
Appendix B-5 Modified Puls Subreach Calculations

Appendix B-5**Modified Puls Subreach Calculations
Kee Branch**

Time Step (min) = 1

Creek/River	Reach Name	Length	Average Velocity	Steps	Rounded Steps
Kee Branch	R_KEE_000_020	2161	3.58	10.06	10.0
KB_Route1	R_KEE_000_140	1958	8.33	3.92	4.0
	R_KEE_000_160	361	7.26	0.83	1.0
KB_Route2	R_KEE_000_260	2290	6.71	5.69	6.0
Kee Branch Trib 4	R_KEE_004_020	741	9.01	1.37	2.0
Kee Branch Trib 5	R_KEE_005_020	1589	2.81	9.44	10.0
Stream KB-1.1	R_KEE_KB1_001_020	1428	6.99	3.40	4.0

Notes:

- (1) Length of the main channel
- (2) Average channel velocity calculated in the time of concentration spreadsheet (V2)
- (3) Number of Routing Steps = (River Length / Channel Velocity) * (1 / 60 min/s) / Time Step
- (4) Rounded Steps = the number of routing steps rounded up

Appendix B-5
Modified Puls Subreach Calculations
Lower Rush

Time Step (min) = 1

Creek/River	Reach Name	Length	Average Velocity	Steps	Rounded Steps
Pantego	R_PAN_000_030b	2870	7.63	6.27	7.0
	R_PAN_000_050a	687	3.86	2.97	3.0
Rush Creek Trib 3	R_RUS_003_020b	908	5.28	2.87	3.0
Rush Creek Trib 4.1	R_RUS_004_001_020	1140	6.66	2.85	3.0
	R_RUS_004_001_030	1161	6.43	3.01	4.0
LR_Route1	R_RUS_004_030a	1041	2.87	6.05	7.0
Rush Creek Trib 4	R_RUS_004_030b	382	3.73	1.71	2.0

Notes:

- (1) Length of the main channel
- (2) Average channel velocity calculated in the time of concentration spreadsheet (V2)
- (3) Number of Routing Steps = (River Length / Channel Velocity) * (1 / 60 min/s) / Time Step
- (4) Rounded Steps = the number of routing steps rounded up

Appendix B-5**Modified Puls Subreach Calculations
Middle Rush**

Time Step (min) = 1

Creek/River	Reach Name	Length	Average Velocity	Steps	Rounded Steps
Rush Creek Trib 7	R_RUS_007_020	1857	7.83	3.95	4.0
Rush Creek Trib 9	R_RUS_009_030	332	10.29	0.54	1.0
Twin Springs Draw	R_TWI_000_020	1012	6.27	2.69	3.0
	R_TWI_000_030	1572	8.10	3.24	4.0

Notes:

- (1) Length of the main channel
- (2) Average channel velocity calculated in the time of concentration spreadsheet (V2)
- (3) Number of Routing Steps = (River Length / Channel Velocity) * (1 / 60 min/s) / Time Step
- (4) Rounded Steps = the number of routing steps rounded up

Appendix B-5**Modified Puls Subreach Calculations
Stream RC-1****Time Step (min) = 1**

Creek/River	Reach Name	Length	Average Velocity	Steps	Rounded Steps
Stream RC-1	R_RUS_RCO_020a	1381	6.81	3.38	4.0
	R_RUS_RCO_030	279	8.14	0.57	1.0
	R_RUS_RCO_070	1230	7.43	2.76	3.0
Stream RC-1A	R_RUS_TOA_030	2177	6.09	5.96	6.0

Notes:

- (1) Length of the main channel
- (2) Average channel velocity calculated in the time of concentration spreadsheet (V2)
- (3) Number of Routing Steps = (River Length / Channel Velocity) * (1 / 60 min/s) / Time Step
- (4) Rounded Steps = the number of routing steps rounded up

Appendix B-5**Modified Puls Subreach Calculations
Upper Rush**

Time Step (min) = 1

Creek/River	Reach Name	Length	Average Velocity	Steps	Rounded Steps
UR_Route6	R_RUS_000_085	3143	3.26	16.07	10.0
Rush Creek Trib 18	R_RUS_018_020	2026	4.90	6.89	7.0
	R_RUS_018_030	1252	4.86	4.29	5.0
	R_RUS_018_040	1183	3.96	4.98	5.0
	R_RUS_018_050	1126	4.07	4.61	5.0
Rush Creek Trib 20	R_RUS_020_040	3245	3.13	17.28	10.0
Sublett Creek	R_SUB_000_020	1566	4.71	5.54	6.0
UR_Route 3	R_SUB_000_060	1715	3.13	9.13	10.0
	R_SUB_000_070	2505	3.45	12.10	10.0
UR_Route 4	R_SUB_000_140	1644	3.52	7.78	8.0
	R_SUB_000_150	1859	3.65	8.49	9.0
	R_SUB_000_155	1269	4.50	4.70	5.0
UR_Route 5	R_SUB_000_220	2003	3.01	11.09	10.0
	R_SUB_000_230	2137	3.15	11.31	10.0
Sublett Creek Trib 4	R_SUB_004_020	1219	3.63	5.60	6.0
UR_Route 1	R_SUB_004_040	1634	2.36	11.54	10.0
	R_SUB_004_050a	301	4.03	1.24	2.0
	R_SUB_004_050b	2233	4.03	9.23	10.0
	R_SUB_004_060	794	2.15	6.16	7.0
	R_SUB_004_070	504	2.54	3.31	4.0
UR_Route 2	R_SUB_004_090	1654	2.71	10.17	10.0
	R_SUB_004_100	1194	2.91	6.84	7.0
	R_SUB_004_110	1384	3.72	6.20	7.0
	R_SUB_004_120	1149	2.09	9.16	10.0

Notes:

- (1) Length of the main channel
- (2) Average channel velocity calculated in the time of concentration spreadsheet (V2)
- (3) Number of Routing Steps = (River Length / Channel Velocity) * (1 / 60 min/s) / Time Step
- (4) Rounded Steps = the number of routing steps rounded up

Appendix C QAQC Documentation

QA/QC Review Certification

Product Name: Final Hydrologic Models

Level: Internal/Subproduct Deliverable Audit

Type: Checklist Monthly Model Review Engineer Deliverables

Checklist Category: Survey Hydrology Hydraulic Mapping

WBS Code: 4.3

Date: 6/22/2012 Status: Draft Revision Final

Originator/Firm: Ben Plyant/Halff Associates, Inc.

QC Reviewer/Firm: Tom Nye/CDM Smith, Inc.

General Comments: Based on comparisons to the aerial photographs in several areas, the percent impervious based on land use may be high, especially for the very low density land use type. The PMC contends that the aerial photography does not always support the argument that large amounts of impervious area is not included in the GIS impervious cover shapefiles. As discussed in the weekly Rush Creek Watershed Study team meeting of 6/11/2012, the PMC accepts these results pending hydraulic model calibration, at which time the percent impervious values may need to be revisited.

Subbasin delineations may also need to be revisited after hydraulic model calibration. As documented in the PMC review of draft subbasin delineations, it was recommended that some subbasin delineations be modified to account for differences between the topography and the anticipated actual flow path (accounting for momentum in the 100-year stormwater flow and depth of runoff from relatively large areas that will be unlikely to funnel into narrow openings without a buildup of depth).

In most cases though, the long "fingers" have been removed from the Tc Calculations. The PMC accepts the subbasin delineations pending hydraulic model calibration.

Additional Review Comments Attached: Yes No

Recommendation:

Approved as is Approved with Minor Corrections Resubmittal Required

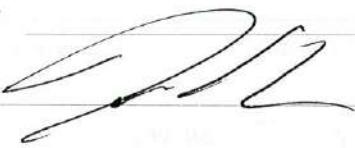
Ridge Creek
Review Completed By:

Tom Nye/CDM Smith, Inc.

Date: 6 / 22 / 2012

Resubmittal Date (if required):

Approved as Final by:



Date: 6/27/12



QA/QC Review Certification

Product Name: *Draft Hydrology Report*

Level: Internal/Subproduct Deliverable Audit

Type: Checklist Monthly Model Review Engineer Deliverables

Checklist Category: Survey Hydrology Hydraulic Mapping

WBS Code: *4.4.1*

Date: *6/22/2012* Status: Draft Revision Final

Originator/Firm: *Ben Plyant/Halff Associates, Inc.*

QC Reviewer/Firm: *Tom Nye/CDM Smith, Inc.*

General Comments: *Remove Appendix C, or at least remove all but the signed QC Page. Internal review notes, comments and responses are Internal work products that should not be published as part of the final document.*

Most of Appendix B should be submitted in electronic form only. We could submit this appendix in electronic form or print just the figures and move the tables to a CD/DVD in order to keep the appendices as labeled.

Other minor edits/comments as noted in the attached scan.

Additional Review Comments Attached: Yes No

Recommendation:

Approved as is Approved with Minor Corrections Resubmittal Required

Review Completed By:

Tom Nye, CDM Smith, Inc.

Date: *6 / 22 / 2012*

Resubmittal Date (if required): *N/A*

Approved as Final by:

Date: *6/22/2012*

Appendix D Correspondence



Draft Memorandum

To: *Hydrology File*
From: *Eric Loucks, P.E., Ph.D.*
Date: *May 31, 2012*
Subject: *Flow paths for estimating Basin Lag Time*

1. Purpose

This memo clarifies the procedure for defining the subbasin flow path to be used for estimating basin lag time in the Rush Creek hydrologic model. For the Rush Creek hydrology we have selected the SCS unit hydrograph method to convert the subbasin runoff volumes into a runoff hydrograph. The SCS unit hydrograph method uses a single input parameter: the basin lag time, T_L .

Runoff hydrographs are either routed downstream in HEC-HMS or directly loaded into HEC-RAS. There are three different applications for each hydrograph generated in HEC-HMS.

1. It is used in a downstream routing or junction in the HEC-HMS model.
2. It is loaded to the HEC-RAS model as a point flow
3. It is loaded to the HEC-RAS model as a distributed flow

The primary purpose of this memo is to describe the need for using different flow paths when defining basin lag time in cases 2 & 3 above. Generally case 1 is the same application as case 2, but that can depend on how routings through basins are handled in HEC-HMS.

2. Discussion

For the Rush Creek hydrology we have selected the SCS unit hydrograph method to convert the subbasin runoff volumes into a runoff hydrograph. The SCS unit hydrograph method uses a single input parameter: the basin lag time, T_L .

Basin lag time for a storm event is defined as the time from the centroid of the effective rainfall to the peak of the outflow hydrograph. There are several empirical methods for estimating T_L (McCuen, 1989) and one of the most popular uses the time of concentration, T_c even though there is no physical connection between the two. Time of concentration is the time it takes for a drainage area to become 100 percent effective in contributing runoff from the start of a runoff producing rainfall. There are also many empirical methods for estimating T_c (Xing, et al., 2005). One of the most popular, the SCS velocity method, involves selecting the longest flow path within the drainage basin and using estimates of flow velocity to determine the travel time to traverse the entire flow path. In a basin with no internal sinks, topology dictates that the longest flow path end at the basin outlet.

Virtually all methods for estimating either T_L or T_c use a flow path that is extended to the basin outlet. The implication is that the flow path ends where the hydrograph is being determined. The technical literature does not say this explicitly, possibly because the point is obvious. The recommendation for the Rush Creek study is to terminate the flow path at the location where the flow path meets a channel that is being modeled in HEC-RAS, or at the basin outlet if the flow path never meets a HEC-RAS channel.

In a HEC-RAS model, there are two types of hydrograph input, point inflow or distributed inflow along a reach. It is worth noting that, on a computational level, all input is the same. As illustrated in *Figure 2-1*, each computational element receives up to three inflows; one lateral inflow along with inflows each adjacent computational elements. In HEC-RAS, each computational element corresponds to a model cross-section. In reaches with distributed inflows, the inflow hydrograph is allocated proportionally among the elements. Distributed inflow to a reach that has just one cross-section, behaves identically to a point inflow.

The inflow hydrographs are computed in HEC-HMS. The locations of HEC-HMS basin outlets must be carefully defined to correspond to the input points in the HEC-RAS model. An example is illustrated in schematic form in *Figure 2-2*. As indicated, the subbasin KEE_000_040 is being loaded as a headwaters point inflow at cross-section 30699.74; therefore it follows that the calculation of basin lag time should terminate where the flow path intersects this cross-section, which is also the basin outlet. Therefore the flowpath for KEE_000_040 does include the main channel segment.

Subbasin KEE_000_050 is loaded as a distributed inflow between 30699.74 and 28906. In HEC-RAS, the inflow will be represented as seven inflow hydrographs, one for each of the seven cross-sections in the reach. In the actual Kee Branch channel, inflows will occur at various points on each side of the channel through small tributaries and storm sewer outfalls. Of course, it is beyond the scale of this modeling effort to individually account for each one of these sources. The longest flow path for subbasin KEE_000_050 is shown in *Figure 2-3*. The flow path used to estimate T_L for this hydrograph should not include the portion of the channel that is modeled in unsteady HEC-RAS. The east-west flow path segment shown in the figure will be used to approximate the travel time for all of the lateral inflow hydrographs in the subbasin.

Discharge from subbasin KEE_000_060 has characteristics of both a distributed and point inflow to the Kee Branch main channel. As shown in *Figure 2-4*, the longest flow path drains a large area that discharges through an outfall.

It is up to the hydraulic modeler to decide how a given subbasin should be represented. While the choice of approach has some local effect, the impact on overall results will be minor. This is especially true in the Rush Creek Watershed Study because we have elected to use small subbasins, minimizing the effect of the modeling approach on each particular subbasin. Subbasin KEE_000_070 will be loaded as a distributed inflow. The longest flow path for this subbasin is also shown in *Figure 2-4*. Again the portion that overlaps the main channel should be excluded from the basin lag time calculation. This is because routing through the main channel is modeled in HEC-RAS so including it would duplicate this travel time and storage and because the truncated flow path is more representative of all the flow paths leading to the main channel from Subbasin KEE_000_070.

3. Conclusion

The primary conclusion of this memo is a procedural guideline to exclude any portion of the channel modeled in unsteady HEC-RAS from the flow path used to determine basin lag time. This essentially defines a clear boundary between HEC-RAS and HEC-HMS at the point where the HEC-HMS hydrograph enters the HEC-RAS channel model. This is a situation that arises when unsteady HEC-RAS is used because channel routing can occur in both models and it seems appropriate to ensure that not only is no portion of any modeled channel double-counted, but also that the entire channel is used. In other words, HMS-routing should end right where HEC-RAS routing begins. In the examples presented, it has been demonstrated that there is no clean break in subbasins with distributed lateral inflow to the channel due to the fact that there are multiple inflows from these basins. However the recommended approach of excluding the main channel for calculating basin lag will, on average, provide an appropriate path length.

References

Franz, D. D. and C. S. Melching. Full Equations Model for the Solution of the Full, Dynamic Equations of Motion for One-Dimensional Unsteady Flow in Open Channels and Through Control Structures, USGS WRI Report 96-4240, 1997.

McCuen, Richard H., Hydrologic Analysis and Design, Prentice Hall, 1989.

Xing, Fang, Pradhan, P., Malla, R., Cleveland, Theodore, and David Thompson, "Estimating Time of Concentration for Texas Watersheds," 2005.

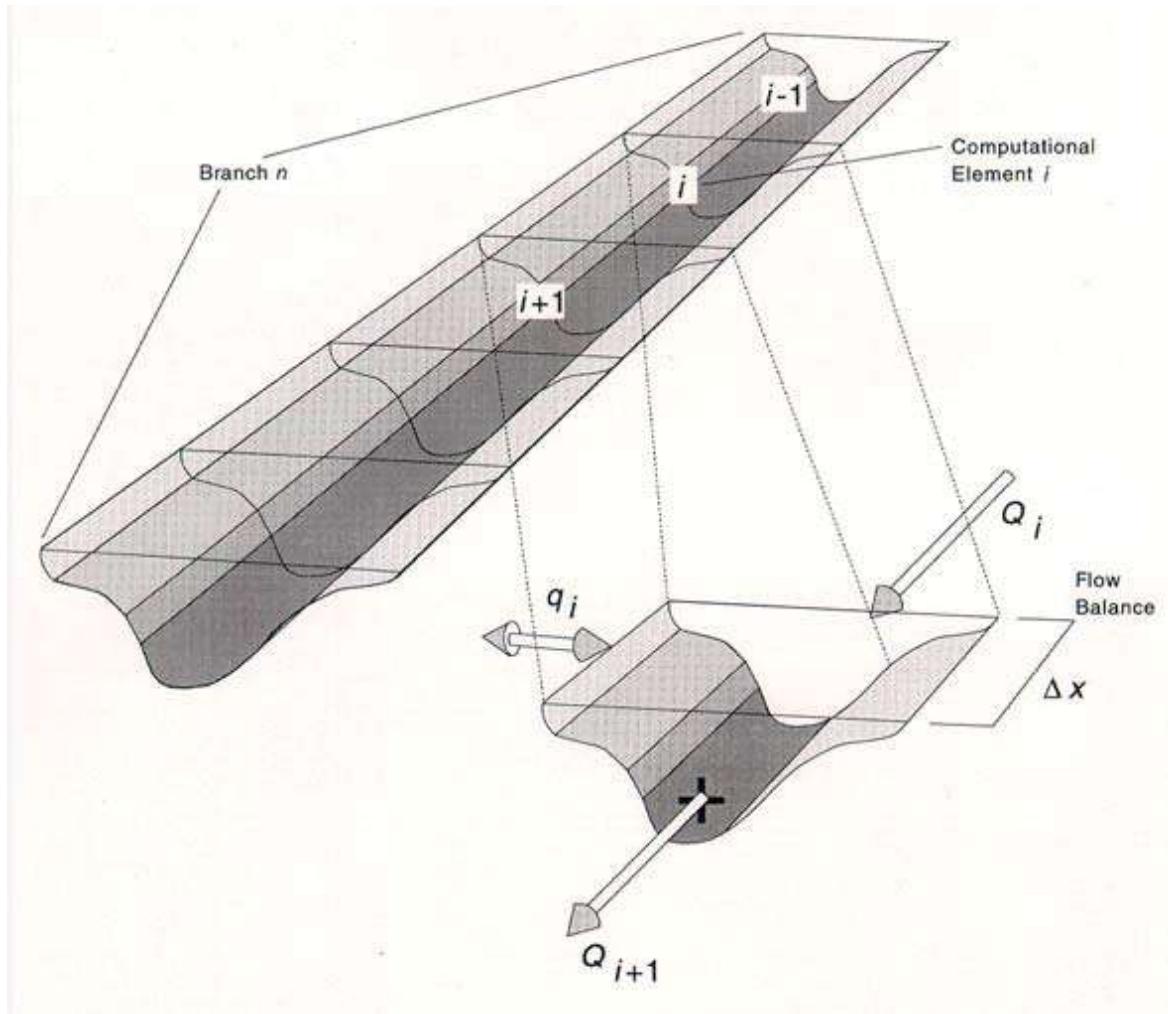


Figure 2-1. Computational elements in an unsteady Flow Model (Franz and Melching, 1996)

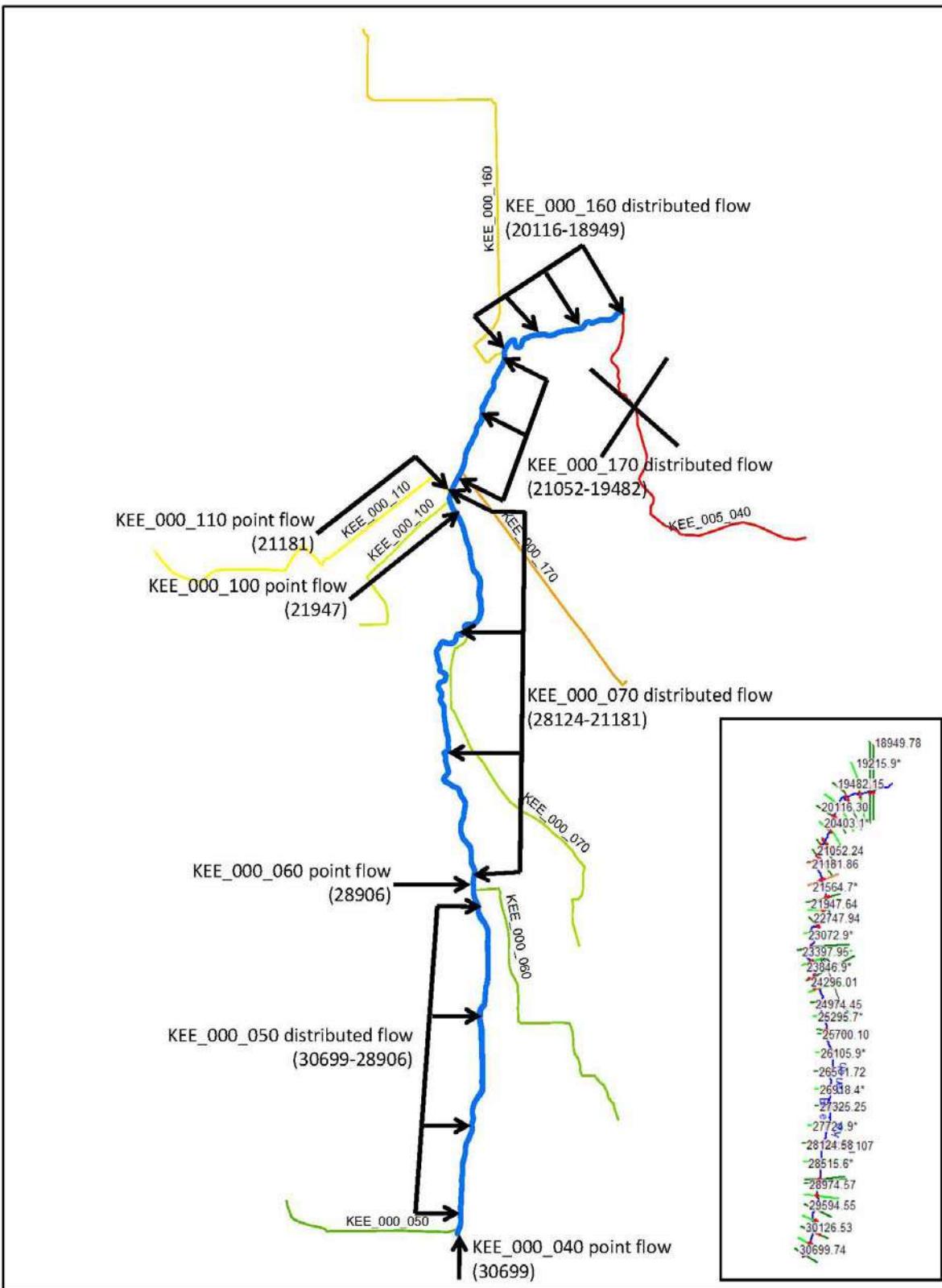
**Figure 2-2. Point flow and distributed flow schematics.**



Figure 2-3. Longest flow paths for subbasins at the Kee branch Headwaters.



Figure 2-4. Additional KEE_ooo Subbasins

Appendix E
LiDAR QA Report

LiDAR Quality Assurance (QA) Report
Fort Worth, Texas
Texas Water Development Board
May 10, 2010

Submitted to:
Texas Water Development Board

Prepared by:
 **Dewberry**
Fairfax, VA

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Executive Summary

Reference: Texas Water Development Board Contract 580-09-0824

This report documents Dewberry's assessment of the quality of the LiDAR deliverables for Fort Worth, Texas, developed under contract to the Texas Water Development Board (TWDB). The LiDAR data and supplemental deliverables were acquired and processed by Fugro Earth Data, Inc. (FEDI) beginning in March 2009. The area consists of 322 tiles of LiDAR data in LAS format 1.1, classified into eight classes as follows.

- Class 1 – Unclassified
- Class 2 – Ground
- Class 3 – Low Vegetation
- Class 4 – Medium Vegetation
- Class 5 – High Vegetation
- Class 6 – Building
- Class 7 – Noise
- Class 9 – Water

The data were reviewed quantitatively for statistical errors and vertical accuracy, and qualitatively for completeness and visual anomalies.

The LiDAR data are of good quality; however, some issues exist in the supplemental products including the breakline dataset, hydro-enforced Digital Elevation Models (DEMs), and metadata products.

- Breakline Dataset - There are topology and completeness issues, albeit minimal, in the breakline dataset. The end user should make note of these errors; however, they do not render the data unusable.
- Hydro-enforced DEMs - The hydro-enforced DEMs contain data voids and incomplete tile edges due to processing errors. The specific tiles containing data voids are documented in this report and must be corrected before use.
- Metadata - Errors exist in the metadata for all products: LAS, breakline, intensity, and DEM. Dewberry has provided suggestions for improvement later in this report.

Completeness: The LiDAR data were required to contain multiple returns per pulse with an intensity value recorded for each point. Dewberry verified that the LAS files adhere to these specifications. Furthermore, the spatial extent of each tile was required to conform to a 1/16th 7.5-minute quadrangle, otherwise known as the USGS Quarter-Quarter-Quad. The internal tiles contain a 50-meter overlap between tiles, while those that line the project boundary contain a 300-meter buffer on all sides. The LAS data were projected to NAD83 UTM Zone 14N and NAVD 88, Geoid 03, meters.

Quantitative Assessment: One of the first steps in assessing the quality of the LAS dataset is a vertical accuracy assessment of the ground models in comparison to the survey checkpoints. Using the checkpoints provided by Dewberry's surveyor, Dewberry tested the RMSE_Z per FEMA/NSSDA and NDEP/ASPRS specifications. The checkpoints were collected in a total of four land cover types (Open Terrain, Urban Terrain, Weeds/Crop, and Forest). The LAS dataset conforms to the vertical accuracy requirements using 100% of the

original 72 checkpoints. Table 1 provides the accuracy results in open terrain based on the FEMA/NSSDA methodology ($RMSE_z \times 1.960$).

Table 2 contains the results measured at the 95% confidence level in the Fundamental Vertical Accuracy (FVA) and the 95th percentile for the Consolidated and Supplemental Vertical Accuracies (CVA and SVA).

Table 1 – Vertical accuracy assessment summary (FEMA/NSSDA)

Criterion	Number of Checkpoints	Accuracy Specification(m)	Results(m)
RMSE _z	24	0.185	0.040
FVA	24	0.363	0.078

Table 2 – Vertical accuracy assessment summary (NDEP/ASPRS)

Criterion	Number of Checkpoints	Accuracy Specification(m)	Results(m)
Consolidated	72	0.363	0.084
FVA – Open Terrain	24	0.363	0.078
SVA – Open Terrain	24	0.363	0.076
SVA – Weeds/Crop	11	0.363	0.075
SVA – Forest	12	0.363	0.480
SVA – Urban	25	0.363	0.072

- Tested 0.084 m consolidated vertical accuracy at 95% confidence level in all land cover categories (NDEP/ASPRS methodology)
- Tested 0.078 m fundamental vertical accuracy at 95% confidence level in Open Terrain using $RMSE_z \times 1.9600$ (FEMA/NSSDA and NDEP/ASPRS methodologies)
- Tested 0.076 m supplemental vertical accuracy at 95th percentile in Open Terrain category (NDEP/ASPRS methodology)
- Tested 0.075 m supplemental vertical accuracy at 95th percentile in Weeds/Crop category (NDEP/ASPRS methodology)
- Tested 0.480 m supplemental vertical accuracy at 95th percentile in Forest category (NDEP/ASPRS methodology)
- Tested 0.072 m supplemental vertical accuracy at 95th percentile in Urban category (NDEP/ASPRS methodology)

Qualitative Assessment: Dewberry conducted a visual inspection of 100% of the data on a tile-by-tile basis. The data do not contain any major anomalies or data voids. The bare earth model is very clean, but contains some minor anomalies. It is 98% free of artifacts, which exceeds expectations (the acceptable limit is 95%). Very few divots and flight line ridges were identified in the ground models. There are misclassification errors in the dataset, specifically within classes 3, 4, 5, and 6; however, these types of errors are to be expected. Overall, Dewberry can confirm that the LiDAR data is of good quality.

QA Report

1 Introduction

The goal of the TWDB LiDAR Task Order is to provide high accuracy elevation datasets of multiple deliverable products including LAS, intensity imagery, hydro-enforced DEMs, and 3D breaklines for the State of Texas. The project area spans 322 tiles covering 1,061 square miles and will support the National Flood Insurance Program in the development of accurate flood zone maps as well as the USGS's efforts in maintaining its National Elevation Data.

Dewberry had previously reviewed data provided by FEDI with both satisfactory and unsatisfactory results. In summary, the LiDAR data passed the quantitative assessment, however the Quality Assurance (QA) review recommended minor corrections. The original breakline dataset did not pass completeness and qualitative checks, and the data contained topology and other quantitative errors. Dewberry identified that the intensity imagery did not contain a defined projection. Lastly, Dewberry identified errors in the LAS metadata and proposed a set of recommendations to improve the overall quality.

The first review of the Fort Worth data did not consist of all deliverables. The following deliverables were not initially included:

- Hydro-enforced DEMs
- Intensity Metadata
- DEM Metadata
- Breakline Metadata

Dewberry performed a final review of all data products, which included completeness checks, vertical accuracy testing, and qualitative reviews. This report documents the results and defines whether or not each deliverable meets specifications. Special notes have been documented where improvements were made.

The sensor used to acquire the data was the Leica ALS-50. Refer to Figure 1 for the flight line trajectories. The trajectories were provided in shapefile format and include the required information: the aircraft position, attitude and GPS time.



Figure 1 – Map of Fort Worth project area displaying complete coverage by trajectories

2 LAS

2.1 Completeness

The LAS datasets were provided in format 1.1, in 322 tiles as defined by USGS 1/16th 7.5 minute quadrangles. The tiles that fall on the project boundary have a 300-meter buffer while those that fall within the boundary contain a 50-meter overlap between tiles.

2.1.1 Methodology

Dewberry conducted a statistical analysis of the LiDAR data to ensure its completeness. The tool used to perform the analysis reports the relevant information specific to LAS data in format 1.1. This information includes the following:

- Number of points per tile;
- ASPRS classes used throughout the dataset;
- Projection and datum;
- Scan angle of the sensor;
- Elevation values per tile;
- Swath overlap; and
- Other criteria.

2.1.2 Assessment Results

Dewberry verified that the LAS contained the appropriate information in each of the aforementioned categories. One point to note is the amount of swath overlap. The scope of work requires a nominal sidelap of 50% on adjoining swaths, meaning that all of the data should have 100% double coverage. The tile in Figure 2 colored by individual flight lines amounts to 34% of overlap on either side. This same characteristic is present throughout the dataset.

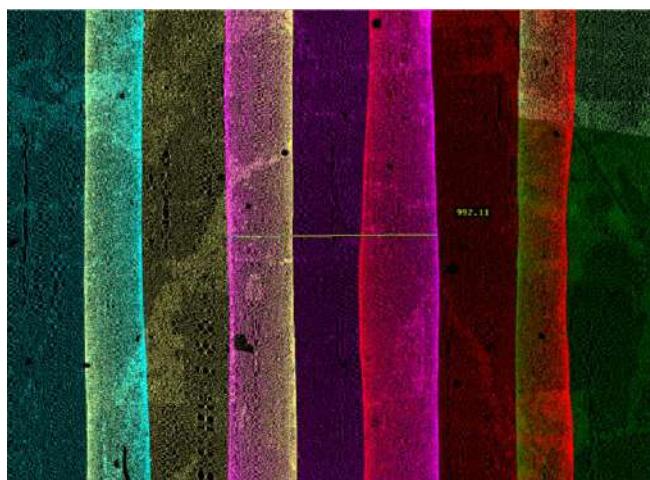


Figure 2 - Tile u339760_2_a; LAS Source data showing flight line overlap. The yellow line defines the width of one flight line.

The LAS data follow the USGS tile naming system and are classified by the following ASPRS classes:

- Class 1 – Unclassified

- Class 2 – Ground
- Class 3 – Low Vegetation
- Class 4 – Medium Vegetation
- Class 5 – High Vegetation
- Class 6 – Building
- Class 7 – Low Point/Noise
- Class 9 – Water

Figure 3 illustrates the total number of LiDAR points collected per tile. The tiles along the project boundary with the highest number of points reflect the 300-meter buffer. This is to be expected.

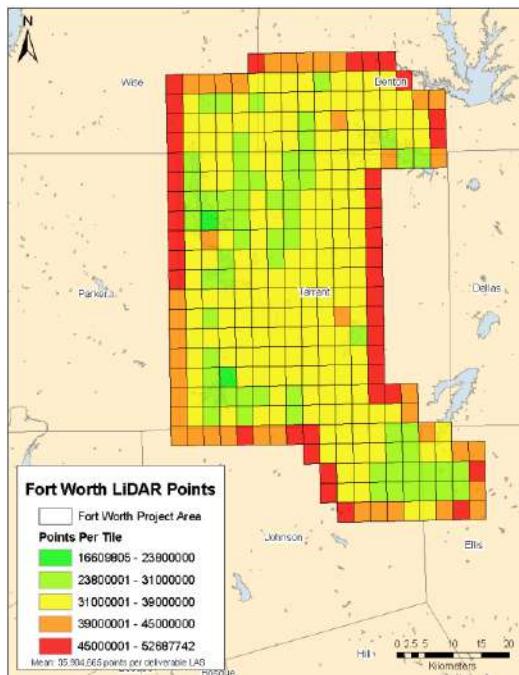


Figure 3 – Map illustrating the total number of LiDAR points per tile

The figures provided below illustrate the minimum and maximum elevation values of the ground class. The lowest z-minimum values depicted by Figure 4 exist in the eastern portion of the project area and elevate toward the west. The same pattern is recognized in Figure 5 as the lowest of the z-maximum values originate in the east and gradually heighten toward the west. The maps also verify that null or extraneous z-values in the ground class do not exist.

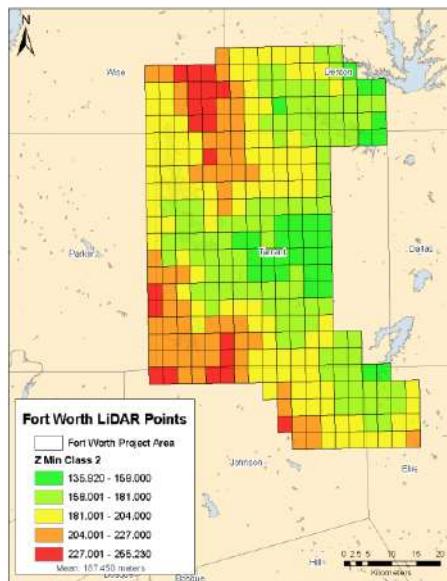


Figure 4 – Map of Z-minimum values in the ground class

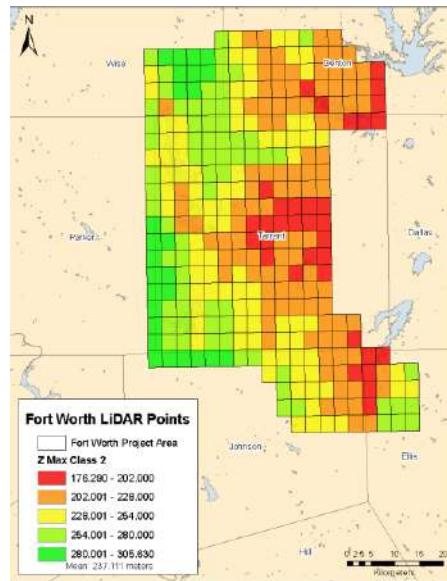


Figure 5 – Map of Z-maximum values in the ground class

2.2 Quantitative Assessment

Dewberry performed an analysis that compared the elevation values of ground survey checkpoints against the LiDAR data to ensure the vertical accuracy of the LiDAR data.

2.2.1 Methodology

Dewberry used 72 surveyed checkpoints, chosen to fall into the following land cover categories:

- Urban Terrain – 25 points
- Open Terrain – 24 points
- Forest – 12 points
- Weeds/Crops – 11 points

The checkpoints were spread across the 1,061 square mile project area in an effort to survey as many flight lines as possible. To verify accuracy of the survey, 50% of the checkpoints were re-surveyed. The re-surveyed values match the initial surveyed positions within the 95% confidence level. Figure 6 illustrates the locations of the checkpoints throughout the project area colored by their respective land cover types.

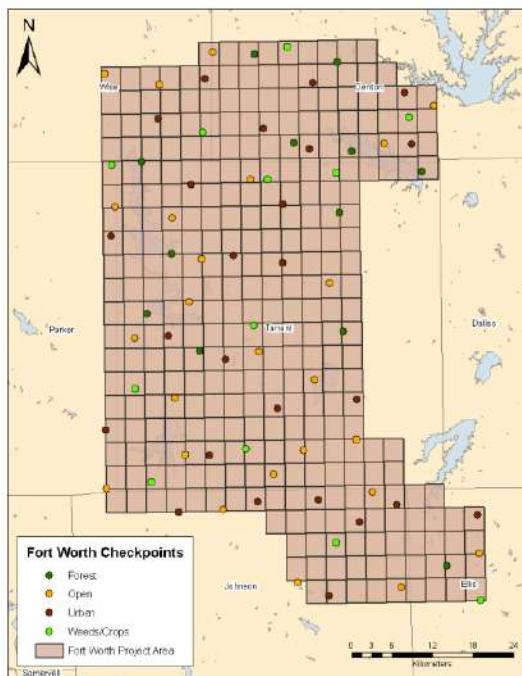


Figure 6 – Map displaying spatial location of 72 survey checkpoints

The GPS technique used to survey the data was connected to Real Time Kinematic (RTK) network. This network is composed of highly accurate GPS reference stations that compare the survey checkpoints against published coordinates. It is linked to create a Virtual Reference Station (VRS) system. The VRS functions as a network of points that send corrections to the survey checkpoints, solving for ionospheric and tropospheric conditions. Additionally, six National Geodetic Survey monuments were used to validate the accuracy of the VRS network. These monuments also acted as the primary project control monuments.

Dewberry's methodology for testing vertical accuracy used the orthometric heights of the survey checkpoints compared against the bare-earth LiDAR elevations at the same horizontal locations. The survey checkpoints were overlaid on the Triangulated Irregular Network (TIN) created by the LiDAR ground points and the interpolated Z value from the TIN at that point was subtracted from the survey checkpoint elevation. The differences in Z values were recorded, and represent the amount of error between the two measurements.

2.2.2 Assessment Results

The LAS data passed the quantitative assessment using 100% of the survey checkpoints with a consolidated RMSE of 0.112m as shown in Table 3.

Table 3 – RMSE method for testing vertical accuracy

100% of Totals	RMSE (m) Spec=0.185m	Mean (m)	Median (m)	Skew	Std Dev	# of Points	Min (m)	Max (m)
Consolidated	0.112	-0.008	0.009	-6.635	0.113	72	-0.875	0.089
Open Terrain	0.040	0.006	0.003	-0.506	0.040	24	-0.092	0.077
Weeds/Crop	0.041	0.028	0.023	0.344	0.032	11	-0.022	0.089
Forest	0.259	-0.091	0.005	-3.172	0.254	12	-0.875	0.033
Urban	0.041	0.004	0.009	-0.294	0.041	25	-0.080	0.075

The result of the FVA assessment shown in Table 4 provides the best summary of the data, as it describes how well the sensor worked in open terrain - the land cover type with the least amount of induced error. With an FVA value of 7.8 cm and a threshold of 36.3 cm, it can be concluded that the LAS data were collected with accuracy. As a result, we expect that the sensor functioned appropriately in all other land cover types. The CVA and SVA assessments report the RMSE value that 95 percent of the errors fall on or below, known as the 95th percentile. The remaining 5 percent of the errors lie above the stated CVA and SVA values.

Table 4 – Fundamental, Consolidated, and Supplemental Vertical Accuracies

Land Cover Category	# of Points	FVA — Fundamental Vertical Accuracy	CVA — Consolidated Vertical Accuracy	SVA — Supplemental Vertical Accuracy
Consolidated	72		0.084	
Open Terrain	24	0.078		0.076
Weeds/Crop	11			0.075
Forest	12			0.480
Urban	25			0.072

The following graph illustrates the RMSE results of the survey checkpoints separated by land cover type. The majority of errors are distributed just above and below zero with one outlier in the forest category.

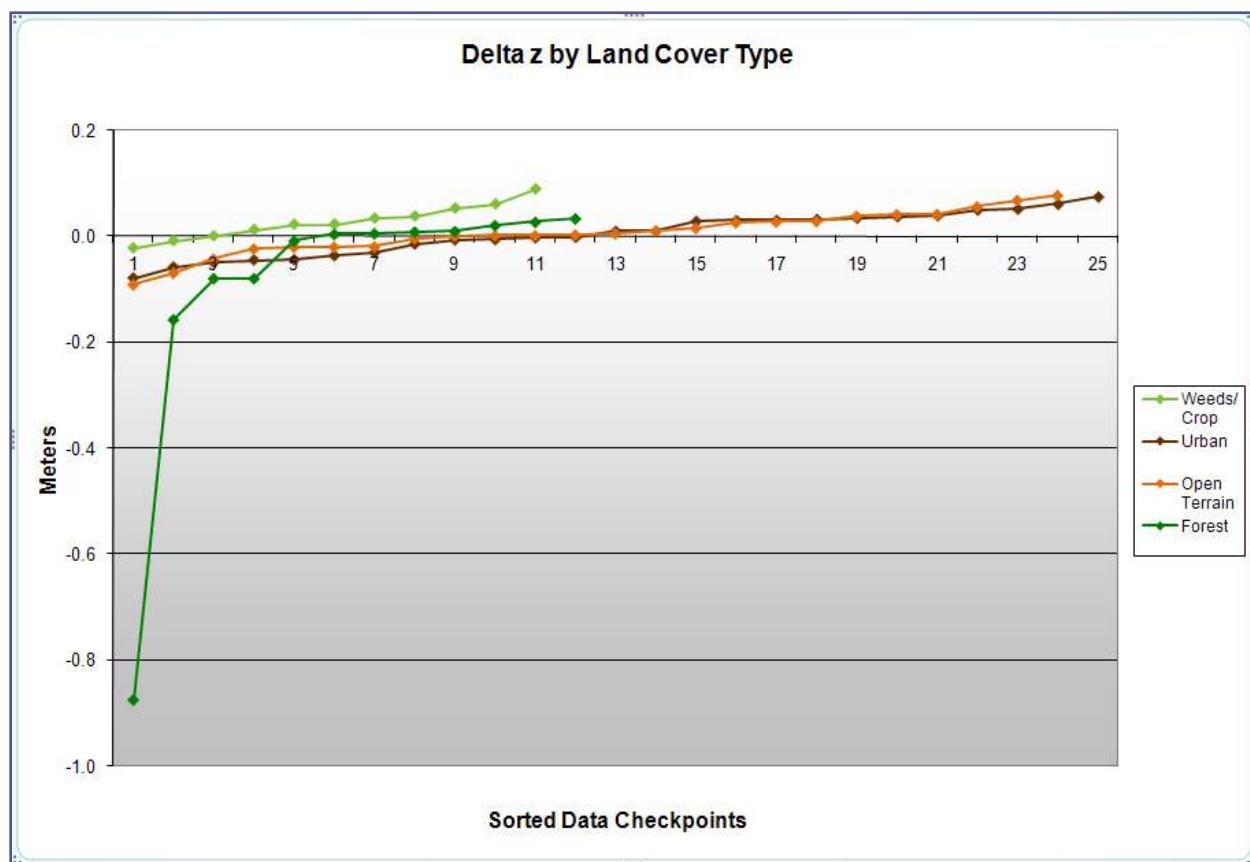


Figure 7 – Display of RMSE value of 72 checkpoints based on land cover type

The RMSE value using the 95% best checkpoints was computed. Table 5 identifies the four points that were removed.

Table 5 – The least accurate 5% of checkpoints

Point	Easting	Northing	Elevation	Z LiDAR	Land Cover Type	DeltaZ
W-612-F	685304.402	3592474.073	218.637	217.762	Forest	-0.875
W-506-VTF	662641.773	3654876.960	175.717	175.560	Forest	-0.157
OT-628	652252.904	3600719.460	245.930	245.838	Open Terrain	-0.092
B-19-VTV	679674.813	3658657.342	178.733	178.822	Weeds/Crop	0.089

The RMSE using the 95% of the best checkpoints is **0.037m**, as shown in Table 6. The most notable improvements exist in the Forest and Weeds/Crop categories.

Table 6 – RMSE method for testing vertical accuracy at 95%

100 % of Totals	RMSE (m) Spec=0.185m	Mean (m)	Median (m)	Skew	Std Dev	# of Points	Min (m)	Max (m)
Consolidated	0.037	0.007	0.007	-0.485	0.036	68	-0.080	0.077
Open Terrain	0.035	0.009	0.003	-0.096	0.034	23	-0.070	0.077
Weeds/Crop	0.031	0.019	0.022	0.076	0.026	10	-0.022	0.061
Forest	0.036	-0.005	0.005	-1.568	0.037	10	-0.079	0.033
Urban	0.041	0.004	0.009	-0.294	0.041	25	-0.080	0.075

Improvements are made in the FVA, CVA, and SVA values using the best 95% of the checkpoints.

Table 7 - Fundamental, Consolidated, and Supplemental Vertical Accuracies

Land Cover Category	# of Points	FVA — Fundamental Vertical Accuracy (RMSEz x 1.9600)	CVA — Consolidated Vertical Accuracy (95th Percentile)	SVA — Supplemental Vertical Accuracy (95th Percentile)
Consolidated	68		0.076	
Open Terrain	23	0.069		0.069
Weeds/Crop	10			0.057
Forest	10			0.079
Urban	25			0.072

2.3 Qualitative Assessment

Dewberry performed a micro-level qualitative analysis on 100% of the LAS data by performing a visual analysis of ground models, full point cloud models, and raw LiDAR points. Below is a discussion of the discrepancies identified in the dataset. Appendix A contains a complete list of LiDAR calls. While corrective actions could have been made, the LiDAR data pass the qualitative assessment.

Artifacts

In any dataset it is not uncommon to find artifacts left in the ground models. Typically, artifacts are caused by misclassification of points. As an example, points that should have been classified as a building (class 6) may be left in the ground class (class 2). Dewberry identified a total of four artifacts in the bare-earth LiDAR models throughout the entire Ft. Worth project area. In the Acceptance Criterion, Dewberry requires 95% removal of artifacts. This dataset meets the accuracy specifications, as 98% of the ground models are free of artifacts.

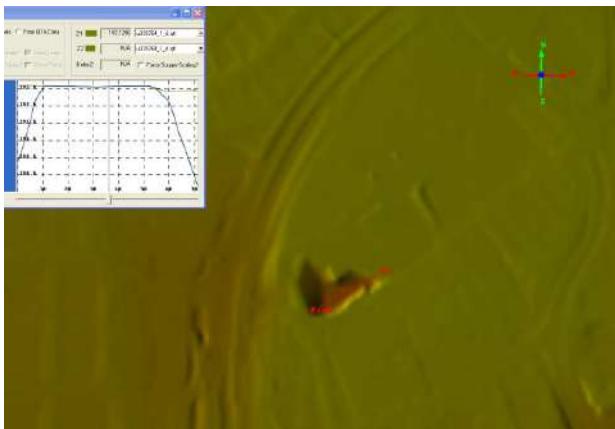


Figure 8 - Tile u329764_1_d; Partial building left in the ground model

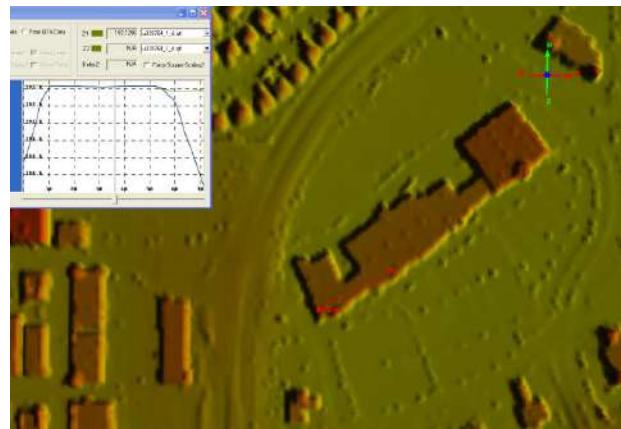


Figure 9 – Full point cloud model showing entire building

Inconsistent Editing

Dewberry identified a few cases in the dataset where inconsistent editing occurred. This type of error may be visible in the removal of buildings, bridges, highway ramps or vegetation. The example below shows a highway ramp that was incorrectly removed from the ground. It is evident when analyzing the full point cloud model that both ramps on either side of the overpass are similar, thus the ground points should have been edited in the same manner. Placing ground points back in the ground class would have improved data quality; however, due to the minimal number of inconsistent edits in the ground models (1.8%), the data meets the requirements.

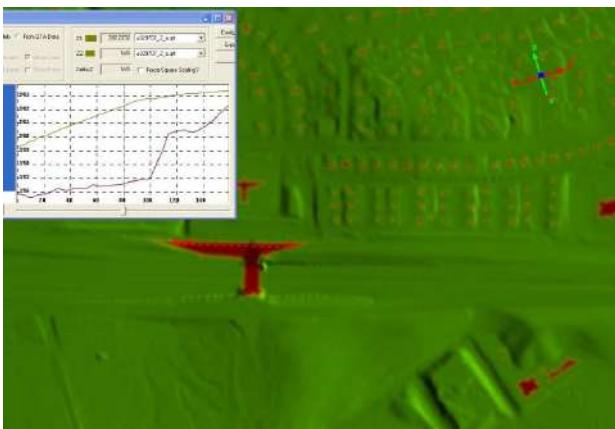


Figure 10 – Tile u329707_2_a; Inconsistent editing of the ground class

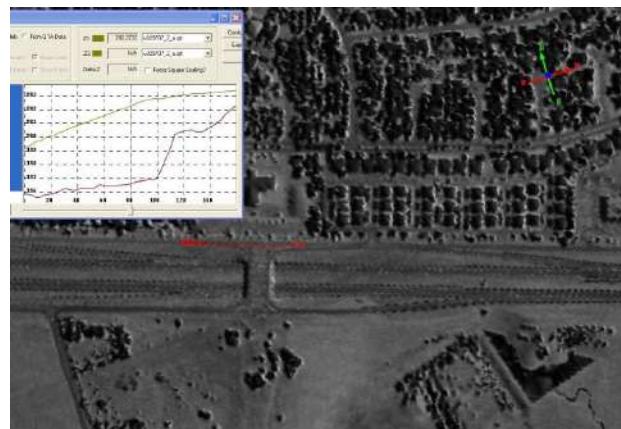


Figure 11 – Full point cloud intensity model showing that the highway ramp and overpass features

Divots

Divots in the dataset are caused by the misclassification of points. As an example, points that should exist in class 7 (noise) may instead be classified as class 2 (ground points). These points lie well below the true ground and may be overlooked during the classification

process. Five examples of divots were identified in the ground models. Since the data are largely free of such outliers, Dewberry did not ask for correction.

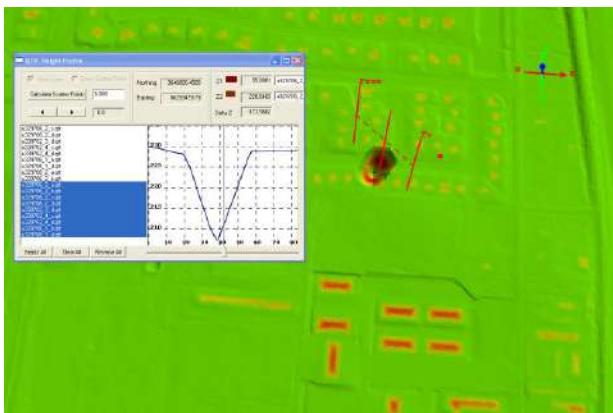


Figure 12 – Tile u329706_2_d; Ground density model of divot

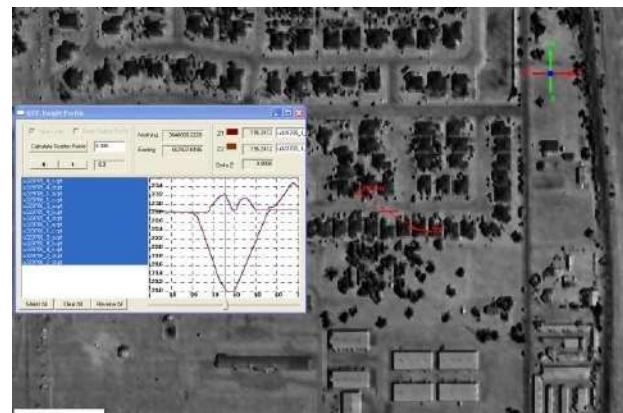


Figure 13 – Full point cloud intensity model

Misclassification

Throughout the dataset there are many examples of the misclassification of LiDAR points in classes 3, 4, 5, and 6. The image below displays an area populated by trailers. Although the trailers should be classified as buildings, they are classified as high vegetation (Figure 14, shown in purple). However, the ground is not affected by this type of misclassification as illustrated by Figure 15. Dewberry is not concerned with this anomaly, as it does not affect the usability of the bare-earth data; it is simply an observation.

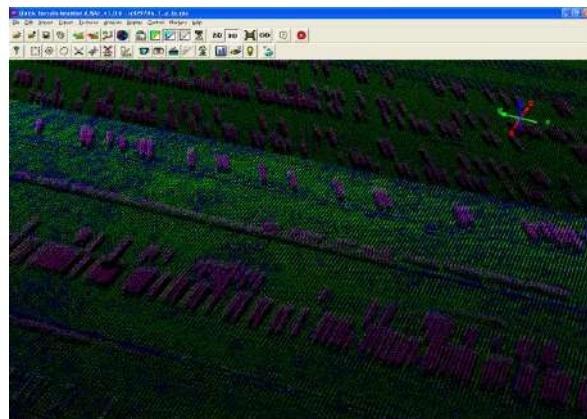


Figure 14 - Tile u329706_1_a; LAS showing trailers classified as high vegetation points

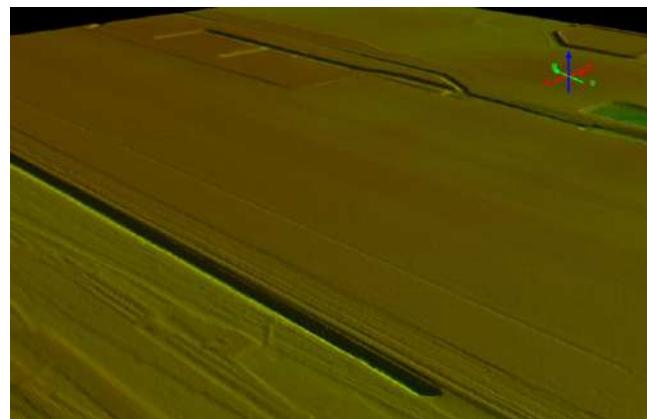


Figure 15 – Tile u329706_1_a; model showing correct classification of ground despite misclassification of trailers

Flight Line Ridges

Minimal flight line ridges, amounting to mismatches of 20-centimeters, were identified in the dataset. The Acceptance Criterion specifies the correction of seam line mismatches that are greater than 20-centimeters. These do not require corrective measures.

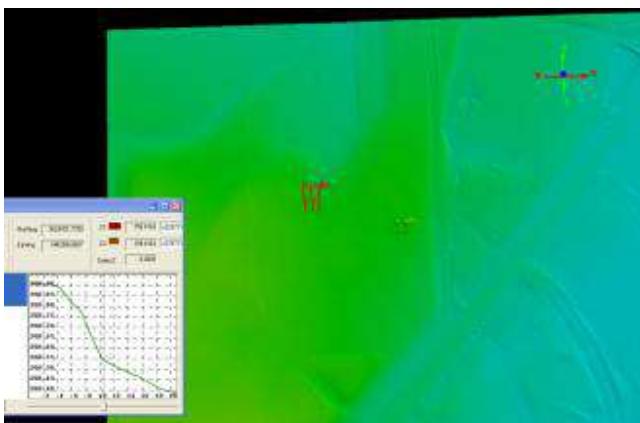


Figure 16 – Tile u329721_2_a; Ground model of flight line ridge

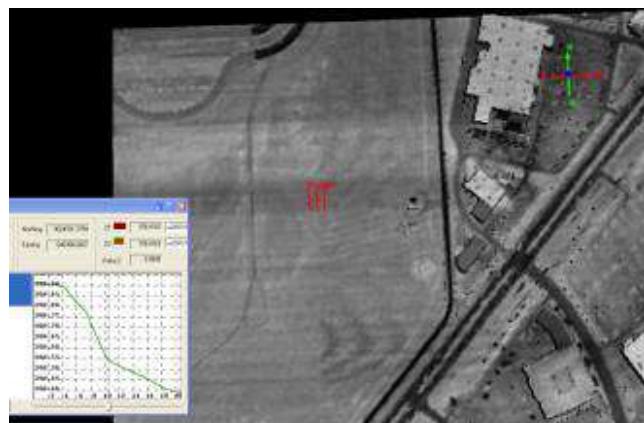


Figure 17 – Intensity image illustrates the boundary between flight lines

3 Breaklines

Dewberry conducted a thorough quantitative and qualitative analysis of the breakline dataset. The breaklines were examined a second time to determine if they met project requirements for completeness, topology (including monotonicity – ensuring that each stream flows downhill), and vertical accuracy. Dewberry assessed the dataset for hydro-enforcement of the hydrolines, the topology of the dataset, and the completeness of the watershed.

In a previous memo, Dewberry provided a list of edit calls and common issues found in the breakline dataset and recommended their correction. After reviewing the most recent geodatabase, it is evident that FEDI has made many improvements to the data. Some outstanding issues still remain that are detailed in the qualitative analysis section below.

3.1 Inventory

Dewberry received an ESRI Geodatabase that included the following feature classes:

- Culvert
- Single Stream
- Stream Polygon
- Stream Connector
- Stream Island Polygon
- Waterbody Polygon
- Waterbody Connector
- Waterbody Island Polygon

3.2 Topology

An important requirement of hydro breaklines intended for modeling is valid topology. Dewberry tested the topology using ESRI's PLTS to ensure that breakline vertices snapped together, that hydro lines were monotonic within a tolerance, that all waterbodies were flat, and that all breaklines had defined elevations. The issues identified during the review are listed below.

- Duplicate geometry:
 - 9 waterbody to waterbody islands
 - 5 stream to stream islands
- Dangles:
 - 1 stream dangle

3.3 Vertical Accuracy Assessment

In order to test the relative accuracy of the breaklines compared to the LiDAR, Dewberry compared a sample of the breakline vertices to the LiDAR masspoints. This is not a definitive test; it is used as an internal guideline to determine how well the breaklines fit the LiDAR. We expect in some cases that the data will not fit, which may be due to the distribution of points or the difficulty in collecting a bankline on a steep slope, for example. Therefore, we use this check as an indication of the vertical consistency between the two products.

3.3.1 Methodology

Dewberry tests the vertical accuracy of the breaklines by comparing the elevation of a sample of the breakline vertices to the surrounding LiDAR points. The vertices of polyline breaklines are converted to points while a GeoTerrain is created from the LiDAR masspoints using only the ground classification. The elevation of the LiDAR is derived by extracting the Z-value of the terrain at the same X/Y-values of the “checkpoints”. Finally, an analysis of the elevation comparison between the checkpoints and the terrain is conducted to determine the accuracy of the breakline collection. Due to the enforced monotonicity of the breaklines, Dewberry set a criterion of twice the RMSE to allow room for acceptable errors.

A slightly modified version of the process described above was implemented for the analysis of the waterbody features. Since the waterbody breakline vertices are all equal, the purpose of the vertical accuracy assessment is to determine if LiDAR masspoints surrounding the breakline are lower in elevation than the breakline. If there are masspoints with lower elevations, then the horizontal placement of the breakline may need to be adjusted. Dewberry set a criterion that if 20% of the vertices are higher in elevation or “float above” the surrounding masspoints, then the feature is marked as an error.

3.3.2 Assessment Results

The breakline vertex samples were tested for the individual feature classes against the masspoints. Table 1 shows the raw RMSE_z values, the vertical accuracy value at the 95th percentile, and the vertical accuracy value and percentile level at which the breaklines reach the accuracy of less than twice the RMSE_z or 0.363 m.

Table 8 – Vertical Accuracy Results

Breakline Feature Class	Vertical Accuracy at 95 th Percentile	Percentile at which the vertical accuracy is less than twice the RMSE_z , Spec= 0.363 m
Single Line Stream	0.351	95th
Dual Line Stream	0.852	79th

Table 2 illustrates the results of the vertical accuracy assessment performed on the waterbody feature vertices. Dewberry tested 1,319 breaklines and found that 14 features have at least 20% of their vertices with higher elevations than the surrounding masspoints.

Table 9 – Vertical Accuracy Results of the Water body Feature Class

Total Waterbodies floating (based on 20% criterion)	14
Total Waterbodies	1319
Percent of Water bodies floating	1%

The waterbody feature class achieved the poorest vertical accuracy rating using this method. Of the total feature count, 1% of the waterbody features float above the masspoints. Please note that this analysis does not take into account the distance of the vertices above the terrain, only that a certain percentage of the vertices are in error. However, after the visual review, Dewberry only identified waterbodies floating by 0.35m or less. Dewberry did not identify any major anomalies that would cause concern. Based on the very small percentage of waterbodies floating, and the small degree by which they float, Dewberry is confident in the level of vertical consistency between the waterbodies and the LiDAR masspoints.

3.4 Qualitative Assessment

Dewberry performed a second visual qualitative analysis of the breaklines against intensity imagery as well as a terrain created using LiDAR masspoints. The purpose of this check is to verify the completeness of each feature class. The analysts check for feature coding errors and missing features. They also verify that breaklines are compiled to the correct project boundary, and that features are captured without overlap.

In the previous dataset, a general call was placed to snap all breaklines to the project boundary. It appears that issues still remain, as several breaklines extend past the boundary while others stop short of the boundary. Figure 18 illustrates this issue. All breaklines should be snapped to the project boundary.



Figure 18 – Tile u329704_4_c; waterbody extends past project boundary

Waterbody Feature Class

As defined by the breakline specifications, any waterbody greater than or equal to 1 acre is to be captured. Previously, Dewberry identified 100+ missing waterbodies in the dataset. FEDI made many improvements to the waterbody feature class; however, there are waterbodies that meet the criteria that have not been collected. Figure 19 and Figure 20 identify a waterbody in the intensity and terrain that is 1.4 acres.

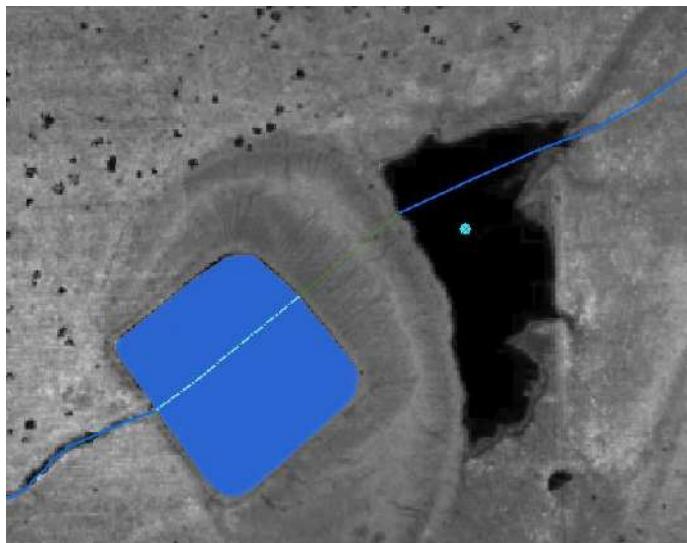


Figure 19 – Tile u339754_4_d; Intensity supports initial claim that a waterbody is missing

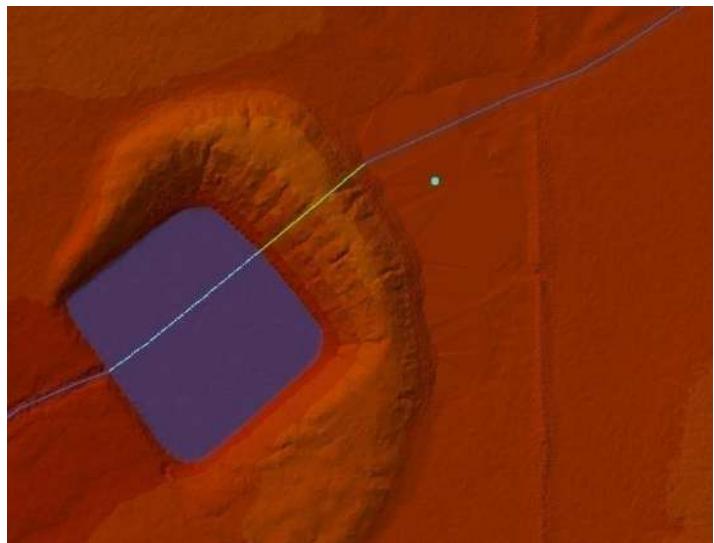


Figure 20 – Flatness of terrain due to absence of masspoints supports the collection of the waterbody

There are very minimal feature coding errors that affect the waterbody feature class. In Figure 21, a single line stream runs through a waterbody. Instead, this feature should have been coded as a waterbody connector.

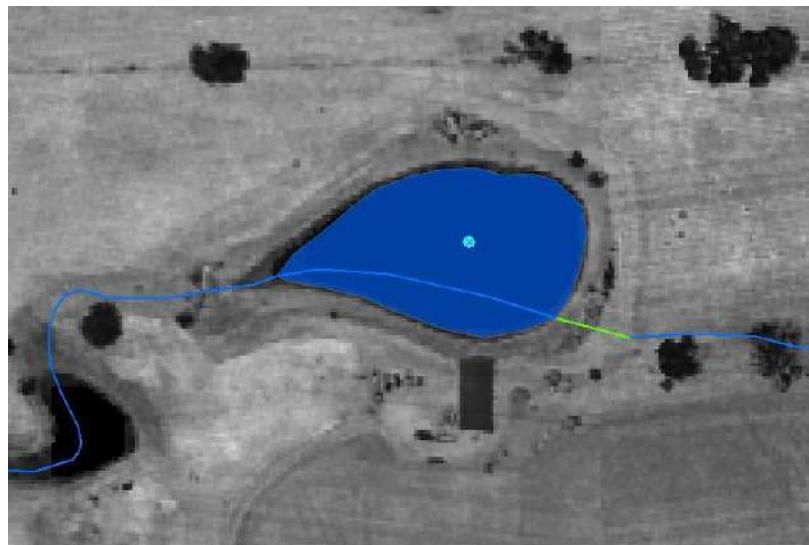


Figure 21 – Tile u339762_2_c; Stream passing through waterbody should be coded as a waterbody connector

Hydrographic Features

Many inconsistencies in the collection of hydrographic features existed in the previous dataset. However, FEDI heeded many of Dewberry's recommendations and as a result the hydrographic features have significantly improved. Some discrepancies may exist - it can be debatable if a feature should be a waterbody or a stream, for example. However, overall the hydrographic

feature class is of good quality in terms of both capture methods and horizontal placement of the breaklines.

Below is an example of one error that was also called in the previous dataset. The major waterbody in blue should have two dual line streams (purple) that feed into the waterbody from the west. The single line stream to the north, highlighted by the yellow arrow, should be captured and coded as a dual line stream for two reasons: it is greater than 40ft wide, and the feature to the south that has the same characteristics was treated as a dual line stream.

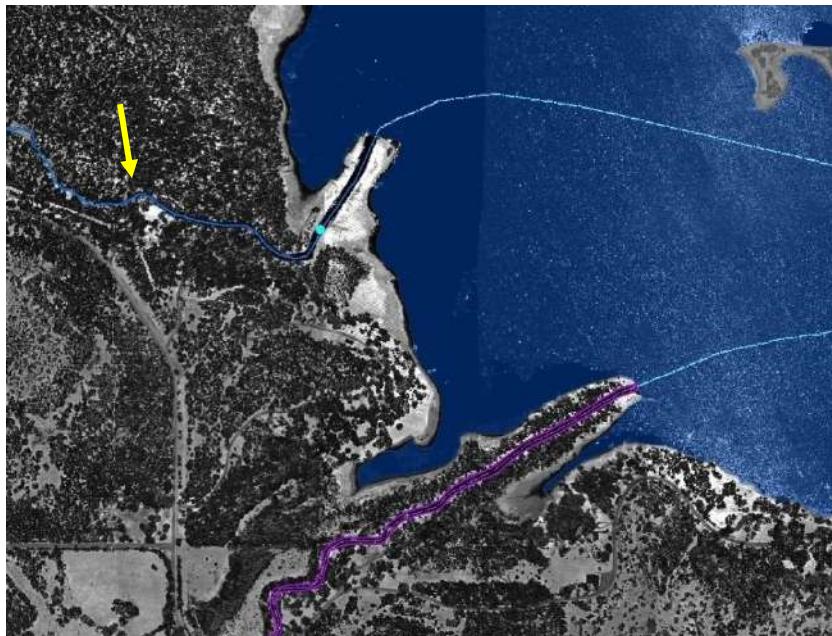


Figure 22 – Stream denoted by yellow arrow should be coded as a dual line instead

Waterbody Island Feature Class

Dewberry placed calls that requested the delineation of water body islands in the previously submitted dataset. In their response, FEDI stated that island feature classes less than one acre did not require collection. However, there are island features greater than 1 acre that were not compiled. Figure 23 shows three islands that are between 1 and 2 acres in size that were not collected.

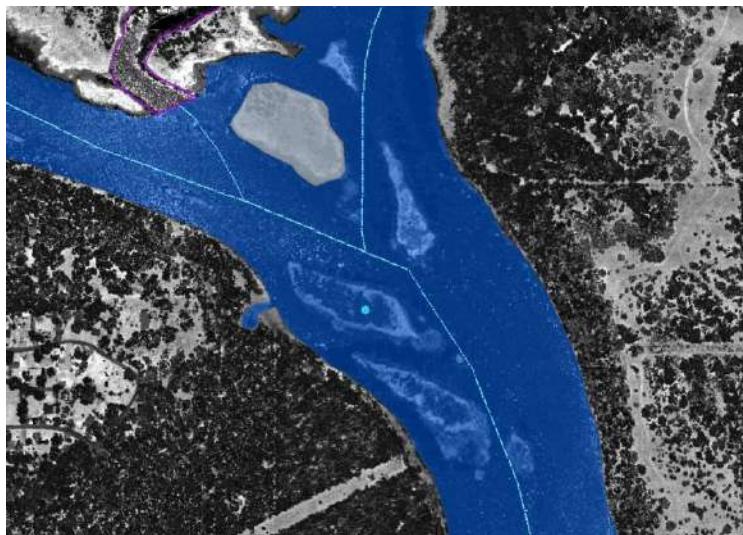


Figure 23 – Tile u329713_1_d; waterbody islands up to 2 acres not collected

Culverts

The purpose of culverts is to connect hydrographic features when they are interrupted by a road. The difficulty in using culverts consistently throughout the dataset is in determining the type of feature underneath which they pass. If the stream is running under a bridge, it should remain a stream. However, if the stream passes under a road as a culvert, then it should be coded as such. It is not always easy to judge if the feature is a road or bridge based on intensity imagery. Therefore, it is possible that one reviewer may interpret the feature as a bridge while the other sees a road. Dewberry took this into account when placing calls that asked for streams to be coded as culverts, and Fugro either made the appropriate changes or provided justifications.

After completing the review of culverts, Dewberry did not identify any major discrepancies that require resolution.

4 Intensity

Dewberry received a complete delivery of LiDAR intensity images. The data were required to meet the following specifications:

- Raster images in GeoTIFF format of 1st-return
- 1-meter pixel size
- 1/4th USGS 7.5-minute quadrangle

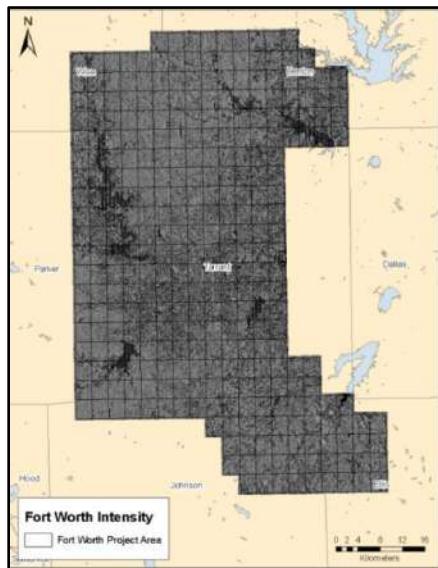


Figure 24 - Complete delivery of Fort Worth Intensity

With the exception of the tile grid, all 322 files were delivered in accordance with the requirements. The intensity are tiled based on the 1/16th USGS 7.5-minute quadrangle. They follow the same tiling scheme as the LAS data; that is, the internal tiles have a 50-meter overlap between tiles and those that line the project boundary have a 300-meter buffer.

Dewberry verified that the pixel values in the areas of overlap are the same. However, Dewberry could not verify that the intensity data are projected. FEDI stated that the projection has been defined using a different set of definitions that ArcGIS cannot read as shown in Figure 25. It appears that the projection may be defined by the number 3721, as opposed to a text format definition. Dewberry recommends that the projection be defined so that it may be validated in ArcGIS.

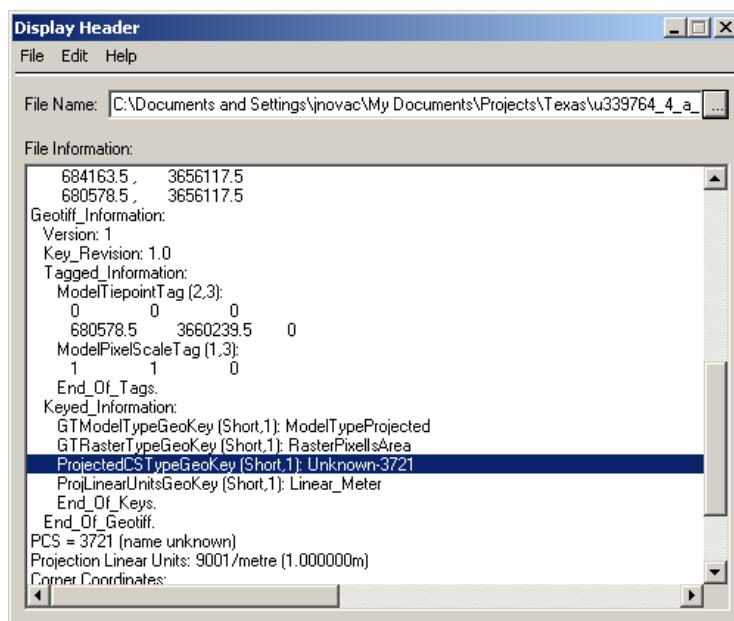


Figure 25 - Intensity header example

5 Hydro-Enforced DEMs

To verify the accuracy and completeness of the hydro-enforced DEMs, Dewberry performed a series of checks on the data, beginning with a visual analysis. This analysis was performed on each DEM, on a tile-by-tile basis in an effort to identify any major anomalies in the data, specifically data voids. Furthermore, each DEM was processed to create a hillshade as a second visual check. Hillshades provide an illuminated view of the ground surface created from a hypothetical light source, which gives analysts an image in which data voids are easier to see during the assessment process.

The DEMs are required to be free of artifacts, gaps, or smoothing at tile boundaries. Upon completion of the visual analysis, Dewberry identified the following discrepancies:

Table 10 – Complete list of errors identified in the hydro-enforced DEMs

DEM Tile	Error Type
u329704_4_b_be	data void
u329704_4_d_be	data void
u329707_4_c_be	data void
u339762_2_b_be	data void
u329633_1_a_be	incomplete tile edge
u329705_3_c_be	incomplete tile edge
u329708_1_b_be	incomplete tile edge
u329712_4_c_be	incomplete tile edge
u329728_2_a_be	incomplete tile edge
u329729_4_b_be	incomplete tile edge
u329732_1_a_be	incomplete tile edge
u339753_4_d_be	incomplete tile edge
u339764_2_c_be	incomplete tile edge

Figure 26 and Figure 27 illustrate the data void identified in tile u329707_4_a. Since the DEMs are composed of LiDAR ground points and hydro-enforced breaklines, a data void of this magnitude would cause suspicion of the quality of the ground points. However, Dewberry verified that the ground points are complete in this particular tile, as illustrated in Figure 28. As a result, Dewberry attributes this error to DEM processing. This is true for all tiles that contain errors, as listed in Table 10. Dewberry verified the integrity of the ground points from the LAS source, and concluded that all errors resulted from the processing steps. Dewberry strongly encourages that these errors be corrected before the data is used.

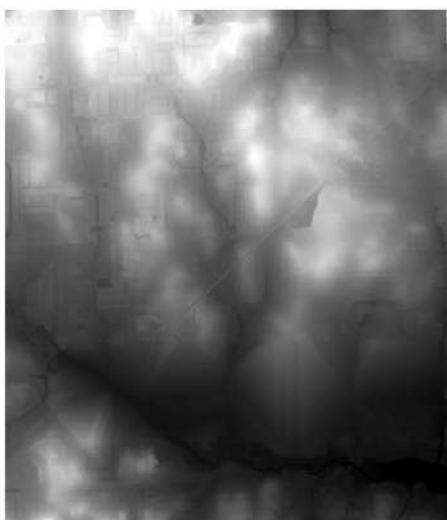


Figure 26 – Tile u329707_4_a; data void in bottom half of DEM

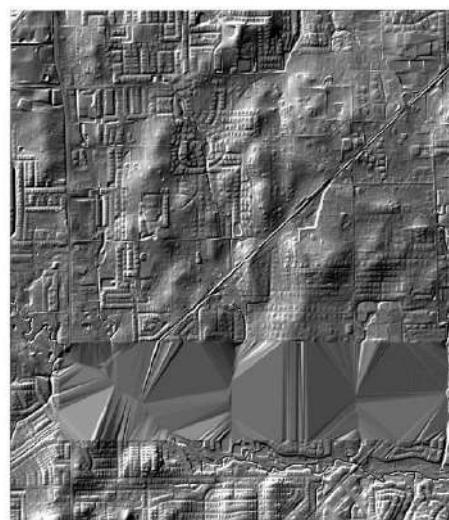


Figure 27 – Data void illustrated by hillshade model

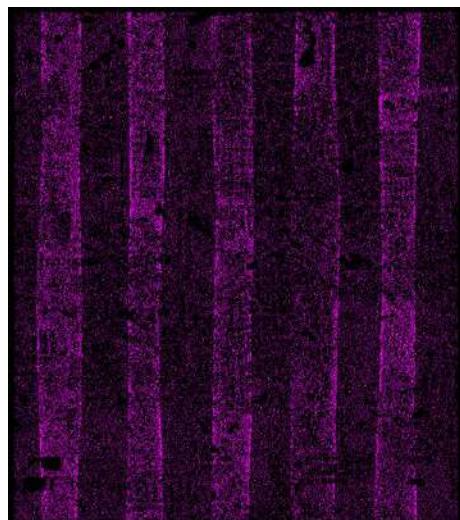


Figure 28 – Ground LiDAR points from source LAS are complete throughout the tile

6 Metadata

Dewberry received tile-based LAS, DEM, and intensity metadata, as well as breakline metadata provided in the geodatabase. Dewberry reviewed the metadata, checking for accuracy and completeness based on Federal Geographic Data Committee (FGDC) requirements.

6.1 LAS Metadata

In the previous delivery, Dewberry received LAS metadata and proposed a set of corrections. Many improvements have been made to the LAS metadata. There are three recommendations remaining:

1. The *Theme* states *intensity image*. This should be removed.
2. *Who created the data and who completed this document* is FEDI, instead of the TWDB.
3. The *Horizontal Coordinate System* does not state the projection: UTM Zone 14N

6.2 Intensity Metadata

This is the first review that Dewberry has performed on the intensity metadata. Below are recommendations to improve the metadata quality:

1. *Who created the data and who completed this document* is FEDI, instead of the TWDB.
2. *Type of data* reads LAS. This is incorrect and it should be Intensity.
3. The *Horizontal Coordinate System* does not state the projection: UTM Zone 14N
4. The *FGDC lineage process steps* should only contain step 3. Steps 1 and 2 are not needed. The source information should reference the LAS ground files.
5. The *Attributes* tab lists LAS 1.1 format. This should be removed.

6.3 DEM Metadata

This is the first review that Dewberry has performed on the DEM metadata. Below are recommendations to improve the metadata quality:

1. *Who created the data and who completed this document* is FEDI, instead of the TWDB.
2. *Type of data* reads LAS. This is incorrect. It is DEM data delivered in ESRI grid format.
3. The *Horizontal Coordinate System* does not state the projection: UTM Zone 14N
4. The *FGDC lineage process steps* 1 and 2 are not needed.
5. The *Vertical positional accuracy* states the LiDAR accuracy, which is different from the accuracy of the DEMs.
6. The *Attributes* tab lists LAS 1.1 format and GeoTiff. This should be removed as it is DEM data in ESRI grid format.

6.4 Breakline Metadata

The breakline metadata was delivered per feature class. Dewberry reviewed each of the eight feature class metadata files for accuracy and completeness. The following issues were identified:

1. The *Theme* specifies *waterbody* for each feature class. This is incorrect for every feature classes with the exception of the waterbody feature class
2. The *FGDC lineage process step 1* defines the criteria for capturing a single line stream as any hydro feature less than 50 feet, when in fact the breakline specification states 40 feet.

7 Optional Deliverables

7.1 ASCII Ground Point List

Dewberry received 322 ASCII text files that list the x, y, and z coordinates of all ground points, class 2. The models follow the 1/16th USGS 7.5-minute quadrangle tiling scheme. To ensure the correct number of ground points in each file, Dewberry compared the count of the ground class from the LAS to the count from the ASCII text files. In each comparison, Dewberry found consistency between the two types of models. Secondly, Dewberry created ground models of all 322 ASCII files as a second check to verify that data is present in each tile. Dewberry then conducted a macro level assessment of the ground models and did not find any major anomalies.

7.2 First-Return Surface Model

Dewberry performed a qualitative analysis on 322 models in ESRI Grid format. The models are to be created from the first-return of the LiDAR pulse, using either a 1-meter or 2-meter cell size, and following the 1/4th USGS 7.5-minute quadrangle tiling scheme. Dewberry used a random sample of LAS data to create 1-meter gridded models using only the first-return LiDAR pulses. Dewberry queried the pixel values to ensure consistency between the deliverable and the sample model created by Dewberry. This process is used to verify that the raster models conform to the specifications. Figure 29 is an example of a first-return model.



Figure 29 - Tile u329705_2_b; an example of first-return model showing NoData areas in bright blue

8 Conclusion

The LiDAR data for Fort Worth, Texas was thoroughly examined by Dewberry for accuracy, completeness, and conformity to project specifications. Because the data meet the vertical accuracy requirements and are free of major anomalies, Dewberry is confident in the quality and integrity of the LiDAR data for general geographic use and for hydrographic modeling.

The hydrographic breaklines are also of good quality with some minor issues. The breaklines pass the completeness and topology requirements; however, there are vertical accuracy errors in the dataset that should be noted. A specific tolerance (twice the RMSE) was utilized as a baseline to allow for small amounts of vertical accuracy error due to compiler error and monotonicity enforcement, but in this dataset some errors are outside this threshold. As previously stated, this is not a definitive check; however it is important for the end user to be aware of minor discrepancies in vertical accuracy.

The hydro-enforced DEMs require corrective actions before the data can be used. This is due to processing errors that resulted in data voids. Secondly, the DEMs do not have a defined projection. This should be corrected. This deliverable did not meet project specifications.

Although FEDI stated that the intensity are projected, Dewberry strongly encourages that the data have their projection defined in such a way that is readable by ArcGIS.

Lastly, Dewberry identified that the metadata for the LAS, intensity, and DEMs are not FGDC compliant, as they lack a defined projection. Additional recommendations have been provided for improvements to the overall metadata quality.

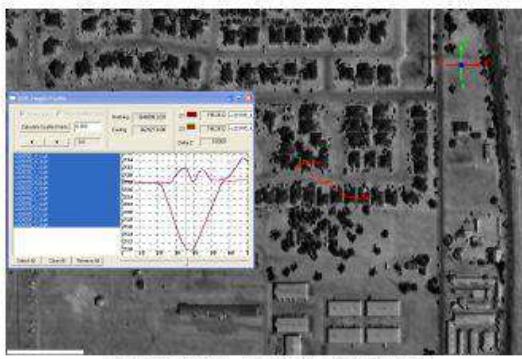
In summary, the following list illustrates the deliverables that meet project specifications:

- ✓ All-Return LAS Point Cloud Data
- ✓ Hydrographic Breaklines
- ✓ Intensity Imagery
- ✓ First-Return Surface Model
- ✓ ASCII Ground Point List
- ✓ Breakline Metadata

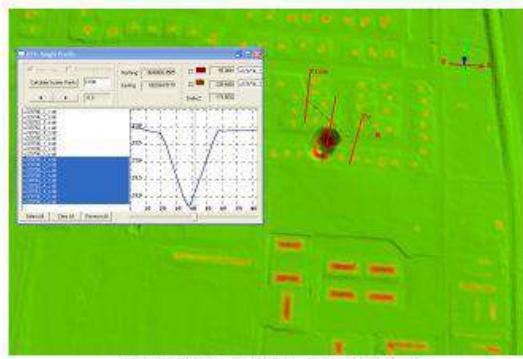
The data that require correction include:

- Hydro-Enforced DEMs
- LAS Metadata
- Intensity Metdata
- DEM Metadata

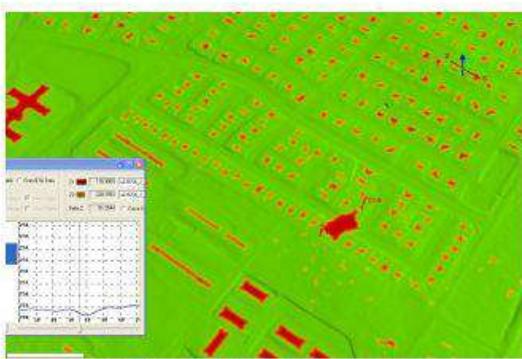
Appendix A



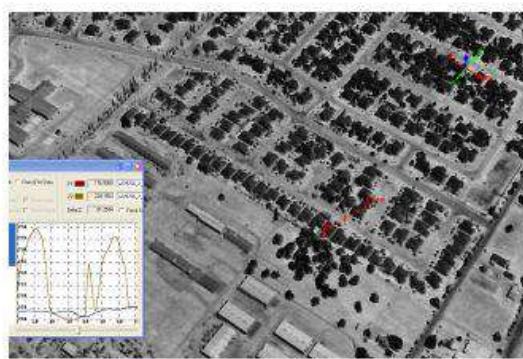
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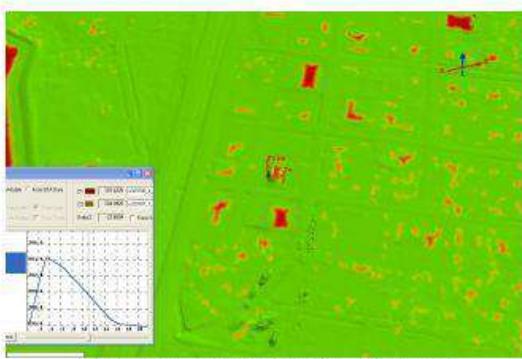
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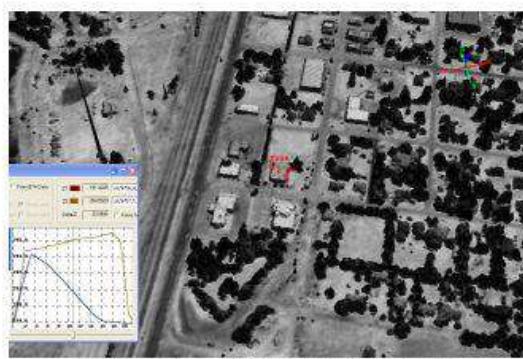
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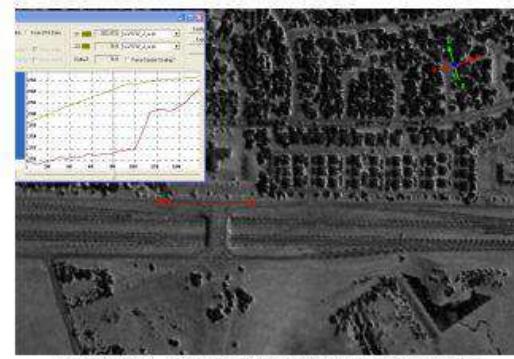
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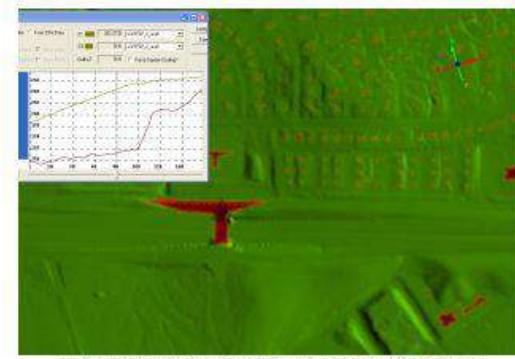
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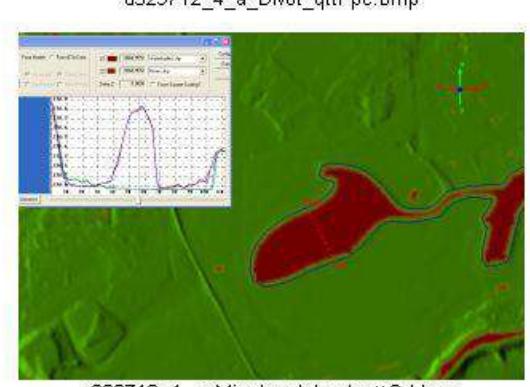
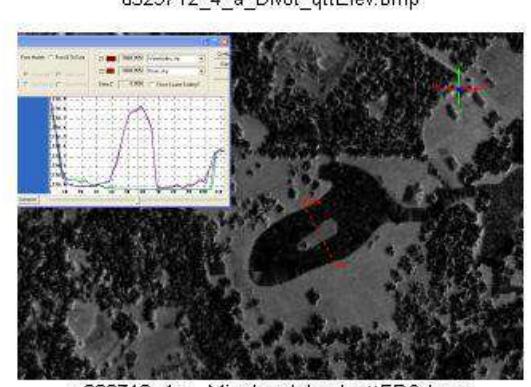
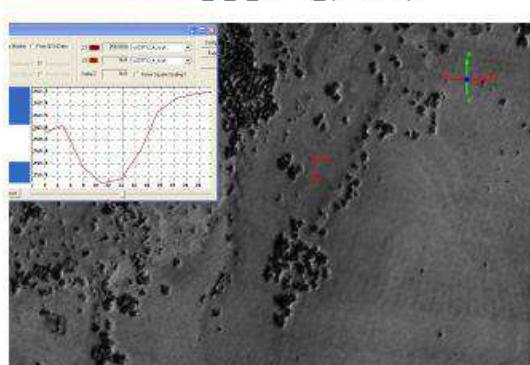
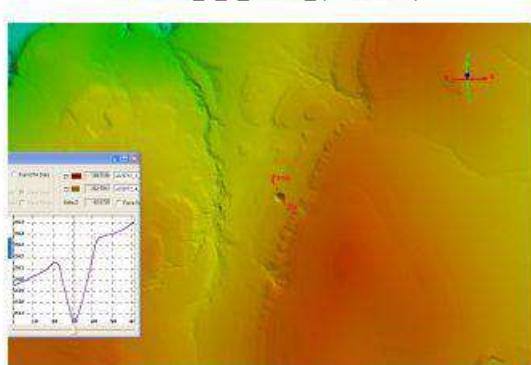
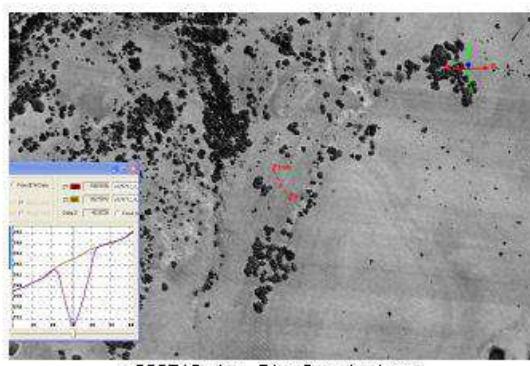
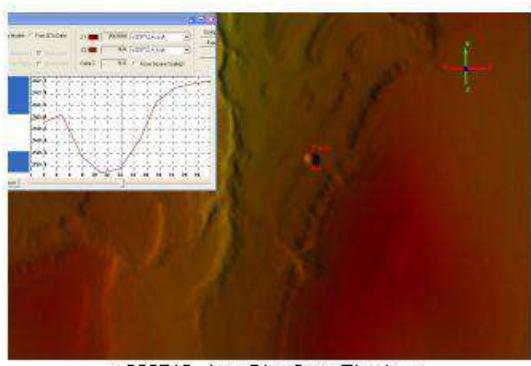
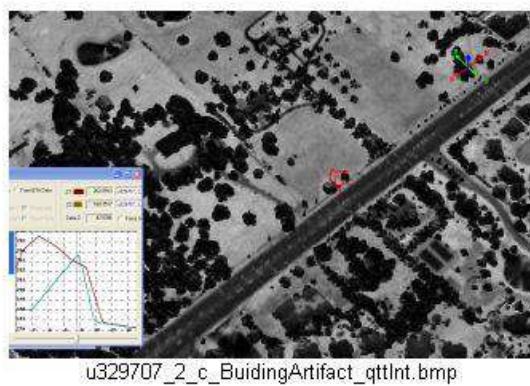
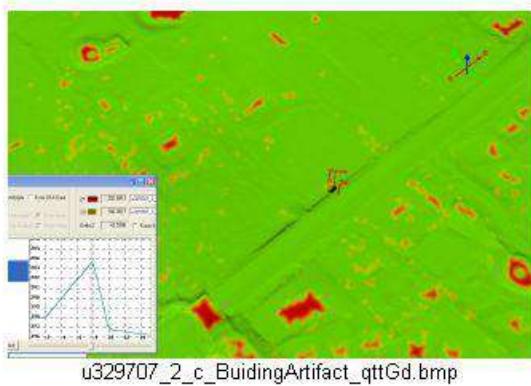
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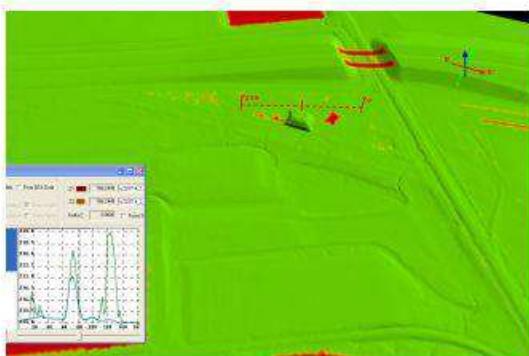


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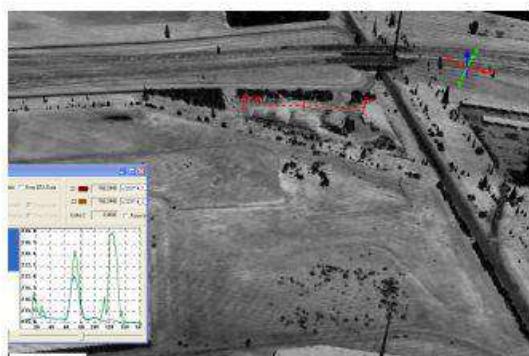


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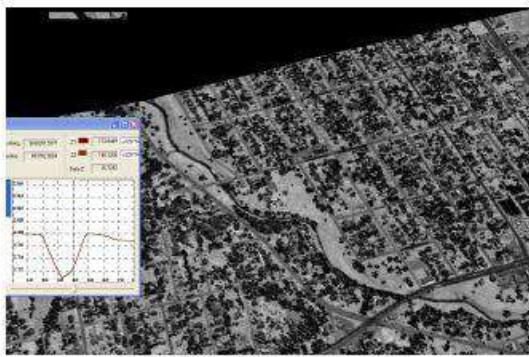




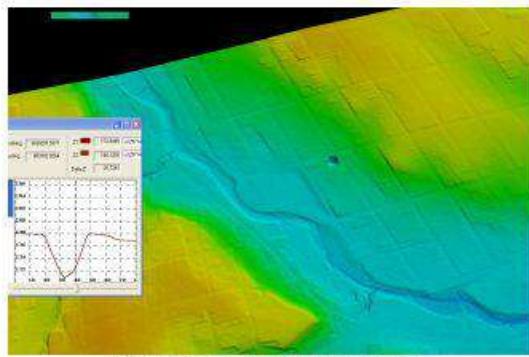
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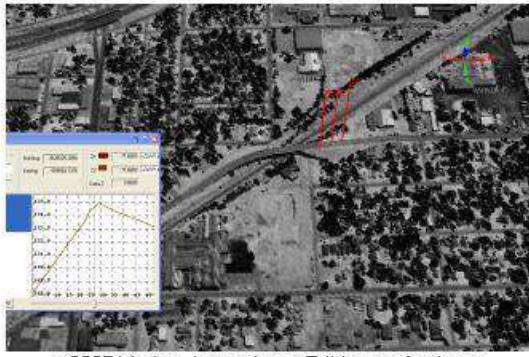
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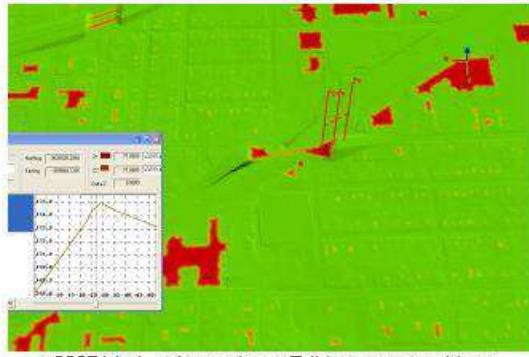
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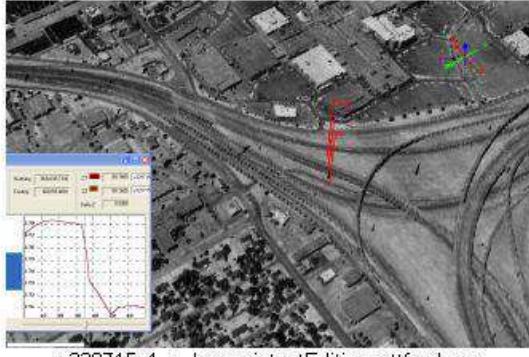
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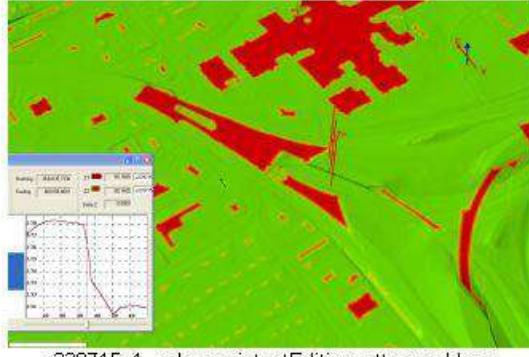
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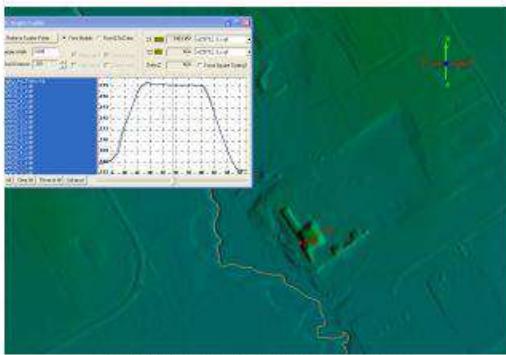
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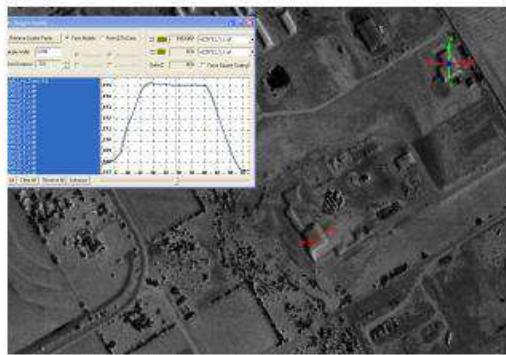
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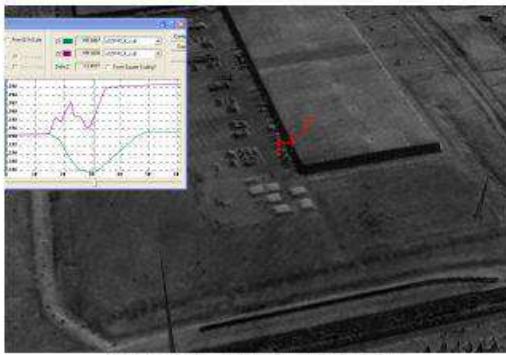
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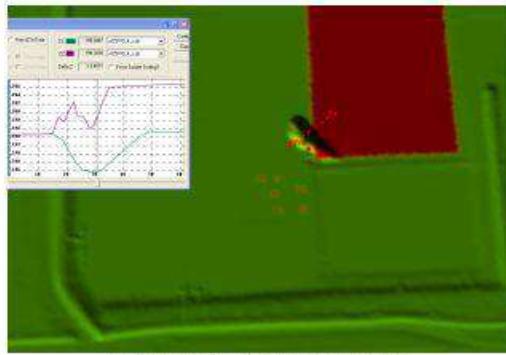
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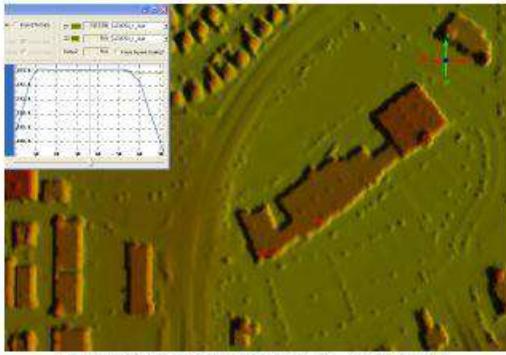
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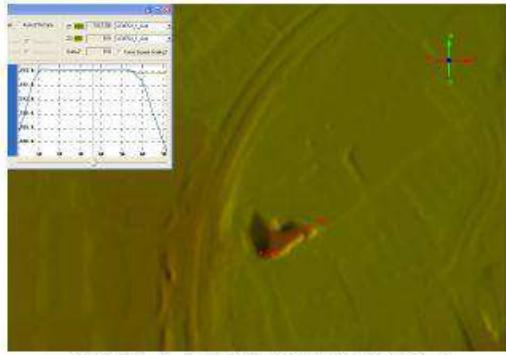
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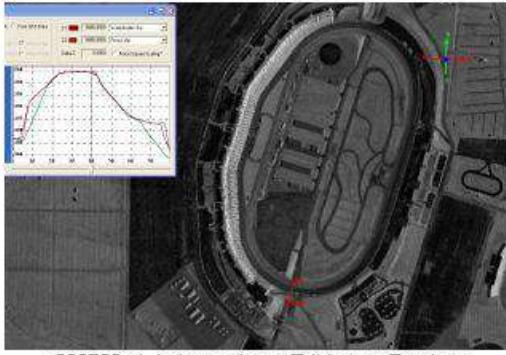
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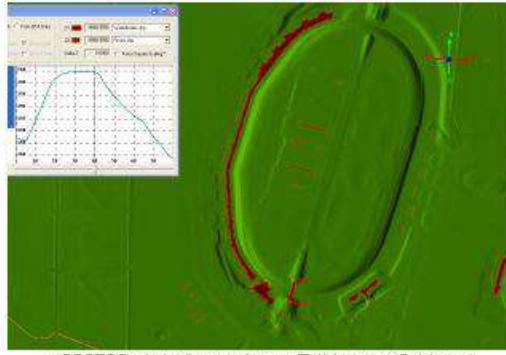
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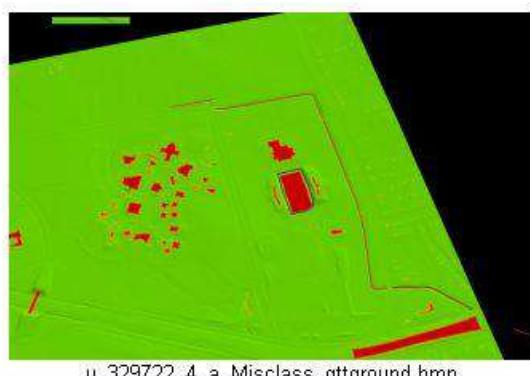
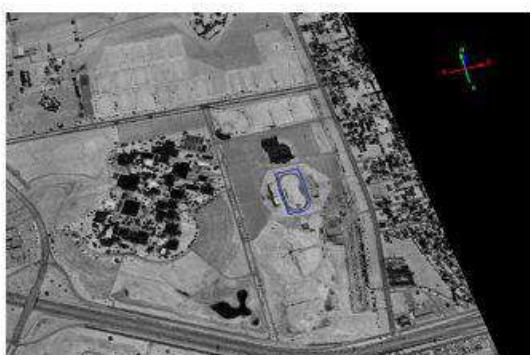
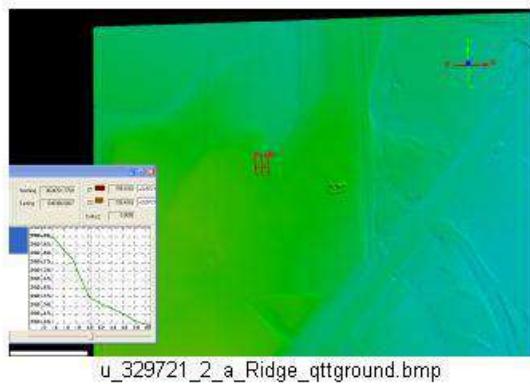
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Appendix F CD-ROM

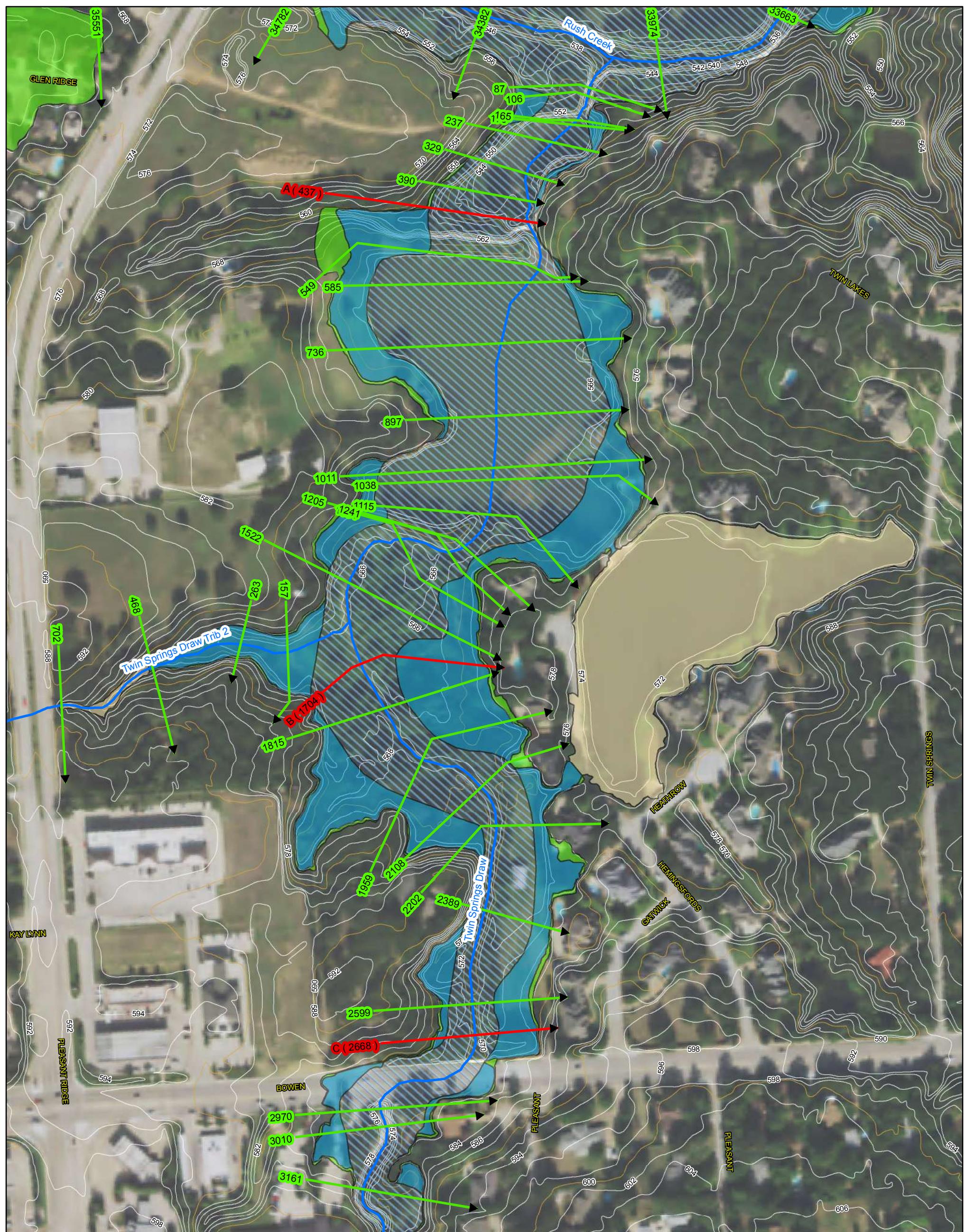
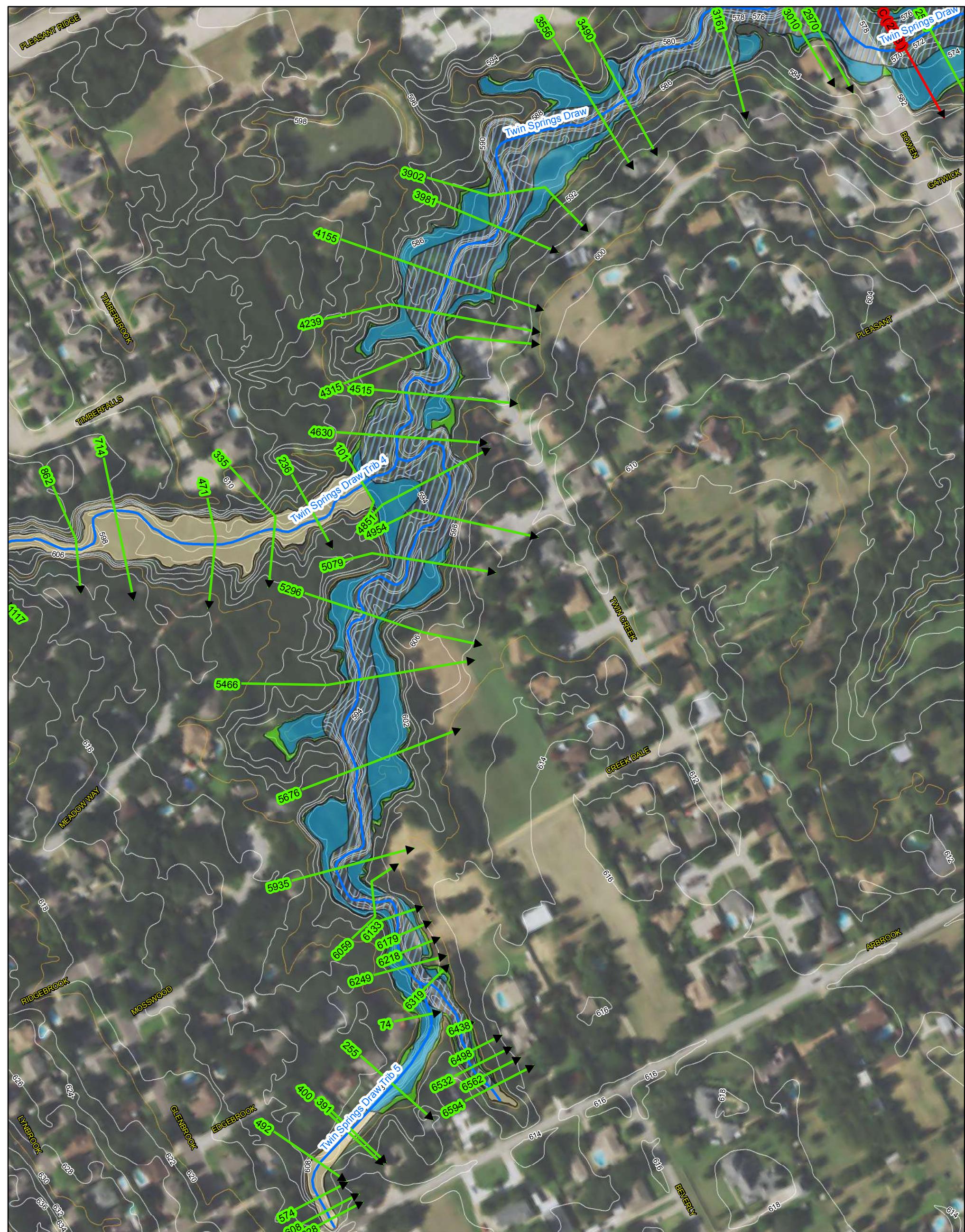
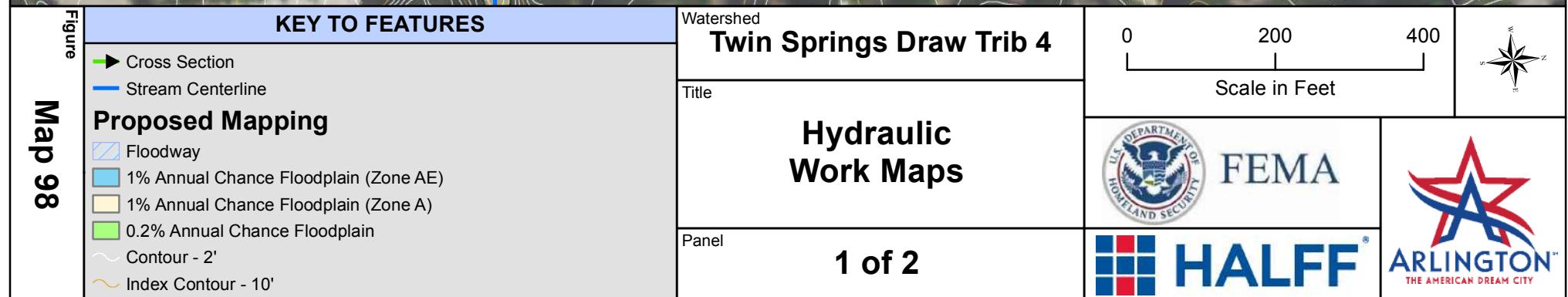
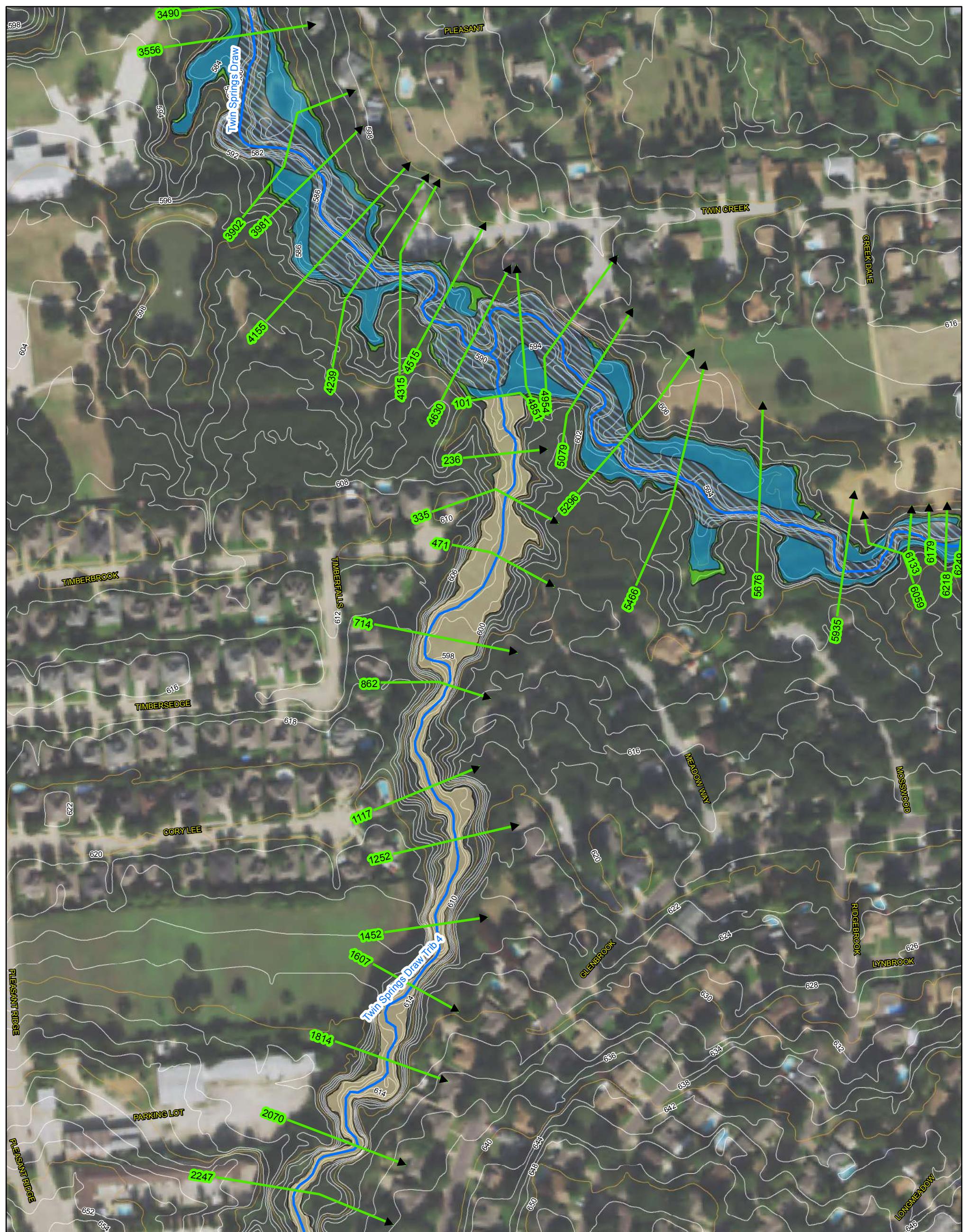


Figure Map 96	KEY TO FEATURES		Watershed Twin Springs Draw	Scale in Feet	North arrow
	Cross Section	Cross Section - Lettered			
	Stream Centerline			0 200 400	
	Proposed Mapping		Title Hydraulic Work Maps		
	Floodway 1% Annual Chance Floodplain (Zone AE) 1% Annual Chance Floodplain (Zone A) 0.2% Annual Chance Floodplain Contour - 2' Index Contour - 10'		FEMA		
			Panel 1 of 2	 HALFF	 ARLINGTON™ THE AMERICAN DREAM CITY

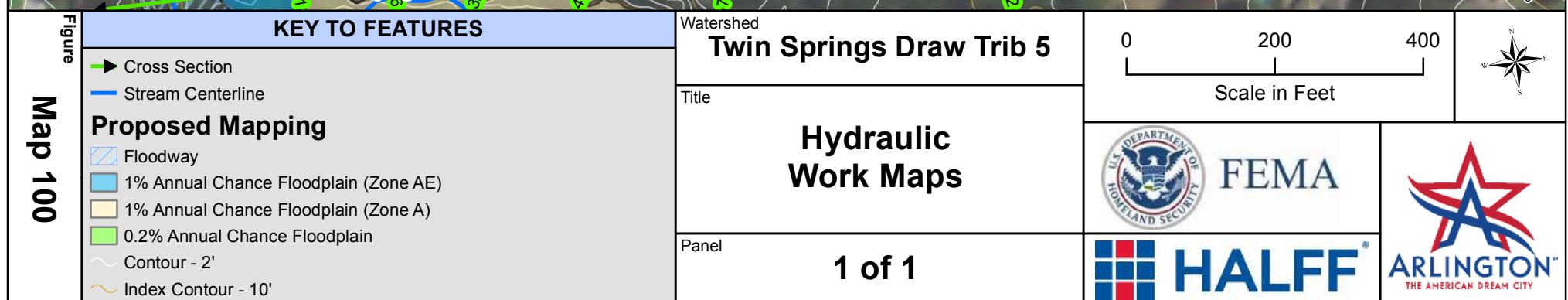
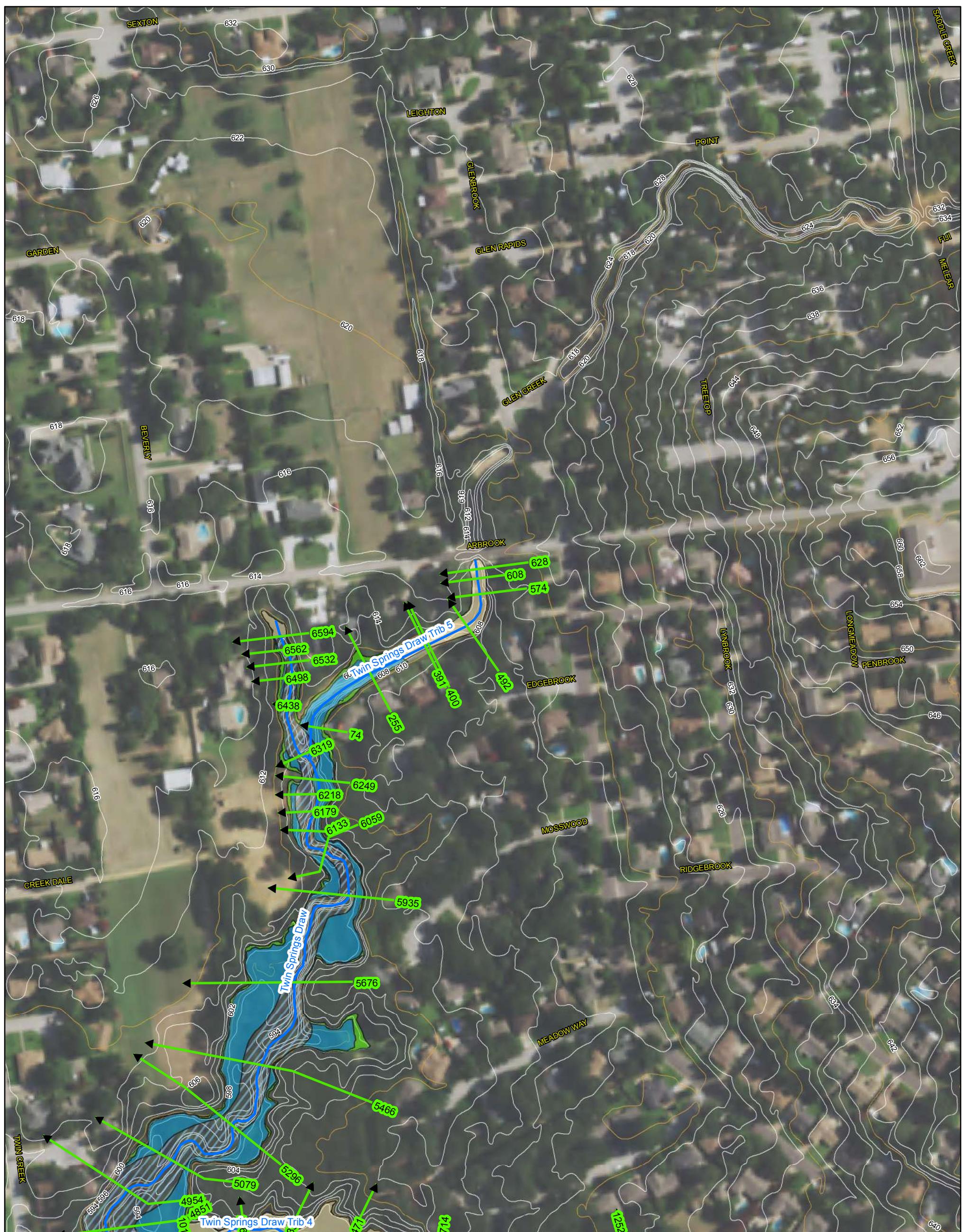


Map 97

Figure Map 97	KEY TO FEATURES	Twin Springs Draw Hydraulic Work Maps	 Scale in Feet	
Watershed Proposed Mapping  Cross Section  Cross Section - Lettered  Stream Centerline Floodway  1% Annual Chance Floodplain (Zone AE)  1% Annual Chance Floodplain (Zone A)  0.2% Annual Chance Floodplain  Contour - 2'  Index Contour - 10'				
Title Panel	 FEMA		 HALFF	
2 of 2	 ARLINGTON <small>THE AMERICAN DREAM CITY</small>			





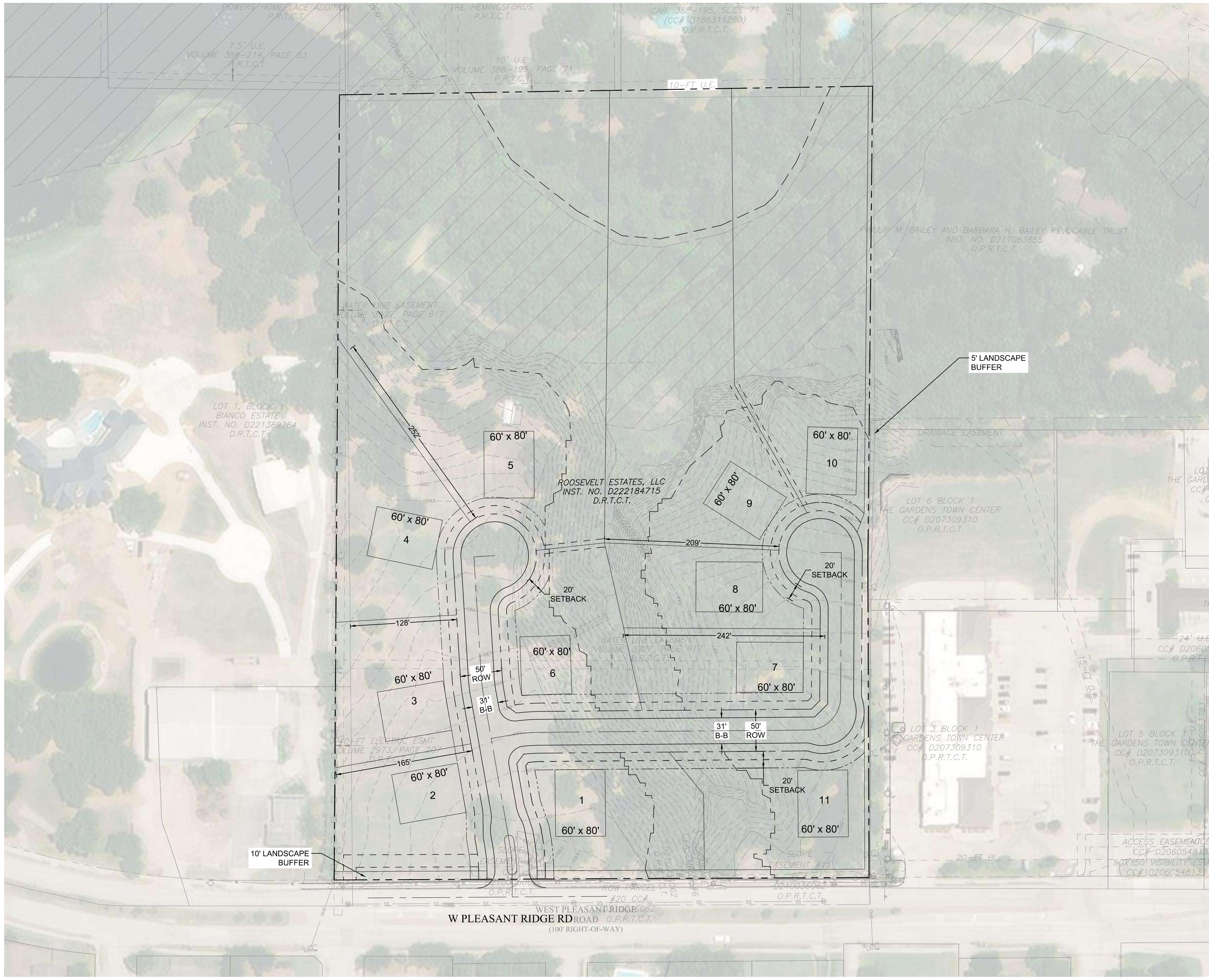




APPENDIX D: PROJECT LAYOUT SHEETS

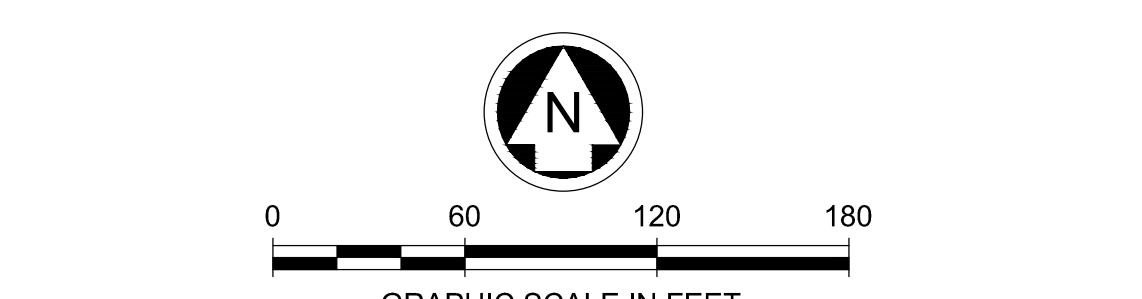
1600 W. 7th Street, Suite 400, Fort Worth, Texas 76102 | 817.810.0696
Shield Engineering Group, PLLC

info@shield-engineering.com | www.SHIELDENGINEERINGGROUP.com
TBPE FIRM #F-11039 | TBPLS FIRM #10193890



LEGEND

	FLOODPLAIN
	OPEN SPACE
	PROJECT LOCATION



CITY OF
DALWORTHINGTON GARDENS, TEXAS

ROOSEVELT ESTATES

LAND PLAN
June 2, 2023

DESIGNED: JGD	SCALE: 1" = 60'	DATE: JUN 2023	SHEET: 1 OF 1
---------------	--------------------	-------------------	------------------



APPENDIX E: DIGITAL DATA

1600 W. 7th Street, Suite 400, Fort Worth, Texas 76102 | 817.810.0696
Shield Engineering Group, PLLC

info@shield-engineering.com | www.SHIELDENGINEERINGGROUP.com
TBPE FIRM #F-11039 | TBPLS FIRM #10193890



APPENDIX F: HEC-RAS OUTPUT

1600 W. 7th Street, Suite 400, Fort Worth, Texas 76102 | 817.810.0696
Shield Engineering Group, PLLC

info@shield-engineering.com | www.SHIELDENGINEERINGGROUP.com
TBPE FIRM #F-11039 | TBPLS FIRM #10193890



TWIN SPRINGS DRAW

(HEC-RAS VERSION 4.1)

1600 W. 7th Street, Suite 400, Fort Worth, Texas 76102 | 817.810.0696
Shield Engineering Group, PLLC

info@shield-engineering.com | www.SHIELDENGINEERINGGROUP.com
TBPE FIRM #F-11039 | TBPLS FIRM #10193890

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
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TWI000A	6562	01JAN2012 2100	10.00	606.81	607.32	607.38	0.017615	1.90	5.26	15.69	0.58	
TWI000A	6562	01JAN2012 2200	10.00	606.81	607.33	607.38	0.017403	1.89	5.28	15.71	0.58	
TWI000A	6562	01JAN2012 2300	10.00	606.81	607.33	607.38	0.017187	1.88	5.31	15.74	0.57	
TWI000A	6562	01JAN2012 2400	10.00	606.81	607.33	607.38	0.016979	1.88	5.33	15.76	0.57	
TWI000A	6532	Max WS	152.46	605.86	608.26	608.53	0.011083	4.14	37.37	27.73	0.59	
TWI000A	6532	31DEC2011 2400	10.00	605.86	607.24	607.25	0.000749	0.70	14.37	17.90	0.14	
TWI000A	6532	01JAN2012 0100	10.00	605.86	607.14	607.15	0.001072	0.79	12.61	16.91	0.16	
TWI000A	6532	01JAN2012 0200	10.00	605.86	607.13	607.14	0.001097	0.80	12.50	16.85	0.16	
TWI000A	6532	01JAN2012 0300	10.00	605.86	607.13	607.14	0.001123	0.81	12.40	16.79	0.17	
TWI000A	6532	01JAN2012 0400	10.00	605.86	607.12	607.13	0.001151	0.81	12.28	16.72	0.17	
TWI000A	6532	01JAN2012 0500	10.00	605.86	607.11	607.12	0.001186	0.82	12.15	16.64	0.17	
TWI000A	6532	01JAN2012 0600	10.00	605.86	607.10	607.11	0.001226	0.83	12.01	16.56	0.17	
TWI000A	6532	01JAN2012 0700	10.00	605.86	607.07	607.08	0.001376	0.87	11.52	16.26	0.18	
TWI000A	6532	01JAN2012 0800	10.00	605.86	607.05	607.07	0.001477	0.89	11.22	16.09	0.19	
TWI000A	6532	01JAN2012 0900	10.00	605.86	607.04	607.05	0.001566	0.91	10.99	15.94	0.19	
TWI000A	6532	01JAN2012 1000	10.00	605.86	607.04	607.05	0.001563	0.91	10.99	15.94	0.19	
TWI000A	6532	01JAN2012 1100	10.00	605.86	607.07	607.08	0.001408	0.88	11.42	16.20	0.18	
TWI000A	6532	01JAN2012 1200	56.98	605.86	607.63	607.73	0.007474	2.58	22.10	21.65	0.45	
TWI000A	6532	01JAN2012 1300	19.30	605.86	607.32	607.35	0.002110	1.21	15.91	18.74	0.23	
TWI000A	6532	01JAN2012 1400	10.00	605.86	607.08	607.09	0.001324	0.86	11.68	16.36	0.18	
TWI000A	6532	01JAN2012 1500	10.00	605.86	607.05	607.07	0.001482	0.89	11.21	16.08	0.19	
TWI000A	6532	01JAN2012 1600	10.00	605.86	607.04	607.05	0.001584	0.91	10.94	15.91	0.19	
TWI000A	6532	01JAN2012 1700	10.00	605.86	607.04	607.05	0.001578	0.91	10.96	15.92	0.19	
TWI000A	6532	01JAN2012 1800	10.00	605.86	607.04	607.06	0.001542	0.90	11.05	15.98	0.19	
TWI000A	6532	01JAN2012 1900	10.00	605.86	607.07	607.08	0.001374	0.87	11.52	16.27	0.18	
TWI000A	6532	01JAN2012 2000	10.00	605.86	607.08	607.09	0.001319	0.86	11.69	16.37	0.18	
TWI000A	6532	01JAN2012 2100	10.00	605.86	607.09	607.10	0.001288	0.85	11.79	16.43	0.18	
TWI000A	6532	01JAN2012 2200	10.00	605.86	607.09	607.11	0.001261	0.84	11.89	16.48	0.17	
TWI000A	6532	01JAN2012 2300	10.00	605.86	607.10	607.11	0.001236	0.84	11.97	16.54	0.17	
TWI000A	6532	01JAN2012 2400	10.00	605.86	607.10	607.12	0.001213	0.83	12.05	16.58	0.17	
TWI000A	6498	Max WS	152.02	605.51	608.08	608.25	0.005177	3.27	52.29	36.18	0.42	
TWI000A	6498	31DEC2011 2400	10.00	605.51	605.97	606.01	0.0083179	3.64	2.75	9.88	1.22	
TWI000A	6498	01JAN2012 0100	10.00	605.51	605.98	606.01	0.0072589	3.47				

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	6498	01JAN2012 0200	10.00	605.51	605.98	606.01	606.17	0.071986	3.46	2.89	10.08	1.14
TWI000A	6498	01JAN2012 0300	10.00	605.51	605.98	606.01	606.17	0.071263	3.45	2.90	10.09	1.13
TWI000A	6498	01JAN2012 0400	10.00	605.51	605.98	606.01	606.17	0.070580	3.43	2.91	10.10	1.13
TWI000A	6498	01JAN2012 0500	10.00	605.51	605.98	606.01	606.17	0.069707	3.42	2.93	10.12	1.12
TWI000A	6498	01JAN2012 0600	10.00	605.51	605.99	606.01	606.17	0.068780	3.40	2.94	10.14	1.11
TWI000A	6498	01JAN2012 0700	10.00	605.51	605.99	606.01	606.16	0.065559	3.34	2.99	10.21	1.09
TWI000A	6498	01JAN2012 0800	10.00	605.51	605.99	606.01	606.16	0.063570	3.31	3.02	10.26	1.07
TWI000A	6498	01JAN2012 0900	10.00	605.51	606.00	606.01	606.16	0.062022	3.28	3.05	10.29	1.06
TWI000A	6498	01JAN2012 1000	10.00	605.51	606.00	606.01	606.16	0.062074	3.28	3.05	10.29	1.06
TWI000A	6498	01JAN2012 1100	10.00	605.51	605.99	606.01	606.16	0.065004	3.33	3.00	10.22	1.08
TWI000A	6498	01JAN2012 1200	56.58	605.51	606.57	606.63	606.98	0.056873	5.16	10.96	17.48	1.15
TWI000A	6498	01JAN2012 1300	19.36	605.51	606.13	606.19	606.41	0.076250	4.27	4.53	11.98	1.22
TWI000A	6498	01JAN2012 1400	10.01	605.51	605.99	606.01	606.17	0.066626	3.36	2.97	10.19	1.10
TWI000A	6498	01JAN2012 1500	10.00	605.51	605.99	606.01	606.16	0.063543	3.31	3.02	10.26	1.07
TWI000A	6498	01JAN2012 1600	10.00	605.51	606.00	606.01	606.16	0.061732	3.27	3.06	10.30	1.06
TWI000A	6498	01JAN2012 1700	10.00	605.51	606.00	606.01	606.16	0.061823	3.27	3.05	10.30	1.06
TWI000A	6498	01JAN2012 1800	10.00	605.51	606.00	606.01	606.16	0.062455	3.29	3.04	10.28	1.06
TWI000A	6498	01JAN2012 1900	10.00	605.51	605.99	606.01	606.16	0.065675	3.35	2.99	10.21	1.09
TWI000A	6498	01JAN2012 2000	10.00	605.51	605.99	606.01	606.17	0.066774	3.37	2.97	10.18	1.10
TWI000A	6498	01JAN2012 2100	10.00	605.51	605.99	606.01	606.17	0.067423	3.38	2.96	10.17	1.10
TWI000A	6498	01JAN2012 2200	10.00	605.51	605.99	606.01	606.17	0.068012	3.39	2.95	10.16	1.11
TWI000A	6498	01JAN2012 2300	10.00	605.51	605.99	606.01	606.17	0.068594	3.40	2.94	10.15	1.11
TWI000A	6498	01JAN2012 2400	10.00	605.51	605.99	606.01	606.17	0.069146	3.41	2.93	10.13	1.12
TWI000A	6438	Max WS	151.98	602.48	607.99		608.05	0.001016	1.82	86.57	36.15	0.19
TWI000A	6438	31DEC2011 2400	10.00	602.48	602.87	603.06	603.52	0.296380	6.46	1.55	5.99	2.24
TWI000A	6438	01JAN2012 0100	10.00	602.48	602.82	603.06	603.82	0.587827	8.02	1.25	5.88	3.07
TWI000A	6438	01JAN2012 0200	10.00	602.48	602.82	603.06	603.84	0.610553	8.11	1.23	5.88	3.12
TWI000A	6438	01JAN2012 0300	10.00	602.48	602.82	603.06	603.86	0.633750	8.21	1.22	5.87	3.18
TWI000A	6438	01JAN2012 0400	10.00	602.48	602.82	603.06	603.89	0.658254	8.31	1.20	5.87	3.23
TWI000A	6438	01JAN2012 0500	10.00	602.48	602.81	603.06	603.92	0.690472	8.43	1.19	5.86	3.30
TWI000A	6438	01JAN2012 0600	10.00	602.48	602.81	603.06	603.95	0.725084	8.56	1.17	5.85	3.38
TWI000A	6438	01JAN2012 0700	10.00	602.48	602.80	603.06	604.06	0.859460	9.03	1.11	5.83	3.65
TWI000A	6438	01JAN2012 0800	10.00	602.48	602.79	603.06	604.14	0.948194	9.31	1.07	5.82	3.82
TWI000A	6438	01JAN2012 0900	10.00	602.48	602.79	603.06	604.20	1.027305	9.54	1.05	5.81	3.96
TWI000A	6438	01JAN2012 1000	10.00	602.48	602.79	603.06	604.20	1.026504	9.54	1.05	5.81	3.96
TWI000A	6438	01JAN2012 1100	10.00	602.48	602.80	603.06	604.09	0.889926	9.12	1.10	5.83	3.71
TWI000A	6438	01JAN2012 1200	54.99	602.48	604.61		604.82	0.009968	3.63	15.14	9.65	0.51
TWI000A	6438	01JAN2012 1300	19.48	602.48	603.27	603.30	603.62	0.054435	4.74	4.11	6.83	1.08
TWI000A	6438	01JAN2012 1400	10.01	602.48	602.80	603.06	604.02	0.811544	8.87	1.13	5.84	3.56
TWI000A	6438	01JAN2012 1500	10.00	602.48	602.79	603.06	604.14	0.952329	9.32	1.07	5.82	3.82
TWI000A	6438	01JAN2012 1600	10.00	602.48	602.79	603.06	604.22	1.042279	9.59	1.04	5.81	3.99
TWI000A	6438	01JAN2012 1700	10.00	602.48	602.79	603.06	604.21	1.038303	9.57	1.04	5.81	3.98
TWI000A	6438	01JAN2012 1800	10.00	602.48	602.79	603.06	604.18	1.004769	9.48	1.06	5.81	3.92
TWI000A	6438	01JAN2012 1900	10.00	602.48	602.80	603.06	604.06	0.858432	9.02	1.11	5.83	3.65
TWI000A	6438	01JAN2012 2000	10.00	602.48	602.80	603.06	604.02	0.808430	8.86	1.13	5.84	3.55
TWI000A	6438	01JAN2012 2100	10.00	602.48	602.80	603.06	604.00	0.781924	8.76	1.14	5.84	3.50
TWI000A	6438	01JAN2012 2200	10.00	602.48	602.81	603.06	603.98	0.757514	8.68	1.15	5.85	3.44
TWI000A	6438	01JAN2012 2300	10.00	602.48	602.81	603.06	603.96	0.735410	8.60	1.16	5.85	3.40
TWI000A	6438	01JAN2012 2400	10.00	602.48	602.81	603.06	603.94	0.714693	8.52	1.17	5.86	3.35
TWI000A	6319	Max WS	151.73	598.58	607.96		607.96	0.000028	0.49	341.45	85.74	0.04
TWI000A	6319	31DEC2011 2400	10.00	598.58	599.01	599.36	600.94	1.043292	11.16	0.90	3.89	4.10
TWI000A	6319	01JAN2012 0100	10.00	598.58	599.08	599.36	600.14	0.453688	8.26	1.21	4.42	2.78
TWI000A	6319	01JAN2012 0200	10.00	598.58	599.09	599.36	600.09	0.420232	8.03	1.25	4.47	2.68
TWI000A	6319	01JAN2012 0300	10.00	598.58	599.10	599.36	600.04	0.386957	7.79	1.28	4.53	2.58
TWI000A	6319	01JAN2012 0400	10.00	598.58	599.11	599.36	599.99	0.350496	7.52	1.33	4.60	2.46
TWI000A	6319	01JAN2012 0500	10.00	598.58	599.12	599.36	599.92	0.309761	7.19	1.39	4.70	2.33
TWI000A	6319	01JAN2012 0600	10.00	598.58	599.14	599.36	599.85	0.263454	6.77	1.48	4.82	2.16
TWI000A	6319	01JAN2012 0700	10.00	598.58	599.22	599.36	599.65	0.133615	5.28	1.89	5.39	1.57
TWI000A	6319	01JAN2012 0800	10.00	598.58	599.29	599.36	599.59	0.082283	4.42	2.26	5.85	1.25
TWI000A	6319	01JAN2012 0900	9.99	598.58	599.39		599.57	0.041078	3.42	2.92	6.59	0.90
TWI000A	6319	01JAN2012 1000	9.97	598.58	599.64		599.71	0.011349	2.08	4.79	8.67	0.49
TWI000A	6319	01JAN2012 1100	9.91	598.58	599.99		600.01	0.002661	1.19	8.35	11.87	0.25
TWI000A	6319	01JAN2012 1200	40.08	598.58	604.10		604.11	0.000045	0.37	108.50	41.17	0.04
TWI000A	6319	01JAN2012 1300	21.25	598.58	601.74		601.75	0.000177	0.55	38.95	22.90	0.07
TWI000A	6319	01JAN2012 1400	10.08	598.58	600.14		600.15	0.001576	0.99	10.20	12.85	0.20
TWI000A	6319	01JAN2012 1500	10.03	598.58	599.80		599.84	0.005705	1.60	6.28	10.14	0.36
TWI000A	6319	01JAN2012 1600	10.02	598.58	599.55		599.64	0.017570	2.47	4.05	7.84	0.61
TWI000A	6319	01JAN2012 1700	10.01	598.58	599.43		599.58	0.033169	3.16	3.17	6.84	0.82
TWI000A	6319	01JAN2012 1800	10.00	598.58	599.36		599.57	0.052162	3.73	2.68	6.32	1.01
TWI000A	6319	01JAN2012 1900	10.00	598.58	599.22		599.66	0.134620	5.30	1.89	5.38	1.58
TWI000A	6319	01JAN2012 2000	10.00	598.58	599.19		599.70	0.167547	5.74	1.74	5.19	1.75
TWI000A	6319	01JAN2012 2100	10.00	598.58	599.17		599.75	0.197986	6.10	1.64	5.05	1.89
TWI000A	6319	01JAN2012 2200	10.00	598.58	599.16		599.79	0.226330	6.41	1.56	4.94	2.01
TWI000A	6319	01JAN2012 2300	10.00	598.58	599.14		599.83	0.252657	6.67	1.50	4.85	2.12
TWI000A	6319	01JAN2012 2400	10.00	598.58	599.13		599.87	0.278052	6.91	1.45	4.78	2.21
TWI000A	6249	Max WS	1760.53	597.08	605.74	604.13	607.43	0.018074	10.66	210.56	66.08	

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	6249	01JAN2012 0500	27.15	597.08	598.17		598.21	0.004269	1.68	16.13	15.89	0.29
TWI000A	6249	01JAN2012 0600	29.31	597.08	598.20		598.25	0.004416	1.75	16.75	15.92	0.30
TWI000A	6249	01JAN2012 0700	39.19	597.08	598.37		598.43	0.005039	2.03	19.32	16.05	0.33
TWI000A	6249	01JAN2012 0800	45.99	597.08	598.48		598.55	0.005261	2.18	21.10	16.13	0.34
TWI000A	6249	01JAN2012 0900	56.16	597.08	598.59		598.69	0.006016	2.44	22.98	16.22	0.36
TWI000A	6249	01JAN2012 1000	75.92	597.08	598.84		598.96	0.006695	2.81	26.97	16.40	0.39
TWI000A	6249	01JAN2012 1100	104.08	597.08	599.17		599.33	0.007155	3.21	32.42	16.65	0.41
TWI000A	6249	01JAN2012 1200	598.46	597.08	602.54		603.19	0.010760	6.44	92.97	19.21	0.52
TWI000A	6249	01JAN2012 1300	263.27	597.08	600.78		601.08	0.007186	4.36	60.33	17.88	0.42
TWI000A	6249	01JAN2012 1400	116.51	597.08	599.32		599.49	0.007124	3.33	34.97	16.77	0.41
TWI000A	6249	01JAN2012 1500	88.02	597.08	598.99		599.13	0.006790	2.98	29.56	16.52	0.39
TWI000A	6249	01JAN2012 1600	69.00	597.08	598.75		598.86	0.006540	2.70	25.54	16.34	0.38
TWI000A	6249	01JAN2012 1700	59.29	597.08	598.63		598.73	0.006188	2.51	23.58	16.25	0.37
TWI000A	6249	01JAN2012 1800	52.68	597.08	598.55		598.64	0.005784	2.36	22.34	16.19	0.35
TWI000A	6249	01JAN2012 1900	39.09	597.08	598.36		598.43	0.005030	2.03	19.30	16.04	0.33
TWI000A	6249	01JAN2012 2000	35.96	597.08	598.31		598.37	0.004871	1.94	18.49	16.01	0.32
TWI000A	6249	01JAN2012 2100	33.53	597.08	598.27		598.33	0.004723	1.88	17.86	15.98	0.31
TWI000A	6249	01JAN2012 2200	31.57	597.08	598.24		598.29	0.004585	1.82	17.35	15.95	0.31
TWI000A	6249	01JAN2012 2300	29.94	597.08	598.22		598.26	0.004463	1.77	16.92	15.93	0.30
TWI000A	6249	01JAN2012 2400	28.57	597.08	598.19		598.24	0.004362	1.73	16.55	15.91	0.30
TWI000A	6218	Max WS	1759.68	597.00	606.05		606.59	0.004965	6.03	359.51	90.92	0.43
TWI000A	6218	31DEC2011 2400	10.00	597.00	597.56		597.60	0.012780	1.59	6.27	16.40	0.45
TWI000A	6218	01JAN2012 0100	22.06	597.00	597.72		597.81	0.019616	2.45	9.01	17.01	0.59
TWI000A	6218	01JAN2012 0200	23.08	597.00	597.73		597.83	0.019997	2.50	9.21	17.05	0.60
TWI000A	6218	01JAN2012 0300	24.17	597.00	597.75		597.85	0.020246	2.56	9.45	17.11	0.61
TWI000A	6218	01JAN2012 0400	25.50	597.00	597.77		597.87	0.020312	2.61	9.77	17.17	0.61
TWI000A	6218	01JAN2012 0500	27.14	597.00	597.79		597.90	0.020250	2.67	10.17	17.26	0.61
TWI000A	6218	01JAN2012 0600	29.30	597.00	597.82		597.94	0.019923	2.73	10.74	17.38	0.61
TWI000A	6218	01JAN2012 0700	39.18	597.00	597.99		598.12	0.016604	2.86	13.71	18.01	0.58
TWI000A	6218	01JAN2012 0800	45.98	597.00	598.11		598.24	0.014389	2.89	15.93	18.46	0.55
TWI000A	6218	01JAN2012 0900	56.14	597.00	598.24		598.38	0.014090	3.07	18.27	18.93	0.55
TWI000A	6218	01JAN2012 1000	75.86	597.00	598.53		598.68	0.011388	3.17	23.91	20.00	0.51
TWI000A	6218	01JAN2012 1100	104.00	597.00	598.91		599.08	0.009102	3.27	31.85	21.43	0.47
TWI000A	6218	01JAN2012 1200	594.47	597.00	602.63		602.92	0.004635	4.33	137.38	35.27	0.39
TWI000A	6218	01JAN2012 1300	264.08	597.00	600.70		600.89	0.004723	3.46	76.23	28.09	0.37
TWI000A	6218	01JAN2012 1400	116.57	597.00	599.09		599.25	0.008116	3.26	35.77	22.10	0.45
TWI000A	6218	01JAN2012 1500	88.06	597.00	598.71		598.87	0.009966	3.19	27.62	20.68	0.49
TWI000A	6218	01JAN2012 1600	69.03	597.00	598.43		598.58	0.012199	3.14	21.95	19.64	0.52
TWI000A	6218	01JAN2012 1700	59.31	597.00	598.28		598.43	0.013641	3.10	19.15	19.10	0.55
TWI000A	6218	01JAN2012 1800	52.70	597.00	598.19		598.34	0.014282	3.02	17.45	18.77	0.55
TWI000A	6218	01JAN2012 1900	39.10	597.00	597.99		598.12	0.016565	2.85	13.71	18.01	0.58
TWI000A	6218	01JAN2012 2000	35.96	597.00	597.93		598.06	0.017836	2.84	12.68	17.79	0.59
TWI000A	6218	01JAN2012 2100	33.54	597.00	597.89		598.01	0.018740	2.81	11.94	17.64	0.60
TWI000A	6218	01JAN2012 2200	31.57	597.00	597.86		597.98	0.019377	2.78	11.36	17.52	0.61
TWI000A	6218	01JAN2012 2300	29.94	597.00	597.83		597.95	0.019801	2.75	10.91	17.42	0.61
TWI000A	6218	01JAN2012 2400	28.58	597.00	597.81		597.92	0.020072	2.71	10.54	17.34	0.61
TWI000A	6179	Max WS	1759.58	596.45	605.86		606.39	0.004426	5.91	317.56	61.43	0.41
TWI000A	6179	31DEC2011 2400	10.00	596.45	596.80		596.91	0.054201	2.65	3.78	13.72	0.89
TWI000A	6179	01JAN2012 0100	22.06	596.45	597.11		597.22	0.021671	2.65	8.33	15.06	0.63
TWI000A	6179	01JAN2012 0200	23.07	596.45	597.14		597.25	0.020768	2.65	8.69	15.16	0.62
TWI000A	6179	01JAN2012 0300	24.17	596.45	597.16		597.27	0.019864	2.66	9.09	15.27	0.61
TWI000A	6179	01JAN2012 0400	25.49	596.45	597.19		597.30	0.019026	2.67	9.54	15.40	0.60
TWI000A	6179	01JAN2012 0500	27.14	596.45	597.23		597.34	0.017961	2.68	10.12	15.56	0.59
TWI000A	6179	01JAN2012 0600	29.29	596.45	597.28		597.39	0.016639	2.69	10.91	15.77	0.57
TWI000A	6179	01JAN2012 0700	39.16	596.45	597.52		597.63	0.011642	2.64	14.85	16.80	0.49
TWI000A	6179	01JAN2012 0800	45.95	596.45	597.68		597.79	0.009709	2.62	17.55	17.47	0.46
TWI000A	6179	01JAN2012 0900	56.10	596.45	597.87		597.98	0.008554	2.68	20.95	18.28	0.44
TWI000A	6179	01JAN2012 1000	75.78	596.45	598.24		598.35	0.006685	2.71	27.99	19.85	0.40
TWI000A	6179	01JAN2012 1100	103.87	596.45	598.69		598.81	0.005494	2.79	37.28	21.75	0.37
TWI000A	6179	01JAN2012 1200	587.94	596.45	602.54		602.77	0.003516	3.86	152.42	38.10	0.34
TWI000A	6179	01JAN2012 1300	265.37	596.45	600.59		600.74	0.003399	3.07	86.32	29.83	0.32
TWI000A	6179	01JAN2012 1400	116.66	596.45	598.89		599.01	0.004998	2.79	41.81	22.61	0.36
TWI000A	6179	01JAN2012 1500	88.11	596.45	598.45		598.57	0.005980	2.73	32.28	20.74	0.39
TWI000A	6179	01JAN2012 1600	69.07	596.45	598.13		598.24	0.007066	2.68	25.76	19.36	0.41
TWI000A	6179	01JAN2012 1700	59.33	596.45	597.94		598.05	0.008069	2.67	22.20	18.57	0.43
TWI000A	6179	01JAN2012 1800	52.71	596.45	597.81		597.92	0.008839	2.65	19.87	18.02	0.45
TWI000A	6179	01JAN2012 1900	39.12	596.45	597.53		597.63	0.011514	2.63	14.89	16.81	0.49
TWI000A	6179	01JAN2012 2000	35.97	596.45	597.45		597.56	0.012813	2.65	13.60	16.48	0.51
TWI000A	6179	01JAN2012 2100	33.55	596.45	597.39		597.50	0.014019	2.66	12.61	16.22	0.53
TWI000A	6179	01JAN2012 2200	31.58	596.45	597.34		597.45	0.015139	2.67	11.81	16.01	0.55
TWI000A	6179	01JAN2012 2300	29.95	596.45	597.30		597.41	0.016113	2.68	11.18	15.84	0.56
TWI000A	6179	01JAN2012 2400	28.58	596.45	597.27		597.38	0.016961	2.68	10.67	15.71	0.57
TWI000A	6133	Max WS	1758.85	595.31	605.47		606.21	0.004881	7.04	295.54	57.44	0.44
TWI000A	6133	31DEC2011 2400	10.01	595.31	596.18		596.20	0.002758	1.09	9.17	13.12	0.23
TWI000A	6133	01JAN2012 0100	22.04	595.31	596.75		596.78	0.001986	1.28	17.22	14.91	0.21
TWI000A	6133	01JAN2012 0200	23.07	595.31	596.79		596.82	0.001949	1.29	17.86	15.05	0.21
TWI000A	6133	01JAN2012 0300	24.16	595.31	596.84		596.86	0.001921	1.30	18.52	15.18	0.21
TWI000A	6133	01JAN2012 0400	25.48	595.31	596.88		596.91	0.001925	1.33	19.19	15.32	0.

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	6133	01JAN2012 0800	45.90	595.31	597.48		597.52	0.001900	1.59	28.87	17.17	0.22
TWI000A	6133	01JAN2012 0900	56.04	595.31	597.70		597.75	0.001961	1.71	32.80	17.87	0.22
TWI000A	6133	01JAN2012 1000	75.67	595.31	598.10		598.15	0.002017	1.89	40.11	19.10	0.23
TWI000A	6133	01JAN2012 1100	103.71	595.31	598.56		598.63	0.002110	2.10	49.37	20.56	0.24
TWI000A	6133	01JAN2012 1200	579.70	595.31	602.38		602.62	0.002811	3.87	152.19	35.72	0.31
TWI000A	6133	01JAN2012 1300	266.93	595.31	600.48		600.60	0.002322	2.83	94.43	26.52	0.26
TWI000A	6133	01JAN2012 1400	116.77	595.31	598.77		598.85	0.002110	2.17	53.74	21.21	0.24
TWI000A	6133	01JAN2012 1500	88.19	595.31	598.32		598.38	0.002049	1.98	44.45	19.80	0.23
TWI000A	6133	01JAN2012 1600	69.13	595.31	597.98		598.03	0.001979	1.82	37.89	18.74	0.23
TWI000A	6133	01JAN2012 1700	59.37	595.31	597.78		597.83	0.001957	1.74	34.18	18.11	0.22
TWI000A	6133	01JAN2012 1800	52.74	595.31	597.64		597.68	0.001929	1.67	31.62	17.67	0.22
TWI000A	6133	01JAN2012 1900	39.14	595.31	597.30		597.34	0.001897	1.51	25.86	16.62	0.21
TWI000A	6133	01JAN2012 2000	35.99	595.31	597.21		597.24	0.001903	1.48	24.38	16.34	0.21
TWI000A	6133	01JAN2012 2100	33.56	595.31	597.14		597.17	0.001909	1.45	23.22	16.12	0.21
TWI000A	6133	01JAN2012 2200	31.59	595.31	597.08		597.11	0.001917	1.42	22.24	15.93	0.21
TWI000A	6133	01JAN2012 2300	29.96	595.31	597.03		597.06	0.001921	1.40	21.44	15.77	0.21
TWI000A	6133	01JAN2012 2400	28.59	595.31	596.98		597.01	0.001922	1.38	20.76	15.63	0.21
TWI000A	6059	Max WS	1758.08	594.03	604.92		605.81	0.006873	7.72	269.50	56.43	0.49
TWI000A	6059	31DEC2011 2400	10.04	594.03	596.10		596.10	0.000277	0.55	18.39	12.41	0.08
TWI000A	6059	01JAN2012 0100	22.02	594.03	596.68		596.69	0.000500	0.85	26.04	13.98	0.11
TWI000A	6059	01JAN2012 0200	23.05	594.03	596.72		596.73	0.000514	0.86	26.66	14.10	0.11
TWI000A	6059	01JAN2012 0300	24.15	594.03	596.77		596.78	0.000529	0.89	27.28	14.22	0.11
TWI000A	6059	01JAN2012 0400	25.47	594.03	596.81		596.82	0.000553	0.91	27.88	14.33	0.12
TWI000A	6059	01JAN2012 0500	27.11	594.03	596.86		596.87	0.000582	0.95	28.63	14.47	0.12
TWI000A	6059	01JAN2012 0600	29.25	594.03	596.93		596.94	0.000618	0.99	29.58	14.65	0.12
TWI000A	6059	01JAN2012 0700	39.08	594.03	597.21		597.23	0.000758	1.15	33.89	15.42	0.14
TWI000A	6059	01JAN2012 0800	45.83	594.03	597.39		597.42	0.000834	1.25	36.73	15.91	0.14
TWI000A	6059	01JAN2012 0900	55.94	594.03	597.61		597.64	0.000967	1.39	40.24	16.50	0.16
TWI000A	6059	01JAN2012 1000	75.49	594.03	598.00		598.04	0.001164	1.61	46.81	17.54	0.17
TWI000A	6059	01JAN2012 1100	103.47	594.03	598.45		598.50	0.001407	1.88	55.01	18.76	0.19
TWI000A	6059	01JAN2012 1200	567.71	594.03	602.15		602.40	0.003014	3.99	145.80	34.12	0.31
TWI000A	6059	01JAN2012 1300	269.06	594.03	600.31		600.44	0.002189	2.84	94.71	23.81	0.25
TWI000A	6059	01JAN2012 1400	116.93	594.03	598.65		598.72	0.001490	1.98	58.93	19.32	0.20
TWI000A	6059	01JAN2012 1500	88.30	594.03	598.21		598.26	0.001281	1.74	50.68	18.13	0.18
TWI000A	6059	01JAN2012 1600	69.22	594.03	597.88		597.92	0.001102	1.54	44.81	17.23	0.17
TWI000A	6059	01JAN2012 1700	59.43	594.03	597.69		597.72	0.001003	1.43	41.49	16.70	0.16
TWI000A	6059	01JAN2012 1800	52.78	594.03	597.55		597.58	0.000925	1.35	39.21	16.33	0.15
TWI000A	6059	01JAN2012 1900	39.18	594.03	597.22		597.24	0.000756	1.15	33.97	15.44	0.14
TWI000A	6059	01JAN2012 2000	36.01	594.03	597.13		597.15	0.000716	1.10	32.61	15.20	0.13
TWI000A	6059	01JAN2012 2100	33.58	594.03	597.06		597.08	0.000681	1.06	31.56	15.01	0.13
TWI000A	6059	01JAN2012 2200	31.60	594.03	597.00		597.02	0.000653	1.03	30.67	14.85	0.13
TWI000A	6059	01JAN2012 2300	29.97	594.03	596.95		596.97	0.000628	1.00	29.94	14.71	0.12
TWI000A	6059	01JAN2012 2400	28.60	594.03	596.91		596.92	0.000606	0.98	29.32	14.60	0.12
TWI000A	5935	Max WS	1758.16	594.37	604.04		604.82	0.009381	7.47	290.63	95.85	0.57
TWI000A	5935	31DEC2011 2400	10.11	594.37	595.79		595.82	0.004541	1.53	6.60	7.99	0.30
TWI000A	5935	01JAN2012 0100	21.99	594.37	596.30		596.36	0.004970	1.96	11.25	9.99	0.32
TWI000A	5935	01JAN2012 0200	23.04	594.37	596.34		596.40	0.005010	1.99	11.60	10.12	0.33
TWI000A	5935	01JAN2012 0300	24.13	594.37	596.38		596.44	0.005062	2.02	11.96	10.26	0.33
TWI000A	5935	01JAN2012 0400	25.45	594.37	596.41		596.48	0.005191	2.07	12.32	10.39	0.33
TWI000A	5935	01JAN2012 0500	27.08	594.37	596.45		596.52	0.005336	2.12	12.77	10.56	0.34
TWI000A	5935	01JAN2012 0600	29.21	594.37	596.51		596.58	0.005510	2.19	13.34	10.77	0.35
TWI000A	5935	01JAN2012 0700	39.01	594.37	596.73		596.83	0.006135	2.46	15.87	11.64	0.37
TWI000A	5935	01JAN2012 0800	45.74	594.37	596.87		596.97	0.006460	2.62	17.48	12.10	0.38
TWI000A	5935	01JAN2012 0900	55.82	594.37	597.04		597.17	0.006948	2.84	19.66	12.67	0.40
TWI000A	5935	01JAN2012 1000	75.27	594.37	597.36		597.51	0.007457	3.16	23.79	13.66	0.42
TWI000A	5935	01JAN2012 1100	103.13	594.37	597.77		597.96	0.007621	3.47	29.69	14.96	0.43
TWI000A	5935	01JAN2012 1200	551.10	594.37	601.11		601.61	0.009652	5.67	97.12	27.57	0.53
TWI000A	5935	01JAN2012 1300	272.09	594.37	599.54		599.85	0.007464	4.47	60.88	20.24	0.45
TWI000A	5935	01JAN2012 1400	117.17	594.37	597.98		598.17	0.007449	3.57	32.86	15.61	0.43
TWI000A	5935	01JAN2012 1500	88.46	594.37	597.56		597.73	0.007597	3.33	26.57	14.29	0.43
TWI000A	5935	01JAN2012 1600	69.34	594.37	597.27		597.41	0.007337	3.08	22.55	13.37	0.42
TWI000A	5935	01JAN2012 1700	59.51	594.37	597.11		597.24	0.007053	2.91	20.48	12.87	0.41
TWI000A	5935	01JAN2012 1800	52.84	594.37	597.00		597.11	0.006797	2.77	19.05	12.52	0.40
TWI000A	5935	01JAN2012 1900	39.23	594.37	596.74		596.83	0.006155	2.46	15.92	11.65	0.37
TWI000A	5935	01JAN2012 2000	36.05	594.37	596.67		596.76	0.005913	2.37	15.18	11.41	0.36
TWI000A	5935	01JAN2012 2100	33.61	594.37	596.62		596.70	0.005709	2.30	14.60	11.21	0.36
TWI000A	5935	01JAN2012 2200	31.63	594.37	596.57		596.65	0.005624	2.25	14.04	11.01	0.35
TWI000A	5935	01JAN2012 2300	29.99	594.37	596.53		596.60	0.005532	2.21	13.58	10.85	0.35
TWI000A	5935	01JAN2012 2400	28.62	594.37	596.49		596.57	0.005438	2.17	13.20	10.72	0.34
TWI000A	5676	Max WS	1885.86	592.61	602.50		602.96	0.004499	6.11	507.99	111.14	0.42
TWI000A	5676	31DEC2011 2400	10.55	592.61	595.24		595.24	0.000122	0.40	26.34	15.87	0.05
TWI000A	5676	01JAN2012 0100	22.76	592.61	595.68		595.69	0.000287	0.67	33.73	17.60	0.09
TWI000A	5676	01JAN2012 0200	23.90	592.61	595.70		595.71	0.000307	0.70	34.12	17.68	0.09
TWI000A	5676	01JAN2012 0300	25.07	592.61	595.72		595.73	0.000328	0.73	34.50	17.77	0.09
TWI000A	5676	01JAN2012 0400	26.47	592.61	595.75		595.76	0.000353	0.76	34.95	17.87	0.10
TWI000A	5676	01JAN2012 0500	28.21	592.61	595.78		595.79	0.000384	0.79	35.49	17.99	0.10
TWI000A	5676	01JAN2012 0600	30.47	592.61	595.81		595.83	0.000426	0.84	36.15	18.13	0.11
TWI000A	5676	01JAN2012 0700	40.89	592.61	595.94		595.96	0.000647	1.06	38.50	18.	

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	5676	01JAN2012 1100	109.41	592.61	596.63		596.70	0.002019	2.09	52.31	21.40	0.24
TWI000A	5676	01JAN2012 1200	573.98	592.61	599.56		599.78	0.003801	3.87	207.06	94.79	0.35
TWI000A	5676	01JAN2012 1300	297.95	592.61	598.35		598.49	0.002913	3.04	113.02	57.10	0.30
TWI000A	5676	01JAN2012 1400	126.11	592.61	596.85		596.93	0.002124	2.21	57.12	22.36	0.24
TWI000A	5676	01JAN2012 1500	94.99	592.61	596.44		596.50	0.001884	1.97	48.33	20.64	0.23
TWI000A	5676	01JAN2012 1600	74.29	592.61	596.22		596.27	0.001493	1.69	43.92	19.76	0.20
TWI000A	5676	01JAN2012 1700	63.62	592.61	596.14		596.18	0.001214	1.50	42.28	19.43	0.18
TWI000A	5676	01JAN2012 1800	56.43	592.61	596.07		596.10	0.001038	1.38	41.00	19.17	0.17
TWI000A	5676	01JAN2012 1900	41.67	592.61	595.94		595.96	0.000674	1.08	38.45	18.63	0.13
TWI000A	5676	01JAN2012 2000	38.22	592.61	595.92		595.93	0.000583	1.00	38.07	18.55	0.12
TWI000A	5676	01JAN2012 2100	35.61	592.61	595.90		595.91	0.000519	0.94	37.72	18.47	0.12
TWI000A	5676	01JAN2012 2200	33.46	592.61	595.86		595.88	0.000481	0.90	37.04	18.33	0.11
TWI000A	5676	01JAN2012 2300	31.68	592.61	595.83		595.84	0.000449	0.87	36.49	18.21	0.11
TWI000A	5676	01JAN2012 2400	30.19	592.61	595.81		595.82	0.000422	0.84	36.04	18.11	0.10
TWI000A	5466	Max WS	1992.81	592.59	600.79		601.61	0.009668	8.32	422.74	110.10	0.60
TWI000A	5466	31DEC2011 2400	10.91	592.59	593.44		593.53	0.021662	2.38	4.58	9.70	0.61
TWI000A	5466	01JAN2012 0100	23.41	592.59	593.76		593.90	0.019245	2.93	7.98	11.20	0.61
TWI000A	5466	01JAN2012 0200	24.62	592.59	593.79		593.93	0.019156	2.98	8.27	11.32	0.61
TWI000A	5466	01JAN2012 0300	25.85	592.59	593.82		593.96	0.019014	3.01	8.58	11.44	0.61
TWI000A	5466	01JAN2012 0400	27.33	592.59	593.85		593.99	0.018768	3.05	8.95	11.59	0.61
TWI000A	5466	01JAN2012 0500	29.16	592.59	593.89		594.04	0.018383	3.09	9.43	11.78	0.61
TWI000A	5466	01JAN2012 0600	31.53	592.59	593.94		594.09	0.017757	3.13	10.07	12.03	0.60
TWI000A	5466	01JAN2012 0700	42.47	592.59	594.17		594.34	0.015719	3.28	12.94	13.08	0.58
TWI000A	5466	01JAN2012 0800	49.72	592.59	594.30		594.48	0.014957	3.38	14.72	13.69	0.57
TWI000A	5466	01JAN2012 0900	61.01	592.59	594.53		594.71	0.012969	3.41	17.87	14.64	0.54
TWI000A	5466	01JAN2012 1000	83.05	592.59	594.93		595.11	0.010312	3.45	24.08	16.25	0.50
TWI000A	5466	01JAN2012 1100	114.70	592.59	595.42		595.61	0.008471	3.53	32.48	18.11	0.46
TWI000A	5466	01JAN2012 1200	584.06	592.59	598.02		598.42	0.009640	5.45	156.28	78.94	0.54
TWI000A	5466	01JAN2012 1300	321.29	592.59	596.99		597.31	0.008731	4.65	86.27	53.16	0.50
TWI000A	5466	01JAN2012 1400	133.72	592.59	595.65		595.85	0.008162	3.64	36.86	21.39	0.46
TWI000A	5466	01JAN2012 1500	100.50	592.59	595.25		595.43	0.008476	3.40	29.55	17.48	0.46
TWI000A	5466	01JAN2012 1600	78.49	592.59	594.85		595.04	0.010680	3.43	22.86	15.96	0.51
TWI000A	5466	01JAN2012 1700	67.10	592.59	594.65		594.83	0.011946	3.41	19.67	15.13	0.53
TWI000A	5466	01JAN2012 1800	59.47	592.59	594.50		594.68	0.013055	3.40	17.52	14.54	0.55
TWI000A	5466	01JAN2012 1900	43.73	592.59	594.20		594.37	0.015507	3.29	13.28	13.20	0.58
TWI000A	5466	01JAN2012 2000	40.06	592.59	594.13		594.29	0.015747	3.23	12.42	12.89	0.58
TWI000A	5466	01JAN2012 2100	37.29	592.59	594.08		594.24	0.015915	3.17	11.76	12.66	0.58
TWI000A	5466	01JAN2012 2200	35.00	592.59	594.03		594.18	0.016631	3.16	11.08	12.41	0.59
TWI000A	5466	01JAN2012 2300	33.11	592.59	593.98		594.13	0.017207	3.14	10.54	12.20	0.60
TWI000A	5466	01JAN2012 2400	31.52	592.59	593.94		594.10	0.017671	3.12	10.09	12.03	0.60
TWI000A	5296	Max WS	2071.95	590.93	599.18		600.05	0.009483	8.36	425.59	125.88	0.60
TWI000A	5296	31DEC2011 2400	11.03	590.93	591.25	591.68	596.79	5.725938	18.88	0.58	3.64	8.30
TWI000A	5296	01JAN2012 0100	23.89	590.93	591.68	591.95	592.60	0.296603	7.69	3.11	8.06	2.18
TWI000A	5296	01JAN2012 0200	25.17	590.93	591.72	591.97	592.54	0.244421	7.28	3.46	8.43	2.00
TWI000A	5296	01JAN2012 0300	26.44	590.93	591.76	591.99	592.51	0.202024	6.92	3.82	8.69	1.84
TWI000A	5296	01JAN2012 0400	27.98	590.93	591.81	592.02	592.48	0.164120	6.56	4.27	9.00	1.68
TWI000A	5296	01JAN2012 0500	29.88	590.93	591.87	592.05	592.47	0.130646	6.18	4.83	9.38	1.52
TWI000A	5296	01JAN2012 0600	32.32	590.93	591.95	592.08	592.48	0.104439	5.86	5.52	9.81	1.38
TWI000A	5296	01JAN2012 0700	43.62	590.93	592.27	592.24	592.64	0.046249	4.87	8.96	11.31	0.96
TWI000A	5296	01JAN2012 0800	51.05	590.93	592.47		592.79	0.032095	4.51	11.33	12.14	0.82
TWI000A	5296	01JAN2012 0900	62.76	590.93	592.76		593.03	0.021878	4.19	14.96	13.32	0.70
TWI000A	5296	01JAN2012 1000	85.66	590.93	593.27		593.50	0.013065	3.83	22.37	15.36	0.56
TWI000A	5296	01JAN2012 1100	118.68	590.93	593.82		594.04	0.009943	3.78	31.42	17.82	0.50
TWI000A	5296	01JAN2012 1200	597.62	590.93	596.57		596.96	0.007682	5.12	149.06	68.36	0.49
TWI000A	5296	01JAN2012 1300	338.10	590.93	595.63		595.90	0.008008	4.20	92.19	53.81	0.48
TWI000A	5296	01JAN2012 1400	139.48	590.93	594.08		594.31	0.009904	3.84	36.34	20.12	0.50
TWI000A	5296	01JAN2012 1500	104.65	590.93	593.65		593.86	0.010002	3.68	28.42	16.83	0.50
TWI000A	5296	01JAN2012 1600	81.68	590.93	593.20		593.43	0.013727	3.84	21.25	15.07	0.57
TWI000A	5296	01JAN2012 1700	69.76	590.93	592.93		593.18	0.017753	4.02	17.35	14.02	0.64
TWI000A	5296	01JAN2012 1800	61.78	590.93	592.74		593.01	0.022016	4.18	14.77	13.26	0.70
TWI000A	5296	01JAN2012 1900	45.30	590.93	592.32		592.67	0.041195	4.73	9.57	11.53	0.92
TWI000A	5296	01JAN2012 2000	41.46	590.93	592.21	592.21	592.60	0.051399	4.97	8.35	11.09	1.01
TWI000A	5296	01JAN2012 2100	38.56	590.93	592.13	592.18	592.55	0.062723	5.19	7.43	10.74	1.10
TWI000A	5296	01JAN2012 2200	36.17	590.93	592.06	592.14	592.51	0.075050	5.40	6.70	10.46	1.19
TWI000A	5296	01JAN2012 2300	34.18	590.93	592.00	592.11	592.49	0.087925	5.60	6.10	10.17	1.28
TWI000A	5296	01JAN2012 2400	32.52	590.93	591.95	592.09	592.48	0.101001	5.80	5.61	9.87	1.36
TWI000A	5079	Max WS	2149.10	588.81	597.37		598.20	0.008699	8.39	401.57	115.90	0.62
TWI000A	5079	31DEC2011 2400	11.34	588.81	590.16		590.19	0.003367	1.41	8.03	10.43	0.28
TWI000A	5079	01JAN2012 0100	24.44	588.81	590.64		590.69	0.003562	1.82	13.40	12.22	0.31
TWI000A	5079	01JAN2012 0200	25.80	588.81	590.68		590.73	0.003534	1.85	13.96	12.39	0.31
TWI000A	5079	01JAN2012 0300	27.13	588.81	590.72		590.77	0.003559	1.88	14.43	12.53	0.31
TWI000A	5079	01JAN2012 0400	28.73	588.81	590.76		590.82	0.003589	1.92	14.98	12.69	0.31
TWI000A	5079	01JAN2012 0500	30.70	588.81	590.81		590.87	0.003626	1.96	15.64	12.89	0.31
TWI000A	5079	01JAN2012 0600	33.24	588.81	590.87		590.94	0.003706	2.02	16.42	13.12	0.32
TWI000A	5079	01JAN2012 0700	44.97	588.81	591.15		591.23	0.003807	2.23	20.17	14.14	0.33
TWI000A	5079	01JAN2012 0800	52.60	588.81	591.29		591.38	0.003988	2.37	22.20	14.66	0.34
TWI000A	5079	01JAN2012 0900	64.80	588.81	591.49		591.59	0.004280	2.58	25.14	15.39	0.36
TWI000A	5079	01JAN2012 1000	88.75	5								

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	5079	01JAN2012 1400	146.22	588.81	592.51		592.69	0.005082	3.42	42.80	19.32	0.40
TWI000A	5079	01JAN2012 1500	109.57	588.81	592.11		592.26	0.004728	3.08	35.52	17.75	0.38
TWI000A	5079	01JAN2012 1600	85.42	588.81	591.81		591.94	0.004406	2.81	30.38	16.60	0.37
TWI000A	5079	01JAN2012 1700	72.89	588.81	591.64		591.75	0.004192	2.64	27.57	15.96	0.35
TWI000A	5079	01JAN2012 1800	64.49	588.81	591.49		591.59	0.004218	2.56	25.18	15.40	0.35
TWI000A	5079	01JAN2012 1900	47.17	588.81	591.20		591.28	0.003817	2.26	20.85	14.32	0.33
TWI000A	5079	01JAN2012 2000	43.11	588.81	591.12		591.19	0.003696	2.18	19.78	14.04	0.32
TWI000A	5079	01JAN2012 2100	40.06	588.81	591.04		591.11	0.003798	2.15	18.59	13.72	0.33
TWI000A	5079	01JAN2012 2200	37.54	588.81	590.98		591.05	0.003755	2.11	17.82	13.51	0.32
TWI000A	5079	01JAN2012 2300	35.45	588.81	590.93		591.00	0.003718	2.06	17.17	13.33	0.32
TWI000A	5079	01JAN2012 2400	33.70	588.81	590.89		590.95	0.003678	2.03	16.63	13.17	0.32
TWI000A	4954	Max WS	2184.96	588.24	596.64		597.24	0.005837	7.13	495.75	146.84	0.52
TWI000A	4954	31DEC2011 2400	11.65	588.24	589.95		589.96	0.000571	0.74	15.79	14.40	0.12
TWI000A	4954	01JAN2012 0100	24.76	588.24	590.39		590.41	0.000956	1.09	22.61	16.70	0.17
TWI000A	4954	01JAN2012 0200	26.19	588.24	590.43		590.45	0.000980	1.12	23.36	16.94	0.17
TWI000A	4954	01JAN2012 0300	27.55	588.24	590.47		590.49	0.001017	1.15	23.91	17.11	0.17
TWI000A	4954	01JAN2012 0400	29.19	588.24	590.50		590.53	0.001063	1.19	24.54	17.31	0.18
TWI000A	4954	01JAN2012 0500	31.21	588.24	590.55		590.57	0.001116	1.23	25.33	17.56	0.18
TWI000A	4954	01JAN2012 0600	33.81	588.24	590.61		590.63	0.001179	1.28	26.32	17.86	0.19
TWI000A	4954	01JAN2012 0700	45.80	588.24	590.87		590.90	0.001352	1.47	31.24	19.23	0.20
TWI000A	4954	01JAN2012 0800	53.56	588.24	590.99		591.03	0.001521	1.60	33.51	19.77	0.22
TWI000A	4954	01JAN2012 0900	66.06	588.24	591.16		591.21	0.001757	1.79	37.00	20.57	0.23
TWI000A	4954	01JAN2012 1000	90.65	588.24	591.49		591.56	0.002042	2.06	44.06	22.10	0.26
TWI000A	4954	01JAN2012 1100	126.19	588.24	591.87		591.95	0.002439	2.40	52.68	23.99	0.28
TWI000A	4954	01JAN2012 1200	618.77	588.24	594.08		594.41	0.005618	4.74	162.25	110.51	0.46
TWI000A	4954	01JAN2012 1300	372.18	588.24	593.43		593.65	0.004515	3.72	102.43	59.57	0.40
TWI000A	4954	01JAN2012 1400	150.39	588.24	592.09		592.19	0.002657	2.58	58.22	25.23	0.30
TWI000A	4954	01JAN2012 1500	112.60	588.24	591.74		591.82	0.002280	2.27	49.61	23.30	0.27
TWI000A	4954	01JAN2012 1600	87.73	588.24	591.46		591.53	0.001983	2.02	43.48	21.98	0.25
TWI000A	4954	01JAN2012 1700	74.83	588.24	591.32		591.37	0.001774	1.85	40.34	21.31	0.24
TWI000A	4954	01JAN2012 1800	66.16	588.24	591.17		591.21	0.001746	1.78	37.12	20.60	0.23
TWI000A	4954	01JAN2012 1900	48.32	588.24	590.91		590.95	0.001398	1.51	32.07	19.43	0.21
TWI000A	4954	01JAN2012 2000	44.13	588.24	590.85		590.88	0.001296	1.43	30.88	19.15	0.20
TWI000A	4954	01JAN2012 2100	40.99	588.24	590.76		590.79	0.001315	1.41	29.13	18.69	0.20
TWI000A	4954	01JAN2012 2200	38.39	588.24	590.71		590.74	0.001265	1.36	28.15	18.41	0.19
TWI000A	4954	01JAN2012 2300	36.24	588.24	590.66		590.69	0.001223	1.33	27.33	18.16	0.19
TWI000A	4954	01JAN2012 2400	34.44	588.24	590.62		590.65	0.001184	1.29	26.63	17.96	0.19
TWI000A	4851	Max WS	2183.75	588.32	596.45		596.72	0.003233	5.14	717.98	207.64	0.39
TWI000A	4851	31DEC2011 2400	11.86	588.32	589.44		589.50	0.009085	1.94	6.11	10.51	0.45
TWI000A	4851	01JAN2012 0100	24.72	588.32	589.79		589.88	0.009728	2.41	10.25	13.40	0.49
TWI000A	4851	01JAN2012 0200	26.18	588.32	589.82		589.91	0.009792	2.45	10.67	13.66	0.49
TWI000A	4851	01JAN2012 0300	27.54	588.32	589.84		589.94	0.009969	2.50	11.00	13.86	0.50
TWI000A	4851	01JAN2012 0400	29.17	588.32	589.87		589.97	0.010106	2.56	11.40	14.04	0.50
TWI000A	4851	01JAN2012 0500	31.19	588.32	589.91		590.01	0.010224	2.62	11.90	14.26	0.51
TWI000A	4851	01JAN2012 0600	33.78	588.32	589.95		590.06	0.010302	2.69	12.56	14.54	0.51
TWI000A	4851	01JAN2012 0700	45.75	588.32	590.11		590.25	0.011666	3.07	14.90	15.50	0.55
TWI000A	4851	01JAN2012 0800	53.49	588.32	590.23		590.39	0.011335	3.18	16.84	16.25	0.55
TWI000A	4851	01JAN2012 0900	65.95	588.32	590.42		590.58	0.010714	3.30	19.97	17.40	0.54
TWI000A	4851	01JAN2012 1000	90.46	588.32	590.66		590.87	0.011569	3.71	24.41	18.90	0.57
TWI000A	4851	01JAN2012 1100	125.92	588.32	591.00		591.26	0.011429	4.02	31.29	21.17	0.58
TWI000A	4851	01JAN2012 1200	593.86	588.32	593.08		593.53	0.013383	5.68	141.54	128.91	0.68
TWI000A	4851	01JAN2012 1300	376.32	588.32	592.39		592.84	0.012995	5.45	74.32	62.51	0.66
TWI000A	4851	01JAN2012 1400	150.59	588.32	591.21		591.48	0.011465	4.22	35.70	22.55	0.59
TWI000A	4851	01JAN2012 1500	112.75	588.32	590.88		591.12	0.011580	3.93	28.68	20.31	0.58
TWI000A	4851	01JAN2012 1600	87.84	588.32	590.62		590.84	0.011778	3.70	23.74	18.68	0.58
TWI000A	4851	01JAN2012 1700	74.90	588.32	590.46		590.66	0.012569	3.62	20.66	17.64	0.59
TWI000A	4851	01JAN2012 1800	66.21	588.32	590.41		590.58	0.010855	3.32	19.93	17.38	0.55
TWI000A	4851	01JAN2012 1900	48.36	588.32	590.14		590.30	0.011757	3.13	15.46	15.72	0.56
TWI000A	4851	01JAN2012 2000	44.15	588.32	590.08		590.22	0.011868	3.06	14.44	15.32	0.55
TWI000A	4851	01JAN2012 2100	41.01	588.32	590.07		590.20	0.010365	2.85	14.38	15.29	0.52
TWI000A	4851	01JAN2012 2200	38.41	588.32	590.03		590.15	0.010442	2.81	13.69	15.01	0.52
TWI000A	4851	01JAN2012 2300	36.26	588.32	589.99		590.11	0.010465	2.76	13.13	14.78	0.52
TWI000A	4851	01JAN2012 2400	34.45	588.32	589.96		590.07	0.010456	2.72	12.67	14.58	0.51
TWI000A	4630	Max WS	2181.47	585.93	596.26		596.37	0.001015	2.99	897.87	190.87	0.20
TWI000A	4630	31DEC2011 2400	11.85	585.93	588.68		588.68	0.000106	0.33	39.63	35.67	0.05
TWI000A	4630	01JAN2012 0100	24.68	585.93	588.95		588.95	0.000250	0.55	49.90	39.97	0.08
TWI000A	4630	01JAN2012 0200	26.15	585.93	588.96		588.97	0.000272	0.58	50.51	40.12	0.08
TWI000A	4630	01JAN2012 0300	27.51	585.93	588.98		588.99	0.000288	0.60	51.29	40.30	0.08
TWI000A	4630	01JAN2012 0400	29.13	585.93	589.01		589.01	0.000306	0.62	52.27	40.53	0.09
TWI000A	4630	01JAN2012 0500	31.14	585.93	589.04		589.04	0.000327	0.65	53.53	40.83	0.09
TWI000A	4630	01JAN2012 0600	33.71	585.93	589.08		589.08	0.000351	0.68	55.23	41.22	0.09
TWI000A	4630	01JAN2012 0700	45.53	585.93	589.10		589.11	0.000617	0.90	55.95	41.39	0.12
TWI000A	4630	01JAN2012 0800	53.24	585.93	589.27		589.28	0.000601	0.93	63.09	43.00	0.12
TWI000A	4630	01JAN2012 0900	65.48	585.93	589.52		589.54	0.000591	0.97	75.12	48.55	0.12
TWI000A	4630	01JAN2012 1000	89.64	585.93	589.70		589.72	0.000808	1.18	84.01	50.22	0.15
TWI000A	4630	01JAN2012 1100	125.17	585.93	590.08		590.11	0.000890	1.33	103.87	55.35	0.16
TWI000A	4630	01JAN2012 1200	554.40	585.93	592.12		592.19	0.001631	2.02	264.94	110.13	0.22
TWI000A	4630	01JAN2012 1300	384.30	585.93	591.33		591.40	0.001784	2.08			

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	4630	01JAN2012 1700	75.05	585.93	589.37		589.39	0.001025	1.24	68.01	47.03	0.16
TWI000A	4630	01JAN2012 1800	66.43	585.93	589.51		589.52	0.000628	1.00	74.28	48.39	0.13
TWI000A	4630	01JAN2012 1900	48.54	585.93	589.13		589.14	0.000653	0.93	57.36	41.71	0.13
TWI000A	4630	01JAN2012 2000	44.26	585.93	589.03		589.04	0.000668	0.92	53.33	40.78	0.13
TWI000A	4630	01JAN2012 2100	41.08	585.93	589.18		589.19	0.000423	0.76	59.46	42.19	0.10
TWI000A	4630	01JAN2012 2200	38.47	585.93	589.14		589.14	0.000406	0.74	57.58	41.76	0.10
TWI000A	4630	01JAN2012 2300	36.30	585.93	589.10		589.11	0.000389	0.72	56.11	41.42	0.10
TWI000A	4630	01JAN2012 2400	34.49	585.93	589.07		589.08	0.000373	0.70	54.92	41.15	0.10
TWI000A	4515	Max WS	3183.51	585.61	595.53		595.98	0.003687	5.76	605.03	102.41	0.37
TWI000A	4515	31DEC2011 2400	11.78	585.61	586.50		586.68	0.047664	3.36	3.51	7.87	0.89
TWI000A	4515	01JAN2012 0100	32.34	585.61	586.97		587.23	0.034321	4.08	7.93	10.20	0.81
TWI000A	4515	01JAN2012 0200	34.77	585.61	587.01		587.28	0.034355	4.18	8.32	10.30	0.82
TWI000A	4515	01JAN2012 0300	36.83	585.61	587.04		587.32	0.034335	4.26	8.65	10.39	0.82
TWI000A	4515	01JAN2012 0400	39.36	585.61	587.08		587.37	0.034152	4.34	9.06	10.50	0.82
TWI000A	4515	01JAN2012 0500	42.44	585.61	587.13		587.43	0.033721	4.43	9.57	10.63	0.82
TWI000A	4515	01JAN2012 0600	46.37	585.61	587.19		587.51	0.032917	4.53	10.24	10.81	0.82
TWI000A	4515	01JAN2012 0700	64.36	585.61	587.49		587.84	0.027936	4.73	13.62	11.78	0.77
TWI000A	4515	01JAN2012 0800	75.87	585.61	587.63		588.01	0.027808	4.93	15.47	14.26	0.78
TWI000A	4515	01JAN2012 0900	93.88	585.61	587.84		588.25	0.026798	5.14	18.89	17.99	0.78
TWI000A	4515	01JAN2012 1000	129.78	585.61	588.17		588.61	0.025613	5.45	25.58	23.50	0.77
TWI000A	4515	01JAN2012 1100	182.00	585.61	588.54		588.99	0.023603	5.66	36.70	33.27	0.76
TWI000A	4515	01JAN2012 1200	856.41	585.61	591.07		591.42	0.010337	5.38	186.35	86.13	0.54
TWI000A	4515	01JAN2012 1300	537.43	585.61	590.23		590.58	0.012568	5.41	119.59	69.07	0.59
TWI000A	4515	01JAN2012 1400	216.58	585.61	588.74		589.19	0.022667	5.76	43.43	36.35	0.75
TWI000A	4515	01JAN2012 1500	161.06	585.61	588.43		588.87	0.023216	5.49	33.17	31.64	0.75
TWI000A	4515	01JAN2012 1600	124.59	585.61	588.13		588.57	0.025485	5.39	24.73	22.22	0.77
TWI000A	4515	01JAN2012 1700	105.24	585.61	587.99		588.39	0.024644	5.11	21.65	20.06	0.75
TWI000A	4515	01JAN2012 1800	92.70	585.61	587.83		588.23	0.026847	5.12	18.66	17.82	0.78
TWI000A	4515	01JAN2012 1900	66.50	585.61	587.52		587.87	0.027939	4.77	13.94	11.90	0.78
TWI000A	4515	01JAN2012 2000	60.25	585.61	587.44		587.77	0.027571	4.62	13.04	11.57	0.77
TWI000A	4515	01JAN2012 2100	55.57	585.61	587.34		587.68	0.030319	4.67	11.91	11.22	0.80
TWI000A	4515	01JAN2012 2200	51.74	585.61	587.28		587.61	0.031434	4.62	11.21	11.05	0.81
TWI000A	4515	01JAN2012 2300	48.56	585.61	587.23		587.55	0.032301	4.57	10.64	10.91	0.81
TWI000A	4515	01JAN2012 2400	45.90	585.61	587.18		587.50	0.032951	4.51	10.17	10.79	0.82
TWI000A	4315	Max WS	3181.45	581.62	592.87		594.94	0.013915	11.64	292.48	54.85	0.72
TWI000A	4315	31DEC2011 2400	12.05	581.62	582.62		582.79	0.036508	3.25	3.71	7.12	0.79
TWI000A	4315	01JAN2012 0100	32.21	581.62	583.53		583.64	0.009666	2.63	12.26	11.89	0.45
TWI000A	4315	01JAN2012 0200	34.74	581.62	583.62		583.72	0.009067	2.62	13.27	12.12	0.44
TWI000A	4315	01JAN2012 0300	36.80	581.62	583.67		583.78	0.008891	2.64	13.95	12.40	0.44
TWI000A	4315	01JAN2012 0400	39.33	581.62	583.74		583.85	0.008657	2.66	14.80	12.74	0.43
TWI000A	4315	01JAN2012 0500	42.40	581.62	583.82		583.93	0.008351	2.67	15.86	13.15	0.43
TWI000A	4315	01JAN2012 0600	46.32	581.62	583.92		584.04	0.007976	2.69	17.22	13.66	0.42
TWI000A	4315	01JAN2012 0700	64.26	581.62	584.34		584.46	0.006783	2.75	23.40	15.87	0.40
TWI000A	4315	01JAN2012 0800	75.73	581.62	584.58		584.70	0.006279	2.78	27.28	17.18	0.39
TWI000A	4315	01JAN2012 0900	93.60	581.62	584.87		585.00	0.005817	2.88	32.50	18.18	0.38
TWI000A	4315	01JAN2012 1000	129.24	581.62	585.36		585.51	0.005561	3.07	42.04	20.54	0.38
TWI000A	4315	01JAN2012 1100	181.36	581.62	585.97		586.13	0.005259	3.28	55.34	23.52	0.38
TWI000A	4315	01JAN2012 1200	828.67	581.62	589.48		589.92	0.005774	5.34	155.31	32.39	0.43
TWI000A	4315	01JAN2012 1300	546.73	581.62	588.78		589.04	0.003888	4.11	133.15	30.85	0.35
TWI000A	4315	01JAN2012 1400	217.14	581.62	586.34		586.52	0.005035	3.37	64.39	25.34	0.37
TWI000A	4315	01JAN2012 1500	161.54	581.62	585.77		585.93	0.005255	3.18	50.75	22.53	0.37
TWI000A	4315	01JAN2012 1600	124.90	581.62	585.32		585.46	0.005487	3.03	41.18	20.34	0.38
TWI000A	4315	01JAN2012 1700	105.43	581.62	585.06		585.19	0.005625	2.93	35.93	19.03	0.38
TWI000A	4315	01JAN2012 1800	92.84	581.62	584.87		585.00	0.005731	2.86	32.49	18.18	0.38
TWI000A	4315	01JAN2012 1900	66.60	581.62	584.40		584.52	0.006558	2.74	24.35	16.20	0.39
TWI000A	4315	01JAN2012 2000	60.30	581.62	584.27		584.38	0.006858	2.72	22.20	15.45	0.40
TWI000A	4315	01JAN2012 2100	55.62	581.62	584.16		584.27	0.007075	2.70	20.63	14.87	0.40
TWI000A	4315	01JAN2012 2200	51.78	581.62	584.07		584.18	0.007359	2.69	19.28	14.40	0.41
TWI000A	4315	01JAN2012 2300	48.60	581.62	583.99		584.10	0.007658	2.68	18.12	13.98	0.42
TWI000A	4315	01JAN2012 2400	45.93	581.62	583.92		584.03	0.007909	2.68	17.17	13.64	0.42
TWI000A	4239	Max WS	3191.92	581.19	592.38		593.86	0.010851	10.59	480.26	105.24	0.65
TWI000A	4239	31DEC2011 2400	12.19	581.19	582.40		582.46	0.008551	1.94	6.30	8.84	0.40
TWI000A	4239	01JAN2012 0100	32.22	581.19	583.21		583.28	0.005511	2.17	14.87	12.46	0.35
TWI000A	4239	01JAN2012 0200	34.83	581.19	583.29		583.36	0.005361	2.19	15.90	12.82	0.35
TWI000A	4239	01JAN2012 0300	36.90	581.19	583.34		583.42	0.005341	2.22	16.61	13.07	0.35
TWI000A	4239	01JAN2012 0400	39.43	581.19	583.41		583.49	0.005308	2.26	17.46	13.33	0.35
TWI000A	4239	01JAN2012 0500	42.51	581.19	583.49		583.57	0.005243	2.30	18.51	13.63	0.35
TWI000A	4239	01JAN2012 0600	46.45	581.19	583.58		583.67	0.005185	2.34	19.81	14.00	0.35
TWI000A	4239	01JAN2012 0700	64.42	581.19	583.97		584.07	0.004979	2.52	25.53	15.60	0.35
TWI000A	4239	01JAN2012 0800	75.95	581.19	584.18		584.28	0.004933	2.63	28.91	16.47	0.35
TWI000A	4239	01JAN2012 0900	93.86	581.19	584.48		584.60	0.004750	2.75	34.09	17.50	0.35
TWI000A	4239	01JAN2012 1000	129.62	581.19	584.99		585.12	0.004694	2.99	43.42	19.48	0.35
TWI000A	4239	01JAN2012 1100	182.04	581.19	585.60		585.76	0.004637	3.25	56.02	21.82	0.36
TWI000A	4239	01JAN2012 1200	825.20	581.19	589.02		589.48	0.005842	5.47	170.73	71.60	0.44
TWI000A	4239	01JAN2012 1300	553.45	581.19	588.48		588.75	0.003918	4.18	135.19	57.34	0.35
TWI000A	4239	01JAN2012 1400	218.71	581.19	585.98		586.15	0.004559	3.39	64.56	23.27	0.36
TWI000A	4239	01JAN2012 1500	162.72	581.19	585.40		585.55	0.004575	3.14	51.82	21.07	0.35
TWI000A	4239	01JAN2012 1600	125.77	581.19	584.95		585.08	0.004627	2.95	42.		

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	4239	01JAN2012 2000	60.66	581.19	583.90		584.00	0.004931	2.47	24.52	15.33	0.34
TWI000A	4239	01JAN2012 2100	55.94	581.19	583.80		583.89	0.004974	2.43	23.03	14.92	0.34
TWI000A	4239	01JAN2012 2200	52.07	581.19	583.72		583.81	0.005026	2.39	21.78	14.57	0.34
TWI000A	4239	01JAN2012 2300	48.87	581.19	583.64		583.73	0.005088	2.36	20.70	14.26	0.35
TWI000A	4239	01JAN2012 2400	46.18	581.19	583.58		583.66	0.005127	2.33	19.81	14.00	0.35
TWI000A	4155	Max WS	3214.31	580.71	592.43		592.75	0.003311	5.52	1059.63	217.96	0.36
TWI000A	4155	31DEC2011 2400	12.35	580.71	582.14		582.16	0.002685	1.29	9.59	10.37	0.24
TWI000A	4155	01JAN2012 0100	32.20	580.71	582.89		582.94	0.002895	1.74	18.54	13.32	0.26
TWI000A	4155	01JAN2012 0200	34.93	580.71	582.97		583.02	0.002882	1.77	19.68	13.61	0.26
TWI000A	4155	01JAN2012 0300	37.00	580.71	583.03		583.08	0.002895	1.81	20.47	13.81	0.26
TWI000A	4155	01JAN2012 0400	39.55	580.71	583.10		583.15	0.002926	1.85	21.39	14.04	0.26
TWI000A	4155	01JAN2012 0500	42.64	580.71	583.17		583.23	0.002952	1.89	22.50	14.31	0.27
TWI000A	4155	01JAN2012 0600	46.58	580.71	583.27		583.33	0.002990	1.95	23.87	14.64	0.27
TWI000A	4155	01JAN2012 0700	64.60	580.71	583.66		583.73	0.003109	2.17	29.81	15.98	0.28
TWI000A	4155	01JAN2012 0800	76.18	580.71	583.86		583.95	0.003215	2.29	33.20	16.70	0.29
TWI000A	4155	01JAN2012 0900	94.17	580.71	584.17		584.26	0.003280	2.45	38.47	17.76	0.29
TWI000A	4155	01JAN2012 1000	130.07	580.71	584.67		584.78	0.003465	2.73	47.72	19.42	0.31
TWI000A	4155	01JAN2012 1100	182.77	580.71	585.27		585.41	0.003658	3.05	60.74	28.32	0.32
TWI000A	4155	01JAN2012 1200	811.39	580.71	588.83		589.01	0.003700	3.71	332.30	129.47	0.34
TWI000A	4155	01JAN2012 1300	566.71	580.71	588.29		588.42	0.003237	3.17	263.03	126.67	0.31
TWI000A	4155	01JAN2012 1400	220.53	580.71	585.65		585.81	0.003687	3.20	73.28	36.73	0.33
TWI000A	4155	01JAN2012 1500	164.06	580.71	585.08		585.21	0.003560	2.93	56.00	20.77	0.31
TWI000A	4155	01JAN2012 1600	126.76	580.71	584.64		584.75	0.003414	2.69	47.08	19.32	0.30
TWI000A	4155	01JAN2012 1700	106.93	580.71	584.36		584.46	0.003337	2.55	41.95	18.42	0.30
TWI000A	4155	01JAN2012 1800	94.12	580.71	584.18		584.27	0.003244	2.44	38.61	17.79	0.29
TWI000A	4155	01JAN2012 1900	67.49	580.71	583.72		583.79	0.003098	2.19	30.81	16.20	0.28
TWI000A	4155	01JAN2012 2000	61.07	580.71	583.60		583.67	0.003044	2.12	28.84	15.77	0.28
TWI000A	4155	01JAN2012 2100	56.31	580.71	583.50		583.56	0.003020	2.06	27.27	15.42	0.27
TWI000A	4155	01JAN2012 2200	52.41	580.71	583.41		583.47	0.002993	2.02	25.98	15.13	0.27
TWI000A	4155	01JAN2012 2300	49.18	580.71	583.34		583.40	0.002980	1.98	24.85	14.87	0.27
TWI000A	4155	01JAN2012 2400	46.46	580.71	583.27		583.33	0.002961	1.94	23.91	14.65	0.27
TWI000A	3981	Max WS	3248.08	579.93	590.75		591.85	0.010748	9.01	532.10	134.29	0.64
TWI000A	3981	31DEC2011 2400	12.72	579.93	581.77		581.79	0.001743	1.14	11.19	10.36	0.19
TWI000A	3981	01JAN2012 0100	32.15	579.93	582.40		582.45	0.002822	1.74	18.50	12.88	0.26
TWI000A	3981	01JAN2012 0200	35.12	579.93	582.47		582.52	0.002955	1.81	19.39	13.13	0.26
TWI000A	3981	01JAN2012 0300	37.21	579.93	582.52		582.57	0.003046	1.86	20.00	13.29	0.27
TWI000A	3981	01JAN2012 0400	39.77	579.93	582.57		582.63	0.003155	1.92	20.72	13.49	0.27
TWI000A	3981	01JAN2012 0500	42.87	579.93	582.64		582.70	0.003271	1.98	21.60	13.72	0.28
TWI000A	3981	01JAN2012 0600	46.84	579.93	582.72		582.78	0.003387	2.06	22.74	13.99	0.28
TWI000A	3981	01JAN2012 0700	64.94	579.93	583.04		583.12	0.003895	2.37	27.35	15.01	0.31
TWI000A	3981	01JAN2012 0800	76.62	579.93	583.21		583.31	0.004201	2.55	29.99	15.57	0.32
TWI000A	3981	01JAN2012 0900	94.77	579.93	583.47		583.59	0.004503	2.78	34.12	16.40	0.34
TWI000A	3981	01JAN2012 1000	130.95	579.93	583.87		584.03	0.005201	3.19	41.09	17.82	0.37
TWI000A	3981	01JAN2012 1100	184.16	579.93	584.38		584.58	0.005896	3.65	50.51	19.59	0.40
TWI000A	3981	01JAN2012 1200	773.55	579.93	587.60		587.99	0.008800	5.04	167.37	87.88	0.51
TWI000A	3981	01JAN2012 1300	594.06	579.93	586.97		587.35	0.009948	4.90	122.41	58.10	0.53
TWI000A	3981	01JAN2012 1400	223.96	579.93	584.71		584.95	0.006262	3.92	57.17	20.79	0.42
TWI000A	3981	01JAN2012 1500	166.58	579.93	584.22		584.41	0.005690	3.51	47.51	19.05	0.39
TWI000A	3981	01JAN2012 1600	128.62	579.93	583.85		584.01	0.005158	3.16	40.67	17.74	0.37
TWI000A	3981	01JAN2012 1700	108.44	579.93	583.62		583.76	0.004825	2.95	36.73	16.94	0.35
TWI000A	3981	01JAN2012 1800	95.40	579.93	583.47		583.60	0.004515	2.79	34.25	16.42	0.34
TWI000A	3981	01JAN2012 1900	68.41	579.93	583.09		583.18	0.003991	2.43	28.15	15.18	0.31
TWI000A	3981	01JAN2012 2000	61.85	579.93	582.99		583.07	0.003791	2.32	26.66	14.87	0.31
TWI000A	3981	01JAN2012 2100	57.00	579.93	582.91		582.99	0.003629	2.23	25.54	14.62	0.30
TWI000A	3981	01JAN2012 2200	53.05	579.93	582.85		582.92	0.003500	2.16	24.57	14.41	0.29
TWI000A	3981	01JAN2012 2300	49.77	579.93	582.78		582.85	0.003445	2.11	23.60	14.19	0.29
TWI000A	3981	01JAN2012 2400	47.01	579.93	582.72		582.79	0.003386	2.06	22.80	14.01	0.28
TWI000A	3902	Max WS	3265.49	579.57	589.82		591.04	0.011771	10.36	584.25	188.04	0.73
TWI000A	3902	31DEC2011 2400	12.86	579.57	580.66		580.83	0.026369	3.30	3.89	6.48	0.75
TWI000A	3902	01JAN2012 0100	32.17	579.57	581.16		581.43	0.025344	4.17	7.72	8.72	0.78
TWI000A	3902	01JAN2012 0200	35.22	579.57	581.22		581.50	0.025691	4.29	8.21	8.96	0.79
TWI000A	3902	01JAN2012 0300	37.31	579.57	581.26		581.55	0.025791	4.36	8.55	9.13	0.79
TWI000A	3902	01JAN2012 0400	39.88	579.57	581.30		581.61	0.025759	4.44	8.98	9.33	0.80
TWI000A	3902	01JAN2012 0500	43.00	579.57	581.36		581.68	0.025553	4.52	9.52	9.58	0.80
TWI000A	3902	01JAN2012 0600	46.97	579.57	581.43		581.76	0.025106	4.59	10.23	9.90	0.80
TWI000A	3902	01JAN2012 0700	65.14	579.57	581.71		582.09	0.024395	4.98	13.09	10.92	0.80
TWI000A	3902	01JAN2012 0800	76.88	579.57	581.86		582.28	0.024277	5.20	14.78	11.48	0.81
TWI000A	3902	01JAN2012 0900	95.13	579.57	582.09		582.55	0.023295	5.43	17.52	12.32	0.80
TWI000A	3902	01JAN2012 1000	131.47	579.57	582.45		582.99	0.023143	5.91	22.23	13.60	0.82
TWI000A	3902	01JAN2012 1100	185.02	579.57	582.91		583.55	0.022455	6.44	28.74	15.02	0.82
TWI000A	3902	01JAN2012 1200	764.80	579.57	585.89		587.05	0.019435	8.62	88.71	26.49	0.83
TWI000A	3902	01JAN2012 1300	601.86	579.57	585.24		586.31	0.019740	8.30	72.55	23.11	0.82
TWI000A	3902	01JAN2012 1400	225.55	579.57	583.21		583.92	0.021918	6.74	33.48	15.97	0.82
TWI000A	3902	01JAN2012 1500	167.77	579.57	582.77		583.38	0.022579	6.28	26.73	14.59	0.82
TWI000A	3902	01JAN2012 1600	129.51	579.57	582.43		582.97	0.023106	5.89	22.00	13.55	0.81
TWI000A	3902	01JAN2012 1700	109.17	579.57	582.23		582.73	0.023486	5.65	19.32	12.84	0.81
TWI000A	3902	01JAN2012 1800	96.03	579.57	582.10		582.56	0.023238	5.44	17.66	12.36	0.80
TWI000A	3902	01JAN2012 1900	68.85	579.57	581.76		582.15	0.024338	5.05	13.6		

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	3902	01JAN2012 2300	50.05	579.57	581.49		581.82	0.024518	4.63	10.81	10.13	0.79
TWI000A	3902	01JAN2012 2400	47.28	579.57	581.44		581.77	0.024966	4.59	10.30	9.93	0.79
TWI000A	3556	Max WS	3333.62	574.86	585.68		587.21	0.011314	10.51	418.98	113.63	0.72
TWI000A	3556	31DEC2011 2400	13.70	574.86	576.60		576.61	0.000530	0.78	17.67	13.91	0.12
TWI000A	3556	01JAN2012 0100	32.23	574.86	576.94		576.97	0.001424	1.42	22.67	14.93	0.20
TWI000A	3556	01JAN2012 0200	35.61	574.86	576.99		577.02	0.001601	1.53	23.32	15.06	0.22
TWI000A	3556	01JAN2012 0300	37.73	574.86	577.02		577.06	0.001697	1.59	23.79	15.15	0.22
TWI000A	3556	01JAN2012 0400	40.33	574.86	577.06		577.11	0.001784	1.65	24.49	15.28	0.23
TWI000A	3556	01JAN2012 0500	43.48	574.86	577.12		577.17	0.001867	1.71	25.41	15.46	0.24
TWI000A	3556	01JAN2012 0600	47.52	574.86	577.19		577.24	0.001978	1.79	26.50	15.66	0.24
TWI000A	3556	01JAN2012 0700	65.88	574.86	577.44		577.51	0.002556	2.16	30.46	16.39	0.28
TWI000A	3556	01JAN2012 0800	77.84	574.86	577.58		577.67	0.002883	2.37	32.82	16.77	0.30
TWI000A	3556	01JAN2012 0900	96.44	574.86	577.79		577.90	0.003330	2.66	36.26	17.30	0.32
TWI000A	3556	01JAN2012 1000	133.45	574.86	578.16		578.31	0.003935	3.10	43.01	18.29	0.36
TWI000A	3556	01JAN2012 1100	188.28	574.86	578.63		578.83	0.004651	3.63	51.80	19.52	0.39
TWI000A	3556	01JAN2012 1200	759.30	574.86	581.47		582.11	0.008021	6.41	118.45	27.87	0.55
TWI000A	3556	01JAN2012 1300	628.65	574.86	581.06		581.59	0.007129	5.86	107.25	26.44	0.51
TWI000A	3556	01JAN2012 1400	231.78	574.86	578.98		579.22	0.004975	3.95	58.73	20.46	0.41
TWI000A	3556	01JAN2012 1500	172.43	574.86	578.51		578.70	0.004416	3.48	49.55	19.21	0.38
TWI000A	3556	01JAN2012 1600	132.97	574.86	578.17		578.32	0.003886	3.09	43.10	18.31	0.35
TWI000A	3556	01JAN2012 1700	112.01	574.86	577.97		578.09	0.003534	2.84	39.47	17.78	0.34
TWI000A	3556	01JAN2012 1800	98.45	574.86	577.82		577.93	0.003322	2.67	36.83	17.38	0.32
TWI000A	3556	01JAN2012 1900	70.55	574.86	577.51		577.58	0.002657	2.24	31.53	16.56	0.29
TWI000A	3556	01JAN2012 2000	63.68	574.86	577.42		577.49	0.002450	2.11	30.19	16.34	0.27
TWI000A	3556	01JAN2012 2100	58.66	574.86	577.36		577.42	0.002300	2.01	29.13	16.15	0.26
TWI000A	3556	01JAN2012 2200	54.57	574.86	577.30		577.36	0.002182	1.93	28.21	15.98	0.26
TWI000A	3556	01JAN2012 2300	51.16	574.86	577.25		577.31	0.002074	1.86	27.44	15.84	0.25
TWI000A	3556	01JAN2012 2400	48.31	574.86	577.21		577.26	0.001976	1.80	26.81	15.72	0.24
TWI000A	3490	Max WS	3347.91	574.69	584.86		586.47	0.010429	10.43	378.99	100.66	0.71
TWI000A	3490	31DEC2011 2400	13.94	574.69	576.55		576.56	0.000793	0.84	16.64	16.13	0.15
TWI000A	3490	01JAN2012 0100	32.25	574.69	576.82		576.86	0.002161	1.52	21.21	17.83	0.25
TWI000A	3490	01JAN2012 0200	35.69	574.69	576.85		576.89	0.002485	1.64	21.70	18.00	0.26
TWI000A	3490	01JAN2012 0300	37.82	574.69	576.87		576.92	0.002652	1.71	22.11	18.14	0.27
TWI000A	3490	01JAN2012 0400	40.42	574.69	576.91		576.96	0.002773	1.77	22.83	18.39	0.28
TWI000A	3490	01JAN2012 0500	43.58	574.69	576.97		577.02	0.002866	1.83	23.82	18.73	0.29
TWI000A	3490	01JAN2012 0600	47.64	574.69	577.03		577.08	0.003006	1.91	24.98	19.11	0.29
TWI000A	3490	01JAN2012 0700	66.03	574.69	577.22		577.30	0.003914	2.29	28.79	20.33	0.34
TWI000A	3490	01JAN2012 0800	78.04	574.69	577.34		577.44	0.004325	2.49	31.30	21.01	0.36
TWI000A	3490	01JAN2012 0900	96.70	574.69	577.51		577.63	0.004864	2.77	34.91	21.81	0.39
TWI000A	3490	01JAN2012 1000	133.84	574.69	577.87		578.02	0.005170	3.11	42.97	23.49	0.41
TWI000A	3490	01JAN2012 1100	188.94	574.69	578.31		578.50	0.005447	3.50	53.93	25.60	0.43
TWI000A	3490	01JAN2012 1200	758.36	574.69	581.23		581.65	0.005405	5.19	146.12	37.43	0.46
TWI000A	3490	01JAN2012 1300	634.86	574.69	580.82		581.18	0.005108	4.84	131.07	35.77	0.45
TWI000A	3490	01JAN2012 1400	233.13	574.69	578.67		578.88	0.005283	3.68	63.32	27.19	0.43
TWI000A	3490	01JAN2012 1500	173.45	574.69	578.20		578.38	0.005350	3.40	51.06	25.07	0.42
TWI000A	3490	01JAN2012 1600	133.72	574.69	577.88		578.02	0.005087	3.10	43.19	23.54	0.40
TWI000A	3490	01JAN2012 1700	112.62	574.69	577.68		577.81	0.004899	2.91	38.76	22.63	0.39
TWI000A	3490	01JAN2012 1800	98.96	574.69	577.55		577.66	0.004788	2.77	35.68	21.98	0.38
TWI000A	3490	01JAN2012 1900	70.91	574.69	577.28		577.37	0.004020	2.36	30.03	20.71	0.35
TWI000A	3490	01JAN2012 2000	63.99	574.69	577.21		577.29	0.003725	2.23	28.65	20.29	0.33
TWI000A	3490	01JAN2012 2100	58.94	574.69	577.16		577.23	0.003504	2.14	27.58	19.95	0.32
TWI000A	3490	01JAN2012 2200	54.83	574.69	577.11		577.18	0.003321	2.05	26.68	19.67	0.31
TWI000A	3490	01JAN2012 2300	51.40	574.69	577.08		577.14	0.003148	1.98	25.96	19.44	0.30
TWI000A	3490	01JAN2012 2400	48.52	574.69	577.05		577.10	0.002988	1.91	25.37	19.24	0.29
TWI000A	3161	Max WS	3415.00	572.39	582.35		583.48	0.007306	9.52	531.85	153.01	0.65
TWI000A	3161	31DEC2011 2400	14.88	572.39	573.31		573.44	0.023169	2.88	5.17	11.71	0.76
TWI000A	3161	01JAN2012 0100	32.19	572.39	573.64		573.82	0.019021	3.47	9.29	13.63	0.74
TWI000A	3161	01JAN2012 0200	36.05	572.39	573.71		573.90	0.017894	3.52	10.24	14.03	0.73
TWI000A	3161	01JAN2012 0300	38.20	572.39	573.74		573.94	0.017262	3.54	10.79	14.25	0.72
TWI000A	3161	01JAN2012 0400	40.82	572.39	573.79		573.99	0.016666	3.57	11.43	14.50	0.71
TWI000A	3161	01JAN2012 0500	44.01	572.39	573.84		574.04	0.016002	3.61	12.21	14.81	0.70
TWI000A	3161	01JAN2012 0600	48.14	572.39	573.90		574.11	0.015479	3.66	13.14	15.16	0.69
TWI000A	3161	01JAN2012 0700	66.68	572.39	574.12		574.37	0.015143	4.02	16.58	16.33	0.70
TWI000A	3161	01JAN2012 0800	78.88	572.39	574.27		574.54	0.014140	4.15	19.00	16.87	0.69
TWI000A	3161	01JAN2012 0900	97.83	572.39	574.48		574.77	0.013023	4.33	22.60	17.65	0.67
TWI000A	3161	01JAN2012 1000	135.49	572.39	574.80		575.15	0.012600	4.74	28.58	18.87	0.68
TWI000A	3161	01JAN2012 1100	191.79	572.39	575.22		575.64	0.012310	5.23	36.69	20.44	0.69
TWI000A	3161	01JAN2012 1200	751.44	572.39	577.51		578.50	0.014065	8.02	93.73	29.75	0.80
TWI000A	3161	01JAN2012 1300	663.28	572.39	577.24		578.16	0.013730	7.71	86.02	28.45	0.78
TWI000A	3161	01JAN2012 1400	239.02	572.39	575.50		575.99	0.012549	5.62	42.55	21.50	0.70
TWI000A	3161	01JAN2012 1500	177.93	572.39	575.12		575.53	0.012310	5.11	34.81	20.09	0.68
TWI000A	3161	01JAN2012 1600	137.04	572.39	574.81		575.17	0.012627	4.76	28.78	18.91	0.68
TWI000A	3161	01JAN2012 1700	115.30	572.39	574.63		574.95	0.013038	4.56	25.28	18.21	0.68
TWI000A	3161	01JAN2012 1800	101.24	572.39	574.50		574.80	0.013141	4.39	23.06	17.75	0.68
TWI000A	3161	01JAN2012 1900	72.53	572.39	574.19		574.45	0.014844	4.11	17.66	16.57	0.70
TWI000A	3161	01JAN2012 2000	65.36	572.39	574.10		574.35	0.015430	4.02	16.26	16.25	0.71
TWI000A	3161	01JAN2012 2100	60.16	572.39	574.04		574.28	0.015692	3.94	15.27	15.95	0.71
TWI000A	3161	01JAN2012 2200	55.95	572.39	573.99		574.22	0.015763	3.8			

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	3010	Max WS	3394.40	570.55	581.16	581.11	582.41	0.007648	9.50	487.75	240.05	0.66
TWI000A	3010	31DEC2011 2400	15.15	570.55	571.68	571.73	0.004371	1.68	9.00	13.03	0.36	
TWI000A	3010	01JAN2012 0100	31.97	570.55	571.97	572.06	0.006828	2.46	13.00	14.83	0.46	
TWI000A	3010	01JAN2012 0200	36.03	570.55	572.02	572.12	0.007473	2.63	13.71	15.12	0.49	
TWI000A	3010	01JAN2012 0300	38.18	570.55	572.04	572.16	0.007711	2.71	14.08	15.28	0.50	
TWI000A	3010	01JAN2012 0400	40.79	570.55	572.07	572.19	0.008174	2.81	14.50	15.45	0.51	
TWI000A	3010	01JAN2012 0500	43.98	570.55	572.10	572.23	0.008659	2.93	14.99	15.64	0.53	
TWI000A	3010	01JAN2012 0600	48.10	570.55	572.14	572.29	0.009226	3.08	15.62	15.89	0.55	
TWI000A	3010	01JAN2012 0700	66.60	570.55	572.31	572.51	0.011118	3.61	18.44	16.96	0.61	
TWI000A	3010	01JAN2012 0800	78.77	570.55	572.43	572.66	0.011704	3.86	20.42	17.67	0.63	
TWI000A	3010	01JAN2012 0900	97.67	570.55	572.58	572.85	0.012727	4.22	23.14	18.60	0.67	
TWI000A	3010	01JAN2012 1000	135.21	570.55	572.83	573.19	0.014223	4.81	28.14	20.19	0.72	
TWI000A	3010	01JAN2012 1100	191.52	570.55	573.17	573.63	0.014798	5.43	35.26	21.57	0.75	
TWI000A	3010	01JAN2012 1200	739.56	570.55	575.57	576.51	0.012241	7.76	95.34	28.45	0.75	
TWI000A	3010	01JAN2012 1300	669.42	570.55	575.39	576.25	0.011733	7.42	90.21	27.94	0.73	
TWI000A	3010	01JAN2012 1400	239.29	570.55	573.45	573.97	0.014520	5.80	41.23	22.39	0.75	
TWI000A	3010	01JAN2012 1500	178.18	570.55	573.11	573.54	0.014476	5.27	33.83	21.35	0.74	
TWI000A	3010	01JAN2012 1600	137.21	570.55	572.85	573.21	0.014080	4.81	28.54	20.32	0.71	
TWI000A	3010	01JAN2012 1700	115.41	570.55	572.71	573.02	0.013451	4.51	25.59	19.40	0.69	
TWI000A	3010	01JAN2012 1800	101.32	570.55	572.61	572.89	0.012753	4.27	23.74	18.80	0.67	
TWI000A	3010	01JAN2012 1900	72.62	570.55	572.38	572.59	0.011104	3.70	19.63	17.39	0.61	
TWI000A	3010	01JAN2012 2000	65.40	570.55	572.31	572.51	0.010664	3.54	18.47	16.97	0.60	
TWI000A	3010	01JAN2012 2100	60.19	570.55	572.27	572.45	0.010259	3.41	17.65	16.67	0.58	
TWI000A	3010	01JAN2012 2200	55.98	570.55	572.23	572.39	0.009875	3.30	16.99	16.42	0.57	
TWI000A	3010	01JAN2012 2300	52.45	570.55	572.19	572.35	0.009510	3.19	16.43	16.21	0.56	
TWI000A	3010	01JAN2012 2400	49.50	570.55	572.16	572.31	0.009175	3.10	15.97	16.03	0.55	
TWI000A	2970	Max WS	3887.54	571.22	580.97	581.86	0.001601	7.71	663.51	220.61	0.47	
TWI000A	2970	31DEC2011 2400	15.26	571.22	571.57	571.60	0.004628	1.43	10.68	38.52	0.48	
TWI000A	2970	01JAN2012 0100	35.87	571.22	571.79	571.84	0.003850	1.89	18.99	39.10	0.48	
TWI000A	2970	01JAN2012 0200	40.46	571.22	571.83	571.89	0.003649	1.95	20.78	39.23	0.47	
TWI000A	2970	01JAN2012 0300	42.98	571.22	571.85	571.91	0.003642	1.99	21.57	39.28	0.47	
TWI000A	2970	01JAN2012 0400	46.03	571.22	571.87	571.94	0.003659	2.05	22.47	39.34	0.48	
TWI000A	2970	01JAN2012 0500	49.78	571.22	571.90	571.97	0.003660	2.11	23.57	39.42	0.48	
TWI000A	2970	01JAN2012 0600	54.61	571.22	571.94	572.01	0.003640	2.19	24.99	39.52	0.48	
TWI000A	2970	01JAN2012 0700	76.15	571.22	572.10	572.19	0.003381	2.43	31.35	39.96	0.48	
TWI000A	2970	01JAN2012 0800	90.93	571.22	572.21	572.31	0.003146	2.54	35.77	40.26	0.48	
TWI000A	2970	01JAN2012 0900	113.68	571.22	572.36	572.47	0.002983	2.72	41.76	40.66	0.47	
TWI000A	2970	01JAN2012 1000	158.62	571.22	572.63	572.77	0.002723	3.00	52.87	41.40	0.47	
TWI000A	2970	01JAN2012 1100	225.59	571.22	572.99	573.16	0.002448	3.31	68.22	42.41	0.46	
TWI000A	2970	01JAN2012 1200	886.34	571.22	575.61	575.95	0.001637	4.70	188.39	49.56	0.43	
TWI000A	2970	01JAN2012 1300	821.10	571.22	575.38	575.71	0.001688	4.63	177.25	48.94	0.43	
TWI000A	2970	01JAN2012 1400	285.05	571.22	573.29	573.48	0.002286	3.53	80.86	43.21	0.45	
TWI000A	2970	01JAN2012 1500	211.10	571.22	572.91	573.08	0.002511	3.25	64.90	42.19	0.46	
TWI000A	2970	01JAN2012 1600	161.93	571.22	572.65	572.79	0.002700	3.02	53.70	41.46	0.47	
TWI000A	2970	01JAN2012 1700	135.96	571.22	572.49	572.62	0.002870	2.88	47.24	41.03	0.47	
TWI000A	2970	01JAN2012 1800	119.08	571.22	572.39	572.51	0.002960	2.76	43.08	40.75	0.47	
TWI000A	2970	01JAN2012 1900	84.83	571.22	572.16	572.26	0.003244	2.50	33.94	40.13	0.48	
TWI000A	2970	01JAN2012 2000	76.18	571.22	572.10	572.19	0.003379	2.43	31.37	39.96	0.48	
TWI000A	2970	01JAN2012 2100	69.95	571.22	572.05	572.14	0.003472	2.37	29.52	39.83	0.49	
TWI000A	2970	01JAN2012 2200	64.92	571.22	572.01	572.10	0.003540	2.32	28.02	39.73	0.49	
TWI000A	2970	01JAN2012 2300	60.71	571.22	571.98	572.06	0.003588	2.27	26.78	39.64	0.49	
TWI000A	2970	01JAN2012 2400	57.19	571.22	571.96	572.03	0.003619	2.22	25.75	39.57	0.49	
TWI000A	2820	Bowen Rd		Culvert								
TWI000A	2668	Max WS	3942.57	566.85	578.08	578.64	0.005953	7.71	859.35	224.81	0.48	
TWI000A	2668	31DEC2011 2400	15.26	566.85	569.35	569.35	0.000251	0.60	25.50	13.81	0.08	
TWI000A	2668	01JAN2012 0100	35.87	566.85	569.91	569.93	0.000635	1.07	33.63	15.08	0.13	
TWI000A	2668	01JAN2012 0200	40.46	566.85	569.99	570.02	0.000725	1.16	34.94	15.27	0.13	
TWI000A	2668	01JAN2012 0300	42.98	566.85	570.04	570.07	0.000771	1.20	35.68	15.38	0.14	
TWI000A	2668	01JAN2012 0400	46.03	566.85	570.10	570.13	0.000825	1.26	36.59	15.51	0.14	
TWI000A	2668	01JAN2012 0500	49.78	566.85	570.17	570.20	0.000887	1.32	37.71	15.69	0.15	
TWI000A	2668	01JAN2012 0600	54.61	566.85	570.27	570.30	0.000982	1.39	39.19	16.26	0.16	
TWI000A	2668	01JAN2012 0700	76.15	566.85	570.59	570.64	0.001412	1.70	44.87	18.29	0.19	
TWI000A	2668	01JAN2012 0800	90.93	566.85	570.81	570.86	0.001651	1.86	48.88	19.60	0.21	
TWI000A	2668	01JAN2012 0900	113.68	566.85	571.07	571.14	0.002012	2.09	54.33	21.24	0.23	
TWI000A	2668	01JAN2012 1000	158.62	566.85	571.54	571.64	0.002390	2.46	64.57	22.42	0.26	
TWI000A	2668	01JAN2012 1100	225.59	566.85	572.13	572.26	0.002857	2.89	78.14	24.24	0.28	
TWI000A	2668	01JAN2012 1200	886.34	566.85	574.55	574.96	0.006410	5.42	214.36	120.52	0.45	
TWI000A	2668	01JAN2012 1300	821.10	566.85	574.49	574.86	0.005853	5.13	207.27	116.72	0.43	
TWI000A	2668	01JAN2012 1400	285.05	566.85	572.54	572.70	0.003314	3.22	88.54	26.12	0.31	
TWI000A	2668	01JAN2012 1500	211.10	566.85	572.03	572.15	0.002713	2.79	75.69	23.77	0.28	
TWI000A	2668	01JAN2012 1600	161.93	566.85	571.58	571.68	0.002395	2.47	65.46	22.52	0.26	
TWI000A	2668	01JAN2012 1700	135.96	566.85	571.33	571.41	0.002175	2.27	59.92	21.91	0.24	
TWI000A	2668	01JAN2012 1800	119.08	566.85	571.14	571.21	0.002043	2.13	55.83	21.44	0.23	
TWI000A	2668	01JAN2012 1900	84.83	566.85	570.72	570.77	0.001555	1.80	47.25	19.08	0.20	
TWI000A	2668	01JAN2012 2000	76.18	566.85	570.60	570.64	0.001411	1.70	44.90	18.30	0.19	
TWI000A	2668	01JAN2012 2100	69.95	566.85	570.51	570.55	0.001294	1.62	43.26	17.74	0.18	
TWI000A	2668	01JAN2012 2200	64.92	566.85	570.43	570.47	0.001193	1.55	41.97	17.28	0.17	
TWI000A	2668	01JAN2012 2300	60.71	566.85	570.37	570.40	0.001104	1.48	40.92	16.90	0.17	
TWI000A	266											

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		
TWI000A	2599	31DEC2011 2400	15.54	567.91	569.03	569.09	0.008675	1.94	7.99	11.49	0.41	
TWI000A	2599	01JAN2012 0100	35.69	567.91	569.48	569.58	0.010215	2.59	13.80	14.55	0.47	
TWI000A	2599	01JAN2012 0200	40.44	567.91	569.59	569.69	0.009638	2.62	15.43	15.27	0.46	
TWI000A	2599	01JAN2012 0300	42.96	567.91	569.63	569.74	0.009626	2.66	16.14	15.57	0.46	
TWI000A	2599	01JAN2012 0400	46.01	567.91	569.69	569.80	0.009511	2.70	17.04	15.95	0.46	
TWI000A	2599	01JAN2012 0500	49.75	567.91	569.76	569.87	0.009308	2.74	18.19	16.41	0.46	
TWI000A	2599	01JAN2012 0600	54.57	567.91	569.85	569.97	0.008987	2.77	19.71	17.01	0.45	
TWI000A	2599	01JAN2012 0700	76.09	567.91	570.19	570.32	0.008342	2.95	25.83	19.16	0.45	
TWI000A	2599	01JAN2012 0800	90.83	567.91	570.39	570.54	0.007956	3.04	29.87	20.36	0.44	
TWI000A	2599	01JAN2012 0900	113.54	567.91	570.66	570.82	0.007661	3.19	35.61	21.96	0.44	
TWI000A	2599	01JAN2012 1000	158.37	567.91	571.13	571.31	0.007190	3.40	46.61	24.85	0.44	
TWI000A	2599	01JAN2012 1100	225.34	567.91	571.73	571.93	0.006646	3.60	62.67	28.93	0.43	
TWI000A	2599	01JAN2012 1200	872.56	567.91	574.02	574.46	0.008301	5.46	186.19	98.85	0.52	
TWI000A	2599	01JAN2012 1300	828.95	567.91	573.99	574.40	0.007722	5.24	183.51	97.45	0.50	
TWI000A	2599	01JAN2012 1400	285.32	567.91	572.13	572.35	0.006927	3.81	74.82	32.67	0.44	
TWI000A	2599	01JAN2012 1500	211.35	567.91	571.64	571.83	0.006656	3.52	59.99	28.29	0.43	
TWI000A	2599	01JAN2012 1600	162.08	567.91	571.18	571.36	0.007058	3.39	47.76	25.17	0.43	
TWI000A	2599	01JAN2012 1700	136.05	567.91	570.93	571.09	0.007193	3.27	41.59	23.51	0.43	
TWI000A	2599	01JAN2012 1800	119.15	567.91	570.74	570.90	0.007394	3.19	37.37	22.43	0.44	
TWI000A	2599	01JAN2012 1900	84.90	567.91	570.31	570.45	0.008090	3.00	28.27	19.90	0.44	
TWI000A	2599	01JAN2012 2000	76.22	567.91	570.19	570.33	0.008323	2.95	25.88	19.18	0.45	
TWI000A	2599	01JAN2012 2100	69.98	567.91	570.10	570.23	0.008445	2.89	24.20	18.64	0.45	
TWI000A	2599	01JAN2012 2200	64.95	567.91	570.03	570.15	0.008510	2.84	22.84	18.17	0.45	
TWI000A	2599	01JAN2012 2300	60.73	567.91	569.96	570.08	0.008593	2.80	21.67	17.74	0.45	
TWI000A	2599	01JAN2012 2400	57.21	567.91	569.91	570.03	0.008629	2.76	20.71	17.39	0.45	
TWI000A	2389	Max WS	3939.07	565.02	576.00	576.55	0.005881	7.67	758.73	172.22	0.47	
TWI000A	2389	31DEC2011 2400	17.84	565.02	568.22	568.23	0.000178	0.55	32.57	14.73	0.06	
TWI000A	2389	01JAN2012 0100	34.96	565.02	568.46	568.47	0.000515	0.97	36.07	15.37	0.11	
TWI000A	2389	01JAN2012 0200	40.57	565.02	568.64	568.66	0.000565	1.04	39.04	16.09	0.12	
TWI000A	2389	01JAN2012 0300	43.08	565.02	568.69	568.71	0.000607	1.08	39.78	16.27	0.12	
TWI000A	2389	01JAN2012 0400	46.14	565.02	568.75	568.77	0.000652	1.13	40.81	16.50	0.13	
TWI000A	2389	01JAN2012 0500	49.88	565.02	568.83	568.85	0.000703	1.19	42.08	16.79	0.13	
TWI000A	2389	01JAN2012 0600	54.70	565.02	568.93	568.95	0.000766	1.25	43.72	17.16	0.14	
TWI000A	2389	01JAN2012 0700	76.33	565.02	569.33	569.36	0.001000	1.50	50.94	18.70	0.16	
TWI000A	2389	01JAN2012 0800	91.07	565.02	569.53	569.57	0.001180	1.66	54.74	19.45	0.17	
TWI000A	2389	01JAN2012 0900	113.82	565.02	569.83	569.88	0.001403	1.87	60.73	20.59	0.19	
TWI000A	2389	01JAN2012 1000	158.88	565.02	570.29	570.37	0.001827	2.24	70.79	22.38	0.22	
TWI000A	2389	01JAN2012 1100	226.54	565.02	570.88	570.99	0.002328	2.68	84.52	24.60	0.25	
TWI000A	2389	01JAN2012 1200	854.74	565.02	572.59	572.97	0.005905	5.41	225.68	125.83	0.43	
TWI000A	2389	01JAN2012 1300	858.45	565.02	572.74	573.07	0.005082	5.12	244.38	131.18	0.40	
TWI000A	2389	01JAN2012 1400	288.88	565.02	571.17	571.32	0.002978	3.14	93.37	41.32	0.29	
TWI000A	2389	01JAN2012 1500	214.00	565.02	570.81	570.91	0.002189	2.58	82.86	24.34	0.25	
TWI000A	2389	01JAN2012 1600	163.96	565.02	570.35	570.43	0.001860	2.28	72.02	22.58	0.22	
TWI000A	2389	01JAN2012 1700	137.55	565.02	570.10	570.16	0.001619	2.07	66.43	21.62	0.21	
TWI000A	2389	01JAN2012 1800	120.39	565.02	569.92	569.98	0.001440	1.92	62.76	20.97	0.20	
TWI000A	2389	01JAN2012 1900	85.85	565.02	569.45	569.49	0.001125	1.61	53.29	19.17	0.17	
TWI000A	2389	01JAN2012 2000	76.97	565.02	569.33	569.37	0.001015	1.51	50.99	18.70	0.16	
TWI000A	2389	01JAN2012 2100	70.65	565.02	569.24	569.27	0.000935	1.43	49.28	18.35	0.15	
TWI000A	2389	01JAN2012 2200	65.57	565.02	569.16	569.18	0.000874	1.37	47.77	18.04	0.15	
TWI000A	2389	01JAN2012 2300	61.31	565.02	569.07	569.10	0.000830	1.33	46.26	17.72	0.14	
TWI000A	2389	01JAN2012 2400	57.74	565.02	569.00	569.02	0.000792	1.28	44.99	17.44	0.14	
TWI000A	2202	Max WS	3928.78	565.73	575.10	575.57	0.004659	6.78	958.90	204.60	0.44	
TWI000A	2202	31DEC2011 2400	21.93	565.73	568.19	568.19	0.000222	0.54	40.95	26.07	0.08	
TWI000A	2202	01JAN2012 0100	33.65	565.73	568.38	568.39	0.000374	0.73	46.06	27.19	0.10	
TWI000A	2202	01JAN2012 0200	40.67	565.73	568.56	568.57	0.000407	0.80	51.12	28.25	0.10	
TWI000A	2202	01JAN2012 0300	43.17	565.73	568.60	568.61	0.000431	0.83	52.27	28.48	0.11	
TWI000A	2202	01JAN2012 0400	46.24	565.73	568.66	568.67	0.000453	0.86	53.90	28.81	0.11	
TWI000A	2202	01JAN2012 0500	49.97	565.73	568.73	568.74	0.000477	0.89	55.93	29.22	0.11	
TWI000A	2202	01JAN2012 0600	54.79	565.73	568.82	568.83	0.000504	0.94	58.58	29.74	0.12	
TWI000A	2202	01JAN2012 0700	76.57	565.73	569.20	569.21	0.000595	1.09	70.24	32.06	0.13	
TWI000A	2202	01JAN2012 0800	91.21	565.73	569.37	569.40	0.000679	1.20	76.05	33.19	0.14	
TWI000A	2202	01JAN2012 0900	113.96	565.73	569.65	569.68	0.000773	1.33	85.46	35.02	0.15	
TWI000A	2202	01JAN2012 1000	159.19	565.73	570.07	570.11	0.000968	1.58	102.03	45.13	0.17	
TWI000A	2202	01JAN2012 1100	227.20	565.73	570.61	570.66	0.001222	1.82	132.82	95.27	0.19	
TWI000A	2202	01JAN2012 1200	838.65	565.73	571.89	572.07	0.003038	3.71	342.52	181.31	0.32	
TWI000A	2202	01JAN2012 1300	892.44	565.73	572.15	572.30	0.002574	3.55	388.51	183.02	0.30	
TWI000A	2202	01JAN2012 1400	293.45	565.73	570.83	570.90	0.001532	2.15	159.10	141.22	0.22	
TWI000A	2202	01JAN2012 1500	216.95	565.73	570.55	570.60	0.001193	1.78	127.93	83.96	0.19	
TWI000A	2202	01JAN2012 1600	165.75	565.73	570.12	570.16	0.001003	1.61	104.29	46.26	0.17	
TWI000A	2202	01JAN2012 1700	138.99	565.73	569.89	569.93	0.000886	1.47	94.46	40.11	0.16	
TWI000A	2202	01JAN2012 1800	121.56	565.73	569.74	569.77	0.000796	1.37	88.74	35.68	0.15	
TWI000A	2202	01JAN2012 1900	86.78	565.73	569.30	569.33	0.000669	1.18	73.73	32.74	0.14	
TWI000A	2202	01JAN2012 2000	77.66	565.73	569.20	569.21	0.000613	1.11	70.22	32.05	0.13	
TWI000A	2202	01JAN2012 2100	71.28	565.73	569.11	569.13	0.000573	1.05	67.61	31.53	0.13	
TWI000A	2202	01JAN2012 2200	66.17	565.73	569.04	569.05	0.000545	1.01	65.23	31.05	0.12	
TWI000A	2202	01JAN2012 2300	61.86	565.73	568.96	568.97	0.000529	0.99	62.76	30.54	0.12	
TWI000A	2202	01JAN2012 2400	58.23	565.73	568.89	568.90	0.000515	0.96	60.69	30.15	0.12	
TWI000A	2201	Lat Struct										
TWI000A	2108	Max WS	3910.41	566.08	574.56	575.06	0.006241	7.31	1208.96	298.88	0.51	
TWI000A	2108	31DEC2011 2400	24.60	566.08	568.15	568.16	0.000503	0.73	33.92	25.46	0.11	

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	2108	01JAN2012 0100	32.78	566.08	568.33		568.34	0.000623	0.85	38.62	26.84	0.12
TWI000A	2108	01JAN2012 0200	40.73	566.08	568.51		568.52	0.000693	0.94	43.47	28.20	0.13
TWI000A	2108	01JAN2012 0300	43.22	566.08	568.54		568.56	0.000730	0.97	44.53	28.49	0.14
TWI000A	2108	01JAN2012 0400	46.28	566.08	568.60		568.61	0.000762	1.00	46.08	28.90	0.14
TWI000A	2108	01JAN2012 0500	50.01	566.08	568.66		568.68	0.000792	1.04	48.05	29.42	0.14
TWI000A	2108	01JAN2012 0600	54.82	566.08	568.75		568.77	0.000824	1.08	50.65	30.10	0.15
TWI000A	2108	01JAN2012 0700	76.70	566.08	569.12		569.14	0.000914	1.23	62.22	32.83	0.16
TWI000A	2108	01JAN2012 0800	91.25	566.08	569.29		569.32	0.001018	1.34	67.88	34.08	0.17
TWI000A	2108	01JAN2012 0900	113.94	566.08	569.55		569.59	0.001123	1.48	77.19	71.50	0.18
TWI000A	2108	01JAN2012 1000	158.91	566.08	569.96		570.00	0.001321	1.68	106.80	115.97	0.20
TWI000A	2108	01JAN2012 1100	226.79	566.08	570.49		570.54	0.001400	1.88	147.27	174.48	0.21
TWI000A	2108	01JAN2012 1200	833.29	566.08	571.56		571.74	0.003872	3.80	423.52	229.63	0.36
TWI000A	2108	01JAN2012 1300	914.58	566.08	571.87		572.03	0.003209	3.66	495.40	233.76	0.33
TWI000A	2108	01JAN2012 1400	296.92	566.08	570.67		570.74	0.002016	2.26	162.55	195.93	0.25
TWI000A	2108	01JAN2012 1500	219.35	566.08	570.43		570.48	0.001391	1.86	142.95	167.83	0.20
TWI000A	2108	01JAN2012 1600	166.95	566.08	570.01		570.05	0.001372	1.73	110.07	121.91	0.20
TWI000A	2108	01JAN2012 1700	139.92	566.08	569.79		569.83	0.001291	1.63	86.01	91.06	0.19
TWI000A	2108	01JAN2012 1800	122.28	566.08	569.65		569.68	0.001159	1.52	80.53	78.85	0.18
TWI000A	2108	01JAN2012 1900	87.28	566.08	569.22		569.25	0.001027	1.33	65.49	33.56	0.17
TWI000A	2108	01JAN2012 2000	78.04	566.08	569.12		569.14	0.000951	1.26	62.10	32.80	0.16
TWI000A	2108	01JAN2012 2100	71.60	566.08	569.04		569.06	0.000897	1.20	59.60	32.23	0.16
TWI000A	2108	01JAN2012 2200	66.49	566.08	568.97		568.99	0.000863	1.16	57.28	31.70	0.15
TWI000A	2108	01JAN2012 2300	62.14	566.08	568.89		568.91	0.000851	1.13	54.81	31.12	0.15
TWI000A	2108	01JAN2012 2400	58.50	566.08	568.82		568.84	0.000839	1.11	52.74	30.63	0.15
TWI000A	1959	Max WS	3883.78	565.50	573.97		574.22	0.003874	5.78	1464.31	347.20	0.43
TWI000A	1959	31DEC2011 2400	27.52	565.50	567.35		567.46	0.010342	2.57	10.73	13.07	0.50
TWI000A	1959	01JAN2012 0100	31.93	565.50	567.43		567.54	0.011145	2.73	11.69	13.73	0.52
TWI000A	1959	01JAN2012 0200	40.80	565.50	567.60		567.73	0.010963	2.87	14.21	15.33	0.53
TWI000A	1959	01JAN2012 0300	43.29	565.50	567.64		567.77	0.010919	2.91	14.90	15.74	0.53
TWI000A	1959	01JAN2012 0400	46.34	565.50	567.69		567.83	0.010996	2.96	15.65	16.18	0.53
TWI000A	1959	01JAN2012 0500	50.08	565.50	567.75		567.89	0.011094	3.03	16.55	16.88	0.54
TWI000A	1959	01JAN2012 0600	54.88	565.50	567.81		567.96	0.011155	3.10	17.71	19.84	0.54
TWI000A	1959	01JAN2012 0700	76.87	565.50	568.06		568.25	0.011899	3.44	22.32	28.85	0.57
TWI000A	1959	01JAN2012 0800	91.34	565.50	568.20		568.41	0.012315	3.63	25.13	33.43	0.58
TWI000A	1959	01JAN2012 0900	113.97	565.50	568.40		568.64	0.012541	3.86	29.53	38.53	0.60
TWI000A	1959	01JAN2012 1000	158.53	565.50	568.70		568.99	0.013663	4.32	36.68	46.89	0.63
TWI000A	1959	01JAN2012 1100	226.19	565.50	569.12		569.46	0.013787	4.70	48.13	68.21	0.65
TWI000A	1959	01JAN2012 1200	809.87	565.50	570.55		570.82	0.009771	4.94	339.50	311.10	0.58
TWI000A	1959	01JAN2012 1300	959.21	565.50	571.48		571.58	0.002714	3.28	633.62	321.13	0.33
TWI000A	1959	01JAN2012 1400	301.63	565.50	569.66		569.96	0.012385	4.33	70.23	126.84	0.62
TWI000A	1959	01JAN2012 1500	222.85	565.50	569.17		569.48	0.012352	4.49	49.65	71.86	0.62
TWI000A	1959	01JAN2012 1600	168.71	565.50	568.81		569.09	0.012689	4.26	39.61	51.34	0.62
TWI000A	1959	01JAN2012 1700	141.27	565.50	568.62		568.88	0.012524	4.07	34.75	44.34	0.61
TWI000A	1959	01JAN2012 1800	123.34	565.50	568.50		568.73	0.012120	3.88	31.76	41.05	0.59
TWI000A	1959	01JAN2012 1900	88.04	565.50	568.20		568.39	0.011430	3.50	25.14	33.44	0.56
TWI000A	1959	01JAN2012 2000	78.58	565.50	568.10		568.28	0.011456	3.41	23.03	30.08	0.56
TWI000A	1959	01JAN2012 2100	72.08	565.50	568.03		568.20	0.011208	3.32	21.74	27.83	0.55
TWI000A	1959	01JAN2012 2200	66.93	565.50	567.98		568.14	0.011054	3.24	20.66	25.90	0.54
TWI000A	1959	01JAN2012 2300	62.54	565.50	567.92		568.08	0.011086	3.19	19.60	24.03	0.54
TWI000A	1959	01JAN2012 2400	58.87	565.50	567.87		568.03	0.011071	3.14	18.73	22.36	0.54
TWI000A	1815	Max WS	3868.34	564.98	573.70		573.78	0.001340	3.99	2044.31	381.82	0.25
TWI000A	1815	31DEC2011 2400	29.40	564.98	566.69		566.71	0.000931	1.07	28.54	26.47	0.16
TWI000A	1815	01JAN2012 0100	31.35	564.98	566.67		566.69	0.001107	1.16	28.05	26.23	0.18
TWI000A	1815	01JAN2012 0200	40.74	564.98	566.85		566.88	0.001235	1.31	33.58	42.48	0.19
TWI000A	1815	01JAN2012 0300	43.25	564.98	566.91		566.93	0.001232	1.34	36.19	51.52	0.19
TWI000A	1815	01JAN2012 0400	46.30	564.98	566.95		566.98	0.001280	1.38	38.54	55.37	0.19
TWI000A	1815	01JAN2012 0500	49.92	564.98	567.00		567.03	0.001342	1.44	41.31	65.93	0.20
TWI000A	1815	01JAN2012 0600	54.68	564.98	567.05		567.09	0.001419	1.51	45.41	78.87	0.20
TWI000A	1815	01JAN2012 0700	76.55	564.98	567.21		567.26	0.001953	1.85	60.39	123.68	0.24
TWI000A	1815	01JAN2012 0800	90.87	564.98	567.33		567.38	0.002014	1.95	78.93	163.88	0.25
TWI000A	1815	01JAN2012 0900	113.11	564.98	567.50		567.55	0.001995	2.03	107.69	182.32	0.25
TWI000A	1815	01JAN2012 1000	157.00	564.98	567.75		567.80	0.001957	2.13	155.77	194.42	0.25
TWI000A	1815	01JAN2012 1100	224.04	564.98	568.12		568.16	0.001701	2.14	229.64	217.99	0.23
TWI000A	1815	01JAN2012 1200	737.01	564.98	569.91		569.94	0.000967	2.24	741.52	310.44	0.19
TWI000A	1815	01JAN2012 1300	1012.76	564.98	571.30		571.31	0.000456	1.85	1187.10	333.38	0.14
TWI000A	1815	01JAN2012 1400	307.18	564.98	568.77		568.79	0.000947	1.82	398.14	290.07	0.18
TWI000A	1815	01JAN2012 1500	225.15	564.98	568.26		568.30	0.001259	1.90	263.48	236.82	0.20
TWI000A	1815	01JAN2012 1600	170.00	564.98	567.95		567.99	0.001416	1.89	195.38	202.02	0.21
TWI000A	1815	01JAN2012 1700	142.03	564.98	567.76		567.80	0.001573	1.92	157.15	194.69	0.22
TWI000A	1815	01JAN2012 1800	123.82	564.98	567.63		567.67	0.001667	1.91	132.44	188.94	0.23
TWI000A	1815	01JAN2012 1900	88.70	564.98	567.41		567.45	0.001575	1.76	91.43	175.69	0.22
TWI000A	1815	01JAN2012 2000	78.82	564.98	567.29		567.33	0.001688	1.77	72.20	154.64	0.22
TWI000A	1815	01JAN2012 2100	72.25	564.98	567.23		567.27	0.001655	1.72	63.06	132.40	0.22
TWI000A	1815	01JAN2012 2200	67.06	564.98	567.18		567.22	0.001602	1.67	57.13	113.19	0.22
TWI000A	1815	01JAN2012 2300	62.66	564.98	567.14		567.18	0.001539	1.61	52.87	98.28	0.21
TWI000A	1815	01JAN2012 2400	58.96	564.98	567.10		567.14	0.001472	1.56	49.78	89.20	0.21
TWI000A	1704	Max WS	3923.64	565.00	573.60		573.66	0.000885	3.43	2453.17	412.00	0.22
TWI000A	1704	31DEC2011 2400	34.01	5								

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	1704	01JAN2012 0400	47.79	565.00	566.84		566.85	0.001420	1.14	86.41	222.96	0.20
TWI000A	1704	01JAN2012 0500	51.55	565.00	566.88		566.89	0.001333	1.13	96.01	231.79	0.19
TWI000A	1704	01JAN2012 0600	56.62	565.00	566.93		566.94	0.001244	1.13	108.51	242.89	0.19
TWI000A	1704	01JAN2012 0700	79.28	565.00	567.08		567.09	0.001241	1.22	146.31	266.46	0.19
TWI000A	1704	01JAN2012 0800	94.50	565.00	567.21		567.22	0.001024	1.19	182.01	275.69	0.18
TWI000A	1704	01JAN2012 0900	117.70	565.00	567.37		567.38	0.000890	1.19	226.63	282.77	0.17
TWI000A	1704	01JAN2012 1000	163.35	565.00	567.64		567.65	0.000766	1.22	303.81	295.70	0.16
TWI000A	1704	01JAN2012 1100	233.70	565.00	568.02		568.03	0.000628	1.25	417.56	304.90	0.15
TWI000A	1704	01JAN2012 1200	821.80	565.00	569.84		569.85	0.000548	1.74	1019.70	349.50	0.15
TWI000A	1704	01JAN2012 1300	1075.02	565.00	571.26		571.28	0.000271	1.50	1536.37	374.51	0.11
TWI000A	1704	01JAN2012 1400	325.61	565.00	568.71		568.72	0.000355	1.13	637.86	327.71	0.12
TWI000A	1704	01JAN2012 1500	236.26	565.00	568.19		568.20	0.000449	1.11	471.64	309.54	0.13
TWI000A	1704	01JAN2012 1600	178.27	565.00	567.87		567.87	0.000509	1.08	372.37	300.98	0.13
TWI000A	1704	01JAN2012 1700	148.52	565.00	567.67		567.68	0.000581	1.08	313.13	296.36	0.14
TWI000A	1704	01JAN2012 1800	129.23	565.00	567.53		567.54	0.000643	1.08	273.18	290.23	0.14
TWI000A	1704	01JAN2012 1900	93.13	565.00	567.31		567.32	0.000681	1.01	210.22	280.23	0.14
TWI000A	1704	01JAN2012 2000	82.14	565.00	567.19		567.20	0.000837	1.06	176.50	274.55	0.16
TWI000A	1704	01JAN2012 2100	75.15	565.00	567.13		567.14	0.000911	1.07	158.96	270.09	0.16
TWI000A	1704	01JAN2012 2200	69.72	565.00	567.08		567.09	0.000971	1.08	145.61	266.26	0.17
TWI000A	1704	01JAN2012 2300	65.09	565.00	567.03		567.04	0.001018	1.08	134.61	260.56	0.17
TWI000A	1704	01JAN2012 2400	61.23	565.00	567.00		567.01	0.001056	1.08	125.60	252.31	0.17
TWI000A	1522	Max WS	3917.53	564.01	573.45		573.51	0.000714	3.07	2157.35	367.42	0.19
TWI000A	1522	31DEC2011 2400	43.43	564.01	566.33		566.34	0.000806	1.11	57.45	103.01	0.15
TWI000A	1522	01JAN2012 0100	28.43	564.01	566.36		566.36	0.000315	0.70	60.83	106.16	0.10
TWI000A	1522	01JAN2012 0200	41.18	564.01	566.60		566.61	0.000335	0.77	89.18	131.01	0.10
TWI000A	1522	01JAN2012 0300	44.28	564.01	566.67		566.67	0.000322	0.77	98.59	139.24	0.10
TWI000A	1522	01JAN2012 0400	47.50	564.01	566.71		566.71	0.000335	0.79	104.21	148.68	0.10
TWI000A	1522	01JAN2012 0500	51.24	564.01	566.74		566.75	0.000354	0.82	109.97	158.04	0.10
TWI000A	1522	01JAN2012 0600	56.16	564.01	566.79		566.80	0.000387	0.86	117.45	167.51	0.11
TWI000A	1522	01JAN2012 0700	77.50	564.01	566.94		566.95	0.000487	1.00	144.07	184.37	0.12
TWI000A	1522	01JAN2012 0800	92.79	564.01	567.09		567.10	0.000479	1.02	172.51	202.47	0.12
TWI000A	1522	01JAN2012 0900	115.42	564.01	567.25		567.26	0.000493	1.07	207.17	219.87	0.13
TWI000A	1522	01JAN2012 1000	158.96	564.01	567.53		567.54	0.000491	1.12	271.17	242.76	0.13
TWI000A	1522	01JAN2012 1100	228.60	564.01	567.92		567.93	0.000436	1.16	370.66	259.20	0.12
TWI000A	1522	01JAN2012 1200	703.92	564.01	569.76		569.77	0.000316	1.38	898.52	307.03	0.11
TWI000A	1522	01JAN2012 1300	1148.64	564.01	571.22		571.23	0.000243	1.45	1369.87	338.20	0.10
TWI000A	1522	01JAN2012 1400	338.39	564.01	568.66		568.66	0.000282	1.09	570.62	285.14	0.10
TWI000A	1522	01JAN2012 1500	241.43	564.01	568.12		568.13	0.000334	1.06	423.13	265.12	0.11
TWI000A	1522	01JAN2012 1600	182.00	564.01	567.79		567.80	0.000362	1.02	336.72	255.32	0.11
TWI000A	1522	01JAN2012 1700	150.73	564.01	567.58		567.59	0.000388	1.01	285.06	246.14	0.11
TWI000A	1522	01JAN2012 1800	130.60	564.01	567.44		567.45	0.000404	1.00	250.50	237.20	0.11
TWI000A	1522	01JAN2012 1900	95.82	564.01	567.22		567.23	0.000364	0.91	201.10	217.18	0.11
TWI000A	1522	01JAN2012 2000	83.10	564.01	567.09		567.10	0.000381	0.91	173.22	202.93	0.11
TWI000A	1522	01JAN2012 2100	75.81	564.01	567.02		567.03	0.000378	0.90	159.29	194.07	0.11
TWI000A	1522	01JAN2012 2200	70.23	564.01	566.97		566.98	0.000372	0.88	149.15	187.67	0.11
TWI000A	1522	01JAN2012 2300	65.51	564.01	566.92		566.93	0.000365	0.86	140.92	182.51	0.11
TWI000A	1522	01JAN2012 2400	61.58	564.01	566.89		566.89	0.000358	0.85	133.90	178.33	0.11
TWI000A	1354	Max WS	3947.86	563.89	573.30		573.39	0.000991	3.69	1830.60	382.98	0.23
TWI000A	1354	31DEC2011 2400	47.53	563.89	566.22		566.24	0.000655	1.07	66.92	107.53	0.14
TWI000A	1354	01JAN2012 0100	27.18	563.89	566.32		566.33	0.00162	0.55	78.27	113.36	0.07
TWI000A	1354	01JAN2012 0200	40.86	563.89	566.56		566.56	0.000237	0.61	106.76	132.08	0.08
TWI000A	1354	01JAN2012 0300	44.49	563.89	566.63		566.63	0.000244	0.60	116.56	139.24	0.09
TWI000A	1354	01JAN2012 0400	47.78	563.89	566.67		566.67	0.000258	0.62	121.91	142.44	0.09
TWI000A	1354	01JAN2012 0500	51.56	563.89	566.70		566.71	0.000269	0.64	126.98	143.25	0.09
TWI000A	1354	01JAN2012 0600	56.52	563.89	566.75		566.75	0.000283	0.67	133.15	144.22	0.09
TWI000A	1354	01JAN2012 0700	77.33	563.89	566.88		566.89	0.000362	0.80	152.84	147.45	0.11
TWI000A	1354	01JAN2012 0800	93.13	563.89	567.03		567.03	0.000362	0.84	174.61	151.60	0.11
TWI000A	1354	01JAN2012 0900	115.92	563.89	567.19		567.20	0.000386	0.92	199.42	156.18	0.11
TWI000A	1354	01JAN2012 1000	159.21	563.89	567.46		567.47	0.000421	1.04	242.44	169.58	0.12
TWI000A	1354	01JAN2012 1100	229.90	563.89	567.85		567.87	0.000443	1.18	312.74	180.34	0.13
TWI000A	1354	01JAN2012 1200	676.53	563.89	569.70		569.72	0.000410	1.61	684.54	225.66	0.13
TWI000A	1354	01JAN2012 1300	1216.66	563.89	571.16		571.19	0.000391	1.89	1071.08	321.05	0.14
TWI000A	1354	01JAN2012 1400	352.71	563.89	568.60		568.62	0.000355	1.25	452.73	194.83	0.12
TWI000A	1354	01JAN2012 1500	248.97	563.89	568.07		568.08	0.000369	1.14	351.46	183.76	0.12
TWI000A	1354	01JAN2012 1600	187.58	563.89	567.73		567.74	0.000362	1.04	291.41	178.43	0.11
TWI000A	1354	01JAN2012 1700	154.78	563.89	567.53		567.54	0.000365	0.99	254.65	175.09	0.11
TWI000A	1354	01JAN2012 1800	133.69	563.89	567.38		567.39	0.000341	0.92	230.70	161.42	0.11
TWI000A	1354	01JAN2012 1900	99.16	563.89	567.18		567.18	0.000290	0.79	197.68	155.87	0.10
TWI000A	1354	01JAN2012 2000	85.17	563.89	567.04		567.05	0.000292	0.76	177.00	152.04	0.10
TWI000A	1354	01JAN2012 2100	77.56	563.89	566.97		566.98	0.000287	0.73	166.46	150.06	0.10
TWI000A	1354	01JAN2012 2200	71.67	563.89	566.92		566.93	0.000279	0.71	158.84	148.61	0.09
TWI000A	1354	01JAN2012 2300	66.88	563.89	566.88		566.88	0.000272	0.69	152.58	147.40	0.09
TWI000A	1354	01JAN2012 2400	62.80	563.89	566.84		566.85	0.000265	0.67	147.15	146.40	0.09
TWI000A	1241	Max WS	3956.10	563.81	572.63		573.26	0.006068	8.84	874.51	324.46	0.55
TWI000A	1241	31DEC2011 2400	52.95	563.81	566.12		566.14	0.001042	1.35	39.21	21.92	0.18
TWI000A	1241	01JAN2012 0100	30.98	563.81	566.29		566.30	0.000269	0.72	43.16	22.47	0.09
TWI000A	1241	01JAN2012 0200	45.02	563.81	566.51		566.53	0.000420				

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	1241	01JAN2012 0700	81.30	563.81	566.79		566.83	0.000944	1.48	54.96	25.11	0.17
TWI000A	1241	01JAN2012 0800	97.21	563.81	566.92		566.96	0.001124	1.67	58.27	26.06	0.19
TWI000A	1241	01JAN2012 0900	119.88	563.81	567.06		567.12	0.001415	1.95	61.89	27.27	0.22
TWI000A	1241	01JAN2012 1000	162.75	563.81	567.28		567.37	0.001955	2.42	68.12	29.23	0.26
TWI000A	1241	01JAN2012 1100	233.22	563.81	567.61		567.75	0.002699	3.07	78.27	32.17	0.31
TWI000A	1241	01JAN2012 1200	738.71	563.81	569.08		569.63	0.006329	6.13	143.81	62.78	0.51
TWI000A	1241	01JAN2012 1300	1253.51	563.81	570.69		571.18	0.004521	6.35	294.14	205.79	0.45
TWI000A	1241	01JAN2012 1400	360.15	563.81	568.31		568.53	0.003054	3.76	103.64	42.78	0.34
TWI000A	1241	01JAN2012 1500	254.54	563.81	567.84		567.98	0.002496	3.10	85.82	34.32	0.30
TWI000A	1241	01JAN2012 1600	192.83	563.81	567.55		567.66	0.001965	2.59	76.54	31.68	0.26
TWI000A	1241	01JAN2012 1700	159.67	563.81	567.37		567.45	0.001673	2.29	70.93	30.07	0.24
TWI000A	1241	01JAN2012 1800	138.42	563.81	567.25		567.32	0.001465	2.08	67.31	28.98	0.22
TWI000A	1241	01JAN2012 1900	104.20	563.81	567.08		567.12	0.001036	1.68	62.52	27.47	0.19
TWI000A	1241	01JAN2012 2000	89.82	563.81	566.96		566.99	0.000913	1.52	59.19	26.37	0.17
TWI000A	1241	01JAN2012 2100	82.13	563.81	566.89		566.93	0.000834	1.43	57.57	25.82	0.17
TWI000A	1241	01JAN2012 2200	76.23	563.81	566.85		566.88	0.000766	1.35	56.42	25.48	0.16
TWI000A	1241	01JAN2012 2300	71.41	563.81	566.81		566.84	0.000708	1.29	55.47	25.24	0.15
TWI000A	1241	01JAN2012 2400	67.32	563.81	566.78		566.80	0.000658	1.23	54.66	25.03	0.15
TWI000A	1205	Max WS	3898.20	563.78	572.00	572.21	573.23	0.012260	11.79	656.99	310.23	0.76
TWI000A	1205	31DEC2011 2400	54.14	563.78	566.07		566.10	0.001217	1.45	37.36	20.63	0.19
TWI000A	1205	01JAN2012 0100	32.16	563.78	566.28		566.29	0.000308	0.77	41.76	21.14	0.10
TWI000A	1205	01JAN2012 0200	46.24	563.78	566.49		566.51	0.000469	1.00	46.33	21.71	0.12
TWI000A	1205	01JAN2012 0300	50.04	563.78	566.56		566.58	0.000500	1.05	47.84	21.90	0.12
TWI000A	1205	01JAN2012 0400	53.37	563.78	566.60		566.62	0.000545	1.10	48.55	21.99	0.13
TWI000A	1205	01JAN2012 0500	57.17	563.78	566.63		566.65	0.000602	1.16	49.19	22.07	0.14
TWI000A	1205	01JAN2012 0600	62.06	563.78	566.66		566.68	0.000679	1.24	49.94	22.16	0.15
TWI000A	1205	01JAN2012 0700	82.51	563.78	566.75		566.79	0.001068	1.59	51.93	22.52	0.18
TWI000A	1205	01JAN2012 0800	98.42	563.78	566.87		566.92	0.001297	1.80	54.69	23.38	0.20
TWI000A	1205	01JAN2012 0900	121.08	563.78	566.99		567.06	0.001684	2.11	57.56	24.68	0.23
TWI000A	1205	01JAN2012 1000	163.92	563.78	567.18		567.29	0.002416	2.65	62.80	30.48	0.28
TWI000A	1205	01JAN2012 1100	234.35	563.78	567.47		567.64	0.003456	3.39	72.87	39.12	0.34
TWI000A	1205	01JAN2012 1200	761.55	563.78	568.58		569.34	0.010567	7.32	122.34	49.80	0.64
TWI000A	1205	01JAN2012 1300	1260.78	563.78	570.41		571.06	0.006127	7.12	237.31	123.20	0.51
TWI000A	1205	01JAN2012 1400	361.73	563.78	568.18		568.42	0.003594	3.99	103.34	45.99	0.36
TWI000A	1205	01JAN2012 1500	255.89	563.78	567.72		567.89	0.003055	3.36	82.85	41.49	0.33
TWI000A	1205	01JAN2012 1600	194.15	563.78	567.46		567.58	0.002404	2.82	72.45	38.95	0.29
TWI000A	1205	01JAN2012 1700	160.95	563.78	567.29		567.39	0.002028	2.50	66.36	33.85	0.26
TWI000A	1205	01JAN2012 1800	139.69	563.78	567.18		567.26	0.001757	2.26	62.77	30.44	0.24
TWI000A	1205	01JAN2012 1900	105.49	563.78	567.03		567.08	0.001210	1.81	58.62	25.96	0.20
TWI000A	1205	01JAN2012 2000	91.08	563.78	566.91		566.96	0.001049	1.64	55.75	23.69	0.18
TWI000A	1205	01JAN2012 2100	83.38	563.78	566.86		566.89	0.000947	1.53	54.38	23.28	0.17
TWI000A	1205	01JAN2012 2200	77.48	563.78	566.81		566.85	0.000863	1.45	53.42	22.99	0.17
TWI000A	1205	01JAN2012 2300	72.66	563.78	566.78		566.81	0.000795	1.38	52.63	22.74	0.16
TWI000A	1205	01JAN2012 2400	68.57	563.78	566.75		566.78	0.000737	1.32	51.95	22.53	0.15
TWI000A	1115	Max WS	3884.53	564.00	571.83		571.86	0.000109	1.33	3243.89	521.43	0.09
TWI000A	1115	31DEC2011 2400	54.52	564.00	566.03		566.03	0.000015	0.20	278.77	359.76	0.03
TWI000A	1115	01JAN2012 0100	35.26	564.00	566.27		566.27	0.000004	0.11	316.13	378.04	0.01
TWI000A	1115	01JAN2012 0200	49.96	564.00	566.48		566.48	0.000006	0.14	348.70	381.53	0.02
TWI000A	1115	01JAN2012 0300	54.15	564.00	566.55		566.55	0.000007	0.15	359.45	382.68	0.02
TWI000A	1115	01JAN2012 0400	57.55	564.00	566.58		566.58	0.000007	0.16	364.41	383.21	0.02
TWI000A	1115	01JAN2012 0500	61.35	564.00	566.61		566.61	0.000008	0.17	368.66	383.66	0.02
TWI000A	1115	01JAN2012 0600	66.21	564.00	566.64		566.64	0.000009	0.18	373.63	384.19	0.02
TWI000A	1115	01JAN2012 0700	86.04	564.00	566.72		566.72	0.000014	0.22	385.95	385.49	0.02
TWI000A	1115	01JAN2012 0800	102.22	564.00	566.83		566.83	0.000017	0.25	404.04	387.41	0.03
TWI000A	1115	01JAN2012 0900	124.73	564.00	566.94		566.94	0.000021	0.30	421.69	389.27	0.03
TWI000A	1115	01JAN2012 1000	167.02	564.00	567.11		567.12	0.000031	0.38	449.34	392.55	0.04
TWI000A	1115	01JAN2012 1100	236.98	564.00	567.38		567.39	0.000047	0.49	493.71	401.70	0.05
TWI000A	1115	01JAN2012 1200	824.82	564.00	568.40		568.42	0.000222	1.27	679.25	439.08	0.11
TWI000A	1115	01JAN2012 1300	1296.82	564.00	570.27		570.28	0.000027	0.57	2455.25	478.00	0.04
TWI000A	1115	01JAN2012 1400	371.40	564.00	568.12		568.12	0.000057	0.62	625.08	432.17	0.06
TWI000A	1115	01JAN2012 1500	261.94	564.00	567.65		567.65	0.000044	0.50	538.81	411.99	0.05
TWI000A	1115	01JAN2012 1600	199.70	564.00	567.40		567.40	0.000033	0.41	496.16	402.19	0.04
TWI000A	1115	01JAN2012 1700	165.91	564.00	567.24		567.24	0.000027	0.36	469.42	396.73	0.04
TWI000A	1115	01JAN2012 1800	144.51	564.00	567.13		567.13	0.000023	0.32	452.06	393.12	0.03
TWI000A	1115	01JAN2012 1900	110.77	564.00	567.00		567.00	0.000016	0.26	430.63	390.14	0.03
TWI000A	1115	01JAN2012 2000	95.77	564.00	566.88		566.88	0.000014	0.23	412.49	388.30	0.03
TWI000A	1115	01JAN2012 2100	87.92	564.00	566.83		566.83	0.000012	0.22	403.59	387.36	0.02
TWI000A	1115	01JAN2012 2200	82.01	564.00	566.79		566.79	0.000011	0.21	397.38	386.70	0.02
TWI000A	1115	01JAN2012 2300	77.14	564.00	566.76		566.76	0.000010	0.20	392.21	386.16	0.02
TWI000A	1115	01JAN2012 2400	72.99	564.00	566.73		566.73	0.000010	0.19	387.72	385.68	0.02
TWI000A	1076.5	Lat Struct										
TWI000A	1038	Max WS	4334.44	564.00	571.83		571.85	0.000049	1.16	4085.73	636.63	0.07
TWI000A	1038	31DEC2011 2400	49.23	564.00	566.03		566.03	0.000002	0.09	528.91	464.71	0.01
TWI000A	1038	01JAN2012 0100	35.19	564.00	566.27		566.27	0.000001	0.06	592.92	470.72	0.01
TWI000A	1038	01JAN2012 0200	51.54	564.00	566.48		566.48	0.000001	0.08	648.51	478.46	0.01
TWI000A	1038	01JAN2012 0300	56.97	564.00	566.55		566.55	0.000001	0.09	666.87	480.95	0.01
TWI000A	1038	01JAN2012 0400	60.82	564.00	566.58		566.58	0.000001	0.09	675.35	482.10	0.01
TWI000A	1038	01JAN2012 0500	65.01	564.00	566.61		566.61					

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	1038	01JAN2012 0800	108.55	564.00	566.83		566.83	0.00003	0.15	743.15	487.48	0.02
TWI000A	1038	01JAN2012 0900	133.07	564.00	566.94		566.94	0.00004	0.17	773.41	489.21	0.02
TWI000A	1038	01JAN2012 1000	179.58	564.00	567.11		567.11	0.00006	0.22	820.79	491.89	0.02
TWI000A	1038	01JAN2012 1100	257.93	564.00	567.38		567.38	0.00009	0.29	895.49	496.09	0.03
TWI000A	1038	01JAN2012 1200	865.22	564.00	568.40		568.41	0.00043	0.75	1192.04	526.79	0.06
TWI000A	1038	01JAN2012 1300	1560.36	564.00	570.27		570.27	0.00014	0.53	3124.38	576.20	0.04
TWI000A	1038	01JAN2012 1400	449.10	564.00	568.11		568.12	0.00015	0.41	1106.84	519.08	0.04
TWI000A	1038	01JAN2012 1500	306.39	564.00	567.65		567.65	0.00010	0.32	969.33	502.77	0.03
TWI000A	1038	01JAN2012 1600	232.13	564.00	567.40		567.40	0.00007	0.26	899.51	496.31	0.02
TWI000A	1038	01JAN2012 1700	191.66	564.00	567.24		567.24	0.00006	0.23	854.80	493.81	0.02
TWI000A	1038	01JAN2012 1800	166.13	564.00	567.13		567.13	0.00005	0.20	825.37	492.15	0.02
TWI000A	1038	01JAN2012 1900	128.35	564.00	567.00		567.00	0.00003	0.16	788.71	490.08	0.02
TWI000A	1038	01JAN2012 2000	109.39	564.00	566.88		566.88	0.00003	0.14	757.61	488.31	0.02
TWI000A	1038	01JAN2012 2100	99.80	564.00	566.83		566.83	0.00003	0.13	742.37	487.44	0.01
TWI000A	1038	01JAN2012 2200	92.77	564.00	566.79		566.79	0.00002	0.13	731.76	486.83	0.01
TWI000A	1038	01JAN2012 2300	87.01	564.00	566.75		566.76	0.00002	0.12	722.91	486.32	0.01
TWI000A	1038	01JAN2012 2400	82.12	564.00	566.73		566.73	0.00002	0.12	715.22	485.88	0.01
TWI000A	1011	Max WS	4334.02	564.00	571.83		571.85	0.00052	1.17	4072.91	643.67	0.08
TWI000A	1011	31DEC2011 2400	46.47	564.00	566.03		566.03	0.00003	0.10	443.56	466.30	0.01
TWI000A	1011	01JAN2012 0100	34.34	564.00	566.27		566.27	0.00001	0.07	513.60	483.87	0.01
TWI000A	1011	01JAN2012 0200	51.13	564.00	566.48		566.48	0.00002	0.09	575.67	490.26	0.01
TWI000A	1011	01JAN2012 0300	56.82	564.00	566.55		566.55	0.00002	0.10	596.20	492.36	0.01
TWI000A	1011	01JAN2012 0400	60.72	564.00	566.58		566.58	0.00002	0.10	605.69	493.32	0.01
TWI000A	1011	01JAN2012 0500	64.92	564.00	566.61		566.61	0.00002	0.11	613.84	494.15	0.01
TWI000A	1011	01JAN2012 0600	70.39	564.00	566.64		566.64	0.00003	0.11	623.37	495.12	0.01
TWI000A	1011	01JAN2012 0700	89.73	564.00	566.72		566.72	0.00004	0.14	646.97	497.50	0.02
TWI000A	1011	01JAN2012 0800	108.18	564.00	566.83		566.83	0.00005	0.16	681.81	500.96	0.02
TWI000A	1011	01JAN2012 0900	132.59	564.00	566.94		566.94	0.00006	0.19	715.86	503.95	0.02
TWI000A	1011	01JAN2012 1000	178.75	564.00	567.11		567.11	0.00009	0.24	769.35	509.72	0.03
TWI000A	1011	01JAN2012 1100	256.80	564.00	567.38		567.38	0.00013	0.31	853.75	522.48	0.03
TWI000A	1011	01JAN2012 1200	849.55	564.00	568.40		568.40	0.00050	0.75	1181.81	550.48	0.07
TWI000A	1011	01JAN2012 1300	1576.20	564.00	570.27		570.27	0.00015	0.55	3106.52	600.02	0.04
TWI000A	1011	01JAN2012 1400	452.47	564.00	568.11		568.12	0.00018	0.43	1089.26	544.46	0.04
TWI000A	1011	01JAN2012 1500	307.49	564.00	567.64		567.65	0.00014	0.34	937.37	533.56	0.03
TWI000A	1011	01JAN2012 1600	232.93	564.00	567.40		567.40	0.00010	0.28	858.36	524.68	0.03
TWI000A	1011	01JAN2012 1700	192.14	564.00	567.24		567.24	0.00008	0.24	807.77	514.52	0.03
TWI000A	1011	01JAN2012 1800	166.42	564.00	567.13		567.13	0.00007	0.22	774.54	510.37	0.02
TWI000A	1011	01JAN2012 1900	129.01	564.00	567.00		567.00	0.00005	0.18	733.16	505.46	0.02
TWI000A	1011	01JAN2012 2000	109.67	564.00	566.88		566.88	0.00004	0.16	698.08	502.39	0.02
TWI000A	1011	01JAN2012 2100	99.96	564.00	566.83		566.83	0.00004	0.15	680.95	500.89	0.02
TWI000A	1011	01JAN2012 2200	92.89	564.00	566.79		566.79	0.00004	0.14	668.97	499.71	0.02
TWI000A	1011	01JAN2012 2300	87.11	564.00	566.75		566.75	0.00003	0.13	659.01	498.71	0.02
TWI000A	1011	01JAN2012 2400	82.22	564.00	566.73		566.73	0.00003	0.13	650.41	497.85	0.02
TWI000A	897	Max WS	4332.24	564.00	571.80		571.84	0.000105	1.67	2721.65	408.45	0.11
TWI000A	897	31DEC2011 2400	36.27	564.00	566.03		566.03	0.00001	0.06	594.41	340.31	0.01
TWI000A	897	01JAN2012 0100	31.26	564.00	566.27		566.27	0.00000	0.05	676.80	341.62	0.01
TWI000A	897	01JAN2012 0200	49.65	564.00	566.48		566.48	0.00001	0.07	748.11	342.75	0.01
TWI000A	897	01JAN2012 0300	56.24	564.00	566.55		566.55	0.00001	0.07	771.57	343.12	0.01
TWI000A	897	01JAN2012 0400	60.37	564.00	566.58		566.58	0.00001	0.08	782.38	343.29	0.01
TWI000A	897	01JAN2012 0500	64.56	564.00	566.61		566.61	0.00001	0.08	791.64	344.44	0.01
TWI000A	897	01JAN2012 0600	69.92	564.00	566.64		566.64	0.00001	0.09	802.48	343.61	0.01
TWI000A	897	01JAN2012 0700	87.68	564.00	566.71		566.72	0.00002	0.11	829.15	344.05	0.01
TWI000A	897	01JAN2012 0800	106.82	564.00	566.83		566.83	0.00002	0.12	868.42	344.75	0.01
TWI000A	897	01JAN2012 0900	130.92	564.00	566.94		566.94	0.00003	0.14	906.59	345.42	0.02
TWI000A	897	01JAN2012 1000	175.77	564.00	567.11		567.11	0.00005	0.18	966.21	346.47	0.02
TWI000A	897	01JAN2012 1100	252.75	564.00	567.38		567.38	0.00007	0.24	1060.29	352.18	0.02
TWI000A	897	01JAN2012 1200	792.59	564.00	568.39		568.40	0.00027	0.57	1421.72	361.38	0.05
TWI000A	897	01JAN2012 1300	1633.70	564.00	570.26		570.27	0.000032	0.80	2116.42	383.37	0.06
TWI000A	897	01JAN2012 1400	464.76	564.00	568.11		568.12	0.000012	0.36	1320.99	358.92	0.03
TWI000A	897	01JAN2012 1500	311.65	564.00	567.64		567.65	0.00008	0.27	1153.39	355.22	0.03
TWI000A	897	01JAN2012 1600	235.88	564.00	567.40		567.40	0.00006	0.22	1065.52	352.33	0.02
TWI000A	897	01JAN2012 1700	193.87	564.00	567.24		567.24	0.00005	0.19	1009.07	349.44	0.02
TWI000A	897	01JAN2012 1800	167.66	564.00	567.13		567.13	0.00004	0.17	972.05	346.58	0.02
TWI000A	897	01JAN2012 1900	131.39	564.00	567.00		567.00	0.00003	0.14	925.93	345.76	0.02
TWI000A	897	01JAN2012 2000	110.67	564.00	566.88		566.88	0.00002	0.13	886.69	345.07	0.01
TWI000A	897	01JAN2012 2100	100.53	564.00	566.83		566.83	0.00002	0.12	867.41	344.73	0.01
TWI000A	897	01JAN2012 2200	93.29	564.00	566.79		566.79	0.00002	0.11	853.97	344.49	0.01
TWI000A	897	01JAN2012 2300	87.49	564.00	566.75		566.75	0.00002	0.10	842.79	344.29	0.01
TWI000A	897	01JAN2012 2400	82.54	564.00	566.73		566.73	0.00002	0.10	833.04	344.12	0.01
TWI000A	736	Max WS	4325.60	564.00	571.80		571.83	0.000053	1.21	3888.84	601.31	0.08
TWI000A	736	31DEC2011 2400	22.80	564.00	566.03		566.03	0.00000	0.03	886.58	445.40	0.00
TWI000A	736	01JAN2012 0100	27.18	564.00	566.27		566.27	0.00000	0.03	994.48	447.93	0.00
TWI000A	736	01JAN2012 0200	47.63	564.00	566.48		566.48	0.00000	0.04	1088.10	450.12	0.00
TWI000A	736	01JAN2012 0300	55.55	564.00	566.55		566.55	0.00000	0.05	1118.87	450.84	0.01
TWI000A	736	01JAN2012 0400	59.94	564.00	566.58		566.58	0.00000	0.05	1133.07	451.17	0.01
TWI000A	736	01JAN2012 0500	64.02	564.00	566.61		566.61	0.00000	0.06	1145.28	451.45	0.01

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	736	01JAN2012 1100	247.30	564.00	567.38		567.38	0.000003	0.17	1501.00	473.22	0.02
TWI000A	736	01JAN2012 1200	717.89	564.00	568.39		568.39	0.000011	0.37	1991.64	497.15	0.03
TWI000A	736	01JAN2012 1300	1711.40	564.00	570.26		570.27	0.000018	0.61	2989.09	568.42	0.04
TWI000A	736	01JAN2012 1400	480.87	564.00	568.11		568.11	0.000006	0.26	1853.99	490.69	0.02
TWI000A	736	01JAN2012 1500	316.96	564.00	567.64		567.64	0.000004	0.20	1626.40	479.50	0.02
TWI000A	736	01JAN2012 1600	239.79	564.00	567.40		567.40	0.000003	0.16	1507.96	473.57	0.02
TWI000A	736	01JAN2012 1700	196.12	564.00	567.23		567.24	0.000002	0.14	1432.49	466.70	0.01
TWI000A	736	01JAN2012 1800	169.10	564.00	567.13		567.13	0.000002	0.12	1383.11	458.52	0.01
TWI000A	736	01JAN2012 1900	134.55	564.00	567.00		567.00	0.000001	0.10	1322.22	456.71	0.01
TWI000A	736	01JAN2012 2000	111.87	564.00	566.88		566.88	0.000001	0.09	1270.41	455.16	0.01
TWI000A	736	01JAN2012 2100	101.23	564.00	566.83		566.83	0.000001	0.08	1245.01	454.40	0.01
TWI000A	736	01JAN2012 2200	93.93	564.00	566.79		566.79	0.000001	0.08	1227.30	453.86	0.01
TWI000A	736	01JAN2012 2300	88.04	564.00	566.75		566.75	0.000001	0.07	1212.49	453.42	0.01
TWI000A	736	01JAN2012 2400	83.04	564.00	566.73		566.73	0.000001	0.07	1199.71	453.03	0.01
TWI000A	585	Max WS	4324.58	564.00	571.79		571.82	0.000060	1.29	3515.73	515.79	0.08
TWI000A	585	31DEC2011 2400	8.80	564.00	566.03		566.03	0.000000	0.01	846.75	425.53	0.00
TWI000A	585	01JAN2012 0100	22.92	564.00	566.27		566.27	0.000000	0.02	949.89	428.27	0.00
TWI000A	585	01JAN2012 0200	45.52	564.00	566.48		566.48	0.000000	0.04	1039.38	430.35	0.00
TWI000A	585	01JAN2012 0300	54.76	564.00	566.55		566.55	0.000000	0.05	1068.82	431.04	0.01
TWI000A	585	01JAN2012 0400	59.43	564.00	566.58		566.58	0.000000	0.05	1082.40	431.35	0.01
TWI000A	585	01JAN2012 0500	63.56	564.00	566.61		566.61	0.000001	0.06	1094.01	431.62	0.01
TWI000A	585	01JAN2012 0600	68.64	564.00	566.64		566.64	0.000001	0.06	1107.61	431.93	0.01
TWI000A	585	01JAN2012 0700	82.14	564.00	566.71		566.71	0.000001	0.07	1141.12	432.71	0.01
TWI000A	585	01JAN2012 0800	103.14	564.00	566.83		566.83	0.000001	0.09	1190.47	433.84	0.01
TWI000A	585	01JAN2012 0900	126.32	564.00	566.94		566.94	0.000001	0.10	1238.48	434.95	0.01
TWI000A	585	01JAN2012 1000	167.63	564.00	567.11		567.11	0.000002	0.13	1313.52	436.66	0.01
TWI000A	585	01JAN2012 1100	241.64	564.00	567.38		567.38	0.000003	0.17	1431.22	438.33	0.02
TWI000A	585	01JAN2012 1200	640.52	564.00	568.39		568.39	0.000009	0.34	1876.20	444.16	0.03
TWI000A	585	01JAN2012 1300	1792.78	564.00	570.26		570.27	0.000022	0.67	2744.35	489.08	0.05
TWI000A	585	01JAN2012 1400	497.69	564.00	568.11		568.11	0.000007	0.29	1753.34	442.01	0.03
TWI000A	585	01JAN2012 1500	322.51	564.00	567.64		567.64	0.000004	0.21	1546.68	439.54	0.02
TWI000A	585	01JAN2012 1600	243.84	564.00	567.40		567.40	0.000003	0.17	1437.75	438.39	0.02
TWI000A	585	01JAN2012 1700	198.50	564.00	567.23		567.23	0.000003	0.15	1367.43	437.75	0.01
TWI000A	585	01JAN2012 1800	170.65	564.00	567.13		567.13	0.000002	0.13	1320.93	436.83	0.01
TWI000A	585	01JAN2012 1900	137.88	564.00	567.00		567.00	0.000002	0.11	1262.92	435.51	0.01
TWI000A	585	01JAN2012 2000	113.19	564.00	566.88		566.88	0.000001	0.09	1213.52	434.37	0.01
TWI000A	585	01JAN2012 2100	102.06	564.00	566.83		566.83	0.000001	0.09	1189.25	433.81	0.01
TWI000A	585	01JAN2012 2200	94.59	564.00	566.79		566.79	0.000001	0.08	1172.34	433.43	0.01
TWI000A	585	01JAN2012 2300	88.55	564.00	566.75		566.75	0.000001	0.08	1158.27	433.10	0.01
TWI000A	585	01JAN2012 2400	83.50	564.00	566.73		566.73	0.000001	0.07	1146.06	432.82	0.01
TWI000A	549	Max WS	4324.16	564.00	571.51		568.32	0.002724	5.47	977.38	492.93	0.49
TWI000A	549	31DEC2011 2400	6.39	564.00	566.03		564.06	0.000000	0.04	169.94	205.55	0.00
TWI000A	549	01JAN2012 0100	22.18	564.00	566.27		564.15	0.000003	0.12	191.29	220.64	0.01
TWI000A	549	01JAN2012 0200	45.13	564.00	566.48		564.22	0.000008	0.22	209.98	224.75	0.02
TWI000A	549	01JAN2012 0300	54.64	564.00	566.55		564.24	0.000011	0.25	216.17	226.09	0.03
TWI000A	549	01JAN2012 0400	59.33	564.00	566.58		564.26	0.000012	0.27	219.03	226.64	0.03
TWI000A	549	01JAN2012 0500	63.48	564.00	566.60		564.27	0.000014	0.29	221.48	227.06	0.03
TWI000A	549	01JAN2012 0600	68.50	564.00	566.64		564.28	0.000015	0.31	224.35	227.56	0.03
TWI000A	549	01JAN2012 0700	81.66	564.00	566.71		564.32	0.000019	0.35	231.41	228.77	0.04
TWI000A	549	01JAN2012 0800	102.83	564.00	566.83		564.37	0.000027	0.43	241.83	230.55	0.05
TWI000A	549	01JAN2012 0900	125.91	564.00	566.94		564.43	0.000035	0.50	251.96	232.28	0.05
TWI000A	549	01JAN2012 1000	166.91	564.00	567.11		564.51	0.000051	0.63	267.80	234.96	0.06
TWI000A	549	01JAN2012 1100	240.65	564.00	567.37		564.65	0.000080	0.83	292.65	242.40	0.08
TWI000A	549	01JAN2012 1200	626.77	564.00	568.36		568.23	0.000222	1.66	388.04	276.04	0.14
TWI000A	549	01JAN2012 1300	1807.76	564.00	570.16		566.45	0.000562	3.34	570.10	355.32	0.24
TWI000A	549	01JAN2012 1400	500.63	564.00	568.09		565.06	0.000177	1.41	361.50	259.74	0.12
TWI000A	549	01JAN2012 1500	323.49	564.00	567.63		564.79	0.000111	1.03	317.12	248.08	0.10
TWI000A	549	01JAN2012 1600	244.56	564.00	567.39		564.66	0.000081	0.84	294.03	242.72	0.08
TWI000A	549	01JAN2012 1700	198.91	564.00	567.23		564.57	0.000063	0.72	279.17	237.98	0.07
TWI000A	549	01JAN2012 1800	170.95	564.00	567.12		564.52	0.000052	0.64	269.36	235.22	0.06
TWI000A	549	01JAN2012 1900	138.48	564.00	566.99		564.45	0.000040	0.54	257.11	233.15	0.06
TWI000A	549	01JAN2012 2000	113.40	564.00	566.88		564.40	0.000031	0.46	246.70	231.38	0.05
TWI000A	549	01JAN2012 2100	102.22	564.00	566.82		564.37	0.000027	0.43	241.58	230.51	0.05
TWI000A	549	01JAN2012 2200	94.71	564.00	566.79		564.35	0.000024	0.40	238.01	229.90	0.04
TWI000A	549	01JAN2012 2300	88.66	564.00	566.75		564.34	0.000022	0.38	235.04	229.39	0.04
TWI000A	549	01JAN2012 2400	83.58	564.00	566.72		564.32	0.000020	0.36	232.46	228.95	0.04
TWI000A	544	Inl Struct										
TWI000A	437	Max WS	4321.40	543.21	555.94		556.10	0.000344	3.77	1910.85	233.77	0.20
TWI000A	437	31DEC2011 2400	6.39	543.21	544.22		544.22	0.000275	0.42	15.28	32.80	0.11
TWI000A	437	01JAN2012 0100	22.18	543.21	545.00		545.00	0.000126	0.47	47.06	46.54	0.08
TWI000A	437	01JAN2012 0200	45.13	543.21	545.45		545.45	0.000164	0.65	68.91	50.26	0.10
TWI000A	437	01JAN2012 0300	54.64	543.21	545.63		545.64	0.000162	0.70	78.30	51.48	0.10
TWI000A	437	01JAN2012 0400	59.33	543.21	545.71		545.72	0.000165	0.72	82.18	51.98	0.10
TWI000A	437	01JAN2012 0500	63.48	543.21	545.77		545.78	0.000169	0.74	85.26	52.36	0.10
TWI000A	437	01JAN2012 0600	68.50	543.21	545.83		545.84	0.000174	0.77	88.76	52.80	0.10
TWI000A	437	01JAN2012 0700	81.66	543.21	545.97		545.99	0.000193	0.85	96.28	53.73	0.11
TWI000A	437	01JAN2012 0800	102.83	543.21	546.22		546.24	0.000208	0.94	109.94	64.66	0.12
TWI000A	437	01JAN2012 0900	125.91	543.21	546.46</td							

HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

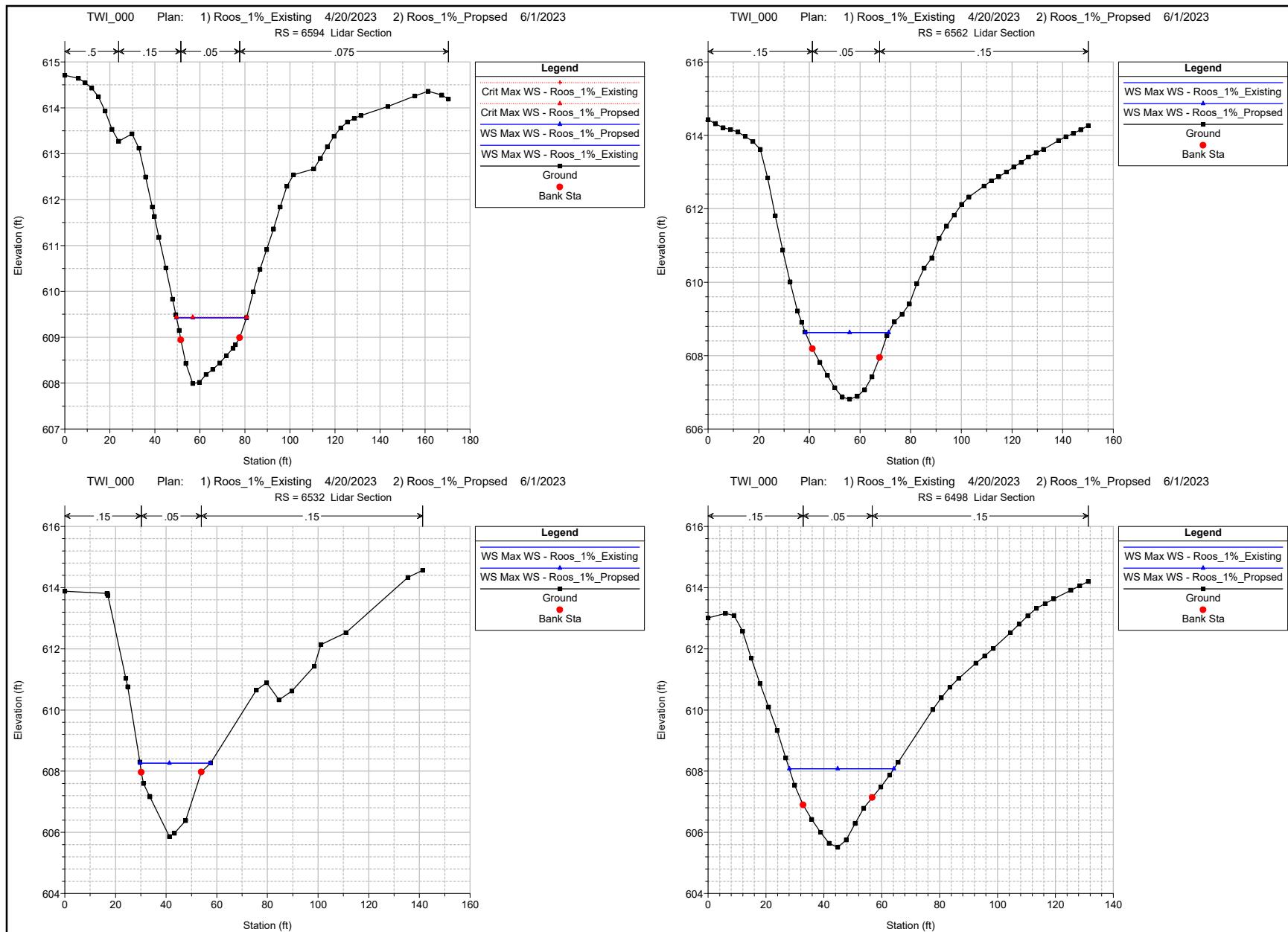
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	437	01JAN2012 1200	626.77	543.21	549.57		549.63	0.000247	1.81	351.72	186.44	0.15
TWI000A	437	01JAN2012 1300	1807.76	543.21	553.50		553.62	0.000267	2.81	675.72	219.12	0.17
TWI000A	437	01JAN2012 1400	500.63	543.21	549.30		549.34	0.000193	1.54	329.62	179.47	0.13
TWI000A	437	01JAN2012 1500	323.49	543.21	548.13		548.15	0.000221	1.35	239.67	132.38	0.13
TWI000A	437	01JAN2012 1600	244.56	543.21	547.56		547.58	0.000225	1.23	198.94	106.70	0.13
TWI000A	437	01JAN2012 1700	198.91	543.21	547.18		547.20	0.000232	1.15	172.75	97.92	0.13
TWI000A	437	01JAN2012 1800	170.95	543.21	546.93		546.95	0.000237	1.10	155.71	92.00	0.13
TWI000A	437	01JAN2012 1900	138.48	543.21	546.66		546.67	0.000236	1.01	136.81	85.72	0.13
TWI000A	437	01JAN2012 2000	113.40	543.21	546.38		546.40	0.000216	0.95	119.07	72.69	0.12
TWI000A	437	01JAN2012 2100	102.22	543.21	546.25		546.27	0.000200	0.92	111.61	66.26	0.12
TWI000A	437	01JAN2012 2200	94.71	543.21	546.17		546.18	0.000190	0.89	106.89	62.78	0.11
TWI000A	437	01JAN2012 2300	88.66	543.21	546.10		546.11	0.000186	0.86	103.07	60.89	0.11
TWI000A	437	01JAN2012 2400	83.58	543.21	546.04		546.05	0.000182	0.84	99.81	56.99	0.11
TWI000A	390	Max WS	4342.35	540.00	555.99		556.05	0.000076	2.13	2482.46	226.77	0.10
TWI000A	390	31DEC2011 2400	6.79	540.00	544.21		544.21	0.000000	0.02	288.92	127.66	0.00
TWI000A	390	01JAN2012 0100	23.54	540.00	545.00		545.00	0.000000	0.06	399.42	144.97	0.01
TWI000A	390	01JAN2012 0200	46.59	540.00	545.45		545.45	0.000001	0.10	465.18	148.00	0.01
TWI000A	390	01JAN2012 0300	56.38	540.00	545.63		545.63	0.000001	0.12	492.70	149.43	0.01
TWI000A	390	01JAN2012 0400	61.11	540.00	545.71		545.71	0.000002	0.12	503.99	150.41	0.01
TWI000A	390	01JAN2012 0500	65.27	540.00	545.77		545.77	0.000002	0.13	512.90	151.18	0.01
TWI000A	390	01JAN2012 0600	70.28	540.00	545.83		545.83	0.000002	0.14	523.04	152.05	0.01
TWI000A	390	01JAN2012 0700	83.16	540.00	545.98		545.98	0.000002	0.16	544.73	153.90	0.01
TWI000A	390	01JAN2012 0800	104.40	540.00	546.23		546.23	0.000003	0.18	583.81	157.04	0.02
TWI000A	390	01JAN2012 0900	127.37	540.00	546.46		546.46	0.000004	0.21	621.21	159.31	0.02
TWI000A	390	01JAN2012 1000	167.98	540.00	546.83		546.83	0.000005	0.26	680.93	162.86	0.02
TWI000A	390	01JAN2012 1100	241.31	540.00	547.43		547.43	0.000006	0.33	780.10	168.07	0.03
TWI000A	390	01JAN2012 1200	620.76	540.00	549.60		549.60	0.000013	0.59	1168.50	187.41	0.04
TWI000A	390	01JAN2012 1300	1827.11	540.00	553.57		553.59	0.000026	1.10	1953.75	207.49	0.06
TWI000A	390	01JAN2012 1400	508.50	540.00	549.32		549.32	0.000010	0.50	1115.89	185.54	0.03
TWI000A	390	01JAN2012 1500	326.82	540.00	548.14		548.14	0.000008	0.39	901.44	176.89	0.03
TWI000A	390	01JAN2012 1600	247.33	540.00	547.56		547.57	0.000006	0.33	802.34	169.38	0.02
TWI000A	390	01JAN2012 1700	201.28	540.00	547.19		547.19	0.000005	0.29	739.23	166.04	0.02
TWI000A	390	01JAN2012 1800	173.15	540.00	546.94		546.94	0.000005	0.26	698.18	163.87	0.02
TWI000A	390	01JAN2012 1900	141.01	540.00	546.66		546.66	0.000004	0.22	652.85	161.20	0.02
TWI000A	390	01JAN2012 2000	115.51	540.00	546.38		546.38	0.000003	0.20	608.57	158.55	0.02
TWI000A	390	01JAN2012 2100	104.23	540.00	546.26		546.26	0.000003	0.18	588.46	157.33	0.02
TWI000A	390	01JAN2012 2200	96.68	540.00	546.17		546.17	0.000003	0.17	575.13	156.45	0.02
TWI000A	390	01JAN2012 2300	90.62	540.00	546.10		546.10	0.000002	0.17	564.21	155.54	0.01
TWI000A	390	01JAN2012 2400	85.52	540.00	546.04		546.04	0.000002	0.16	554.86	154.75	0.01
TWI000A	329	Max WS	4368.50	540.00	555.96		556.05	0.000080	2.34	2085.01	180.15	0.10
TWI000A	329	31DEC2011 2400	6.22	540.00	544.21		544.21	0.000000	0.01	436.88	118.30	0.00
TWI000A	329	01JAN2012 0100	24.95	540.00	545.00		545.00	0.000000	0.05	531.26	121.25	0.00
TWI000A	329	01JAN2012 0200	48.18	540.00	545.45		545.45	0.000000	0.08	586.09	122.93	0.01
TWI000A	329	01JAN2012 0300	58.49	540.00	545.63		545.63	0.000001	0.10	608.94	123.62	0.01
TWI000A	329	01JAN2012 0400	63.31	540.00	545.71		545.71	0.000001	0.10	618.26	123.83	0.01
TWI000A	329	01JAN2012 0500	67.46	540.00	545.77		545.77	0.000001	0.11	625.58	124.00	0.01
TWI000A	329	01JAN2012 0600	72.43	540.00	545.83		545.83	0.000001	0.12	633.87	124.18	0.01
TWI000A	329	01JAN2012 0700	84.83	540.00	545.98		545.98	0.000001	0.13	651.51	124.58	0.01
TWI000A	329	01JAN2012 0800	106.23	540.00	546.23		546.23	0.000001	0.16	682.90	125.28	0.01
TWI000A	329	01JAN2012 0900	129.04	540.00	546.46		546.46	0.000002	0.18	712.60	125.94	0.01
TWI000A	329	01JAN2012 1000	169.13	540.00	546.83		546.83	0.000002	0.23	759.48	126.97	0.02
TWI000A	329	01JAN2012 1100	241.92	540.00	547.43		547.43	0.000004	0.30	836.26	129.59	0.02
TWI000A	329	01JAN2012 1200	615.87	540.00	549.60		549.60	0.000010	0.57	1123.12	135.01	0.03
TWI000A	329	01JAN2012 1300	1849.17	540.00	553.56		553.59	0.000025	1.18	1686.87	150.88	0.06
TWI000A	329	01JAN2012 1400	517.71	540.00	549.32		549.32	0.000008	0.50	1085.22	134.35	0.03
TWI000A	329	01JAN2012 1500	331.02	540.00	548.14		548.14	0.000005	0.37	928.32	131.58	0.02
TWI000A	329	01JAN2012 1600	250.91	540.00	547.56		547.57	0.000004	0.30	853.38	130.18	0.02
TWI000A	329	01JAN2012 1700	204.33	540.00	547.19		547.19	0.000003	0.26	804.71	128.44	0.02
TWI000A	329	01JAN2012 1800	175.99	540.00	546.94		546.94	0.000003	0.23	772.91	127.28	0.02
TWI000A	329	01JAN2012 1900	144.33	540.00	546.66		546.66	0.000002	0.20	737.52	126.49	0.01
TWI000A	329	01JAN2012 2000	118.24	540.00	546.38		546.38	0.000002	0.17	702.59	125.72	0.01
TWI000A	329	01JAN2012 2100	106.78	540.00	546.26		546.26	0.000001	0.16	686.61	125.36	0.01
TWI000A	329	01JAN2012 2200	99.19	540.00	546.17		546.17	0.000001	0.15	675.97	125.12	0.01
TWI000A	329	01JAN2012 2300	93.12	540.00	546.10		546.10	0.000001	0.14	667.20	124.93	0.01
TWI000A	329	01JAN2012 2400	87.98	540.00	546.04		546.04	0.000001	0.13	659.69	124.76	0.01
TWI000A	237	Max WS	4408.75	540.00	555.99		556.04	0.000044	1.76	2783.48	219.82	0.08
TWI000A	237	31DEC2011 2400	4.81	540.00	544.21		544.21	0.000000	0.01	596.92	156.15	0.00
TWI000A	237	01JAN2012 0100	27.13	540.00	545.00		545.00	0.000000	0.04	721.28	159.88	0.00
TWI000A	237	01JAN2012 0200	50.62	540.00	545.45		545.45	0.000000	0.06	793.77	163.19	0.01
TWI000A	237	01JAN2012 0300	61.69	540.00	545.63		545.63	0.000000	0.08	824.14	164.48	0.01
TWI000A	237	01JAN2012 0400	66.69	540.00	545.71		545.71	0.000000	0.08	836.52	164.82	0.01
TWI000A	237	01JAN2012 0500	70.85	540.00	545.77		545.77	0.000000	0.08	846.29	165.10	0.01
TWI000A	237	01JAN2012 0600	75.76	540.00	545.83		545.83	0.000000	0.09	857.33	165.29	0.01
TWI000A	237	01JAN2012 0700	87.36	540.00	545.98		545.98	0.000001	0.10	880.79	165.67	0.01
TWI000A	237	01JAN2012 0800	109.04	540.00	546.23		546.23	0.000001	0.12	922.51	166.36	0.01
TWI000A	237	01JAN2012 0900	131.63	540.00	546.46		546.46	0.000001	0.14	961.92	167.00	0.01
TWI000A	237	01JAN2012 1000	170.91	540.00	546.83		546.83	0.000001	0.17	1024.05	168.17	0.01
TWI000A	237</td											

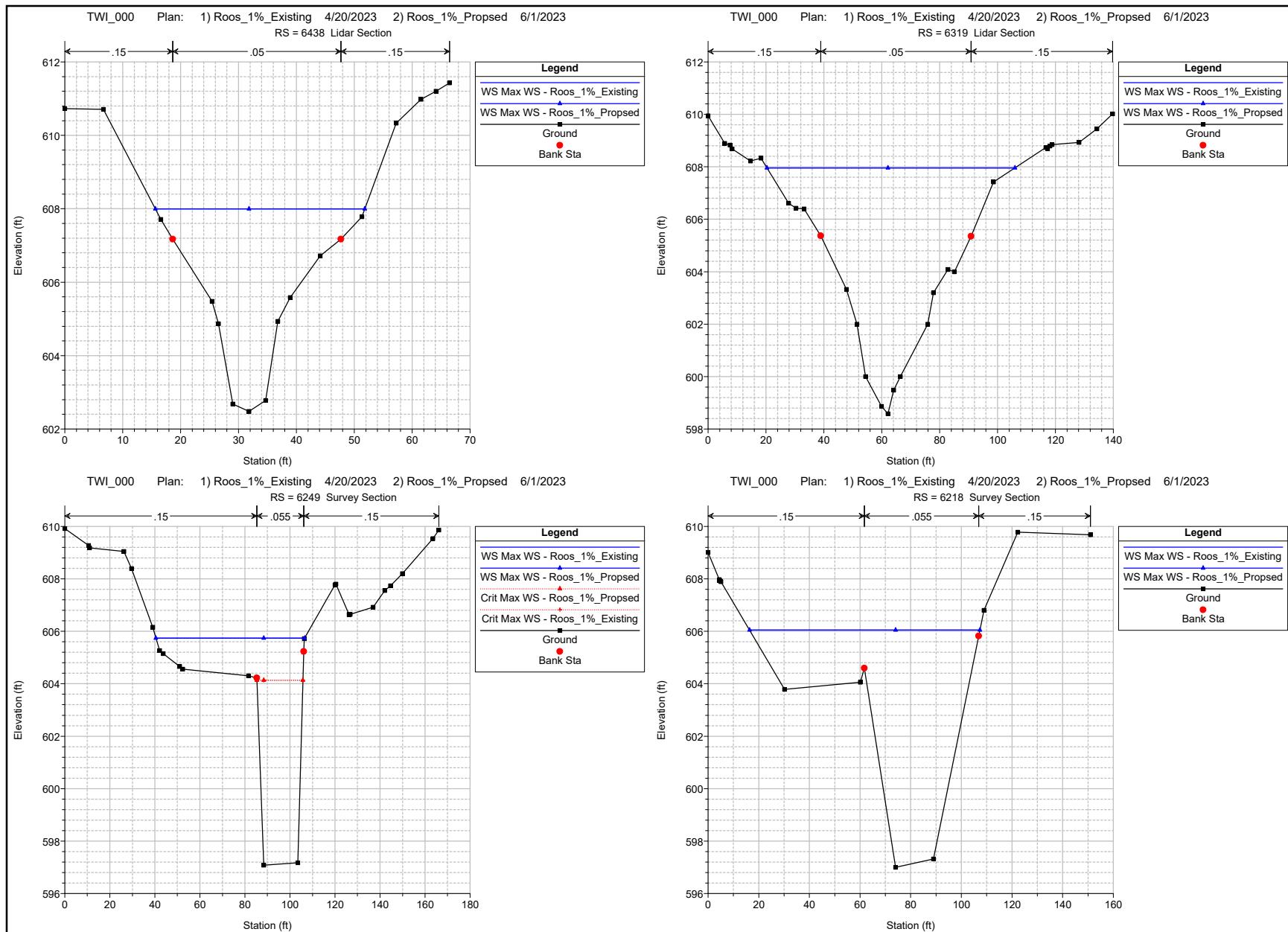
HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

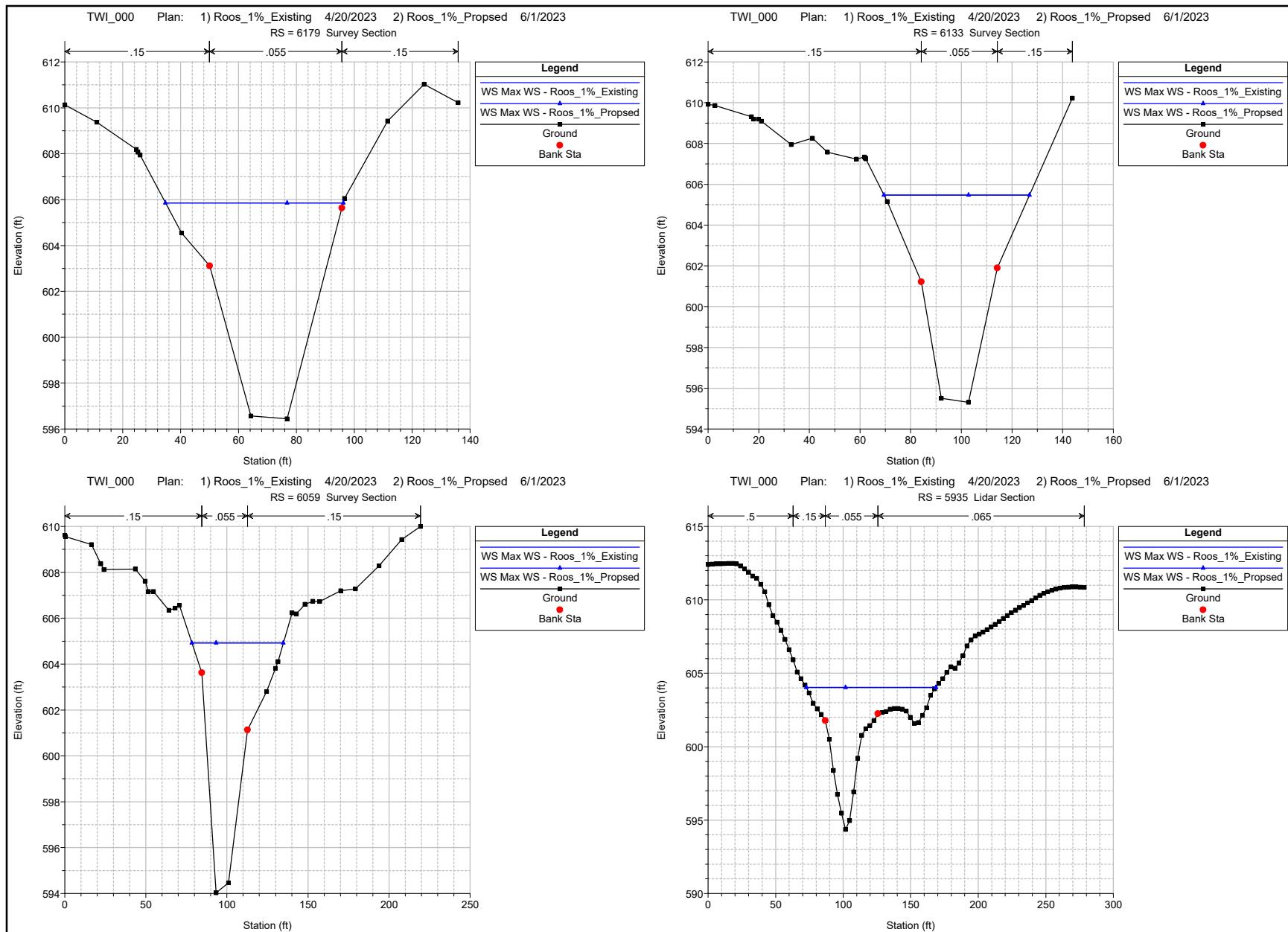
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	237	01JAN2012 1500	337.45	540.00	548.14		548.14	0.000003	0.28	1246.80	173.78	0.02
TWI000A	237	01JAN2012 1600	256.40	540.00	547.56		547.57	0.000002	0.23	1148.08	171.15	0.02
TWI000A	237	01JAN2012 1700	209.05	540.00	547.19		547.19	0.000002	0.20	1083.91	169.61	0.01
TWI000A	237	01JAN2012 1800	180.39	540.00	546.94		546.94	0.000001	0.18	1041.83	168.60	0.01
TWI000A	237	01JAN2012 1900	149.44	540.00	546.66		546.66	0.000001	0.15	994.99	167.54	0.01
TWI000A	237	01JAN2012 2000	122.46	540.00	546.38		546.38	0.000001	0.13	948.67	166.79	0.01
TWI000A	237	01JAN2012 2100	110.75	540.00	546.26		546.26	0.000001	0.12	927.44	166.44	0.01
TWI000A	237	01JAN2012 2200	103.09	540.00	546.17		546.17	0.000001	0.11	913.30	166.21	0.01
TWI000A	237	01JAN2012 2300	96.97	540.00	546.10		546.10	0.000001	0.11	901.68	166.02	0.01
TWI000A	237	01JAN2012 2400	91.81	540.00	546.04		546.04	0.000001	0.10	891.68	165.85	0.01
TWI000A	179	Max WS	4432.28	540.00	555.96		556.04	0.000074	2.24	2376.57	215.10	0.10
TWI000A	179	31DEC2011 2400	3.79	540.00	544.21		544.21	0.000000	0.01	425.23	122.71	0.00
TWI000A	179	01JAN2012 0100	28.37	540.00	545.00		545.00	0.000000	0.05	526.61	133.08	0.00
TWI000A	179	01JAN2012 0200	52.02	540.00	545.45		545.45	0.000001	0.09	587.39	137.53	0.01
TWI000A	179	01JAN2012 0300	63.63	540.00	545.63		545.63	0.000001	0.11	613.03	139.11	0.01
TWI000A	179	01JAN2012 0400	68.73	540.00	545.71		545.71	0.000001	0.11	623.52	139.74	0.01
TWI000A	179	01JAN2012 0500	72.88	540.00	545.77		545.77	0.000001	0.12	631.80	140.33	0.01
TWI000A	179	01JAN2012 0600	77.74	540.00	545.83		545.83	0.000001	0.12	641.20	140.99	0.01
TWI000A	179	01JAN2012 0700	88.84	540.00	545.97		545.98	0.000001	0.14	661.28	142.41	0.01
TWI000A	179	01JAN2012 0800	110.68	540.00	546.23		546.23	0.000002	0.16	697.36	144.76	0.01
TWI000A	179	01JAN2012 0900	133.11	540.00	546.46		546.46	0.000002	0.19	731.83	146.96	0.01
TWI000A	179	01JAN2012 1000	171.86	540.00	546.83		546.83	0.000003	0.23	786.82	149.04	0.02
TWI000A	179	01JAN2012 1100	243.36	540.00	547.43		547.43	0.000004	0.29	876.50	150.48	0.02
TWI000A	179	01JAN2012 1200	603.55	540.00	549.60		549.60	0.000009	0.54	1208.93	156.98	0.03
TWI000A	179	01JAN2012 1300	1905.10	540.00	553.56		553.58	0.000025	1.16	1884.06	193.09	0.06
TWI000A	179	01JAN2012 1400	540.60	540.00	549.32		549.32	0.000008	0.50	1165.09	156.09	0.03
TWI000A	179	01JAN2012 1500	341.53	540.00	548.14		548.14	0.000005	0.37	983.06	152.17	0.02
TWI000A	179	01JAN2012 1600	259.82	540.00	547.56		547.57	0.000004	0.31	896.37	150.80	0.02
TWI000A	179	01JAN2012 1700	211.98	540.00	547.19		547.19	0.000003	0.27	839.79	149.89	0.02
TWI000A	179	01JAN2012 1800	183.07	540.00	546.94		546.94	0.000003	0.24	802.57	149.30	0.02
TWI000A	179	01JAN2012 1900	152.62	540.00	546.66		546.66	0.000002	0.21	761.06	148.59	0.02
TWI000A	179	01JAN2012 2000	125.05	540.00	546.38		546.38	0.000002	0.18	720.19	146.22	0.01
TWI000A	179	01JAN2012 2100	113.15	540.00	546.26		546.26	0.000002	0.17	701.65	145.04	0.01
TWI000A	179	01JAN2012 2200	105.46	540.00	546.17		546.17	0.000001	0.16	689.35	144.25	0.01
TWI000A	179	01JAN2012 2300	99.30	540.00	546.10		546.10	0.000001	0.15	679.29	143.60	0.01
TWI000A	179	01JAN2012 2400	94.13	540.00	546.04		546.04	0.000001	0.14	670.65	143.04	0.01
TWI000A	165	Max WS	4432.25	540.00	555.70	551.20	556.16	0.002470	6.25	1003.13	217.24	0.49
TWI000A	165	31DEC2011 2400	3.24	540.00	544.21	540.19	544.21	0.000000	0.05	62.98	97.25	0.01
TWI000A	165	01JAN2012 0100	28.20	540.00	545.00	540.77	545.00	0.000014	0.34	84.35	107.90	0.03
TWI000A	165	01JAN2012 0200	51.88	540.00	545.44	541.11	545.45	0.000030	0.55	98.62	113.29	0.05
TWI000A	165	01JAN2012 0300	63.60	540.00	545.63	541.26	545.64	0.000038	0.64	104.94	115.18	0.06
TWI000A	165	01JAN2012 0400	68.71	540.00	545.70	541.31	545.71	0.000041	0.68	107.59	116.06	0.06
TWI000A	165	01JAN2012 0500	72.86	540.00	545.76	541.36	545.77	0.000044	0.71	109.86	122.16	0.06
TWI000A	165	01JAN2012 0600	77.70	540.00	545.83	541.41	545.84	0.000048	0.74	112.64	122.68	0.06
TWI000A	165	01JAN2012 0700	88.72	540.00	545.97	541.52	545.98	0.000055	0.82	118.55	123.77	0.07
TWI000A	165	01JAN2012 0800	110.58	540.00	546.22	541.73	546.23	0.000070	0.95	129.03	125.70	0.08
TWI000A	165	01JAN2012 0900	132.99	540.00	546.45	541.92	546.47	0.000084	1.08	138.87	127.50	0.09
TWI000A	165	01JAN2012 1000	171.64	540.00	546.82	542.21	546.85	0.000107	1.28	154.30	130.29	0.10
TWI000A	165	01JAN2012 1100	243.04	540.00	547.41	542.67	547.45	0.000144	1.60	179.17	134.79	0.12
TWI000A	165	01JAN2012 1200	599.42	540.00	549.54	544.29	549.65	0.000335	2.68	278.66	148.33	0.19
TWI000A	165	01JAN2012 1300	1907.98	540.00	553.41	547.40	553.71	0.000584	4.84	586.74	190.80	0.26
TWI000A	165	01JAN2012 1400	541.68	540.00	549.27	544.08	549.36	0.000320	2.55	260.86	146.14	0.18
TWI000A	165	01JAN2012 1500	341.86	540.00	548.11	543.19	548.16	0.000188	1.98	208.35	139.44	0.14
TWI000A	165	01JAN2012 1600	260.05	540.00	547.54	542.76	547.58	0.000152	1.67	184.64	135.79	0.12
TWI000A	165	01JAN2012 1700	212.12	540.00	547.17	542.48	547.20	0.000129	1.47	169.03	132.95	0.11
TWI000A	165	01JAN2012 1800	183.16	540.00	546.93	542.29	546.95	0.000113	1.34	158.69	131.08	0.10
TWI000A	165	01JAN2012 1900	152.80	540.00	546.65	542.07	546.67	0.000096	1.19	147.10	128.98	0.09
TWI000A	165	01JAN2012 2000	125.12	540.00	546.37	541.85	546.39	0.000079	1.04	135.57	126.90	0.08
TWI000A	165	01JAN2012 2100	113.19	540.00	546.25	541.75	546.26	0.000071	0.97	130.26	125.93	0.08
TWI000A	165	01JAN2012 2200	105.50	540.00	546.16	541.68	546.18	0.000066	0.92	126.72	125.27	0.08
TWI000A	165	01JAN2012 2300	99.33	540.00	546.09	541.63	546.11	0.000062	0.88	123.80	124.74	0.07
TWI000A	165	01JAN2012 2400	94.16	540.00	546.04	541.58	546.05	0.000059	0.85	121.29	124.27	0.07
TWI000A	143	Inl Struct										
TWI000A	106	Max WS	4432.25	537.10	550.79	548.90	553.07	0.008250	13.03	479.64	143.92	0.66
TWI000A	106	31DEC2011 2400	3.24	537.10	537.76		537.82	0.020018	1.97	1.64	4.95	0.60
TWI000A	106	01JAN2012 0100	28.20	537.10	538.69		538.81	0.014543	2.86	9.85	13.20	0.58
TWI000A	106	01JAN2012 0200	51.88	537.10	539.17		539.31	0.011071	3.01	17.24	17.43	0.53
TWI000A	106	01JAN2012 0300	63.60	537.10	539.36		539.51	0.009608	3.08	20.67	18.06	0.51
TWI000A	106	01JAN2012 0400	68.71	537.10	539.44		539.59	0.009139	3.11	22.09	18.24	0.50
TWI000A	106	01JAN2012 0500	72.86	537.10	539.50		539.65	0.008833	3.14	23.20	18.38	0.49
TWI000A	106	01JAN2012 0600	77.70	537.10	539.57		539.73	0.008475	3.17	24.53	18.55	0.49
TWI000A	106	01JAN2012 0700	88.72	537.10	539.72		539.88	0.007950	3.25	27.32	18.89	0.48
TWI000A	106	01JAN2012 0800	110.58	537.10	539.99		540.17	0.007252	3.39	32.58	19.52	0.46
TWI000A	106	01JAN2012 0900	132.99	537.10	540.23		540.43	0.006994	3.56	37.32	20.09	0.46
TWI000A	106	01JAN2012 1000	171.64	537.10	540.60		540.83	0.006777	3.83	44.84	20.97	0.46
TWI000A	106	01JAN2012 1100	243.04	537.10	541.19		541.46	0.006560	4.22	57.58	22.39	0.46
TWI000A	106	01JAN2012 1200	599.42	537.10	5							

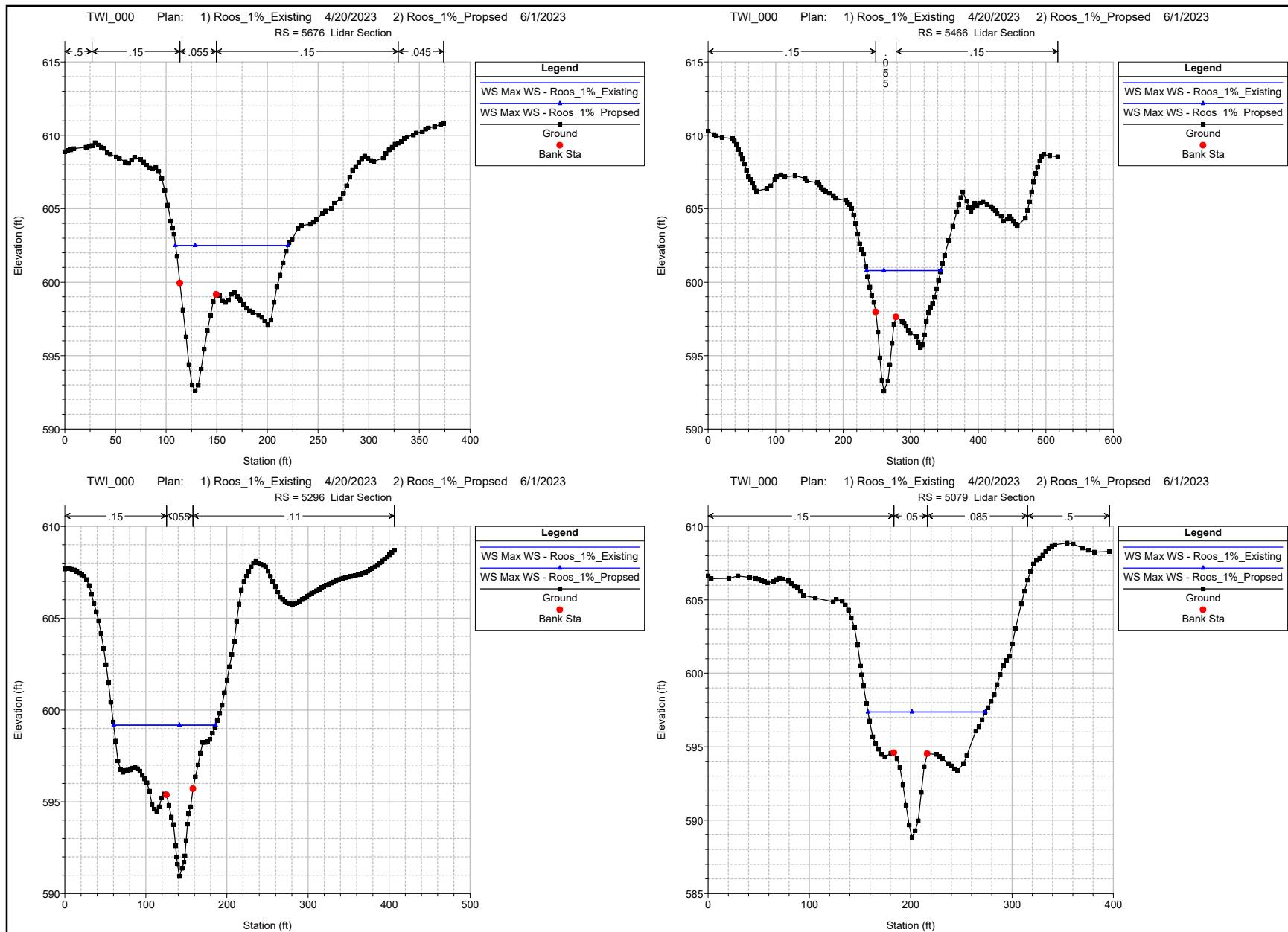
HEC-RAS Plan: Roos_1%_Proposed River: TSD Reach: TWI000A (Continued)

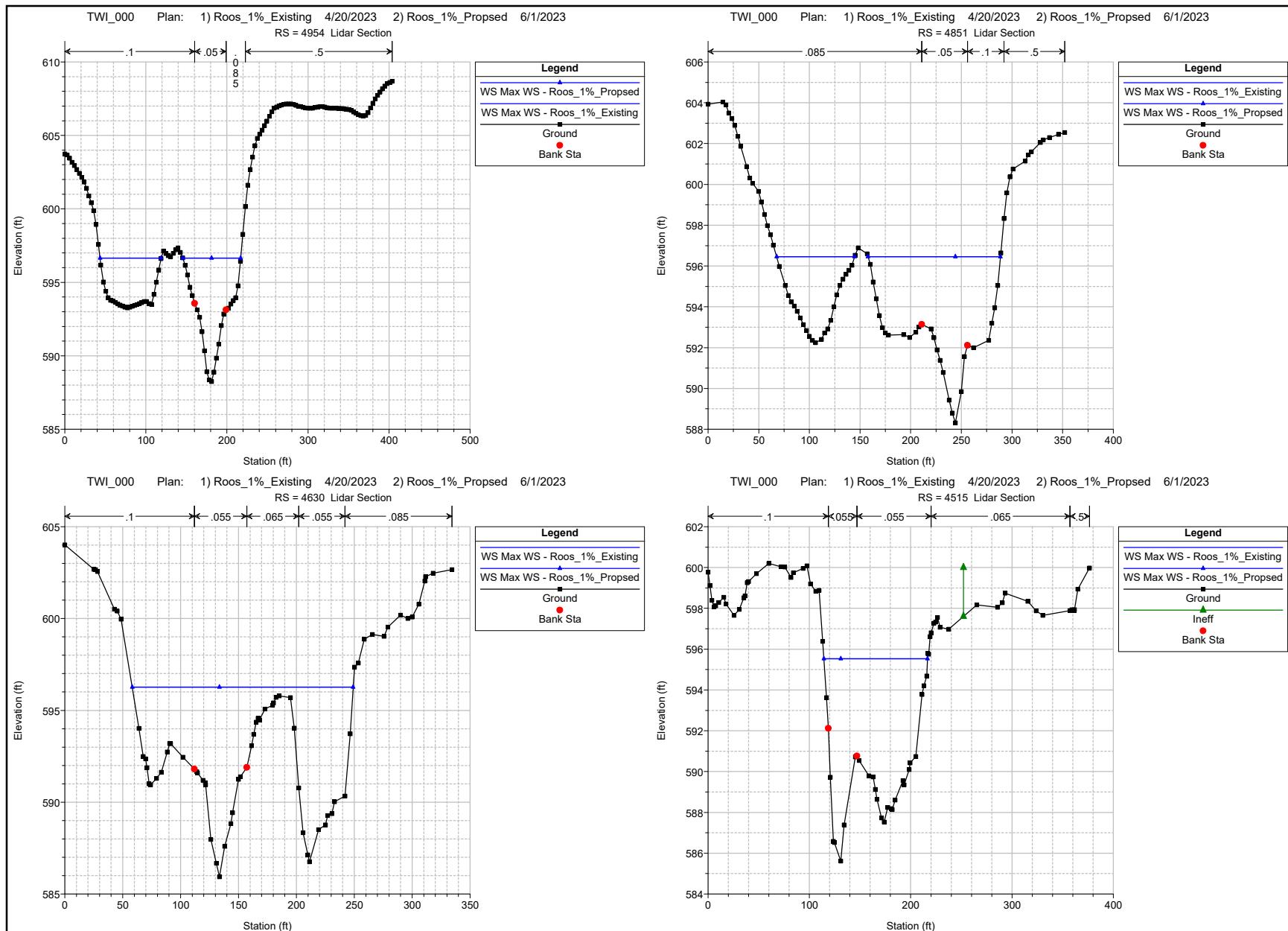
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
TWI000A	106	01JAN2012 1600	260.05	537.10	541.31		541.60	0.006518	4.30	60.47	22.70	0.46
TWI000A	106	01JAN2012 1700	212.12	537.10	540.94		541.20	0.006627	4.06	52.23	21.81	0.46
TWI000A	106	01JAN2012 1800	183.16	537.10	540.70		540.94	0.006729	3.90	46.99	21.22	0.46
TWI000A	106	01JAN2012 1900	152.80	537.10	540.43		540.64	0.006863	3.70	41.26	20.56	0.46
TWI000A	106	01JAN2012 2000	125.12	537.10	540.15		540.34	0.007044	3.50	35.74	19.90	0.46
TWI000A	106	01JAN2012 2100	113.19	537.10	540.02		540.20	0.007217	3.41	33.15	19.59	0.46
TWI000A	106	01JAN2012 2200	105.50	537.10	539.93		540.11	0.007375	3.36	31.40	19.38	0.47
TWI000A	106	01JAN2012 2300	99.33	537.10	539.86		540.03	0.007559	3.32	29.93	19.20	0.47
TWI000A	106	01JAN2012 2400	94.16	537.10	539.79		539.96	0.007705	3.28	28.71	19.06	0.47
TWI000A	87	Max WS	4432.39	536.80	551.12	549.27	552.45	0.004988	10.47	735.89	189.58	0.52
TWI000A	87	31DEC2011 2400	3.17	536.80	537.57	537.29	537.59	0.005357	1.14	2.79	7.21	0.32
TWI000A	87	01JAN2012 0100	28.17	536.80	538.56	537.98	538.63	0.005046	2.04	13.78	13.88	0.36
TWI000A	87	01JAN2012 0200	51.85	536.80	539.06	538.28	539.15	0.005018	2.43	21.31	16.25	0.37
TWI000A	87	01JAN2012 0300	63.59	536.80	539.26	538.41	539.37	0.005016	2.58	24.68	17.21	0.38
TWI000A	87	01JAN2012 0400	68.70	536.80	539.35	538.46	539.45	0.005018	2.63	26.10	17.59	0.38
TWI000A	87	01JAN2012 0500	72.85	536.80	539.41	538.51	539.52	0.005023	2.68	27.22	17.89	0.38
TWI000A	87	01JAN2012 0600	77.70	536.80	539.48	538.55	539.60	0.005008	2.72	28.55	18.24	0.38
TWI000A	87	01JAN2012 0700	88.69	536.80	539.64	538.65	539.76	0.005018	2.82	31.41	18.97	0.39
TWI000A	87	01JAN2012 0800	110.56	536.80	539.92	538.84	540.06	0.005011	3.00	36.91	20.30	0.39
TWI000A	87	01JAN2012 0900	132.96	536.80	540.16	539.01	540.32	0.005012	3.17	41.97	21.13	0.40
TWI000A	87	01JAN2012 1000	171.59	536.80	540.53	539.28	540.71	0.005006	3.43	50.00	22.14	0.40
TWI000A	87	01JAN2012 1100	242.96	536.80	541.13	539.70	541.35	0.005005	3.82	63.66	23.74	0.41
TWI000A	87	01JAN2012 1200	598.36	536.80	543.10	541.13	543.52	0.005001	5.23	115.15	28.01	0.44
TWI000A	87	01JAN2012 1300	1909.71	536.80	547.25	544.26	548.24	0.005003	8.17	269.10	67.35	0.49
TWI000A	87	01JAN2012 1400	541.95	536.80	542.85	540.95	543.24	0.005004	5.03	108.18	27.57	0.44
TWI000A	87	01JAN2012 1500	341.95	536.80	541.83	540.17	542.10	0.005006	4.22	80.95	25.64	0.42
TWI000A	87	01JAN2012 1600	260.11	536.80	541.26	539.79	541.49	0.005006	3.90	66.77	24.09	0.41
TWI000A	87	01JAN2012 1700	212.15	536.80	540.88	539.53	541.09	0.005004	3.66	57.92	23.08	0.41
TWI000A	87	01JAN2012 1800	183.18	536.80	540.63	539.35	540.83	0.005009	3.50	52.30	22.42	0.40
TWI000A	87	01JAN2012 1900	152.85	536.80	540.36	539.15	540.53	0.005010	3.31	46.17	21.66	0.40
TWI000A	87	01JAN2012 2000	125.14	536.80	540.08	538.96	540.23	0.005011	3.11	40.28	20.92	0.39
TWI000A	87	01JAN2012 2100	113.21	536.80	539.95	538.86	540.09	0.005026	3.02	37.51	20.44	0.39
TWI000A	87	01JAN2012 2200	105.51	536.80	539.85	538.80	539.99	0.005012	2.96	35.66	20.01	0.39
TWI000A	87	01JAN2012 2300	99.33	536.80	539.78	538.75	539.91	0.005017	2.91	34.12	19.64	0.39
TWI000A	87	01JAN2012 2400	94.16	536.80	539.71	538.70	539.84	0.005005	2.87	32.84	19.33	0.39

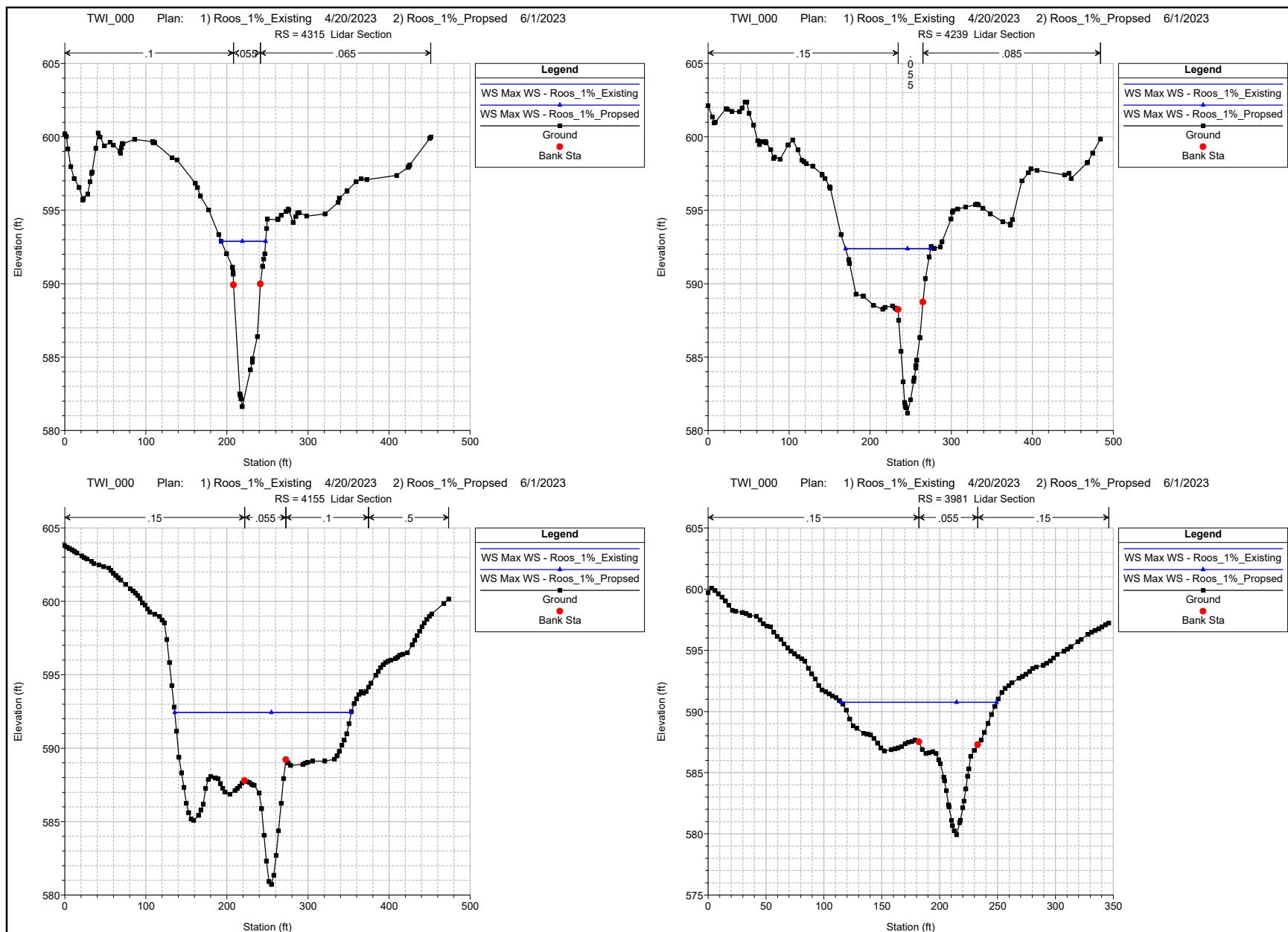


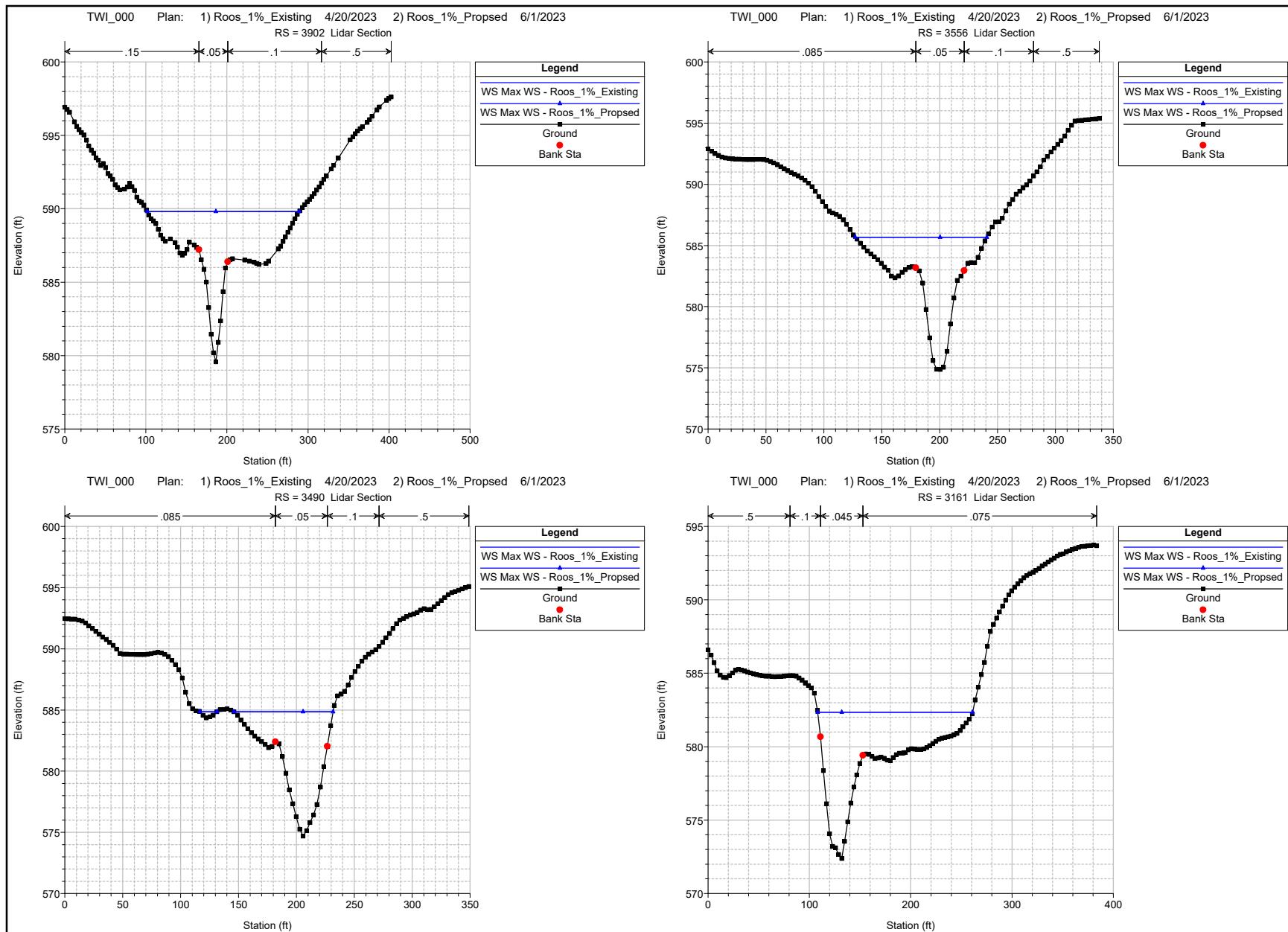


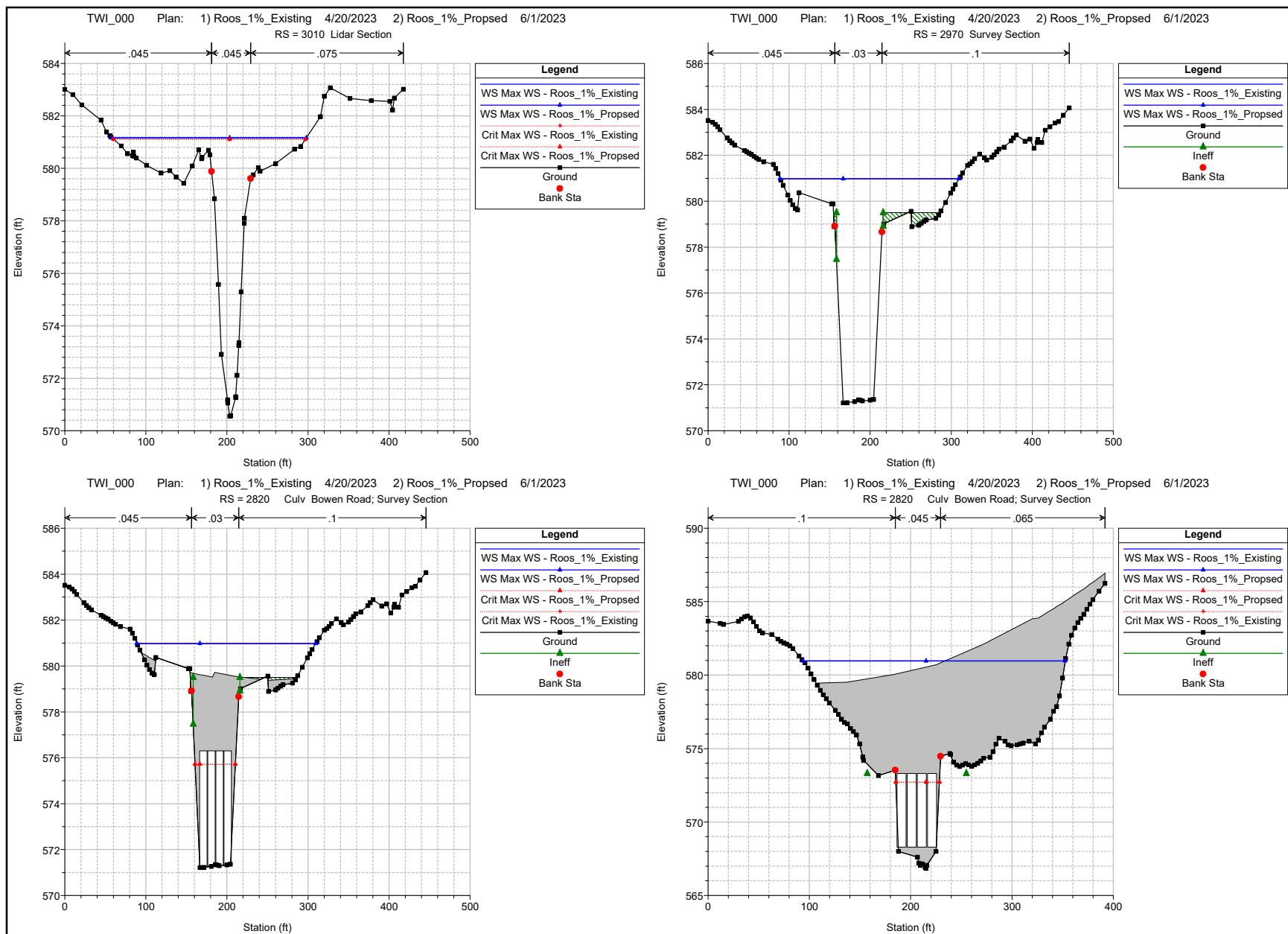


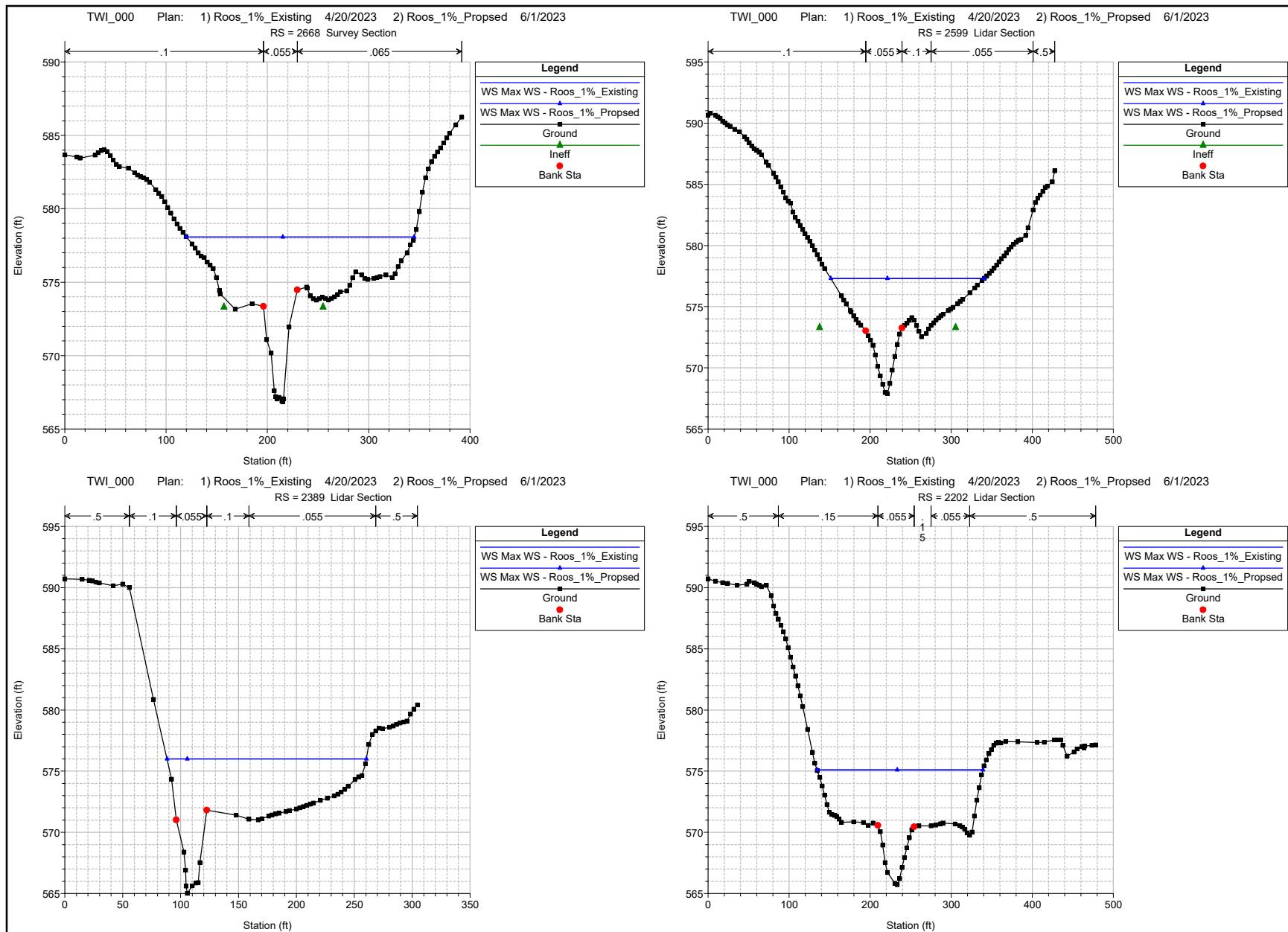


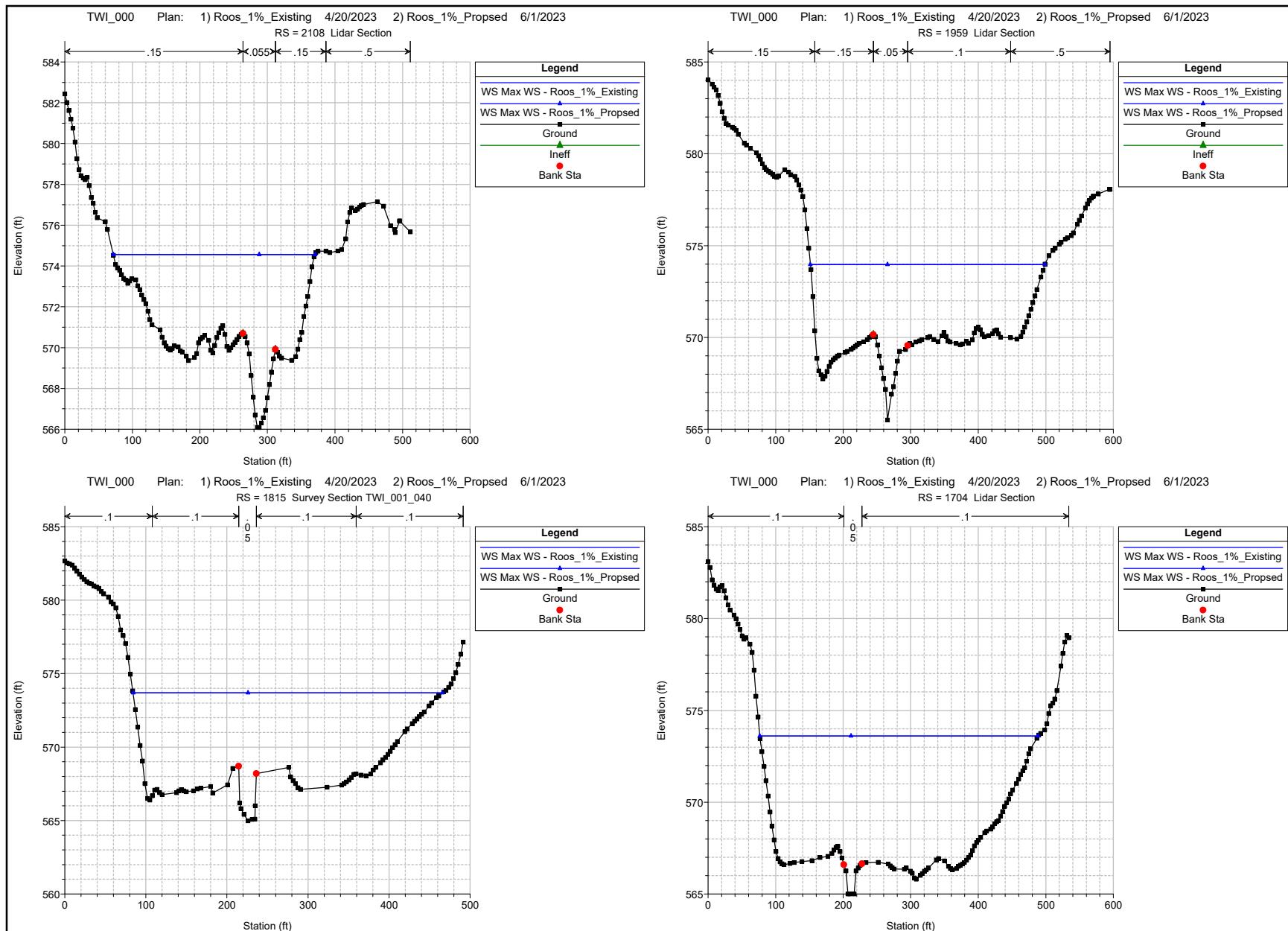


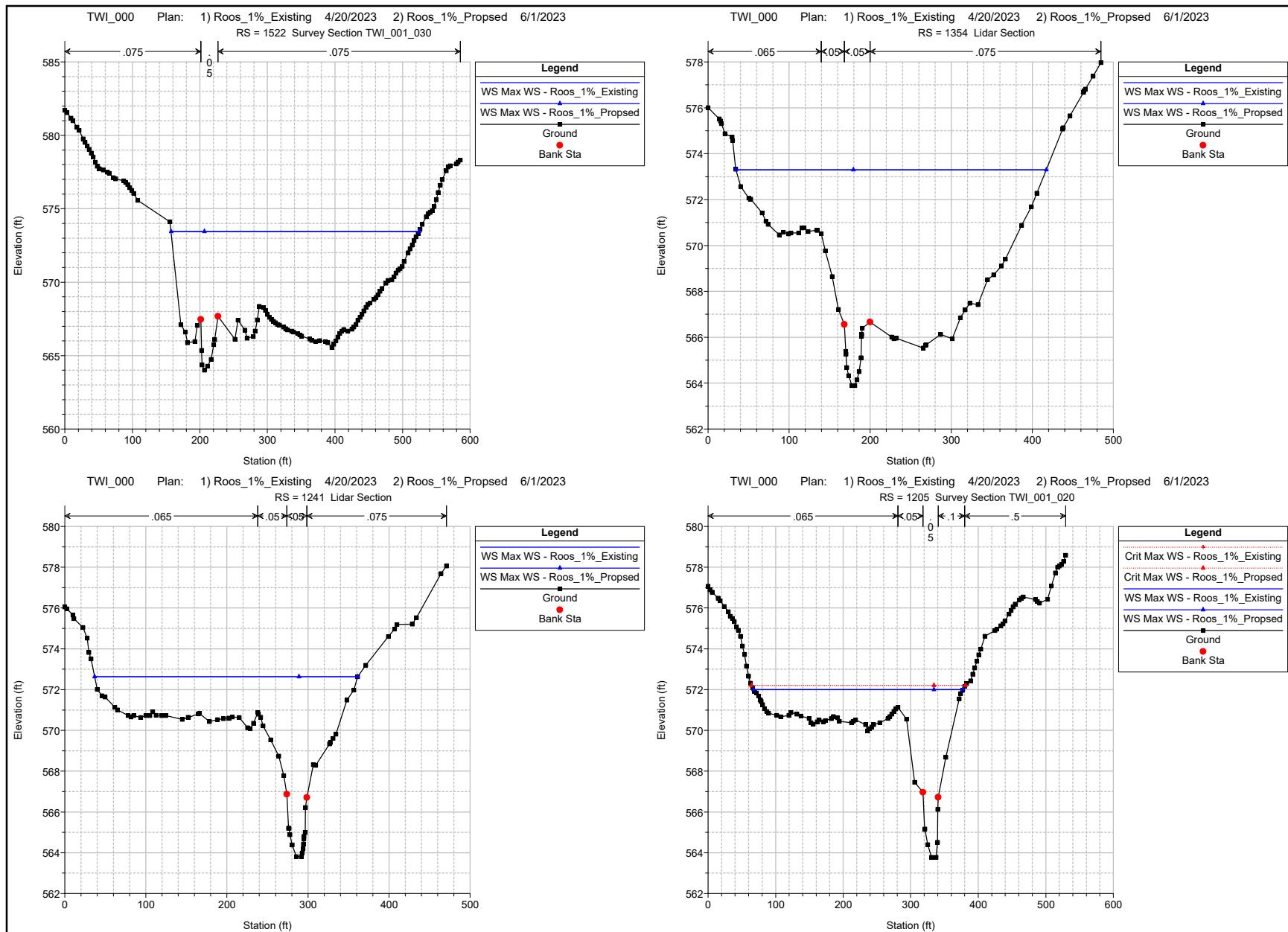


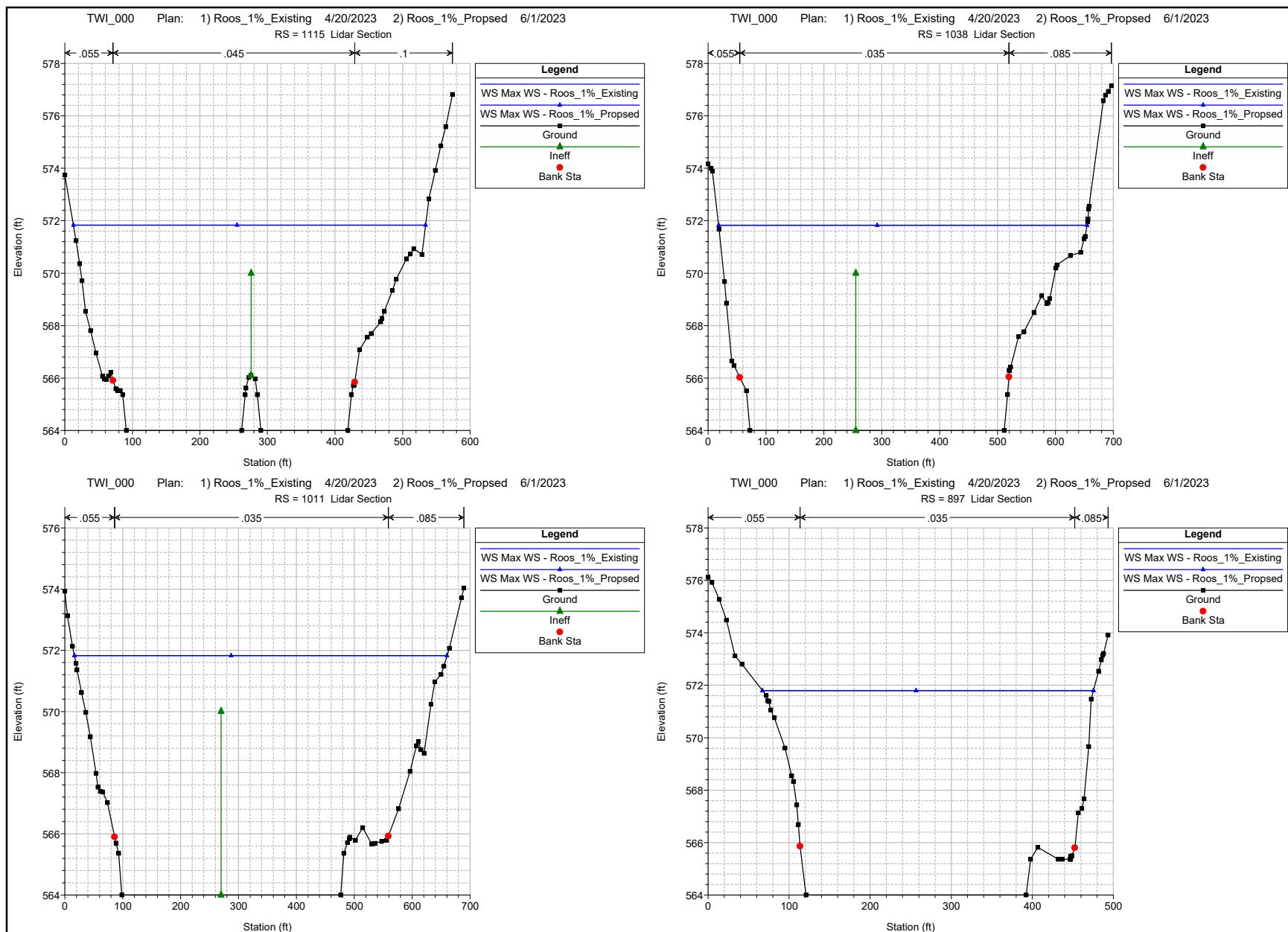


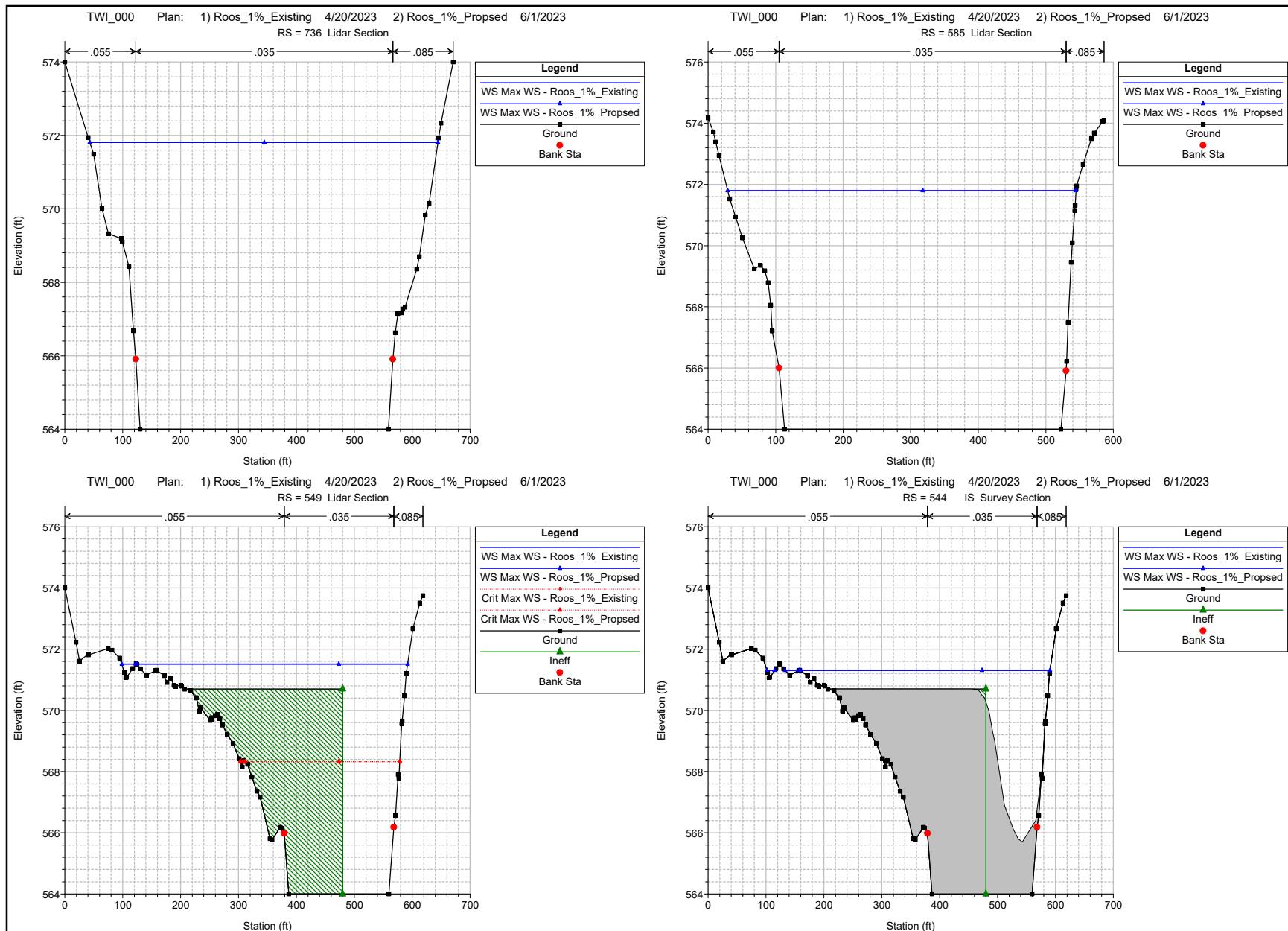


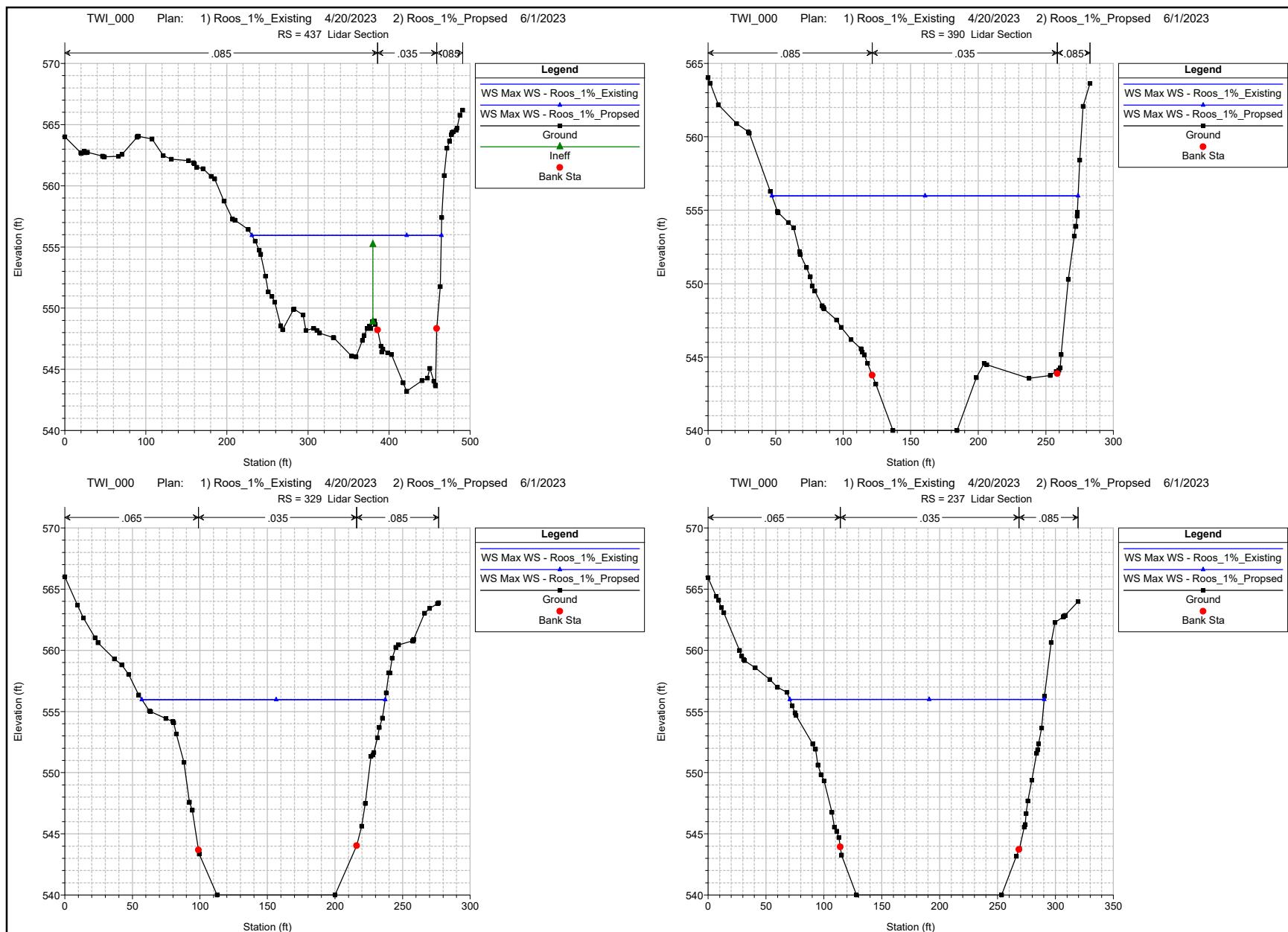


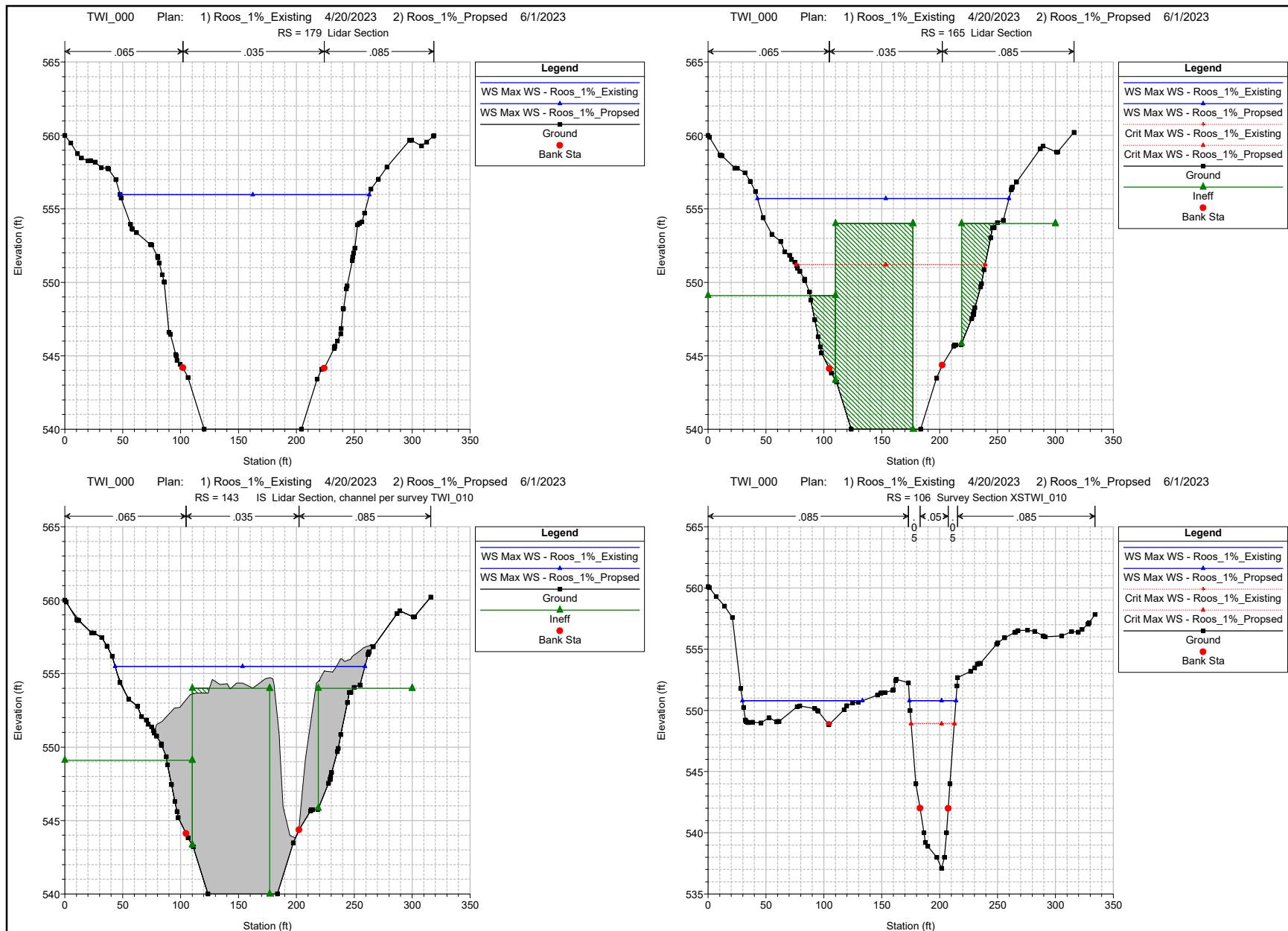


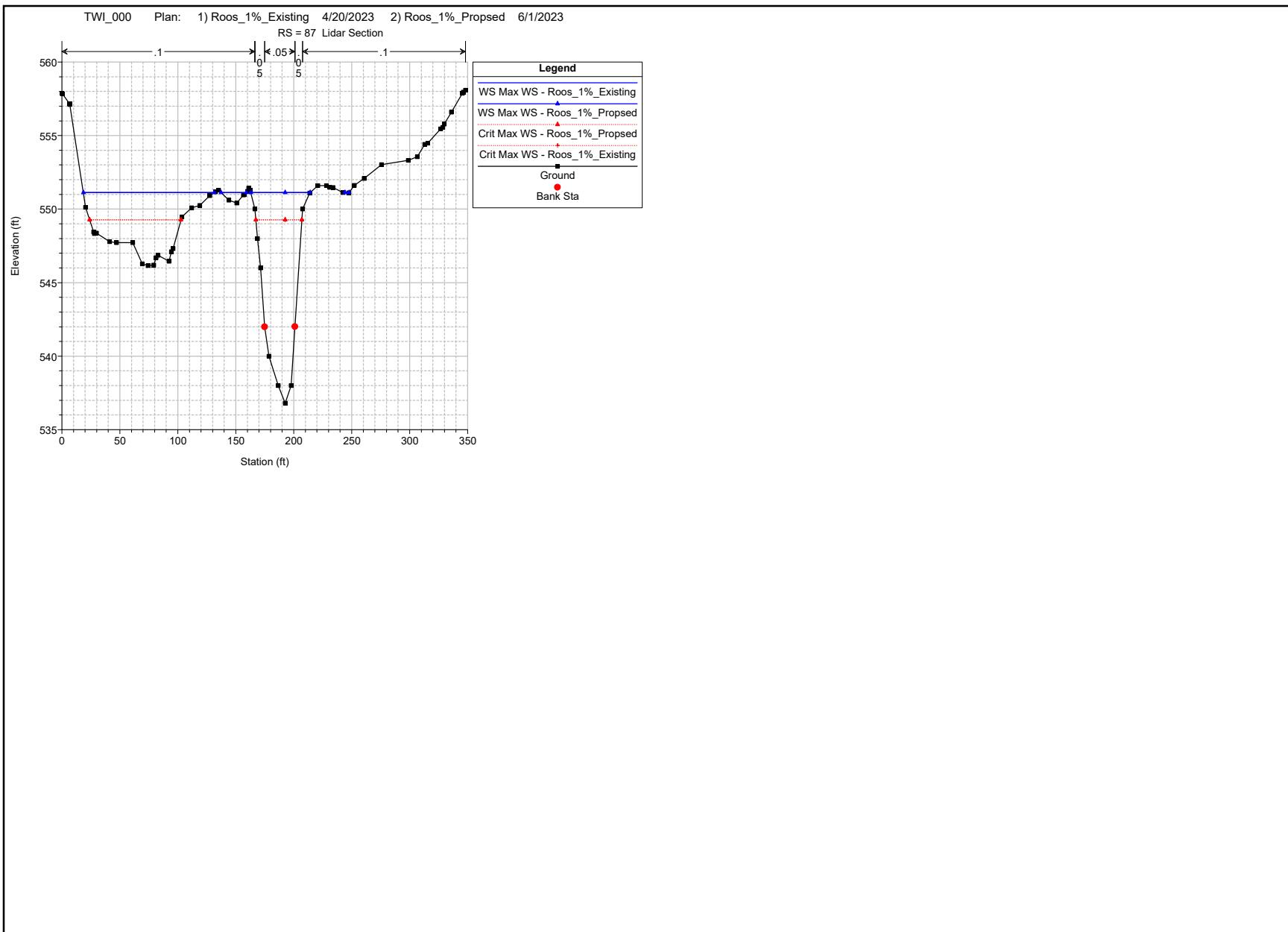


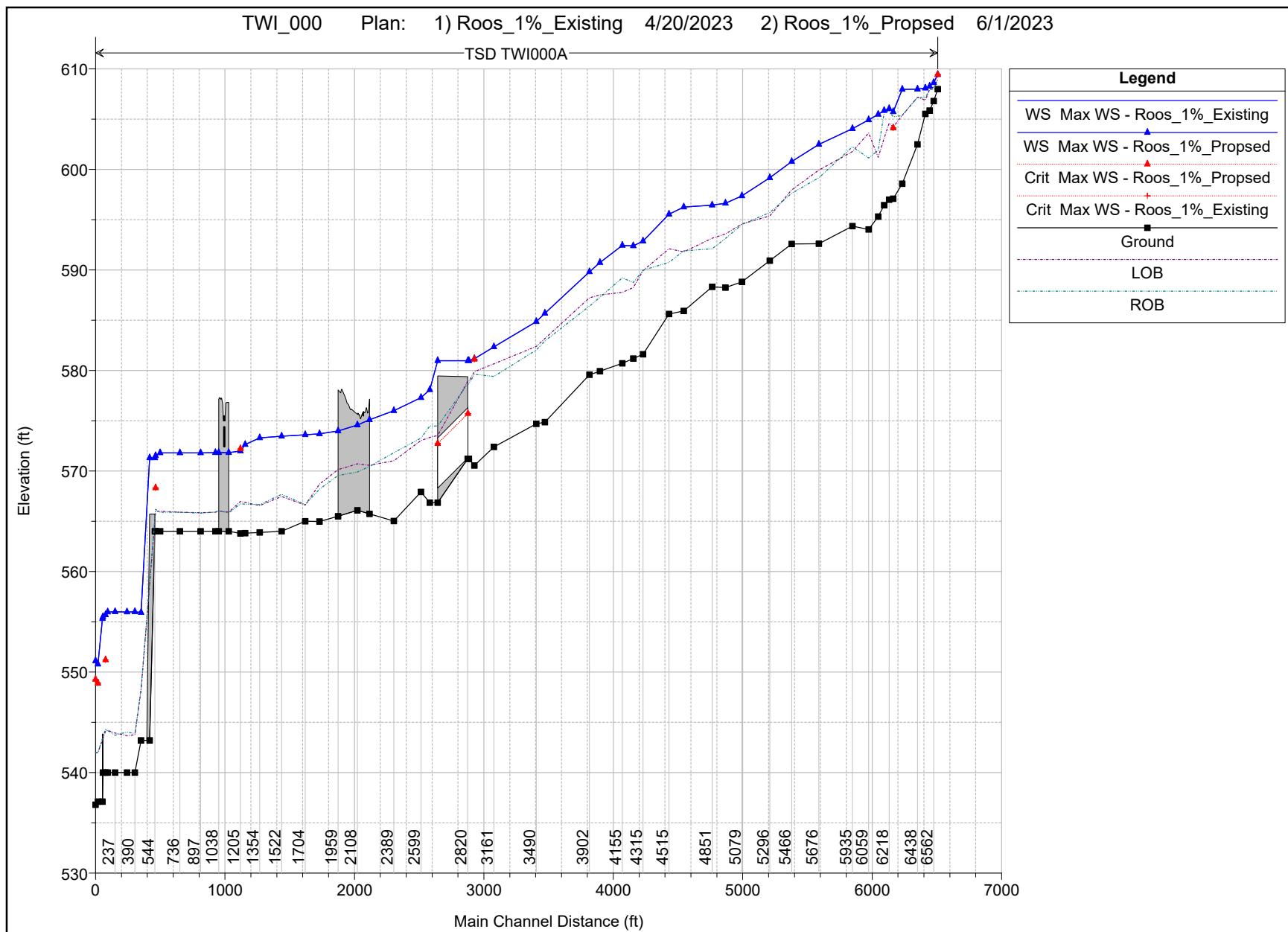














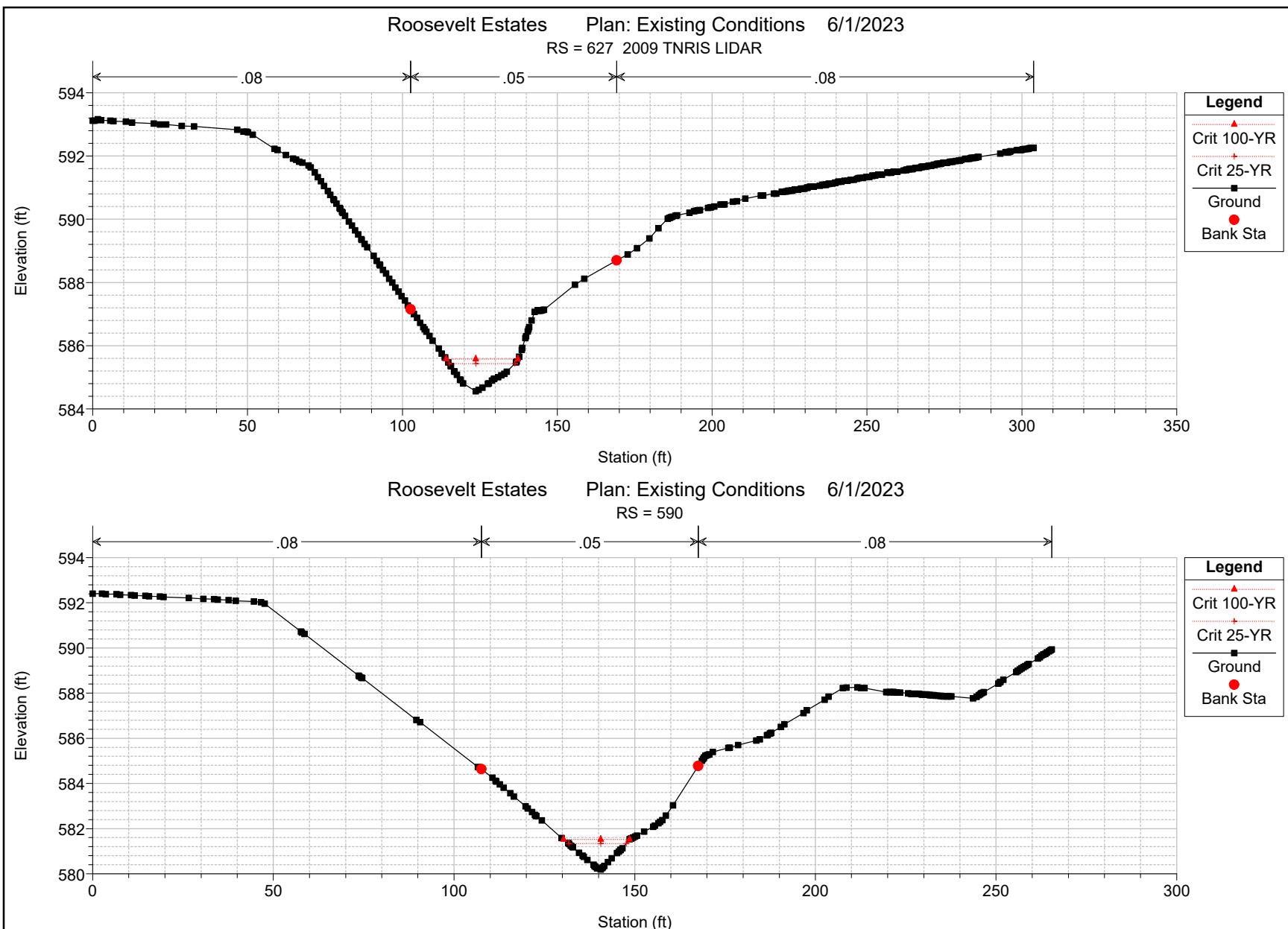
TWIN SPRINGS DRAW TRIBUTARY 2 (HEC-RAS VERSION 6.3)

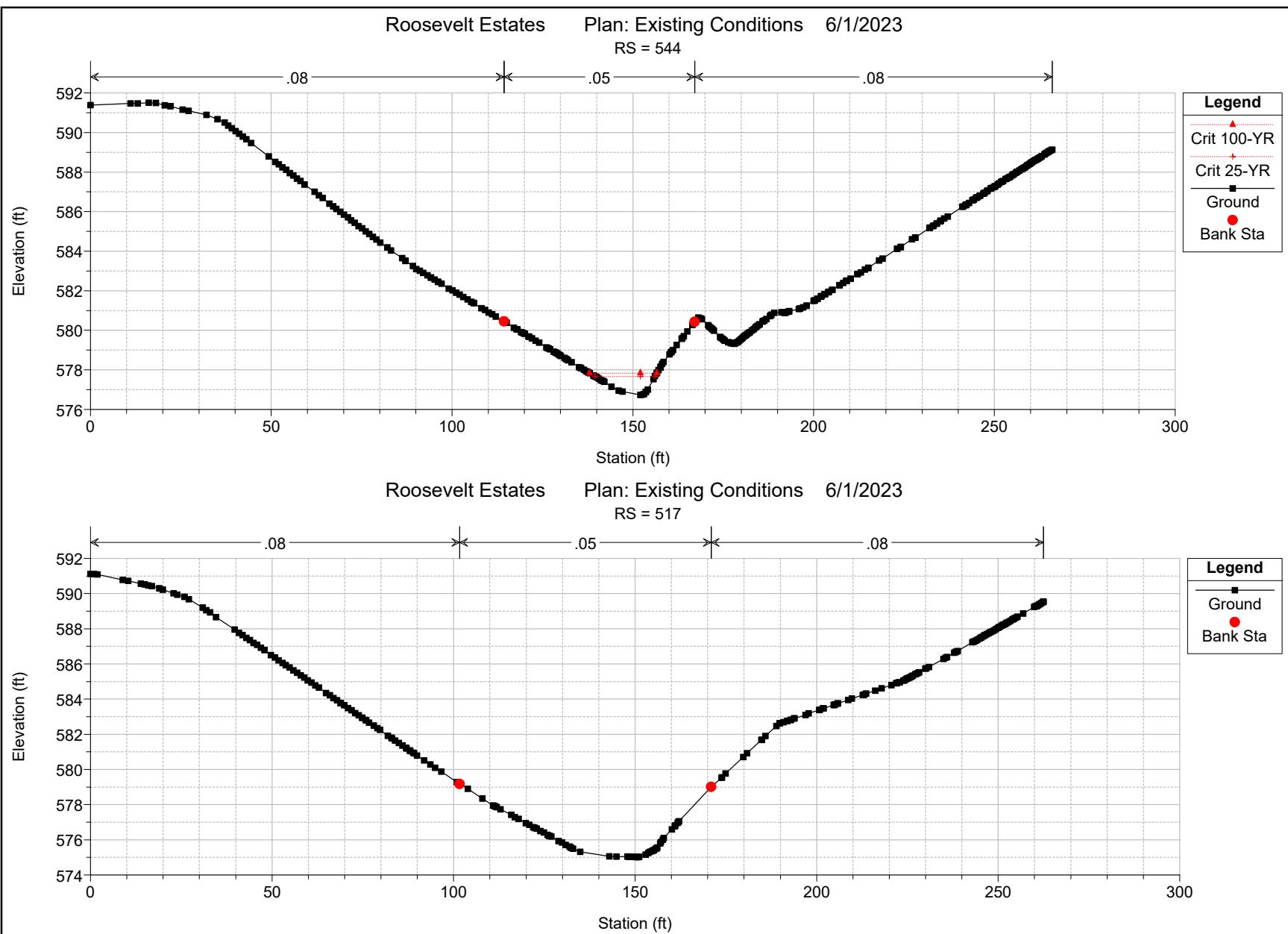
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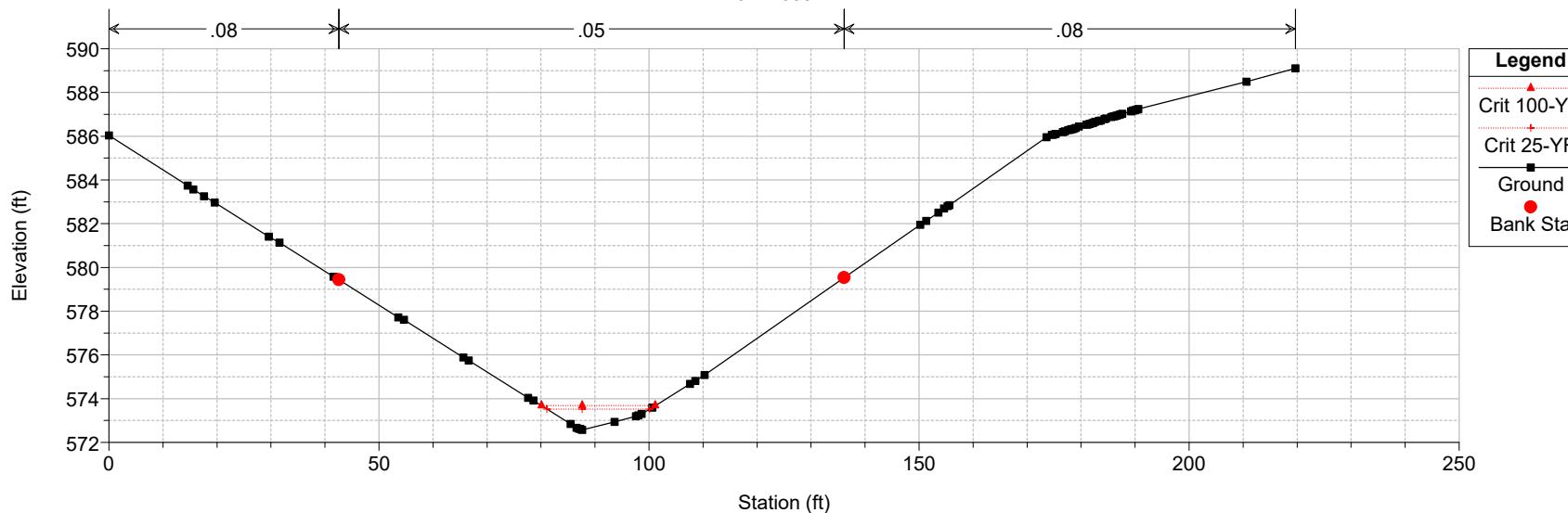
HEC-RAS Plan: Exist River: River 1 Reach: Reach 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	627	25-YR	42.44	584.56	585.43	585.43	585.69	0.047281	4.03	10.52	21.24	1.01
Reach 1	627	100-YR	60.37	584.56	585.57	585.57	585.88	0.044966	4.42	13.67	23.19	1.01
Reach 1	590	25-YR	42.44	580.19	581.34	581.34	581.65	0.045034	4.46	9.53	15.87	1.01
Reach 1	590	100-YR	60.37	580.19	581.52	581.52	581.87	0.042768	4.77	12.64	18.26	1.01
Reach 1	544	25-YR	42.44	576.74	577.67	577.67	577.97	0.044905	4.38	9.69	16.51	1.01
Reach 1	544	100-YR	60.37	576.74	577.84	577.84	578.19	0.043284	4.75	12.71	18.65	1.01
Reach 1	517	25-YR	42.44	575.02	575.90		575.99	0.011576	2.37	17.92	27.99	0.52
Reach 1	517	100-YR	60.37	575.02	576.07		576.18	0.011699	2.66	22.68	29.95	0.54
Reach 1	407	25-YR	42.44	572.57	573.52	573.52	573.79	0.046624	4.19	10.12	19.03	1.01
Reach 1	407	100-YR	60.37	572.57	573.68	573.68	574.00	0.043963	4.55	13.25	21.07	1.01
Reach 1	379	25-YR	42.44	571.61	572.90		573.03	0.014118	2.83	15.00	20.73	0.59
Reach 1	379	100-YR	60.37	571.61	573.53		573.59	0.004152	1.98	30.48	28.70	0.34
Reach 1	336	25-YR	42.44	571.12	572.82		572.85	0.001497	1.24	34.32	30.46	0.21
Reach 1	336	100-YR	60.37	571.12	573.50		573.51	0.000735	1.05	57.33	37.93	0.15
Reach 1	273	25-YR	42.44	569.67	572.83		572.83	0.000053	0.36	118.99	55.18	0.04
Reach 1	273	100-YR	60.37	569.67	573.50		573.50	0.000048	0.38	158.32	62.22	0.04
Reach 1	208	25-YR	42.44	566.34	572.83		572.83	0.000005	0.16	264.01	67.02	0.01
Reach 1	208	100-YR	60.37	566.34	573.50		573.50	0.000006	0.19	310.81	72.35	0.02
Reach 1	150	25-YR	42.44	565.88	572.83		572.83	0.000002	0.11	383.25	89.83	0.01
Reach 1	150	100-YR	60.37	565.88	573.50		573.50	0.000002	0.14	445.73	96.72	0.01
Reach 1	89	25-YR	42.44	566.08	572.83		572.83	0.000000	0.06	659.92	122.63	0.00
Reach 1	89	100-YR	60.37	566.08	573.50		573.50	0.000001	0.08	743.85	127.93	0.01
Reach 1	57	25-YR	42.44	565.97	572.83	566.27	572.83	0.000000	0.05	896.35	159.58	0.00
Reach 1	57	100-YR	60.37	565.97	573.50	566.31	573.50	0.000000	0.06	1005.18	165.22	0.00

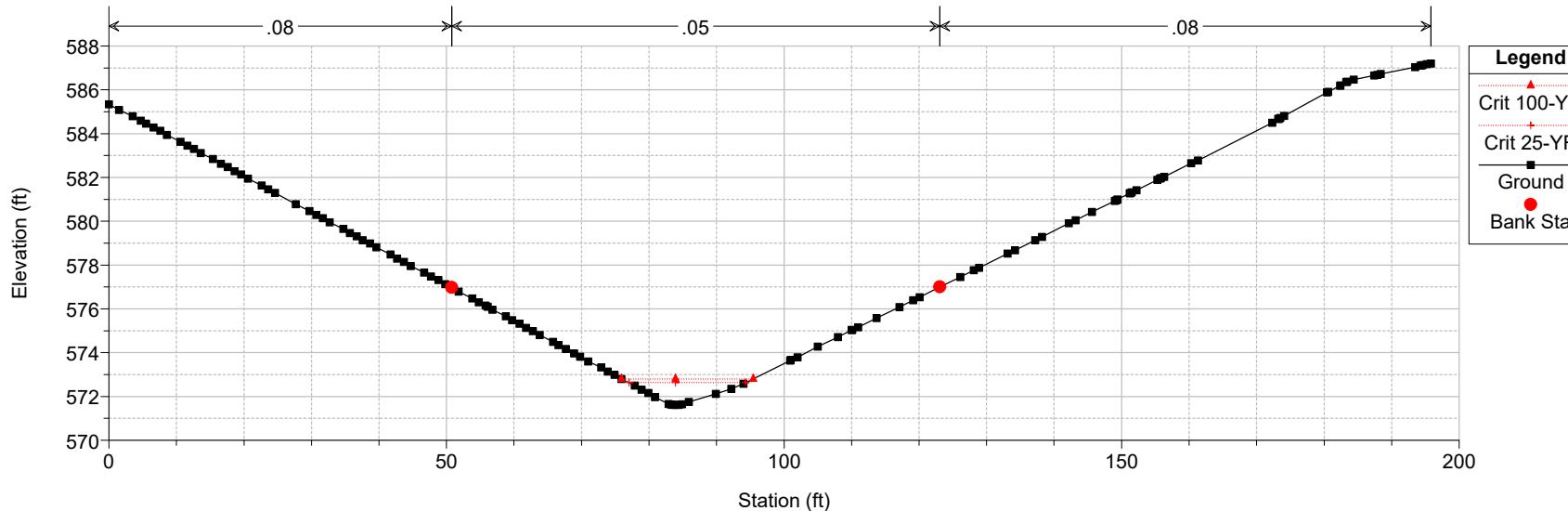


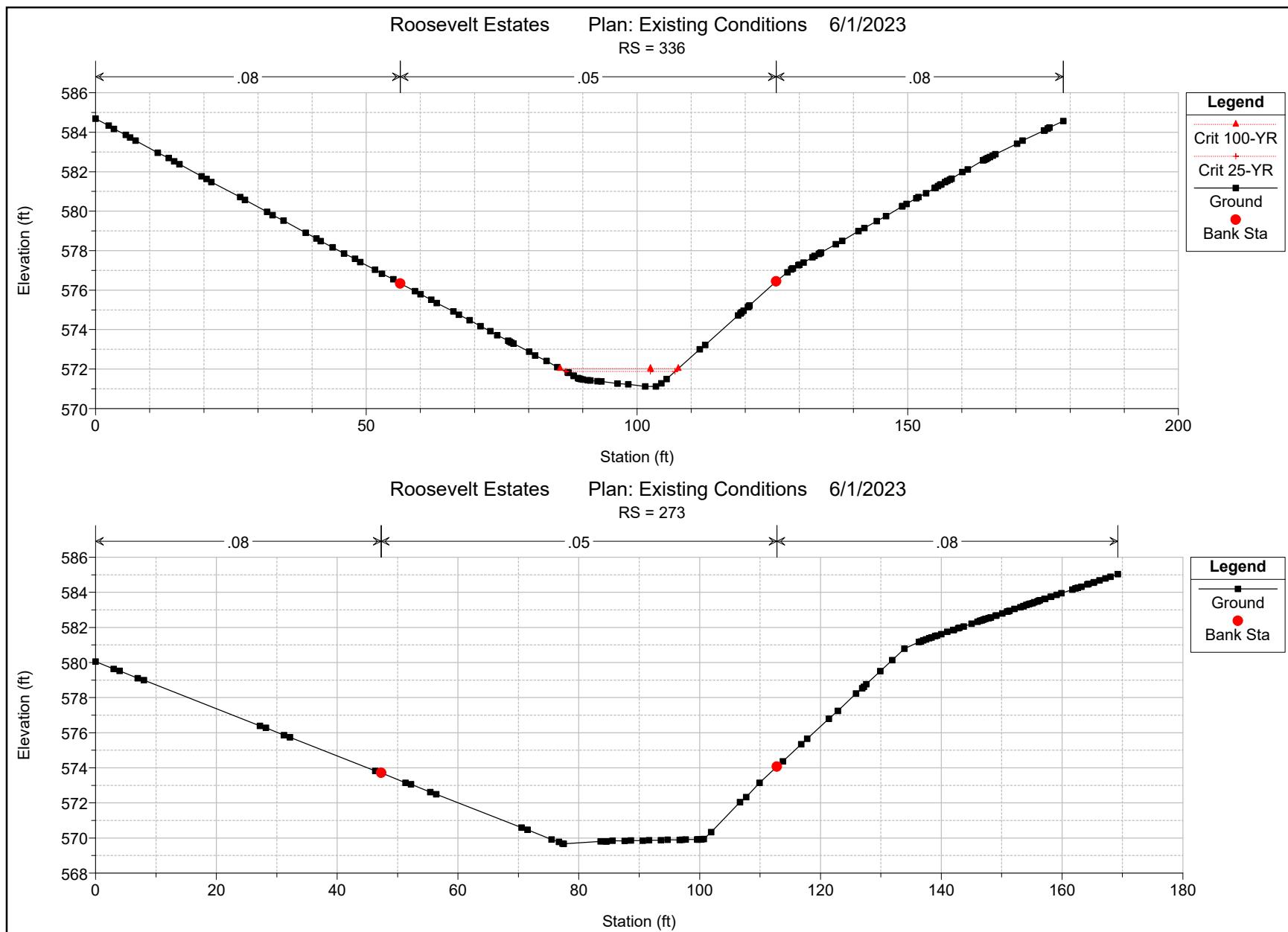


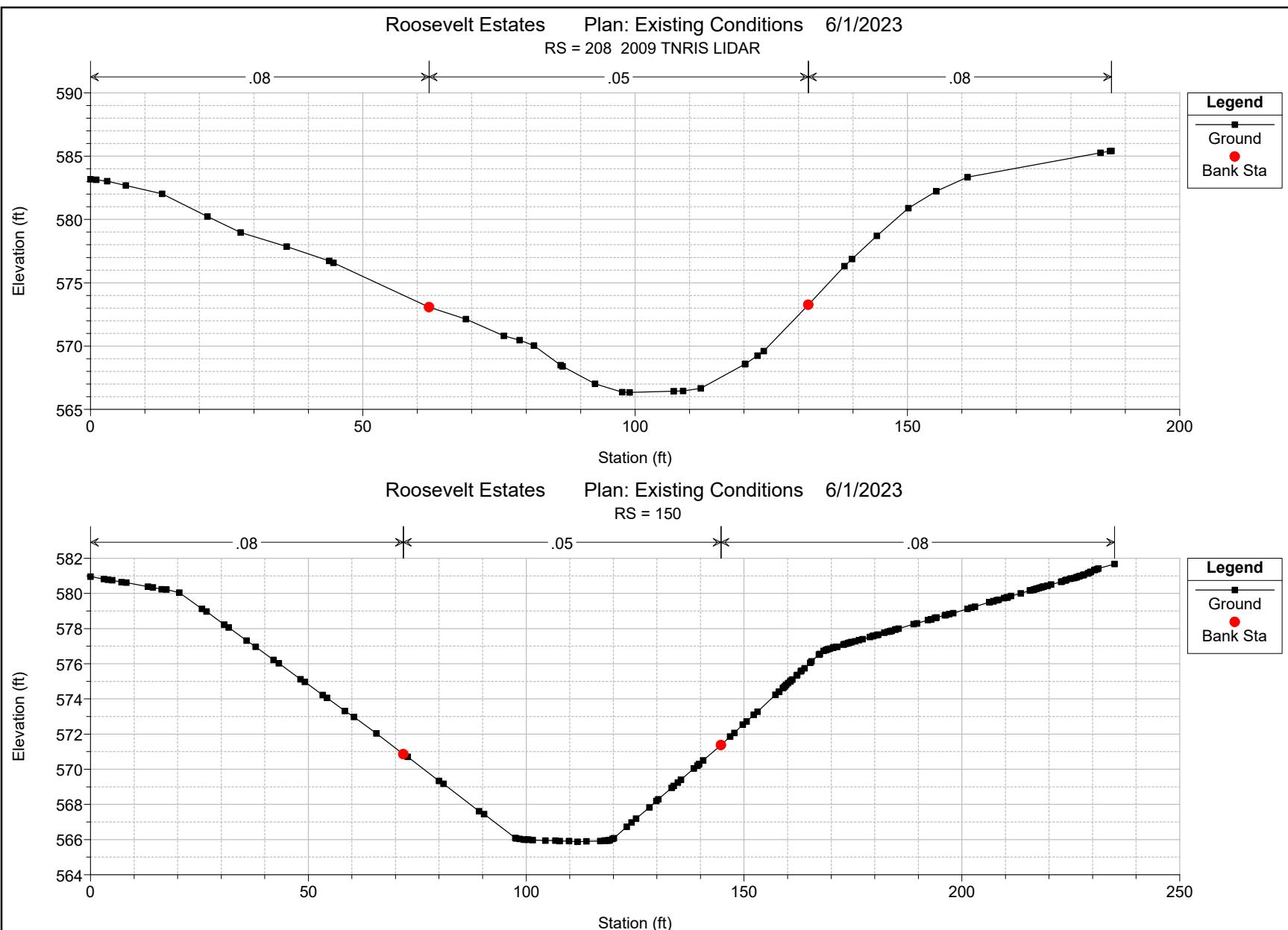
Roosevelt Estates Plan: Existing Conditions 6/1/2023
RS = 407 2009 TNRIS LIDAR

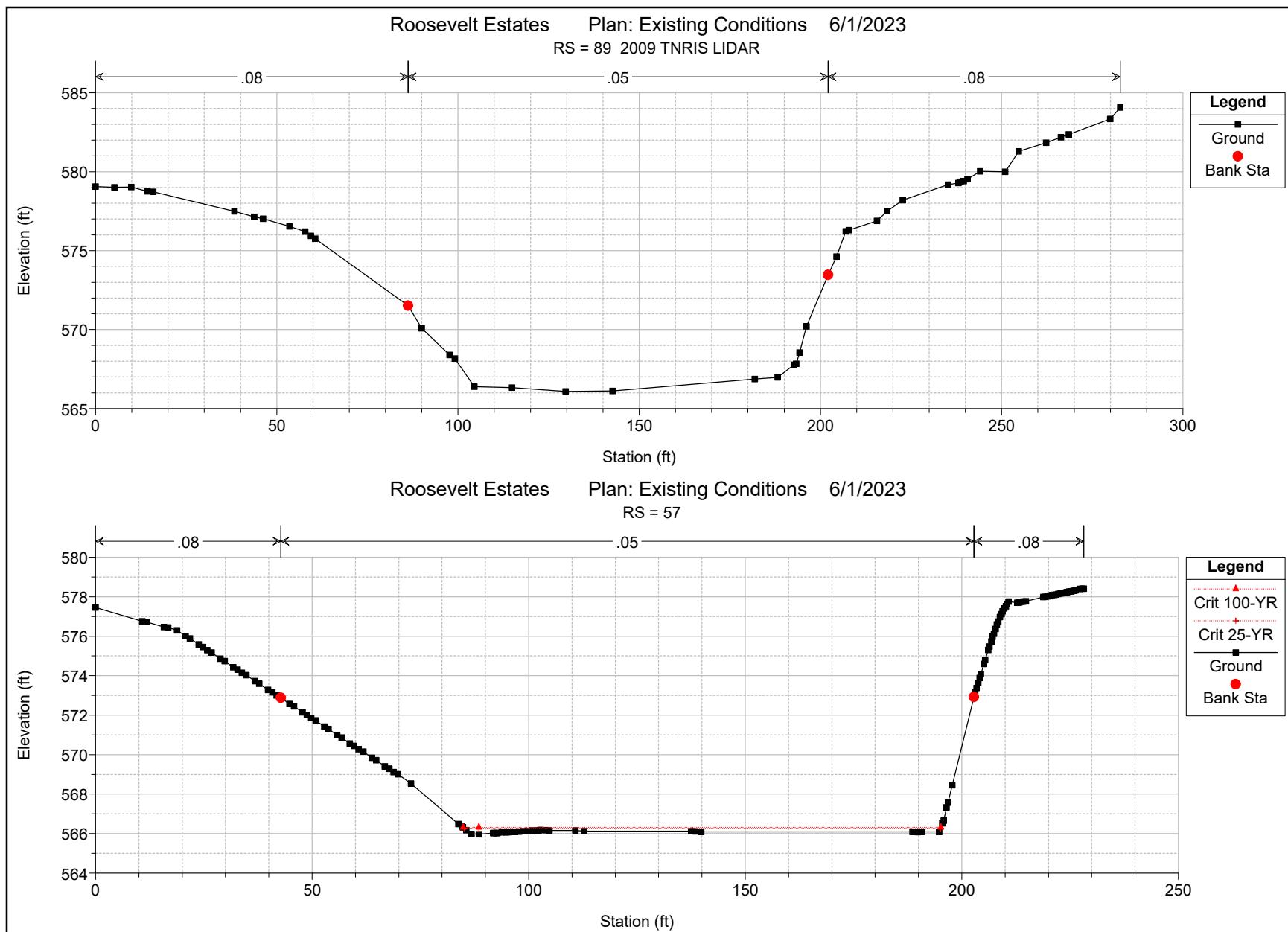


Roosevelt Estates Plan: Existing Conditions 6/1/2023
RS = 379



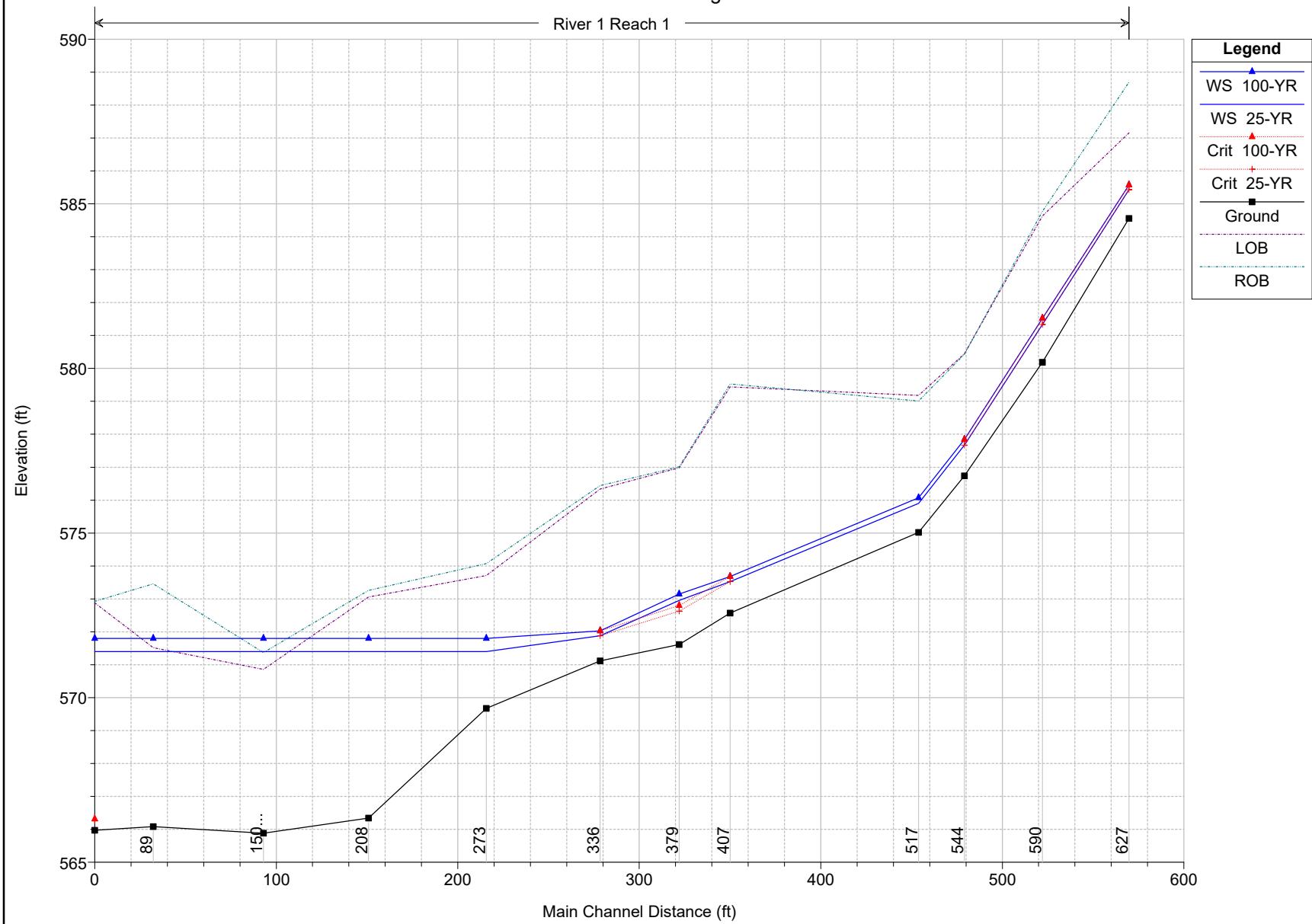






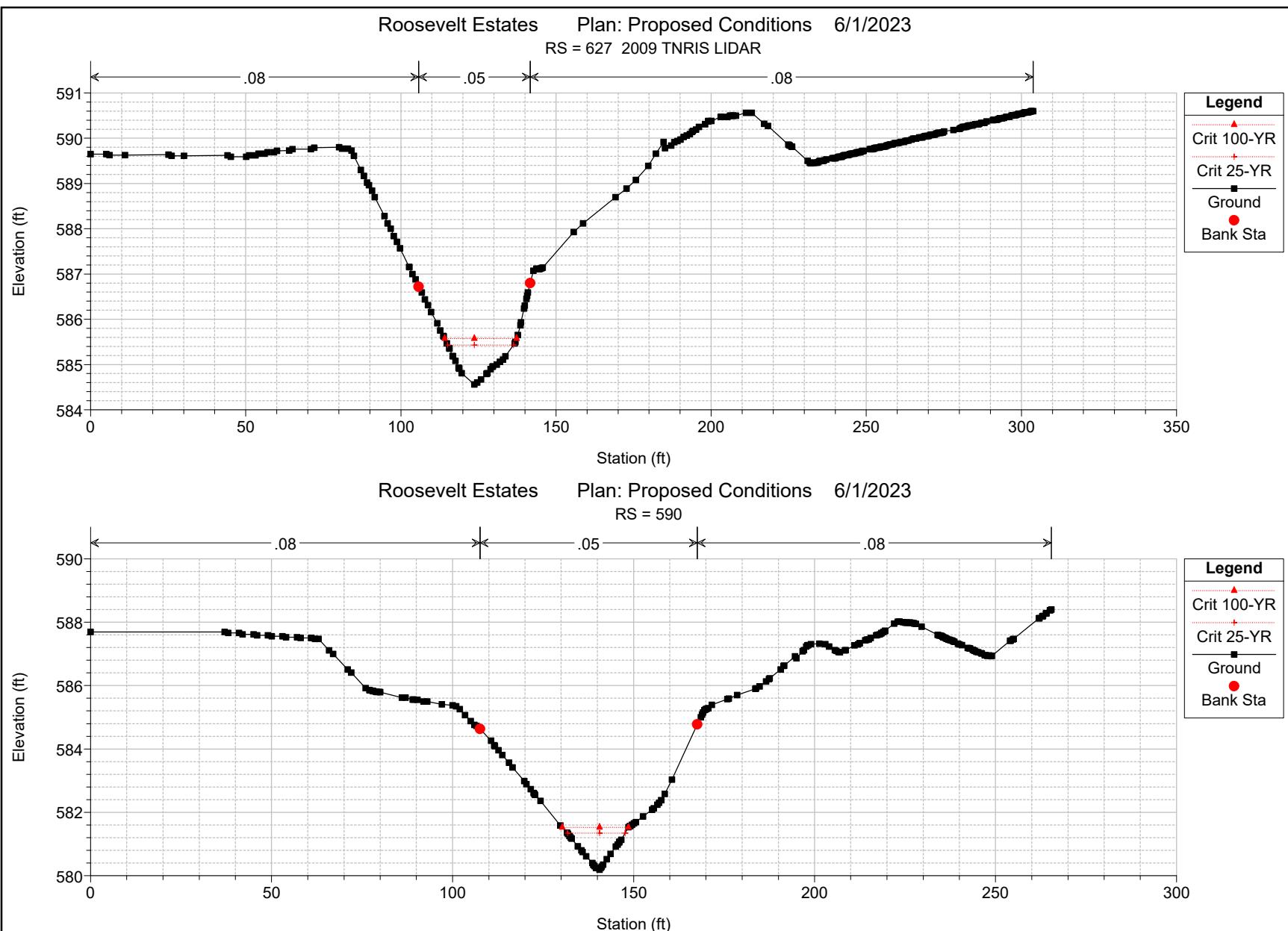
Roosevelt Estates Plan: Existing Conditions 6/1/2023

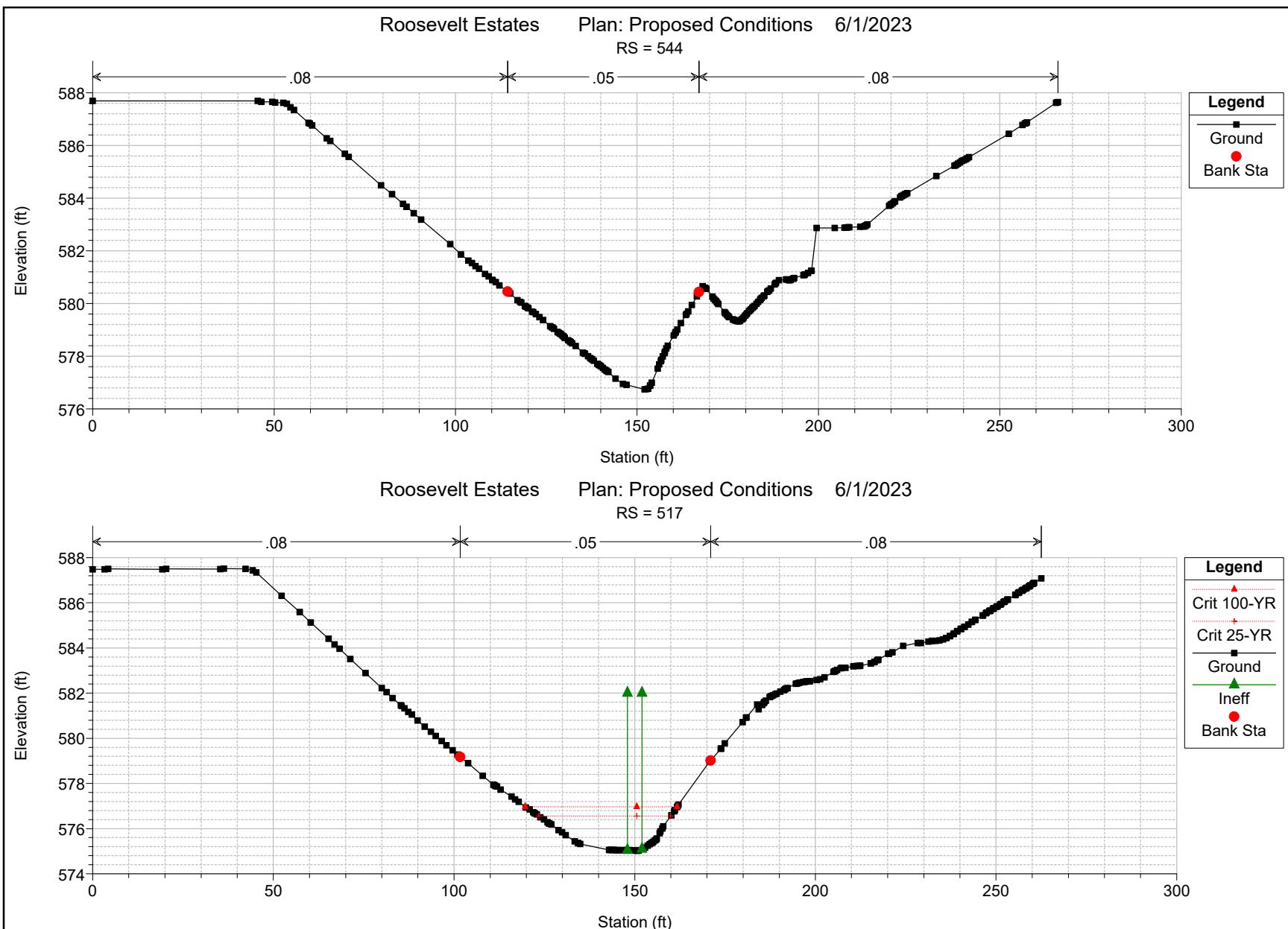
River 1 Reach 1

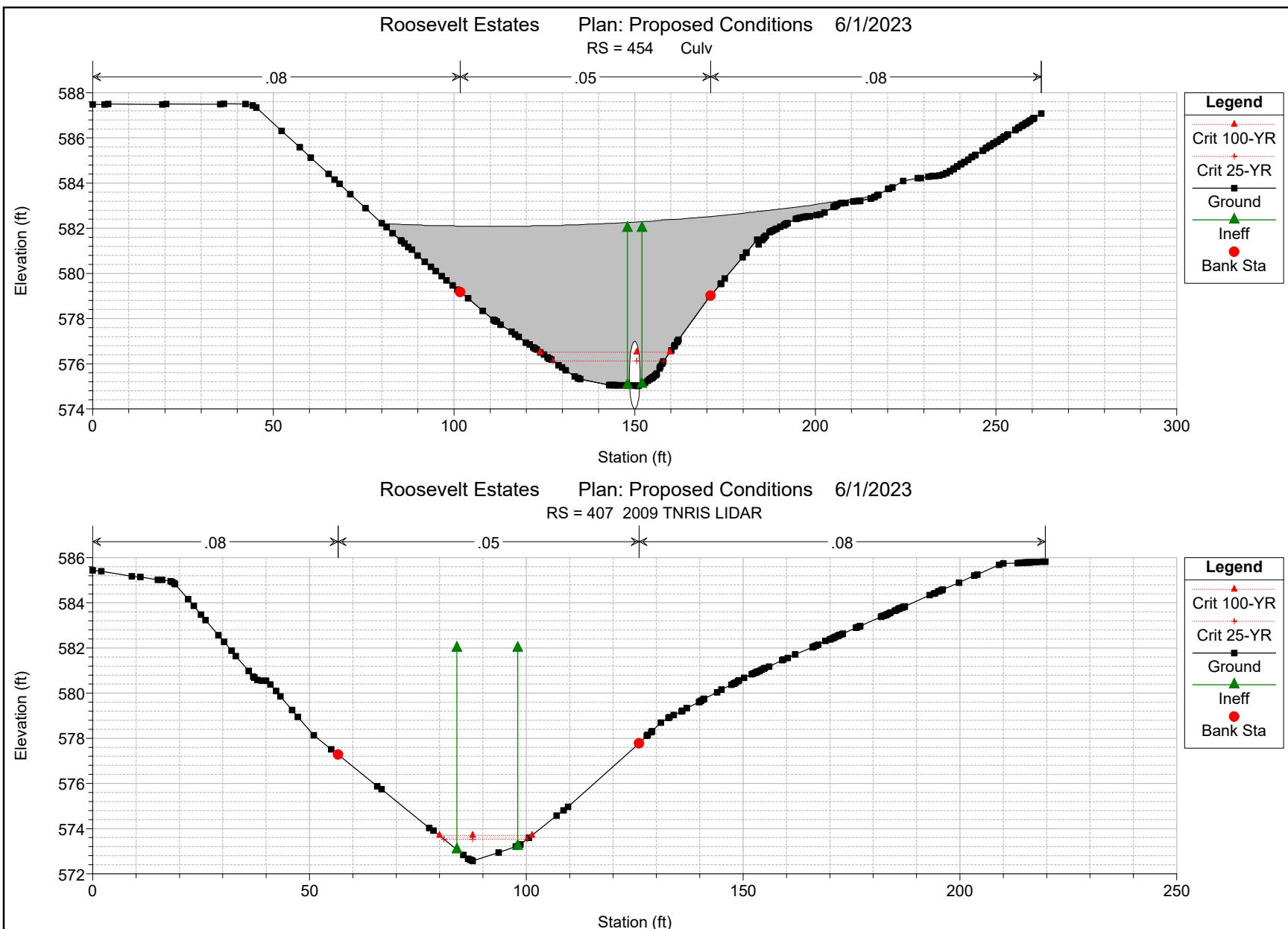


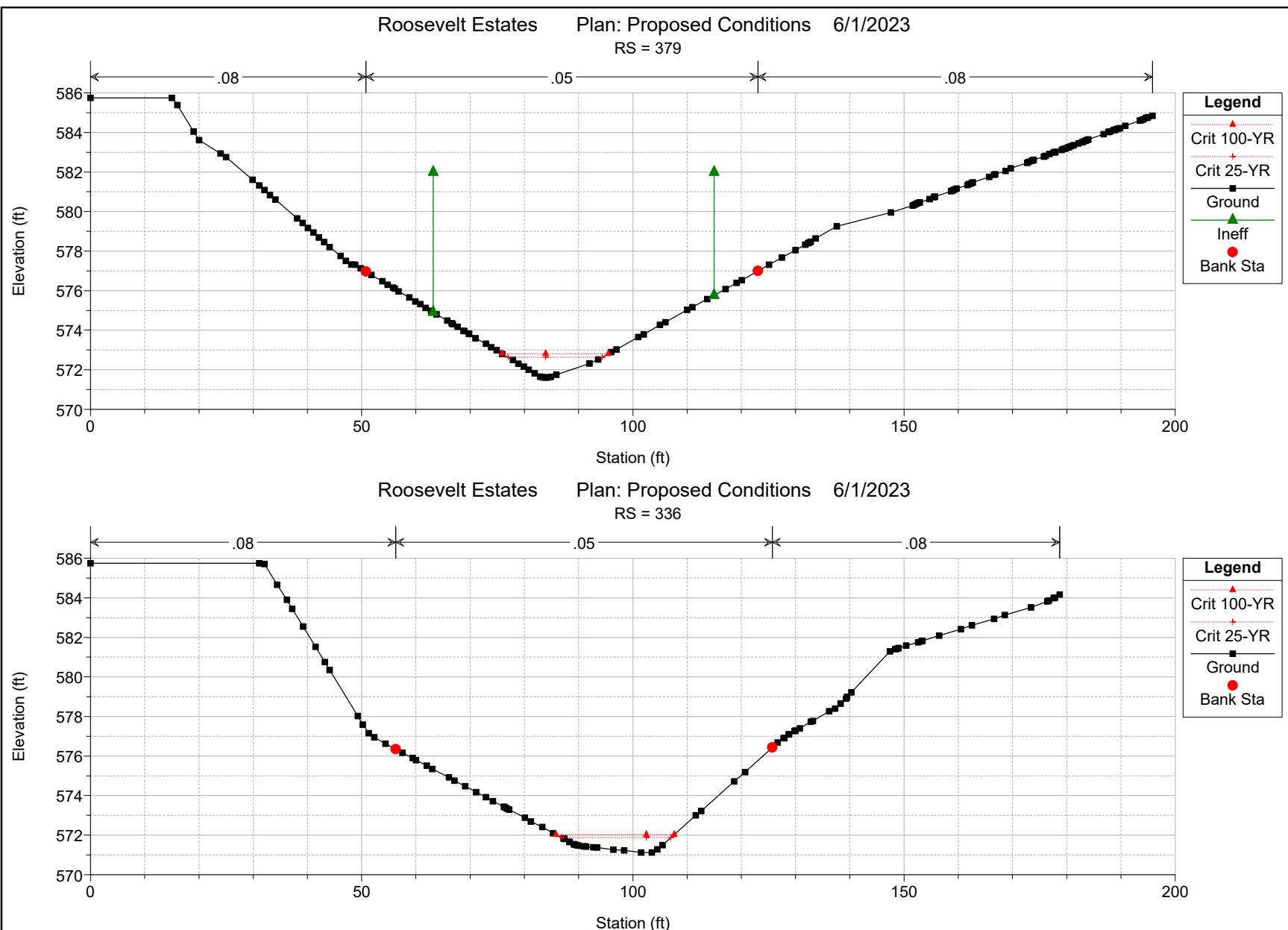
HEC-RAS Plan: Prop River: River 1 Reach: Reach 1

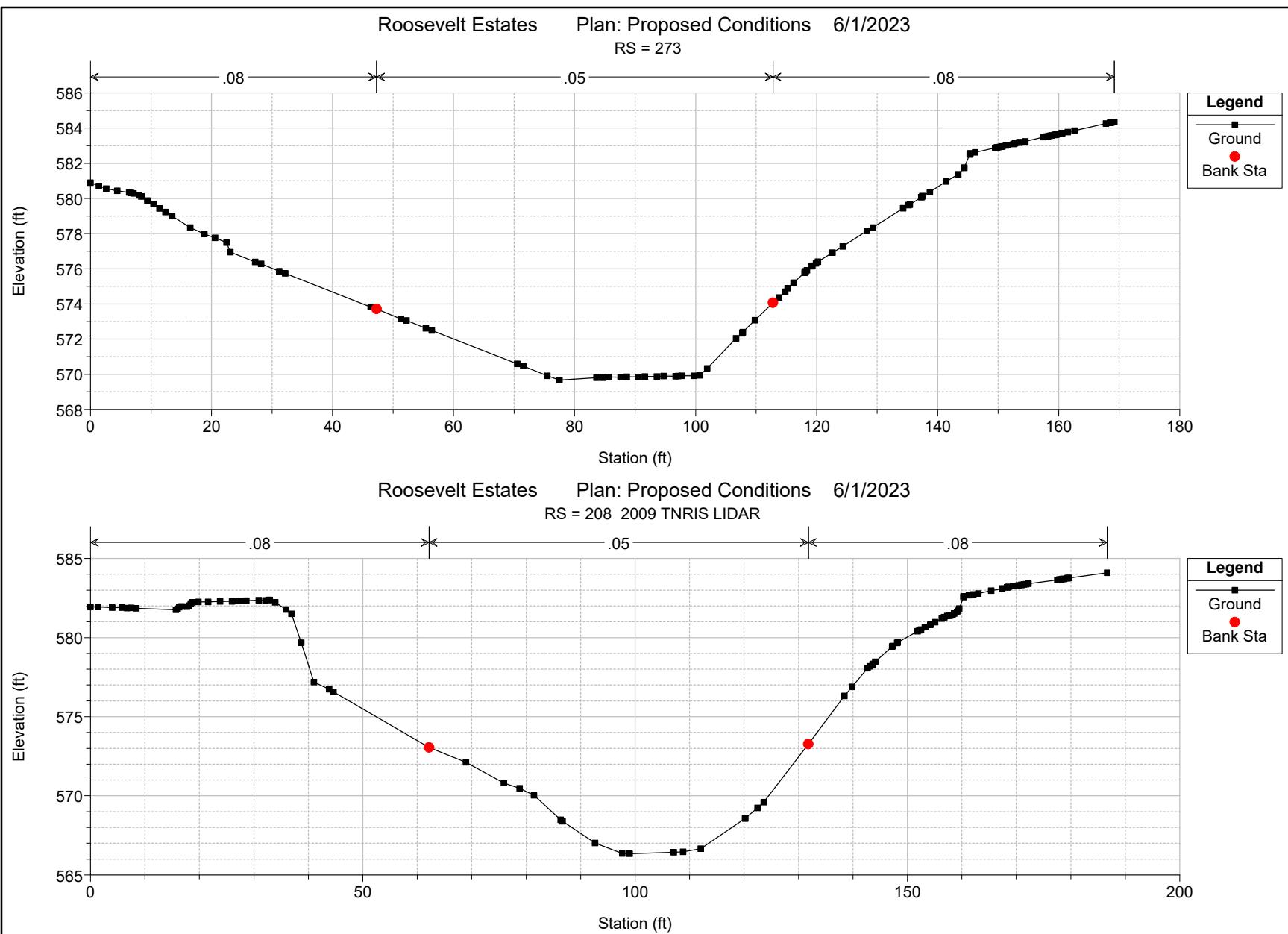
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	627	25-YR	42.44	584.56	585.43	585.43	585.69	0.047265	4.03	10.52	21.24	1.01
Reach 1	627	100-YR	60.37	584.56	585.57	585.57	585.88	0.044993	4.42	13.66	23.18	1.01
Reach 1	590	25-YR	42.44	580.19	581.34	581.34	581.65	0.044336	4.43	9.58	15.91	1.01
Reach 1	590	100-YR	60.37	580.19	581.52	581.52	581.87	0.042607	4.77	12.66	18.28	1.01
Reach 1	544	25-YR	42.44	576.74	577.90		578.05	0.016735	3.05	13.92	19.47	0.64
Reach 1	544	100-YR	60.37	576.74	578.98		579.01	0.001739	1.43	42.07	33.33	0.23
Reach 1	517	25-YR	42.44	575.02	577.50	576.56	577.79	0.006338	4.31	9.85	48.94	0.48
Reach 1	517	100-YR	60.37	575.02	578.65	576.97	578.92	0.003554	4.17	14.47	63.66	0.39
Reach 1	454 Culvert Crossing	Culvert										
Reach 1	407	25-YR	42.44	572.57	573.53	573.53	573.86	0.041888	4.60	9.23	19.13	1.00
Reach 1	407	100-YR	60.37	572.57	573.70	573.70	574.12	0.039525	5.20	11.61	21.34	1.01
Reach 1	379	25-YR	42.44	571.61	572.96	572.63	573.07	0.011269	2.61	16.28	21.48	0.53
Reach 1	379	100-YR	60.37	571.61	573.16	572.81	573.29	0.011769	2.91	20.77	24.04	0.55
Reach 1	336	25-YR	42.44	571.12	571.88	571.88	572.14	0.046726	4.10	10.35	20.18	1.01
Reach 1	336	100-YR	60.37	571.12	572.03	572.03	572.34	0.043965	4.49	13.44	21.81	1.01
Reach 1	273	25-YR	65.36	569.67	571.39		571.42	0.001437	1.30	50.31	40.27	0.20
Reach 1	273	100-YR	92.98	569.67	571.79		571.82	0.001259	1.38	67.26	44.36	0.20
Reach 1	208	25-YR	65.36	566.34	571.40		571.40	0.000033	0.37	177.32	54.92	0.04
Reach 1	208	100-YR	92.98	566.34	571.80		571.80	0.000049	0.47	199.88	57.93	0.04
Reach 1	150	25-YR	65.36	565.88	571.40		571.40	0.000013	0.25	264.82	75.89	0.02
Reach 1	150	100-YR	92.98	565.88	571.80		571.80	0.000018	0.32	295.92	79.72	0.03
Reach 1	89	25-YR	65.36	566.08	571.40		571.40	0.000003	0.13	492.48	111.49	0.01
Reach 1	89	100-YR	92.98	566.08	571.80		571.80	0.000004	0.17	537.81	116.09	0.01
Reach 1	57	25-YR	65.36	565.97	571.40	566.32	571.40	0.000001	0.10	676.47	147.74	0.01
Reach 1	57	100-YR	92.98	565.97	571.80	566.38	571.80	0.000002	0.13	736.01	150.02	0.01

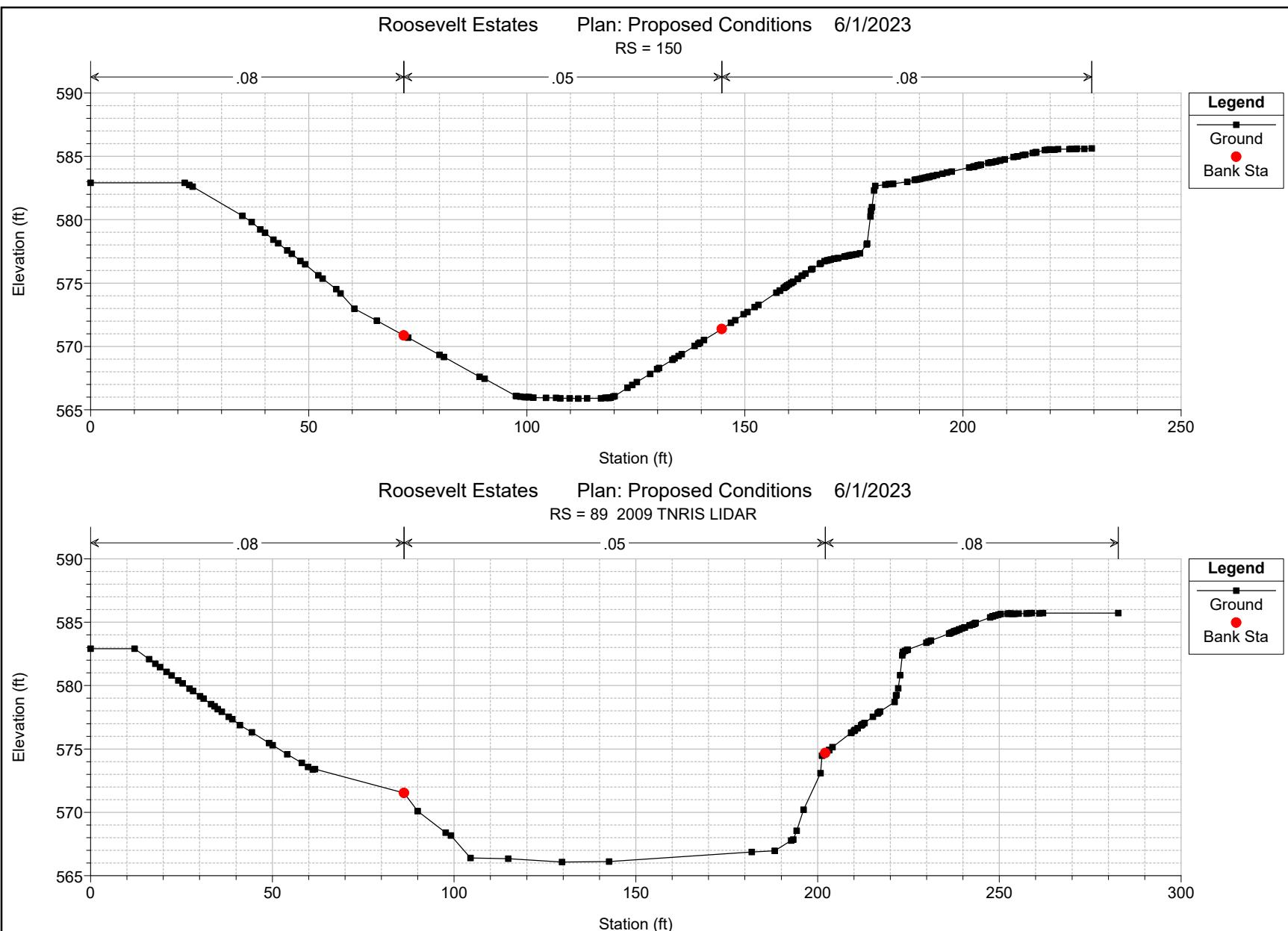


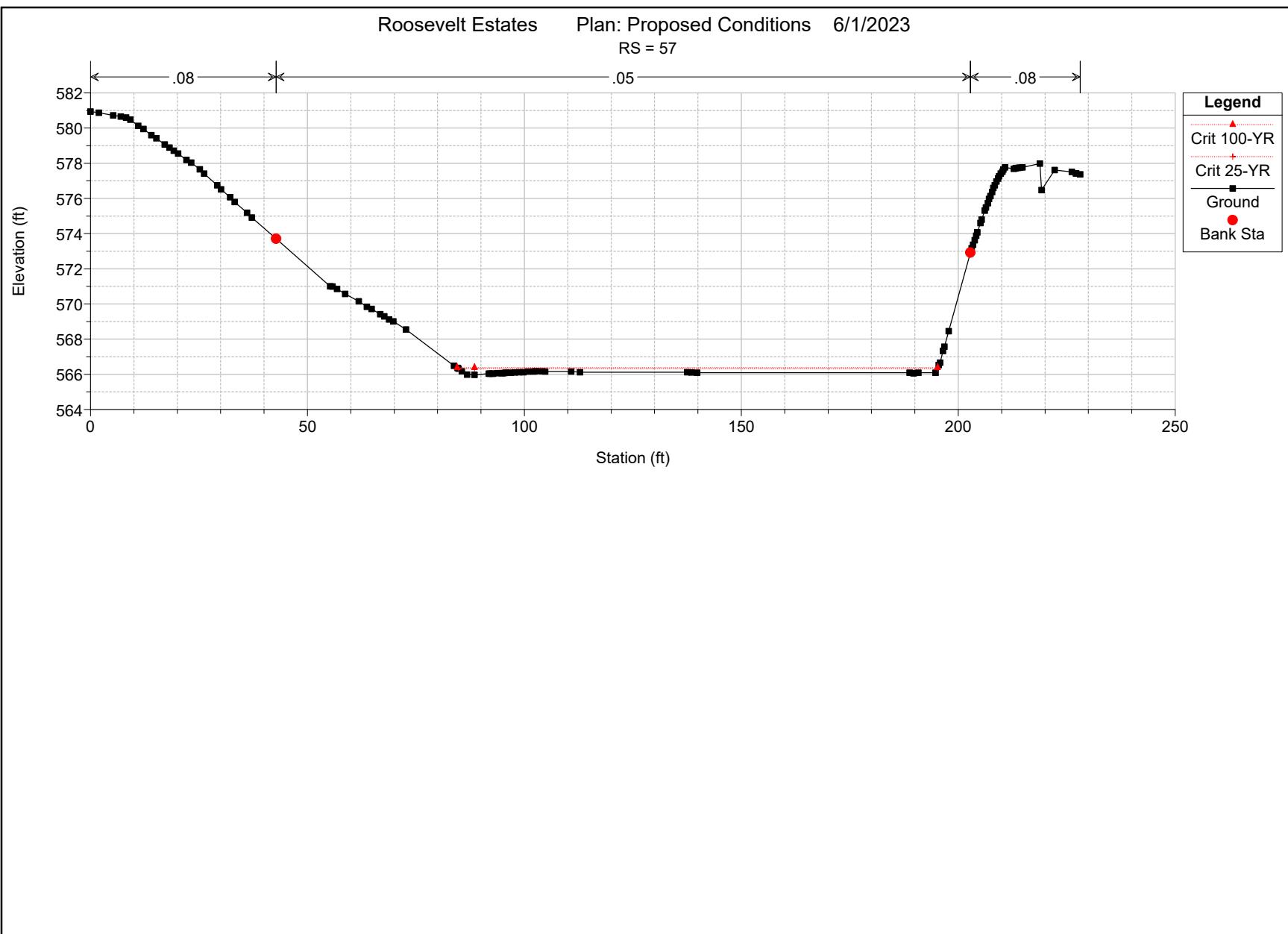






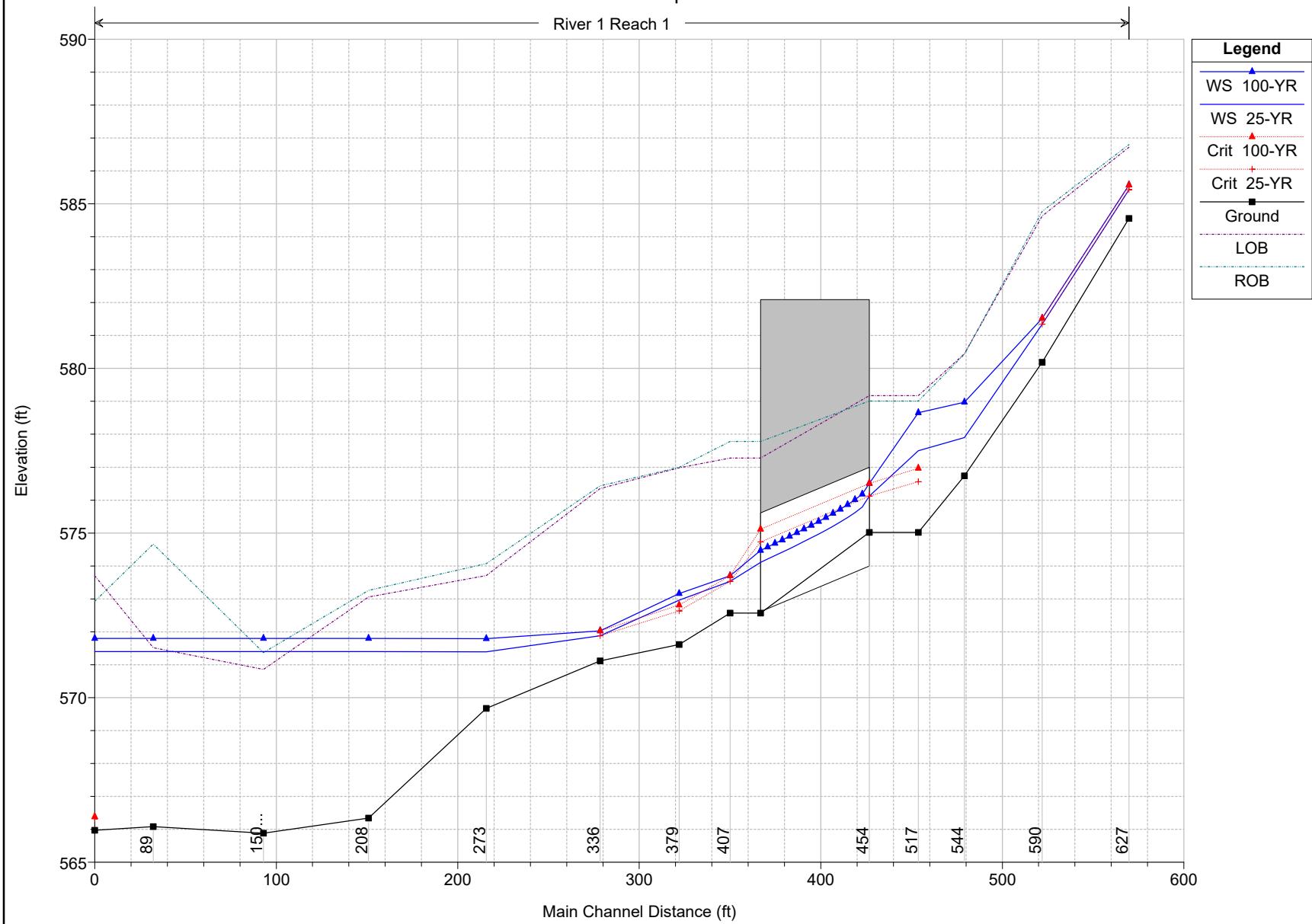


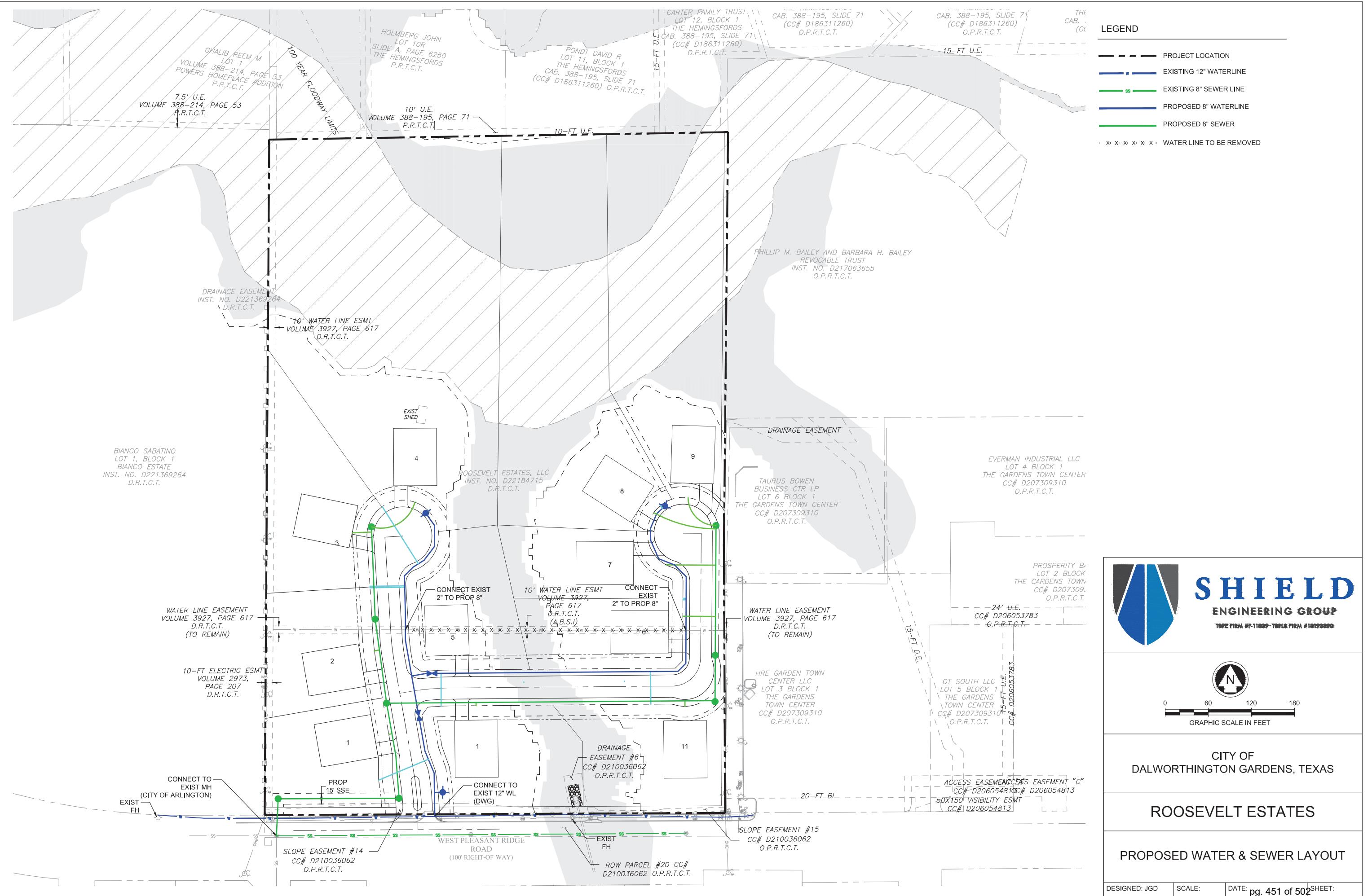




Roosevelt Estates Plan: Proposed Conditions 6/1/2023

River 1 Reach 1





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Kimley»Horn

January 23, 2024

Sandra Ma
Interim City Secretary
City of Dalworthington Gardens
2600 Roosevelt Drive
Dalworthington Gardens, TX 76016

RE: Seventh Preliminary Plat Submittal Review
Roosevelt Estates
KHA No. 068302505

Dear Sandra:

We have completed our review of the seventh submittal of the Preliminary Plat for the above referenced project. The Preliminary Plat was received via email for review on January 23, 2024.

The property is owned by Roosevelt Estates LLC and lies within the corporate boundary of the City. The proposed land use complies with the current zoning requirements and the Future Land Use Map.

All previous comments have been adequately addressed. Conformity of the Preliminary Plat submitted is contingent on Dalworthington Gardens City Council's approval of the zoning change application for the subject property.

If council approves the zoning change application, the Preliminary Plat as submitted conforms to the technical requirements listed in the Dalworthington Gardens Code of Ordinances and we recommend approval.

If council denies the zoning change application, the Preliminary Plat as submitted would not comply with the setback requirements listed in table 14.02.171 in the Dalworthington Gardens Code of Ordinances and we therefore recommend denial.

Please remember that the adequacy of the design work reflected in the plans reviewed and the responsibility to adhere to all applicable ordinances and codes remains with the design engineer.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.



Brandon Bell, P.E.

Staff Agenda Report

Agenda Subject: Discussion and possible recommendation request for a concept plan with a Bowen Road planned development overlay for property located at 2500 and 2512 California Lane, Dalworthington Gardens, Tarrant County, Texas

Background Information: A Zone Change Application submitted by Trevor Turnbow was received on 7/17/2023 for properties located at 2500 California Lane and 2512 California Lane for a change from single family "SF" residential to garden home "GH" base zoning with a mixed-use "MU" overlay.

Per discussion with applicant, city staff, and attorney. Applicant submitted an amended zoning application on 1/16/2024 requesting to allow for the Bowen Road Overlay.

Notification of tonight's public hearing were sent to all property owners within 200' of the subject property as well as being posted in the Commercial Recorder. Of the 12 property owner notifications sent, 0 were returned with comments.

Per Local Government Code, Chapter 211, zone changes must comply with the City's Comprehensive Plan as follows:

Sec. 211.004. COMPLIANCE WITH COMPREHENSIVE PLAN. (a) Zoning regulations must be adopted in accordance with a comprehensive plan and must be designed to:

- (1) lessen congestion in the streets;
- (2) secure safety from fire, panic, and other dangers;
- (3) promote health and the general welfare;
- (4) provide adequate light and air;
- (5) prevent the overcrowding of land;
- (6) avoid undue concentration of population; or
- (7) facilitate the adequate provision of transportation, water, sewers, schools, parks, and other public requirements.

The Future Land Use Map from the current 2005 adopted Plan shows these properties to remain as single family residential. However, in the latest Plan draft amendment from June 2023 includes changes to proposed Bowen Road future land uses as described below. The full description can be found in your packet.

The Bowen Road Planned Development Overlay may include Large Lot Residential uses but may also include a mixture of Medium Density Single Family Garden Homes, and Commercial Uses with a preference toward agricultural related businesses (vegetable and meat markets, farm and ranch supply, etc.) and restaurants. Garden Home developments shall include 10 percent open space for parks and community gardens. The Planned Development shall provide an orderly transition from commercial uses to the large lot Residential uses and incorporate suitable separation barriers with a preference to vegetated barriers in lieu of hardened barriers such as fences. Uses other than large lot residential uses shall be planned development.

The applicant has communicated to the City he desires to build garden homes with a few small foot print restaurants on the south end of the development.

Recommended Action/Motion: Motion to recommend approval of a Zone Change Application requesting for a concept plan with a Bowen Road planned development overlay for property located at 2500 and 2512 California Lane, Dalworthington Gardens, Tarrant County, Texas

OR

Motion to recommend denial of a Zone Change Application requesting for a concept plan with a Bowen Road planned development overlay for property located at 2500 and 2512 California Lane, Dalworthington Gardens, Tarrant County, Texas

Attachments:

Zone Change Application 7/17/2023

Amended Zone Change Application 1/16/2024

2005 Current Future Land Use Map

Bowen Road Corridor PD Overlay Verbiage from Comp

Plan 2023 Draft Future Land Use Map

Ordinance No. 2023-18 - Bowen Road Overlay



Zone Change Application

General Information

- Prior to the submittal of an application, the applicant is encouraged to schedule a pre-application conference with City Staff.
- This application will not be scheduled for hearing until reviewed by the Director of Community Development or designee.
- Incomplete applications will not be reviewed.
- The application fee is \$1,500.00 plus \$50.00/acre if not SF zoned.

Applicant Information

Property Owner **Authorized Representative** (*Notarized affidavit required including signature of legal owner(s)*)

Name: TREVOR TURNBOW	Phone Number: 682-266-8929
Mailing Address: 4726 LENNON AVE. ARLINGTON, TX 76016	Email Address: TREVOR.TURNBOW@ICLOUD.COM

Subject Property Address and/or Location (*Use attachment, if necessary:*)

2500 & 2512 CALIFORNIA LN DALWORTHINGTON, TX 76015

Legal Description (*Use attachment, if necessary:*) DALWORTHINGTON GARDENS ADDN BLOCK 4 LOT 4AI
DALWORTHINGTON GARDENS ADDN BLOCK 4 LOT 4

Existing Use of Property: RAW LAND

Proposed Use of Property: Garden Homes as outlined in DWG City Ordinance

Current Zoning: SFR	Comprehensive Plan Designation: Garden Homes
---------------------	--

Proposed Zoning: Garden Homes "GH" As Base Zoning with Mixed Use Overlay

Important Information Regarding Zone Change Requests

1. An application for a zone change on a property may only be made by the owner of that property and/or an authorized representative of the property owner. An authorized representative shall present a notarized affidavit from the property owner. If the subject property is owned by the City of Dalworthington Gardens, the City Administrator or designee may apply for the zone change on behalf of the City.
2. No application will be processed if a zoning violation exists on the property, unless such processing is authorized by City Council. Use of the subject property for any new activity not allowed by present zoning cannot occur before City Council's final approval of the requested zone change. Any such unauthorized use of the subject property is subject to prosecution in Municipal Court. **(continued)**

Zone Change Application (cont.)

3. If approved, a zone change is applied to the property, not the property owner.
4. The Planning & Zoning Commission makes recommendations to City Council. If the Planning & Zoning Commission recommends approval of a zone change request, the case must still go before City Council for final action.
5. Certain minimum building setbacks from some or all property lines must be maintained, and room for a minimum number of parking spaces must be reserved on a subject property, based on that property's zoning classification and the nature of its proposed use. A privacy fence may also be required between residential and non-residential zoning districts. These requirements are outlined in the City of Dalworthington Garden's Ordinances. It is the applicant's benefit to ensure that any proposed development will fit onto the subject property, in compliance with these and other applicable requirements of the City's Code of Ordinances.
6. The City is required to mail letters to owners of property within 200 feet of the subject property of the zone change request.
7. The applicant or an authorized representative should attend public hearings pertaining to the request and be prepared to present the case and answer any relevant questions from the Planning & Zoning Commission and City Council members.

I hereby certify that I am the owner or duly authorized agent of the owner for the purposes of this application. I further certify that I have read and examined this application and know the same to be true and correct. If any of the information provided on this application is incorrect, the permit or approval may be revoked.

Signature: Trent Tish

Date: 07/17/23

OFFICE USE ONLY

Case Number:	Date of Application:	Date Paid:
Affidavit attached?: Yes <input type="checkbox"/> No <input type="checkbox"/>	P&Z Meeting Date:	



Zone Change Application

General Information

- Prior to the submittal of an application, the applicant is encouraged to schedule a pre-application conference with City Staff.
- This application will not be scheduled for hearing until reviewed by the Director of Community Development or designee.
- Incomplete applications will not be reviewed.
- The application fee is \$1,500.00 plus \$50.00/acre if not SF zoned.

Applicant Information

Property Owner **Authorized Representative** (*Notarized affidavit required including signature of legal owner(s)*)

Name: Trevor Turnbow	Phone Number: 682-266-8929
Mailing Address: PO Box 151567 Arlington, TX 76015	Email Address: trevor.turnbow@icloud.com

Subject Property Address and/or Location (*Use attachment, if necessary*): **2500 & 2512 California Ln
Dalworthington Gardens, TX 76015**

Legal Description (*Use attachment, if necessary*): **Dalworthington Gardens Addn Block 4 Lot 4A1
Dalworthington Gardens Addn Block 4 Lot 4**

Existing Use of Property: **Raw Land**

Proposed Use of Property: **Bowen Road**

Current Zoning: SFR	Comprehensive Plan Designation: Bowen Road Overlay
----------------------------	---

Proposed Zoning: **Bowen Road Overlay**

Important Information Regarding Zone Change Requests

- An application for a zone change on a property may only be made by the owner of that property and/or an authorized representative of the property owner. An authorized representative shall present a notarized affidavit from the property owner. If the subject property is owned by the City of Dalworthington Gardens, the City Administrator or designee may apply for the zone change on behalf of the City.
- No application will be processed if a zoning violation exists on the property, unless such processing is authorized by City Council. Use of the subject property for any new activity not allowed by present zoning cannot occur before City Council's final approval of the requested zone change. Any such unauthorized use of the subject property is subject to prosecution in Municipal Court. **(continued)**

Zone Change Application (cont.)

3. If approved, a zone change is applied to the property, not the property owner.
4. The Planning & Zoning Commission makes recommendations to City Council. If the Planning & Zoning Commission recommends approval of a zone change request, the case must still go before City Council for final action.
5. Certain minimum building setbacks from some or all property lines must be maintained, and room for a minimum number of parking spaces must be reserved on a subject property, based on that property's zoning classification and the nature of its proposed use. A privacy fence may also be required between residential and non-residential zoning districts. These requirements are outlined in the City of Dalworthington Garden's Ordinances. It is the applicant's benefit to ensure that any proposed development will fit onto the subject property, in compliance with these and other applicable requirements of the City's Code of Ordinances.
6. The City is required to mail letters to owners of property within 200 feet of the subject property of the zone change request.
7. The applicant or an authorized representative should attend public hearings pertaining to the request and be prepared to present the case and answer any relevant questions from the Planning & Zoning Commission and City Council members.

I hereby certify that I am the owner or duly authorized agent of the owner for the purposes of this application. I further certify that I have read and examined this application and know the same to be true and correct. If any of the information provided on this application is incorrect, the permit or approval may be revoked.

Signature: Trevor Turnbow /s/

Date: 1/18/24

OFFICE USE ONLY

Case Number:	Date of Application:	Date Paid:
Affidavit attached?: Yes <input type="checkbox"/> No <input type="checkbox"/>	P&Z Meeting Date:	

**CITY OF
DALWORTHINGTON
GARDENS**
Tarrant County, Texas
**FUTURE LAND USE
PLAN MAP**

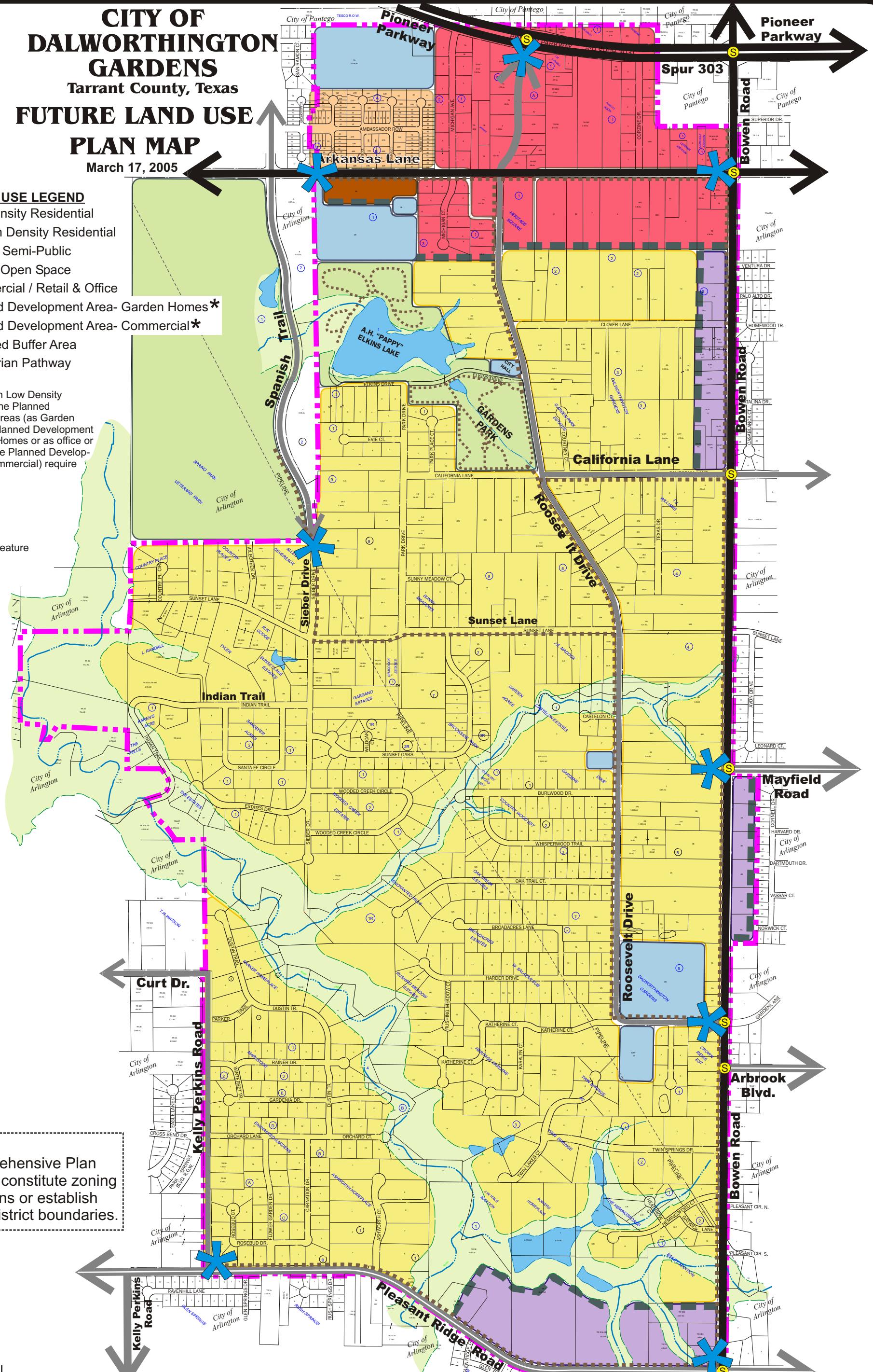
March 17, 2005

- LAND USE LEGEND**
- Yellow Low Density Residential
 - Orange Medium Density Residential
 - Blue Public / Semi-Public
 - Green Parks / Open Space
 - Red Commercial / Retail & Office
 - Brown Planned Development Area- Garden Homes*
 - Purple Planned Development Area- Commercial*
 - Black Required Buffer Area
 - Dashed Pedestrian Pathway

*NOTE:
Uses other than Low Density Residential in the Planned Development Areas (as Garden homes in the Planned Development Area- Garden Homes or as office or retail uses in the Planned Development Area- Commercial) require plan approval.

(S) Traffic Signal

Entry Feature

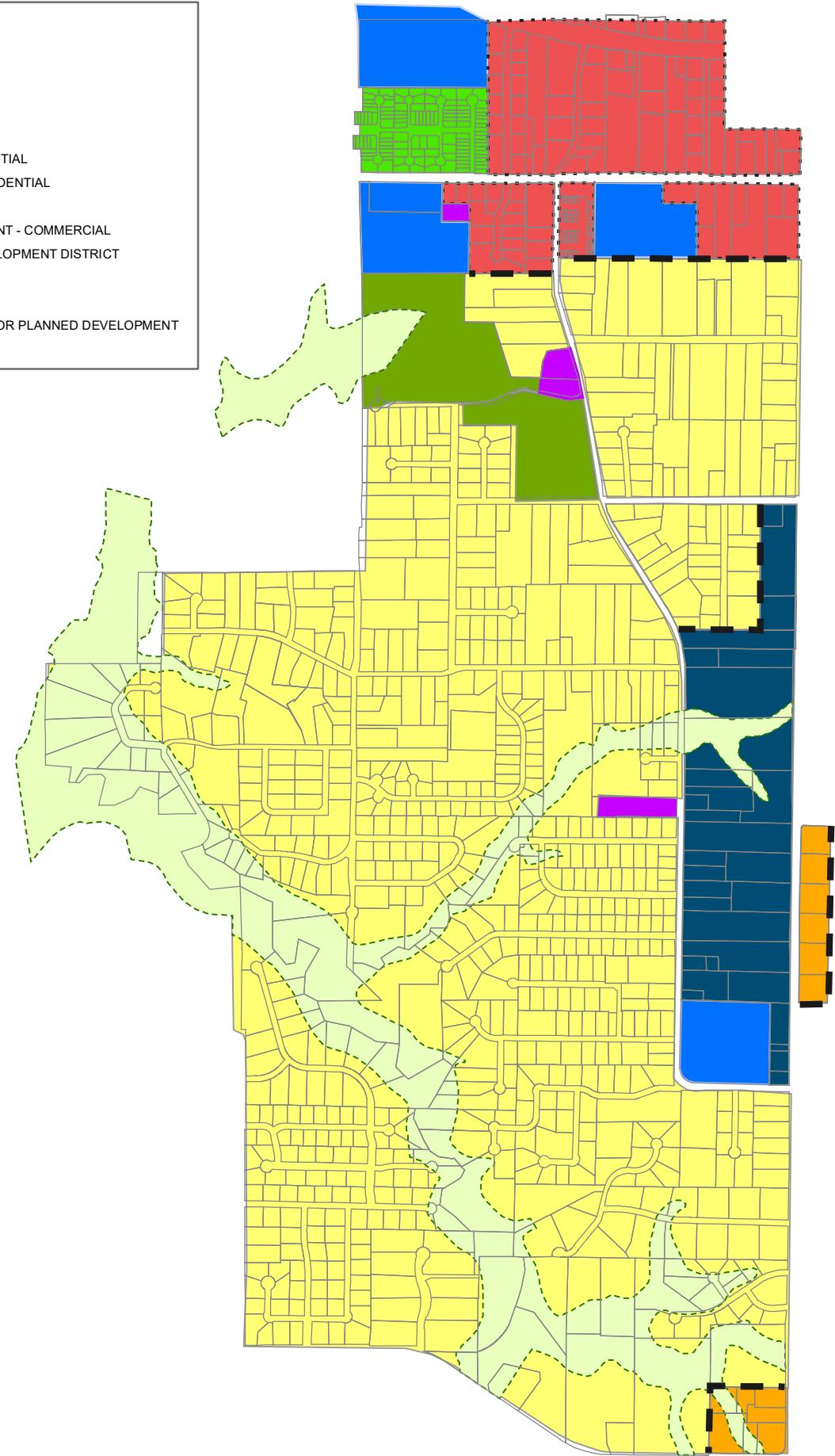


Base map prepared by:
TEAGUE NALL AND PERKINS
CONSULTING ENGINEERS

Prepared by:
MPRG inc.
Municipal Planning Resources Group, Inc.

Land Use Legend

- [Yellow Box] LOW DENSITY RESIDENTIAL
- [Green Box] MEDIUM DENSITY RESIDENTIAL
- [Light Green Box] PARKS/OPEN SPACE
- [Orange Box] PLANNED DEVELOPMENT - COMMERCIAL
- [Red Box] COMMERCIAL/REDEVELOPMENT DISTRICT
- [Blue Box] EDUCATION
- [Purple Box] PUBLIC/SEMI-PUBLIC
- [Dark Blue Box] BOWEN ROAD CORRIDOR PLANNED DEVELOPMENT



Bowen Road Corridor Area (Planned Development Overlay)

The Bowen Road corridor will have a multi-use purpose. Its future development will focus on commercial as well as residential development. Existing large residential lots that have both Bowen and Roosevelt access may be subdivided to allow commercial development on the Bowen Corridor only. These said lots shall remain residential on the Roosevelt side with no vehicular traffic connection between them.

One Planned Development Area of higher intensity use is designated along Bowen Road. The area on the east side of Bowen Road, south of Mayfield, would be an ideal location for an office or retail development.

The west side of the Bowen Road corridor between Roosevelt Drive and Bowen Road from the Roosevelt Drive intersection to the California Lane intersection shall be designated as a Planned Development Overlay Area.

Such a community shall be defined as an organized mixed-use community that integrates agricultural and food service commercial businesses, with residential uses, and open spaces that might be used as parks or community gardens.

Most of the west side of the Bowen Road corridor between Roosevelt Drive and Bowen Road from the Roosevelt Drive intersection to the California Lane intersection shall be designated as a Planned Development. The exception to including all of the land between Roosevelt Drive and Bowen Road begins at the California Lane intersection. Here the Planned Development shall only extend approximately 290 feet to the west from the Bowen Road right-of-way line for a distance of approximately 1,042 feet south along Bowen Road. (See the Future Land Use Map.)

The Bowen Road Planned Development Overlay may include Large Lot Residential uses but may also include a mixture of Medium Density Single Family Garden Homes, and Commercial Uses with a preference toward agricultural related businesses (vegetable and meat markets, farm and ranch supply, etc.) and restaurants. Garden Home developments shall include 10 percent open space for parks and community gardens. The Planned Development shall provide an orderly transition from commercial uses to the large lot Residential uses and incorporate suitable separation barriers with a preference to vegetated barriers in lieu of hardened barriers such as fences. Uses other than large lot residential uses shall be planned development.

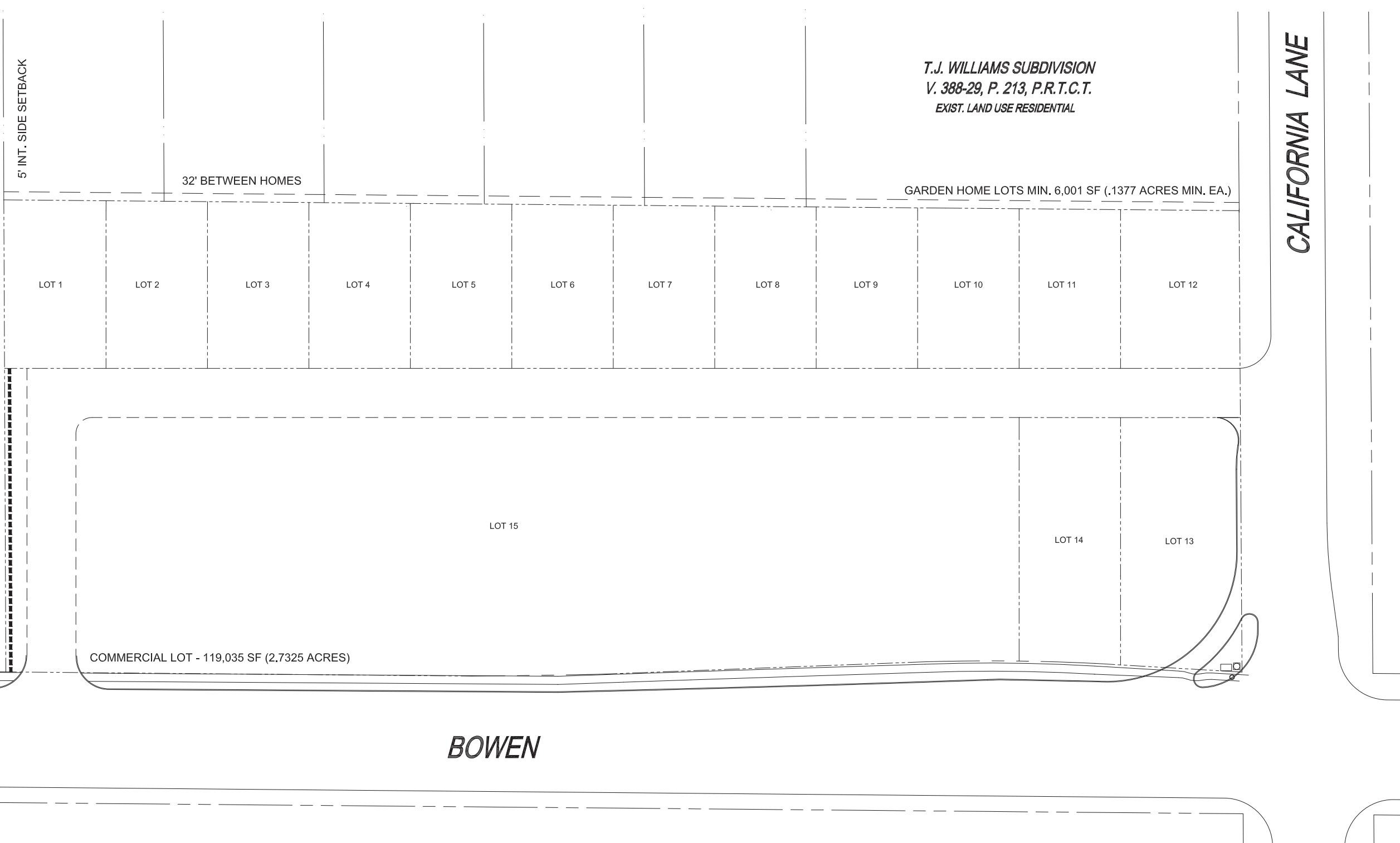
The decisions made now by the City as to the type of uses permitted along Bowen Road as it passes the core of the City are surely critical to the future of Dalworthington Gardens. Although it may be possible to attract some limited retail uses to this corridor, it is believed that such development would likely not be of a character clearly compatible with the residential development along Roosevelt Drive and would almost certainly tend toward the sort of intermittent strip development seen along Pioneer Parkway. The most promising area is at the intersection of Mayfield/Bowen between the Rush Creek tributaries. The light there affords good traffic flow in all directions. It is also highly probable that indecisiveness in the land use designation for Bowen Road will inhibit the build-out of the area between Bowen and Roosevelt south of California Lane as large lot residential developments. Dalworthington Gardens is a very small city surrounded by a very large one. Build-out of the area within Bowen Road, Roosevelt Drive, and California Lane as large lot residential properties is highly desirable in order to maintain a critical mass of large lot residential properties and identity of DWG as having such attractive land use. This is the surest path to maintaining the property values of the residential property in the City.

PLANNED DEVELOPMENT DISTRICT FOR MIXED USE

DALWORTHINGTON GARDENS, TEXAS 76016

LOT 4 & 4A

LOT 54, BLK. 4
DALWORTHINGTON GARDENS ADDITION
V. 388-123, P. 29, P.R.T.C.T.
EXIST. LAND USE VACANT



AREA TABULATIONS	
TOTAL COMMERCIAL LOT = 2.733 ACRES (APPROX. 119,035 SF)	
TOTAL RESIDENTIAL LOTS = 2.060 ACRES (APPROX. 89,733 SF) (MIN. LOT = 6,001 SF, MAX. LOT = 11,342 SF.)	

N
TRUE 01
OVERALL CONCEPT PLAN
ALL DIMENSIONS ARE APPROXIMATE

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 INTERIM REVIEW DOCUMENTS
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REVISIONS:

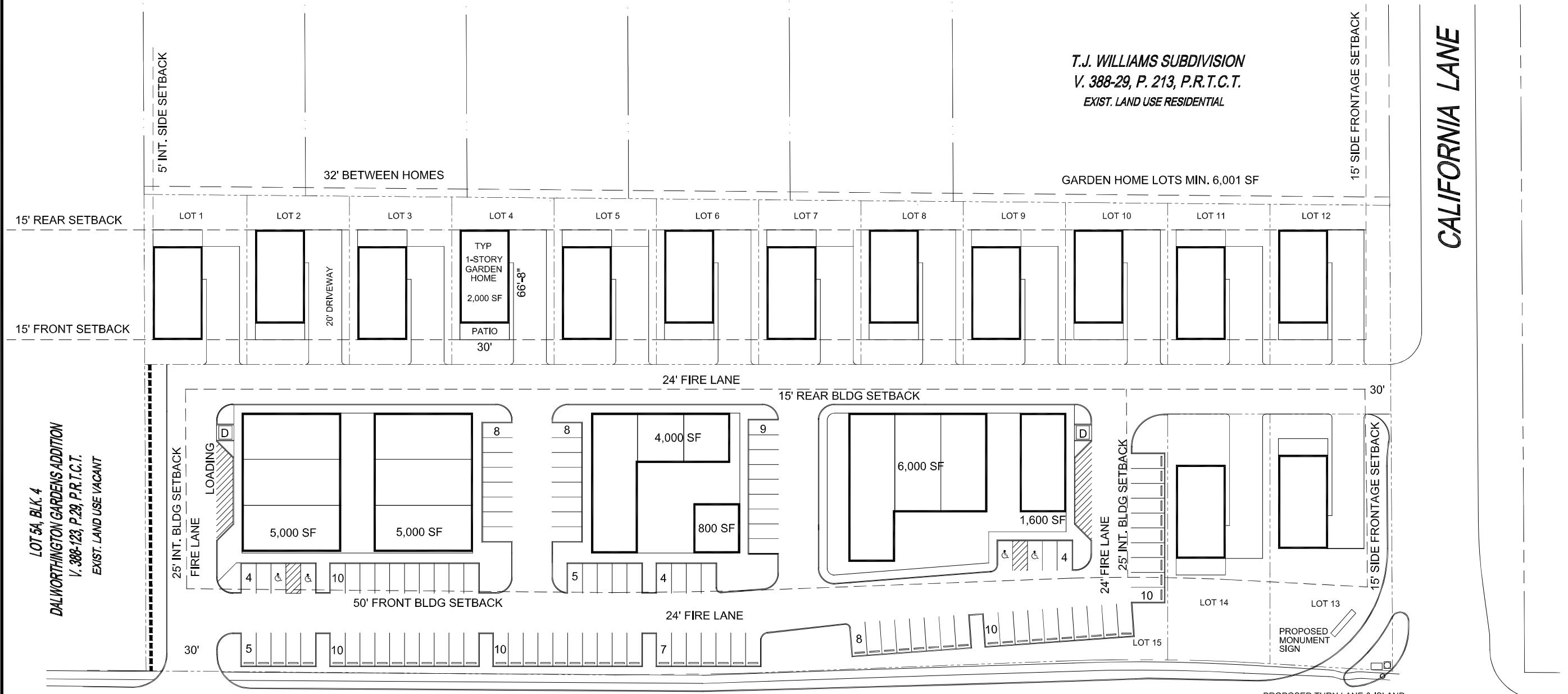
 ISSUE DATE:
 13 DEC 2023

 PROJECT No.:
 22028.100

 SHEET TITLE:
 OVERALL
 ARCHITECTURAL
 SITE PLAN

CALIFORNIA LANE

T.J. WILLIAMS SUBDIVISION
V. 388-29, P. 213, P.R.T.C.T.
EXIST. LAND USE RESIDENTIAL



BOWEN

ZONING INFORMATION		
LOCATION:	LOTS 4 & 4A	
DALWORTHINGTON GARDENS ADDITION (S. BOWEN RD. & CALIFORNIA LN.)		
CITY:	DALWORTHINGTON GARDENS, TX	
COUNTY:	TARRANT	
PROPERTY SIZE:	4.793 ACRES (208,783 S.F.)	
LAND USE:	NONE (UNDEVELOPED LAND)	
CURRENT ZONING:	SF-1 (SINGLE FAMILY)	
PROPOSED ZONING:	MIXED USE OVERLAY DISTRICT	
-	SINGLE FAMILY (GARDEN HOMES)	
-	RESTAURANT	
-	RETAIL	
-	OFFICE	

ZONING STANDARDS		
SINGLE FAMILY:	GARDEN HOME:	NON-RESIDENTIAL
MIN. AREA = 21,780 SF	= 6,000 SF	= NONE
MIN. LIVING = 1,250 SF	= 800-1,800 SF	= NONE
MAX. HEIGHT = 35'	= 35'	= 45'
MIN. LOT WIDTH = 80'	= 50'	= NONE
MAX. BUILDING = 25%	= 50%	= 25%
MAX. IMPERVIOUS COVERAGE = 40%	= 70%	= 40%
FRONT YARD = 50'	= 15'	= 50'
SIDE INT. YARD = 25'	= 5'	= 25'
SIDE EXT. YARD = 35'	= 15'	= 35'
REAR YARD = 25'	= 15'	= 25'
DBL. FRONTAGE REAR YARD = 35'	= N/A	= 35'
LANDSCAPE = NONE	= NONE	= 20%

LEGEND		
RESIDENTIAL		
2 COVERED STALLS PER UNIT		
NON-RESIDENTIAL		
PERSONAL SERVICE = 1/200 SF I.F.A.		
RETAIL SHOP = 1/200 SF I.F.A.		
DRIVE UP/TAKE OUT = 1/75 SF I.F.A. & O.F.A. (MIN. 8 SPACES)		
DRIVE UP/EAT IN = 1/50 SF I.F.A. & O.F.A. (MIN. 12 SPACES)		
DINE IN ONLY = 1/100 SF I.F.A. & O.F.A. (MIN. 12 SPACES)		
BUSINESS/PRO OFFICE = 3 + 1/300 SF I.F.A.		
LOADING		
RETAIL/COMMERCIAL 0-25K SF = 1, 25K-84K SF = 2		
OFFICE/RESTAURANT 0-150K SF = 1		
LANDSCAPE AREA		
LANDSCAPING		
NON-RESIDENTIAL LOT SIZE = 133,337 SF		
TOTAL LANDSCAPING PROVIDED AT NON-RESIDENTIAL LOT = 39,815 SF		
NON-RESIDENTIAL LANDSCAPE COVERAGE = 29.8 %		

PARKING ANALYSIS					
RESIDENTIAL		LANDSCAPE AREA			
2 COVERED STALLS PER UNIT					
NON-RESIDENTIAL					
PERSONAL SERVICE = 1/200 SF I.F.A.					
RETAIL SHOP = 1/200 SF I.F.A.					
DRIVE UP/TAKE OUT = 1/75 SF I.F.A. & O.F.A. (MIN. 8 SPACES)					
DRIVE UP/EAT IN = 1/50 SF I.F.A. & O.F.A. (MIN. 12 SPACES)					
DINE IN ONLY = 1/100 SF I.F.A. & O.F.A. (MIN. 12 SPACES)					
BUSINESS/PRO OFFICE = 3 + 1/300 SF I.F.A.					
LOADING					
RETAIL/COMMERCIAL 0-25K SF = 1, 25K-84K SF = 2					
OFFICE/RESTAURANT 0-150K SF = 1					

AREA TABULATIONS			
COMMERCIAL LOT = 2.733 ACRES (APPROX. 119,035 SF)			
RESIDENTIAL LOTS = 2.060 ACRES (APPROX. 89,733 SF) (MIN. LOT = 6,001 SF)			
TOTAL = 4.793 ACRES (APPROX. 208,783 S.F.)			
SINGLE-STORY GARDEN HOMES X14 = 2,000 SF			
TOTAL RESIDENTIAL = 28,000 SF			
COMMERCIAL SINGLE-STORY SHELL BLDG'S 5,000 SF + 5,000 SF + 4,000 SF + 800 SF + 6,000 SF + 1,600 SF = 22,400 SF			
TOTAL DEVELOPMENT = 50,400 SF			
PARKING:	RATE	REQUIRED	PROVIDED
RETAIL:	1 PER 200	112	112
RESIDENTIAL:	2 PER UNIT	28	28
LOADING:	1 PER BLDG	-	2

PRELIMINARY ARCH. SITE PLAN A
N 01 SCALE: NTS.

INTERIM REVIEW DOCUMENTS
These documents are for planning and design purposes only. They are not intended for building, zoning, or permitting purposes.
This document is issued under good faith, and it's issued in good faith under any circumstances.

REVISIONS:

ISSUE DATE:
13 DEC 2023

PROJECT No.:
22028.100

SHEET TITLE:

PRELIMINARY
ARCHITECTURAL
SITE PLAN

pg. 463 of 501
SHEET NO.:
A1.01



The Villages of DWG

Project Narrative

Introduction

This mixed-use planned development envisions a vibrant node of commercial and residential uses on 5 acres of vacant land at the high-traffic intersection of S. Bowen Road and California Lane. Currently zoned single-family residential yet situated along an approved commercial corridor, the site allows a thoughtful fusion of neighborhood-scale commerce and garden homes that align with both Ordinance No. 2023-18 and Dalworthington Gardens' growth management goals.

The Villages of DWG project comes from long-time Dalworthington Gardens resident Trevor Turnbow and his firm Turnbow Construction. For over 20 years prior to its transfer to Trevor, the land had been part of his family heritage and stories. Having witnessed DWG endure sweeping changes over the decades of personal history here, Trevor feels passionately about guiding the next chapter of positive yet sensitive development growth. As both a landowner deeply vested in this place as well as a developer attuned to responsible practices, Trevor Turnbow through Turnbow Construction and its affiliate Turnbow Fairytale LLC is dedicated to collaboratively seeing The Villages at DWG come to life in alignment with the City's Vision.

Honoring the City's History

As the only surviving New Deal subsistence homestead town in Texas, Dalworthington Gardens cherishes its roots while welcoming new development. The Villages of DWG concept seeks to continue that balance of history and progress through a carefully-designed mix of uses befitting DWG's heritage. 14 garden homes pay homage to the City's original homestead cottages, buffering nearby neighborhoods from more intense retail and offices. High-quality architectural designs will complement the development's placement along the new "Gates Gateway" into DWG.

Alignment with City Plans

The 2005 Comprehensive Plan encourages partnerships to enable fiscally and environmentally responsible growth. It also endorses beautification initiatives and redevelopment of aging sites. Located on vacant land at the intersection of two critical roadways, The Villages of DWG will transform an underutilized lot into an attractive commercial node offering contemporary conveniences to residents and visitors alike. Landscaping, lighting, and signage will enhance aesthetics and safety for all.

Traffic Mitigation Strategy

While the site's arterial placement suits a commercial node, Bowen Road's high southbound volumes necessitate circulation improvements. As such, the developer will proactively dedicate a 0.05 acre portion of land on the corner for the City to later build a deceleration lane. Though not essential currently, this concession reserves the option to enhance mobility long-term.

Responsible Site Design

Initial engineering consultation confirms the relatively flat topography limits major grading needs. The site also falls outside flood-prone areas. Upon concept approval, the developer will furnish professionally engineered grading and drainage plans meeting all City specifications for review, helping ensure responsible stormwater management.

Requested Concessions

In the spirit of win-win compromise, the developer seeks the following concessions from the City:

- 1) Waiver of all impact fees and replatting fees in exchange for the gifted deceleration lane land noted above, worth approximately \$125,000. This mirrors concessions secured for similar developments in Arlington.
- 2) Additionally, the developer will construct an ornamental entrance sign on donated land near the site to welcome visitors to Dalworthington Gardens along the high-profile Bowen Road corridor.

We believe these community enhancements demonstrate good faith while saving taxpayer funds and enabling the City to meet its growth vision. We kindly request consideration of the requested concessions above in recognition of the significant value being provided to the public through The Villages of DWG.

Sincerely,

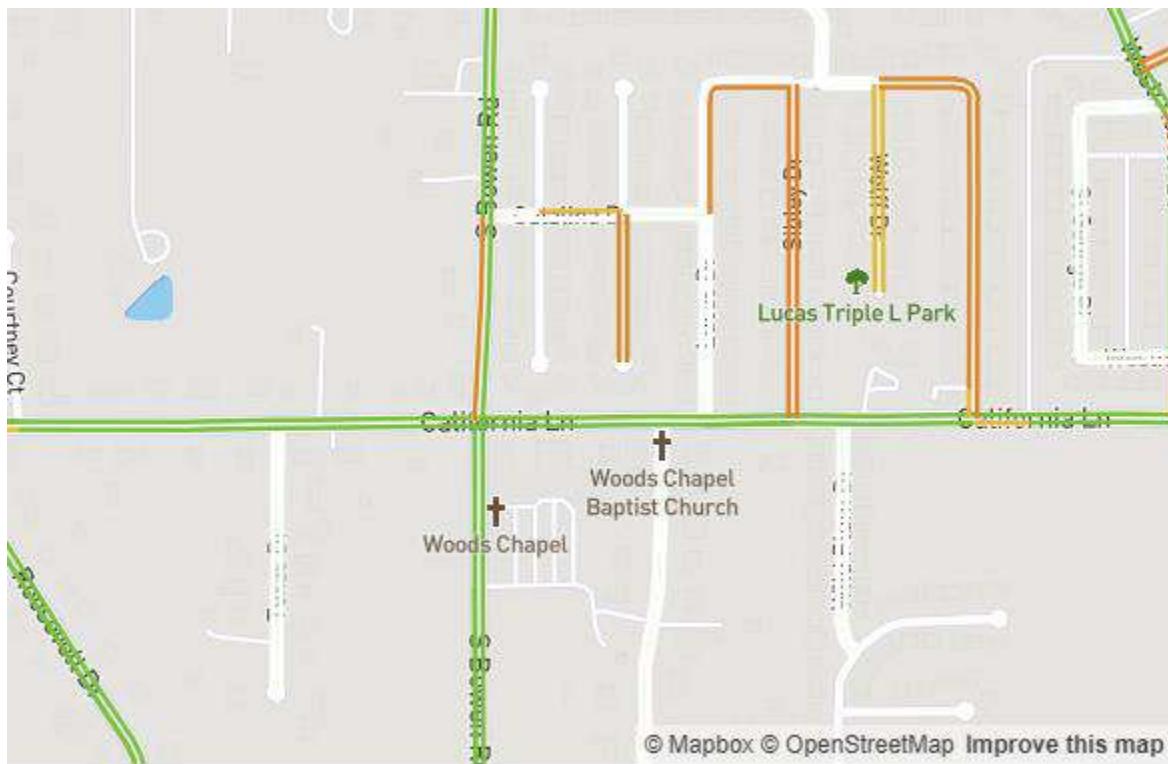
Trevor Turnbow

President Turnbow Construction

www.TurnbowConstruction.biz

682-266-8929

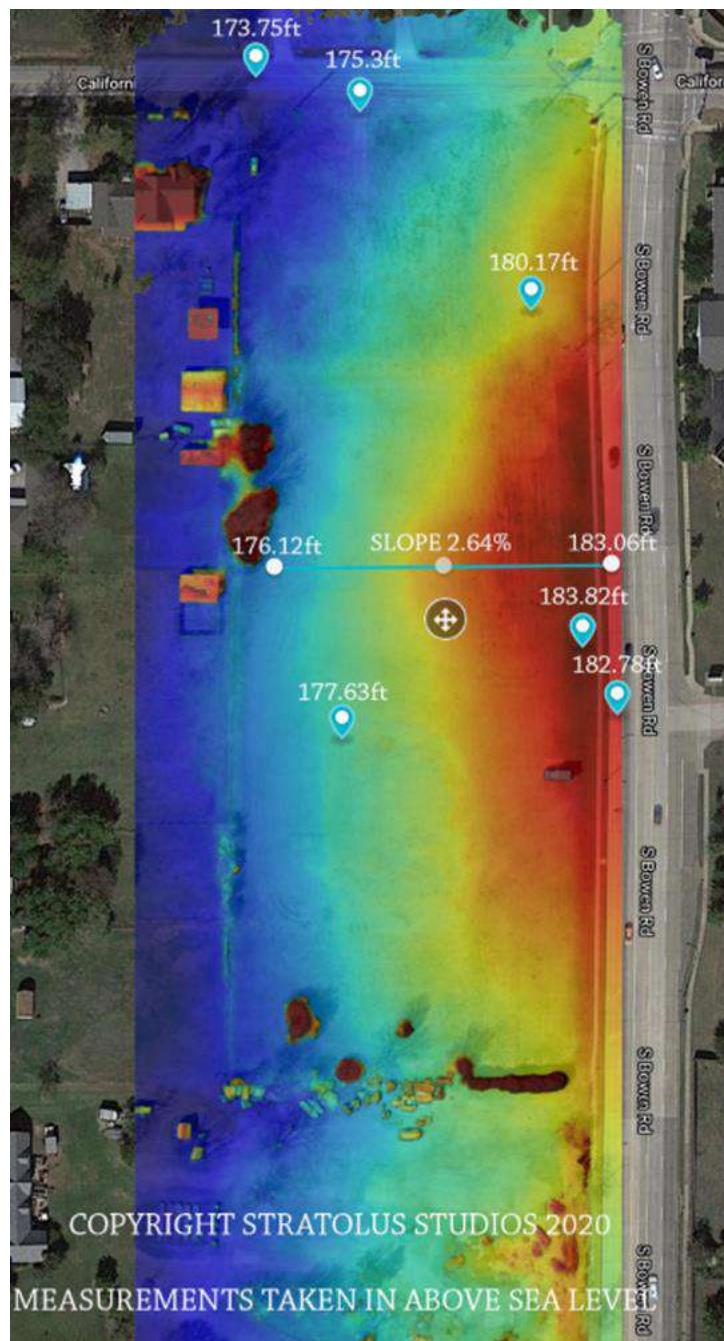
Traffic Study provided by Mapbox OpenStreetMap



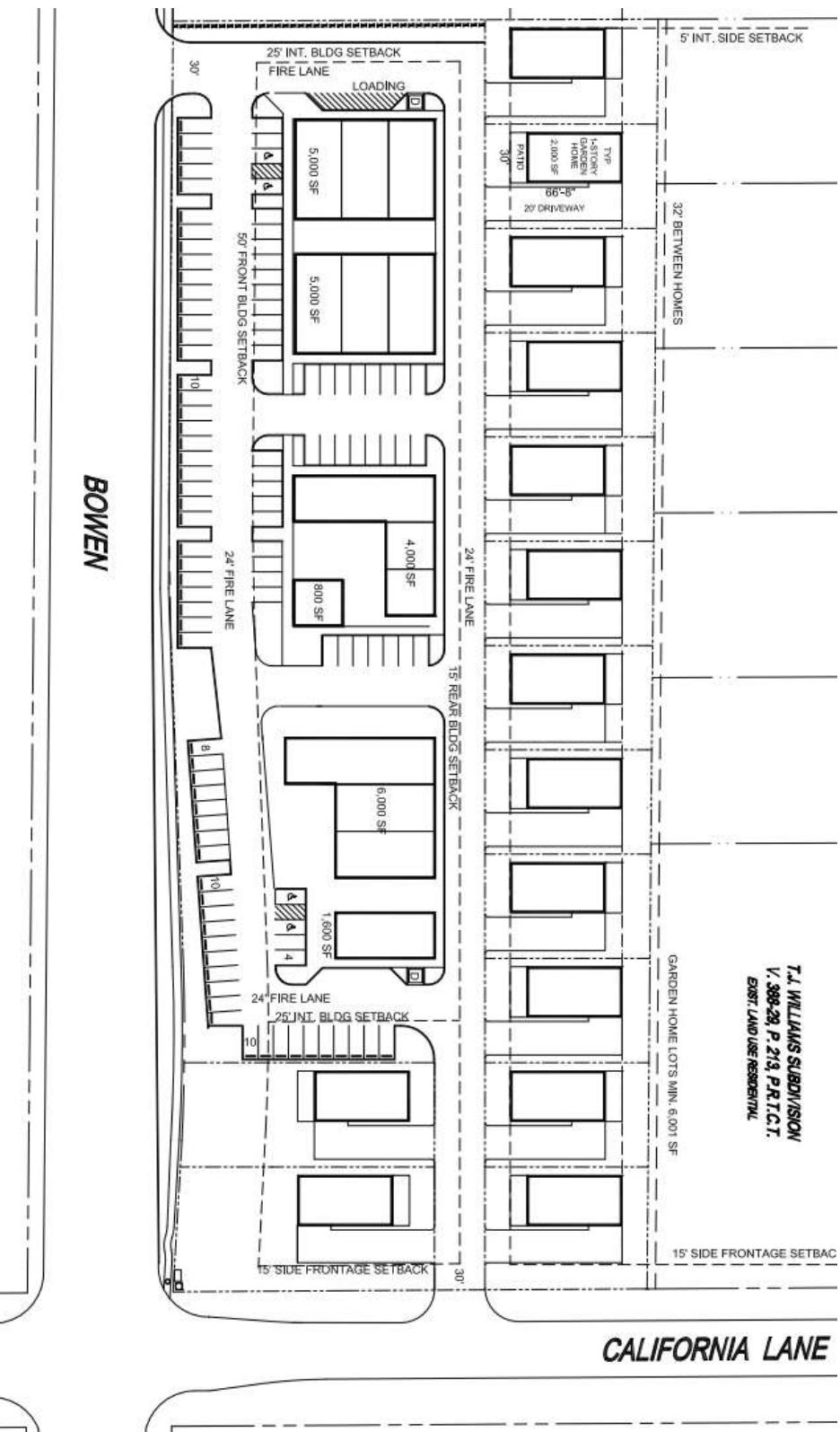
Ariels provided by Turnbow Construction



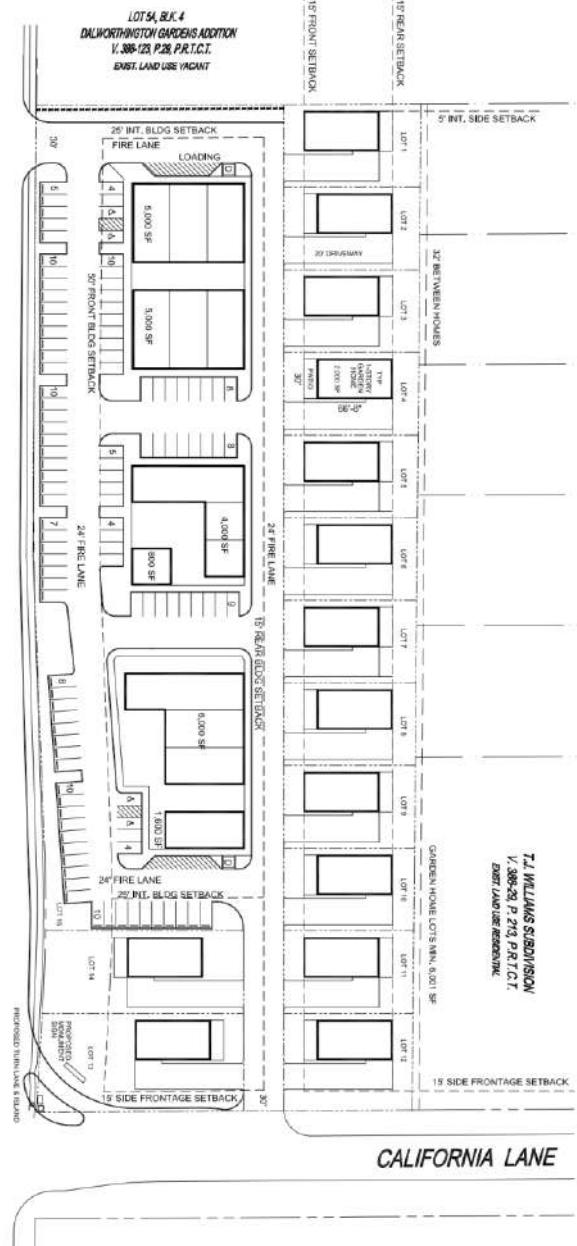
Topography Report



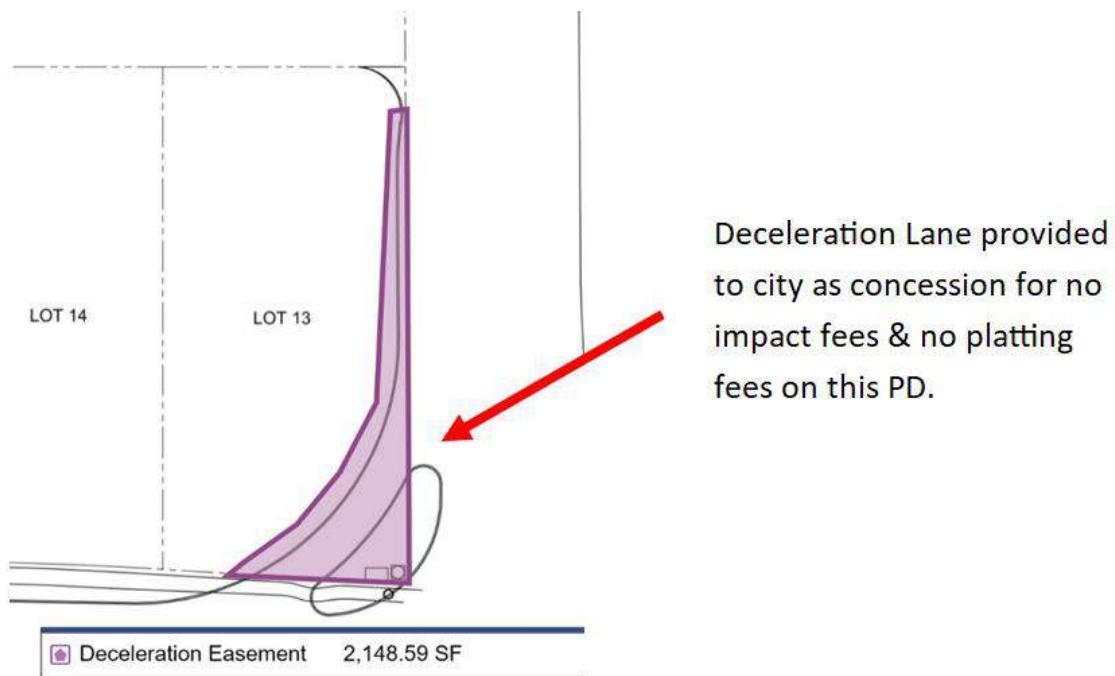
Concept Plans without Deceleration Lane or City Monument Sign



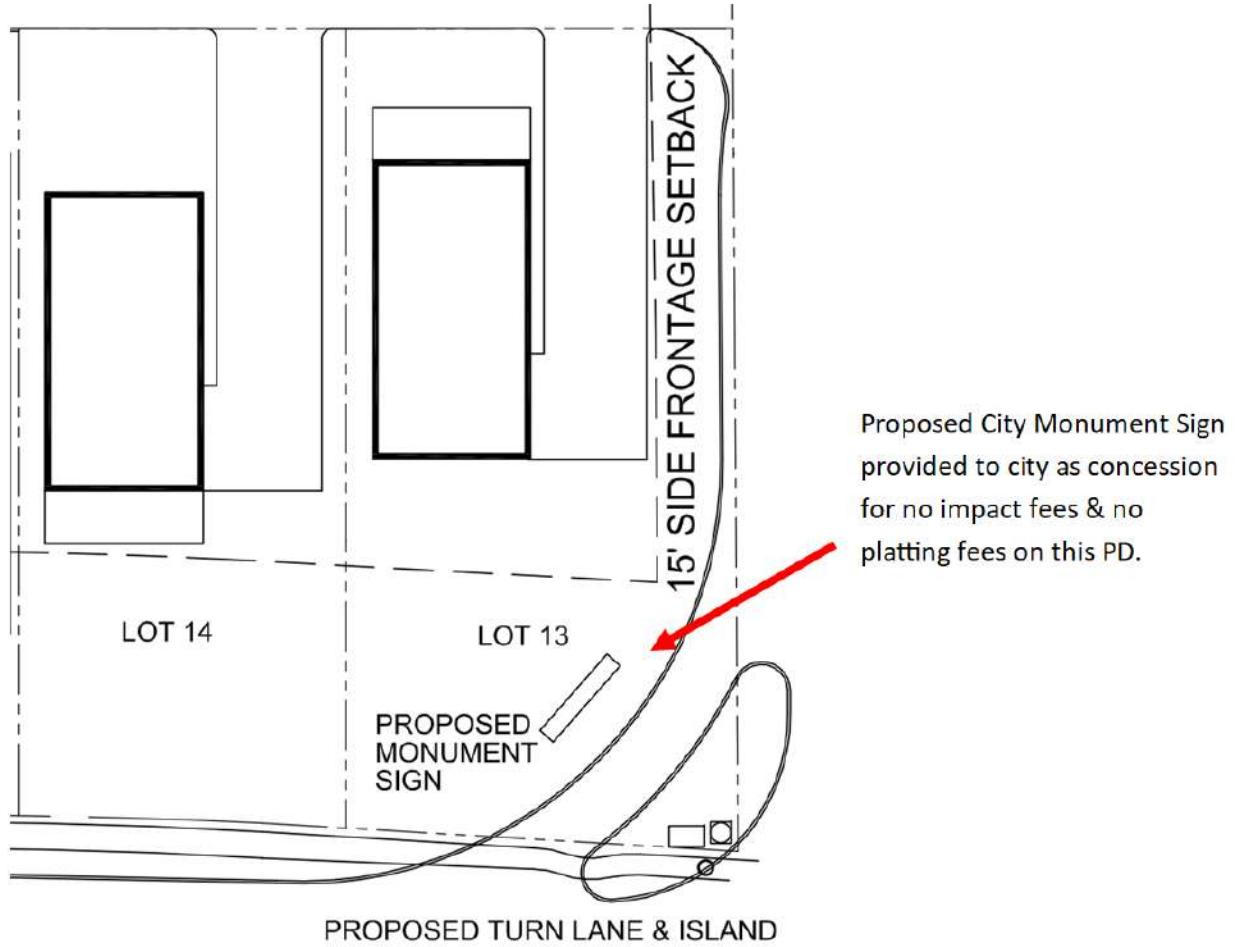
Concept Plan with Deceleration Lane & City Monument Sign



Deceleration Lane



Monument Sign



Example of Deed w/ Impact & Replat Fee Waivers

 Mary Louise Garcia

Mary Louise Garcia

SPECIAL WARRANTY DEED WITH VENDOR'S LIEN LANGUAGE

GF# 17000230167 Stewart/drxx/23

NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OR ALL OF THE FOLLOWING INFORMATION FROM ANY INSTRUMENT THAT TRANSFERS AN INTEREST IN REAL PROPERTY BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER.

THE STATE OF TEXAS §

§

COUNTY OF TARRANT §

§

THAT, **CENTER STREET COMPLEX, LLC**, a Texas limited liability company ("Grantor"), whose address is 4040 Vernon Way, Fort Worth, Texas 76244, for and in consideration of the sum of \$10.00 cash in hand paid by **CENTER ST. FACTOR, LLC**, a Texas limited liability company ("Grantee"), whose address is 4040 Vernon Way, Fort Worth, Texas 76244, and other good and valuable consideration, and the further consideration of the execution and delivery by the said Grantee of its promissory note in the stated principal sum set forth therein ("Note"), payable to the order of **PLAINSCAPITAL BANK**, a Texas state bank ("Lender"), bearing interest, being payable and maturing as therein provided, and being secured by a vendor's lien and superior title retained herein in favor of said Lender and being also secured by, inter alia, that certain Deed of Trust, Security Agreement, Assignment of Leases, Assignment of Rents, and Financing Statement from Grantee in favor of Darrell G. Adams, Trustee for the benefit of the Lender, the receipt and sufficiency of which are hereby acknowledged by Grantor, has GRANTED, BARGAINED, SOLD AND CONVEYED, and by these presents does GRANT, BARGAIN, SEAL and CONVEY unto Grantee, that certain tract of real property situated in Tarrant County, Texas, and described in Exhibit "A" attached hereto and made a part hereof for all purposes (the "Land") together with, all and singular, all improvements thereon (if any), and all rights and appurtenances pertaining thereto, including, without limitation, any right, title and interest of Grantor in and to adjacent streets, roads, alleys, or rights-of-way, strips and gores adjoining the Land, any development rights, air rights, and any other easements, interests, rights, powers and privileges appurtenant to the use and enjoyment of the Land. The Land and all rights, property and interests above described being hereinafter referred to collectively as the "Property."

This conveyance is being made by Grantor and accepted by Grantee subject to all easements, restrictions, rights, reservations, encumbrances and other matters described in Exhibit "B" attached hereto and made a part hereof (collectively, the "Permitted Exceptions").

TO HAVE AND TO HOLD the Property, together with, all and singular, the rights and appurtenances thereto in anywise belonging, to Grantee and Grantee's successors and assigns forever; and subject to the Permitted Exceptions, Grantor does hereby bind Grantor and Grantor's successors and assigns to warrant and forever defend, all and singular, the Property unto Grantee and Grantee's successors and assigns, against every person whomsoever lawfully claiming or to claim the same, or any part thereof by, through or under Grantor, but not otherwise, subject to the Permitted Exceptions.

Lender, at Grantee's request, has paid in cash to Grantor that portion of the purchase price of the Property that is evidenced by the Note. The first and superior vendor's lien against and superior title to the Property are retained for the benefit of Lender and are transferred to Lender without recourse against Grantor.

Unofficial Copy

EFFECTIVE as of the 18 day of July, 2018.

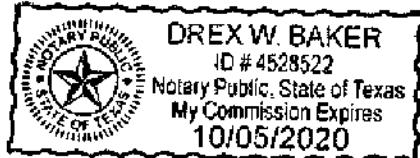
GRANTOR:

CENTER STREET COMPLEX, LLC,
a Delaware limited liability company

Name: Cary Moon
Title: President

THE STATE OF TEXAS \$
 \$
COUNTY OF TARRANT \$

This instrument was acknowledged before me on July 18, 2018, by
Cary Moon, the President, of CENTER STREET COMPLEX, LLC, a Texas
limited liability company, on behalf of said limited liability company.



Notary Public, State of Texas

DOCUMENT PREPARED BY:

Husch Blackwell LLP
2001 Ross Avenue, Suite 2000
Dallas, Texas 75201
Attention: W. Brian Memory

Exhibit "A" to the Deed

Legal Description

Lot 2R1A, Block 2, of Original Town of Arlington, an addition to the City of Arlington, Tarrant County, Texas, according to the Map or Plat thereof recorded in/under Clerk's File No. D216177186, Map/Plat Records, Tarrant County, Texas.

Unofficial Copy

Exhibit "A"

Exhibit "B" to the Deed

Permitted Exceptions

1. Restrictive covenants recorded in/under Clerk's File No. D216177186, Map/Plat Records, Tarrant County, Texas. (Provisions, if any, based on race, color, religion, sex, handicap, familial status or national origins are nullified.)
2. Standby fees, taxes and assessments by any taxing authority for the year 2018, and subsequent years.
3. Terms, conditions, provisions and stipulations of Off-Premise Parking Agreement, by and between City of Arlington and Center Street Station, LLC, dated 12/22/2008, filed 01/16/2009, recorded in/under Clerk's File No. D209012721, Real Property Records, Tarrant County, Texas, and as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.
4. Terms, conditions, provisions and stipulations of Off-Premise Parking Agreement, by and between City of Arlington and Center Street Station, LLC, dated 12/18/2008, filed 01/16/2009, recorded in/under Clerk's File No. D209012722, Real Property Records, Tarrant County, Texas, and as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.
5. Terms, conditions, provisions and stipulations of Mutual Covenant to Maintain Private Water Lines, by and between Center Street Station and City of Arlington, dated 11/13/2009, filed 12/10/2009, recorded in/under Clerk's File No. D209322285, Real Property Records, Tarrant County, Texas, and as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.
6. Terms, conditions, provisions and stipulations of Parking Agreement, by and between Center Street Station Downtown, LLC and CSSD Mushroom LLC, dated 03/11/2011, filed 04/25/2011, recorded in/under Clerk's File No. D211095535, Real Property Records, Tarrant County, Texas. As amended by First Amendment to Parking Agreement, by and between Center Street Station Downtown, LLC and RAH Arlington, LLC, effective 05/30/2013, filed 05/31/2013, recorded in/under Clerk's File No. D213138798, Real Property Records, Tarrant County, Texas, and as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.
7. Terms, conditions, provisions and stipulations of First Amendment Off-Premise Parking Agreement, by and between City of Arlington, Center Street Station, LLC and CCSD Mushroom LLC, effective 07/19/2011, filed 11/04/2011, recorded in/under Clerk's File No. D211269338, Real Property Records, Tarrant County, Texas, and as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.

Exhibit "B"

8. Terms, conditions, provisions and stipulations of Off-Premise Parking Agreement, by and between City of Arlington and Center Street Station, LLC, effective 07/19/2011, filed 11/04/2011, recorded in/under Clerk's File No. D211269339, Real Property Records, Tarrant County, Texas, and as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.
9. The location of sidewalk, as shown on survey dated 05/14/2018 prepared by David Carlton Lewis RPLS No. 5647 of Spry Surveyors, Project No. 016-018-11.

UNOFFICIAL COPY

Exhibit "D-1"

DAL-6633026-1

ORDINANCE NO. 2023-18

AN ORDINANCE OF THE CITY OF DALWORTHINGTON GARDENS, TEXAS, AMENDING DIVISION 7, "OVERLAY DISTRICT REGULATIONS" OF CHAPTER 14, "ZONING," OF THE CODE OF ORDINANCES, CITY OF DALWORTHINGTON GARDENS, TEXAS, TO CREATE A SECTION DEFINING AND GOVERNING THE STANDARDS AND REQUIREMENTS OF A BOWEN ROAD OVERLAY DISTRICT; PROVIDING THAT THIS ORDINANCE SHALL BE CUMULATIVE OF ALL ORDINANCES; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A SAVINGS CLAUSE; PROVIDING A PENALTY; PROVIDING FOR PUBLICATION IN THE OFFICIAL NEWSPAPER; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City of Dalworthington Gardens is a Type-A general law municipality located in Tarrant County, created in accordance with the provisions of Chapter 6 of the Texas Local Government Code and operating pursuant to the enabling legislation of the State of Texas; and

WHEREAS, the City Council of the City of Dalworthington Gardens desires to amend Chapter 14 of its zoning regulations to create a Bowen Road overlay in Dalworthington Gardens; and

WHEREAS, the Planning and Zoning Commission of the City of Dalworthington Gardens, Texas held a public hearing on 5/22/2023, and the City Council of the City of Dalworthington Gardens, Texas, held a public hearing on 6/15/2023, with respect to the proposed rezoning as described herein; and

WHEREAS, the City Council finds and determines that the adoption of this Ordinance is in the best interests of and necessary to protect the health, safety, and welfare of the public; and

WHEREAS, the City Council has determined that the proposed ordinance amendment to the zoning ordinance is in the best interest of the citizens of the City.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF DALWORTHINGTON GARDENS, TEXAS:

SECTION 1.

That Division 7, "Overlay District Regulations," of Chapter 14, "Zoning," of the Code of Ordinances, City of Dalworthington Gardens, Texas, is hereby amended by adding Section 14.02.275 to read as follows:

"§ 14.02.275 "Bowen Road" overlay district ("PD-BR").

- (a) **Purpose.** The purpose of the Bowen Road zoning overlay district is to allow additional uses by planned development in appropriate SF districts to create a mixed-use community that

integrates predominantly agricultural and food service commercial businesses, with medium density residential uses, and open spaces. Appropriate areas would be adjacent to principal arterials to allow commercial uses compatible with nearby single family residential to take advantage of large traffic volumes while helping maintain the vision and character of the City.

- (b) Use regulations. A building or premises in this zoning district shall only be used for the purposes permitted in the base district or overlaid by an approved final PD-BR plan from additional uses allowed in base districts Residential District ("GH"), Business Districts 1, 2, and 3, ("B-1", "B-2", and "B-3", respectively), The Mixed Use overlay district, ("MU"); special exceptions, or an agricultural use without a principal structure. Any portion of the PD-BR adjacent to a street, other than a principal arterial, across which exists Single Family ("SF") zoning, shall be restricted to SF zoning for 200 feet from the street's right-of-way line with no vehicular access to the principal arterial.
- (c) Height regulations. Structures, other than SF, shall not exceed two stories.
- (d) Applicability. All development, other than SF development, along Bowen Road between California Lane and Roosevelt shall be governed by this overlay district.
- (e) Area regulations. The minimum gross land area which may be developed in this district shall be:
 - (1) For residential developments, four (4) acres; and
 - (2) For all other developments, two (2) acres.
- (f) Density and coverage regulations.
 - (1) Density of development and maximum site coverage shall be established on the approved final plan with due regard to site and general area characteristics including land use, zoning, topography, thoroughfares and open space opportunity. In no case, however, shall maximum density and site coverage exceed the maximum percentages prescribed therefor in the applicable base district regulations.
 - (2) When common open space is provided for recreational purposes, the developer may propose that the percentage of the gross site area in common open space be added to the maximum site coverage percentages referred to in subsection (1) above. In no case, however, shall the additional percentage points added to the maximum site coverage regulations total more than the total percentage of the site in common open space. Such proposal shall be evaluated as part of the plan.
- (g) Open space regulations. Provisions for public, private, and common open space shall be evaluated with due regard to density, site coverage, and physical characteristics of the site and, if deemed necessary, required as part of the plan. When common open space, common recreational areas, or common areas containing some other amenity to the development are

approved as a part of a final plan, as defined in section 14.02.272, such areas shall be retained and owned by the owner or owners of the residential units contained within the development or an owners' association of which they are members, and shall be perpetually maintained by the owner or owners or the association as a part of the development for the use and benefit of the residents of the development. Garden Home developments shall include a minimum of 10 percent open space, not including platted lots and streets.

(h) Screening. An orderly transition from commercial uses to the large lot residential uses will incorporate suitable separation barriers with a preference to vegetated barriers in lieu of hardened barriers such as fences.

(i) Setback regulations. Minimum setbacks shall be approved as a part of the development plan; provided however, that the minimum setbacks on the boundaries of a PD-BR district shall not be less than the requirements of the zoning district it abuts.

(j) Off-street parking regulations.

(1) Off-street parking facilities shall be provided at locations designated on the final plan.

(2) Minimum off-street parking requirements shall be established on the final plan, but shall not be less than the minimum requirements for permitted uses prescribed in Division 9 of this article.

(k) "PD-BR" planned development-redevelopment district.

(1) Development regulations. The regulations of this district as to use, height, density, coverage, open space, setback and parking, shall be the same as provided in section 14.02.275 hereof.

(2) Area regulations. The minimum gross land area which may be developed in this district is two (2) acres for SF properties. If the property does not fall under SF, then this subsection (j)(2) does not apply.

(3) Development standards and procedures. The standards and procedures for development in this district shall be as provided in this division for PD district development, but shall include also the following:

(A) In any PD-BR district where substandard streets or utilities are in existence, the property owner or developer shall install, rebuild, or improve all necessary streets and utilities at his sole expense, including off-site streets and utilities which are determined by the council to be necessary to serve the redevelopment, subject to the standard cost-sharing policies and ordinances which determine the development costs which the city may pay, and subject to any agreements for cost sharing which are mutually agreed upon by the property owner and the city. The city's participation in redevelopment shall in every instance be

conditioned upon the determination by the council, in its sole discretion, of the availability of public funds therefor at the time of such development.

(B) Installation, rebuilding, or improvement of necessary streets and utilities shall be required when new buildings are constructed within the PD-BR district.

(C) Uses conducted in existing buildings shall not require the construction of streets and utilities unless: additional construction, such as additional paved parking, must be done on the site; a change or expansion in use would require increased utility service; or, the council finds that such construction is necessary at the time the PID-BR plan is approved.

§14.02.276 through §14.02.320. (Reserved)"

SECTION 2.

This Ordinance shall be cumulative of all provisions of ordinances and on the Code of Ordinances, City of Dalworthington Gardens, Texas as amended, except where the provisions are in direct conflict with the provisions of other ordinances, in which event the conflicting provisions of the other ordinances are hereby repealed.

SECTION 3.

It is hereby declared to be the intention of the City Council that the phrases, clauses, sentences, paragraphs, and sections of this Ordinance are severable, and if any phrase, clause, sentence, paragraph, or section of this Ordinance shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Ordinance, since the same would have been enacted by the City Council without incorporation in this Ordinance of any such unconstitutional phrase, clause, sentence, paragraph, or section.

SECTION 4.

Any person, firm or corporation who violates, disobeys, omits, neglects or refuses to comply with or who resists the enforcement of any of the provisions of this Ordinance shall be fined not more than Two Thousand Dollars (\$2,000.00) for each offense. Each day that a violation is permitted to exist shall constitute a separate offense.

SECTION 5.

All rights and remedies of the City of Dalworthington Gardens are expressly saved as to any and all violations of the provisions of the Code of Ordinances, City of Dalworthington Gardens, Texas, as amended or revised herein, or any other ordinances affecting the matters regulated herein which have accrued at the time of the effective date of this Ordinance; and, as to such accrued violations and all pending litigation, both civil and criminal, whether pending in court

or not, under such ordinances, same shall not be affected by this Ordinance but may be prosecuted until final disposition by the courts.

SECTION 6.

The City Secretary of the City of Dalworthington Gardens is hereby directed to publish in the official newspaper of the City of Dalworthington, the caption, publication clause, and effective date clause of this ordinance in accordance with Section 52.011 of the Texas Local Government Code.

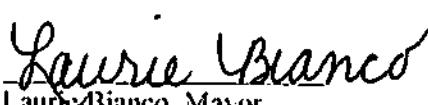
SECTION 7.

This Ordinance shall be in full force and effect from and after its passage and publication as provided by law, and it is so ordained.

PASSED AND APPROVED ON THIS 16th DAY OF November, 2023.

ATTEST:


Sandra Ma
Interim City Secretary


Laurie Bianco, Mayor



Staff Agenda Report

Agenda Subject: Consideration of a Special Exception Application for motor vehicle sales – indoor: Showroom wholly within a building; no vehicle display visible from outside the building; detailing for sale but no mechanical work allowed; no outside storage, in accordance with the City of Dalworthington Garden's Zoning Ordinance subsection (a) (15) of Section 14.02.224. Business located at 2209 Michigan Ave, Dalworthington Gardens

Background Information: Business Owner Amel Kohnic is requesting a special exception in accordance with Section 14.02.224(a)(15) for motor vehicle sales – indoor: Showroom wholly within a building; no vehicle display visible from outside the building; detailing for sale but no mechanical work allowed; no outside storage as outline in Ordinance No. 2023-25

Mr. Kohnic originally applied for a certificate of occupancy on May 30, 2019 and was given a certificate of occupancy

July 2, 2019 for auto repair and motorcycle shop. Mr. Kohnic is seeking to renew his dealer's license with the State. He

was denied renewal from the State with an explanation per Dalworthington Gardens City Ordinance 14.02.224, which

does not permit vehicle sales.

An application for a certificate of occupancy was submitted on January 22, 2024 and was returned from Safebuilt with a

denial letter on January 26, 2024.

Consideration for special exceptions should abide by the following guidelines from the ordinance. They differ from variances in that a hardship is not required to be shown or proven.

Recommended Action/Motion:

Motion to recommend a Special Exception Application for motor vehicle sales – indoor: Showroom wholly within a building; no vehicle display visible from outside the building; detailing for sale but no mechanical work allowed; no outside storage, in accordance with the City of Dalworthington Garden's Zoning Ordinance subsection (a) (15) of Section 14.02.224.

OR

Motion to deny a Special Exception Application for motor vehicle sales – indoor: Showroom wholly within a building; no vehicle display visible from outside the building; detailing for sale but no mechanical work allowed; no outside storage, in accordance with the City of Dalworthington Garden's Zoning Ordinance subsection (a) (15) of Section 14.02.224.

Attachments:

Ordinance No. 2023-25

Special Exception Application

Certificate of Occupancy Application from 2019

Certificate of Occupancy Application from 2024

Letter from applicant

ORDINANCE NO. 2023-25

AN ORDINANCE AMENDING CHAPTER 14, "ZONING," OF THE CODE OF ORDINANCES, CITY OF DALWORTHINGTON GARDENS, TEXAS, BY AMENDING SECTION 14.02.224, "B-3' BUSINESS DISTRICT," OF DIVISION 6, "COMMERCIAL AND INDUSTRIAL DISTRICT REGULATIONS" TO AMEND REGULATIONS FOR MOTOR VEHICLE SALES; AMENDING SECTION 14.02.225, "LI" LIGHT INDUSTRIAL DISTRICT" OF DIVISION 6, "COMMERCIAL AND INDUSTRIAL DISTRICT REGULATIONS" TO ADD REGULATIONS FOR MOTOR VEHICLE SALES; PROVIDING A CUMULATIVE CLAUSE; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A PENALTY CLAUSE; PROVIDING A SAVINGS CLAUSE; PROVIDING A PUBLICATION CLAUSE; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the City of Dalworthington Gardens is a Type-A general law municipality located in Tarrant County, created in accordance with the provisions of Chapter 6 of the Texas Local Government Code and operating pursuant to the enabling legislation of the State of Texas; and

WHEREAS, the City Council previously established zoning regulations governing motor vehicle sales; and

WHEREAS, the City Council desires to clarify regulations for motor vehicle sales; and

WHEREAS, the City Council of the City does hereby deem it advisable and in the public interest to amend Chapter 14 of the City Code, as amended, as described herein.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF DALWORTHINGTON GARDENS, TEXAS, THAT:

SECTION 1.

Subsection (a)(15) of Section 14.02.224. "'B-3' Business District," of Division 6, "Commercial and Industrial District Regulations," of Chapter 14, "Zoning," of the Code of Ordinances, City of Dalworthington Gardens, Texas is hereby amended to read as follows:

"..."

(15) Motor Vehicle Sales – indoor: Showroom wholly within a building; no vehicle display visible from outside the building; detailing for sale but no mechanical work allowed; no outside storage. Motor Vehicle Sales as provided herein are only permitted pursuant to a special exception as provided in division 8 of this article."

SECTION 2.

Section 14.02.225, "LI" Light Industrial District," of Division 6. "Commercial and Industrial District Regulations," of Chapter 14. "Zoning," of the Code of Ordinances, City of Dalworthington Gardens, Texas is hereby amended to read as follows:

"...

(14) Motor Vehicle Sales – indoor: Showroom wholly within a building; no vehicle display visible from outside the building; detailing for sale but no mechanical work allowed; no outside storage. Motor Vehicle Sales as provided herein are only permitted pursuant to a special exception as provided in division 8 of this article."

SECTION 3.

This ordinance shall be cumulative of all provisions and ordinances of the Code of Ordinances, City of Dalworthington Gardens, Texas, as amended, except where the provisions of this ordinance are in direct conflict with the provisions of such ordinances and such Code, in which event the conflicting provisions of such ordinances and such Code are hereby repealed.

SECTION 4.

It is hereby declared to be the intention of the City Council that the phrases, clauses, sentences, paragraphs, and sections of this ordinance are severable, and if any phrase, clause sentence, paragraph or section of this ordinance shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs and sections of this ordinance, since the same would have been enacted by the City Council without the incorporation in this ordinance of any such unconstitutional phrase, clause, sentence, paragraph or section.

SECTION 5.

Any person, firm, or corporation who violates, disobeys, omits, neglects, or refuses to comply with or who resists the enforcement of any of the provisions of this ordinance shall be guilty of a misdemeanor and, upon conviction, shall be fined an amount not to exceed \$2,000.00. Each day that a violation continues shall be deemed a separate offense.

SECTION 6.

All rights and remedies of the City of Dalworthington Gardens, Texas are expressly saved as to any and all violations of the City's Zoning Ordinance, as amended, which have accrued at the time of the effective date of this ordinance; and, as to such accrued violations and all pending litigation, both civil and criminal, whether pending in court or not, under such ordinances same shall not be affected by this ordinance but may be prosecuted until final disposition by the courts.

SECTION 7.

The City Secretary of the City of Dalworthington Gardens is hereby directed to publish at least twice in the official newspaper of the City of Dalworthington Gardens, the caption and the penalty clause of this ordinance in accordance with Section 52.011 of the Local Government Code.

SECTION 8.

This ordinance shall be in full force and effect from and after its passage and publication as required by law,

AND IT IS SO ORDAINED.

PASSED AND APPROVED on this 21st day of December, 2023.

CITY OF DALWORTHINGTON GARDENS

By:

Laurie Bianco
Laurie Bianco, Mayor

ATTEST:

Sandra Ma
Sandra Ma, Interim City Secretary



CITY OF DALWORTHINGTON GARDENS
SPECIAL EXCEPTION APPLICATION

RECEIVED
JAN 26 2024
BY C.Newell

Amel Kohnic

Applicant's Name (please print)

1-22-24

Date

2241 Sophie Ln Arlington TX 76010

817-614-5371

Address

Telephone Number

2209 Michigan Ave Dalworthington Gardens TX 76013

Property Address

Amel Kohnic

2241 Sophie Ln

817-614-5371

Property Owner

Address

Telephone Number

4,000 square foot building with offices, garage

Legal Description of Property

Space and indoor showroom.

I hereby apply to the Planning and Zoning Commission and City Council for the following special exception.

Be sure to include the following with your application:

- (1) Exact special exception requested;
- (2) Site plan sketch showing location of the use on property;
- (3) A statement as to why the proposed special exception will not cause substantial injury to the value, use or enjoyment of other property in the neighborhood;
- (4) A statement as to how the proposed special exception is to be designed, arranged and operated in order to ensure that development and use of neighboring property in accordance with the applicable district regulations will not be prevented or made unlikely, and that the value, use and reasonable enjoyment of such property will not be impaired or adversely affected; and
- (5) An identification of any potentially adverse effects that may be associated with the proposed special exception and the means proposed by the applicant to avoid, minimize or mitigate such effects.

We would like a special exception for vehicle sales in our indoor showroom. Please see attached letter.

Amel Kohnic

Applicant's Signature

1-22-24

Date

For Office Use Only

Fee Amount: \$500.00

Date: 1/26/2024

Receipt Number: CK25D590

Transaction Code - 161

OC 377

1129



**CERTIFICATE OF OCCUPANCY
APPLICATION**

CITY OF DALWORTHINGTON GARDENS
2600 Roosevelt Drive, DWG, TX 76016
TEL. 817-274-7368 FAX 817-265-4401
www.cityofdwg.net

A non-refundable \$100.00 processing fee is required WITH application submittal along with Photo Identification

Application Date 5-30-19 (application will expire after 60 days of submittal)

Address of Use 2209 Michigan Ave Suite No. _____

Business Name AA MOTORS Phone # 817-614-5371

Proposed Use of Building (be specific) motorcycle shop/ auto repair

Nature of Business
(Check all that apply)

Auto Repair Manufacturing Office Restaurant
 Retail School Warehouse
 Other motorcycle shop

Number of Square Feet to be used for the following:

Total Area 3600 Office 1460 Warehouse use 2200

Will signs be replaced or installed? Yes No Is this a sub-lease? Yes No

Is your business required to collect sales tax? Yes No Unsure

If Yes, list your sales tax permit number and business name _____
(sales tax #) _____ (business name) _____

Type of Application (check all that may apply)

New Construction/Shell Change of Ownership Change of Occupant/ New Business
 Clean & Show (over 30 days) Existing Business/New Owner Existing Business Name Change
 Expanding Lease Space Other _____

Occupant/Lessee Name Amel Kahnic

Phone Number _____ Cell Phone 817-614-5571 Fax Number _____

Email Address Amel100@aol.com - 614-5371

Mailing Address (other than application address) 2241 Sophie Ln Arlington TX 76010

Building Owner Name Amel Kahnic

Mailing Address 2241 Sophie Ln Arlington Tx 76010

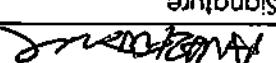
Phone Number _____ Cell Phone 817-614-5571 Fax Number _____

Email Address Amel100@aol.com

Emergency Contact

Name Amel Kahnic Phone Number 817-675-9854

Name Saniya Kahnic Phone Number 817-614-9152

C. O. Questionnaire		YES	NO
1. Are you enlarging which existing tenant space by combining suites, or portions of suites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2. Will you store, use, dispense or mix flammable or combustible liquids for purposes other than monitoring for operation of equipment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3. Will there be any spray painting on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4. Will you handle or use any hazardous or toxic chemicals such as but not limited to oxidizers, corrosive liquids, poisons gases and radioactive materials.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5A. Will the principal use of the building be specifically the type and projected quantities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5B. If yes, what materials will be stored for storage?	<p>How high will materials be stacked?</p> <hr/> <p>What percentage will be used for storage?</p> <hr/> <p>Will the building be stored on racks?</p>		
6. Will the building be equipped with a fire sprinkler system or standpipe system?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
7. Will food or beverages be manufactured, packaged, stored, distributed, sold or prepared in any manner other than vending machine?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8. Will alcoholic beverages be sold for consumption on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
9. Will fine building or rental space be used for a sexually-oriented business or adult entertainment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
10. Trash Disposal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
11. I have installed or plan to install an alarm system. (Notify DPS and obtain a \$10.00 permit)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
12. Will dry goods, merchandise or raw materials be stored outside?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
13. Will dry goods, merchandise or raw materials be displayed outside?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
14. Will used goods be sold on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15. Will you be performing any of the following processes on the premises? If yes, check:	<p>Manufacturing</p> <input type="checkbox"/> Treating <p>Formulation/Mixing/Processing</p> <input type="checkbox"/> Vehicle Washing		
16. Will any liquid wastes or sludges be generated which are not disposed of in the sewer system?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
17. Will any form of waste water pre-treatment be utilized at this facility?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
18. Will combustible dust be generated (swust), fine metal shavings, grain processing/storage?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
19. Will a swimming pool be located on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
20. Will any portion of the building/space be utilized as a classroom, training room or day-care?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
21. Will you be performing any of the following activities or processes on the premises? Check all that would apply	<p>Detail Sales</p> <input type="checkbox"/> Sale of alcoholic beverages <p>Food Products</p> <input type="checkbox"/> Outside storage of display <p>Office</p> <input type="checkbox"/> Dance floor <p>Child Care Center</p> <input type="checkbox"/> Sanding Mill or Wood Cutting <p>Incineration</p> <input type="checkbox"/> Items stacked higher than 12'. <p>Outside Storage of Display</p> <input type="checkbox"/> Sale of non-alcoholic beverages <p>Grocery or Convenience Store</p> <input type="checkbox"/> Tree Storage <p>Restaurant</p> <input type="checkbox"/> Sale of alcohol beverages <p>Bar Area</p> <input type="checkbox"/> Personal Services <p>Child Care Center</p> <input type="checkbox"/> Parts or Vehicle Wash <p>Office</p> <input type="checkbox"/> Dance Floor <p>Food Products</p> <input type="checkbox"/> Inside storage <p>Items stackable/combustible liquids</p> <input type="checkbox"/> Painting or Coating <p>Manufacturing</p> <input type="checkbox"/> Mixing/Mixing/Processing <p>Assembly/Gathering/Worship</p> <input type="checkbox"/> On-Site Sewage Facility <p>Medicai/Dental</p> <input type="checkbox"/> Smoking Section on Premise <p>Barber</p> <input type="checkbox"/> Warehouse <p>Personnel Services</p> <input type="checkbox"/> Cleaning or Cutting <p>Food Production</p> <input type="checkbox"/> Laundry or Cleaning <p>Office</p> <input type="checkbox"/> Dance Floor <p>Food Products</p> <input type="checkbox"/> Outside storage <p>Child Care Center</p> <input type="checkbox"/> Parts or Vehicle Wash <p>Office</p> <input type="checkbox"/> Dance Floor <p>Food Products</p> <input type="checkbox"/> Inside storage <p>Items stackable/combustible liquids</p> <input type="checkbox"/> Painting or Coating <p>Manufacturing</p> <input type="checkbox"/> Mixing/Mixing/Processing <p>Assembly/Gathering/Worship</p> <input type="checkbox"/> On-Site Sewage Facility <p>Medicai/Dental</p>		
22. I hereby certify that I have completed this questionnaire for 2204 W. 4th St. Ave and know the same to be true and correct.	<p>Printed Name: AMC Kala C</p> <p>Date: 05/30/19</p> <p>Signature: </p> <p>(Address): 2204 W. 4th St. Ave</p>		

Certificate of Occupancy

City of Dalworthington Gardens Department of Building Inspection

This Certificate issued pursuant to the requirements of the City of Dalworthington Gardens certifying that at the time of issuance this structure was in compliance with the various ordinances of the City regulating building structure or use.

Business Name:	AA Motors	Permit No.	1129
Address:	2209 Michigan Ave DWG, Texas 76013	Zone:	B-3
Building Owner		Building Occupant	
Name:	Amel Kohnic	Name:	Amel Kohnic
Address:	2241 Sophie Lane Arlington, Texas 76010	Address:	2241 Sophie Lane Arlington, Texas 76010
Phone:	817-614-5371	Phone:	817-614-5371
Building Official:	Gary Harsley		
Date:	July 2, 2019		



Plan Review Information

Jurisdiction: Dalworthington Gardens

Applicant: 2255

Contractor:

Permit Type: Occupancy

Total Square Footage: 4,000.00

Description of Work: Occupancy - auto repairs and online indoor showroom sales

Submittal Name and #: SAFEbuilt Plan Review #1

Initial Submittal

Resubmittal

Date Received for Review: 01/22/2024

Plan Review Completion Status:

Approved

Approved with Comments

Resubmittal Required

Building Code(s):

Plans Examiner(s): Joseph Newton, Building, Electrical, Mechanical, Plumbing, jnewton@bbgcode.com

Completion Date:

Plan Review Comments:

Building, Electrical, Mechanical, Plumbing: Resubmittal Required - Joseph Newton, jnewton@bbgcode.com

C/O is Disapproved with the following comments:

1. Per Ordinance No. 2023-25, no online sales are permitted without special approval of the Planning & Zoning Commission.



Plan Review Information

Your plans have been reviewed under code(s) listed above. These plans have only been reviewed for compliance with building codes adopted by this jurisdiction.

If "Resubmittal Required" is checked under Plan Review Completion Status above, a resubmittal of plans addressing the comments is required.

If "Approved" or "Approved with Comments" is checked under Plan Review Completion Status above, any remaining comments shall be addressed during construction. The commencement of work constitutes acceptance of all items listed herein.



CERTIFICATE OF OCCUPANCY
APPLICATION

Permit Number 2255

CITY OF DALWORTHINGTON GARDENS
2600 Roosevelt Drive, DWG, TX 76016
TEL. 817-274-7368 www.cityofdwg.net
email: permits@cityofdwg.net

A non-refundable \$100.00 processing fee is required with application submittal along with Photo Identification

Application Date 1-22-24 (application will expire after 60 days of submittal)

Address of Use 2209 Michigan Ave Suite No. _____

Business Name AA MOTORS Phone # 817-614-5371

Proposed Use of Building (be specific) auto repair and online indoor showroom sales

Nature of Business
(Check all that apply)

Auto Repair Manufacturing Office Restaurant
 Retail School Warehouse
 Other indoor showroom sales

Number of Square Feet to be used for the following:

Total Area 4,000 Office 1,000 Warehouse use 3,000

Will signs be replaced or installed? Yes No Is this a sub-lease? Yes No

Is your business required to collect sales tax? Yes No Unsure

If Yes, list your sales tax permit number and business name
(sales tax #) _____ (business name) _____

Type of Application (check all that may apply)

New Construction/Shell Change of Ownership Change of Occupant/ New Business
 Clean & Show (over 30 days) Existing Business/New Owner Existing Business Name Change
 Expanding Lease Space Other adding showroom sales

Occupant/Lessee Name Amel Kohnic DBA AA MOTORS

Phone Number 817-861-5544 Cell Phone 817-614-5371 Fax Number 817-274-6710

Email Address AAMOTORS@att.net

Mailing Address (other than application address) 2241 Sophie Ln Arlington TX 76010

Building Owner Name Amel Kohnic

Mailing Address 2241 Sophie Ln Arlington TX 76010

Phone Number _____ Cell Phone 817-614-5371 Fax Number _____

Email Address Amel100@aol.com

Emergency Contact

Name Amel Kohnic Phone Number 817-673-9854

Name Saniya Kohnic Phone Number 817-614-9132

RECEIVED
JAN 22 2024

C. O. Questionnaire

JAN 22 2024

YES NO

1.	Are you enlarging an existing tenant space by combining suites, or portions of suites? If yes, list lease spaces being combined _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.	Will you store, use, dispense or mix flammable or combustible liquids for purposes other than maintenance for operation of equipment? If yes, specify the type of product and the projected quantities _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.	Will there be any spray painting on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.	Will you handle or use any hazardous or toxic chemicals such as but not limited to oxidizers, corrosive liquids, poisonous gases and radioactive materials? If yes, specify the type and projected quantities _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5A	Will the principal use of the building or tenant space be used for storage? If yes what materials will be stored? _____ What percentage will be used for storage? _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5B	How high will materials be stacked? _____ Will the materials be stored on racks? _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6.	Will the building be equipped with a <input type="checkbox"/> fire sprinkler system <input type="checkbox"/> standpipe system <input type="checkbox"/> hood ansul system	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7.	Will food or beverages be manufactured, packaged, stored, distributed, sold or prepared in any manner other than vending machines?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8.	Will alcoholic beverages be sold for consumption on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9.	Will the building or tenant space be used for a sexually-oriented business or adult entertainment As defined within the Code of Ordinance Chapter 17.8.C.15	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10.	Trash Disposal <input type="checkbox"/> Rented Dumpster <input checked="" type="checkbox"/> Curb-Side Pick-Up		
11.	I have installed or plan to install an alarm system. (Notify DPS and obtain a \$10.00 permit)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12.	Will any goods, merchandise or raw materials be stored outdoors?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13.	Will any goods or merchandise be displayed outdoors?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14.	Will used goods be sold on the premises?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15.	Will you be performing any of the following processes on the premises? If yes, check: <input type="checkbox"/> Manufacturing <input type="checkbox"/> Treating <input type="checkbox"/> Formulation/Mixing/Processing <input type="checkbox"/> Vehicle Washing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16.	Will any liquid wastes or sludges be generated which are not disposed of in the sewer system?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17.	Will any form of waste water pre-treatment be utilized at this facility? If yes, briefly describe _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18.	Will combustible dust be generated (sawdust, fine metal shavings, grain processing/storage?)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
19.	Will a swimming pool be located on the premises?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
20.	Will any portion of the building/space be utilized as a classroom, training room or daycare? If yes, <input type="checkbox"/> Age 0-2 ½ _____ (Number of students) <input type="checkbox"/> older than 2 ½ _____ (Number of students)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
21	Will you be performing any of the following activities or processes on the premises? Check all that would apply		
	<input type="checkbox"/> Restaurant <input type="checkbox"/> Sale of alcoholic Beverages <input checked="" type="checkbox"/> Retail Sales <input type="checkbox"/> Grocery or Convenience Store <input type="checkbox"/> Office <input type="checkbox"/> Food Products <input type="checkbox"/> Dance Floor <input type="checkbox"/> Sanding Mill or Wood Cutting <input type="checkbox"/> Child Care Center <input type="checkbox"/> Parts or Vehicle Wash <input type="checkbox"/> Personal Services <input type="checkbox"/> Welding or Cutting <input type="checkbox"/> Bar Area <input type="checkbox"/> Warehouse <input type="checkbox"/> Use of Medical Gas <input type="checkbox"/> Smoking Section on Premise <input type="checkbox"/> Medical/Dental <input type="checkbox"/> Assembly/Gathering/Worship	<input type="checkbox"/> Tire Storage <input type="checkbox"/> Outside Storage or Display <input type="checkbox"/> Items stacked higher than 12' <input type="checkbox"/> Incineration <input type="checkbox"/> Flammable/Combustible Liquids <input type="checkbox"/> Painting or Coating <input type="checkbox"/> Manufacturing <input type="checkbox"/> Formulation/Mixing/Processing <input type="checkbox"/> On-Site Sewage Facility	

I hereby certify that I have completed this questionnaire for 2209 Michigan Ave and know the same to be true and correct.
(Address)

Amel Kohnic

Printed Name

Amel Kohnic

Signature

1-22-24

Date

Office Use Only

Amount Paid \$100.00 Date Received 1/22/2024 Receipt Number CK256362
Clerk C.Newbell Zone B3
Approved by _____
Inspected by _____ Special Conditions _____
TXU Release Date _____ Confirmation Number _____
Fire Inspection Date _____ Approved by _____
Gas Line Inspection Needed Yes No

RECEIVED
R JAN 26 2024
BY: C. Newell

AA Motors
2209 Michigan Ave
Dalworthington Gardens, TX 76013

To the Attention of: City of Dalworthington Gardens

Dear Sir/Madam,

Our company AA Motors is a family owned business that has been providing exceptional auto services to the residents of Dalworthington Gardens since 2019 and prior to that we were located in Arlington since 1996 making our business 28 years old. Our commitment to quality service and community support has allowed us to establish a positive presence in the area.

We are reaching out to address the recent ordinance related to auto sales which require a special exception. AA Motors operates its sales division of the business exclusively online without a physical presence. Since being in Dalworthington Gardens and even before while in Arlington we have never had a customer at random or by chance stop by and want to purchase a vehicle. This is because on our property we don't have any signs that state or implies sales, we are strictly one hundred percent online. We have an indoor showroom where the whole operation takes place. Our online sales approach is in line with the intent of the city's new ordinance. We kindly request the city's consideration and approval of our application for a special exception from the aforementioned ordinance.

It's important to note that AA Motors has been an integral part of the Dalworthington Gardens community since 2019. We firmly believe that we should be grandfathered in, as we have been in the city since 2019 and were seeking resolution regarding our business practices prior to the ordinances adoption on December 21, 2023.

In our previous interactions with the city in 2019 when getting our building ready for operation a former city inspector understood our business model and what we do. He told us specifically not to put any signs outside that said vehicle sales or have cars parked outside with advertising. He told us to keep everything inside the showroom(we're not sure why he didn't advise us to put sales on our COO). This is the way we have been doing business to date. Nobody can see that there are any kind of sales going on. The dealers license expires every two years. We've had ours renewed twice. But this year when getting it renewed the license specialist came across a rule that Dalworthington Gardens doesn't allow any kind of car sales but he didn't scroll down the whole city ordinance zoning list. Under city zoning online indoor showroom sales are permitted. To get our license renewed we need a letter from the city that states we are allowed to conduct business. Regrettably, this misunderstanding could now impact a major significant portion of our business. We are trying to convert our COO to show online sales and make sure everything is in correct order. Auto sales are crucial for our operations and if we were to lose our license we would be impacted in a severe way.

RECEIVED
R JAN 26 2024
BY C Newbell

By granting this special exception there would not be any negative effects to the community. Since acquiring our property in 2019 and to this date the property value has increased by seventy five percent. We maintain our property to the highest standard both inside and outside. We strive to achieve this because it is important to us as a business to have a positive outlook on both ourselves and the community.

We kindly ask for your understanding and consideration in granting our request for a special exception. This would allow us to continue providing valuable services to the residents of Dalworthington Gardens while ensuring compliance with city regulations.

Thank you for your time and consideration. We look forward to a positive resolution that benefits us both. Since 2019 while being in Dalworthington Gardens this city has felt like home to us. We frequent the business' that include Green's produce, multiple food establishments and everything in between. We hope to continue calling Dalworthington Gardens our home.

Sincerely,
AA Motors

Staff Agenda Report

Agenda Subject: Discussion and possible action to potentially change the Planning and Zoning meeting dates and time.

Background Information: The Planning and Zoning Commission is scheduled to meet on the 4th Monday of each month. If no agenda items are proposed, the meeting may be canceled.

The city is receiving more applications to go before P&Z to receive a recommendation before going to the council. For the city to be more transparent on when to accept an application, staff will need to create a “planning submittal calendar/table”.

Staff will need to ensure the city complies timely with our State Legislature such as public notices and publications.

Staff feels that having meetings on Monday may lead to rescheduling due to holidays.

Staff believes changing the meeting date to the 1st Thursday of the Month would be ideal with working around schedules of the court, water, and other boards and commissions.

Recommended Action/Motion: Motion to set future P&Z meeting dates and time.

Attachments:

[**2023 Planning Submittal Calendar**](#)
[**2024 Planning Submittal Calendar**](#)



2023 PLANNING SUBMITTAL CALENDAR

Created 8/23/2023

Application Submittal Date	Planning and Zoning Commission Meeting Date	City Council Meeting Date
8/25/2023	9/25/2023	10/19/2023
9/22/2023	10/23/2023	11/16/2023
10/27/2023	11/27/2023	12/21/2023
11/24/2023	12/25/2023 (date will change due to holiday)	1/18/2024

Application Submittal Date	Zoning Board of Adjustment
8/4/2023	9/4/2023 (City holiday)
9/1/2023	10/2/2023
10/6/2023	11/6/2023
11/3/2023	12/4/2023

NOTE: Submittals are due in the Permitting Office by 5:00 p.m. on the application submittal date to City Hall, 2600 Roosevelt Drive, TX 76016, with the required fee. Incomplete applications will not be accepted.

P&Z and ZBA do not meet if there are no cases to be considered and the meeting dates shown above are subject to change. P&Z meetings start at 6:00 pm, and ZBA and Council meetings start at 7:00 p.m. in the Council Chambers in City Hall, 2600 Roosevelt Drive, TX 76016, unless posted otherwise. Agendas are posted a minimum of 72 hours prior to the meeting. Meeting agendas, packets, applications, and development fees are available to view and download at www.cityofdwg.net.

Please direct any questions to:

Lola Smith, City Administrator

lsmith@cityofdwg.net or 682-330-7418



2024 PLANNING SUBMITTAL CALENDAR – PLANNING AND ZONING

Created 1/25/2024

Application Submittal Date	Planning and Zoning Commission Meeting Date	City Council Meeting Date
		3/21/2024
		4/18/2024
		5/16/2024
		6/20/2024
		7/18/2024
		8/15/2024
		9/19/2024
		10/17/2024
		11/21/2024
		12/19/2024

Note: Submittals are due in the Permitting Office by 5:00 p.m. on the application submittal date to City Hall, 2600 Roosevelt Drive, Texas 76016, with the required fee. Incomplete applications will not be accepted.

P&Z do not meet if no cases are to be considered and the meeting dates shown above are subject to change. P&Z meetings start at 6:00 p.m. in the Council Chambers located in City Hall at 2600 Roosevelt Drive, Dalworthington Gardens, Texas 76016, unless posted otherwise. Agendas are posted a minimum 72 hours prior to the meeting. Meeting agendas, packets, applications, and development fees are available to view and download at www.cityofdwg.net.

Please direct any questions to :

Sandra Ma,
City Secretary