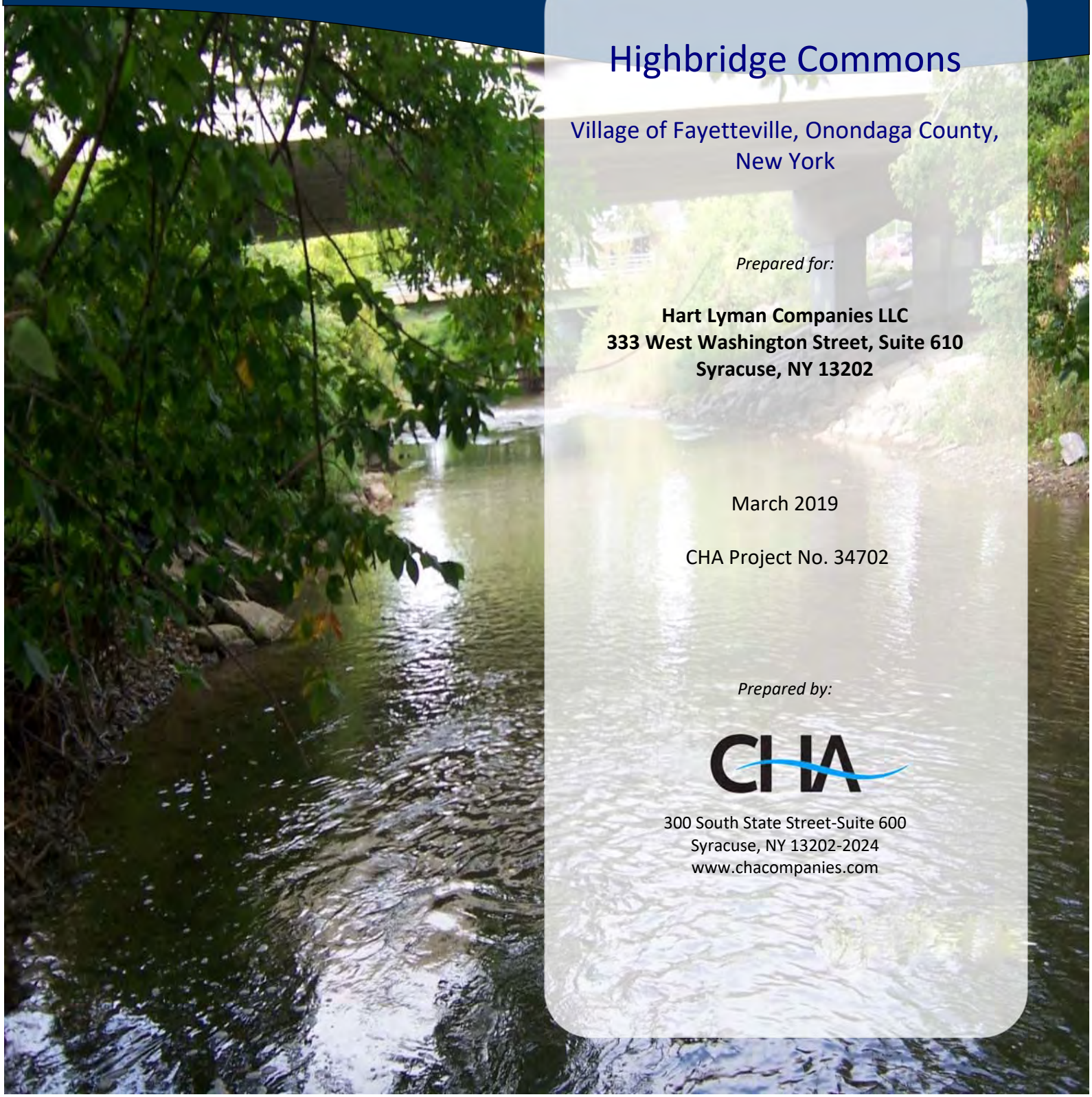
FLOODPLAIN EVALUATION



Highbridge Commons

Village of Fayetteville, Onondaga County, New York

Prepared for:

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March 2019

CHA Project No. 34702

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Highbridge Commons Floodplain Evaluation

Hydrologic & Hydraulic Report

Table of Contents

1.0 PROJECT DESCRIPTION 1

2.0 NATIONAL FLOOD INSURANCE PROGRAM REQUIREMENTS 1

3.0 FLOODPLAIN EVALUATION 1

4.0 HYDROLOGIC ASSESSMENT 2

5.0 HYDRAULIC ANALYSIS 2

5.1 Methodology 2

5.2 Duplicate Effective Model 3

5.3 Corrected Effective Model 3

5.4 Revised Reach Tie-In to the Effective Flood Insurance Study 5

5.5 Existing Conditions Model 6

5.6 Proposed Condition Results 6

6.0 RESULTS AND CONCLUSIONS 8

Highbridge Commons Floodplain Evaluation
Hydrologic & Hydraulic Report

List of Figures

Figure 1 – General Location Map

Figure 2 – Flood Insurance Study (FIS) Overview Map

Figure 3 – Existing Conditions Map

Figure 4 – Proposed Conditions Map

List of Tables

Table 1 – Limestone Creek Design Flows

Table 2 – 100-Year Profile Comparison Effective FEMA vs. Duplicate Effective Model

Table 3 – 100-Year Profile Comparison Effective FEMA vs. Corrected Effective Model

Table 4 – Conformance with NFIP Model Tie-in Regulations

Table 5 – Comparison of Existing and Proposed Models

Appendices

Appendix A – Figures

Appendix B – Supporting Information

Appendix C – Model Output

Appendix D – Village of Fayetteville Forms / FEMA Forms

1.0 PROJECT DESCRIPTION

The project site is located on the western overbank of Limestone Creek, just upstream of West Genesee Street (Route 5) in the Village of Fayetteville, Onondaga County, New York (see Figure 1 – Location Map). Hart Lyman Companies LLC proposes to redevelop approximately 1.8 acres at this location, including the removal of three existing buildings and the construction of two new buildings with adjacent parking facilities. A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) for Onondaga County (November 2016) indicates that Limestone Creek has been studied by detailed methods, and a base (100-year) flood elevation and regulated floodway have been established. As the project site is located within the regulated floodway, a technical evaluation is required to show that the proposed redevelopment will not adversely impact base flood elevations along Limestone Creek. In order to maintain the conveyance capacity of the 100-year floodplain, the project will minimize any changes to existing grade, while reducing the building footprint by approximately 300 square feet to mitigate the potential for the accumulation of debris. As a result, the proposed redevelopment will maintain the conveyance capacity of the regulated floodway and avoid any potential adverse impacts to base flood elevations along Limestone Creek.

Consistent with the effective FIS, all references to left to right, are defined looking downstream and elevations are presented in the North American Vertical Datum of 1988 (NAVD88).

2.0 NATIONAL FLOOD INSURANCE PROGRAM REQUIREMENTS

Encroachment in floodplains, such as the placement of artificial fill, can reduce the conveyance capacity of the floodplain, thus potentially increasing flood elevations and hazards to adjacent properties. For the purposes of the National Flood Insurance Program (NFIP), the concept of a floodway is used to assist in the matter of flood management. Under this concept, the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the area of the channel, which must be kept free of encroachment, so the 100-year flood can be conveyed while limiting the increase to flood elevations. As a minimum standard, FEMA limits this increase to one foot. The requirements pertaining to floodplain management contained in the FEMA Flood Damage Prevention Guidelines require that the following conditions be met:

- Any structures and/or fill associated with the proposed work cannot raise upstream 100-year (base) flood elevations more than a foot at any point.
- All encroachments including fill, new construction, substantial improvements, and other development are prohibited within the limits of the floodway unless a technical evaluation demonstrates that such encroachments will not result in any increase in floodway water surface elevations during the occurrence of the base flood.

3.0 FLOODPLAIN EVALUATION

Based on the preliminary design plans, the redevelopment of the site will include regrading and the placement of fill (buildings) within the floodway of Limestone Creek (See Figure 2 – FIS Overview Map). As such, CHA developed a hydraulic model to evaluate the potential impacts consistent with the NFIP requirements. For the purposes of this analysis, the study reach extends approximately 1,830 feet from FIS Section AP (±900 feet downstream of Genesee Street) to Section AT (±930 feet upstream of Genesee Street).

At this site, a levee was observed to extend along the western embankment of Limestone Creek. Based on a review of the FEMA backup model (effective model), two separate geometries were initially developed to evaluate the regulated base flood elevations and floodway. The first geometry assumes that the levee overtops/breaches thus allowing flow behind the levee. Since this geometry allows flow in the left overbank and increases the width of the channel, this scenario provides lower base flood elevations but conservative inundation limits. Alternatively, the second geometry assumes that the levee does not overtop/breach. Since this geometry does not allow flow in the left overbank (confined to the channel), this scenario provides conservative base flood elevations but significantly reduces the inundation limits. Since the levee is not certified, the first geometry was used to develop the Flood Insurance Rate Map (FIRM). As such, CHA utilized the first geometry to evaluate the potential impacts of the proposed project.

Although the base flood elevation published in the FIRM references the first geometry explained above, CHA found that the fill associated with the levee was not included in the cross-section geometry. Therefore, for the purposes of this analysis, CHA added the levee to the cross-section geometry based on the recent survey data to accurately model the conveyance capacity of the overbank area.

4.0 HYDROLOGIC ASSESSMENT

A review of the contributing watershed indicates that Limestone Creek generally flows from south to north and has a drainage area of approximately 86.6 square miles (sq-mi) at USGS Gage 04245000, located approximately 0.6 miles upstream of the project site. Although this gage is no longer active, it has period of record of 56 years, beginning in 1940 and ending in 1986. The discharges published in the FIS were developed based on a Log-Pearson analysis of the gage data and are summarized in Table 1.

Table 1 – Limestone Creek Design Flows

Site	Watershed Area (mi^2)	Peak Discharges (ft^3/sec)			
		10-Year	50-Year	100-Year	500-Year
USGS Gage 04245000 0.6 mi upstream Genesee Street	86.6	5083	7758	9012	12091

5.0 HYDRAULIC ANALYSIS

5.1 Methodology

In order to evaluate the potential impacts associated with the proposed re-development of the Hart Lyman Companies LLC property, CHA developed a hydraulic model using the Army Corps of Engineers' River Analysis System (HEC-RAS) software (Version 5.0.3). Subcritical flow scenarios were modeled for the 10-, 50-, 100- and 500-year flood events and starting water surface elevations were referenced from the FIS profiles at the downstream terminus of the model reach.

Consistent with standard engineering guidance, the hydraulic results presented in this report are based on the assumption of unobstructed flow. Therefore, the water surface elevations established in the hydraulic model are thus considered valid, if the bridges and cross-sections remain clear of debris.

5.2 Duplicate Effective Model

For the purposes of this analysis, CHA obtained the effective model from the New York State Department of Environmental Conservation (DEC). Based on a review of the available information, the effective model was originally developed using HEC-RAS (Version 3.1.3). Therefore, CHA developed the duplicate effective model by importing the effective model into the most recent version of HEC-RAS (Version 5.0.3). In order to verify that the model input was transferred correctly, the water surface elevations during the base (100-year) flood event were compared. Table 2 provides a comparison of the FEMA FIS (effective model) and duplicate effective water surface elevations.

Table 2 – 100-Year Profile Comparison Effective FEMA vs. Duplicate Effective Model

Model Station	Base Flood Elevation (ft-NAVD88)			Floodway Elevation (ft-NAVD88)		
	FEMA	DUPLICATE EFFECTIVE	Δ	FEMA	DUPLICATE EFFECTIVE	Δ
47224 (DS Model Limits) FEMA Section AP	434.4	434.4	0.0	434.9	435.0	0.1
47431 FEMA Section AQ	434.5	434.5	0.0	435.1	435.2	0.1
47681 FEMA Section AR	434.6	434.6	0.0	435.3	435.4	0.1
48404 FEMA Section AS	439.6	439.6	0.0	440.0	440.0	0.0
49053 (US Model Limits) FEMA Section AT	440.8	440.8	0.0	441.0	441.0	0.0

Although no changes were made to the model inputs, a change in water surface elevations was observed in the encroached model results near the downstream boundary. Based on a review of the hydraulic model, the difference was found to be caused by differences in the bridge routines between version 3.1.3 to 5.0.3.

5.3 Corrected Effective Model

A corrected effective model was developed to represent any changes in the site since the FEMA model was completed in July 2007. Several sources of data were referenced to update the model including 1-meter Light Detection and Ranging (LiDAR) data from 2016, base mapping for the existing parcel from 2015 and the latest site plan for the proposed development from March 2019. Based on a review of these data sources, several edits were made to the duplicate effective model:

- The effective model was truncated such that the geometry extends from FIS Section AP (Sta. 47224) to FIS Section AT (Sta. 49053) which are the designated tie-in boundaries to the effective FIS. The downstream boundary condition utilized a known water surface elevation that referenced FIS Section AP (Sta. 47224).
- Geometry points representing the non-certified levee feature were added back into the left overbank geometry at FIS Section (Sta. 48176) and FIS Section (Sta. 48404) to represent the conditions that exist on the site and to provide a more conservative assessment given the loss of conveyance area associated with the levee berm.
- Three cross-sections were added: XS 48239.38, XS 48292.29 and XS 48347.24 (utilizing the LiDAR data and base survey mapping from the plans within the project site) to represent changes in grading and building placement from the existing to proposed condition. The channel data and inverts where established based on interpolation between the bounding FIS sections.
- Within the limits of the project site, cross-sections were edited to reflect the 2015 base surveyed mapping. As the elevations from this document were referenced to NGVD29, they were transferred to NAVD88 (NAVD88=NGVD29-0.57ft), to be consistent with vertical datum used in the FEMA model.
- To represent the change in conveyance associated with differences in the size and location of on-site structures, they were represented using blocked obstructions in the existing and proposed condition models. In addition, to compensate for the loss of conveyance and potential rise in water surface elevation (WSE) associated with the blocked obstructions, the overbank Manning's n was reduced (0.1 to 0.06) to be more representative of the hydraulic conditions on the site.
- Floodway encroachment stations were established for the added sections: XS 48239.38, XS 48292.29 and XS 48347.24 using Method 4 Equal Conveyance method to establish encroachment stations and checked with NFHL mapped limits.
- Due to the extensive overtopping of the left approach roadway, the high flow methodology was changed from pressure to energy at Bridge STA 48097.

A comparison of the 100-year water surface elevations from the effective model and corrected effective models are presented in Table 3 on the following page.

Table 3 – 100-Year Profile Comparison Effective FEMA vs. Corrected Effective Model

Model Station	Base Flood Elevation (ft-NAVD88)			Floodway Elevation (ft-NAVD88)		
	FEMA	CORRECTED EFFECTIVE	Δ	FEMA	CORRECTED EFFECTIVE	Δ
47224 (DS Model Limits) FEMA Section AP	434.4	434.4	0.0	434.9	435.0	0.1
47431 FEMA Section AQ	434.5	434.5	0.0	435.1	435.2	0.1
47681 FEMA Section AR	434.6	434.6	0.0	435.3	435.4	0.1
48404 FEMA Section AS	439.6	440.1	0.5	440.0	440.3	0.3
49053 (US Model Limits) FEMA Section AT	440.8	440.9	0.1	441.0	441.1	0.1

Resultant changes are due to the geometric adjustments due to addition of existing features which include site surveyed existing base mapping, LiDAR data, existing levee berm geometry and blocked obstructions representing the existing buildings onsite.

5.4 Revised Reach Tie-In to the Effective Flood Insurance Study

According to 44 CFR Part 65.6 (a) (2), the corrected effective or existing conditions model must tie into the effective water surface elevation profiles to within approximately 0.5 feet. Table 4 shows the that the effective model tie-in is within the acceptable limits.

Table 4 – Conformance with NFIP Model Tie-in Regulations

Model Station	Base Flood Elevation (ft-NAVD88)		
	FEMA	CORRECTED EFFECTIVE	Δ
47224 (DS Model Limits) FEMA Section AP	434.4	434.4	0.0
49053 (US Model Limits) FEMA Section AT	440.8	440.9	0.1

5.5 Existing Conditions Model

The existing condition model was developed to reflect any changes in flow conditions and/or undocumented, man-made changes that have occurred within the floodplain since the effective study was adopted, but prior to the construction of the proposed project. However, since there were no changes in flow conditions and CHA did not identify any undocumented man-made changes within the regulated floodplain, the existing condition geometry matches the corrected effective model geometry. The location of the modeled cross sections and existing buildings are shown in Figure 3 – Existing Conditions.

5.6 Proposed Condition Results

To ensure that the proposed project meets the NFIP guidelines, the proposed buildings and associated grading were designed to provide a net increase in conveyance through the site. As shown in the most recent site plans (March 2019), the existing building footprint is 14,330 square feet and the proposed building footprint is 14,030 square feet, producing a net reduction of 300 square feet. The brick building located on the southwest corner of the site will be removed to provide additional parking. The changes due to building layout and re-grading will provide a net compensation for conveyance between existing to proposed conditions. In addition, the reoriented position of the proposed building footprint in place of the removed existing building located closest to the left bank at XS 48239.38 increases the available conveyance width within the floodway. The results of the proposed condition analysis are presented in Table 5 below and represented in Figure 4 – Proposed Conditions.

Table 5 – Comparison of Existing and Proposed Models

Model Station	Base Flood Elevation (ft-NAVD88)			Floodway Elevation (ft-NAVD88)		
	Existing	Proposed	Δ	Existing	Proposed	Δ
47224 (DS Model Limits) FEMA Section AP	434.4	434.4	0.0	435.0	435.0	0.0
47431 FEMA Section AQ	434.5	434.5	0.0	435.2	435.2	0.0
47681 FEMA Section AR	434.6	434.6	0.0	435.4	435.4	0.0
47885 FEMA Section-DS BR	435.9	435.9	0.0	436.1	436.1	0.0
48004 FEMA Section-US BR	437.0	437.0	0.0	437.3	437.3	0.0
48038 FEMA Section-DS BR	437.4	437.4	0.0	437.4	437.4	0.0
48176 FEMA Section-US BR	439.1	439.1	0.0	439.1	439.1	0.0
48239.38 LiDAR Section	439.9	439.9	0.0	440.0	440.0	0.0
48292.29 LiDAR Section	440.0	440.0	0.0	440.2	440.2	0.0
48347.24 LiDAR Section	440.0	440.0	0.0	440.2	440.2	0.0
48404 FEMA Section AS	440.1	440.1	0.0	440.3	440.3	0.0
48632 FEMA Model Section	440.0	440.0	0.0	440.4	440.4	0.0
49053 (US Model Limits) FEMA Section AT	440.9	440.9	0.0	441.1	441.1	0.0

6.0 RESULTS AND CONCLUSIONS

According to the conceptual design plans for the Highbridge Commons site dated March 2019, the proposed redevelopment will include changes to the existing grading and the removal of approximately 300 square-feet of building footprint from the regulated floodway. Based on the results of the hydraulic analysis, the proposed modifications are expected to maintain or reduce the regulated base (100-year) flood and floodway elevations published in the effective 2016 Onondaga Countywide FEMA FIS for Limestone Creek. As such, the proposed project is consistent with regulations associated with development within the regulatory floodway published in Section 60.3(d)(3) of the National Flood Insurance Program (NFIP). In order to document the results of the analysis and meet the requirements of the Village of Fayetteville Floodplain Development Permit, an Engineering "No-Rise" Certification has been completed and is located in the Technical Appendix.

The Flood Disaster Protection Act of 1973 and the Flood Insurance Reform Act of 1994, as amended, requires those Federal agencies, other than FEMA, that are responsible for overseeing federally-regulated and insured lenders, to mandate the purchase of flood insurance for properties located within an area having special flood hazards for the term of the loan. Since the proposed buildings will be constructed within a Special Flood Hazard Area, the owners will be required to obtain flood insurance through an insurance agent or an insurer participating in the NFIP if financing is necessary.

In addition, FEMA guidelines state that a community's permit file must have an official record that shows new buildings and substantial improvements in all identified Special Flood Hazard Areas (SFHAs) are properly elevated. This elevation information is needed to show compliance with the floodplain management ordinance. Consistent with the New York State 2017 Supplement for the International Building Code (Code) and the Village of Fayetteville Chapter 81 - Flood Damage Protection, all residential and commercial structures constructed within the 100-year floodplain will be required to have a finished floor elevation (including basements) located at least 2.0 feet above the base (100-year) flood elevation. The NFIP Elevation Certificate (EC) (FEMA form 086-0-33) is an administrative tool of the NFIP which is to be used to provide elevation information necessary to ensure compliance with community floodplain management ordinances. The Elevation Certificate (EC) is used only to certify building elevations. A separate certificate is required for floodproofing. Under the NFIP, non-residential buildings can be floodproofed up to or above the base (100-year) flood elevation (BFE). A floodproofed building is a building that has been designed and constructed to be watertight (substantially impermeable to floodwaters) below the BFE. Floodproofing of residential buildings is not permitted under the NFIP unless FEMA has granted the community an exception for residential floodproofed basements. For floodproofed non-residential buildings in communities that have been grated an exception by FEMA, a floodproofing certificate is required.

Technical Appendix

Appendix A

(Figures)

1 inch = 1,500 feet

Highbridge Commons
General Location Map

Village of Fayetteville, Onondaga County, New York

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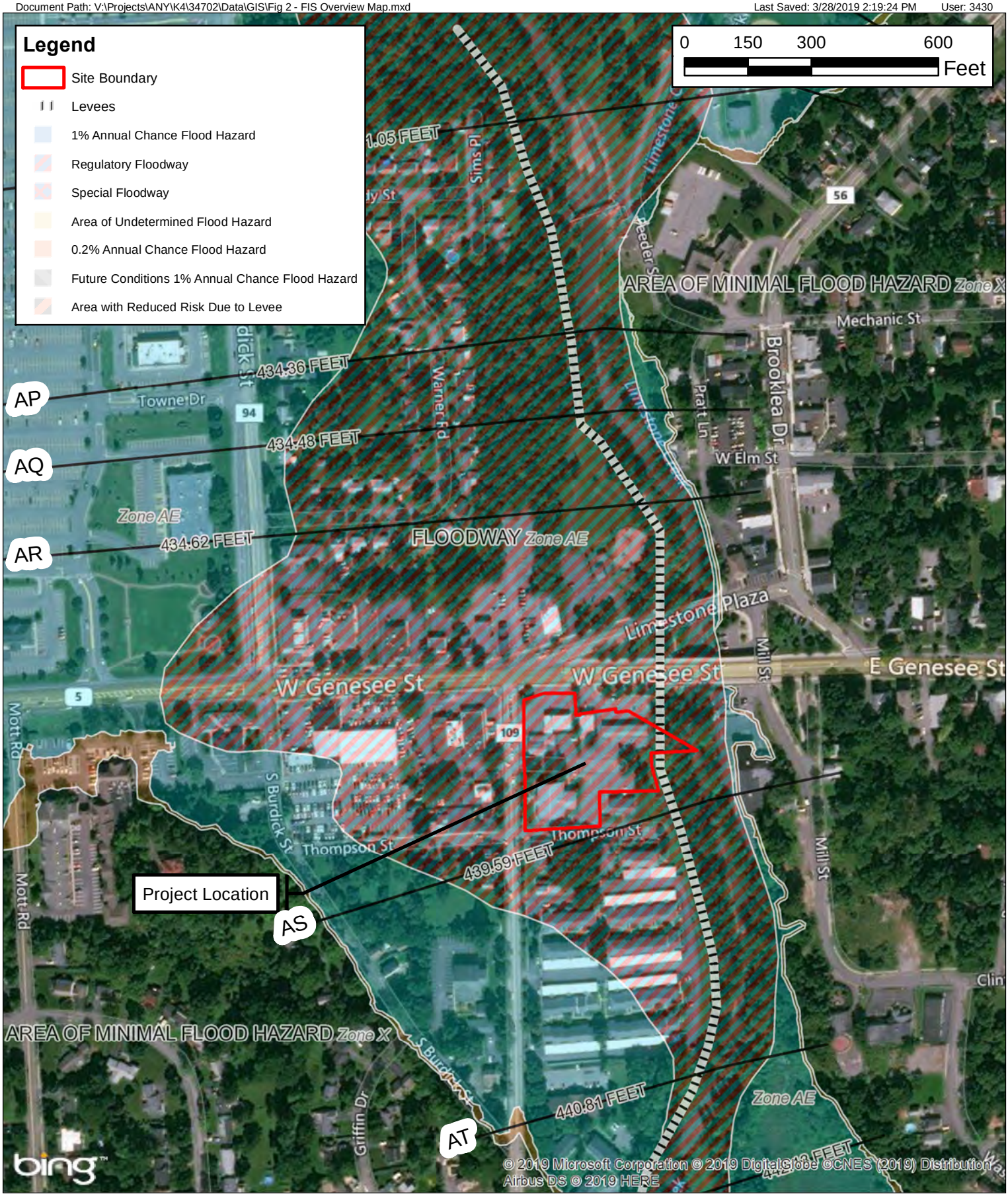
Figure 1



1 inch = 300 feet

Highbridge Commons
FIS Overview Map

Village of Fayetteville, Onondaga County, New York

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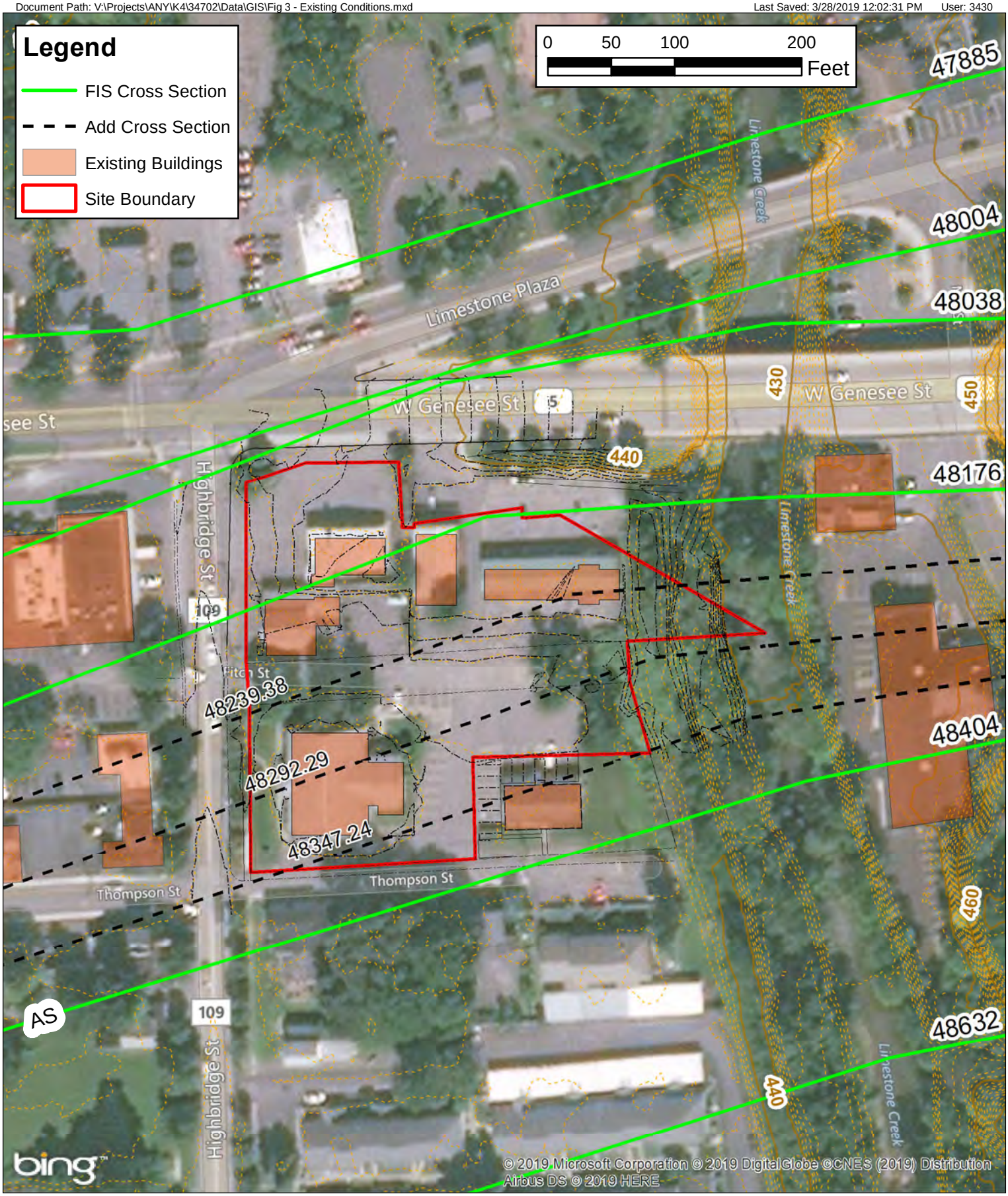
Figure 2



1 inch = 100 feet

Highbridge Commons
Existing Conditions

Village of Fayetteville, Onondaga County, New York

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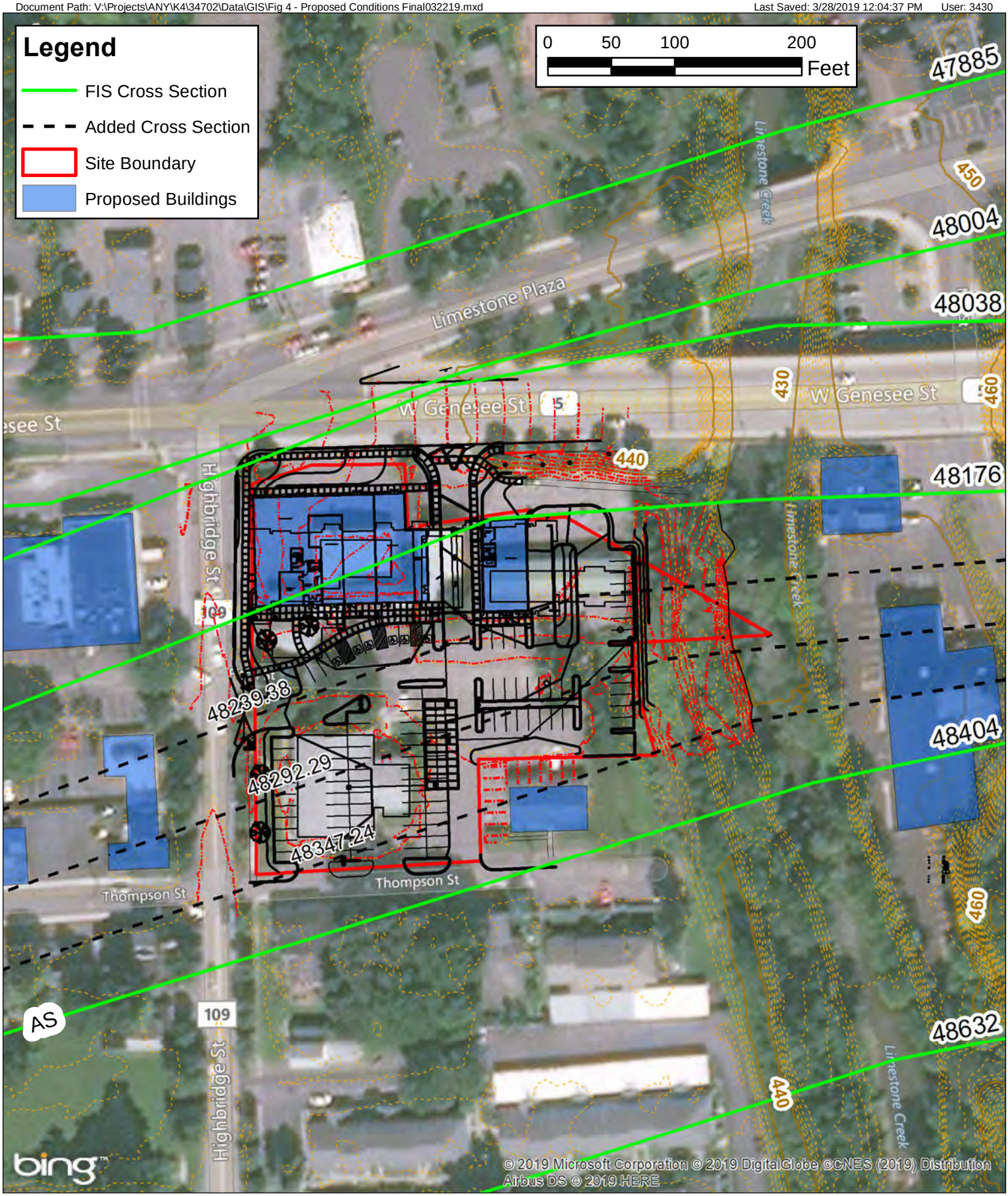
Figure 3



1 inch = 100 feet

Highbridge Commons
Proposed Conditions 03/22/19

Village of Fayetteville, Onondaga County, New York

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Figure 4

Appendix B

(Supporting Information)

Elbridge, Town of:	The hydrologic and hydraulic analyses for the February 16, 1982 FIS and August 16, 1982 FIRM, were prepared by the Buffalo District of the USACE for FEMA, under Inter-Agency Agreement No. IAA-H-18-78, Project Order No. 28. That work was completed in May 1980.
Elbridge, Village of:	The hydrologic and hydraulic analyses for the February 16, 1982 FIS and August 16, 1982 FIRM, were prepared by the Buffalo District of the USACE for FEMA under Inter-Agency Agreement No. IAA-H-18-78, Project Order No. 28. That work was completed in May 1980.
Fayetteville, Village of:	The hydrologic and hydraulic analysis in the April 17, 1985 FIS represent a revision of the original analyses performed by NYSDEC for FEMA, under Contract No. H-4546. The original work was completed in September 1980. The 1985 FIS was prepared by Dewberry & Davis, under agreement with FEMA. That work was completed in May 1984.
Geddes, Town of:	The hydrologic and hydraulic analyses for the August 17, 1981 FIS and February 17, 1982 FIRM, were prepared by NYSDEC for FEMA, under Contract No. H-3945. That work was completed in October 1979.
Jordan, Village of:	The hydrologic and hydraulic analyses for the February 16, 1982 FIS and August 16, 1982 FIRM were prepared by the USACE, Buffalo District, for FEMA under Inter-Agency Agreement No. (IAA)-H-18-78, Project Order No. 28. That work was completed in May 1980.
LaFayette, Town of:	The hydrologic and hydraulic analyses for the October 2, 1984 FIS and April 3, 1985 FIRM, were performed by Staunton & Freeman, for FEMA, under Contract No. H-4742. That study was completed in November 1983.
Liverpool, Village of:	The hydrologic and hydraulic analyses for the August 4, 1980 FIS and February 4, 1981 FIRM, were prepared by NYSDEC for FIA, under Contract No. H-3945. That work, which was

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

As part of this countywide FIS, updated or new analyses were included for the flooding sources shown in Table 3, "Scope of Study for November 4, 2016 Countywide Study."

TABLE 3 - SCOPE OF STUDY FOR NOVEMBER 4, 2016 COUNTYWIDE STUDY

Stream Name	Limits of Revised Study
Harbor Brook	From Confluence with Onondaga Lake to approximately 900 feet upstream of Onondaga Road (NY State Route 173)
Limestone Creek	From Confluence with Chittenango Creek to approximately 320 feet upstream of Pompey Center Road
Meadow Brook	From Confluence with Old Erie Canal Feeder to approximately 190 feet upstream of Meadowbrook Drive
Ninemile Creek	From Confluence with Onondaga Lake to Dam at Otisco Lake
Onondaga Creek	From Confluence with Onondaga Lake to approximately 1.12 miles upstream of Dorwin Avenue
Skaneateles Creek	From Onondaga/Cayuga County Boundary to approximately 120 feet upstream of West Genesee Street

Floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on more up-to-date topographic mapping.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, NYSDEC and the communities within Onondaga County.

This initial countywide FIS incorporates and reviews the determination of letters issued by FEMA resulting in map changes as shown in Table 4, "Letters of Map Change (LOMCs)."

Village of Fayetteville

Floods on Limestone Creek in Fayetteville were recorded at the USGS gaging station in the village as follows: March 28, 1950, with a peak flow of 7,010 cfs and a recurrence interval of 17 years; March 5, 1964 with a peak flow of 4,160 cfs and a recurrence interval of 4 years; and June 21, 1972, with a peak flow of 3,800 cfs and a recurrence interval of 3.5 years (USACE, 1973). The period of record had a maximum flow of 7,490 cubic feet per second (cfs) was recorded on October 28, 1981 Overbank flooding has occurred along Limestone Creek, especially in the northwestern portion of the village.

Since the completion of the original study, another flood occurred on Limestone Creek in 1981. The flood was estimated to have a recurrence interval between 50 and 100 years. During the flood, a levee on the western bank of the creek was breached in several places, causing a split in the flow of Limestone Creek.

Town of Geddes

Records do not indicate any major floods on Ninemile Creek except for the poorly documented flood of 1865 which resulted from failure of a dam at the north end of Otisco Lake. The dam has since been replaced by a modern structural dam.

Heavy rains, especially those occurring in the spring combined with snow-melt, have frequently caused high waters and local flooding. On March 30, 1960, a record discharge of 2,760 cfs was measured on Ninemile Creek at the USGS gage at the Village of Camillus. Stream records at the same gage indicate that a discharge of 2,150 cfs occurred on June 18, 1970 and again on March 15, 1971. There are, however, no newspaper accounts to indicate severe or widespread flooding for these events. One of the most severe basin-wide floods occurred on June 23, 1972 with a recorded discharge of 1,930 cfs. Extensive damage from this relatively low discharge flood was caused by high flood crest elevations resulting from debris blockages in the stream.

Some local flooding occurs in the northwest portion of the town when the Seneca River overflows its banks. One of the most severe floods on record occurred on April 4, 1960 with a discharge of 17,000 cfs and elevation of 371.23 feet (NAVD88), recorded in Baldwinsville. This peak flow and stage occurred again on June 28 and 30, 1972 during Tropical Storm Agnes.

Data on estimated damage to surrounding communities from the overflowing of Onondaga Lake was developed by the USACE (USACE, 1973). The average annual damage was estimated at $45,000, whereas the damage caused by Tropical Storm Agnes was about $375,000 when the lake water level rose to 369.22 feet (NAVD88), approximately a 20-year estimated recurrence interval. About 40 percent of these damages were estimated to have occurred in the Town of Geddes.

was some channel improvement for several hundred feet beyond East Genesee Street.

Just south of the DeWitt town boundary, the Jamesville Reservoir helps to reduce peak flows on Butternut Creek. Although flood protection is not its principal purpose, it does provide some protection for downstream areas.

Town and Village of Elbridge

As of the 1982 FIS, no flood protection measures were initiated along any of the streams in the Town and Village of Elbridge.

Village of Fayetteville

There are no existing or planned flood protection projects in the Limestone Creek and Bishop Brook basins that would have any effect on Fayetteville. The New York State Department of Transportation operates the DeRuyter Reservoir, which diverts into Limestone Creek from the Middle Branch Tioughnioga Creek basin for lockage use in the Erie Canal System. There are no flood control benefits associated with this operation.

A non-certified levee exists on the western bank of Limestone Creek within the Village. The levee has been breached and does not have three feet of freeboard. FEMA specifies that all levees must have a minimum of three foot freeboard against the 1-percent annual chance flooding to be considered a safe flood protection structure.

Town of Geddes

The Onondaga County Water Supply Board operates a dam on Otisco Lake in the upper portion of Ninemile Creek for the singular purpose of water supply. Partial flood peak reduction, limited mostly to the immediate downstream areas, does occur because of the structure. A stream clearance project for Ninemile Creek within the Village of Camillus was completed by the USACE in April 1956.

Village of Jordan

The Buffalo District of the USACE and the State of New York jointly improved Skaneateles Creek (Clearing and Snagging Project) through the Village of Jordan in 1955 under Section 13 of the 1946 Flood Control Act. NYSDEC is responsible for maintenance of the project. This is the only flood protection measure in Jordan.

Town of LaFayette

The Town of LaFayette has no flood protection structures existing or planned. There is, however, a flood protection dam in the Onondaga Indian Reservation located outside the corporate limits. This dam does affect flooding along portions

areal study for which synthetic gage statistics were established. From this, flows were computed as if the stream had an actual gaging station. The "Modified Puls Method" of flood routing was used to evaluate the effect that storage in Jamesville Reservoir has in reducing flows in the downstream section of Butternut Creek.

Town and Village of Elbridge

Discharges for Skaneateles Creek were previously determined in 1979 by a regional regression analysis of five gages within central New York (USACE, 1979). The previous study used drainage area as the only regression analysis variable. In addition, a discharge component was added from Skaneateles Lake (FEMA, 1982f; 1982g).

Flood flow-frequencies for the Seneca River were adopted from the hydrologic analysis of the FIS for the Towns of Lysander and Cato (FEMA, 1981f; 1981c). The frequencies were developed using the log-Pearson Type III method of statistical analysis recommended by the Water Resources Council (US Water Resources Council, 1976). The stage discharge records for the USGS gaging station (No. 04237500, with 25 years of record) located on the Seneca River in Baldwinsville were used in this analysis.

For Dead Creek, the discharge-frequency computations were based on an areal study of gaged streams in the vicinity of the Town of Van Buren. A regional study of the local drainage areas with emphasis on non-regulated streams having from 10 to 200 square miles of area contributing to the gages was prepared. A regional equation and residual mapping coefficients were prepared, and this information was used to establish synthetic gage statistics for Dead Creek. Using this information, flows were computed as if Dead Creek had an actual gaging station.

The flood level frequencies for Cross Lake were previously developed for the Town of Lysander which is located on the west shore of the lake (US Water Resources Council, 1976). The flood elevation for the Lysander study was evaluated and was found to be acceptable so a review of the hydrology was not carried out.

Village of Fayetteville

Discharges for the Limestone Creek were previously determined using a gage analysis of peak flow data at USGS Gage 04245000 - Limestone Creek at Fayetteville, NY (FEMA, 1978b; 1992a; 1984a; 1985; and 1982e). This gage analysis was based on a LP3 probability distribution.

For Bishop Brook, discharge-frequency values were calculated using USGS Water-Supply Paper 1677 (USGS, 1965). With this technique, floods of

recurrence intervals up to 1-percent annual chance were determined. The 0.2-percent annual chance flood was estimated by graph extrapolation.

Town of Geddes

The initial hydrologic analysis for the Town of Geddes was completed in 1979 and incorporated the development of an "exceedance interval discharge curve" with extrapolation of discharges for the 1-percent annual chance and 0.2-percent annual chance recurrence intervals (FEMA, 1999a; 1981d). As stated in the 1999 Town of Camillus FIS (FEMA, 1999a), the 1979 hydrologic analysis was deemed inappropriate to carry forward, as it was based on inadequate data and did not account for the regulated nature of the stream; therefore, the 1999 Town of Camillus FIS (FEMA, 1999a) utilized a gage analysis using a plotting position methodology based on an LP3 distribution. The 1999 FIS lowered the discharges on Ninemile Creek significantly within the Town of Camillus; however, the discharges in the Town of Geddes were not updated from the 1981 FIS.

The hydrologic analyses for the Seneca River were obtained from the FIS for the Towns of Clay and Van Buren (FEMA, 1992b; 1984d). These consisted of a log-Pearson Type III analysis of the stream gages on the Seneca and Oswego Rivers at Baldwinsville and Oswego, New York, respectively (US Water Resources Council, 1976).

Discharges for Geddes Brook were calculated using an exceedance interval-discharge curve developed from USGS Circular 454 (USGS, 1961).

An exceedance interval/lake elevation curve was used to compute the elevations of Onondaga Lake (USACE, 1973).

Village of Jordan

Discharges for Skaneateles Creek were previously determined in 1979 by a regional regression analysis of five gages within central New York (USACE, 1979). The previous study used drainage area as the only regression analysis variable. In addition, a discharge component was added from Skaneateles Lake (FEMA, 1982h).

Town of LaFayette

The discharge frequency data for Butternut Creek were based on statistical analyses of discharge records at USGS gage (No. 04245200 with 17 years of record) operated on Butternut Creek, approximately 4 miles upstream of Jamesville, New York. This analysis followed the standard log-Pearson Type III method as outlined by the Water Resources Council (US Water Resources Council, 1976). The discharges at the gage, with a drainage area of 32.2 square miles, were transferred using a drainage area ratio and a coefficient of 0.8. Outflow discharges were obtained by routing a 1-percent annual chance frequency

A detention basin on Harbor Brook immediately upstream of Velasko Road and USGS Gage 04240100 was built in 1980. The detention basin was designed to provide flood mitigation up to the 4-percent annual chance flooding event, but does not provide flood control for the larger flooding events (NYSDEC, 1992). Therefore, the effect of the detention basin was considered in the gage analysis to estimate the 10-percent annual chance discharge at the USGS Velasko Road gage, but not for the 2-, 1- , and 0.2-percent annual chance discharges. The construction of the detention basin in 1980 creates a split gage record, which represents 20 years of pre-basin record and 26 years of post-basin record. Also, based on the gage records of surrounding gages, the pre-basin period from 1960-1979 was found to be a wetter period than the 1980-2006 post-basin period. To account for the effects of the detention basin and climatic conditions on the 10-percent annual chance flood event, it was assumed that a portion of the reduction of the 10-percent annual chance discharges in the post-construction period was due to the climatic situation of that period, and that a portion of the discharge reduction resulted from construction of the basin. Based on the gage record of nearby USGS Gage 04239000 (Onondaga Creek at Dorwin Avenue), the portion of discharge reduction attributed to the detention basin was estimated to be 20%. The 10-percent annual chance discharge was calculated by reducing the discharge derived from the full period of record at the Velasko Road gage by 20% because the post-construction gage record at the Velasko Road gage appeared to generate lower discharges independent of construction of the detention basin.

For the first two nomination points upstream of the detention basin, a gage transfer was performed based on discharges calculated by gage analysis of the pre-basin record (1960-1979) at the Velasko Road gage. For the most upstream nomination point on Harbor Brook (in the Town of Onondaga 100 feet upstream of Onondaga Road), the drainage area was outside of 150% of the gaged drainage area at the Velasko Road gage. Therefore, a gage transfer was not used at this nomination point. Instead, the previous FIS discharges at this point, based on a USACE HEC-1 model (completed 1989), were retained for this revised study.

Limestone Creek

Limestone Creek originates from Deruyter Reservoir, which is located in Madison County, Town of Cazenovia. Deruyter Reservoir also drains to the Tioughnioga Watershed to the south. As indicated in the Village of Fayetteville FIS (FEMA, 1985), the New York State Canal Corporation has previously used Deruyter Reservoir to provide flow for the Barge Canal system (now Erie Canal). The Canal Corporation no longer uses the Deruyter Reservoir to supply the Erie Canal system. Deruyter Reservoir also provides no flood protection for the Limestone Creek watershed (Village of Fayetteville FIS [FEMA, 1985] and Town of Pompey FIS [FEMA, 1978b]).

In this revised study, discharges for the majority of the Limestone Creek nomination points were calculated by weighting gage analysis derived discharges with discharges derived by regional regression analysis. The gage analysis was based upon 56 years (1940-1995) of annual peak flow data available at USGS Gage 04250000 - Limestone Creek at Fayetteville, NY. The gage analysis

utilized the USGS PEAKFQ program (USGS, 2002a) in accordance with USGS WRC Bulletin 17B guidance (USGS, 1982). The USGS PEAKFQ program was used due to the unregulated nature of the stream.

Discharges for Limestone Creek also were calculated using the regional regression analysis in accordance with USGS 90-4197 (USGS, 1991). Due to the suburban/urban nature of the watershed within the study area, an urban adjustment was applied to the regression analysis discharges. The urban adjustment was based upon the USGS Water Supply Paper 2207 method (USGS, 1983). In this methodology, the level of urbanization for the stream watershed was estimated using a basin development factor (BDF) which assessed four characteristics of the drainage system for development: channel improvements, channel linings, storm drains/storm sewers, and curb-and-gutter streets. Using the BDF, the urban-adjusted regression discharges were calculated based on the USGS Water-Supply Paper 2207 regression equations (USGS, 1983). The discharges determined by gage analysis were then weighted with the urban-adjusted regression analysis discharges for the nomination points having drainage within 50% to 150% of the drainage area at the gage, in accordance with USGS 90-4197 (USGS, 1991). The drainage areas for the two most downstream nomination points were outside of 150% of the gage drainage area. For these two nomination points, discharges were calculated using the regional regression analysis only (not adjusted using the urban adjustment, due to the low degree of urbanization for this portion of the watershed).

Meadow Brook

Over 30 years of gage records were available for this revised study. These records, which were not available for the earlier studies, provided a sufficient basis to utilize a gage analysis to determine Meadow Brook discharges for the revised study. In the gage analysis, 34 years (1971-2004) of annual peak flow data at USGS Gage 04245236 (Meadow Brook at Hurlburt Road) were analyzed using a graphical probability plotting methodology, based on an LP3 distribution. A detention basin, built in 1975 and maintained by Onondaga County, is located within the upper third of the Meadow Brook watershed. Additional smaller detention basins have been built in the watershed since 1975. The main detention basin provides storage and flood attenuation up to the 20-percent annual chance recurrence interval storm (Barton & Loguidice, 1998); however, for events greater than the 20-percent annual chance flood, Meadow Brook can be considered an unregulated stream.

In addition to the gage analysis, discharges for Meadow Brook were calculated using the regional regression analysis in accordance with USGS 90-4197 (USGS, 1991). Due to the urban nature of the watershed within the study area, an urban adjustment was applied to the regression analysis discharges using the USGS/Sauer methodology (USGS, 1983) (see Limestone Creek section for urban adjustment methodology). The discharges determined by gage analysis were then weighted with the urban-adjusted regression analysis discharges for the nomination points having drainage area within 50% to 150% of the drainage area at the gage, in accordance with USGS 90-4197 (USGS, 1991).

TABLE 5 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-percent chance	2-percent chance	1-percent chance	0.2 percent chance
LIMESTONE CREEK					
At confluence with Chittenango Creek	180.83	8,360	12,210	13,870	18,330
Downstream of confluence with Butternut Creek	169.09	7,850	11,480	13,040	17,250
Upstream of NYS Thruway	100.26	6,470	9,670	11,230	15,010
Upstream of NYS Thruway	99.39	6,420	9,610	11,170	14,950
Upstream of Minoa Road at corner of Minoa	98.05	6,250	9,380	10,910	14,620
Erie Canal	94.34	5,740	8,660	10,070	13,510
At USGS Gage 04245000	86.56	5,080	7,760	9,010	12,090
At Village of Fayetteville upstream of corporate limits	86.21	5,060	7,720	8,970	12,030
At Downstream Village of Manlius Limit	83.13	4,920	7,460	8,670	11,630
Upstream of Route 173	56.09	3,630	5,260	6,060	8,050
At upstream Village of Manlius limit	53.26	3,240	4,700	5,400	7,190
At Pompey Center Road	52.87	3,200	4,630	5,340	7,100
Cross Section A	50.56	3,822	6,117	7,323	10,162
Cross Section B	50.3	3,807	6,092	7,293	10,120
Cross Section N	34.94	2,844	4,552	5,449	7,561
Cross Section V	10.16	1,059	1,694	2,029	2,815
MEADOW BROOK					
At Confluence with the Erie Canal	4.37	690	910	1,010	1,230
At City of Syracuse corporate limits	3.99	550	760	850	1,090
At DeWitt Street	3.53	420	610	710	950

* Not computed

and by field survey for corresponding stream channel locations. Cross sections were also taken at close intervals upstream and downstream of bridges in order to compute the significant backwater effects of these structures.

Village of East Syracuse

For South Branch Ley Creek, water-surface elevations were calculated using the USACE HEC-2 step-backwater computer program (USACE, 1968). Starting water-surface elevations for the South Branch Ley Creek and Butternut Creek were obtained from the Town of DeWitt FIS (FEMA, 1978a).

Town of Elbridge

Water-surface elevations for the Seneca River were taken from the Flood Insurance Studies for the contiguous Towns of Lysander and Cato (FEMA, 1981f; 1981c). Water-surface elevations for floods of the selected recurrence intervals on Skaneateles Creek and Dead Creek were computed through the use of the USACE HEC-2 step-backwater computer program (USACE, 1968). Starting water-surface elevations for Skaneateles Creek were calculated starting at critical depth downstream of the corporate limits. Starting water-surface elevations for Dead Creek were taken from the Seneca River.

Due to the small size of the structure that allows Dead Creek to flow under the Erie Canal, flood flows on Dead Creek were extremely limited.

The hydraulic analyses for Cross Lake were carried out in the FIS for the Town of Lysander (FEMA, 1981f). A straight-forward averaging technique, based on elevations determined in the FIS for the Towns of Brutus and Van Buren for the portions of the Seneca River upstream and downstream of Cross Lake, was used to determine the water-surface elevations of selected recurrence intervals (FEMA, 1997; 1984d). Because of the relatively minor change in water-surface elevation between the points of previous study, this method was determined to be acceptable for the purposes of this study.

Village of Elbridge

Water-surface elevations for floods of selected recurrence intervals were computed through the use of the USACE HEC-2 step-backwater computer program (USACE, 1968). Starting water-surface elevations for Skaneateles Creek were calculated starting at critical depth downstream of the village corporate limits.

Village of Fayetteville

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (USACE, 1968). The revised hydraulic analyses for Limestone Creek utilized two models. One model was used for the area west of the levee in the overbank, while the

second was used on the main channel. The overbank model carried approximately 50 percent of the 1-percent annual chance storm.

Starting water-surface elevations for Bishop Brook were determined by the slope/area method. Starting water-surface elevations for Limestone Creek were obtained from the FIS for the Town of Manlius (FEMA, 1992a).

Town of Geddes

For the streams studied in detail, flood profiles were calculated using the USACE HEC-2 water-surface profiles computer program (USACE, 1968). The slope/area method was used to determine starting water-surface elevations for Ninemile Creek and Geddes Brook. For the Seneca River, the starting water-surface elevations were taken from the FIS for the Town of Clay and the Clay/Township of Salina corporate limits (FEMA, 1992b; 1982i). The backwater analysis was then carried through the Towns of Salina and Geddes and checked with the downstream corporate limits at the Town of Van Buren and given in the FIS for the Town of Van Buren (FEMA, 1984d). For Harbor Brook the starting water-surface elevation was determined by a separate culvert analysis. This was done where Harbor Brook flows into a long culvert (slightly over a mile in length) at Delaware Street in the City of Syracuse. Harbor Brook flows out of the culvert for a short distance before it reaches Onondaga Lake still within the boundaries of the City of Syracuse.

It was found in the hydraulic analysis of Onondaga Lake and the Seneca River that the Onondaga Lake Outlet (approximately 3,500 feet of channel between the lake and the Seneca River) can be considered as part of the lake system. Hydraulic control of Onondaga Lake Outlet up to the Seneca River is from Onondaga Lake because the outlet at this point has a very flat hydraulic gradeline and a hydrologically slow response system. This means the lake outlet often has no flow or very little flow when the Seneca River is at its highest flood level, and thus acts essentially as dead storage or, for hydraulic purposes, as part of the lake system.

Village of Jordan

Water surface elevations for the floods of selected recurrence intervals were computed through the use of the USACE HEC-2 step-backwater computer program (USACE, 1968). Starting water surface elevations for Skaneateles Creek were calculated starting at critical depth downstream of the village corporate limits.

Town of LaFayette

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (USACE, 1968). Starting water-surface elevations for Butternut Creek were taken from the

The hydraulic model used for this FIS was the USACE Hydraulic Engineering Center River Analysis Stream, version 3.1.3 (HEC-RAS 3.1.3). The models were developed using recently acquired LIDAR land data, field measurements of hydraulic structure information, and updated hydrologic data. The models were run for the peak 0.2-, 1-, 2-, and 10-percent annual chance frequency storm discharges. Although no high-water marks were available for the studied streams, calibration was performed using USGS gage locations.

Starting conditions for the hydraulic models were set to normal depth using starting slopes calculated from water surface elevation values from LIDAR data.

A non-certified levee exists along the western bank of Limestone Creek within the Village of Fayetteville. Water-surface elevations were computed on the river side of the levee using a "with levee" HEC-RAS analysis and water-surface elevations on the land side of the levee were computed using a "with-out levee" HEC-RAS analysis.

A 2,300 foot long dike exists along Onondaga Creek within the Town of Onondaga. However, because the dike no longer is effective, a HEC-RAS 4.1 analysis was completed only for existing conditions along Onondaga Creek within the Town of Onondaga.

In 2013 the City of Syracuse and NYSDEC contracted O'Brien and Gere Engineers, Inc. to restudy Onondaga Creek, at various survey locations, to determine channel conditions and sediment depth. Based on their findings O'Brien and Gere Engineers revised the June 2012 HEC-RAS hydraulic modeling near the I-690 overpass, in downtown Syracuse, to reflecting new channel dredging, new survey data and revised roughness coefficients for Onondaga Creek. HEC-RAS model also incorporated low-chord elevation data for the downstream opening of Pedestrian Bridge 1 at River Station 6021, obtained from the City of Syracuse Engineering Department and C&S Engineers on August 13, 2012. The updates to Onondaga Creek affect the Base Flood Elevations from Lake Onondaga to The Onondaga Indian Reservation.

Harbor Brook contains an approximately 4,000 foot long culvert in the City of Syracuse. The brook was modeled in two segments rather than estimate conveyance through the culvert under the city. The upstream segment of the brook contains a county-maintained detention basin at Velasko Road. The detention basin is designed for a 4-percent annual chance flood. and is a variable control outlet, with a maximum design outflow of 480 cfs. The outlet was modeled as a static outlet limiting flow to 480 cfs in a basin-full condition.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevation shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

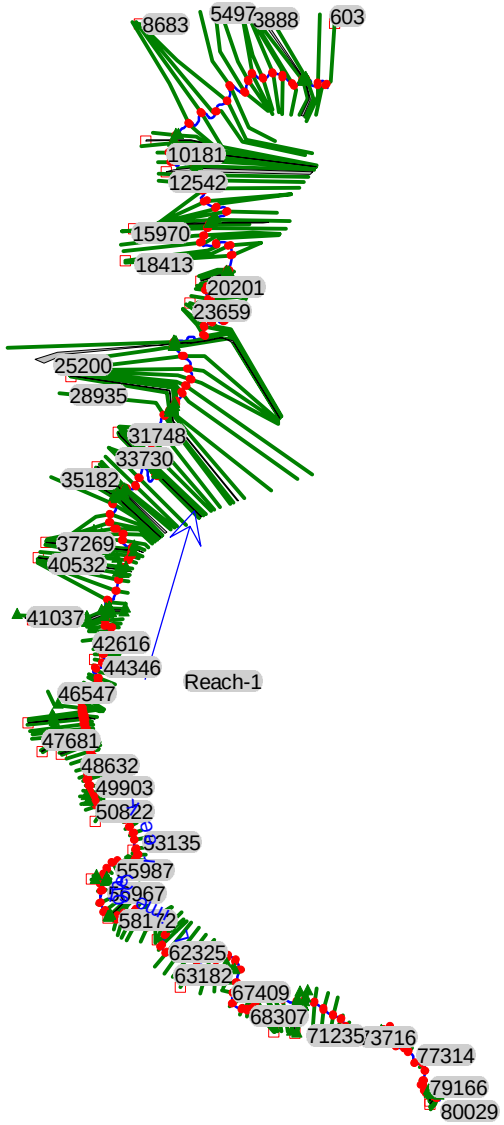
Roughness factors (Manning's "n") used in the hydraulic model were obtained based on field observation. Table 7, "Manning's N Values" provides a summary of the Manning's roughness factors used for the detailed studies

Appendix C

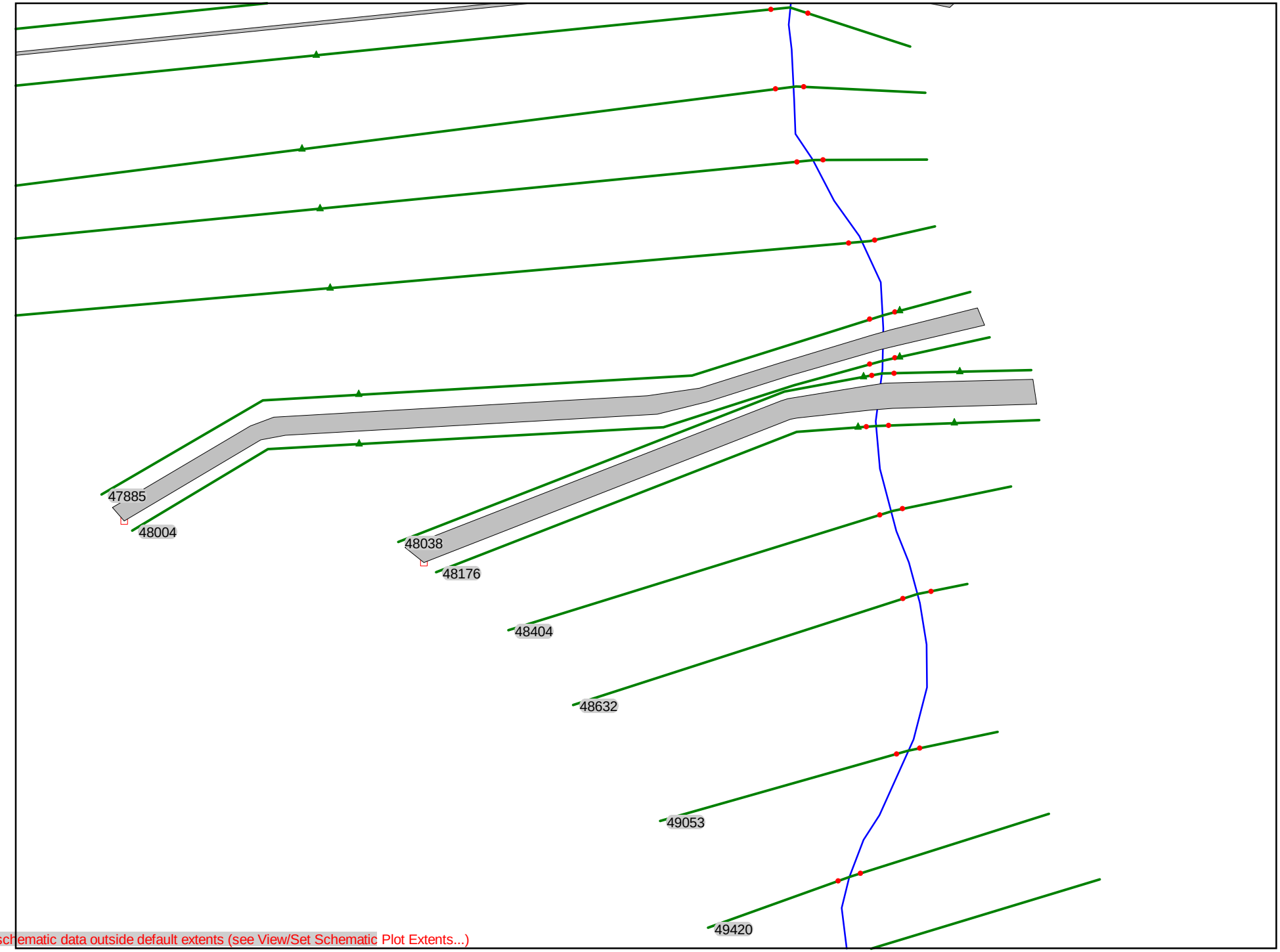
(Model Output)

FEMA Duplicate Effective Model

Output



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	80029	100-year	739.75		739.91	623.44	1720.43	2405.70	1212.88		4973.70	5027.00	
Reach-1	80029	100-FW	739.75	0.00	740.13	301.14	1629.38	3219.87	489.75	4800.28	4973.70	5027.00	5101.42
Reach-1	79977	100-year	739.69		739.84	519.27	1927.00	2857.67	554.33		4950.50	5027.30	
Reach-1	79977	100-FW	739.75	0.05	739.94	320.00	1736.60	3167.52	434.88	4780.00	4950.50	5027.30	5100.00
Reach-1	79924		Inl Struct										
Reach-1	79864	100-year	725.95		726.17	261.63	999.54	3284.97	1054.49		4972.90	5030.50	
Reach-1	79864	100-FW	725.96	0.01	726.23	200.00	1137.29	3530.51	671.20	4880.00	4972.90	5030.50	5080.00
Reach-1	79757	100-year	725.84		726.08	269.28	836.93	3289.14	1212.93		4978.60	5021.80	
Reach-1	79757	100-FW	725.84	0.00	726.13	173.80	689.82	3502.87	1146.31	4926.20	4978.60	5021.80	5100.00
Reach-1	79706 BR U	100-year	725.84		726.08	200.43	390.09	2370.08	2580.02		4978.60	5021.80	
Reach-1	79706 BR U	100-FW	725.84	0.00	726.13	172.52	408.14	2388.93	2547.10	4926.20	4978.60	5021.80	5100.00
Reach-1	79706 BR D	100-year	725.25		726.08	157.20	390.09	2217.05	2733.04		4978.60	5021.80	
Reach-1	79706 BR D	100-FW	725.27	0.02	726.13	157.63	408.14	2235.53	2700.50	4926.20	4978.60	5021.80	5100.00
Reach-1	79650	100-year	716.43		717.24	198.79	553.86	3918.53	866.61		4978.60	5021.80	
Reach-1	79650	100-FW	716.42	-0.01	717.26	173.80	501.86	3966.65	870.49	4926.20	4978.60	5021.80	5100.00
Reach-1	79522	100-year	713.46		716.02	163.84	164.26	4816.11	358.63		4980.30	5020.30	
Reach-1	79522	100-FW	713.42	-0.04	716.02	163.77	161.83	4826.63	350.54	4952.93	4980.30	5020.30	5116.70
Reach-1	79395	100-year	707.97		711.64	68.64	98.94	5184.57	55.49		4980.30	5020.30	
Reach-1	79395	100-FW	708.05	0.08	711.64	68.10	102.53	5178.18	58.29	4964.33	4980.30	5020.30	5032.43
Reach-1	79166	100-year	657.23		658.94	133.03	11.10	5378.17	14.73		4907.20	5029.50	
Reach-1	79166	100-FW	658.21	0.98	659.34	124.00	4.56	5398.47	0.96	4906.00	4907.20	5029.50	5030.00
Reach-1	78965	100-year	655.69		657.11	145.43	549.84	4832.01	22.16		4973.70	5027.00	
Reach-1	78965	100-FW	656.13	0.44	657.93	55.00	2.15	5397.94	3.91	4973.00	4973.70	5027.00	5028.00
Reach-1	78573	100-year	650.18		653.52	86.35	25.59	5005.04	373.37		4980.30	5020.30	
Reach-1	78573	100-FW	650.93	0.75	654.42	42.00	0.74	5390.10	13.16	4980.00	4980.30	5020.30	5022.00
Reach-1	78240	100-year	646.73		648.93	207.29	1032.88	4365.46	5.66		4980.30	5020.30	
Reach-1	78240	100-FW	646.98	0.25	649.95	112.00	474.04	4923.67	6.29	4910.00	4980.30	5020.30	5022.00
Reach-1	77884	100-year	640.70		643.76	122.95	4.58	5040.94	358.48		4980.30	5020.30	
Reach-1	77884	100-FW	640.74	0.04	643.74	116.00	3.96	5024.17	375.86	4979.00	4980.30	5020.30	5095.00
Reach-1	77314	100-year	633.66		634.95	238.11	11.32	4664.55	728.13		4973.70	5027.00	
Reach-1	77314	100-FW	633.89	0.23	635.78	55.00	1.86	5398.27	3.87	4973.00	4973.70	5027.00	5028.00
Reach-1	77091	100-year	631.10		633.30	117.95	382.19	4651.30	370.51		4980.30	5020.30	
Reach-1	77091	100-FW	631.79	0.69	634.09	72.00	7.24	4961.09	435.67	4979.00	4980.30	5020.30	5051.00
Reach-1	76727	100-year	626.93		629.32	163.05	0.61	4305.81	1097.58		4980.30	5020.30	
Reach-1	76727	100-FW	627.33	0.40	630.24	110.00	0.44	4757.57	646.00	4980.00	4980.30	5020.30	5090.00
Reach-1	76439	100-year	621.04		624.41	158.85	103.24	5250.53	50.23		4980.30	5020.30	
Reach-1	76439	100-FW	621.16	0.11	624.41	115.40	114.33	5237.12	52.56	4914.00	4980.30	5020.30	5029.40
Reach-1	76215	100-year	618.26		620.22	123.96	1258.16	4053.55	92.30		4980.30	5020.30	
Reach-1	76215	100-FW	618.26	0.00	620.19	119.00	1277.36	4032.91	93.72	4915.00	4980.30	5020.30	5034.00
Reach-1	75767	100-year	612.44		615.34	98.73	193.41	5201.34	9.25		4980.30	5020.30	
Reach-1	75767	100-FW	612.44	0.01	615.34	64.00	195.61	5200.87	7.53	4958.00	4980.30	5020.30	5022.00
Reach-1	75467	100-year	612.02		613.27	100.05	335.09	4906.62	162.29		4980.30	5020.30	
Reach-1	75467	100-FW	612.04	0.02	613.28	97.00	342.79	4897.90	163.31	4938.00	4980.30	5020.30	5035.00
Reach-1	75299	100-year	611.95		612.62	144.60	1049.38	3969.95	384.67		4982.30	5017.70	
Reach-1	75299	100-FW	611.94	-0.01	612.65	139.40	984.26	4053.79	365.95	4925.60	4982.30	5017.70	5065.00
Reach-1	75207 BR U	100-year	608.93		612.62		126.12	5274.06	3.82		4982.30	5017.70	
Reach-1	75207 BR U	100-FW	608.93	0.00	612.65		126.12	5274.06	3.82	4925.60	4982.30	5017.70	5065.00
Reach-1	75207 BR D	100-year	604.23		608.54	41.00	102.97	5298.18	2.85		4982.30	5017.70	
Reach-1	75207 BR D	100-FW	604.40	0.16	608.54	41.00	102.68	5298.49	2.83	4947.93	4982.30	5017.70	5057.90
Reach-1	75135	100-year	604.23		607.65	110.67	410.67	4896.18	97.15		4982.30	5017.70	
Reach-1	75135	100-FW	604.40	0.16	607.63	109.97	424.01	4869.66	110.33	4947.93	4982.30	5017.70	5057.90
Reach-1	74951	100-year	600.62		603.85	114.07	61.88	5009.86	332.26		4980.30	5020.30	
Reach-1	74951	100-FW	601.43	0.80	604.79	40.00		5404.00		4980.30	4980.30	5020.30	5020.30

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	74682	100-year	597.89		600.55	109.56	9.55	5274.55	119.90		4980.30	5020.30	
Reach-1	74682	100-FW	598.43	0.54	601.00	40.00		5404.00		4980.30	4980.30	5020.30	5020.30
Reach-1	74216	100-year	591.19		594.96	99.46	44.04	5234.00	125.96		4980.30	5020.30	
Reach-1	74216	100-FW	591.36	0.17	594.94	72.00	47.98	5215.89	140.13	4971.00	4980.30	5020.30	5043.00
Reach-1	73716	100-year	580.78		583.64	86.13	5.91	6049.10	5.99		4961.10	5037.50	
Reach-1	73716	100-FW	580.78	0.00	583.64	84.00	6.06	6048.91	6.03	4957.00	4961.10	5037.50	5041.00
Reach-1	73328	100-year	576.35		578.59	66.30	20.04	6017.83	23.13		4973.20	5023.40	
Reach-1	73328	100-FW	576.72	0.37	578.85	50.20		6061.00		4973.20	4973.20	5023.40	5023.40
Reach-1	72963	100-year	571.25		574.87	77.30	30.25	6022.77	7.98		4973.20	5023.40	
Reach-1	72963	100-FW	571.26	0.01	574.86	75.00	31.05	6021.82	8.12	4952.00	4973.20	5023.40	5027.00
Reach-1	72599	100-year	568.61		570.35	269.83	20.42	6022.78	17.80		4966.50	5029.20	
Reach-1	72599	100-FW	568.64	0.03	570.36	83.00	21.41	6022.45	17.14	4952.00	4966.50	5029.20	5035.00
Reach-1	72115	100-year	564.22		566.56	89.35	0.99	6041.63	18.39		4966.50	5035.30	
Reach-1	72115	100-FW	564.53	0.31	566.70	68.80		6061.00		4966.50	4966.50	5035.30	5035.30
Reach-1	71640	100-year	562.27		563.54	355.33	54.42	5970.94	35.64		4966.50	5029.20	
Reach-1	71640	100-FW	562.75	0.48	563.96	63.70	0.58	6059.68	0.74	4966.00	4966.50	5029.20	5029.70
Reach-1	71235	100-year	562.16		562.42	417.69	947.21	5031.85	81.94		4950.20	5055.60	
Reach-1	71235	100-FW	562.67	0.51	562.93	247.60	800.67	5209.31	51.02	4838.00	4950.20	5055.60	5085.60
Reach-1	71067 BR U	100-year	562.16		562.42	139.80	273.88	5690.36	95.27		4950.20	5055.60	
Reach-1	71067 BR U	100-FW	562.67	0.51	562.93	36.87	129.79	5856.20	75.22	4838.00	4950.20	5055.60	5085.60
Reach-1	71067 BR D	100-year	561.58		561.86	167.32	273.88	5690.36	95.27		4950.20	5060.00	
Reach-1	71067 BR D	100-FW	562.50	0.91	562.78	84.99	129.79	5856.20	75.22	4950.00	4950.20	5060.00	5205.60
Reach-1	70878	100-year	556.83		557.59	582.10	508.81	4754.22	797.96		4950.20	5060.00	
Reach-1	70878	100-FW	556.87	0.04	557.91	255.60	0.07	5313.86	747.07	4950.00	4950.20	5060.00	5205.60
Reach-1	70275	100-year	551.43		553.18	399.36	1470.03	7162.81	40.16		4955.30	5028.80	
Reach-1	70275	100-FW	551.41	-0.01	553.18	397.91	1464.50	7168.26	40.25	4657.58	4955.30	5028.80	5055.50
Reach-1	69934	100-year	549.57		550.62	665.01	3102.27	5550.73	20.00		4959.00	5034.70	
Reach-1	69934	100-FW	549.57	0.01	550.61	623.00	3123.35	5531.38	18.26	4431.00	4959.00	5034.70	5054.00
Reach-1	69564	100-year	547.97		548.63	575.22	3400.65	5226.97	45.38		4966.50	5047.20	
Reach-1	69564	100-FW	547.98	0.00	548.64	547.00	3390.61	5232.29	50.10	4520.00	4966.50	5047.20	5067.00
Reach-1	69008	100-year	545.62		546.75	358.07	1395.10	7173.53	104.37		4966.50	5029.20	
Reach-1	69008	100-FW	545.60	-0.01	546.74	355.00	1378.08	7188.79	106.13	4711.00	4966.50	5029.20	5066.00
Reach-1	68788	100-year	542.08		545.37	243.80	198.63	8446.34	28.03		4966.50	5029.20	
Reach-1	68788	100-FW	542.09	0.01	545.36	195.00	206.34	8439.02	27.64	4840.00	4966.50	5029.20	5035.00
Reach-1	68535	100-year	541.19		543.13	140.80	15.40	8639.45	18.15		4966.50	5036.20	
Reach-1	68535	100-FW	541.19	0.01	543.13	91.00	19.97	8634.08	18.95	4960.00	4966.50	5036.20	5051.00
Reach-1	68307	100-year	537.86		541.28	118.85	36.14	8506.27	130.60		4966.50	5030.50	
Reach-1	68307	100-FW	537.84	-0.02	541.28	118.40	35.56	8508.54	128.90	4948.60	4966.50	5030.50	5067.00
Reach-1	67849	100-year	532.85		535.99	143.24	366.55	8094.29	212.16		4969.10	5030.90	
Reach-1	67849	100-FW	532.96	0.12	536.04	124.00	392.99	8107.19	172.82	4922.00	4969.10	5030.90	5046.00
Reach-1	67409	100-year	529.00		531.89	201.62	873.60	7503.07	296.33		4977.90	5022.10	
Reach-1	67409	100-FW	529.22	0.22	532.11	130.00	931.46	7593.09	148.45	4900.00	4977.90	5022.10	5030.00
Reach-1	66932	100-year	526.51		528.57	360.47	1078.72	7417.83	176.45		4973.50	5026.50	
Reach-1	66932	100-FW	526.77	0.26	528.90	166.52	883.54	7617.89	171.57	4870.48	4973.50	5026.50	5037.00
Reach-1	66390	100-year	524.85		526.00	283.10	1564.01	6790.79	318.20		4975.00	5039.60	
Reach-1	66390	100-FW	525.53	0.68	526.53	266.00	1798.84	6744.46	129.70	4784.00	4975.00	5039.60	5050.00
Reach-1	65969	100-year	520.55		523.35	188.91	686.16	7979.18	7.67		4962.00	5042.50	
Reach-1	65969	100-FW	521.01	0.47	524.17	81.10	1.80	8671.11	0.09	4961.50	4962.00	5042.50	5042.60
Reach-1	65595	100-year	518.09		519.27	405.94	2303.74	6211.06	158.21		4966.60	5052.80	
Reach-1	65595	100-FW	518.87	0.77	520.31	195.55	1532.50	7139.34	1.16	4857.75	4966.60	5052.80	5053.30
Reach-1	65079	100-year	514.92		516.03	689.78	633.20	6176.03	1863.77		4951.60	5034.20	
Reach-1	65079	100-FW	515.67	0.75	517.13	181.05	1.22	7200.12	1471.66	4951.10	4951.60	5034.20	5132.15
Reach-1	64775	100-year	513.69		514.14	1862.58	3100.48	4887.76	684.76		4941.10	5044.90	
Reach-1	64775	100-FW	514.72	1.03	515.33	412.33	2707.77	5957.20	8.04	4634.57	4941.10	5044.90	5046.90

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	64123	100-year	509.40		510.57	1454.84	2319.00	5277.03	1076.97		4975.00	5042.50	
Reach-1	64123	100-FW	509.67	0.26	511.50	372.77	2058.23	6265.57	349.20	4638.93	4975.00	5042.50	5098.03
Reach-1	63663	100-year	506.96		507.39	1367.28	1304.17	7160.28	208.55		4924.90	5118.80	
Reach-1	63663	100-FW	507.37	0.41	507.80	457.60	1131.04	7450.92	91.04	4692.40	4924.90	5118.80	5150.00
Reach-1	63182	100-year	505.46		506.00	2015.23	1977.45	5494.85	1200.71		4948.20	5051.80	
Reach-1	63182	100-FW	506.15	0.69	506.64	782.31	1520.55	5642.33	1510.12	4687.69	4948.20	5051.80	5470.00
Reach-1	62715	100-year	504.86		504.96	1933.98	2890.64	2507.12	3275.25		4969.90	5047.50	
Reach-1	62715	100-FW	505.11	0.25	505.39	943.88	497.63	3705.29	4470.08	4885.66	4969.90	5047.50	5829.54
Reach-1	62325	100-year	504.11		504.39	1287.88	7.15	4686.49	3979.37		4944.70	5072.80	
Reach-1	62325	100-FW	504.45	0.34	504.69	832.83	3.70	4578.42	4090.89	4942.70	4944.70	5072.80	5775.53
Reach-1	61807	100-year	502.91		503.40	576.15	1110.66	5437.25	2125.09		4956.10	5043.90	
Reach-1	61807	100-FW	503.04	0.13	503.71	384.62	292.03	6080.27	2300.70	4928.06	4956.10	5043.90	5312.68
Reach-1	61264	100-year	500.44		501.70	624.28	2429.24	6159.22	84.53		4953.90	5018.70	
Reach-1	61264	100-FW	501.40	0.96	502.22	470.70	2938.48	5695.80	38.72	4560.00	4953.90	5018.70	5030.70
Reach-1	60572	100-year	499.42		499.72	680.45	3723.52	4403.92	545.56		4953.90	5050.10	
Reach-1	60572	100-FW	500.05	0.63	500.53	372.60	2789.05	5497.54	386.41	4709.60	4953.90	5050.10	5082.20
Reach-1	60261	100-year	499.07		499.17	948.31	4235.25	3251.46	1186.29		4953.90	5062.70	
Reach-1	60261	100-FW	499.59	0.52	499.78	543.91	4295.46	4323.77	53.77	4527.53	4953.90	5062.70	5071.44
Reach-1	59648	100-year	498.92		498.95	1646.82	4456.65	2873.33	1343.02		4921.60	5045.40	
Reach-1	59648	100-FW	499.29	0.37	499.38	666.44	4143.26	4526.13	3.62	4380.96	4921.60	5045.40	5047.40
Reach-1	59362	100-year	498.89		498.91	1812.43	4986.11	2248.33	1438.56		4930.90	5033.10	
Reach-1	59362	100-FW	499.17	0.27	499.27	545.10	4115.24	4507.67	50.09	4500.00	4930.90	5033.10	5045.10
Reach-1	58820	100-year	498.87		498.88	1590.45	1420.10	2871.61	4676.29		4898.60	5050.50	
Reach-1	58820	100-FW	499.09	0.22	499.15	613.18	1992.54	5273.15	1702.31	4666.60	4898.60	5050.50	5279.78
Reach-1	58512	100-year	498.86		498.87	1715.60	165.00	3589.06	5213.94		4870.90	5074.20	
Reach-1	58512	100-FW	499.07	0.21	499.11	683.97	4.73	5891.49	3071.77	4868.90	4870.90	5074.20	5552.87
Reach-1	58172	100-year	498.85		498.86	1764.38	31.50	1582.83	7353.67		4975.60	5030.10	
Reach-1	58172	100-FW	498.99	0.14	499.06	728.14	63.67	3143.20	5761.13	4957.71	4975.60	5030.10	5685.85
Reach-1	58161 BR U	100-year	498.85		498.86	1758.25	32.62	1639.11	7296.27		4975.60	5030.10	
Reach-1	58161 BR U	100-FW	499.02	0.17	499.02	80.38	0.00	0.00	0.00	4957.71	4975.60	5030.10	5685.85
Reach-1	58161 BR D	100-year	498.85		498.86	1759.16	35.23	1679.17	7253.60		4975.60	5030.10	
Reach-1	58161 BR D	100-FW	499.02	0.17	499.02	81.10	0.00	0.00	0.00	4957.00	4975.60	5030.10	5685.85
Reach-1	58151	100-year	498.85		498.86	1765.26	34.12	1626.13	7307.76		4975.60	5030.10	
Reach-1	58151	100-FW	498.92	0.07	499.00	728.85	67.83	3202.89	5697.28	4957.00	4975.60	5030.10	5685.85
Reach-1	57850	100-year	498.82		498.84	1830.48	27.26	3006.30	5934.44		4953.90	5064.60	
Reach-1	57850	100-FW	498.86	0.04	498.94	580.87	5.14	4957.40	4005.46	4951.90	4953.90	5064.60	5532.77
Reach-1	57465	100-year	498.78		498.81	1814.13	114.83	2523.34	6329.84		4953.90	5016.90	
Reach-1	57465	100-FW	498.75	-0.04	498.85	472.63	6.76	3958.22	5003.03	4951.90	4953.90	5016.90	5424.53
Reach-1	56967	100-year	498.30		498.66	223.94	723.96	7935.89	308.15		4966.30	5041.60	
Reach-1	56967	100-FW	498.26	-0.04	498.63	184.00	678.09	7979.04	310.87	4911.00	4966.30	5041.60	5095.00
Reach-1	56692	100-year	498.07		498.52	202.43	412.44	7310.26	1245.30		4974.10	5032.00	
Reach-1	56692	100-FW	498.03	-0.04	498.49	180.41	415.93	7338.61	1213.46	4935.00	4974.10	5032.00	5115.41
Reach-1	56576	100-year	497.57		498.34	178.33	574.08	6558.02	1835.90		4981.20	5017.40	
Reach-1	56576	100-FW	497.55	-0.02	498.31	172.40	577.28	6536.66	1854.07	4945.00	4981.20	5017.40	5117.40
Reach-1	56498 BR U	100-year	497.42		498.27	174.31	587.23	6765.58	1615.19		4981.20	5017.40	
Reach-1	56498 BR U	100-FW	497.39	-0.02	498.24	169.10	594.98	6744.40	1628.63	4945.00	4981.20	5017.40	5117.40
Reach-1	56498 BR D	100-year	495.34		497.69	144.20	418.80	7503.06	1046.14		4981.20	5017.40	
Reach-1	56498 BR D	100-FW	495.35	0.01	497.67	130.70	453.03	7471.27	1043.70	4961.00	4981.20	5017.40	5095.00
Reach-1	56412	100-year	492.61		496.80	134.95	343.14	8004.99	619.88		4981.20	5017.40	
Reach-1	56412	100-FW	492.68	0.07	496.80	134.00	347.42	7984.86	635.71	4961.00	4981.20	5017.40	5095.00
Reach-1	56240	100-year	484.26		488.10	111.50	804.91	7563.78	599.31		4980.20	5019.80	
Reach-1	56240	100-FW	484.72	0.47	490.57	40.36	0.94	8961.98	5.08	4980.00	4980.20	5019.80	5020.36
Reach-1	55987	100-year	482.19		485.31	113.47	236.40	8309.17	422.42		4974.10	5032.00	

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	55987	100-FW	482.94	0.75	486.26	61.90	24.90	8920.41	22.70	4972.10	4974.10	5032.00	5034.00
Reach-1	55653	100-year	479.90		482.24	401.77	230.49	7695.24	1042.27		4974.10	5032.00	
Reach-1	55653	100-FW	480.62	0.72	483.42	87.00	284.76	8566.19	117.05	4955.00	4974.10	5032.00	5042.00
Reach-1	55401	100-year	477.53		479.83	402.03	409.72	7252.27	1306.01		4974.10	5032.00	
Reach-1	55401	100-FW	477.50	-0.03	481.03	97.00	472.96	8351.85	143.20	4945.00	4974.10	5032.00	5042.00
Reach-1	55064	100-year	474.89		476.47	243.49	693.63	7186.40	1087.97		4974.10	5032.00	
Reach-1	55064	100-FW	475.62	0.72	478.07	69.72	7.47	8716.98	243.55	4973.10	4974.10	5032.00	5042.82
Reach-1	54652	100-year	471.81		473.93	454.07	2209.45	6100.16	658.39		4979.30	5025.60	
Reach-1	54652	100-FW	472.32	0.52	475.11	234.64	1658.26	6929.48	380.26	4840.96	4979.30	5025.60	5075.60
Reach-1	54046	100-year	466.84		468.17	541.44	382.83	6172.80	2412.37		4974.10	5032.00	
Reach-1	54046	100-FW	467.76	0.92	469.55	227.08	142.55	7260.01	1565.45	4964.10	4974.10	5032.00	5191.18
Reach-1	53796	100-year	465.78		466.98	517.09	476.94	6493.46	1997.60		4974.10	5032.00	
Reach-1	53796	100-FW	466.76	0.97	468.30	218.41	98.87	7485.49	1383.65	4964.10	4974.10	5032.00	5182.51
Reach-1	53544	100-year	464.75		465.80	391.94	152.12	5401.18	3414.70		4974.10	5032.00	
Reach-1	53544	100-FW	465.69	0.94	467.10	247.41	216.51	6391.29	2360.20	4954.10	4974.10	5032.00	5201.51
Reach-1	53135	100-year	460.86		463.01	406.97	476.20	6120.31	2371.50		4981.90	5022.40	
Reach-1	53135	100-FW	461.46	0.60	464.21	185.66	247.92	6893.49	1826.59	4971.90	4981.90	5022.40	5157.56
Reach-1	52853	100-year	458.54		460.29	455.84	689.21	6975.70	1303.10		4974.10	5032.00	
Reach-1	52853	100-FW	459.20	0.66	461.91	87.90	147.51	8433.07	387.41	4964.10	4974.10	5032.00	5052.00
Reach-1	52537	100-year	457.18		458.52	467.75	877.16	6764.63	1326.21		4974.10	5032.00	
Reach-1	52537	100-FW	457.92	0.74	459.80	142.46	183.39	7918.51	866.10	4964.10	4974.10	5032.00	5106.56
Reach-1	52205	100-year	456.66		457.24	699.41	502.78	6660.40	1804.82		4941.90	5039.90	
Reach-1	52205	100-FW	457.58	0.91	458.37	185.39	96.81	7891.58	979.60	4931.90	4941.90	5039.90	5117.29
Reach-1	51939	100-year	455.71		456.54	571.58	373.58	7106.91	1487.51		4962.80	5036.80	
Reach-1	51939	100-FW	456.56	0.85	457.66	172.43	58.56	8186.22	723.22	4952.80	4962.80	5036.80	5125.23
Reach-1	51599	100-year	454.87		455.68	551.01	830.85	6552.04	1585.11		4969.00	5030.70	
Reach-1	51599	100-FW	455.37	0.50	456.67	161.78	164.80	7890.87	912.33	4948.04	4969.00	5030.70	5109.82
Reach-1	51398	100-year	453.13		454.89	372.08	867.55	7960.28	140.16		4969.00	5030.70	
Reach-1	51398	100-FW	453.97	0.84	455.87	112.70	294.61	8546.44	126.95	4928.00	4969.00	5030.70	5040.70
Reach-1	51077	100-year	450.45		452.69	272.12	21.85	7244.18	1701.97		4969.00	5030.70	
Reach-1	51077	100-FW	451.42	0.97	453.90	151.00	61.53	8042.24	864.23	4949.00	4969.00	5030.70	5100.00
Reach-1	50822	100-year	448.45		450.56	440.30	425.85	7171.49	1370.66		4969.00	5030.70	
Reach-1	50822	100-FW	448.48	0.03	451.54	169.50	39.82	8146.76	781.42	4959.00	4969.00	5030.70	5128.50
Reach-1	50589	100-year	446.74		448.24	588.37	1083.60	6524.36	1360.04		4969.00	5030.70	
Reach-1	50589	100-FW	447.29	0.55	449.13	371.08	999.99	7263.37	704.65	4803.92	4969.00	5030.70	5175.00
Reach-1	50390	100-year	446.48		447.11	604.68	1467.33	5250.19	2250.49		4964.30	5030.70	
Reach-1	50390	100-FW	447.20	0.72	447.93	419.76	1161.93	5805.84	2000.24	4797.34	4964.30	5030.70	5217.10
Reach-1	50152	100-year	445.62		446.41	579.69	985.50	6436.73	1589.77		4954.30	5030.70	
Reach-1	50152	100-FW	446.35	0.73	447.25	319.89	509.91	7065.59	1436.50	4884.00	4954.30	5030.70	5203.89
Reach-1	49903	100-year	444.19		445.42	496.03	872.80	6773.00	1366.20		4965.10	5033.40	
Reach-1	49903	100-FW	444.77	0.58	446.27	182.49	388.07	7520.24	1103.69	4936.17	4965.10	5033.40	5118.66
Reach-1	49630	100-year	443.17		444.15	525.54	231.34	7031.23	1749.43		4952.20	5030.70	
Reach-1	49630	100-FW	444.01	0.84	445.03	247.80	289.04	7523.32	1199.64	4932.20	4952.20	5030.70	5180.00
Reach-1	49420	100-year	442.13		443.30	644.40	448.31	6475.19	2088.50		4969.00	5030.70	
Reach-1	49420	100-FW	442.62	0.49	444.17	227.34	184.24	7339.43	1488.33	4939.00	4969.00	5030.70	5166.34
Reach-1	49053	100-year	440.81		441.82	698.92	1900.20	6278.71	833.09		4969.00	5030.70	
Reach-1	49053	100-FW	441.03	0.22	442.45	230.79	941.94	7122.80	947.26	4869.91	4969.00	5030.70	5100.70
Reach-1	48632	100-year	439.82		440.45	927.10	2457.59	6118.32	436.09		4960.10	5036.80	
Reach-1	48632	100-FW	440.28	0.46	440.92	472.56	2374.78	6289.10	348.12	4594.24	4960.10	5036.80	5066.80
Reach-1	48404	100-year	439.59		439.89	1008.52	4763.58	4155.07	93.35		4969.00	5030.70	
Reach-1	48404	100-FW	439.97	0.38	440.37	712.01	4162.95	4724.05	125.00	4348.69	4969.00	5030.70	5060.70
Reach-1	48176	100-year	438.73		439.34	1177.04	3518.48	5308.54	184.99		4973.80	5032.60	
Reach-1	48176	100-FW	439.48	0.75	439.94	975.61	3763.96	5005.94	242.09	4104.19	4973.80	5032.60	5079.80

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	48097 BR U	100-year	438.36		439.15	871.89	3146.88	5667.10	198.02		4973.80	5032.60	
Reach-1	48097 BR U	100-FW	439.15	0.79	439.79	734.05	3254.04	5516.62	241.35	4104.19	4973.80	5032.60	5079.80
Reach-1	48097 BR D	100-year	437.65		438.73	910.06	3997.92	4968.40	45.68		4973.80	5032.60	
Reach-1	48097 BR D	100-FW	438.59	0.94	439.48	677.58	3924.66	5003.40	83.94	4104.19	4973.80	5032.60	5048.71
Reach-1	48038	100-year	437.47		438.48	996.88	4199.07	4774.17	38.75		4973.80	5032.60	
Reach-1	48038	100-FW	437.78	0.31	439.15	641.51	3510.56	5444.94	56.50	4104.19	4973.80	5032.60	5048.71
Reach-1	48004	100-year	437.02		437.49	1442.76	4463.87	4533.60	14.53		4965.70	5034.30	
Reach-1	48004	100-FW	437.34	0.32	437.72	1323.56	4701.40	4305.42	5.18	3712.74	4965.70	5034.30	5036.30
Reach-1	47950 BR U	100-year	437.21		437.21	70.10	0.00	0.00	0.00		4965.70	5034.30	
Reach-1	47950 BR U	100-FW	437.50	0.29	437.50	70.10	0.00	0.00	0.00	3712.74	4965.70	5034.30	5036.30
Reach-1	47950 BR D	100-year	437.21		437.21	70.10	0.00	0.00	0.00		4965.70	5034.40	
Reach-1	47950 BR D	100-FW	437.50	0.29	437.50	70.10	0.00	0.00	0.00	3712.79	4965.70	5034.40	5036.30
Reach-1	47885	100-year	435.89		436.85	1290.20	3535.94	5467.51	8.56		4965.70	5034.40	
Reach-1	47885	100-FW	436.09	0.20	437.12	1192.83	3315.66	5691.41	4.93	3712.79	4965.70	5034.40	5036.30
Reach-1	47681	100-year	434.62		435.01	1440.00	4507.11	4483.19	21.70		4965.90	5033.80	
Reach-1	47681	100-FW	435.36	0.74	435.82	939.15	4017.21	4966.85	27.94	4100.00	4965.90	5033.80	5039.15
Reach-1	47431	100-year	434.48		434.61	1366.52	5676.64	3243.35	92.02		4958.00	5026.00	
Reach-1	47431	100-FW	435.20	0.73	435.39	856.00	5022.69	3844.93	144.38	4200.00	4958.00	5026.00	5056.00
Reach-1	47224	100-year	434.35		434.44	1369.95	5993.01	2910.26	108.73		4953.60	5027.20	
Reach-1	47224	100-FW	434.96	0.61	435.18	656.00	4744.61	4102.88	164.51	4400.00	4953.60	5027.20	5056.00
Reach-1	47015	100-year	434.24		434.32	1307.07	4945.37	4065.51	1.12		4949.40	5048.80	
Reach-1	47015	100-FW	434.77	0.53	434.98	556.00	3175.14	5833.07	3.78	4500.00	4949.40	5048.80	5056.00
Reach-1	46928		Inl Struct										
Reach-1	46860	100-year	431.65		431.83	1278.70	2029.28	5154.03	1828.70		4951.30	5048.70	
Reach-1	46860	100-FW	432.94	1.28	433.07	748.46	2087.32	5047.16	1877.53	4429.40	4951.30	5048.70	5178.23
Reach-1	46704	100-year	431.47		431.69	1814.14	1612.37	5400.43	2319.20		4973.00	5051.50	
Reach-1	46704	100-FW	432.78	1.31	432.96	852.50	1461.75	5376.82	2493.43	4501.20	4973.00	5051.50	5353.70
Reach-1	46547	100-year	431.41		431.54	1699.45	3264.63	3400.09	2667.28		4982.00	5034.30	
Reach-1	46547	100-FW	432.74	1.33	432.85	967.80	3181.18	3417.09	2733.73	4394.30	4982.00	5034.30	5362.10
Reach-1	46228	100-year	431.20		431.31	1587.51	3260.34	3204.06	2867.60		4982.00	5034.30	
Reach-1	46228	100-FW	432.47	1.28	432.63	980.52	3710.22	3865.48	1756.30	4410.00	4982.00	5034.30	5390.52
Reach-1	45976	100-year	431.11		431.21	1524.43	3517.23	3067.14	2747.63		4982.00	5034.30	
Reach-1	45976	100-FW	432.38	1.27	432.52	964.39	4013.32	3702.82	1615.87	4371.20	4982.00	5034.30	5335.59
Reach-1	45479	100-year	430.75		430.88	1110.40	1873.42	3385.58	4812.01		4982.00	5034.30	
Reach-1	45479	100-FW	432.10	1.35	432.21	871.23	1414.98	3453.95	5202.07	4786.37	4982.00	5034.30	5657.60
Reach-1	45092	100-year	430.30		430.57	1003.60	2787.60	4654.22	2629.18		4982.00	5034.30	
Reach-1	45092	100-FW	431.73	1.43	431.98	626.02	2591.10	4734.50	2745.41	4678.51	4982.00	5034.30	5304.53
Reach-1	44899	100-year	430.01		430.36	831.98	3038.98	5130.44	1901.58		4982.00	5034.30	
Reach-1	44899	100-FW	431.55	1.54	431.83	546.05	2703.46	4997.50	2370.04	4734.44	4982.00	5034.30	5280.49
Reach-1	44346	100-year	429.43		429.81	611.18	490.01	5214.99	4366.00		4982.00	5034.30	
Reach-1	44346	100-FW	431.11	1.68	431.43	474.24	682.71	5325.02	4063.28	4887.00	4982.00	5034.30	5361.24
Reach-1	43906	100-year	429.09		429.31	671.92	2739.82	3923.58	3407.60		4982.00	5034.30	
Reach-1	43906	100-FW	430.81	1.72	431.05	422.95	2680.63	4399.78	2990.59	4771.31	4982.00	5034.30	5194.26
Reach-1	43474	100-year	428.84		428.96	932.72	2408.45	3688.67	3973.89		4982.00	5034.30	
Reach-1	43474	100-FW	430.51	1.67	430.73	471.64	2741.99	4807.25	2521.76	4760.79	4982.00	5034.30	5232.43
Reach-1	43183	100-year	428.72		428.82	875.16	1488.11	4689.35	3893.54		4940.90	5034.30	
Reach-1	43183	100-FW	430.42	1.70	430.56	544.69	1236.55	5734.76	3099.69	4818.19	4940.90	5034.30	5362.88
Reach-1	42616	100-year	428.57		428.68	872.04	3839.85	4500.75	1730.41		4976.60	5044.60	
Reach-1	42616	100-FW	430.29	1.72	430.41	603.01	4197.48	5073.98	799.54	4529.35	4976.60	5044.60	5132.36
Reach-1	42135	100-year	428.48		428.55	1116.90	5295.38	3361.15	1414.47		4982.00	5034.30	
Reach-1	42135	100-FW	430.19	1.71	430.29	577.84	5950.38	4056.30	64.33	4466.46	4982.00	5034.30	5044.30
Reach-1	41716	100-year	428.37		428.48	1084.76	1947.21	4828.96	3294.83		4976.60	5044.60	
Reach-1	41716	100-FW	429.97	1.60	430.18	364.89	868.32	6382.78	2819.91	4910.18	4976.60	5044.60	5275.07

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	41480	100-year	428.35		428.41	1382.63	3710.70	3171.97	3188.33		4982.00	5034.30	
Reach-1	41480	100-FW	429.89	1.53	430.09	361.94	1163.29	5230.20	3677.51	4907.81	4982.00	5034.30	5269.75
Reach-1	41307	100-year	428.23		428.35	1063.66	2512.75	7121.56	1276.69		4951.10	5052.30	
Reach-1	41307	100-FW	429.82	1.60	430.02	321.00	480.21	8827.44	1603.35	4884.00	4951.10	5052.30	5205.00
Reach-1	41159 BR U	100-year	428.23		428.35	848.07	1438.85	6900.67	2576.38		4951.10	5052.30	
Reach-1	41159 BR U	100-FW	429.82	1.60	430.02	271.76	2936.63	7754.84	225.02	4884.00	4951.10	5052.30	5205.00
Reach-1	41159 BR D	100-year	428.23		428.35	781.11	1438.85	6900.67	2576.38		4952.50	5049.80	
Reach-1	41159 BR D	100-FW	429.21	0.99	430.02	270.66	2936.63	7754.84	225.02	4697.14	4952.50	5049.80	5057.50
Reach-1	41037	100-year	423.60		423.75	985.88	4962.69	4660.15	1288.16		4952.50	5049.80	
Reach-1	41037	100-FW	424.10	0.50	424.67	360.36	3175.85	7663.84	71.31	4697.14	4952.50	5049.80	5057.50
Reach-1	40532	100-year	423.16		423.26	3560.69	5426.23	3605.56	1879.21		4982.00	5034.30	
Reach-1	40532	100-FW	423.49	0.33	423.71	650.00	4088.13	4698.58	2124.29	4550.00	4982.00	5034.30	5200.00
Reach-1	39908	100-year	422.74		422.94	2945.39	5888.85	4638.73	383.42		4982.00	5034.30	
Reach-1	39908	100-FW	422.90	0.16	423.23	519.50	5026.70	5423.33	460.97	4562.50	4982.00	5034.30	5082.00
Reach-1	39448	100-year	422.52		422.64	2921.40	5814.86	3942.95	1153.19		4982.00	5034.30	
Reach-1	39448	100-FW	422.53	0.01	422.81	467.07	5271.45	5049.56	590.00	4610.93	4982.00	5034.30	5078.00
Reach-1	39154	100-year	420.20		421.85	257.16	1418.84	8629.97	862.19		4975.30	5030.80	
Reach-1	39154	100-FW	420.28	0.08	421.92	248.51	1449.62	8650.23	811.15	4816.00	4975.30	5030.80	5078.00
Reach-1	38988 BR U	100-year	420.20		421.85	140.56	4368.09	6124.02	417.50		4975.30	5030.80	
Reach-1	38988 BR U	100-FW	420.28	0.08	421.92	141.31	4475.26	6024.12	410.69	4816.00	4975.30	5030.80	5078.00
Reach-1	38988 BR D	100-year	420.04		421.85	144.85	4373.94	6081.72	453.95		4975.30	5030.80	
Reach-1	38988 BR D	100-FW	420.10	0.05	421.92	145.34	4481.02	5982.51	446.55	4825.00	4975.30	5030.80	5078.00
Reach-1	38856	100-year	418.17		420.63	244.51	996.66	9178.43	735.91		4975.30	5030.80	
Reach-1	38856	100-FW	418.37	0.20	420.70	236.91	1056.94	9112.07	741.99	4825.00	4975.30	5030.80	5078.00
Reach-1	38505	100-year	417.82		418.42	627.49	4367.43	5588.20	955.37		4982.00	5034.30	
Reach-1	38505	100-FW	417.86	0.04	418.56	549.00	4625.47	5911.74	373.79	4521.00	4982.00	5034.30	5070.00
Reach-1	38274	100-year	417.78		417.96	1070.56	6692.90	3652.50	565.59		4982.00	5034.30	
Reach-1	38274	100-FW	417.88	0.10	418.06	873.00	7131.30	3663.89	115.81	4182.00	4982.00	5034.30	5055.00
Reach-1	38132	100-year	417.63		417.79	998.80	7281.08	3379.86	250.06		4972.70	5024.30	
Reach-1	38132	100-FW	417.73	0.11	417.90	978.00	7347.83	3370.63	192.54	4070.00	4972.70	5024.30	5048.00
Reach-1	38005 BR U	100-year	415.66		417.18	81.00	50.37	5241.96	238.53		4972.70	5024.30	
Reach-1	38005 BR U	100-FW	416.23	0.57	417.41	81.00	54.05	4889.72	236.63	4070.00	4972.70	5024.30	5048.00
Reach-1	38005 BR D	100-year	415.41		417.10	81.00	36.08	5267.63	227.16		4972.70	5024.30	
Reach-1	38005 BR D	100-FW	416.09	0.68	417.37	81.00	38.99	4911.45	229.96	4030.00	4972.70	5024.30	5048.00
Reach-1	37908	100-year	416.03		416.16	904.02	8076.46	2683.83	150.71		4972.70	5024.30	
Reach-1	37908	100-FW	416.54	0.51	416.65	1014.40	8122.58	2653.60	134.83	4030.00	4972.70	5024.30	5048.00
Reach-1	37269	100-year	414.82		415.33	1674.47	2597.57	4790.23	3523.20		4982.00	5034.30	
Reach-1	37269	100-FW	415.66	0.84	416.03	1331.00	3362.54	4504.96	3043.51	4399.00	4982.00	5034.30	5730.00
Reach-1	37007	100-year	414.50		414.65	2182.71	3565.06	3209.15	4136.80		4982.00	5034.30	
Reach-1	37007	100-FW	415.44	0.94	415.56	1828.00	4435.03	3077.89	3398.09	4112.00	4982.00	5034.30	5940.00
Reach-1	36568	100-year	414.34		414.44	2340.45	3134.64	4884.15	2892.21		4958.60	5078.90	
Reach-1	36568	100-FW	415.28	0.94	415.39	1958.48	3438.16	5301.68	2171.16	4310.00	4958.60	5078.90	6355.00
Reach-1	36184	100-year	414.15		414.27	2476.13	2706.43	2981.29	5223.29		4982.00	5034.30	
Reach-1	36184	100-FW	415.06	0.91	415.22	2111.09	3115.91	3452.84	4342.25	4390.00	4982.00	5034.30	6680.00
Reach-1	35849	100-year	413.98		414.07	2718.53	3980.02	2820.46	4110.53		4982.00	5034.30	
Reach-1	35849	100-FW	414.82	0.85	414.98	1935.74	3545.39	3561.98	3803.63	4360.00	4982.00	5034.30	6790.00
Reach-1	35182	100-year	413.52		413.61	3534.08	1600.22	2963.31	6347.47		4982.00	5034.30	
Reach-1	35182	100-FW	414.43	0.91	414.51	2376.69	1822.26	2935.41	6153.33	4380.00	4982.00	5034.30	6896.00
Reach-1	34922	100-year	413.46		413.49	3477.74	2971.28	2164.98	5774.74		4972.90	5027.10	
Reach-1	34922	100-FW	414.36	0.91	414.43	2127.08	1245.78	2719.14	6946.08	4700.00	4972.90	5027.10	6970.00
Reach-1	34839 BR U	100-year	413.40		413.43	3173.11	3488.79	1209.26	6212.95		4972.90	5027.10	
Reach-1	34839 BR U	100-FW	414.27	0.87	414.34	2026.55	665.52	1567.67	8677.81	4700.00	4972.90	5027.10	6970.00
Reach-1	34839 BR D	100-year	413.34		413.40	3195.70	1992.14	1414.48	7504.38		4972.90	5027.10	
Reach-1	34839 BR D	100-FW	414.21	0.88	414.30	2056.19	880.53	1547.98	8482.49	4670.00	4972.90	5027.10	6910.00

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	34727	100-year	412.94		413.12	3453.96	1953.69	3554.21	5403.11		4972.90	5027.10	
Reach-1	34727	100-FW	413.80	0.86	414.01	2145.28	1503.85	3916.06	5491.08	4670.00	4972.90	5027.10	6910.00
Reach-1	34674	100-year	412.85		412.96	3327.95	2918.04	3114.99	4877.97		4982.00	5034.30	
Reach-1	34674	100-FW	413.71	0.86	413.89	2163.73	1501.08	3844.36	5565.56	4630.00	4982.00	5034.30	6860.00
Reach-1	34517	100-year	412.79		412.85	3420.96	3078.83	2603.47	5228.71		4966.10	5029.40	
Reach-1	34517	100-FW	413.68	0.89	413.75	2180.00	2530.89	2890.31	5489.80	4530.00	4966.10	5029.40	6710.00
Reach-1	34432 BR U	100-year	412.71		412.77	3033.08	2921.35	1763.48	6226.17		4966.10	5029.40	
Reach-1	34432 BR U	100-FW	413.62	0.90	413.67	2056.61	1895.13	1657.53	7358.34	4530.00	4966.10	5029.40	6710.00
Reach-1	34432 BR D	100-year	412.57		412.66	3020.97	2195.72	2306.93	6408.35		4966.10	5029.40	
Reach-1	34432 BR D	100-FW	413.48	0.91	413.57	1832.85	1498.07	2249.89	7163.04	4590.00	4966.10	5029.40	6560.00
Reach-1	34312	100-year	412.49		412.54	3280.38	2156.98	2590.63	6163.39		4966.10	5029.40	
Reach-1	34312	100-FW	413.40	0.91	413.46	1970.00	2094.42	2874.91	5941.67	4590.00	4966.10	5029.40	6560.00
Reach-1	34179	100-year	412.40		412.46	3158.22	1329.62	2470.94	7110.45		4982.00	5034.30	
Reach-1	34179	100-FW	413.32	0.92	413.39	1978.00	1548.89	2679.91	6682.21	4642.00	4982.00	5034.30	6620.00
Reach-1	33730	100-year	412.32		412.35	3530.95	2600.52	2374.39	5936.09		4976.60	5044.60	
Reach-1	33730	100-FW	413.23	0.92	413.27	2050.00	2804.86	2658.91	5447.23	4294.00	4976.60	5044.60	6344.00
Reach-1	33346	100-year	412.20		412.23	3456.00	2159.62	1930.35	6821.04		4982.00	5034.30	
Reach-1	33346	100-FW	413.13	0.93	413.16	1962.92	1587.63	2077.43	7245.95	4427.08	4982.00	5034.30	6390.00
Reach-1	31792	100-year	412.01		412.05	3933.62	3854.11	3757.85	3299.04		4935.80	5052.10	
Reach-1	31792	100-FW	412.88	0.87	412.94	2036.64	4083.74	4687.87	2139.39	3803.36	4935.80	5052.10	5840.00
Reach-1	31748	100-year	411.98		411.99	4196.27	6770.15	751.21	3389.64		4981.30	5017.40	
Reach-1	31748	100-FW	412.83	0.85	412.86	2090.00	6449.25	1297.20	3164.55	3760.00	4981.30	5017.40	5850.00
Reach-1	31661 BR U	100-year	411.97		411.97	4072.80	7110.61	312.27	3488.12		4981.30	5017.40	
Reach-1	31661 BR U	100-FW	412.80	0.83	412.81	2077.51	6990.33	482.28	3438.39	3760.00	4981.30	5017.40	5850.00
Reach-1	31661 BR D	100-year	411.97		411.97	4052.38	6756.57	298.92	3855.51		4981.30	5017.40	
Reach-1	31661 BR D	100-FW	412.79	0.83	412.81	2167.44	6033.03	445.74	4432.23	3870.00	4981.30	5017.40	6050.00
Reach-1	31516	100-year	411.94		411.95	4208.99	6799.85	675.59	3435.57		4981.30	5017.40	
Reach-1	31516	100-FW	412.73	0.79	412.75	2180.00	6142.38	1122.95	3645.67	3870.00	4981.30	5017.40	6050.00
Reach-1	31330	100-year	411.91		411.92	3975.54	4945.97	1619.68	4345.35		4966.20	5027.40	
Reach-1	31330	100-FW	412.68	0.77	412.71	2160.00	4403.01	2267.13	4240.86	4000.00	4966.20	5027.40	6160.00
Reach-1	30662	100-year	411.85		411.88	3934.20	3672.77	3522.24	3715.99		4939.20	5049.30	
Reach-1	30662	100-FW	412.57	0.72	412.63	2200.00	2180.82	4548.14	4182.05	4500.00	4939.20	5049.30	6700.00
Reach-1	30284	100-year	411.80		411.84	4021.82	3937.16	2899.94	4073.90		4956.10	5035.60	
Reach-1	30284	100-FW	412.50	0.70	412.56	2525.00	2015.80	3750.08	5145.12	4570.00	4956.10	5035.60	7095.00
Reach-1	29539	100-year	411.77		411.78	4322.05	2480.22	1707.53	6723.25		4963.00	5035.60	
Reach-1	29539	100-FW	412.48	0.71	412.49	2909.03	1248.03	1802.36	7860.60	4593.00	4963.00	5035.60	7525.00
Reach-1	28935	100-year	411.71		411.72	5975.79	1841.66	1776.52	7292.82		4966.20	5027.40	
Reach-1	28935	100-FW	412.43	0.72	412.45	3027.45	47.14	1914.20	8949.66	4950.00	4966.20	5027.40	7977.45
Reach-1	28670	100-year	411.68		411.69	6458.91	1579.40	2278.33	7053.27		4950.70	5035.00	
Reach-1	28670	100-FW	412.41	0.73	412.43	2992.81	91.08	2412.04	8407.88	4900.00	4950.70	5035.00	8000.00
Reach-1	28532 BR U	100-year	411.49		411.62	5455.27	1764.62	4185.55	4960.83		4950.70	5035.00	
Reach-1	28532 BR U	100-FW	412.27	0.78	412.37	2694.82	0.39	3604.55	7306.06	4900.00	4950.70	5035.00	8000.00
Reach-1	28532 BR D	100-year	411.38		411.51	5466.31	998.73	3486.92	6425.35		4950.70	5035.00	
Reach-1	28532 BR D	100-FW	412.24	0.86	412.29	3151.23	0.14	2143.63	8767.23	4700.00	4950.70	5035.00	8400.00
Reach-1	28344	100-year	411.40		411.41	6530.69	2041.35	1336.81	7532.84		4950.70	5035.00	
Reach-1	28344	100-FW	412.23	0.83	412.24	3647.00	338.71	1400.96	9171.34	4700.00	4950.70	5035.00	8400.00
Reach-1	28200	100-year	411.38		411.38	6961.39	1482.60	2240.42	7445.98		4925.60	5060.30	
Reach-1	28200	100-FW	412.21	0.83	412.21	3653.72	616.96	2177.25	8374.79	4600.00	4925.60	5060.30	8402.50
Reach-1	27730	100-year	411.31		411.33	7459.30	1668.86	2242.51	7257.63		4949.30	5029.30	
Reach-1	27730	100-FW	412.15	0.83	412.16	3473.13	883.59	2374.81	7910.61	4688.82	4949.30	5029.30	8178.00
Reach-1	27384	100-year	411.29		411.29	7799.81	1120.29	1250.40	8798.31		4960.20	5034.00	
Reach-1	27384	100-FW	412.12	0.84	412.13	3155.35	633.75	1263.34	9271.91	4743.78	4960.20	5034.00	7961.50
Reach-1	27054	100-year	411.24		411.25	6358.38	2275.16	1692.81	7201.04		4965.40	5027.40	

HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

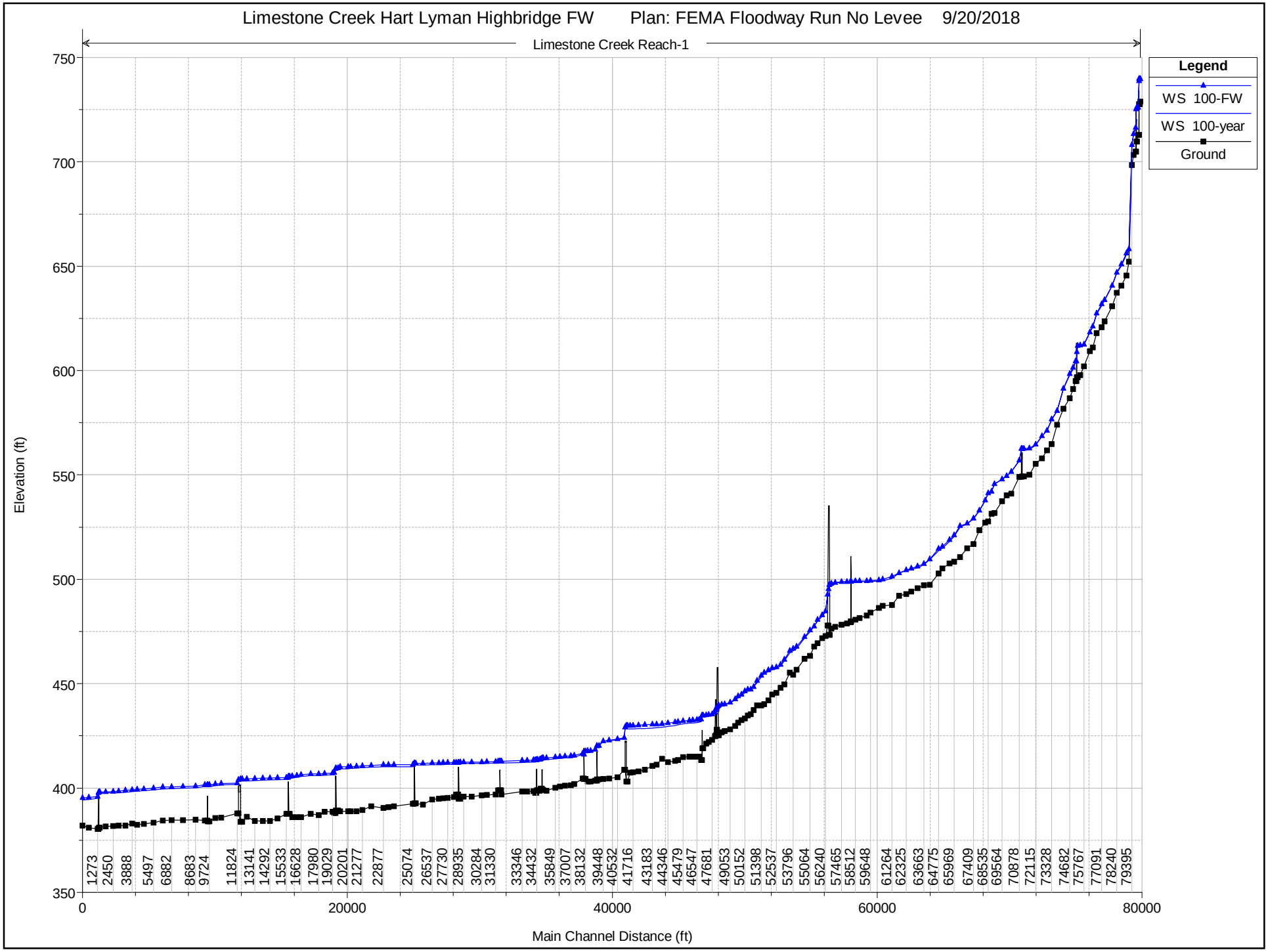
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	27054	100-FW	412.08	0.84	412.09	3078.30	1368.00	1933.50	7867.51	4732.85	4965.40	5027.40	7811.15
Reach-1	26537	100-year	411.19		411.21	6578.90	3199.41	2239.47	5730.12		4966.20	5027.40	
Reach-1	26537	100-FW	412.02	0.82	412.05	3434.27	2311.24	2586.35	6271.40	4704.87	4966.20	5027.40	8139.14
Reach-1	25834	100-year	411.08		411.12	7041.67	2878.75	3821.20	4469.05		4959.40	5035.60	
Reach-1	25834	100-FW	411.90	0.82	411.96	2618.96	878.21	4264.98	6025.81	4842.69	4959.40	5035.60	7461.65
Reach-1	25319	100-year	411.00		411.00	6040.75	5.18	2300.54	8863.28		4958.00	5032.00	
Reach-1	25319	100-FW	411.84	0.84	411.85	2957.40	14.32	2147.94	9006.74	4892.50	4958.00	5032.00	7849.90
Reach-1	25200 BR U	100-year	411.00		411.01	4852.03		3093.25	8275.25		4958.00	5032.00	
Reach-1	25200 BR U	100-FW	411.84	0.84	411.85	2364.85		2867.32	8360.91	4892.50	4958.00	5032.00	7849.90
Reach-1	25200 BR D	100-year	411.00		411.01	4897.52		3093.25	8275.25		4958.10	5032.00	
Reach-1	25200 BR D	100-FW	411.84	0.84	411.85	2364.85		2867.32	8360.91	4917.60	4958.10	5032.00	7849.90
Reach-1	25074	100-year	410.26		410.56	5767.89	4.40	6226.81	4937.79		4958.10	5032.00	
Reach-1	25074	100-FW	411.21	0.95	411.40	2932.30	18.91	5519.84	5630.25	4917.60	4958.10	5032.00	7849.90
Reach-1	23659	100-year	410.25		410.26	5817.92	3606.26	3924.28	3638.46		4929.00	5057.50	
Reach-1	23659	100-FW	411.19	0.95	411.21	2331.00	3697.83	3740.10	3731.07	3870.00	4929.00	5057.50	6201.00
Reach-1	23233	100-year	410.23		410.25	5571.76	3426.35	2465.43	5277.22		4966.20	5027.40	
Reach-1	23233	100-FW	411.18	0.95	411.20	2010.70	3473.13	2323.00	5372.87	4196.40	4966.20	5027.40	6207.10
Reach-1	22877	100-year	410.15		410.21	5518.96	2163.66	4499.59	4505.75		4956.10	5035.60	
Reach-1	22877	100-FW	411.11	0.96	411.17	979.30	2154.67	4489.68	4524.65	4670.00	4956.10	5035.60	5649.30
Reach-1	21931	100-year	409.92		409.96	3105.52	6862.07	3087.58	1219.35		4966.20	5027.40	
Reach-1	21931	100-FW	410.86	0.94	410.93	1037.40	7008.63	3815.17	345.20	4150.00	4966.20	5027.40	5187.40
Reach-1	21277	100-year	409.79		409.88	2336.33	4036.60	6176.52	955.89		4942.50	5046.60	
Reach-1	21277	100-FW	410.61	0.83	410.80	724.96	2781.64	8103.87	283.49	4646.20	4942.50	5046.60	5371.16
Reach-1	20821	100-year	409.64		409.79	1744.84	2403.79	8600.22	164.99		4929.00	5057.50	
Reach-1	20821	100-FW	410.38	0.75	410.66	365.37	77.90	10801.05	290.05	4918.63	4929.00	5057.50	5284.00
Reach-1	20400	100-year	409.31		409.63	1794.75	1196.17	6643.49	3329.35		4966.20	5027.40	
Reach-1	20400	100-FW	410.27	0.96	410.49	472.02	652.52	6077.09	4439.40	4912.04	4966.20	5027.40	5384.06
Reach-1	20201	100-year	409.26		409.53	1687.21	93.41	8911.19	2164.39		4942.50	5046.60	
Reach-1	20201	100-FW	410.22	0.96	410.43	398.40	62.07	8483.09	2623.84	4932.50	4942.50	5046.60	5330.90
Reach-1	19593	100-year	409.27		409.36	1415.76	357.79	10286.77	524.44		4872.40	5119.20	
Reach-1	19593	100-FW	410.21	0.93	410.29	365.18	75.97	10776.29	316.74	4855.00	4872.40	5119.20	5220.18
Reach-1	19442	100-year	408.57		409.16	492.41	3207.65	7838.99	122.36		4970.50	5034.40	
Reach-1	19442	100-FW	409.55	0.98	410.11	320.00	2987.50	7985.32	196.19	4795.00	4970.50	5034.40	5115.00
Reach-1	19269 BR U	100-year	408.57		409.16	409.02	2895.43	7756.94	514.68		4970.50	5034.40	
Reach-1	19269 BR U	100-FW	409.55	0.98	410.11	320.00	2236.19	8101.54	831.27	4795.00	4970.50	5034.40	5115.00
Reach-1	19269 BR D	100-year	408.19		408.78	472.08	2895.77	7754.28	517.00		4970.50	5034.40	
Reach-1	19269 BR D	100-FW	409.12	0.93	409.85	321.00	2236.53	8098.85	833.63	4755.00	4970.50	5034.40	5076.00
Reach-1	19144	100-year	406.42		407.19	455.08	2891.60	8176.43	100.96		4970.50	5034.40	
Reach-1	19144	100-FW	407.30	0.88	407.95	321.00	3012.20	8017.59	139.21	4755.00	4970.50	5034.40	5076.00
Reach-1	19029	100-year	406.30		406.91	606.07	2902.37	8139.84	126.79		4959.40	5037.90	
Reach-1	19029	100-FW	407.16	0.85	407.75	375.45	2547.50	8432.34	189.17	4724.55	4959.40	5037.90	5100.00
Reach-1	18413	100-year	406.11		406.18	5106.62	5941.03	4585.30	642.67		4950.70	5046.10	
Reach-1	18413	100-FW	406.94	0.83	407.05	809.92	5558.51	5270.12	340.38	4300.08	4950.70	5046.10	5110.00
Reach-1	17980	100-year	406.01		406.10	4920.96	5339.94	5808.53	20.53		4942.00	5054.20	
Reach-1	17980	100-FW	406.86	0.85	406.96	907.92	5006.92	6134.89	27.19	4162.08	4942.00	5054.20	5070.00
Reach-1	17376	100-year	405.87		405.97	5622.03	6882.55	3591.99	694.46		4971.00	5027.10	
Reach-1	17376	100-FW	406.74	0.87	406.83	991.33	6756.75	3599.89	812.37	4228.67	4971.00	5027.10	5220.00
Reach-1	16628	100-year	405.49		405.68	5263.55	1005.83	6965.75	3255.42		4952.10	5047.90	
Reach-1	16628	100-FW	406.35	0.86	406.56	674.38	761.34	7524.71	2940.95	4800.12	4952.10	5047.90	5474.50
Reach-1	16316	100-year	405.22		405.52	5518.56	1748.09	6485.35	2993.56		4965.40	5034.60	
Reach-1	16316	100-FW	406.05	0.83	406.41	970.58	1726.29	7038.21	2462.50	4320.70	4965.40	5034.60	5291.28
Reach-1	15970	100-year	404.82		405.16	5439.79	3597.77	5572.87	2056.36		4973.40	5026.60	
Reach-1	15970	100-FW	405.71	0.89	406.06	1417.39	3518.33	5822.06	1886.62	3780.00	4973.40	5026.60	5197.39

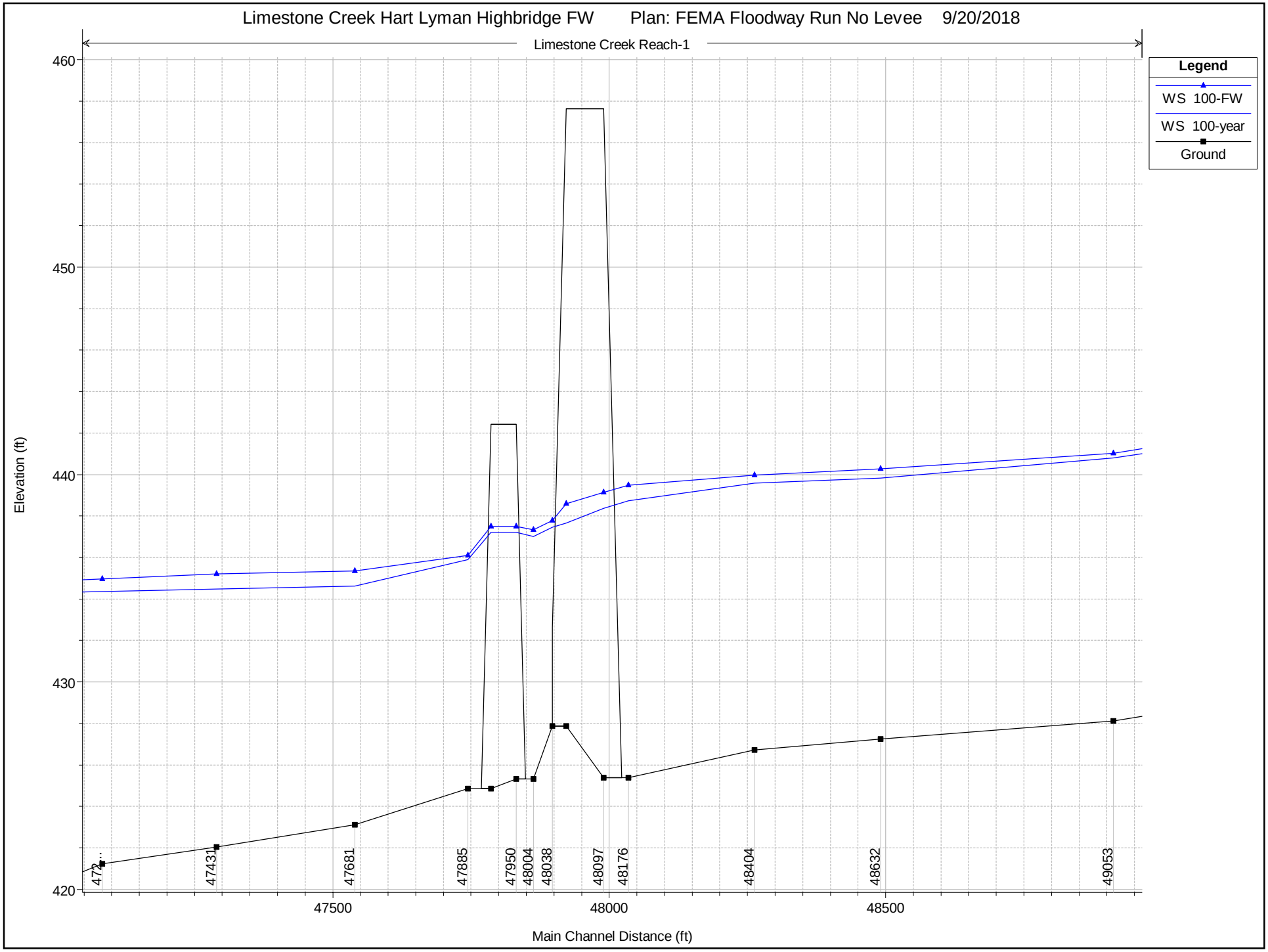
HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

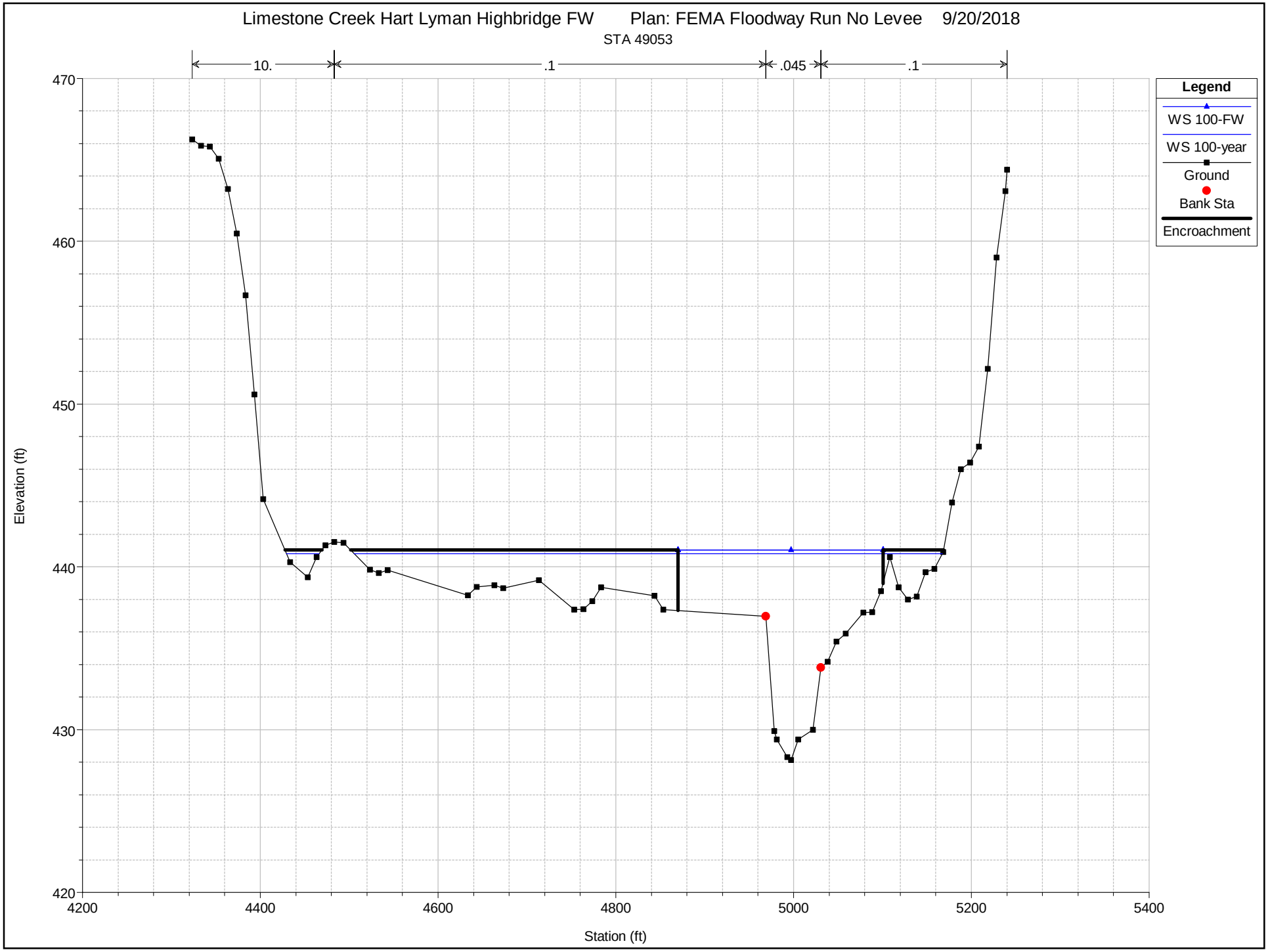
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	15776	100-year	404.75		404.98	4146.20	2196.46	7322.86	1707.67		4959.80	5066.20	
Reach-1	15776	100-FW	405.66	0.91	405.89	1606.30	1778.02	7682.76	1766.22	3723.70	4959.80	5066.20	5330.00
Reach-1	15677 BR U	100-year	404.75		404.97	3953.18	3440.20	6603.02	1132.37		4959.80	5066.20	
Reach-1	15677 BR U	100-FW	405.66	0.91	405.89	1483.48	3567.26	6951.07	677.17	3723.70	4959.80	5066.20	5330.00
Reach-1	15677 BR D	100-year	404.14		404.30	3117.81	3440.21	6603.05	1132.34		4959.80	5066.20	
Reach-1	15677 BR D	100-FW	404.96	0.82	405.09	1501.60	3567.26	6951.10	677.14	3723.70	4959.80	5066.20	5380.00
Reach-1	15533	100-year	404.14		404.30	3803.48	3171.94	6346.53	1708.53		4959.80	5066.20	
Reach-1	15533	100-FW	404.96	0.82	405.09	1656.30	3081.21	6170.92	1974.87	3723.70	4959.80	5066.20	5380.00
Reach-1	14862	100-year	404.02		404.09	4769.91	5734.92	3728.90	1763.18		4965.20	5032.50	
Reach-1	14862	100-FW	404.87	0.85	404.92	2295.78	5704.02	3483.03	2039.95	3260.00	4965.20	5032.50	5555.78
Reach-1	14292	100-year	403.86		403.95	5389.74	3489.86	4559.75	3177.39		4962.30	5035.20	
Reach-1	14292	100-FW	404.76	0.91	404.83	2396.72	3681.76	4154.81	3390.44	3710.00	4962.30	5035.20	6106.72
Reach-1	13742	100-year	403.79		403.86	5527.90	1262.77	6439.81	3524.43		4927.50	5067.80	
Reach-1	13742	100-FW	404.70	0.91	404.77	2257.52	898.61	6408.95	3919.45	4089.09	4927.50	5067.80	6346.61
Reach-1	13141	100-year	403.58		403.72	5958.31	2333.76	5145.41	3747.83		4962.30	5035.20	
Reach-1	13141	100-FW	404.48	0.89	404.64	1877.95	2038.60	5563.74	3624.66	4040.00	4962.30	5035.20	5917.95
Reach-1	12542	100-year	403.41		403.47	5909.06	1554.89	4922.32	4749.80		4936.20	5058.50	
Reach-1	12542	100-FW	404.35	0.94	404.41	1560.00	739.56	5103.17	5384.27	4500.00	4936.20	5058.50	6060.00
Reach-1	12212	100-year	403.34		403.40	6033.96	2183.66	4751.28	4292.06		4955.20	5044.80	
Reach-1	12212	100-FW	404.27	0.93	404.35	1458.00	1473.32	5173.69	4579.99	4402.00	4955.20	5044.80	5860.00
Reach-1	11987 BR U	100-year	403.34		403.40	2617.47	892.97	5964.28	4360.41		4955.20	5044.80	
Reach-1	11987 BR U	100-FW	404.27	0.93	404.35	1015.12	2323.65	6709.88	2196.92	4402.00	4955.20	5044.80	5860.00
Reach-1	11987 BR D	100-year	403.34		403.40	2038.03	891.27	5966.07	4360.32		4955.20	5044.80	
Reach-1	11987 BR D	100-FW	403.93	0.60	404.35	925.69	2321.74	6711.89	2196.82	4410.00	4955.20	5044.80	5790.00
Reach-1	11824	100-year	401.75		402.32	5369.30	1606.16	7700.29	1920.55		4955.20	5044.80	
Reach-1	11824	100-FW	402.26	0.51	402.82	1380.00	1969.04	7879.62	1378.33	4410.00	4955.20	5044.80	5790.00
Reach-1	10610	100-year	401.45		401.54	6392.05	692.45	4927.32	7420.24		4958.60	5049.10	
Reach-1	10610	100-FW	402.06	0.60	402.13	1840.00	608.98	4740.07	7690.95	4750.00	4958.60	5049.10	6590.00
Reach-1	10181	100-year	401.19		401.37	6431.04	313.40	4622.74	8103.86		4974.10	5030.70	
Reach-1	10181	100-FW	401.90	0.71	402.01	1575.20	273.65	3968.79	8797.56	4850.00	4974.10	5030.70	6425.20
Reach-1	9724	100-year	400.73		401.06	4798.73	531.88	6983.98	5524.14		4960.00	5039.60	
Reach-1	9724	100-FW	401.61	0.88	401.83	1310.00	685.70	6242.48	6111.82	4490.00	4960.00	5039.60	5800.00
Reach-1	9583 BR U	100-year	400.73		401.06	3274.65	548.68	2786.14	9705.61		4960.00	5039.60	
Reach-1	9583 BR U	100-FW	401.61	0.88	401.82	1299.40	967.51	2685.75	9316.22	4490.00	4960.00	5039.60	5800.00
Reach-1	9583 BR D	100-year	400.63		400.78	3477.60	548.68	2786.16	9705.59		4960.00	5039.60	
Reach-1	9583 BR D	100-FW	401.45	0.82	401.55	1141.19	967.51	2685.77	9316.20	4540.00	4960.00	5039.60	5700.00
Reach-1	9386	100-year	400.63		400.78	5202.00	2857.10	5152.51	5030.39		4960.00	5039.60	
Reach-1	9386	100-FW	401.45	0.82	401.55	1160.00	3549.36	4609.19	4881.45	4540.00	4960.00	5039.60	5700.00
Reach-1	8683	100-year	400.07		400.12	5835.62	8706.92	3818.12	1344.97		4963.70	5043.00	
Reach-1	8683	100-FW	400.97	0.90	401.03	1896.00	7990.68	4190.60	1688.72	3510.00	4963.70	5043.00	5406.00
Reach-1	7741	100-year	399.90		399.95	5599.16	8751.80	3202.45	1915.75		4974.10	5040.50	
Reach-1	7741	100-FW	400.79	0.89	400.86	1980.00	7849.65	3538.66	2481.69	3600.00	4974.10	5040.50	5580.00
Reach-1	6882	100-year	399.72		399.77	5207.50	9367.41	2920.68	1581.90		4974.10	5030.70	
Reach-1	6882	100-FW	400.60	0.88	400.66	1800.00	9177.93	3270.13	1421.94	3500.00	4974.10	5030.70	5300.00
Reach-1	6187	100-year	399.59		399.63	5120.15	10068.48	2655.00	1146.52		4974.10	5026.10	
Reach-1	6187	100-FW	400.43	0.85	400.50	1332.70	9456.51	3245.54	1167.95	3967.30	4974.10	5026.10	5300.00
Reach-1	5497	100-year	399.09		399.18	3900.21	4601.91	5176.55	4091.55		4966.30	5069.10	
Reach-1	5497	100-FW	399.87	0.78	400.00	1106.22	4138.14	5944.98	3786.88	4481.57	4966.30	5069.10	5587.79
Reach-1	4770	100-year	398.75		398.84	2564.23	7229.03	3757.07	2883.90		4973.10	5030.50	
Reach-1	4770	100-FW	399.54	0.79	399.64	1165.76	7930.73	4036.05	1903.23	3999.70	4973.10	5030.50	5165.46
Reach-1	4253	100-year	398.52		398.61	2240.42	7212.37	3821.83	2835.80		4973.10	5030.50	
Reach-1	4253	100-FW	399.28	0.76	399.40	1338.75	7106.82	4301.43	2461.76	4231.49	4973.10	5030.50	5570.24
Reach-1	3888	100-year	398.23		398.37	1907.74	3994.25	4262.95	5612.81		4971.20	5030.50	
Reach-1	3888	100-FW	399.03	0.80	399.16	1333.25	4347.02	4321.43	5201.55	4473.45	4971.20	5030.50	5806.70

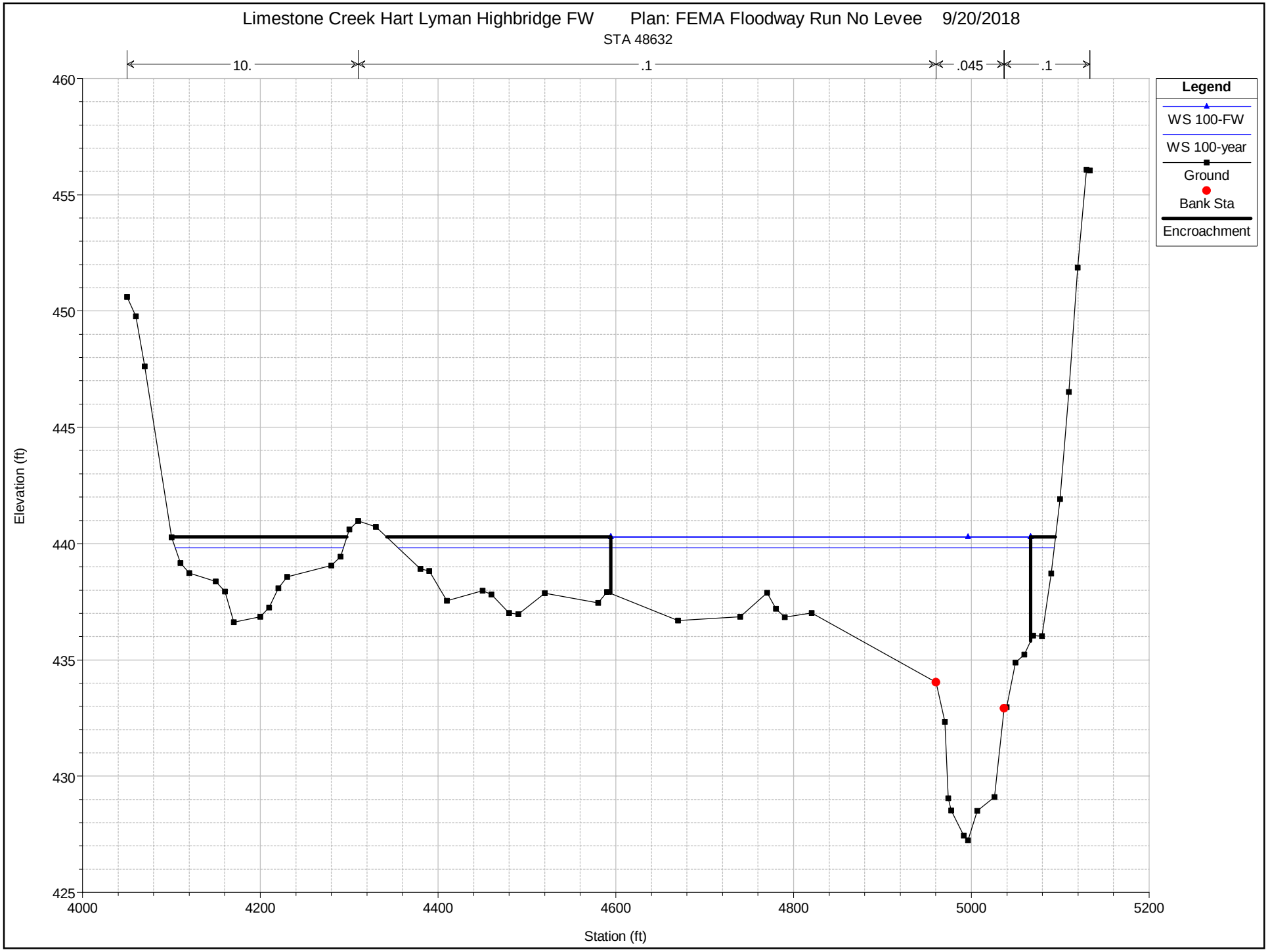
HEC-RAS Plan: Fldwy FEMA No Lev River: Limestone Creek Reach: Reach-1 (Continued)

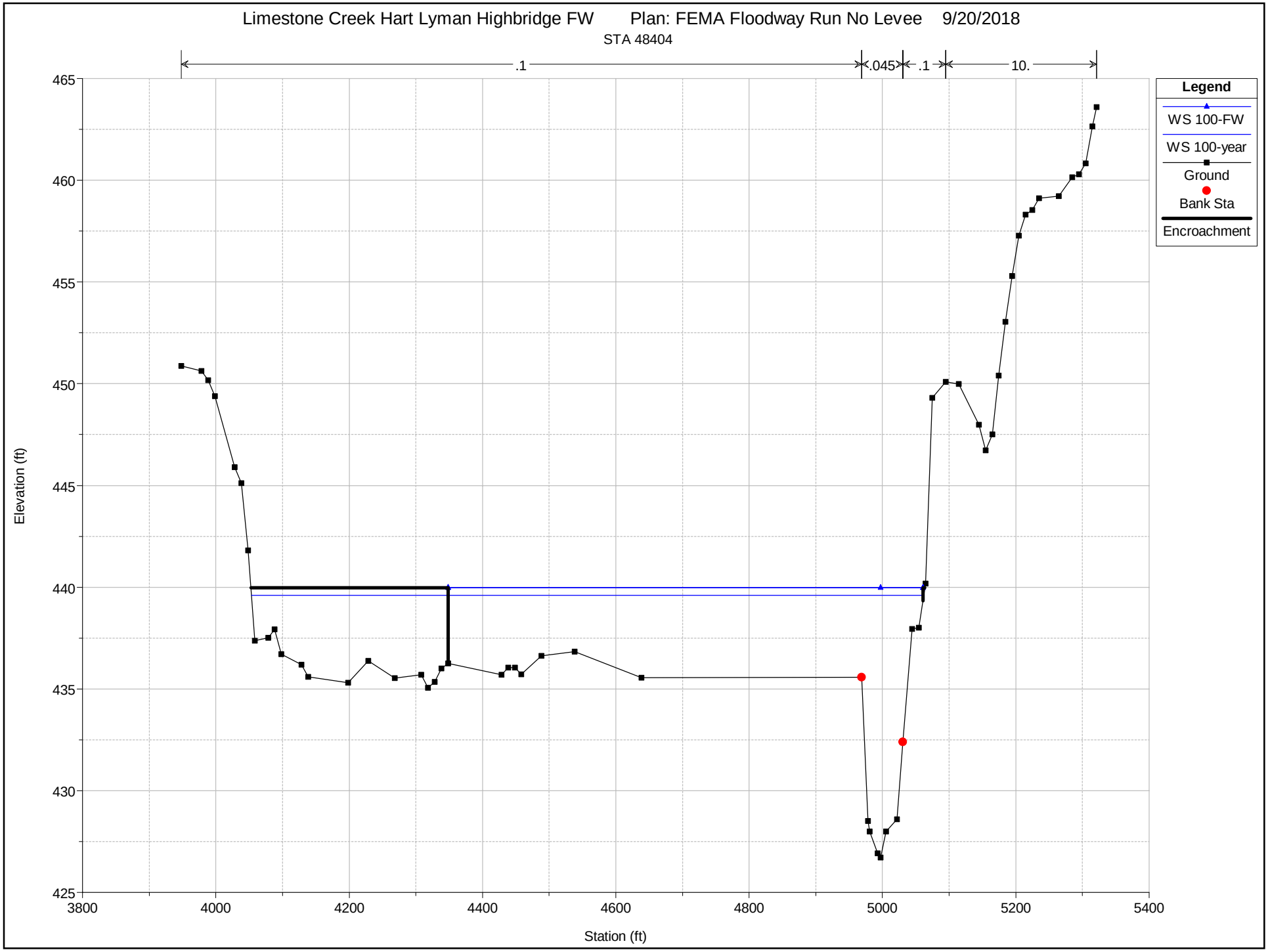
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	3389	100-year	397.97		398.15	1996.38	4919.43	4829.43	4121.15		4973.10	5030.50	
Reach-1	3389	100-FW	398.83	0.86	398.98	1213.24	5612.33	4731.76	3525.91	4334.10	4973.10	5030.50	5547.34
Reach-1	2882	100-year	397.78		397.85	3165.83	5775.14	3575.00	4519.86		4971.20	5030.50	
Reach-1	2882	100-FW	398.47	0.69	398.66	966.29	3764.28	5086.78	5018.94	4644.21	4971.20	5030.50	5610.50
Reach-1	2450	100-year	397.68		397.75	3373.68	5521.12	5825.79	2523.10		4939.50	5064.10	
Reach-1	2450	100-FW	398.28	0.60	398.46	888.25	3706.57	8248.65	1914.78	4460.00	4939.50	5064.10	5348.25
Reach-1	1892	100-year	397.62		397.67	3533.85	6800.55	5358.38	1711.07		4936.00	5067.50	
Reach-1	1892	100-FW	398.20	0.58	398.30	1226.22	6160.75	7131.22	578.03	4000.00	4936.00	5067.50	5226.22
Reach-1	1432	100-year	397.51		397.57	3538.41	5863.53	4665.16	3341.31		4960.10	5060.50	
Reach-1	1432	100-FW	398.04	0.53	398.17	1383.45	4446.16	5841.77	3582.07	4200.00	4960.10	5060.50	5583.45
Reach-1	1360 BR U	100-year	397.51		397.57	2275.70	2689.85	10157.09	1029.51		4960.10	5060.50	
Reach-1	1360 BR U	100-FW	398.04	0.53	398.16	1004.29	2826.77	9502.74	1496.98	4200.00	4960.10	5060.50	5583.45
Reach-1	1360 BR D	100-year	397.33		397.57	1961.08	2692.94	9992.87	1190.64		4960.10	5049.30	
Reach-1	1360 BR D	100-FW	397.71	0.38	398.14	957.62	2829.66	9349.09	1647.72	4200.00	4960.10	5049.30	5592.85
Reach-1	1273	100-year	395.05		395.21	2195.19	3362.98	5441.68	5065.33		4960.10	5049.30	
Reach-1	1273	100-FW	395.96	0.91	396.14	1392.85	3776.07	5923.05	4170.88	4200.00	4960.10	5049.30	5592.85
Reach-1	603	100-year	394.54		394.63	3364.06	6275.43	5089.60	2504.96		4949.50	5053.30	
Reach-1	603	100-FW	395.53	0.99	395.61	2055.32	5962.40	5177.58	2730.03	3535.87	4949.50	5053.30	5591.19
Reach-1	141	100-year	394.34		394.39	3667.45	6674.59	2873.15	4322.27		4964.40	5035.50	
Reach-1	141	100-FW	395.34	1.00	395.40	2201.20	6859.49	3307.50	3703.01	3471.40	4964.40	5035.50	5672.60

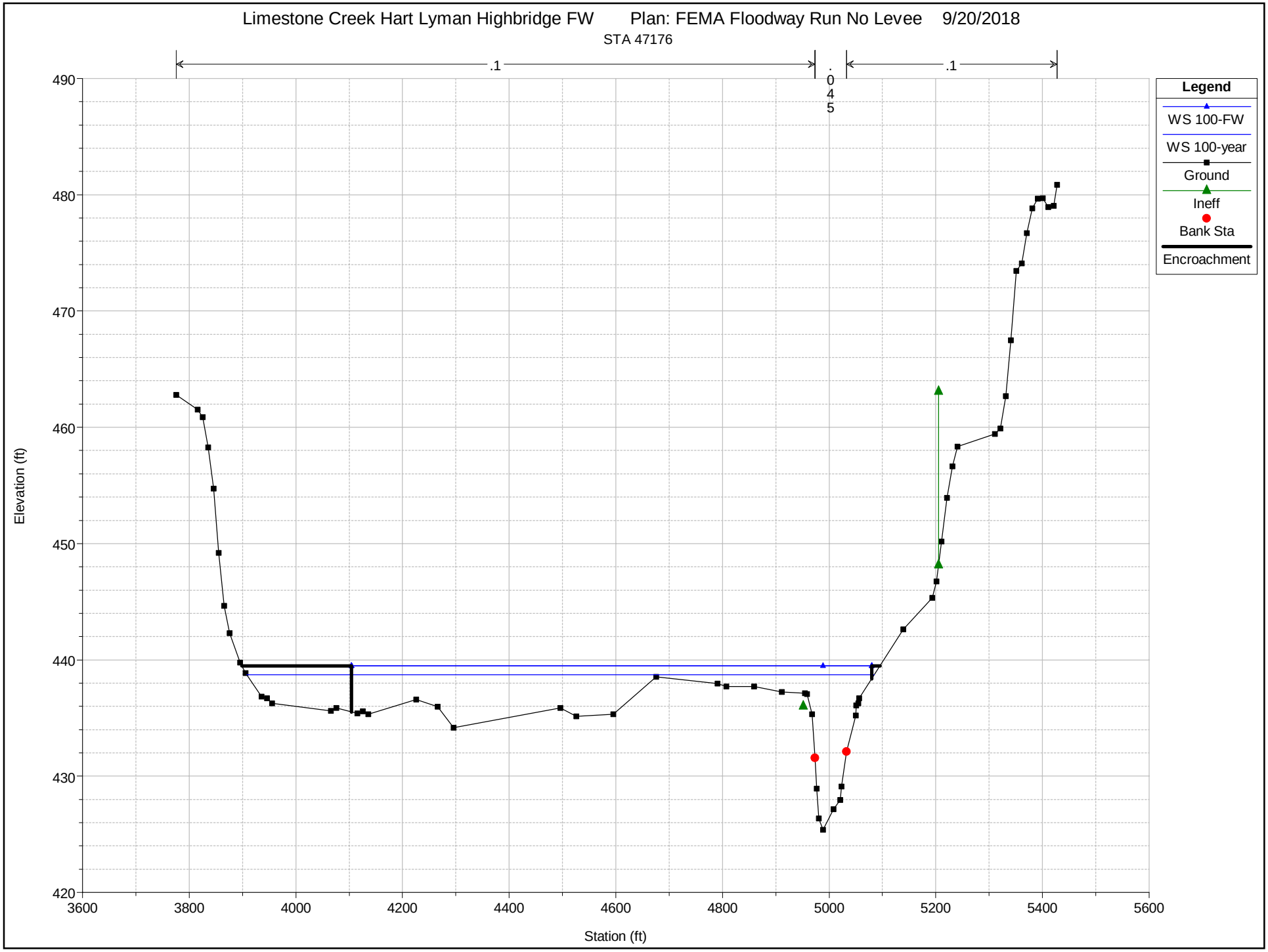

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
Limestone Creek Reach-1
Legend
WS 100-FW
WS 100-year
Ground
Elevation (ft)
750
700
650
600
550
500
450
400
350
0
20000
40000
60000
80000
Main Channel Distance (ft)
1273
2450
3888
5497
6882
8683
9724
11824
13141
14292
15533
16628
17980
19029
20201
21277
22877
25074
26537
27730
28935
30284
31330
33346
34432
35849
37007
38132
39448
40532
41716
43183
44346
45479
46547
47681
49053
50152
51398
52537
53796
55064
56240
57465
58512
59648
61264
62325
63663
64775
65969
67409
68535
69564
70878
72115
73328
74682
75767
77091
78240
79395

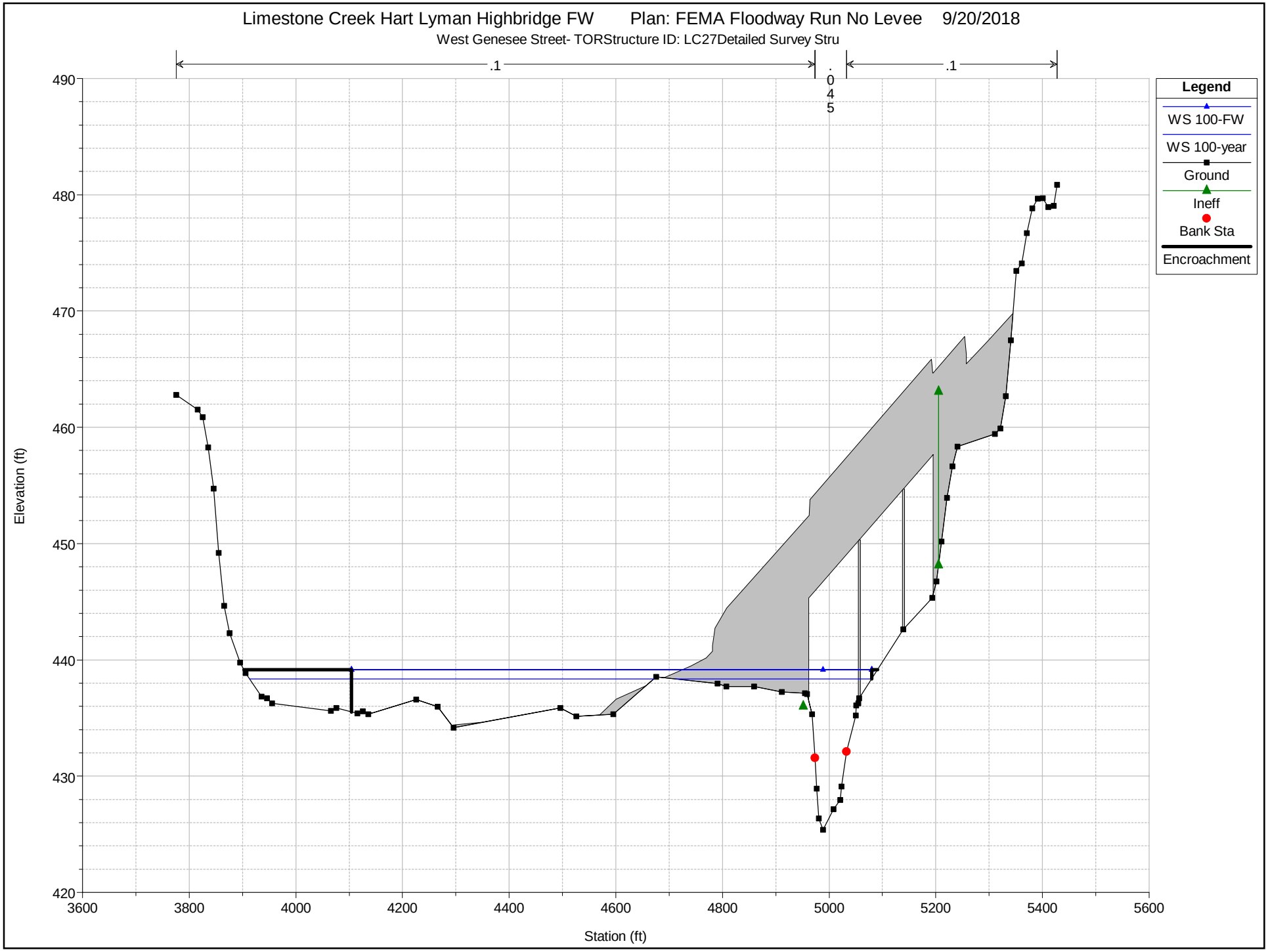

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
Limestone Creek Reach-1
Legend
WS 100-FW
WS 100-year
Ground
Elevation (ft)
460
450
440
430
420
47500
48000
48500
Main Channel Distance (ft)
47431
47681
47885
47950
48004
48038
48097
48176
48404
48632
49053


Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 49053
10.
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Bank Sta
Encroachment
Elevation (ft)
470
460
450
440
430
420
4200
4400
4600
4800
5000
5200
5400
Station (ft)


Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 48632
10.
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Bank Sta
Encroachment
Elevation (ft)
460
455
450
445
440
435
430
425
4000
4200
4400
4600
4800
5000
5200
Station (ft)

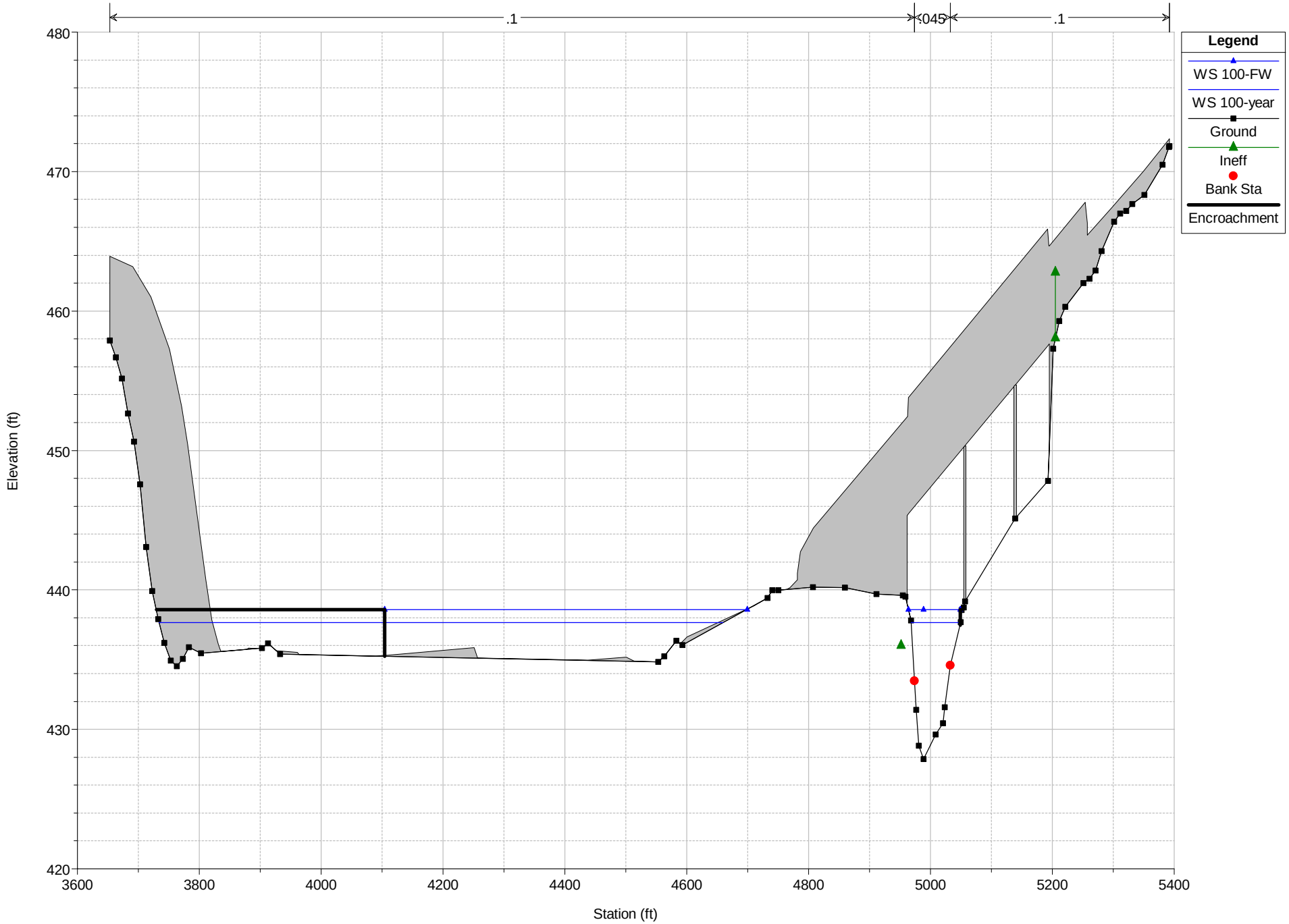

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 48404
.1
.045
.1
10.
Legend
WS 100-FW
WS 100-year
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
465
460
455
450
445
440
435
430
425
3800
4000
4200
4400
4600
4800
5000
5200
5400

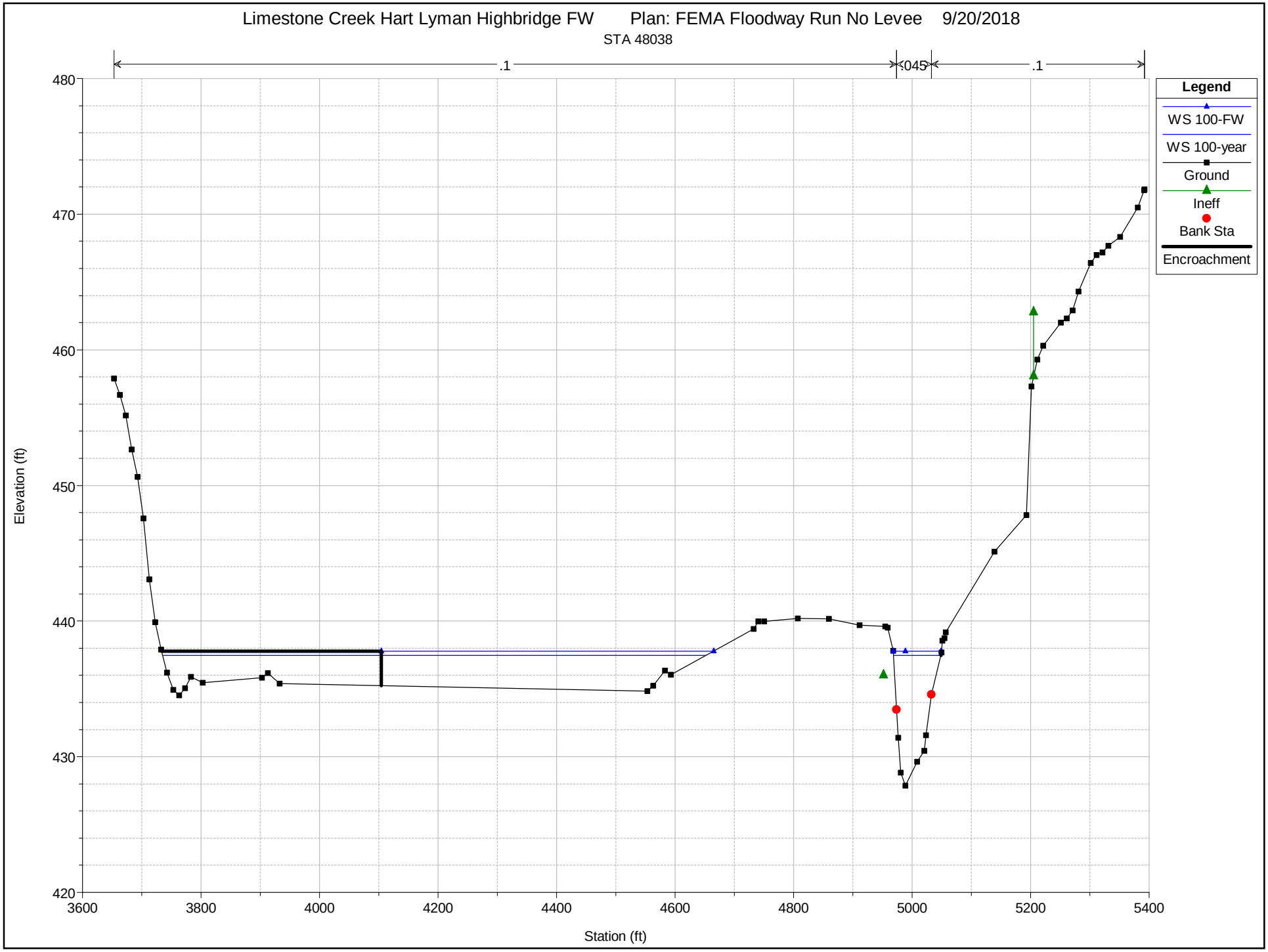

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 47176
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
490
480
470
460
450
440
430
420
3600
3800
4000
4200
4400
4600
4800
5000
5200
5400
5600

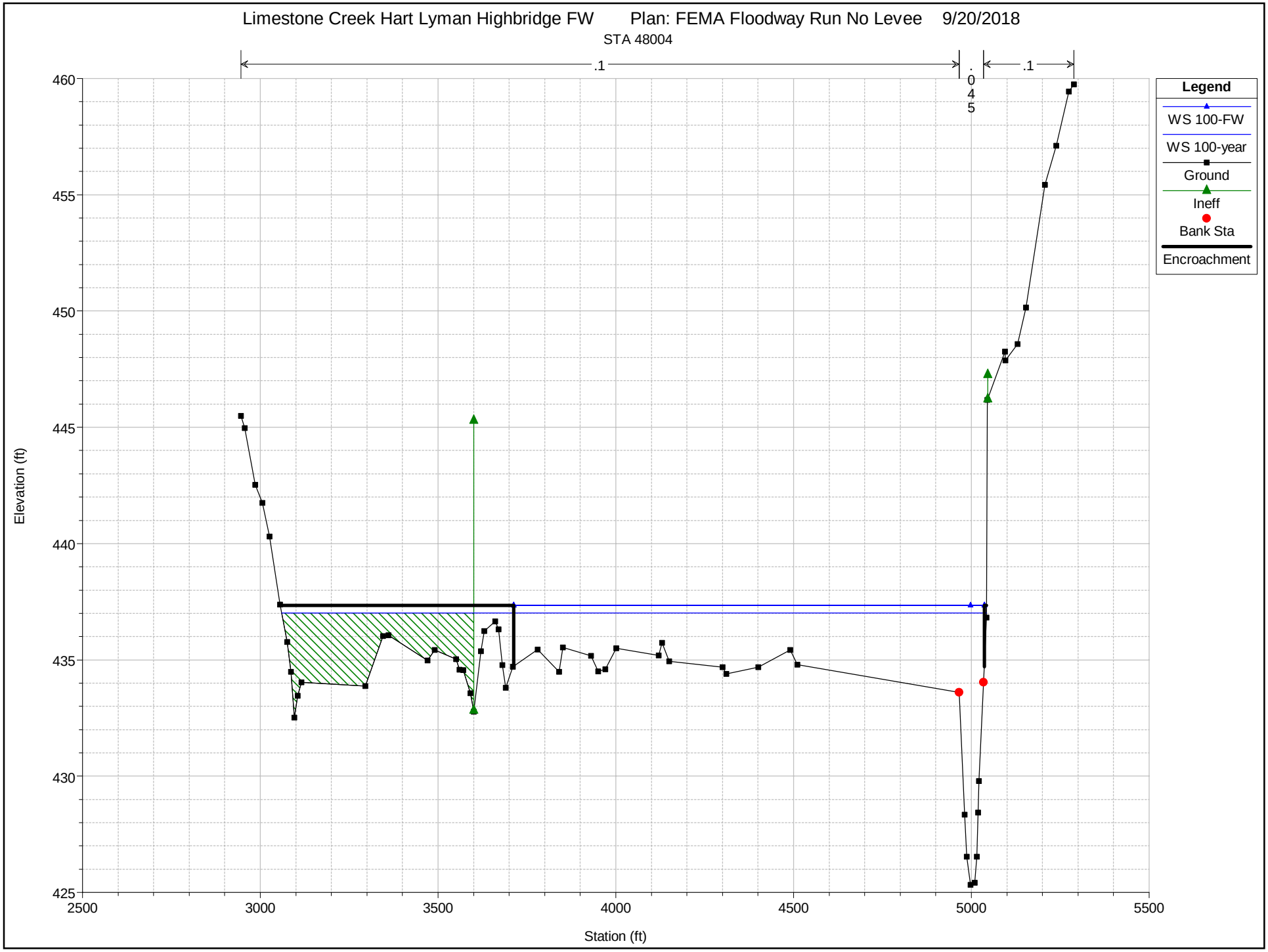

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
West Genesee Street- TORStructure ID: LC27Detailed Survey Stru
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
490
480
470
460
450
440
430
420
3600
3800
4000
4200
4400
4600
4800
5000
5200
5400
5600
Station (ft)

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018

West Genesee Street- TORStructure ID: LC27Detailed Survey Stru

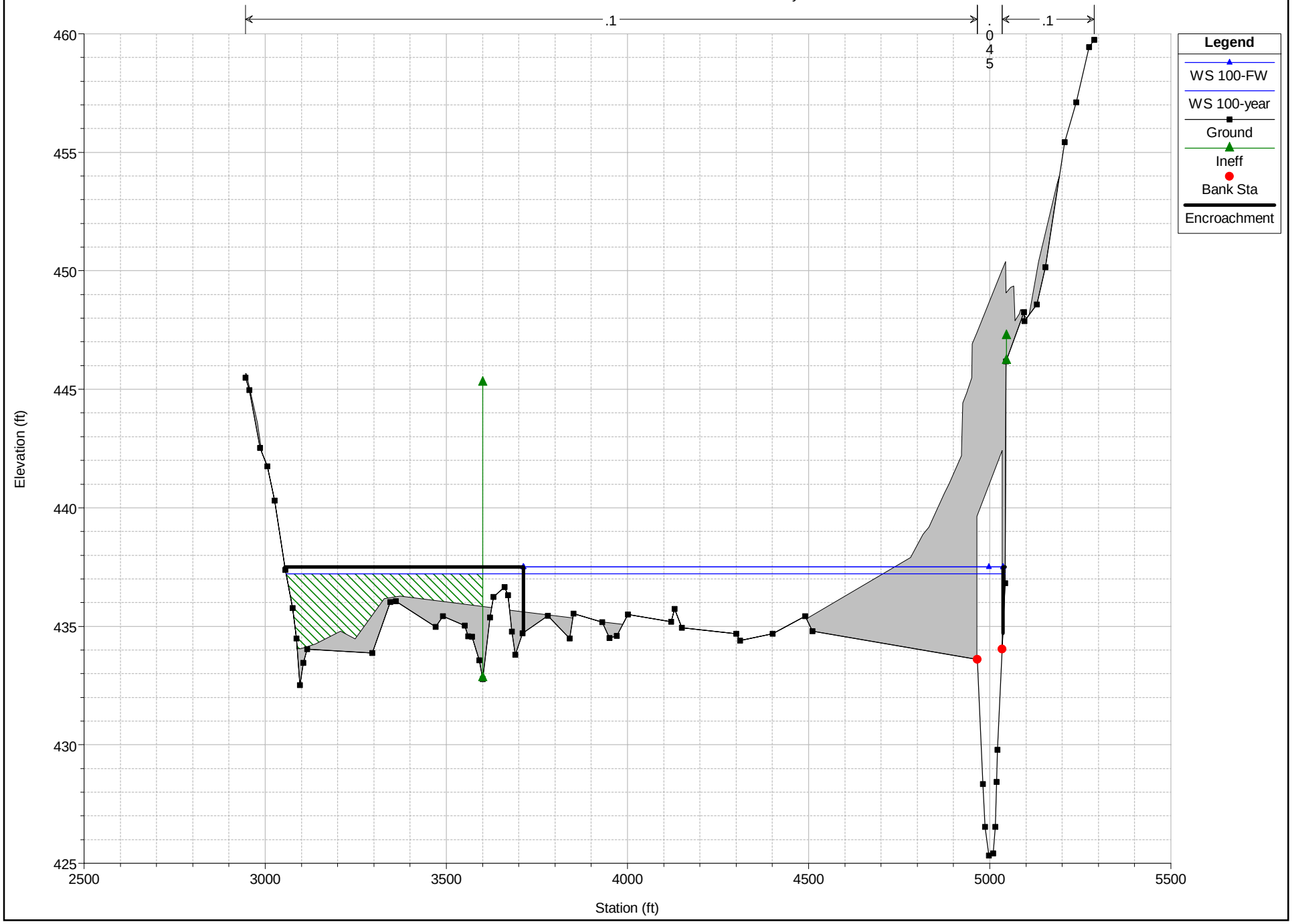



Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 48038
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
480
470
460
450
440
430
420
3600
3800
4000
4200
4400
4600
4800
5000
5200
5400


Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 48004
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
460
455
450
445
440
435
430
425
2500
3000
3500
4000
4500
5000
5500
Station (ft)

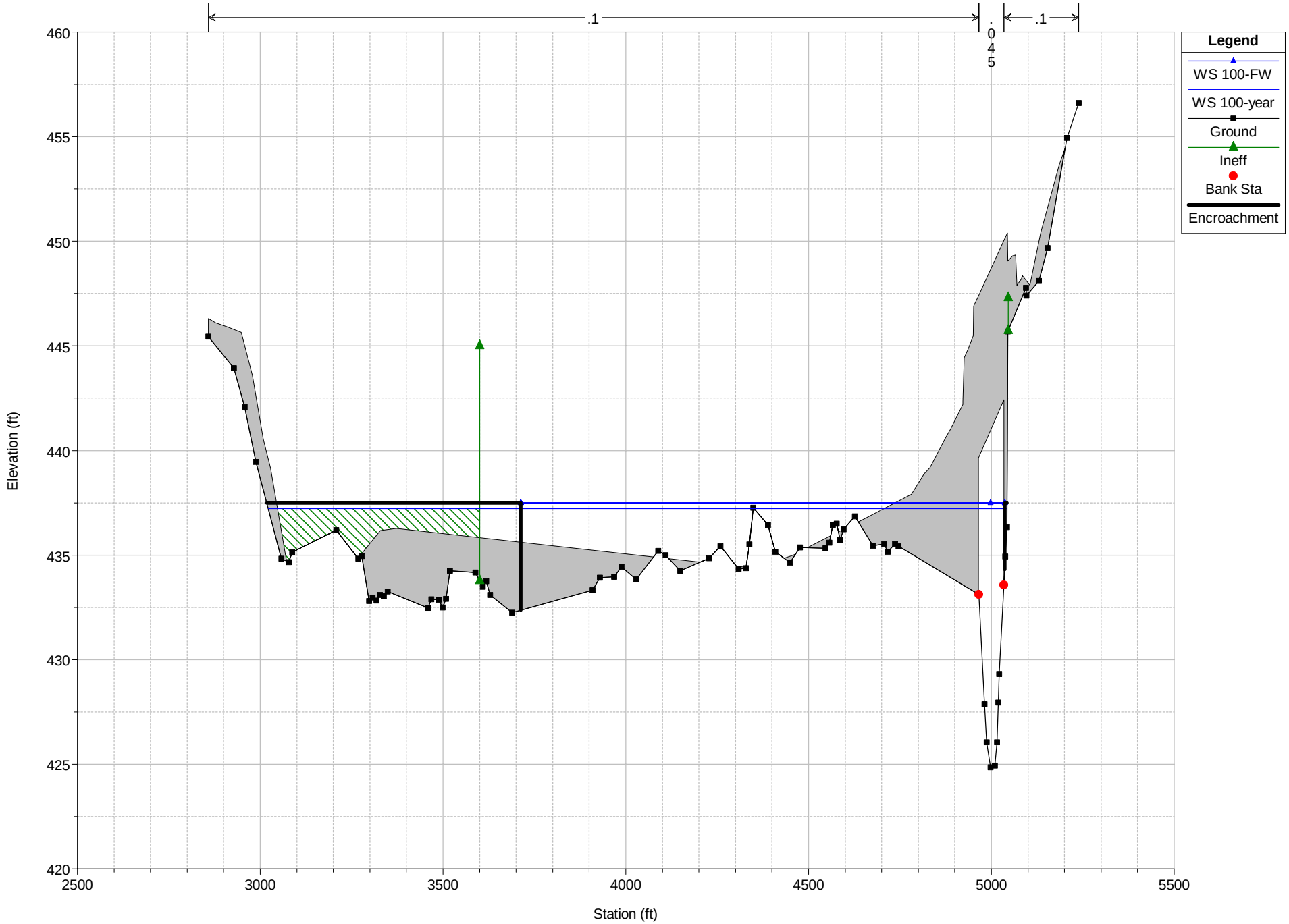
Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018

Limestone Plaza- TORStructure ID: LC26Detailed Survey Structur



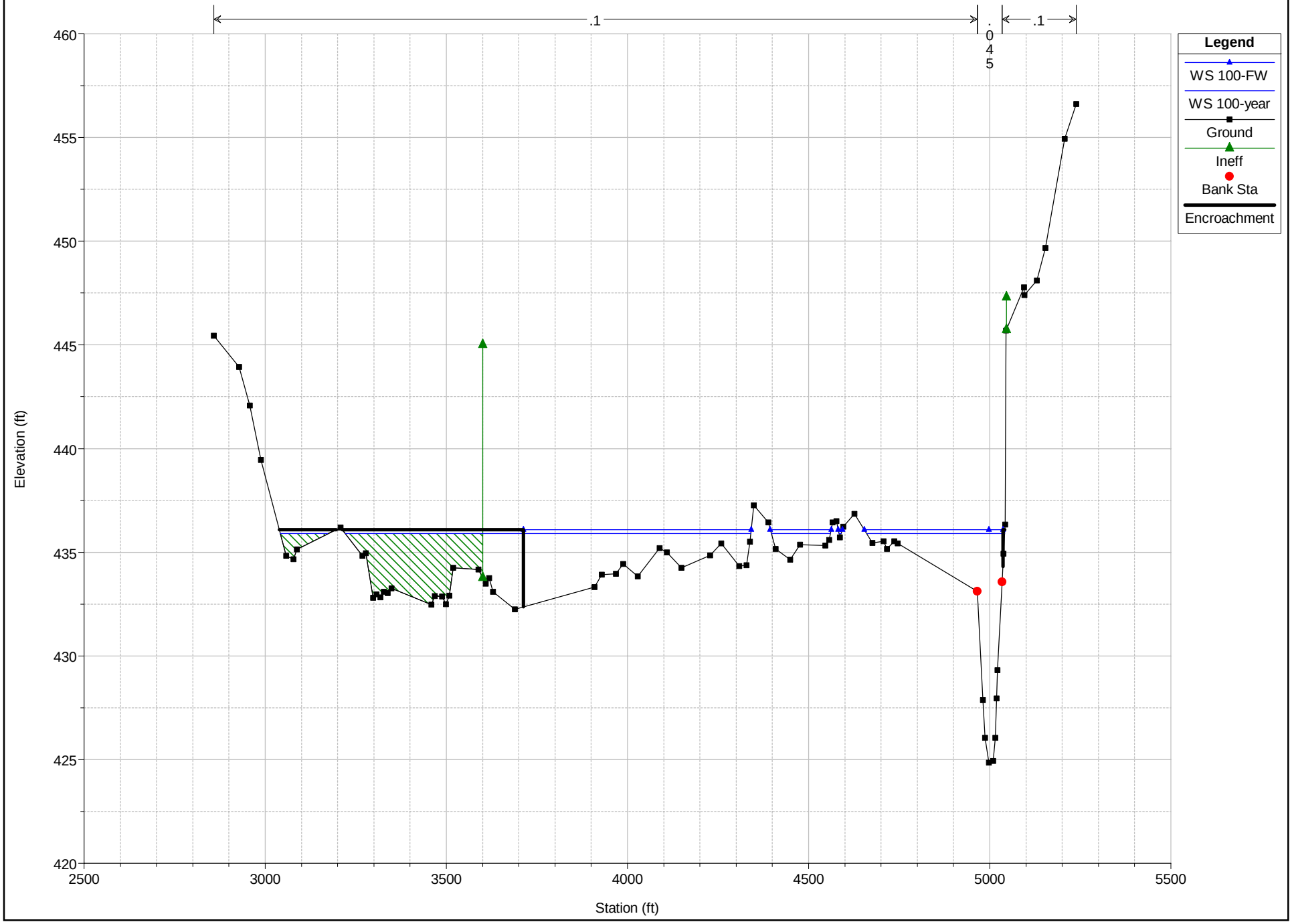
Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018

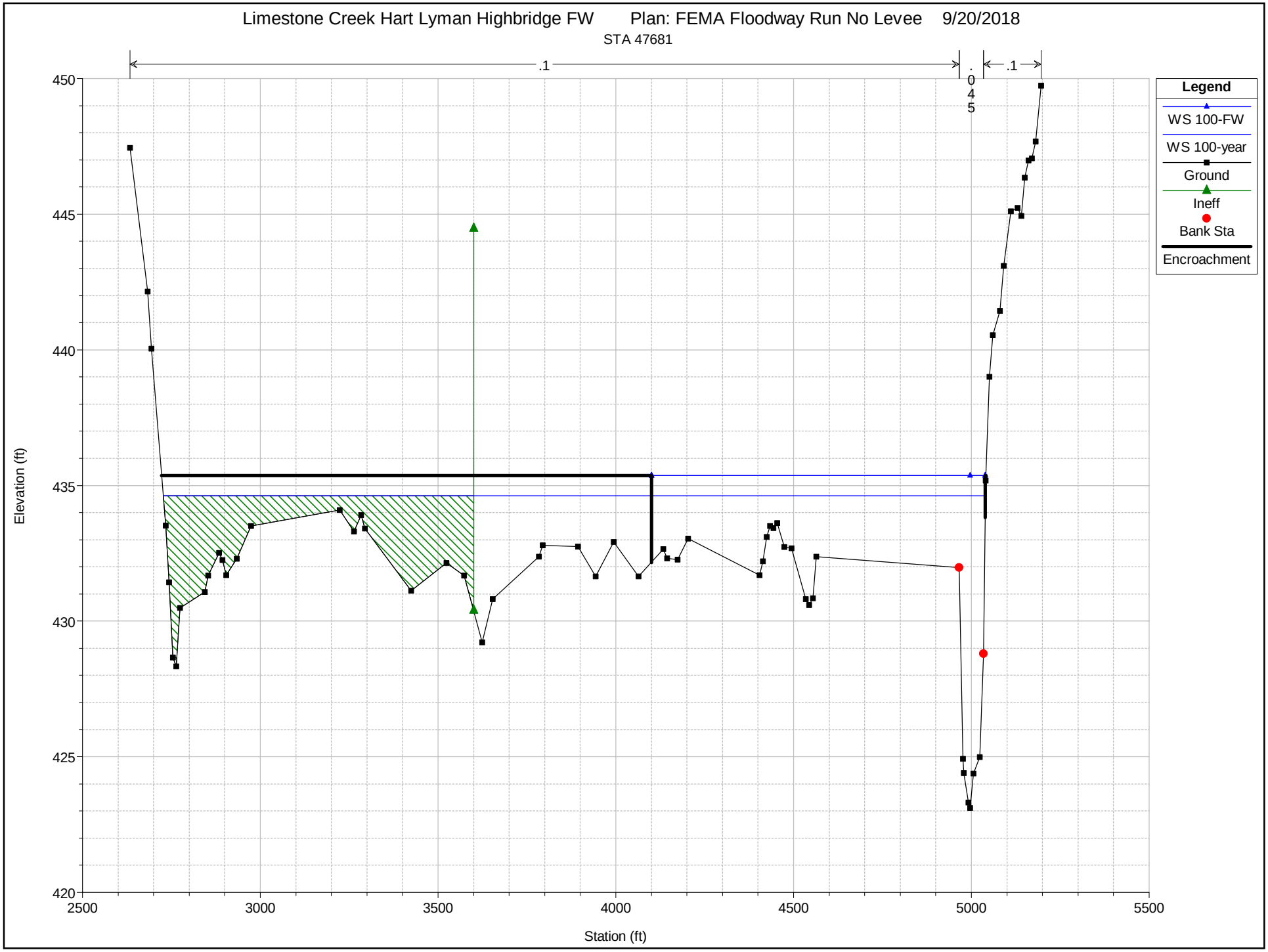
Limestone Plaza- TORStructure ID: LC26Detailed Survey Structur

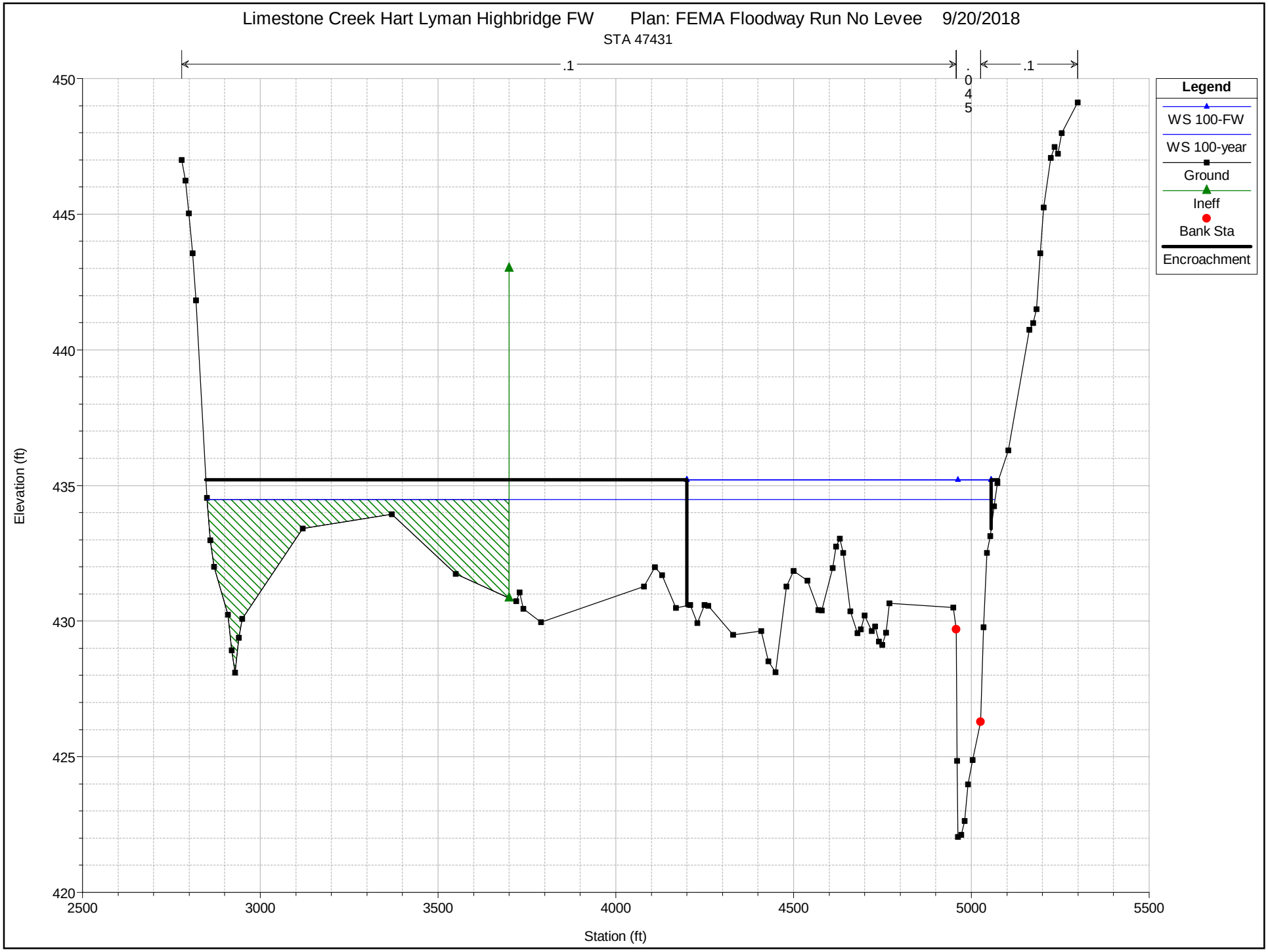


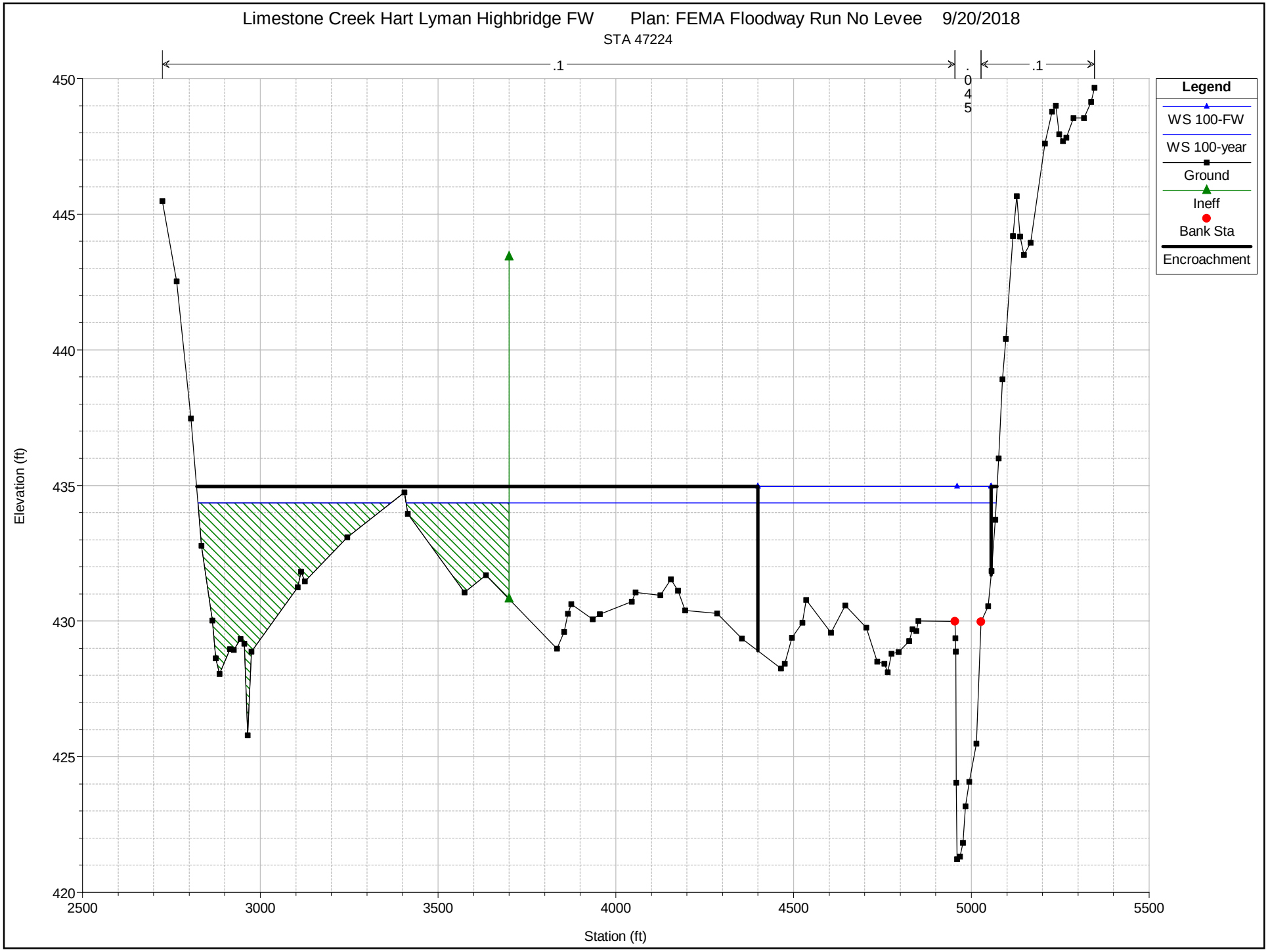
Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018

STA 47885

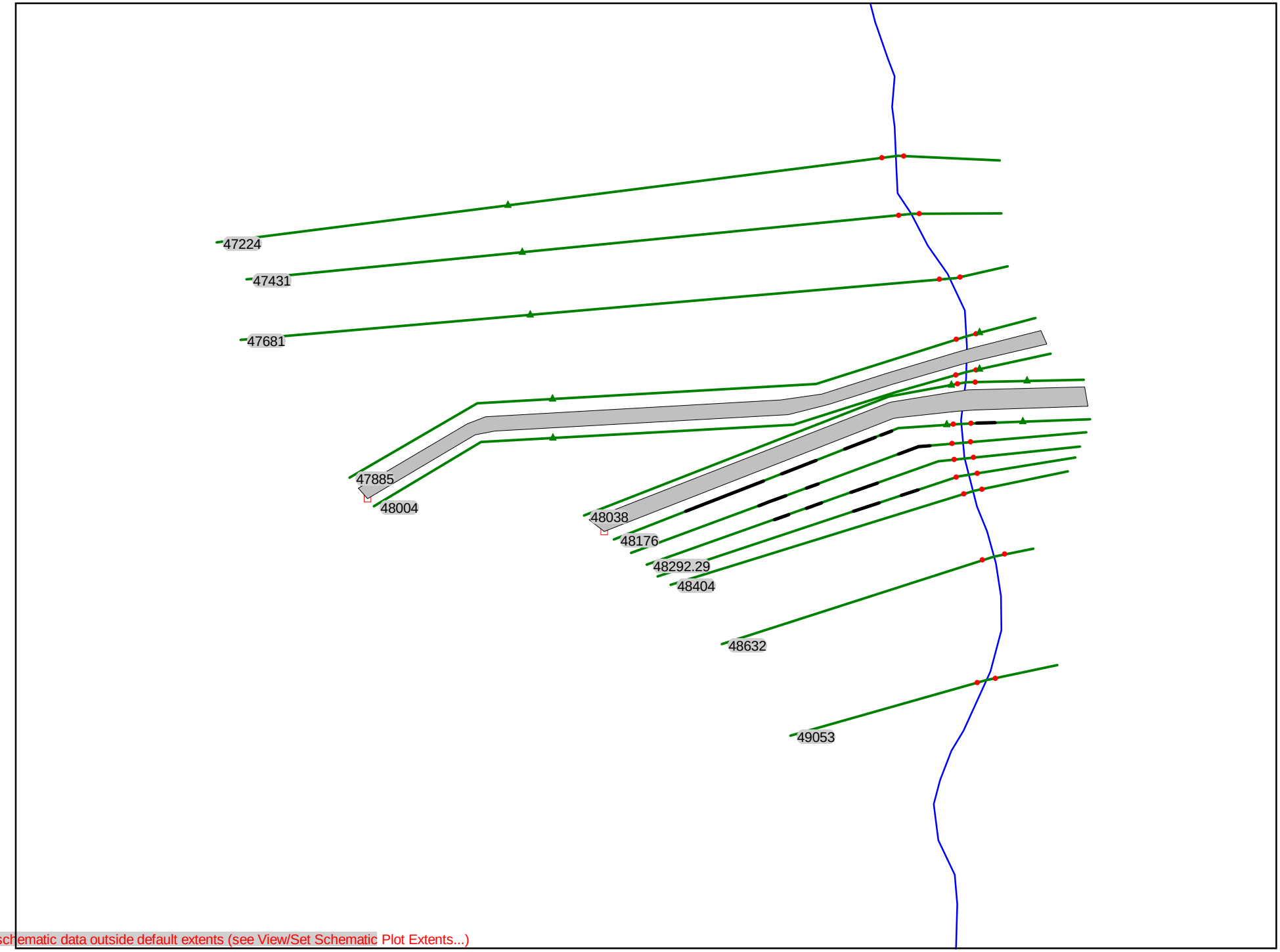



Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 47681
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
450
445
440
435
430
425
420
2500
3000
3500
4000
4500
5000
5500

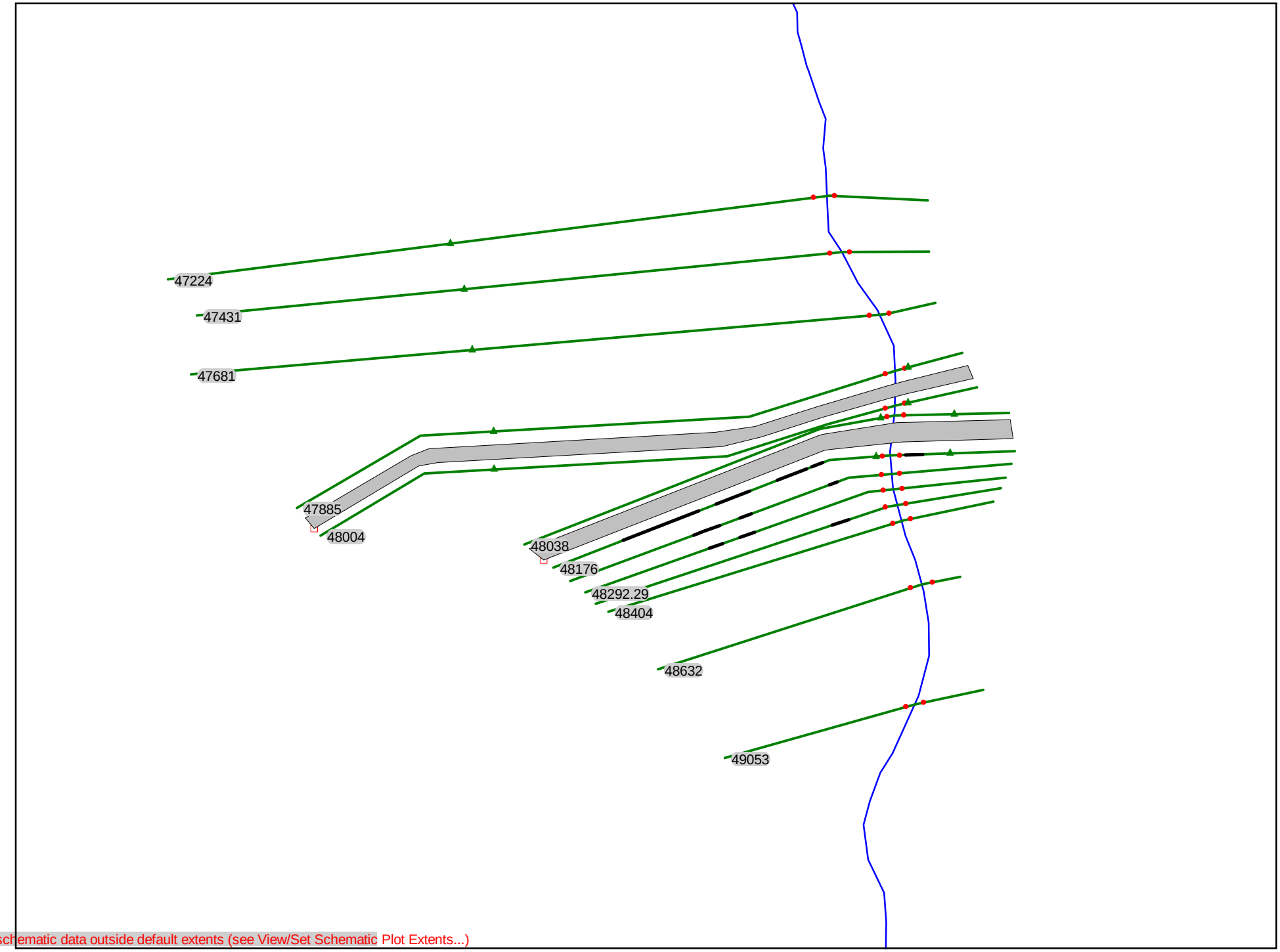

Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 47431
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
450
445
440
435
430
425
420
2500
3000
3500
4000
4500
5000
5500


Limestone Creek Hart Lyman Highbridge FW Plan: FEMA Floodway Run No Levee 9/20/2018
STA 47224
.1
.045
.1
Legend
WS 100-FW
WS 100-year
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
450
445
440
435
430
425
420
2500
3000
3500
4000
4500
5000
5500

Corrected Effective / Proposed Model Output



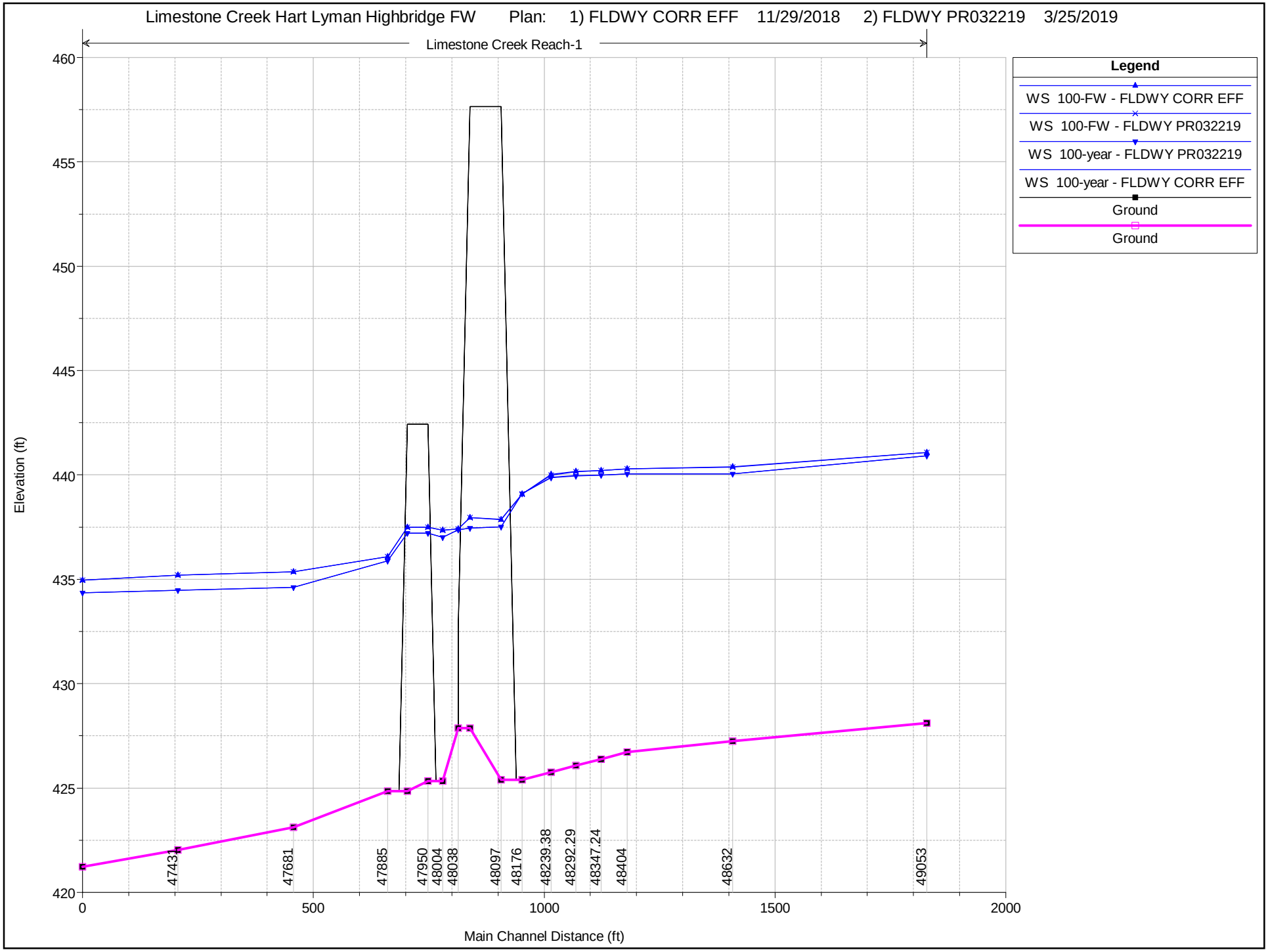
Some schematic data outside default extents (see View/Set Schematic Plot Extents...)



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

HEC-RAS River: Limestone Creek Reach: Reach-1

Reach	River Sta	Profile	Plan	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
				(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach-1	49053	100-year	FLDWY CORR EFF	440.91		441.86	703.71	1966.55	6196.64	848.81		4969.00	5030.70	
Reach-1	49053	100-year	FLDWY PR032219	440.91		441.86	703.73	1966.80	6196.34	848.87		4969.00	5030.70	
Reach-1	49053	100-FW	FLDWY CORR EFF	441.08	0.18	442.48	230.79	953.33	7104.33	954.35	4869.91	4969.00	5030.70	5100.70
Reach-1	49053	100-FW	FLDWY PR032219	441.08	0.17	442.48	230.79	952.79	7105.20	954.01	4869.91	4969.00	5030.70	5100.70
Reach-1	48632	100-year	FLDWY CORR EFF	440.04		440.60	937.86	2610.15	5957.98	443.87		4960.10	5036.80	
Reach-1	48632	100-year	FLDWY PR032219	440.04		440.60	937.89	2610.58	5957.53	443.90		4960.10	5036.80	
Reach-1	48632	100-FW	FLDWY CORR EFF	440.39	0.35	440.99	472.56	2424.67	6237.77	349.56	4594.24	4960.10	5036.80	5066.80
Reach-1	48632	100-FW	FLDWY PR032219	440.38	0.34	440.99	472.56	2422.40	6240.10	349.50	4594.24	4960.10	5036.80	5066.80
Reach-1	48404	100-year	FLDWY CORR EFF	440.06		440.19	1011.70	5867.71	3063.36	80.93		4969.00	5030.70	
Reach-1	48404	100-year	FLDWY PR032219	440.06		440.19	1011.71	5868.10	3062.97	80.93		4969.00	5030.70	
Reach-1	48404	100-FW	FLDWY CORR EFF	440.30	0.25	440.53	712.01	5086.70	3812.44	112.87	4348.69	4969.00	5030.70	5060.70
Reach-1	48404	100-FW	FLDWY PR032219	440.30	0.24	440.52	712.01	5083.54	3815.69	112.77	4348.69	4969.00	5030.70	5060.70
Reach-1	48347.24	100-year	FLDWY CORR EFF	440.00		440.14	952.67	5343.00	3542.29	126.71		4958.53	5029.98	
Reach-1	48347.24	100-year	FLDWY PR032219	439.99		440.14	1043.66	5313.25	3571.09	127.66		4958.53	5029.98	
Reach-1	48347.24	100-FW	FLDWY CORR EFF	440.21	0.22	440.46	585.40	4696.24	4315.76		4293.58	4958.53	5029.98	5029.98
Reach-1	48347.24	100-FW	FLDWY PR032219	440.21	0.22	440.46	676.40	4690.63	4321.38		4293.58	4958.53	5029.98	5029.98
Reach-1	48292.29	100-year	FLDWY CORR EFF	439.96		440.10	960.82	5529.61	3298.86	183.53		4965.38	5030.56	
Reach-1	48292.29	100-year	FLDWY PR032219	439.96		440.10	1053.78	5420.99	3402.47	188.54		4965.38	5030.56	
Reach-1	48292.29	100-FW	FLDWY CORR EFF	440.16	0.20	440.38	580.83	5042.67	3969.33		4253.73	4965.38	5030.56	5030.56
Reach-1	48292.29	100-FW	FLDWY PR032219	440.15	0.20	440.39	673.83	4898.01	4114.00		4253.73	4965.38	5030.56	5030.56
Reach-1	48239.38	100-year	FLDWY CORR EFF	439.89		440.05	933.09	5379.15	3438.51	194.34		4965.01	5026.62	
Reach-1	48239.38	100-year	FLDWY PR032219	439.88		440.05	1013.01	5259.32	3553.39	199.29		4965.01	5026.62	
Reach-1	48239.38	100-FW	FLDWY CORR EFF	440.03	0.14	440.30	576.44	4800.17	4211.84		4207.18	4965.01	5026.62	5026.62
Reach-1	48239.38	100-FW	FLDWY PR032219	440.00	0.12	440.30	656.44	4617.83	4394.17		4207.18	4965.01	5026.62	5026.62
Reach-1	48176	100-year	FLDWY CORR EFF	439.10		439.80	598.17	3192.93	5620.33	198.74		4973.80	5032.60	
Reach-1	48176	100-year	FLDWY PR032219	439.10		439.80	598.28	3202.71	5610.81	198.48		4973.80	5032.60	
Reach-1	48176	100-FW	FLDWY CORR EFF	439.09	-0.01	439.99	469.06	2663.21	6132.30	216.49	4104.19	4973.80	5032.60	5079.80
Reach-1	48176	100-FW	FLDWY PR032219	439.09	-0.01	439.99	469.17	2675.04	6120.75	216.21	4104.19	4973.80	5032.60	5079.80
Reach-1	48097 BR U	100-year	FLDWY CORR EFF	437.52		439.30	361.62	1785.03	7040.95	186.02		4973.80	5032.60	
Reach-1	48097 BR U	100-year	FLDWY PR032219	437.52		439.30	361.60	1785.93	7040.15	185.92		4973.80	5032.60	
Reach-1	48097 BR U	100-FW	FLDWY CORR EFF	437.87	0.34	439.57	255.30	1730.20	7079.42	202.38	4104.19	4973.80	5032.60	5079.80
Reach-1	48097 BR U	100-FW	FLDWY PR032219	437.87	0.35	439.57	255.30	1733.35	7076.32	202.33	4104.19	4973.80	5032.60	5079.80
Reach-1	48097 BR D	100-year	FLDWY CORR EFF	437.45		438.14	897.73	4908.81	4070.49	32.70		4973.80	5032.60	
Reach-1	48097 BR D	100-year	FLDWY PR032219	437.45		438.14	897.73	4908.81	4070.49	32.70		4973.80	5032.60	
Reach-1	48097 BR D	100-FW	FLDWY CORR EFF	437.95	0.50	438.71	642.54	4564.00	4395.97	52.03	4104.19	4973.80	5032.60	5048.71
Reach-1	48097 BR D	100-FW	FLDWY PR032219	437.95	0.50	438.71	642.54	4564.00	4395.97	52.03	4104.19	4973.80	5032.60	5048.71
Reach-1	48038	100-year	FLDWY CORR EFF	437.38		437.94	992.13	5231.97	3751.42	28.61		4973.80	5032.60	
Reach-1	48038	100-year	FLDWY PR032219	437.38		437.94	992.13	5231.97	3751.42	28.61		4973.80	5032.60	
Reach-1	48038	100-FW	FLDWY CORR EFF	437.41	0.03	438.46	625.36	4270.53	4704.80	36.67	4104.19	4973.80	5032.60	5048.71
Reach-1	48038	100-FW	FLDWY PR032219	437.41	0.03	438.46	625.36	4270.53	4704.80	36.67	4104.19	4973.80	5032.60	5048.71
Reach-1	48004	100-year	FLDWY CORR EFF	437.02		437.49	1442.76	4463.87	4533.60	14.53		4965.70	5034.30	
Reach-1	48004	100-year	FLDWY PR032219	437.02		437.49	1442.76	4463.87	4533.60	14.53		4965.70	5034.30	
Reach-1	48004	100-FW	FLDWY CORR EFF	437.34	0.32	437.72	1323.56	4701.40	4305.42	5.18	3712.74	4965.70	5034.30	5036.30
Reach-1	48004	100-FW	FLDWY PR032219	437.34	0.32	437.72	1323.56	4701.40	4305.42	5.18	3712.74	4965.70	5034.30	5036.30
Reach-1	47950 BR U	100-year	FLDWY CORR EFF	437.21		437.21	70.10	0.00	0.00	0.00		4965.70	5034.30	
Reach-1	47950 BR U	100-year	FLDWY PR032219	437.21		437.21	70.10	0.00	0.00	0.00		4965.70	5034.30	
Reach-1	47950 BR U	100-FW	FLDWY CORR EFF	437.50	0.29	437.50	70.10	0.00	0.00	0.00	3712.74	4965.70	5034.30	5036.30
Reach-1	47950 BR U	100-FW	FLDWY PR032219	437.50	0.29	437.50	70.10	0.00	0.00	0.00	3712.74	4965.70	5034.30	5036.30
Reach-1	47950 BR D	100-year	FLDWY CORR EFF	437.21		437.21	70.10	0.00	0.00	0.00		4965.70	5034.40	
Reach-1	47950 BR D	100-year	FLDWY PR032219	437.21		437.21	70.10	0.00	0.00	0.00		4965.70	5034.40	
Reach-1	47950 BR D	100-FW	FLDWY CORR EFF	437.50	0.29	437.50	70.10	0.00	0.00	0.00	3712.79	4965.70	5034.40	5036.30
Reach-1	47950 BR D	100-FW	FLDWY PR032219	437.50	0.29	437.50	70.10	0.00	0.00	0.00	3712.79	4965.70	5034.40	5036.30
Reach-1	47885	100-year	FLDWY CORR EFF	435.89		436.85	1290.20	3535.94	5467.51	8.56		4965.70	5034.40	
Reach-1	47885	100-year	FLDWY PR032219	435.89		436.85	1290.20	3535.94	5467.51	8.56		4965.70	5034.40	
Reach-1	47885	100-FW	FLDWY CORR EFF	436.09	0.20	437.12	1192.83	3315.66	5691.41	4.93	3712.79	4965.70	5034.40	5036.30
Reach-1	47885	100-FW	FLDWY PR032219	436.09	0.20	437.12	1192.83	3315.66	5691.41	4.93	3712.79	4965.70	5034.40	5036.30
Reach-1	47681	100-year	FLDWY CORR EFF	434.62		435.01	1440.00	4504.01	4486.29	21.70		4965.90	5033.80	
Reach-1	47681	100-year	FLDWY PR032219	434.62		435.01	1440.00	4504.01	4486.29	21.70		4965.90	5033.80	
Reach-1	47681	100-FW	FLDWY CORR EFF	435.36	0.74	435.82	939.15	4015.17	4968.89	27.94	4100.00	4965.90	5033.80	5039.15
Reach-1	47681	100-FW	FLDWY PR032219	435.36	0.74	435.82	939.15	4015.17	4968.89	27.94	4100.00	4965.90	5033.80	5039.15
Reach-1	47431	100-year	FLDWY CORR EFF	434.47		434.60	1366.48	5675.08	3244.93	91.99		4958.00	5026.00	
Reach-1	47431	100-year	FLDWY PR032219	434.47		434.60	1366.48	5675.08	3244.93	91.99		4958.00	5026.00	
Reach-1	47431	100-FW	FLDWY CORR EFF	435.20	0.73	435.39	856.00	5021.63	3846.04	144.34	4200.00	4958.00	5026.00	5056.00
Reach-1	47431	100-FW	FLDWY PR032219	435.20	0.73	435.39	856.00	5021.63	3846.04	144.34	4200.00	4958.00	5026.00	5056.00
Reach-1	47224	100-year	FLDWY CORR EFF	434.35		434.44	1369.93	5991.72	2911.61	108.67		4953.60	5027.20	
Reach-1	47224	100-year	FLDWY PR032219	434.35		434.44	1369.93	5991.72	2911.61	108.67		4953.60	5027.20	
Reach-1	47224	100-FW	FLDWY CORR EFF	434.96	0.61	435.17	656.00	4743.69	4103.86	164.45	4400.00	4953.60	5027.20	5056.00
Reach-1	47224	100-FW	FLDWY PR032219	434.96	0.61	435.17	656.00	4743.69	4103.86	164.45	4400.00	4953.60	5027.20	5056.00


Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 11/29/2018 2) FLDWY PR032219 3/25/2019
Limestone Creek Reach-1
Legend
WS 100-FW - FLDWY CORR EFF
WS 100-FW - FLDWY PR032219
WS 100-year - FLDWY PR032219
WS 100-year - FLDWY CORR EFF
Ground
Ground
Elevation (ft)
Main Channel Distance (ft)
460
455
450
445
440
435
430
425
420
0
500
1000
1500
2000
47431
47681
47885
47950
48004
48038
48097
48176
48239.38
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48404
48632
49053

Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

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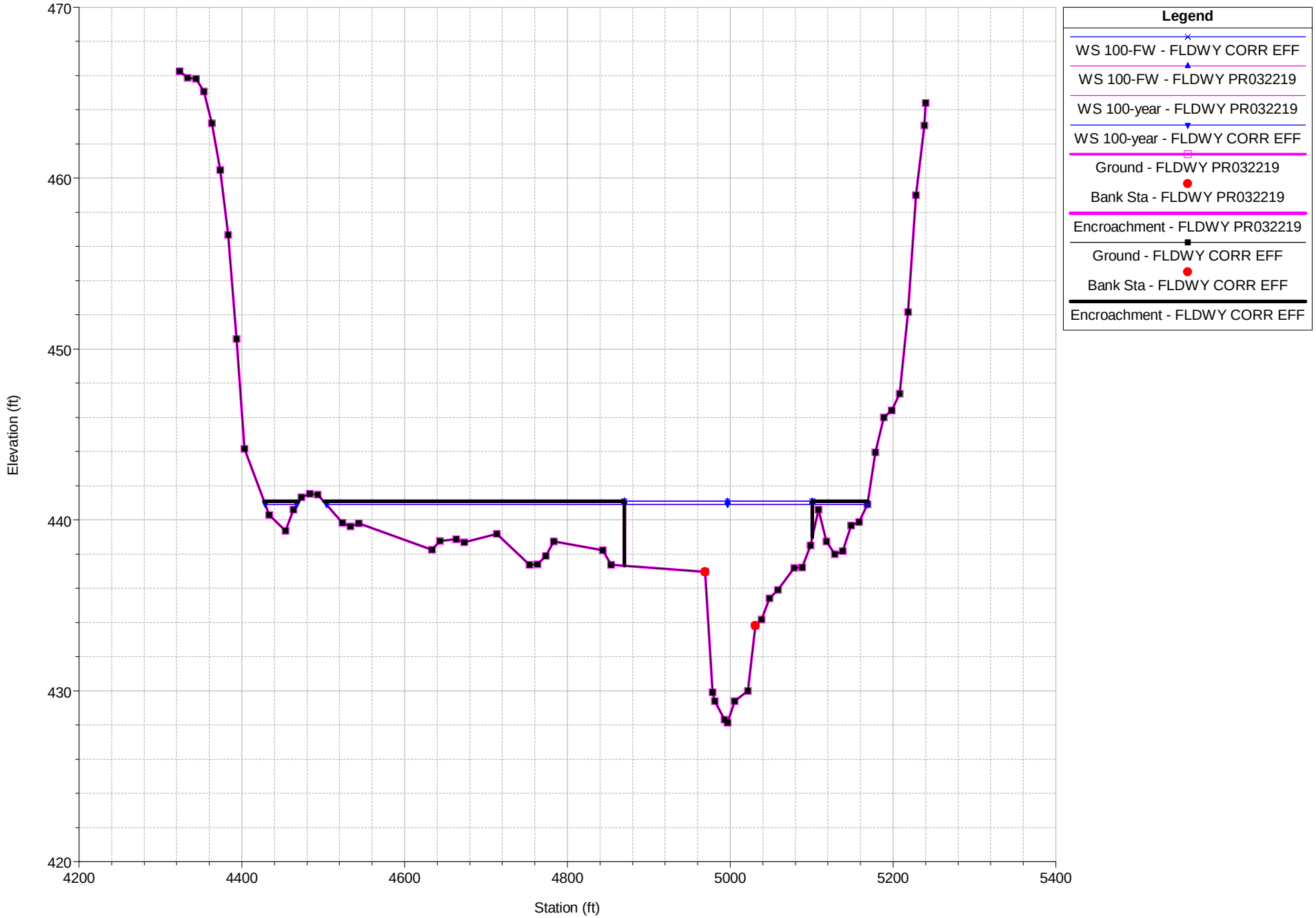

Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

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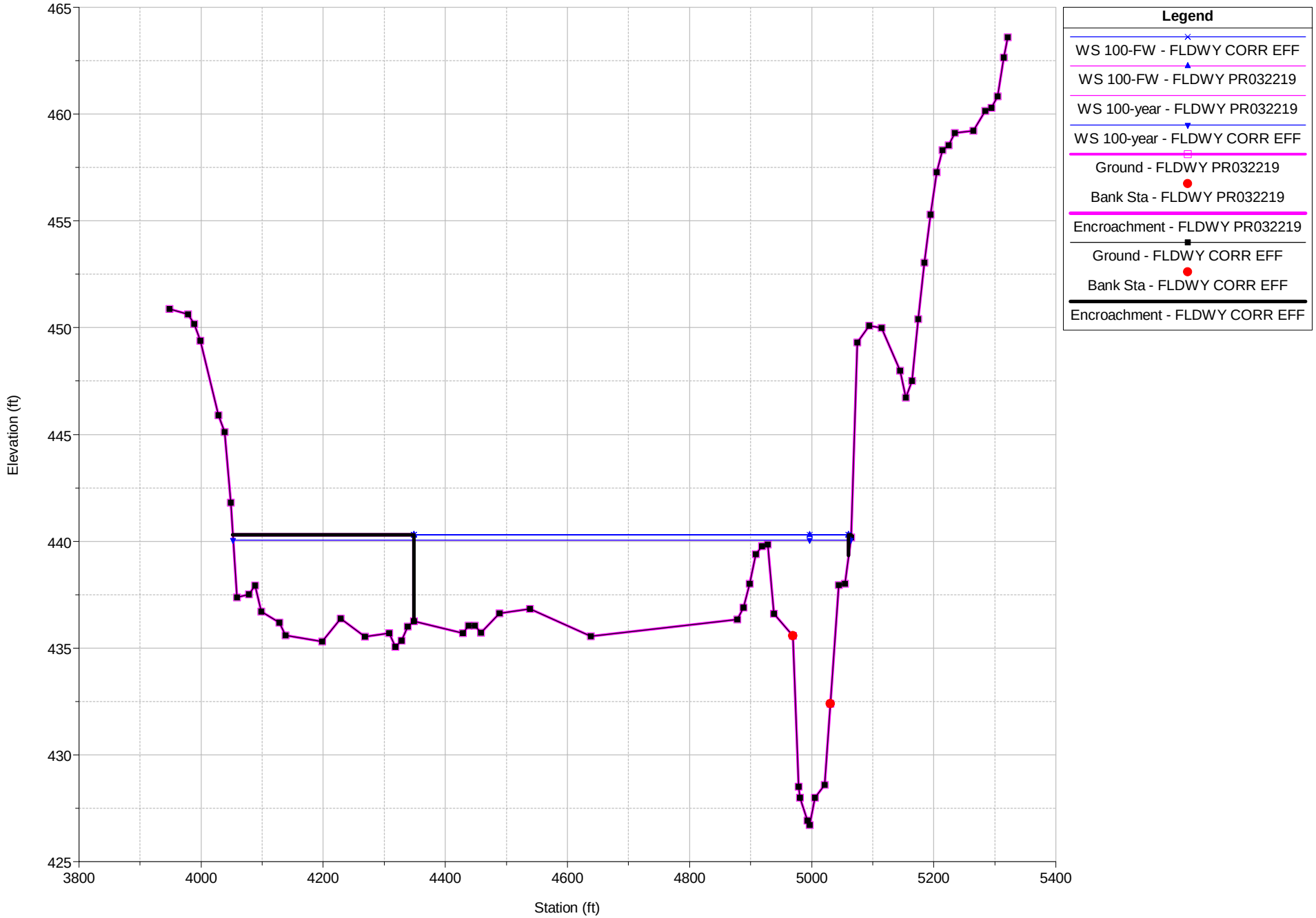
Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

STA 48404



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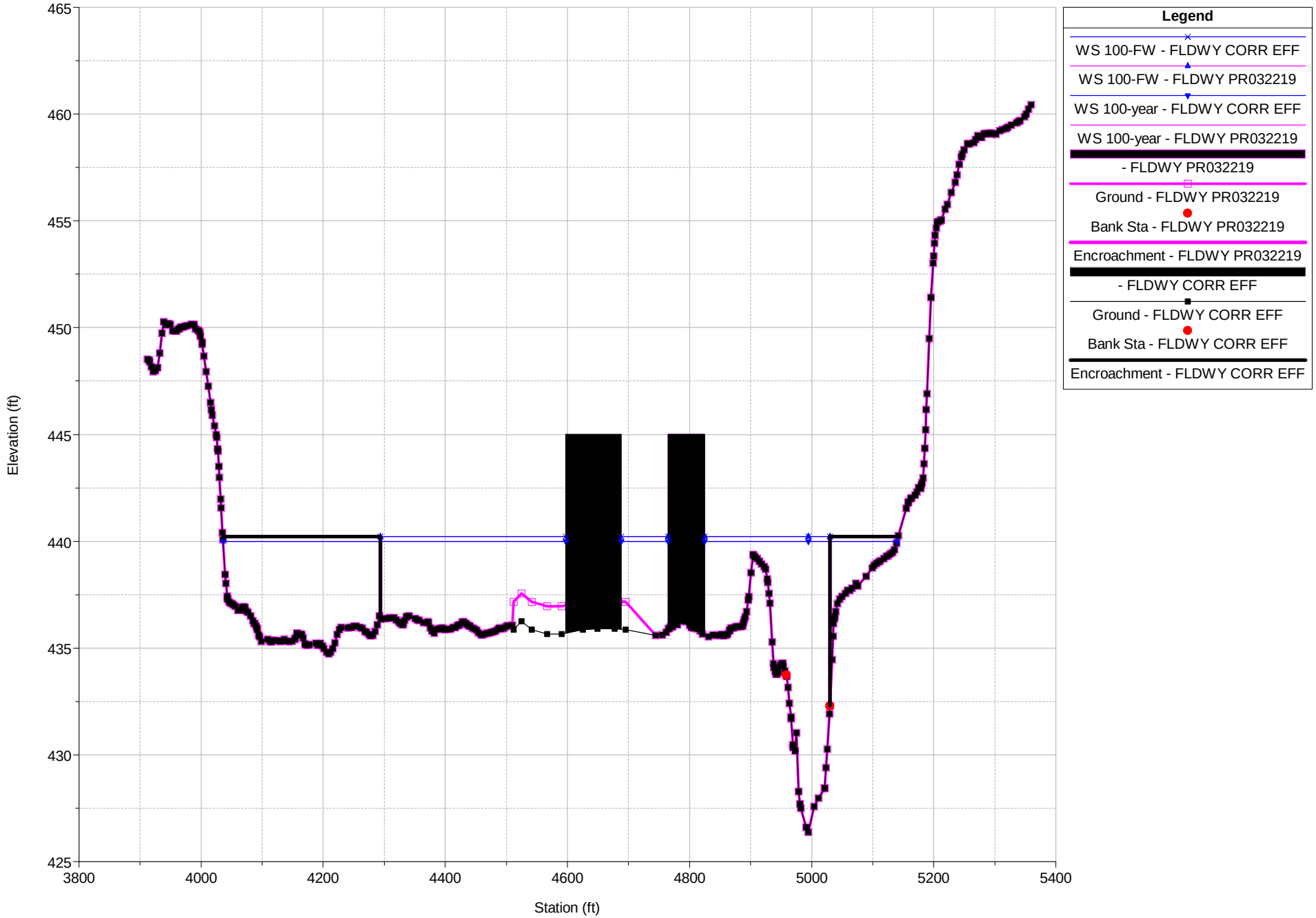

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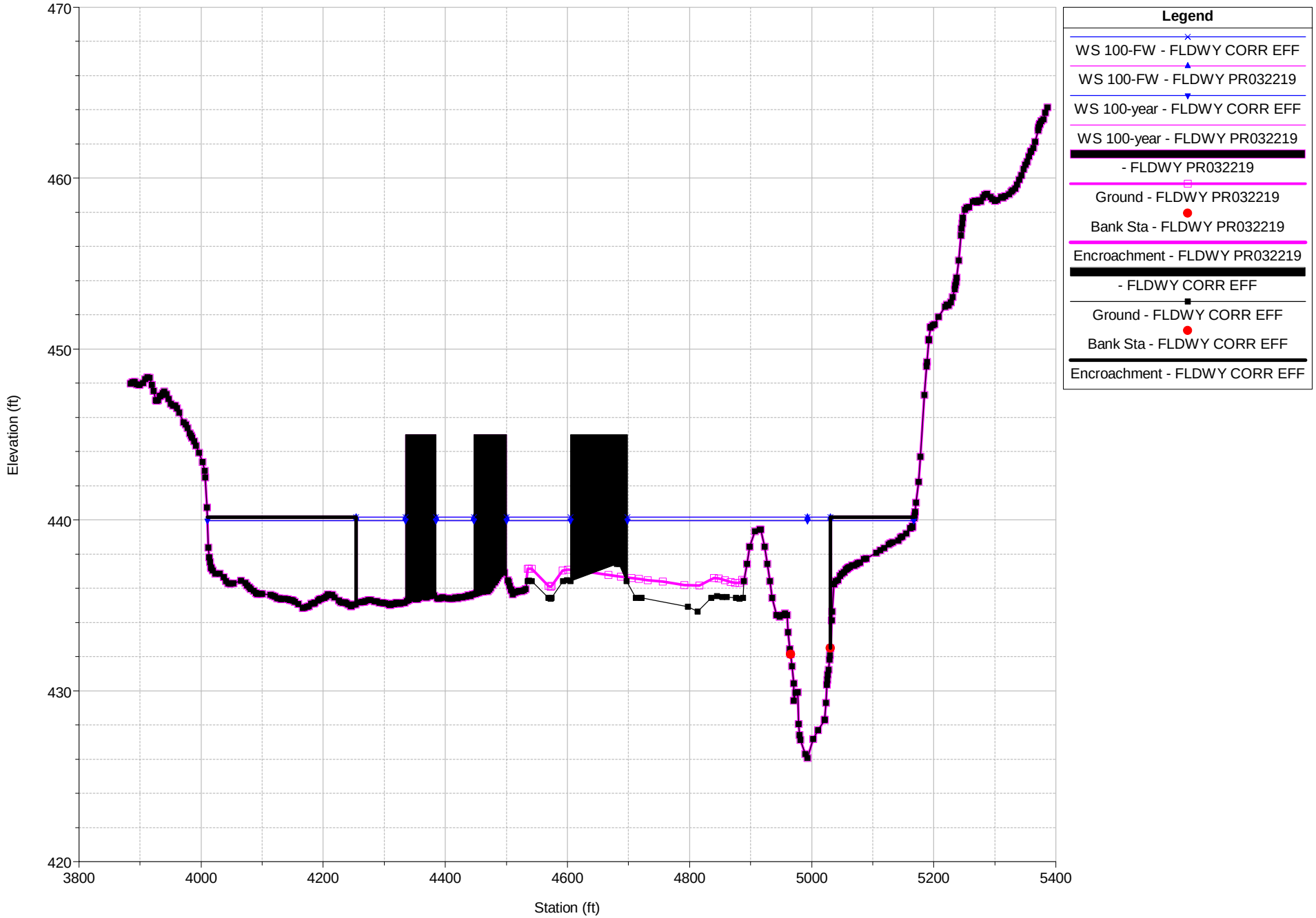

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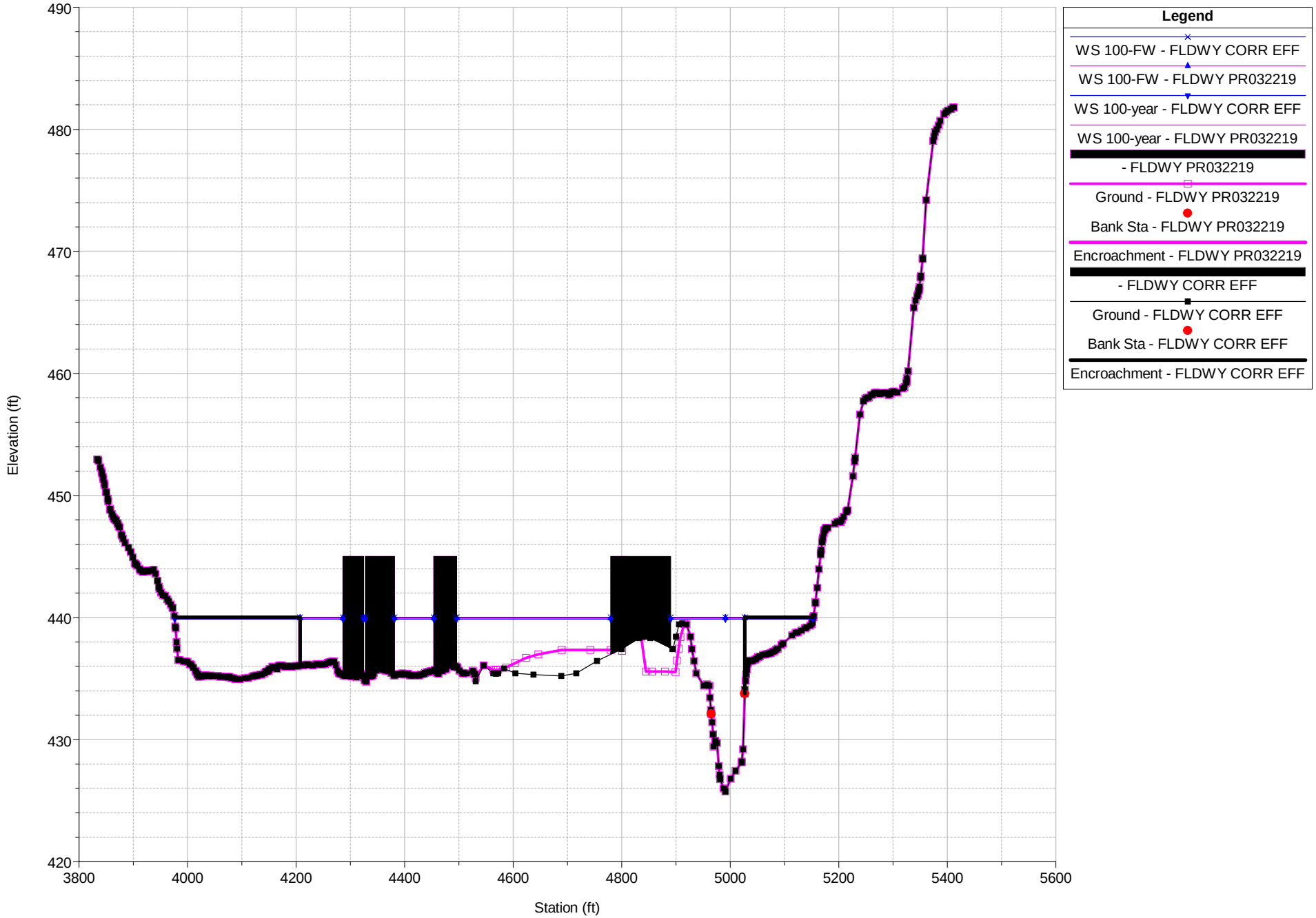

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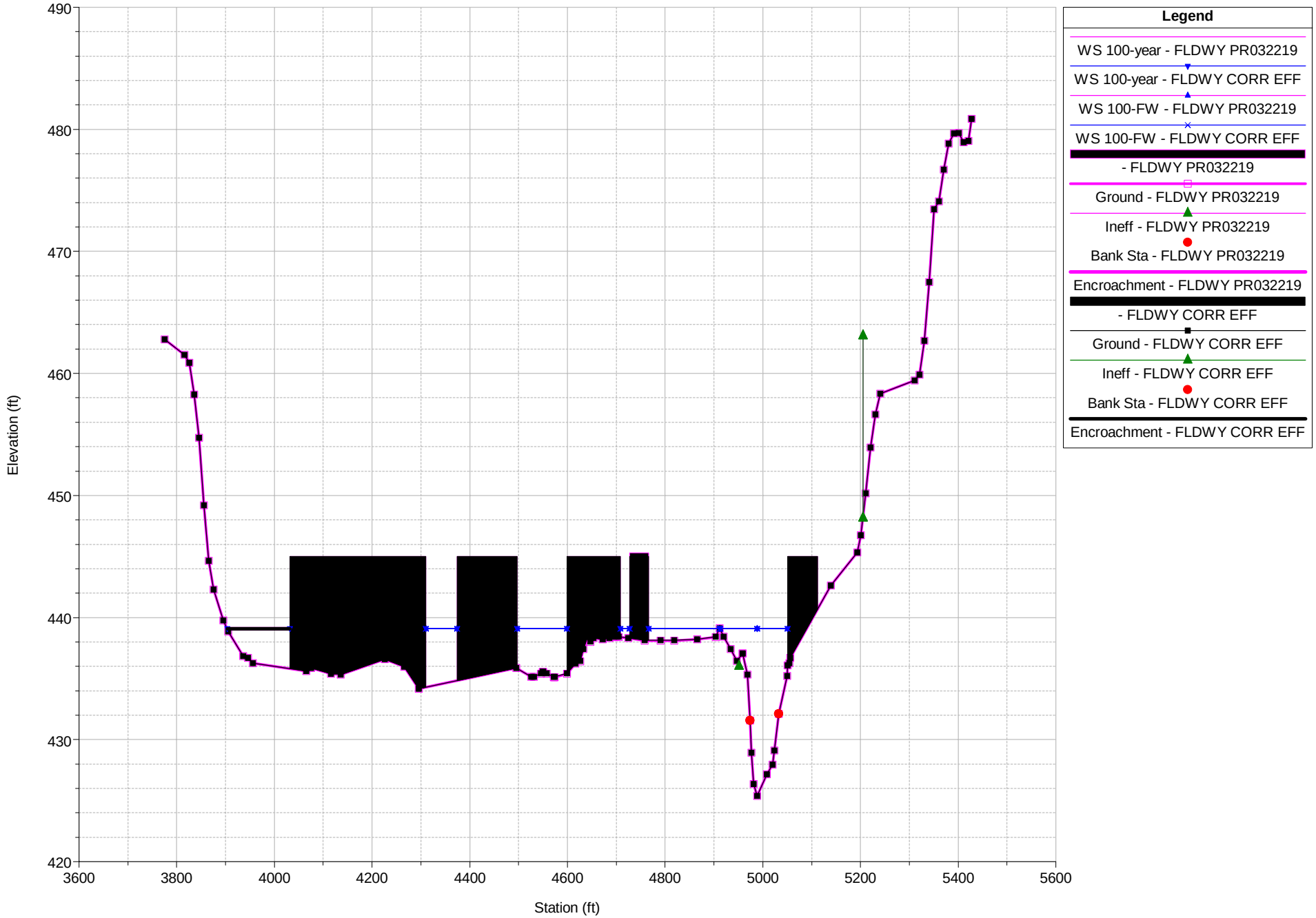
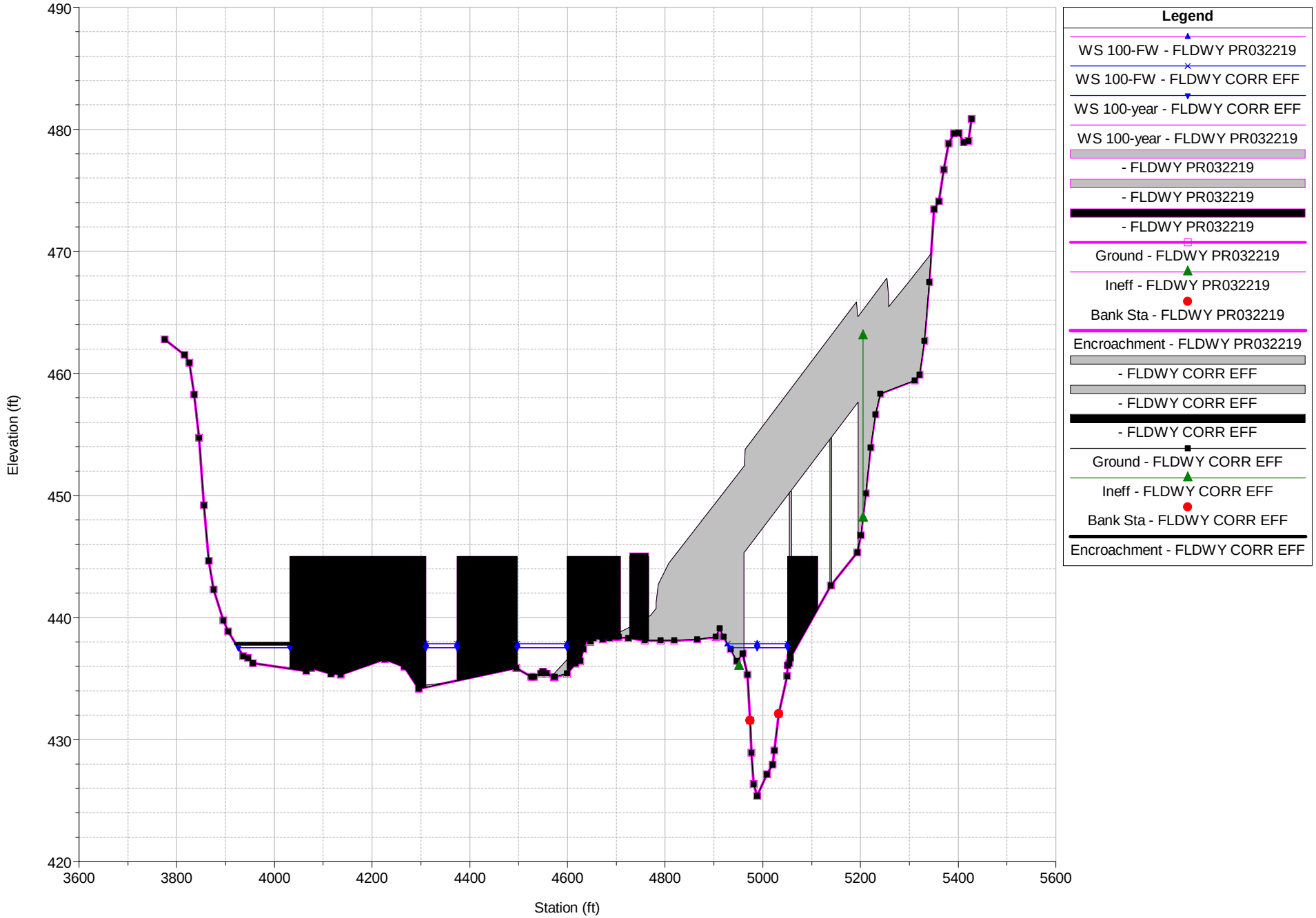
48176



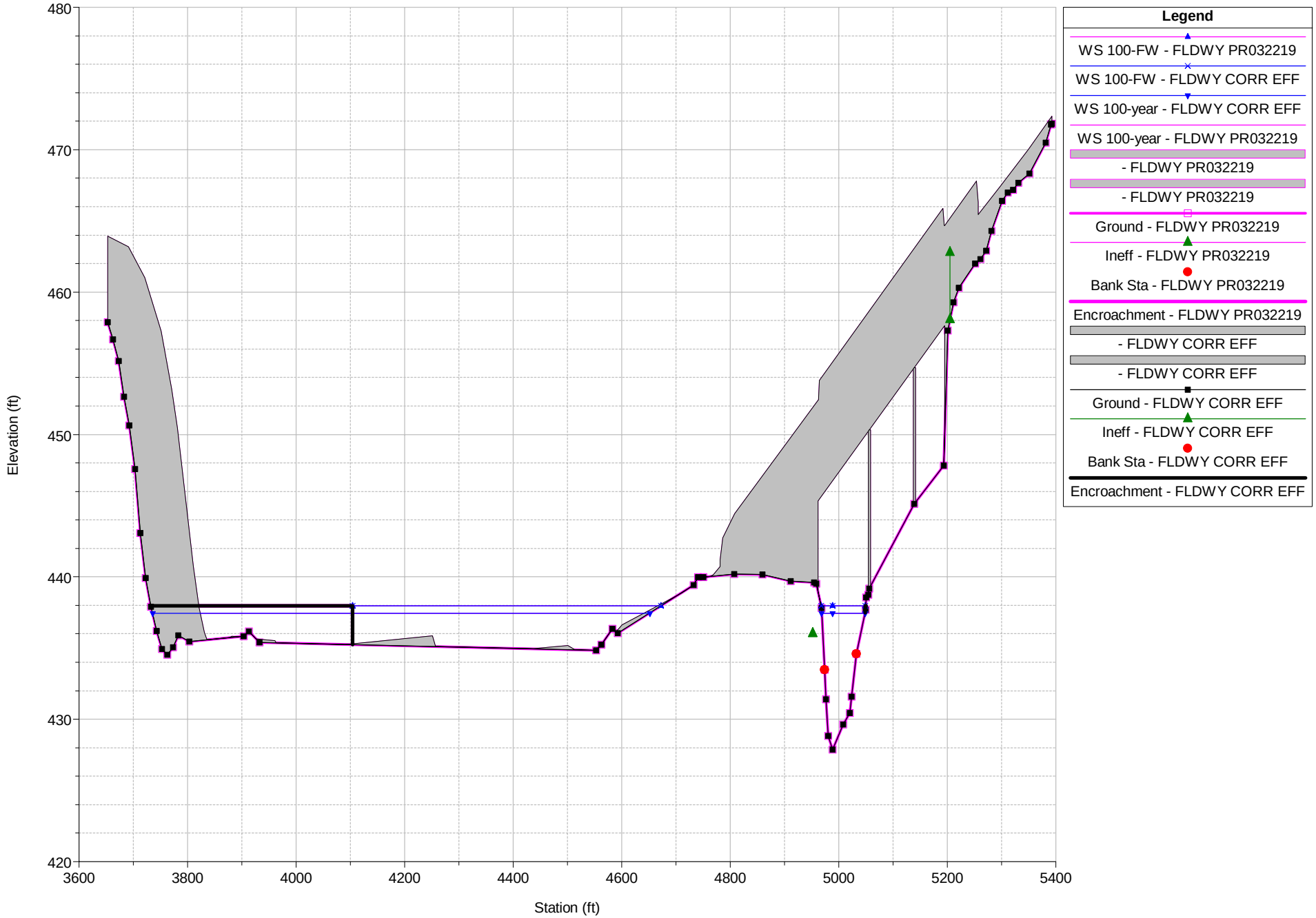
Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

West Genesee Street- TORStructure ID: LC27Detailed Survey Stru



Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

West Genesee Street- TORStructure ID: LC27Detailed Survey Stru



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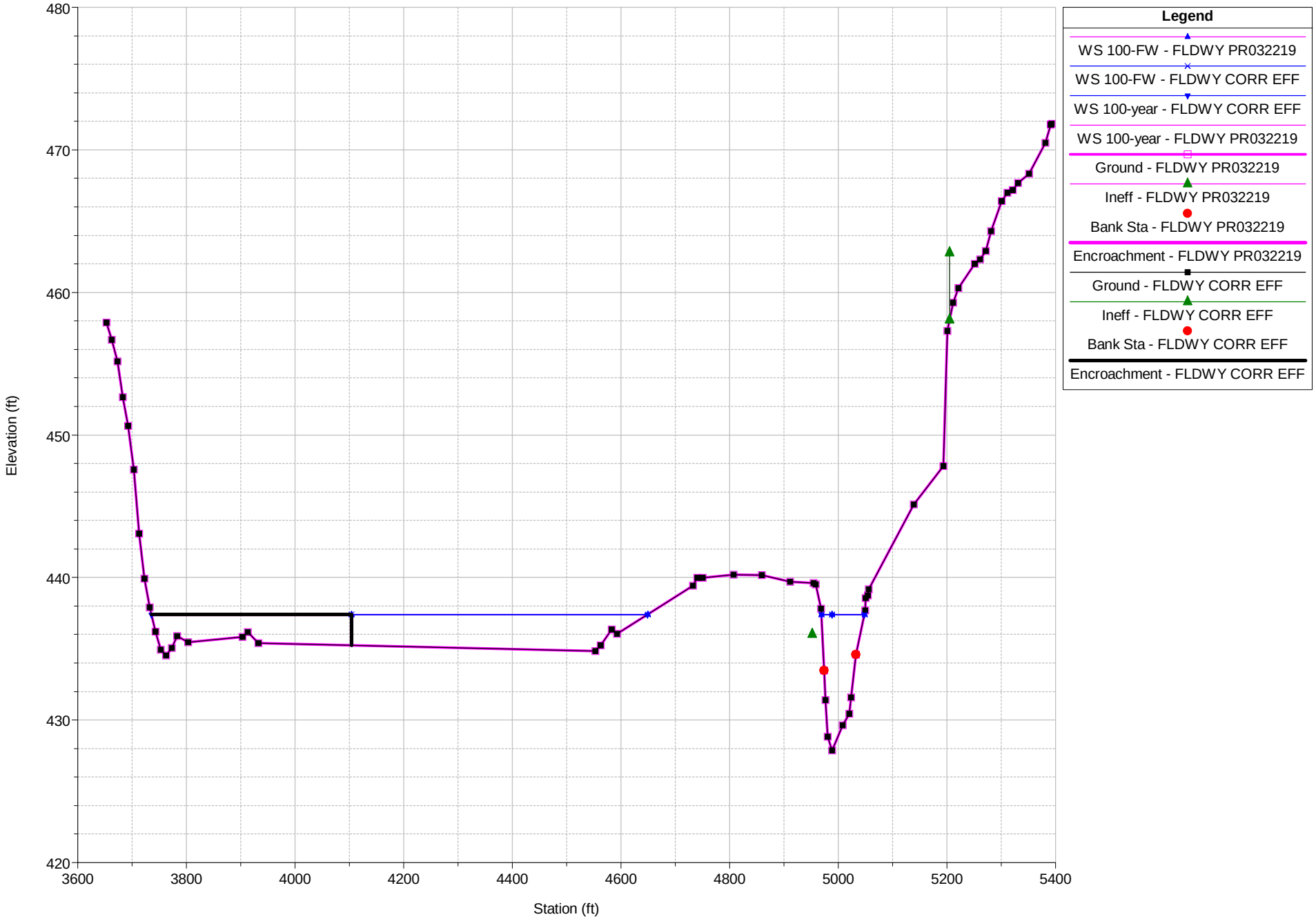
48038



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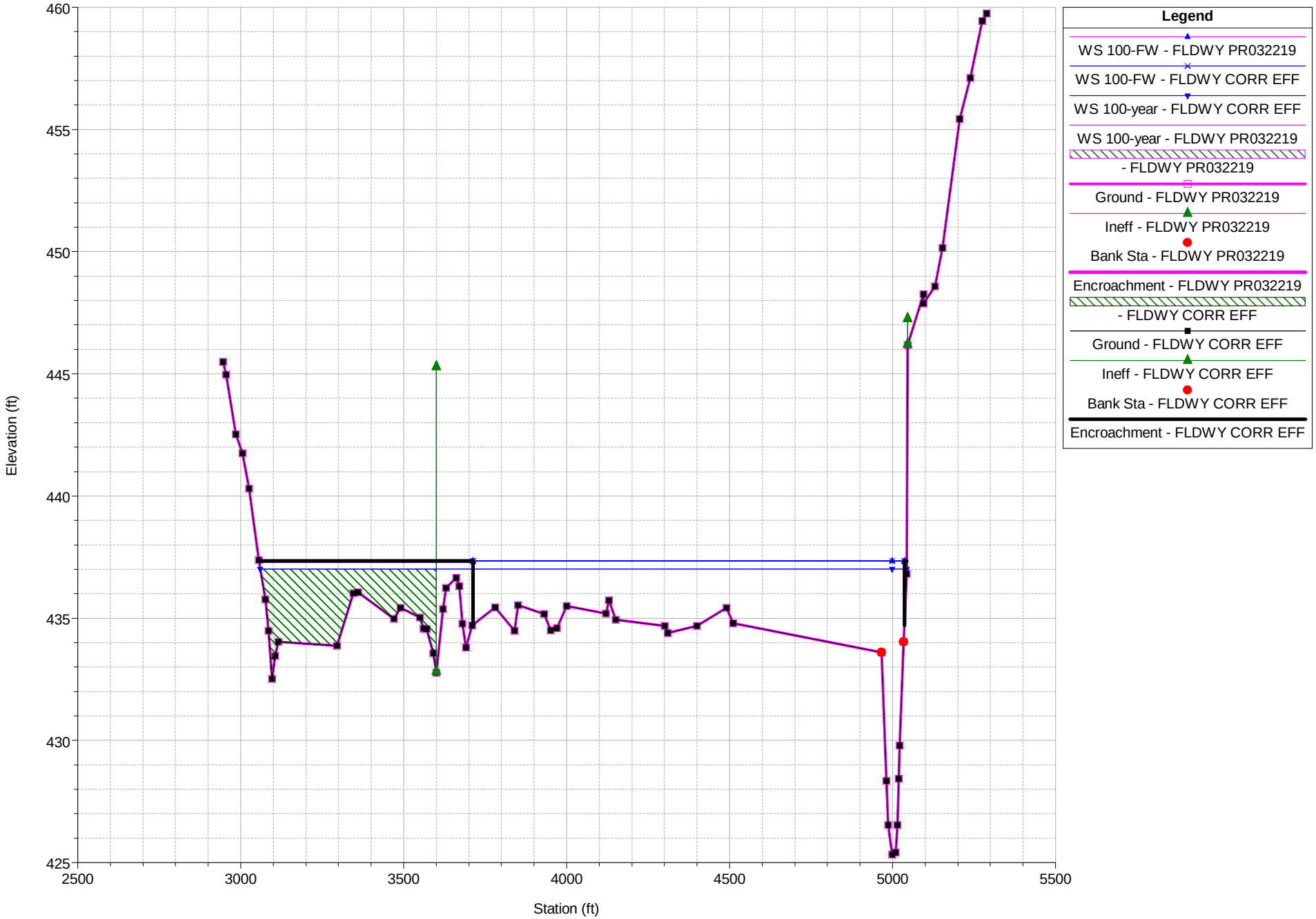
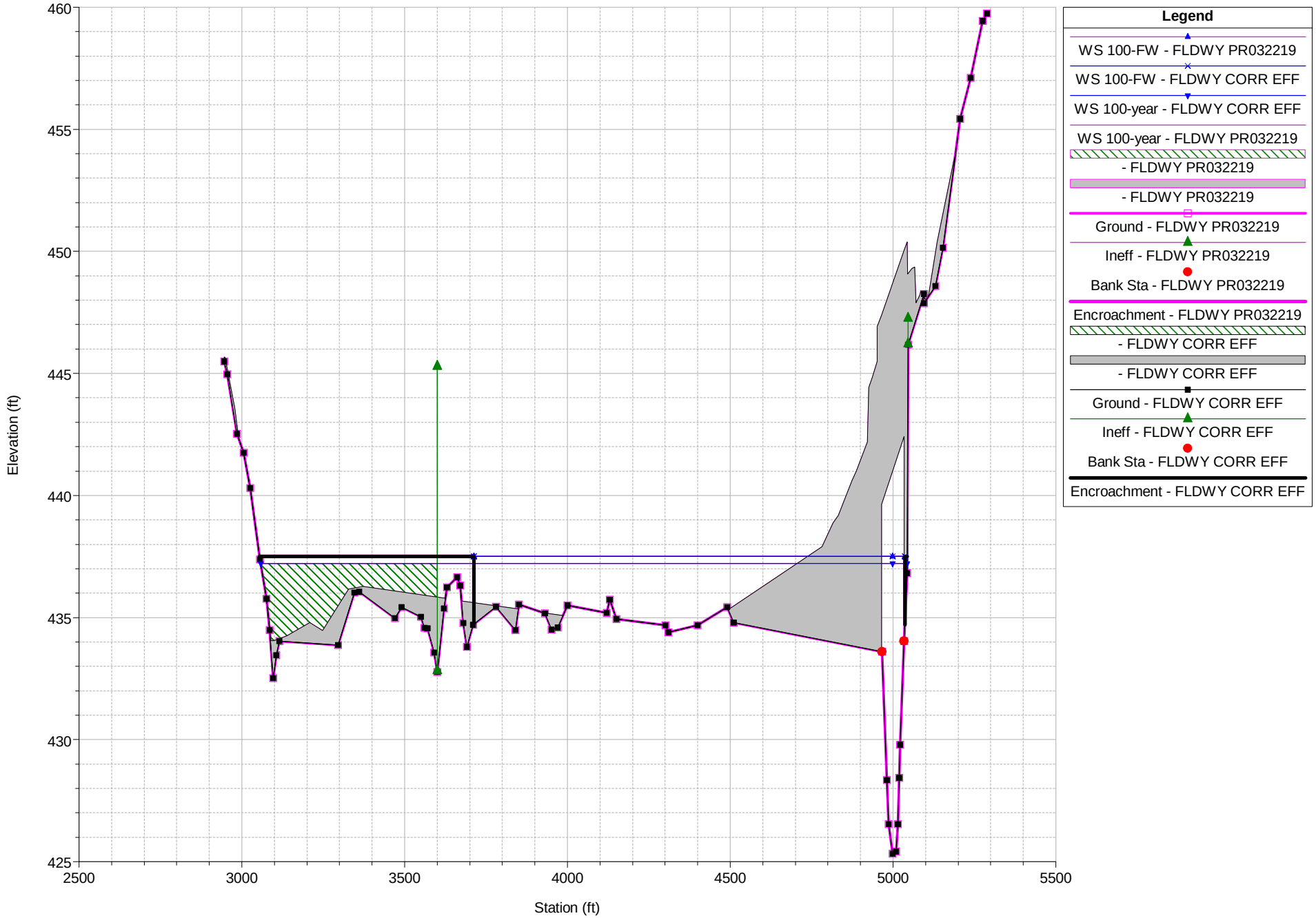


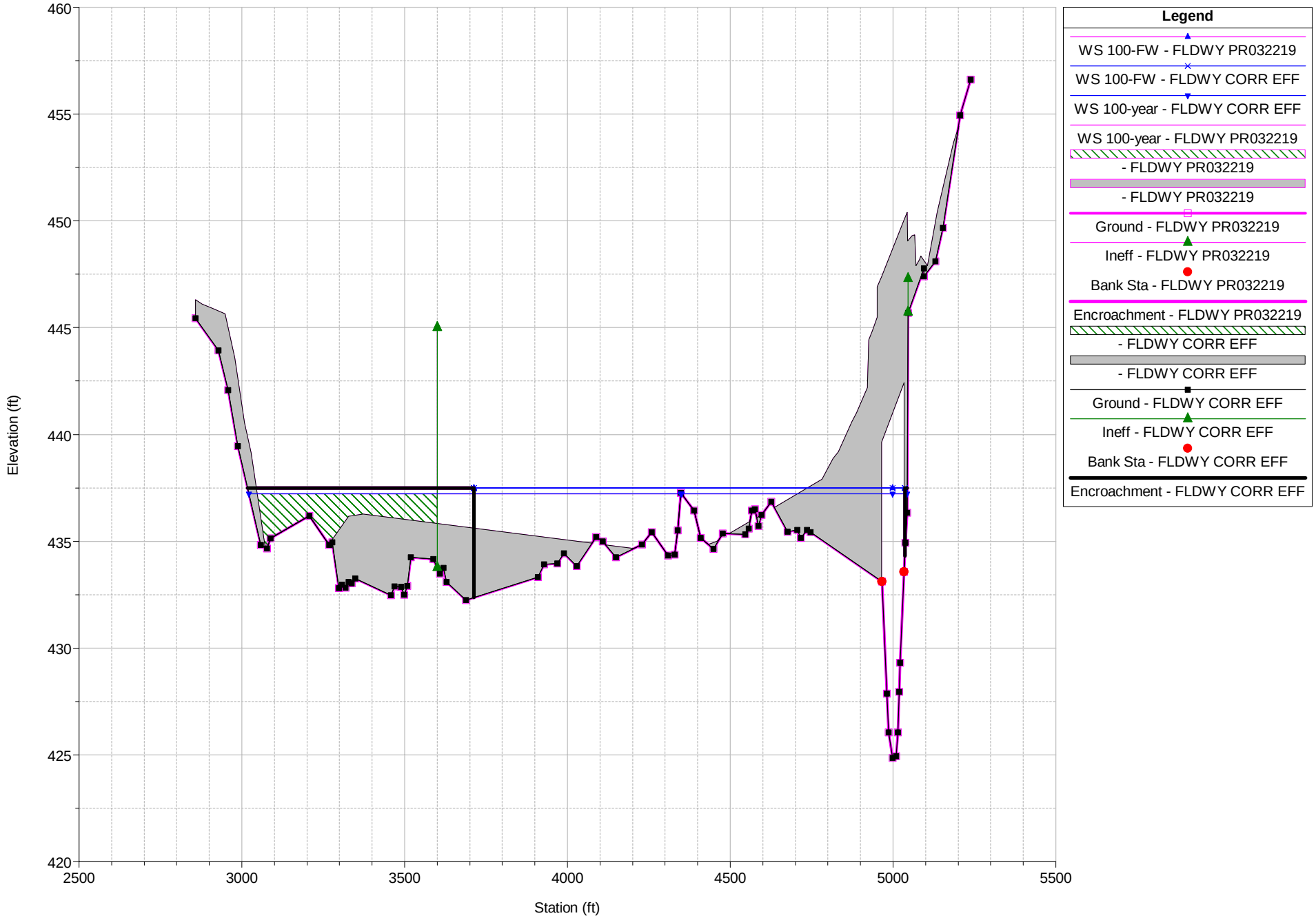
Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

Limestone Plaza- TORStructure ID: LC26Detailed Survey Structur



Limestone Creek Hart Lyman Highbridge FW Plan: 1) FLDWY CORR EFF 2) FLDWY PR032219

Limestone Plaza- TORStructure ID: LC26Detailed Survey Structur



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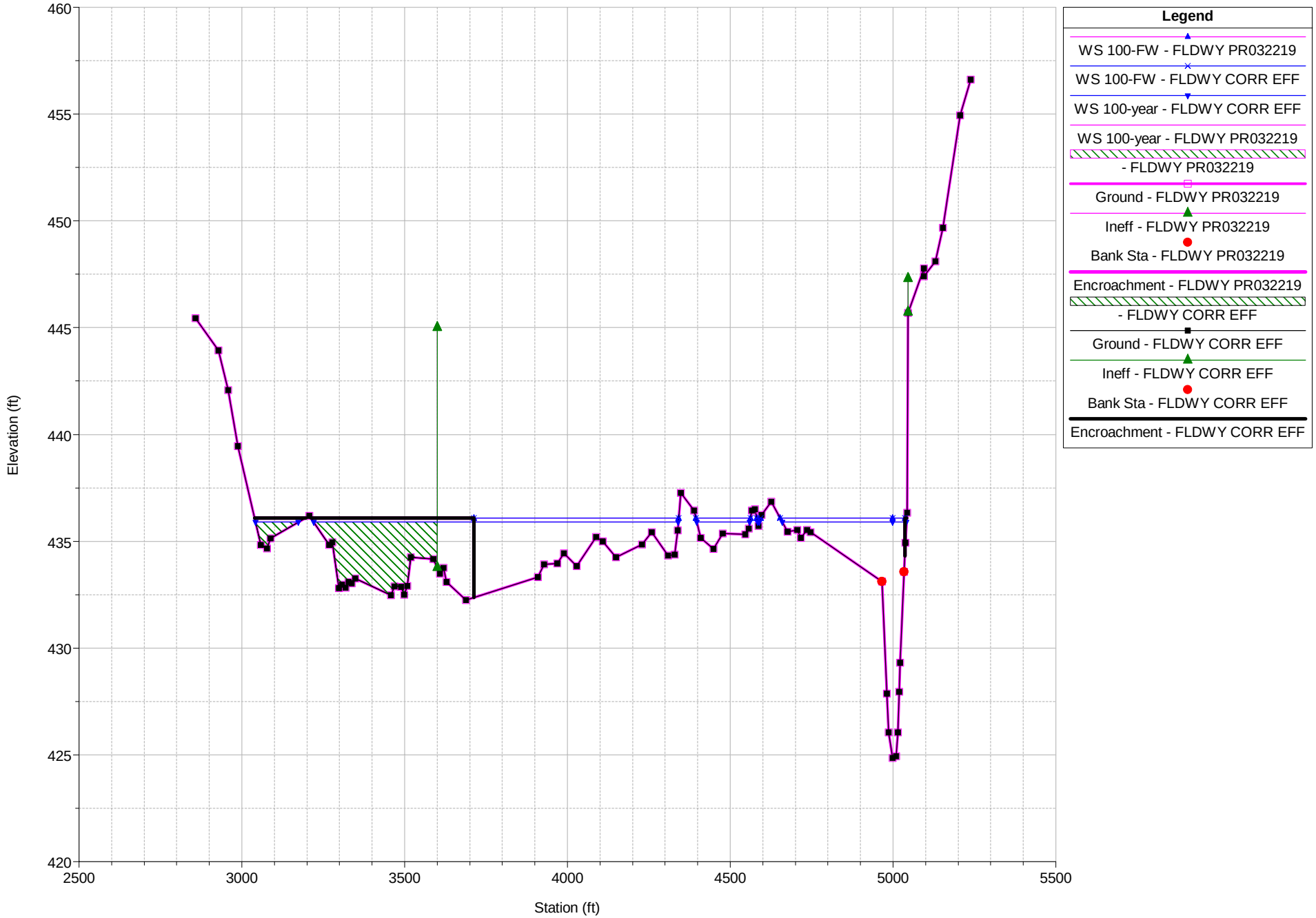

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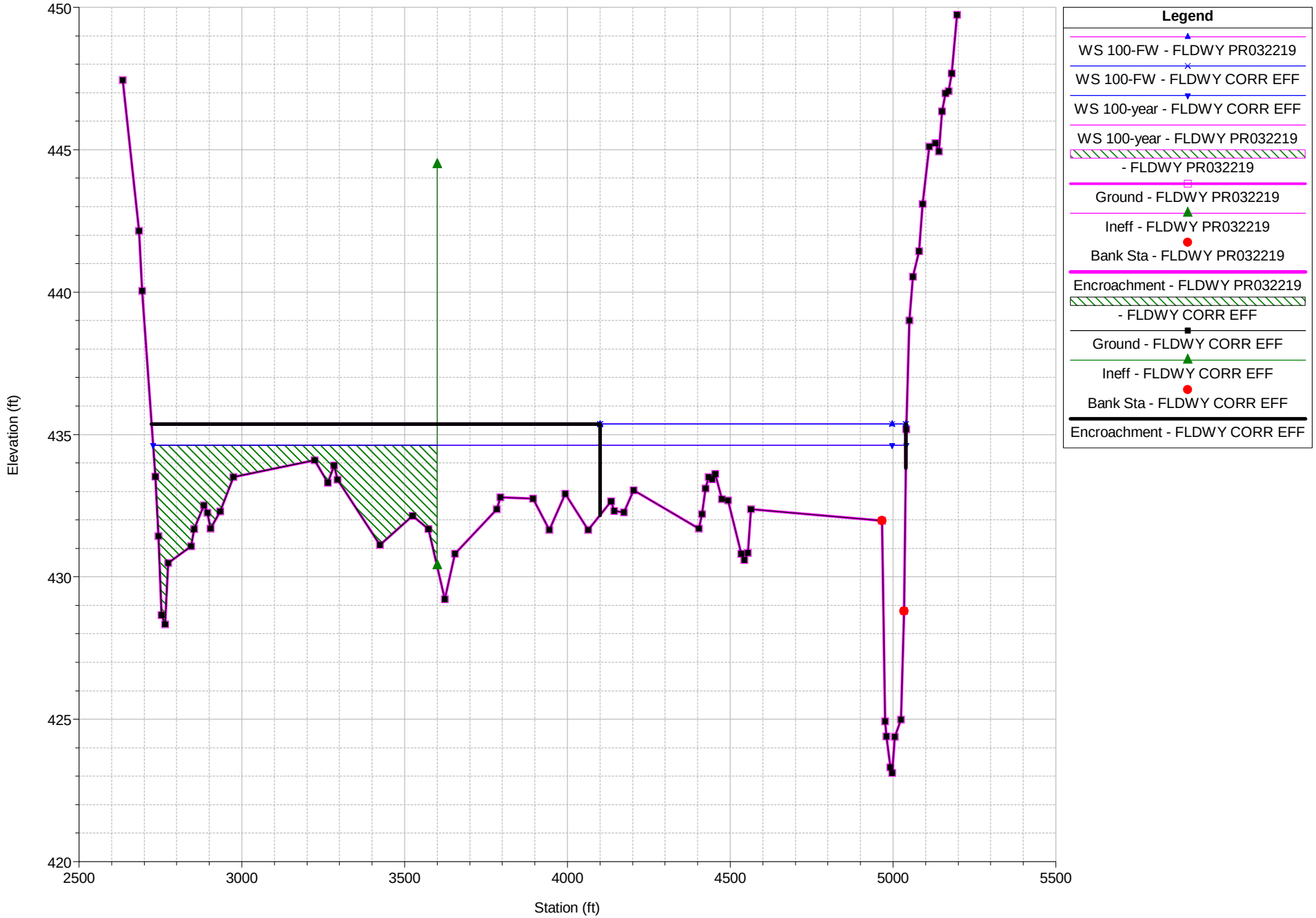
47681



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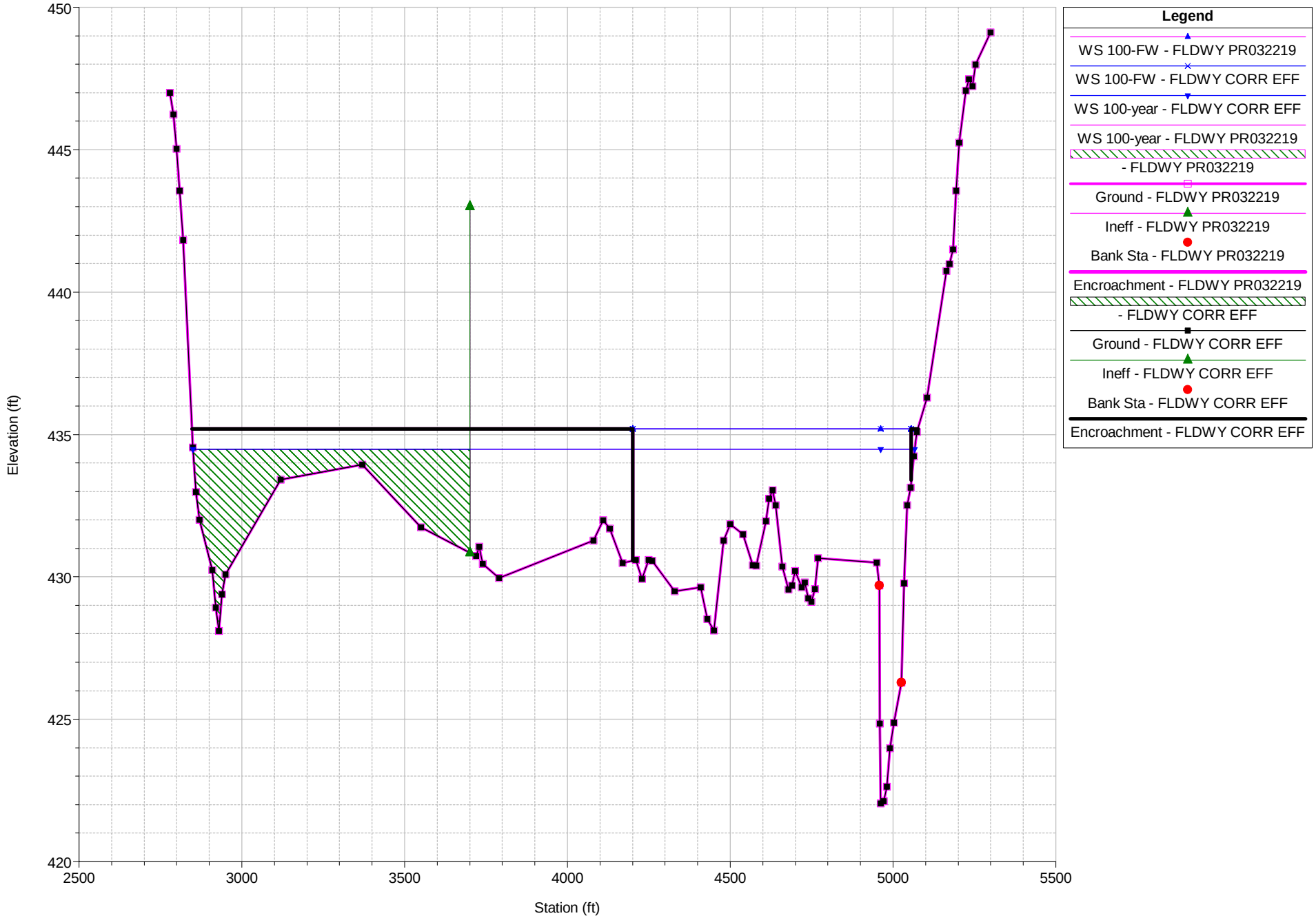
47431



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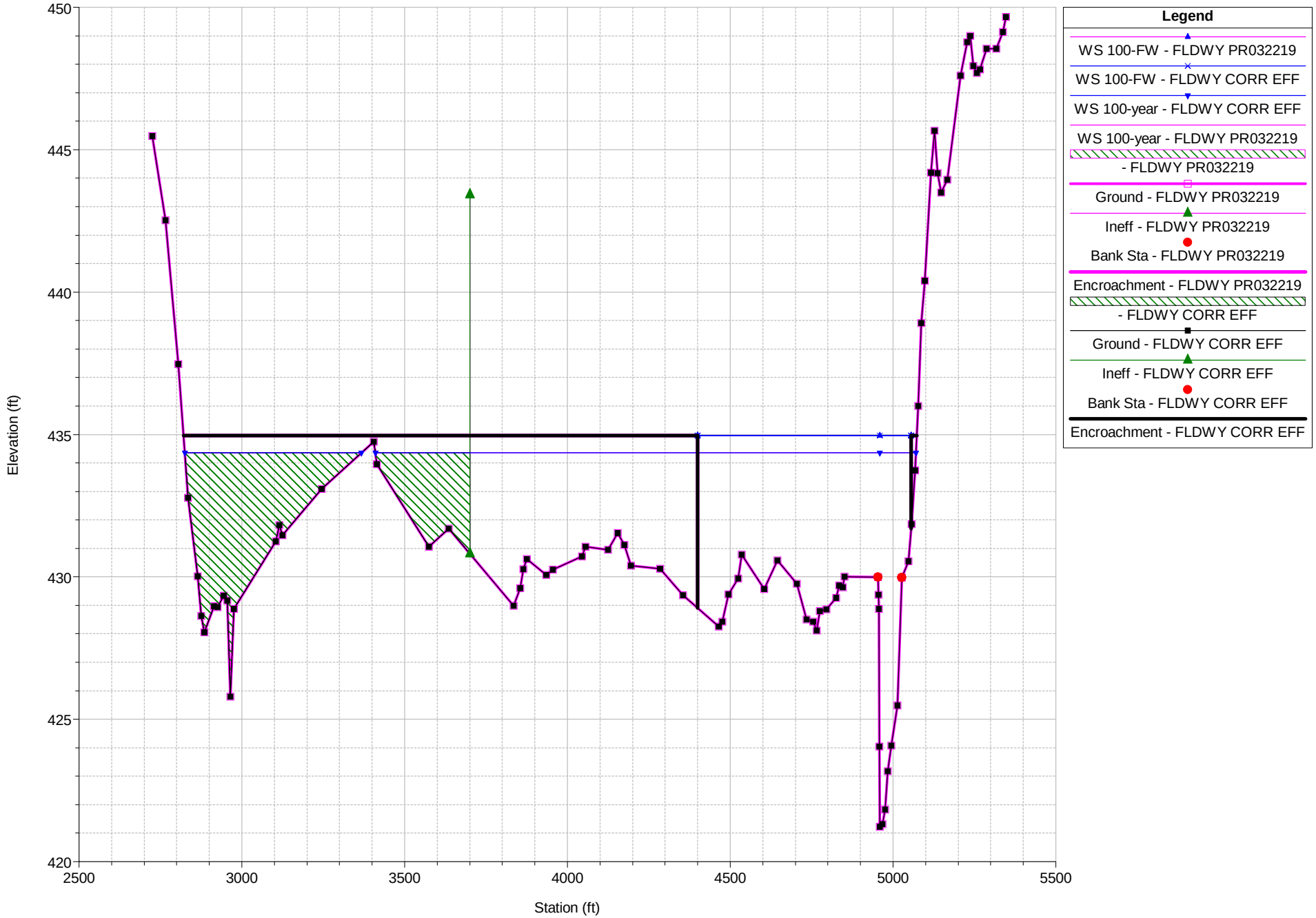

Appendix D

(Village of Fayetteville Forms / FEMA Forms)

FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

This form is to be filled out in duplicate.

SECTION 1: GENERAL PROVISIONS (APPLICANT to read and sign):_____

1. No work may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance is issued.
5. The permit is invalid if no work is commenced within six months of issuance, and expires 2 years from date of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state and federal regulatory requirements.
7. Applicant hereby gives consent to the Local Administrator or his/her representative to make reasonable inspections required to verify compliance.
8. I, THE APPLICANT, CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.

(APPLICANT'S SIGNATURE)_____ DATE

SECTION 2: PROPOSED DEVELOPMENT (To be completed by **APPLICANT)**

NAME	ADDRESS	TELEPHONE
APPLICANT		
BUILDER		
ENGINEER		

PROJECT LOCATION:

To avoid delay in processing the application, please provide enough information to easily identify the project location. Provide the street address, lot number or legal description (attach) and, outside urban areas, the distance to the nearest intersecting road or well-known landmark. A map attached to this application, and a sketch showing the project layout would be helpful.

_____

_____

_____

_____

_____

_____

DESCRIPTION OF WORK (Check all applicable boxes):

A. STRUCTURAL DEVELOPMENT

ACTIVITY	STRUCTURE TYPE
☐ New Structure	☐ Residential (1-4 Family)
☐ Addition	☐ Residential (More than 4 Family)
☐ Alteration	☐ Non-residential (Floodproofing? ☐ Yes)
☐ Relocation	☐ Combined Use (Residential & Commercial)
☐ Demolition	☐ Manufactured (Mobile) Home
☐ Replacement	(In Manufactured Home Park? ☐ Yes ☐ No)

ESTIMATED COST OF PROJECT $_____

B. OTHER DEVELOPMENT ACTIVITIES:

☐ Fill ☐ Mining ☐ Drilling ☐ Grading
☐ Excavation (Except for Structural Development Checked Above)
☐ Watercourse Alteration (Including Dredging and Channel Modifications)
☐ Drainage Improvements (Including Culvert Work), Stormwater Control Structures or Ponds
☐ Road, Street or Bridge Construction
☐ Subdivision (New or Expansion)
☐ Individual Water or Sewer System
☐ Other (Please Specify)_____

After completing SECTION 2, APPLICANT should submit form to Local Administrator for review.

SECTION 3: FLOODPLAIN DETERMINATION (To be completed by **LOCAL ADMINISTRATOR)**

The proposed development is located on FIRM Panel No._____, Dated_____.

The Proposed Development:

☐ The proposed development is reasonably safe from flooding. Entire property is in Zone B, C or X.

☒ The proposed development is in adjacent to a flood prone area.
100-Year flood elevation at the site is:
440 Ft. ☐ NGVD 1929/ ☒ NAVD 1988 (MSL)
☐ Unavailable

☐ See Section 4 for additional instructions for development that is or may be in a flood prone area.

SIGNED_____ DATE

SECTION 4: ADDITIONAL INFORMATION REQUIRED (To be completed by **LOCAL ADMINISTRATOR**)

The applicant must submit the documents checked below before the application can be processed:

- ☐ A site plan showing the location of all existing structures, water bodies, adjacent roads, lot dimensions and proposed development.
- ☐ Development plans and specifications, drawn to scale, including where applicable: details for anchoring structures, proposed elevation of lowest floor (including basement), types of water resistant materials used below the first floor, details of floodproofing of utilities located below the first floor, details of enclosures below the first floor, openings in foundation for entry and exit of floodwaters.
  Other_____
- ☐ Elevation Certificate
- ☐ Subdivision or other development plans (If the subdivision or other development exceeds 50 lots or 5 acres, whichever is the lesser, the applicant must provide 100-year flood elevations if they are not otherwise available).
- ☐ Plans showing the watercourse location, proposed relocations, Floodway location.
- ☐ Topographic information showing existing and proposed grades, location of all proposed fill.
- ☐ Top of new fill elevation _____Ft. ☐ NGVD 1929/ ☐ NAVD 1988 (MSL)
- ☐ PE Certification of Soil Compaction
- ☐ Floodproofing protection level (non-residential only) _____ ☐ NGVD 1929/ ☐ NAVD 1988 (MSL)
  For floodproofed structures, applicant must attach certification from registered engineer or architect.
- ☐ Other: _____

_____

_____

SECTION 5: PERMIT DETERMINATION (To be completed by **LOCAL ADMINISTRATOR**)

I have determined that the proposed activity: A. ☐ Is
B. ☐ Is not

in conformance with provisions of Local Law #_____, (yr)_____. This permit is herby issued subject to the conditions attached to and made part of this permit.

SIGNED_____, DATE_____

If BOX A is checked, the Local Administrator may issue a Development Permit upon payment of designated fee.
If BOX B is checked, the Local Administrator will provide a written summary of deficiencies. Applicant may revise and resubmit an application to the Local Administrator or may request a hearing from the Board of Appeals.

Expiration Date: _____

APPEALS: Appealed to Board of Appeals? ☐ Yes ☐ No
Hearing date:_____
Appeals Board Decision --- Approved? ☐ Yes ☐ No

Conditions: _____

_____

_____

SECTION 6: AS-BUILT ELEVATIONS (To be submitted by **APPLICANT** before Certificate of Compliance is issued)

The following information must be provided for project structures. This section must be completed by a registered professional engineer or a licensed land surveyor (or attach a certification to this application). Complete 1 or 2 below.

1. Actual (As-Built) Elevation of the top of the lowest floor, including basement (in Coastal High Hazard Areas, bottom of lowest structural member of the lowest floor, excluding piling and columns) is: _____ FT. ☐ NGVD 1929/ ☐ NAVD 1988 (MSL). **Attach Elevation Certificate FEMA Form 81-31**

2. Actual (As-Built) Elevation of floodproofing protection is _____ FT. ☐ NGVD 1929/ ☐ NAVD 1988 (MSL). **Attach Floodproofing Certificate FEMA Form 81-65**

NOTE: Any work performed prior to submittal of the above information is at the risk of the Applicant.

SECTION 7: COMPLIANCE ACTION (To be completed by **LOCAL ADMINISTRATOR**)

The **LOCAL ADMINISTRATOR** will complete this section as applicable based on inspection of the project to ensure compliance with the community's local law for flood damage prevention.

INSPECTIONS: DATE_____ BY_____ DEFICIENCIES? ☐ YES ☐ NO
DATE_____ BY_____ DEFICIENCIES? ☐ YES ☐ NO
DATE_____ BY_____ DEFICIENCIES? ☐ YES ☐ NO

SECTION 8: CERTIFICATE OF COMPLIANCE(To be completed by **LOCAL ADMINISTRATOR**)

Certificate of Compliance issued: DATE:_____

BY: _____

FEMA

NATIONAL FLOOD INSURANCE PROGRAM

ELEVATION CERTIFICATE

AND

INSTRUCTIONS

2015 EDITION

OMB No. 1660-0008
Expiration Date: November 30, 2018

U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

ELEVATION CERTIFICATE AND INSTRUCTIONS

Paperwork Reduction Act Notice

Public reporting burden for this data collection is estimated to average 3.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and submitting this form. You are not required to respond to this collection of information unless a valid OMB control number is displayed on this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing the burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street SW, Washington, DC 20742, Paperwork Reduction Project (1660-0008). **NOTE: Do not send your completed form to this address.**

Privacy Act Statement

Authority: Title 44 CFR § 61.7 and 61.8.

Principal Purpose(s): This information is being collected for the primary purpose of estimating the risk premium rates necessary to provide flood insurance for new or substantially improved structures in designated Special Flood Hazard Areas.

Routine Use(s): The information on this form may be disclosed as generally permitted under 5 U.S.C. § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA-003 – National Flood Insurance Program Files System or Records Notice 73 Fed. Reg. 77747 (December 19, 2008); DHS/FEMA/NFIP/LOMA-1 – National Flood Insurance Program (NFIP) Letter of Map Amendment (LOMA) System of Records Notice 71 Fed. Reg. 7990 (February 15, 2006); and upon written request, written consent, by agreement, or as required by law.

Disclosure: The disclosure of information on this form is voluntary; however, failure to provide the information requested may result in the inability to obtain flood insurance through the National Flood Insurance Program or the applicant may be subject to higher premium rates for flood insurance. Information will only be released as permitted by law.

Purpose of the Elevation Certificate

The Elevation Certificate is an important administrative tool of the National Flood Insurance Program (NFIP). It is to be used to provide elevation information necessary to ensure compliance with community floodplain management ordinances, to determine the proper insurance premium rate, and to support a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F).

The Elevation Certificate is required in order to properly rate Post-FIRM buildings, which are buildings constructed after publication of the Flood Insurance Rate Map (FIRM), located in flood insurance Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, and AR/AO. The Elevation Certificate is not required for Pre-FIRM buildings unless the building is being rated under the optional Post-FIRM flood insurance rules.

As part of the agreement for making flood insurance available in a community, the NFIP requires the community to adopt floodplain management regulations that specify minimum requirements for reducing flood losses. One such requirement is for the community to obtain the elevation of the lowest floor (including basement) of all new and substantially improved buildings, and maintain a record of such information. The Elevation Certificate provides a way for a community to document compliance with the community's floodplain management ordinance.

Use of this certificate does not provide a waiver of the flood insurance purchase requirement. Only a LOMA or LOMR-F from the Federal Emergency Management Agency (FEMA) can amend the FIRM and remove the Federal mandate for a lending institution to require the purchase of flood insurance. However, the lending institution has the option of requiring flood insurance even if a LOMA/LOMR-F has been issued by FEMA. The Elevation Certificate may be used to support a LOMA or LOMR-F request. Lowest floor and lowest adjacent grade elevations certified by a surveyor or engineer will be required if the certificate is used to support a LOMA or LOMR-F request. A LOMA or LOMR-F request must be submitted with either a completed FEMA MT-EZ or MT-1 package, whichever is appropriate.

This certificate is used only to certify building elevations. A separate certificate is required for floodproofing. Under the NFIP, non-residential buildings can be floodproofed up to or above the Base Flood Elevation (BFE). A floodproofed building is a building that has been designed and constructed to be watertight (substantially impermeable to floodwaters) below the BFE. Floodproofing of residential buildings is not permitted under the NFIP unless FEMA has granted the community an exception for residential floodproofed basements. The community must adopt standards for design and construction of floodproofed basements before FEMA will grant a basement exception. For both floodproofed non-residential buildings and residential floodproofed basements in communities that have been granted an exception by FEMA, a floodproofing certificate is required.

Additional guidance can be found in FEMA Publication 467-1, Floodplain Management Bulletin: Elevation Certificate, available on FEMA's website at https://www.fema.gov/media-library/assets/documents/3539?id=1727.

U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2018

ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1–9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION		FOR INSURANCE COMPANY USE
A1. Building Owner's Name		Policy Number:
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.		Company NAIC Number:
City	State	ZIP Code
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)		

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____

A5. Latitude/Longitude: Lat. _____ Long. _____ Horizontal Datum: ☐ NAD 1927 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):

a) Square footage of crawlspace or enclosure(s) _____ sq ft

b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____

c) Total net area of flood openings in A8.b _____ sq in

d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:

a) Square footage of attached garage _____ sq ft

b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____

c) Total net area of flood openings in A9.b _____ sq in

d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/ Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: _____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No

Designation Date: _____ ☐ CBRS ☐ OPA

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.	FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.	Policy Number:
City State ZIP Code	Company NAIC Number

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☐ Finished Construction

*A new Elevation Certificate will be required when construction of the building is complete.

C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.

Benchmark Utilized: _____ Vertical Datum: _____

Indicate elevation datum used for the elevations in items a) through h) below.

☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____

Datum used for building elevations must be the same as that used for the BFE.

		Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	_____	☐ feet	☐ meters
b) Top of the next higher floor	_____	☐ feet	☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only)	_____	☐ feet	☐ meters
d) Attached garage (top of slab)	_____	☐ feet	☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	_____	☐ feet	☐ meters
f) Lowest adjacent (finished) grade next to building (LAG)	_____	☐ feet	☐ meters
g) Highest adjacent (finished) grade next to building (HAG)	_____	☐ feet	☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	_____	☐ feet	☐ meters

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. *I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

Were latitude and longitude in Section A provided by a licensed land surveyor? ☐ Yes ☐ No ☐ Check here if attachments.

Certifier's Name	License Number		Place Seal Here
Title			
Company Name			
Address			
City	State	ZIP Code	
Signature	Date	Telephone	Ext.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

Comments (including type of equipment and location, per C2(e), if applicable)

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.			Policy Number:
City	State	ZIP Code	Company NAIC Number

SECTION E – BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)

For Zones AO and A (without BFE), complete Items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B,and C. For Items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).

a) Top of bottom floor (including basement, crawlspace, or enclosure) is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

b) Top of bottom floor (including basement, crawlspace, or enclosure) is _____ ☐ feet ☐ meters ☐ above or ☐ below the LAG.

E2. For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 1–2 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E3. Attached garage (top of slab) is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E4. Top of platform of machinery and/or equipment servicing the building is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance? ☐ Yes ☐ No ☐ Unknown. The local official must certify this information in Section G.

SECTION F – PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION

The property owner or owner's authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.

Property Owner or Owner's Authorized Representative's Name			
Address	City	State	ZIP Code
Signature	Date	Telephone	

Comments

☐ Check here if attachments.

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.			Policy Number:
City	State	ZIP Code	Company NAIC Number

SECTION G – COMMUNITY INFORMATION (OPTIONAL)

The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8–G10. In Puerto Rico only, enter meters.

G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4–G10) is provided for community floodplain management purposes.

G4. Permit Number	G5. Date Permit Issued	G6. Date Certificate of Compliance/Occupancy Issued

G7. This permit has been issued for: ☐ New Construction ☐ Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building: _____ ☐ feet ☐ meters Datum _____

G9. BFE or (in Zone AO) depth of flooding at the building site: _____ ☐ feet ☐ meters Datum _____

G10. Community's design flood elevation: _____ ☐ feet ☐ meters Datum _____

Local Official's Name	Title
Community Name	Telephone
Signature	Date

Comments (including type of equipment and location, per C2(e), if applicable)

☐ Check here if attachments.

ELEVATION CERTIFICATE

BUILDING PHOTOGRAPHS

See Instructions for Item A6.

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.			Policy Number:
City	State	ZIP Code	Company NAIC Number

If using the Elevation Certificate to obtain NFIP flood insurance, affix at least 2 building photographs below according to the instructions for Item A6. Identify all photographs with date taken; "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8. If submitting more photographs than will fit on this page, use the Continuation Page.

Photo One

Photo One

Photo One Caption

Clear Photo One

Photo Two

Photo Two

Photo Two Caption

Clear Photo Two

ELEVATION CERTIFICATE

BUILDING PHOTOGRAPHS

Continuation Page

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.			Policy Number:
City	State	ZIP Code	Company NAIC Number

If submitting more photographs than will fit on the preceding page, affix the additional photographs below. Identify all photographs with: date taken; "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8.

Photo Three

Photo Three

Photo Three Caption

Clear Photo Three

Photo Four

Photo Four

Photo Four Caption

Clear Photo Four

US Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021

Procedures for "No-Rise" Certification
For Proposed Developments in the Regulatory Floodway

Section 60.3 (d) (3) of the National Flood Insurance Program (NFIP) regulations states that a community shall "prohibit encroachments, including fill, new construction, substantial improvements and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base (100-year) flood discharge."

Prior to issuing any building, grading or development permits involving activities in a regulatory floodway the community must obtain a certification stating the proposed development will not impact the pre-project base flood elevations, floodway elevations, or floodway data widths. The certification should be obtained from the applicant and be signed and sealed by a professional engineer.

<u>The engineering or "no-rise" certification must be supported by technical data</u>.

The supporting technical data should be based upon hydraulic analyses that utilize the same model used to prepare the effective Flood Insurance Study (FIS) report and Flood Insurance Rate Map (FIRM) unless it is demonstrated that the 'effective' hydraulic model is unavailable or its use is inappropriate. If an alternative hydraulic model is used, the new model must be calibrated to reproduce the FIS profiles within 0.5 feet. Hydraulic model used in the analysis must be on FEMA's accepted models list, or documentation must be provided showing the model meets the requirements of NFIP regulation 65.6(a)(6).

October 2013

Although communities are required to review and approve the "no-rise" submittals, they may request, in writing, technical assistance and review from the FEMA regional office. However, if this alternative is chosen, the community must review the technical submittal package and verify that all supporting data, listed in the following paragraphs, are included in the package before forwarding to FEMA.

To support a "no-rise" certification for proposed developments encroaching into the regulatory floodway, a community will require that the following procedures be followed:

1. Current Effective Model: Submit a written request for the effective model for the specified stream and community, identifying the limits of the requested data. A fee will be assessed for providing the data. Data request forms and instructions can obtained at:

   http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/how-order-technical-administrative-support

   or by writing to:

   FEMA Engineering Library
   847 S. Pickett Street
   Alexandria, VA 22304
   Phone: 1-877-336-2627
   Facsimile: 1-703-212-4090

2. Duplicate Effective Model: Upon receipt of the effective computer model, the engineer should run the original model to duplicate the output in the effective (FIS).

3. Corrected Effective Model: The model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections, or incorporates more detailed topographic information than that used in the current effective model. Floodway limits should be manually set at the new cross-section locations by measuring from the effective FIRM or FBFM. The cumulative reach lengths of the stream should also remain unchanged. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model.

4. Existing, or Pre-Project Conditions Model: Revise the Duplicate Effective or the Corrected Effective model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project. If no modifications have occurred since the date of the effective model, then the model would be identical to the Duplicate Effective or Corrected Effective model. The results of this

Existing Conditions analysis will indicate the 100-yr elevations at the project site.

5. Proposed, or Post-Project Conditions Model: Modify the Existing Condition or Pre-Project Conditions Model (or Duplicate Effective model or Corrected Effective model, as appropriate) to reflect revised or post-project conditions. The overbank roughness coefficients should remain the same unless a reasonable explanation of how the proposed development will impact Manning's “n” values is included with the supporting data. The results of this analysis will indicate the 100-year elevation for proposed conditions at the project site. These results must indicate NO impact on the 100-year floodway elevations when compared to the Existing Conditions or Pre-Project Conditions model. If an increase results the project will require the submittal of a CLOMR prior to the start of the project.

The "no-rise" supporting data and a copy of the engineering certification must be submitted to and reviewed by the appropriate community official prior to issuing a permit.

The "no-rise" supporting data should include, but may not be limited to:

1) Copy of the Duplicate Effective model;

2) Copy of the Corrected Effective model;

3) Existing conditions, or Pre-Project conditions model

4) Proposed conditions or Post-Project conditions model.

5) FIRM and topographic map, showing floodplain and floodway, the additional cross-sections, the site location with the proposed topographic modification superimposed onto the maps, and a copy of the effective FIRM or FBFM showing the current regulatory floodway.

6) Documentation clearly stating analysis procedures. All modifications made to the original FIS model to represent revised existing conditions, as well as those made to the revised existing conditions model to represent proposed conditions, should be well documented and submitted with all supporting data.

7) Copy of effective Floodway Data Table copied from the (FIS) report.

8) Statement defining source of additional cross-section topographic data and supporting information.

9) Cross-section plots, of the added cross sections, for revised existing and proposed conditions.

10) Certified planimetric (boundary survey) information indicating the location of structures on the property.

11) Copy of the source from which input for original FIS model was taken.

12) CD with all input and output files.

13) Printout of output files from EDIT runs for all three floodway models.

The engineering "no-rise" certification and-supporting technical data must stipulate NO impact on the 100-year flood or floodway elevations at the new cross-sections and at all existing cross-sections anywhere in the model. Therefore, the revised computer model should be run for a sufficient distance (usually one mile, depending on hydraulic slope of the stream) upstream and downstream of the development site to insure proper "no-rise" certification.

Attached is a sample "no-rise" certification form that can be completed by a registered professional engineer and supplied to the community along with the supporting technical data when applying for a development permit.

ENGINEERING "NO-RISE" CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice in the State of New York .

It is to further certify that the attached technical data supports the fact that proposed Addition of fill at Highbridge Commons address will
(Name of Development)
not impact the 100-year flood elevations, floodway elevations and floodway widths on Limestone Creek at published sections
(Name of Stream)
in the Flood Insurance Study for Onondaga County, New York ,
(Name of Community)
dated November, 2016 and will not impact the 100-year flood elevations, floodway elevations, and floodway widths at unpublished cross-sections in the vicinity of the proposed development.

Attached are the following documents that support my findings:

Limestone Creek Floodplain/Floodway Analysis for Highbridge Commons site.

(Date) March 29, 2019

(Signature)

PRINCIPAL ENGINEER
(Title)

Highbridge Commons

Village of Fayetteville, NY 13066

(Address)

(Seal)

STATE OF NEW YORK
JAMES FRANCIS TRASHER
No. 081584
LICENSED PROFESSIONAL ENGINEER