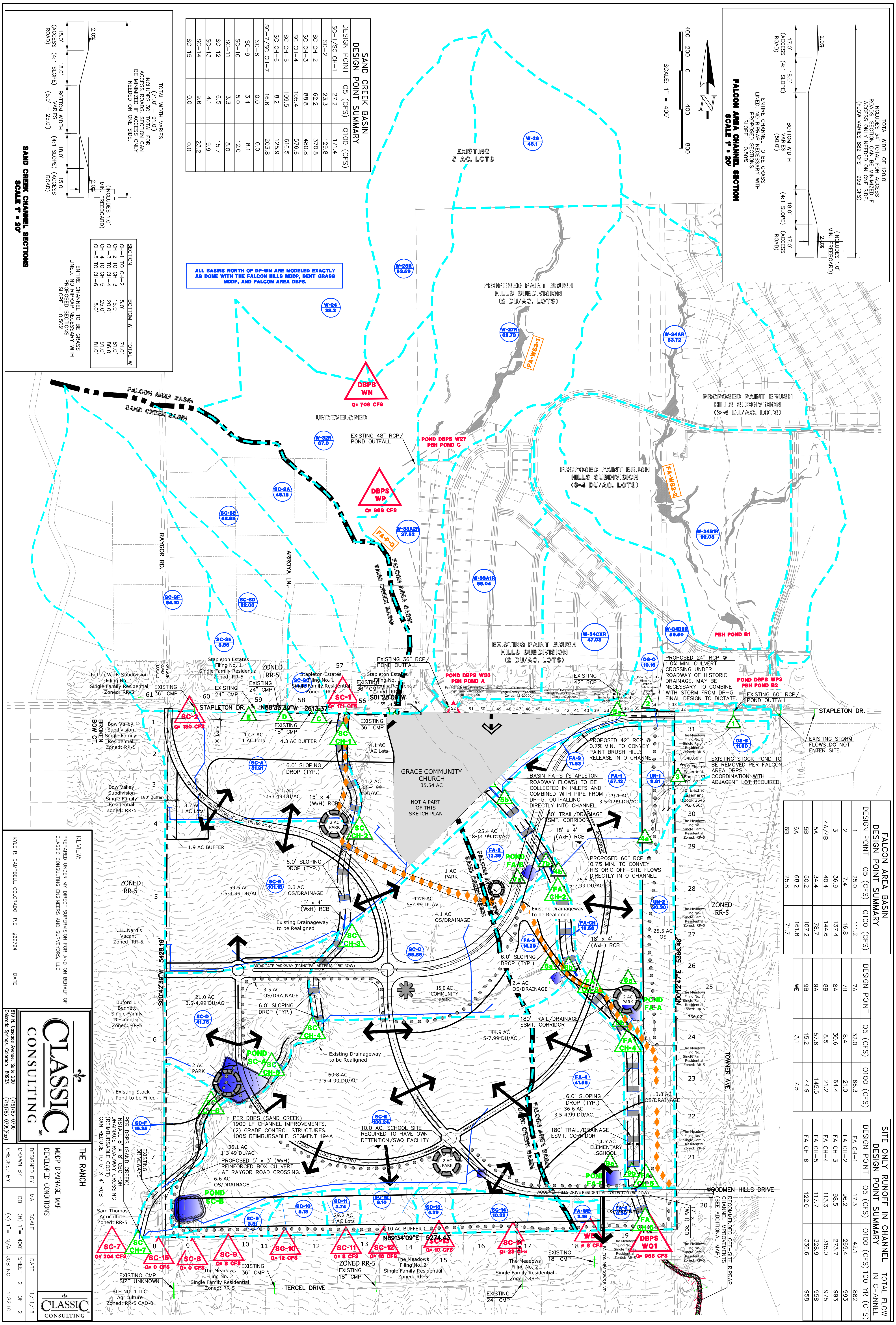
- Protect In Place
- Natural Channel Design
- Small Drop Structures w/ Toe Protection

Figure 5-3
Sub-Regional Detention Alternative
Falcon DBPS
El Paso County, CO

0 0.5 1
Miles

NOTE: FIGURE MUST BE VIEWED IN COLOR

N:\118210\DRAWINGS\DEVELOPMENT\118210 - MDDP - DEVELOPED.dwg, 11/12/2018 10:35:18 AM, 1:1



SAND CREEK BASIN DESIGN POINT SUMMARY

DESIGN POINT	Q5 (CFS)	Q100 (CFS)
SC-1/SC CH-1	27.2	171.4
SC-2	23.3	129.8
SC CH-2	62.2	370.8
SC CH-3	88.8	480.8
SC CH-4	105.4	576.6
SC CH-5	109.5	616.5
SC CH-6	8.2	125.9
SC-7/SC CH-7	16.6	203.8
SC-8	0.0	0.0
SC-9	3.4	8.1
SC-10	5.0	12.0
SC-11	3.3	8.0
SC-12	6.5	15.7
SC-13	4.1	9.9
SC-14	9.6	23.2
SC-15	0.0	0.0

SECTION	BOTTOM W	TOTAL W
CH-1 TO CH-2	5.0'	71.0'
CH-2 TO CH-3	15.0'	81.0'
CH-3 TO CH-4	20.0'	86.0'
CH-4 TO CH-5	25.0'	91.0'
CH-5 TO CH-6	15.0'	81.0'

ENTIRE CHANNEL TO BE GRASS LINED. NO RIPRAP NECESSARY WITH PROPOSED SECTIONS. SLOPE = 0.50%

FALCON AREA BASIN DESIGN POINT SUMMARY

DESIGN POINT	Q5 (CFS)	Q100 (CFS)
1	25.0	111.2
2	7.4	16.8
3	36.9	137.4
4A/4B	40.4	144.6
5A	34.4	78.7
5B	50.2	107.2
6A	68.2	161.8
6B	25.8	71.7

DESIGN POINT	Q5 (CFS)	Q100 (CFS)
7A	32.0	66.3
7B	8.4	21.0
8A	30.6	64.4
8B	8.5	21.2
9A	57.6	145.5
9B	15.2	44.9
WE	3.1	7.5

SITE ONLY RUNOFF IN CHANNEL DESIGN POINT SUMMARY

DESIGN POINT	Q5 (CFS)	Q100 (CFS)	TOTAL FLOW IN CHANNEL 100 YR (CFS)
FA CH-1	17.3	42.1	882
FA CH-2	96.2	269.4	993
FA CH-3	98.5	273.7	993
FA CH-4	113.3	315.0	975
FA CH-5	117.7	328.9	958
FA CH-6	122.0	336.6	958

REVIEW:
PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE

CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799(Fax)

THE RANCH
MDDP DRAINAGE MAP
DEVELOPED CONDITIONS

DESIGNED BY	MAL	SCALE	DATE 11/11/18
DRAWN BY	BB	(H) 1"= 400'	SHEET 2 OF 2
CHECKED BY		(V) 1"= N/A	JOB NO. 1182.10

APPENDIX B

Hydrologic Computations

Existing Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: EXISTING

Subdivision: Bent Grass Metro District
Location: CO, Colorado Springs

Project Name: Bent Grass
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By:
Date: 4/10/19

Basin ID	Total Area (ac)	Paved/Dirt Roads			Lawns			Roofs			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A-1	5.42	100	0.16	3.00	2	5.26	1.90	90	0.00	0.00	4.9
A-2	18.00	100	0.00	0.00	2	18.00	2.00	90	0.00	0.00	2.0
A-3	19.59	100	0.00	0.00	2	19.59	2.00	90	0.00	0.00	2.0
A-4	23.81	100	0.57	2.40	2	23.12	1.90	90	0.12	0.50	4.8
B-1	32.53	100	0.00	0.00	2	32.53	2.00	90	0.00	0.00	2.0
B-2	4.51	100	0.00	0.00	2	4.51	2.00	90	0.00	0.00	2.0
B-3	16.18	100	1.00	6.20	3	15.18	2.80	90	0.00	0.00	9.0
OS-1	18.31	100	0.94	5.10	4	16.80	3.70	90	0.57	2.80	11.6
OS-2	21.15	100	2.00	9.50	5	18.52	4.40	90	0.63	2.70	16.6
OS-3	9.99	100	0.69	6.90	6	9.08	5.50	90	0.22	2.00	14.4
OS-4	30.69	100	1.42	4.60	7	28.41	6.50	90	0.86	2.50	13.6

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: EXISTING

Subdivision: Bent Grass Metro District
Location: CO, Colorado Springs

Project Name: Bent Grass
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By:
Date: 4/10/19

Basin ID	Total Area (ac)	Paved Roads			Lawns/Undeveloped			Roofs			Composite C_5	Composite C_{100}
		C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)		
A-1	5.42	0.90	0.96	0.16	0.09	0.36	5.26	0.73	0.81	0.00	0.11	0.38
A-2	18.00	0.90	0.96	0.00	0.09	0.36	18.00	0.73	0.81	0.00	0.09	0.36
A-3	19.59	0.90	0.96	0.00	0.09	0.36	19.59	0.73	0.81	0.00	0.09	0.36
A-4	23.81	0.90	0.96	0.57	0.09	0.36	23.12	0.73	0.81	0.12	0.11	0.38
B-1	32.53	0.90	0.96	0.00	0.09	0.36	32.53	0.73	0.81	0.00	0.09	0.36
B-2	4.51	0.90	0.96	0.00	0.09	0.36	4.51	0.73	0.81	0.00	0.09	0.36
B-3	16.18	0.90	0.96	1.00	0.09	0.36	15.18	0.73	0.81	0.00	0.14	0.40
OS-1	18.31	0.90	0.96	0.94	0.09	0.36	16.80	0.73	0.81	0.57	0.15	0.40
OS-2	21.15	0.90	0.96	2.00	0.09	0.36	18.52	0.73	0.81	0.63	0.19	0.43
OS-3	9.99	0.90	0.96	0.69	0.09	0.36	9.08	0.73	0.81	0.22	0.16	0.41
OS-4	30.69	0.90	0.96	1.42	0.09	0.36	28.41	0.73	0.81	0.86	0.15	0.40

C values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. (Referencing UDFCD 2001)

STANDARD FORM SF-2: EXISTING
TIME OF CONCENTRATION

Subdivision: Bent Grass Metro District
Location: CO, Colorado Springs

Project Name: Bent Grass
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By:
Date: 4/10/19

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
A-1	5.42	A	4.90	0.38	0.11	300	2.5	22.9	466	2.5	15.0	2.4	3.3	26.2	766.0	14.3	14.3
A-2	18.00	A	2.00	0.36	0.09	300	2.4	23.9	1130	2.0	15.0	2.1	8.9	32.8	1430.0	17.9	17.9
A-3	19.59	A	2.00	0.36	0.09	300	2.7	23.0	760	2.7	15.0	2.5	5.1	28.1	1060.0	15.9	15.9
A-4	23.81	A	4.80	0.38	0.11	300	2.0	24.9	1500	2.0	15.0	2.1	11.8	36.6	1800.0	20.0	20.0
B-1	32.53	A	2.00	0.36	0.09	300	2.6	23.3	1100	2.6	15.0	2.4	7.6	30.9	1400.0	17.8	17.8
B-2	4.51	A	2.00	0.36	0.09	300	3.0	22.2	323	5.0	15.0	3.4	1.6	23.8	623.0	13.5	13.5
B-3	16.18	A	9.00	0.40	0.14	300	2.9	21.4	780	2.9	15.0	2.6	5.1	26.4	1080.0	16.0	16.0
OS-1	18.31	A	11.60	0.40	0.15	300	2.5	22.2	1420	2.5	15.0	2.4	10.0	32.1	1720.0	19.6	19.6
OS-2	21.15	A	16.60	0.43	0.19	300	2.3	22.0	1370	2.3	15.0	2.3	10.0	32.0	1670.0	19.3	19.3
OS-3	9.99	A	14.40	0.41	0.16	300	2.0	23.7	850	2.0	15.0	2.1	6.7	30.3	1150.0	16.4	16.4
OS-4	30.69	A	13.60	0.40	0.15	300	2.3	22.9	2600	2.3	15.0	2.3	19.0	42.0	2900.0	26.1	26.1

NOTES:
T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33), S in ft/ft
T_t=L/60V (Velocity From Fig. 501)
Velocity V=Cv*S^0.5, S in ft/ft
Tc Check = 10+L/180
For Urbanized basins a minimum T_c of 5.0 minutes is required.
For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3: EXISTING

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Metro District
Project No.: CLH000014.20
Location: CO, Colorado Springs
Calculated By: CMWJ
Design Storm: 100-Year
Checked By:
Date: 4/10/19

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
		OS-1	18.31	0.40	19.6	7.41	5.24	38.8													
		A-1	5.42	0.38	14.3	2.05	6.04	12.4													
	1								19.6	9.46	5.24	49.6									
		OS-2	21.15	0.43	19.3	9.10	5.28	48.0													
		A-2	18.00	0.36	17.9	6.48	5.46	35.4													
	2								19.3	15.58	5.28	82.3									
		OS-3	9.99	0.41	16.4	4.11	5.69	23.4													
		A-3	19.59	0.36	15.9	7.05	5.77	40.7													
	3								16.4	11.16	5.69	63.5									
		OS-4	30.69	0.40	26.1	12.29	4.51	55.4													
		A-4	23.81	0.38	20.0	8.97	5.19	46.6													
	4								26.1	21.26	4.51	95.9									
	5	B-1	32.53	0.36	17.8	11.71	5.48	64.2													
	6	B-2	4.51	0.36	13.5	1.62	6.18	10.0													
	7	B-3	16.18	0.40	16.0	6.42	5.75	36.9													
	8							43.0													RWT204 - Per Matrix DBPS Existing Hydrology
	9							770													RWT202 - Per Matrix DBPS Existing Hydrology
	10							880													RWT210 - Per Matrix DBPS Existing Hydrology

STANDARD FORM SF-3: EXISTING
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Metro District
Project No.: CLH000014.20
Location: CO, Colorado Springs
Calculated By: CMWJ
Design Storm: 5-Year
Checked By:
Date: 4/10/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		OS-1	18.31	0.15	19.6	2.77	3.12	8.6													
		A-1	5.42	0.11	14.3	0.62	3.60	2.2													
	1								19.6	3.39	3.12	10.6									Total flow going offsite to Bent Grass F1 Residential
		OS-2	21.15	0.19	19.3	3.93	3.14	12.3													
		A-2	18.00	0.09	17.9	1.62	3.25	5.3													
	2								19.3	5.55	3.14	17.4									Total Flow entering Junction of RWT202&204
		OS-3	9.99	0.16	16.4	1.60	3.39	5.4													
		A-3	19.59	0.09	15.9	1.76	3.43	6.0													
	3								16.4	3.36	3.39	11.4									Total Flow entering Junction of RWT202&204
		OS-4	30.69	0.15	26.1	4.46	2.69	12.0													
		A-4	23.81	0.11	20.0	2.68	3.09	8.3													
	4								26.1	7.14	2.69	19.2									
	5	B-1	32.53	0.09	17.8	2.93	3.27	9.6													
	6	B-2	4.51	0.09	13.5	0.41	3.68	1.5													
	7	B-3	16.18	0.14	16.0	2.27	3.42	7.8													
	8							4.0													RWT204 - Per Matrix DBPS Existing Hydrology
	9							0.0													RWT202 - Per Matrix DBPS Existing Hydrology
	10							14.0													RWT210 - Per Matrix DBPS Existing Hydrology

Proposed Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: PROPOSED

Subdivision: Bent Grass Residential Filing No. 2
Location: CO, Colorado Springs

Project Name: Bent Grass
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 10/18/19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Roofs**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Basins Total**
		% Imp.	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**Weighted % Imp.**
A-1	2.70	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	1.18	28.4	40	0.68	10.1	30	0.00	0.0	25	0.00	0.0	20	0.84	6.2	44.7
A-2	1.19	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.37	20.2	40	0.56	18.8	30	0.00	0.0	25	0.00	0.0	20	0.26	4.4	43.4
A-3	1.57	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.59	24.4	40	0.98	25.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	49.4
A-4	2.24	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.93	27.0	40	0.88	15.7	30	0.00	0.0	25	0.00	0.0	20	0.43	3.8	46.5
B-1	4.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	2.28	33.2	40	1.46	13.1	30	0.00	0.0	25	0.00	0.0	20	0.72	3.2	49.5
B-2	1.17	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	1.17	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-3	0.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.46	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
B-4	1.19	100	0.00	0.0	2	1.19	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
B-5	1.56	100	0.00	0.0	2	1.56	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
B-6	0.62	100	0.00	0.0	2	0.62	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
C-1	1.35	100	0.03	2.1	2	0.16	0.2	90	0.00	0.0	65.0	1.16	55.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	58.2
C-2	7.81	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	2.86	23.8	40	3.01	15.4	30	0.70	2.7	25	1.24	4.0	20	0.00	0.0	45.9
C-3	2.38	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	1.61	44.0	40	0.77	12.9	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	56.9
C-4	3.61	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	2.86	51.4	40	0.75	8.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	59.8
C-5	7.86	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	6.53	54.0	40	1.33	6.8	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	60.8
C-6	5.54	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	3.14	36.8	40	1.60	11.6	30	0.80	4.3	25	0.00	0.0	20	0.00	0.0	52.7
C-7	0.76	100	0.00	0.0	2	0.76	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
C-8	0.92	100	0.00	0.0	2	0.92	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
D-1	12.85	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	3.65	18.5	40	5.89	18.3	30	0.75	1.8	25	0.00	0.0	20	2.56	4.0	42.6
D-2	3.19	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	1.63	33.2	40	0.91	11.4	30	0.00	0.0	25	0.00	0.0	20	0.65	4.1	48.7
D-3	9.16	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.82	5.8	40	5.88	25.7	30	1.86	6.1	25	0.60	1.6	20	0.00	0.0	39.2
D-4	9.53	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.00	0.0	40	0.88	3.7	30	5.94	18.7	25	1.63	4.3	20	1.08	2.3	29.0
E-1	1.71	100	0.78	45.6	2	0.23	0.3	90	0.00	0.0	65.0	0.00	0.0	40	0.70	16.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	62.3
E-2	0.68	100	0.56	82.4	2	0.12	0.4	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	82.8
E-3	0.78	100	0.69	88.5	2	0.09	0.2	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	88.7
E-4	0.91	100	0.73	80.2	2	0.18	0.4	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	80.6
E-5	0.89	100	0.79	88.8	2	0.10	0.2	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	89.0
F-1	0.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.00	0.0	40	0.43	37.4	30	0.00	0.0	25	0.00	0.0	20	0.03	1.3	38.7
F-2	0.62	100	0.28	45.2	2	0.11	0.4	90	0.00	0.0	65.0	0.23	24.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	69.7
G-1	0.98	100	0.00	0.0	2	0.98	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
H-1	0.31	100	0.22	71.0	2	0.09	0.6	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.6
OS-1	32.28	100	2.15	6.7	2	29.25	1.8	90	0.88	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	11.0
OS-2	20.08	80	0.90	3.6	2	18.62	1.9	90	0.56	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
OS-3	10.62	80	0.48	3.6	2	9.84	1.9	90	0.30	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
OS-4	2.64	100	0.00	0.0	2	2.64	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
OS-5	14.13	100	0.17	1.2	2	13.74	1.9	90	0.22	1.4	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	4.5
OS-6	5.38	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	5.38	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:
% Impervious values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: PROPOSED

Subdivision: Bent Grass Residential Filing No. 2
Location: CO, Colorado Springs

Project Name: Bent Grass
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 10/18/19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Roofs**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Composite C_5**	**Composite C_{100}**
		C_5	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**		
A-1	2.70	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.18	0.30	0.50	0.68	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.84	0.33	0.52
A-2	1.19	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.37	0.30	0.50	0.56	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.26	0.32	0.51
A-3	1.57	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.59	0.30	0.50	0.98	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.36	0.53
A-4	2.24	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.93	0.30	0.50	0.88	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.43	0.34	0.53
B-1	4.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.28	0.30	0.50	1.46	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.72	0.36	0.54
B-2	1.17	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.17	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
B-3	0.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.46	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
B-4	1.19	0.90	0.96	0.00	0.09	0.36	1.19	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
B-5	1.56	0.90	0.96	0.00	0.09	0.36	1.56	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
B-6	0.62	0.90	0.96	0.00	0.09	0.36	0.62	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
C-1	1.35	0.90	0.96	0.03	0.09	0.36	0.16	0.73	0.81	0.00	0.45	0.59	1.16	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.42	0.57
C-2	7.81	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.86	0.30	0.50	3.01	0.25	0.47	0.70	0.22	0.46	1.24	0.20	0.44	0.00	0.34	0.52
C-3	2.38	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.61	0.30	0.50	0.77	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.40	0.56
C-4	3.61	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.86	0.30	0.50	0.75	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.42	0.57
C-5	7.86	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	6.53	0.30	0.50	1.33	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.42	0.57
C-6	5.54	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	3.14	0.30	0.50	1.60	0.25	0.47	0.80	0.22	0.46	0.00	0.20	0.44	0.00	0.38	0.55
C-7	0.76	0.90	0.96	0.00	0.09	0.36	0.76	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
C-8	0.92	0.90	0.96	0.00	0.09	0.36	0.92	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
D-1	12.85	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	3.65	0.30	0.50	5.89	0.25	0.47	0.75	0.22	0.46	0.00	0.20	0.44	2.56	0.32	0.51
D-2	3.19	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.63	0.30	0.50	0.91	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.65	0.36	0.53
D-3	9.16	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.82	0.30	0.50	5.88	0.25	0.47	1.86	0.22	0.46	0.60	0.20	0.44	0.00	0.30	0.50
D-4	9.53	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.88	0.25	0.47	5.94	0.22	0.46	1.63	0.20	0.44	1.08	0.24	0.47
E-1	1.71	0.90	0.96	0.78	0.09	0.36	0.23	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.70	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.55	0.69
E-2	0.68	0.90	0.96	0.56	0.09	0.36	0.12	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.76	0.85
E-3	0.78	0.90	0.96	0.69	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
E-4	0.91	0.90	0.96	0.73	0.09	0.36	0.18	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.74	0.84
E-5	0.89	0.90	0.96	0.79	0.09	0.36	0.10	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
F-1	0.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.43	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.03	0.29	0.50
F-2	0.62	0.90	0.96	0.28	0.09	0.36	0.11	0.73	0.81	0.00	0.45	0.59	0.23	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.59	0.72
G-1	0.98	0.90	0.96	0.00	0.09	0.36	0.98	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
H-1	0.31	0.90	0.96	0.22	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.66	0.79
OS-1	32.28	0.90	0.96	2.15	0.09	0.36	29.25	0.73	0.81	0.88	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.16	0.41
OS-2	20.08	0.90	0.96	0.90	0.09	0.36	18.62	0.73	0.81	0.56	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-3	10.62	0.90	0.96	0.48	0.09	0.36	9.84	0.73	0.81	0.30	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-4	2.64	0.90	0.96	0.00	0.09	0.36	2.64	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
OS-5	14.13	0.90	0.96	0.17	0.09	0.36	13.74	0.73	0.81	0.22	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.11	0.37
OS-6	5.38	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	5.38	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	</= 1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:

C values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)

Coeffficients use HSG A&B soils - Refer to "Appendix A: Exhibits and Figures" for soil map

STANDARD FORM SF-2: PROPOSED
TIME OF CONCENTRATION

Subdivision: Bent Grass Residential Filing No. 2
Location: CO, Colorado Springs

Project Name: Bent Grass
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 10/18/19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SUB-BASIN DATA						**INITIAL/OVERLAND (T_i)**			**TRAVEL TIME (T_t)**					**Tc CHECK (URBANIZED BASINS)**			**FINAL**
BASIN ID	**D.A. (AC)**	**Hydrologic Soils Group**	**Impervious (%)**	**C_5**	**C_{100}**	**L (FT)**	**S (%)**	**T_i (MIN)**	**L (FT)**	**S (%)**	**Cv**	**VEL. (FPS)**	**T_t (MIN)**	**COMP. T_c (MIN)**	**TOTAL LENGTH(FT)**	**Urbanized T_c (MIN)**	**T_c (MIN)**
A-1	2.70	A	44.7	0.33	0.52	100	1.3	12.8	550	1.3	20	2.3	4.0	16.8	650.0	13.6	13.6
A-2	1.19	A	43.4	0.32	0.51	100	4.3	8.8	310	2.3	20	3.0	1.7	10.5	410.0	12.3	10.5
A-3	1.57	A	49.4	0.36	0.53	70	1.0	11.3	680	1.2	20	2.2	5.2	16.5	750.0	14.2	14.2
A-4	2.24	A	46.5	0.34	0.53	100	4.2	8.6	650	1.7	20	2.6	4.2	12.8	750.0	14.2	12.8
B-1	4.46	A	49.5	0.36	0.54	100	2.0	10.8	910	1.2	20	2.2	6.9	17.7	1010.0	15.6	15.6
B-2	1.17	A	65.0	0.45	0.59	85	0.2	18.7	430	0.9	20	1.9	3.9	22.6	515.0	12.9	12.9
B-3	0.46	A	65.0	0.45	0.59	15	2.0	3.7	190	1.0	20	2.0	1.6	5.2	205.0	11.1	5.2
B-4	1.19	A	2.0	0.09	0.36	300	2.7	22.9	690	2.7	15	2.5	4.6	27.6	990.0	15.5	15.5
B-5	1.56	A	2.0	0.09	0.36	200	2.7	18.8	100	2.7	15	2.5	0.7	19.5	300.0	11.7	11.7
B-6	0.62	A	2.0	0.09	0.36	100	5.0	10.8	30	2.7	15	2.5	0.2	11.0	130.0	10.7	10.7
C-1	1.35	A	58.2	0.42	0.57	35	2.4	5.5	400	2.4	20	3.1	2.2	7.7	435.0	12.4	7.7
C-2	7.81	A	45.9	0.34	0.52	100	2.0	11.0	1770	1.5	20	2.4	12.0	23.1	1870.0	20.4	20.4
C-3	2.38	A	56.9	0.40	0.56	100	1.6	11.0	810	1.0	20	2.0	6.8	17.7	910.0	15.1	15.1
C-4	3.61	A	59.8	0.42	0.57	100	2.0	9.9	973	2.0	20	2.8	5.7	15.6	1073.0	16.0	15.6
C-5	7.86	A	60.8	0.42	0.57	100	2.0	9.9	1200	1.3	20	2.2	8.9	18.8	1300.0	17.2	17.2
C-6	5.54	A	52.7	0.38	0.55	100	3.0	9.1	1230	1.5	20	2.4	8.4	17.5	1330.0	17.4	17.4
C-7	0.76	A	2.0	0.09	0.36	80	2.5	12.2	150	2.0	15	2.1	1.2	13.4	230.0	11.3	11.3
C-8	0.92	A	2.0	0.09	0.36	100	2.5	13.6	170	2.5	15	2.4	1.2	14.8	270.0	11.5	11.5
D-1	12.85	A	42.6	0.32	0.51	100	1.0	14.3	1180	2.0	20	2.8	7.0	21.2	1280.0	17.1	17.1
D-2	3.19	A	48.7	0.36	0.53	100	1.0	13.5	1000	2.0	20	2.8	5.9	19.4	1100.0	16.1	16.1
D-3	9.16	A	39.2	0.30	0.50	90	1.5	12.1	1020	1.5	20	2.4	6.9	19.1	1110.0	16.2	16.2
D-4	9.53	A	29.0	0.24	0.47	100	1.5	13.8	1700	1.5	20	2.4	11.6	25.3	1800.0	20.0	20.0
E-1	1.69	A	62.3	0.55	0.69	25	2.0	4.0	940	1.0	20	2.0	7.8	11.8	965.0	15.4	11.8
E-2	0.68	A	82.8	0.76	0.85	25	2.0	2.5	665	1.6	20	2.5	4.4	6.9	690.0	13.8	6.9
E-3	0.78	A	88.7	0.81	0.89	25	2.0	2.1	632	1.0	20	2.0	5.3	7.4	657.0	13.7	7.4
E-4	0.91	A	80.6	0.74	0.84	25	2.0	2.6	913	2.0	20	2.8	5.4	8.0	938.0	15.2	8.0
E-5	0.89	A	89.0	0.81	0.89	25	2.0	2.1	903	2.1	20	2.9	5.2	7.3	928.0	15.2	7.3
F-1	0.46	A	38.7	0.29	0.50	66	2.5	8.9	-	-	15	10.4	0.1	9.0	66.0	10.4	9.0
F-2	0.62	A	69.7	0.59	0.72	25	2.0	3.7	464	4.0	20	4.0	1.9	5.6	489.0	12.7	5.6
G-1	0.98	A	2.0	0.09	0.36	100	3.5	12.2	109	3.5	15	2.8	0.6	12.8	209.0	11.2	11.2
H-1	0.31	A	71.6	0.66	0.79	25	2.0	3.2	135	2.0	20	2.8	0.8	4.0	160.0	10.9	5.0
OS-1	32.28	A	11.0	0.16	0.41	100	2.4	12.9	2100	2.2	15	2.2	15.7	28.6	2200.0	22.2	22.2
OS-2	20.08	A	8.0	0.14	0.40	100	2.3	13.3	1400	2.3	15	2.3	10.3	23.6	1500.0	18.3	18.3
OS-3	10.62	A	8.0	0.14	0.40	100	2.0	14.0	1500	2.0	15	2.1	11.8	25.7	1600.0	18.9	18.9
OS-4	2.64	A	2.0	0.09	0.36	100	2.0	14.7	400	2.0	15	2.1	3.1	17.8	500.0	12.8	12.8
OS-5	14.13	A	4.5	0.11	0.37	100	2.5	13.4	1600	3.0	15	2.6	10.3	23.6	1700.0	19.4	19.4
OS-6	5.38	A	65.0	0.45	0.59	100	2.0	9.4	600	2.0	15	2.1	4.7	14.2	700.0	13.9	13.9

NOTES:

T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33), S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Residential Filing No. 2 **Project No.:** CLH000014.20
Location: CO, Colorado Springs **Calculated By:** CMWJ
Design Storm: 100-Year **Checked By:** SMB
Date: 10/18/19

STREET	Design Point	DIRECT RUNOFF: Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	TOTAL RUNOFF: Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	STREET: Slope (%)	Street Flow (cfs)	PIPE: Design Flow (cfs)	Slope (%)	Pipe Size (inches)	TRAVEL TIME: Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		OS-1	32.28	0.41	22.2	13.23	4.92	65.1													
	1	A-1	2.70	0.52	13.6	1.40	6.16	8.6					1.0	8.6				160	2.0	1.3	Total flow on North side of Niebrara Drive
	2	A-2	1.19	0.51	10.5	0.61	6.82	4.2													
	2								14.9	2.01	5.92	11.9	1.5	11.9				290	2.4	2.0	Total flow at DP-2
	3	A-3	1.57	0.53	14.2	0.83	6.05	5.0													
	3								16.9	2.84	5.61	15.9	1.4	15.9				60	2.4	0.4	Total flow at NE corner of Bent Grass M.D. & Berwyn Ct.
	4	A-4	2.24	0.53	12.8	1.19	6.31	7.5													Total flow at NW corner of Bent Grass M.D. & Berwyn Ct.
	4								17.3	4.03	5.55	22.4	1.0	22.4				840	2.0	7.0	Total flow entering Bent Grass M.D. from Berwyn Ct.
	5	D-2	3.19	0.53	16.1	1.69	5.73	9.7													Total flow at DP-5
	6	D-1	12.85	0.51	17.1	6.55	5.58	36.5													Total flow at DP-6
	5&6								17.1	8.24	5.58	46.0 23.0									Q at each inlet = 23 cfs
	5								17.1	4.12	5.58	23.0	1.1	8.1	14.9			60	2.1	0.5	Future total flow by-passing inlet = 8.1 cfs Future total flow captured by inlet = 14.9 cfs
	6								17.1	4.12	5.58	23.0	1.0	4.4	18.6						Future total flow by-passing inlet = 4.4 cfs Future total flow captured by inlet = 18.6 cfs
	6								17.6	2.24	5.51	12.3	1	12.3				430	2.0	3.6	Future total flow entering Bent Grass M.D. = 12.3 cfs // Routed to inlet at DP-8
	7	E-3	0.78	0.89	7.4	0.69	7.70	5.3													Total flow at DP-7 along South side of Bent Grass M.D.
	8	E-2	0.68	0.85	6.9	0.58	7.89	4.6													
	8-W								21.2	2.82	5.04	14.2									Total flow approaching DP-8 from the West
	8	E-1	1.69	0.69	11.8	1.17	6.51	7.6													
	8-E								24.3	5.20	4.69	24.4									Total flow approaching DP-8 from the East
	8								24.3	8.02	4.69	37.6									Total flow at DP-8 along North side of Bent Grass M.D
	7&8								24.3	8.71	4.69	40.8 20.4									Total flow at DP-7& Q at each inlet = 20.4 cfs
	7														20.4						Total flow captured by inlet = 20.4 cfs
	7														20.4						Total flow at DP-7 = 20.4 cfs // Piped to inlet at DP-8
	8														20.4						Total flow captured by inlet = 20.4 cfs
	8								24.3	14.71	4.69	69.0			69.0						Total flow at DP-8 = 69 cfs // Piped to Water Quality Pond

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Location: CO, Colorado Springs
Calculated By: CMWJ
Design Storm: 100-Year
Checked By: SMB
Date: 10/18/19

STREET		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	9	B-3	0.46	0.59	5.2	0.27	8.56	2.3					2.5	2.3				350	3.2	1.8	Total flow at the west point of Silky Thread Rd.
	10	B-4	1.19	0.36	15.5	0.43	5.83	2.5													Total flow at thesouth point of Moskell Court.
	10								15.5	0.70	5.83	4.1									Total flow to temporary swale - directs flow to Water Quality Pond
	11	B-1	4.46	0.54	15.6	2.41	5.81	14.0													Total flow on North side of Willmore Dr.
	12	B-2	1.17	0.59	12.9	0.69	6.30	4.3													Total flow on South side of Willmore Dr.
	13								15.6	3.10	5.81	18.0	2.5	18.0				200	3.2	1.1	Total flow going West off of Willmore Dr. into temporary swale
	14	B-5	1.56	0.36	11.7	0.56	6.54	3.7													Total flow sheet flowing from Basin B-4 to temporary swale
	14								16.7	4.36	5.65	24.6									Total flow entering proposed Water Quality Pond from north
	15	B-6	0.62	0.36	10.7	0.22	6.76	1.5													Flows directly into proposed Water Quality Pond
	15								24.3	19.29	4.69	90.5									Total flow entering proposed Water Quality Pond
	16	C-5	7.86	0.57	17.2	4.48	5.56	24.9					1.0	9.4	15.5			150	2.0	1.3	Total flow by-passing inlet = 9.4 cfs Total flow at DP-16 = 15.5 cfs // Piped to inlet at DP-17
	17	C-6	5.54	0.55	17.4	3.05	5.54	16.9					1	7.7	9.2			150	2.0	1.3	Total flow by-passing inlet = 7.7 cfs Total flow captured by inlet = 9.2 cfs
	17								17.4	4.45	5.54	24.6			24.6						Total flow at DP-17 = 24.6 cfs // Piped to manhole at DP-19A
	18	C-4	3.61	0.57	15.6	2.06	5.81	12.0													
	18								18.5	3.75	5.39	20.2									Total flow approaching DP-18 from the NW
	18	C-3	2.38	0.56	15.1	1.33	5.90	7.8													Total flow approaching DP-18 from the SE
	18								18.5	5.08	5.39	27.4			27.4						Total flow at DP-18 = 27.4 cfs // Piped to inlet at DP-19
	19	C-1	1.35	0.57	7.7	0.77	7.59	5.8					1.5	5.8				1400	2.4	9.5	
	19	C-2	7.81	0.52	20.4	4.06	5.14	20.9													
	19								20.4	4.83	5.14	24.8									Total flow approaching DP-19 from the SE
	19								20.4	6.22	5.14	32.0			32.0						Total flow captured by inlet = 32 cfs
	19A								20.4	15.75	5.14	81.0			81.0						Total flow at DP-19 = 81 cfs // Piped to Water Quality Pond
	20	C-7	0.76	0.36	11.3	0.27	6.63	1.8													Flows directly into Water Quality Pond
	20								20.4	16.02	5.14	82.3			82.3						Total flow to Water Quality Pond

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Location: CO, Colorado Springs
Calculated By: CMWJ
Design Storm: 100-Year
Checked By: SMB
Date: 10/18/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	21	D-3	9.16	0.50	16.2	4.58	5.72	26.2							26.2						Total Flow at DP-21
	22	OS-2	20.08	0.40	18.3	8.03	5.41	43.4					1.5	43.4				1800	2.4	12.2	
	22	D-4	9.53	0.47	20.0	4.48	5.19	23.3													
	22								30.6	12.51	4.12	51.5									Total flow at DP-22
	21&22								30.6	17.09	4.12	70.4 35.2									Total flow at DP-21&22 Q at each inlet = 35.2 cfs
	21								30.6	8.55	4.12	35.2	1.25	12.1	23.1			60	2.2	0.4	Total flow by-passing inlet = 12.1 cfs Total flow at DP-21 = 23.1 cfs // Piped to inlet at DP-22
	22								30.6	8.55	4.12	35.2		12.1	23.1						Total flow by-passing inlet = 12.1 cfs Total flow captured by inlet = 23.1 cfs
	22								31.0	5.88	4.08	24.0	2.5	24.0				550	3.2	2.9	Total flow entering Bent Grass M.D. from DP-21&22
	22								30.6	11.21	4.12	46.2			46.2						Total flow at DP-22 = 46.2 cfs // Piped to inlet at DP-23
	23	OS-3	10.62	0.40	18.9	4.25	5.33	22.7					2	22.7				470	2.8	2.8	
	23								21.7	4.25	4.99	21.2			21.2						Total flow captured by area inlet = 21.2 cfs
	23A								30.6	15.46	4.12	63.7			63.7	2.0		600	2.8	3.5	Total flow at DP-23A = 63.7 cfs // Piped under Bent Grass M.D. into swale
	24	E-4	0.91	0.84	8.0	0.76	7.50	5.7													
	24	OS-4	2.64	0.36	12.8	0.95	6.31	6.0													
	24								31.0	7.59	4.08	31.0									Total flow at DP-24
	25	E-5	0.89	0.89	7.3	0.79	7.73	6.1													Total flow at DP-25
	24&25								31.0	8.38	4.08	34.2 17.1		0.1	17.0						Total flow at DP-24&25 Q at each inlet = 17.1 cfs
	24								31.0	4.19	4.08	17.1		0.1	17.0						Total flow by-passing inlet = 0.1 cfs Total flow at DP-24 = 17 cfs // Piped to inlet at DP-25
	25								31.0	4.19	4.08	17.1		0.1	17.0						Total flow by-passing inlet = 0.1 cfs Total flow captured by inlet = 17 cfs
	25								31.0	8.33	4.08	34.0			34.0						Total flow at DP-25 = 34 cfs // Piped to outfall at DP-26
	26								34.1	23.80	3.84	91.4			91.4						Total flow at DP-26 = 91.4 cfs // Routed to RWT204
		C-8	0.92	0.36	11.5	0.33	6.58	2.2													Pervious/landscape - Flows into RWT204
		F-1	0.46	0.50	9.0	0.23	7.20	1.7													Flows offsite
		F-2	0.62	0.72	5.6	0.45	8.38	3.8													Flows offsite
		G-1	0.98	0.36	11.2	0.35	6.66	2.3													Flows offsite
		H-1	0.31	0.79	5.0	0.24	8.68	2.1													Flows offsite
		OS-5	14.13	0.37	19.4	5.23	5.26	27.5													Flows into Basin OS-6
		OS-6	5.38	0.59	13.9	3.17	6.10	19.3													To be developed in the future

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Location: CO, Colorado Springs
Calculated By: CMWJ
Design Storm: 5-Year
Checked By: SMB
Date: 10/18/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		OS-1	32.28	0.16	22.2	5.16	2.93	15.1													Swale conveys flow to future drainage tract
	1	A-1	2.70	0.33	13.6	0.89	3.67	3.3					1	3.3				160	2.0	1.3	Total flow on North side of Niebrara Drive
	2	A-2	1.19	0.32	10.5	0.38	4.06	1.5													
	2								14.9	1.27	3.53	4.5	1.5	4.5				290	2.4	2.0	Total flow at DP-2
	3	A-3	1.57	0.36	14.2	0.57	3.61	2.1													
	3								16.9	1.84	3.34	6.1	1.4	6.1				60	2.4	0.4	Total flow at NE corner of Bent Grass M.D. & Berwyn Ct.
	4	A-4	2.24	0.34	12.8	0.76	3.76	2.9													Total flow at NW corner of Bent Grass M.D. & Berwyn Ct.
	4								17.3	2.60	3.30	8.6	1.0	8.6				840	2.0	7.0	Total flow entering Bent Grass M.D. from Berwyn Ct.
	5	D-2	3.19	0.36	16.1	1.15	3.41	3.9							3.9						Future total flow captured by inlet = 3.9 cfs
	6	D-1	12.85	0.32	17.1	4.11	3.32	13.6					1.1	0.5	13.1						Future total flow by-passing inlet = 0.5 cfs Future total flow captured by inlet = 13.1 cfs
	6								17.1	5.10	3.32	16.9									Total flow piped to DP-8
	6								17.1	0.16	3.32	0.5		0.5				430	2.0	3.6	Future total flow entering Bent Grass M.D. = 0.5 cfs // Routed to inlet at DP-8
	7	E-3	0.78	0.81	7.4	0.63	4.59	2.9							2.9						Total flow captured by inlet = 2.9 cfs
	8	E-2	0.68	0.76	6.9	0.52	4.70	2.4													
	8-W								17.1	0.68	3.32	2.3									Total flow approaching DP-8 from the West
	8	E-1	1.69	0.55	11.8	0.93	3.88	3.6													
	8-E								24.3	3.53	2.79	9.8									Total flow approaching DP-8 from the East
	8								24.3	4.21	2.79	11.8			11.8						Total flow captured by inlet = 11.8 cfs
	8								24.34	9.94	2.79	27.7			27.7						Total flow at DP-8 = 27.7 cfs // Piped to Water Quality Pond

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project Name: Bent Grass
Subdivision: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Location: CO, Colorado Springs
Calculated By: CMWJ
Design Storm: 5-Year
Checked By: SMB
Date: 10/18/19

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	9	B-3	0.46	0.45	5.2	0.21	5.10	1.1					2.5	1.1				350	3.2	1.8	Total flow at the west point of Silky Thread Rd.
	10	B-4	1.19	0.09	15.5	0.11	3.47	0.4													Total flow at the south point of future Moskell Court.
	10								15.5	0.32	3.47	1.1									Total flow to temporary swale - directs flow to Water Quality Pond
	11	B-1	4.46	0.36	15.6	1.61	3.46	5.6													Total flow on North side of Willmore Dr.
	12	B-2	1.17	0.45	12.9	0.53	3.75	2.0													Total flow on South side of Willmore Dr.
	13								15.6	2.14	3.46	7.4	2.5	7.4				200	3.2	1.1	Total flow going West off of Willmore Dr. into temporary swale
	14	B-5	1.56	0.09	11.7	0.14	3.90	0.5													Total flow sheet flowing from Basin B-4 to temporary swale
	14								16.7	2.60	3.36	8.7									Total flow entering proposed Water Quality Pond from north
	15	B-6	0.62	0.09	10.7	0.06	4.02	0.2													Flows directly into proposed Water Quality Pond
	15								24.3	12.60	2.79	35.2									Total flow entering proposed Water Quality Pond
	16	C-5	7.86	0.42	17.2	3.30	3.31	10.9					1.0	1.1	9.8			150	2.0	1.3	Total flow by-passing inlet = 1.1 cfs Total flow at DP-16 = 9.8 cfs // Piped to inlet at DP-17
	17	C-6	5.54	0.38	17.4	2.11	3.30	7.0					1	1.2	5.8			150	2.0	1.3	Total flow by-passing inlet = 1.2 cfs Total flow captured by inlet = 5.8 cfs
	17								17.4	4.72	3.30	15.6			15.6						Total flow at DP-17 = 15.6 cfs // Piped to manhole at DP-19A
	18	C-4	3.61	0.42	15.6	1.52	3.46	5.3													
	18								18.5	1.86	3.21	6.0									Total flow approaching DP-18 from the NW
	18	C-3	2.38	0.40	15.1	0.95	3.52	3.3													Total flow approaching DP-18 from the SE
	18								18.5	2.81	3.21	9.0			9.0						Total flow captured by inlet = 9 cfs Total flow at DP-18 = 9 cfs // Piped to inlet at DP-19
	19	C-1	1.35	0.42	7.7	0.57	4.52	2.6					1.5	2.6				1400	2.4	9.5	
	19	C-2	7.81	0.34	20.4	2.66	3.06	8.1													
	19								20.4	3.23	3.06	9.9									Total flow approaching DP-19 from the SE
	19								20.4	3.58	3.06	11.0			11.0						Total flow captured by inlet = 11 cfs
	19								20.4	6.39	3.06	19.6			19.6						Total flow at DP-19 = 19.6 cfs // Piped to inlet at DP-19A
	19A								20.4	11.11	3.06	34.0			34.0						Total flow at DP-19A = 34 cfs // Piped to Water Quality Pond
	20	C-7	0.76	0.09	11.3	0.07	3.95	0.3													Flows directly into Water Quality Pond
	20								20.4	11.18	3.06	34.2			34.2						Total flow to Water Quality Pond

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

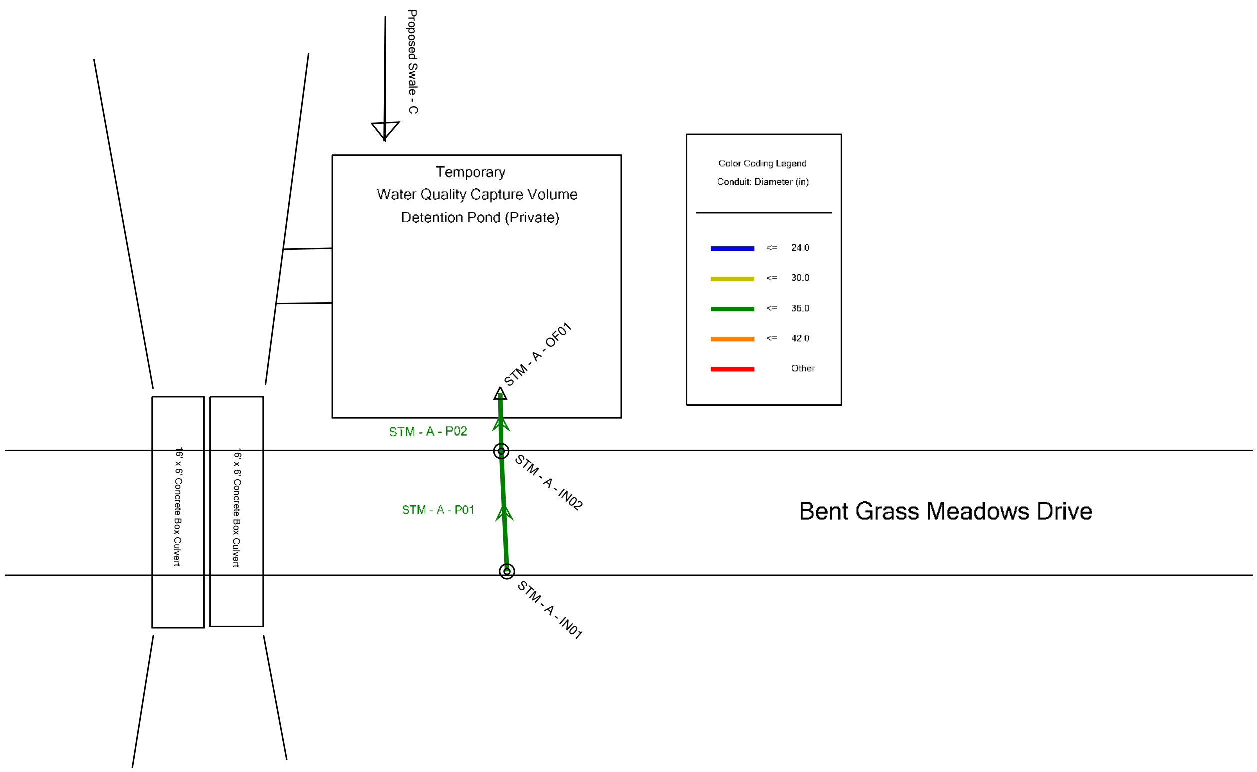
Project Name: Bent Grass
Subdivision: Bent Grass Residential Filing No. 2 **Project No.:** CLH000014.20
Location: CO, Colorado Springs **Calculated By:** CMWJ
Design Storm: 5-Year **Checked By:** SMB
Date: 10/18/19

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	21	D-3	9.16	0.30	16.2	2.75	3.41	9.4							9.4						Total flow at DP-21 = 9.4 cfs // Piped to future inlet at DP-22
	22	OS-2	20.08	0.14	18.3	2.81	3.22	9.0					1.5	9.0				1800	2.4	12.2	
	22	D-4	9.53	0.24	20.0	2.29	3.09	7.1													
	22								30.6	5.10	2.45	12.5		0.2	12.3						Total flow by-passing inlet = 0.2 cfs Total flow captured by inlet = 12.3 cfs
	22								30.6	7.77	2.45	19.0			19.0						Total flow at DP-22 = 19 cfs // Piped to inlet at DP-23
	22								30.6	0.08	2.45	0.2	2.5	0.2				550	3.2	2.9	Total flow entering Bent Grass M.D. from DP-21&22
	23	OS-3	10.62	0.14	18.9	1.49	3.18	4.7					2	4.7				470	2.8	2.8	
	23								21.7	1.49	2.97	4.4			4.4						Total flow captured by area inlet = 4.4 cfs
	23A								30.6	9.26	2.45	22.7			22.7	2.0		600	2.8	3.5	Total flow at DP-23A = 22.7 cfs // Piped under Bent Grass M.D. into swale
	24	E-4	0.91	0.74	8.0	0.67	4.46	3.0													
	24	OS-4	2.64	0.09	12.8	0.24	3.76	0.9					2.8	0.9				150	3.3	0.7	
	24								33.5	0.99	2.32	2.3			2.3						Total flow at DP-24 = 2.3 cfs // Piped to inlet at DP-25
	25	E-5	0.89	0.81	7.3	0.72	4.60	3.3							3.3						Total flow captured by inlet = 3.3 cfs
	25								33.5	1.71	2.32	4.0			4.0						Total flow at DP-25 = 4 cfs // Piped to outfall at DP-26
	26								33.5	10.97	2.32	25.5			25.5						Total flow at DP-26 = 25.5 cfs // Routed to RWT204
		C-8	0.92	0.09	11.5	0.08	3.92	0.3							0.3						Pervious/landscape - Flows into RWT204
		F-1	0.46	0.29	9.0	0.13	4.29	0.6							0.6						Flows offsite
		F-2	0.62	0.59	5.6	0.37	4.99	1.8							1.8						Flows offsite
		G-1	0.98	0.09	11.2	0.09	3.96	0.4							0.4						Flows offsite
		H-1	0.31	0.66	5.0	0.20	5.17	1.0							1.0						Flows offsite
		OS-5	14.13	0.11	19.4	1.55	3.13	4.9							4.9						Flows into Basin OS-6
		OS-6	5.38	0.45	13.9	2.42	3.64	8.8							8.8						To be developed in the future

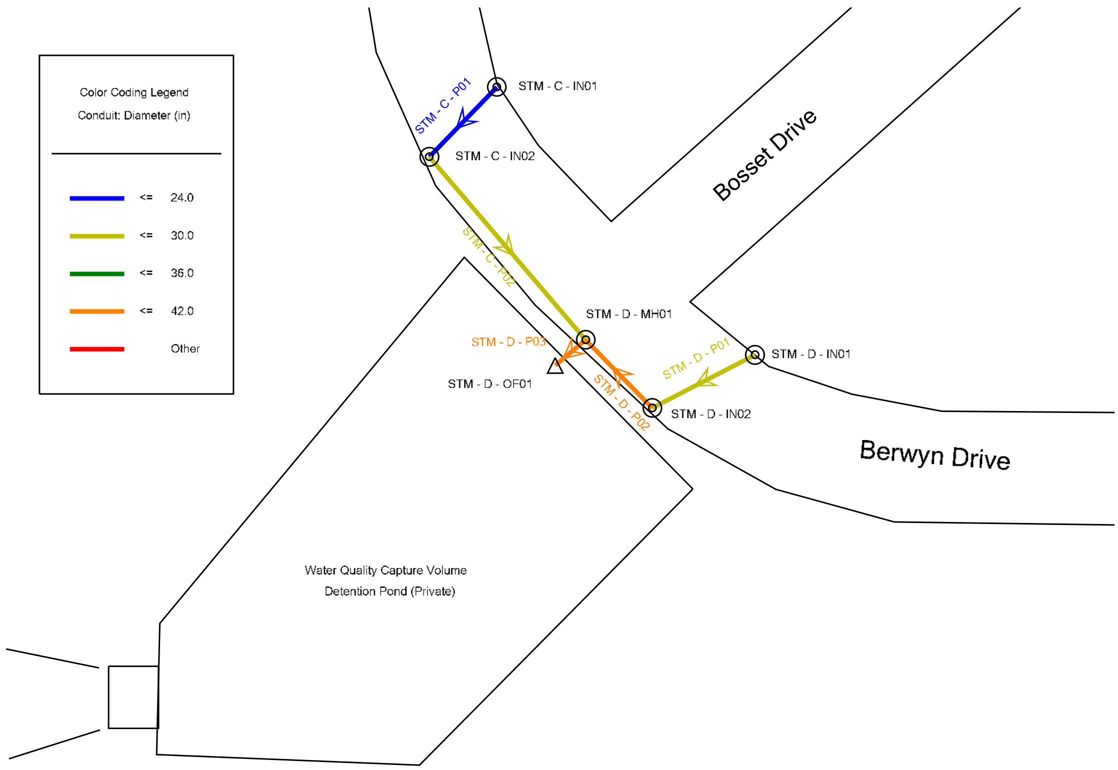
APPENDIX C

Hydraulic Computations

Storm - A

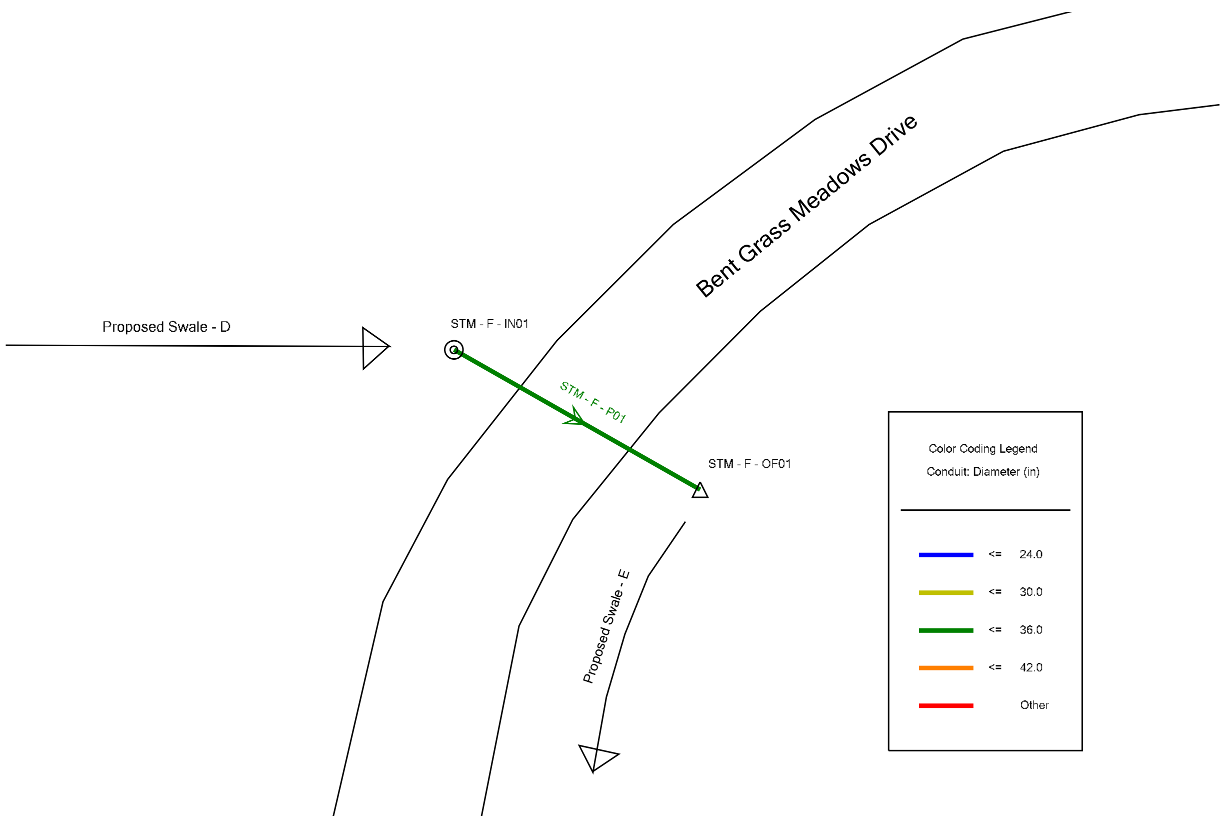

Proposed Swale - C
Temporary
Water Quality Capture Volume
Detention Pond (Private)
Color Coding Legend
Conduit: Diameter (in)
<= 24.0
<= 30.0
<= 36.0
<= 42.0
Other
STM - A - OF01
STM - A - P02
STM - A - IN02
STM - A - P01
STM - A - IN01
16' x 6' Concrete Box Culvert
16' x 6' Concrete Box Culvert
Bent Grass Meadows Drive

Storm - C & D



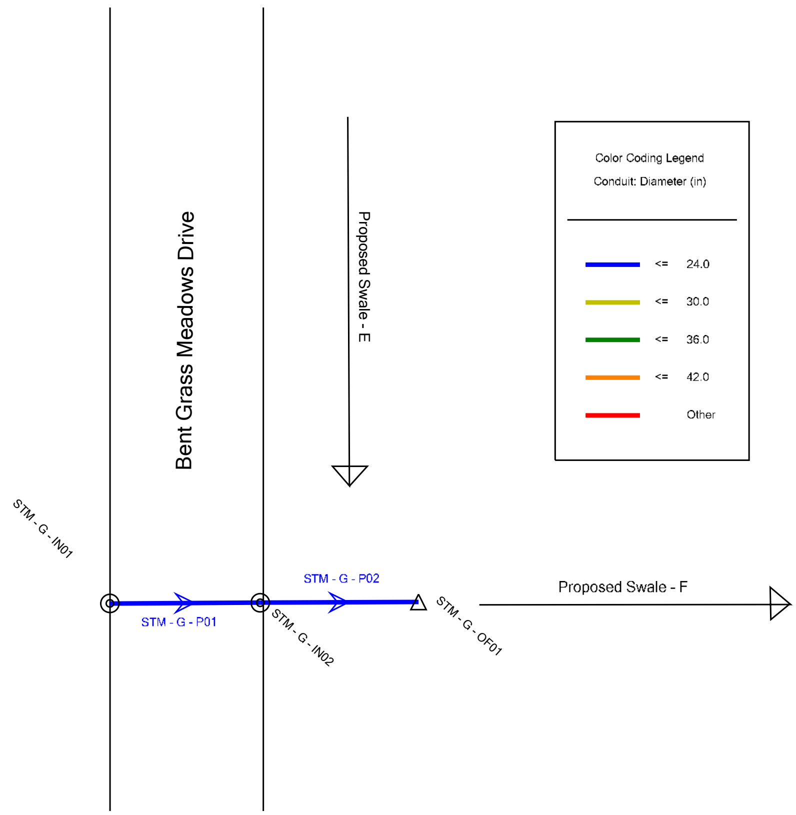
Color Coding Legend
Conduit: Diameter (in)
<= 24.0
<= 30.0
<= 36.0
<= 42.0
Other
STM - C - IN01
STM - C - P01
STM - C - IN02
Bosset Drive
STM - C - P02
STM - D - MH01
STM - D - P03
STM - D - OF01
STM - D - P01
STM - D - IN01
STM - D - P02
STM - D - IN02
Berwyn Drive
Water Quality Capture Volume
Detention Pond (Private)

Storm - F



Bent Grass Meadows Drive
Proposed Swale - D
STM - F - IN01
STM - F - P01
STM - F - OF01
Proposed Swale - E
Color Coding Legend
Conduit: Diameter (in)
<= 24.0
<= 30.0
<= 36.0
<= 42.0
Other

Storm - G



Bent Grass Meadows Drive
Proposed Swale - E
Color Coding Legend
Conduit: Diameter (in)
<= 24.0
<= 30.0
<= 36.0
<= 42.0
Other
STM - G - IN01
STM - G - P02
Proposed Swale - F
STM - G - P01
STM - G - IN02
STM - G - OF01

FlexTable: Conduit Table

Active Scenario: 5 YR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
STM - A - P01	STM - A - IN01	STM - A - IN02	6,940.04	6,939.80	49.0	0.005	36.0	0.013	2.90	3.67	46.66	6,940.74	6,940.75	6,940.82	6,940.79
STM - G - P01	STM - G - IN01	STM - G - IN02	6,931.91	6,931.67	49.0	0.005	24.0	0.013	2.40	3.64	15.83	6,933.43	6,933.42	6,933.44	6,933.43
STM - G - P02	STM - G - IN02	STM - G - OF01	6,931.67	6,931.41	51.4	0.005	24.0	0.013	4.00	4.25	16.09	6,933.42	6,933.41	6,933.45	6,933.44
STM - C - P01	STM - C - IN01	STM - C - IN02	6,926.43	6,926.25	36.2	0.005	24.0	0.013	9.80	5.33	15.94	6,928.42	6,928.35	6,928.57	6,928.50
STM - D - P01	STM - D - IN01	STM - D - IN02	6,925.97	6,925.79	36.5	0.005	30.0	0.013	9.00	5.18	28.79	6,928.13	6,928.12	6,928.19	6,928.18
STM - D - P03	STM - D - MH01	STM - D - OF01	6,924.32	6,924.25	13.2	0.005	42.0	0.013	34.00	7.47	73.29	6,927.76	6,927.75	6,927.96	6,927.94
STM - A - P02	STM - A - IN02	STM - A - OF01	6,938.70	6,938.50	40.5	0.005	36.0	0.013	27.70	6.91	46.87	6,940.40	6,940.16	6,941.10	6,940.90
STM - F - P01	STM - F - IN01	STM - F - OF01	6,934.42	6,933.64	155.0	0.005	36.0	0.013	22.70	6.62	47.31	6,935.95	6,935.10	6,936.56	6,935.79
STM - C - P02	STM - C - IN02	STM - D - MH01	6,925.75	6,925.32	85.4	0.005	30.0	0.013	15.60	6.03	29.11	6,928.14	6,928.02	6,928.30	6,928.18
STM - D - P02	STM - D - IN02	STM - D - MH01	6,924.79	6,924.62	34.1	0.005	42.0	0.013	19.60	6.31	71.06	6,928.03	6,928.02	6,928.10	6,928.09

FlexTable: Manhole Table

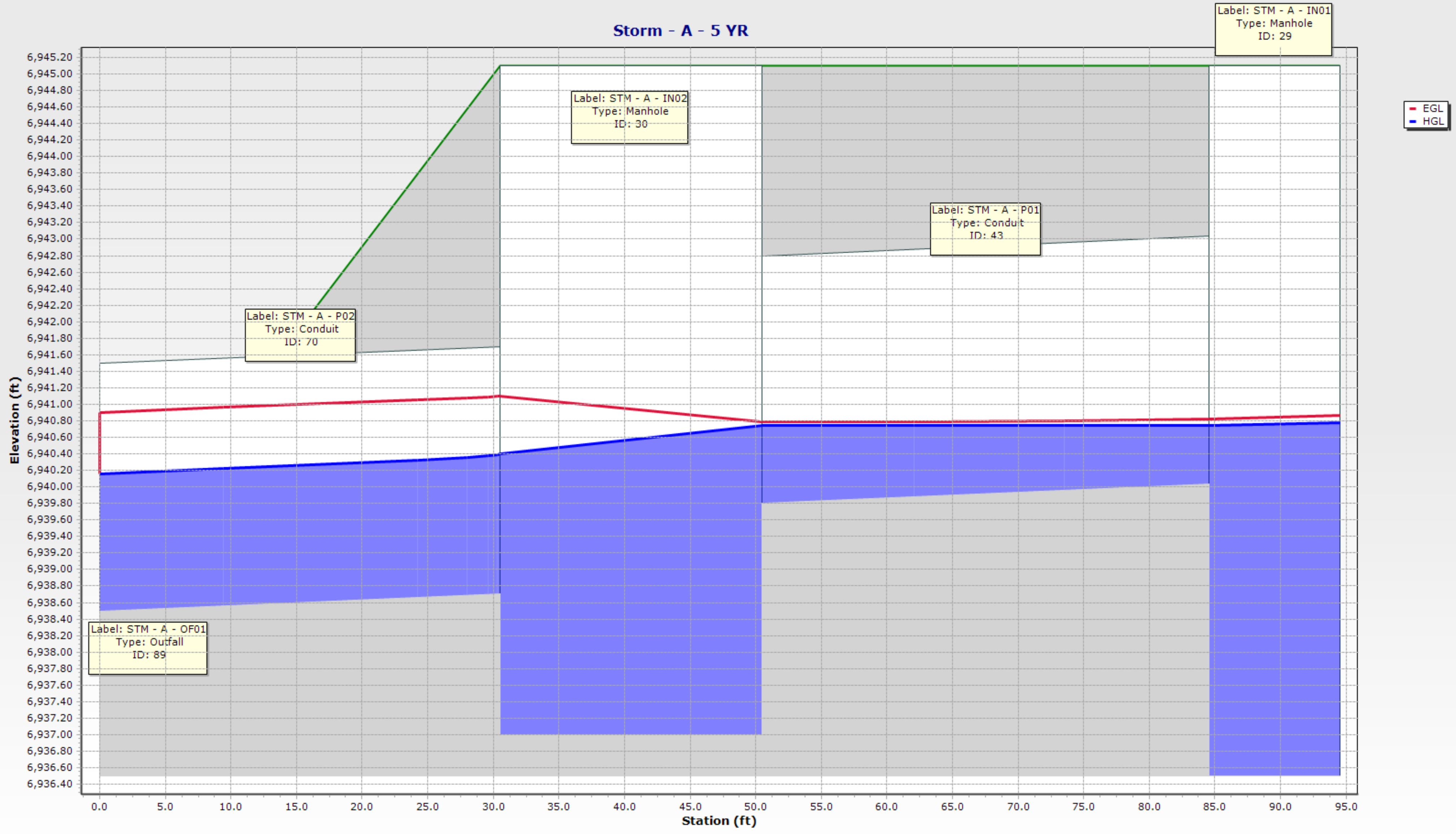
Active Scenario: 5 YR

Label	Elevation (Rim) (ft)	Headloss Coefficient (Standard)	Headloss Method	Headloss (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
STM - A - IN01	6,945.10	0.500	Standard	0.04	6,940.78	6,940.74	6,940.86	6,940.82
STM - A - IN02	6,945.10	0.500	Standard	0.35	6,940.75	6,940.40	6,940.79	6,941.10
STM - G - IN02	6,937.01	0.050	Standard	0.00	6,933.42	6,933.42	6,933.43	6,933.45
STM - G - IN01	6,937.01	1.320	Standard	0.02	6,933.44	6,933.43	6,933.46	6,933.44
STM - C - IN02	6,932.39	1.320	Standard	0.21	6,928.35	6,928.14	6,928.50	6,928.30
STM - C - IN01	6,932.52	0.000	Standard	0.00	6,928.42	6,928.42	6,928.57	6,928.57
STM - D - IN01	6,931.23	0.000	Standard	0.00	6,928.13	6,928.13	6,928.19	6,928.19
STM - D - IN02	6,931.21	1.320	Standard	0.09	6,928.12	6,928.03	6,928.18	6,928.10
STM - F - IN01	6,945.20	0.000	Standard	0.00	6,935.95	6,935.95	6,936.56	6,936.56
STM - D - MH01	6,930.74	1.320	Standard	0.26	6,928.02	6,927.76	6,928.09	6,927.96

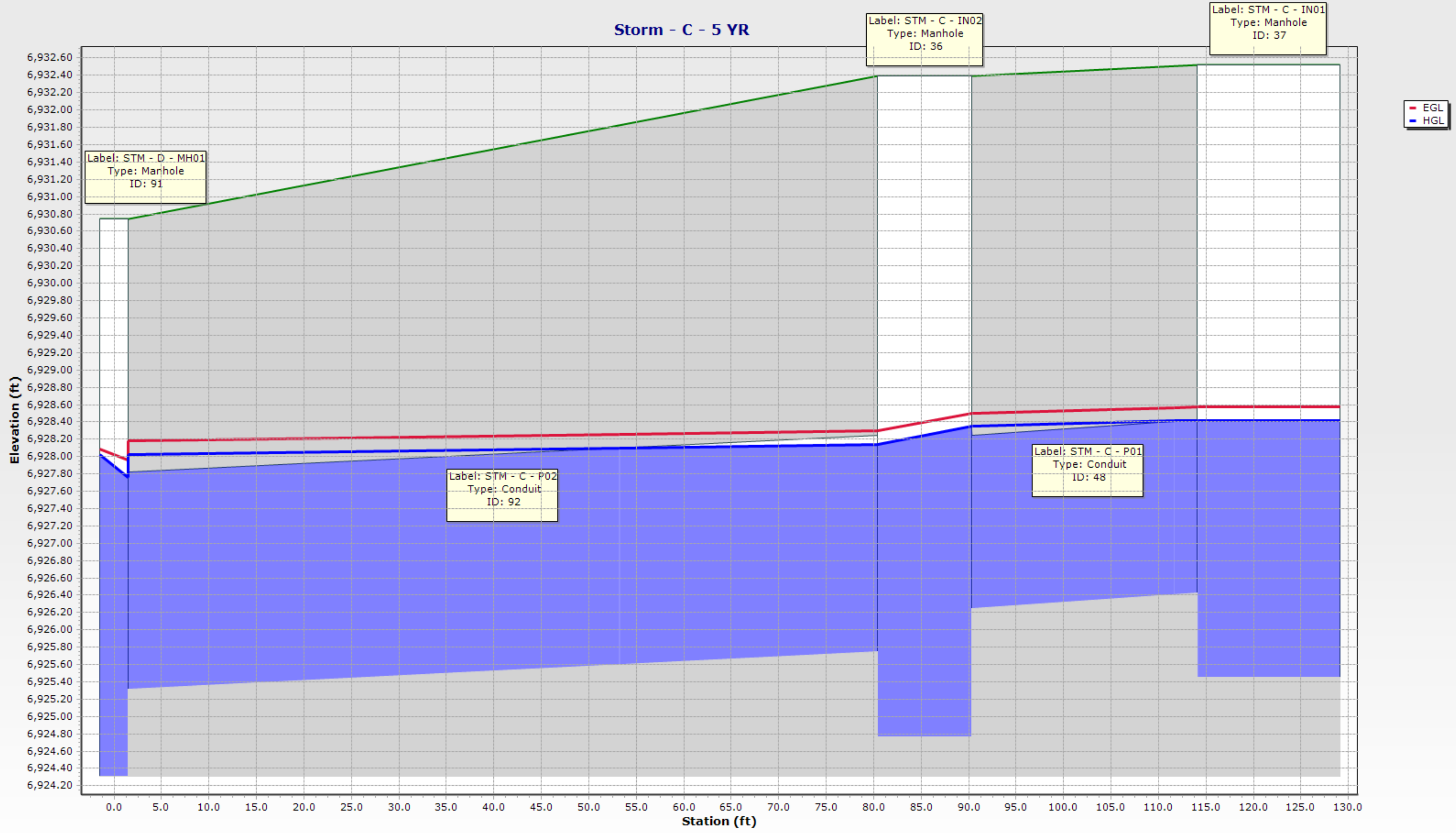
FlexTable: Outfall Table

Active Scenario: 5 YR

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Energy Grade Line (ft)	Flow (Total Out) (cfs)
STM - G - OF01	6,938.13	6,931.41	Crown		6,933.41	6,933.41	4.00
STM - D - OF01	6,923.50	6,919.81	Crown		6,927.75	6,927.75	34.00
STM - F - OF01	6,933.64	6,933.64	Free Outfall		6,935.10	6,935.10	22.70
STM - A - OF01	6,938.75	6,937.29	Free Outfall		6,940.16	6,940.16	27.70



Storm - A - 5 YR
Label: STM - A - IN01
Type: Manhole
ID: 29
Label: STM - A - IN02
Type: Manhole
ID: 30
Label: STM - A - P01
Type: Conduit
ID: 43
Label: STM - A - P02
Type: Conduit
ID: 70
Label: STM - A - OF01
Type: Outfall
ID: 89
EGL
HGL
Elevation (ft)
Station (ft)
6,945.20
6,945.00
6,944.80
6,944.60
6,944.40
6,944.20
6,944.00
6,943.80
6,943.60
6,943.40
6,943.20
6,943.00
6,942.80
6,942.60
6,942.40
6,942.20
6,942.00
6,941.80
6,941.60
6,941.40
6,941.20
6,941.00
6,940.80
6,940.60
6,940.40
6,940.20
6,940.00
6,939.80
6,939.60
6,939.40
6,939.20
6,939.00
6,938.80
6,938.60
6,938.40
6,938.20
6,938.00
6,937.80
6,937.60
6,937.40
6,937.20
6,937.00
6,936.80
6,936.60
6,936.40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0



Storm - C - 5 YR
Label: STM - C - IN02
Type: Manhole
ID: 36
Label: STM - C - IN01
Type: Manhole
ID: 37
Label: STM - D - MH01
Type: Manhole
ID: 91
Label: STM - C - P02
Type: Conduit
ID: 92
Label: STM - C - P01
Type: Conduit
ID: 48
EGL
HGL
Elevation (ft)
Station (ft)
6,932.60
6,932.40
6,932.20
6,932.00
6,931.80
6,931.60
6,931.40
6,931.20
6,931.00
6,930.80
6,930.60
6,930.40
6,930.20
6,930.00
6,929.80
6,929.60
6,929.40
6,929.20
6,929.00
6,928.80
6,928.60
6,928.40
6,928.20
6,928.00
6,927.80
6,927.60
6,927.40
6,927.20
6,927.00
6,926.80
6,926.60
6,926.40
6,926.20
6,926.00
6,925.80
6,925.60
6,925.40
6,925.20
6,925.00
6,924.80
6,924.60
6,924.40
6,924.20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
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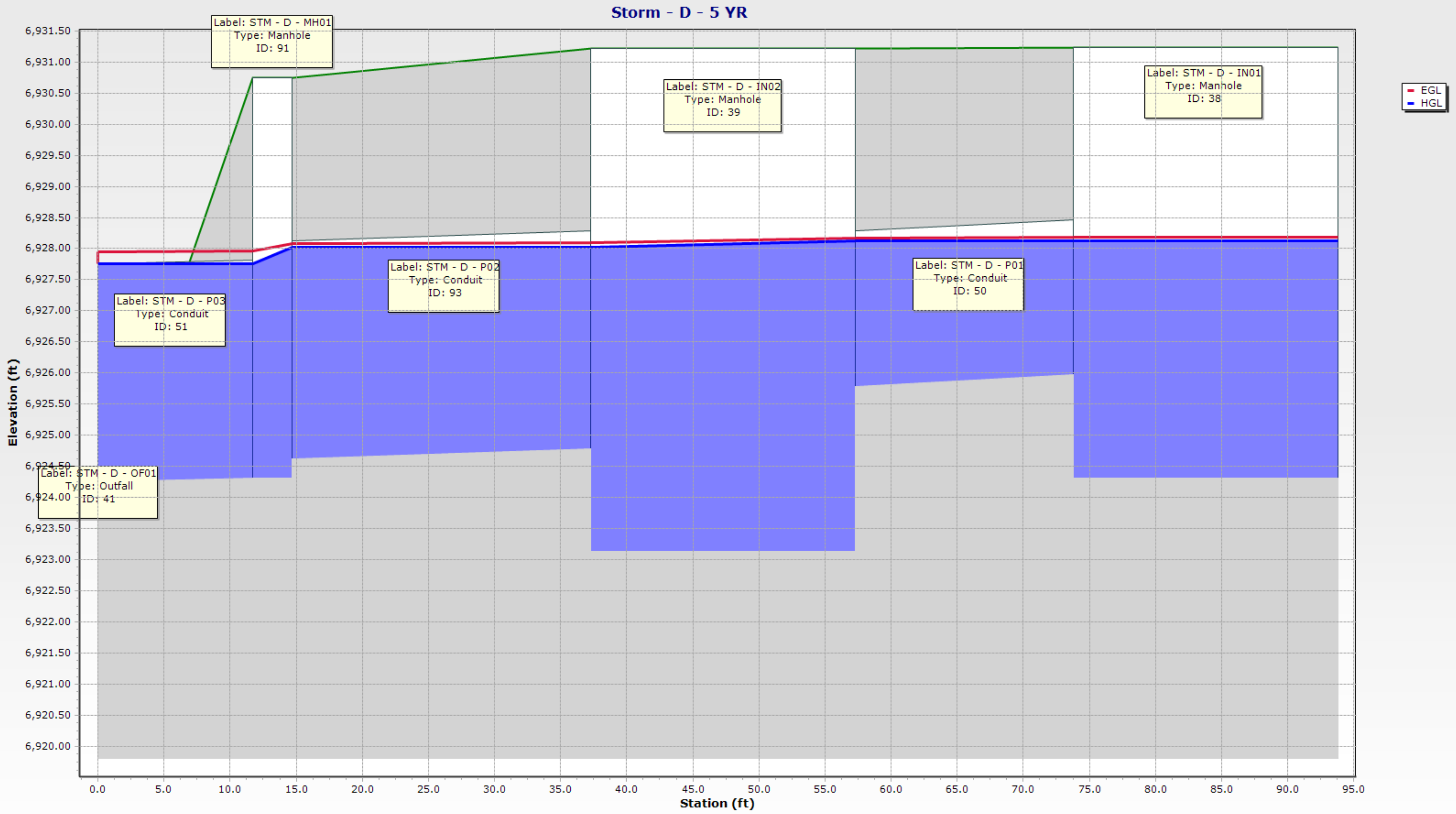
120.0
125.0
130.0



Storm - D - 5 YR
Label: STM - D - MH01
Type: Manhole
ID: 91
Label: STM - D - IN02
Type: Manhole
ID: 39
Label: STM - D - IN01
Type: Manhole
ID: 38
EGL
HGL
Label: STM - D - P03
Type: Conduit
ID: 51
Label: STM - D - P02
Type: Conduit
ID: 93
Label: STM - D - P01
Type: Conduit
ID: 50
Label: STM - D - OF01
Type: Outfall
ID: 41
Elevation (ft)
Station (ft)
6,931.50
6,931.00
6,930.50
6,930.00
6,929.50
6,929.00
6,928.50
6,928.00
6,927.50
6,927.00
6,926.50
6,926.00
6,925.50
6,925.00
6,924.50
6,924.00
6,923.50
6,923.00
6,922.50
6,922.00
6,921.50
6,921.00
6,920.50
6,920.00
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
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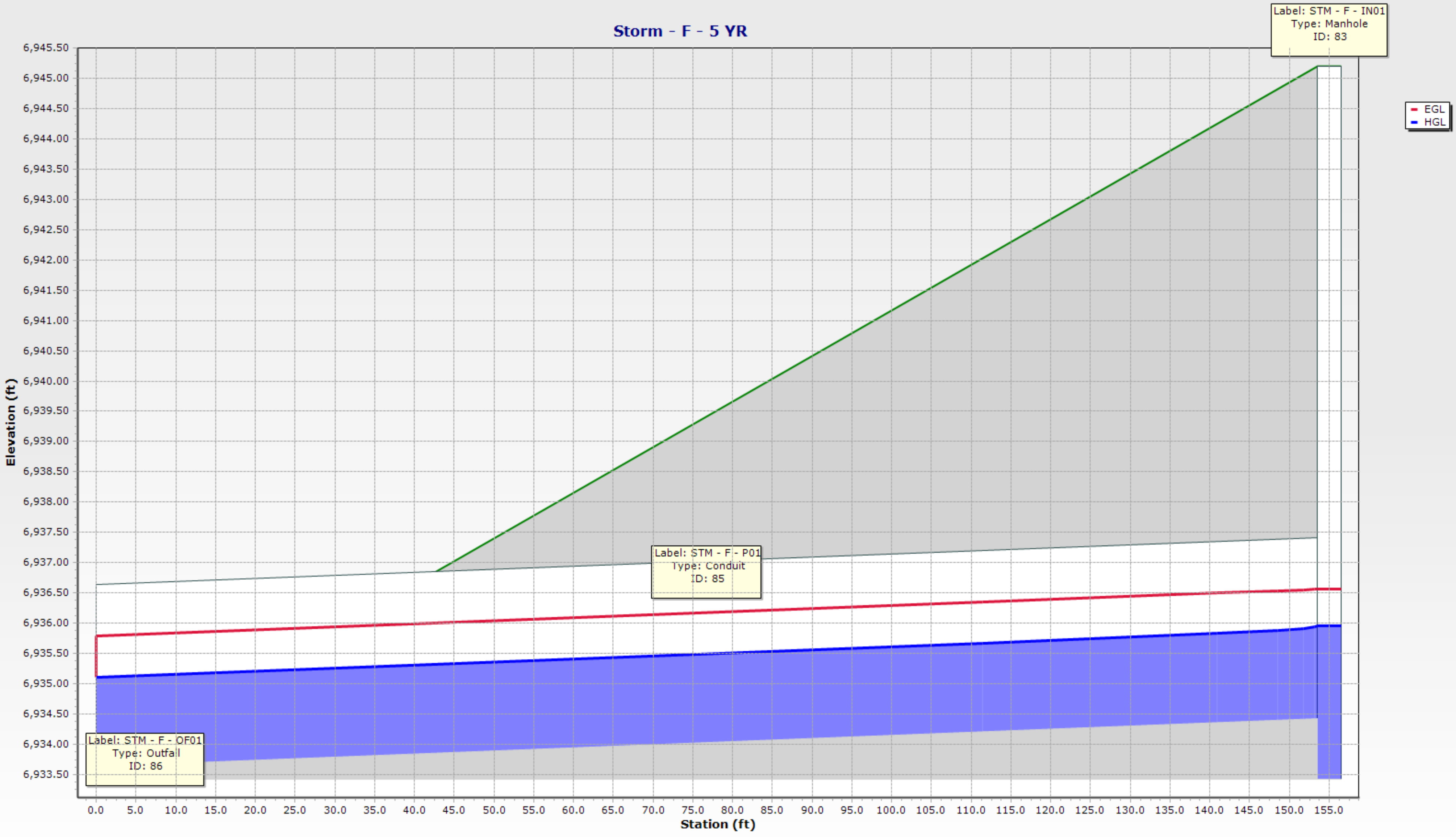
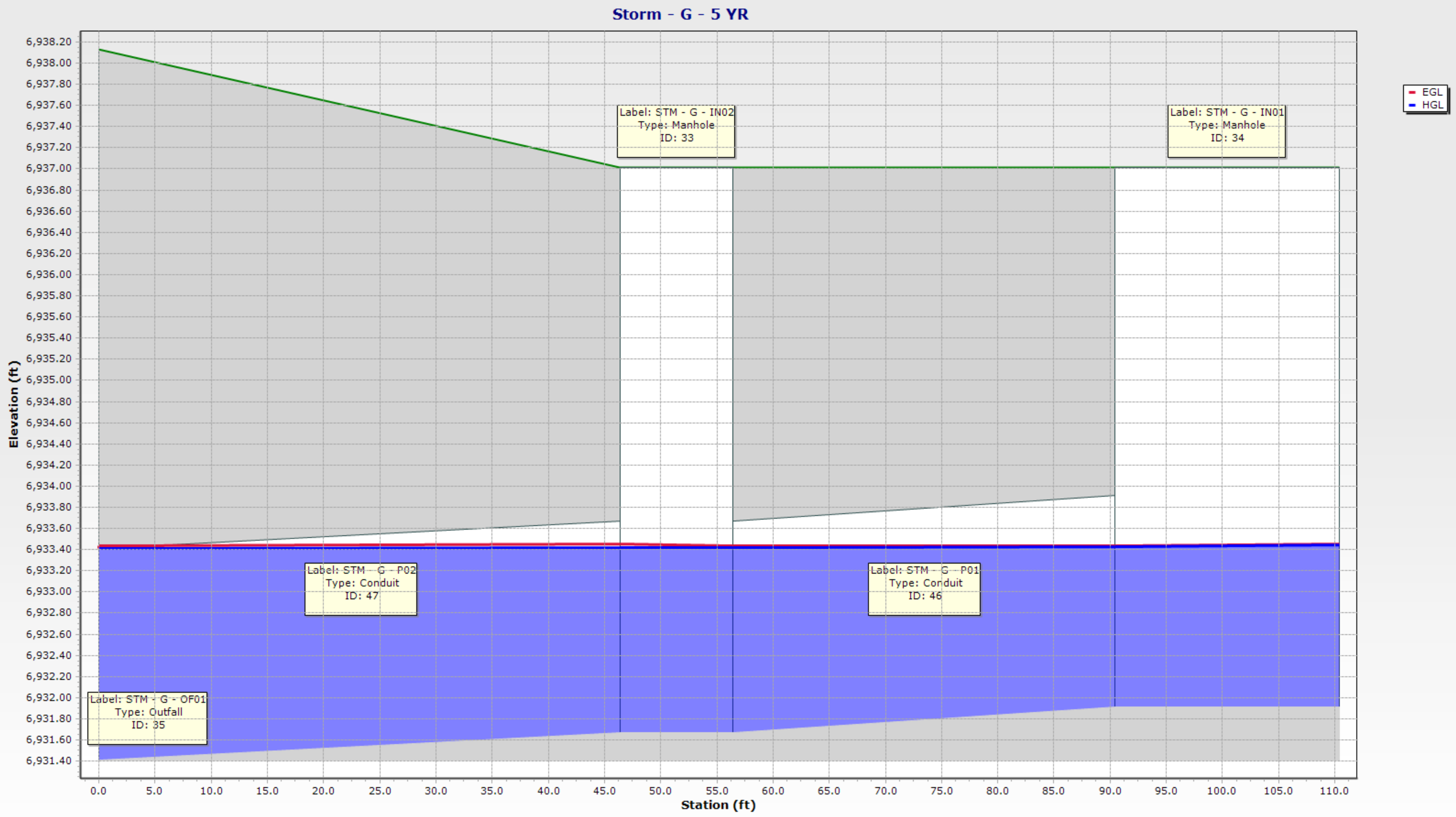
80.0
85.0
90.0
95.0



Storm - F - 5 YR
Label: STM - F - IN01
Type: Manhole
ID: 83
EGL
HGL
Label: STM - F - P01
Type: Conduit
ID: 85
Label: STM - F - OF01
Type: Outfall
ID: 86
Elevation (ft)
6,945.50
6,945.00
6,944.50
6,944.00
6,943.50
6,943.00
6,942.50
6,942.00
6,941.50
6,941.00
6,940.50
6,940.00
6,939.50
6,939.00
6,938.50
6,938.00
6,937.50
6,937.00
6,936.50
6,936.00
6,935.50
6,935.00
6,934.50
6,934.00
6,933.50
Station (ft)
0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0 105.0 110.0 115.0 120.0 125.0 130.0 135.0 140.0 145.0 150.0 155.0



Storm - G - 5 YR
EGL
HGL
Elevation (ft)
Station (ft)
6,938.20
6,938.00
6,937.80
6,937.60
6,937.40
6,937.20
6,937.00
6,936.80
6,936.60
6,936.40
6,936.20
6,936.00
6,935.80
6,935.60
6,935.40
6,935.20
6,935.00
6,934.80
6,934.60
6,934.40
6,934.20
6,934.00
6,933.80
6,933.60
6,933.40
6,933.20
6,933.00
6,932.80
6,932.60
6,932.40
6,932.20
6,932.00
6,931.80
6,931.60
6,931.40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0
Label: STM - G - IN02
Type: Manhole
ID: 33
Label: STM - G - IN01
Type: Manhole
ID: 34
Label: STM - G - P02
Type: Conduit
ID: 47
Label: STM - G - P01
Type: Conduit
ID: 46
Label: STM - G - OF01
Type: Outfall
ID: 35

FlexTable: Conduit Table

Active Scenario: 100 YR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
STM - A - P01	STM - A - IN01	STM - A - IN02	6,940.04	6,939.80	49.0	0.005	36.0	0.013	20.40	2.89	46.66	6,943.07	6,943.02	6,943.20	6,943.15
STM - G - P01	STM - G - IN01	STM - G - IN02	6,931.91	6,931.67	49.0	0.005	24.0	0.013	17.00	5.41	15.83	6,934.94	6,934.66	6,935.39	6,935.12
STM - G - P02	STM - G - IN02	STM - G - OF01	6,931.67	6,931.41	51.4	0.005	24.0	0.013	34.00	10.82	16.09	6,934.57	6,933.41	6,936.39	6,935.23
STM - C - P01	STM - C - IN01	STM - C - IN02	6,926.43	6,926.25	36.2	0.005	24.0	0.013	15.50	4.93	15.94	6,930.06	6,929.89	6,930.44	6,930.27
STM - D - P01	STM - D - IN01	STM - D - IN02	6,925.97	6,925.79	36.5	0.005	30.0	0.013	27.40	5.58	28.79	6,930.13	6,929.97	6,930.62	6,930.45
STM - D - P03	STM - D - MH01	STM - D - OF01	6,924.32	6,924.25	13.2	0.005	42.0	0.013	81.00	8.42	73.29	6,927.27	6,927.06	6,928.63	6,928.55
STM - A - P02	STM - A - IN02	STM - A - OF01	6,938.70	6,938.50	40.5	0.005	36.0	0.013	69.00	9.76	46.87	6,942.28	6,941.85	6,943.76	6,943.33
STM - F - P01	STM - F - IN01	STM - F - OF01	6,934.42	6,933.64	155.0	0.005	36.0	0.013	63.70	9.01	47.31	6,938.05	6,936.64	6,939.32	6,937.90
STM - C - P02	STM - C - IN02	STM - D - MH01	6,925.75	6,925.32	85.4	0.005	30.0	0.013	24.60	5.01	29.11	6,929.37	6,929.07	6,929.76	6,929.46
STM - D - P02	STM - D - IN02	STM - D - MH01	6,924.79	6,924.62	34.1	0.005	42.0	0.013	59.40	6.17	71.06	6,929.19	6,929.07	6,929.78	6,929.66

FlexTable: Manhole Table

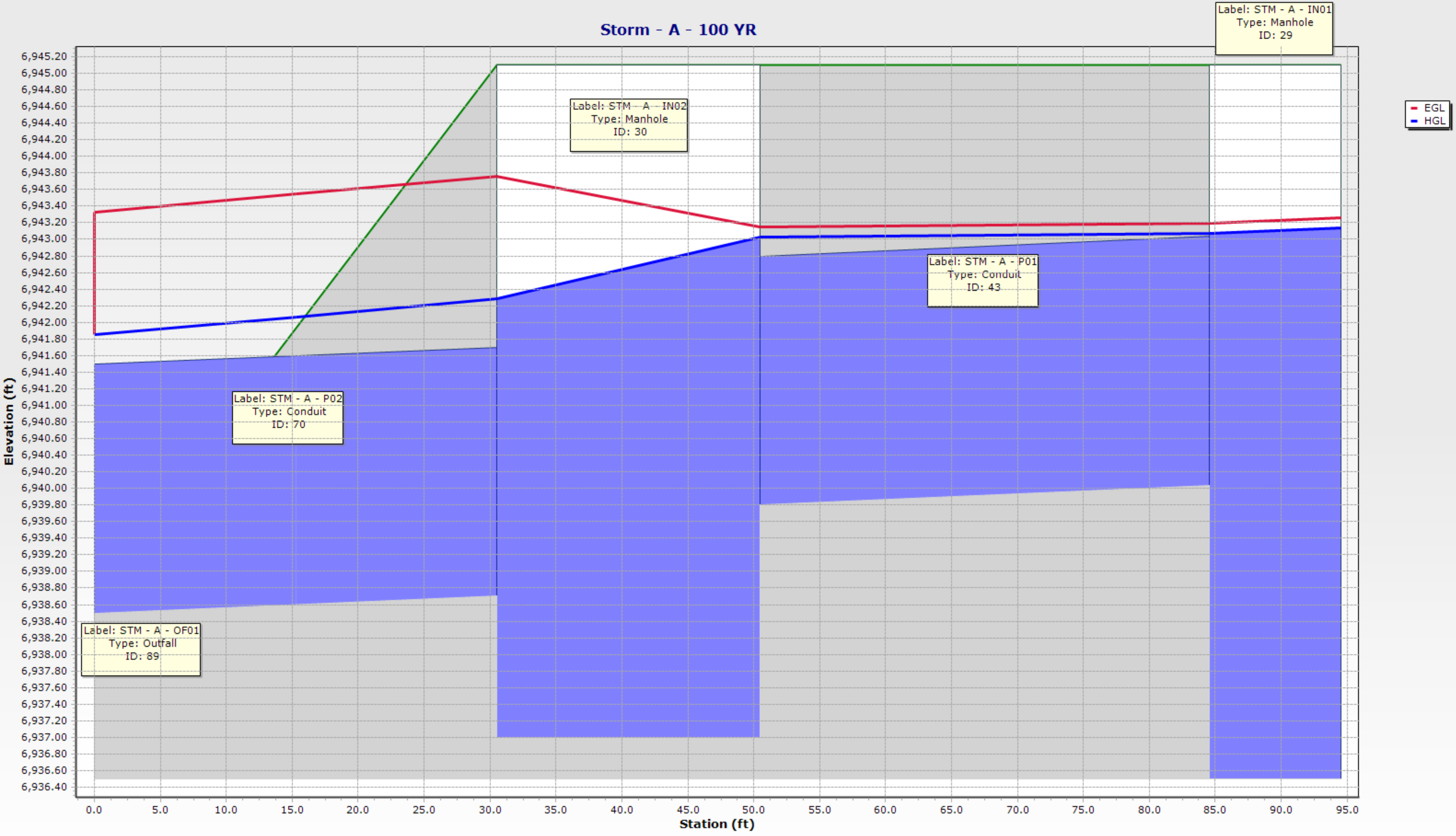
Active Scenario: 100 YR

Label	Elevation (Rim) (ft)	Headloss Coefficient (Standard)	Headloss Method	Headloss (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
STM - A - IN01	6,945.10	0.500	Standard	0.06	6,943.13	6,943.07	6,943.26	6,943.20
STM - A - IN02	6,945.10	0.500	Standard	0.74	6,943.02	6,942.28	6,943.15	6,943.76
STM - G - IN02	6,937.01	0.050	Standard	0.09	6,934.66	6,934.57	6,935.12	6,936.39
STM - G - IN01	6,937.01	1.320	Standard	0.60	6,935.54	6,934.94	6,935.99	6,935.39
STM - C - IN02	6,932.39	1.320	Standard	0.52	6,929.89	6,929.37	6,930.27	6,929.76
STM - C - IN01	6,932.52	0.000	Standard	0.00	6,930.06	6,930.06	6,930.44	6,930.44
STM - D - IN01	6,931.23	0.000	Standard	0.00	6,930.13	6,930.13	6,930.62	6,930.62
STM - D - IN02	6,931.21	1.320	Standard	0.78	6,929.97	6,929.19	6,930.45	6,929.78
STM - F - IN01	6,945.20	0.000	Standard	0.00	6,938.05	6,938.05	6,939.32	6,939.32
STM - D - MH01	6,930.74	1.320	Standard	1.79	6,929.07	6,927.27	6,929.66	6,928.63

FlexTable: Outfall Table

Active Scenario: 100 YR

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Energy Grade Line (ft)	Flow (Total Out) (cfs)
STM - G - OF01	6,938.13	6,931.41	Crown		6,933.41	6,933.41	34.00
STM - D - OF01	6,923.50	6,919.81	User Defined Tailwater	6,926.68	6,927.06	6,927.06	81.00
STM - F - OF01	6,933.64	6,933.64	Crown		6,936.64	6,936.64	63.70
STM - A - OF01	6,938.75	6,937.29	User Defined Tailwater	6,941.85	6,941.85	6,941.85	69.00



Storm - A - 100 YR
Label: STM - A - IN01
Type: Manhole
ID: 29
Label: STM - A - IN02
Type: Manhole
ID: 30
Label: STM - A - P01
Type: Conduit
ID: 43
Label: STM - A - P02
Type: Conduit
ID: 70
Label: STM - A - OF01
Type: Outfall
ID: 89
EGL
HGL
Elevation (ft)
Station (ft)
6,945.20
6,945.00
6,944.80
6,944.60
6,944.40
6,944.20
6,944.00
6,943.80
6,943.60
6,943.40
6,943.20
6,943.00
6,942.80
6,942.60
6,942.40
6,942.20
6,942.00
6,941.80
6,941.60
6,941.40
6,941.20
6,941.00
6,940.80
6,940.60
6,940.40
6,940.20
6,940.00
6,939.80
6,939.60
6,939.40
6,939.20
6,939.00
6,938.80
6,938.60
6,938.40
6,938.20
6,938.00
6,937.80
6,937.60
6,937.40
6,937.20
6,937.00
6,936.80
6,936.60
6,936.40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
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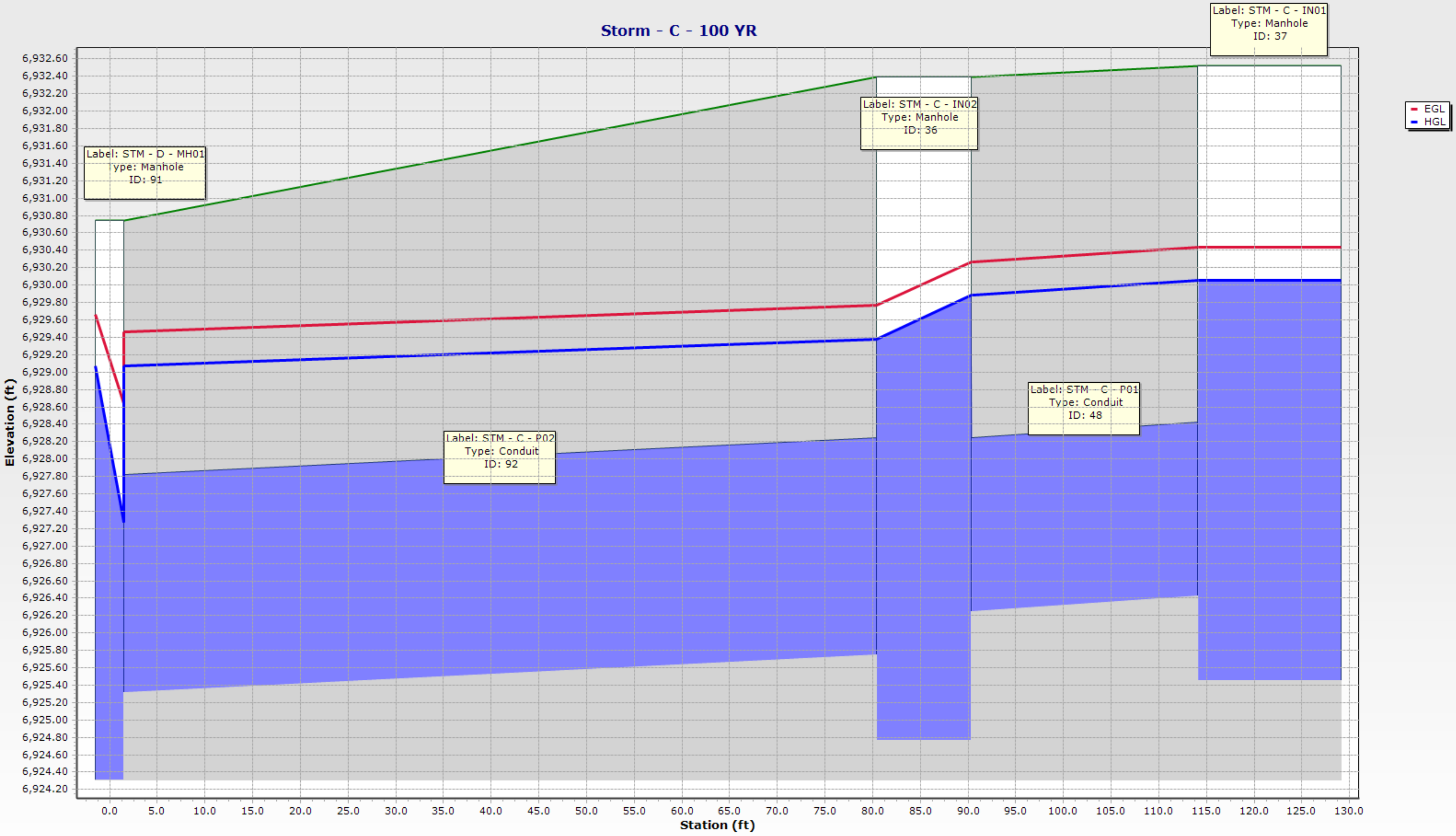
75.0
80.0
85.0
90.0
95.0



Storm - C - 100 YR
Label: STM - C - IN01
Type: Manhole
ID: 37
Label: STM - C - IN02
Type: Manhole
ID: 36
Label: STM - D - MH01
Type: Manhole
ID: 91
Label: STM - C - P02
Type: Conduit
ID: 92
Label: STM - C - P01
Type: Conduit
ID: 48
EGL
HGL
Elevation (ft)
Station (ft)
6,932.60
6,932.40
6,932.20
6,932.00
6,931.80
6,931.60
6,931.40
6,931.20
6,931.00
6,930.80
6,930.60
6,930.40
6,930.20
6,930.00
6,929.80
6,929.60
6,929.40
6,929.20
6,929.00
6,928.80
6,928.60
6,928.40
6,928.20
6,928.00
6,927.80
6,927.60
6,927.40
6,927.20
6,927.00
6,926.80
6,926.60
6,926.40
6,926.20
6,926.00
6,925.80
6,925.60
6,925.40
6,925.20
6,925.00
6,924.80
6,924.60
6,924.40
6,924.20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
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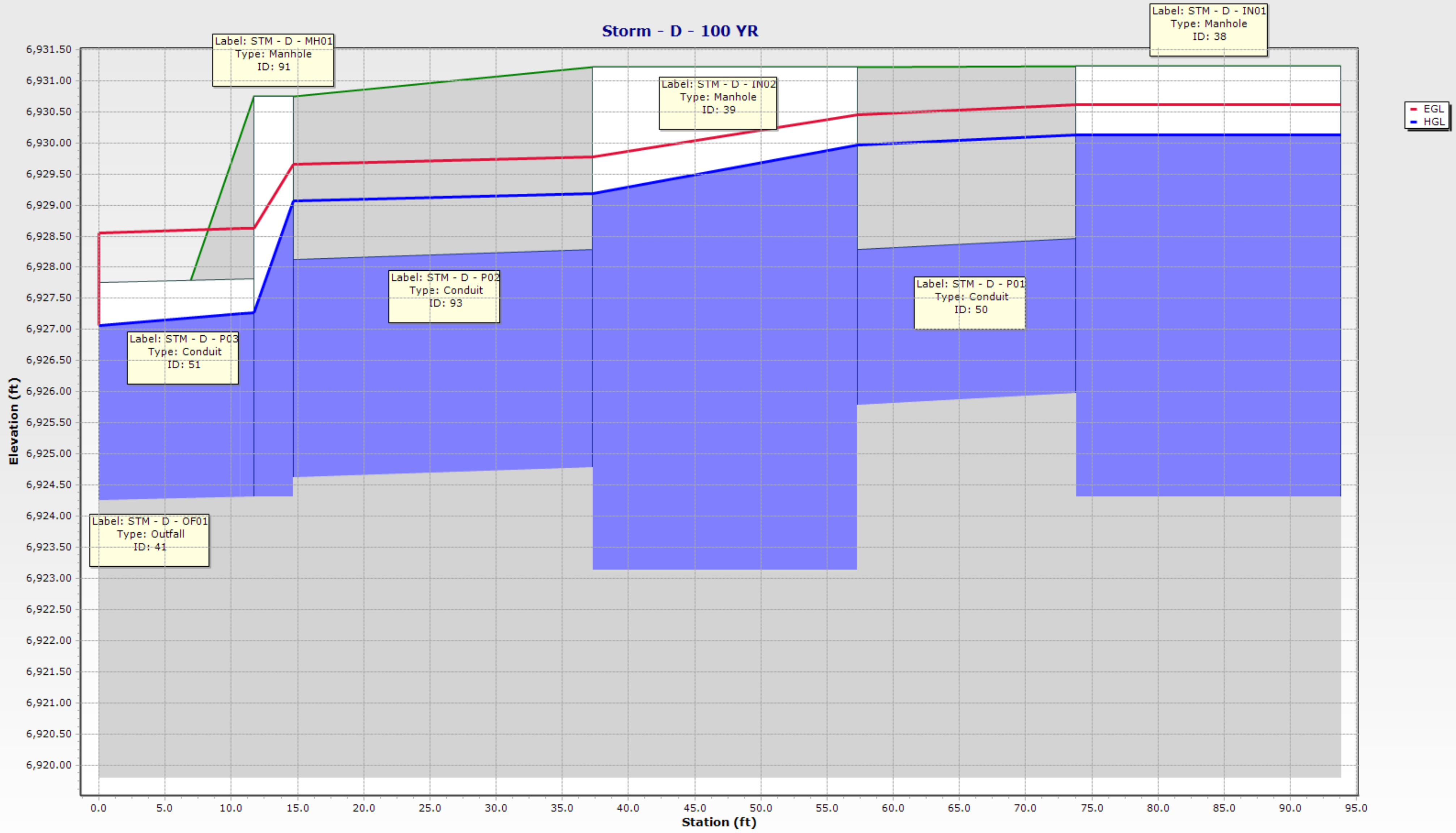
120.0
125.0
130.0


Storm - D - 100 YR
Label: STM - D - MH01
Type: Manhole
ID: 91
Label: STM - D - IN02
Type: Manhole
ID: 39
Label: STM - D - IN01
Type: Manhole
ID: 38
Label: STM - D - P02
Type: Conduit
ID: 93
Label: STM - D - P01
Type: Conduit
ID: 50
Label: STM - D - P03
Type: Conduit
ID: 51
Label: STM - D - OF01
Type: Outfall
ID: 41
EGL
HGL
Elevation (ft)
6,931.50
6,931.00
6,930.50
6,930.00
6,929.50
6,929.00
6,928.50
6,928.00
6,927.50
6,927.00
6,926.50
6,926.00
6,925.50
6,925.00
6,924.50
6,924.00
6,923.50
6,923.00
6,922.50
6,922.00
6,921.50
6,921.00
6,920.50
6,920.00
Station (ft)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
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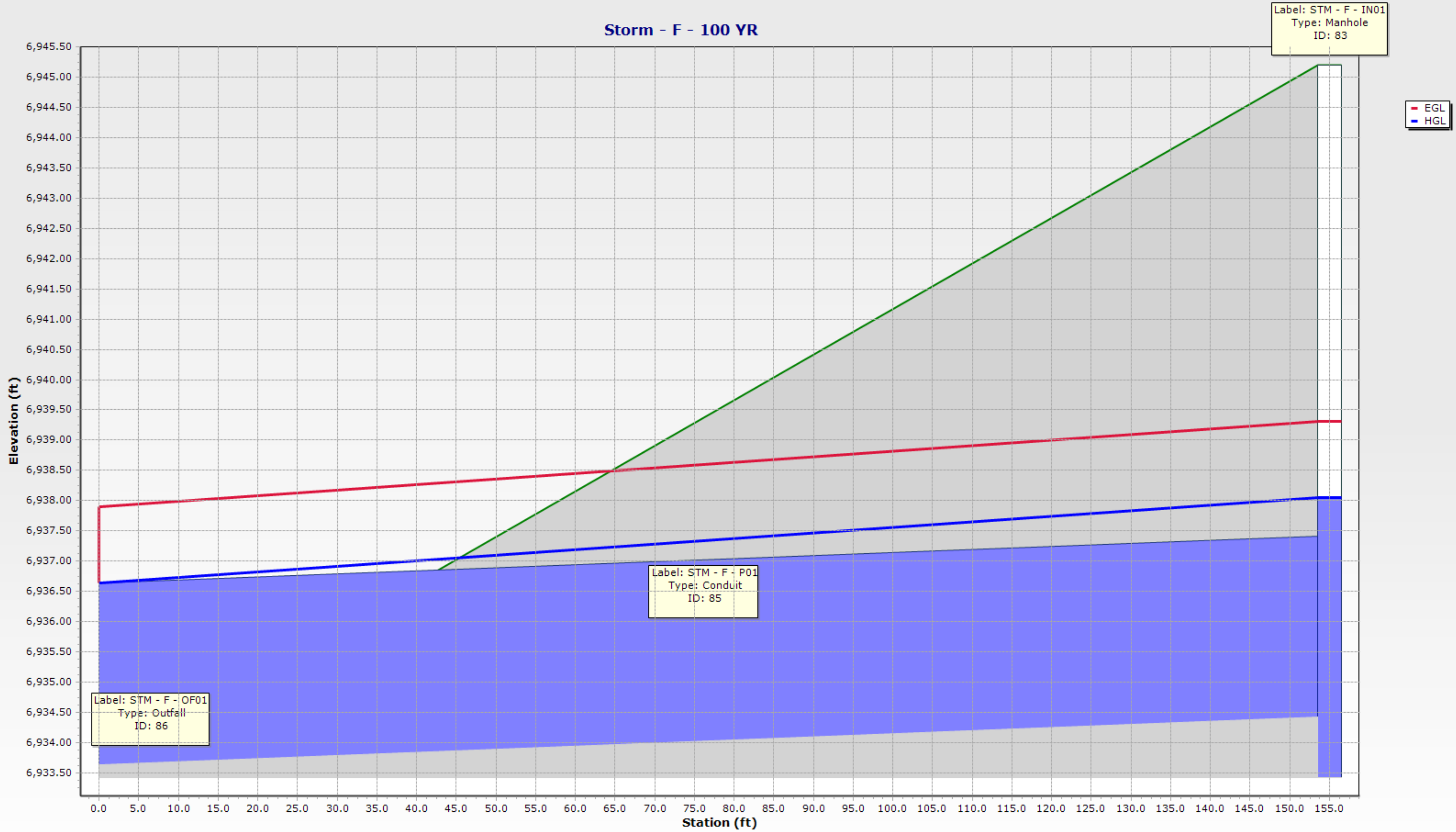
85.0
90.0
95.0



Storm - F - 100 YR
Label: STM - F - IN01
Type: Manhole
ID: 83
EGL
HGL
Label: STM - F - P01
Type: Conduit
ID: 85
Label: STM - F - OF01
Type: Outfall
ID: 86
Elevation (ft)
Station (ft)
6,945.50
6,945.00
6,944.50
6,944.00
6,943.50
6,943.00
6,942.50
6,942.00
6,941.50
6,941.00
6,940.50
6,940.00
6,939.50
6,939.00
6,938.50
6,938.00
6,937.50
6,937.00
6,936.50
6,936.00
6,935.50
6,935.00
6,934.50
6,934.00
6,933.50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
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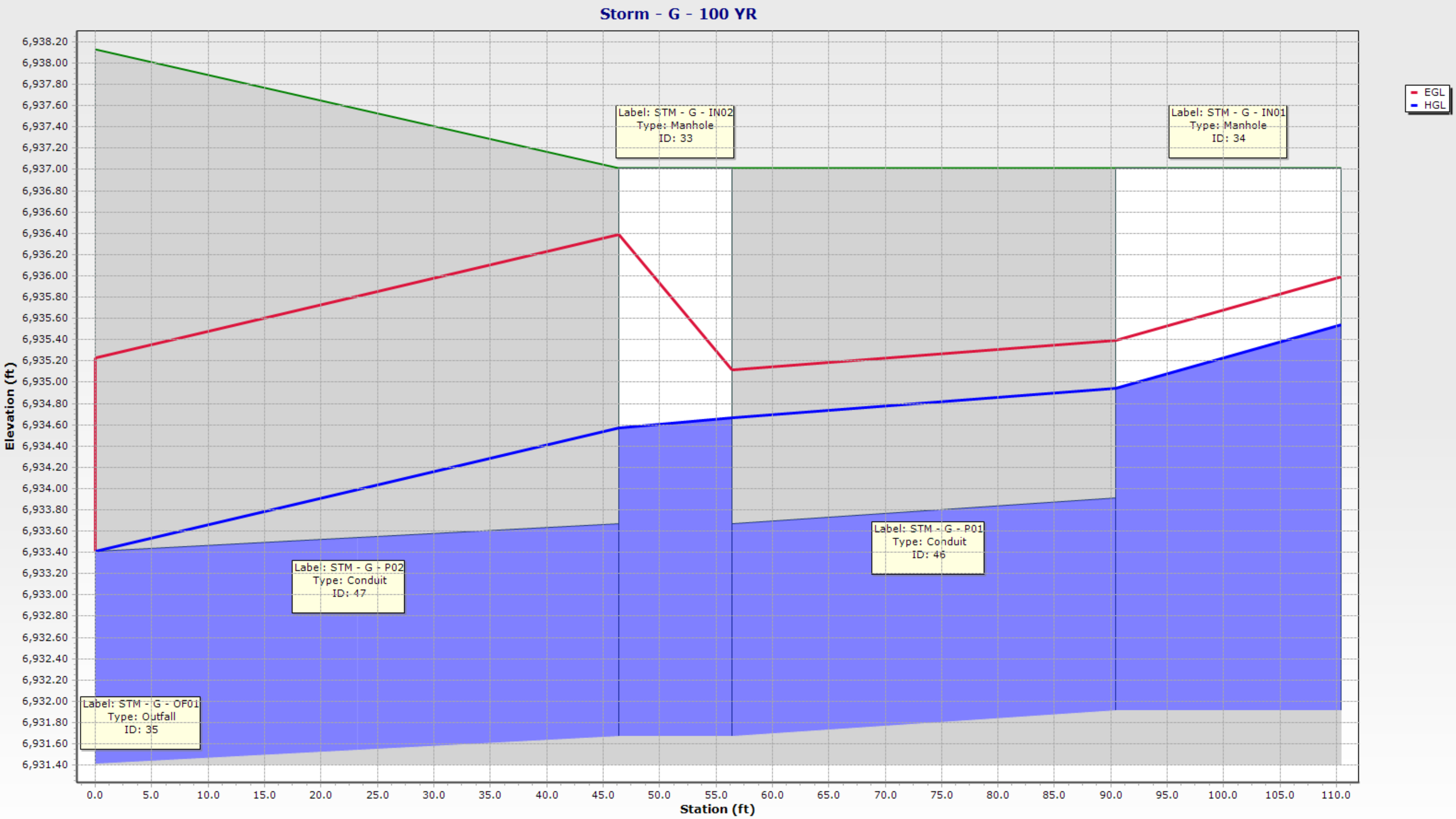
145.0
150.0
155.0



Storm - G - 100 YR
Elevation (ft)
Station (ft)
EGL
HGL
Label: STM - G - IN02
Type: Manhole
ID: 33
Label: STM - G - IN01
Type: Manhole
ID: 34
Label: STM - G - P01
Type: Conduit
ID: 46
Label: STM - G - P02
Type: Conduit
ID: 47
Label: STM - G - OF01
Type: Outfall
ID: 35
6,938.20
6,938.00
6,937.80
6,937.60
6,937.40
6,937.20
6,937.00
6,936.80
6,936.60
6,936.40
6,936.20
6,936.00
6,935.80
6,935.60
6,935.40
6,935.20
6,935.00
6,934.80
6,934.60
6,934.40
6,934.20
6,934.00
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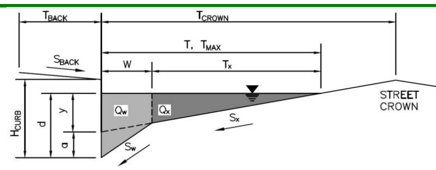
6,932.60
6,932.40
6,932.20
6,932.00
6,931.80
6,931.60
6,931.40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
105.0
110.0

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.9**	**113.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

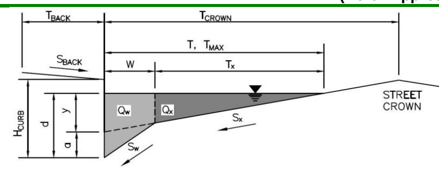
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-2 (North Approach)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.023	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**16.5**	**127.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

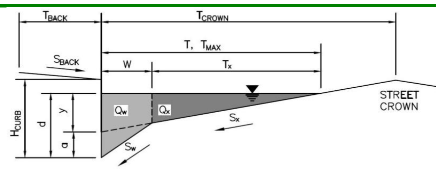
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

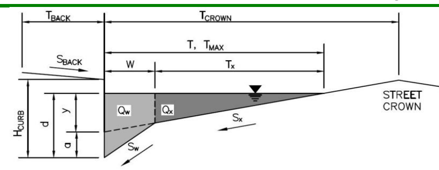
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-3



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**12.4**	**128.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

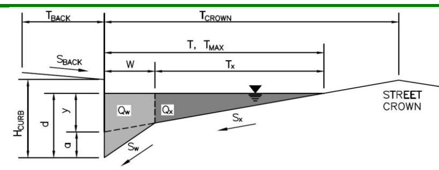
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

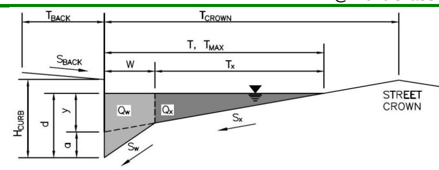
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-4 @ Bent Grass M.D.**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.8**	**143.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

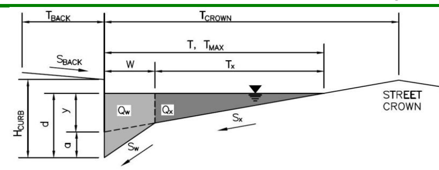
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-5



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

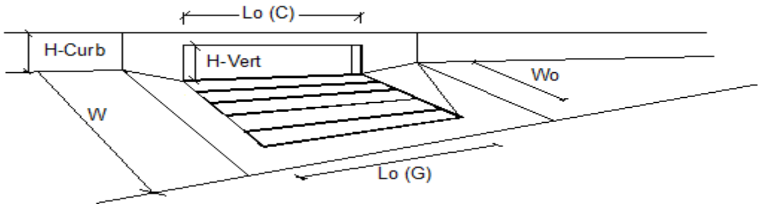
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.9**	**14.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**8.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**65**	**%**

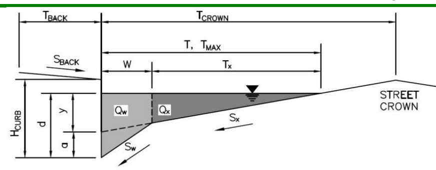
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-6



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

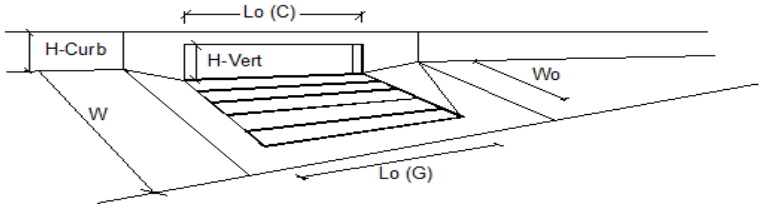
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**15.4**	**133.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



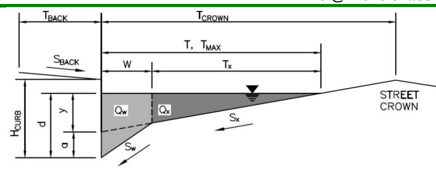
Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**13.1**	**18.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.5**	**4.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**96**	**81**	**%**

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-6 @ Bent Grass M.D.



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**15.4**	**133.3**	**cfs**

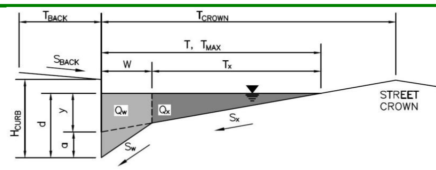
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-7



Gutter Geometry (Enter data in the blue cells)

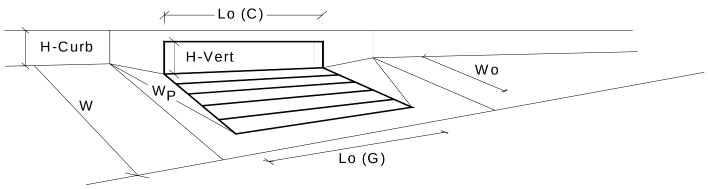
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



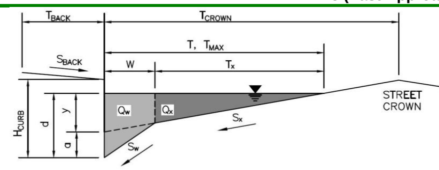
		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**8.3**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.9	20.4	cfs

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-8 (East Approach)



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**19.0**	**171.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

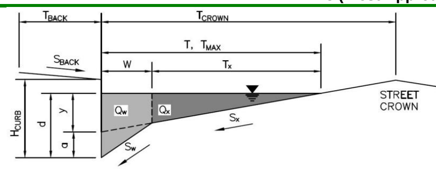
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-8 (West Approach)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**14.5**	**150.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

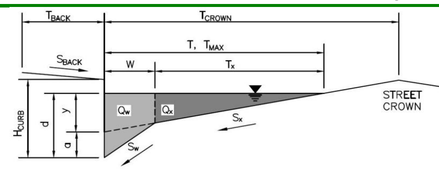
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-8**



Gutter Geometry (Enter data in the blue cells)

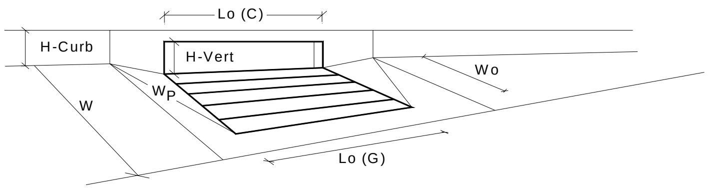
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



			MINOR	MAJOR	
Design Information (Input)					
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

		MINOR	MAJOR	
Low Head Performance Reduction (Calculated)				
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**14.4**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	11.8	20.4	cfs

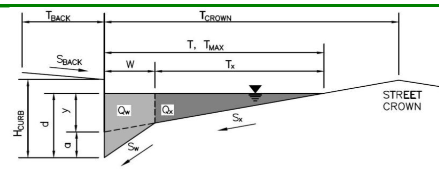
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-11



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

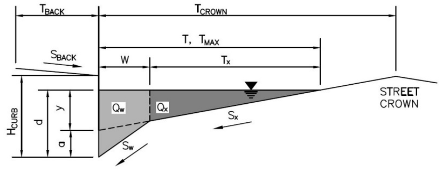
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-12**



Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

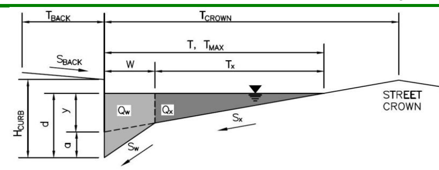
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-16



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

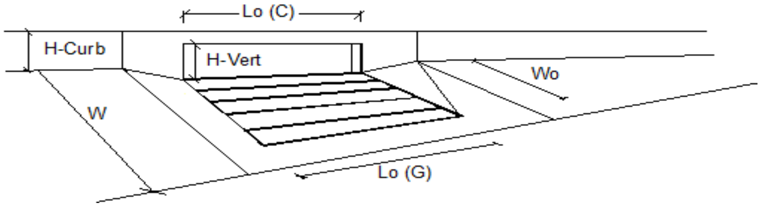
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.1**	**136.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**9.8**	**15.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**1.1**	**9.4**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**90**	**62**	**%**

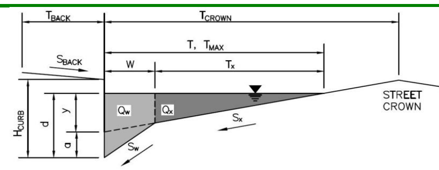
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-17



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

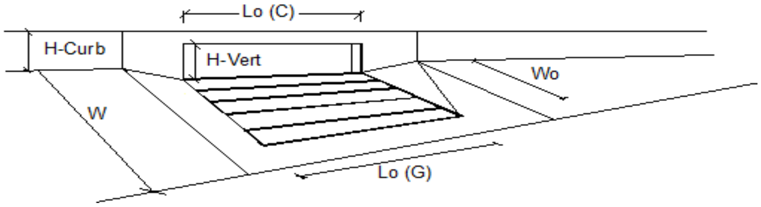
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.1**	**136.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



			MINOR	MAJOR	
Design Information (Input)					
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.8**	**9.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**1.2**	**7.7**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**83**	**54**	**%**

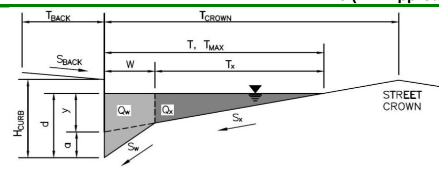
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-18 (NW Approach)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

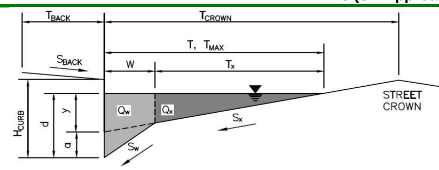
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-18 (SE Approach)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

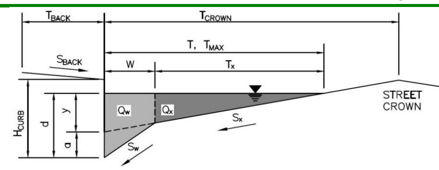
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-18**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

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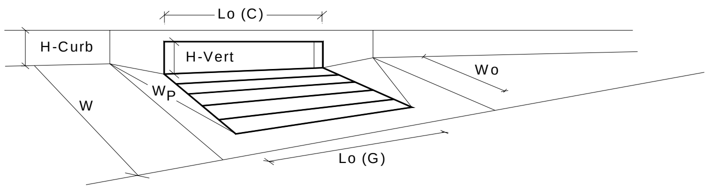

Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**11.8**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	9.0	27.4	cfs

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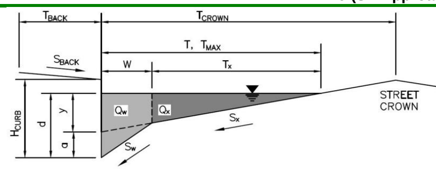
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-19 (SE Approach)



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.9**	**113.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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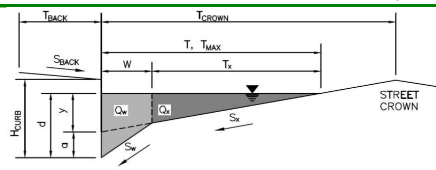
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-19**



Gutter Geometry (Enter data in the blue cells)

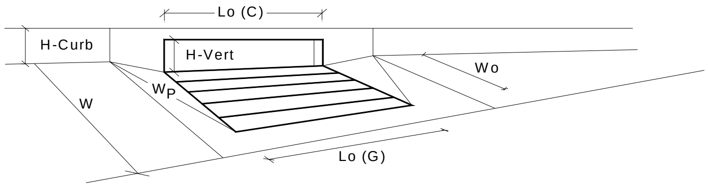
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

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

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	12.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**11.8**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	11.0	32.0	cfs

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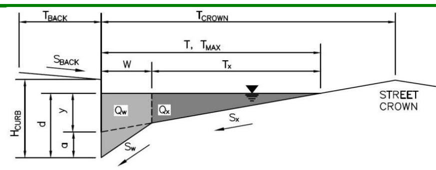
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-21**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

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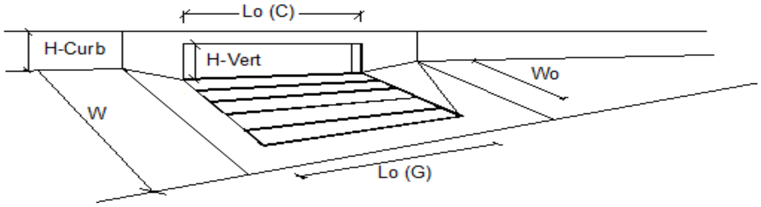

Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.4**	**23.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**12.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**66**	**%**

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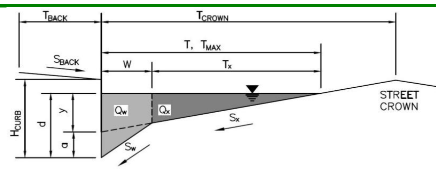
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-22



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

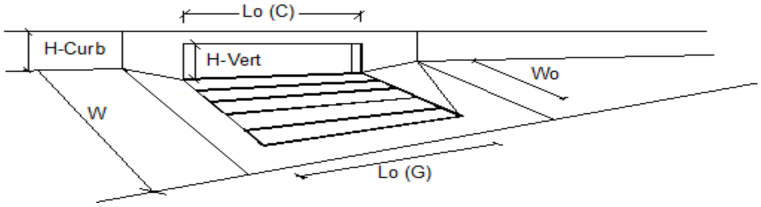
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.3**	**138.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**12.3**	**23.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.2**	**12.1**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**98**	**66**	**%**

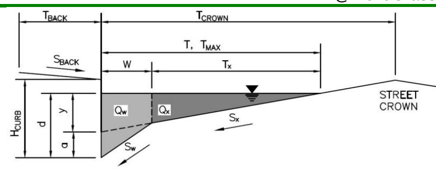
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-22 @ Bent Grass M.D.**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**16.9**	**175.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

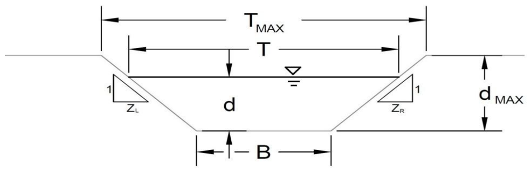
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Bent Grass Residential Filing No. 2

DP-23



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.030	
Channel Invert Slope	S_O =	0.0030	ft/ft
Bottom Width	B =	3.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Slope	Z2 =	4.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- (●) **Non-Cohesive**
- ( ) **Cohesive**
- ( ) **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**19.00**	**19.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.50**	**1.50**	**feet**

Maximum Channel Capacity Based On Allowable Top Width		Minor Storm	Major Storm	
Max. Allowable Top Width	T_{MAX} =	**19.00**	**19.00**	**ft**
Water Depth	d =	2.00	2.00	ft
Flow Area	A =	22.00	22.00	sq ft
Wetted Perimeter	P =	19.49	19.49	ft
Hydraulic Radius	R =	1.13	1.13	ft
Manning's n	n =	0.030	0.030	
Flow Velocity	V =	2.95	2.95	fps
Velocity-Depth Product	VR =	3.33	3.33	ft^2/s
Hydraulic Depth	D =	1.16	1.16	ft
Froude Number	Fr =	0.48	0.48	
Max. Flow Based On Allowable Top Width	Q_T =	**64.9**	**64.9**	**cfs**

Maximum Channel Capacity Based On Allowable Water Depth		Minor Storm	Major Storm	
Max. Allowable Water Depth	d_{MAX} =	**1.50**	**1.50**	**feet**
Top Width	T =	15.00	15.00	feet
Flow Area	A =	13.50	13.50	square feet
Wetted Perimeter	P =	15.37	15.37	feet
Hydraulic Radius	R =	0.88	0.88	feet
Manning's n	n =	0.030	0.030	
Flow Velocity	V =	2.50	2.50	fps
Velocity-Depth Product	VR =	2.19	2.19	ft^2/s
Hydraulic Depth	D =	0.90	0.90	feet
Froude Number	Fr =	0.46	0.46	
Max. Flow Based On Allowable Water Depth	Q_d =	**33.7**	**33.7**	**cfs**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**33.7**	**33.7**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**1.50**	**1.50**	**ft**

Water Depth in Channel Based On Design Peak Flow				
Design Peak Flow	Q_o =	**4.4**	**21.2**	**cfs**
Water Depth	**d =**	**0.57**	**1.22**	**feet**
Top Width	T =	7.57	12.73	feet
Flow Area	A =	3.02	9.57	square feet
Wetted Perimeter	P =	7.71	13.03	feet
Hydraulic Radius	R =	0.39	0.73	feet
Manning's n	n =	0.030	0.030	
Flow Velocity	V =	1.46	2.21	fps
Velocity-Depth Product	VR =	0.57	1.63	ft^2/s
Hydraulic Depth	D =	0.40	0.75	feet
Froude Number	Fr =	0.41	0.45	

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

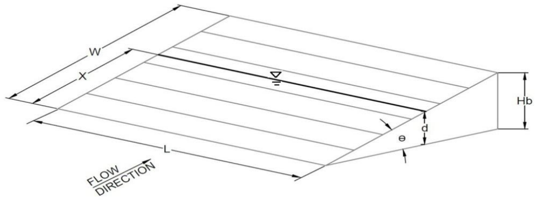
AREA INLET IN A SWALE

Bent Grass Residential Filing No. 2

DP-23

Inlet Design Information (Input)

Type of Inlet	CDOT TYPE D (Parallel & Depressed)	Inlet Type =	CDOT TYPE D (Parallel & Depressed)	
Angle of Inclined Grate (must be <= 30 degrees)		θ =	0.17	degrees
Width of Grate		W =	6.00	feet
Length of Grate		L =	3.00	feet
Open Area Ratio		A_{RATIO} =	0.70	
Height of Inclined Grate		H_B =	0.01	feet
Clogging Factor		C_f =	0.38	
Grate Discharge Coefficient		C_d =	0.67	
Orifice Coefficient		C_o =	0.45	
Weir Coefficient		C_w =	1.44	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.57	2.22	
Grate Capacity as a Weir				
Submerged Side Weir Length	X =	3.00	3.00	feet
Inclined Side Weir Flow	Q_{ws} =	14.9	25.0	cfs
Base Weir Flow	Q_{wb} =	42.7	71.5	cfs
Interception without Clogging	Q_{wi} =	72.4	121.4	cfs
Interception with Clogging	Q_{wa} =	45.3	75.9	cfs
Grate Capacity as an Orifice				
Interception without Clogging	Q_{oi} =	81.5	96.8	cfs
Interception with Clogging	Q_{oa} =	50.9	60.5	cfs
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**45.3**	**60.5**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

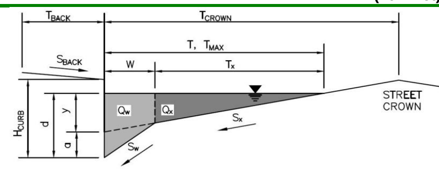
Version 4.05 Released March 2017

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

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

Project: Bent Grass Residential Filing No. 2

Inlet ID: DP-24 (10' Inlet)



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

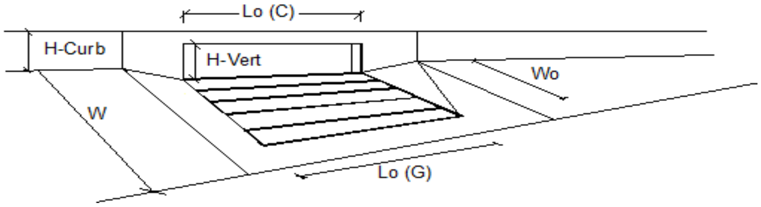
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**18.1**	**152.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.0**	**4.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**0**	**98**	**%**

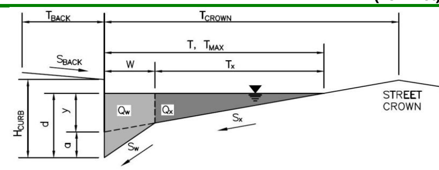
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-24 (15' Inlet)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

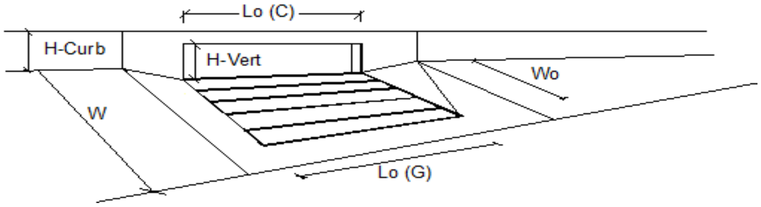
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**18.1**	**152.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.3**	**12.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**4.3**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**75**	**%**

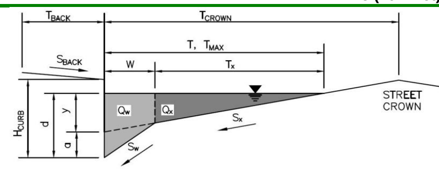
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-25 (10' Inlet)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

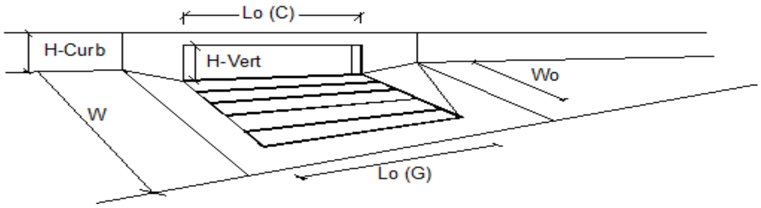
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**18.1**	**152.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.0**	**4.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**0**	**98**	**%**

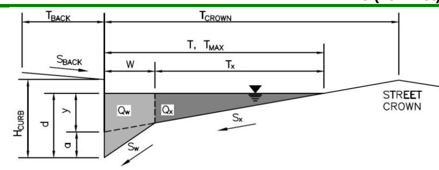
Version 4.05 Released March 2017

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

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

Project: **Bent Grass Residential Filing No. 2**

Inlet ID: **DP-25 (15' Inlet)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

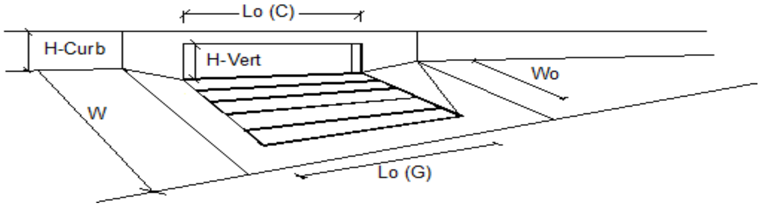
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**18.1**	**152.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.3**	**12.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**4.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**75**	**%**

Swale - A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	1.00	ft
Discharge	65.10	ft³/s

Results

Normal Depth	2.01	ft
Flow Area	18.18	ft²
Wetted Perimeter	17.58	ft
Hydraulic Radius	1.03	ft
Top Width	17.08	ft
Critical Depth	1.63	ft
Critical Slope	0.01424	ft/ft
Velocity	3.58	ft/s
Velocity Head	0.20	ft
Specific Energy	2.21	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.01	ft
Critical Depth	1.63	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01424	ft/ft

Swale - B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.05000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	24.60	ft³/s

Results

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Normal Depth	0.55	ft
Flow Area	3.98	ft²
Wetted Perimeter	9.55	ft
Hydraulic Radius	0.42	ft
Top Width	9.42	ft
Critical Depth	0.74	ft
Critical Slope	0.01646	ft/ft
Velocity	6.18	ft/s
Velocity Head	0.59	ft
Specific Energy	1.15	ft
Froude Number	1.68	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.74	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.01646	ft/ft

Swale - C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.11000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	18.00	ft³/s

Results

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Normal Depth	0.38	ft
Flow Area	2.44	ft²
Wetted Perimeter	8.09	ft
Hydraulic Radius	0.30	ft
Top Width	8.00	ft
Critical Depth	0.62	ft
Critical Slope	0.01726	ft/ft
Velocity	7.38	ft/s
Velocity Head	0.85	ft
Specific Energy	1.22	ft
Froude Number	2.36	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.62	ft
Channel Slope	0.11000	ft/ft
Critical Slope	0.01726	ft/ft

Swale - D

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	3.00	ft
Discharge	21.20	ft³/s

Results

Normal Depth	1.08	ft
Flow Area	7.94	ft²
Wetted Perimeter	11.93	ft
Hydraulic Radius	0.67	ft
Top Width	11.66	ft
Critical Depth	0.82	ft
Critical Slope	0.01660	ft/ft
Velocity	2.67	ft/s
Velocity Head	0.11	ft
Specific Energy	1.19	ft
Froude Number	0.57	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.08	ft
Critical Depth	0.82	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01660	ft/ft

Swale - E

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	3.00	ft
Discharge	63.70	ft³/s

Results

Normal Depth	1.78	ft
Flow Area	17.97	ft²
Wetted Perimeter	17.66	ft
Hydraulic Radius	1.02	ft
Top Width	17.22	ft
Critical Depth	1.41	ft
Critical Slope	0.01428	ft/ft
Velocity	3.54	ft/s
Velocity Head	0.20	ft
Specific Energy	1.97	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.78	ft
Critical Depth	1.41	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01428	ft/ft

Swale - F

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01300	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	6.67	ft
Discharge	91.40	ft³/s

Results

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Normal Depth	1.39	ft
Flow Area	16.93	ft²
Wetted Perimeter	18.10	ft
Hydraulic Radius	0.94	ft
Top Width	17.76	ft
Critical Depth	1.37	ft
Critical Slope	0.01372	ft/ft
Velocity	5.40	ft/s
Velocity Head	0.45	ft
Specific Energy	1.84	ft
Froude Number	0.98	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

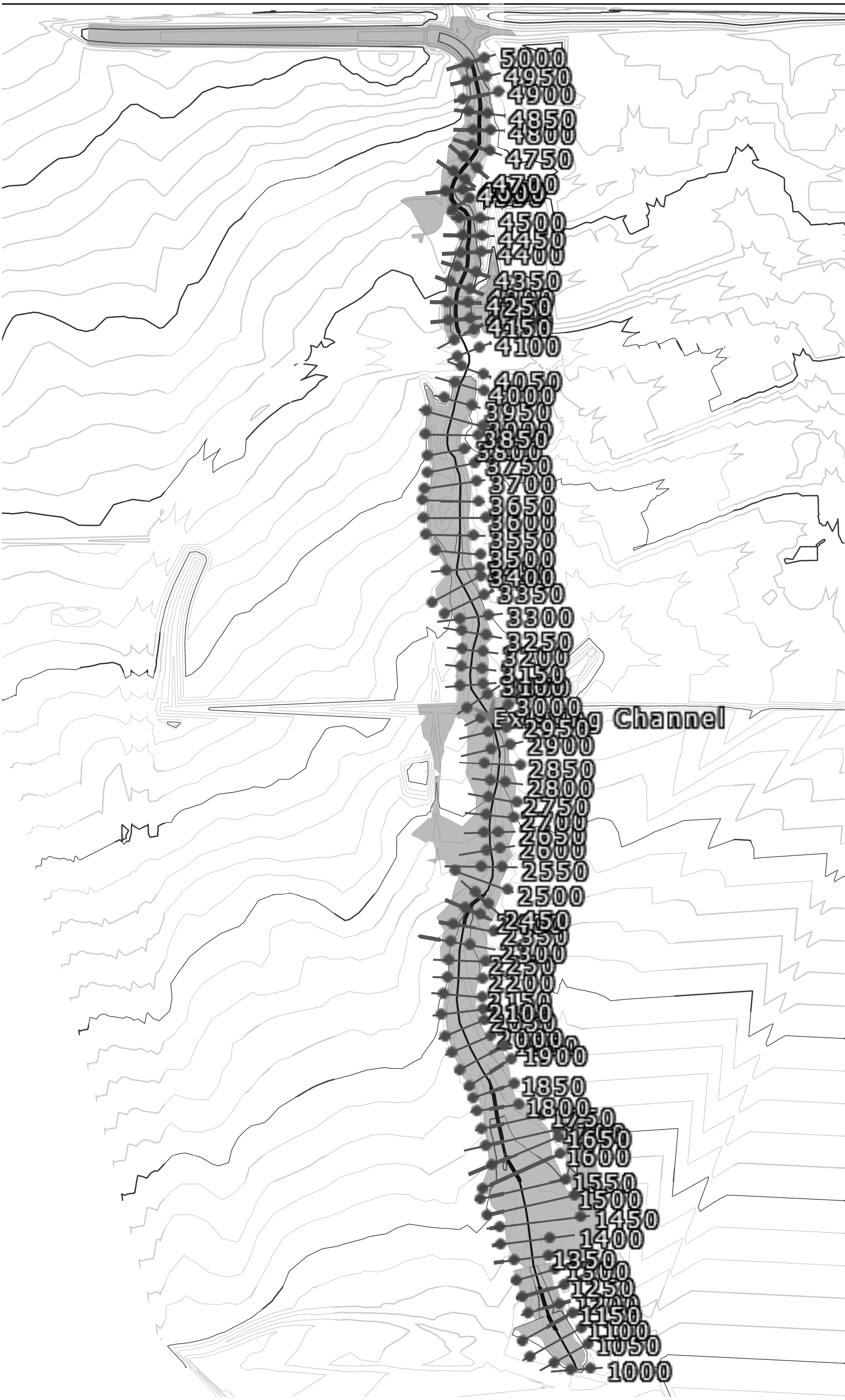
GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.39	ft
Critical Depth	1.37	ft
Channel Slope	0.01300	ft/ft
Critical Slope	0.01372	ft/ft

APPENDIX D

Preliminary Channel HEC-RAS Models

Existing Conditions Model



5000
4950
4900
4850
4800
4750
4700
4500
4450
4400
4350
4250
4150
4100
4050
4000
3950
3850
3750
3700
3650
3600
3550
3500
3400
3350
3300
3250
3200
3150
3100
3000
g Channel
2950
2900
2850
2800
2750
2700
2650
2600
2550
2500
2450
2350
2300
2250
2200
2150
2100
2000
1900
1850
1800
1750
1650
1600
1550
1500
1450
1400
1350
1300
1250
1200
1150
1100
1050
1000

HEC-RAS HEC-RAS 5.0.3 September 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: HEC-RAS Model
Project File : CLH14.20_Channel.prj
Run Date and Time: 5/21/2019 2:12:02 PM

Project in English units

Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="3502"
Unit="US_survey_Foot" AcadCode="" /> <Registration OffsetX="0" OffsetY="0"
OffsetZ="0" ScaleX="1" ScaleY="1" ScaleZ="1" /></SpatialReference>

PLAN DATA

Plan Title: Existing
Plan File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel.p01

Geometry Title: Existing
Geometry File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel.g01

Flow Title : Existing
Flow File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel.f01

Plan Summary Information:

Number of:	Cross Sections =	81	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.33
Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Existing
Flow File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel.f01

Flow Data (cfs)

River	Reach	RS	100-YR	5-YR
Existing Channel	East	5000	43	4
Existing Channel	East	3900	880	14

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Existing Channel	East	100-YR	Normal S = 0.0329	Normal S = 0.0247
Existing Channel	East	5-YR	Normal S = 0.0329	Normal S = 0.0247

GEOMETRY DATA

Geometry Title: Existing
Geometry File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel.g01

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 5000

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6963.58	38.49	6963.58	42.67	6962.96	75	6959.7	89.7	6962.75
110.04	6963.46	118.77	6963.24	121.11	6963.48	125.8	6963.63	150	6963.63

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38.49	.045	89.7	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38.49	89.7	53.22	50	51.12	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4950

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6964.91	4.49	6964.91	14.11	6964.28	28.72	6963.12	45.08	6961.83
66.68	6958.45	67.88	6958.26	72.91	6957.97	75	6957.85	81.59	6957.48
83.44	6957.78	105.7	6961.57	120.79	6962.71	134.68	6963.68	150	6963.68

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	45.08	.045	105.7	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45.08	105.7	56.3	50	55.05	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4900

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6963.53	12.58	6963.53	20.95	6963.2	27.05	6962.33	36.46	6961.09
59.75	6957.96	71.58	6956.48	75	6956.22	76.29	6956.13	77.28	6956.08
80.6	6956.68	100.6	6959.86	126.33	6962.03	150	6963.76		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	20.95	.045	126.33	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
20.95	126.33	71.1	50	38.94	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4850

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6959.99	34.39	6959.99	54.42	6958.91	58.9	6957.85	72.94	6954.52
75	6954.47	76.05	6954.44	77.22	6954.55	88.32	6956.31	97.52	6957.97
111.09	6958.96	131.03	6960.59	146.87	6962.04	150	6962.04		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.05	54.42	.045	111.09	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
54.42	111.09	49.15	50	56.56	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4800

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6960.57	9.2	6960.57	44.01	6958.08	59.83	6954.92	68.81	6953.23
75	6953.14	76.25	6953.12	79.12	6953.16	91.93	6955.91	95.94	6956.94
100.1	6956.93	150	6956.93						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	44.01	.045	95.94	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
44.01	95.94	61.25	50	43.37	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4750

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.34	35.51	6958.34	38.45	6958.32	40.25	6958.17	43.73	6957.56
73.46	6952.3	75	6952.25	75.36	6952.24	77.32	6952.32	89.26	6955.07
96.38	6956.45	105.11	6956.9	123.28	6956.85	137.41	6956.83	150	6956.83

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	40.25	.045	96.38	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
40.25	96.38	62.73	50	41.17	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4700

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.93	6.21	6958.93	26.86	6957.79	46.91	6956.53	55.57	6954.93
72.9	6951.61	75	6951.59	75.6	6951.58	77.45	6951.54	84.09	6952.97
93.45	6955.07	97.28	6955.56	135.4	6956.48	143.04	6956.78	144.21	6956.78
145.18	6956.78	147.21	6956.91	150	6957.05				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	46.91	.045	97.28	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
46.91	97.28	48.59	50	53.31	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4650

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6955.92	13	6955.92	15.98	6955.77	17.47	6955.75	19.19	6955.69
39.7	6954.03	40.71	6953.88	59.63	6950.54	61.54	6950.65	62.99	6950.73
63.73	6950.75	68.59	6951.79	81.56	6954.29	100.82	6955.21	110.87	6955.88
117.25	6955.97	128.49	6956.29	136.54	6956.29				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.7	.045	81.56	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.7	81.56	31.33	50	63.68	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4600

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6955.98	3.42	6955.98	11.44	6955.16	22.53	6954.54	39.05	6953.33
60.56	6950.2	67.66	6949.26	68.34	6949.29	69.24	6949.27	71.52	6949.23
78.98	6950.86	88.89	6953.25	99.87	6954.11	104.06	6954.54	107.26	6954.49
144.24	6954.49								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.05	.045	88.89	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.05	88.89	31.96	50	60.47	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4550

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6954.47	15.6	6953.37	18.05	6953.02	48.88	6948.55	52.45	6948.24
55.27	6947.91	55.52	6947.88	59.39	6948.6	75.66	6952.81	89.66	6953.03
91.58	6953.08								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	15.6	.045	75.66	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

15.6	75.66	69.03	50	28.51	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4500

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6955.85	9.47	6955.85	42.52	6953.36	46.11	6953.07	52.65	6951.78
69.08	6947.9	75	6947.95	75.53	6947.96	76.98	6947.94	83.7	6948.98
107.55	6952.53	110.42	6952.62	126.61	6953.03	127.51	6953.05		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	46.11	.045	107.55	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
46.11	107.55	50.62	50	52.59	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4450

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6954.6	18.39	6954.6	39.23	6952.75	40.72	6952.62	44.07	6951.87
69.43	6946.6	73	6946.49	75	6946.44	76.07	6946.4	95.73	6951.85
96.83	6952.15	115.18	6952.51	150	6952.51				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	40.72	.045	96.83	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
40.72	96.83	46.56	50	51.87	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4400

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6954.57	12.29	6954.57	24.56	6954.28	34.56	6953.13	39.34	6952.67
42.47	6951.97	70.43	6945.75	70.85	6945.66	70.89	6945.64	70.91	6945.64
75	6944.96	75.01	6944.96	96.91	6951.35	98.66	6951.94	121.74	6952.08
150	6952.08								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.34	.045	98.66	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.34	98.66	61.22	50	41.17	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4350

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6951.38	40.69	6951.38	47.23	6951.34	70.53	6944.91	70.85	6944.84
70.91	6944.83	75	6944.47	75.21	6944.46	87.72	6947.7	104.7	6951.48
134.53	6952.12	141.79	6952.34	150	6952.34				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	47.23	.045	104.7	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
47.23	104.7	50.69	50	48.39	.1	.3

CROSS SECTION

```
RIVER: Existing Channel
REACH: East                RS: 4300

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6949.81   27.06 6949.81   45.38 6949.59   68.23 6944.71   72.38  6943.8
   72.71 6943.79      75 6943.87   78.16 6943.97   98.85 6948.57  107.94 6950.62
   120.3 6951.57  129.52 6951.73     150 6951.73

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   45.38    .045  107.94     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         45.38  107.94            39.47      50   60.56             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                RS: 4250

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6948.57    9.29 6948.57    42.5 6948.14   64.45  6944.4   72.35 6942.82
      75 6942.96   75.29 6942.98   79.17 6943.16   89.72  6945.8  103.42 6949.07
  109.38 6949.39  124.14 6949.31     150 6949.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    42.5    .045  103.42     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          42.5  103.42            47.28      50   53.35             .1       .3

CROSS SECTION
```

RIVER: Existing Channel
REACH: East RS: 4200

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6947.06	16.62	6947.06	37.93	6946.33	57.15	6943.81	69.99	6941.92
73.64	6941.77	75	6941.74	77.7	6941.68	85.94	6943.75	100.62	6947.59
107.28	6947.97	118.1	6948.6	141.84	6948.75	150	6948.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	37.93	.045	100.62	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.93	100.62	34.12	50	59.42	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4150

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6946.72	21.81	6946.72	33.75	6946.21	44.72	6944.88	62.77	6942.12
71	6941.78	75	6941.68	75.99	6941.65	88.27	6943.68	99.02	6945.62
133.28	6946.17	148.4	6946.47	150	6946.47				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	33.75	.045	99.02	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
33.75	99.02	54.56	50	47.87	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4100

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6946.92	12.52	6946.92	26.8	6946.38	41.81	6945.52	49.62	6943.85
65.65	6940.64	75	6940.5	76.62	6940.48	80.6	6940.53	99.13	6942.25
110.21	6943.95	122.91	6944.07	136.87	6945.44	138.58	6945.44		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	41.81	.045	110.21	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
41.81	110.21	78.87	50	30.41	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4050

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6944.33	26.04	6944.33	27.03	6944.25	27.69	6944.25	31.28	6943.83
69.09	6939.89	69.24	6939.61	75	6939.61	78.24	6939.61	78.37	6939.6
78.82	6939.73	95.65	6943.72	103.92	6943.86	115.58	6945.3	119.28	6945.5
124.8	6945.27	136.11	6945.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	27.69	.045	95.65	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
27.69	95.65	48.52	50	51.38	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 4000

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6944.13	6.34	6944.13	8.29	6943.89	23.16	6942.56	71.88	6938.59
75	6938.53	76.88	6938.49	77.66	6938.51	79.85	6939.03	94.21	6943.12
108.06	6943.52	148.53	6944.03	150	6944.03				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	6.34	.045	94.21	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6.34	94.21	53.35	50	53.9	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3950

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6941.02	28.34	6941.02	73	6938.11	75.49	6938.03	75.83	6938.01
77.39	6937.94	81.6	6939.05	111.91	6941.68	115.43	6941.7	136.93	6940.99
138.53	6940.99								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	28.34	.045	111.91	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
28.34	111.91	66.9	50	63.88	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3900

INPUT
Description:

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6943.22	2.46	6943.22	33.41	6939.86	35.37	6939.67	36.6	6939.52
40.25	6939.3	47.13	6939.08	82.19	6938.13	92.84	6937.57	93.35	6937.54
108.61	6937.58	113.66	6937.66	129.2	6937.61	148.46	6937.5	151.59	6937.21
153.38	6937.13	156.56	6937.91	171.58	6942.04	176.24	6942.19	190.37	6942.19

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	2.46	.045	171.58	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
2.46	171.58	29.56	50	67.78	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3850

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6941.79	3.34	6941.79	16.12	6941.2	44.4	6939.51	73.28	6937.89
89.2	6936.79	89.45	6936.8	103.72	6937.45	123.96	6937.2	133.88	6935.31
149.05	6939.25	156.89	6941.24	161.79	6941.24				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	3.34	.045	156.89	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3.34	156.89	54.23	50	63.45	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3800

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6938.59	23.83	6938.59	26.75	6938.1	64.69	6934.35	65	6934.41
72.38	6935.95	78.29	6937.48	86.93	6938.68	87.76	6938.73	89.76	6938.23
107.51	6934.66	127	6938.71	132.8	6939.83	140	6939.83		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	23.83	.045	132.8	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
23.83	132.8	51.02	50	49.21	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3750

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6938.4	22.93	6938.4	39.82	6937.64	64.36	6934.46	73.46	6933.22
73.77	6933.18	76.31	6933.49	86.66	6934.62	92.06	6934.61	95.12	6934.69
103.76	6934.62	132.38	6934.34	155.38	6938.15	162.61	6939.21	169.1	6939.38
170.59	6939.38								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	22.93	.045	162.61	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.93	162.61	52.26	50	46.49	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3700

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	6938.69	13.37	6938.69	28.67	6938.2	70.27	6932.3	72.77	6931.91
72.8	6931.9	74.04	6932.1	88.79	6933.84	92.58	6934.15	96.39	6934.03
121.74	6933.67	137.6	6933.46	148.44	6933.23	164.2	6936.02	181.52	6938.72
185.99	6938.72								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	28.67	.045	181.52	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
28.67	181.52	60.14	50	33.53	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3650

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6937.92	15.4	6937.92	21.77	6937.78	43.82	6934.93	72.59	6931.21
72.68	6931.2	76.28	6931.74	89.29	6933.63	104.89	6934.34	113.84	6934.54
126.98	6934.36	154.1	6932.43	160.15	6933.47	184.83	6938.29	190.1	6938.29

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	21.77	.045	184.83	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21.77	184.83	51.25	50	52.46	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3600

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6937.62	3.4	6937.62	12.79	6937.38	31.35	6936.43	41.1	6935.11

```
   72.31 6930.64   72.71 6930.58   85.12 6931.53   99.12 6932.37  109.14 6933.33
  125.17 6934.55  145.22 6931.88  153.89 6930.85  173.12 6935.35  181.06  6937.1
  185.24 6937.26  194.98 6937.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05       0    .045  181.06     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  181.06            62.01      50    47.9             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 3550

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6935.73    5.33 6935.73   37.55 6934.96   49.84 6933.13   73.26 6929.49
   73.65 6929.51   95.34 6930.85  104.54  6931.6  109.72 6931.57  122.26 6931.76
  135.86 6930.75   147.9 6929.91  163.85 6933.22  175.35 6935.76  179.76 6935.76

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.55    .045  175.35     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.55  175.35            59.06      50   53.38             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 3500

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6935.25   15.01 6935.25   28.58 6934.15   35.27  6933.7   49.03 6931.78
   74.87  6928.8      75 6928.81   88.97 6930.15   92.89 6930.24   97.98 6929.93
```

```
  111.92 6929.62  120.37 6928.86  136.63 6932.23  146.26 6934.93     150 6934.93

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   15.01    .045  146.26     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         15.01  146.26             39.9      50   66.73             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 3450

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6933.2   12.09  6933.2   13.53 6932.95   41.86 6930.45    64.8 6928.71
      75 6928.49   78.25 6928.42   89.89 6928.01  109.29 6933.08  109.55 6933.15
     150 6933.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   12.09    .045  109.55     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         12.09  109.55             24.8      50  100.26             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 3400

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6932.69   17.69 6932.69   60.53 6928.38   63.35 6928.09   63.87 6928.07
   72.82 6927.76   80.87 6927.47   86.02 6928.04  105.87 6929.71  122.83 6930.24
  177.44 6932.03  180.28 6932.03
```

```
Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   17.69    .045  177.44     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         17.69  177.44            54.43      50   48.43             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                RS: 3350

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6932.72     3.8 6932.72    5.77 6932.69    7.36  6932.6   35.04 6931.32
   58.71 6927.57   67.53 6926.42   69.95 6926.44   73.79 6926.56   81.57 6926.79
   98.39 6928.03  119.22 6929.56  143.64 6930.24  162.24 6930.68  169.23 6930.68

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   35.04    .045  162.24     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         35.04  162.24             60.4      50   46.98             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                RS: 3300

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6931.16    1.46 6931.16   44.98 6930.18   48.76  6929.8   64.02 6925.77
   69.23 6924.78   72.69 6924.97   73.78 6925.03   84.98 6925.91  105.49 6927.36
   128.8 6929.31  141.49 6929.55  185.07 6931.08  185.49 6931.08     192 6931.08

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
       0     .05   44.98    .045   128.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         44.98   128.8             56.3      50   33.79             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East              RS: 3250

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6929.55    4.97 6929.53   22.77 6929.02   50.59 6928.45   55.37 6927.16
    70.4 6923.75   73.72 6924.03   77.53 6924.34   81.44 6924.74   88.07 6925.55
  122.82  6929.1  123.27 6929.11  155.02 6929.73  171.66 6930.38  173.05 6930.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   50.59    .045  122.82     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.59  122.82            48.03      50   52.79             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East              RS: 3200

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6928.61   16.79 6928.61   37.89 6927.96   47.88 6927.46   61.58  6925.2
   70.66 6923.44      75 6923.29   75.47 6923.28   79.54 6923.32  108.39 6927.73
  109.33 6927.91  114.48  6928.1  140.39 6929.05     150 6929.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   47.88    .045  109.33     .05
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         47.88  109.33             50.1      50   50.13             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 3150

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6926.88   22.24 6926.88   45.77 6926.19   52.94 6924.92   62.61 6923.15
      75 6923.39   82.58 6923.53    93.8 6923.61  101.67 6925.21  106.55 6926.24
  133.38 6928.12  144.02 6928.52     150 6928.52

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   45.77    .045  106.55     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         45.77  106.55            44.23      50   56.79             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 3100

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6925.44   41.21 6925.44   42.21 6925.41   42.95 6925.29   60.07 6921.98
   72.45  6922.5      75 6922.53   96.06 6922.78  107.62 6924.87  109.76 6925.31
  120.75 6926.15  136.34 6927.41  138.56 6927.55  141.06 6927.59     150 6927.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   42.21    .045  109.76     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         42.21  109.76             33.1      50   68.21             .1       .3
```

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3050

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6927.04	20.4	6926.3	37.77	6925.36	47.85	6924.76	63.81	6921.9
64.86	6921.72	68.48	6921.7	75	6921.67	101.35	6921.56	109.5	6922.78
119.15	6924.48	139.32	6925.18	150	6925.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	47.85	.045	119.15	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
47.85	119.15	67.72	50	48.85	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 3000

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6926.75	12.07	6926.75	30.38	6924.81	46.17	6923.42	69.32	6920.99
70.32	6920.85	70.81	6920.84	75	6920.75	83.92	6920.57	92.87	6922.59
100.45	6924.17	134.8	6924.77	150	6924.77				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	12.07	.045	100.45	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.07	100.45	64.93	50	45.01	.1	.3

CROSS SECTION

```
RIVER: Existing Channel
REACH: East                RS: 2950

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6925.81   18.13 6925.81   19.68 6925.79   20.08 6925.76   21.08  6925.7
   40.93 6924.34   62.31 6920.25   64.23 6919.84    65.4 6919.86   73.12 6919.94
   79.78 6920.01    89.4 6921.77   95.22 6922.65  166.18 6924.46  175.43  6924.7
  179.51  6924.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   40.93    .045   95.22     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         40.93   95.22            50.79      50   51.25             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                RS: 2900

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6924.92    20.3 6924.92   22.17 6924.89   24.13 6924.76   41.82 6923.67
   59.09 6919.82   61.33 6919.34   64.69 6919.34   73.26 6919.33   82.61 6919.31
   94.28 6920.95      99 6921.46  183.37 6923.45  185.87 6923.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   41.82    .045      99     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         41.82      99            65.91      50   45.14             .1       .3

CROSS SECTION
```

```
RIVER: Existing Channel
REACH: East               RS: 2850

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6923.53   14.01 6923.53   32.65 6922.77   47.73 6922.24   62.37 6918.47
   64.37 6917.96   70.64 6918.05   72.59 6918.07   78.56 6918.13   84.89 6918.97
   98.45 6920.68  118.89 6921.29  188.61 6923.26  189.28 6923.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   14.01    .045  118.89     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         14.01  118.89            66.73      50   53.41              .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2800

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6922.35   10.49 6922.35   37.01 6921.12   54.97 6920.34   63.84 6917.94
   66.89 6917.16      75 6917.29   81.41 6917.39    81.5 6917.39   81.68 6917.42
    98.3 6920.39  144.82 6921.51     150 6921.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   54.97    .045    98.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         54.97    98.3            67.78      50   48.95              .1       .3

CROSS SECTION


RIVER: Existing Channel
```

```
REACH: East               RS: 2750

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6920.98    8.09 6920.98   32.07 6919.62   49.48 6918.77   61.26 6917.17
   64.88 6916.55      75 6915.94   75.38 6915.92   78.15 6915.84   83.39 6917.25
   92.71 6919.98     150 6919.98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    8.09    .045   92.71     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          8.09   92.71            45.41      50   50.66             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2700

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6919.86   10.07 6919.86   28.38 6918.78   49.99 6917.31   60.09 6916.05
   67.57 6915.26   70.91 6915.09      75 6914.88   77.09 6914.78   83.92 6917.05
   90.44 6919.08  131.67 6919.81     150 6919.81

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   10.07    .045   90.44     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         10.07   90.44             62.4      50   52.53             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2650
```

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6919.1	8.33	6919.1	17.17	6918.81	23.07	6918.56	53.21	6917.64
56.81	6916.91	68.79	6914.18	72.13	6913.94	75	6913.83	78.45	6913.71
89.72	6916.51	95.1	6918.05	106.86	6918.14	150	6918.14		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	53.21	.045	95.1	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
53.21	95.1	54.3	50	79.13	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 2600

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6918.03	15.61	6918.03	18.34	6917.93	20.86	6917.82	26.37	6917.5
46.83	6916.29	48.34	6915.95	62	6913.18	68.32	6912.98	71.23	6912.9
73.59	6912.84	82.87	6915.73	87.16	6916.8	113.27	6916.84	164.93	6917.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	46.83	.045	87.16	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
46.83	87.16	60.01	50	72.05	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 2550

INPUT
Description:

Station Elevation Data   num=   18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6917.98	16.03	6917.98	30.3	6917.37	33.44	6916.28	39.01	6915.48
47.77	6914.45	64.51	6912.49	71.43	6912.49	71.67	6912.49	75.28	6912.38
89.77	6914.65	90.88	6914.77	108.35	6915.07	144.31	6915.68	157.36	6915.97
178.95	6916.25	199.36	6916.51	211.51	6916.51				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	47.77	.045	108.35	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
47.77	108.35	65.45	50	93.8	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East   RS: 2500

INPUT
Description:
Station Elevation Data   num=   14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6917.34	21.33	6917.34	43.19	6915.76	50.05	6915.24	58.83	6913.21
65.27	6911.7	72.35	6911.56	73.69	6911.54	75.82	6911.56	81.29	6912.14
96.3	6913.77	116.43	6914.35	183.46	6915.89	185.27	6915.89		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	21.33	.045	183.46	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21.33	183.46	69.23	50	85.3	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East   RS: 2450

INPUT
Description:
Station Elevation Data   num=   13

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6914.52     .64 6914.52   46.94 6913.89   51.13 6913.72   53.31 6913.16
   67.55 6910.62      75  6910.7   78.02 6910.73   79.98 6910.73   98.22 6913.34
   98.49 6913.37  134.64 6914.39     150 6914.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   46.94    .045   98.49     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          46.94   98.49            38.25      50   54.23             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2400

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6913.88     .43 6913.88    22.4 6913.14   42.22 6912.55   51.23 6911.52
   66.38 6909.67   72.38 6908.29      75 6907.83   75.12 6907.81   79.67 6909.31
   90.18 6912.93  130.62 6913.82     150 6913.82

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   42.22    .045   90.18     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          42.22   90.18            62.04      50   59.15             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2350

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6913.3   15.78  6913.3   61.91 6911.47   66.32 6911.31   76.86 6910.37
```

```
   95.48 6908.73  100.28 6908.56  101.17  6908.5  104.23 6908.31  110.73 6909.36
  126.12 6911.75   135.5 6912.03  171.12  6912.6  174.35  6912.6

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   15.78    .045   135.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         15.78   135.5            50.75      50   50.85             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                RS: 2300

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6911.72   22.76 6911.72   33.65 6911.34   69.33  6910.1   78.94 6909.72
    85.8 6908.79    90.2 6908.18  100.69 6908.29  102.97 6908.31   116.1 6908.44
  121.54 6909.11   135.6 6911.06  146.49 6911.35   179.8 6912.22  187.16 6912.38
  192.88 6912.56  216.57 6912.97     229 6912.97

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   78.94    .045   135.6     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         78.94   135.6            40.98      50   54.76             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                RS: 2250

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6910.61    1.56 6910.61   23.77 6909.76   50.13 6908.84   60.48  6907.4
   61.16 6907.31    62.7  6907.3      75 6907.38      89 6907.46    92.6 6908.02
```

```
  107.95 6910.49  119.02 6910.41     150 6910.41

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    1.56    .045  107.95     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1.56  107.95            49.97      50   49.41             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2200

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6910.07    8.28 6910.07    13.9 6909.74   24.43 6909.15   45.28 6908.07
   57.94 6906.38   59.54 6906.18   61.87 6906.21      75  6906.3   88.29 6906.39
   94.06 6907.33   109.9 6910.46     150 6910.46

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    8.28    .045   109.9     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          8.28   109.9            53.67      50   48.88             .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East               RS: 2150

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6909.25     5.2 6909.25   19.11  6908.3   32.48 6907.46   50.08 6905.59
   53.71 6905.09   59.94 6905.13      75 6905.29   92.37 6905.47  103.43 6907.89
  118.11 6910.41  137.07 6910.55  144.67 6910.76     150 6910.76
```

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	5.2	.045	118.11	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5.2	118.11	34.58	50	63.09	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 2100

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6908.5	6.15	6908.5	10.02	6908.21	19.07	6907.14	26.74	6906.22
32.27	6905.66	49.04	6903.79	75	6904.43	88.43	6904.77	103.66	6905.1
122.34	6909.12	127.5	6909.92	143.26	6910.52	150	6910.52		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	6.15	.045	127.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6.15	127.5	31.66	50	64.9	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 2050

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6907.45	9.89	6907.45	17.07	6906.74	23.21	6905.85	42.66	6903.64
45.68	6903.25	75	6903.71	98.82	6904.09	109.01	6904.25	110.23	6904.49
132.05	6908.89	142	6909.17	150	6909.17				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.05	9.89	.045	132.05	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.89	132.05	49.84	50	49.41	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 2000

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6906.54	9.47	6906.54	20.03	6905.52	29.79	6904.81	44.84	6903.15
46.69	6902.93	50.42	6902.97	75	6903.16	111.98	6903.44	122.44	6905.66
132.44	6907.76	144.92	6907.83	150	6907.83				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	9.47	.045	132.44	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.47	132.44	47.64	50	56.5	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1950

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6906.83	2.6	6906.83	24.26	6906.52	57.8	6904.5	68.74	6903.96
75.6	6903.31	86.59	6902.27	110.3	6902.52	134.76	6902.78	138.55	6902.8
144.24	6903.49	165.28	6905.85	170.19	6906.05	182.84	6906.05		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	24.26	.045	170.19	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          24.26  170.19            52.36      50    54.3              .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                 RS: 1900

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6906.08    5.45 6906.08    18.2 6905.94   28.51 6905.83   53.96 6904.57
    81.9 6902.98   82.53 6902.93   98.87 6901.84  114.34  6901.8  127.32 6901.77
  130.99  6901.8  137.41 6902.43  143.62 6903.03  173.17 6905.83  186.59 6905.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   28.51    .045  173.17     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          28.51  173.17            63.75      50   36.61              .1       .3

CROSS SECTION


RIVER: Existing Channel
REACH: East                 RS: 1850

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6904.47   10.75 6904.47   13.78 6904.31   33.62 6903.13   51.09 6902.12
   52.48 6901.98   61.55 6901.26      75 6901.25   81.26 6901.25    88.3  6901.2
  104.78 6902.72  137.72 6905.89     150 6905.89

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   10.75    .045  137.72     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          10.75  137.72            61.98      50   38.16              .1       .3
```

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1800

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6903.01	10.31	6903.01	20.44	6902.68	47.13	6901.17	48.74	6901.04
58.16	6900.25	69.18	6900.3	75	6900.32	93.92	6900.39	132.45	6905.6
133.42	6905.71	133.78	6905.72	148.41	6905.96	150	6905.96		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	10.31	.045	133.78	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.31	133.78	50.79	50	53.54	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1750

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6903.28	1.47	6903.28	3.64	6903.26	15.26	6902.98	16.04	6902.96
51.67	6902.08	60.78	6901.9	64.92	6901.8	92.65	6900.99	104.5	6900.66
106.01	6900.54	119.29	6899.84	139.25	6899.82	140.69	6899.82	159.99	6899.76
164.67	6899.75	195.04	6904.47	196.26	6904.65	197.05	6904.67	212.31	6904.88
212.46	6904.88								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	15.26	.045	196.26	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
15.26	196.26	61.55	50	50.72	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1700

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6903	.45	6903	3.91	6902.88	31.82	6901.95	34.62	6901.88
36.89	6901.82	115.47	6900.28	119.22	6900.19	123.6	6899.98	140.07	6899.58
161.01	6899.71	163.07	6899.72	182.45	6899.75	186.05	6899.76	214.78	6903.01
215.32	6903.07	215.47	6903.08	234.71	6903.44	269.69	6904.2	276.85	6904.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	3.91	.045	215.47	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3.91	215.47	28.94	50	59.09	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1650

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6902.16	4.27	6902.16	6.93	6902.4	12.64	6902.49	15.67	6902.55
21.47	6902.35	25.2	6902.23	52.02	6901.33	103.14	6900.15	118.47	6899.75
142.92	6898.99	157.7	6899.12	160.56	6899.28	174.94	6899.63	175.17	6899.63
188.88	6899.92	189.58	6899.93	197.96	6899.52	201.38	6899.35	218.42	6901.04
224.9	6901.7	228.87	6901.79	281.79	6902.4	295.03	6902.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	15.67	.045	224.9	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

15.67	224.9	50.13	50	73.62	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1600

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6901.59	2.06	6901.59	7.04	6901.57	15.57	6901.33	43.98	6900.34
66.12	6899.74	74.32	6899.49	118.46	6899.89	145.39	6899.62	166.55	6899.4
180.14	6898.93	185.57	6898.29	201.22	6899.59	206.55	6899.96	252.15	6900.82
254.18	6900.88	255.31	6900.91	259.84	6900.91				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	7.04	.045	254.18	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.04	254.18	77.3	50	30.02	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1550

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6900.06	4.45	6900.06	9.08	6900.11	32.59	6899.49	43.11	6899.21
85.62	6898.17	136.71	6897.97	148.44	6897.92	152.79	6897.91	154.06	6897.87
157.25	6897.99	202.23	6899.17	208.34	6899.21	236.29	6900.05	262.22	6900.88
275.94	6900.88								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	9.08	.045	262.22	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

9.08	262.22	50.69	50	49.44	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6899.23	10.45	6898.71	16.94	6898.13	54.66	6897.28	72.38	6897.55
92.11	6897.48	108.73	6897.41	135.95	6897.51	142.61	6897.58	144.79	6897.6
172.75	6898.08	172.79	6898.08	180.01	6898.25	214.74	6899.1	227.93	6899.3
259.53	6900.29	259.56	6900.29	266.11	6900.29				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	0	.045	259.53	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	259.53	65.39	50	50.26	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1450

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6897.19	2.4	6897.19	7.1	6897.19	9.98	6897.11	13.15	6897.51
28.03	6897.92	30.39	6897.92	33.72	6897.79	64.2	6896.43	97.65	6897
111.18	6897.22	136.14	6897.73	136.58	6897.73	136.63	6897.73	137.26	6897.73
179.1	6896.36	180.44	6896.37	183.9	6896.41	185.63	6896.94	208.58	6897.29
258.32	6899.12	259.97	6899.22	265.98	6899.49	280.35	6899.49	302.4	6899.49

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	30.39	.045	265.98	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
30.39	265.98	109.19	50	50.75	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1400

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6895.61	.12	6895.61	36.32	6896.21	53.71	6896.47	75.26	6897.27
76.03	6897.29	76.07	6897.29	91.24	6896.72	97.25	6896.52	100.08	6895.77
125.33	6894.94	129.54	6894.98	135.84	6895.04	139.62	6896.21	153.34	6896.42
183.07	6897.51	193.08	6898.17	218.95	6899.32	220.94	6899.32	222.25	6899.32
229.54	6899.61	237.52	6899.45	241.42	6899.45				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	76.07	.045	218.95	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76.07	218.95	51.77	50	59.74	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1350

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6897.05	.01	6897.05	6.43	6895.86	11.05	6895.69	23.15	6895.3
28.83	6893.78	36.57	6893.53	43.63	6893.6	52.76	6893.68	58.59	6895.48
63.1	6895.55	72.88	6895.91	91.22	6897.11	100.4	6897.52	111.21	6897.52
118.27	6897.5	140.44	6898.4	156.39	6898.4				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	0	.045	100.4	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	100.4	44.72	50	60.04	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1300

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6895.69	2.98	6895.69	11.3	6896.14	21.38	6895.92	37.79	6893.21
45.21	6891.73	57.32	6891.49	62.54	6889.74	62.55	6889.74	66.21	6889.28
69.25	6889.35	75	6889.28	85.9	6889.13	91.38	6892.02	96.92	6892.54
127.41	6893.56	129.81	6893.59	137.69	6895.62	140.07	6895.68	144.43	6895.79
146.08	6895.8	147.85	6896.16	150	6896.16				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	21.38	.045	137.69	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21.38	137.69	53.12	50	50.07	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1250

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6894.47	2.29	6894.47	7.64	6894.85	25.6	6893.42	34.28	6893.23
42.32	6891.9	45.96	6891.17	51.88	6891.06	54.44	6890.2	54.45	6890.2
65.86	6888.78	75	6888.97	75.36	6888.98	85.1	6888.85	88.31	6890.54
104.84	6892.1	123.12	6892.71	129.88	6892.8	134.6	6894.01	141.16	6894.17
150	6894.17								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	7.64	.045	134.6	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.64	134.6	56.63	50	49.44	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1200

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6892.64	36.66	6892.64	38.75	6892.52	40.72	6892.49	42.5	6891.63
42.59	6889.77	45.59	6890.58	47.79	6890.64	47.8	6890.64	48.4	6890.41
65.51	6888.27	75	6888.47	81.47	6888.61	84.3	6888.57	85.23	6889.07
112.76	6891.66	118.83	6891.86	129.94	6892	131.5	6892.4	142.26	6892.66
150	6892.66								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	36.66	.045	131.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
36.66	131.5	46.46	50	82.68	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1150

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6894.07	2.72	6894.07	9.98	6893.64	21.21	6891.55	25.74	6891.01
35.28	6889.26	55.82	6886.35	62.27	6885.25	67.09	6885.33	72.87	6885.38
82.05	6885.45	123.13	6886.62	131.01	6888.31	159.52	6889.99	175.93	6890.37
182.4	6890.4	182.62	6890.41	183.5	6890.43	186.85	6890.43		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	9.98	.045	175.93	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.98	175.93	49.8	50	49.97	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1100

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6893.38	7.97	6893.47	11.03	6893.11	43.57	6887.14	55.97	6885.38
59.86	6884.72	72.02	6884.92	74.21	6884.96	82.63	6885.03	105.76	6885.69
124.96	6889.81	142.19	6890.83	178.29	6891.67	192.54	6891.73	193.02	6891.75
194.96	6891.8	199.21	6891.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	7.97	.045	178.29	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.97	178.29	50.13	50	72.83	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1050

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6892.05	10.03	6892.05	13.94	6892.08	15.76	6892.37	40.21	6887.63
40.39	6887.58	54.33	6885.03	58.63	6884.41	59.99	6884.18	73.7	6884.42
83.82	6884.59	85.74	6884.61	91.01	6884.76	121.46	6891.3	127.47	6891.66
171.48	6891.66								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	15.76	.045	127.47	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
15.76	127.47	72.28	50	51.48	.1	.3

CROSS SECTION

RIVER: Existing Channel
REACH: East RS: 1000

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6891.26	5.44	6891.26	11.48	6891.3	19.25	6891.2	19.5	6891.76
19.5	6891.74	19.58	6891.76	26.72	6892.42	26.75	6892.42	26.76	6892.42
31.73	6892.62	38.17	6892.85	39.06	6892.87	53.88	6890.92	62.2	6883.33
75.01	6883.38	76.97	6883.39	89.26	6887.7	96.33	6893.15	97.62	6892.7
104.25	6892.35	105.39	6892.98	105.63	6892.96	106.44	6892.9	107.05	6892.85
150.01	6892.85								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.06	.045	96.33	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.06	96.33	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Existing Channel

Reach	River Sta.	n1	n2	n3
East	5000	.05	.045	.05
East	4950	.05	.045	.05
East	4900	.05	.045	.05
East	4850	.05	.045	.05
East	4800	.05	.045	.05

East	4750	.05	.045	.05
East	4700	.05	.045	.05
East	4650	.05	.045	.05
East	4600	.05	.045	.05
East	4550	.05	.045	.05
East	4500	.05	.045	.05
East	4450	.05	.045	.05
East	4400	.05	.045	.05
East	4350	.05	.045	.05
East	4300	.05	.045	.05
East	4250	.05	.045	.05
East	4200	.05	.045	.05
East	4150	.05	.045	.05
East	4100	.05	.045	.05
East	4050	.05	.045	.05
East	4000	.05	.045	.05
East	3950	.05	.045	.05
East	3900	.05	.045	.05
East	3850	.05	.045	.05
East	3800	.05	.045	.05
East	3750	.05	.045	.05
East	3700	.05	.045	.05
East	3650	.05	.045	.05
East	3600	.05	.045	.05
East	3550	.05	.045	.05
East	3500	.05	.045	.05
East	3450	.05	.045	.05
East	3400	.05	.045	.05
East	3350	.05	.045	.05
East	3300	.05	.045	.05
East	3250	.05	.045	.05
East	3200	.05	.045	.05
East	3150	.05	.045	.05
East	3100	.05	.045	.05
East	3050	.05	.045	.05
East	3000	.05	.045	.05
East	2950	.05	.045	.05
East	2900	.05	.045	.05
East	2850	.05	.045	.05
East	2800	.05	.045	.05
East	2750	.05	.045	.05
East	2700	.05	.045	.05
East	2650	.05	.045	.05
East	2600	.05	.045	.05

East	2550	.05	.045	.05
East	2500	.05	.045	.05
East	2450	.05	.045	.05
East	2400	.05	.045	.05
East	2350	.05	.045	.05
East	2300	.05	.045	.05
East	2250	.05	.045	.05
East	2200	.05	.045	.05
East	2150	.05	.045	.05
East	2100	.05	.045	.05
East	2050	.05	.045	.05
East	2000	.05	.045	.05
East	1950	.05	.045	.05
East	1900	.05	.045	.05
East	1850	.05	.045	.05
East	1800	.05	.045	.05
East	1750	.05	.045	.05
East	1700	.05	.045	.05
East	1650	.05	.045	.05
East	1600	.05	.045	.05
East	1550	.05	.045	.05
East	1500	.05	.045	.05
East	1450	.05	.045	.05
East	1400	.05	.045	.05
East	1350	.05	.045	.05
East	1300	.05	.045	.05
East	1250	.05	.045	.05
East	1200	.05	.045	.05
East	1150	.05	.045	.05
East	1100	.05	.045	.05
East	1050	.05	.045	.05
East	1000	.05	.045	.05

SUMMARY OF REACH LENGTHS

River: Existing Channel

Reach	River Sta.	Left	Channel	Right
East	5000	53.22	50	51.12
East	4950	56.3	50	55.05

East	4900	71.1	50	38.94
East	4850	49.15	50	56.56
East	4800	61.25	50	43.37
East	4750	62.73	50	41.17
East	4700	48.59	50	53.31
East	4650	31.33	50	63.68
East	4600	31.96	50	60.47
East	4550	69.03	50	28.51
East	4500	50.62	50	52.59
East	4450	46.56	50	51.87
East	4400	61.22	50	41.17
East	4350	50.69	50	48.39
East	4300	39.47	50	60.56
East	4250	47.28	50	53.35
East	4200	34.12	50	59.42
East	4150	54.56	50	47.87
East	4100	78.87	50	30.41
East	4050	48.52	50	51.38
East	4000	53.35	50	53.9
East	3950	66.9	50	63.88
East	3900	29.56	50	67.78
East	3850	54.23	50	63.45
East	3800	51.02	50	49.21
East	3750	52.26	50	46.49
East	3700	60.14	50	33.53
East	3650	51.25	50	52.46
East	3600	62.01	50	47.9
East	3550	59.06	50	53.38
East	3500	39.9	50	66.73
East	3450	24.8	50	100.26
East	3400	54.43	50	48.43
East	3350	60.4	50	46.98
East	3300	56.3	50	33.79
East	3250	48.03	50	52.79
East	3200	50.1	50	50.13
East	3150	44.23	50	56.79
East	3100	33.1	50	68.21
East	3050	67.72	50	48.85
East	3000	64.93	50	45.01
East	2950	50.79	50	51.25
East	2900	65.91	50	45.14
East	2850	66.73	50	53.41
East	2800	67.78	50	48.95
East	2750	45.41	50	50.66

East	2700	62.4	50	52.53
East	2650	54.3	50	79.13
East	2600	60.01	50	72.05
East	2550	65.45	50	93.8
East	2500	69.23	50	85.3
East	2450	38.25	50	54.23
East	2400	62.04	50	59.15
East	2350	50.75	50	50.85
East	2300	40.98	50	54.76
East	2250	49.97	50	49.41
East	2200	53.67	50	48.88
East	2150	34.58	50	63.09
East	2100	31.66	50	64.9
East	2050	49.84	50	49.41
East	2000	47.64	50	56.5
East	1950	52.36	50	54.3
East	1900	63.75	50	36.61
East	1850	61.98	50	38.16
East	1800	50.79	50	53.54
East	1750	61.55	50	50.72
East	1700	28.94	50	59.09
East	1650	50.13	50	73.62
East	1600	77.3	50	30.02
East	1550	50.69	50	49.44
East	1500	65.39	50	50.26
East	1450	109.19	50	50.75
East	1400	51.77	50	59.74
East	1350	44.72	50	60.04
East	1300	53.12	50	50.07
East	1250	56.63	50	49.44
East	1200	46.46	50	82.68
East	1150	49.8	50	49.97
East	1100	50.13	50	72.83
East	1050	72.28	50	51.48
East	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Existing Channel

Reach	River Sta.	Contr.	Expan.

East	5000	.1	.3
East	4950	.1	.3
East	4900	.1	.3
East	4850	.1	.3
East	4800	.1	.3
East	4750	.1	.3
East	4700	.1	.3
East	4650	.1	.3
East	4600	.1	.3
East	4550	.1	.3
East	4500	.1	.3
East	4450	.1	.3
East	4400	.1	.3
East	4350	.1	.3
East	4300	.1	.3
East	4250	.1	.3
East	4200	.1	.3
East	4150	.1	.3
East	4100	.1	.3
East	4050	.1	.3
East	4000	.1	.3
East	3950	.1	.3
East	3900	.1	.3
East	3850	.1	.3
East	3800	.1	.3
East	3750	.1	.3
East	3700	.1	.3
East	3650	.1	.3
East	3600	.1	.3
East	3550	.1	.3
East	3500	.1	.3
East	3450	.1	.3
East	3400	.1	.3
East	3350	.1	.3
East	3300	.1	.3
East	3250	.1	.3
East	3200	.1	.3
East	3150	.1	.3
East	3100	.1	.3
East	3050	.1	.3
East	3000	.1	.3
East	2950	.1	.3
East	2900	.1	.3

East	2850	.1	.3
East	2800	.1	.3
East	2750	.1	.3
East	2700	.1	.3
East	2650	.1	.3
East	2600	.1	.3
East	2550	.1	.3
East	2500	.1	.3
East	2450	.1	.3
East	2400	.1	.3
East	2350	.1	.3
East	2300	.1	.3
East	2250	.1	.3
East	2200	.1	.3
East	2150	.1	.3
East	2100	.1	.3
East	2050	.1	.3
East	2000	.1	.3
East	1950	.1	.3
East	1900	.1	.3
East	1850	.1	.3
East	1800	.1	.3
East	1750	.1	.3
East	1700	.1	.3
East	1650	.1	.3
East	1600	.1	.3
East	1550	.1	.3
East	1500	.1	.3
East	1450	.1	.3
East	1400	.1	.3
East	1350	.1	.3
East	1300	.1	.3
East	1250	.1	.3
East	1200	.1	.3
East	1150	.1	.3
East	1100	.1	.3
East	1050	.1	.3
East	1000	.1	.3

HEC-RAS Plan: Existing River: Existing Channel Reach: East

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	5000	100-YR	43.00	6959.70	6960.86	6960.86	6961.15	0.036699	4.36	9.86	17.05	1.01
East	5000	5-YR	4.00	6959.70	6960.15	6960.15	6960.26	0.049278	2.69	1.49	6.62	1.00
East	4950	100-YR	43.00	6957.48	6958.53		6958.71	0.022577	3.43	12.52	21.61	0.80
East	4950	5-YR	4.00	6957.48	6957.89	6957.84	6957.95	0.030306	1.99	2.01	9.76	0.78
East	4900	100-YR	43.00	6956.08	6957.19	6957.14	6957.44	0.028870	3.98	10.80	17.92	0.90
East	4900	5-YR	4.00	6956.08	6956.53	6956.47	6956.59	0.024429	1.97	2.03	8.53	0.71
East	4850	100-YR	43.00	6954.44	6955.51	6955.51	6955.84	0.035476	4.60	9.35	14.50	1.01
East	4850	5-YR	4.00	6954.44	6954.77	6954.77	6954.88	0.050805	2.71	1.48	6.68	1.02
East	4800	100-YR	43.00	6953.12	6954.22		6954.33	0.009349	2.69	15.98	20.46	0.54
East	4800	5-YR	4.00	6953.12	6953.41		6953.44	0.015502	1.48	2.70	12.39	0.56
East	4750	100-YR	43.00	6952.24	6953.55		6953.73	0.015007	3.39	12.69	16.31	0.68
East	4750	5-YR	4.00	6952.24	6952.70		6952.74	0.012493	1.67	2.39	7.75	0.53
East	4700	100-YR	43.00	6951.54	6952.77		6952.96	0.016053	3.46	12.44	16.32	0.70
East	4700	5-YR	4.00	6951.54	6951.92		6951.97	0.019453	1.90	2.11	7.91	0.65
East	4650	100-YR	43.00	6950.54	6951.74	6951.65	6951.99	0.023552	3.95	10.87	15.56	0.83
East	4650	5-YR	4.00	6950.54	6951.00	6950.91	6951.06	0.017481	1.84	2.18	7.89	0.62
East	4600	100-YR	43.00	6949.23	6950.23	6950.23	6950.54	0.035718	4.46	9.64	15.79	1.01
East	4600	5-YR	4.00	6949.23	6949.53	6949.53	6949.64	0.052726	2.65	1.51	7.26	1.02
East	4550	100-YR	43.00	6947.88	6949.52		6949.60	0.006158	2.36	18.23	20.70	0.44
East	4550	5-YR	4.00	6947.88	6948.60		6948.62	0.004239	1.06	3.78	10.84	0.32
East	4500	100-YR	43.00	6947.90	6948.82		6949.04	0.024525	3.83	11.22	17.43	0.84
East	4500	5-YR	4.00	6947.90	6948.19		6948.23	0.018267	1.65	2.43	10.75	0.61
East	4450	100-YR	43.00	6946.40	6947.45	6947.40	6947.74	0.027957	4.27	10.06	14.54	0.91
East	4450	5-YR	4.00	6946.40	6946.71	6946.71	6946.81	0.050436	2.48	1.62	8.31	0.99
East	4400	100-YR	43.00	6944.96	6946.69		6946.85	0.011515	3.24	13.26	14.71	0.60
East	4400	5-YR	4.00	6944.96	6945.69		6945.73	0.009171	1.60	2.50	6.78	0.46
East	4350	100-YR	43.00	6944.46	6945.83		6946.08	0.020831	4.04	10.64	13.31	0.80
East	4350	5-YR	4.00	6944.46	6944.96	6944.89	6945.03	0.023999	2.15	1.86	6.76	0.72
East	4300	100-YR	43.00	6943.79	6945.06	6944.81	6945.23	0.013613	3.28	13.12	16.46	0.65
East	4300	5-YR	4.00	6943.79	6944.24		6944.27	0.010147	1.48	2.70	9.00	0.48

HEC-RAS Plan: Existing River: Existing Channel Reach: East (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	4250	100-YR	43.00	6942.82	6943.85	6943.85	6944.17	0.035008	4.55	9.45	14.74	1.00
East	4250	5-YR	4.00	6942.82	6943.19	6943.19	6943.28	0.053175	2.47	1.62	8.74	1.01
East	4200	100-YR	43.00	6941.68	6943.18		6943.25	0.004488	2.09	20.61	22.22	0.38
East	4200	5-YR	4.00	6941.68	6942.29		6942.30	0.001900	0.78	5.11	12.64	0.22
East	4150	100-YR	43.00	6941.65	6942.47	6942.47	6942.73	0.037587	4.09	10.52	20.50	1.01
East	4150	5-YR	4.00	6941.65	6941.96	6941.96	6942.03	0.046812	2.16	1.85	11.10	0.93
East	4100	100-YR	43.00	6940.48	6941.42		6941.50	0.008415	2.29	18.76	28.36	0.50
East	4100	5-YR	4.00	6940.48	6940.76		6940.78	0.010299	1.13	3.54	18.02	0.45
East	4050	100-YR	43.00	6939.60	6940.41	6940.41	6940.70	0.037059	4.31	9.97	17.56	1.01
East	4050	5-YR	4.00	6939.60	6939.81	6939.79	6939.88	0.039089	2.12	1.88	10.01	0.86
East	4000	100-YR	43.00	6938.49	6940.37		6940.39	0.001184	1.18	36.59	34.47	0.20
East	4000	5-YR	4.00	6938.49	6938.88		6938.91	0.011363	1.42	2.82	10.93	0.49
East	3950	100-YR	43.00	6937.94	6940.35		6940.36	0.000326	0.65	66.18	57.94	0.11
East	3950	5-YR	4.00	6937.94	6938.47		6938.49	0.006433	1.15	3.46	11.95	0.38
East	3900	100-YR	880.00	6937.13	6939.82		6940.07	0.007176	3.98	221.03	129.74	0.54
East	3900	5-YR	14.00	6937.13	6937.71	6937.67	6937.74	0.020669	1.37	10.21	65.67	0.61
East	3850	100-YR	880.00	6935.31	6938.98		6939.51	0.017110	5.86	150.07	94.14	0.82
East	3850	5-YR	14.00	6935.31	6936.24	6936.21	6936.44	0.033437	3.56	3.93	8.45	0.92
East	3800	100-YR	880.00	6934.35	6937.63	6937.63	6938.44	0.026291	7.21	121.99	76.87	1.01
East	3800	5-YR	14.00	6934.35	6935.18		6935.25	0.016913	2.19	6.40	17.38	0.64
East	3750	100-YR	880.00	6933.18	6935.97	6935.97	6936.69	0.026437	6.83	128.91	89.51	1.00
East	3750	5-YR	14.00	6933.18	6933.93	6933.90	6934.08	0.033448	3.10	4.51	12.14	0.90
East	3700	100-YR	880.00	6931.90	6935.52		6935.80	0.007109	4.18	210.53	113.85	0.54
East	3700	5-YR	14.00	6931.90	6932.80		6932.89	0.017452	2.47	5.67	13.17	0.66
East	3650	100-YR	880.00	6931.20	6934.83	6934.62	6935.26	0.016635	5.24	168.06	122.56	0.79
East	3650	5-YR	14.00	6931.20	6932.18		6932.24	0.010004	2.03	6.89	14.16	0.51
East	3600	100-YR	880.00	6930.58	6933.47	6933.47	6934.19	0.026631	6.81	129.30	90.30	1.00
East	3600	5-YR	14.00	6930.58	6931.22	6931.20	6931.34	0.040634	2.85	4.91	17.42	0.95
East	3550	100-YR	880.00	6929.49	6932.59		6932.98	0.011886	4.99	176.41	107.50	0.69
East	3550	5-YR	14.00	6929.49	6930.27		6930.31	0.011960	1.72	8.13	24.52	0.53

HEC-RAS Plan: Existing River: Existing Channel Reach: East (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	3500	100-YR	880.00	6928.80	6932.16		6932.50	0.007413	4.65	189.41	90.02	0.56
East	3500	5-YR	14.00	6928.80	6929.43		6929.50	0.022467	2.21	6.33	21.03	0.71
East	3450	100-YR	880.00	6928.01	6931.43		6931.99	0.013155	6.03	146.02	72.18	0.75
East	3450	5-YR	14.00	6928.01	6928.72		6928.76	0.010592	1.58	8.87	27.90	0.49
East	3400	100-YR	880.00	6927.47	6930.79	6930.47	6931.25	0.015329	5.49	160.35	102.84	0.77
East	3400	5-YR	14.00	6927.47	6928.12	6927.99	6928.17	0.013515	1.81	7.73	23.81	0.56
East	3350	100-YR	880.00	6926.42	6929.45	6929.42	6930.27	0.024029	7.29	120.78	70.80	0.98
East	3350	5-YR	14.00	6926.42	6926.87	6926.87	6927.00	0.047251	2.91	4.81	18.56	1.01
East	3300	100-YR	880.00	6924.78	6928.87		6929.39	0.011224	5.77	152.42	71.24	0.70
East	3300	5-YR	14.00	6924.78	6925.58		6925.65	0.012551	2.08	6.72	15.81	0.56
East	3250	100-YR	880.00	6923.75	6928.18		6928.79	0.012342	6.26	140.48	62.21	0.73
East	3250	5-YR	14.00	6923.75	6924.48	6924.45	6924.64	0.036210	3.22	4.34	11.70	0.93
East	3200	100-YR	880.00	6923.28	6927.07	6926.93	6927.98	0.020071	7.69	114.50	53.76	0.93
East	3200	5-YR	14.00	6923.28	6924.06		6924.10	0.004634	1.50	9.33	16.97	0.36
East	3150	100-YR	880.00	6923.15	6925.91	6925.91	6926.88	0.024117	7.91	111.27	57.61	1.00
East	3150	5-YR	14.00	6923.15	6923.67		6923.72	0.015644	1.63	8.57	34.37	0.58
East	3100	100-YR	880.00	6921.98	6925.26		6925.84	0.012334	6.11	144.02	66.41	0.73
East	3100	5-YR	14.00	6921.98	6922.62		6922.70	0.027686	2.16	6.48	26.20	0.77
East	3050	100-YR	880.00	6921.56	6925.08		6925.39	0.004921	4.50	200.36	93.77	0.48
East	3050	5-YR	14.00	6921.56	6921.92		6921.94	0.009235	1.31	10.66	39.99	0.45
East	3000	100-YR	880.00	6920.57	6924.42		6925.00	0.011987	6.08	146.34	80.22	0.72
East	3000	5-YR	14.00	6920.57	6921.05		6921.16	0.030929	2.64	5.31	17.30	0.84
East	2950	100-YR	880.00	6919.84	6923.24	6923.24	6924.20	0.019805	7.93	116.13	71.49	0.93
East	2950	5-YR	14.00	6919.84	6920.40		6920.45	0.007840	1.63	8.57	20.43	0.44
East	2900	100-YR	880.00	6919.31	6922.38	6922.27	6923.14	0.015667	7.14	135.67	90.41	0.83
East	2900	5-YR	14.00	6919.31	6919.57	6919.56	6919.67	0.043662	2.56	5.47	24.20	0.95
East	2850	100-YR	880.00	6917.96	6922.05		6922.48	0.008515	5.30	173.38	97.24	0.61
East	2850	5-YR	14.00	6917.96	6918.48		6918.54	0.013678	1.99	7.02	18.84	0.58
East	2800	100-YR	880.00	6917.16	6920.74	6920.74	6921.80	0.019517	8.27	110.09	67.16	0.93
East	2800	5-YR	14.00	6917.16	6917.66		6917.74	0.018761	2.23	6.28	18.08	0.67

HEC-RAS Plan: Existing River: Existing Channel Reach: East (Continued)

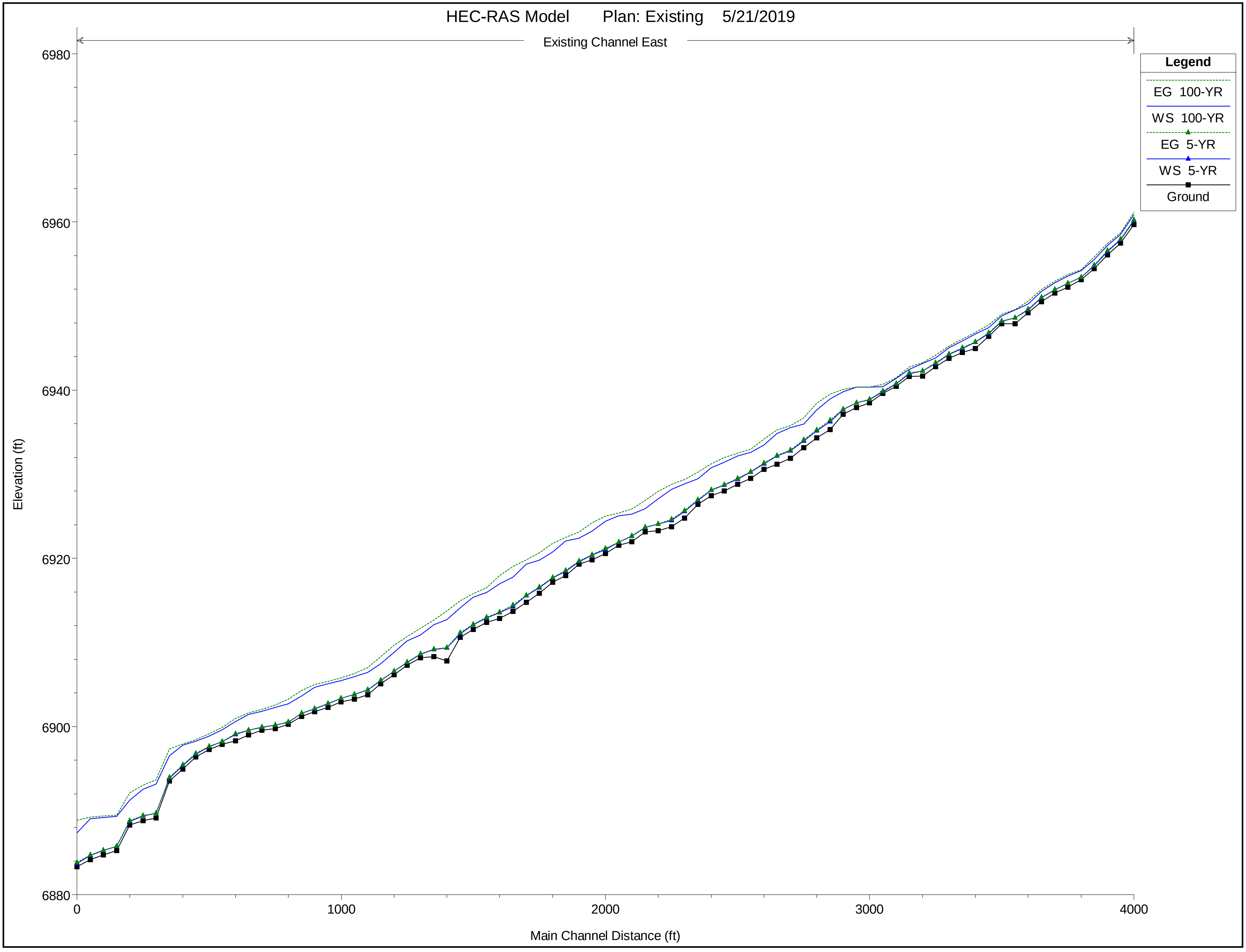
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	2750	100-YR	880.00	6915.84	6919.79	6919.67	6920.64	0.021782	7.39	119.13	63.08	0.95
East	2750	5-YR	14.00	6915.84	6916.49		6916.60	0.027695	2.72	5.14	14.61	0.81
East	2700	100-YR	880.00	6914.78	6919.33		6919.82	0.010160	5.59	158.99	85.51	0.66
East	2700	5-YR	14.00	6914.78	6915.54	6915.40	6915.62	0.014491	2.25	6.22	14.47	0.60
East	2650	100-YR	880.00	6913.71	6917.78	6917.78	6919.01	0.022953	8.88	99.38	45.63	1.01
East	2650	5-YR	14.00	6913.71	6914.27	6914.27	6914.44	0.042538	3.32	4.22	12.34	1.00
East	2600	100-YR	880.00	6912.84	6916.95	6916.95	6917.96	0.016859	8.11	114.79	86.19	0.88
East	2600	5-YR	14.00	6912.84	6913.56		6913.61	0.008222	1.83	7.63	15.76	0.46
East	2550	100-YR	880.00	6912.38	6915.93	6915.70	6916.48	0.012350	6.15	162.55	119.51	0.73
East	2550	5-YR	14.00	6912.38	6912.88	6912.81	6912.97	0.022779	2.41	5.82	17.27	0.73
East	2500	100-YR	880.00	6911.54	6915.38		6915.78	0.013164	5.04	174.57	113.18	0.72
East	2500	5-YR	14.00	6911.54	6912.11	6911.95	6912.17	0.011681	1.96	7.15	17.50	0.54
East	2450	100-YR	880.00	6910.62	6914.10	6914.10	6914.96	0.018168	7.52	125.22	92.48	0.89
East	2450	5-YR	14.00	6910.62	6911.01	6911.01	6911.15	0.044623	3.00	4.67	16.51	0.99
East	2400	100-YR	880.00	6907.81	6912.72	6912.60	6913.72	0.020181	8.06	109.65	52.89	0.94
East	2400	5-YR	14.00	6907.81	6909.36		6909.40	0.002629	1.43	9.76	12.11	0.28
East	2350	100-YR	880.00	6908.31	6912.09	6911.78	6912.65	0.017486	6.04	145.77	92.62	0.83
East	2350	5-YR	14.00	6908.31	6909.14		6909.18	0.008051	1.71	8.17	18.46	0.45
East	2300	100-YR	880.00	6908.18	6910.90	6910.90	6911.70	0.019749	7.38	130.55	88.05	0.92
East	2300	5-YR	14.00	6908.18	6908.61		6908.65	0.014289	1.67	8.37	30.31	0.56
East	2250	100-YR	880.00	6907.30	6910.18		6910.72	0.016717	5.85	150.37	93.35	0.81
East	2250	5-YR	14.00	6907.30	6907.61		6907.68	0.028653	2.04	6.85	30.99	0.77
East	2200	100-YR	880.00	6906.18	6908.81	6908.81	6909.67	0.025344	7.41	118.78	70.62	1.01
East	2200	5-YR	14.00	6906.18	6906.56		6906.60	0.016610	1.70	8.25	32.69	0.60
East	2150	100-YR	880.00	6905.09	6907.46	6907.46	6908.33	0.025269	7.47	117.75	68.96	1.01
East	2150	5-YR	14.00	6905.09	6905.45	6905.41	6905.51	0.029664	1.88	7.47	39.40	0.76
East	2100	100-YR	880.00	6903.79	6906.44		6907.02	0.017047	6.11	143.96	84.97	0.83
East	2100	5-YR	14.00	6903.79	6904.35		6904.40	0.017075	1.83	7.63	27.49	0.61
East	2050	100-YR	880.00	6903.25	6905.91		6906.31	0.010559	5.08	173.36	94.41	0.66
East	2050	5-YR	14.00	6903.25	6903.81		6903.83	0.007776	1.25	11.24	40.15	0.41

HEC-RAS Plan: Existing River: Existing Channel Reach: East (Continued)

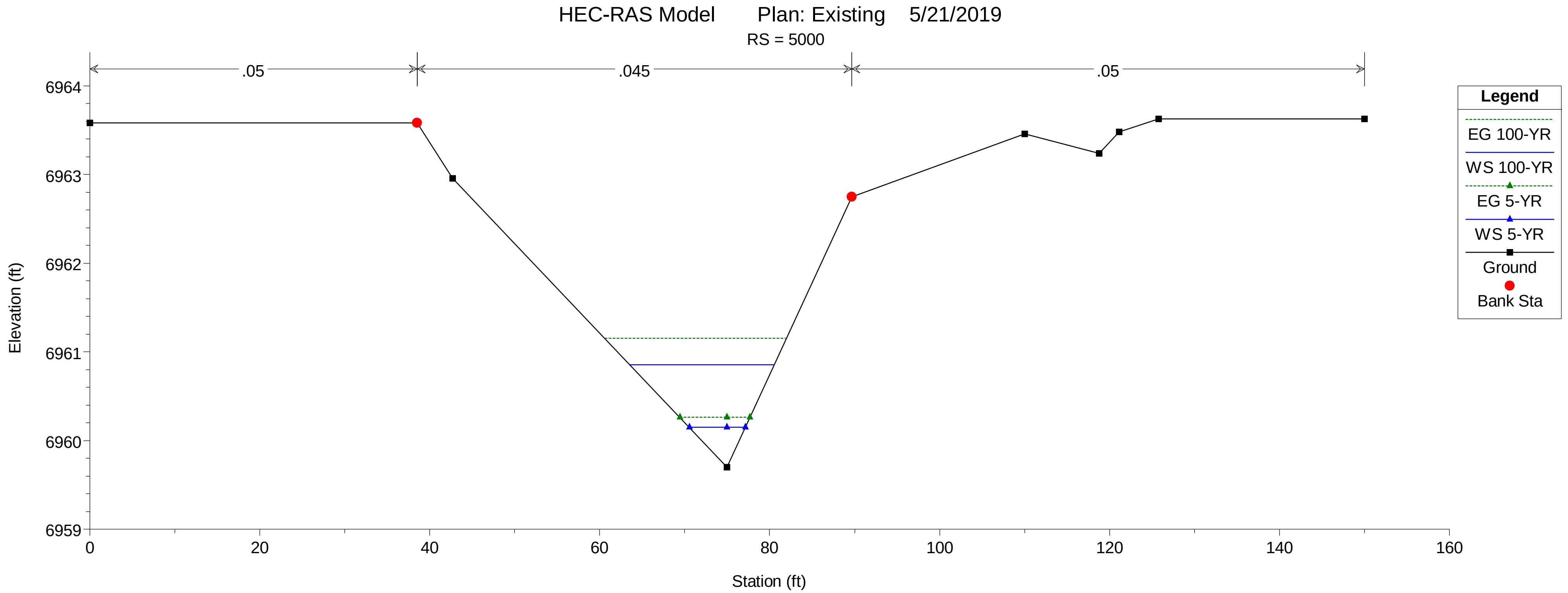
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	2000	100-YR	880.00	6902.93	6905.46		6905.81	0.008814	4.69	187.81	100.72	0.60
East	2000	5-YR	14.00	6902.93	6903.35		6903.37	0.011438	1.22	11.50	56.74	0.48
East	1950	100-YR	880.00	6902.27	6905.08		6905.38	0.007938	4.38	200.75	110.13	0.57
East	1950	5-YR	14.00	6902.27	6902.70		6902.74	0.014071	1.41	9.90	45.58	0.54
East	1900	100-YR	880.00	6901.77	6904.66		6904.97	0.008319	4.47	196.81	108.57	0.59
East	1900	5-YR	14.00	6901.77	6902.09		6902.12	0.010813	1.39	10.04	38.75	0.48
East	1850	100-YR	880.00	6901.20	6903.61	6903.53	6904.28	0.022907	6.58	133.81	88.45	0.94
East	1850	5-YR	14.00	6901.20	6901.56	6901.44	6901.59	0.010508	1.45	9.66	34.42	0.48
East	1800	100-YR	880.00	6900.25	6902.69		6903.25	0.017469	6.00	146.79	90.94	0.83
East	1800	5-YR	14.00	6900.25	6900.49	6900.49	6900.57	0.054590	2.25	6.21	39.29	1.00
East	1750	100-YR	880.00	6899.75	6902.27		6902.55	0.009309	4.22	208.72	136.86	0.60
East	1750	5-YR	14.00	6899.75	6900.16		6900.17	0.002612	0.80	17.56	54.06	0.25
East	1700	100-YR	880.00	6899.58	6901.83		6902.06	0.009474	3.91	225.10	167.64	0.59
East	1700	5-YR	14.00	6899.58	6899.89		6899.91	0.014544	1.28	10.92	59.80	0.53
East	1650	100-YR	880.00	6898.99	6901.44		6901.64	0.007234	3.55	247.56	173.70	0.52
East	1650	5-YR	14.00	6898.99	6899.54		6899.55	0.004246	0.94	14.91	51.72	0.31
East	1600	100-YR	880.00	6898.29	6900.57	6900.55	6900.97	0.029291	5.10	172.65	201.43	0.97
East	1600	5-YR	14.00	6898.29	6899.04	6898.94	6899.13	0.022796	2.39	5.85	17.54	0.73
East	1550	100-YR	880.00	6897.87	6899.60		6899.88	0.015843	4.32	203.85	192.52	0.74
East	1550	5-YR	14.00	6897.87	6898.19		6898.21	0.014518	1.14	12.29	80.18	0.51
East	1500	100-YR	880.00	6897.28	6898.85		6899.12	0.014571	4.17	210.88	196.80	0.71
East	1500	5-YR	14.00	6897.28	6897.62		6897.63	0.009372	0.89	15.66	105.95	0.41
East	1450	100-YR	880.00	6896.36	6898.24		6898.45	0.011479	3.73	243.10	234.35	0.63
East	1450	5-YR	14.00	6896.36	6896.71	6896.69	6896.78	0.039766	2.05	6.84	39.39	0.87
East	1400	100-YR	880.00	6894.94	6897.76		6897.92	0.006047	3.34	276.99	186.93	0.48
East	1400	5-YR	14.00	6894.94	6895.37	6895.29	6895.43	0.019574	1.99	7.02	24.71	0.66
East	1350	100-YR	880.00	6893.53	6896.51	6896.51	6897.30	0.026314	7.16	122.97	79.06	1.01
East	1350	5-YR	14.00	6893.53	6893.84	6893.84	6893.95	0.049736	2.64	5.30	24.69	1.00
East	1300	100-YR	880.00	6889.13	6893.14		6893.67	0.012928	5.83	150.96	76.82	0.73
East	1300	5-YR	14.00	6889.13	6889.67		6889.71	0.007983	1.54	9.07	23.82	0.44

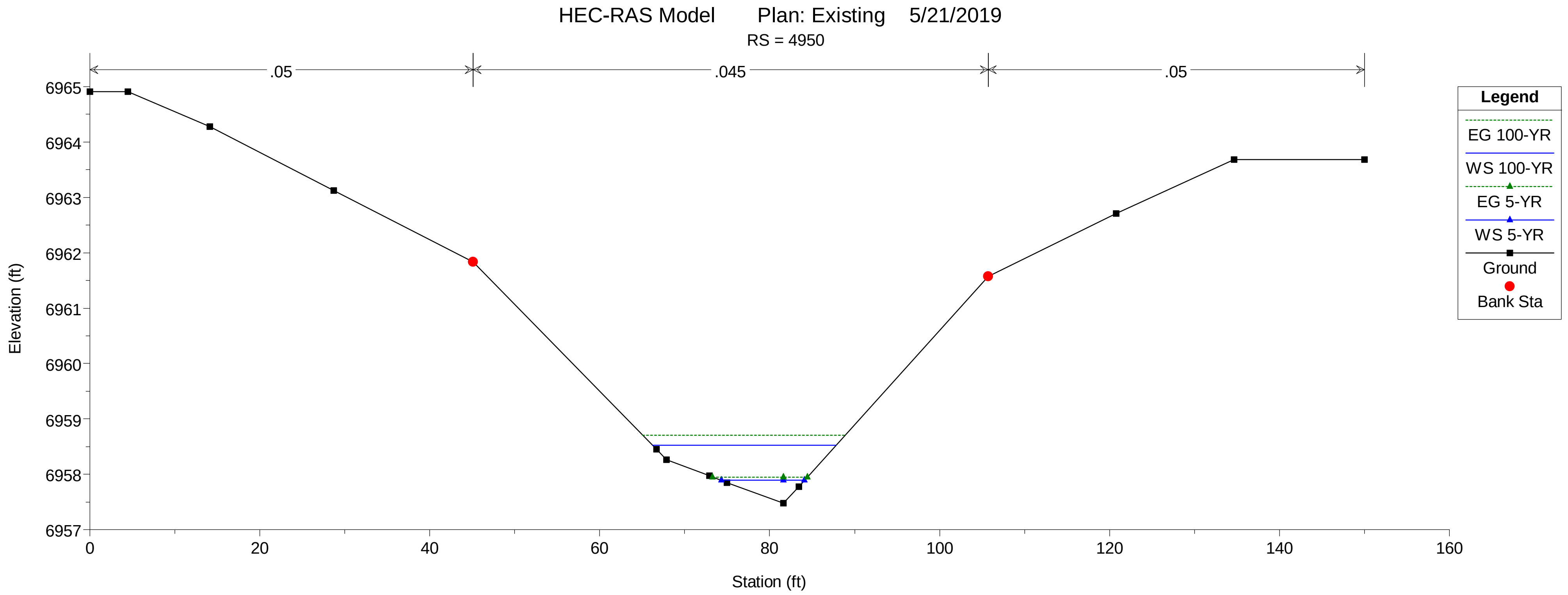
HEC-RAS Plan: Existing River: Existing Channel Reach: East (Continued)

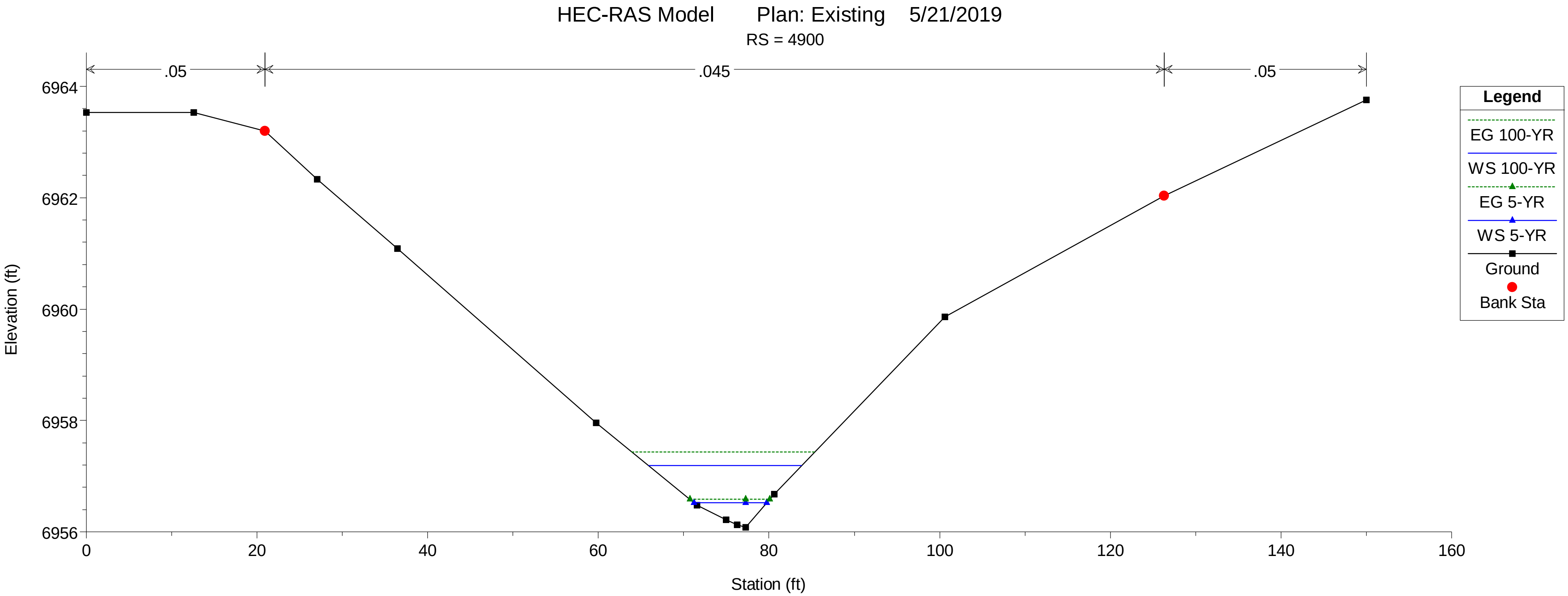
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	1250	100-YR	880.00	6888.78	6892.52	6891.92	6893.03	0.012479	5.72	153.94	78.94	0.72
East	1250	5-YR	14.00	6888.78	6889.36		6889.39	0.005136	1.33	10.54	24.88	0.36
East	1200	100-YR	880.00	6888.27	6891.21	6891.21	6892.12	0.026053	7.63	115.37	65.50	1.01
East	1200	5-YR	14.00	6888.27	6888.70	6888.70	6888.81	0.044386	2.65	5.29	22.50	0.96
East	1150	100-YR	880.00	6885.25	6889.31		6889.45	0.002445	3.04	289.00	112.95	0.34
East	1150	5-YR	14.00	6885.25	6885.74		6885.77	0.010348	1.47	9.52	32.78	0.48
East	1100	100-YR	880.00	6884.72	6889.19		6889.34	0.002046	3.16	278.35	89.62	0.32
East	1100	5-YR	14.00	6884.72	6885.26		6885.29	0.008650	1.37	10.21	34.19	0.44
East	1050	100-YR	880.00	6884.18	6889.04		6889.23	0.002327	3.47	253.67	78.02	0.34
East	1050	5-YR	14.00	6884.18	6884.70		6884.74	0.014211	1.63	8.59	32.24	0.56
East	1000	100-YR	880.00	6883.33	6887.34	6887.34	6888.83	0.022827	9.80	89.84	30.43	1.01
East	1000	5-YR	14.00	6883.33	6883.72	6883.66	6883.82	0.024726	2.53	5.54	16.13	0.76

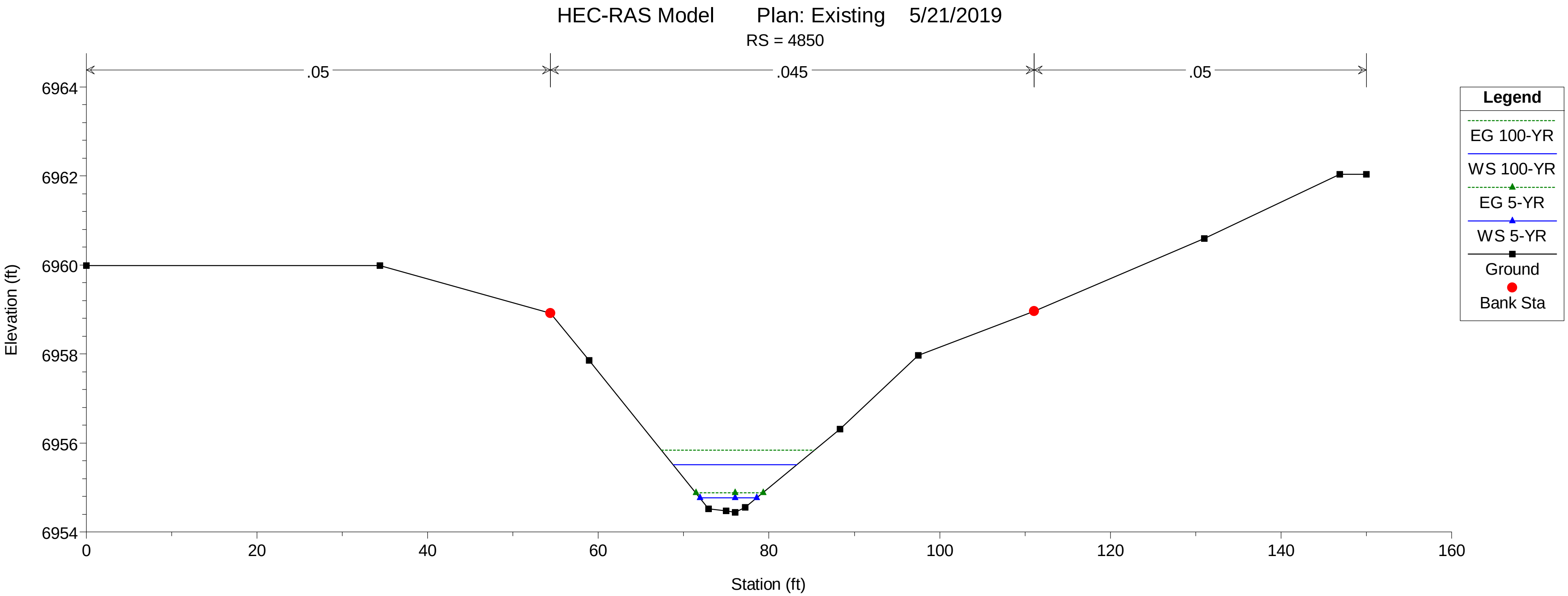


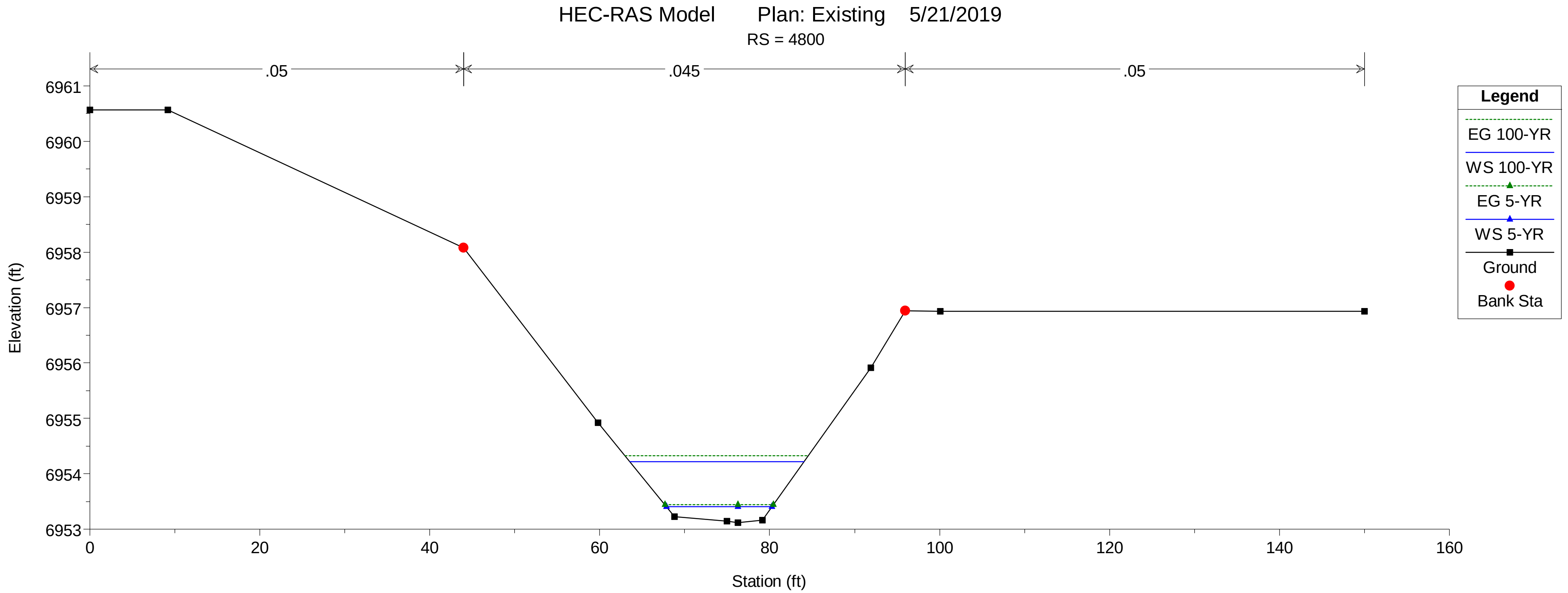
HEC-RAS Model Plan: Existing 5/21/2019
Existing Channel East
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Elevation (ft)
Main Channel Distance (ft)
6880
6900
6920
6940
6960
6980
0
1000
2000
3000
4000

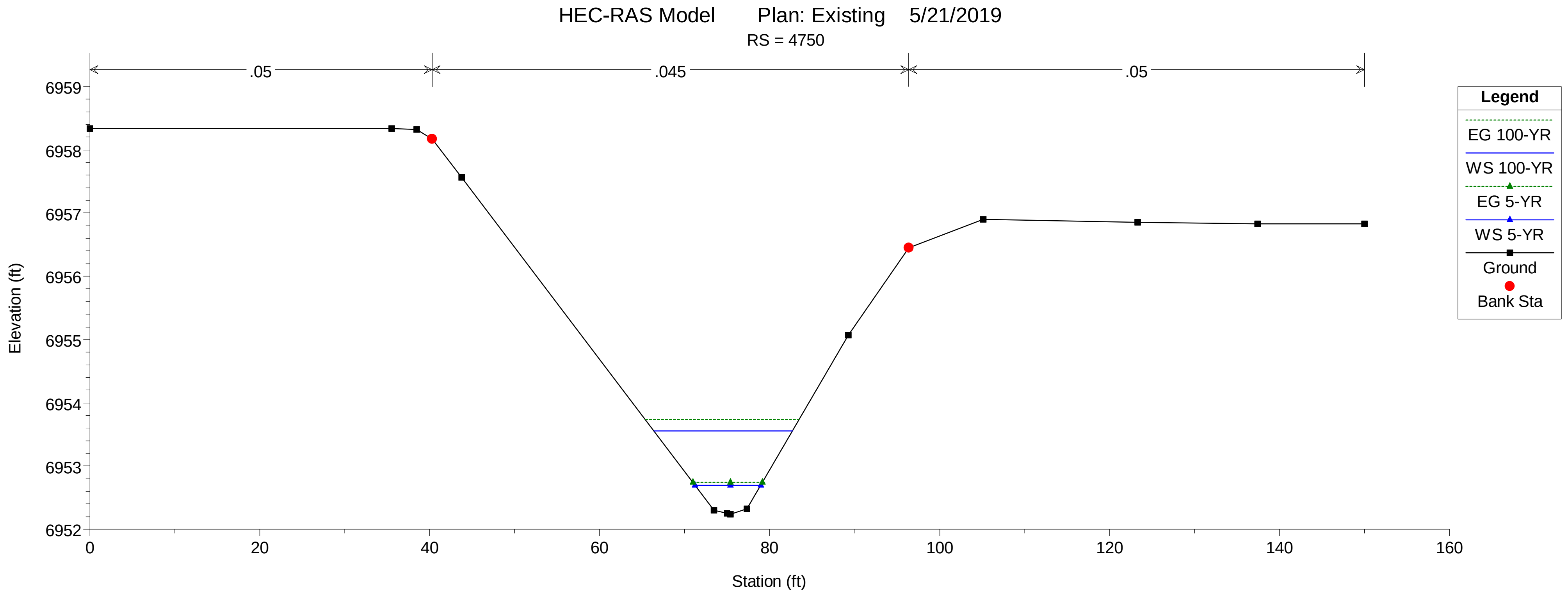

HEC-RAS Model Plan: Existing 5/21/2019
RS = 5000
.05
.045
.05
Elevation (ft)
6959
6960
6961
6962
6963
6964
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

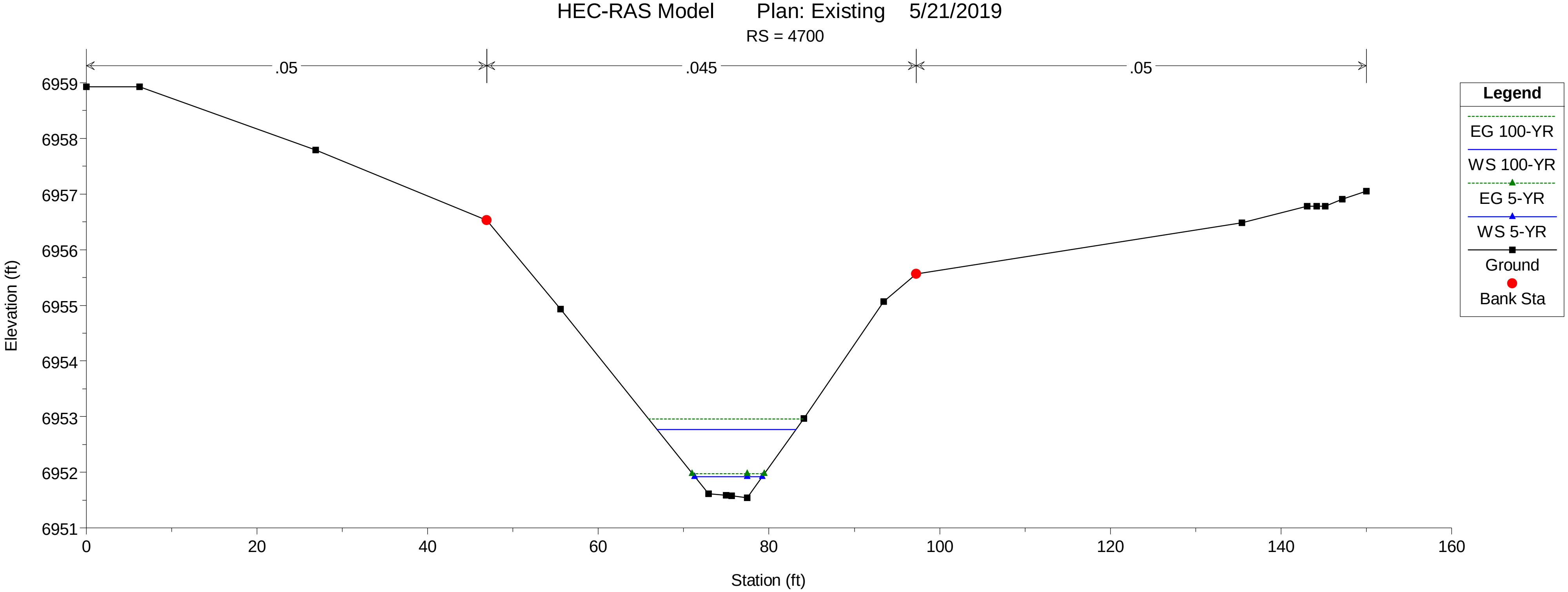

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4950
.05
.045
.05
Elevation (ft)
6957
6958
6959
6960
6961
6962
6963
6964
6965
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

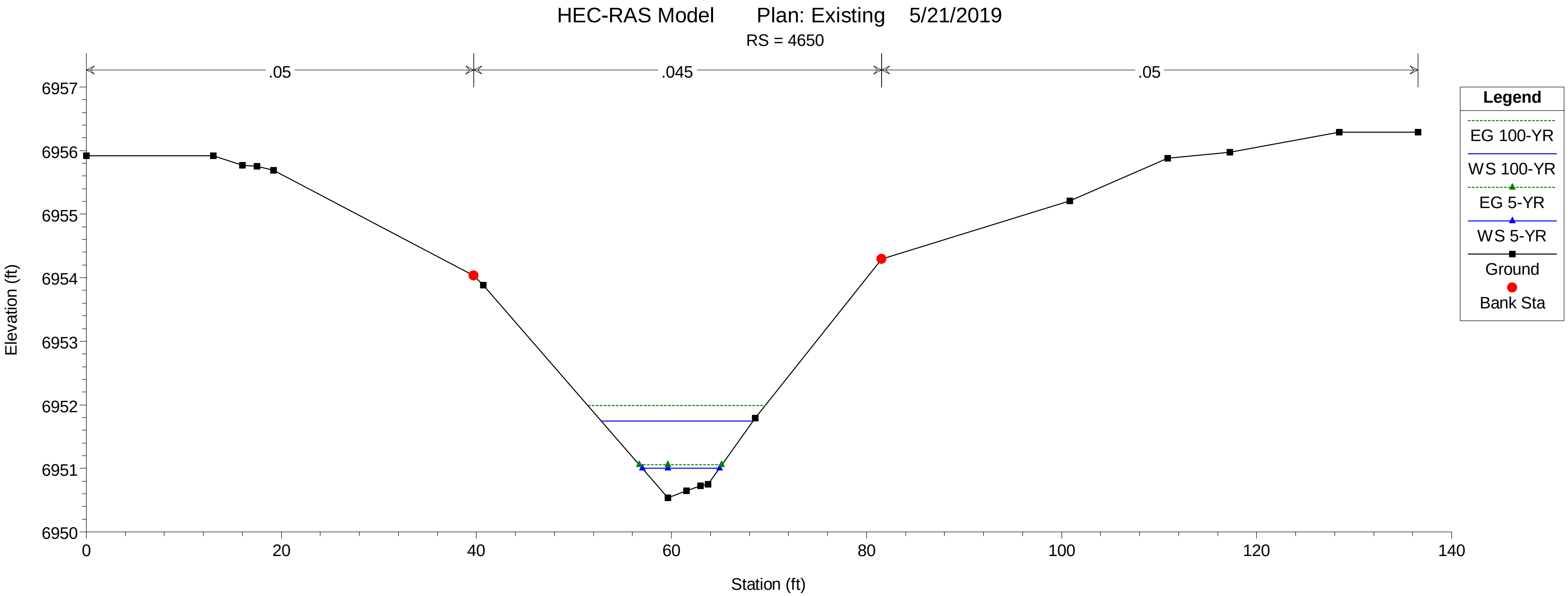

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4900
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6964
6962
6960
6958
6956
0
20
40
60
80
100
120
140
160
Station (ft)

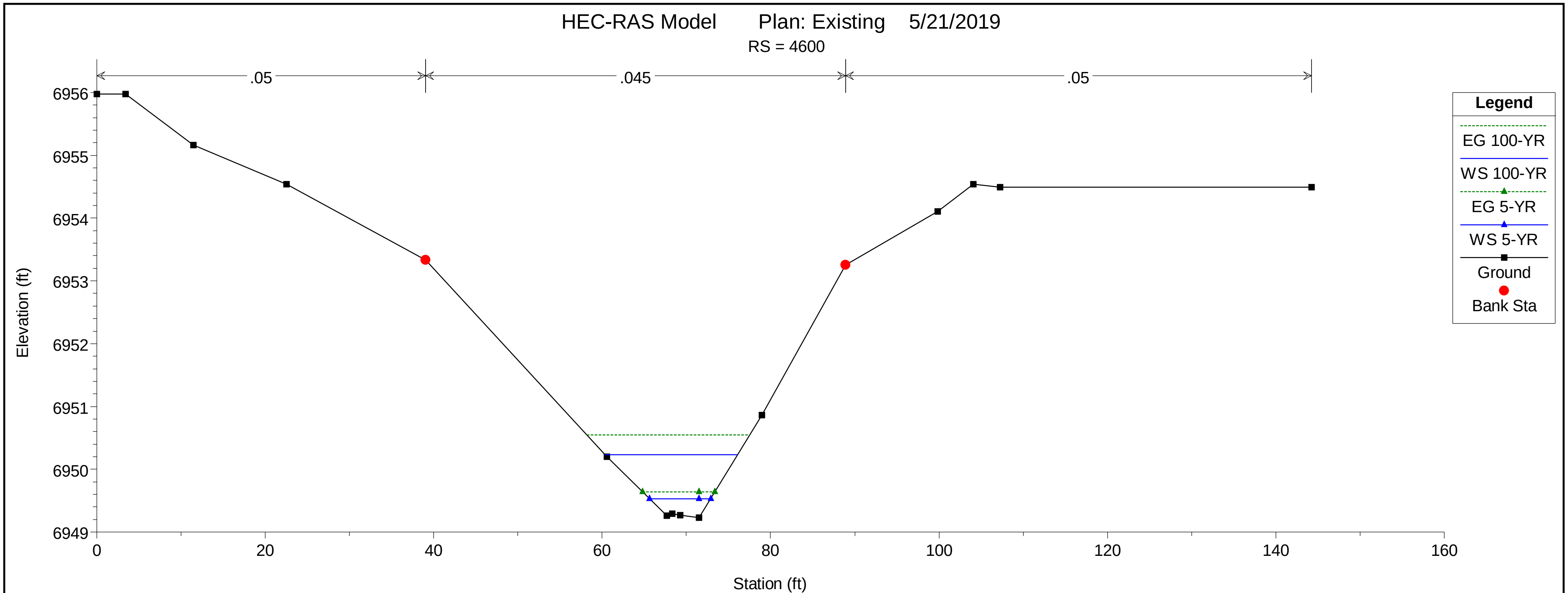

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4850
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6964
6962
6960
6958
6956
6954
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 4800
.05
.045
.05
Elevation (ft)
6961
6960
6959
6958
6957
6956
6955
6954
6953
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

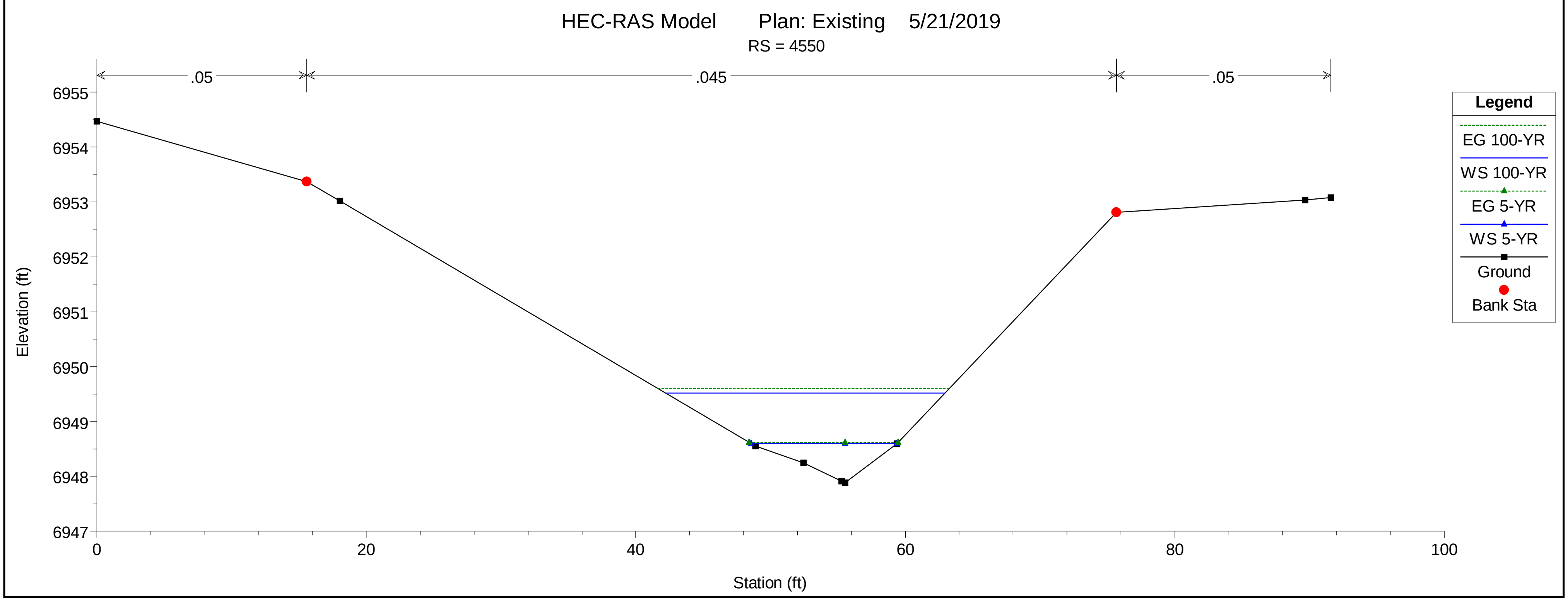

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4750
.05
.045
.05
Elevation (ft)
6959
6958
6957
6956
6955
6954
6953
6952
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 4700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

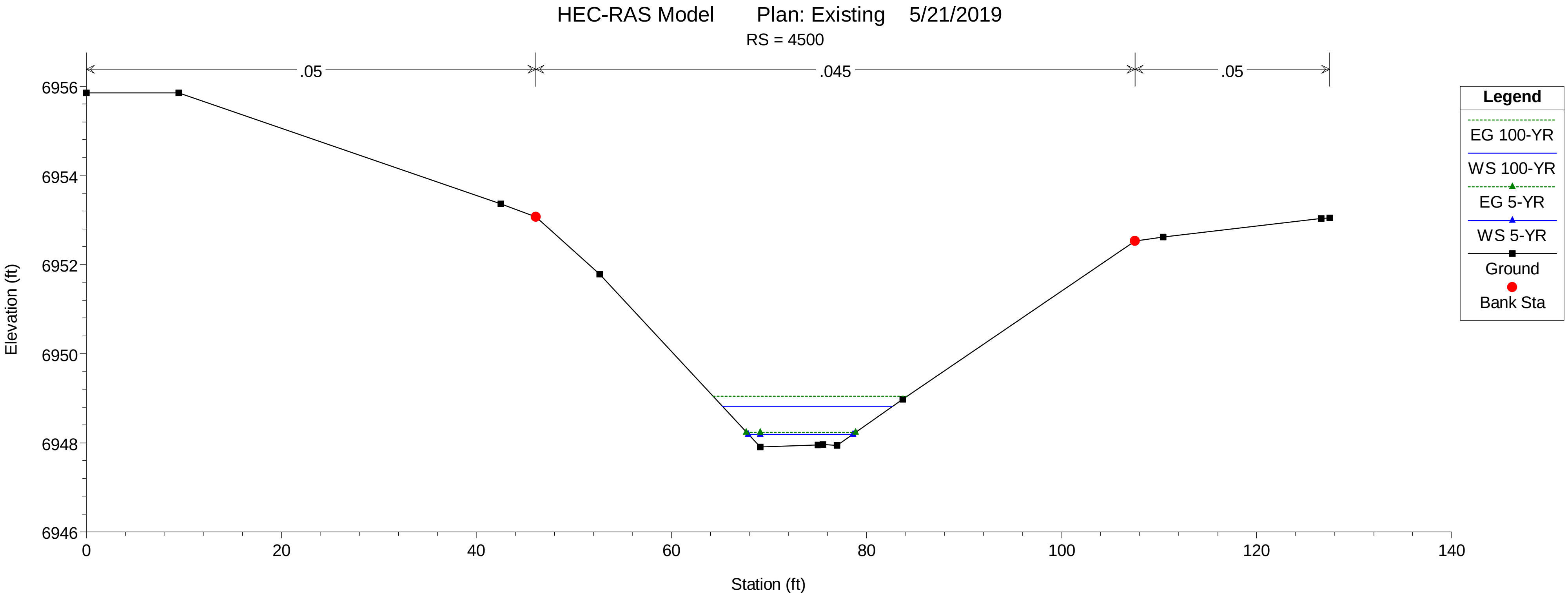

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4650
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

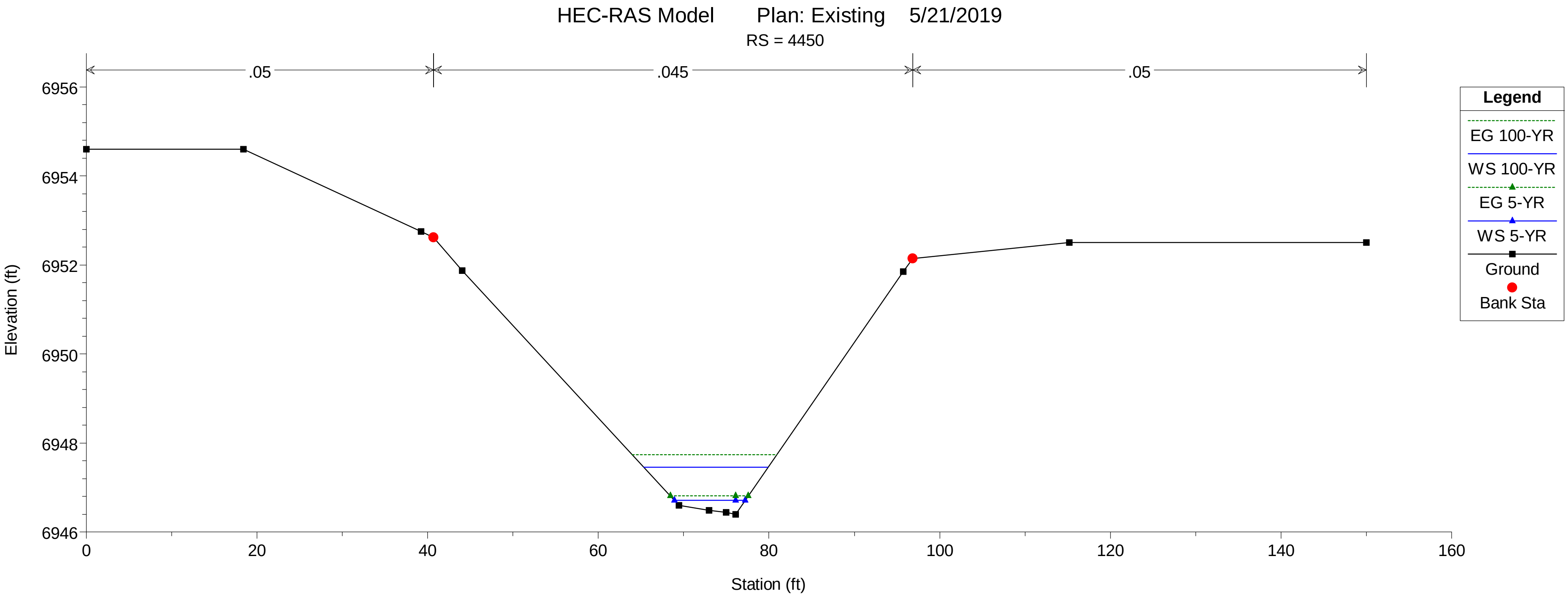


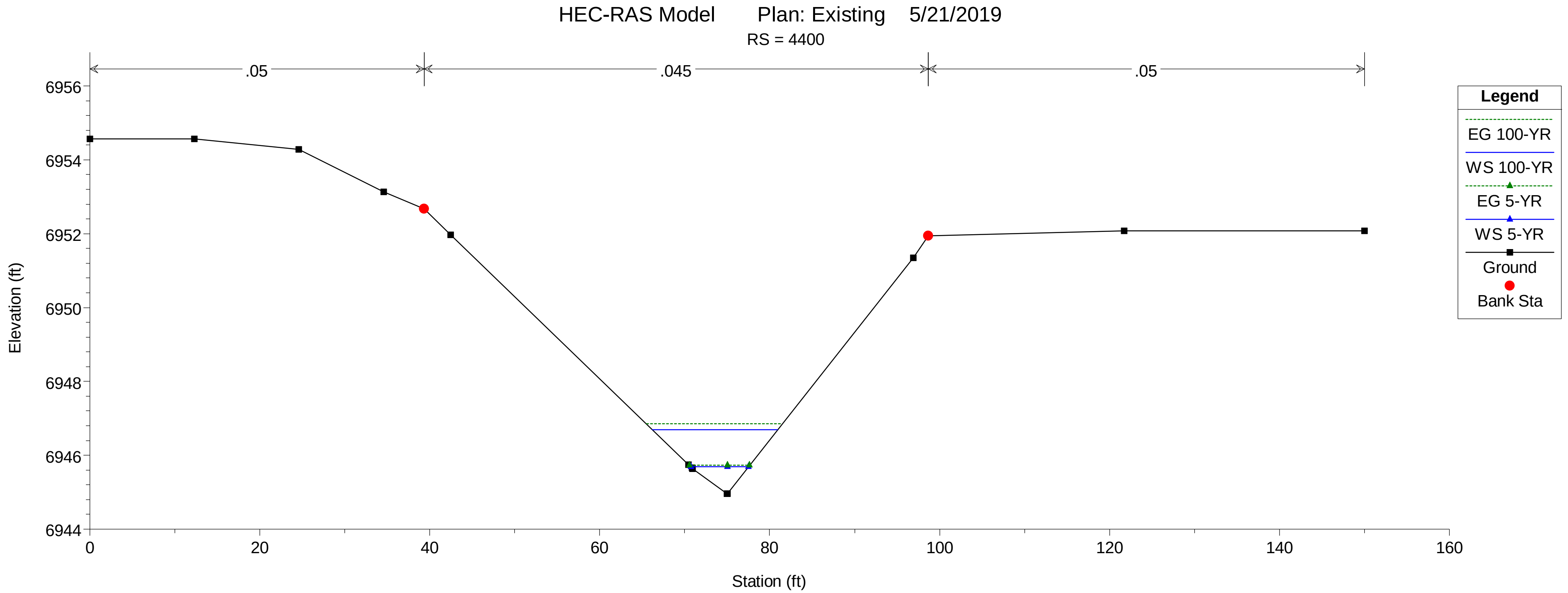
HEC-RAS Model Plan: Existing 5/21/2019
RS = 4600
.05
.045
.05
Elevation (ft)
6949
6950
6951
6952
6953
6954
6955
6956
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

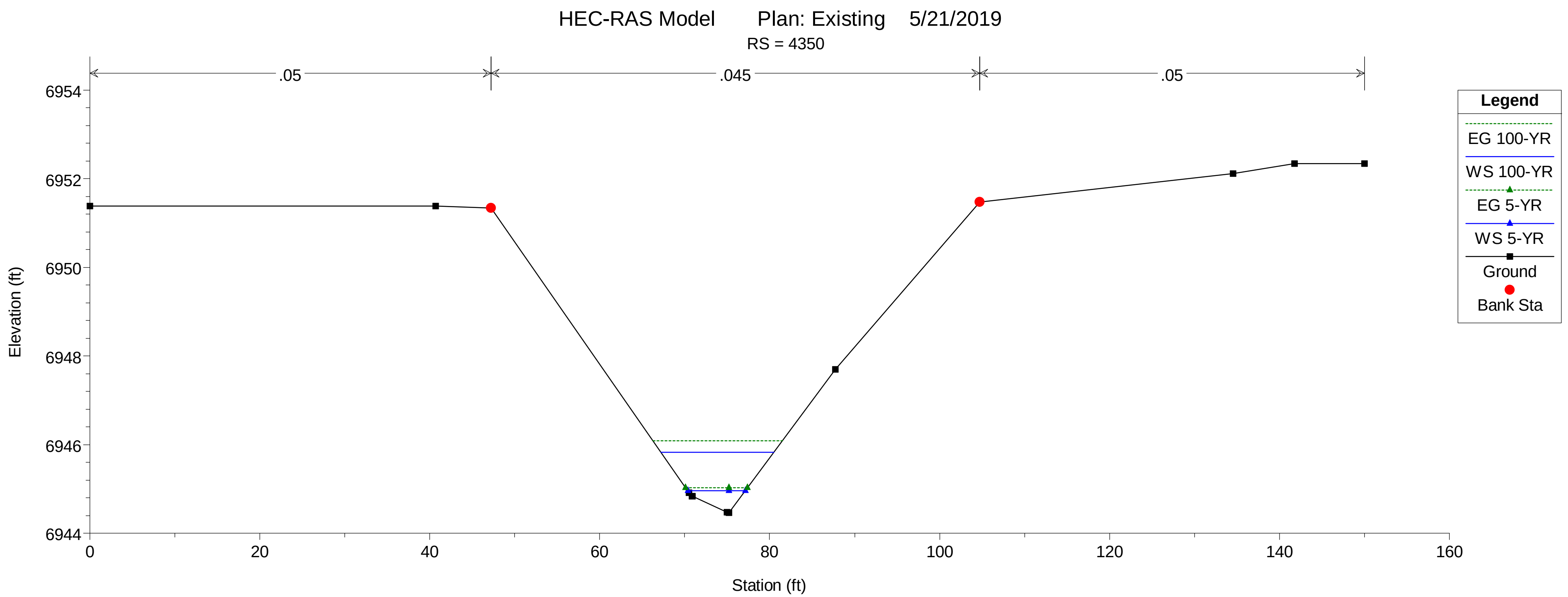


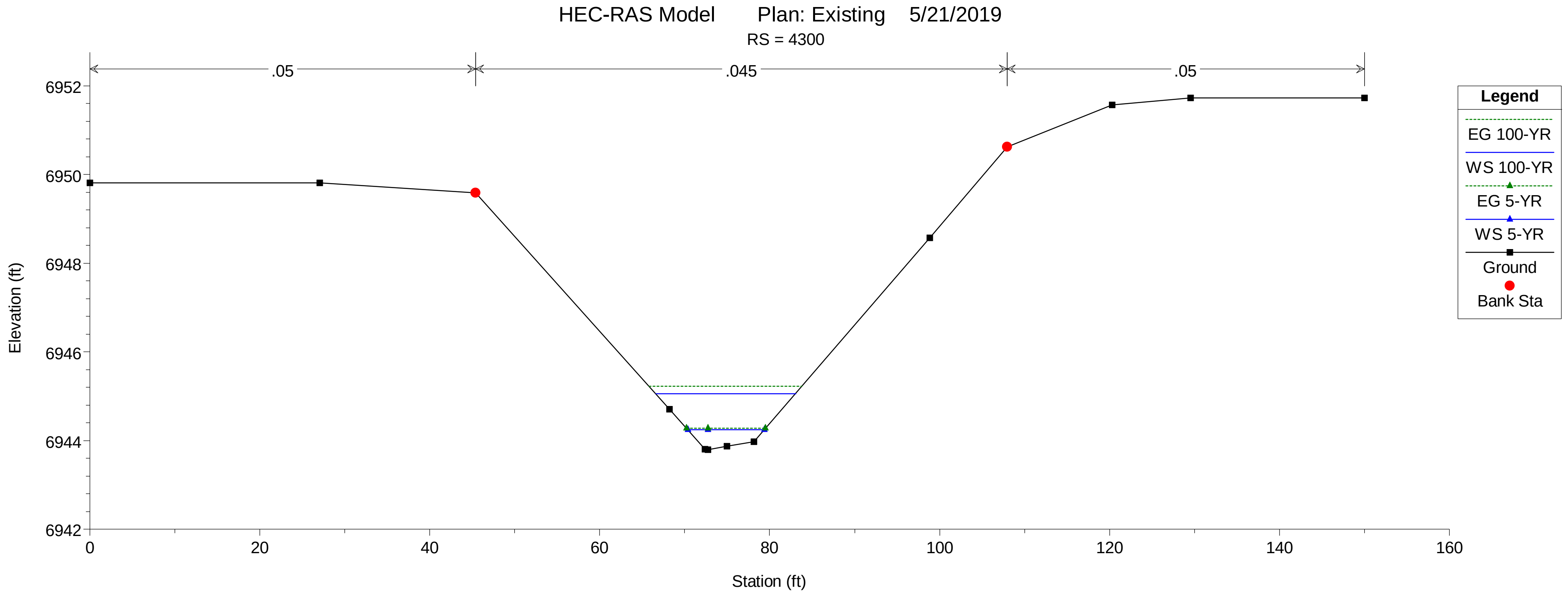
HEC-RAS Model Plan: Existing 5/21/2019
RS = 4550
.05
.045
.05
Elevation (ft)
6947
6948
6949
6950
6951
6952
6953
6954
6955
0
20
40
60
80
100
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

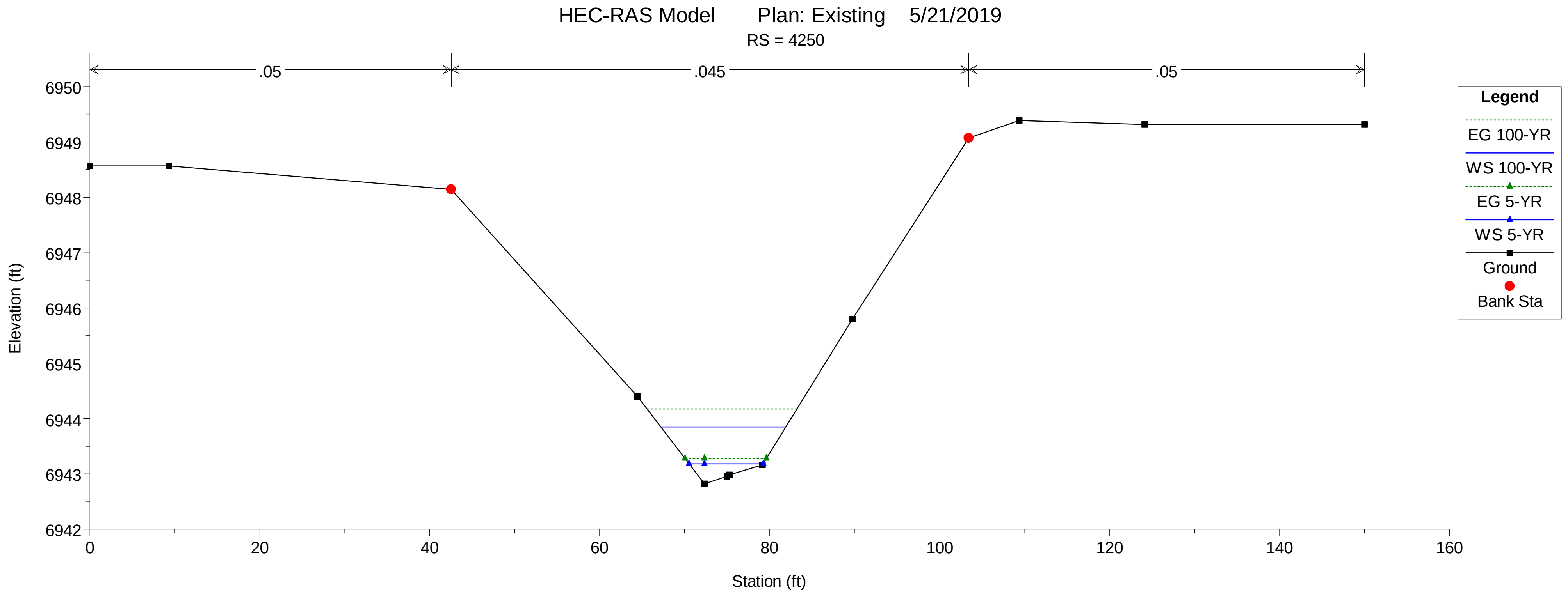

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4500
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6946
6948
6950
6952
6954
6956
0
20
40
60
80
100
120
140
Station (ft)

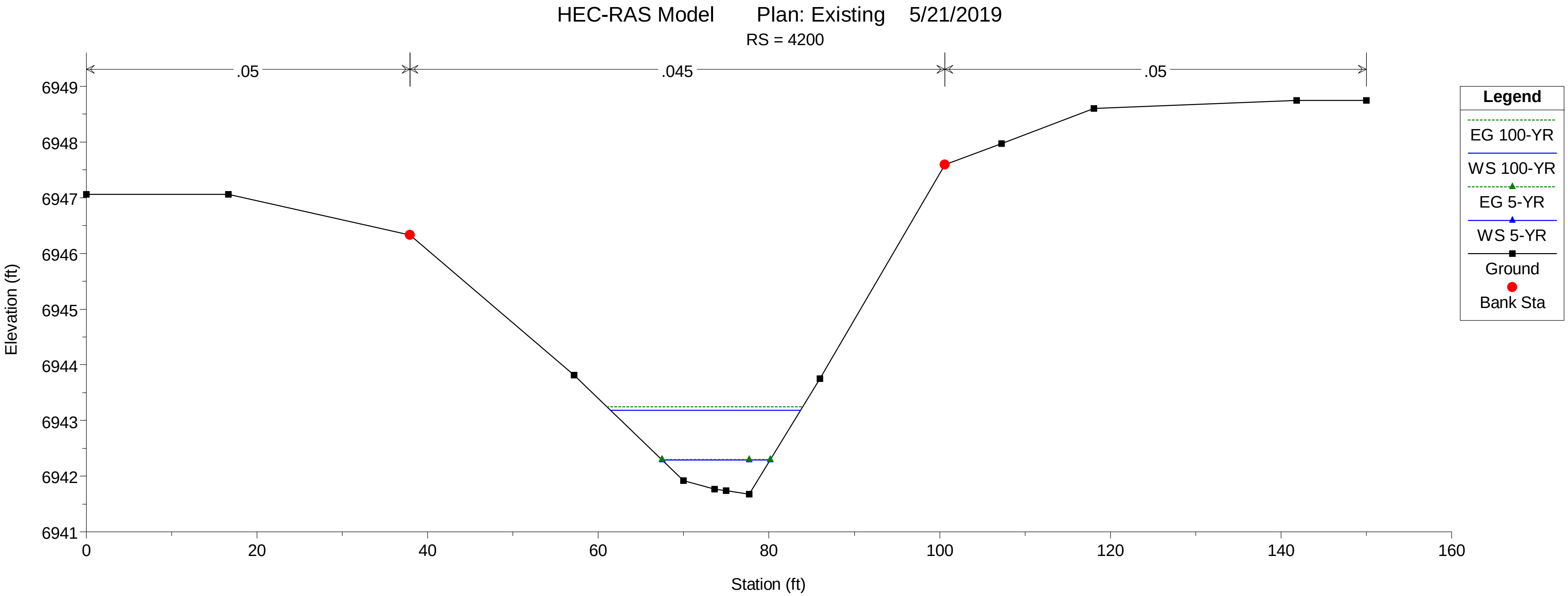

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4450
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6946
6948
6950
6952
6954
6956
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 4400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

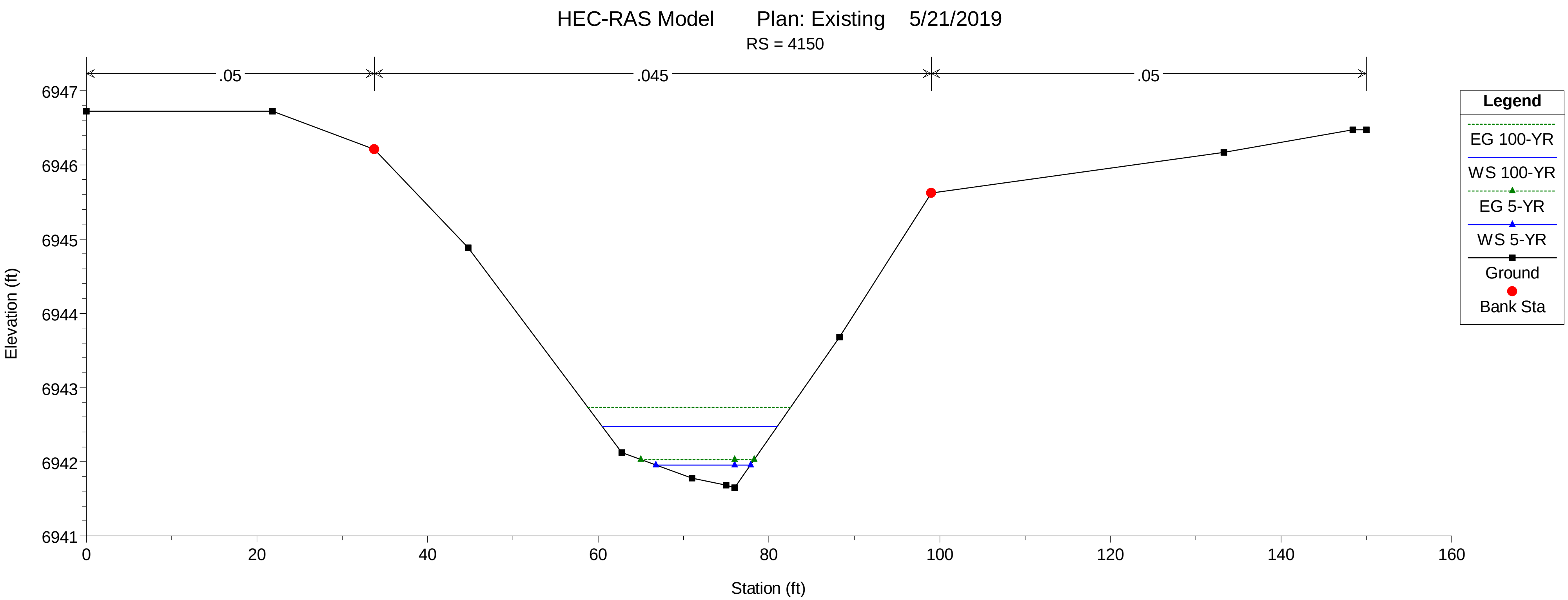

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 4300
.05
.045
.05
Elevation (ft)
6952
6950
6948
6946
6944
6942
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

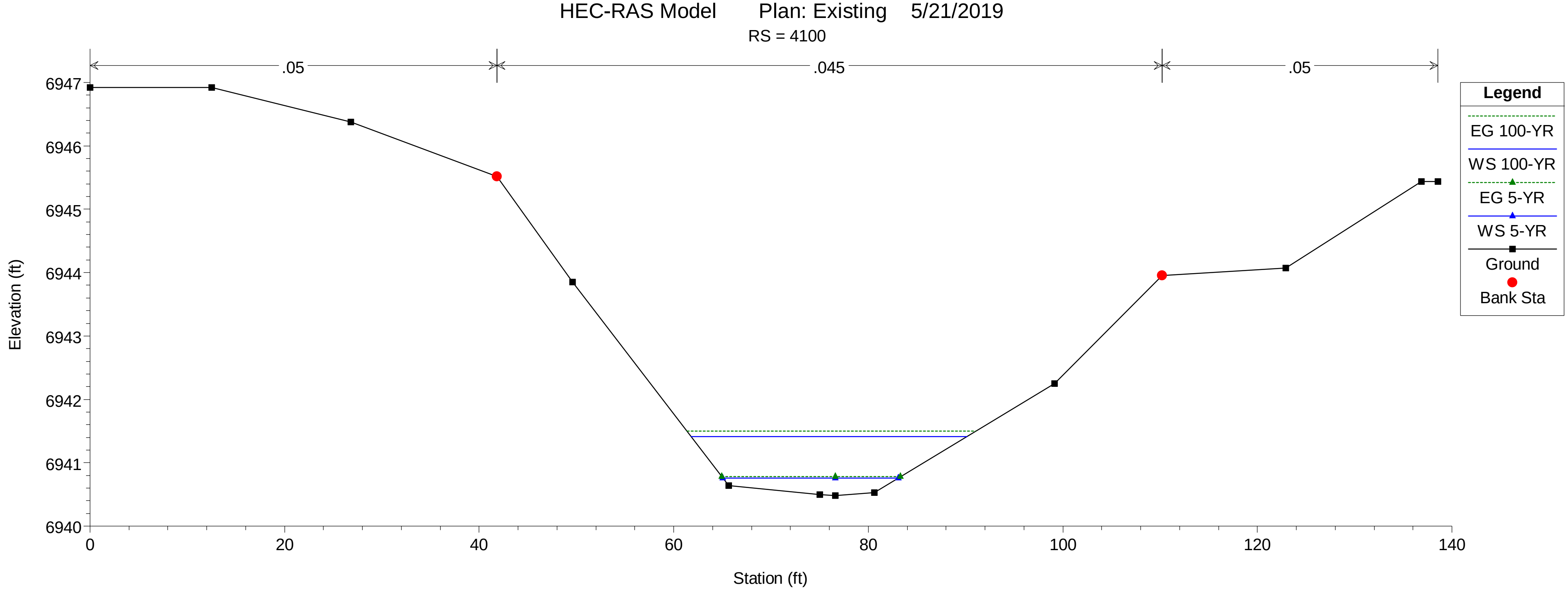

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4250
.05
.045
.05
Elevation (ft)
6950
6949
6948
6947
6946
6945
6944
6943
6942
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



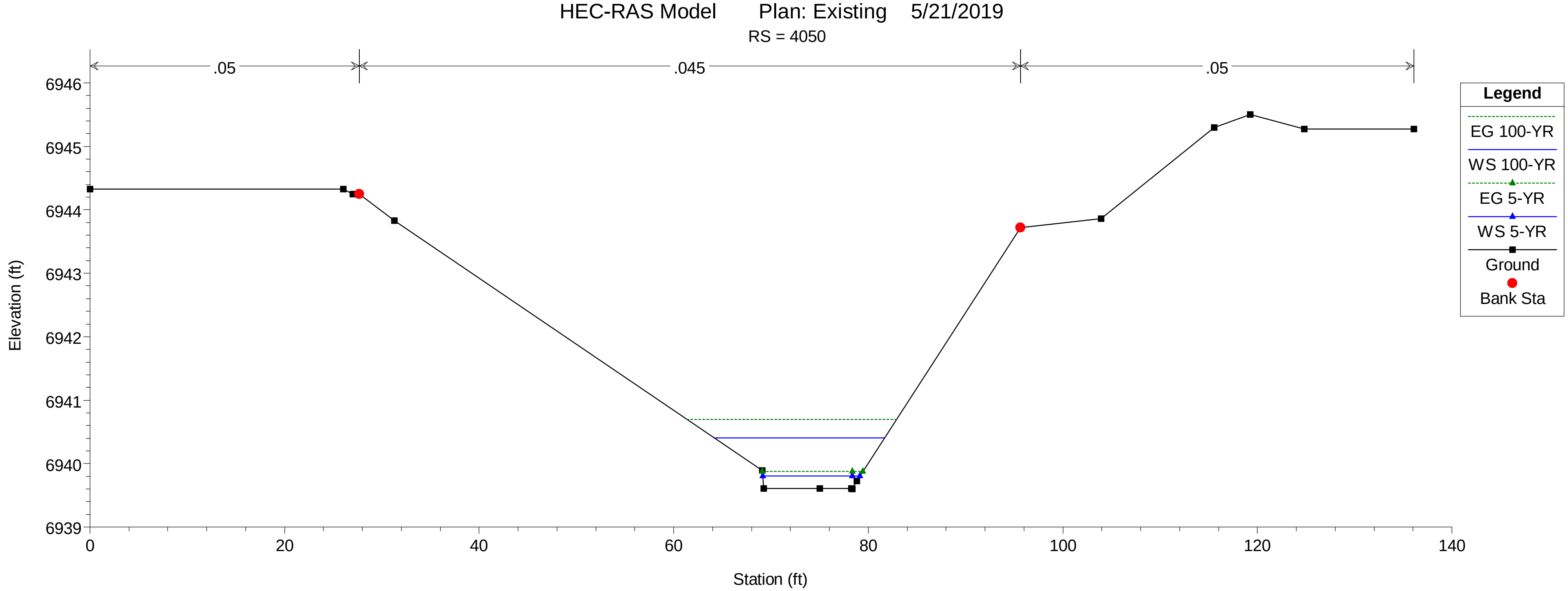
HEC-RAS Model Plan: Existing 5/21/2019
RS = 4200
.05
.045
.05
Elevation (ft)
6949
6948
6947
6946
6945
6944
6943
6942
6941
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



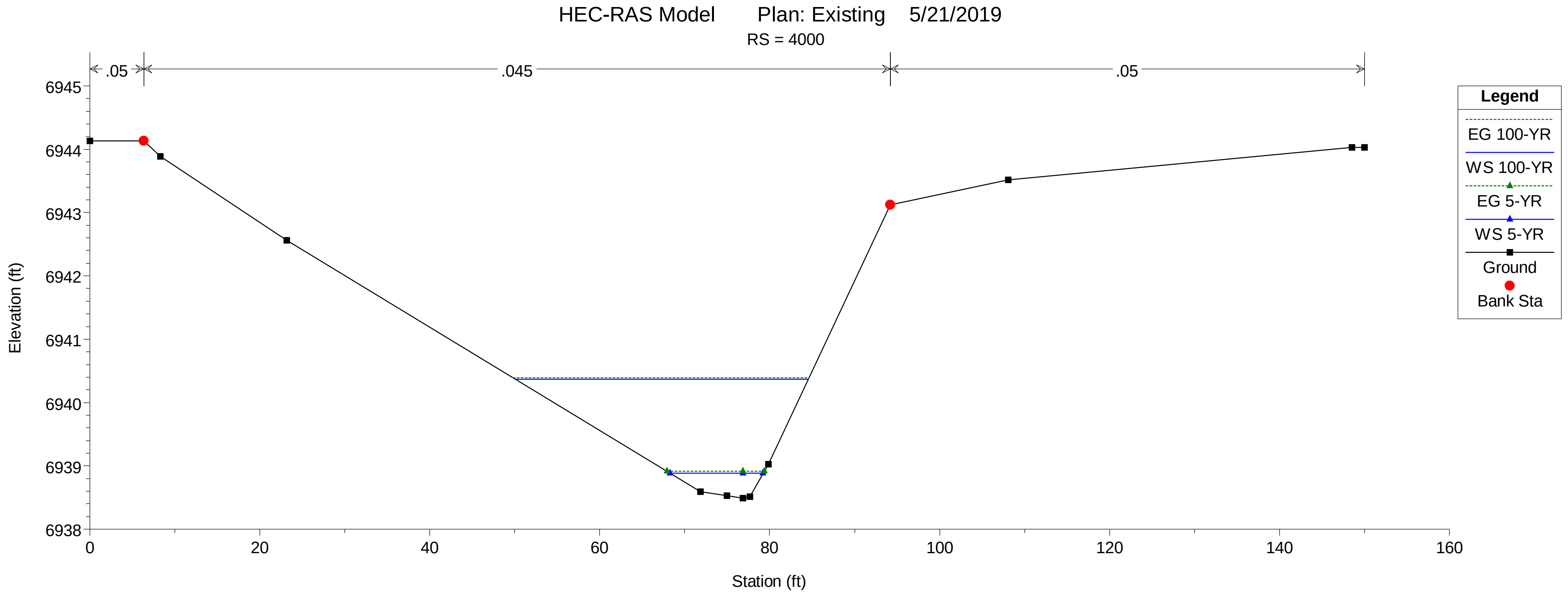
HEC-RAS Model Plan: Existing 5/21/2019
RS = 4150
.05
.045
.05
Elevation (ft)
6947
6946
6945
6944
6943
6942
6941
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

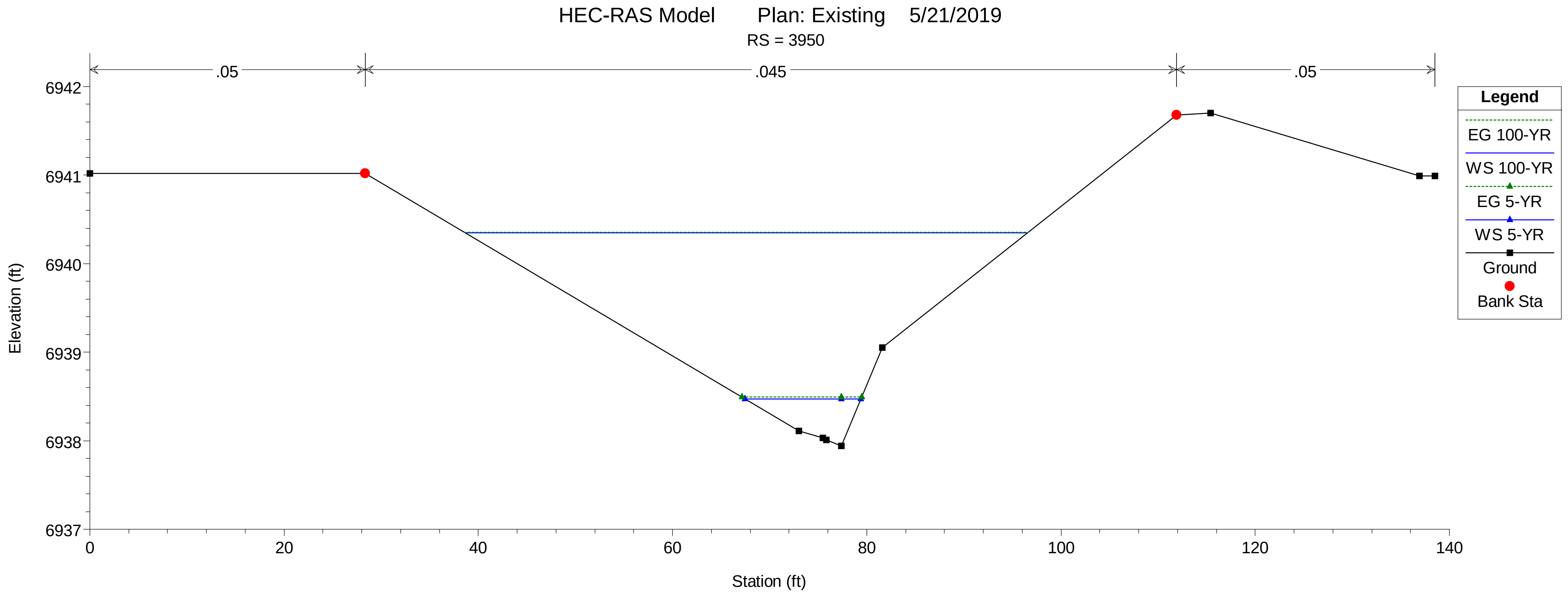


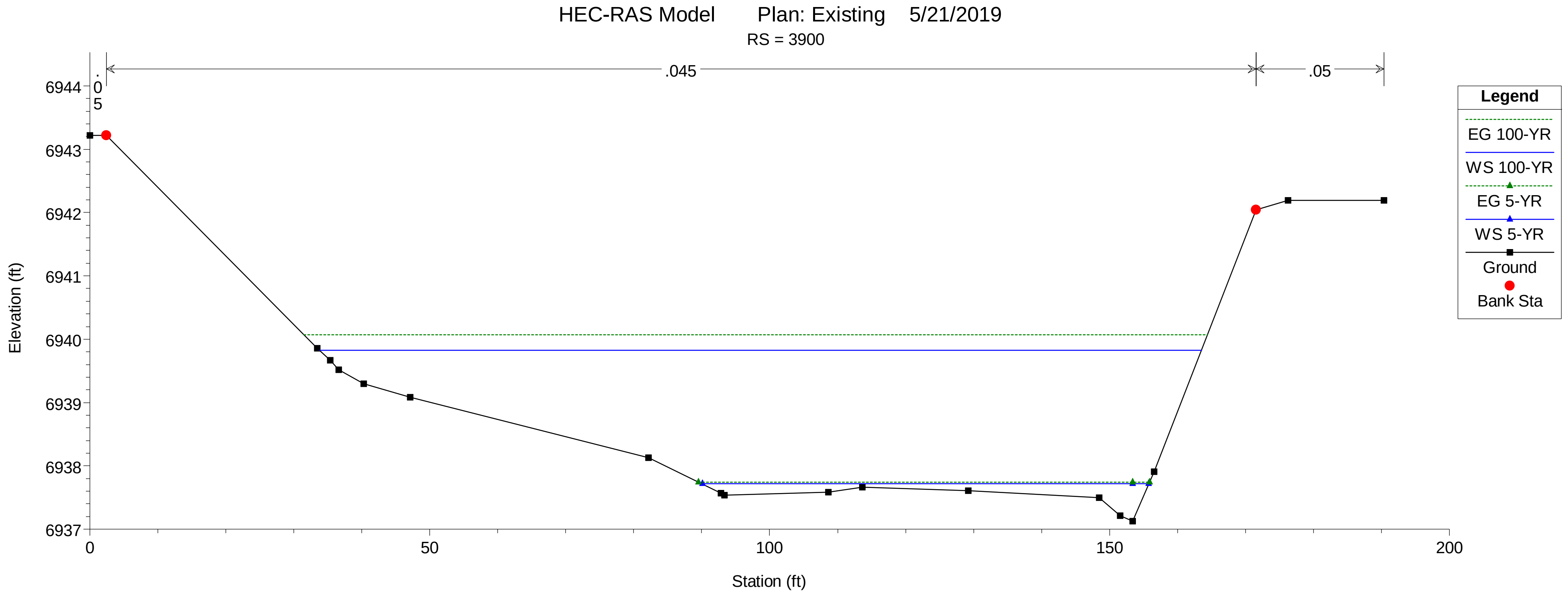
HEC-RAS Model Plan: Existing 5/21/2019
RS = 4100
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

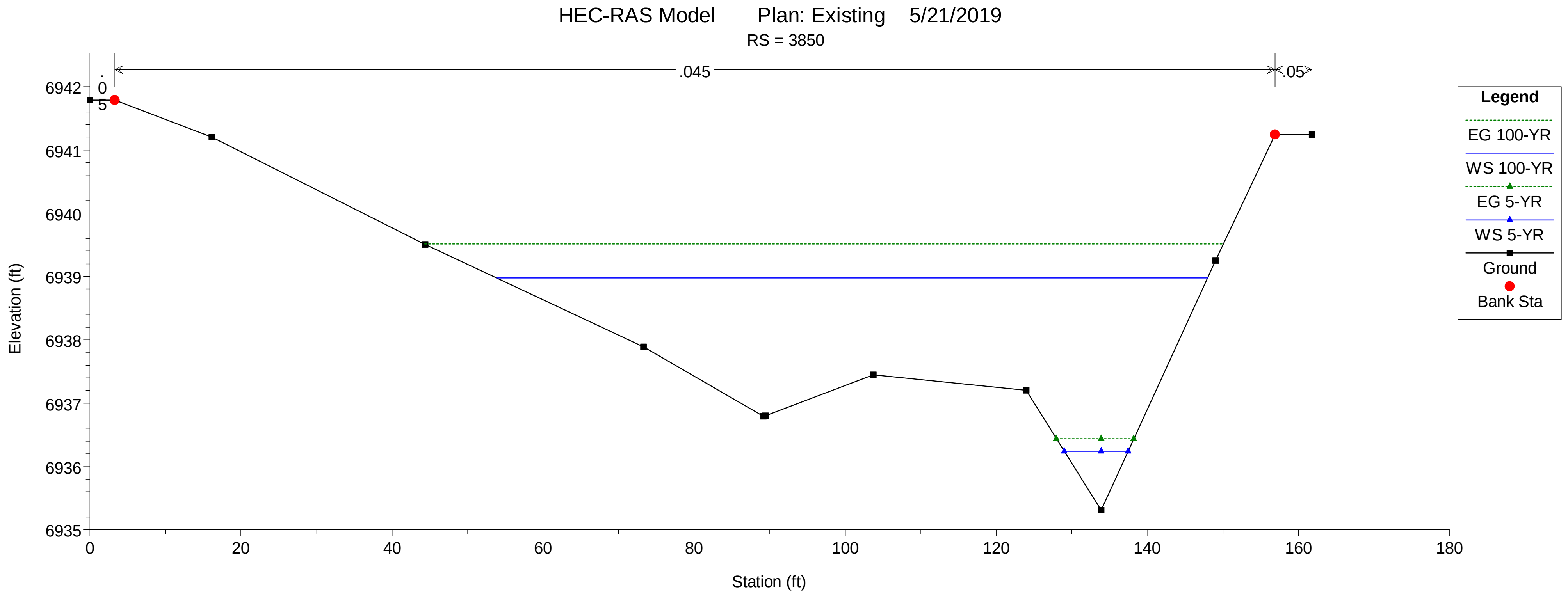


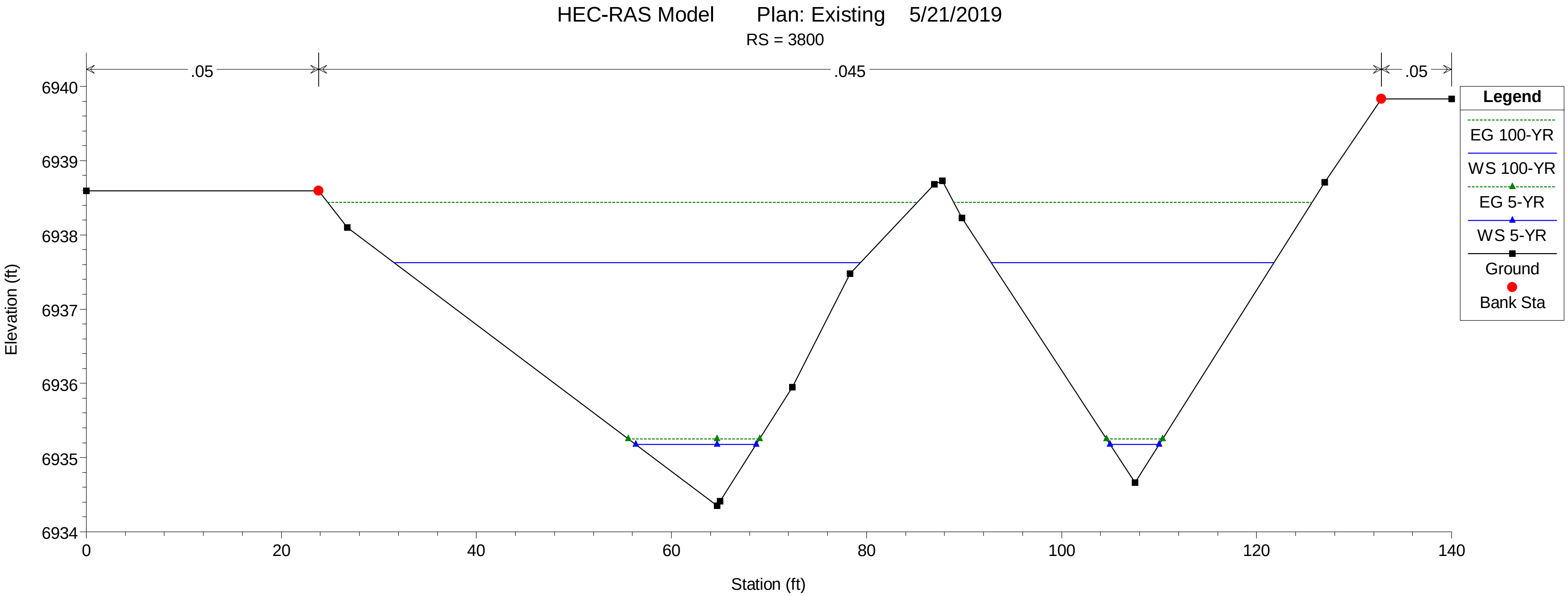
HEC-RAS Model Plan: Existing 5/21/2019
RS = 4050
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

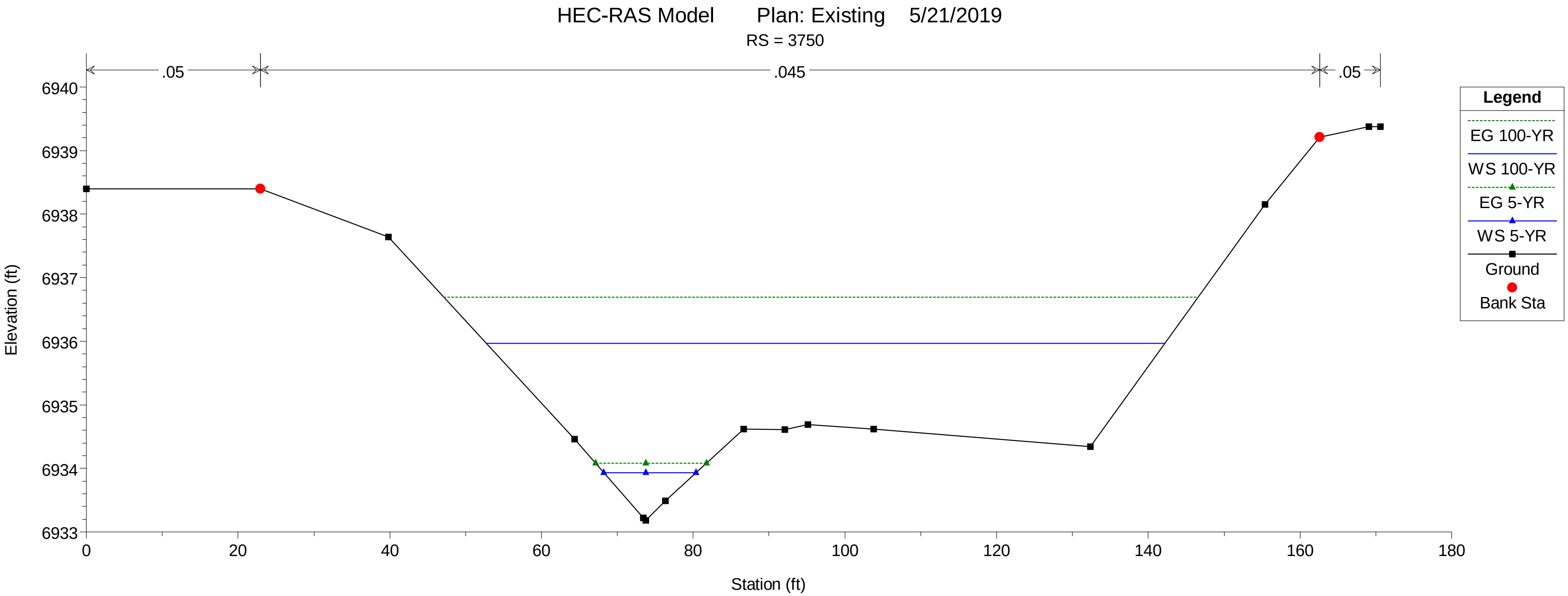

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4000
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

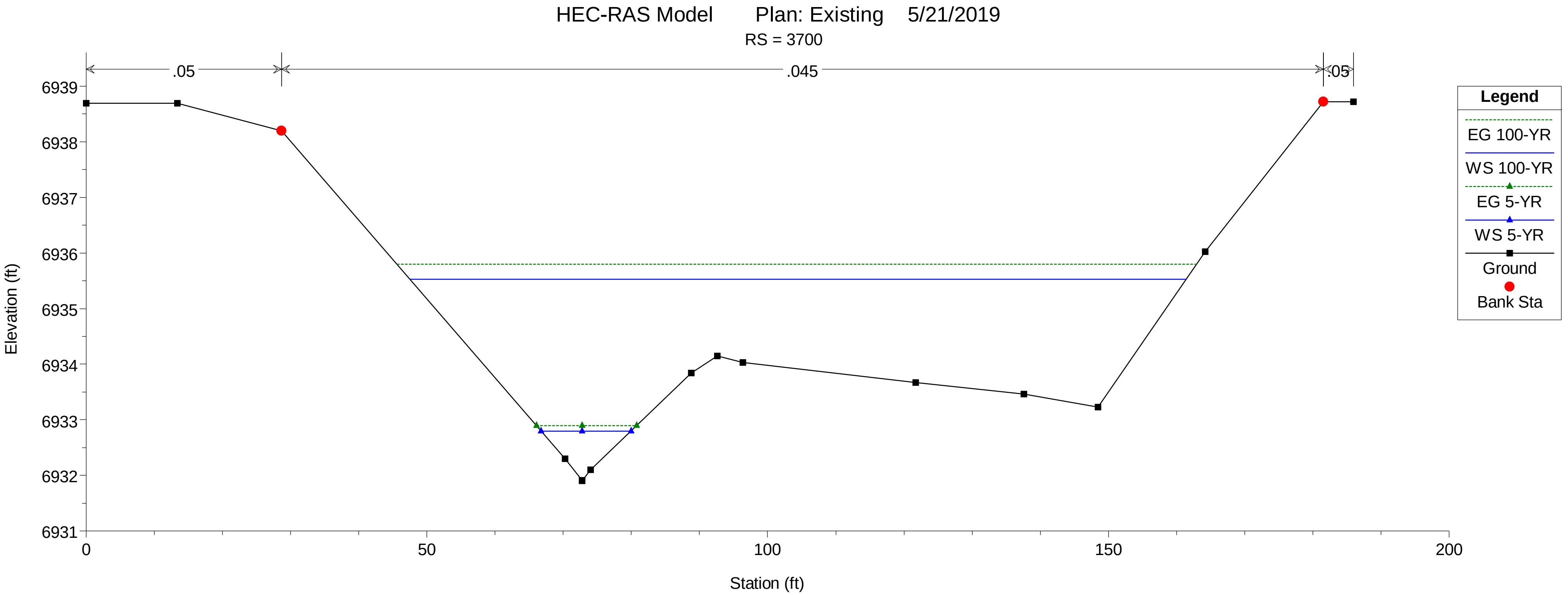

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

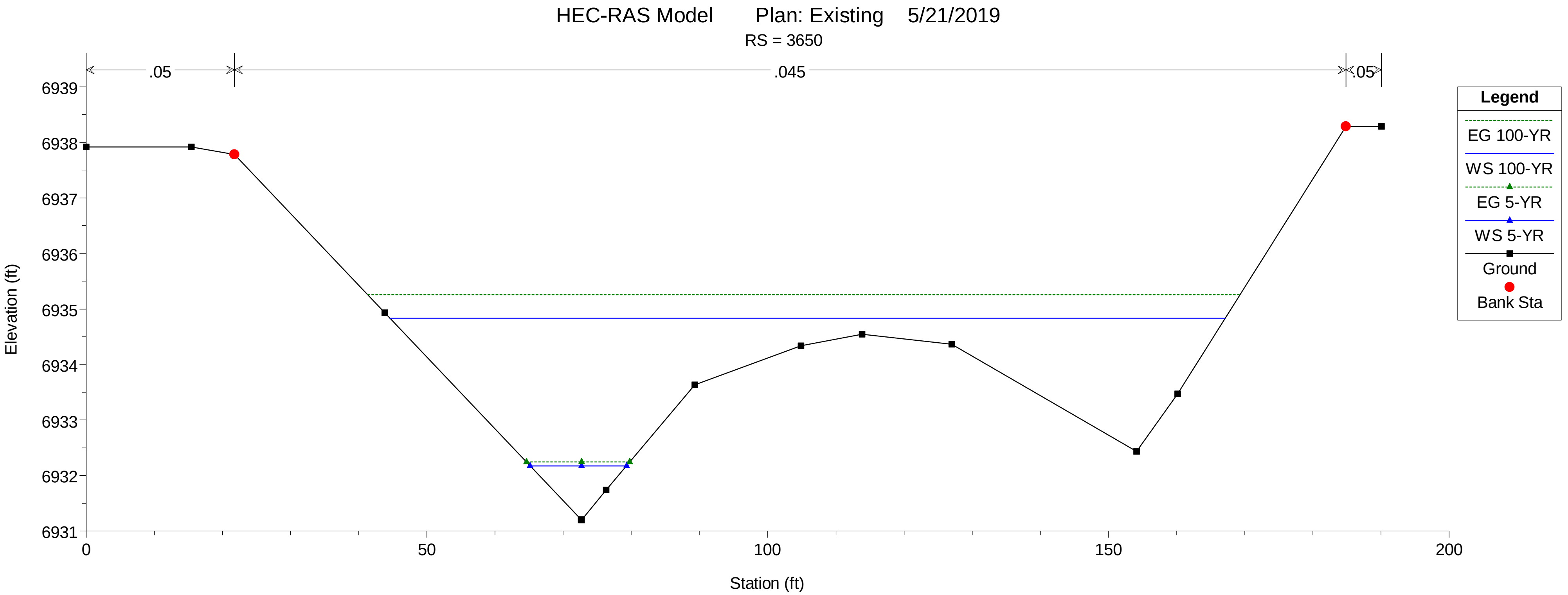

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3900
.045
.05
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6937
6938
6939
6940
6941
6942
6943
6944
0
50
100
150
200
Station (ft)

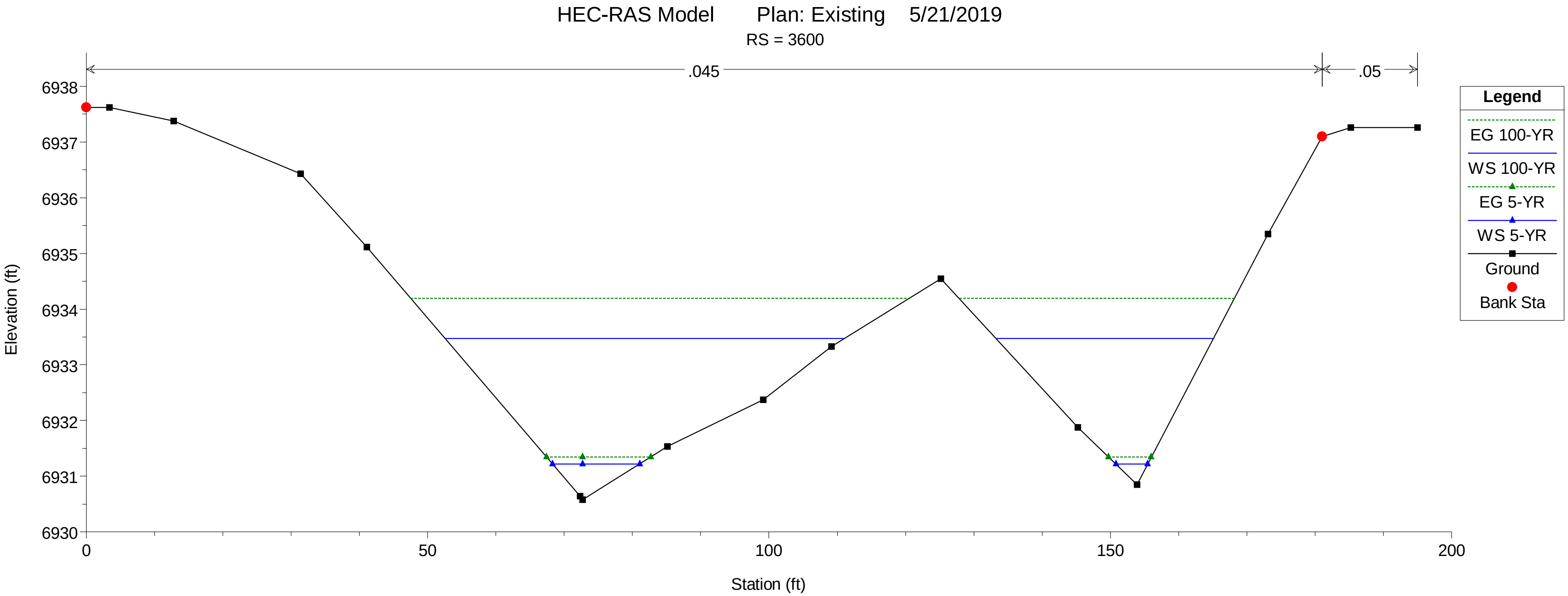

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3850
.045
.05
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6935
6936
6937
6938
6939
6940
6941
6942
0
20
40
60
80
100
120
140
160
180
Station (ft)

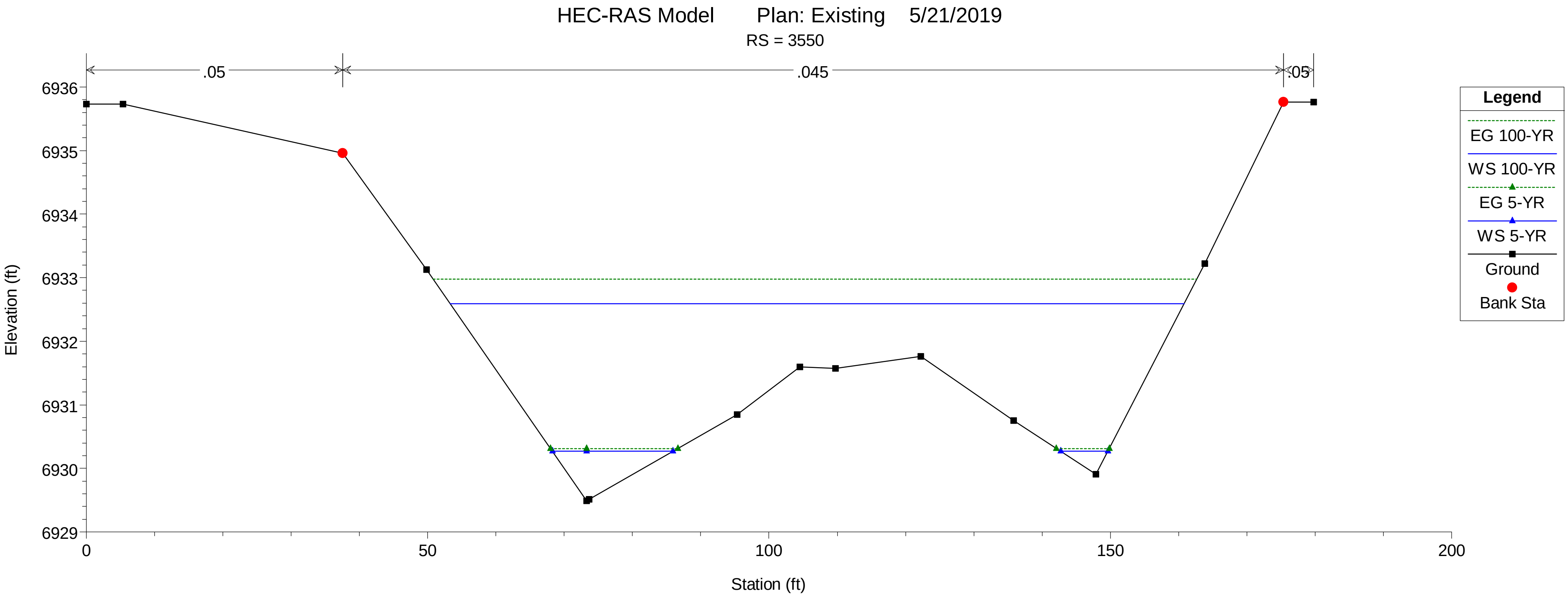

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3800
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6934
6935
6936
6937
6938
6939
6940
0
20
40
60
80
100
120
140
Station (ft)

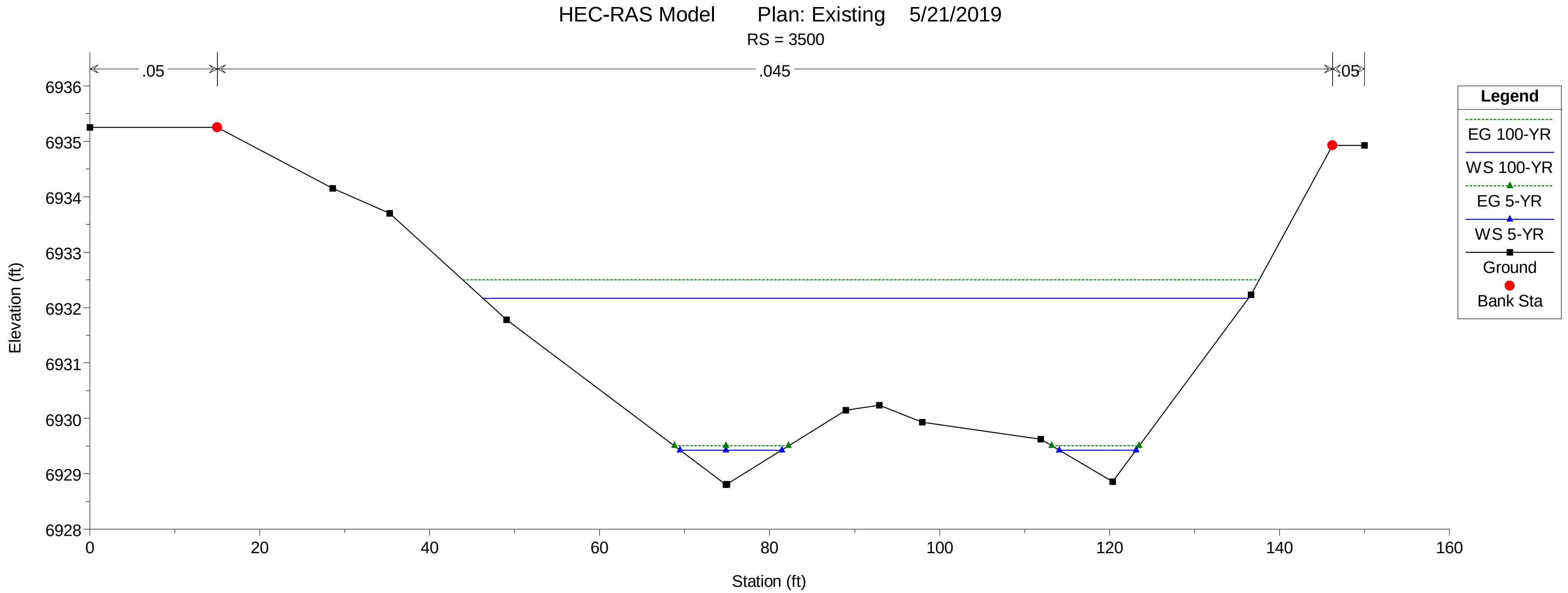

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3750
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6933
6934
6935
6936
6937
6938
6939
6940
0
20
40
60
80
100
120
140
160
180
Station (ft)

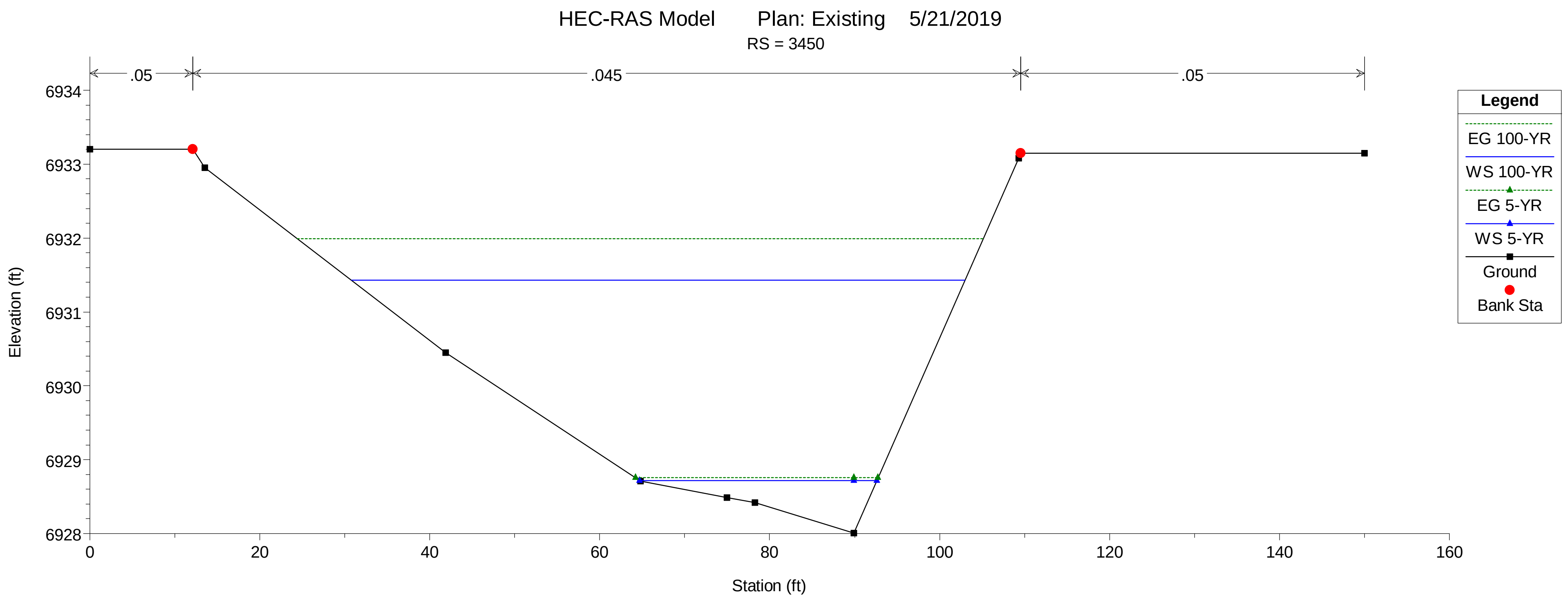

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3700
.05
.045
.05
Elevation (ft)
6939
6938
6937
6936
6935
6934
6933
6932
6931
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

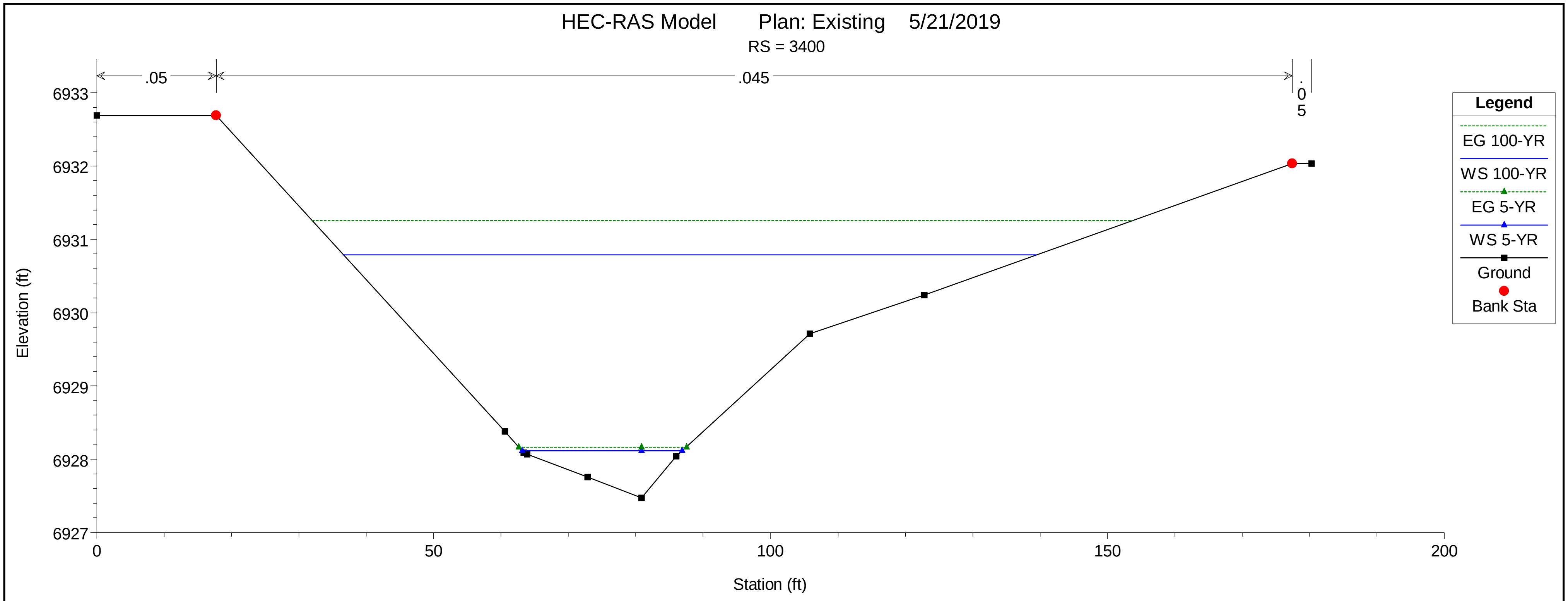

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3650
.05
.045
.05
Elevation (ft)
6939
6938
6937
6936
6935
6934
6933
6932
6931
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 3600
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6930
6931
6932
6933
6934
6935
6936
6937
6938
Station (ft)
0
50
100
150
200

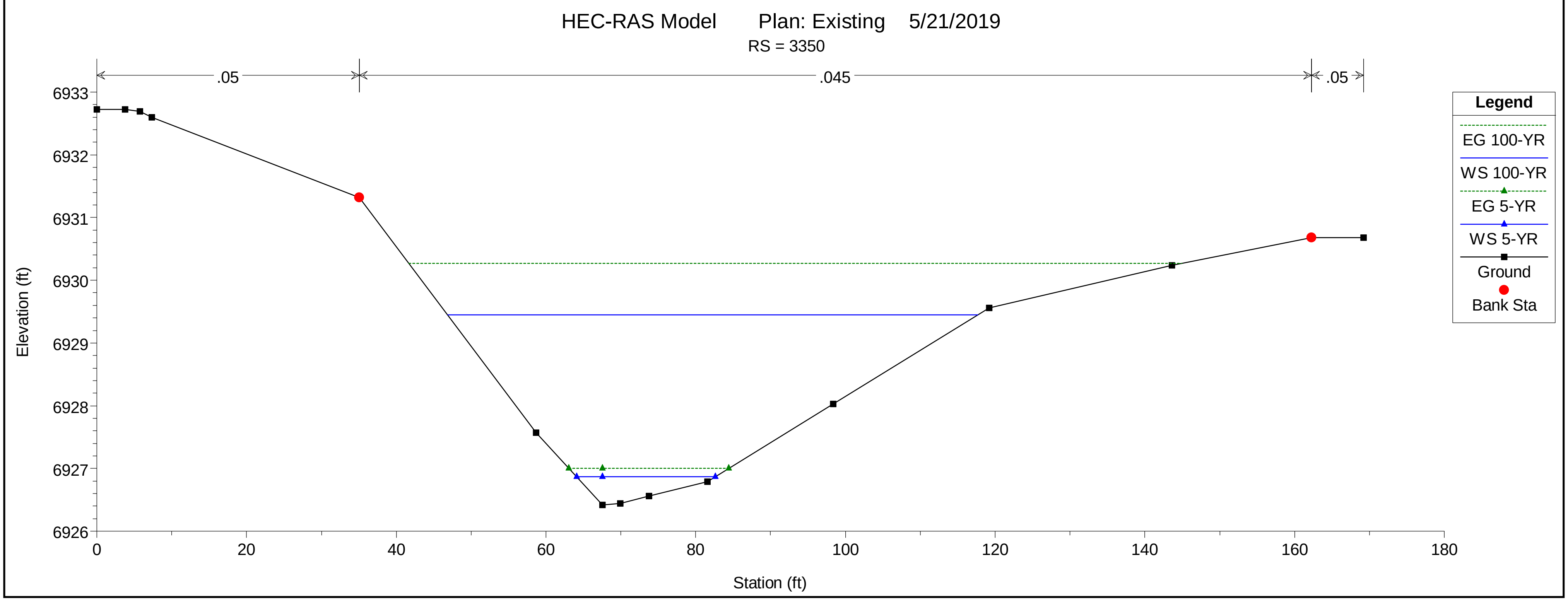

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3550
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6929
6930
6931
6932
6933
6934
6935
6936
Station (ft)
0
50
100
150
200


HEC-RAS Model Plan: Existing 5/21/2019
RS = 3500
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6928
6929
6930
6931
6932
6933
6934
6935
6936
0
20
40
60
80
100
120
140
160

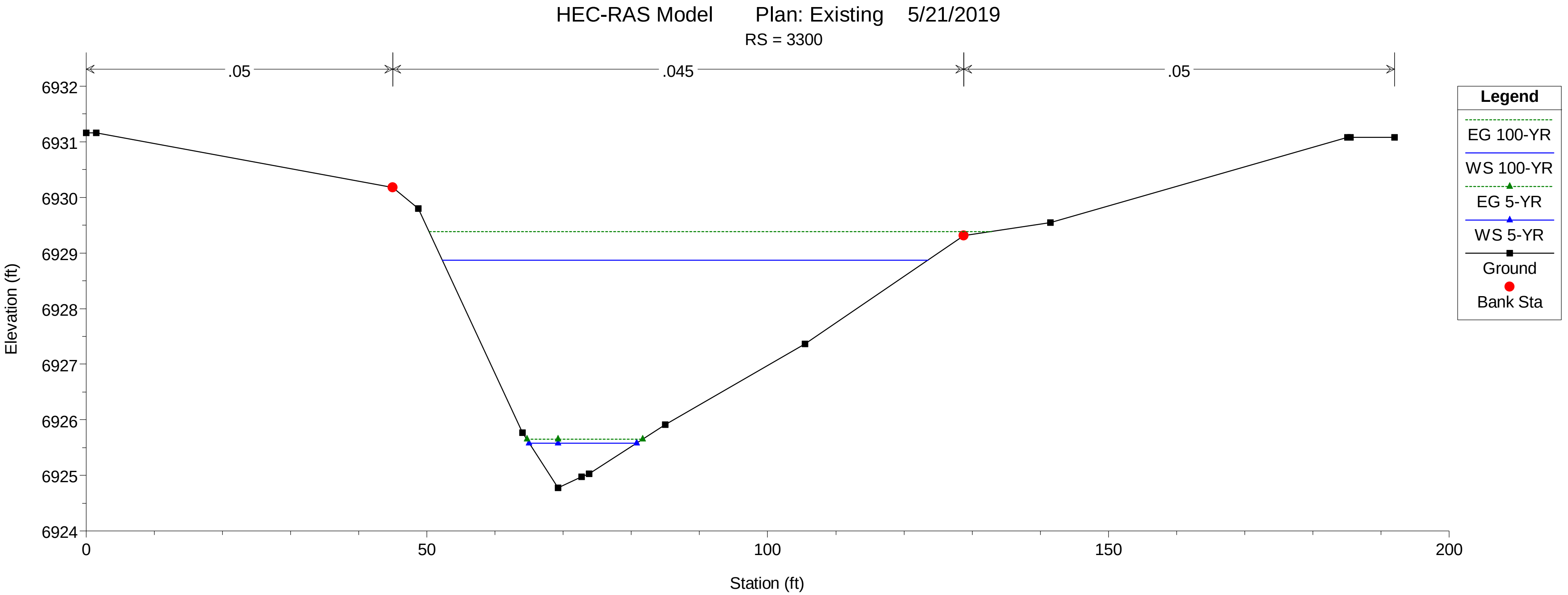

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3450
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6928
6929
6930
6931
6932
6933
6934
0
20
40
60
80
100
120
140
160



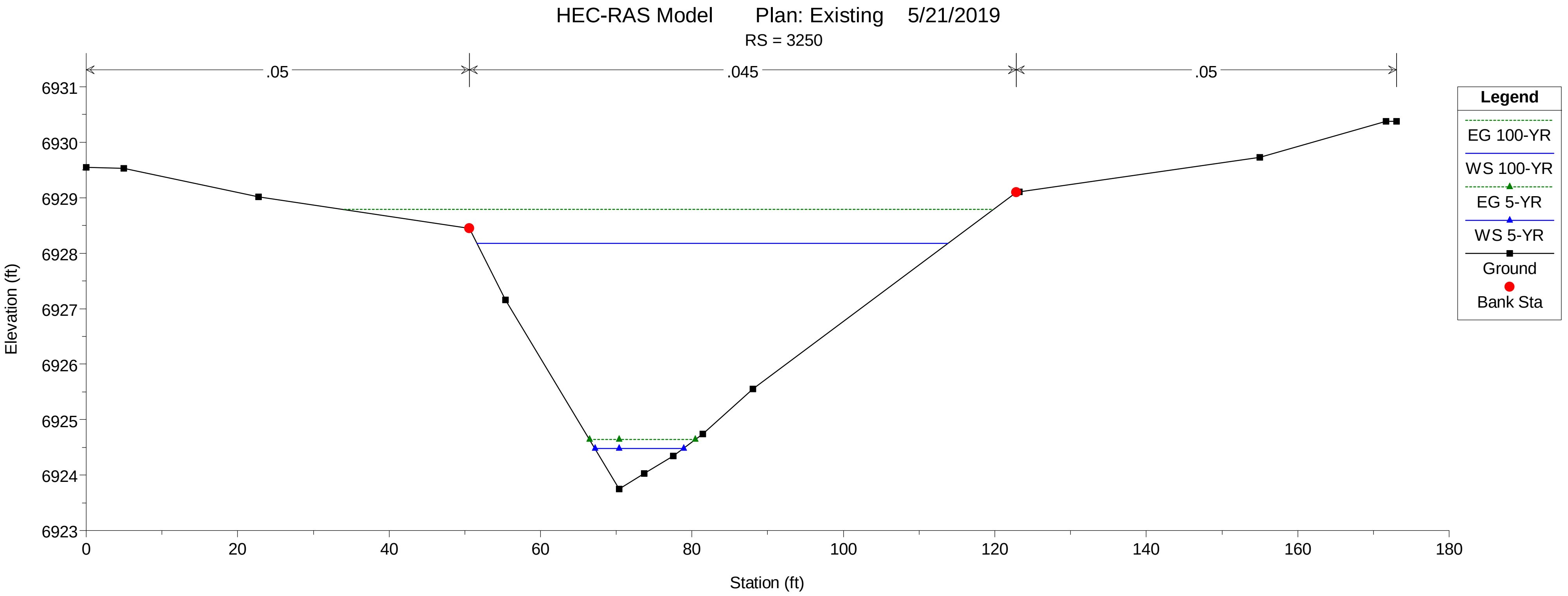
HEC-RAS Model Plan: Existing 5/21/2019
RS = 3400
.05
.045
.
0
5
Elevation (ft)
6933
6932
6931
6930
6929
6928
6927
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



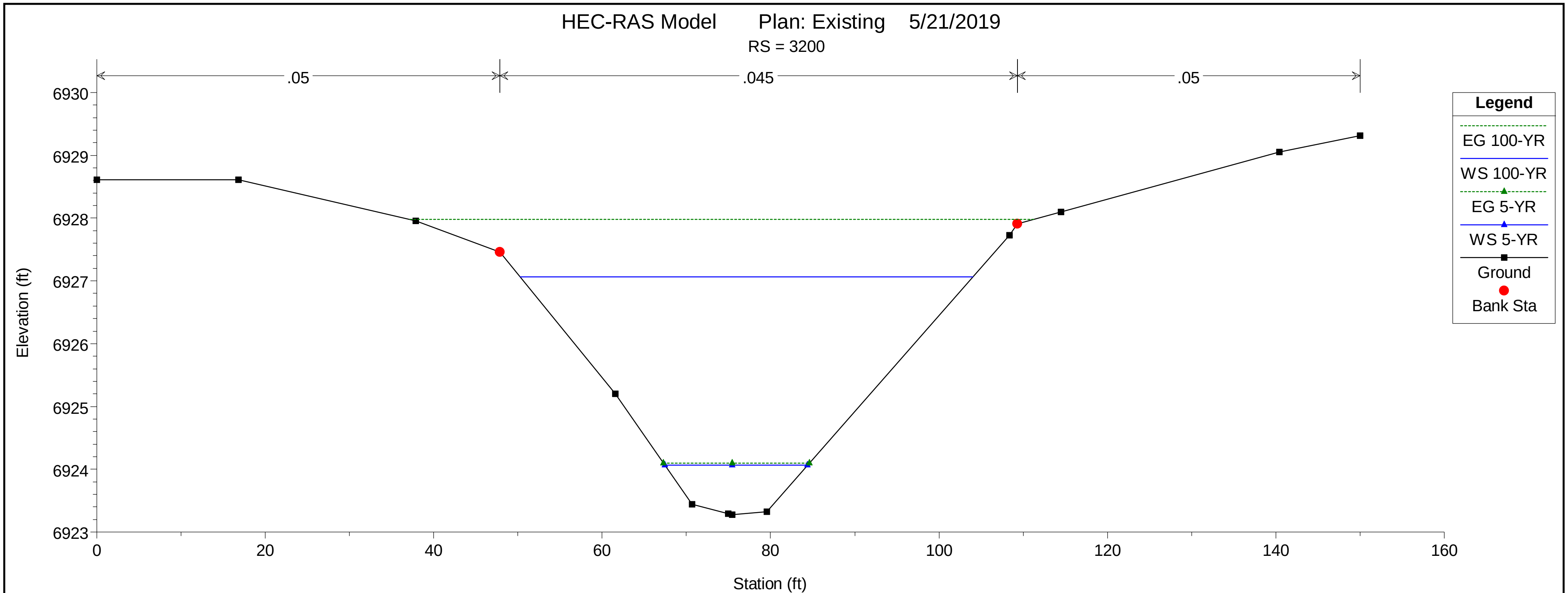
HEC-RAS Model Plan: Existing 5/21/2019
RS = 3350
.05
.045
.05
Elevation (ft)
6933
6932
6931
6930
6929
6928
6927
6926
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

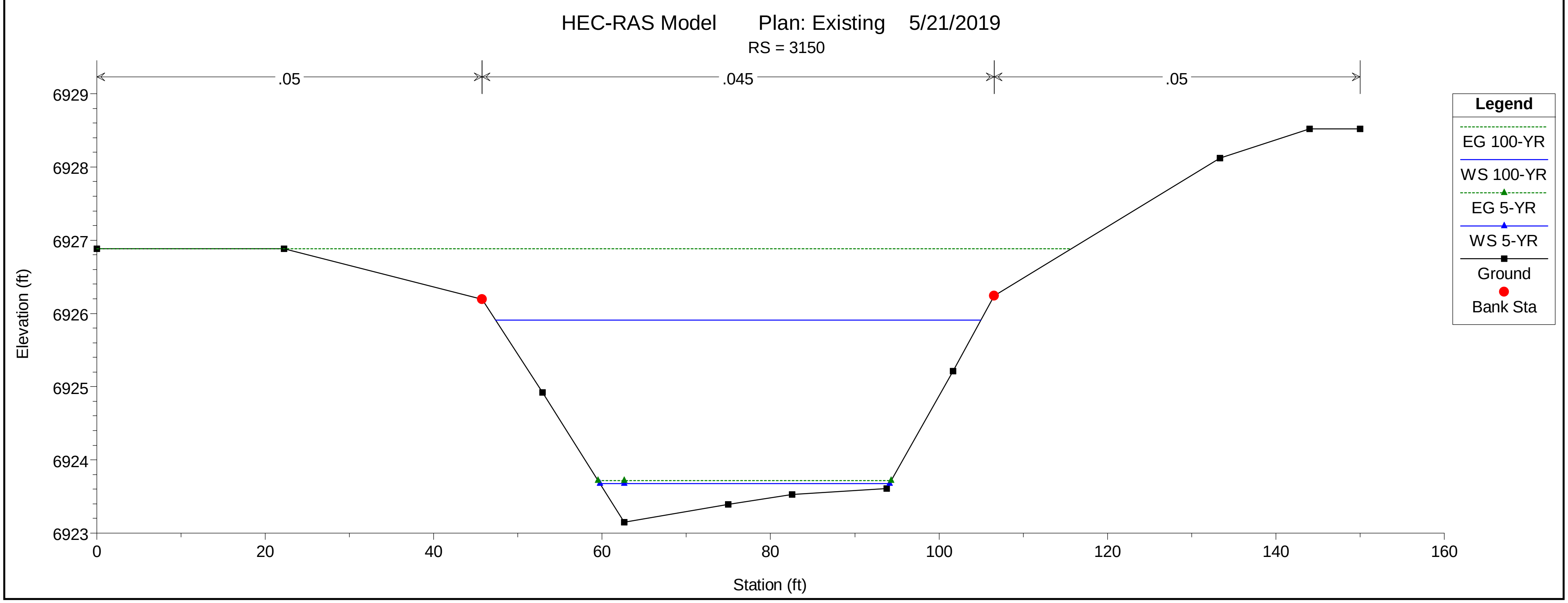


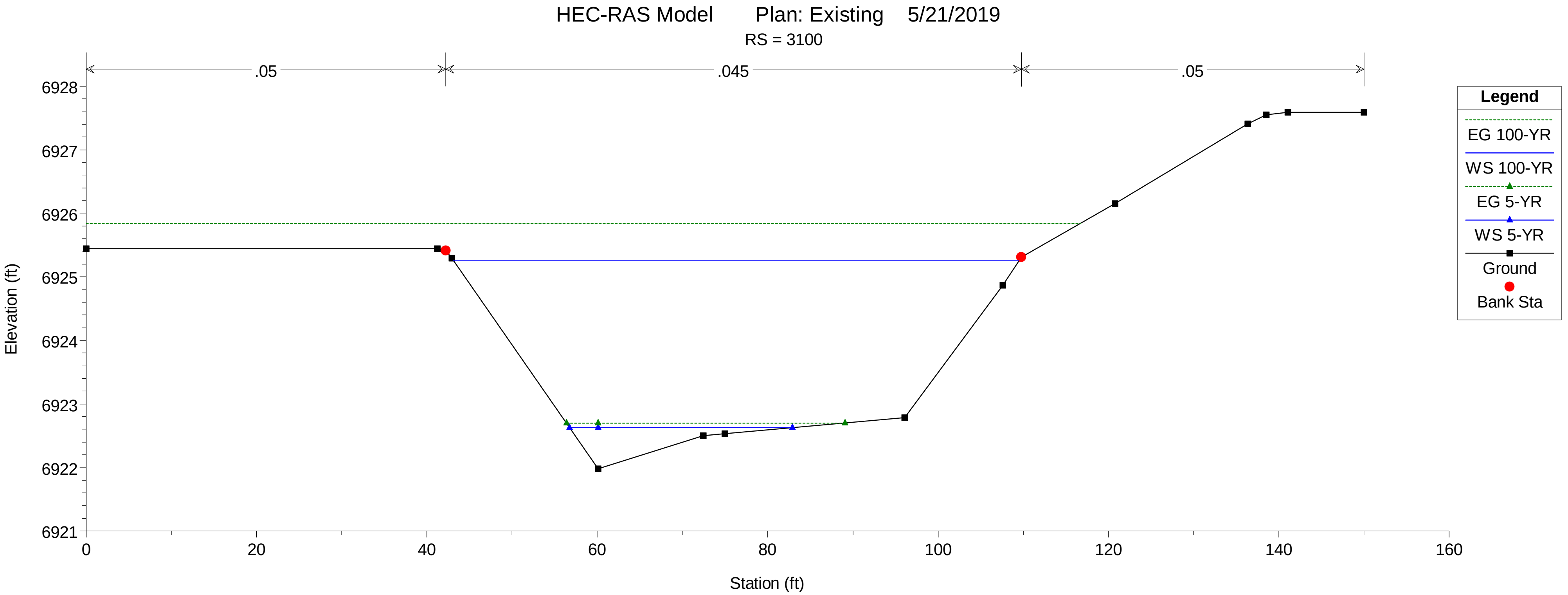
HEC-RAS Model Plan: Existing 5/21/2019
RS = 3300
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6932
6931
6930
6929
6928
6927
6926
6925
6924
0
50
100
150
200
Station (ft)



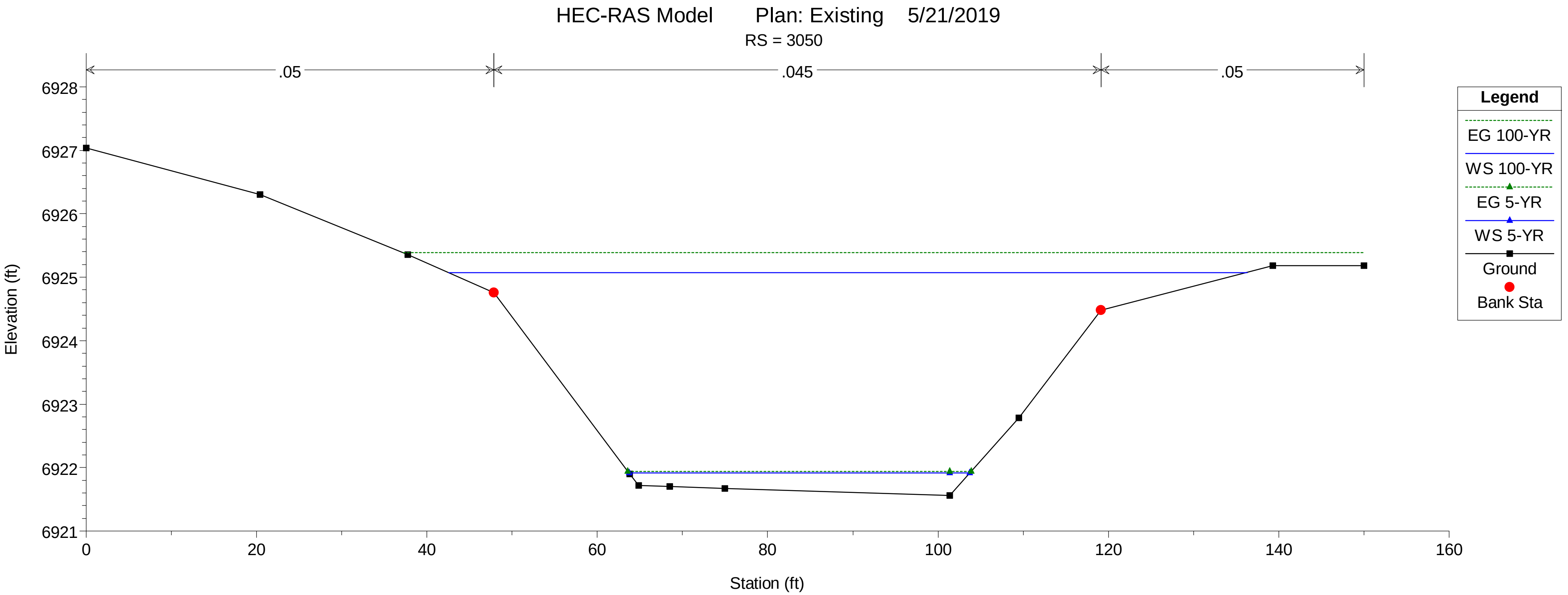
HEC-RAS Model Plan: Existing 5/21/2019
RS = 3250
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6931
6930
6929
6928
6927
6926
6925
6924
6923
0
20
40
60
80
100
120
140
160
180
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 3200
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6930
6929
6928
6927
6926
6925
6924
6923
0
20
40
60
80
100
120
140
160
Station (ft)

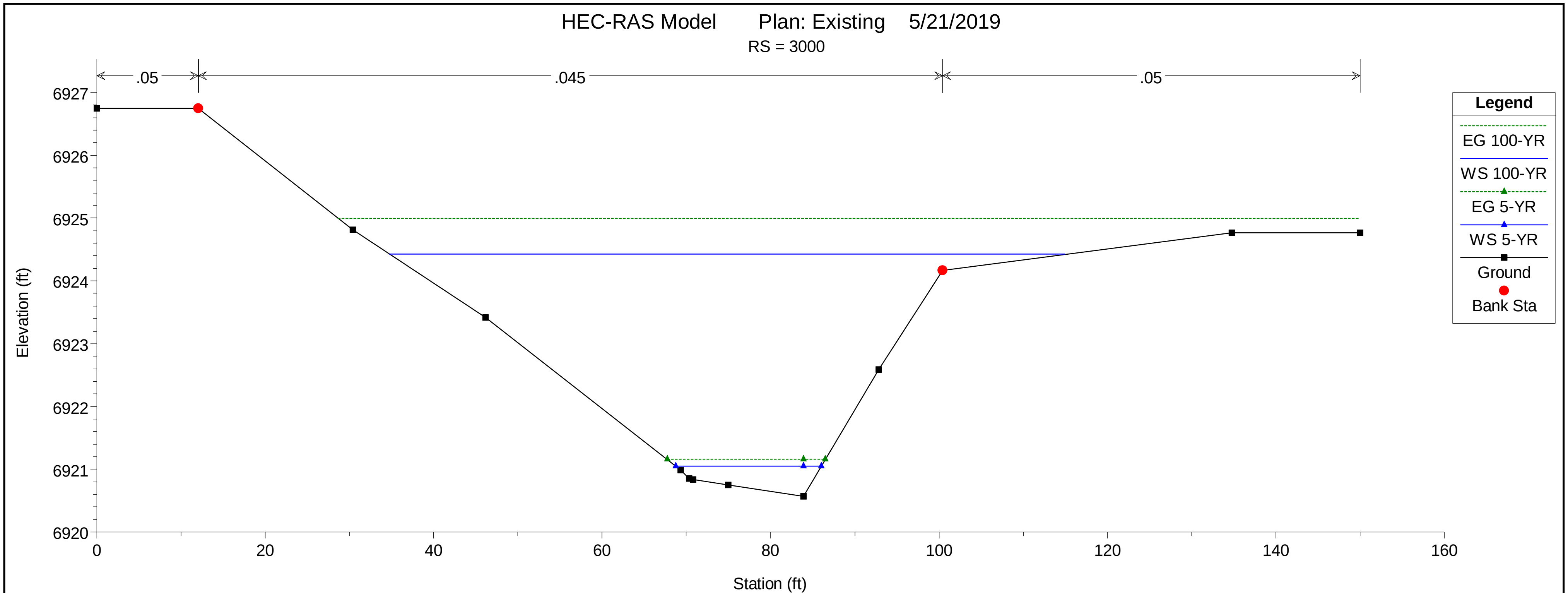

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3150
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6929
6928
6927
6926
6925
6924
6923
0
20
40
60
80
100
120
140
160
Station (ft)

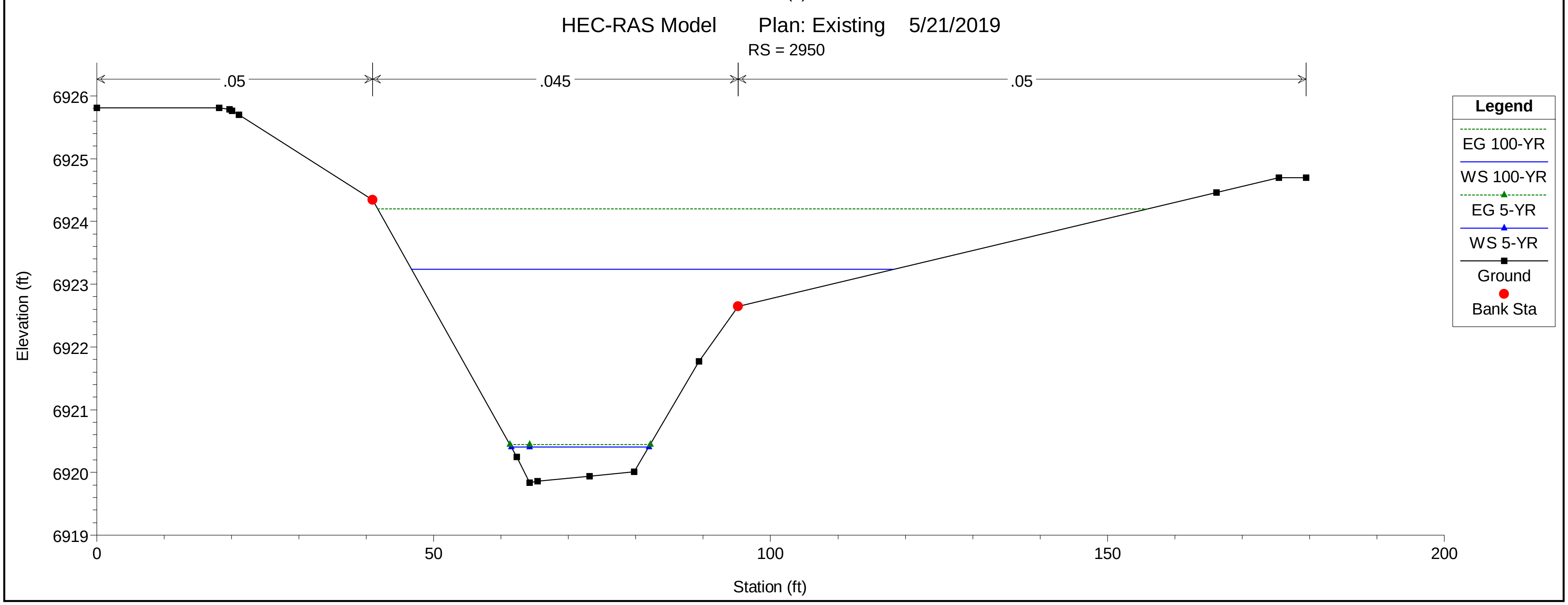


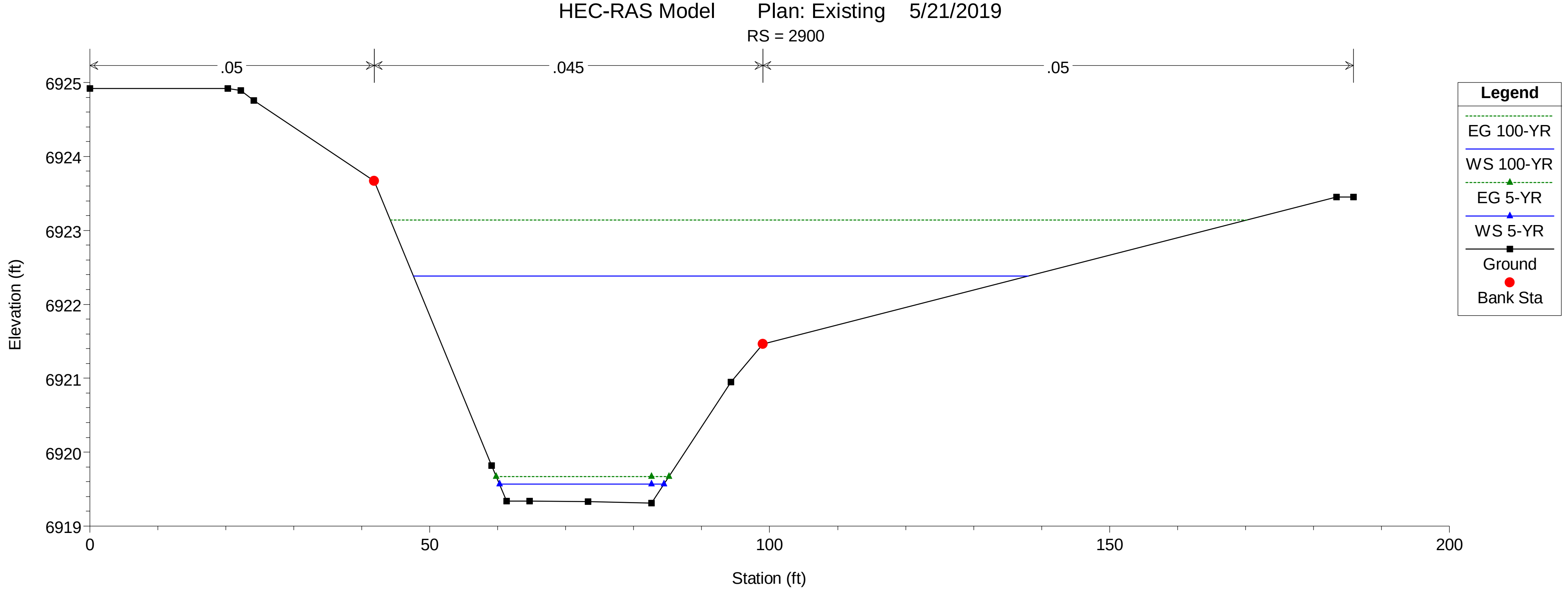
HEC-RAS Model Plan: Existing 5/21/2019
RS = 3100
.05
.045
.05
6928
6927
6926
6925
6924
6923
6922
6921
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

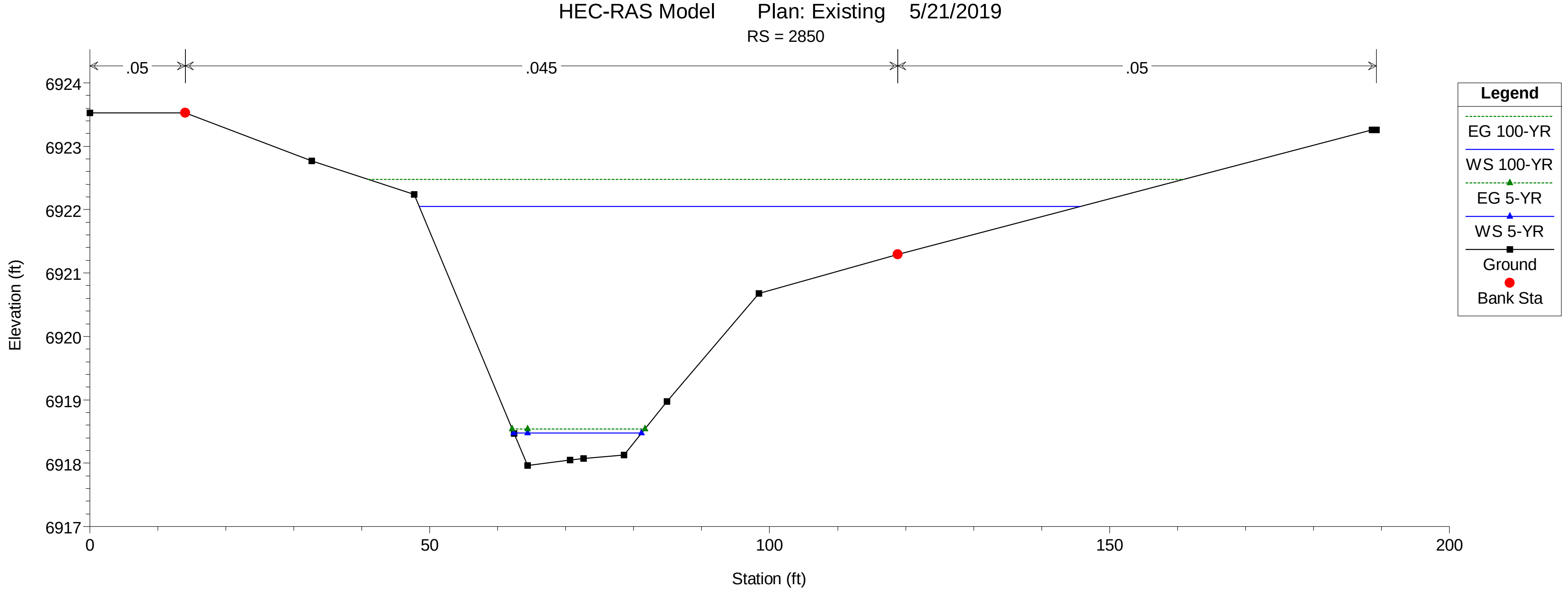


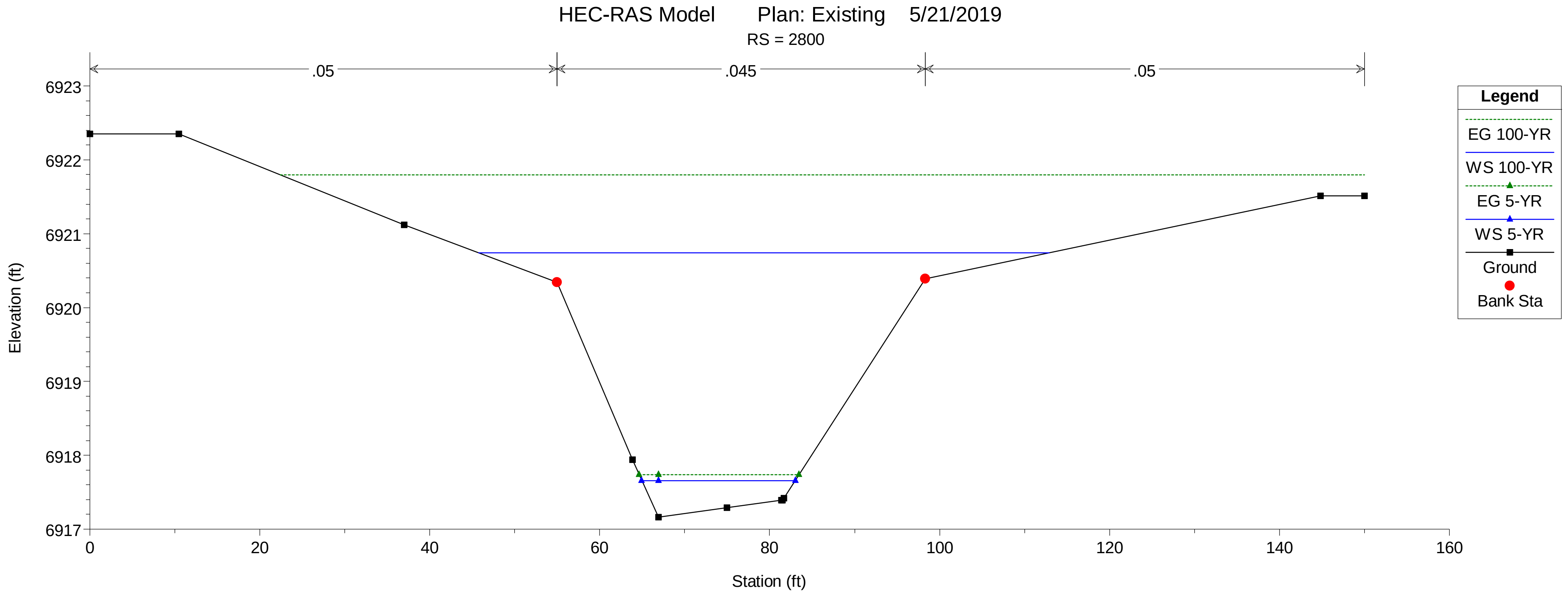
HEC-RAS Model Plan: Existing 5/21/2019
RS = 3050
.05
.045
.05
6928
6927
6926
6925
6924
6923
6922
6921
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 3000
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6920
6921
6922
6923
6924
6925
6926
6927
0
20
40
60
80
100
120
140
160

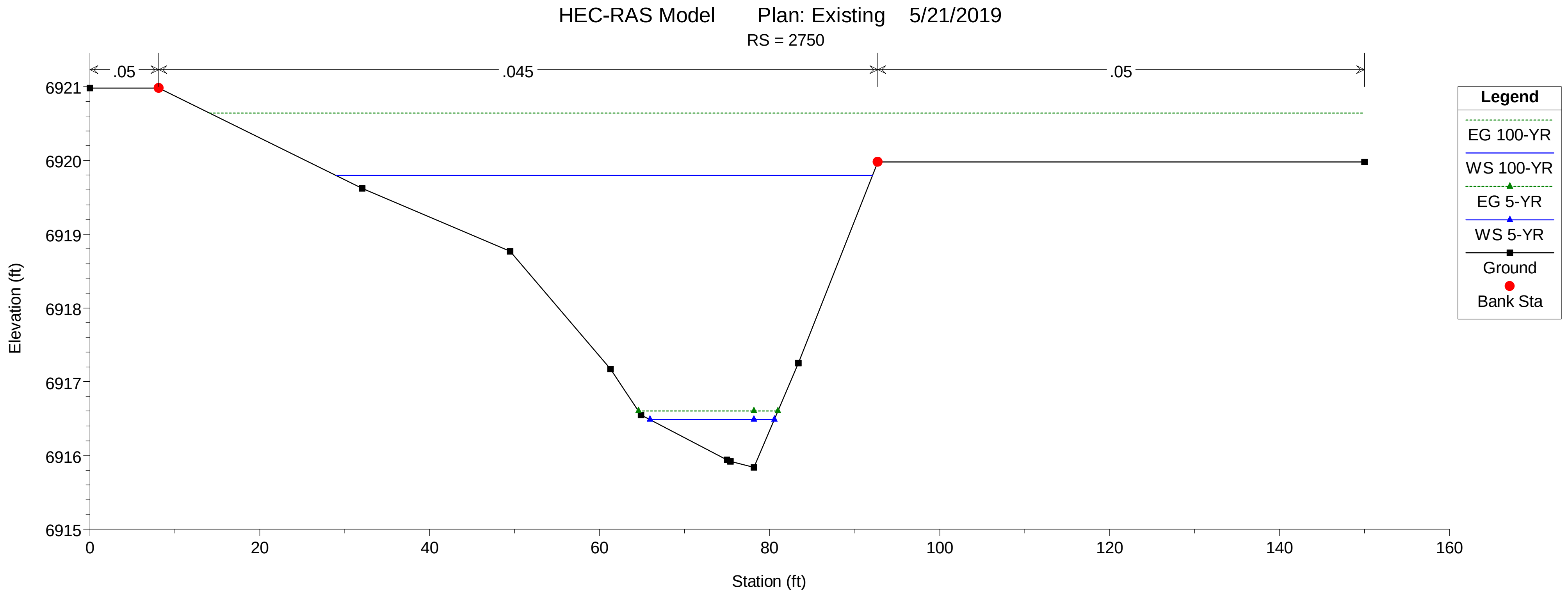

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2950
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6919
6920
6921
6922
6923
6924
6925
6926
0
50
100
150
200


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2900
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6925
6924
6923
6922
6921
6920
6919
0
50
100
150
200
Station (ft)

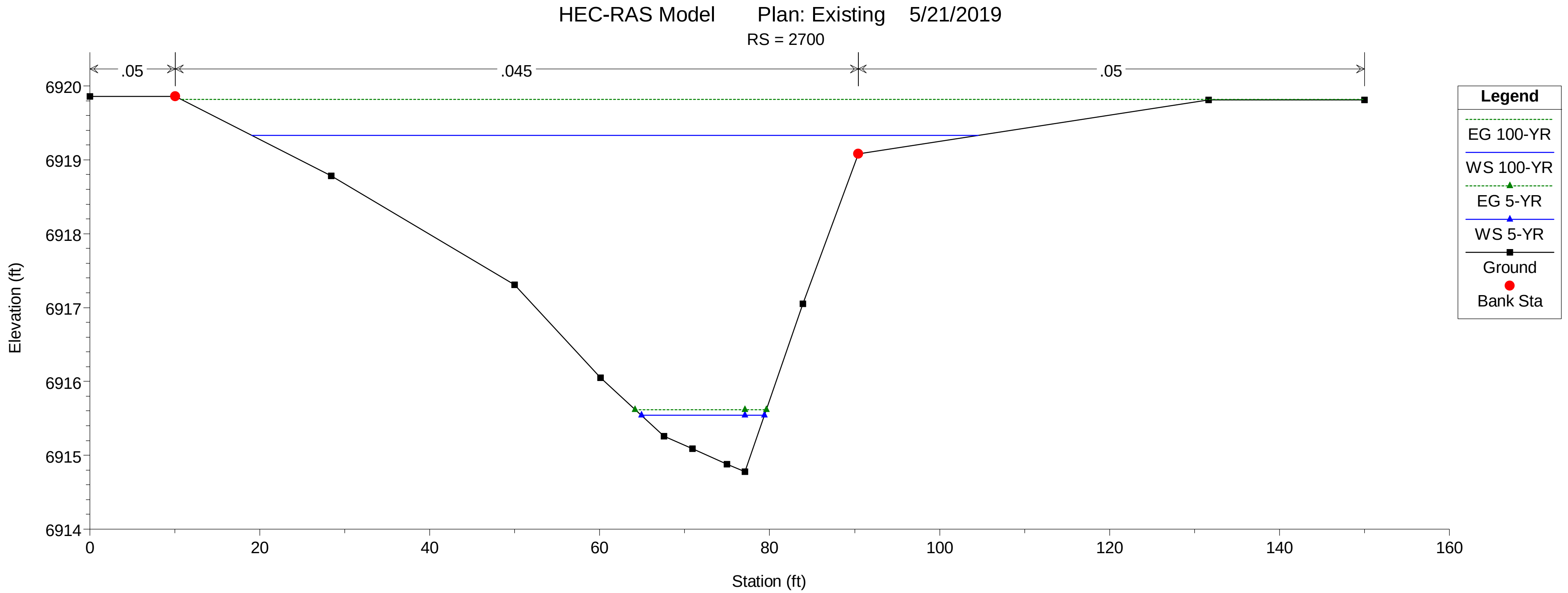

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2850
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6924
6923
6922
6921
6920
6919
6918
6917
0
50
100
150
200
Station (ft)



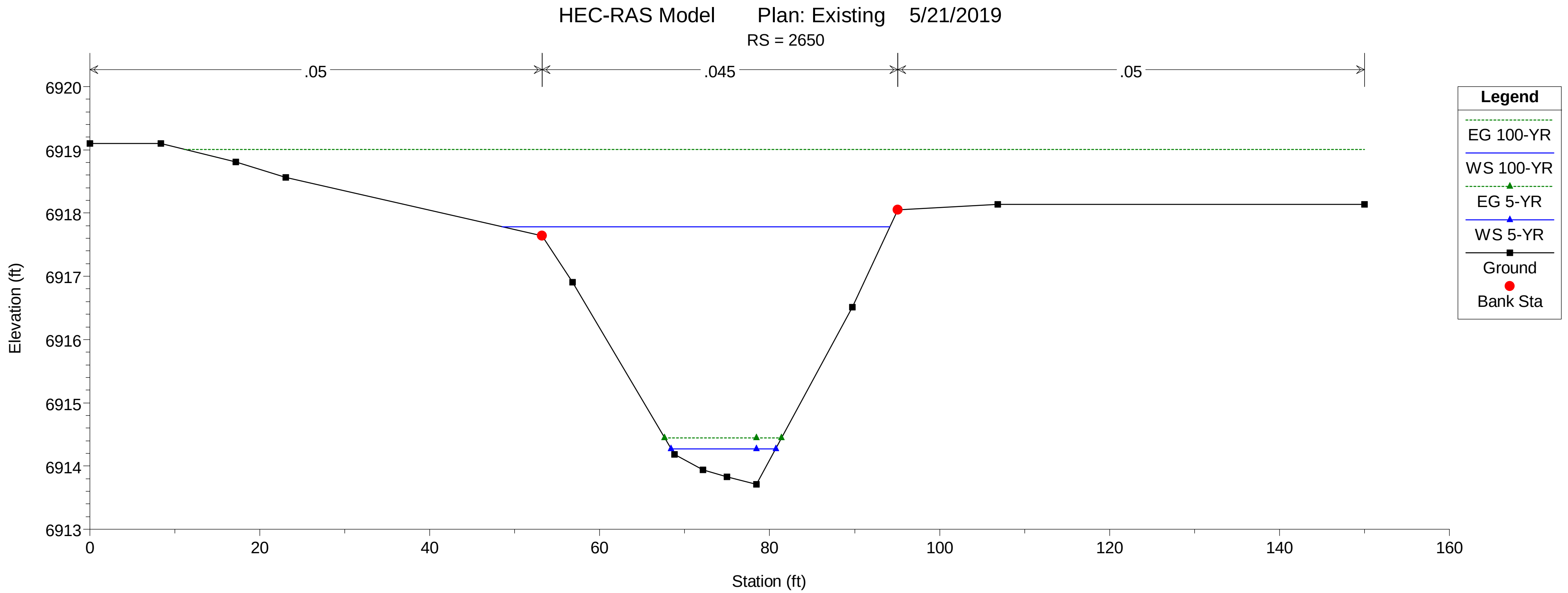
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2800
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6923
6922
6921
6920
6919
6918
6917
0
20
40
60
80
100
120
140
160
Station (ft)



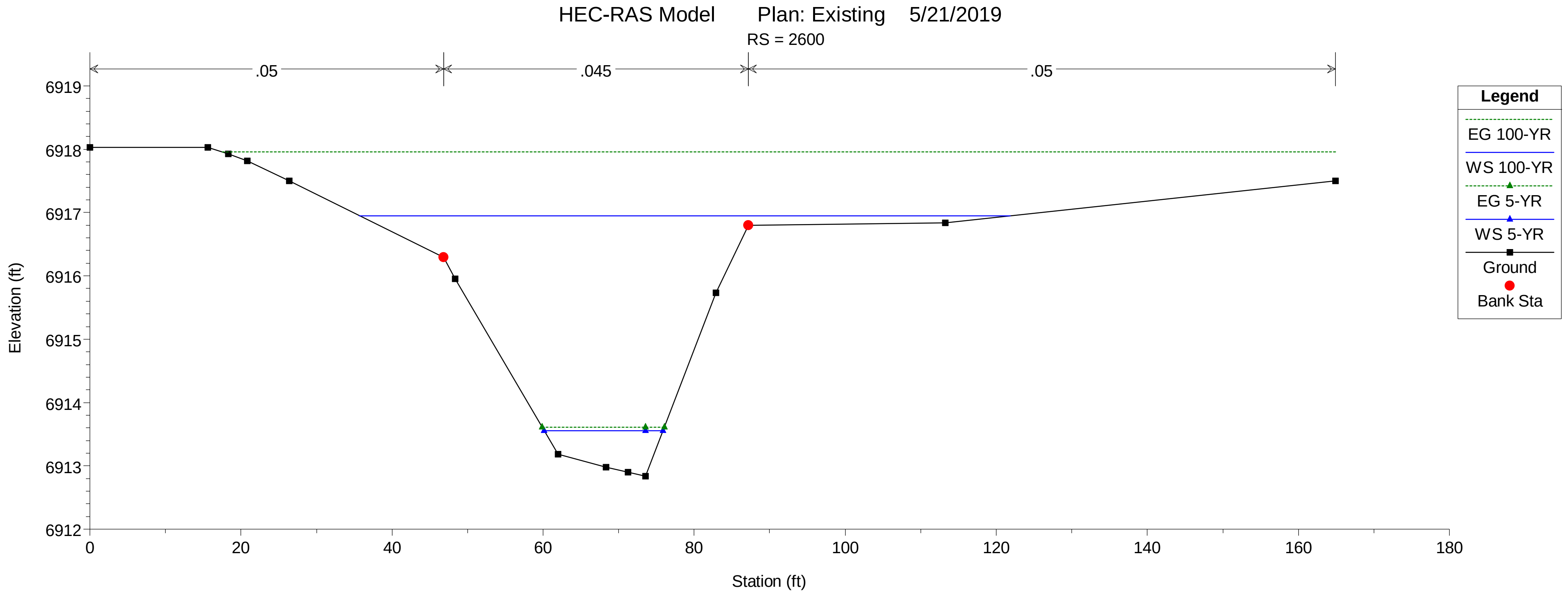
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2750
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6921
6920
6919
6918
6917
6916
6915
0
20
40
60
80
100
120
140
160
Station (ft)

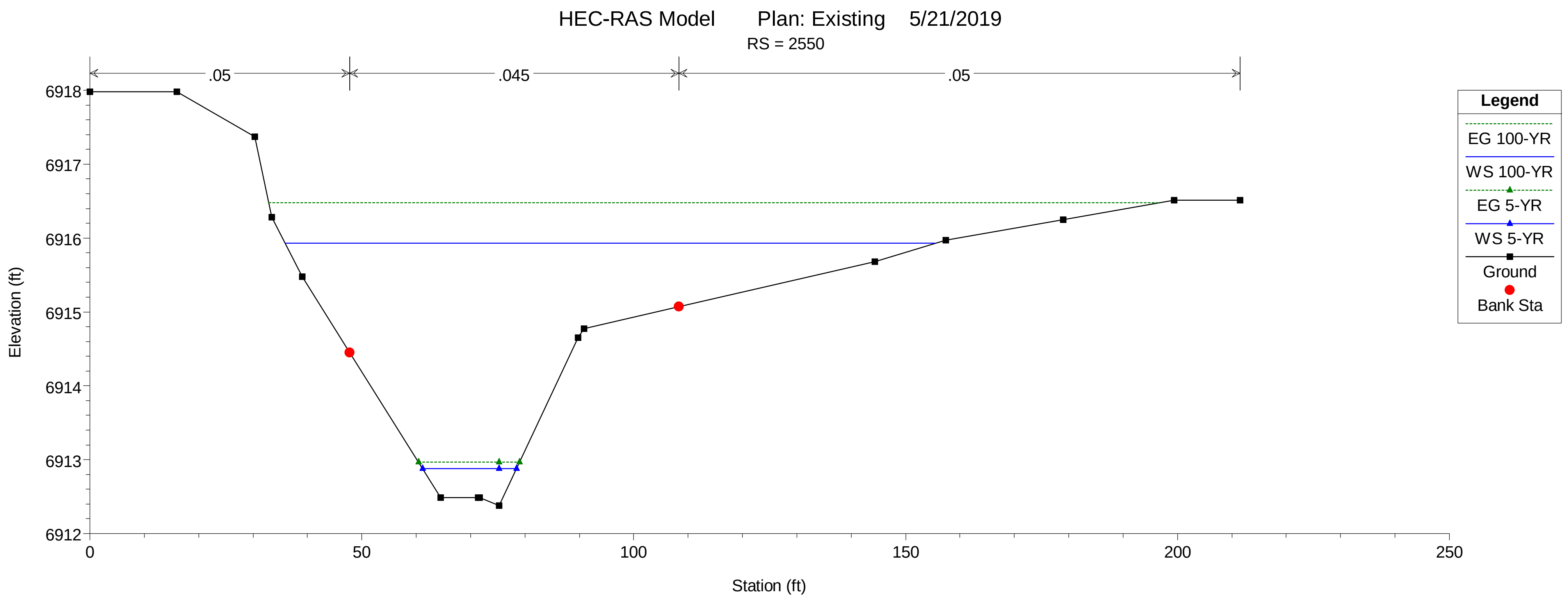


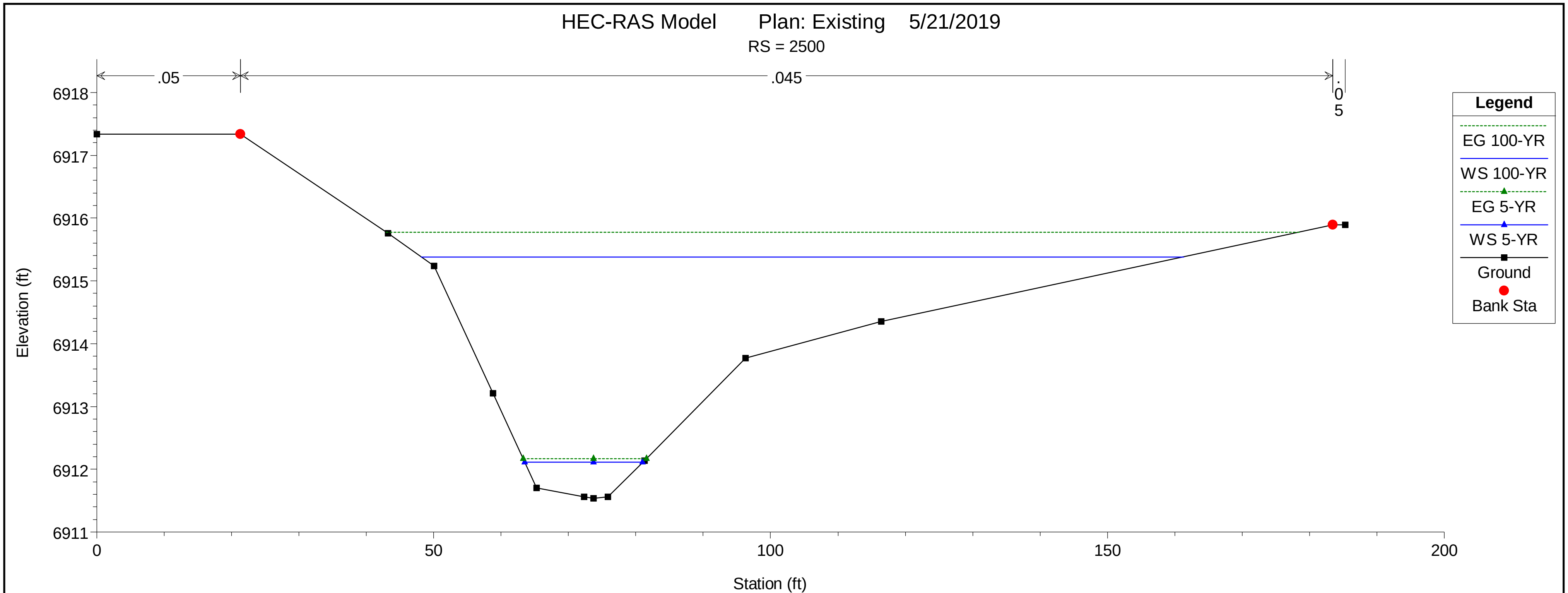
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2700
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6914
6915
6916
6917
6918
6919
6920
0
20
40
60
80
100
120
140
160
Station (ft)

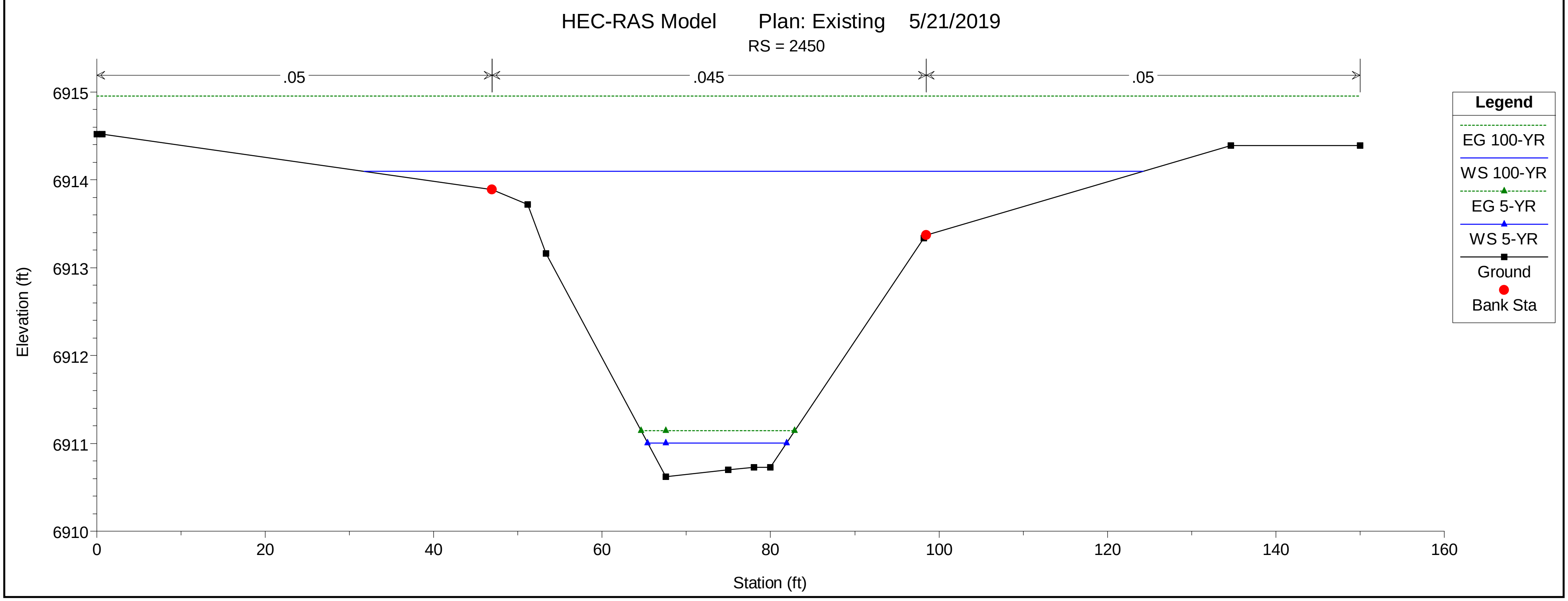


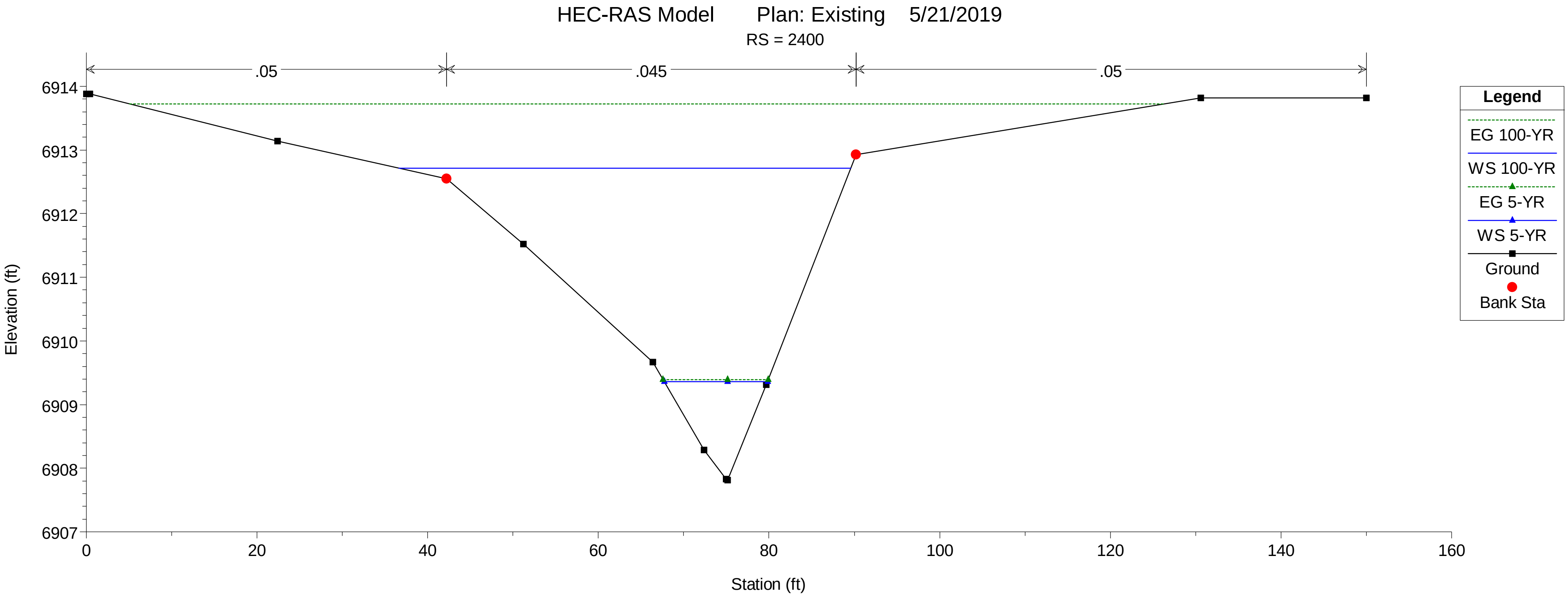
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2650
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6913
6914
6915
6916
6917
6918
6919
6920
0
20
40
60
80
100
120
140
160
Station (ft)

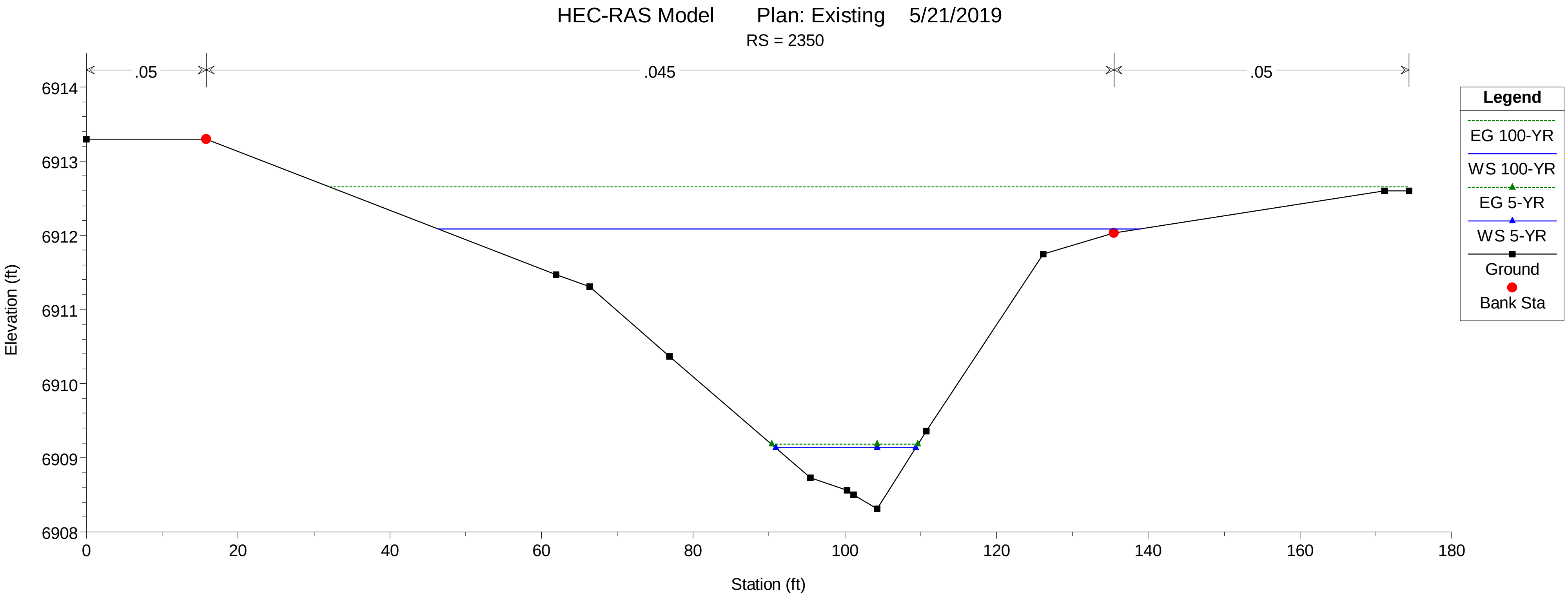

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2600
.05
.045
.05
Elevation (ft)
6912
6913
6914
6915
6916
6917
6918
6919
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

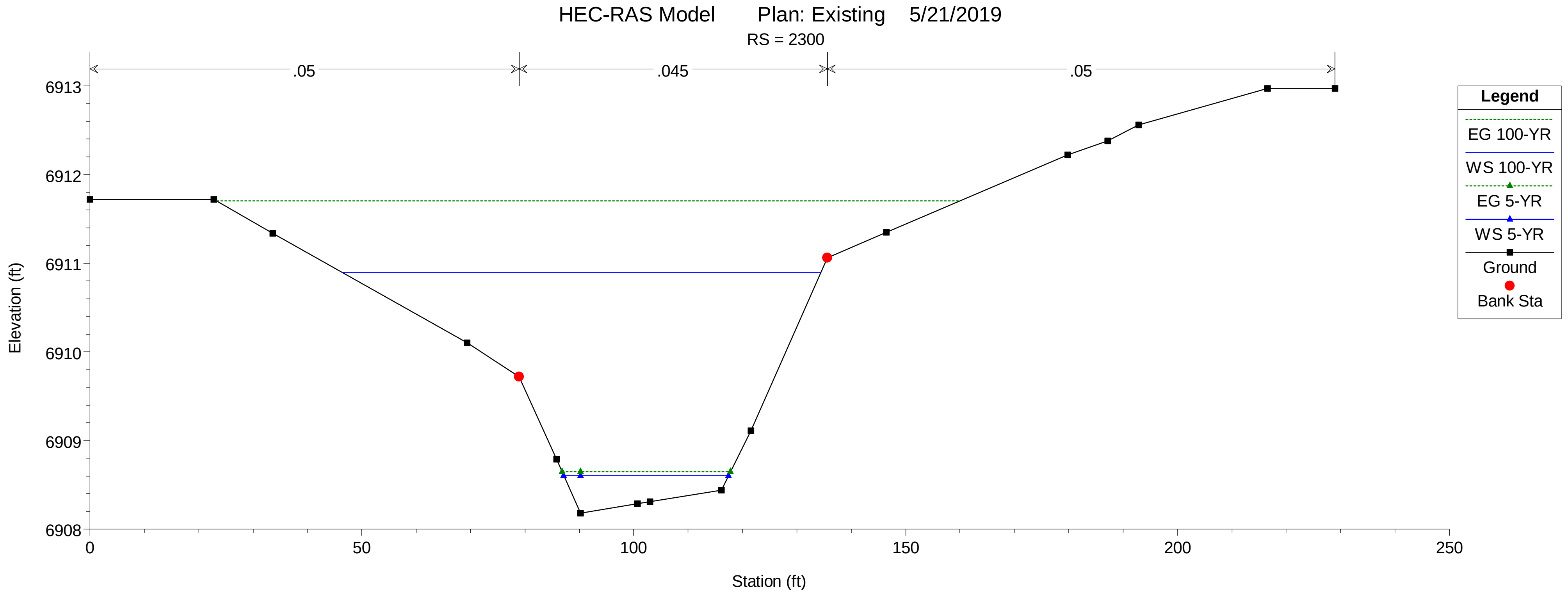

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2550
.05
.045
.05
Elevation (ft)
6912
6913
6914
6915
6916
6917
6918
0
50
100
150
200
250
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2500
.05
.045
.05
Elevation (ft)
6918
6917
6916
6915
6914
6913
6912
6911
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

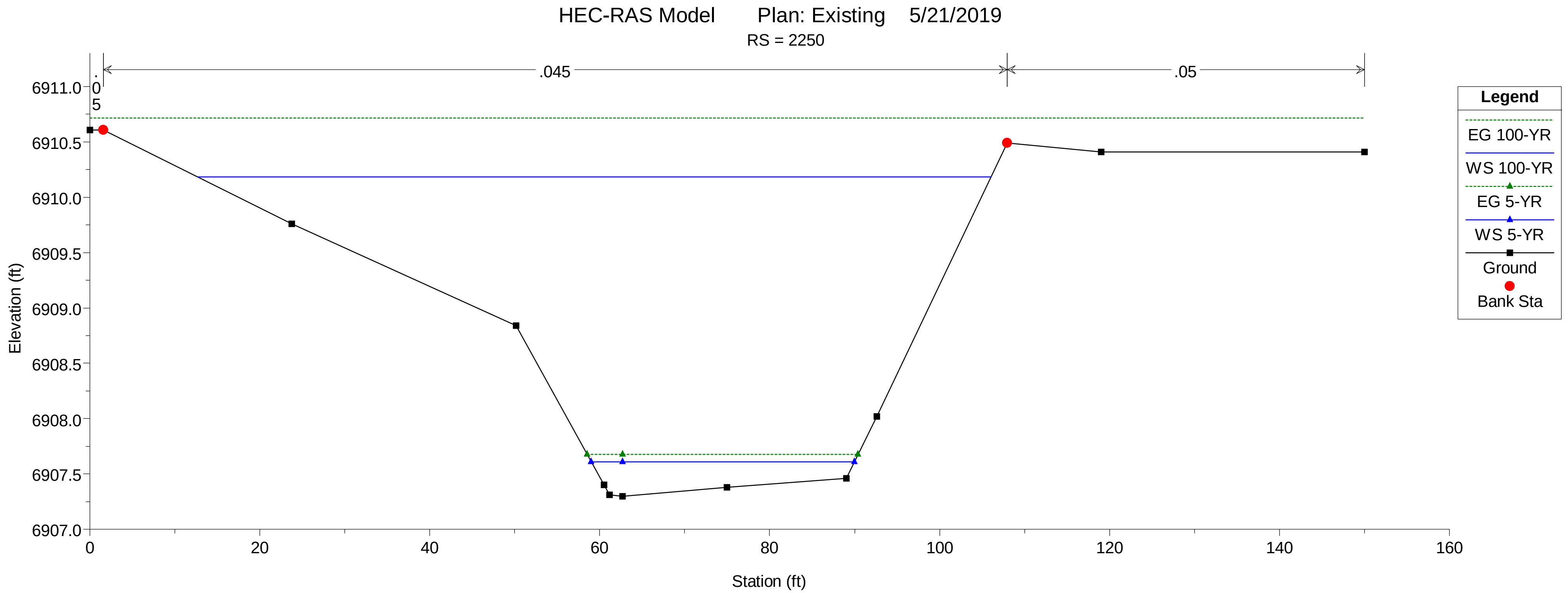

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2450
.05
.045
.05
Elevation (ft)
6915
6914
6913
6912
6911
6910
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2400
.05
.045
.05
Elevation (ft)
6907
6908
6909
6910
6911
6912
6913
6914
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

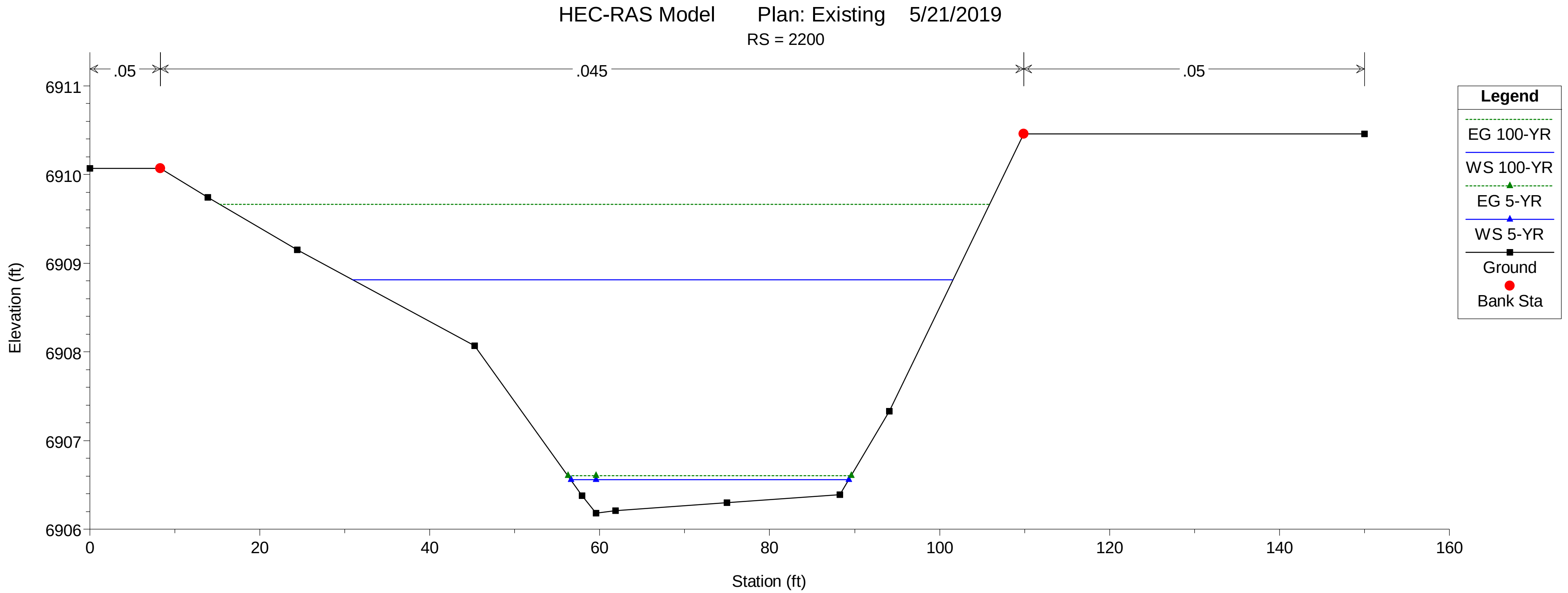

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2350
.05
.045
.05
Elevation (ft)
6908
6909
6910
6911
6912
6913
6914
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



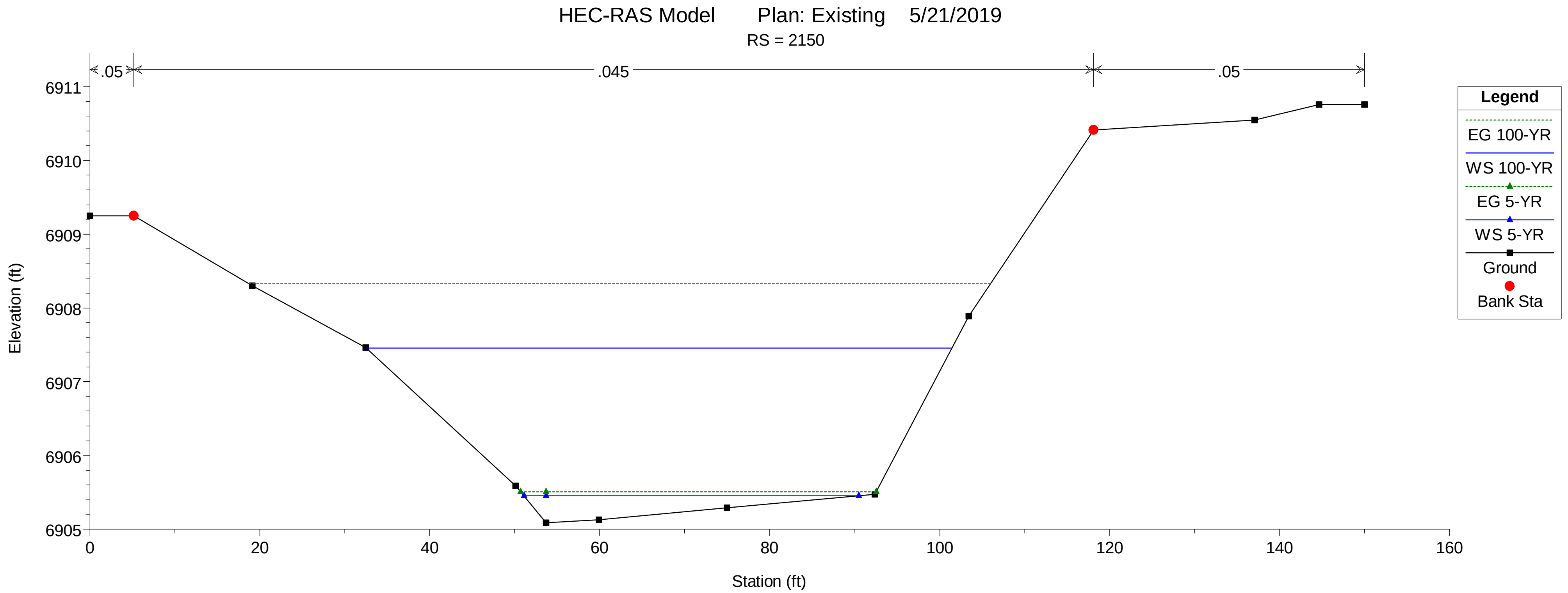
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2300
.05
.045
.05
Elevation (ft)
6913
6912
6911
6910
6909
6908
0
50
100
150
200
250
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



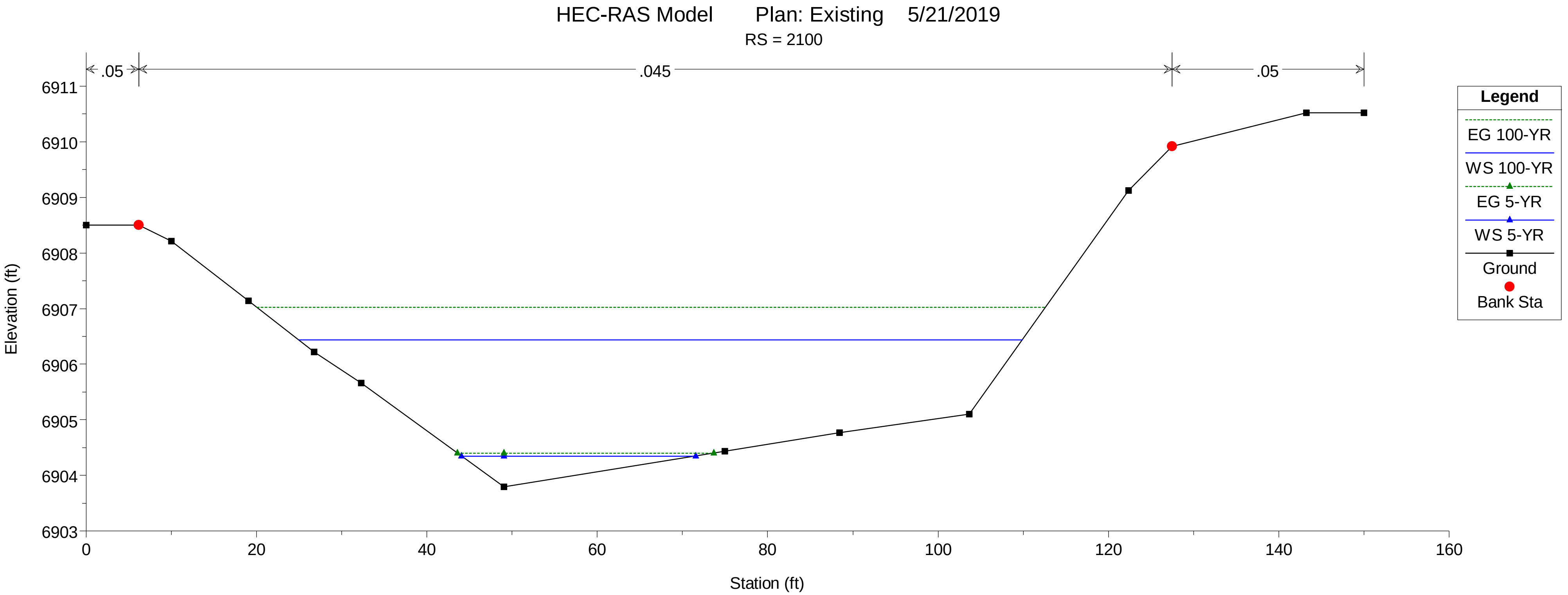
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2250
.05
.045
.05
Elevation (ft)
6911.0
6910.5
6910.0
6909.5
6909.0
6908.5
6908.0
6907.5
6907.0
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



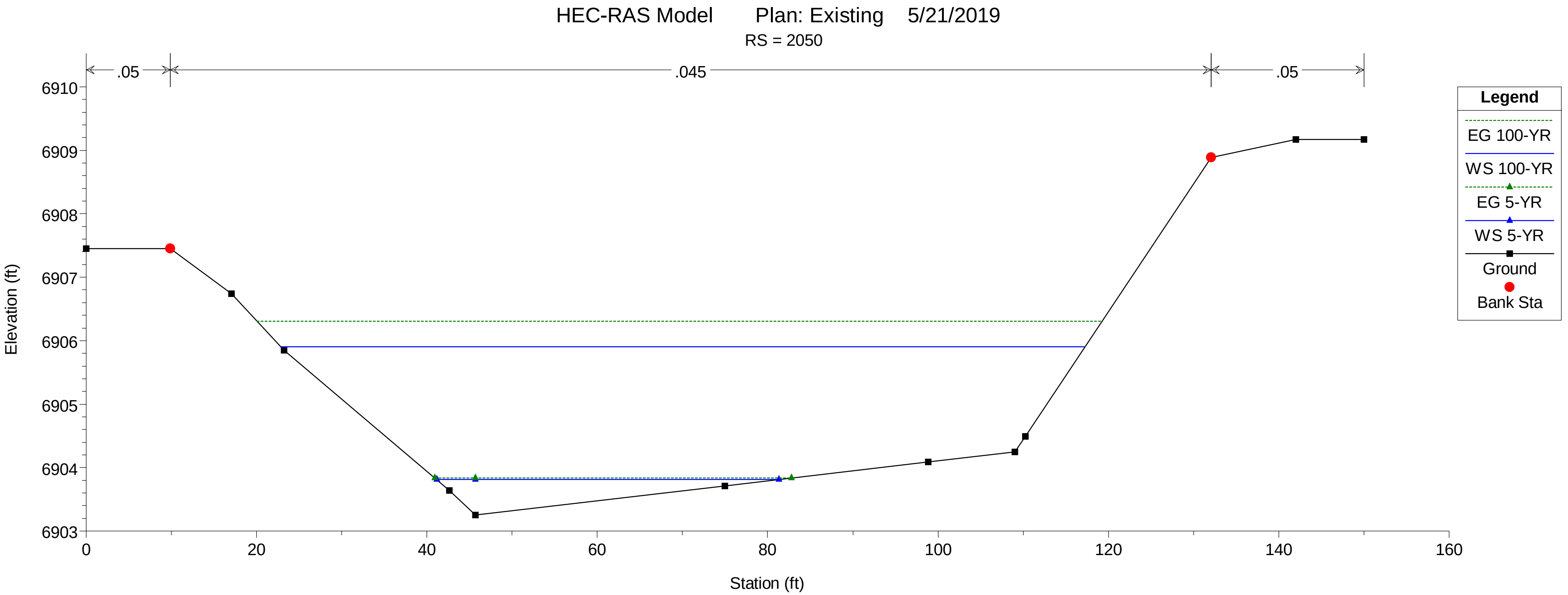
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2200
.05
.045
.05
Elevation (ft)
Station (ft)
6906
6907
6908
6909
6910
6911
0
20
40
60
80
100
120
140
160
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



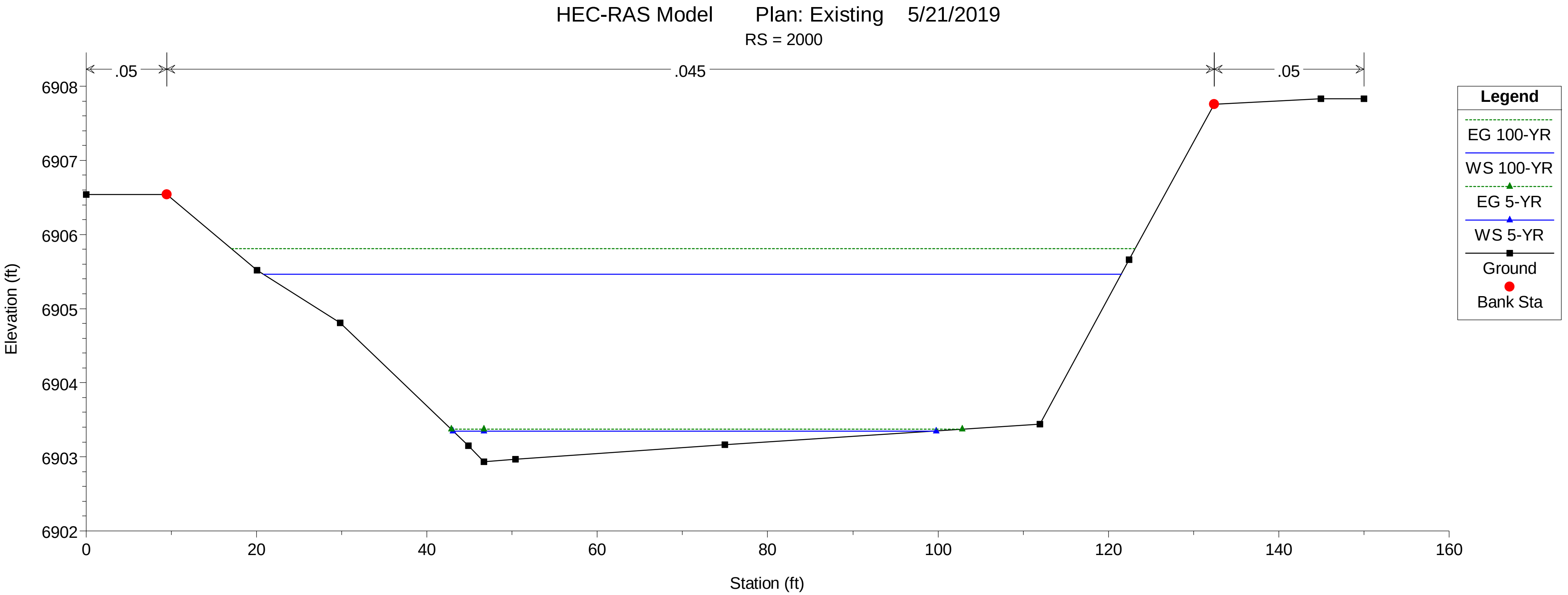
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2150
.05
.045
.05
Elevation (ft)
Station (ft)
6905
6906
6907
6908
6909
6910
6911
0
20
40
60
80
100
120
140
160
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

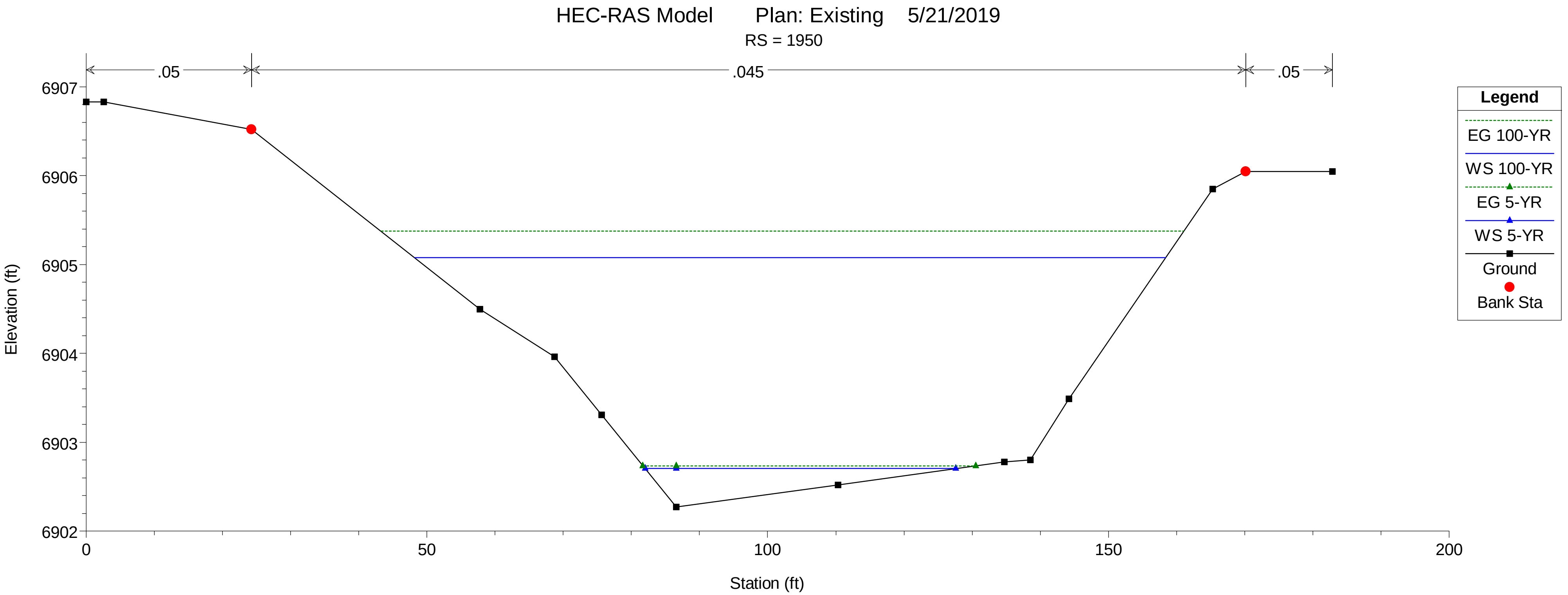


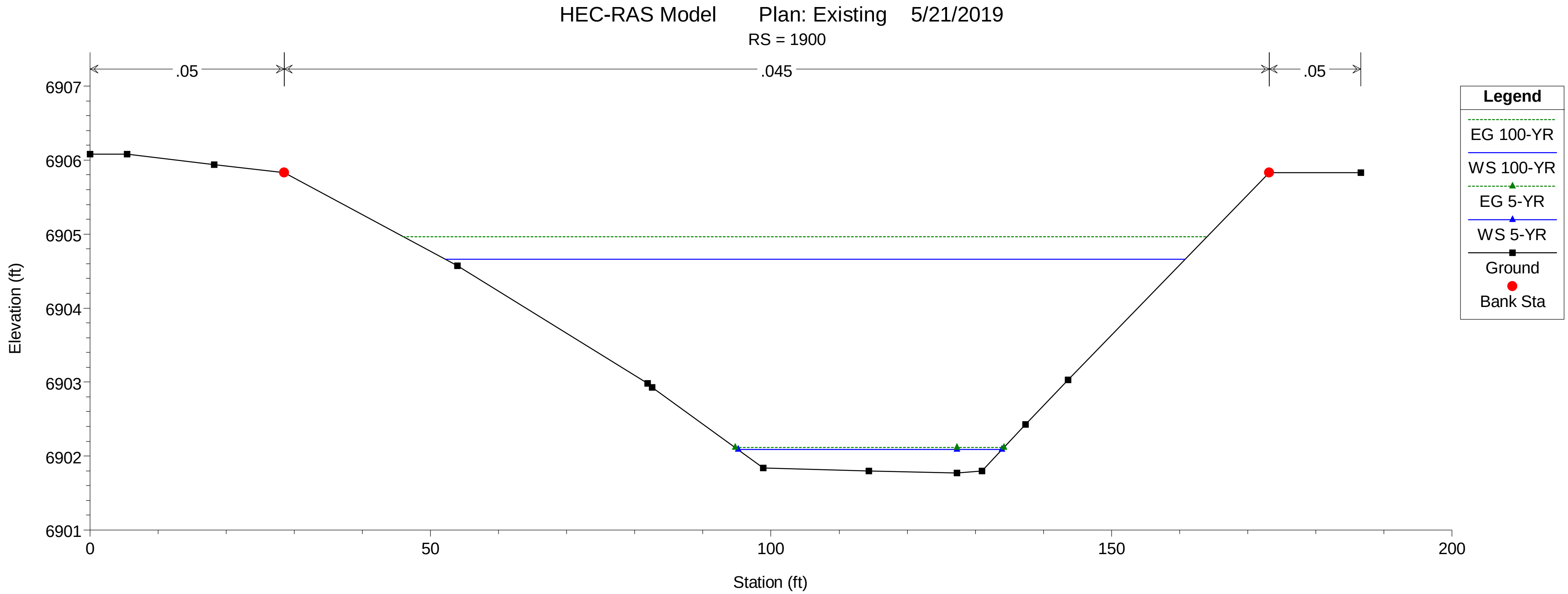
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2100
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6903
6904
6905
6906
6907
6908
6909
6910
6911
Station (ft)
0
20
40
60
80
100
120
140
160

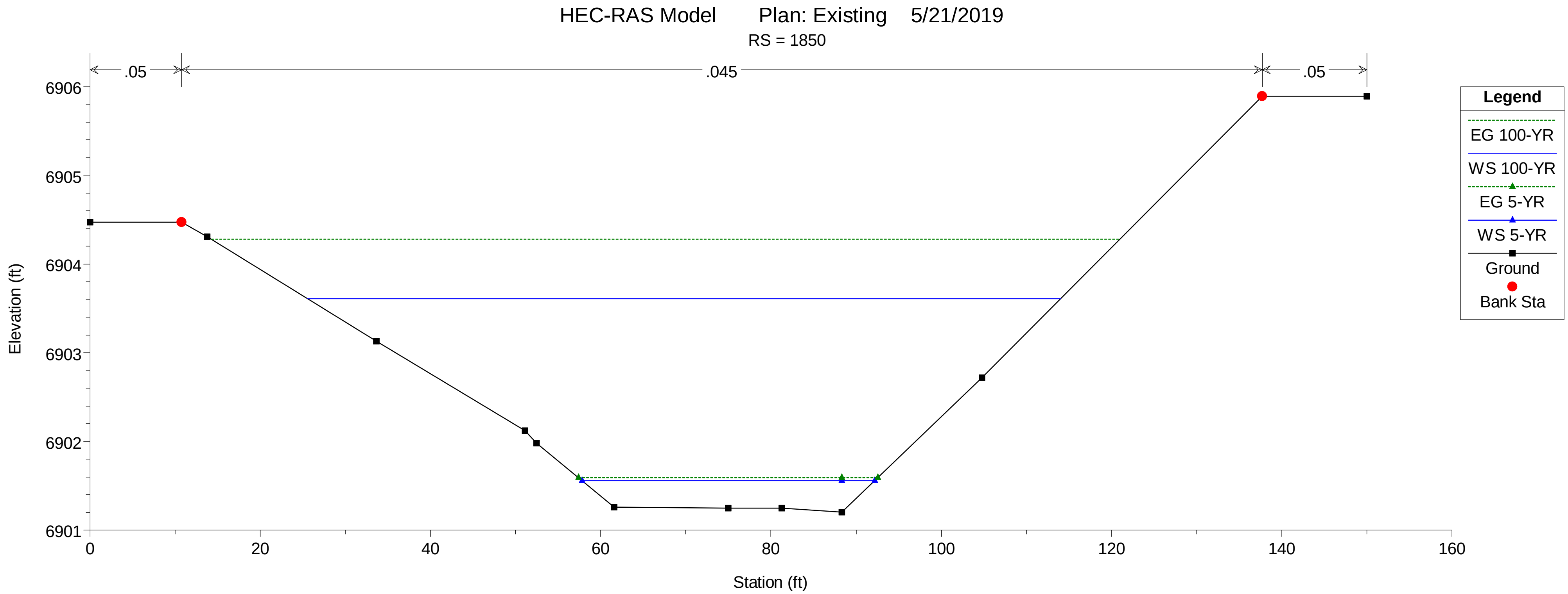


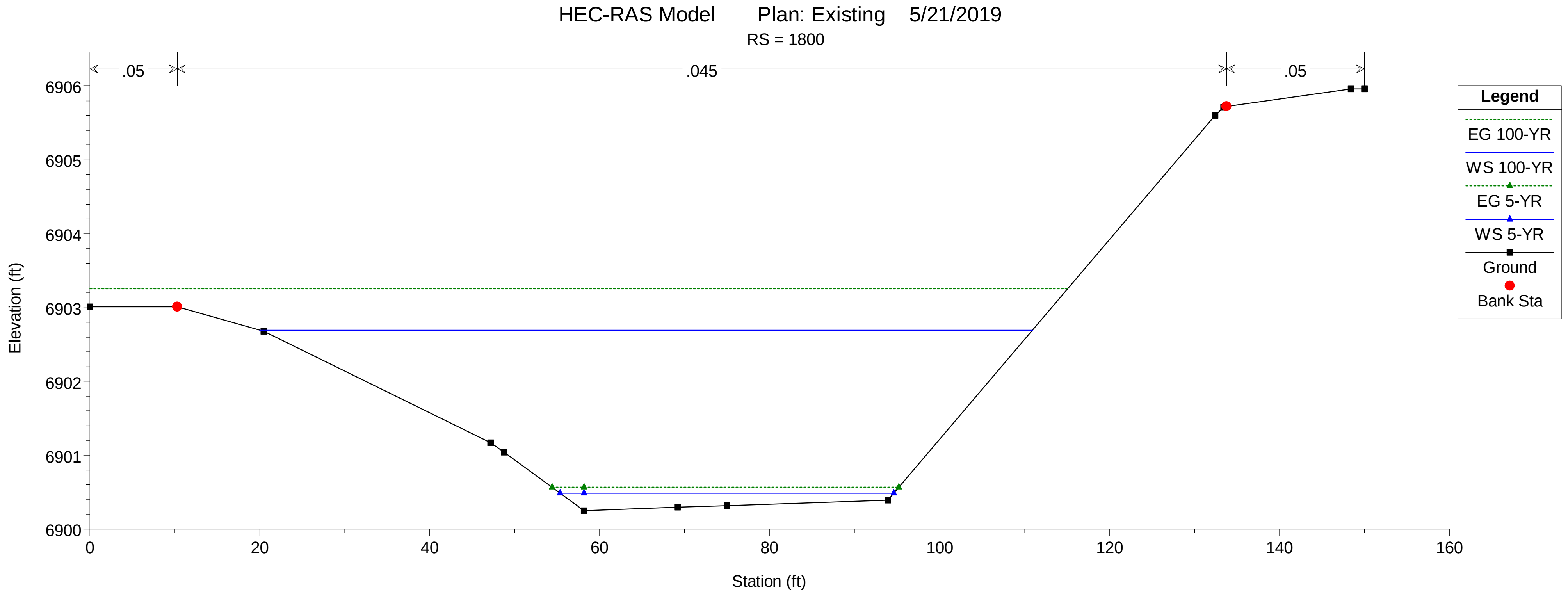
HEC-RAS Model Plan: Existing 5/21/2019
RS = 2050
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6903
6904
6905
6906
6907
6908
6909
6910
Station (ft)
0
20
40
60
80
100
120
140
160


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2000
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

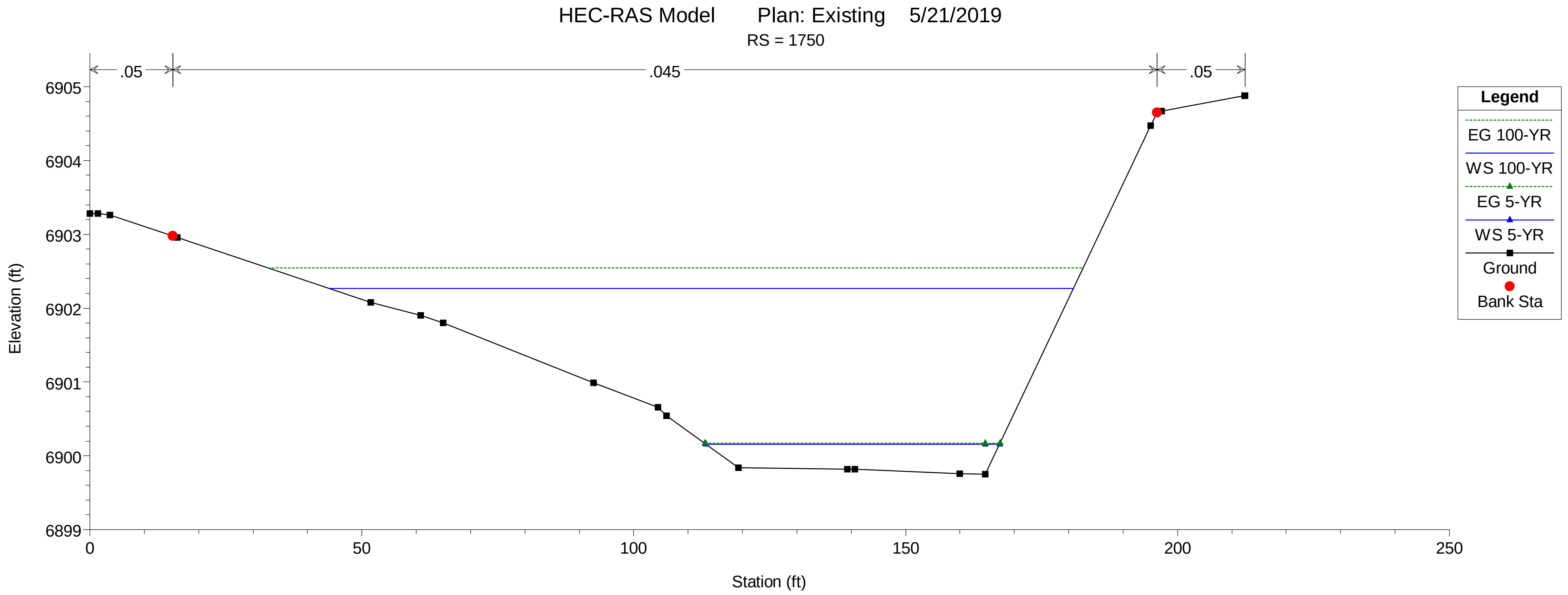

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1900
.05
.045
.05
Elevation (ft)
6907
6906
6905
6904
6903
6902
6901
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

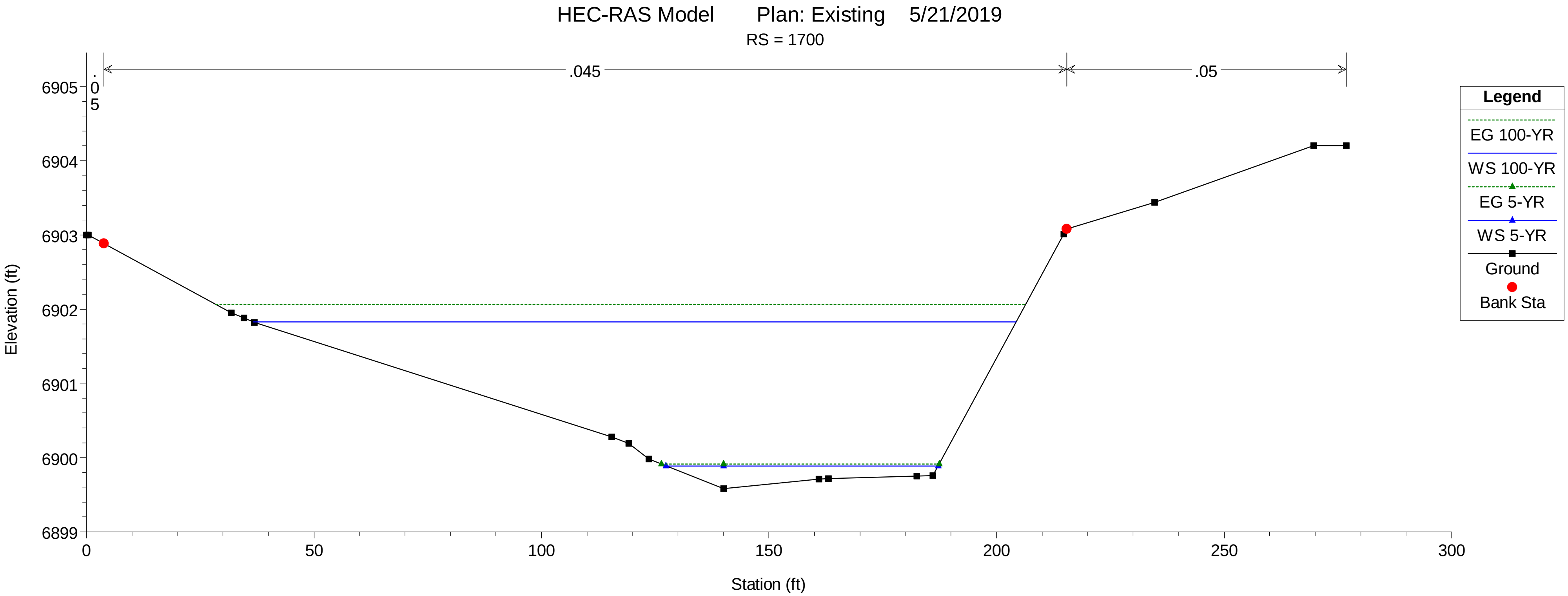

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1850
.05
.045
.05
Elevation (ft)
6906
6905
6904
6903
6902
6901
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



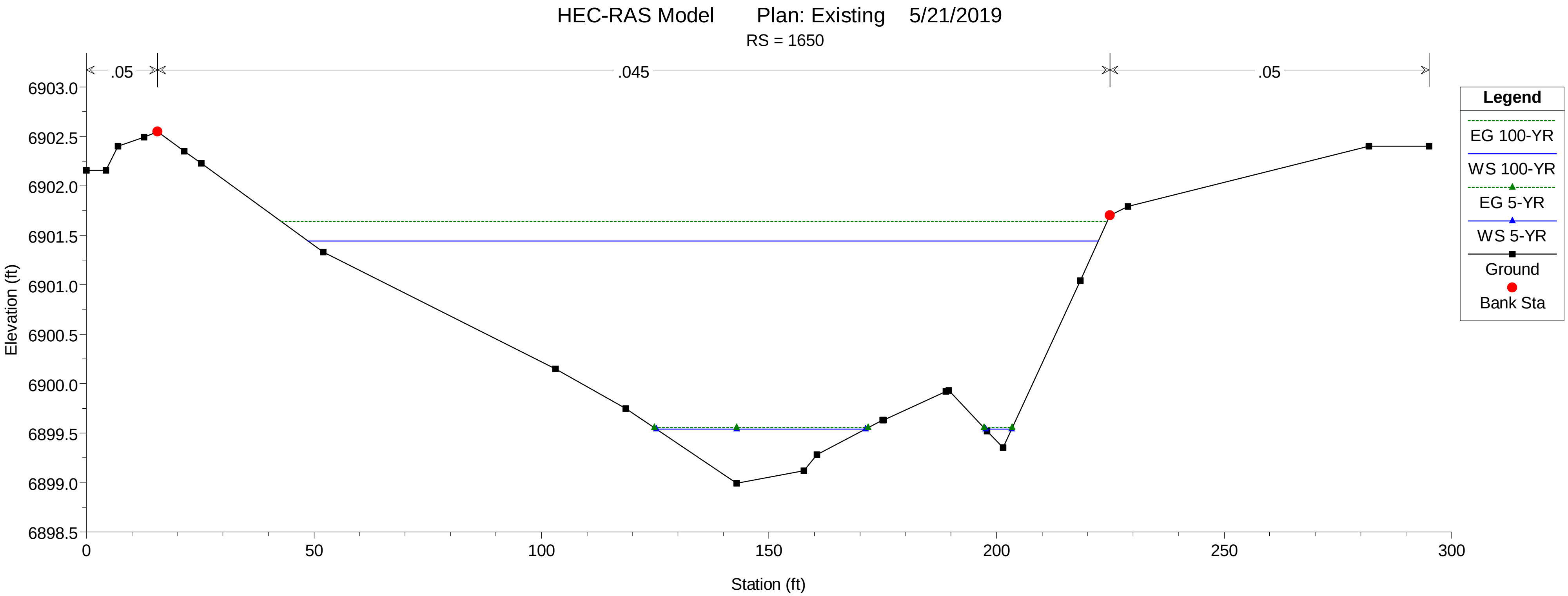
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1800
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6906
6905
6904
6903
6902
6901
6900
0
20
40
60
80
100
120
140
160
Station (ft)



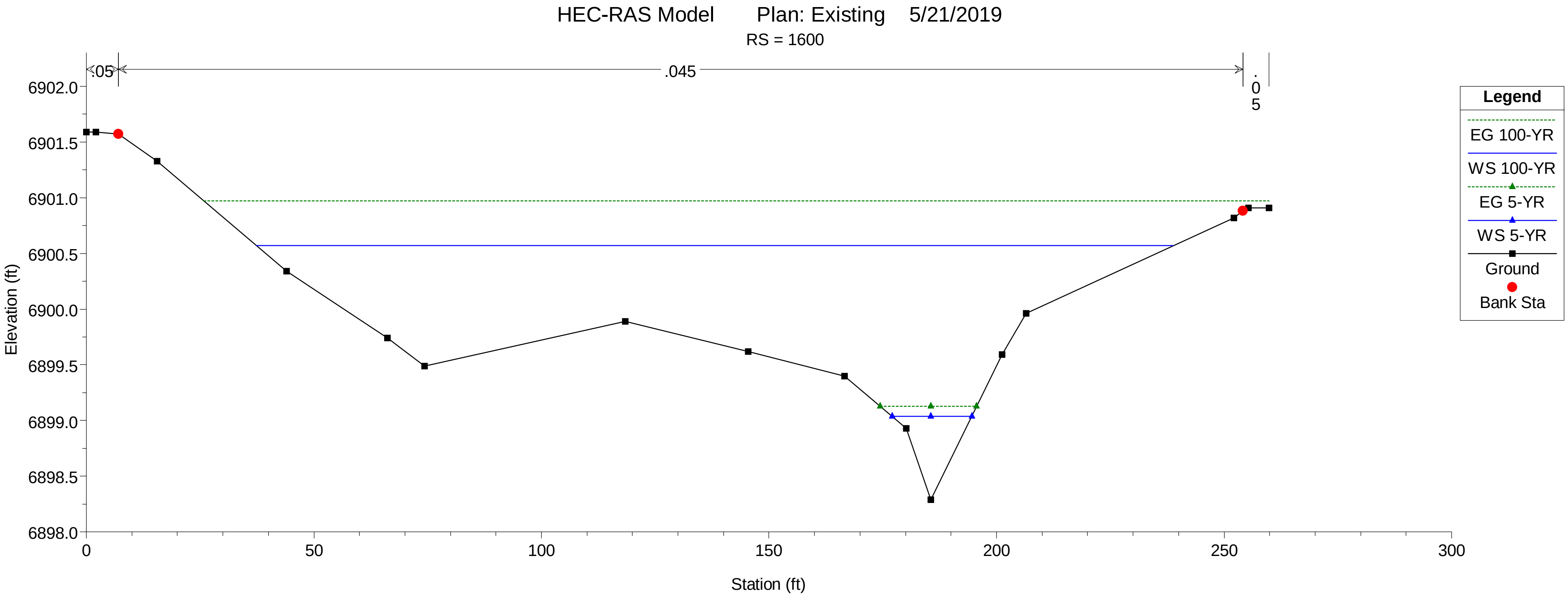
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1750
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6905
6904
6903
6902
6901
6900
6899
0
50
100
150
200
250
Station (ft)

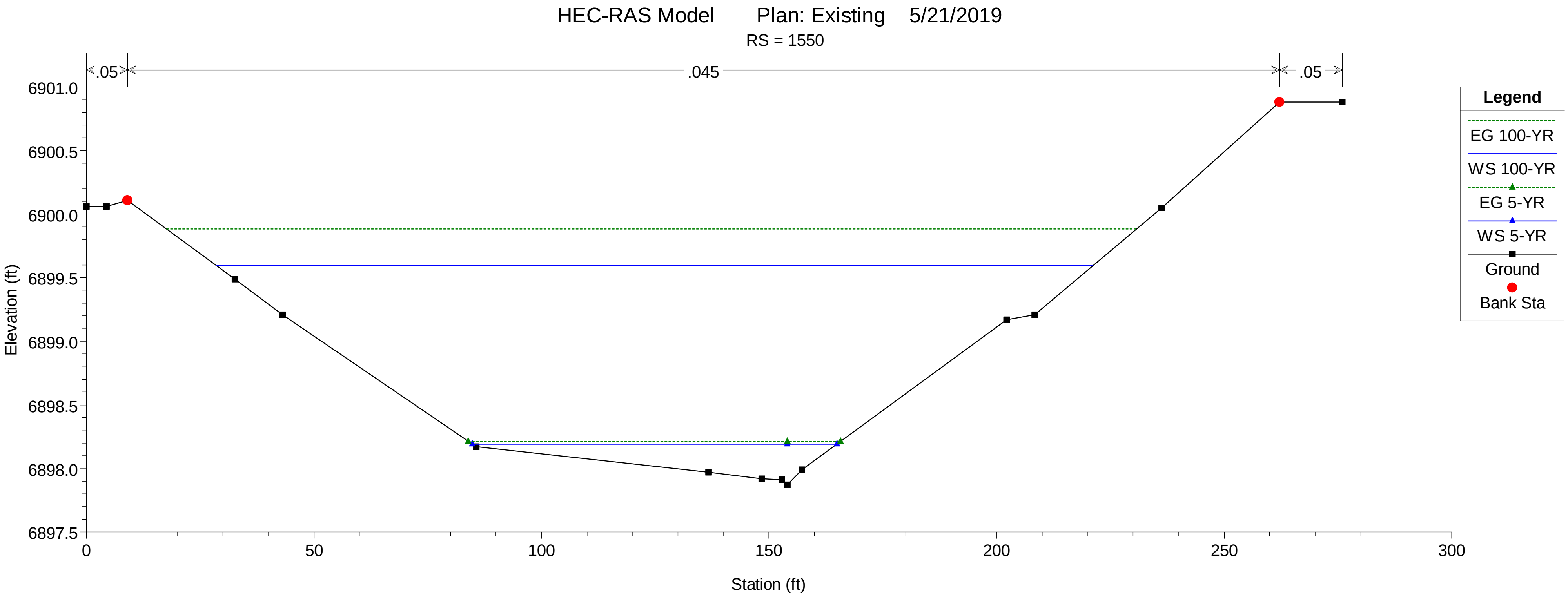


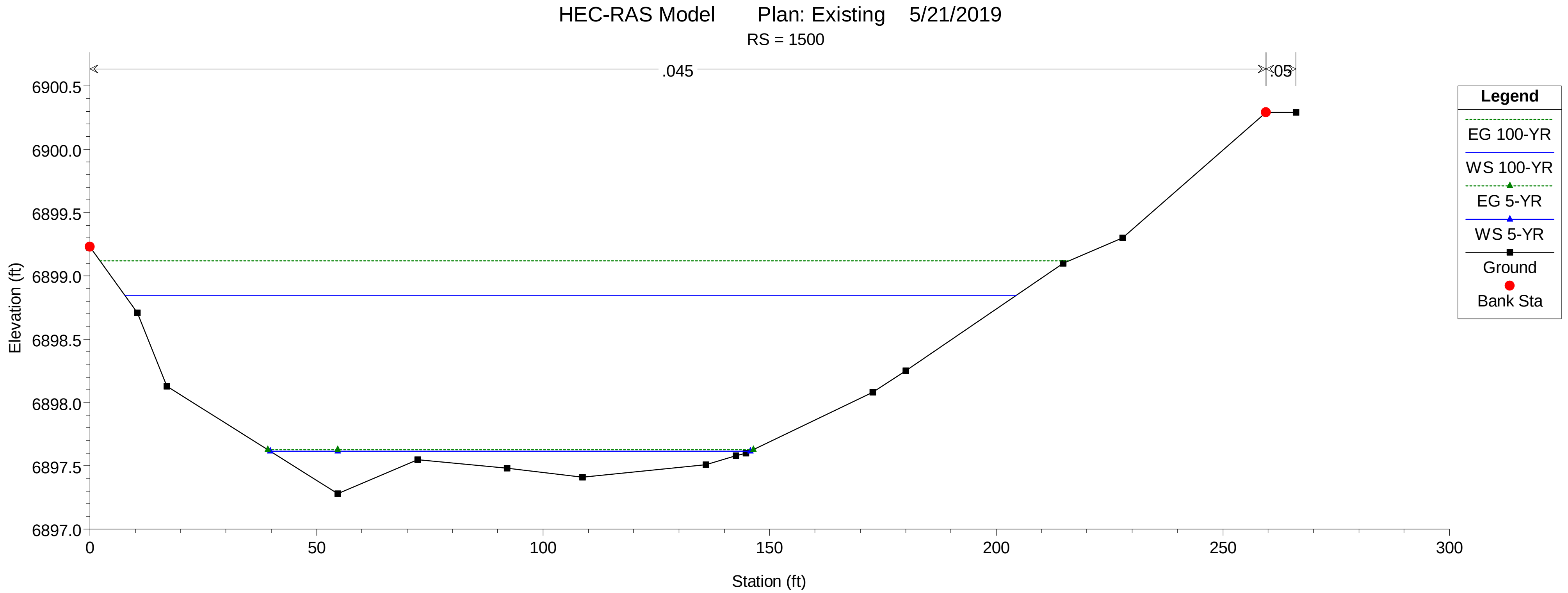
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1700
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6905
6904
6903
6902
6901
6900
6899
0
50
100
150
200
250
300
Station (ft)

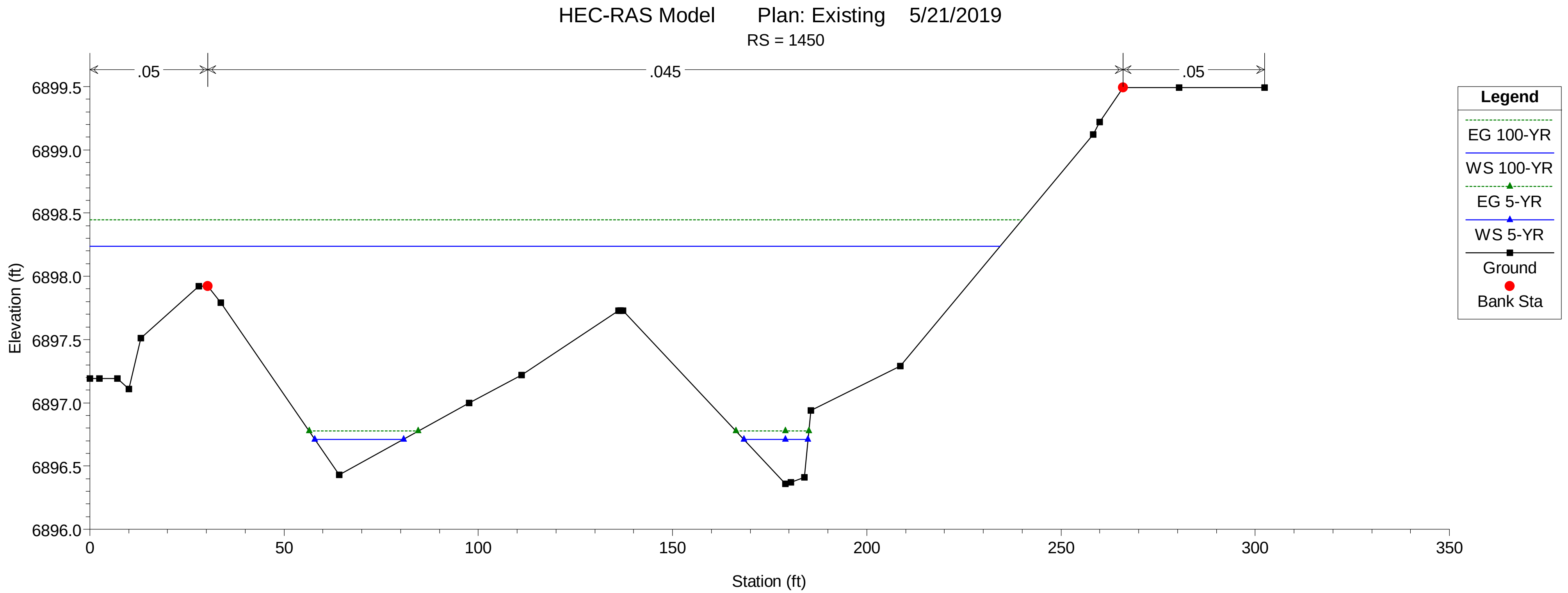


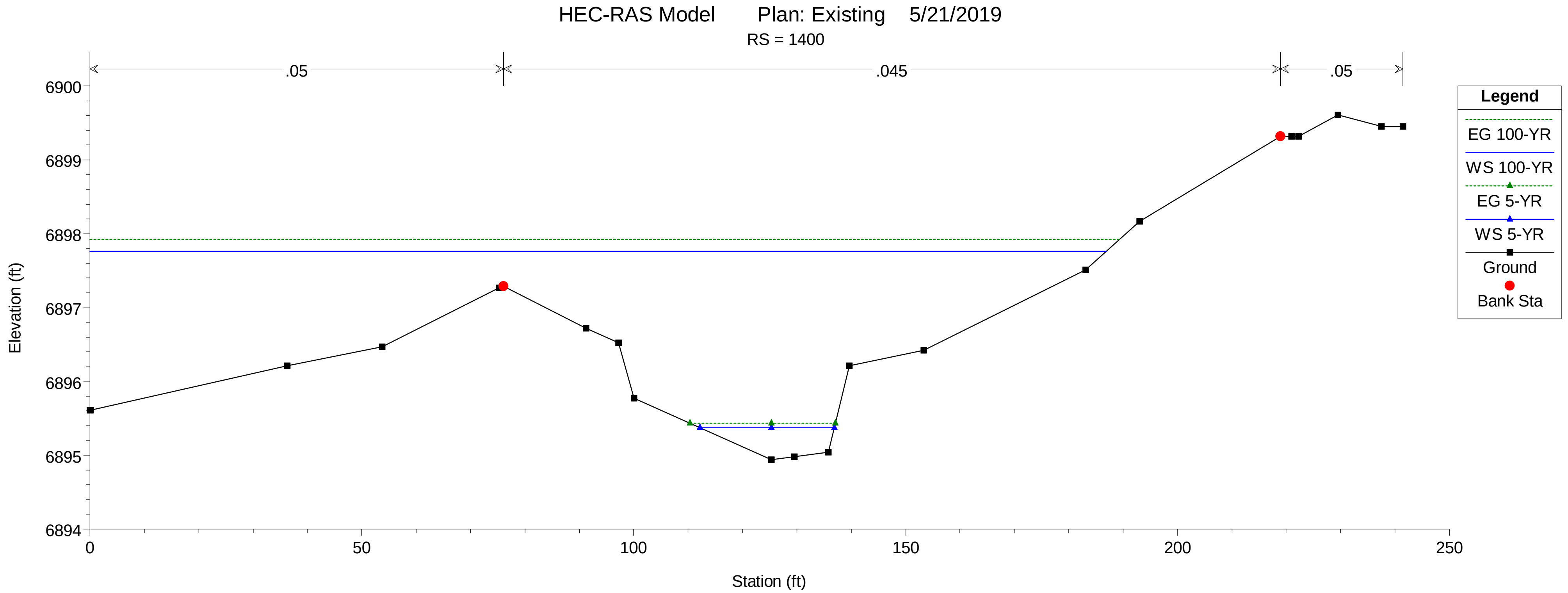
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1650
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6903.0
6902.5
6902.0
6901.5
6901.0
6900.5
6900.0
6899.5
6899.0
6898.5
0
50
100
150
200
250
300
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1600
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

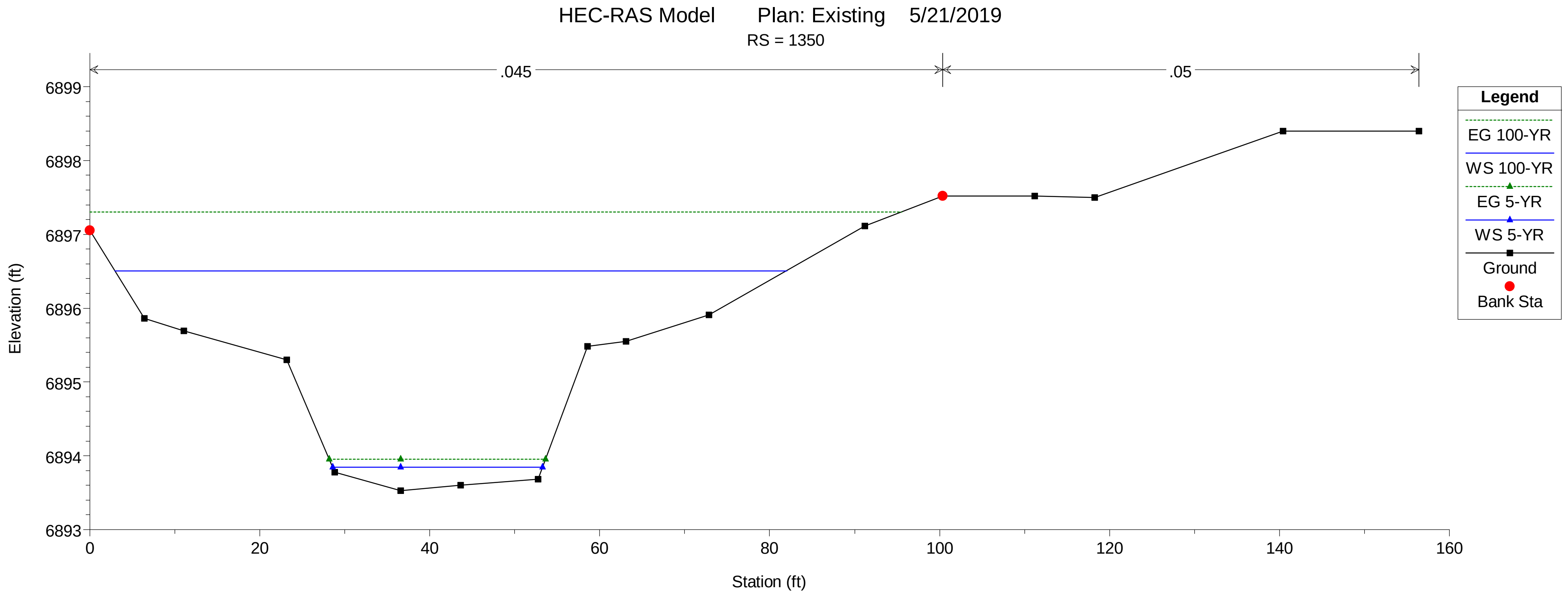

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1550
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1500
.045
.05
Elevation (ft)
Station (ft)
6900.5
6900.0
6899.5
6899.0
6898.5
6898.0
6897.5
6897.0
0
50
100
150
200
250
300
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

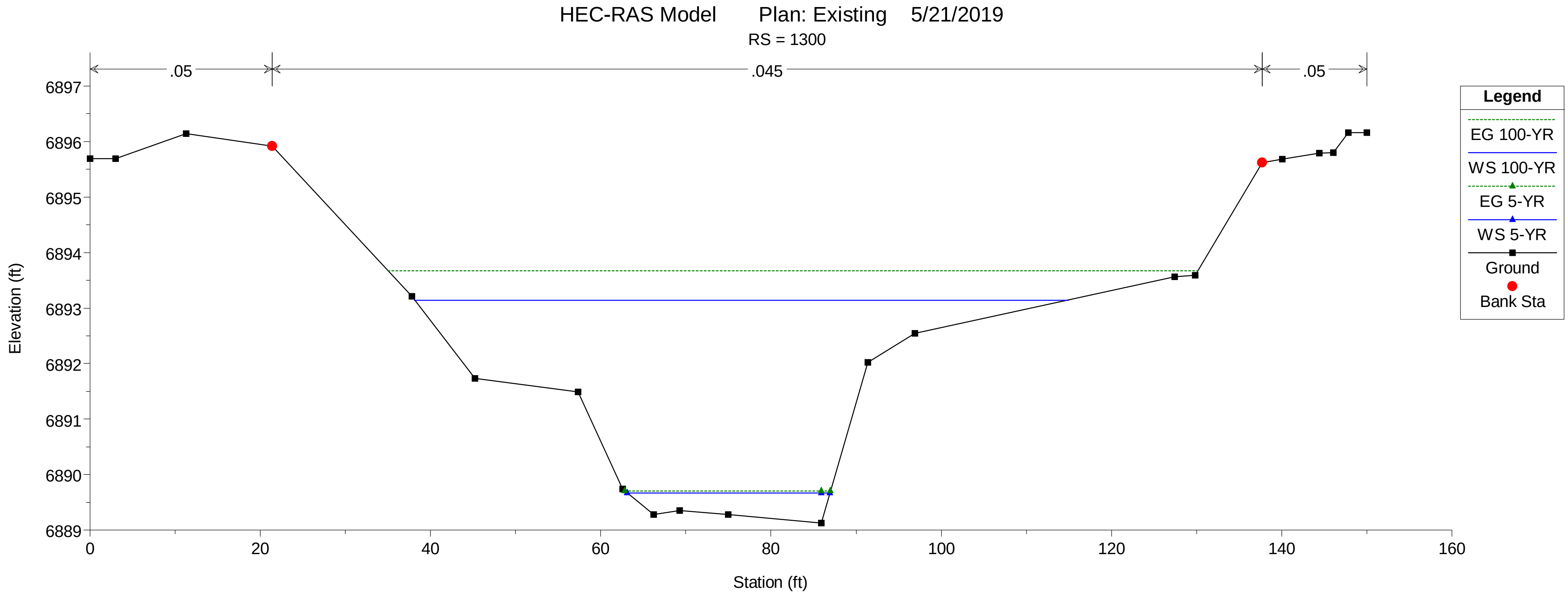

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1450
.05
.045
.05
Elevation (ft)
Station (ft)
6899.5
6899.0
6898.5
6898.0
6897.5
6897.0
6896.5
6896.0
0
50
100
150
200
250
300
350
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

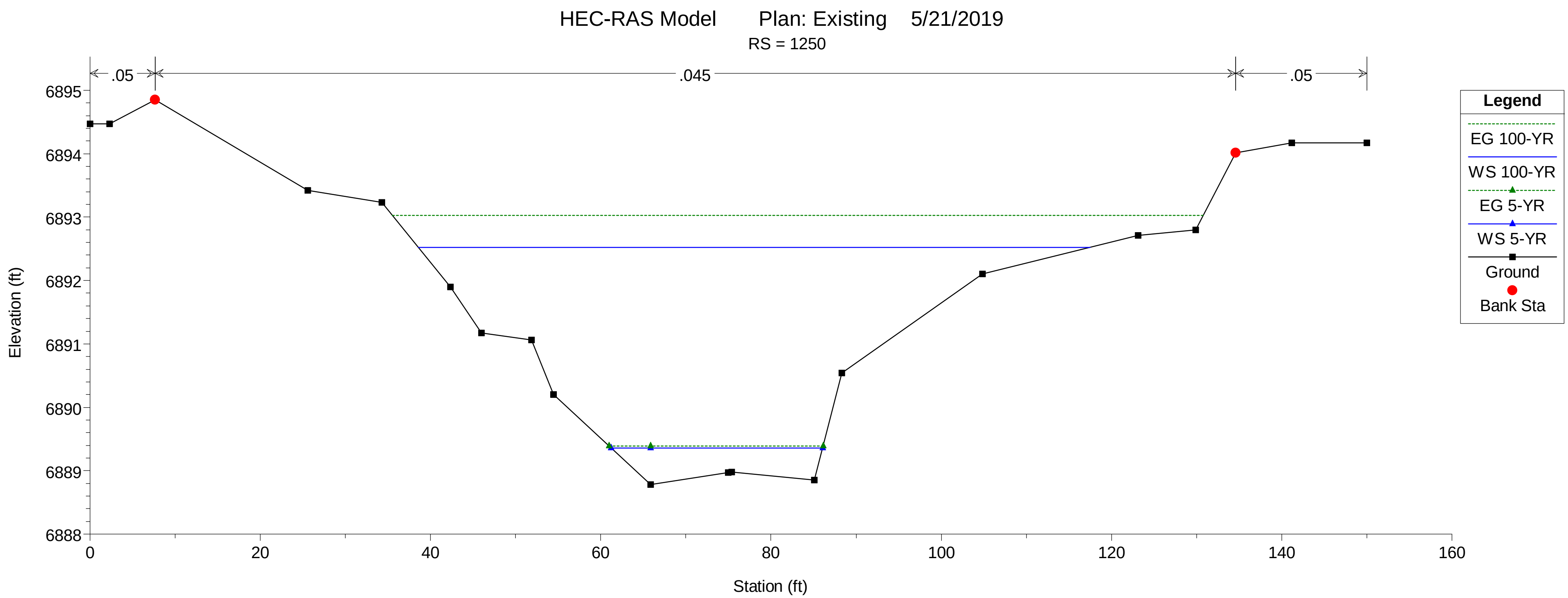


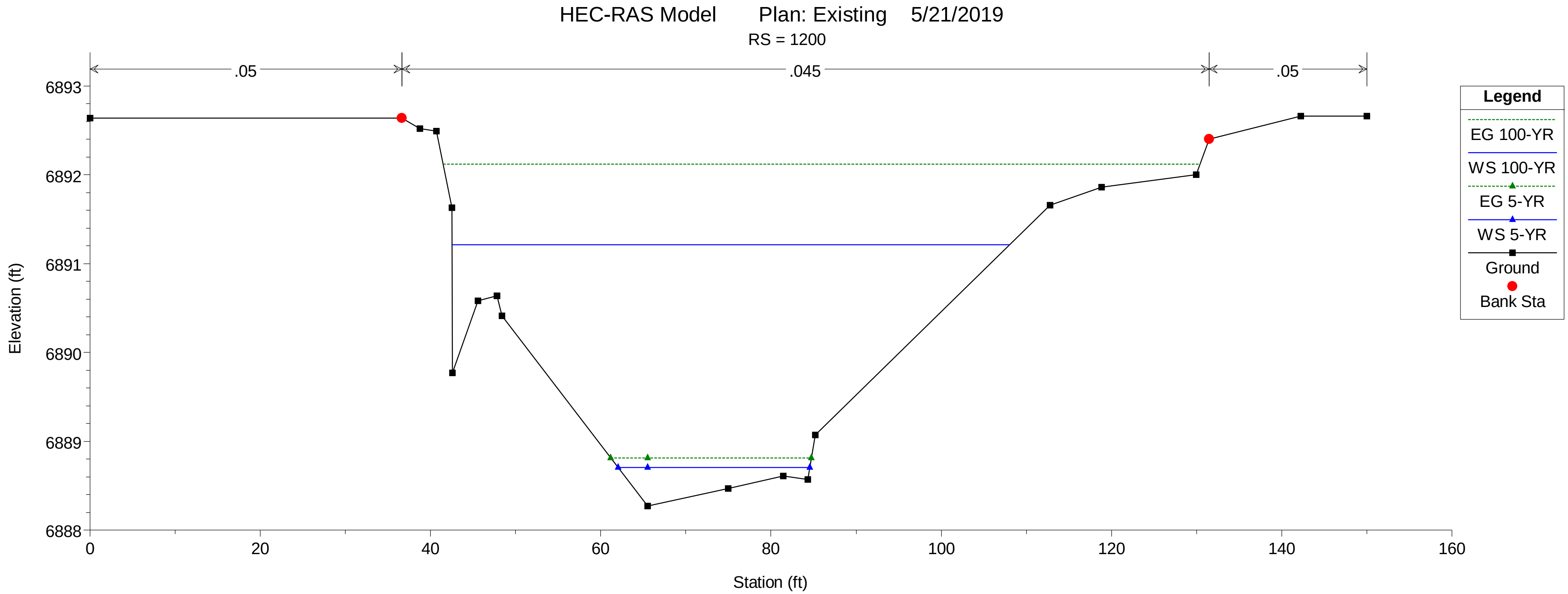
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1400
.05
.045
.05
Elevation (ft)
6900
6899
6898
6897
6896
6895
6894
0
50
100
150
200
250
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



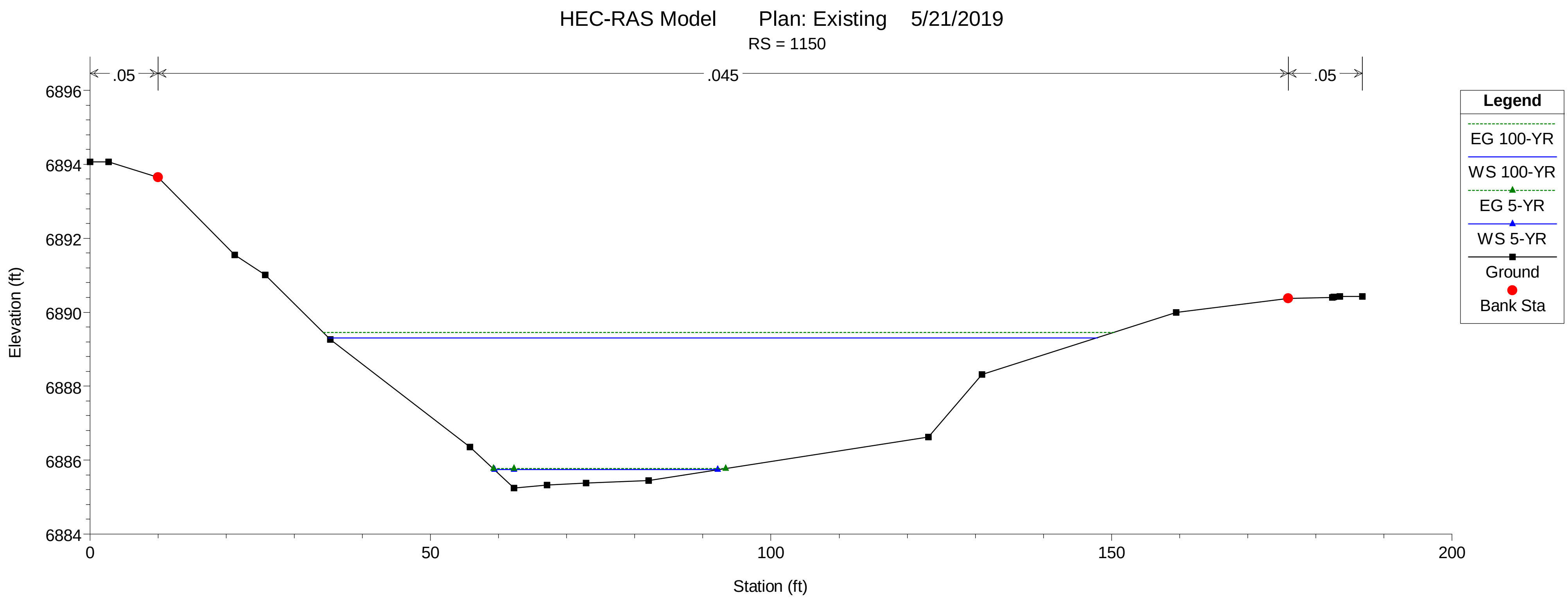
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1350
.045
.05
Elevation (ft)
6899
6898
6897
6896
6895
6894
6893
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1300
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6889
6890
6891
6892
6893
6894
6895
6896
6897
0
20
40
60
80
100
120
140
160

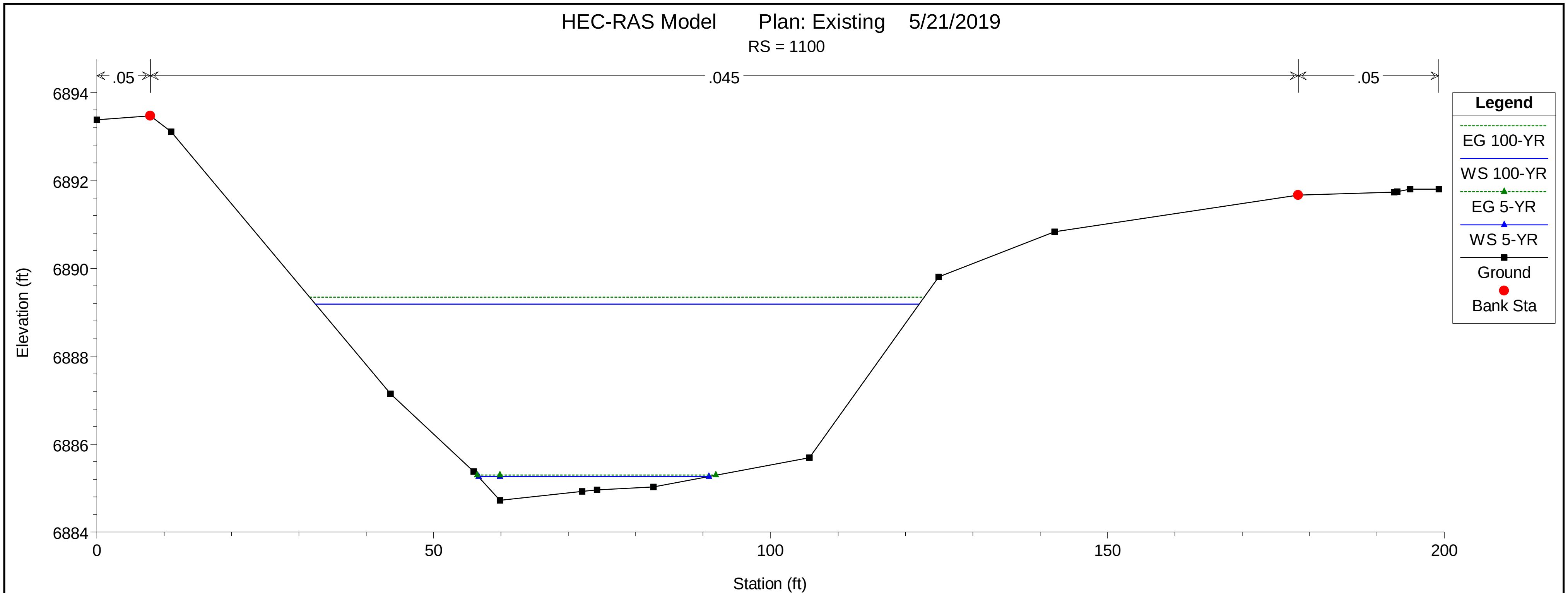

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1250
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6888
6889
6890
6891
6892
6893
6894
6895
0
20
40
60
80
100
120
140
160

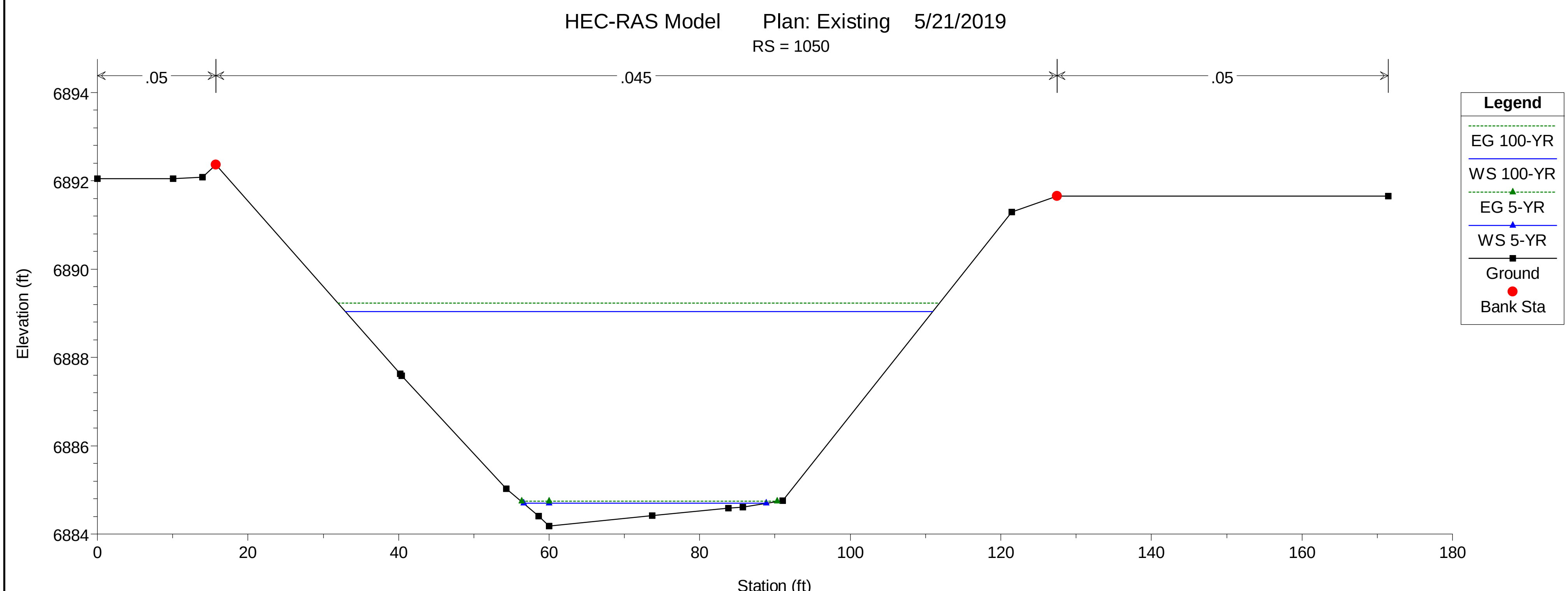


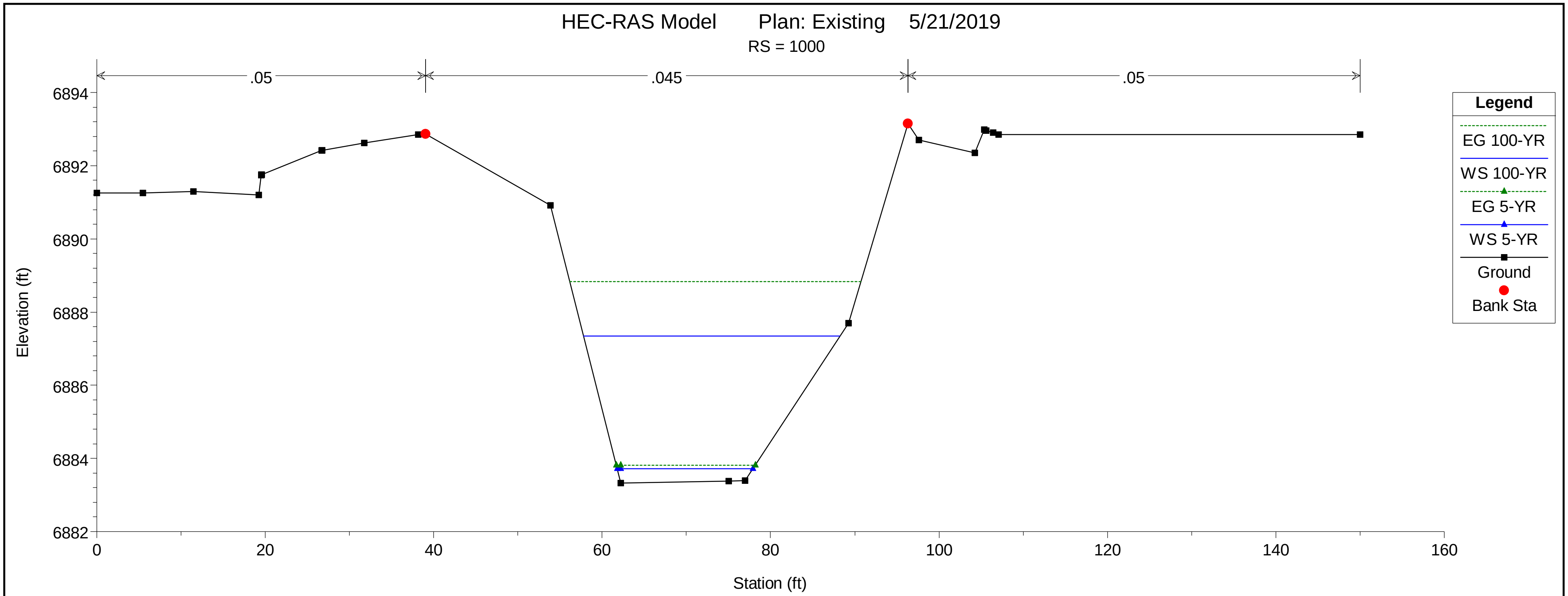
HEC-RAS Model Plan: Existing 5/21/2019
RS = 1200
.05
.045
.05
Elevation (ft)
6888
6889
6890
6891
6892
6893
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta



HEC-RAS Model Plan: Existing 5/21/2019
RS = 1150
.05
.045
.05
Elevation (ft)
6884
6886
6888
6890
6892
6894
6896
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

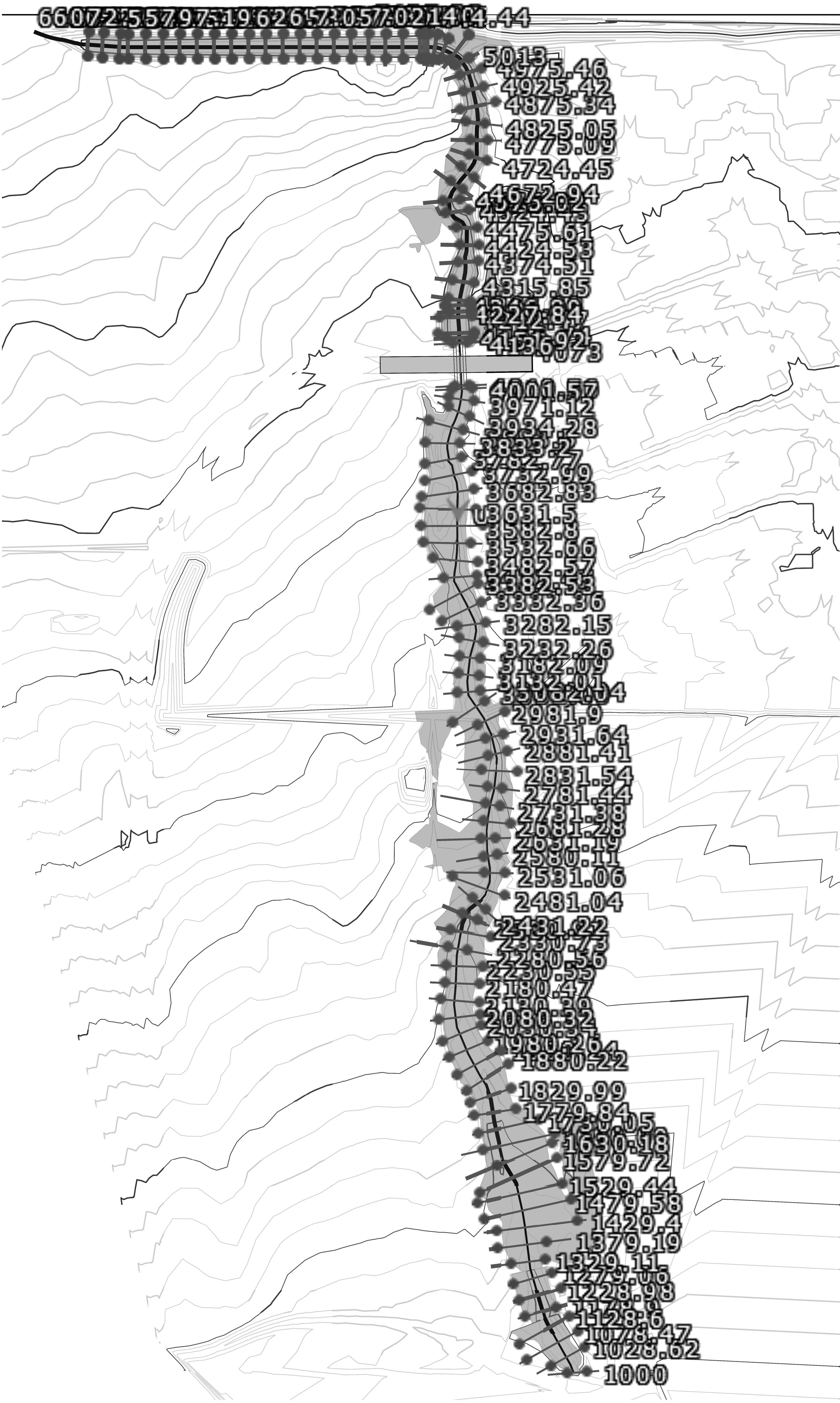

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1100
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6894
6892
6890
6888
6886
6884
0
50
100
150
200
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1050
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6894
6892
6890
6888
6886
6884
0
20
40
60
80
100
120
140
160
180
Station (ft)



HEC-RAS Model Plan: Existing 5/21/2019
RS = 1000
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6894
6892
6890
6888
6886
6884
6882
0
20
40
60
80
100
120
140
160
Station (ft)

Proposed Conditions Model



5013
4975.46
4925.42
4875.34
4825.05
4775.09
4724.45
4672.94
4475.61
4424.53
4374.51
4315.85
4227.84
4001.57
3971.12
3934.28
3732.99
3682.83
3631.5
3532.66
3482.57
3382.53
3332.36
3282.15
3232.26
3182.09
2981.9
2931.64
2881.41
2831.54
2781.44
2731.38
2681.28
2580.11
2531.06
2481.04
2431.22
2330.73
2280.56
2180.47
2080.32
1880.22
1829.99
1779.84
1630.18
1579.72
1529.44
1479.58
1429.4
1379.19
1329.11
1228.98
1128.6
1078.47
1028.62
1000

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: HEC-RAS Model
Project File : CLH14.20_Channel_10_17_2019_new_inputs.prj
Run Date and Time: 10/21/2019 6:50:03 AM

Project in English units

Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="3502"
Unit="US_survey_Foot" AcadCode="" /> <Registration OffsetX="0" OffsetY="0"
OffsetZ="0" ScaleX="1" ScaleY="1" ScaleZ="1" /></SpatialReference>

PLAN DATA

Plan Title: Phase 1
Plan File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel_10_17_2019_new_inputs.p03

Geometry Title: Phase 1

Phase 1

Geometry File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel_10_17_2019_new_inputs.g03

Flow Title : Phase 1
Flow File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel_10_17_2019_new_inputs.f03

Plan Summary Information:

Number of:	Cross Sections =	111	Multiple Openings =	0
	Culverts =	1	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.33
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Phase 1
Flow File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel_10_17_2019_new_inputs.f03

Flow Data (cfs)

River	Reach	RS	DBPS 100-YR	DBPS 2-YR	FEMA 100-YR
UT_BSC2	NCONFL-BGM	6115.07	1000	100	1000
UT_BSC2	NCONFL-BGM	5045.44	1200	110	1482

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
UT_BSC2	NCONFL-BGM	DBPS 100-YR		Normal S = 0.025094
UT_BSC2	NCONFL-BGM	DBPS 2-YR		Normal S = 0.025094
UT_BSC2	NCONFL-BGM	FEMA 100-YR		Normal S = 0.025094

GEOMETRY DATA

Geometry Title: Phase 1
Geometry File : H:\Challenger Homes Inc\CO, El Paso County-CLH0000014.20-Bent Grass\3. Permit Const Docs\3.04 Grad-Drain\3.04.2 Prop Drain Rpt\Channel Design\GeoHecRas\CLH14.20_Channel_10_17_2019_new_inputs.g03

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 6115.07

INPUT
Description:
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6975.45	.08	6975.45	.74	6975.41	.82	6975.4	2.11	6975.36
2.79	6975.34	3.14	6975.33	4.81	6975.21	4.87	6975.19	4.94	6974.73
27.86	6969	28.94	6968.73	30.78	6968.73	40.57	6968.73	52.37	6968.74
52.88	6968.74	52.89	6968.74	53.01	6968.74	54.94	6968.74	60.85	6970.36
75.99	6974.79	76.18	6974.79	78.39	6974.74	78.94	6974.74	79.58	6974.68
79.97	6974.65	81.37	6974.53	81.38	6974.52	81.39	6974.52	81.41	6974.52
81.42	6974.51	81.45	6974.51	81.47	6974.5	81.51	6974.49	81.56	6974.48
81.6	6974.47	81.64	6974.46	81.76	6974.43	82.04	6974.37	83.23	6974.59
83.47	6974.6	83.94	6974.64						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	4.94	.04	75.99	.045

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          4.94   75.99            42.96   42.96   42.96             .1       .3
```

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 6072.11

INPUT
Description:

```
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6975.43     .52 6975.43     .55 6975.47    1.23 6975.47    1.29 6975.47
    1.32 6975.47    5.27 6975.41    5.57  6975.4    5.65  6975.4    5.77  6975.4
    5.85 6975.37    8.21 6974.58    8.58 6974.49   32.21 6968.58   44.48 6968.58
   57.99 6968.58   58.21 6968.58   82.09 6974.56   82.21 6974.59   87.19 6974.49
   87.21 6974.49   87.23 6974.48

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045    8.21     .04   82.09    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          8.21   82.09            49.27   49.27   49.27             .1       .3
```

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 6022.84

INPUT
Description:

```
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6976.92     .12 6977.04      .2 6977.04     .21 6977.04     .22 6977.04
     .23 6977.04     .25 6977.04     .27 6977.04     .29 6977.04     .32 6977.04
     .37 6977.04     .44 6977.04     .57 6977.03     .83 6977.02     .98 6977.02
    3.28 6976.93    3.47 6976.92    3.49 6976.92    3.53 6976.92      11 6974.42
   11.05 6974.41   34.68  6968.5   35.05 6968.41   35.45 6968.41   48.04 6968.41
```

61.05	6968.41	61.61	6968.55	85.05	6974.41	85.2	6974.41	90.05	6974.31

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	11.05	.04	85.05	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
11.05	85.05	24.9	24.9	24.9	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5997.93

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6977.05	.8	6977.08	.84	6977.08	2.67	6977.14	2.91	6977.15
3.1	6977.15	11.17	6974.46	11.58	6974.33	12.74	6974.03	35.58	6968.32
36.71	6968.32	48.79	6968.32	61.58	6968.32	84.75	6974.12	85.58	6974.32
85.75	6974.32	90.58	6974.22						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	12.74	.04	84.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.74	84.75	50.34	50.34	50.34	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5947.6

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	6976.63	2.34	6976.56	2.56	6976.55	2.62	6976.55	2.71	6976.55
2.83	6976.51	9.91	6974.15	10.26	6974.06	33.91	6968.15	34.21	6968.15
47.18	6968.15	59.91	6968.15	83.77	6974.11	83.91	6974.15	83.94	6974.15
88.91	6974.05	90.07	6974.34	90.77	6974.31	95.08	6974.16		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.91	.04	83.77	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.91	83.77	50.74	50.74	50.74	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5896.86

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6976.17	2.88	6976.08	4.15	6976.04	4.28	6976.04	4.45	6976.04
10.55	6974	10.64	6973.97	34.22	6968.08	34.64	6967.97	35.11	6967.97
47.97	6967.97	60.64	6967.97	84.08	6973.83	84.64	6973.97	84.76	6973.97
89.64	6973.87	89.66	6973.87	91.05	6974.22	95.08	6974.12		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.64	.04	84.64	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.64	84.64	49.32	49.32	49.32	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5847.54

INPUT

Description:

Station Elevation Data   num=   19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6975.72	1.38	6975.69	1.83	6975.68	1.95	6975.68	2.16	6975.67
2.28	6975.63	7.78	6973.8	31.5	6967.87	31.78	6967.8	45.17	6967.8
57.68	6967.8	57.78	6967.8	71.83	6971.31	81.78	6973.8	86.76	6973.7
86.78	6973.7	86.85	6973.71	87.76	6973.63	93.48	6973.53		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	7.78	.04	81.78	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.78	81.78	50.34	50.34	50.34	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM   RS: 5797.19

INPUT

Description:

Station Elevation Data   num=   18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6975.51	4.27	6975.36	4.42	6975.35	4.47	6975.35	4.54	6975.35
4.57	6975.34	9.71	6973.62	9.82	6973.6	25.6	6969.65	33.71	6967.62
47.16	6967.62	59.47	6967.62	59.72	6967.62	83.32	6973.52	83.72	6973.62
83.8	6973.62	88.72	6973.52	88.75	6973.51				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.71	.04	83.32	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.71	83.32	49.93	49.93	49.93	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 5747.26

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6975.26	2.91	6975.17	3.14	6975.16	3.2	6975.16	3.32	6975.16
8.41	6973.46	8.45	6973.45	32.43	6967.45	32.45	6967.45	34.69	6967.45
45.96	6967.45	58.45	6967.45	58.61	6967.49	82.45	6973.45	87.38	6973.35
87.45	6973.35	87.48	6973.34						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	8.41	.04	82.45	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8.41	82.45	49.94	49.94	49.94	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5697.32

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6975.21	3.56	6975.12	3.85	6975.11	3.93	6975.11	4.08	6975.11
9.53	6973.29	9.58	6973.27	33.51	6967.29	33.58	6967.27	44.79	6967.27
47.15	6967.27	59.48	6967.27	59.58	6967.27	59.68	6967.3	83.58	6973.27
88.52	6973.17	88.58	6973.17						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.58	.04	83.58	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.58	83.58	50.96	50.96	50.96	.1	.3

CROSS SECTION

```
RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 5646.36

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6974.82    1.49 6974.77    2.18 6974.75    3.01 6974.73    3.27 6974.64
    7.92 6973.09    9.04 6972.81   31.92 6967.09   45.54 6967.09   56.97 6967.09
   57.92 6967.09   81.16 6972.91   81.92 6973.09   82.07 6973.09   86.92 6972.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045    9.04     .04   81.16    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9.04   81.16             49.7    49.7    49.7             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 5596.65

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6974.98     .61 6974.95    2.43 6974.87    2.62 6974.86    2.86 6974.85
    2.95 6974.82    8.65 6972.92    9.06 6972.82   32.65 6966.92   33.27 6966.92
   46.33 6966.92   58.65 6966.92    59.4 6967.11   82.65 6972.92   87.46 6972.82
   87.65 6972.82   87.77 6972.79

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045    9.06     .04   82.65    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9.06   82.65            49.95   49.95   49.95             .1       .3
```

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5546.7

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6975.24	3.2	6975.09	4.64	6975.03	4.79	6975.02	4.98	6975.01
5.08	6974.98	11.78	6972.74	35.27	6966.87	35.78	6966.74	49.52	6966.74
61.05	6966.74	61.78	6966.74	62.47	6966.92	85.78	6972.74	90.6	6972.65
90.78	6972.64								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	11.78	.04	85.78	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
11.78	85.78	49.33	49.33	49.33	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5497.37

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6974.99	3.45	6974.85	3.6	6974.84	3.64	6974.84	3.72	6974.84
3.76	6974.82	10.52	6972.57	34.45	6966.59	34.52	6966.57	34.59	6966.57
48.32	6966.57	60.52	6966.57	63.01	6967.19	84.46	6972.56	84.52	6972.57
84.53	6972.57	89.52	6972.47						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.52	.04	84.46	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.52	84.46	49.32	49.32	49.32	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5448.05

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6974.39	2.57	6974.27	3.85	6974.21	4.2	6974.19	4.76	6974.17
5.02	6974.08	10.05	6972.4	10.97	6972.17	34.05	6966.4	47.91	6966.4
59.39	6966.4	60.05	6966.4	83.59	6972.28	84.05	6972.4	88.96	6972.3
89.06	6972.3	89.18	6972.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.97	.04	83.59	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.97	83.59	50.15	50.15	50.15	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5397.9

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6973.62	2.95	6973.49	4.01	6973.44	4.3	6973.44	4.81	6973.42
4.91	6973.38	8.39	6972.22	9.03	6972.06	32.39	6966.22	46.3	6966.22
57.83	6966.22	58.39	6966.22	81.94	6972.11	82.39	6972.22	82.48	6972.22
87.39	6972.12								

```
Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045    9.03     .04   81.94    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9.03   81.94             49.15   49.15   49.15             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 5348.75

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6974.19      .6 6974.16    2.52 6974.08    3.05 6974.05    4.05 6974.01
    9.63 6972.15    9.92 6972.05   32.52  6966.4   33.92 6966.05   35.44 6966.05
   47.89 6966.05   59.92 6966.05   61.25 6966.38   83.92 6972.05   88.66 6971.96
   88.92 6971.95

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045    9.92     .04   83.92    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9.92   83.92             51.73   51.73   51.73             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 5297.02

INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6974.75    1.96 6974.68    3.67 6974.62    3.84 6974.61    4.05  6974.6
    4.18 6974.56   12.25 6971.87   35.93 6965.95   36.25 6965.87    36.6 6965.87
```

50.28	6965.87	62.25	6965.87	85.99	6971.81	86.25	6971.87	91.2	6971.77
91.25	6971.77	98.08	6973.48	98.17	6973.5	99.45	6973.49	104.67	6973.42

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	12.25	.04	85.99	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.25	85.99	48.95	48.95	48.95	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5248.07

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6974.53	4.15	6974.51	4.62	6974.5	4.76	6974.5	4.98	6974.5
5.16	6974.44	13.38	6971.7	13.91	6971.56	37.39	6965.7	51.48	6965.7
62.56	6965.7	63.39	6965.7	86.51	6971.48	87.39	6971.7	87.57	6971.69
92.39	6971.6	92.74	6971.69	105.01	6974.75	108.26	6974.74		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	13.91	.04	86.51	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
13.91	86.51	49.93	49.93	49.93	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5198.14

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6973.86	4.44	6973.84	5.57	6973.83	5.89	6973.83	6.4	6973.83
6.69	6973.73	13.32	6971.52	36.5	6965.73	37.32	6965.52	38.2	6965.52
51.47	6965.52	63.32	6965.52	64.07	6965.71	87.32	6971.52	92.18	6971.43
92.32	6971.42	98.62	6973	98.91	6973.07	103.07	6973.05		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	13.32	.04	87.32	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
13.32	87.32	50.88	50.88	50.88	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5147.26

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6972.44	8.82	6972.26	9.64	6972.24	12.38	6971.32	12.9	6971.14
36.13	6965.3	36.91	6965.1	37.5	6965.1	40.92	6965.1	51.11	6965.08
62.71	6965.06	62.91	6965.06	86.53	6970.93	86.91	6971.02	91.82	6970.91
91.91	6970.91	91.96	6970.92	92.23	6970.99	93.7	6970.98	95.22	6970.96

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	12.9	.04	86.53	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.9	86.53	12.18	12.18	12.18	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5135.07

```
INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6971.75     1.9 6971.71    3.55 6971.68    12.8 6968.57   14.18 6968.11
   23.76  6965.7   38.18 6962.06   48.29 6962.04    52.4 6962.03   64.18 6962.01
   73.27 6964.26   88.18 6967.96   90.04 6967.92   93.18 6967.85    93.2 6967.85
  103.29 6970.36  103.84 6970.35  107.58 6970.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   14.18     .04   88.18    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         14.18   88.18             9.79    9.79    9.79              .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 5125.28

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6971.22     .39 6971.22     2.5 6971.24    3.66  6971.2    3.73 6971.19
    3.77 6971.19    4.03 6971.18   19.12 6966.15   19.31 6966.09   19.76 6965.98
   43.32 6960.09   44.77 6960.09   57.55 6960.09   69.32 6960.09   90.52 6965.39
   93.33 6966.09   97.54    6966   98.33 6965.99  101.55 6966.79  113.91 6969.88
  114.02 6969.88  114.27 6969.88  114.28 6969.88  115.04 6969.87

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   19.76     .04   93.33    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         19.76   93.33            21.27   21.27   21.27              .1       .3

CROSS SECTION
```

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5104.02

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6969.3	4.95	6969.12	7.02	6969.05	14.96	6966.4	16.13	6966.02
36.3	6960.97	40.13	6960.01	53.07	6960.01	61.5	6960.01	66.13	6960.01
85.13	6964.77	90.12	6966.01	91.49	6965.99	95.12	6965.91	99.43	6966.99
109.06	6969.39	109.12	6969.39	109.41	6969.39	109.69	6969.39	109.95	6969.39
110.07	6969.39	110.17	6969.39	111.27	6969.39				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	16.13	.04	90.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
16.13	90.12	26.62	26.62	26.62	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 5077.4

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6968.63	.68	6968.57	1.55	6968.5	9.4	6967.39	13.89	6966.61
22	6965.66	22.51	6965.61	31.31	6964.96	32.67	6964.86	32.7	6964.86
33.62	6964.63	52.46	6959.92	65.88	6959.92	78.42	6959.92	78.46	6959.92
78.51	6959.93	91.82	6963.23	95.78	6964.18	104.75	6966.39	106.04	6966.75
108.39	6967.37	113.64	6968.71	113.66	6968.71				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	32.7	.04	95.78	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
32.7	95.78	31.96	31.96	31.96	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 5045.44

INPUT
Description:
Station Elevation Data   num=   20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6966.58	1	6966.29	16.5	6961.71	23.18	6961.88	32.89	6962.11
48.78	6962.08	65.99	6962.04	71.55	6960.65	74.91	6959.81	87.35	6959.81
90.19	6959.81	100.91	6959.81	108.83	6961.78	113.43	6962.94	120.31	6964.64
128.84	6966.8	129.52	6966.83	131.49	6966.94	135.79	6967.17	137.42	6967.26

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	16.5	.04	108.83	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
16.5	108.83	32.44	32.44	32.44	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 5013

INPUT
Description:
Station Elevation Data   num=   19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6965.08	9.6	6963.68	26.04	6961.99	26.61	6961.93	34.14	6961.91
36.34	6961.83	41.42	6960.59	45.12	6959.69	56.11	6959.7	56.63	6959.7
64.81	6959.71	72	6959.72	76.17	6960.72	80.12	6961.68	85.97	6963.07
93.9	6964.95	94.44	6965.07	95.1	6965.2	95.22	6965.22		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	36.34	.04	80.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
36.34	80.12	37.54	37.54	37.54	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4975.46

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6966.08	38.49	6963.58	54	6961.82	54.36	6961.8	54.81	6961.69
63.38	6959.57	71.3	6959.57	74.14	6959.57	75.86	6959.57	80.43	6959.57
89.06	6959.58	89.61	6959.58	89.7	6959.6	89.83	6959.63	90.38	6959.77
99.95	6962.13	104.34	6963.22	111.19	6963.43	118.77	6963.24	121.11	6963.48
125.8	6963.63	150	6965.22						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	38.49	.04	104.34	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38.49	104.34	50.04	50.04	50.04	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4925.42

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6965.1	4.49	6964.91	14.11	6964.28	28.72	6963.12	45.08	6961.83
66.68	6958.45	67.88	6958.26	72.91	6957.97	75.23	6957.84	81.59	6957.48

83.44	6957.78	105.7	6961.57	120.79	6962.71	134.68	6963.68	150	6964.1

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	45.08	.04	105.7	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45.08	105.7	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4875.34

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6963.99	12.58	6963.53	20.95	6963.2	27.05	6962.33	36.46	6961.09
59.75	6957.96	71.58	6956.48	75.25	6956.2	76.29	6956.13	77.28	6956.08
80.6	6956.68	100.6	6959.86	126.33	6962.03	150	6963.76		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	20.95	.04	126.33	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
20.95	126.33	50.29	50.29	50.29	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4825.05

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6961.95	34.39	6959.99	54.42	6958.91	58.9	6957.85	72.94	6954.52

73.41	6954.5	76.05	6954.44	77.22	6954.55	88.32	6956.31	97.52	6957.97
111.09	6958.96	131.03	6960.59	146.87	6962.04	150	6962.13		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	54.42	.04	111.09	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
54.42	111.09	49.96	49.96	49.96	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4775.09

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6961.31	9.2	6960.57	44.01	6958.08	59.83	6954.92	68.81	6953.23
73.95	6953.15	76.25	6953.12	79.12	6953.16	91.93	6955.91	95.94	6956.94
100.1	6956.93	150	6959.04						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	44.01	.04	95.94	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
44.01	95.94	50.64	50.64	50.64	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4724.45

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
       0  6959.3   35.51 6958.34   38.45 6958.32   40.25 6958.17   43.73 6957.56
   72.32  6952.5   73.46  6952.3   75.36 6952.24   77.32 6952.32   89.26 6955.07
   96.38 6956.45  105.11  6956.9  123.28 6956.85  137.41 6956.83     150 6957.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   40.25     .04   96.38    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         40.25   96.38            51.51   51.51   51.51              .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 4672.94

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6959.12    6.21 6958.93   26.86 6957.79   46.91 6956.53   55.57 6954.93
   70.54 6952.06    72.9 6951.61    75.6 6951.58   77.45 6951.54   84.09 6952.97
   93.45 6955.07   97.28 6955.56   135.4 6956.48  143.04 6956.78  144.21 6956.78
  145.18 6956.78  147.21 6956.91     150 6957.05

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   46.91     .04   97.28    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         46.91   97.28            49.67   49.67   49.67              .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 4623.27

INPUT
Description:
```

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6956.44	5.23	6956.23	9.7	6956.05	11.8	6955.97	13.75	6955.88
15.98	6955.77	17.47	6955.75	19.19	6955.69	39.69	6954.03	39.7	6954.03
40.7	6953.88	57.45	6950.92	59.62	6950.54	62.99	6950.73	63.73	6950.75
68.59	6951.79	81.56	6954.29	100.82	6955.21	110.86	6955.88	117.25	6955.97
128.49	6956.29	136.54	6956.52						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	39.7	.04	81.56	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.7	81.56	48.25	48.25	48.25	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4575.02

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6956.26	1.83	6956.11	4.72	6955.85	11.44	6955.16	22.53	6954.54
39.04	6953.33	39.05	6953.33	60.56	6950.2	67.66	6949.26	68.1	6949.28
68.33	6949.29	71.51	6949.23	78.98	6950.86	88.89	6953.25	99.86	6954.11
104.06	6954.54	107.26	6954.49	144.24	6954.44				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	39.05	.04	88.89	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.05	88.89	35.78	35.78	35.78	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 4524.43

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-19.62	6956.38	-14.58	6955.15	-7.44	6954.41	-2.52	6953.9	-1.17	6953.76
-.55	6953.7	.08	6953.58	.51	6953.51	.8	6953.45	1.01	6953.42
1.03	6953.41	4.59	6953.1	32.71	6950.05	45.89	6948.46	50.82	6948.09
52.9	6948.2	54.39	6948.55	68.43	6951.89	73.31	6953.09	77.76	6953.27
85.19	6953.66	96.43	6954.18	108.86	6954.27				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-19.62	.045	4.59	.04	73.31	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4.59	73.31	63.64	63.64	63.64	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4475.61

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
33.56	6958.43	46.11	6955.1	55.02	6952.74	69.08	6947.9	75.54	6947.96
76.98	6947.94	77.38	6948	83.71	6948.98	107.55	6952.53	110.42	6952.62
126.61	6953.03	127.51	6953.05						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
33.56	.045	46.11	.04	107.55	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
46.11	107.55	51.08	51.08	51.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4424.53

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
32.4	6956.66	40.72	6954.27	44.76	6953.11	59.82	6949.04	67.84	6946.93
69.43	6946.6	73	6946.49	73.94	6946.47	76.07	6946.4	92.54	6950.97
95.79	6951.81	96.62	6952	96.83	6952.11	97.62	6952.03	126.53	6952.85
150	6952.58								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
32.4	.045	40.72	.04	96.83	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
40.72	96.83	50.02	50.02	50.02	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4374.51

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
28.44	6954.28	28.75	6954.24	30.7	6953.58	32.99	6952.89	39.34	6951.26
61.79	6945.49	66.88	6945	74.35	6945	85.85	6945	98.66	6947.84
116.08	6951.7	117.76	6952.07	118.42	6952.08	119.36	6952.07	150	6952.35

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
28.44	.045	39.34	.04	98.66	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.34	98.66	58.66	58.66	58.66	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 4315.85

INPUT
Description:
Station Elevation Data   num=   17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
20.28	6951.56	26.7	6951.42	33.91	6949.65	37.33	6948.81	53.33	6944.89
55.87	6944.88	63.8	6944.88	65.95	6944.88	92.16	6944.86	92.5	6944.94
101.14	6947.05	118.32	6951.25	118.64	6951.32	120.8	6951.85	121.16	6951.86
129.93	6952.12	150	6951.75						

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
20.28	.045	37.33	.04	101.14	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.33	101.14	54.22	54.22	54.22	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 4261.63

INPUT
Description:
Station Elevation Data   num=   16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
30.19	6949.01	34.7	6949.6	35.35	6949.44	37.1	6949	54.41	6944.7
66.07	6944.71	83.69	6944.71	92.5	6944.72	92.59	6944.72	94.11	6945.1
102.47	6947.18	112.24	6949.62	114.5	6950.18	118.65	6950.2	139.58	6950.43
150	6950.54								

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
30.19	.045	37.1	.04	102.47	.045

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.

37.1	102.47		14.74	14.74	14.74	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 4246.89

INPUT
Description:
Station Elevation Data   num=   16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4.95	6949.3	6.85	6948.82	23.48	6944.66	25	6944.66	37.92	6944.66
43.73	6944.66	43.86	6944.66	44	6944.66	59.6	6944.63	61.48	6944.62
61.58	6944.6	62.9	6944.92	80.14	6948.84	83.18	6949.48	86.23	6949.49
92.48	6949.49								

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
4.95	.045	6.85	.04	80.14	.045

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.

6.85	80.14		19.05	19.05	19.05	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 4227.84

INPUT
Description:
Station Elevation Data   num=   9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7.14	6945.21	19.57	6941.59	27.33	6939.95	41.28	6939.96	44.13	6939.96
65.33	6939.96	73.42	6941.98	102.88	6949.35	105.23	6949.34		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val

7.14	.045	7.14	.04	73.42	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.14	73.42	15.37	15.37	15.37	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 4212.47

INPUT
Description:
Station Elevation Data   num=   19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.6	6942.15	30.53	6942.05	31.61	6942.05	31.64	6942.05	31.77	6942.02
31.92	6942.04	32.46	6941.88	32.8	6941.77	40.17	6939.85	51.1	6937.01
68.22	6937.01	83.35	6937.01	89.1	6937.01	92.5	6937.91	125.68	6946.65
136.2	6949.29	138.26	6949.3	148.71	6949.28	150	6949.27		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
15.6	.045	31.61	.04	125.68	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
31.61	125.68	46.77	46.77	46.77	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 4166.74

INPUT
Description:
Station Elevation Data   num=   26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
18.15	6943.53	26.49	6943.57	33.17	6943.61	36.8	6942.81	42.61	6941.52
59.15	6937.38	61.23	6936.87	66.82	6936.87	78.27	6936.87	92.51	6936.87
99.24	6936.87	100.86	6937.27	142.76	6947.75	142.91	6947.77	144.35	6948.38
144.49	6948.38	144.9	6948.39	145.32	6948.4	145.74	6948.4	146.16	6948.41

146.59	6948.41	147.02	6948.41	147.46	6948.42	147.9	6948.42	148.34	6948.42
150.14	6948.44								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
18.15	.045	36.8	.04	142.76	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
36.8	142.76	13.78	13.78	13.78	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4151.92

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1.58	6944.75	14	6941.83	19.81	6940.54	24.05	6939.48	34.7	6936.82
36.79	6936.82	52.06	6936.82	64.48	6936.82	72.7	6936.82	83.34	6939.48
92.5	6941.77	93.36	6941.98	94.72	6942.19	107.88	6947.78	109.2	6947.84
113.01	6947.94	116.9	6947.97	120.86	6948	124.89	6948.04	126.86	6948.05

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1.58	.045	14	.04	92.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
14	92.5	15.92	15.92	15.92	.3	.5

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4136

INPUT
Description:
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6943.34	4.65	6943.76	7.68	6944.25	11.51	6944.35	20.53	6944.7
21.47	6944.74	21.69	6944.75	22.23	6944.62	41.22	6941.91	43.44	6941.94
54.33	6943.31	54.44	6943.77	54.47	6943.88	54.7	6943.92	55.6	6944.05
55.72	6937.44	55.74	6937.35	56.12	6937.26	58.03	6936.78	64.42	6936.78
66.8	6936.78	75.05	6936.78	96.03	6936.78	97.9	6937.25	98.31	6937.35
98.34	6937.44	98.46	6944.05	99.35	6943.92	99.59	6943.88	99.62	6943.77
99.73	6943.3	115.44	6942.42	126.76	6947.17	127.87	6947.22	131	6947.3
140.42	6947.38	143.55	6947.4	146.64	6947.43	149.68	6947.45	150	6947.45

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	56.12	.013	97.9	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
56.12	97.9	125.44	125.44	125.44	.3	.5

CULVERT

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4073

INPUT
Description:
Distance from Upstream XS = 39.21
Deck/Roadway Width = 47.87
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 116

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-133.85	6948.14	0	-130.68	6948.06	0	-130.54	6948.05	0
-130.4	6948.05	0	-123.71	6947.88	0	-123.55	6947.87	0
-123.54	6947.87	0	-123.14	6947.86	0	-123.07	6947.86	0
-120.28	6947.79	0	-116.65	6947.7	0	-116.55	6947.7	0
-116.54	6947.7	0	-115.88	6947.68	0	-109.7	6947.53	0
-109.56	6947.53	0	-105.51	6947.44	0	-105.42	6947.43	0
-102.62	6947.37	0	-102.56	6947.37	0	-102.47	6947.37	0
-98.56	6947.28	0	-95.61	6947.22	0	-95.56	6947.22	0
-88.68	6947.07	0	-88.56	6947.07	0	-81.67	6946.93	0
-81.55	6946.93	0	-74.65	6946.8	0	-74.55	6946.8	0

-73.57	6946.78	0	-73.55	6946.78	0	-67.63	6946.68	0
-67.55	6946.68	0	-60.63	6946.57	0	-60.55	6946.56	0
-53.61	6946.46	0	-53.55	6946.46	0	-53.51	6946.46	0
-48.55	6946.39	0	-46.57	6946.36	0	-46.55	6946.36	0
-39.59	6946.27	0	-39.55	6946.27	0	-32.57	6946.18	0
-32.55	6946.18	0	-25.56	6946.11	0	-25.55	6946.11	0
-23.55	6946.08	0	-21.69	6946.07	0	-18.56	6946.04	0
-18.55	6946.04	0	-11.55	6945.97	0	-11.53	6945.97	0
-4.55	6945.92	0	-4.53	6945.92	0	1.45	6945.88	0
2.45	6945.87	0	2.49	6945.87	0	9.45	6945.83	0
9.5	6945.83	0	16.45	6945.8	0	16.52	6945.8	0
23.45	6945.77	0	23.48	6945.77	0	26.45	6945.76	0
30.39	6945.76	0	30.45	6945.76	0	30.54	6945.76	0
37.45	6945.75	0	41.66	6945.74	0	41.73	6945.74	0
41.78	6945.74	0	44.45	6945.74	0	44.57	6945.74	0
51.45	6945.75	0	51.58	6945.75	0	58.45	6945.76	0
58.6	6945.76	0	65.45	6945.79	0	65.61	6945.79	0
72.45	6945.81	0	72.55	6945.82	0	76.45	6945.83	0
79.37	6945.85	0	79.45	6945.85	0	79.64	6945.85	0
81.02	6945.86	0	86.45	6945.9	0	86.64	6945.9	0
93.45	6945.95	0	93.64	6945.95	0	100.45	6946.01	0
100.47	6946.01	0	101.45	6946.02	0	101.55	6946.02	0
105.26	6946.06	0	105.82	6946.06	0	126.45	6946.27	0
127.09	6946.27	0	151.45	6946.51	0	152.06	6946.52	0
176.45	6946.76	0	177.04	6946.77	0	201.45	6947.01	0
202.02	6947.02	0	213.4	6947.13	0	226.45	6947.26	0
226.99	6947.27	0	251.45	6947.51	0	251.95	6947.51	0
276.45	6947.76	0	276.9	6947.76	0	301.45	6948.01	0
301.86	6948.01	0	309.04	6948.08	0			

Upstream Bridge Cross Section Data
Station Elevation Data   num=   40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6943.34	4.65	6943.76	7.68	6944.25	11.51	6944.35	20.53	6944.7
21.47	6944.74	21.69	6944.75	22.23	6944.62	41.22	6941.91	43.44	6941.94
54.33	6943.31	54.44	6943.77	54.47	6943.88	54.7	6943.92	55.6	6944.05
55.72	6937.44	55.74	6937.35	56.12	6937.26	58.03	6936.78	64.42	6936.78
66.8	6936.78	75.05	6936.78	96.03	6936.78	97.9	6937.25	98.31	6937.35
98.34	6937.44	98.46	6944.05	99.35	6943.92	99.59	6943.88	99.62	6943.77
99.73	6943.3	115.44	6942.42	126.76	6947.17	127.87	6947.22	131	6947.3
140.42	6947.38	143.55	6947.4	146.64	6947.43	149.68	6947.45	150	6947.45

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	56.12	.013	97.9	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
56.12	97.9	.3	.5

Downstream Deck/Roadway Coordinates
num= 116

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-134.4	6948.14	0	-131.23	6948.06	0	-131.09	6948.05	0
-130.95	6948.05	0	-124.26	6947.88	0	-124.1	6947.87	0
-124.09	6947.87	0	-123.69	6947.86	0	-123.62	6947.86	0
-120.83	6947.79	0	-117.2	6947.7	0	-117.1	6947.7	0
-117.09	6947.7	0	-116.43	6947.68	0	-110.25	6947.53	0
-110.11	6947.53	0	-106.06	6947.44	0	-105.97	6947.43	0
-103.17	6947.37	0	-103.11	6947.37	0	-103.02	6947.37	0
-99.11	6947.28	0	-96.16	6947.22	0	-96.11	6947.22	0
-89.23	6947.07	0	-89.11	6947.07	0	-82.22	6946.93	0
-82.1	6946.93	0	-75.2	6946.8	0	-75.1	6946.8	0
-74.12	6946.78	0	-74.1	6946.78	0	-68.18	6946.68	0
-68.1	6946.68	0	-61.18	6946.57	0	-61.1	6946.56	0
-54.16	6946.46	0	-54.1	6946.46	0	-54.06	6946.46	0
-49.1	6946.39	0	-47.12	6946.36	0	-47.1	6946.36	0
-40.14	6946.27	0	-40.1	6946.27	0	-33.12	6946.18	0
-33.1	6946.18	0	-26.11	6946.11	0	-26.1	6946.11	0
-24.1	6946.08	0	-22.24	6946.07	0	-19.11	6946.04	0
-19.1	6946.04	0	-12.1	6945.97	0	-12.08	6945.97	0
-5.1	6945.92	0	-5.08	6945.92	0	.9	6945.88	0
1.9	6945.87	0	1.94	6945.87	0	8.9	6945.83	0
8.95	6945.83	0	15.9	6945.8	0	15.97	6945.8	0
22.9	6945.77	0	22.93	6945.77	0	25.9	6945.76	0
29.84	6945.76	0	29.9	6945.76	0	29.99	6945.76	0
36.9	6945.75	0	41.11	6945.74	0	41.18	6945.74	0
41.23	6945.74	0	43.9	6945.74	0	44.02	6945.74	0
50.9	6945.75	0	51.03	6945.75	0	57.9	6945.76	0
58.05	6945.76	0	64.9	6945.79	0	65.06	6945.79	0
71.9	6945.81	0	72	6945.82	0	75.9	6945.83	0
78.82	6945.85	0	78.9	6945.85	0	79.09	6945.85	0
80.47	6945.86	0	85.9	6945.9	0	86.09	6945.9	0

92.9	6945.95	0	93.09	6945.95	0	99.9	6946.01	0
99.92	6946.01	0	100.9	6946.02	0	101	6946.02	0
104.71	6946.06	0	105.27	6946.06	0	125.9	6946.27	0
126.54	6946.27	0	150.9	6946.51	0	151.51	6946.52	0
175.9	6946.76	0	176.49	6946.77	0	200.9	6947.01	0
201.47	6947.02	0	212.85	6947.13	0	225.9	6947.26	0
226.44	6947.27	0	250.9	6947.51	0	251.4	6947.51	0
275.9	6947.76	0	276.35	6947.76	0	300.9	6948.01	0
301.31	6948.01	0	308.49	6948.08	0			

Downstream Bridge Cross Section Data
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6945.08	1.53	6945.06	2.48	6944.97	7.41	6944.75	7.51	6944.75
12.38	6944.53	12.48	6944.52	12.61	6944.51	17.31	6944.29	21.85	6944.13
26.23	6943.62	29.4	6943.25	31.77	6942.61	33.63	6942.27	53.17	6942.94
53.28	6943.41	53.31	6943.51	53.54	6943.55	54.44	6943.69	54.56	6937.03
54.58	6936.94	54.94	6936.85	56.79	6936.4	58.88	6936.4	74.51	6936.4
75.79	6936.4	78.86	6936.4	94.79	6936.4	96.62	6936.85	96.98	6936.94
97	6937.03	97.12	6943.7	97.32	6943.66	98.25	6943.52	98.28	6943.41
98.4	6942.94	122.18	6943.21	124.52	6943.84	125.96	6943.87	127.43	6943.87
129.25	6943.86	135.98	6944.11	140.37	6944.08	143.66	6944.1	147.99	6944.08
150	6944.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	54.94	.04	96.62	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
54.94	96.62	.3	.5

Upstream Embankment side slope = 3 horiz. to 1.0 vertical
Downstream Embankment side slope = 3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	6	16

FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
1	120	.011	.011	0	.5	1

Number of Barrels = 2
Upstream Elevation = 6937.5
Centerline Stations

Sta.	Sta.
67	85.5

Downstream Elevation = 6936.5
Centerline Stations

Sta.	Sta.
67	85.5

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4010.56

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6945.08	1.53	6945.06	2.48	6944.97	7.41	6944.75	7.51	6944.75
12.38	6944.53	12.48	6944.52	12.61	6944.51	17.31	6944.29	21.85	6944.13
26.23	6943.62	29.4	6943.25	31.77	6942.61	33.63	6942.27	53.17	6942.94
53.28	6943.41	53.31	6943.51	53.54	6943.55	54.44	6943.69	54.56	6937.03
54.58	6936.94	54.94	6936.85	56.79	6936.4	58.88	6936.4	74.51	6936.4
75.79	6936.4	78.86	6936.4	94.79	6936.4	96.62	6936.85	96.98	6936.94
97	6937.03	97.12	6943.7	97.32	6943.66	98.25	6943.52	98.28	6943.41
98.4	6942.94	122.18	6943.21	124.52	6943.84	125.96	6943.87	127.43	6943.87
129.25	6943.86	135.98	6944.11	140.37	6944.08	143.66	6944.1	147.99	6944.08
150	6944.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	54.94	.04	96.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
54.94	96.62	8.99	8.99	8.99	.3	.5

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 4001.57

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6945.21	3.74	6945.15	11.79	6944.39	13.92	6944.3	14.57	6944.27
17.27	6944.15	17.81	6944.09	18.55	6944.01	20.88	6943.9	23.14	6943.83
25.31	6943.57	26.89	6943.39	38.91	6940.17	39.21	6940.11	42.35	6940.22
42.37	6940.3	42.49	6940.73	43.44	6940.88	43.63	6940.91	43.65	6939.56
43.77	6939.11	44.02	6939.05	54.92	6936.38	65.53	6936.38	72.11	6936.38
73.92	6936.38	89.52	6936.38	92.92	6936.38	103.83	6939.05	104.07	6939.11
104.19	6939.55	104.21	6940.91	105.19	6940.76	105.35	6940.74	105.47	6940.3
105.49	6940.22	109.33	6940.27	121.26	6943.46	124.17	6943.53	126.92	6943.52
130.05	6943.5	133.09	6943.49	136.04	6943.48	138.91	6943.46	141.7	6943.45
150	6943.42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	44.02	.04	103.83	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
44.02	103.83	30.39	30.39	30.39	.3	.5

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3971.12

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6944.52	8.95	6944.09	17.21	6943.79	18.4	6943.71	18.96	6943.67
23.19	6943.34	35.37	6940.3	42.21	6938.59	51.48	6936.28	60.36	6936.28
70.95	6936.29	71.49	6936.29	84.17	6936.29	89.59	6936.29	101.56	6939.28
110.82	6941.59	115.8	6942.83	117.79	6942.83	125.91	6942.79	150	6942.86

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	35.37	.04	110.82	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
35.37	110.82	36.9	36.9	36.9	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3934.28

INPUT
Description:
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6943.74	19.5	6943	21.78	6942.81	23.61	6942.59	25.44	6942.5
25.67	6942.48	26.29	6942.45	27.77	6942.38	33.52	6942.08	40.37	6941.65
49.63	6939.36	50.22	6939.21	62.45	6936.17	72.81	6936.17	81.8	6936.17
84.93	6936.17	87.92	6936.18	95	6936.18	100.74	6936.18	109.14	6938.26
111.53	6938.84	117.56	6940.35	119.3	6940.78	122.37	6941.11	128.43	6941.78
130.03	6941.95	130.99	6942	133.11	6942.09	150	6942.35		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	49.63	.04	117.56	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
49.63	117.56	50.78	50.78	50.78	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 3883.5

INPUT

Description:

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6943.2	2.46	6943.22	33.41	6939.86	35.37	6939.67	36.6	6939.52
39.71	6939.33	45.47	6939.13	52.98	6938.93	58.14	6937.65	64.68	6936.04
71.55	6936.03	73.66	6936.03	79.41	6936.03	80.98	6936.03	83.75	6936.03
87.1	6936.03	90.85	6936.03	92.74	6936.02	103.06	6936.02	105.91	6936.73
107.03	6937.01	109.59	6937.64	112.81	6937.65	113.66	6937.66	114.33	6937.66
129.2	6937.61	148.46	6937.5	151.59	6937.21	153.38	6937.13	156.56	6937.91
171.58	6942.04	176.24	6942.19	190.37	6942.59				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	52.98	.04	156.56	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
52.98	156.56	50.3	50.3	50.3	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 3833.2

INPUT

Description:

Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6942.16	3.34	6941.79	16.12	6941.2	44.4	6939.51	45.87	6939.43
46.22	6939.41	47.38	6939.35	48.21	6939.3	56.35	6937.27	61.02	6936.11
61.91	6935.89	75.41	6935.88	79.35	6935.88	79.69	6935.88	80.96	6935.88
82.4	6935.88	82.99	6935.88	90.23	6935.88	100.05	6935.88	104.3	6936.94
105.69	6937.29	105.87	6937.35	108.18	6937.39	123.96	6937.2	133.88	6935.31
149.05	6939.25	156.89	6941.24	161.79	6941.36				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	48.21	.04	149.05	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.21	149.05	50.43	50.43	50.43	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3782.77

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6940.08	23.83	6938.59	26.75	6938.1	27.41	6938.02	31.79	6937.43
34.91	6936.64	39.02	6935.9	41.7	6935.42	43.32	6935.41	58.12	6935
58.22	6934.99	63.76	6934.44	64.69	6934.35	66.28	6934.68	67.06	6935
71.73	6935.38	75.33	6935.53	83.44	6937.16	88.43	6937.54	90.78	6938.12
90.82	6938.12	93.1	6937.56	107.51	6934.66	127	6938.71	132.8	6939.83
140	6940.13								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	23.83	.04	132.8	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
23.83	132.8	49.78	49.78	49.78	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3732.99

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6939.47	22.93	6938.4	39.82	6937.64	64.36	6934.46	73.16	6933.26
73.77	6933.18	76.31	6933.49	86.66	6934.62	92.06	6934.61	95.12	6934.69
103.76	6934.62	132.38	6934.34	155.38	6938.15	162.61	6939.21	169.1	6939.38

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  170.59 6939.42

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   22.93     .04  162.61    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         22.93  162.61            50.16   50.16   50.16             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 3682.83

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6938.96   13.37 6938.69   28.67  6938.2   70.27  6932.3   72.56 6931.94
    72.8  6931.9   74.04  6932.1   88.79 6933.84   92.58 6934.15   96.39 6934.03
  121.74 6933.67   137.6 6933.46  148.44 6933.23   164.2 6936.02  181.52 6938.72
  185.99 6938.82

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   28.67     .04  181.52    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         28.67  181.52            51.33   51.33   51.33             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 3631.5

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

0	6938.16	15.4	6937.92	21.77	6937.78	43.82	6934.93	72.63	6931.2
72.68	6931.2	76.28	6931.74	89.29	6933.63	104.89	6934.34	113.84	6934.54
126.98	6934.36	154.1	6932.43	160.15	6933.47	184.83	6938.29	190.1	6938.48

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	21.77	.04	184.83	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21.77	184.83	48.71	48.71	48.71	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3582.8

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6937.62	3.4	6937.62	12.79	6937.38	31.35	6936.43	41.1	6935.11
72.3	6930.64	72.71	6930.58	85.12	6931.53	99.12	6932.37	109.14	6933.33
125.17	6934.55	145.22	6931.88	153.89	6930.85	173.12	6935.35	181.06	6937.1
185.24	6937.26	194.98	6937.42						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	0	.04	181.06	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	181.06	50.14	50.14	50.14	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3532.66

INPUT
Description:

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6935.9	5.33	6935.73	37.55	6934.96	49.84	6933.13	73.26	6929.49
73.68	6929.51	95.34	6930.85	104.54	6931.6	109.72	6931.57	122.26	6931.76
135.86	6930.75	147.9	6929.91	163.85	6933.22	175.35	6935.76	179.76	6935.87

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	37.55	.04	175.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.55	175.35	50.09	50.09	50.09	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3482.57

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6935.09	15.01	6935.25	28.58	6934.15	35.27	6933.7	49.03	6931.78
74.87	6928.8	75.13	6928.82	88.97	6930.15	92.89	6930.24	97.98	6929.93
111.92	6929.62	120.37	6928.86	136.63	6932.23	146.26	6934.93	150	6934.42

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	15.01	.04	146.26	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
15.01	146.26	50.1	50.1	50.1	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3432.47

INPUT

Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6934.04	12.09	6933.79	12.83	6933.78	16.91	6933.02	34.95	6931.31
65.27	6928.75	75.11	6928.49	78.87	6928.39	88.93	6927.99	98.97	6930.78
107.19	6932.75	109.55	6932.86	114.68	6933.1	140.81	6933.36	150	6933.46

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	12.09	.04	109.55	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.09	109.55	49.93	49.93	49.93	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3382.53

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6933.24	17.69	6932.69	60.53	6928.38	63.35	6928.09	63.87	6928.07
72.11	6927.78	80.87	6927.47	86.02	6928.04	105.87	6929.71	122.83	6930.24
177.44	6932.03	180.28	6932.01						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	17.69	.04	177.44	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
17.69	177.44	50.18	50.18	50.18	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3332.36

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6932.77	3.8	6932.72	5.77	6932.69	7.36	6932.6	35.04	6931.32
58.71	6927.57	67.53	6926.42	69.95	6926.44	73.15	6926.54	81.57	6926.79
98.39	6928.03	119.22	6929.56	143.64	6930.24	162.24	6930.68	169.23	6930.91

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	35.04	.04	162.24	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
35.04	162.24	50.21	50.21	50.21	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3282.15

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6931.17	1.46	6931.16	44.98	6930.18	48.76	6929.8	64.02	6925.77
69.23	6924.78	72.51	6924.96	73.78	6925.03	84.98	6925.91	105.49	6927.36
128.8	6929.31	141.49	6929.55	185.07	6931.08	185.49	6931.08	192	6931.06

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	44.98	.04	128.8	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
44.98	128.8	49.89	49.89	49.89	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3232.26

INPUT
Description:
Station Elevation Data   num=   15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6929.55	4.97	6929.53	22.77	6929.02	50.59	6928.45	55.37	6927.16
70.4	6923.75	74.08	6924.06	77.53	6924.34	81.44	6924.74	88.07	6925.55
122.82	6929.1	123.27	6929.11	155.02	6929.73	171.66	6930.38	173.05	6930.4

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	50.59	.04	122.82	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
50.59	122.82	50.17	50.17	50.17	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM   RS: 3182.09

INPUT
Description:
Station Elevation Data   num=   14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6928.69	16.79	6928.61	37.89	6927.96	47.88	6927.46	61.58	6925.2
70.66	6923.44	75.17	6923.29	75.47	6923.28	79.54	6923.32	108.39	6927.73
109.33	6927.91	114.48	6928.1	140.39	6929.05	150	6929.31		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	47.88	.04	109.33	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
47.88	109.33	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 3132.01

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6927.49	22.24	6926.88	45.77	6926.19	52.94	6924.92	62.61	6923.15
75.17	6923.39	82.58	6923.53	93.8	6923.61	101.67	6925.21	106.55	6926.24
133.38	6928.12	144.02	6928.52	150	6928.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	45.77	.04	106.55	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45.77	106.55	49.96	49.96	49.96	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3082.04

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6928.05	38.05	6927.43	43.4	6927.16	93.94	6925.45	95.21	6925.41
96.15	6925.26	113.08	6921.99	125.32	6922.51	127.87	6922.54	149.07	6922.79
160.41	6924.83	162.73	6925.31	174.68	6926.23	189.47	6927.42	191.56	6927.56
191.58	6927.56	193.94	6927.59	200.66	6927.61				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	95.21	.04	162.73	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
95.21	162.73	49.96	49.96	49.96	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 3032.09

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6926.97	18.49	6926.3	35.86	6925.36	45.94	6924.76	61.9	6921.9
62.95	6921.72	64.44	6921.71	66.81	6921.7	72.27	6921.68	99.45	6921.56
103.57	6922.18	107.6	6922.78	107.9	6922.83	117.14	6921.62	117.24	6921.6
117.26	6921.6	117.35	6921.59	117.52	6921.57	117.53	6921.57	123.18	6921.62
123.5	6921.62	123.85	6921.63	129.48	6921.68	129.73	6921.72	136.89	6922.78
157.71	6925.89	165.78	6925.81	175.4	6925.61				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	45.94	.04	157.71	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45.94	157.71	50.18	50.18	50.18	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2981.9

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6926.94	10.46	6926.75	12.07	6926.58	28.76	6924.81	44.56	6923.42
67.71	6920.99	68.71	6920.85	69.2	6920.84	72.75	6920.77	82.31	6920.57
91.26	6922.59	98.84	6924.17	99.59	6924.18	100.45	6924.2	133.18	6924.77
138.48	6924.85	170.65	6925.36	171.52	6925.35				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	12.07	.04	100.45	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.07	100.45	50.27	50.27	50.27	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2931.64

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6926.1	18.13	6925.81	19.68	6925.79	20.08	6925.76	21.08	6925.7
40.93	6924.34	62.31	6920.25	64.23	6919.84	65.4	6919.86	72.78	6919.94
79.78	6920.01	89.4	6921.77	95.22	6922.65	166.18	6924.46	175.43	6924.7
179.51	6924.79								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	40.93	.04	95.22	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
40.93	95.22	50.22	50.22	50.22	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2881.41

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6925.24	20.3	6924.92	22.17	6924.89	24.13	6924.76	41.82	6923.67
59.09	6919.82	61.33	6919.34	64.69	6919.34	72.92	6919.33	82.61	6919.31
94.28	6920.95	99	6921.46	183.37	6923.45	185.87	6923.51		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.045	41.82	.04	99	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
41.82	99	49.87	49.87	49.87	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2831.54

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6923.75	14.01	6923.53	32.65	6922.77	47.73	6922.24	62.37	6918.47
64.37	6917.96	70.64	6918.05	72.66	6918.07	78.56	6918.13	84.89	6918.97
98.45	6920.68	118.89	6921.29	188.61	6923.26	189.28	6923.26		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	14.01	.04	118.89	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
14.01	118.89	50.1	50.1	50.1	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2781.44

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6922.59	10.49	6922.35	37.01	6921.12	54.97	6920.34	63.84	6917.94
66.89	6917.16	75.17	6917.29	81.41	6917.39	81.5	6917.39	81.68	6917.42
98.3	6920.39	144.82	6921.51	150	6921.62				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	54.97	.04	98.3	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
54.97	98.3	50.07	50.07	50.07	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2731.38

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6921.06	2.97	6920.98	26.95	6919.62	44.36	6918.77	56.14	6917.17
59.76	6916.55	70.14	6915.93	70.26	6915.92	73.03	6915.84	78.27	6917.25
87.59	6919.98	149.06	6921.29	162.54	6921.54	175.32	6921.49	218.27	6921.33

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	44.36	.04	87.59	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
44.36	87.59	50.1	50.1	50.1	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2681.28

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6920.08	10.07	6919.86	28.38	6918.78	49.99	6917.31	60.09	6916.05
67.57	6915.26	70.91	6915.09	75.15	6914.88	77.09	6914.78	83.92	6917.05
90.44	6919.08	131.67	6919.81	150	6920.14				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.07	.04	90.44	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.07	90.44	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2631.19

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6919.2	3.3	6919.1	12.14	6918.81	18.04	6918.56	48.18	6917.64
51.78	6916.91	63.76	6914.18	67.1	6913.94	69.93	6913.83	73.42	6913.71
84.69	6916.51	90.07	6918.05	101.83	6918.14	152.13	6918.8	209.76	6918.3
213.27	6918.29	216.87	6917.85	217.08	6917.83				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	48.18	.04	90.07	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.18	90.07	51.08	51.08	51.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2580.11

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6918.26	6.74	6917.96	8.13	6917.91	9.41	6917.85	36.41	6916.26
36.83	6916.17	51.62	6913.17	57.5	6912.98	60.57	6912.9	63.17	6912.83

71.84	6915.53	76.79	6916.76	101.56	6916.8	154.82	6917.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	36.41	.04	76.79	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
36.41	76.79	49.05	49.05	49.05	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2531.06

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6918.43	13.25	6917.98	27.48	6917.37	30.62	6916.28	36.17	6915.49
61.7	6912.49	68.63	6912.49	68.87	6912.49	72.47	6912.38	86.97	6914.65
88.06	6914.77	141.53	6915.68	154.56	6915.97	176.13	6916.25	196.52	6916.51

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	27.48	.04	88.06	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
27.48	88.06	50.03	50.03	50.03	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2481.04

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6917.26	21.33	6917.34	43.19	6915.76	50.05	6915.24	58.83	6913.21

```
   65.27  6911.7   72.86 6911.55   73.69 6911.54   75.82 6911.56   81.29 6912.14
    96.3 6913.77  116.43 6914.35  183.46 6915.89  185.27 6915.94

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   21.33     .04  183.46    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         21.33  183.46            49.82   49.82   49.82             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 2431.22

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6915.25   10.77 6915.03   39.35 6914.35   46.94 6914.01   52.03 6913.79
   56.47 6912.59   67.16 6910.68    76.2  6910.7   78.84 6910.71   79.96  6910.7
   82.85  6911.1   97.61 6913.31   98.49 6913.33  116.83 6913.83     150 6914.72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   46.94     .04   98.49    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         46.94   98.49             50.3    50.3    50.3             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 2380.91

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0  6913.9     .43 6913.88    22.4 6913.14   42.22 6912.55   51.23 6911.52
   66.38 6909.67   72.38 6908.29   75.12 6907.81   75.59 6907.97   79.67 6909.31
   90.18 6912.93  130.62 6913.82     150 6914.18

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   42.22     .04   90.18    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         42.22   90.18            50.18   50.18   50.18             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 2330.73

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6913.49   15.78  6913.3   61.91 6911.47   66.32 6911.31   76.86 6910.37
   95.48 6908.73  100.28 6908.56  101.43 6908.48  104.23 6908.31  110.73 6909.36
  126.12 6911.75   135.5 6912.03  171.12  6912.6  174.35 6912.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   15.78     .04   135.5    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         15.78   135.5            50.18   50.18   50.18             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 2280.56

INPUT
Description:
Station Elevation Data    num=      17
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6911.82	21.63	6911.72	68.2	6910.1	77.81	6909.72	84.67	6908.79
89.07	6908.18	99.56	6908.29	102.09	6908.32	114.97	6908.44	120.41	6909.11
134.47	6911.06	178.67	6912.22	186.02	6912.38	191.75	6912.56	215.43	6912.97
242.12	6913.43	244.08	6913.51						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	77.81	.04	134.47	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
77.81	134.47	50.01	50.01	50.01	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2230.55

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6910.61	1.56	6910.61	23.77	6909.76	50.13	6908.84	60.48	6907.4
61.16	6907.31	62.7	6907.3	75.05	6907.38	89	6907.46	92.6	6908.02
107.95	6910.49	119.02	6910.41	150	6911.34				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	1.56	.04	107.95	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
1.56	107.95	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2180.47

INPUT

Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6909.97	8.28	6910.07	13.9	6909.74	24.43	6909.15	45.28	6908.07
57.94	6906.38	59.54	6906.18	61.87	6906.21	75.05	6906.3	88.29	6906.39
94.06	6907.33	109.9	6910.46	150	6910.88				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	8.28	.04	109.9	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8.28	109.9	50.07	50.07	50.07	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2130.39

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6909.22	5.2	6909.25	19.11	6908.3	32.48	6907.46	50.08	6905.59
53.71	6905.09	59.94	6905.13	75.13	6905.29	92.37	6905.47	103.43	6907.89
118.11	6910.41	137.07	6910.55	144.67	6910.76	150	6910.91		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	5.2	.04	118.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5.2	118.11	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2080.32

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6908.48	6.15	6908.5	10.02	6908.21	19.07	6907.14	26.74	6906.22
32.27	6905.66	49.04	6903.79	74.82	6904.43	88.43	6904.77	103.66	6905.1
122.34	6909.12	127.5	6909.92	143.26	6910.52	150	6910.74		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	6.15	.04	127.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
6.15	127.5	49.97	49.97	49.97	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 2030.34

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6907.76	9.89	6907.45	17.07	6906.74	23.21	6905.85	42.66	6903.64
45.68	6903.25	74.42	6903.7	98.82	6904.09	109.01	6904.25	110.23	6904.49
132.05	6908.89	142	6909.17	150	6909.42				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.89	.04	132.05	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.89	132.05	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1980.26

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6906.82	9.47	6906.54	20.03	6905.52	29.79	6904.81	44.84	6903.15
46.69	6902.93	50.42	6902.97	74.42	6903.16	111.98	6903.44	122.44	6905.66
132.44	6907.76	144.92	6907.83	150	6907.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.47	.04	132.44	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.47	132.44	50.02	50.02	50.02	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1930.24

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6906.83	2.6	6906.83	24.26	6906.52	57.8	6904.5	68.74	6903.96
75.6	6903.31	86.59	6902.27	109.59	6902.51	134.76	6902.78	138.55	6902.8
144.24	6903.49	165.28	6905.85	170.19	6906.05	182.84	6906.33		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	24.26	.04	170.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
24.26	170.19	50.03	50.03	50.03	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 1880.22

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6906.09	7.45	6906.08	30.5	6905.83	55.96	6904.57	83.9	6902.98
84.52	6902.93	100.86	6901.84	115.53	6901.81	129.31	6901.77	132.98	6901.8
145.61	6903.03	175.17	6905.83	188.45	6906.15				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	30.5	.04	175.17	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
30.5	175.17	50.23	50.23	50.23	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1829.99

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6904.58	10.75	6904.47	13.78	6904.31	33.62	6903.13	51.09	6902.12
52.48	6901.98	61.55	6901.26	74.51	6901.25	81.26	6901.25	88.3	6901.2
104.78	6902.72	137.72	6905.89	150	6906.25				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.75	.04	137.72	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.75	137.72	50.14	50.14	50.14	.1	.3

CROSS SECTION

```
RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 1779.84

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6903.08   10.31 6903.01   20.44 6902.68   47.13 6901.17   48.74 6901.04
   58.16 6900.25   69.18  6900.3   74.77 6900.32   93.92 6900.39  132.45  6905.6
  133.42 6905.71  133.78 6905.72  148.41 6905.96     150 6905.98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   10.31     .04  133.78    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         10.31  133.78             49.8    49.8    49.8             .1       .3

CROSS SECTION


RIVER: UT_BSC2
REACH: NCONFL-BGM         RS: 1730.05

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6903.29     .48 6903.28    2.59 6903.26   14.65 6902.96   15.17 6902.95
   50.62 6902.08   59.82  6901.9   63.99  6901.8   91.99 6900.98  103.49 6900.66
  104.95 6900.55  118.29 6899.84  138.14 6899.82  139.35 6899.82  163.67 6899.75
   193.9 6904.45  195.26 6904.65  196.13 6904.67  211.27 6904.87

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045   15.17     .04  196.13    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         15.17  196.13            49.95   49.95   49.95             .1       .3

CROSS SECTION
```

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1680.09

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6902.5	6.93	6902.99	8.14	6903.01	39.36	6901.96	42.3	6901.88
44.68	6901.82	123.09	6900.28	126.95	6900.19	131.45	6899.98	147.78	6899.58
168.39	6899.71	171.02	6899.72	193.75	6899.76	222.18	6902.98	223.04	6903.08
223.27	6903.08	242.45	6903.45	277.3	6904.2	284.5	6904.23		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	8.14	.04	223.04	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
8.14	223.04	49.91	49.91	49.91	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1630.18

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6901.82	3.92	6902.16	6.58	6902.39	12.3	6902.49	15.32	6902.55
21.1	6902.35	25.17	6902.21	51.67	6901.33	102.76	6900.15	118.11	6899.75
142.55	6898.99	157.36	6899.12	160.23	6899.28	173.9	6899.61	174.86	6899.64
188.52	6899.92	189.21	6899.93	197.93	6899.5	201.03	6899.35	218.05	6901.03
224.55	6901.7	228.53	6901.79	281.43	6902.4	294.65	6902.49		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	25.17	.04	197.93	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
25.17	197.93	50.47	50.47	50.47	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1579.72

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6901.59	2.06	6901.59	7.04	6901.57	15.57	6901.33	43.98	6900.34
66.12	6899.74	74.32	6899.49	118.46	6899.89	144.62	6899.63	166.55	6899.4
180.14	6898.93	185.57	6898.29	201.22	6899.59	206.55	6899.96	252.15	6900.82
254.18	6900.88	255.31	6900.91	259.84	6900.97				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	7.04	.04	254.18	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.04	254.18	50.28	50.28	50.28	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1529.44

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6899.88	4.45	6900.06	9.08	6900.11	32.59	6899.49	43.11	6899.21
85.62	6898.17	136.39	6897.97	148.44	6897.92	152.79	6897.91	154.06	6897.87
157.25	6897.99	202.23	6899.17	208.34	6899.21	236.29	6900.05	262.22	6900.88
275.94	6901.08								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.08	.04	262.22	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.08	262.22	49.86	49.86	49.86	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1479.58

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6898.94	10.45	6898.71	16.94	6898.13	54.66	6897.28	72.38	6897.55
92.11	6897.48	108.73	6897.41	135.95	6897.51	142.29	6897.57	144.79	6897.6
172.75	6898.08	172.79	6898.08	180.01	6898.25	214.74	6899.1	227.93	6899.3
259.53	6900.29	259.56	6900.29	266.11	6900.36				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	0	.04	259.53	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	259.53	50.17	50.17	50.17	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1429.4

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6897.37	7.1	6897.19	9.98	6897.11	13.15	6897.51	28.03	6897.92
30.39	6897.92	33.72	6897.79	64.2	6896.43	97.65	6897	111.18	6897.22
136.14	6897.73	136.58	6897.73	136.63	6897.73	137.26	6897.73	179.1	6896.36

180.25	6896.37	183.9	6896.41	185.63	6896.94	208.58	6897.29	258.32	6899.12
259.97	6899.22	265.98	6899.49	280.35	6899.49	302.4	6899.76		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	30.39	.04	265.98	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
30.39	265.98	50.22	50.22	50.22	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1379.19

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6895.62	.12	6895.61	36.32	6896.21	53.71	6896.47	75.26	6897.27
76.03	6897.29	76.07	6897.29	91.24	6896.72	97.25	6896.52	100.08	6895.77
125.33	6894.94	129.35	6894.98	135.84	6895.04	139.62	6896.21	153.34	6896.42
183.07	6897.51	193.08	6898.17	218.95	6899.32	220.94	6899.32	222.25	6899.32
229.54	6899.61	237.52	6899.45	241.42	6899.44				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	76.07	.04	218.95	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76.07	218.95	50.07	50.07	50.07	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1329.11

INPUT
Description:

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6896.76	.27	6896.77	18.93	6897.05	18.94	6897.05	25.36	6895.86
29.98	6895.69	42.08	6895.3	47.76	6893.78	55.5	6893.53	62.37	6893.6
71.69	6893.68	77.52	6895.48	82.03	6895.55	91.81	6895.91	110.15	6897.11
119.33	6897.52	130.14	6897.52	137.2	6897.5	159.37	6898.4	175.32	6898.97

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	18.93	.04	119.33	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
18.93	119.33	50.05	50.05	50.05	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1279.06

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6895.52	2.98	6895.69	11.3	6896.14	21.38	6895.92	37.79	6893.21
45.21	6891.73	57.32	6891.49	62.54	6889.74	62.55	6889.74	66.21	6889.28
69.25	6889.35	74.59	6889.28	85.9	6889.13	91.38	6892.02	96.92	6892.54
127.41	6893.56	129.81	6893.59	137.69	6895.62	140.07	6895.68	144.43	6895.79
146.08	6895.8	147.85	6896.16	150	6896.19				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	21.38	.04	137.69	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21.38	137.69	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2

REACH: NCONFL-BGM RS: 1228.98

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6894.35	2.29	6894.47	7.64	6894.85	25.6	6893.42	34.28	6893.23
42.32	6891.9	45.96	6891.17	51.88	6891.06	54.44	6890.2	54.45	6890.2
65.86	6888.78	74.59	6888.96	75.36	6888.98	85.1	6888.85	88.31	6890.54
104.84	6892.1	123.12	6892.71	129.88	6892.8	134.6	6894.01	141.16	6894.17
150	6894.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	7.64	.04	134.6	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.64	134.6	50.08	50.08	50.08	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1178.9

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6894.08	36.66	6892.64	38.75	6892.52	40.72	6892.49	42.5	6891.63
42.59	6889.77	45.59	6890.58	47.79	6890.64	47.8	6890.64	48.4	6890.41
65.51	6888.27	74.59	6888.46	81.47	6888.61	84.3	6888.57	85.23	6889.07
112.76	6891.66	118.83	6891.86	129.94	6892	131.5	6892.4	142.26	6892.66
150	6892.85								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	36.66	.04	131.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
36.66	131.5	50.31	50.31	50.31	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1128.6

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6894.04	2.72	6894.07	9.98	6893.64	21.21	6891.55	25.74	6891.01
35.28	6889.26	55.82	6886.35	62.27	6885.25	67.09	6885.33	72.15	6885.37
82.05	6885.45	123.13	6886.62	131.01	6888.31	159.52	6889.99	175.93	6890.37
182.4	6890.4	182.62	6890.41	183.5	6890.43	186.85	6890.52		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	9.98	.04	175.93	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9.98	175.93	50.13	50.13	50.13	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1078.47

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6893.38	7.97	6893.47	11.03	6893.11	43.57	6887.14	55.97	6885.38
59.86	6884.72	71.3	6884.91	74.21	6884.96	82.63	6885.03	105.76	6885.69
124.96	6889.81	142.19	6890.83	178.29	6891.67	192.54	6891.73	193.02	6891.75
194.96	6891.8	199.21	6891.91						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	7.97	.04	178.29	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
7.97	178.29	49.85	49.85	49.85	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1028.62

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6892.12	10.03	6892.05	13.94	6892.08	15.76	6892.37	40.21	6887.63
40.39	6887.58	54.33	6885.03	58.63	6884.41	59.99	6884.18	72.98	6884.41
83.82	6884.59	85.74	6884.61	91.01	6884.76	121.46	6891.3	127.47	6891.66
171.48	6892.68								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	15.76	.04	127.47	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
15.76	127.47	50.16	50.16	50.16	.1	.3

CROSS SECTION

RIVER: UT_BSC2
REACH: NCONFL-BGM RS: 1000

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6891.49	.07	6891.49	.14	6891.5	.21	6891.5	23.83	6891.84
23.89	6891.84	34.15	6892.35	39.06	6892.57	49.95	6893.05	49.99	6893.05
50.98	6892.86	61.86	6883.24	74.44	6883.37	88.74	6883.52	89.47	6883.54
96.33	6887.01	106.4	6892.11	113.12	6892.47	113.15	6892.47	114.07	6892.45
122.35	6892.06	150	6892.54						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	39.06	.04	96.33	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.06	96.33	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:UT_BSC2

Reach	River Sta.	n1	n2	n3
NCONFL-BGM	6115.07	.045	.04	.045
NCONFL-BGM	6072.11	.045	.04	.045
NCONFL-BGM	6022.84	.045	.04	.045
NCONFL-BGM	5997.93	.045	.04	.045
NCONFL-BGM	5947.6	.045	.04	.045
NCONFL-BGM	5896.86	.045	.04	.045
NCONFL-BGM	5847.54	.045	.04	.045
NCONFL-BGM	5797.19	.045	.04	.045
NCONFL-BGM	5747.26	.045	.04	.045
NCONFL-BGM	5697.32	.045	.04	.045
NCONFL-BGM	5646.36	.045	.04	.045
NCONFL-BGM	5596.65	.045	.04	.045
NCONFL-BGM	5546.7	.045	.04	.045
NCONFL-BGM	5497.37	.045	.04	.045
NCONFL-BGM	5448.05	.045	.04	.045
NCONFL-BGM	5397.9	.045	.04	.045
NCONFL-BGM	5348.75	.045	.04	.045
NCONFL-BGM	5297.02	.045	.04	.045
NCONFL-BGM	5248.07	.045	.04	.045
NCONFL-BGM	5198.14	.045	.04	.045
NCONFL-BGM	5147.26	.045	.04	.045
NCONFL-BGM	5135.07	.045	.04	.045
NCONFL-BGM	5125.28	.045	.04	.045
NCONFL-BGM	5104.02	.045	.04	.045
NCONFL-BGM	5077.4	.045	.04	.045

NCONFL-BGM	5045.44	.045	.04	.045
NCONFL-BGM	5013	.045	.04	.045
NCONFL-BGM	4975.46	.045	.04	.045
NCONFL-BGM	4925.42	.045	.04	.045
NCONFL-BGM	4875.34	.045	.04	.045
NCONFL-BGM	4825.05	.045	.04	.045
NCONFL-BGM	4775.09	.045	.04	.045
NCONFL-BGM	4724.45	.045	.04	.045
NCONFL-BGM	4672.94	.045	.04	.045
NCONFL-BGM	4623.27	.045	.04	.045
NCONFL-BGM	4575.02	.045	.04	.045
NCONFL-BGM	4524.43	.045	.04	.045
NCONFL-BGM	4475.61	.045	.04	.045
NCONFL-BGM	4424.53	.045	.04	.045
NCONFL-BGM	4374.51	.045	.04	.045
NCONFL-BGM	4315.85	.045	.04	.045
NCONFL-BGM	4261.63	.045	.04	.045
NCONFL-BGM	4246.89	.045	.04	.045
NCONFL-BGM	4227.84	.045	.04	.045
NCONFL-BGM	4212.47	.045	.04	.045
NCONFL-BGM	4166.74	.045	.04	.045
NCONFL-BGM	4151.92	.045	.04	.045
NCONFL-BGM	4136	.045	.013	.045
NCONFL-BGM	4073	Culvert		
NCONFL-BGM	4010.56	.045	.04	.045
NCONFL-BGM	4001.57	.045	.04	.045
NCONFL-BGM	3971.12	.045	.04	.045
NCONFL-BGM	3934.28	.045	.04	.045
NCONFL-BGM	3883.5	.045	.04	.045
NCONFL-BGM	3833.2	.045	.04	.045
NCONFL-BGM	3782.77	.045	.04	.045
NCONFL-BGM	3732.99	.045	.04	.045
NCONFL-BGM	3682.83	.045	.04	.045
NCONFL-BGM	3631.5	.045	.04	.045
NCONFL-BGM	3582.8	.045	.04	.045
NCONFL-BGM	3532.66	.045	.04	.045
NCONFL-BGM	3482.57	.045	.04	.045
NCONFL-BGM	3432.47	.045	.04	.045
NCONFL-BGM	3382.53	.045	.04	.045
NCONFL-BGM	3332.36	.045	.04	.045
NCONFL-BGM	3282.15	.045	.04	.045

NCONFL-BGM	3232.26	.045	.04	.045
NCONFL-BGM	3182.09	.045	.04	.045
NCONFL-BGM	3132.01	.045	.04	.045
NCONFL-BGM	3082.04	.045	.04	.045
NCONFL-BGM	3032.09	.045	.04	.045
NCONFL-BGM	2981.9	.045	.04	.045
NCONFL-BGM	2931.64	.045	.04	.045
NCONFL-BGM	2881.41	.045	.04	.045
NCONFL-BGM	2831.54	.045	.04	.045
NCONFL-BGM	2781.44	.045	.04	.045
NCONFL-BGM	2731.38	.045	.04	.045
NCONFL-BGM	2681.28	.045	.04	.045
NCONFL-BGM	2631.19	.045	.04	.045
NCONFL-BGM	2580.11	.045	.04	.045
NCONFL-BGM	2531.06	.045	.04	.045
NCONFL-BGM	2481.04	.045	.04	.045
NCONFL-BGM	2431.22	.045	.04	.045
NCONFL-BGM	2380.91	.045	.04	.045
NCONFL-BGM	2330.73	.045	.04	.045
NCONFL-BGM	2280.56	.045	.04	.045
NCONFL-BGM	2230.55	.045	.04	.045
NCONFL-BGM	2180.47	.045	.04	.045
NCONFL-BGM	2130.39	.045	.04	.045
NCONFL-BGM	2080.32	.045	.04	.045
NCONFL-BGM	2030.34	.045	.04	.045
NCONFL-BGM	1980.26	.045	.04	.045
NCONFL-BGM	1930.24	.045	.04	.045
NCONFL-BGM	1880.22	.045	.04	.045
NCONFL-BGM	1829.99	.045	.04	.045
NCONFL-BGM	1779.84	.045	.04	.045
NCONFL-BGM	1730.05	.045	.04	.045
NCONFL-BGM	1680.09	.045	.04	.045
NCONFL-BGM	1630.18	.045	.04	.045
NCONFL-BGM	1579.72	.045	.04	.045
NCONFL-BGM	1529.44	.045	.04	.045
NCONFL-BGM	1479.58	.045	.04	.045
NCONFL-BGM	1429.4	.045	.04	.045
NCONFL-BGM	1379.19	.045	.04	.045
NCONFL-BGM	1329.11	.045	.04	.045
NCONFL-BGM	1279.06	.045	.04	.045
NCONFL-BGM	1228.98	.045	.04	.045

NCONFL-BGM	1178.9	.045	.04	.045
NCONFL-BGM	1128.6	.045	.04	.045
NCONFL-BGM	1078.47	.045	.04	.045
NCONFL-BGM	1028.62	.045	.04	.045
NCONFL-BGM	1000	.045	.04	.045

SUMMARY OF REACH LENGTHS

River: UT_BSC2

Reach	River Sta.	Left	Channel	Right
NCONFL-BGM	6115.07	42.96	42.96	42.96
NCONFL-BGM	6072.11	49.27	49.27	49.27
NCONFL-BGM	6022.84	24.9	24.9	24.9
NCONFL-BGM	5997.93	50.34	50.34	50.34
NCONFL-BGM	5947.6	50.74	50.74	50.74
NCONFL-BGM	5896.86	49.32	49.32	49.32
NCONFL-BGM	5847.54	50.34	50.34	50.34
NCONFL-BGM	5797.19	49.93	49.93	49.93
NCONFL-BGM	5747.26	49.94	49.94	49.94
NCONFL-BGM	5697.32	50.96	50.96	50.96
NCONFL-BGM	5646.36	49.7	49.7	49.7
NCONFL-BGM	5596.65	49.95	49.95	49.95
NCONFL-BGM	5546.7	49.33	49.33	49.33
NCONFL-BGM	5497.37	49.32	49.32	49.32
NCONFL-BGM	5448.05	50.15	50.15	50.15
NCONFL-BGM	5397.9	49.15	49.15	49.15
NCONFL-BGM	5348.75	51.73	51.73	51.73
NCONFL-BGM	5297.02	48.95	48.95	48.95
NCONFL-BGM	5248.07	49.93	49.93	49.93
NCONFL-BGM	5198.14	50.88	50.88	50.88
NCONFL-BGM	5147.26	12.18	12.18	12.18
NCONFL-BGM	5135.07	9.79	9.79	9.79
NCONFL-BGM	5125.28	21.27	21.27	21.27
NCONFL-BGM	5104.02	26.62	26.62	26.62
NCONFL-BGM	5077.4	31.96	31.96	31.96
NCONFL-BGM	5045.44	32.44	32.44	32.44

NCONFL-BGM	5013	37.54	37.54	37.54
NCONFL-BGM	4975.46	50.04	50.04	50.04
NCONFL-BGM	4925.42	50.08	50.08	50.08
NCONFL-BGM	4875.34	50.29	50.29	50.29
NCONFL-BGM	4825.05	49.96	49.96	49.96
NCONFL-BGM	4775.09	50.64	50.64	50.64
NCONFL-BGM	4724.45	51.51	51.51	51.51
NCONFL-BGM	4672.94	49.67	49.67	49.67
NCONFL-BGM	4623.27	48.25	48.25	48.25
NCONFL-BGM	4575.02	35.78	35.78	35.78
NCONFL-BGM	4524.43	63.64	63.64	63.64
NCONFL-BGM	4475.61	51.08	51.08	51.08
NCONFL-BGM	4424.53	50.02	50.02	50.02
NCONFL-BGM	4374.51	58.66	58.66	58.66
NCONFL-BGM	4315.85	54.22	54.22	54.22
NCONFL-BGM	4261.63	14.74	14.74	14.74
NCONFL-BGM	4246.89	19.05	19.05	19.05
NCONFL-BGM	4227.84	15.37	15.37	15.37
NCONFL-BGM	4212.47	46.77	46.77	46.77
NCONFL-BGM	4166.74	13.78	13.78	13.78
NCONFL-BGM	4151.92	15.92	15.92	15.92
NCONFL-BGM	4136	125.44	125.44	125.44
NCONFL-BGM	4073	Culvert		
NCONFL-BGM	4010.56	8.99	8.99	8.99
NCONFL-BGM	4001.57	30.39	30.39	30.39
NCONFL-BGM	3971.12	36.9	36.9	36.9
NCONFL-BGM	3934.28	50.78	50.78	50.78
NCONFL-BGM	3883.5	50.3	50.3	50.3
NCONFL-BGM	3833.2	50.43	50.43	50.43
NCONFL-BGM	3782.77	49.78	49.78	49.78
NCONFL-BGM	3732.99	50.16	50.16	50.16
NCONFL-BGM	3682.83	51.33	51.33	51.33
NCONFL-BGM	3631.5	48.71	48.71	48.71
NCONFL-BGM	3582.8	50.14	50.14	50.14
NCONFL-BGM	3532.66	50.09	50.09	50.09
NCONFL-BGM	3482.57	50.1	50.1	50.1
NCONFL-BGM	3432.47	49.93	49.93	49.93
NCONFL-BGM	3382.53	50.18	50.18	50.18
NCONFL-BGM	3332.36	50.21	50.21	50.21
NCONFL-BGM	3282.15	49.89	49.89	49.89
NCONFL-BGM	3232.26	50.17	50.17	50.17

NCONFL-BGM	3182.09	50.08	50.08	50.08
NCONFL-BGM	3132.01	49.96	49.96	49.96
NCONFL-BGM	3082.04	49.96	49.96	49.96
NCONFL-BGM	3032.09	50.18	50.18	50.18
NCONFL-BGM	2981.9	50.27	50.27	50.27
NCONFL-BGM	2931.64	50.22	50.22	50.22
NCONFL-BGM	2881.41	49.87	49.87	49.87
NCONFL-BGM	2831.54	50.1	50.1	50.1
NCONFL-BGM	2781.44	50.07	50.07	50.07
NCONFL-BGM	2731.38	50.1	50.1	50.1
NCONFL-BGM	2681.28	50.08	50.08	50.08
NCONFL-BGM	2631.19	51.08	51.08	51.08
NCONFL-BGM	2580.11	49.05	49.05	49.05
NCONFL-BGM	2531.06	50.03	50.03	50.03
NCONFL-BGM	2481.04	49.82	49.82	49.82
NCONFL-BGM	2431.22	50.3	50.3	50.3
NCONFL-BGM	2380.91	50.18	50.18	50.18
NCONFL-BGM	2330.73	50.18	50.18	50.18
NCONFL-BGM	2280.56	50.01	50.01	50.01
NCONFL-BGM	2230.55	50.08	50.08	50.08
NCONFL-BGM	2180.47	50.07	50.07	50.07
NCONFL-BGM	2130.39	50.08	50.08	50.08
NCONFL-BGM	2080.32	49.97	49.97	49.97
NCONFL-BGM	2030.34	50.08	50.08	50.08
NCONFL-BGM	1980.26	50.02	50.02	50.02
NCONFL-BGM	1930.24	50.03	50.03	50.03
NCONFL-BGM	1880.22	50.23	50.23	50.23
NCONFL-BGM	1829.99	50.14	50.14	50.14
NCONFL-BGM	1779.84	49.8	49.8	49.8
NCONFL-BGM	1730.05	49.95	49.95	49.95
NCONFL-BGM	1680.09	49.91	49.91	49.91
NCONFL-BGM	1630.18	50.47	50.47	50.47
NCONFL-BGM	1579.72	50.28	50.28	50.28
NCONFL-BGM	1529.44	49.86	49.86	49.86
NCONFL-BGM	1479.58	50.17	50.17	50.17
NCONFL-BGM	1429.4	50.22	50.22	50.22
NCONFL-BGM	1379.19	50.07	50.07	50.07
NCONFL-BGM	1329.11	50.05	50.05	50.05
NCONFL-BGM	1279.06	50.08	50.08	50.08
NCONFL-BGM	1228.98	50.08	50.08	50.08
NCONFL-BGM	1178.9	50.31	50.31	50.31

NCONFL-BGM	1128.6	50.13	50.13	50.13
NCONFL-BGM	1078.47	49.85	49.85	49.85
NCONFL-BGM	1028.62	50.16	50.16	50.16
NCONFL-BGM	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: UT_BSC2

Reach	River Sta.	Contr.	Expan.
NCONFL-BGM	6115.07	.1	.3
NCONFL-BGM	6072.11	.1	.3
NCONFL-BGM	6022.84	.1	.3
NCONFL-BGM	5997.93	.1	.3
NCONFL-BGM	5947.6	.1	.3
NCONFL-BGM	5896.86	.1	.3
NCONFL-BGM	5847.54	.1	.3
NCONFL-BGM	5797.19	.1	.3
NCONFL-BGM	5747.26	.1	.3
NCONFL-BGM	5697.32	.1	.3
NCONFL-BGM	5646.36	.1	.3
NCONFL-BGM	5596.65	.1	.3
NCONFL-BGM	5546.7	.1	.3
NCONFL-BGM	5497.37	.1	.3
NCONFL-BGM	5448.05	.1	.3
NCONFL-BGM	5397.9	.1	.3
NCONFL-BGM	5348.75	.1	.3
NCONFL-BGM	5297.02	.1	.3
NCONFL-BGM	5248.07	.1	.3
NCONFL-BGM	5198.14	.1	.3
NCONFL-BGM	5147.26	.1	.3
NCONFL-BGM	5135.07	.1	.3
NCONFL-BGM	5125.28	.1	.3
NCONFL-BGM	5104.02	.1	.3
NCONFL-BGM	5077.4	.1	.3
NCONFL-BGM	5045.44	.1	.3
NCONFL-BGM	5013	.1	.3

NCONFL-BGM	4975.46	.1	.3
NCONFL-BGM	4925.42	.1	.3
NCONFL-BGM	4875.34	.1	.3
NCONFL-BGM	4825.05	.1	.3
NCONFL-BGM	4775.09	.1	.3
NCONFL-BGM	4724.45	.1	.3
NCONFL-BGM	4672.94	.1	.3
NCONFL-BGM	4623.27	.1	.3
NCONFL-BGM	4575.02	.1	.3
NCONFL-BGM	4524.43	.1	.3
NCONFL-BGM	4475.61	.1	.3
NCONFL-BGM	4424.53	.1	.3
NCONFL-BGM	4374.51	.1	.3
NCONFL-BGM	4315.85	.1	.3
NCONFL-BGM	4261.63	.1	.3
NCONFL-BGM	4246.89	.1	.3
NCONFL-BGM	4227.84	.1	.3
NCONFL-BGM	4212.47	.1	.3
NCONFL-BGM	4166.74	.1	.3
NCONFL-BGM	4151.92	.3	.5
NCONFL-BGM	4136	.3	.5
NCONFL-BGM	4073	Culvert	
NCONFL-BGM	4010.56	.3	.5
NCONFL-BGM	4001.57	.3	.5
NCONFL-BGM	3971.12	.1	.3
NCONFL-BGM	3934.28	.1	.3
NCONFL-BGM	3883.5	.1	.3
NCONFL-BGM	3833.2	.1	.3
NCONFL-BGM	3782.77	.1	.3
NCONFL-BGM	3732.99	.1	.3
NCONFL-BGM	3682.83	.1	.3
NCONFL-BGM	3631.5	.1	.3
NCONFL-BGM	3582.8	.1	.3
NCONFL-BGM	3532.66	.1	.3
NCONFL-BGM	3482.57	.1	.3
NCONFL-BGM	3432.47	.1	.3
NCONFL-BGM	3382.53	.1	.3
NCONFL-BGM	3332.36	.1	.3
NCONFL-BGM	3282.15	.1	.3
NCONFL-BGM	3232.26	.1	.3
NCONFL-BGM	3182.09	.1	.3

NCONFL-BGM	3132.01	.1	.3
NCONFL-BGM	3082.04	.1	.3
NCONFL-BGM	3032.09	.1	.3
NCONFL-BGM	2981.9	.1	.3
NCONFL-BGM	2931.64	.1	.3
NCONFL-BGM	2881.41	.1	.3
NCONFL-BGM	2831.54	.1	.3
NCONFL-BGM	2781.44	.1	.3
NCONFL-BGM	2731.38	.1	.3
NCONFL-BGM	2681.28	.1	.3
NCONFL-BGM	2631.19	.1	.3
NCONFL-BGM	2580.11	.1	.3
NCONFL-BGM	2531.06	.1	.3
NCONFL-BGM	2481.04	.1	.3
NCONFL-BGM	2431.22	.1	.3
NCONFL-BGM	2380.91	.1	.3
NCONFL-BGM	2330.73	.1	.3
NCONFL-BGM	2280.56	.1	.3
NCONFL-BGM	2230.55	.1	.3
NCONFL-BGM	2180.47	.1	.3
NCONFL-BGM	2130.39	.1	.3
NCONFL-BGM	2080.32	.1	.3
NCONFL-BGM	2030.34	.1	.3
NCONFL-BGM	1980.26	.1	.3
NCONFL-BGM	1930.24	.1	.3
NCONFL-BGM	1880.22	.1	.3
NCONFL-BGM	1829.99	.1	.3
NCONFL-BGM	1779.84	.1	.3
NCONFL-BGM	1730.05	.1	.3
NCONFL-BGM	1680.09	.1	.3
NCONFL-BGM	1630.18	.1	.3
NCONFL-BGM	1579.72	.1	.3
NCONFL-BGM	1529.44	.1	.3
NCONFL-BGM	1479.58	.1	.3
NCONFL-BGM	1429.4	.1	.3
NCONFL-BGM	1379.19	.1	.3
NCONFL-BGM	1329.11	.1	.3
NCONFL-BGM	1279.06	.1	.3
NCONFL-BGM	1228.98	.1	.3
NCONFL-BGM	1178.9	.1	.3
NCONFL-BGM	1128.6	.1	.3

NCONFL-BGM	1078.47	.1	.3
NCONFL-BGM	1028.62	.1	.3
NCONFL-BGM	1000	.1	.3

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	6115.07	DBPS 100-YR	1000.00	6968.73	6973.37		6973.75	0.003689	4.96	201.80	60.77	0.48
NCONFL-BGM	6115.07	DBPS 2-YR	100.00	6968.73	6970.07		6970.16	0.003548	2.41	41.51	36.20	0.40
NCONFL-BGM	6072.11	DBPS 100-YR	1000.00	6968.58	6973.23		6973.59	0.003543	4.82	207.26	63.16	0.47
NCONFL-BGM	6072.11	DBPS 2-YR	100.00	6968.58	6969.92		6970.01	0.003480	2.38	41.97	36.70	0.39
NCONFL-BGM	6022.84	DBPS 100-YR	1000.00	6968.41	6973.05		6973.42	0.003555	4.83	207.05	63.16	0.47
NCONFL-BGM	6022.84	DBPS 2-YR	100.00	6968.41	6969.75		6969.84	0.003495	2.39	41.92	36.70	0.39
NCONFL-BGM	5997.93	DBPS 100-YR	1000.00	6968.32	6972.97		6973.33	0.003552	4.83	207.08	63.14	0.47
NCONFL-BGM	5997.93	DBPS 2-YR	100.00	6968.32	6969.66		6969.75	0.003458	2.38	42.07	36.72	0.39
NCONFL-BGM	5947.6	DBPS 100-YR	1000.00	6968.15	6972.78		6973.15	0.003585	4.84	206.45	63.10	0.47
NCONFL-BGM	5947.6	DBPS 2-YR	100.00	6968.15	6969.49		6969.57	0.003515	2.39	41.84	36.69	0.39
NCONFL-BGM	5896.86	DBPS 100-YR	1000.00	6967.97	6972.60		6972.97	0.003601	4.85	206.10	63.04	0.47
NCONFL-BGM	5896.86	DBPS 2-YR	100.00	6967.97	6969.31		6969.40	0.003502	2.39	41.89	36.68	0.39
NCONFL-BGM	5847.54	DBPS 100-YR	1000.00	6967.80	6972.42		6972.79	0.003627	4.86	205.56	62.97	0.47
NCONFL-BGM	5847.54	DBPS 2-YR	100.00	6967.80	6969.13		6969.22	0.003525	2.39	41.80	36.67	0.40
NCONFL-BGM	5797.19	DBPS 100-YR	1000.00	6967.62	6972.24		6972.61	0.003641	4.87	205.26	62.92	0.48
NCONFL-BGM	5797.19	DBPS 2-YR	100.00	6967.62	6968.96		6969.05	0.003482	2.38	41.97	36.71	0.39
NCONFL-BGM	5747.26	DBPS 100-YR	1000.00	6967.45	6972.05		6972.42	0.003692	4.90	204.24	62.80	0.48
NCONFL-BGM	5747.26	DBPS 2-YR	100.00	6967.45	6968.78		6968.87	0.003542	2.40	41.74	36.67	0.40
NCONFL-BGM	5697.32	DBPS 100-YR	1000.00	6967.27	6971.86		6972.24	0.003724	4.91	203.61	62.72	0.48
NCONFL-BGM	5697.32	DBPS 2-YR	100.00	6967.27	6968.61		6968.70	0.003513	2.39	41.84	36.66	0.39
NCONFL-BGM	5646.36	DBPS 100-YR	1000.00	6967.09	6971.67		6972.05	0.003769	4.93	202.70	62.58	0.48
NCONFL-BGM	5646.36	DBPS 2-YR	100.00	6967.09	6968.43		6968.52	0.003485	2.38	41.96	36.70	0.39
NCONFL-BGM	5596.65	DBPS 100-YR	1000.00	6966.92	6971.47		6971.86	0.003850	4.97	201.18	62.40	0.49
NCONFL-BGM	5596.65	DBPS 2-YR	100.00	6966.92	6968.25		6968.34	0.003540	2.40	41.74	36.65	0.40
NCONFL-BGM	5546.7	DBPS 100-YR	1000.00	6966.74	6971.27		6971.66	0.003918	5.00	199.92	62.25	0.49
NCONFL-BGM	5546.7	DBPS 2-YR	100.00	6966.74	6968.08		6968.17	0.003510	2.39	41.85	36.66	0.39
NCONFL-BGM	5497.37	DBPS 100-YR	1000.00	6966.57	6971.07		6971.47	0.004030	5.05	197.88	61.97	0.50

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	5497.37	DBPS 2-YR	100.00	6966.57	6967.90		6967.99	0.003534	2.39	41.76	36.66	0.40
NCONFL-BGM	5448.05	DBPS 100-YR	1000.00	6966.40	6970.85		6971.26	0.004186	5.12	195.23	61.65	0.51
NCONFL-BGM	5448.05	DBPS 2-YR	100.00	6966.40	6967.73		6967.82	0.003607	2.41	41.48	36.61	0.40
NCONFL-BGM	5397.9	DBPS 100-YR	1000.00	6966.22	6970.63		6971.05	0.004372	5.20	192.18	61.24	0.52
NCONFL-BGM	5397.9	DBPS 2-YR	100.00	6966.22	6967.54		6967.64	0.003616	2.41	41.44	36.59	0.40
NCONFL-BGM	5348.75	DBPS 100-YR	1000.00	6966.05	6970.38		6970.82	0.004665	5.33	187.75	60.66	0.53
NCONFL-BGM	5348.75	DBPS 2-YR	100.00	6966.05	6967.36		6967.46	0.003729	2.44	41.03	36.51	0.41
NCONFL-BGM	5297.02	DBPS 100-YR	1000.00	6965.87	6970.09		6970.57	0.005160	5.52	181.05	59.76	0.56
NCONFL-BGM	5297.02	DBPS 2-YR	100.00	6965.87	6967.16		6967.26	0.003979	2.49	40.14	36.30	0.42
NCONFL-BGM	5248.07	DBPS 100-YR	1000.00	6965.70	6969.76		6970.29	0.006009	5.83	171.47	58.50	0.60
NCONFL-BGM	5248.07	DBPS 2-YR	100.00	6965.70	6966.94		6967.05	0.004541	2.60	38.42	35.93	0.44
NCONFL-BGM	5198.14	DBPS 100-YR	1000.00	6965.52	6969.27		6969.93	0.008206	6.52	153.37	55.95	0.69
NCONFL-BGM	5198.14	DBPS 2-YR	100.00	6965.52	6966.64		6966.77	0.006486	2.93	34.13	34.94	0.52
NCONFL-BGM	5147.26	DBPS 100-YR	1000.00	6965.06	6968.11	6968.11	6969.28	0.018207	8.65	115.62	50.26	1.01
NCONFL-BGM	5147.26	DBPS 2-YR	100.00	6965.06	6965.82	6965.82	6966.16	0.027168	4.67	21.40	31.92	1.01
NCONFL-BGM	5135.07	DBPS 100-YR	1000.00	6962.01	6965.06	6965.06	6966.23	0.018279	8.66	115.44	50.22	1.01
NCONFL-BGM	5135.07	DBPS 2-YR	100.00	6962.01	6962.77	6962.77	6963.11	0.027230	4.68	21.38	31.90	1.01
NCONFL-BGM	5125.28	DBPS 100-YR	1000.00	6960.09	6964.58		6964.98	0.004045	5.06	197.63	61.95	0.50
NCONFL-BGM	5125.28	DBPS 2-YR	100.00	6960.09	6961.44		6961.52	0.003409	2.37	42.27	36.77	0.39
NCONFL-BGM	5104.02	DBPS 100-YR	1000.00	6960.01	6964.50		6964.90	0.004083	5.08	196.89	61.81	0.50
NCONFL-BGM	5104.02	DBPS 2-YR	100.00	6960.01	6961.37		6961.45	0.003330	2.35	42.59	36.82	0.38
NCONFL-BGM	5077.4	DBPS 100-YR	1000.00	6959.92	6964.39		6964.79	0.004073	5.10	196.29	62.01	0.50
NCONFL-BGM	5077.4	DBPS 2-YR	100.00	6959.92	6961.28		6961.36	0.003307	2.34	42.72	36.92	0.38
NCONFL-BGM	5045.44	DBPS 100-YR	1200.00	6959.81	6964.42		6964.64	0.002280	3.86	324.44	112.07	0.38
NCONFL-BGM	5045.44	DBPS 2-YR	110.00	6959.81	6961.13		6961.24	0.004465	2.67	41.18	36.56	0.44
NCONFL-BGM	5013	DBPS 100-YR	1200.00	6959.69	6963.94		6964.50	0.004862	6.31	218.41	81.85	0.57
NCONFL-BGM	5013	DBPS 2-YR	110.00	6959.69	6960.98		6961.09	0.004710	2.69	40.87	37.38	0.45

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	4975.46	DBPS 100-YR	1200.00	6959.57	6962.94	6962.94	6964.12	0.018106	8.71	137.76	59.14	1.01
NCONFL-BGM	4975.46	DBPS 2-YR	110.00	6959.57	6960.35	6960.35	6960.71	0.027366	4.83	22.77	32.49	1.02
NCONFL-BGM	4925.42	DBPS 100-YR	1200.00	6957.48	6961.61	6961.61	6962.79	0.018277	8.74	137.32	59.67	1.01
NCONFL-BGM	4925.42	DBPS 2-YR	110.00	6957.48	6958.92	6958.89	6959.31	0.023306	4.99	22.03	26.47	0.96
NCONFL-BGM	4875.34	DBPS 100-YR	1200.00	6956.08	6960.42	6960.42	6961.53	0.018613	8.43	142.41	65.82	1.01
NCONFL-BGM	4875.34	DBPS 2-YR	110.00	6956.08	6957.67	6957.67	6958.10	0.025299	5.26	20.92	24.70	1.01
NCONFL-BGM	4825.05	DBPS 100-YR	1200.00	6954.44	6959.21	6959.21	6960.39	0.017174	8.71	138.85	65.33	0.99
NCONFL-BGM	4825.05	DBPS 2-YR	110.00	6954.44	6956.09	6956.09	6956.58	0.024802	5.60	19.64	20.65	1.01
NCONFL-BGM	4775.09	DBPS 100-YR	1200.00	6953.12	6958.01		6958.80	0.008565	7.24	178.59	81.37	0.72
NCONFL-BGM	4775.09	DBPS 2-YR	110.00	6953.12	6954.81		6955.02	0.008328	3.66	30.04	26.43	0.61
NCONFL-BGM	4724.45	DBPS 100-YR	1200.00	6952.24	6957.28	6957.28	6958.26	0.012348	8.11	163.35	99.99	0.85
NCONFL-BGM	4724.45	DBPS 2-YR	110.00	6952.24	6954.12		6954.46	0.014642	4.66	23.61	22.00	0.79
NCONFL-BGM	4672.94	DBPS 100-YR	1200.00	6951.54	6956.45	6956.45	6957.52	0.013431	8.40	154.91	86.82	0.89
NCONFL-BGM	4672.94	DBPS 2-YR	110.00	6951.54	6953.33		6953.68	0.015612	4.77	23.05	21.75	0.82
NCONFL-BGM	4623.27	DBPS 100-YR	1200.00	6950.54	6955.36	6955.36	6956.49	0.012392	8.73	153.46	79.89	0.87
NCONFL-BGM	4623.27	DBPS 2-YR	110.00	6950.54	6952.23	6952.23	6952.71	0.024388	5.55	19.82	20.87	1.00
NCONFL-BGM	4575.02	DBPS 100-YR	1200.00	6949.23	6953.74	6953.74	6955.00	0.016347	9.02	135.19	61.70	0.98
NCONFL-BGM	4575.02	DBPS 2-YR	110.00	6949.23	6950.79	6950.79	6951.25	0.024969	5.47	20.13	22.13	1.01
NCONFL-BGM	4524.43	DBPS 100-YR	1200.00	6948.09	6953.82		6954.24	0.004089	5.23	235.79	90.37	0.51
NCONFL-BGM	4524.43	DBPS 2-YR	110.00	6948.09	6950.29		6950.42	0.004996	2.94	37.39	31.15	0.47
NCONFL-BGM	4475.61	DBPS 100-YR	1200.00	6947.90	6952.60	6952.41	6953.73	0.014385	8.52	140.92	54.37	0.91
NCONFL-BGM	4475.61	DBPS 2-YR	110.00	6947.90	6949.31	6949.31	6949.79	0.024539	5.55	19.81	20.92	1.01
NCONFL-BGM	4424.53	DBPS 100-YR	1200.00	6946.40	6951.43	6951.43	6952.89	0.017385	9.68	124.01	43.35	1.01
NCONFL-BGM	4424.53	DBPS 2-YR	110.00	6946.40	6948.01	6948.01	6948.54	0.023821	5.81	18.93	18.15	1.00
NCONFL-BGM	4374.51	DBPS 100-YR	1200.00	6945.00	6948.73	6948.56	6949.89	0.013925	8.63	140.45	53.52	0.91
NCONFL-BGM	4374.51	DBPS 2-YR	110.00	6945.00	6946.23		6946.40	0.008205	3.36	32.70	32.45	0.59

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	4315.85	DBPS 100-YR	1200.00	6944.86	6948.68		6949.22	0.005454	5.90	207.05	69.95	0.58
NCONFL-BGM	4315.85	DBPS 2-YR	110.00	6944.86	6945.97		6946.05	0.003970	2.32	47.41	47.78	0.41
NCONFL-BGM	4261.63	DBPS 100-YR	1200.00	6944.70	6948.07	6947.51	6948.82	0.009107	6.97	173.35	65.15	0.74
NCONFL-BGM	4261.63	DBPS 2-YR	110.00	6944.70	6945.65		6945.77	0.007009	2.80	39.27	45.70	0.53
NCONFL-BGM	4246.89	DBPS 100-YR	1200.00	6944.60	6947.45	6947.45	6948.60	0.018237	8.59	139.71	61.69	1.01
NCONFL-BGM	4246.89	DBPS 2-YR	110.00	6944.60	6945.27	6945.27	6945.57	0.029145	4.39	25.06	43.37	1.02
NCONFL-BGM	4227.84	DBPS 100-YR	1200.00	6939.95	6943.16		6944.00	0.010392	7.36	164.99	63.96	0.78
NCONFL-BGM	4227.84	DBPS 2-YR	110.00	6939.95	6940.58	6940.58	6940.87	0.027710	4.32	25.47	43.49	0.99
NCONFL-BGM	4212.47	DBPS 100-YR	1200.00	6937.01	6943.63		6943.75	0.000693	2.83	439.06	98.62	0.22
NCONFL-BGM	4212.47	DBPS 2-YR	110.00	6937.01	6938.61		6938.65	0.001122	1.55	70.74	50.24	0.23
NCONFL-BGM	4166.74	DBPS 100-YR	1200.00	6936.87	6943.60		6943.72	0.000671	2.74	439.27	107.03	0.22
NCONFL-BGM	4166.74	DBPS 2-YR	110.00	6936.87	6938.57		6938.60	0.000907	1.44	76.25	51.66	0.21
NCONFL-BGM	4151.92	DBPS 100-YR	1200.00	6936.82	6943.59		6943.71	0.000589	2.77	442.11	91.52	0.21
NCONFL-BGM	4151.92	DBPS 2-YR	110.00	6936.82	6938.56		6938.59	0.000841	1.41	78.17	51.92	0.20
NCONFL-BGM	4136	DBPS 100-YR	1200.00	6936.78	6943.37	6939.74	6943.66	0.000118	4.34	307.69	84.42	0.30
NCONFL-BGM	4136	DBPS 2-YR	110.00	6936.78	6938.55	6937.39	6938.59	0.000082	1.50	74.12	42.66	0.20
NCONFL-BGM	4073		Culvert									
NCONFL-BGM	4010.56	DBPS 100-YR	1200.00	6936.40	6940.03		6941.01	0.008305	7.95	152.96	42.55	0.74
NCONFL-BGM	4010.56	DBPS 2-YR	110.00	6936.40	6937.56		6937.65	0.003210	2.30	48.20	42.46	0.38
NCONFL-BGM	4001.57	DBPS 100-YR	1200.00	6936.38	6940.17		6940.74	0.005492	6.07	198.52	62.65	0.59
NCONFL-BGM	4001.57	DBPS 2-YR	110.00	6936.38	6937.54		6937.61	0.003432	2.23	49.40	47.45	0.38
NCONFL-BGM	3971.12	DBPS 100-YR	1200.00	6936.28	6939.95		6940.55	0.006963	6.20	193.50	67.48	0.65
NCONFL-BGM	3971.12	DBPS 2-YR	110.00	6936.28	6937.43		6937.51	0.003583	2.26	48.69	47.26	0.39
NCONFL-BGM	3934.28	DBPS 100-YR	1200.00	6936.17	6939.31		6940.19	0.012132	7.51	159.89	63.60	0.83
NCONFL-BGM	3934.28	DBPS 2-YR	110.00	6936.17	6937.29		6937.37	0.003887	2.32	47.50	47.24	0.41
NCONFL-BGM	3883.5	DBPS 100-YR	1200.00	6936.02	6939.22		6939.61	0.006188	5.04	241.13	118.45	0.59
NCONFL-BGM	3883.5	DBPS 2-YR	110.00	6936.02	6937.03		6937.13	0.005545	2.59	42.40	46.44	0.48

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	3833.2	DBPS 100-YR	1200.00	6935.31	6938.74		6939.24	0.008421	5.69	210.87	96.62	0.68
NCONFL-BGM	3833.2	DBPS 2-YR	110.00	6935.31	6936.56		6936.72	0.013153	3.14	35.06	55.02	0.69
NCONFL-BGM	3782.77	DBPS 100-YR	1200.00	6934.35	6937.69	6937.69	6938.58	0.019623	7.59	158.16	88.65	1.00
NCONFL-BGM	3782.77	DBPS 2-YR	110.00	6934.35	6935.83		6936.01	0.014971	3.42	32.18	48.89	0.74
NCONFL-BGM	3732.99	DBPS 100-YR	1200.00	6933.18	6936.33	6936.33	6937.18	0.019654	7.43	161.55	94.39	1.00
NCONFL-BGM	3732.99	DBPS 2-YR	110.00	6933.18	6934.75	6934.75	6934.96	0.032470	3.69	29.83	72.71	1.02
NCONFL-BGM	3682.83	DBPS 100-YR	1200.00	6931.90	6935.81		6936.19	0.006725	4.93	243.29	117.45	0.60
NCONFL-BGM	3682.83	DBPS 2-YR	110.00	6931.90	6933.87		6933.98	0.010711	2.62	42.05	74.61	0.61
NCONFL-BGM	3631.5	DBPS 100-YR	1200.00	6931.20	6934.97	6934.89	6935.62	0.018143	6.49	184.82	124.30	0.94
NCONFL-BGM	3631.5	DBPS 2-YR	110.00	6931.20	6933.03	6932.90	6933.27	0.017222	3.91	28.10	38.73	0.81
NCONFL-BGM	3582.8	DBPS 100-YR	1200.00	6930.58	6933.84	6933.84	6934.67	0.020613	7.29	164.53	101.99	1.01
NCONFL-BGM	3582.8	DBPS 2-YR	110.00	6930.58	6931.90	6931.90	6932.21	0.028607	4.45	24.71	41.10	1.01
NCONFL-BGM	3532.66	DBPS 100-YR	1200.00	6929.49	6933.04		6933.48	0.008201	5.32	225.42	112.51	0.66
NCONFL-BGM	3532.66	DBPS 2-YR	110.00	6929.49	6930.91		6931.09	0.015203	3.38	32.53	51.01	0.75
NCONFL-BGM	3482.57	DBPS 100-YR	1200.00	6928.80	6932.77		6933.14	0.005015	4.88	245.95	96.60	0.54
NCONFL-BGM	3482.57	DBPS 2-YR	110.00	6928.80	6930.12		6930.29	0.016471	3.32	33.18	56.91	0.77
NCONFL-BGM	3432.47	DBPS 100-YR	1200.00	6927.99	6931.58	6931.58	6932.63	0.018782	8.24	145.69	70.19	1.01
NCONFL-BGM	3432.47	DBPS 2-YR	110.00	6927.99	6929.48		6929.66	0.010068	3.37	32.64	37.73	0.64
NCONFL-BGM	3382.53	DBPS 100-YR	1200.00	6927.47	6931.07	6930.84	6931.68	0.014362	6.27	191.53	114.43	0.85
NCONFL-BGM	3382.53	DBPS 2-YR	110.00	6927.47	6928.76	6928.65	6929.01	0.017373	3.97	27.72	37.87	0.82
NCONFL-BGM	3332.36	DBPS 100-YR	1200.00	6926.42	6929.91	6929.91	6930.82	0.019570	7.64	157.13	87.83	1.01
NCONFL-BGM	3332.36	DBPS 2-YR	110.00	6926.42	6927.57	6927.57	6927.92	0.027146	4.77	23.08	33.47	1.01
NCONFL-BGM	3282.15	DBPS 100-YR	1200.00	6924.78	6929.26		6929.94	0.010289	6.61	181.52	77.40	0.76
NCONFL-BGM	3282.15	DBPS 2-YR	110.00	6924.78	6926.41		6926.69	0.016573	4.26	25.81	30.44	0.82
NCONFL-BGM	3232.26	DBPS 100-YR	1200.00	6923.75	6928.61		6929.40	0.010985	7.11	169.24	75.31	0.79
NCONFL-BGM	3232.26	DBPS 2-YR	110.00	6923.75	6925.53		6925.86	0.016673	4.59	23.98	25.36	0.83

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	3182.09	DBPS 100-YR	1200.00	6923.28	6927.46	6927.46	6928.66	0.018301	8.77	136.91	58.83	1.01
NCONFL-BGM	3182.09	DBPS 2-YR	110.00	6923.28	6924.88		6925.14	0.011836	4.07	27.04	26.51	0.71
NCONFL-BGM	3132.01	DBPS 100-YR	1200.00	6923.15	6926.40	6926.40	6927.53	0.017492	8.54	141.36	70.01	0.99
NCONFL-BGM	3132.01	DBPS 2-YR	110.00	6923.15	6924.23		6924.45	0.015590	3.75	29.32	40.15	0.77
NCONFL-BGM	3082.04	DBPS 100-YR	1200.00	6921.99	6925.25	6925.25	6926.35	0.018520	8.39	142.96	66.27	1.01
NCONFL-BGM	3082.04	DBPS 2-YR	110.00	6921.99	6923.11	6923.11	6923.41	0.029020	4.37	25.15	43.61	1.02
NCONFL-BGM	3032.09	DBPS 100-YR	1200.00	6921.56	6925.59		6925.77	0.001926	3.48	349.72	124.02	0.35
NCONFL-BGM	3032.09	DBPS 2-YR	110.00	6921.56	6922.54		6922.60	0.004201	1.99	55.15	72.88	0.40
NCONFL-BGM	2981.9	DBPS 100-YR	1200.00	6920.57	6924.58	6924.44	6925.49	0.014630	7.68	159.77	91.00	0.90
NCONFL-BGM	2981.9	DBPS 2-YR	110.00	6920.57	6921.88	6921.78	6922.20	0.018527	4.50	24.44	28.89	0.86
NCONFL-BGM	2931.64	DBPS 100-YR	1200.00	6919.84	6923.82	6923.82	6924.80	0.013066	8.14	165.48	97.46	0.88
NCONFL-BGM	2931.64	DBPS 2-YR	110.00	6919.84	6921.18		6921.43	0.012203	3.98	27.65	28.74	0.71
NCONFL-BGM	2881.41	DBPS 100-YR	1200.00	6919.31	6922.77	6922.77	6923.68	0.013020	7.96	174.15	108.54	0.87
NCONFL-BGM	2881.41	DBPS 2-YR	110.00	6919.31	6920.19	6920.19	6920.55	0.026092	4.83	22.80	31.46	1.00
NCONFL-BGM	2831.54	DBPS 100-YR	1200.00	6917.96	6922.35		6922.95	0.008562	6.27	204.93	111.93	0.70
NCONFL-BGM	2831.54	DBPS 2-YR	110.00	6917.96	6919.33		6919.58	0.012884	4.05	27.19	28.69	0.73
NCONFL-BGM	2781.44	DBPS 100-YR	1200.00	6917.16	6921.43	6921.43	6922.42	0.011024	8.25	171.47	111.10	0.82
NCONFL-BGM	2781.44	DBPS 2-YR	110.00	6917.16	6918.42	6918.34	6918.78	0.019777	4.84	22.71	25.18	0.90
NCONFL-BGM	2731.38	DBPS 100-YR	1200.00	6915.84	6920.29	6920.29	6921.39	0.012911	8.68	154.74	86.78	0.88
NCONFL-BGM	2731.38	DBPS 2-YR	110.00	6915.84	6917.34	6917.29	6917.74	0.021640	5.10	21.57	23.65	0.94
NCONFL-BGM	2681.28	DBPS 100-YR	1200.00	6914.78	6919.24	6919.15	6920.22	0.016757	7.96	151.31	78.66	0.96
NCONFL-BGM	2681.28	DBPS 2-YR	110.00	6914.78	6916.41	6916.30	6916.75	0.017403	4.68	23.50	24.84	0.85
NCONFL-BGM	2631.19	DBPS 100-YR	1200.00	6913.71	6918.94	6918.94	6919.62	0.006974	7.06	235.25	208.76	0.66
NCONFL-BGM	2631.19	DBPS 2-YR	110.00	6913.71	6915.21	6915.21	6915.71	0.024890	5.66	19.45	20.21	1.02
NCONFL-BGM	2580.11	DBPS 100-YR	1200.00	6912.83	6917.63	6917.63	6918.40	0.008495	7.56	208.29	141.69	0.73
NCONFL-BGM	2580.11	DBPS 2-YR	110.00	6912.83	6914.43		6914.74	0.013388	4.46	24.64	22.90	0.76
NCONFL-BGM	2531.06	DBPS 100-YR	1200.00	6912.38	6916.16	6916.16	6916.95	0.013012	7.59	192.32	137.70	0.86

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

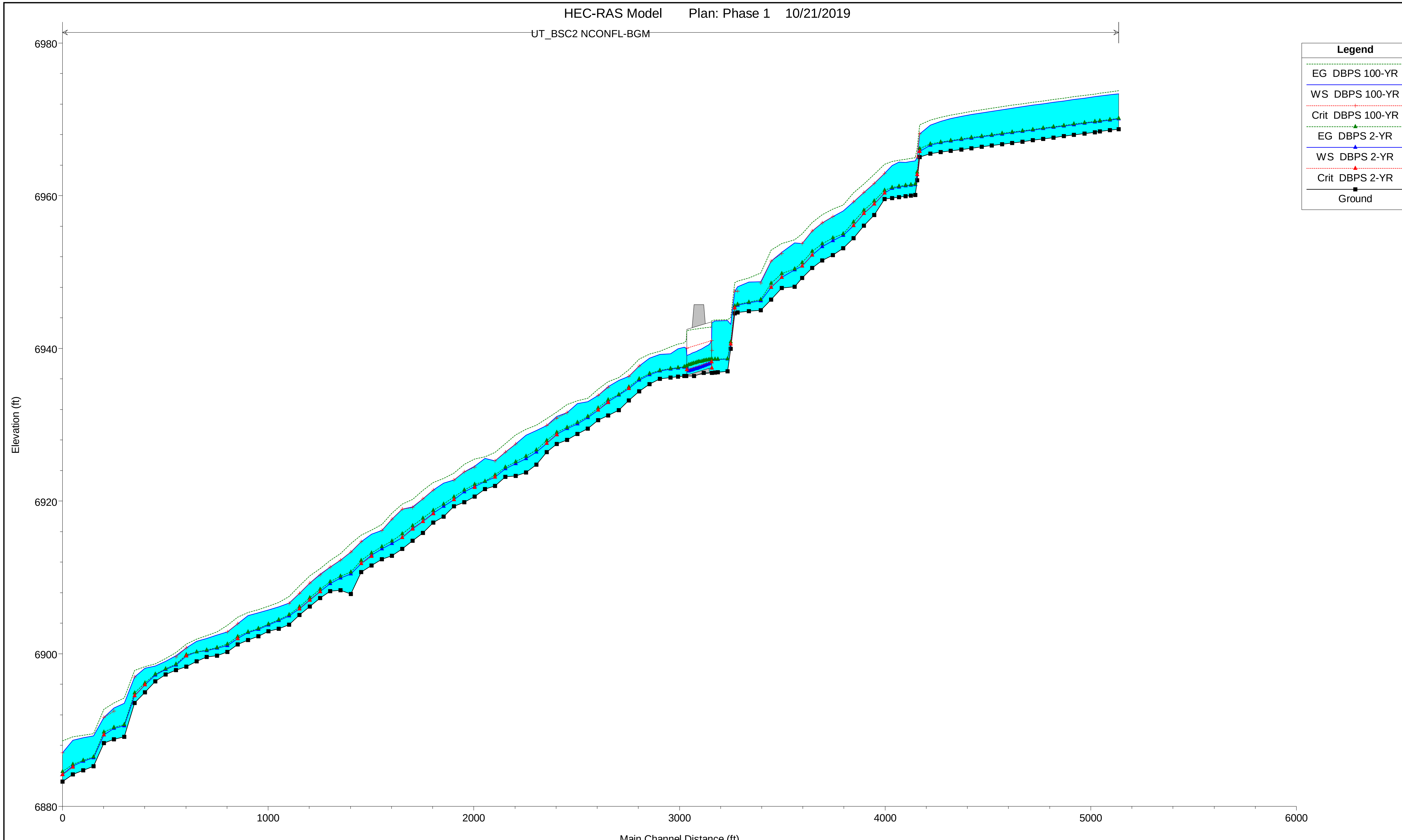
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	2531.06	DBPS 2-YR	110.00	6912.38	6913.73		6914.01	0.016188	4.27	25.78	29.88	0.81
NCONFL-BGM	2481.04	DBPS 100-YR	1200.00	6911.54	6915.67		6916.18	0.012690	5.75	208.84	129.22	0.80
NCONFL-BGM	2481.04	DBPS 2-YR	110.00	6911.54	6912.90	6912.76	6913.20	0.016146	4.36	25.22	28.17	0.81
NCONFL-BGM	2431.22	DBPS 100-YR	1200.00	6910.68	6914.65	6914.65	6915.53	0.011648	7.81	179.38	120.98	0.83
NCONFL-BGM	2431.22	DBPS 2-YR	110.00	6910.68	6911.78	6911.78	6912.19	0.025350	5.13	21.46	26.43	1.00
NCONFL-BGM	2380.91	DBPS 100-YR	1200.00	6907.81	6913.30	6913.30	6914.42	0.013530	8.57	149.99	89.62	0.89
NCONFL-BGM	2380.91	DBPS 2-YR	110.00	6907.81	6910.45		6910.69	0.008500	3.87	28.44	23.03	0.61
NCONFL-BGM	2330.73	DBPS 100-YR	1200.00	6908.31	6912.27	6912.27	6913.11	0.019039	7.37	164.26	108.72	0.99
NCONFL-BGM	2330.73	DBPS 2-YR	110.00	6908.31	6909.93		6910.17	0.012955	3.85	28.54	32.61	0.73
NCONFL-BGM	2280.56	DBPS 100-YR	1200.00	6908.18	6911.33	6911.33	6912.23	0.014125	7.91	173.49	112.17	0.90
NCONFL-BGM	2280.56	DBPS 2-YR	110.00	6908.18	6909.18		6909.41	0.017247	3.91	28.13	39.07	0.81
NCONFL-BGM	2230.55	DBPS 100-YR	1200.00	6907.30	6910.39	6910.32	6911.16	0.017664	7.03	170.74	100.15	0.95
NCONFL-BGM	2230.55	DBPS 2-YR	110.00	6907.30	6908.16	6908.11	6908.44	0.022312	4.25	25.86	38.42	0.91
NCONFL-BGM	2180.47	DBPS 100-YR	1200.00	6906.18	6909.26	6909.26	6910.22	0.019370	7.85	152.95	81.40	1.01
NCONFL-BGM	2180.47	DBPS 2-YR	110.00	6906.18	6907.06	6907.01	6907.33	0.021988	4.19	26.26	39.49	0.91
NCONFL-BGM	2130.39	DBPS 100-YR	1200.00	6905.09	6907.91	6907.91	6908.89	0.019111	7.94	151.20	78.29	1.01
NCONFL-BGM	2130.39	DBPS 2-YR	110.00	6905.09	6905.90	6905.87	6906.15	0.024745	4.04	27.20	47.15	0.94
NCONFL-BGM	2080.32	DBPS 100-YR	1200.00	6903.79	6906.62	6906.59	6907.50	0.018384	7.51	159.74	87.36	0.98
NCONFL-BGM	2080.32	DBPS 2-YR	110.00	6903.79	6904.95		6905.12	0.016687	3.30	33.29	58.19	0.77
NCONFL-BGM	2030.34	DBPS 100-YR	1200.00	6903.25	6906.14		6906.72	0.010707	6.12	196.06	97.22	0.76
NCONFL-BGM	2030.34	DBPS 2-YR	110.00	6903.25	6904.33		6904.44	0.010880	2.66	41.39	72.79	0.62
NCONFL-BGM	1980.26	DBPS 100-YR	1200.00	6902.93	6905.72		6906.21	0.008794	5.60	214.34	104.82	0.69
NCONFL-BGM	1980.26	DBPS 2-YR	110.00	6902.93	6903.77		6903.88	0.011700	2.69	40.83	74.29	0.64
NCONFL-BGM	1930.24	DBPS 100-YR	1200.00	6902.27	6905.37		6905.78	0.007578	5.11	234.64	117.71	0.64
NCONFL-BGM	1930.24	DBPS 2-YR	110.00	6902.27	6903.20		6903.32	0.010960	2.78	39.50	65.12	0.63
NCONFL-BGM	1880.22	DBPS 100-YR	1200.00	6901.77	6904.99		6905.40	0.007648	5.11	234.92	118.90	0.64
NCONFL-BGM	1880.22	DBPS 2-YR	110.00	6901.77	6902.76		6902.87	0.007330	2.62	41.92	55.85	0.53

HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

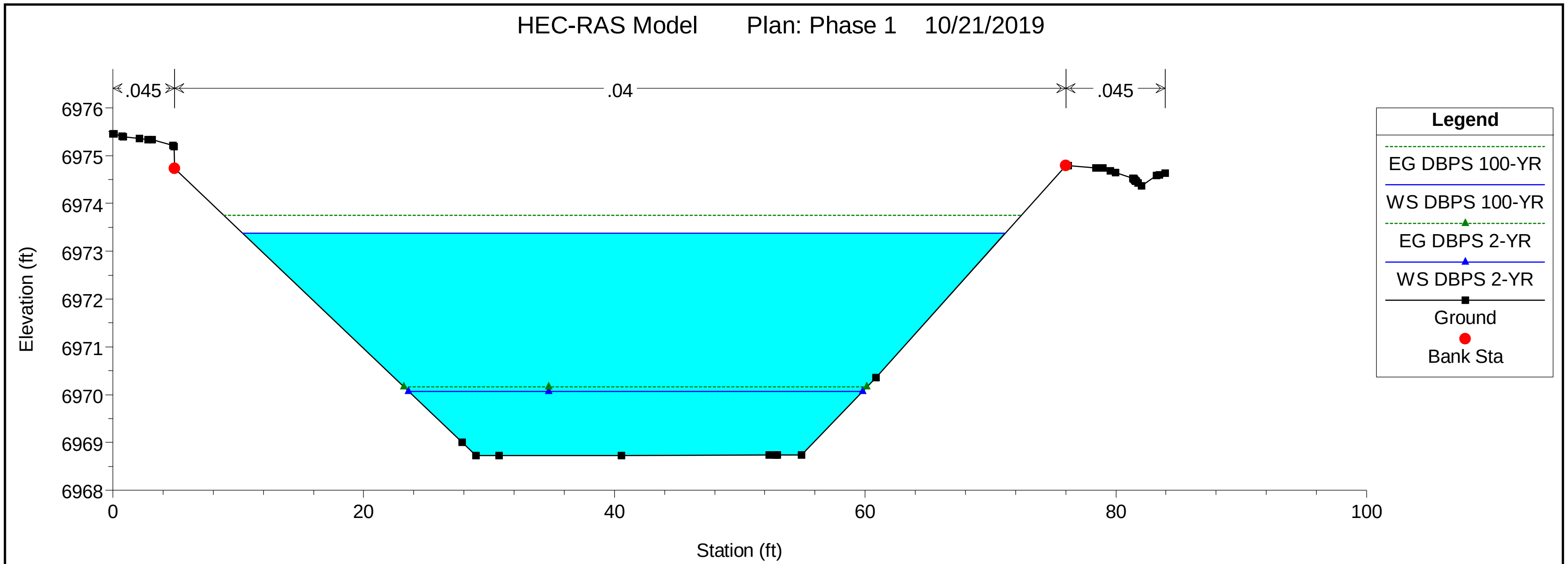
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	1829.99	DBPS 100-YR	1200.00	6901.20	6903.92	6903.92	6904.77	0.019997	7.40	162.16	96.78	1.01
NCONFL-BGM	1829.99	DBPS 2-YR	110.00	6901.20	6902.00	6901.96	6902.26	0.023055	4.04	27.20	44.74	0.91
NCONFL-BGM	1779.84	DBPS 100-YR	1200.00	6900.25	6902.86	6902.86	6903.71	0.019915	7.37	162.83	97.44	1.01
NCONFL-BGM	1779.84	DBPS 2-YR	110.00	6900.25	6901.04		6901.24	0.017446	3.56	30.92	49.99	0.80
NCONFL-BGM	1730.05	DBPS 100-YR	1200.00	6899.75	6902.45		6902.86	0.010043	5.11	234.78	145.68	0.71
NCONFL-BGM	1730.05	DBPS 2-YR	110.00	6899.75	6900.73		6900.80	0.004667	2.11	52.18	68.83	0.43
NCONFL-BGM	1680.09	DBPS 100-YR	1200.00	6899.58	6902.01		6902.35	0.009515	4.67	257.19	175.87	0.68
NCONFL-BGM	1680.09	DBPS 2-YR	110.00	6899.58	6900.41		6900.49	0.008215	2.32	47.44	82.95	0.54
NCONFL-BGM	1630.18	DBPS 100-YR	1200.00	6898.99	6901.62		6901.91	0.007632	4.42	279.28	180.86	0.62
NCONFL-BGM	1630.18	DBPS 2-YR	110.00	6898.99	6900.21		6900.25	0.002938	1.55	72.45	109.71	0.33
NCONFL-BGM	1579.72	DBPS 100-YR	1200.00	6898.29	6900.75	6900.75	6901.26	0.024561	5.71	210.12	216.11	1.02
NCONFL-BGM	1579.72	DBPS 2-YR	110.00	6898.29	6899.70	6899.70	6899.88	0.034904	3.39	32.41	94.69	1.02
NCONFL-BGM	1529.44	DBPS 100-YR	1200.00	6897.87	6899.75	6899.59	6900.16	0.015690	5.11	234.64	203.58	0.84
NCONFL-BGM	1529.44	DBPS 2-YR	110.00	6897.87	6898.52		6898.62	0.015562	2.54	43.25	106.37	0.70
NCONFL-BGM	1479.58	DBPS 100-YR	1200.00	6897.28	6898.98		6899.38	0.015545	5.04	238.17	209.83	0.83
NCONFL-BGM	1479.58	DBPS 2-YR	110.00	6897.28	6897.94		6898.00	0.009845	1.99	55.23	139.07	0.56
NCONFL-BGM	1429.4	DBPS 100-YR	1200.00	6896.36	6898.38		6898.68	0.011352	4.48	276.02	238.21	0.72
NCONFL-BGM	1429.4	DBPS 2-YR	110.00	6896.36	6897.19		6897.30	0.020221	2.71	40.65	113.38	0.79
NCONFL-BGM	1379.19	DBPS 100-YR	1200.00	6894.94	6898.11		6898.30	0.004586	3.66	342.88	192.20	0.49
NCONFL-BGM	1379.19	DBPS 2-YR	110.00	6894.94	6895.91	6895.91	6896.18	0.023867	4.24	27.75	57.40	0.94
NCONFL-BGM	1329.11	DBPS 100-YR	1200.00	6893.53	6896.94	6896.94	6897.82	0.018928	7.55	159.91	99.41	0.99
NCONFL-BGM	1329.11	DBPS 2-YR	110.00	6893.53	6894.47	6894.47	6894.85	0.025809	4.96	22.18	29.07	1.00
NCONFL-BGM	1279.06	DBPS 100-YR	1200.00	6889.13	6893.49		6894.18	0.012935	6.68	179.69	89.18	0.83
NCONFL-BGM	1279.06	DBPS 2-YR	110.00	6889.13	6890.54		6890.72	0.007497	3.44	31.98	28.42	0.57
NCONFL-BGM	1228.98	DBPS 100-YR	1200.00	6888.78	6892.87	6892.47	6893.53	0.012767	6.53	183.66	93.67	0.82
NCONFL-BGM	1228.98	DBPS 2-YR	110.00	6888.78	6890.20		6890.35	0.006846	3.15	34.91	33.21	0.54

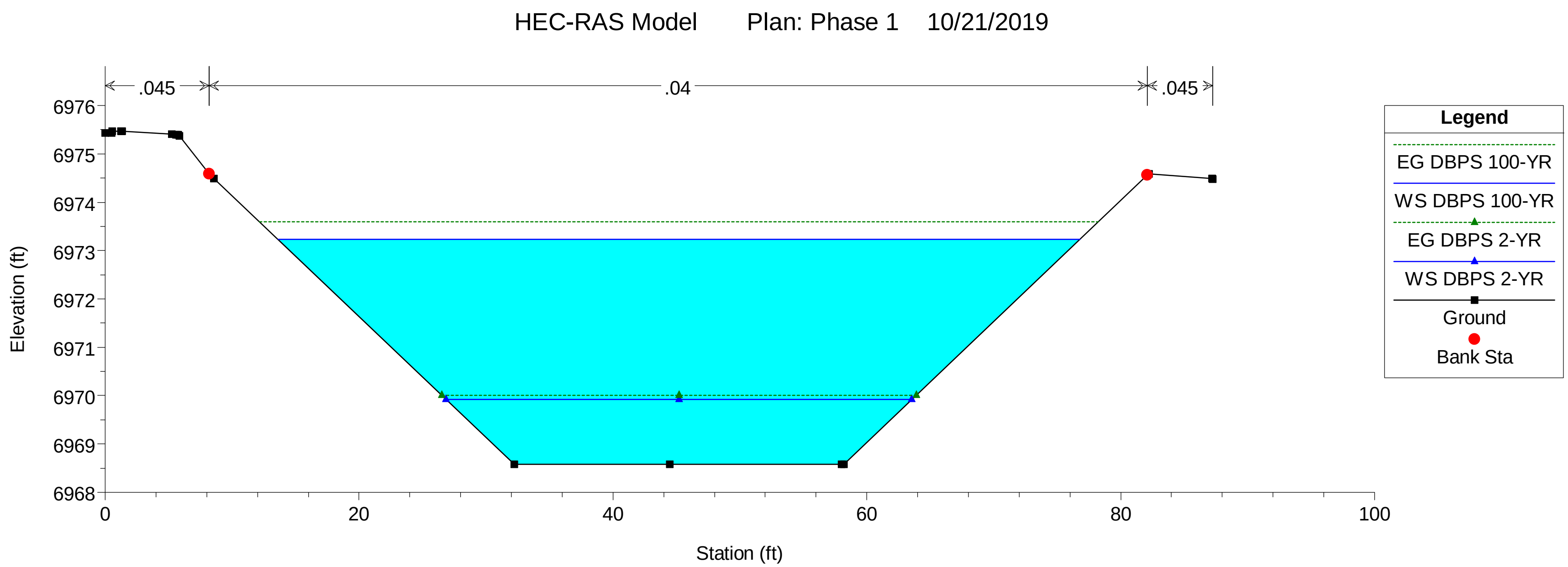
HEC-RAS Plan: Phase 1 River: UT_BSC2 Reach: NCONFL-BGM (Continued)

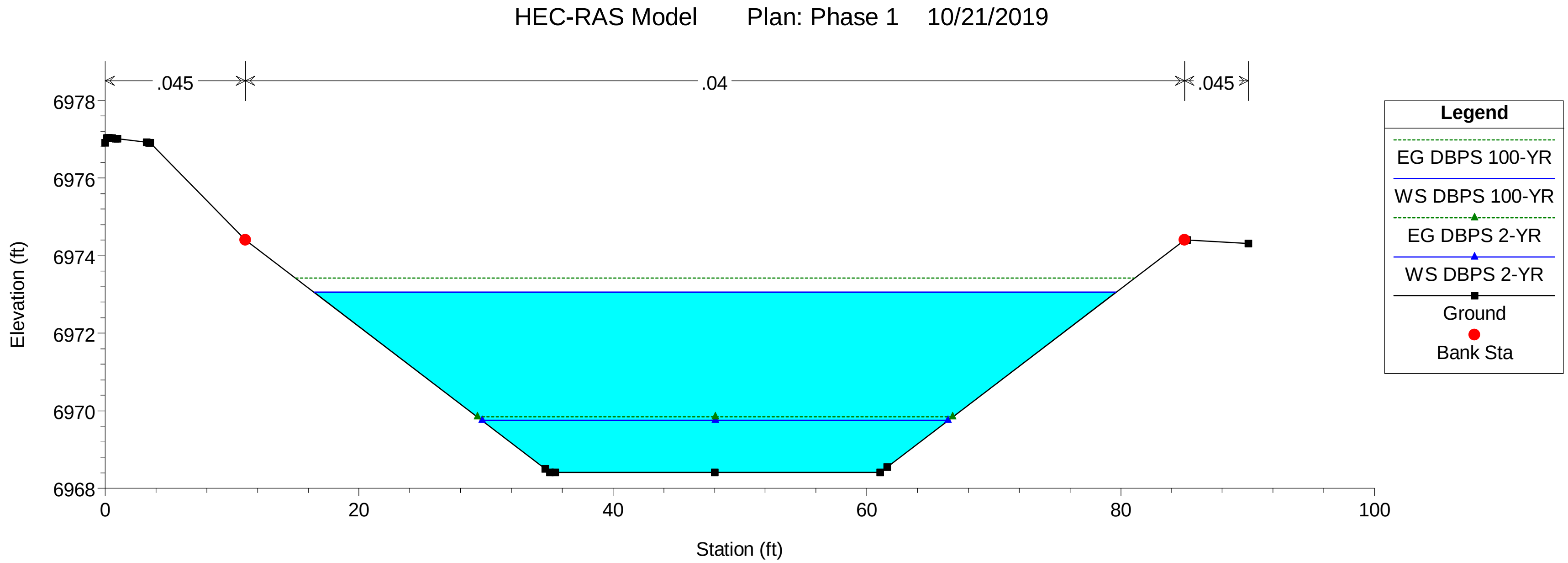
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
NCONFL-BGM	1178.9	DBPS 100-YR	1200.00	6888.27	6891.67	6891.67	6892.72	0.019273	8.20	146.30	70.62	1.00
NCONFL-BGM	1178.9	DBPS 2-YR	110.00	6888.27	6889.36	6889.36	6889.73	0.026689	4.85	22.69	31.58	1.01
NCONFL-BGM	1128.6	DBPS 100-YR	1200.00	6885.25	6889.22		6889.51	0.003936	4.30	279.14	110.91	0.48
NCONFL-BGM	1128.6	DBPS 2-YR	110.00	6885.25	6886.37		6886.50	0.010484	2.86	38.41	58.67	0.62
NCONFL-BGM	1078.47	DBPS 100-YR	1200.00	6884.72	6888.98		6889.31	0.003636	4.61	260.46	87.59	0.47
NCONFL-BGM	1078.47	DBPS 2-YR	110.00	6884.72	6885.91		6886.02	0.008280	2.75	40.04	54.51	0.57
NCONFL-BGM	1028.62	DBPS 100-YR	1200.00	6884.18	6888.65		6889.09	0.004871	5.37	223.44	74.12	0.55
NCONFL-BGM	1028.62	DBPS 2-YR	110.00	6884.18	6885.28	6885.13	6885.49	0.014281	3.64	30.19	40.46	0.74
NCONFL-BGM	1000	DBPS 100-YR	1200.00	6883.24	6887.00	6887.00	6888.56	0.017487	10.04	119.56	38.69	1.01
NCONFL-BGM	1000	DBPS 2-YR	110.00	6883.24	6884.17	6884.16	6884.54	0.025114	4.84	22.71	29.92	0.98



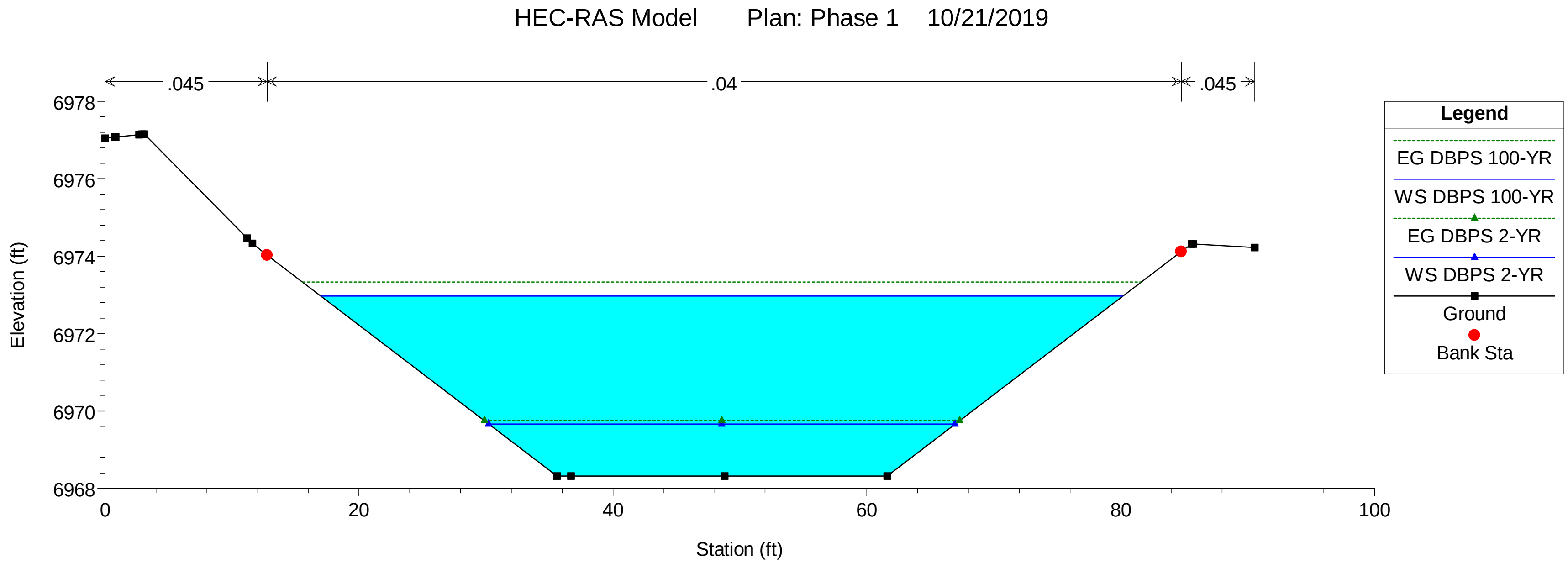
HEC-RAS Model Plan: Phase 1 10/21/2019
UT_BSC2 NCONFL-BGM
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Elevation (ft)
Main Channel Distance (ft)
6880
6900
6920
6940
6960
6980
0
1000
2000
3000
4000
5000
6000


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

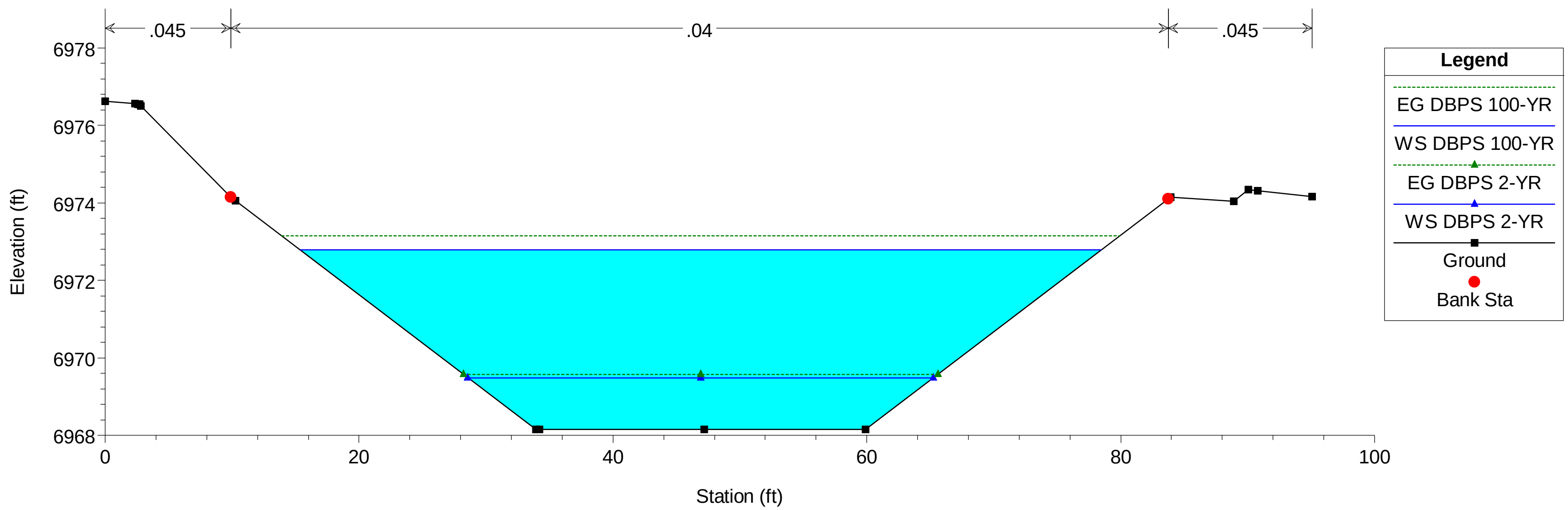


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
6978
6976
6974
6972
6970
6968
0
20
40
60
80
100
Station (ft)

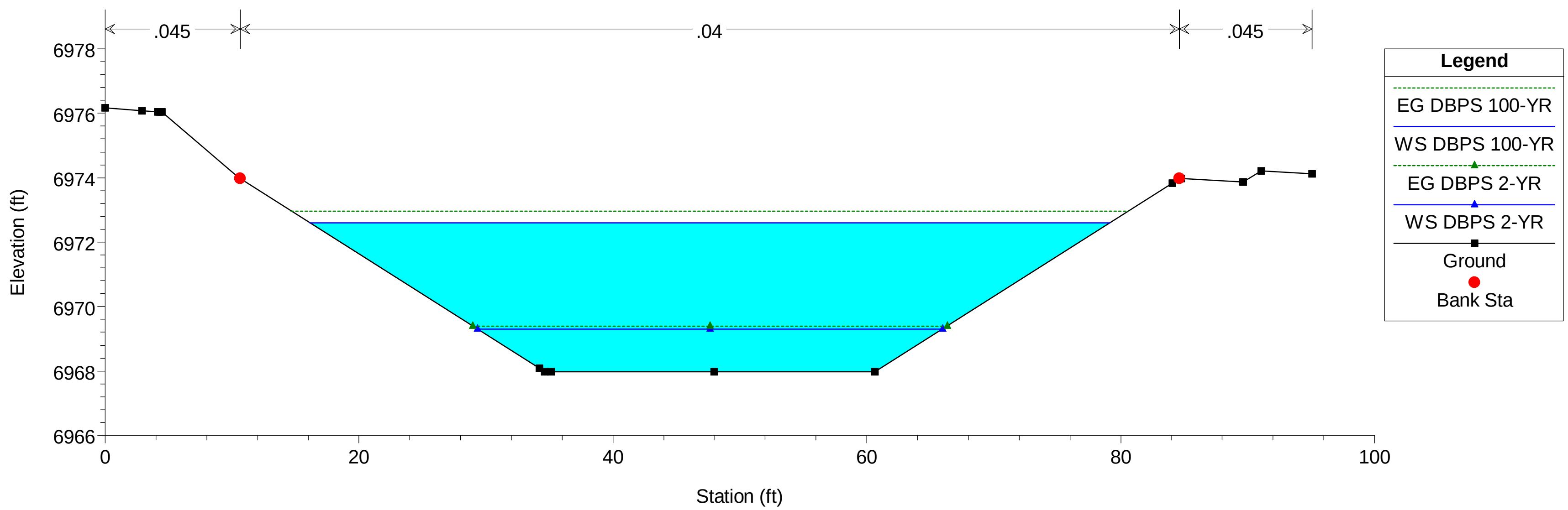


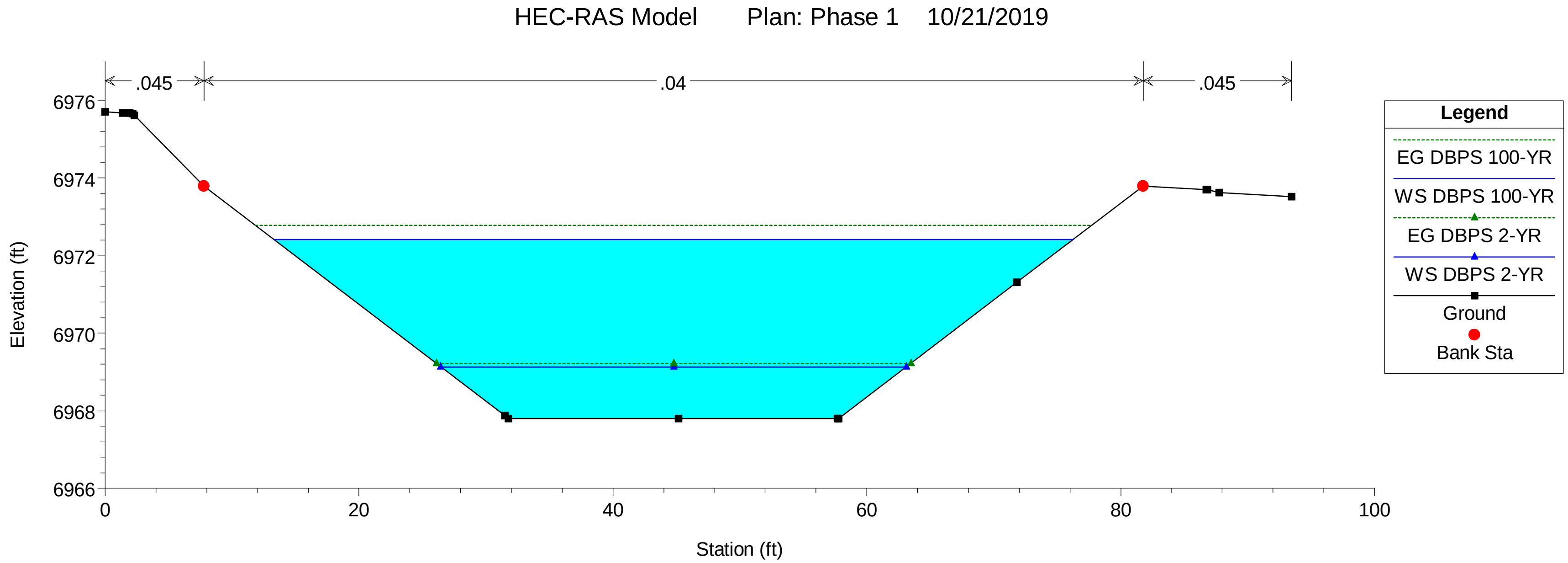
HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
6978
6976
6974
6972
6970
6968
0
20
40
60
80
100
Station (ft)

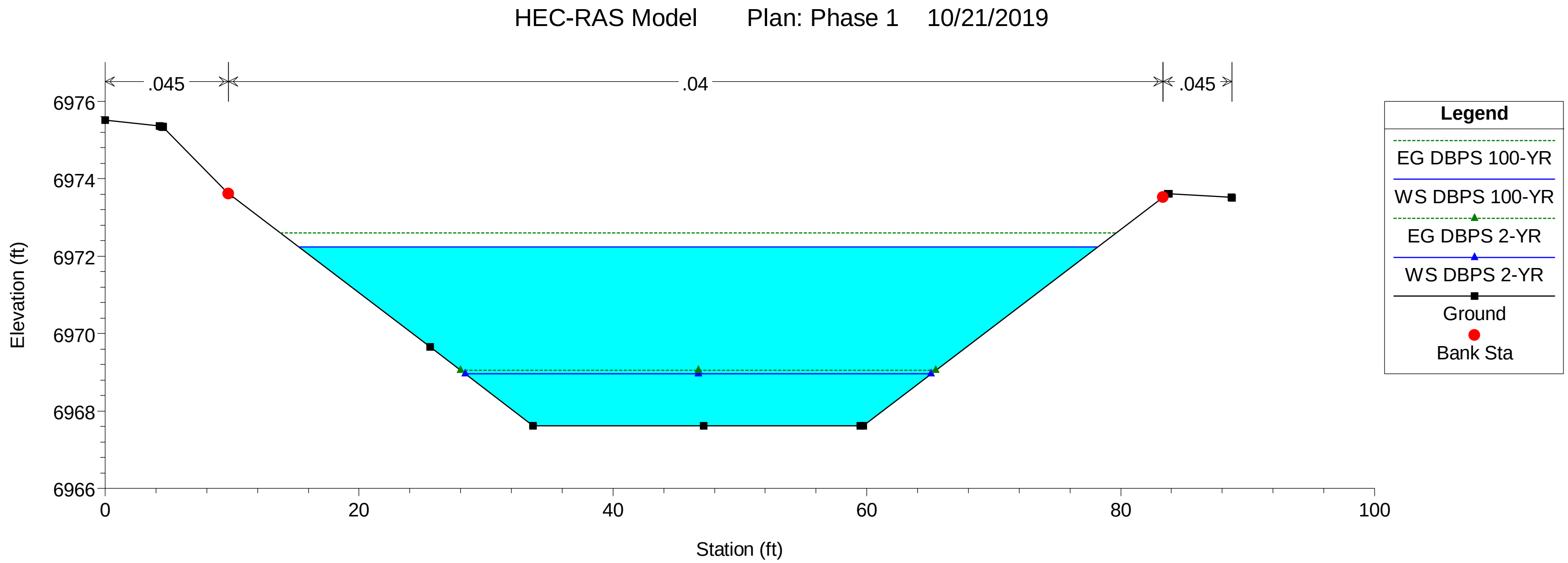
HEC-RAS Model Plan: Phase 1 10/21/2019

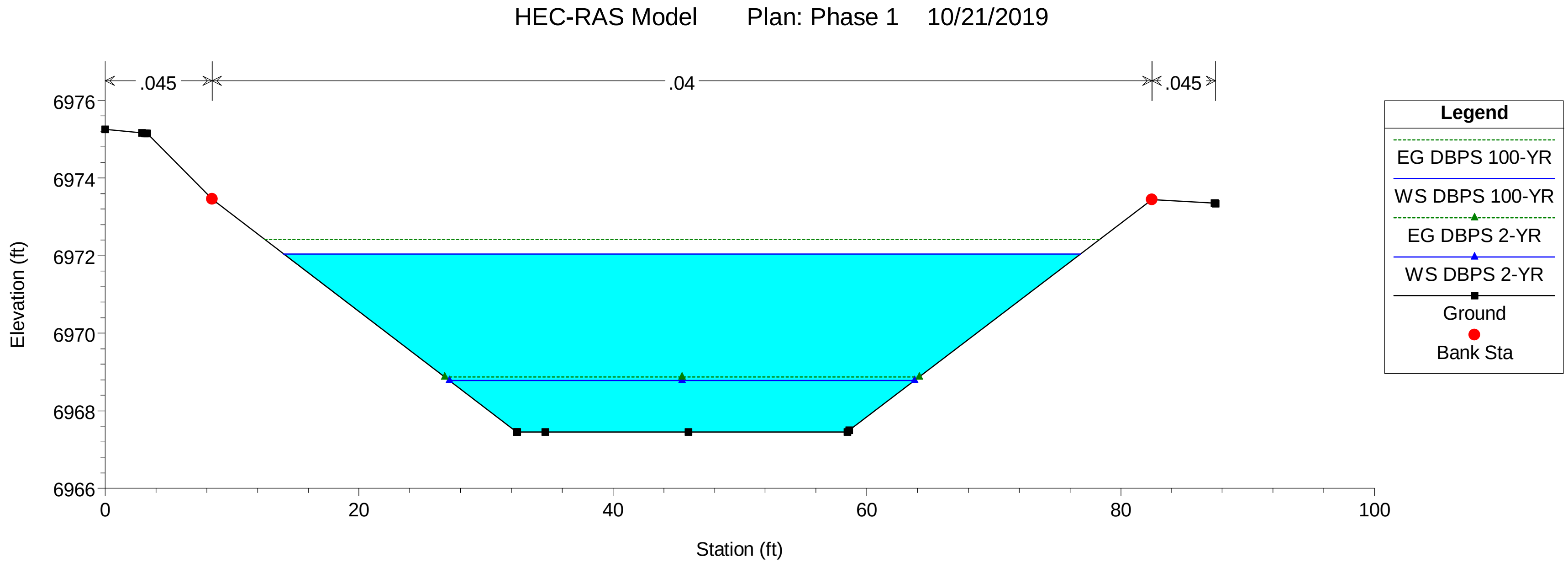


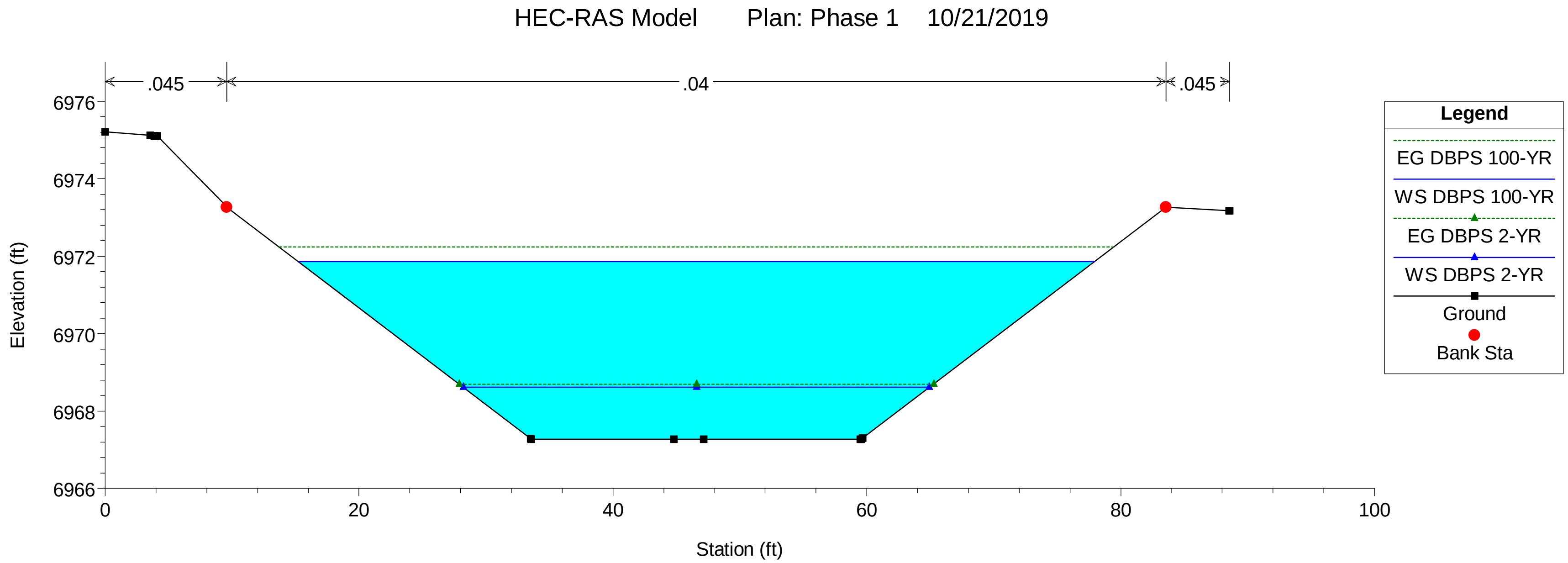
HEC-RAS Model Plan: Phase 1 10/21/2019

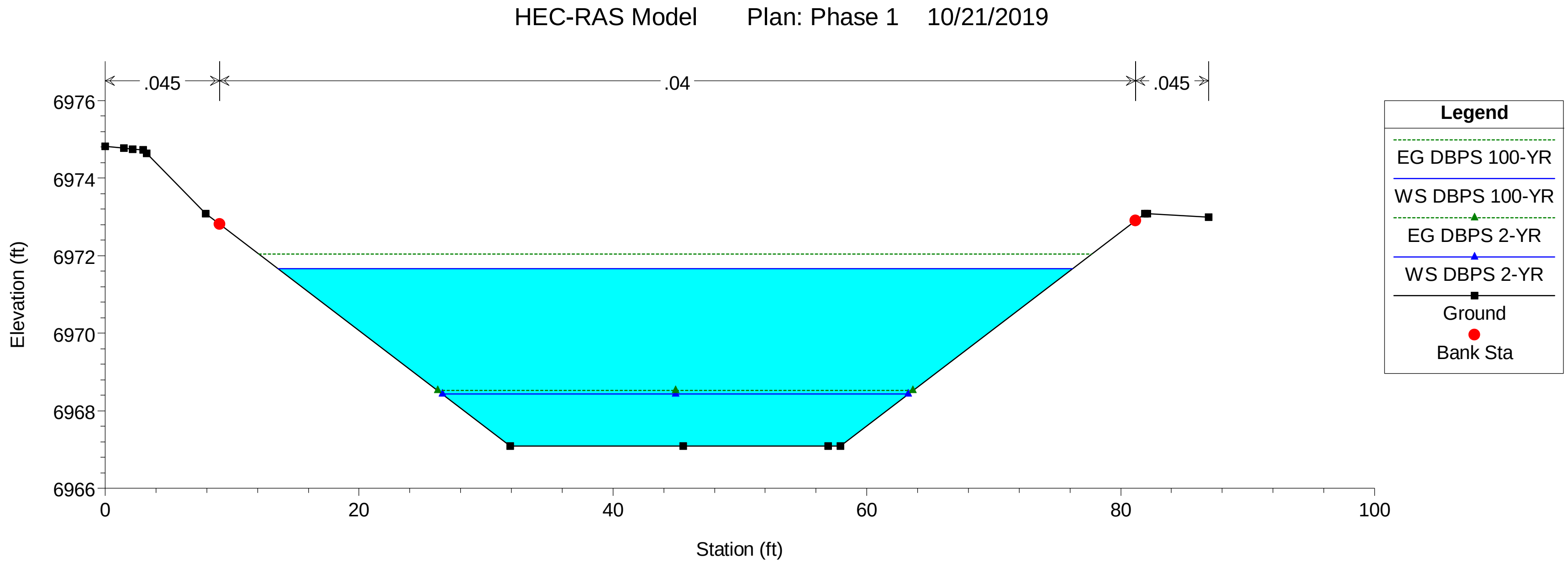


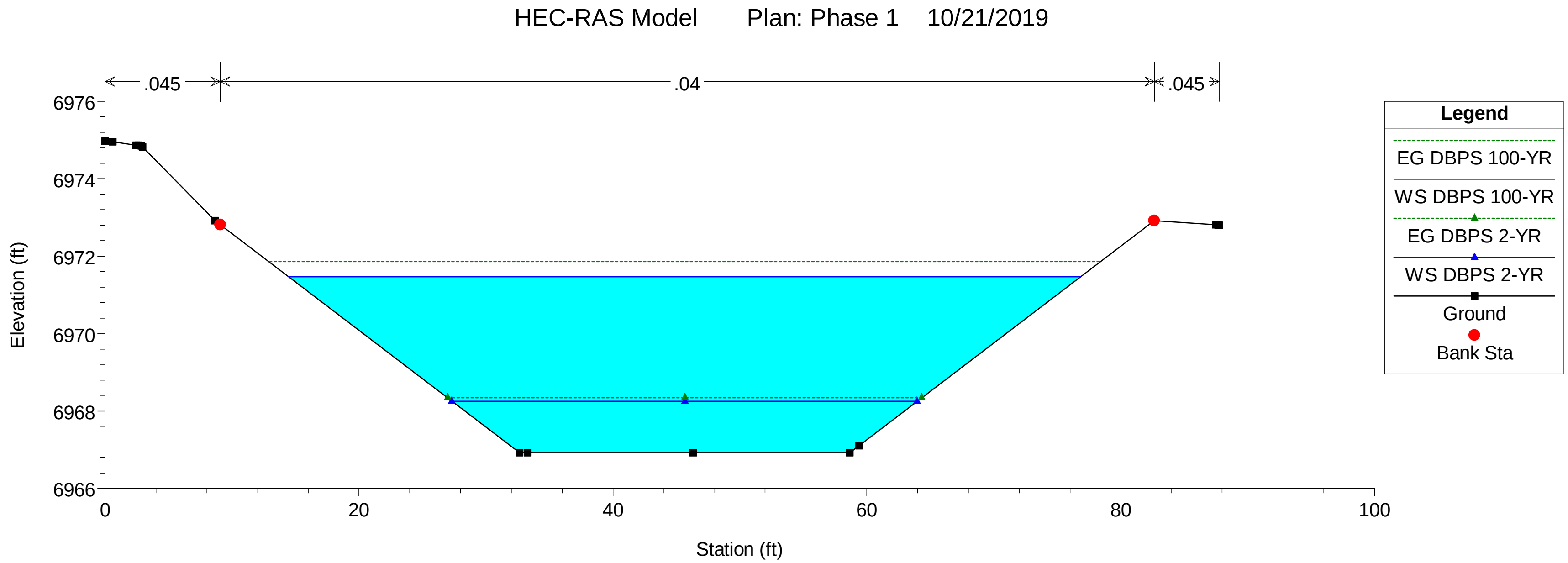

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
6976
6974
6972
6970
6968
6966
0
20
40
60
80
100
Station (ft)


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
6976
6974
6972
6970
6968
6966
0
20
40
60
80
100
Station (ft)

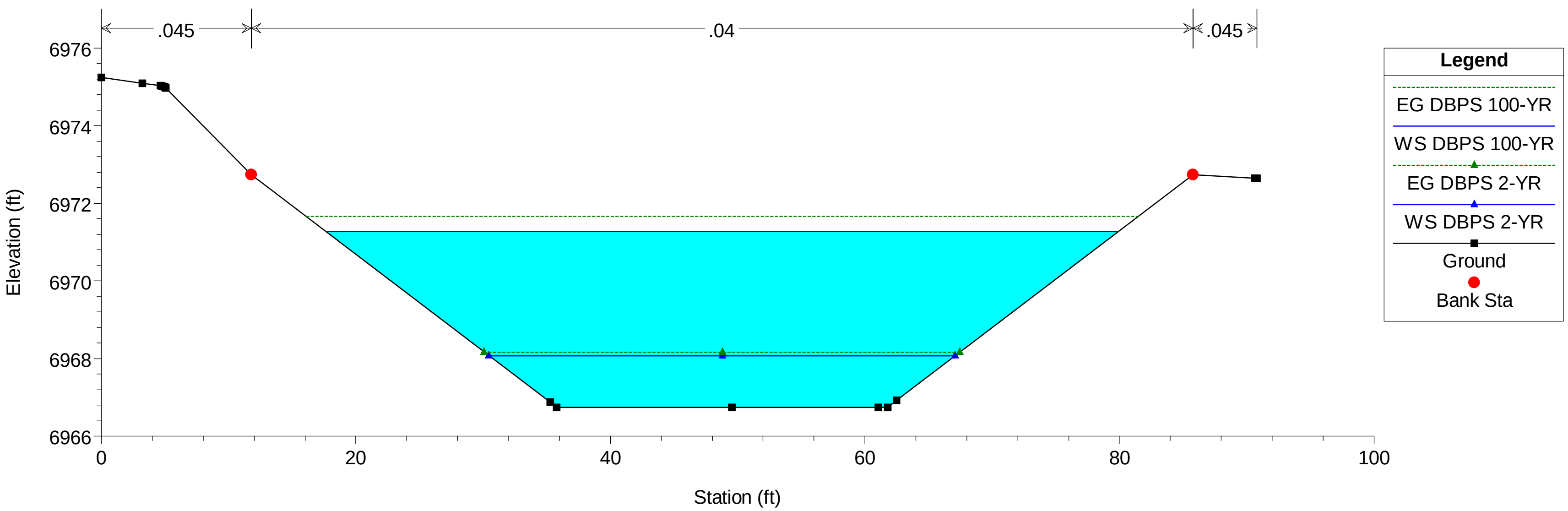

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
6976
6974
6972
6970
6968
6966
0
20
40
60
80
100
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
6976
6974
6972
6970
6968
6966
0
20
40
60
80
100
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

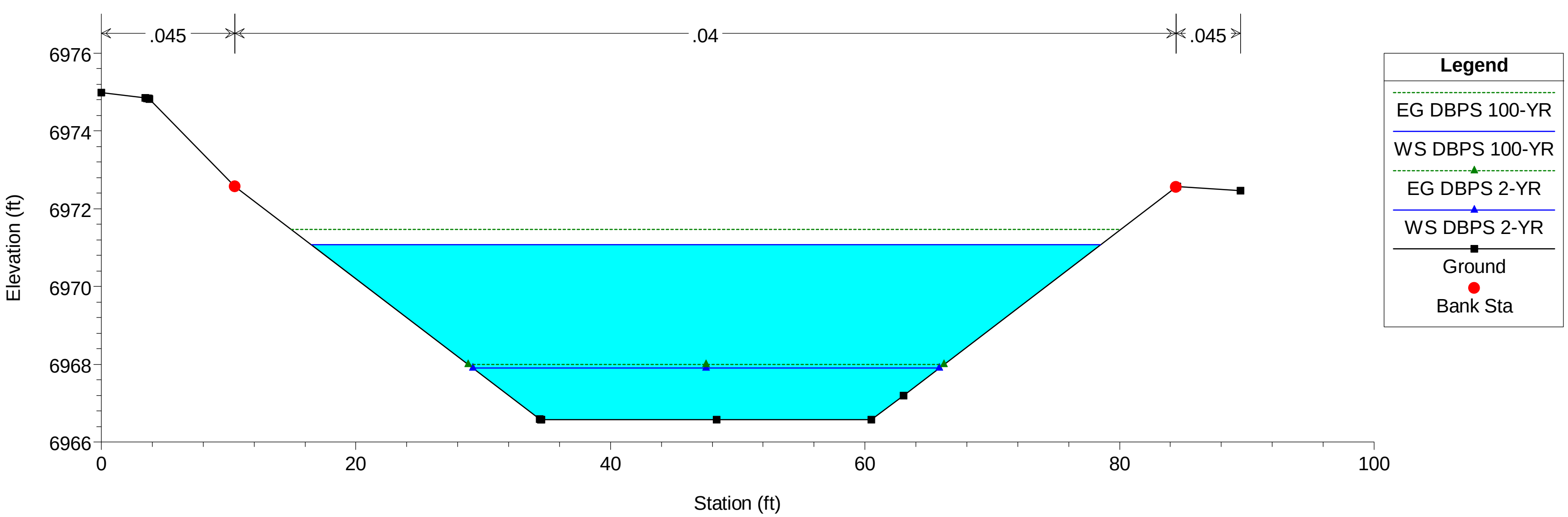

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

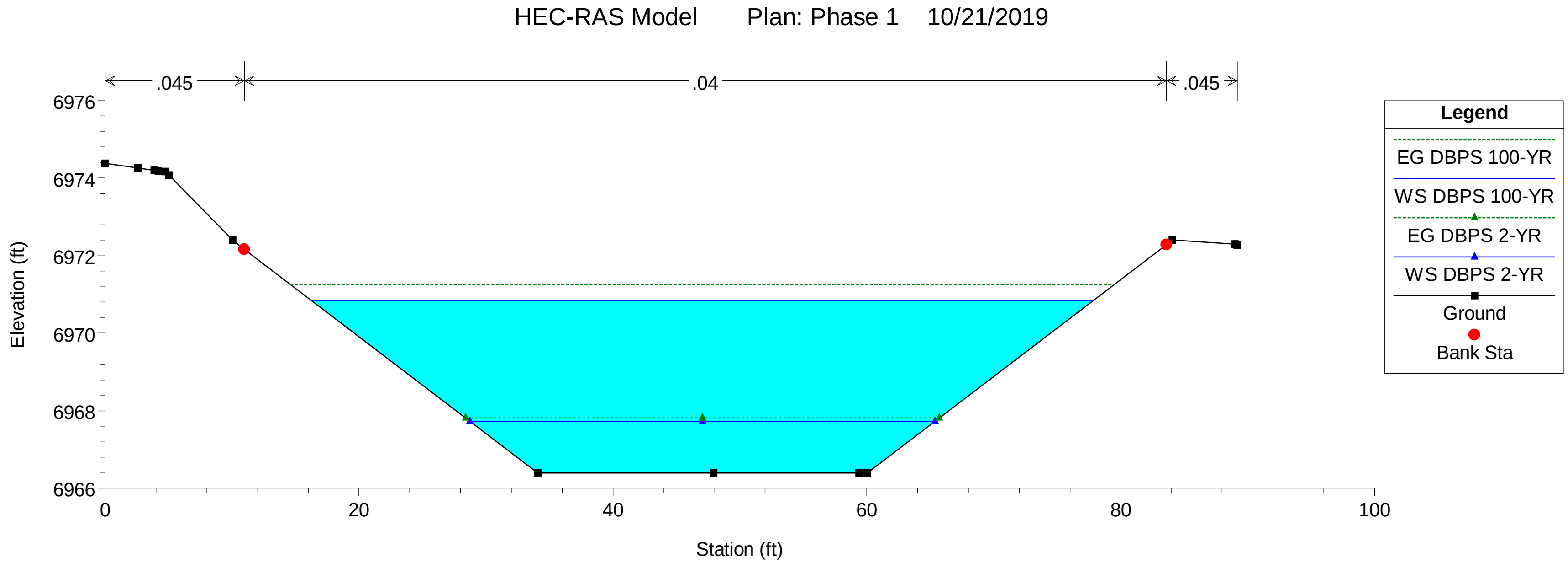

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

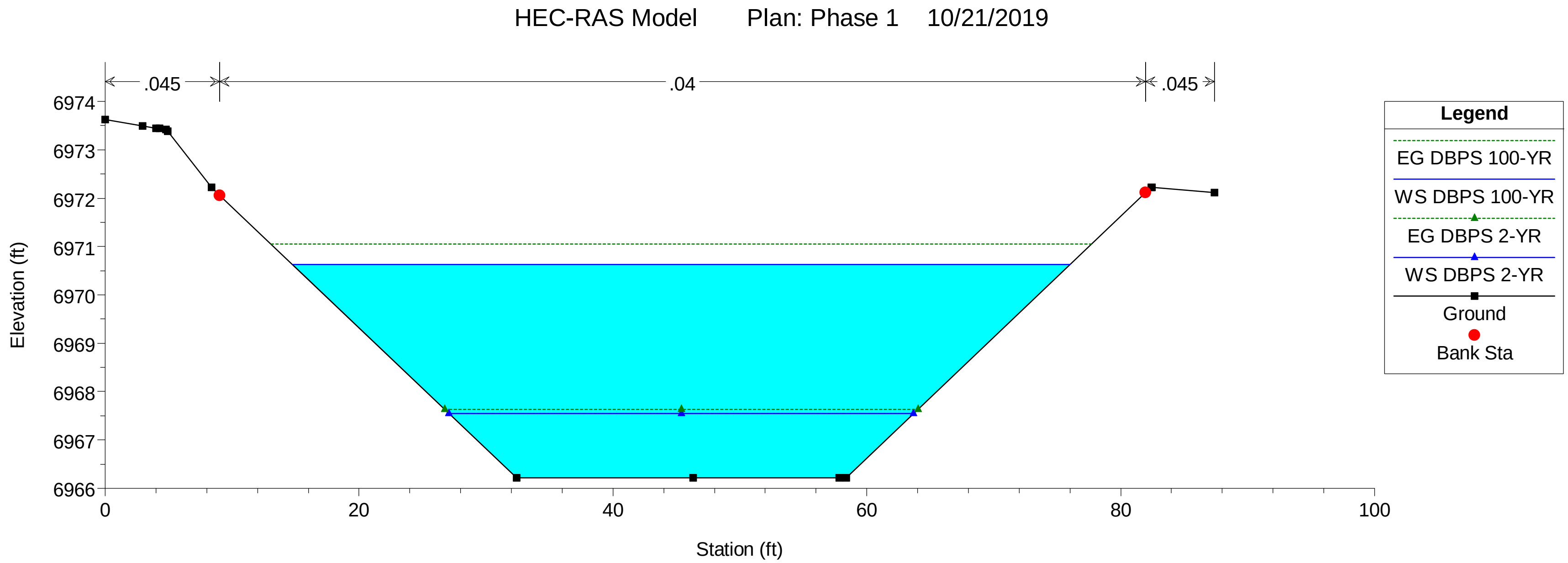
HEC-RAS Model Plan: Phase 1 10/21/2019

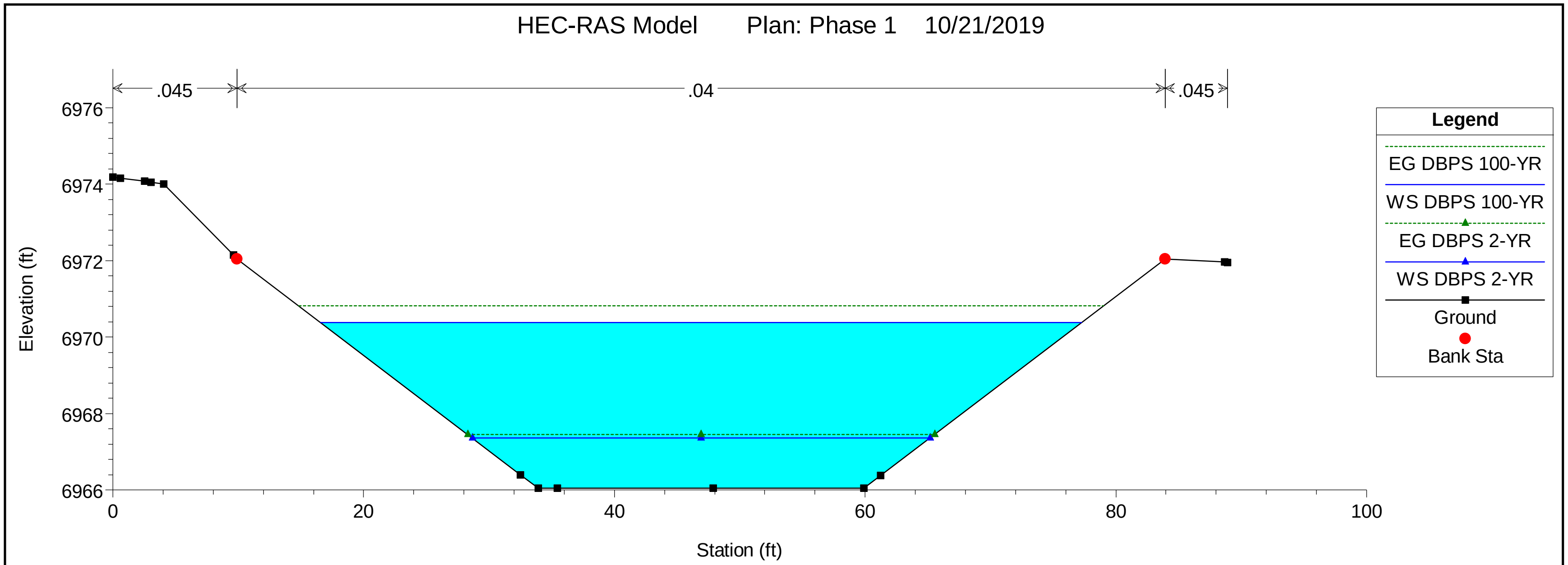


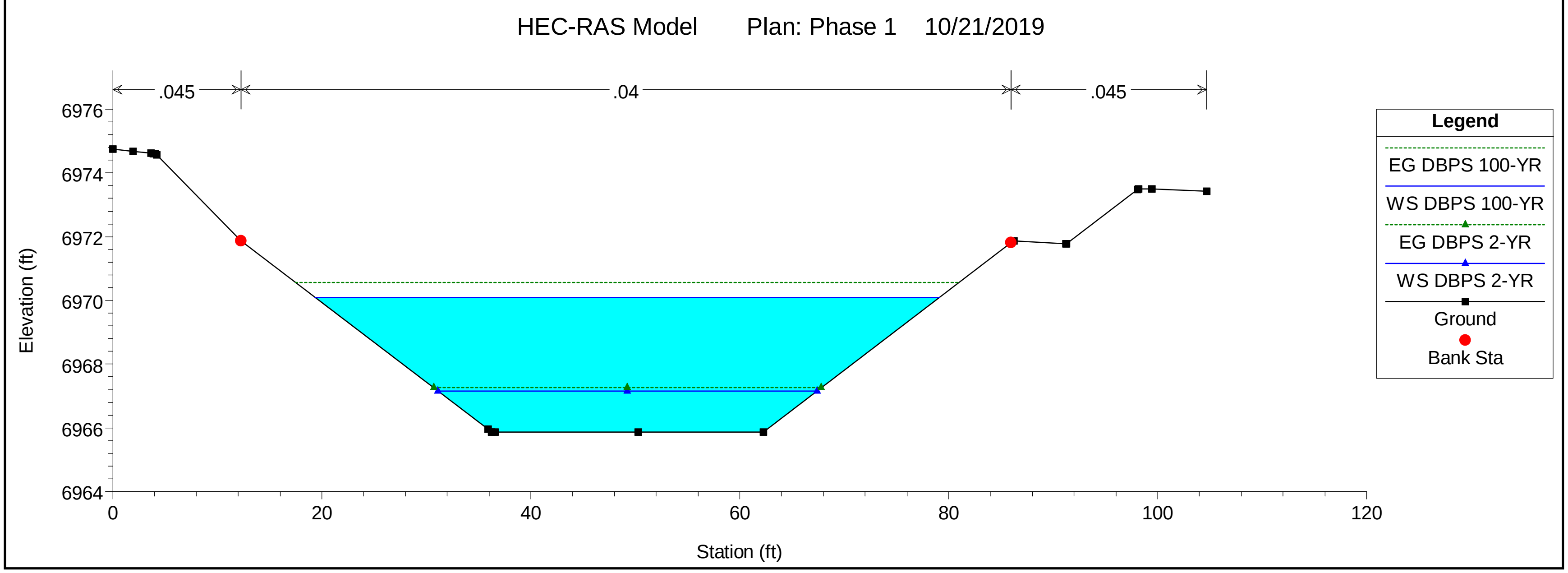
HEC-RAS Model Plan: Phase 1 10/21/2019

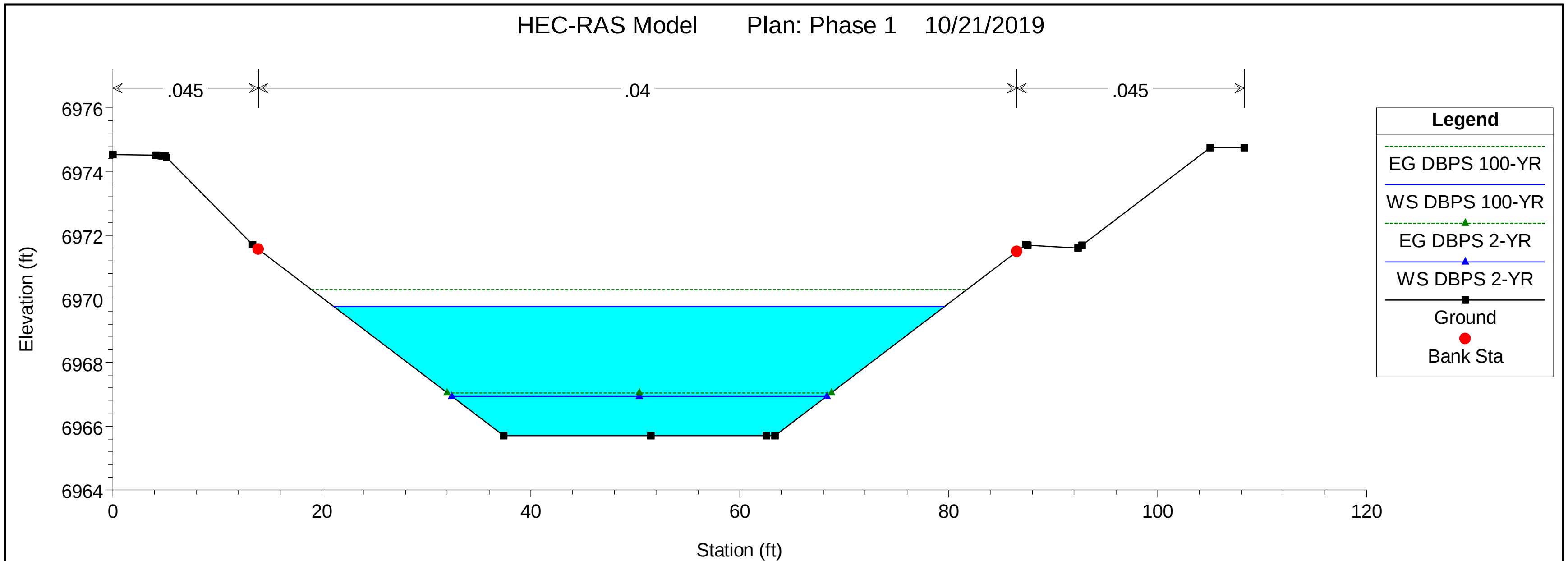


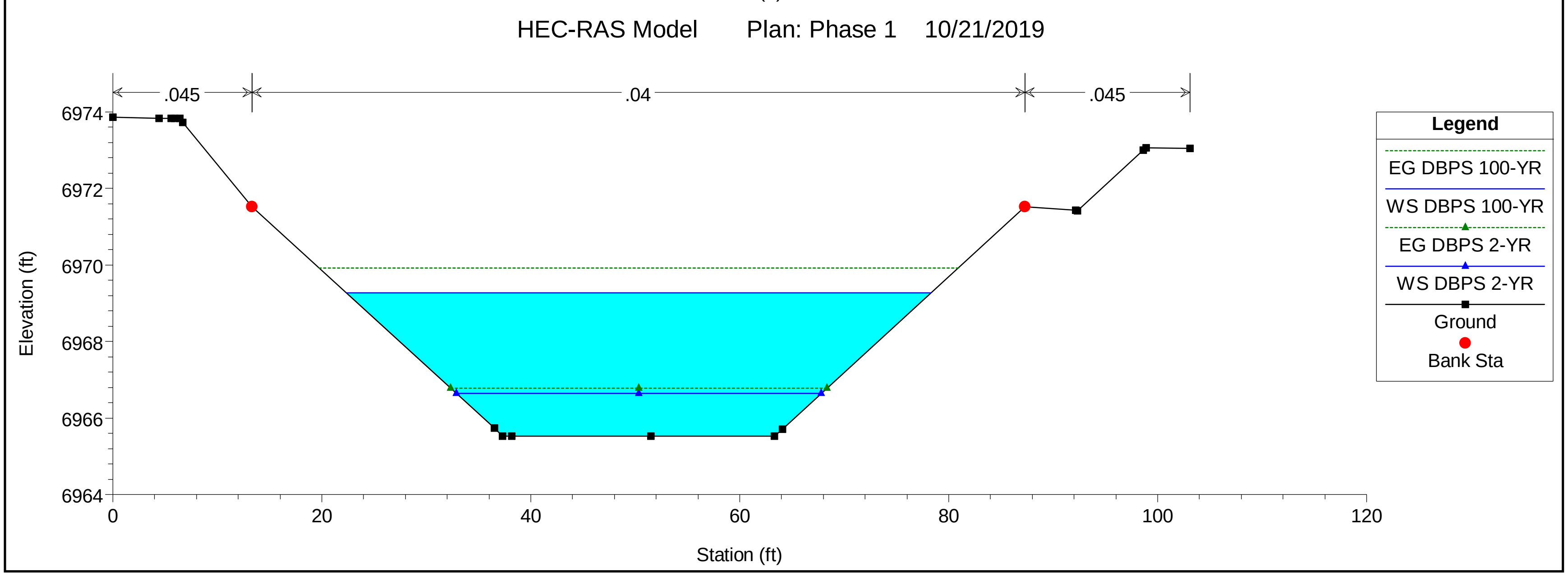

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
6976
6974
6972
6970
6968
6966
0
20
40
60
80
100
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

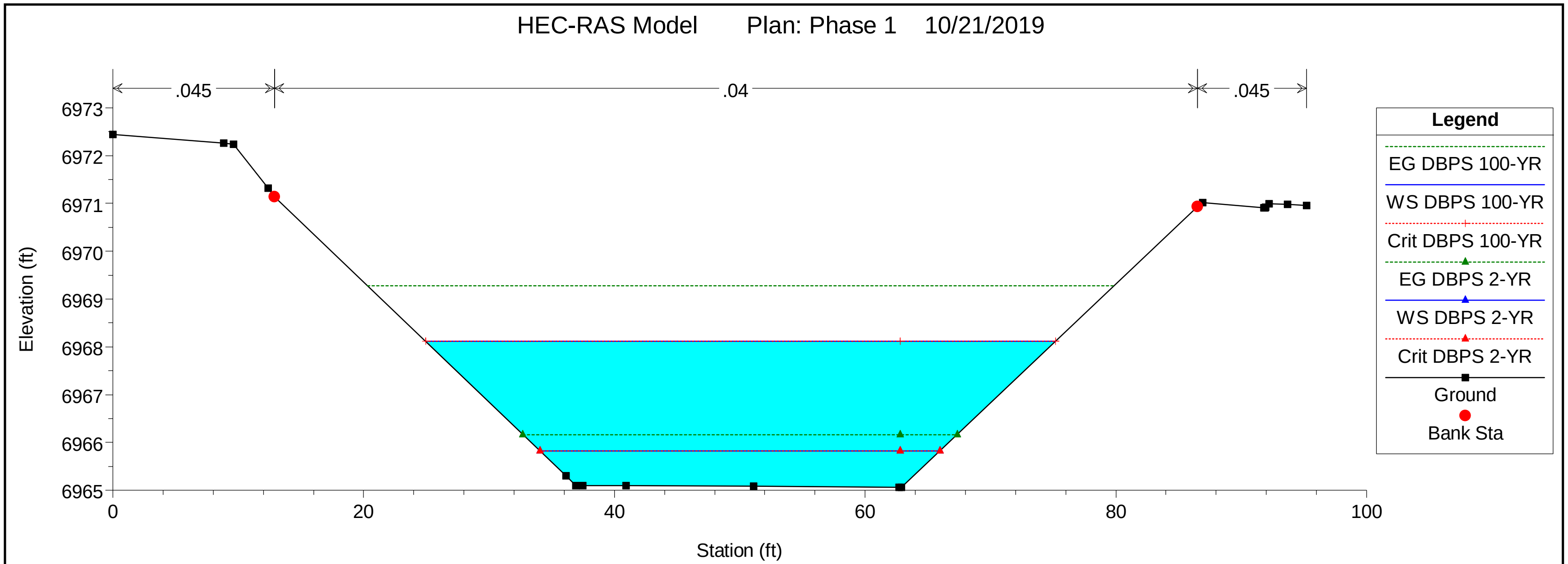

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
6974
6973
6972
6971
6970
6969
6968
6967
6966
0
20
40
60
80
100
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

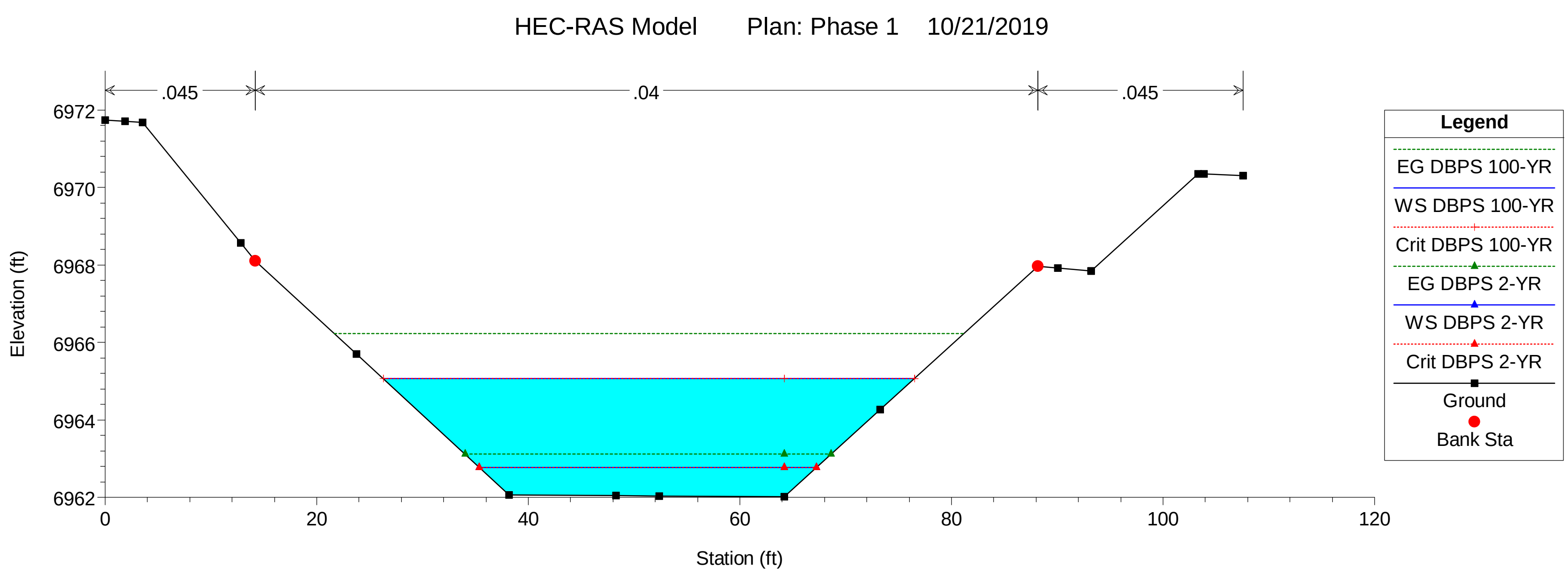

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
6976
6974
6972
6970
6968
6966
0
20
40
60
80
100
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

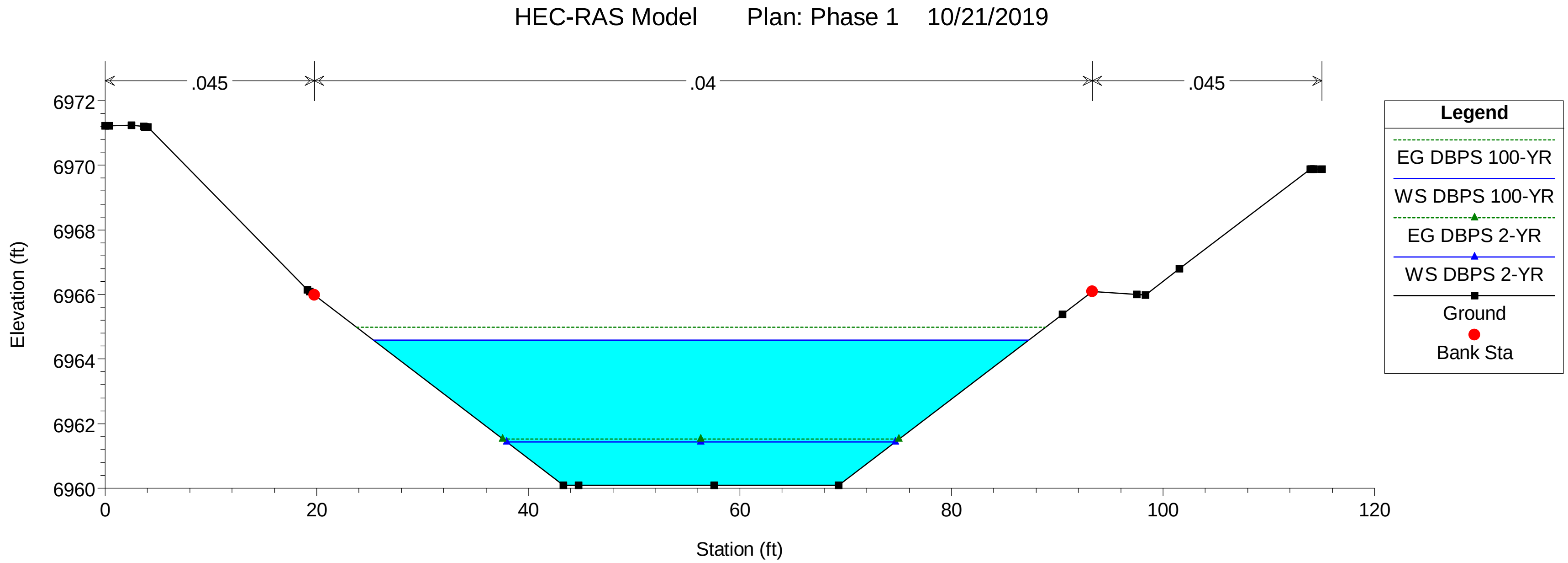

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
6976
6974
6972
6970
6968
6966
6964
0
20
40
60
80
100
120
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
6964
6966
6968
6970
6972
6974
6976
0
20
40
60
80
100
120
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta

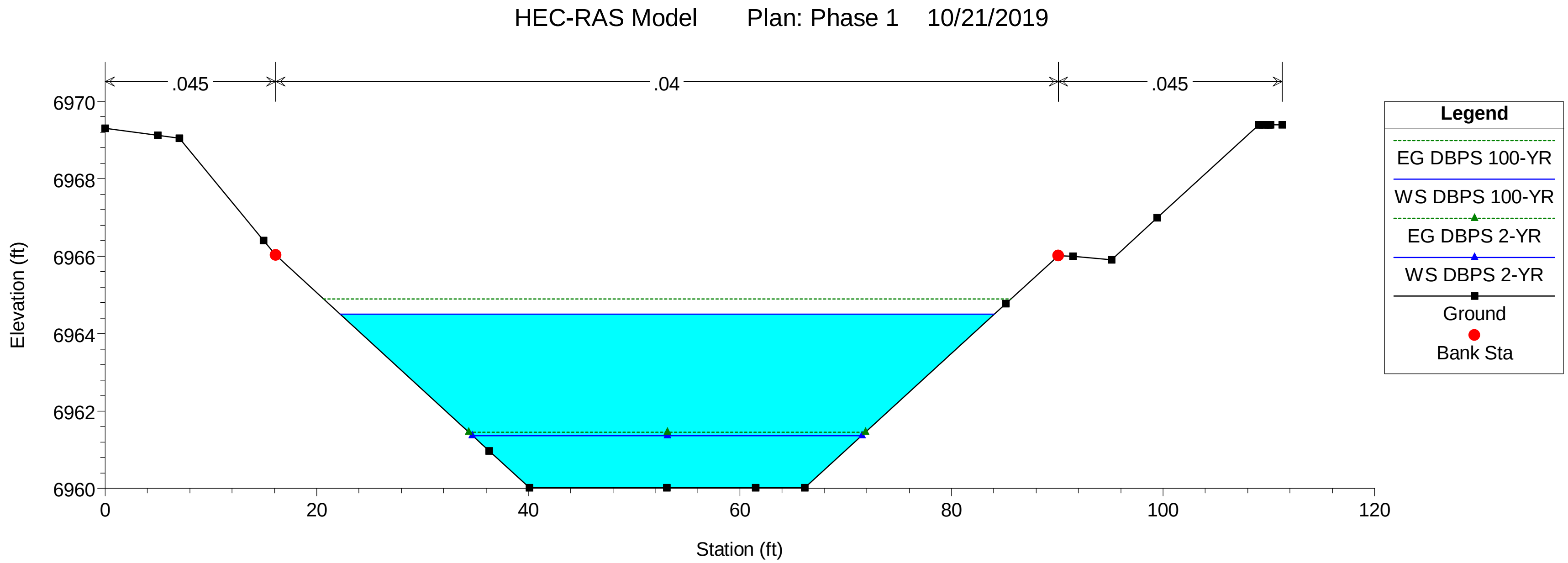

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
6964
6966
6968
6970
6972
6974
0
20
40
60
80
100
120
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta

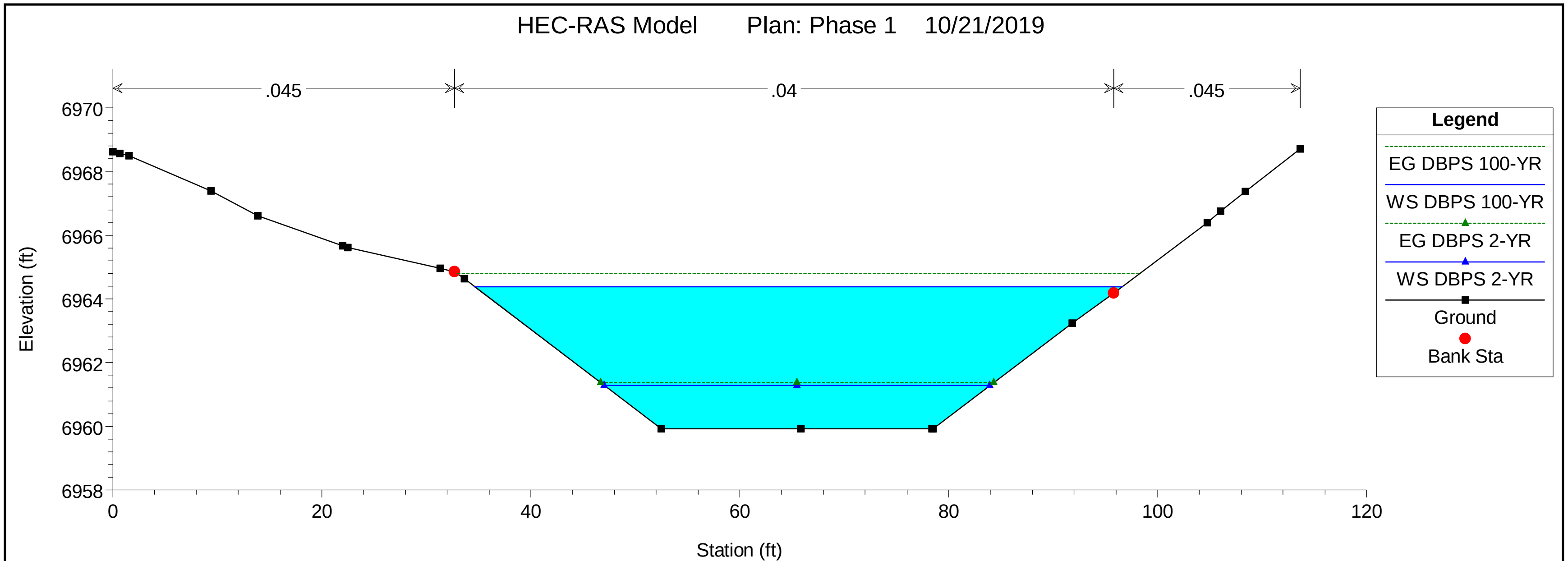

HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta

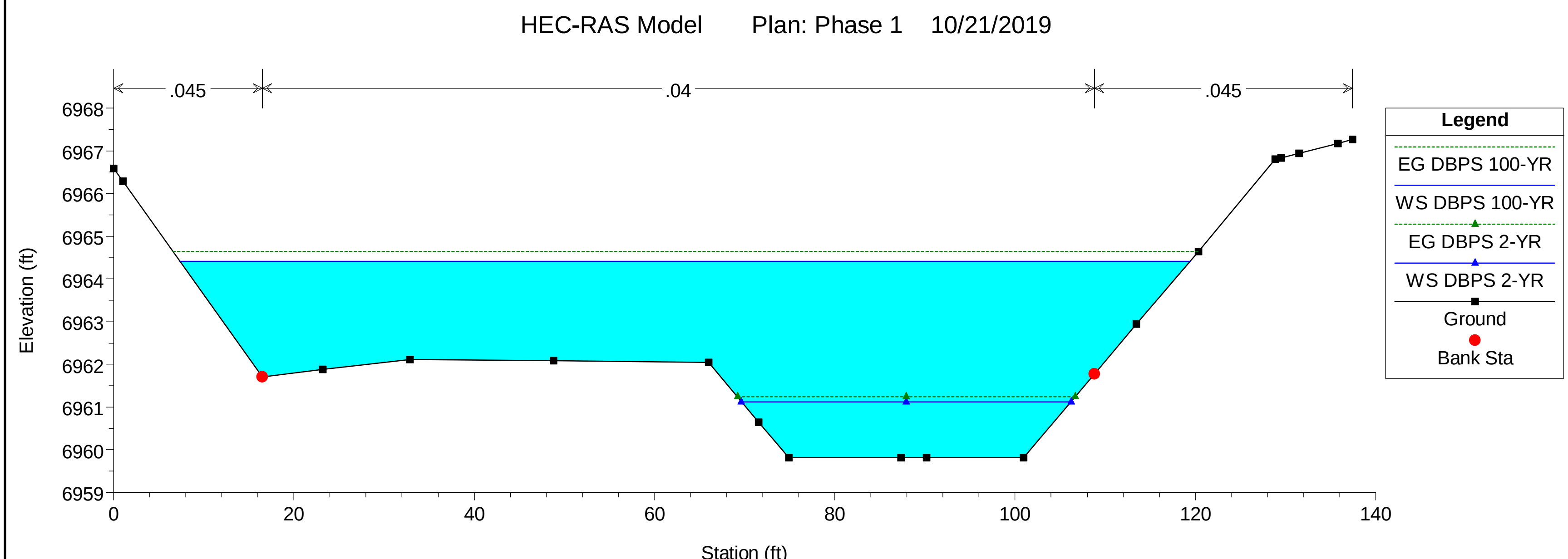


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6970
6968
6966
6964
6962
6960
6958
0
20
40
60
80
100
120


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
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Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6968
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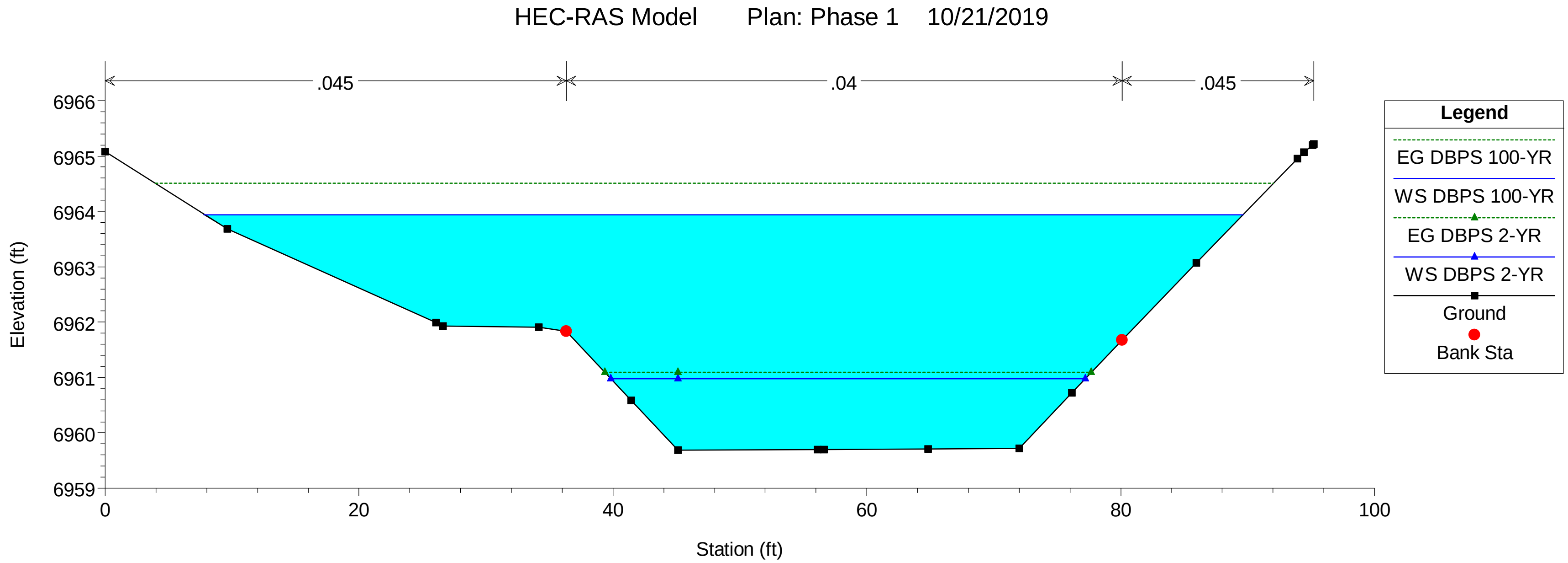
HEC-RAS Model Plan: Phase 1 10/21/2019
.045
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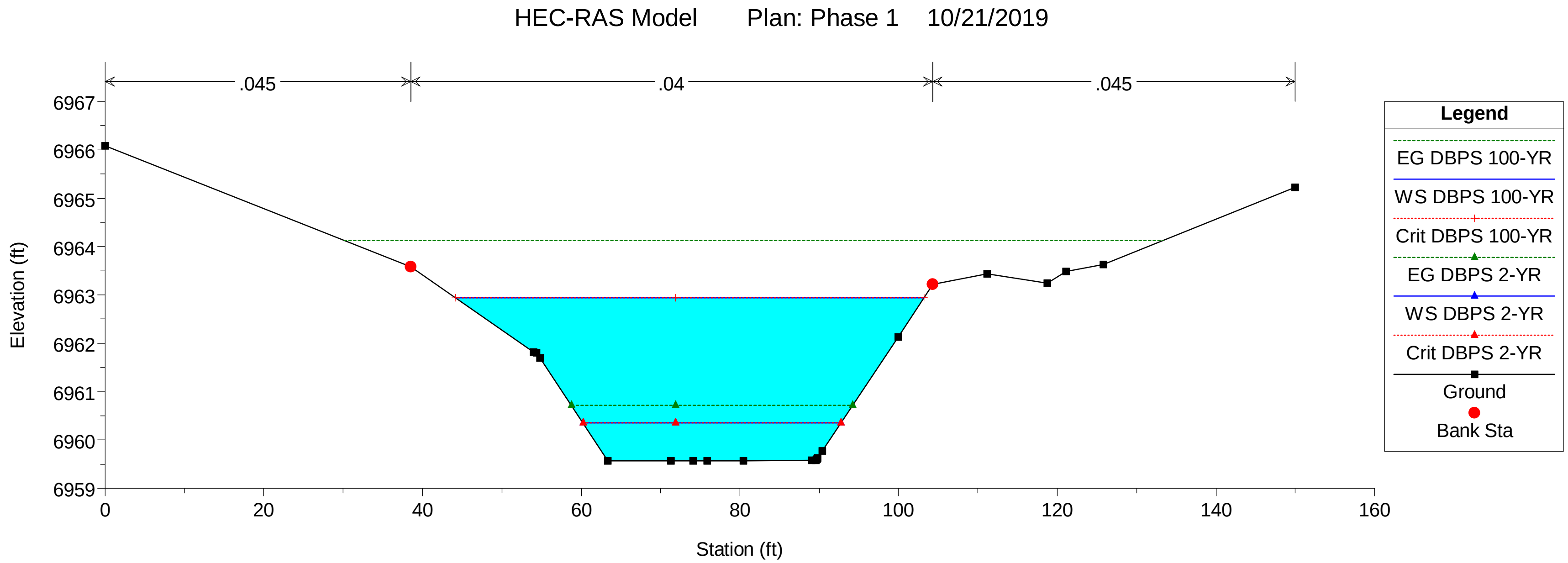
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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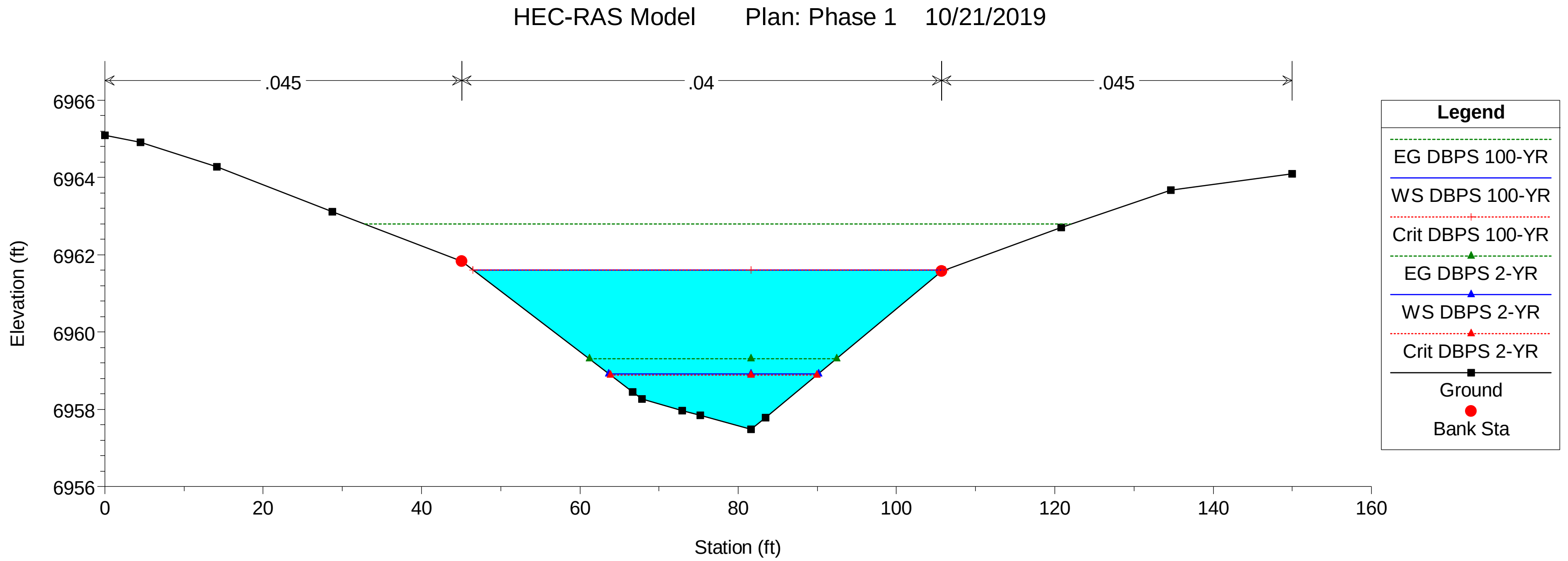
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
6966
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6962
6960
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6956
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40
60
80
100
120
140
160
Station (ft)
Legend
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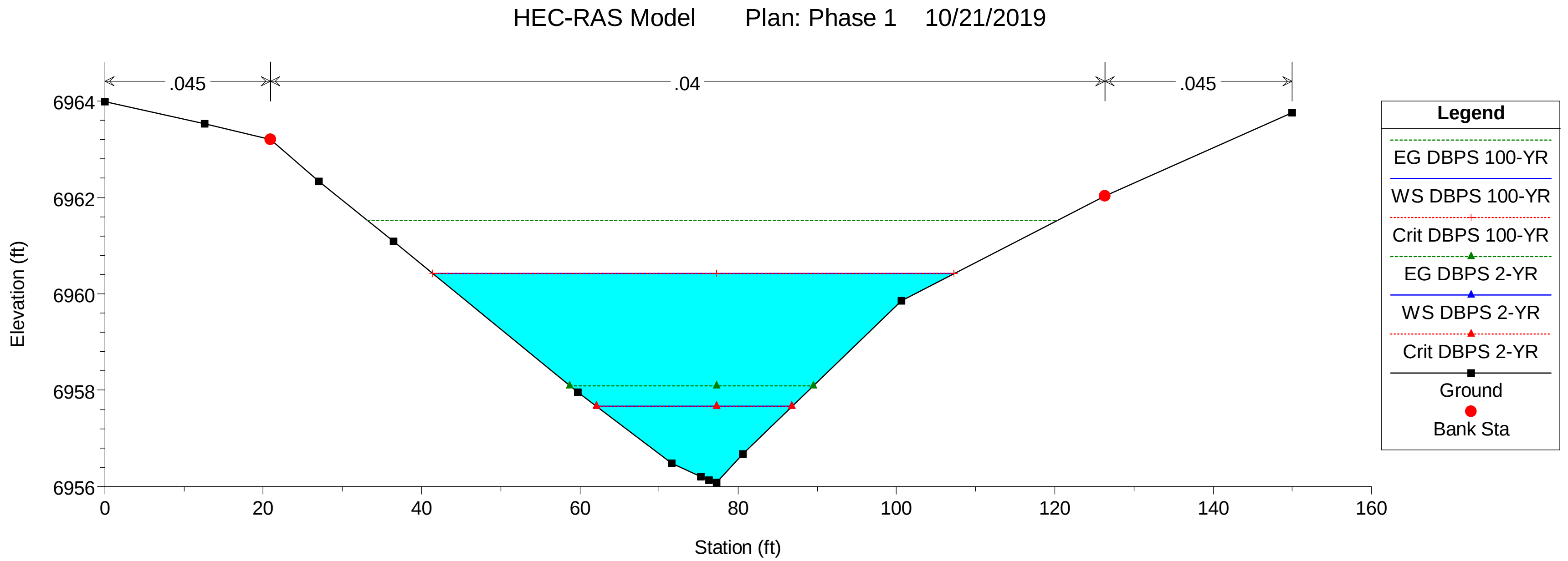
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
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6962
6960
6958
6956
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40
60
80
100
120
140
160
Station (ft)
Legend
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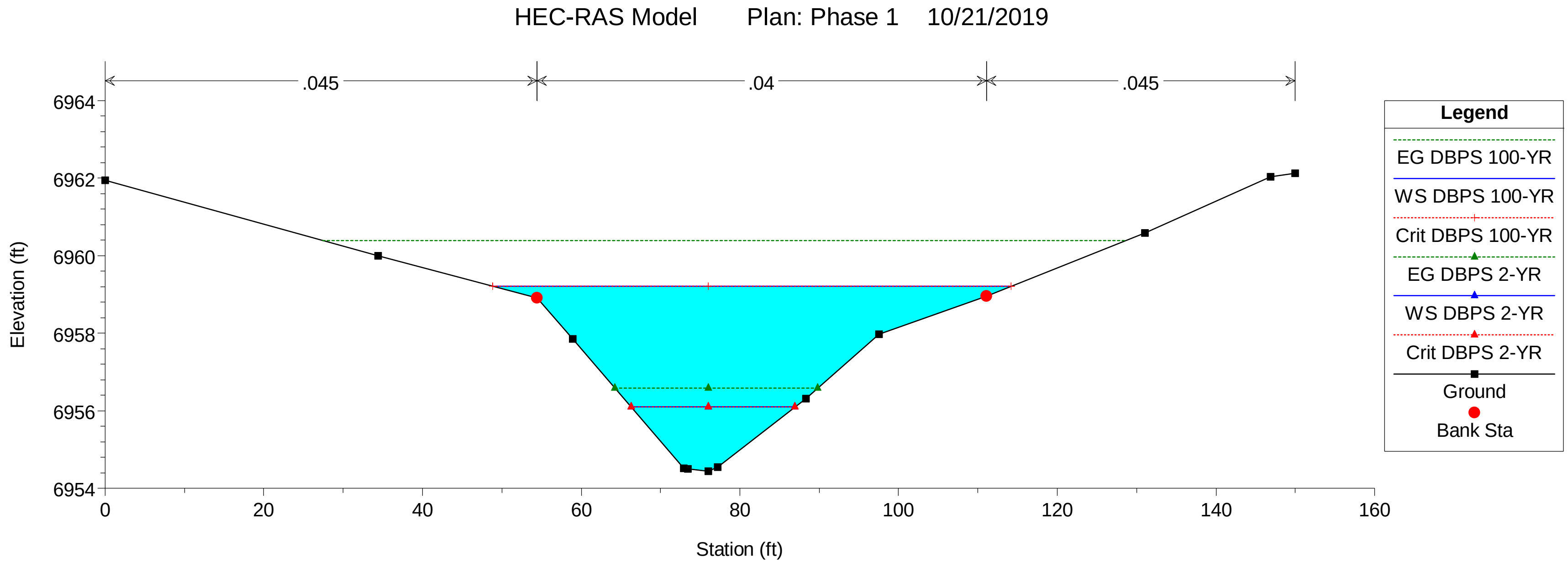
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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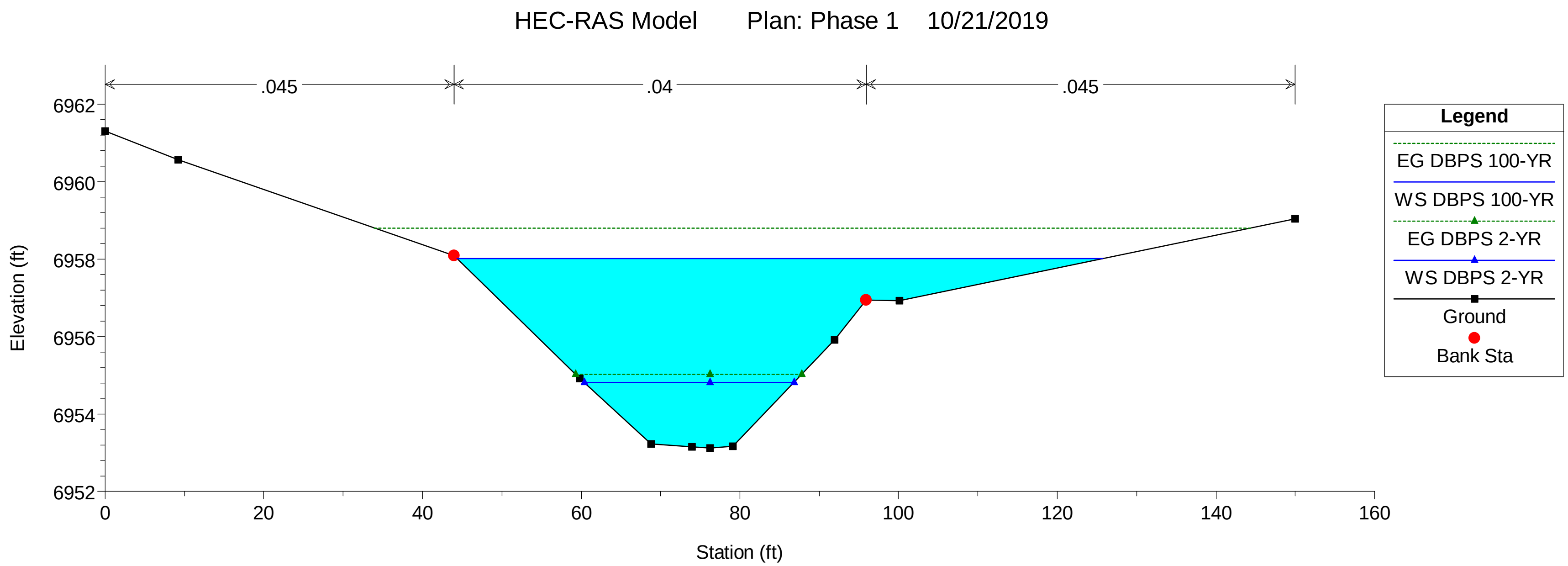
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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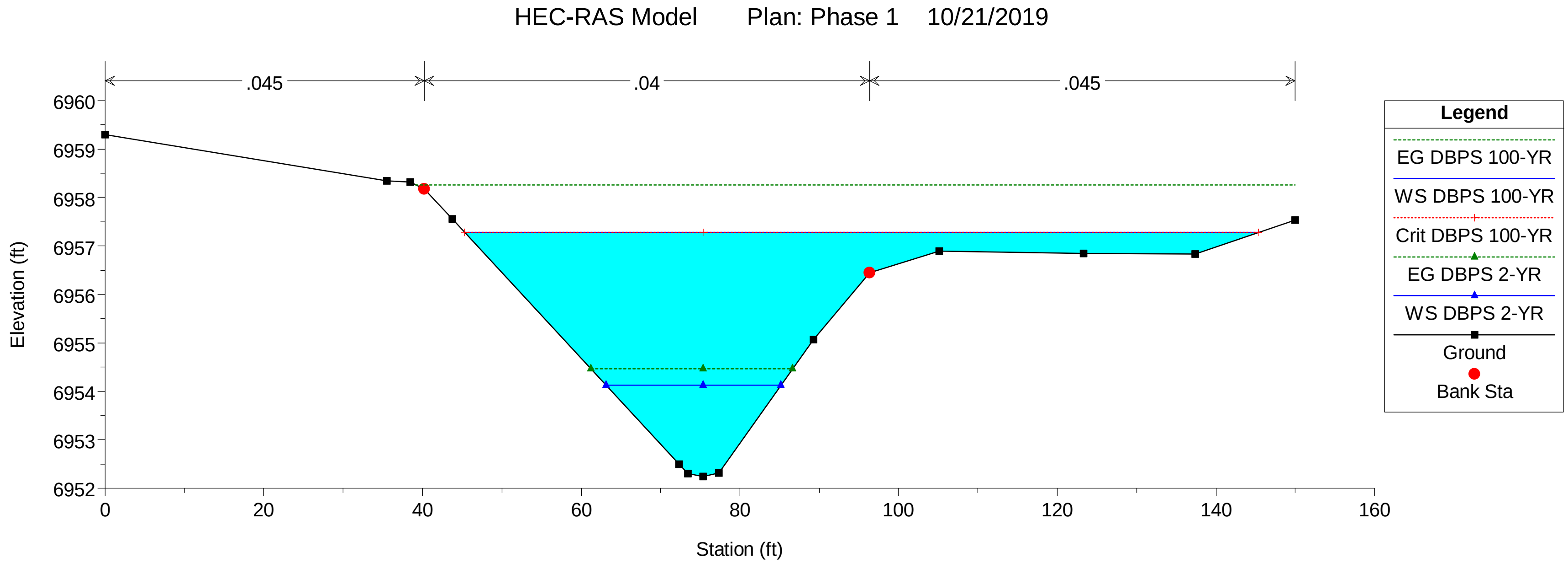
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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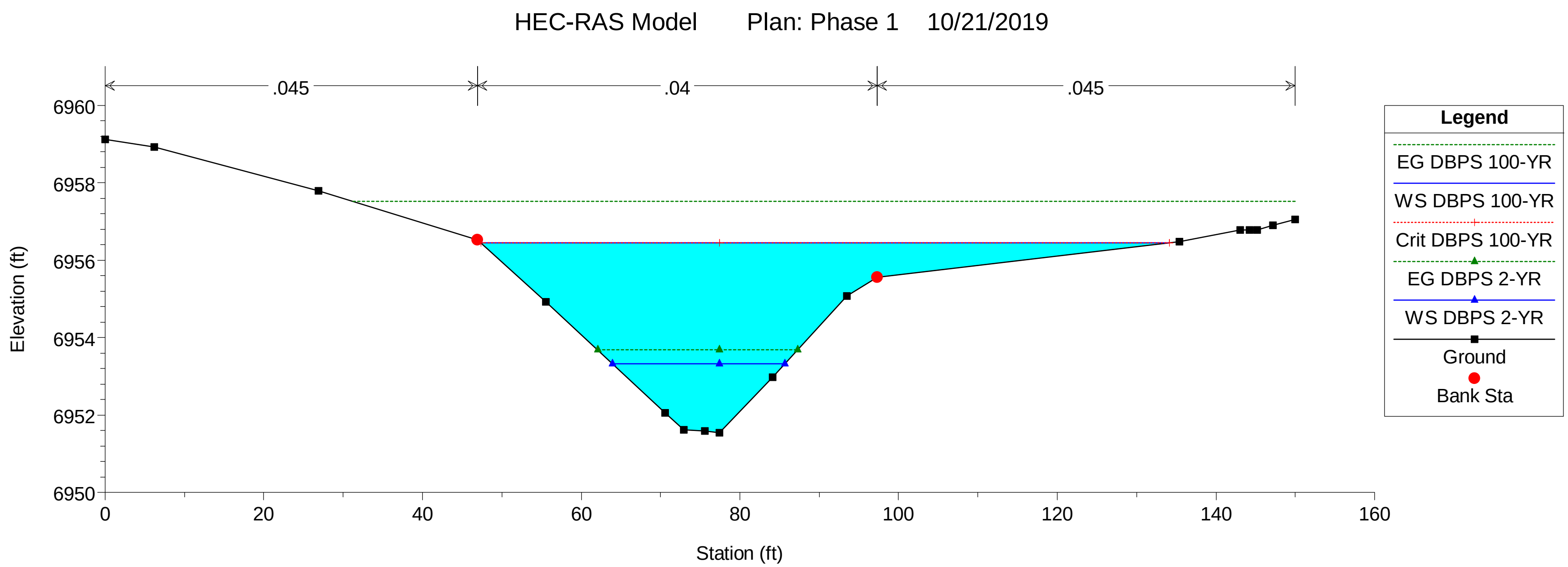
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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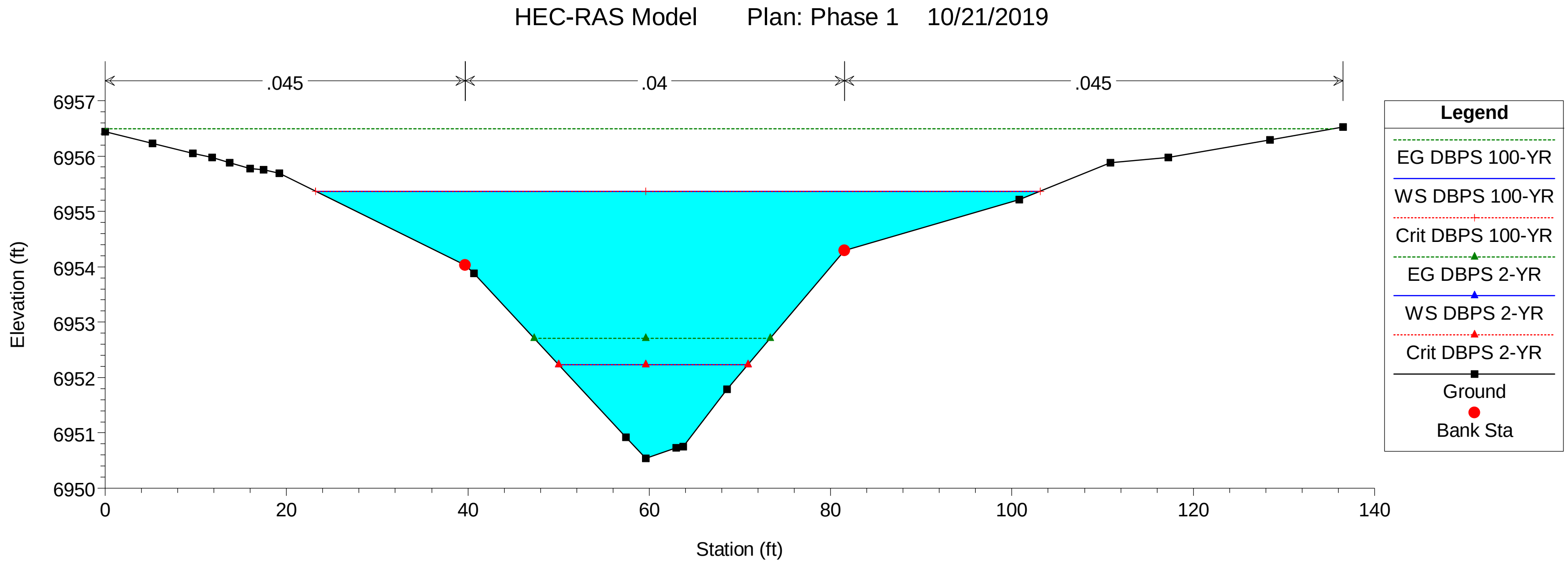
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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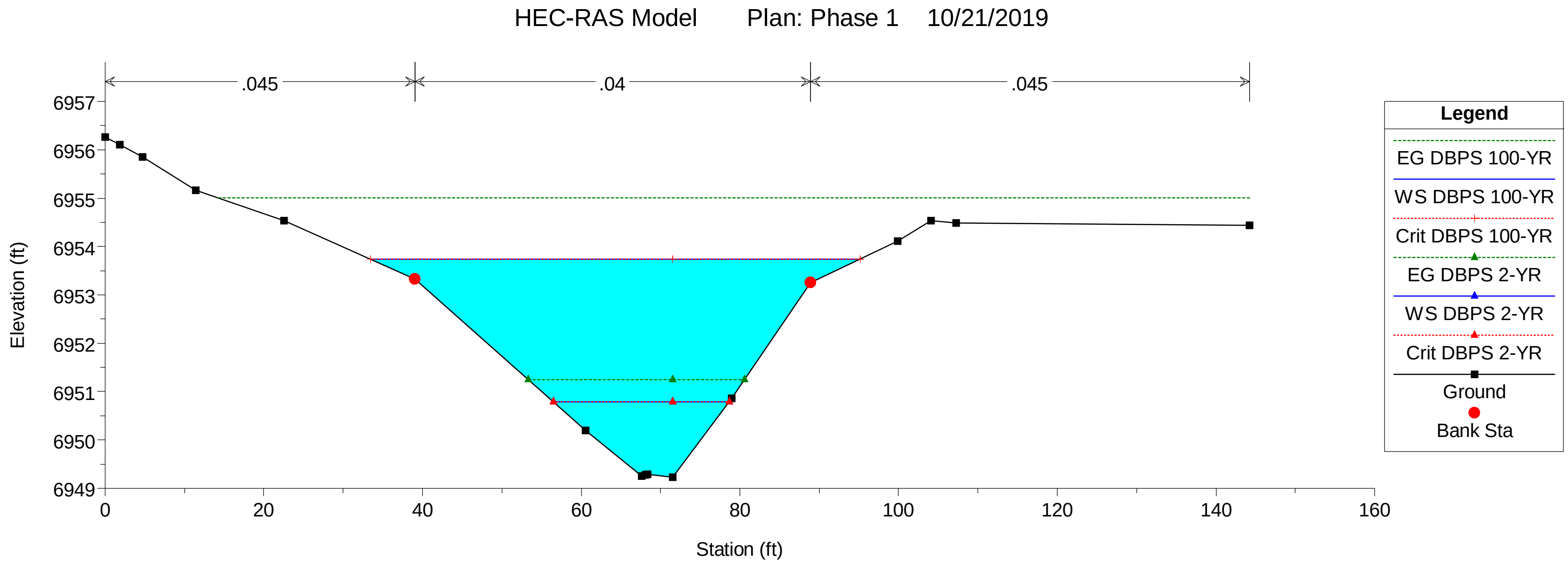
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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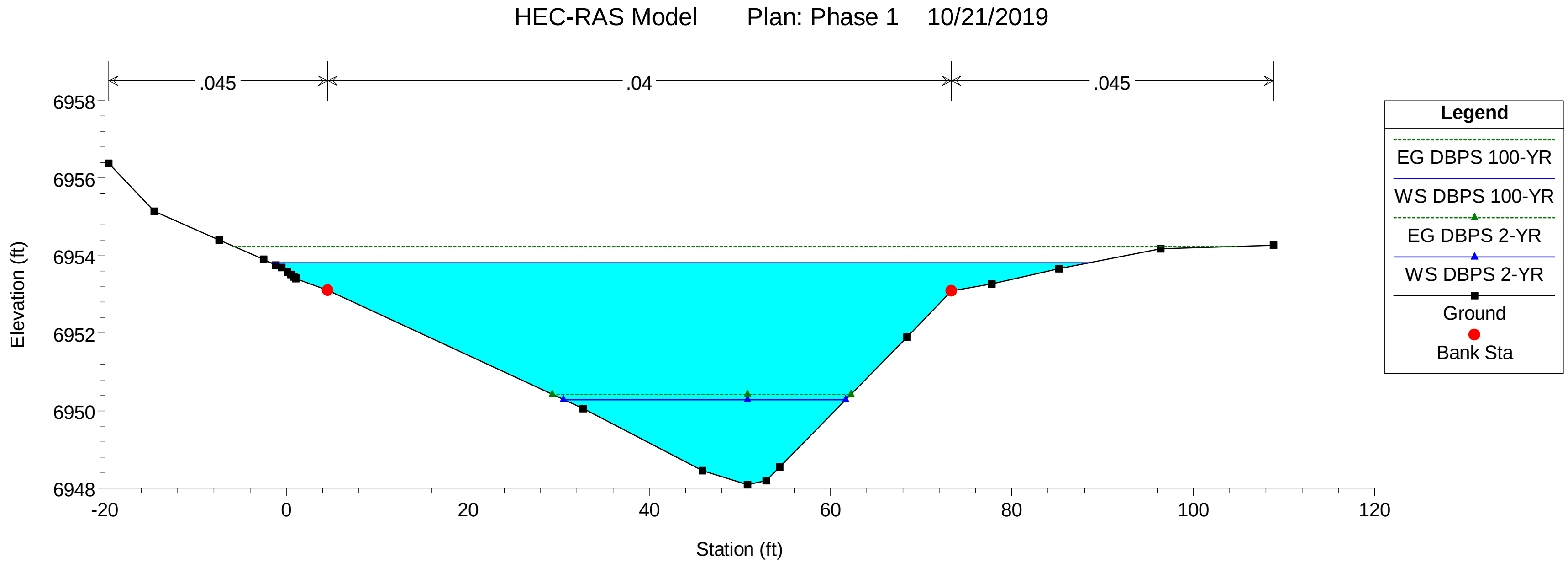
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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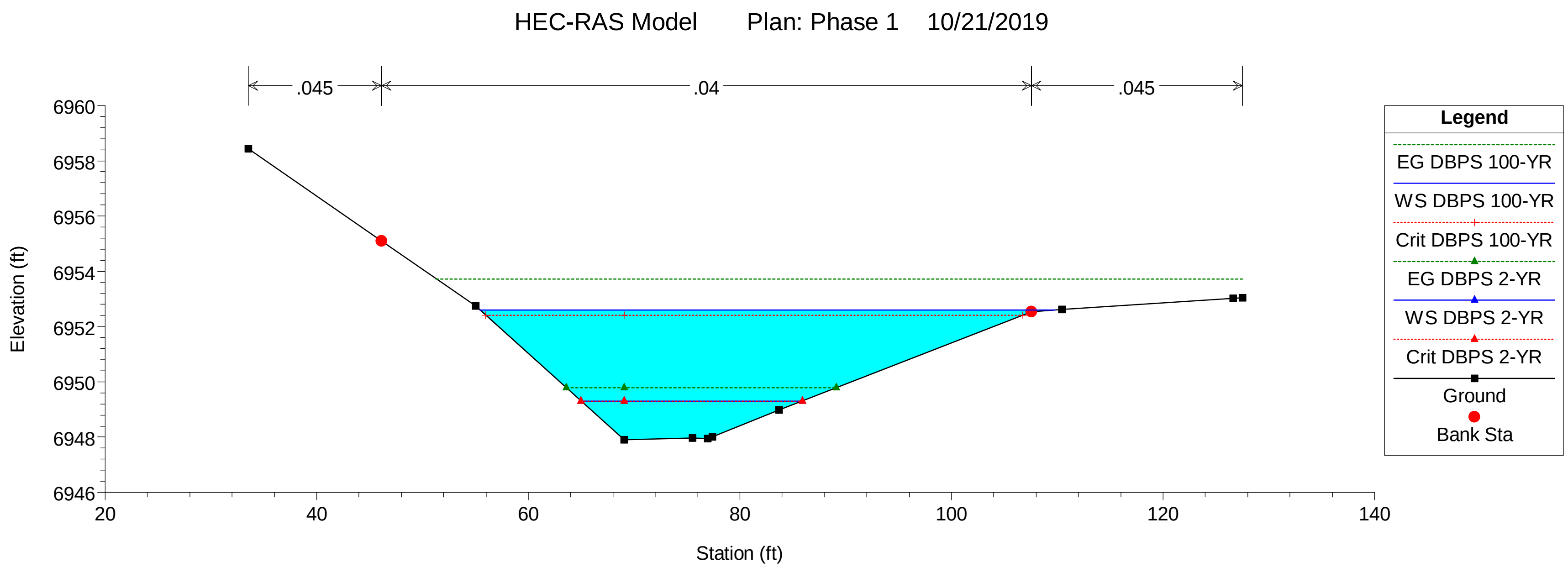
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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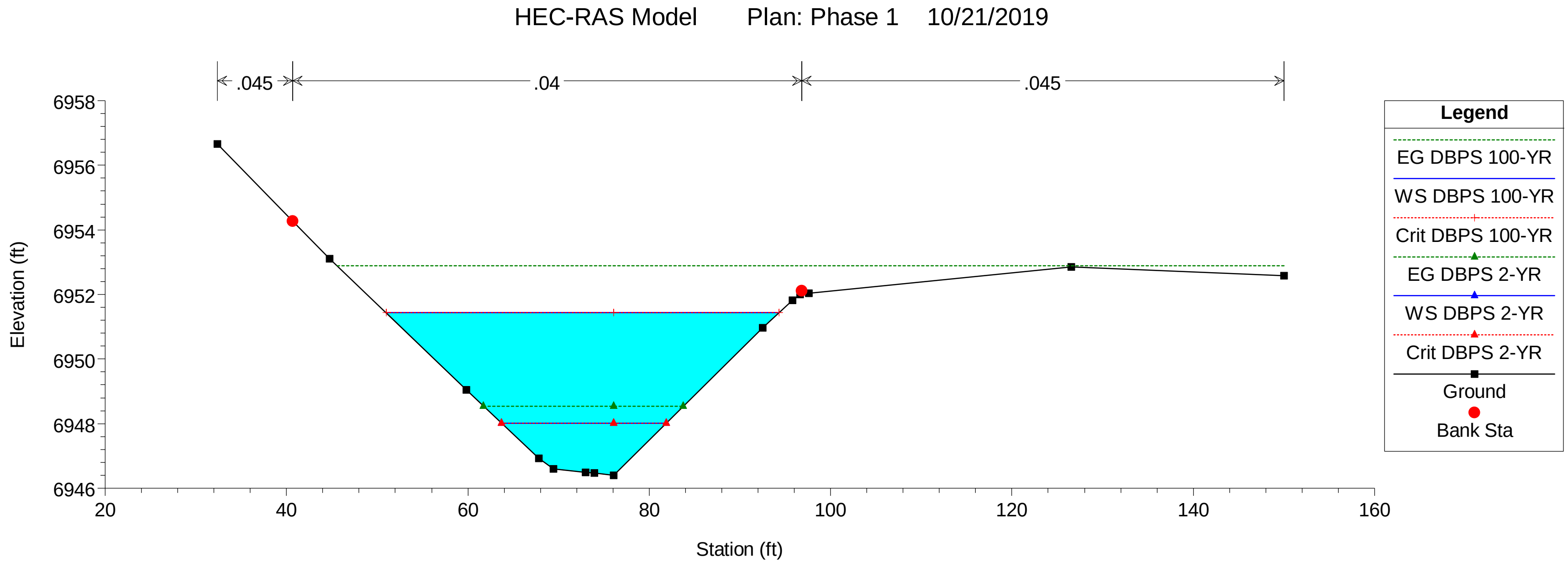
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
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6956
6954
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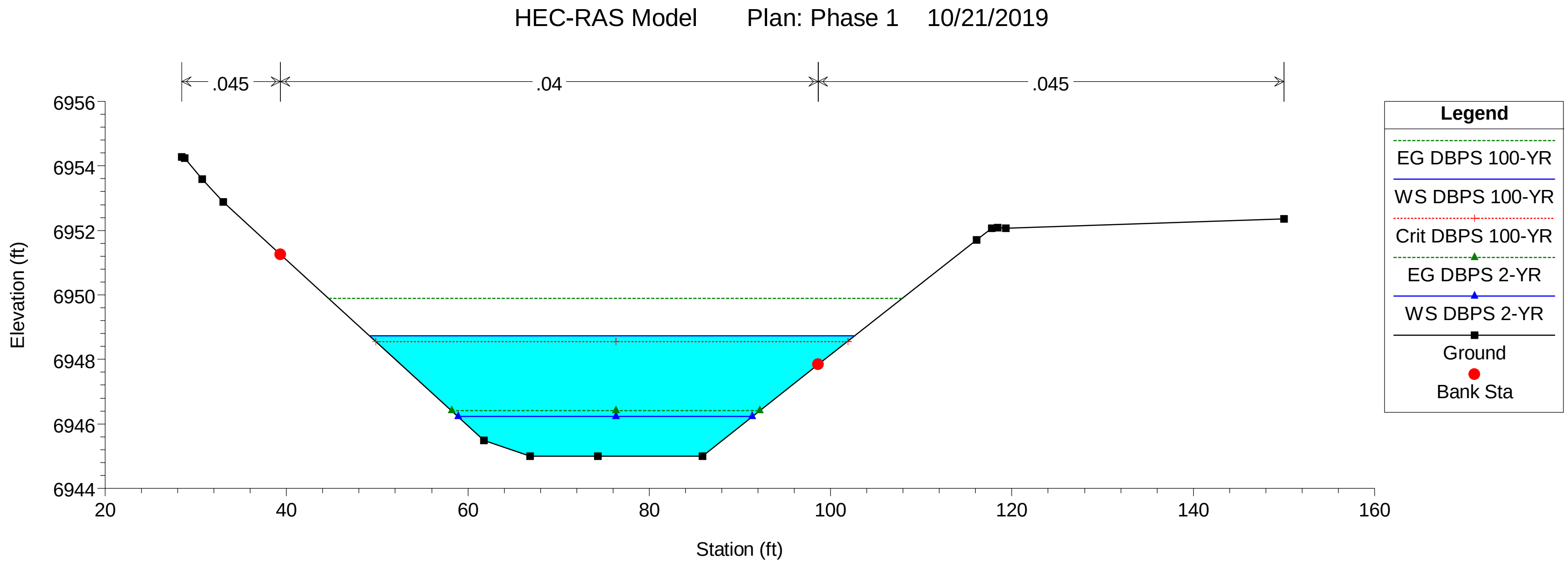
100
120
140
160


HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
.045
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
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6952
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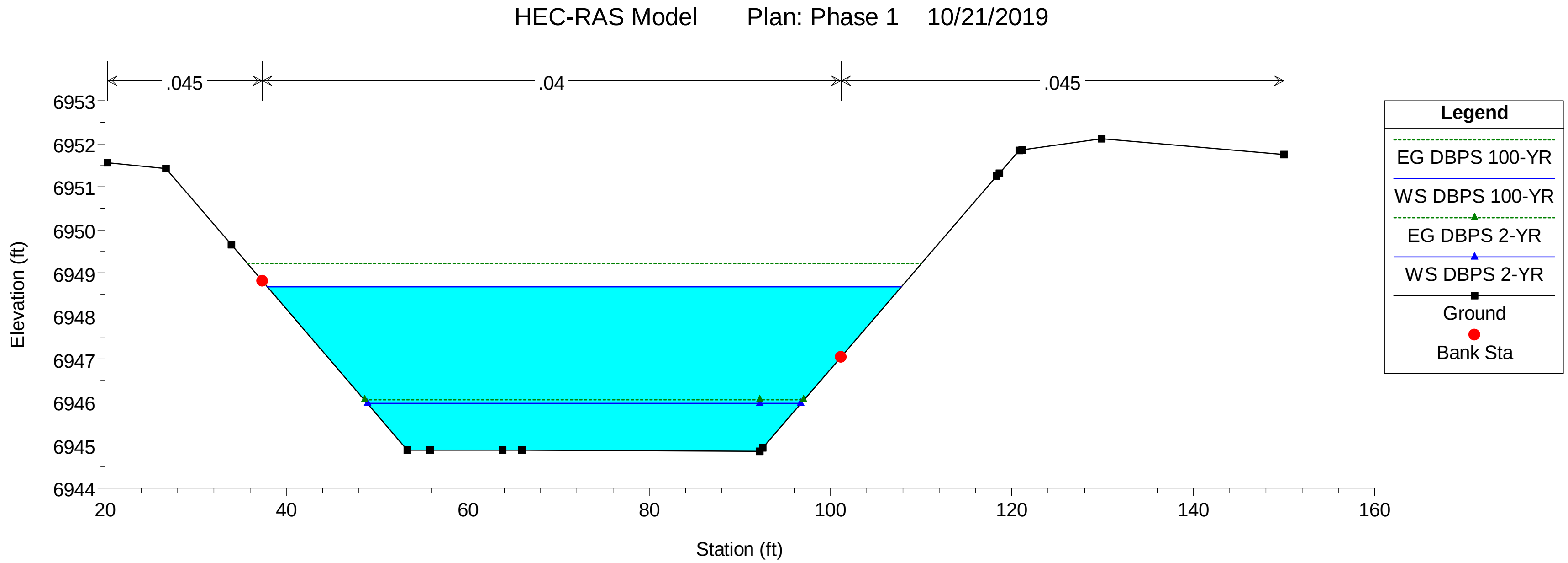
100
120
140
160


HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
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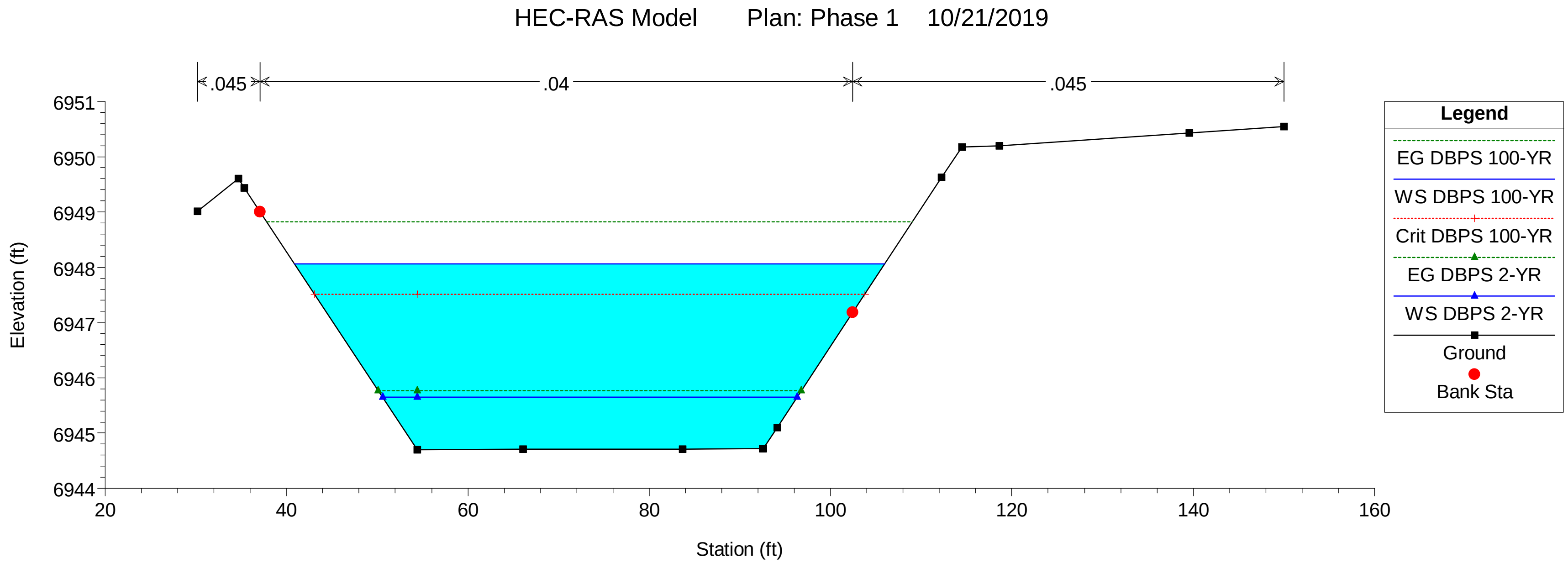
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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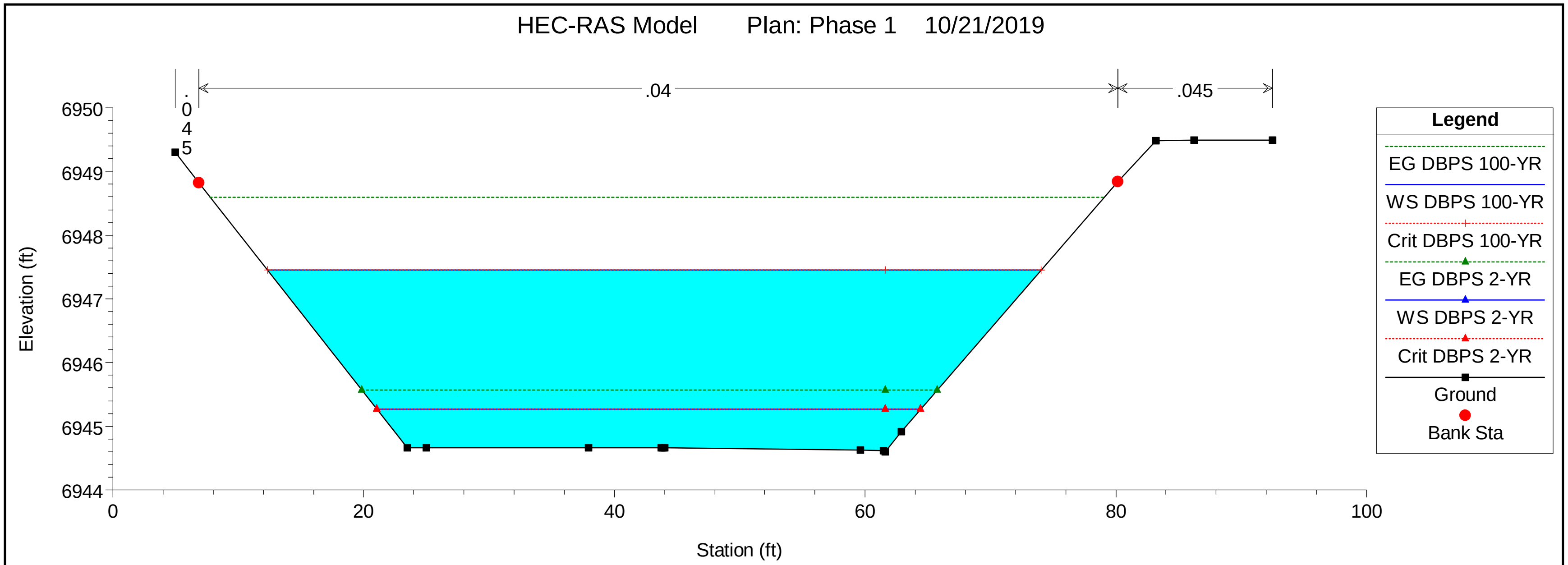
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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6945
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6947
6948
6949
6950
0
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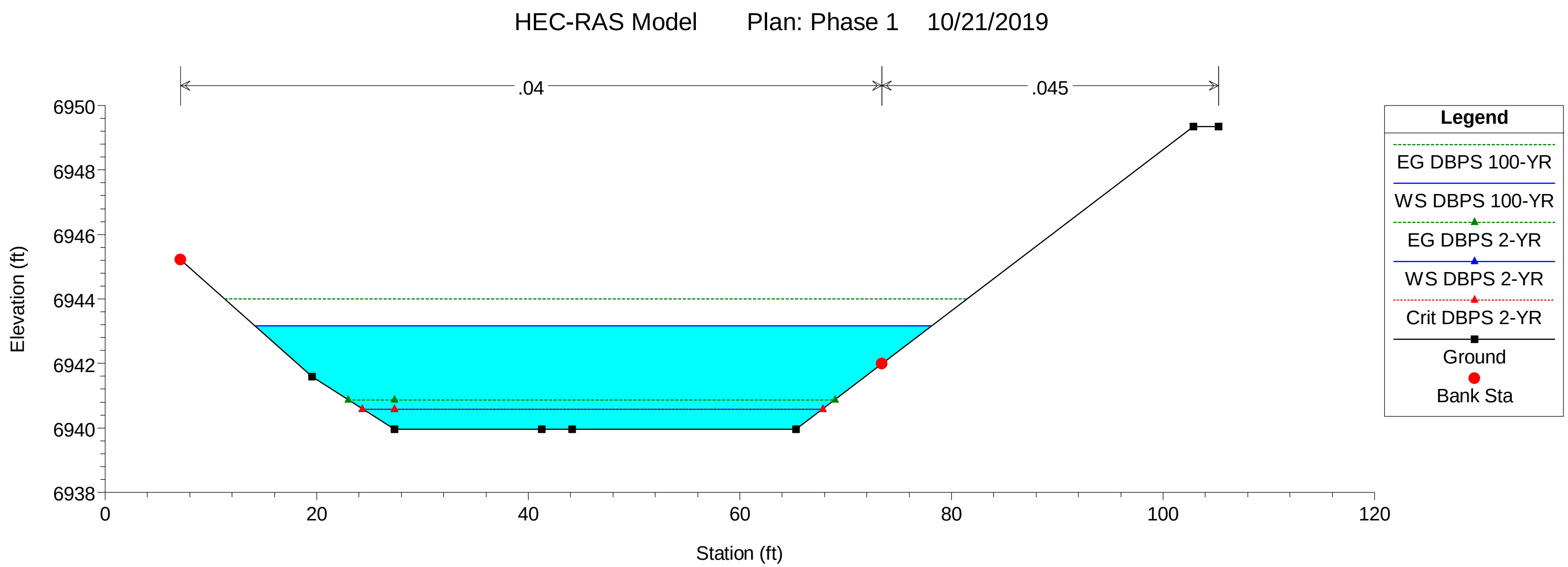
40
60
80
100
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.04
.045
Elevation (ft)
Station (ft)
6938
6940
6942
6944
6946
6948
6950
0
20
40
60
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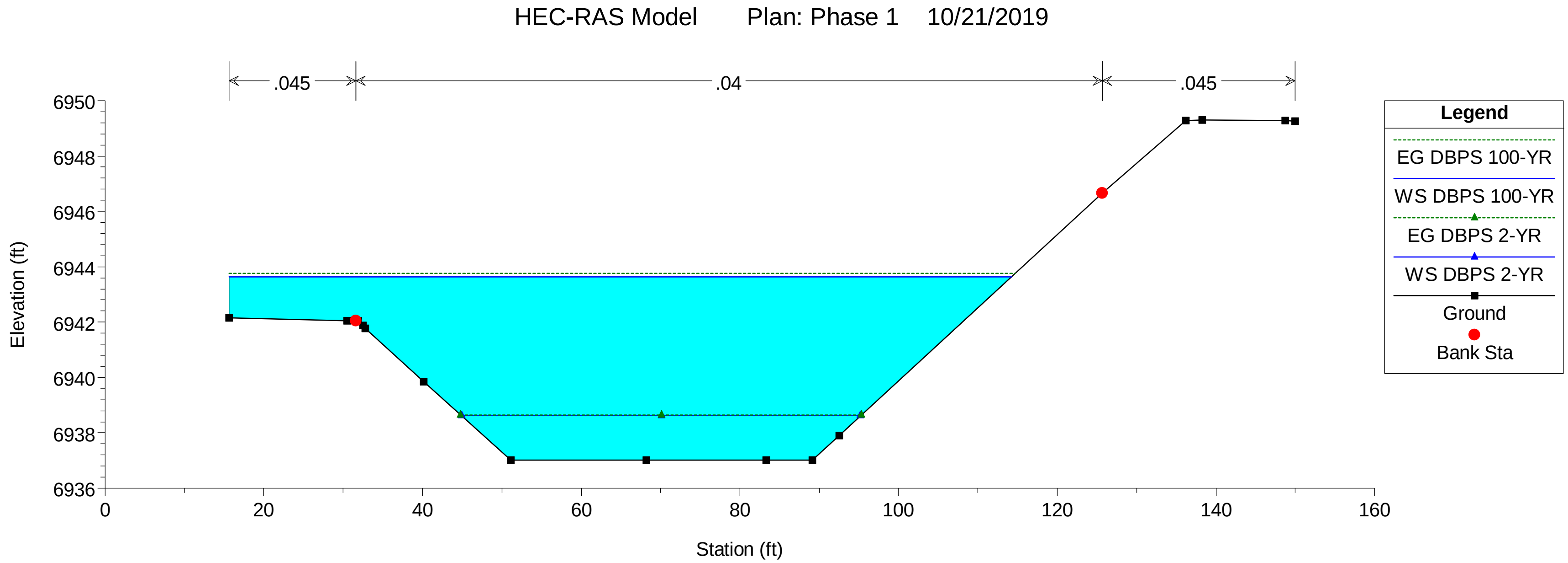
100
120
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
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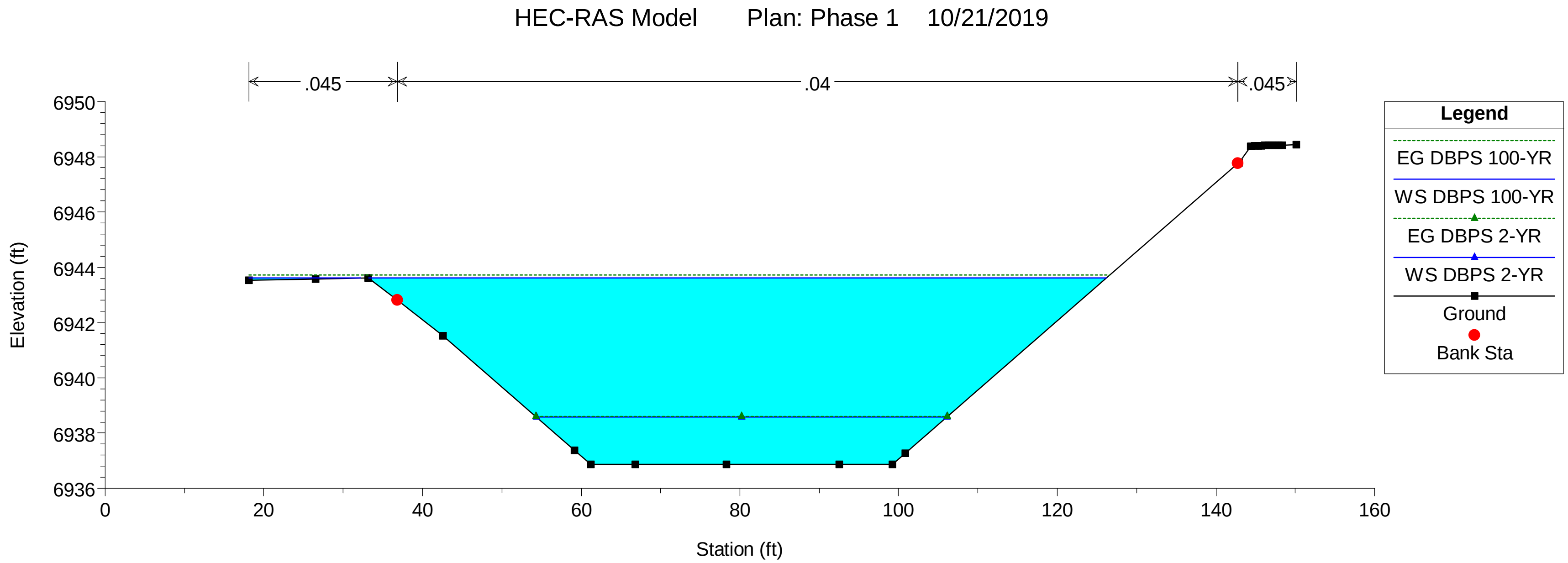
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
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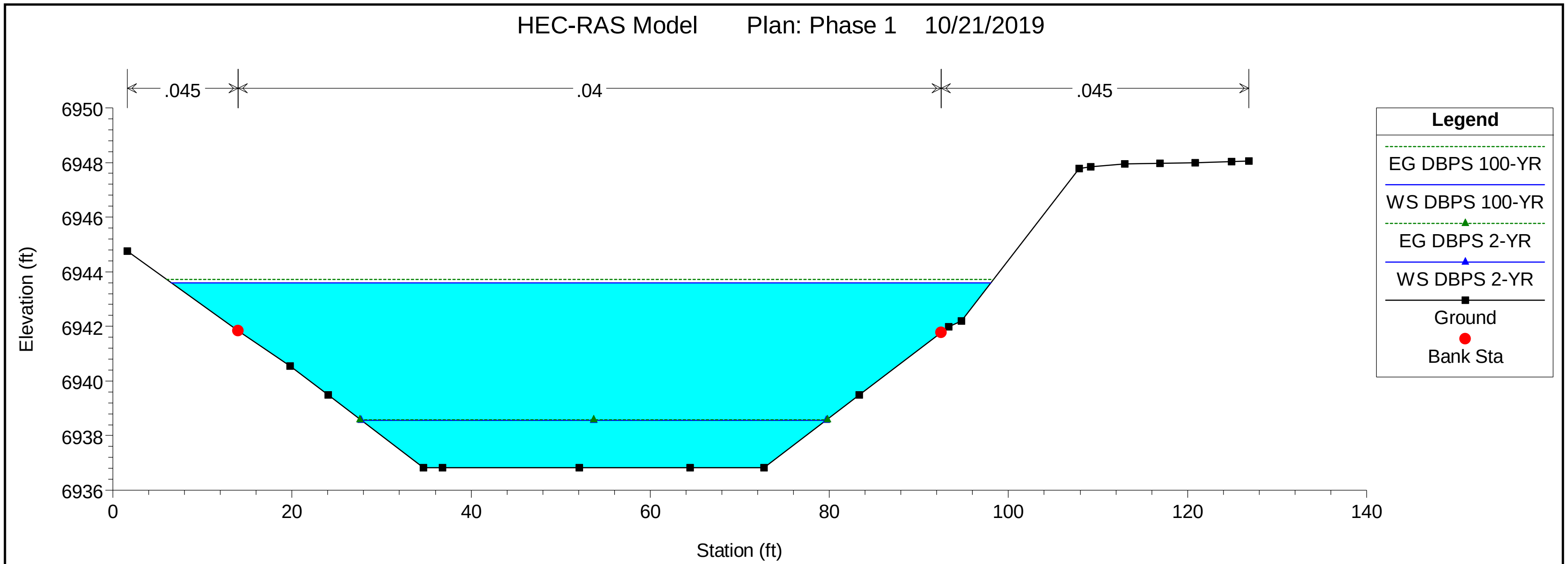
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
.045
Elevation (ft)
Station (ft)
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6948
6946
6944
6942
6940
6938
6936
0
20
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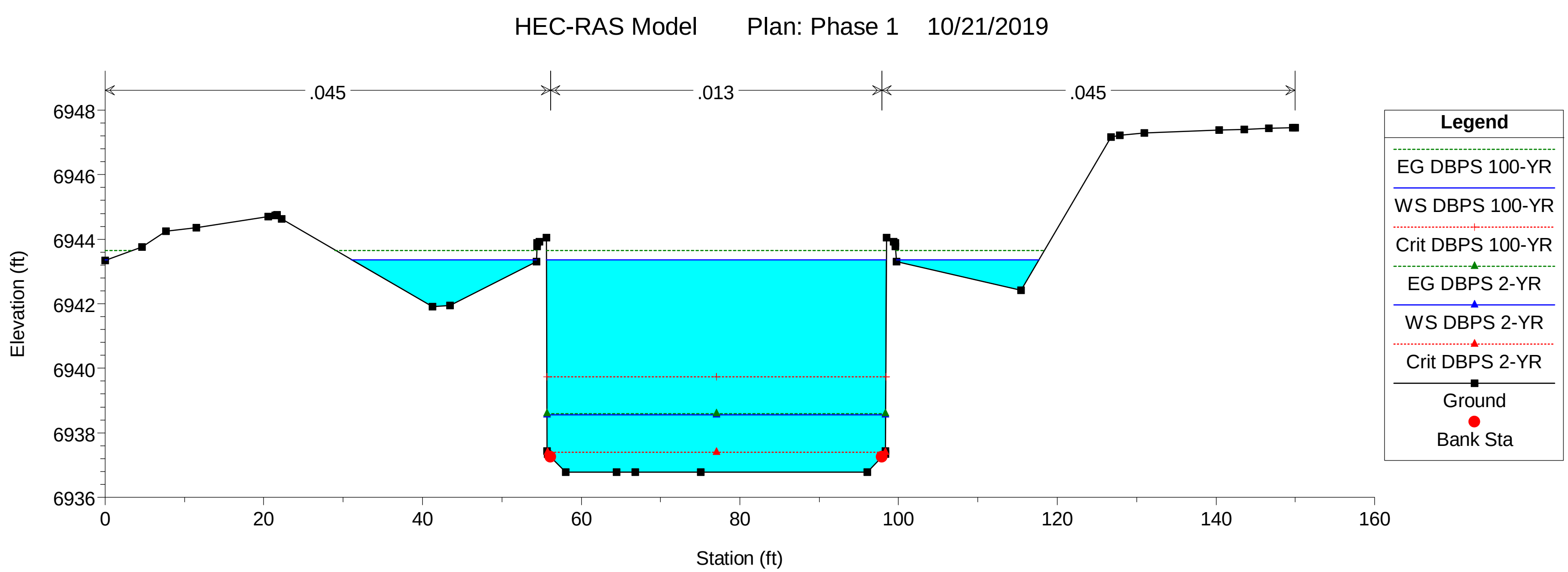
80
100
120
140
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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.013
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Elevation (ft)
Station (ft)
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6946
6944
6942
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6938
6936
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20
40
60
80
100
120
140
160
Legend
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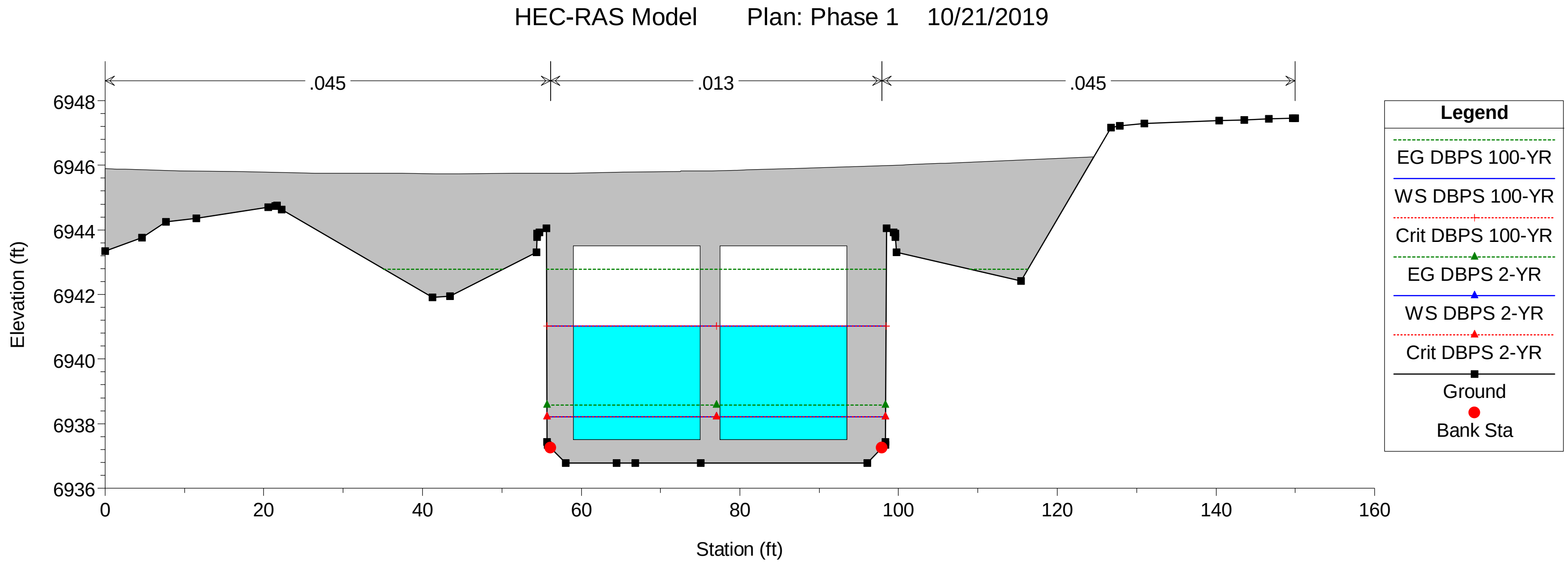
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.013
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Elevation (ft)
Station (ft)
Legend
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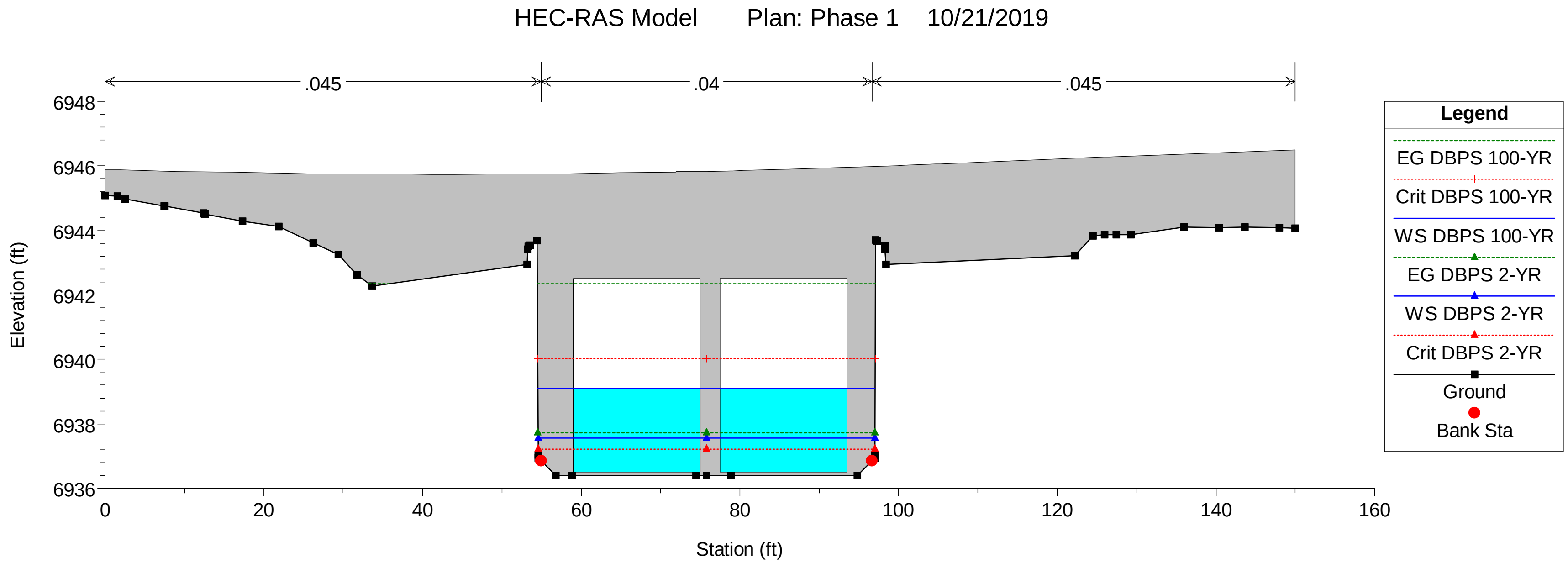
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
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.045
Elevation (ft)
Station (ft)
Legend
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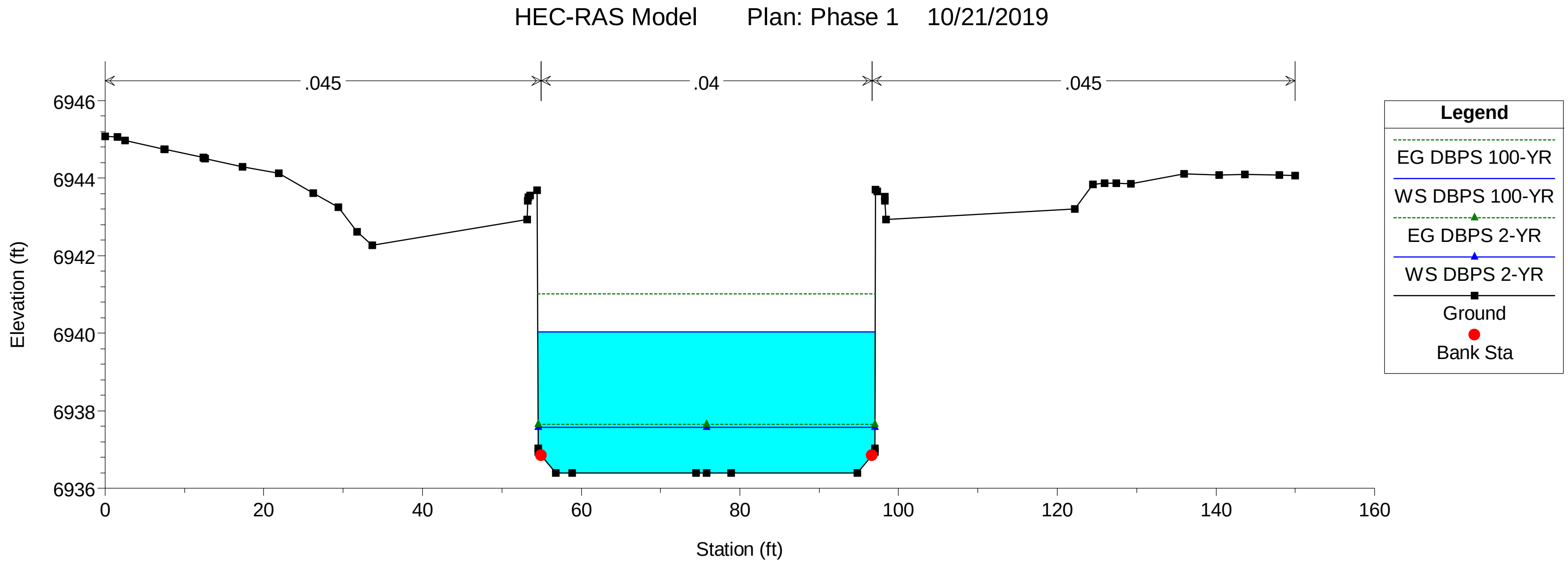
Crit DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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.045
Elevation (ft)
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6936
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40
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Station (ft)
Legend
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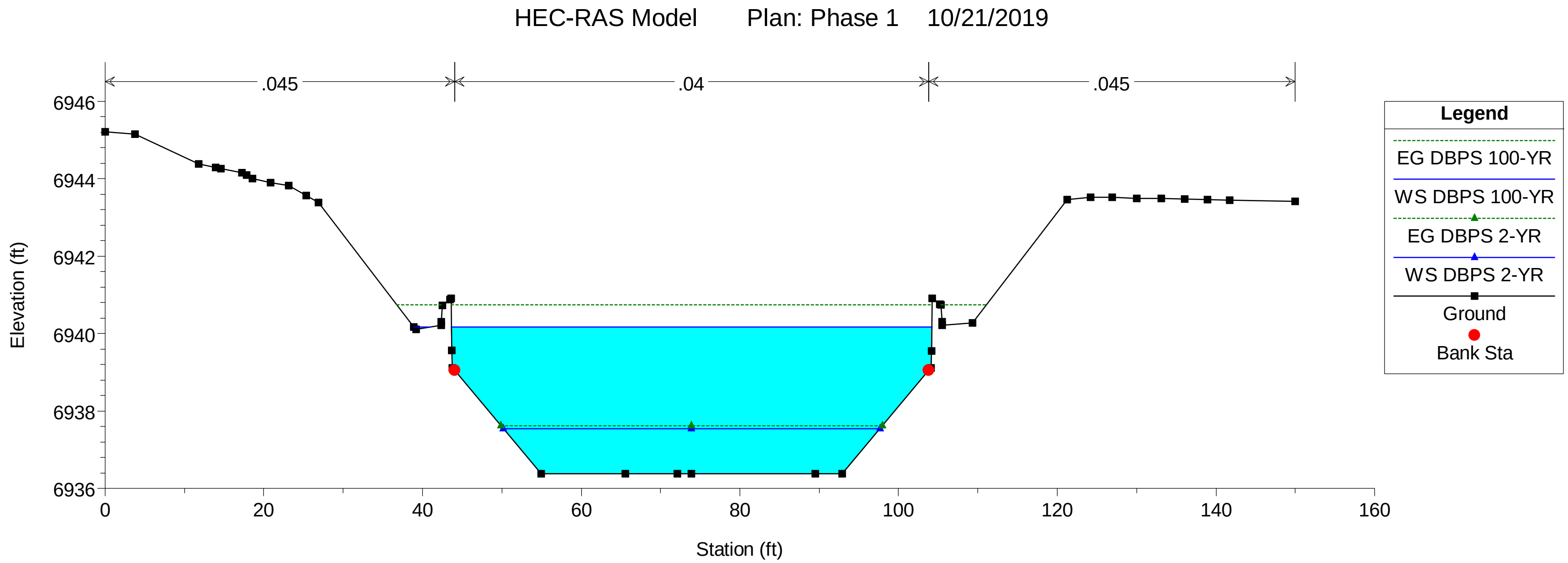
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
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.045
Elevation (ft)
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6936
0
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40
60
80
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Station (ft)
Legend
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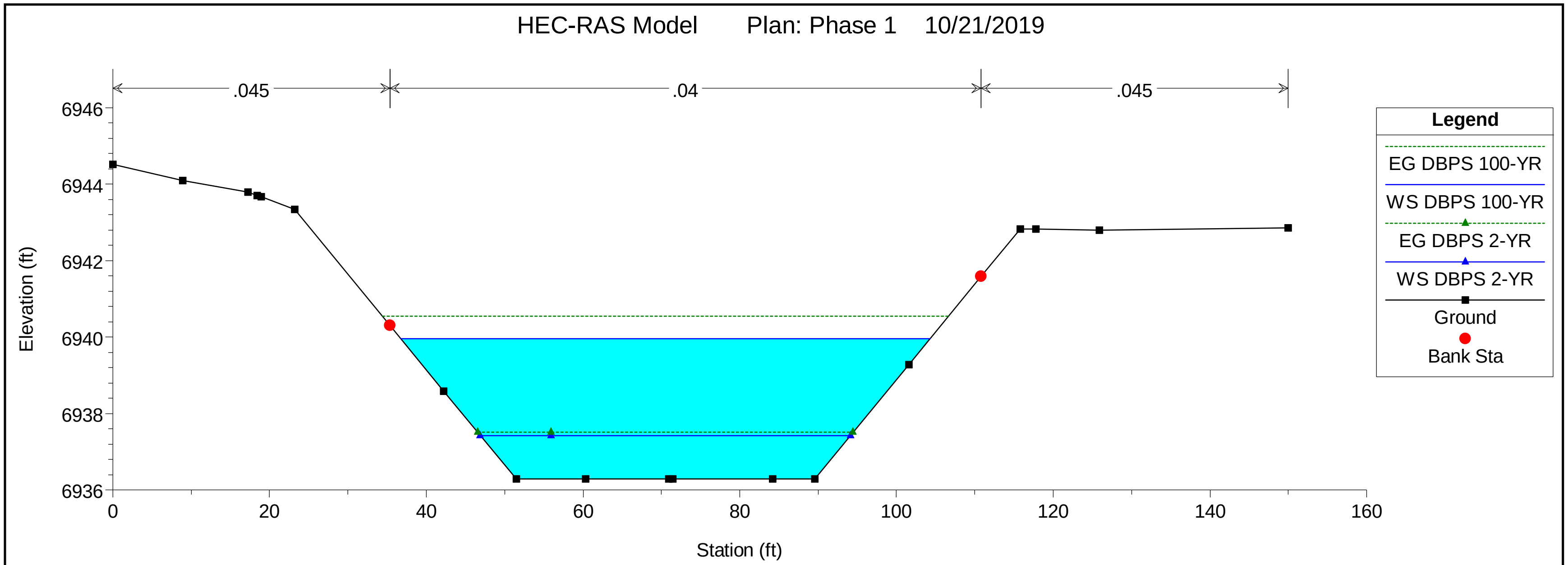
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
6936
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6942
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6946
Station (ft)
0
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100
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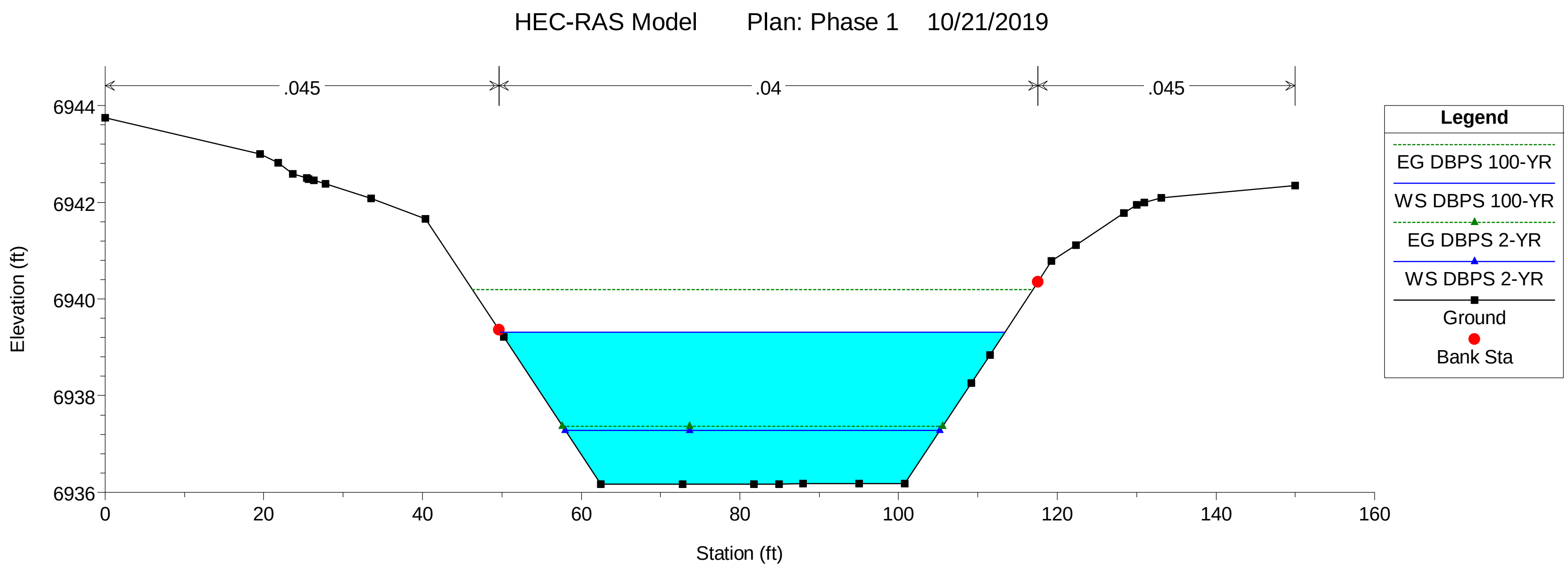
140
160


HEC-RAS Model Plan: Phase 1 10/21/2019
.045
.04
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Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
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6938
6940
6942
6944
Station (ft)
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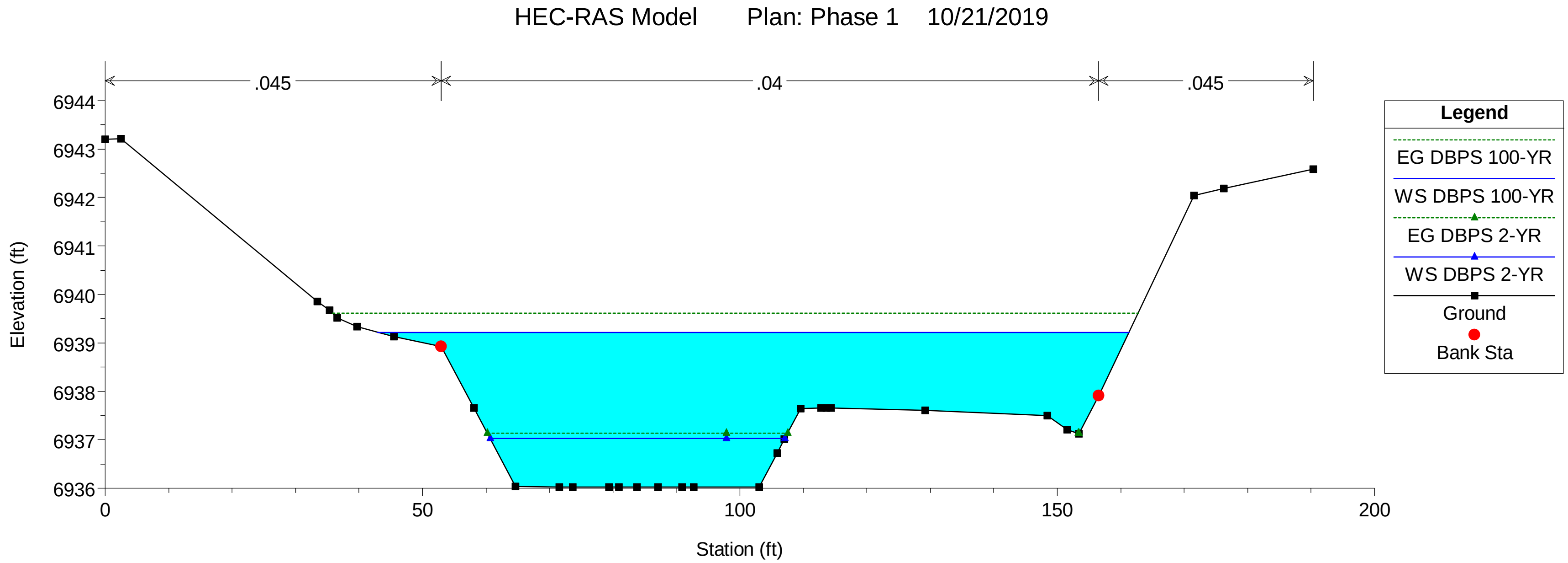
140
160


HEC-RAS Model Plan: Phase 1 10/21/2019
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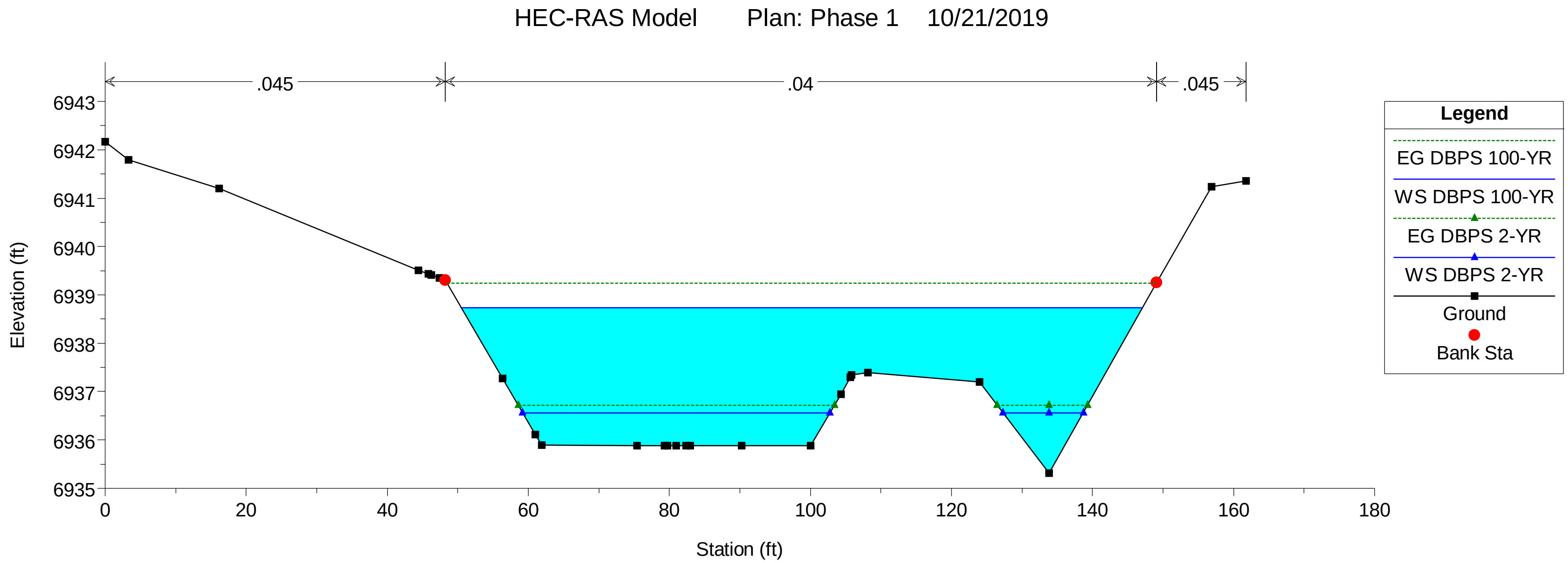
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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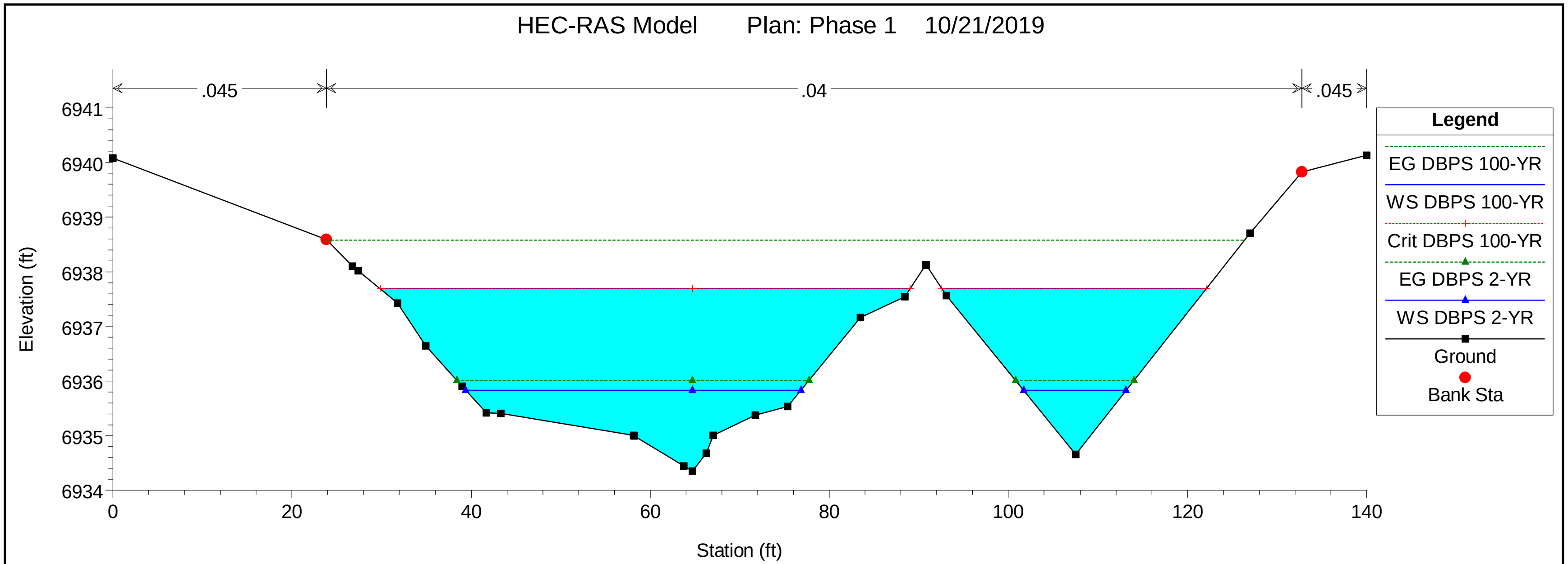
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
.045
Elevation (ft)
6941
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6934
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20
40
60
80
100
120
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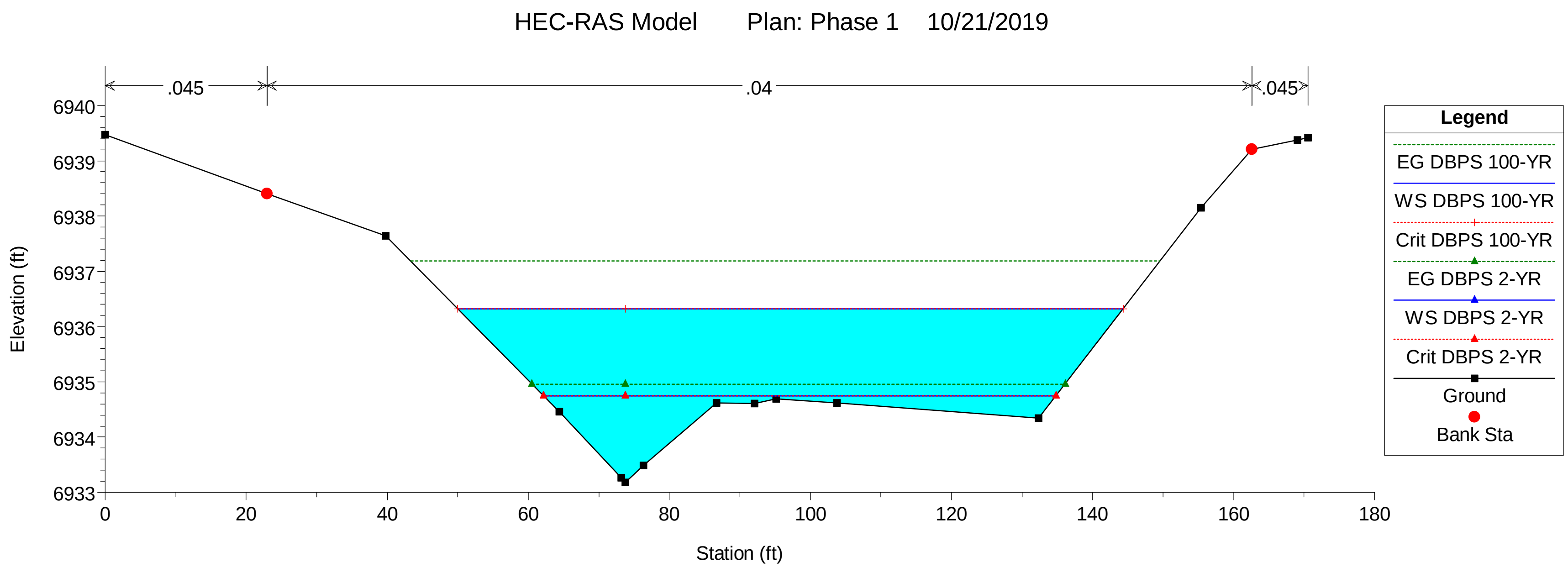
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
.045
Elevation (ft)
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6937
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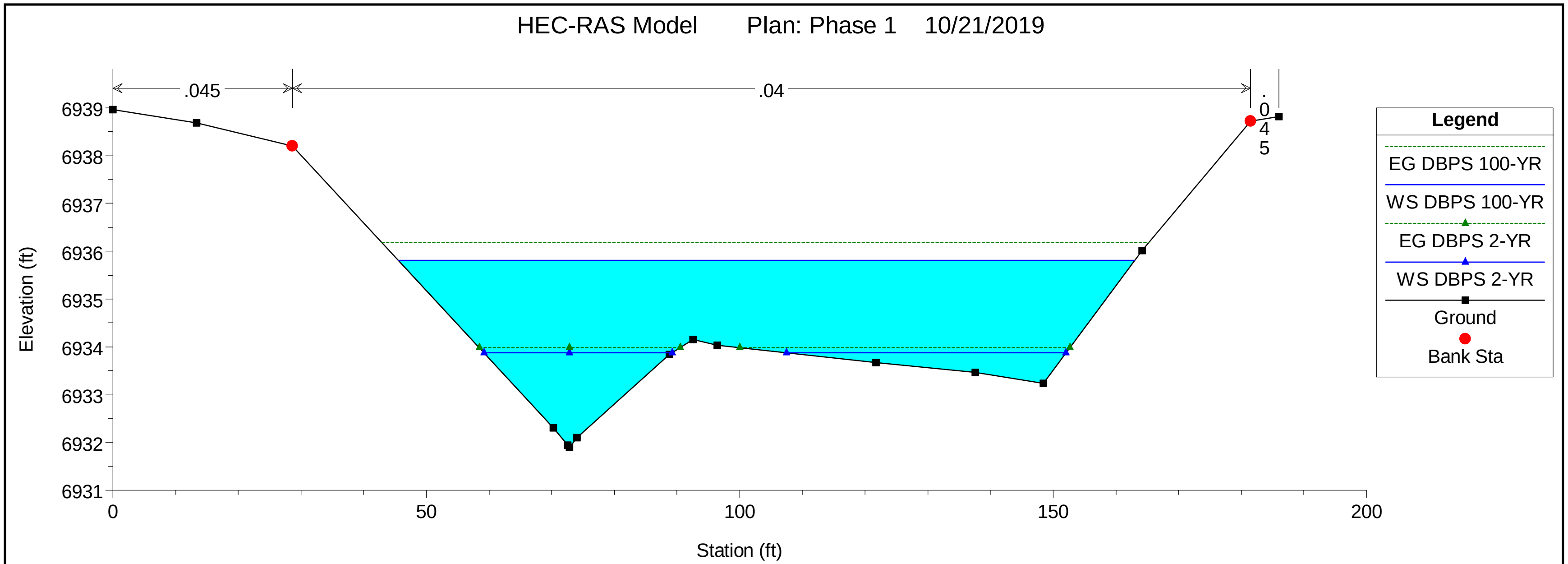
6933
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
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Elevation (ft)
Station (ft)
Legend
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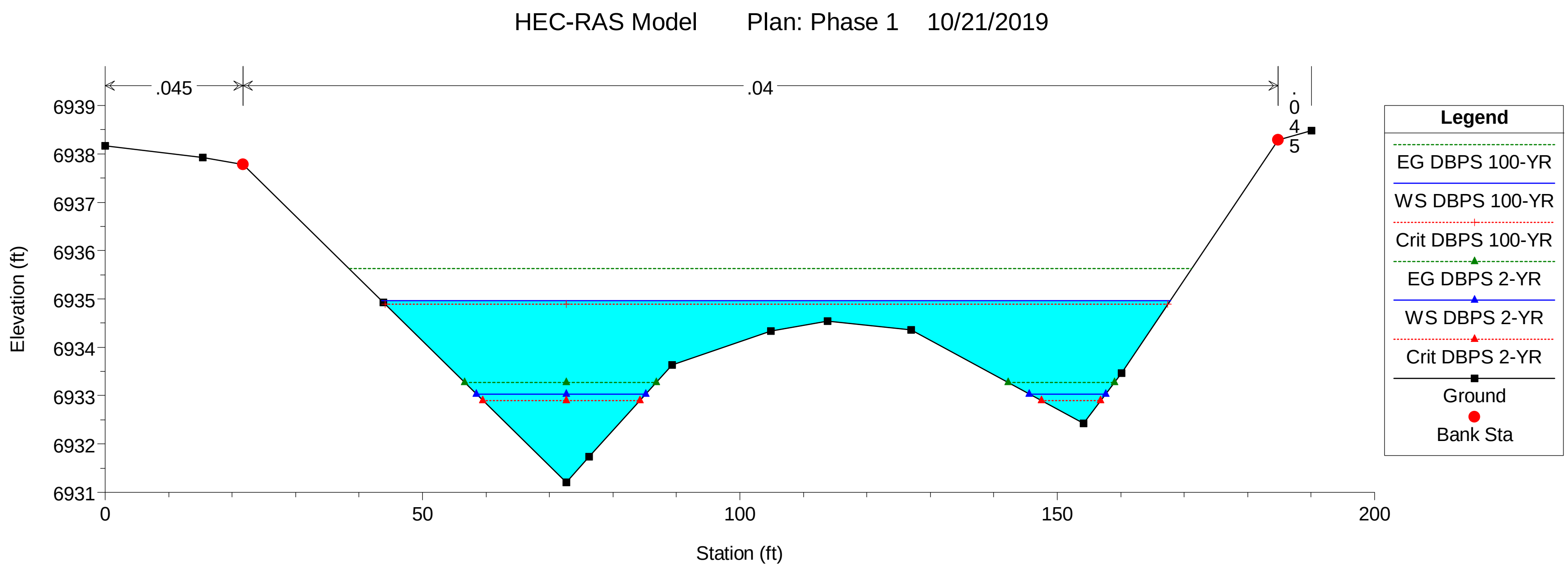
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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.04
.045
Elevation (ft)
Station (ft)
Legend
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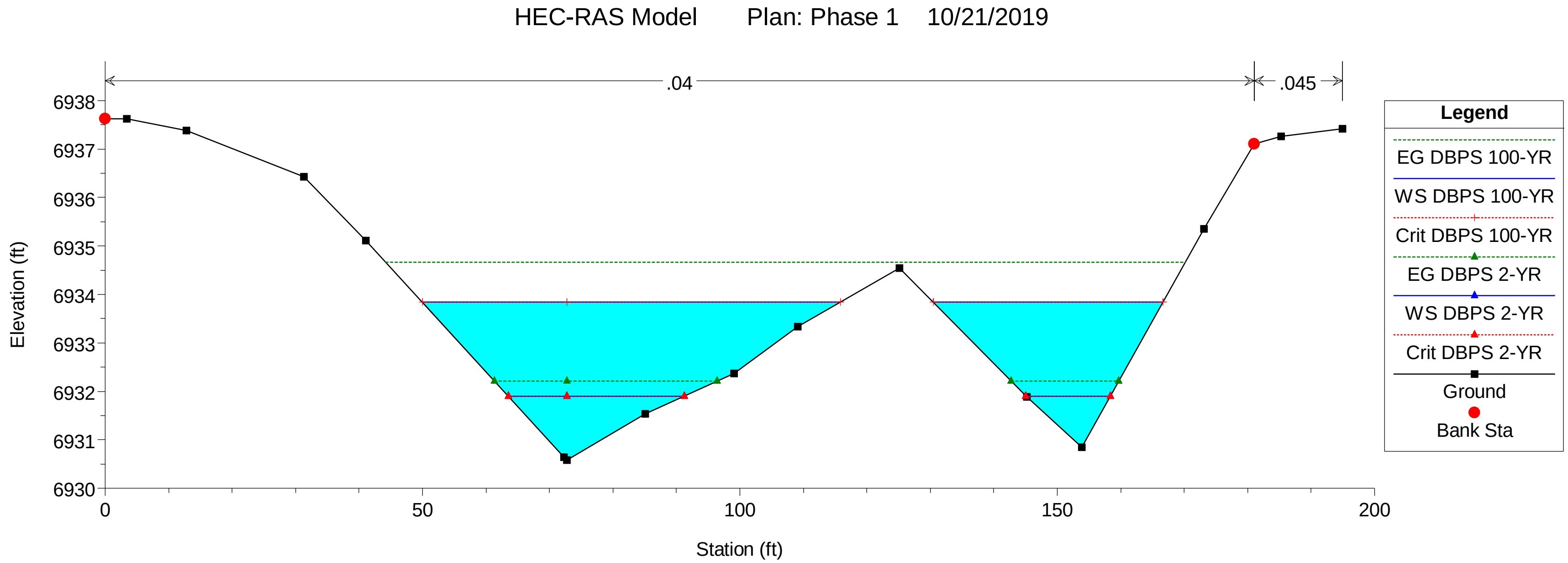
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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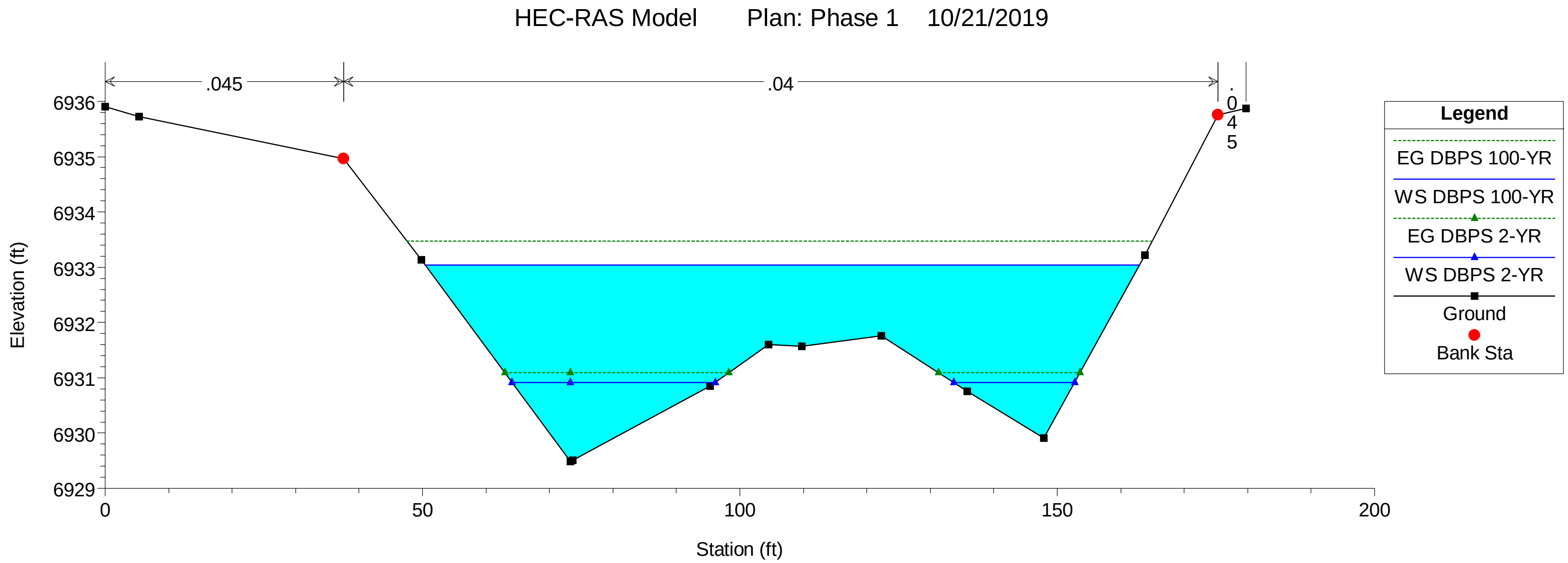
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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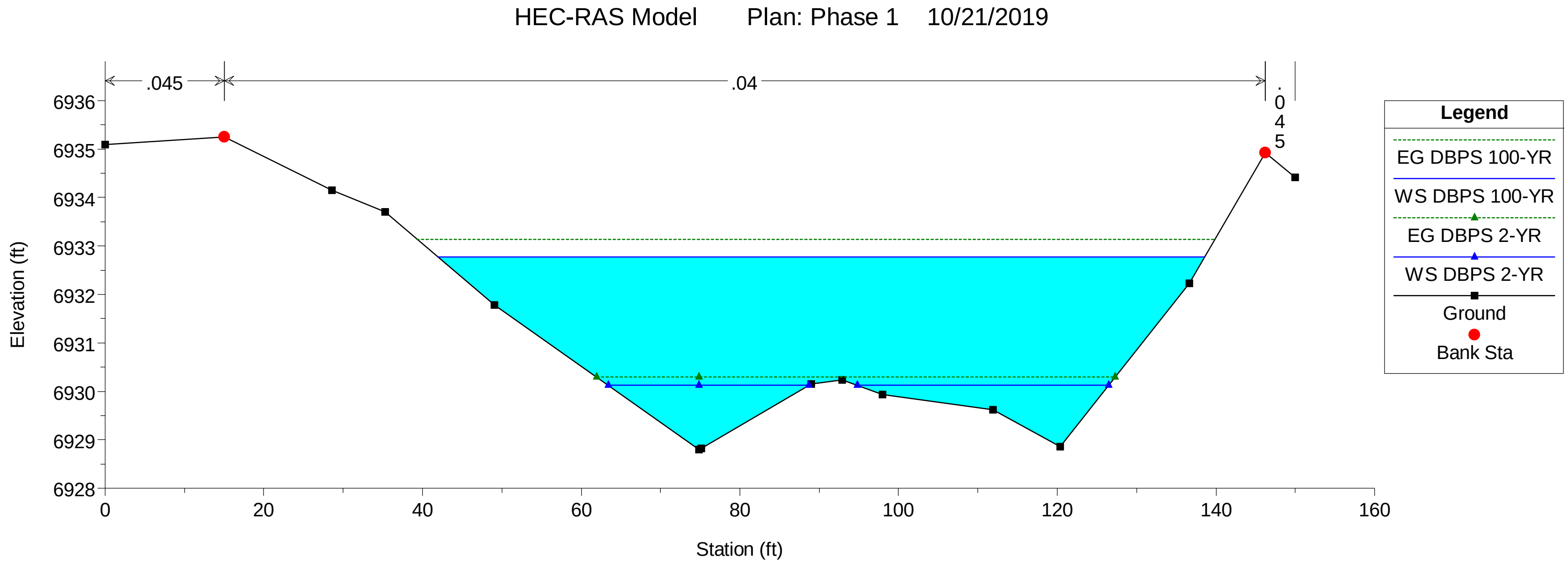
.04
.045
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
6928
6929
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6931
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Station (ft)
0
20
40
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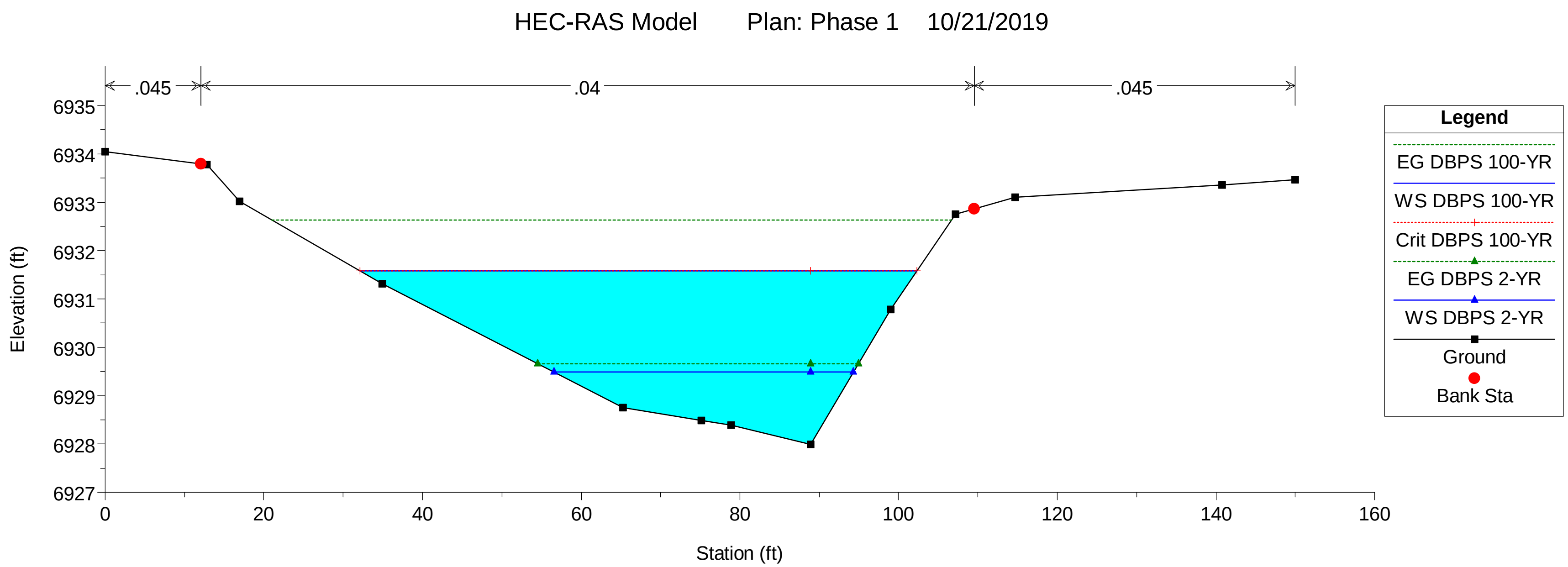
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
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6935
Station (ft)
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60
80
100
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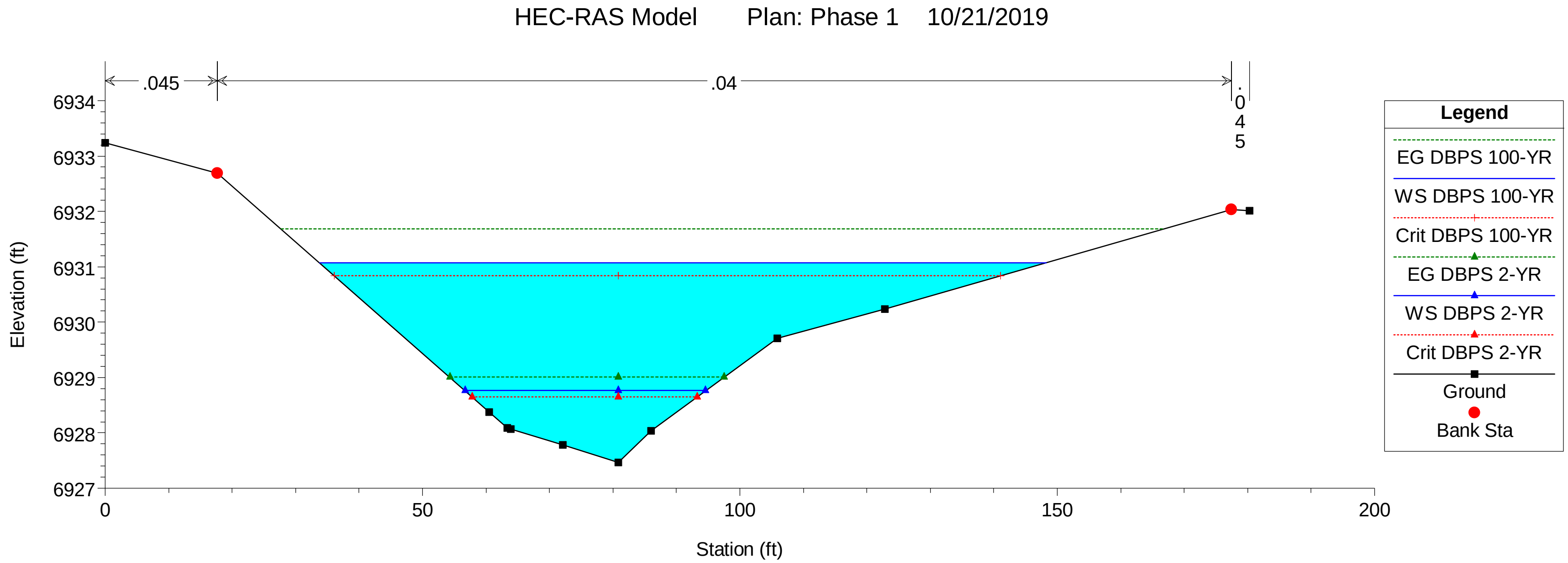
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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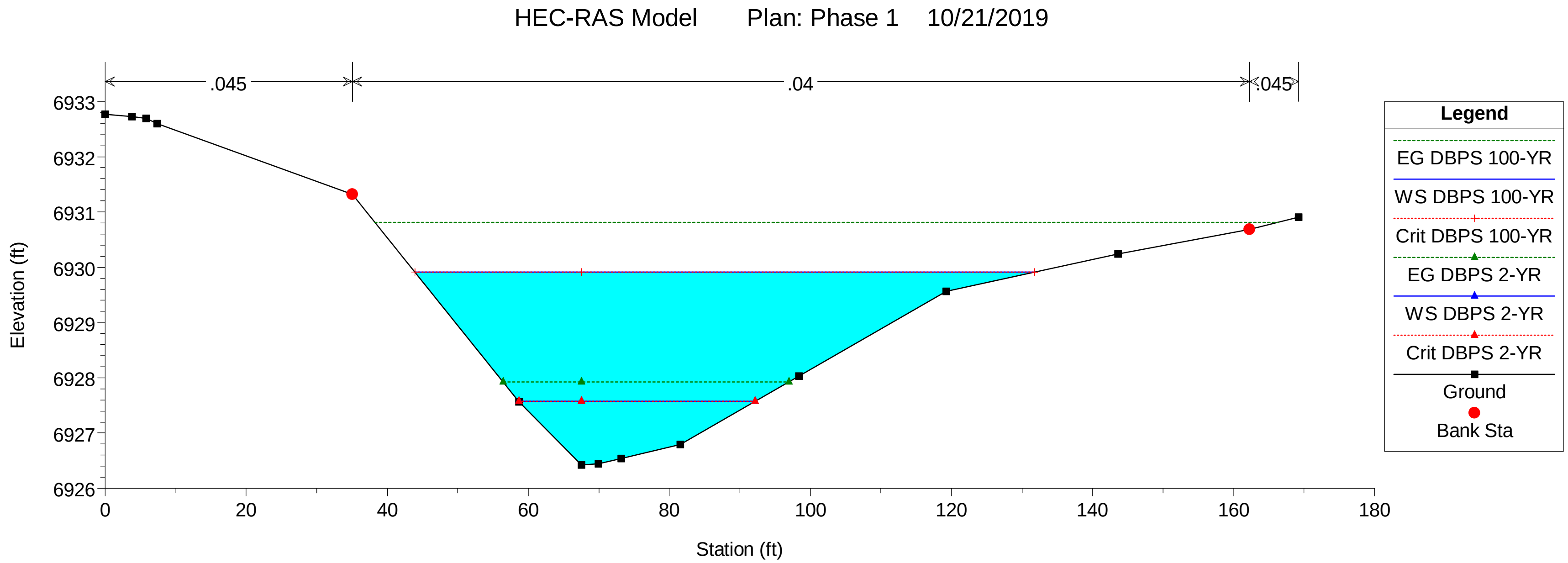
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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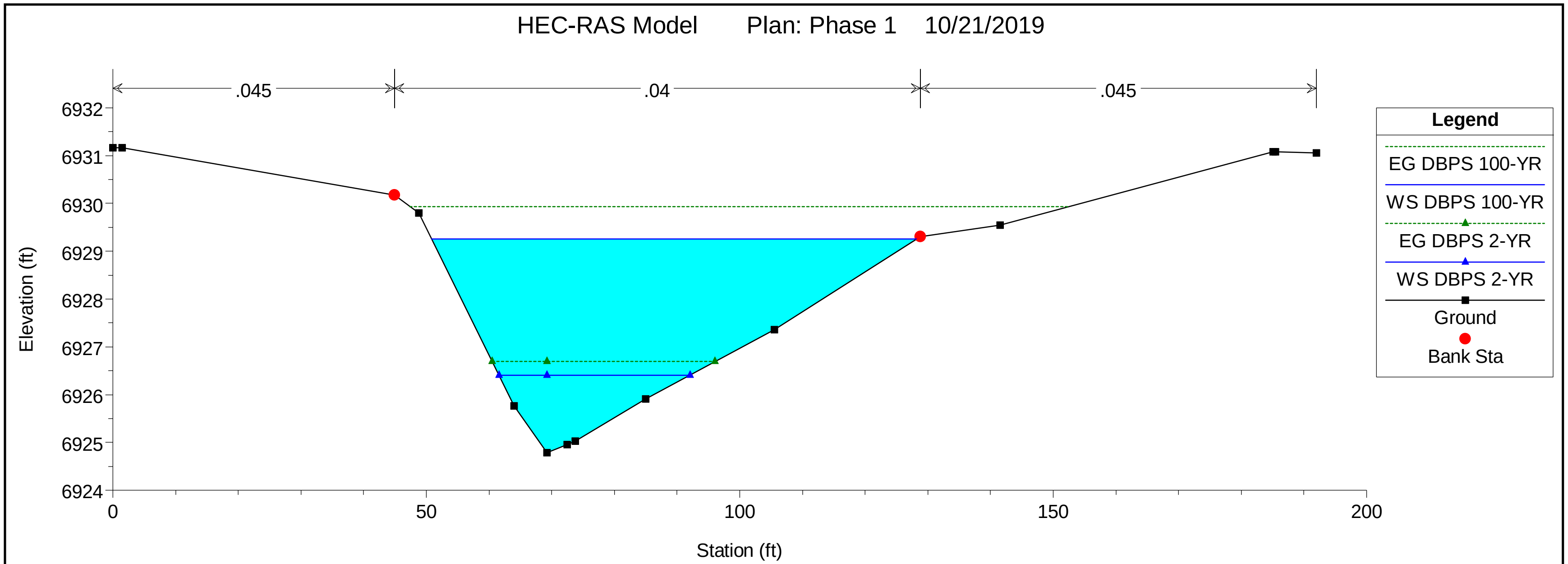
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
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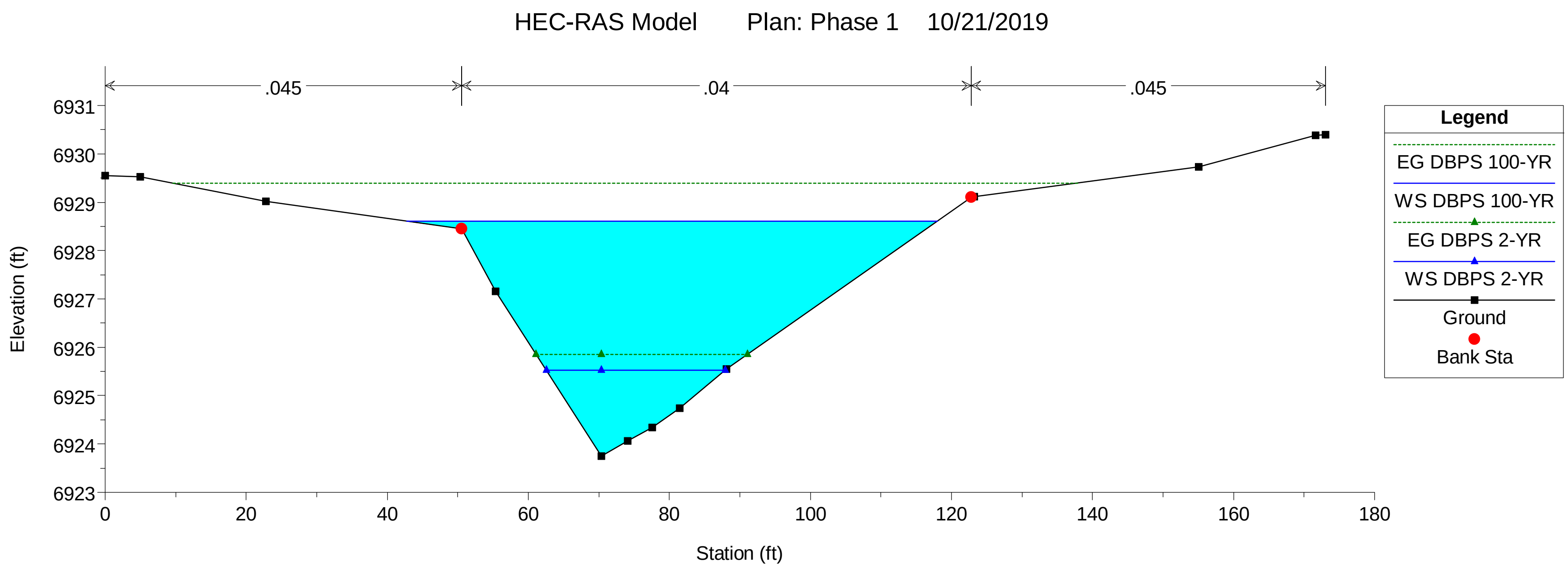
100
150
200
Station (ft)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Legend
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EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
6931
6930
6929
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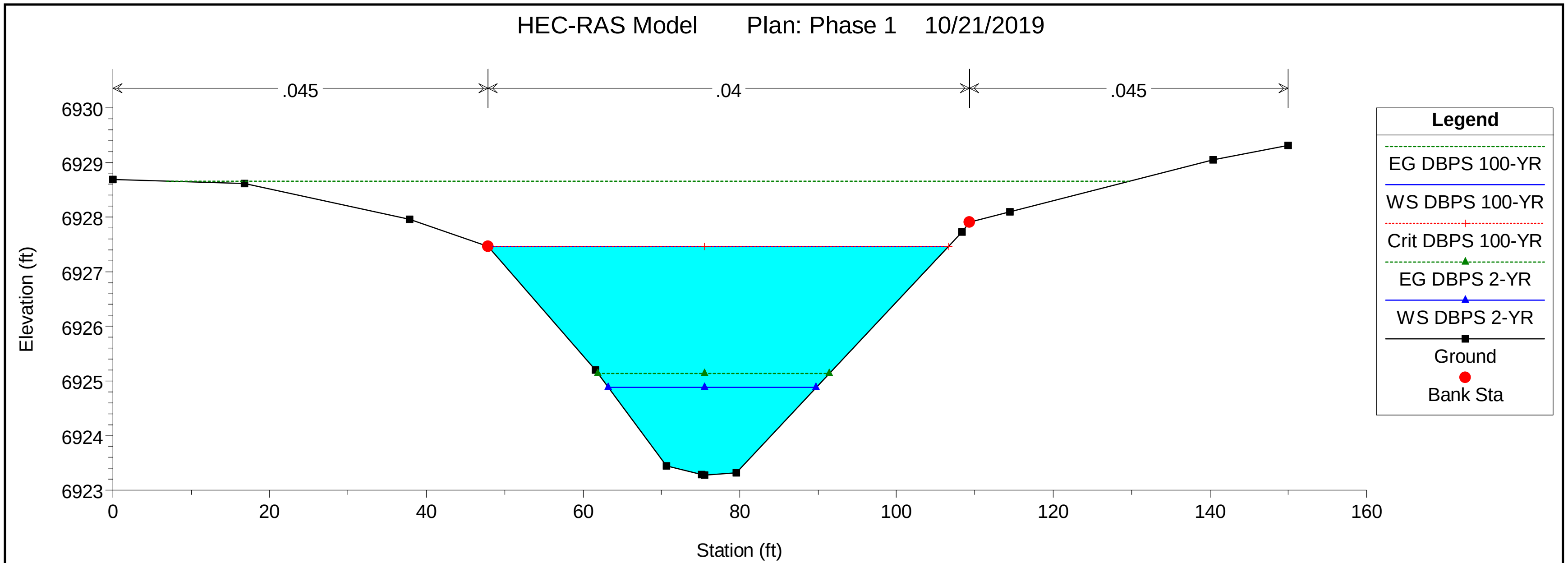
Station (ft)



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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Crit DBPS 100-YR
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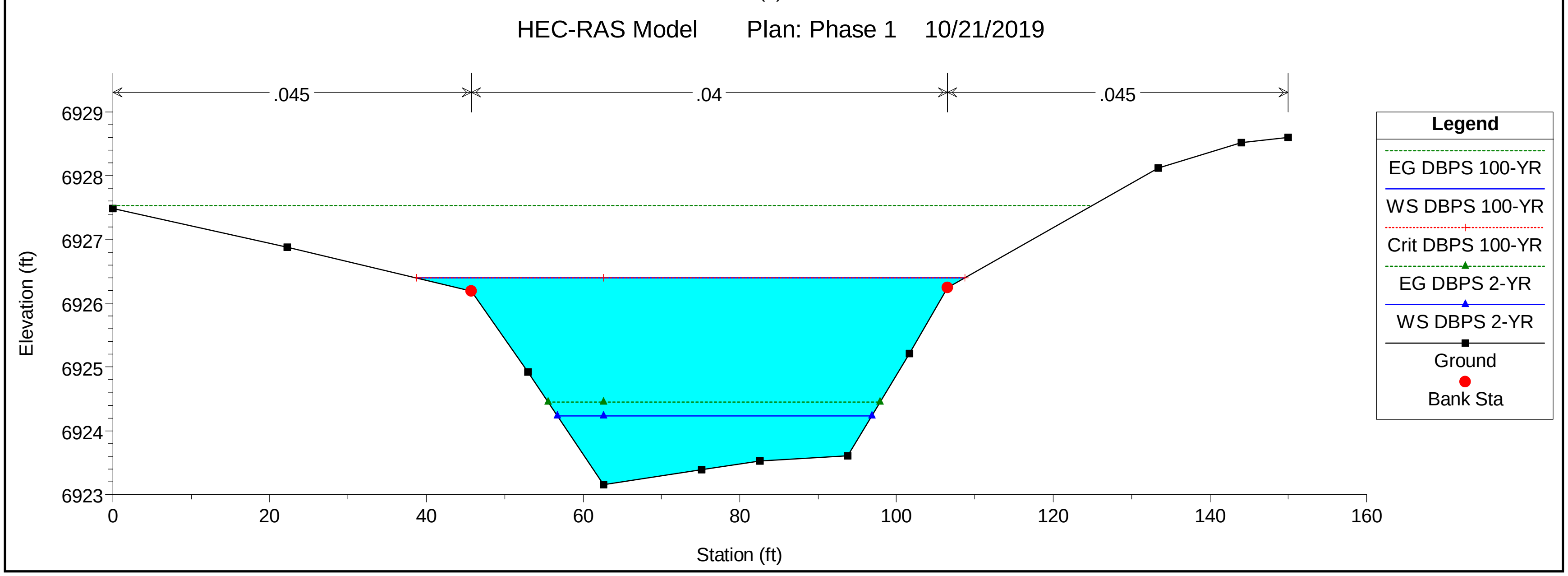
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
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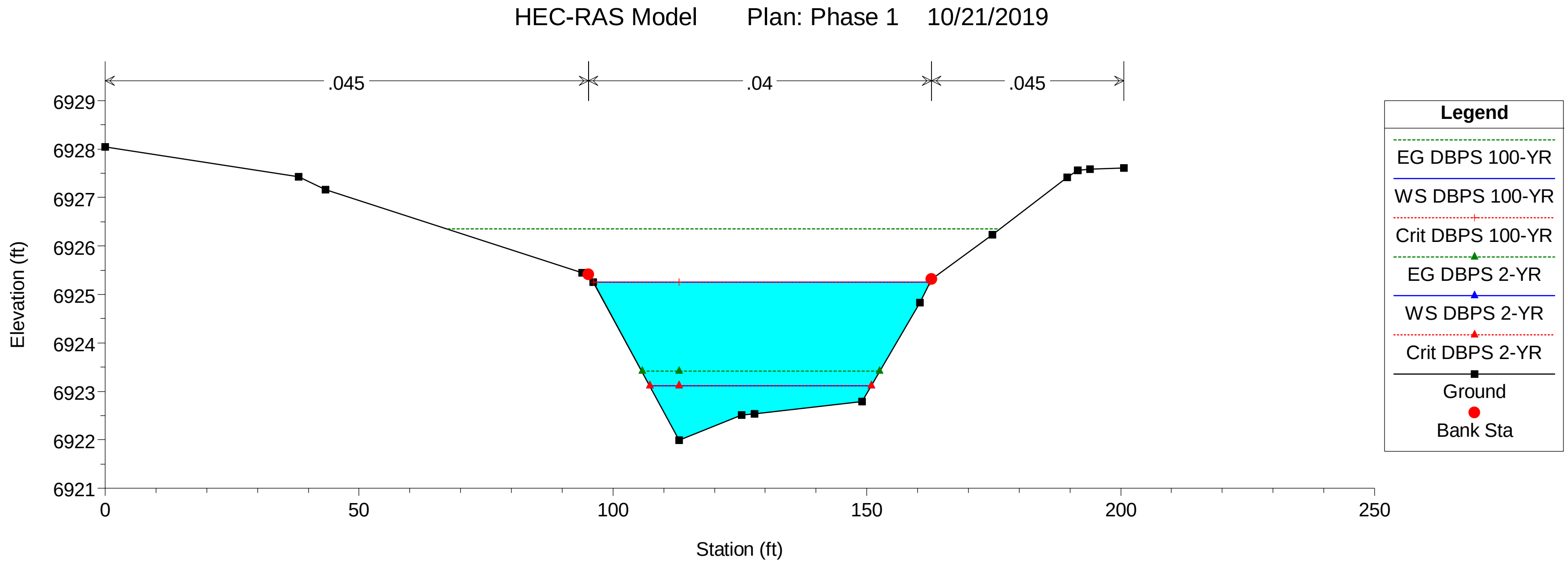
Bank Sta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Elevation (ft)
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0
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100
150
200
250
Station (ft)
Legend
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Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
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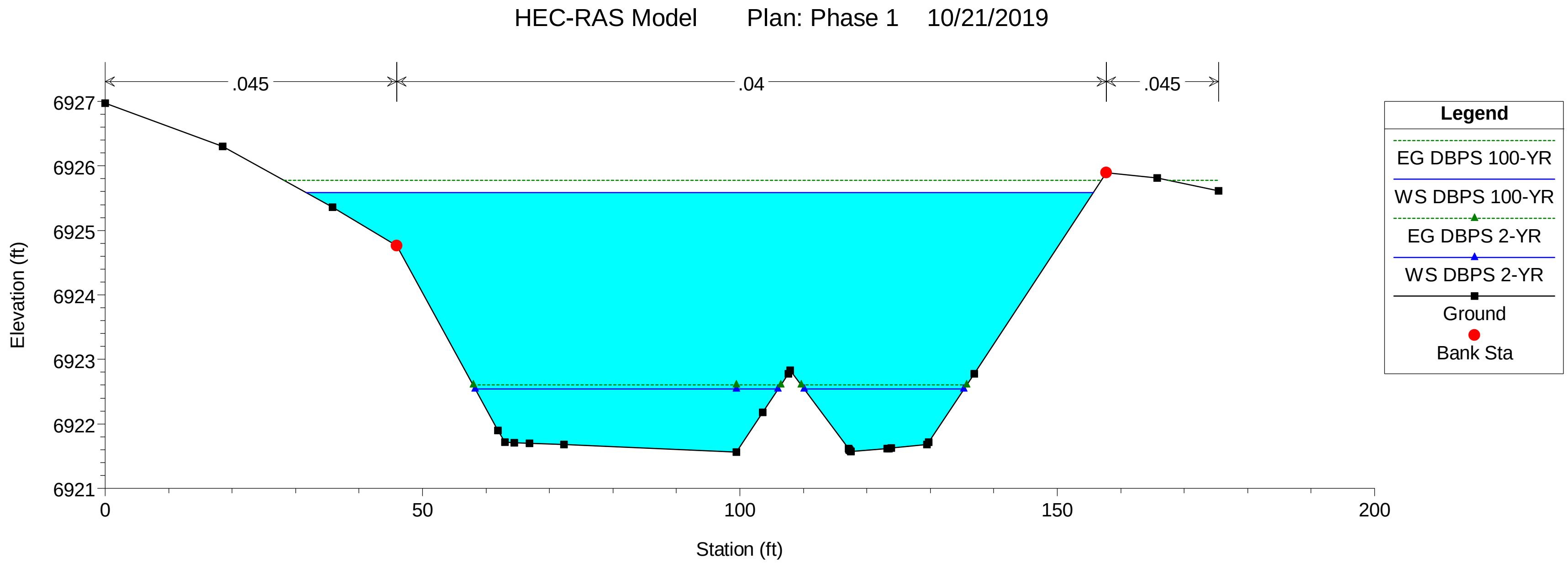
Bank Sta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Elevation (ft)
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0
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Station (ft)
Legend
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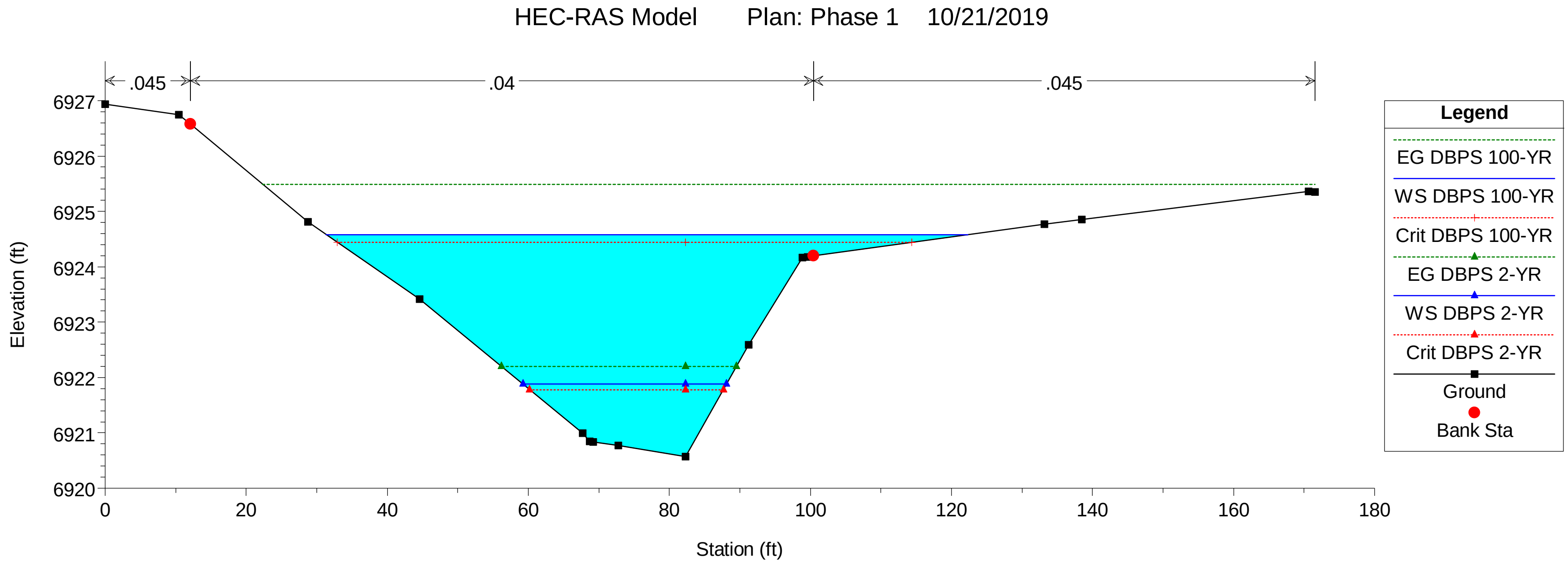
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
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100
120
140
160
180
Station (ft)
Legend
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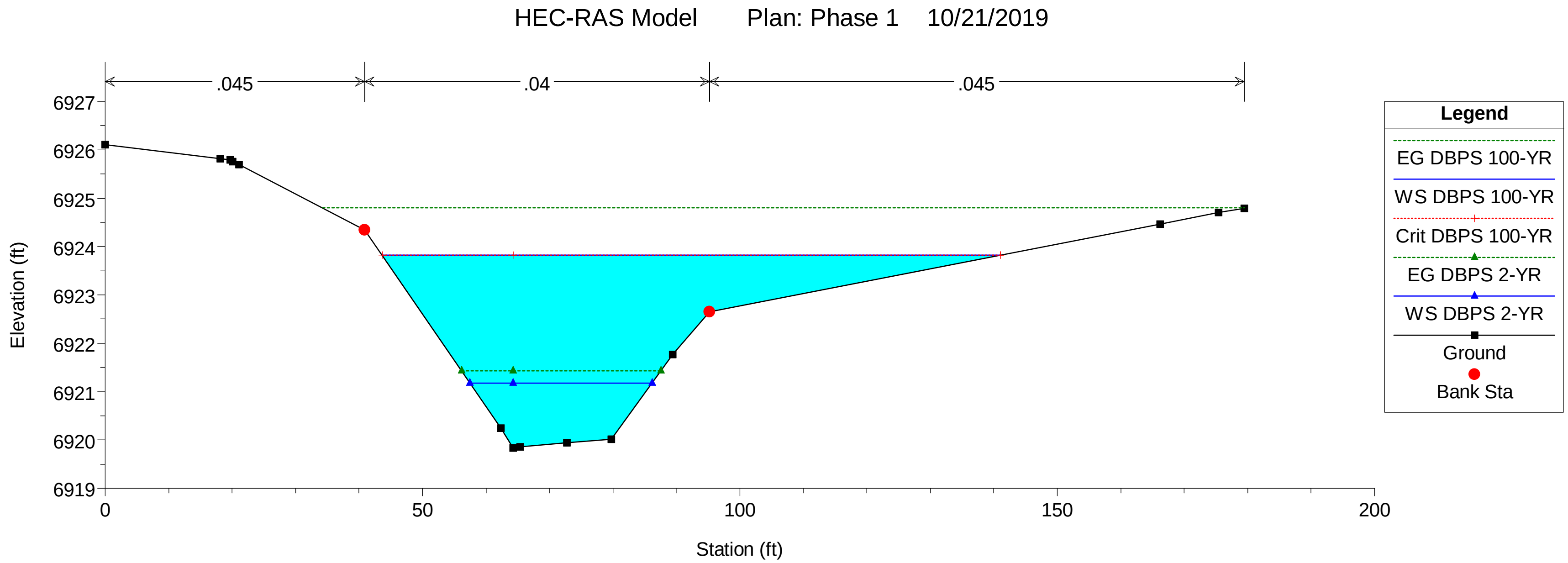
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
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100
150
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Station (ft)
Legend
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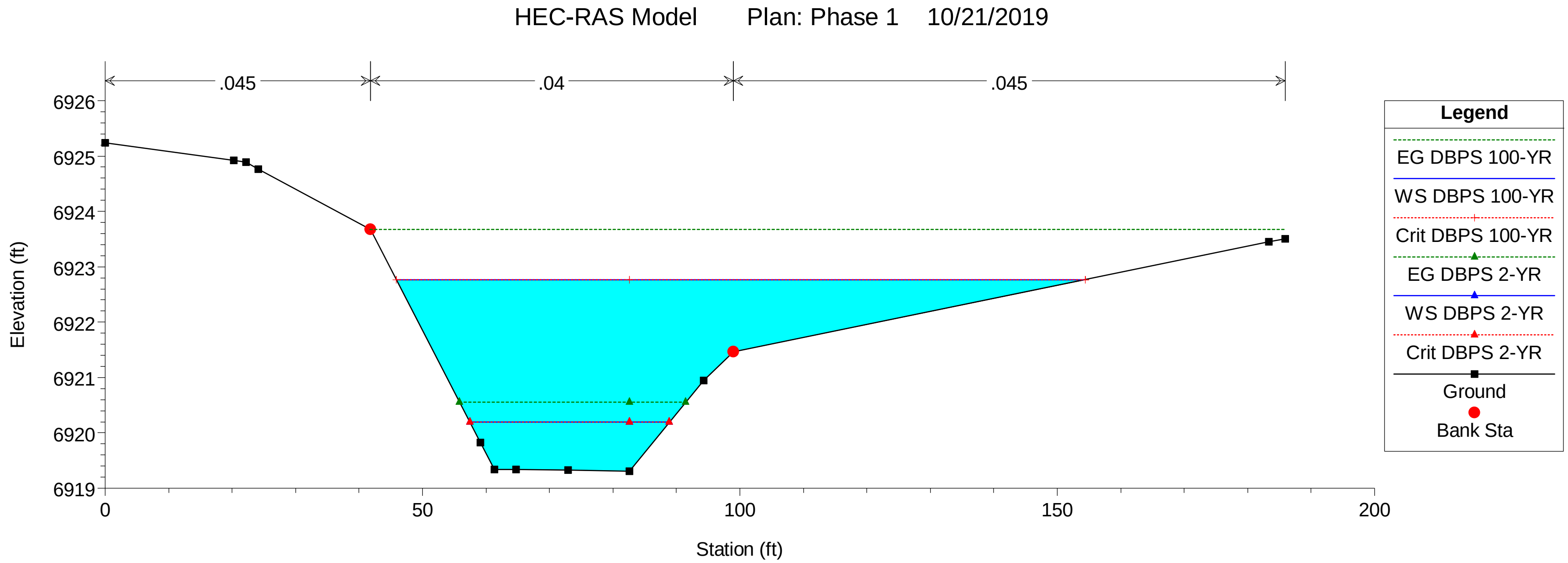
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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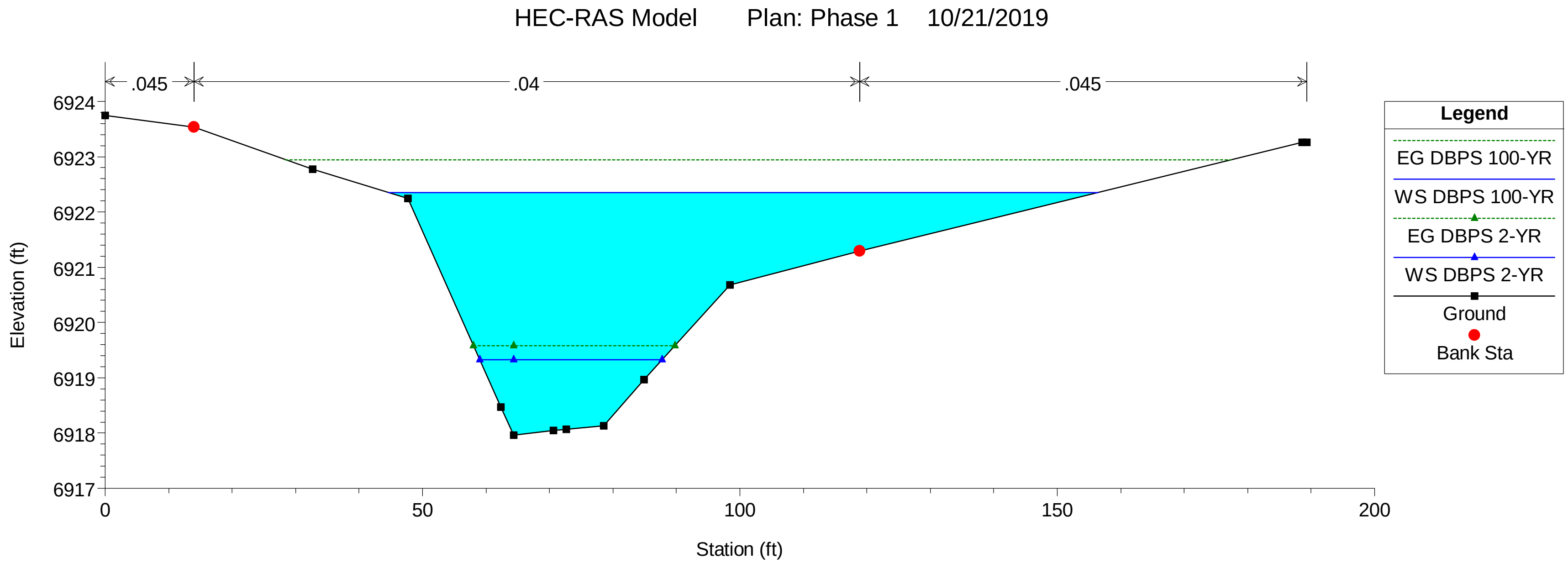
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
Legend
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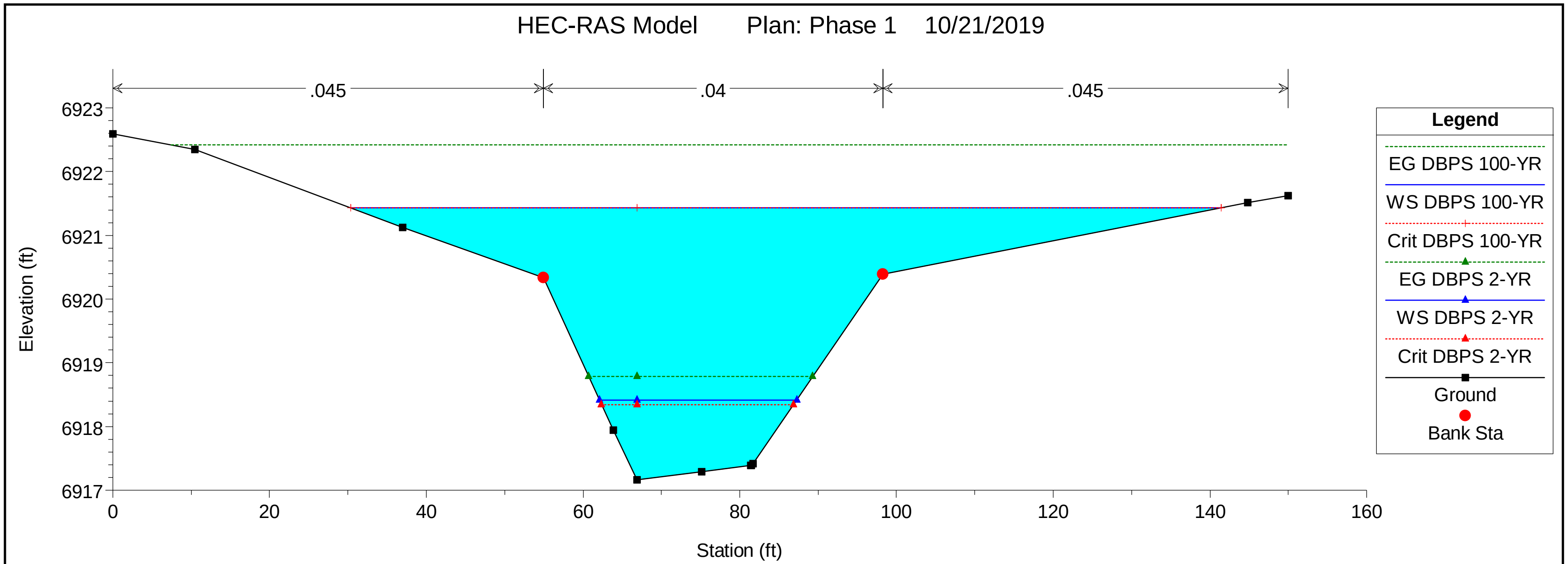
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
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6920
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6918
6917
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
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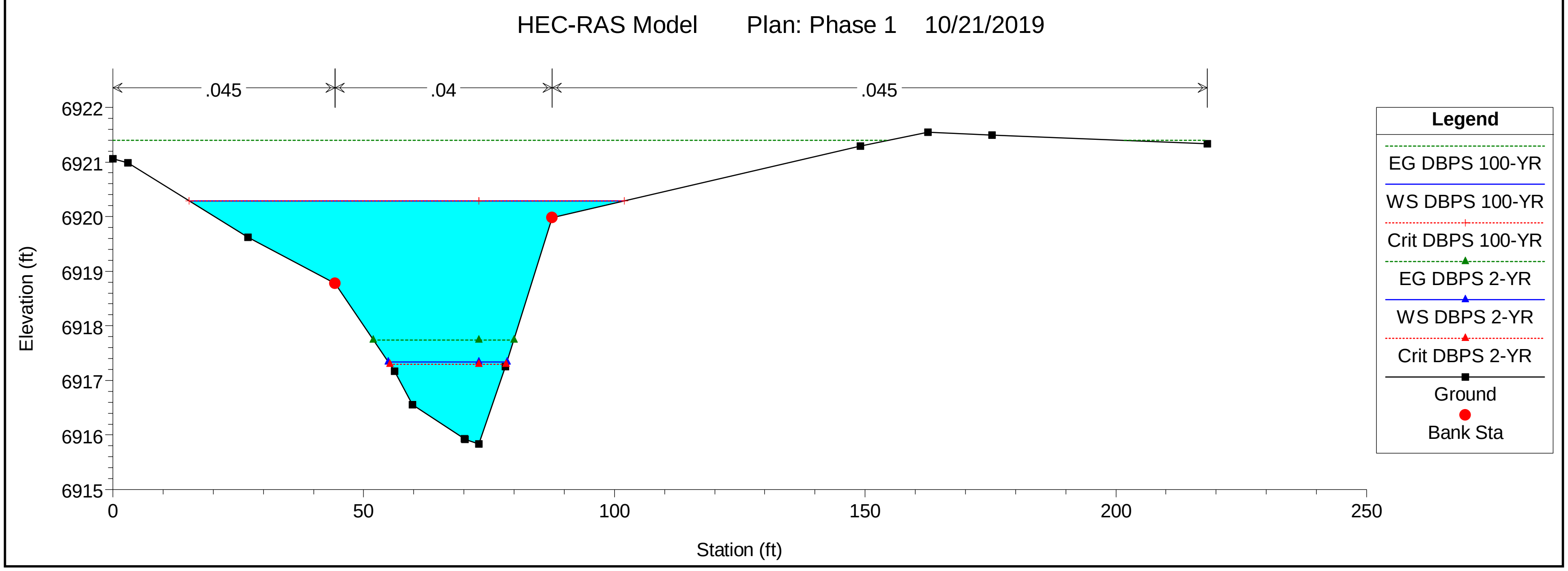
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



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Elevation (ft)
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6915
0
50
100
150
200
250
Station (ft)
Legend
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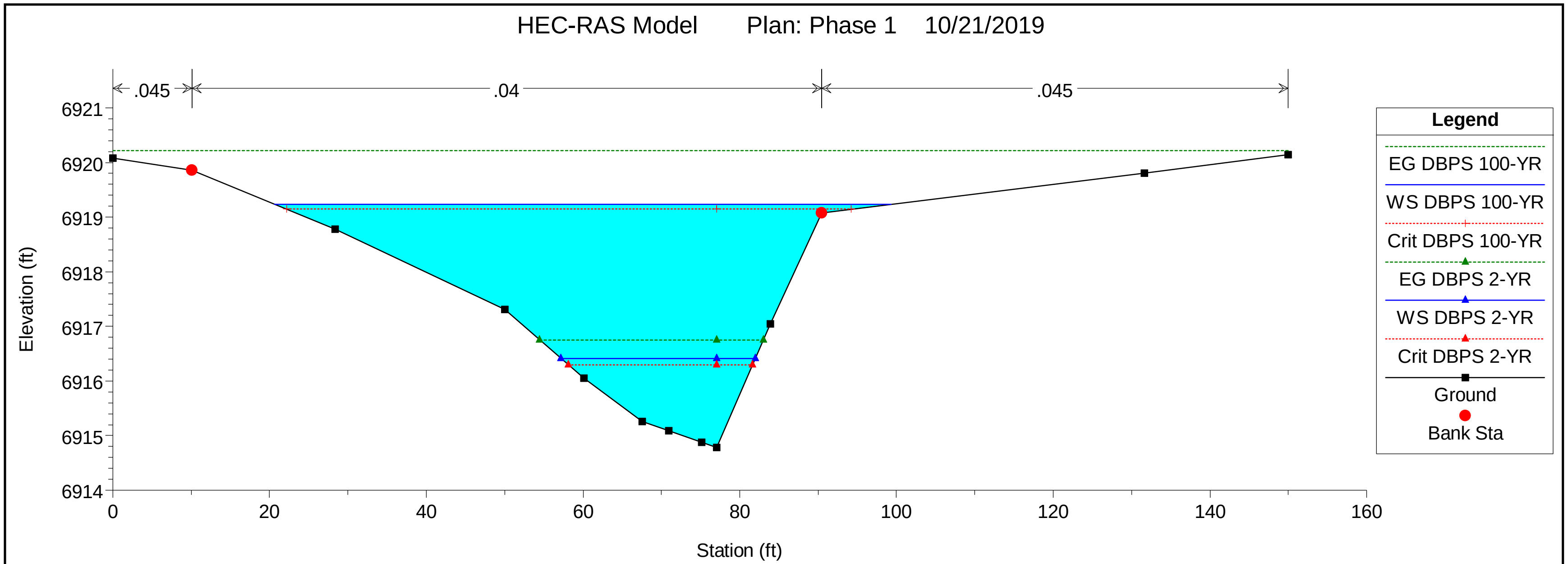
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
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6921
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20
40
60
80
100
120
140
160
Station (ft)
Legend
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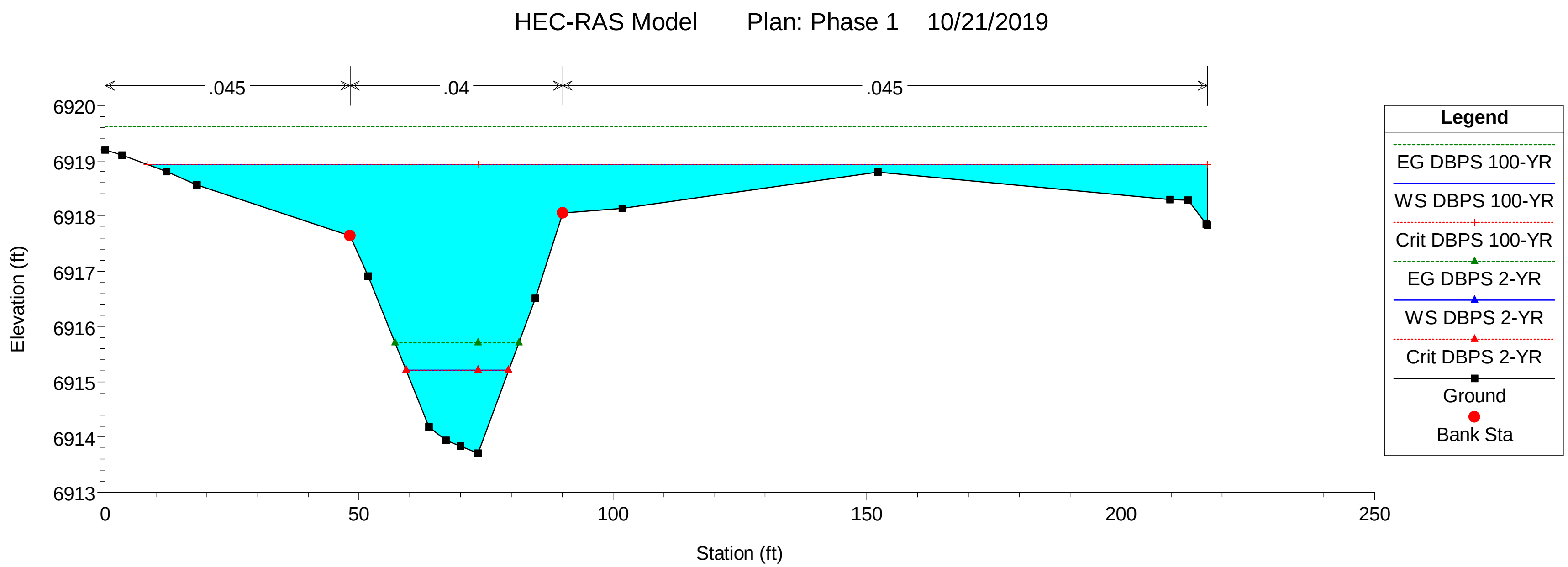
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
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6920
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100
150
200
250
Station (ft)
Legend
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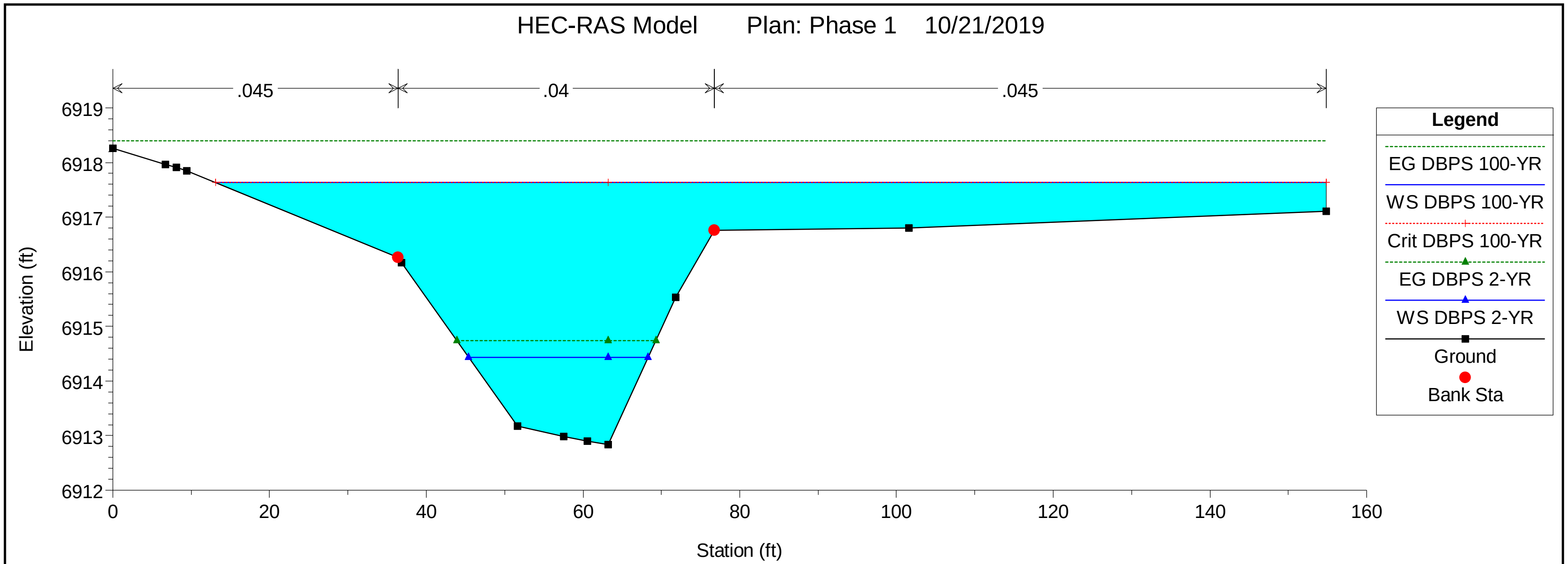
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
Station (ft)
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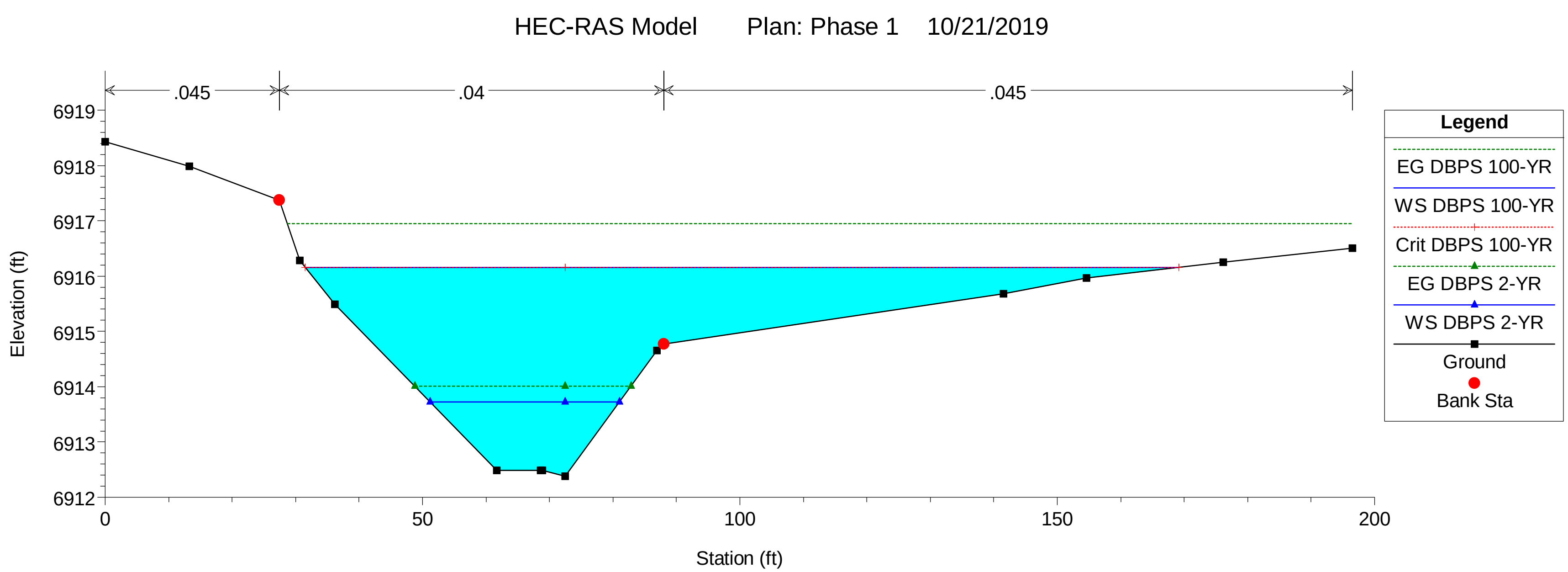
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
Station (ft)
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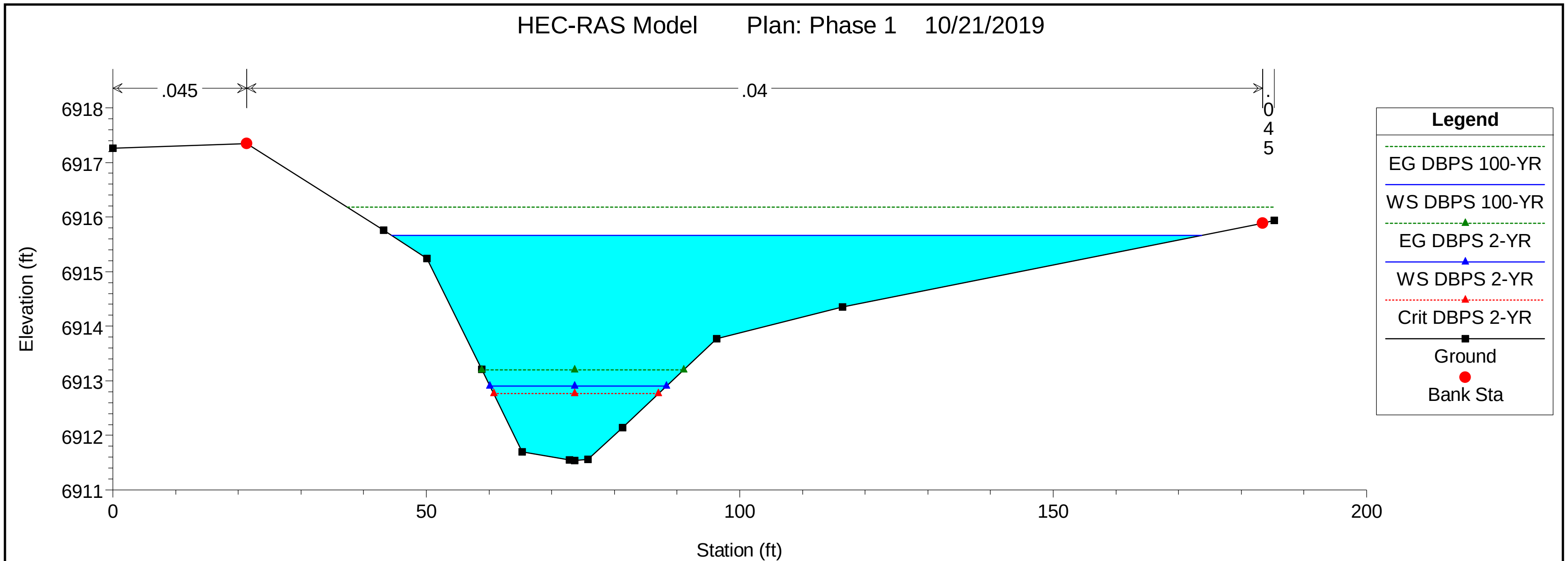
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
Station (ft)
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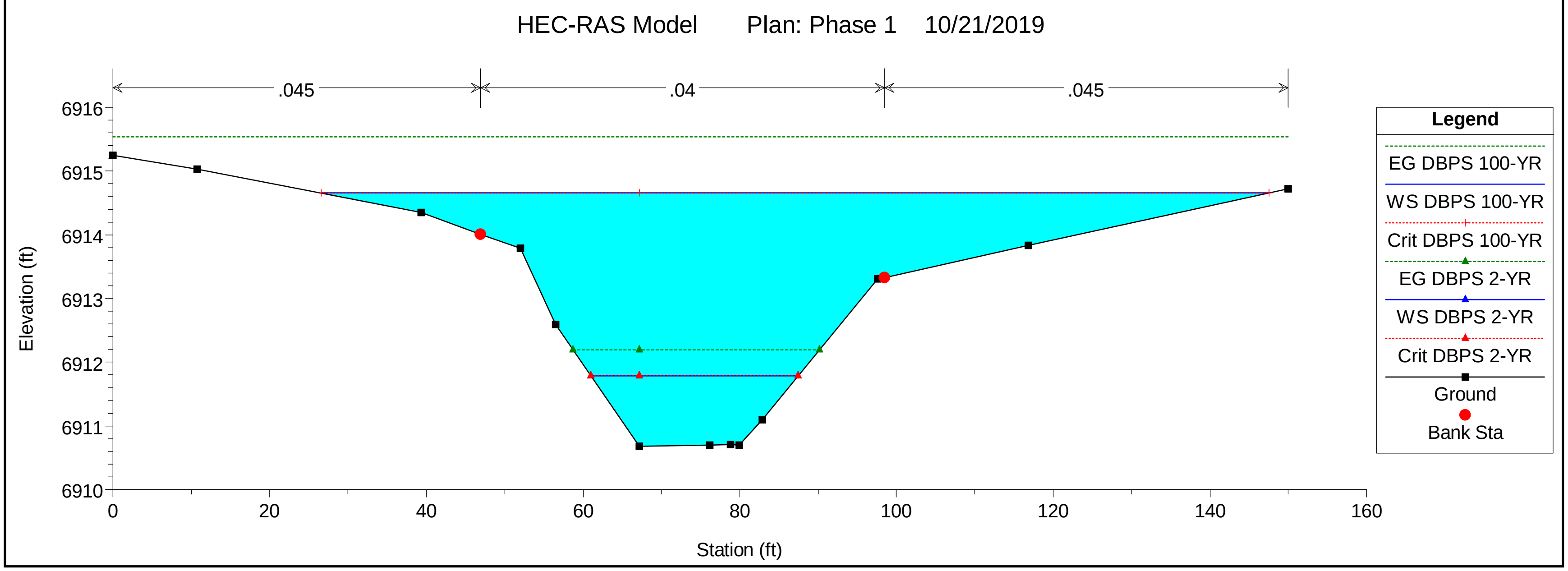
Bank Sta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Elevation (ft)
Station (ft)
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EG DBPS 2-YR
WS DBPS 2-YR
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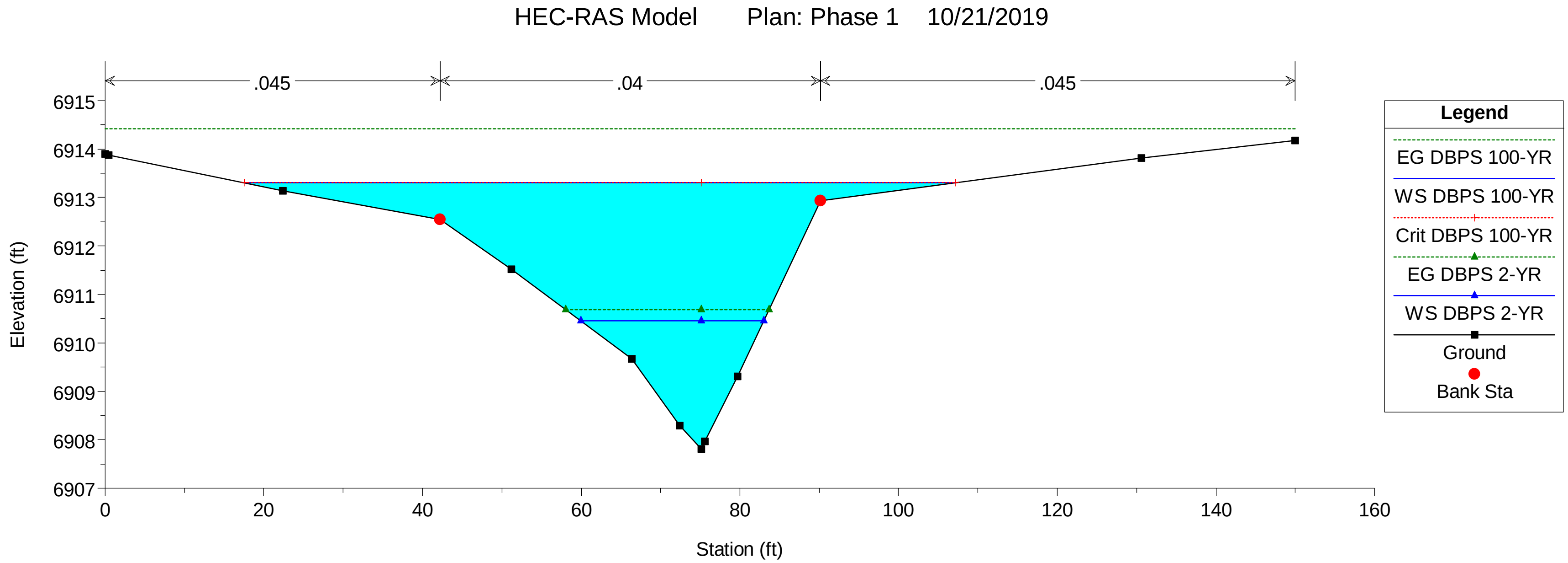
Bank Sta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Elevation (ft)
Station (ft)
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Crit DBPS 100-YR
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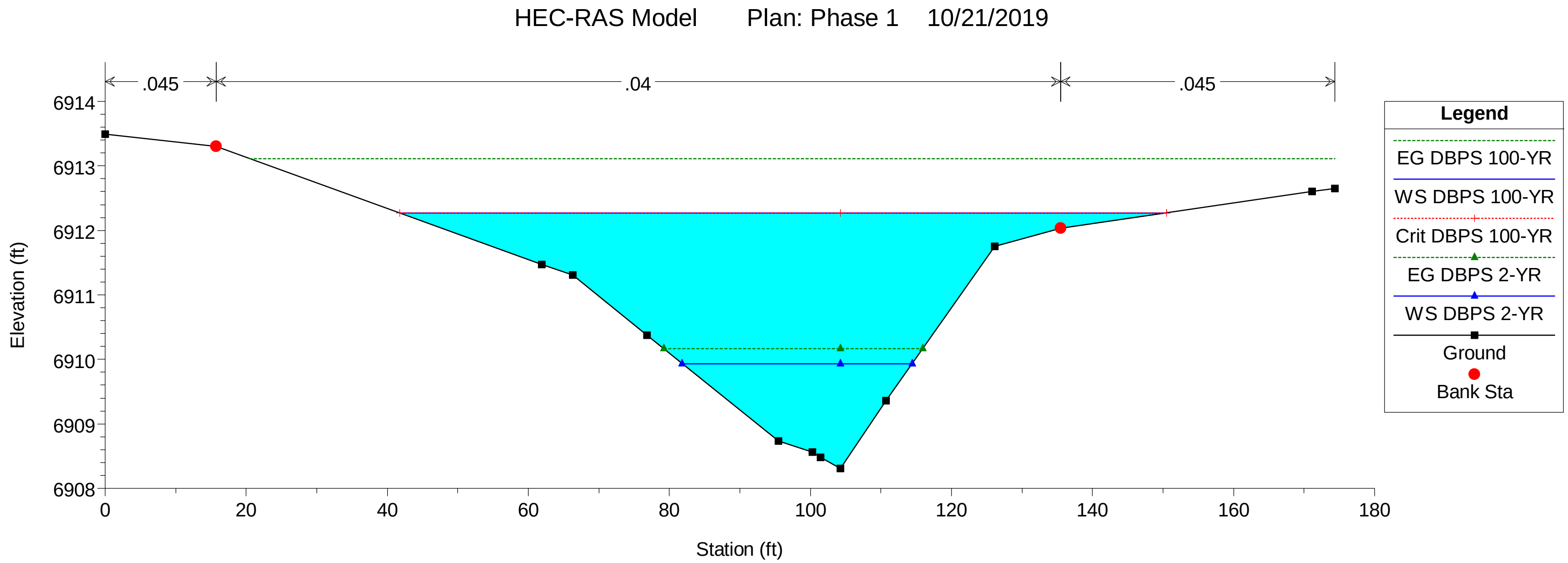
Ground
Bank Sta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Elevation (ft)
Station (ft)
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Crit DBPS 100-YR
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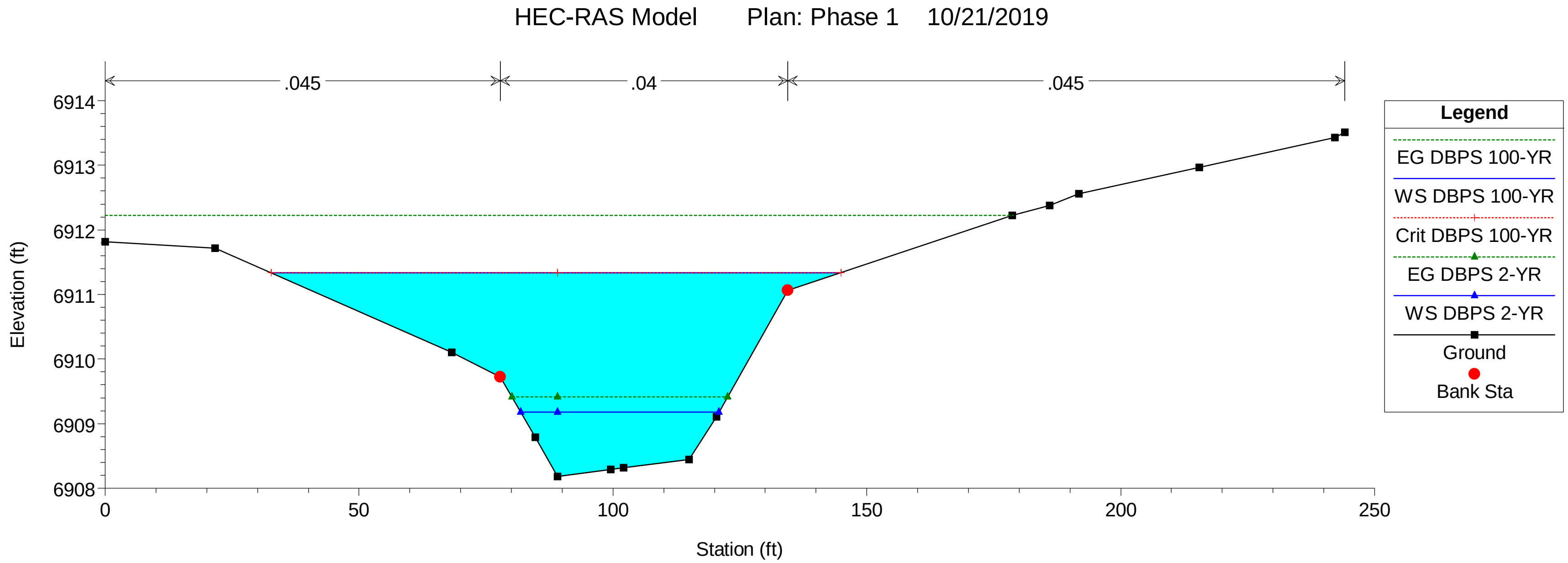
Ground
Bank Sta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Elevation (ft)
Station (ft)
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Crit DBPS 100-YR
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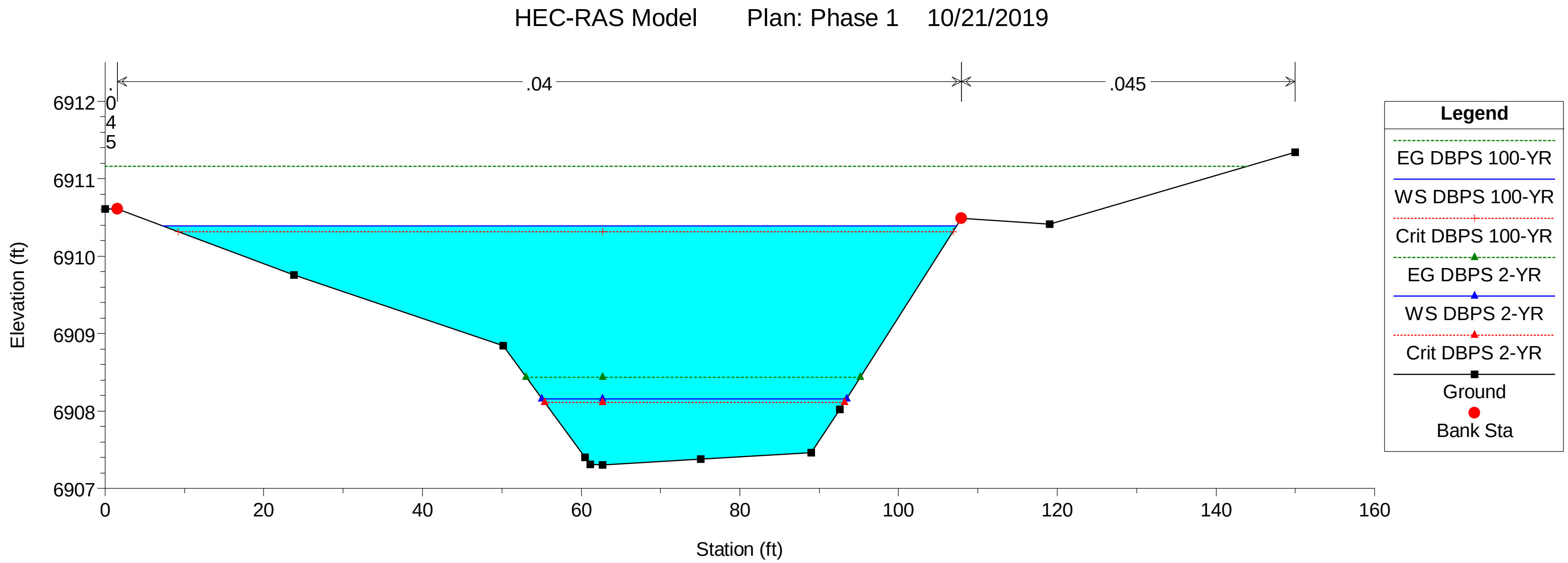
Ground
Bank Sta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Elevation (ft)
Station (ft)
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Crit DBPS 100-YR
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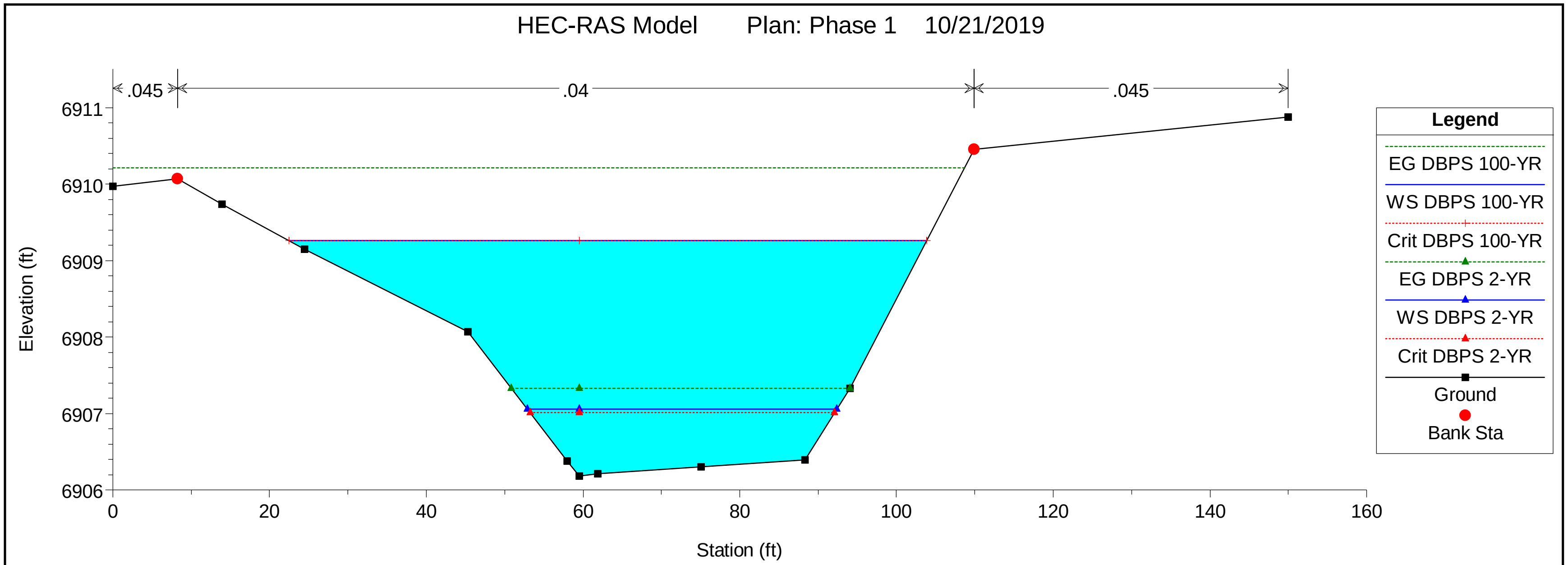
Crit DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
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Crit DBPS 100-YR
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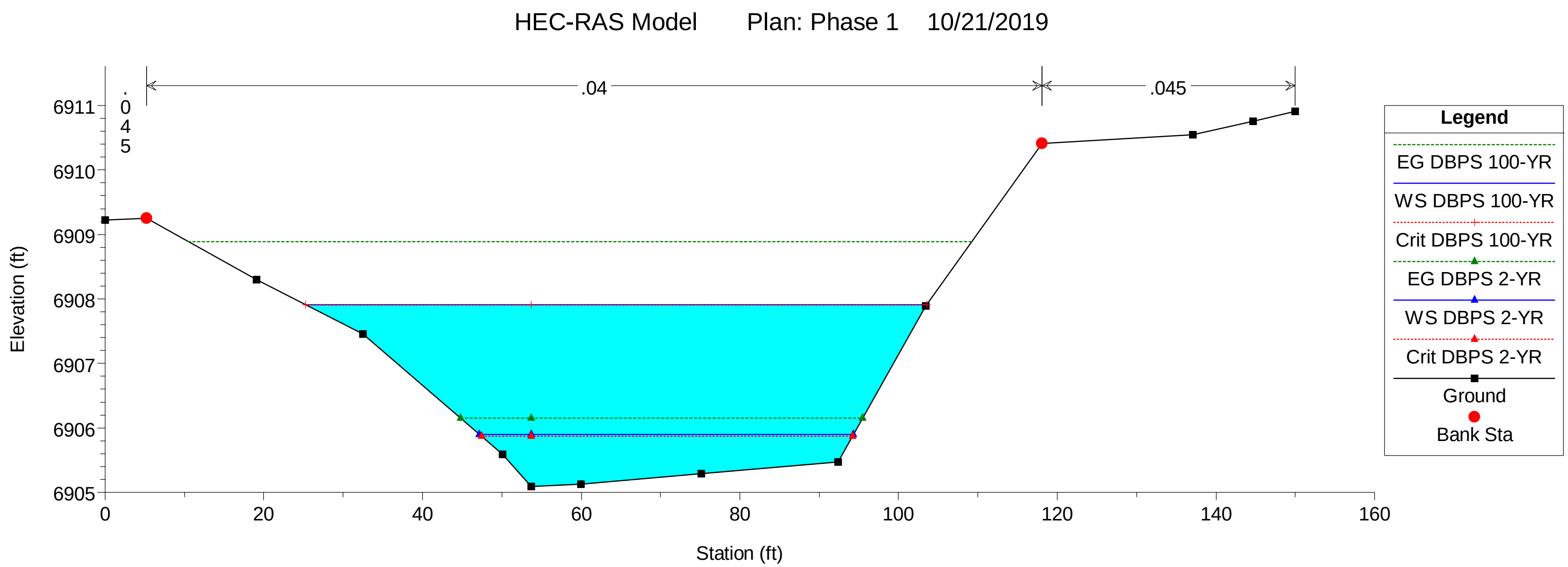
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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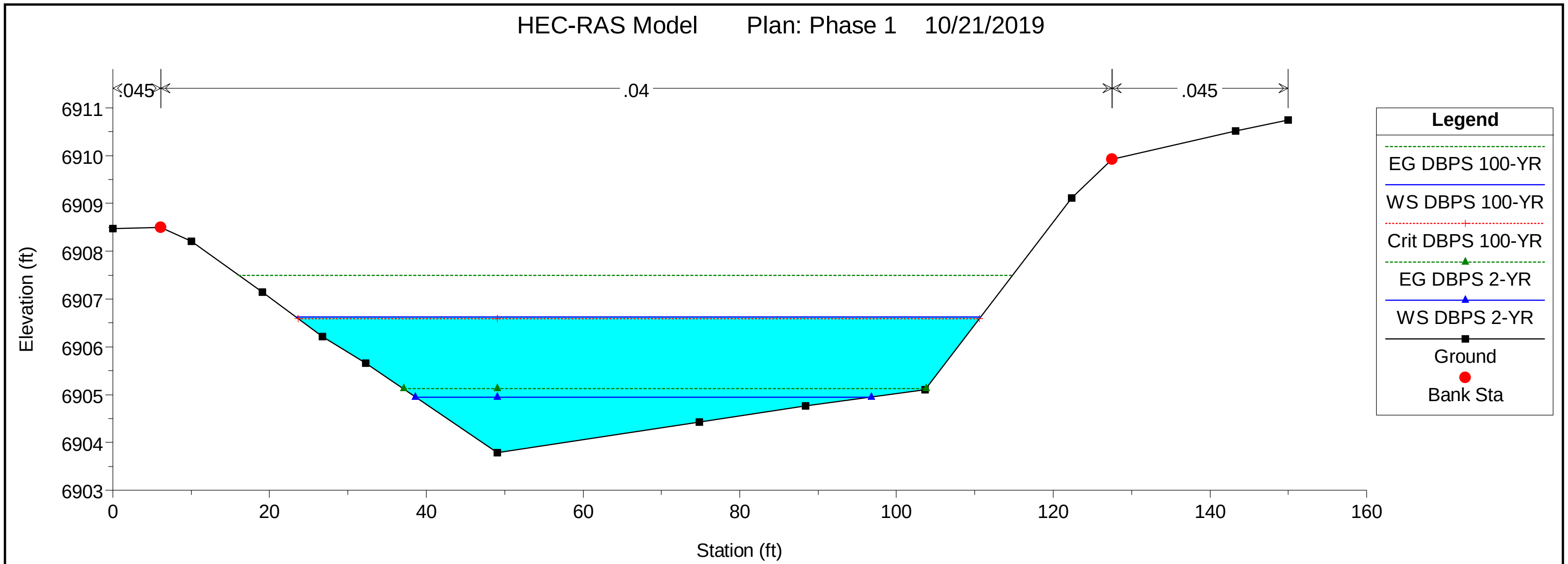
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Station (ft)
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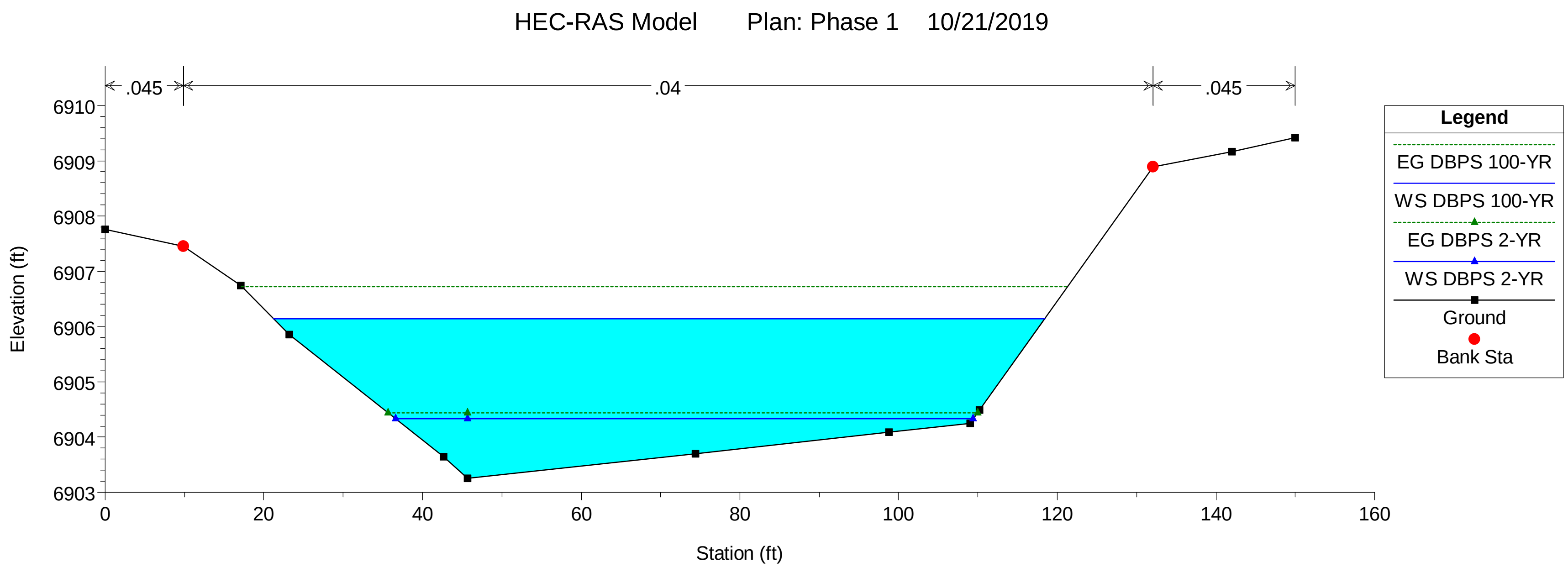
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Station (ft)
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EG DBPS 2-YR
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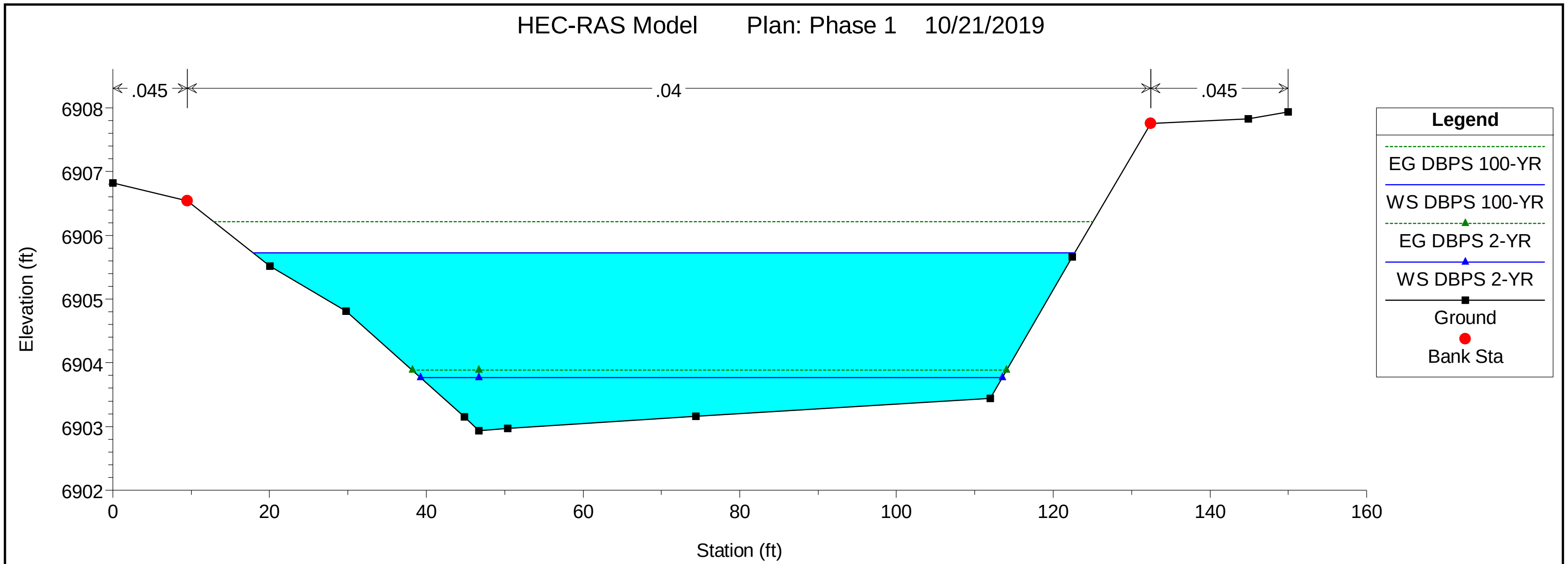
Bank Sta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Elevation (ft)
Station (ft)
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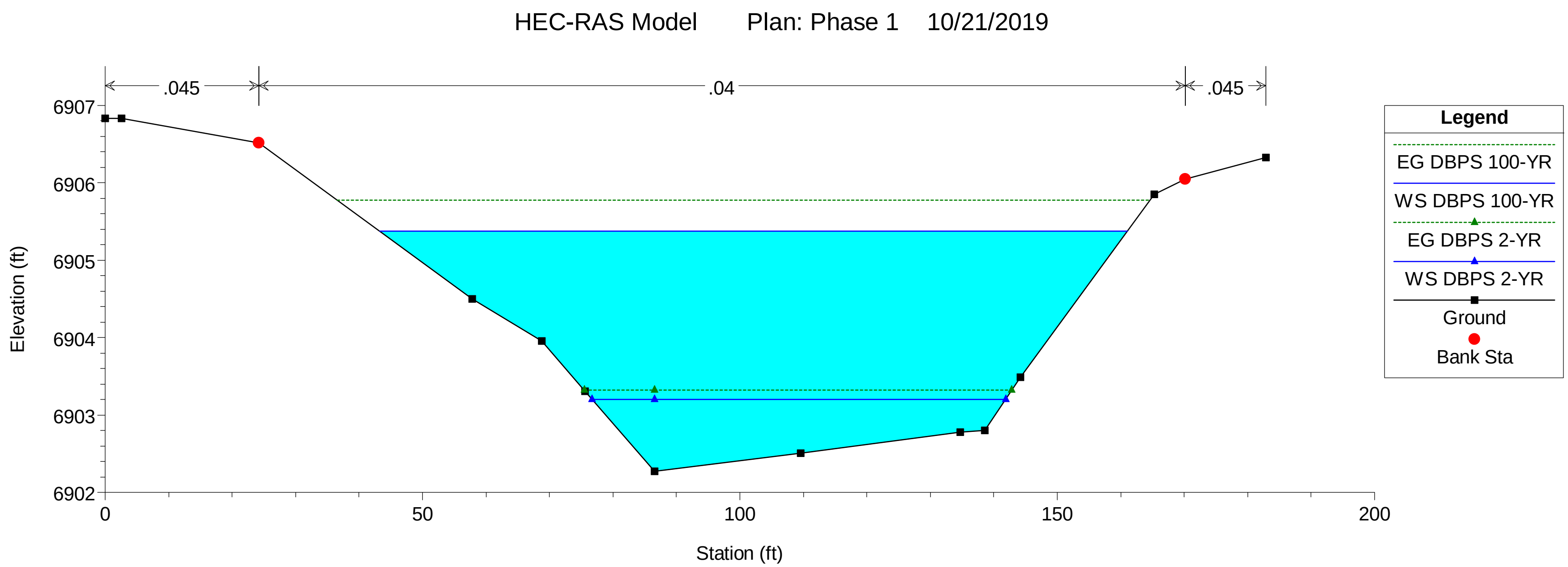
Bank Sta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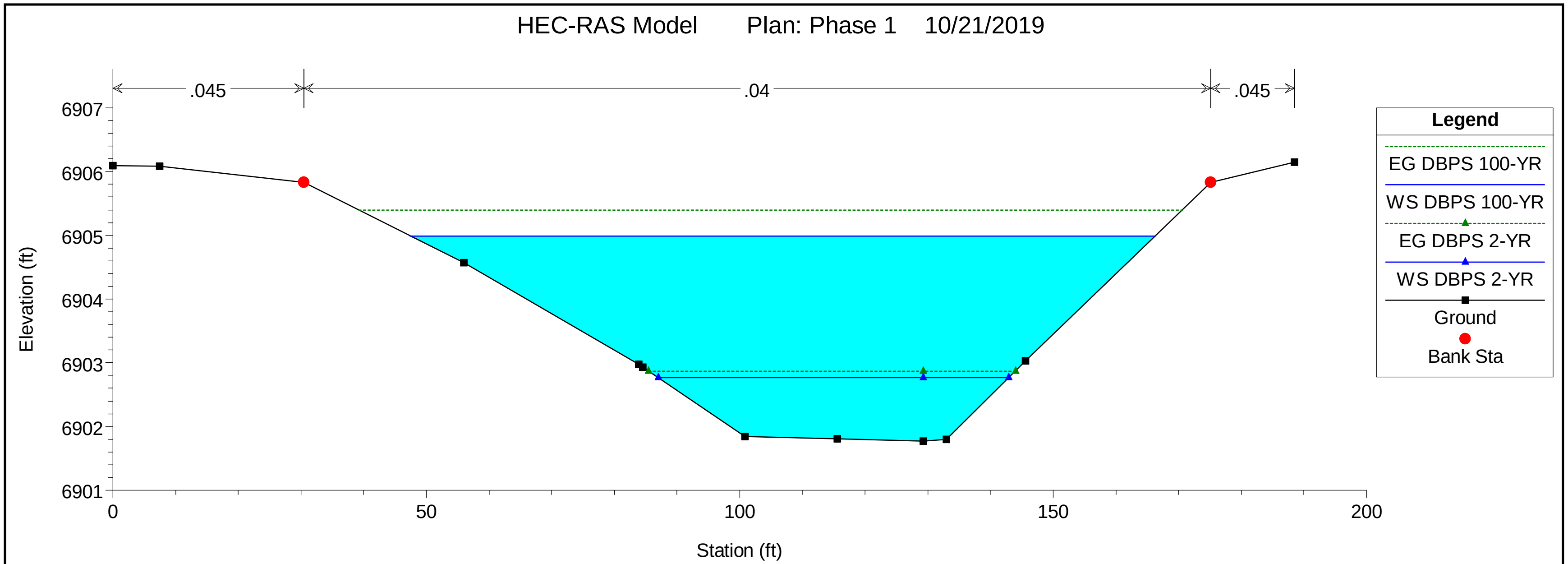
Bank Sta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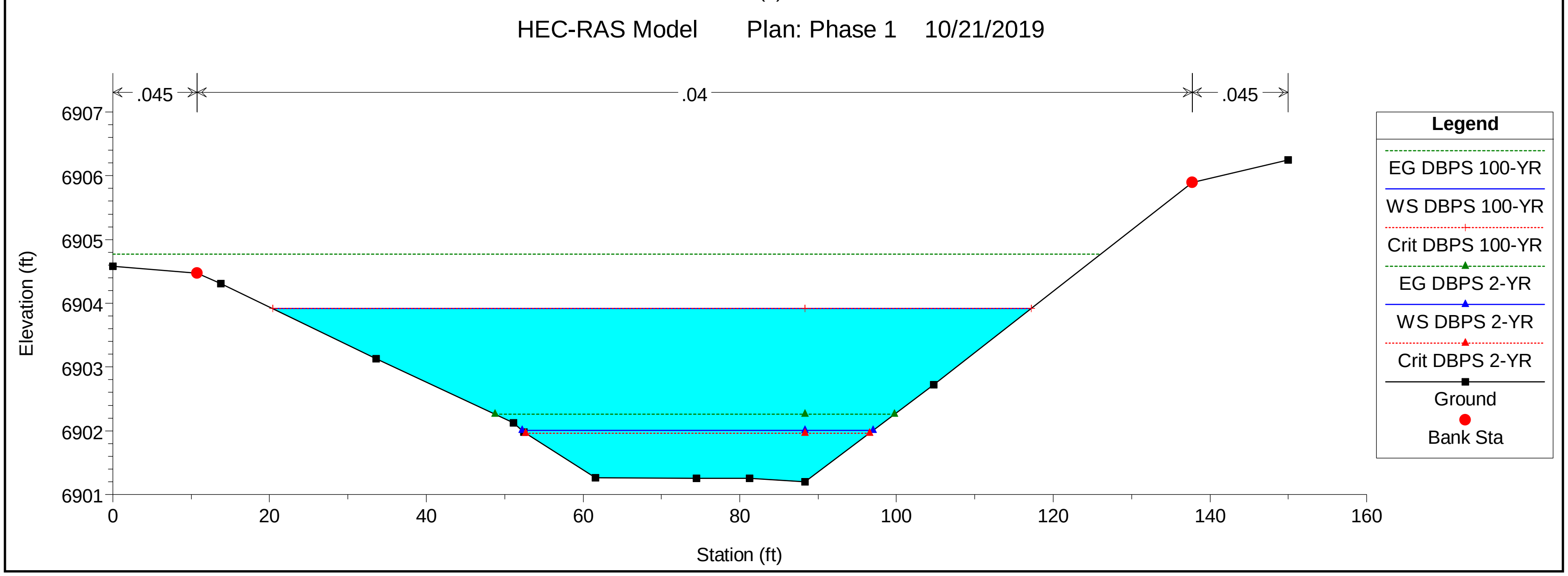
Ground
Bank Sta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Station (ft)
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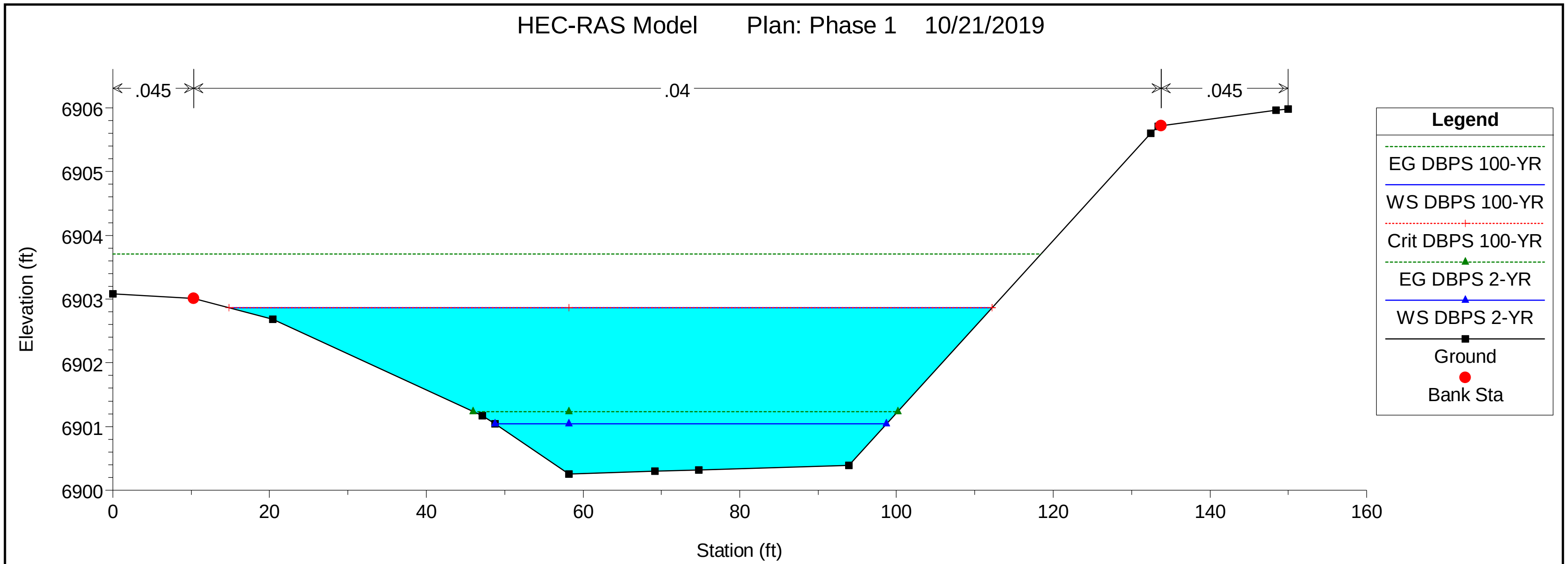
Crit DBPS 2-YR
Ground
Bank Sta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Elevation (ft)
Station (ft)
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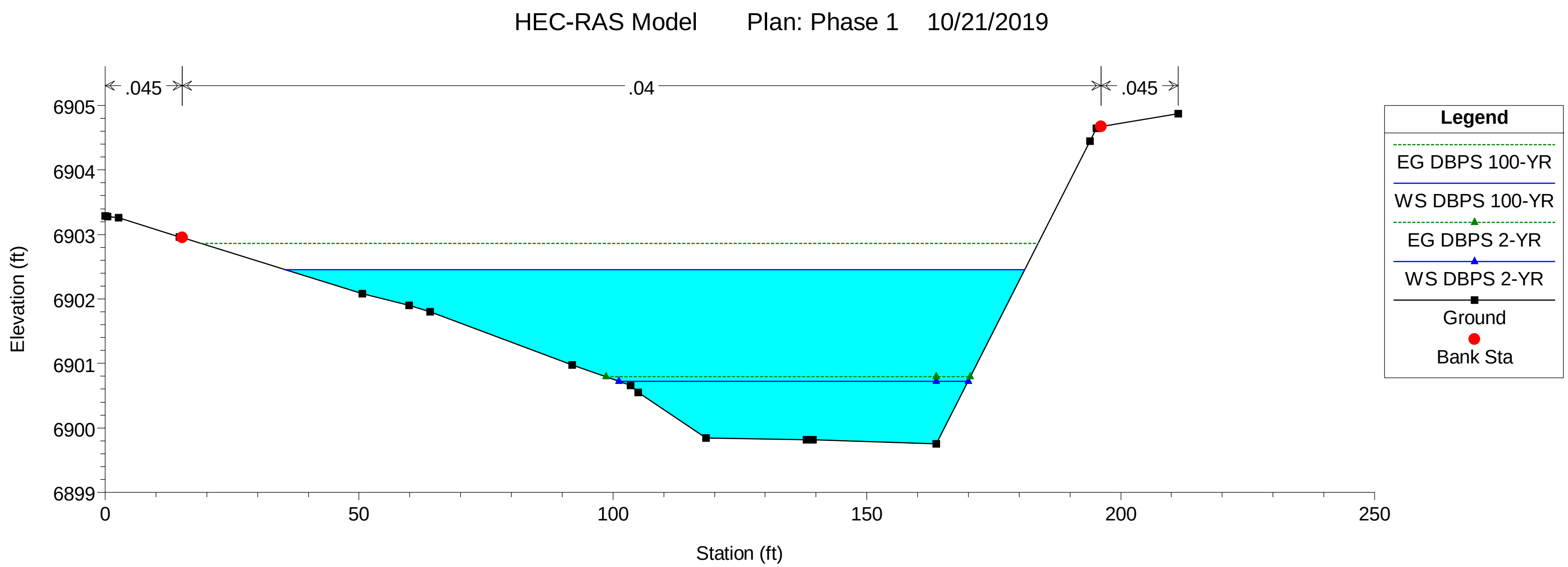
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
Station (ft)
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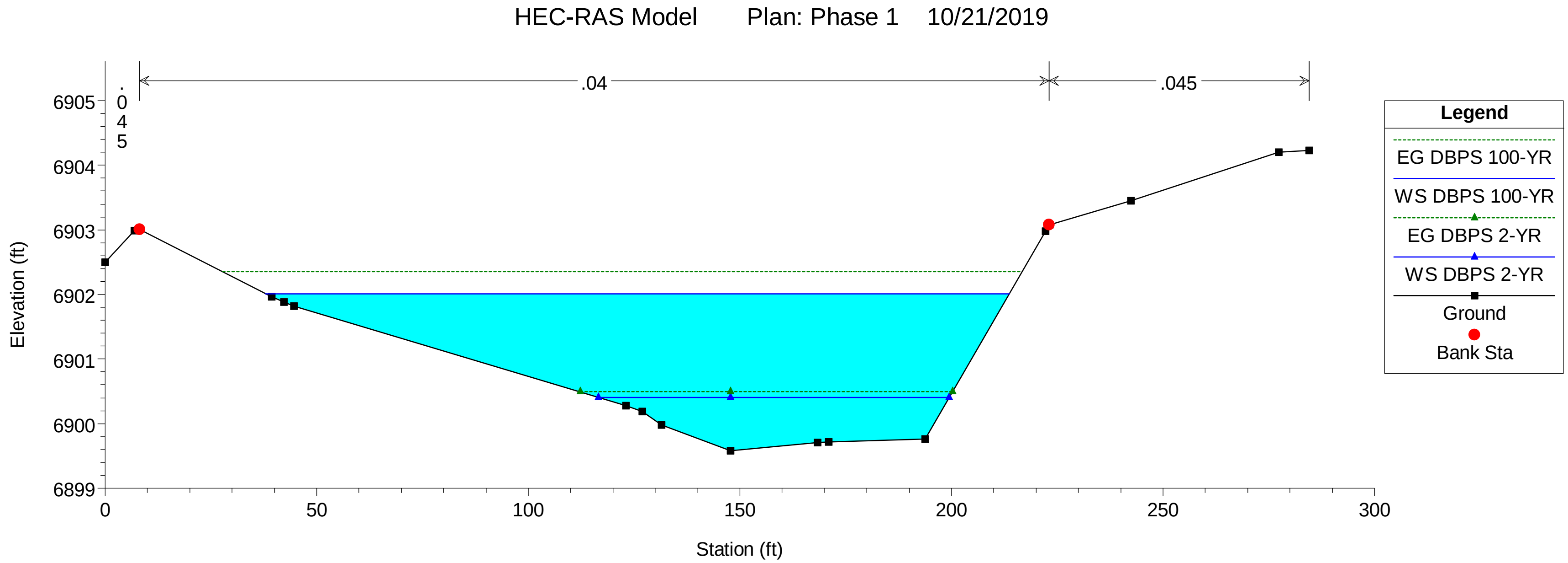
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Legend
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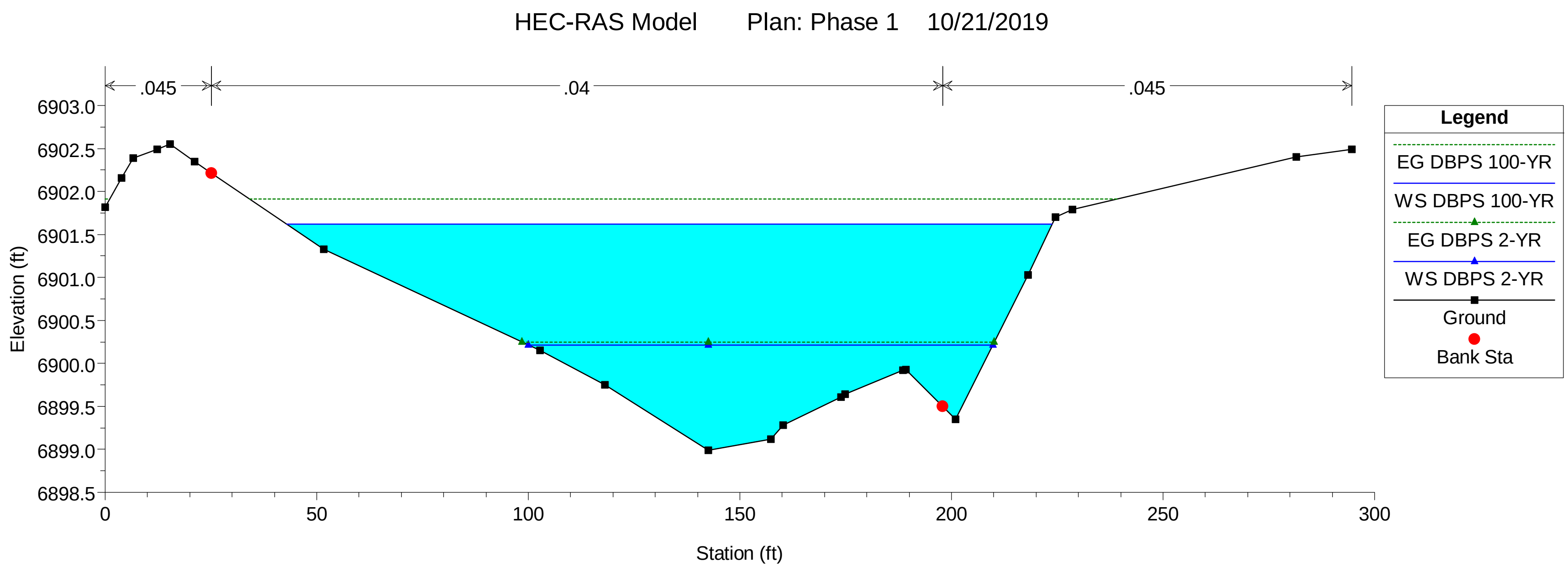
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)



HEC-RAS Model Plan: Phase 1 10/21/2019
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Legend
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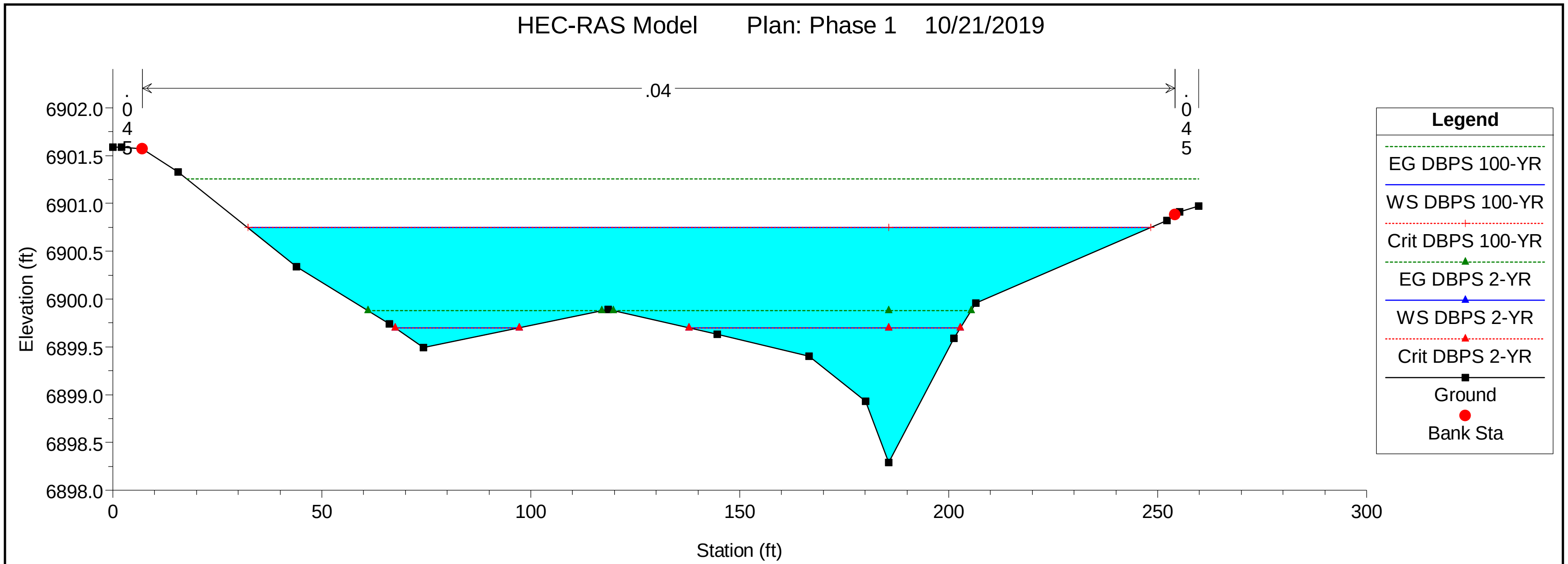
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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6900.0
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6899.0
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6898.0
0
50
100
150
200
250
300
Station (ft)
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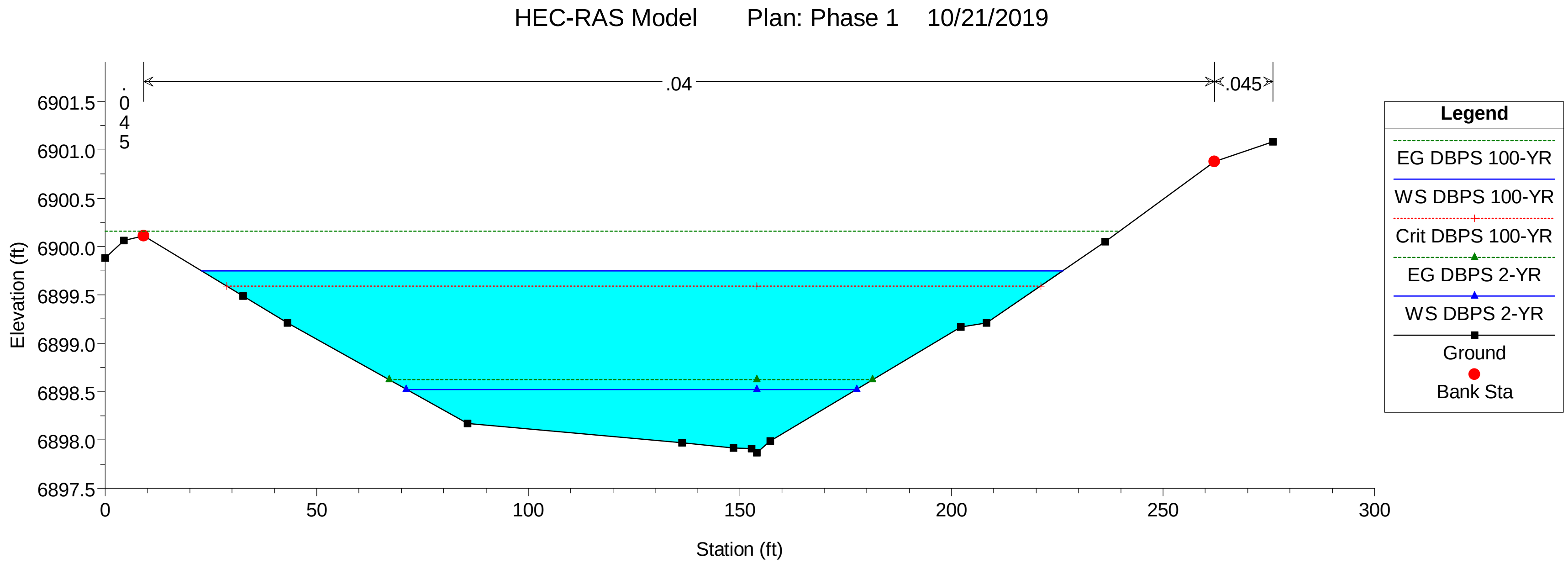
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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6899.0
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6898.0
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Station (ft)
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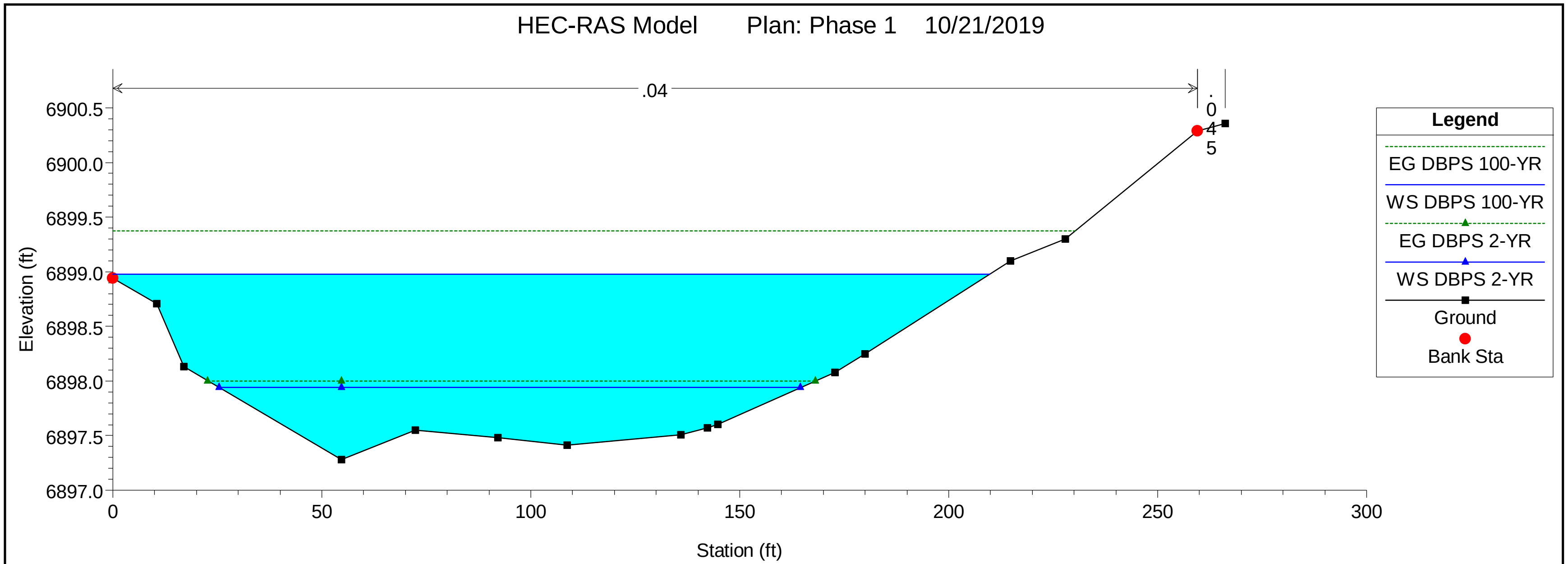
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta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WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
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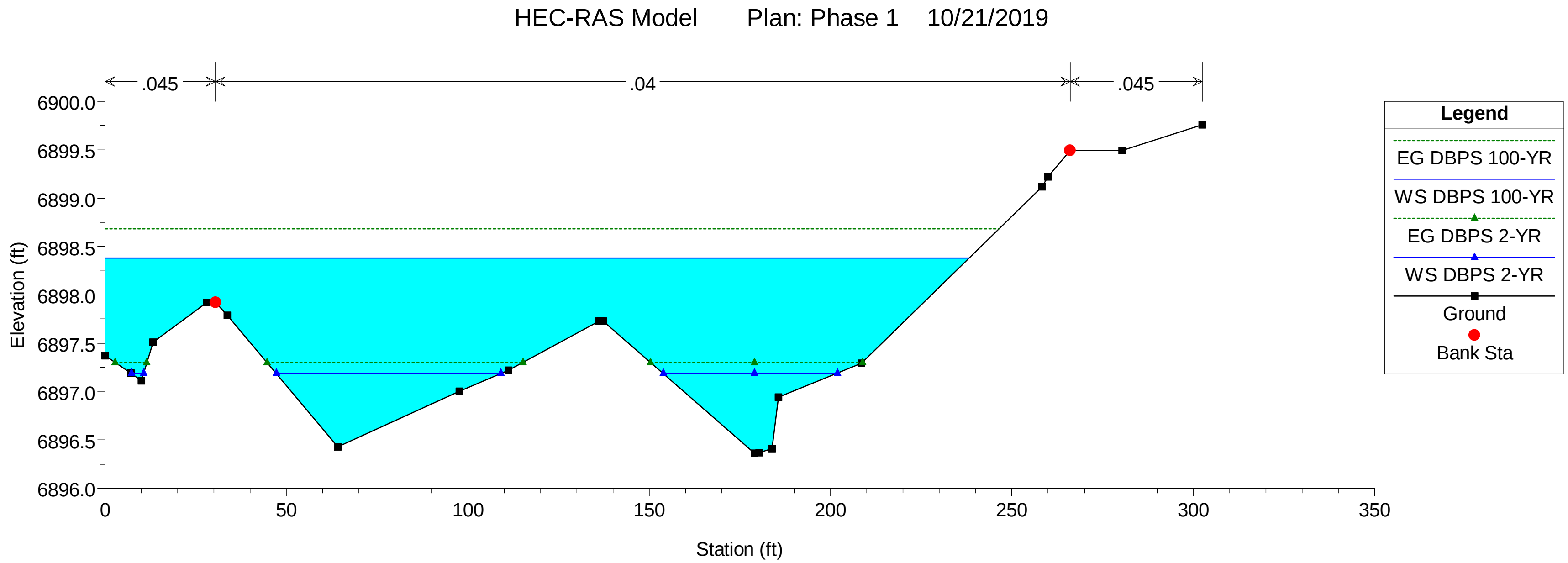
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Legend
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WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
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6897.0
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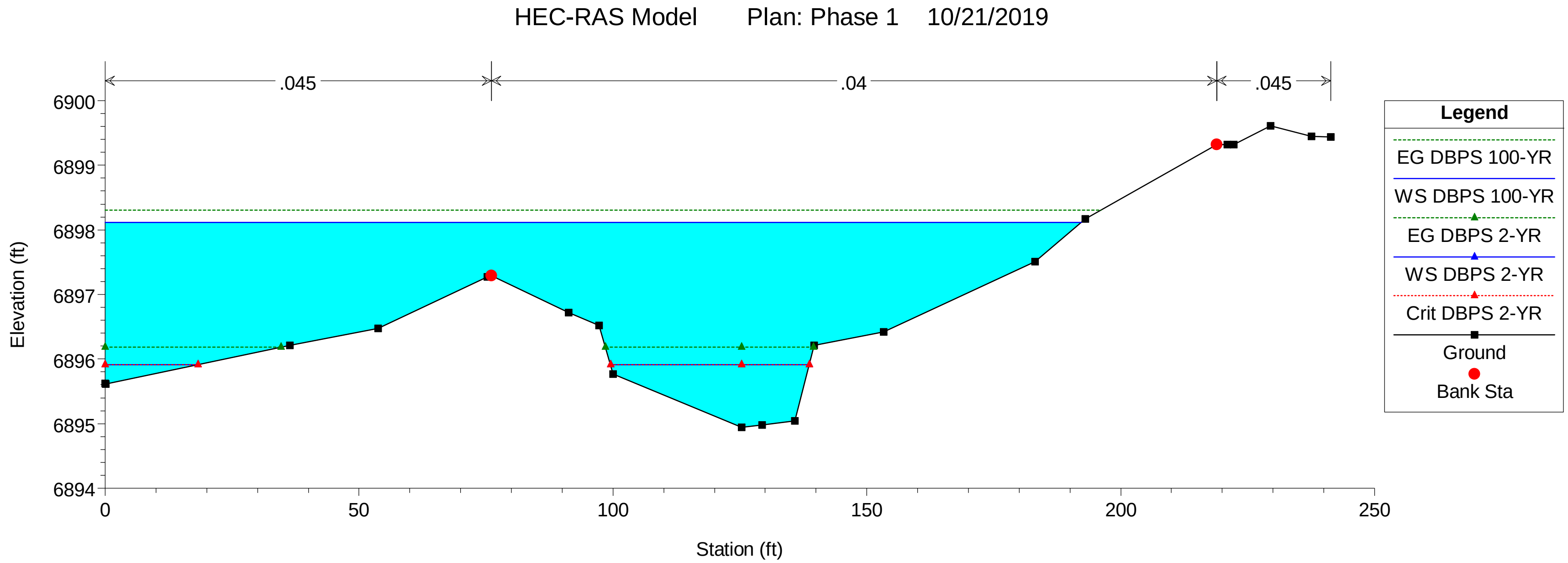

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Elevation (ft)
Station (ft)
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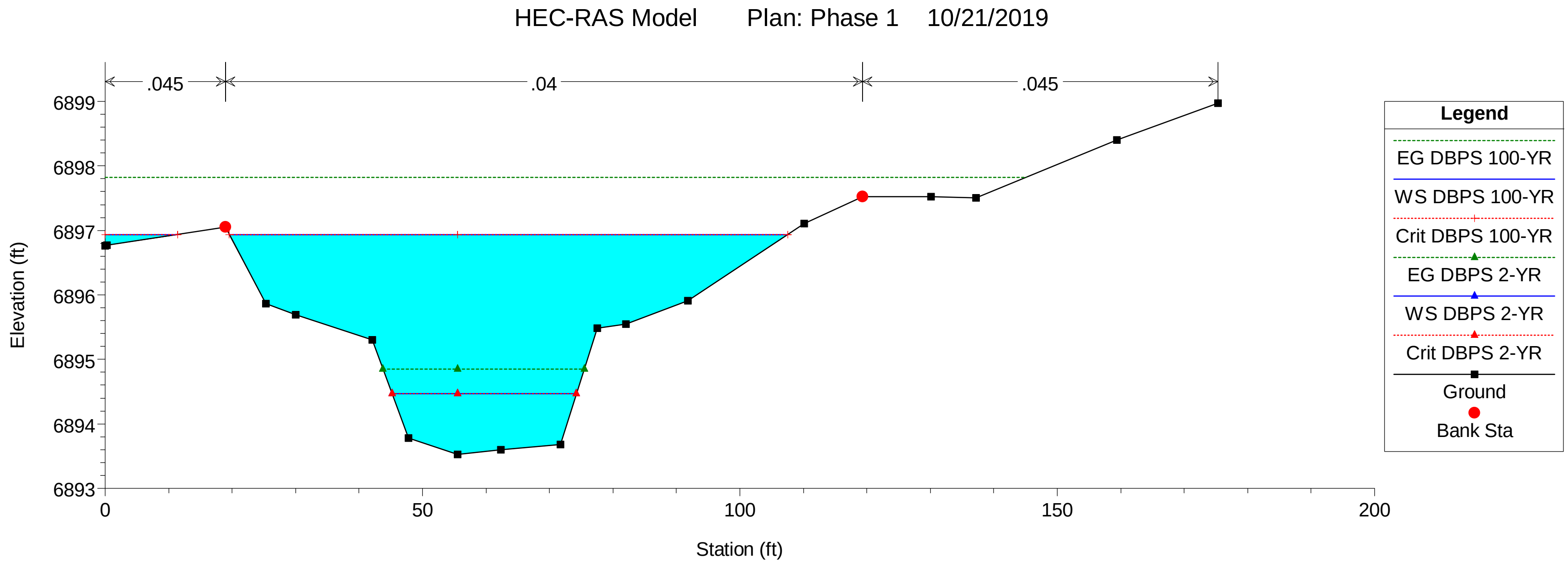
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



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Elevation (ft)
Station (ft)
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WS DBPS 100-YR
Crit DBPS 100-YR
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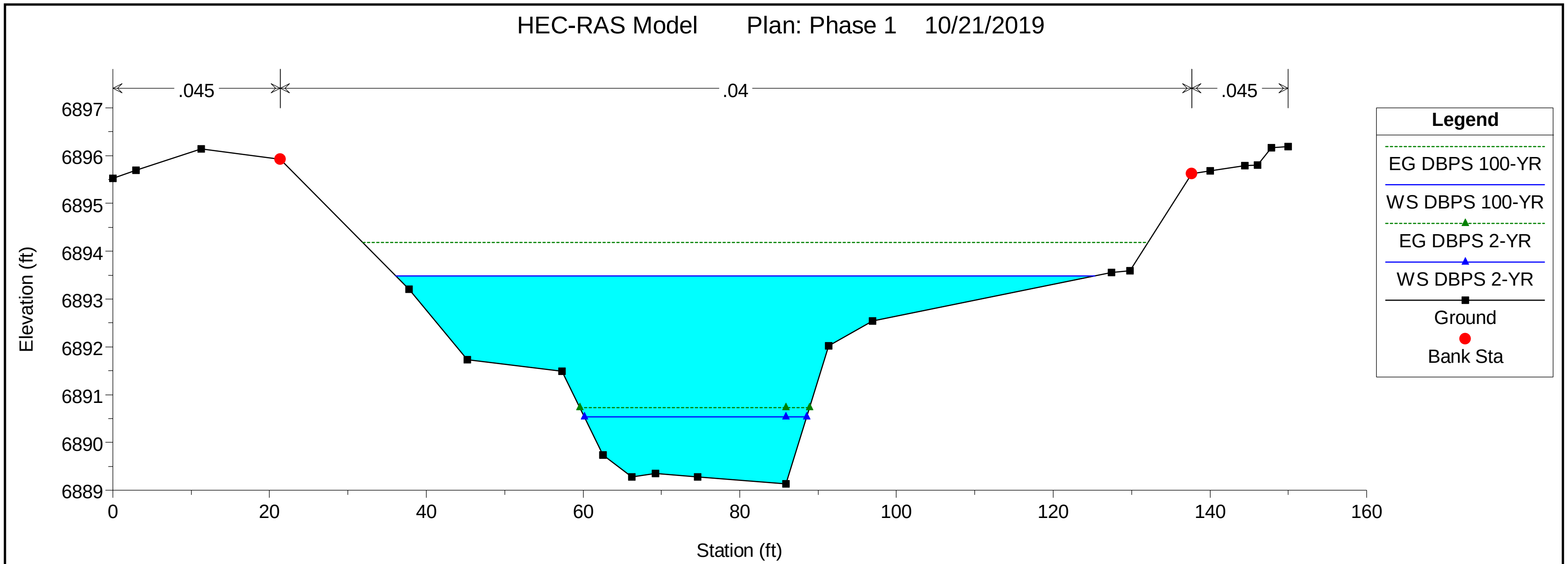
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
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Station (ft)
Legend
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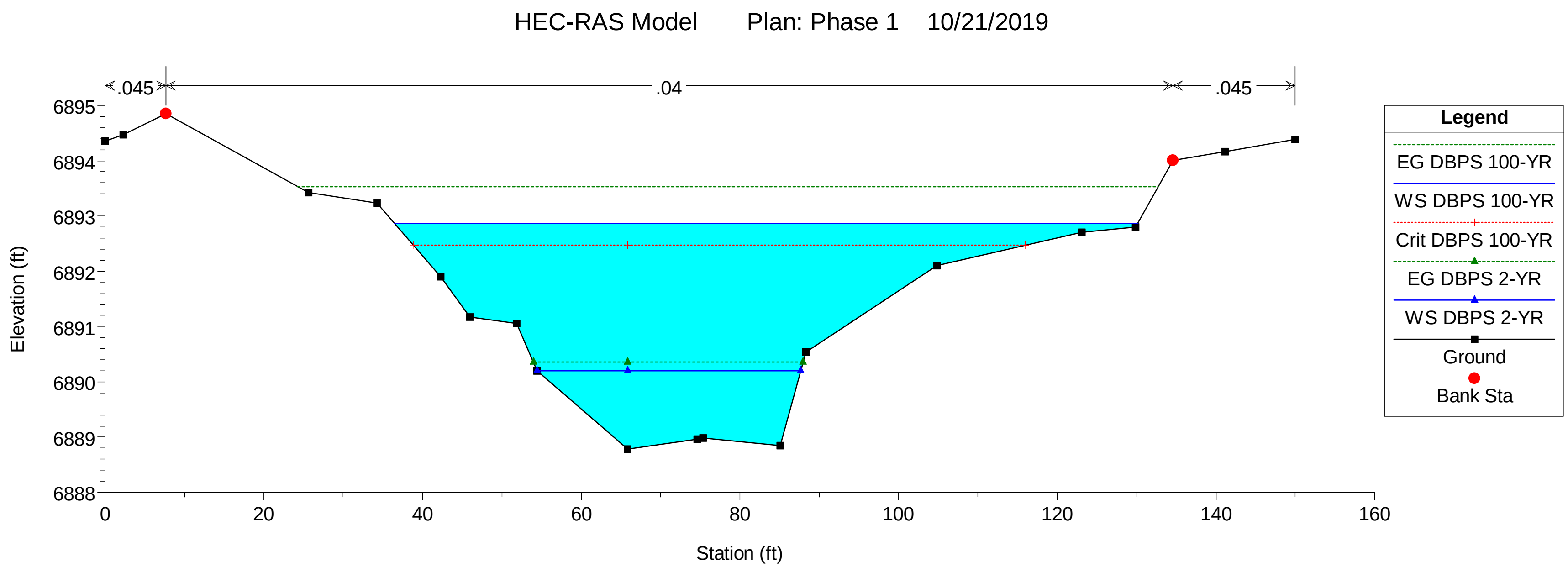
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta



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Elevation (ft)
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6889
6888
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80
100
120
140
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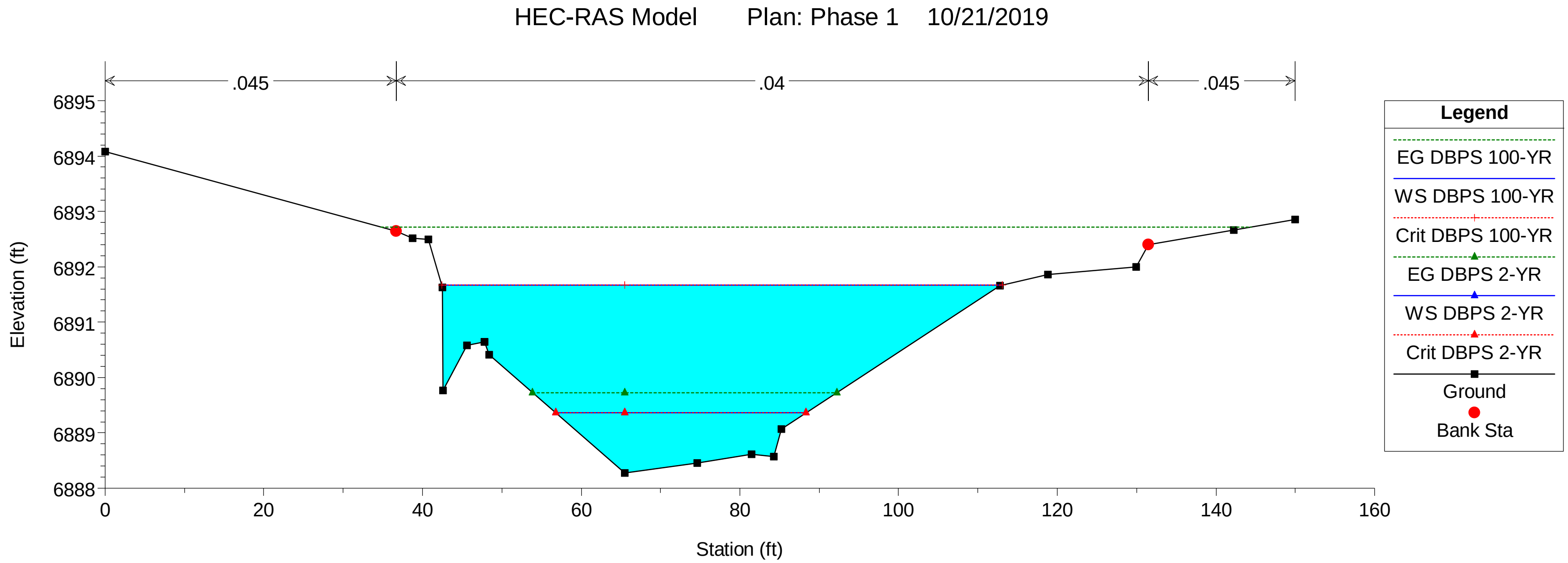
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta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Station (ft)
Legend
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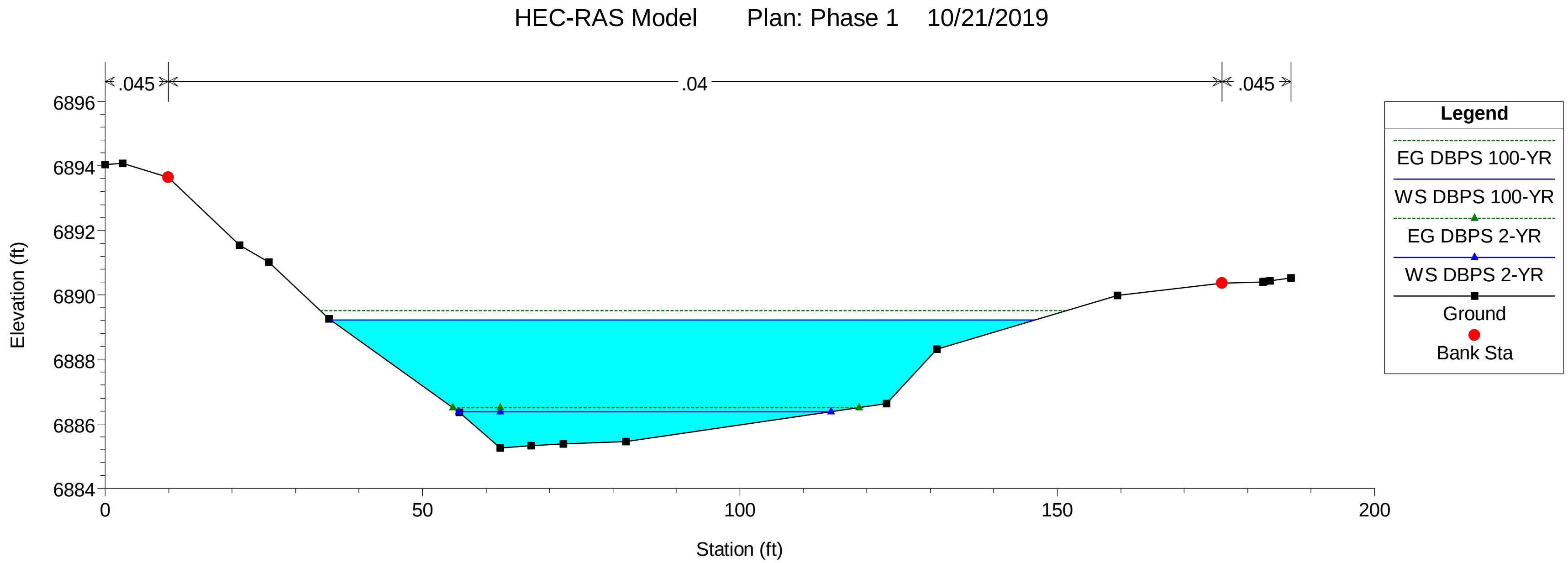
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta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Station (ft)
Legend
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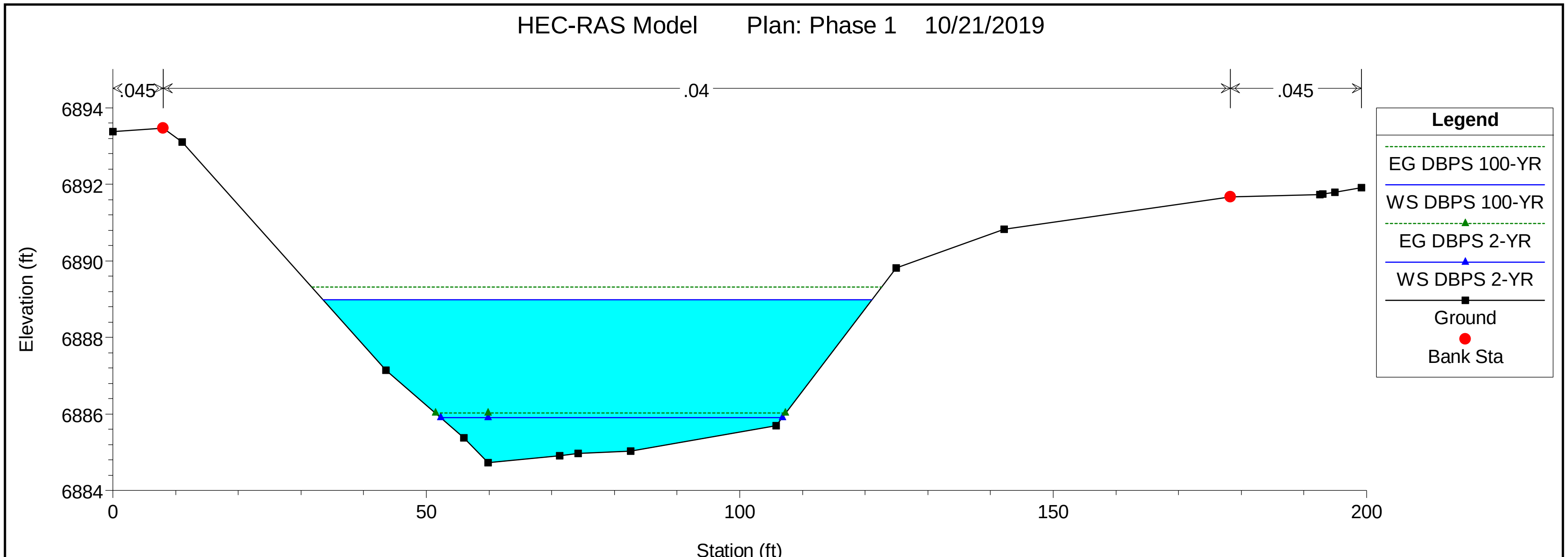
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta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Station (ft)
Legend
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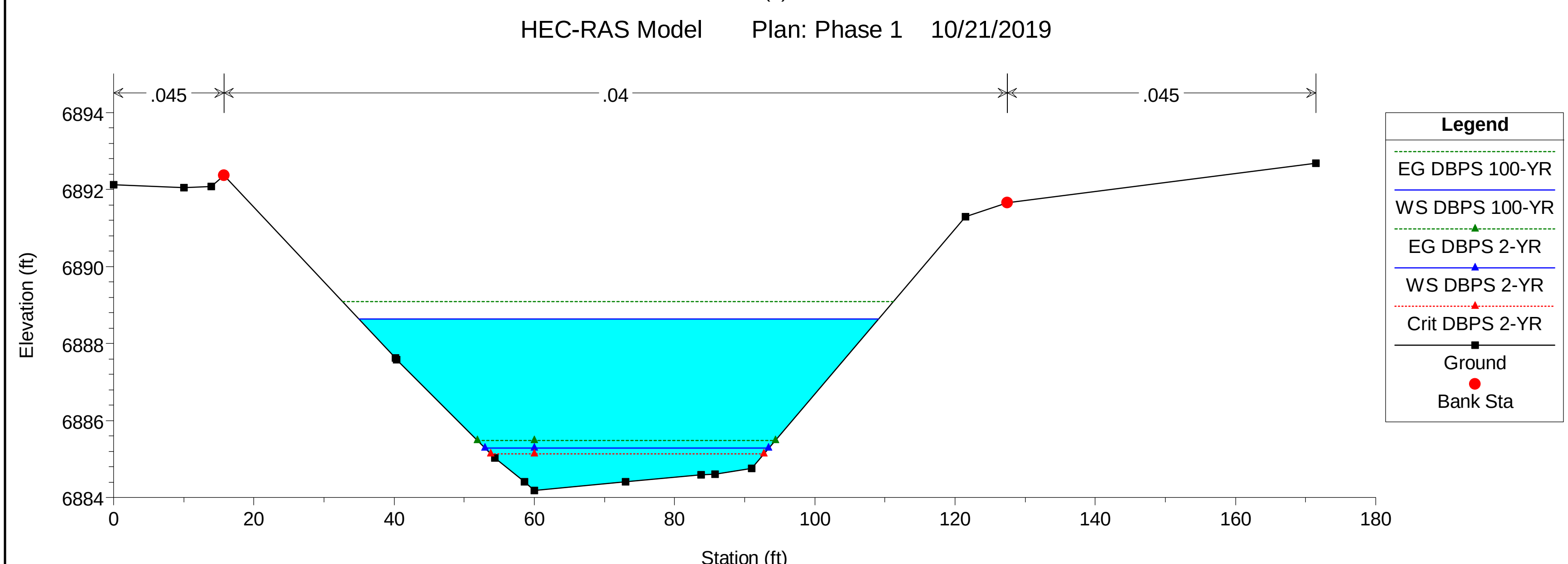
EG DBPS 2-YR
WS DBPS 2-YR
Ground
Bank Sta


HEC-RAS Model Plan: Phase 1 10/21/2019
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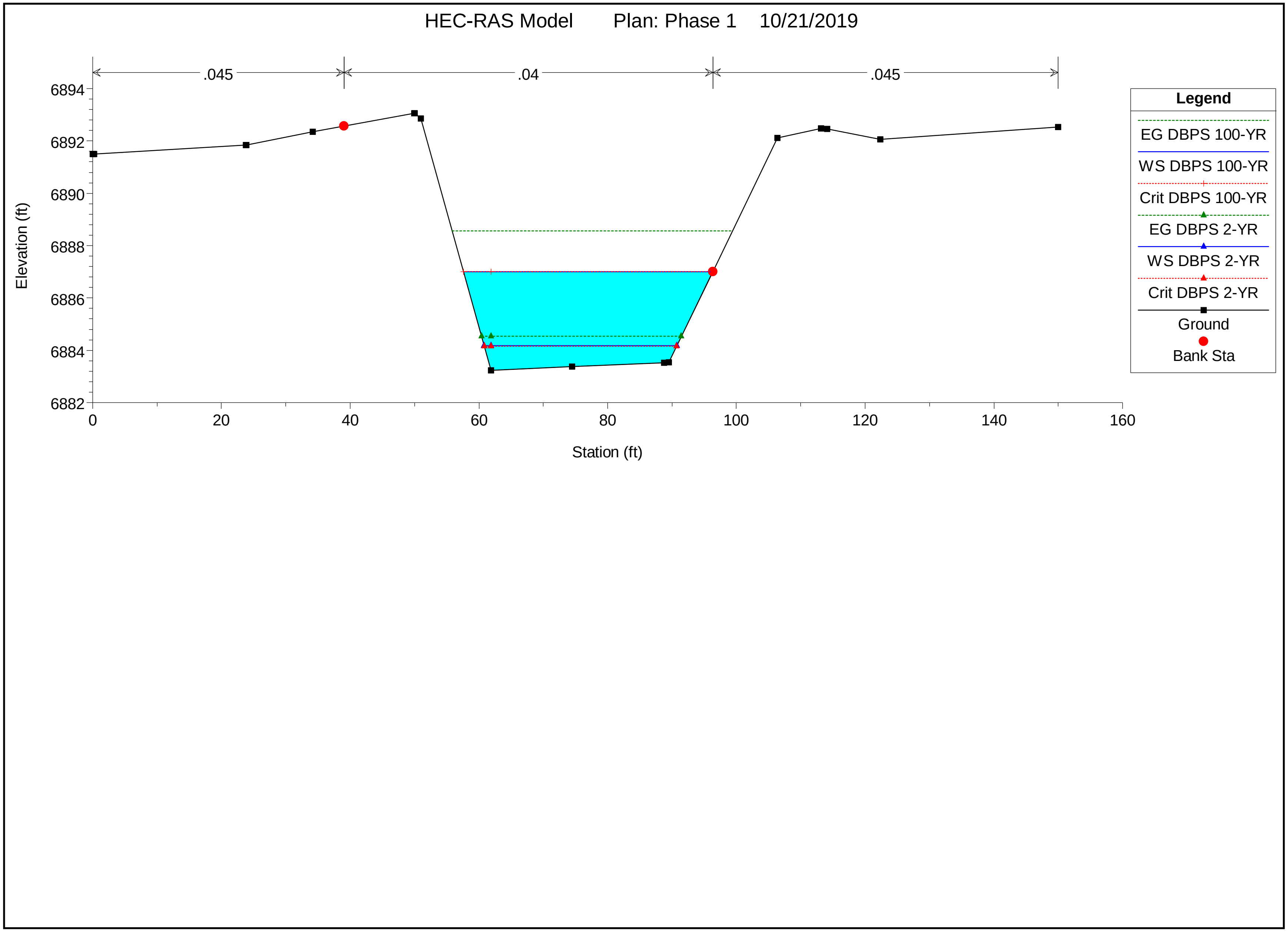
Elevation (ft)
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta



HEC-RAS Model Plan: Phase 1 10/21/2019
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Elevation (ft)
6894
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6884
6882
0
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40
60
80
100
120
140
160
Station (ft)
Legend
EG DBPS 100-YR
WS DBPS 100-YR
Crit DBPS 100-YR
EG DBPS 2-YR
WS DBPS 2-YR
Crit DBPS 2-YR
Ground
Bank Sta

APPENDIX E

On-Site Pond Calculations

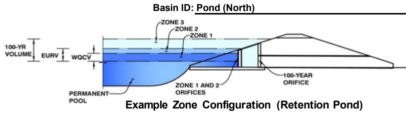
Pond (North) Calculations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (North)



Example Zone Configuration (Retention Pond)

Depth Increment = User ft

Required Volume Calculation

Selected BMP Type =	EDB				
Watershed Area =	19.12	acres			
Watershed Length =	1,700	ft			
Watershed Slope =	0.020	ft/ft			
Watershed Imperviousness =	47.90%	percent			
Percentage Hydrologic Soil Group A =	100.0%	percent			
Percentage Hydrologic Soil Group B =	0.0%	percent			
Percentage Hydrologic Soil Groups C/D =	0.0%	percent			
Desired WQCV Drain Time =	40.0	hours			
Location for 1-hr Rainfall Depths =	User Input				
Water Quality Capture Volume (WQCV) =	0.320	acre-feet	Optional User Override 1-hr Precipitation		
Excess Urban Runoff Volume (EURV) =	1.043	acre-feet			
2-yr Runoff Volume (P1 = 1.19 in.) =	0.711	acre-feet		1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.936	acre-feet		1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.154	acre-feet		1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.445	acre-feet		2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.817	acre-feet		2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.259	acre-feet		2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	3.846	acre-feet		3.68	inches
Approximate 2-yr Detention Volume =	0.670	acre-feet			
Approximate 5-yr Detention Volume =	0.883	acre-feet			
Approximate 10-yr Detention Volume =	1.079	acre-feet			
Approximate 25-yr Detention Volume =	1.324	acre-feet			
Approximate 50-yr Detention Volume =	1.481	acre-feet			
Approximate 100-yr Detention Volume =	1.678	acre-feet			

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.320	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	Total detention volume is less than 100-year volume.
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.320	acre-feet	
Initial Surcharge Volume (ISV) =	user	ft^3	
Initial Surcharge Depth (ISD) =	user	ft	
Total Available Detention Depth (H_{total}) =	user	ft	
Depth of Trickle Channel (H_{TC}) =	user	ft	
Slope of Trickle Channel (S_{TC}) =	user	ft/ft	
Slopes of Main Basin Sides (S_{main}) =	user	H:V	
Basin Length-to-Width Ratio ($R_{L/W}$) =	user		
Initial Surcharge Area (A_{ISV}) =	user	ft^2	
Surcharge Volume Length (L_{ISV}) =	user	ft	
Surcharge Volume Width (W_{ISV}) =	user	ft	
Depth of Basin Floor (H_{FLOOR}) =	user	ft	
Length of Basin Floor (L_{FLOOR}) =	user	ft	
Width of Basin Floor (W_{FLOOR}) =	user	ft	
Area of Basin Floor (A_{FLOOR}) =	user	ft^2	
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3	
Depth of Main Basin (H_{MAIN}) =	user	ft	
Length of Main Basin (L_{MAIN}) =	user	ft	
Width of Main Basin (W_{MAIN}) =	user	ft	
Area of Main Basin (A_{MAIN}) =	user	ft^2	
Volume of Main Basin (V_{MAIN}) =	user	ft^3	
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet	

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6939.25	--	0.50	--	--	--	3,500	0.080	840	0.019
6940.25	--	1.50	--	--	--	4,637	0.106	4,897	0.112
6941.25	--	2.50	--	--	--	5,865	0.135	10,194	0.234
6942.25	--	3.50	--	--	--	7,177	0.165	16,715	0.384
6943.25	--	4.50	--	--	--	8,559	0.196	24,583	0.564
6944.25	--	5.50	--	--	--	10,013	0.230	33,869	0.778
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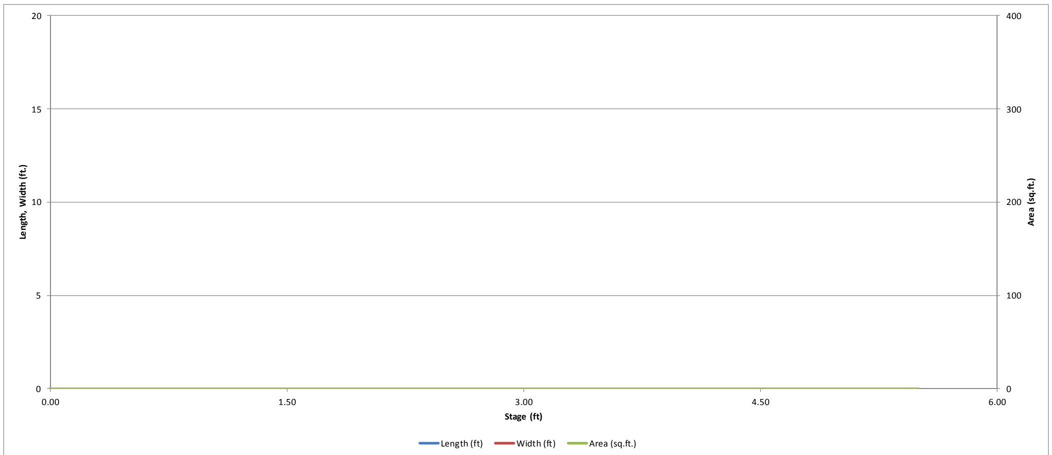
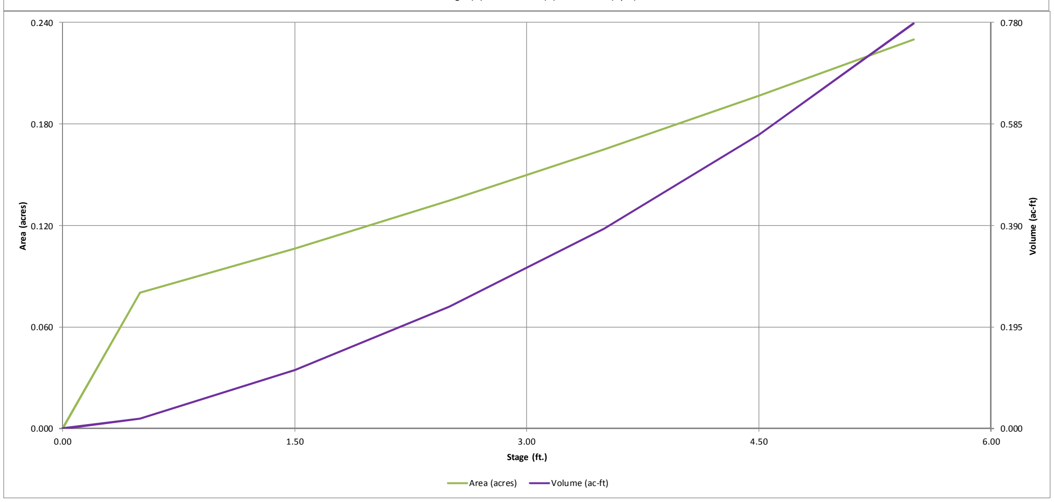
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

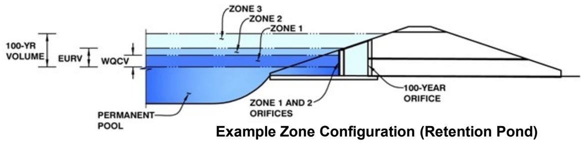




Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2
Basin ID: Pond (North)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.10	0.320	Orifice Plate
Zone 2			
Zone 3			
		0.320	Total

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.10	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	1.66	sq. inches (diameter = 1-7/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.153E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	2.00					
Orifice Area (sq. inches)	1.66	1.66	1.66					

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =			inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =			ft^2
Vertical Orifice Centroid =			feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =			ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =			feet
Overflow Weir Slope =			H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =			feet
Overflow Grate Open Area % =			%, grate open area/total area
Debris Clogging % =			%

Calculated Parameters for Overflow Weir

	Not Selected	Not Selected	
Height of Grate Upper Edge, H_t =			feet
Over Flow Weir Slope Length =			feet
Grate Open Area / 100-yr Orifice Area =			should be ≥ 4
Overflow Grate Open Area w/o Debris =			ft^2
Overflow Grate Open Area w/ Debris =			ft^2

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

	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =			ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =			inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

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

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.25	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	40.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

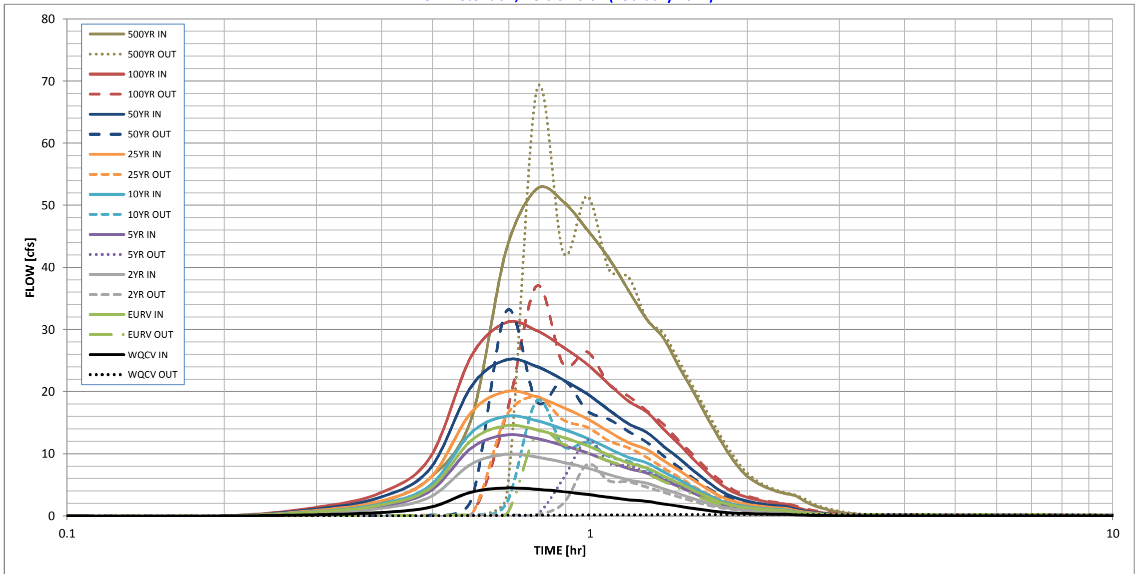
Spillway Design Flow Depth=	0.39	feet
Stage at Top of Freeboard =	4.64	feet
Basin Area at Top of Freeboard =	0.20	acres

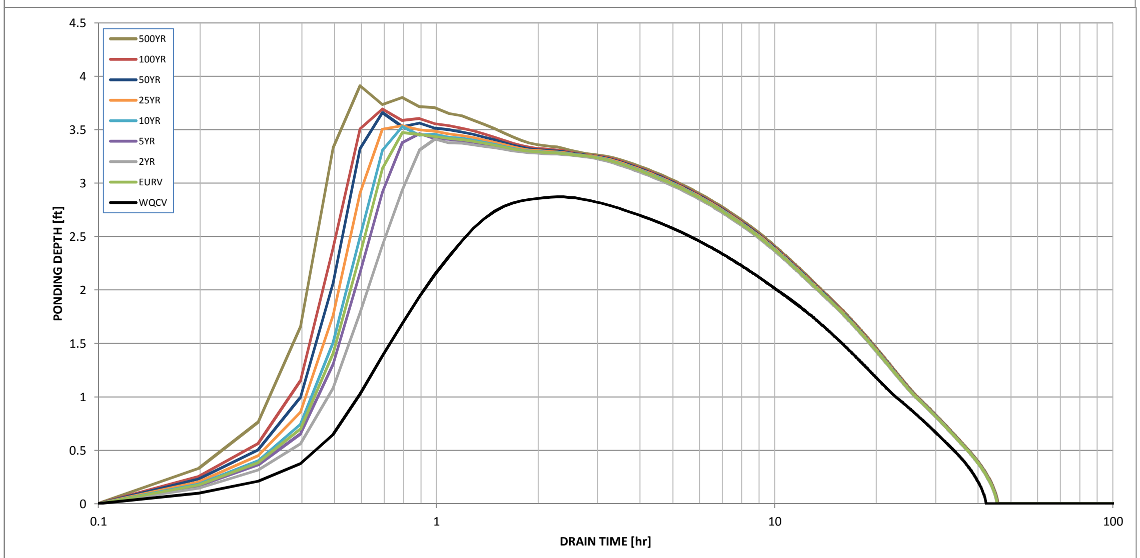
Routed Hydrograph Results

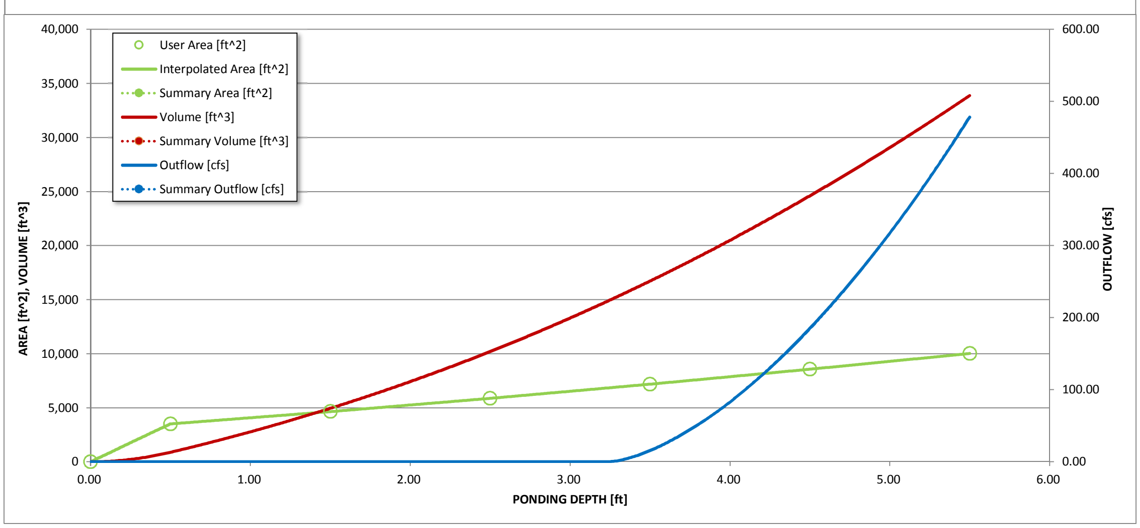
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.68
Calculated Runoff Volume (acre-ft) =	0.320	1.043	0.711	0.936	1.154	1.445	1.817	2.259	3.846
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.320	1.043	0.710	0.936	1.154	1.445	1.817	2.259	3.847
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.02	0.15	0.38	1.02
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.2	0.4	3.0	7.2	19.5
Peak Inflow Q (cfs) =	4.5	14.5	9.9	13.0	16.1	20.0	25.1	31.1	52.6
Peak Outflow Q (cfs) =	0.2	13.2	8.3	12.2	18.5	19.2	32.9	37.0	68.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	159.6	104.1	48.2	11.1	5.1	3.5
Structure Controlling Flow =	Plate	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	34	37	35	33	31	28	26	19
Time to Drain 99% of Inflow Volume (hours) =	**40**	40	42	41	40	39	38	37	32
Maximum Ponding Depth (ft) =	2.87	3.47	3.41	3.46	3.53	3.54	3.66	3.69	3.91
Area at Maximum Ponding Depth (acres) =	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18
Maximum Volume Stored (acre-ft) =	0.286	0.379	0.369	0.377	0.389	0.389	0.410	0.416	0.454

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







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

Pond (North) - FOREBAY CALCULATIONS

1) WQCV (inches) = $a(.91I^3 - 1.19I^2 + .78I)$

I = impervious percentage = 48%

a = Coefficient corresponding to WQCV drain time = 1 (40 hours)

WQCV (inches) = 0.20 inches

2) WQCV (ac-ft) = (WQCV (inches))/12 x A

Area = tributary area = 19.12 acres

WQCV (ac-ft) = 0.32

WQCV (cubic feet) = 13,923

3) Forebay Volume

Per Table EDB-4, Section T-5 of USDCM Volume 3 - Forebay Volume = 2% of WQCV and be 18" depth since watershed up to 5 impervious acres

Forebay Volume = 2% of WQCV = 278 cubic feet

with pond depth at 1.5', Forebay Area = 185.6 sq-ft (minimum)

4) Forebay Discharge

Per Table EDB-4, Section T-5 of USDCM Volume 3 - Forebay Discharge = 2% of 100-yr Flow into pond

Q100 = 50 cfs

Forebay discharge = 1.00 cfs

Pond (North) - Forebay Slot

Project Description

Solve For	Crest Length

Input Data

Discharge		1.00	ft³/s
Headwater Elevation		1.25	ft
Crest Elevation		0.00	ft
Tailwater Elevation		0.00	ft
Weir Coefficient		3.00	US
Number Of Contractions	0		

Results

Crest Length	0.24	ft
Headwater Height Above Crest	1.25	ft
Tailwater Height Above Crest	0.00	ft
Flow Area	0.30	ft²
Velocity	3.35	ft/s
Wetted Perimeter	2.74	ft
Top Width	0.24	ft

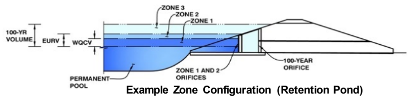
Pond (South) Calculations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (South)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	29.31	acres		
Watershed Length =	1,800	ft		
Watershed Slope =	0.020	ft/ft		
Watershed Imperviousness =	53.20%	percent		
Percentage Hydrologic Soil Group A =	100.0%	percent		
Percentage Hydrologic Soil Group B =	0.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.526	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	1.829	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	1.250	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.641	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.016	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.495	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.079	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.764	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	6.261	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	1.180	acre-feet		
Approximate 5-yr Detention Volume =	1.550	acre-feet		
Approximate 10-yr Detention Volume =	1.886	acre-feet		
Approximate 25-yr Detention Volume =	2.299	acre-feet		
Approximate 50-yr Detention Volume =	2.557	acre-feet		
Approximate 100-yr Detention Volume =	2.861	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.526	acre-feet	
Select Zone 2 Storage Volume (Optional) =		acre-feet	**Total detention volume is less than 100-year volume.**
Select Zone 3 Storage Volume (Optional) =		acre-feet	
Total Detention Basin Volume =	0.526	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 = User 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	--	--	--	0	0.000		
6924	--	0.50	--	--	--	5,438	0.125	1,305	0.030
6925	--	1.50	--	--	--	7,249	0.166	7,630	0.175
6926	--	2.50	--	--	--	9,448	0.217	16,051	0.368
6927	--	3.50	--	--	--	11,635	0.267	26,593	0.610
6928	--	4.50	--	--	--	13,951	0.320	39,386	0.904
6929	--	5.50	--	--	--	16,542	0.380	54,632	1.254
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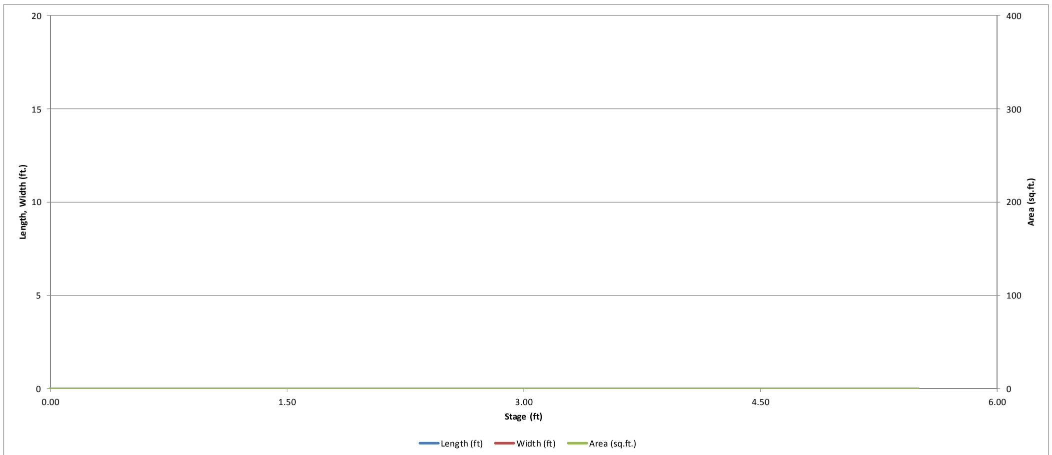
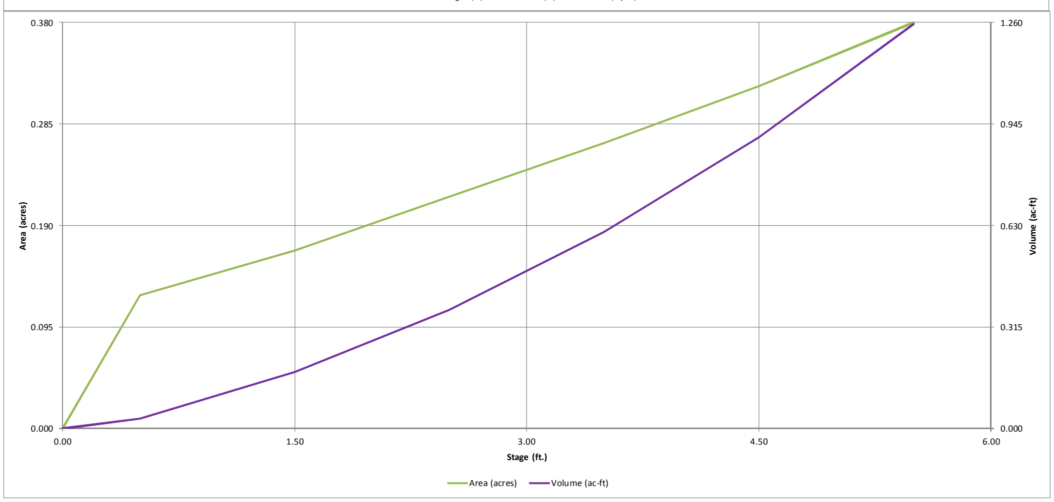
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



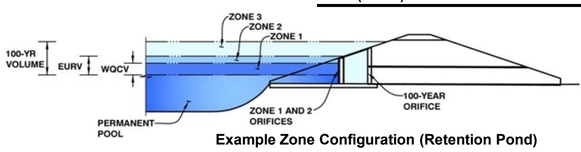


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (South)



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.18	0.526	Orifice Plate
Zone 2			Not Utilized
Zone 3			Not Utilized
		0.526	Total

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.20	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	12.80	inches
Orifice Plate: Orifice Area per Row =	2.75	sq. inches (diameter = 1-7/8 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.910E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.10	2.20					
Orifice Area (sq. inches)	2.75	2.75	2.75					

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

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	N/A	N/A	feet
Overflow Weir Slope =	N/A	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	N/A	N/A	feet
Overflow Grate Open Area % =	N/A	N/A	%, grate open area/total area
Debris Clogging % =	N/A	N/A	%

Calculated Parameters for Overflow Weir

	Not Selected	Not Selected	
Height of Grate Upper Edge, H_t =	N/A	N/A	feet
Over Flow Weir Slope Length =	N/A	N/A	feet
Grate Open Area / 100-yr Orifice Area =	N/A	N/A	should be $\geq$ 4
Overflow Grate Open Area w/o Debris =	N/A	N/A	ft^2
Overflow Grate Open Area w/ Debris =	N/A	N/A	ft^2

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

	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	N/A	N/A	ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

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

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.25	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	50.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

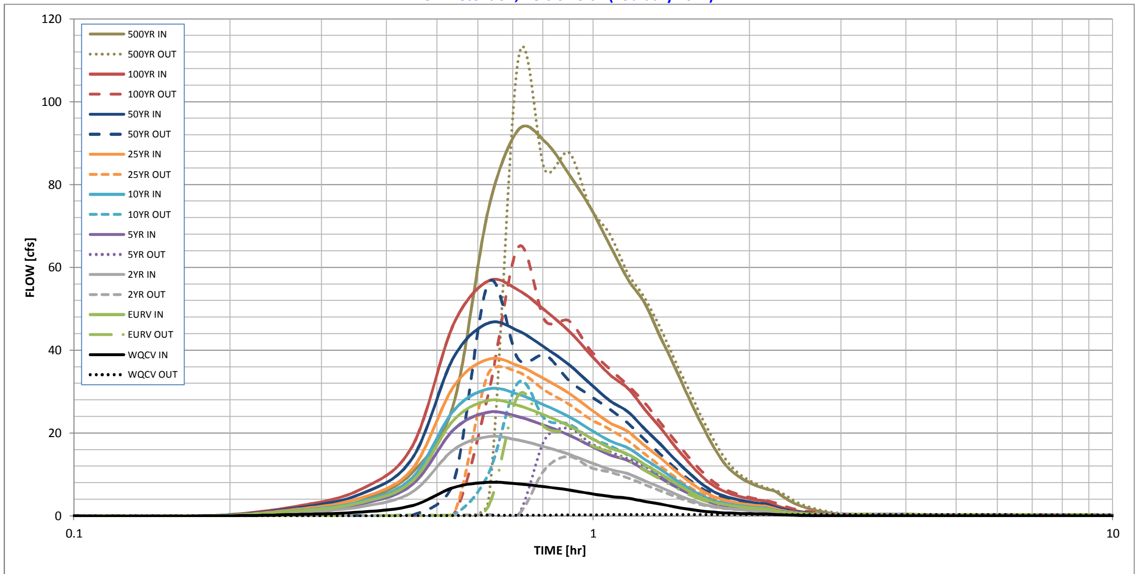
Spillway Design Flow Depth=	0.51	feet
Stage at Top of Freeboard =	4.76	feet
Basin Area at Top of Freeboard =	0.34	acres

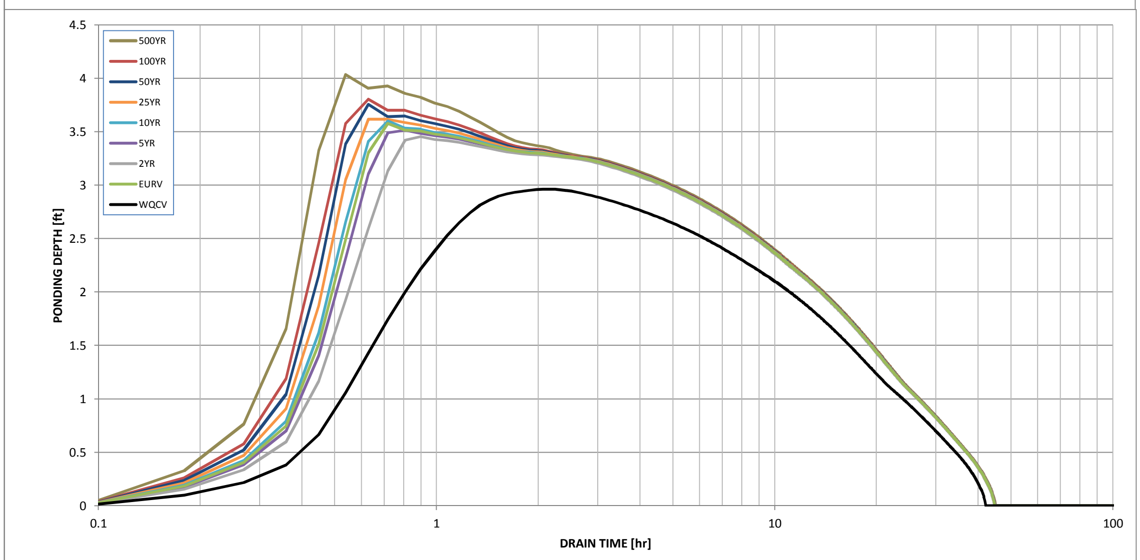
Routed Hydrograph Results

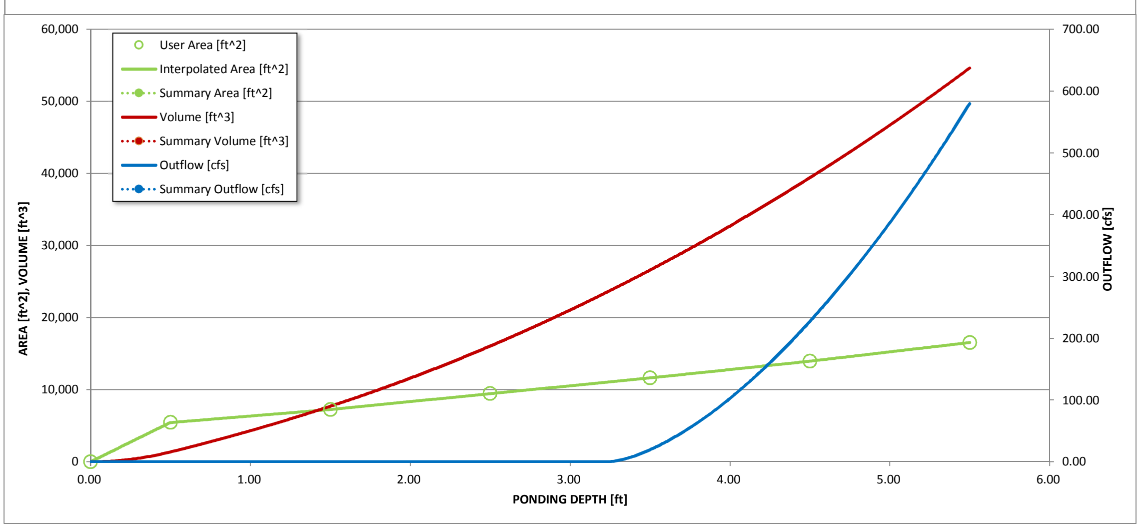
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.68
Calculated Runoff Volume (acre-ft) =	0.526	1.829	1.250	1.641	2.016	2.495	3.079	3.764	6.261
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.525	1.828	1.250	1.640	2.014	2.493	3.077	3.762	6.249
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.02	0.18	0.43	1.15
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.1	0.3	0.7	5.2	12.6	33.8
Peak Inflow Q (cfs) =	8.1	27.9	19.1	25.0	30.7	37.8	46.6	56.8	93.2
Peak Outflow Q (cfs) =	0.4	29.2	14.4	21.2	32.2	34.7	56.2	64.9	110.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	157.1	102.8	49.5	10.8	5.1	3.3
Structure Controlling Flow =	Plate	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	33	36	34	32	30	28	25	19
Time to Drain 99% of Inflow Volume (hours) =	**40**	40	41	40	39	38	37	36	32
Maximum Ponding Depth (ft) =	2.96	3.58	3.45	3.51	3.60	3.62	3.76	3.81	4.04
Area at Maximum Ponding Depth (acres) =	0.24	0.27	0.26	0.27	0.27	0.27	0.28	0.28	0.30
Maximum Volume Stored (acre-ft) =	0.474	0.629	0.597	0.613	0.637	0.640	0.679	0.693	0.760

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







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

Pond (South) - FOREBAY CALCULATIONS

1) WQCV (inches) = $a(.91I^3 - 1.19I^2 + .78I)$

I = impervious percentage = 53%

a = Coefficient corresponding to WQCV drain time = 1 (40 hours)

WQCV (inches) = 0.22 inches

2) WQCV (ac-ft) = (WQCV (inches))/12 x A

Area = tributary area = 29.31 acres

WQCV (ac-ft) = 0.53

WQCV (cubic feet) = 22,894

3) Forebay Volume

Per Table EDB-4, Section T-5 of USDCM Volume 3 - Forebay Volume = 2% of WQCV and be 18" depth since watershed up to 5 impervious acres

Forebay Volume = 2% of WQCV = 458 cubic feet

with pond depth at 1.5', Forebay Area = 305.3 sq-ft (minimum)

4) Forebay Discharge

Per Table EDB-4, Section T-5 of USDCM Volume 3 - Forebay Discharge = 2% of 100-yr Flow into pond

Q100 = 85 cfs

Forebay discharge = 1.70 cfs

Pond (South) - Forebay Slot

Project Description

Solve For	Crest Length

Input Data

Discharge	1.70	ft³/s
Headwater Elevation	1.25	ft
Crest Elevation	0.00	ft
Tailwater Elevation	0.00	ft
Weir Coefficient	3.00	US
Number Of Contractions	0	

Results

Crest Length	0.41	ft
Headwater Height Above Crest	1.25	ft
Tailwater Height Above Crest	0.00	ft
Flow Area	0.51	ft²
Velocity	3.35	ft/s
Wetted Perimeter	2.91	ft
Top Width	0.41	ft

Pond (South) - Overflow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	5.00	ft
Discharge	75.00	ft³/s

Results

Normal Depth	1.46	ft
Flow Area	15.89	ft²
Wetted Perimeter	17.07	ft
Hydraulic Radius	0.93	ft
Top Width	16.71	ft
Critical Depth	1.35	ft
Critical Slope	0.01403	ft/ft
Velocity	4.72	ft/s
Velocity Head	0.35	ft
Specific Energy	1.81	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.46	ft
Critical Depth	1.35	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01403	ft/ft

APPENDIX F

Regional Pond Calculations

Tributary to Detention Pond WU

See Figures 3-2 & 3-7 of the Falcon Drainage Basin Planning Study (September 2015)

Basin	Area (sq miles)	Percent Impervious
WT10	0.14	2%
WT20	0.07	2%
WT30	0.08	4%
WT40	0.19	3%
WT50	0.19	2%
WT60	0.20	2%
WT70	0.17	1%
WT80	0.07	2%
WT90	0.15	1%
WT100	0.19	1%
WT110	0.19	2%
WT120	0.05	3%
WT130	0.10	29%
WT140	0.13	2%
WT150	0.23	10%
WT160	0.11	20%
WT170	0.12	3%
WT180	0.10	0%
WT190	0.06	8%
WT200	0.30	4%
WT210	0.27	12%
WT220	0.19	13%
WT230	0.20	27%
WT240	0.08	27%
Total	3.58	7.33%

Water Quality Capture Volume, WQCV:

WQCV = a(0.91*I* ^3 - 1.19*I* ^2 + 0.78*I*) (Equation 3-1)

Where:

a = Coefficient corresponding to WQCV drain time

I = Imperviousness (%/100)

Drain Time = 40 hrs

WQCV = 0.051 Inches

BMP Storage Volume, V:

V = (WQCV/12)A (Equation 3-3)

Where:

A = Tributary area (acres)

V = 9.764 acre-ft

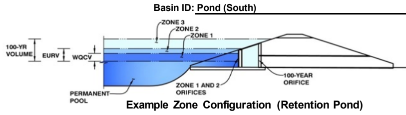
*Reference Section 3.0 of UDFCD Volume 3, August 2011

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Bent Grass Residential Filing No. 2

Basin ID: Pond (South)



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB			
Watershed Area =	29.31	acres		
Watershed Length =	1,800	ft		
Watershed Slope =	0.020	ft/ft		
Watershed Imperviousness =	53.20%	percent		
Percentage Hydrologic Soil Group A =	100.0%	percent		
Percentage Hydrologic Soil Group B =	0.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			
Water Quality Capture Volume (WQCV) =	0.526	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	1.829	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	1.250	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.641	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.016	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.495	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.079	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.764	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	6.261	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	1.180	acre-feet		
Approximate 5-yr Detention Volume =	1.550	acre-feet		
Approximate 10-yr Detention Volume =	1.886	acre-feet		
Approximate 25-yr Detention Volume =	2.299	acre-feet		
Approximate 50-yr Detention Volume =	2.557	acre-feet		
Approximate 100-yr Detention Volume =	2.861	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.526	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.526	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	

Total detention volume is less than 100-year volume.

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 = User 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	--	--	--	0	0.000		
6924	--	0.50	--	--	--	5,438	0.125	1,305	0.030
6925	--	1.50	--	--	--	7,249	0.166	7,630	0.175
6926	--	2.50	--	--	--	9,448	0.217	16,051	0.368
6927	--	3.50	--	--	--	11,635	0.267	26,593	0.610
6928	--	4.50	--	--	--	13,951	0.320	39,386	0.904
6929	--	5.50	--	--	--	16,542	0.380	54,632	1.254
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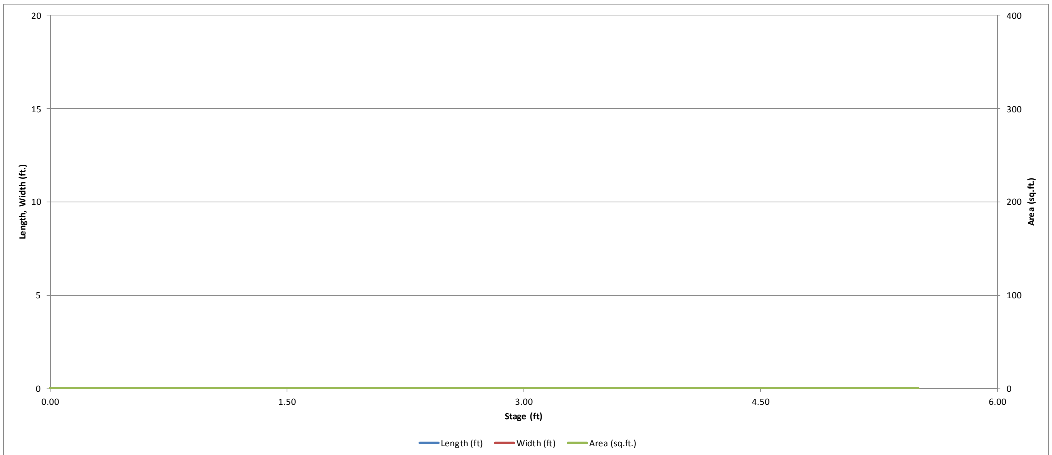
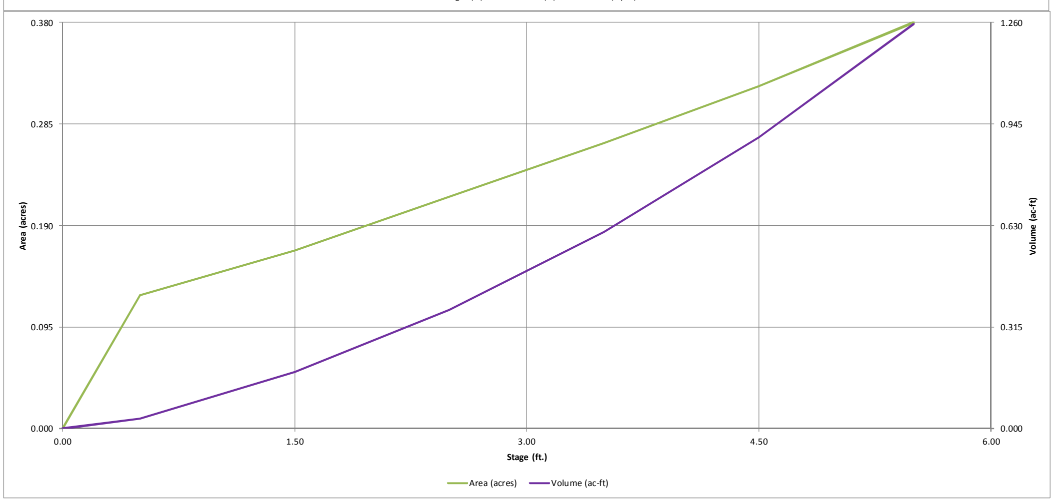
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



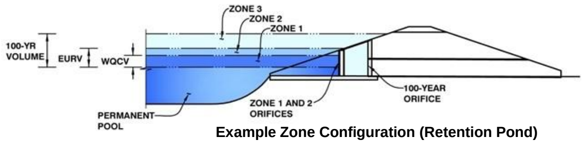


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: **Thompson Thrift**

Basin ID: **Detention and Water Quality Pond**



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	5.64	9.764	Orifice Plate
Zone 2			
Zone 3			
		9.764	Total

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	5.64	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	15.87	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.102E-01	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	2.00	3.00	4.00	5.00		
Orifice Area (sq. inches)	15.87	15.87	15.87	15.87	15.87	15.87		

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

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =			inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =			ft^2
Vertical Orifice Centroid =			feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =			ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =			feet
Overflow Weir Slope =			H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =			feet
Overflow Grate Open Area % =			%, grate open area/total area
Debris Clogging % =			%

Calculated Parameters for Overflow Weir

	Not Selected	Not Selected	
Height of Grate Upper Edge, H_t =			feet
Over Flow Weir Slope Length =			feet
Grate Open Area / 100-yr Orifice Area =			should be $\geq$ 4
Overflow Grate Open Area w/o Debris =			ft^2
Overflow Grate Open Area w/ Debris =			ft^2

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

	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =			ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =			inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

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

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	12.70	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	200.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	0.00	feet

Calculated Parameters for Spillway

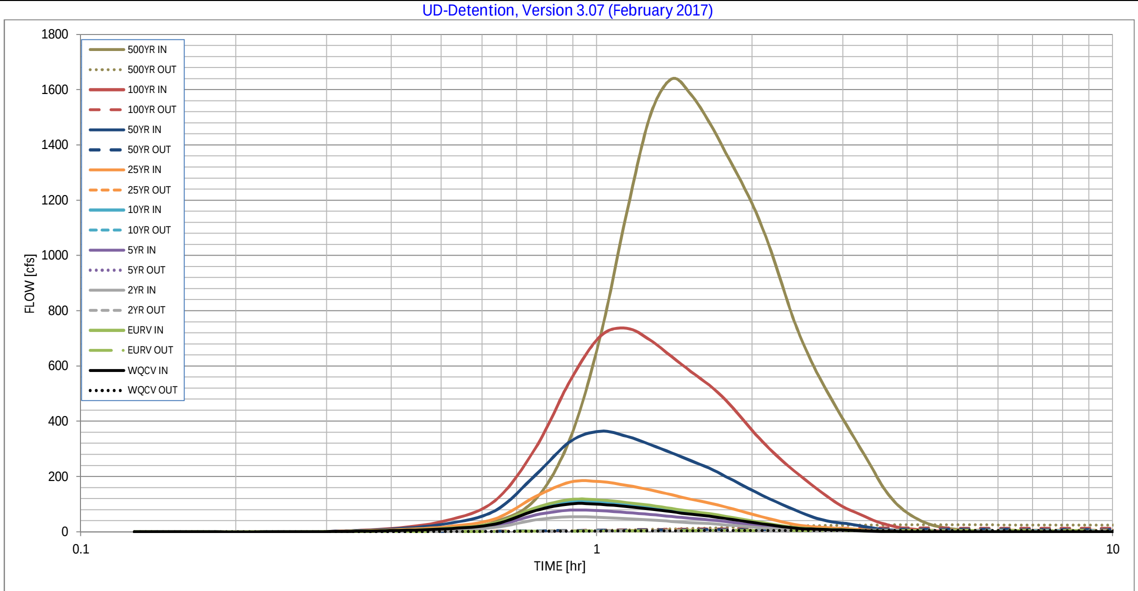
Spillway Design Flow Depth=	1.13	feet
Stage at Top of Freeboard =	13.83	feet
Basin Area at Top of Freeboard =	5.56	acres

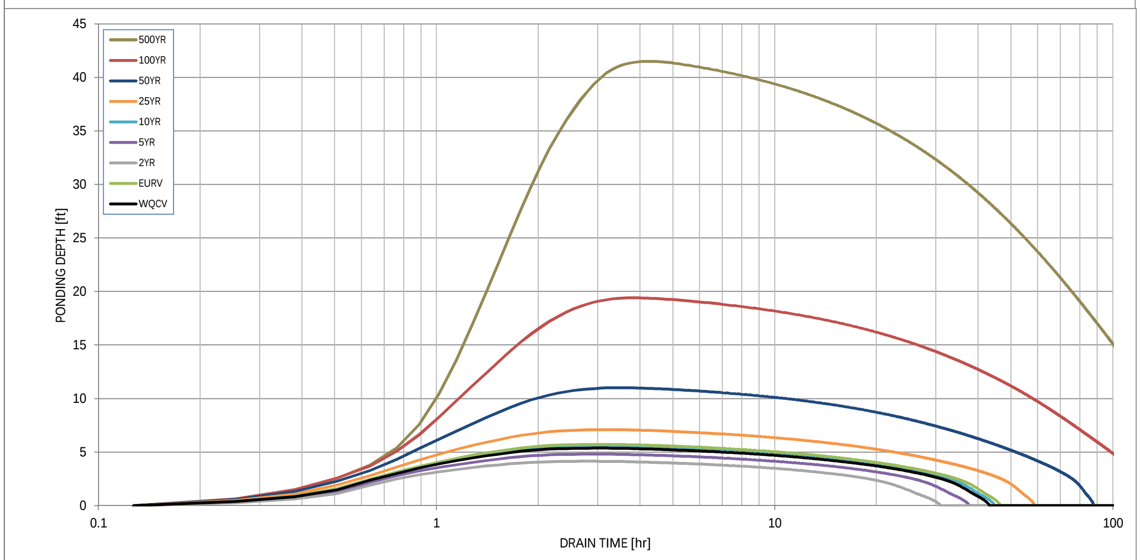
Routed Hydrograph Results

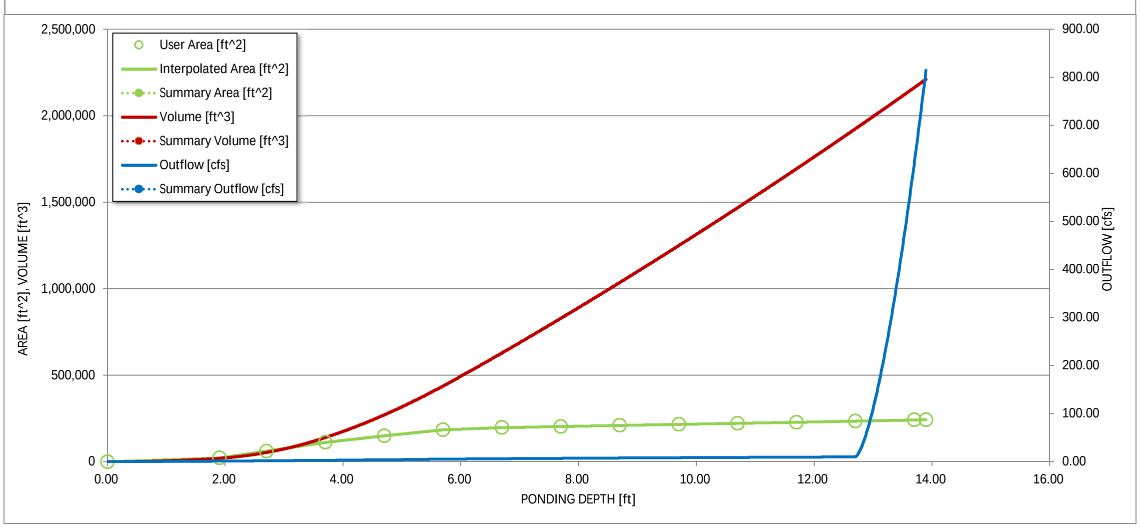
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	0.84	1.12	1.36	1.72	2.01	2.31	3.07
Calculated Runoff Volume (acre-ft) =	9.764	11.312	5.157	7.503	10.464	17.753	37.566	82.799	201.813
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	9.756	11.304	5.148	7.496	10.451	17.740	37.540	82.749	201.703
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.00	0.01	0.01	0.11	0.27	0.68
Predevelopment Peak Q (cfs) =	0.0	0.0	0.7	5.4	13.0	32.3	249.1	626.2	1569.1
Peak Inflow Q (cfs) =	101.5	117.0	54.5	78.6	108.5	181.6	364.4	736.9	1639.4
Peak Outflow Q (cfs) =	5.1	5.5	3.6	4.3	5.3	6.7	9.2	13.7	25.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	0.4	0.2	0.0	0.0	0.0
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Plate	N/A	N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	37	40	27	32	38	50	75	115	177
Time to Drain 99% of Inflow Volume (hours) =	40	43	29	35	41	54	81	124	>120
Maximum Ponding Depth (ft) =	5.37	5.72	4.14	4.81	5.53	7.10	11.01	19.41	41.50
Area at Maximum Ponding Depth (acres) =	3.98	4.25	2.95	3.53	4.10	4.59	5.14	5.57	5.57
Maximum Volume Stored (acre-ft) =	8.703	10.143	4.429	6.602	9.349	16.262	35.297	50.761	50.761

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







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

Rock Chute Design - Plan Sheet

(Version 4.02 - 11/04/09, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Pond WU - Riprap Weir
Designer: Aaron Johnston
Date: 5/20/2019

County: 0.00
Checked by:
Date:

Design Values

Angular D_{50} dia. = *19.1* in.
$Rock_{chute}$ thickness = *38.3* in.
Inlet apron length = *19* ft.
Outlet apron length = *24* ft.
Radius = *53* ft.
Will bedding be used? *Yes* ---------- Depth (in.) = *6.0*

Rock Gradation Envelope

% Passing		*Diameter, in. (weight, lbs.)*
D_{100}	---------	29 - 38 (1714 - 4062)
D_{85}	---------	25 - 34 (1116 - 2961)
D_{50}	---------	19 - 29 (508 - 1714)
D_{10}	---------	15 - 25 (260 - 1116)

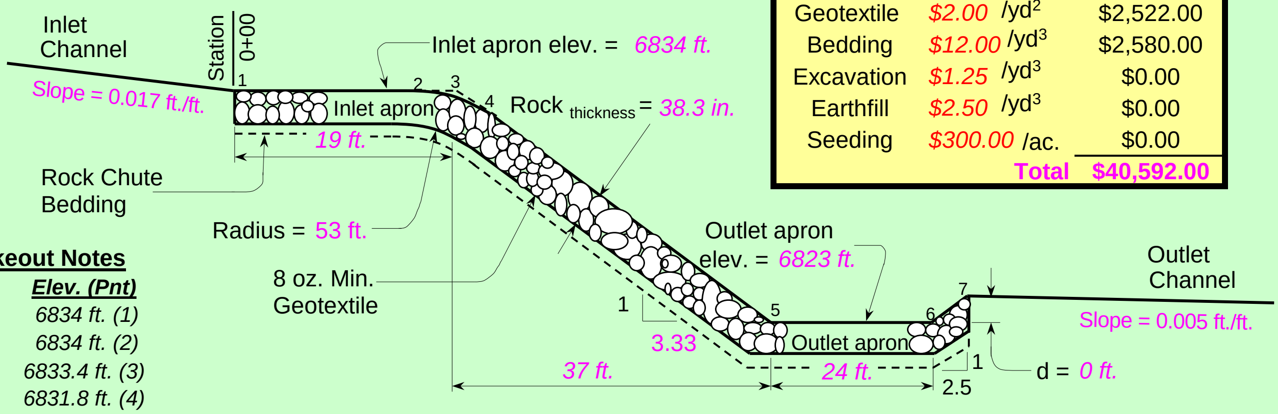
Quantities [a]

Angular Rock = *1183* yd^3
Geotextile (8 oz.)[b] = *1261* yd^2
Bedding (6 in.) = *215* yd^3
Excavation = *0* yd^3
Earthfill = *0* yd^3
Seeding = *0.0* acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from the x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. min.) and anchored (18-in. min. along sides and 24-in. min. on the ends).*

Rock Chute Cost Estimate

Unit	*Unit Cost*	*Cost*
Rock	*$30.00* $/yd^3$	$35,490.00
Geotextile	*$2.00* $/yd^2$	$2,522.00
Bedding	*$12.00* $/yd^3$	$2,580.00
Excavation	*$1.25* $/yd^3$	$0.00
Earthfill	*$2.50* $/yd^3$	$0.00
Seeding	*$300.00* /ac.	$0.00
	Total	**$40,592.00**

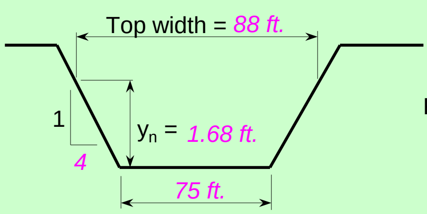


Stakeout Notes

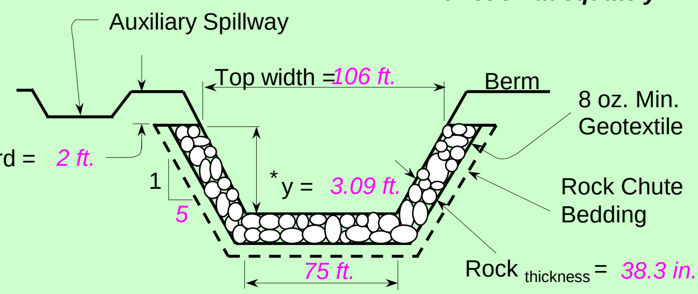
Sta.	***Elev. (Pnt)***
0+00	*6834 ft. (1)*
0+11.2	*6834 ft. (2)*
0+19	*6833.4 ft. (3)*
0+26.5	*6831.8 ft. (4)*
0+56	*6823 ft. (5)*
0+80	*6823 ft. (6)*
0+80	*6823 ft. (7)*

Profile Along Centerline of Rock Chute

****Note*: *The outlet* ***will not*** ***function adequately***

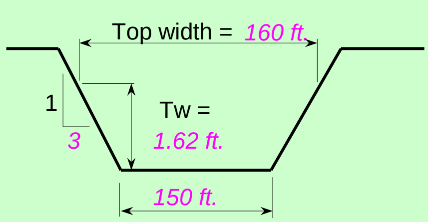


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

Project: Pond WU - Riprap Weir
Location: County

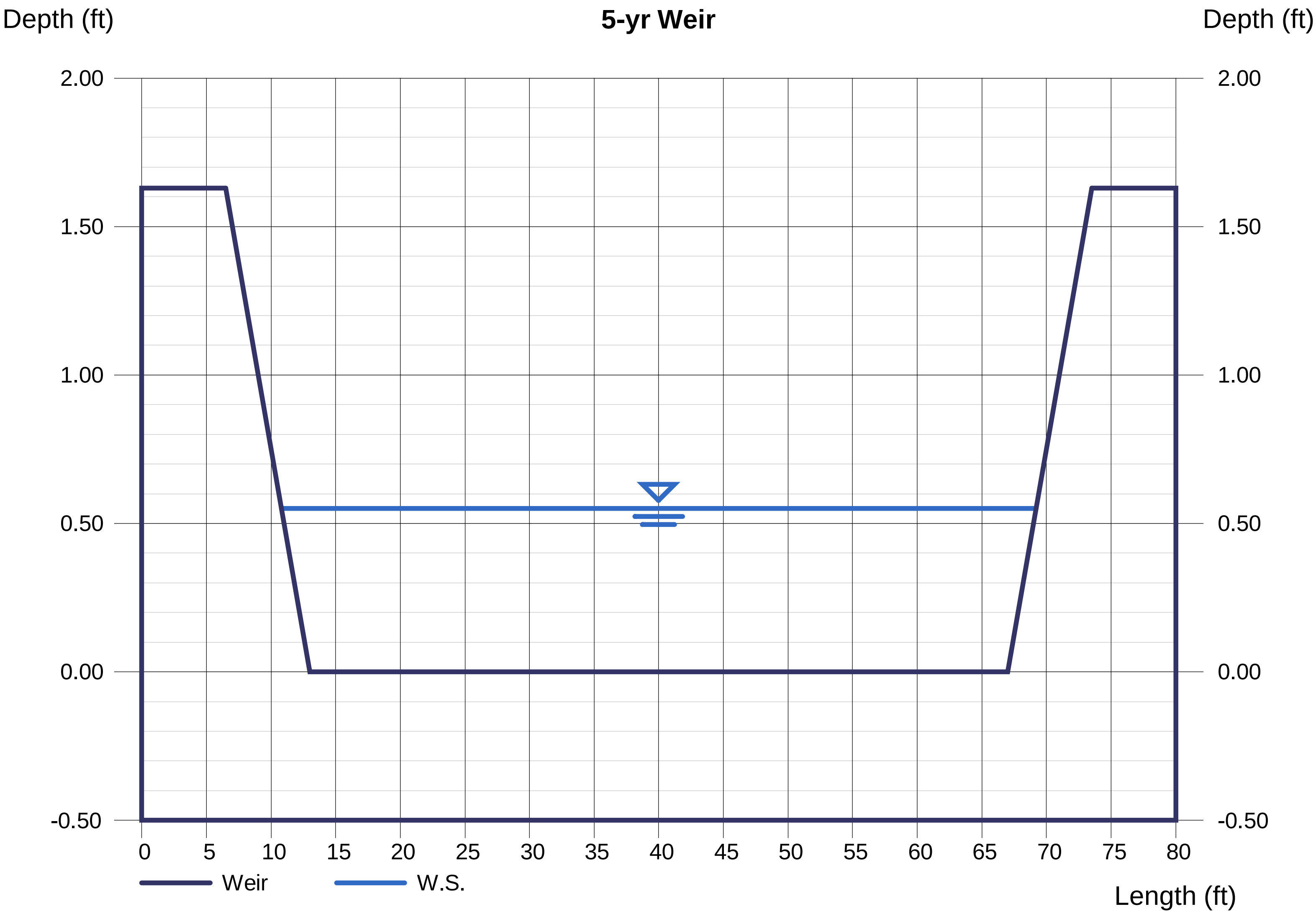
U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: Aaron Johnston	Approved by:	
Drawn: NRCS Standard Dwg.	Title:	
Traced:	Sheet No.	Drawing No.
Checked:	of	

Weir Report

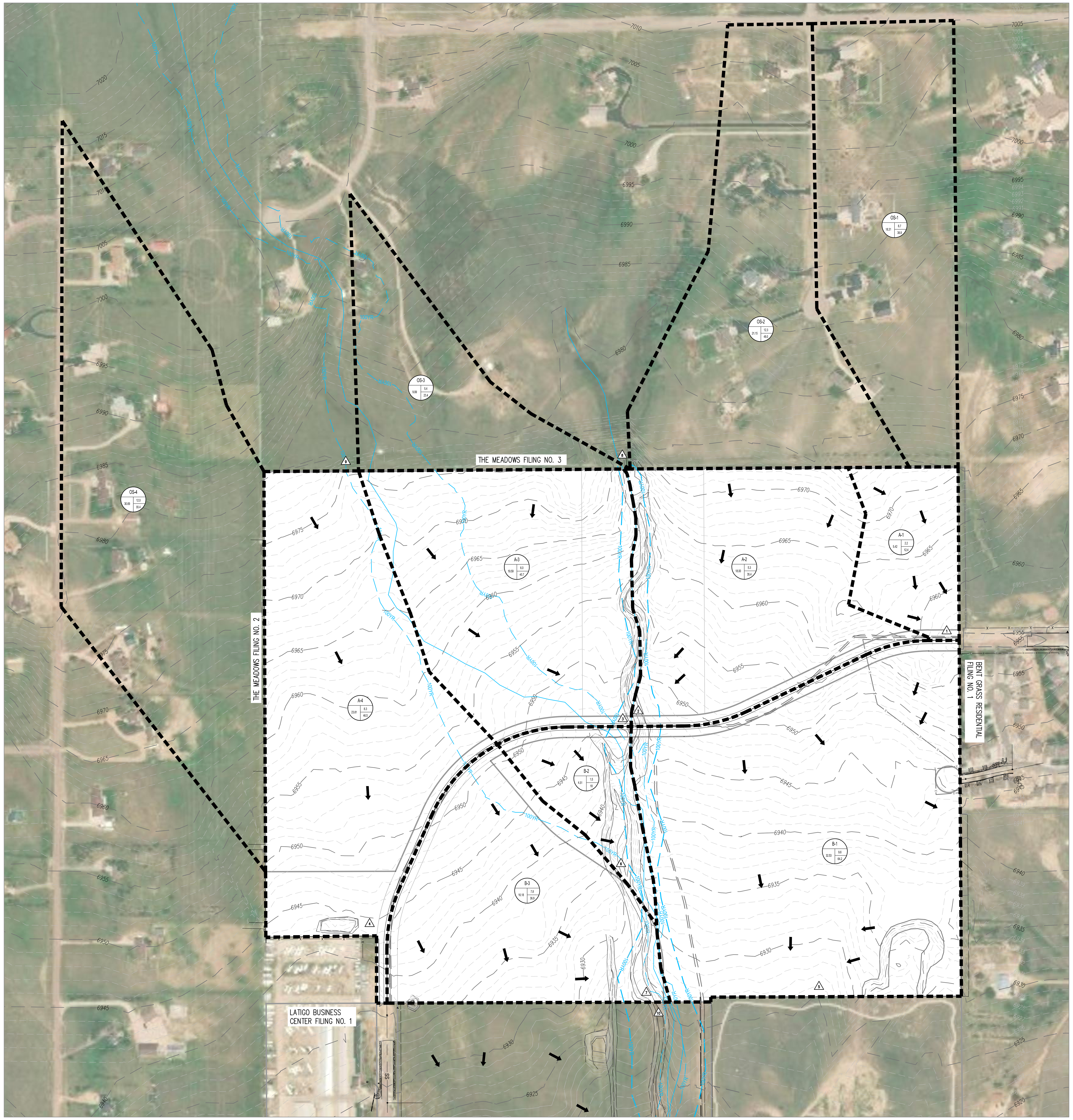
5-yr Weir

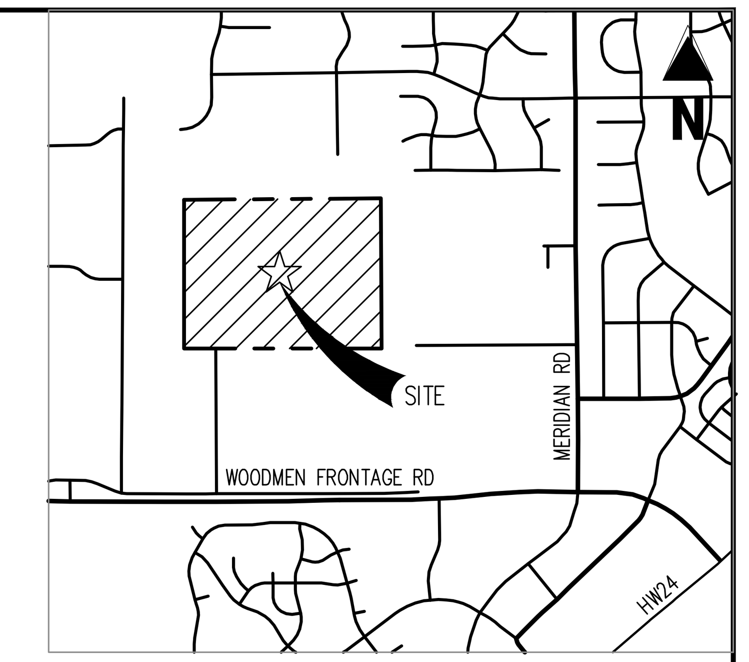
Trapezoidal Weir		**Highlighted**	
Crest	= Sharp	Depth (ft)	= 0.55
Bottom Length (ft)	= 54.00	Q (cfs)	= 70.00
Total Depth (ft)	= 1.63	Area (sqft)	= 30.91
Side Slope (z:1)	= 4.00	Velocity (ft/s)	= 2.26
		Top Width (ft)	= 58.40
Calculations			
Weir Coeff. Cw	= 3.10		
Compute by:	Known Q		
Known Q (cfs)	= 70.00		



APPENDIX G

Drainage Map





VICINITY MAP

N

0 20 50 100

SCALE: 1"=100'

DRAINAGE LEGEND

- PROPERTY LINE
- 6485 EXISTING MAJOR CONTOUR
- 6483 EXISTING MINOR CONTOUR
- BASIN BOUNDARY LINE
- 100YR FEMA EFFECTIVE 100-YR FLOODPLAIN
- CENTERLINE OF STREAM
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DIRECTION OF RUNOFF

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	10.6	49.6
2	17.4	82.3
3	11.4	63.5
4	19.2	95.9
5	9.6	64.2
6	1.5	10.0
7	7.8	36.9
8	4.0	43.0
9	0.0	770.0
10	14.0	880.0

RUNOFF SUMMARY TABLE

Basin ID	Q_5 (cfs)	Q_{100} (cfs)
A-1	2.2	12.4
A-2	5.3	35.4
A-3	6.0	40.7
A-4	8.3	46.5
B-1	9.6	64.2
B-2	1.5	10.0
B-3	7.8	36.9
OS-1	8.7	38.8
OS-2	12.3	48.0
OS-3	5.4	23.4
OS-4	12.0	55.4

Galloway
1755 Telstar Drive, Suite 107
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

NOT FOR CONSTRUCTION

CHALLENGER HOMES

BENT GRASS RESIDENTIAL FILING NO. 2 DRAINAGE PLAN

BENT GRASS MEADOWS DRIVE
COLORADO SPRINGS, COLORADO

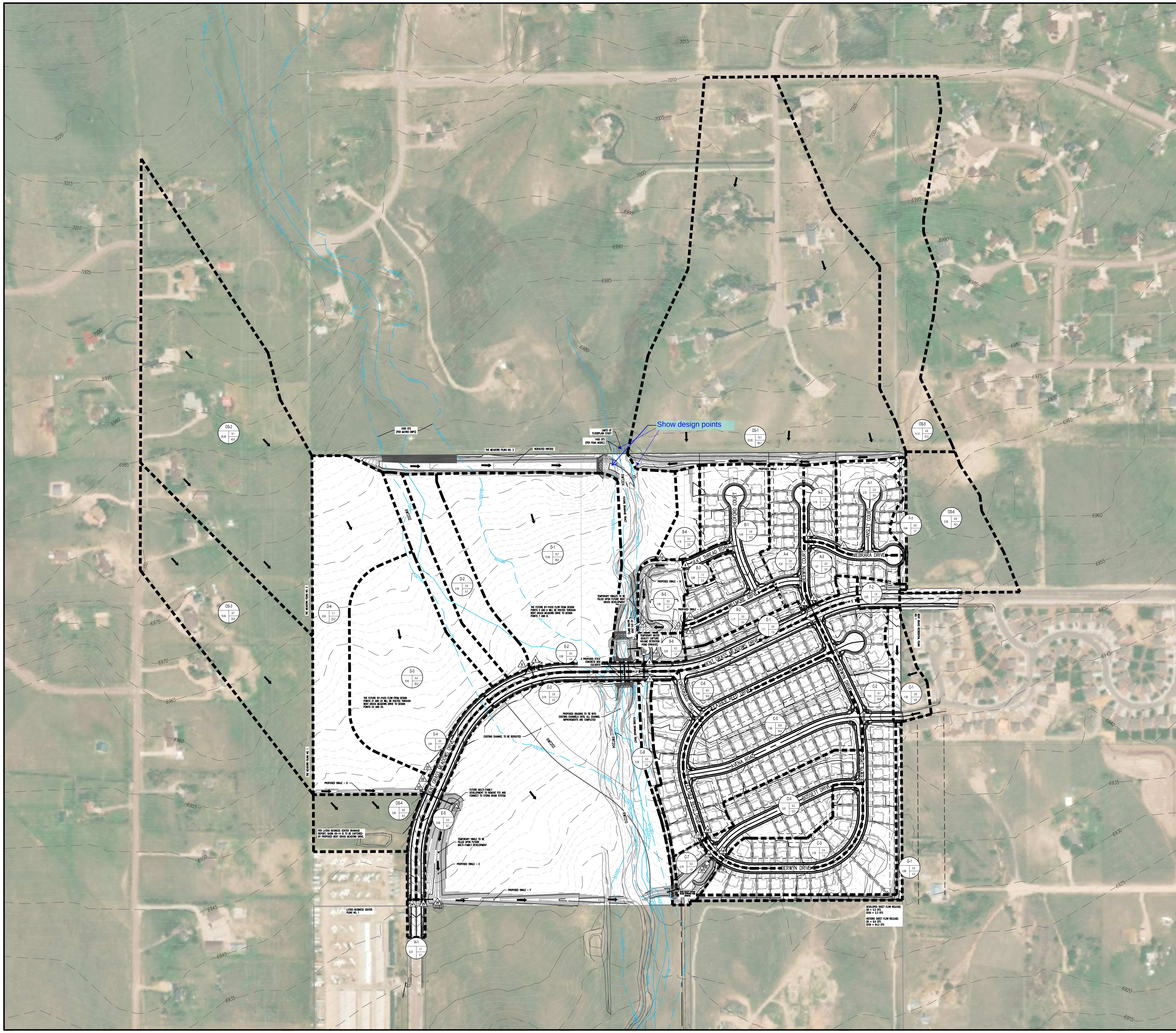
#	Date	Issue / Description	Init.

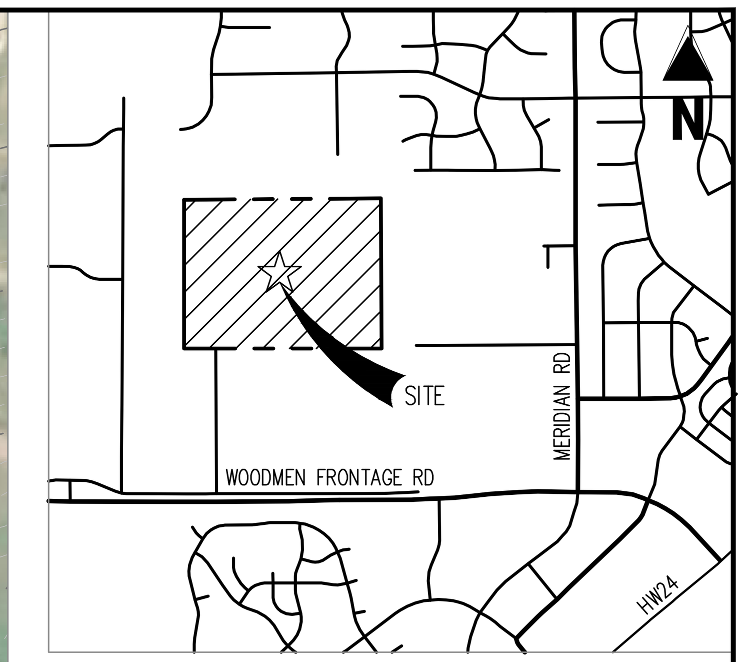
Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	SMB
Date:	OCTOBER 2019

EXISTING DRAINAGE MAP

DR-1

Sheet 1 of 3





VICINITY MAP

N

0 20 50 100

SCALE: 1"=100'

DRAINAGE LEGEND

- PROPERTY LINE
- 6485 EXISTING MAJOR CONTOUR
- 6485 EXISTING MINOR CONTOUR
- BASIN BOUNDARY LINE
- 100-YR FEMA EFFECTIVE 100-YR FLOODPLAIN
- CENTERLINE OF STREAM
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	3.3	8.6
2	4.5	11.9
3	6.1	15.9
4	8.6	22.4
5	3.9	9.7
6	16.9	46.0
7	2.9	5.3
8	27.7	69.0
9	1.1	2.3
10	1.1	4.1
11	5.6	14.0
12	2.0	4.3
13	7.4	18.0
14	8.7	24.6
15	35.2	90.5
16	10.9	24.9
17	15.6	24.6
18	9.0	27.4
19	19.6	32.0
19A	34.0	81.0
20	34.2	82.3
21	9.4	35.2
22	19.0	35.2
23	4.4	21.2
23A	22.7	63.7
24	2.3	17.1
25	4.0	34.0
26	25.5	91.4

PIPE AND INLET SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
5 Inlet	3.9	14.9
6 Inlet	13.1	18.6
6 Pipe	16.9	33.5
7 Inlet	2.9	20.4
8 Inlet	11.8	20.4
8 Pipe	27.7	69.0
16 Inlet	9.8	15.5
16 Pipe	9.8	15.5
17 Inlet	5.8	9.2
17 Pipe	15.6	27.4
18 Inlet	9.0	27.4
18 Pipe	9.0	27.4
19 Inlet	11.0	32.0
19 Pipe	19.6	32.0
19A Pipe	34.0	81.0
21 Inlet	9.4	23.1
21 Pipe	9.4	23.1
22 Inlet	12.3	23.1
22 Pipe	19.0	46.2
23 Inlet	4.4	21.2
23A Pipe	22.7	63.7
24 Inlet	2.3	17.0
24 Pipe	2.3	17.0
25 Inlet	3.3	17.0
25 Pipe	4.0	34.0
24 Pipe	25.5	91.4

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
A-1	2.70	3.3	8.6
A-2	1.19	1.5	4.1
A-3	1.57	2.0	5.0
A-4	2.24	2.9	7.5
B-1	4.46	5.6	14.0
B-2	1.17	2.0	4.3
B-3	0.46	1.1	2.3
B-4	1.19	0.4	2.5
B-5	1.56	0.5	3.7
B-6	0.62	0.2	1.5
C-1	1.35	2.6	5.8
C-2	7.81	8.1	20.9
C-3	2.38	3.4	7.9
C-4	3.61	5.2	12.0
C-5	7.86	10.9	24.9
C-6	5.54	6.9	16.9
C-7	0.76	0.3	1.8
C-8	0.92	0.3	2.2
D-1	12.85	13.7	36.6
D-2	3.19	3.9	9.7
D-3	9.16	9.4	26.2
D-4	9.53	7.1	23.2
E-1	1.69	3.6	7.6
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1
F-1	0.46	0.6	1.7
F-2	0.62	1.8	3.7
G-1	0.98	0.3	2.3
H-1	0.31	1.1	2.1
OS-1	32.28	15.1	65.1
OS-2	20.08	9.1	43.5
OS-3	10.62	4.7	22.6
OS-4	2.64	0.9	6.0
OS-5	14.13	4.9	27.5
OS-6	5.38	8.8	19.4

Galloway
1755 Telstar Drive, Suite 107
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

NOT FOR CONSTRUCTION

CHALLENGER HOMES

BENT GRASS RESIDENTIAL FILING NO. 2
DRAINAGE PLAN

BENT GRASS MEADOWS DRIVE
COLORADO SPRINGS, COLORADO

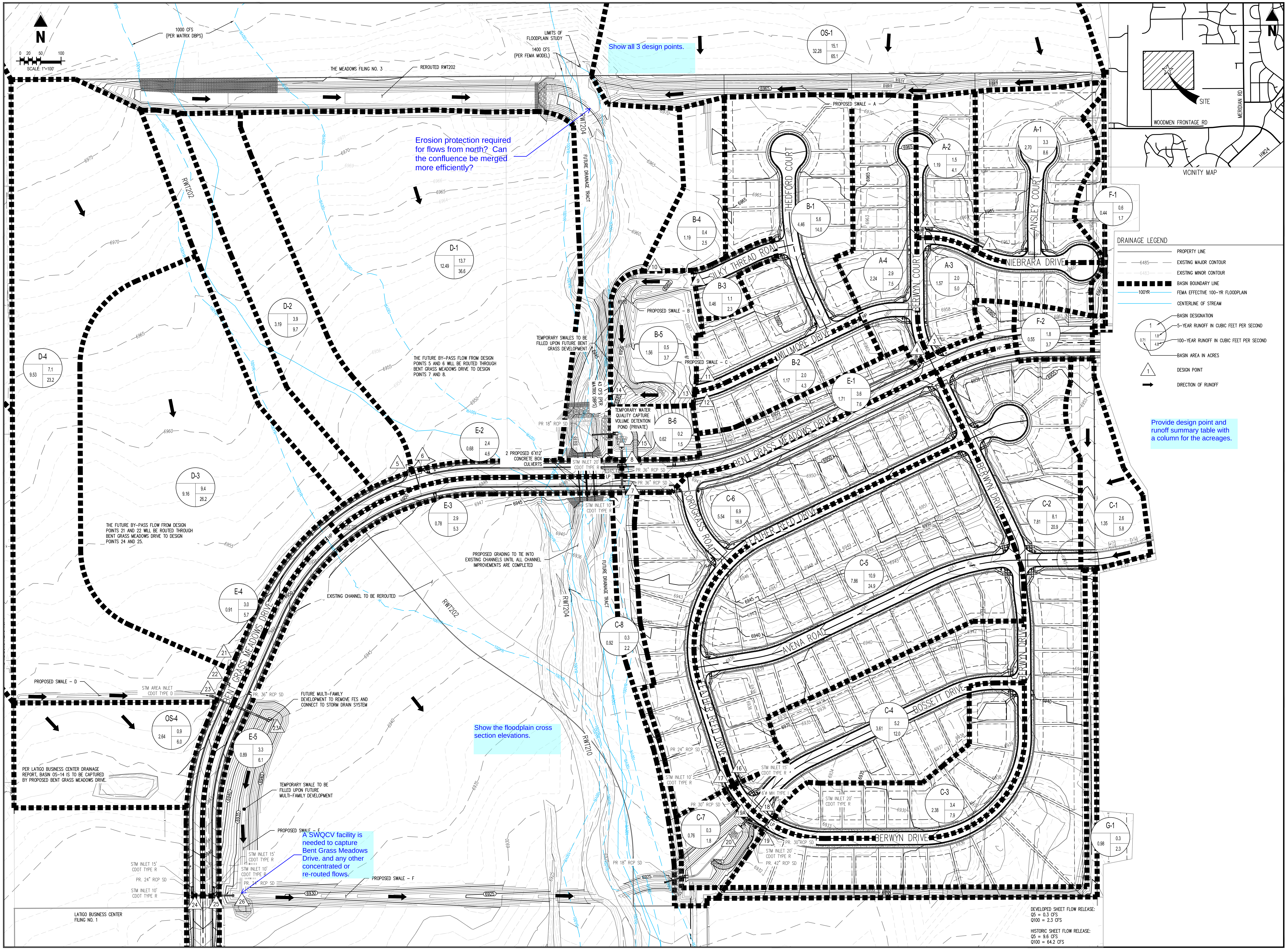
#	Date	Issue / Description	Init.

Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	SMB
Date:	OCTOBER 2019

OVERALL BASIN PLAN - FDR

DR-2

Sheet 2 of 3



Galloway

1755 Telstar Drive, Suite 107
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

NOT FOR CONSTRUCTION

CHALLENGER HOMES

BENT GRASS RESIDENTIAL FILING NO. 2
DRAINAGE PLAN

BENT GRASS MEADOWS DRIVE
COLORADO SPRINGS, COLORADO

#	Date	Issue / Description	Init.

Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	SMB
Date:	OCTOBER 2019

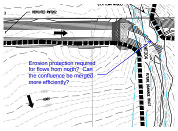
PROPOSED DRAINAGE MAP - FDR

DR-3

Sheet 3 of 3

EGP19005-R1-Drainage-redlines V_1.pdf Markup Summary

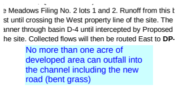
dsdrice (1)



Subject: Callout
Page Label: 392
Author: dsdrice
Date: 11/18/2019 1:06:33 PM
Status:
Color:
Layer:
Space:

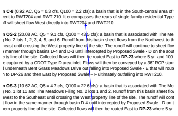
Erosion protection required for flows from north? Can the confluence be merged more efficiently?

Steve Kuehster (36)

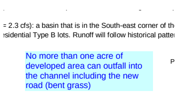


Subject: text box
Page Label: 11
Author: Steve Kuehster
Date: 11/12/2019 1:14:54 PM
Status:
Color:
Layer:
Space:

No more than one acre of developed area can outfall into the channel including the new road (bent grass)

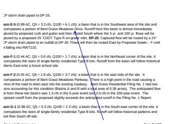


Subject: Arrow
Page Label: 11
Author: Steve Kuehster
Date: 11/12/2019 1:15:13 PM
Status:
Color:
Layer:
Space:

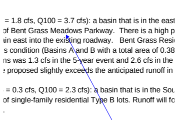


Subject: text box
Page Label: 12
Author: Steve Kuehster
Date: 11/12/2019 1:18:56 PM
Status:
Color:
Layer:
Space:

No more than one acre of developed area can outfall into the channel including the new road (bent grass)



Subject: Arrow
Page Label: 12
Author: Steve Kuehster
Date: 11/12/2019 1:19:31 PM
Status:
Color:
Layer:
Space:



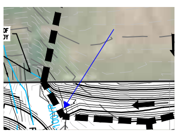
Subject: Arrow
Page Label: 12
Author: Steve Kuehster
Date: 11/12/2019 1:19:45 PM
Status:
Color:
Layer:
Space:

Subject: Highlight
Page Label: 13
Author: Steve Kuehster
Date: 11/12/2019 1:40:02 PM
Status:
Color:
Layer:
Space:

he EURV and
100-year volumes will be conveyed via the
emergency overflow weir.

Subject: text box
Page Label: 13
Author: Steve Kuehster
Date: 11/12/2019 1:45:37 PM
Status:
Color:
Layer:
Space:

We recommend the outlet pipe (s) convey the
flows up to 100 yr so the overflow path does not
need to have permanent armoring.



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Page Label: 391
Author: Steve Kuehster
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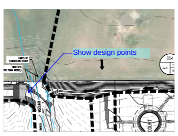
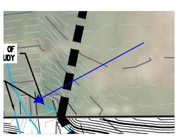
Status:
Color:
Layer:
Space:



Subject: arrow & box
Page Label: 391
Author: Steve Kuehster
Date: 11/12/2019 10:11:46 AM
Status:
Color:
Layer:
Space:

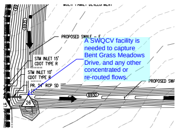
Show design points



Subject: Arrow
Page Label: 391
Author: Steve Kuehster
Date: 11/12/2019 10:11:54 AM
Status:
Color:
Layer:
Space:

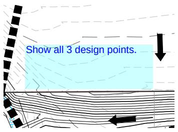
Subject: text box
Page Label: 8
Author: Steve Kuehster
Date: 11/12/2019 10:15:07 AM
Status:
Color:
Layer:
Space:

See comment on drainage map concerning
channel improvements.



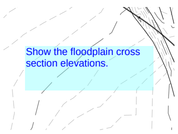
Subject: arrow & box
Page Label: 392
Author: Steve Kuehster
Date: 11/12/2019 11:12:01 AM
Status:
Color:
Layer:
Space:

A SWQCV facility is needed to capture Bent Grass Meadows Drive. and any other concentrated or re-routed flows.



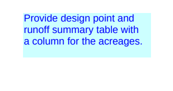
Subject: text box
Page Label: 392
Author: Steve Kuehster
Date: 11/12/2019 11:14:42 AM
Status:
Color:
Layer:
Space:

Show all 3 design points.



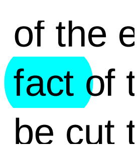
Subject: text box
Page Label: 392
Author: Steve Kuehster
Date: 11/12/2019 11:18:49 AM
Status:
Color:
Layer:
Space:

Show the floodplain cross section elevations.



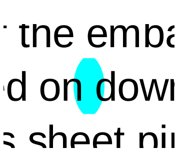
Subject: text box
Page Label: 392
Author: Steve Kuehster
Date: 11/12/2019 12:47:18 PM
Status:
Color:
Layer:
Space:

Provide design point and runoff summary table with a column for the acreages.



Subject: Highlight
Page Label: 15
Author: Steve Kuehster
Date: 11/13/2019 2:03:38 PM
Status:
Color:
Layer:
Space:

fact



Subject: Highlight
Page Label: 15
Author: Steve Kuehster
Date: 11/13/2019 2:20:11 PM
Status:
Color:
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gh the area
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Subject: Highlight
Page Label: 15
Author: Steve Kuehster
Date: 11/13/2019 2:20:53 PM
Status:
Color:
Layer:
Space:

are

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cutoff wall i
eet pipe wa

Subject: Highlight
Page Label: 15
Author: Steve Kuehster
Date: 11/13/2019 2:21:52 PM
Status:
Color:
Layer:
Space:

pipe

Subject: text box
Page Label: 15
Author: Steve Kuehster
Date: 11/13/2019 2:32:41 PM
Status:
Color:
Layer:
Space:

El Paso County will not accept a channel for maintenance until channel design report is accepted, the channel is fully improved and access roads etc. are provided. Also, you stated Channel RWT204 is going to need to be a realigned. Please indicate, what needs to occur with the flood plain administrator in order to do this. A LOMR or just a floodplain development permit?

Supercritical

Subject: Highlight
Page Label: 116
Author: Steve Kuehster
Date: 11/14/2019 11:57:49 AM
Status:
Color:
Layer:
Space:

Supercritical

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Subject: text box
Page Label: 116
Author: Steve Kuehster
Date: 11/14/2019 11:59:56 AM
Status:
Color:
Layer:
Space:

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Subject: text box
Page Label: 117
Author: Steve Kuehster
Date: 11/14/2019 12:00:04 PM
Status:
Color:
Layer:
Space:

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Supercritical

Subject: Highlight
Page Label: 117
Author: Steve Kuehster
Date: 11/14/2019 12:00:11 PM
Status:
Color:
Layer:
Space:

upercritical

0.01726 ft/ft
7.38 ft/s
0.85 ft

Subject: Highlight
Page Label: 117
Author: Steve Kuehster
Date: 11/14/2019 12:01:09 PM
Status:
Color:
Layer:
Space:

7.38 ft/s

0.01646 ft/ft
6.18 ft/s
0.59 ft

Subject: Highlight
Page Label: 116
Author: Steve Kuehster
Date: 11/14/2019 12:01:18 PM
Status:
Color:
Layer:
Space:

6.18 ft/s

Subcritical

Subject: Highlight
Page Label: 120
Author: Steve Kuehster
Date: 11/14/2019 12:01:35 PM
Status:
Color:
Layer:
Space:

Subcritical

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

Subject: text box
Page Label: 120
Author: Steve Kuehster
Date: 11/14/2019 12:01:42 PM
Status:
Color:
Layer:
Space:

This proposed Swale is obviously erosive and will probably need to be a pipe or something else for these velocities.

0.01372 ft/ft
5.40 ft/s
0.45 ft

Subject: Highlight
Page Label: 120
Author: Steve Kuehster
Date: 11/14/2019 12:01:52 PM
Status:
Color:
Layer:
Space:

5.40 ft/s

Subject: Pen
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 1:56:40 PM
Status:
Color:
Layer:
Space:

Subject: Pen
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 1:57:31 PM
Status:
Color:
Layer:
Space:

Subject: Pen
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 1:57:33 PM
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Color:
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Subject: Pen
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 1:57:37 PM
Status:
Color:
Layer:
Space:

Subject: text box
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 1:58:03 PM
Status:
Color:
Layer:
Space:

Preliminary Drainage Report.
EGP-19-005

Subject: arrow & box
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 1:59:35 PM
Status:
Color:
Layer:
Space:

Please consider naming this a preliminary drainage report (PDR) since we need a drainage report to accompany a EGP submittal. Then several of our comments can be addressed in the FDR. For the Final Plat submittal.
Identify it as Shown above.

05

Engineering Review
11/18/2019 2:39:50 PM
dsdkuehster
stevekuehster@elpasoco.com
(719) 520-6813
EPC Planning & Community Development Department

Subject: EPC ENG Review
Page Label: 1
Author: Steve Kuehster
Date: 11/18/2019 2:39:52 PM
Status:
Color:
Layer:
Space: