Attachment A.

Hydraulic Analyses and CEQA Drainage Study (separate documents)

HYDRAULIC ANALYSES
FOR THE
EL MONTE SAND MINING
AND
NATURE PRESERVE PROJECT

August 27, 2018

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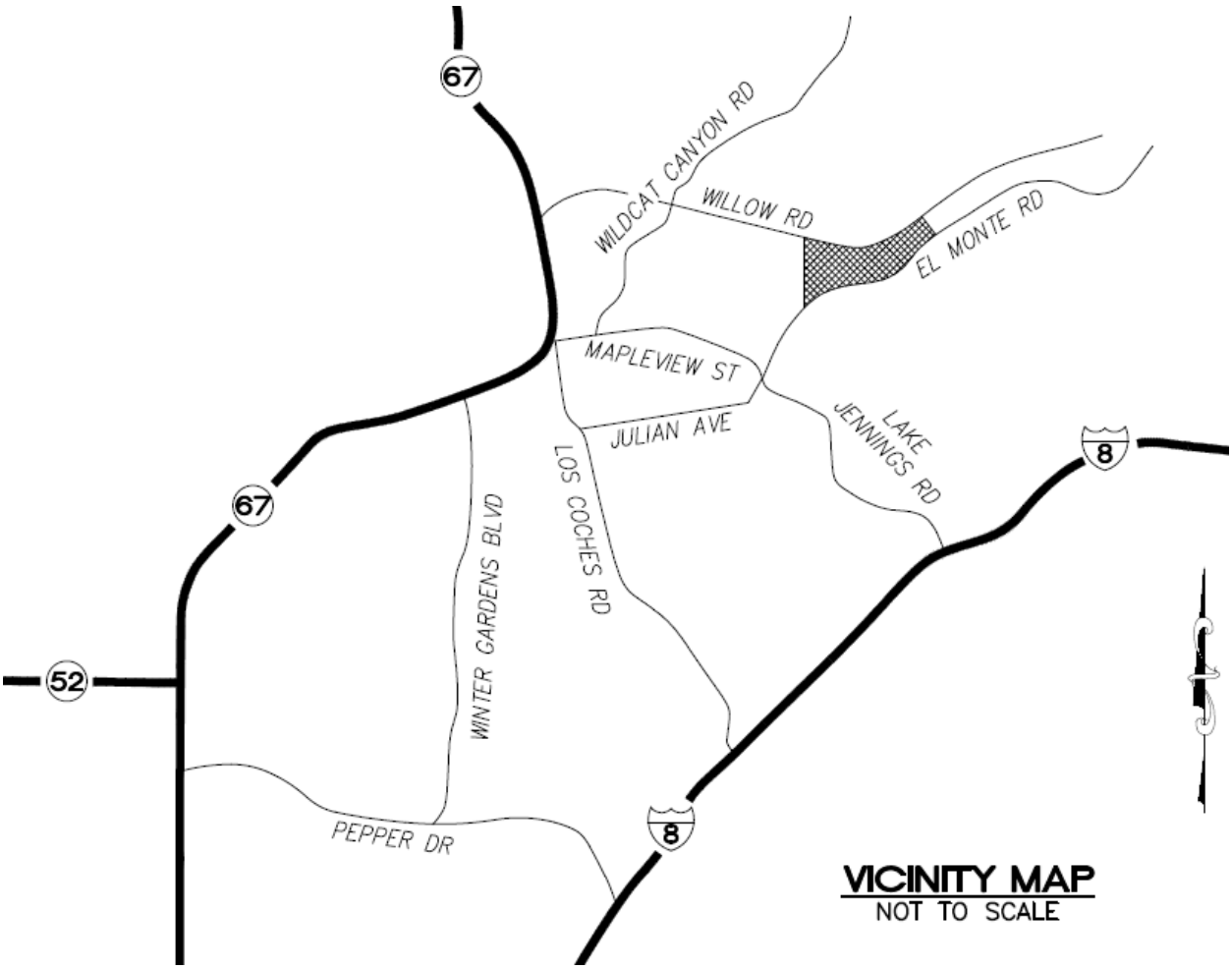
MAP POCKET

Hydraulic Work Map
CD Containing Reclamation Plan Drawings, Effective Hydraulic Data, FIRMs, HEC-RAS files

INTRODUCTION

El Monte Nature Preserve, L.L.C. is proposing the El Monte Sand Mining and Nature Preserve Project along the El Monte Valley in the Lakeside community of the county of San Diego (see the Vicinity Map). The project will extract up to approximately 12.5 million cubic yards of mineral resource over a 12 year period within the San Diego River floodplain. The project is expected to be fully completed in 16 years. Mining will be ongoing for 12 years after inception, while reclamation will commence 4 years after the start of mining and progressively continue over a 16 year period. Reclaimed areas will be restored to an end use of open space with recreational trail easements. The combined mineral extraction and reclamation project will affect approximately 228 acres of land on 479.5 acres currently owned by the El Monte Nature Preserve, L.L.C.



Vicinity Map

The San Diego River flows in a westerly direction along the site. The *Flood Insurance Rate Maps* (FIRM) covering the site are Map Numbers 06073C1394G, 1415G and 1660G, dated May 16, 2012 (included on attached CD). The FIRMs delineate an approximate Zone A floodplain along this portion of the river. The floodplain encompasses the majority of the proposed extraction area. The floodplain on the FIRMs covering the site generally match the floodplain

shown on the County of San Diego's 1973, *Flood Area Map, Floodway Delineation, San Diego River* (sheets 254-1797, 254-1803, 258-1803, and 258-1809 are included on the CD). Consequently, although the floodplain is designated as approximate on the FIRMs, a detailed study was performed to establish the floodplain.

This report contains the outlines the historic FEMA and County floodplain information as well as an updated existing condition hydraulic analysis based on recent topographic mapping. The proposed condition hydraulic analyses model the project's extraction area under the fully mined scenario as well as under the four proposed extraction phases. The hydraulic analyses demonstrate the project does not cause adverse effects on the San Diego River floodplain.

According to William A. Steen and Associates, a prior grading permit (L-14105) was approved by the County of San Diego on July 31, 2003. Another grading permit under the same number was approved by the County of San Diego on December 13, 2006. A Conditional Letter of Map Revision (FEMA Case No. 02-09-804R) was prepared in 2002. Some, but not all, of the grading was performed at the site pursuant to the grading permit. The grading will not be completed, and the site is proposed to be developed pursuant to project outlined in this report. The County has indicated that the associated floodplain and floodway changes associated with the prior grading can be addressed through a Letter of Map Revision. A CLOMR (prior to grading) and LOMR (at project completion) will also be required for the current project.

HYDRAULIC ANALYSES

Effective Studies

As mentioned in the Introduction, the FIRMs covering the site are included on the CD and delineate an approximate Zone A floodplain along the San Diego River. The Zone A delineation is not representative of the current floodplain in at least some areas. For instance, it reflects an area of high ground within the abandoned Hanson Aggregates mining pond near the southwest corner of the site. The floodplain should extend across the entire pond surface.

The County of San Diego's hydraulic studies and work maps for this reach of the river were requested and obtained from the County's Flood Control Engineering Department. This data is included on the attached CD. The County's effective cross-section locations, 100-year floodplain, and floodway are also reproduced on the HEC-RAS Work Map in the map pocket. There are two sets of effective work maps covering the overall study reach. Both sets use the County's orthotopographic mapping as a base, which is on NGVD 29 vertical datum. One set is dated September 1985 and extends over the downstream end of the study reach (from station 880 to 920) analyzed in this report. The second set is on mapping from April 1973 and extends over the remainder of the study reach (including the portion along the project site). The stations on the second set are numbered in the 90's to 100's. Station 920 on the September 1985 work map is at the same location as Station 92 on the March 1973 work maps. Therefore, the 1973/1985 stations will be on the same numbering system if a zero is added to the March 1973 stations.

The 1973 and 1985 hydraulic analyses were performed using HEC-2. The HEC-2 input and output files were available for the 1985 analyses (see CD) and the results generally match the

water surface elevations included on the 1985 work map. On the other hand, the County was not able to provide working HEC-2 data for the 1973 analyses, but the CD includes a pdf of the HEC-2 output. The 1973 work maps do not contain water surface elevations and the work maps have poor legibility, so the HEC-2 output cannot be compared to the floodplain shown on the work maps. The 1973 and 1985 100-year water surface elevations are summarized in Table 1.

The upstream end of the 1985 analysis is at station 920. The floodplain and floodway elevations at this location are 419.78 and 419.69 feet, respectively. The elevations at corresponding station 92 from the 1973 analysis are 421.54 and 422.48 feet, respectively. Therefore, the 1985 study apparently did not attempt to tie-in with the 1973 study. Regardless, the new existing and proposed condition analyses prepared for this report provide updated results based on recent topography (see discussion below).

Comparison of the FEMA Zone A floodplain with the County's effective work maps reveals that the FEMA floodplain generally matches the 1973 work maps.

Existing Condition

The existing condition HEC-RAS analysis extends from river station 880 to 1180. The cross-sections generally correspond to the cross-section locations from the County's effective model. The downstream end of the HEC-RAS analysis at station 880 ties into the 100-year water surface elevation (416.38 feet NAVD 88) from the County's 1985 effective model. The County's effective data does not provide cross-section GR points (the effective pdf document on the CD only contains the HEC-2 results) at the upstream end of the existing condition analysis. However, an electronic file obtained from the County contains station/elevation points for effective stations 116, 116.5, 117, and 118 – this file is not an executable HEC-2. These stations were added in the existing condition HEC-RAS analysis as 1160, 1165, 1170, and 1180 to allow an upstream tie-in. The 100-year flow rate from 19,000 to 20,000 cubic feet per second (cfs) from the effective HEC-2 was used.

The existing condition cross-sections at and below station 995 were created from 1-foot contour interval topographic mapping (NAVD 88) flown on April 21, 2013 (see the HEC-RAS Work Map in the map pocket). The cross-sections above station 995 to and including 1150 were created from 1-foot contour interval topographic mapping (NGVD 29) flown on October 27, 2005. As mentioned above, stations 1160 through 1180 were based on the effective County data to allow an upstream tie-in. The cross-sections above station 995 were increased in elevation by 2.04 feet to convert to NAVD 88 (see NGS Data Sheet from a mapping consultant included after this report text for conversion), which is consistent with the current FEMA datum.

The existing condition roughness coefficients were assigned based on a site investigation and review of aerial photographs. The channel bed contains a fairly dense cover of mature vegetation (brush and trees), so was assigned a value of n=0.075. The overbanks have less vegetation and were assigned a roughness of n=0.05.

Encroachments were used at some locations to keep the effective flow in the active portion of the main river channel. This includes along the existing berm separating the abandoned Hanson Aggregates mining pond from the main river channel and a nearby berm along the south river

bank just upstream. The HEC-RAS results indicate that the 100-year flow in the main river channel will not overtop the berm separating the channel from the pond, so the encroachments are appropriate. Since the existing berm and nearby berm create a constriction along the southerly side of the floodplain, encroachments were also used for the flow approaching and exiting the berms. A 1:1 contraction was modeled for the flow approaching the nearby berm (based on typical standards and feedback from prior County projects), and a 3:1 expansion was used for flow downstream of the Hanson berm. The adjacent Hanson El Monte Pond Flood Control, Restoration, and Recharge Project has constructed a culvert in the berm to direct some river flow into the pond. The culvert will have minor impact on the floodplain, so was not included in the analyses in this report.

The existing condition 100-year HEC-RAS results are summarized in Table 1 following this report text, included in Appendix A, and the electronic files are on the CD.

Table 1 shows a variation between the effective and existing condition hydraulic results. The existing condition water surface elevations are generally lower than the effective elevations. This is attributed to physical manmade changes to the San Diego River that have occurred since the effective model was prepared. One of the primary changes includes significant channelization of the river associated with sand mining by Woodward Sand. Figure 1 contains a February 1980 photograph of the channelization along the project site and extending upstream. This channelization is not included in the 1975 effective model.

Proposed Condition

The project proposes in-stream resource extraction with the San Diego River floodplain and (County) floodway. The ultimate extraction grading is included on the HEC-RAS Work Map. Since the extraction will lower the natural river channel and expand the conveyance area, the project will not adversely increase water surface elevations and will generally reduce flow velocities.

The existing condition HEC-RAS model was modified to create the proposed condition model for the ultimate extraction. Cross-sections 992 to 1148 reflect the proposed extraction area. Near the downstream end of the extraction area, existing cross-sections 992 and 995 were modified with proposed cross-sections 992 and 995 to reflect the proposed conditions in this area. Near the upstream end of the extraction area, cross-section 1148 was added to reflect the proposed conditions in this area. The proposed condition HEC-RAS model is on NAVD 88 datum to be consistent with the current FEMA mapping. However, the project plans are on NGVD 29 datum to match the topographic mapping. As mentioned above, the conversion is 2.04 feet.

The roughness coefficients are the same as existing conditions except in some portions of the mining pit. The roughness in the extraction area will be lower during mining activities when the ground is disturbed, but can potentially be higher than existing conditions in some pit areas after habitat restoration following completion of mining. A roughness coefficient of 0.15 was used to conservatively model dense revegetation within the majority of the pit. The exception is between cross-sections 992 and 1040 after mining completion. Since the mining pit will likely contain some ponded water during a 100-year storm event, a lower roughness of 0.075 was assigned to these cross-sections. Blocked obstructions were assigned within the extraction area to reflect

antecedent storm events that result in ponded water filling the extraction area. Based on the topographic mapping water can pond to approximately elevation 424 feet NAVD 88, so the block obstructions were set at this elevation in the cross-sections where the extraction will be below this elevation. Jim Prine, Senior Restoration Ecologist, prepared the memorandum included after this report text stating that the "post-mining riparian habitat density in the river corridor would be similar to the existing density of vegetation. . . ." The selected roughness of 0.15 in the extraction area was based on a more conservative condition than indicated by Mr. Prine. Therefore, the 0.15 roughness can potentially be lowered in the future if more detailed information is provided by Mr. Prine.

Temporary stockpiles will exist during mining operations. Per the reclamation plan drawings, the stockpiles will be placed around the perimeter of a mining phase at approximately 6 foot high with 1:1 slopes (12 feet wide at the base). The stockpile locations will be dynamic with lengths that increase and decrease based on operational needs. At many of the cross-sections, the stockpile heights will be lower than the top of the blocked obstruction, so they will have no impact on the hydraulic results. In other cross-sections, the stockpile encroachment will be so minor in comparison to the cross-sectional flow area that an adverse rise in water surface elevations will not occur based on review of the tabulated results discussed next. Taller stockpiles can occur in the processing area, but this area is outside the 100-year floodplain.

The proposed condition HEC-RAS results are summarized in Table 1 and included in Appendix A for the 100-year flow event. The results show that a decrease in water surface elevations varies within the extraction area, which is expected since the channel bed is being lowered and the channel is being widened. The flow velocities naturally lower due to the increase in conveyance area. As a result, the project will not create adverse inundation impacts and will reduce the potential for erosion with the extraction area. Beyond the extraction area, the water surface elevations and flow velocities are essentially unchanged.

Additional HEC-RAS analyses were performed to reflect progression along the four mining phases. Mining will proceed from east to west (upstream to downstream). The phase boundaries are included on the hydrology work map. During Phase 1, extractive operations would commence at the far eastern portion of the mining area approximately 300 feet west of Dairy Road for a 4-year duration. Approximately 93 acres is within in Phase 1. Phase 2 would continue the same extraction process as Phase 1 over 3 years on approximately 52 acres in an east to west direction within the adjacent area west of Phase 1. Phase 3 would continue the same extraction process as Phase 2 over 3 years on approximately 48 acres in an east to west direction within the adjacent area west of Phase 2. Phase 4 would continue the same extraction process as Phase 3 over 2 years on approximately 50 acres in an east to west direction to the western end of the mining pit. Additional HEC-RAS analyses were performed for Phase 1 (mining in cross-sections 1120 to 1148), Phase 1 and 2 (mining in cross-sections 1070 to 1148), and Phase 1 through 3 (mining in cross-sections 1030 to 1148). Although phase boundaries are defined, mining will generally be continuous from east to west, so the boundaries are merely general representations of the phasing. Blocked obstructions were included within the mining pit of each phasing analysis to reflect ineffective vertical flow areas. The blocked obstructions were set at the elevation where flow exits the downstream side of the phased pit. A high roughness coefficient of 0.15 was assumed within the pit for the phase analyses. The results are included Appendix 2

and summarized on Table 2. Comparison of the phased results with existing conditions reveals that the phases will not increase water surface elevations.

Since the river flow will occur over a hydraulically steep slope at the upstream end of the extraction area, grouted boulders shall be placed on the slope to prevent upstream headcutting. The plans show this structure extending just below the naturally occurring groundwater level. The groundwater acts as an energy dissipater such that the grouted boulders do not need to extend to the ultimate pit floor. Along the remainder of the naturally-lined mining pit from cross-section 992 to 1140, the flow velocities will decrease in comparison to existing conditions due to wider channelization created by the mining pit. The maximum 100-year flow velocity in the mining pit at project completion will be 3.8 feet per second (at cross-section 1040). Similar velocities will occur in the mining pit during the various phases. The entire pit will be revegetated. The County's September 2014, *Hydraulic Design Manual,* identifies a permissible velocity of 5 fps for unreinforced vegetation (Table 5-1). Since the flow velocities are less than the permissible velocity, erosion potential is mitigated.

Floodway Analyses

Existing and proposed condition floodway analyses have also been performed. These are based on the existing and proposed condition geometries, respectively. However, the analyses were shortened to start just downstream of the site at cross-section 988, i.e., the floodway will tie into the effective floodway just downstream of the site.. The effective floodplain and floodway elevations cannot be determined from the effective data, but the floodway widths are provided on the effective work maps. As a result, the starting floodplain water surface elevation is based on the existing and proposed condition results prepared for this report. The existing and proposed floodplain elevations are identical at this location since it is just downstream of the project. The floodway elevation was selected to be 1 foot higher. The floodway width was set equal to the effective floodway width at the downstream tie-in at cross-section 988 as well as at the upstream effective tie-in cross-sections 1160 to 1180. For existing conditions, a Method 4 encroachment was used for the remaining cross-sections. For proposed conditions, the floodway within the pit will match the floodplain since the pit acts as a channel.

CONCLUSION

Existing and proposed condition 100-year hydraulic analyses have been performed for the reclamation plan submittal of the El Monte Sand Mining and Nature Preserve Project. The project is within the County's effective floodway, but will not raise the 100-year water surface elevations, so meets the County and FEMA's floodway regulations. In addition, the project will not create adverse flood impacts within the study reach under the four phases or ultimate condition, which is consistent with the goals of floodplain regulations. The proposed condition floodway will be defined when the CLOMR, and then are prepared. Since the proposed condition floodplain is contained within the pit, the floodway will follow the floodplain in this area.

NO-RISE CERTIFICATION AND DECLARATION OF RESPONSIBLE CHARGE

No-Rise Certification

Hydraulic analyses have been performed for the proposed El Monte Sand Mining and Nature Preserve Project along the San Diego River in the county of San Diego, California. This report includes the existing and proposed condition 100-year HEC-RAS hydraulic analyses for the proposed project.

This is to certify that I am a duly qualified registered professional engineer licensed to practice in the State of California.

It is further to certify that the attached technical data supports the fact that proposed development (as defined in County of San Diego Ordinance Section 811.201(i)) associated with County of San Diego Project No. PDS2014-LDGRMJ-00012 within the designated floodway delineated on the County of San Diego Floodplain Maps will not result in any increase in flood levels or the volume or velocity of flood flows during the occurrence of the base flood discharge within the San Diego River in compliance with County of San Diego Ordinance Section 811.506.

Name of Report: *Hydraulic Analyses for the Proposed El Monte Sand Mining and Nature Preserve Project*

Date of Report: August 27, 2018

Declaration of Responsible Charge

I hereby declare that I am the civil engineer of work for this project for hydraulic analyses of the San Diego River, that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

August 27, 2018

Wayne W. Chang
RCE 46548
Exp. June 30, 2019

Date

Cross-Section	100-Year Water Surface Elevations, feet (NAVD 88)			
	Effective Models[1]	Existing Conditions	Proposed Conditions (Phase 1-4)	Proposed – Existing
1180	485.53	485.30	485.30	0.00
1170	481.54	481.16	481.16	0.00
1165	478.26	478.74	478.74	0.00
1160	475.31	474.55	474.55	0.00
1150	473.15	467.32	462.76	-4.56
1148	---	---	449.93	---
1140	469.22	465.58	449.25	-16.33
1130	466.38	462.36	447.11	-15.25
1120	462.63	460.63	445.42	-15.21
1110	459.99	458.61	443.60	-15.01
1100	458.77	456.87	442.45	-14.42
1090	457.79	454.83	441.75	-13.08
1080	456.66	453.59	441.30	-12.29
1075	456.13	451.72	440.90	-10.82
1070	455.31	450.25	440.42	-9.83
1060	453.61	448.32	439.20	-9.12
1050	448.56	445.92	437.81	-8.11
1040	446.81	443.69	436.45	-7.24
1030	445.45	441.86	435.87	-5.99
1020	444.08	440.02	435.62	-4.40
1017	---	438.56	435.55	-3.01
1013	---	437.05	435.47	-1.58
1010	439.64	436.51	435.40	-1.11
1005	438.74	435.91	435.33	-0.58
1000	438.44	435.30	435.13	-0.17
995	438.00	---	---	---
992	---	434.54	434.53	-0.01
988	---	433.99	433.99	0.00
985	---	433.29	433.29	0.00
983	---	432.26	432.26	0.00
980	435.34	431.94	431.94	0.00
978	---	431.42	431.42	0.00
975	433.64	431.04	431.04	0.00
973	---	430.64	430.64	0.00
970	431.81	430.24	430.24	0.00
965	---	429.69	429.69	0.00
960	429.80	429.28	429.28	0.00
950	428.69	428.88	428.88	0.00
946	---	428.38	428.38	0.00
944	---	427.79	427.79	0.00
940	427.22	427.41	427.41	0.00
935	---	427.15	427.15	0.00
930	425.21	426.54	426.54	0.00
920	421.82	426.00	426.00	0.00
910	418.18	424.10	424.10	0.00
900	417.04	421.35	421.35	0.00
890	416.71	418.89	418.89	0.00
880	416.38	416.73	416.73	0.00

[1]The effective results for cross-sections 880 to 920 are from the County study approved in 1985. The remaining effective results are from the 1973 County study. A zero was added to the end of the 1973 cross-section numbers to be consistent with the other studies, e.g., cross-section 96 from the 1973 results corresponds to cross-section 960 in the table.

Table 1. Summary of HEC-RAS Results

Cross-Section	100-Year Water Surface Elevations, feet (NAVD 88)						
	Exist. Cond.	Prop. Cond. Phase 1	PC Ph 1 – Ex. Cond.	Prop. Cond. Phase 1-2	PC Ph 1-2 – Ex. Cond.	Prop. Cond. Phase 1-3	PC Ph 1-3 – Exist. Cond.
1180	485.30	485.30	0.00	485.30	0.00	485.30	0.00
1170	481.16	481.16	0.00	481.16	0.00	481.16	0.00
1165	478.74	478.74	0.00	478.74	0.00	478.74	0.00
1160	474.55	474.55	0.00	474.55	0.00	474.55	0.00
1150	467.32	462.76	-4.56	462.76	-4.56	462.76	-4.56
1148	---	461.58	---	452.68	---	450.48	---
1140	465.58	461.43	-4.15	452.48	-13.10	449.97	-15.61
1130	462.36	460.61	-1.75	451.95	-10.41	448.62	-13.74
1120	460.63	460.02	-0.61	451.64	-8.99	447.78	-12.85
1110	458.61	458.61	0.00	451.35	-7.26	447.13	-11.48
1100	456.87	456.87	0.00	451.11	-5.76	446.78	-10.09
1090	454.83	454.83	0.00	450.89	-3.94	446.56	-8.27
1080	453.59	453.59	0.00	450.69	-2.90	446.41	-7.18
1075	451.72	451.72	0.00	450.50	-1.22	446.25	-5.47
1070	450.25	450.25	0.00	450.21	-0.04	446.00	-4.25
1060	448.32	448.32	0.00	448.32	0.00	445.21	-3.11
1050	445.92	445.92	0.00	445.92	0.00	444.35	-1.57
1040	443.69	443.69	0.00	443.69	0.00	443.00	-0.69
1030	441.86	441.86	0.00	441.86	0.00	441.93	0.07
1020	440.02	440.02	0.00	440.02	0.00	440.02	0.00
1017	438.56	438.56	0.00	438.56	0.00	438.56	0.00
1013	437.05	437.05	0.00	437.05	0.00	437.05	0.00
1010	436.51	436.51	0.00	436.51	0.00	436.51	0.00
1005	435.91	435.91	0.00	435.91	0.00	435.91	0.00
1000	435.30	435.30	0.00	435.30	0.00	435.30	0.00
996	---	---	---	---	---	---	---
995	434.54	434.54	0.00	434.54	0.00	434.54	0.00
992	433.99	433.99	0.00	433.99	0.00	433.99	0.00
988	433.29	433.29	0.00	433.29	0.00	433.29	0.00
985	432.26	432.26	0.00	432.26	0.00	432.26	0.00
983	431.94	431.94	0.00	431.94	0.00	431.94	0.00
980	431.42	431.42	0.00	431.42	0.00	431.42	0.00
978	431.04	431.04	0.00	431.04	0.00	431.04	0.00
975	430.64	430.64	0.00	430.64	0.00	430.64	0.00
973	430.24	430.24	0.00	430.24	0.00	430.24	0.00
970	429.69	429.69	0.00	429.69	0.00	429.69	0.00
965	429.28	429.28	0.00	429.28	0.00	429.28	0.00
960	428.88	428.88	0.00	428.88	0.00	428.88	0.00
950	428.38	428.38	0.00	428.38	0.00	428.38	0.00
946	427.79	427.79	0.00	427.79	0.00	427.79	0.00
944	427.41	427.41	0.00	427.41	0.00	427.41	0.00
940	427.15	427.15	0.00	427.15	0.00	427.15	0.00
935	426.54	426.54	0.00	426.54	0.00	426.54	0.00
930	426.00	426.00	0.00	426.00	0.00	426.00	0.00
920	424.10	424.10	0.00	424.10	0.00	424.10	0.00
910	421.35	421.35	0.00	421.35	0.00	421.35	0.00
900	418.89	418.89	0.00	418.89	0.00	418.89	0.00
890	416.73	416.73	0.00	416.73	0.00	416.73	0.00
880	416.38	416.38	0.00	416.38	0.00	416.38	0.00

Table 2. Summary of Phased HEC-RAS Results

Figure 1. February 1980 Photograph Looking Upstream (East) at San Diego River Channelization along and near Project Site

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.2
1        National Geodetic Survey,   Retrieval Date = AUGUST  5, 2013
 DC0498 ***********************************************************************
 DC0498  DESIGNATION -  439.83 USGS
 DC0498  PID         -  DC0498
 DC0498  STATE/COUNTY-  CA/SAN DIEGO
 DC0498  COUNTRY     -  US
 DC0498  USGS QUAD   -  EL CAJON (1975)
 DC0498
 DC0498                         *CURRENT SURVEY CONTROL
 DC0498  ______________________________________________________________________
 DC0498* NAD 83(1986) POSITION- 32 52 00.     (N) 116 53 37.     (W)   SCALED
 DC0498* NAVD 88 ORTHO HEIGHT -   134.36   (+/-2cm)     440.8   (feet) VERTCON
 DC0498  ______________________________________________________________________
 DC0498  GEOID HEIGHT    -        -33.20  (meters)                     GEOID12A
 DC0498  VERT ORDER      -  FIRST     CLASS II (See Below)
 DC0498
 DC0498.The horizontal coordinates were scaled from a topographic map and have
 DC0498.an estimated accuracy of +/- 6 seconds.
 DC0498.
 DC0498.The NAVD 88 height was computed by applying the VERTCON shift value to
 DC0498.the NGVD 29 height (displayed under SUPERSEDED SURVEY CONTROL.)
 DC0498
 DC0498.The vertical order pertains to the NGVD 29 superseded value.
 DC0498
 DC0498;                    North         East    Units  Estimated Accuracy
 DC0498;SPC CA 6     -   577,820.    1,939,760.      MT  (+/- 180 meters Scaled)
 DC0498
 DC0498                         SUPERSEDED SURVEY CONTROL
 DC0498
 DC0498  NGVD 29 (??/??/??)  133.733  (m)          438.76   (f) ADJUSTED    1 2
 DC0498
 DC0498.Superseded values are not recommended for survey control.
 DC0498
 DC0498.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 DC0498.See file dsdata.txt to determine how the superseded data were derived.
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 DC0498_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 DC0498_SP_SET: SET IN TOP OF CONCRETE MONUMENT
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DC0498+STABILITY: SURFACE MOTION
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DC0498+SATELLITE: SATELLITE OBSERVATIONS - February 04, 2012
DC0498
DC0498  HISTORY     - Date     Condition        Report By
DC0498  HISTORY     - UNK      MONUMENTED       USGS
DC0498  HISTORY     - 1955     GOOD             CGS
DC0498  HISTORY     - 20120204 GOOD             INDIV
DC0498
DC0498                          STATION DESCRIPTION
DC0498
DC0498'DESCRIBED BY COAST AND GEODETIC SURVEY 1955
DC0498'2 MI NE FROM LAKESIDE.
DC0498'2.0 MILES NORTHEAST ALONG SYCAMORE AND ELM STREETS FROM THE
DC0498'SECURITY TRUST AND SAVINGS BANK AT LAKESIDE, AT THE EL MONTE
DC0498'PUMPING PLANT OF LA MESA, LEMON GROVE, AND SPRING VALLEY
DC0498'IRRIGATION DISTRICT, 30 FEET SOUTHEAST OF THE CENTER LINE OF THE
DC0498'STREET, 16.0 FEET NORTH OF THE NORTH CORNER OF THE PLANT BUILDING,
DC0498'4 FEET SOUTHEAST OF POWER LINE POLE 7757-R, 2.0 FEET NORTHWEST
DC0498'OF THE NORTHWEST EDGE OF A CONCRETE WATER BASIN, ABOUT LEVEL
DC0498'WITH THE ROAD, UNDER A HEDGE, FLUSH WITH THE GROUND, AND SET IN
DC0498'THE TOP OF A CONCRETE POST.
DC0498
DC0498                          STATION RECOVERY (2012)
DC0498
DC0498'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2012 (JJH)
DC0498'DGPS POSITION IS 32 52 2.47 N LAT, 116 53 36.87 W LONG +/- 0.05 SEC
DC0498'USING 11 MINUTES OF LOGGED DATA.

*** retrieval complete.
Elapsed Time = 00:00:01
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ESA

550 West C Street
Suite 750
San Diego, CA 92101
619.719.4200 phone
619.719.4201 fax

www.esassoc.com

memorandum

date	April 20, 2018
to	Wayne Chang, Chang Consultants
cc	Eric Ruby and Janelle Kassarjian, ESA
from	Jim Prine, ESA
subject	El Monte Sand Mining Project – Estimation of Vegetation Density after Proposed Mining and Habitat Revegetation

In response to your request, provided herein is information pertaining to the anticipated density of riparian vegetation in the San Diego River corridor (channel) after proposed mining and habitat revegetation activities. It is our understanding this information will help support the project's Hydraulic Study Flood Control analysis in response to County of San Diego review Comment 5. dated March 16, 2018 regarding determination of an "n" value.

Based on available information, it is the opinion of ESA that the post-mining riparian habitat density in the river corridor would be similar to the existing riparian vegetation density. As part of field surveys, data was not specifically collected regarding the existing density of vegetation (i.e., number of plants per acre and cover) in the river channel, however; from observations during multiple surveys it is estimated that vegetation cover generally ranges from approximately ≤20% to ≥90%. The denser vegetation areas include areas where additional water appears to enter the system (i.e., from lateral drainage/seepage and near adjacent residences) and where the non-native invasive plant species, tamarisk (*Tamarix ramosissima*), has colonized which can establish in both wetland/riparian and upland settings due in part to an extensive and deep root system.

The existing groundwater elevation within the project area is an average of 40 to 50 feet below the ground surface in the river channel (AECOM 2018). The proposed mining process would lower grades in portions of the basins by 25 to 30 feet, thereby establishing grades in the lower portions of the mining basins approximately 15 to 25 feet above the existing groundwater elevation. Based on a trend of groundwater decline (lowering) over recent history, groundwater levels are anticipated to decline by approximately 25 feet if there is not a spill event over the El Capitan Reservoir in the next 15 years (AECOM 2018). Based on the post-mining grades (i.e.,15 to 25 feet above the groundwater elevation) and a trend of groundwater decline, the County of San Diego directed the project to include a significant proportion of riparian-upland transitional and upland plant species in the proposed riparian plant palettes and seed mixes. The proposed lowering of grades would place portions of the river channel closer to groundwater than the existing condition and likely result in a small increase in downgrade water/moisture runoff accumulation, which could support a slightly higher native plant composition density. However, this slight potential increase in vegetation density would be expected to be offset compared to the

existing condition by the control and removal of tamarisk (and other non-native species) as part of the project's proposed post-mining revegetation and mitigation program. Therefore, the vegetation density of the post-mining habitat (i.e., riparian habitat without invasive plant species) is expected on average to be similar to the existing habitat (i.e., riparian habitat with tamarisk and other invasive species).

In regard to the post-mining habitat in the river channel, the central low-flow channel would only be planted with low-growing native plants and no shrubs or trees, although some shrubs or trees would likely volunteer in the low-flow channel. In the lower portions of the basins on either side of the central low-flow channel for approximately 150 feet (i.e., approximately 300 feet wide total), riparian woodland habitat would be planted. In addition, riparian scrub habitat would be planted on the lower basin slopes beyond the riparian woodland habitat. Accounting for the planting densities in the proposed riparian habitat plant palettes in the project's conceptual revegetation plan (ESA 2018) and some plant mortality (i.e., conceptual revegetation plan includes success standard of 80% container plant survival), plant density for the post-mining riparian habitat is estimated at approximately 720 plants per acre not counting volunteer plants that might establish. Overall post-mining riparian habitat plant cover is estimated at approximately 65%, which corresponds with the conceptual revegetation plan success standard for native cover.

If you have questions, please contact me at 619.719.4212 or jprine@esassoc.com.

APPENDIX A

HEC-RAS ANALYSES

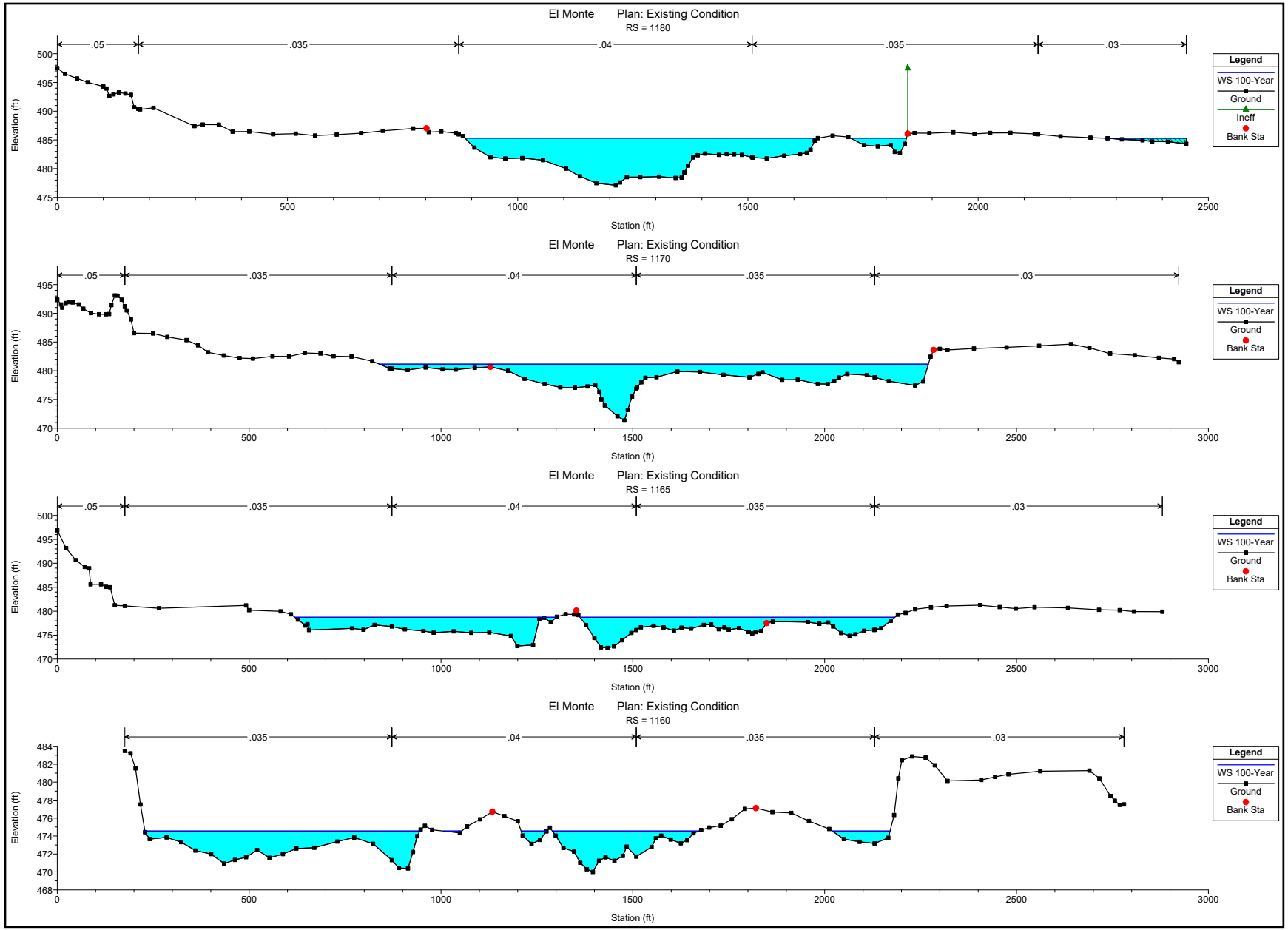
Existing Conditions

HEC-RAS Plan: Exist Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year

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)	
Reach-1	1180	100-Year	19000.00	477.10	485.30		485.74	0.002858	5.35	3552.61	1060.59	0.47
Reach-1	1170	100-Year	19000.00	471.34	481.16		481.63	0.004095	5.55	3565.20	1431.43	0.57
Reach-1	1165	100-Year	19000.00	472.32	478.74	477.70	479.12	0.003946	5.32	3894.30	1502.74	0.55
Reach-1	1160	100-Year	19000.00	469.99	474.55	474.55	475.49	0.014342	7.31	2479.69	1362.41	0.93
Reach-1	1150	100-Year	19000.00	458.04	467.32		467.65	0.001850	3.30	4609.16	563.07	0.21
Reach-1	1140	100-Year	19000.00	456.04	465.58		466.14	0.005934	6.04	3170.44	647.40	0.38
Reach-1	1130	100-Year	19000.00	453.04	462.36		462.91	0.005890	5.97	3239.51	886.11	0.38
Reach-1	1120	100-Year	19000.00	451.04	460.63		460.90	0.002793	4.18	4684.34	734.85	0.26
Reach-1	1110	100-Year	19000.00	449.04	458.61	454.11	459.07	0.004642	5.44	3490.27	704.10	0.34
Reach-1	1100	100-Year	20000.00	447.04	456.87		457.23	0.003604	4.96	4237.13	1257.77	0.30
Reach-1	1090	100-Year	20000.00	445.04	454.83		455.29	0.004200	5.58	3949.94	941.90	0.33
Reach-1	1080	100-Year	20000.00	443.04	453.59		453.95	0.003349	4.94	4287.46	733.94	0.29
Reach-1	1075	100-Year	20000.00	441.04	451.72		452.23	0.004927	5.94	3658.45	676.31	0.35
Reach-1	1070	100-Year	20000.00	439.04	450.25		450.63	0.003218	5.07	4176.33	610.10	0.29
Reach-1	1060	100-Year	20000.00	435.04	448.32		448.74	0.003228	5.36	4065.62	685.91	0.29
Reach-1	1050	100-Year	20000.00	434.04	445.92		446.44	0.004035	5.90	3633.25	782.37	0.32
Reach-1	1040	100-Year	20000.00	432.04	443.69	437.55	444.08	0.003018	5.08	4038.52	869.58	0.28
Reach-1	1030	100-Year	20000.00	429.04	441.86		442.39	0.003722	5.83	3480.44	401.20	0.31
Reach-1	1020	100-Year	20000.00	428.04	440.02		440.62	0.004510	6.22	3228.40	341.92	0.34
Reach-1	1017	100-Year	20000.00	427.04	438.56		439.35	0.006561	7.12	2838.63	375.40	0.41
Reach-1	1013	100-Year	20000.00	426.04	437.05		437.69	0.005441	6.45	3099.78	387.19	0.37
Reach-1	1010	100-Year	20000.00	425.04	436.51		436.82	0.002673	4.70	4592.73	714.02	0.26
Reach-1	1005	100-Year	20000.00	424.04	435.91		436.14	0.001971	4.16	5316.23	880.08	0.23
Reach-1	1000	100-Year	20000.00	423.04	435.30		435.53	0.001907	4.18	5329.39	1157.70	0.23
Reach-1	995	100-Year	20000.00	421.50	434.54		434.83	0.002100	4.45	4772.50	949.35	0.24
Reach-1	992	100-Year	20000.00	420.80	433.99		434.36	0.002591	5.02	4240.64	817.36	0.26
Reach-1	988	100-Year	20000.00	421.00	433.29	427.43	433.77	0.003600	5.74	3807.85	718.35	0.31
Reach-1	985	100-Year	20000.00	419.00	432.26	427.71	432.90	0.005060	6.84	3312.60	2243.60	0.37
Reach-1	983	100-Year	20000.00	418.40	431.94	425.26	432.28	0.002390	4.86	4393.57	2267.80	0.25
Reach-1	980	100-Year	20000.00	418.00	431.42	425.16	431.84	0.002972	5.35	3984.14	2199.31	0.28
Reach-1	978	100-Year	20000.00	418.00	431.04	424.48	431.45	0.002795	5.29	4043.18	2228.92	0.27
Reach-1	975	100-Year	20000.00	417.00	430.64	424.17	431.00	0.002583	4.98	4258.09	2303.30	0.26
Reach-1	973	100-Year	20000.00	416.70	430.24	423.87	430.59	0.002590	4.95	4294.13	2361.87	0.26
Reach-1	970	100-Year	20000.00	415.70	429.69	423.18	430.06	0.002708	5.12	4263.54	2315.13	0.27
Reach-1	965	100-Year	20000.00	415.20	429.28	422.58	429.61	0.002416	4.91	4477.57	2252.77	0.26
Reach-1	960	100-Year	20000.00	414.70	428.88	421.68	429.17	0.001960	4.57	4841.62	2335.43	0.23
Reach-1	950	100-Year	20000.00	414.20	428.38	421.18	428.66	0.001845	4.48	5013.38	2463.93	0.23
Reach-1	946	100-Year	20000.00	413.60	427.79		428.11	0.002681	4.95	4580.39	811.72	0.27

HEC-RAS Plan: Exist Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year (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)	
Reach-1	944	100-Year	20000.00	413.80	427.41		427.82	0.003449	6.01	4198.62	2010.58	0.31
Reach-1	940	100-Year	20000.00	413.90	427.15		427.41	0.002083	4.63	5113.21	1492.87	0.24
Reach-1	935	100-Year	20000.00	413.00	426.54		426.92	0.003177	5.80	4425.96	1397.69	0.29
Reach-1	930	100-Year	20000.00	412.50	426.00	421.47	426.31	0.002404	4.99	4788.01	1213.43	0.26
Reach-1	920	100-Year	20000.00	415.00	424.10		424.59	0.005934	6.22	3772.22	1090.18	0.38
Reach-1	910	100-Year	20000.00	411.90	421.35		421.84	0.005661	6.31	3814.74	1087.02	0.38
Reach-1	900	100-Year	20000.00	408.80	418.89		419.55	0.006822	6.93	3236.08	795.57	0.41
Reach-1	890	100-Year	20000.00	406.60	416.73	413.45	417.37	0.007507	6.39	3131.86	490.61	0.42
Reach-1	880	100-Year	20000.00	401.24	416.38	407.37	416.52	0.000601	2.49	7150.42	815.42	0.12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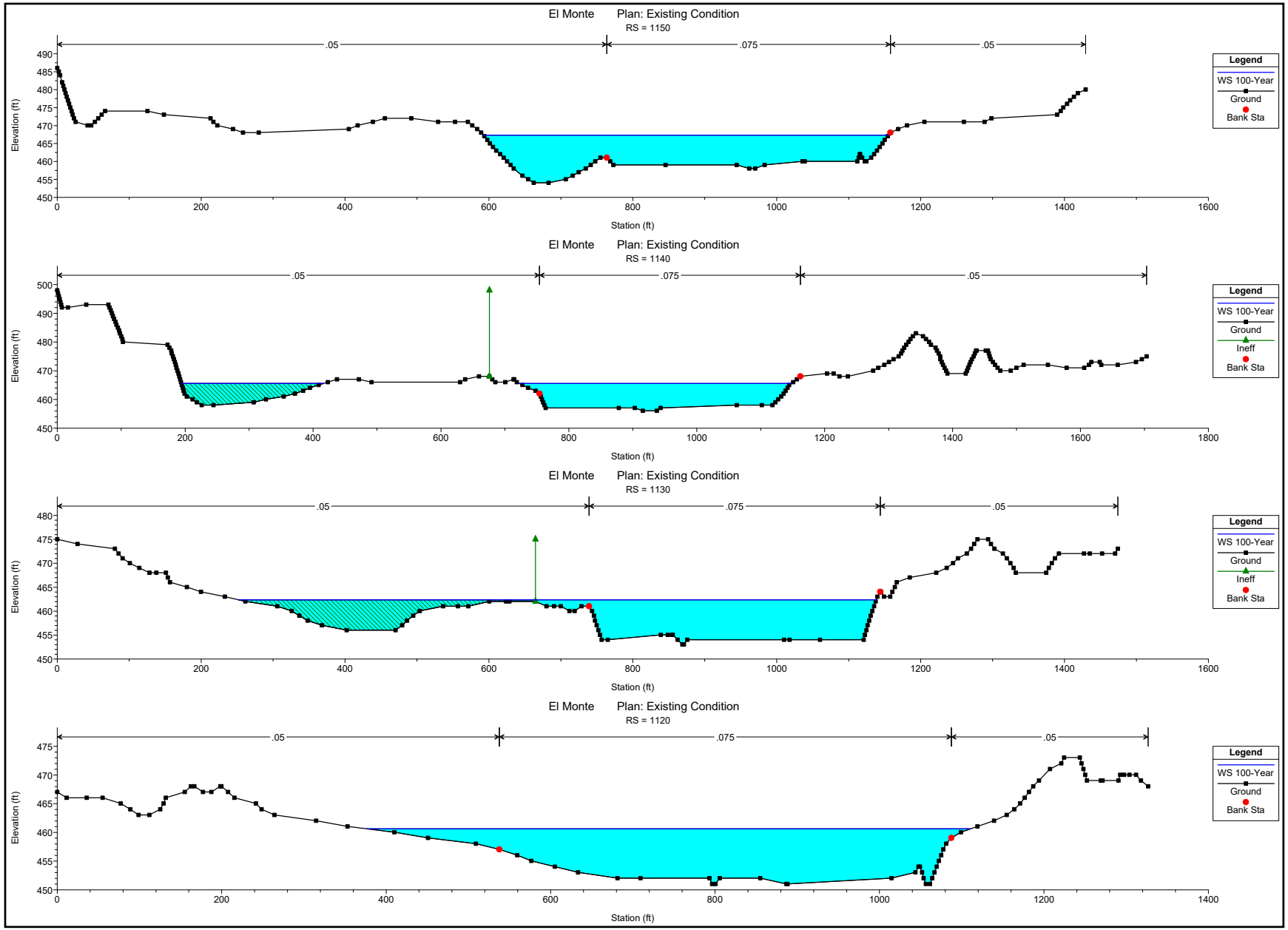
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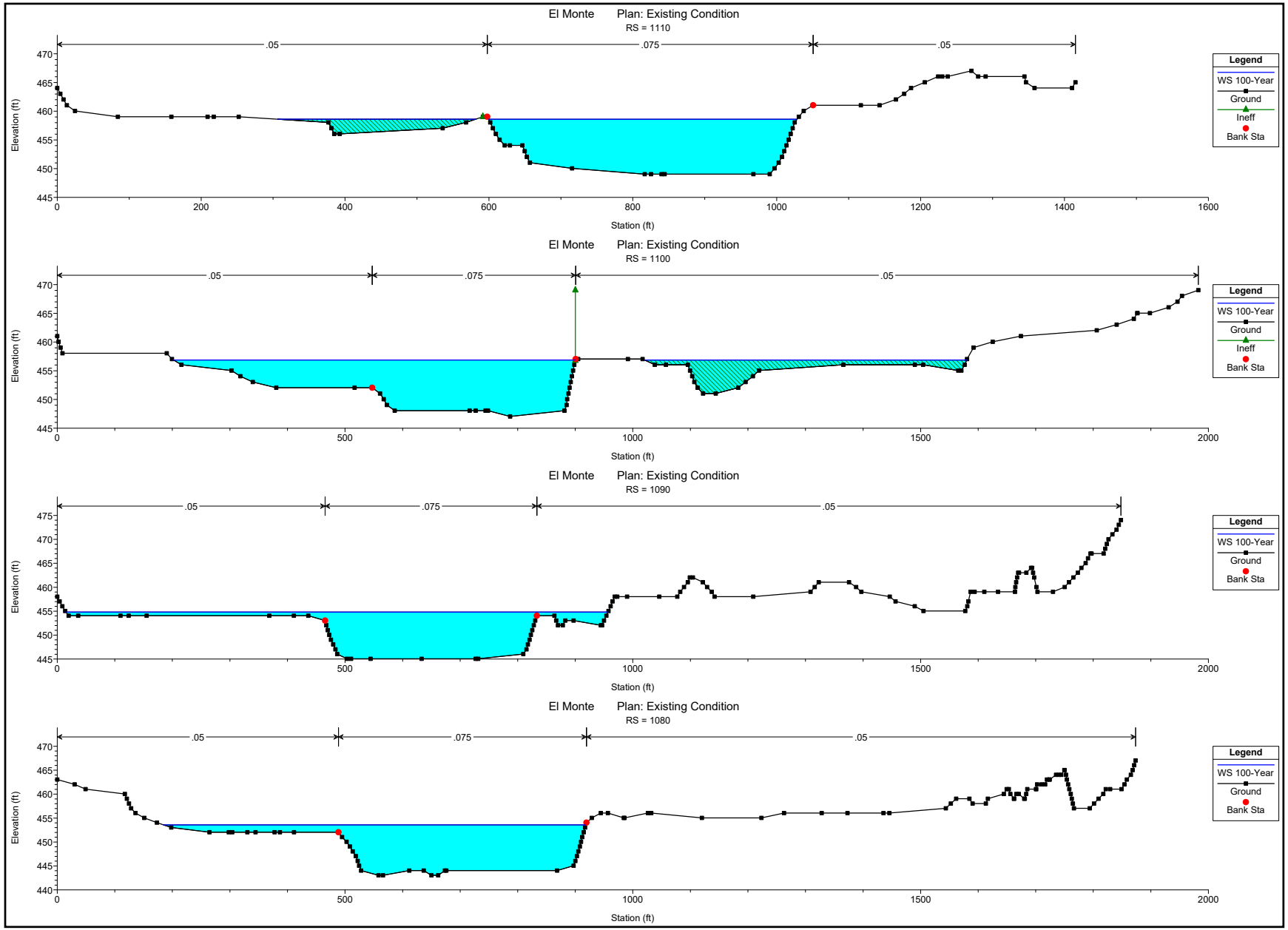
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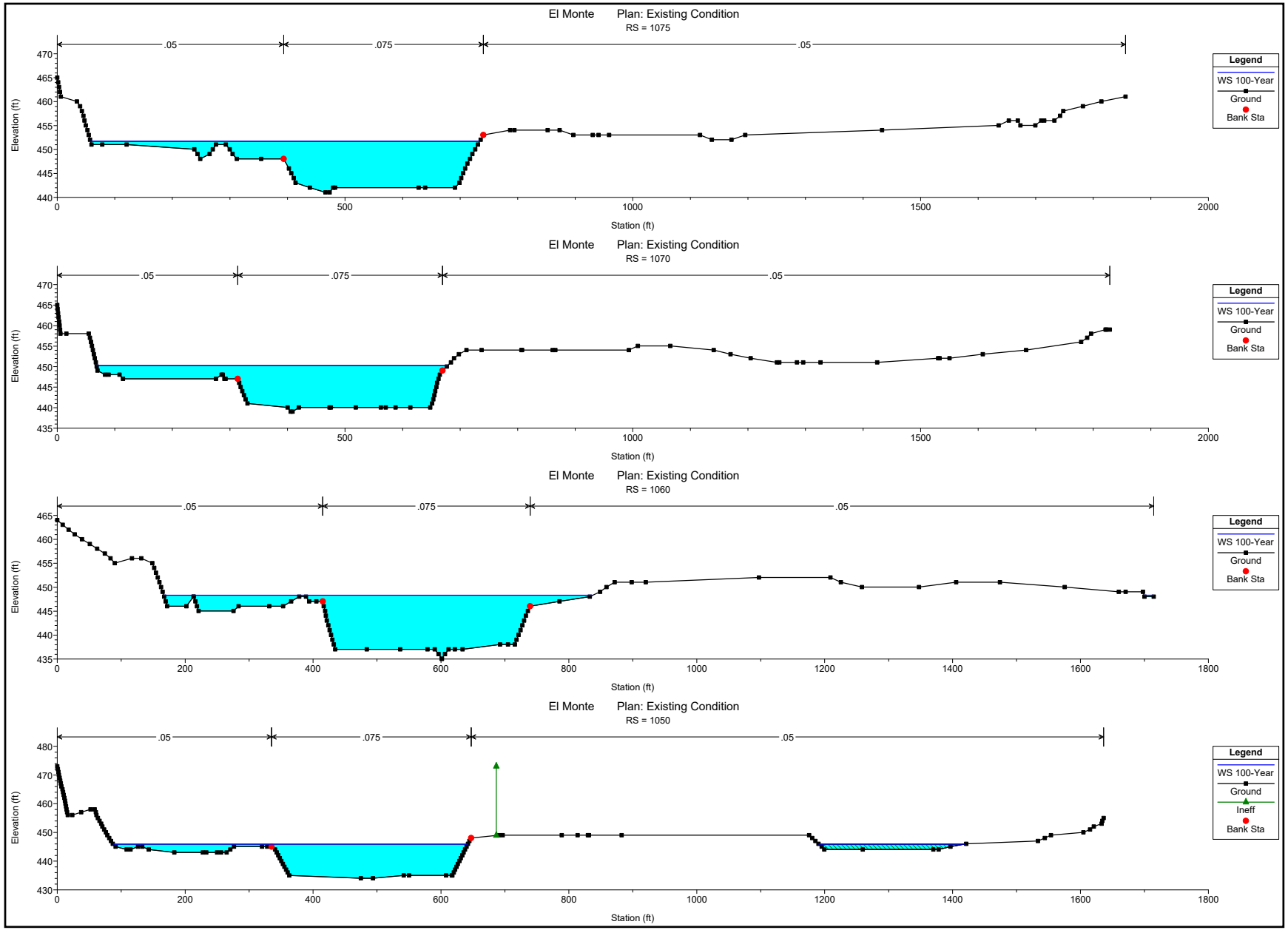
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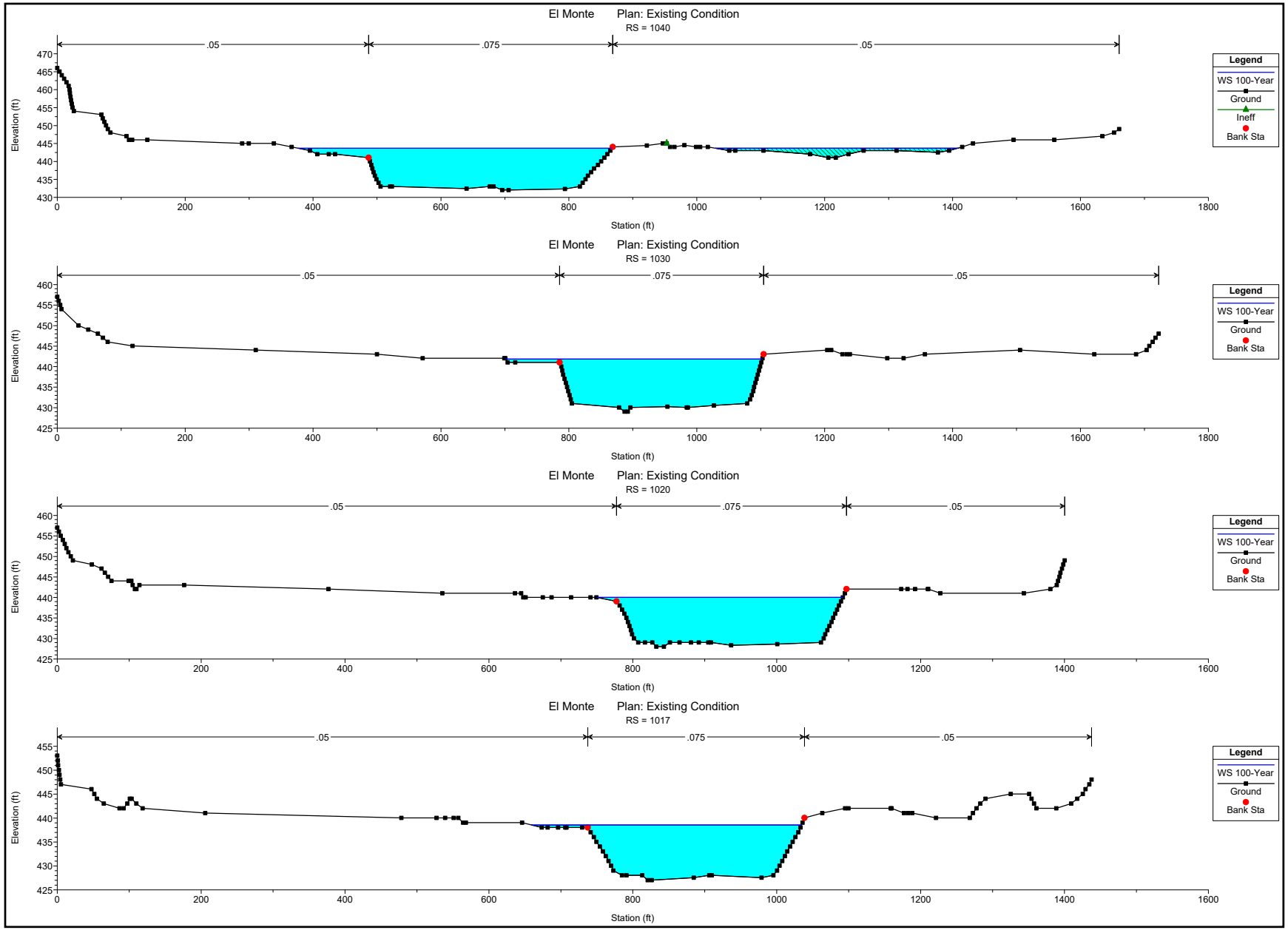
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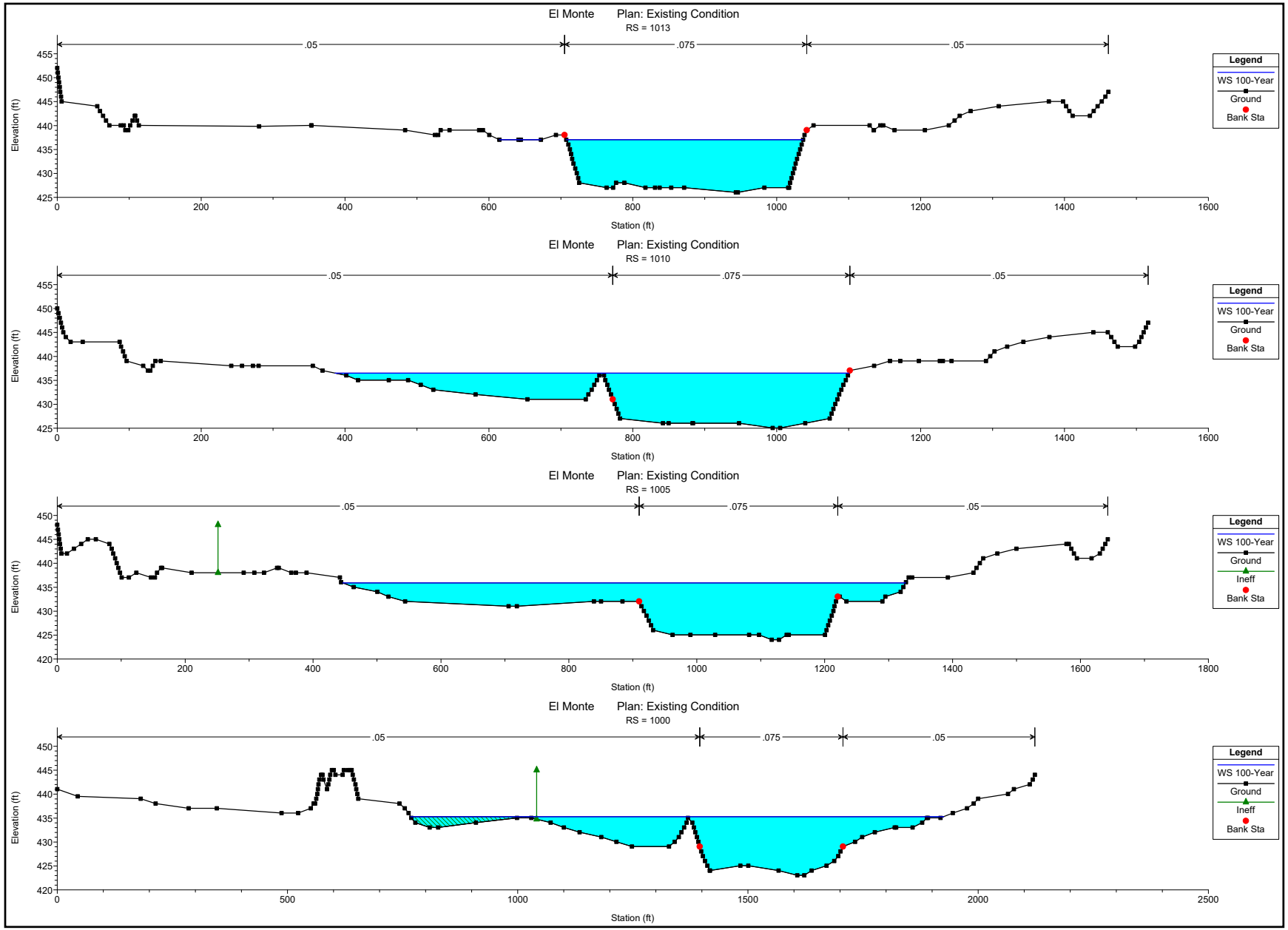
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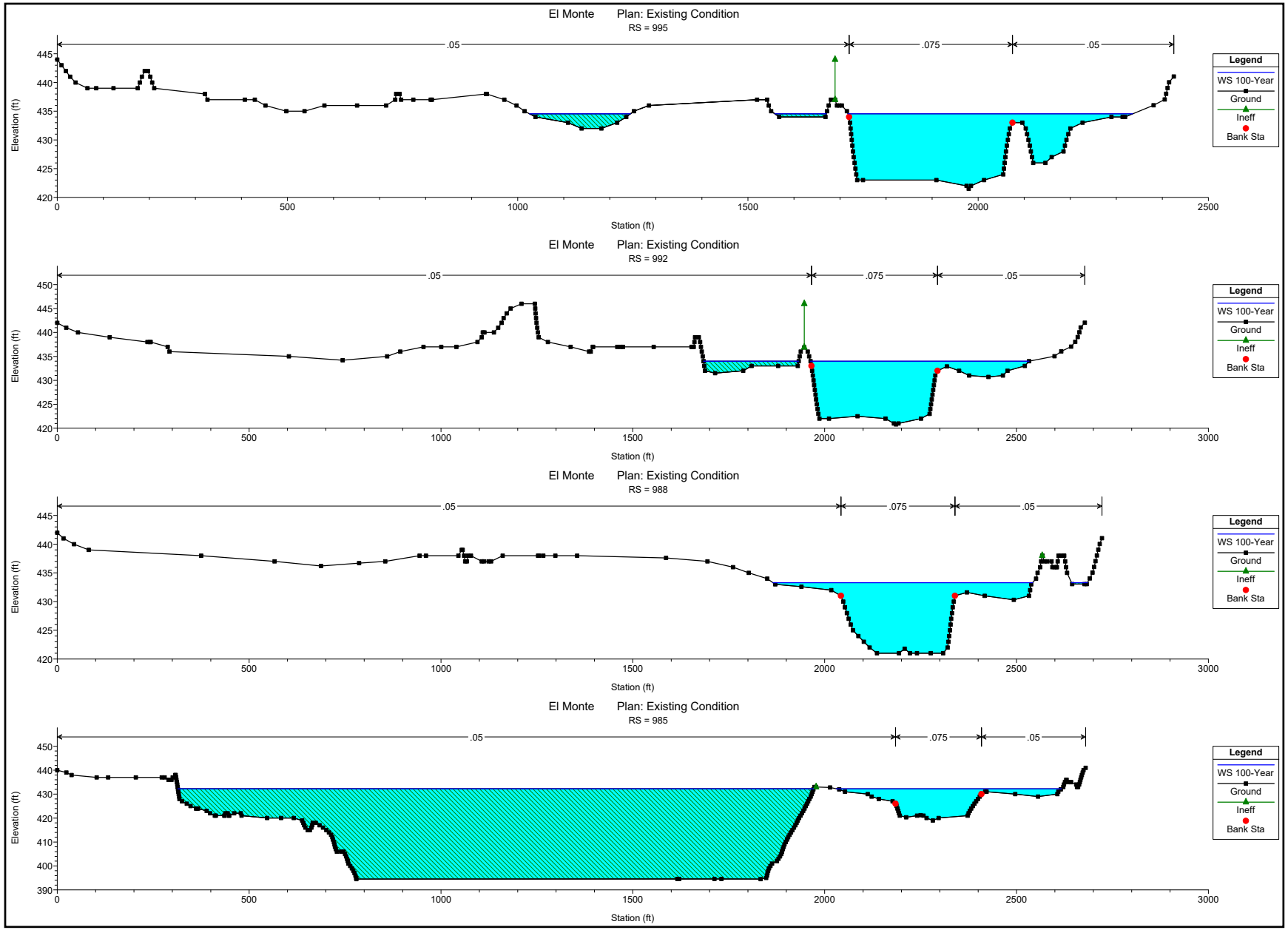
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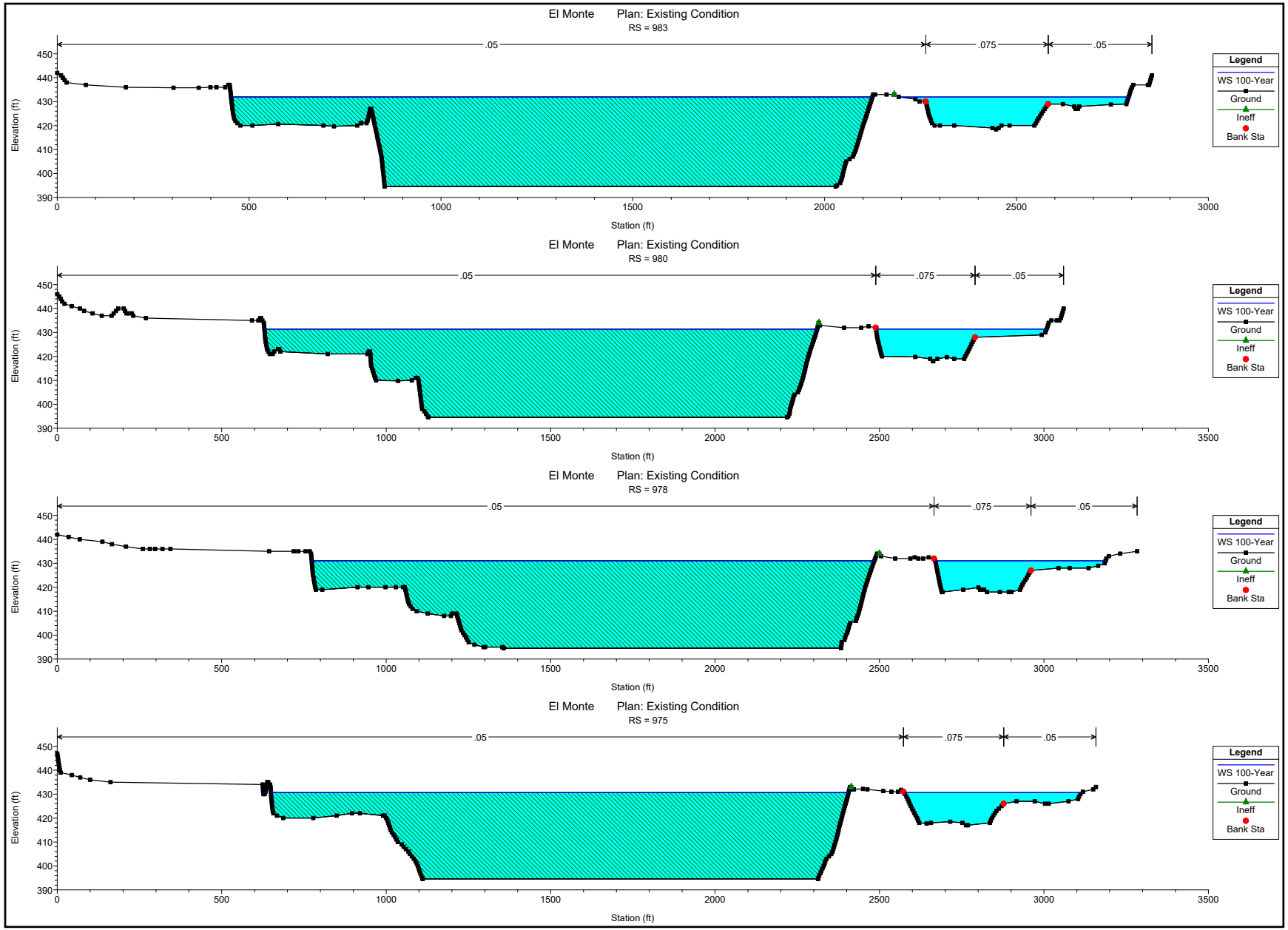
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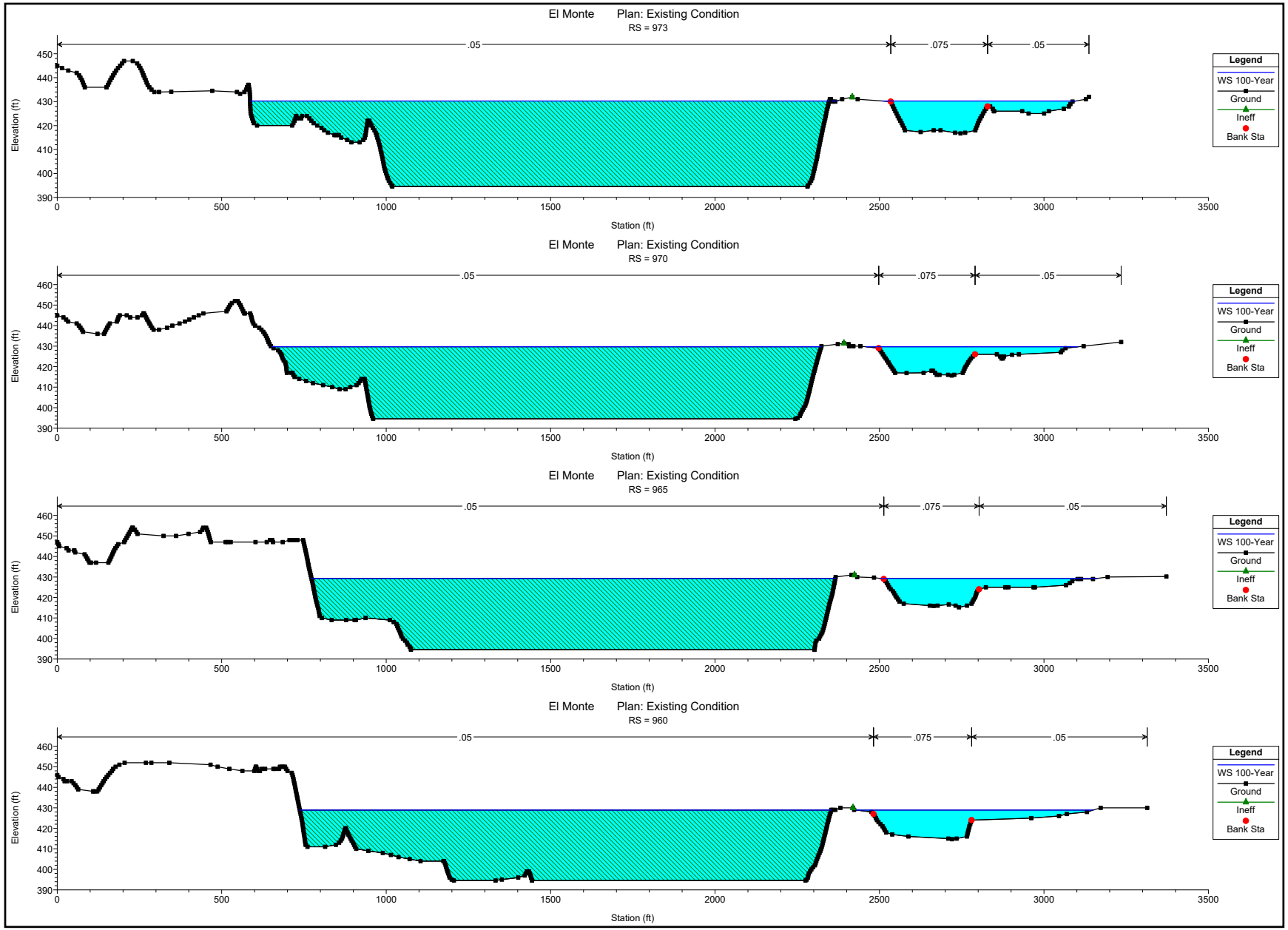
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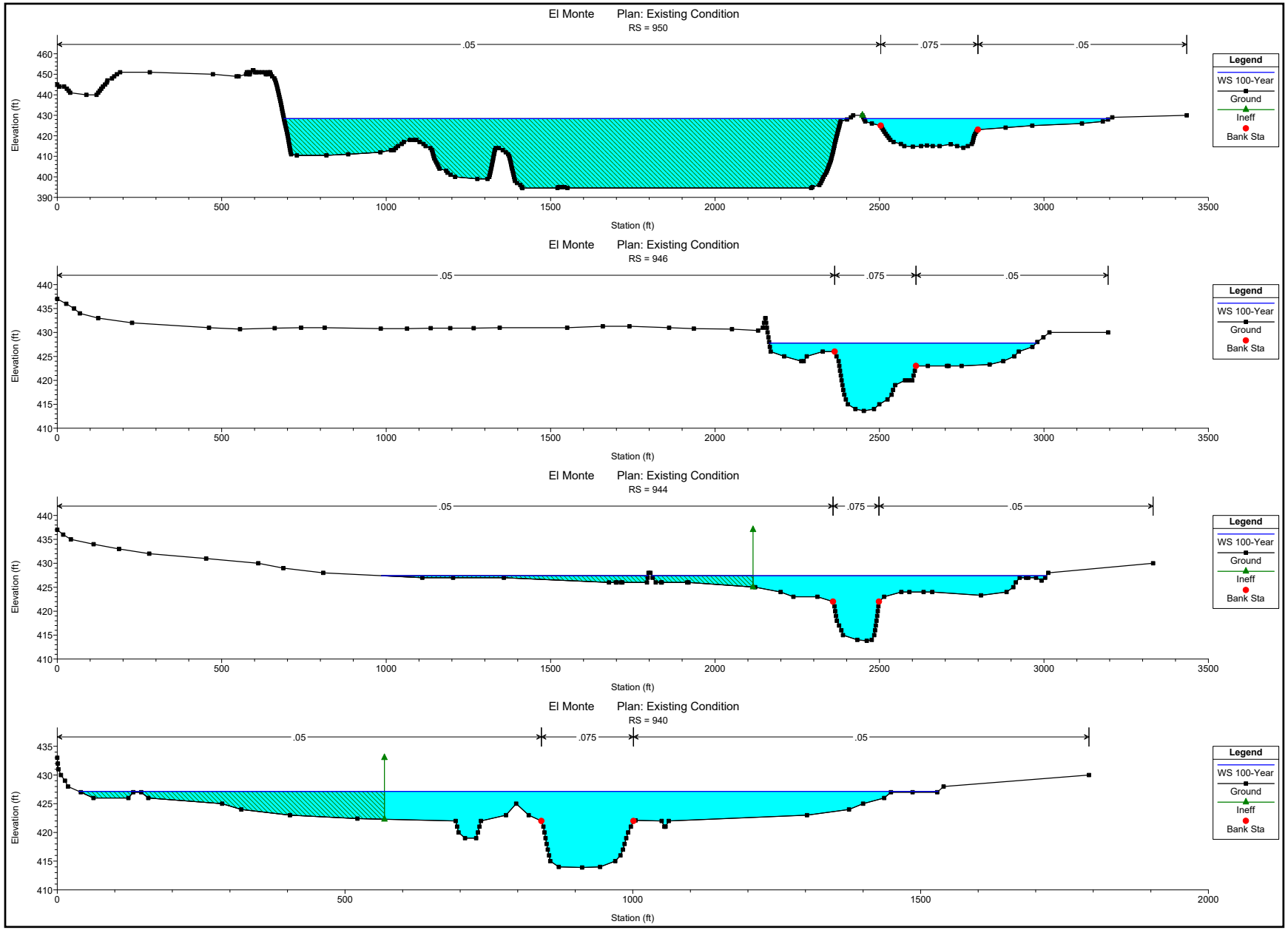
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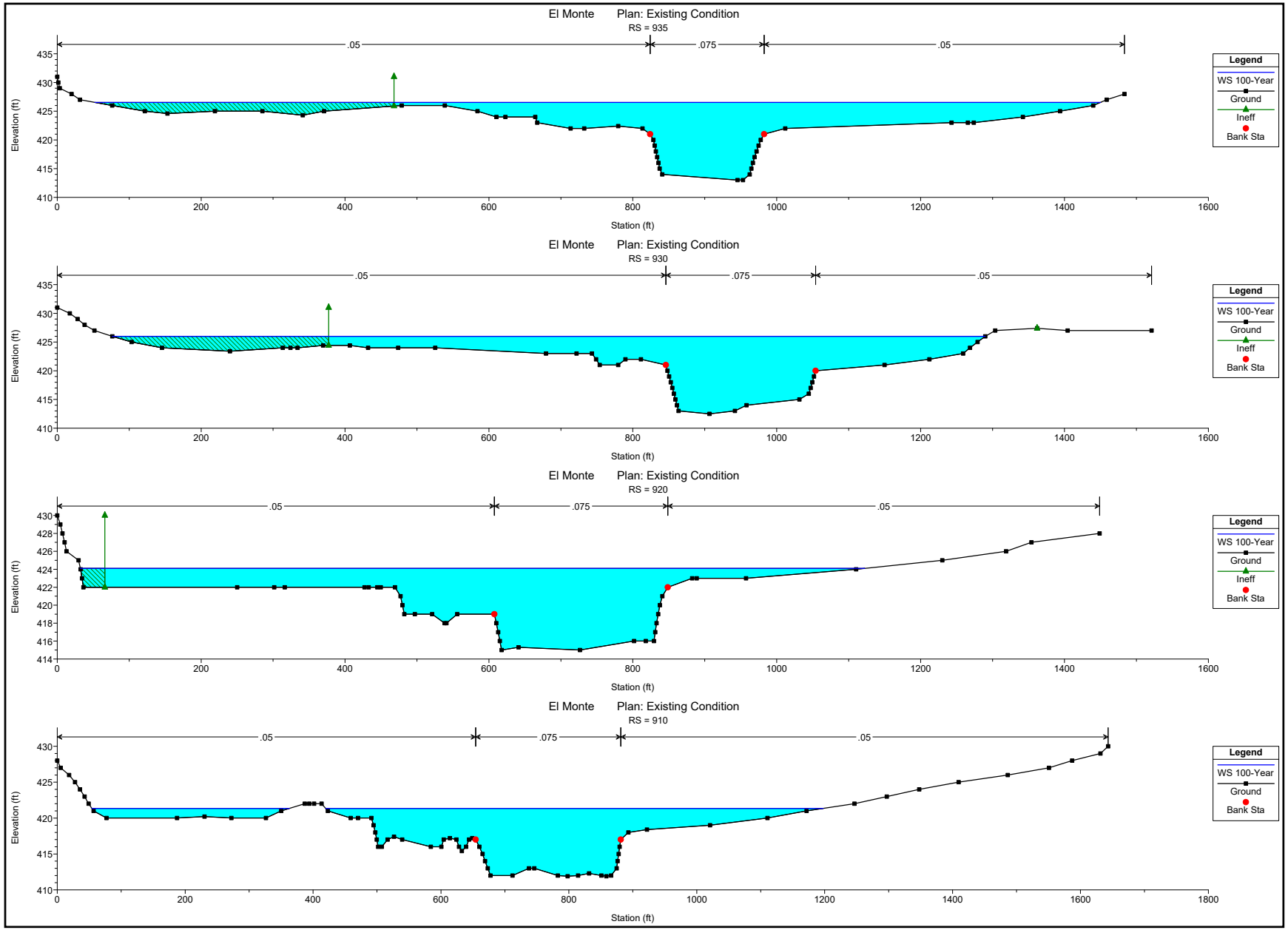
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Existing Condition
RS = 935
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.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Existing Condition
RS = 930
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Existing Condition
RS = 920
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Existing Condition
RS = 910
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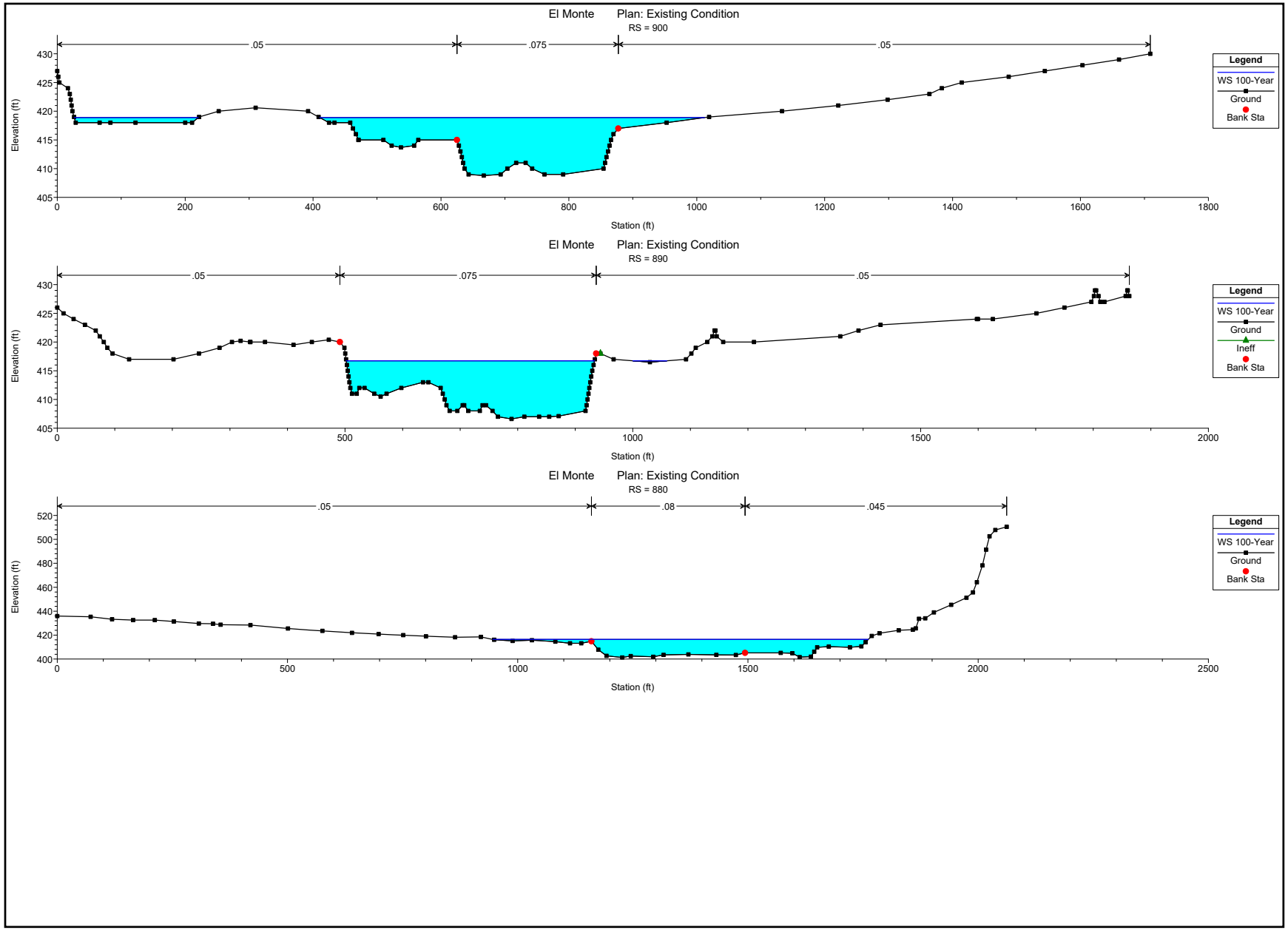
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Existing Condition
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Existing Condition
RS = 890
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Existing Condition
RS = 880
.05
.08
.045
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

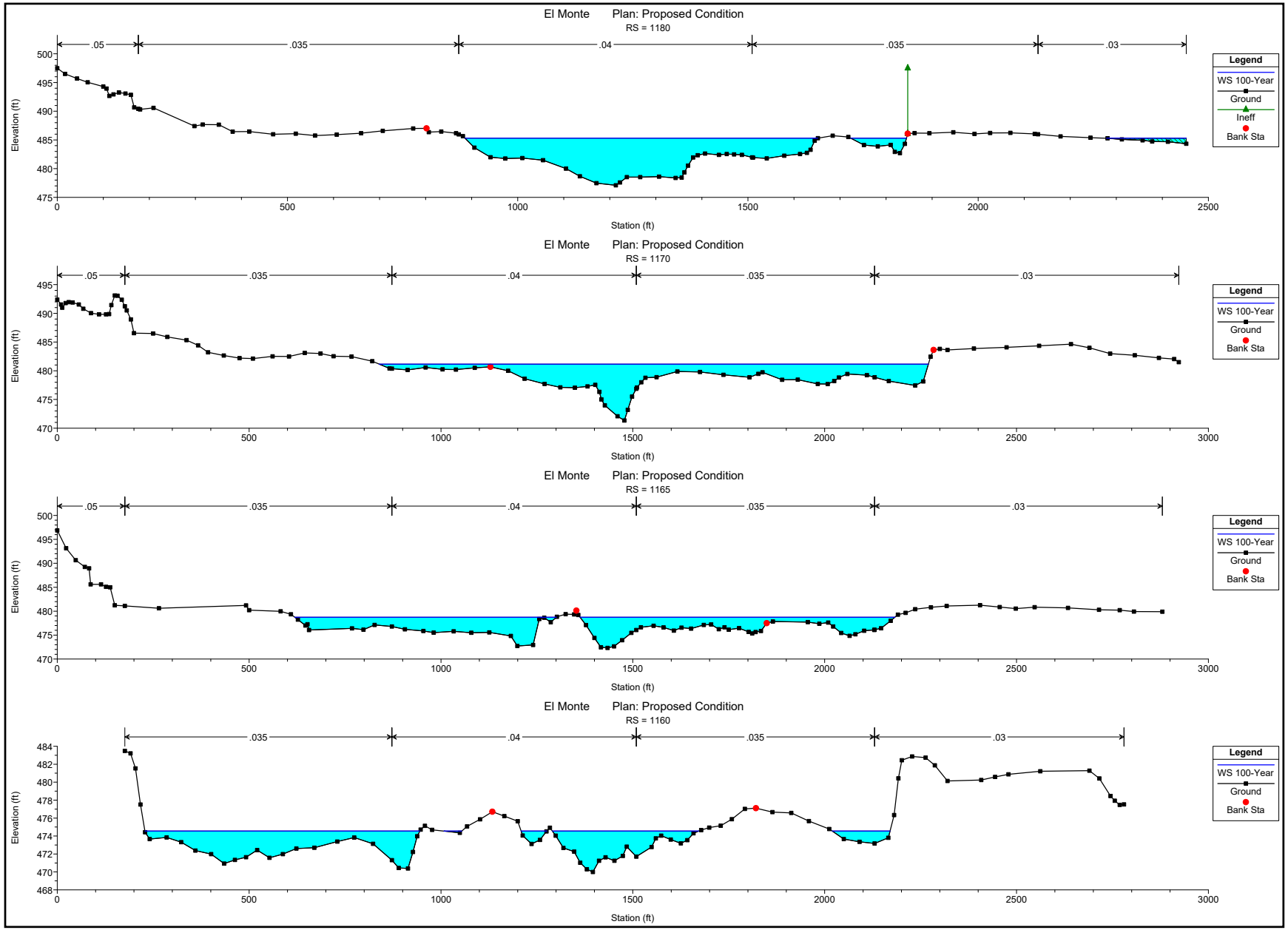
Proposed Conditions All Phases

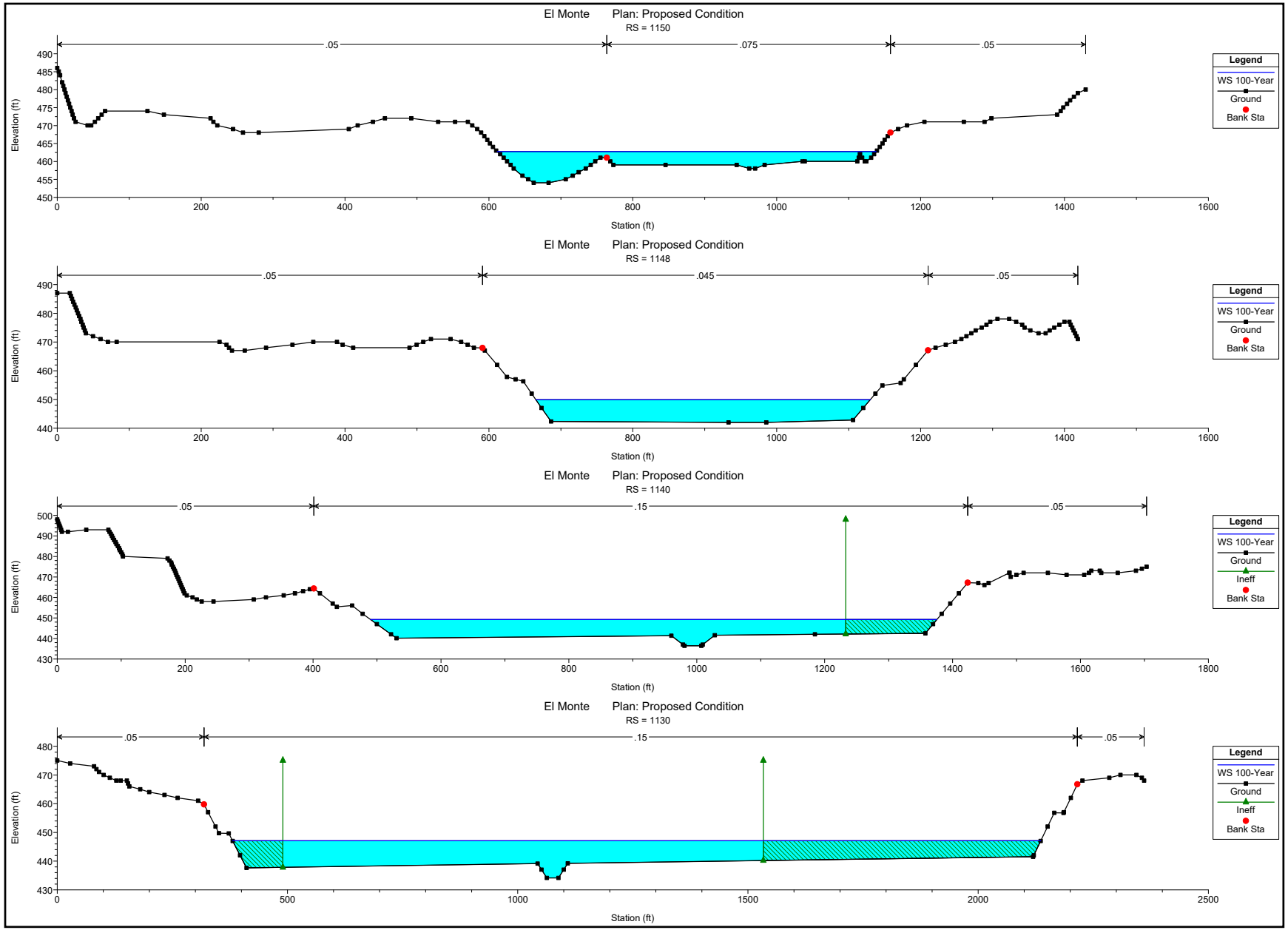
HEC-RAS Plan: Proposed Con River: RIVER-1 Reach: Reach-1 Profile: 100-Year

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)	
Reach-1	1180	100-Year	19000.00	477.10	485.30		485.74	0.002859	5.35	3552.51	1060.54	0.47
Reach-1	1170	100-Year	19000.00	471.34	481.16		481.63	0.004095	5.54	3565.42	1431.43	0.57
Reach-1	1165	100-Year	19000.00	472.32	478.74	477.70	479.12	0.003948	5.32	3893.79	1502.72	0.55
Reach-1	1160	100-Year	19000.00	469.99	474.55	474.55	475.49	0.014382	7.32	2477.28	1361.69	0.93
Reach-1	1150	100-Year	19000.00	458.04	462.76	462.76	464.57	0.018925	6.09	2126.56	526.64	0.59
Reach-1	1148	100-Year	19000.00	442.04	449.93		450.42	0.002047	5.60	3392.00	464.91	0.37
Reach-1	1140	100-Year	19000.00	436.46	449.25		449.40	0.005968	3.11	6107.54	885.55	0.19
Reach-1	1130	100-Year	19000.00	434.16	447.11		447.19	0.002927	2.19	8657.38	1755.34	0.13
Reach-1	1120	100-Year	19000.00	432.01	445.42		445.51	0.003727	2.43	7820.29	1384.69	0.15
Reach-1	1110	100-Year	19000.00	429.69	443.60	436.92	443.68	0.003185	2.36	8036.79	920.33	0.14
Reach-1	1100	100-Year	20000.00	427.44	442.45		442.51	0.001921	1.97	10133.46	1041.36	0.11
Reach-1	1090	100-Year	20000.00	425.34	441.75		441.79	0.001253	1.73	11533.95	1044.36	0.09
Reach-1	1080	100-Year	20000.00	424.00	441.30		441.35	0.001066	1.71	11667.04	951.33	0.09
Reach-1	1075	100-Year	20000.00	424.00	440.90		440.95	0.001112	1.84	10856.96	819.07	0.09
Reach-1	1070	100-Year	20000.00	424.00	440.42	428.80	440.50	0.001564	2.26	8845.75	908.86	0.11
Reach-1	1060	100-Year	20000.00	424.00	439.20	427.69	439.29	0.001869	2.37	8428.91	931.27	0.12
Reach-1	1050	100-Year	20000.00	424.00	437.81	427.43	437.91	0.002096	2.44	8207.36	922.73	0.12
Reach-1	1040	100-Year	20000.00	424.00	436.45	428.37	436.68	0.001619	3.80	5257.38	836.46	0.21
Reach-1	1030	100-Year	20000.00	424.00	435.87		436.03	0.001061	3.15	6350.81	1304.48	0.17
Reach-1	1020	100-Year	20000.00	424.00	435.62		435.68	0.000411	2.01	9947.65	1060.30	0.11
Reach-1	1017	100-Year	20000.00	424.00	435.55		435.60	0.000301	1.69	11849.29	1084.29	0.09
Reach-1	1013	100-Year	20000.00	424.00	435.47		435.51	0.000320	1.73	11541.70	1062.68	0.09
Reach-1	1010	100-Year	20000.00	424.00	435.40		435.45	0.000304	1.69	11822.18	1087.79	0.09
Reach-1	1005	100-Year	20000.00	424.00	435.33		435.37	0.000255	1.55	12898.89	1186.89	0.08
Reach-1	1000	100-Year	20000.00	424.00	435.13		435.24	0.000712	2.62	7879.85	1317.13	0.14
Reach-1	995	100-Year	20000.00	422.00	434.53		434.82	0.002130	4.46	4762.99	1458.95	0.24
Reach-1	992	100-Year	20000.00	421.00	433.99		434.36	0.002523	4.96	4289.34	1488.46	0.26
Reach-1	988	100-Year	20000.00	421.00	433.29	427.43	433.77	0.003600	5.74	3807.85	718.35	0.31
Reach-1	985	100-Year	20000.00	419.00	432.26	427.71	432.90	0.005060	6.84	3312.60	2243.60	0.37
Reach-1	983	100-Year	20000.00	418.40	431.94	425.26	432.28	0.002390	4.86	4393.57	2267.80	0.25
Reach-1	980	100-Year	20000.00	418.00	431.42	425.16	431.84	0.002972	5.35	3984.14	2199.31	0.28
Reach-1	978	100-Year	20000.00	418.00	431.04	424.48	431.45	0.002795	5.29	4043.18	2228.92	0.27
Reach-1	975	100-Year	20000.00	417.00	430.64	424.17	431.00	0.002583	4.98	4258.09	2303.30	0.26
Reach-1	973	100-Year	20000.00	416.70	430.24	423.87	430.59	0.002590	4.95	4294.13	2361.87	0.26
Reach-1	970	100-Year	20000.00	415.70	429.69	423.18	430.06	0.002708	5.12	4263.54	2315.13	0.27
Reach-1	965	100-Year	20000.00	415.20	429.28	422.58	429.61	0.002416	4.91	4477.57	2252.77	0.26
Reach-1	960	100-Year	20000.00	414.70	428.88	421.68	429.17	0.001960	4.57	4841.62	2335.43	0.23
Reach-1	950	100-Year	20000.00	414.20	428.38	421.18	428.66	0.001845	4.48	5013.38	2463.93	0.23

HEC-RAS Plan: Proposed Con River: RIVER-1 Reach: Reach-1 Profile: 100-Year (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)	
Reach-1	946	100-Year	20000.00	413.60	427.79		428.11	0.002681	4.95	4580.39	811.72	0.27
Reach-1	944	100-Year	20000.00	413.80	427.41		427.82	0.003449	6.01	4198.62	2010.58	0.31
Reach-1	940	100-Year	20000.00	413.90	427.15		427.41	0.002083	4.63	5113.21	1492.87	0.24
Reach-1	935	100-Year	20000.00	413.00	426.54		426.92	0.003177	5.80	4425.96	1397.69	0.29
Reach-1	930	100-Year	20000.00	412.50	426.00	421.47	426.31	0.002404	4.99	4788.01	1213.43	0.26
Reach-1	920	100-Year	20000.00	415.00	424.10		424.59	0.005934	6.22	3772.22	1090.18	0.38
Reach-1	910	100-Year	20000.00	411.90	421.35		421.84	0.005661	6.31	3814.74	1087.02	0.38
Reach-1	900	100-Year	20000.00	408.80	418.89		419.55	0.006822	6.93	3236.08	795.57	0.41
Reach-1	890	100-Year	20000.00	406.60	416.73	413.45	417.37	0.007507	6.39	3131.86	490.61	0.42
Reach-1	880	100-Year	20000.00	401.24	416.38	407.37	416.52	0.000601	2.49	7150.42	815.42	0.12


El Monte Plan: Proposed Condition
RS = 1180
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 1170
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1165
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1160
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1148
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.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1140
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.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
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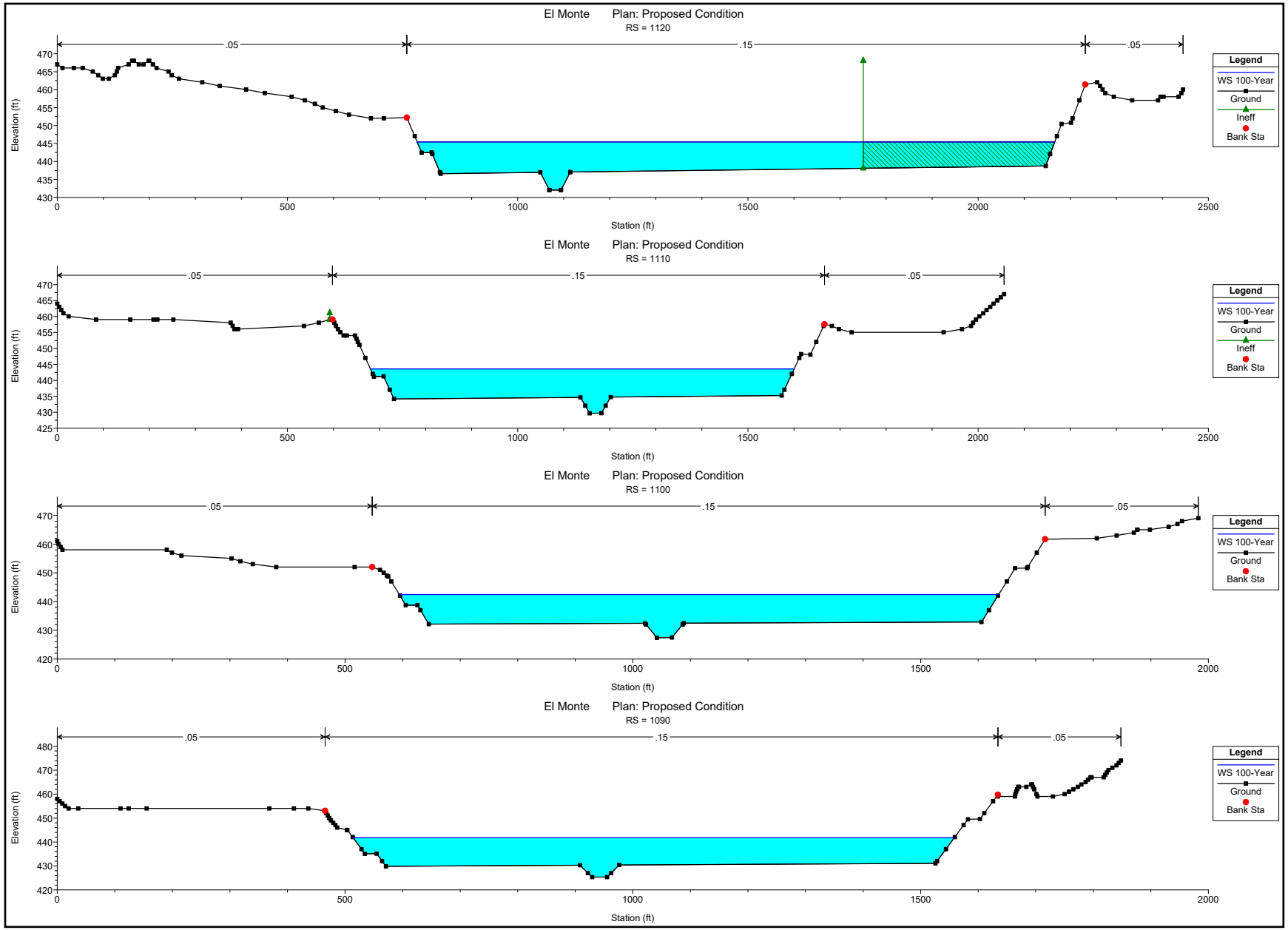
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 1110
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 1100
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1090
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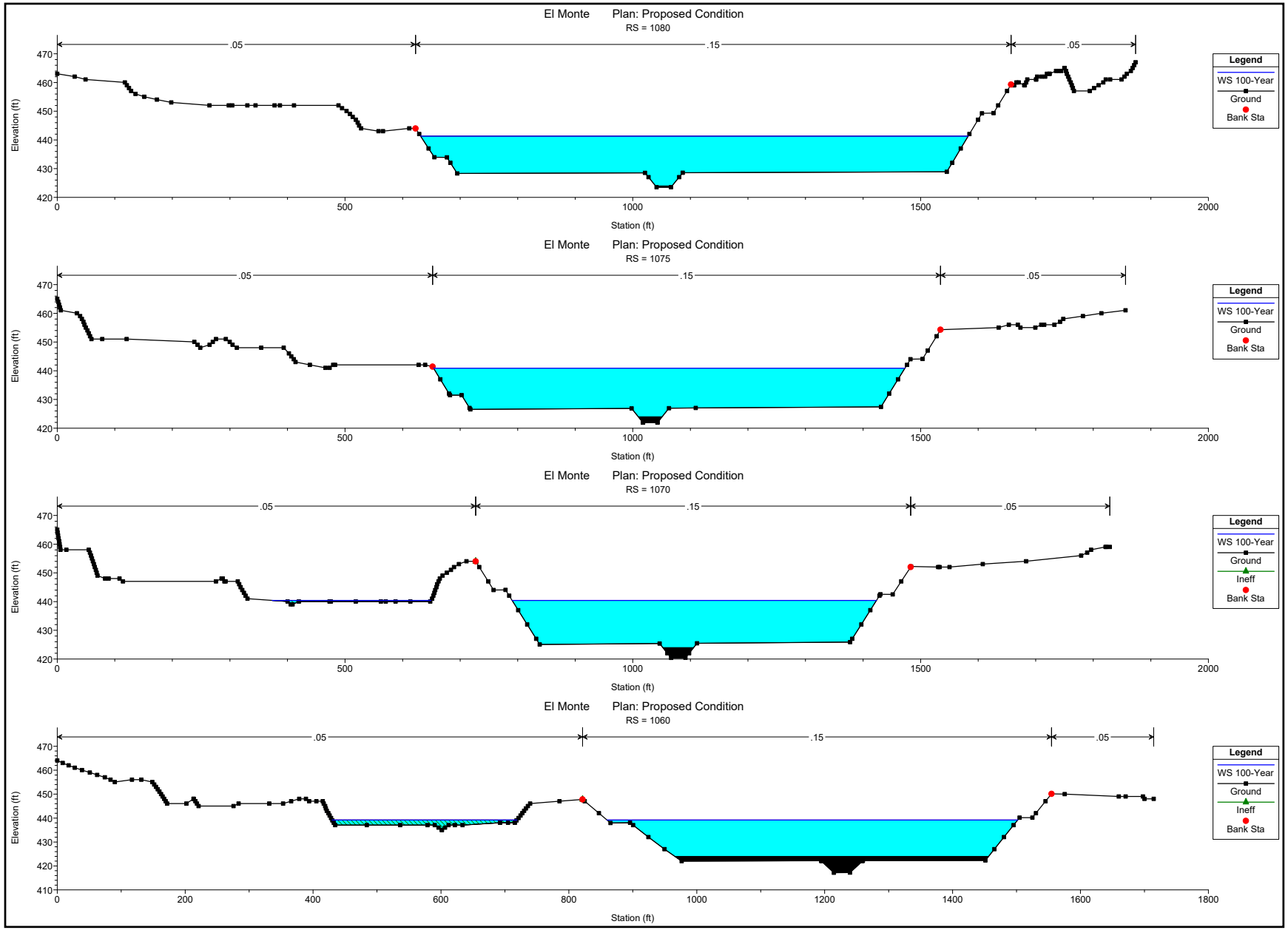
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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.15
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
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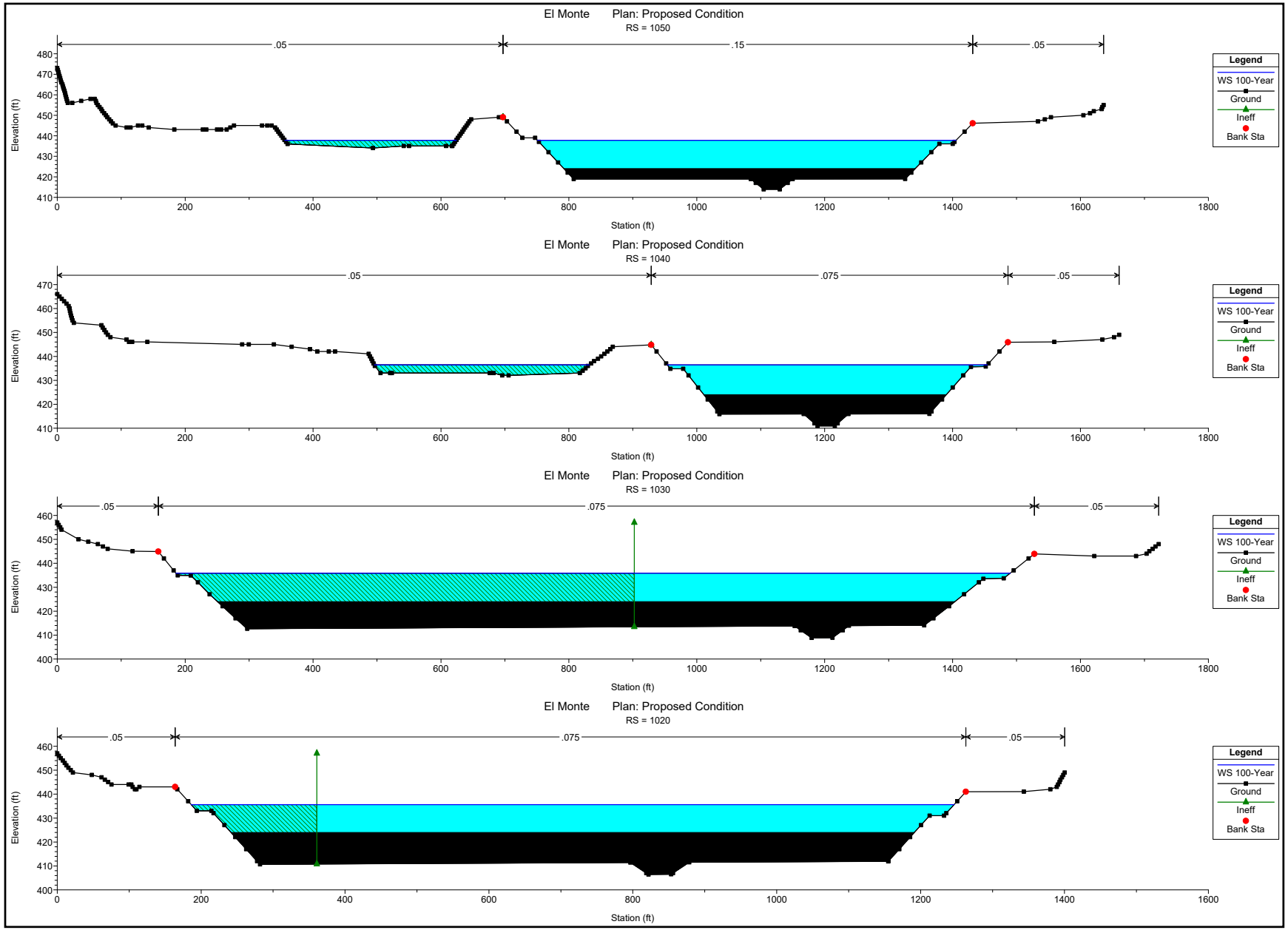
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1070
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 1060
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
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.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 1030
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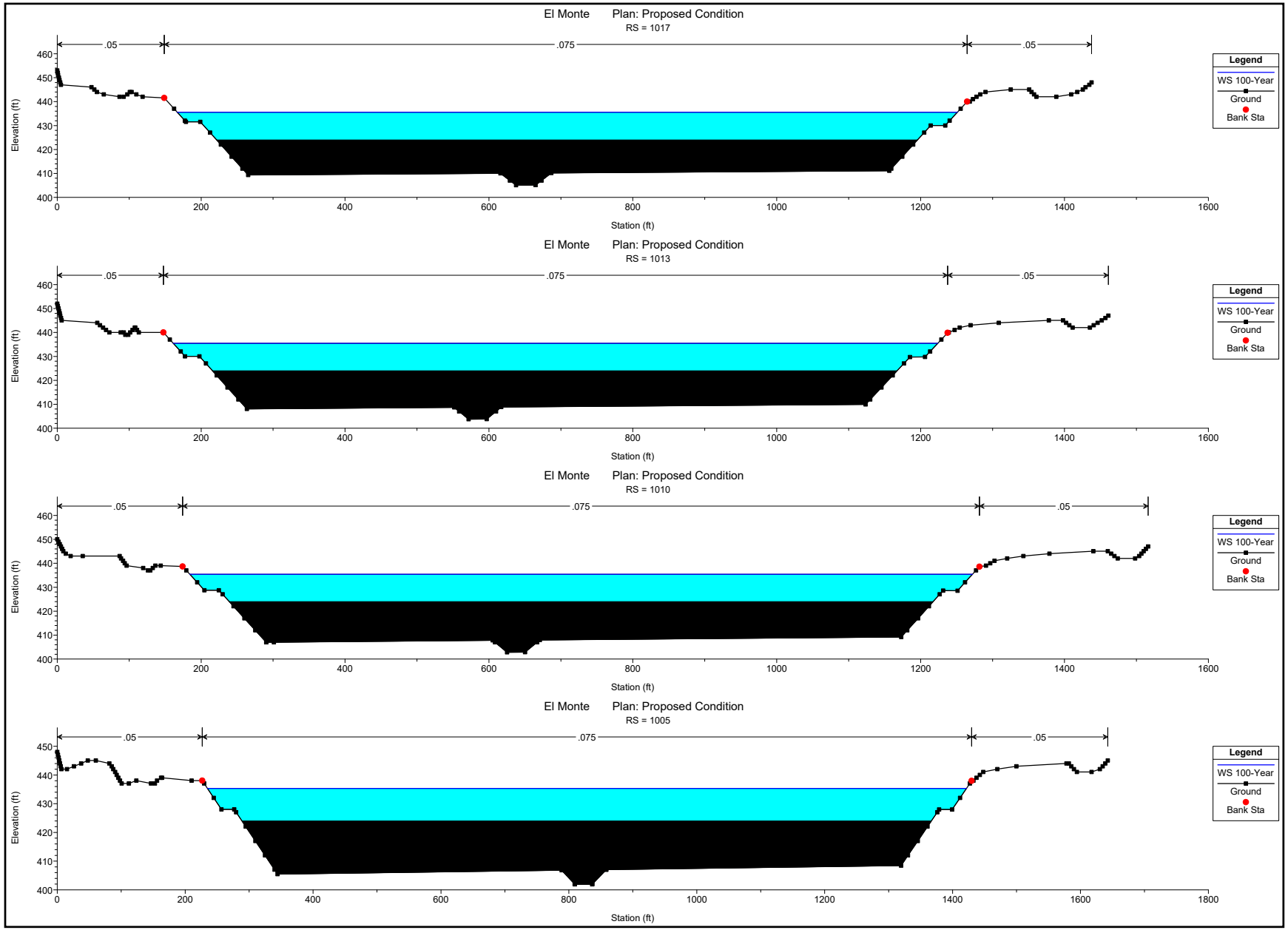
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 1020
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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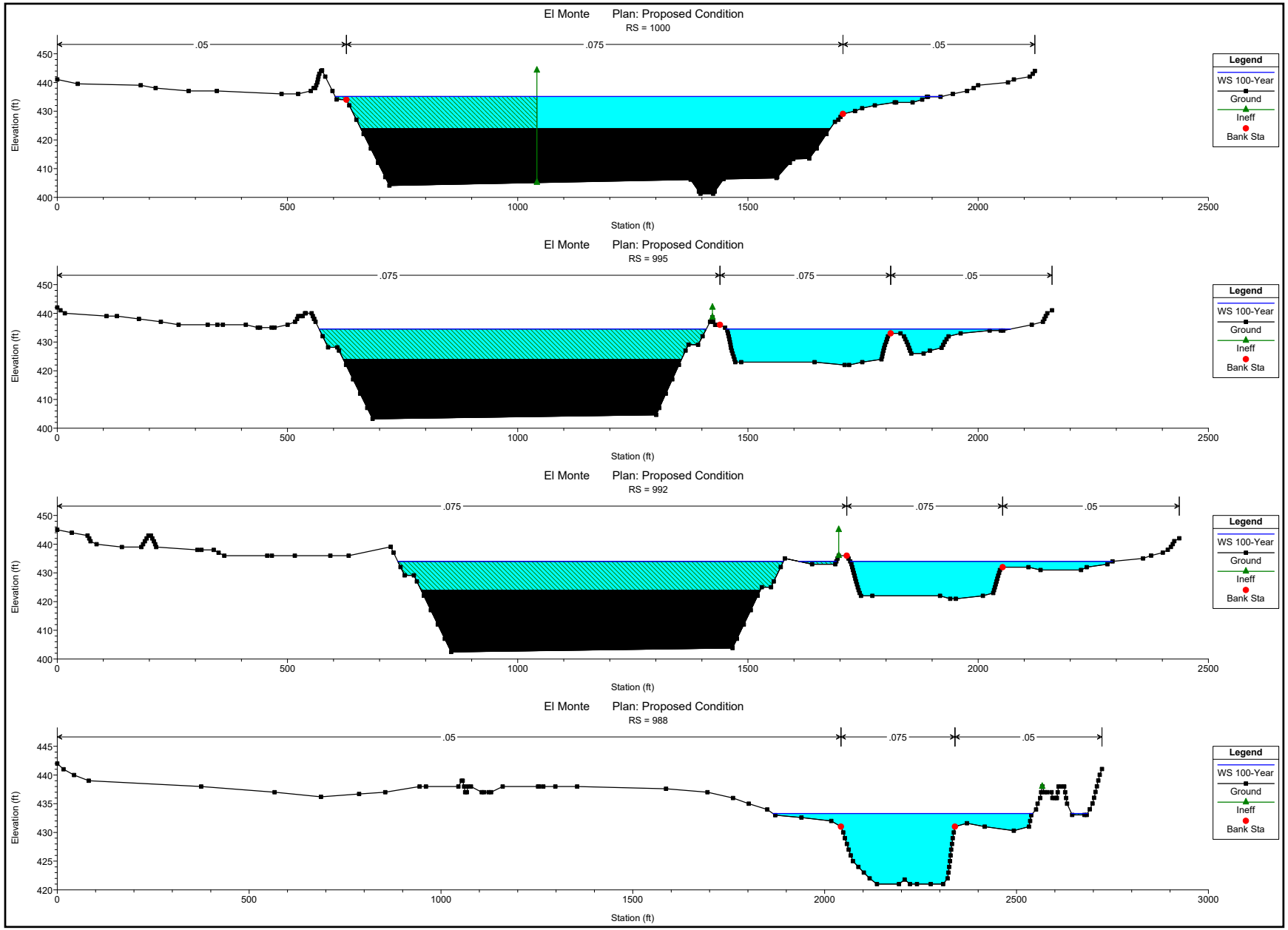
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1013
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1010
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 1005
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition
RS = 1000
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 995
.075
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 992
.075
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
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.075
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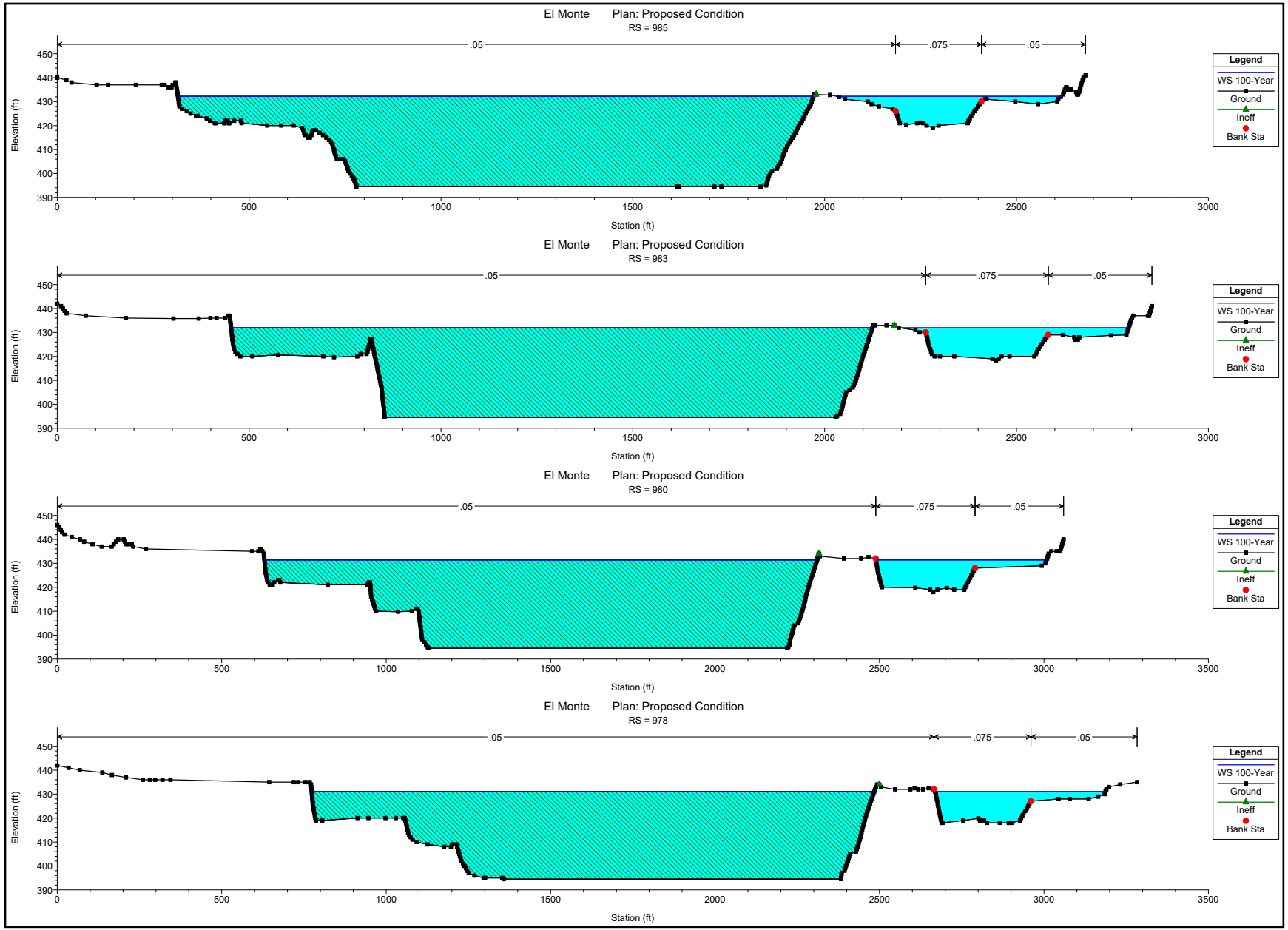
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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.075
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 983
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 980
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
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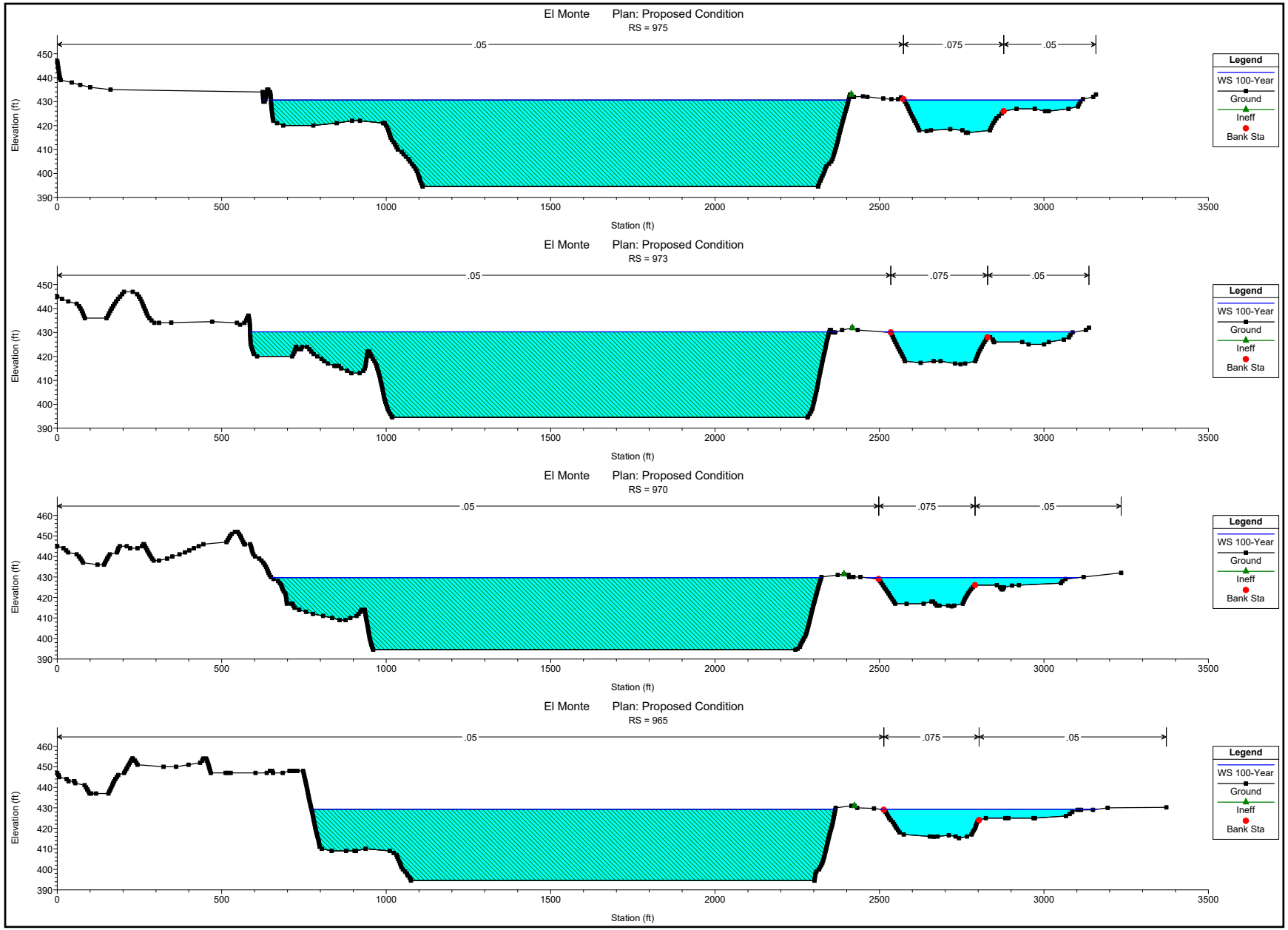
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
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WS 100-Year
Ground
Ineff
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El Monte Plan: Proposed Condition
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Elevation (ft)
Station (ft)
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WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 970
.05
.075
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
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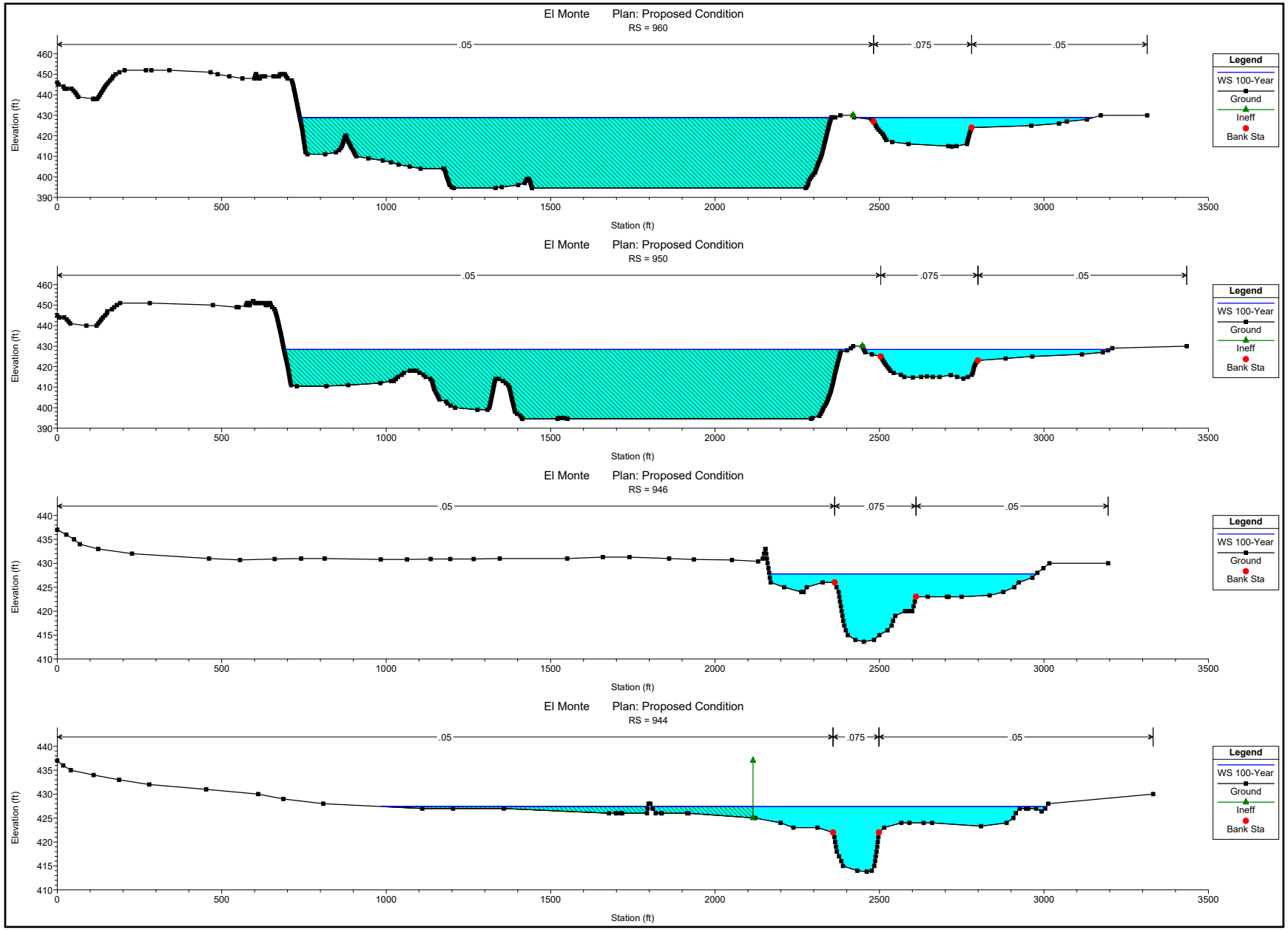
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 950
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 946
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
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.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
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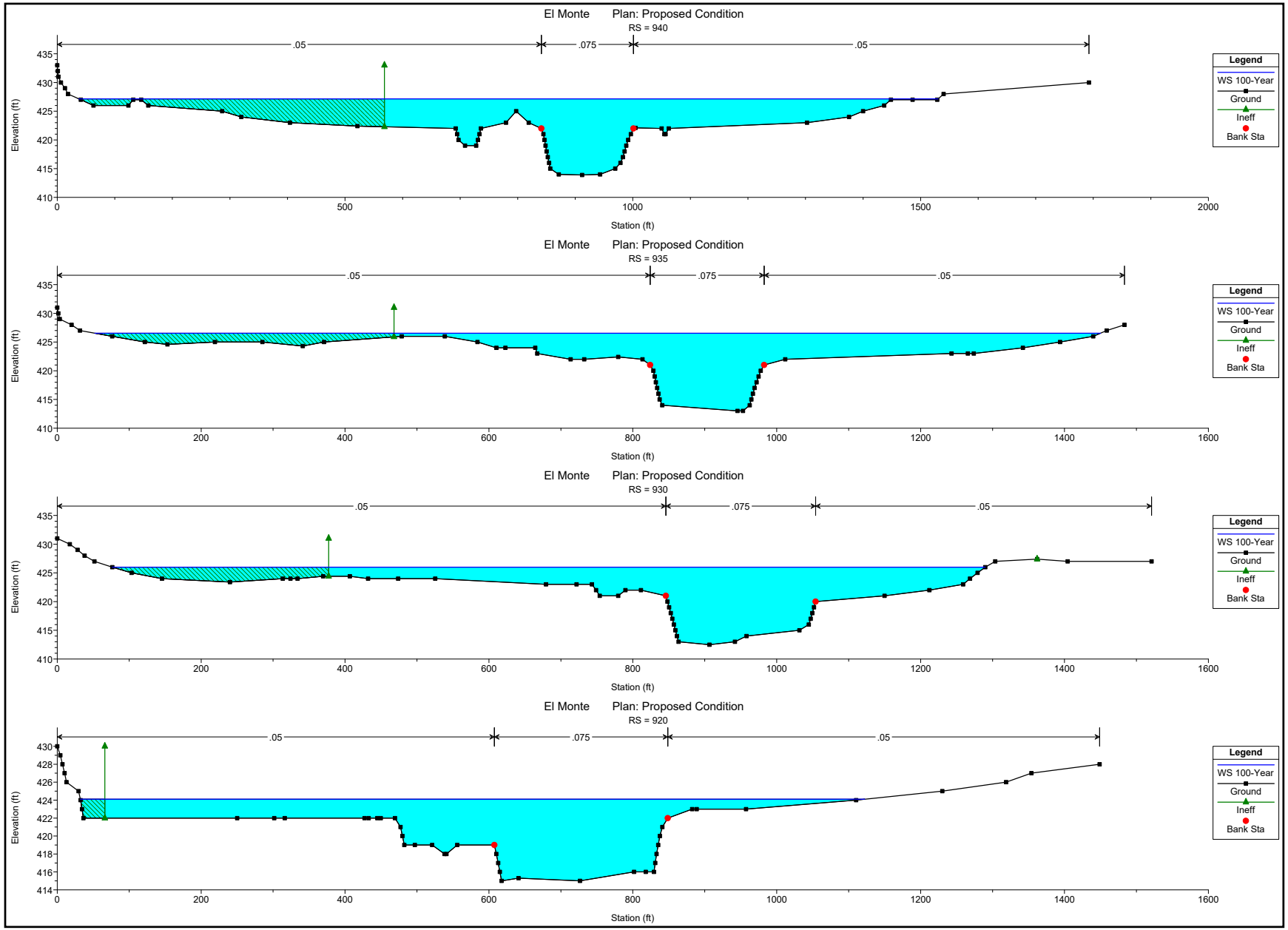
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
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El Monte Plan: Proposed Condition
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Elevation (ft)
Station (ft)
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WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 930
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
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Elevation (ft)
Station (ft)
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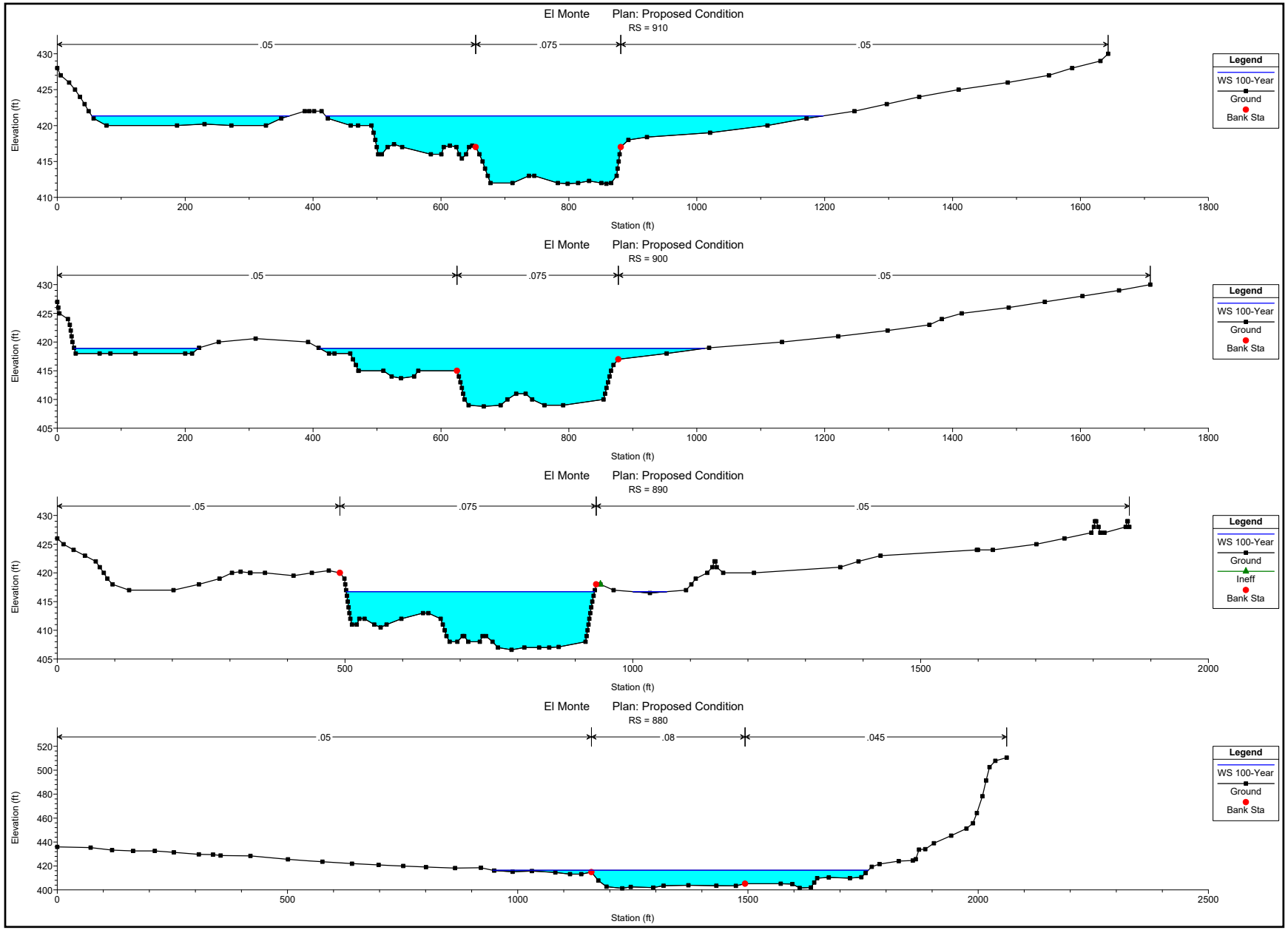
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Elevation (ft)
Station (ft)
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WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 900
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition
RS = 890
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition
RS = 880
.05
.08
.045
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

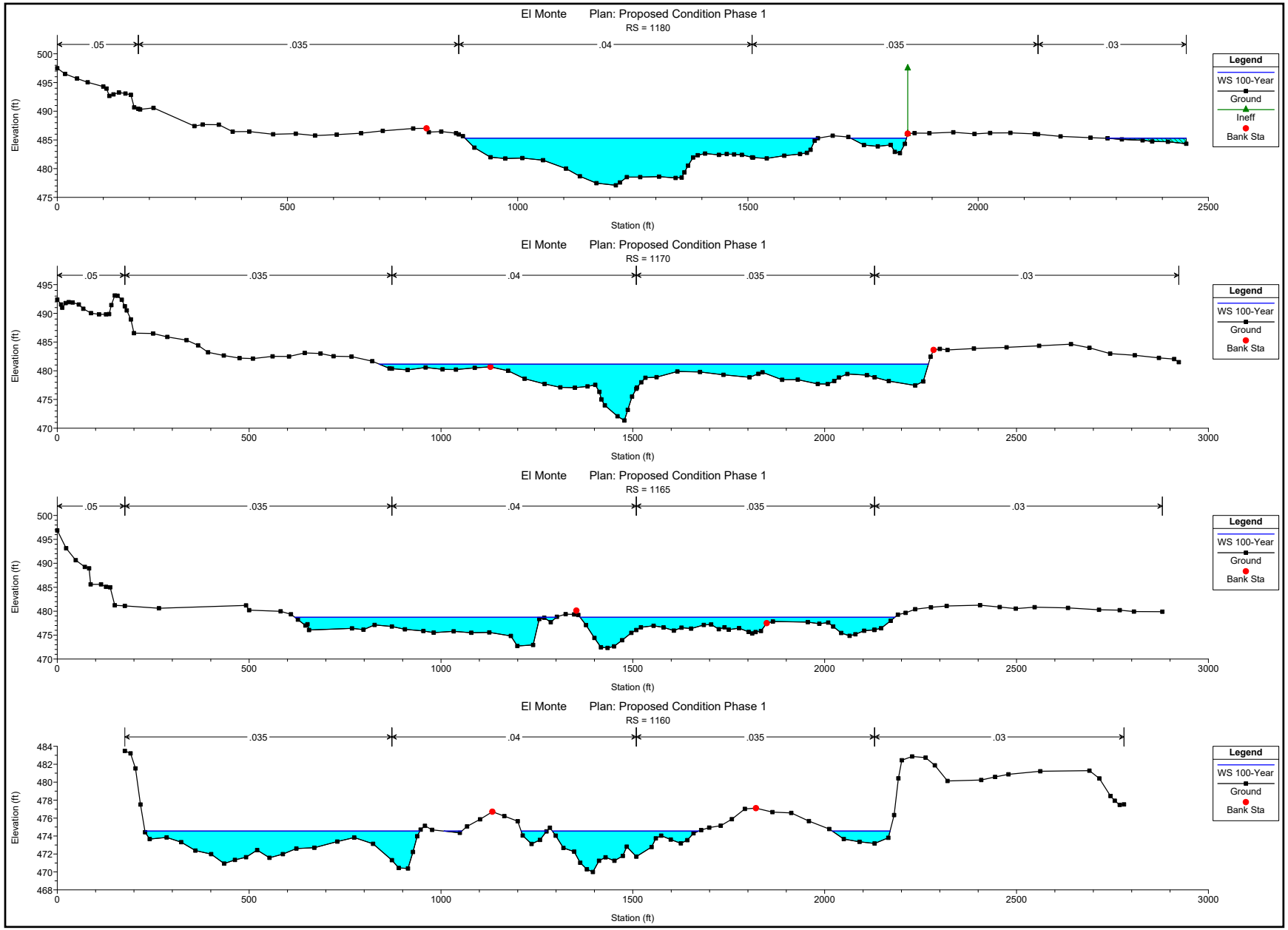
Proposed Conditions Phase 1

HEC-RAS Plan: PC Phase 1 River: RIVER-1 Reach: Reach-1 Profile: 100-Year

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)	
Reach-1	1180	100-Year	19000.00	477.10	485.30		485.74	0.002859	5.35	3552.51	1060.54	0.47
Reach-1	1170	100-Year	19000.00	471.34	481.16		481.63	0.004095	5.54	3565.42	1431.43	0.57
Reach-1	1165	100-Year	19000.00	472.32	478.74	477.70	479.12	0.003948	5.32	3893.79	1502.72	0.55
Reach-1	1160	100-Year	19000.00	469.99	474.55	474.55	475.49	0.014382	7.32	2477.28	1361.69	0.93
Reach-1	1150	100-Year	19000.00	458.04	462.76	462.76	464.57	0.018925	6.09	2126.56	526.64	0.59
Reach-1	1148	100-Year	19000.00	450.00	461.58		461.74	0.000404	3.15	6027.37	579.00	0.17
Reach-1	1140	100-Year	19000.00	450.00	461.43		461.50	0.001900	2.12	8951.35	1154.79	0.11
Reach-1	1130	100-Year	19000.00	450.00	460.61		460.65	0.001289	1.72	11068.02	1886.49	0.09
Reach-1	1120	100-Year	19000.00	450.00	460.02		460.07	0.001023	1.47	11568.96	1992.41	0.08
Reach-1	1110	100-Year	19000.00	449.04	458.61	454.11	459.07	0.004642	5.44	3490.27	704.10	0.34
Reach-1	1100	100-Year	20000.00	447.04	456.87		457.23	0.003604	4.96	4237.13	1257.77	0.30
Reach-1	1090	100-Year	20000.00	445.04	454.83		455.29	0.004200	5.58	3949.94	941.90	0.33
Reach-1	1080	100-Year	20000.00	443.04	453.59		453.95	0.003349	4.94	4287.46	733.94	0.29
Reach-1	1075	100-Year	20000.00	441.04	451.72		452.23	0.004927	5.94	3658.45	676.31	0.35
Reach-1	1070	100-Year	20000.00	439.04	450.25		450.63	0.003218	5.07	4176.33	610.10	0.29
Reach-1	1060	100-Year	20000.00	435.04	448.32		448.74	0.003228	5.36	4065.62	685.91	0.29
Reach-1	1050	100-Year	20000.00	434.04	445.92		446.44	0.004035	5.90	3633.25	782.37	0.32
Reach-1	1040	100-Year	20000.00	432.04	443.69	437.55	444.08	0.003018	5.08	4038.52	869.58	0.28
Reach-1	1030	100-Year	20000.00	429.04	441.86		442.39	0.003722	5.83	3480.44	401.20	0.31
Reach-1	1020	100-Year	20000.00	428.04	440.02		440.62	0.004510	6.22	3228.40	341.92	0.34
Reach-1	1017	100-Year	20000.00	427.04	438.56		439.35	0.006561	7.12	2838.63	375.40	0.41
Reach-1	1013	100-Year	20000.00	426.04	437.05		437.69	0.005441	6.45	3099.78	387.19	0.37
Reach-1	1010	100-Year	20000.00	425.04	436.51		436.82	0.002673	4.70	4592.73	714.02	0.26
Reach-1	1005	100-Year	20000.00	424.04	435.91		436.14	0.001971	4.16	5316.23	880.08	0.23
Reach-1	1000	100-Year	20000.00	423.04	435.30		435.53	0.001907	4.18	5329.39	1157.70	0.23
Reach-1	995	100-Year	20000.00	421.50	434.54		434.83	0.002100	4.45	4772.50	949.35	0.24
Reach-1	992	100-Year	20000.00	420.80	433.99		434.36	0.002591	5.02	4240.64	817.36	0.26
Reach-1	988	100-Year	20000.00	421.00	433.29	427.43	433.77	0.003600	5.74	3807.85	718.35	0.31
Reach-1	985	100-Year	20000.00	419.00	432.26	427.71	432.90	0.005060	6.84	3312.60	2243.60	0.37
Reach-1	983	100-Year	20000.00	418.40	431.94	425.26	432.28	0.002390	4.86	4393.57	2267.80	0.25
Reach-1	980	100-Year	20000.00	418.00	431.42	425.16	431.84	0.002972	5.35	3984.14	2199.31	0.28
Reach-1	978	100-Year	20000.00	418.00	431.04	424.48	431.45	0.002795	5.29	4043.18	2228.92	0.27
Reach-1	975	100-Year	20000.00	417.00	430.64	424.17	431.00	0.002583	4.98	4258.09	2303.30	0.26
Reach-1	973	100-Year	20000.00	416.70	430.24	423.87	430.59	0.002590	4.95	4294.13	2361.87	0.26
Reach-1	970	100-Year	20000.00	415.70	429.69	423.18	430.06	0.002708	5.12	4263.54	2315.13	0.27
Reach-1	965	100-Year	20000.00	415.20	429.28	422.58	429.61	0.002416	4.91	4477.57	2252.77	0.26
Reach-1	960	100-Year	20000.00	414.70	428.88	421.68	429.17	0.001960	4.57	4841.62	2335.43	0.23
Reach-1	950	100-Year	20000.00	414.20	428.38	421.18	428.66	0.001845	4.48	5013.38	2463.93	0.23

HEC-RAS Plan: PC Phase 1 River: RIVER-1 Reach: Reach-1 Profile: 100-Year (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)	
Reach-1	946	100-Year	20000.00	413.60	427.79		428.11	0.002681	4.95	4580.39	811.72	0.27
Reach-1	944	100-Year	20000.00	413.80	427.41		427.82	0.003449	6.01	4198.62	2010.58	0.31
Reach-1	940	100-Year	20000.00	413.90	427.15		427.41	0.002083	4.63	5113.21	1492.87	0.24
Reach-1	935	100-Year	20000.00	413.00	426.54		426.92	0.003177	5.80	4425.96	1397.69	0.29
Reach-1	930	100-Year	20000.00	412.50	426.00	421.47	426.31	0.002404	4.99	4788.01	1213.43	0.26
Reach-1	920	100-Year	20000.00	415.00	424.10		424.59	0.005934	6.22	3772.22	1090.18	0.38
Reach-1	910	100-Year	20000.00	411.90	421.35		421.84	0.005661	6.31	3814.74	1087.02	0.38
Reach-1	900	100-Year	20000.00	408.80	418.89		419.55	0.006822	6.93	3236.08	795.57	0.41
Reach-1	890	100-Year	20000.00	406.60	416.73	413.45	417.37	0.007507	6.39	3131.86	490.61	0.42
Reach-1	880	100-Year	20000.00	401.24	416.38	407.37	416.52	0.000601	2.49	7150.42	815.42	0.12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RS = 1180
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1170
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1165
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
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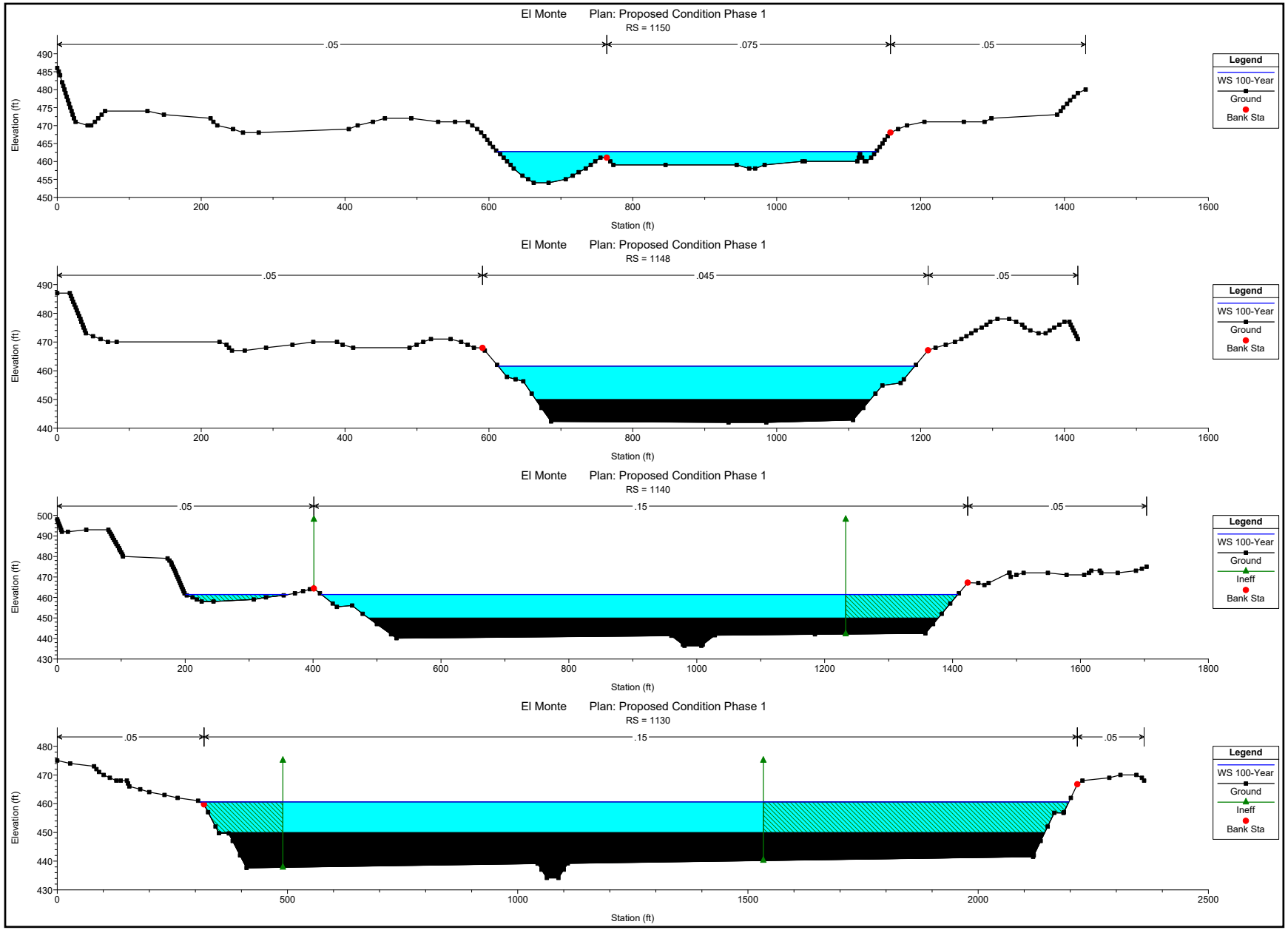
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 1150
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1148
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1140
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
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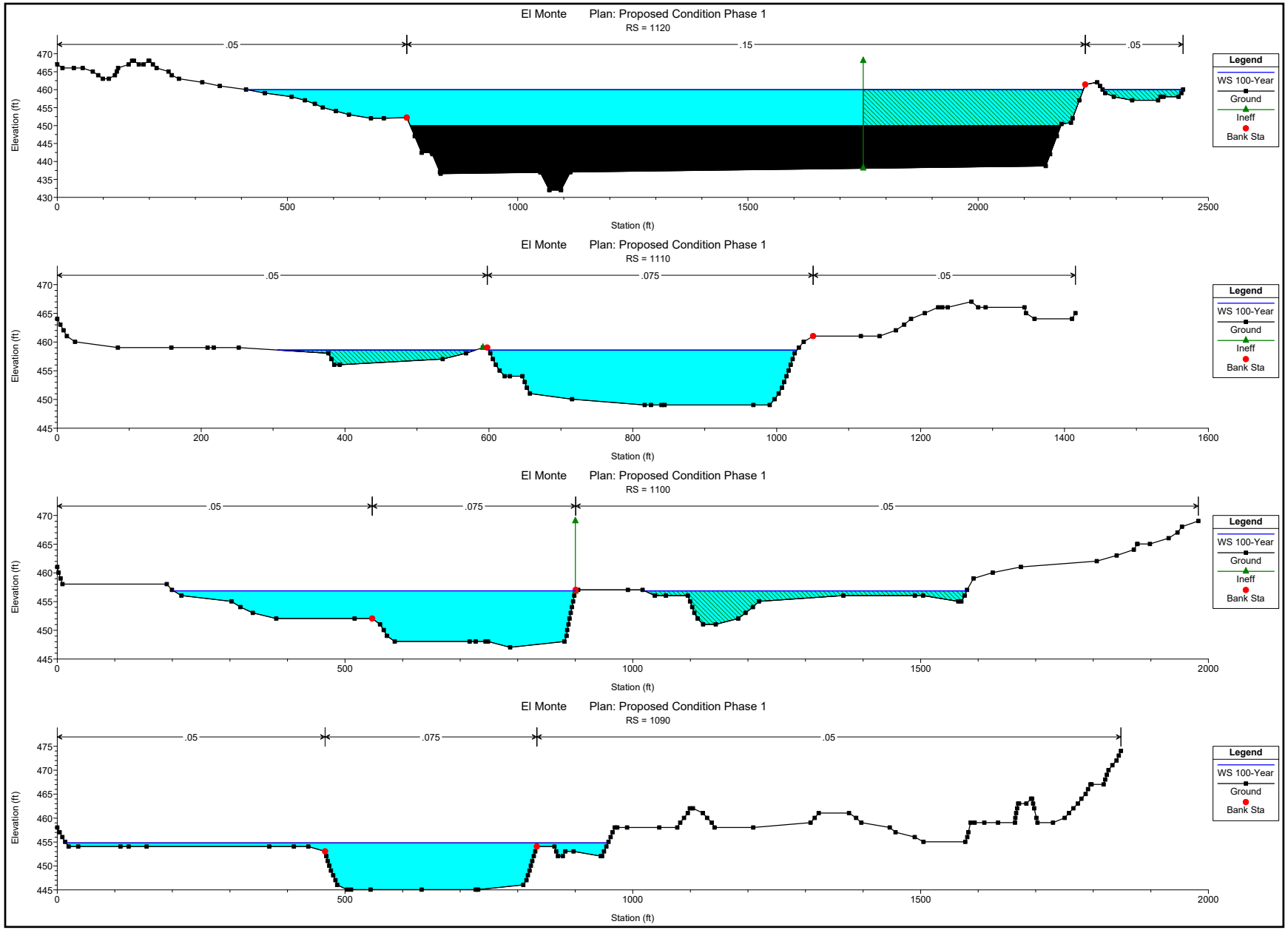
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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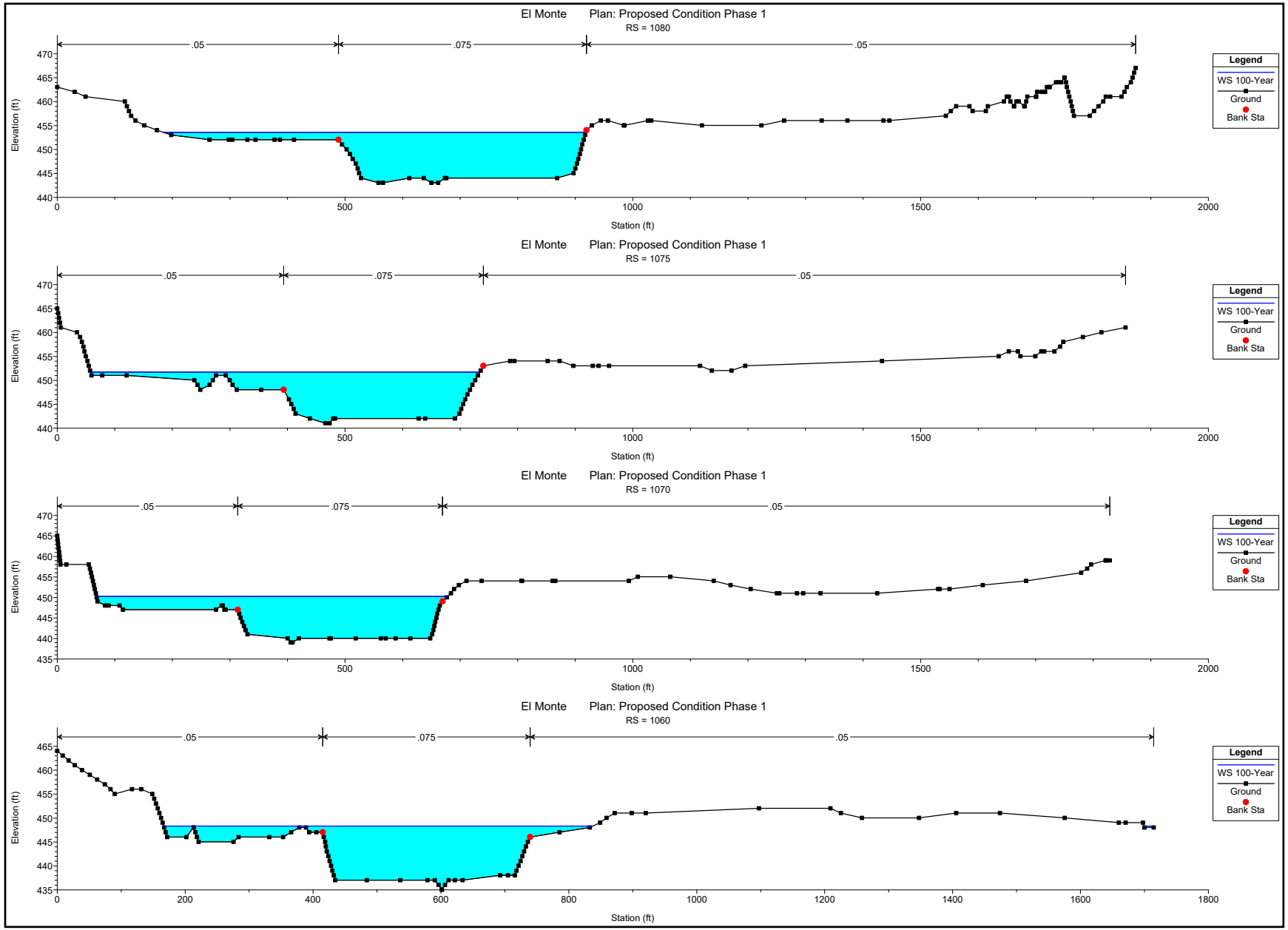
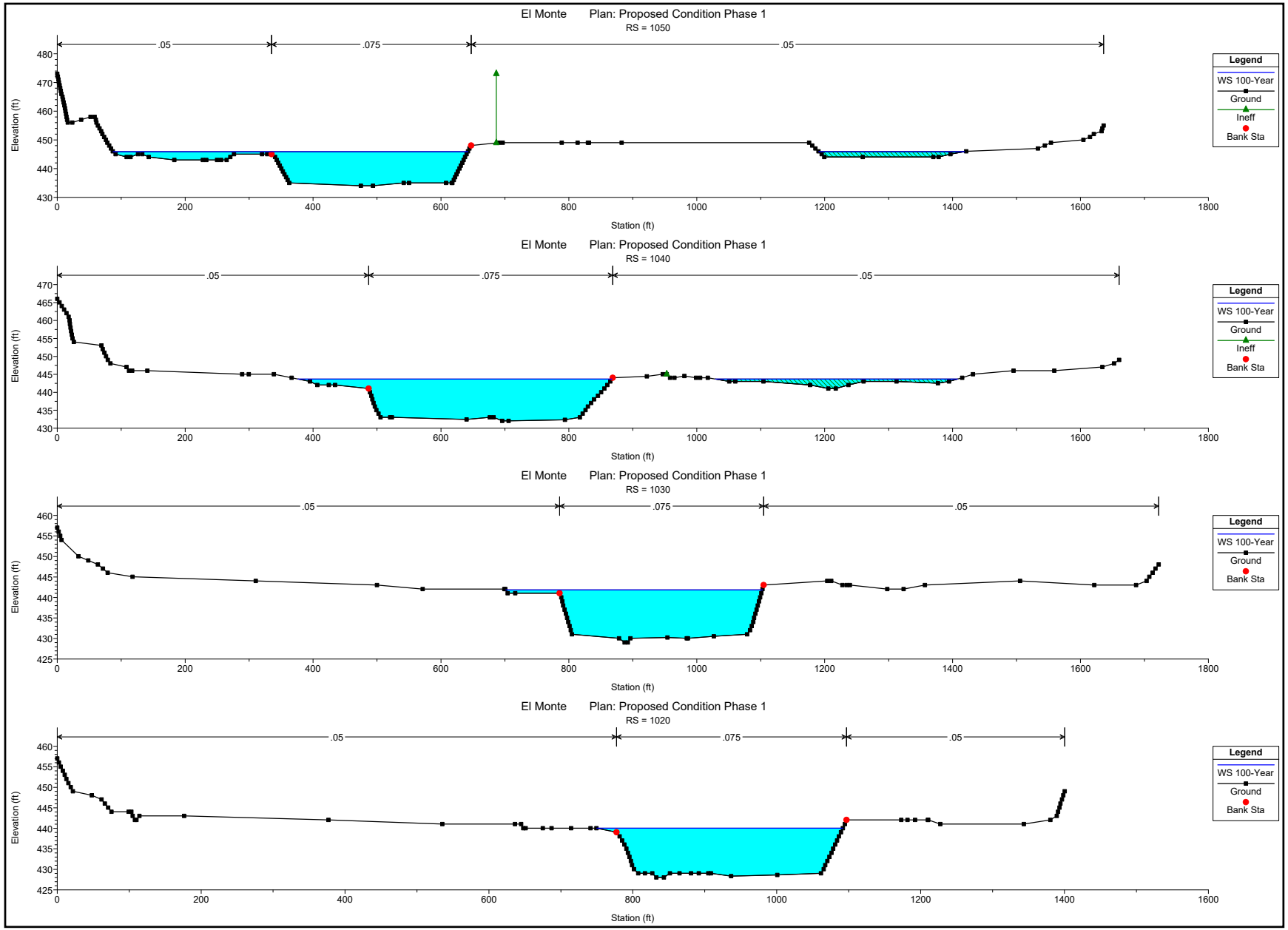
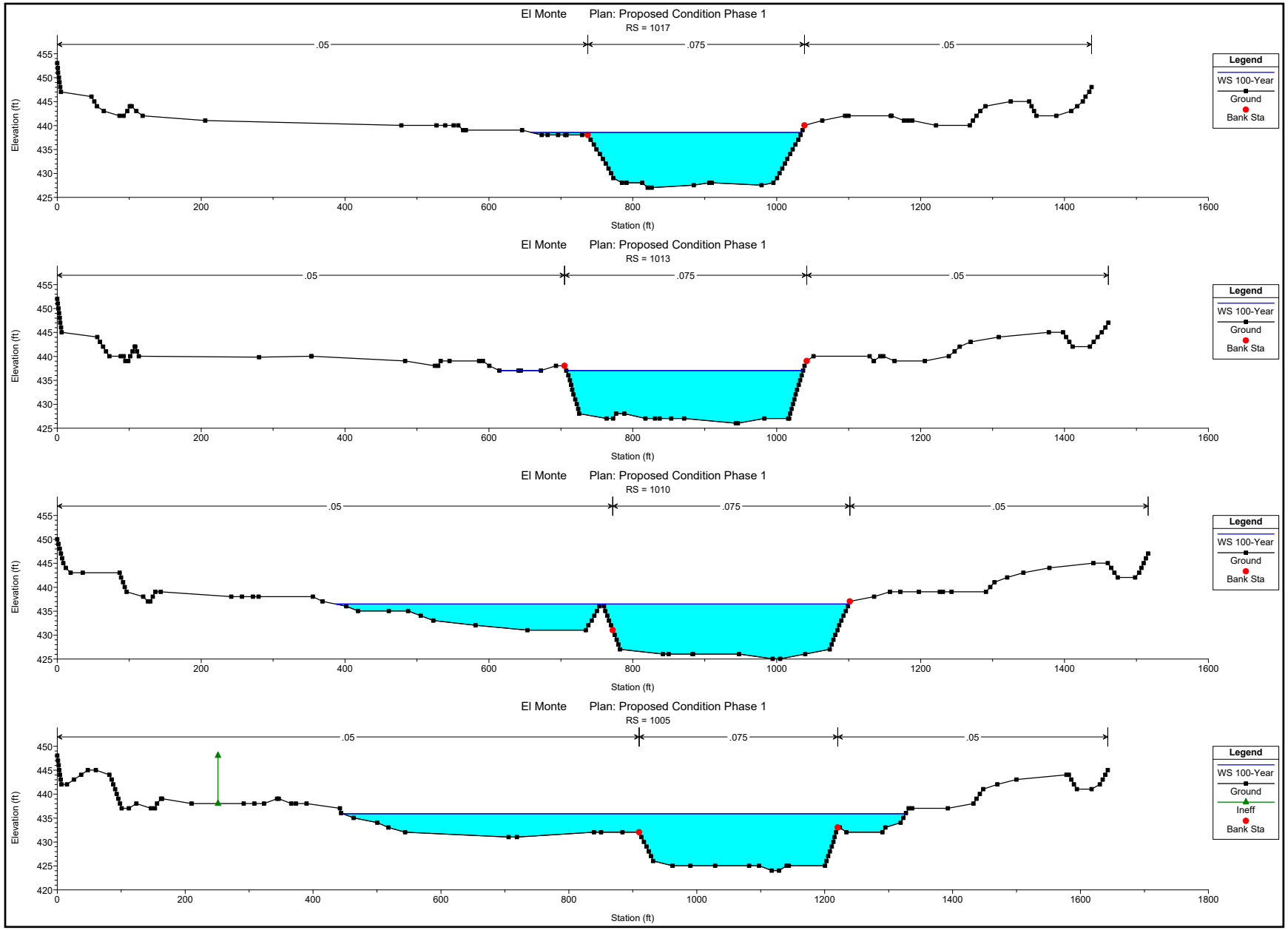
RS = 1120
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1110
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1100
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1090
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 1080
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1075
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1070
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1060
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 1050
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1040
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1030
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1020
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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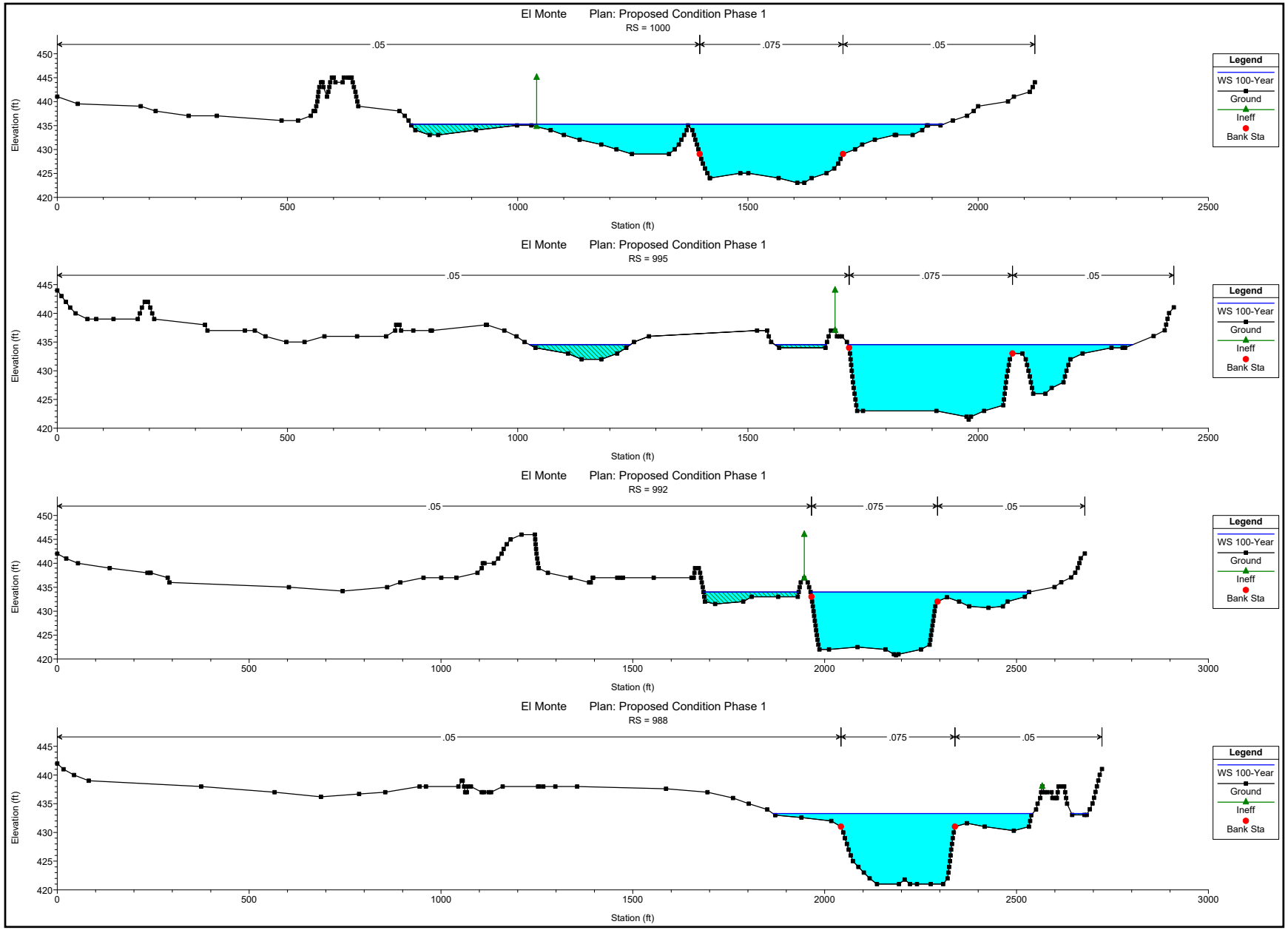
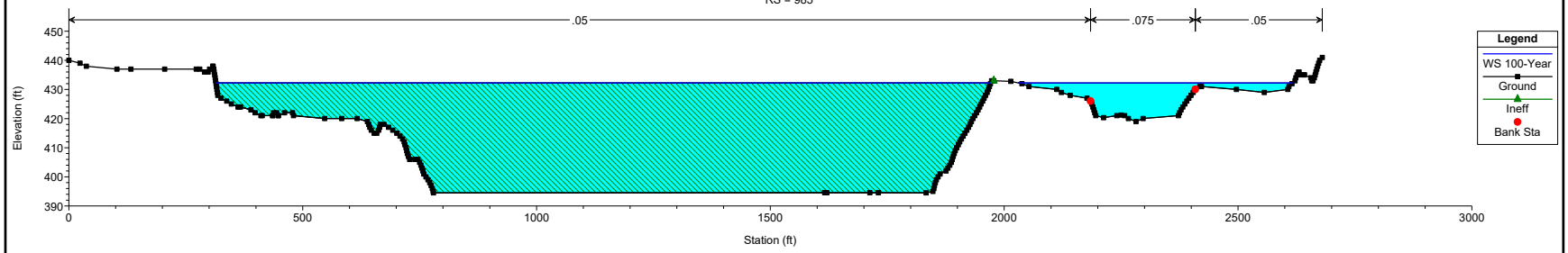
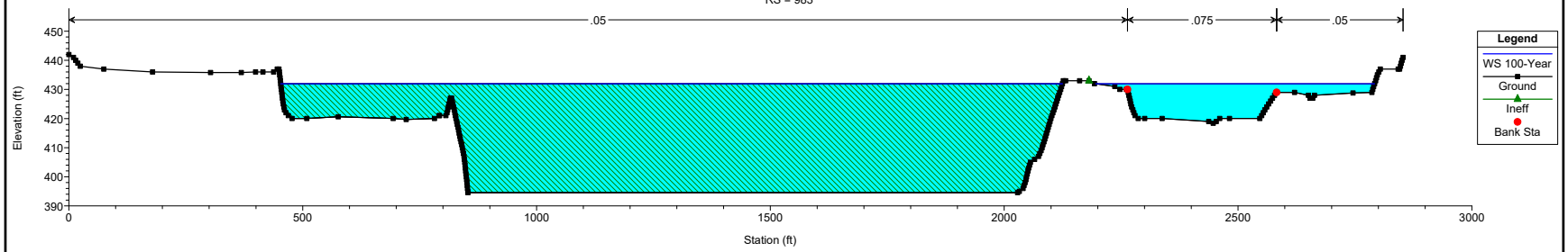
RS = 1017
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1013
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1010
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 1005
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 1000
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 995
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 992
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 988
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta

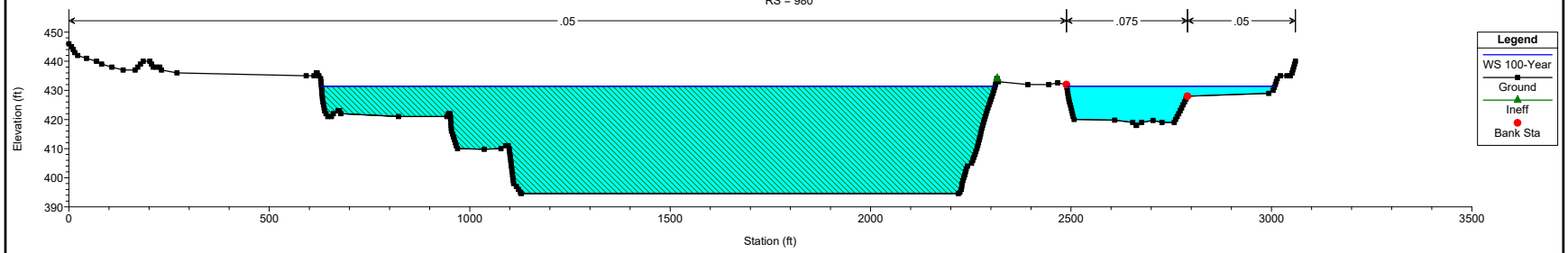
El Monte Plan: Proposed Condition Phase 1
RS = 985



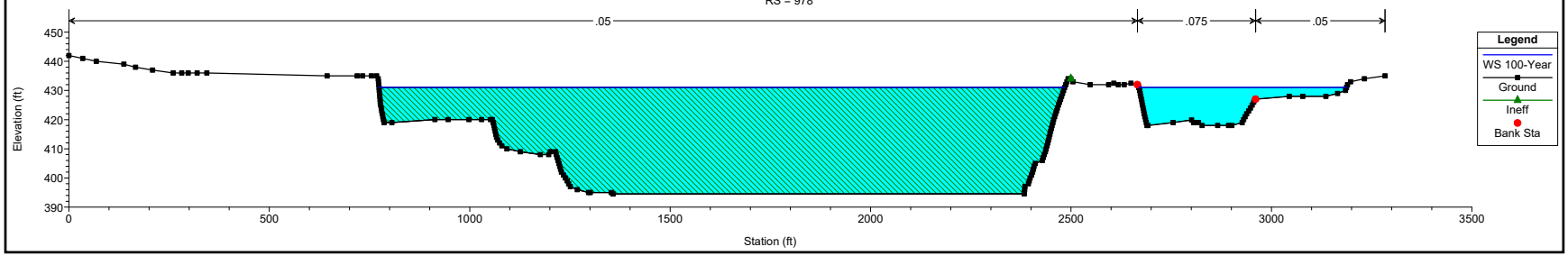
El Monte Plan: Proposed Condition Phase 1
RS = 983

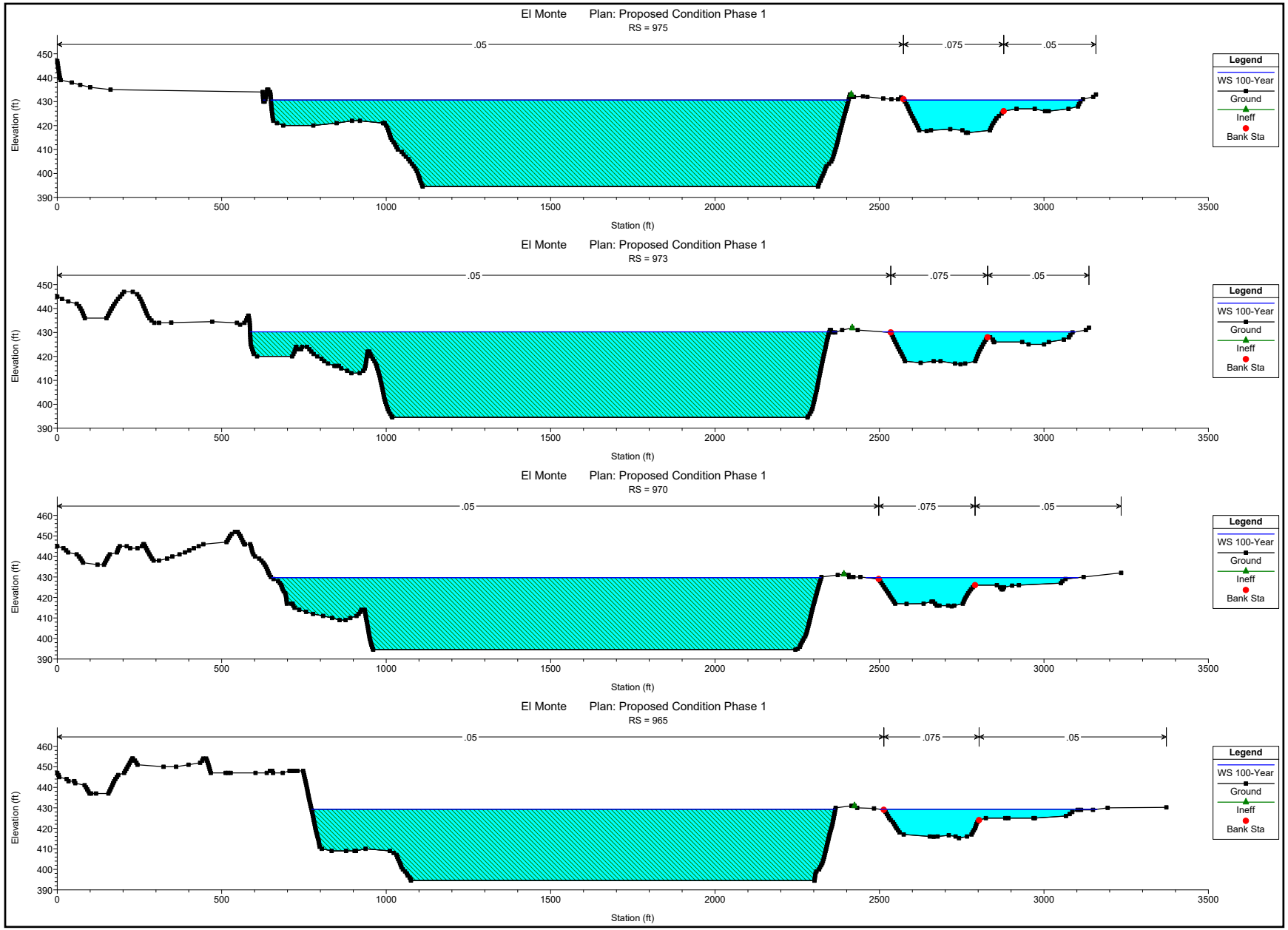


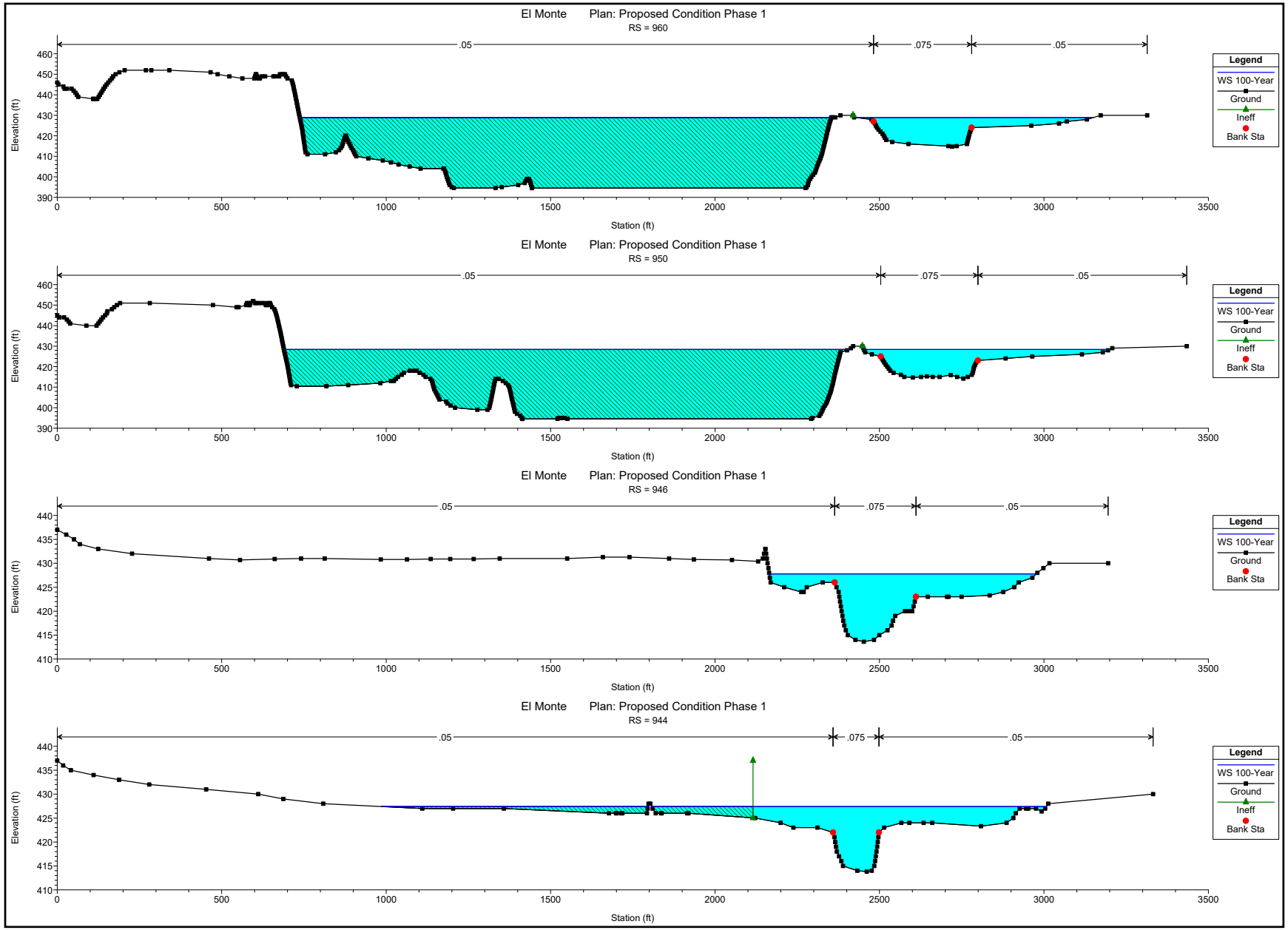
El Monte Plan: Proposed Condition Phase 1
RS = 980

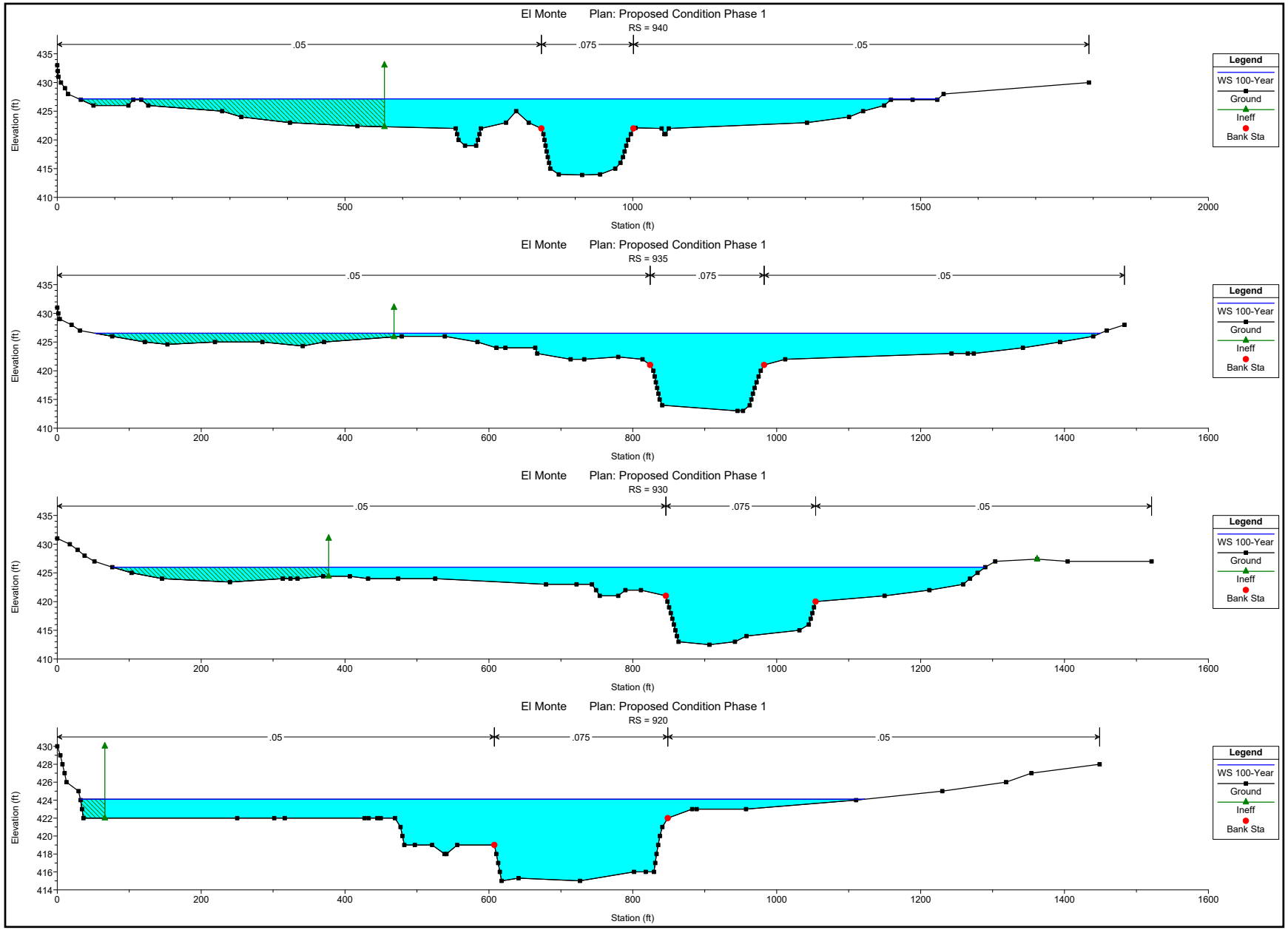


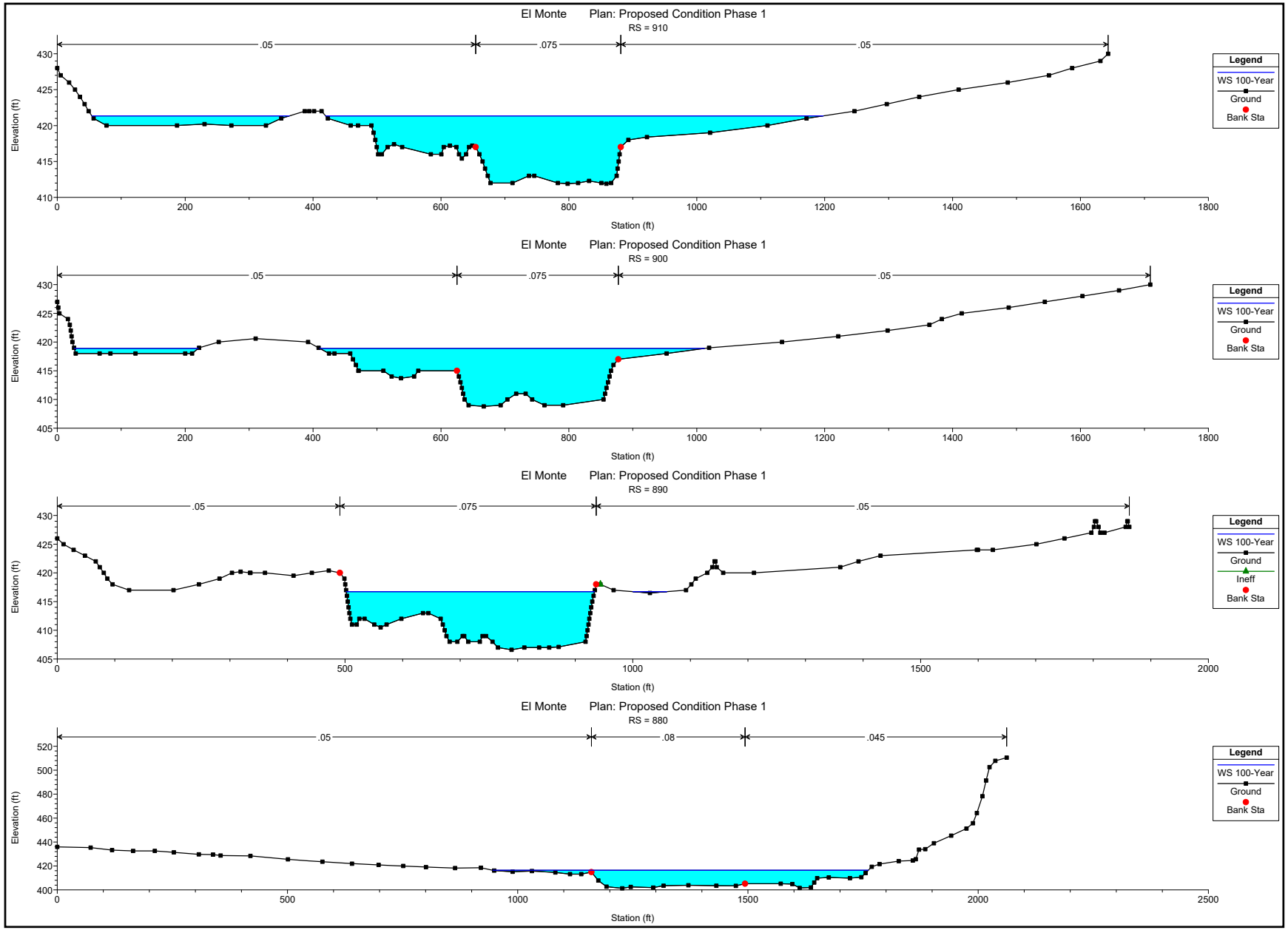
El Monte Plan: Proposed Condition Phase 1
RS = 978




El Monte Plan: Proposed Condition Phase 1
RS = 975
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 973
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 970
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 965
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 960
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 950
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 946
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 944
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 940
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 935
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 930
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 920
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1
RS = 910
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 900
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 890
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1
RS = 880
.05
.08
.045
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

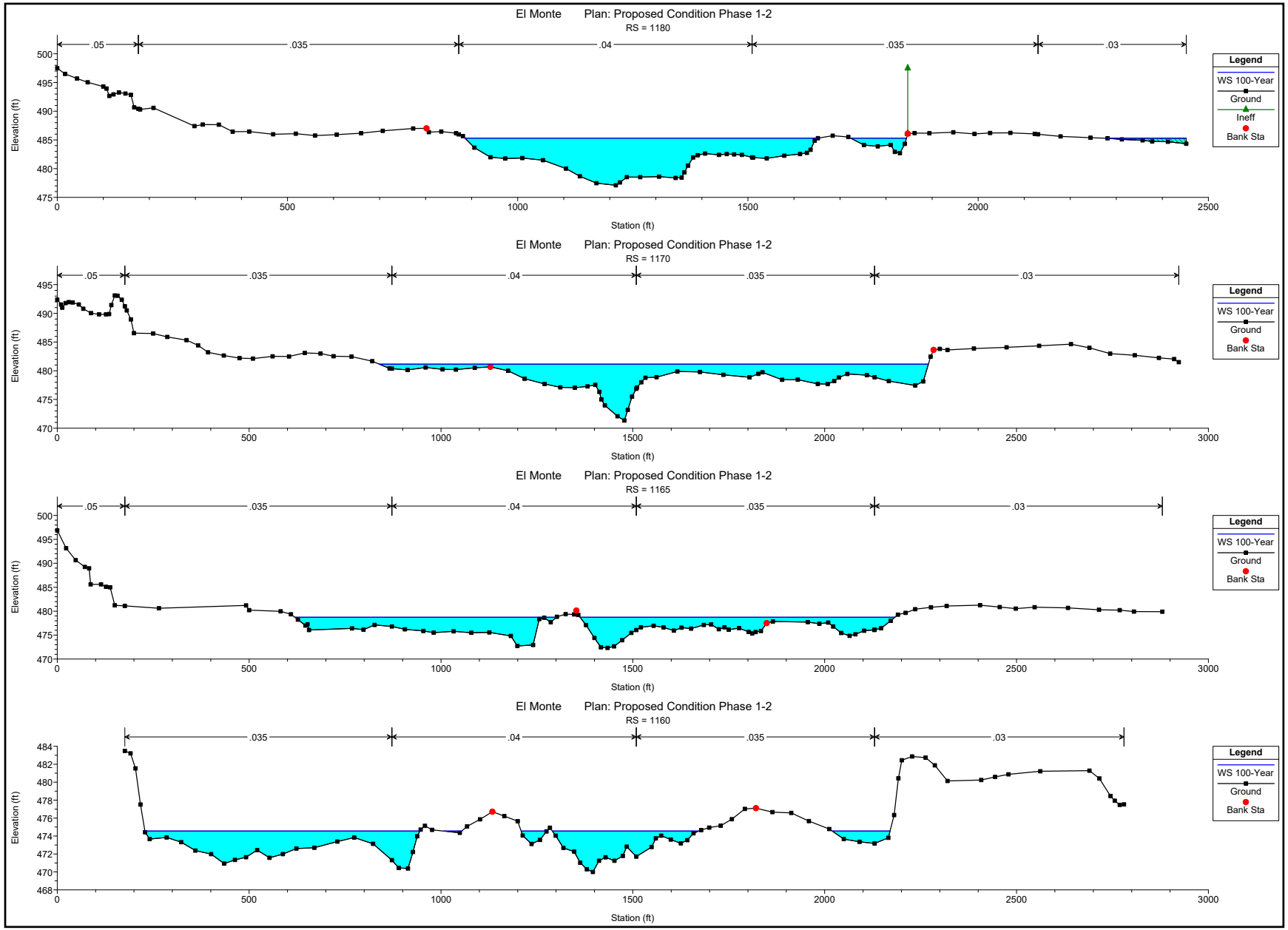
Proposed Conditions Phase 1 and 2

HEC-RAS Plan: PC Phase 1-2 River: RIVER-1 Reach: Reach-1 Profile: 100-Year

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)	
Reach-1	1180	100-Year	19000.00	477.10	485.30		485.74	0.002859	5.35	3552.51	1060.54	0.47
Reach-1	1170	100-Year	19000.00	471.34	481.16		481.63	0.004095	5.54	3565.42	1431.43	0.57
Reach-1	1165	100-Year	19000.00	472.32	478.74	477.70	479.12	0.003948	5.32	3893.79	1502.72	0.55
Reach-1	1160	100-Year	19000.00	469.99	474.55	474.55	475.49	0.014382	7.32	2477.28	1361.69	0.93
Reach-1	1150	100-Year	19000.00	458.04	462.76	462.76	464.57	0.018925	6.09	2126.56	526.64	0.59
Reach-1	1148	100-Year	19000.00	442.04	452.68		452.93	0.000729	4.05	4693.41	481.76	0.23
Reach-1	1140	100-Year	19000.00	436.46	452.48		452.56	0.002009	2.23	8532.31	908.41	0.12
Reach-1	1130	100-Year	19000.00	436.00	451.95		451.98	0.000642	1.39	13644.48	1806.78	0.07
Reach-1	1120	100-Year	19000.00	436.00	451.64		451.67	0.000585	1.38	13741.57	1442.94	0.07
Reach-1	1110	100-Year	19000.00	436.00	451.35	438.49	451.38	0.000541	1.35	14093.19	990.80	0.06
Reach-1	1100	100-Year	20000.00	436.00	451.11		451.14	0.000472	1.27	15792.73	1102.68	0.06
Reach-1	1090	100-Year	20000.00	436.00	450.89		450.91	0.000490	1.26	15812.91	1136.64	0.06
Reach-1	1080	100-Year	20000.00	436.00	450.69		450.72	0.000511	1.30	14875.41	1133.20	0.06
Reach-1	1075	100-Year	20000.00	436.00	450.50	438.70	450.54	0.000457	1.22	14443.10	1315.34	0.06
Reach-1	1070	100-Year	20000.00	436.00	450.21	439.22	450.28	0.001492	2.10	9531.31	1347.59	0.10
Reach-1	1060	100-Year	20000.00	435.04	448.32		448.74	0.003228	5.36	4065.62	685.91	0.29
Reach-1	1050	100-Year	20000.00	434.04	445.92		446.44	0.004035	5.90	3633.25	782.37	0.32
Reach-1	1040	100-Year	20000.00	432.04	443.69	437.55	444.08	0.003018	5.08	4038.52	869.58	0.28
Reach-1	1030	100-Year	20000.00	429.04	441.86		442.39	0.003722	5.83	3480.44	401.20	0.31
Reach-1	1020	100-Year	20000.00	428.04	440.02		440.62	0.004510	6.22	3228.40	341.92	0.34
Reach-1	1017	100-Year	20000.00	427.04	438.56		439.35	0.006561	7.12	2838.63	375.40	0.41
Reach-1	1013	100-Year	20000.00	426.04	437.05		437.69	0.005441	6.45	3099.78	387.19	0.37
Reach-1	1010	100-Year	20000.00	425.04	436.51		436.82	0.002673	4.70	4592.73	714.02	0.26
Reach-1	1005	100-Year	20000.00	424.04	435.91		436.14	0.001971	4.16	5316.23	880.08	0.23
Reach-1	1000	100-Year	20000.00	423.04	435.30		435.53	0.001907	4.18	5329.39	1157.70	0.23
Reach-1	995	100-Year	20000.00	421.50	434.54		434.83	0.002100	4.45	4772.50	949.35	0.24
Reach-1	992	100-Year	20000.00	420.80	433.99		434.36	0.002591	5.02	4240.64	817.36	0.26
Reach-1	988	100-Year	20000.00	421.00	433.29	427.43	433.77	0.003600	5.74	3807.85	718.35	0.31
Reach-1	985	100-Year	20000.00	419.00	432.26	427.71	432.90	0.005060	6.84	3312.60	2243.60	0.37
Reach-1	983	100-Year	20000.00	418.40	431.94	425.26	432.28	0.002390	4.86	4393.57	2267.80	0.25
Reach-1	980	100-Year	20000.00	418.00	431.42	425.16	431.84	0.002972	5.35	3984.14	2199.31	0.28
Reach-1	978	100-Year	20000.00	418.00	431.04	424.48	431.45	0.002795	5.29	4043.18	2228.92	0.27
Reach-1	975	100-Year	20000.00	417.00	430.64	424.17	431.00	0.002583	4.98	4258.09	2303.30	0.26
Reach-1	973	100-Year	20000.00	416.70	430.24	423.87	430.59	0.002590	4.95	4294.13	2361.87	0.26
Reach-1	970	100-Year	20000.00	415.70	429.69	423.18	430.06	0.002708	5.12	4263.54	2315.13	0.27
Reach-1	965	100-Year	20000.00	415.20	429.28	422.58	429.61	0.002416	4.91	4477.57	2252.77	0.26
Reach-1	960	100-Year	20000.00	414.70	428.88	421.68	429.17	0.001960	4.57	4841.62	2335.43	0.23
Reach-1	950	100-Year	20000.00	414.20	428.38	421.18	428.66	0.001845	4.48	5013.38	2463.93	0.23

HEC-RAS Plan: PC Phase 1-2 River: RIVER-1 Reach: Reach-1 Profile: 100-Year (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)	
Reach-1	946	100-Year	20000.00	413.60	427.79		428.11	0.002681	4.95	4580.39	811.72	0.27
Reach-1	944	100-Year	20000.00	413.80	427.41		427.82	0.003449	6.01	4198.62	2010.58	0.31
Reach-1	940	100-Year	20000.00	413.90	427.15		427.41	0.002083	4.63	5113.21	1492.87	0.24
Reach-1	935	100-Year	20000.00	413.00	426.54		426.92	0.003177	5.80	4425.96	1397.69	0.29
Reach-1	930	100-Year	20000.00	412.50	426.00	421.47	426.31	0.002404	4.99	4788.01	1213.43	0.26
Reach-1	920	100-Year	20000.00	415.00	424.10		424.59	0.005934	6.22	3772.22	1090.18	0.38
Reach-1	910	100-Year	20000.00	411.90	421.35		421.84	0.005661	6.31	3814.74	1087.02	0.38
Reach-1	900	100-Year	20000.00	408.80	418.89		419.55	0.006822	6.93	3236.08	795.57	0.41
Reach-1	890	100-Year	20000.00	406.60	416.73	413.45	417.37	0.007507	6.39	3131.86	490.61	0.42
Reach-1	880	100-Year	20000.00	401.24	416.38	407.37	416.52	0.000601	2.49	7150.42	815.42	0.12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RS = 1180
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1170
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1165
.05
.035
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
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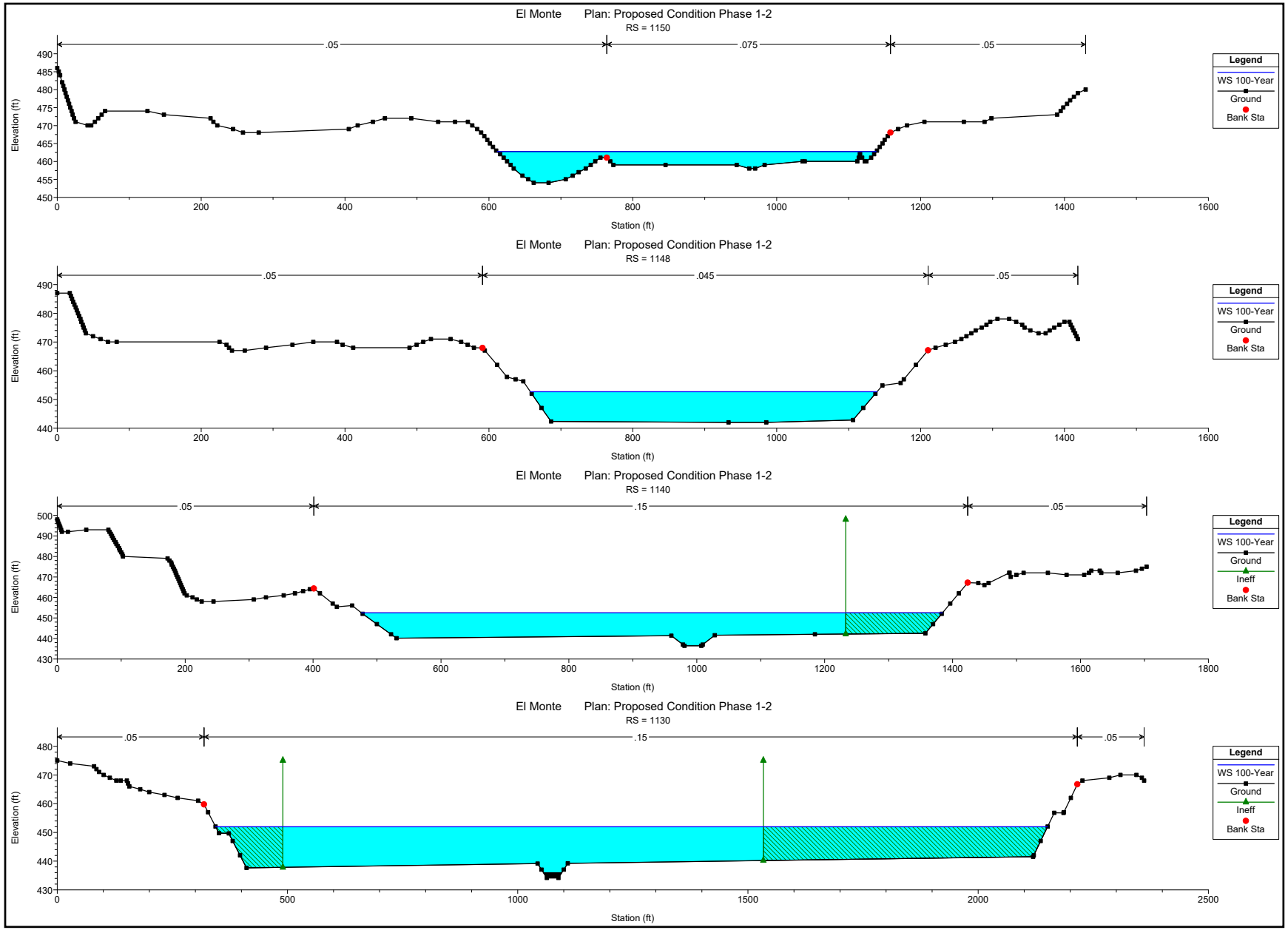
.04
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition Phase 1-2
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1148
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.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1140
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1130
.05
.15
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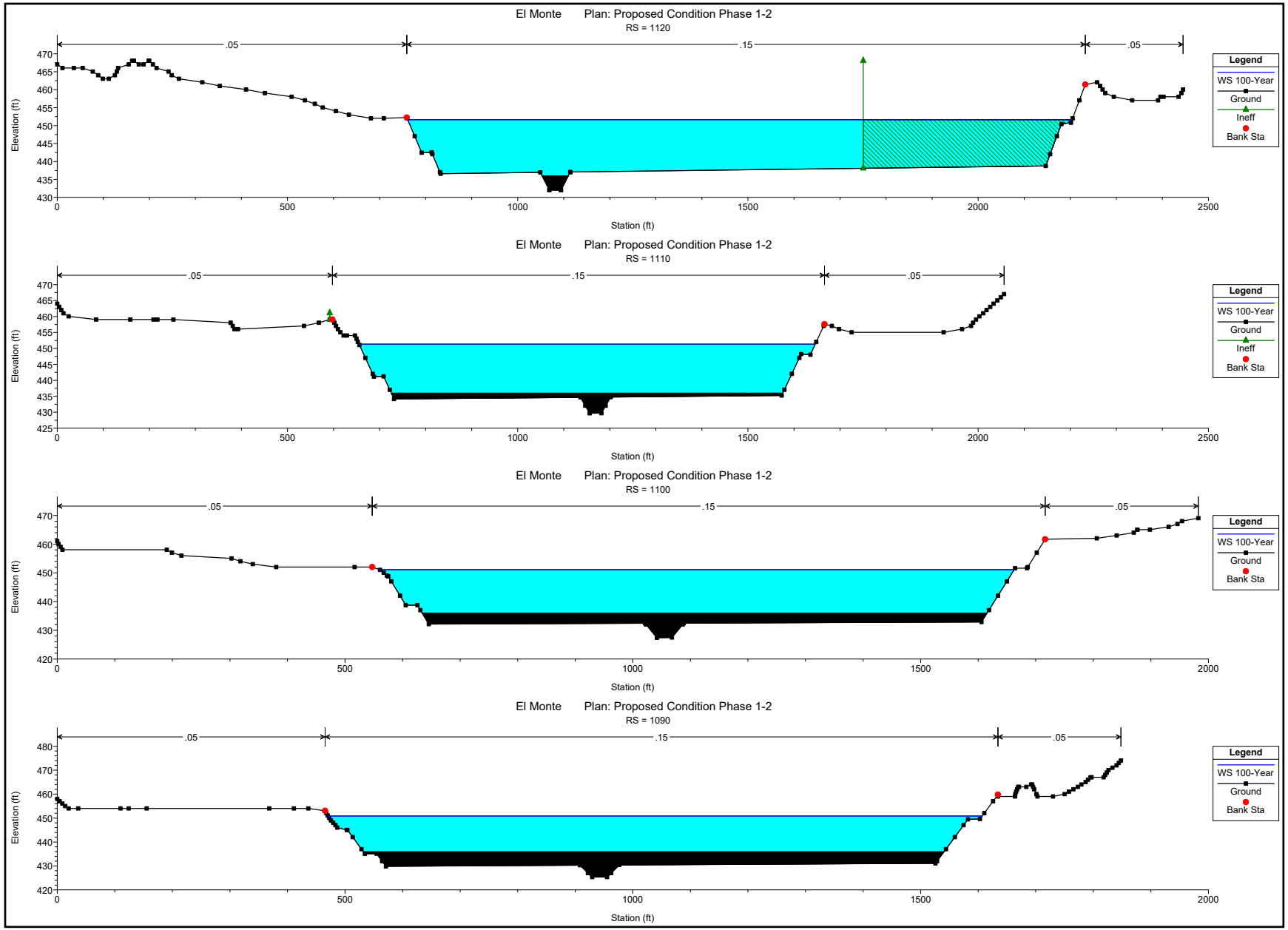
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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.15
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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1110
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1100
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1090
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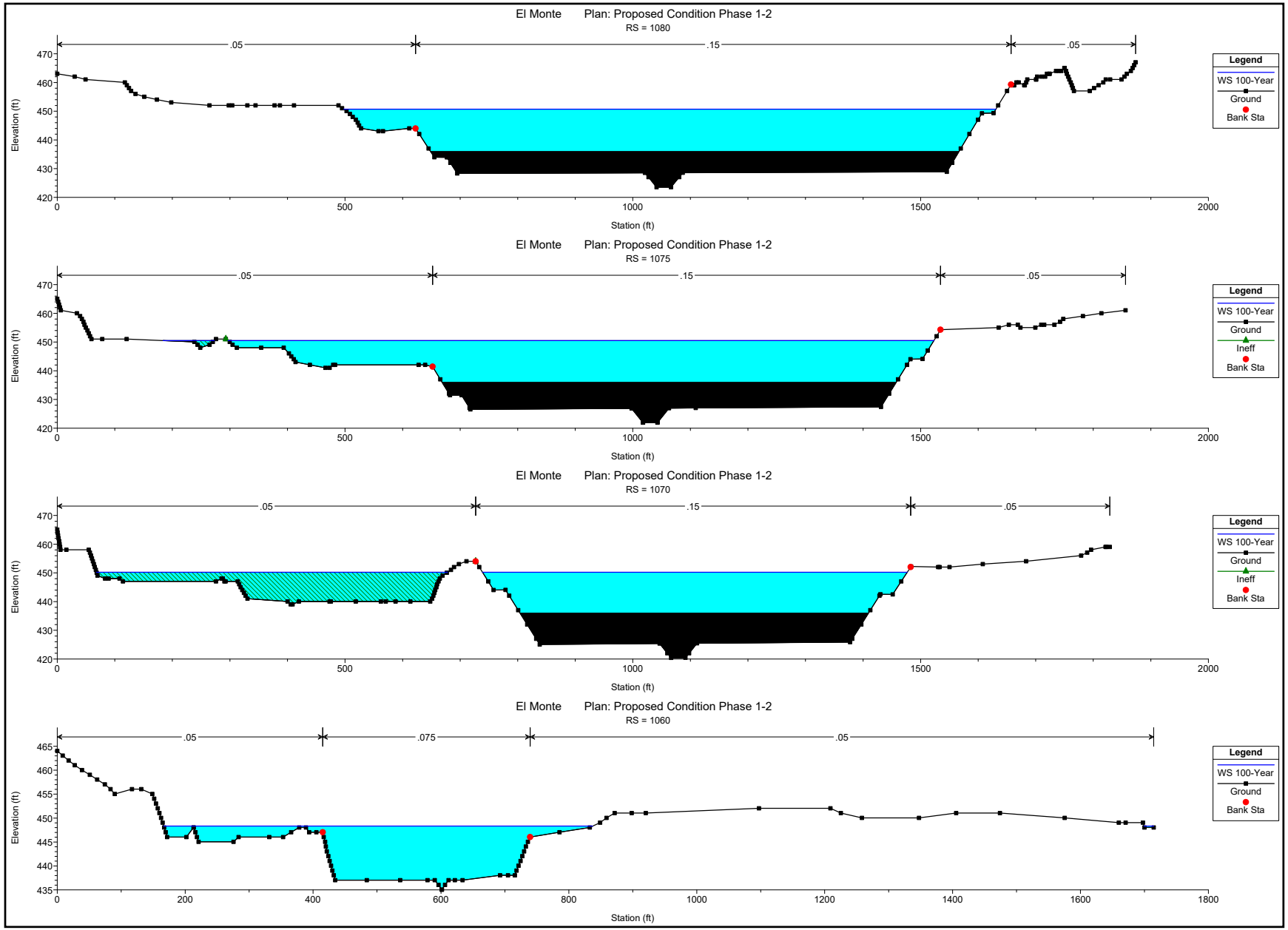
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition Phase 1-2
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.15
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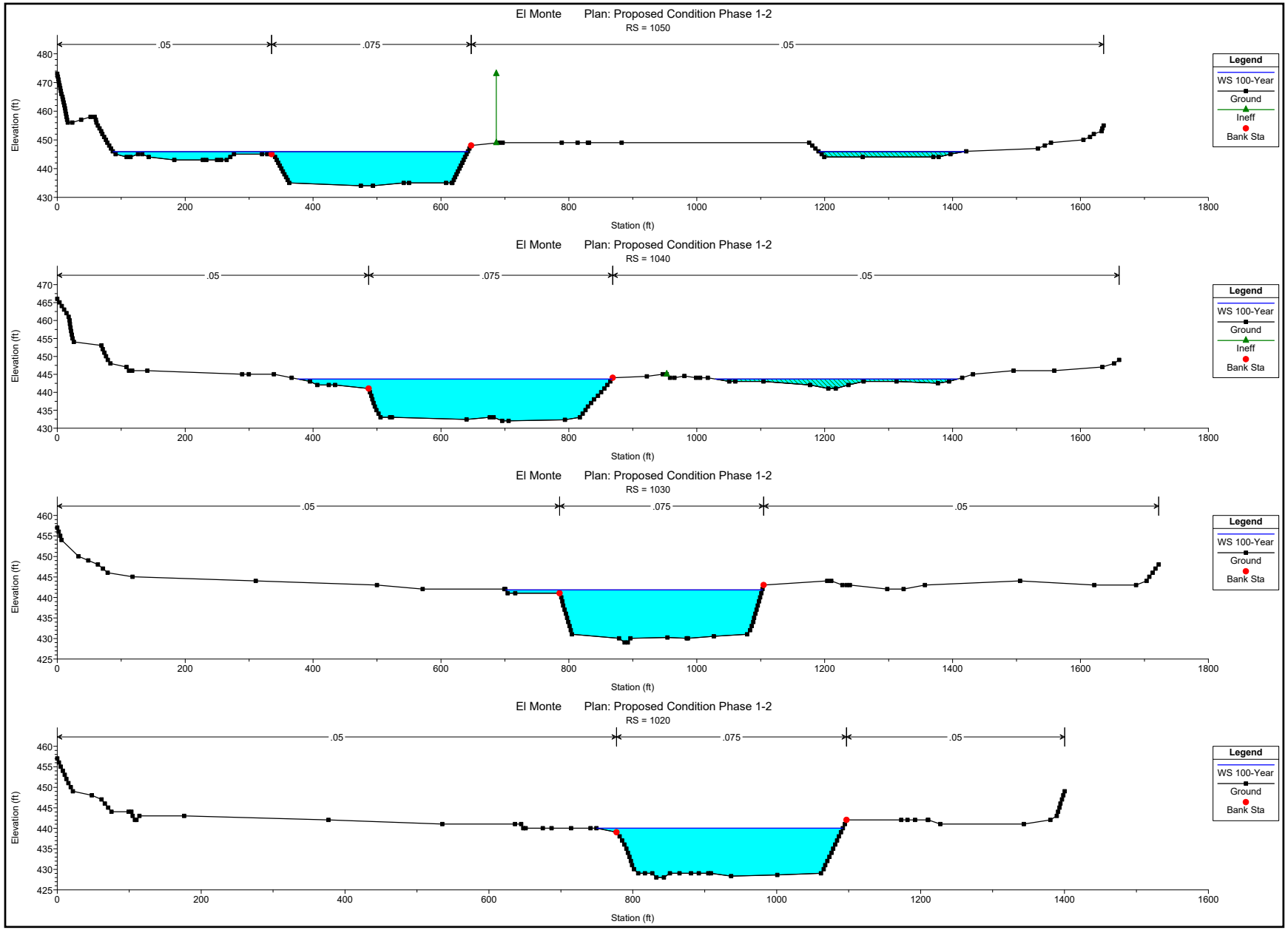
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1075
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1070
.05
.15
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1060
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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.075
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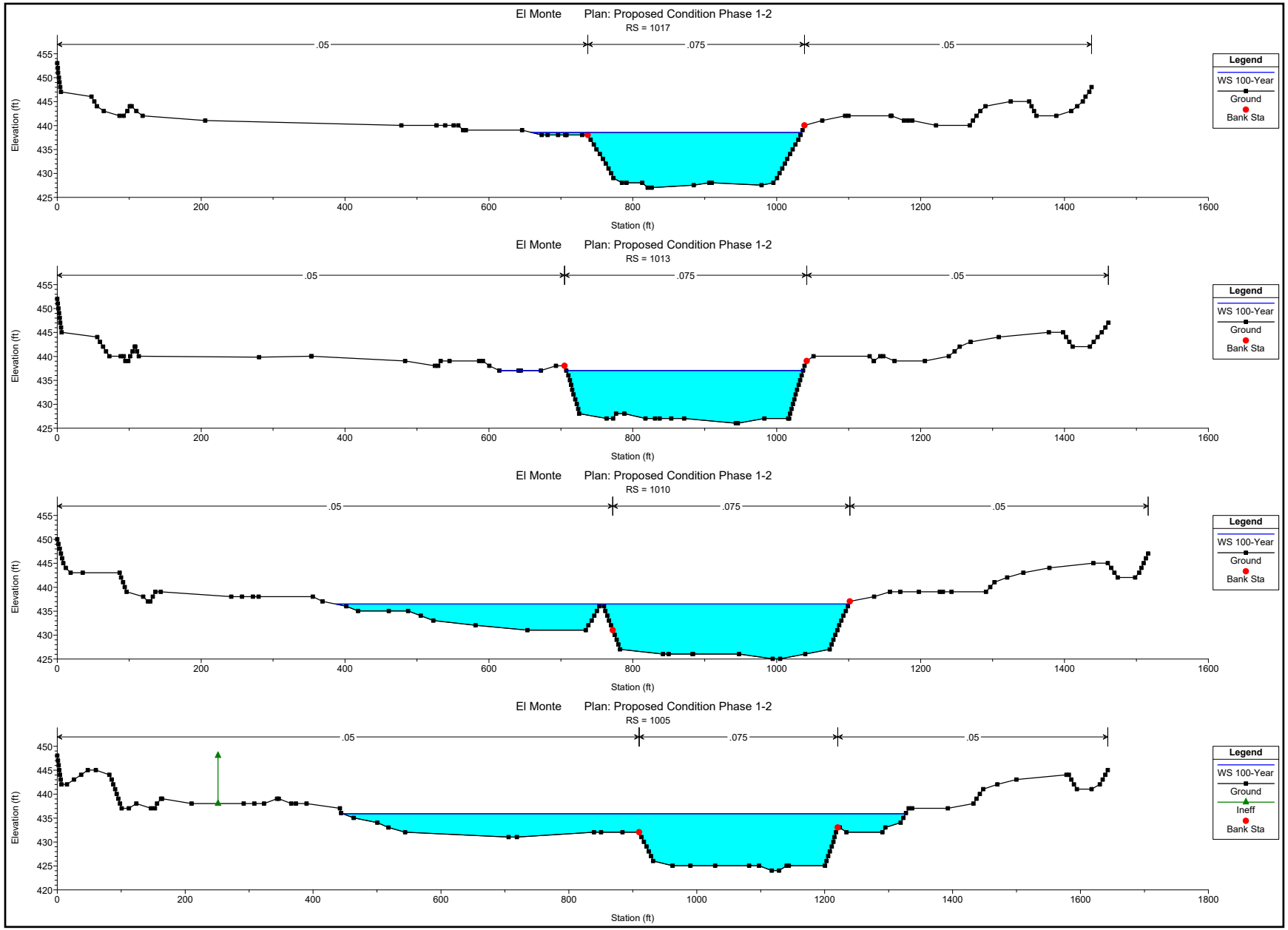
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1040
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1030
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1020
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


El Monte Plan: Proposed Condition Phase 1-2
RS = 1017
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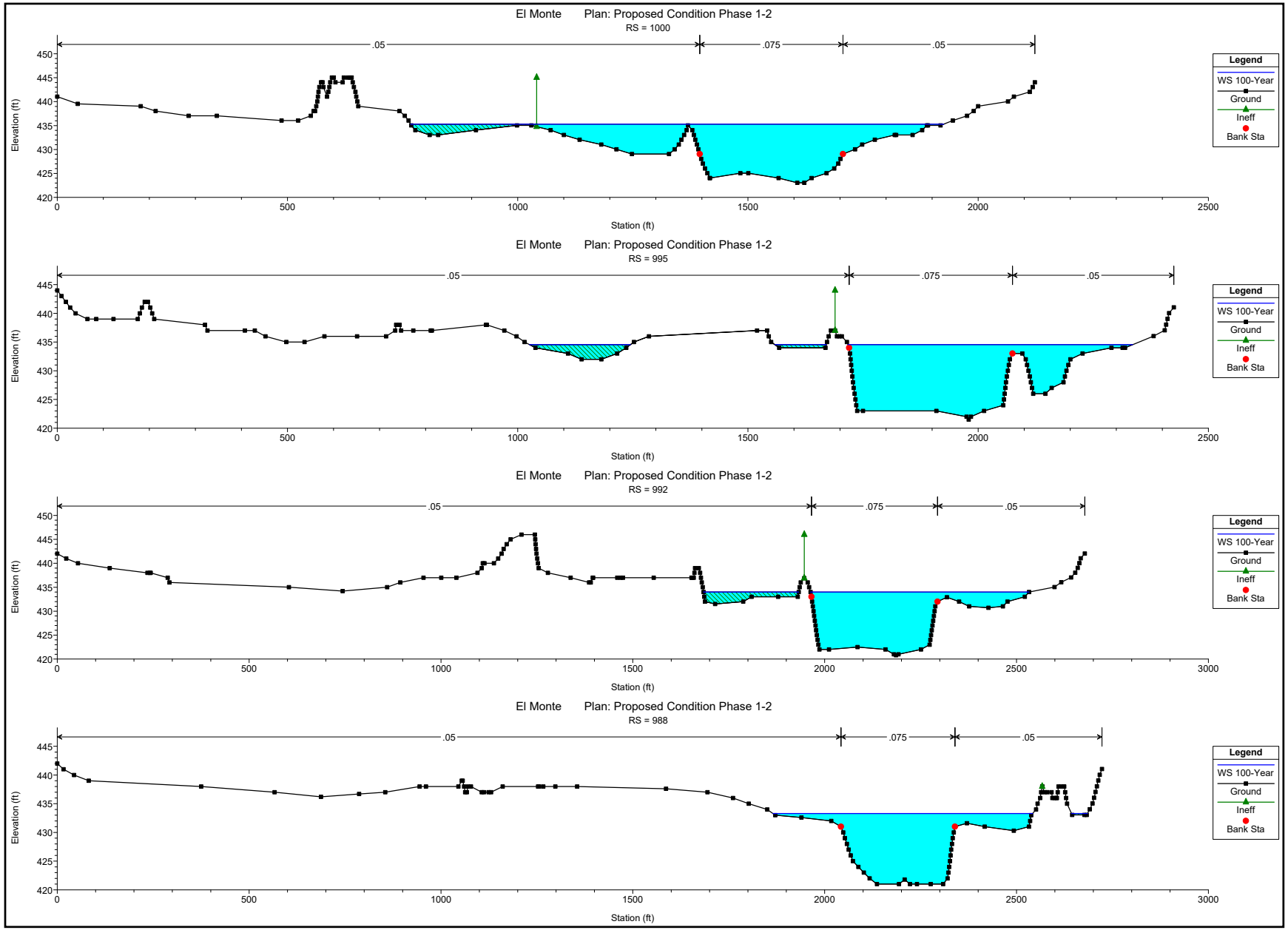
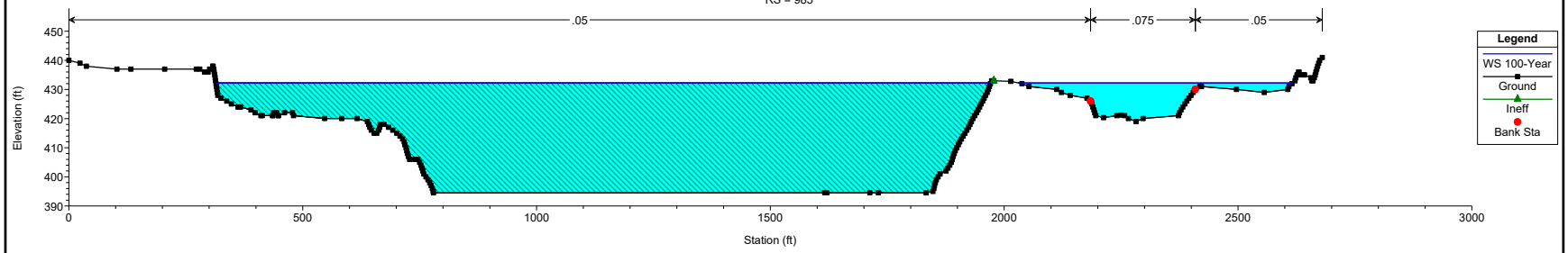
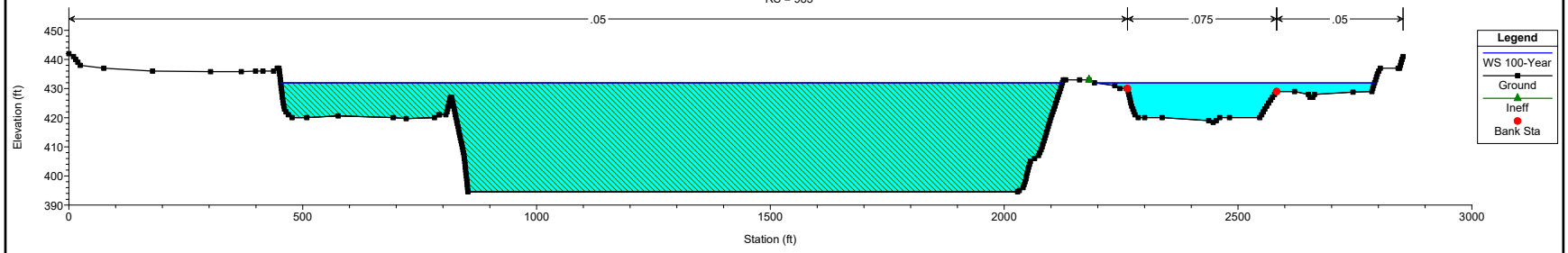
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1013
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1010
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 1005
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1-2
RS = 1000
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 995
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 992
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 988
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta

El Monte Plan: Proposed Condition Phase 1-2
RS = 985



El Monte Plan: Proposed Condition Phase 1-2
RS = 983



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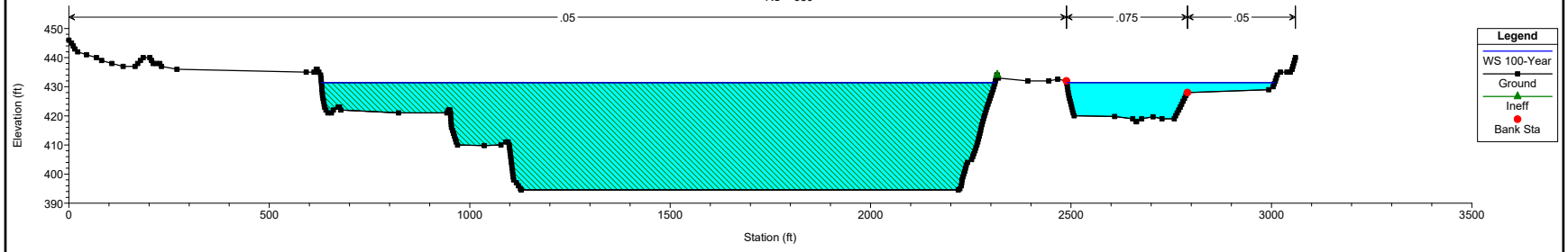
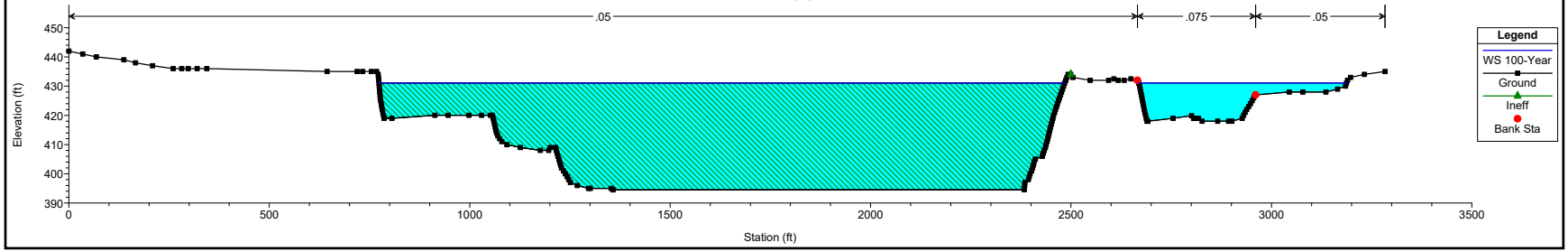
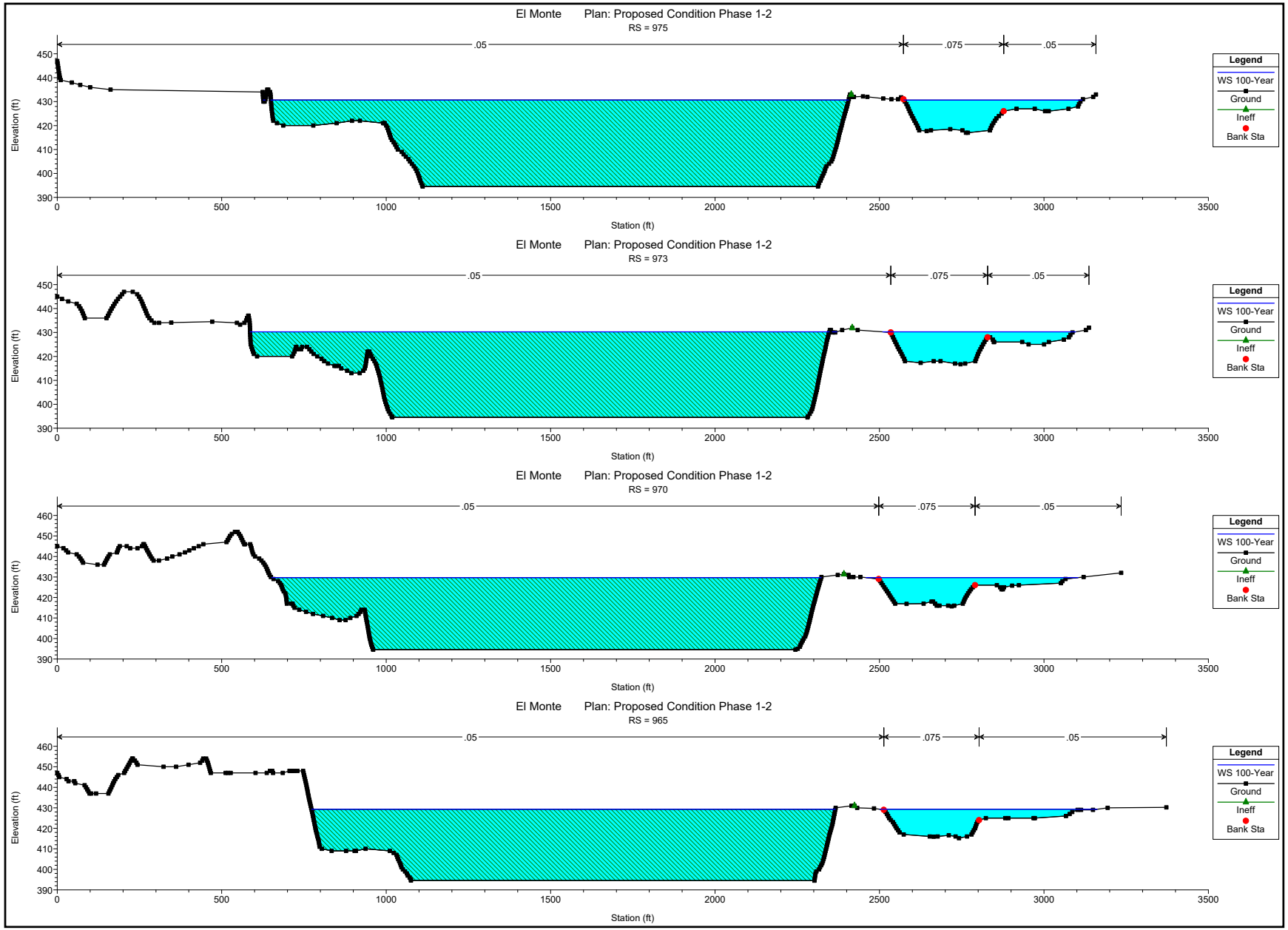
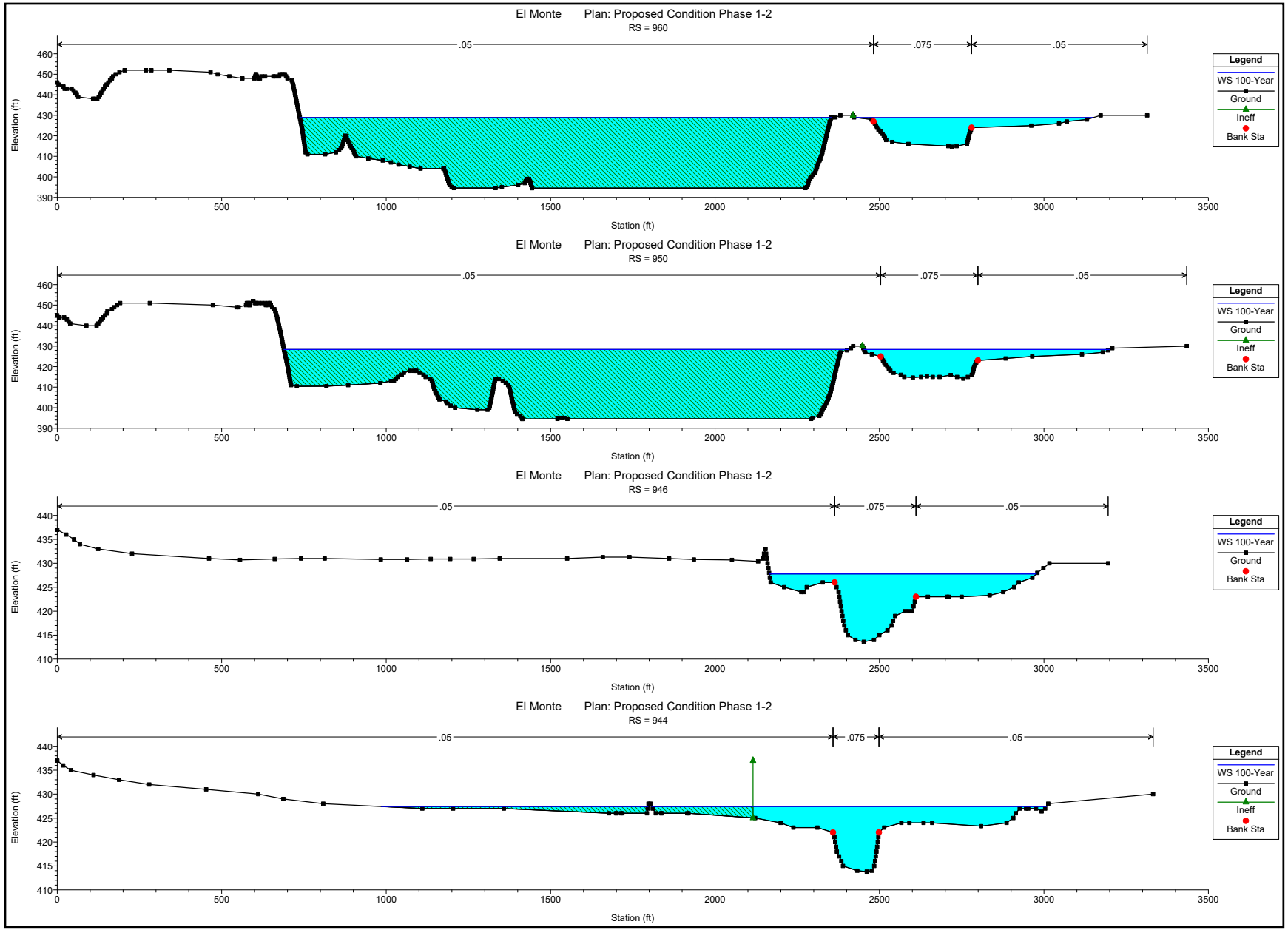


El Monte Plan: Proposed Condition Phase 1-2
RS = 978




El Monte Plan: Proposed Condition Phase 1-2
RS = 975
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 973
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 970
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 965
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1-2
RS = 960
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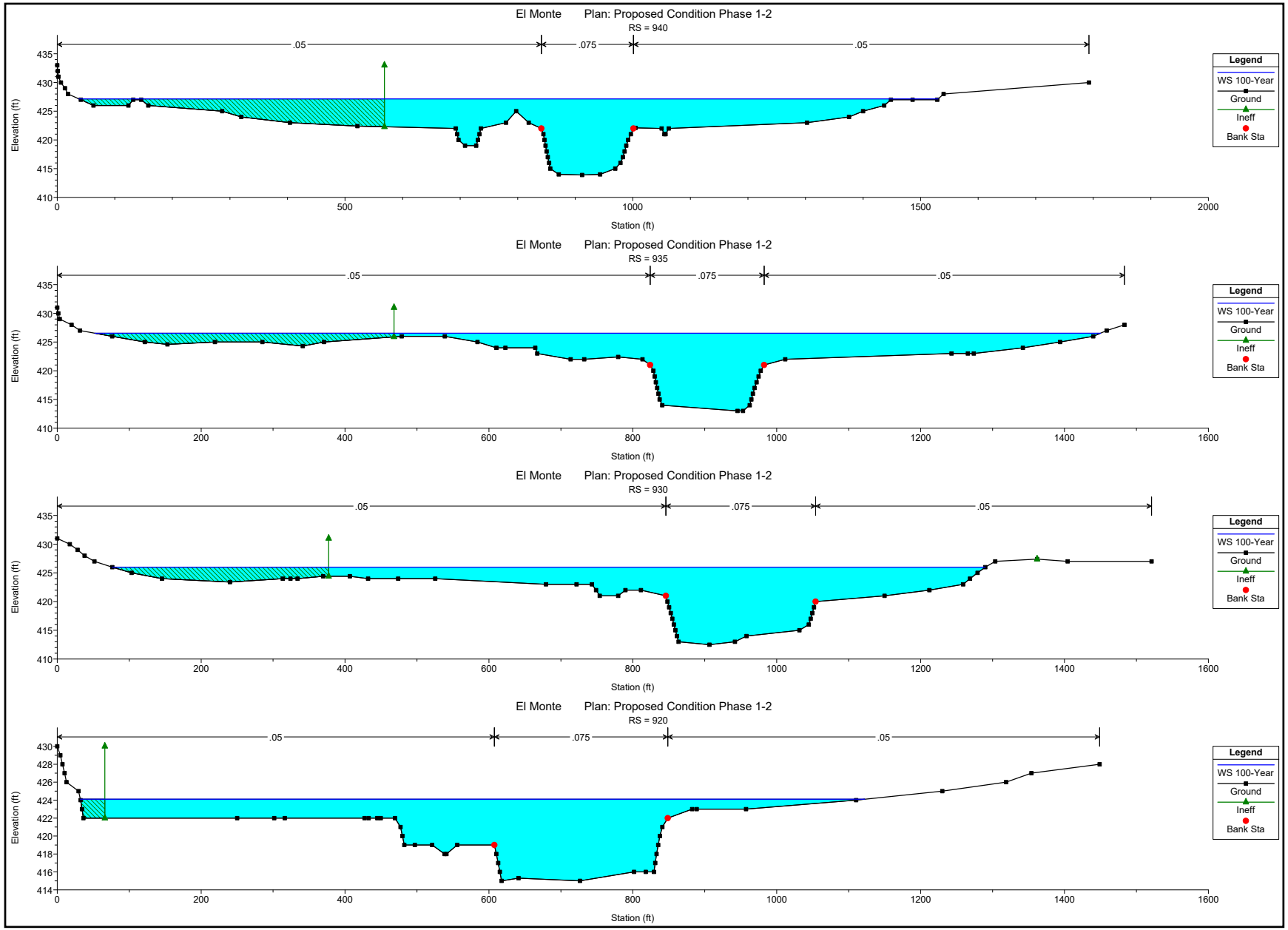
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 950
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 946
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 944
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 935
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 930
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
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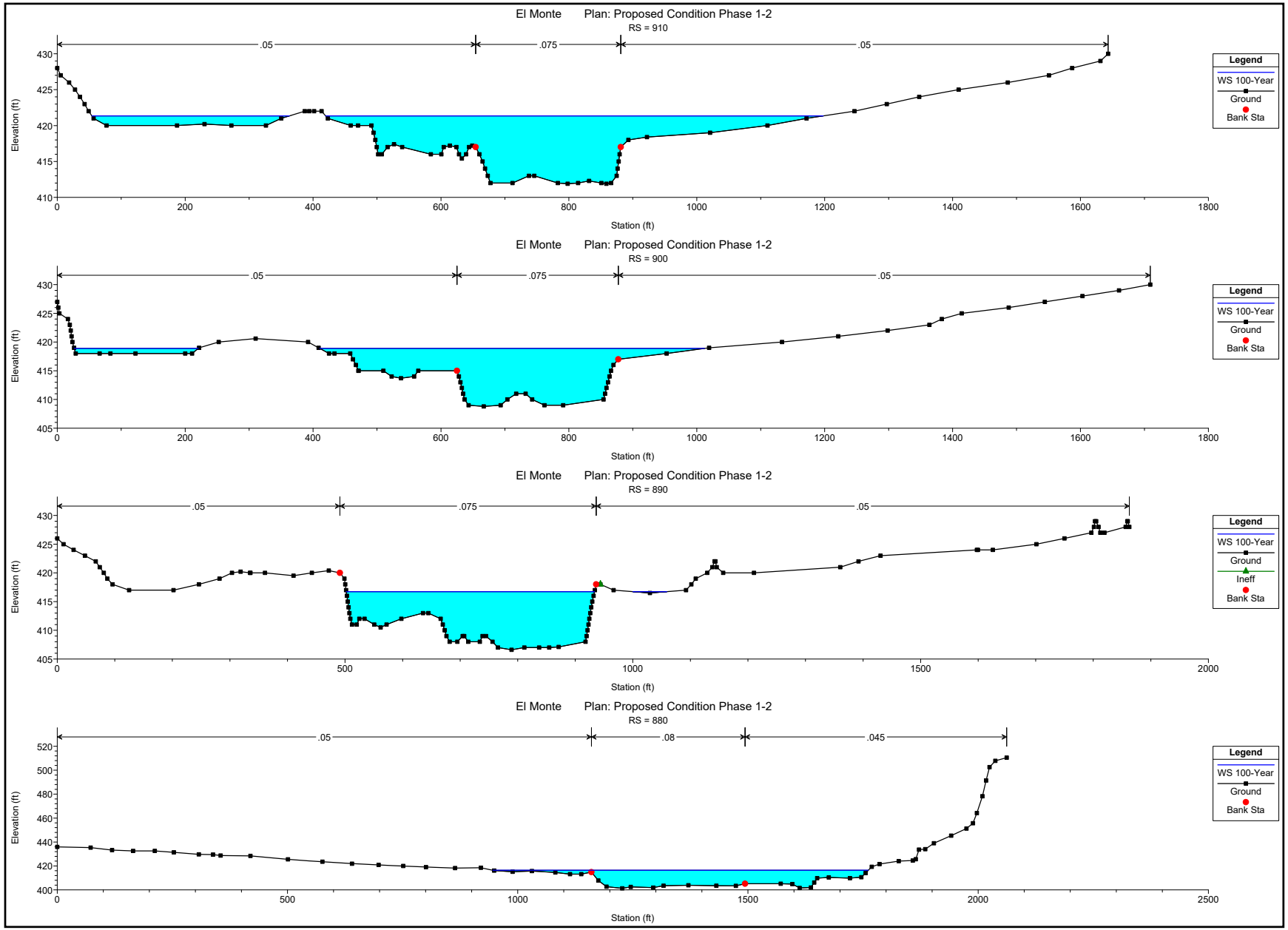
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


El Monte Plan: Proposed Condition Phase 1-2
RS = 910
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 900
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 890
.05
.075
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
El Monte Plan: Proposed Condition Phase 1-2
RS = 880
.05
.08
.045
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

Proposed Conditions Phase 1 through 3

HEC-RAS Plan: PC Phase 1-3 River: RIVER-1 Reach: Reach-1 Profile: 100-Year

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)	
Reach-1	1180	100-Year	19000.00	477.10	485.30		485.74	0.002859	5.35	3552.51	1060.54	0.47
Reach-1	1170	100-Year	19000.00	471.34	481.16		481.63	0.004095	5.54	3565.42	1431.43	0.57
Reach-1	1165	100-Year	19000.00	472.32	478.74	477.70	479.12	0.003948	5.32	3893.79	1502.72	0.55
Reach-1	1160	100-Year	19000.00	469.99	474.55	474.55	475.49	0.014382	7.32	2477.28	1361.69	0.93
Reach-1	1150	100-Year	19000.00	458.04	462.76	462.76	464.57	0.018925	6.09	2126.56	526.64	0.59
Reach-1	1148	100-Year	19000.00	442.04	450.48		450.90	0.001623	5.21	3647.76	468.27	0.33
Reach-1	1140	100-Year	19000.00	436.46	449.97		450.10	0.004538	2.86	6642.20	890.66	0.17
Reach-1	1130	100-Year	19000.00	434.16	448.62		448.67	0.001681	1.86	10224.04	1764.67	0.10
Reach-1	1120	100-Year	19000.00	432.01	447.78		447.84	0.001600	1.88	10112.71	1399.37	0.10
Reach-1	1110	100-Year	19000.00	429.69	447.13	436.92	447.18	0.001048	1.68	11330.98	942.96	0.09
Reach-1	1100	100-Year	20000.00	429.00	446.78		446.81	0.000583	1.37	14645.34	1067.95	0.07
Reach-1	1090	100-Year	20000.00	429.00	446.56		446.58	0.000402	1.21	16494.08	1088.56	0.05
Reach-1	1080	100-Year	20000.00	429.00	446.41		446.43	0.000369	1.23	16333.24	1077.12	0.05
Reach-1	1075	100-Year	20000.00	429.00	446.25		446.28	0.000451	1.33	14781.81	1108.43	0.06
Reach-1	1070	100-Year	20000.00	429.00	446.00	432.38	446.06	0.001008	1.89	10569.59	1054.74	0.09
Reach-1	1060	100-Year	20000.00	429.00	445.21		445.27	0.001214	2.01	9968.05	1081.48	0.09
Reach-1	1050	100-Year	20000.00	429.00	444.35	432.31	444.41	0.001263	2.02	9896.84	1161.44	0.10
Reach-1	1040	100-Year	20000.00	429.00	443.00	433.15	443.14	0.003220	2.99	6696.06	1011.19	0.15
Reach-1	1030	100-Year	20000.00	429.00	441.93		442.00	0.001714	2.19	9117.27	1351.25	0.11
Reach-1	1020	100-Year	20000.00	428.04	440.02		440.62	0.004510	6.22	3228.40	341.92	0.34
Reach-1	1017	100-Year	20000.00	427.04	438.56		439.35	0.006561	7.12	2838.63	375.40	0.41
Reach-1	1013	100-Year	20000.00	426.04	437.05		437.69	0.005441	6.45	3099.78	387.19	0.37
Reach-1	1010	100-Year	20000.00	425.04	436.51		436.82	0.002673	4.70	4592.73	714.02	0.26
Reach-1	1005	100-Year	20000.00	424.04	435.91		436.14	0.001971	4.16	5316.23	880.08	0.23
Reach-1	1000	100-Year	20000.00	423.04	435.30		435.53	0.001907	4.18	5329.39	1157.70	0.23
Reach-1	995	100-Year	20000.00	421.50	434.54		434.83	0.002100	4.45	4772.50	949.35	0.24
Reach-1	992	100-Year	20000.00	420.80	433.99		434.36	0.002591	5.02	4240.64	817.36	0.26
Reach-1	988	100-Year	20000.00	421.00	433.29	427.43	433.77	0.003600	5.74	3807.85	718.35	0.31
Reach-1	985	100-Year	20000.00	419.00	432.26	427.71	432.90	0.005060	6.84	3312.60	2243.60	0.37
Reach-1	983	100-Year	20000.00	418.40	431.94	425.26	432.28	0.002390	4.86	4393.57	2267.80	0.25
Reach-1	980	100-Year	20000.00	418.00	431.42	425.16	431.84	0.002972	5.35	3984.14	2199.31	0.28
Reach-1	978	100-Year	20000.00	418.00	431.04	424.48	431.45	0.002795	5.29	4043.18	2228.92	0.27
Reach-1	975	100-Year	20000.00	417.00	430.64	424.17	431.00	0.002583	4.98	4258.09	2303.30	0.26
Reach-1	973	100-Year	20000.00	416.70	430.24	423.87	430.59	0.002590	4.95	4294.13	2361.87	0.26
Reach-1	970	100-Year	20000.00	415.70	429.69	423.18	430.06	0.002708	5.12	4263.54	2315.13	0.27
Reach-1	965	100-Year	20000.00	415.20	429.28	422.58	429.61	0.002416	4.91	4477.57	2252.77	0.26
Reach-1	960	100-Year	20000.00	414.70	428.88	421.68	429.17	0.001960	4.57	4841.62	2335.43	0.23
Reach-1	950	100-Year	20000.00	414.20	428.38	421.18	428.66	0.001845	4.48	5013.38	2463.93	0.23

HEC-RAS Plan: PC Phase 1-3 River: RIVER-1 Reach: Reach-1 Profile: 100-Year (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)	
Reach-1	946	100-Year	20000.00	413.60	427.79		428.11	0.002681	4.95	4580.39	811.72	0.27
Reach-1	944	100-Year	20000.00	413.80	427.41		427.82	0.003449	6.01	4198.62	2010.58	0.31
Reach-1	940	100-Year	20000.00	413.90	427.15		427.41	0.002083	4.63	5113.21	1492.87	0.24
Reach-1	935	100-Year	20000.00	413.00	426.54		426.92	0.003177	5.80	4425.96	1397.69	0.29
Reach-1	930	100-Year	20000.00	412.50	426.00	421.47	426.31	0.002404	4.99	4788.01	1213.43	0.26
Reach-1	920	100-Year	20000.00	415.00	424.10		424.59	0.005934	6.22	3772.22	1090.18	0.38
Reach-1	910	100-Year	20000.00	411.90	421.35		421.84	0.005661	6.31	3814.74	1087.02	0.38
Reach-1	900	100-Year	20000.00	408.80	418.89		419.55	0.006822	6.93	3236.08	795.57	0.41
Reach-1	890	100-Year	20000.00	406.60	416.73	413.45	417.37	0.007507	6.39	3131.86	490.61	0.42
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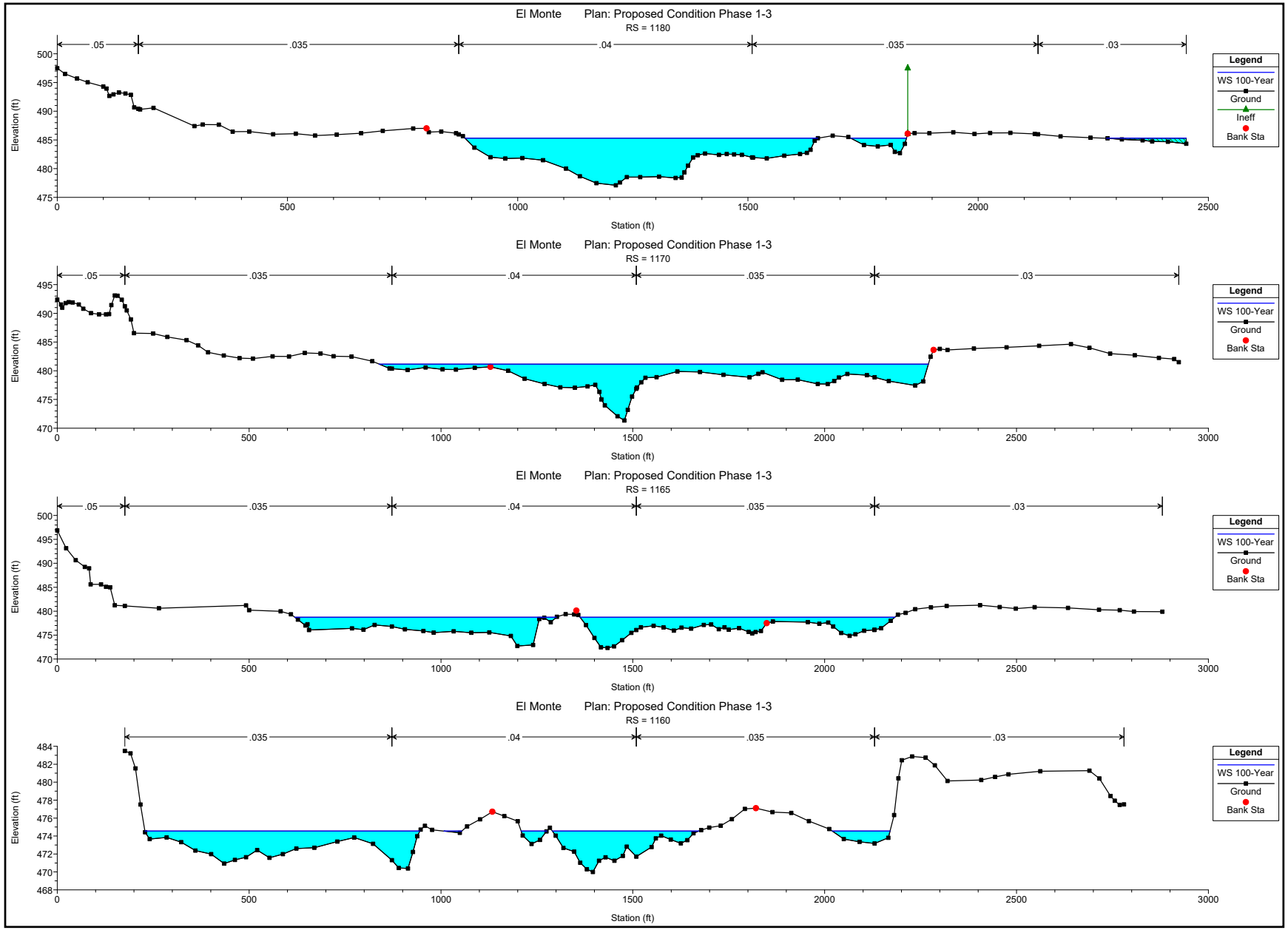
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Ground
Ineff
Bank Sta
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Station (ft)
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Bank Sta
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Bank Sta
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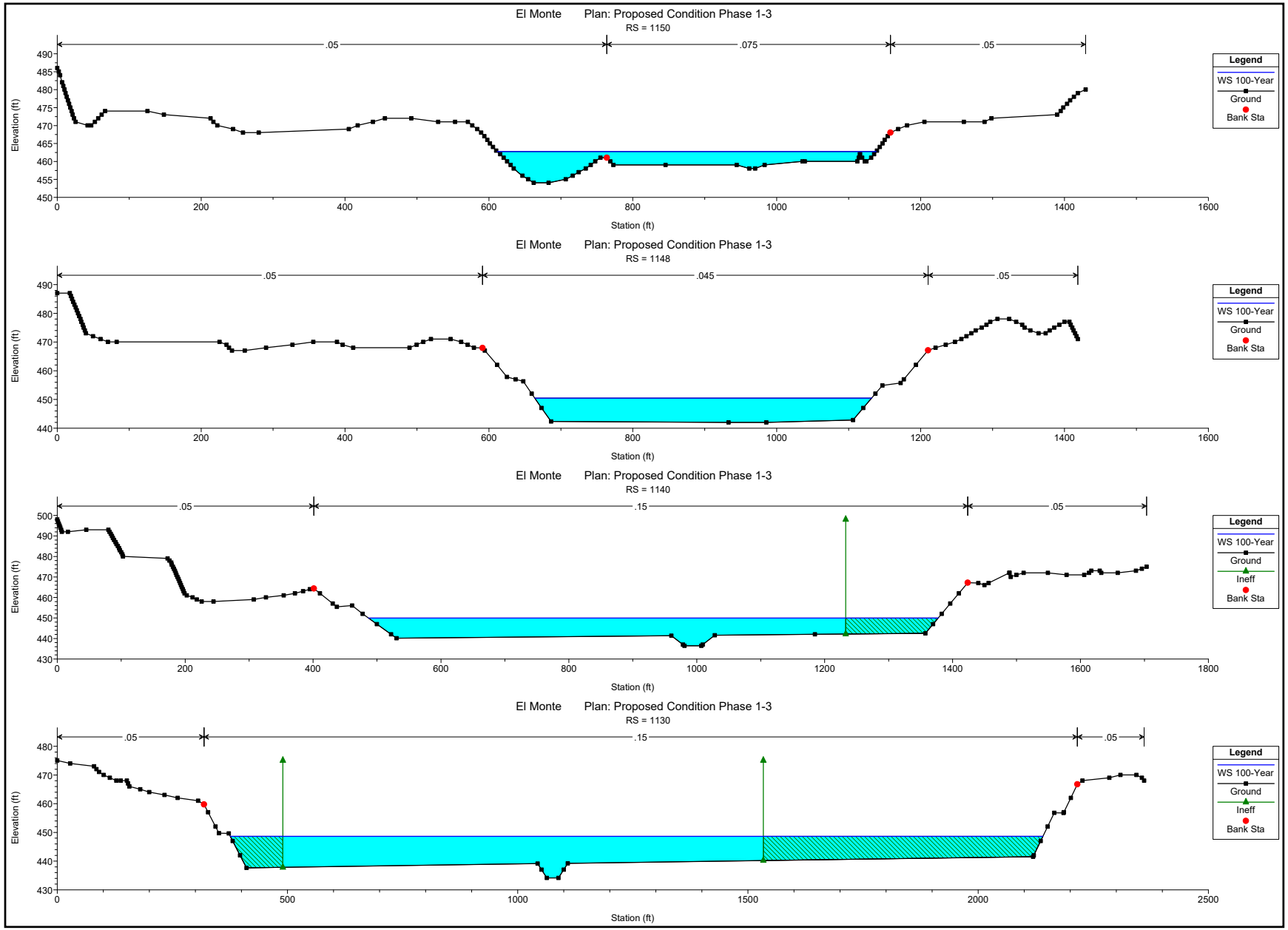
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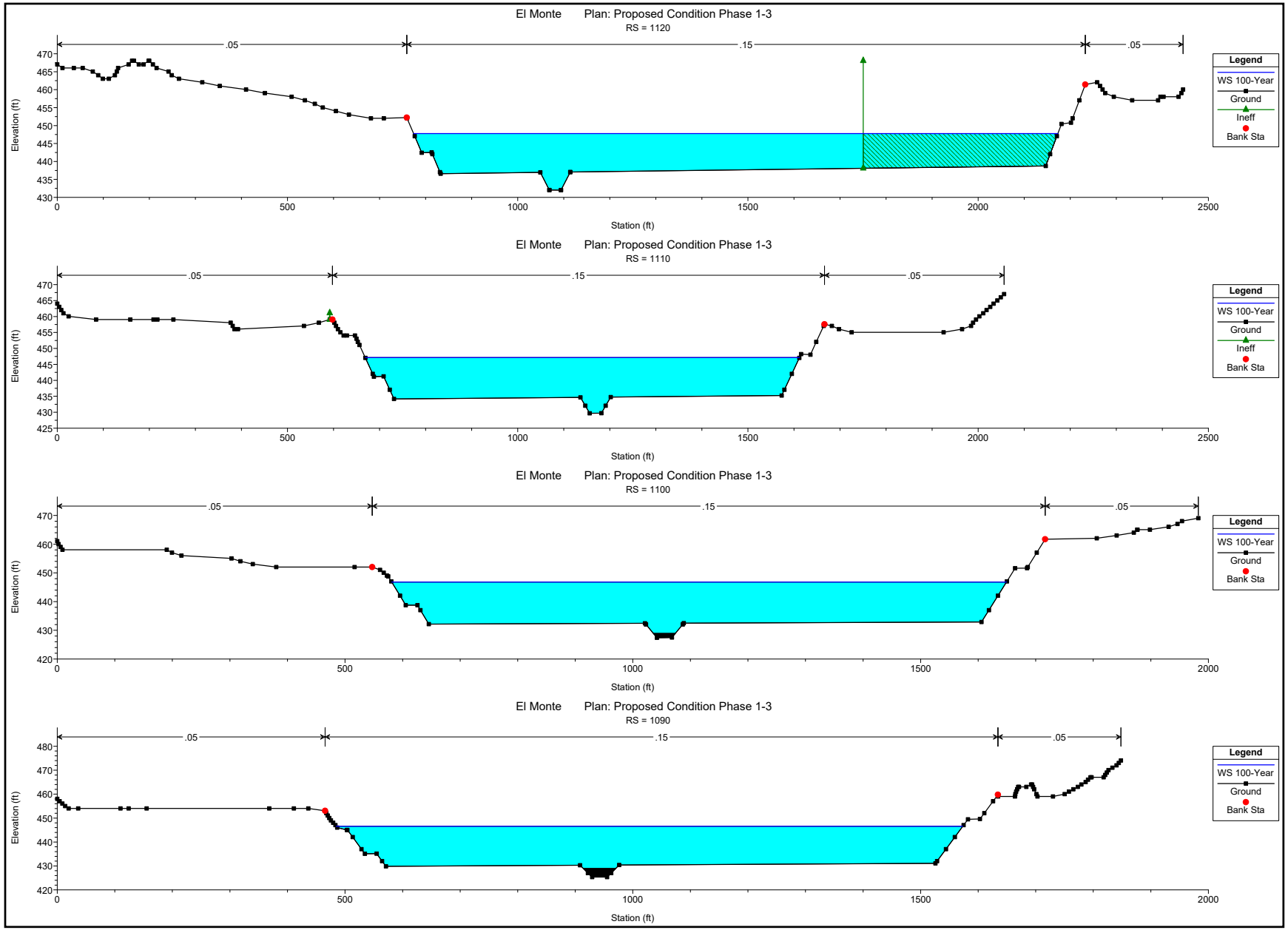
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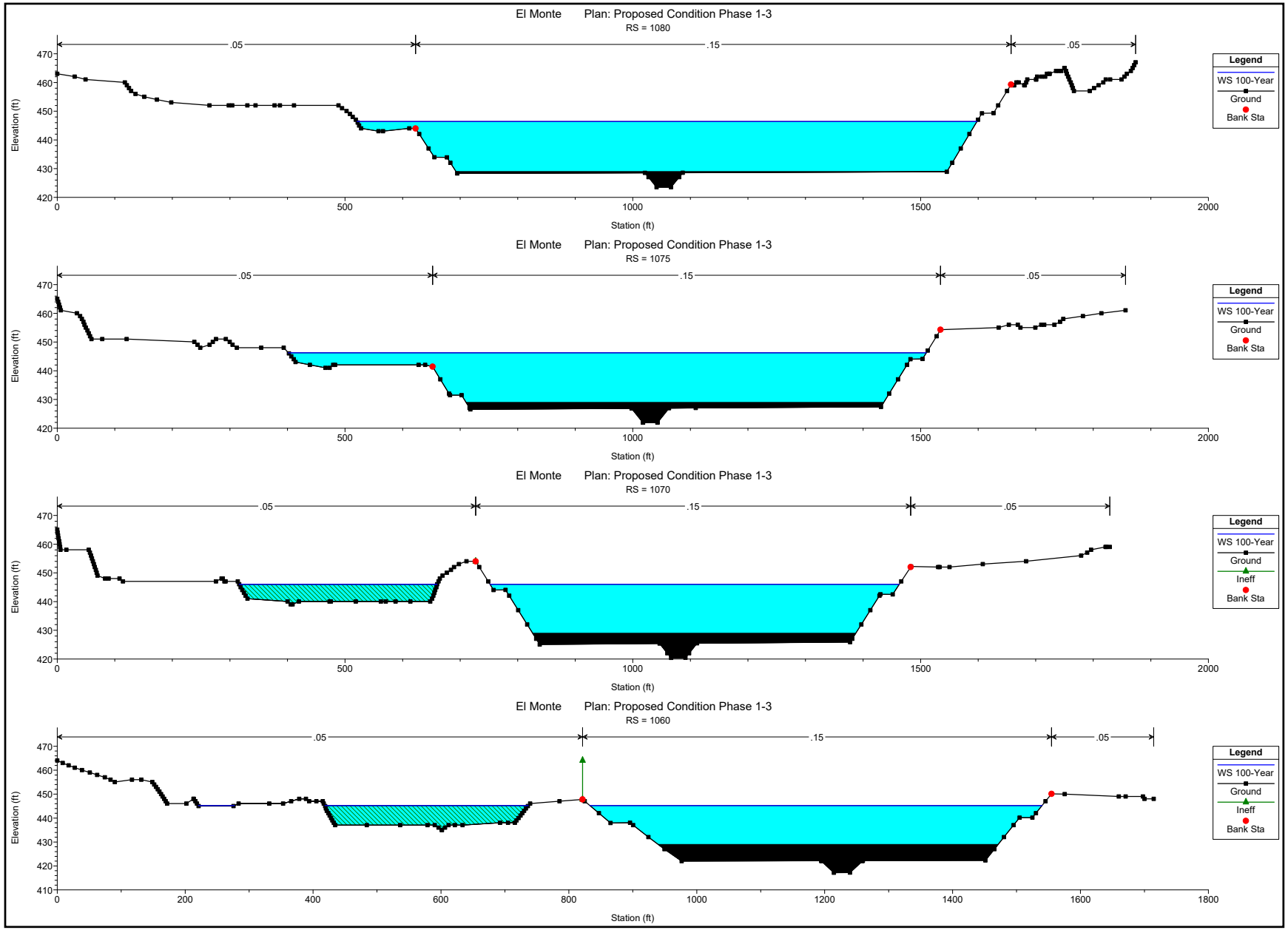
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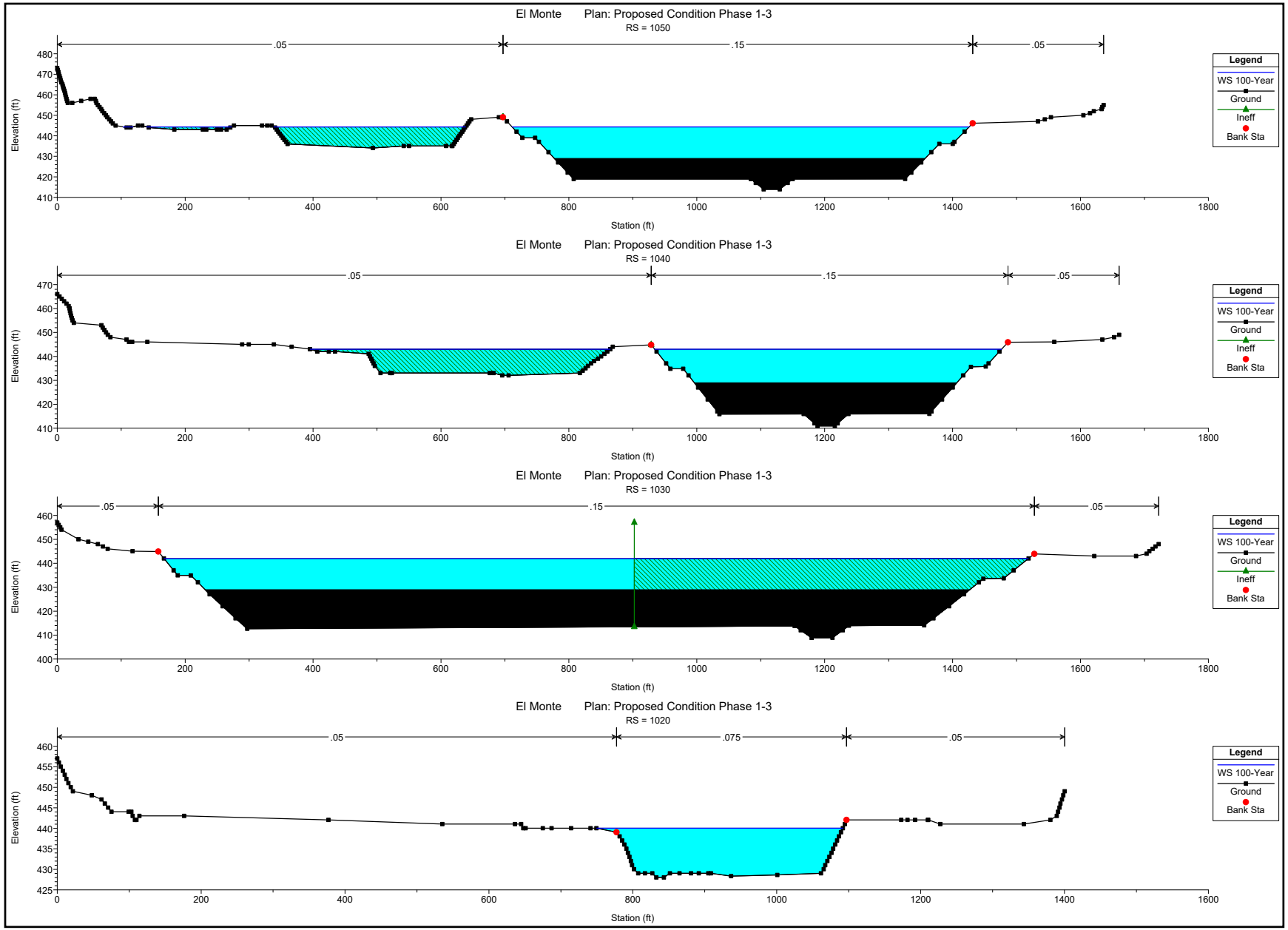
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Station (ft)
Legend
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Ground
Ineff
Bank Sta
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Station (ft)
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Ground
Ineff
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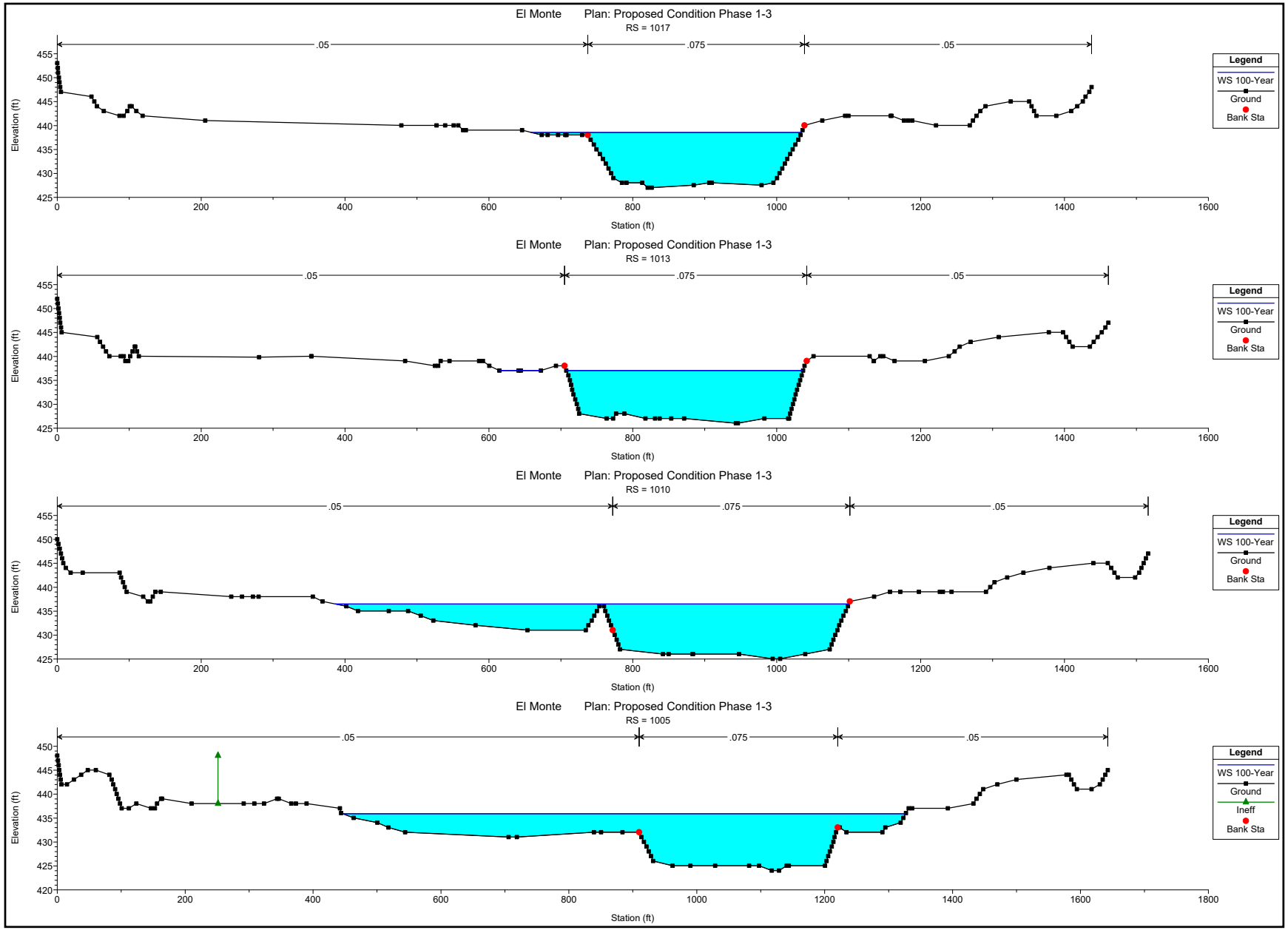
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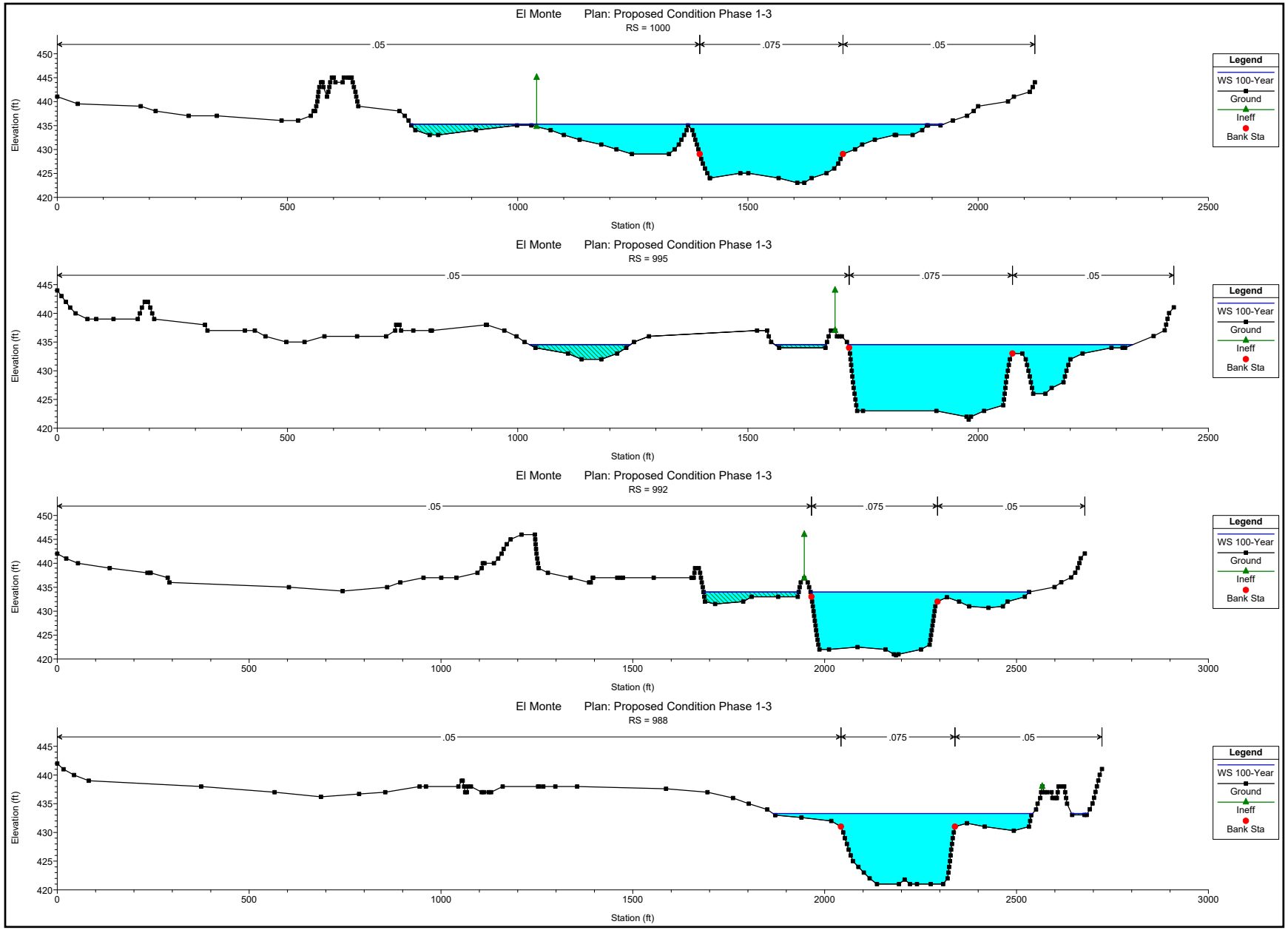
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Station (ft)
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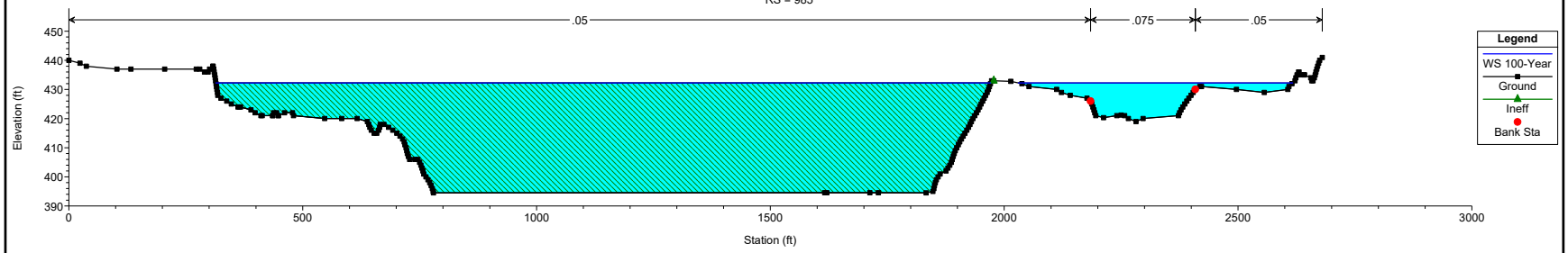

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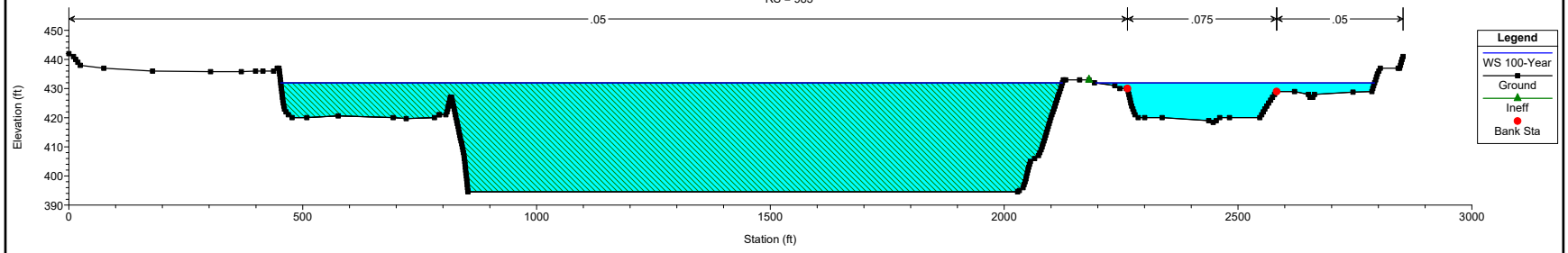

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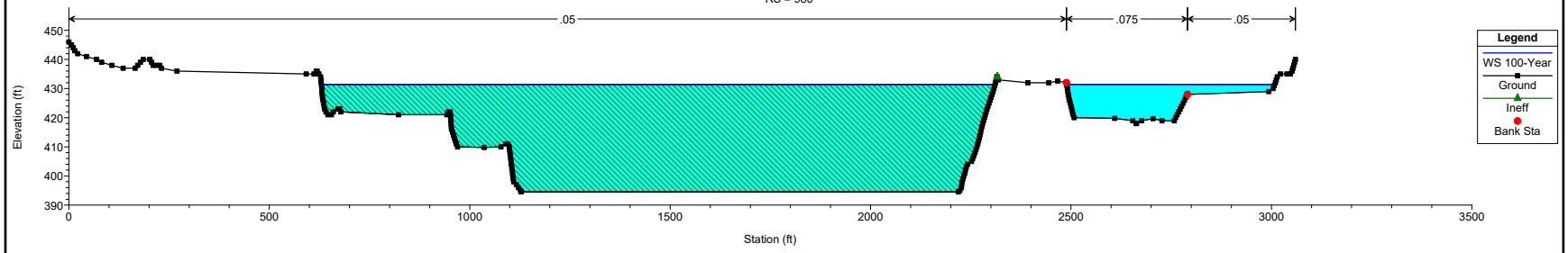

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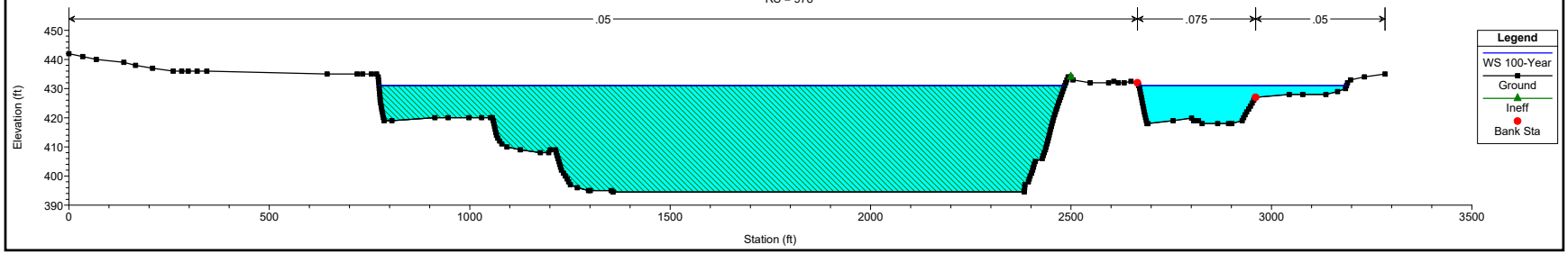

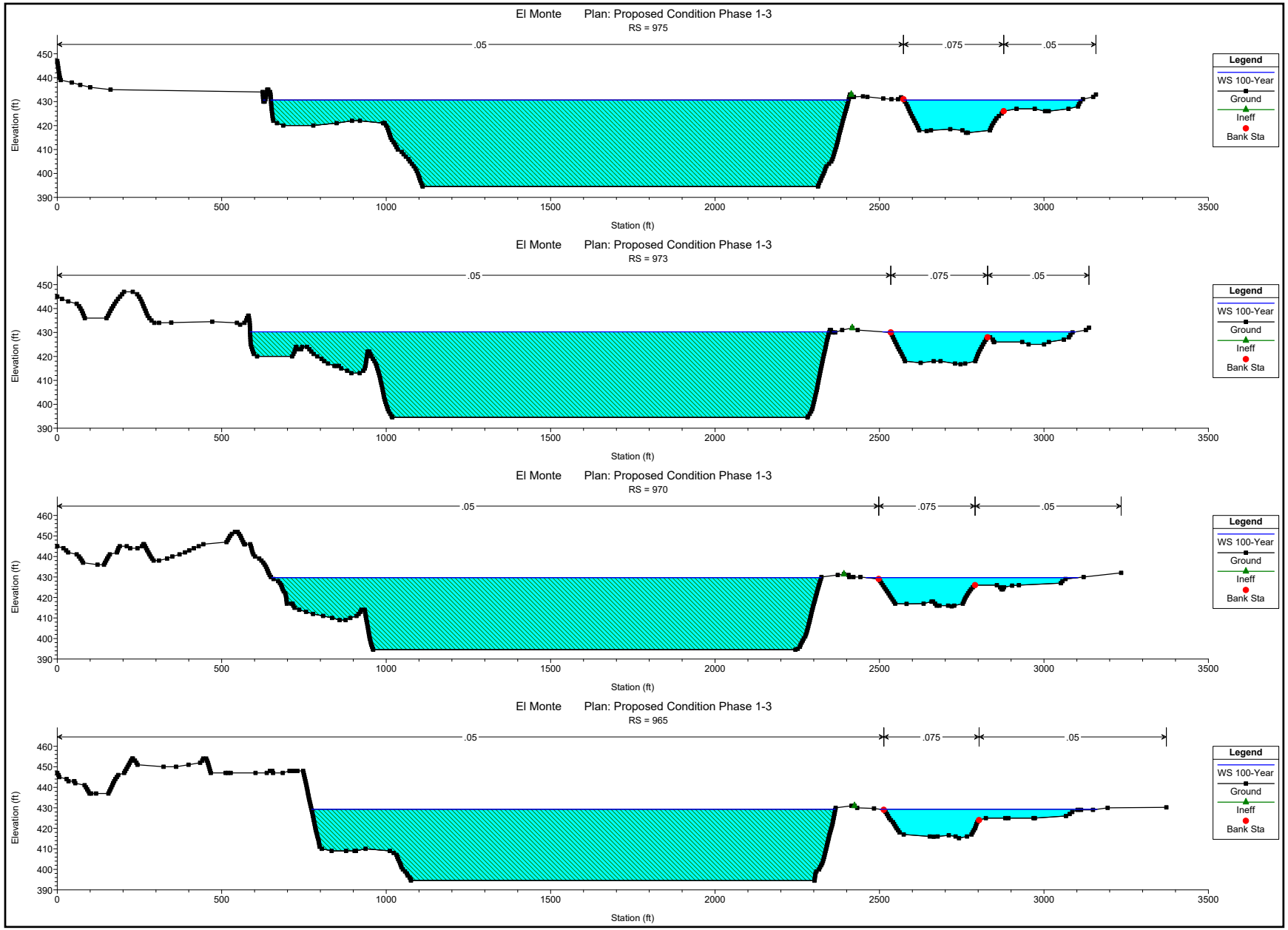
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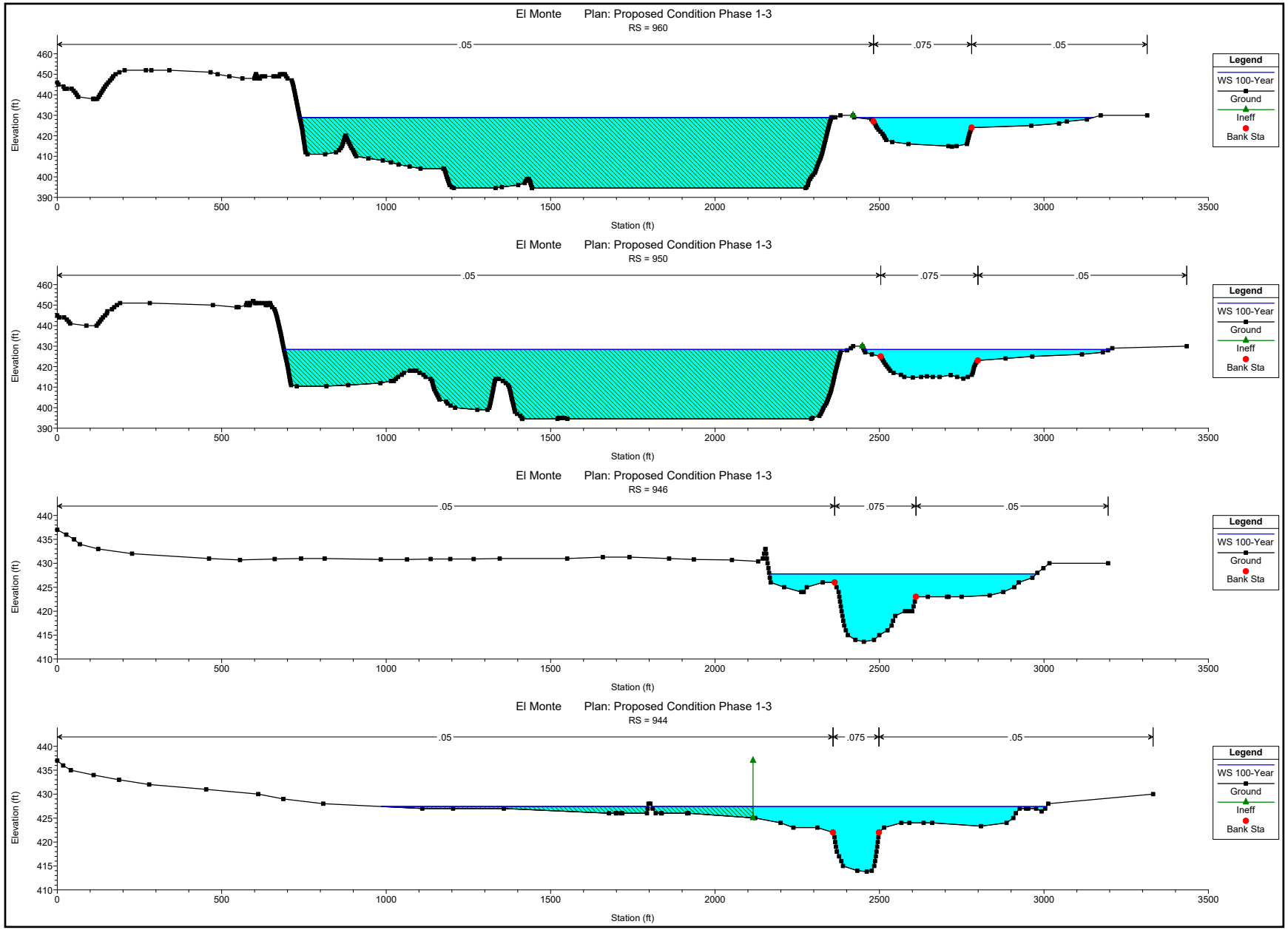
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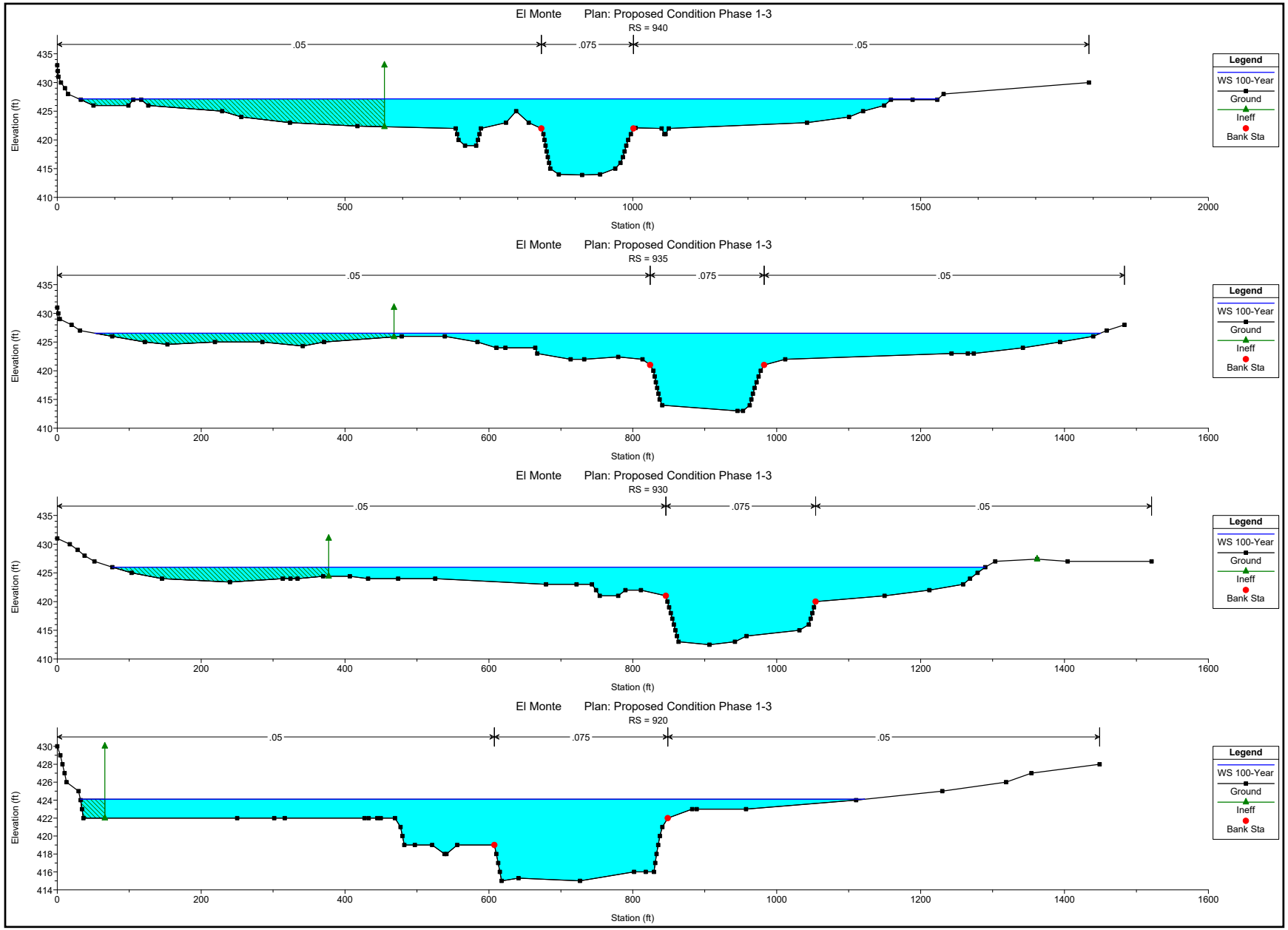
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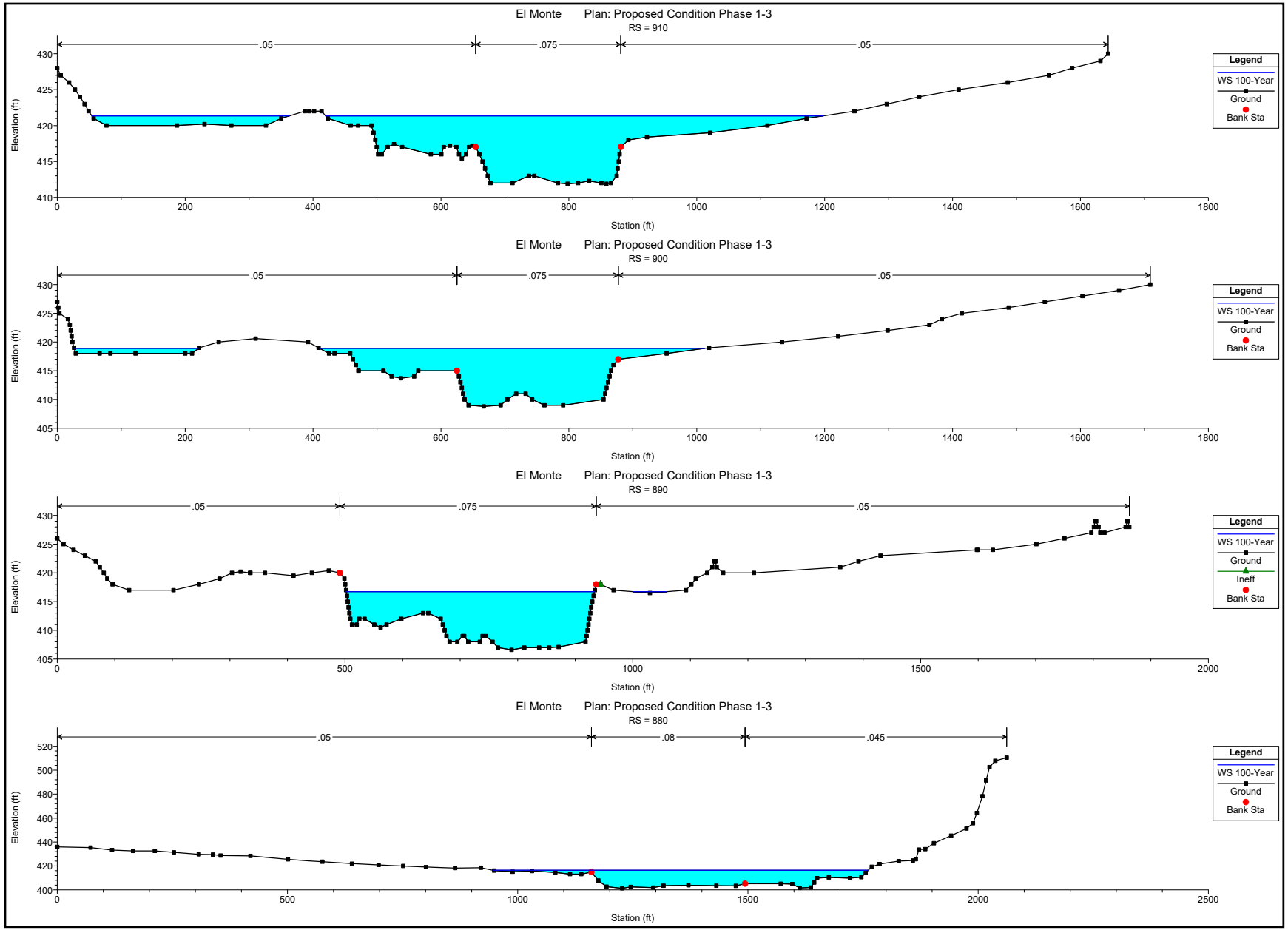
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Bank Sta
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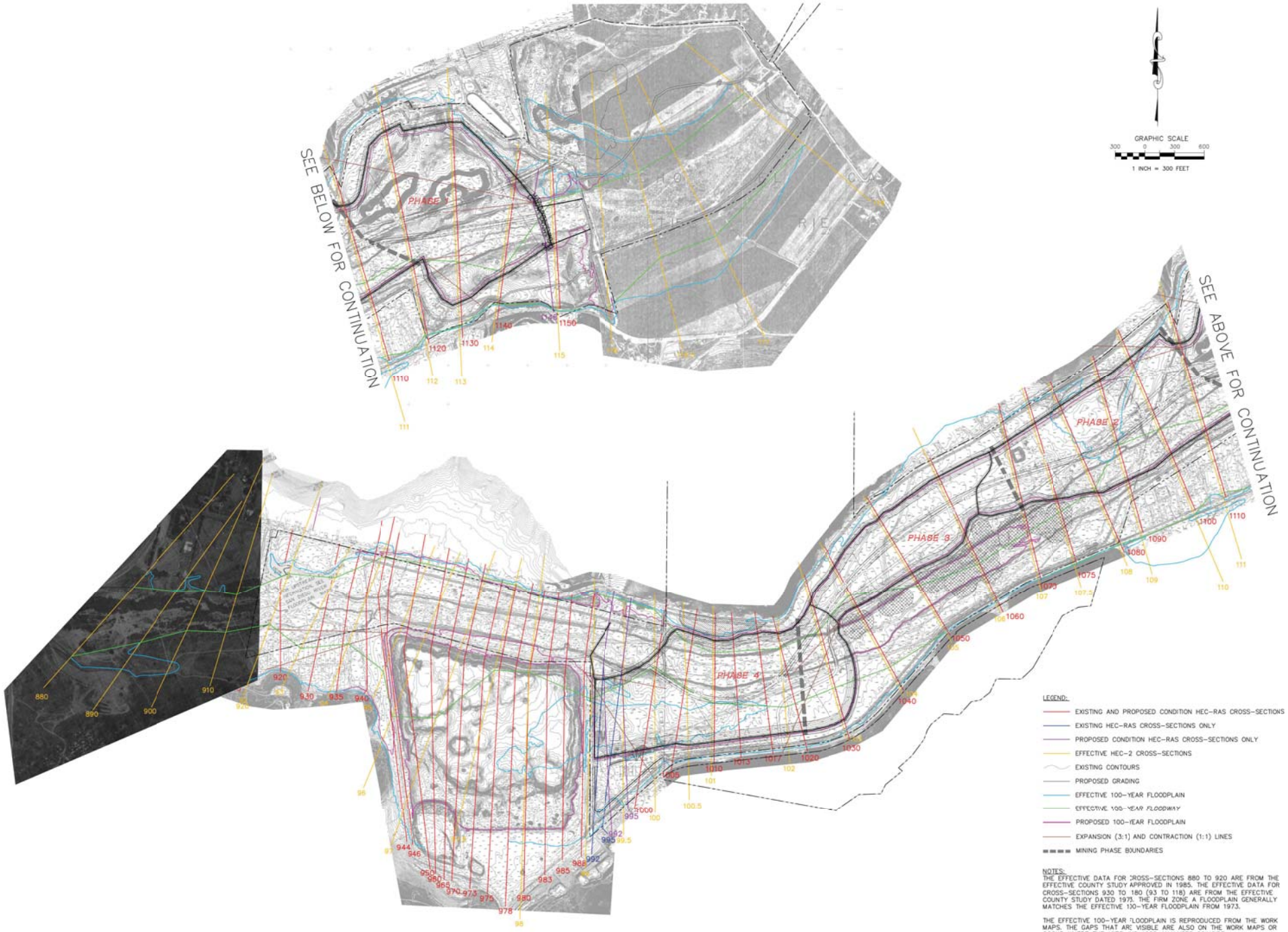

HYDRAULIC WORK MAP

PRELIMINARY CEQA DRAINAGE STUDY

FOR THE

EL MONTE SAND MINING

AND

NATURE PRESERVE PROJECT

June 20, 2018

Wayne W. Chang, MS, PE 46548

ChangConsultants
Civil Engineering ◦ Hydrology ◦ Hydraulics ◦ Sedimentation

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Rancho Santa Fe, CA 92067
(858) 692-0760

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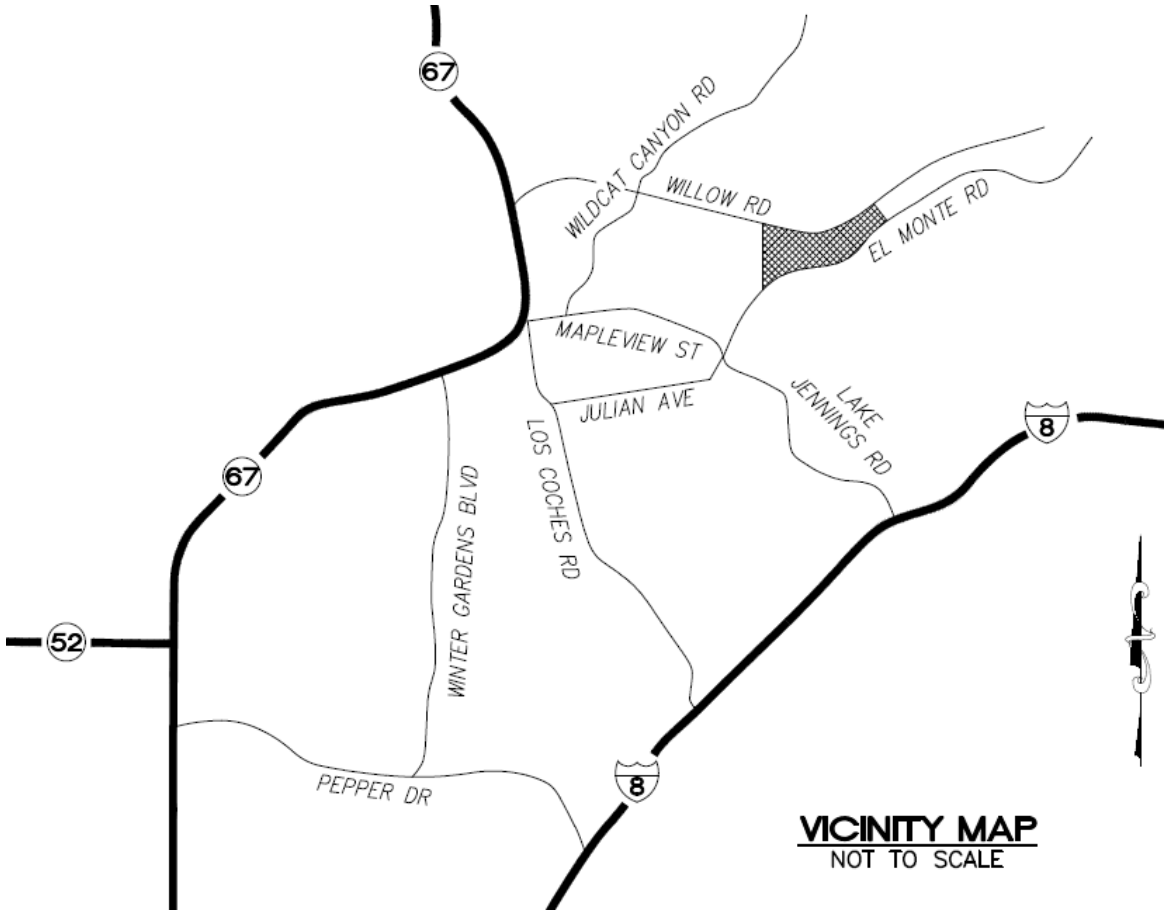
APPENDICES

INTRODUCTION

El Monte Nature Preserve, L.L.C. is proposing the El Monte Sand Mining and Nature Preserve Project along the El Monte Valley in the Lakeside community of the county of San Diego (see the Vicinity Map). The project will extract up to approximately 12.5 million tons of mineral resource over a 12 year period within the San Diego River floodplain. The project is expected to be fully completed in 16 years. Mining will be ongoing for 12 years after inception, while reclamation will commence 4 years after the start of mining and progressively continue over a 16 year period. Reclaimed areas will be restored to an end use of open space with recreational trail easements. The combined mineral extraction and reclamation project will affect approximately 228 acres of land on 479.5 acres currently owned by the El Monte Nature Preserve, LLC.



Vicinity Map

The San Diego River flows in a westerly direction along the site. The San Diego River floodplain encompasses the majority of the proposed extraction area. In addition, the extraction area encroaches into portions of the County of San Diego defined floodway. Chang Consultant's June 20, 2018, *Hydraulic Analyses for the El Monte Sand Mining and Nature Preserve Project,* contains existing and proposed condition hydraulic analyses to assess the pre- and post-project floodplain and floodway impacts. The June 2018 report concludes that the project is within the County's effective floodway, but will not raise the 100-year water surface elevations, so meets the County and FEMA's floodway regulations. In addition, the project will not create adverse flood impacts within the study reach, which is consistent with the goals of floodplain regulations.

The 2018 report analyzes the project in relation to the San Diego River floodway and floodplain. On the other hand, this report contains a Preliminary CEQA drainage study for the proposed processing plant, which will be outside of the proposed condition floodplain and floodway. The processing plant will contain facilities that support mining such as the office, storage and maintenance area, scale and scale house, stockpiles, screens, etc. Existing and proposed condition hydrologic analyses have been performed for the processing plant.

HYDROLOGIC ANALYSES

The County of San Diego's 2003 *Hydrology Manual* rational method procedure was used for the 100-year hydrologic analyses. The existing and proposed condition rational method input parameters are summarized as follows:

- Precipitation: The 100-year, 6- and 24-hour precipitation values are 3.0 and 6.3 inches, respectively. The isopluvials are included in Appendix A.

- Drainage areas: The existing condition drainage area was delineated from the 1-foot contour interval topographic mapping used for the project. The proposed condition drainage area was delineated from the proposed reclamation plan. There is a proposed earthen berm around the south and west sides of the processing plant that define the drainage area. The Existing Condition Rational Method Work Map and Proposed Condition Rational Method Work Maps are included in Appendix A.

- Hydrologic soil groups: The hydrologic soil group was determined from the National Resources Conservation Service's "Web Soil Survey." The attached Web Soil Survey shows that the entire drainage area essentially contains soil group A.

- Runoff coefficients: Runoff coefficients were established for each drainage basin based on the estimated impervious percentage and soil group A. The existing condition land use consists of undisturbed natural terrain with no impervious surfaces. The proposed processing plant will be on the natural ground surface and contain minimal impervious surfaces. Therefore, the proposed condition land use was also modeled as natural terrain.

- Flow lengths and elevations: The flow lengths and elevations were digitized and obtained from the topographic mapping and reclamation plan. Under existing conditions, the drainage area is nearly level with several depressions that retain storm runoff. Under proposed conditions, the drainage area was assumed to be gently sloping towards the San Diego River.

The 100-year existing and proposed condition rational method results are in Appendix A. The analyses were performed using CivilDesign's San Diego County Rational Hydrology Program. The overall existing condition drainage area was set equal to the overall proposed condition drainage area to allow a comparison of the existing and proposed condition results. Table 1 summarizes the 100-year results. Table 1 shows that the project will slightly reduce the 100-year flow rate (from 3.7 to 3.4 cubic feet per second). This is due to the longer flow path under proposed conditions. The difference in flow rates is so small that the existing and proposed condition results are essentially the same.

Condition	H, ft	L, ft	C		T_c, min.	I, in/hr	Area, ac	Q_{100}, cfs
Existing	4.2	422	0.2		17.79	3.49	5.27	3.7
Proposed	3.1	528	0.2		20.21	3.21	5.27	3.4

Table 1. Summary of Rational Method Input and Results

CONCLUSION

Preliminary CEQA existing and proposed condition 100-year hydrologic analyses have been performed for the reclamation plan submittal of the El Monte Sand Mining and Nature Preserve Project. The analyses cover the processing plant, which will be outside of the proposed condition floodplain. A separate hydraulic analysis has been performed for the extraction area, which will be within the floodplain. The hydrologic results show that the processing plant will not cause an adverse increase in flow rates. The proposed time of concentration over the ground surface is long at over 20 minutes, which indicates that the overall velocities will not be erosive.

The existing drainage patterns will not be altered. Under existing conditions, the processing plant area is in the floodplain. Under proposed conditions, runoff from the processing plant will be directed north to the realigned floodplain. The 100-year flow rates at the processing plant are less than 4 cfs, while the 100-year flow rate in the river is 20,000 cfs, so the processing plant will not cause substantial erosion or siltation on- or off-site. In addition, the processing plant will not result in flooding on- or off-site since its flow contribution is so small.

The processing plant runoff will be conveyed by the San Diego River. The relatively small runoff generated by the plant will not create or contribute runoff that will exceed the capacity of downstream drainage facilities beyond their current capacities. The project does not propose housing, so will not place housing in a 100-year flood hazard area.

DECLARATION OF RESPONSIBLE CHARGE

Declaration of Responsible Charge

I hereby declare that I am the civil engineer of work for this project for hydraulic analyses of the San Diego River, that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

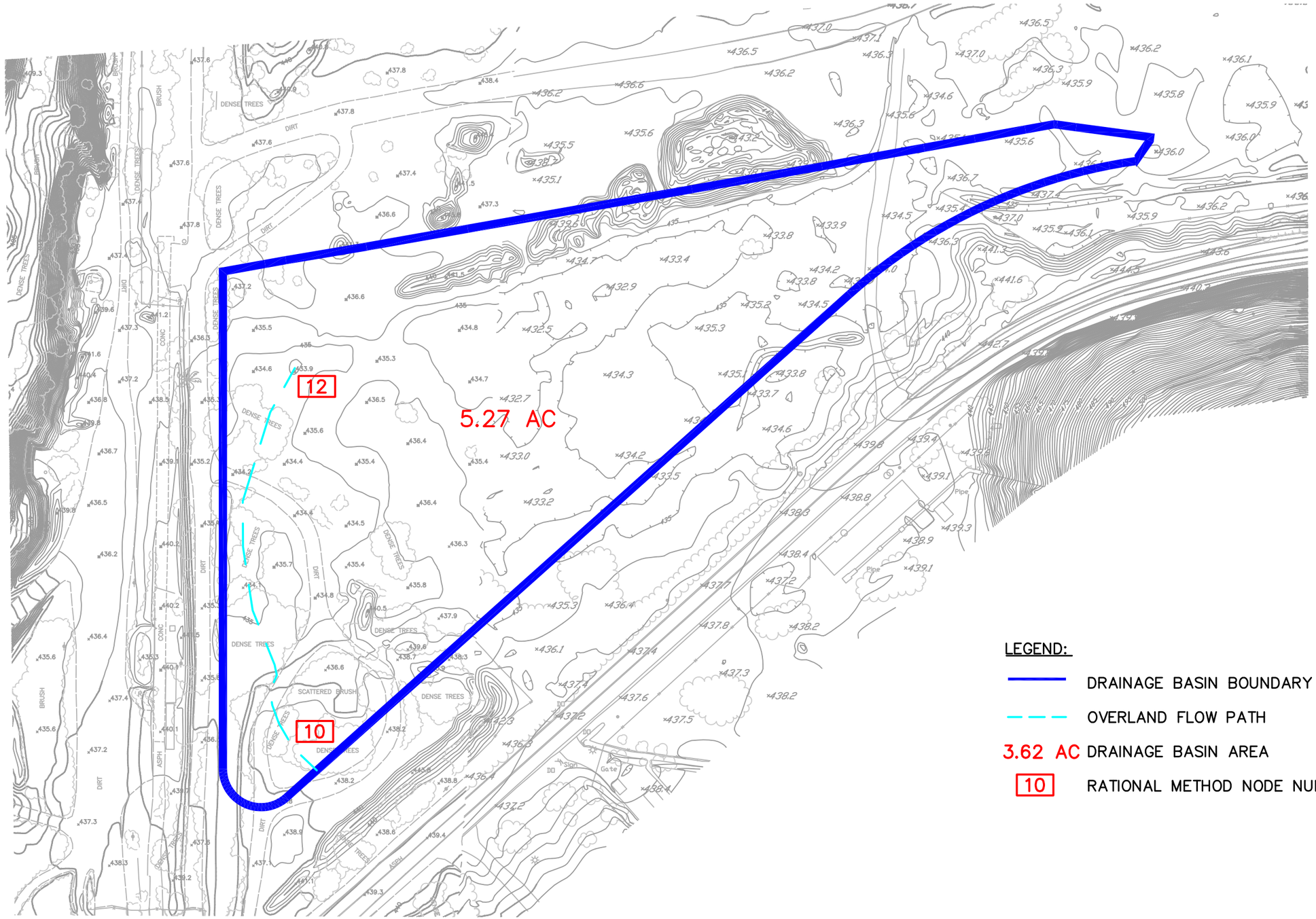
June 20, 2018

Wayne W. Chang
RCE 46548
Exp. June 30, 2019

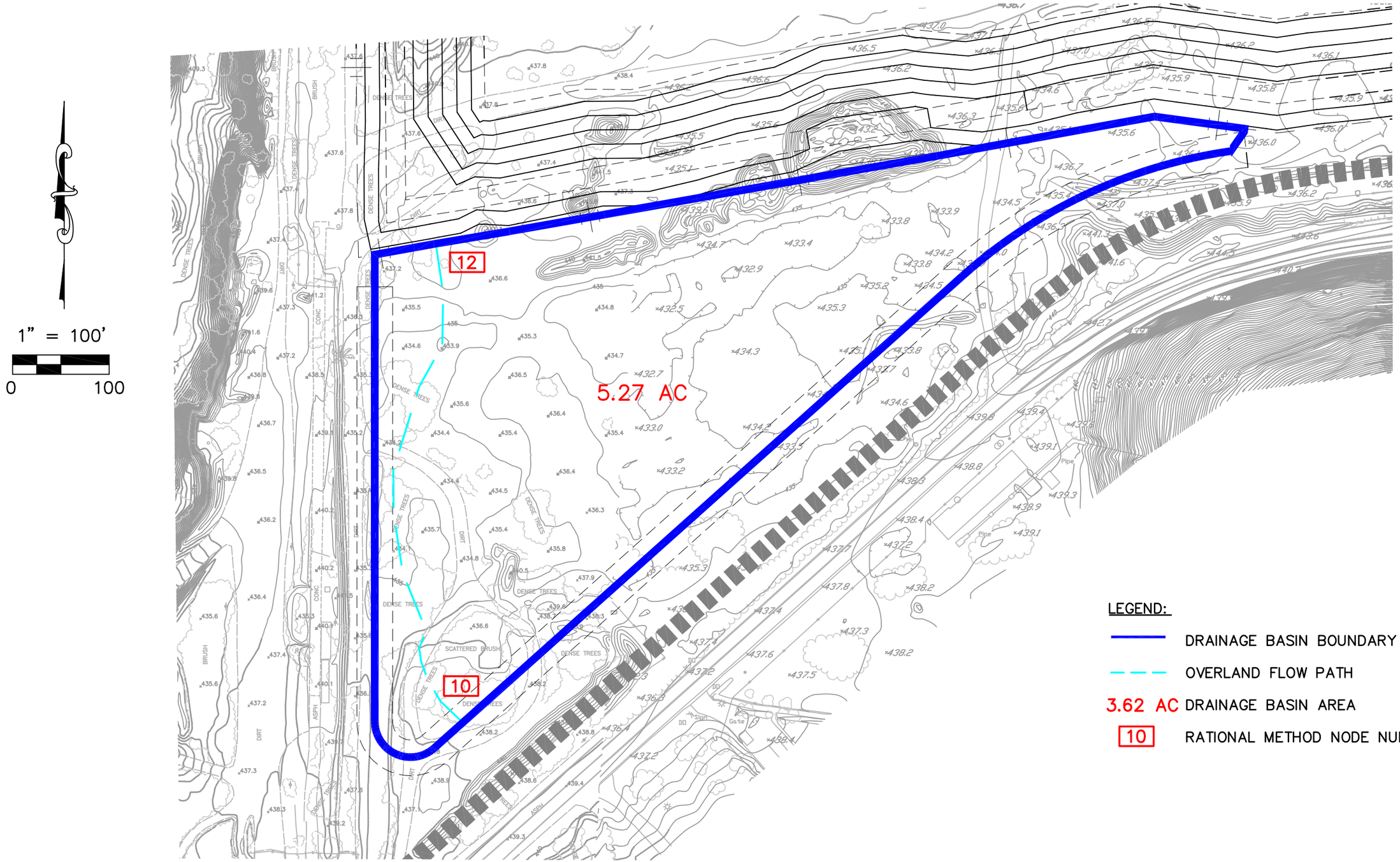
Date

APPENDIX A

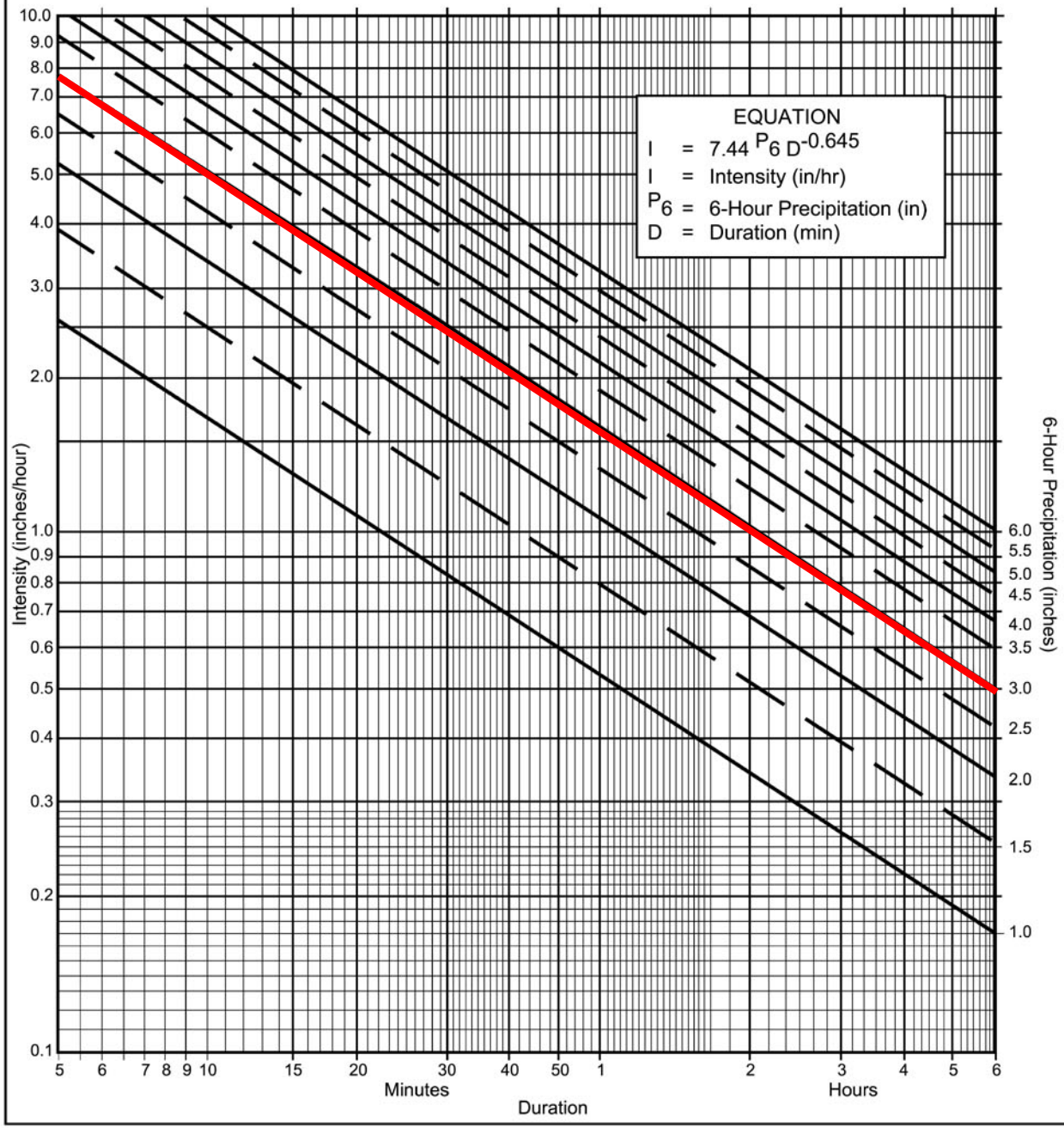
RATIONAL METHOD ANALYSES



EXISTING CONDITION
HEC–RAS WORK MAP



PROPOSED CONDITION
HEC–RAS WORK MAP



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100- year

(b) P_6 = 3.0 in., P_{24} = 6.3, $\frac{P_6}{P_{24}}$ = 47.6 %(2)

(c) Adjusted P_6(2) = 3.0 in.

(d) t_x = _____ min. See rational method calculations for Tc and I.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

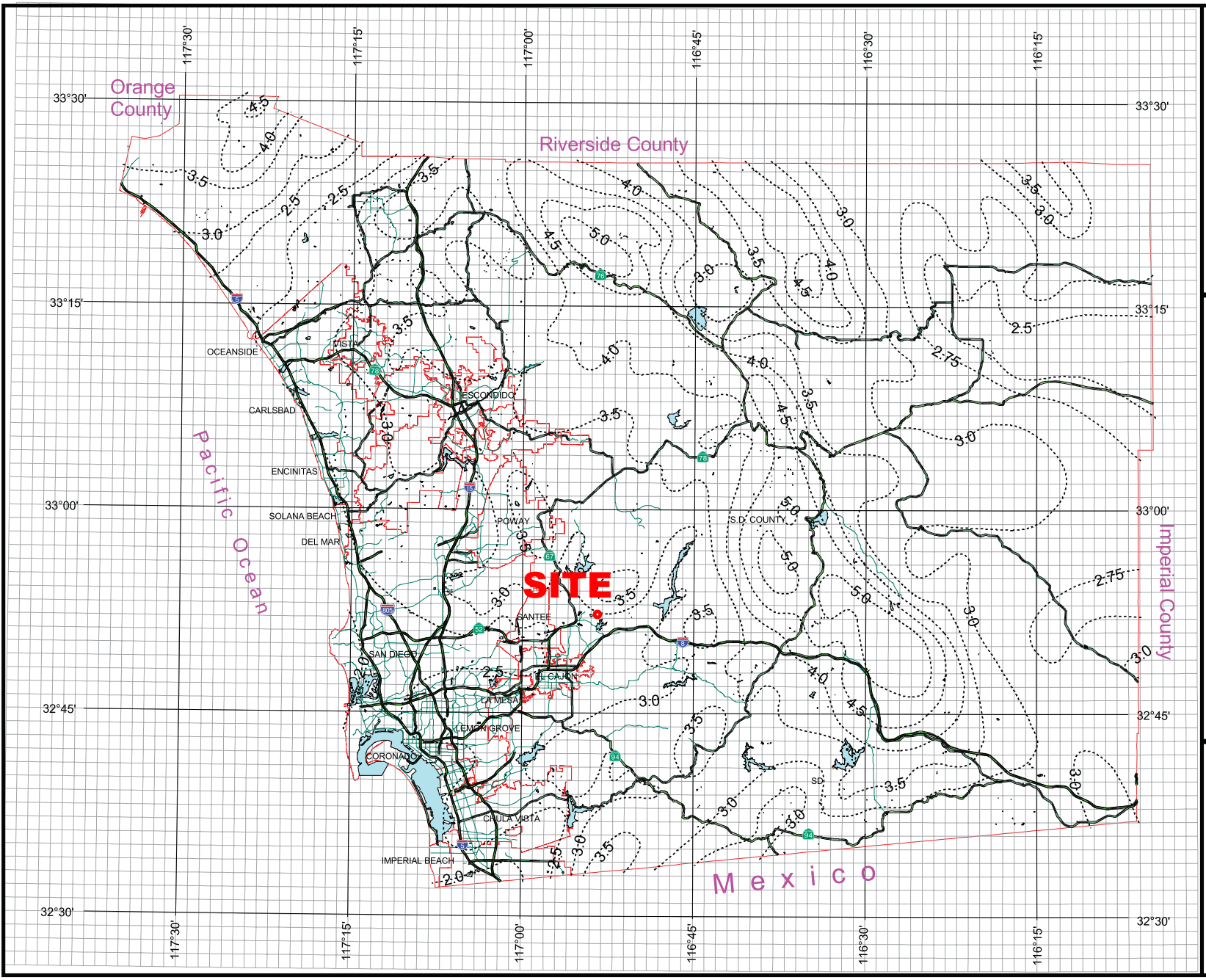
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6=3.0"



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

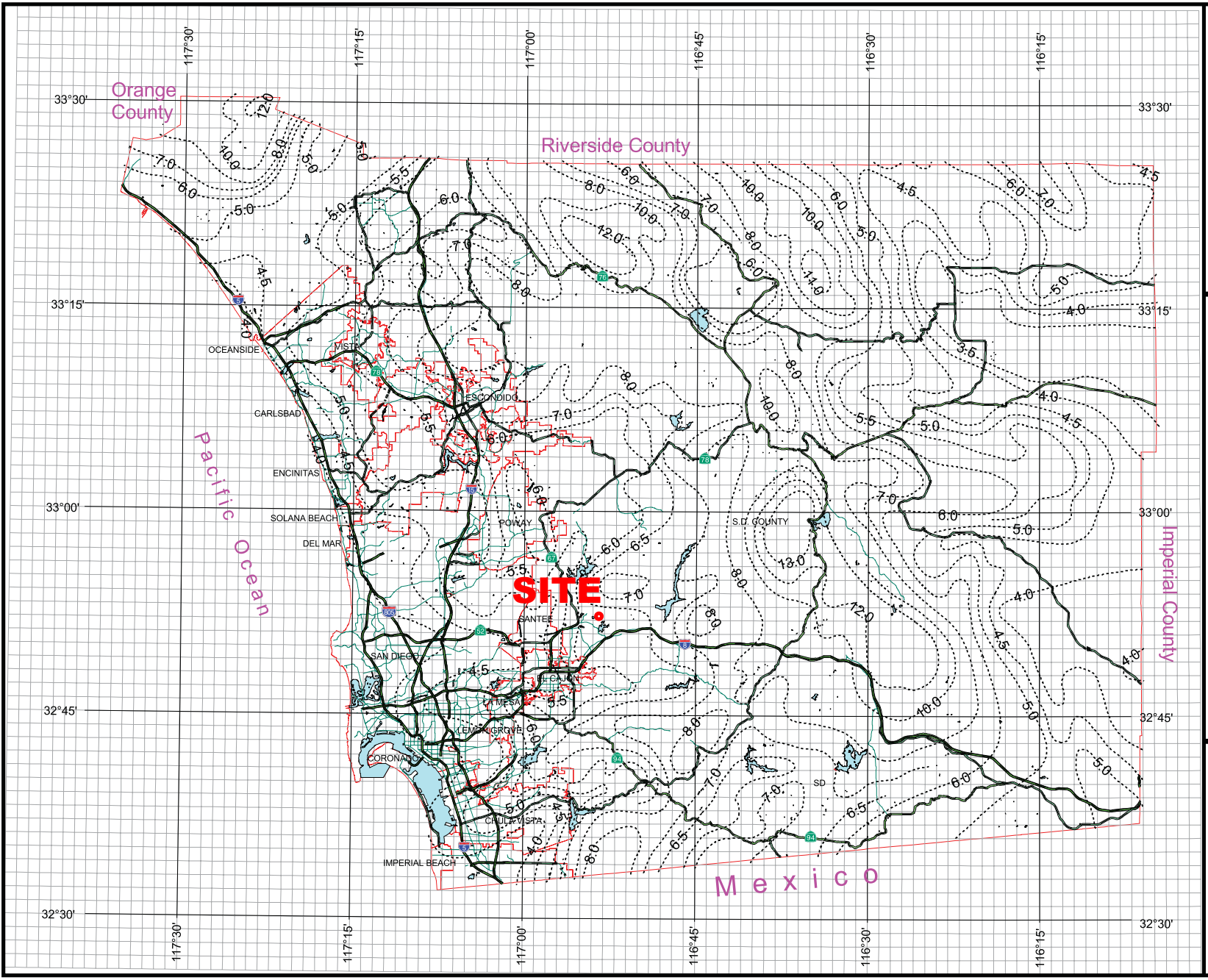
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24=6.3"



DPW GIS — Department of Public Works, Geographic Information Services

SanGIS — We Have San Diego Covered!

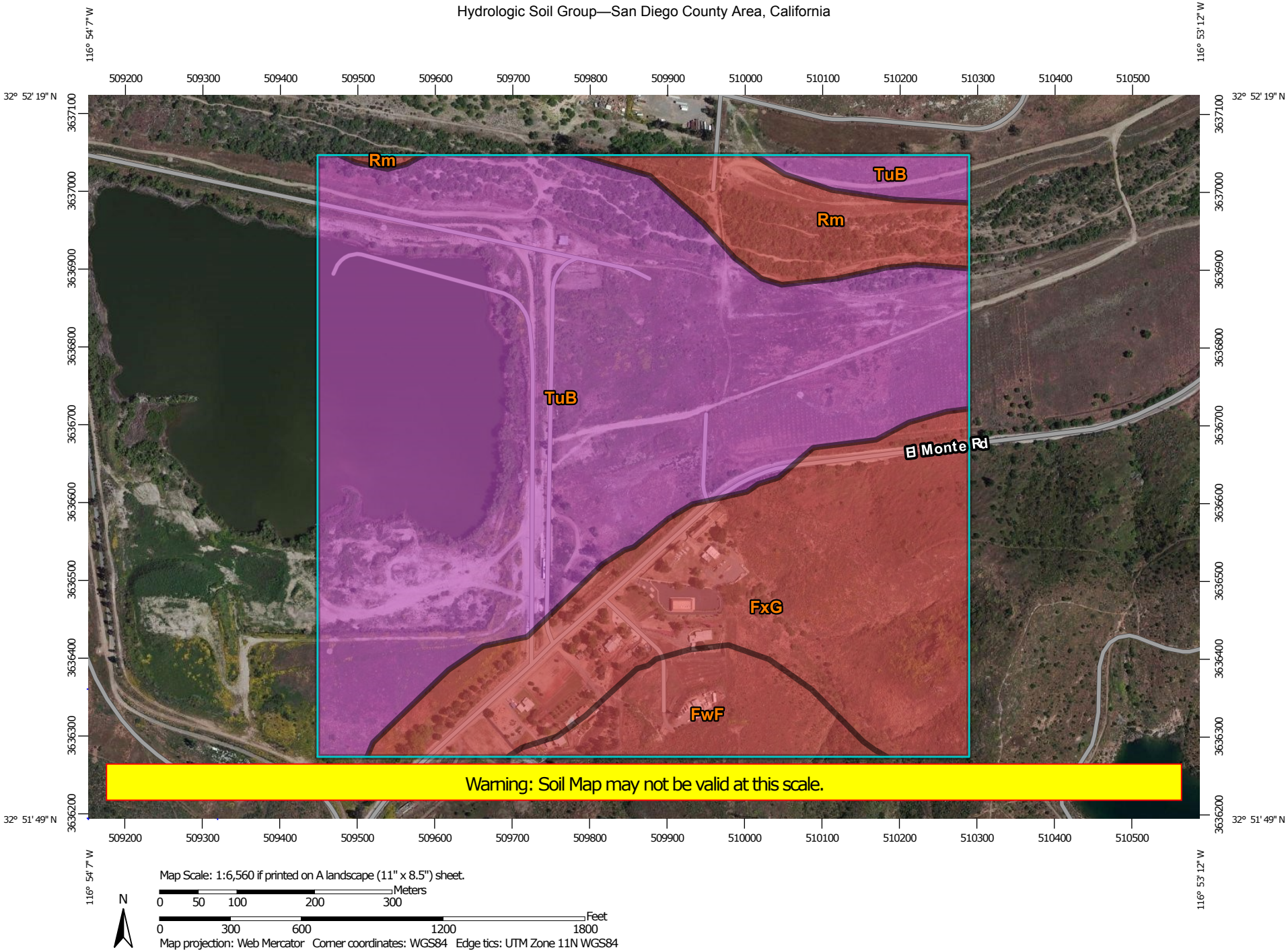
N W E S

3 0 3 Miles

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service


116° 54' 7" W
116° 53' 12" W
32° 52' 19" N
32° 51' 49" N
509200
509300
509400
509500
509600
509700
509800
509900
510000
510100
510200
510300
510400
510500
3637100
3637000
3636900
3636800
3636700
3636600
3636500
3636400
3636300
3636200
Rm
TuB
Rm
TuB
El Monte Rd
FxG
FwF
Warning: Soil Map may not be valid at this scale.
Map Scale: 1:6,560 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 300 600 1200 1800
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N 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.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: San Diego County Area, California
Survey Area Data: Version 9, Sep 17, 2015

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

Date(s) aerial images were photographed: Data not available.

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

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
FwF	Friant fine sandy loam, 30 to 50 percent slopes	D	10.0	6.2%
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes	D	42.7	26.5%
Rm	Riverwash	D	11.0	6.8%
TuB	Tujunga sand, 0 to 5 percent slopes	A	97.7	60.5%
Totals for Area of Interest			**161.4**	**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

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2009 Version 7.8

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
     Rational Hydrology Study   Date: 11/14/16

El Monte San Mining and Nature Preserve Project
Plant Site Analysis
Existing Conditions
100-Year Flow Rate

 *********   Hydrology Study Control Information **********

Program License Serial Number 4028

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.000
24 hour precipitation(inches) = 6.300
P6/P24 =   47.6%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   10.000 to Point/Station   12.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN   ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance = 422.000(Ft.)
Highest elevation = 438.100(Ft.)
Lowest elevation = 433.900(Ft.)
Elevation difference =   4.200(Ft.) Slope = 0.995 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3

Initial Area Time of Concentration = 13.58 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2000)*(70.000^.5)/(0.995^(1/3)]= 13.58
The initial area total distance of 422.00 (Ft.) entered leaves a
remaining distance of 352.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 4.21 minutes
for a distance of 352.00 (Ft.) and a slope of 1.00 %
with an elevation difference of 3.50(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
= 4.210 Minutes
Tt=[(11.9*0.0667^3)/(3.50)]^.385= 4.21
Total initial area Ti = 13.58 minutes from Figure 3-3 formula plus
4.21 minutes from the Figure 3-4 formula = 17.79 minutes
Rainfall intensity (I) = 3.486(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff = 3.675(CFS)
Total initial stream area = 5.270(Ac.)
End of computations, total study area = 5.270 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2009 Version 7.8

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
     Rational Hydrology Study   Date: 11/14/16

El Monte San Mining and Nature Preserve Project
Plant Site Analysis
Proposed Conditions
100-Year Flow Rate

 *********   Hydrology Study Control Information **********

Program License Serial Number 4028

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.000
24 hour precipitation(inches) = 6.300
P6/P24 =   47.6%
San Diego hydrology manual 'C' values used

++
Process from Point/Station   10.000 to Point/Station   12.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[UNDISTURBED NATURAL TERRAIN   ]
(Permanent Open Space   )
Impervious value, Ai = 0.000
Sub-Area C Value = 0.200
Initial subarea total flow distance = 528.000(Ft.)
Highest elevation = 438.100(Ft.)
Lowest elevation = 435.000(Ft.)
Elevation difference =   3.100(Ft.) Slope = 0.587 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.59 %, in a development type of
 Permanent Open Space
In Accordance With Figure 3-3

Initial Area Time of Concentration = 13.68 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.2000)*(50.000^.5)/(0.587^(1/3)]= 13.68
The initial area total distance of 528.00 (Ft.) entered leaves a
remaining distance of 478.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 6.53 minutes
for a distance of 478.00 (Ft.) and a slope of 0.59 %
with an elevation difference of 2.81(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
= 6.529 Minutes
Tt=[(11.9*0.0905^3)/(2.81)]^.385= 6.53
Total initial area Ti = 13.68 minutes from Figure 3-3 formula plus
6.53 minutes from the Figure 3-4 formula = 20.21 minutes
Rainfall intensity (I) = 3.211(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.200
Subarea runoff = 3.384(CFS)
Total initial stream area = 5.270(Ac.)
End of computations, total study area = 5.270 (Ac.)