MASTER DEVELOPMENT DRAINAGE PLAN

BENT GRASS RESIDENTIAL SUBDIVISION

El Paso County, Colorado

Cursory redlines Steve Kuehster 9/25/2019

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

PREPARED BY:
Galloway & Company, Inc.
1755 Telstar Drive, Suite 107
Colorado Springs, CO 80920

DATE:
May 2019

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.

_____ _____

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

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 Section 51.1 of the El Paso Land Development Code, as amended.

_____ _____

For El Paso County Engineer/Director Date

Conditions:

See final drainage report comments for signature blocks.

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Add a section "4 Step Process".
Provide a full discussion in the report.

I. Purpose

The intent of the developer is to develop the residential portion of the Bent Grass Subdivision. The purpose of this Master Development Drainage Plan (MDDP) 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. Potential drainage issues associated with the proposed development will also be discussed, as well as possible solutions. The concepts within this report are preliminary in nature and final drainage reports are required upon any development within the site.

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 and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
3. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
4. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
5. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
6. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
7. *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.

8. *Final Drainage Letter Report for Lot 1, Latigo Business Center Filing No. 1*, by Colorado Design Concepts, April 2005.
9. *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.

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.

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 the appendix.

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 and 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.

VI. 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.

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 site will drain to either of the two channels. The two channels come together near the southern end of the site and become RWT210.

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 not construct this pond, 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 release undetained directly into the West Tributary channels RWT202 and 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 0.25 acre lots. Basin OS-1 (Q5 = 6.3 cfs, Q100 = 28.0 cfs) is associated with The Meadows Filing No. 3 lots 14, 15, 16, and 17. Runoff from this basin sheet flows to the northern property line of the site at Design Point (DP1). It is anticipated that with the plot plans for the lots adjacent to the northern property line they will provide swales around the proposed house directing runoff from Basin OS-1 into the proposed streets. Runoff from the basin will be routed through Basin A-1.

Basin OS-2 (Q5 = 10.2 cfs, Q100 = 42.5 cfs) is associated with The Meadows Filing No. 3 lots 7, 10, 11, 12 and 13. Runoff from this basin sheet flows to the northern property line of the site at DP 2. It is anticipated that with the plot plans for the lots adjacent to the northern property line they will provide swales around the proposed house directing runoff from Basin OS-2 into the proposed streets. Runoff from the basin will be routed through Basin A-2 and A-3.

Basin A-1 (Q5 = 29.5 cfs, Q100 = 70.3 cfs) is located in the northeast corner of the site. It encompasses single family residential lots along with several of the local roads and sits north of Bent Grass Meadows Parkway. A large portion of this basin is associated with the first phase of the development. Runoff from the basin is anticipated to be conveyed through the basin generally from northeast to southwest to DP3. Portions of the basin will flow directly into RWT204 while portions are anticipated to be collected in inlets within Bent Grass Meadows Parkway.

Basin OS-3 (Q5 = 5.5 cfs, Q100 = 16.2 cfs) is associated with The Meadows Filing No. 3 lots 4 and 5. Runoff from this basin sheet flows to the northern property line of the site to DP 4. It is anticipated that with the construction of the lots along the northern property line swales will be constructed to divert flows from Basin OS-3 around the Bent Grass Subdivision and directly into either the RWT202 or RWT204 channels.

Basin OS-4 (Q5 = 2.1 cfs, Q100 = 10.6 cfs) is associated with The Meadows Filing No. 3 lots 4 and 5. Runoff from this basin sheet flows to the northern property line of the site to DP 11. It is anticipated that with the construction of the lots along the northern property line swales will be constructed to divert flows from Basin OS-4 around the Bent Grass Subdivision and directly into either the RWT202 or RWT204 channels.

Basin A-2 (Q5 = 25.6 cfs, Q100 = 61.2 cfs) is located in the northern middle portion of the site. It encompasses single family residential lots along with several of the local roads and sits north of Bent

Grass Meadows Parkway. Runoff from the basin is anticipated to be conveyed through the basin generally from northwest to southeast to DP5. Portions of the basin will flow directly into RWT204 while portions are anticipated to be collected in inlets within Bent Grass Meadows Parkway.

Basin A-3 (Q5 = 6.7 cfs, Q100 = 15.6 cfs) is located in the middle of the site. It encompasses Bent Grass Meadows Parkway. Runoff from the basin drains towards a low point at the crossing of the RWT204 channel through the middle of the site, DP 6. Runoff will be captured in inlets and will connect to the culvert passing under the roadway.

Basin A-5 (Q5 = 1.6 cfs, Q100 = 3.6 cfs) is associated with the rears of several lots from the Bent Grass Residential Subdivision Filing No. 1. Runoff is anticipated to be collected in a swale between the two subdivisions and will outfall into the street at DP 7. Runoff will then be conveyed via curb & gutter through Basin A-4 to the RWT204 channel.

Basin A-4 (Q5 = 39.3 cfs, Q100 = 86.4 cfs) is located in the southeast corner of the site. It encompasses single family residential lots along with several of the local roads and sits south of Bent Grass Meadows Parkway. A large portion of this basin is associated with the first phase of the development. Runoff from the basin is anticipated to be conveyed through the basin generally from northeast to southwest to DP8. Runoff will outfall directly into the RWT204 channel.

Basin B-1 (Q5 = 1.0 cfs, Q100 = 2.1 cfs) is located on 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 roadway is in conformance with the anticipated runoff in the Filing No. 1 Report.

Basin B-2 (Q5 = 3.2 cfs, Q100 = 7.0 cfs) is located in the southeast corner of the site. It encompasses the rears of some of the lots and an undeveloped tract between Bent Grass Residential Filing 2 and Bent Grass Residential Filing 1. Runoff is anticipated to flow offsite following historic patterns.

Basin OS-5 (Q5 = 9.3 cfs, Q100 = 43.4 cfs) is associated with The Meadows Filing No. 1 lots 8, 9, 10 and 11. Runoff from this basin sheet flows east to the western property line of the site. It is anticipated that with the construction of the lots along the western property line swales will be constructed to divert flows from Basin OS-5 to the south around the proposed development where it will be collected in a culvert under Bent Grass Meadows Parkway at DP 13. It will then be conveyed in a swale east to the RWT210 channel.

Basin C-1 (Q5 = 23.2 cfs, Q100 = 58.0 cfs) is located on the west side of the site. It encompasses single family residential lots along with several of the local roads and sits north and west of Bent Grass Meadows Parkway. Runoff from the basin is anticipated to be conveyed through the basin generally from northwest to southeast to DP 13. Runoff from the basin is anticipated to be partially collected in inlets near Bent Grass Meadows Parkway. All runoff will be captured either within the basin or within Bent Grass Meadows Parkway and will be directed east towards the RWT210 Channel.

Basin OS-6 (Q5 = 5.2 cfs, Q100 = 24.3 cfs) is associated with The Meadows Filing No. 1 lots 5, 6, and 7. Runoff from this basin sheet flows east to the western property line of the site to DP 14. It is anticipated that with the construction of the lots along the western property line swales will be constructed to divert

flows from Basin OS-6 to the south around the proposed development where it will be collected in a culvert under Bent Grass Meadows Parkway at DP 13. It will then be conveyed in a swale east to the RWT210 channel.

Basin OS-7 (Q5 = 0.9 cfs, Q100 = 6.0 cfs) is associated with an undeveloped portion of property currently owned by the self storage complex. Runoff from the basin is anticipated to be collected in Bent Grass Meadows Parkway at DP 15.

Basin C-2 (Q5 = 4.1 cfs, Q100 = 9.0 cfs) is located in the southwest corner of the site. It encompasses Bent Grass Meadows Parkway. Runoff from the basin drains towards south towards the site's southern property line and the existing Bent Grass Meadows Parkway at DP 16. Runoff is anticipated to be collected in on-grade inlets and will be directed east to the RWT210 channel.

Basin D-1 (Q5 = 33.8 cfs, Q100 = 74.3 cfs) is located on the southern middle portion of the site. It encompasses single family residential lots along with several of the local roads and sits south of Bent Grass Meadows Parkway. Runoff from the basin is anticipated to be conveyed through the basin generally from northwest to southeast to DP 18. Runoff from the basin is anticipated to be collected and directed into the RWT210 Channel.

Basin E-1 (Q5 = 1.0 cfs, Q100 = 1.9 cfs) is located in the southwest corner of the site. It encompasses Bent Grass Meadows Parkway. Runoff from the basin drains towards south towards the existing Bent Grass Meadows Parkway at DP 18. Runoff is anticipated will be released into the existing roadway where it will be collected in the existing storm system south of the property.

VII. Proposed Channel Improvements

The Falcon Area DBPS has made recommendations for the channels as the run through the project site. For both the RWT202 and RWT204 the DBPS has recommended protecting the channels in place. This is very problematic for both of the channels. The RWT204 is grossly oversized for the actual flows expected through it. The RWT202 is not a clearly defined channel as it passes through the site, it more closely resembles a shallow overland flow. This is not conducive to a development. Both channels are proposed to be relocated and have designed channel sections associated with them. The channels will have longitudinal slopes flattened to below 1% in order to reduce the scour potential of the channel. Grouted Sloping Boulder Drops will be utilized within the channel as grade controls (maximum height of 4' with 4:1 slope). The locations of the channels are anticipated to follow the layout approved with the Development Plan for the Bent Grass Residential Subdivision.

It is anticipated that the site plan approved within the DP will be revised to remove crossings of the channels and reduce infrastructure costs. It is currently planned that only two crossings of the channels will occur, both located at Bent Grass Meadows Parkway. HEC-RAS models have been prepared for the conceptual layout and preliminary culvert sizing has been completed. The models are located in the Appendices of this report.

South of the property is the RWT210 channel. The DBPS calls for a natural channel design through this reach of the channel. A site visit was made and the channel was walked with El Paso County staff. The channel shows little to no sign of degradation in it's current state. There are areas of minor sloughing along the top of slope that may be corrected as the sites develop around the channel. In order to provide a natural channel as the DBPS is proposing would require major grading operations within a nicely

defined and stable channel. Additionally the proposed drop detail within the channel deals only with the low flow portion of the channel and the existing channel does not have a natural low flow section defined.

HEC-RAS models of the channel show that velocities within the channel are relatively low in the 5 ft/s range. However, it does show that Froude numbers exceed 0.8 and at points 1.0. This is seen in the existing conditions. Again based on field investigation it does not appear that the channel is degrading given the existing developments upstream of the channel. Because of this it is proposed to do a check structure design through the RWT210 section of the channel. The check structure design is similar to a prudent line design. Concrete check structures will be installed using an estimated equilibrium slope for the channel and given a drop height of 3'. This allows the channel to create it's own equilibrium slope, allowing it to cut or fill as necessary. At times the channel may cut, and then at other times it may fill itself at the same point it had cut. This is all based on the sediment load of the channel and storm events the channel may see. As the channel cuts to an equilibrium slope the check structures will be exposed on the downstream face creating a vertical drop. If over time the channel has reached an unchanging equilibrium and leaves a vertical drop exposed it may be replaced with an actual grade control structure, such as a grouted sloping boulder drop or vertical hard drop.

The check structures will be installed for full bank width meaning they will pass the full 100-year event. This is as opposed to the proposed vane drops from the DBPS which will only pass low flows or small storm events.

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.

It is the intent of this study to provide a downstream facility for the future improvements through the Meadows to connect to. The RWT202 channel will be constructed to the northern property line and will be left approximately 6.5' below existing grade allowing a channel to be connected to it.

VIII. 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 Pond WU will be modified to provide water quality for the entire tributary area.

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.

IX. Construction Phasing

The existing phasing of the development is unknown at this time. The first phase is known and will lie within Basins A-1 and A-3 east of the RWT204 channel. It is also known that Bent Grass Meadows Parkway will be installed in its entirety with the first phase of the development. This forces the installation of the culverts under the roadway prior to needing the remainder of the channel improvements completed. The final drainage reports for the individual phases will revisit the need for channel improvements as the site develops.

The main purpose of the MDDP is to identify and schedule the improvemnts needed. The channel below the crossing needs to be constructed with the first phase because it is impacted by the phase 1 development.

All pond improvements will be completed with the first phase of the development.

X. 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.

XI. Wetlands Mitigation

No wetlands are located on site.

XII. 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 the appendix.

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. The proposed improvements to RWT204 will likely require a CLOMR and LOMR. At this time it is unknown exactly what was mapped through this section as the FIS does not have detailed enough information contained within it. HEC-RAS models have been requested from FEMA for the channel. The effective models will help identify what flow rates were utilized in establishing the floodplain. More information will be provided as the project progresses and more information can be obtained.

Identify in more detail how this site will develop and the schedule for the CLOMR LOMR process. To support the phasing.

XIII. Drainage Credits/Reimbursements

Per the Drainage Basin Fee Addendum – Chapter 3 for El Paso County, drainage credits/reimbursements will be applicable to this development for construction costs associated with regional facilities. These specific credits/reimbursements will be better defined in the final drainage reports and site construction drawings.

Provide a plan with costs for the improvements needed for this area. This needs to be the channel improvements, detention pond(s), etc. Specifically identify a plan that shows what each phase builds so that all the improvements are not delayed until the last phase of development.

The first phase will need to build more than 1/2 the improvements since they have impacts caused by their outfalls.

XIV. 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 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.

XV. 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.

Call out what accommodations/permissions have been made for the downstream property owners that will receive un-detained developed flows. (considering the removal of the planned detention facility SR 4)

APPENDIX A

Exhibits and Figures

BENT GRASS

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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

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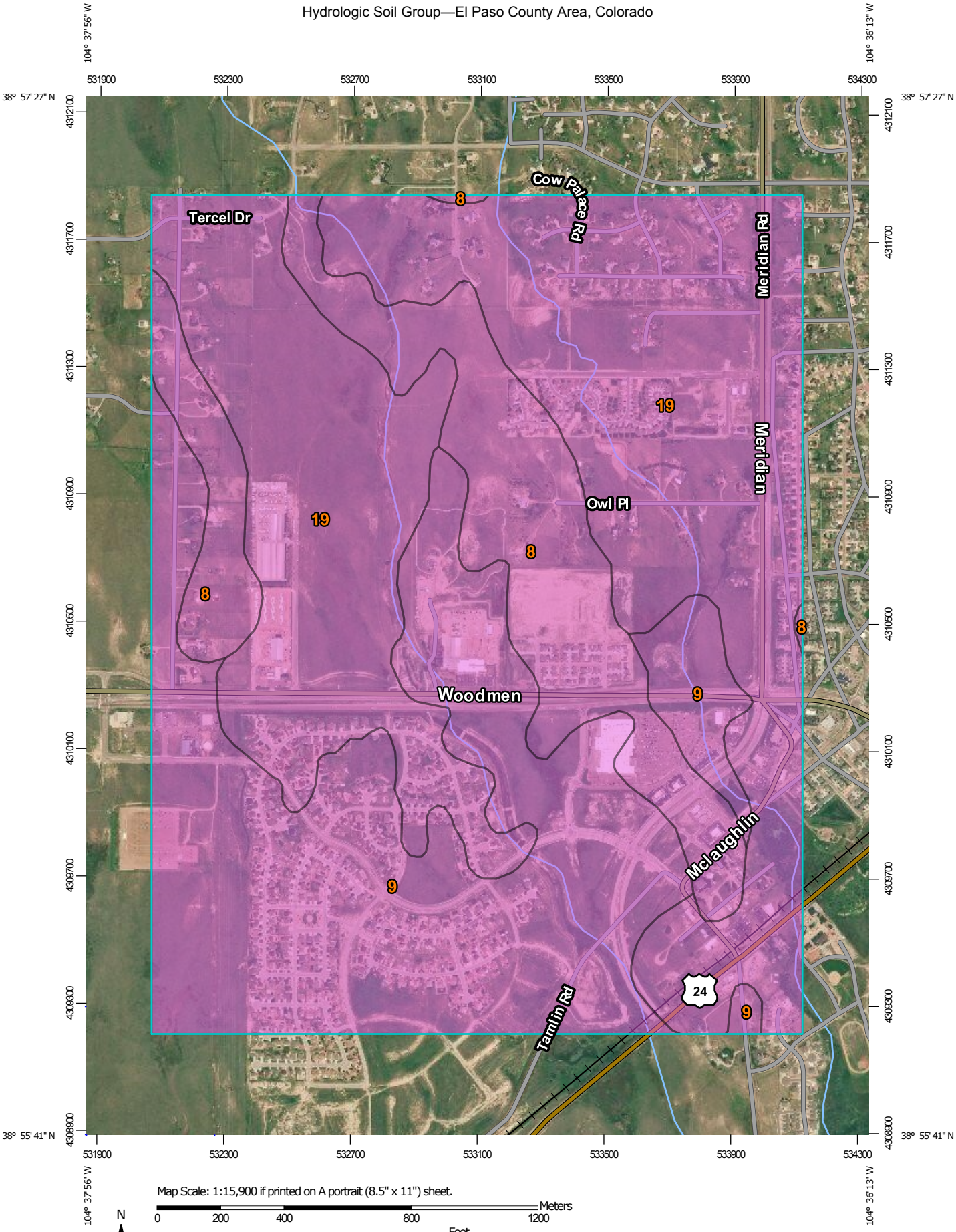
719.900.7220 • GallowayUS.com

Hydrologic Soil Group—El Paso County Area, Colorado



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

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

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.

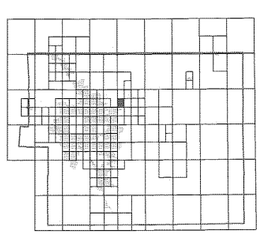
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this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

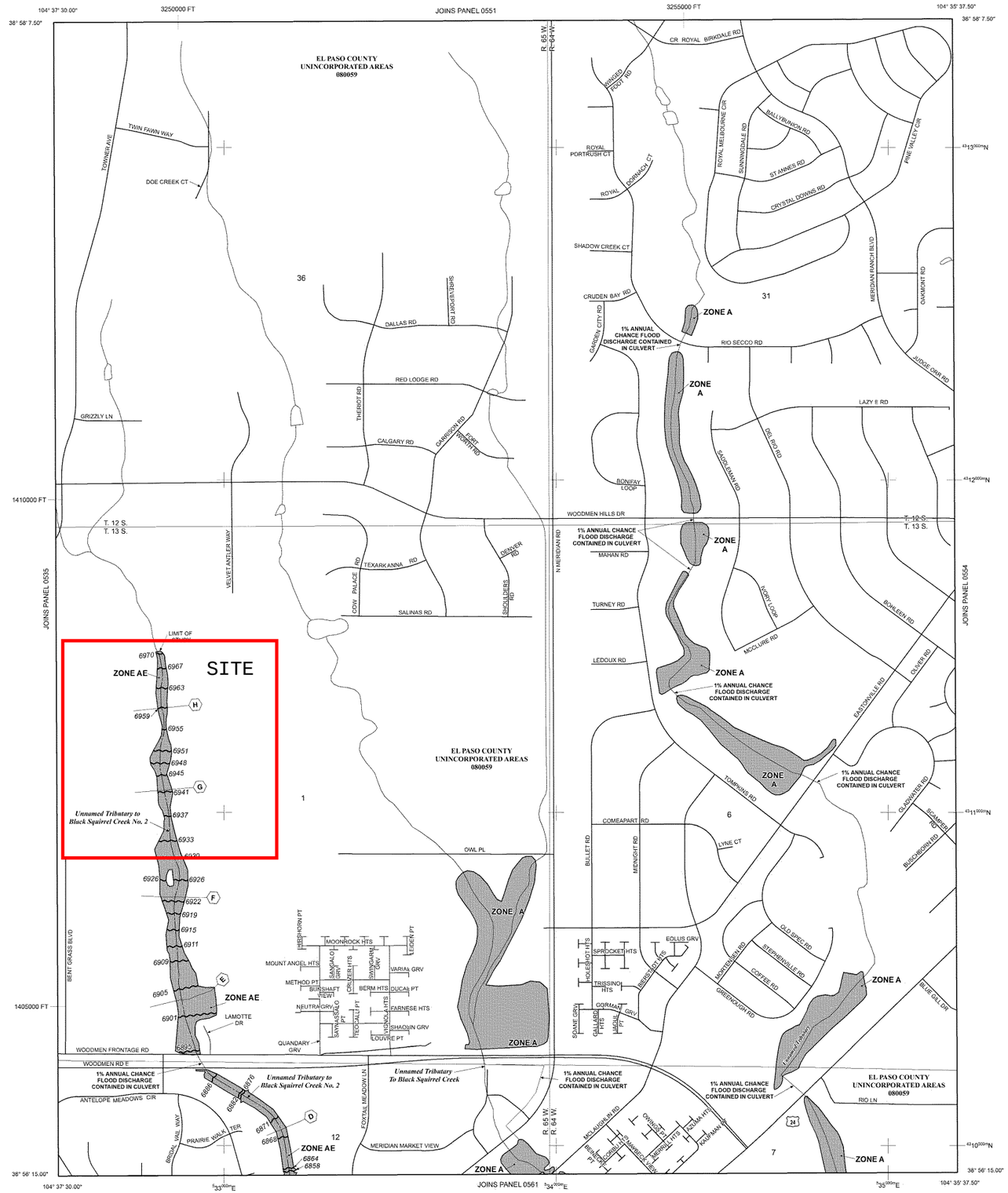
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

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)
$^{42}75^{000m}$N	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

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0553G

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

FALCON DRAINAGE BASIN PLANNING STUDY

SELECTED PLAN REPORT

FINAL - SEPTEMBER 2015

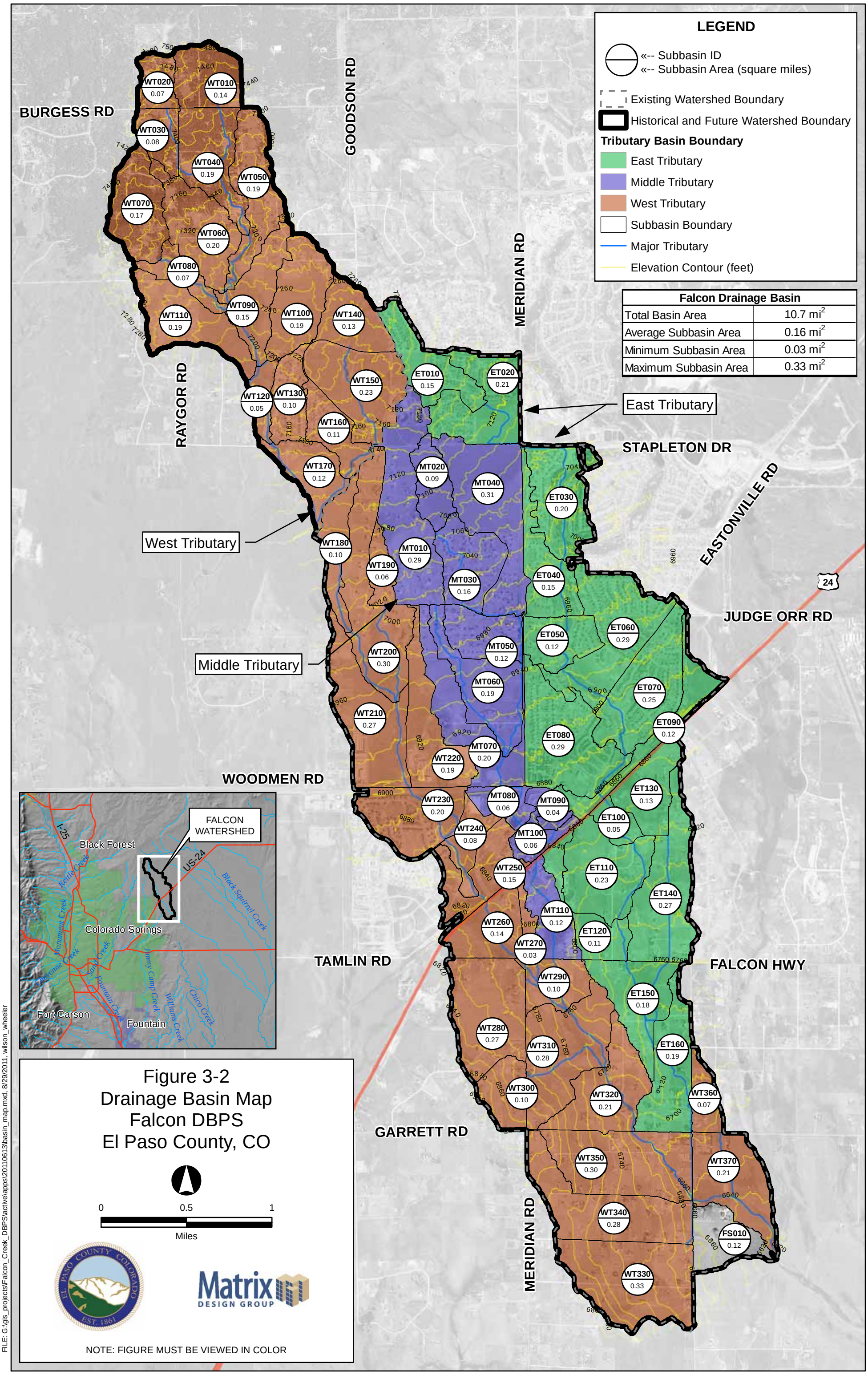
Prepared for:

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


LEGEND
«-- Subbasin ID
«-- Subbasin Area (square miles)
Existing Watershed Boundary
Historical and Future Watershed Boundary
Tributary Basin Boundary
East Tributary
Middle Tributary
West Tributary
Subbasin Boundary
Major Tributary
Elevation Contour (feet)
Falcon Drainage Basin
Total Basin Area 10.7 mi²
Average Subbasin Area 0.16 mi²
Minimum Subbasin Area 0.03 mi²
Maximum Subbasin Area 0.33 mi²
BURGESS RD
GOODSON RD
MERIDIAN RD
RAYGOR RD
STAPLETON DR
EASTONVILLE RD
JUDGE ORR RD
WOODMEN RD
TAMLIN RD
FALCON HWY
GARRETT RD
East Tributary
West Tributary
Middle Tributary
FALCON WATERSHED
Black Forest
Colorado Springs
Fort Carson
Fountain
I-25
US-24
Kettle Creek
Monument Creek
Black Squirrel Creek
Jimmy Camp Creek
Williams Creek
Chico Creek
Sand Creek
Fountain Creek
Figure 3-2
Drainage Basin Map
Falcon DBPS
El Paso County, CO
0
0.5
1
Miles
Matrix DESIGN GROUP
NOTE: FIGURE MUST BE VIEWED IN COLOR
FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20110613\basin_map.mxd, 8/29/2011, wilson_wheeler

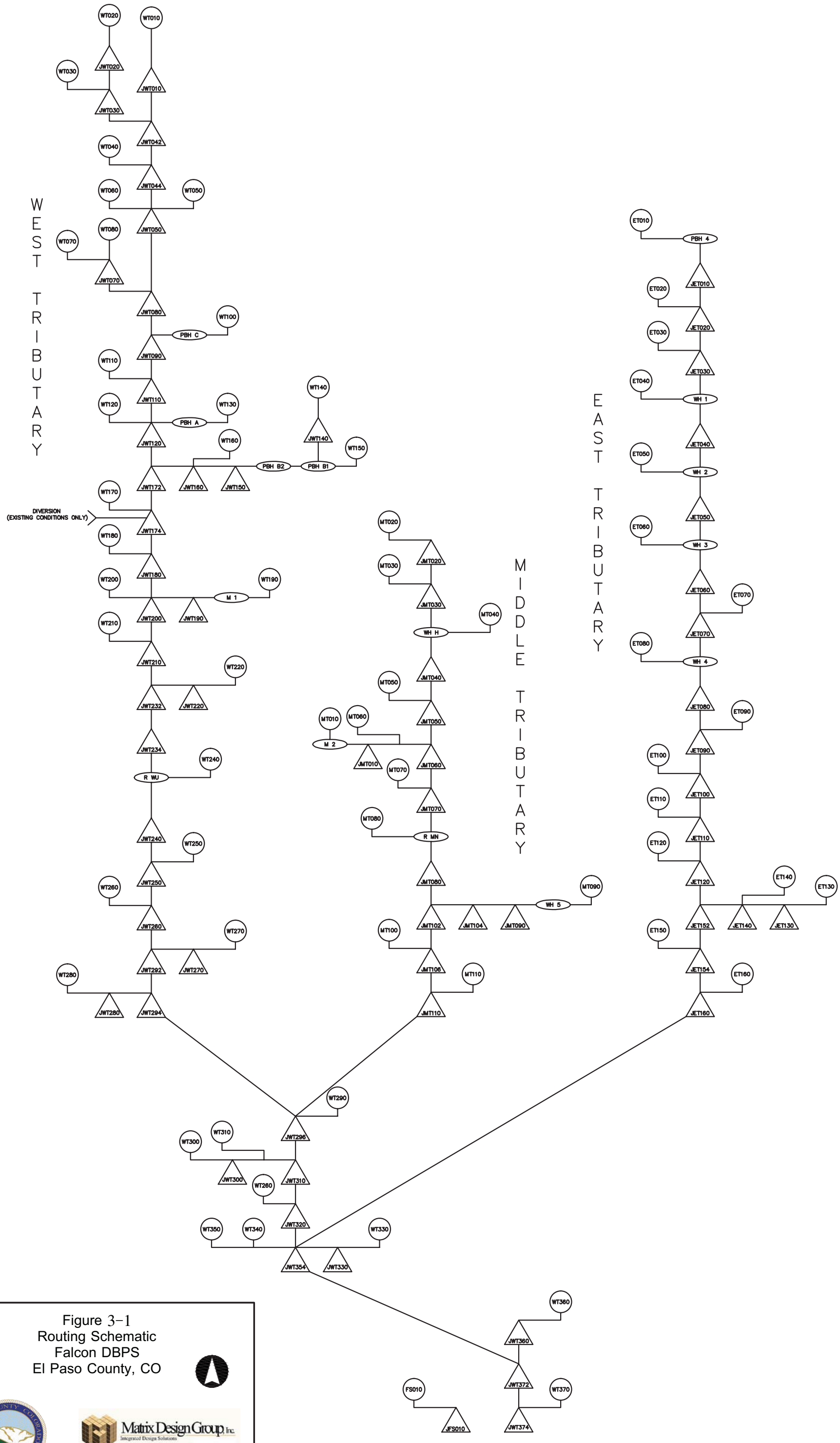


Figure 3-1
Routing Schematic
Falcon DBPS
El Paso County, CO

Matrix Design Group Inc.
Integrated Design Solutions

DRAWING NOT TO SCALE

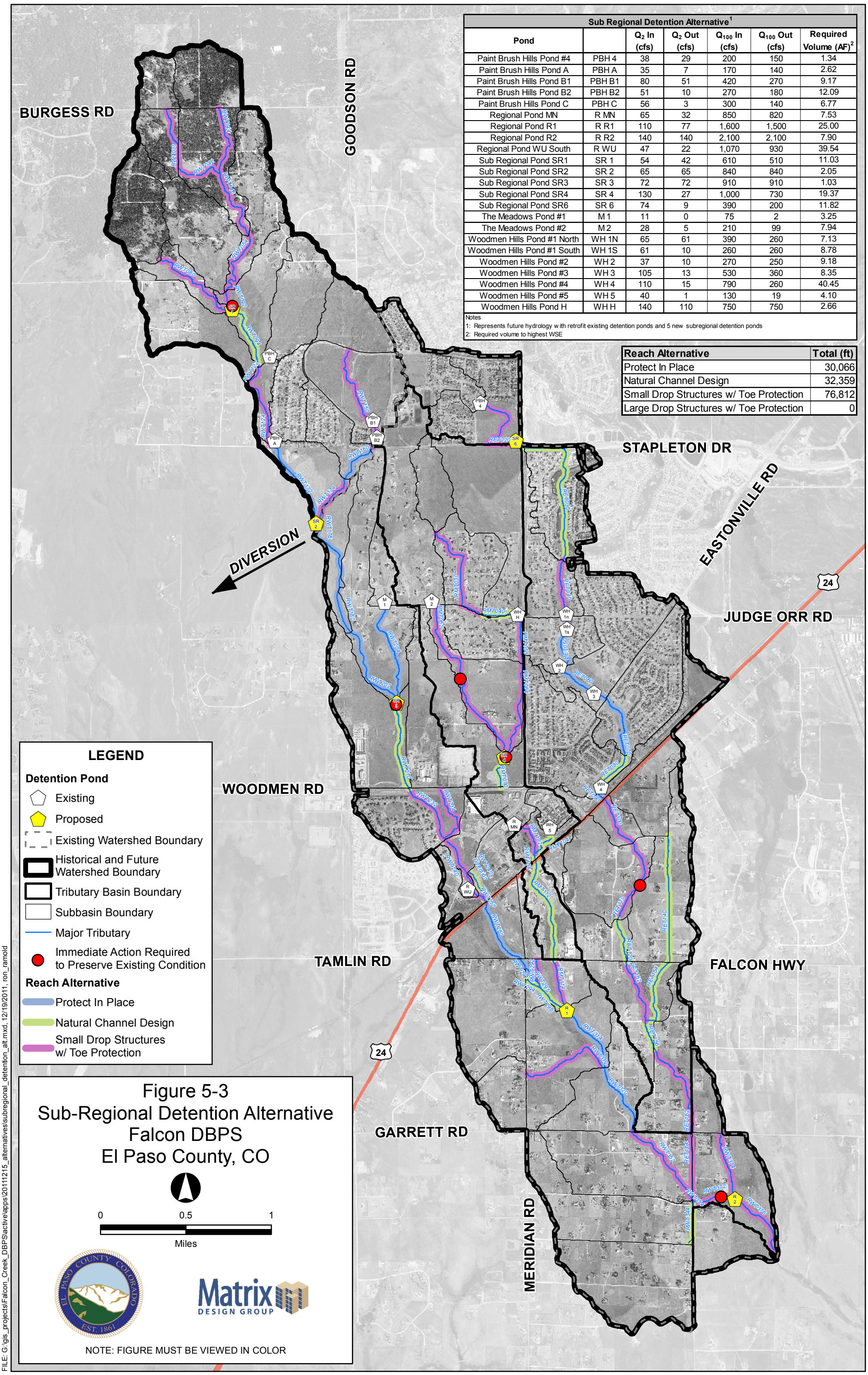
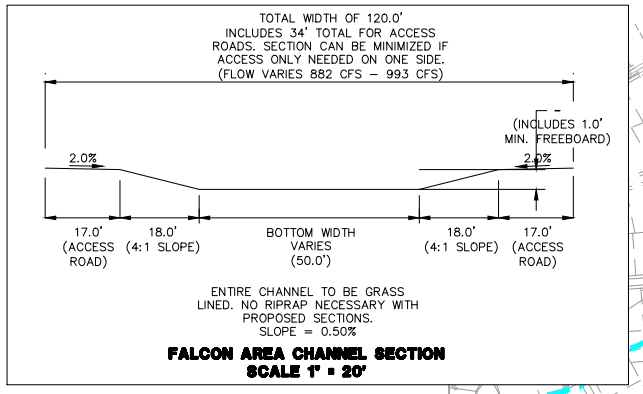


Figure 5-3
Sub-Regional Detention Alternative
Falcon DBPS
El Paso County, CO

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



FALCON AREA CHANNEL SECTION
SCALE 1" = 20'

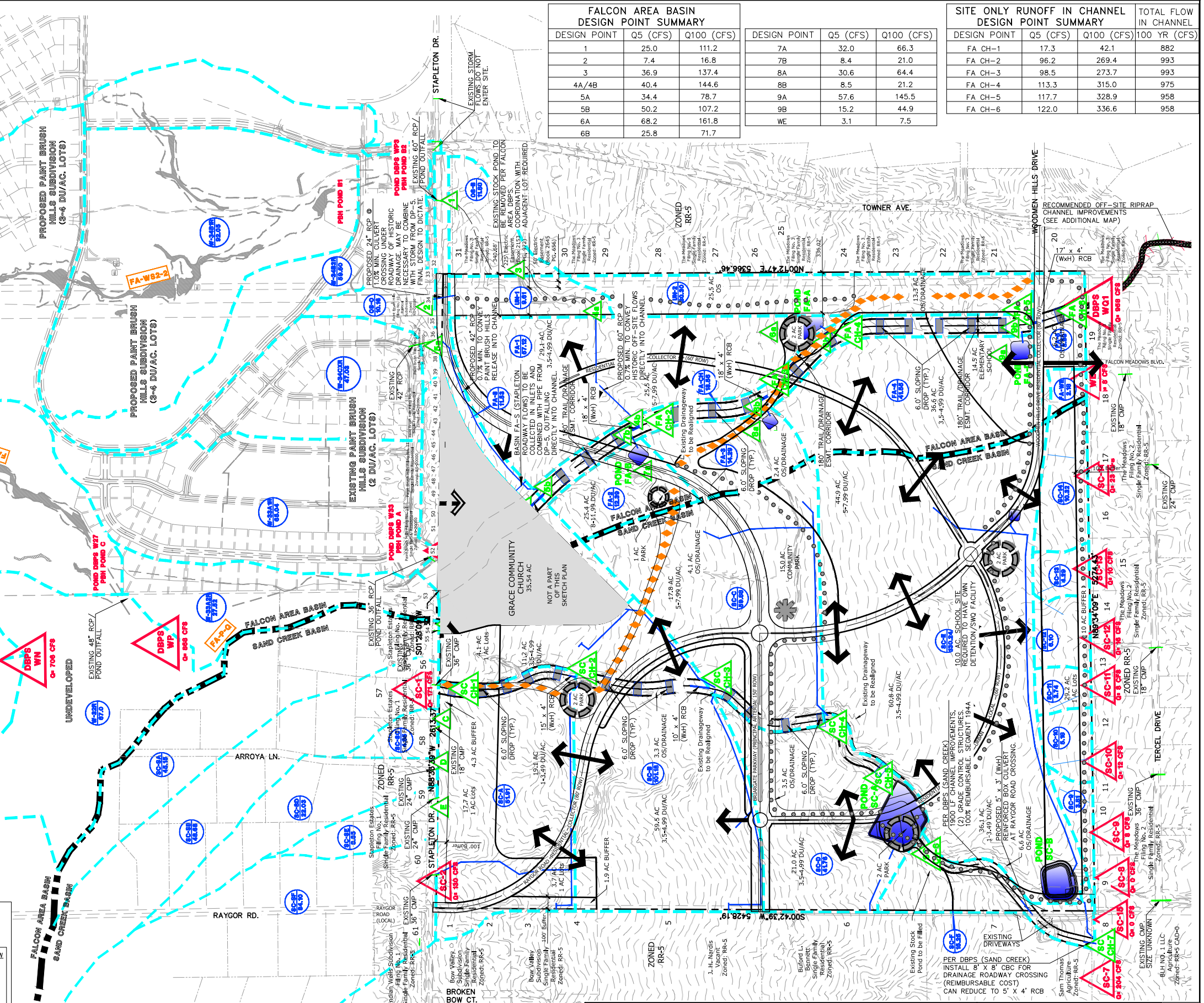
400 200 0 400 800

SCALE: 1" = 400'

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

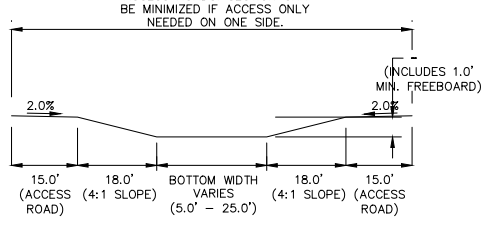
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
7A	32.0	66.3
7B	8.4	21.0
8A	30.6	64.4
8B	8.5	21.2
9A	57.6	145.5
9B	15.2	44.9
WE	3.1	7.5

SITE ONLY RUNOFF IN CHANNEL DESIGN POINT SUMMARY			TOTAL FLOW IN CHANNEL
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	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



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

TOTAL WIDTH VARIES (71.0' – 91.0')
INCLUDES 30' TOTAL FOR ACCESS ROADS. SECTION CAN BE MINIMIZED IF ACCESS ONLY NEEDED ON ONE SIDE.



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%

SAND CREEK CHANNEL SECTIONS
SCALE 1" = 20'

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

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

FINAL DRAINAGE
FALCON HIGHL

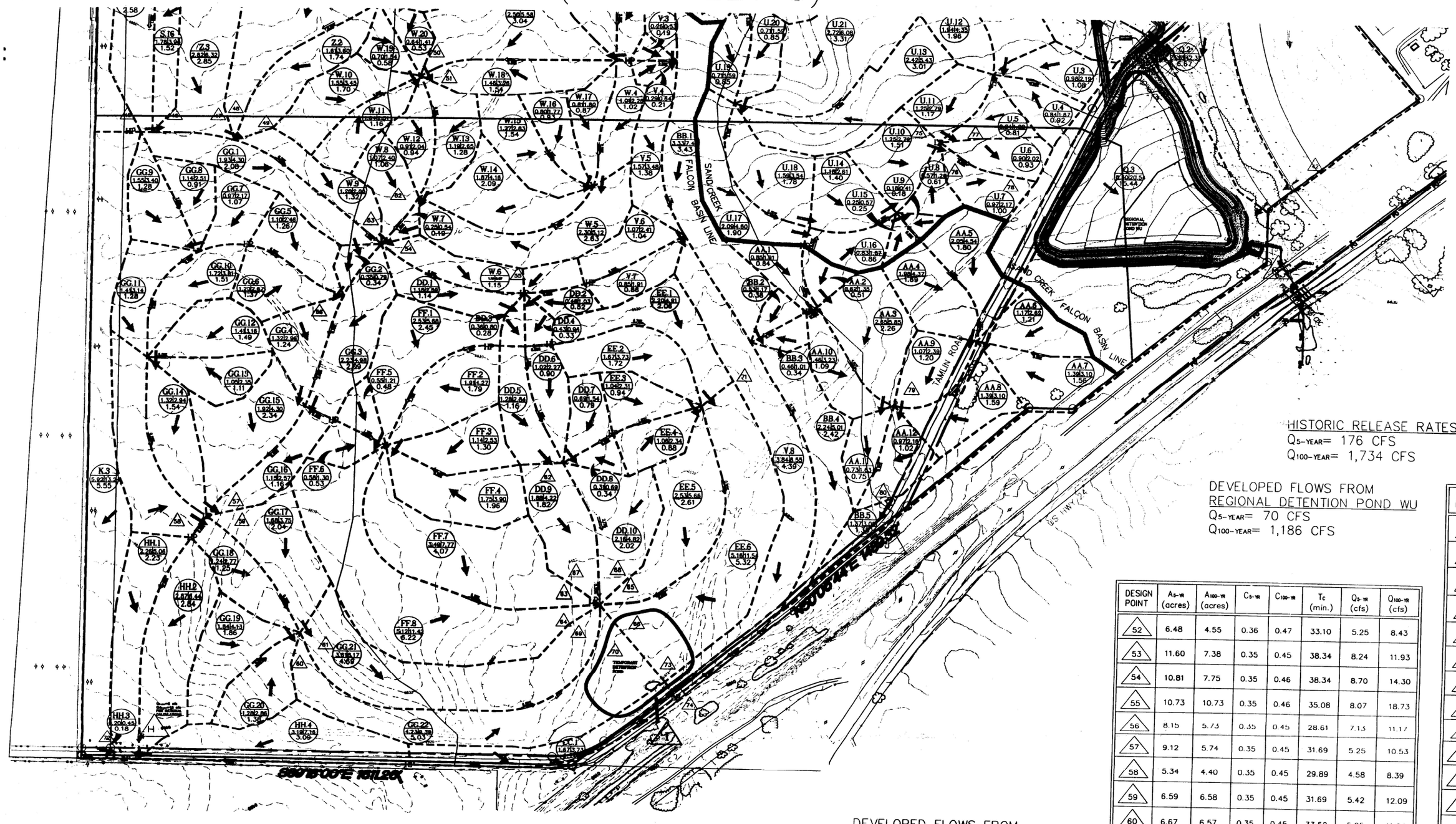
SHEET 4 OF 4

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)	$C_{5\text{-YR}}$	$C_{100\text{-YR}}$	Tc (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

UR
9960 FE
COLORAD
(719) 53

FIGURE

APPENDIX B

Hydrologic Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: PROPOSED (LOTS)

Subdivision: Bent Grass
Location: CO, Colorado Springs

Bent Grass Residential Filing No. 2
CLH000014.20
CMWJ
SMB
5/21/19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Paved Roads			Lawns			Roofs			1/8 Acre or Less			1/3 Acre			1 Acre			
Basin ID	Total Area (ac)	% 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.	Basins Total Weighted % Imp.
A-1	22.13	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	16.89	49.6	30	0.00	0.0	20	5.24	4.7	54.3
A-2	19.05	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	14.24	48.6	30	0.00	0.0	20	4.81	5.0	53.6
A-3	4.05	100	1.78	44.0	2	2.27	1.1	90	0.00	0.0	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	45.1
A-4	27.69	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	27.69	65.0	30	0.00	0.0	20	0.00	0.0	65.0
A-5	0.80	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	0.80	65.0	30	0.00	0.0	20	0.00	0.0	65.0
B-1	0.34	100	0.20	58.8	2	0.14	0.8	90	0.00	0.0	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	59.6
B-2	1.37	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	1.37	65.0	30	0.00	0.0	20	0.00	0.0	65.0
C-1	19.95	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	11.75	38.3	30	5.83	8.8	20	2.37	2.4	49.5
C-2	1.88	100	1.01	53.7	2	0.87	0.9	90	0.00	0.0	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	54.6
D-1	21.44	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65	21.44	65.0	30	0.00	0.0	20	0.00	0.0	65.0
E-1	0.26	100	0.20	76.9	2	0.06	0.5	90	0.00	0.0	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	77.4
OS-1	13.03	100	0.74	5.7	2	11.89	1.8	90	0.40	2.8	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	10.3
OS-2	18.30	100	1.41	7.7	2	16.41	1.8	90	0.48	2.4	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	11.9
OS-3	5.58	80	1.36	19.5	2	4.22	1.5	90	0.00	0.0	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	21.0
OS-4	4.68	80	0.12	2.1	2	4.42	1.9	90	0.14	2.7	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	6.7
OS-5	20.07	80	0.90	3.6	2	18.61	1.9	90	0.56	2.5	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	8.0
OS-6	10.62	80	0.48	3.6	2	9.84	1.9	90	0.30	2.5	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	8.0
OS-7	2.64	100	0.00	0.0	2	2.64	2.0	90	0.00	0.0	65	0.00	0.0	30	0.00	0.0	20	0.00	0.0	2.0

Lot Type Identification:

Lot Size (SF)	*Lot Size (Acre)*
< 8,167	1/8 Acre or Less
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

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: PROPOSED

Subdivision: Bent Grass
Location: CO, Colorado Springs

Project Name: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 5/21/19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Basin ID	Total Area (ac)	Paved Roads			Lawns/Undeveloped			Roofs			1/8 Acre or Less			1/3 Acre			1 Acre			Composite	Composite
		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}
A-1	22.13	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	16.89	0.25	0.47	0.00	0.20	0.44	5.24	0.39	0.55
A-2	19.05	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	14.24	0.25	0.47	0.00	0.20	0.44	4.81	0.39	0.55
A-3	4.05	0.90	0.96	1.78	0.09	0.36	2.27	0.73	0.81	0.00	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.45	0.62
A-4	27.69	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	27.69	0.25	0.47	0.00	0.20	0.44	0.00	0.45	0.59
A-5	0.80	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.80	0.25	0.47	0.00	0.20	0.44	0.00	0.45	0.59
B-1	0.34	0.90	0.96	0.20	0.09	0.36	0.14	0.73	0.81	0.00	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.57	0.71
B-2	1.37	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.37	0.25	0.47	0.00	0.20	0.44	0.00	0.45	0.59
C-1	19.95	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	11.75	0.25	0.47	5.83	0.20	0.44	2.37	0.36	0.54
C-2	1.88	0.90	0.96	1.01	0.09	0.36	0.87	0.73	0.81	0.00	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.53	0.68
D-1	21.44	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	21.44	0.25	0.47	0.00	0.20	0.44	0.00	0.45	0.59
E-1	0.26	0.90	0.96	0.20	0.09	0.36	0.06	0.73	0.81	0.00	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.71	0.82
OS-1	13.03	0.90	0.96	0.74	0.09	0.36	11.89	0.73	0.81	0.40	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.16	0.41
OS-2	18.30	0.90	0.96	1.41	0.09	0.36	16.41	0.73	0.81	0.48	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.17	0.42
OS-3	5.58	0.90	0.96	1.36	0.09	0.36	4.22	0.73	0.81	0.00	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.29	0.51
OS-4	4.68	0.90	0.96	0.12	0.09	0.36	4.42	0.73	0.81	0.14	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.13	0.39
OS-5	20.07	0.90	0.96	0.90	0.09	0.36	18.61	0.73	0.81	0.56	0.45	0.59	0.00	0.25	0.47	0.00	0.20	0.44	0.00	0.14	0.40
OS-6	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	0.25	0.47	0.00	0.20	0.44	0.00	0.14	0.40
OS-7	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	0.25	0.47	0.00	0.20	0.44	0.00	0.09	0.36

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
< 8,167	1/8 Acre or Less
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

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 # for soil map

STANDARD FORM SF-2: PROPOSED
TIME OF CONCENTRATION

Subdivision: Bent Grass
Location: CO, Colorado Springs

Project Name: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 5/21/19

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	22.13	A	54.30	0.55	0.39	100	2.0	10.3	1000	1.0	20.0	2.0	8.3	18.6	1100.0	16.1	16.1
A-2	19.05	A	53.60	0.55	0.39	100	2.0	10.4	900	1.0	20.0	2.0	7.5	17.9	1000.0	15.6	15.6
A-3	4.05	A	45.10	0.62	0.45	24	2.0	4.7	1050	1.0	20.0	2.0	8.8	13.4	1074.0	16.0	13.4
A-4	27.69	A	65.00	0.59	0.45	100	2.0	9.4	1650	2.0	20.0	2.8	9.7	19.2	1750.0	19.7	19.2
A-5	0.80	A	65.00	0.59	0.45	35	2.4	5.3	400	2.4	20.0	3.1	2.2	7.4	435.0	12.4	7.4
B-1	0.34	A	59.60	0.71	0.57	24	2.0	3.8	150	1.0	20.0	2.0	1.3	5.0	174.0	11.0	5.0
B-2	1.37	A	65.00	0.59	0.45	20	2.0	4.2						4.2	20.0	10.1	5.0
C-1	19.95	A	49.50	0.54	0.36	100	2.0	10.7	1400	2.0	20.0	2.8	8.2	19.0	1500.0	18.3	18.3
C-2	1.88	A	54.60	0.68	0.53	24	2.0	4.1	950	2.0	20.0	2.8	5.6	9.7	974.0	15.4	9.7
D-1	21.44	A	65.00	0.59	0.45	100	2.0	9.4	850	1.5	20.0	2.4	5.8	15.2	950.0	15.3	15.2
E-1	0.26	A	77.40	0.82	0.71	24	2.0	2.8	110	2.0	20.0	2.8	0.6	3.4	134.0	10.7	5.0
OS-1	13.03	A	10.30	0.41	0.16	100	2.4	12.9	1600	2.4	15.0	2.3	11.5	24.4	1700.0	19.4	19.4
OS-2	18.30	A	11.90	0.42	0.17	100	2.2	13.1	1200	2.2	15.0	2.2	9.0	22.1	1300.0	17.2	17.2
OS-3	5.58	A	21.00	0.51	0.29	100	2.1	11.6	1000	2.3	15.0	2.3	7.3	18.9	1100.0	16.1	16.1
OS-4	4.68	A	6.70	0.39	0.13	100	2.1	13.9	900	2.3	15.0	2.3	6.6	20.5	1000.0	15.6	15.6
OS-5	20.07	A	8.00	0.40	0.14	100	2.3	13.3	1400	2.3	15.0	2.3	10.3	23.5	1500.0	18.3	18.3
OS-6	10.62	A	8.00	0.40	0.14	100	2.0	13.9	1000	2.0	15.0	2.1	7.9	21.7	1100.0	16.1	16.1
OS-7	2.64	A	2.00	0.36	0.09	100	2.0	14.7	400	2.0	15.0	2.1	3.1	17.8	500.0	12.8	12.8

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)

Subdivision: Bent Grass
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 5/21/19

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)	
	1	OS-1	13.03	0.16	19.4	2.03	3.13	6.4													
	2	OS-2	18.30	0.17	17.2	3.10	3.31	10.3													
	3	A-1	22.13	0.39	16.1	8.65	3.41	29.5													
	4	OS-3	5.58	0.29	16.1	1.60	3.41	5.5													
	5	A-2	19.05	0.39	15.6	7.37	3.47	25.6													
	6	A-3	4.05	0.45	13.4	1.81	3.69	6.7													
	6								19.4	24.56	3.13	76.9									
	7	A-5	0.80	0.45	7.4	0.36	4.58	1.6													
	8	A-4	27.69	0.45	19.2	12.46	3.15	39.2													
	8								19.2	12.82	3.15	40.4									
	9	B-1	0.34	0.57	5.0	0.19	5.15	1.0													
	10	B-2	1.37	0.45	5.0	0.62	5.17	3.2													
	11	OS-4	4.68	0.13	15.6	0.61	3.47	2.1													
	12	OS-5	20.07	0.14	18.3	2.89	3.22	9.3													
	13	C-1	19.95	0.36	18.3	7.22	3.22	23.2													
	13								18.3	10.11	3.22	32.6									
	14	OS-6	10.62	0.14	16.1	1.54	3.41	5.3													
	15	OS-7	2.64	0.09	12.8	0.24	3.76	0.9													
	16	C-2	1.88	0.53	9.7	0.99	4.18	4.1													
	16								18.3	11.34	3.22	36.5									
	17	D-1	21.44	0.45	15.2	9.65	3.50	33.8													
	18	E-1	0.26	0.71	5.0	0.19	5.17	1.0													

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Bent Grass
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Bent Grass Residential Filing No. 2
Project No.: CLH000014.20
Calculated By: CMWJ
Checked By: SMB
Date: 5/21/19

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)	
	1	OS-1	13.03	0.41	19.4	5.31	5.26	27.9													
	2	OS-2	18.30	0.42	17.2	7.65	5.56	42.5													
	3	A-1	22.13	0.55	16.1	12.27	5.73	70.3													
	4	OS-3	5.58	0.51	16.1	2.82	5.73	16.2													
	5	A-2	19.05	0.55	15.6	10.52	5.82	61.2													
	6	A-3	4.05	0.62	13.4	2.53	6.19	15.7													
	6								19.4	41.10	5.26	216.2									
	7	A-5	0.80	0.59	7.4	0.47	7.69	3.6													
	8	A-4	27.69	0.59	19.2	16.34	5.29	86.4													
	8								19.2	16.81	5.29	88.9									
	9	B-1	0.34	0.71	5.0	0.24	8.65	2.1													
	10	B-2	1.37	0.59	5.0	0.81	8.68	7.0													
	11	OS-4	4.68	0.39	15.6	1.82	5.82	10.6													
	12	OS-5	20.07	0.40	18.3	8.02	5.41	43.4													
	13	C-1	19.95	0.54	18.3	10.72	5.41	58.0													
	13								18.3	18.74	5.41	101.4									
	14	OS-6	10.62	0.40	16.1	4.25	5.73	24.4													
	15	OS-7	2.64	0.36	12.8	0.95	6.31	6.0													
	16	C-2	1.88	0.68	9.7	1.28	7.01	9.0													
	16								18.3	20.97	5.41	113.4									
	17	D-1	21.44	0.59	15.2	12.65	5.87	74.3													
	18	E-1	0.26	0.82	5.0	0.21	8.68	1.8													

APPENDIX C

Preliminary Channel HEC-RAS Models

Provide plan/map showing channel cross-section locations.

Existing Conditions Model

```
                    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)

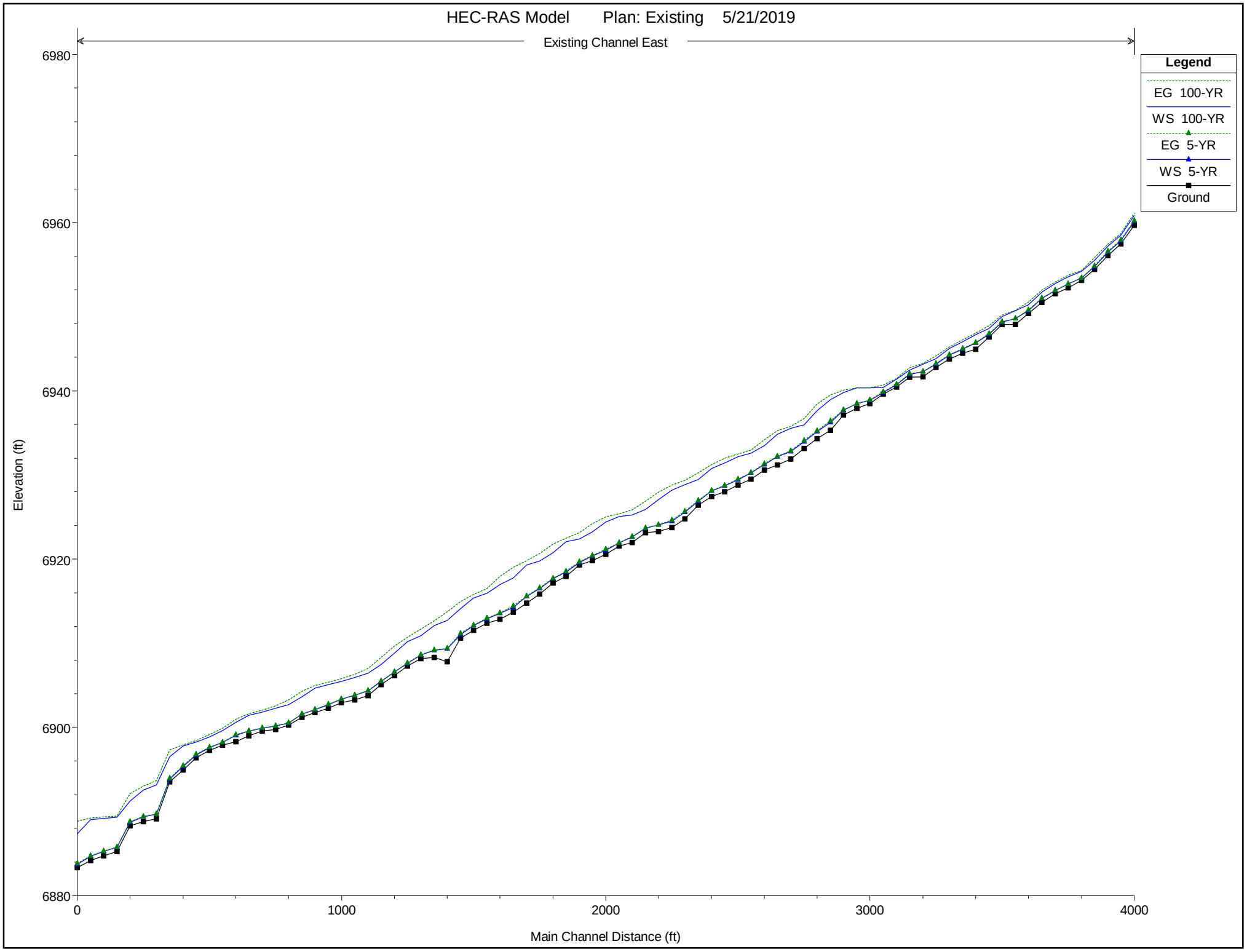
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
East	2750	100-YR	880.00	6915.84	6919.79	6919.67	6920.64	0.021782	7.39	119.13	63.08	0.95
East	2750	5-YR	14.00	6915.84	6916.49		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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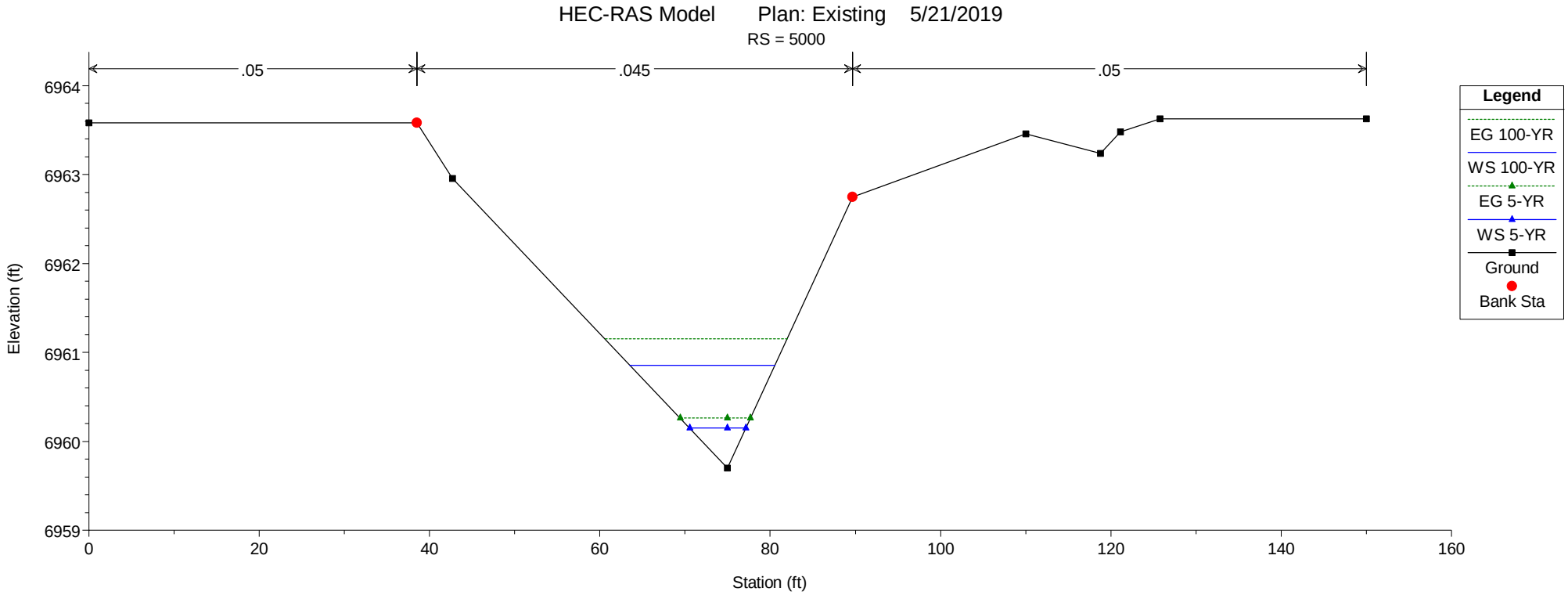
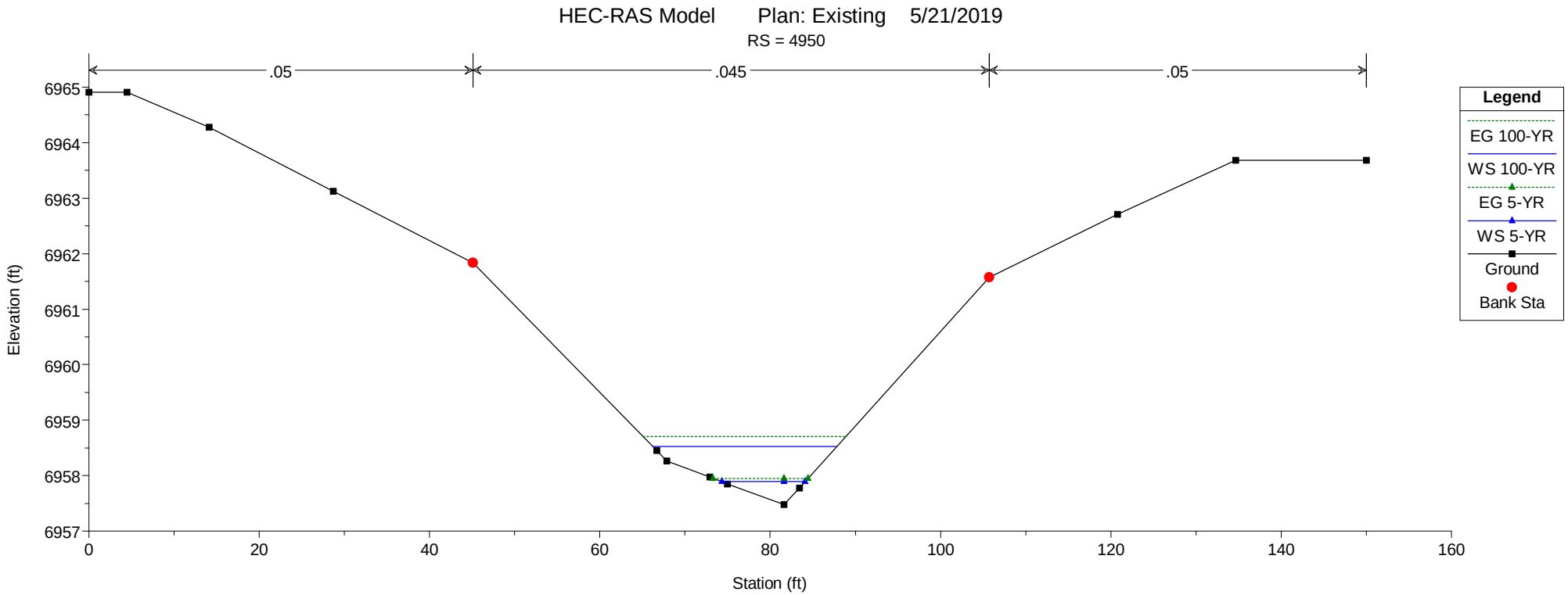
Existing Channel East
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Elevation (ft)
6980
6960
6940
6920
6900
6880
0
1000
2000
3000
4000
Main Channel Distance (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 5000
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta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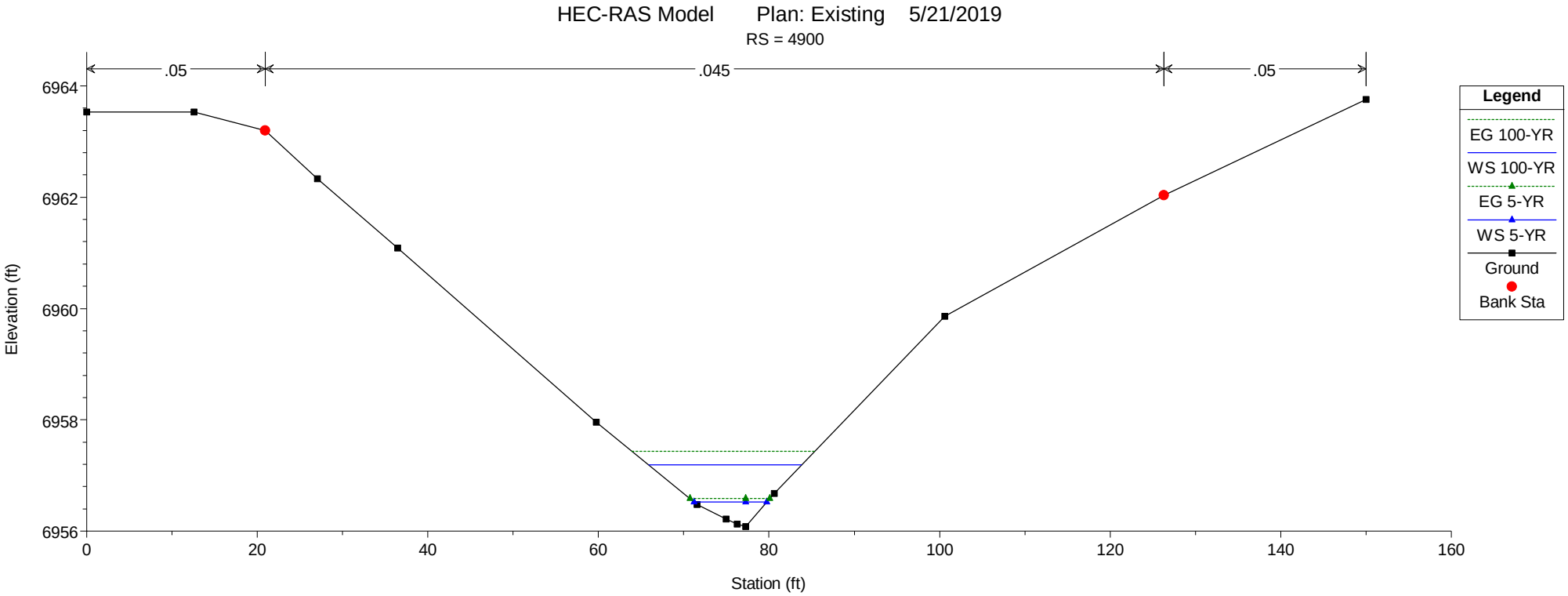
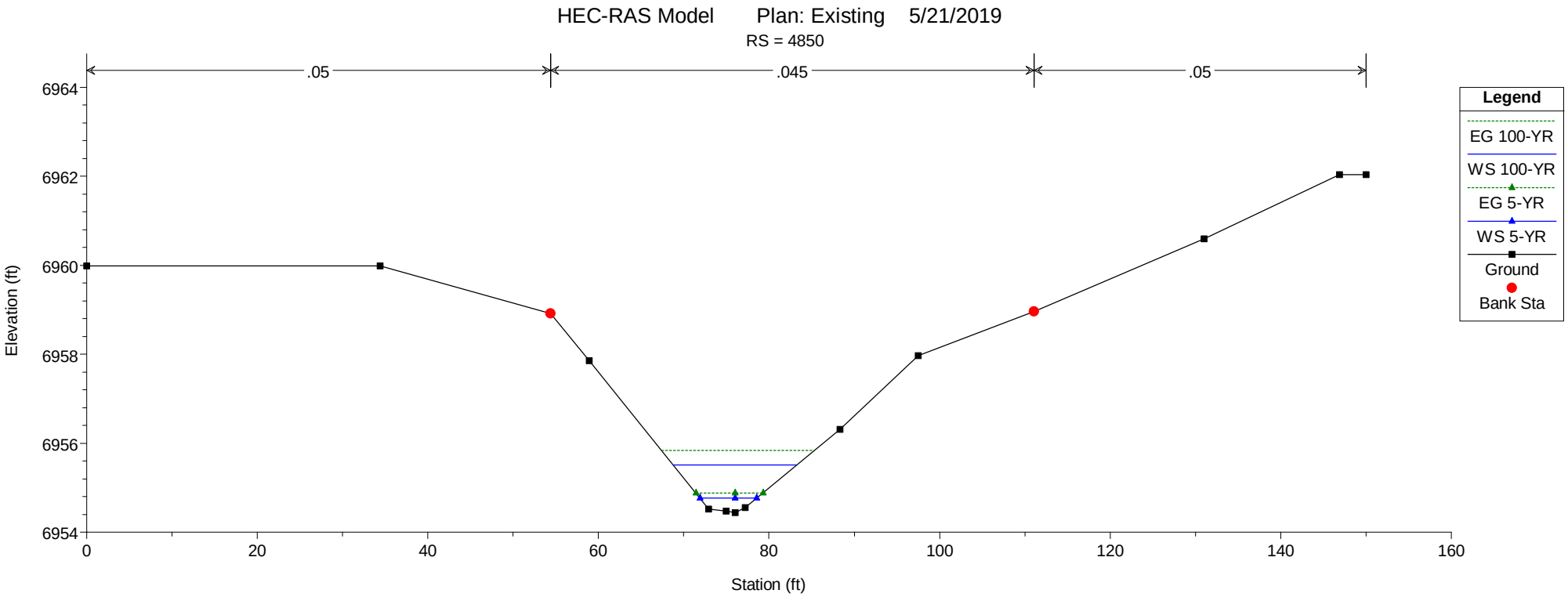
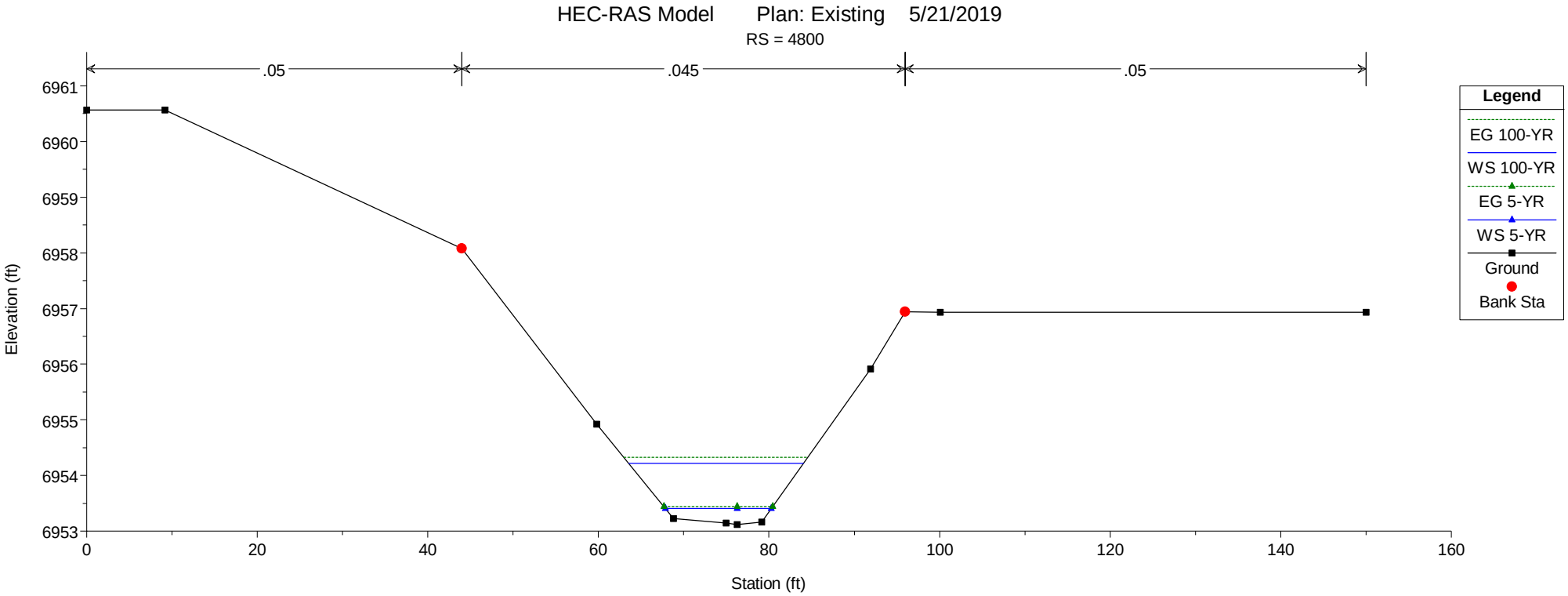
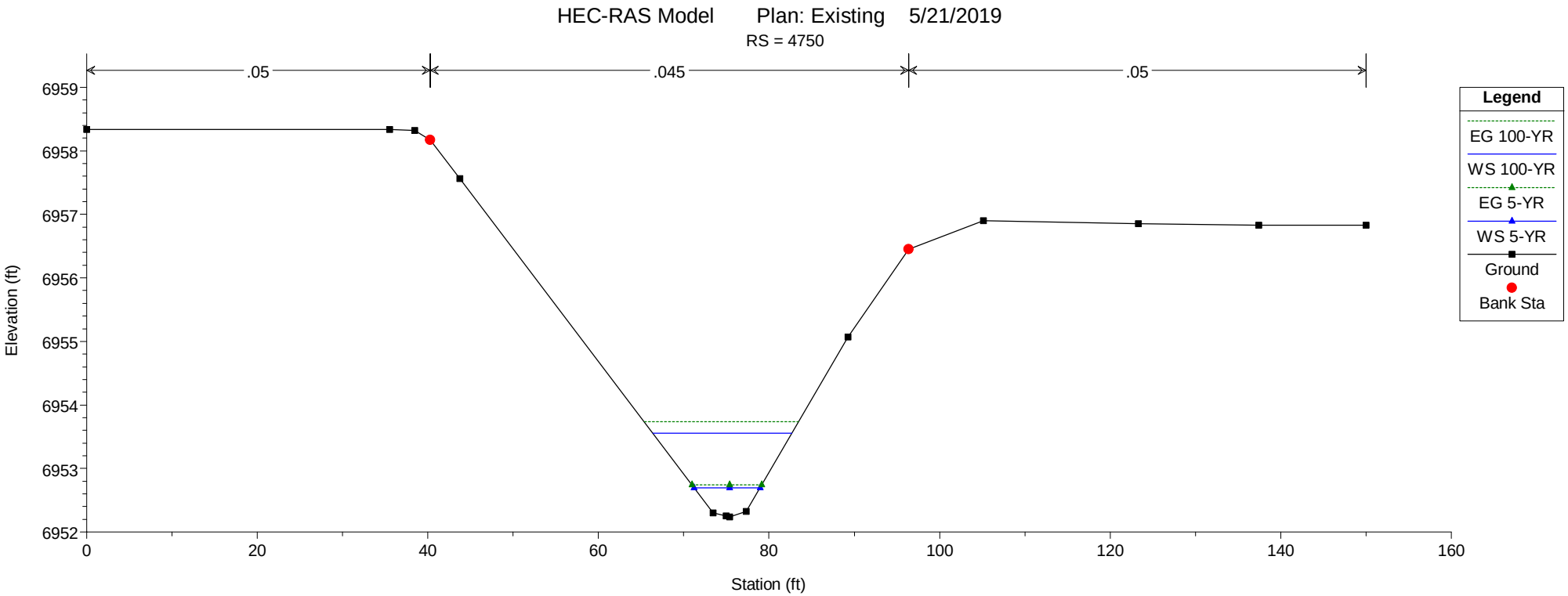
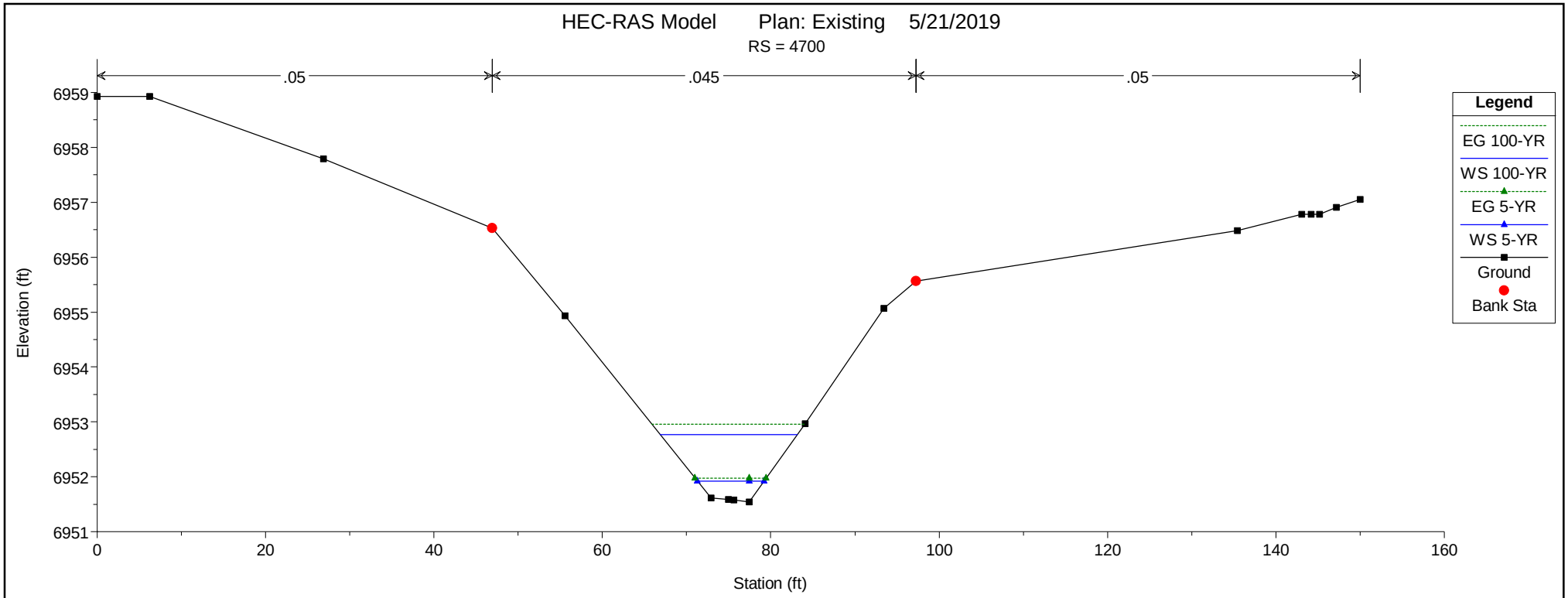
RS = 4950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

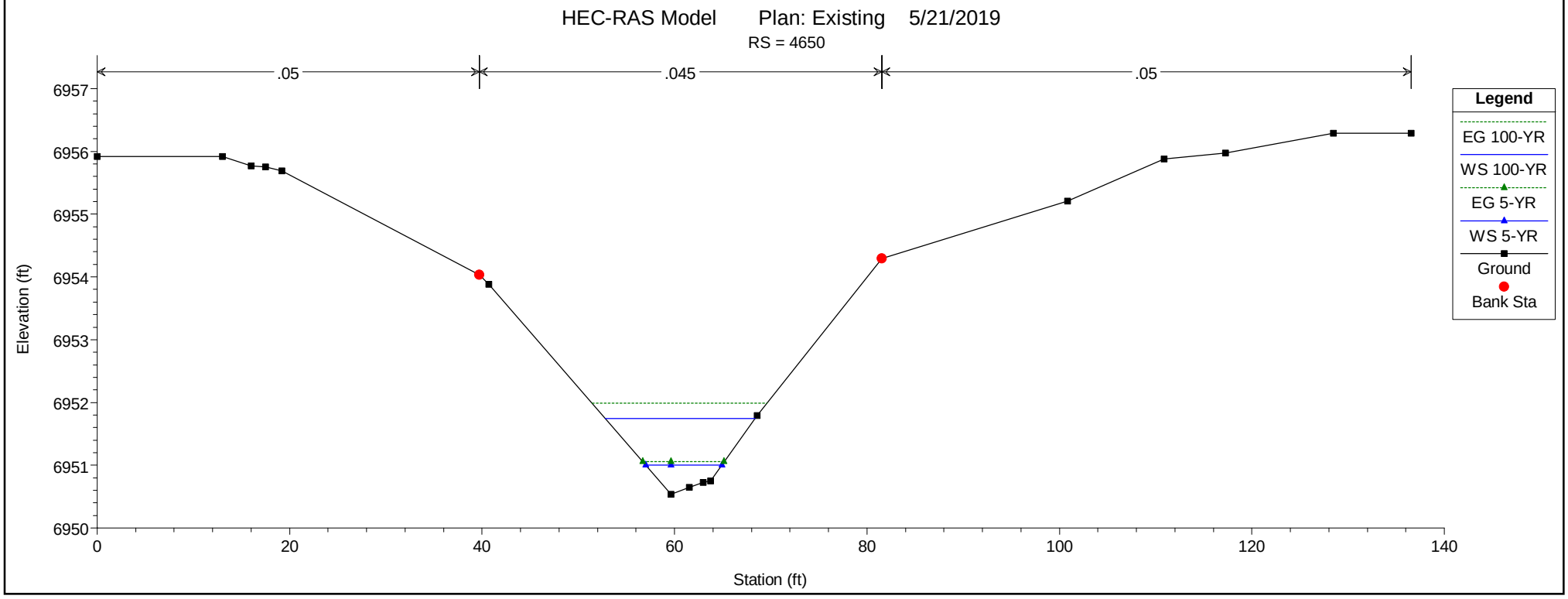

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4900
.05
.045
.05
Elevation (ft)
6964
6962
6960
6958
6956
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

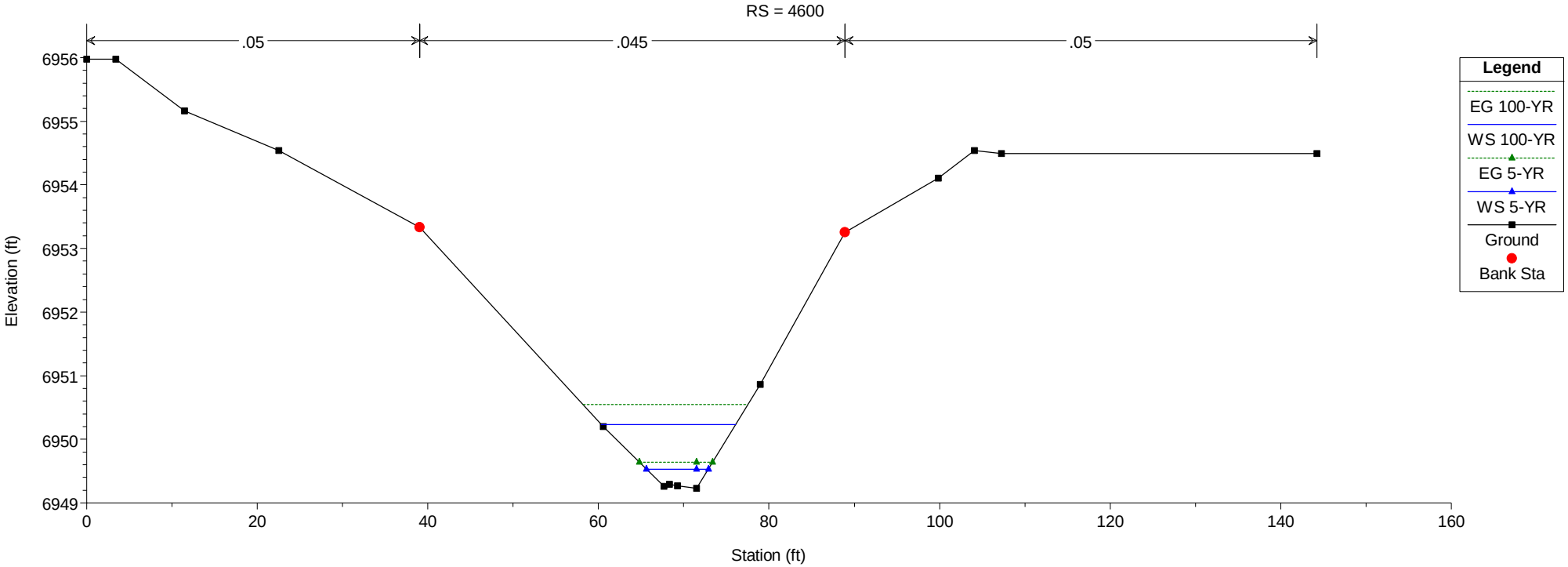

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4850
.05
.045
.05
Elevation (ft)
6964
6962
6960
6958
6956
6954
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

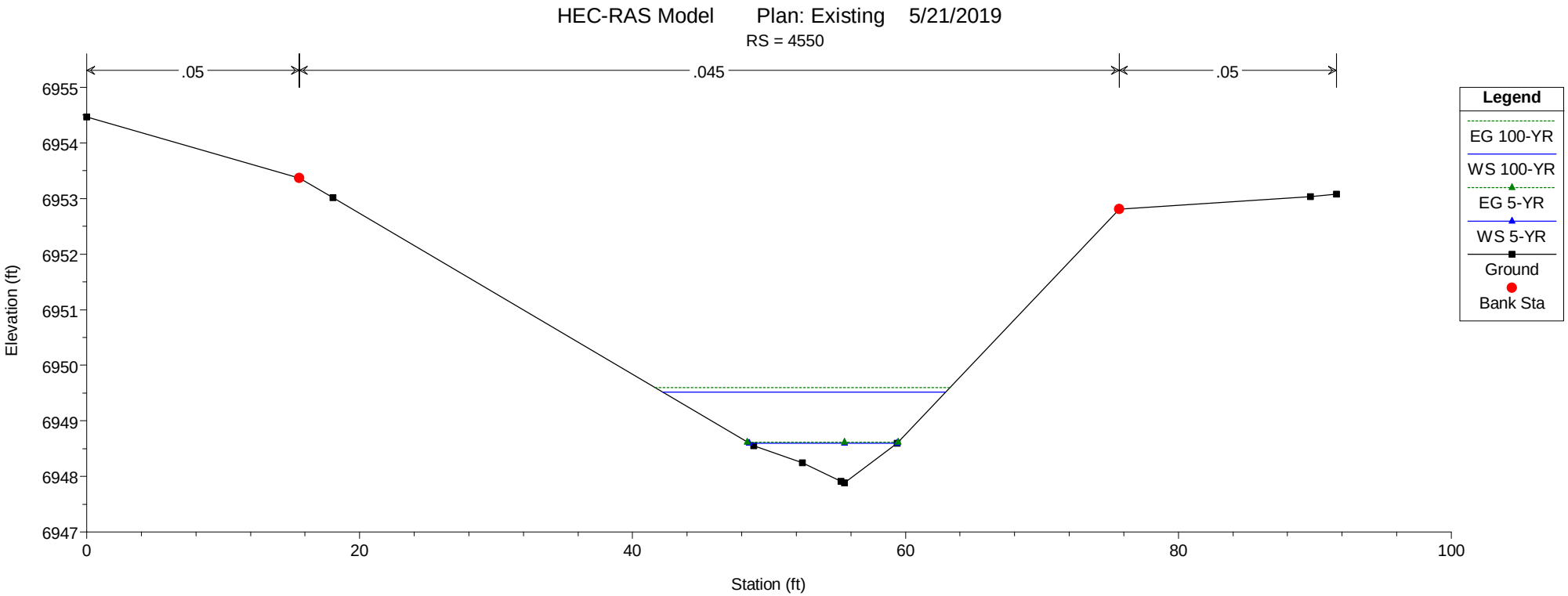

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4800
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

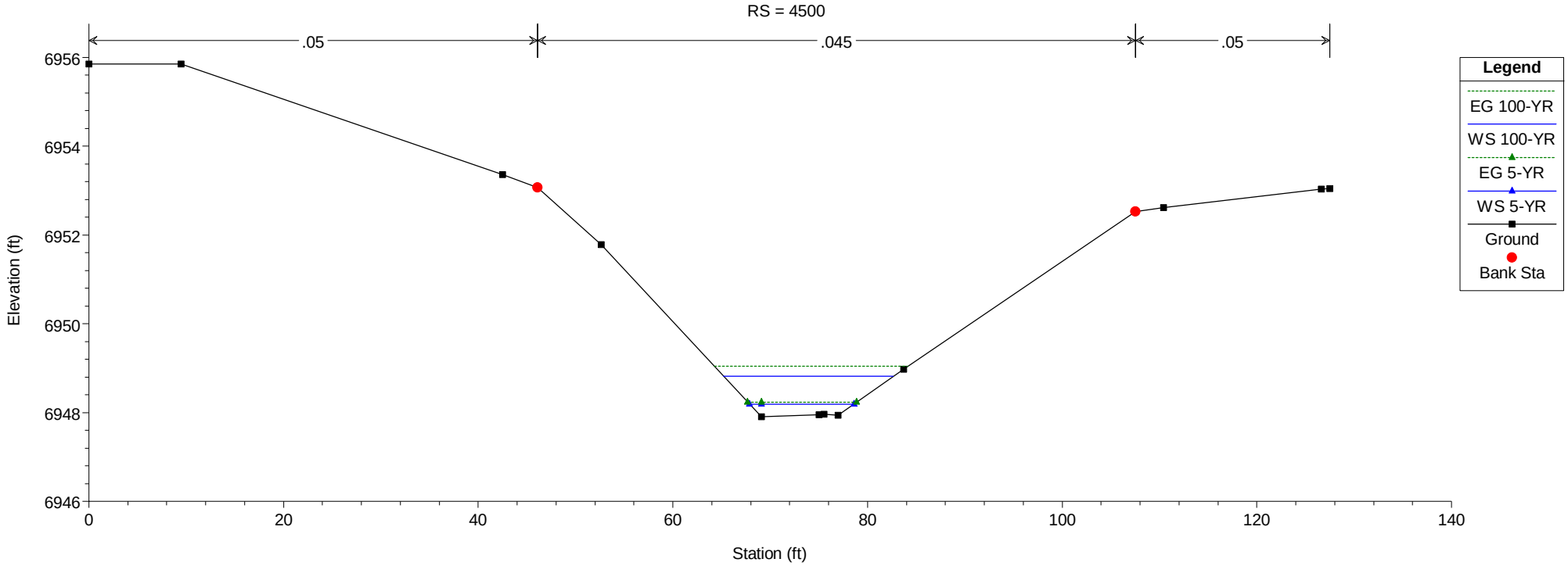

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

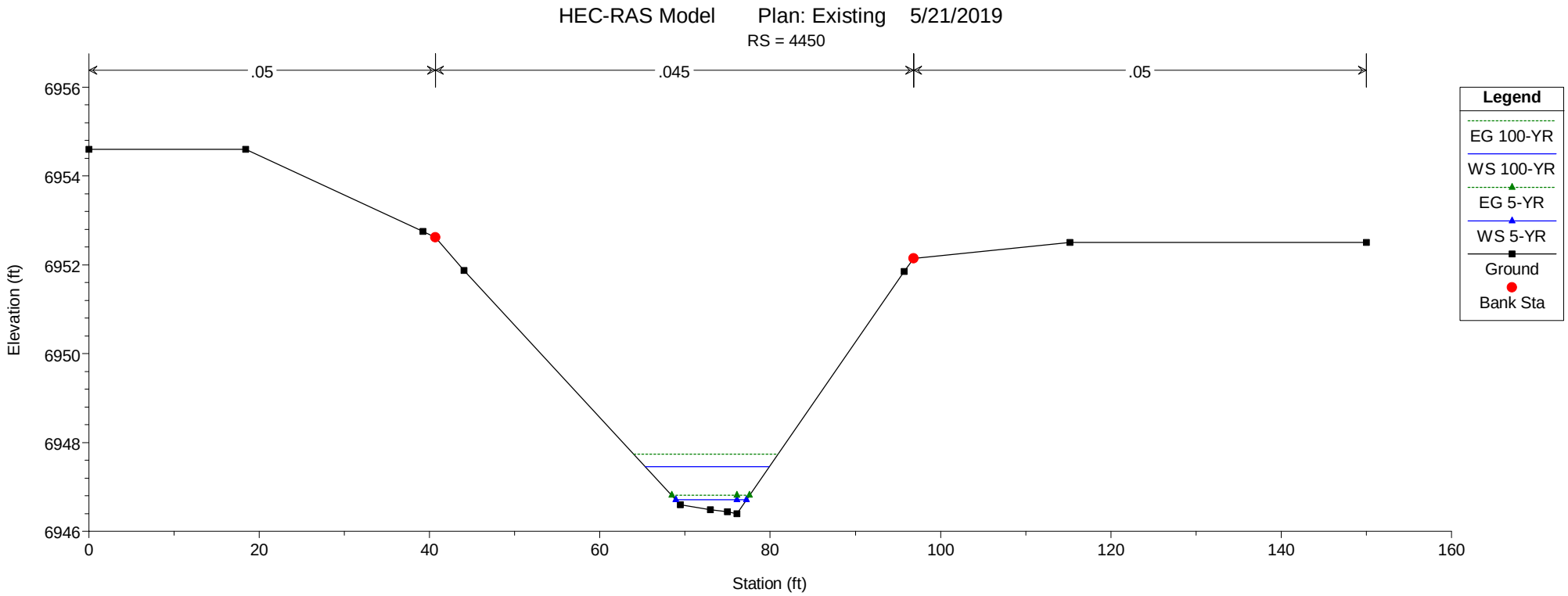

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

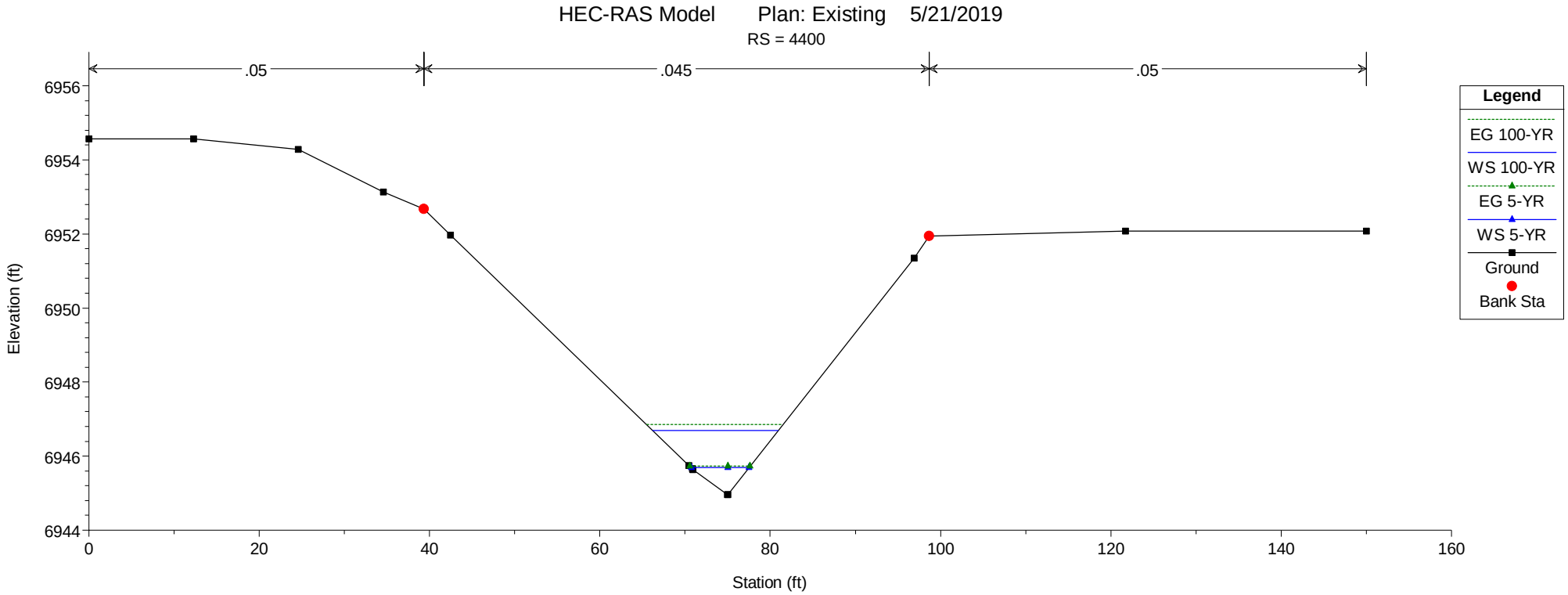

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4650
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

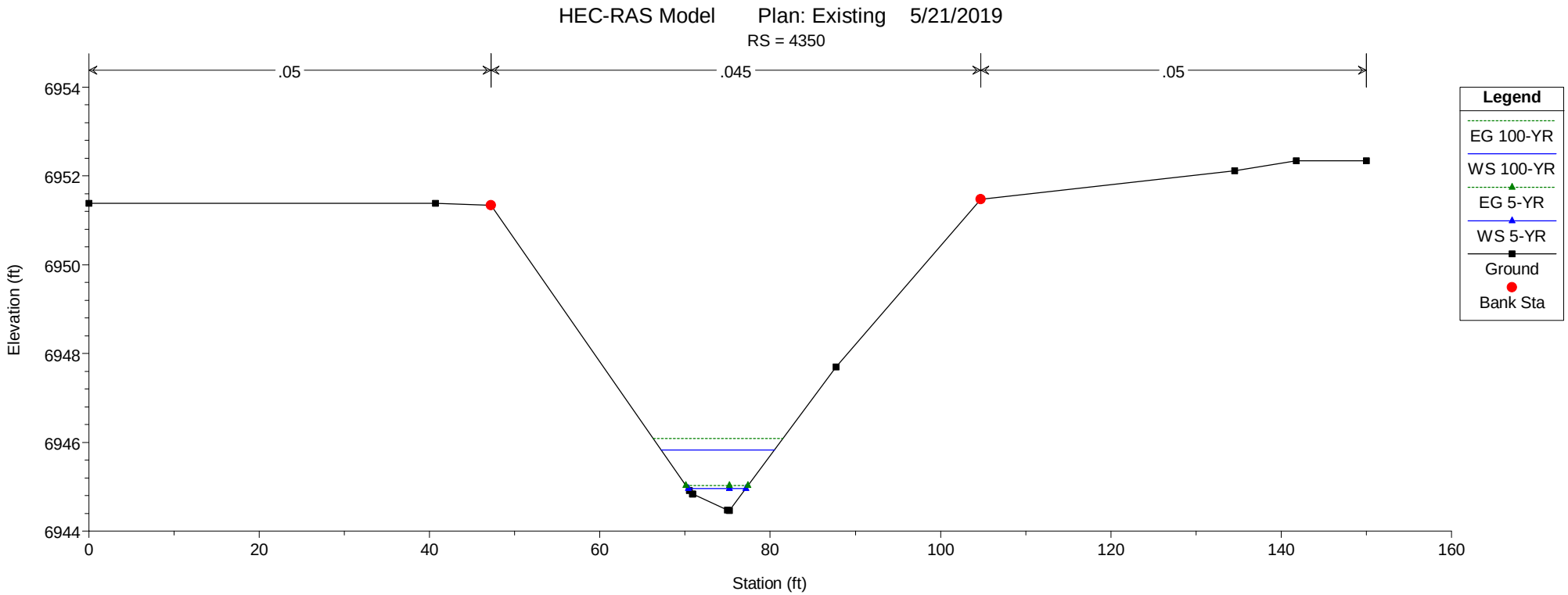

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4600
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

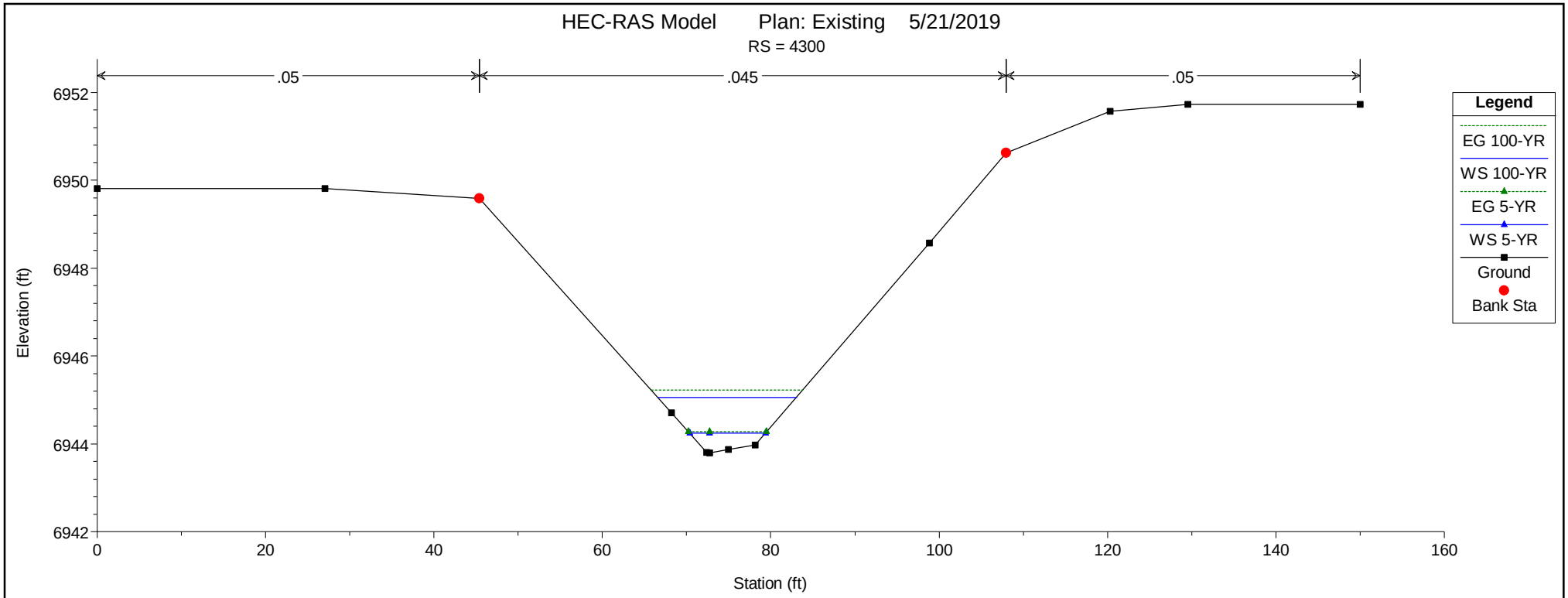

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4550
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

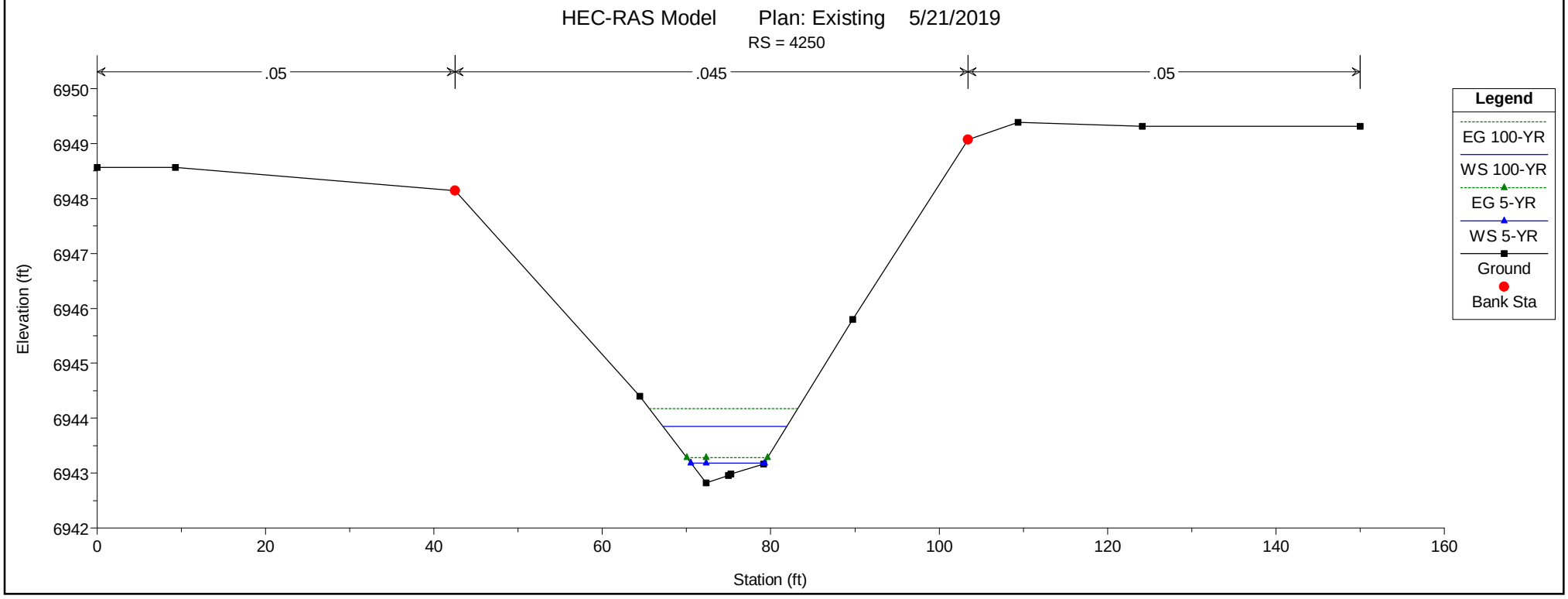

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4500
.05
.045
.05
Elevation (ft)
6956
6954
6952
6950
6948
6946
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

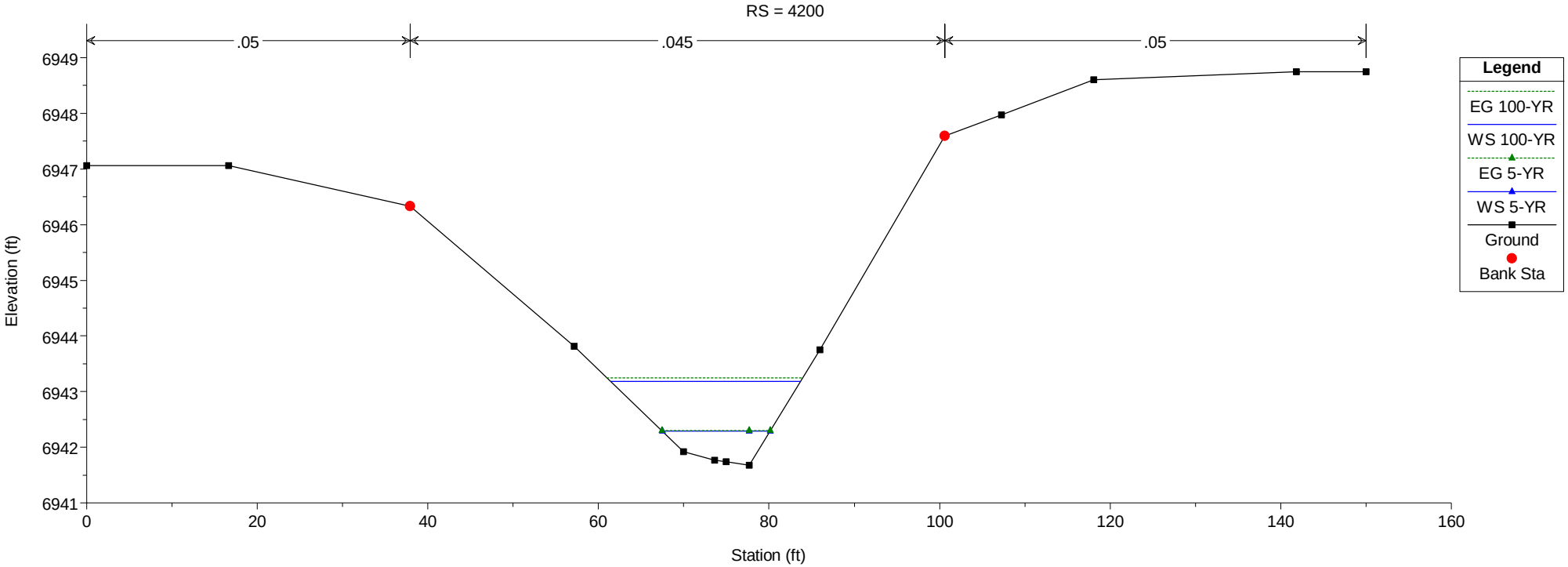

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4450
.05
.045
.05
Elevation (ft)
6956
6954
6952
6950
6948
6946
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

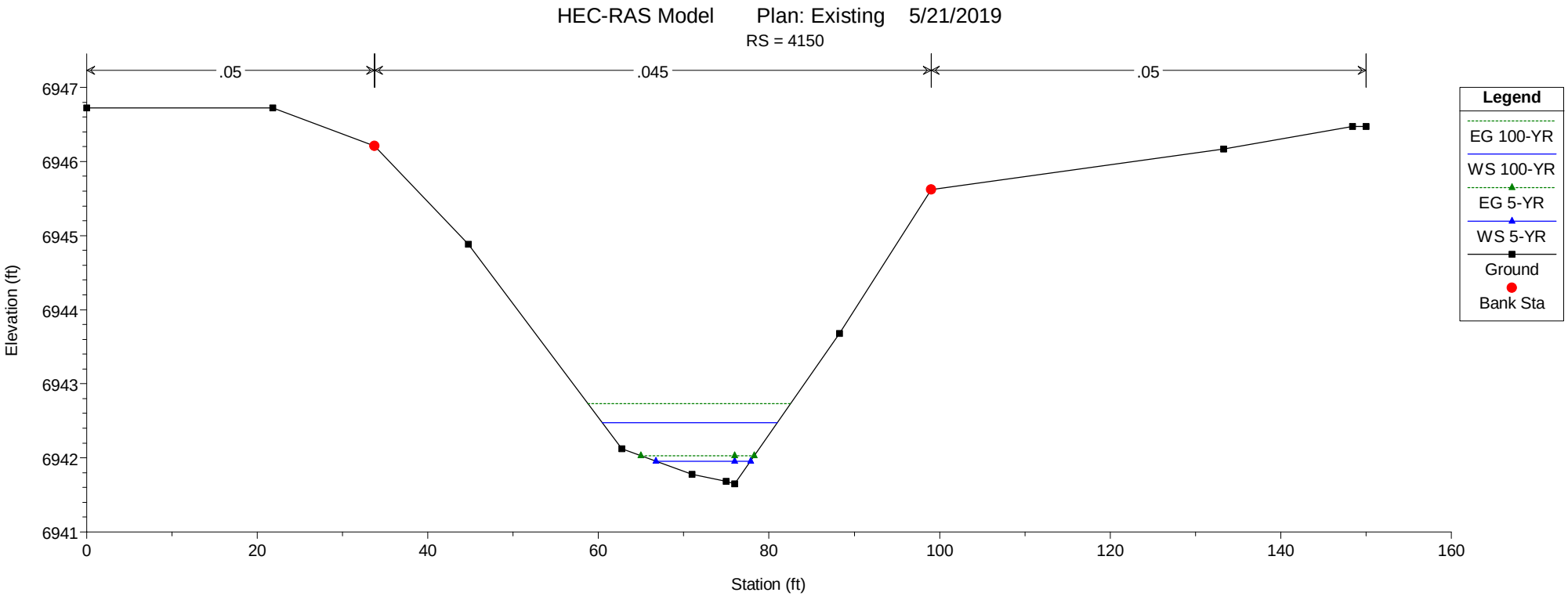

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

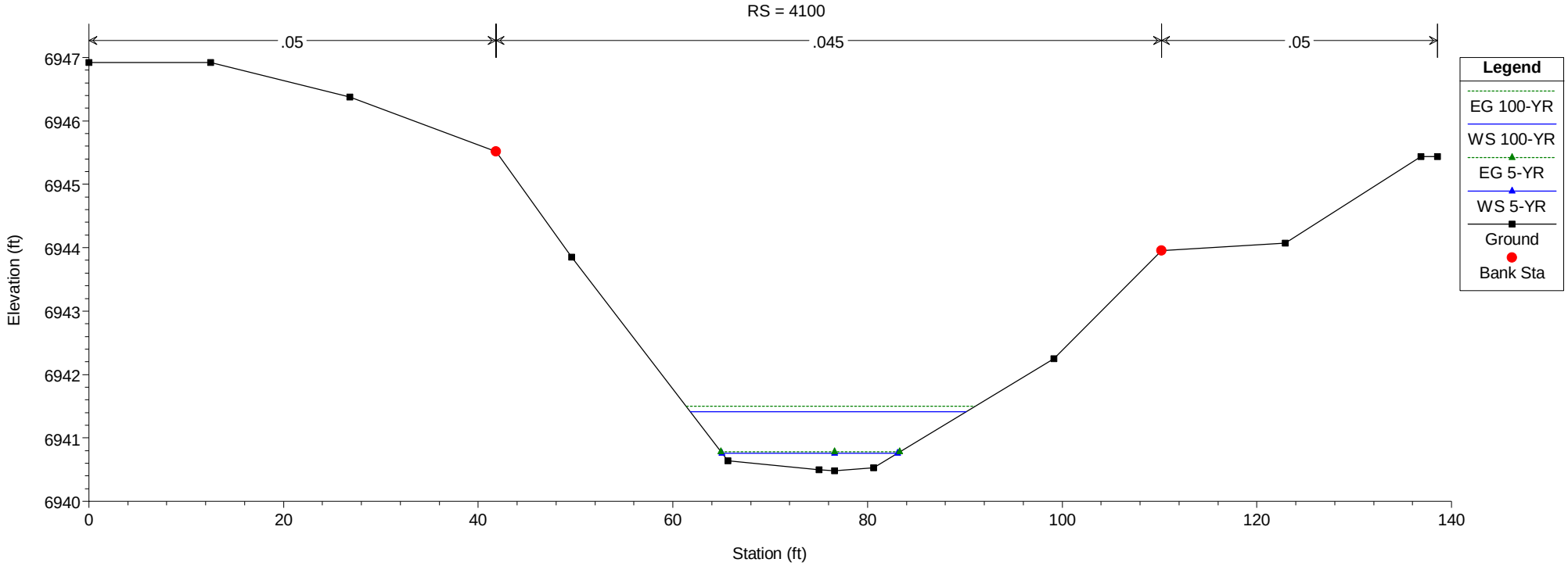

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

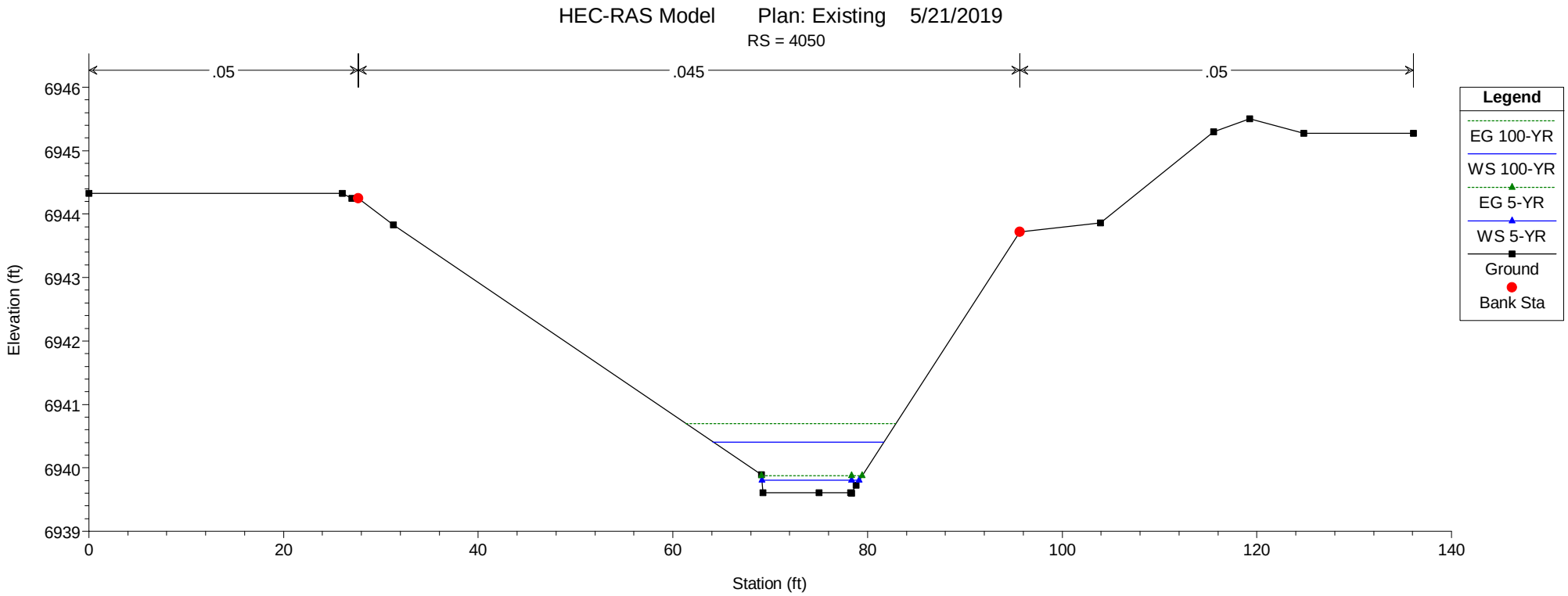

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4300
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

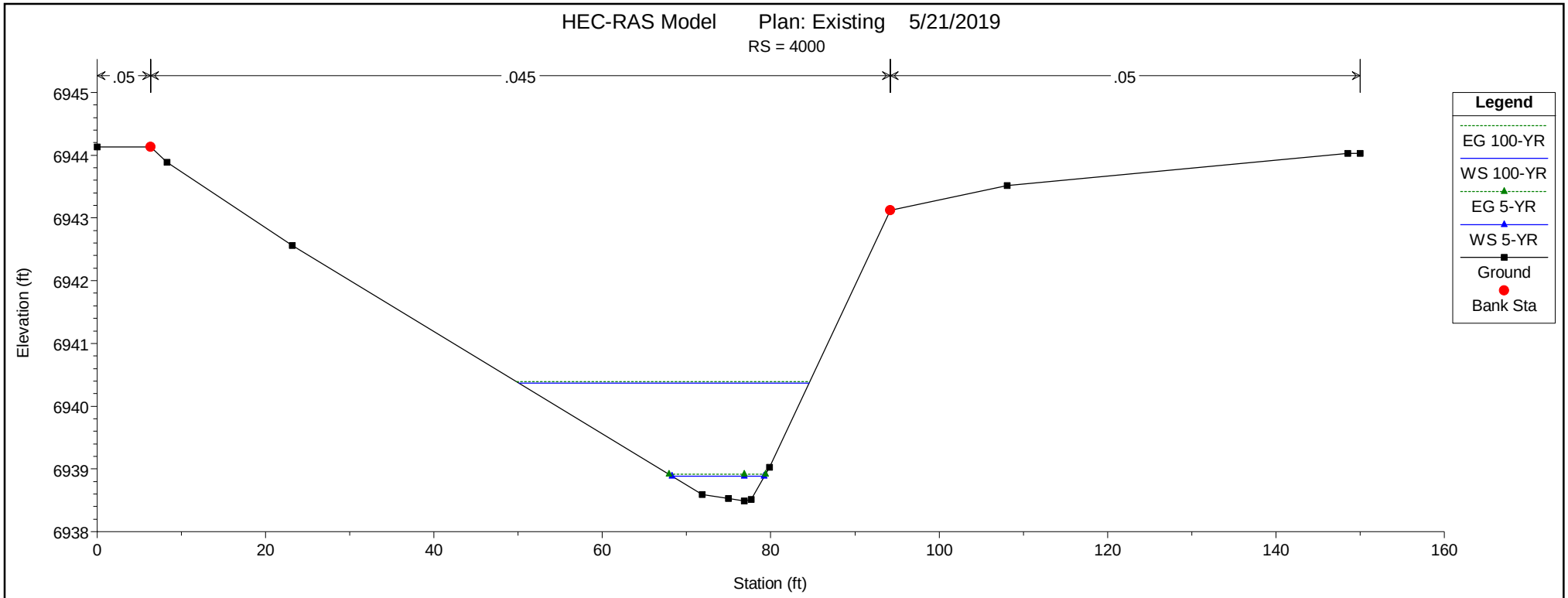

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4250
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

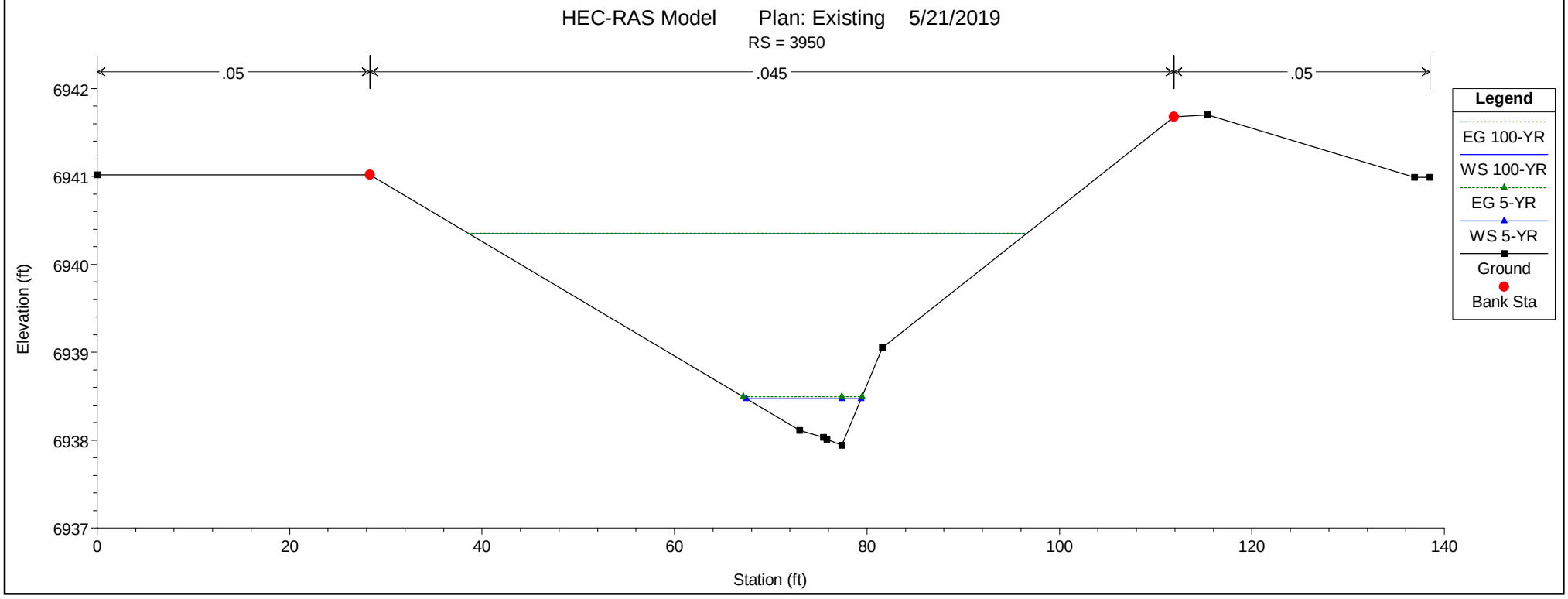

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4200
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6949
6948
6947
6946
6945
6944
6943
6942
6941
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 4150
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6947
6946
6945
6944
6943
6942
6941
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 4100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

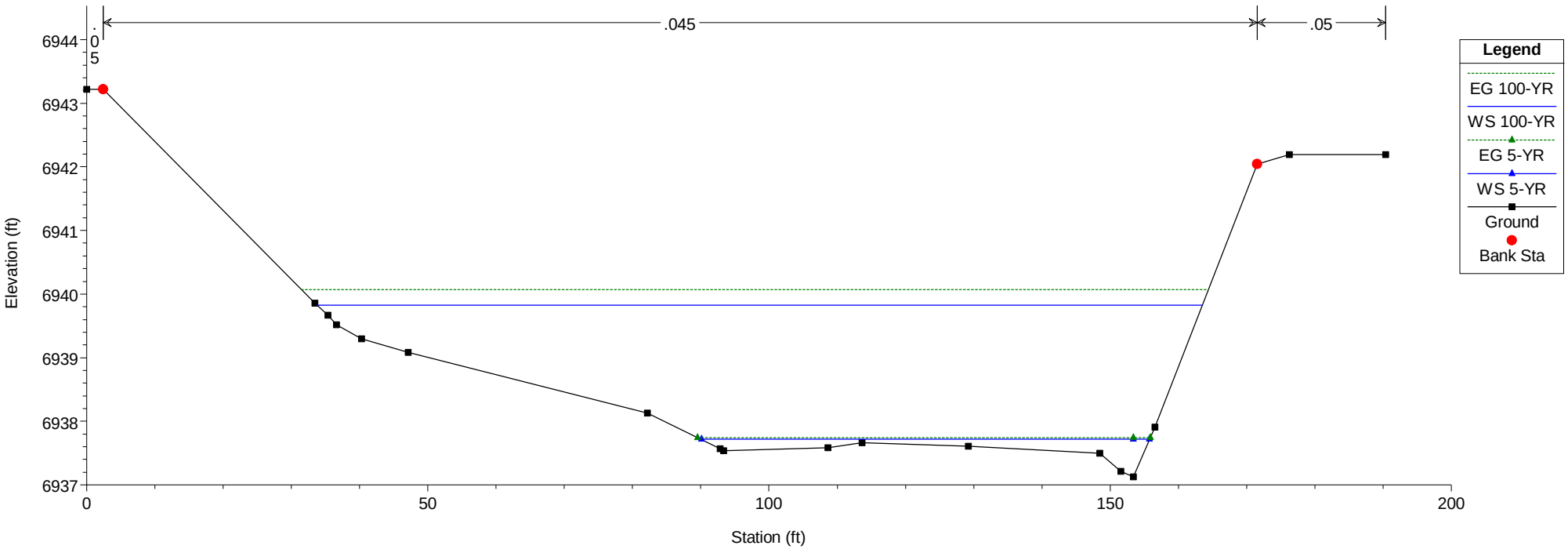

HEC-RAS Model Plan: Existing 5/21/2019
RS = 4050
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 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

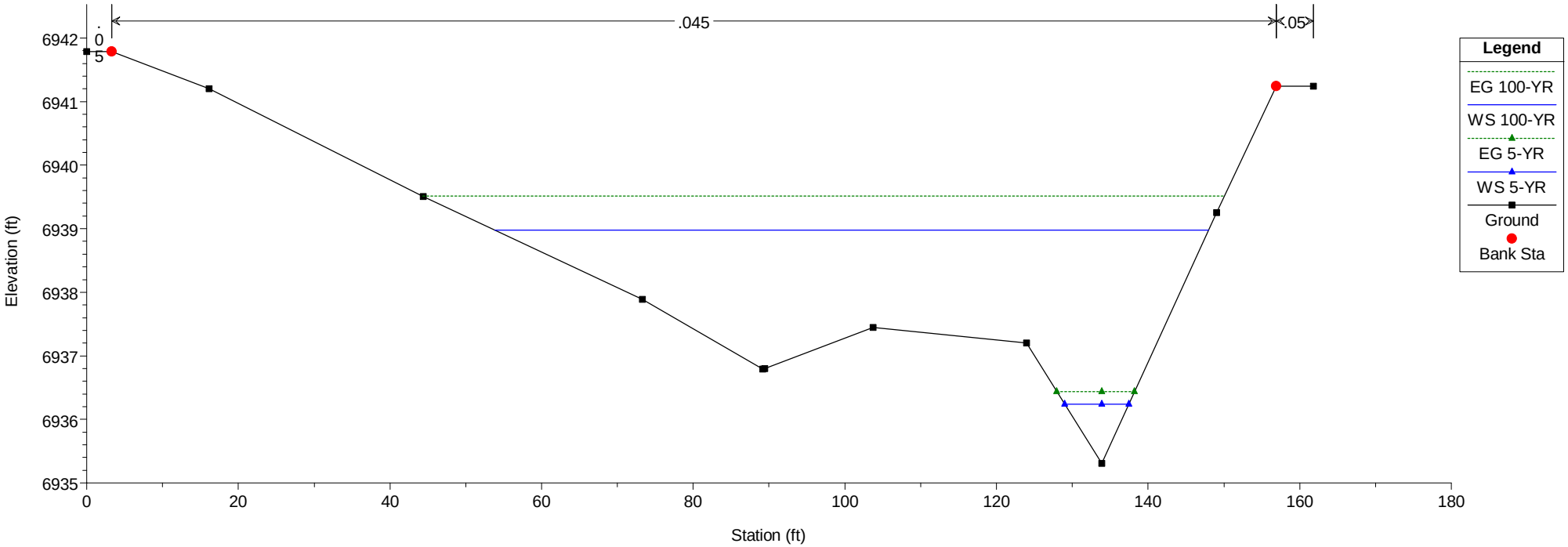
HEC-RAS Model Plan: Existing 5/21/2019

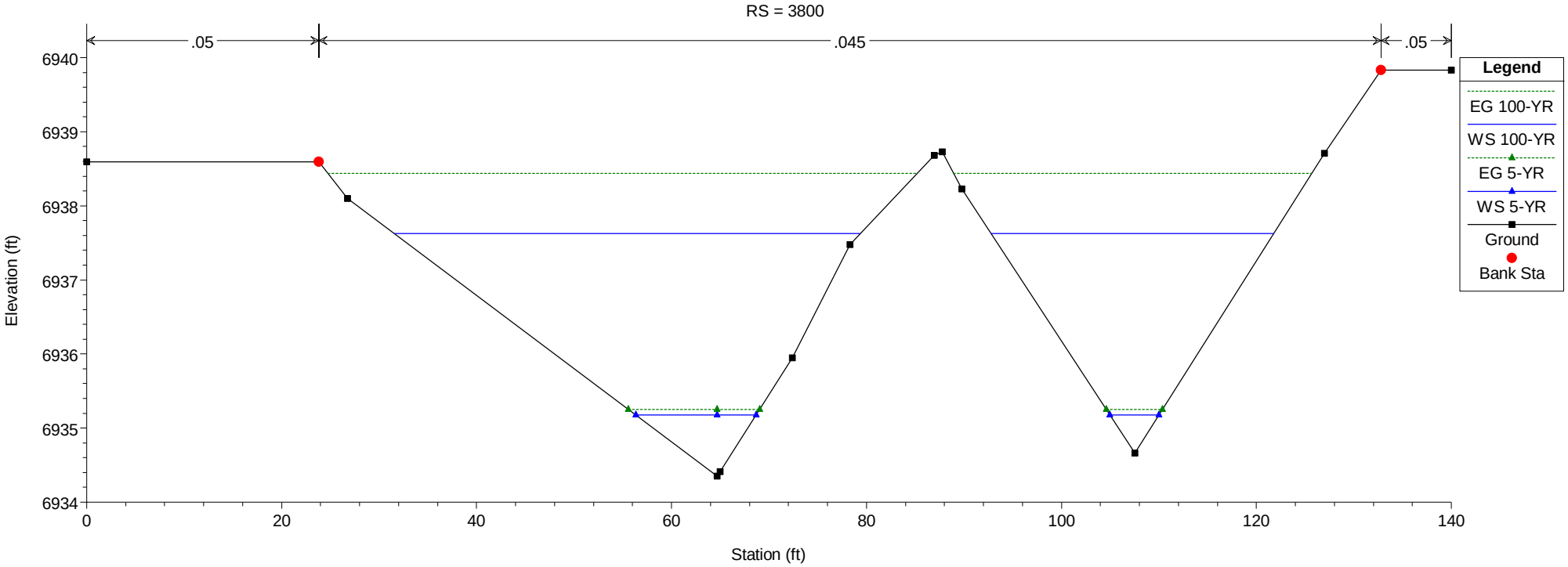
RS = 3900

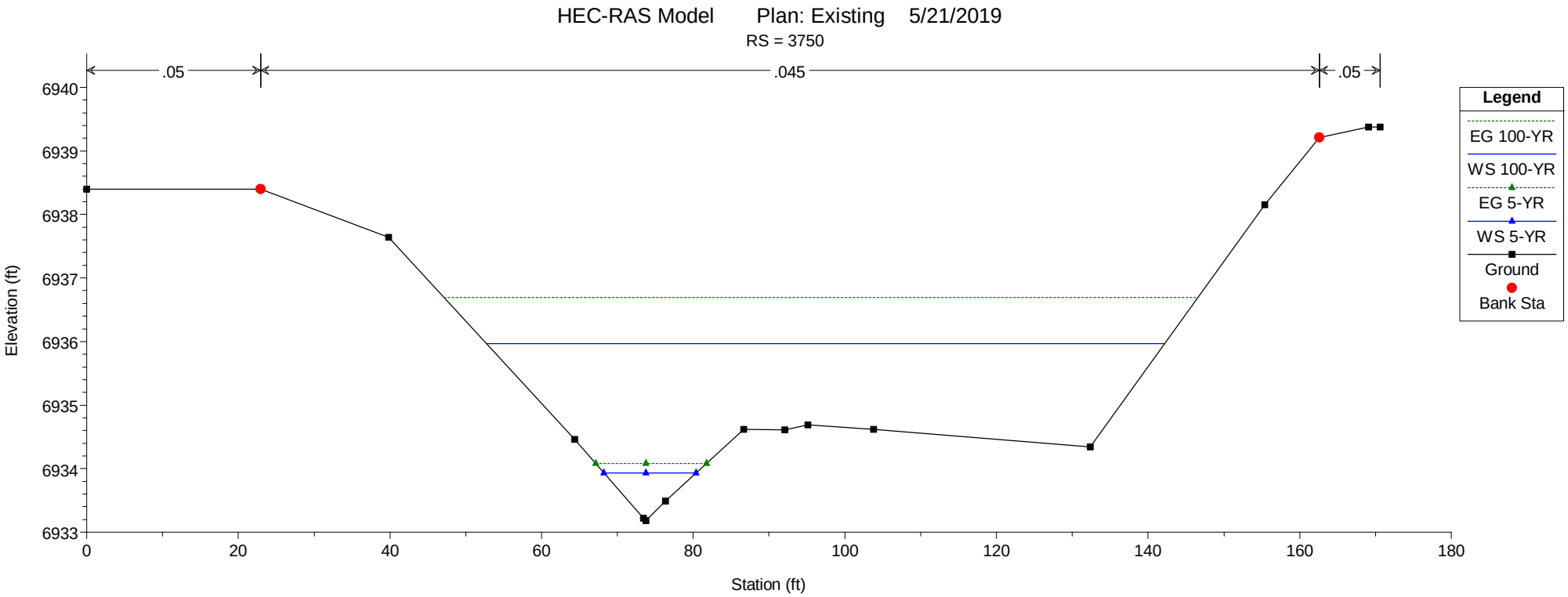


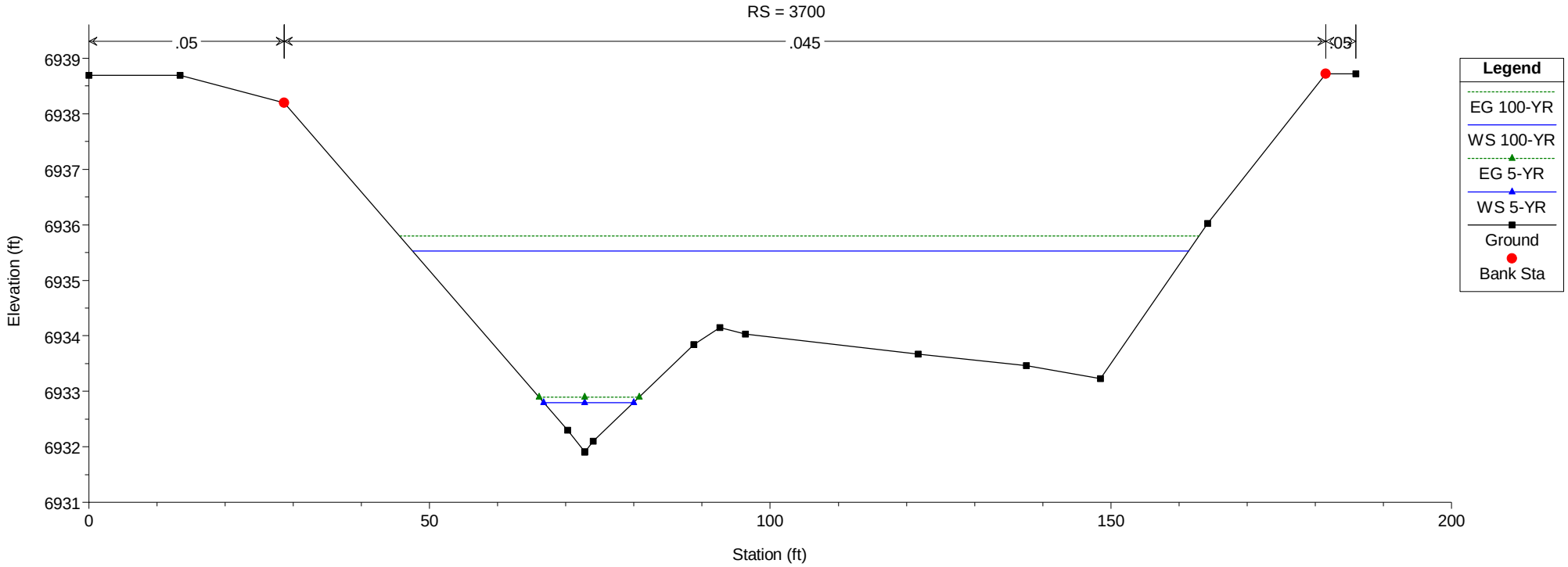
HEC-RAS Model Plan: Existing 5/21/2019

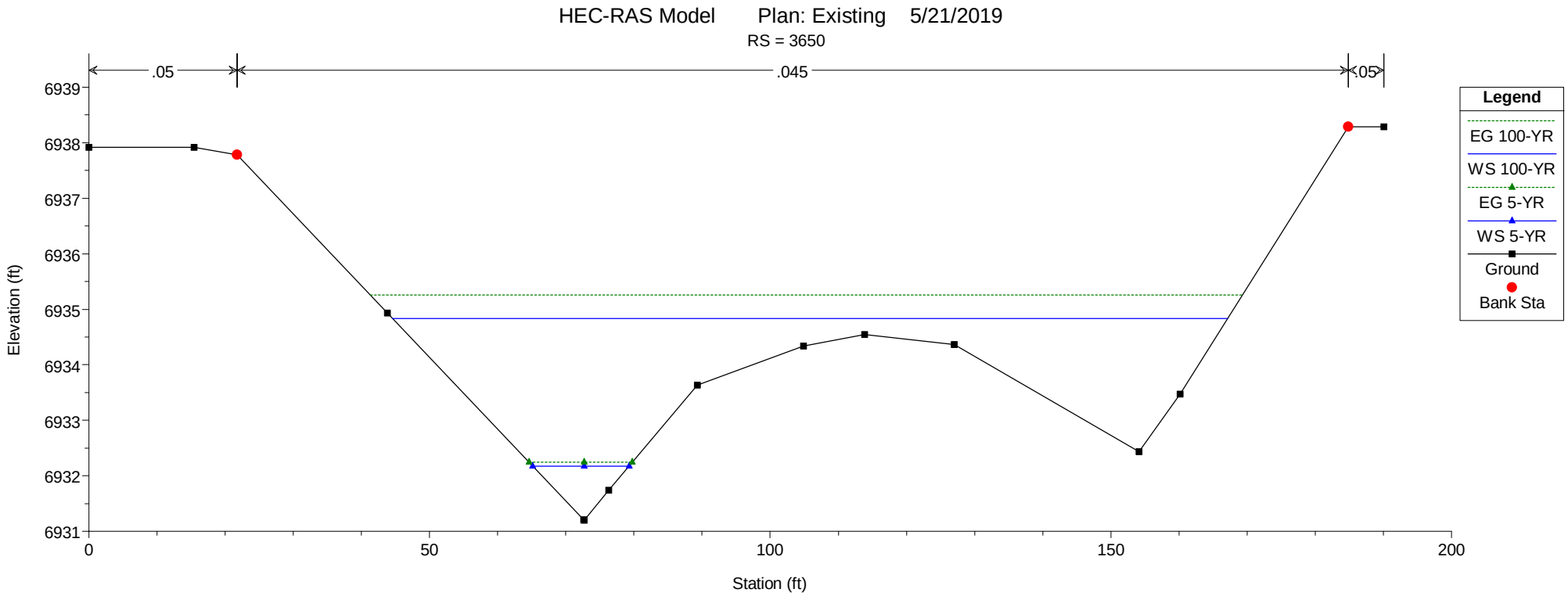
RS = 3850

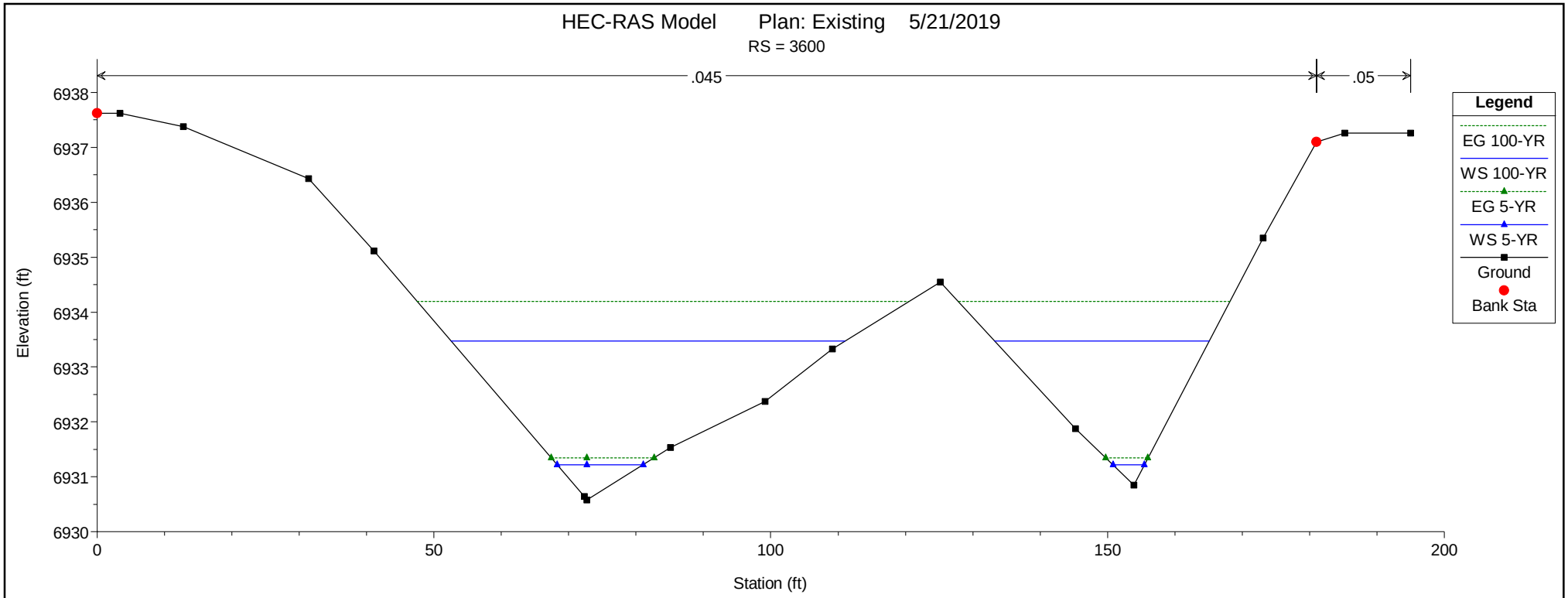


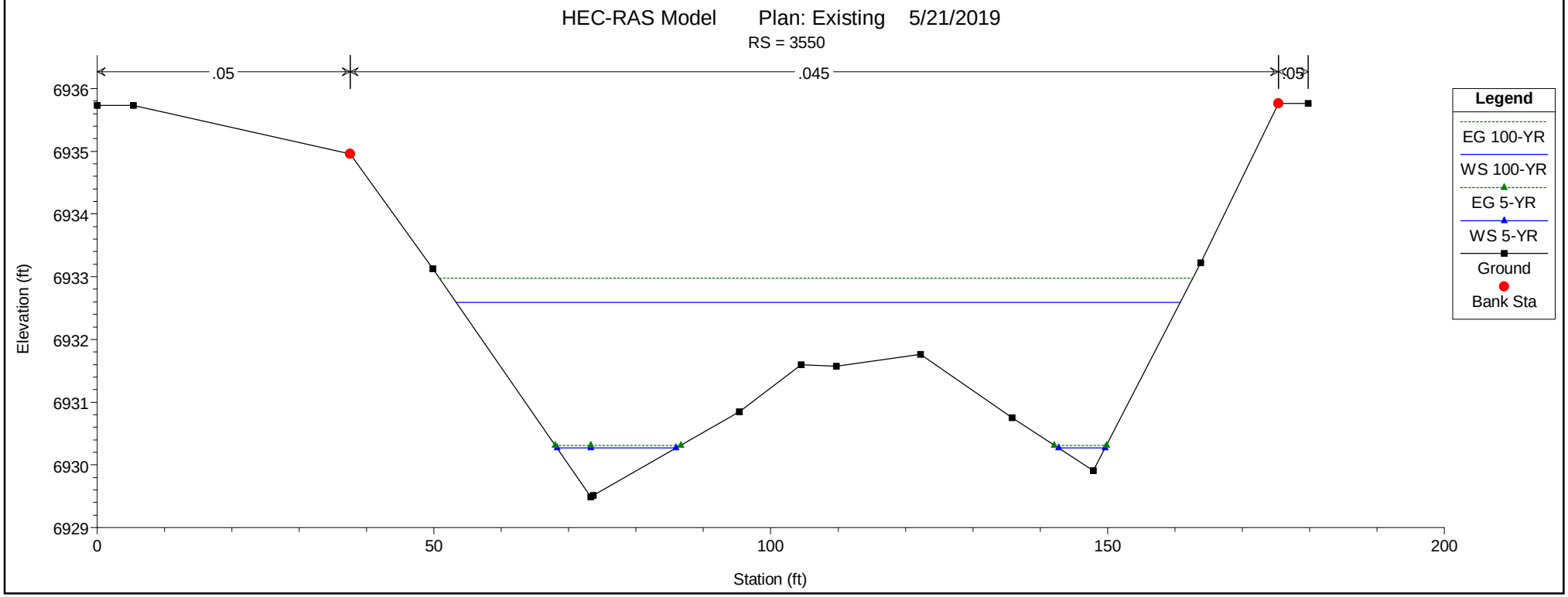

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3800
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

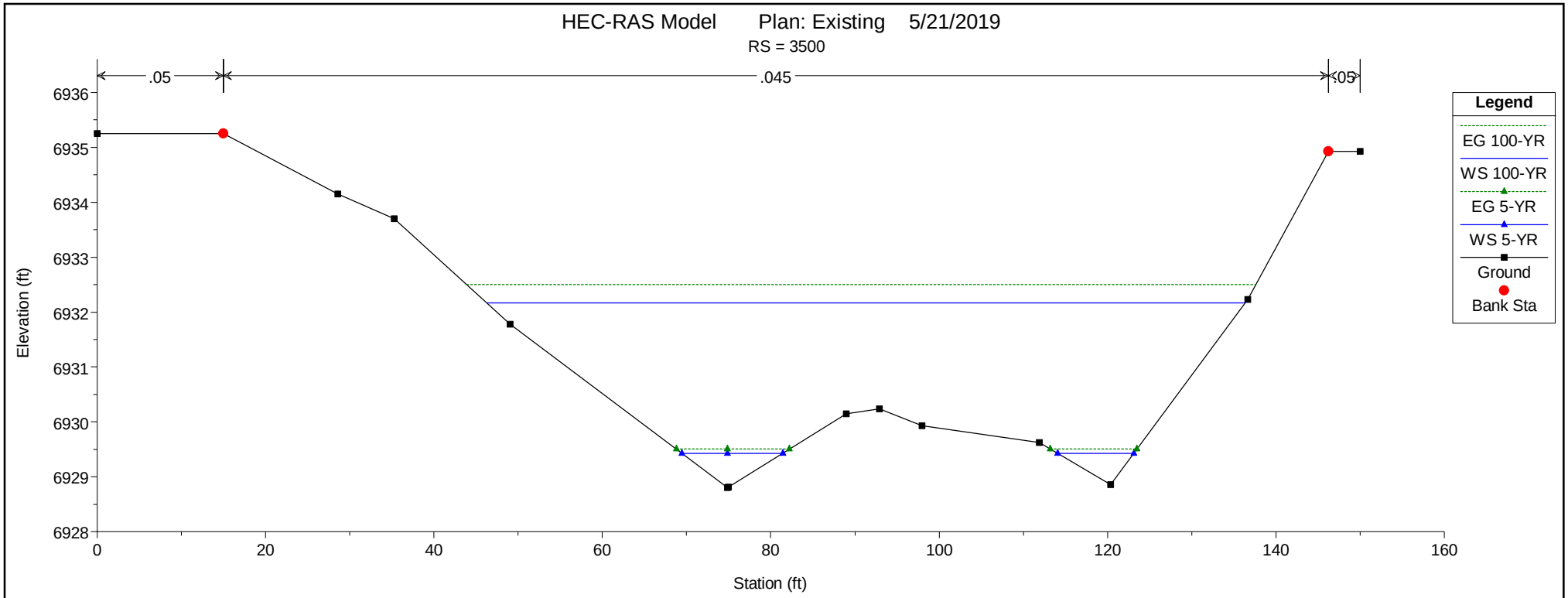

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

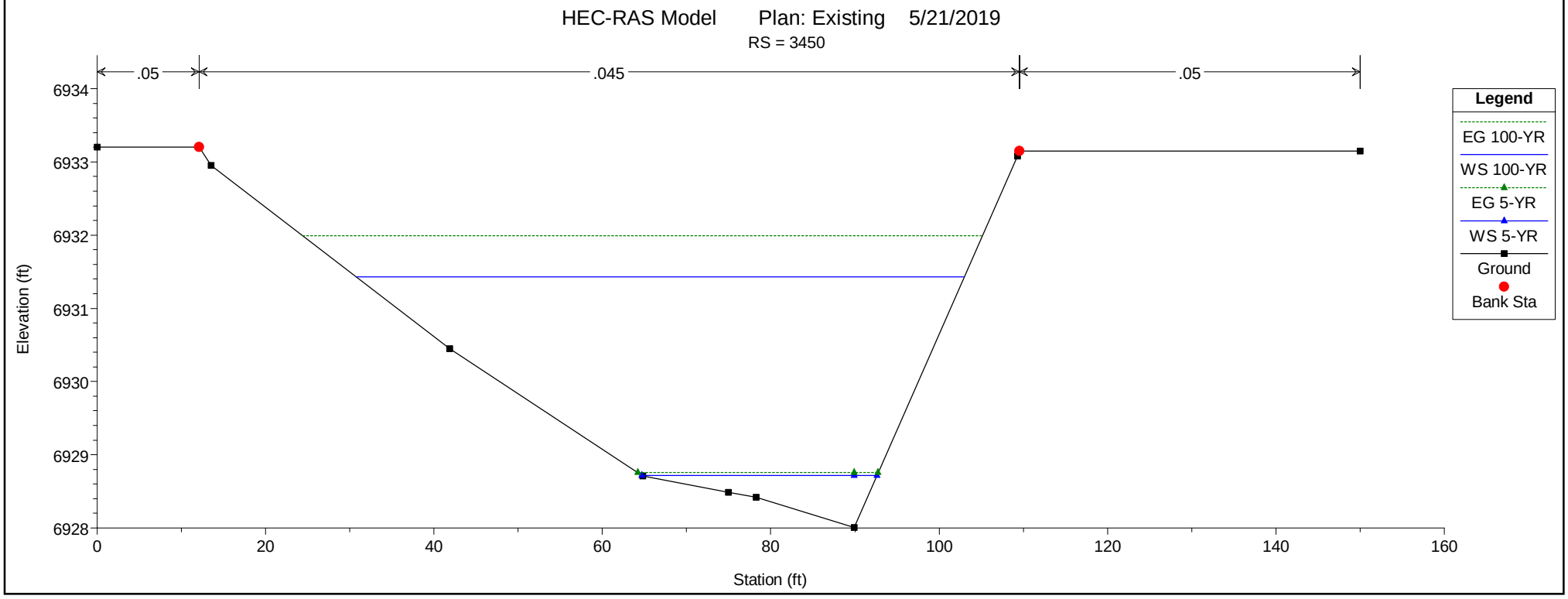

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3700
.05
.045
.05
Elevation (ft)
6939
6938
6937
6936
6935
6934
6933
6932
6931
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

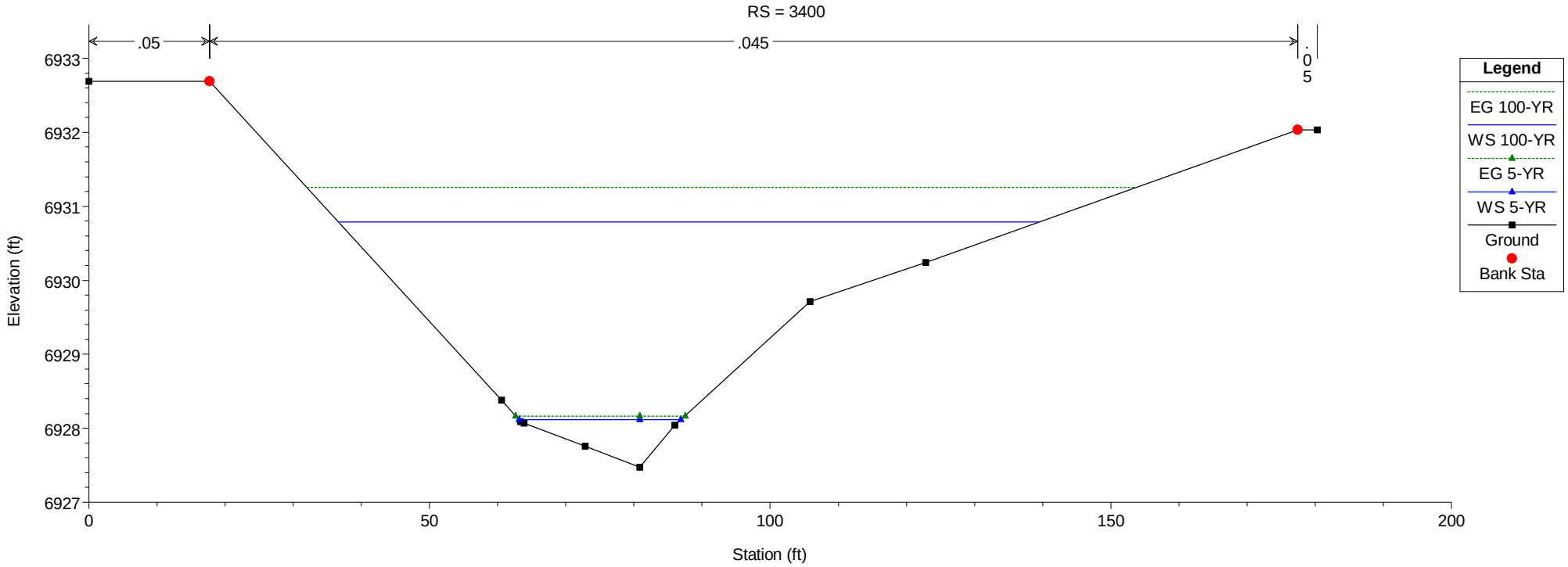

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3650
.05
.045
.05
Elevation (ft)
6939
6938
6937
6936
6935
6934
6933
6932
6931
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

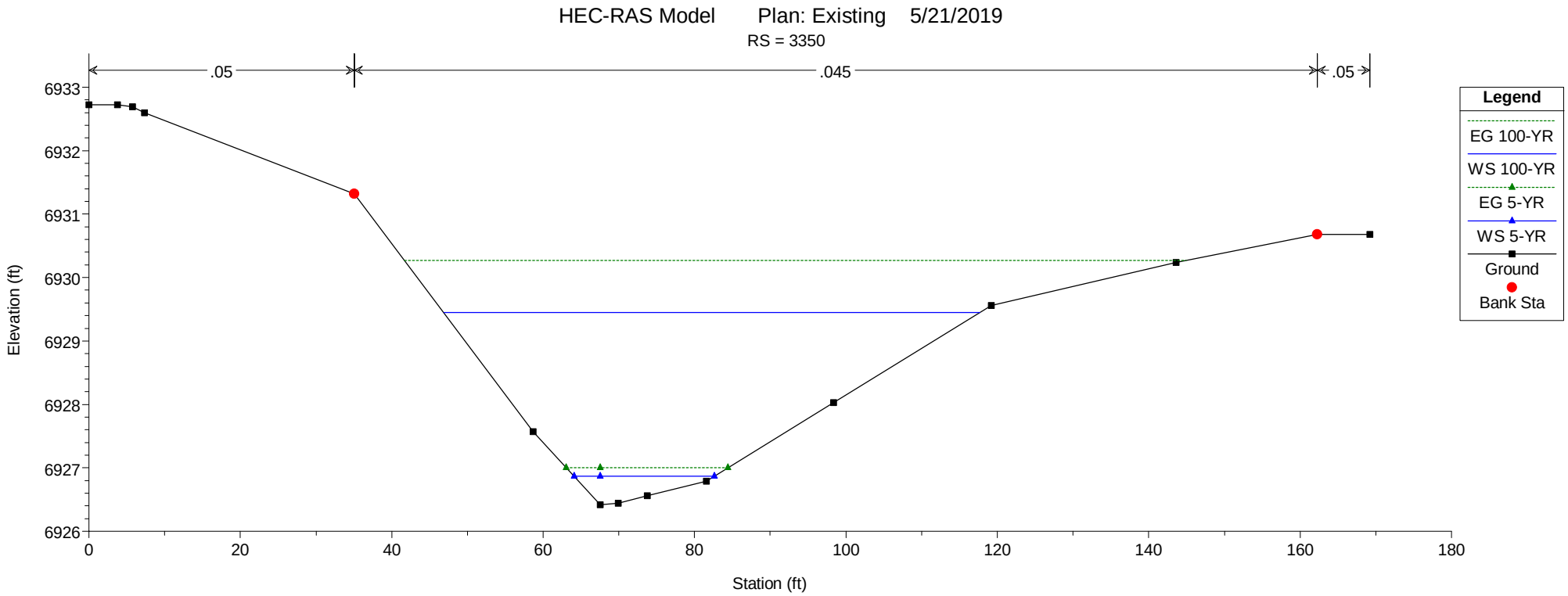

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3600
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

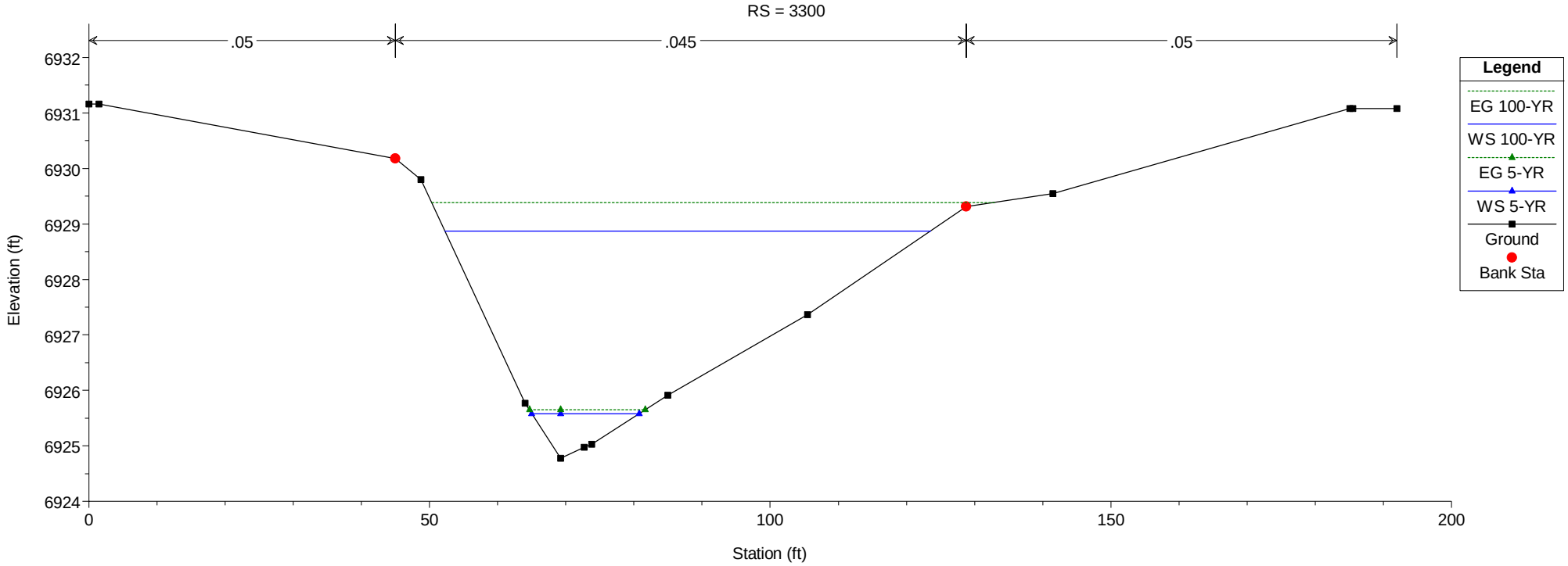

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3550
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

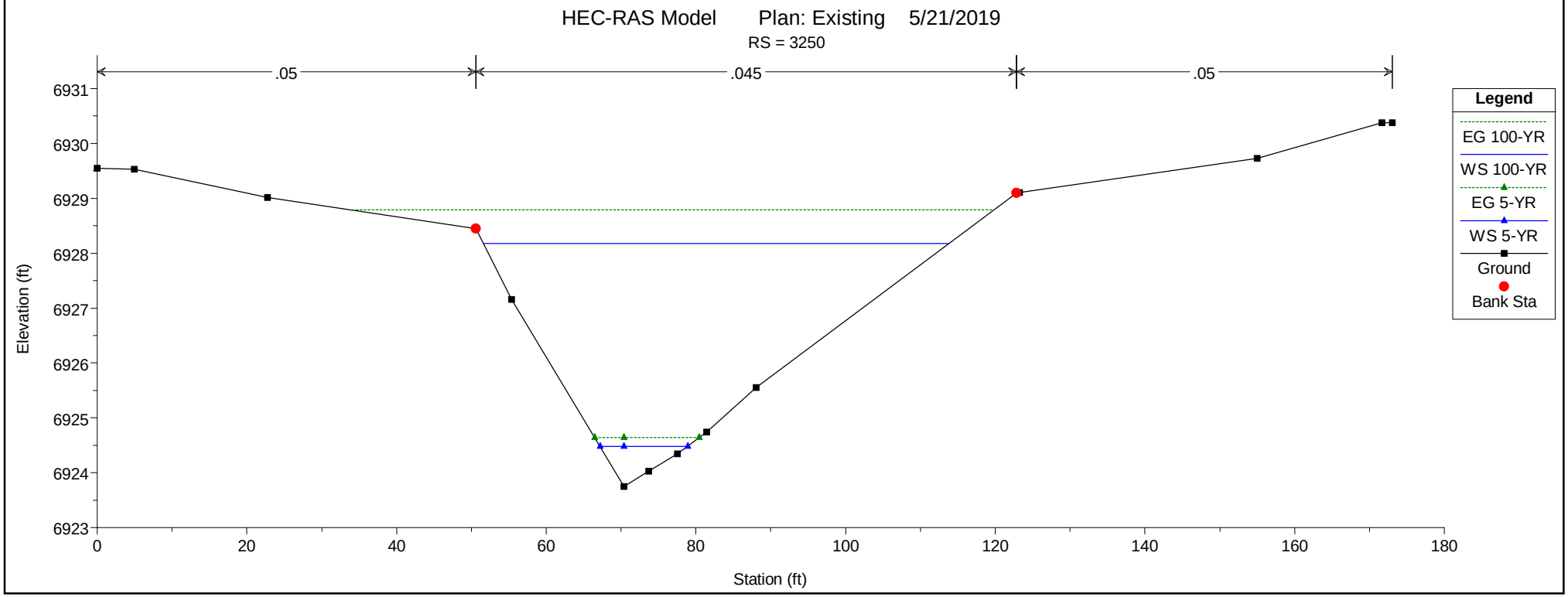

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3500
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

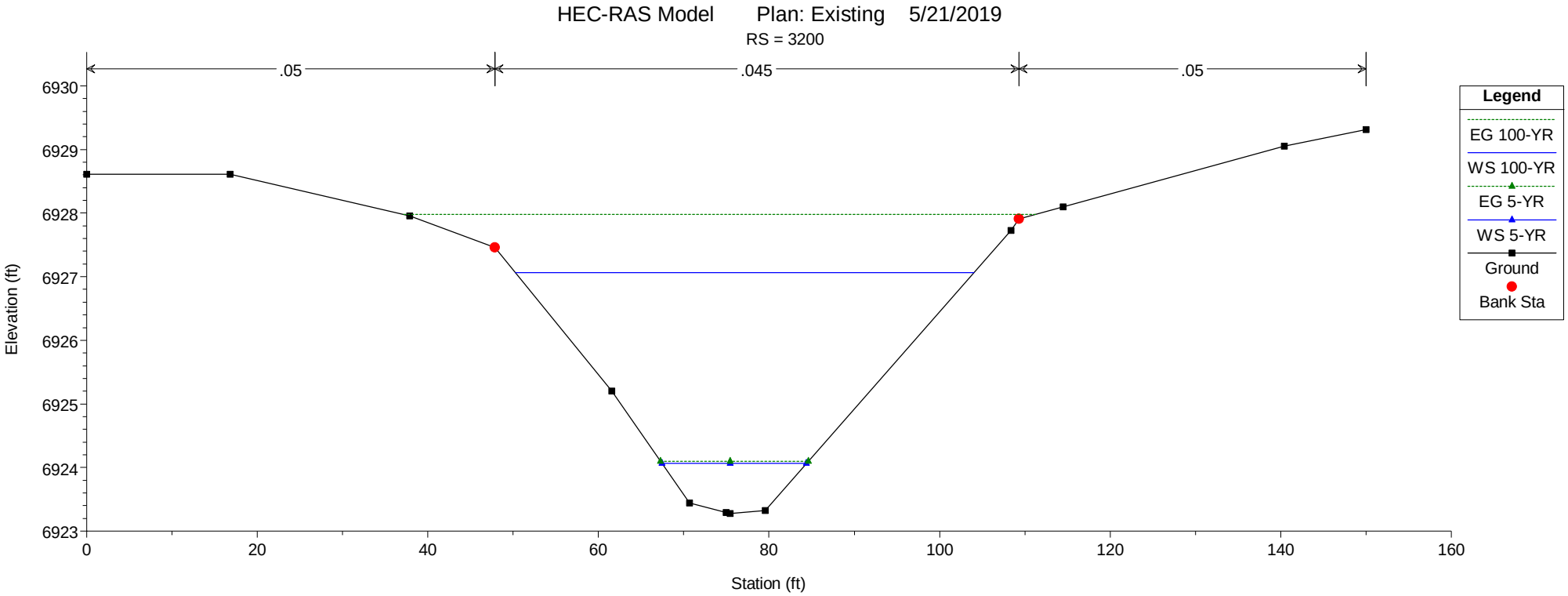

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

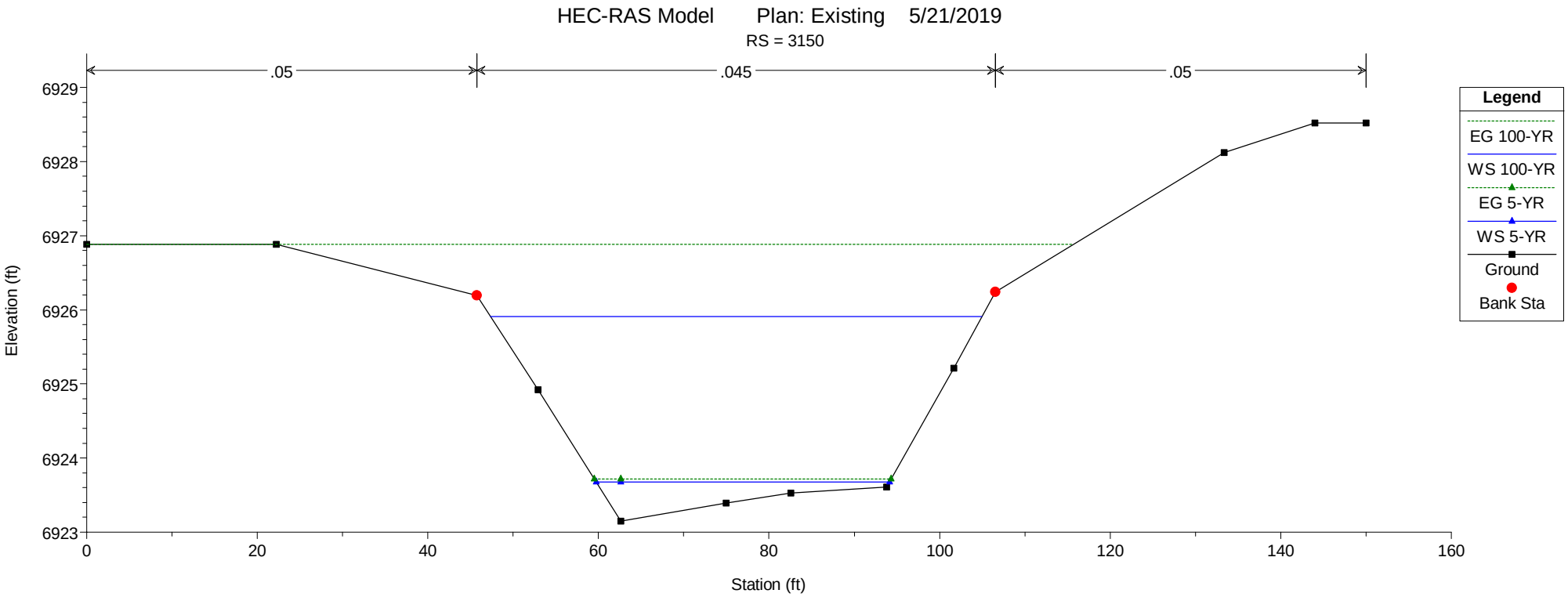

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

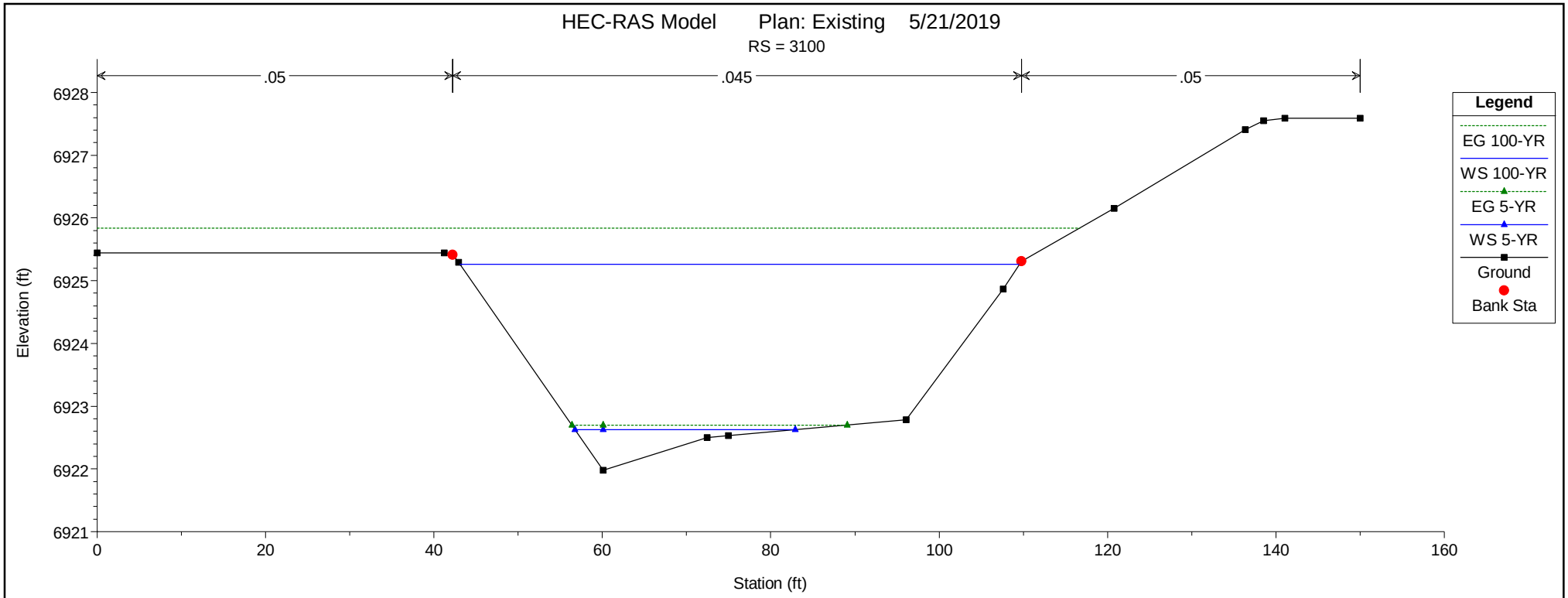

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

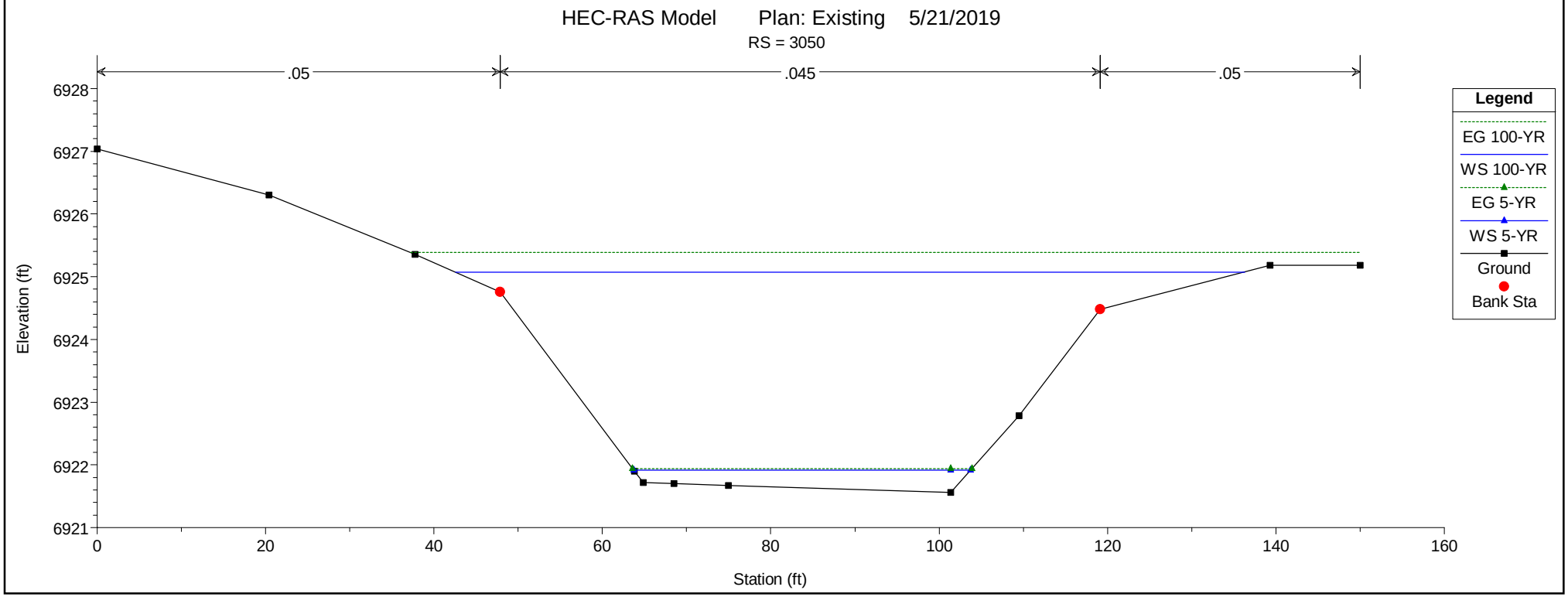

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3300
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

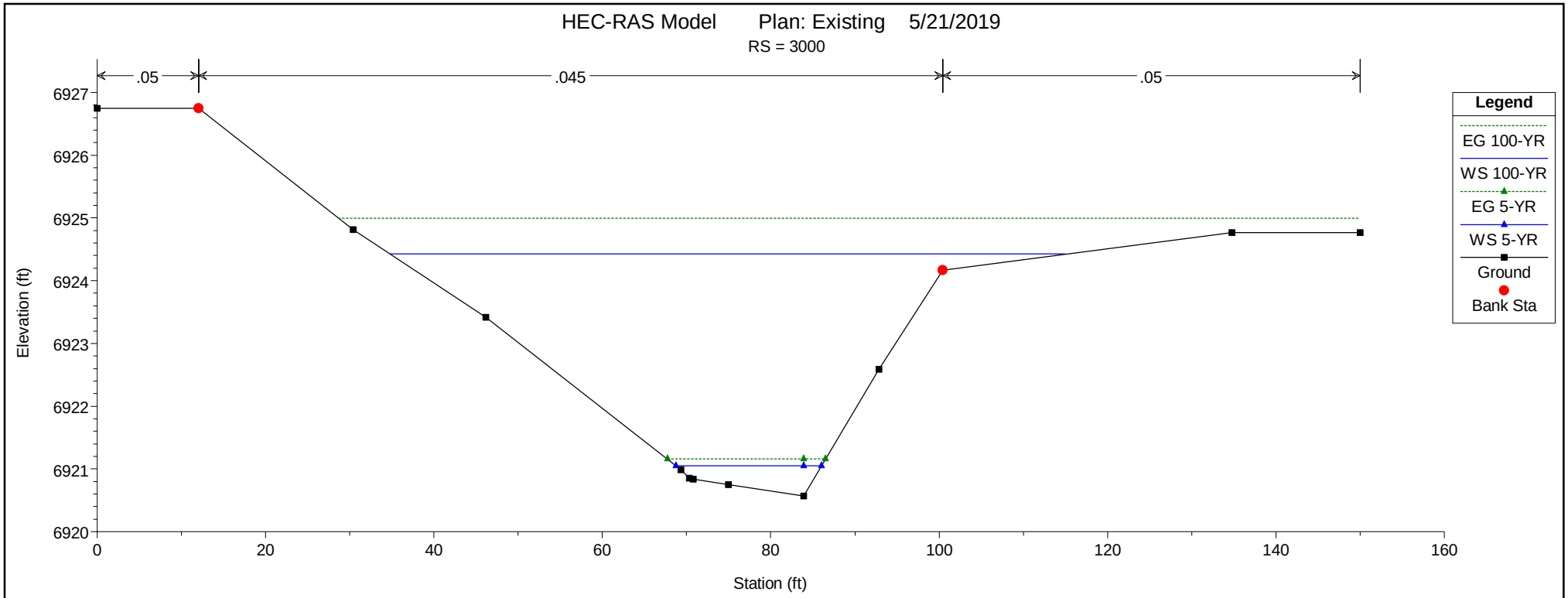

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3250
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

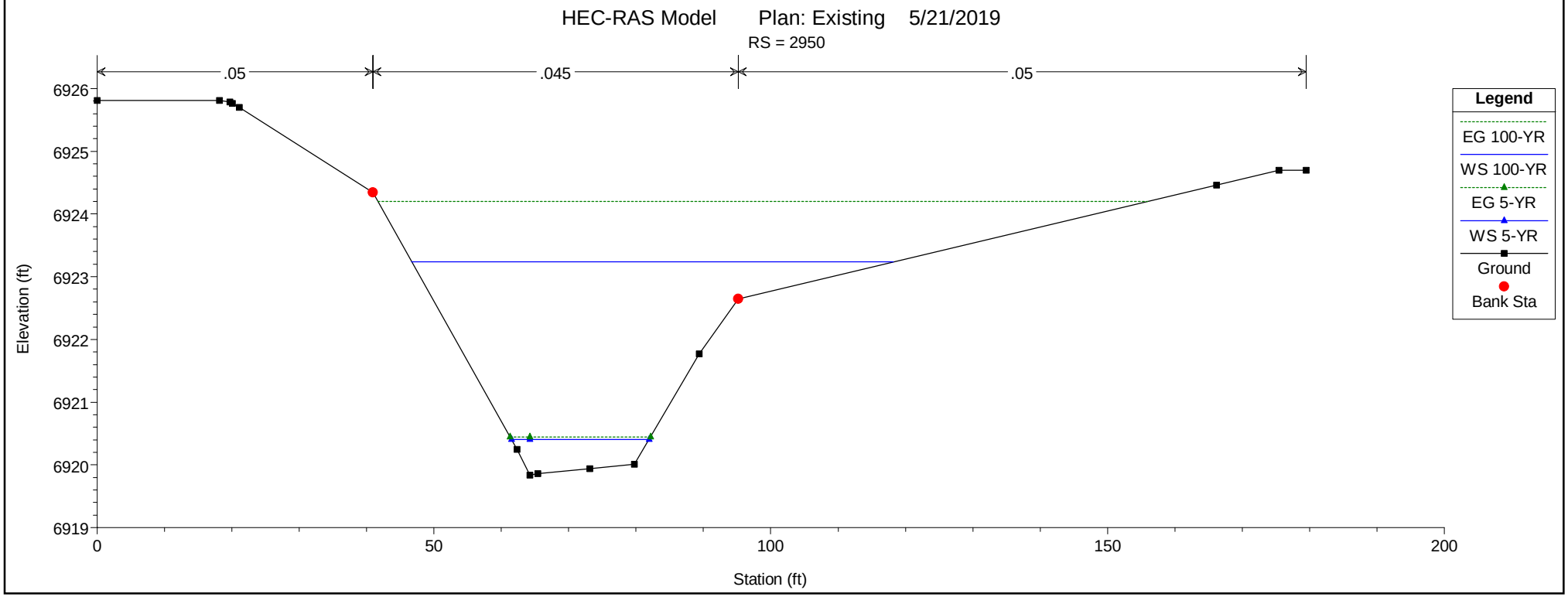

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3200
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6930
6929
6928
6927
6926
6925
6924
6923
0
20
40
60
80
100
120
140
160

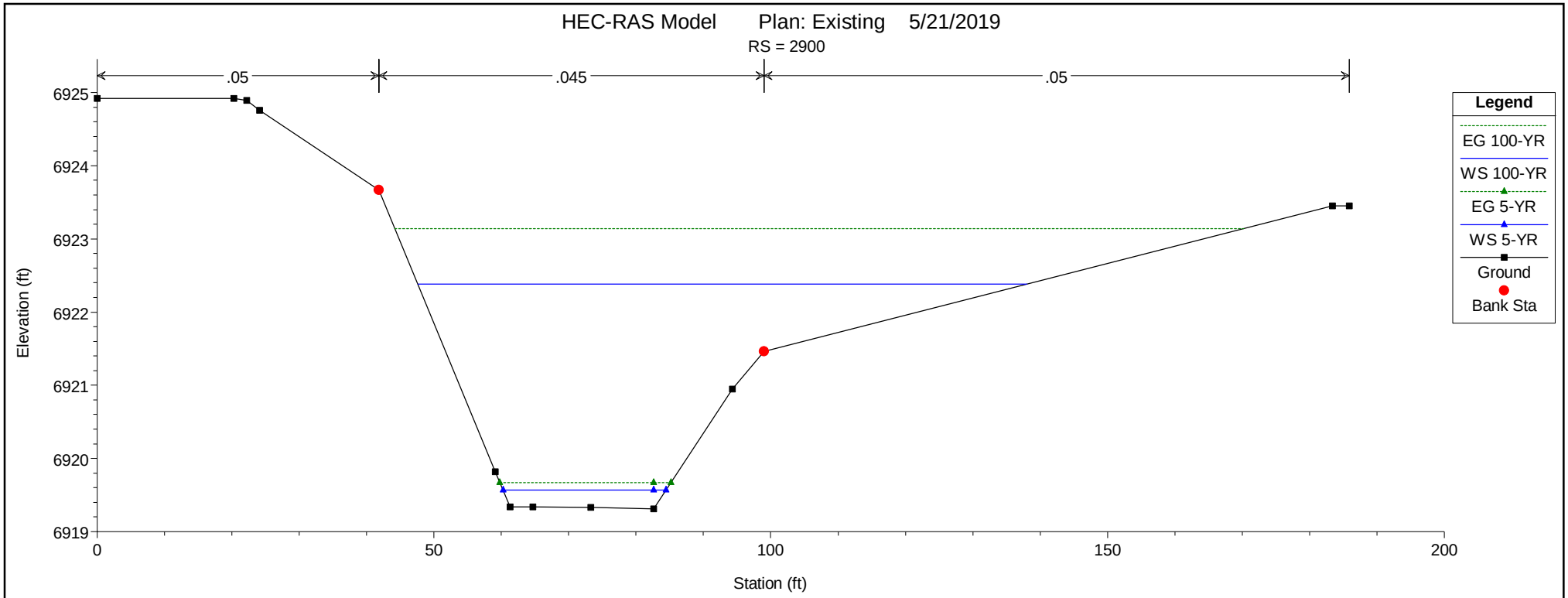

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3150
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6929
6928
6927
6926
6925
6924
6923
0
20
40
60
80
100
120
140
160

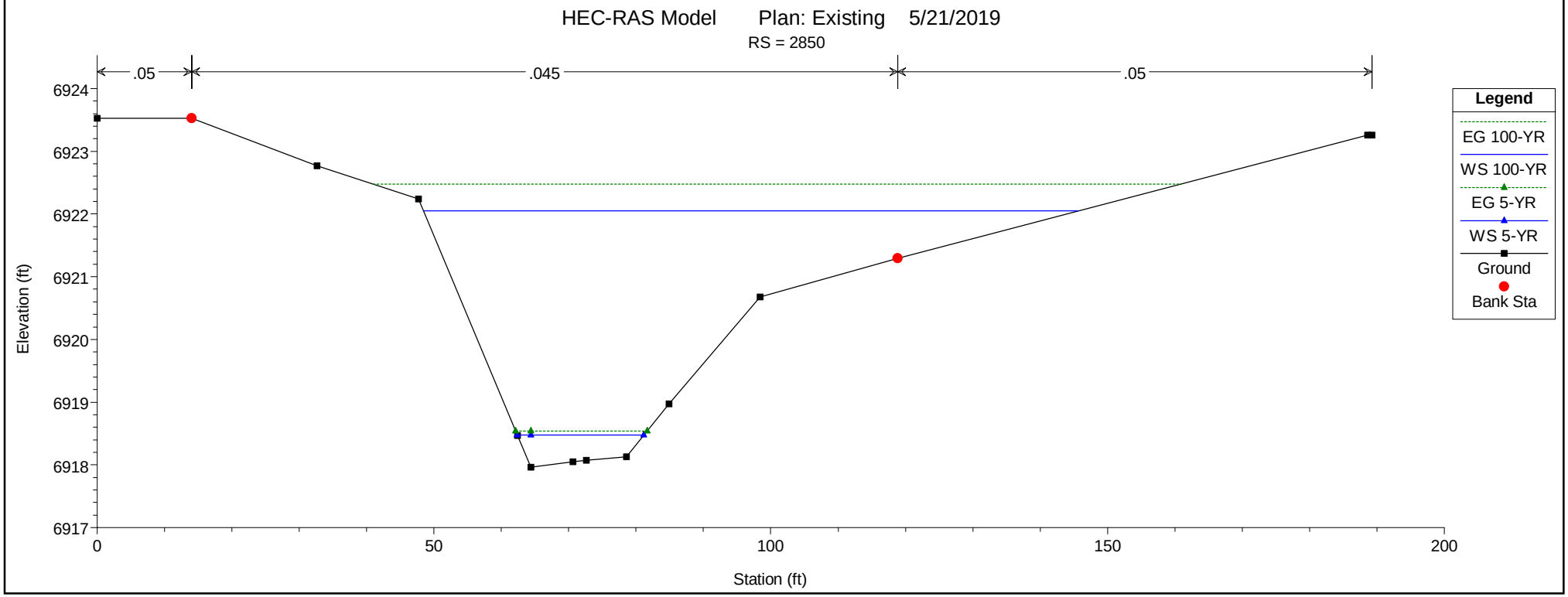

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

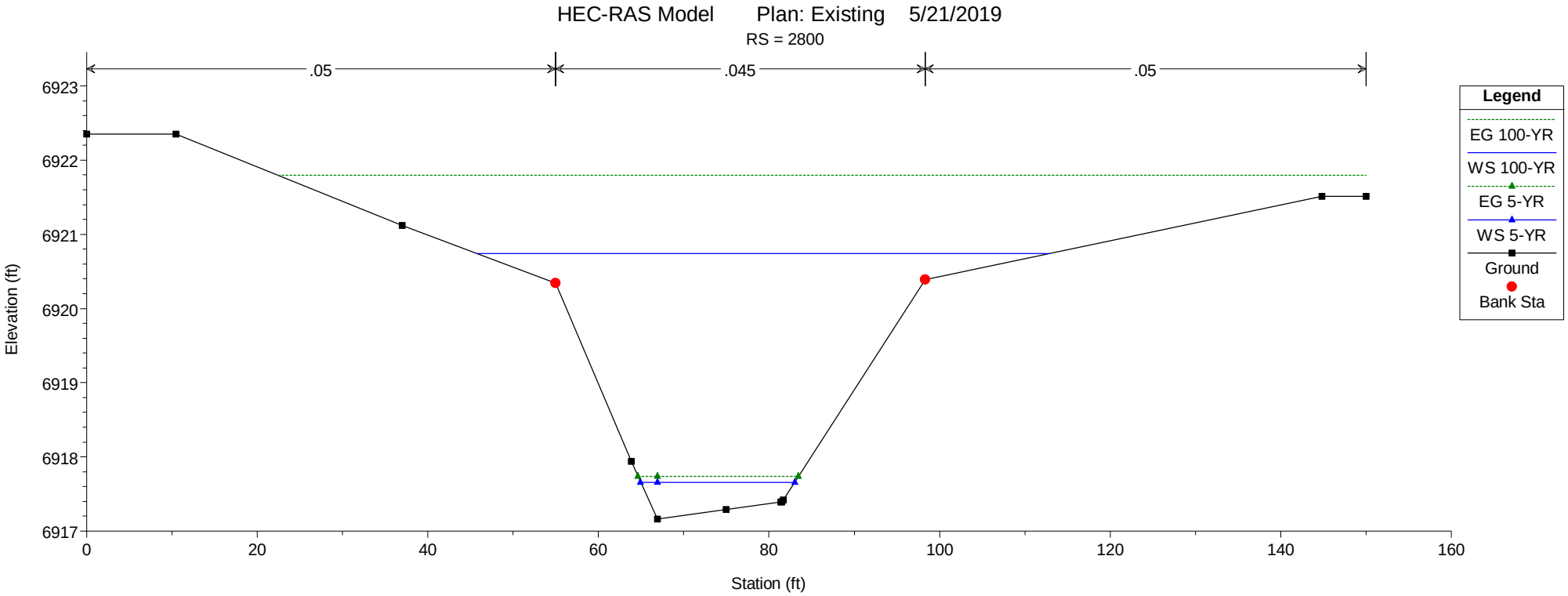

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3050
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

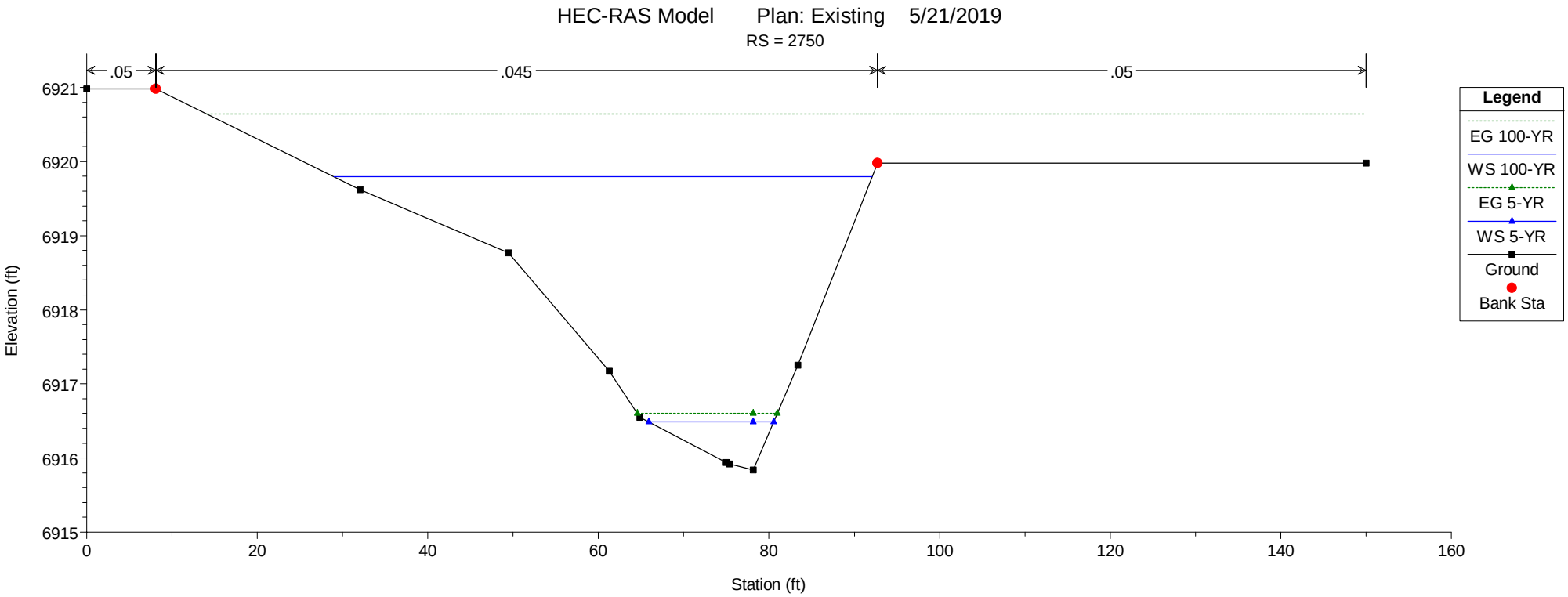

HEC-RAS Model Plan: Existing 5/21/2019
RS = 3000
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

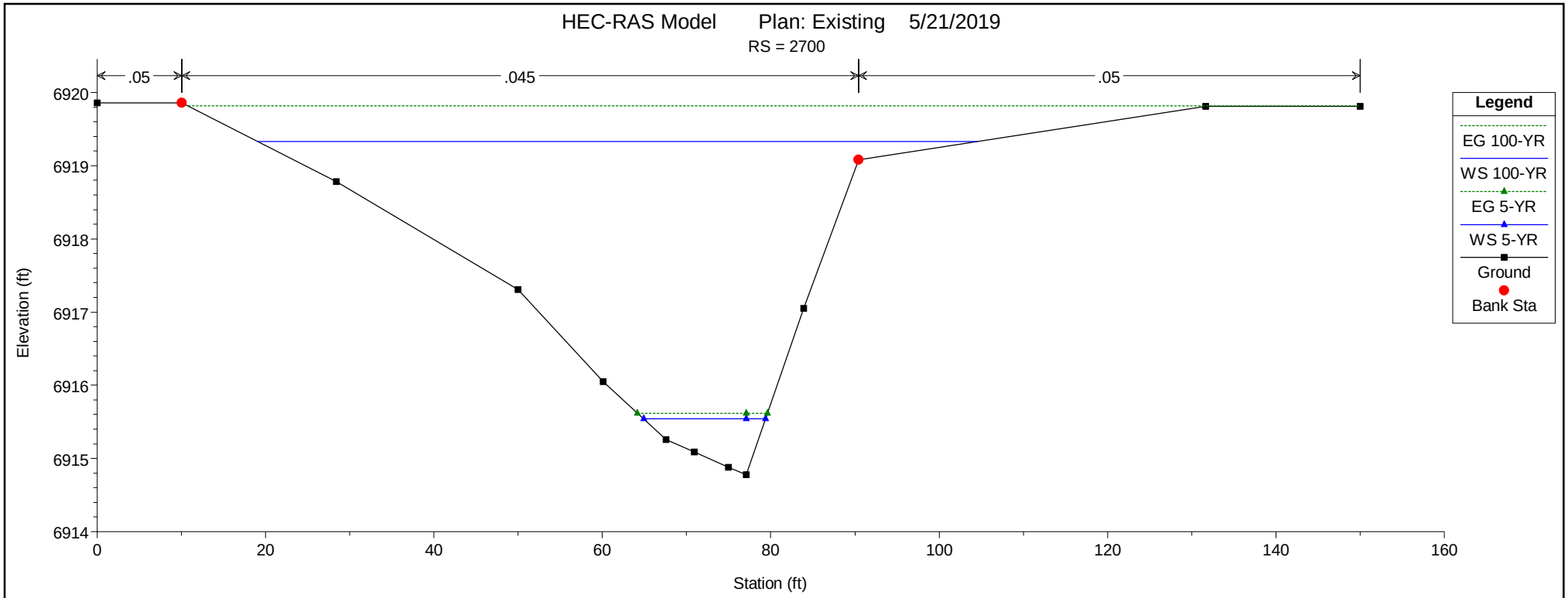

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

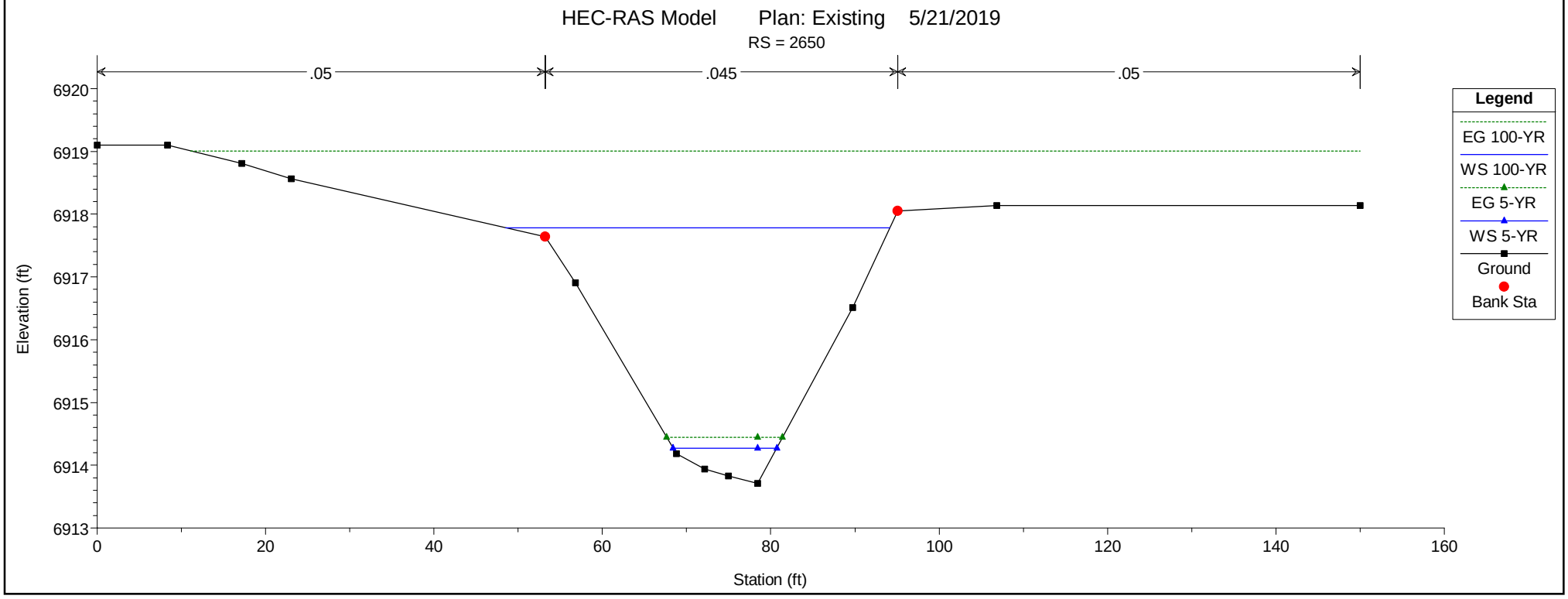

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2900
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

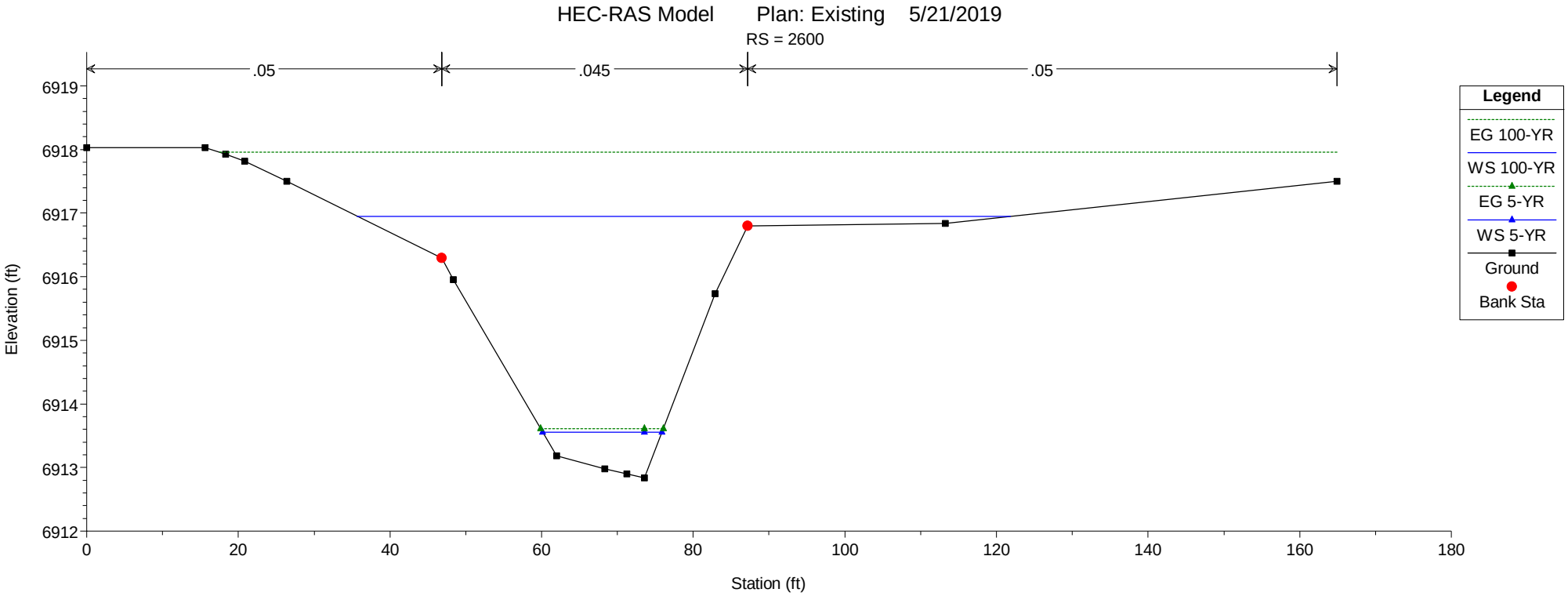

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2850
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

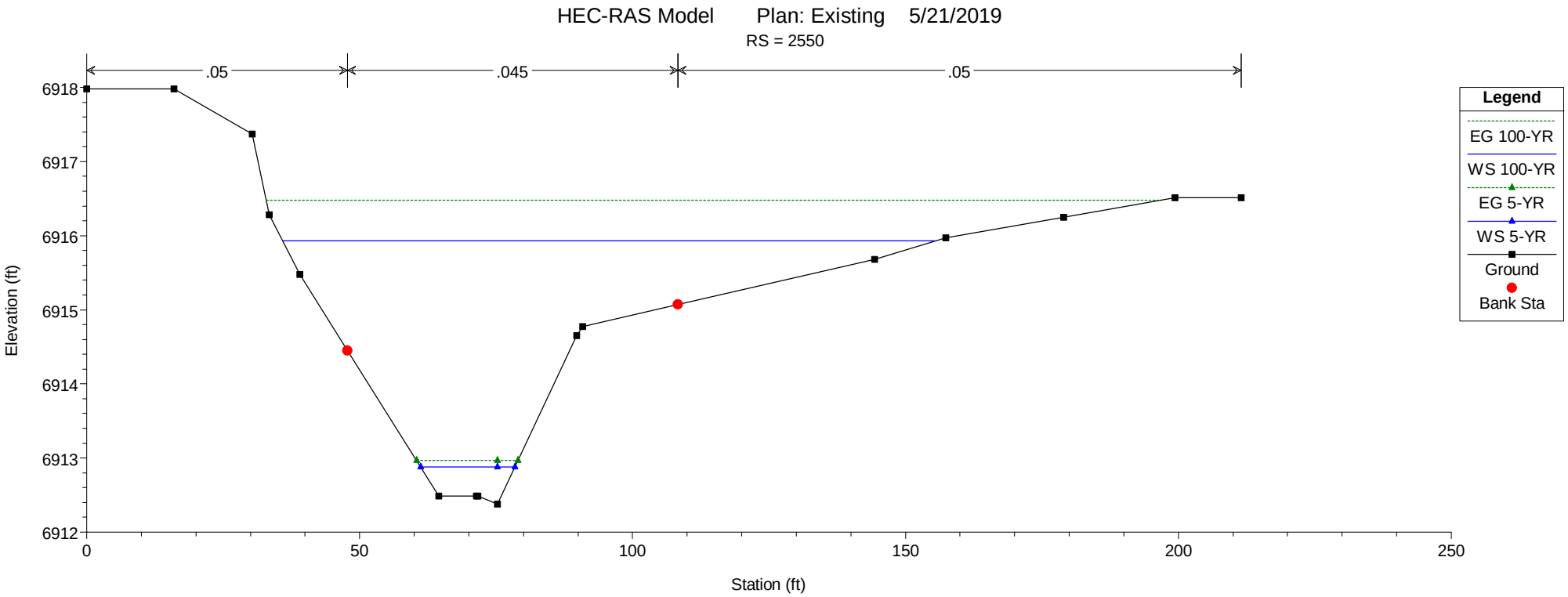

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2800
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

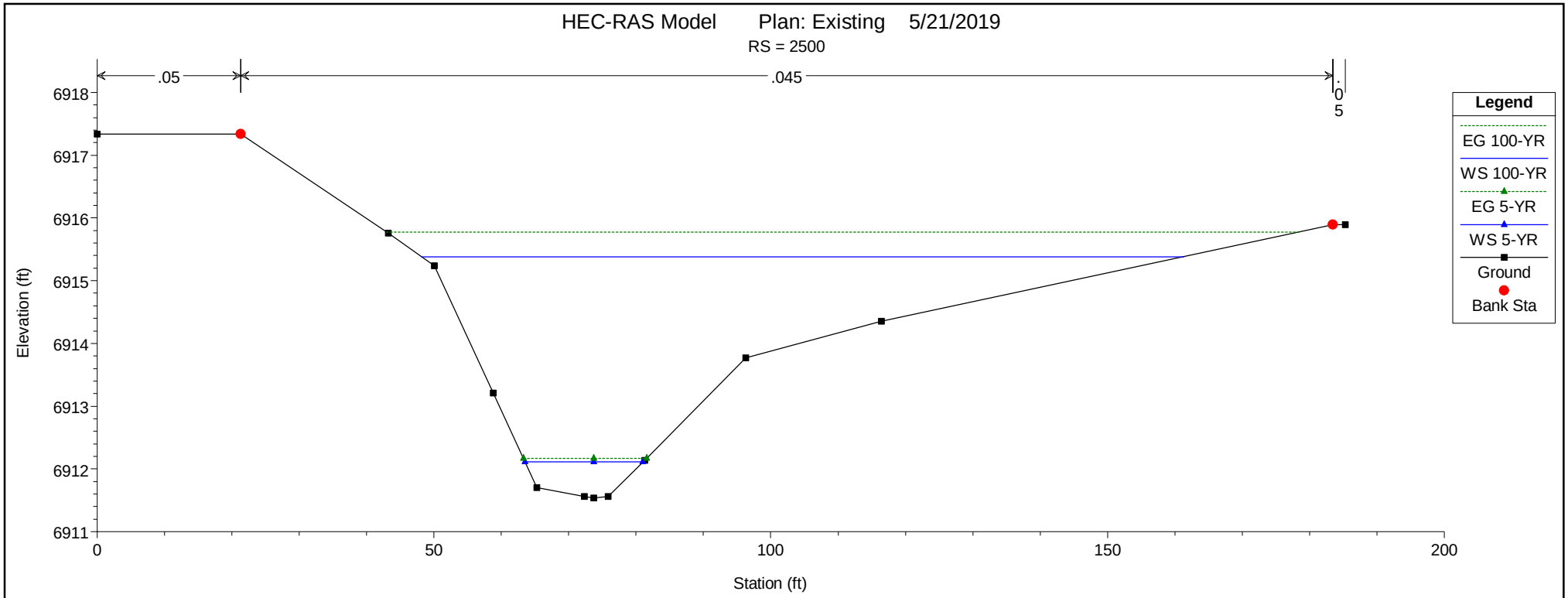

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2750
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2700
.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 = 2650
.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 = 2600
.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 = 2550
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta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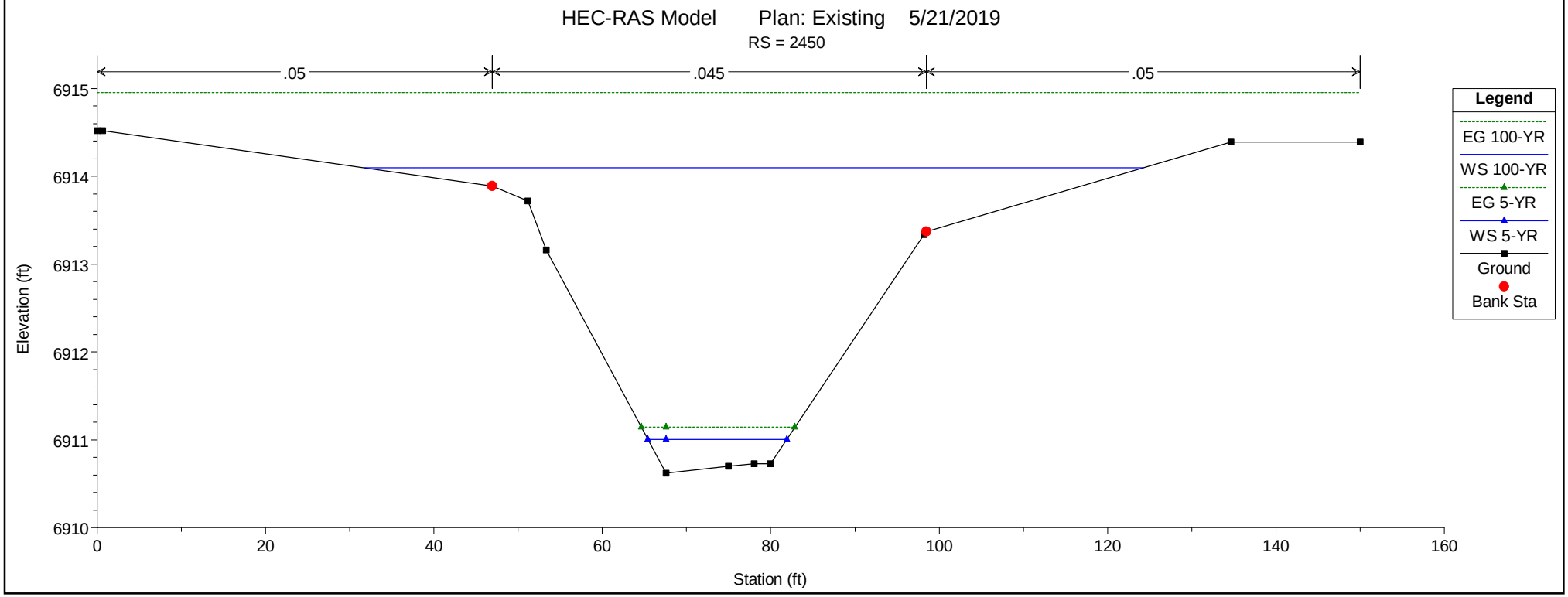
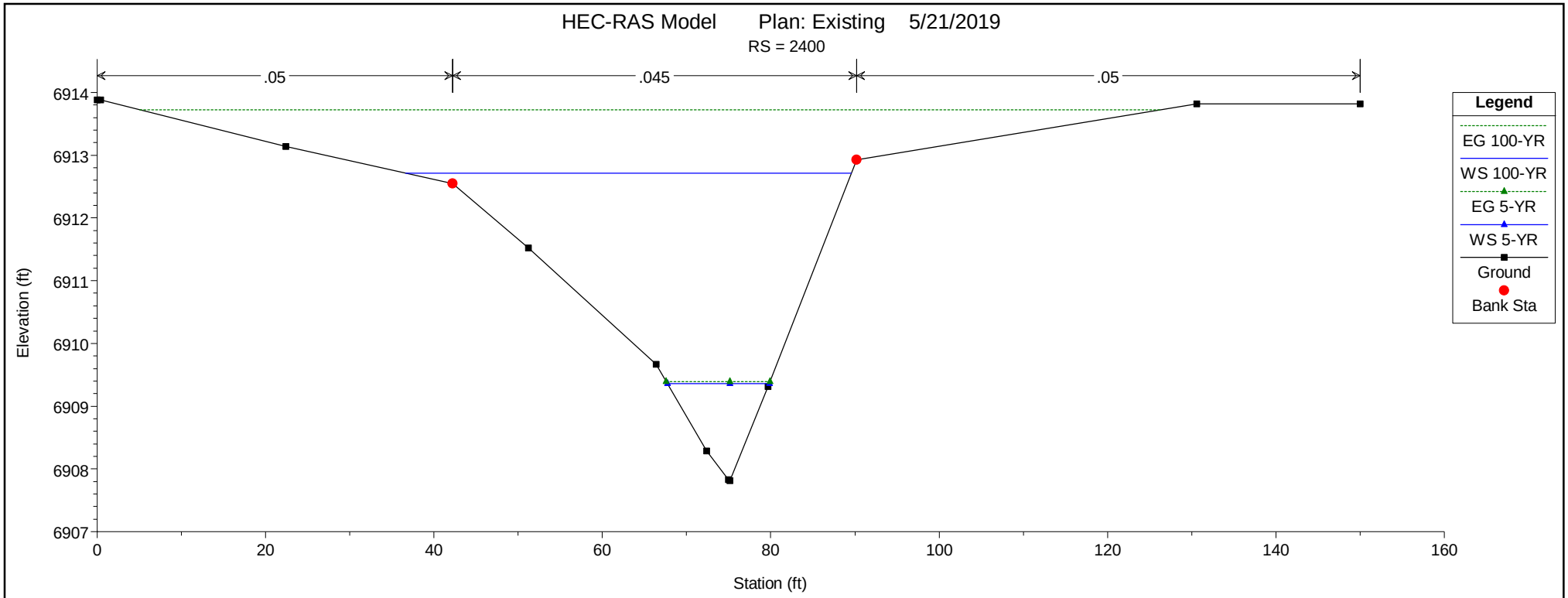
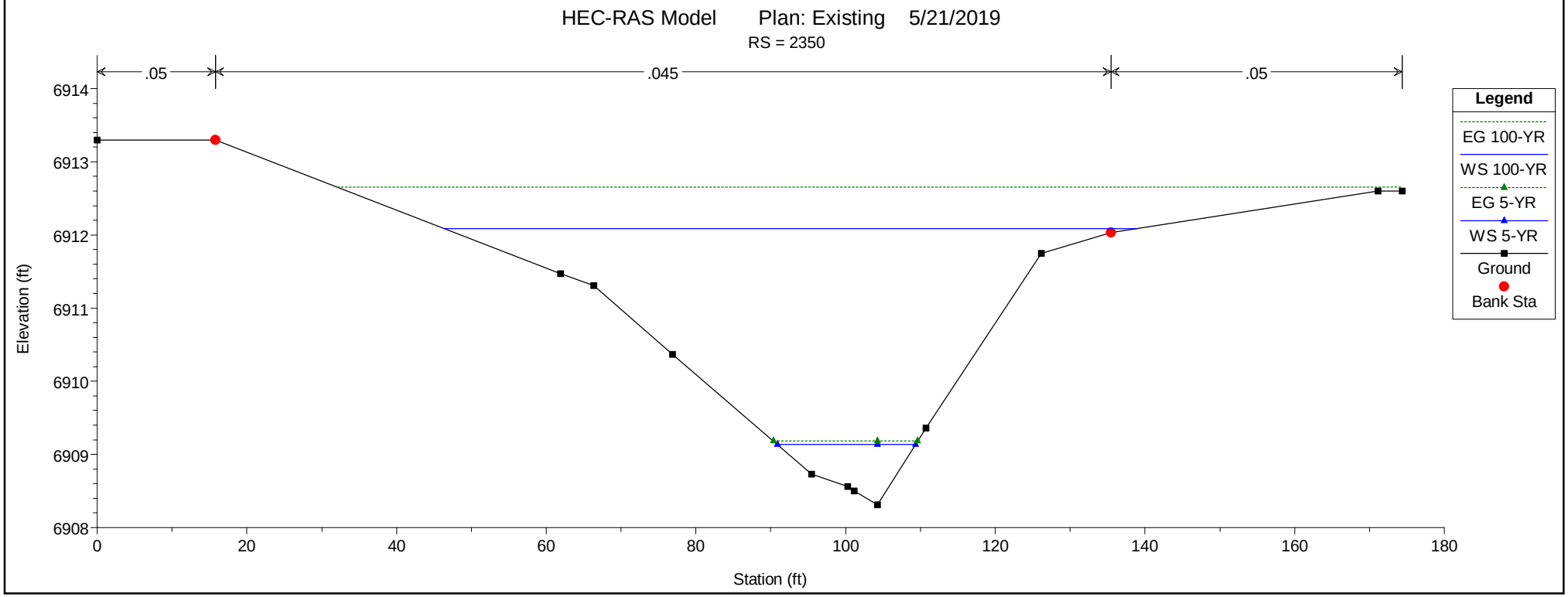
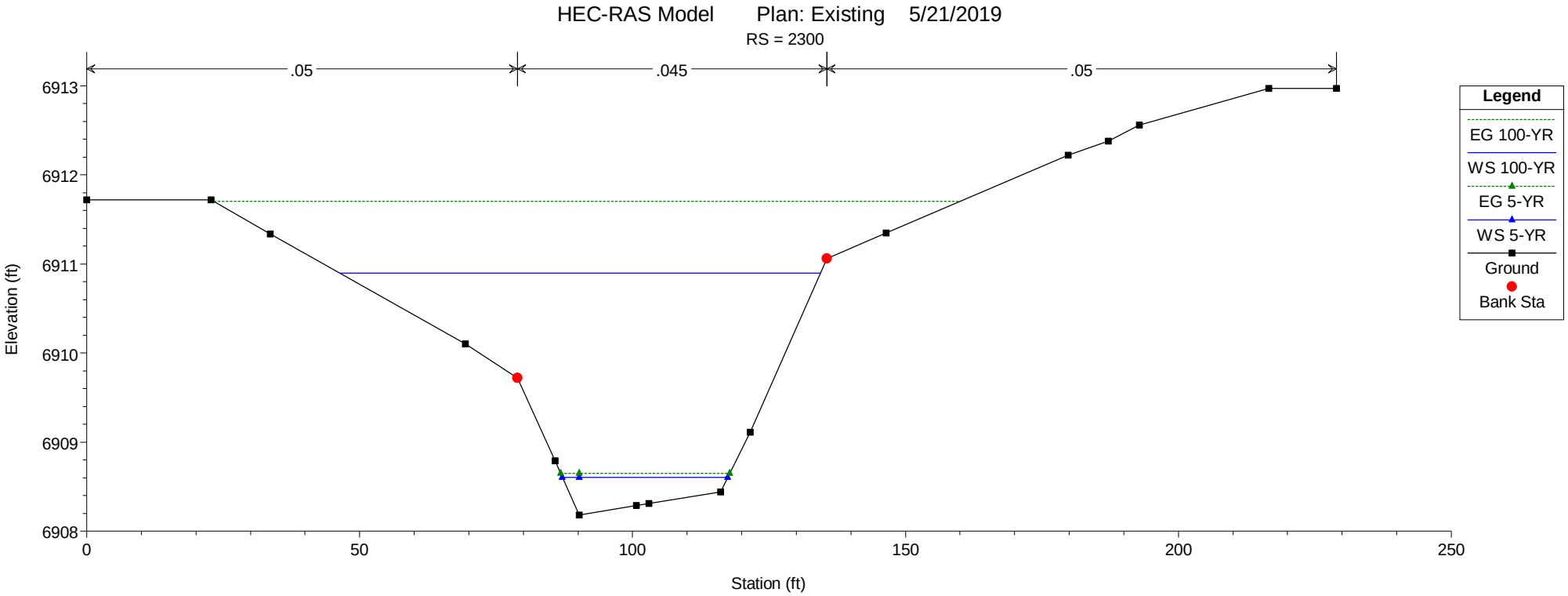
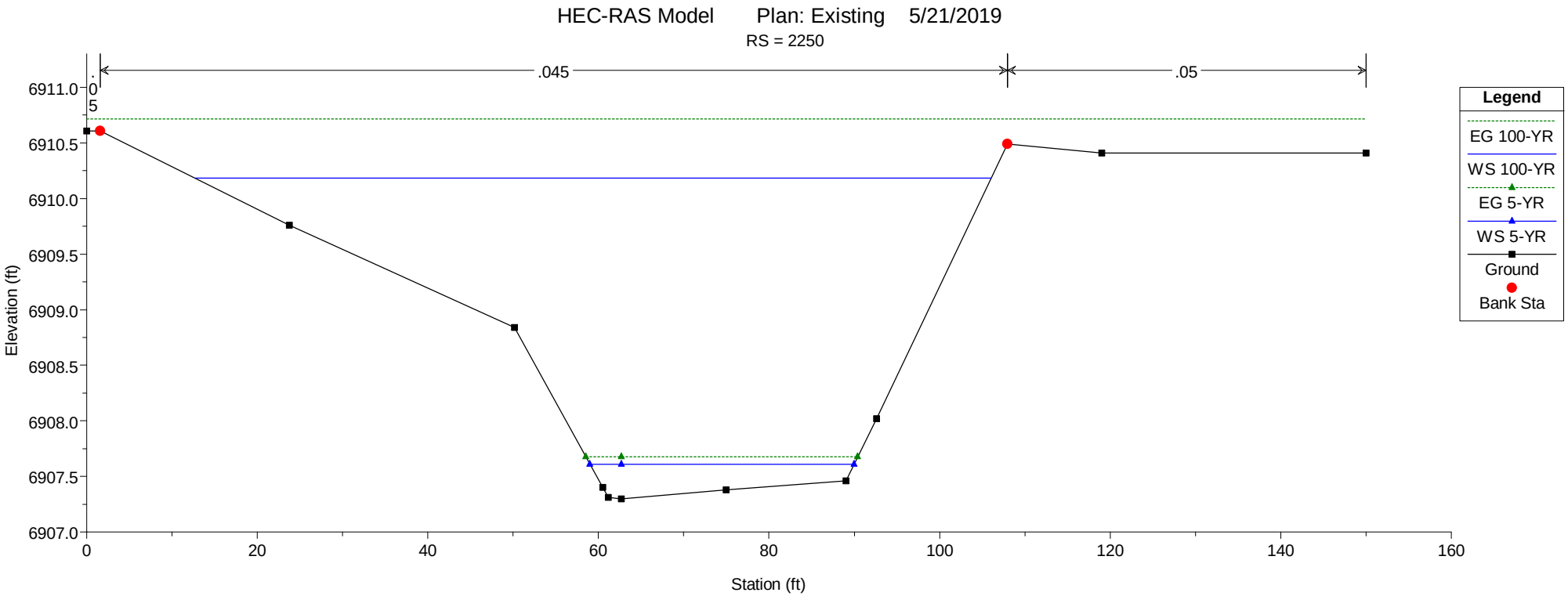
RS = 2500
.05
.045
.05
Elevation (ft)
6918
6917
6916
6915
6914
6913
6912
6911
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

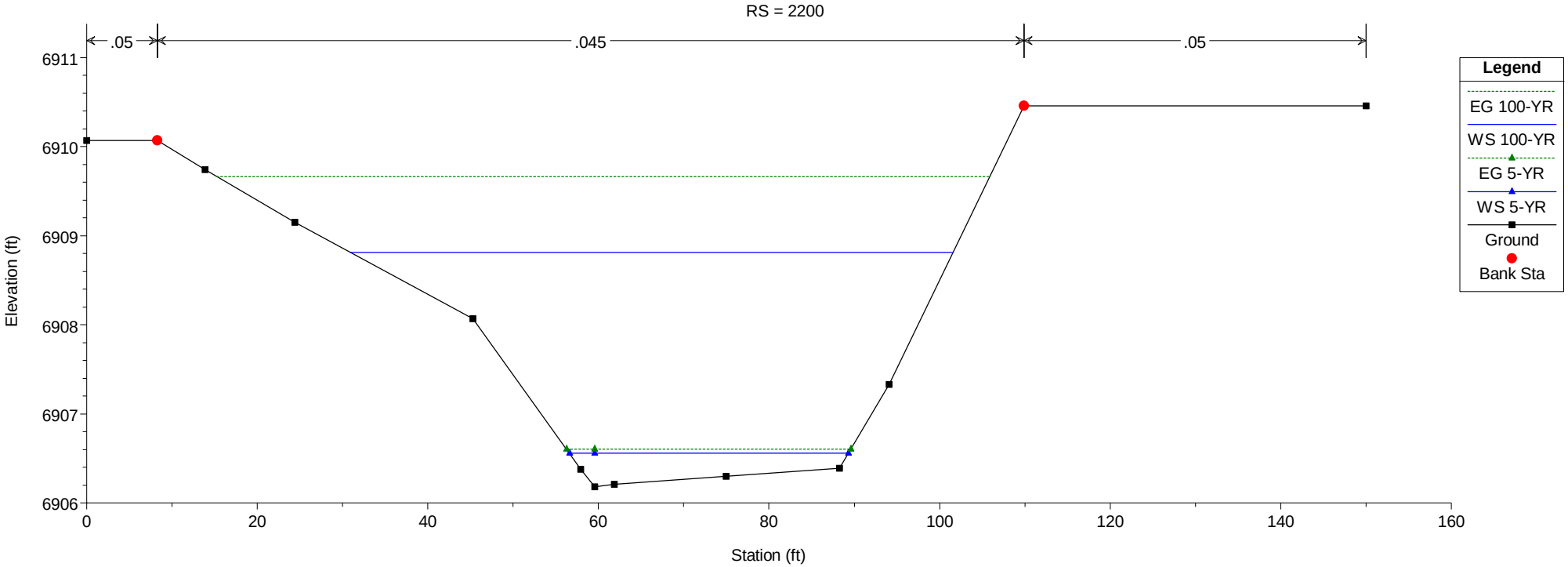

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2450
.05
.045
.05
Elevation (ft)
6915
6914
6913
6912
6911
6910
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

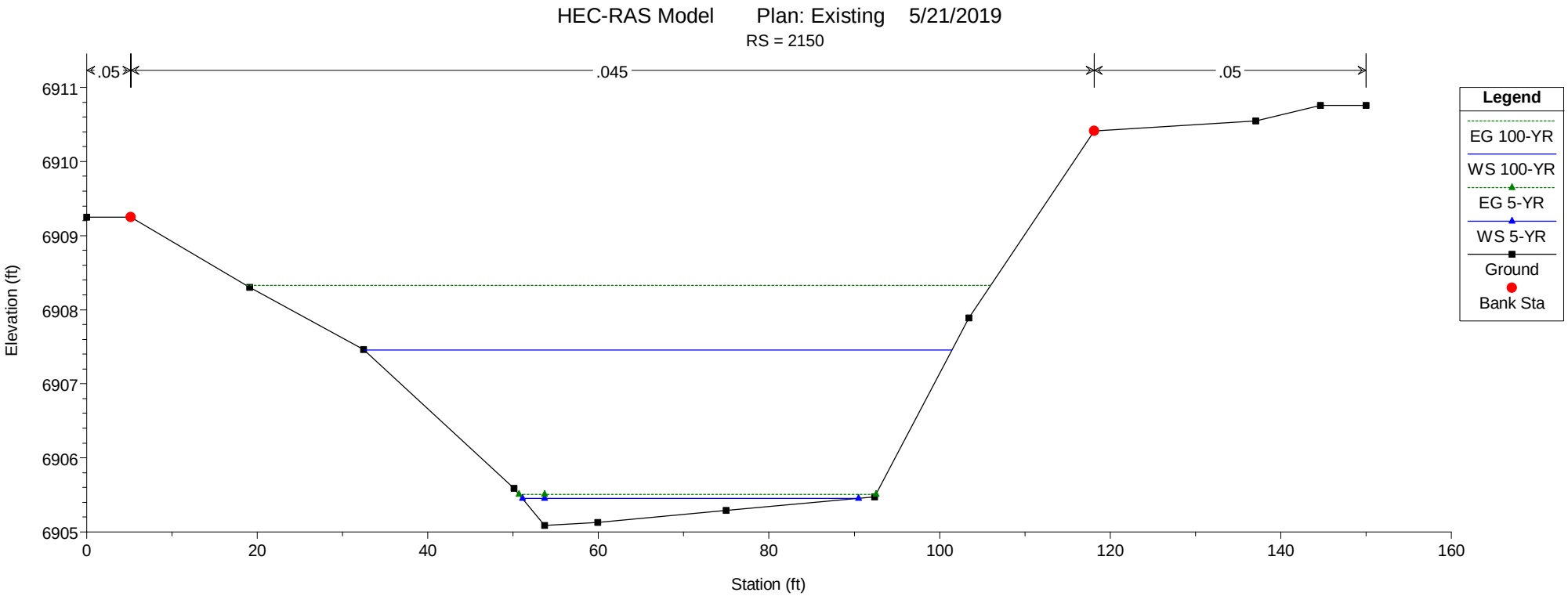

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

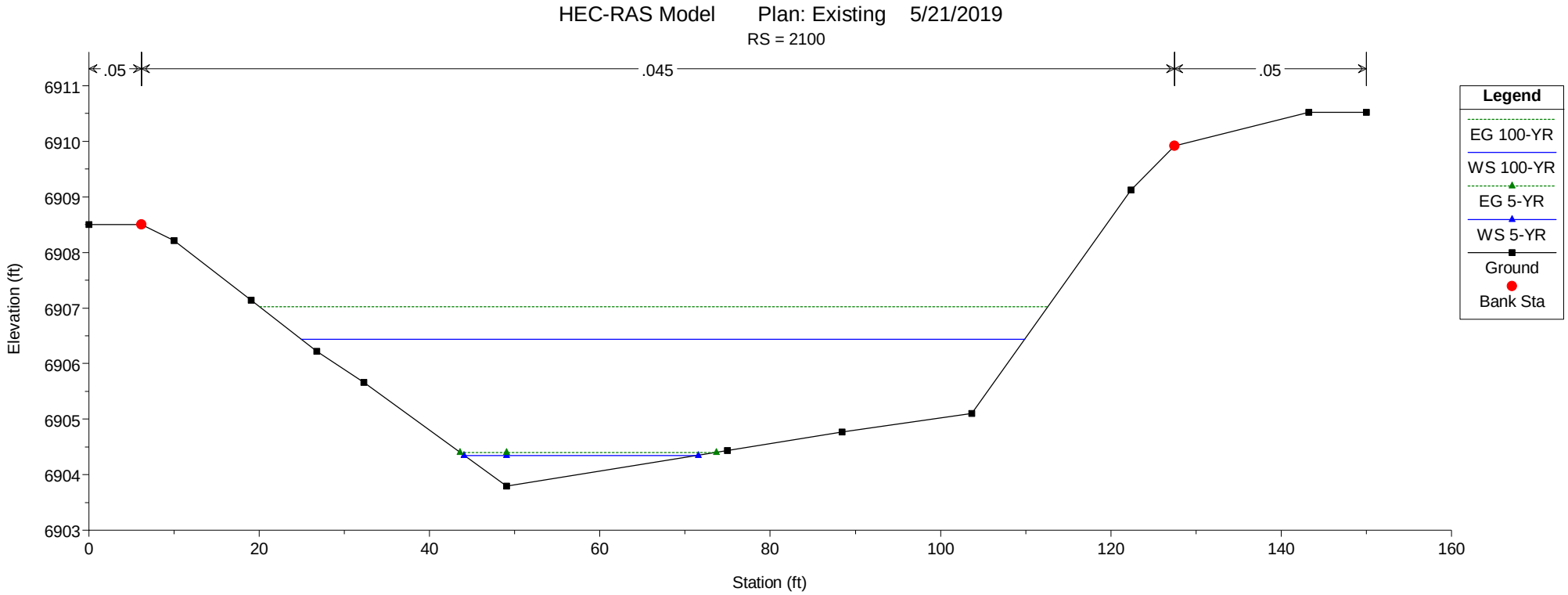

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

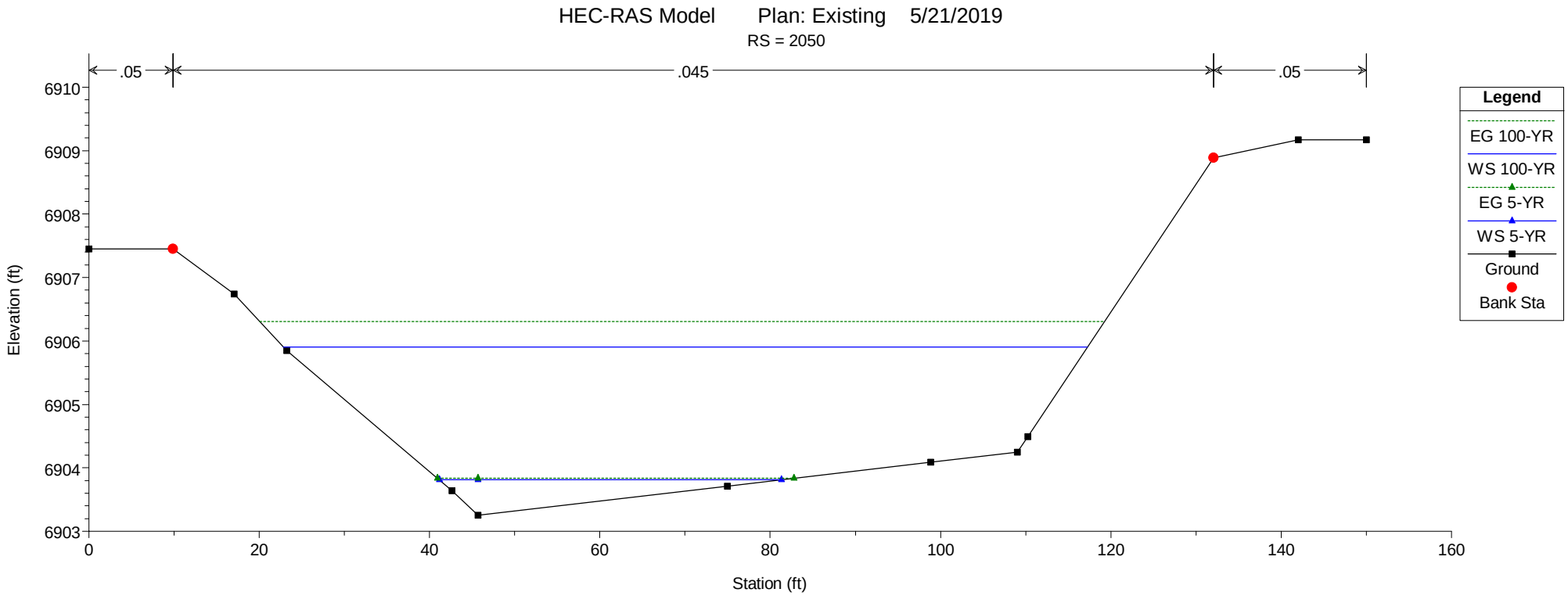

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2300
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2250
.05
.045
.05
Elevation (ft)
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
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6911
6910
6909
6908
6907
6906
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2150
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6911
6910
6909
6908
6907
6906
6905
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 2100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta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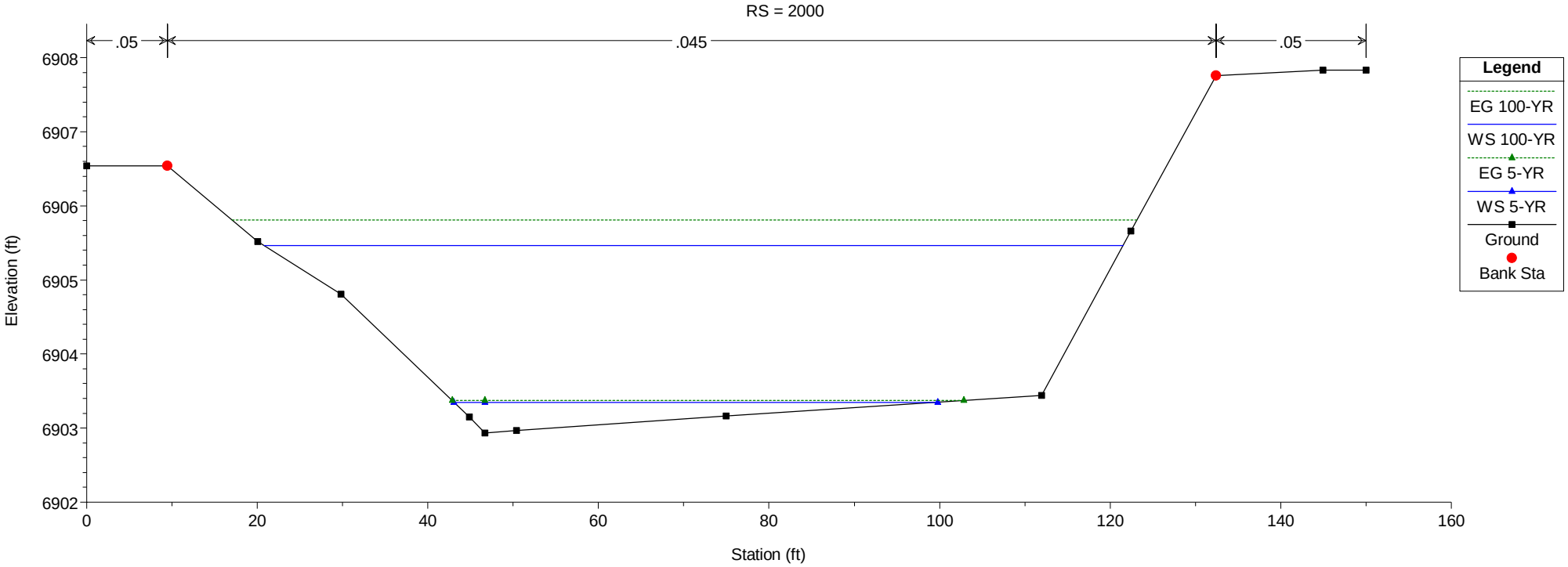
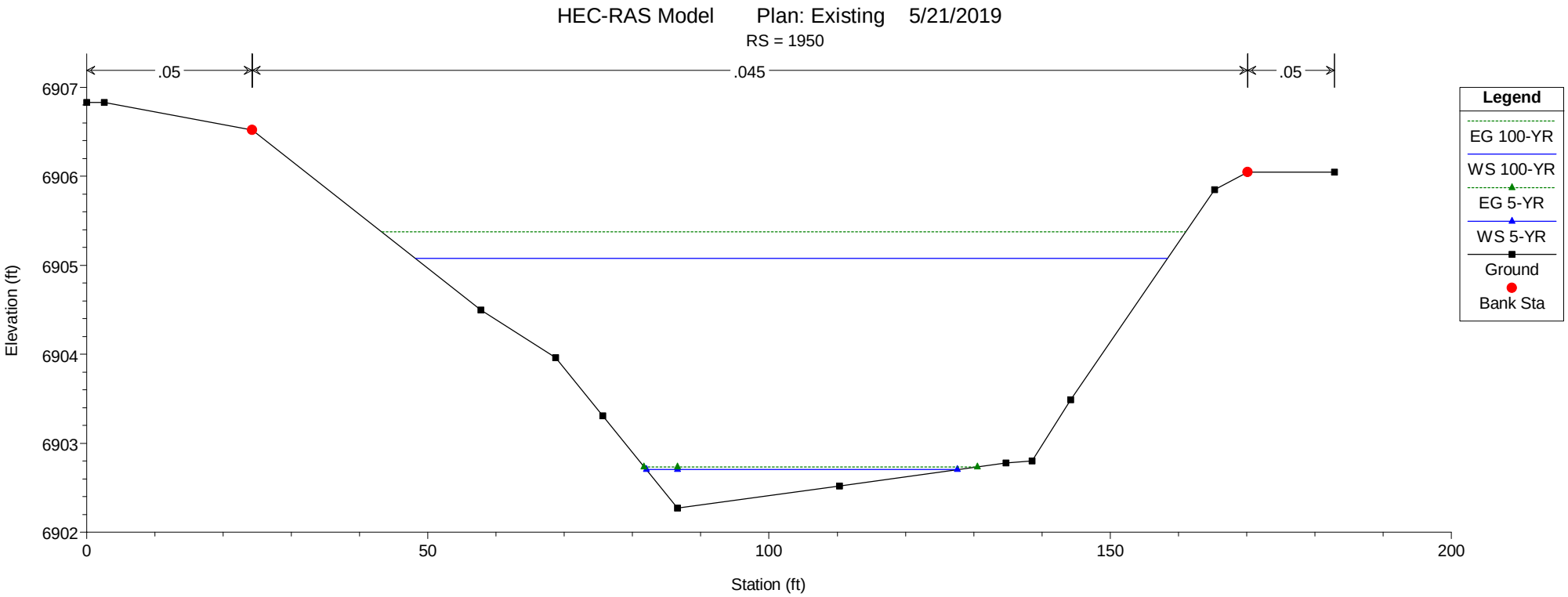
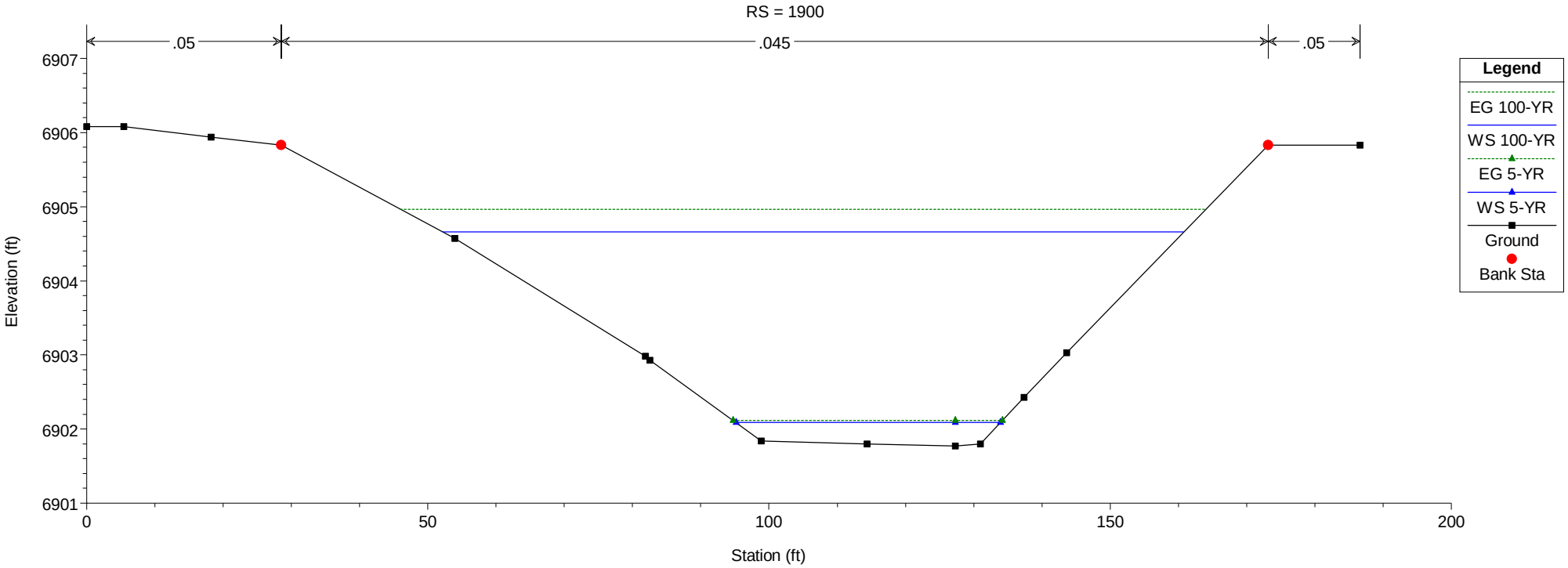
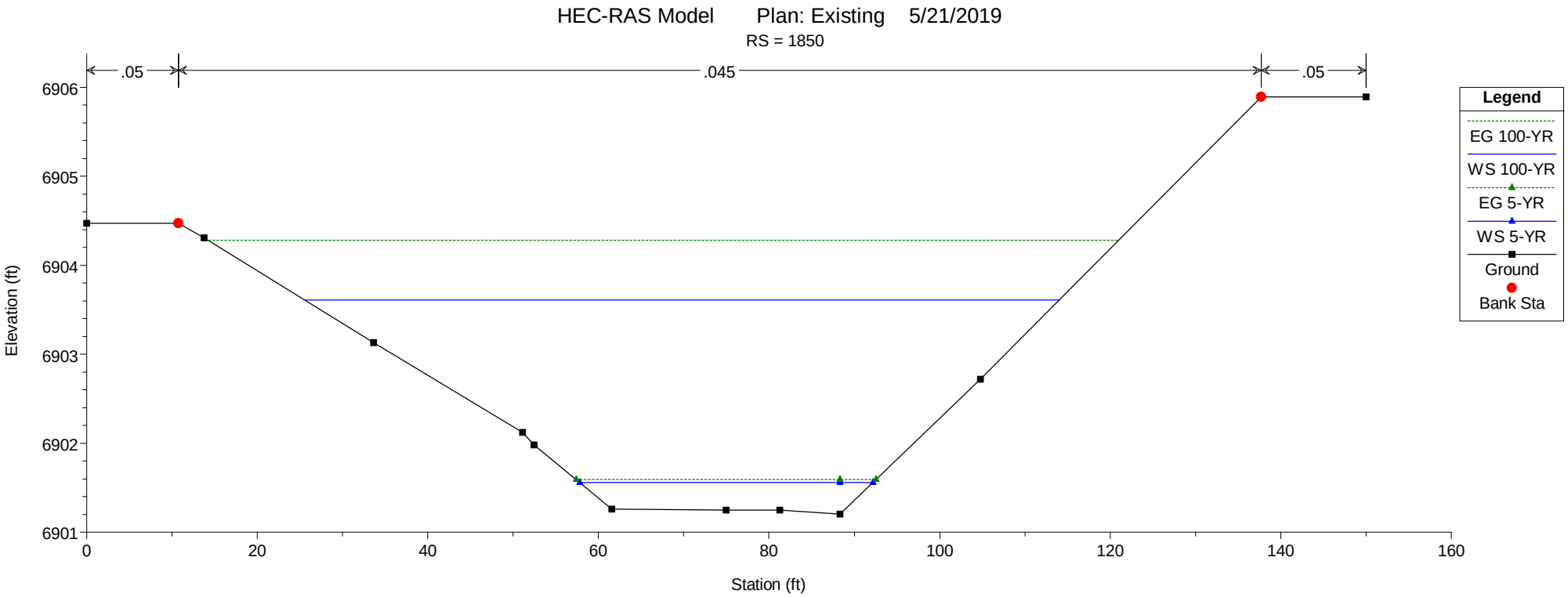
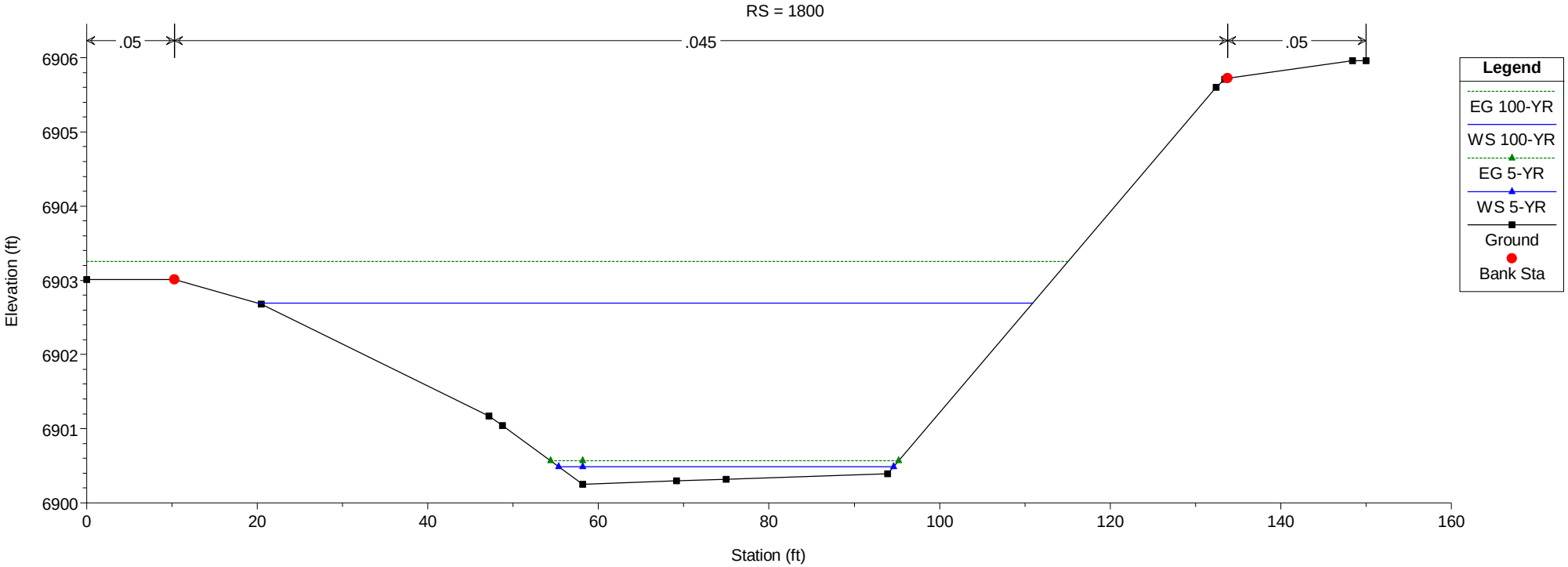
RS = 2050
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

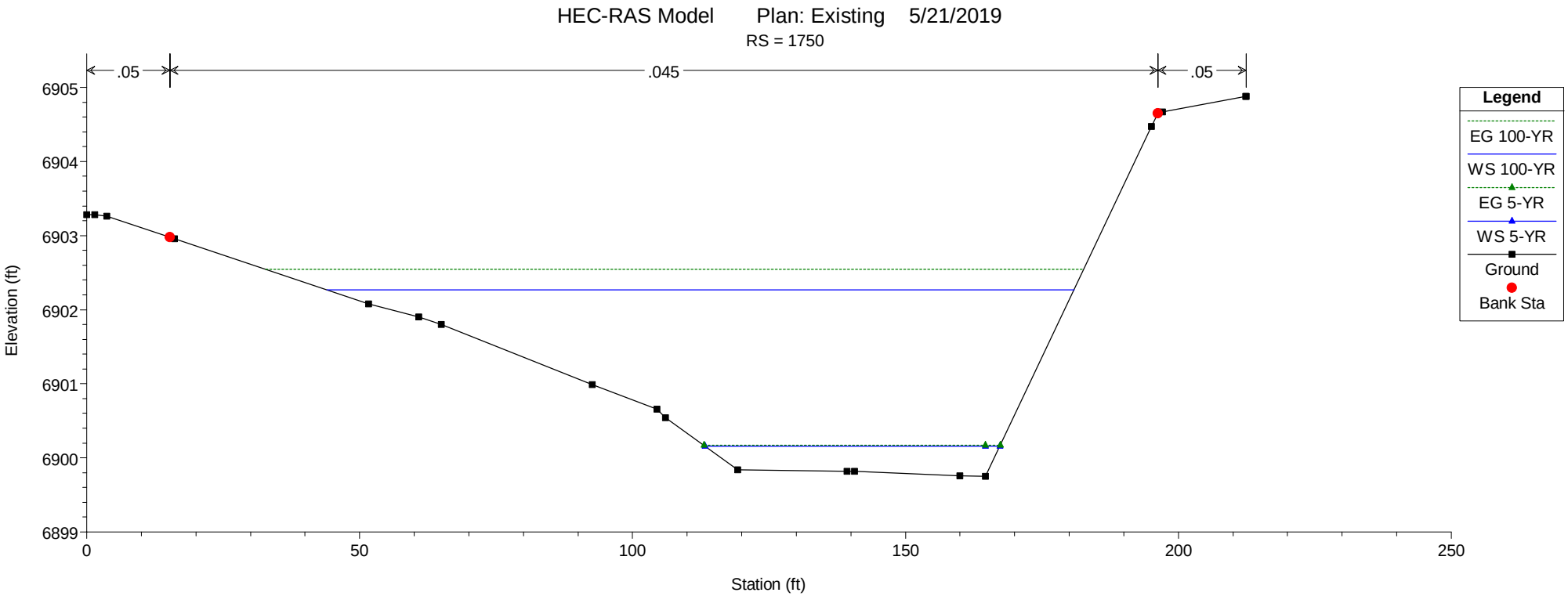

HEC-RAS Model Plan: Existing 5/21/2019
RS = 2000
.05
.045
.05
Elevation (ft)
6908
6907
6906
6905
6904
6903
6902
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

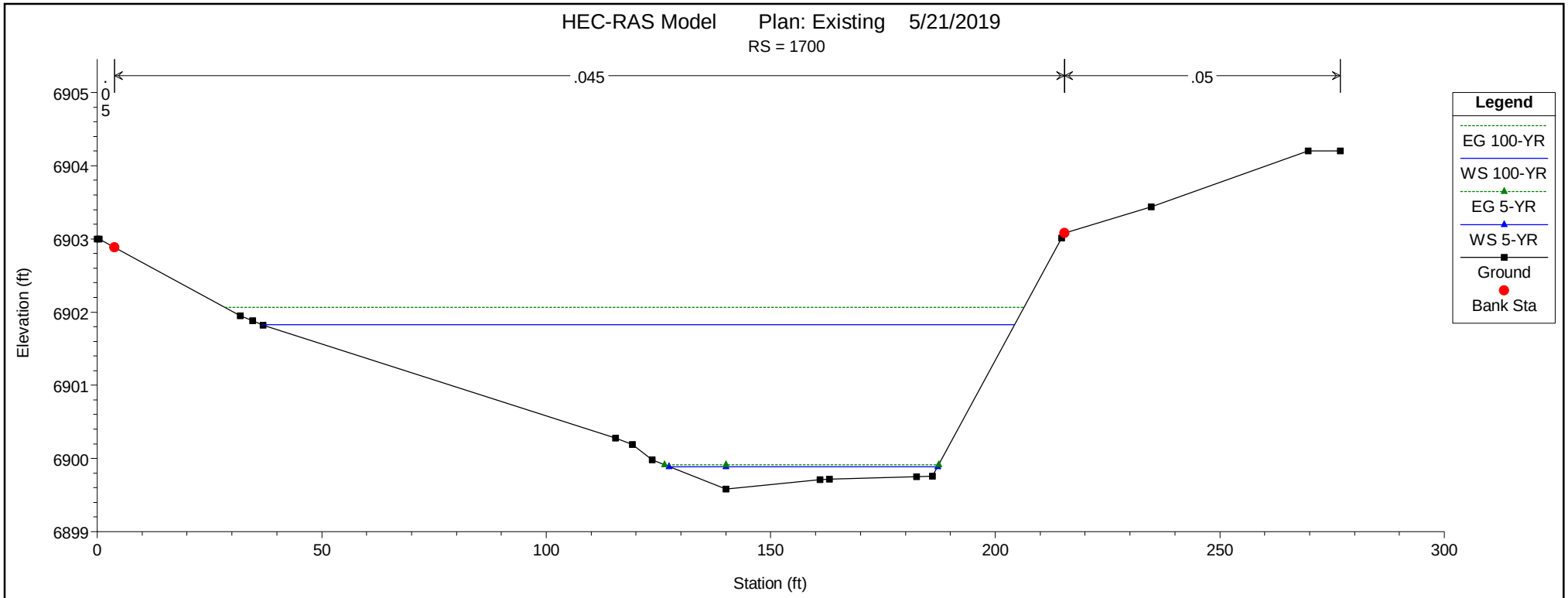

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1950
.05
.045
.05
Elevation (ft)
6907
6906
6905
6904
6903
6902
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

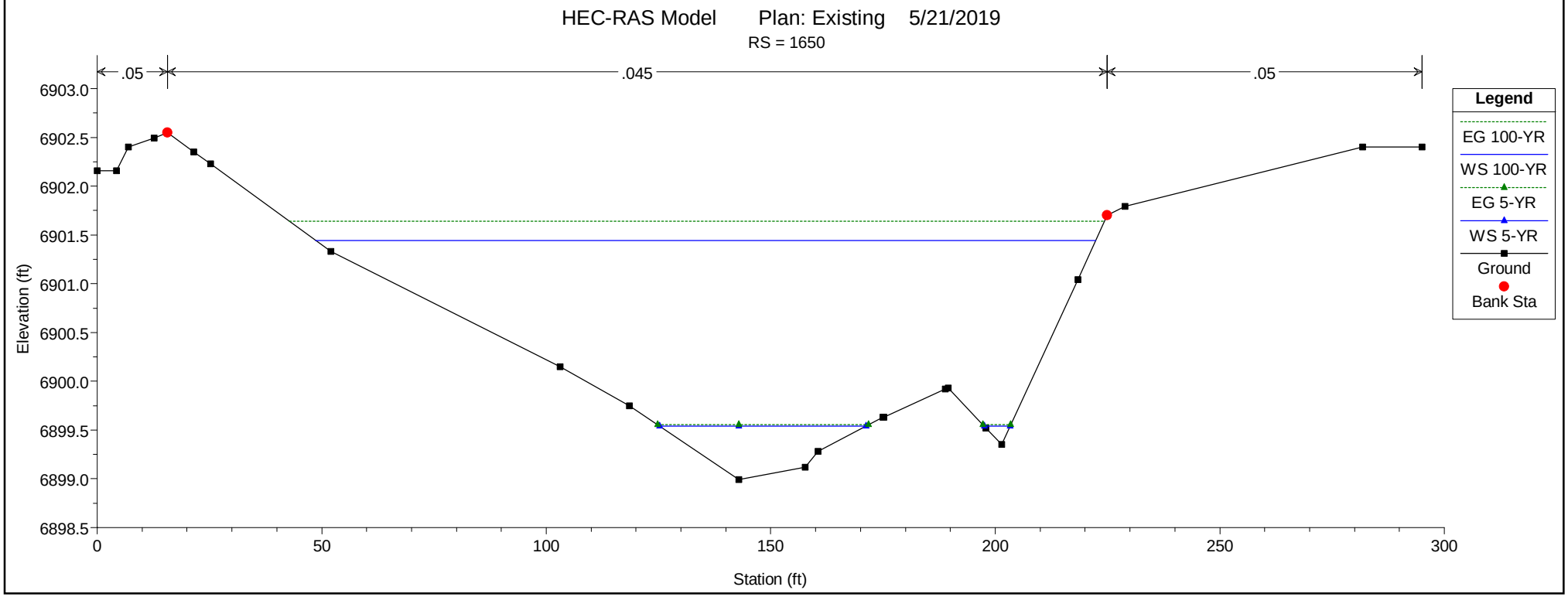

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1900
.05
.045
.05
Elevation (ft)
6907
6906
6905
6904
6903
6902
6901
0
50
100
150
200
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

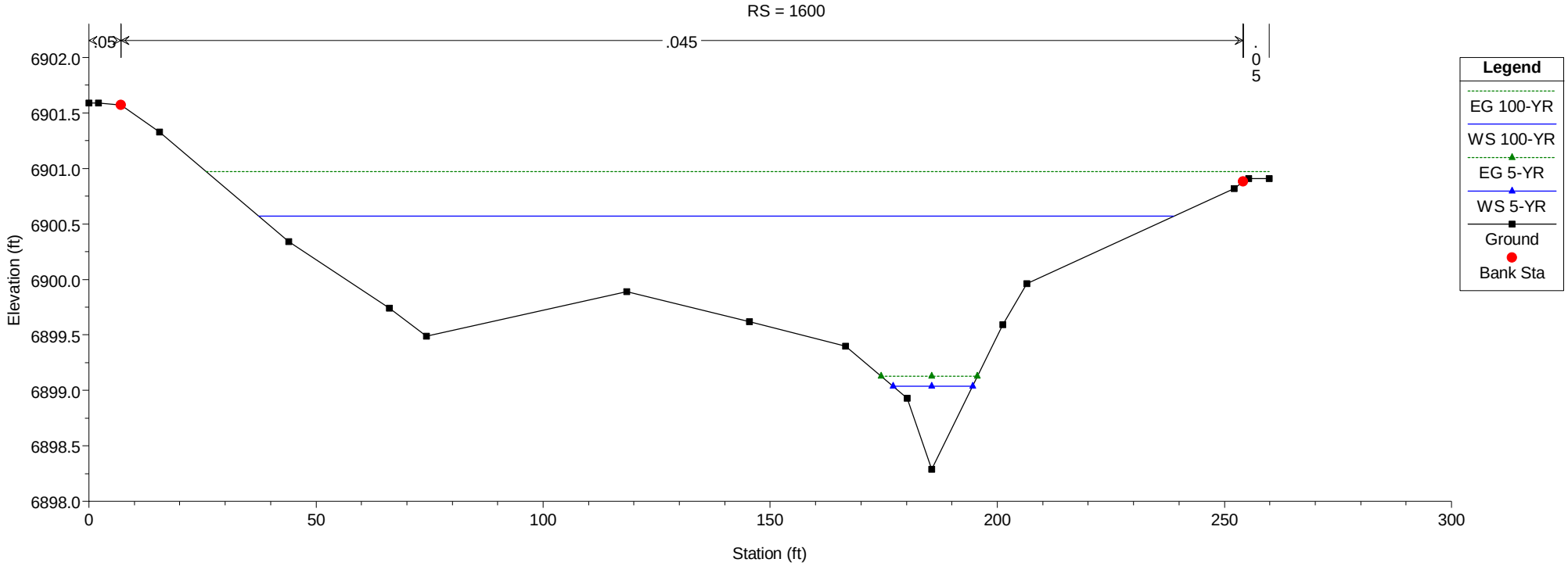

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1850
.05
.045
.05
Elevation (ft)
6906
6905
6904
6903
6902
6901
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

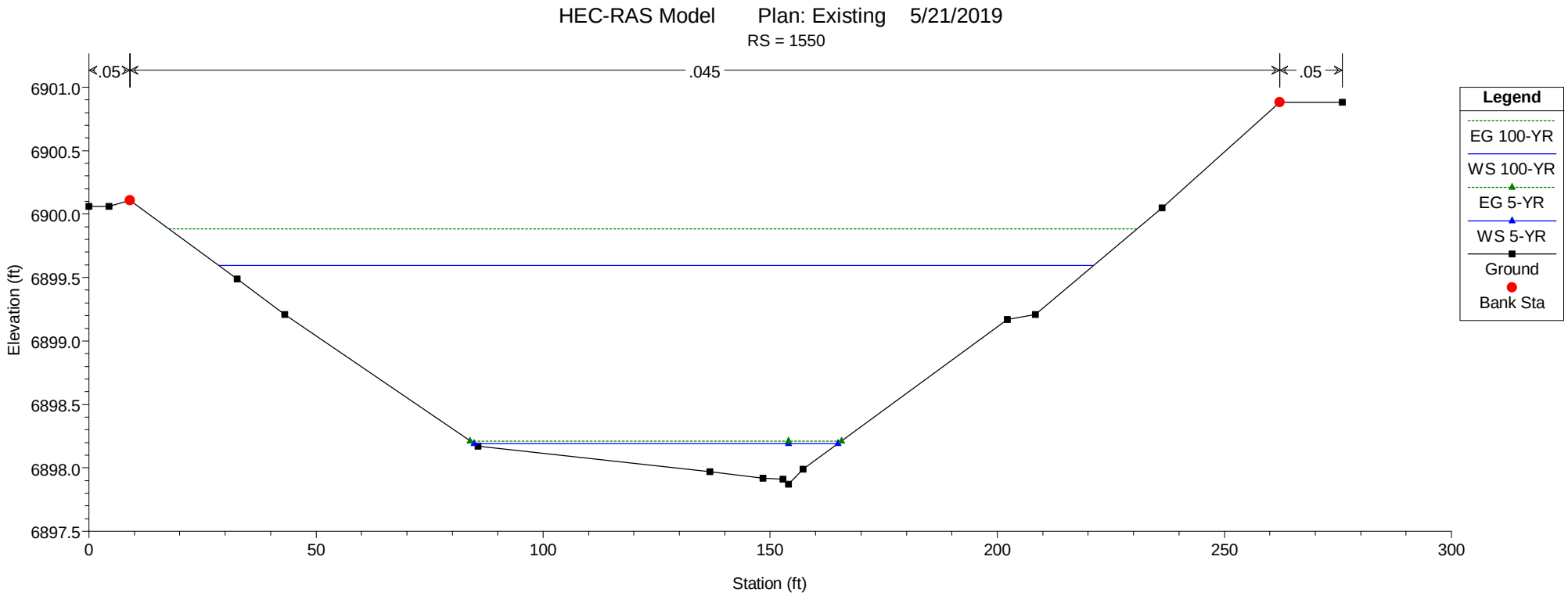

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1800
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

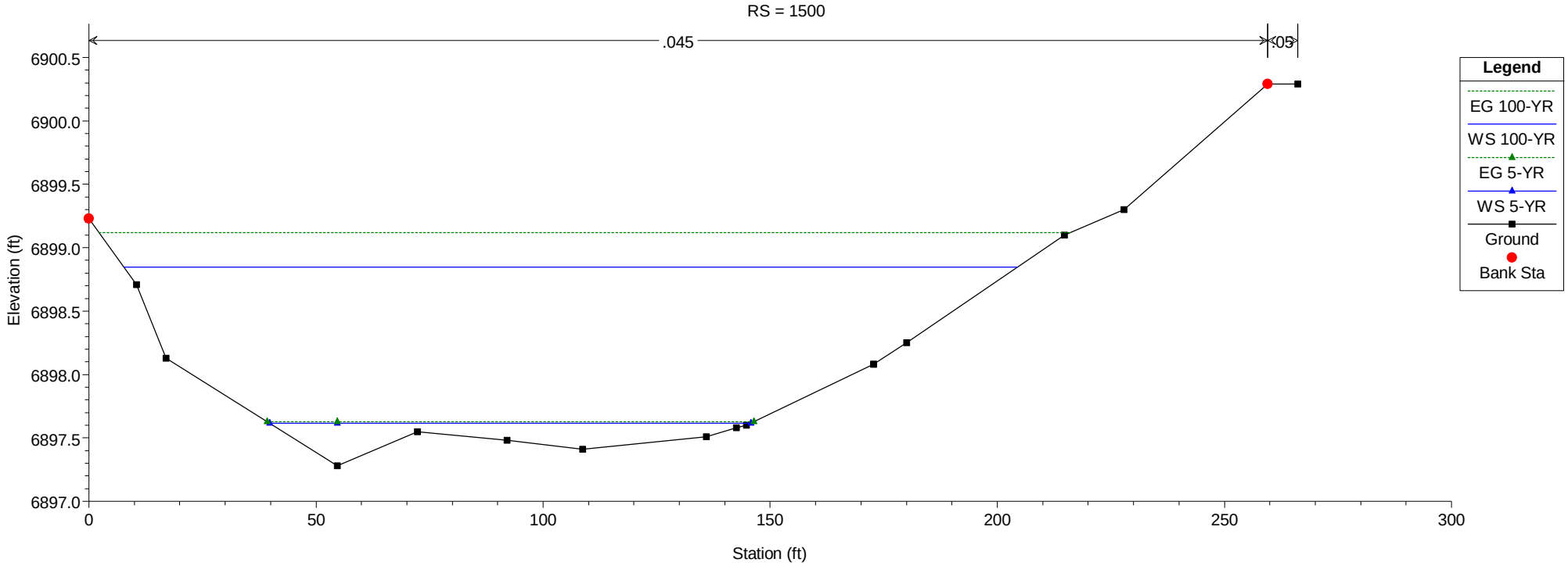

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

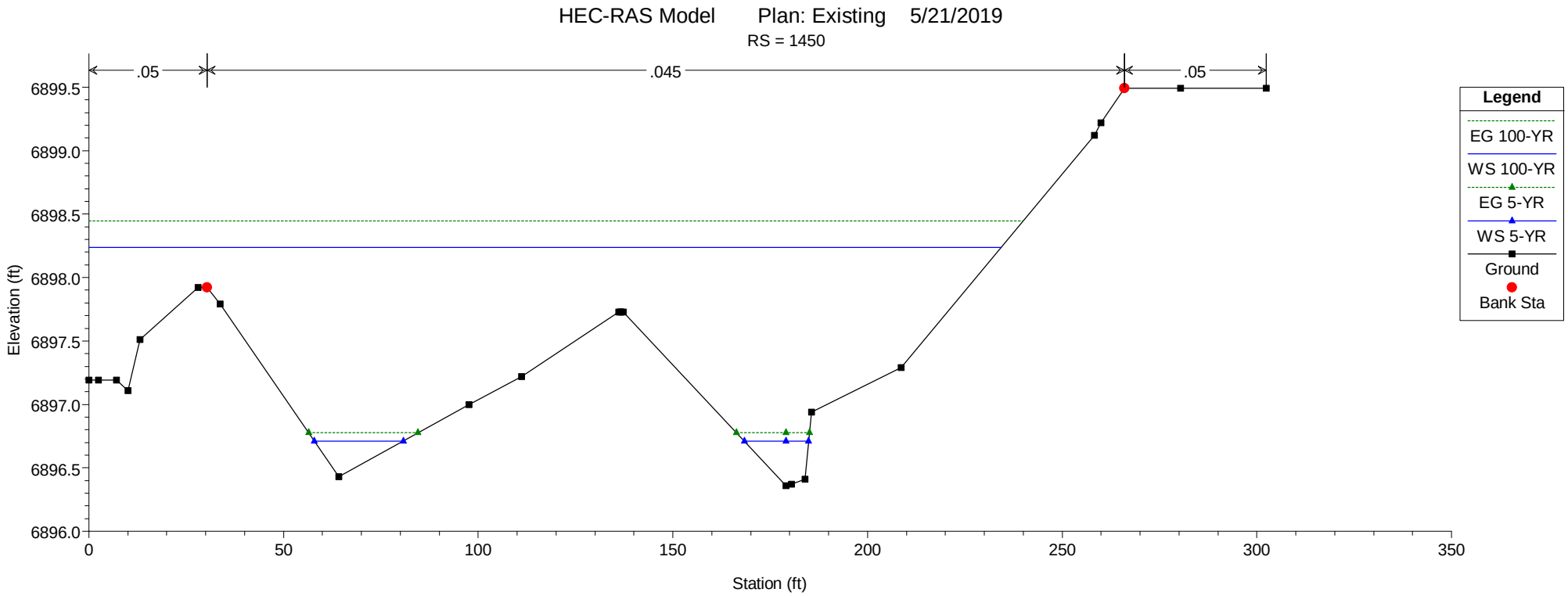

HEC-RAS Model Plan: Existing 5/21/2019
RS = 1700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1650
.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 = 1600
.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 = 1550
.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 = 1500
.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 = 1450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
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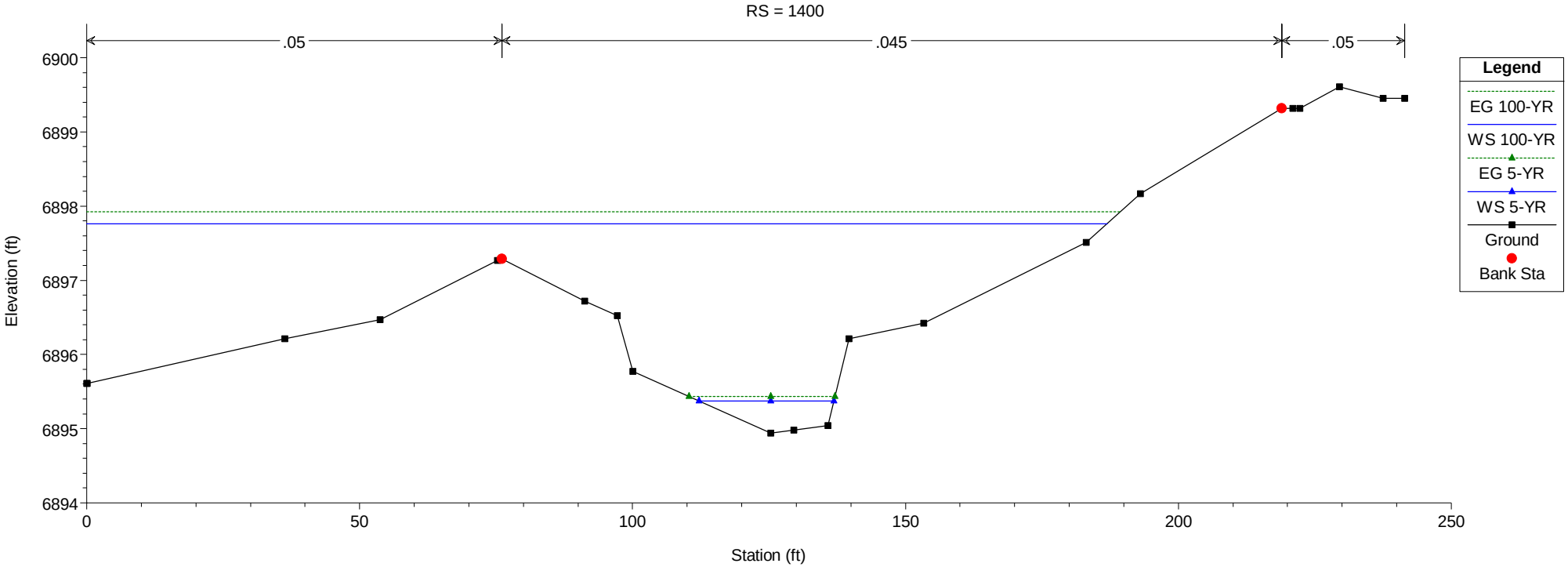
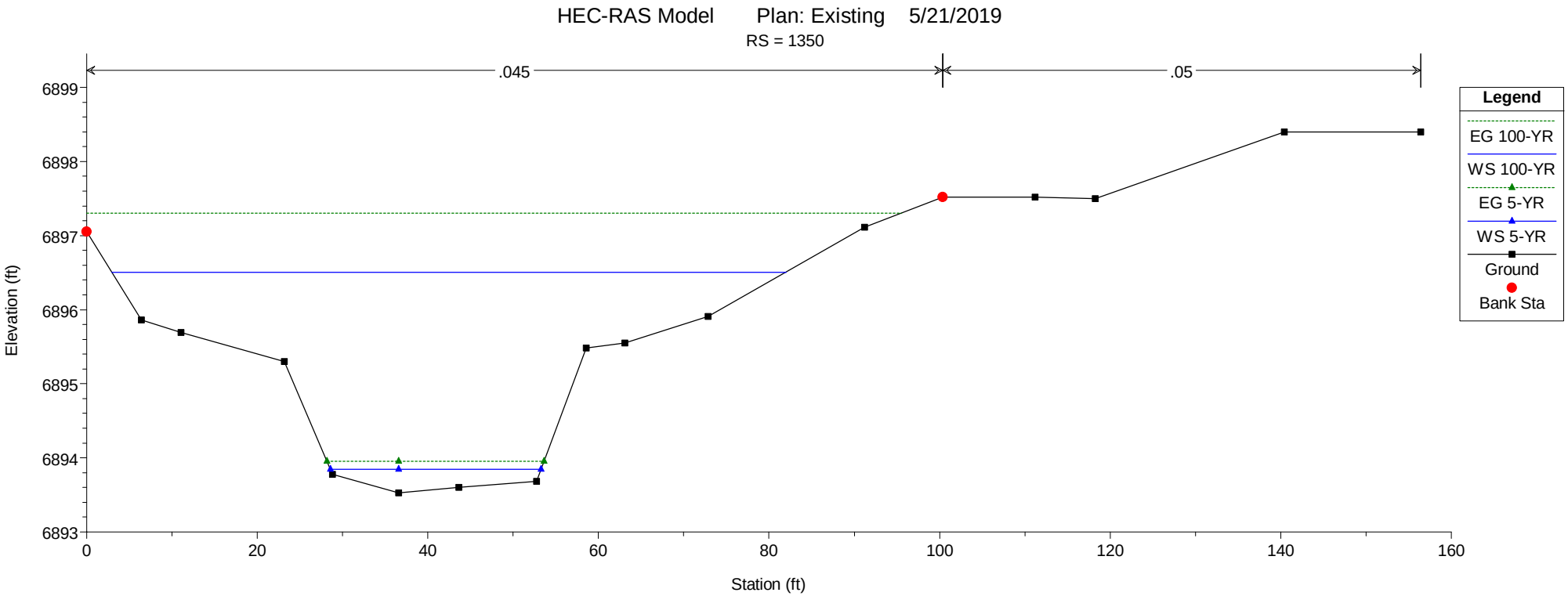
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1400
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6900
6899
6898
6897
6896
6895
6894
0
50
100
150
200
250
Station (ft)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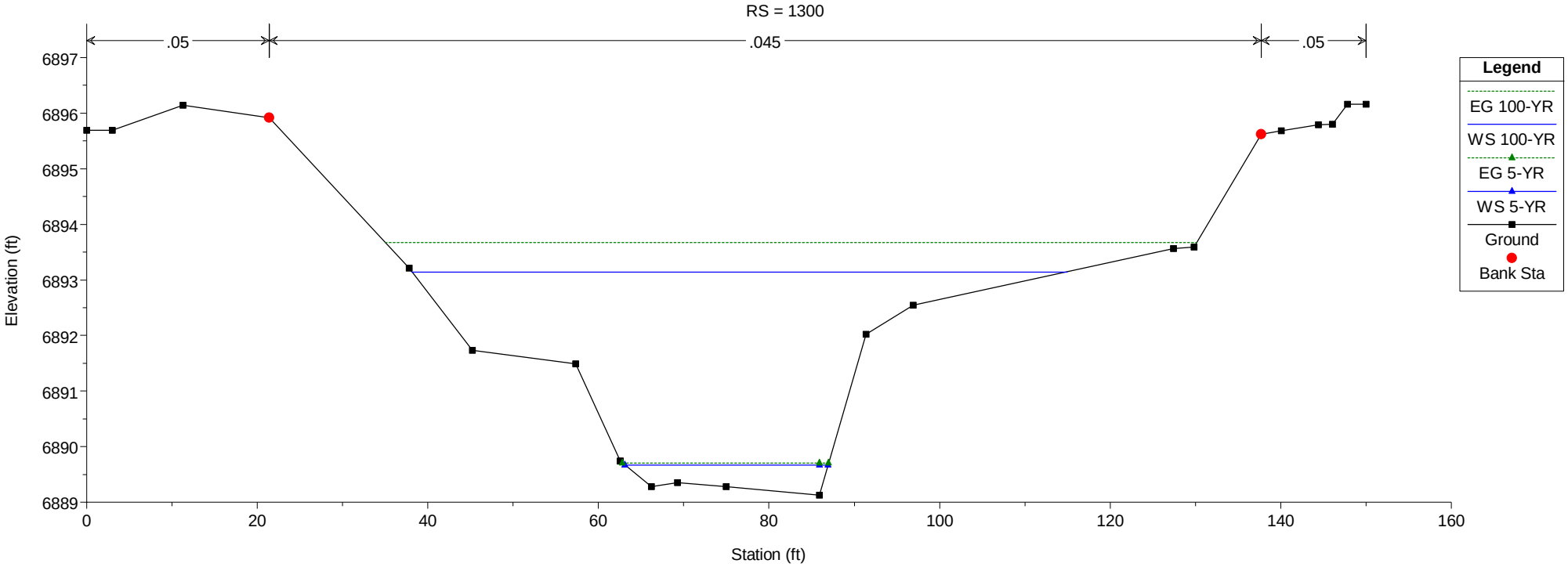
RS = 1350
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6899
6898
6897
6896
6895
6894
6893
0
20
40
60
80
100
120
140
160
Station (ft)


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1300
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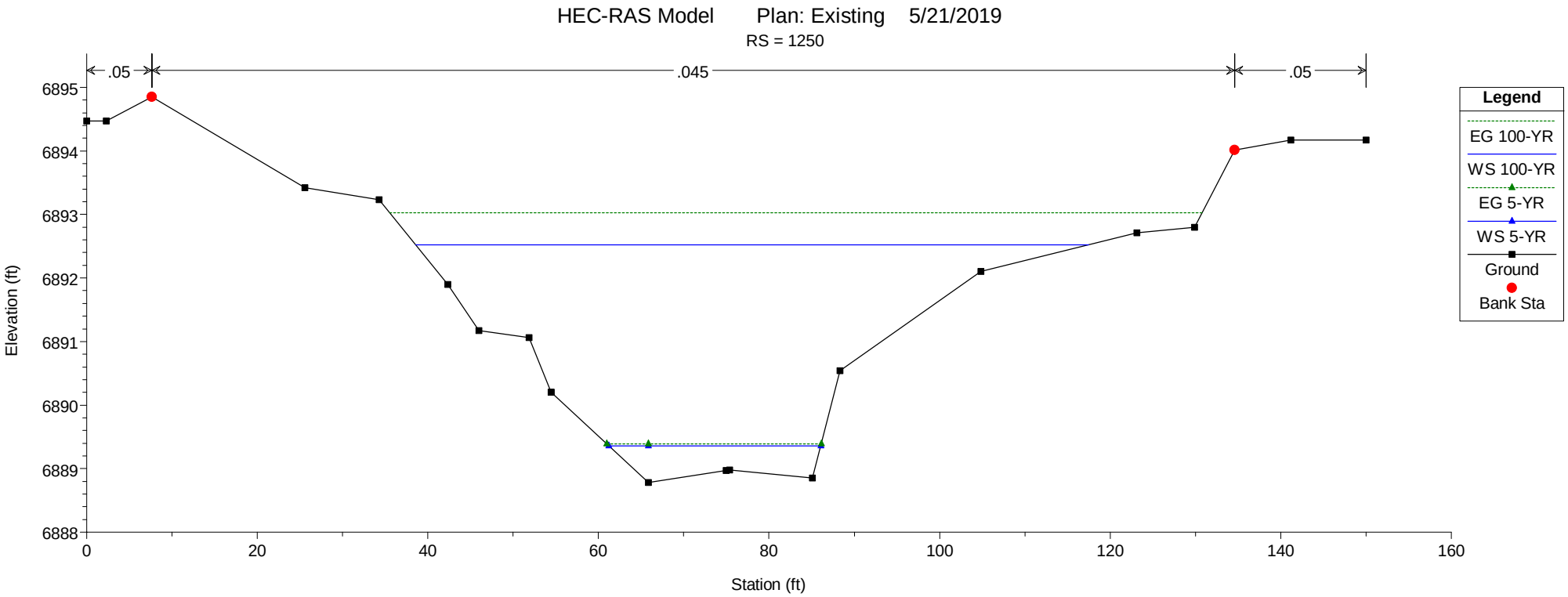
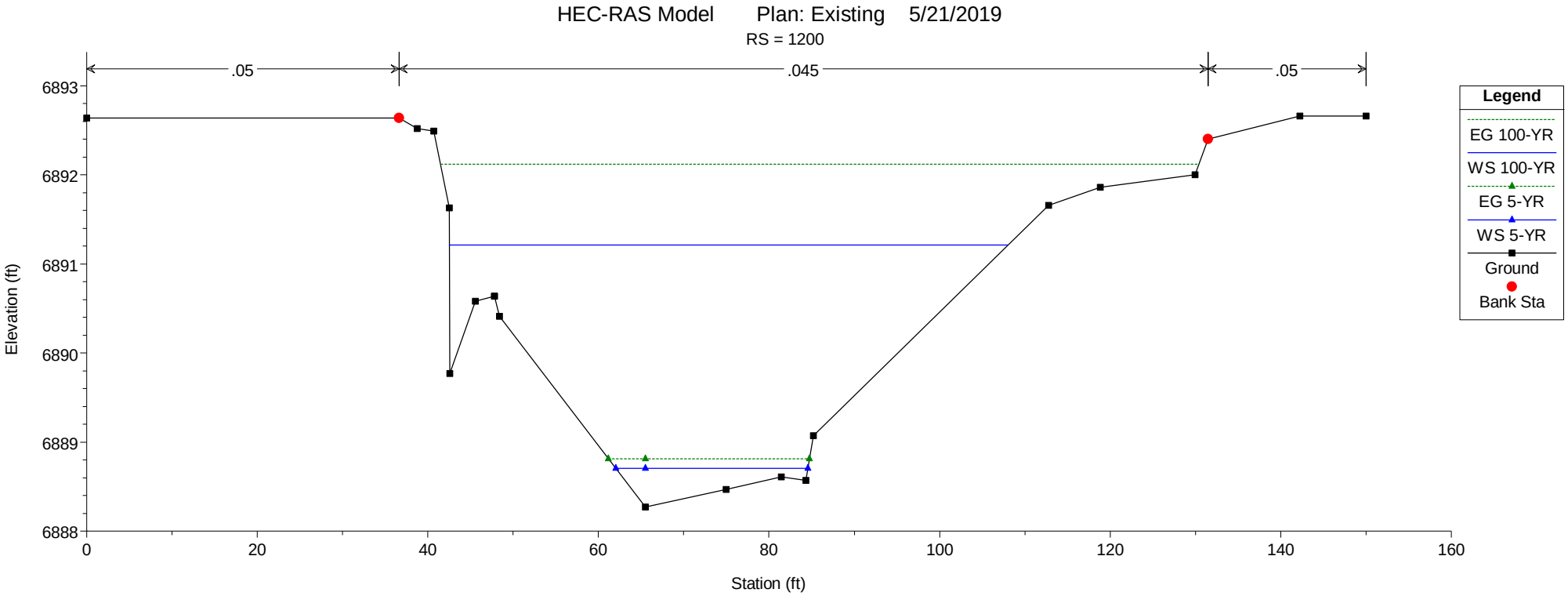
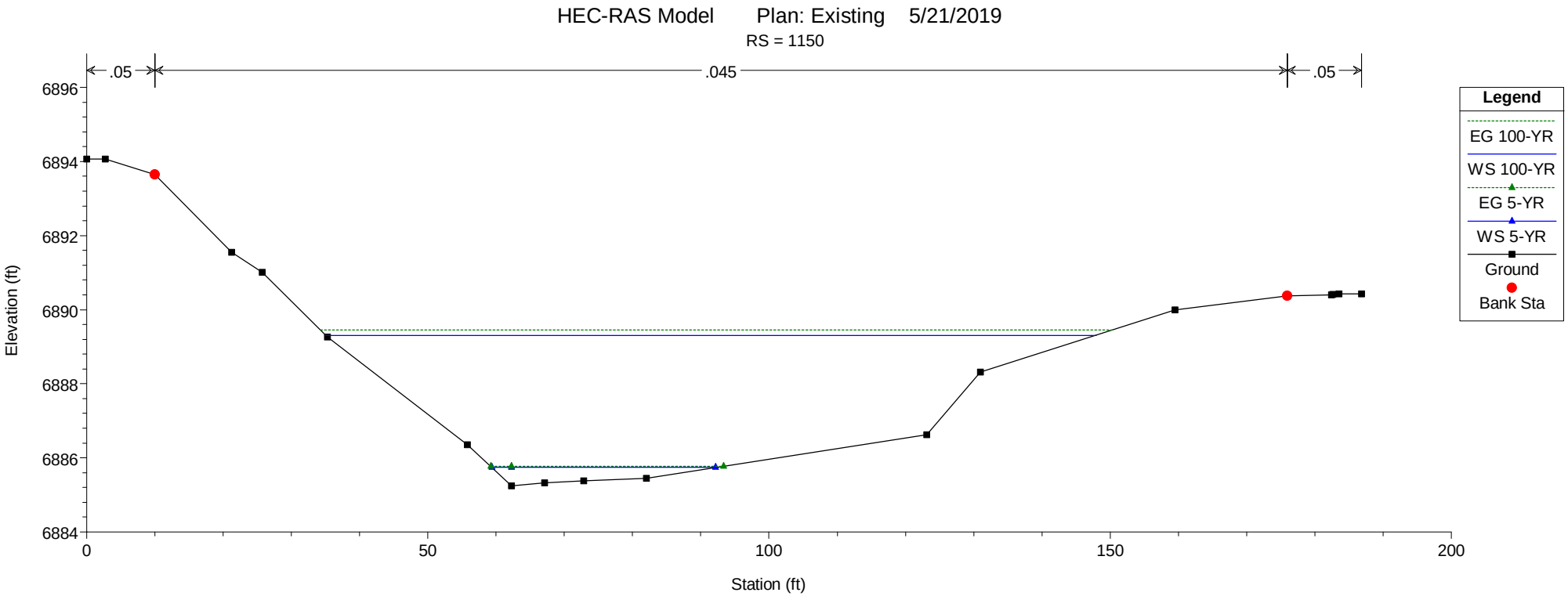
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1250
.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 = 1200
.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 = 1150
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.045
.05
Elevation (ft)
Station (ft)
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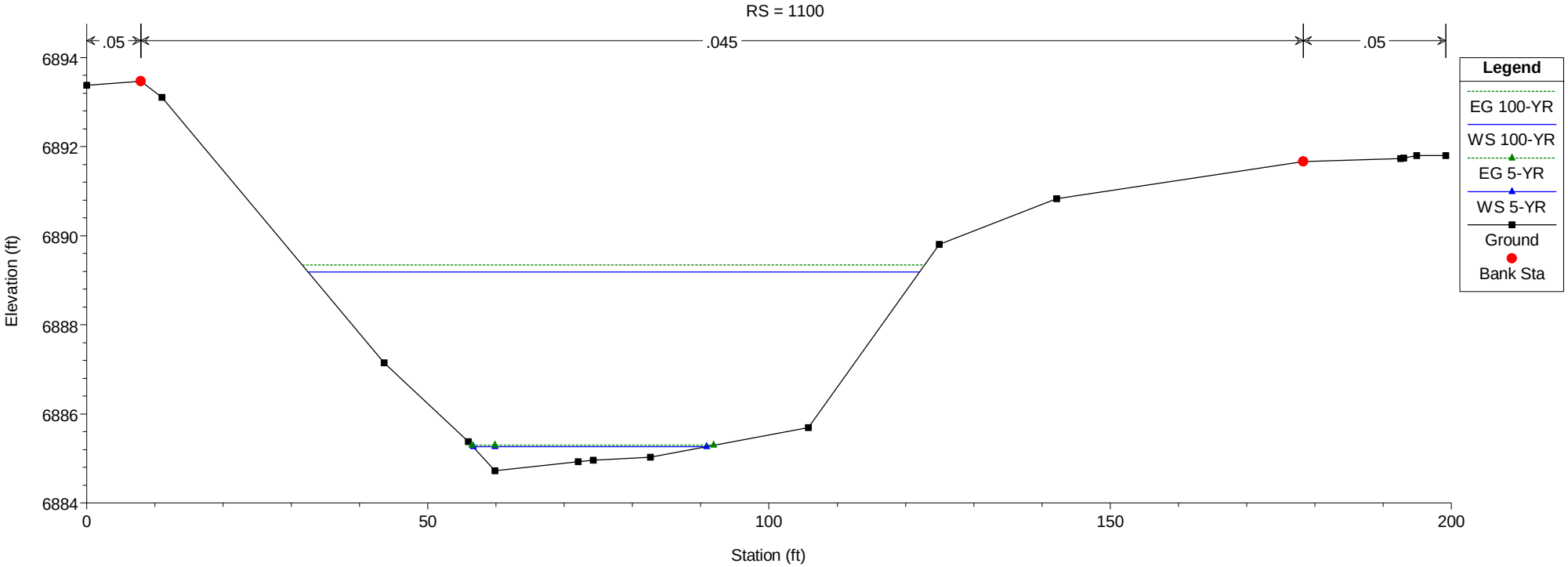
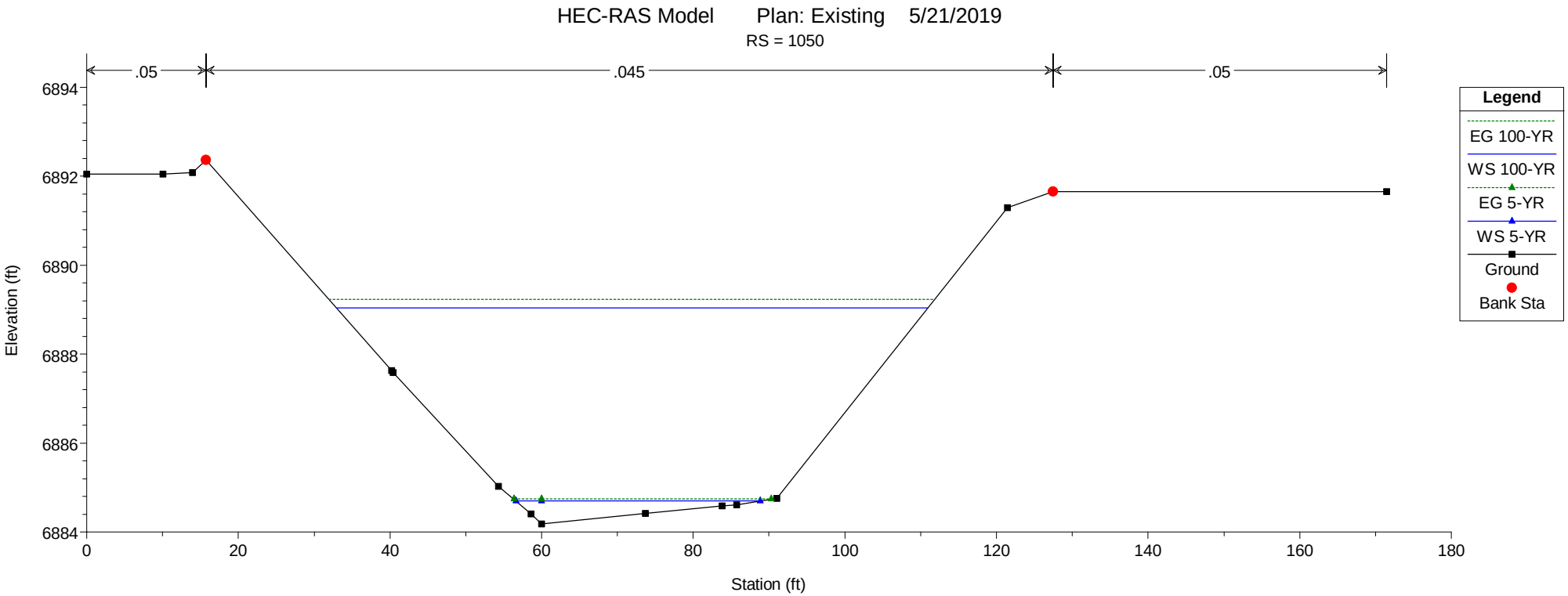
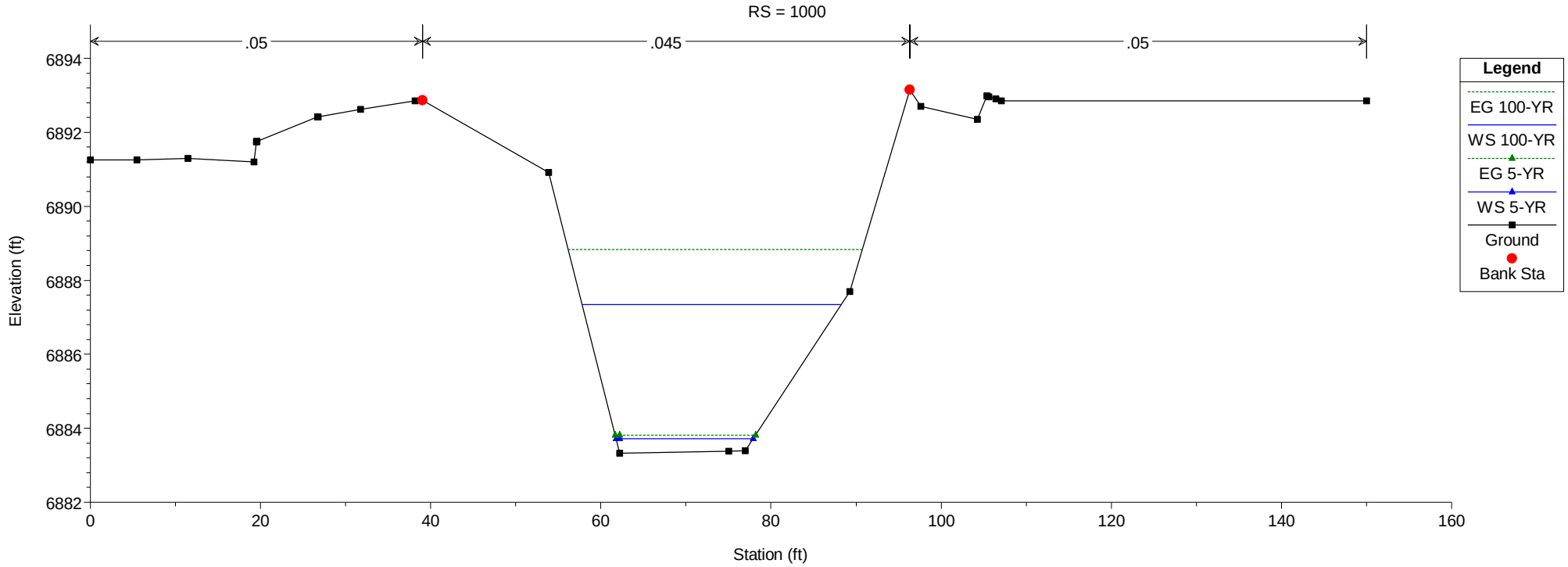
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Existing 5/21/2019
RS = 1100
.05
.045
.05
Elevation (ft)
6894
6892
6890
6888
6886
6884
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 = 1050
.05
.045
.05
Elevation (ft)
6894
6892
6890
6888
6886
6884
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 = 1000
.05
.045
.05
Elevation (ft)
6894
6892
6890
6888
6886
6884
6882
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

Proposed Conditions Model

```
                    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
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Project File : CLH14.20_Channel.prj
Run Date and Time: 5/21/2019 2:15:48 PM

Project in English units

Project Description:
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PLAN DATA

Plan Title: Proposed
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.p02

Geometry Title: Proposed
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.g02

Flow Title : Proposed
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.f02

Plan Summary Information:

Number of:	Cross Sections	= 175	Multiple Openings	=	0
	Culverts	= 2	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: Proposed
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.f02

Flow Data (cfs)

River	Reach	RS	100-YR	5-YR
Channel	East	8490	43	4
Channel	East	7583	131	22.5
Channel	South	3379	1288	128.5
Channel	West	6158	1000	100

Boundary Conditions

River	Reach	Profile	Upstream	Downstream

Channel	South	100-YR		Normal S = 0.02505
Channel	South	5-YR		Normal S = 0.02505
Channel	East	100-YR	Normal S = 0.098756	
Channel	East	5-YR	Normal S = 0.098756	
Channel	West	100-YR	Normal S = 0.073569	
Channel	West	5-YR	Normal S = 0.073569	

GEOMETRY DATA

Geometry Title: Proposed
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.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Channel	South	Junc-DS01	
Channel	East		Junc-DS01
Channel	West		Junc-DS01

JUNCTION INFORMATION

Name: Junc-DS01
Description:
Energy computation Method

Length across Junction		Tributary			
River	Reach	River	Reach	Length	Angle
Channel	East	to Channel	South	0	0
Channel	West	to Channel	South	0	0

CROSS SECTION

RIVER: Channel
REACH: South RS: 3379

INPUT
Description:

Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6933.13	1.36	6933.13	1.43	6933.13	1.52	6933.13	3.43	6933.12
21.81	6933.02	23.04	6933.02	23.05	6933.02	23.08	6933.02	23.68	6932.86
37.73	6929.36	40.37	6929.29	42.73	6929.23	50.74	6927.25	61.38	6924.64
74.9	6924.64	87.82	6924.65	104.62	6924.65	114.03	6926.93	130.23	6930.83
133.96	6930.93	134.47	6930.94	134.94	6931.07	135.52	6931.21	137.21	6931.13
150.01	6931.13								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	42.73	.045	130.23	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
42.73	130.23	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: South RS: 3329

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6932.26	2.66	6932.26	4.23	6932.26	11.34	6932.23	24.32	6932.17
29.7	6930.83	31.05	6930.49	31.92	6930.27	34.12	6929.72	39.02	6929.61
39.13	6929.61	39.62	6929.48	59.87	6924.47	61.63	6924.47	74.76	6924.47
96.48	6924.47	105.03	6926.61	120.86	6930.53	124.78	6930.62	125.01	6930.63
125.06	6930.65	125.12	6930.68	126.15	6930.65	126.57	6930.64	127.53	6930.61
134.31	6930.42	139.57	6929.89	150	6929.89				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.02	.045	120.86	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
39.02	120.86	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel

REACH: South RS: 3279

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6931.35	5.39	6931.35	8.25	6931.34	9.28	6931.33	25.83	6931.26
26.57	6931.08	30.52	6930.09	32.26	6930.05	35.53	6929.98	50.98	6926.13
58.38	6924.29	74.49	6924.29	74.64	6924.29	84.13	6924.3	93.53	6924.3
105.52	6927.3	117.54	6930.3	120.09	6930.35	122.54	6930.4	125.87	6929.52
126.24	6929.43	133.22	6929.24	150	6929.24				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	35.53	.045	117.54	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
35.53	117.54	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: South RS: 3229

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6930.68	.57	6930.68	1.04	6930.67	7.02	6930.69	8.54	6930.67
8.82	6930.67	10.98	6930.65	10.99	6930.65	26.74	6930.51	26.77	6930.5
26.97	6930.45	27.76	6930.43	32.94	6930.11	45.8	6926.9	56.97	6924.12
63.84	6924.12	74.5	6924.12	74.54	6924.12	89.14	6924.12	92.03	6924.12
94.97	6924.86	107.48	6927.99	116.07	6930.13	116.52	6930.14	121.08	6930.23
121.73	6930.07	125.88	6929.04	147.75	6928.82	149.46	6928.81	149.83	6928.8
149.86	6928.8	150.01	6928.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	32.94	.045	116.07	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
32.94	116.07	52.3	39.36	37.89	.1	.3

CROSS SECTION

RIVER: Channel
REACH: South RS: 3190

INPUT
Description:
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6930.24	3.07	6930.24	6.78	6930.18	10.02	6930.22	17.15	6930.15
18.73	6930.13	22.86	6930.09	28.27	6930.02	28.29	6930.02	28.3	6930.02
28.53	6930.08	33.52	6929.98	33.53	6929.98	34.16	6929.82	56.55	6924.23
57.54	6923.98	73.71	6923.98	75.04	6923.98	75.08	6923.98	90.58	6923.98
92.54	6923.98	112.68	6929.02	116.55	6929.99	120.61	6930.07	121.55	6930.09
122.83	6929.77	128.26	6928.41	128.42	6928.41	133.58	6928.36	146.66	6927.84
150	6927.84								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	33.52	.045	116.55	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
33.52	116.55	5	5	5	.1	.3

CROSS SECTION

RIVER: Channel
REACH: South RS: 3185

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6930.16	4.24	6930.16	6.44	6930.13	8.36	6930.15	17.19	6930.06
19.15	6930.04	24.27	6929.99	26.69	6929.96	27.41	6929.95	27.61	6929.95
28	6929.94	28.48	6930.06	28.48	6930.07	33.34	6929.97	33.48	6929.97
55.03	6924.58	57.48	6923.97	72.04	6923.97	74.99	6923.97	75	6923.97
88.38	6923.97	92.49	6923.97	108.78	6928.04	116.48	6929.97	116.49	6929.97
119.58	6930.03	121.49	6930.07	122.45	6929.71	127.99	6928.33	128.37	6928.32
128.45	6928.33	128.46	6928.32	128.52	6928.32	128.65	6928.32	128.75	6928.32
130.78	6928.3	135.95	6928.1	150	6928.1				

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   33.48    .045  116.48     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.48  116.48                8       8       8             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3177

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6930.03    5.89 6930.03    6.75 6930.02    6.78 6930.02    7.96 6930.01
   17.26 6929.92   19.85 6929.89   21.73 6929.88   27.55 6928.42   28.52 6928.18
   32.26 6928.09   33.52 6928.07   51.96 6923.43   57.52 6922.04   71.16 6922.02
   75.02 6922.02   75.07 6922.02   88.89 6921.99   92.52    6922  112.04 6926.84
  116.52 6927.96   119.3 6928.02  121.52 6928.06  122.49  6928.3  122.51  6928.3
  123.92 6928.28  124.77 6928.27   128.7 6928.22  129.23 6928.19  129.72 6928.16
     150 6928.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   33.52    .045  116.52     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.52  116.52             9.34    9.34    9.34             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3168

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6929.89     .37 6929.89    4.98 6929.87   12.49 6929.79    13.6 6929.78
   25.81 6926.73   28.47 6926.06   29.38 6926.04   33.46 6925.96   33.47 6925.96
```

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   37.66 6924.91   57.47 6919.96    59.9 6919.96   74.97 6919.96      75 6919.96
   76.92 6919.96   92.47 6919.96   94.42 6920.45  116.46 6925.96  116.47 6925.96
  116.65 6925.97  121.47 6926.06  121.68 6926.12  129.48 6928.07  129.51 6928.06
  129.56 6928.06   130.8    6928     150    6928

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   33.46    .045  116.46     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.46  116.46             17.59   17.59   17.59              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3150

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6929.56    2.71 6929.56    8.82 6929.48   11.09 6929.45    14.8 6929.41
   14.82 6929.41   16.32 6929.03   28.46    6926   30.12 6925.97   33.46  6925.9
   49.35 6921.93   57.46  6919.9   63.96  6919.9   74.96  6919.9      75  6919.9
   81.82  6919.9   92.46  6919.9  102.56 6922.42  116.46  6925.9  118.62 6925.94
  121.46    6926   125.6 6927.03  128.83 6927.84  130.37 6927.77  131.66  6927.7
  132.31 6927.67  132.33 6927.67  132.76 6927.65  148.85 6927.15     150 6927.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   33.46    .045  116.46     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.46  116.46              52.2      50   47.24              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3100

INPUT
Description:
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```
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6928.62    3.29 6928.62    5.61 6928.61    6.97  6928.6    7.17  6928.6
    9.47 6928.58   10.62 6928.57   17.74 6928.52   23.37 6927.11    28.5 6925.83
   29.71  6925.8    33.5 6925.73   51.68 6921.18    57.5 6919.73   61.75 6919.73
      75 6919.73   79.25 6919.73    92.5 6919.73  110.68 6924.27   116.5 6925.73
  117.71 6925.75   121.5 6925.83  123.04 6926.21  126.53 6927.08  126.59  6927.1
  127.39 6927.07  129.77 6926.95     150 6926.95

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    33.5    .045   116.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          33.5   116.5             49.7      50    49.7              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3050

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6927.68    2.99 6927.68    6.27 6927.66   16.38 6927.61   20.75 6927.59
   21.03 6927.52    28.5 6925.65   29.65 6925.63    33.5 6925.55   51.97 6920.93
    57.5 6919.55   61.53 6919.55      75 6919.55   79.03 6919.55    92.5 6919.55
  110.97 6924.17   116.5 6925.55  121.38 6925.65   121.5 6925.65  121.52 6925.66
   122.9 6925.53  124.16 6925.41  124.17 6925.41  124.64 6925.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    33.5    .045   116.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          33.5   116.5            25.73   25.73   25.73              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3024
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```
INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6927.25     8.6 6927.25    8.92 6927.24   13.33 6927.15   20.99 6927.11
   22.32 6927.11   25.33 6926.35    28.5 6925.56   30.79 6925.52    33.5 6925.46
   44.48 6922.72    57.5 6919.46   65.51 6919.46      75 6919.46   83.01 6919.46
    92.5 6919.46  103.48 6922.21   116.5 6925.46  118.79 6925.51   121.5 6925.56
  123.19 6925.14  123.87 6924.97  124.39 6924.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    33.5    .045   116.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          33.5   116.5                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3019

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6927.35    1.52 6927.35   11.29 6927.16   11.67 6927.15    17.1 6927.04
   20.27 6927.03   22.62 6927.01   22.88 6926.95    28.5 6925.54    28.7 6925.54
    33.5 6925.44   34.46 6925.21    57.5 6919.44    58.2 6919.44      75 6919.44
    75.7 6919.44    92.5 6919.44   93.46 6919.68   116.5 6925.44   116.7 6925.45
   121.5 6925.54  121.65 6925.51  123.31 6925.09  124.59 6924.95   128.3 6924.55
   128.8 6924.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    33.5    .045   116.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          33.5   116.5                 4       4       4             .1       .3

CROSS SECTION
```

RIVER: Channel
REACH: South RS: 3015

INPUT
Description:
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6927.18	8.37	6927.18	13.43	6927.08	13.88	6927.07	19.27	6926.97
19.37	6926.97	19.83	6926.95	20.82	6926.58	25.64	6925.38	28.5	6924.66
30.94	6924.61	33.5	6924.56	45.21	6921.63	57.5	6918.56	66.04	6918.56
75	6918.56	83.54	6918.56	92.5	6918.56	104.21	6921.49	116.5	6924.56
119.42	6924.62	121.5	6924.66	123.27	6925.1	123.55	6925.09	124	6925.07
124.42	6925.02	124.75	6924.98	125.56	6924.9	126.62	6924.52	127.38	6924.26
127.44	6924.24								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	33.5	.045	116.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
33.5	116.5	4.15	4.15	4.15	.1	.3

CROSS SECTION

RIVER: Channel
REACH: South RS: 3011

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6926.99	15.42	6926.99	15.92	6926.99	15.93	6926.99	16.02	6926.99
20.48	6926.87	22.13	6926.25	27.15	6924.37	28.5	6923.82	29.41	6923.8
33.5	6923.72	37.64	6922.68	57.5	6917.72	60.06	6917.72	75	6917.72
77.21	6917.72	92.5	6917.72	95.03	6918.35	116.5	6923.72	116.9	6923.73
119.3	6923.78	121.5	6923.82	121.65	6923.86	124.67	6924.61	125.69	6924.27
125.77	6924.24								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	33.5	.045	116.9	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          33.5   116.9            10.82   10.82   10.82              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 3000

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6926.34     .73 6926.34   13.11 6926.41   22.13 6926.52   29.18 6924.76
   31.32 6924.23   32.11 6924.04   32.53 6923.95    33.7 6923.68   56.43 6917.99
   57.68 6917.68   74.33 6917.68      75 6917.68   75.16 6917.68   91.91 6917.73
   92.64 6917.76   94.67 6918.29   94.76 6918.32  116.54 6923.77  116.75 6923.83
  117.41    6924   119.3 6924.47  119.31 6924.46  120.04  6924.4  121.03 6924.26
  121.05 6924.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   22.13    .045   119.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         22.13   119.3            49.69   49.69   49.69              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2950

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6925.37   20.76 6925.37   21.17 6925.38   23.64 6925.38   24.59 6925.38
   27.24 6924.78   33.05  6923.5   46.88 6920.01   48.19 6919.68   56.98 6917.51
   69.08 6917.51    73.6 6917.51    74.4 6917.51   87.54    6918   91.79  6918.3
   96.02 6919.44   98.17 6920.01   98.55 6920.11  107.99 6922.52  108.45 6922.64
  108.46 6922.64  117.17 6920.98  125.32 6919.65   139.3 6919.87  146.44 6919.97
  156.59 6921.65  163.82 6922.71  168.65 6922.71
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   24.59    .045  108.45     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         24.59  108.45             58.6      50   59.74             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2900

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6924.03   15.56 6924.03   24.65 6923.98   27.95 6923.96   29.05 6923.69
   30.47 6923.33   43.55 6920.07   44.51 6919.83   54.47 6917.33   62.44 6917.33
   71.97 6917.33   71.98 6917.33   79.93 6918.11   89.47 6918.84   89.56 6918.86
    90.2 6919.02   93.43 6919.83   93.47 6919.84   93.61 6919.87   94.91 6919.57
   98.53 6918.89  106.92 6919.22  121.87 6919.33  131.87 6920.58  140.82 6921.75
  188.52 6923.46  192.59 6923.46

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   27.95    .045  140.82     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         27.95  140.82            49.61      50   55.18             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2850

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6922.77   18.83 6922.77   19.71 6922.75   19.87 6922.75   20.04 6922.74
   20.51 6922.73   30.17 6922.44   30.54 6922.35   30.91 6922.26   31.79 6922.04
    41.3 6919.66   46.65 6918.32   55.79 6917.19    71.4 6917.16   73.29 6917.16
```

```
   73.31 6917.17   74.99 6917.66    77.7 6918.37   80.14 6917.81   86.74 6917.73
   94.55 6917.88  107.98 6919.66  110.55    6920  116.06 6920.66  170.93 6922.46
  172.47 6922.46

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   30.17    .045  116.06     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         30.17  116.06            41.34      50   57.94             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2800

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6921.85    2.53 6921.85     7.6 6921.75   29.63 6920.82   30.19  6920.8
   30.62 6920.69   31.06 6920.58   35.16 6919.55   36.47 6919.39   55.48 6917.07
    62.2 6917.05   64.02 6917.04   64.78 6917.04   70.87    6917    72.4 6916.94
   73.53 6916.89   78.69 6916.99   90.02 6919.39    93.7 6920.17   94.95 6920.39
  105.27 6920.64  180.55 6922.32  184.61 6922.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   30.19    .045   94.95     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         30.19   94.95             49.7      50   51.54             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2750

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0 6920.64    8.53 6920.64   48.56 6918.38   48.65 6918.38   48.69 6918.37
   65.64 6916.26   74.32 6915.74      75 6915.71   78.45 6915.53   86.96  6918.2
   92.54 6919.83  110.04  6920.2     150  6920.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   48.69    .045   92.54     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         48.69   92.54            48.06      50   50.82             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2700

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6919.99    3.66 6919.99   24.93 6919.53   60.28 6917.45    64.7 6917.15
   66.46 6916.93   70.78 6916.39   81.43 6914.88    88.1 6914.54   88.17 6914.54
   89.76 6914.43   95.18 6916.14   97.74 6916.93  103.72 6918.78  118.88 6919.05
  168.04 6919.95  181.41 6919.95

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    64.7    .045  103.72     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          64.7  103.72            46.75      50   51.94             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2650

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6919.58   20.85 6919.58   53.32 6919.69   55.96 6919.69   59.04  6919.6
```

```
    90.8 6918.55  111.98 6917.65  125.17 6917.25  138.31 6914.58  140.89 6914.03
  141.82    6914  147.52 6913.79  151.55 6913.64  154.89 6914.66  165.93 6917.81
  172.25 6917.86  201.99 6918.07  213.02 6918.21  230.99 6918.45  264.21 6918.16
  291.28 6918.11  297.22 6917.38  300.75 6916.73  304.97 6917.22  312.59 6918.03
  316.66 6918.15  366.65 6918.85  369.45 6918.89  370.32 6918.91  383.24 6918.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  125.17    .045  165.93     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        125.17  165.93            47.87      50    51.9             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2600

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6919.39   11.55 6919.39   23.82 6918.84   31.98 6918.48   53.92 6916.44
   70.17 6915.46   83.65 6913.81   86.62 6913.45   88.58 6913.06   89.31 6913.03
    97.3 6912.82   99.76 6912.76  101.22 6913.22  113.93 6916.37  122.91 6916.39
  195.01  6916.8  204.27 6916.76   232.7 6916.77  245.42 6916.77  255.03 6915.07
  255.76 6914.96   265.8 6916.35  265.98 6916.37  281.82 6916.82  286.39 6916.99
  315.07 6917.63  333.69 6918.08   337.8 6918.08

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   53.92    .045  113.93     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         53.92  113.93            56.36      50   47.11             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2550

INPUT
```

```
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6916.83    32.6 6916.83   33.97 6916.35   46.04 6914.64   57.55 6913.01
   62.46 6912.43   63.83 6912.43   69.84 6912.24   73.29 6912.14   78.19  6912.9
   91.22  6914.4   105.3 6914.64  119.37 6914.88  143.02  6915.4  182.16 6915.91
  218.79 6916.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    32.6    .045   91.22     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          32.6   91.22             62.8      50   42.22             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2500

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6917.02   18.55 6917.02   53.28 6914.51   53.44  6914.5   53.64 6914.45
   55.89 6913.92   66.32 6911.46   68.25 6911.42   72.55 6911.47   77.69 6911.54
   93.62 6913.24   97.98 6913.63  111.29 6913.92  114.04 6913.98  184.21  6915.6
  186.87  6915.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   53.28    .045   97.98     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         53.28   97.98            61.91      50    35.5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2450

INPUT
```

```
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6914.76   17.96 6914.76   59.19 6913.69   62.97  6913.6   68.62 6912.68
   71.45 6912.22   82.92 6910.18   85.45 6910.18   89.02 6910.27   92.76 6910.36
   99.74 6911.87  105.15 6912.68  108.35 6913.16  173.77  6914.9  181.47  6914.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   68.62    .045  105.15     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         68.62  105.15            34.45      50   58.27              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2400

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6913.59   37.34 6912.48   62.02 6909.64   68.81 6908.81   73.17 6907.82
      75  6907.7    75.2 6907.69   84.82 6910.13   92.52 6912.78  109.33 6913.15
     150 6913.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.34    .045   92.52     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.34   92.52            40.98      50   54.76              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2350

INPUT
Description:
Station Elevation Data    num=      18
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6913.31   11.97 6913.31   20.04 6913.25   43.57 6912.97    80.3 6911.52
   95.54  6910.9   97.26 6910.83  104.46 6910.16  120.57 6908.74  127.16  6908.5
  127.87 6908.49  132.11  6908.4  144.74 6910.32  148.46  6910.9  152.82 6911.58
  170.34  6912.1  184.64 6912.33  199.19 6912.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   97.26    .045  152.82     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         97.26  152.82            49.67      50   50.33             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2300

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6911.59    4.95 6911.59   17.73 6911.61   25.17 6911.57   60.08 6911.41
   84.19 6910.57  103.71 6909.89  114.71 6909.53  118.06 6909.12  125.67 6908.07
  139.29 6908.21  145.08 6908.27  153.78 6908.27  165.58 6909.89  170.49 6910.57
  173.52 6910.99  187.06 6911.35   209.8 6911.85

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  114.71    .045  173.52     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        114.71  173.52            46.82      50   54.23             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2250

INPUT
Description:
Station Elevation Data    num=      13
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6910.51    3.09 6910.51   48.03 6908.78   49.89 6908.69   50.99 6908.56
   61.08 6907.19      75 6907.27   81.64  6907.3   87.94 6907.37  101.02 6909.42
  108.89 6910.69  127.83 6910.54     150 6910.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   49.89    .045  108.89     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         49.89  108.89            51.31      50   48.16              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2200

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6909.9    8.07  6909.9    22.3 6909.08   43.39 6907.92   44.73 6907.73
   58.72 6905.88      75    6906    81.8 6906.05    89.2 6906.11   96.84 6907.83
  109.84  6910.4  134.99 6910.68     150 6910.68

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   43.39    .045  109.84     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         43.39  109.84            51.87      50   53.48              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2150

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6909.06     3.9 6909.06   29.81 6907.29   29.99 6907.28   30.57 6907.22
```

```
   51.98 6904.87      75 6905.17   90.24 6905.36   93.25 6905.43   98.04 6906.18
  122.74 6910.41  131.54 6910.48     150 6910.48

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   30.57    .045  122.74     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         30.57  122.74            46.59      50   58.86             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2100

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6908.32     4.2 6908.32    6.53 6908.27    7.24 6908.21     9.4 6907.89
   24.78 6906.06   42.65 6904.23   48.08 6903.63      75 6904.29   83.06 6904.49
  104.27 6905.01  106.86 6905.51  126.81  6909.8   130.7 6909.98  147.16  6910.6
     150  6910.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    7.24    .045  126.81     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          7.24  126.81            31.23      50   65.06             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2050

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6907.15   12.28 6907.15    21.8 6906.21   24.15 6905.87   31.58 6905.02
   45.83 6903.18      75 6903.64   89.36 6903.86  109.61  6904.1  118.67 6905.88
```

```
  132.41 6908.66     150 6908.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   12.28    .045  132.41     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         12.28  132.41            50.56      50   50.13             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 2000

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6906.53    7.24 6906.53   14.27 6905.85   30.29 6904.69   38.98 6903.73
   46.81 6902.87   60.51 6902.96      75 6903.07  111.35 6903.34  116.27 6904.12
   132.1 6907.44   140.5 6907.49     150 6907.49

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    7.24    .045   132.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          7.24   132.1            51.57      50   55.58             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1950

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6906.53    3.47 6906.53   22.57 6905.37      38 6904.62   54.25 6903.83
   71.07 6902.23   72.28 6902.12   74.39 6902.14   95.01 6902.38  121.58 6902.69
  130.18 6903.49  140.26 6904.62   149.8 6905.69  162.22  6906.2  168.71  6906.2
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   54.25    .045   149.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         54.25   149.8            52.13      50   55.38             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1900

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6905.97     3.3 6905.97   32.47 6905.65   48.49 6904.85   60.54 6904.17
   67.09  6903.8   84.22 6902.88   98.28 6901.98  100.72 6901.81  106.06  6901.8
  114.58 6901.76   130.6 6901.67  143.47 6902.83   157.6 6904.17  175.32 6905.85
  186.82 6905.85

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   32.47    .045  175.32     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         32.47  175.32            64.34      50   35.53             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1850

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6904.36    9.15 6904.36      12 6904.32   19.16 6903.97   51.83 6902.08
   58.71  6901.4   61.53 6901.18      75 6901.16   88.67 6901.15    88.8 6901.15
   89.11 6901.18  138.07 6905.88     150 6905.88

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      12    .045  138.07     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            12  138.07            61.25      50   39.47              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1800

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6903.72   18.23 6903.72   54.07 6903.47    74.2 6903.01    95.6 6902.86
  114.25 6902.25   134.2 6901.13  143.83 6900.35  145.98 6900.18  148.49 6900.19
  163.66 6900.24  183.28 6900.31   202.4 6902.89  221.57  6905.6  232.48 6905.78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    95.6    .045  221.57     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          95.6  221.57            81.73      50   53.35              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1750

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6903.28     .06 6903.28    5.21 6903.14   49.64 6902.05   67.22 6901.71
   75.19 6901.51  106.38  6900.6  113.61 6900.24  121.96  6899.8  130.88  6899.8
  142.94 6899.76  167.26 6899.69  183.55 6902.22  198.56 6904.47  208.22 6904.66
   213.2 6904.66

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

```
       0     .05    5.21    .045  198.56     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          5.21  198.56             50.56      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1700

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6902.83    2.41 6902.89   25.53 6902.12   32.43 6901.89   36.87 6901.75
    45.7 6901.57  119.28 6900.12  123.42 6900.05  141.04 6899.62  152.81  6899.7
  162.09 6899.71  187.38 6899.76  205.33 6901.79  208.49 6902.12  216.04 6902.91
  221.67 6902.99  231.33 6902.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    2.41    .045  216.04     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          2.41  216.04              9.45      50   66.57             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1650

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6902.03    1.95 6902.03   15.12 6901.58   78.77 6900.03   88.55 6899.75
  110.81    6899  130.84 6899.23  136.43 6899.52   143.4  6899.7  153.69 6899.97
  157.02 6900.05  157.98 6900.06  168.53 6899.21  172.42 6899.01  174.61  6899.2
  195.91 6901.23  213.94 6901.51  250.06 6901.78  252.14 6901.78

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

```
       0     .05    1.95    .045  195.91     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1.95  195.91            49.67      50   88.88             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1600

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6901.8    4.02  6901.8    7.61 6901.78   28.77 6901.16    46.4 6900.52
   73.56 6899.74   82.32 6899.45  120.59 6899.88  150.14 6899.47  171.73 6899.17
  192.58 6898.36  193.73 6898.23  196.42 6898.45  213.59 6899.55  230.22 6899.79
  255.79 6900.39  274.95 6900.89   276.4 6900.89

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    7.61    .045   276.4     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          7.61   276.4            95.11      50   29.82             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1550

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6900.04    1.33 6900.05   30.05  6899.3   35.39 6899.15   82.09 6898.02
  129.22 6897.83  139.33 6897.79  144.17 6897.84  145.67 6897.86  148.22 6897.93
  195.15 6899.15  203.02 6899.21  226.74 6899.92  252.51 6899.92

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    1.33    .045  226.74     .05
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1.33  226.74             83.46      50    43.8              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1500

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6898.43     8.4 6898.43    13.8 6898.43    14.4 6898.43   16.19 6898.35
   40.15  6897.4   44.06 6897.06   54.59 6896.89   83.75 6897.36   94.12 6897.53
   96.04 6897.57   99.45 6897.54  121.66 6897.44  155.67 6897.54   158.4 6897.57
  159.54 6897.58  188.49 6898.06  188.53 6898.06  223.84  6898.9  229.49 6899.05
  238.62 6899.12  246.52 6899.23  269.99 6899.93  296.96 6900.85  303.21 6900.95
   308.4 6900.95  312.63 6900.95

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    14.4    .045  229.49     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          14.4  229.49             31.36      50   60.93              .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1450

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6897.84     .01 6897.84     .33 6897.84    5.03 6897.83   12.12 6897.57
   38.61 6896.38   77.89 6897.05   86.32 6897.19  103.38 6897.54  103.48 6897.54
  111.74 6897.71  112.62 6897.68  112.97 6897.67  113.13 6897.62   154.7 6896.26
  156.24 6896.27  159.92 6896.31  161.79 6896.89  184.07 6897.22  232.38    6899
  234.63 6899.15  242.84 6899.51  262.46 6899.52  300.33 6899.52
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    5.03    .045  242.84     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          5.03  242.84           108.56      50   49.97             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1400

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6896.83    1.16 6896.83    5.52  6896.8   12.58 6896.58   22.59 6896.24
   42.82 6895.55      84 6896.23    96.4 6896.42  114.36 6897.09  118.52 6897.26
  119.22 6897.27  119.25 6897.27  119.48 6897.22  134.64 6896.65  141.04 6896.45
  144.04 6895.65  168.21 6894.86  172.59  6894.9  179.07 6894.96  182.98 6896.17
  196.12 6896.36  224.62 6897.41  235.15  6898.1  259.98 6899.21  262.52 6899.21
  264.18  6899.2  273.46 6899.58  283.63 6899.38  319.92 6899.27  322.59 6899.27
  327.57 6899.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  119.48    .045  259.98     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        119.48  259.98            51.74      50   60.89             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1350

INPUT
Description:
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6896.11     .33 6896.11     9.2 6896.03   13.15 6895.99   18.14  6895.9
   45.29 6895.22    59.3 6894.87    97.4 6895.59  112.95  6895.9  129.11  6896.6
```

```
  133.29 6896.81  135.52 6896.79  152.22 6897.03     159 6895.78  163.01 6895.63
  175.45 6895.23  181.29 6893.68  188.07 6893.45  195.29 6893.52  204.57 6893.61
  210.51 6895.44  214.52  6895.5  223.21 6895.82  242.01 6897.05  250.28 6897.42
  261.58 6897.43  268.94  6897.4  289.04 6898.22  310.21 6898.98  326.79 6898.61
  341.29 6898.07  345.29 6898.07  361.43 6898.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  152.22    .045  250.28     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        152.22  250.28            44.78      50   63.94             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1300

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6895.68    4.13 6895.68   10.78 6896.04   21.97  6895.8      38 6893.15
   45.25  6891.7   57.07 6891.47   62.17 6889.76   62.18 6889.76   66.19 6889.26
   69.53 6889.33      75 6889.26   85.86 6889.12   91.24 6891.95   97.29 6892.52
  127.21 6893.52  129.82 6893.56  137.55 6895.55  140.12 6895.61  144.84 6895.72
  146.62 6895.74  148.53 6896.13     150 6896.13

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   21.97    .045   97.29     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         21.97   97.29            51.08      50   49.97             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1250

INPUT
Description:
```

```
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6894.48    3.04 6894.48    7.58 6894.81   26.44 6893.31   34.78 6893.12
    42.5 6891.85   45.98 6891.15   51.68 6891.04   54.13 6890.22   65.85 6888.76
      75 6888.95    75.6 6888.97   85.07 6888.84   88.19 6890.49  105.15 6892.08
  122.96 6892.68  129.88 6892.77  134.48 6893.95  141.21 6894.11     150 6894.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   34.78    .045  105.15     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         34.78  105.15             49.9      50    51.9             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1200

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6892.85   32.64 6892.85   36.48 6892.63    40.1 6892.58   43.39    6891
   43.43 6890.17   44.76 6890.53   48.65 6890.64   48.67 6890.64   49.72 6890.22
    65.5 6888.25      75 6888.46   81.66  6888.6   84.27 6888.57   85.13 6889.02
     113 6891.64   118.7 6891.83  129.94 6891.98   131.4 6892.35  142.29 6892.61
     150 6892.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    40.1    .045     113     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          40.1     113             47.7      50   63.16             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1150

INPUT
```

```
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6894.06     1.9 6894.06    8.97 6893.64   19.89  6891.6    24.6 6891.05
   34.51 6889.23   54.92 6886.33   61.33 6885.24    66.3 6885.33   71.95 6885.37
   81.15 6885.44  121.95 6886.61  130.01 6888.34  158.34    6890  175.06 6890.39
  181.66 6890.42  181.88 6890.43  182.78 6890.46  190.62 6890.46

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    8.97    .045  130.01     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          8.97  130.01            50.56      50   50.26             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1100

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6893.36    2.69 6893.36    3.02 6893.38     3.2 6893.38    3.36 6893.38
   10.99 6893.47    13.9 6893.12   46.61 6887.12   58.95 6885.37   62.83 6884.71
      75 6884.92   77.25 6884.96   85.62 6885.02  108.62 6885.68  127.89 6889.82
  145.04 6890.83     150 6890.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   10.99    .045  127.89     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         10.99  127.89            49.51      50   49.41             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1050

INPUT
```

```
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6892.05   11.92 6892.05   15.26 6892.07   17.08 6892.37   41.66  6887.6
   41.84 6887.55   55.67 6885.02   59.94 6884.41   61.28 6884.18      75 6884.42
   85.15 6884.59   87.04  6884.6   92.24 6884.75  122.74 6891.31   128.7 6891.66
     150 6891.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   17.08    .045  122.74     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         17.08  122.74            72.41      50   40.03             .1       .3

CROSS SECTION


RIVER: Channel
REACH: South              RS: 1000

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6891.85   24.21 6891.85   24.26 6891.85   34.16 6892.34   50.16 6893.06
   50.19 6893.06   50.84 6892.93   61.83 6883.24      75 6883.38   88.65 6883.53
   89.51 6883.54  106.31 6892.04  114.14 6892.43  114.17 6892.43  115.28  6892.4
  122.42 6892.07  148.37 6892.53     150 6892.53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   50.16    .045  106.31     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         50.16  106.31                 0       0       0             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8490

INPUT
```

Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6967.58	15.97	6967.58	19.89	6967.29	21.37	6967.11	23.86	6966.87
26.68	6966.44	50.94	6962.7	52.5	6963.09	54.05	6963.06	57.57	6963.08
63.03	6961.73	64.44	6961.76	75	6962.02	75.71	6962.04	77.76	6962.07
83.28	6962.16	84.12	6962.28	90.48	6963.17	91.67	6963.36	93.41	6963.63
95.37	6963.94	104.44	6965.37	119.17	6968.08	119.67	6968.12	136.66	6969.11
150	6969.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	23.86	.045	119.17	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
23.86	119.17	5	5	5	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8485

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6968.22	.33	6968.22	18.47	6966.89	25.3	6966.06	36.77	6964.95
47.8	6963.25	52.42	6964.41	57.01	6964.32	57.5	6964.33	66.95	6961.97
67.5	6961.83	70.27	6961.74	70.83	6961.74	73.63	6961.83	75	6961.83
82.08	6961.83	82.5	6961.83	83.26	6961.98	83.64	6961.92	84.49	6962.13
92.5	6964.33	94.93	6964.38	96.62	6964.16	97.5	6964.43	97.84	6964.35
99.21	6964.56	100.19	6964.72	102.42	6965.07	117.55	6967.44	120	6967.89
120.08	6967.9	122.9	6968.06	150	6968.06				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	8	8	8	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8477

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6966.24	16.18	6966.24	31.59	6964.38	50.14	6962.59	52.21	6962.39
52.3	6962.38	56.1	6962.3	57.5	6962.33	58.26	6962.14	67.5	6959.83
67.72	6959.82	74.66	6959.82	74.89	6959.83	75	6959.83	75.57	6959.83
82.5	6959.83	82.56	6959.84	82.59	6959.84	91.85	6962.15	92.5	6962.33
92.93	6962.34	97.5	6962.43	99.65	6962.97	105.76	6964.5	117.53	6967.44
119.48	6967.93	119.51	6967.93	124.76	6968.22	140.01	6969.39	150	6969.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	8.79	8.79	8.79	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8468

INPUT
Description:
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6966.07	6.36	6966.07	13.68	6965.53	38.5	6962.54	44.75	6961.93
45.71	6961.84	46.07	6961.81	47.35	6961.86	47.4	6961.85	48.33	6961.61
51.85	6960.73	56.17	6960.65	57.5	6960.47	66.74	6958.16	67.5	6957.97
74.43	6957.97	75	6957.97	81.93	6957.97	82.5	6957.97	91.74	6960.28
92.5	6960.47	97.12	6960.56	97.5	6960.57	103.86	6962.16	127.38	6968.44
129.69	6968.62	129.73	6968.63	130.09	6968.65	150	6968.65		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	56.17	.045	92.5	.05

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

```
         56.17    92.5             17.6    17.6    17.6             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8450

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6965.83    8.27 6965.83   27.45 6962.87   37.29 6961.61   46.34 6961.72
   47.34 6961.73   52.14 6960.53   56.82 6960.44    57.5 6960.34   67.23 6957.91
    67.5 6957.84   67.71 6957.84      75 6957.84   75.21 6957.84    82.5 6957.84
   92.23 6960.27    92.5 6960.34   97.36 6960.44    97.5 6960.44   99.93 6961.05
  106.84 6962.77  131.31 6968.89  131.93 6968.92  136.12 6969.15  142.52 6969.64
     150 6969.64

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8400

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6964.79    2.69 6964.79    9.79 6964.28    16.5 6965.74   21.79 6965.84
    30.9 6965.14    32.8 6964.99    33.4 6964.84   35.71 6964.26   50.78  6960.5
   52.06 6960.17    52.5 6960.06   57.36 6959.97    57.5 6959.96   67.23 6957.53
    67.5 6957.46   67.71 6957.46      75 6957.46   75.21 6957.46    82.5 6957.46
   92.23  6959.9    92.5 6959.96   97.36 6960.06    97.5 6960.06   98.24 6960.25
  101.01 6960.94  131.98 6968.68     134 6968.77     150 6968.77

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8350

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6962.59       6 6962.59    23.3 6960.16   28.01 6959.44   40.19  6958.9
   47.92 6958.54   47.93 6958.55   48.86 6958.78   50.99 6959.31   51.47 6959.43
   51.97 6959.56   56.48 6959.47    57.5 6959.59   67.23 6957.16    67.5 6957.09
   67.71 6957.09      75 6957.09   75.21 6957.09    82.5 6957.09   92.23 6959.52
    92.5 6959.59   97.36 6959.69    97.5 6959.69   98.06 6959.83     120 6965.32
  142.26 6966.96  146.59 6967.27     150 6967.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8300

INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6958.92    4.31 6959.69    5.68 6959.34   10.41 6959.25   10.57 6959.21
   19.88 6956.88    20.8 6956.71      21 6956.71    28.3 6956.71    28.5 6956.71
    35.8 6956.71   45.52 6959.15    45.8 6959.21   50.66 6959.31    50.8 6959.31
   70.99 6964.36   71.62 6964.52   72.33 6964.54   82.69 6964.81   103.3 6964.81
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   10.57    .045    45.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         10.57    45.8               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8250

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6958.84     1.1 6958.92    1.53 6958.96    2.87 6959.06    3.04 6959.07
    3.56 6958.94    7.85 6958.85   16.44 6956.71   18.56 6956.34    18.8 6956.34
   26.06 6956.34    26.3 6956.34   33.56 6956.34   43.24 6958.76   43.56 6958.84
    48.4 6958.94   48.56 6958.94   48.95 6959.04   65.45 6963.16   65.56 6963.17
   65.63 6963.17   66.39 6963.18   72.79  6963.3    83.5 6963.63  101.06 6964.17

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    7.85    .045   43.56     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          7.85   43.56            15.42   15.42   15.42             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8234

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6958.17     .01 6958.17     .03 6958.17    6.09 6958.75   12.98 6957.03
   17.64 6956.22   23.34 6956.22   25.14 6956.22   30.84 6956.22   32.64 6956.22
   35.03 6956.82   42.64 6958.72   43.84 6958.75   47.64 6958.82    56.7 6961.09
```

```
   60.79 6962.11   63.37 6962.16   64.96 6962.19   82.74 6962.52   85.71 6962.57
   90.68 6962.73   98.83 6962.98  100.14 6962.98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    6.09    .045   42.64     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          6.09   42.64                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8229

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6958.01     .01 6958.01    3.08 6958.78    8.01 6958.68     8.1 6958.69
    8.12 6958.68   18.06  6956.2   18.12 6956.19   25.59 6956.19   25.62 6956.19
   33.09 6956.19   33.12 6956.19   33.15 6956.19   43.12 6958.69   43.14 6958.69
   48.12 6958.79      60 6961.76   60.05 6961.77   63.43 6961.83   65.52 6961.87
   88.82  6962.3   90.68 6962.34   93.79 6962.43   98.88 6962.59  100.62 6962.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    8.12    .045   43.12     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          8.12   43.12                 8       8       8             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8221

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6957.27     2.6 6957.73    3.18 6957.59    3.54 6957.58   11.31  6956.7
```

```
   17.94 6955.05   21.31  6954.2   26.28  6954.2   28.81  6954.2   33.78  6954.2
   36.31  6954.2   42.94 6955.86   46.31  6956.7   49.62 6956.77   51.31  6956.8
   61.24 6959.29   66.94 6960.71   69.65 6961.39    92.8 6961.81  100.97 6961.96
  101.05 6961.96  101.18 6961.97  101.39 6961.97  103.51 6961.98  103.81 6961.98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   11.31    .045   46.31     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         11.31   46.31             9.24    9.24    9.24              .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8212

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6956.35    2.15 6956.73    6.37 6955.68    9.07    6955    9.98 6954.78
   14.52 6954.69   14.98 6954.68   24.07  6952.4   24.98 6952.18   25.66 6952.18
   32.48 6952.18   33.16 6952.18   39.98 6952.18   49.07 6954.45   49.98 6954.68
   54.52 6954.77   54.98 6954.78   57.05  6955.3   79.97 6961.03   80.14 6961.03
  102.15 6961.43   107.3 6961.51  107.48 6961.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   14.98    .045   49.98     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         14.98   49.98            12.34   12.34   12.34              .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 8200

INPUT
Description:
Station Elevation Data    num=      23
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6955	2.97	6955.55	6.57	6956.22	7.74	6956.44	14.51	6954.75
19.3	6954.65	19.77	6954.58	29.5	6952.15	29.77	6952.08	29.98	6952.08
37.27	6952.08	37.48	6952.08	44.77	6952.08	54.5	6954.52	54.77	6954.58
59.63	6954.68	59.77	6954.68	60.26	6954.81	82.37	6960.33	82.49	6960.34
84.33	6960.37	102.94	6960.71	112.27	6960.71				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	19.77	.045	54.77	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
19.77	54.77	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8150

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6955.27	.91	6955.54	1.01	6955.51	4.23	6954.71	5.72	6954.34
10.53	6954.24	10.82	6954.21	20.55	6951.78	20.82	6951.71	21.03	6951.71
28.32	6951.71	28.53	6951.71	35.82	6951.71	45.55	6954.14	45.82	6954.21
50.68	6954.31	50.82	6954.31	51.51	6954.48	63.32	6957.43	63.81	6957.45
67.8	6957.61	70.73	6957.66	72.48	6957.69	72.96	6957.7	77.77	6957.79
103.32	6957.79								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	10.82	.045	45.82	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.82	45.82	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8100

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.02	14.36	6958.02	29.05	6955.52	32.03	6955.03	45.06	6952.88
47.01	6952.56	52.2	6953.86	53.72	6953.83	56.76	6953.77	57.16	6953.82
66.67	6951.44	67.5	6951.33	67.71	6951.33	75	6951.33	75.21	6951.33
82.5	6951.33	92.23	6953.77	92.5	6953.83	92.88	6953.89	93.36	6953.98
98.04	6954.07	106.33	6956.14	107.41	6956.15	116.97	6956.18	134	6956.25
150	6956.25								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.16	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.16	92.5	54.43	54.43	54.43	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8046

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.8	15.88	6958.8	16.43	6958.79	25.18	6958.23	25.4	6958.22
27.62	6958.08	27.97	6958.05	33.67	6957.59	37.43	6957.29	45.22	6955.35
52.5	6953.53	55.02	6953.48	57.5	6953.43	62.53	6952.17	67.5	6950.93
71.27	6950.93	75	6950.93	78.77	6950.93	82.5	6950.93	87.53	6952.18
92.5	6953.43	95.02	6953.48	97.5	6953.53				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	5	5	5	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8041

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.9	15.33	6958.9	15.94	6958.89	22.54	6958.47	22.8	6958.45
25.45	6958.28	25.69	6958.26	29.59	6957.95	37.03	6957.36	52.42	6953.51
52.5	6953.49	57.47	6953.39	57.5	6953.39	67.45	6950.9	67.5	6950.89
74.96	6950.89	75	6950.89	82.46	6950.89	82.5	6950.89	92.45	6953.38
92.5	6953.39	97.47	6953.49	97.5	6953.49	97.54	6953.48		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	9	9	9	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8031

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6959.31	5.63	6959.31	14.34	6959.08	15.06	6959.06	17.78	6958.89
18.11	6958.87	21.55	6958.65	21.59	6958.65	22.25	6958.6	23.53	6958.49
45.68	6952.96	46.36	6952.79	52.5	6951.25	54.48	6951.21	57.5	6951.15
61.47	6950.16	67.5	6948.65	70.48	6948.65	75	6948.65	77.98	6948.65
82.5	6948.65	86.47	6949.64	92.5	6951.15	96.3	6951.23	97.5	6951.25
98.95	6951.61	98.98	6951.61						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	8.4	8.4	8.4	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8023

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6959.53	2.92	6959.53	13.41	6959.25	14.07	6959.23	14.5	6959.21
17.41	6959.01	18.08	6958.93	27.91	6956.6	52.5	6949.48	57.22	6949.38
57.5	6949.38	66.94	6947.02	67.5	6946.88	67.92	6946.88	75	6946.88
75.42	6946.88	82.5	6946.88	91.94	6949.24	92.5	6949.38	93.82	6949.59
98.32	6949.68	104.47	6951.22	107.39	6950.72	112.22	6949.89	113.76	6949.86
115.65	6949.88	132.82	6953.19	135.09	6953.61	136.04	6953.64	150	6953.64

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	23.17	23.17	23.17	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 8000

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6959.02	9.77	6959.02	10.44	6959	14.45	6958.75	14.8	6958.73
51.62	6949.53	52.5	6949.3	57.36	6949.21	57.5	6949.2	67.23	6946.77
67.5	6946.7	67.71	6946.7	75	6946.7	75.21	6946.7	82.5	6946.7
92.23	6949.14	92.5	6949.2	92.95	6949.27	97.73	6949.36	104.07	6950.95
104.58	6950.88	118.2	6949.1	119.63	6949.17	122.27	6949.12	134.74	6951.88
140.16	6953.2	147.09	6953.75	150	6953.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7950

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6957.12    1.91 6957.01    4.52 6956.85   25.95 6955.57    26.4 6955.45
   28.39 6954.96   51.68 6949.13    52.5 6948.93   57.36 6948.83    57.5 6948.83
   67.23  6946.4    67.5 6946.33   67.71 6946.33      75 6946.33   75.21 6946.33
    82.5 6946.33      85 6946.76   93.25 6948.83   93.33 6948.85    97.5 6948.93
   99.02 6948.55   99.71 6948.62   103.4 6949.01  105.93 6949.61   109.9 6950.12
  120.21 6952.49  122.15 6952.95   125.9 6953.09  146.47 6953.81     150 6953.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045   93.25     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5   93.25               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7900

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6955.04   12.44 6955.04   21.99 6954.31   26.08    6954   32.16 6953.51
   32.95 6953.44   49.94  6949.2    52.5 6948.55   52.64 6948.55    57.5 6948.45
   57.77 6948.39    67.5 6945.95   67.71 6945.95      75 6945.95   75.21 6945.95
    82.5 6945.95   82.77 6946.02    92.5 6948.45   92.64 6948.46    97.5 6948.55
   98.46 6948.79  111.82 6952.13  114.28 6952.75  118.24 6952.88  126.12 6953.14
  126.53 6953.15  126.76 6953.16  127.14 6953.17   127.9 6953.19     150 6953.19
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5            43.51   43.51   43.51             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7856

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6954.84   14.82 6954.84   19.71 6954.73   25.04 6954.26   29.21  6953.9
   30.17 6953.81   48.55 6949.22    52.5 6948.23   53.53 6948.21    57.5 6948.13
   59.55 6947.62    67.5 6945.63   73.46 6945.63      75 6945.63   80.96 6945.63
    82.5 6945.63   84.55 6946.14    92.5 6948.13   93.53 6948.15    97.5 6948.23
  109.71 6951.28  112.26 6951.92  119.58 6951.87  124.52 6951.92     150 6952.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7851

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6954.91   14.46 6954.91   20.18 6954.78    22.9 6954.54   28.15 6954.08
   29.31 6953.98   29.43 6953.95   30.49 6953.68    52.5 6948.18   52.74 6948.18
    57.5 6948.08   57.98 6947.96    67.5 6945.58   67.86 6945.58      75 6945.58
```

```
   75.36 6945.58    82.5 6945.58   82.98  6945.7    92.5 6948.08   92.74 6948.09
    97.5 6948.18   111.3 6951.63  112.04 6951.82  112.55 6951.82  114.49 6951.84
  145.16 6952.13     150 6952.13

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5                8       8       8             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7844

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6955.1     .69  6955.1    9.07 6955.14   13.88 6955.03   17.45 6954.94
   19.29 6954.81   24.98 6953.38   28.93 6952.07   39.63  6949.4      41 6949.06
    52.5 6946.18   55.12 6946.13    57.5 6946.08   62.75 6944.77    67.5 6943.58
   71.44 6943.58      75 6943.58   78.94 6943.58    82.5 6943.58   87.75 6944.89
    92.5 6946.08   95.12 6946.13    97.5 6946.18  105.58  6948.2  120.49 6951.93
  137.01 6952.09     150 6952.09

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5             8.78    8.78    8.78             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7835

INPUT
Description:
Station Elevation Data    num=      24
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6954.89	6.63	6954.89	9.61	6954.91	11.23	6954.92	12.45	6954.9
14.95	6954.72	38.54	6948.82	52.5	6944.18	52.91	6944.18	57.5	6944.08
58.32	6943.88	67.5	6941.58	68.12	6941.58	75	6941.58	75.62	6941.58
82.5	6941.58	83.32	6941.79	92.5	6944.08	92.91	6944.09	97.5	6944.18
126.31	6951.39	128.94	6952.05	129.44	6952.05	150	6952.05		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	34.71	34.71	34.71	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7800

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6953.7	3.49	6953.7	4.68	6953.7	10.16	6953.72	13.38	6953.7
13.62	6953.64	13.65	6953.64	51.54	6944.16	52.5	6943.92	57.36	6943.83
57.5	6943.82	67.23	6941.39	67.5	6941.32	67.71	6941.32	75	6941.32
75.21	6941.32	82.5	6941.32	92.23	6943.76	92.5	6943.82	97.36	6943.92
97.5	6943.92	98.41	6944.15	108.08	6946.57	129.95	6952.04	139.61	6952.19
150	6952.34								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7750

INPUT
Description:
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6951.79	19.55	6951.79	19.6	6951.77	19.96	6951.68	20.37	6951.58
50.97	6943.93	52.5	6943.55	57.36	6943.45	57.5	6943.45	67.23	6941.02
67.5	6940.95	67.71	6940.95	75	6940.95	75.21	6940.95	82.5	6940.95
92.23	6943.38	92.5	6943.45	93.24	6943.53	97.76	6943.62	98.17	6943.72
100.2	6944.22	100.65	6944.2	101.54	6944.15	111.73	6946.08	114.58	6946.63
136.43	6950.81	136.71	6950.83	145.39	6951.35	150	6951.35		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7700

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6950.24	5.86	6950.24	12.25	6950.19	13.54	6950.18	18.89	6950.13
24.16	6950.06	25.03	6950.04	51.01	6943.55	51.53	6943.42	52.5	6943.17
57.36	6943.08	57.5	6943.07	67.23	6940.64	67.5	6940.57	67.71	6940.57
75	6940.57	75.21	6940.57	82.5	6940.57	92.23	6943.01	92.5	6943.07
93.08	6943.17	97.88	6943.27	101.37	6944.14	105.86	6945.27	106	6945.24
110.4	6944.38	115.54	6943.36	116.3	6943.21	117.42	6943.27	123.99	6943.63
131.09	6945.09	149.99	6949.52	150	6949.52				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7650

INPUT
Description:
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6949.27	3.3	6949.27	21.03	6948.92	21.45	6948.9	29.26	6948.61
51.87	6942.96	52.5	6942.8	57.36	6942.7	57.5	6942.7	67.23	6940.27
67.5	6940.2	67.71	6940.2	75	6940.2	75.21	6940.2	82.5	6940.2
92.23	6942.63	92.5	6942.7	92.95	6942.77	97.75	6942.86	98.49	6943.05
104.53	6944.56	110.41	6943.66	119.71	6942.25	120.76	6942.07	121.61	6941.92
122.09	6941.94	127.52	6942.06	143.94	6946.23	150	6946.23		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	52.73	52.73	52.73	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7597

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6948.26	7.7	6948.26	24.68	6947.93	29.09	6947.84	30.89	6947.81
43.86	6944.56	52.5	6942.4	55.48	6942.34	57.5	6942.3	63.46	6940.81
67.5	6939.8	71.97	6939.8	75	6939.8	79.47	6939.8	82.5	6939.8
88.46	6941.29	92.5	6942.3	95.48	6942.36	97.5	6942.4	100.55	6943.17
100.92	6943.26	101.23	6943.22	106.72	6942.53	107.3	6942.52	109.73	6942.47
119.86	6941.88	136.91	6945.29	142.35	6946.64	149.24	6947.03	150	6947.03

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5                5       5       5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   68.94 6945.17       T
   80.96     150 6945.17       T

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7592

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6948.26    3.48 6948.26   15.81 6948.02   26.68  6947.8   31.11 6947.72
   31.22 6947.69    52.5 6942.37   52.53 6942.37    57.5 6942.27   57.55 6942.25
    67.5 6939.77   67.54 6939.77      75 6939.77   75.04 6939.77    82.5 6939.77
   82.55 6939.78    92.5 6942.27   92.53 6942.27   92.65 6942.27    97.5 6942.37
   97.53 6942.37   99.78 6942.94  101.71 6942.69  104.73 6942.31  106.58 6942.28
  114.34 6942.12  118.34 6941.89  140.62 6946.35  141.23  6946.5  141.99 6946.54
     150 6946.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045   92.65     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5   92.65                9       9       9             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   70.23 6945.17       T
   79.74     150 6945.17       T

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7583

INPUT
Description:
```

Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6948.17	19.37	6947.79	22.07	6947.73	22.51	6947.73	24.44	6947.24
42.69	6943.45	50.42	6940.65	52.5	6940.13	57.01	6940.04	57.5	6940.03
66.53	6937.77	67.5	6937.53	74.27	6937.53	75	6937.53	81.77	6937.53
82.5	6937.53	91.53	6939.79	92.5	6940.03	97.01	6940.12	97.5	6940.13
98.7	6940.43	104.45	6941.87	105.3	6941.85	106.91	6941.81	111.72	6941.74
115.3	6941.69	121.33	6942.72	138.75	6946.11	147.34	6946.4	150	6946.4

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	118.48	118.48	118.48	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	72.52	6945.17	T
77.48	150	6945.17	T

CULVERT

RIVER: Channel
REACH: East RS: 7524

INPUT
Description:
Distance from Upstream XS = 1
Deck/Roadway Width = 116
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 23

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	6945.17	0	2.37	6945.17	0	16.51	6945.17	0
23.09	6945.17	0	42.27	6945.17	0	52.5	6945.17	0
52.83	6945.17	0	57.5	6945.17	0	66.84	6945.17	0
67.5	6945.17	0	68	6945.17	0	75	6945.17	0
75.5	6945.17	0	82.5	6945.17	0	91.84	6945.17	0
92.5	6945.17	0	94.83	6945.17	0	98.98	6945.17	0
104.37	6945.17	0	104.9	6945.17	0	123.21	6945.17	0
128.66	6945.17	0	150	6945.17	0			

Upstream Bridge Cross Section Data

Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6948.17	19.37	6947.79	22.07	6947.73	22.51	6947.73	24.44	6947.24
42.69	6943.45	50.42	6940.65	52.5	6940.13	57.01	6940.04	57.5	6940.03
66.53	6937.77	67.5	6937.53	74.27	6937.53	75	6937.53	81.77	6937.53
82.5	6937.53	91.53	6939.79	92.5	6940.03	97.01	6940.12	97.5	6940.13
98.7	6940.43	104.45	6941.87	105.3	6941.85	106.91	6941.81	111.72	6941.74
115.3	6941.69	121.33	6942.72	138.75	6946.11	147.34	6946.4	150	6946.4

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
57.5	92.5	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	72.52	6945.17	T
77.48	150	6945.17	T

Downstream Deck/Roadway Coordinates
num= 23

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	6945.18	0	2.37	6945.18	0	16.51	6945.18	0
23.09	6945.18	0	42.27	6945.18	0	52.5	6945.18	0
52.83	6945.18	0	57.5	6945.18	0	66.84	6945.18	0
67.5	6945.18	0	68	6945.18	0	75	6945.18	0
75.5	6945.18	0	82.5	6945.18	0	91.84	6945.18	0
92.5	6945.18	0	94.83	6945.18	0	98.98	6945.18	0
104.37	6945.18	0	104.9	6945.18	0	123.21	6945.18	0
128.66	6945.18	0	150	6945.18	0			

Downstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6946.37	2.2	6946.37	7.27	6946.27	9.68	6946.22	11.41	6946.19
14.82	6946.03	26.66	6945.47	38.16	6942.59	52.5	6939.01	55.32	6938.95
57.5	6938.91	63.14	6937.5	67.5	6936.41	70.77	6936.41	75	6936.41
78.27	6936.41	82.5	6936.41	88.14	6937.82	92.5	6938.91	96.72	6939.43
99.39	6939.48	99.63	6939.54	99.96	6939.51	106.54	6938.95	113.62	6939.17
113.63	6939.17	131.15	6942.74	133.31	6943.3	150	6943.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          57.5    92.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   72.23 6945.18       T
   77.75     150 6945.18       T

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      Circular     4.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  1   116.5     .013     .013        0                   .5                1
Upstream   Elevation =  6937.29
           Centerline Station =  75
Downstream Elevation =  6936.41
           Centerline Station =  75

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7465

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6946.37     2.2 6946.37    7.27 6946.27    9.68 6946.22   11.41 6946.19
   14.82 6946.03   26.66 6945.47   38.16 6942.59    52.5 6939.01   55.32 6938.95
    57.5 6938.91   63.14  6937.5    67.5 6936.41   70.77 6936.41      75 6936.41
```

```
   78.27 6936.41    82.5 6936.41   88.14 6937.82    92.5 6938.91   96.72 6939.43
   99.39 6939.48   99.63 6939.54   99.96 6939.51  106.54 6938.95  113.62 6939.17
  113.63 6939.17  131.15 6942.74  133.31  6943.3     150  6943.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5            14.79   14.79   14.79             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   72.23 6945.18       T
   77.75     150 6945.18       T

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7450

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6945.98     .36 6945.98     .79 6945.97     1.1 6945.96     1.7 6945.94
    7.85 6945.65   22.02 6945.38    26.9 6945.29   50.44 6939.41    52.5 6938.89
   57.36  6938.8    57.5 6938.79   67.23 6936.36    67.5 6936.29   67.71 6936.29
      75 6936.29   75.21 6936.29    82.5 6936.29   92.23 6938.73    92.5 6938.79
   94.08 6938.99   98.21 6939.07  101.57 6939.91  106.23 6939.46  115.55 6938.71
  117.98 6938.66  121.18  6938.7  127.54 6939.99  139.62 6943.13  148.73 6943.34
     150 6943.34

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5               50      50      50             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   64.83 6945.18       T
   85.16     150 6945.18       T
```

CROSS SECTION

RIVER: Channel
REACH: East RS: 7400

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6945.2	18.12	6945.2	22.67	6945.16	26.21	6945.09	26.33	6945.06
26.48	6945.02	26.8	6944.94	26.91	6944.92	35.23	6942.84	49.54	6939.26
51.19	6938.85	52.5	6938.52	57.36	6938.42	57.5	6938.42	67.23	6935.99
67.5	6935.92	67.71	6935.92	75	6935.92	75.21	6935.92	82.5	6935.92
92.23	6938.35	92.5	6938.42	93.18	6938.52	97.89	6938.62	101.32	6939.48
104.54	6940.28	107.09	6940.09	122.69	6938.89	133.49	6938.18	135.2	6938.12
138.25	6937.98	144.3	6939.47	150	6939.47				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7350

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6944.22	24.03	6944.22	28.2	6944.22	45.91	6939.79	48.91	6939.04
52.5	6938.14	57.36	6938.05	57.5	6938.04	67.23	6935.61	67.5	6935.54
67.71	6935.54	75	6935.54	75.21	6935.54	82.5	6935.54	92.23	6937.98
92.5	6938.04	92.89	6938.1	97.69	6938.19	103.65	6939.68	115.7	6938.78
136.3	6938.11	137.49	6938.07	144.88	6937.92	150	6937.92		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5            23.81   23.81   23.81             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7326

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6943.33   10.23 6943.33   12.81 6943.35   12.94 6943.35   29.93  6943.5
   30.02  6943.5   30.27 6943.51   30.34 6943.51   45.27 6939.77   51.91 6938.11
    52.5 6937.97    52.6 6937.96    57.5 6937.87    57.7 6937.82    67.5 6935.37
   74.85 6935.37      75 6935.37   82.35 6935.37    82.5 6935.37    82.7 6935.42
    92.5 6937.87   93.16 6937.96   97.83 6938.05   97.99 6938.09  103.04 6939.35
  106.02 6939.29  128.98  6938.8  146.78 6937.83     150 6937.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045   93.16     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5   93.16                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7321

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6943.28    2.23 6943.28   12.32 6943.21   12.46 6943.21   13.79  6943.2
   28.18 6943.33    30.3 6943.35   30.41 6943.35   30.42 6943.35   30.43 6943.35
   30.68 6943.35   30.98 6943.28    52.5  6937.9   57.46  6937.8    57.5  6937.8
   67.41 6935.32    67.5  6935.3   74.94  6935.3      75  6935.3   82.44  6935.3
    82.5  6935.3   92.41 6937.77    92.5  6937.8   97.46 6937.89    97.5  6937.9
  103.78 6939.47  103.97 6939.51  106.28 6939.41  107.01 6939.38  107.46 6939.37
```

```
  109.81 6939.32  125.64 6938.99  137.91 6938.32     150 6938.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5                 8       8       8              .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7313

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6943.04   14.15 6943.04   14.63 6943.03   19.23    6943    23.9 6943.04
   41.21 6938.72   41.35 6938.68   41.83 6938.56    52.5  6935.9   54.96 6935.85
    57.5  6935.8   62.41 6934.57    67.5  6933.3   71.19  6933.3      75  6933.3
   78.69  6933.3    82.5  6933.3   87.41 6934.52    92.5  6935.8   94.96 6935.84
    97.5  6935.9  100.61 6936.67  112.04 6939.53  112.84  6939.5  115.08  6939.4
  115.21  6939.4  115.87 6939.38   120.3 6939.29  123.73  6939.1     150  6939.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5             8.98    8.98    8.98              .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7304

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6942.84    16.2 6942.84   16.83 6942.84   18.61 6942.83   19.43 6942.82
```

```
   40.85 6937.27    52.5 6933.92    56.3 6933.85    57.5 6933.82    65.1 6931.92
    67.5 6931.32    69.3 6931.32      75 6931.32    76.8 6931.32    82.5 6931.32
    90.1 6933.22    92.5 6933.82    96.3  6933.9    97.5 6933.92  105.52  6936.3
   118.4  6939.5  119.25 6939.45  119.56 6939.44  119.64 6939.43     150 6939.43

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5            54.21   54.21   54.21             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7250

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6941.68   19.82 6941.68   19.87 6941.67   20.15  6941.6   50.05 6934.13
    52.5 6933.51   57.36 6933.42    57.5 6933.41   67.23 6930.98    67.5 6930.91
   67.71 6930.91      75 6930.91   75.21 6930.91    82.5 6930.91   92.23 6933.35
    92.5 6933.41   97.36 6933.51    97.5 6933.51   98.23  6933.7  117.65 6938.55
  117.67 6938.55  117.87 6938.54  120.01 6938.42  129.71 6936.89     150 6936.89

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    57.5    .045    92.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.5    92.5               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7200

INPUT
Description:
Station Elevation Data    num=      24
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6940.61	2.31	6940.61	19.15	6940.51	23.11	6940.49	51.1	6933.49
52.5	6933.14	57.26	6933.04	57.5	6933.04	67.02	6930.66	67.5	6930.54
74.64	6930.54	75	6930.54	82.14	6930.54	82.5	6930.54	92.02	6932.92
92.5	6933.04	97.26	6933.14	97.5	6933.14	98.14	6933.3	112.17	6936.81
113.2	6936.65	119.58	6935.75	142.11	6932.93	150	6932.93		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	48.75	50	51.38	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7150

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6939.46	10.98	6939.46	24.02	6939.34	24.87	6939.34	25.38	6939.34
26.28	6939.33	26.29	6939.33	38.91	6936.18	52.56	6932.77	55.1	6932.72
57.56	6932.67	57.6	6932.66	62.68	6931.39	67.56	6930.17	71.46	6930.17
75.02	6930.16	75.06	6930.16	79.01	6930.16	82.56	6930.16	87.88	6931.5
92.56	6932.66	95.26	6932.72	97.56	6932.76	102.62	6934.03	108.86	6935.59
115.42	6934.68	115.64	6934.65						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.6	.045	92.56	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.6	92.56	48.2	50	51.94	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7100

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6938.65	16.73	6938.65	19.18	6938.62	26.28	6938.78	26.31	6938.78
26.32	6938.78	26.33	6938.78	27.01	6938.78	30.56	6937.89	52.55	6932.39
54.19	6932.36	57.55	6932.29	60.81	6931.48	67.55	6929.79	70	6929.79
75.01	6929.79	75.05	6929.79	80.05	6929.79	82.55	6929.79	89.21	6931.45
92.55	6932.29	95.89	6932.36	97.55	6932.39	101.89	6933.47	111.11	6935.78
116.08	6935.15	116.37	6935.11						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.55	.045	92.55	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.55	92.55	59.14	59.14	59.14	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7041

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6937.57	8.73	6937.57	13.28	6937.61	13.9	6937.62	14.22	6937.63
19.47	6937.57	19.8	6937.57	28.21	6937.54	30.14	6937.54	33.68	6936.65
52.5	6931.95	54.15	6931.91	57.5	6931.85	64.19	6930.17	67.5	6929.35
69.98	6929.35	75	6929.35	77.48	6929.35	82.5	6929.35	89.19	6931.02
92.5	6931.85	94.15	6931.88	97.5	6931.95	110.31	6935.15	114.4	6936.17
120.04	6935.86	121.15	6935.79	122.01	6935.75	135.62	6933.8	150	6933.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	5	5	5	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7036

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6937.42	9.15	6937.42	12.65	6937.45	14.11	6937.48	14.87	6937.5
18.52	6937.46	19.09	6937.45	27.23	6937.43	28.5	6937.42	32.42	6936.52
32.44	6936.51	52.49	6931.87	57.44	6931.77	57.49	6931.77	57.5	6931.77
57.59	6931.75	67.5	6929.27	74.93	6929.27	75	6929.27	75.07	6929.27
82.5	6929.27	82.62	6929.3	92.5	6931.77	92.56	6931.77	97.5	6931.87
113.92	6935.98	114.23	6936.05	114.45	6936.04	117.46	6935.92	122.78	6935.63
123.33	6935.6	123.75	6935.57	130.47	6934.61	143.8	6932.61	150	6932.61

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	57.5	.045	92.5	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.5	92.5	8	8	8	.1	.3

CROSS SECTION

RIVER: Channel
REACH: East RS: 7028

INPUT
Description:
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6937.18	9.83	6937.18	11.65	6937.19	14.45	6937.25	15.9	6937.28
16.99	6937.27	17.95	6937.26	19.72	6937.26	19.99	6937.26	42	6932.16
42.01	6932.16	51.91	6929.87	54.36	6929.82	56.91	6929.77	62.35	6928.5
67.26	6927.27	70.94	6927.27	75	6927.27	78.82	6927.27	82.5	6927.27
89.04	6928.91	92.5	6929.77	95.77	6929.84	97.5	6929.87	103.25	6931.31
117.8	6934.95	118.62	6935.15	119.85	6935.42	120.03	6935.51	124.69	6935.37
126.2	6935.3	126.31	6935.31	148.01	6932.06	150	6932.06		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	56.91	.045	92.5	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         56.91    92.5             9.05    9.05    9.05             .1       .3

CROSS SECTION


RIVER: Channel
REACH: East               RS: 7019

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6936.9   10.52  6936.9    10.6  6936.9   10.74 6936.91   14.88 6937.02
   14.93    6937   16.76 6937.04   47.53 6928.85   51.26 6927.92   54.91 6927.84
    56.1 6927.82   56.26 6927.82   56.48 6927.77   66.99  6925.3   68.04 6925.32
   71.05 6925.39      75 6925.39    82.5 6925.39   90.07 6927.24   92.95 6927.88
   96.52 6927.95   98.26    6928  106.26 6930.14  115.08 6932.49  119.74 6933.39
  126.41 6934.72  127.15 6935.06  128.39    6935  128.64 6935.06

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   56.26    .045   92.95     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         56.26   92.95            18.81   18.81   18.81             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6158

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6976.31   29.27  6975.8   29.49 6975.87   37.71 6975.64   41.35  6975.5
   46.77 6975.28   49.92 6975.15   52.34  6975.1   53.07 6974.94   56.05 6974.25
   60.87 6973.14      64 6973.14   72.32 6972.45      75 6972.45   81.76 6972.46
    85.9 6972.46   95.45 6974.86   95.78 6974.86   95.92 6974.86  111.89 6974.78
  112.06 6974.78  114.83 6974.87  114.95 6974.87   147.8    6976     150    6976
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   52.34    .045   95.92     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         52.34   95.92                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6153

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6976.57   15.46 6976.21   15.84 6976.33   21.34 6976.18   37.86 6975.51
   40.96 6975.38   45.73 6975.19   46.68 6975.15   47.34 6975.05   49.93 6974.41
   56.05    6973    58.2  6972.5   61.69  6971.7   66.99  6971.7   73.01  6971.2
      75  6971.2   79.86 6971.21   85.88 6971.21   99.81  6974.7  100.29  6974.7
   100.5  6974.7  111.86 6974.64   112.1 6974.64  115.39 6974.76  115.53 6974.76
     150 6974.76

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   46.68    .045  100.29     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         46.68  100.29                14      14      14             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6145

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6975.53   28.57 6975.53   28.84 6975.52   31.99 6974.73   32.84 6974.52
      34 6974.49   37.84 6974.42   43.69 6972.95   63.84 6967.92   66.15 6967.92
   74.84 6967.92      75 6967.92   77.06 6967.92   85.84 6967.92  106.73 6973.14
```

```
  111.45 6974.32  111.84 6974.42  112.73 6974.43  116.84 6974.52  117.03 6974.47
  117.13 6974.44  129.36 6974.86  138.31 6975.17  142.62 6975.32  145.31 6975.41
     150 6975.41

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.84    .045  111.84     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.84  111.84            13.54   13.54   13.54             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6131

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6975.27   26.22 6975.27   27.14 6975.24    29.7 6975.13   30.21 6975.12
   30.23 6975.11    32.1 6974.64    32.8 6974.47   35.75 6974.41    37.8 6974.37
   37.86 6974.36   53.17 6970.53    63.8 6967.87   70.32 6967.87    74.8 6967.87
      75 6967.87   81.34 6967.87    85.8 6967.87  101.31 6971.75   111.8 6974.37
  111.86 6974.37  117.11 6974.14  118.17 6974.13  122.35 6974.27     150 6974.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.86    .045  111.86     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.86  111.86            31.21   31.21   31.21             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6100

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0 6974.94   13.53 6974.94   15.82 6974.89   22.52 6974.62   23.08 6974.61
   32.43 6974.43    32.5 6974.41   32.71 6974.36   33.61 6974.34   37.71 6974.26
    54.8 6969.99   63.71 6967.76   70.92 6967.76   74.71 6967.76      75 6967.76
   81.91 6967.76   85.71 6967.76  102.66    6972  111.71 6974.26  113.46 6974.29
  116.71 6974.36  117.47 6974.17  119.64 6973.63  144.25  6974.3     150  6974.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.71    .045  111.71     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.71  111.71               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6050

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6973.05   22.84 6973.05   25.37 6972.98   27.52 6972.92   27.79 6972.99
   32.57 6974.19   34.35 6974.15   37.57 6974.09   54.26 6969.91   63.57 6967.59
   70.61 6967.59   74.57 6967.59      75 6967.59   81.59 6967.59   85.57 6967.59
  102.11 6971.72  111.57 6974.09  116.71 6973.51  119.07 6973.56  121.16 6973.04
  121.79 6973.05  125.41 6973.15     126 6973.15  133.36 6973.21     150 6973.21

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.57    .045  111.57     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.57  111.57            43.73   43.73   43.73             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6006

INPUT
Description:
```

```
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6971.93   14.34 6971.93   23.19 6971.72   27.66 6972.84   32.44 6974.03
   34.09    6974   37.44 6973.93   46.06 6971.78   63.44 6967.43   67.13 6967.43
   74.44 6967.43      75 6967.43   78.16 6967.43   85.44 6967.43    94.3 6969.65
  111.44 6973.93  113.16 6973.97  116.44 6974.03  118.85 6973.43  120.21 6973.09
   121.6 6973.13  122.71 6973.15  123.78 6973.18  124.22 6973.19  125.23 6973.22
  128.35 6973.25     150 6973.25

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.44    .045  111.44     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.44  111.44                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 6001

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6972.1    3.84  6972.1   22.05 6971.67      23 6971.65   23.01 6971.65
   23.04 6971.65   23.16 6971.64   32.43 6973.97   32.44 6973.97   32.53 6973.97
   37.42 6973.87   37.44 6973.87   37.86 6973.77   63.44 6967.39   63.54 6967.39
   74.44  6967.4   74.51  6967.4   75.02  6967.4   85.44 6967.41   85.52 6967.43
   95.52 6969.93  111.44 6973.92  111.46 6973.92  112.45 6973.94  116.44 6974.02
   120.1  6973.1  120.12  6973.1  122.22 6973.15  122.98 6973.17  124.21  6973.2
  124.52 6973.21  125.23 6973.23  128.63 6973.26  150.02 6973.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.42    .045  112.45     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.42  112.45                 8       8       8             .1       .3

CROSS SECTION
```

RIVER: Channel
REACH: West RS: 5993

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6971.5	23.84	6971.5	24.18	6971.5	25.15	6971.47	29.96	6971.36
31.93	6971.85	32.4	6971.97	36.35	6971.89	37.4	6971.87	57.79	6966.79
63.4	6965.39	71.98	6965.4	74.4	6965.4	75	6965.4	82.95	6965.41
85.4	6965.41	105.44	6970.43	111.4	6971.93	113.3	6971.97	116.4	6972.03
120.78	6973.13	122.69	6973.18	123.19	6973.19	123.36	6973.19	124.84	6973.23
124.95	6973.24	125.18	6973.24	129.04	6973.27	149.94	6973.44	150	6973.44

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	37.4	.045	111.4	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.4	111.4	9.14	9.14	9.14	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5984

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6971.34	24.82	6971.34	25.53	6971.32	27.3	6971.28	32.09	6970.08
32.38	6970.01	37.04	6969.92	37.38	6969.91	37.42	6969.9	39.13	6969.47
63.38	6963.41	64.08	6963.41	74.38	6963.41	75	6963.41	75.06	6963.41
85.38	6963.41	86.94	6963.8	111.38	6969.91	112.45	6969.93	116.1	6970.01
116.38	6970.01	117.54	6970.3	118.8	6970.62	129.5	6973.29	138.51	6973.36
145.15	6973.34	150	6973.34						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	37.42	.045	112.45	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.42	112.45	33.35	33.35	33.35	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5950

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6970.97	18.84	6970.97	21.54	6970.91	28.38	6970.74	28.94	6970.73
30.54	6970.33	32.28	6969.89	34.22	6969.86	37.28	6969.79	53.16	6965.82
63.28	6963.29	69.98	6963.29	74.28	6963.29	75	6963.29	80.96	6963.29
85.28	6963.29	101.02	6967.23	111.28	6969.79	113.26	6969.83	116.28	6969.89
122.53	6971.46	126.85	6972.54	129.12	6972.59	130.38	6972.59	131.52	6972.6
150	6972.6								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	37.28	.045	111.28	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.28	111.28	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5900

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6970.42	5.5	6970.42	30.89	6970.03	31.6	6969.85	32.14	6969.72
34.15	6969.68	37.14	6969.62	52.61	6965.75	63.14	6963.12	69.66	6963.12
74.14	6963.12	75	6963.12	80.65	6963.12	85.14	6963.12	100.47	6966.95
111.14	6969.62	116.97	6970.31	118.64	6970.35	120.84	6970.9	132.76	6971.2
136.12	6971.26	136.3	6971.27	137.66	6971.29	150	6971.29		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	37.14	.045	111.14	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.14  111.14            41.56   41.56   41.56             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5858

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6969.61   25.28 6969.61   28.71 6969.56   28.79 6969.56   29.02 6969.56
   31.79 6969.52   32.02 6969.57   34.73 6969.52   37.02 6969.47   51.63 6965.82
   63.02 6962.98   69.15 6962.98   74.02 6962.98      75 6962.98   80.12 6962.98
   85.02 6962.98   99.31 6966.55  111.02 6969.48  113.75 6969.53  116.02 6969.58
  116.35 6969.49  117.63 6969.17  119.24  6969.2  124.32  6969.3  124.68 6969.31
  130.53 6969.43  134.34  6969.5     150  6969.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.02    .045  111.02     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.02  111.02                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5853

INPUT
Description:
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6969.61   20.28 6969.61   26.25 6969.53   26.31 6969.53   26.47 6969.53
   31.56 6969.46   31.62 6969.45      32 6969.55   36.78 6969.46   36.99 6969.45
      37 6969.45   43.83 6967.75   62.88 6962.99      63 6962.96   73.92 6962.96
      74 6962.96      75 6962.96   84.89 6962.96      85 6962.96  110.56 6969.35
  110.99 6969.46     111 6969.46  115.91 6969.56     116 6969.56  116.02 6969.55
  118.32 6968.98  121.23 6969.04  125.11 6969.11  125.38 6969.12  129.85  6969.2
```

```
  134.11 6969.29     150 6969.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   36.99    .045  110.99     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         36.99  110.99                 9       9       9              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5844

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6969.61   11.29 6969.61   21.84 6969.47   21.86 6969.47   21.89 6969.47
   23.14 6969.45   23.36 6969.45   31.98  6967.3   35.25 6967.24   36.98  6967.2
    45.7 6965.03   62.98 6960.72   66.72 6960.72   73.98 6960.73      75 6960.73
   77.74 6960.73   84.98 6960.74   93.97 6962.99  110.98 6967.26  113.23  6967.3
  115.98 6967.36  121.16 6968.66  122.95 6968.69  123.46  6968.7  124.79 6968.73
  126.53 6968.76  126.65 6968.77  128.64 6968.81  133.69  6968.9     150  6968.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   36.98    .045  110.98     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         36.98  110.98              8.52    8.52    8.52              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5835

INPUT
Description:
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6969.62    2.76 6969.62    7.63 6969.55    8.56 6969.54   11.15 6969.52
```

```
    16.3 6969.47   30.87 6965.82   31.95 6965.55   36.61 6965.46   36.85 6965.45
   36.95 6965.45   38.73 6965.01   62.95 6958.95   63.67 6958.95   73.95 6958.95
   74.65 6958.95      75 6958.95   84.95 6958.95   86.57 6959.36  110.85 6965.43
  110.95 6965.45  115.66 6965.55  115.95 6965.55  116.85 6965.78  127.45 6968.43
   127.5 6968.44  127.52 6968.44  127.56 6968.46  127.58 6968.46  127.91 6968.44
  133.29 6968.54     150 6968.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   36.85    .045  110.85     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         36.85  110.85            35.14   35.14   35.14              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5800

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6969.3   16.37  6969.3   20.37  6968.3   31.85 6965.43   34.02 6965.39
   36.85 6965.33   51.52 6961.66   62.85 6958.83   69.03 6958.83   73.85 6958.83
      75 6958.83   80.02 6958.83   84.85 6958.83   99.37 6962.46  110.85 6965.33
  113.06 6965.37  115.85 6965.43  120.59 6966.62  124.14  6967.5  124.64 6967.63
   125.2 6967.77  125.24 6967.78  129.93 6967.43  130.78 6967.42  142.09  6967.3
     150  6967.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   36.85    .045  110.85     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         36.85  110.85               50      50      50              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5750
```

```
INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6968.3    3.97  6968.3    8.54 6968.33   15.77 6968.38      20 6968.42
   22.39 6967.83   32.66 6965.26   35.02 6965.21   37.66 6965.16   50.09 6962.05
   63.66 6958.66   69.04 6958.66   74.66 6958.66      75 6958.66    80.1 6958.66
   85.66 6958.66   98.73 6961.92  111.66 6965.15  120.09 6966.41  121.38 6966.43
  123.14 6966.87  124.67 6966.85  124.68 6966.85  125.98 6966.84  137.75 6966.71
  150.01 6966.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.66    .045  111.66     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.66  111.66               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5700

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6967.27   13.63 6967.27    23.8 6967.38   23.83 6967.38   30.49 6965.71
      33 6965.08   33.38 6965.08      38 6964.98   40.07 6964.47      64 6958.48
   65.07 6958.48      75 6958.48   76.15 6958.48      86 6958.48   88.91 6959.21
     112 6964.98  113.81 6965.18  117.73 6965.26  120.61 6965.98  122.69 6965.97
  122.77 6965.97  132.08 6965.93  140.38 6965.89  140.98 6965.88  142.16 6965.88
     150 6965.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION
```

RIVER: Channel
REACH: West RS: 5650

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6966.26	26.54	6966.26	27.55	6966.27	27.86	6966.19	33	6964.91
35.43	6964.86	38	6964.81	50.64	6961.65	64	6958.31	69.65	6958.31
75	6958.31	80.65	6958.31	86	6958.31	98.64	6961.47	112	6964.81
116.23	6965.15	118.55	6965.3	123.4	6965.27	150	6965.27		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38	112	31.64	31.64	31.64	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5618

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6965.2	11.27	6965.2	11.62	6965.2	22.64	6965.34	24.01	6965.36
29.8	6965.43	30.43	6965.44	31.27	6965.23	33	6964.8	33.96	6964.78
38	6964.7	43.01	6963.45	64	6958.2	72.88	6958.2	75	6958.2
83.88	6958.2	86	6958.2	91.01	6959.45	112	6964.7	114.31	6964.74
117	6964.8	117.41	6964.7	119.93	6964.71	124.44	6964.74	124.79	6964.75
138.3	6964.83	143.66	6964.8	150	6964.8				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38	112	5	5	5	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5613

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6965.09	13.55	6965.09	13.93	6965.09	21.84	6965.19	22.82	6965.21
30.09	6965.3	30.56	6965.3	31.72	6965.01	33	6964.69	35.98	6964.63
38	6964.59	53.49	6960.72	64	6958.09	70.55	6958.09	75	6958.09
81.55	6958.09	86	6958.09	101.49	6961.97	112	6964.59	114.06	6964.64
117	6964.69	117.44	6964.58	117.46	6964.58	118.05	6964.59	122.65	6964.62
126.06	6964.64	126.33	6964.64	143.02	6964.75	146.87	6964.73	150	6964.73

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38	112	8	8	8	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5605

INPUT
Description:
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6964.81	7.85	6964.81	10.98	6964.84	17.19	6964.91	17.63	6964.92
20.55	6964.96	20.92	6964.96	23.79	6965	31.55	6963.06	33	6962.69
35.53	6962.64	38	6962.59	51.14	6959.31	64	6956.09	69.44	6956.09
75	6956.09	80.44	6956.09	86	6956.09	99.14	6959.38	112	6962.59
114.53	6962.64	117.01	6962.7	117.02	6962.69	124.02	6964.44	124.76	6964.45
127	6964.46	128.67	6964.47	128.8	6964.48	150.02	6964.48		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112             8.75    8.75    8.75             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5596

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6964.66   14.24 6964.66   15.25 6964.67   17.36 6964.69   18.14 6964.69
   18.83  6964.7   30.45 6961.42      33 6960.78   37.44 6960.69      38 6960.68
   40.91 6959.95      64 6954.18   65.23 6954.18      75 6954.18   76.23 6954.18
      86 6954.18   88.91  6954.9     112 6960.68  116.44 6960.77     117 6960.78
  119.99 6961.52  131.05 6964.29  131.07  6964.3  131.08  6964.3     150  6964.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            45.83   45.83   45.83             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5550

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6963.37    5.71 6963.37    7.23 6963.39    7.26 6963.39    7.97  6963.4
    9.35 6963.42   21.19 6963.57   24.08 6962.85      33 6960.62   35.59 6960.57
      38 6960.52   51.45 6957.15      64 6954.02   69.31 6954.02      75 6954.02
   80.31 6954.02      86 6954.02   99.45 6957.38     112 6960.52  114.59 6960.57
     117 6960.62  125.84 6962.83  128.62 6963.52  132.63  6963.6  137.38 6963.64
     150 6963.64
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5500

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6962.35   16.71 6962.35   24.87 6962.42   24.98 6962.42    25.1 6962.42
   29.77 6961.25      33 6960.44   35.66 6960.39      38 6960.34   51.86 6956.88
      64 6953.84   69.14 6953.84      75 6953.84   80.14 6953.84      86 6953.84
   99.86 6957.31     112 6960.34  114.66  6960.4     117 6960.44  120.01  6961.2
  124.54 6962.33  145.14 6962.72     150 6962.72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5450

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6961.21   19.94 6961.21   26.65 6961.31   28.12 6961.32   28.14 6961.32
    28.2 6961.32   28.39 6961.33   28.76 6961.33   31.22 6960.71      33 6960.27
   35.74 6960.22      38 6960.17   52.26  6956.6      64 6953.67   68.97 6953.67
      75 6953.67   79.97 6953.67      86 6953.67  100.26 6957.24     112 6960.17
```

```
  114.74 6960.22     117 6960.27  119.49 6960.89  122.54 6961.66  128.91 6961.63
     150 6961.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5400

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6960.16   13.32 6960.16   31.51 6960.47   32.51 6960.22      33  6960.1
   35.82 6960.04      38    6960   52.67 6956.33      64  6953.5   68.79  6953.5
      75  6953.5   79.79  6953.5      86  6953.5  100.67 6957.16     112    6960
  114.82 6960.05     117  6960.1  118.23  6960.4  120.34 6960.93  123.95 6960.96
  125.19 6960.96  138.52 6961.05  143.24 6961.09     150 6961.09

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            17.06   17.06   17.06             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5383

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6959.54     5.2 6959.54    5.59 6959.55   29.11 6960.06    30.8  6960.1
```

```
   32.59 6960.14      33 6960.04   36.12 6959.97      38 6959.94   54.31 6955.86
      64 6953.44    68.1 6953.44      75 6953.44    79.1 6953.44      86 6953.44
  102.31 6957.51     112 6959.94  115.14    6960     117 6960.04  117.94 6960.27
  119.71 6960.71  121.71 6960.73  128.97 6960.78  129.65 6960.78  137.01 6960.83
  144.63 6960.88     150 6960.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5378

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6959.48    8.54 6959.48    8.98 6959.49    26.9 6959.88   28.19 6959.91
   32.92 6960.02   32.97 6960.02   32.98 6960.02   33.01 6960.01      38 6959.91
   38.01 6959.91   38.05  6959.9   64.01 6953.41   64.03 6953.41   75.01 6953.41
   75.03 6953.41   86.01 6953.41   86.05 6953.42     112 6959.91  112.01 6959.91
     117 6960.01  117.01 6960.01  119.53 6960.64  119.56 6960.65  124.92 6960.69
  130.45 6960.72  130.97 6960.73  136.57 6960.76  145.05 6960.82  150.01 6960.82

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                 8       8       8             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5369

INPUT
```

```
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6959.15    2.95 6959.15   13.88 6959.39   14.42  6959.4   23.36  6959.6
      24 6959.61   26.36 6959.66   26.39 6959.66      33 6958.01   35.51 6957.96
      38 6957.91   51.04 6954.65      64 6951.41   69.52 6951.41      75 6951.41
   80.52 6951.41      86 6951.41   99.04 6954.67     112 6957.91  114.49 6957.96
     117 6958.01  118.26 6958.33  127.36  6960.6  130.03 6960.62   132.8 6960.64
  133.06 6960.64  135.85 6960.66  145.69 6960.73     150 6960.73

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112             9.48    9.48    9.48             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5360

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6958.99     7.1 6958.99   19.75 6959.27   19.95 6959.28   32.48 6956.14
      33 6956.01   37.85 6955.92      38 6955.91   63.24  6949.6      64 6949.41
   74.74 6949.41      75 6949.41   85.77 6949.41      86 6949.41  111.49 6955.79
     112 6955.91  116.92 6956.01     117 6956.01  117.81 6956.22  135.08 6960.54
  135.31 6960.54  135.82 6960.54  146.47 6960.61     150 6960.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            10.07   10.07   10.07             .1       .3

CROSS SECTION


RIVER: Channel
```

REACH: West RS: 5350

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.72	5.39	6958.72	11.5	6958.83	15.86	6958.92	20.39	6959.02
20.68	6959.03	20.74	6959.03	21.54	6958.83	33	6955.96	34.27	6955.94
38	6955.86	45.59	6953.97	64	6949.38	68.85	6949.38	75	6949.38
80.35	6949.38	86	6949.38	99.65	6952.79	112	6955.89	114.98	6955.95
117	6955.99	133.77	6960.18	134.65	6960.4	135.38	6960.41	140.05	6960.44
140.38	6960.45	147.29	6960.49	150	6960.49				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38	112	38.94	50	60.89	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5300

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6958.22	20.98	6958.22	23.2	6958.26	24.41	6957.95	33	6955.81
35.98	6955.75	38	6955.71	48.52	6953.07	64	6949.21	68.45	6949.21
75	6949.21	79.45	6949.21	86	6949.21	96.52	6951.84	112	6955.71
114.98	6955.76	117	6955.81	123.8	6957.51	129.34	6958.89	129.46	6958.92
134.82	6958.98	135.22	6958.99	150	6958.99				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38	112	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5250

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6957.15	25.87	6957.15	26.87	6957.16	27.54	6957	33	6955.63
36.05	6955.57	38	6955.53	48.12	6953	64	6949.03	68.28	6949.03
75	6949.03	79.28	6949.03	86	6949.03	96.12	6951.56	112	6955.53
115.05	6955.59	117	6955.63	120.08	6956.4	126.05	6957.9	145.06	6958
147.2	6958.02	150	6958.02						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
38	112	50	50	50	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 5200

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6955.61	8.6	6955.61	10.06	6955.64	10.11	6955.64	10.61	6955.65
14.76	6955.73	30.65	6956.05	31.65	6955.79	33	6955.46	36.13	6955.4
38	6955.36	47.71	6952.93	64	6948.86	68.11	6948.86	75	6948.86
79.11	6948.86	86	6948.86	95.71	6951.29	112	6955.36	121.03	6956.59
121.55	6956.6	121.95	6956.69	122.64	6956.69	122.74	6956.69	125.39	6956.7
126.76	6956.7	143.67	6956.77	150	6956.77				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

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

```
            38     112            12.19   12.19   12.19             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5188

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6955.46   12.56 6955.46   12.96 6955.46   17.73 6955.58   28.85 6955.78
   31.35 6955.83   32.36 6955.58      33 6955.42   33.69  6955.4      38 6955.32
   60.39 6949.72      64 6948.82   73.47 6948.82      75 6948.82   84.47 6948.82
      86 6948.82  108.39 6954.41     112 6955.32     114 6955.59  118.01 6955.67
  121.02 6956.42  126.33 6956.37  127.08 6956.38  128.77 6956.38  129.65 6956.39
     150 6956.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5183

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6955.61     8.6 6955.61   10.06 6955.64   10.11 6955.64   10.61 6955.65
   14.76 6955.73   30.65 6956.05   31.65 6955.79      33 6955.46   36.13  6955.4
      38 6955.36   47.71 6952.93      64 6948.86   68.11 6948.86      75 6948.86
   79.11 6948.86      86 6948.86   95.71 6951.29     112 6955.36  121.03 6956.59
  121.55  6956.6  121.95 6956.69  122.64 6956.69  122.74 6956.69  125.39  6956.7
  126.76  6956.7  143.67 6956.77     150 6956.77

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                 8       8       8              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5175

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6955.26   15.22 6955.26   15.99 6955.28   25.08 6955.49   25.36 6955.42
      33 6953.51   35.64 6953.46      38 6953.41   50.26 6950.35      64 6946.91
   69.19 6946.91      75 6946.91   80.19 6946.91      86 6946.91   98.26 6949.97
     112 6953.41  114.64 6953.46     117 6953.51  118.91 6953.99  127.22 6956.06
  127.89 6956.06  130.27 6956.04  131.71 6956.04  132.37 6956.04  132.72 6956.05
     150 6956.05

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               9.8     9.8     9.8              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5165

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6954.85   18.63 6954.85   18.95 6954.85   19.49 6954.72      33 6951.34
   36.21 6951.28      38 6951.24    47.3 6948.91      64 6944.74   71.06 6944.74
      75 6944.74   82.06 6944.74      86 6944.74    95.3 6947.07     112 6951.24
  115.21  6951.3     117 6951.34  129.08 6954.36  133.41 6955.44  137.27 6955.41
```

```
  138.25 6955.41  149.92 6955.45     150 6955.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            14.62   14.62   14.62             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5150

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6954.85   18.63 6954.85   18.95 6954.85   19.49 6954.72      33 6951.34
   36.21 6951.28      38 6951.24    47.3 6948.91      64 6944.74   71.06 6944.74
      75 6944.74   82.06 6944.74      86 6944.74    95.3 6947.07     112 6951.24
  115.21  6951.3     117 6951.34  129.08 6954.36  133.41 6955.44  137.27 6955.41
  138.25 6955.41  149.92 6955.45     150 6955.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5100

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6953.45    8.13 6953.45    8.27 6953.45   11.71 6953.52   21.97 6953.72
    22.7 6953.74   23.25  6953.6      33 6951.17   36.29  6951.1      38 6951.07
```

```
    55.1 6946.79      64 6944.57   71.24 6944.57      75 6944.57   82.24 6944.57
      86 6944.57   103.1 6948.84     112 6951.07  115.29 6951.13     117 6951.17
  127.53  6953.8  129.46 6954.28  142.09 6954.15     150 6954.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            33.92   33.92   33.92             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5066

INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6953.2    9.76  6953.2   18.72 6953.35   20.23 6953.38   22.58 6953.42
   23.44 6953.44    25.6  6952.9      33 6951.05   34.09 6951.03      38 6950.95
   58.33 6945.86      64 6944.45    66.4 6944.45      75 6944.45    77.4 6944.45
      86 6944.45  106.33 6949.53     112 6950.95  113.09 6950.97     117 6951.05
   125.3 6953.12  127.24 6953.61   130.6 6953.57  135.34 6953.51   147.5 6953.37
     150 6953.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                5       5       5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   56.52  6951.5       T
   93.46     150  6951.5       T

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5061
```

```
INPUT
Description:
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6953.17   10.37 6953.17   20.33 6953.34   22.01 6953.36   22.44 6953.37
   23.42 6953.39      24 6953.25      33    6951   33.25 6950.99      38  6950.9
   39.28 6950.58      64  6944.4   64.54  6944.4      75  6944.4   75.54  6944.4
      86  6944.4   87.28 6944.72     112  6950.9  112.25  6950.9     117    6951
  126.43 6953.36  127.04 6953.51  127.81  6953.5   131.3 6953.46  145.94 6953.29
     150 6953.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                8       8       8              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   57.79  6951.5       T
   92.23     150  6951.5       T

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5052

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6953.01    4.76 6953.01   11.35 6953.12   16.19  6953.2   26.01 6950.75
      33    6949   35.95 6948.94      38  6948.9   48.67 6946.23      64  6942.4
   70.49  6942.4      75  6942.4   81.49  6942.4      86  6942.4   96.67 6945.07
     112  6948.9  114.95 6948.96     117    6949  124.23  6950.8  134.06 6953.26
  143.44 6953.16     150 6953.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

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

```
            38     112             7.31    7.31    7.31             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   59.78  6951.5       T
   90.21     150  6951.5       T

CROSS SECTION


RIVER: Channel
REACH: West               RS: 5045

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6952.98    8.46 6952.98    9.66    6953   11.53 6953.04   15.64 6952.02
   29.32 6948.09   32.51 6947.29      33 6947.17   33.21 6947.17      38 6947.07
   62.92 6940.84      64 6940.57   64.46 6940.57      75 6940.57   75.46 6940.57
      86 6940.57  110.92  6946.8     112 6947.07  112.21 6947.07     117 6947.17
  117.51  6947.3  140.49 6953.04  141.15 6953.03     150 6953.03

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112           134.51  134.51  134.51             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   61.59  6951.5       T
   88.41     150  6951.5       T

CULVERT


RIVER: Channel
REACH: West               RS: 4978

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =     131
Weir Coefficient          =     2.6
```

Upstream Deck/Roadway Coordinates
num= 30

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-25	6951.5	0	-24.54	6951.5	0	-1.38	6951.5	0
9	6951.5	0	11.36	6951.5	0	13.2	6951.5	0
29.06	6951.5	0	33	6951.5	0	37.02	6951.5	0
38	6951.5	0	58.9	6951.5	0	64	6951.5	0
72.84	6951.5	0	75	6951.5	0	83.84	6951.5	0
86	6951.5	0	106.9	6951.5	0	112	6951.5	0
116.02	6951.5	0	117	6951.5	0	124.54	6951.5	0
135.66	6951.5	0	135.82	6951.5	0	151.89	6951.5	0
158.31	6951.5	0	158.72	6951.5	0	159.15	6951.5	0
159.31	6951.5	0	161.7	6951.5	0	175	6951.5	0

Upstream Bridge Cross Section Data
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6952.98	8.46	6952.98	9.66	6953	11.53	6953.04	15.64	6952.02
29.32	6948.09	32.51	6947.29	33	6947.17	33.21	6947.17	38	6947.07
62.92	6940.84	64	6940.57	64.46	6940.57	75	6940.57	75.46	6940.57
86	6940.57	110.92	6946.8	112	6947.07	112.21	6947.07	117	6947.17
117.51	6947.3	140.49	6953.04	141.15	6953.03	150	6953.03		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38	.045	112	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
38	112	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	61.59	6951.5	T
88.41	150	6951.5	T

Downstream Deck/Roadway Coordinates
num= 30

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-25	6951.36	0	-24.54	6951.36	0	-1.38	6951.36	0
9	6951.36	0	11.36	6951.36	0	13.2	6951.36	0
29.06	6951.36	0	33	6951.36	0	37.02	6951.36	0
38	6951.36	0	58.9	6951.36	0	64	6951.36	0
72.84	6951.36	0	75	6951.36	0	83.84	6951.36	0
86	6951.36	0	106.9	6951.36	0	112	6951.36	0
116.02	6951.36	0	117	6951.36	0	124.54	6951.36	0

```
  135.66 6951.36       0  135.82 6951.36       0  151.89 6951.36       0
  158.31 6951.36       0  158.72 6951.36       0  159.15 6951.36       0
  159.31 6951.36       0   161.7 6951.36       0     175 6951.36       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6950.32    12.8 6950.32   16.17 6950.31    16.6 6950.31   17.12 6950.31
   21.62 6949.19      33 6946.34   36.76 6946.27      38 6946.24   57.54 6941.36
      64 6939.74   72.27 6939.74      75 6939.74   83.27 6939.74      86 6939.74
  105.54 6944.63     112 6946.24  115.76 6946.32     117 6946.34  126.15 6948.63
  129.99 6949.59  132.22 6949.59  135.61  6949.6  138.53  6949.6  139.33  6949.6
  139.46  6949.6     150  6949.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
            38     112             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   61.23  6951.5       T
   88.69     150  6951.5       T

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       5      12
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     133     .013     .013        0                   .5                1
Number of Barrels =  2
Upstream   Elevation =  6940.43
```

```
Centerline Stations
    Sta.    Sta.
   67.64    82.2
Downstream Elevation =  6939.97
Centerline Stations
    Sta.    Sta.
   67.85   82.01

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4910

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6950.32    12.8 6950.32   16.17 6950.31    16.6 6950.31   17.12 6950.31
   21.62 6949.19      33 6946.34   36.76 6946.27      38 6946.24   57.54 6941.36
      64 6939.74   72.27 6939.74      75 6939.74   83.27 6939.74      86 6939.74
  105.54 6944.63     112 6946.24  115.76 6946.32     117 6946.34  126.15 6948.63
  129.99 6949.59  132.22 6949.59  135.61  6949.6  138.53  6949.6  139.33  6949.6
  139.46  6949.6     150  6949.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112             8.69    8.69    8.69             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   61.23  6951.5       T
   88.69     150  6951.5       T

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4901

INPUT
Description:
```

```
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6950.1    9.41 6950.07    9.61 6950.07   22.06 6946.91      33 6944.17
      36 6944.11      38 6944.07   48.42 6941.47      64 6937.57   68.41 6937.57
      75 6937.57   79.41 6937.57      86 6937.57   96.42 6940.17     112 6944.07
     115 6944.13     117 6944.17  126.25 6946.48  137.87 6949.39  142.16 6949.38
  142.56 6949.38  142.63 6949.38     150 6949.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               10      10      10             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   56.97  6951.5       T
   93.04     150  6951.5       T

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4891

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6949.79    1.54 6949.79   29.83 6942.72      33 6941.93   37.48 6941.84
      38 6941.83   61.29 6936.01      64 6935.33   73.85 6935.33      75 6935.33
   84.85 6935.33      86 6935.33  109.29 6941.15     112 6941.83  116.48 6941.92
     117 6941.93  119.92 6942.66  141.65 6949.14  145.81 6949.13  145.95 6949.13
     150 6949.13

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            40.62   40.62   40.62             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   51.97  6951.5       T
```

```
   98.07     150  6951.5       T

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4850

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6948.41    3.36 6948.41    6.22 6948.48   19.84 6945.08      33 6941.79
   36.68 6941.71      38 6941.69   44.87 6939.97      64 6935.19   66.91 6935.19
      75 6935.19   77.91 6935.19      86 6935.19   92.87  6936.9     112 6941.69
  115.68 6941.76     117 6941.79  123.34 6943.37  142.44 6948.15  144.49 6948.15
  145.59 6948.16  148.62 6948.17     150 6948.17

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112             56.9    56.9    56.9             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4793

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6946.82    8.42 6946.82    8.54 6946.82   12.16  6946.8   18.33 6945.26
      33 6941.59   34.38 6941.56      38 6941.49   56.82 6936.79      64 6934.99
   67.04 6934.99      75 6934.99   78.04 6934.99      86 6934.99  104.82 6939.69
     112 6941.49  113.38 6941.52     117 6941.59  131.94 6945.32  138.02 6946.84
  141.23 6946.86     150 6946.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                 5       5       5             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4788

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6946.67    7.55 6946.67    7.71 6946.67   12.72 6946.64   12.73 6946.64
      33 6941.57      38 6941.47   63.99 6934.98      64 6934.97   64.01 6934.97
   75.01 6934.97   86.01 6934.97     112 6941.47  112.01 6941.47  117.01 6941.57
  137.64 6946.73  137.65 6946.73  142.09 6946.75  150.01 6946.75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112                 8       8       8             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4780

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6946.44    5.55 6946.44    6.08 6946.43    8.77 6945.63    9.82 6945.37
   22.85 6942.11      33 6939.57   37.39 6939.49      38 6939.47   41.19 6938.68
      64 6932.97   65.35 6932.97      75 6932.97   76.35 6932.97      86 6932.97
   89.19 6933.77     112 6939.47  116.39 6939.56     117 6939.57  127.33 6942.16
  137.55 6944.71  140.71  6945.5  144.35 6946.59  145.07 6946.59     150 6946.59

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

```
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112             9.55    9.55    9.55             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4770

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6946.22    3.43 6946.22   29.76 6938.38      33 6937.57   37.52 6937.48
      38 6937.47   40.51 6936.84      64 6930.97   73.94 6930.97      75 6930.97
   84.94 6930.97      86 6930.97   88.51 6931.59     112 6937.47  116.52 6937.56
     117 6937.57  120.32  6938.4  147.15 6946.39     150 6946.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112            20.16   20.16   20.16             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4750

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6945.75   18.23 6941.19      33  6937.5   36.83 6937.42      38  6937.4
   57.94 6932.41      64  6930.9   72.44  6930.9      75  6930.9   83.44  6930.9
      86  6930.9  105.94 6935.88     112  6937.4  115.83 6937.47     117  6937.5
  138.96 6942.99     150 6942.99

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

```
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4700

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6944.7    2.97  6944.7    3.33 6944.69    3.53 6944.69   26.85 6938.86
      33 6937.32   36.91 6937.24      38 6937.22   58.35 6932.14      64 6930.72
   72.61 6930.72      75 6930.72   83.61 6930.72      86 6930.72  106.35 6935.81
     112 6937.22  115.91  6937.3     117 6937.32  123.11 6938.85   146.8 6944.77
  149.38 6944.79     150 6944.79

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4650

INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6943.64    7.07 6943.64   19.92 6940.43   33.06 6937.15   35.38  6937.1
   38.06 6937.05   49.54 6934.18   64.06 6930.55   68.84 6930.55      75 6930.55
   75.06 6930.55   81.26 6930.55   86.06 6930.55   100.9 6934.26  112.06 6937.05
  114.09 6937.09  117.06 6937.15  127.12 6939.66  142.82 6943.59     150 6943.59

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   38.06    .045  112.06     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         38.06  112.06            46.52      50   53.48              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4600

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  6942.8     .53  6942.8     .65  6942.8    4.79 6942.76   10.14 6942.71
   20.84 6940.03   33.07 6936.97   35.64 6936.92   38.07 6936.87   51.21 6933.59
   64.06 6930.37   69.75 6930.37      75 6930.37   75.06 6930.37   80.76 6930.37
   86.06 6930.37   99.42 6933.71  112.06 6936.87  114.69 6936.93  117.06 6936.97
  127.25 6939.52  136.69 6941.88  137.32 6941.88  137.36 6941.88  138.15 6941.87
  138.18 6941.87  138.55 6941.87  138.64 6941.87  139.17 6941.87  140.45 6941.88
     150 6941.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   38.07    .045  112.06     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         38.07  112.06            17.86   17.86   17.86              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4582

INPUT
Description:
Station Elevation Data    num=      42
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6942.46    2.82 6942.46    6.51 6942.41   10.99 6942.36   11.25 6942.36
   11.66 6942.25   29.07  6937.9   32.84 6936.96    32.9 6936.94   33.05 6936.91
   38.02 6936.81    38.5 6936.69   64.02 6930.31    64.9 6930.31   74.95 6930.31
```

```
   75.02 6930.31   76.16 6930.31   86.02 6930.31  107.47 6935.67  112.02 6936.81
   116.1 6936.89  117.02 6936.91  120.22 6937.71  134.36 6941.24  134.63 6941.24
  134.92 6941.24  135.02 6941.24   137.1 6941.23  137.13 6941.23  137.31 6941.22
  137.34 6941.22  138.07 6941.22   138.1 6941.22  138.59 6941.22  138.61 6941.22
  138.91 6941.21  138.92 6941.21  139.07 6941.21  139.11 6941.21  140.21 6941.21
  142.88 6941.22  150.02 6941.22

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   38.02    .045  112.02     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         38.02  112.02                 5       5       5              .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4577

INPUT
Description:
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6942.39     .79 6942.39    8.43 6942.29   10.42 6942.26   11.18 6942.25
   11.24 6942.25   12.56 6941.92   16.02 6941.06   37.02 6936.72   38.05  6936.7
   58.19 6931.65   64.05 6930.19   72.56 6930.19      75 6930.19   75.05 6930.19
   77.49 6930.19   86.05 6930.19   91.84 6931.64  112.05 6936.68  115.84 6936.76
  117.05 6936.78  129.85 6939.98  133.03 6940.78  134.24 6941.09  134.27 6941.09
  134.35 6941.09  135.28 6941.08  136.87 6941.07  136.93 6941.07  138.17 6941.06
  138.18 6941.06  138.29 6941.06   138.3 6941.06  138.74 6941.06  138.76 6941.06
  139.06 6941.06  139.07 6941.06  139.26 6941.06  139.27 6941.06  139.35 6941.05
  139.38 6941.05  140.61 6941.06  143.62 6941.06  150.03 6941.06

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   38.05    .045  112.05     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         38.05  112.05                8.01    8.01    8.01              .1       .3

CROSS SECTION
```

RIVER: Channel
REACH: West RS: 4569

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6942.18	1.91	6942.18	2.3	6942.13	2.78	6942.13	2.97	6942.13
32.56	6934.76	32.67	6934.73	32.74	6934.72	32.99	6934.62	37.89	6934.54
37.99	6934.54	45.63	6932.66	62.88	6928.43	63.99	6928.15	74.25	6928.19
74.94	6928.19	74.99	6928.19	85	6928.23	85.99	6928.23	108.33	6933.9
111.99	6934.82	116.24	6934.92	116.99	6934.94	119	6935.44	119.85	6935.66
131.25	6938.53	138.06	6940.25	140.17	6940.8	140.26	6940.8	141.22	6940.8
144.76	6940.8	150	6940.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	37.99	.045	111.99	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
37.99	111.99	9.13	9.13	9.13	.1	.3

CROSS SECTION

RIVER: Channel
REACH: West RS: 4560

INPUT
Description:
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6941.99	.62	6941.99	17.05	6937.84	21.1	6937.01	23.52	6936.5
30.63	6933.51	31.13	6933.38	31.23	6933.33	33.05	6932.89	36.84	6932.81
38.05	6932.79	57.75	6927.86	64.05	6926.29	72.5	6926.29	75	6926.29
75.05	6926.29	83.54	6926.29	86.05	6926.29	106.16	6931.32	112.05	6932.79
115.96	6932.87	117.05	6932.89	125.55	6935.02	145.06	6940.42	146.36	6940.43
147.18	6940.42	147.19	6940.42	147.23	6940.43	150.02	6940.43		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	38.05	.045	112.05	.05

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

```
         38.05  112.05             9.61    9.61    9.61             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4550

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6940.81    2.16 6940.81     9.7 6939.26   14.31  6938.3   18.67 6936.43
   21.55 6935.69   21.63 6935.66   27.83 6934.14   33.05 6932.86   35.87  6932.8
   38.05 6932.76   52.96 6929.03   64.05 6926.26   70.66 6926.26      75 6926.26
   75.05 6926.26   81.78 6926.26   86.05 6926.26  102.31 6930.32  112.05 6932.76
  113.81 6932.79  117.05 6932.86  140.33 6938.68     146 6940.09  146.02  6940.1
  146.04 6940.11     150 6940.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   38.05    .045  112.05     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         38.05  112.05               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4500

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6940.58    1.41 6940.58   28.47 6933.82      33 6932.68   33.78 6932.67
      38 6932.58   42.04 6931.57      64 6926.08   73.29 6926.08      75 6926.08
   84.29 6926.08      86 6926.08   90.04 6927.09     112 6932.58  112.78  6932.6
     117 6932.68  141.18 6938.73  142.06 6938.95  142.19 6938.98  147.16 6938.91
  148.63 6938.89     150 6938.89

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

```
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4450

INPUT
Description:
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6939.03    2.48 6939.03    5.23 6939.04    6.89 6939.04   19.96 6935.77
   26.89 6934.04      33 6932.51    33.7  6932.5      38 6932.41   41.63  6931.5
      64 6925.91   73.46 6925.91      75 6925.91   84.46 6925.91      86 6925.91
   89.63 6926.82     112 6932.41   112.7 6932.42     117 6932.51   124.9 6934.48
  138.83 6937.97  142.78  6937.9     150  6937.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4400

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6932.43    3.75 6932.43    8.12 6932.65    8.59 6932.69    8.77  6932.7
   10.01 6932.81   15.01 6933.29   17.92 6933.56   24.94 6934.17   25.47 6934.22
      33 6932.34      37 6932.26      38 6932.24   41.23 6931.43      64 6925.74
   73.63 6925.74      75 6925.74   84.63 6925.74      86 6925.74   89.23 6926.54
     112 6932.24  112.62 6932.25     117 6932.34  122.16 6933.63  134.37 6936.68
  135.37 6936.67  138.35 6936.63  138.95 6936.63   149.7  6936.5     150  6936.5
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4350

INPUT
Description:
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6934.26    4.41 6934.26   14.24 6934.13    21.7  6934.4   21.93 6934.41
   23.75 6934.47   32.15 6932.38   32.96 6932.17   32.98 6932.17      33 6932.16
   37.68 6932.07      38 6932.06   62.92 6925.83      64 6925.56   74.55 6925.56
      75 6925.56    85.1 6925.56      86 6925.56  111.39 6931.91     112 6932.06
  112.21 6932.07     117 6932.16  117.92 6932.39  128.47 6935.03  134.51 6935.06
  135.76 6935.06  143.47  6935.1     150  6935.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      38    .045     112     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            38     112               50      50      50             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4300

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6930.53    7.82 6930.53    7.85 6930.53    7.88 6930.53   27.81 6930.84
   28.21 6930.85   30.03  6931.3   31.55 6931.68   32.76 6931.98   32.77 6931.99
```

```
   37.73 6931.89   37.77 6931.89   43.11 6930.55   63.77 6925.39   63.99 6925.39
   64.21 6925.39      75 6925.39   85.77 6925.39   97.21 6928.25  111.78 6931.89
  116.71 6931.99  116.78 6931.99  116.99 6932.04  118.16 6932.34  118.38 6932.39
   123.6 6933.41  124.77 6933.64  125.83 6933.88  127.32 6934.23  145.73 6934.12
     150 6934.12

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   37.73    .045  111.78     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         37.73  111.78            50.01   50.01   50.01             .1       .3

CROSS SECTION


RIVER: Channel
REACH: West               RS: 4250

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 6935.02     .41 6935.05    3.31 6934.76    4.19 6934.67   15.18 6931.92
   15.62 6931.81   20.04 6931.72   20.62 6931.71   21.57 6931.47   46.62 6925.21
      53 6925.21   57.63 6925.21   69.14 6925.22   78.48 6927.57   94.92  6931.7
   98.45 6931.77  100.06  6931.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   20.62    .045   94.92     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         20.62   94.92                 0       0       0             .1       .3



SUMMARY OF MANNING'S N VALUES

River:Channel

      Reach          River Sta.       n1        n2        n3

 South                 3379               .05      .045       .05
```

South	3329	.05	.045	.05
South	3279	.05	.045	.05
South	3229	.05	.045	.05
South	3190	.05	.045	.05
South	3185	.05	.045	.05
South	3177	.05	.045	.05
South	3168	.05	.045	.05
South	3150	.05	.045	.05
South	3100	.05	.045	.05
South	3050	.05	.045	.05
South	3024	.05	.045	.05
South	3019	.05	.045	.05
South	3015	.05	.045	.05
South	3011	.05	.045	.05
South	3000	.05	.045	.05
South	2950	.05	.045	.05
South	2900	.05	.045	.05
South	2850	.05	.045	.05
South	2800	.05	.045	.05
South	2750	.05	.045	.05
South	2700	.05	.045	.05
South	2650	.05	.045	.05
South	2600	.05	.045	.05
South	2550	.05	.045	.05
South	2500	.05	.045	.05
South	2450	.05	.045	.05
South	2400	.05	.045	.05
South	2350	.05	.045	.05
South	2300	.05	.045	.05
South	2250	.05	.045	.05
South	2200	.05	.045	.05
South	2150	.05	.045	.05
South	2100	.05	.045	.05
South	2050	.05	.045	.05
South	2000	.05	.045	.05
South	1950	.05	.045	.05
South	1900	.05	.045	.05
South	1850	.05	.045	.05
South	1800	.05	.045	.05
South	1750	.05	.045	.05
South	1700	.05	.045	.05
South	1650	.05	.045	.05
South	1600	.05	.045	.05
South	1550	.05	.045	.05

South	1500	.05	.045	.05
South	1450	.05	.045	.05
South	1400	.05	.045	.05
South	1350	.05	.045	.05
South	1300	.05	.045	.05
South	1250	.05	.045	.05
South	1200	.05	.045	.05
South	1150	.05	.045	.05
South	1100	.05	.045	.05
South	1050	.05	.045	.05
South	1000	.05	.045	.05
East	8490	.05	.045	.05
East	8485	.05	.045	.05
East	8477	.05	.045	.05
East	8468	.05	.045	.05
East	8450	.05	.045	.05
East	8400	.05	.045	.05
East	8350	.05	.045	.05
East	8300	.05	.045	.05
East	8250	.05	.045	.05
East	8234	.05	.045	.05
East	8229	.05	.045	.05
East	8221	.05	.045	.05
East	8212	.05	.045	.05
East	8200	.05	.045	.05
East	8150	.05	.045	.05
East	8100	.05	.045	.05
East	8046	.05	.045	.05
East	8041	.05	.045	.05
East	8031	.05	.045	.05
East	8023	.05	.045	.05
East	8000	.05	.045	.05
East	7950	.05	.045	.05
East	7900	.05	.045	.05
East	7856	.05	.045	.05
East	7851	.05	.045	.05
East	7844	.05	.045	.05
East	7835	.05	.045	.05
East	7800	.05	.045	.05
East	7750	.05	.045	.05
East	7700	.05	.045	.05
East	7650	.05	.045	.05
East	7597	.05	.045	.05
East	7592	.05	.045	.05

East	7583	.05	.045	.05
East	7524	Culvert		
East	7465	.05	.045	.05
East	7450	.05	.045	.05
East	7400	.05	.045	.05
East	7350	.05	.045	.05
East	7326	.05	.045	.05
East	7321	.05	.045	.05
East	7313	.05	.045	.05
East	7304	.05	.045	.05
East	7250	.05	.045	.05
East	7200	.05	.045	.05
East	7150	.05	.045	.05
East	7100	.05	.045	.05
East	7041	.05	.045	.05
East	7036	.05	.045	.05
East	7028	.05	.045	.05
East	7019	.05	.045	.05
West	6158	.05	.045	.05
West	6153	.05	.045	.05
West	6145	.05	.045	.05
West	6131	.05	.045	.05
West	6100	.05	.045	.05
West	6050	.05	.045	.05
West	6006	.05	.045	.05
West	6001	.05	.045	.05
West	5993	.05	.045	.05
West	5984	.05	.045	.05
West	5950	.05	.045	.05
West	5900	.05	.045	.05
West	5858	.05	.045	.05
West	5853	.05	.045	.05
West	5844	.05	.045	.05
West	5835	.05	.045	.05
West	5800	.05	.045	.05
West	5750	.05	.045	.05
West	5700	.05	.045	.05
West	5650	.05	.045	.05
West	5618	.05	.045	.05
West	5613	.05	.045	.05
West	5605	.05	.045	.05
West	5596	.05	.045	.05
West	5550	.05	.045	.05
West	5500	.05	.045	.05

West	5450	.05	.045	.05
West	5400	.05	.045	.05
West	5383	.05	.045	.05
West	5378	.05	.045	.05
West	5369	.05	.045	.05
West	5360	.05	.045	.05
West	5350	.05	.045	.05
West	5300	.05	.045	.05
West	5250	.05	.045	.05
West	5200	.05	.045	.05
West	5188	.05	.045	.05
West	5183	.05	.045	.05
West	5175	.05	.045	.05
West	5165	.05	.045	.05
West	5150	.05	.045	.05
West	5100	.05	.045	.05
West	5066	.05	.045	.05
West	5061	.05	.045	.05
West	5052	.05	.045	.05
West	5045	.05	.045	.05
West	4978	Culvert		
West	4910	.05	.045	.05
West	4901	.05	.045	.05
West	4891	.05	.045	.05
West	4850	.05	.045	.05
West	4793	.05	.045	.05
West	4788	.05	.045	.05
West	4780	.05	.045	.05
West	4770	.05	.045	.05
West	4750	.05	.045	.05
West	4700	.05	.045	.05
West	4650	.05	.045	.05
West	4600	.05	.045	.05
West	4582	.05	.045	.05
West	4577	.05	.045	.05
West	4569	.05	.045	.05
West	4560	.05	.045	.05
West	4550	.05	.045	.05
West	4500	.05	.045	.05
West	4450	.05	.045	.05
West	4400	.05	.045	.05
West	4350	.05	.045	.05
West	4300	.05	.045	.05
West	4250	.05	.045	.05

SUMMARY OF REACH LENGTHS

River: Channel

Reach	River Sta.	Left	Channel	Right
South	3379	50	50	50
South	3329	50	50	50
South	3279	50	50	50
South	3229	52.3	39.36	37.89
South	3190	5	5	5
South	3185	8	8	8
South	3177	9.34	9.34	9.34
South	3168	17.59	17.59	17.59
South	3150	52.2	50	47.24
South	3100	49.7	50	49.7
South	3050	25.73	25.73	25.73
South	3024	5	5	5
South	3019	4	4	4
South	3015	4.15	4.15	4.15
South	3011	10.82	10.82	10.82
South	3000	49.69	49.69	49.69
South	2950	58.6	50	59.74
South	2900	49.61	50	55.18
South	2850	41.34	50	57.94
South	2800	49.7	50	51.54
South	2750	48.06	50	50.82
South	2700	46.75	50	51.94
South	2650	47.87	50	51.9
South	2600	56.36	50	47.11
South	2550	62.8	50	42.22
South	2500	61.91	50	35.5
South	2450	34.45	50	58.27
South	2400	40.98	50	54.76
South	2350	49.67	50	50.33
South	2300	46.82	50	54.23
South	2250	51.31	50	48.16
South	2200	51.87	50	53.48
South	2150	46.59	50	58.86
South	2100	31.23	50	65.06

South	2050	50.56	50	50.13
South	2000	51.57	50	55.58
South	1950	52.13	50	55.38
South	1900	64.34	50	35.53
South	1850	61.25	50	39.47
South	1800	81.73	50	53.35
South	1750	50.56	50	50
South	1700	9.45	50	66.57
South	1650	49.67	50	88.88
South	1600	95.11	50	29.82
South	1550	83.46	50	43.8
South	1500	31.36	50	60.93
South	1450	108.56	50	49.97
South	1400	51.74	50	60.89
South	1350	44.78	50	63.94
South	1300	51.08	50	49.97
South	1250	49.9	50	51.9
South	1200	47.7	50	63.16
South	1150	50.56	50	50.26
South	1100	49.51	50	49.41
South	1050	72.41	50	40.03
South	1000	0	0	0
East	8490	5	5	5
East	8485	8	8	8
East	8477	8.79	8.79	8.79
East	8468	17.6	17.6	17.6
East	8450	50	50	50
East	8400	50	50	50
East	8350	50	50	50
East	8300	50	50	50
East	8250	15.42	15.42	15.42
East	8234	5	5	5
East	8229	8	8	8
East	8221	9.24	9.24	9.24
East	8212	12.34	12.34	12.34
East	8200	50	50	50
East	8150	50	50	50
East	8100	54.43	54.43	54.43
East	8046	5	5	5
East	8041	9	9	9
East	8031	8.4	8.4	8.4
East	8023	23.17	23.17	23.17
East	8000	50	50	50
East	7950	50	50	50

East	7900	43.51	43.51	43.51
East	7856	5	5	5
East	7851	8	8	8
East	7844	8.78	8.78	8.78
East	7835	34.71	34.71	34.71
East	7800	50	50	50
East	7750	50	50	50
East	7700	50	50	50
East	7650	52.73	52.73	52.73
East	7597	5	5	5
East	7592	9	9	9
East	7583	118.48	118.48	118.48
East	7524	Culvert		
East	7465	14.79	14.79	14.79
East	7450	50	50	50
East	7400	50	50	50
East	7350	23.81	23.81	23.81
East	7326	5	5	5
East	7321	8	8	8
East	7313	8.98	8.98	8.98
East	7304	54.21	54.21	54.21
East	7250	50	50	50
East	7200	48.75	50	51.38
East	7150	48.2	50	51.94
East	7100	59.14	59.14	59.14
East	7041	5	5	5
East	7036	8	8	8
East	7028	9.05	9.05	9.05
East	7019	18.81	18.81	18.81
West	6158	5	5	5
West	6153	14	14	14
West	6145	13.54	13.54	13.54
West	6131	31.21	31.21	31.21
West	6100	50	50	50
West	6050	43.73	43.73	43.73
West	6006	5	5	5
West	6001	8	8	8
West	5993	9.14	9.14	9.14
West	5984	33.35	33.35	33.35
West	5950	50	50	50
West	5900	41.56	41.56	41.56
West	5858	5	5	5
West	5853	9	9	9
West	5844	8.52	8.52	8.52

West	5835	35.14	35.14	35.14
West	5800	50	50	50
West	5750	50	50	50
West	5700	50	50	50
West	5650	31.64	31.64	31.64
West	5618	5	5	5
West	5613	8	8	8
West	5605	8.75	8.75	8.75
West	5596	45.83	45.83	45.83
West	5550	50	50	50
West	5500	50	50	50
West	5450	50	50	50
West	5400	17.06	17.06	17.06
West	5383	5	5	5
West	5378	8	8	8
West	5369	9.48	9.48	9.48
West	5360	10.07	10.07	10.07
West	5350	38.94	50	60.89
West	5300	50	50	50
West	5250	50	50	50
West	5200	12.19	12.19	12.19
West	5188	5	5	5
West	5183	8	8	8
West	5175	9.8	9.8	9.8
West	5165	14.62	14.62	14.62
West	5150	50	50	50
West	5100	33.92	33.92	33.92
West	5066	5	5	5
West	5061	8	8	8
West	5052	7.31	7.31	7.31
West	5045	134.51	134.51	134.51
West	4978	Culvert		
West	4910	8.69	8.69	8.69
West	4901	10	10	10
West	4891	40.62	40.62	40.62
West	4850	56.9	56.9	56.9
West	4793	5	5	5
West	4788	8	8	8
West	4780	9.55	9.55	9.55
West	4770	20.16	20.16	20.16
West	4750	50	50	50
West	4700	50	50	50
West	4650	46.52	50	53.48
West	4600	17.86	17.86	17.86

West	4582	5	5	5
West	4577	8.01	8.01	8.01
West	4569	9.13	9.13	9.13
West	4560	9.61	9.61	9.61
West	4550	50	50	50
West	4500	50	50	50
West	4450	50	50	50
West	4400	50	50	50
West	4350	50	50	50
West	4300	50.01	50.01	50.01
West	4250	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Channel

Reach	River Sta.	Contr.	Expan.
South	3379	.1	.3
South	3329	.1	.3
South	3279	.1	.3
South	3229	.1	.3
South	3190	.1	.3
South	3185	.1	.3
South	3177	.1	.3
South	3168	.1	.3
South	3150	.1	.3
South	3100	.1	.3
South	3050	.1	.3
South	3024	.1	.3
South	3019	.1	.3
South	3015	.1	.3
South	3011	.1	.3
South	3000	.1	.3
South	2950	.1	.3
South	2900	.1	.3
South	2850	.1	.3
South	2800	.1	.3
South	2750	.1	.3
South	2700	.1	.3
South	2650	.1	.3

South	2600	.1	.3
South	2550	.1	.3
South	2500	.1	.3
South	2450	.1	.3
South	2400	.1	.3
South	2350	.1	.3
South	2300	.1	.3
South	2250	.1	.3
South	2200	.1	.3
South	2150	.1	.3
South	2100	.1	.3
South	2050	.1	.3
South	2000	.1	.3
South	1950	.1	.3
South	1900	.1	.3
South	1850	.1	.3
South	1800	.1	.3
South	1750	.1	.3
South	1700	.1	.3
South	1650	.1	.3
South	1600	.1	.3
South	1550	.1	.3
South	1500	.1	.3
South	1450	.1	.3
South	1400	.1	.3
South	1350	.1	.3
South	1300	.1	.3
South	1250	.1	.3
South	1200	.1	.3
South	1150	.1	.3
South	1100	.1	.3
South	1050	.1	.3
South	1000	.1	.3
East	8490	.1	.3
East	8485	.1	.3
East	8477	.1	.3
East	8468	.1	.3
East	8450	.1	.3
East	8400	.1	.3
East	8350	.1	.3
East	8300	.1	.3
East	8250	.1	.3
East	8234	.1	.3
East	8229	.1	.3

East	8221	.1	.3
East	8212	.1	.3
East	8200	.1	.3
East	8150	.1	.3
East	8100	.1	.3
East	8046	.1	.3
East	8041	.1	.3
East	8031	.1	.3
East	8023	.1	.3
East	8000	.1	.3
East	7950	.1	.3
East	7900	.1	.3
East	7856	.1	.3
East	7851	.1	.3
East	7844	.1	.3
East	7835	.1	.3
East	7800	.1	.3
East	7750	.1	.3
East	7700	.1	.3
East	7650	.1	.3
East	7597	.3	.5
East	7592	.3	.5
East	7583	.3	.5
East	7524	Culvert	
East	7465	.3	.5
East	7450	.3	.5
East	7400	.1	.3
East	7350	.1	.3
East	7326	.1	.3
East	7321	.1	.3
East	7313	.1	.3
East	7304	.1	.3
East	7250	.1	.3
East	7200	.1	.3
East	7150	.1	.3
East	7100	.1	.3
East	7041	.1	.3
East	7036	.1	.3
East	7028	.1	.3
East	7019	.1	.3
West	6158	.1	.3
West	6153	.1	.3
West	6145	.1	.3
West	6131	.1	.3

West	6100	.1	.3
West	6050	.1	.3
West	6006	.1	.3
West	6001	.1	.3
West	5993	.1	.3
West	5984	.1	.3
West	5950	.1	.3
West	5900	.1	.3
West	5858	.1	.3
West	5853	.1	.3
West	5844	.1	.3
West	5835	.1	.3
West	5800	.1	.3
West	5750	.1	.3
West	5700	.1	.3
West	5650	.1	.3
West	5618	.1	.3
West	5613	.1	.3
West	5605	.1	.3
West	5596	.1	.3
West	5550	.1	.3
West	5500	.1	.3
West	5450	.1	.3
West	5400	.1	.3
West	5383	.1	.3
West	5378	.1	.3
West	5369	.1	.3
West	5360	.1	.3
West	5350	.1	.3
West	5300	.1	.3
West	5250	.1	.3
West	5200	.1	.3
West	5188	.1	.3
West	5183	.1	.3
West	5175	.1	.3
West	5165	.1	.3
West	5150	.1	.3
West	5100	.1	.3
West	5066	.3	.5
West	5061	.3	.5
West	5052	.3	.5
West	5045	.3	.5
West	4978	Culvert	
West	4910	.3	.5

West	4901	.3	.5
West	4891	.3	.5
West	4850	.1	.3
West	4793	.1	.3
West	4788	.1	.3
West	4780	.1	.3
West	4770	.1	.3
West	4750	.1	.3
West	4700	.1	.3
West	4650	.1	.3
West	4600	.1	.3
West	4582	.1	.3
West	4577	.1	.3
West	4569	.1	.3
West	4560	.1	.3
West	4550	.1	.3
West	4500	.1	.3
West	4450	.1	.3
West	4400	.1	.3
West	4350	.1	.3
West	4300	.1	.3
West	4250	.1	.3

HEC-RAS Plan: Proposed

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	8490	100-YR	43.00	6961.73	6962.67		6962.77	0.011181	2.52	17.07	27.70	0.57
East	8490	5-YR	4.00	6961.73	6962.11		6962.13	0.013868	1.22	3.27	18.43	0.51
East	8485	100-YR	43.00	6961.74	6962.40	6962.40	6962.66	0.036963	4.08	10.53	20.26	1.00
East	8485	5-YR	4.00	6961.74	6961.94	6961.94	6962.00	0.056490	1.96	2.04	16.23	0.98
East	8477	100-YR	43.00	6959.82	6960.42	6960.42	6960.69	0.037227	4.13	10.41	19.80	1.00
East	8477	5-YR	4.00	6959.82	6959.95	6959.95	6960.02	0.072688	2.13	1.88	15.98	1.10
East	8468	100-YR	43.00	6957.97	6958.92		6959.01	0.007535	2.42	17.73	22.56	0.48
East	8468	5-YR	4.00	6957.97	6958.21		6958.23	0.007209	1.04	3.84	16.93	0.39
East	8450	100-YR	43.00	6957.84	6958.78		6958.87	0.007669	2.44	17.63	22.52	0.49
East	8450	5-YR	4.00	6957.84	6958.08		6958.09	0.007789	1.07	3.75	16.87	0.40
East	8400	100-YR	43.00	6957.46	6958.41		6958.50	0.007422	2.41	17.82	22.57	0.48
East	8400	5-YR	4.00	6957.46	6957.70		6957.72	0.007217	1.04	3.84	16.91	0.39
East	8350	100-YR	43.00	6957.09	6958.03		6958.12	0.007712	2.44	17.59	22.50	0.49
East	8350	5-YR	4.00	6957.09	6957.33		6957.34	0.007789	1.07	3.75	16.87	0.40
East	8300	100-YR	43.00	6956.71	6957.65		6957.74	0.007546	2.42	17.77	22.72	0.48
East	8300	5-YR	4.00	6956.71	6956.95		6956.97	0.007360	1.04	3.84	17.14	0.39
East	8250	100-YR	43.00	6956.34	6957.22		6957.32	0.009199	2.57	16.73	22.68	0.53
East	8250	5-YR	4.00	6956.34	6956.57		6956.59	0.008026	1.07	3.75	17.26	0.40
East	8234	100-YR	43.00	6956.22	6957.05		6957.16	0.011585	2.74	15.70	23.02	0.58
East	8234	5-YR	4.00	6956.22	6956.45		6956.47	0.007969	1.06	3.76	17.27	0.40
East	8229	100-YR	43.00	6956.19	6956.79	6956.79	6957.05	0.036854	4.11	10.45	19.84	1.00
East	8229	5-YR	4.00	6956.19	6956.32	6956.32	6956.38	0.065006	2.06	1.94	16.05	1.04
East	8221	100-YR	43.00	6954.20	6954.80	6954.80	6955.06	0.037419	4.14	10.39	19.76	1.01
East	8221	5-YR	4.00	6954.20	6954.31	6954.31	6954.40	0.092346	2.30	1.74	15.90	1.22
East	8212	100-YR	43.00	6952.18	6953.12		6953.21	0.007637	2.44	17.66	22.54	0.49
East	8212	5-YR	4.00	6952.18	6952.41		6952.43	0.007937	1.07	3.73	16.90	0.40
East	8200	100-YR	43.00	6952.08	6953.03		6953.12	0.007422	2.41	17.82	22.57	0.48
East	8200	5-YR	4.00	6952.08	6952.32		6952.34	0.007070	1.03	3.87	16.93	0.38
East	8150	100-YR	43.00	6951.71	6952.65		6952.74	0.007767	2.45	17.55	22.49	0.49
East	8150	5-YR	4.00	6951.71	6951.94		6951.96	0.008540	1.10	3.64	16.82	0.42

HEC-RAS Plan: Proposed (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	8100	100-YR	43.00	6951.33	6952.29		6952.38	0.006817	2.33	18.43	23.06	0.46
East	8100	5-YR	4.00	6951.33	6951.58		6951.59	0.006563	1.00	3.99	17.35	0.37
East	8046	100-YR	43.00	6950.93	6951.74		6951.87	0.013133	2.92	14.71	21.48	0.62
East	8046	5-YR	4.00	6950.93	6951.16		6951.18	0.008975	1.11	3.59	16.81	0.43
East	8041	100-YR	43.00	6950.89	6951.49	6951.49	6951.75	0.036823	4.12	10.45	19.81	1.00
East	8041	5-YR	4.00	6950.89	6951.02	6951.02	6951.08	0.055324	1.96	2.04	16.06	0.97
East	8031	100-YR	43.00	6948.65	6949.25	6949.25	6949.51	0.037285	4.13	10.40	19.79	1.00
East	8031	5-YR	4.00	6948.65	6948.78	6948.78	6948.84	0.057523	1.98	2.02	16.04	0.99
East	8023	100-YR	43.00	6946.88	6947.82		6947.91	0.007732	2.45	17.58	22.50	0.49
East	8023	5-YR	4.00	6946.88	6947.12		6947.14	0.007514	1.05	3.79	16.90	0.39
East	8000	100-YR	43.00	6946.70	6947.64		6947.73	0.007714	2.44	17.59	22.49	0.49
East	8000	5-YR	4.00	6946.70	6946.94		6946.96	0.007217	1.04	3.84	16.91	0.39
East	7950	100-YR	43.00	6946.33	6947.27		6947.36	0.007252	2.37	18.16	23.28	0.47
East	7950	5-YR	4.00	6946.33	6946.56		6946.58	0.008145	1.07	3.73	17.26	0.41
East	7900	100-YR	43.00	6945.95	6946.90		6946.99	0.007395	2.41	17.84	22.58	0.48
East	7900	5-YR	4.00	6945.95	6946.20		6946.21	0.006789	1.02	3.91	16.95	0.37
East	7856	100-YR	43.00	6945.63	6946.43		6946.56	0.013772	2.97	14.48	21.37	0.64
East	7856	5-YR	4.00	6945.63	6945.85		6945.87	0.009312	1.13	3.55	16.79	0.43
East	7851	100-YR	43.00	6945.58	6946.18	6946.18	6946.44	0.036974	4.12	10.43	19.80	1.00
East	7851	5-YR	4.00	6945.58	6945.71	6945.71	6945.77	0.065418	2.06	1.94	16.00	1.05
East	7844	100-YR	43.00	6943.58	6944.18	6944.18	6944.44	0.036765	4.11	10.45	19.80	1.00
East	7844	5-YR	4.00	6943.58	6943.71	6943.71	6943.77	0.052078	1.92	2.08	16.07	0.94
East	7835	100-YR	43.00	6941.58	6943.29		6943.31	0.000875	1.15	37.30	28.65	0.18
East	7835	5-YR	4.00	6941.58	6941.82		6941.84	0.007573	1.06	3.78	16.88	0.39
East	7800	100-YR	43.00	6941.32	6943.27		6943.29	0.000533	0.97	44.43	30.58	0.14
East	7800	5-YR	4.00	6941.32	6941.56		6941.58	0.007471	1.05	3.80	16.89	0.39
East	7750	100-YR	43.00	6940.95	6943.26		6943.26	0.000281	0.77	55.82	33.45	0.11
East	7750	5-YR	4.00	6940.95	6941.19		6941.21	0.007316	1.05	3.82	16.91	0.39
East	7700	100-YR	43.00	6940.57	6943.25		6943.25	0.000149	0.63	69.54	45.50	0.08
East	7700	5-YR	4.00	6940.57	6940.81		6940.82	0.007681	1.06	3.77	16.88	0.40

HEC-RAS Plan: Proposed (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	7650	100-YR	43.00	6940.20	6943.24		6943.25	0.000069	0.48	102.59	67.56	0.06
East	7650	5-YR	4.00	6940.20	6940.44		6940.46	0.007216	1.04	3.84	16.92	0.39
East	7597	100-YR	43.00	6939.80	6943.22		6943.24	0.000194	1.04	41.15	76.93	0.10
East	7597	5-YR	4.00	6939.80	6940.10		6940.12	0.005571	1.11	3.62	17.41	0.36
East	7592	100-YR	43.00	6939.77	6943.21		6943.24	0.000305	1.31	32.70	75.78	0.12
East	7592	5-YR	4.00	6939.77	6939.95	6939.95	6940.04	0.052837	2.39	1.68	16.42	1.00
East	7583	100-YR	131.00	6937.53	6942.71	6940.31	6943.11	0.002664	5.10	25.68	76.52	0.40
East	7583	5-YR	22.50	6937.53	6939.26	6938.39	6939.37	0.003025	2.62	8.59	28.85	0.35
East	7524		Culvert									
East	7465	100-YR	131.00	6936.41	6938.99	6938.99	6940.31	0.021831	9.19	14.26	41.83	1.01
East	7465	5-YR	22.50	6936.41	6937.22	6937.22	6937.61	0.031441	5.07	4.44	21.44	1.00
East	7450	100-YR	131.00	6936.29	6938.00		6938.25	0.007651	3.97	33.01	28.67	0.55
East	7450	5-YR	22.50	6936.29	6936.95		6937.01	0.007335	1.94	11.60	20.25	0.45
East	7400	100-YR	131.00	6935.92	6937.64		6937.83	0.007903	3.48	37.66	28.77	0.54
East	7400	5-YR	22.50	6935.92	6936.57		6936.63	0.007487	1.95	11.52	20.23	0.46
East	7350	100-YR	131.00	6935.54	6937.18		6937.40	0.009381	3.70	35.45	28.13	0.58
East	7350	5-YR	22.50	6935.54	6936.19		6936.25	0.007726	1.97	11.40	20.17	0.46
East	7326	100-YR	131.00	6935.37	6936.79		6937.10	0.016208	4.47	29.29	26.34	0.75
East	7326	5-YR	22.50	6935.37	6935.91		6936.00	0.014395	2.42	9.30	19.33	0.62
East	7321	100-YR	131.00	6935.30	6936.48	6936.48	6936.97	0.031369	5.62	23.31	24.47	1.01
East	7321	5-YR	22.50	6935.30	6935.70	6935.70	6935.88	0.042409	3.43	6.55	18.17	1.01
East	7313	100-YR	131.00	6933.30	6934.48	6934.48	6934.97	0.031330	5.61	23.33	24.49	1.01
East	7313	5-YR	22.50	6933.30	6933.70	6933.70	6933.88	0.042271	3.43	6.56	18.18	1.01
East	7304	100-YR	131.00	6931.32	6933.06		6933.25	0.007532	3.42	38.30	28.94	0.52
East	7304	5-YR	22.50	6931.32	6931.97		6932.03	0.007498	1.95	11.52	20.23	0.46
East	7250	100-YR	131.00	6930.91	6932.66		6932.84	0.007441	3.41	38.46	28.97	0.52
East	7250	5-YR	22.50	6930.91	6931.57		6931.63	0.007373	1.94	11.58	20.24	0.45
East	7200	100-YR	131.00	6930.54	6932.29		6932.47	0.007500	3.42	38.36	28.96	0.52
East	7200	5-YR	22.50	6930.54	6931.19		6931.25	0.007696	1.97	11.42	20.19	0.46
East	7150	100-YR	131.00	6930.16	6931.91		6932.09	0.007482	3.41	38.38	28.95	0.52

HEC-RAS Plan: Proposed (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	7150	5-YR	22.50	6930.16	6930.82		6930.88	0.007464	1.95	11.53	20.21	0.46
East	7100	100-YR	131.00	6929.79	6931.54		6931.72	0.007437	3.41	38.47	28.99	0.52
East	7100	5-YR	22.50	6929.79	6930.48		6930.53	0.006157	1.83	12.29	20.54	0.42
East	7041	100-YR	131.00	6929.35	6930.75	6930.54	6931.07	0.017035	4.55	28.79	26.20	0.77
East	7041	5-YR	22.50	6929.35	6929.88		6929.98	0.015513	2.48	9.08	19.26	0.64
East	7036	100-YR	131.00	6929.27	6930.46	6930.46	6930.94	0.030861	5.59	23.44	24.49	1.01
East	7036	5-YR	22.50	6929.27	6929.67	6929.67	6929.85	0.040719	3.39	6.64	18.20	0.99
East	7028	100-YR	131.00	6927.27	6929.60		6929.69	0.002434	2.28	57.51	34.21	0.31
East	7028	5-YR	22.50	6927.27	6927.66	6927.66	6927.84	0.041725	3.40	6.62	18.38	1.00
East	7019	100-YR	131.00	6925.30	6929.65		6929.66	0.000143	0.91	159.64	59.90	0.09
East	7019	5-YR	22.50	6925.30	6926.00		6926.06	0.007885	1.95	11.51	21.01	0.47
West	6158	100-YR	1000.00	6972.45	6975.84	6975.84	6976.67	0.014997	7.69	156.84	115.24	0.83
West	6158	5-YR	100.00	6972.45	6973.41	6973.41	6973.77	0.034205	4.78	20.91	29.99	1.01
West	6153	100-YR	1000.00	6971.20	6974.52	6974.52	6975.69	0.023065	8.70	114.95	49.57	1.01
West	6153	5-YR	100.00	6971.20	6972.15	6972.15	6972.50	0.034063	4.78	20.91	29.90	1.01
West	6145	100-YR	1000.00	6967.92	6972.62		6973.04	0.005371	5.21	192.00	59.66	0.51
West	6145	5-YR	100.00	6967.92	6969.41		6969.50	0.004053	2.40	41.74	33.95	0.38
West	6131	100-YR	1000.00	6967.87	6972.54		6972.97	0.005534	5.27	189.88	59.33	0.52
West	6131	5-YR	100.00	6967.87	6969.36		6969.45	0.004122	2.41	41.50	33.87	0.38
West	6100	100-YR	1000.00	6967.76	6972.33		6972.79	0.006042	5.44	183.92	58.53	0.54
West	6100	5-YR	100.00	6967.76	6969.22		6969.31	0.004404	2.46	40.57	33.65	0.40
West	6050	100-YR	1000.00	6967.59	6971.90		6972.44	0.007613	5.91	169.16	56.50	0.60
West	6050	5-YR	100.00	6967.59	6968.95		6969.06	0.005602	2.67	37.41	32.92	0.44
West	6006	100-YR	1000.00	6967.43	6971.14	6970.68	6971.97	0.013722	7.31	136.73	51.67	0.79
West	6006	5-YR	100.00	6967.43	6968.50		6968.70	0.012934	3.54	28.24	30.58	0.65
West	6001	100-YR	1000.00	6967.39	6970.65	6970.65	6971.85	0.022972	8.80	113.70	48.01	1.01
West	6001	5-YR	100.00	6967.39	6968.21	6968.21	6968.58	0.034016	4.87	20.53	28.51	1.01
West	5993	100-YR	1000.00	6965.39	6968.66	6968.66	6969.85	0.022809	8.77	113.99	48.05	1.00
West	5993	5-YR	100.00	6965.39	6966.22	6966.22	6966.58	0.032980	4.82	20.74	28.57	1.00
West	5984	100-YR	1000.00	6963.41	6968.08		6968.51	0.005515	5.26	190.14	59.39	0.52

HEC-RAS Plan: Proposed (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)	
West	5984	5-YR	100.00	6963.41	6964.90		6964.99	0.004121	2.41	41.51	33.89	0.38
West	5950	100-YR	1000.00	6963.29	6967.86		6968.32	0.006051	5.44	183.82	58.52	0.54
West	5950	5-YR	100.00	6963.29	6964.75		6964.84	0.004388	2.46	40.62	33.67	0.40
West	5900	100-YR	1000.00	6963.12	6967.42		6967.97	0.007658	5.92	168.79	56.44	0.60
West	5900	5-YR	100.00	6963.12	6964.49		6964.60	0.005561	2.67	37.50	32.93	0.44
West	5858	100-YR	1000.00	6962.98	6966.71	6966.23	6967.53	0.013420	7.25	137.88	51.89	0.78
West	5858	5-YR	100.00	6962.98	6964.07		6964.26	0.012367	3.49	28.68	30.72	0.64
West	5853	100-YR	1000.00	6962.96	6966.22	6966.22	6967.41	0.022566	8.74	114.42	48.12	1.00
West	5853	5-YR	100.00	6962.96	6963.77	6963.77	6964.14	0.034024	4.87	20.53	28.50	1.01
West	5844	100-YR	1000.00	6960.72	6963.98	6963.98	6965.18	0.022863	8.78	113.87	48.02	1.01
West	5844	5-YR	100.00	6960.72	6961.54	6961.54	6961.91	0.033691	4.86	20.59	28.51	1.01
West	5835	100-YR	1000.00	6958.95	6963.83		6964.21	0.004650	4.94	202.28	60.98	0.48
West	5835	5-YR	100.00	6958.95	6960.48		6960.57	0.003694	2.32	43.07	34.23	0.36
West	5800	100-YR	1000.00	6958.83	6963.64		6964.04	0.004890	5.03	198.63	60.52	0.49
West	5800	5-YR	100.00	6958.83	6960.35		6960.43	0.003808	2.35	42.64	34.15	0.37
West	5750	100-YR	1000.00	6958.66	6963.35		6963.78	0.005406	5.22	191.55	59.60	0.51
West	5750	5-YR	100.00	6958.66	6960.15		6960.24	0.004120	2.41	41.52	33.90	0.38
West	5700	100-YR	1000.00	6958.48	6963.01		6963.48	0.006236	5.50	181.82	58.23	0.55
West	5700	5-YR	100.00	6958.48	6959.92		6960.02	0.004595	2.50	39.99	33.51	0.40
West	5650	100-YR	1000.00	6958.31	6962.55		6963.12	0.008148	6.06	165.04	55.90	0.62
West	5650	5-YR	100.00	6958.31	6959.63		6959.75	0.006294	2.78	35.96	32.55	0.47
West	5618	100-YR	1000.00	6958.20	6961.46	6961.45	6962.65	0.022664	8.75	114.23	48.08	1.00
West	5618	5-YR	100.00	6958.20	6959.15		6959.41	0.019614	4.06	24.61	29.63	0.79
West	5613	100-YR	1000.00	6958.09	6961.34	6961.34	6962.54	0.023009	8.80	113.59	47.95	1.01
West	5613	5-YR	100.00	6958.09	6958.91	6958.91	6959.27	0.033402	4.84	20.65	28.53	1.00
West	5605	100-YR	1000.00	6956.09	6959.34	6959.34	6960.54	0.023034	8.81	113.54	47.94	1.01
West	5605	5-YR	100.00	6956.09	6956.91	6956.91	6957.27	0.033402	4.84	20.65	28.53	1.00
West	5596	100-YR	1000.00	6954.18	6959.04		6959.42	0.004699	4.96	201.53	60.90	0.48
West	5596	5-YR	100.00	6954.18	6955.71		6955.79	0.003746	2.33	42.89	34.23	0.37
West	5550	100-YR	1000.00	6954.02	6958.80		6959.20	0.005046	5.09	196.39	60.22	0.50

HEC-RAS Plan: Proposed (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)	
West	5550	5-YR	100.00	6954.02	6955.53		6955.61	0.003909	2.37	42.26	34.08	0.37
West	5500	100-YR	1000.00	6953.84	6958.49		6958.93	0.005621	5.30	188.82	59.20	0.52
West	5500	5-YR	100.00	6953.84	6955.32		6955.41	0.004147	2.42	41.41	33.84	0.38
West	5450	100-YR	1000.00	6953.67	6958.12		6958.61	0.006719	5.65	176.98	57.58	0.57
West	5450	5-YR	100.00	6953.67	6955.09		6955.19	0.004868	2.55	39.22	33.34	0.41
West	5400	100-YR	1000.00	6953.50	6957.55		6958.20	0.009761	6.47	154.63	54.41	0.68
West	5400	5-YR	100.00	6953.50	6954.74		6954.88	0.007721	2.98	33.57	31.97	0.51
West	5383	100-YR	1000.00	6953.44	6957.16	6956.69	6957.98	0.013637	7.30	137.08	51.77	0.79
West	5383	5-YR	100.00	6953.44	6954.52		6954.71	0.012906	3.54	28.27	30.61	0.65
West	5378	100-YR	1000.00	6953.41	6956.66	6956.66	6957.86	0.023002	8.80	113.63	47.98	1.01
West	5378	5-YR	100.00	6953.41	6954.22	6954.22	6954.59	0.033880	4.86	20.56	28.51	1.01
West	5369	100-YR	1000.00	6951.41	6954.66	6954.66	6955.86	0.022934	8.79	113.75	48.00	1.01
West	5369	5-YR	100.00	6951.41	6952.22	6952.22	6952.59	0.033881	4.86	20.56	28.51	1.01
West	5360	100-YR	1000.00	6949.41	6954.21		6954.61	0.004934	5.05	197.96	60.41	0.49
West	5360	5-YR	100.00	6949.41	6950.93		6951.02	0.003770	2.34	42.78	34.18	0.37
West	5350	100-YR	1000.00	6949.38	6954.16		6954.56	0.005031	5.09	196.62	60.27	0.50
West	5350	5-YR	100.00	6949.38	6950.89		6950.98	0.003855	2.35	42.46	34.13	0.37
West	5300	100-YR	1000.00	6949.21	6953.85		6954.29	0.005648	5.30	188.52	59.18	0.52
West	5300	5-YR	100.00	6949.21	6950.69		6950.78	0.004213	2.43	41.20	33.82	0.39
West	5250	100-YR	1000.00	6949.03	6953.49		6953.98	0.006673	5.64	177.43	57.64	0.57
West	5250	5-YR	100.00	6949.03	6950.45		6950.55	0.004826	2.54	39.33	33.37	0.41
West	5200	100-YR	1000.00	6948.86	6952.92		6953.57	0.009614	6.43	155.46	54.51	0.67
West	5200	5-YR	100.00	6948.86	6950.12		6950.25	0.007432	2.94	34.00	32.06	0.50
West	5188	100-YR	1000.00	6948.82	6952.70		6953.43	0.011513	6.86	145.68	53.07	0.73
West	5188	5-YR	100.00	6948.82	6949.99		6950.15	0.009726	3.22	31.07	31.33	0.57
West	5183	100-YR	1000.00	6948.86	6952.11	6952.11	6953.31	0.023020	8.80	113.60	47.97	1.01
West	5183	5-YR	100.00	6948.86	6949.67	6949.67	6950.04	0.033883	4.86	20.56	28.51	1.01
West	5175	100-YR	1000.00	6946.91	6950.16	6950.16	6951.36	0.022945	8.79	113.73	48.00	1.01
West	5175	5-YR	100.00	6946.91	6947.72	6947.72	6948.09	0.033881	4.86	20.56	28.51	1.01
West	5165	100-YR	1000.00	6944.74	6949.63		6950.00	0.004605	4.93	203.03	61.10	0.48

HEC-RAS Plan: Proposed (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)	
West	5165	5-YR	100.00	6944.74	6946.26		6946.35	0.003805	2.34	42.65	34.15	0.37
West	5150	100-YR	1000.00	6944.74	6949.53		6949.93	0.004976	5.07	197.39	60.36	0.49
West	5150	5-YR	100.00	6944.74	6946.19		6946.28	0.004532	2.49	40.18	33.57	0.40
West	5100	100-YR	1000.00	6944.57	6949.24		6949.67	0.005535	5.27	189.90	59.36	0.52
West	5100	5-YR	100.00	6944.57	6945.90		6946.02	0.006051	2.74	36.45	32.68	0.46
West	5066	100-YR	1000.00	6944.45	6948.61	6947.66	6949.41	0.008088	7.15	139.80	55.31	0.65
West	5066	5-YR	100.00	6944.45	6945.54		6945.73	0.012153	3.47	28.85	30.77	0.63
West	5061	100-YR	1000.00	6944.40	6947.64	6947.64	6949.14	0.021078	9.81	101.94	47.92	1.01
West	5061	5-YR	100.00	6944.40	6945.21	6945.21	6945.58	0.033884	4.86	20.56	28.51	1.01
West	5052	100-YR	1000.00	6942.40	6946.10		6947.43	0.014653	9.25	108.08	51.58	0.87
West	5052	5-YR	100.00	6942.40	6943.21	6943.21	6943.58	0.033882	4.86	20.56	28.51	1.01
West	5045	100-YR	1000.00	6940.57	6946.39	6944.12	6947.04	0.003728	6.46	154.75	68.59	0.47
West	5045	5-YR	100.00	6940.57	6941.65	6941.37	6941.85	0.011869	3.64	27.46	30.62	0.63
West	4978		Culvert									
West	4910	100-YR	1000.00	6939.74	6943.25	6943.25	6944.99	0.019911	10.58	94.52	50.06	1.01
West	4910	5-YR	100.00	6939.74	6940.55	6940.55	6940.93	0.032573	4.88	20.48	28.50	1.00
West	4901	100-YR	1000.00	6937.57	6940.78	6940.78	6942.23	0.021284	9.66	103.57	47.71	1.00
West	4901	5-YR	100.00	6937.57	6938.38	6938.38	6938.75	0.033880	4.86	20.56	28.51	1.01
West	4891	100-YR	1000.00	6935.33	6939.84		6940.37	0.005516	5.83	171.59	58.08	0.53
West	4891	5-YR	100.00	6935.33	6936.80		6936.89	0.004307	2.45	40.88	33.73	0.39
West	4850	100-YR	1000.00	6935.19	6939.60		6940.11	0.006949	5.72	174.84	57.29	0.58
West	4850	5-YR	100.00	6935.19	6936.60		6936.70	0.005011	2.57	38.85	33.27	0.42
West	4793	100-YR	1000.00	6934.99	6938.72	6938.24	6939.54	0.013415	7.25	137.87	51.87	0.78
West	4793	5-YR	100.00	6934.99	6936.08		6936.27	0.012334	3.49	28.69	30.70	0.64
West	4788	100-YR	1000.00	6934.97	6938.22	6938.22	6939.42	0.022882	8.78	113.84	48.01	1.01
West	4788	5-YR	100.00	6934.97	6935.78	6935.78	6936.15	0.033939	4.87	20.54	28.50	1.01
West	4780	100-YR	1000.00	6932.97	6936.22	6936.22	6937.42	0.022875	8.78	113.84	48.00	1.01
West	4780	5-YR	100.00	6932.97	6933.78	6933.78	6934.15	0.033962	4.87	20.54	28.49	1.01
West	4770	100-YR	1000.00	6930.97	6935.78		6936.18	0.004894	5.04	198.57	60.51	0.49
West	4770	5-YR	100.00	6930.97	6932.49		6932.57	0.003832	2.35	42.55	34.15	0.37

HEC-RAS Plan: Proposed (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)	
West	4750	100-YR	1000.00	6930.90	6935.67		6936.08	0.005066	5.10	196.11	60.19	0.50
West	4750	5-YR	100.00	6930.90	6932.41		6932.49	0.003927	2.37	42.20	34.07	0.38
West	4700	100-YR	1000.00	6930.72	6935.37		6935.80	0.005651	5.31	188.45	59.15	0.52
West	4700	5-YR	100.00	6930.72	6932.20		6932.29	0.004198	2.43	41.23	33.79	0.39
West	4650	100-YR	1000.00	6930.55	6934.99		6935.49	0.006776	5.67	176.44	57.51	0.57
West	4650	5-YR	100.00	6930.55	6931.96		6932.06	0.004989	2.57	38.90	33.26	0.42
West	4600	100-YR	1000.00	6930.37	6934.42		6935.07	0.009777	6.47	154.50	54.36	0.68
West	4600	5-YR	100.00	6930.37	6931.60		6931.75	0.007965	3.01	33.21	31.86	0.52
West	4582	100-YR	1000.00	6930.31	6933.57	6933.56	6934.76	0.022760	8.77	114.07	48.06	1.00
West	4582	5-YR	100.00	6930.31	6931.23		6931.51	0.022063	4.23	23.67	29.37	0.83
West	4577	100-YR	1000.00	6930.19	6933.44	6933.44	6934.64	0.022872	8.78	113.86	48.02	1.01
West	4577	5-YR	100.00	6930.19	6931.01	6931.01	6931.37	0.032914	4.82	20.75	28.57	1.00
West	4569	100-YR	1000.00	6928.15	6931.44	6931.44	6932.64	0.023059	8.81	113.57	48.00	1.01
West	4569	5-YR	100.00	6928.15	6929.01	6929.01	6929.37	0.033879	4.86	20.56	28.51	1.01
West	4560	100-YR	1000.00	6926.29	6931.28		6931.63	0.004241	4.78	209.19	61.89	0.46
West	4560	5-YR	100.00	6926.29	6927.84		6927.92	0.003548	2.29	43.68	34.41	0.36
West	4550	100-YR	1000.00	6926.26	6931.23		6931.59	0.004285	4.80	208.42	61.80	0.46
West	4550	5-YR	100.00	6926.26	6927.80		6927.89	0.003584	2.30	43.53	34.37	0.36
West	4500	100-YR	1000.00	6926.08	6931.00		6931.37	0.004475	4.87	205.16	61.37	0.47
West	4500	5-YR	100.00	6926.08	6927.63		6927.71	0.003577	2.30	43.55	34.36	0.36
West	4450	100-YR	1000.00	6925.91	6930.75		6931.14	0.004790	5.00	200.14	60.72	0.49
West	4450	5-YR	100.00	6925.91	6927.44		6927.53	0.003698	2.32	43.06	34.25	0.37
West	4400	100-YR	1000.00	6925.74	6930.47		6930.88	0.005245	5.16	193.63	59.85	0.51
West	4400	5-YR	100.00	6925.74	6927.25		6927.34	0.003891	2.36	42.33	34.10	0.37
West	4350	100-YR	1000.00	6925.56	6930.15		6930.60	0.005946	5.41	185.00	58.68	0.54
West	4350	5-YR	100.00	6925.56	6927.05		6927.14	0.004122	2.41	41.50	33.88	0.38
West	4300	100-YR	1000.00	6925.39	6929.73		6930.26	0.007420	5.86	170.75	56.73	0.60
West	4300	5-YR	100.00	6925.39	6926.81		6926.91	0.004808	2.54	39.39	33.39	0.41
West	4250	100-YR	1000.00	6925.21	6929.01		6929.77	0.012151	6.99	143.05	52.81	0.75
West	4250	5-YR	100.00	6925.21	6926.02	6926.02	6926.38	0.033402	4.82	20.77	28.94	1.00

HEC-RAS Plan: Proposed (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)	
South	3379	100-YR	1288.00	6924.64	6929.33		6929.63	0.003276	4.40	292.91	85.20	0.41
South	3379	5-YR	128.50	6924.64	6926.00		6926.06	0.002665	1.94	66.32	54.39	0.31
South	3329	100-YR	1288.00	6924.47	6929.01		6929.42	0.004901	5.18	248.85	73.17	0.49
South	3329	5-YR	128.50	6924.47	6925.83		6925.91	0.003679	2.25	57.05	47.51	0.36
South	3279	100-YR	1288.00	6924.29	6928.66		6929.15	0.006066	5.61	229.48	70.10	0.55
South	3279	5-YR	128.50	6924.29	6925.62		6925.71	0.004352	2.40	53.43	45.74	0.39
South	3229	100-YR	1288.00	6924.12	6928.21		6928.79	0.007738	6.12	210.48	67.83	0.61
South	3229	5-YR	128.50	6924.12	6925.35		6925.46	0.005568	2.61	49.26	44.92	0.44
South	3190	100-YR	1288.00	6923.98	6927.55	6927.04	6928.38	0.012884	7.32	175.92	63.56	0.78
South	3190	5-YR	128.50	6923.98	6924.97		6925.14	0.011724	3.32	38.68	42.93	0.62
South	3185	100-YR	1288.00	6923.97	6927.04	6927.04	6928.26	0.022441	8.88	145.06	59.56	1.00
South	3185	5-YR	128.50	6923.97	6924.70	6924.70	6925.04	0.033517	4.65	27.65	40.85	1.00
South	3177	100-YR	1288.00	6921.99	6925.08	6925.08	6926.31	0.022502	8.89	144.93	59.55	1.00
South	3177	5-YR	128.50	6921.99	6922.74	6922.74	6923.08	0.034262	4.68	27.45	40.79	1.01
South	3168	100-YR	1288.00	6919.96	6924.49		6924.94	0.005287	5.35	240.73	71.25	0.51
South	3168	5-YR	128.50	6919.96	6921.33		6921.41	0.003914	2.33	55.25	45.92	0.37
South	3150	100-YR	1288.00	6919.90	6924.38		6924.84	0.005500	5.43	237.38	70.88	0.52
South	3150	5-YR	128.50	6919.90	6921.25		6921.34	0.004031	2.35	54.73	45.84	0.38
South	3100	100-YR	1288.00	6919.73	6924.02		6924.54	0.006471	5.75	224.13	69.38	0.56
South	3100	5-YR	128.50	6919.73	6921.03		6921.12	0.004665	2.46	52.18	45.41	0.41
South	3050	100-YR	1288.00	6919.55	6923.52		6924.15	0.008701	6.38	201.88	66.74	0.65
South	3050	5-YR	128.50	6919.55	6920.73		6920.85	0.006492	2.74	46.84	44.44	0.47
South	3024	100-YR	1288.00	6919.46	6923.01	6922.53	6923.86	0.013133	7.37	174.72	63.38	0.78
South	3024	5-YR	128.50	6919.46	6920.44		6920.62	0.012248	3.37	38.13	42.83	0.63
South	3019	100-YR	1288.00	6919.44	6922.51	6922.51	6923.73	0.022536	8.89	144.81	59.50	1.01
South	3019	5-YR	128.50	6919.44	6920.17	6920.17	6920.51	0.033547	4.65	27.64	40.83	1.00
South	3015	100-YR	1288.00	6918.56	6922.15		6922.97	0.012622	7.27	177.19	63.72	0.77
South	3015	5-YR	128.50	6918.56	6919.29	6919.29	6919.63	0.034239	4.68	27.46	40.80	1.01
South	3011	100-YR	1288.00	6917.72	6922.41		6922.81	0.004644	5.11	252.10	72.53	0.48
South	3011	5-YR	128.50	6917.72	6919.35		6919.41	0.002116	1.90	67.69	48.05	0.28

HEC-RAS Plan: Proposed (Continued)

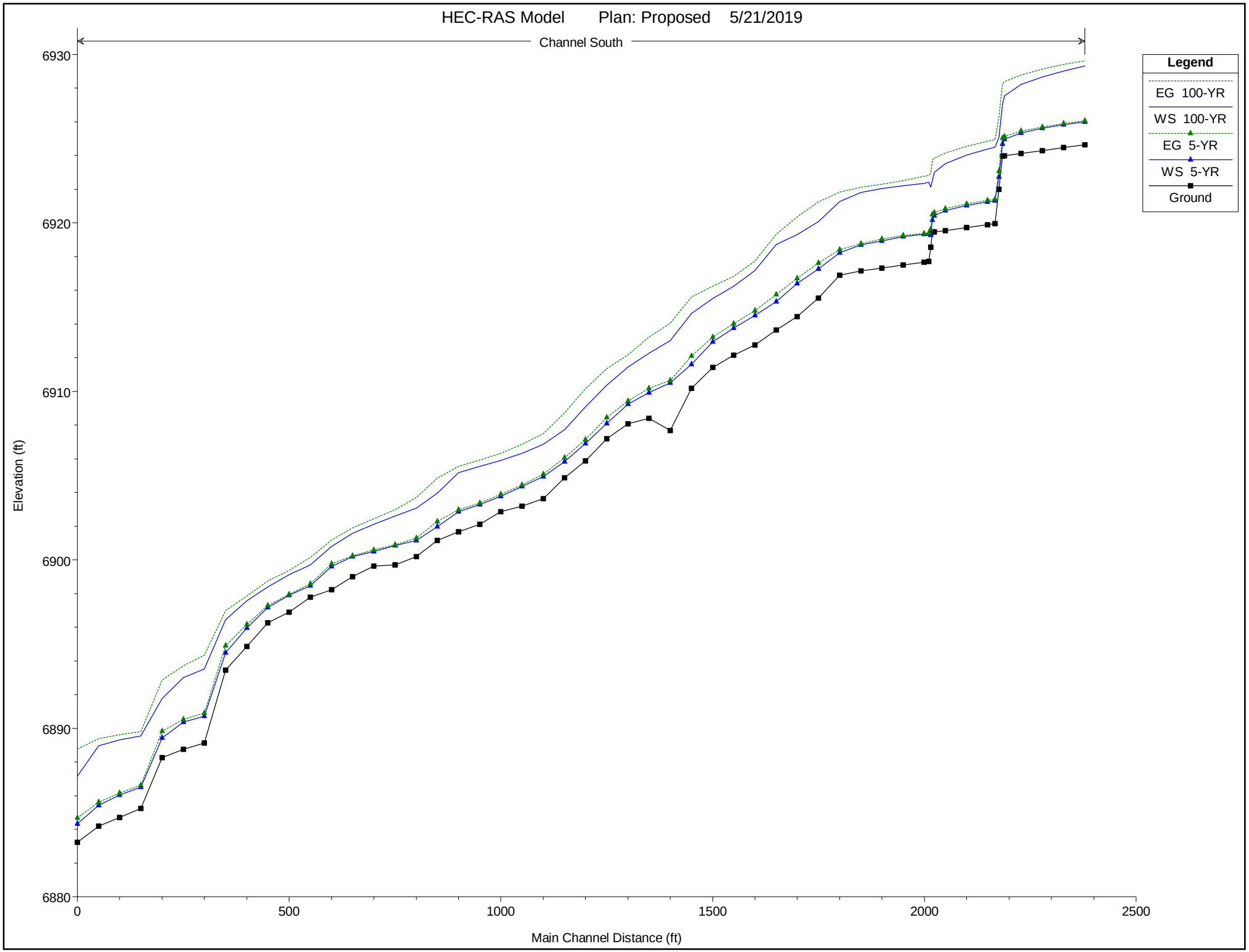
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South	3000	100-YR	1288.00	6917.68	6922.34		6922.76	0.004874	5.21	247.45	71.79	0.49
South	3000	5-YR	128.50	6917.68	6919.33		6919.38	0.002140	1.91	67.27	47.69	0.28
South	2950	100-YR	1288.00	6917.51	6922.22		6922.51	0.003880	4.58	317.57	118.51	0.44
South	2950	5-YR	128.50	6917.51	6919.18		6919.26	0.002971	2.16	59.47	44.87	0.33
South	2900	100-YR	1288.00	6917.33	6922.05		6922.31	0.003573	4.08	316.89	113.62	0.42
South	2900	5-YR	128.50	6917.33	6918.93		6919.05	0.006062	2.72	47.21	43.05	0.46
South	2850	100-YR	1288.00	6917.16	6921.82		6922.12	0.003674	4.48	302.40	118.66	0.43
South	2850	5-YR	128.50	6917.16	6918.69		6918.77	0.004750	2.29	56.23	55.48	0.40
South	2800	100-YR	1288.00	6916.89	6921.28		6921.84	0.007362	6.10	226.37	115.07	0.60
South	2800	5-YR	128.50	6916.89	6918.22		6918.41	0.011520	3.45	37.20	38.47	0.62
South	2750	100-YR	1288.00	6915.53	6920.07	6920.07	6921.25	0.017102	8.97	160.52	85.37	0.91
South	2750	5-YR	128.50	6915.53	6917.28		6917.63	0.021054	4.79	26.85	26.54	0.84
South	2700	100-YR	1288.00	6914.43	6919.31	6919.31	6920.37	0.014212	8.69	176.61	104.14	0.84
South	2700	5-YR	128.50	6914.43	6916.40		6916.71	0.015876	4.48	28.71	25.30	0.74
South	2650	100-YR	1288.00	6913.64	6918.72	6918.72	6919.32	0.008616	6.98	286.66	271.98	0.66
South	2650	5-YR	128.50	6913.64	6915.32		6915.75	0.023048	5.24	24.52	22.57	0.89
South	2600	100-YR	1288.00	6912.76	6917.17	6917.17	6917.74	0.011457	6.64	267.78	248.38	0.73
South	2600	5-YR	128.50	6912.76	6914.51		6914.78	0.015030	4.21	30.53	28.45	0.72
South	2550	100-YR	1288.00	6912.14	6916.23	6916.05	6916.82	0.011794	6.80	245.72	172.53	0.74
South	2550	5-YR	128.50	6912.14	6913.77		6914.01	0.015204	3.97	32.40	33.51	0.71
South	2500	100-YR	1288.00	6911.42	6915.51	6915.36	6916.24	0.011765	7.52	222.05	140.71	0.76
South	2500	5-YR	128.50	6911.42	6912.95		6913.22	0.016336	4.19	30.70	30.84	0.74
South	2450	100-YR	1288.00	6910.18	6914.62	6914.62	6915.61	0.013295	8.61	200.26	140.17	0.82
South	2450	5-YR	128.50	6910.18	6911.61	6911.61	6912.11	0.030882	5.62	22.85	23.70	1.01
South	2400	100-YR	1288.00	6907.69	6913.00	6912.74	6914.04	0.015851	8.21	161.72	82.91	0.86
South	2400	5-YR	128.50	6907.69	6910.51		6910.65	0.005594	3.00	42.88	31.50	0.45
South	2350	100-YR	1288.00	6908.40	6912.26	6912.26	6913.22	0.016511	8.11	180.90	118.28	0.88
South	2350	5-YR	128.50	6908.40	6909.93		6910.19	0.017309	4.05	31.75	35.14	0.75
South	2300	100-YR	1288.00	6908.07	6911.45	6911.25	6912.16	0.012843	7.16	214.70	140.80	0.77
South	2300	5-YR	128.50	6908.07	6909.25		6909.43	0.012603	3.37	38.17	43.97	0.64

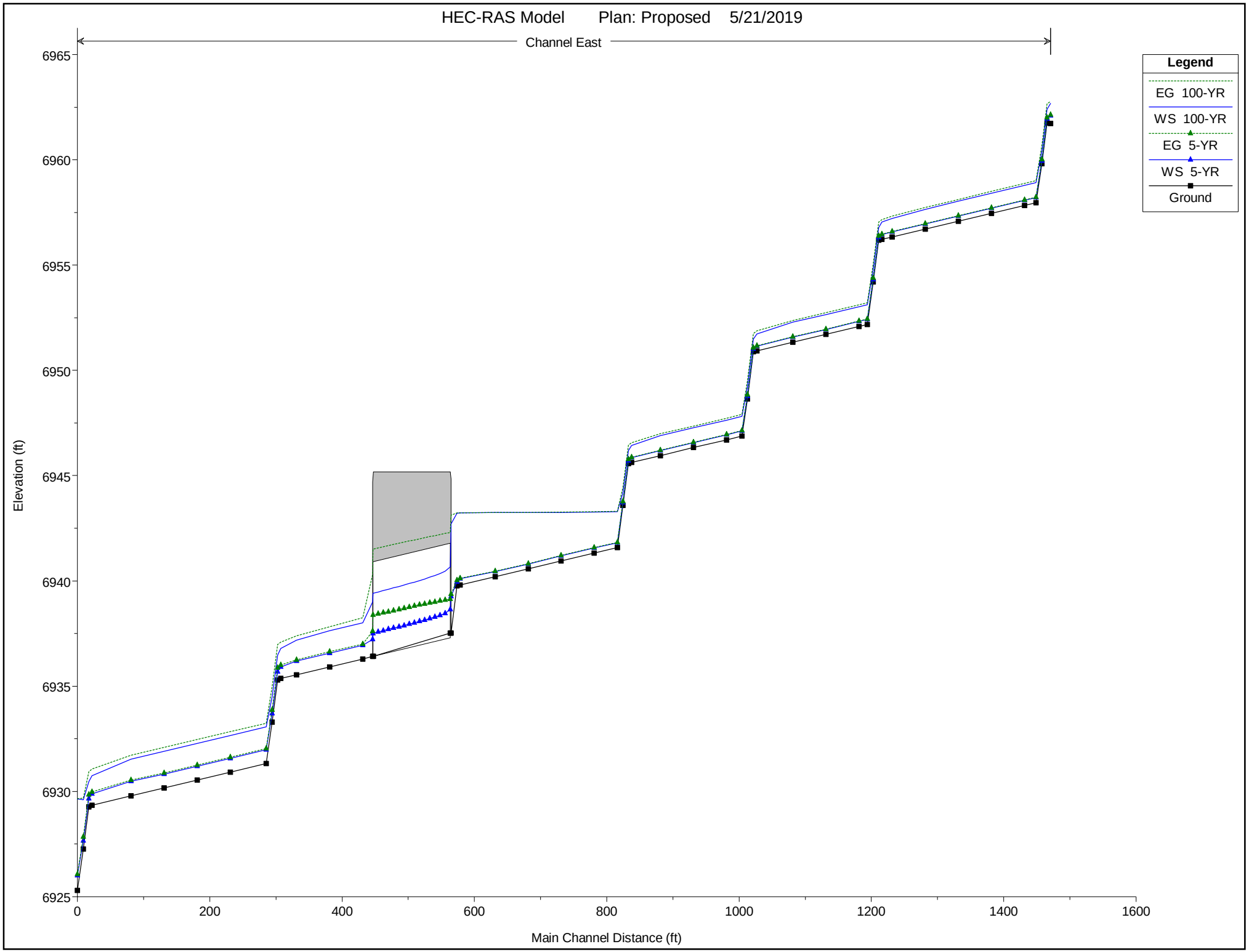
HEC-RAS Plan: Proposed (Continued)

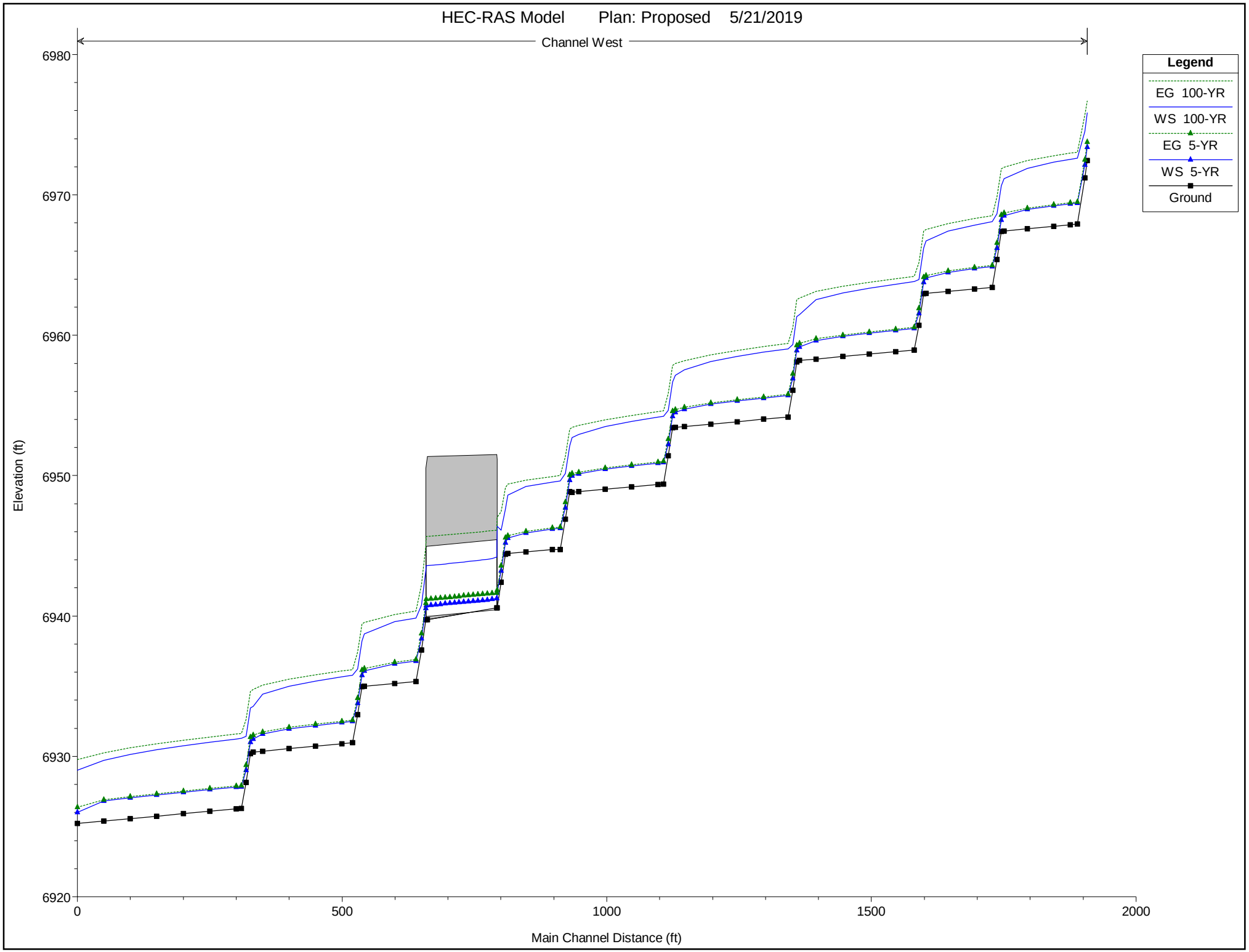
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South	2250	100-YR	1288.00	6907.19	6910.37	6910.37	6911.36	0.019507	8.32	174.84	100.16	0.94
South	2250	5-YR	128.50	6907.19	6908.10	6908.10	6908.45	0.033176	4.76	26.98	38.18	1.00
South	2200	100-YR	1288.00	6905.88	6909.09	6909.09	6910.17	0.019610	8.43	160.95	81.15	0.94
South	2200	5-YR	128.50	6905.88	6906.92		6907.14	0.018022	3.82	33.64	41.90	0.75
South	2150	100-YR	1288.00	6904.87	6907.73	6907.73	6908.74	0.022563	8.06	161.10	83.73	0.99
South	2150	5-YR	128.50	6904.87	6905.82	6905.76	6906.06	0.026449	3.92	32.77	52.42	0.87
South	2100	100-YR	1288.00	6903.63	6906.86		6907.50	0.014059	6.42	200.58	95.11	0.78
South	2100	5-YR	128.50	6903.63	6904.95		6905.08	0.014084	2.96	43.43	66.12	0.64
South	2050	100-YR	1288.00	6903.18	6906.33		6906.85	0.010905	5.83	221.07	100.24	0.69
South	2050	5-YR	128.50	6903.18	6904.36		6904.46	0.010676	2.60	49.42	74.19	0.56
South	2000	100-YR	1288.00	6902.87	6905.90		6906.33	0.009044	5.29	243.44	110.92	0.63
South	2000	5-YR	128.50	6902.87	6903.76		6903.88	0.012986	2.74	46.88	75.32	0.61
South	1950	100-YR	1288.00	6902.12	6905.54		6905.93	0.006744	5.06	271.23	128.78	0.56
South	1950	5-YR	128.50	6902.12	6903.27		6903.37	0.008157	2.49	51.65	67.70	0.50
South	1900	100-YR	1288.00	6901.67	6905.19		6905.55	0.008090	4.86	265.17	126.53	0.59
South	1900	5-YR	128.50	6901.67	6902.87		6902.97	0.007686	2.57	49.93	59.47	0.50
South	1850	100-YR	1288.00	6901.15	6903.97	6903.97	6904.84	0.024933	7.51	171.47	98.93	1.01
South	1850	5-YR	128.50	6901.15	6901.98	6901.95	6902.27	0.030441	4.37	29.44	44.56	0.95
South	1800	100-YR	1288.00	6900.18	6903.06	6902.84	6903.71	0.017275	6.49	200.74	131.55	0.85
South	1800	5-YR	128.50	6900.18	6901.14		6901.29	0.012739	3.08	41.72	55.43	0.63
South	1750	100-YR	1288.00	6899.69	6902.61		6902.97	0.010310	4.76	270.44	159.47	0.64
South	1750	5-YR	128.50	6899.69	6900.84		6900.90	0.004590	1.99	64.49	76.60	0.38
South	1700	100-YR	1288.00	6899.62	6902.12		6902.44	0.010369	4.52	285.15	182.98	0.64
South	1700	5-YR	128.50	6899.62	6900.50		6900.58	0.009555	2.29	56.13	93.93	0.52
South	1650	100-YR	1288.00	6899.00	6901.57		6901.90	0.011062	4.63	281.45	206.26	0.66
South	1650	5-YR	128.50	6899.00	6900.20		6900.24	0.004781	1.73	74.45	113.15	0.38
South	1600	100-YR	1288.00	6898.23	6900.79	6900.64	6901.17	0.019529	4.97	259.37	232.22	0.83
South	1600	5-YR	128.50	6898.23	6899.62	6899.51	6899.76	0.026390	3.05	42.10	98.00	0.82
South	1550	100-YR	1288.00	6897.79	6899.71	6899.57	6900.15	0.021191	5.35	240.82	205.14	0.87
South	1550	5-YR	128.50	6897.79	6898.46		6898.58	0.020832	2.77	46.35	104.46	0.73

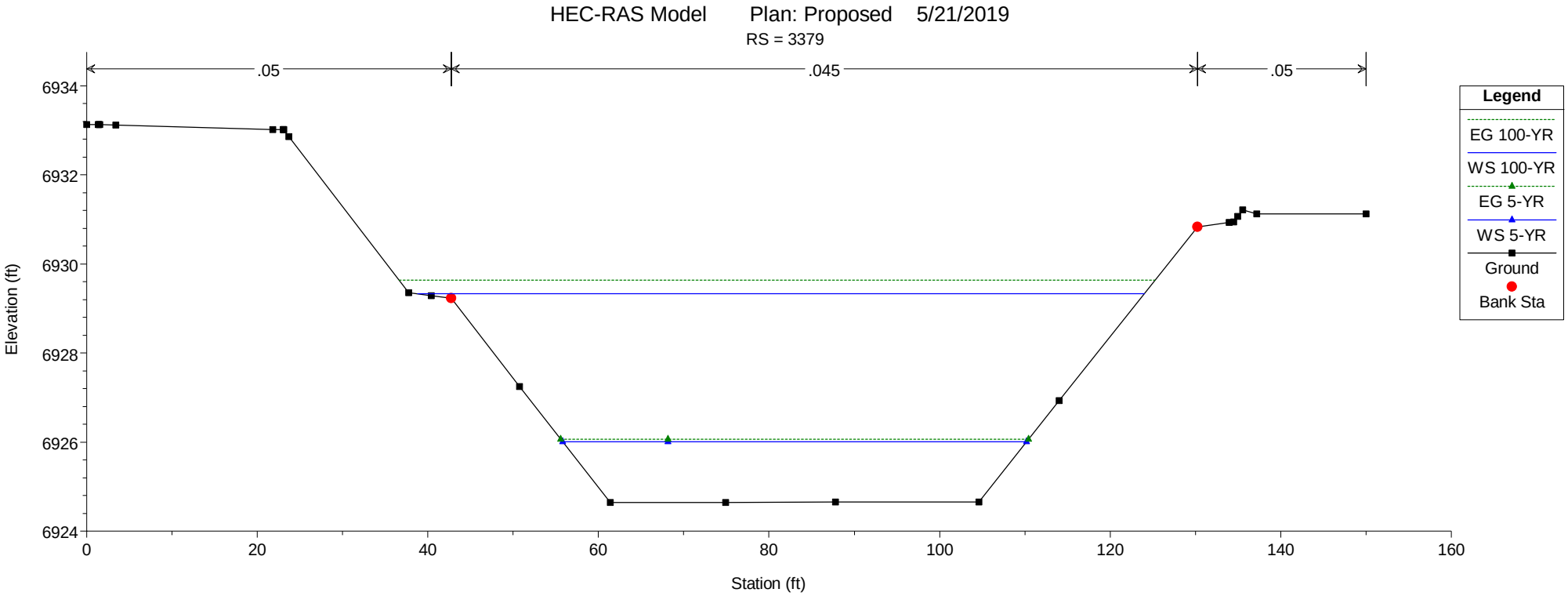
HEC-RAS Plan: Proposed (Continued)

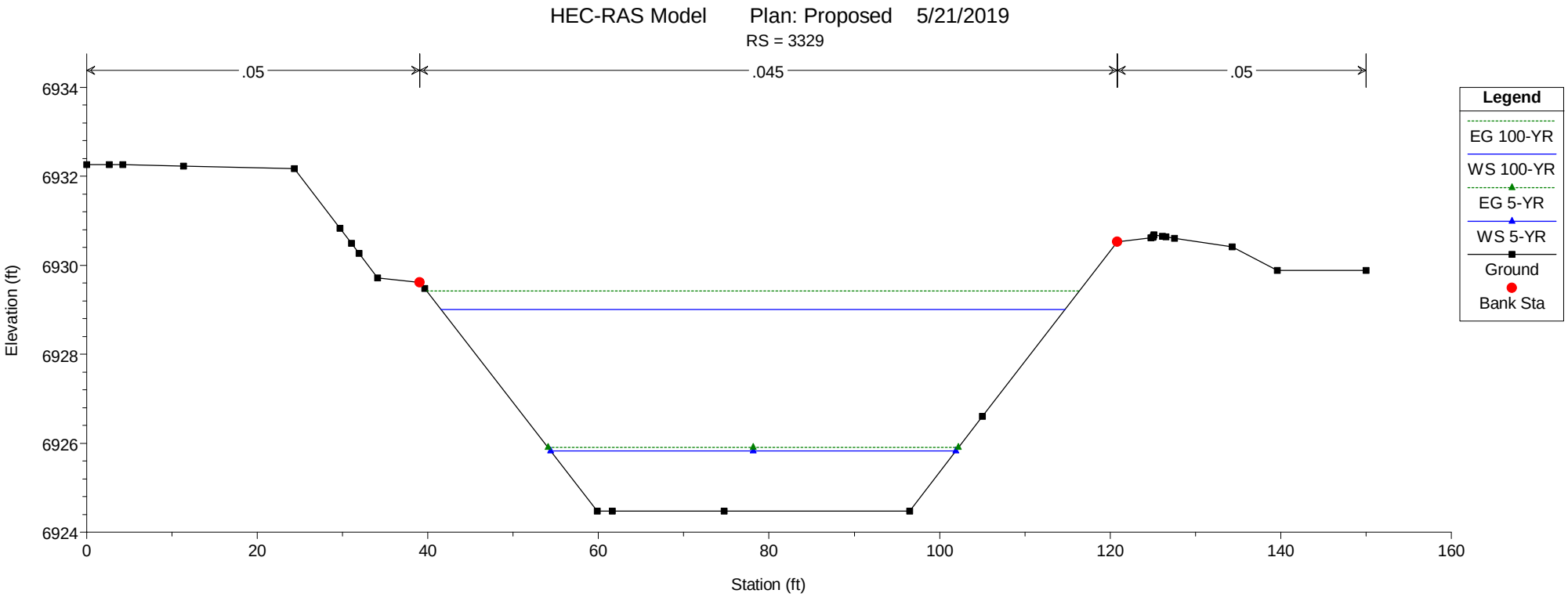
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South	1500	100-YR	1288.00	6896.89	6899.11		6899.38	0.010297	4.20	311.62	237.29	0.62
South	1500	5-YR	128.50	6896.89	6897.89		6897.94	0.008216	1.81	70.94	150.62	0.47
South	1450	100-YR	1288.00	6896.26	6898.39		6898.75	0.015620	4.82	268.78	215.73	0.76
South	1450	5-YR	128.50	6896.26	6897.18		6897.30	0.022606	2.68	47.88	120.35	0.75
South	1400	100-YR	1288.00	6894.86	6897.56		6897.84	0.012188	4.53	305.74	226.95	0.68
South	1400	5-YR	128.50	6894.86	6895.96	6895.90	6896.18	0.019709	3.88	37.91	76.42	0.78
South	1350	100-YR	1288.00	6893.45	6896.46	6896.46	6897.00	0.022669	6.69	235.31	203.39	0.94
South	1350	5-YR	128.50	6893.45	6894.49	6894.49	6894.91	0.032026	5.24	24.54	29.17	1.01
South	1300	100-YR	1288.00	6889.12	6893.54	6893.17	6894.35	0.012963	7.33	186.59	92.53	0.78
South	1300	5-YR	128.50	6889.12	6890.73		6890.90	0.007737	3.38	37.98	29.62	0.53
South	1250	100-YR	1288.00	6888.76	6893.00	6892.52	6893.70	0.011630	6.79	198.80	95.28	0.73
South	1250	5-YR	128.50	6888.76	6890.37		6890.52	0.007203	3.13	41.05	34.27	0.50
South	1200	100-YR	1288.00	6888.25	6891.77	6891.77	6892.86	0.023636	8.37	154.13	75.22	1.00
South	1200	5-YR	128.50	6888.25	6889.44	6889.44	6889.83	0.033348	5.02	25.61	33.55	1.01
South	1150	100-YR	1288.00	6885.24	6889.54		6889.81	0.003578	4.20	315.24	117.63	0.42
South	1150	5-YR	128.50	6885.24	6886.50		6886.62	0.010467	2.73	47.01	64.48	0.56
South	1100	100-YR	1288.00	6884.71	6889.31		6889.62	0.003887	4.44	290.17	90.88	0.44
South	1100	5-YR	128.50	6884.71	6886.04		6886.15	0.008168	2.68	47.92	56.09	0.51
South	1050	100-YR	1288.00	6884.18	6888.96		6889.38	0.005352	5.21	247.20	77.15	0.51
South	1050	5-YR	128.50	6884.18	6885.42		6885.62	0.014314	3.57	36.04	41.86	0.68
South	1000	100-YR	1288.00	6883.24	6887.16	6887.16	6888.78	0.021840	10.22	126.09	39.28	1.01
South	1000	5-YR	128.50	6883.24	6884.32	6884.25	6884.67	0.025064	4.76	26.98	30.44	0.89

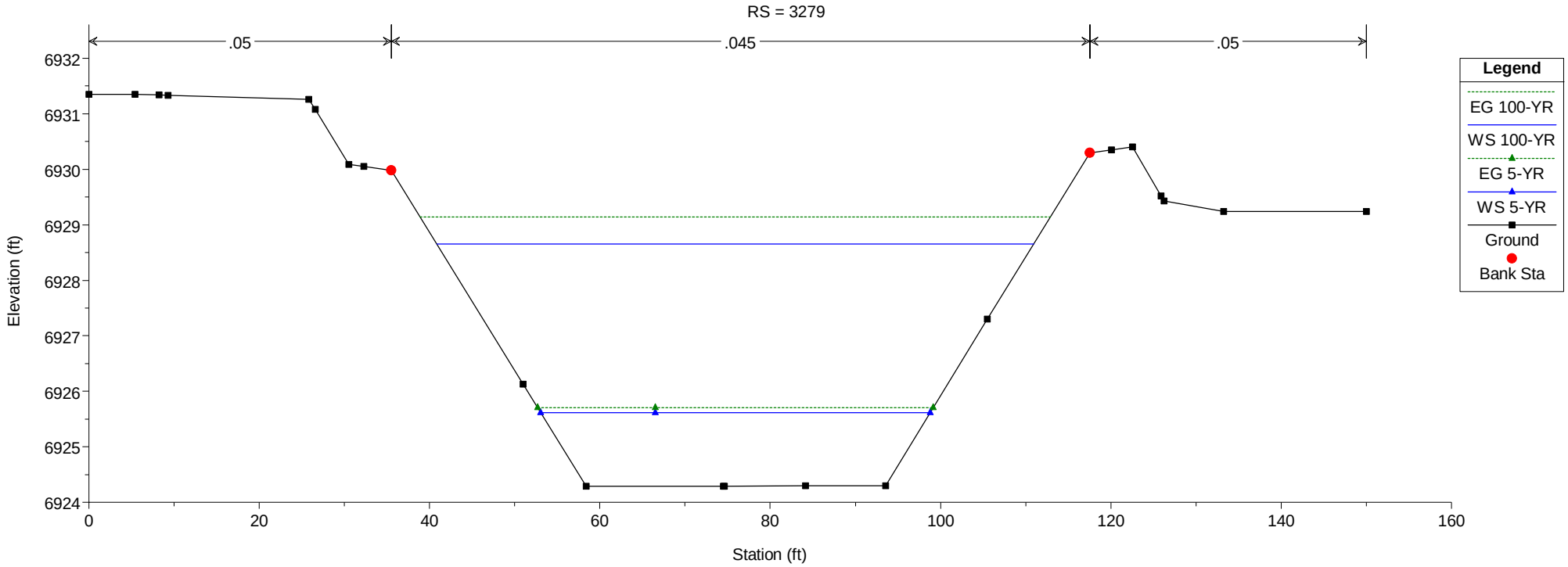

HEC-RAS Model Plan: Proposed 5/21/2019
Channel South
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Elevation (ft)
6930
6920
6910
6900
6890
6880
0
500
1000
1500
2000
2500
Main Channel Distance (ft)

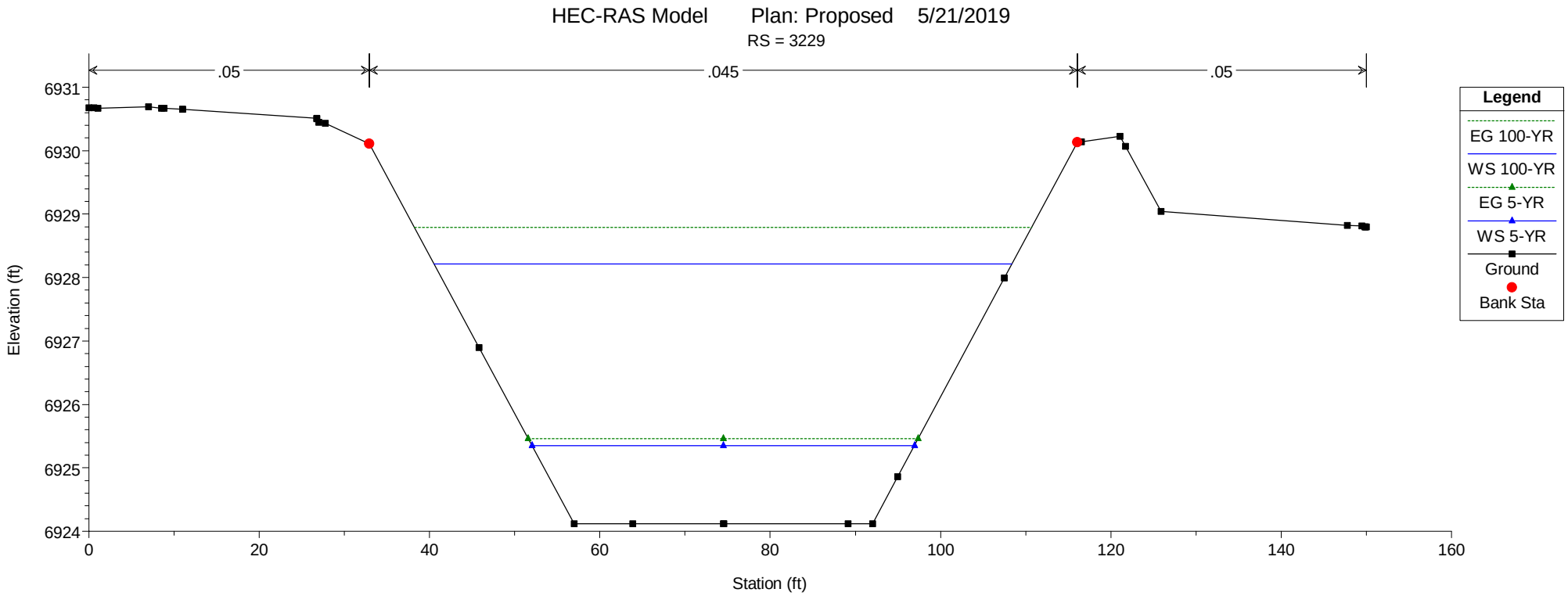

HEC-RAS Model Plan: Proposed 5/21/2019
Channel East
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Elevation (ft)
6965
6960
6955
6950
6945
6940
6935
6930
6925
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

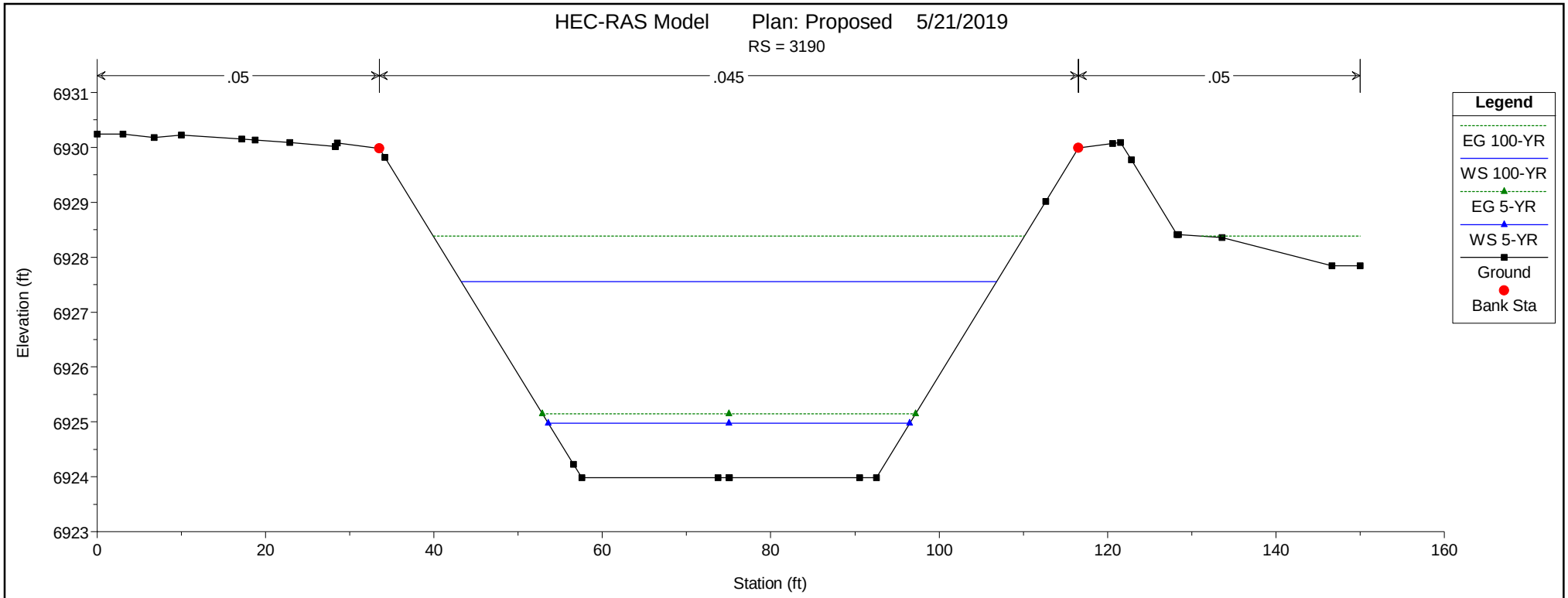

HEC-RAS Model Plan: Proposed 5/21/2019
Channel West
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Elevation (ft)
6980
6970
6960
6950
6940
6930
6920
0
500
1000
1500
2000
Main Channel Distance (ft)

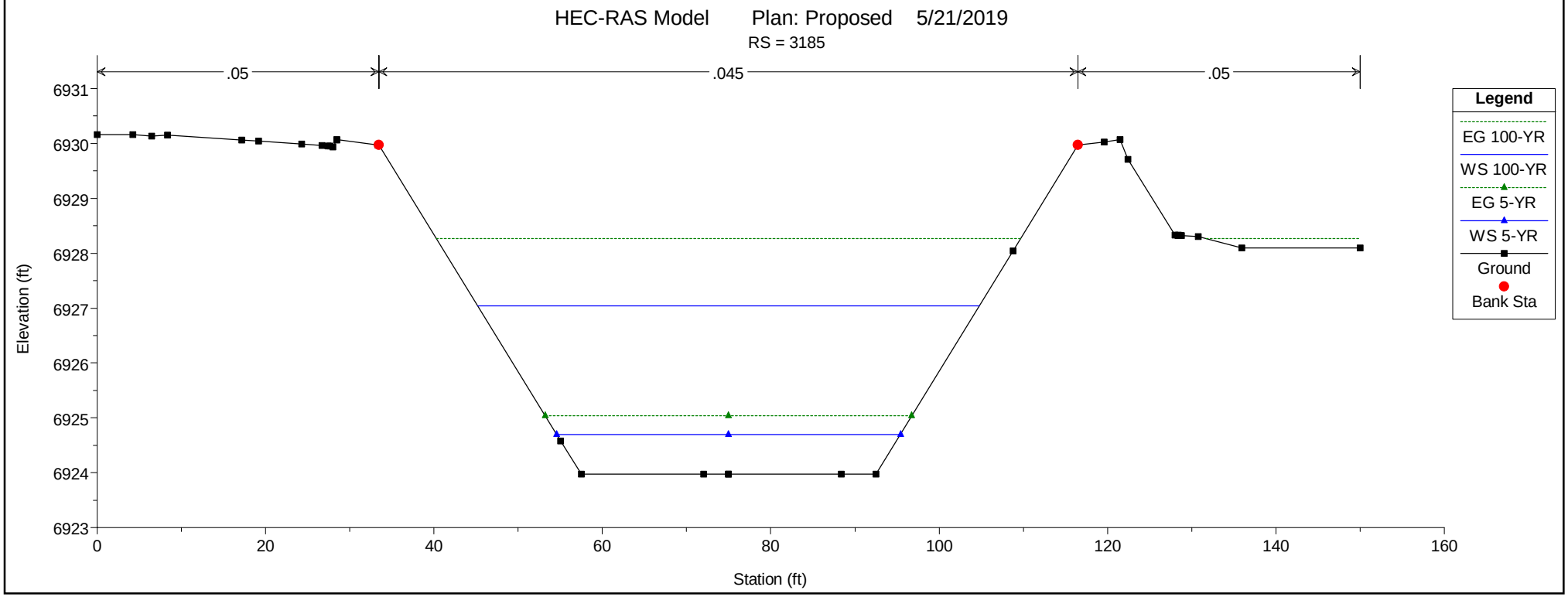

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3379
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

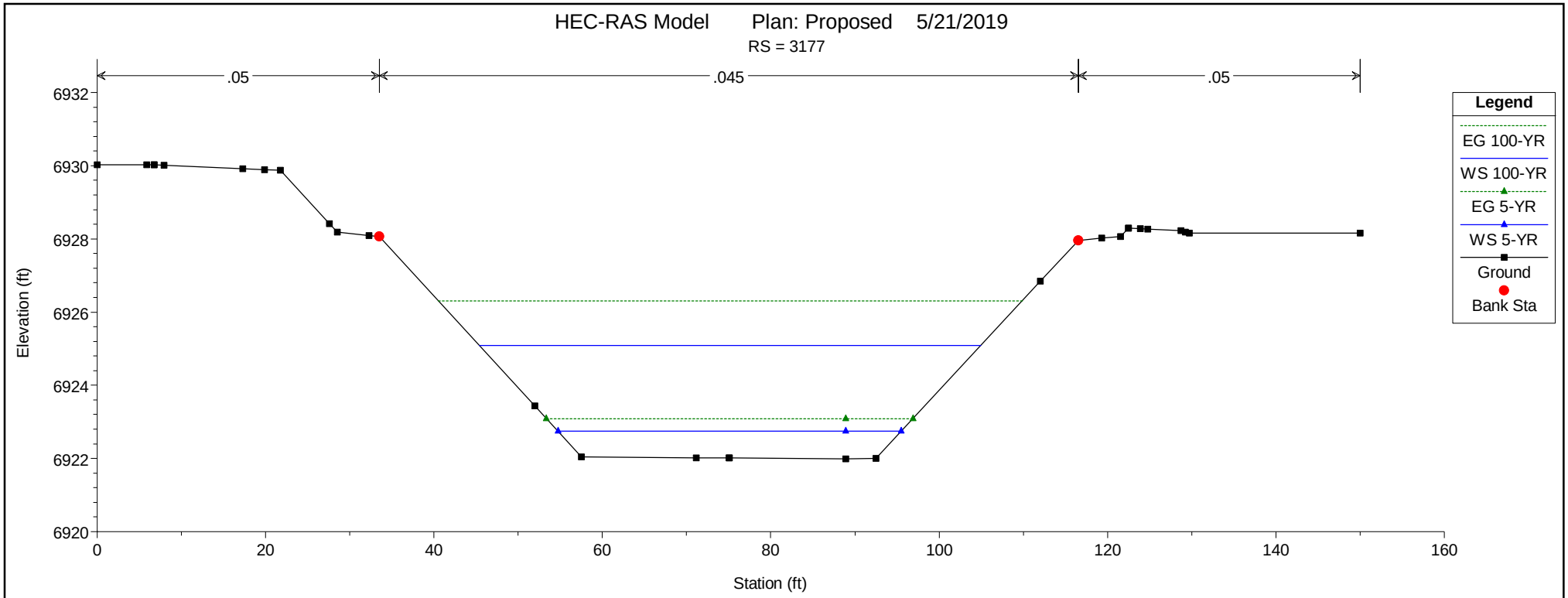

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3329
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

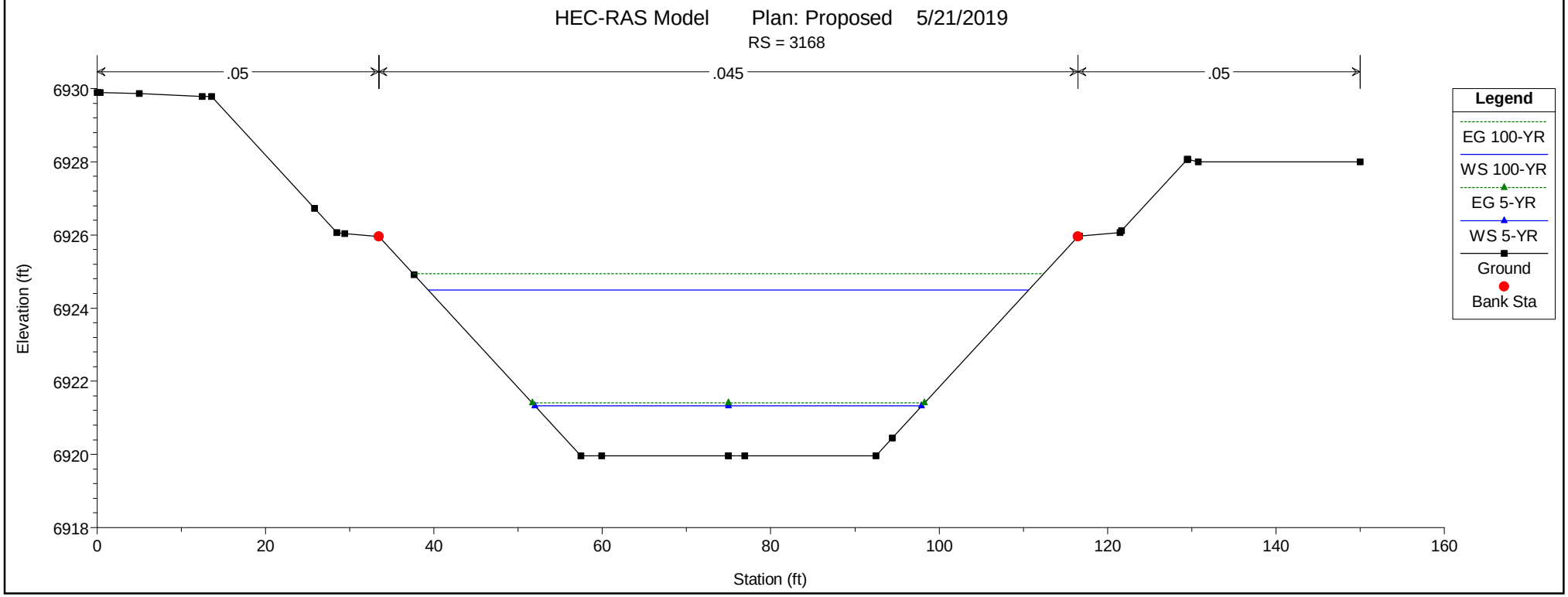

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3279
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

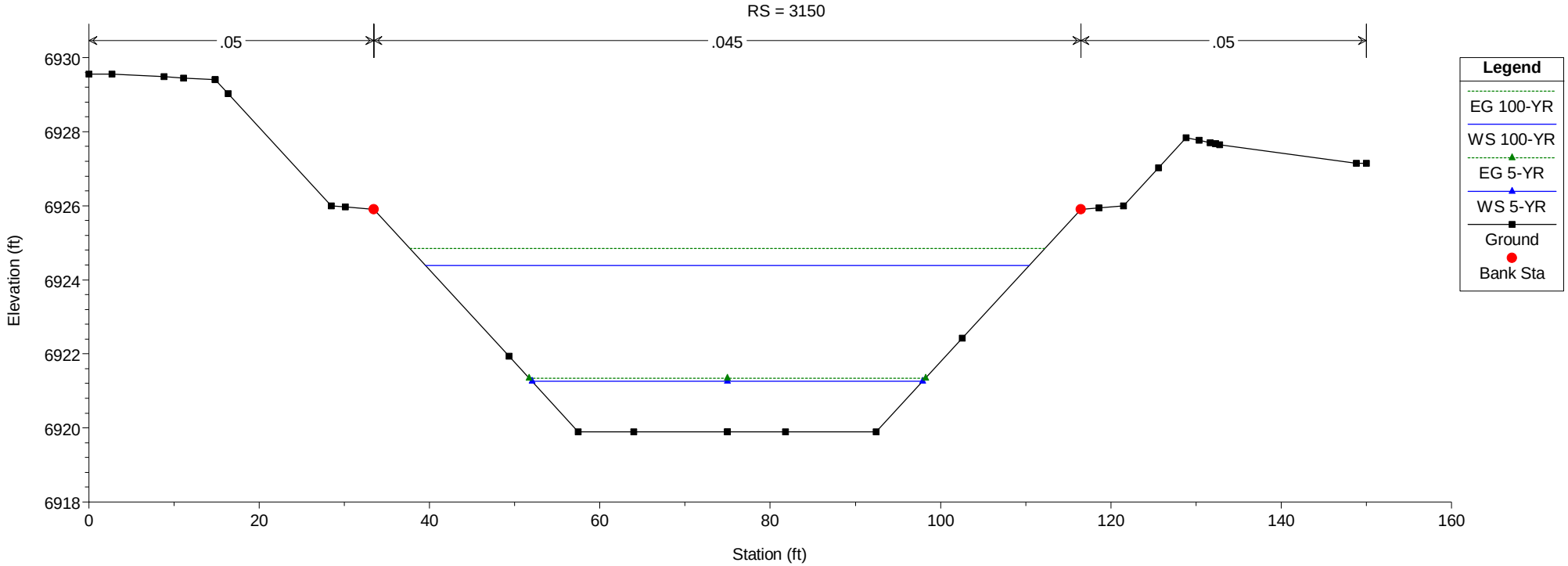

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3229
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

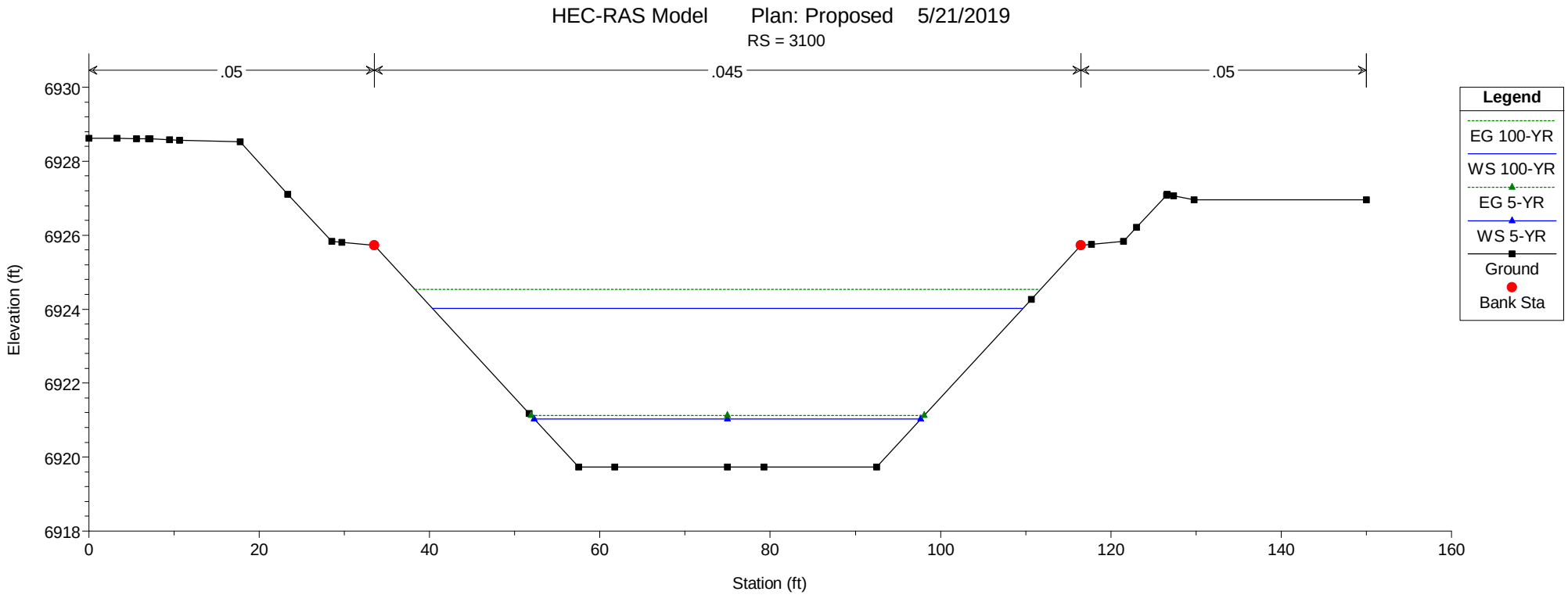

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3190
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

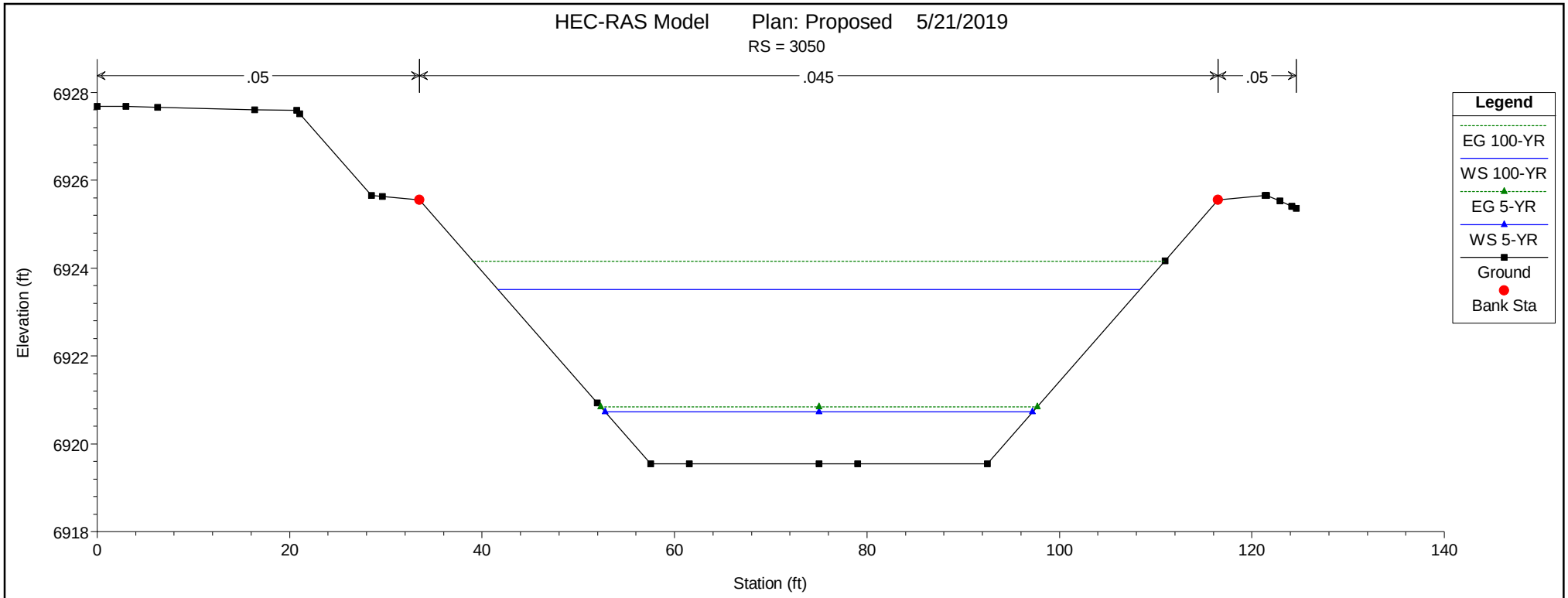

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3185
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

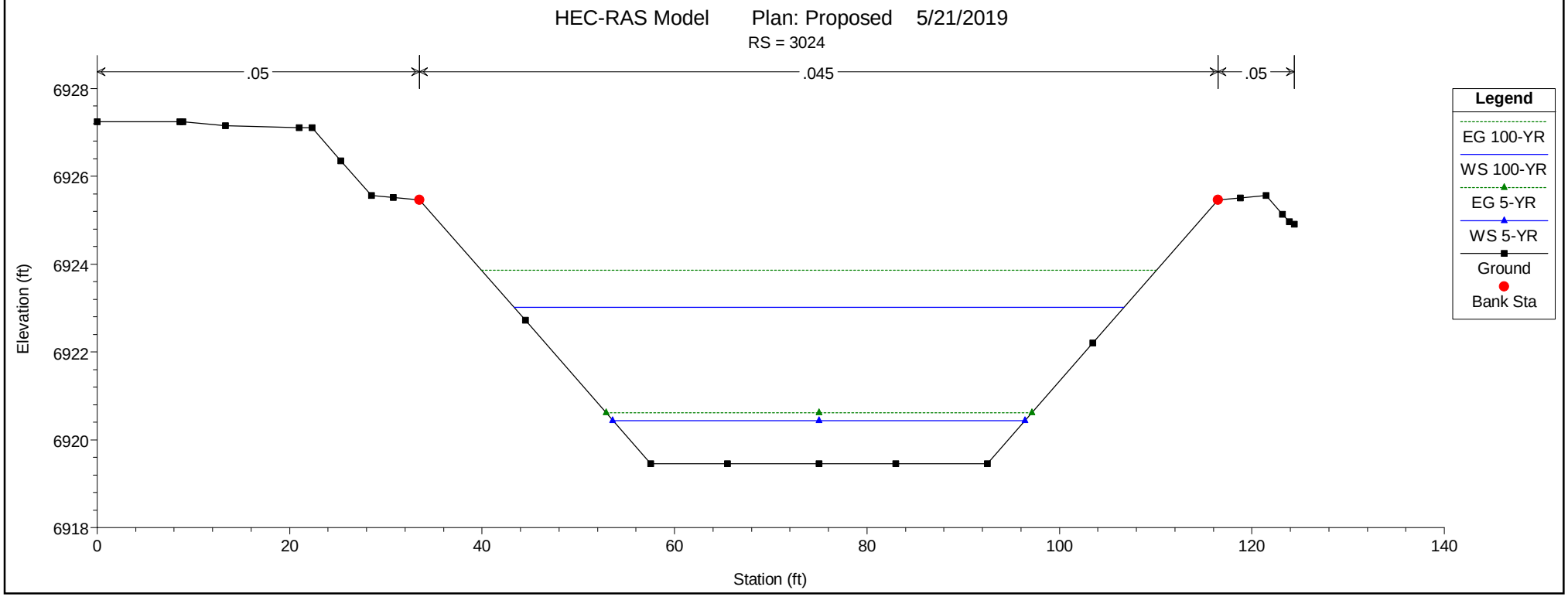

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3177
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

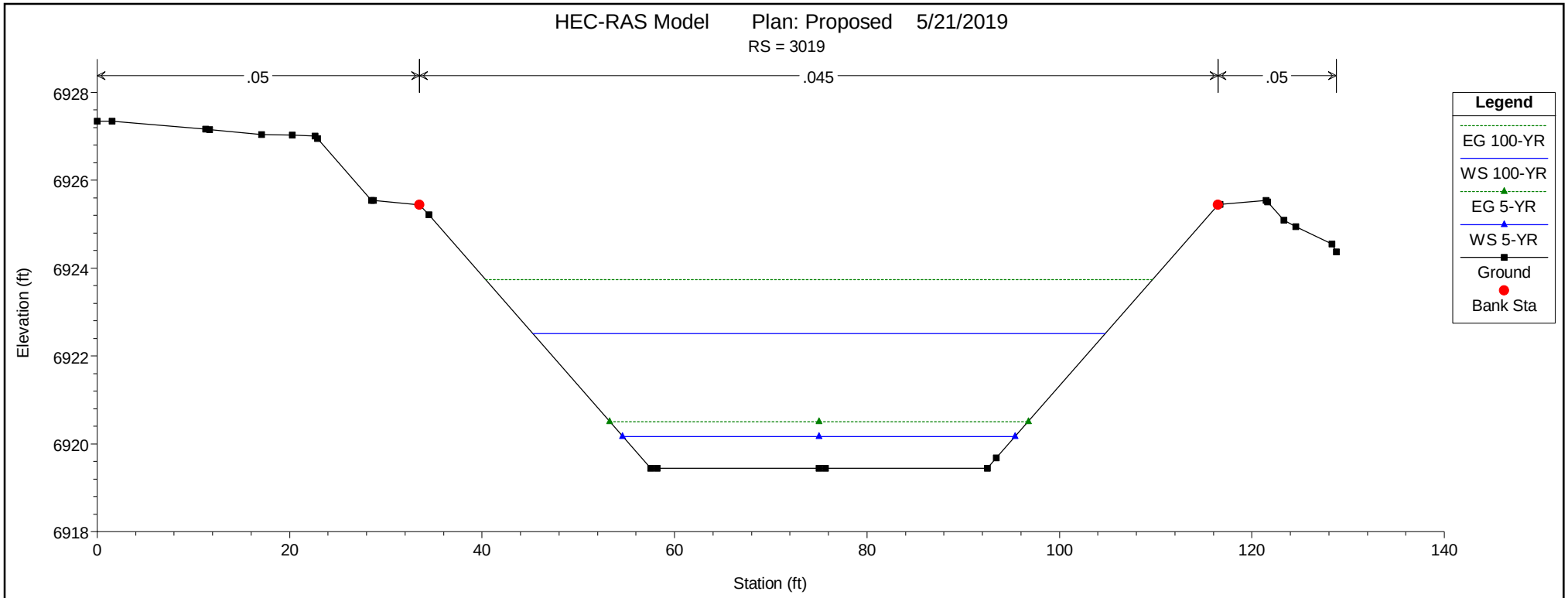

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3168
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

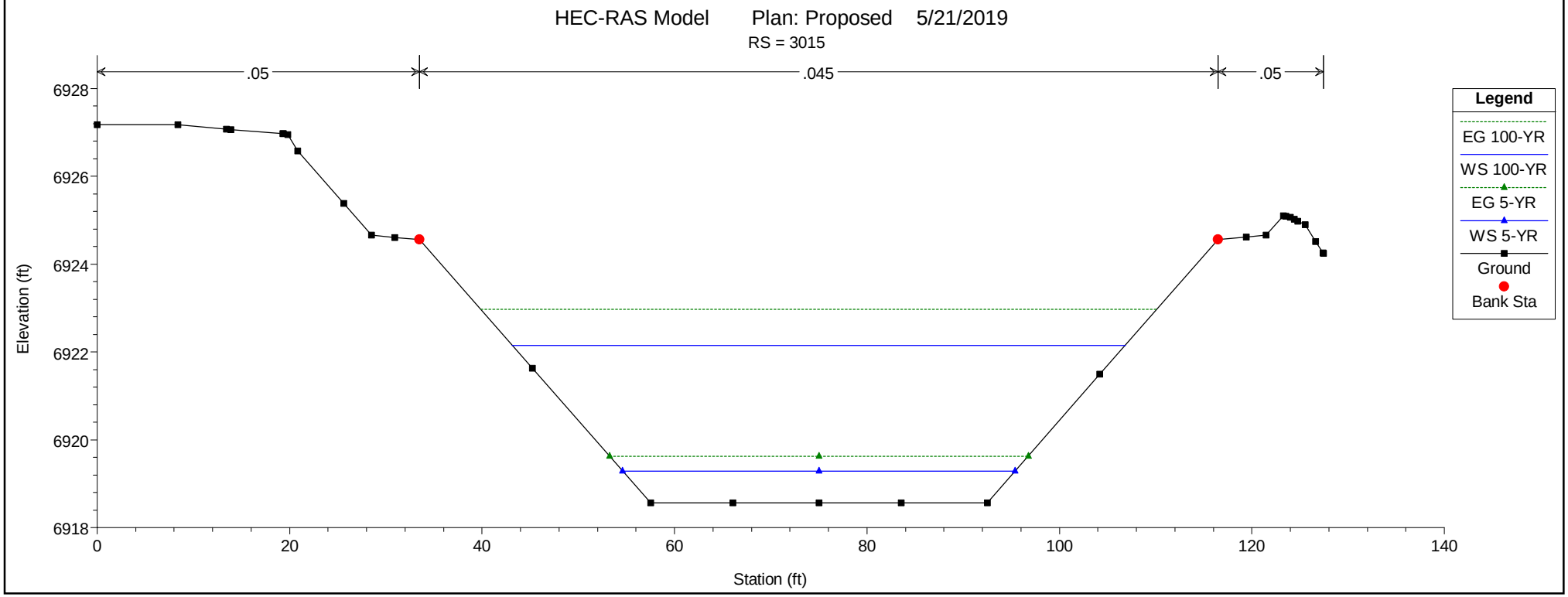

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3150
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

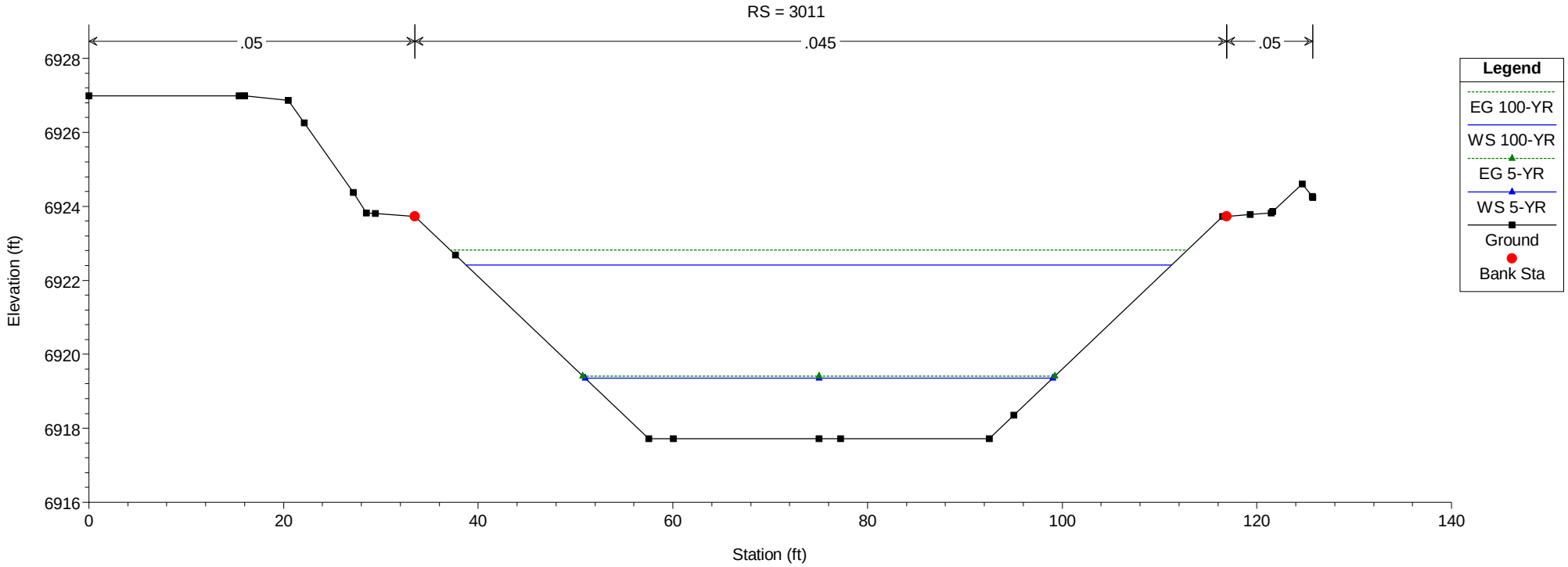

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

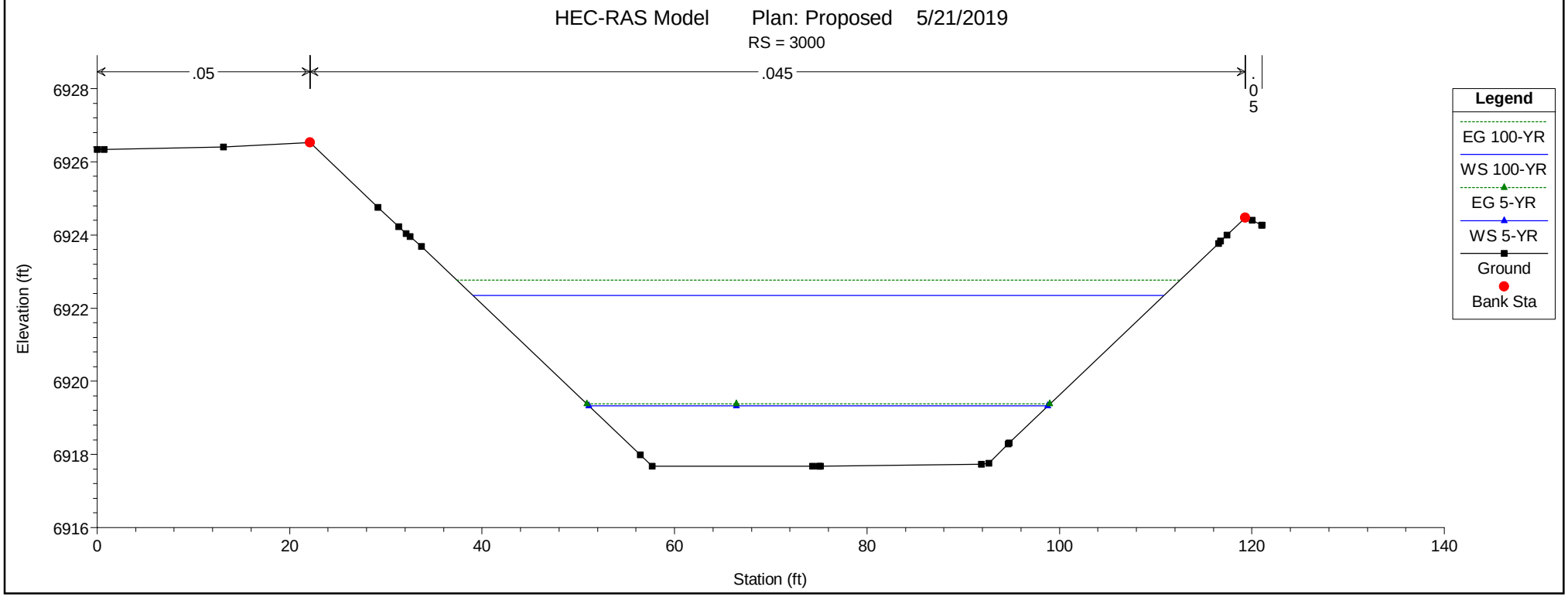

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3050
.05
.045
.05
Elevation (ft)
6928
6926
6924
6922
6920
6918
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

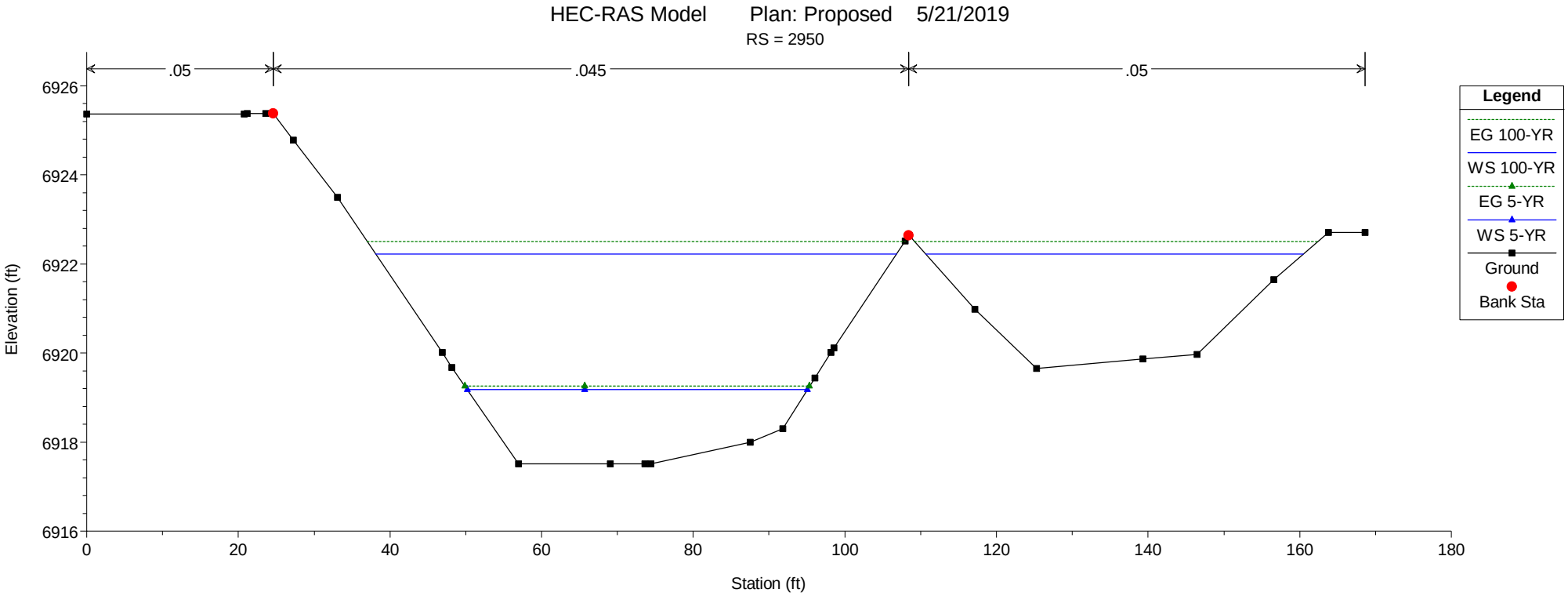

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3024
.05
.045
.05
Elevation (ft)
6928
6926
6924
6922
6920
6918
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

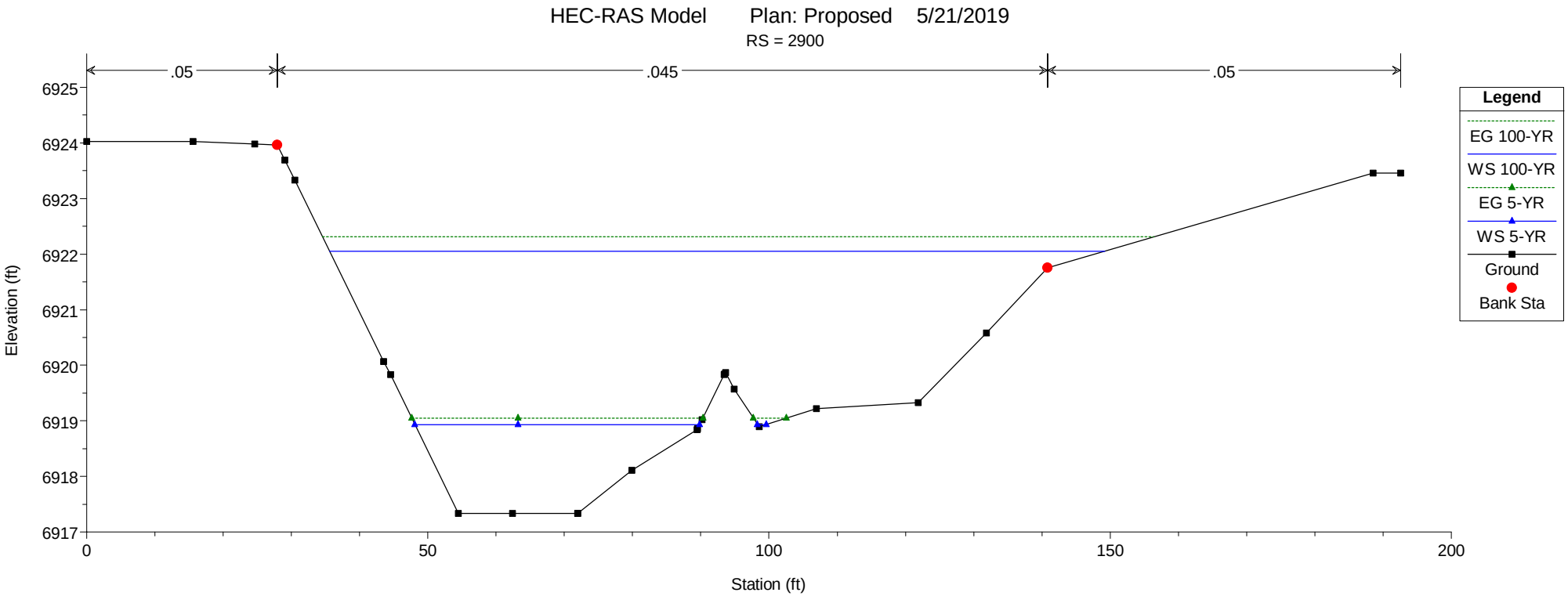

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3019
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6928
6926
6924
6922
6920
6918
0
20
40
60
80
100
120
140
Station (ft)

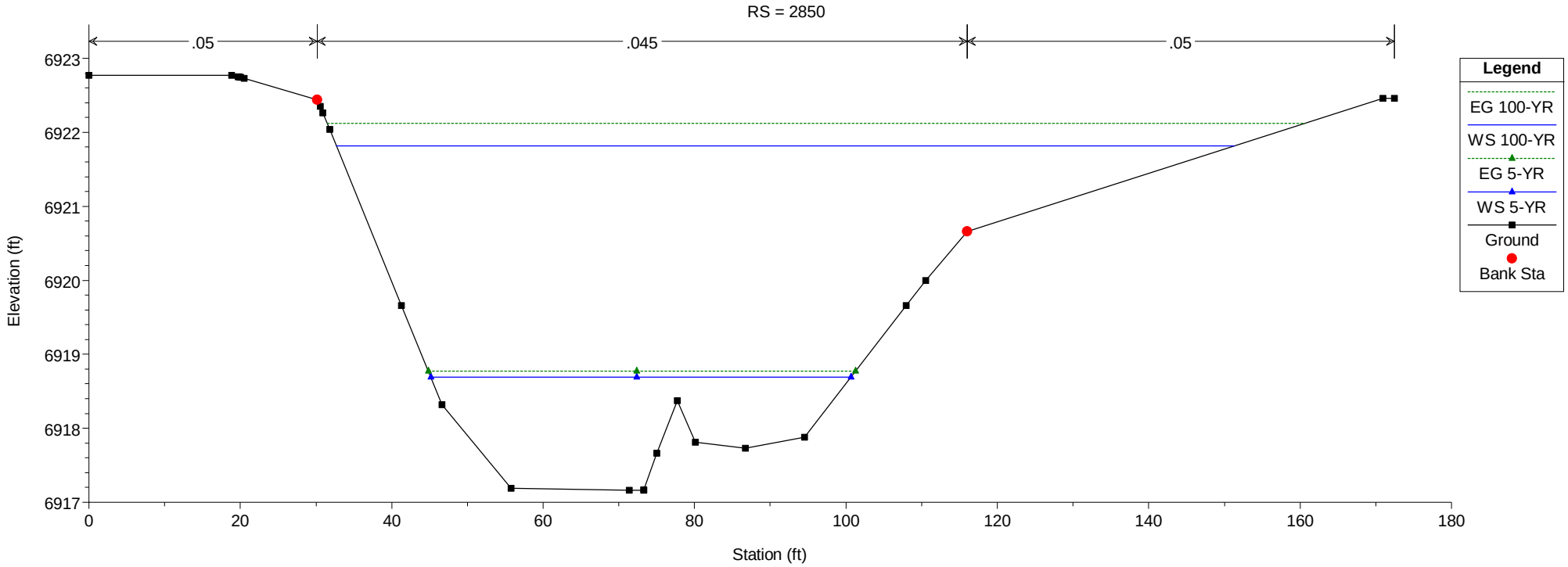

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3015
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6928
6926
6924
6922
6920
6918
0
20
40
60
80
100
120
140
Station (ft)

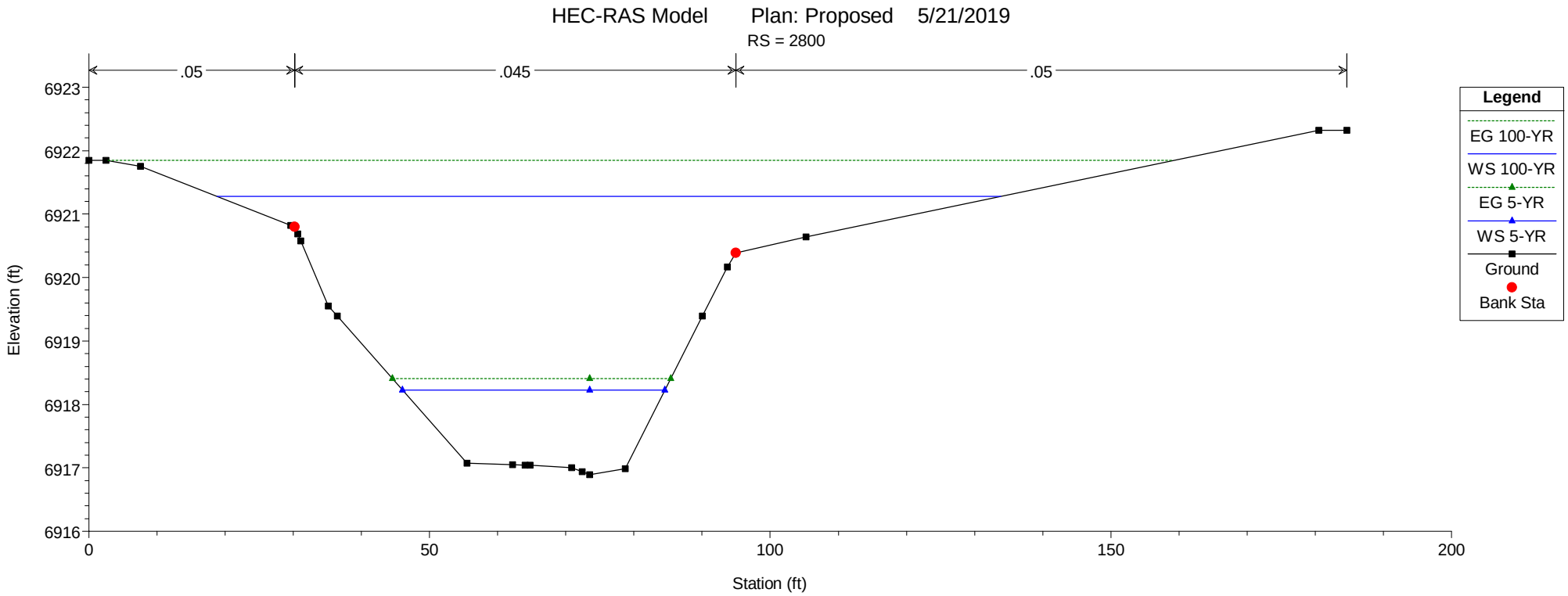

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3011
.05
.045
.05
Elevation (ft)
6928
6926
6924
6922
6920
6918
6916
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

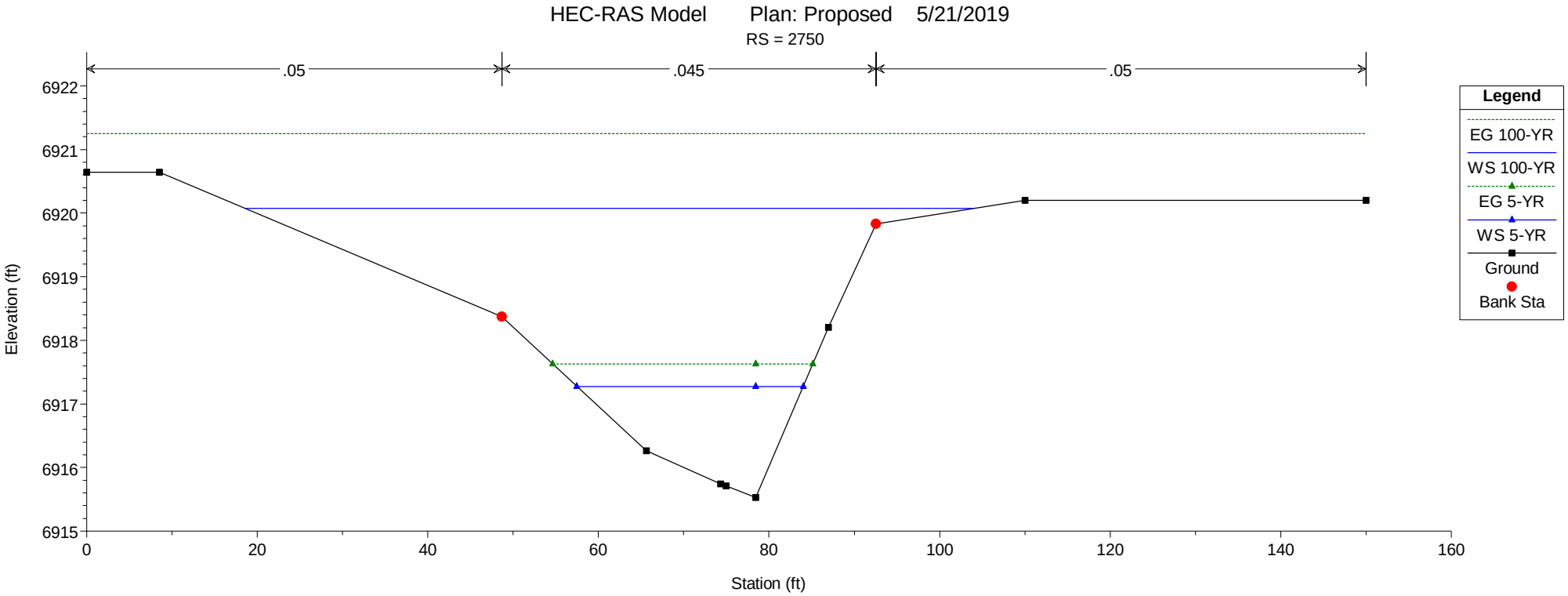

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 3000
.05
.045
.05
Elevation (ft)
6928
6926
6924
6922
6920
6918
6916
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

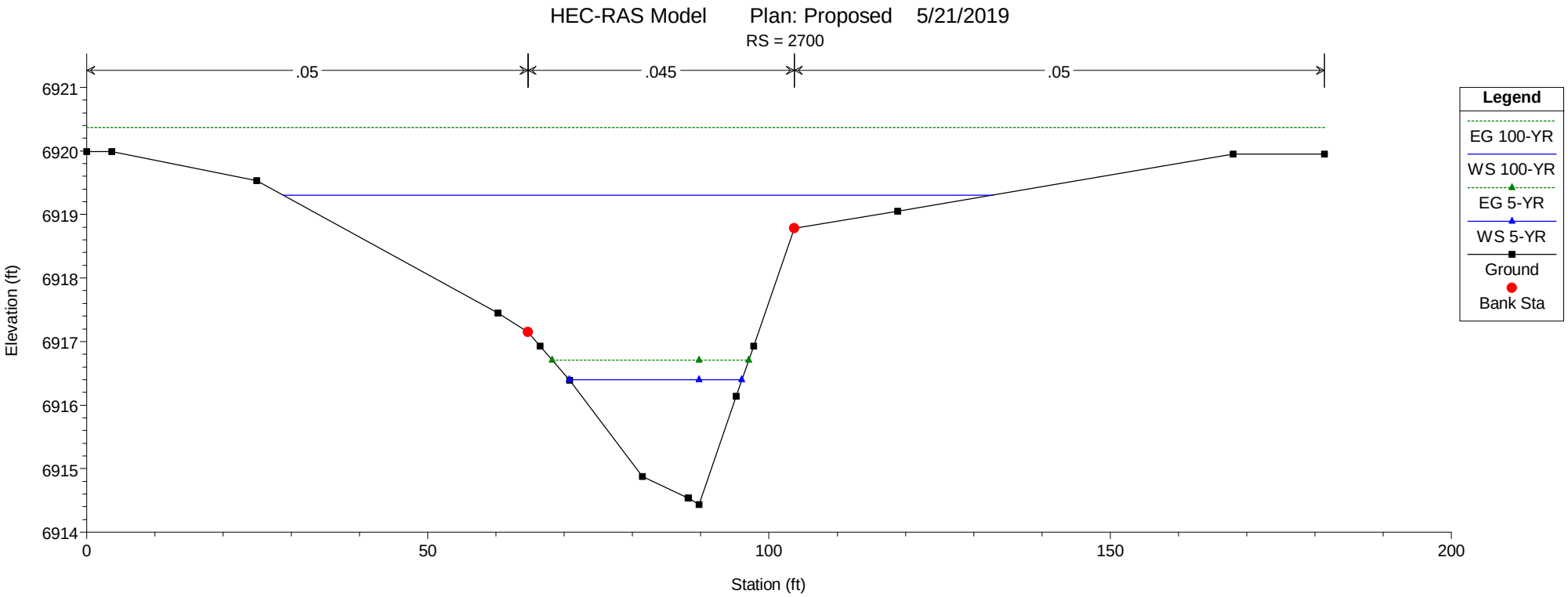

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

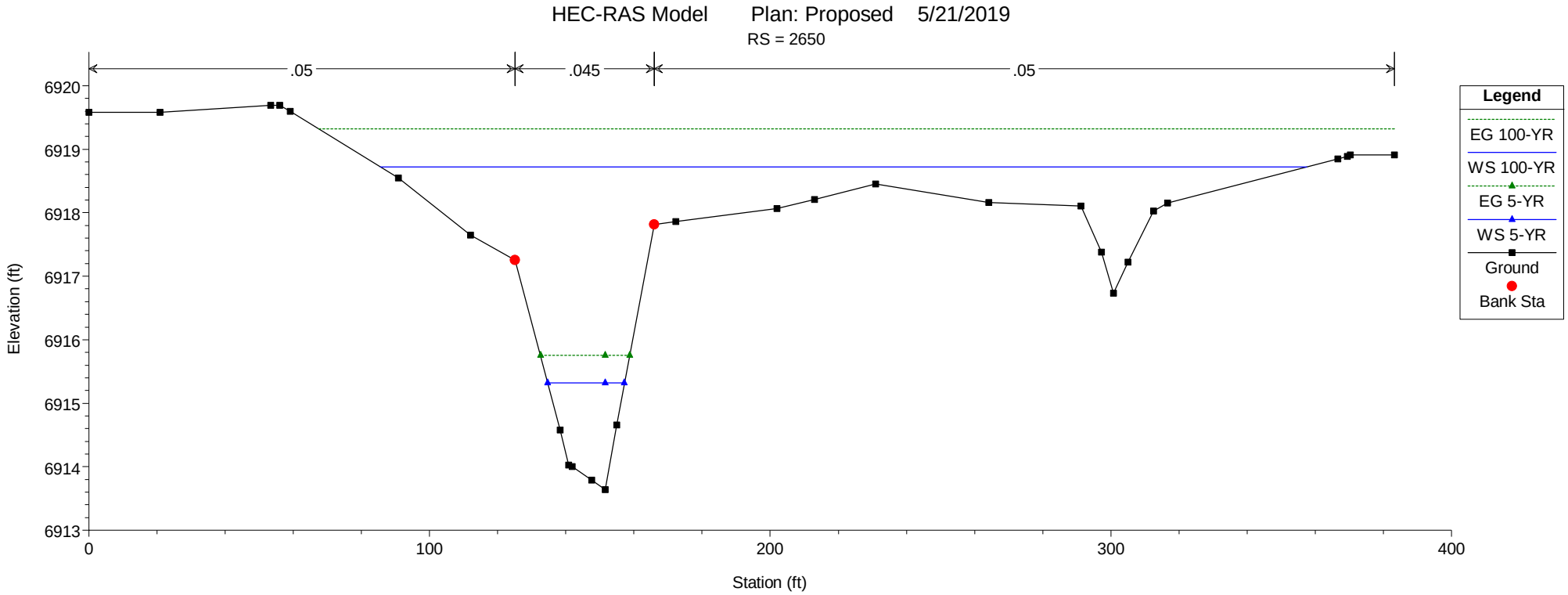

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2900
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

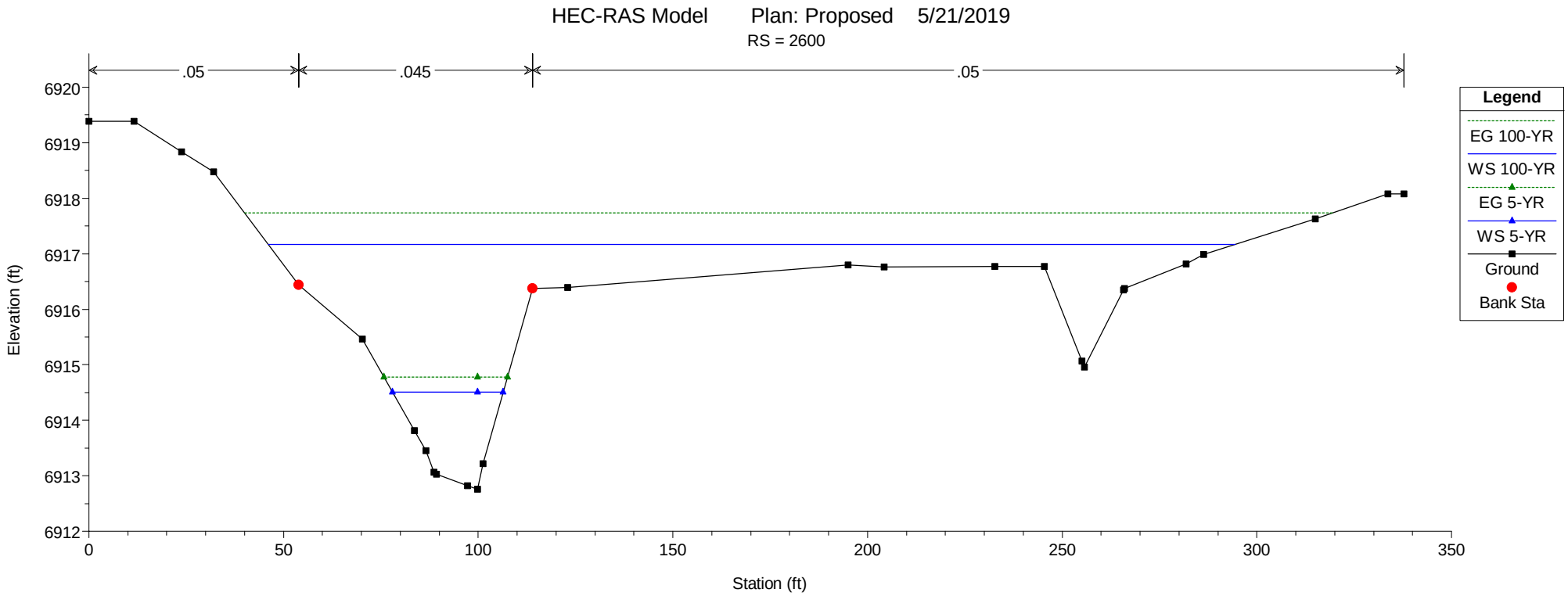

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2850
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

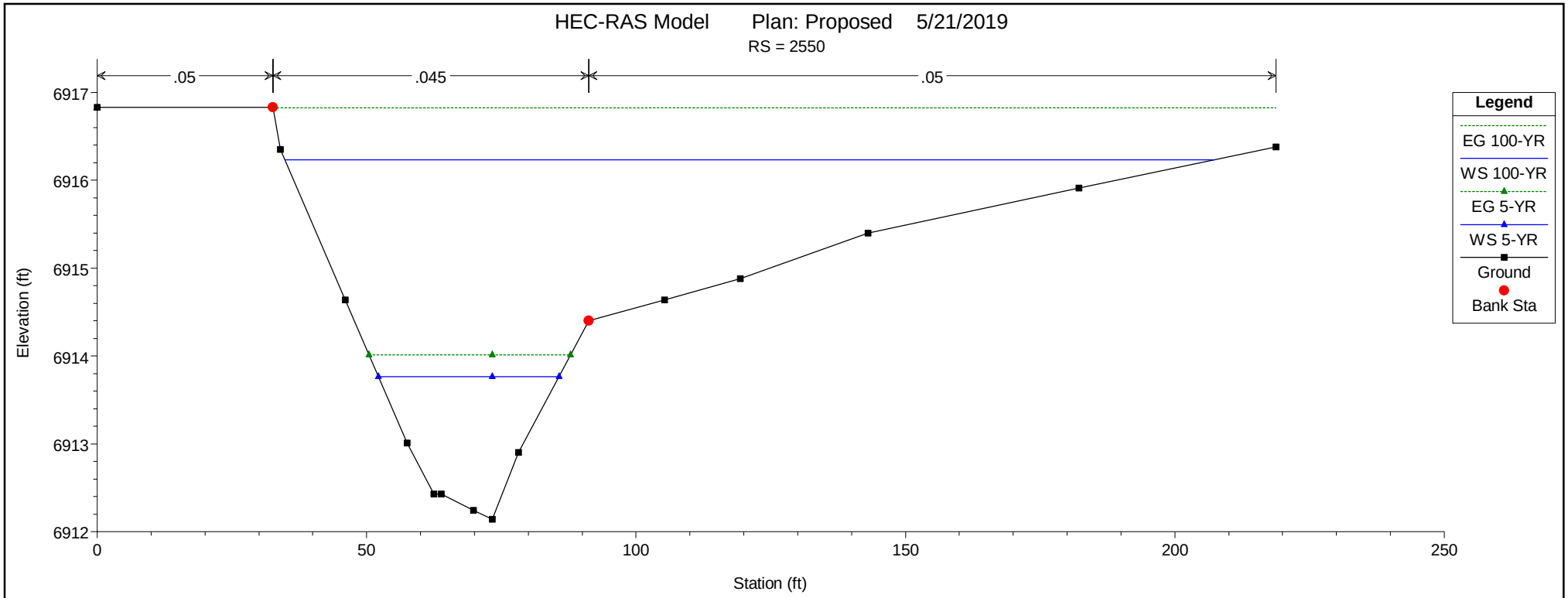

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2800
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

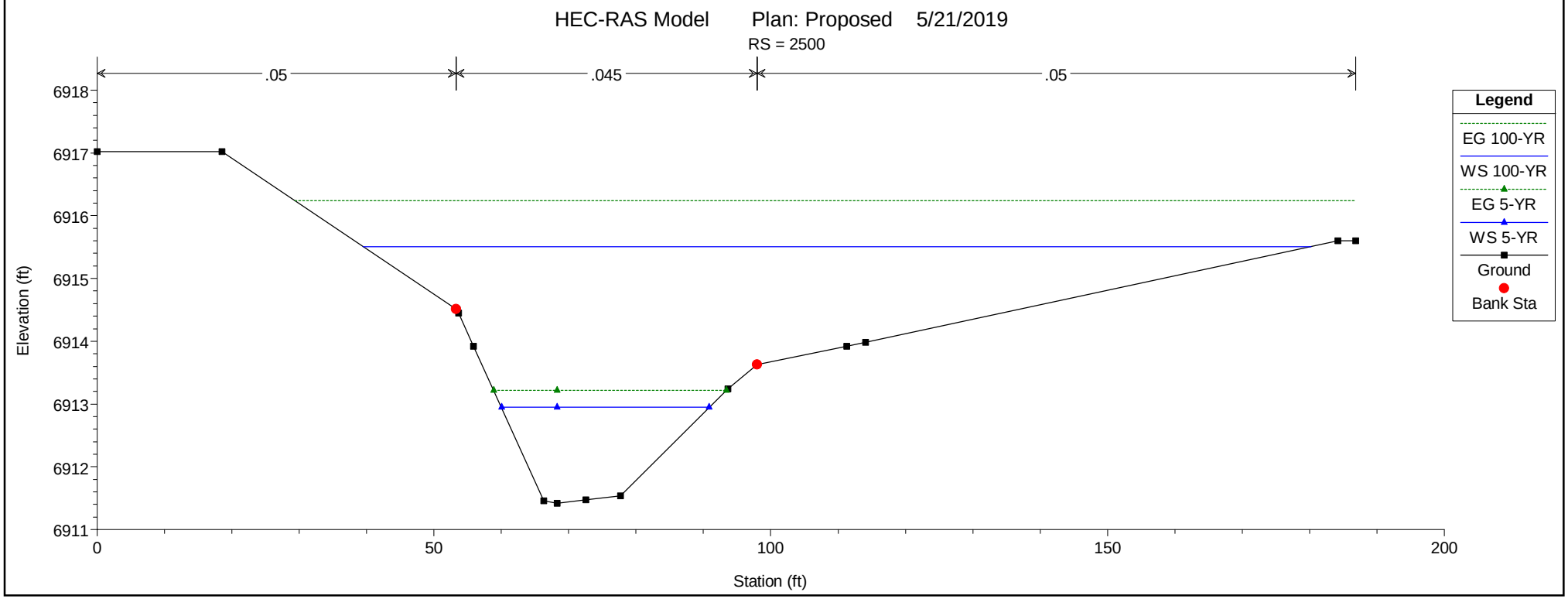

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

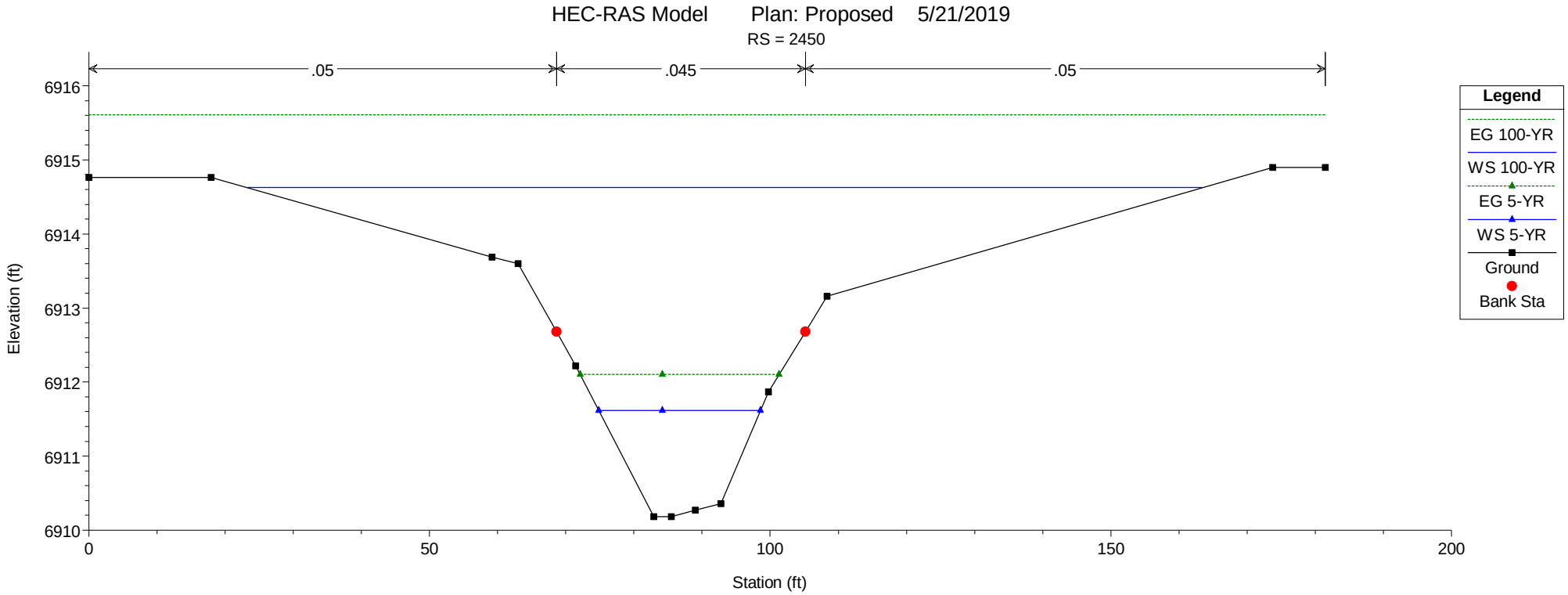

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

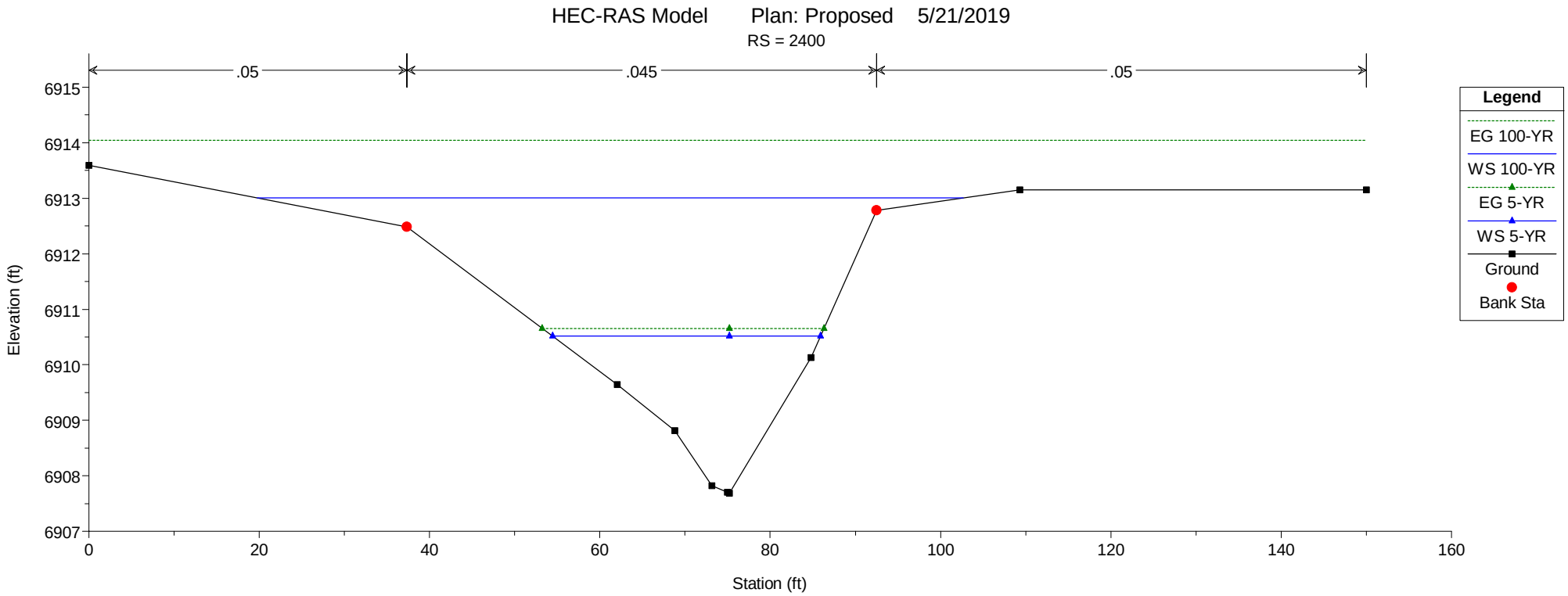

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2650
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

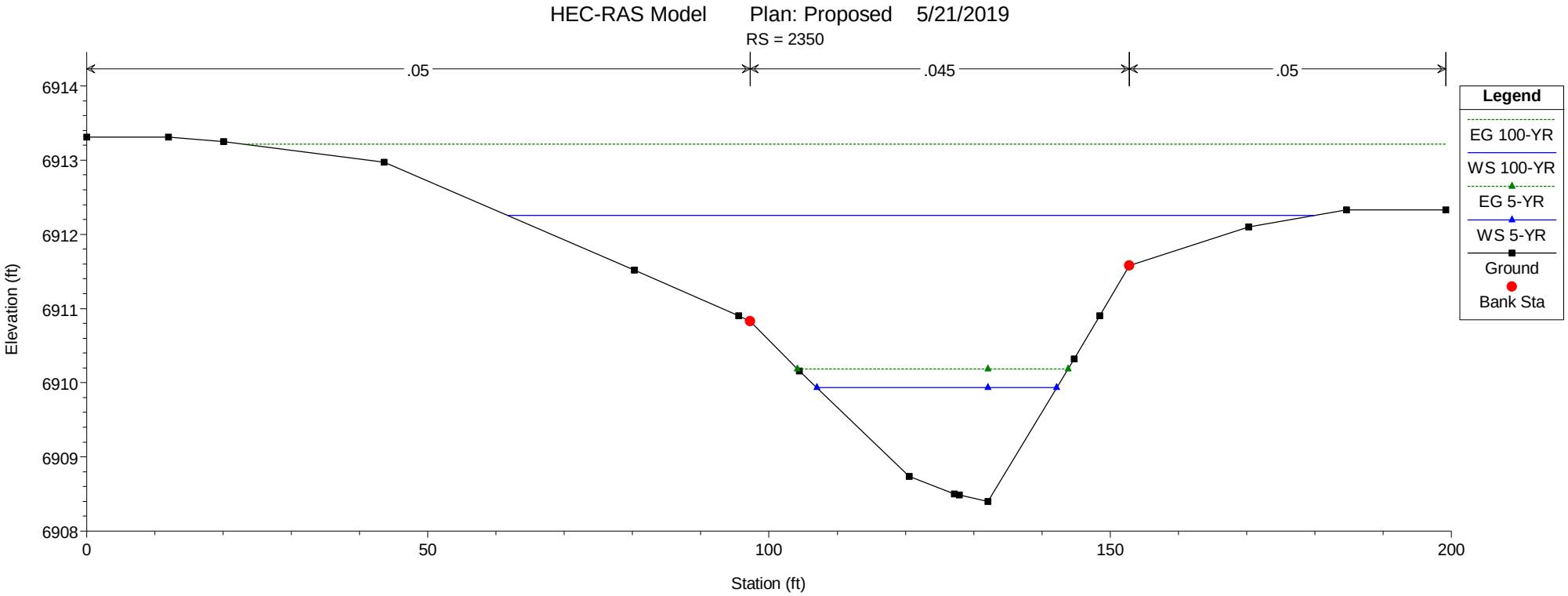

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2600
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

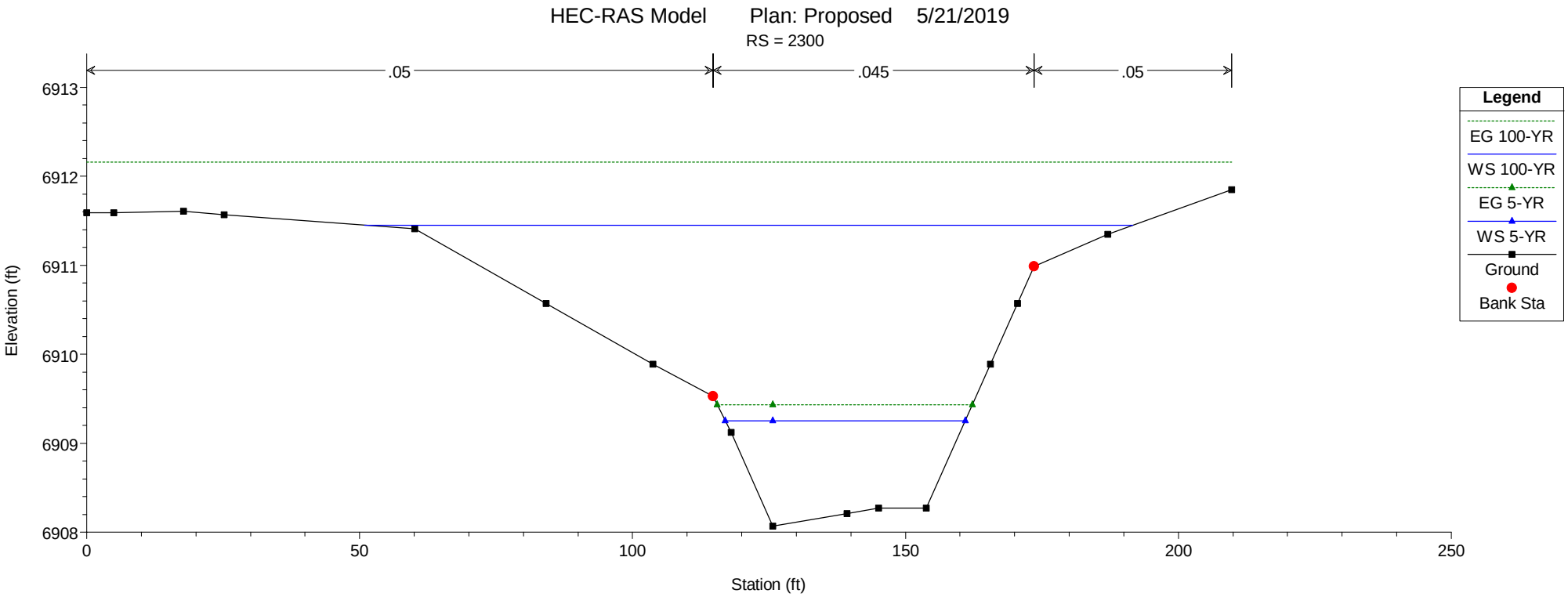

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2550
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

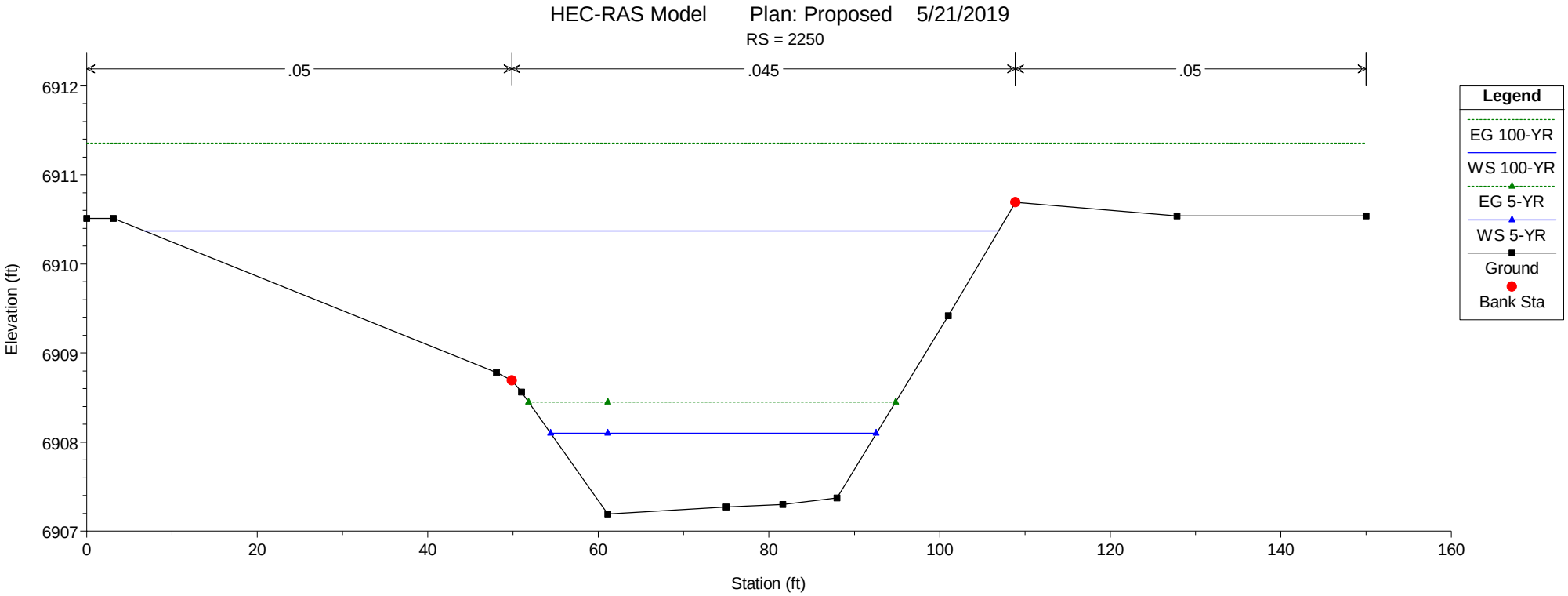

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2500
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

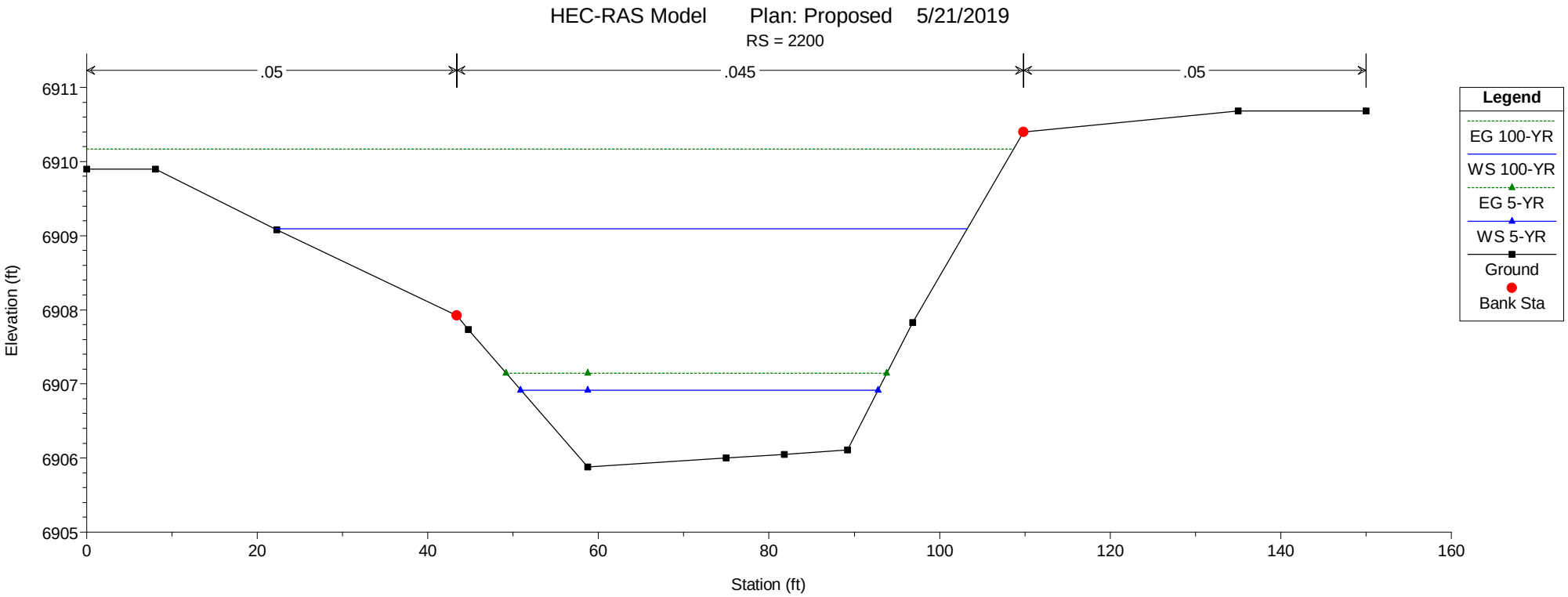

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

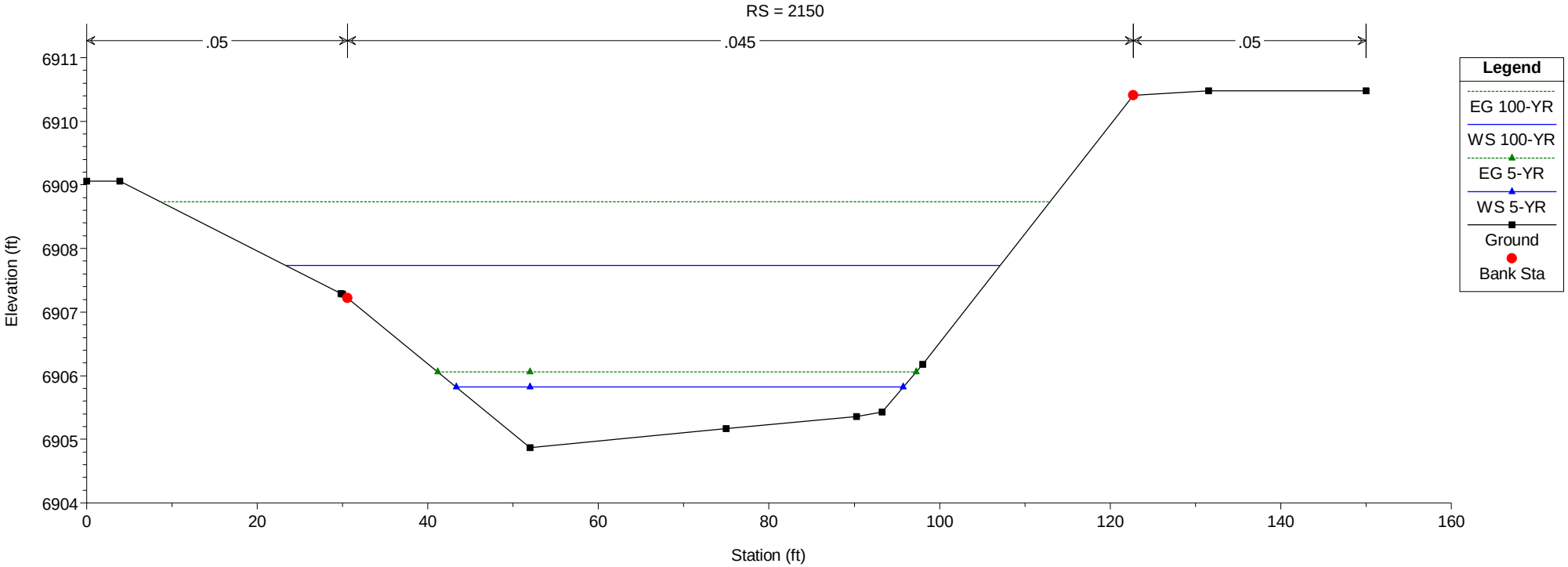

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

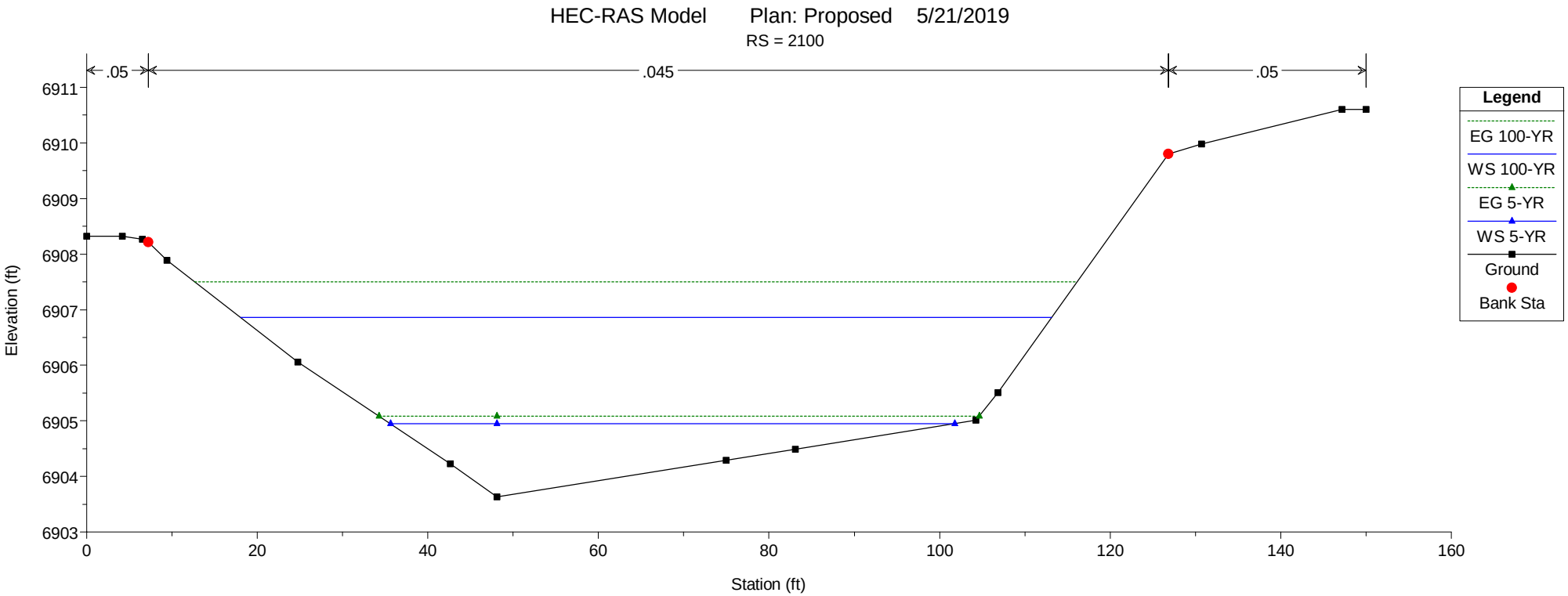

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2350
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6914
6913
6912
6911
6910
6909
6908
0
50
100
150
200
Station (ft)

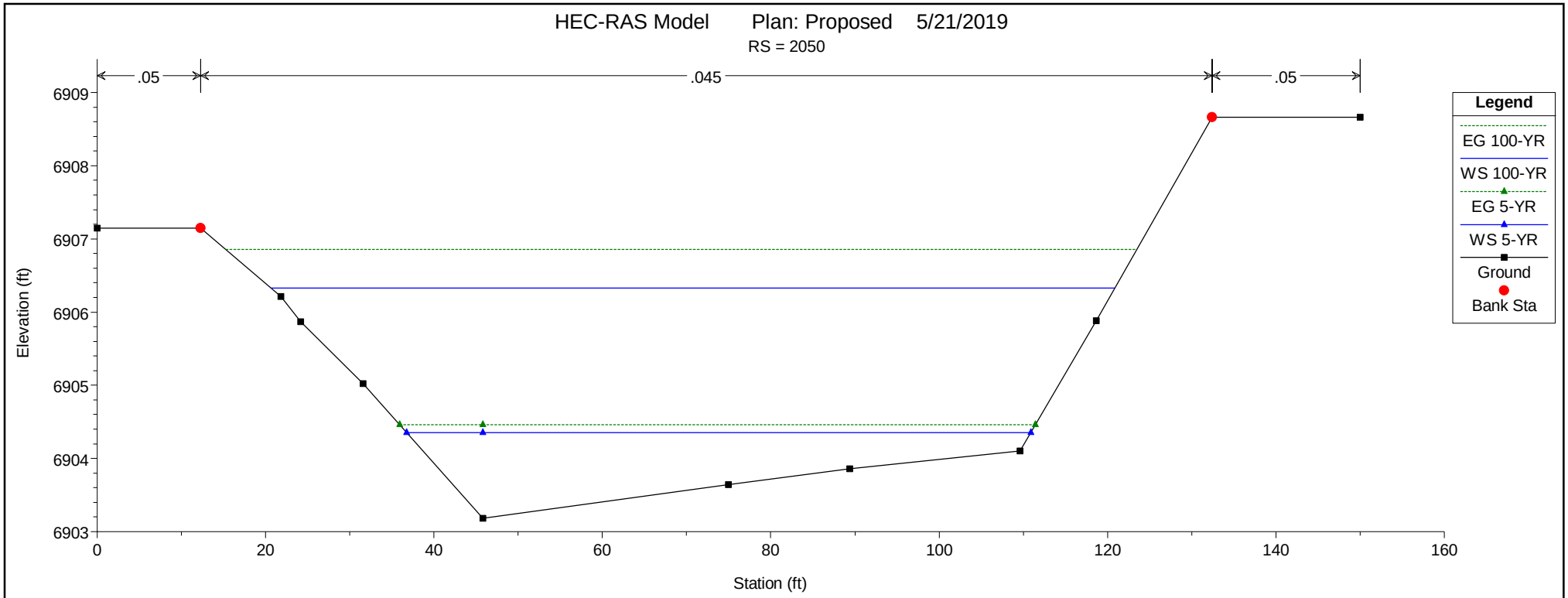

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2300
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6913
6912
6911
6910
6909
6908
0
50
100
150
200
250
Station (ft)

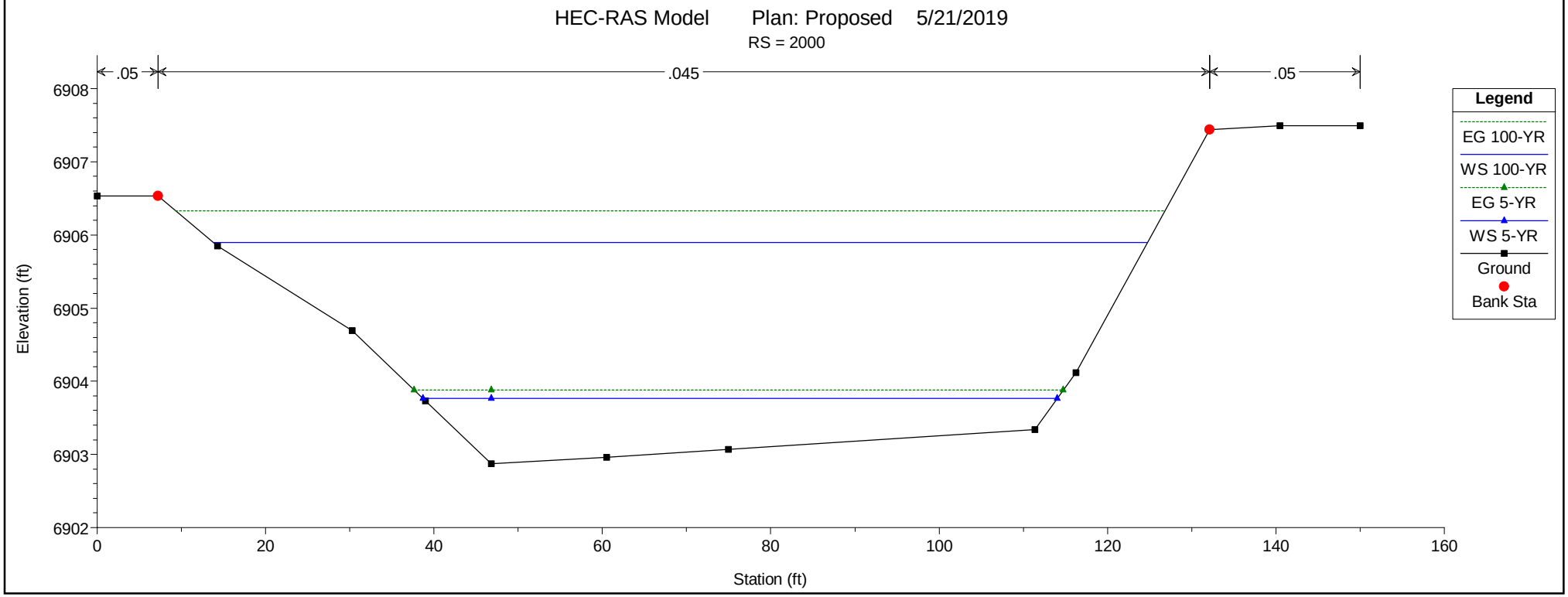

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2250
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6912
6911
6910
6909
6908
6907
0
20
40
60
80
100
120
140
160
Station (ft)

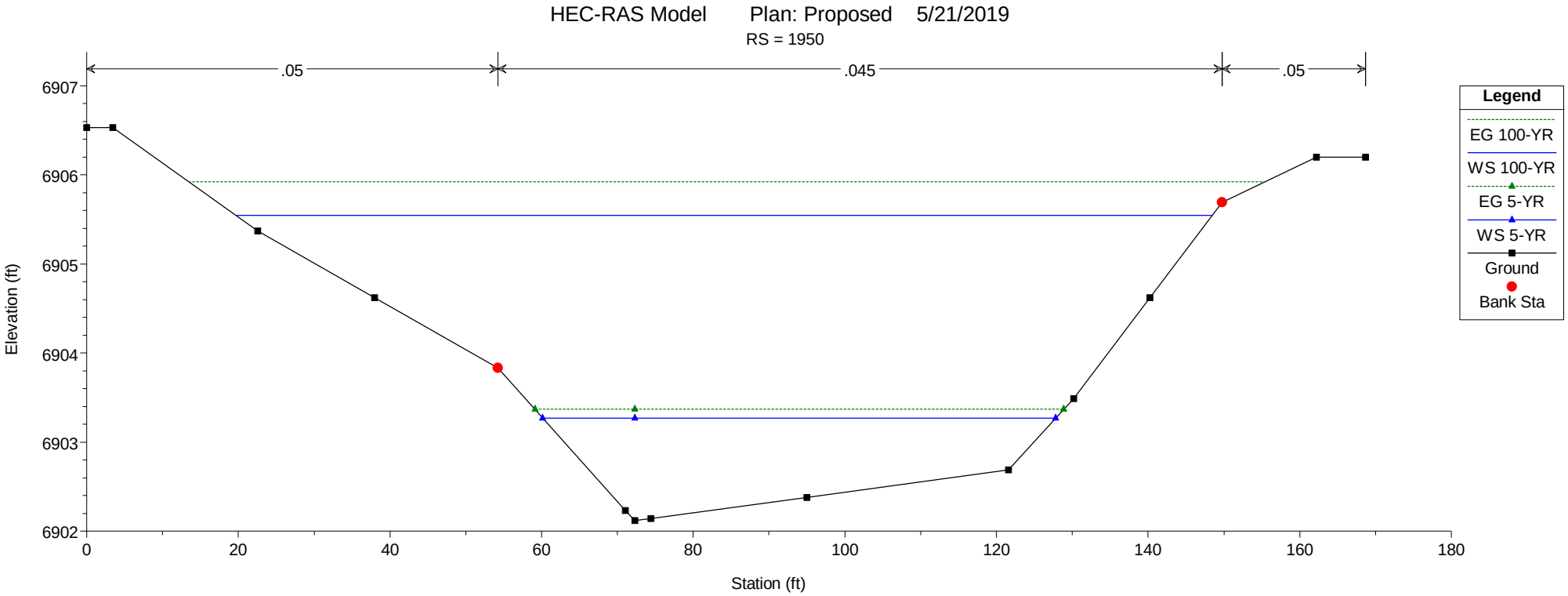

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2200
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6911
6910
6909
6908
6907
6906
6905
0
20
40
60
80
100
120
140
160
Station (ft)

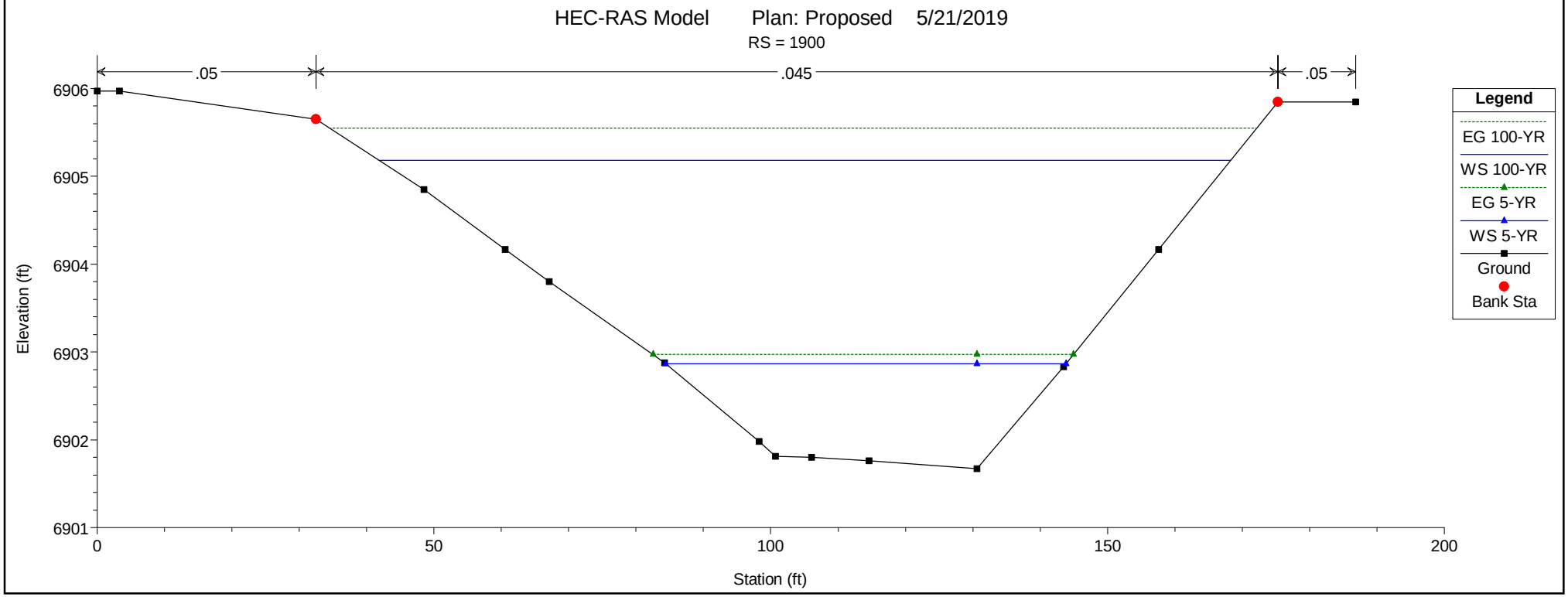

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2150
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

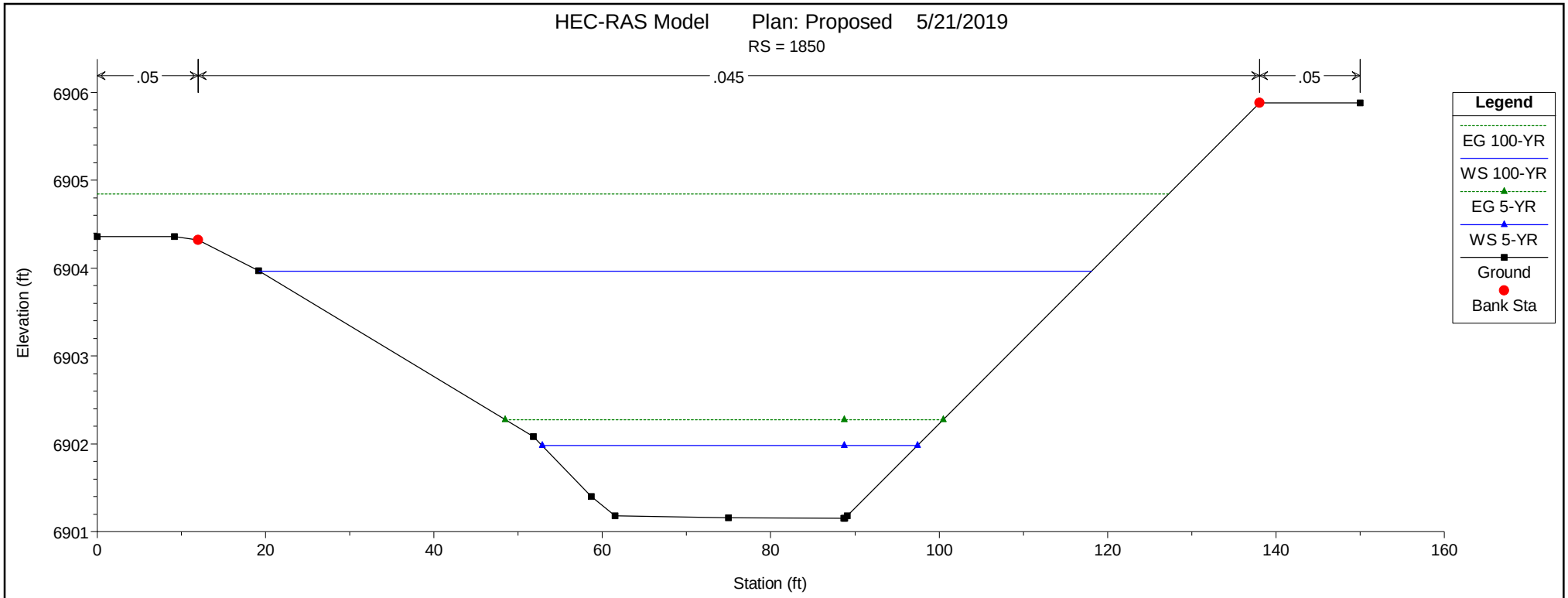

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

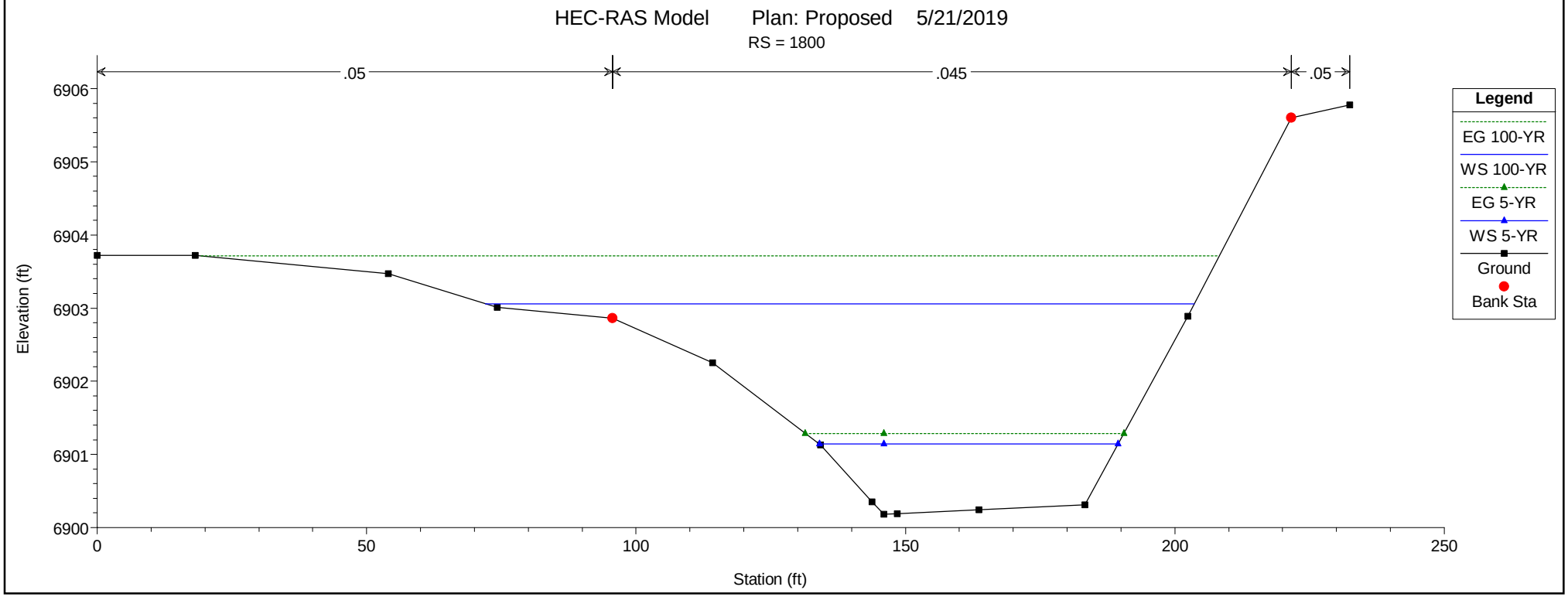

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2050
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

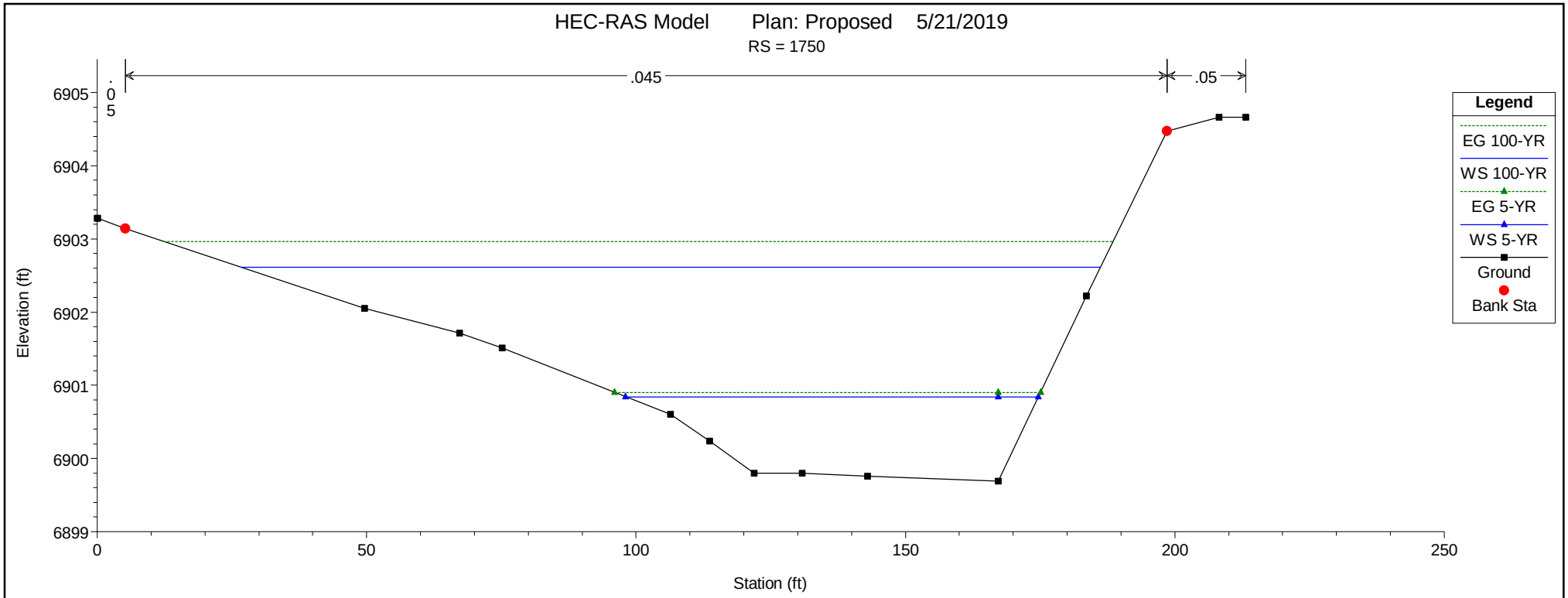

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 2000
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

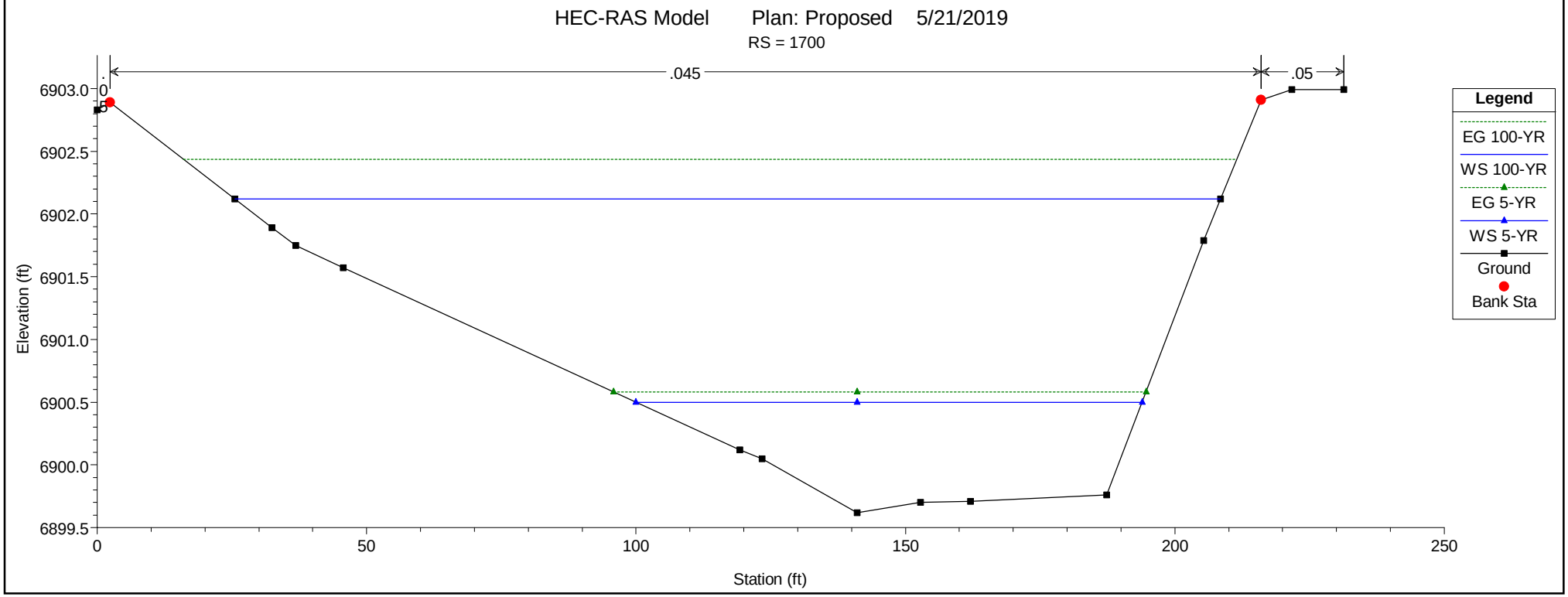

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1950
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6907
6906
6905
6904
6903
6902
0
20
40
60
80
100
120
140
160
180
Station (ft)

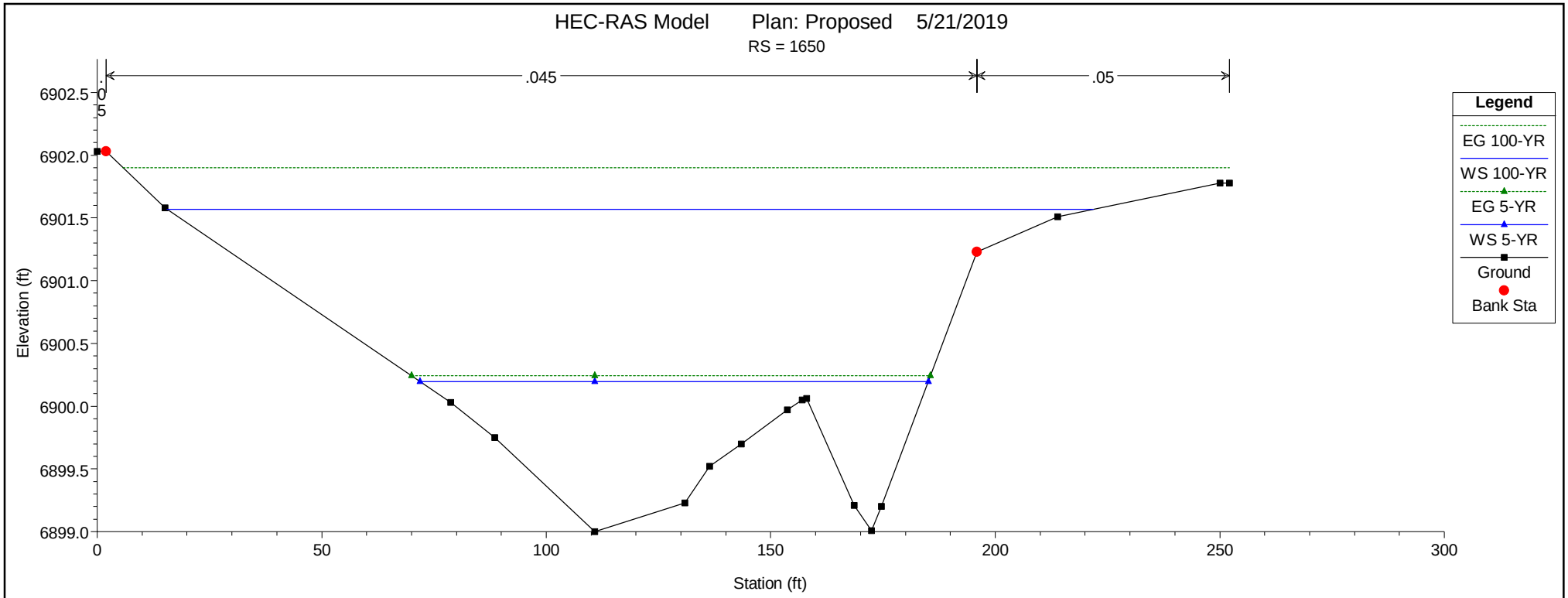

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1900
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6906
6905
6904
6903
6902
6901
0
50
100
150
200
Station (ft)

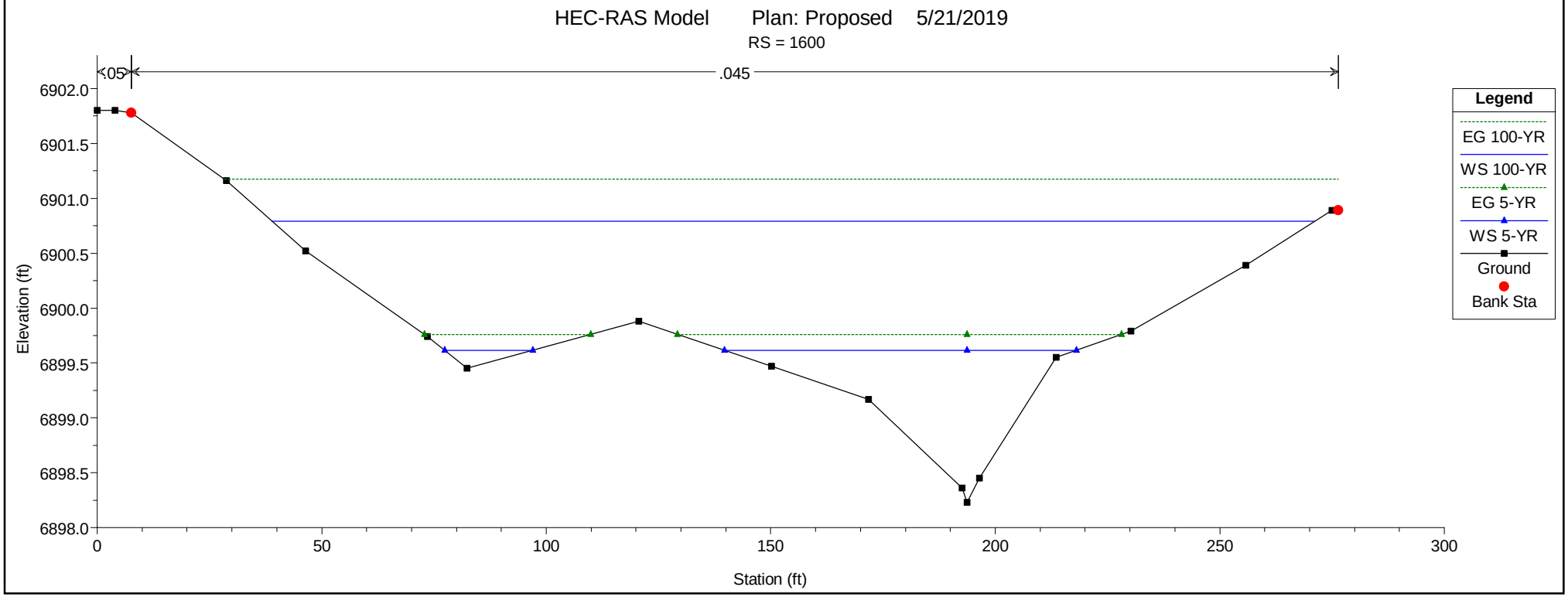

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1850
.05
.045
.05
Elevation (ft)
6906
6905
6904
6903
6902
6901
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

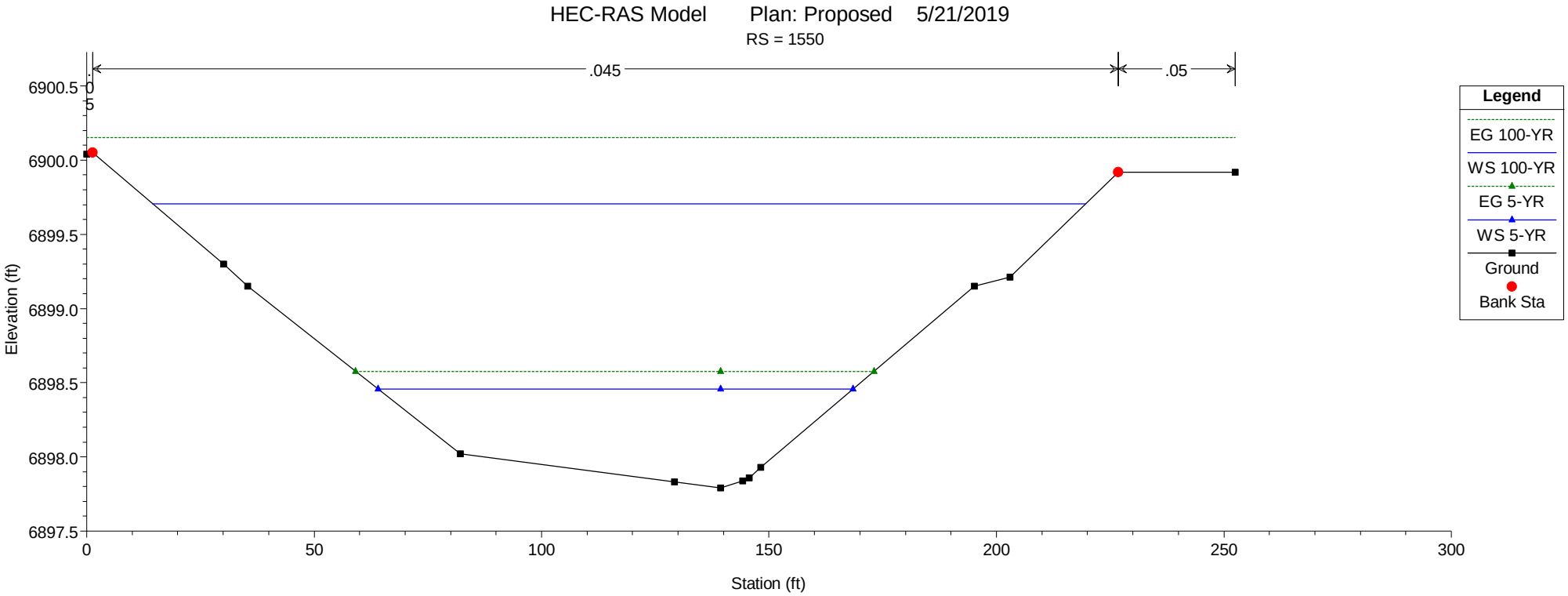

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1800
.05
.045
.05
Elevation (ft)
6906
6905
6904
6903
6902
6901
6900
0
50
100
150
200
250
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

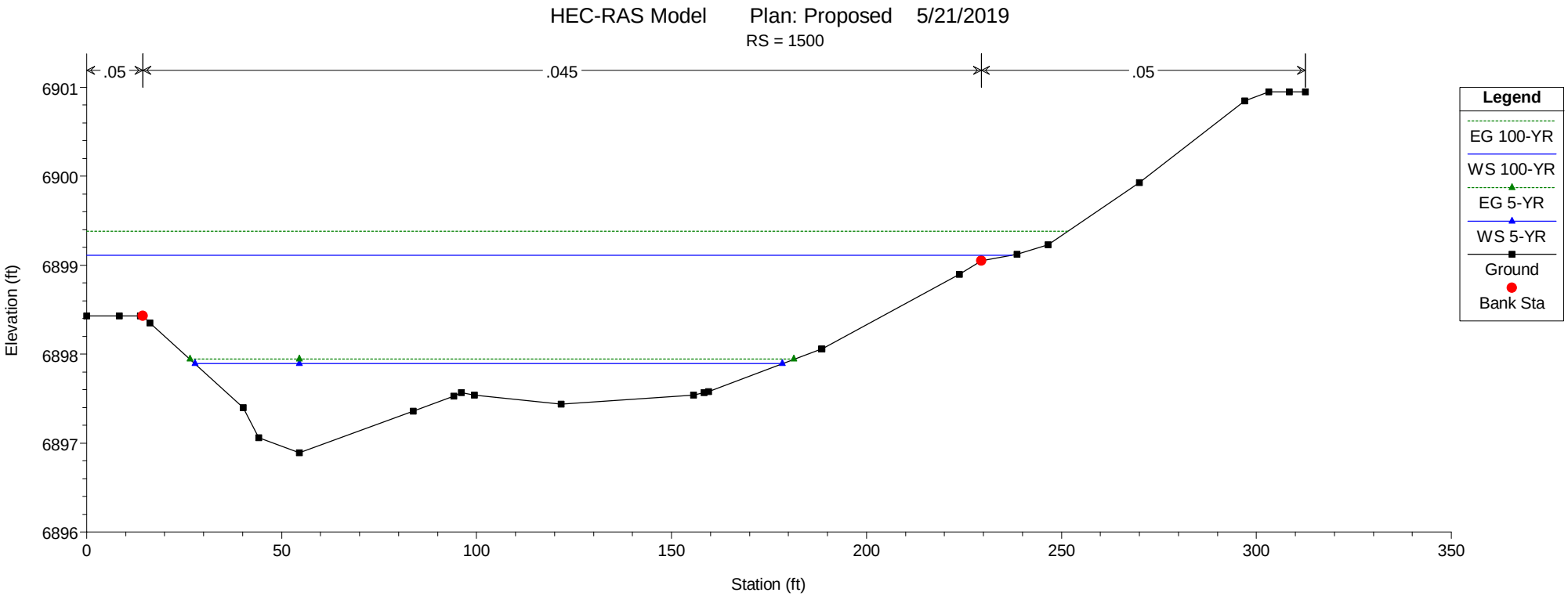

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1750
.045
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

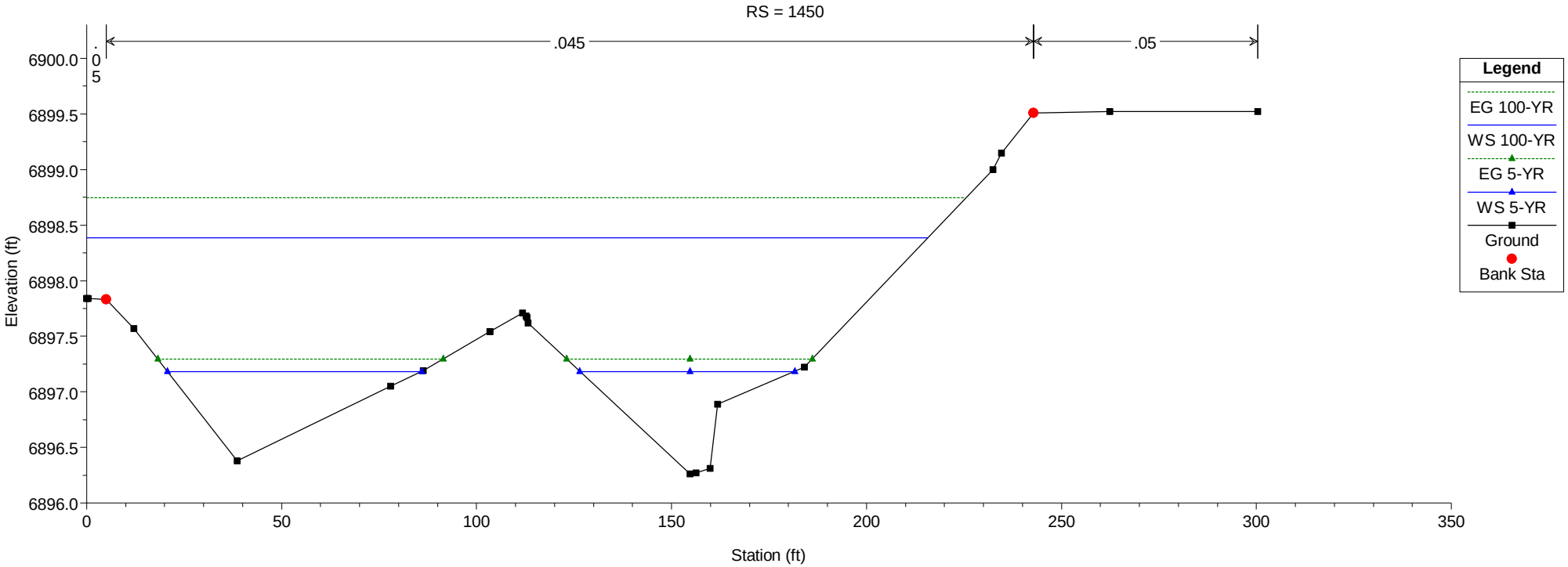

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1700
.045
.05
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

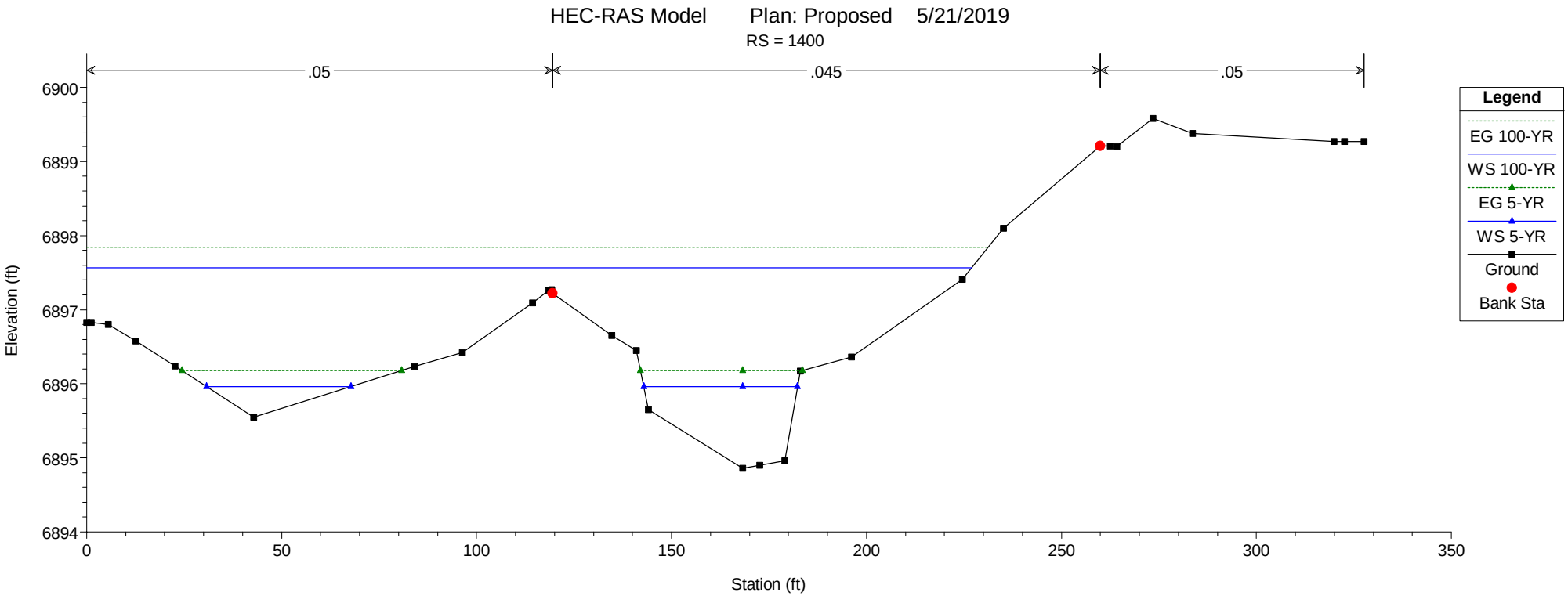

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1650
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

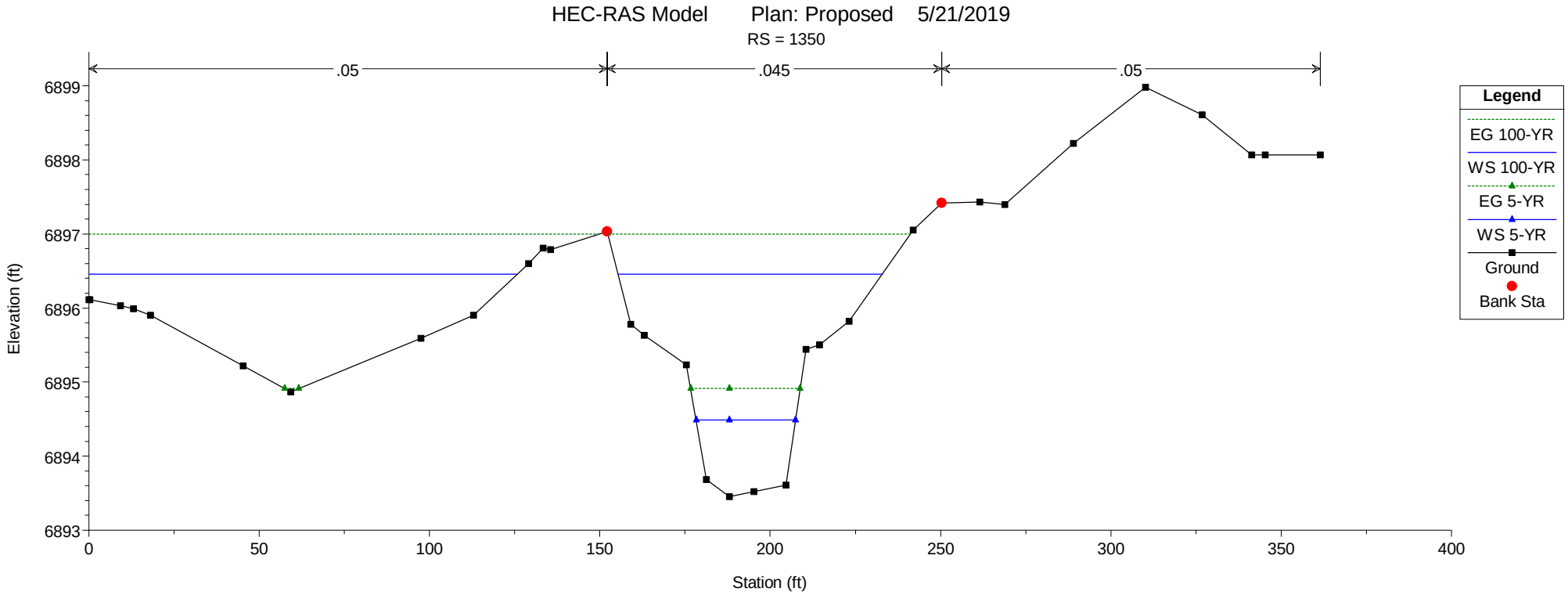

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1600
.05
.045
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

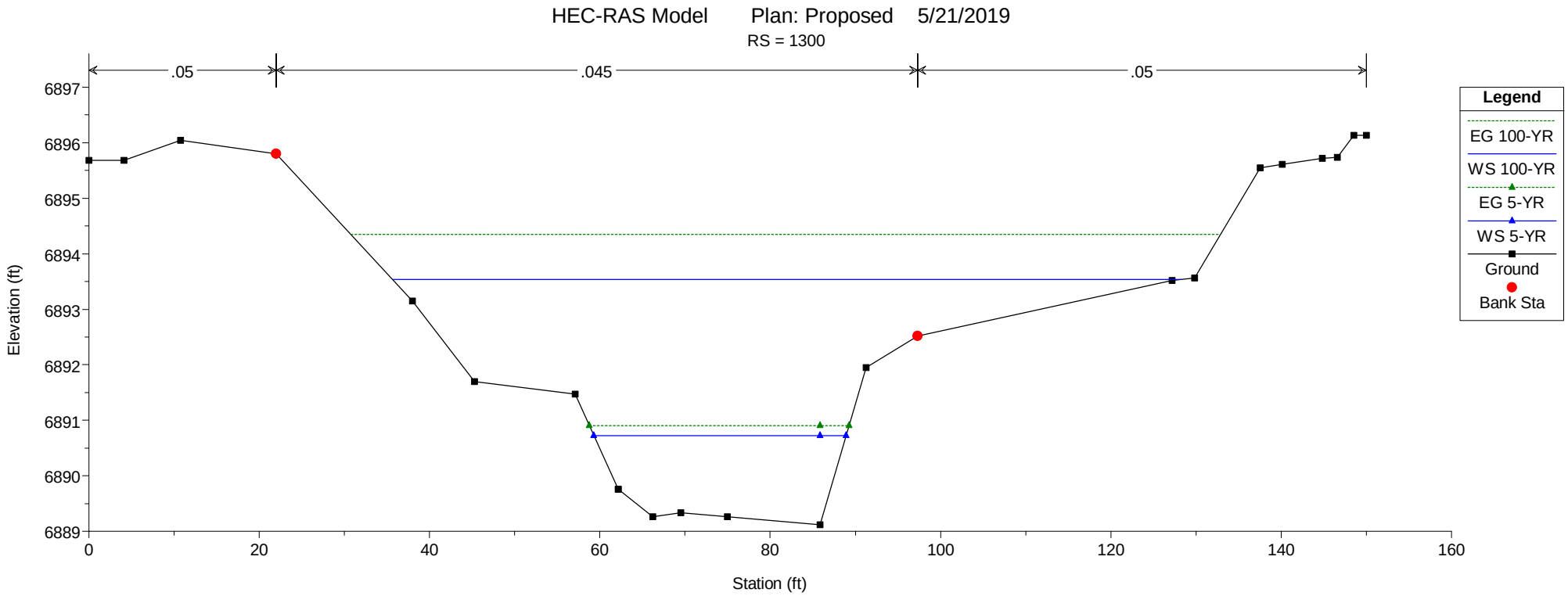

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1550
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

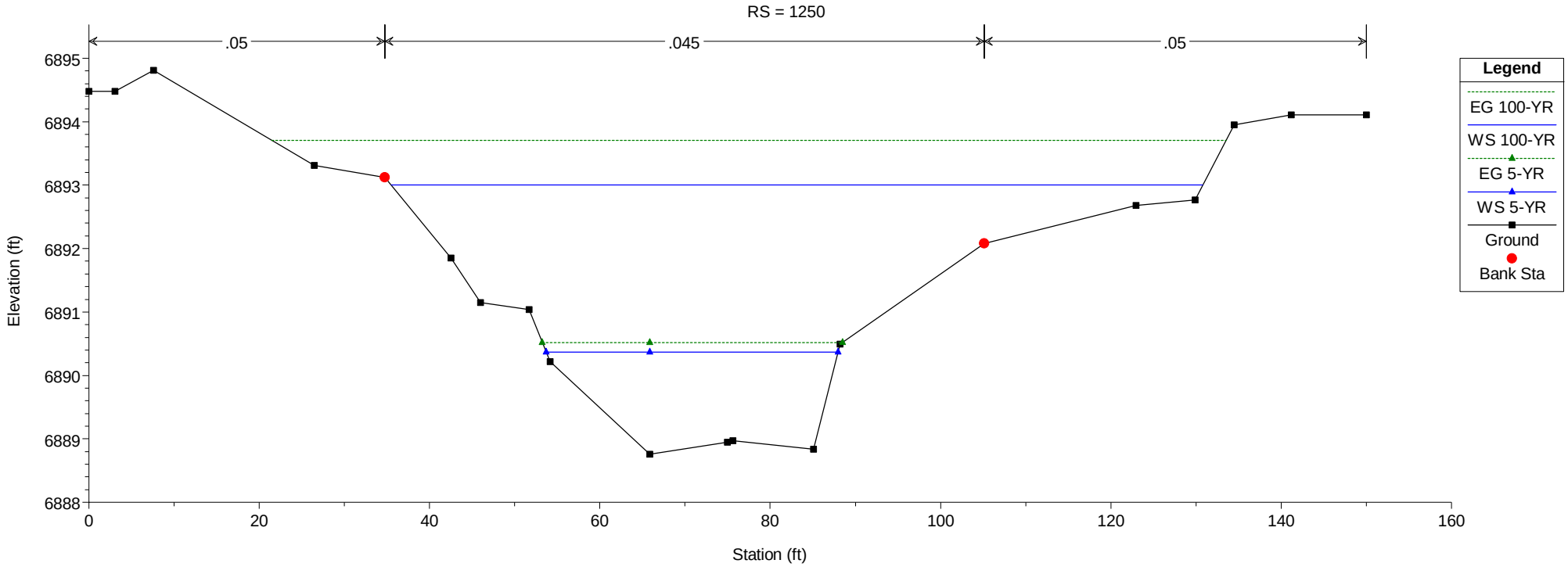

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1500
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

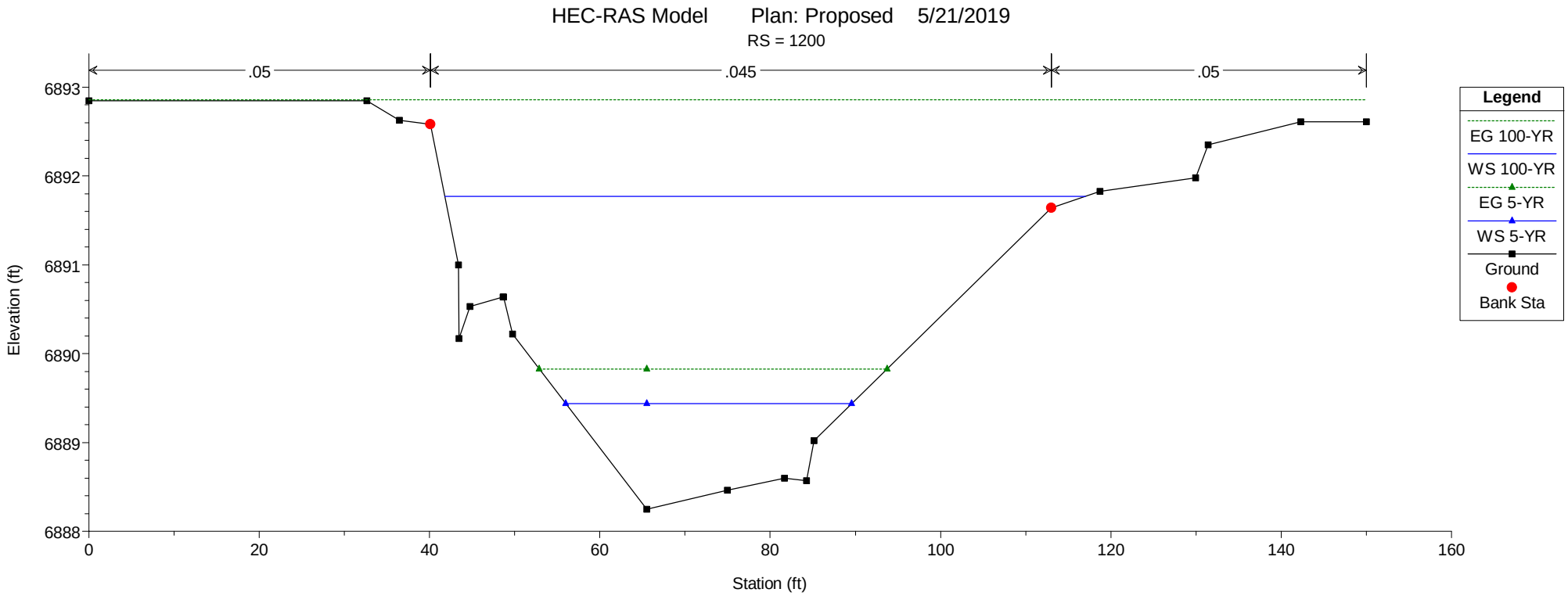

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

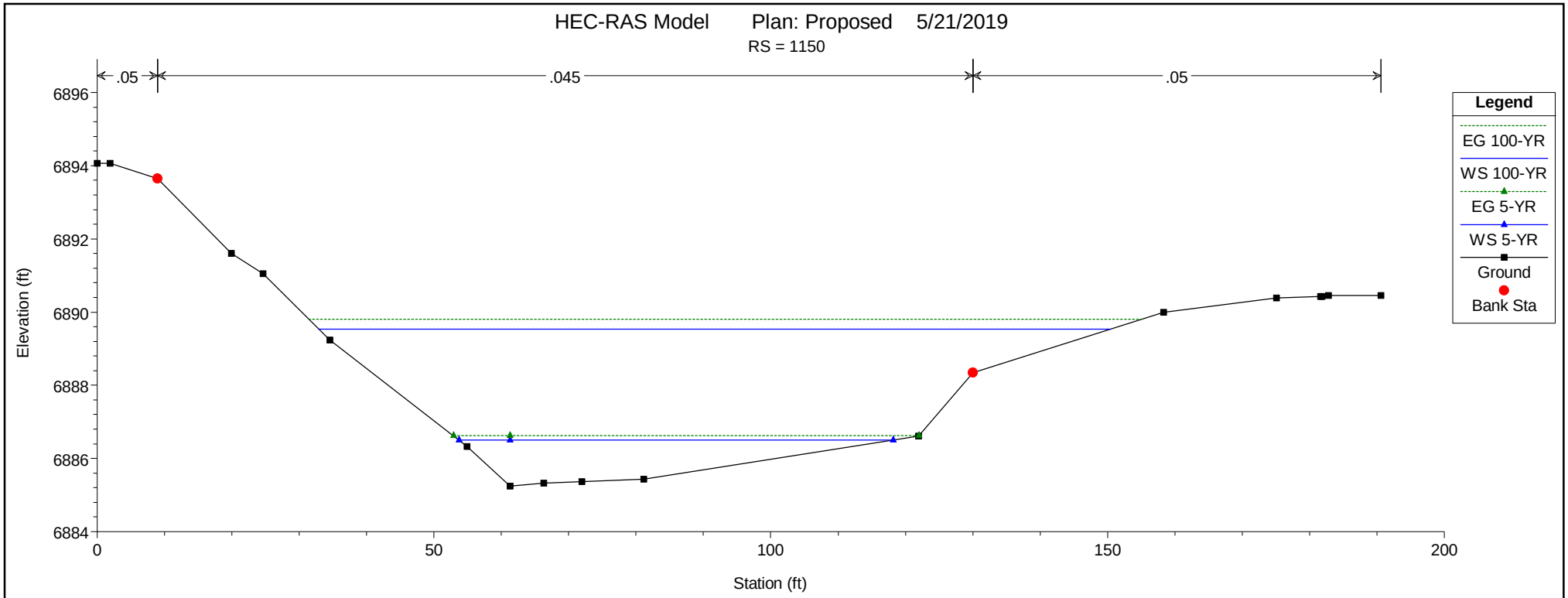

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

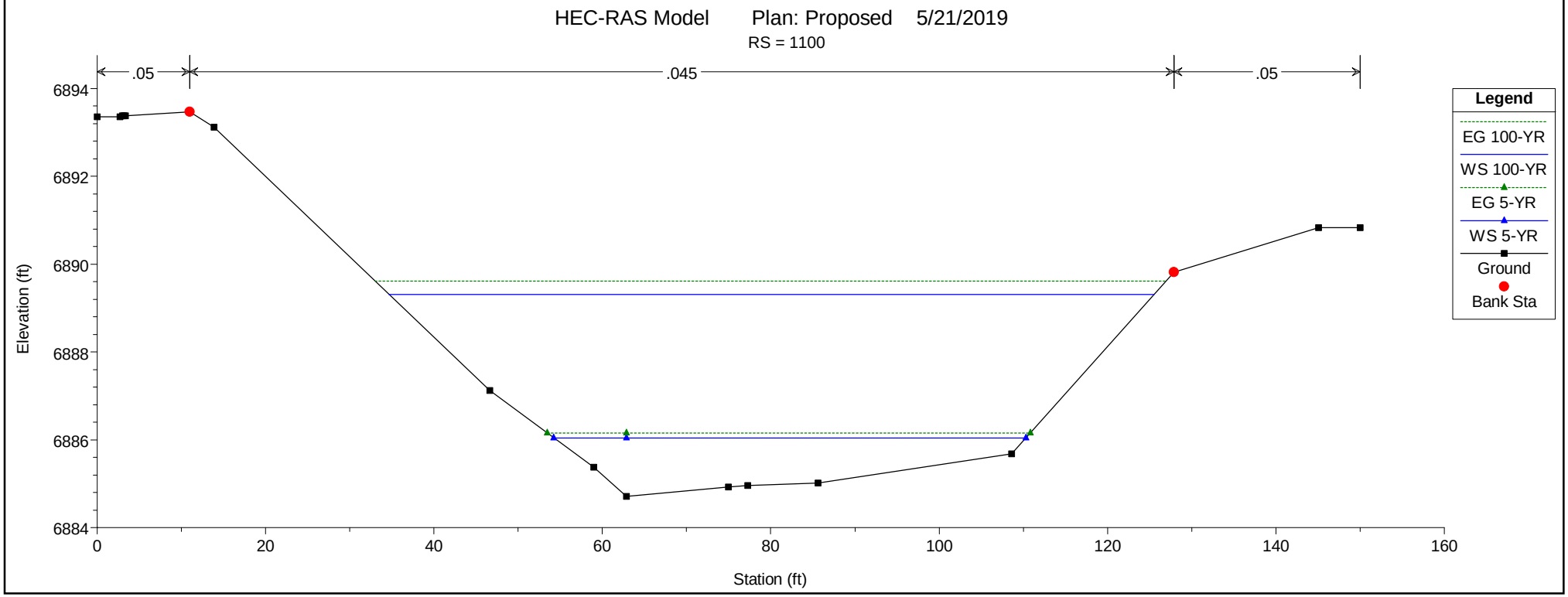

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

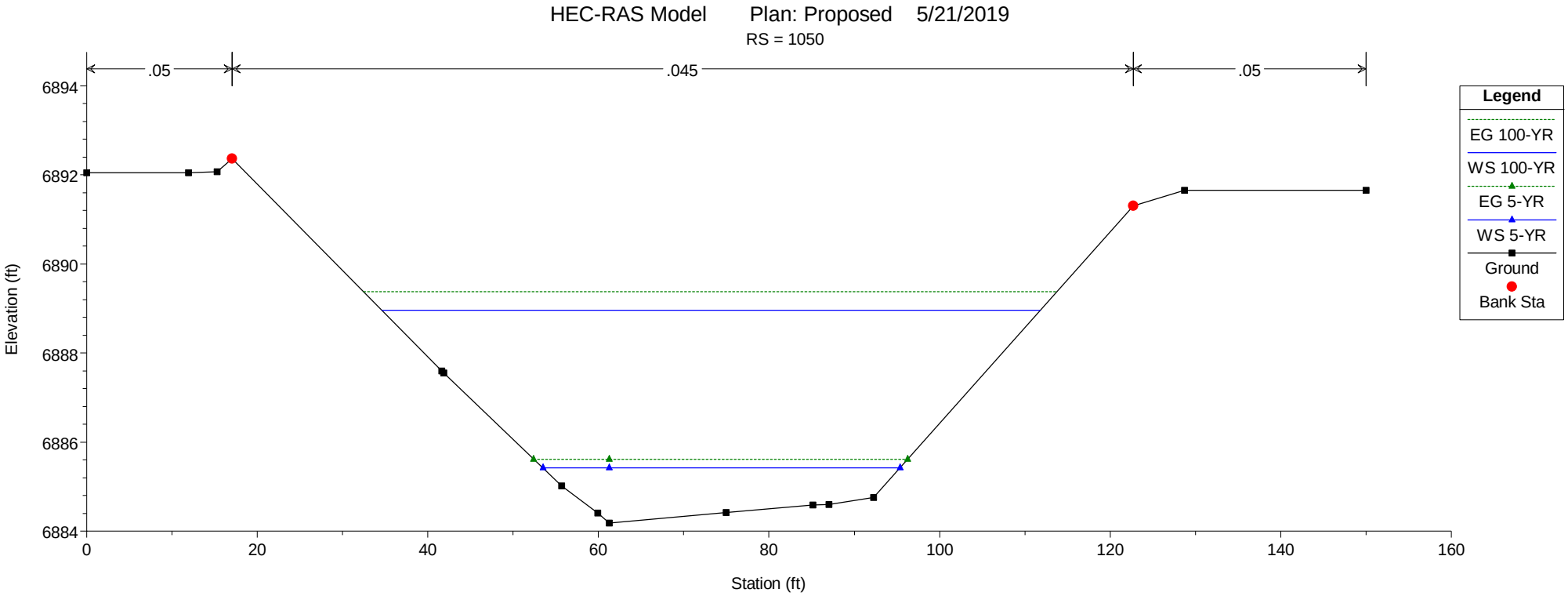

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1300
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

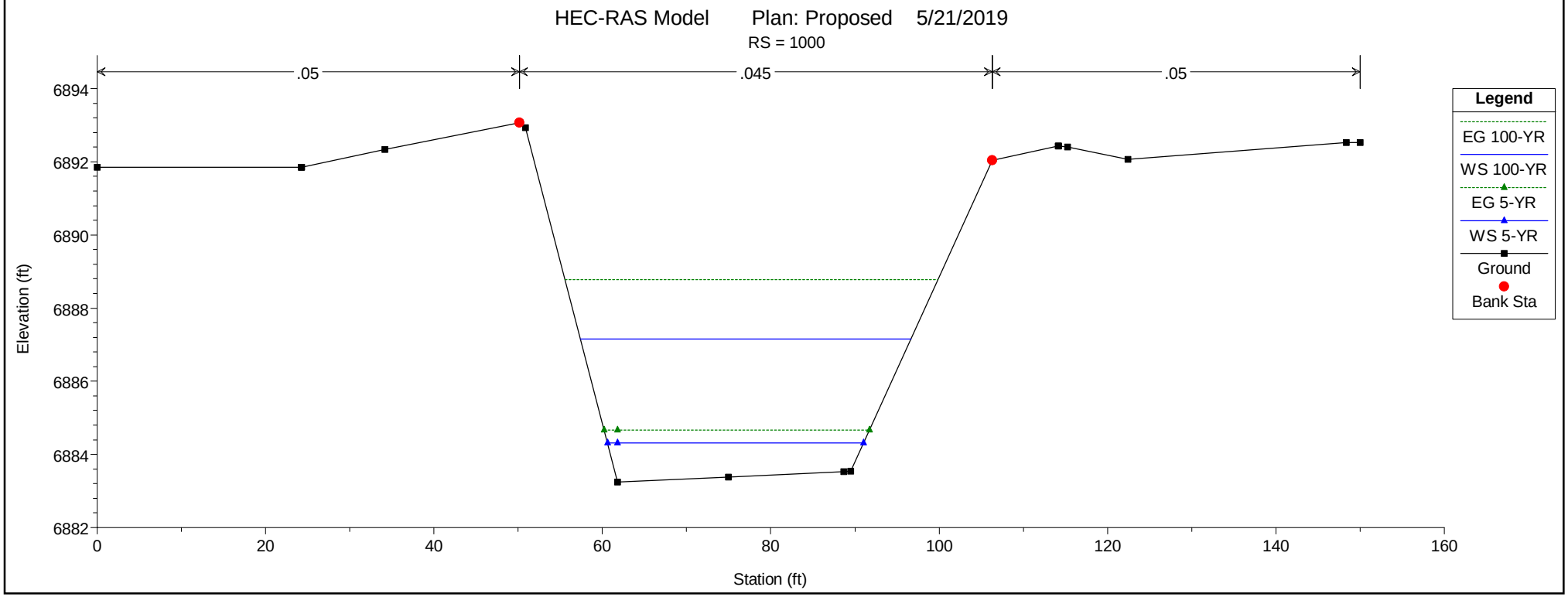

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1250
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

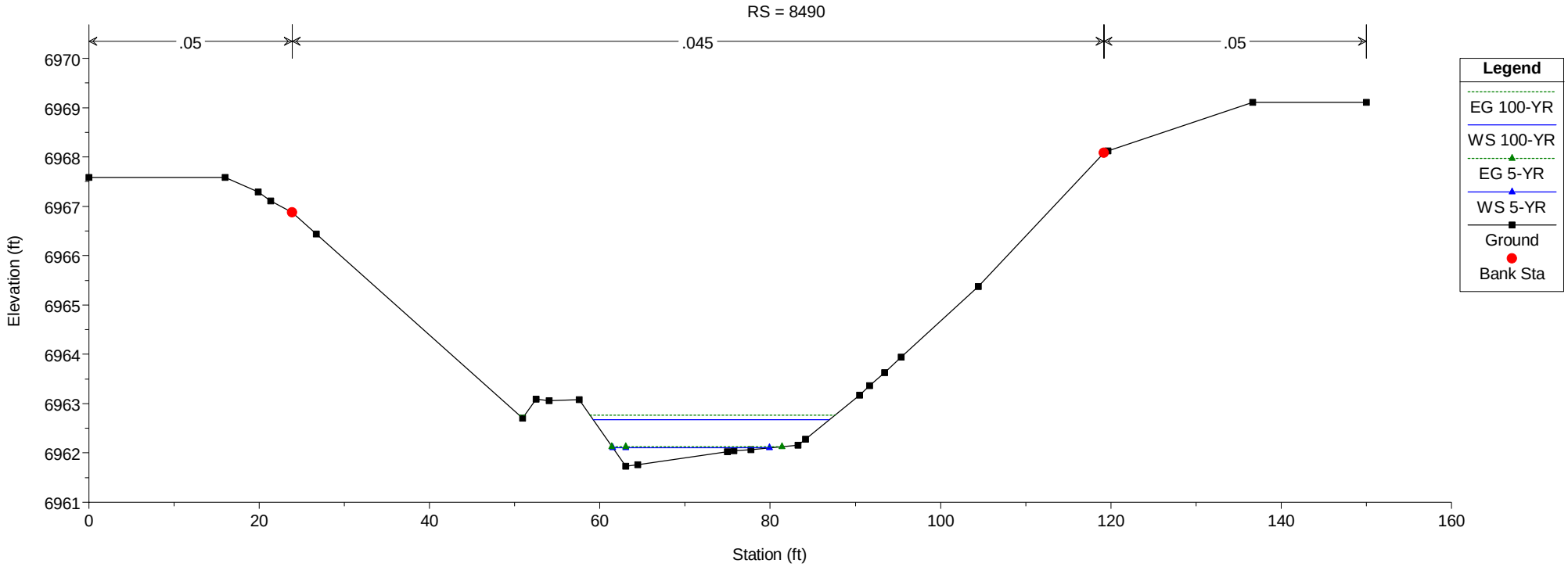

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1200
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

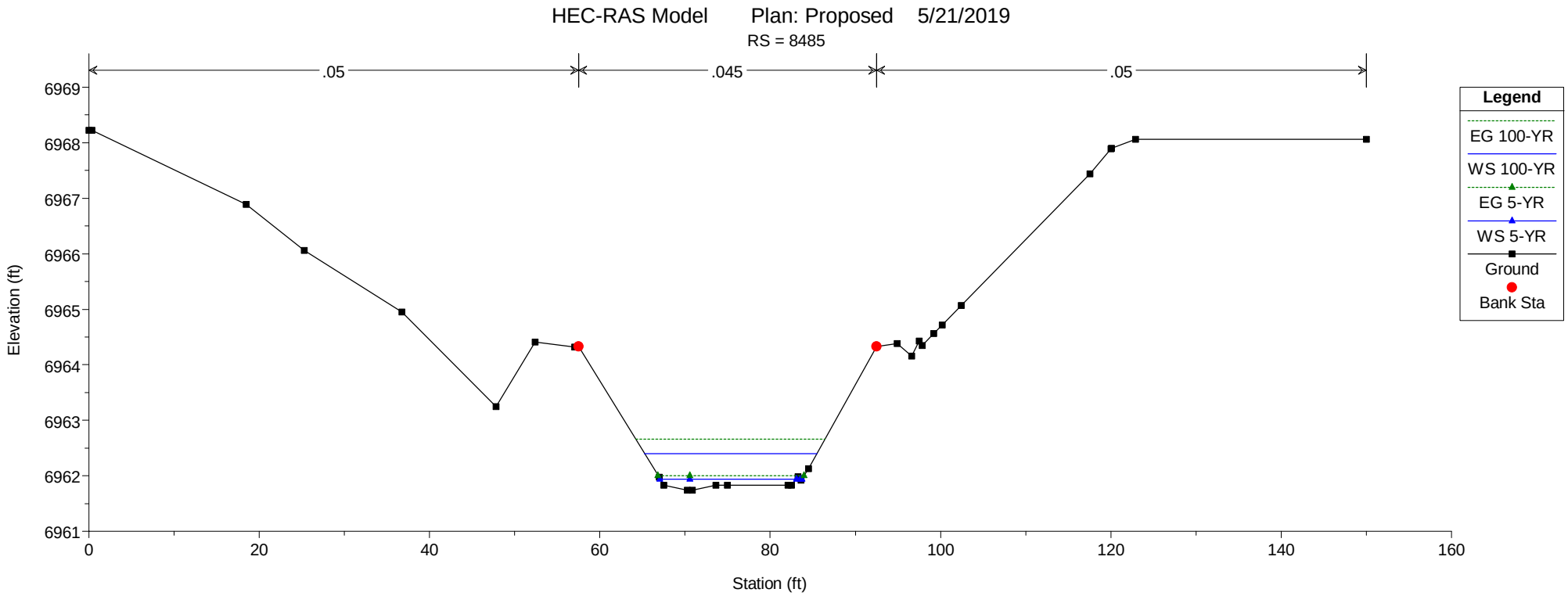

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1150
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6896
6894
6892
6890
6888
6886
6884
0
50
100
150
200
Station (ft)

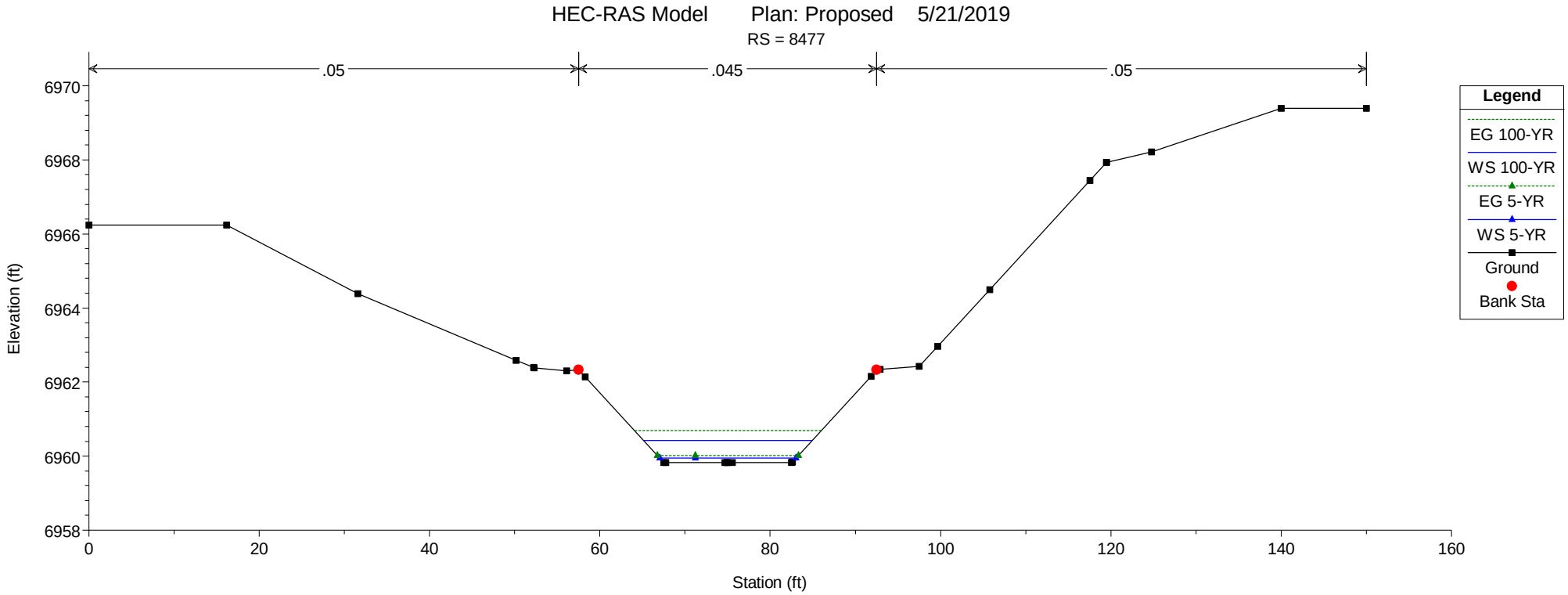

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1100
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6894
6892
6890
6888
6886
6884
0
20
40
60
80
100
120
140
160
Station (ft)

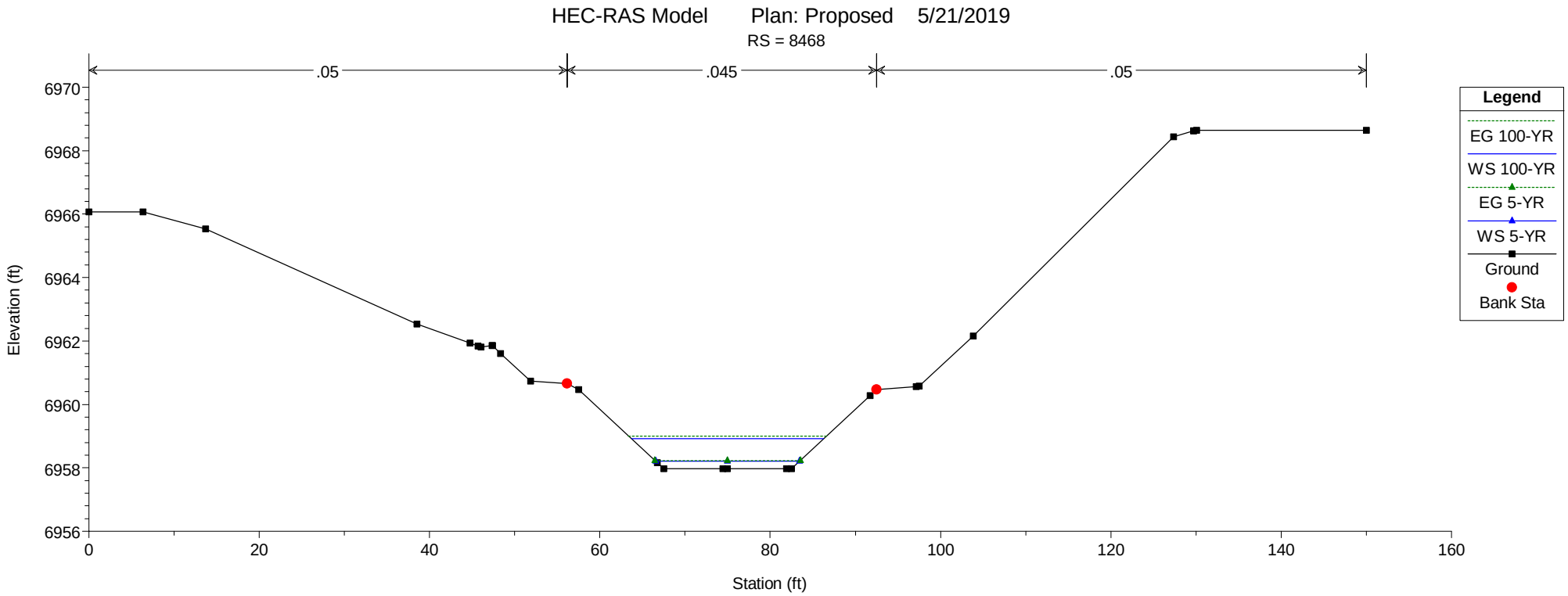

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1050
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6894
6892
6890
6888
6886
6884
0
20
40
60
80
100
120
140
160
Station (ft)

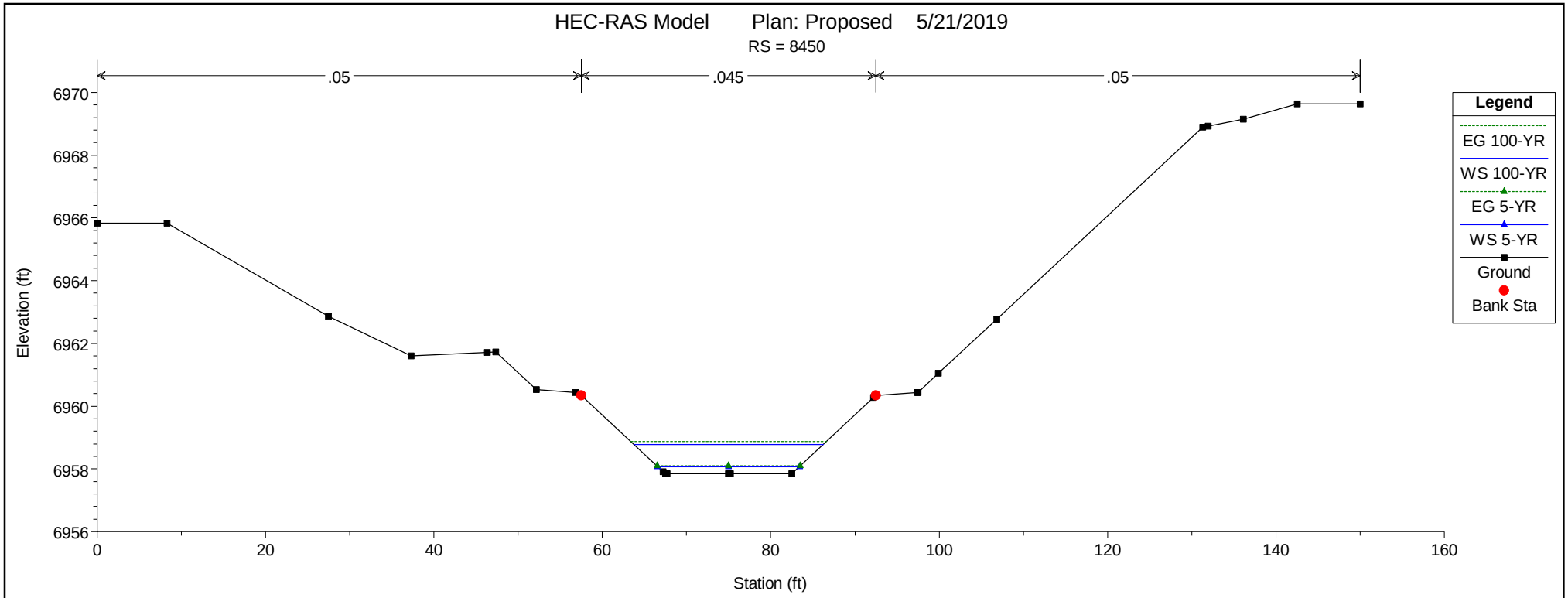

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 1000
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
6894
6892
6890
6888
6886
6884
6882
0
20
40
60
80
100
120
140
160
Station (ft)

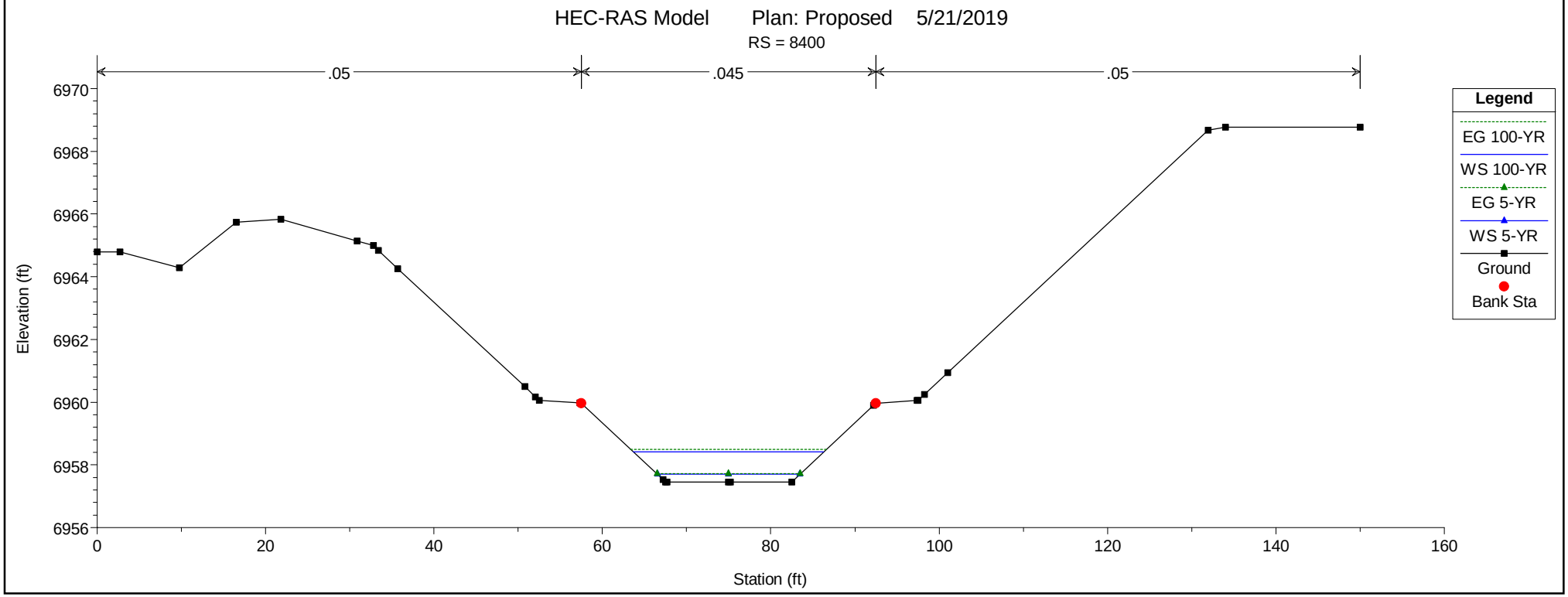

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8490
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

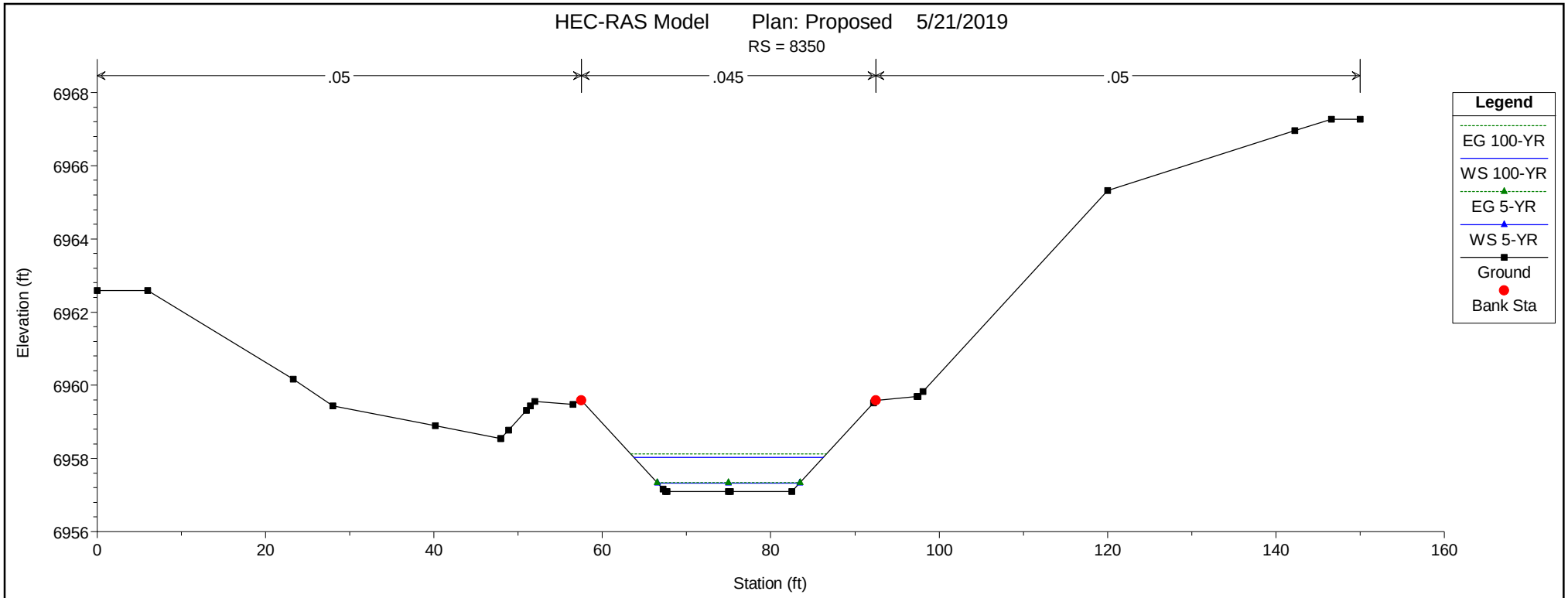

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8485
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

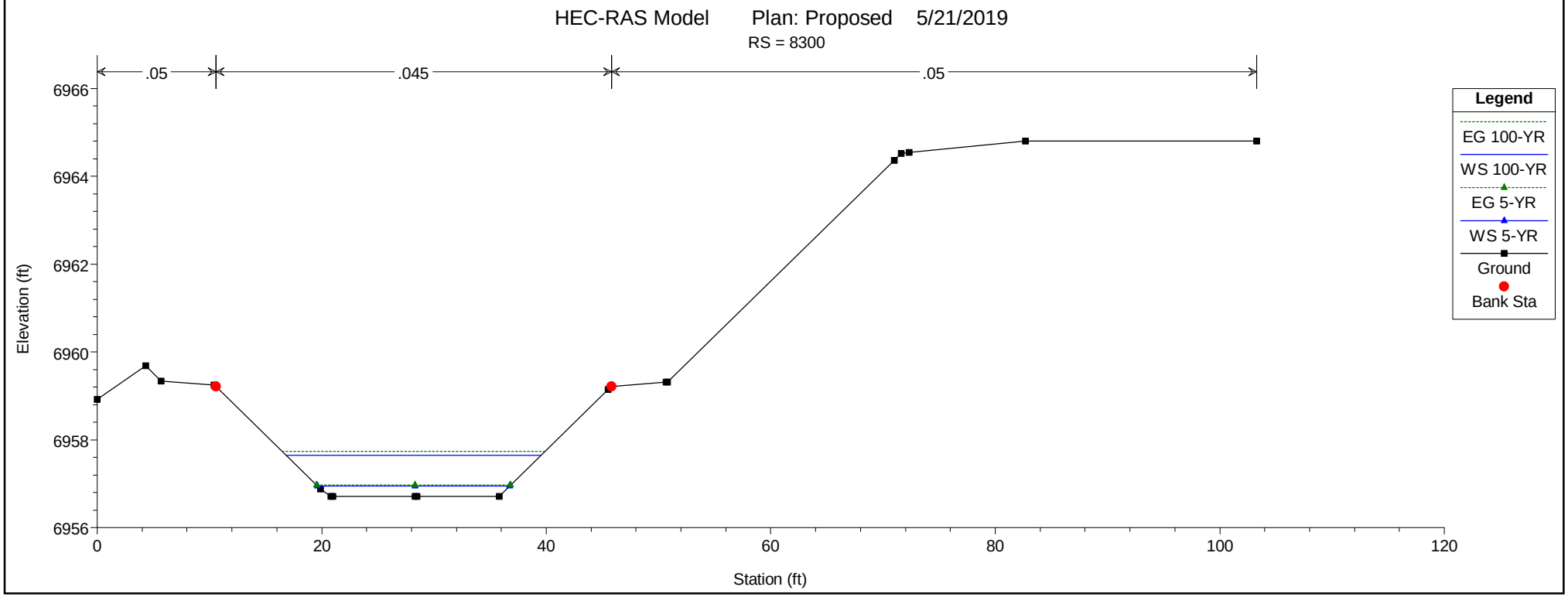

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8477
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

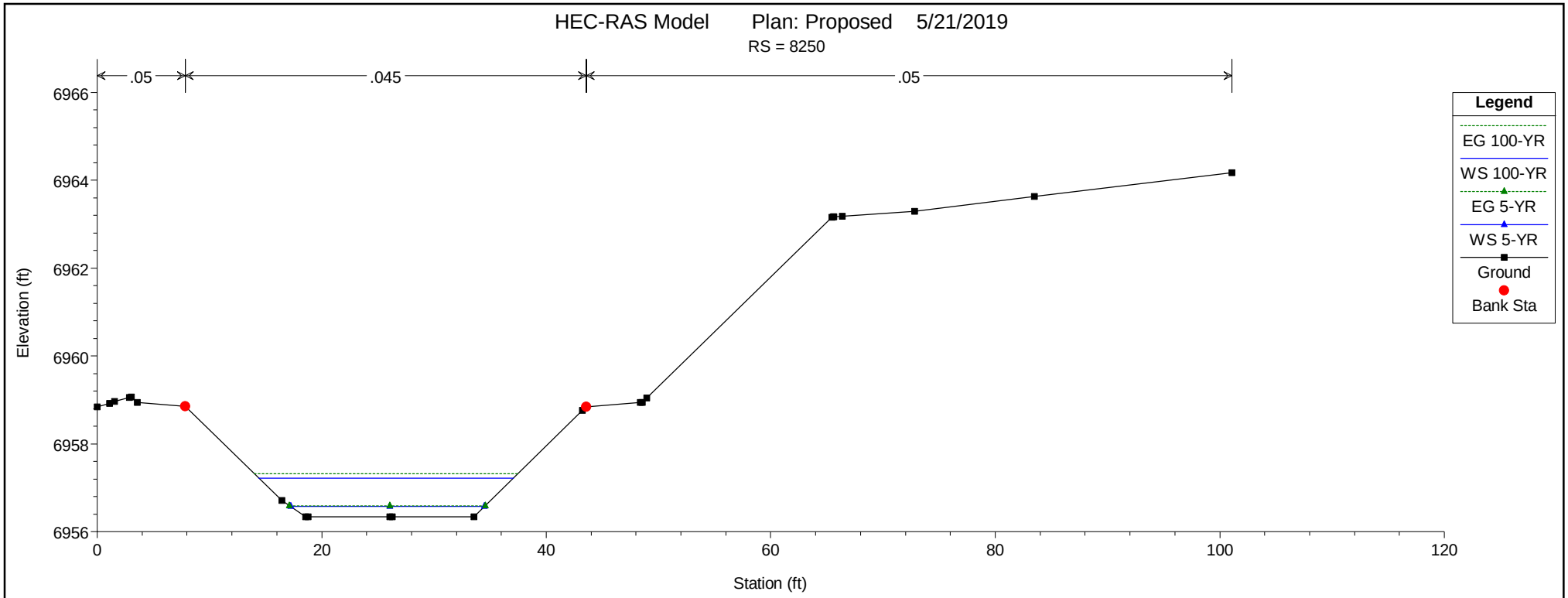

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8468
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

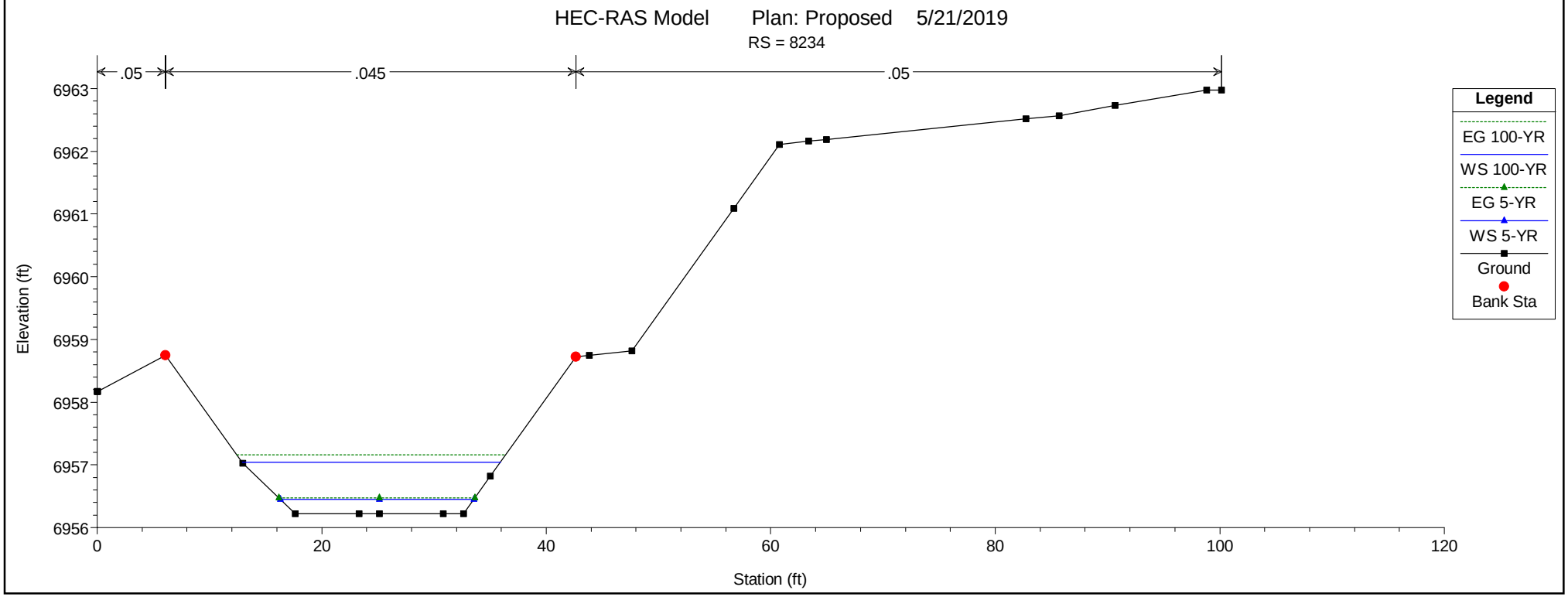

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

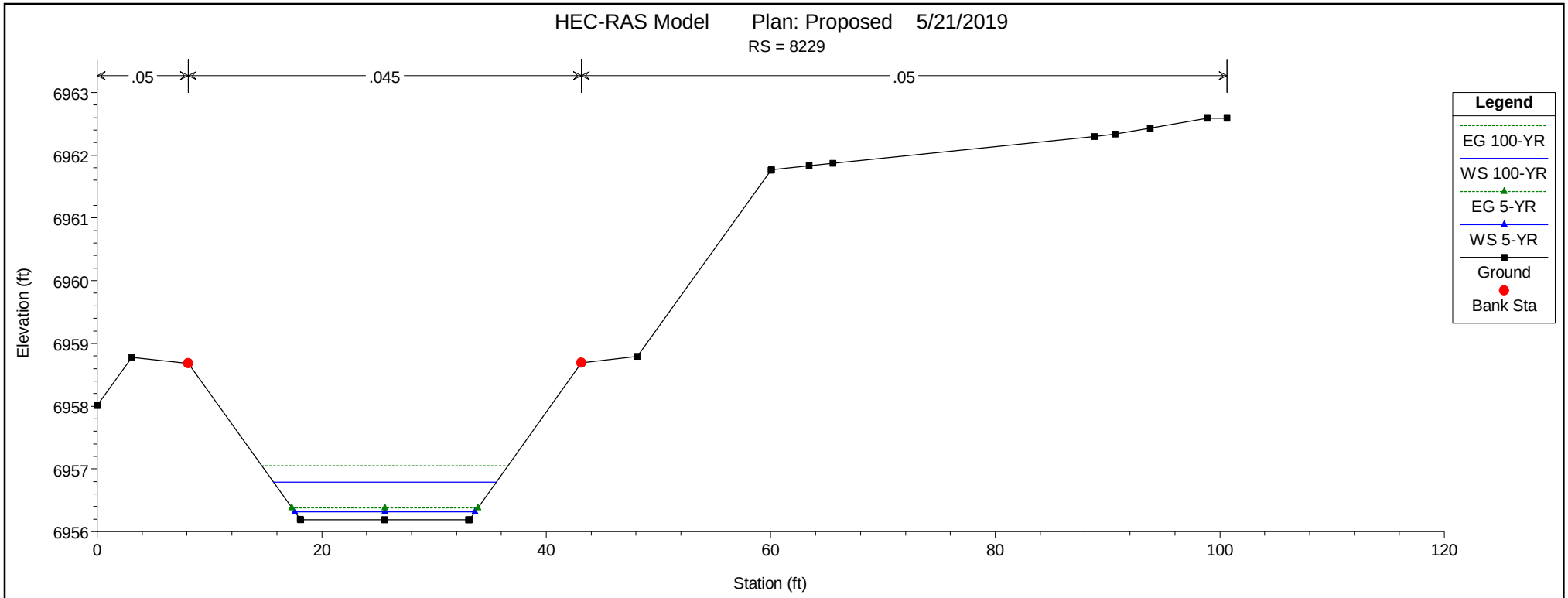

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

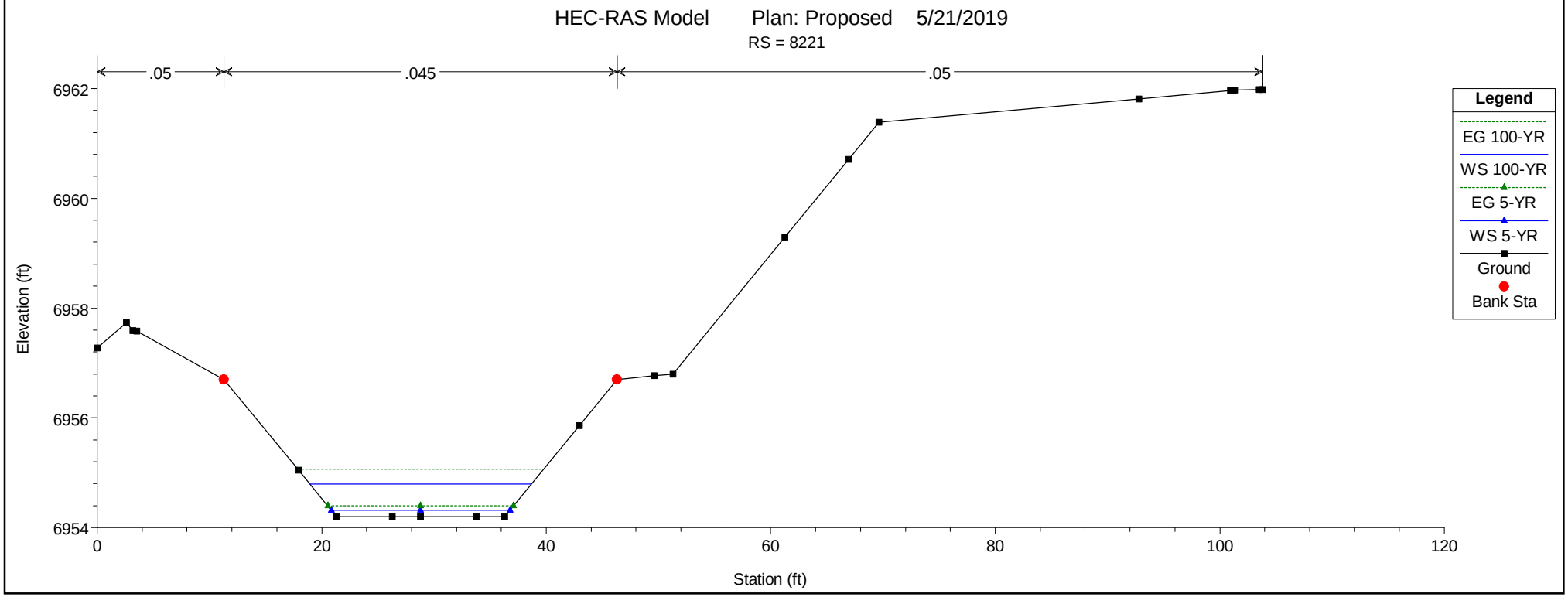

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

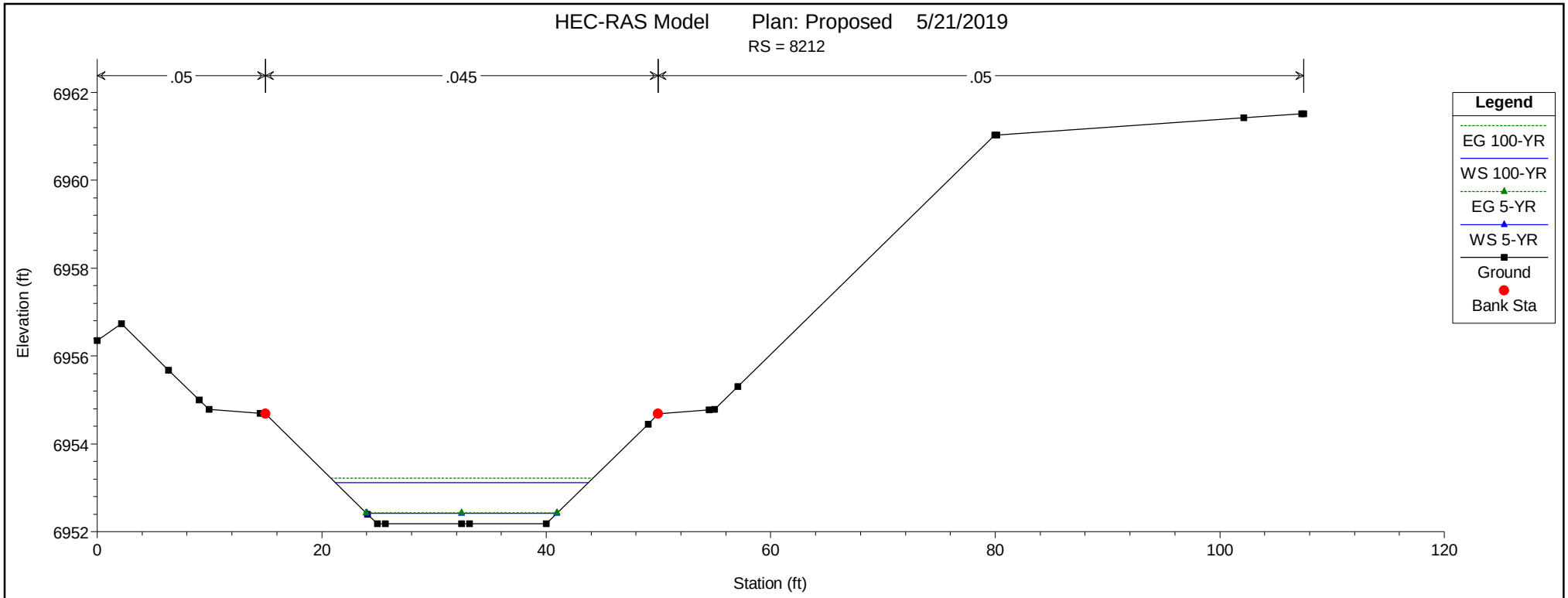

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8300
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

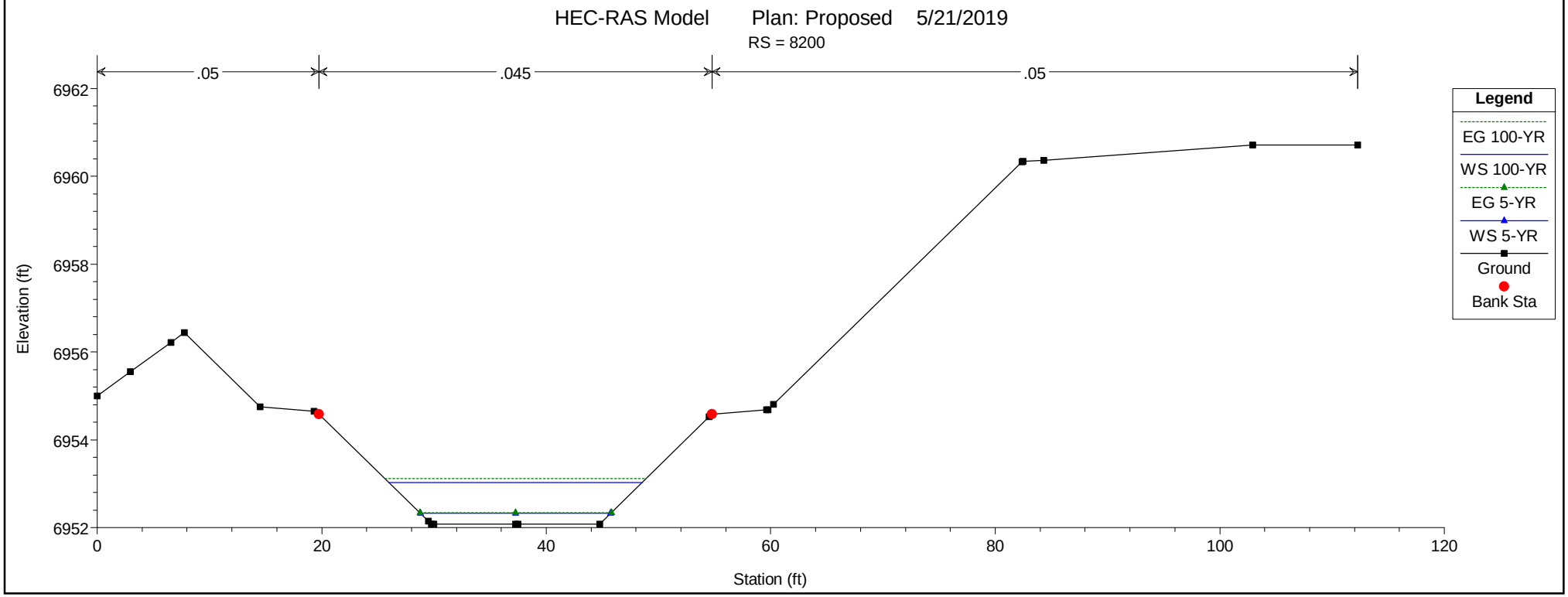

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8250
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

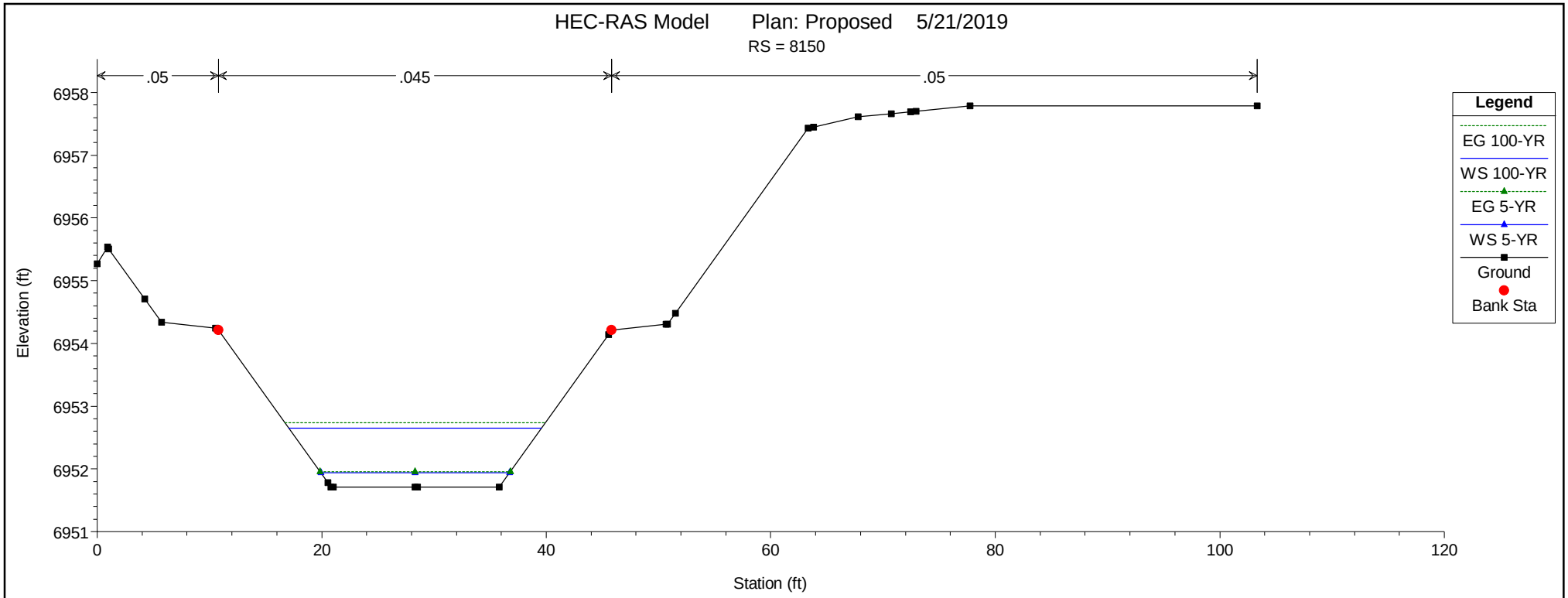

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8234
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

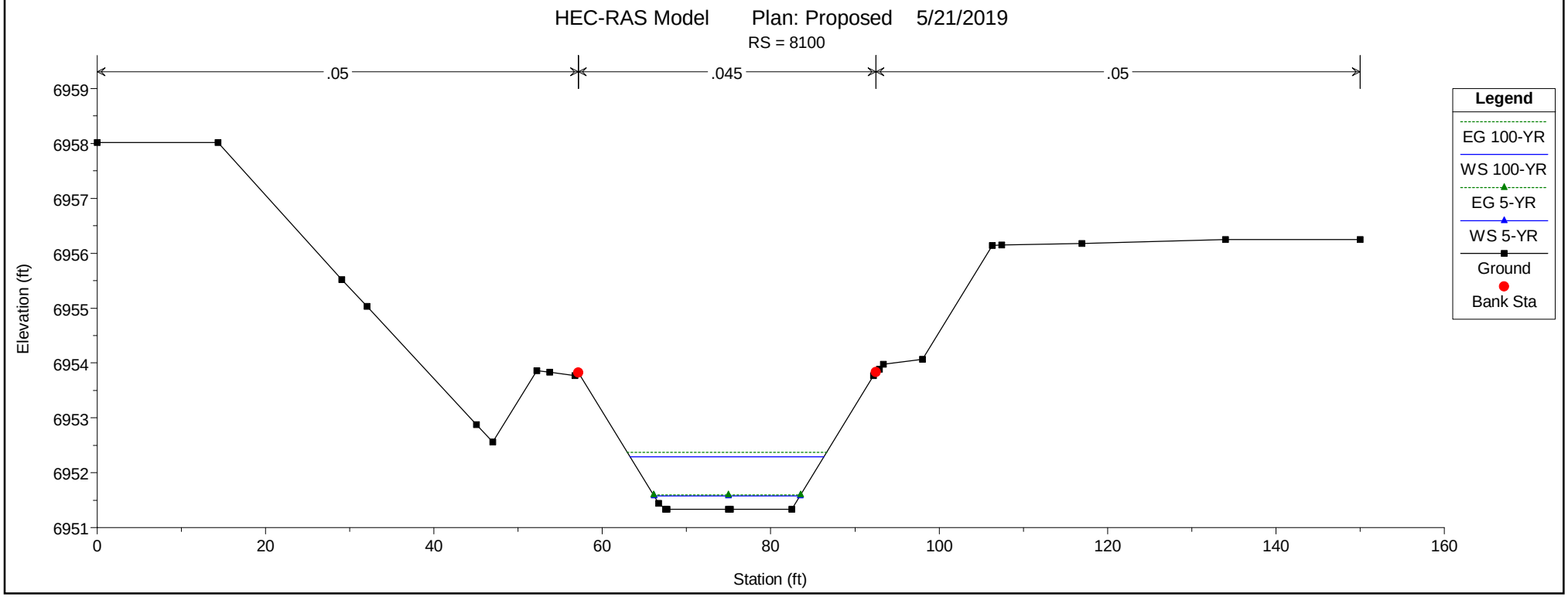

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8229
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

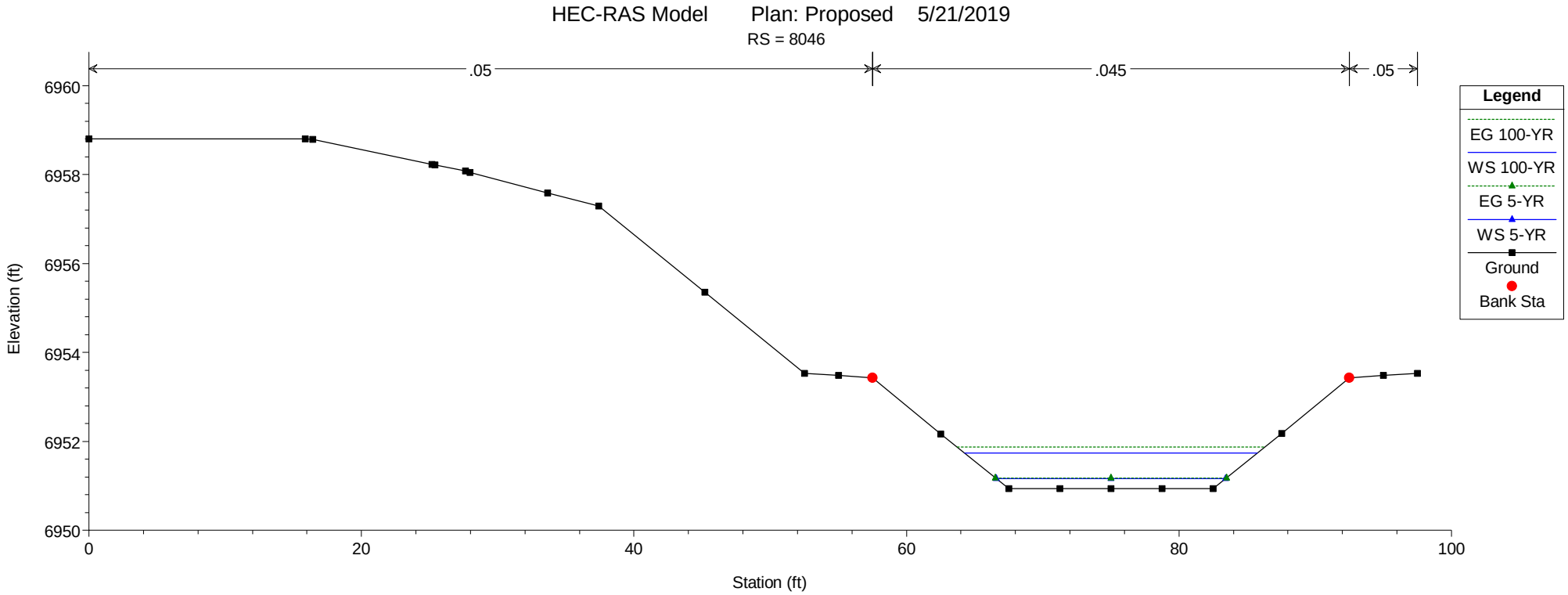

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8221
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

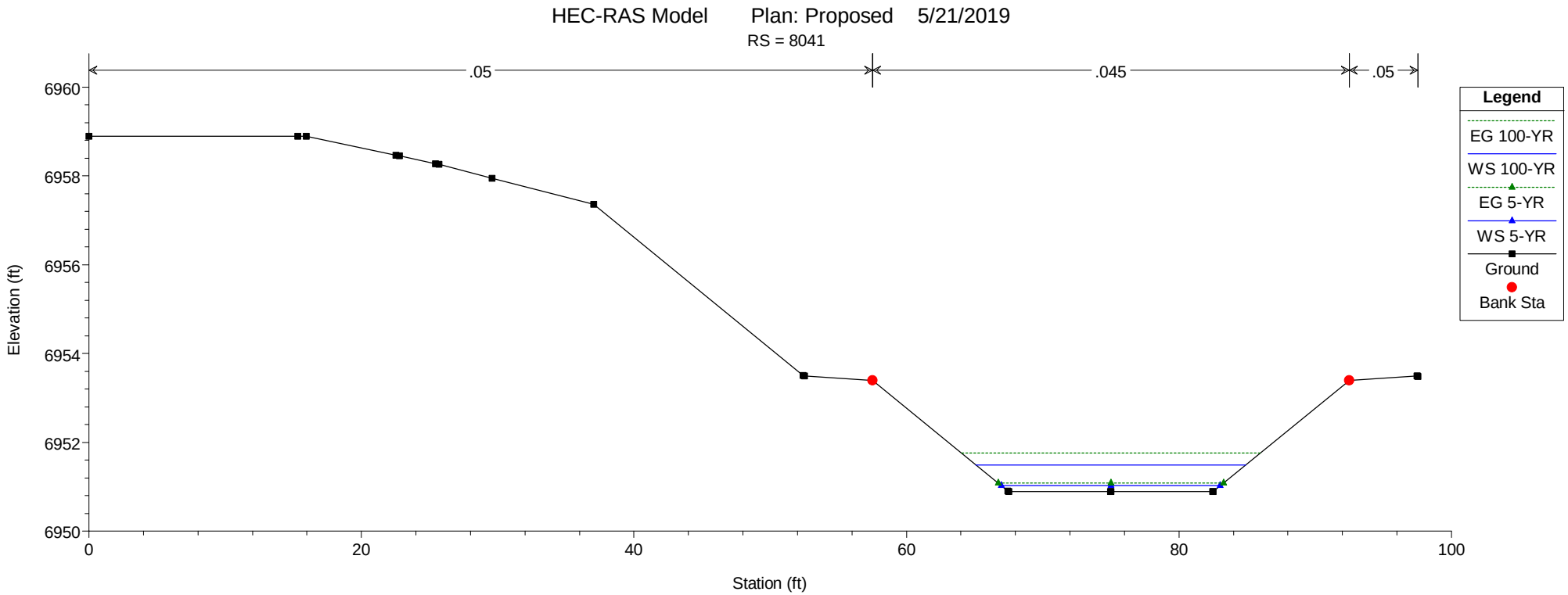

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8212
.05
.045
.05
Elevation (ft)
6962
6960
6958
6956
6954
6952
0
20
40
60
80
100
120
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

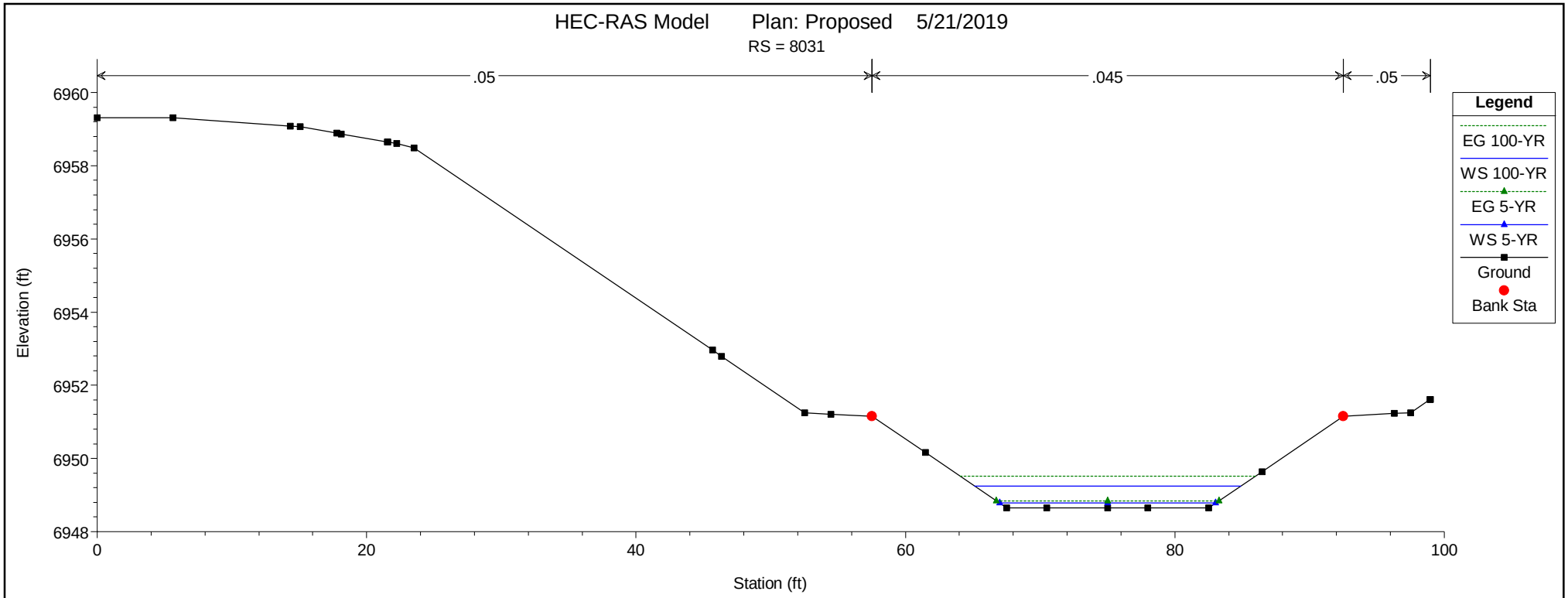

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8200
.05
.045
.05
Elevation (ft)
6962
6960
6958
6956
6954
6952
0
20
40
60
80
100
120
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

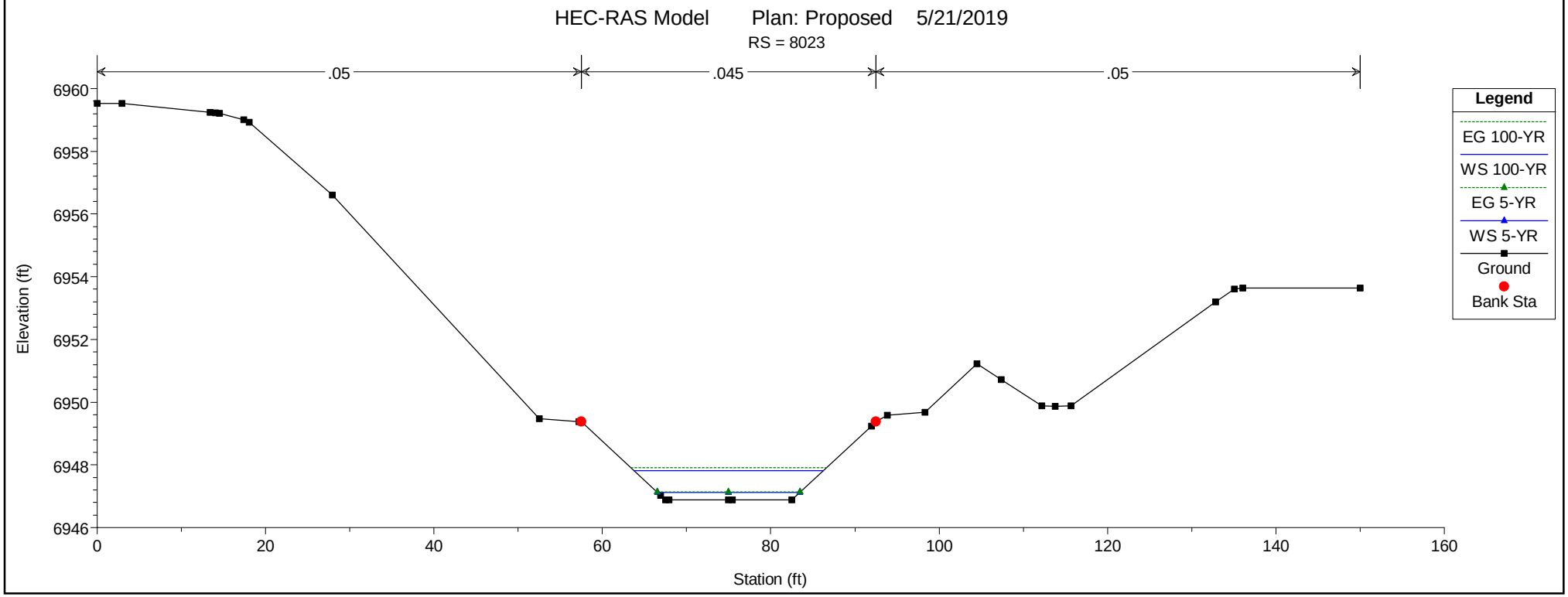

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8150
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

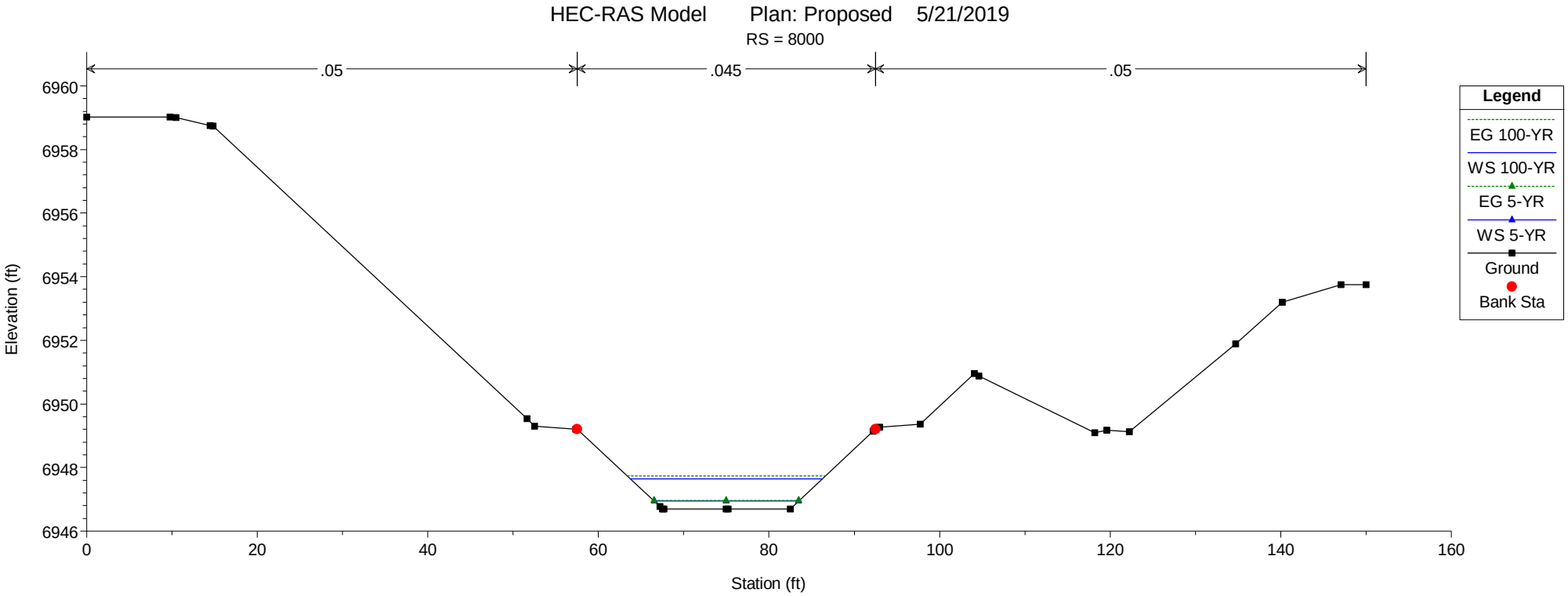

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

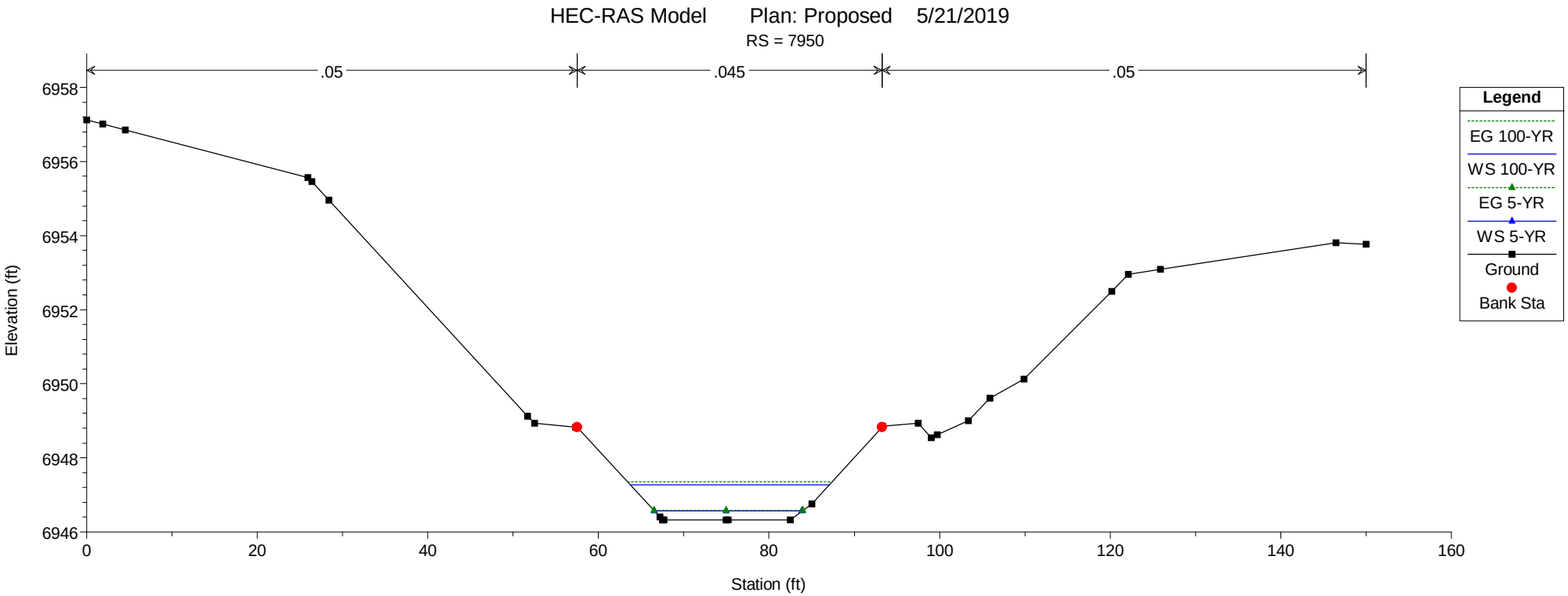

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8046
.05
.045
.05
Elevation (ft)
6960
6958
6956
6954
6952
6950
0
20
40
60
80
100
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

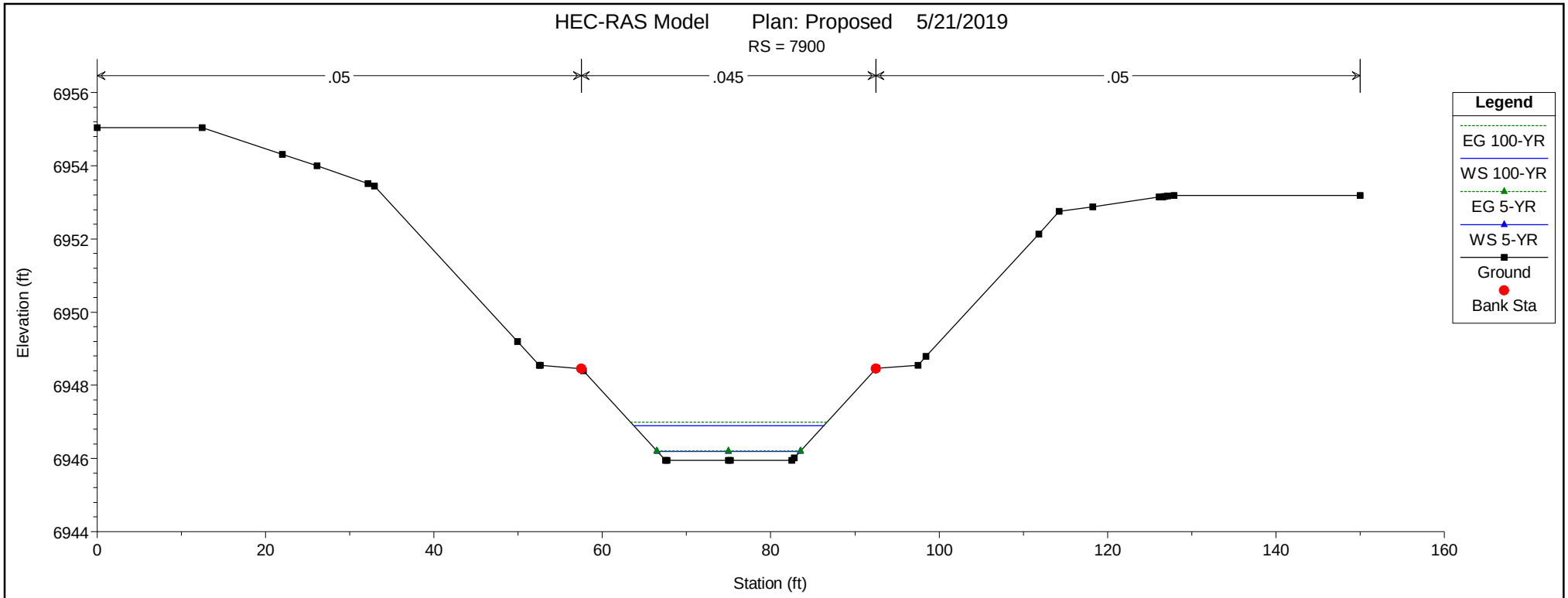

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8041
.05
.045
.05
Elevation (ft)
6960
6958
6956
6954
6952
6950
0
20
40
60
80
100
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

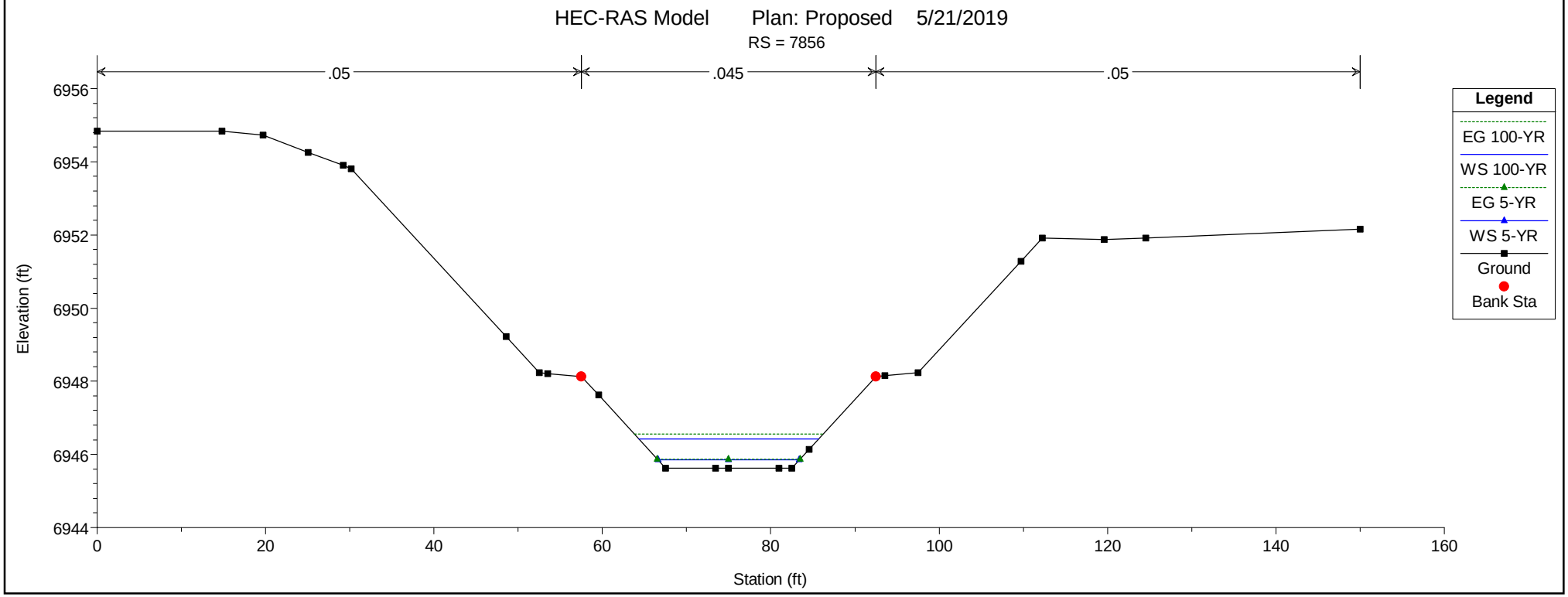

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8031
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

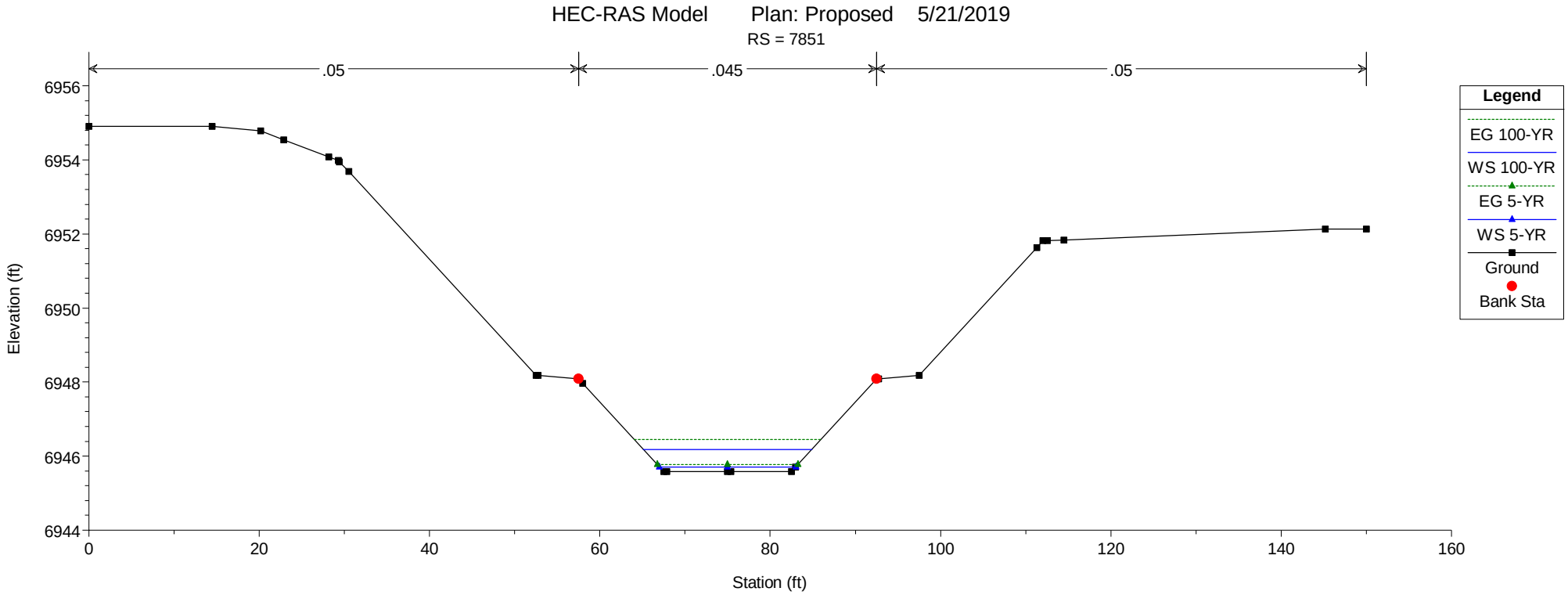

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8023
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

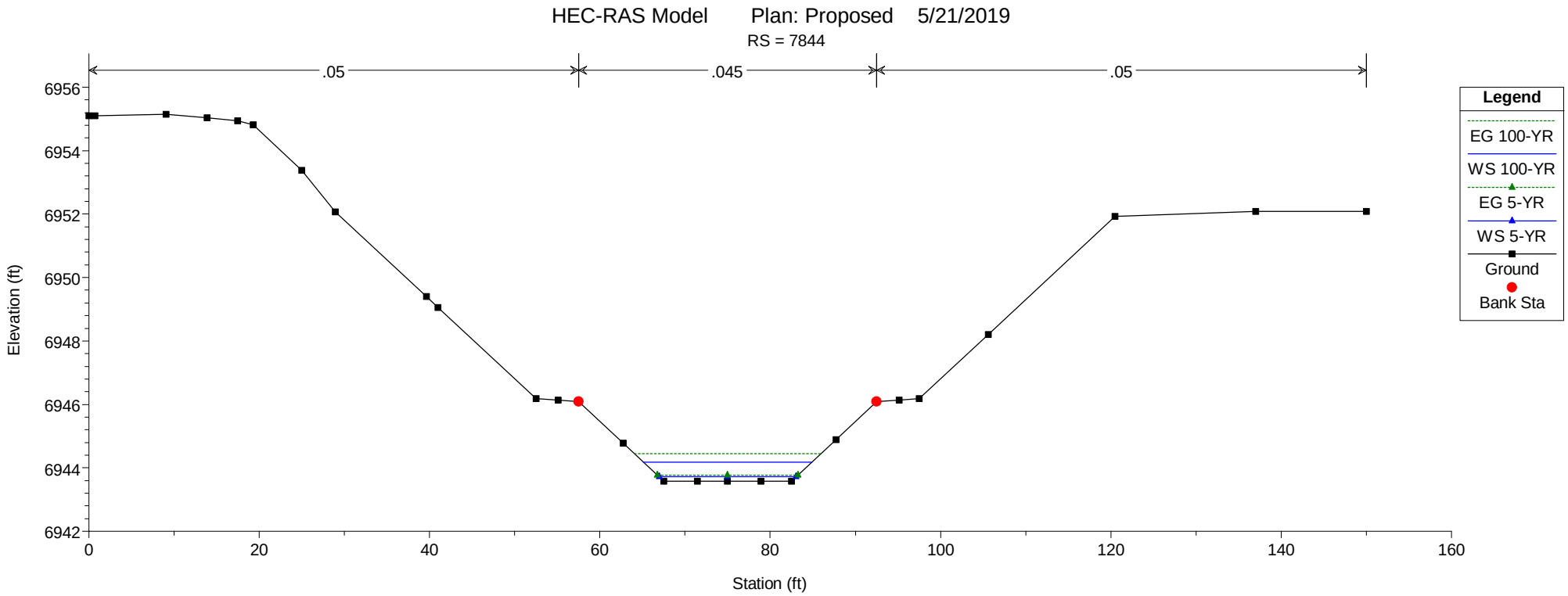

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 8000
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

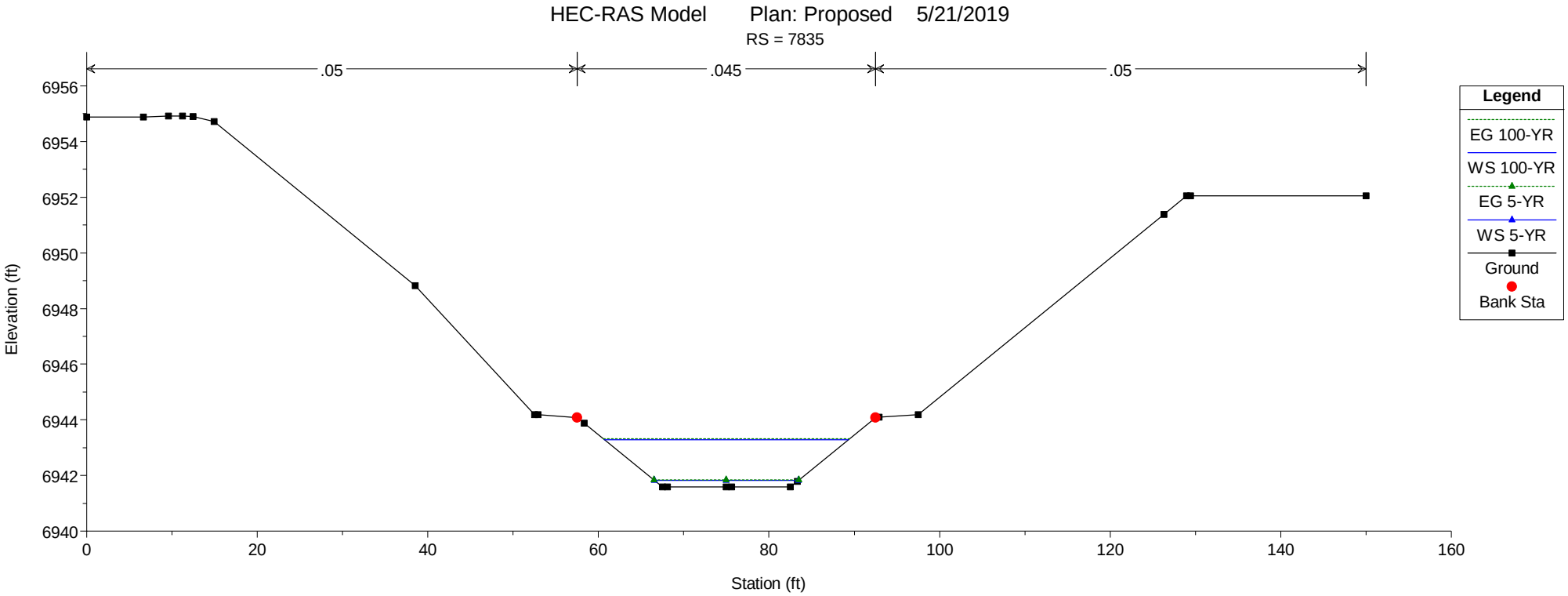

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

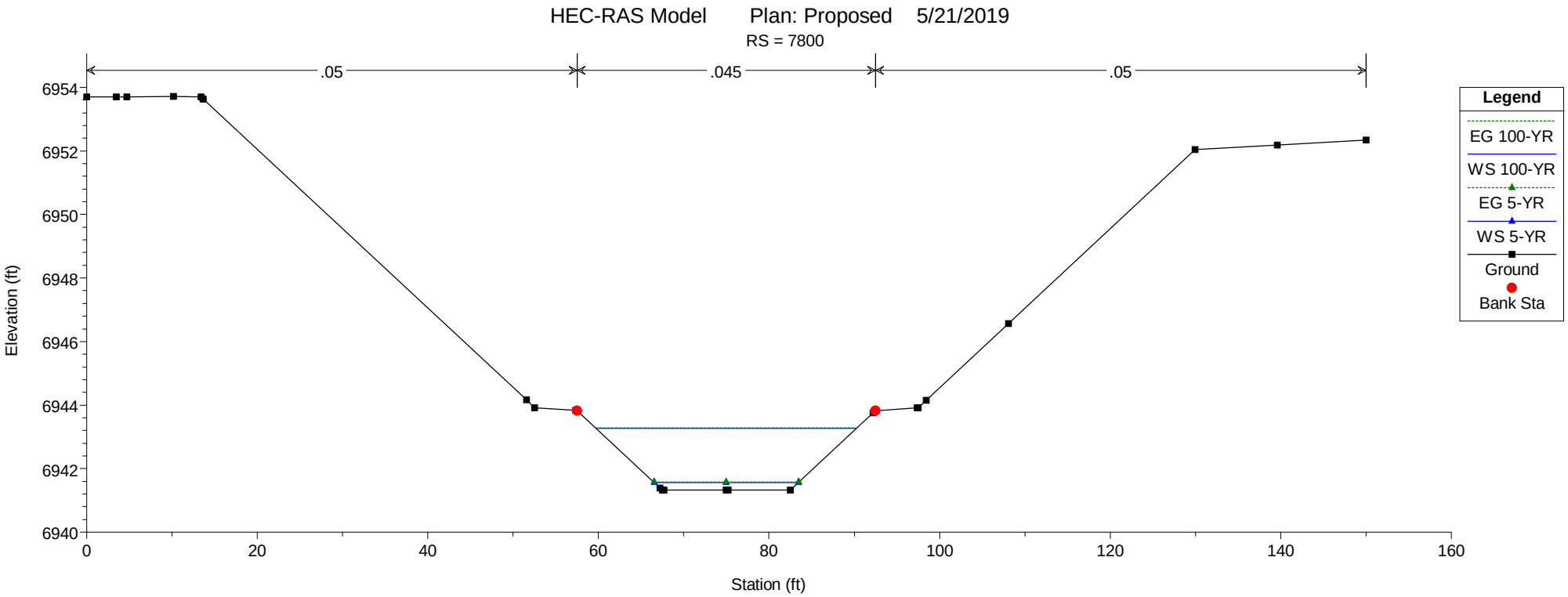

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7900
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

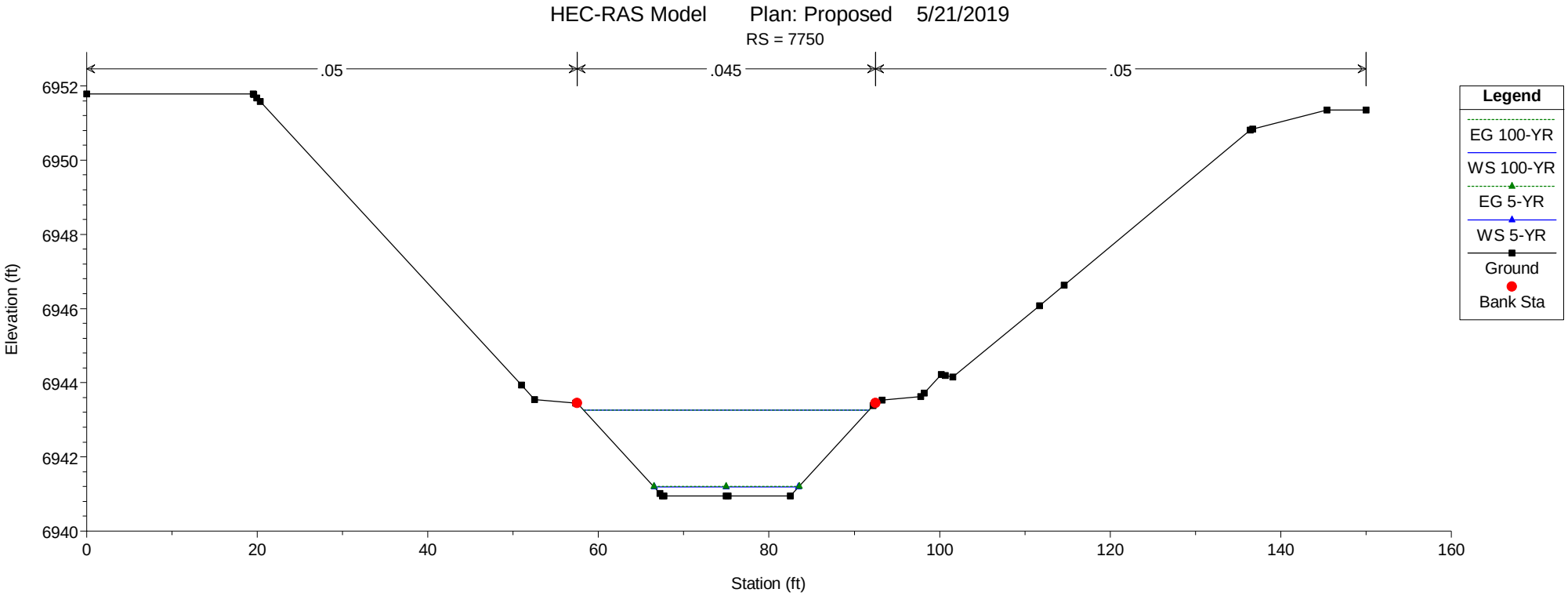

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7856
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

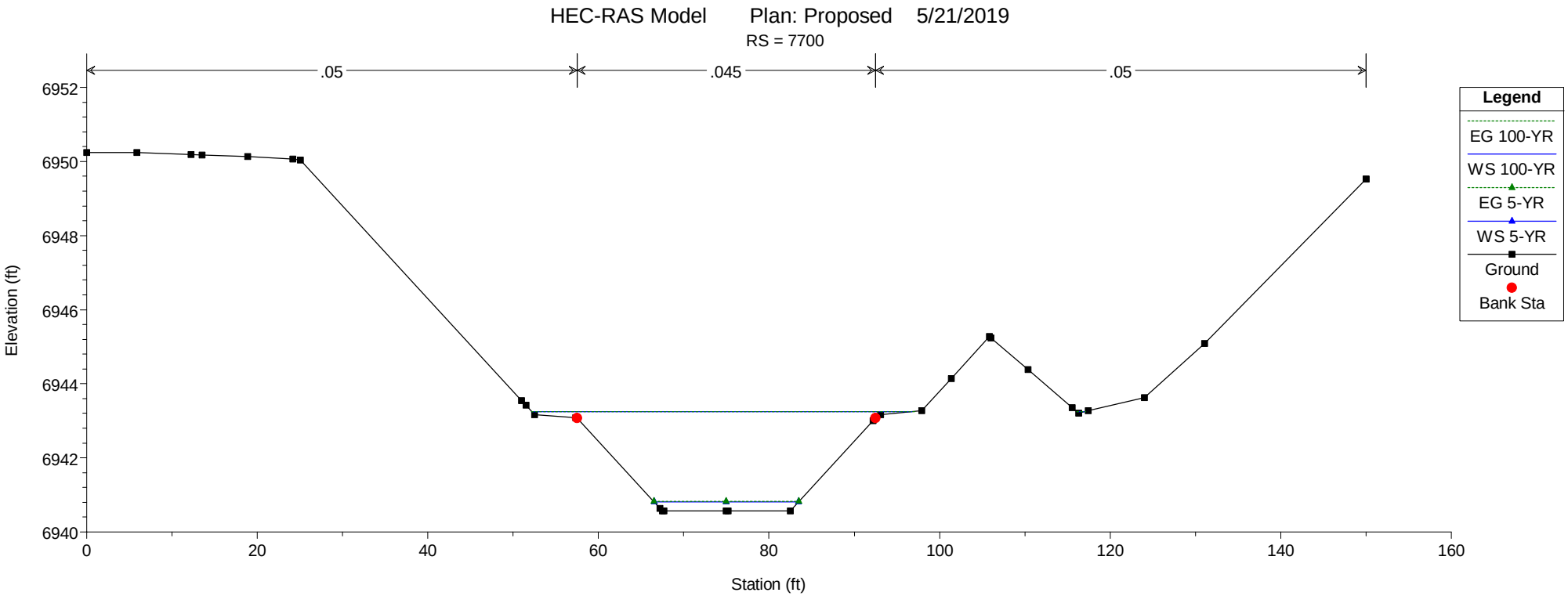

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7851
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

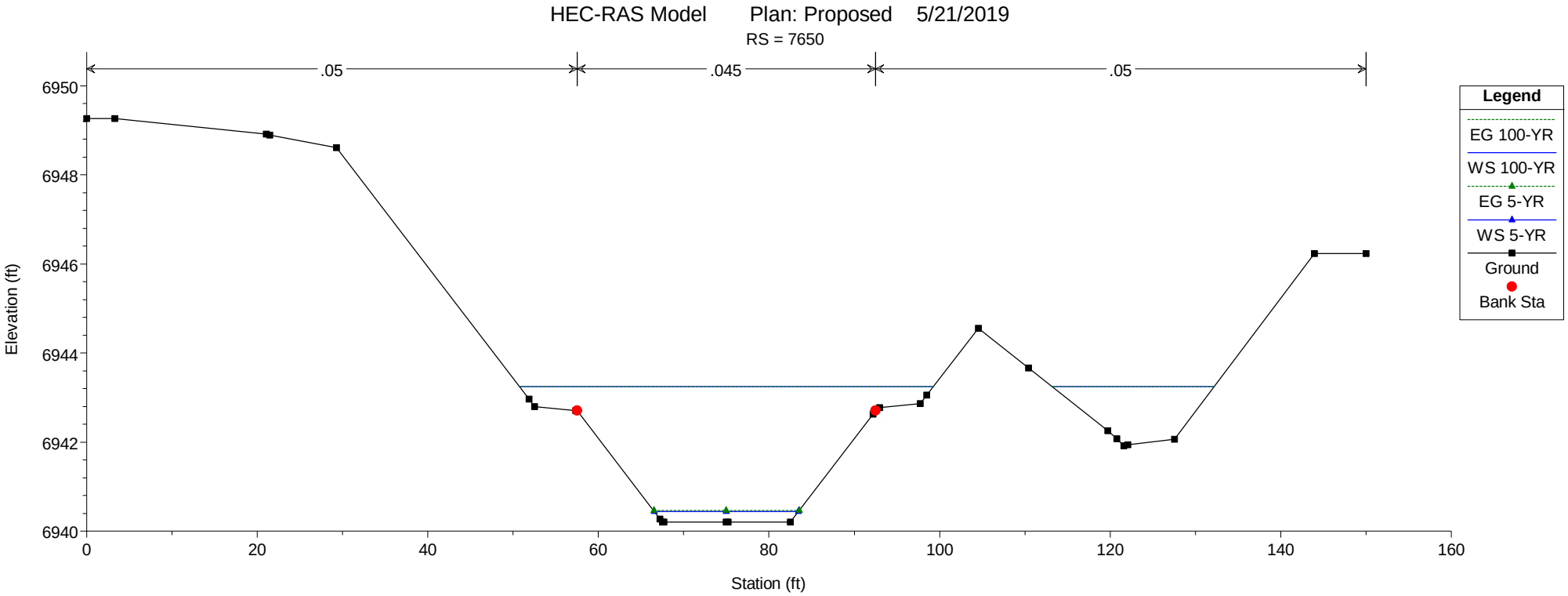

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7844
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

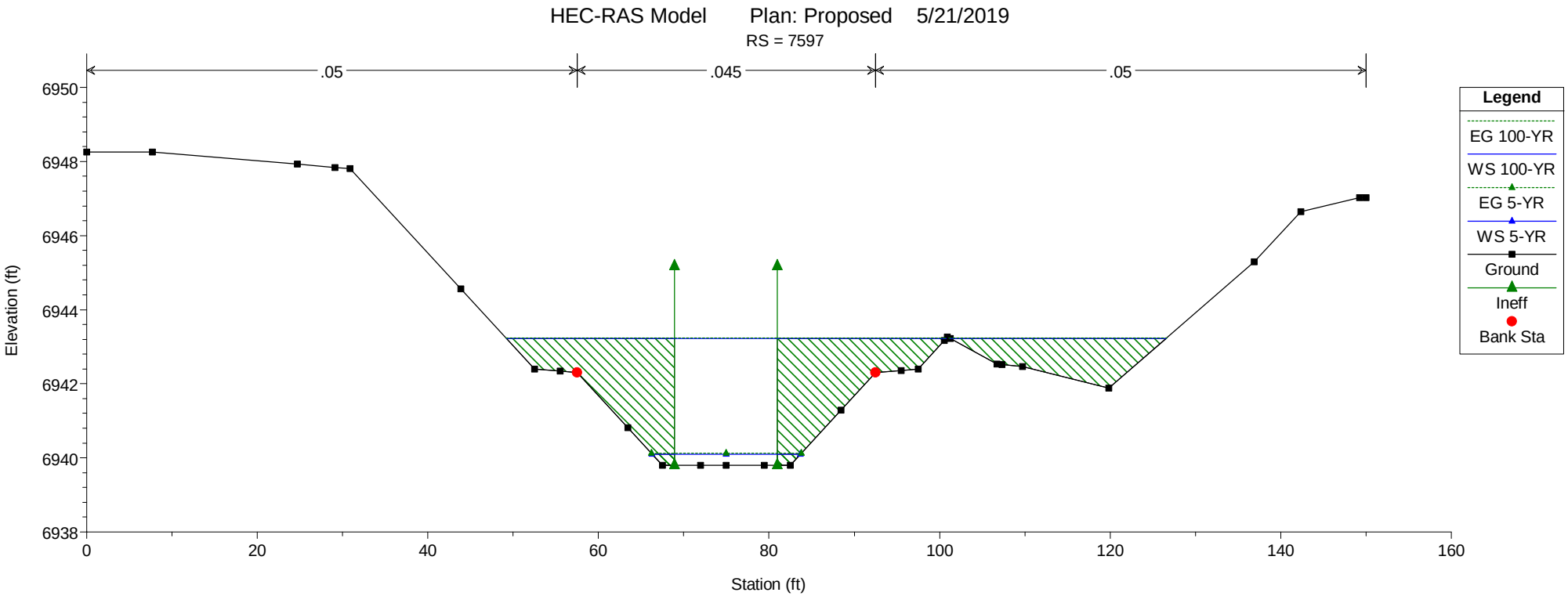

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7835
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

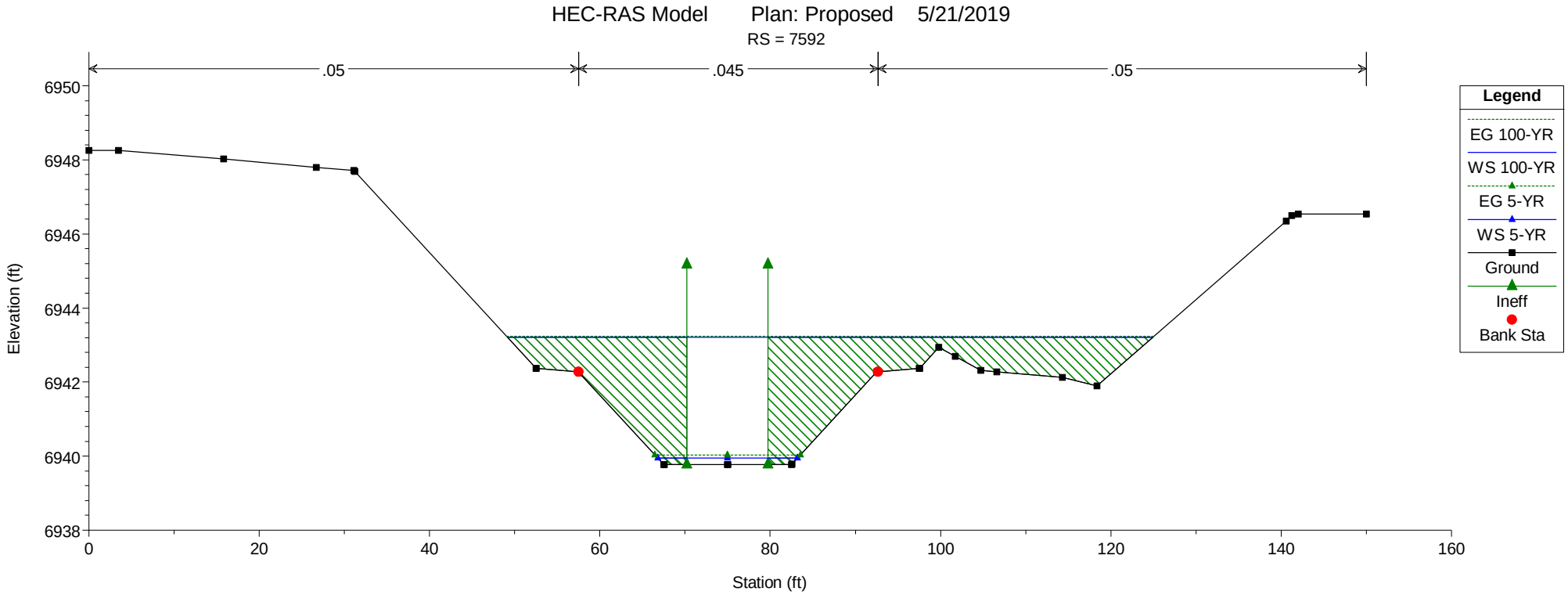

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7800
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

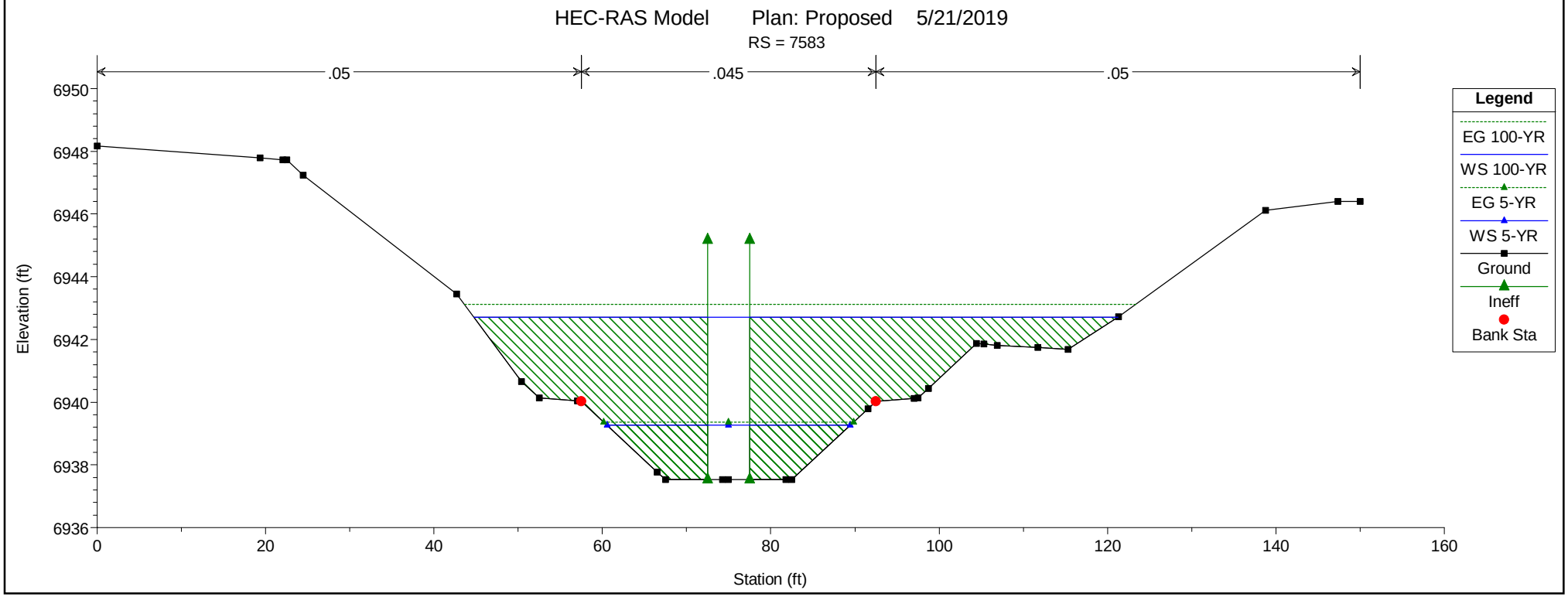

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

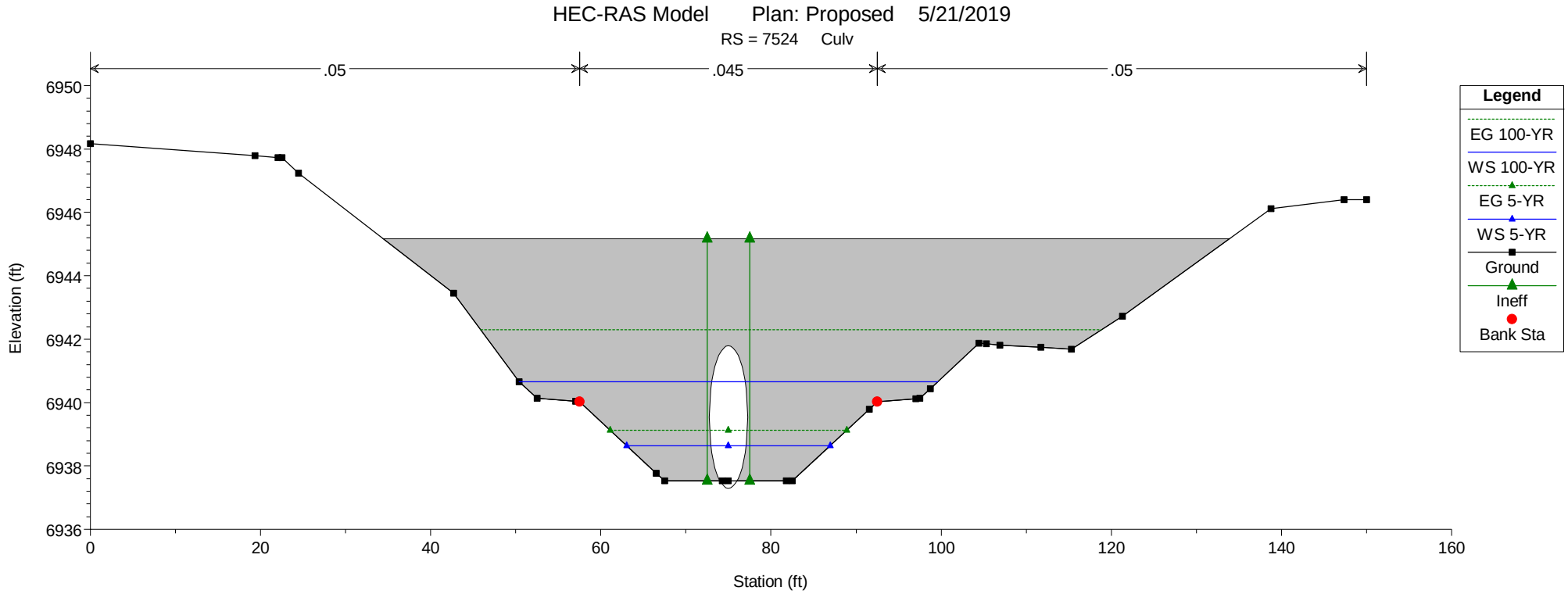

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

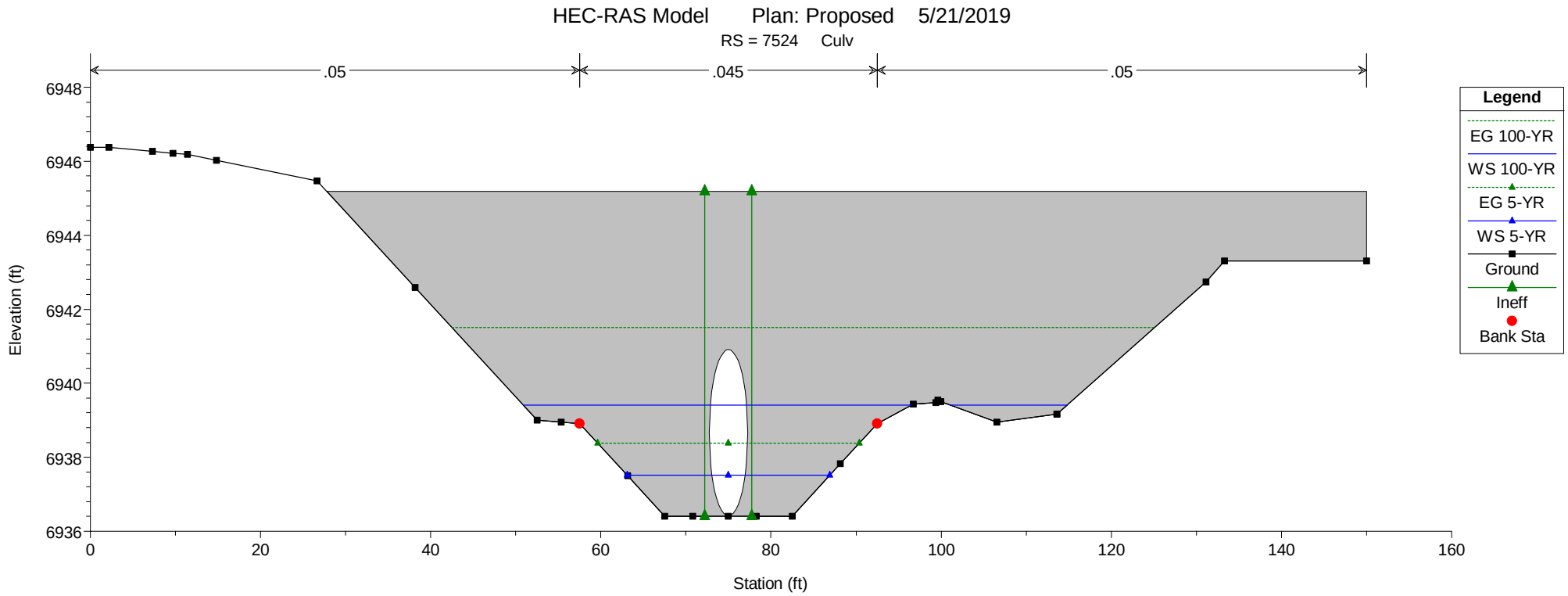

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7650
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

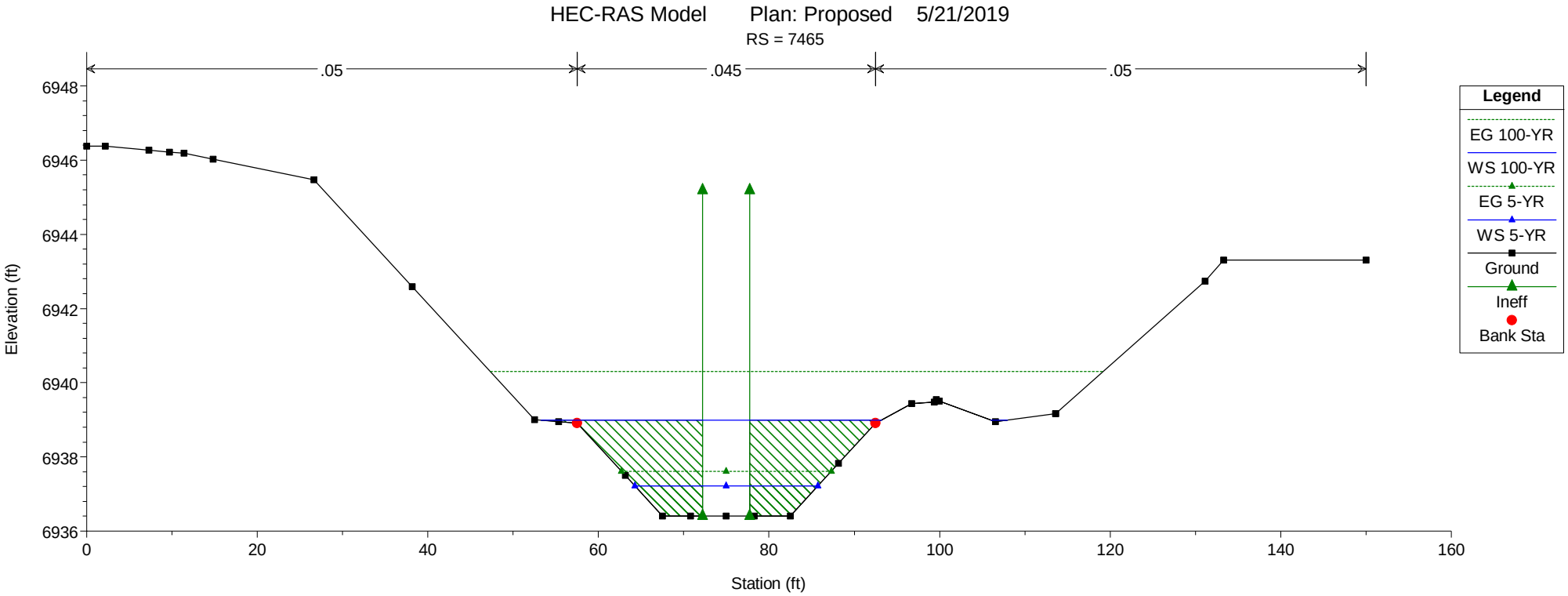

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7597
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

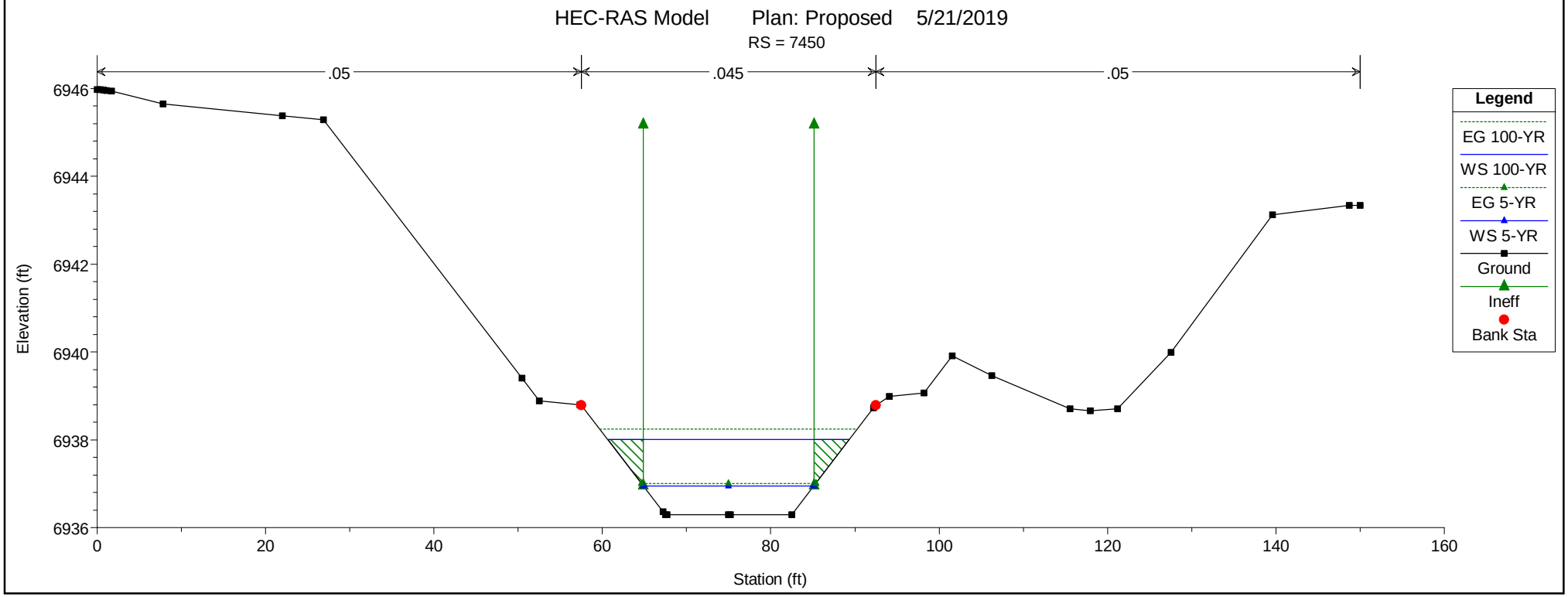

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7592
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

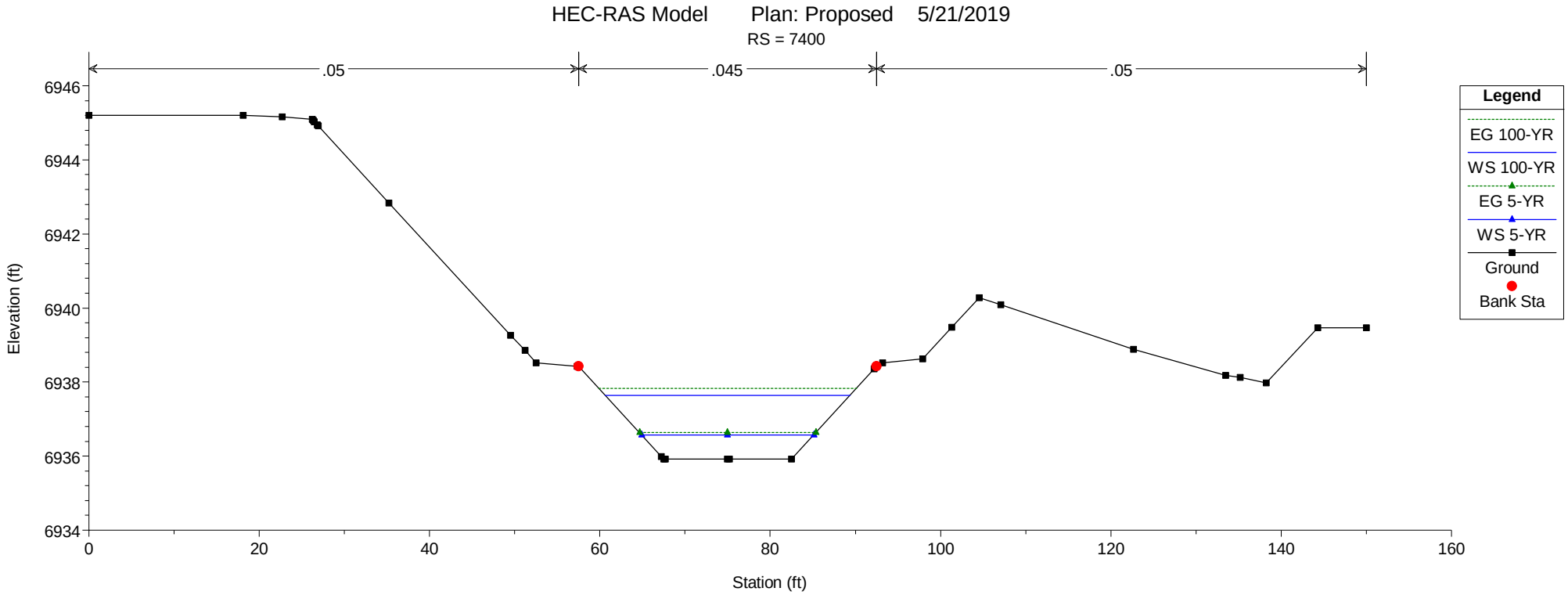

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7583
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

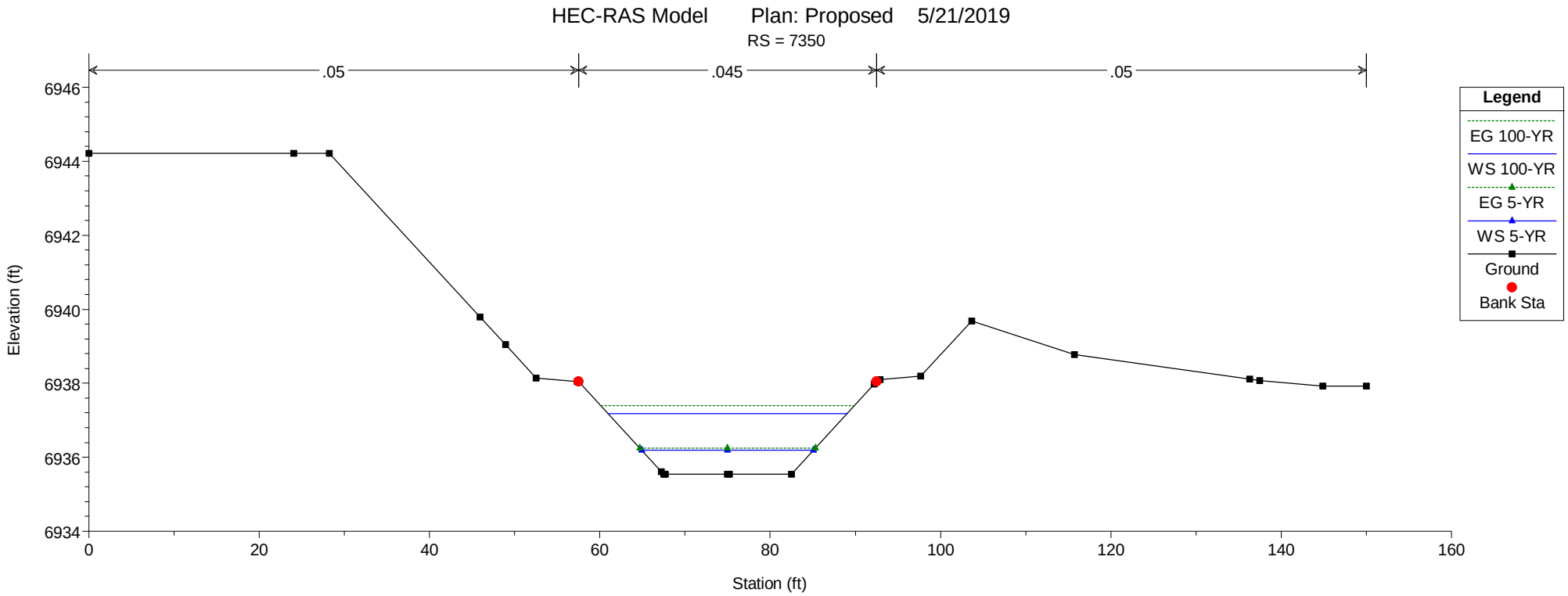

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7524 Culv
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

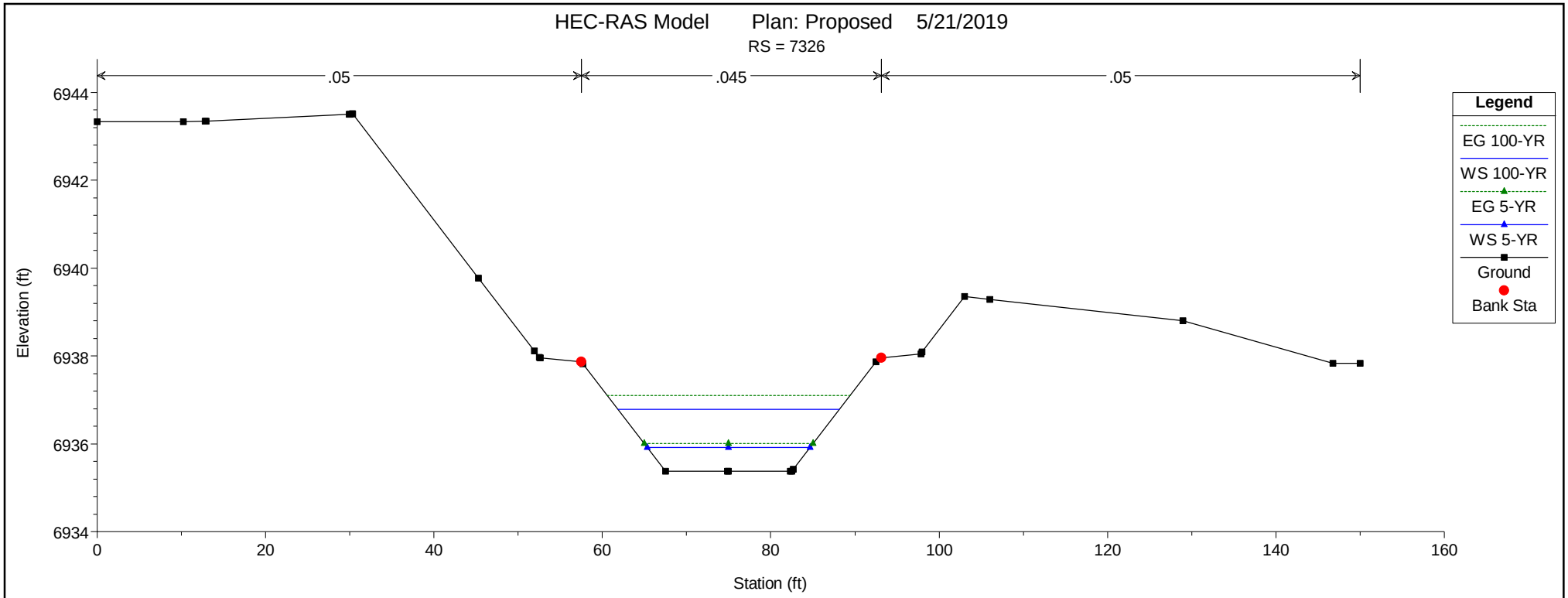

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7524 Culv
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

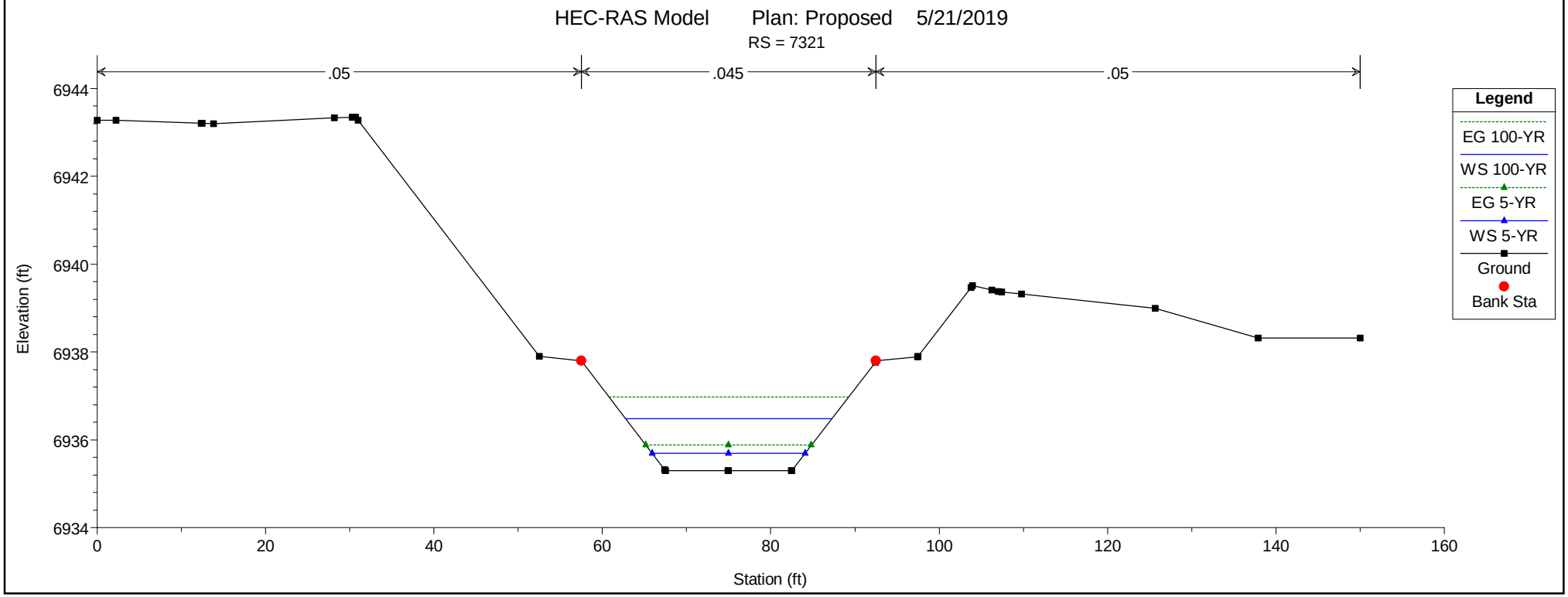

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7465
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
6936
6938
6940
6942
6944
6946
6948
0
20
40
60
80
100
120
140
160

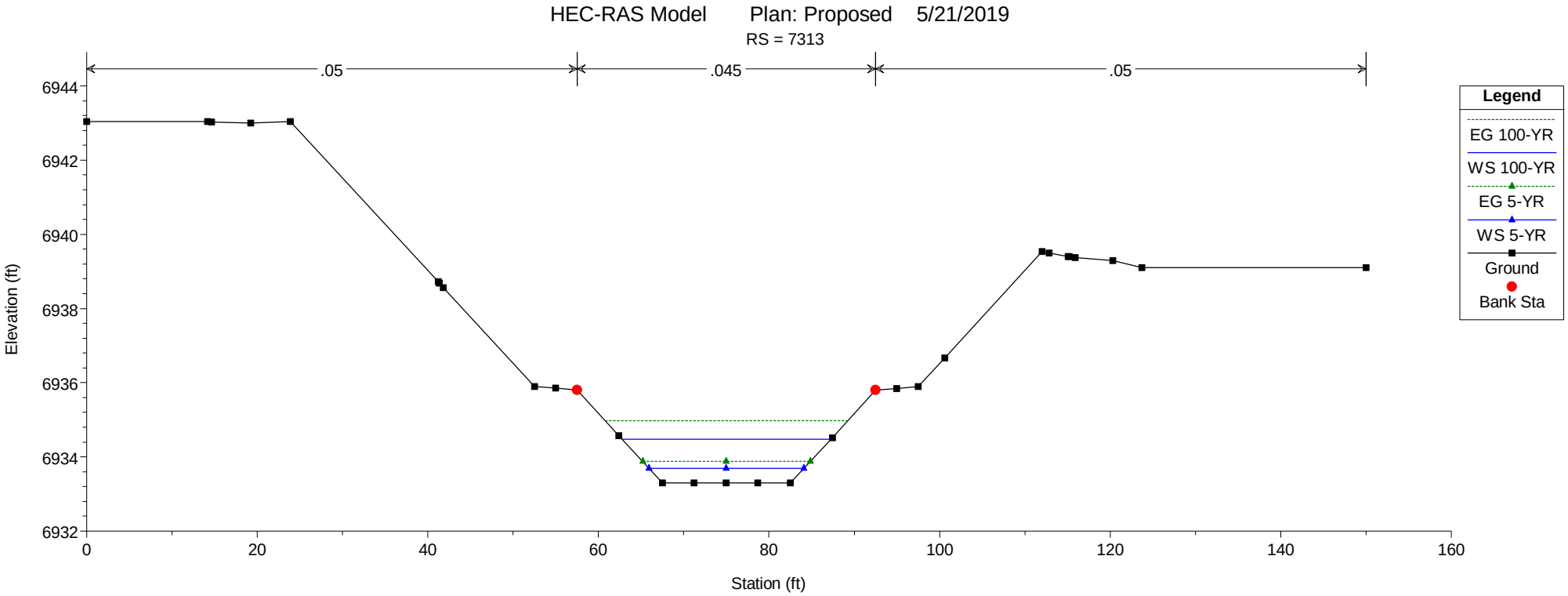

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7450
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
6936
6938
6940
6942
6944
6946
0
20
40
60
80
100
120
140
160

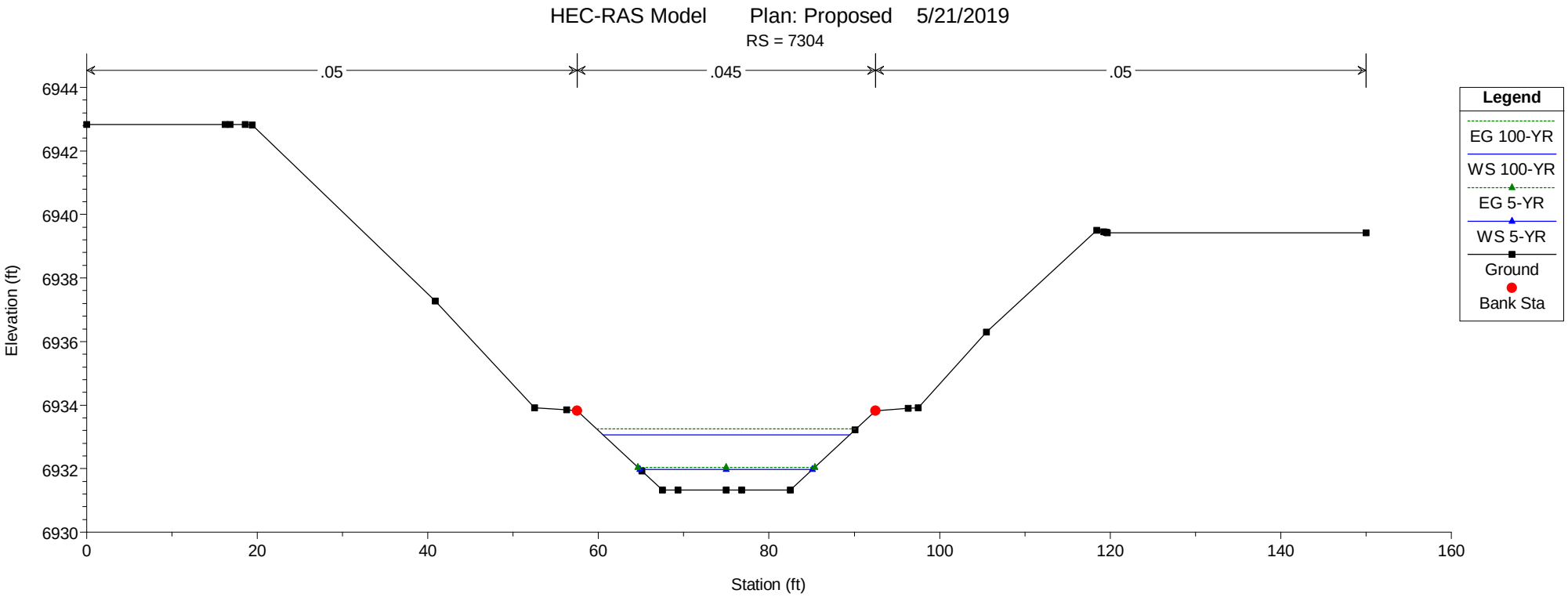

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

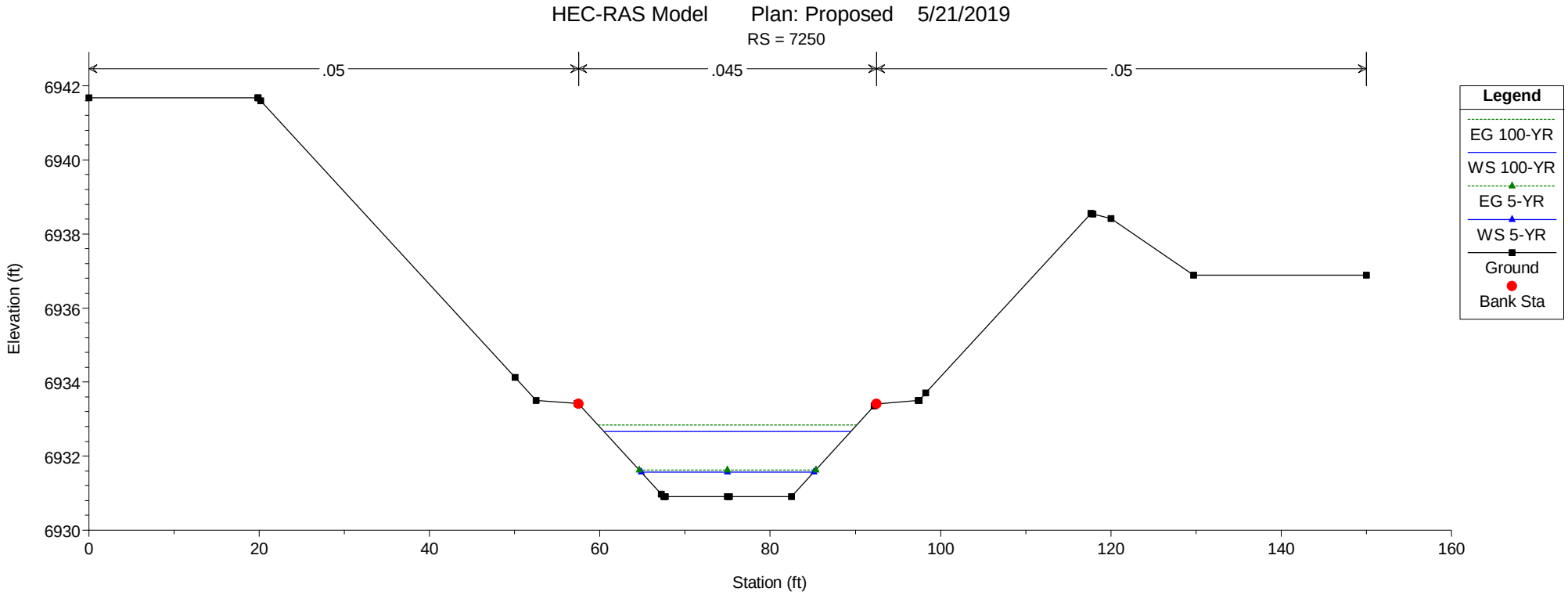

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

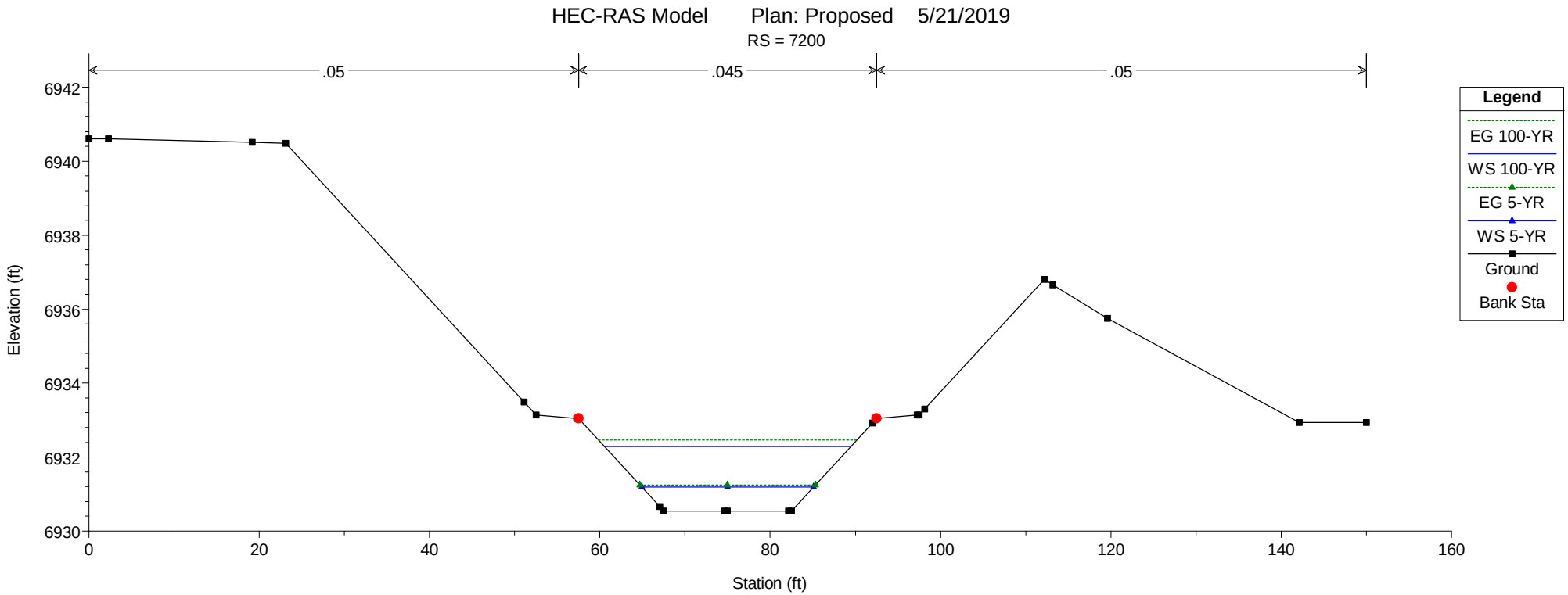

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7326
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

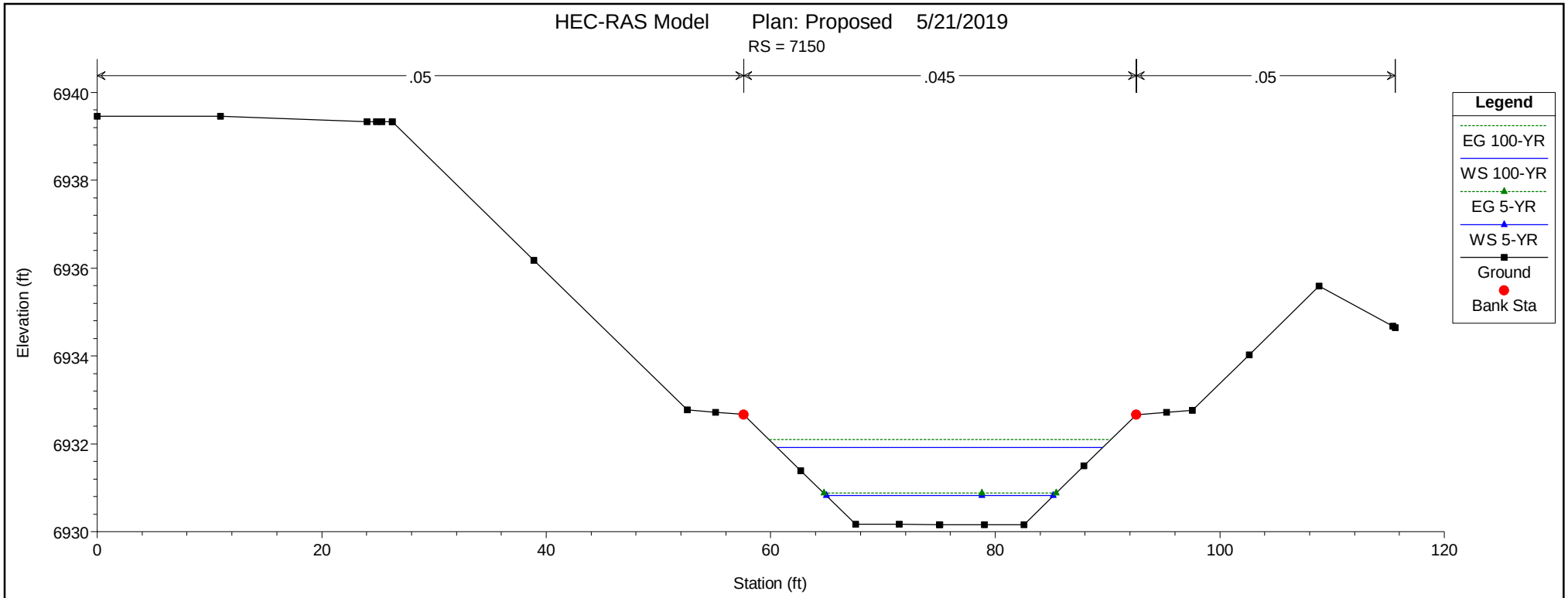

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7321
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

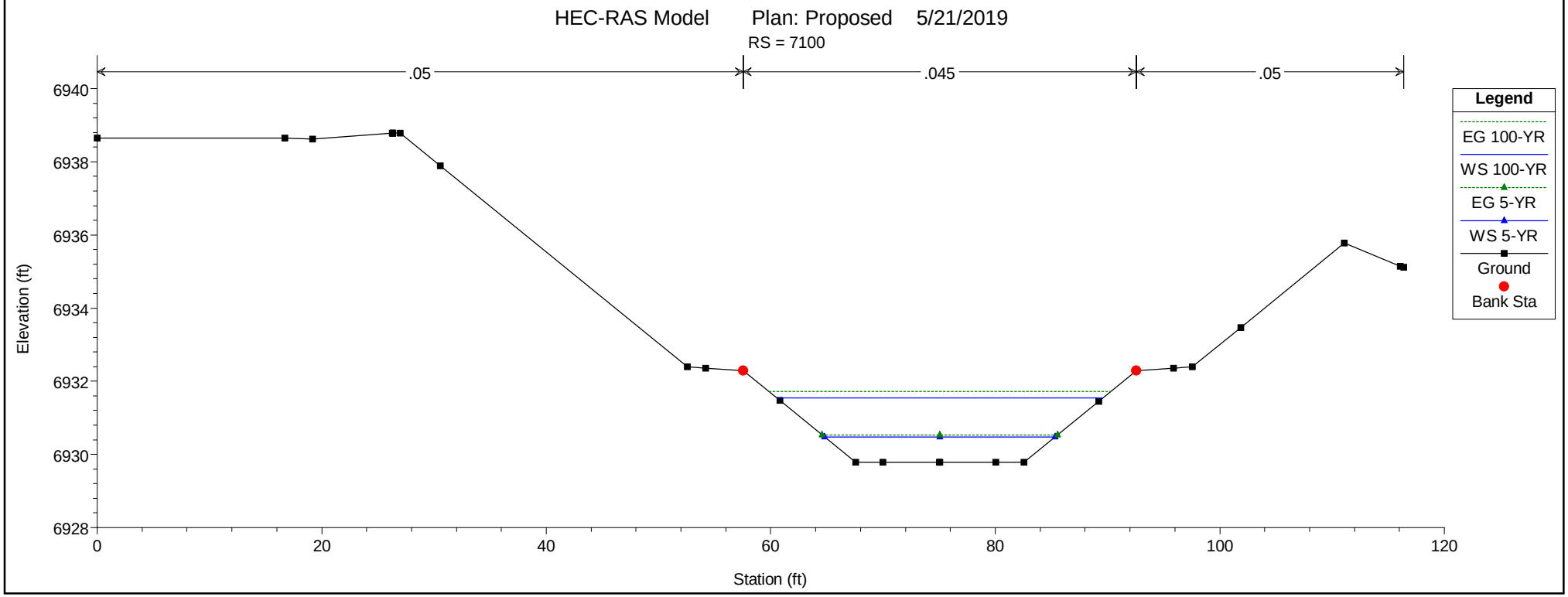

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7313
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

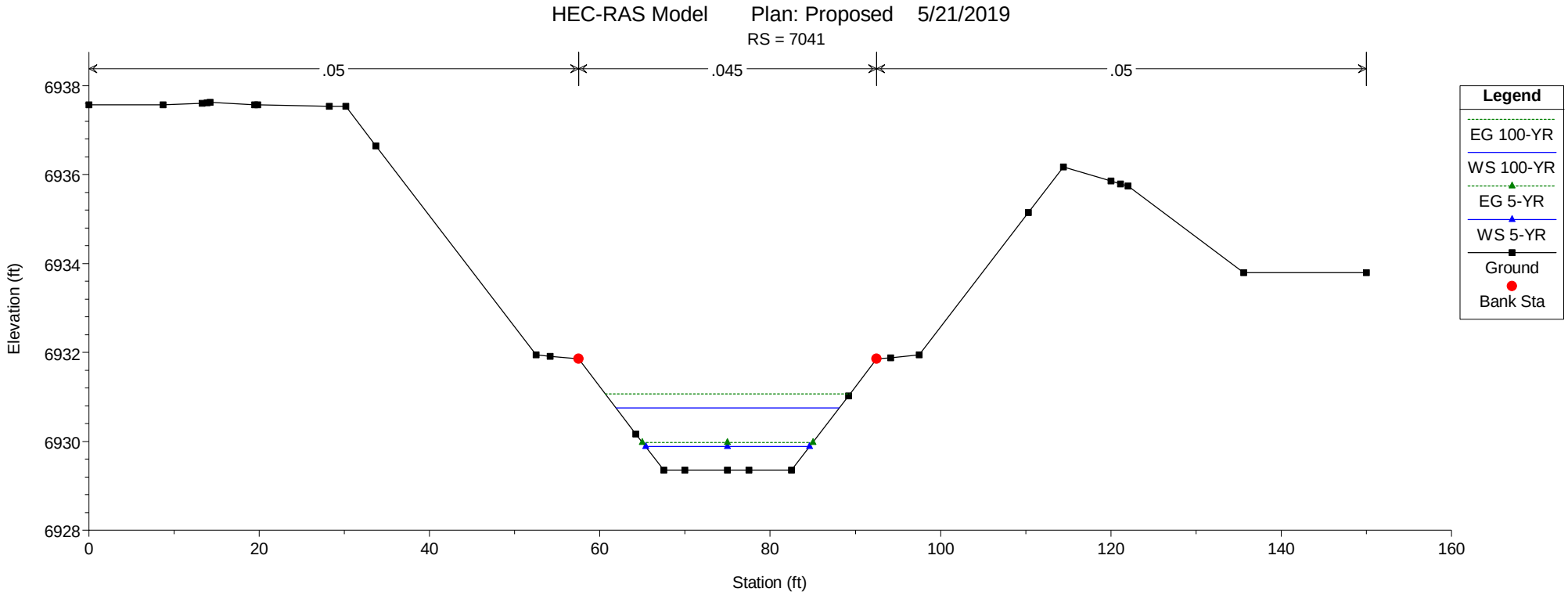

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7304
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

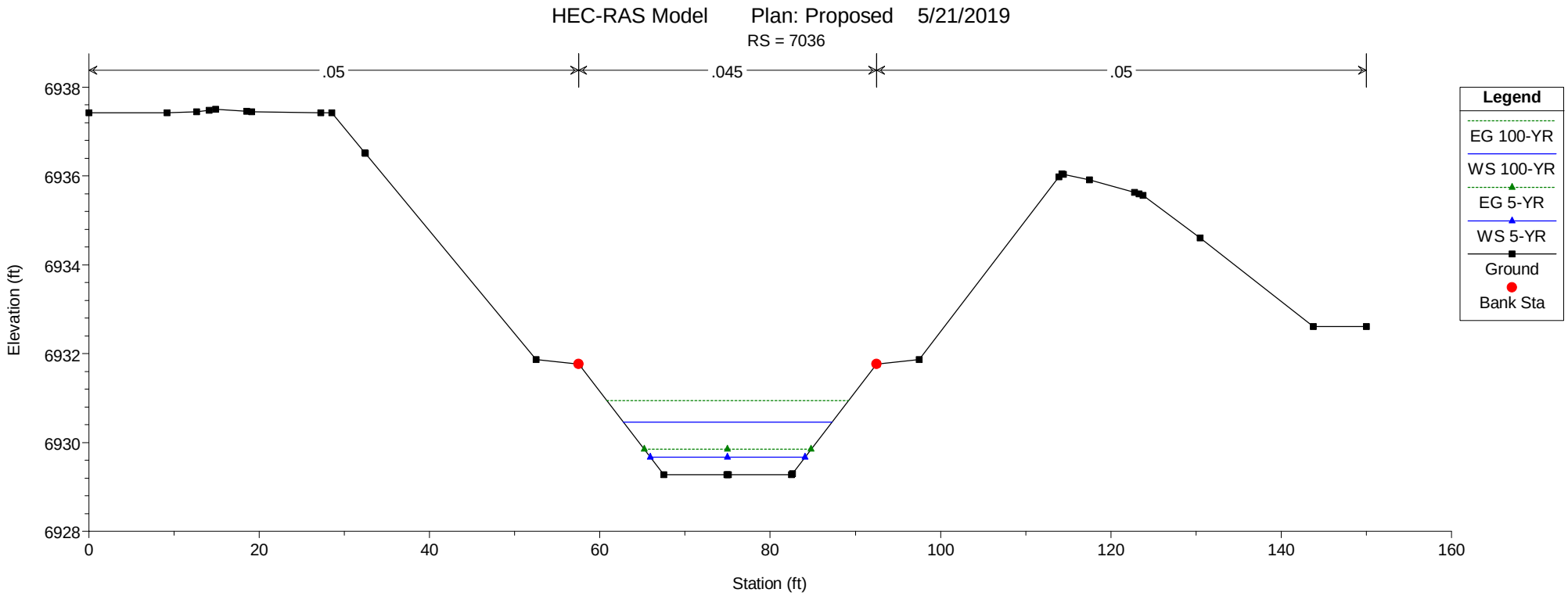

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7250
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

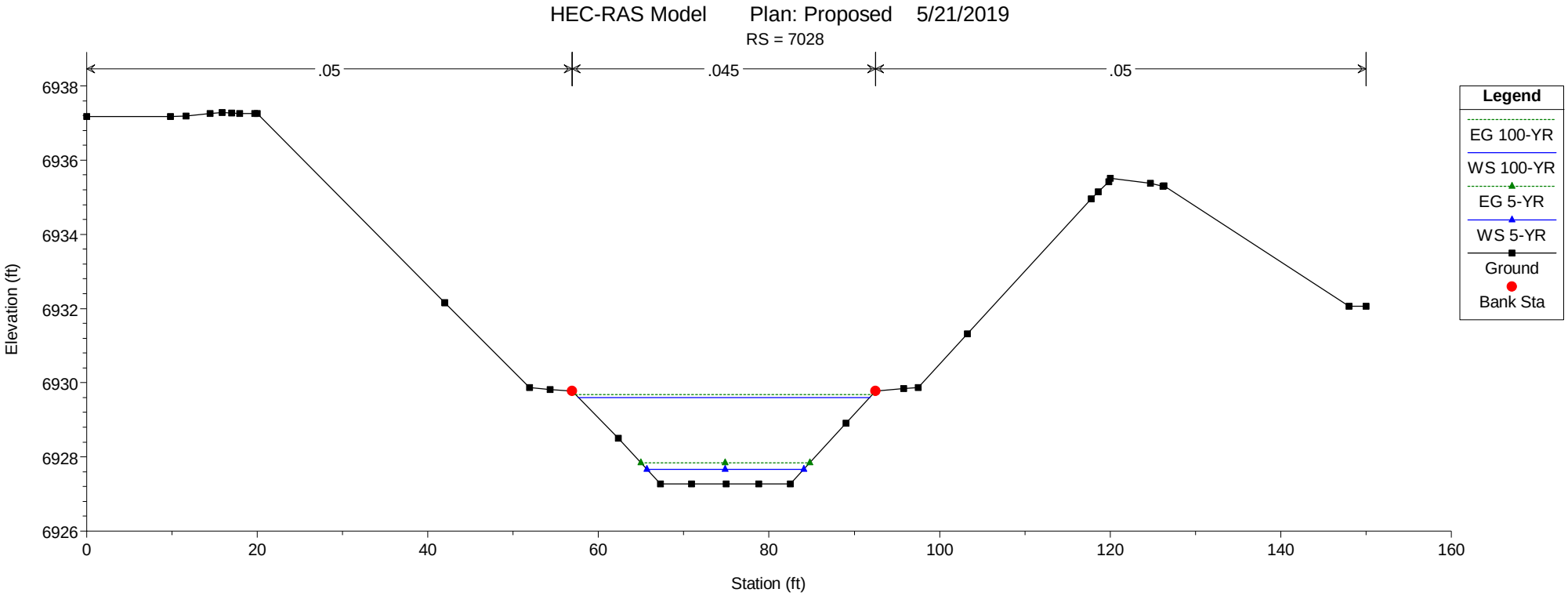

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7200
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

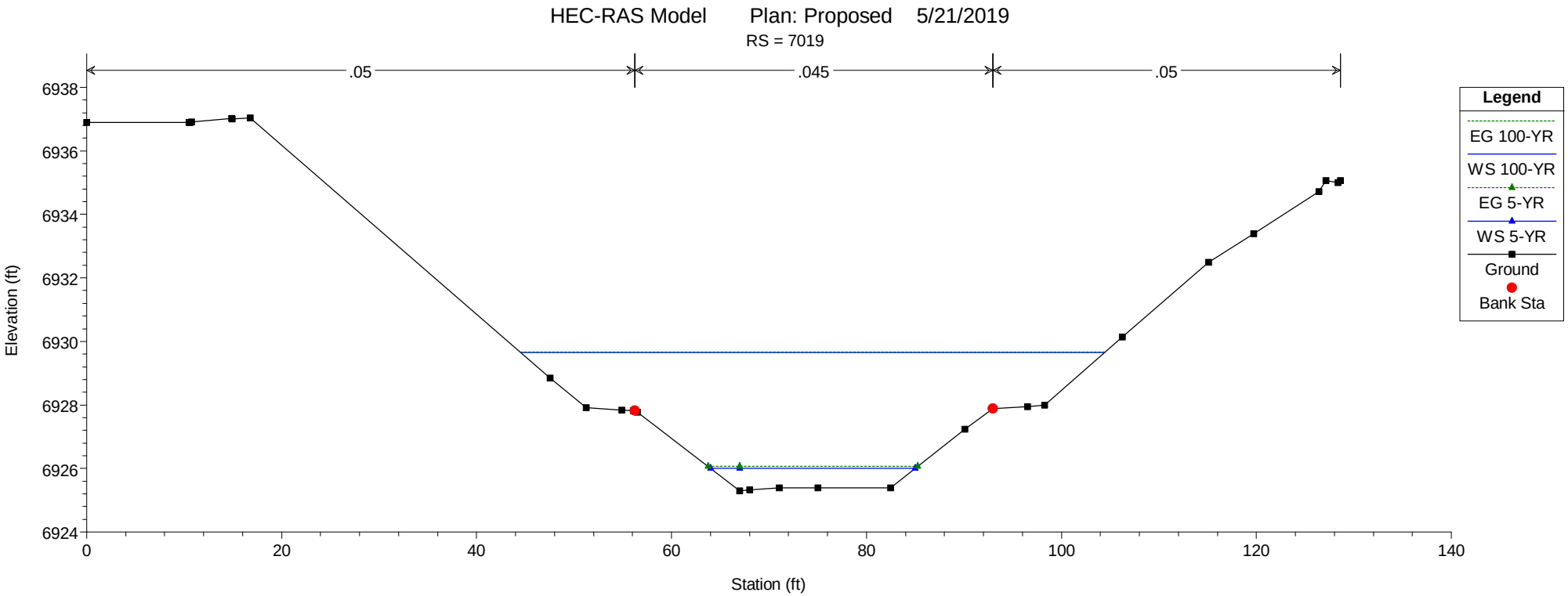

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7150
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

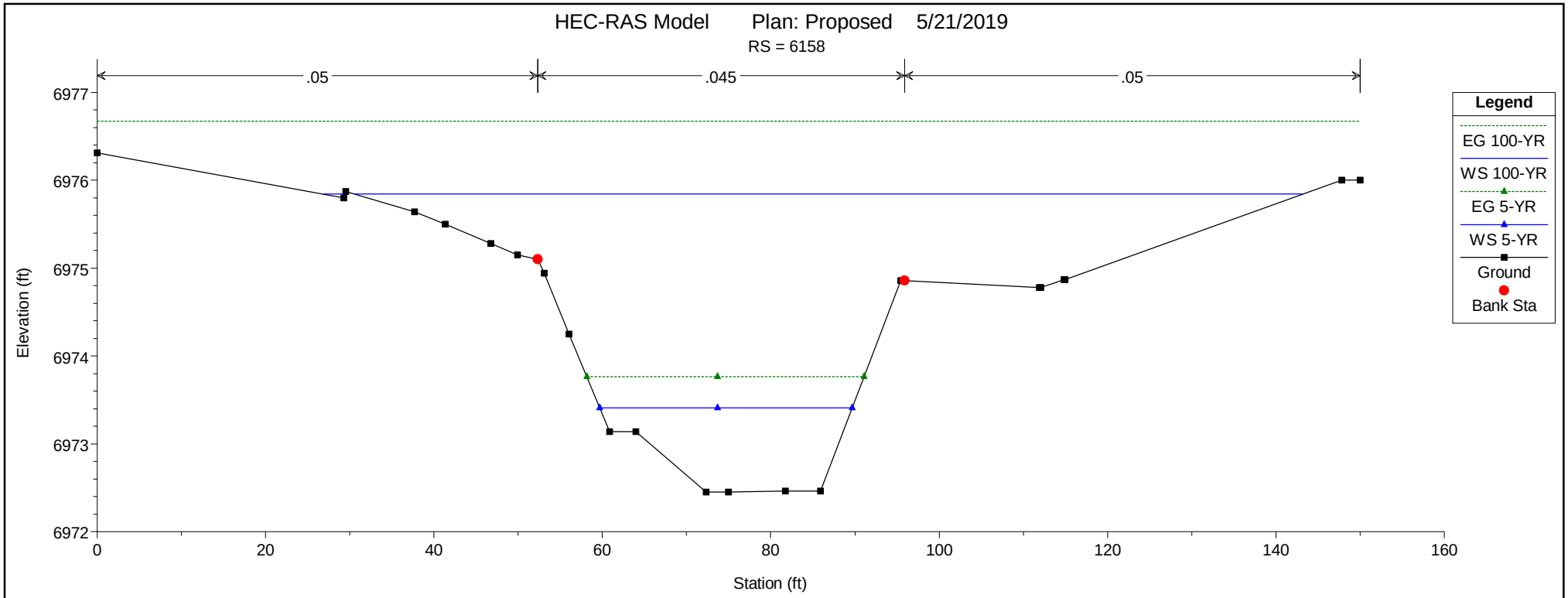

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

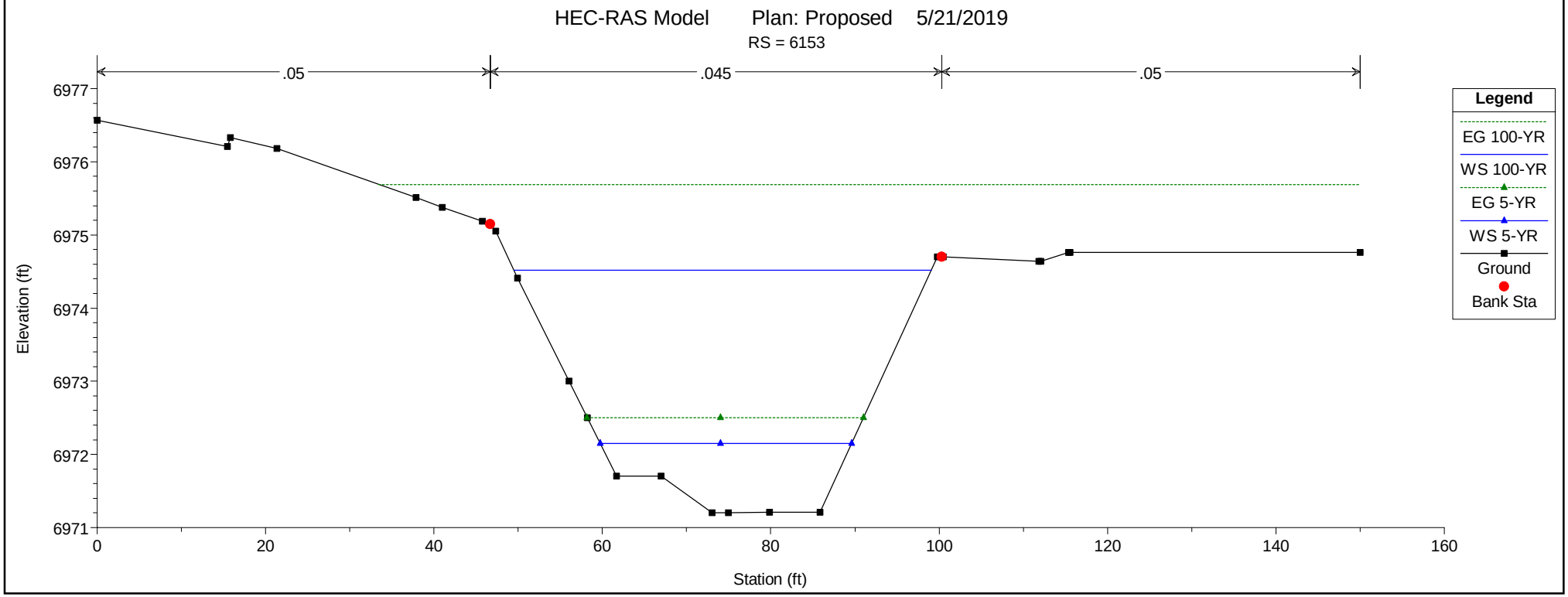

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7041
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

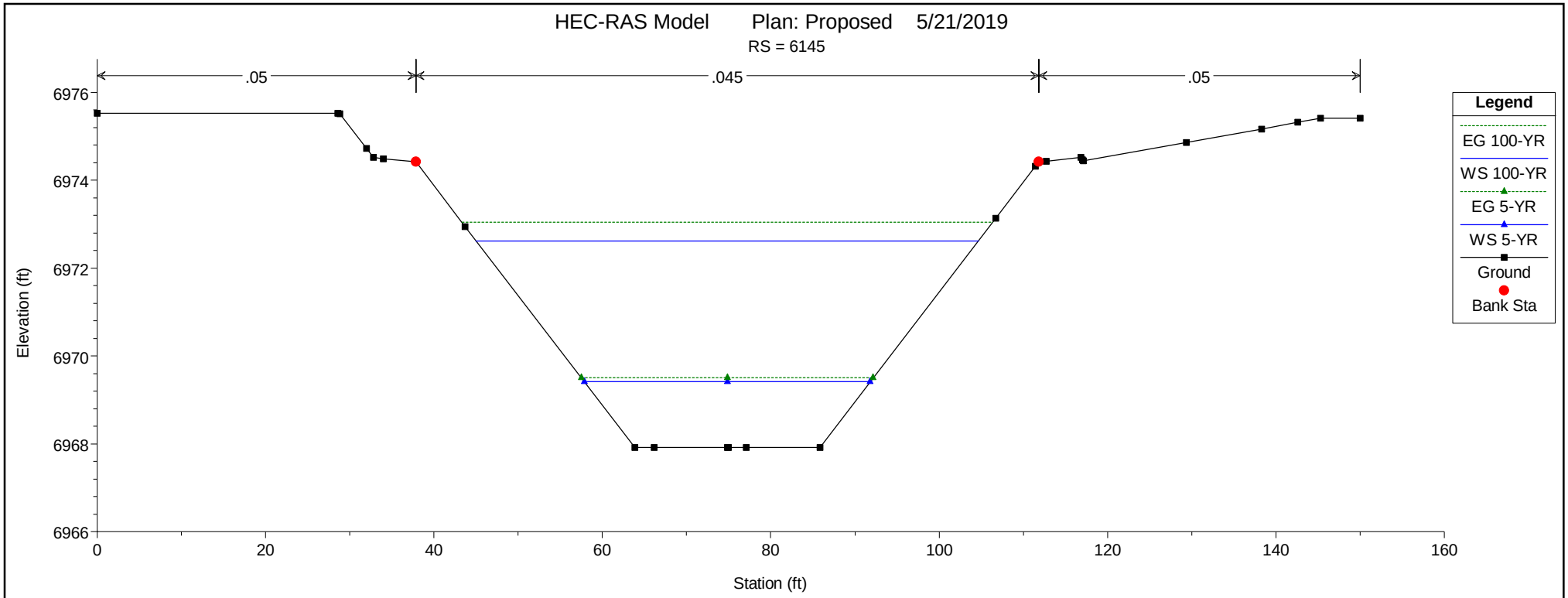

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7036
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

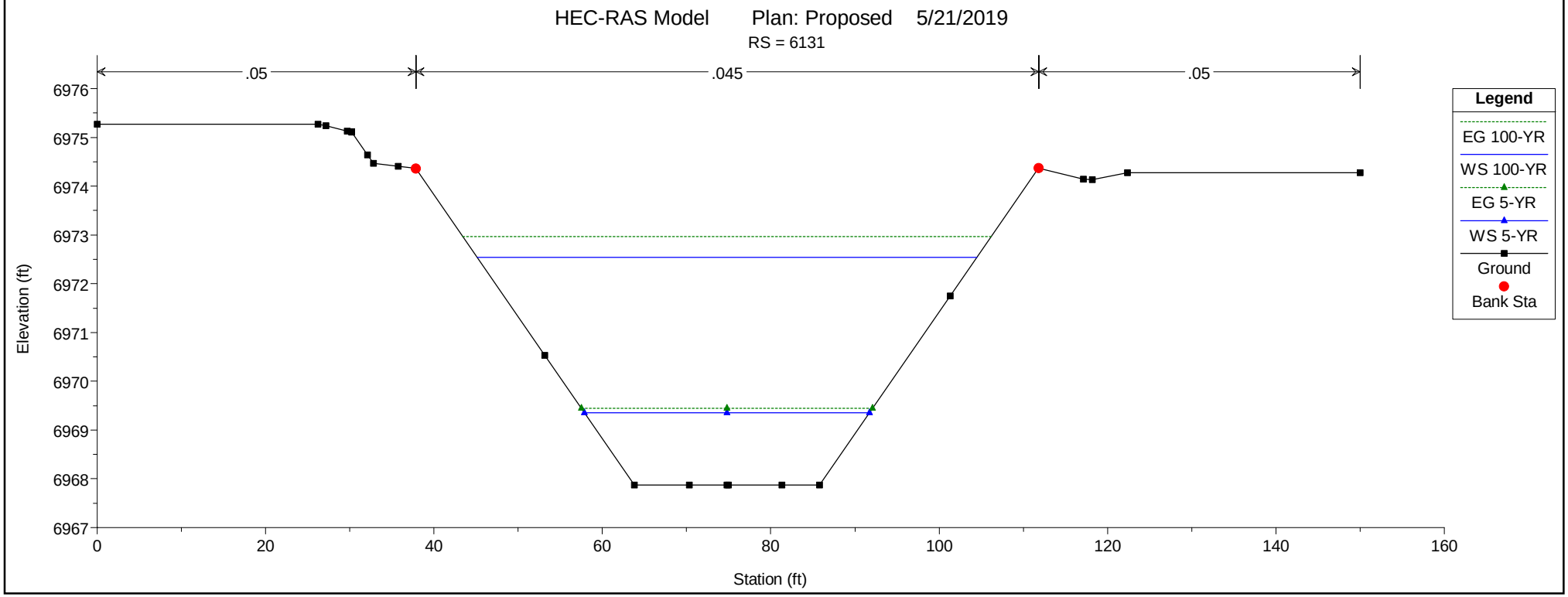

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7028
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

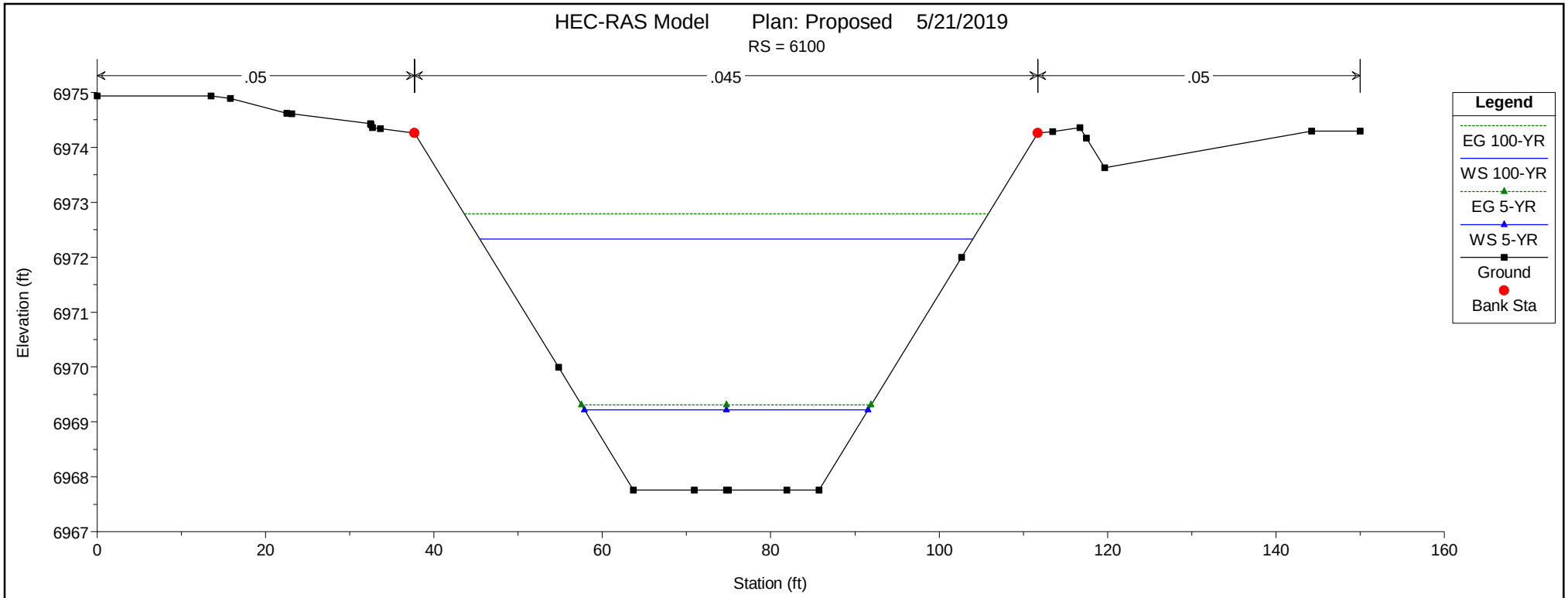

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 7019
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

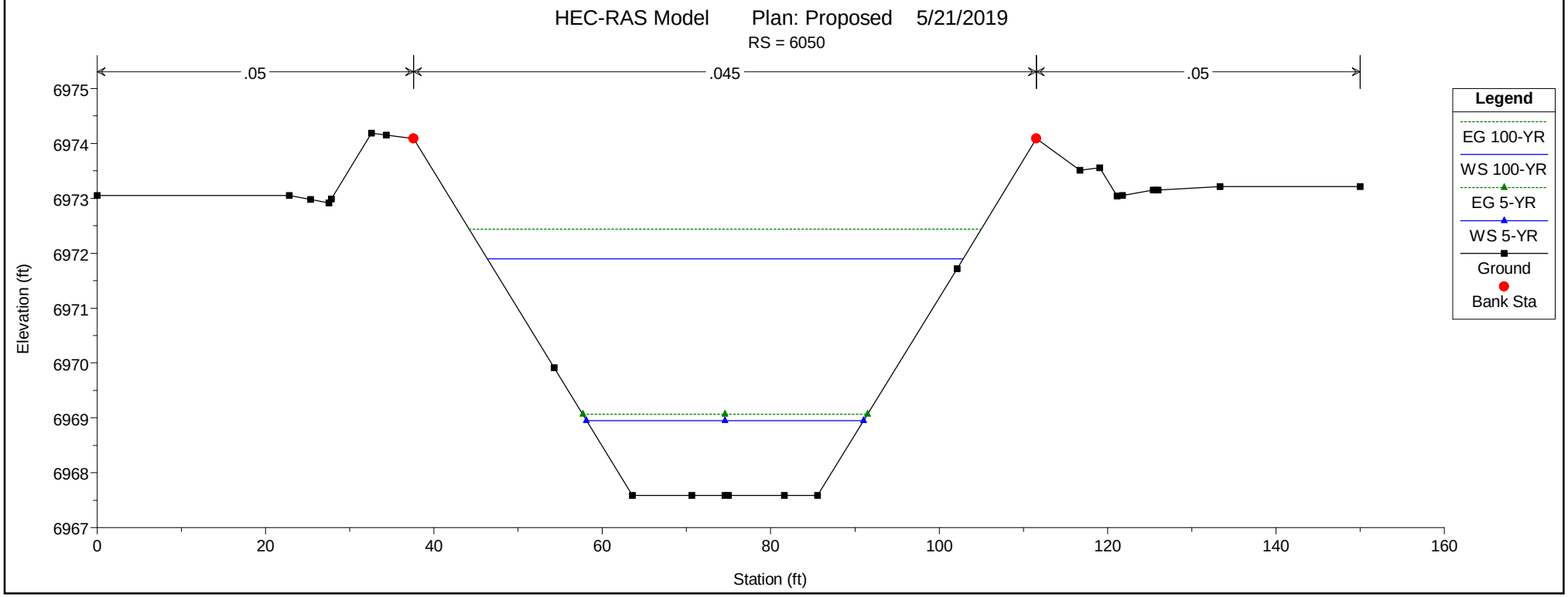

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6158
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6977
6976
6975
6974
6973
6972
0
20
40
60
80
100
120
140
160

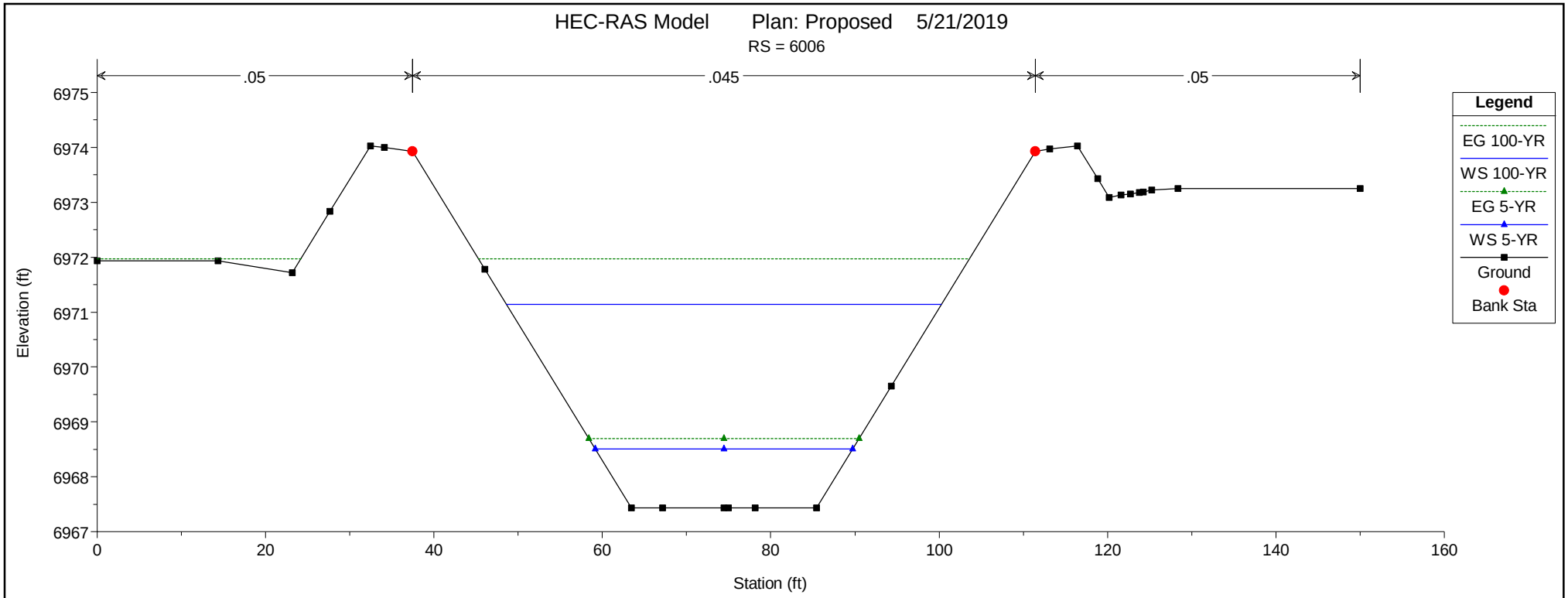

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6153
.05
.045
.05
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
6977
6976
6975
6974
6973
6972
6971
0
20
40
60
80
100
120
140
160

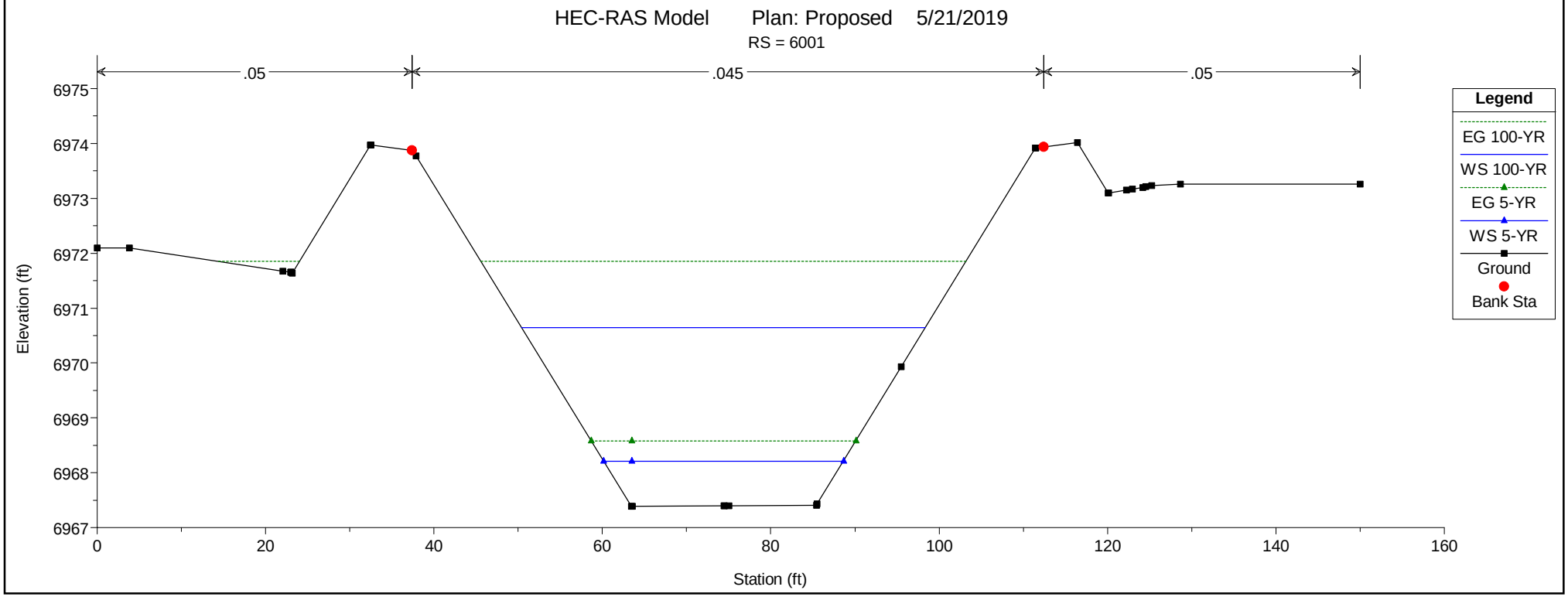

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6145
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

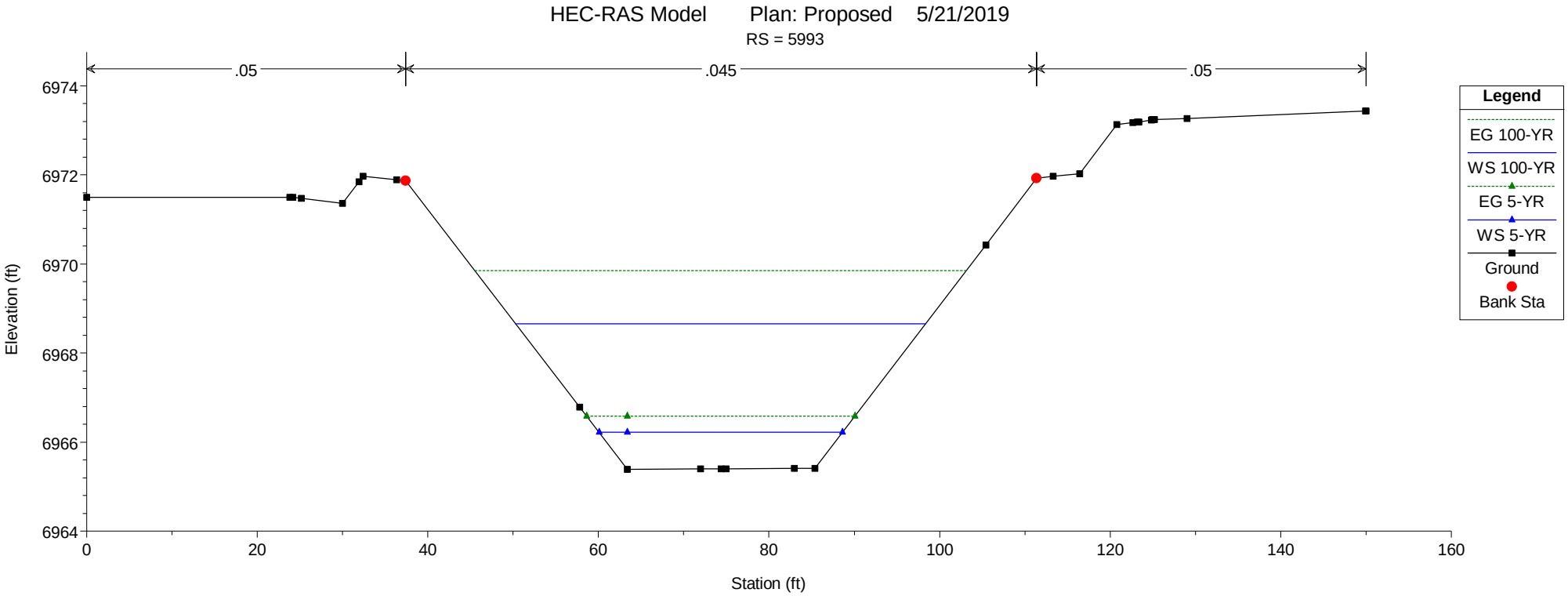

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6131
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

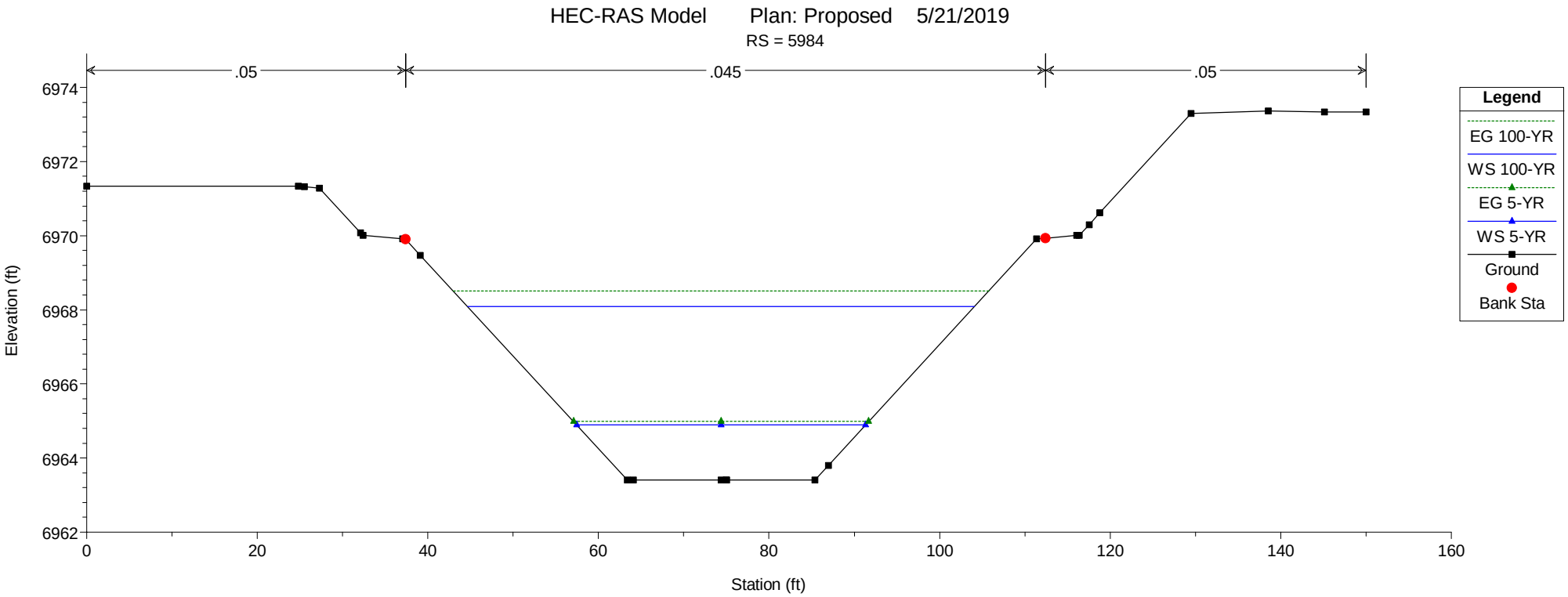

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6100
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

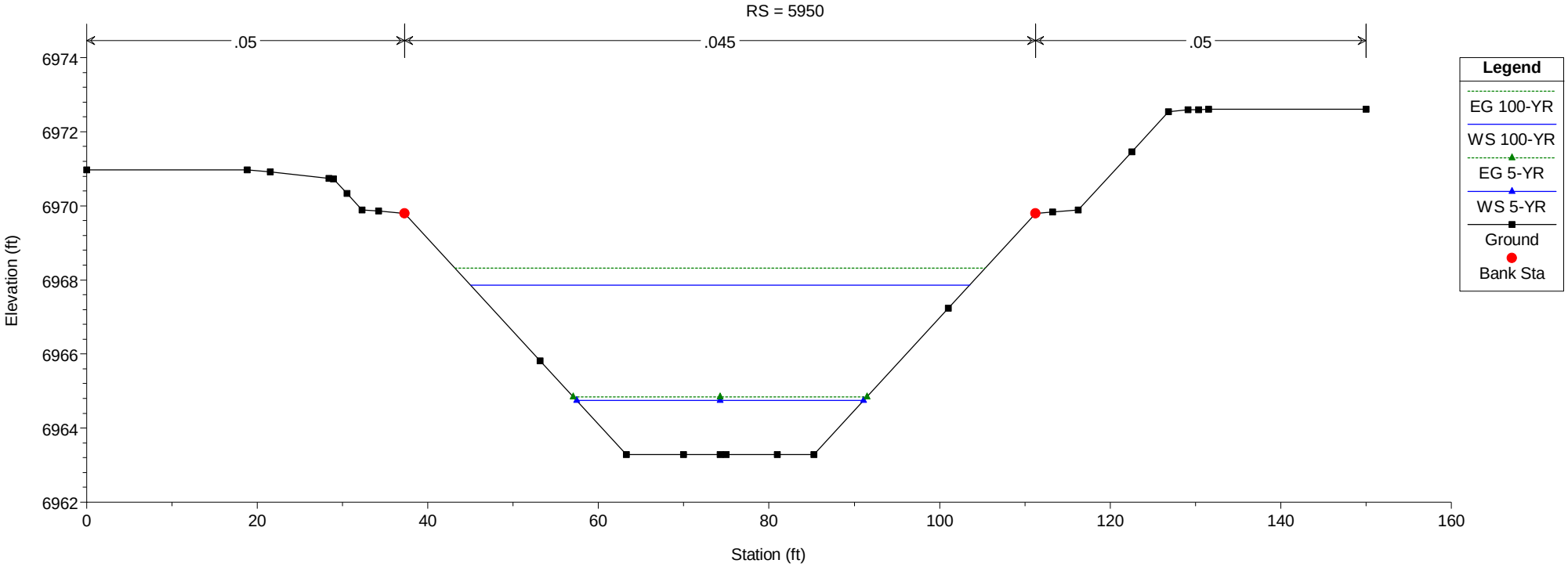

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6050
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

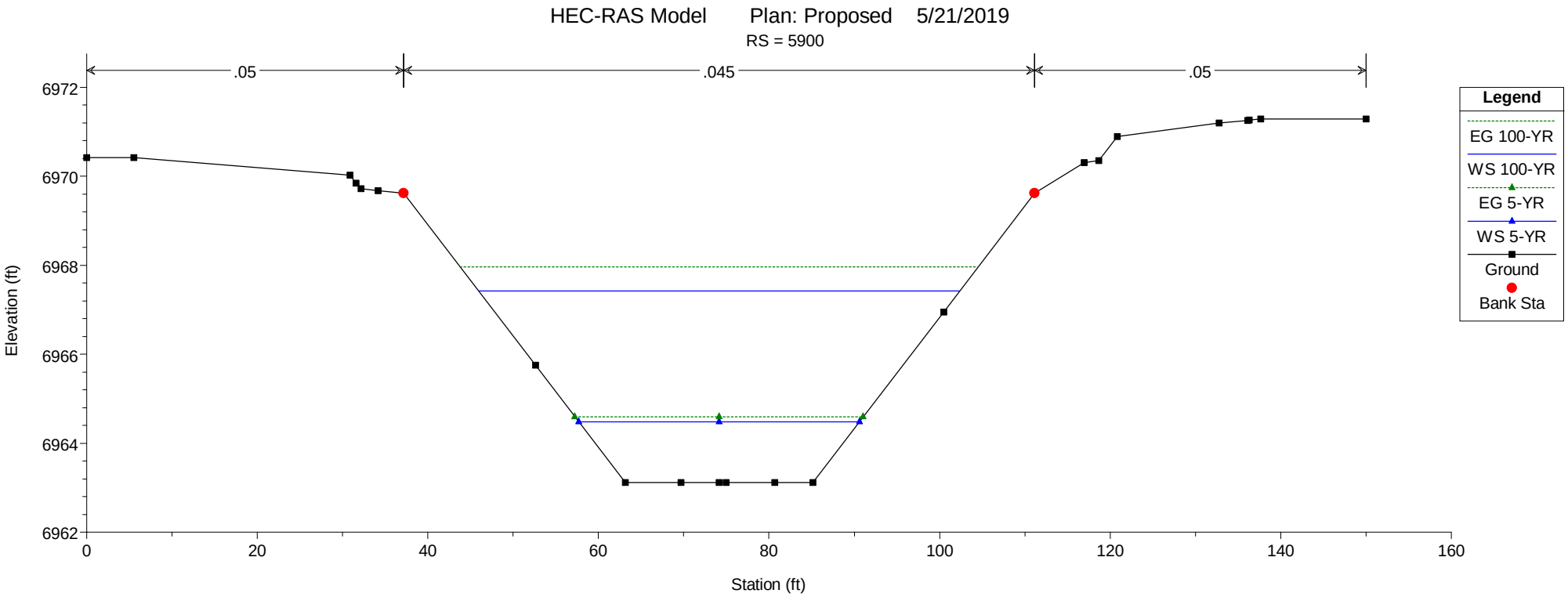

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6006
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

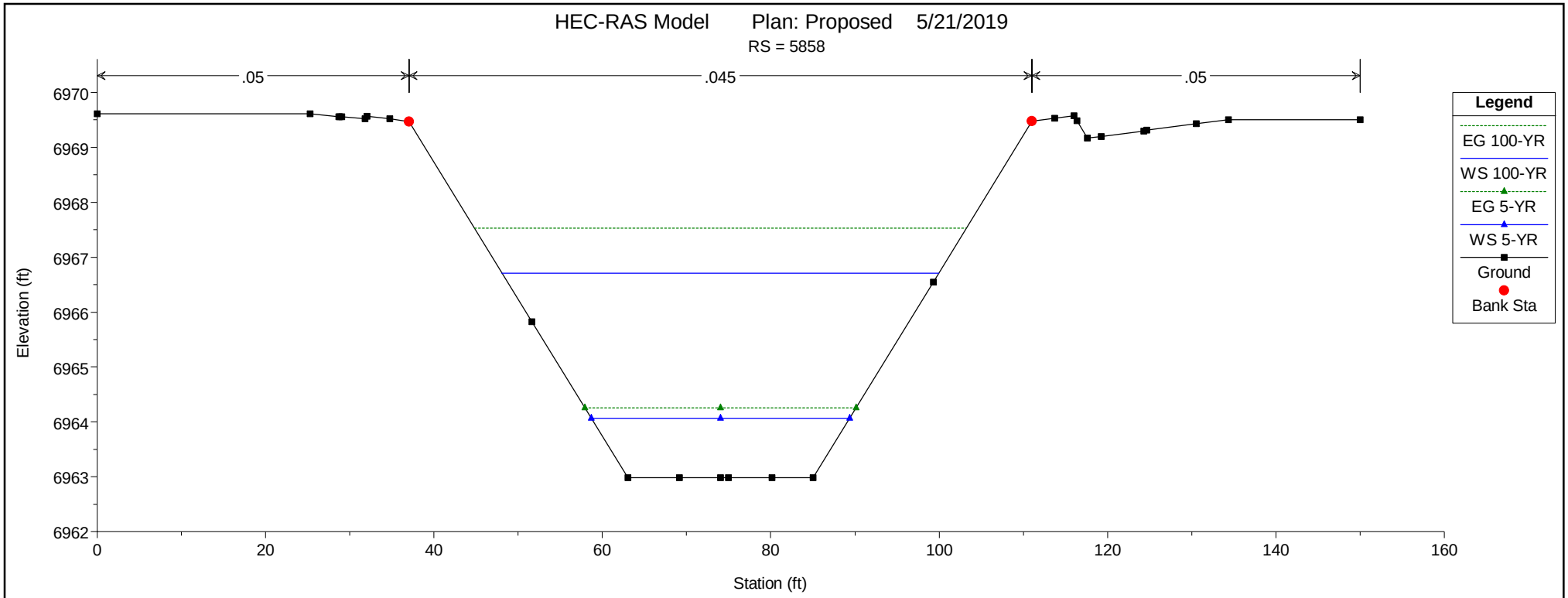

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 6001
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

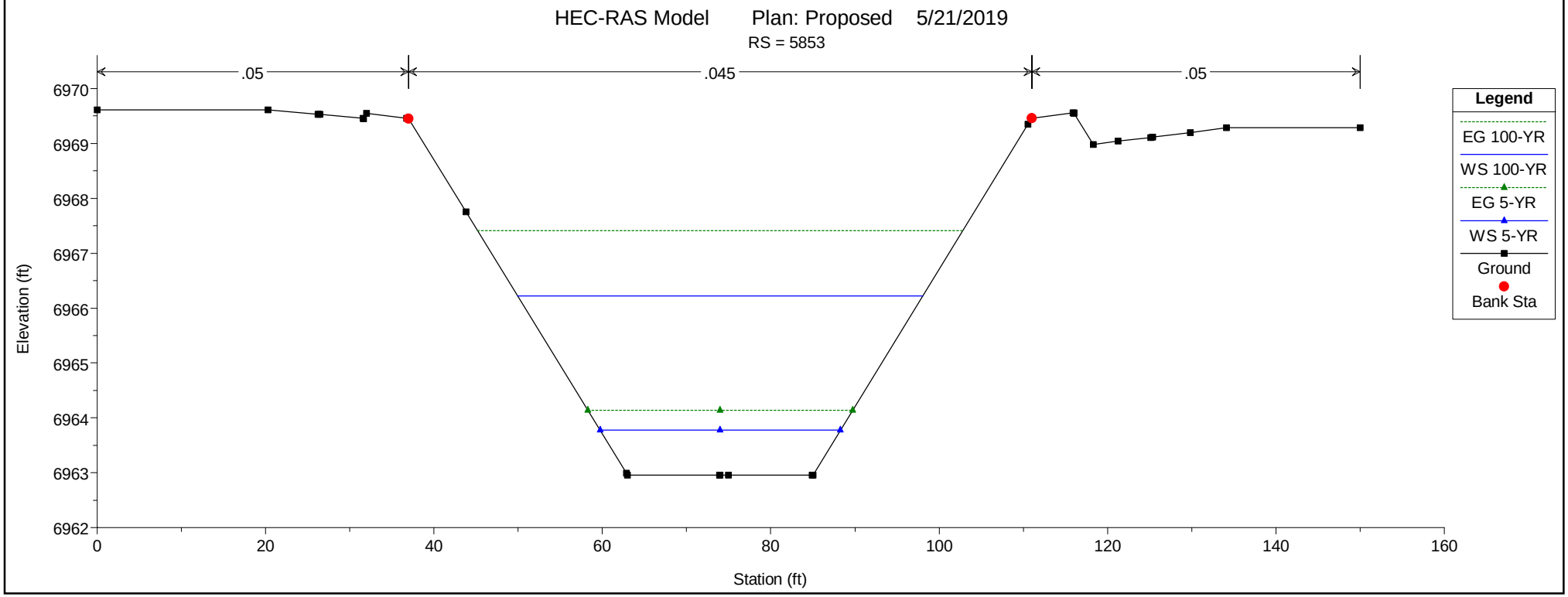

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5993
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

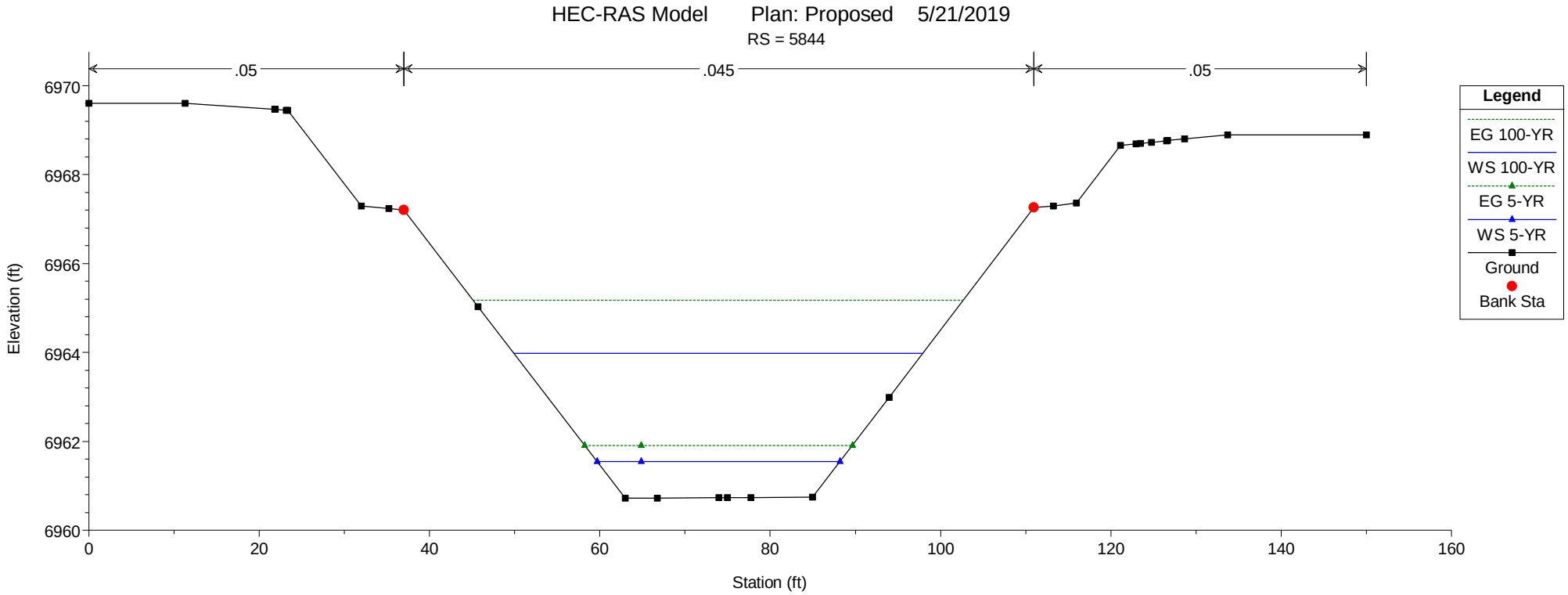

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5984
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

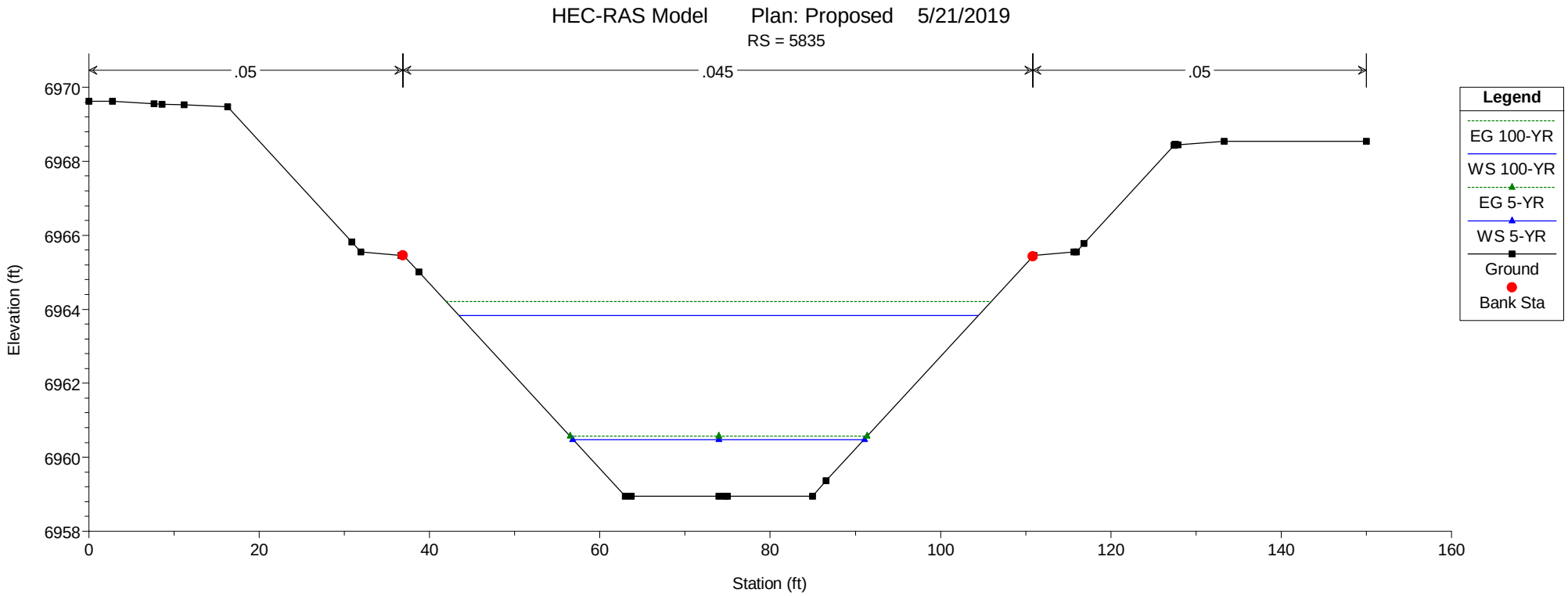

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5950
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

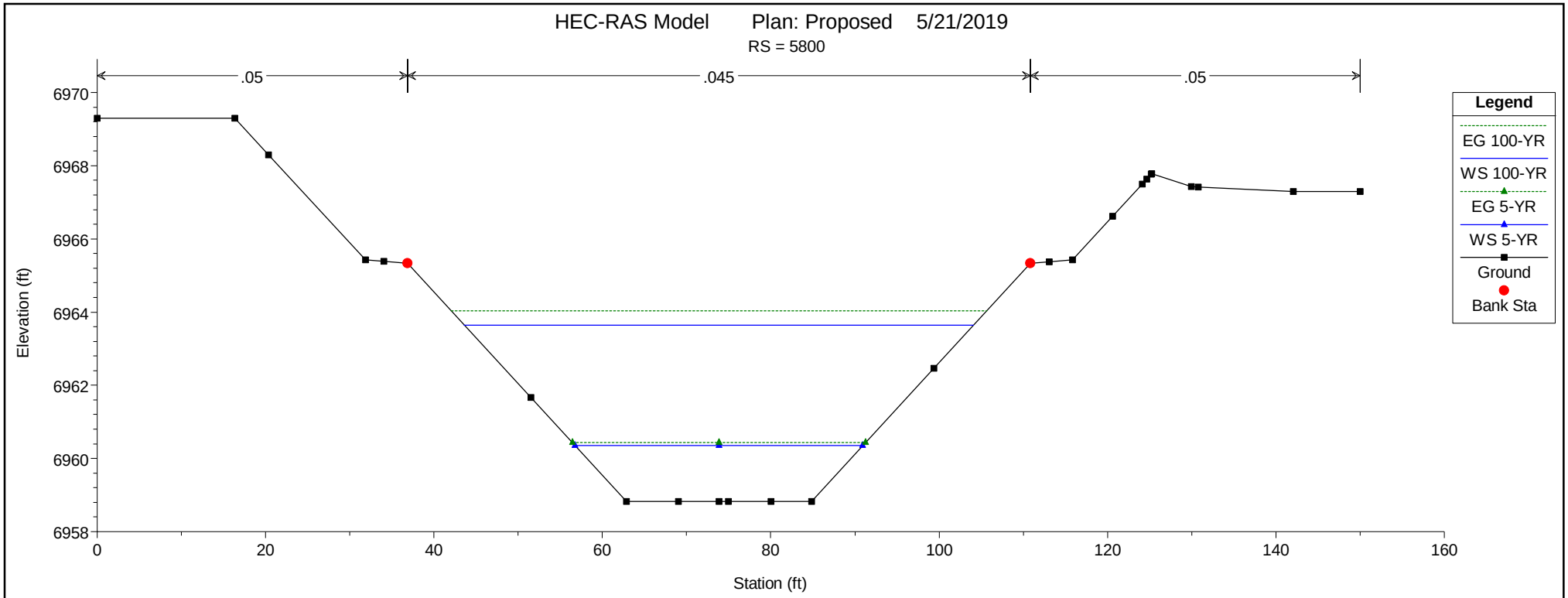

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5900
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

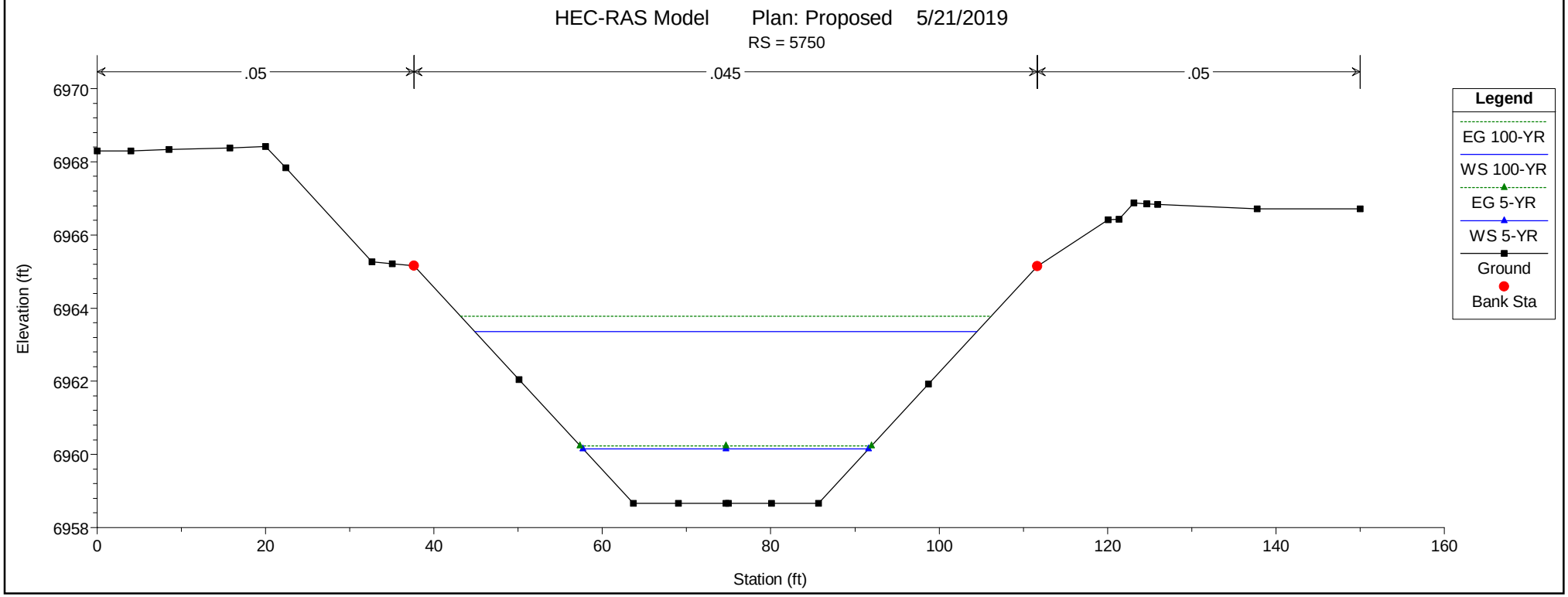

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5858
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

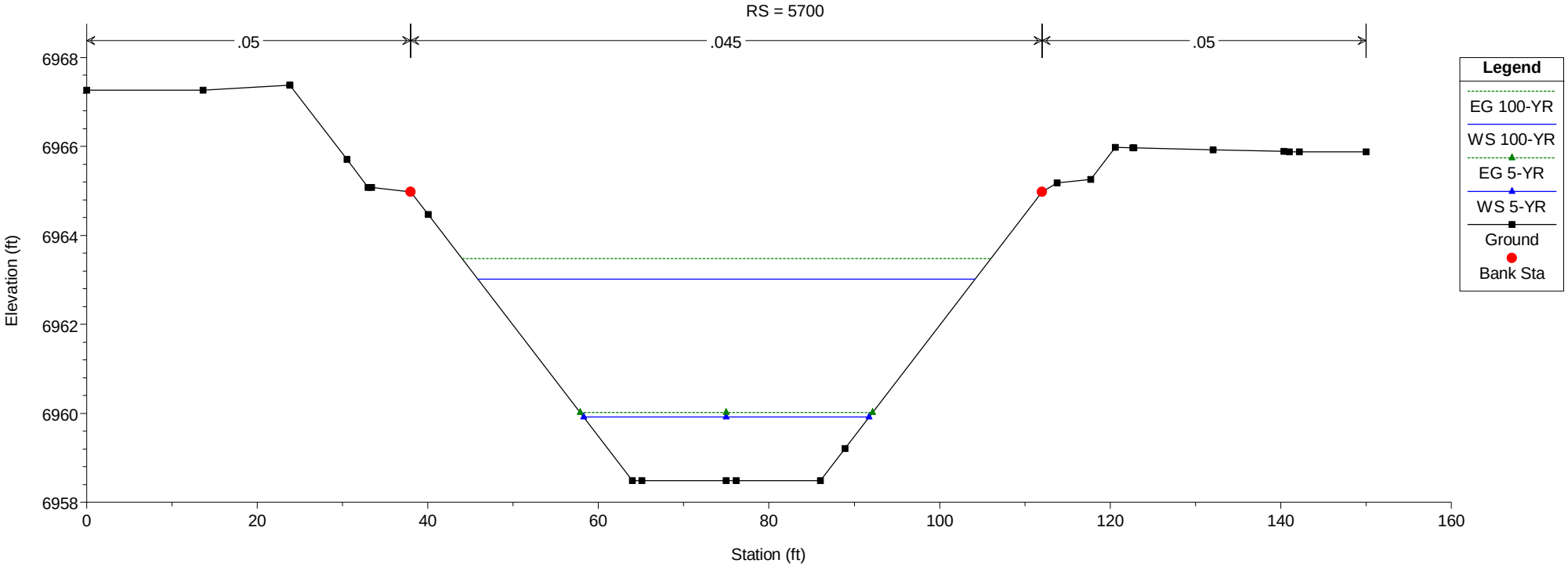

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5853
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

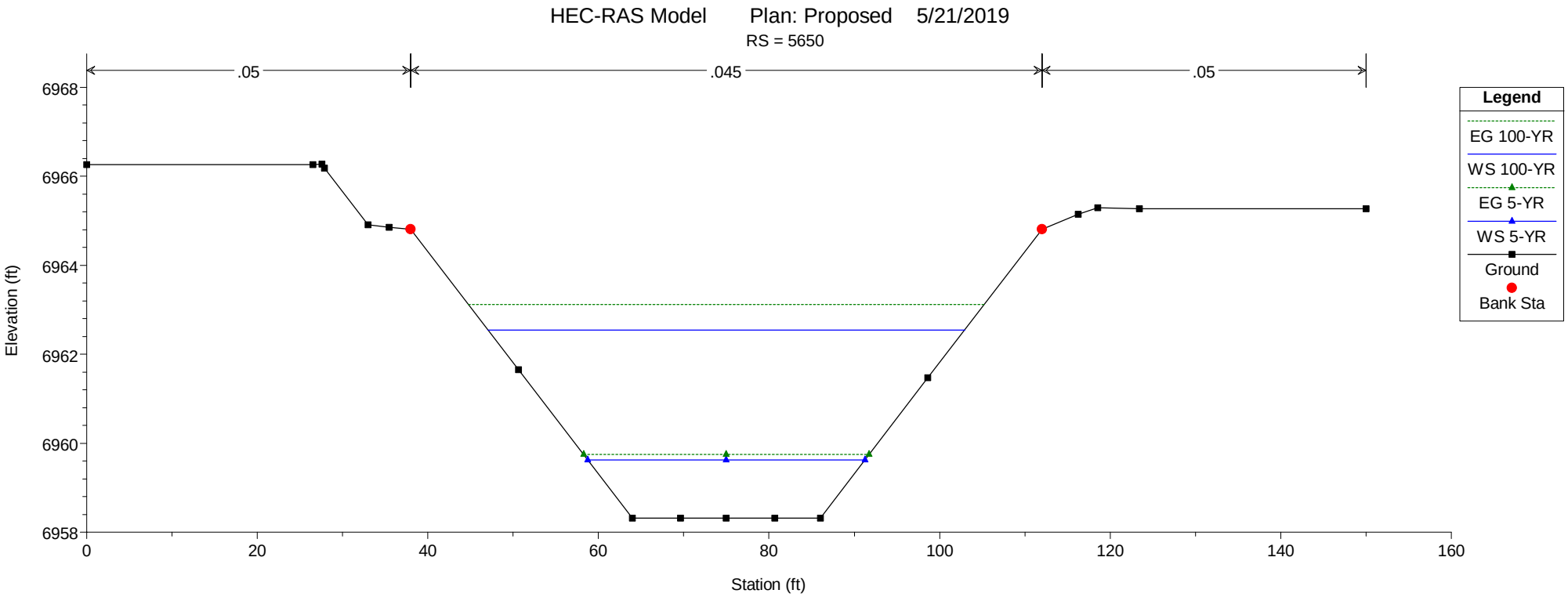

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5844
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

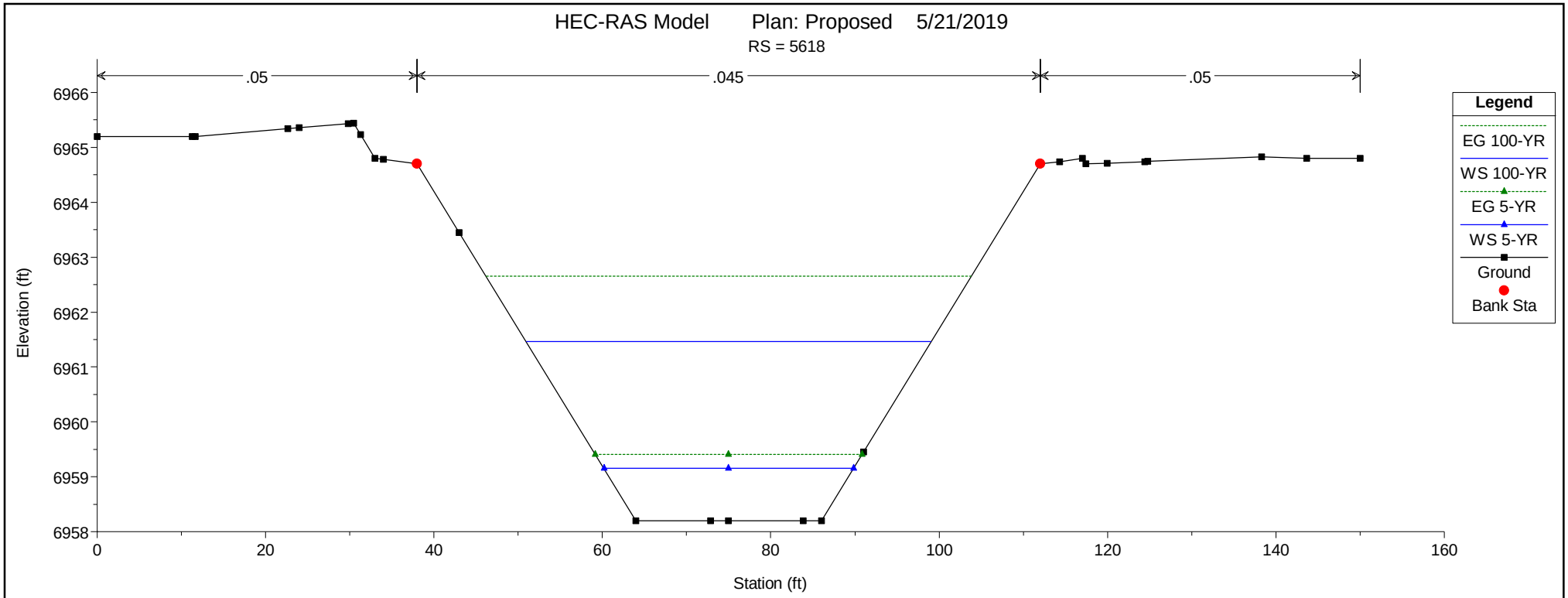

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5835
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

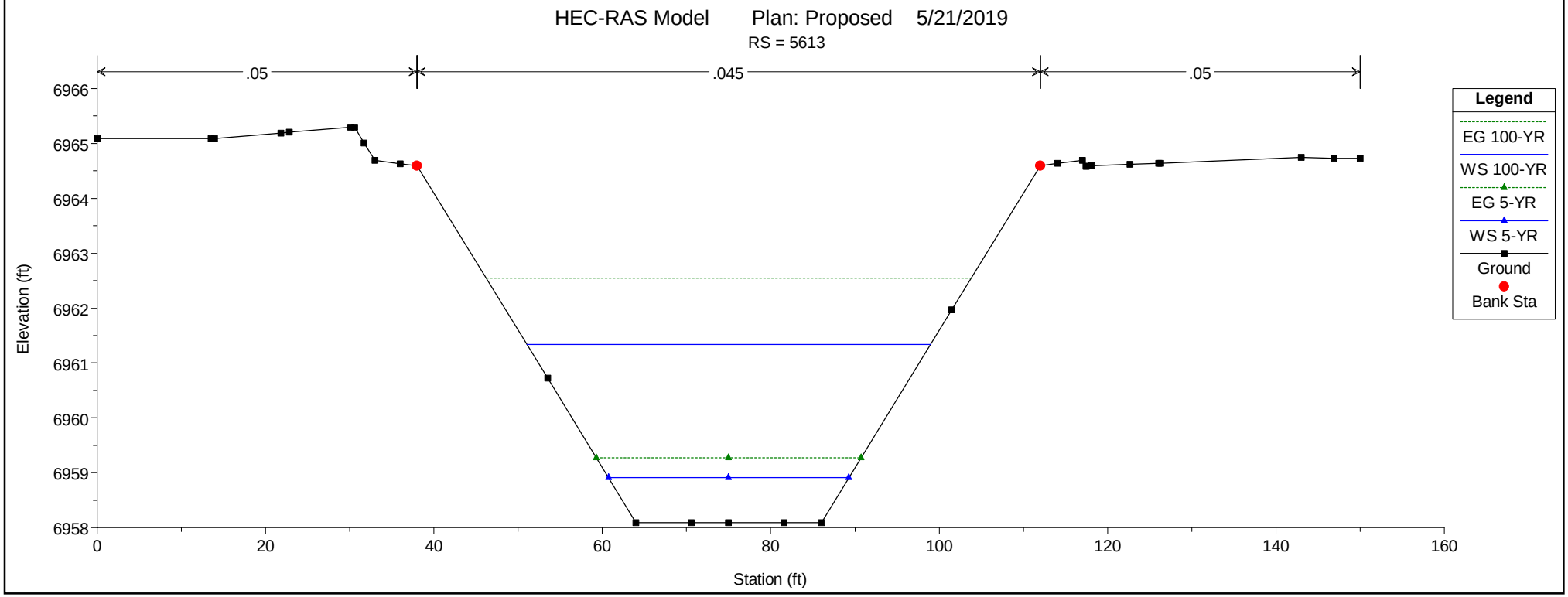

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5800
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

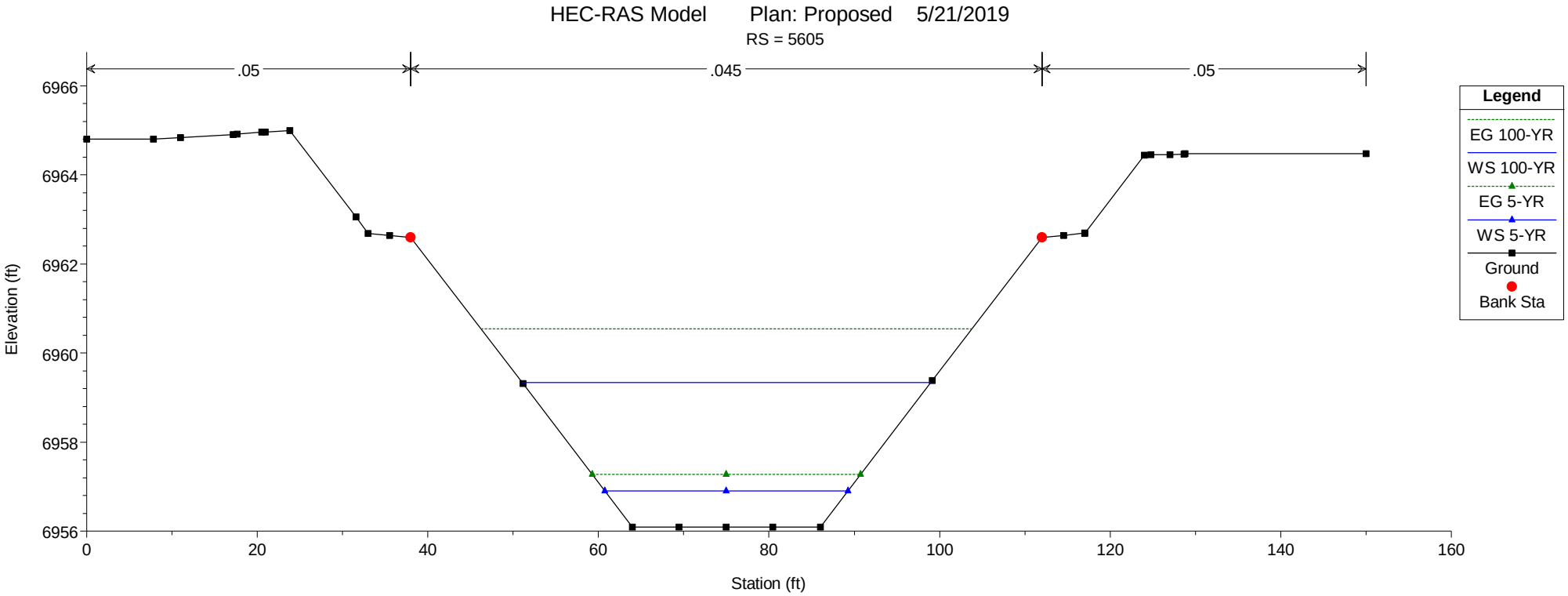

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

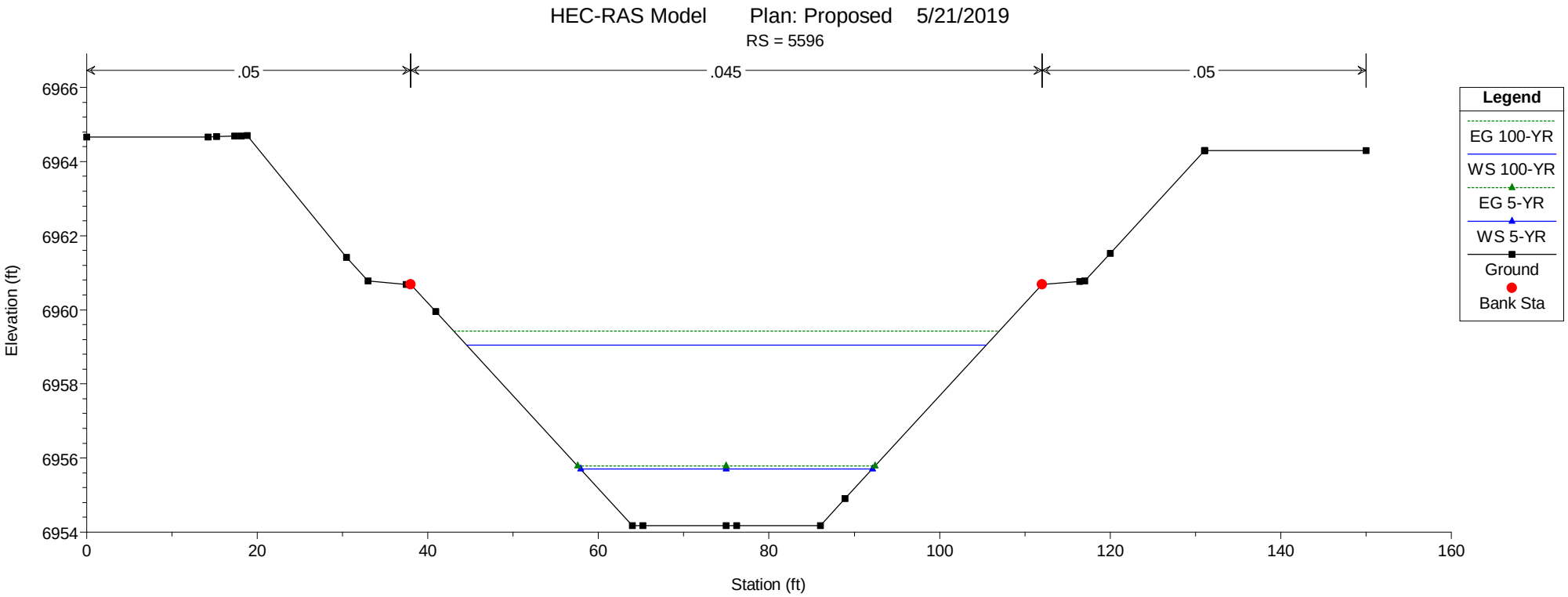

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

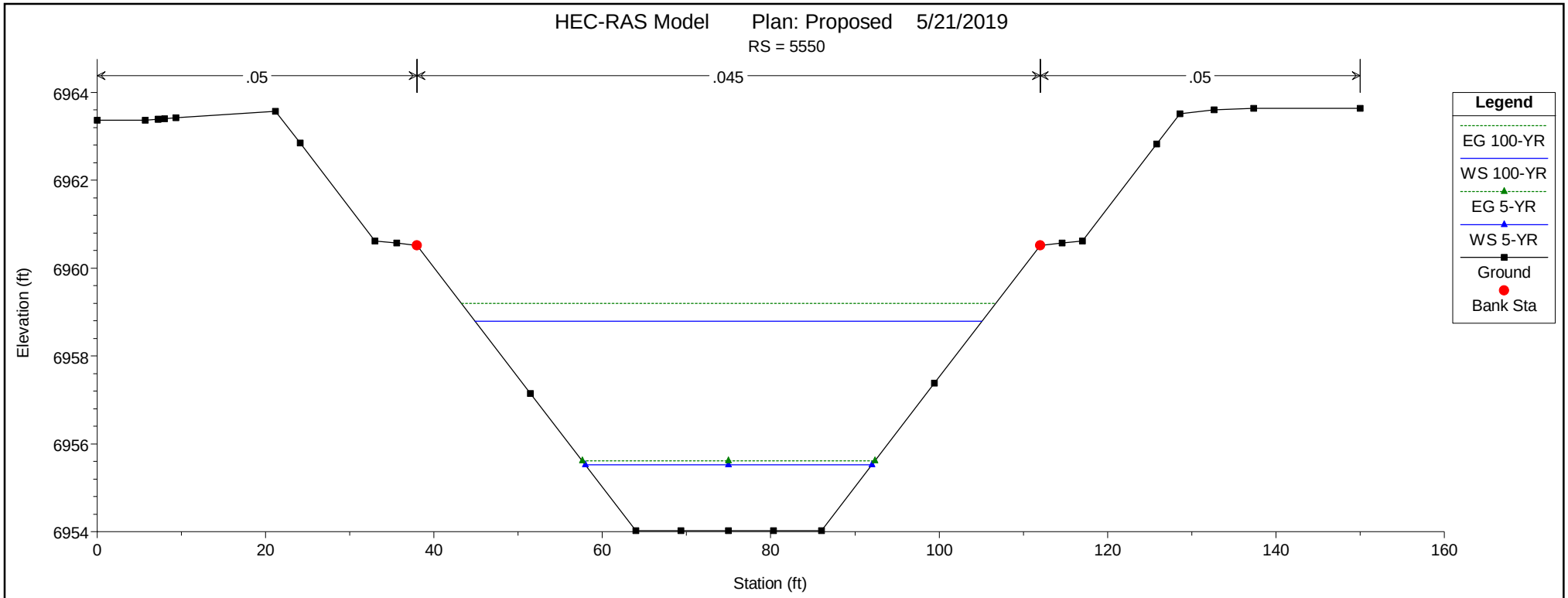

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5650
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

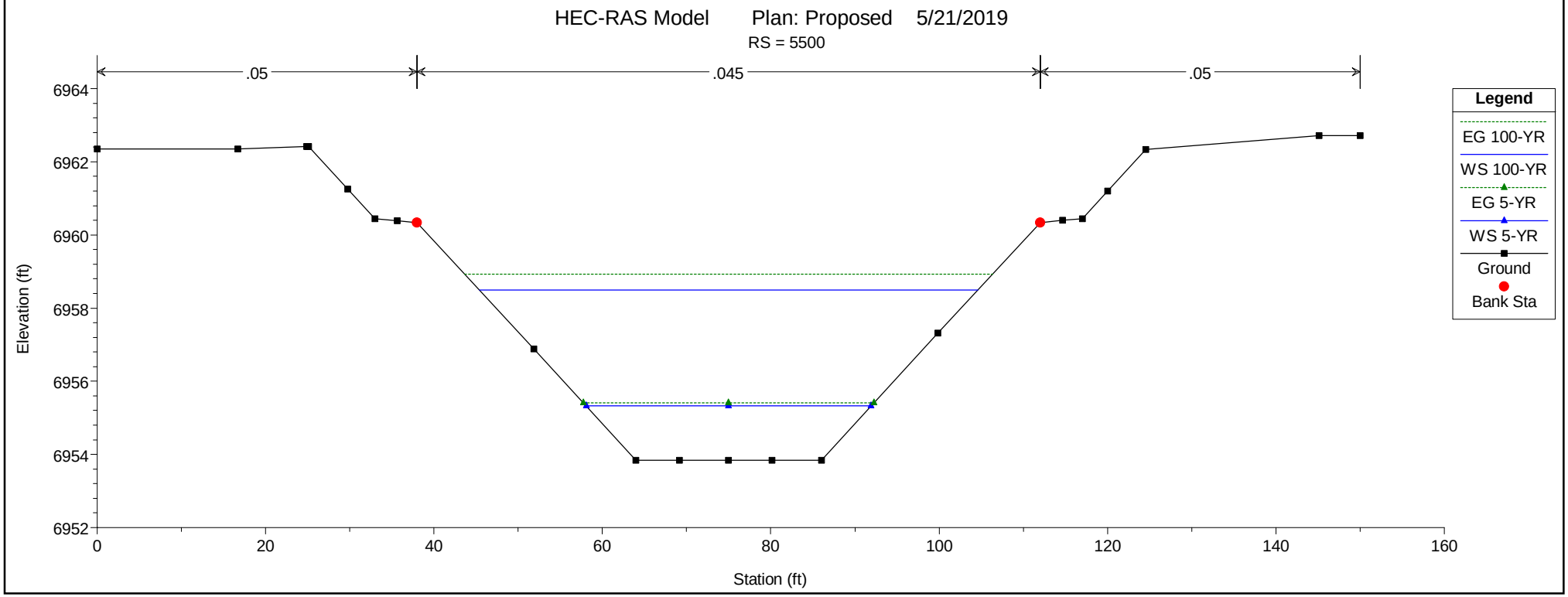

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5618
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

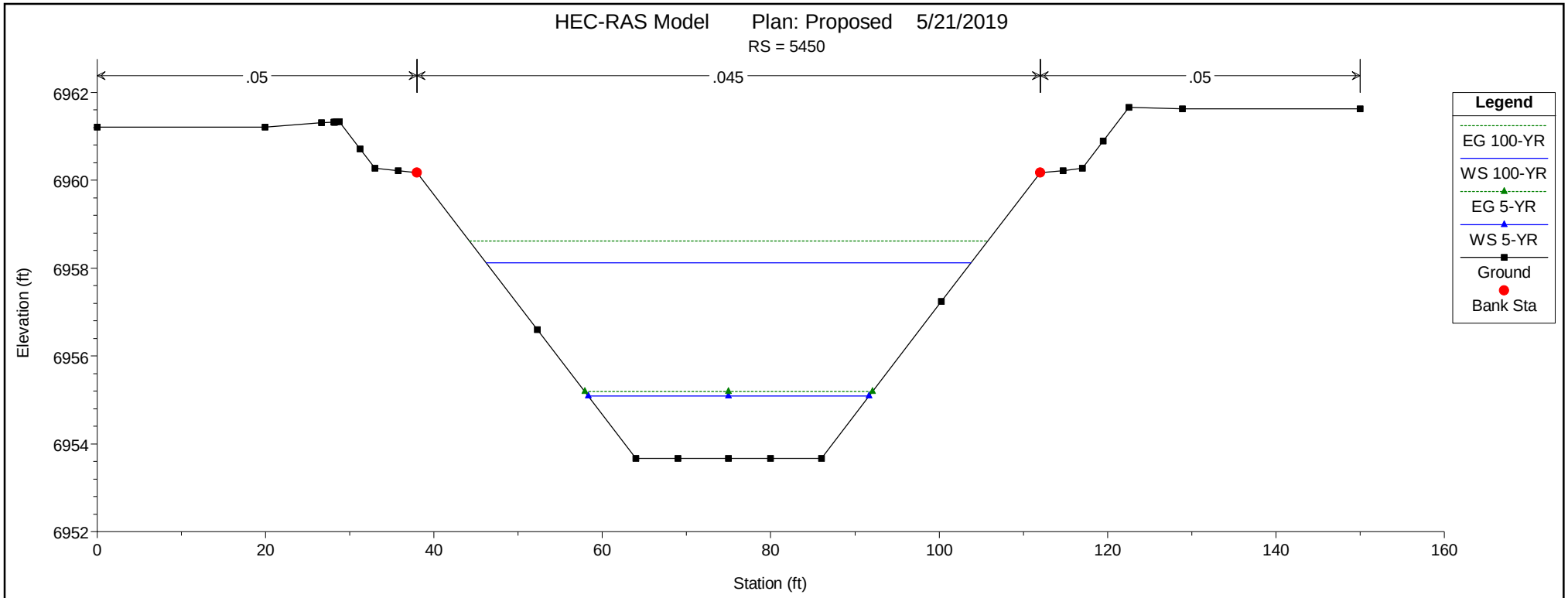

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5613
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

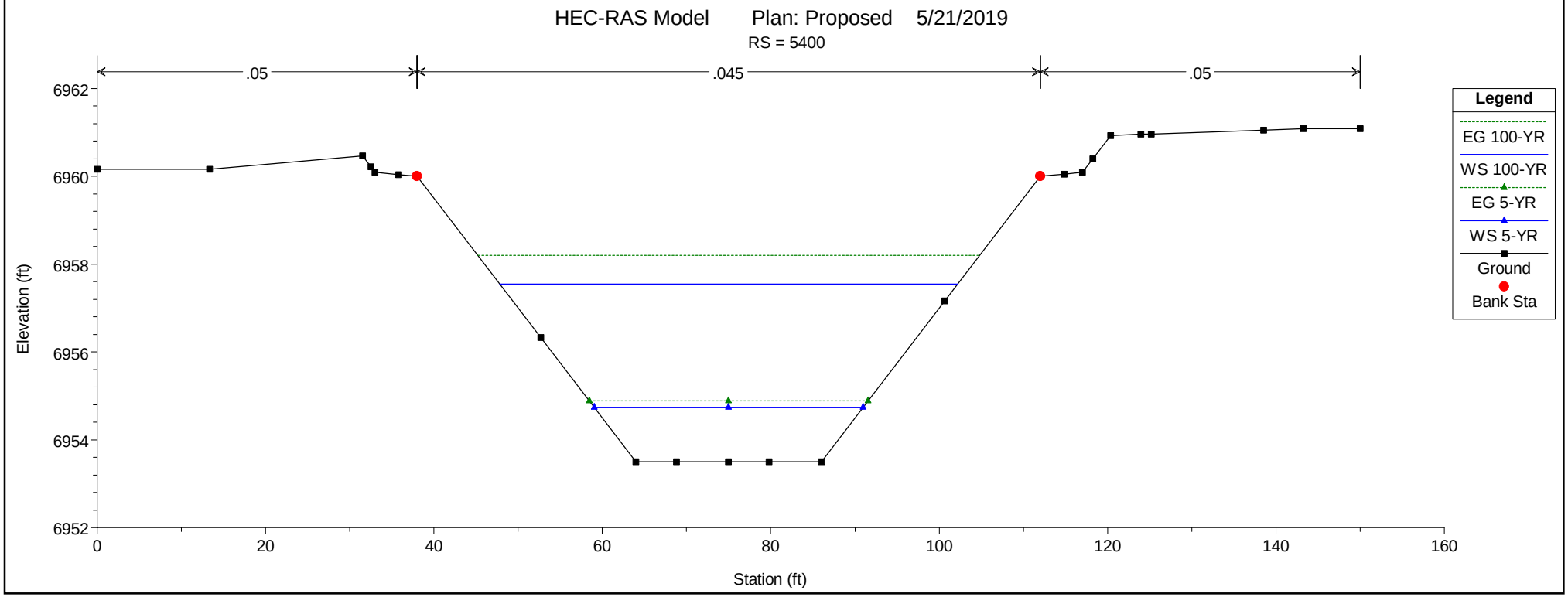

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5605
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

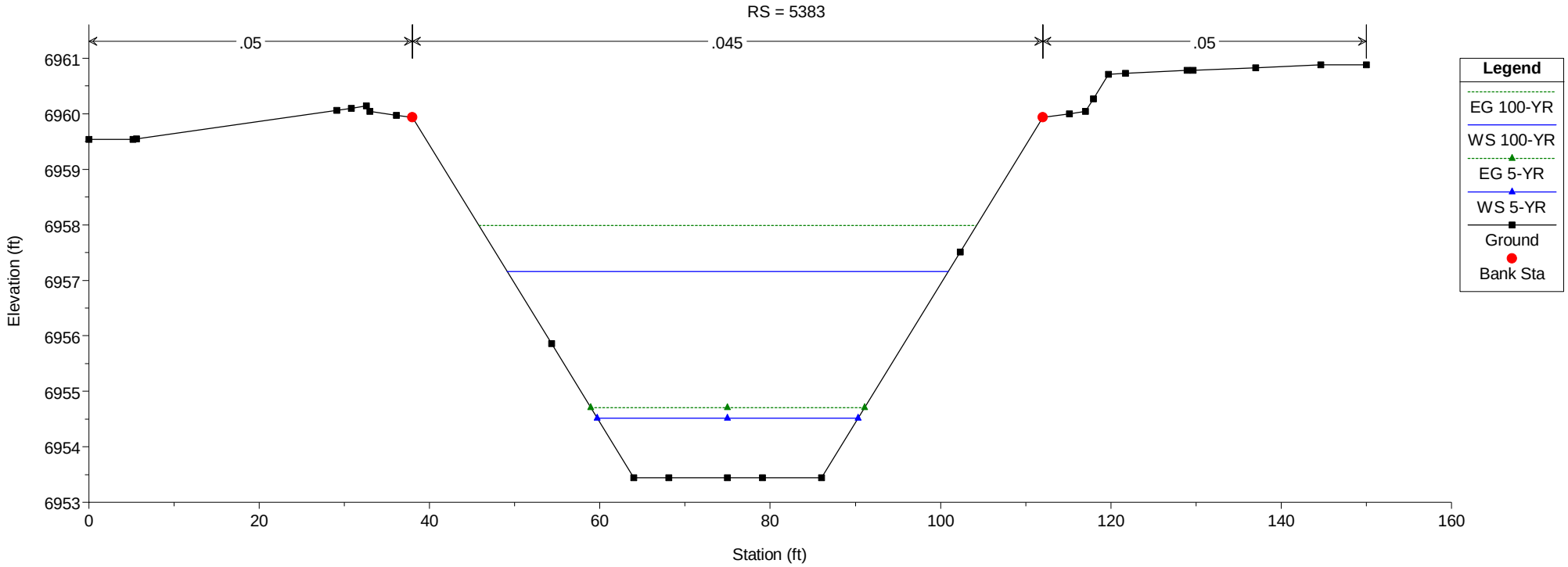

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5596
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

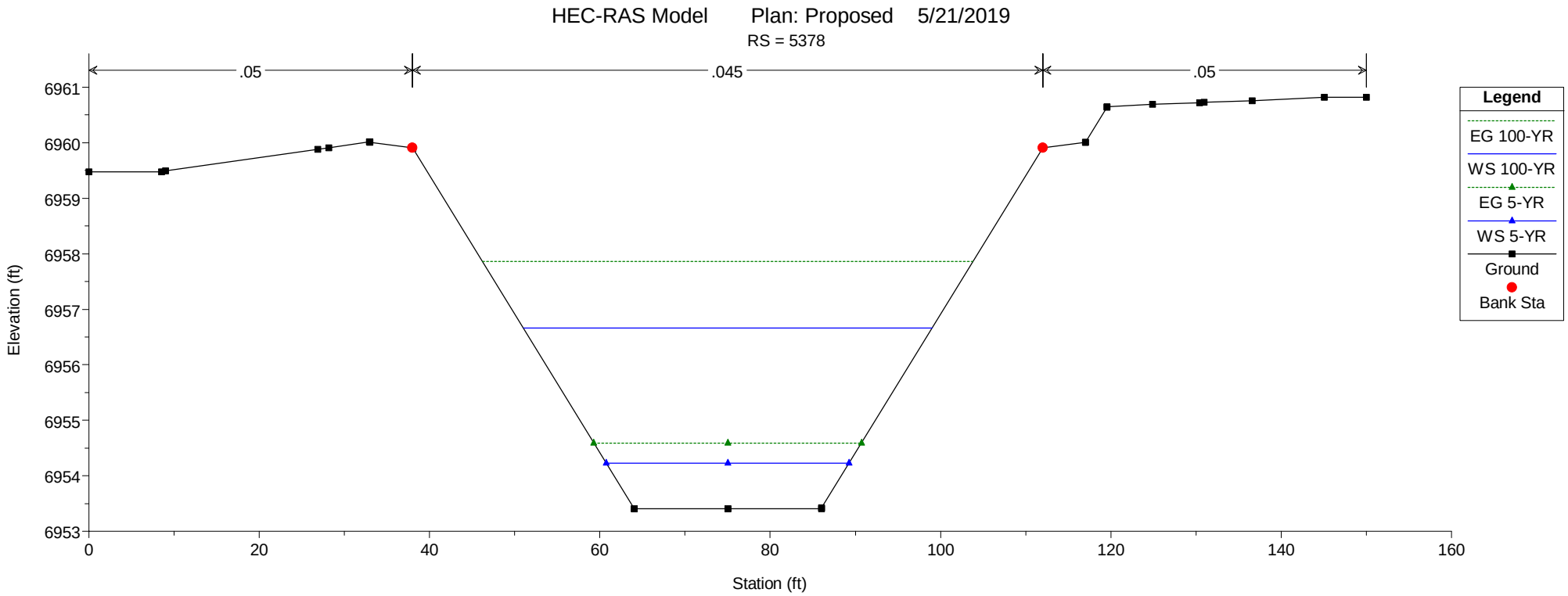

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5550
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

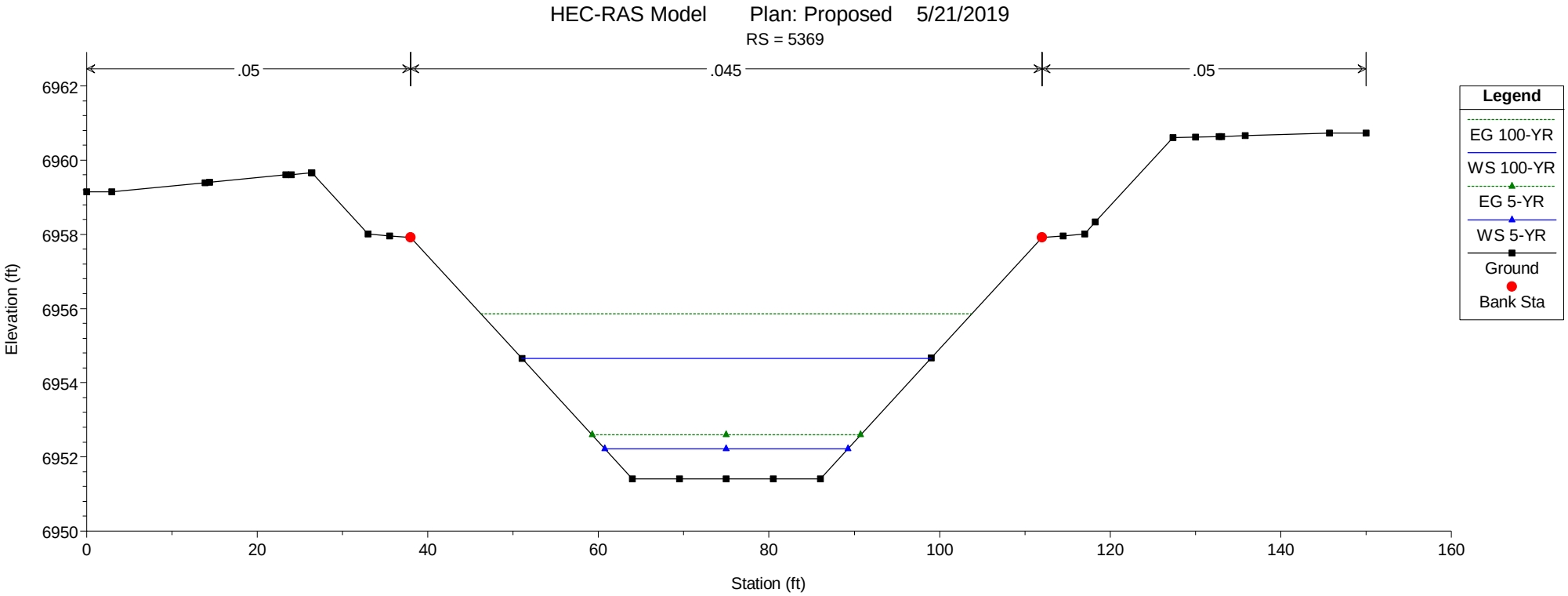

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5500
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

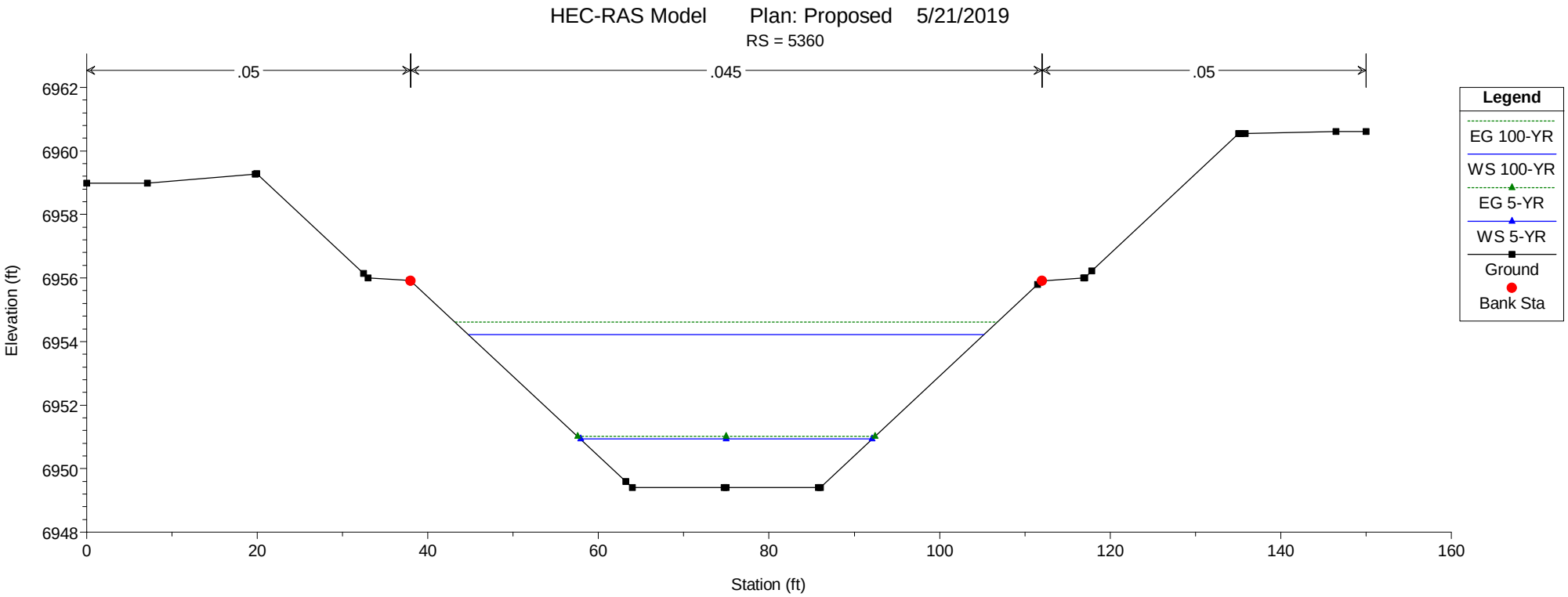

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

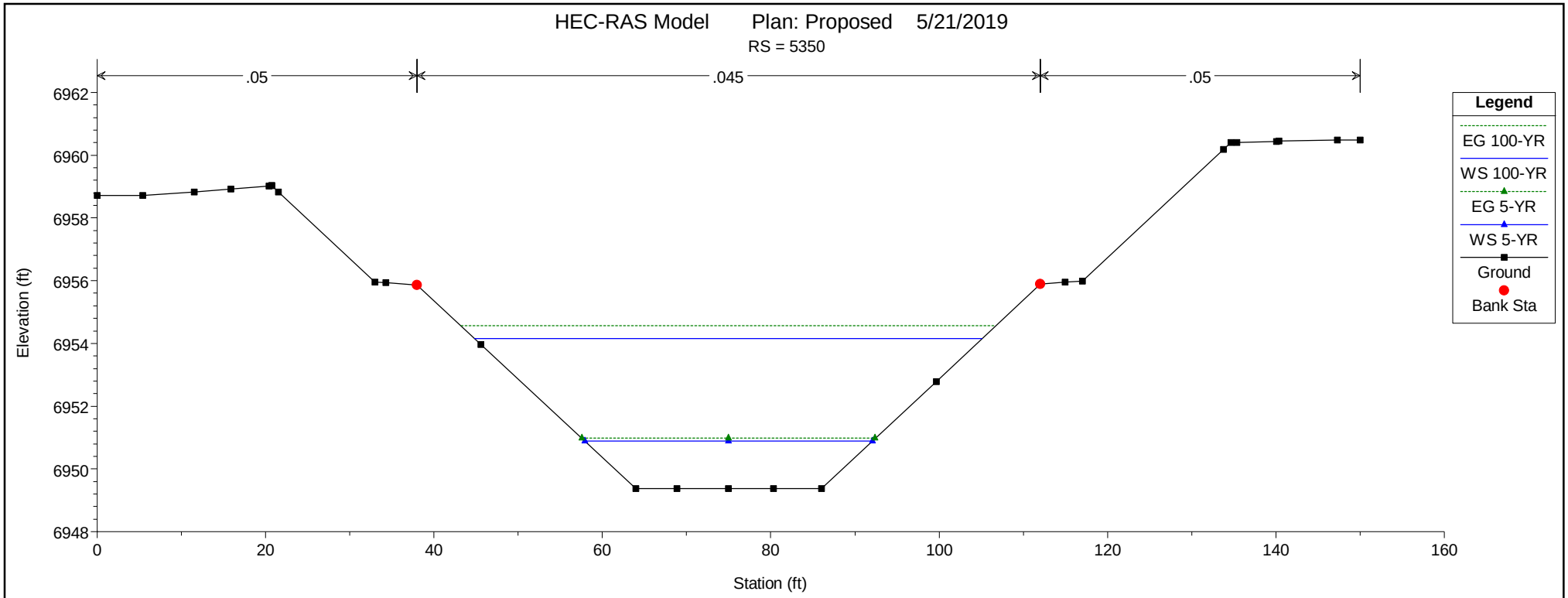

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5400
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

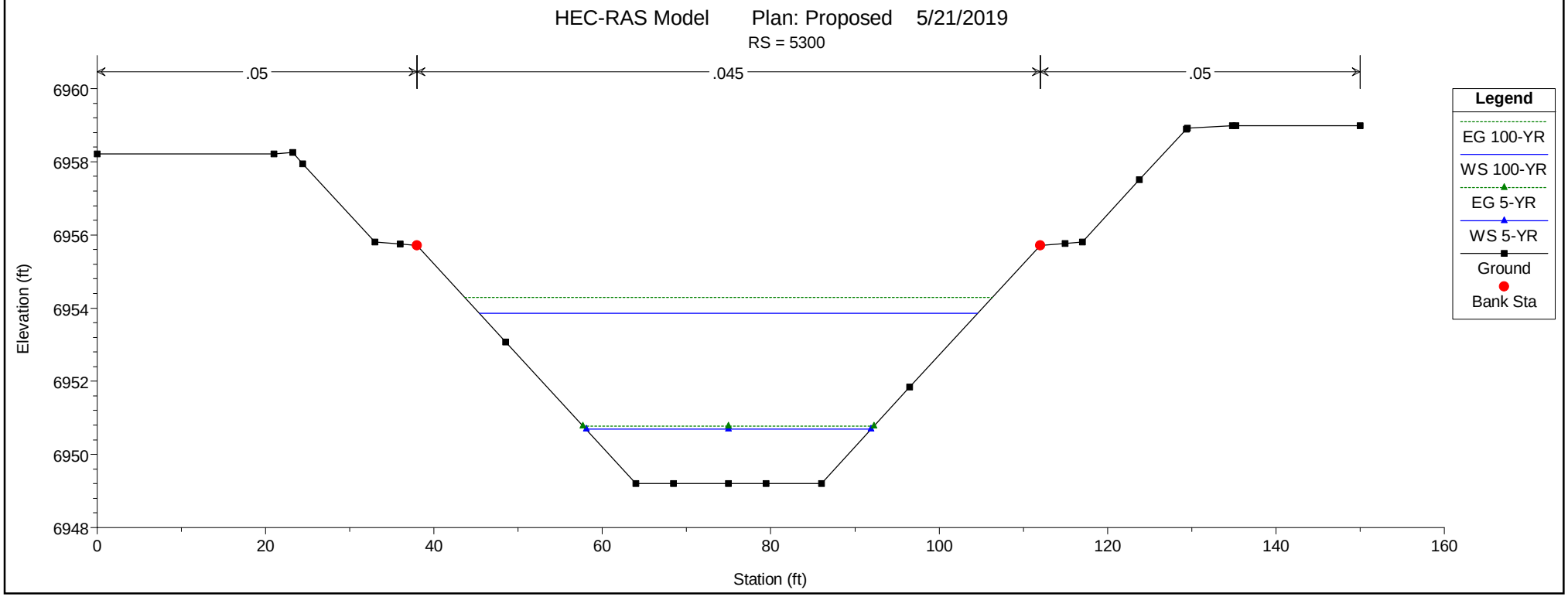

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5383
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

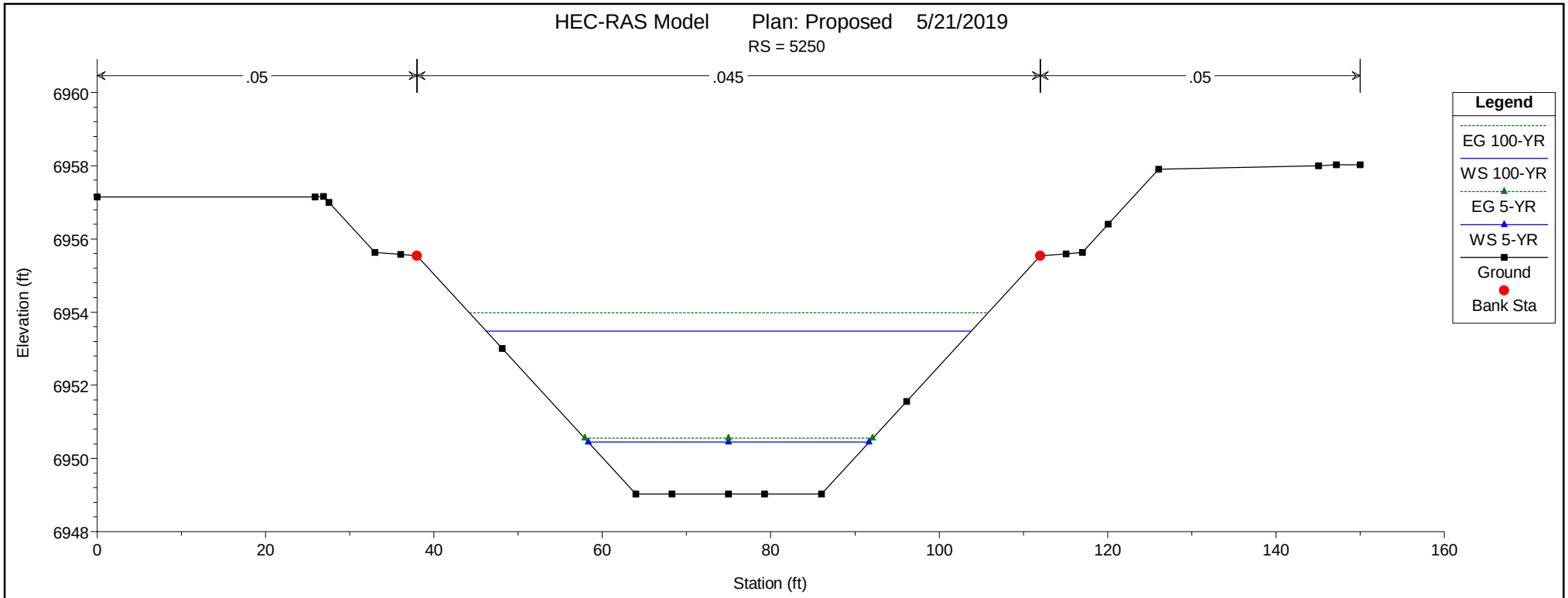

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5378
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

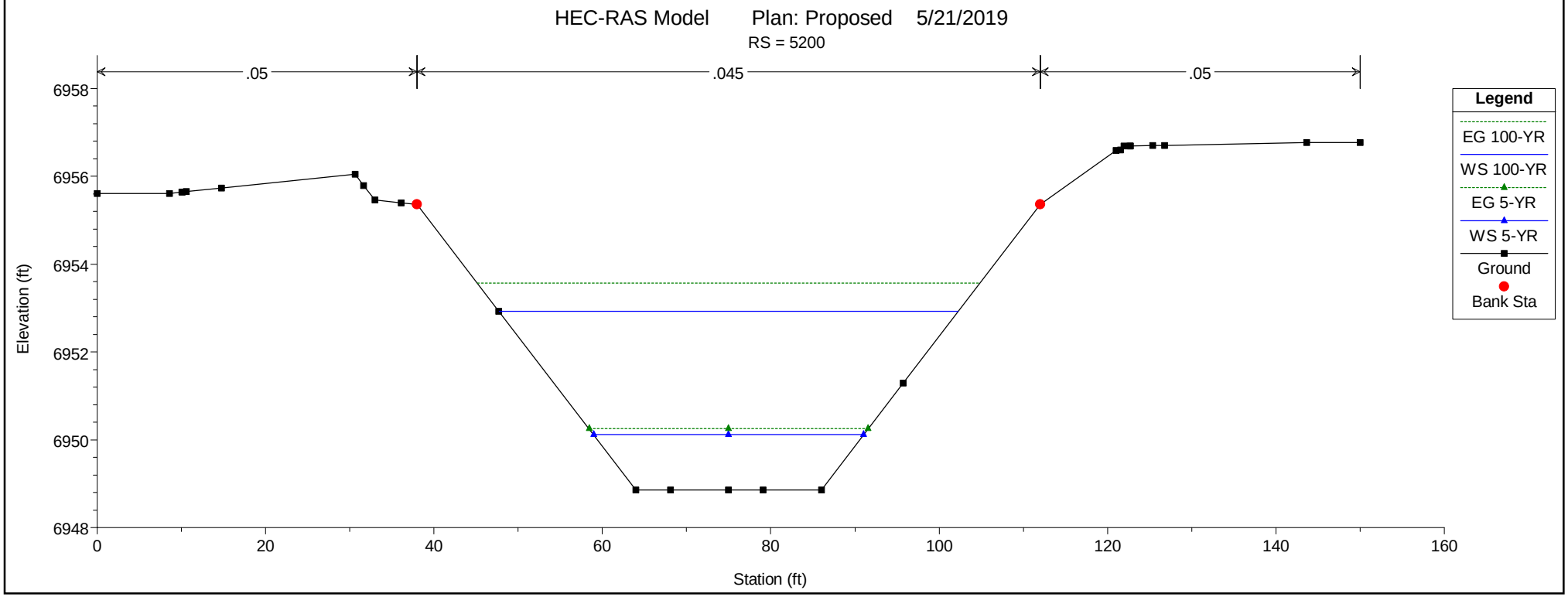

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5369
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

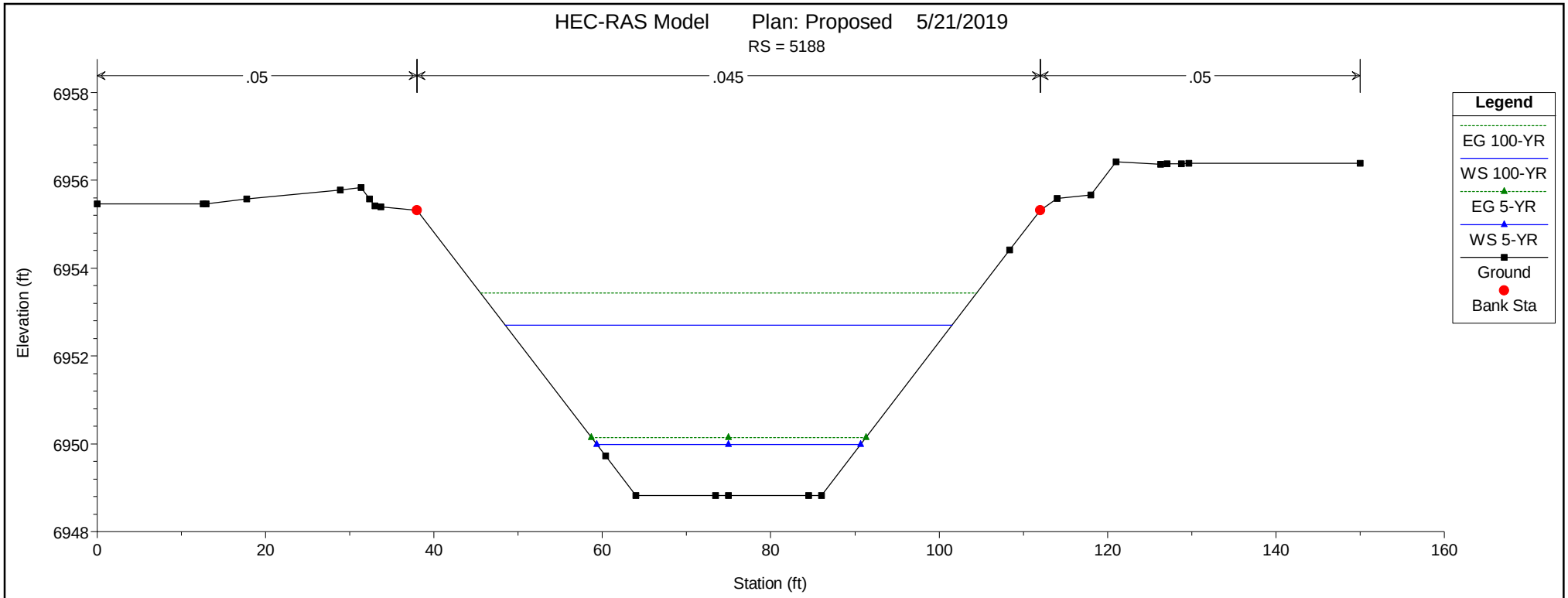

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5360
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

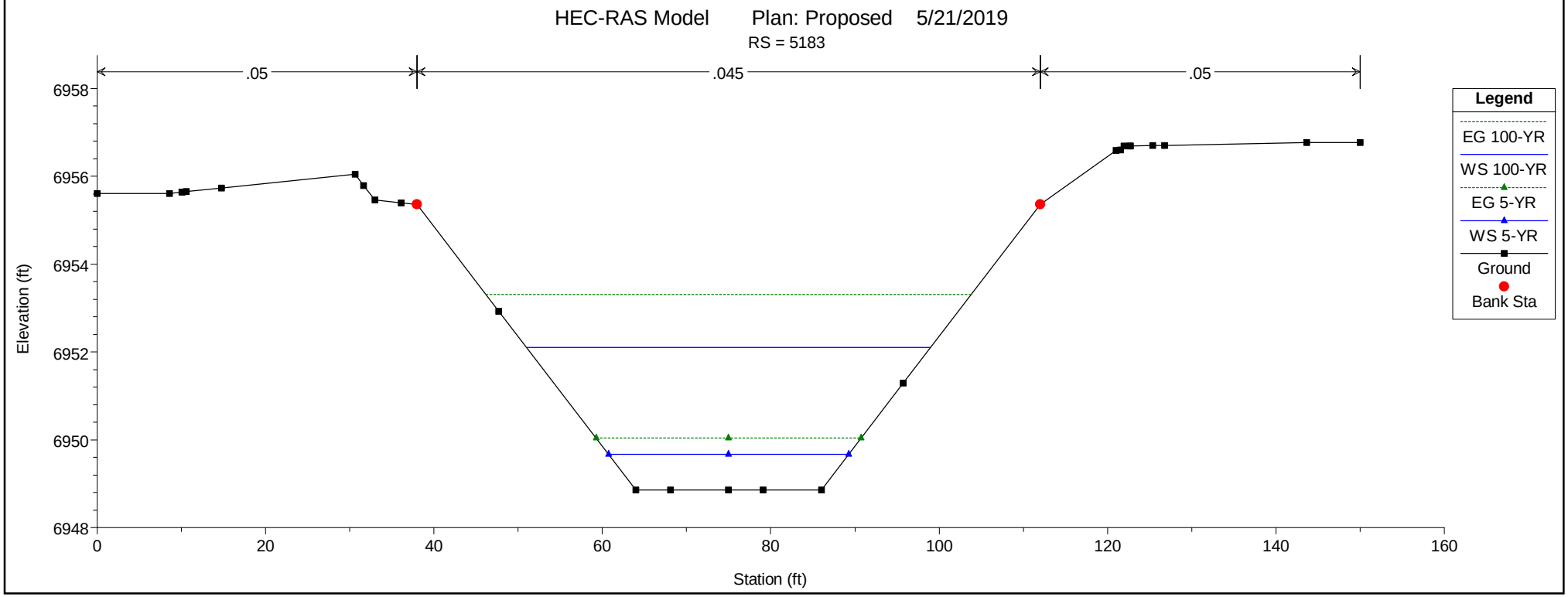

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5350
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

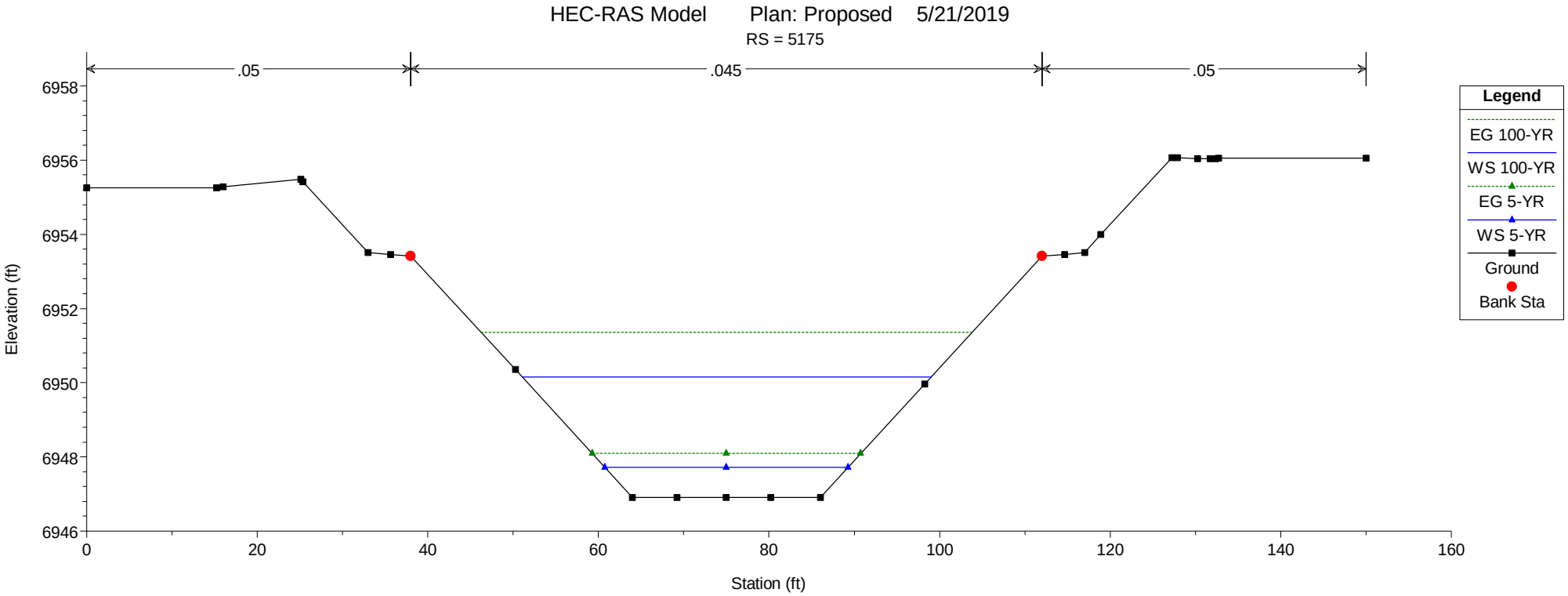

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5300
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

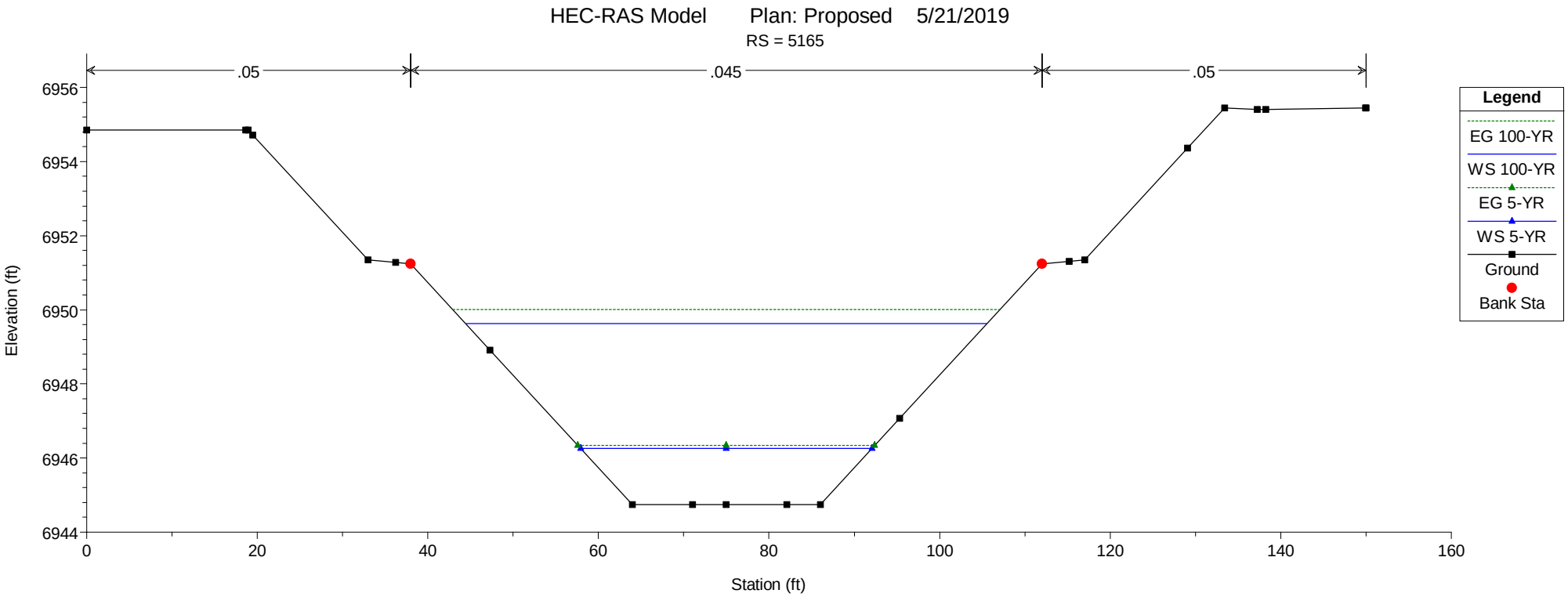

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5250
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

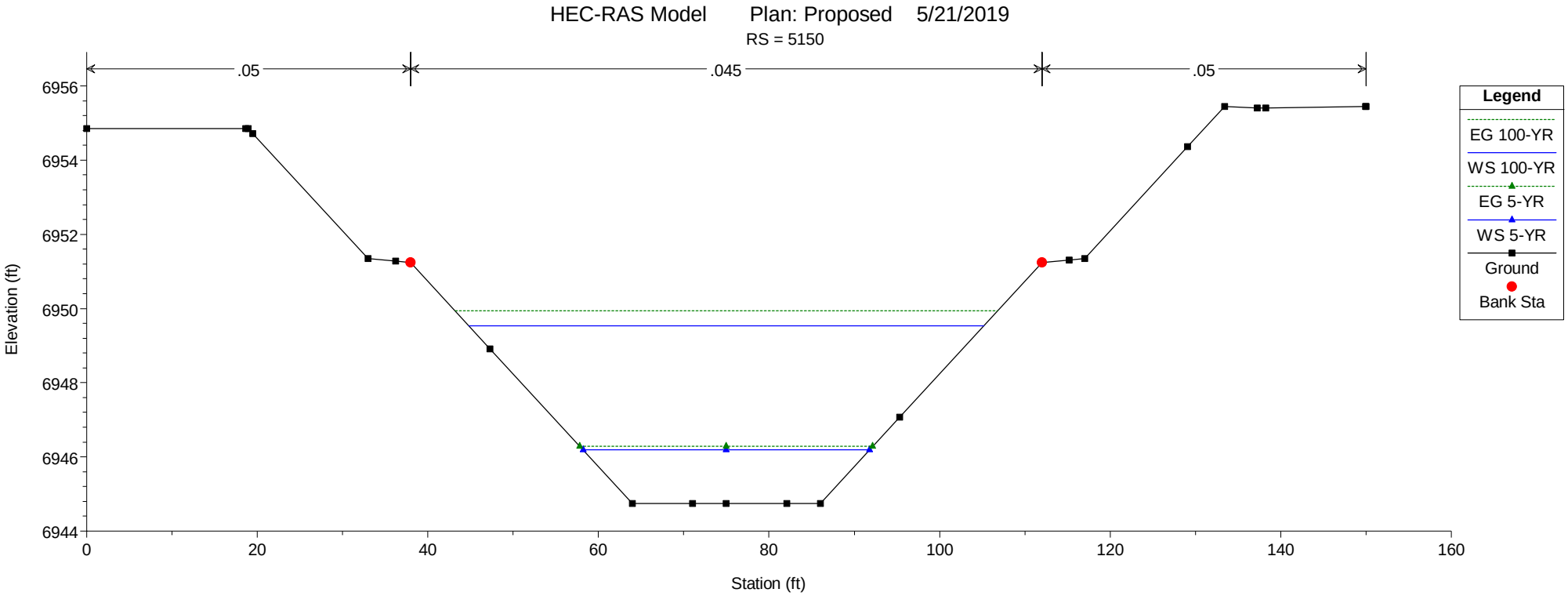

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5200
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

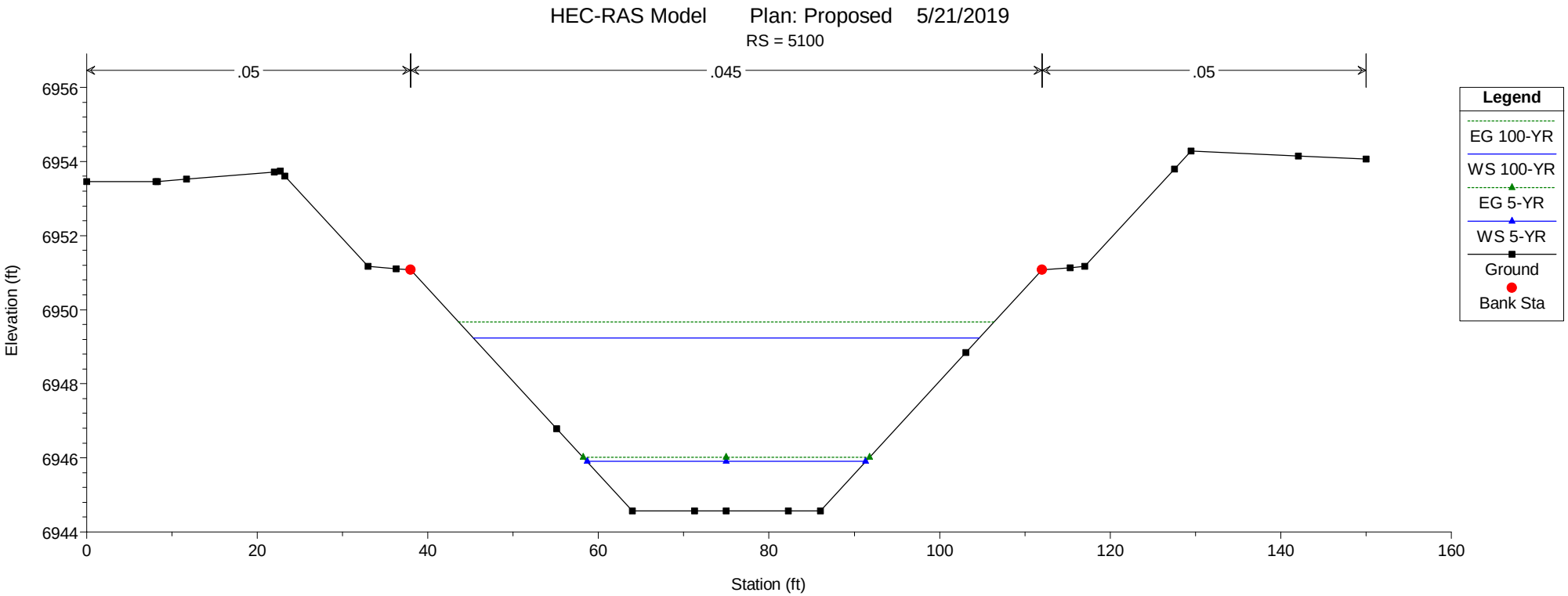

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5188
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

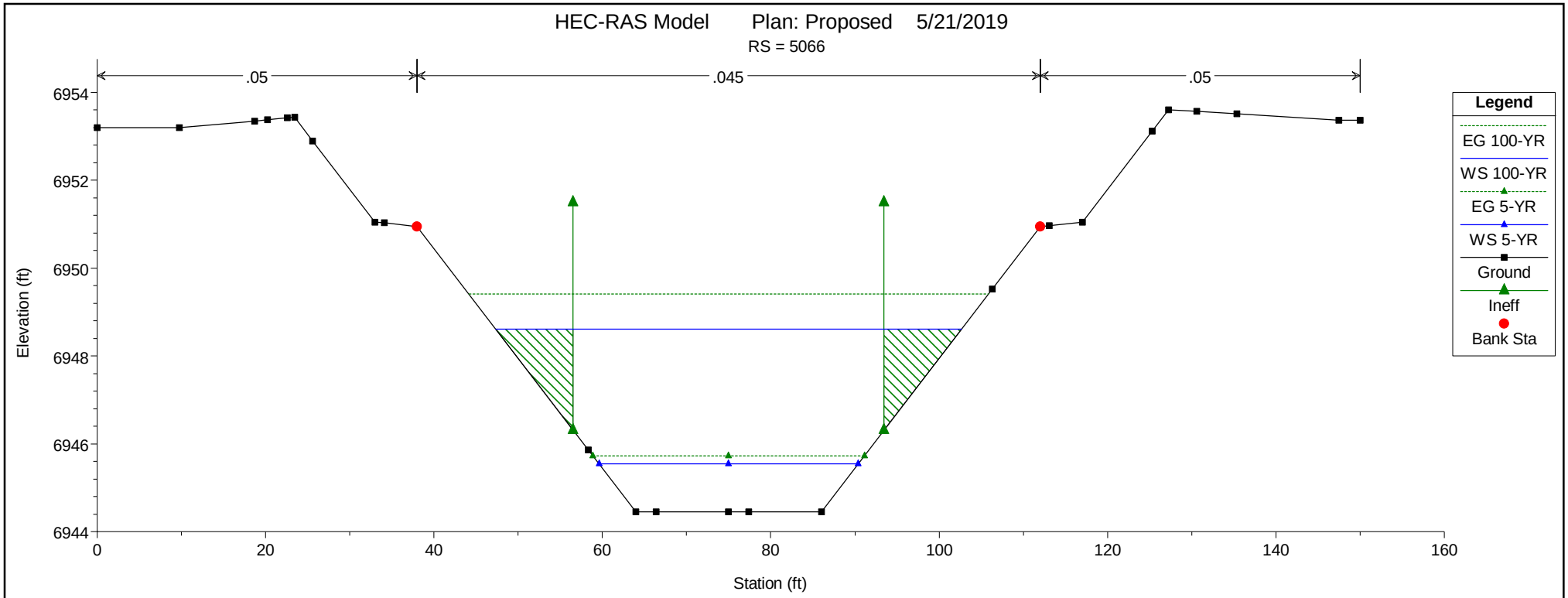

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5183
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

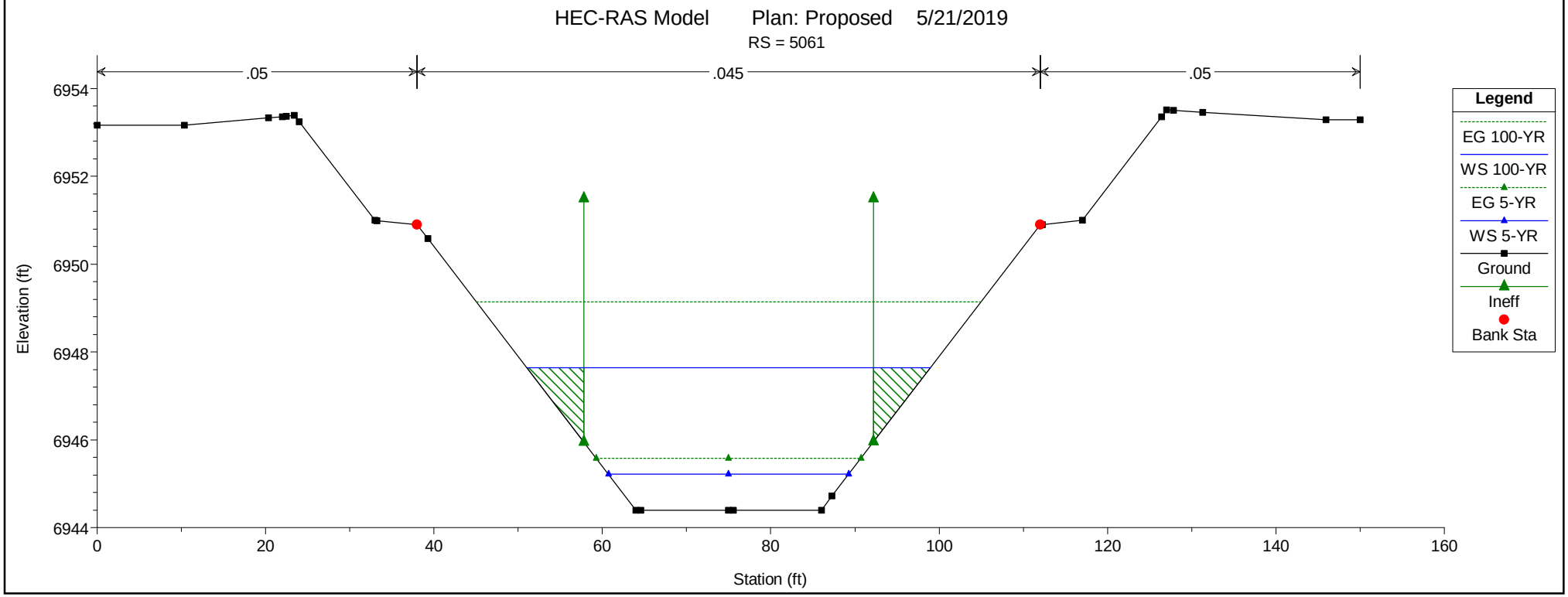

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5175
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

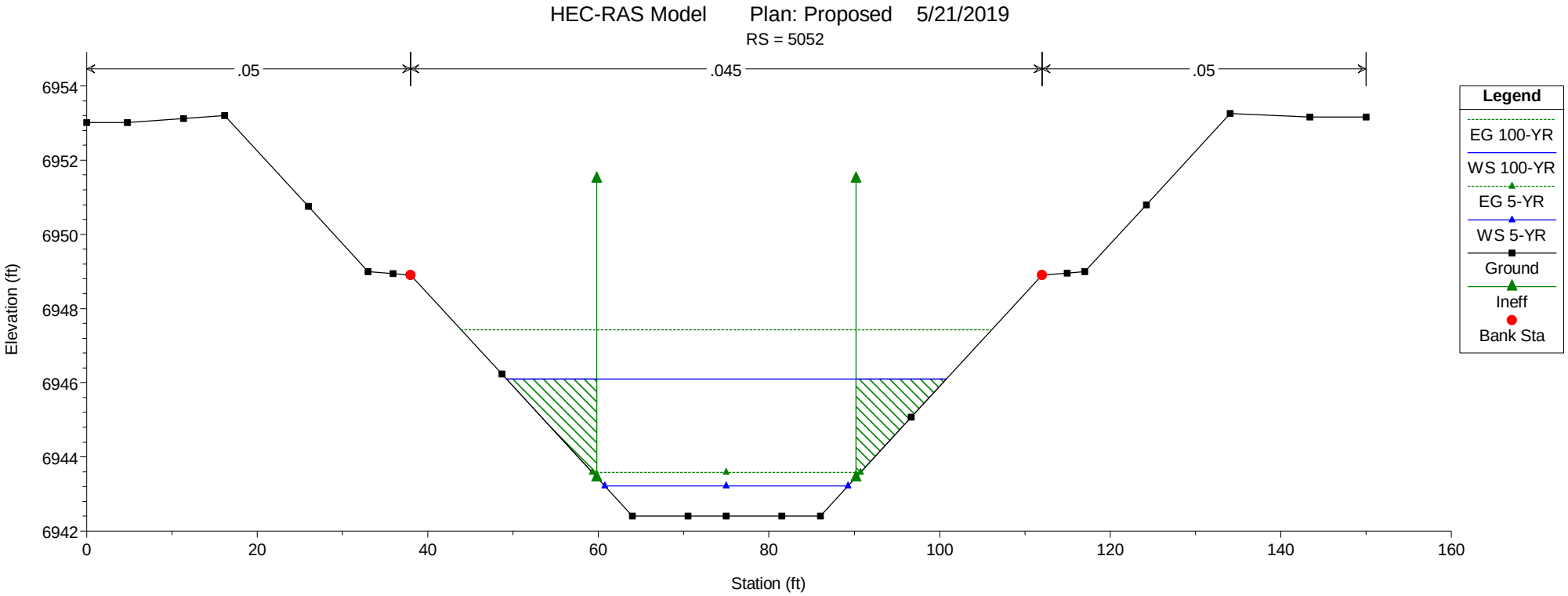

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5165
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

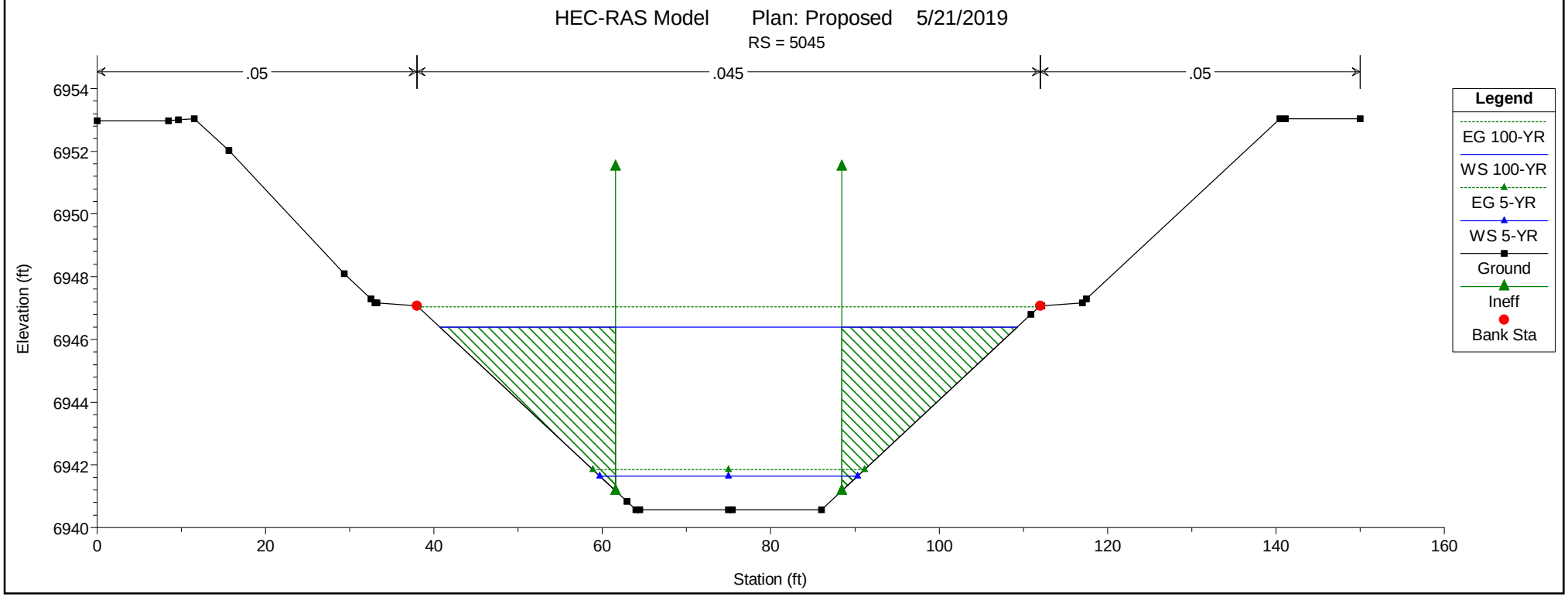

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5150
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5100
.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: Proposed 5/21/2019
RS = 5066
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

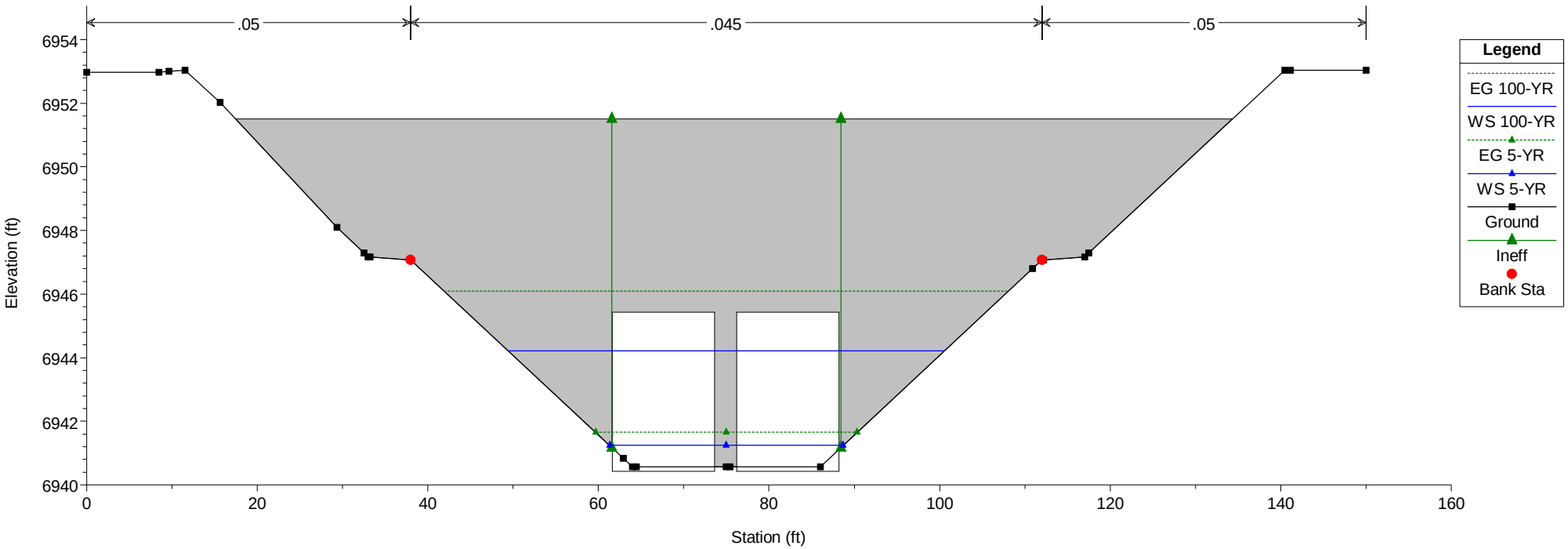

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5061
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5052
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
RS = 5045
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

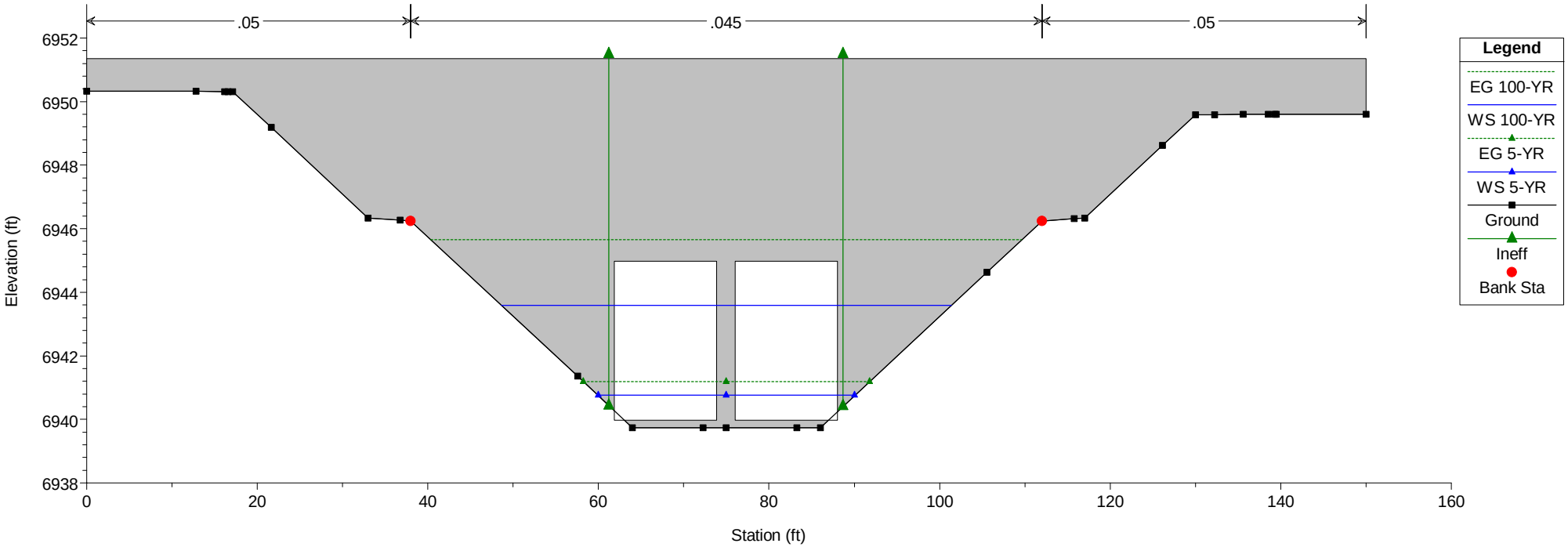
HEC-RAS Model Plan: Proposed 5/21/2019

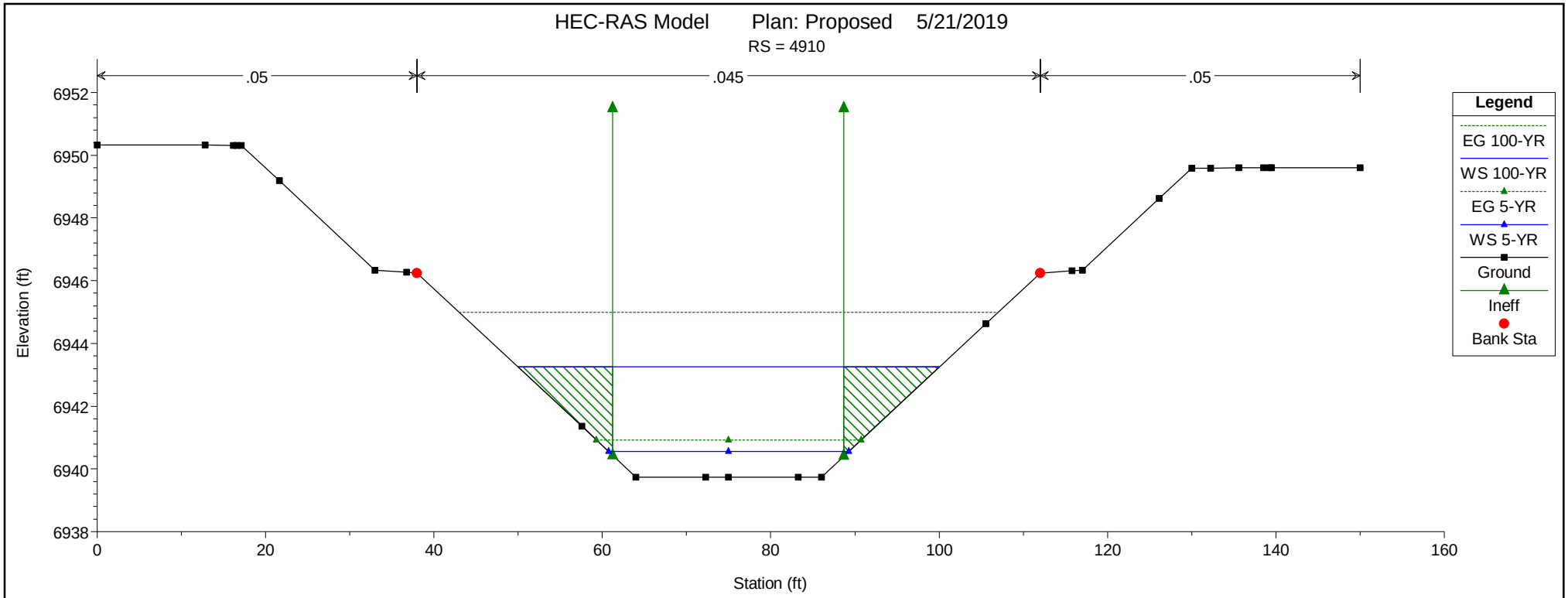
RS = 4978 Culv

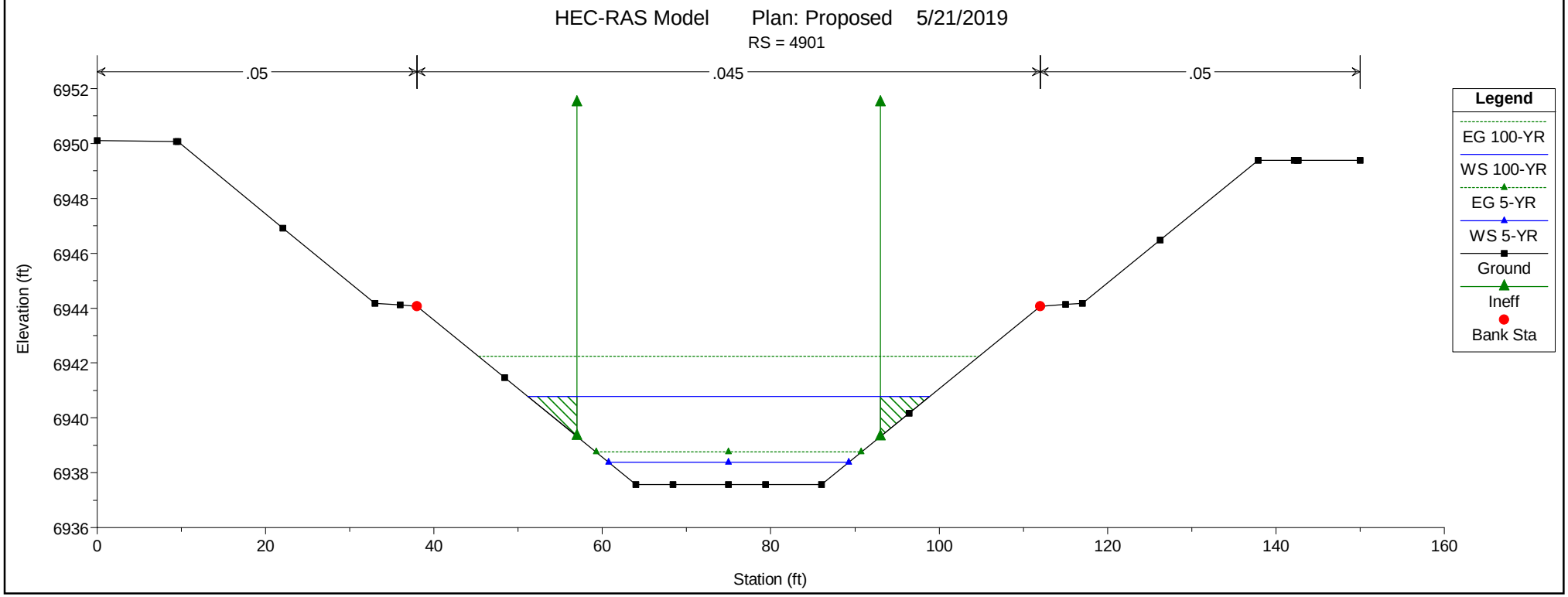


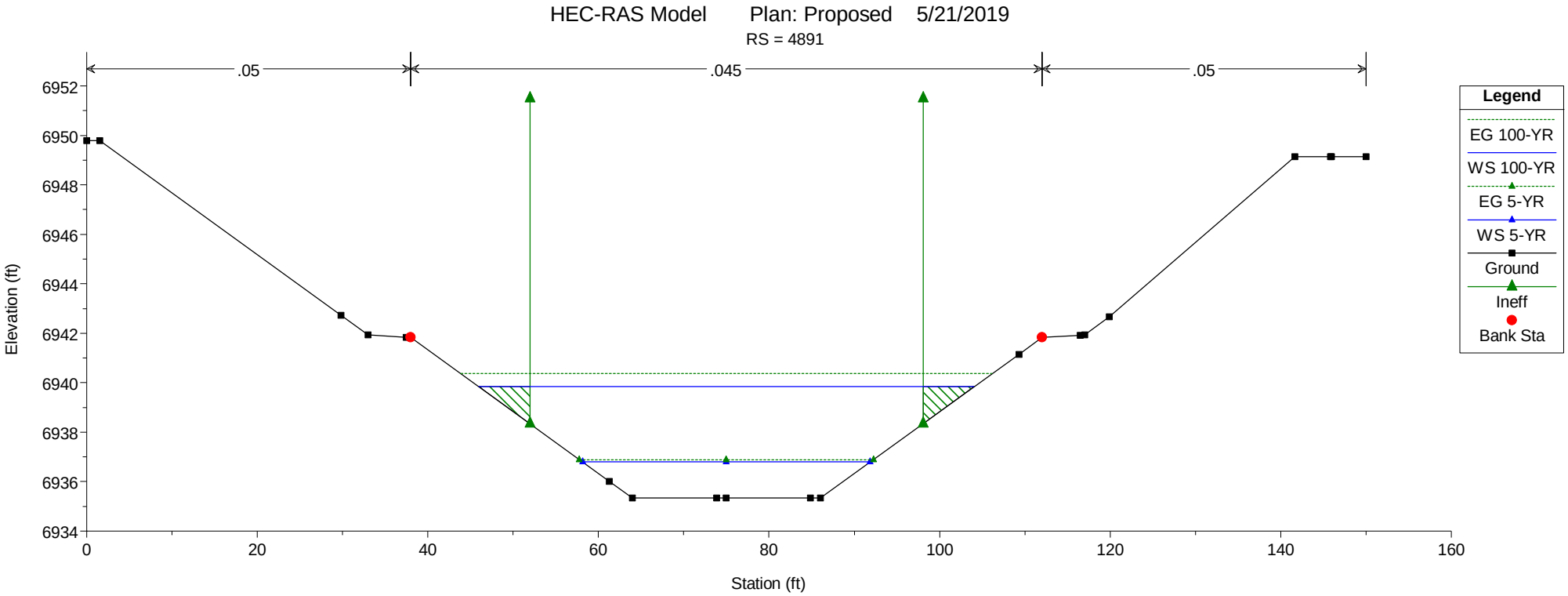
HEC-RAS Model Plan: Proposed 5/21/2019

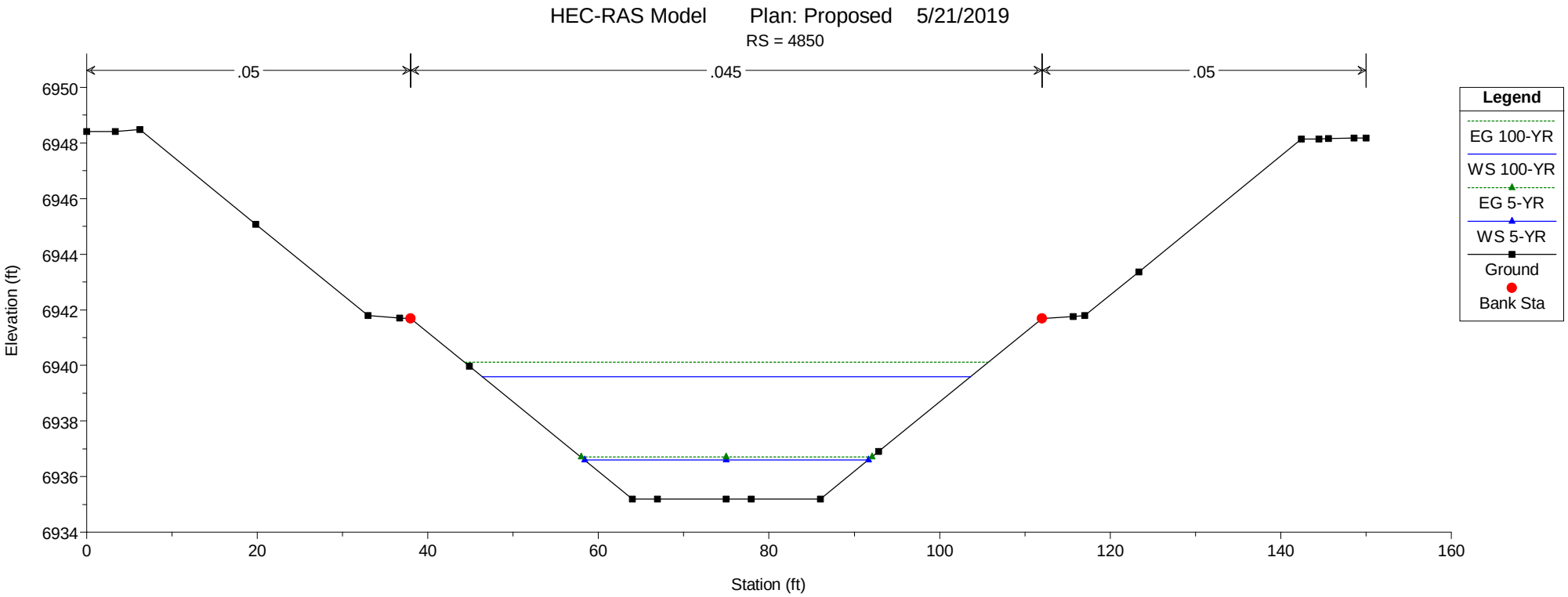
RS = 4978 Culv

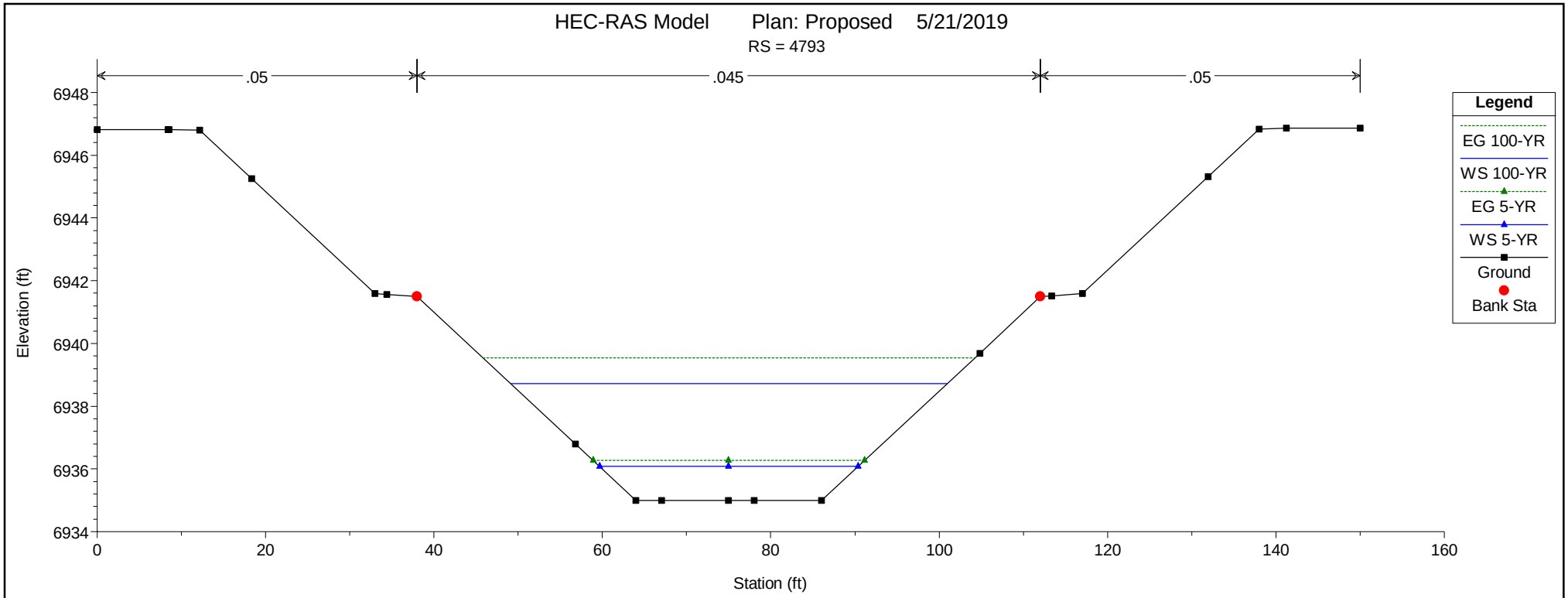


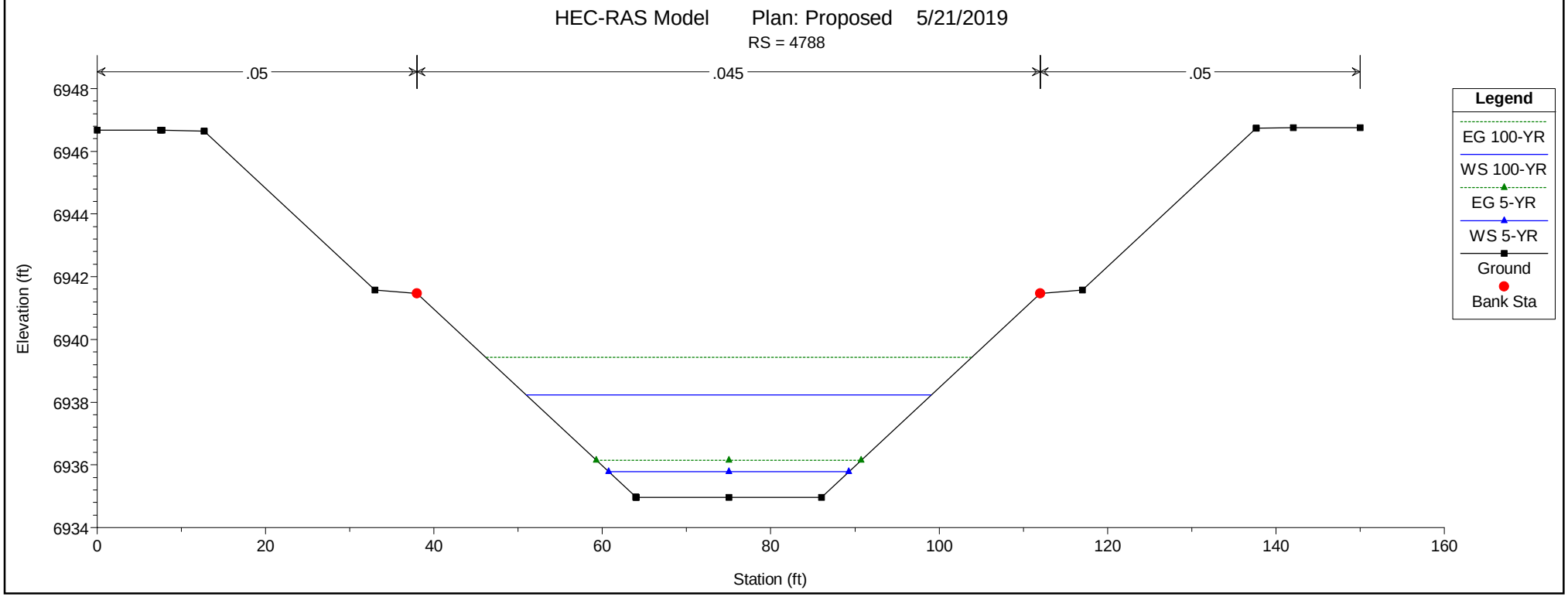

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4910
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

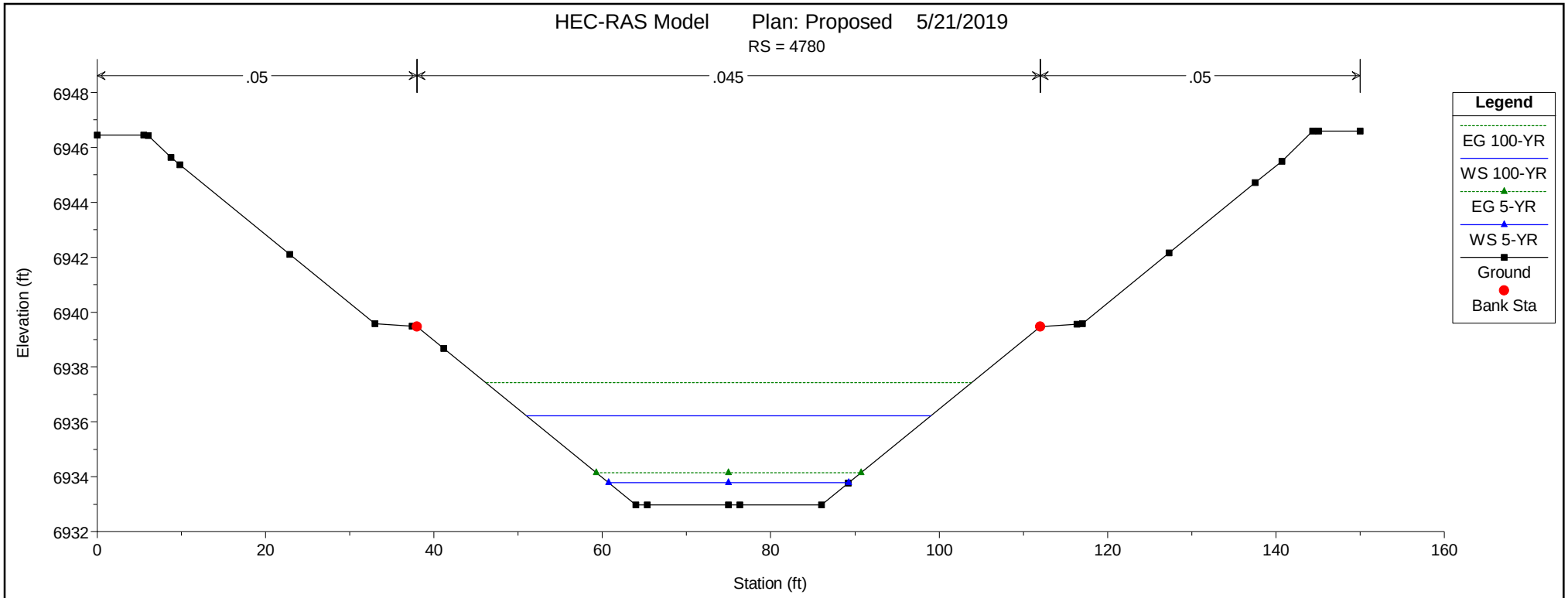

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4901
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

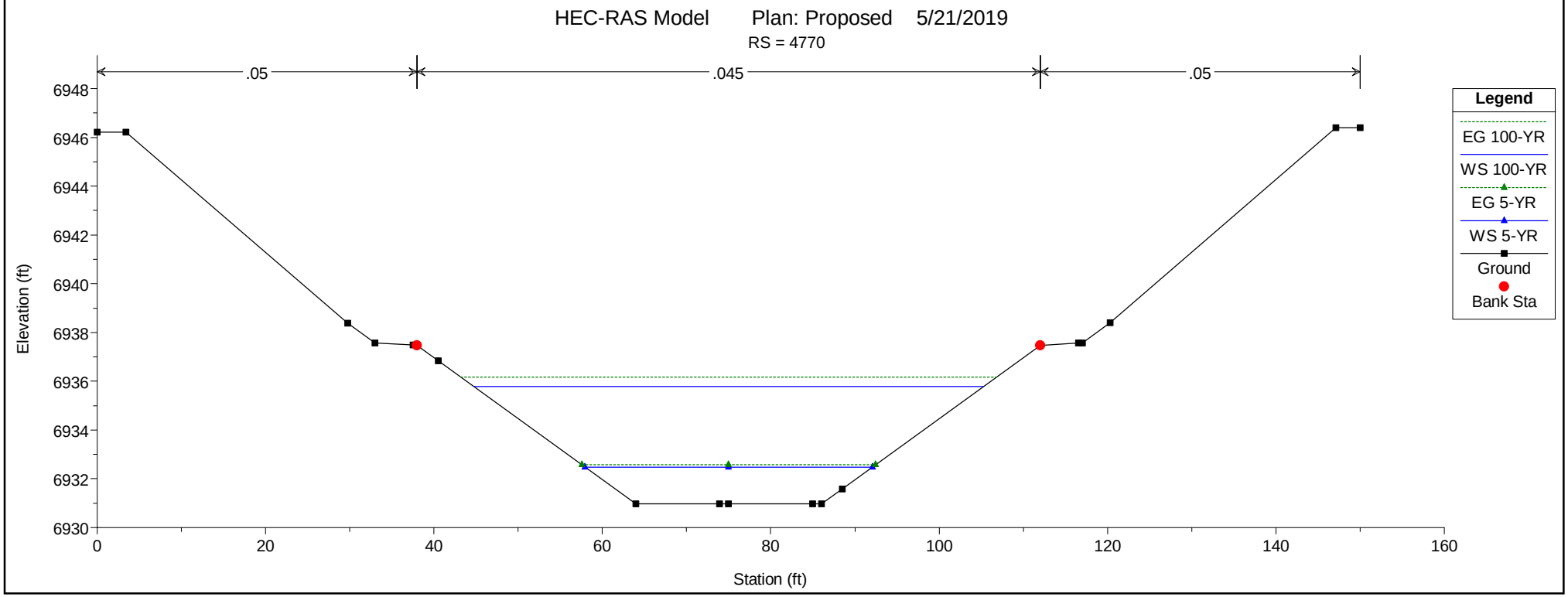

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4891
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Ineff
Bank Sta

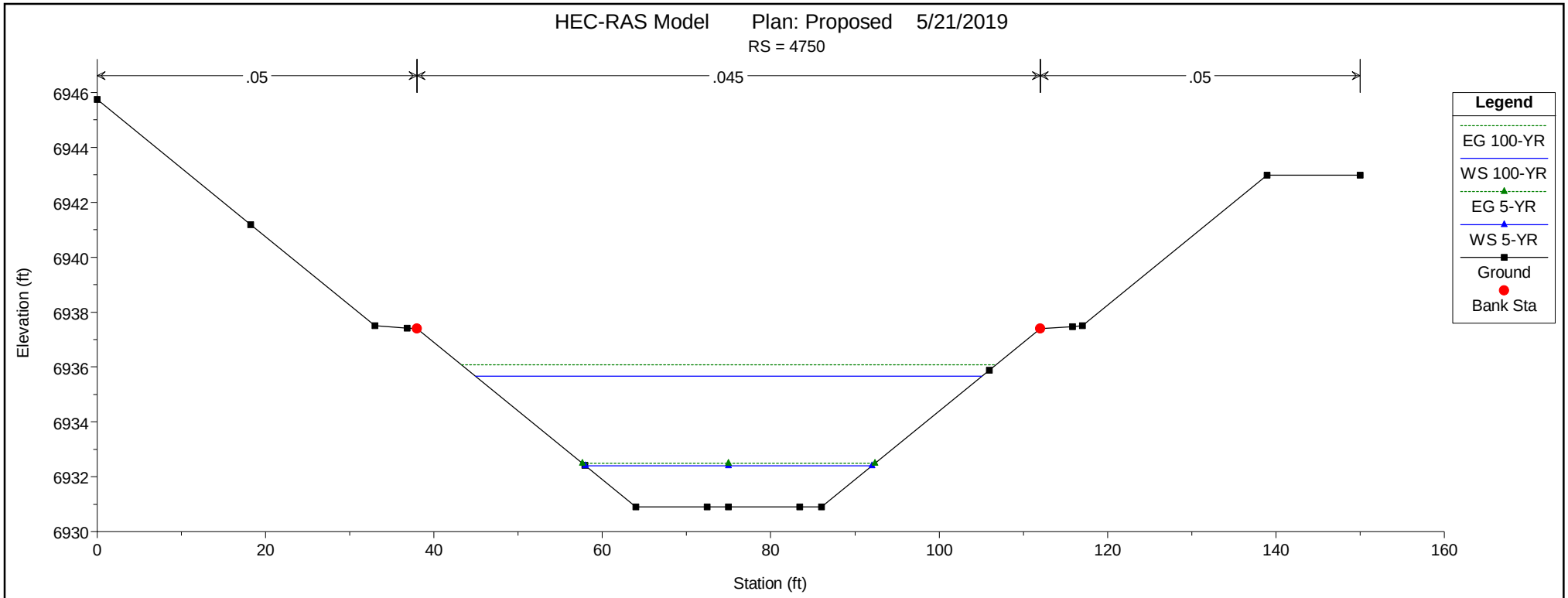

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4850
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

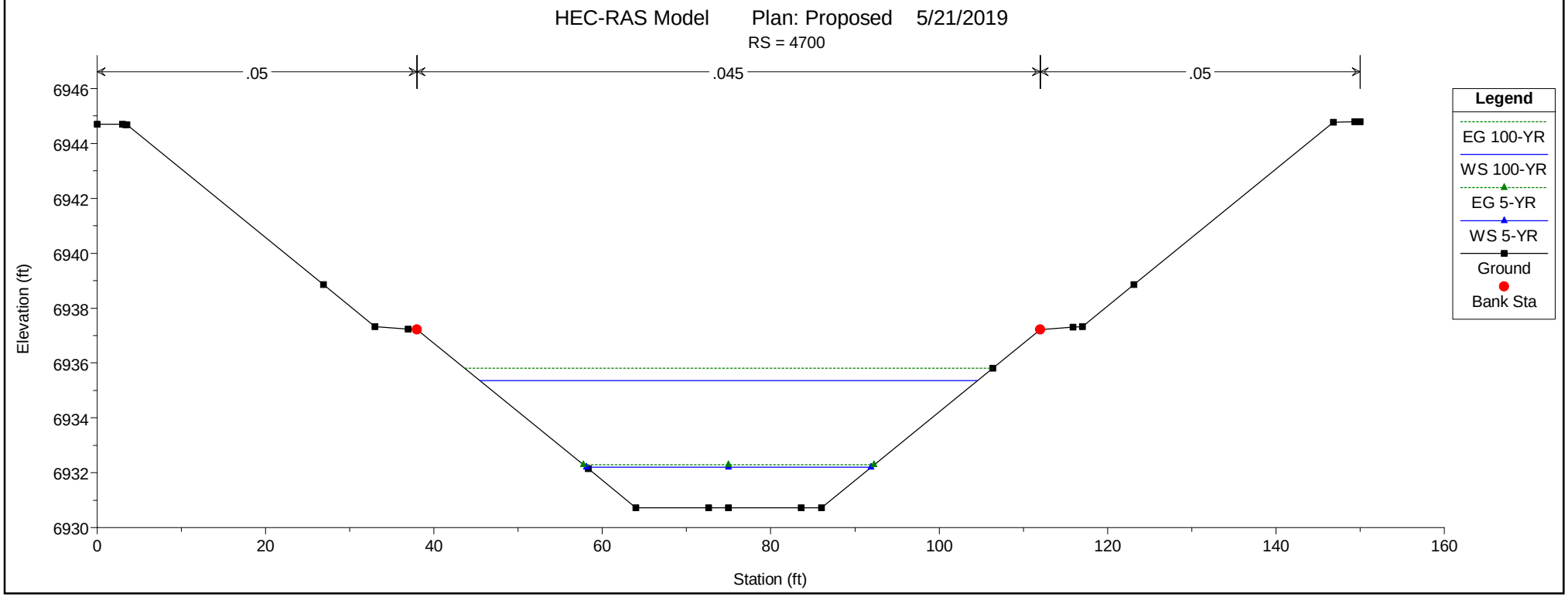

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4793
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

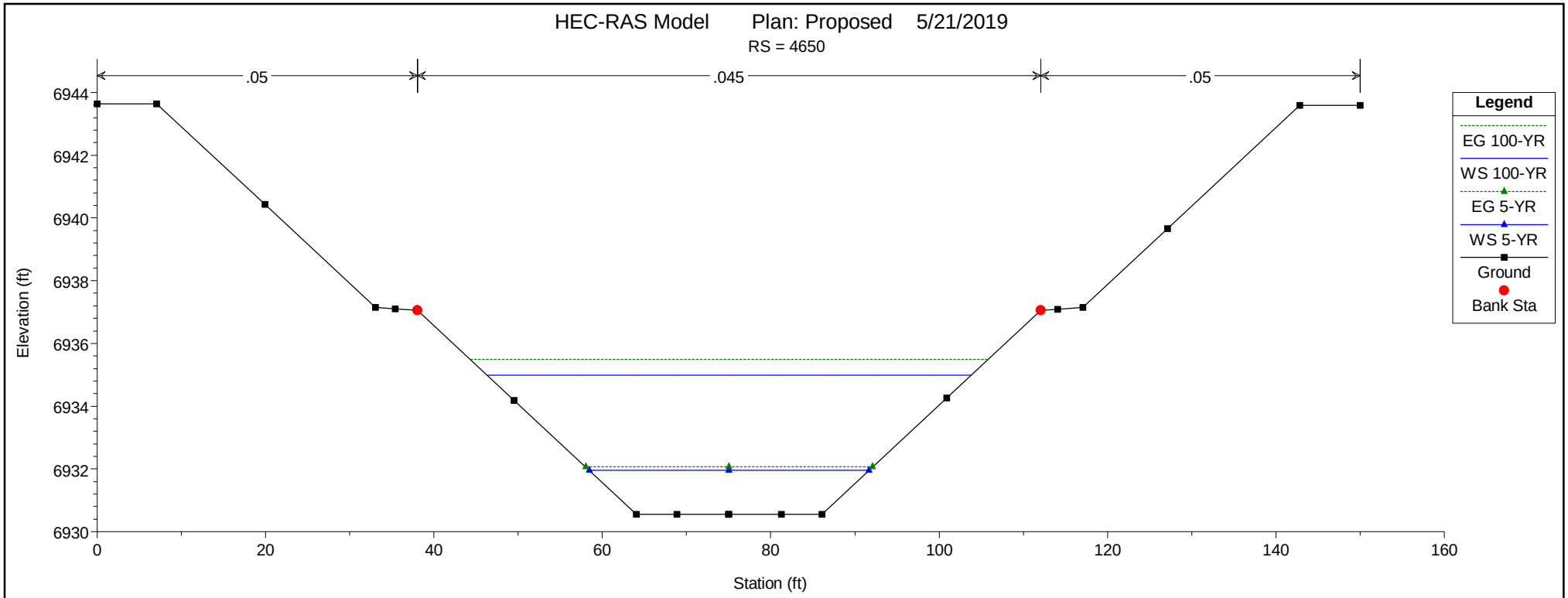

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4788
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

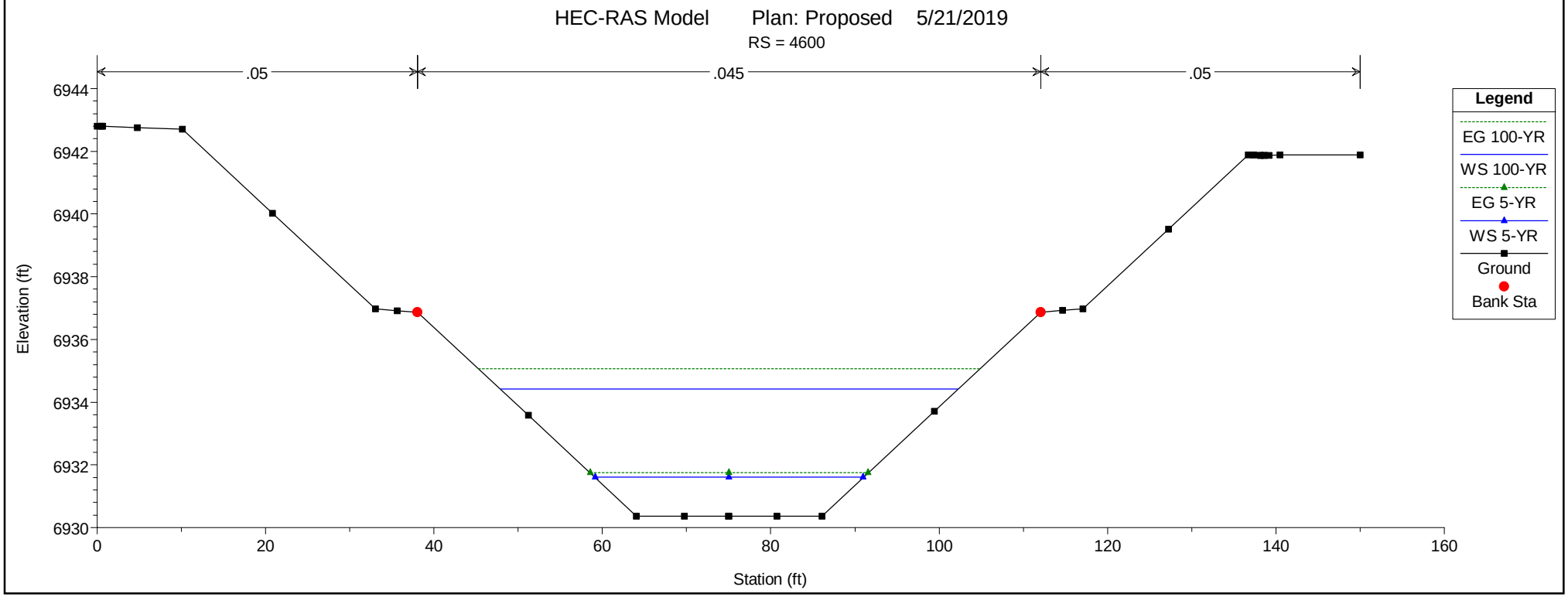

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4780
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

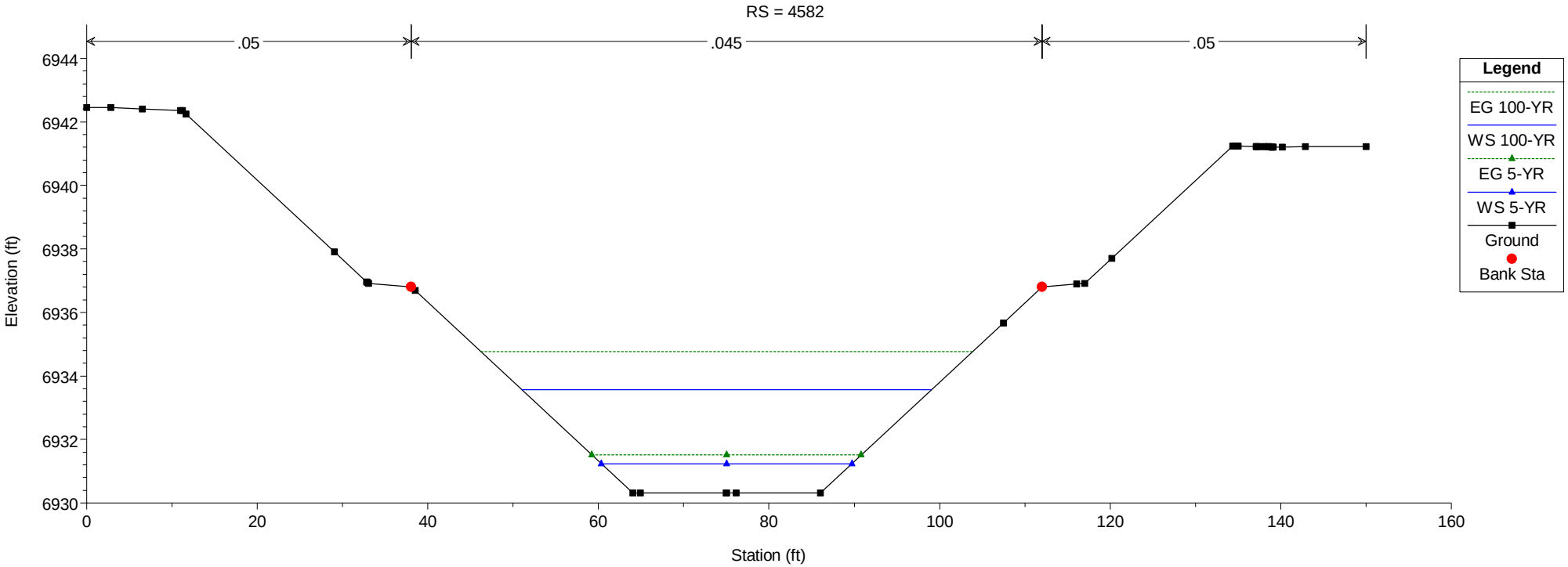

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4770
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

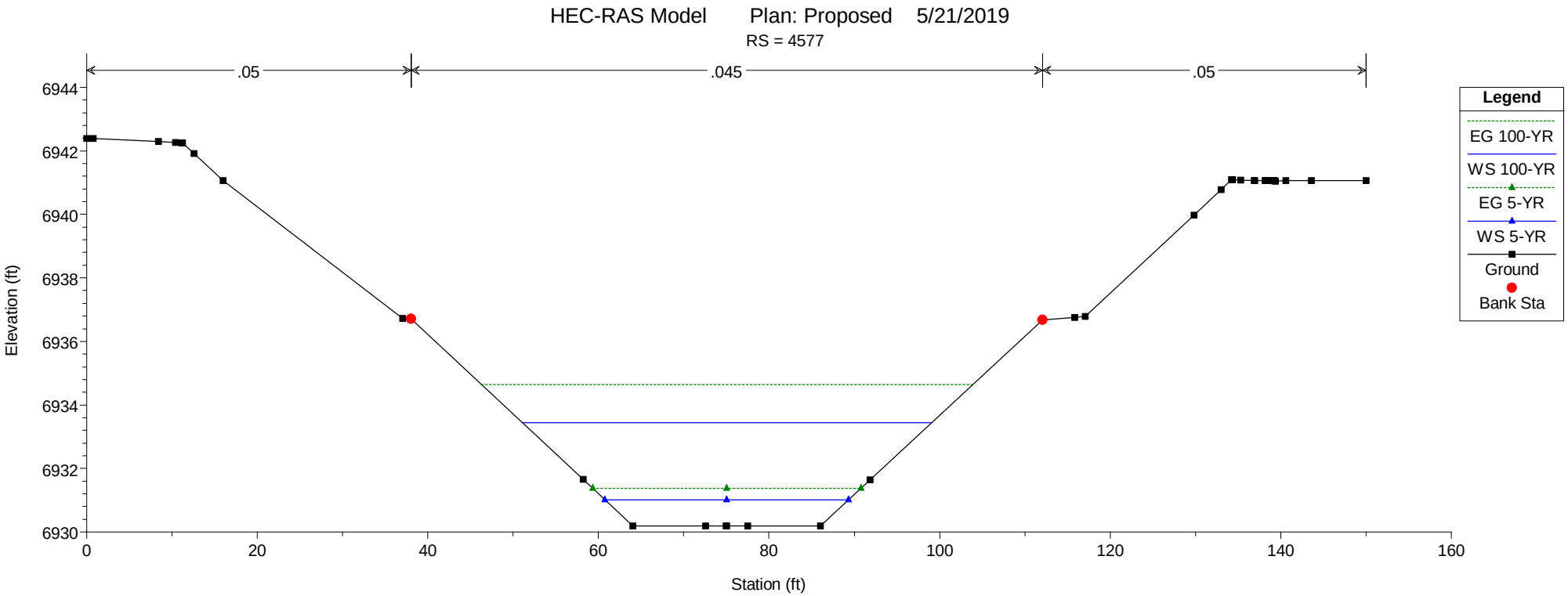

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4750
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

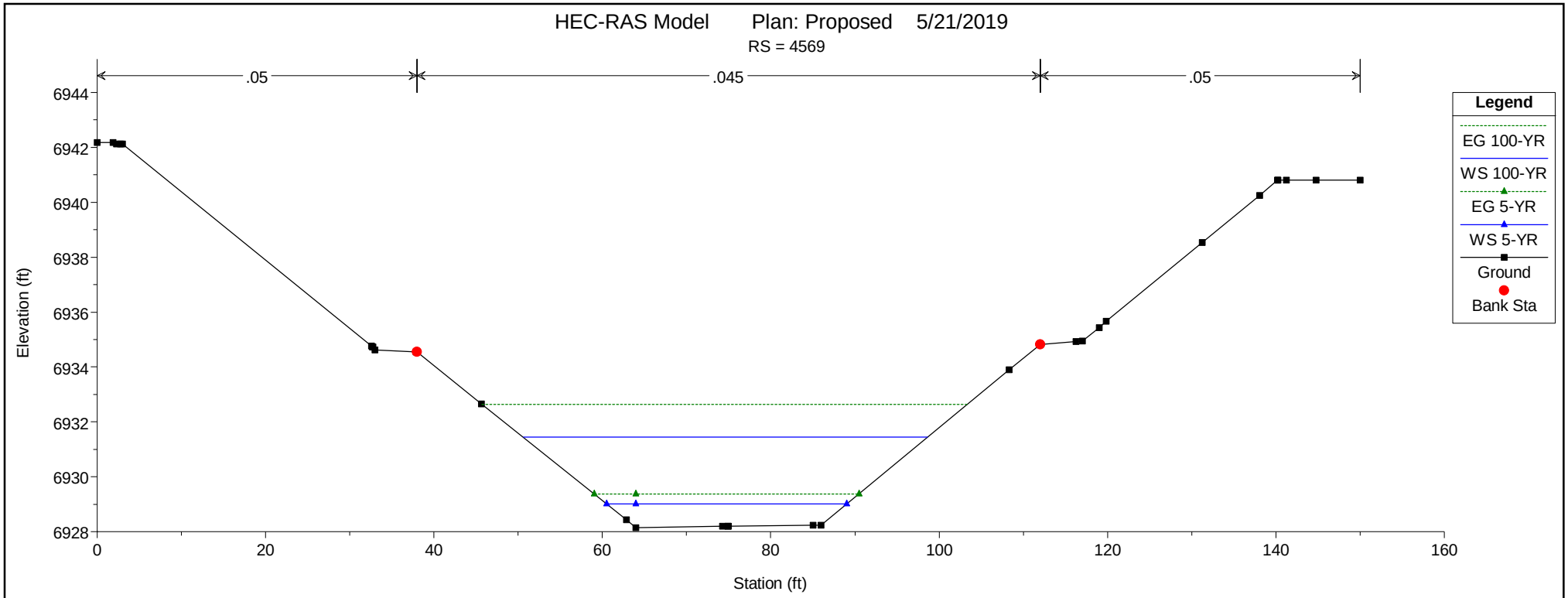

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4700
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

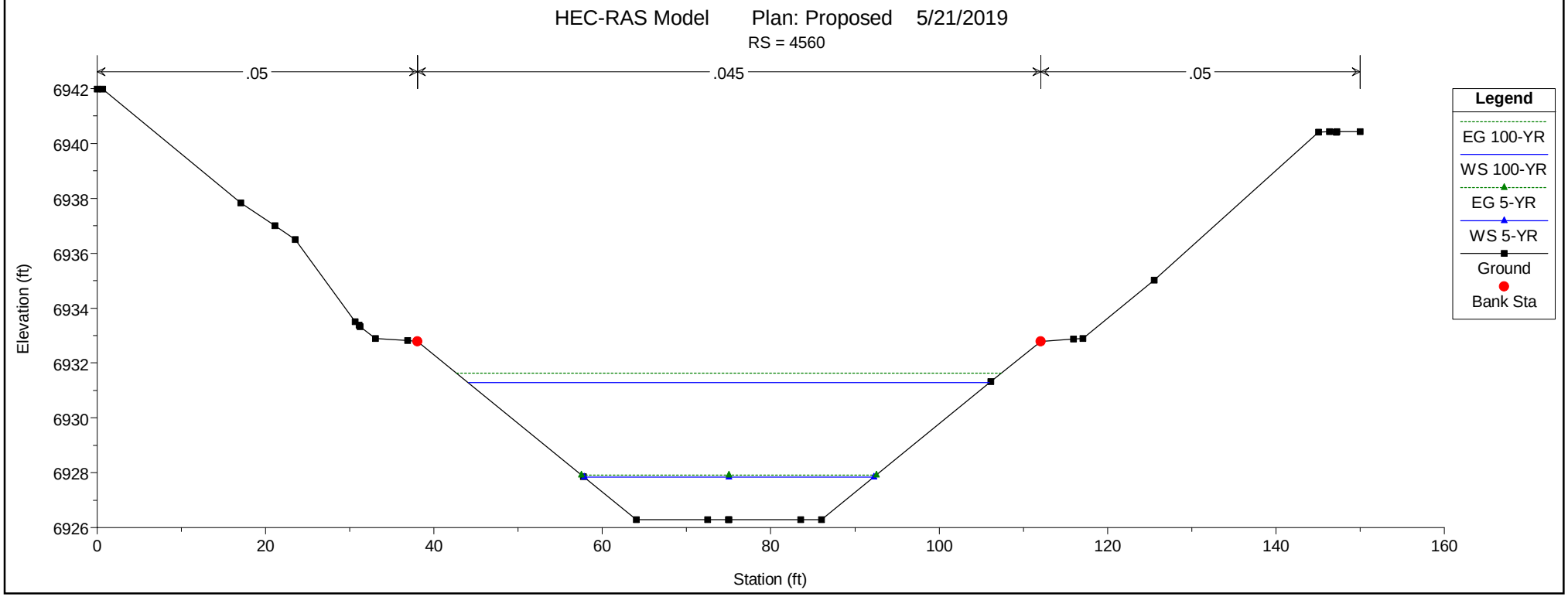

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4650
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

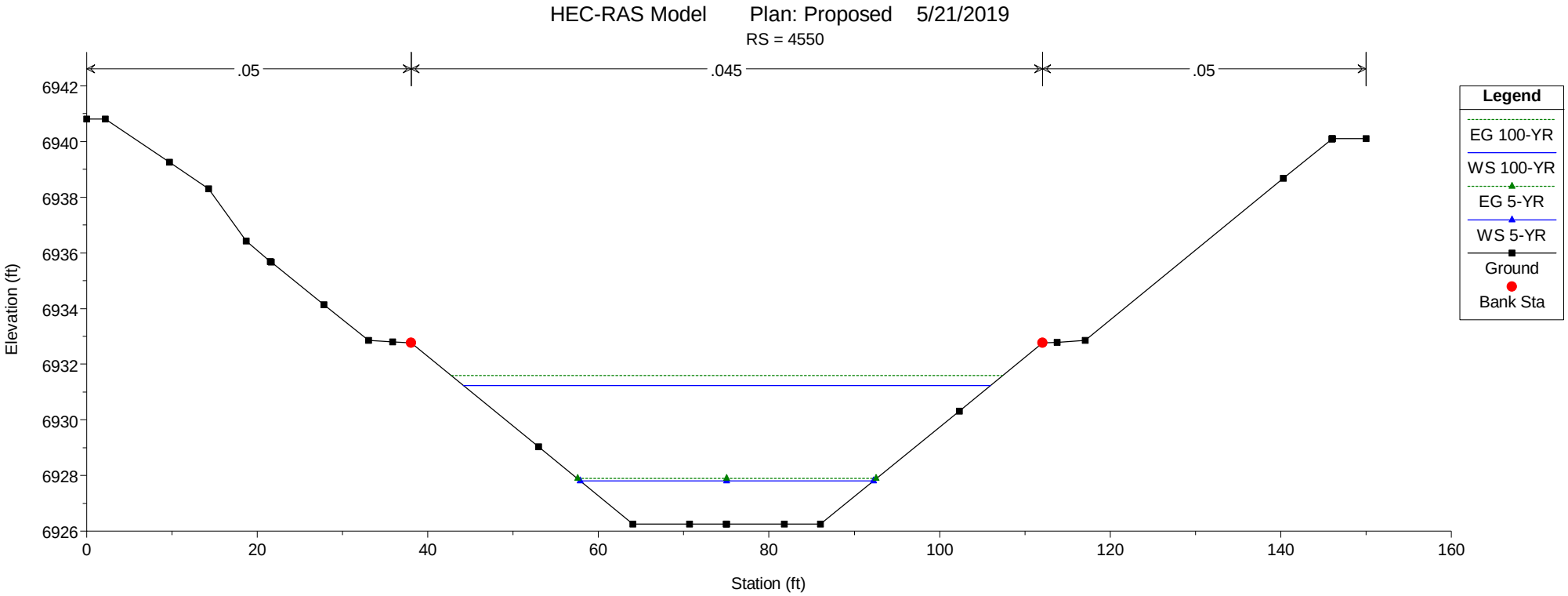

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4600
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

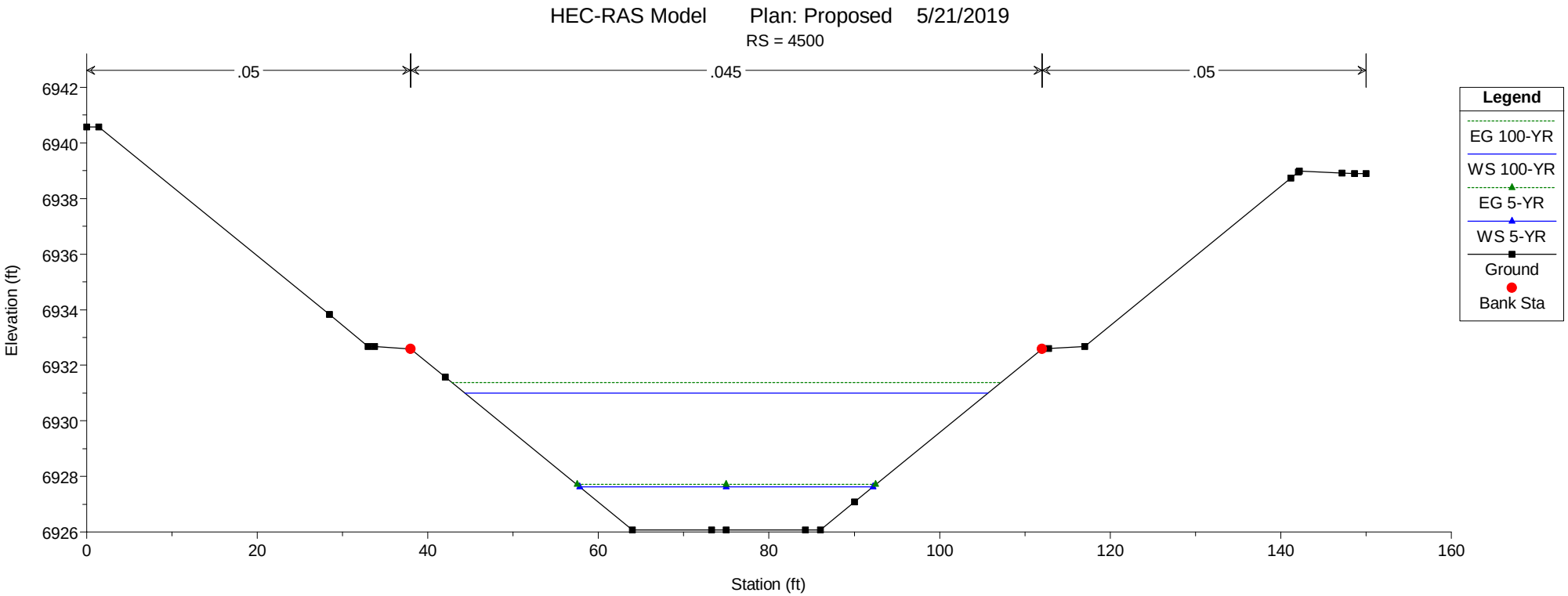

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4582
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta

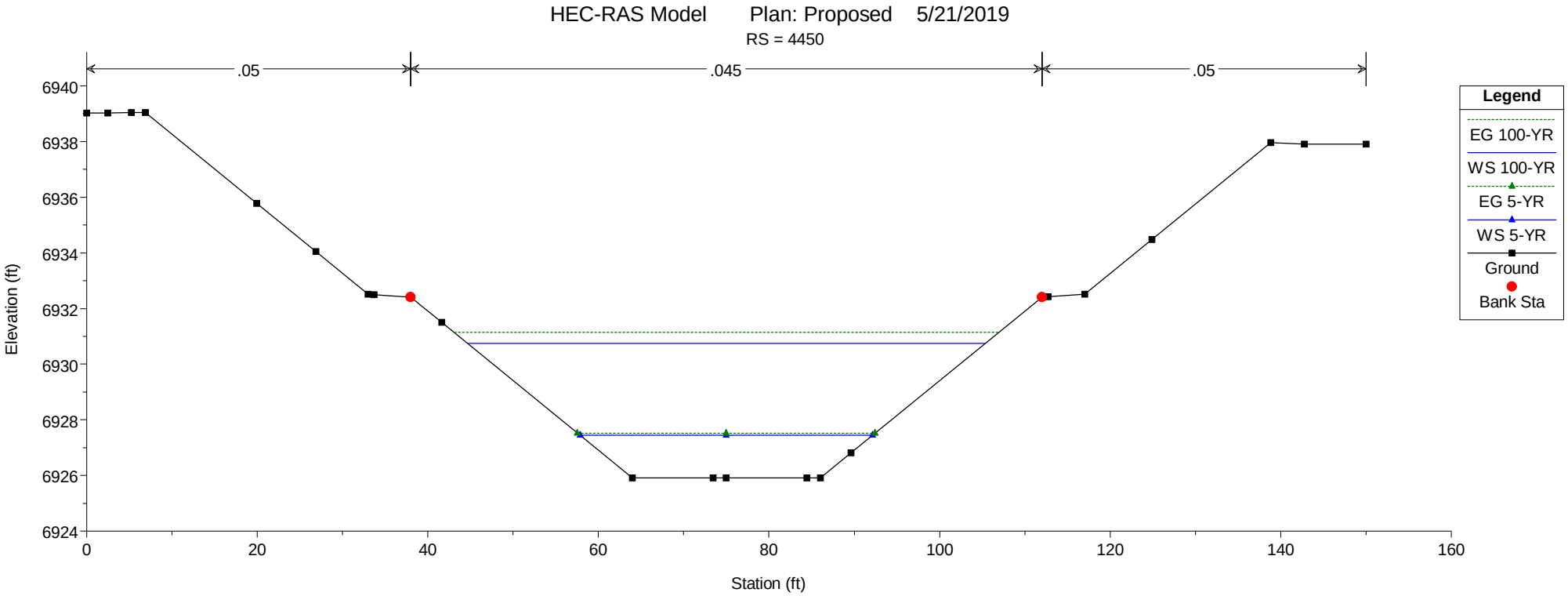

HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4577
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4569
.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: Proposed 5/21/2019
RS = 4560
.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: Proposed 5/21/2019
RS = 4550
.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: Proposed 5/21/2019
RS = 4500
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta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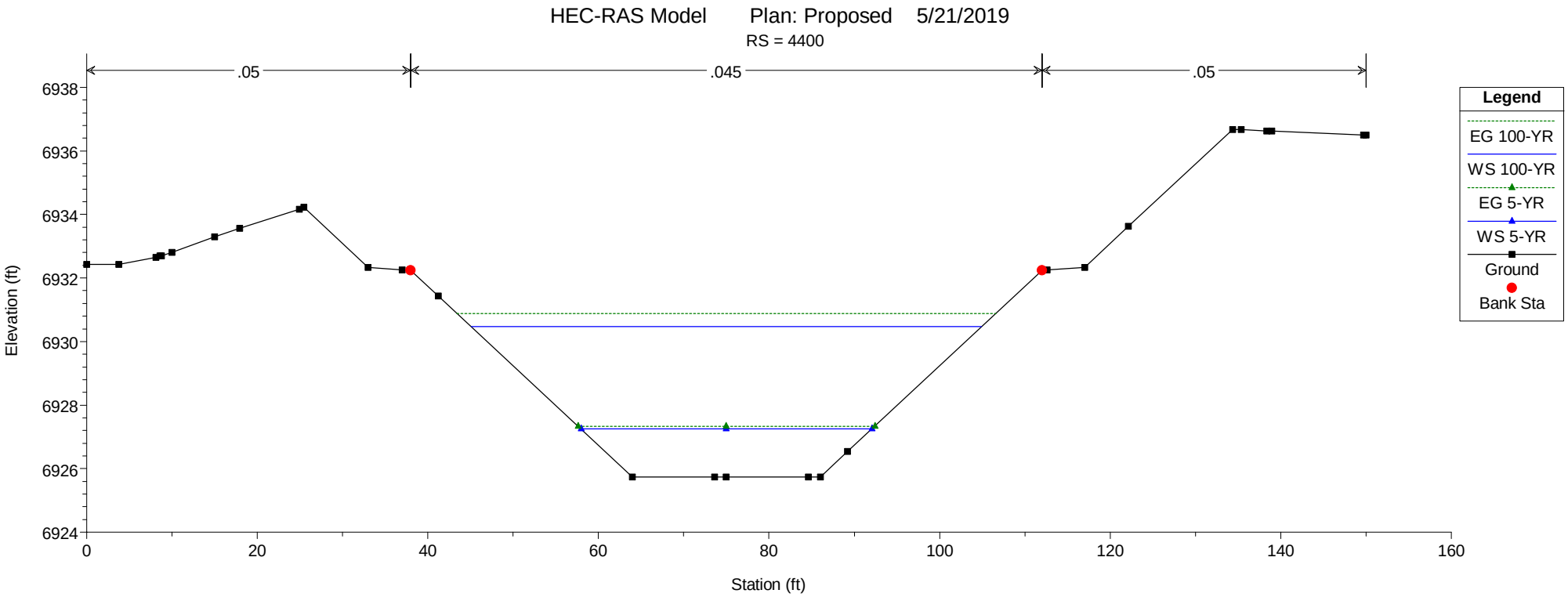
RS = 4450
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
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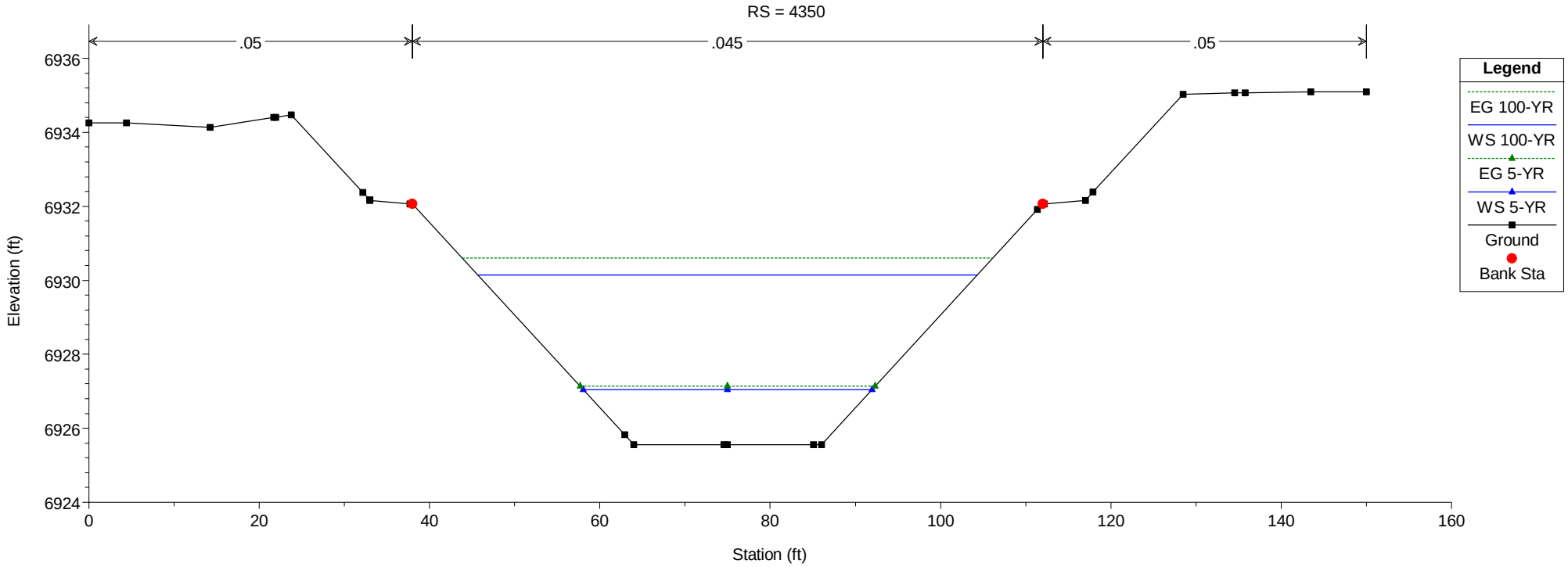
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
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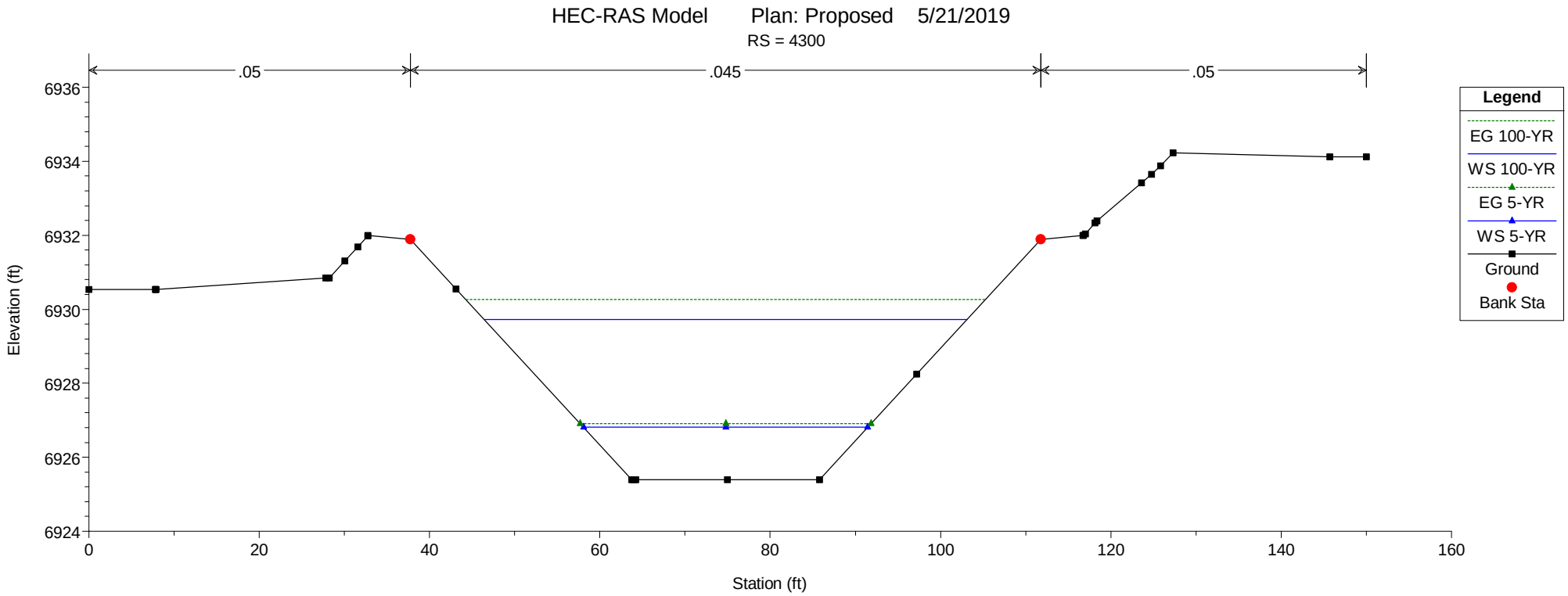
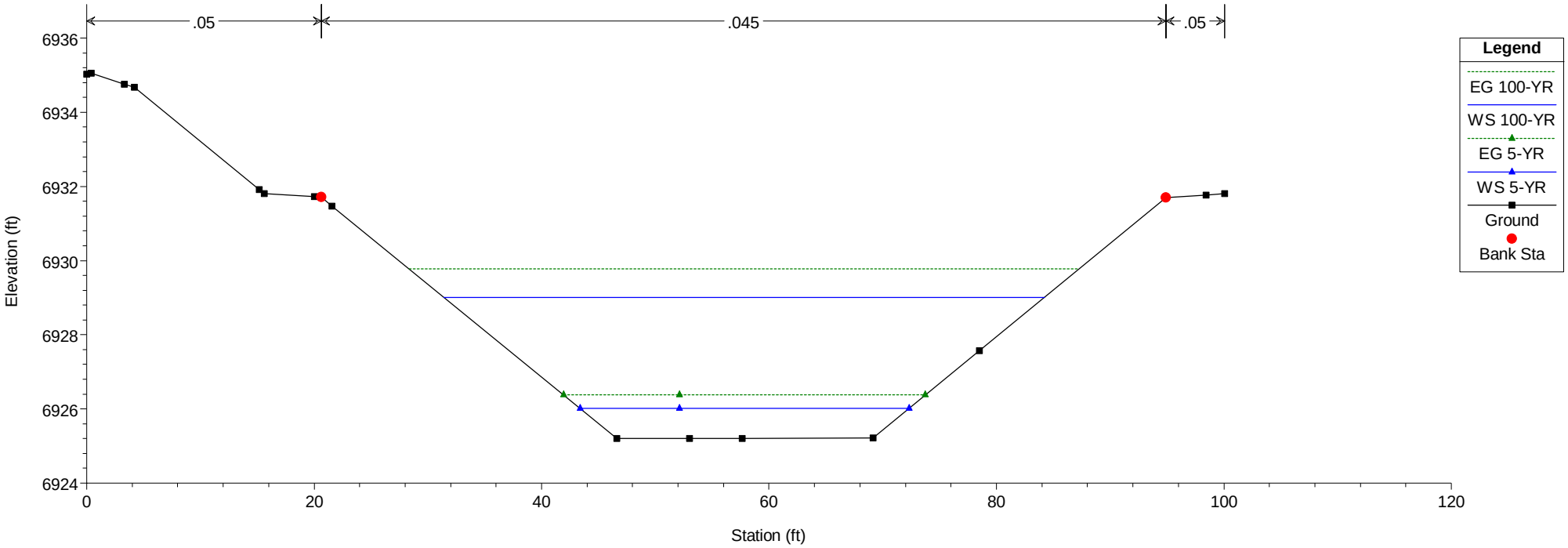
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
EG 100-YR
WS 100-YR
EG 5-YR
WS 5-YR
Ground
Bank Sta


HEC-RAS Model Plan: Proposed 5/21/2019
RS = 4300
.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: Proposed 5/21/2019

RS = 4250



APPENDIX D

Preliminary Pond Design

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

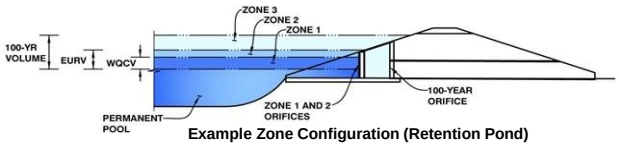
*Reference Section 3.0 of UDFCD Volume 3, August 2011

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: **Challenger Homes**

Basin ID: **Detention and Water Quality Pond WU**



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	**EDB**			
Watershed Area =	2291.20	acres		
Watershed Length =	27,984	ft		
Watershed Slope =	0.020	ft/ft		
Watershed Imperviousness =	7.33%	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 =	Castle Pines - City Office			
Water Quality Capture Volume (WQCV) =	9.764	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	11.312	acre-feet		
2-yr Runoff Volume (P1 = 0.84 in.) =	5.157	acre-feet		inches
5-yr Runoff Volume (P1 = 1.12 in.) =	7.503	acre-feet		inches
10-yr Runoff Volume (P1 = 1.36 in.) =	10.464	acre-feet		inches
25-yr Runoff Volume (P1 = 1.72 in.) =	17.753	acre-feet		inches
50-yr Runoff Volume (P1 = 2.01 in.) =	37.566	acre-feet		inches
100-yr Runoff Volume (P1 = 2.31 in.) =	82.799	acre-feet		inches
500-yr Runoff Volume (P1 = 3.07 in.) =	201.813	acre-feet		inches
Approximate 2-yr Detention Volume =	4.741	acre-feet		
Approximate 5-yr Detention Volume =	6.907	acre-feet		
Approximate 10-yr Detention Volume =	9.601	acre-feet		
Approximate 25-yr Detention Volume =	14.669	acre-feet		
Approximate 50-yr Detention Volume =	22.089	acre-feet		
Approximate 100-yr Detention Volume =	40.896	acre-feet		

Depth Increment = ft

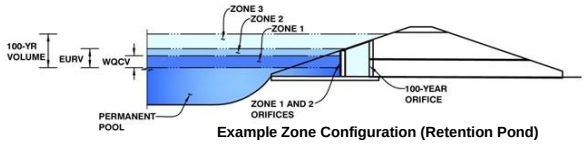
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	15	0.000		
6818.2	--	1.90	--	--	--	21,261	0.488	20,000	0.459
6819	--	2.70	--	--	--	61,537	1.413	53,331	1.224
6820	--	3.70	--	--	--	111,883	2.568	140,041	3.215
6821	--	4.70	--	--	--	149,826	3.440	270,895	6.219
6822	--	5.70	--	--	--	184,669	4.239	438,143	10.058
6823	--	6.70	--	--	--	197,045	4.524	629,000	14.440
6824	--	7.70	--	--	--	203,805	4.679	829,425	19.041
6825	--	8.70	--	--	--	209,996	4.821	1,036,325	23.791
6826	--	9.70	--	--	--	216,045	4.960	1,249,346	28.681
6827	--	10.70	--	--	--	222,053	5.098	1,468,395	33.710
6828	--	11.70	--	--	--	228,051	5.235	1,693,447	38.876
6829	--	12.70	--	--	--	234,619	5.386	1,924,782	44.187
6830	--	13.70	--	--	--	241,328	5.540	2,162,755	49.650
6830.2	--	13.90	--	--	--	242,670	5.571	2,211,155	50.761
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				

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 Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.102E-01	ft^2
Depth at top of Zone using Orifice Plate =	5.64	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	15.87	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	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

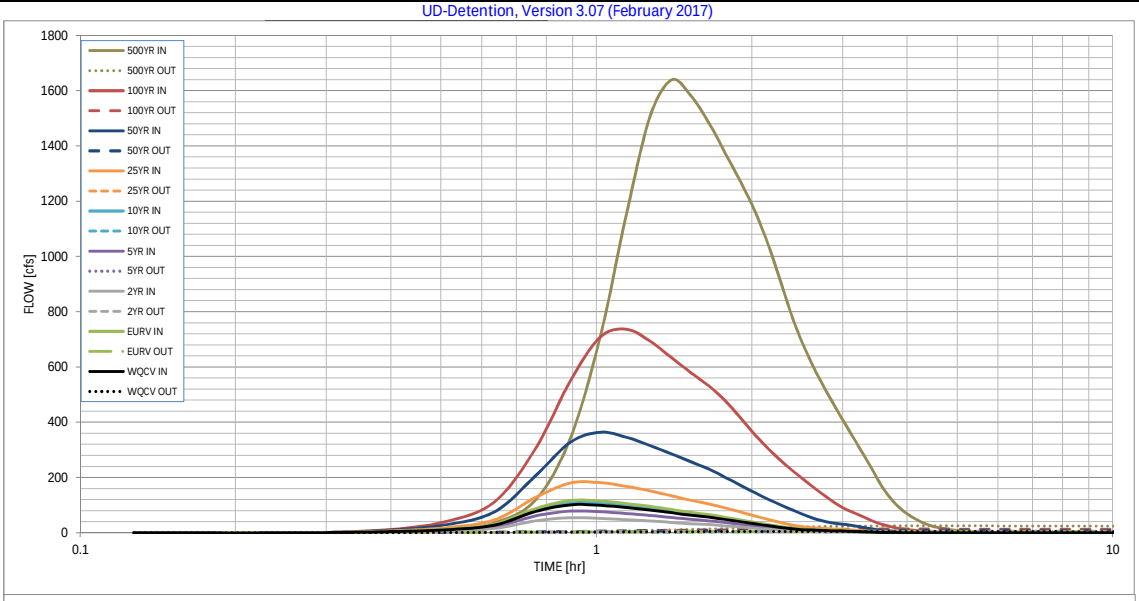
Spillway Design Flow Depth=	1.13	feet
Stage at Top of Freeboard =	13.83	feet
Basin Area at Top of Freeboard =	5.56	acres

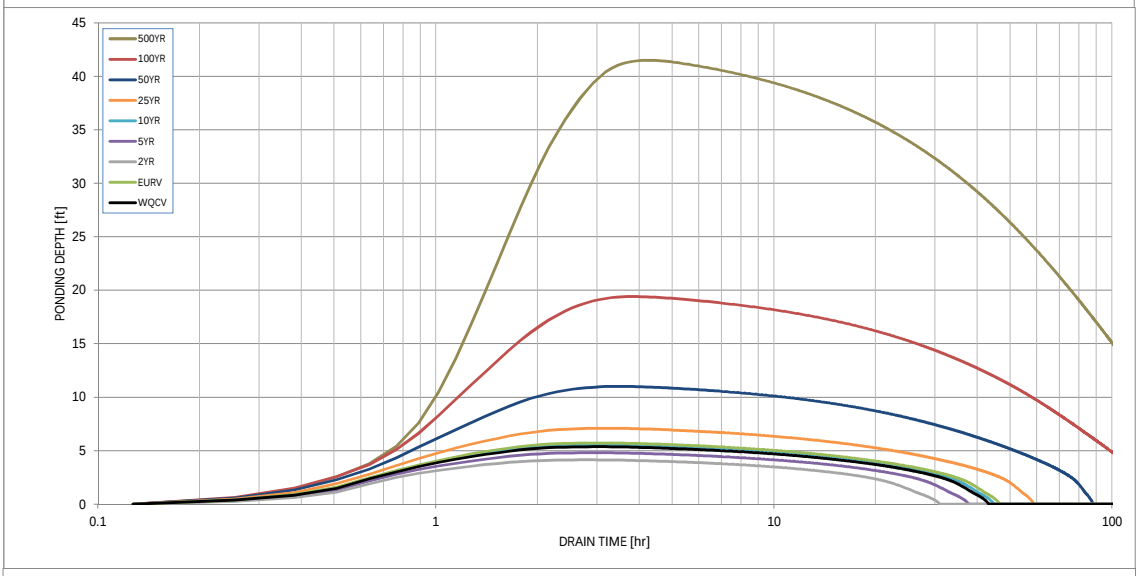
Routed Hydrograph Results

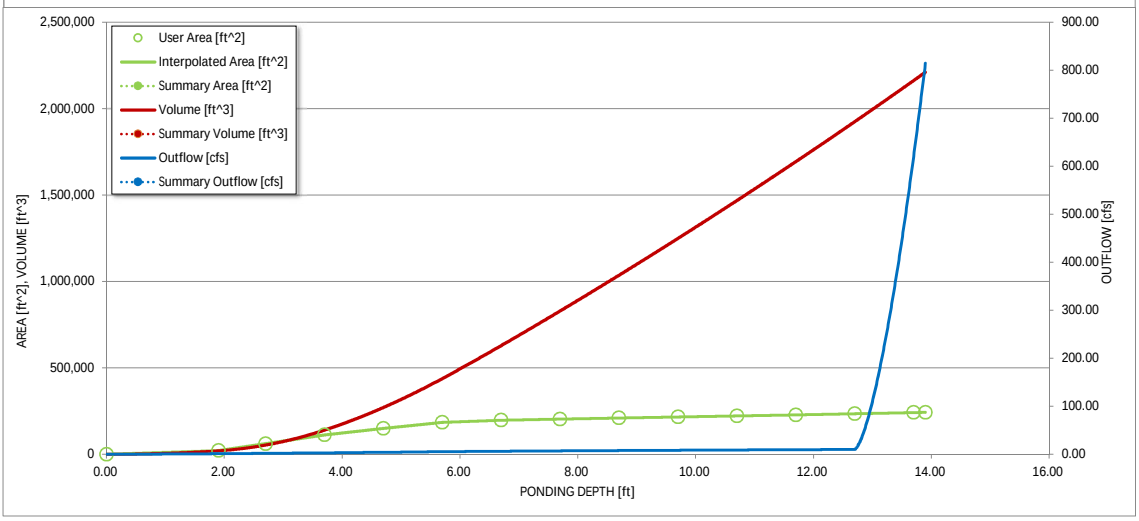
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	0.84	1.12	1.36	1.72	2.01	2.31	3.07
Calculated Runoff Volume (acre-ft) =	9.764	11.312	5.157	7.503	10.464	17.753	37.566	82.799	201.813
OPTIONAL Override Runoff Volume (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			

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs UD-Detention, Version 3.07 (February 2017)

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
7.62 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:07:37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph	0:15:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	0:22:52	3.75	4.19	2.22	3.04	3.95	5.78	8.07	9.62	7.55
0.656	0:30:29	11.02	12.51	6.22	8.74	11.70	18.26	28.75	39.66	36.25
	0:38:06	28.31	32.16	15.96	22.44	30.05	47.01	76.51	112.76	119.21
	0:45:43	77.37	87.83	43.73	61.40	82.11	128.00	206.49	305.00	339.58
	0:53:20	101.50	117.04	54.48	78.60	108.49	180.31	327.12	548.13	706.31
	1:00:58	99.69	115.58	52.61	76.57	106.82	181.63	364.45	707.89	1152.67
	1:08:35	91.53	106.31	48.00	70.10	98.16	168.17	345.95	736.86	1507.19
	1:16:12	82.60	95.96	43.26	63.23	88.59	151.92	316.08	693.86	1639.38
	1:23:49	72.72	84.59	37.90	55.55	78.04	134.40	285.91	634.53	1582.08
	1:31:26	63.68	74.10	33.12	48.61	68.35	117.83	257.20	579.81	1484.12
	1:39:04	57.07	66.30	29.85	43.67	61.21	104.90	231.14	531.57	1371.90
	1:46:41	48.42	56.40	25.08	36.89	51.99	90.02	200.35	477.34	1267.45
	1:54:18	40.28	46.95	20.80	30.66	43.27	75.07	171.48	414.25	1160.11
	2:01:55	32.35	37.79	16.54	24.51	34.78	60.88	144.61	353.48	1035.17
	2:09:32	25.25	29.55	12.81	19.08	27.18	47.84	120.49	302.13	895.48
	2:17:10	19.12	22.42	9.61	14.40	20.60	36.62	99.24	258.47	763.51
	2:24:47	14.14	16.54	7.18	10.69	15.21	27.18	80.45	220.99	662.68
	2:32:24	11.22	13.09	5.75	8.52	12.05	21.23	63.54	187.66	578.97
	2:40:01	9.40	10.95	4.84	7.15	10.09	17.64	49.17	156.98	508.74
	2:47:38	8.13	9.46	4.20	6.19	8.73	15.17	39.88	128.85	445.41
	2:55:16	7.24	8.42	3.75	5.52	7.77	13.45	34.03	104.08	387.09
	3:02:53	6.60	7.68	3.44	5.05	7.09	12.22	30.08	84.67	331.93
	3:10:30	5.07	5.94	2.58	3.83	5.46	9.67	24.88	70.11	278.80
	3:18:07	3.65	4.27	1.86	2.76	3.93	6.98	18.88	56.07	226.05
	3:25:44	2.71	3.17	1.38	2.05	2.92	5.17	13.79	42.78	173.48
	3:33:22	2.01	2.36	1.03	1.52	2.17	3.83	10.17	32.10	133.07
	3:40:59	1.49	1.74	0.75	1.12	1.60	2.84	7.68	24.09	101.80
	3:48:36	1.08	1.26	0.54	0.81	1.16	2.07	5.79	18.05	78.28
	3:56:13	0.78	0.91	0.39	0.59	0.84	1.49	4.35	13.59	59.83
	4:03:50	0.55	0.65	0.28	0.42	0.60	1.08	3.26	10.39	45.67
	4:11:28	0.37	0.43	0.18	0.27	0.40	0.73	2.47	7.95	34.37
	4:19:05	0.22	0.26	0.10	0.16	0.24	0.45	1.79	6.21	25.80
	4:26:42	0.11	0.13	0.05	0.08	0.12	0.23	1.22	4.79	19.98
	4:34:19	0.03	0.04	0.01	0.02	0.04	0.09	0.76	3.55	15.62
	4:41:56	0.00	0.00	0.00	0.00	0.00	0.01	0.41	2.50	12.50
	4:49:34	0.00	0.00	0.00	0.00	0.00	0.00	0.16	1.63	9.73
	4:57:11	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.95	7.31
	5:04:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	5.24
	5:12:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	3.51
	5:20:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.12
	5:27:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07
	5:35:17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
	5:42:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	5:50:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:58:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:05:46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:13:23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:21:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:28:37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:36:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:43:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:51:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:59:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:06:43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:14:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:21:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:29:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:37:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:44:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:52:26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:00:04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:07:41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:15:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:22:55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:30:32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:38:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:45:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:53:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9:01:01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9:08:38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Weir Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 21 2019

5-yr Weir

Trapezoidal Weir

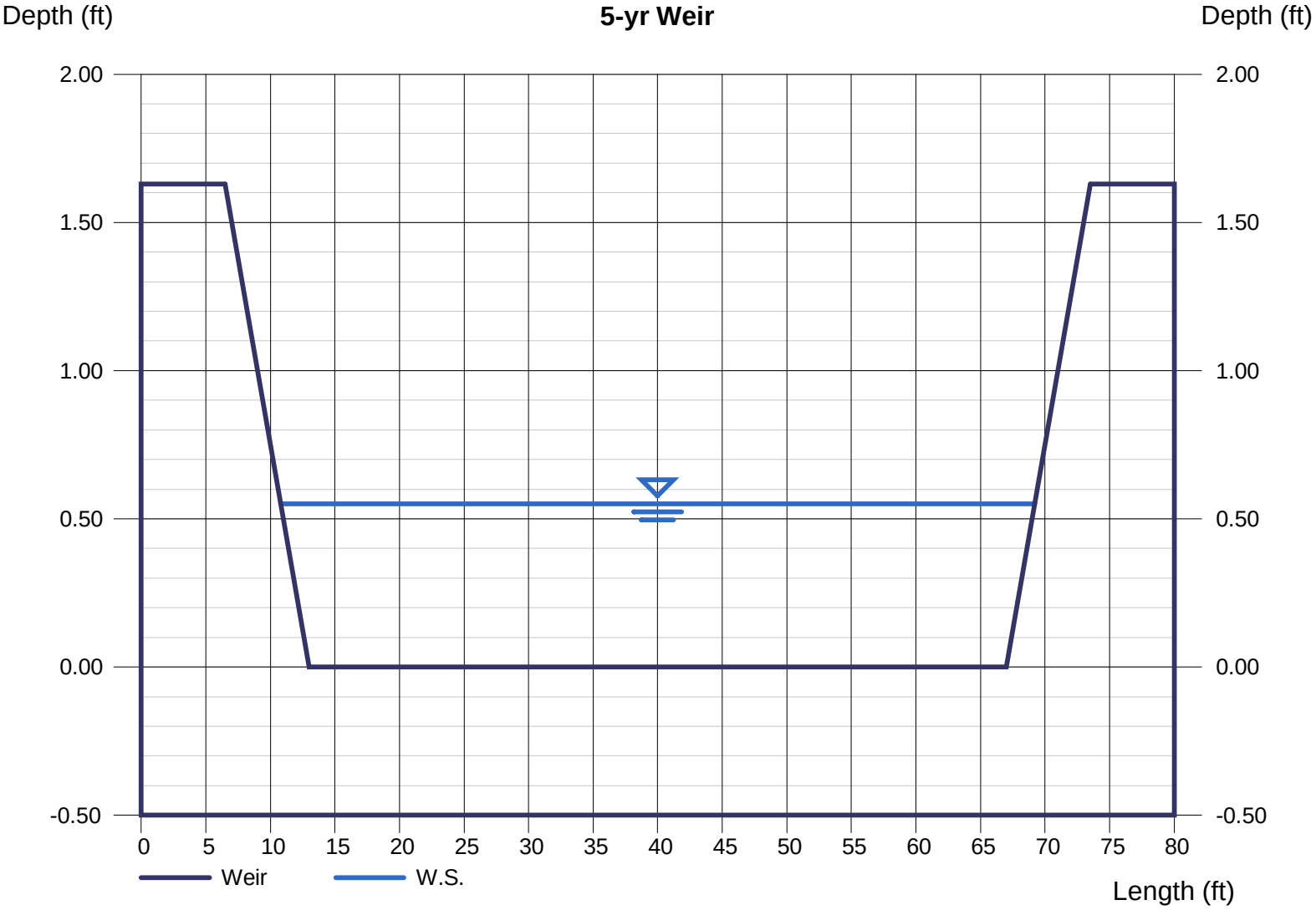
Crest	=	Sharp
Bottom Length (ft)	=	54.00
Total Depth (ft)	=	1.63
Side Slope (z:1)	=	4.00

Calculations

Weir Coeff. Cw	=	3.10
Compute by:		Known Q
Known Q (cfs)	=	70.00

Highlighted

Depth (ft)	=	0.55
Q (cfs)	=	70.00
Area (sqft)	=	30.91
Velocity (ft/s)	=	2.26
Top Width (ft)	=	58.40



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)

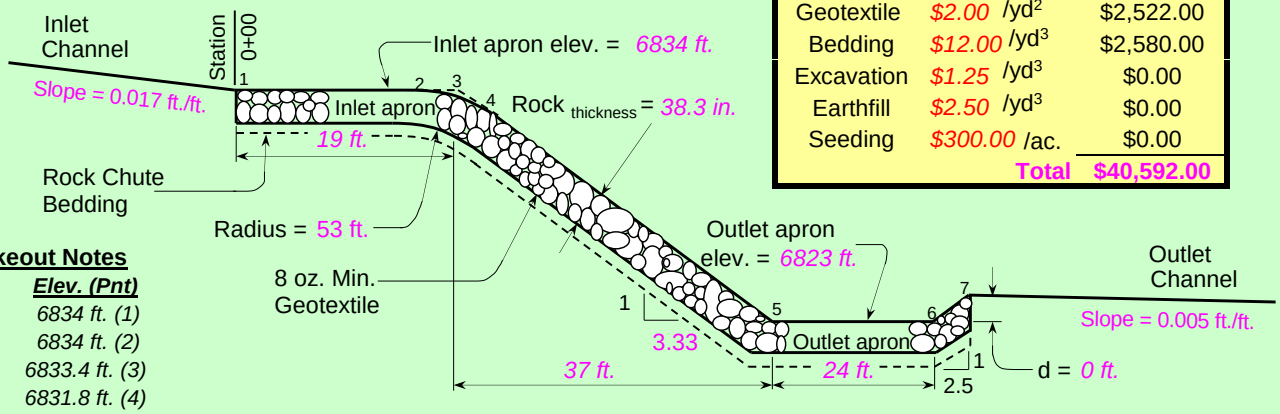
Quantities [a]

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**

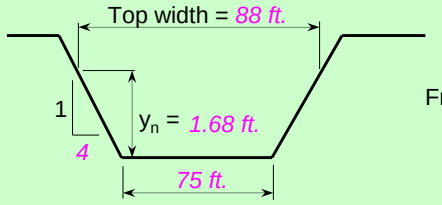


Profile Along Centerline of Rock Chute

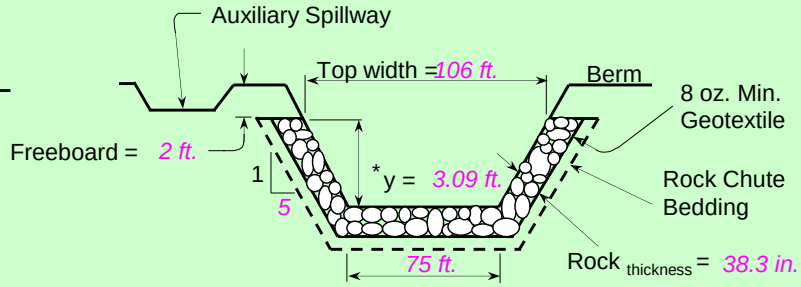
*****Note:*** ***The outlet will not function adequately***

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)

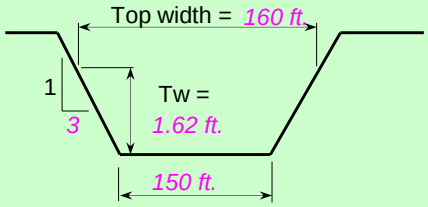


Inlet Channel Cross Section



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

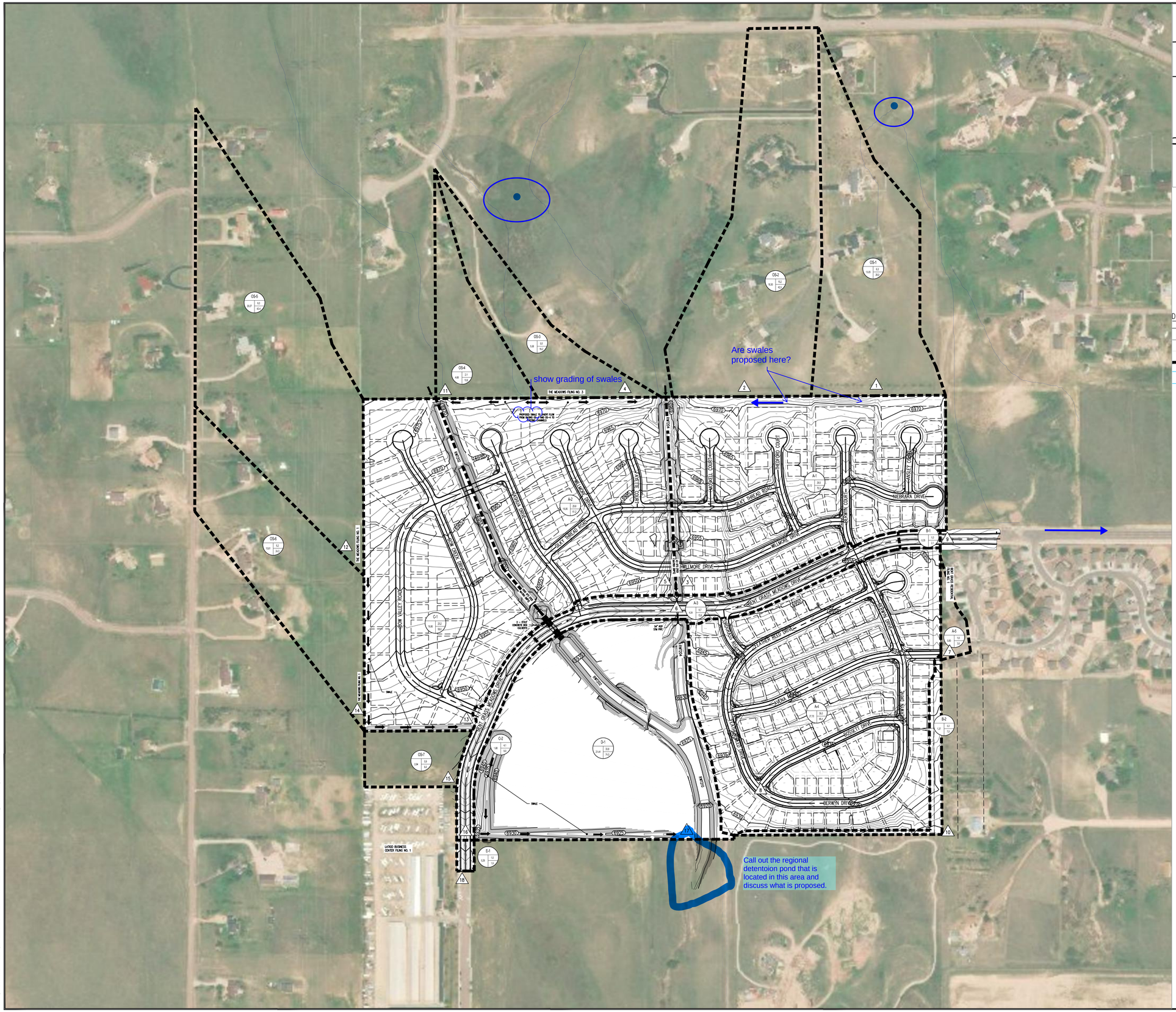
U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: Aaron Johnston	Approved by:	
Drawn: NRCS Standard Dwg.	Title:	
Traced:	Sheet No.	Drawing No.
Checked:	of	

APPENDIX D

Drainage Map

Provide an existing conditions Plan/map that does not show the proposed housing development. The map needs to clearly identify the actual basins that impact this site. Additionally the plan needs to show all (DBPS, Matrix study, FEMA, etc. channel flows) show upstream contours to confirm the Galloway design.



VICINITY MAP

N

0 50 100 200

SCALE: 1"=200'

DRAINAGE LEGEND

- PROPERTY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- BASIN BOUNDARY LINE
- 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

RUNOFF SUMMARY TABLE

Basin ID	Q_5 (cfs)	Q_{100} (cfs)
A-1	29.5	70.3
A-2	25.6	61.2
A-3	6.7	15.6
A-4	39.3	86.4
A-5	1.6	3.6
B-1	1.0	2.1
B-2	3.2	7.0
C-1	23.2	58.0
C-2	4.1	9.0
D-1	33.8	74.3
E-1	1.0	1.9
OS-1	6.3	28.0
OS-2	10.2	42.5
OS-3	5.5	16.2
OS-4	2.1	10.6
OS-5	9.3	43.4
OS-6	5.2	24.3
OS-7	0.9	6.0

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	6.4	27.9
2	10.3	42.5
3	29.5	70.3
4	5.5	16.2
5	25.6	61.2
6	76.9	216.2
7	1.6	3.6
8	40.4	88.9
9	1.0	2.1
10	3.2	7.0
11	2.1	10.6
12	9.3	43.4
13	32.6	101.4
14	5.3	24.4
15	0.9	6.0
16	36.5	113.4
17	33.8	74.3
18	1.0	1.8

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

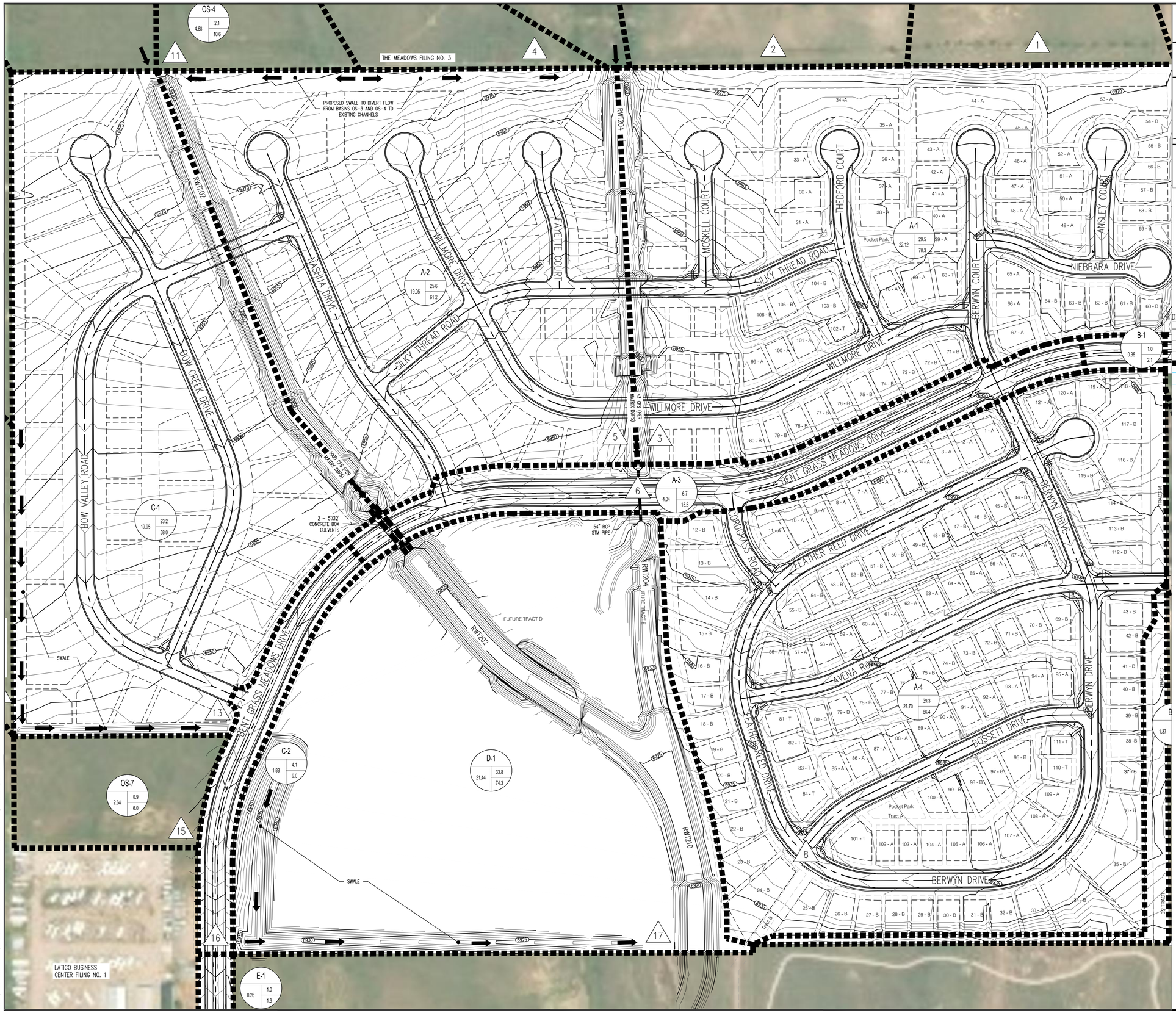
#	Date	Issue / Description	Init.

Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	SMB
Date:	JUNE 2019

PROPOSED DRAINAGE MAP - MDDP

DR-1

Sheet 1 of 2



RUNOFF SUMMARY TABLE

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A-4	39.3	86.4
A-5	1.6	3.6
B-1	1.0	2.1
B-2	3.2	7.0
C-1	23.2	58.0
C-2	4.1	9.0
D-1	33.8	74.3
E-1	1.0	1.9
OS-1	6.3	28.0
OS-2	10.2	42.5
OS-3	5.5	16.2
OS-4	2.1	10.6
OS-5	9.3	43.4
OS-6	5.2	24.3
OS-7	0.9	6.0

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
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2	10.3	42.5
3	29.5	70.3
4	5.5	16.2
5	25.6	61.2
6	76.9	216.2
7	1.6	3.6
8	40.4	88.9
9	1.0	2.1
10	3.2	7.0
11	2.1	10.6
12	9.3	43.4
13	32.6	101.4
14	5.3	24.4
15	0.9	6.0
16	36.5	113.4
17	33.8	74.3
18	1.0	1.8

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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:	JUNE 2019

PROPOSED DRAINAGE MAP - MDDP

DR-2
Sheet 2 of 2