

**Conveyance & Hydraulic Analysis
Harris County Flood Control
Unit E100-00-00
White Oak Bayou Watershed**

Proposed Drainage Conditions Report
To Support a project at

5651 T.C Jester Blvd.
Houston, Texas
77091

For:

Michael L. Richker

By:



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A handwritten signature in black ink, appearing to read "Barry D. Adkins", written over the bottom right of the professional seal.

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Executive Summary

The proposed commercial site development is located in the vicinity of the 5651 block of T.C Jester blvd just North of W Tidwell Rd and South of Paul Quinn St. W Tidwell Rd crosses the E100-00-00 Watershed approximately 400 feet downstream of the proposed site development. (**Exhibit “B”** – Vicinity Map)

The proposed development is located in the regulatory floodway and floodplain of watershed E100-00-00. Flood Insurance Rate Map (FIRM) Panel 48201C0655L dated June 18, 2007 is presented (**Exhibit “C”**). The project is located between the Federal Emergency Management Agency (FEMA) Cross Sections BE and BF.

The proposed development was modeled by adding seven (7) cross sections at the location of the site. The proposed project will comply with current City of Houston Floodplain Ordinances and the Harris County floodplain development requirements.

A hydraulic (HEC-RAS) analysis was performed. It is of sufficient detail to support a "No Rise/No Impact Certification".

**DRAINAGE IMPACT STUDY
IN SUPPORT OF A "NO RISE CERTIFICATION" FOR
THE PROPOSED COMMERCIAL SITE DEVELOPMENT PROJECT
NEAR E100-00-00 (WHITE OAK BAYOU WATERSHED)**

I. GENERAL DISCUSSION

The purpose of this drainage impact study is to present a conveyance and hydraulic (HEC-RAS) analysis with sufficient detail that will support the "No Rise/No Impact" Certification for the proposed commercial site development near E100-00-00 watershed located along T.C Jester and W Tidwell in Houston Texas with respect to conveyance of flood waters and the water surface elevation. The proposed development is located in the vicinity of the 5651 block of TC Jester blvd and just North of W Tidwell rd. Please refer to **Exhibit "B"** - Vicinity Map. The objective of this project is to raise the portion of the property that is not in the regulatory floodway above the base flood elevation, and design proper mitigation and detention plans for future construction.

The proposed site development is partially located in the regulatory floodway and floodplain of watershed E100-00-00, and is presented on the Flood Insurance Rate Map (FIRM) Panel 48201C0655L dated June 18, 2007 located between the Federal Emergency Management Agency (FEMA) Cross Sections BE and BF. (Please refer to **Exhibit "C"** - Proposed Project Location on Flood Insurance Rate Map). Seven cross sections have been marked in red on the FIRM showing the location of the site.

The proposed mitigation and detention project will comply with the current City of Houston Floodplain Ordinances, and the Harris County Floodplain development requirements.

II. CONVEYANCE AND HYDRAULIC ANALYSES

Existing (HEC-RAS) Conditions

The Effective Watershed E100-00-00 hydraulic (HEC-RAS) model used in this analysis was obtained from the Harris County Flood Control District and represents the latest and best available information. As mentioned, the project location is between FEMA Cross Sections BE and BF which are located on FIRM Panel 48201C0655L. The proposed site development is located just north of the FEMA Cross Section BE as shown on **Exhibit "B"**. **Table 1** in the report was started at Station 53,282 which is approximately two-thirds of a mile downstream of the project location, and extends upstream approximately one mile from the project location to Station 62,890. **Table 1** presents the comparison of the 100-year event water surface elevations, channel velocities, and flow areas. The effective hydraulic (HEC-RAS) model for watershed E100-00-00 was reviewed and executed and the results are tabulated on **Table 1**. The 50-year and 10- year events were also reviewed and executed. The results are tabulated on **Table 2**, and **Table 3**. The Effective Conditions HEC-RAS model is also provided on compact disc (CD) as a part of this report.

Revised Existing Conditions

For this analysis, the Effective Conditions HEC-RAS model matched closely with the existing natural topography through the site along FEMA cross section BE, Station (56811). This model was then modified to incorporate the updated topographic survey through the project site and was renamed as the Revised Effective HEC-RAS Condition Model. Please refer to **Exhibit “D”** – Topographic Survey of the Project Site.

Seven cross sections were inserted with the updated topographic information along the E100-00-00 channel. These cross sections are shown on the project site and can be seen on **Exhibit “C”**- Proposed Project Location on Flood Insurance Map. The updated cross sections were inserted at Stations 56811, 56879, 56947, 57015, 57105.3, 57195.6, and 57285.9. The Manning’s “N” values were adjusted through the right overbank area where the property varies from light brush to heavy brush floodplain surfaces. Please refer to **Exhibit A** - Existing Site Photographs.

These were the only updates made to the model in order to establish a revised existing conditions model for watershed E100-00-00 through our project reach.

The Revised Effective HEC-RAS models were then executed for the 100-year, 50-year, and 10-year events. The results are tabulated on **Tables 1:3**. The Revised Existing HEC-RAS models have been submitted on a compact disc (CD) with this report.

The results indicate that water surface elevations have increased slightly when compared to the effective model due to the additional cross sections that were added. This increase is normal whenever updated cross sections are added to any hydraulic model.

Proposed Hydraulic Conditions

For this analysis, the revised existing conditions HEC-RAS model was used and modified with the proposed drainage and mitigation conditions in order to develop a direct comparison of the water surface elevations.

The results of the proposed HEC-RAS models have been tabulated on **Tables 1:3**. The results indicate that the 100-year water surface elevations of the Post Development Conditions are equal to or between 0.01 and 0.03 feet lower than the Pre-Development (Revised Effective) Conditions. The 100- year channel velocities from the Post Development conditions have decreased slightly upstream of the property when compared to the Pre-development (Revised Effective) Conditions. This slight decrease is normal since along the project site development more cut, than fill volume is being provided for drainage purposes.

The Proposed Conditions HEC-RAS model has been submitted on a compact disc (CD) in this report.

The conveyance of flood waters has not been adversely affected as indicated on the representative cross sections A, B, and C in **Figures 3:5**, where the water surface elevations do not vary across the entire cross section.

The proposed conditions in this model are in compliance with all of the FEMA, Harris County and City of Houston Floodplain Regulatory requirements.

III. CONCLUSION

This conveyance analysis developed for the proposed commercial site development near E100-00-00 White Oak Bayou Watershed provides evidence that the development will not have an impact to the conveyance of flood waters and the 100-year water surface elevation and velocity. It can be summed up as ***the proposed project will cause no adverse impact to the conveyance of flood waters, nor any adverse impact to the receiving streams for storm events up to and including the 1% chance exceedance probability (100-year storm event)***. This analysis along with the supporting HEC-RAS documentation following Harris County Flood Control guidelines and policy is sufficient to support the "Engineering No Rise/No impact Certification" for the proposed commercial development over Watershed E100-00-00.



FIRM # F-9503

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October 4, 2012

**ENGINEERING “NO RISE/NO IMPACT” CERTIFICATION
FOR A PROPOSED COMMERCIAL SITE DEVELOPMENT
NEAR E100-00-00
WHITE OAK BAYOU WATERSHED**

This is to certify that I am a duly qualified engineer licensed to practice in the State of Texas. This further certifies that the attached technical data supports the fact that the proposed Commercial Site development in Houston Texas will cause no adverse impact to the receiving streams for storm events up to and including the 1% chance exceedance probability (100-year storm event), and conveyance of flood waters on Watershed E100-00-00 at the published sections located in the Flood Insurance Study (FIS) for Harris county Texas and Incorporated Areas, Panel 48201C0655L.



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Barry D. Adkins, P.E.
Project Engineer
DaRam Engineers, Inc.

TABLE 1
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 100-YEAR WATER SURFACE ELEVATIONS, CHANNEL
VELOCITIES, AND FLOW AREAS

PLAN SHORT ID DESCRIPTION:

(FEMA): FEMA 2010 effective cross section conditions obtained from H.C.F.C.D.

(RevExisting): Revised cross section conditions matching existing natural topography.

(PropAlt): Proposed alternate cross section conditions.

HEC-RAS River: E100-00-00 Reach: E100-00-00_N034 Profile: 1PCT_100yr						
SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
62890	FEMA	73.15		7.59		5344.98
62890	RevExisting	73.34		7.39		5818.11
62890	PropAlt	73.33	-0.01	7.4	0.01	5780.6
61936	FEMA	72.84		7.66		5392.66
61936	RevExisting	73.05		7.47		5833.66
61936	PropAlt	73.03	-0.02	7.48	0.01	5796.66
60759	FEMA	73.09		3.4		15141.44
60759	RevExisting	73.29		3.31		15718.15
60759	PropAlt	73.27	-0.02	3.32	0.01	15672.65
59972	FEMA	72.2		6.8		4493.02
59972	RevExisting	72.46		6.6		4803.25
59972	PropAlt	72.44	-0.02	6.62	0.02	4777.4
58797	FEMA	72.49		1.77		15413.22
58797	RevExisting	72.72		1.74		15874.87
58797	PropAlt	72.7	-0.02	1.74	0	15836.59
57918	FEMA	71.95		5.55		6078.21
57918	RevExisting	72.23		5.36		6621.61
57918	PropAlt	72.2	-0.03	5.38	0.02	6574.79
57285.9*	RevExisting	71.85		4.12		8141.2
57285.9*	PropAlt	71.84	-0.01	4.18	0.06	8035.66
57195.6*	RevExisting	71.71		4.57		8183.85

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
57195.6*	PropAlt	71.71	0	4.34	-0.23	8348.97
57105.3*	RevExisting	71.67		4.55		8506.06
57105.3*	PropAlt	71.67	0	4.28	-0.27	8841.1
57015	FEMA	71.59		4.77		8547.28
57015	RevExisting	71.63		4.85		8503.57
57015	PropAlt	71.6	0	4.74	-0.11	8834.32
56947.*	RevExisting	71.63		3.68		9329.49
56947.*	PropAlt	71.63		3.62	-0.06	10199.24
56879.*	RevExisting	71.63		3.45		9342.68
56879.*	PropAlt	71.61	-0.02	3.47	0.02	9737.71
56811	FEMA	71.54		3.87		7690.42
56811	RevExisting	71.54		3.87		7680.39
56811	PropAlt	71.54	0	3.87	0	7680.39
56718.5		Bridge				
56621	FEMA	70.77		4.28		5990.94
56621	RevExisting	70.77		4.28		5987.21
56621	PropAlt	70.77	0	4.28	0	5987.21
56486	FEMA	70.58		5.33		7296.48
56486	RevExisting	70.57		5.33		7289.96
56486	PropAlt	70.57	0	5.33	0	7289.96
56239	FEMA	70.38		5.82		7424.67
56239	RevExisting	70.38		5.83		7416.93
56239	PropAlt	70.38	0	5.83	0	7416.93
56231	FEMA	70.4		5.66		7492.4
56231	RevExisting	70.4		5.66		7484.66
56231	PropAlt	70.4	0	5.66	0	7484.66
55757	FEMA	69.84		7.26		5060.92
55757	RevExisting	69.84		7.27		5057.22
55757	PropAlt	69.84	0	7.27	0	5057.22

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
55190	FEMA	69.51		7.22		5542.71
55190	RevExisting	69.51		7.22		5535.18
55190	PropAlt	69.51	0	7.22	0	5535.18
55112	FEMA	69.36		7.54		5093.46
55112	RevExisting	69.36		7.54		5086.6
55112	PropAlt	69.36	0	7.54	0	5086.6
55086		Bridge				
55059	FEMA	69.09		7.61		4467.81
55059	RevExisting	69.08		7.61		4461.78
55059	PropAlt	69.08	0	7.61	0	4461.78
54895	FEMA	69.09		6.63		5246.57
54895	RevExisting	69.09		6.63		5240.38
54895	PropAlt	69.09	0	6.63	0	5240.38
54667	FEMA	68.85		7.11		5573.31
54667	RevExisting	68.84		7.11		5566.02
54667	PropAlt	68.84	0	7.11	0	5566.02
54606		Bridge				
54545	FEMA	68.85		6.84		5721.33
54545	RevExisting	68.85		6.84		5717.51
54545	PropAlt	68.85	0	6.84	0	5717.51
54398	FEMA	68.88		6.01		7009.88
54398	RevExisting	68.88		6.01		7005.94
54398	PropAlt	68.88	0	6.01	0	7005.94
54053	FEMA	68.69		6.51		6865.4
54053	RevExisting	68.69		6.52		6862.39
54053	PropAlt	68.69	0	6.52	0	6862.39
53766	FEMA	68.52		6.58		6222.09
53766	RevExisting	68.52		6.58		6218.11
53766	PropAlt	68.52	0	6.58	0	6218.11

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
53664	FEMA	68.48		6.58		6743.14
53664	RevExisting	68.47		6.58		6739.14
53664	PropAlt	68.47	0	6.58	0	6739.14
53653.5		Bridge				
53642	FEMA	68.39		6.64		6593.09
53642	RevExisting	68.39		6.64		6588.57
53642	PropAlt	68.39	0	6.64	0	6588.57
53459	FEMA	68.28		6.74		6750.58
53459	RevExisting	68.28		6.74		6744.81
53459	PropAlt	68.28	0	6.74	0	6744.81
53371		Bridge				
53282	FEMA	67.99		6.84		6232.84
53282	RevExisting	67.98		6.84		6227.18
53282	PropAlt	67.98	0	6.84	0	6227.18

TABLE 1: 100-YR CONDITION MODEL DATA

TABLE 2
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 50-YEAR WATER SURFACE ELEVATIONS, CHANNEL
VELOCITIES, AND FLOW AREAS

PLAN SHORT ID DESCRIPTION:

(FEMA): FEMA 2010 effective cross section conditions obtained from H.C.F.C.D.

(RevExisting): Revised cross section conditions matching existing natural topography.

(PropAlt): Proposed alternate cross section conditions.

HEC-RAS River: E100-00-00 Reach: E100-00-00_N034 Profile: 2PCT_50yr						
SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
62890	FEMA	72.89		7.04		2655.36
62890	RevExisting	72.44		7.11		3662.26
62890	PropAlt	72.41	-0.03	7.13	0.02	3605.67
61936	FEMA	72.62		7.07		2661.72
61936	RevExisting	72.16		7.12		4042.61
61936	PropAlt	72.13	-0.03	7.15	0.03	3985.35
60759	FEMA	72.82		3.34		10624.44
60759	RevExisting	72.37		3.17		13242.09
60759	PropAlt	72.35	-0.02	3.18	0.01	13172.34
59972	FEMA	71.97		6.43		2886.62
59972	RevExisting	71.6		6.23		3844.44
59972	PropAlt	71.56	-0.04	6.25	0.02	3808.29
58797	FEMA	72.21		1.7		9170.33
58797	RevExisting	71.84		1.59		14167.28
58797	PropAlt	71.81	-0.03	1.59	0	14108.84
57918	FEMA	71.7		5.26		3673.15
57918	RevExisting	71.38		5.04		5204.22
57918	PropAlt	71.35	-0.03	5.06	0.02	5155.25
57285.9*	RevExisting	70.96		4.18		6225.87
57285.9*	PropAlt	70.94	-0.02	4.25	0.07	6098.8
57195.6*	RevExisting	70.85		4.47		6241.44

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
57195.6*	PropAlt	70.82	-0.03	4.29	-0.18	6533.34
57105.3*	RevExisting	70.81		4.47		6495.9
57105.3*	PropAlt	70.79	-0.02	4.17	-0.3	6967.75
57015	FEMA	71.27		4.96		4549.3
57015	RevExisting	70.69		5.1		6256.55
57015	PropAlt	70.67	-0.02	4.92	-0.18	6792.71
56947.*	RevExisting	70.74		3.56		7256.02
56947.*	PropAlt	70.73	-0.01	3.46	-0.1	8280.99
56879.*	RevExisting	70.73		3.28		7421.48
56879.*	PropAlt	70.73	0	3.27	-0.01	7938.66
56811	FEMA	71.26		3.86		4678.6
56811	RevExisting	70.66		3.65		5993.44
56811	PropAlt	70.66	0	3.65	0	5993.44
56718.5	Bridge					
56621	FEMA	70.69		3.76		4858.92
56621	RevExisting	70.05		3.93		4953.6
56621	PropAlt	70.05	0	3.93	0	4953.6
56486	FEMA	70.43		5.03		4277.32
56486	RevExisting	69.8		5.14		5389.35
56486	PropAlt	69.8	0	5.14	0	5389.35
56239	FEMA	70.25		5.49		3642.05
56239	RevExisting	69.64		5.51		5430.69
56239	PropAlt	69.64	0	5.51	0	5430.69
56231	FEMA	70.27		5.33		3733.68
56231	RevExisting	69.66		5.35		5487.55
56231	PropAlt	69.66	0	5.35	0	5487.55
55757	FEMA	69.81		6.76		3674.87
55757	RevExisting	69.13		6.98		4179.2
55757	PropAlt	69.13	0	6.98	0	4179.2

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
55190	FEMA	69.53		6.69		3765.77
55190	RevExisting	68.78		7.06		3927.58
55190	PropAlt	68.78	0	7.06	0	3927.58
55112	FEMA	69.42		6.92		3627.78
55112	RevExisting	68.67		7.25		3818.5
55112	PropAlt	68.67	0	7.25	0	3818.5
55086		Bridge				
55059	FEMA	69.2		6.86		3596.72
55059	RevExisting	68.5		7.19		3530.46
55059	PropAlt	68.5	0	7.19	0	3530.46
54895	FEMA	69.2		6.01		4175.1
54895	RevExisting	68.48		6.41		4249.52
54895	PropAlt	68.48	0	6.41	0	4249.52
54667	FEMA	69		6.43		4307.2
54667	RevExisting	68.26		6.79		4493.58
54667	PropAlt	68.26	0	6.79	0	4493.58
54606		Bridge				
54545	FEMA	68.59		6.41		4051.03
54545	RevExisting	68.07		6.64		4313.71
54545	PropAlt	68.07	0	6.64	0	4313.71
54398	FEMA	68.6		5.8		4558.87
54398	RevExisting	68.08		5.92		5499.66
54398	PropAlt	68.08	0	5.92	0	5499.66
54053	FEMA	68.43		6.2		4811.4
54053	RevExisting	67.9		6.35		5725.78
54053	PropAlt	67.9	0	6.35	0	5725.78
53766	FEMA	68.26		6.31		4154.81
53766	RevExisting	67.73		6.43		4920.31
53766	PropAlt	67.73	0	6.43	0	4920.31

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
53664	FEMA	68.2		6.39		4096.96
53664	RevExisting	67.68		6.44		5363.99
53664	PropAlt	67.68	0	6.44	0	5363.99
53653.5		Bridge				
53642	FEMA	68.16		6.41		4074.38
53642	RevExisting	67.65		6.46		5304.32
53642	PropAlt	67.65	0	6.46	0	5304.32
53459	FEMA	67.84		7.22		3560.23
53459	RevExisting	67.52		6.63		5225.83
53459	PropAlt	67.52	0	6.63	0	5225.83
53371		Bridge				
53282	FEMA	67.85		6.51		4056.14
53282	RevExisting	67.36		6.56		5023.62
53282	PropAlt	67.36	0	6.56	0	5023.62

TABLE 2: 50-YR CONDITION MODEL DATA

TABLE 3
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 10-YEAR WATER SURFACE ELEVATIONS, CHANNEL
VELOCITIES, AND FLOW AREAS

PLAN SHORT ID DESCRIPTION:

(FEMA): FEMA 2010 effective cross section conditions obtained from H.C.F.C.D.

(RevExisting): Revised cross section conditions matching existing natural topography.

(PropAlt): Proposed alternate cross section conditions.

HEC-RAS River: E100-00-00 Reach: E100-00-00_N034 Profile: 10PCT_10yr						
SEC. NO.	PLAN SHORT ID	W.S.E (ft)	W.S.E DIFF (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
62890	FEMA	69.8		6.64		1874.45
62890	RevExisting	70.13		6.46		1927.21
62890	PropAlt	70.04	-0.09	6.51	0.05	1912.85
61936	FEMA	69.52		6.62		1881.41
61936	RevExisting	69.87		6.43		1934.93
61936	PropAlt	69.78	-0.09	6.48	0.05	1920.4
60759	FEMA	69.66		3.04		8685.04
60759	RevExisting	70.01		2.94		9062.26
60759	PropAlt	69.92	-0.09	2.97	0.03	8955.28
59972	FEMA	68.86		6.01		2071.92
59972	RevExisting	69.27		5.82		2171.69
59972	PropAlt	69.16	-0.11	5.87	0.05	2139.22
58797	FEMA	69.1		1.46		9890.64
58797	RevExisting	69.5		1.42		10315.82
58797	PropAlt	69.39	-0.11	1.43	0.01	10183.33
57918	FEMA	68.65		4.81		2752.65
57918	RevExisting	69.08		4.65		2946.53
57918	PropAlt	68.96	-0.12	4.69	0.04	2890.95
57285.9*	RevExisting	68.56		4.34		3096.23
57285.9*	PropAlt	68.45	-0.11	4.39	0.05	3022.83
57195.6*	RevExisting	68.47		4.39		3210.56

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
57195.6*	PropAlt	68.35	-0.12	4.26	-0.13	3822.93
57105.3*	RevExisting	68.44		4.35		3350.11
57105.3*	PropAlt	68.33	-0.11	4.02	-0.33	4125.79
57015	FEMA	68.15		4.88		2893.74
57015	RevExisting	68.07		5.9		2469.75
57015	PropAlt	68.05	-0.02	5.5	-0.4	3526.06
56947.*	RevExisting	68.22		3.43		3841.51
56947.*	PropAlt	68.22	0	3.25	-0.18	5012.15
56879.*	RevExisting	68.22		3.09		4277.55
56879.*	PropAlt	68.22	0	3.04	-0.05	4968.35
56811	FEMA	68.16		3.37		3697.86
56811	RevExisting	68.16		3.37		3696.69
56811	PropAlt	68.16	0	3.37	0	3696.69
56718.5	Bridge					
56621	FEMA	67.87		3.48		3583.48
56621	RevExisting	67.87		3.48		3583.51
56621	PropAlt	67.87	0	3.48	0	3583.51
56486	FEMA	67.59		4.79		2602.88
56486	RevExisting	67.59		4.79		2602.91
56486	PropAlt	67.59	0	4.79	0	2602.91
56239	FEMA	67.47		4.98		2525.14
56239	RevExisting	67.47		4.98		2525.18
56239	PropAlt	67.47	0	4.98	0	2525.18
56231	FEMA	67.49		4.82		2676.9
56231	RevExisting	67.49		4.82		2676.95
56231	PropAlt	67.49	0	4.82	0	2676.95
55757	FEMA	67.05		6.23		2715.94
55757	RevExisting	67.05		6.23		2715.98
55757	PropAlt	67.05	0	6.23	0	2715.98

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
55190	FEMA	66.76		6.28		2620.8
55190	RevExisting	66.76		6.28		2620.83
55190	PropAlt	66.76	0	6.28	0	2620.83
55112	FEMA	66.71		6.33		2594.74
55112	RevExisting	66.71		6.33		2594.76
55112	PropAlt	66.71	0	6.33	0	2594.76
55086		Bridge				
55059	FEMA	66.18		6.38		2574.96
55059	RevExisting	66.18		6.38		2574.98
55059	PropAlt	66.18	0	6.38	0	2574.98
54895	FEMA	66.13		6.07		2705.96
54895	RevExisting	66.13		6.07		2705.99
54895	PropAlt	66.13	0	6.07	0	2705.99
54667	FEMA	66.01		6.19		2658.88
54667	RevExisting	66.01		6.19		2658.91
54667	PropAlt	66.01	0	6.19	0	2658.91
54606		Bridge				
54545	FEMA	65.89		5.94		2765.77
54545	RevExisting	65.89		5.94		2765.8
54545	PropAlt	65.89	0	5.94	0	2765.8
54398	FEMA	65.88		5.47		3141.64
54398	RevExisting	65.88		5.47		3141.7
54398	PropAlt	65.88	0	5.47	0	3141.7
54053	FEMA	65.65		5.97		3258.05
54053	RevExisting	65.65		5.97		3258.14
54053	PropAlt	65.65	0	5.97	0	3258.14
53766	FEMA	65.53		5.91		2900.72
53766	RevExisting	65.53		5.91		2900.77
53766	PropAlt	65.53	0	5.91	0	2900.77

SEC.NO.	PLAN ID	W.S.E (ft)	W.S.E DIFF. (ft)	VELOCITY (ft/s)	VELOCITY DIFF. (ft/s)	FLOW AREA (sq ft)
53664	FEMA	65.48		5.92		2922.98
53664	RevExisting	65.48		5.92		2923.04
53664	PropAlt	65.48	0	5.92	0	2923.04
53653.5		Bridge				
53642	FEMA	65.38		5.96		2885.96
53642	RevExisting	65.38		5.96		2886.02
53642	PropAlt	65.38	0	5.96	0	2886.02
53459	FEMA	65.25		6.13		2678.32
53459	RevExisting	65.25		6.13		2678.35
53459	PropAlt	65.25	0	6.13	0	2678.35
53371		Bridge				
53282	FEMA	65.2		5.98		2748.43
53282	RevExisting	65.2		5.98		2748.46
53282	PropAlt	65.2	0	5.98	0	2748.46

TABLE 3: 10-YR CONDITION MODEL DATA

FIGURE 1
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 100-YEAR X-Y-Z PERSPECTIVE PLOTS

In this model the revised existing and proposed geometric outputs comparison is displayed in an X-Y-Z Perspective Plot. Here the resulting conditions for the 100-year event are compared in a 3-dimensional plot of multiple cross sections within white oak bayou. The comparison results in no difference. This assures that the proposed conditions will not increase the width of the channel or water surface elevations in the 100-year event flow. The proposed HEC-RAS model has been submitted on a compact disc (CD) with this report.

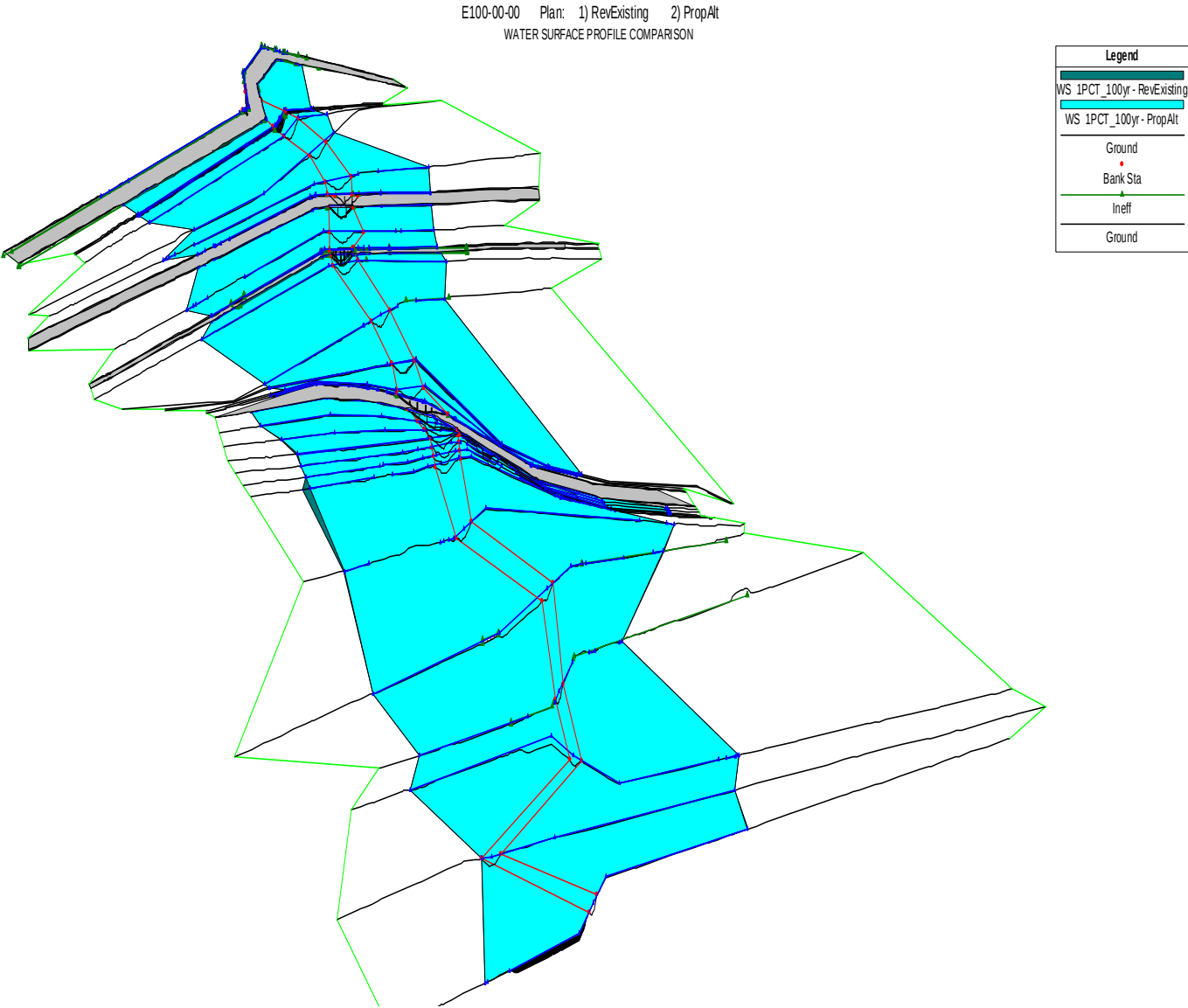


FIGURE 1: 100-YEAR X-Y-Z PERSPECTIVE REACH COMPARISON

FIGURE 2
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 100-YEAR ELEVATIONS AT CROSS SECTION B

In this model a two-dimensional Water Surface Elevations (ft) vs. Station (ft) is plotted for the proposed geometry at CROSS SECTION B. In addition, the resulting 100-year event water surface elevations for both revised existing and proposed conditions are plotted and compared. It can be observed that there is no difference between them. This indicates that there is no adverse impact to conveyance of E100-00-00 White Oak Bayou Watershed. CROSS SECTIONS (A: G) show the same results. The proposed HEC-RAS models have been submitted on a compact disc (CD) with this report.

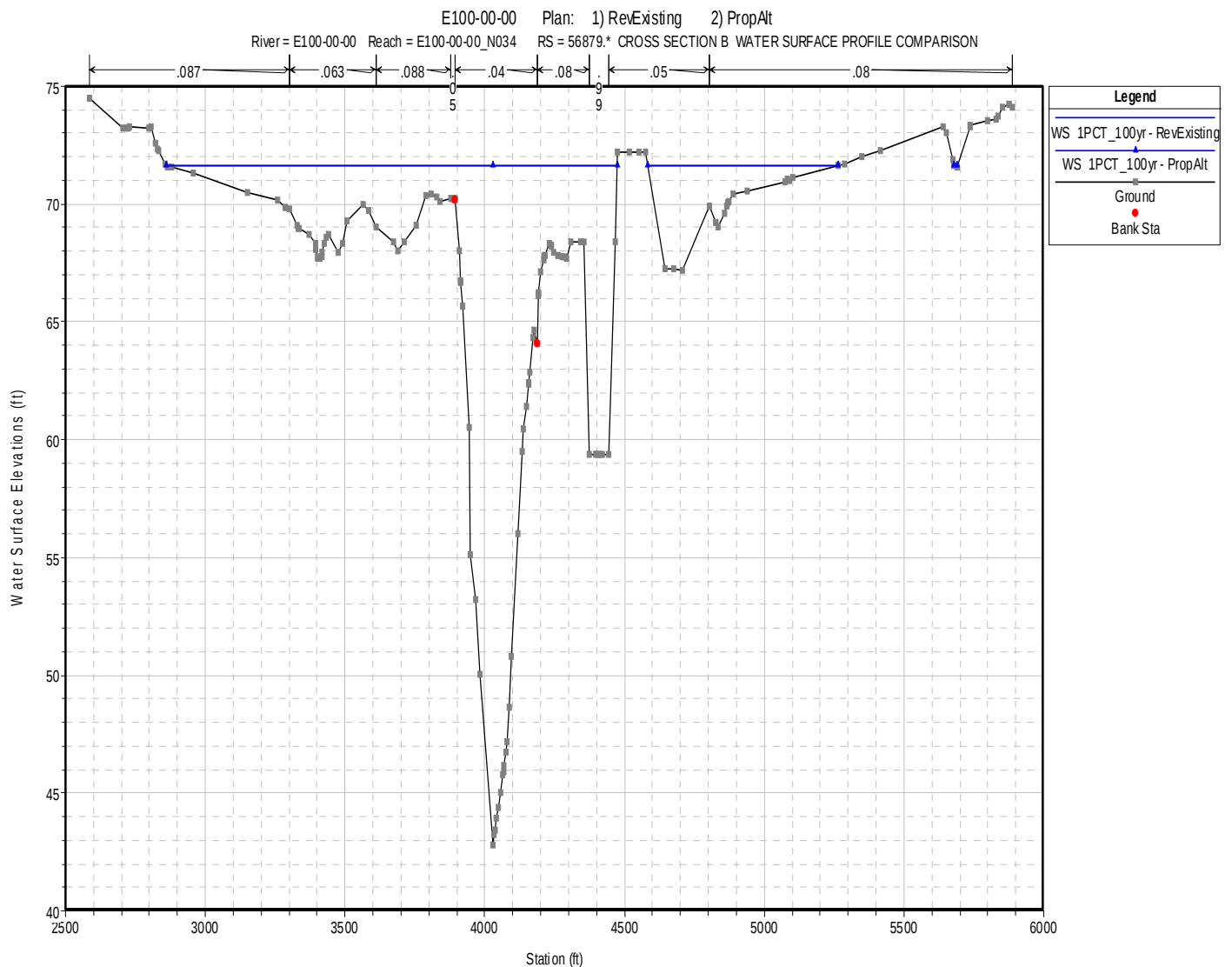


FIGURE 2: 100-YEAR ELEVATION COMPARISON AT CROSS SECTION B

FIGURE 3
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 100-YEAR ELEVATIONS AT CROSS SECTION C

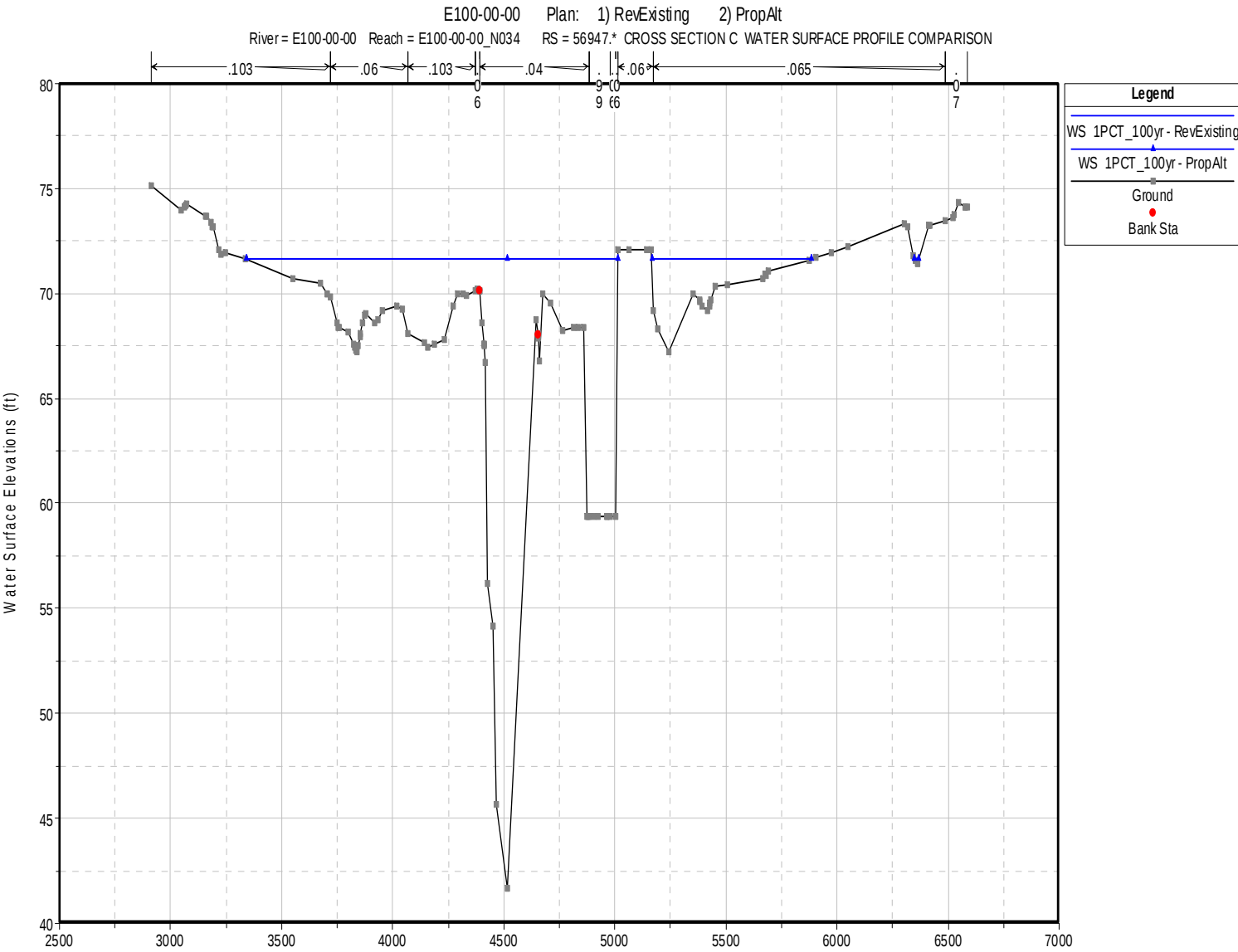


FIGURE 3: 100-YEAR ELEVATION COMPARISON AT CROSS SECTION C

FIGURE 4
WHITE OAK BAYOU WATERSHED E100-00-00
CONVEYANCE ANALYSES OF PROPOSED DEVELOPMENT
COMPARISON OF 100-YEAR ELEVATIONS AT CROSS SECTION D

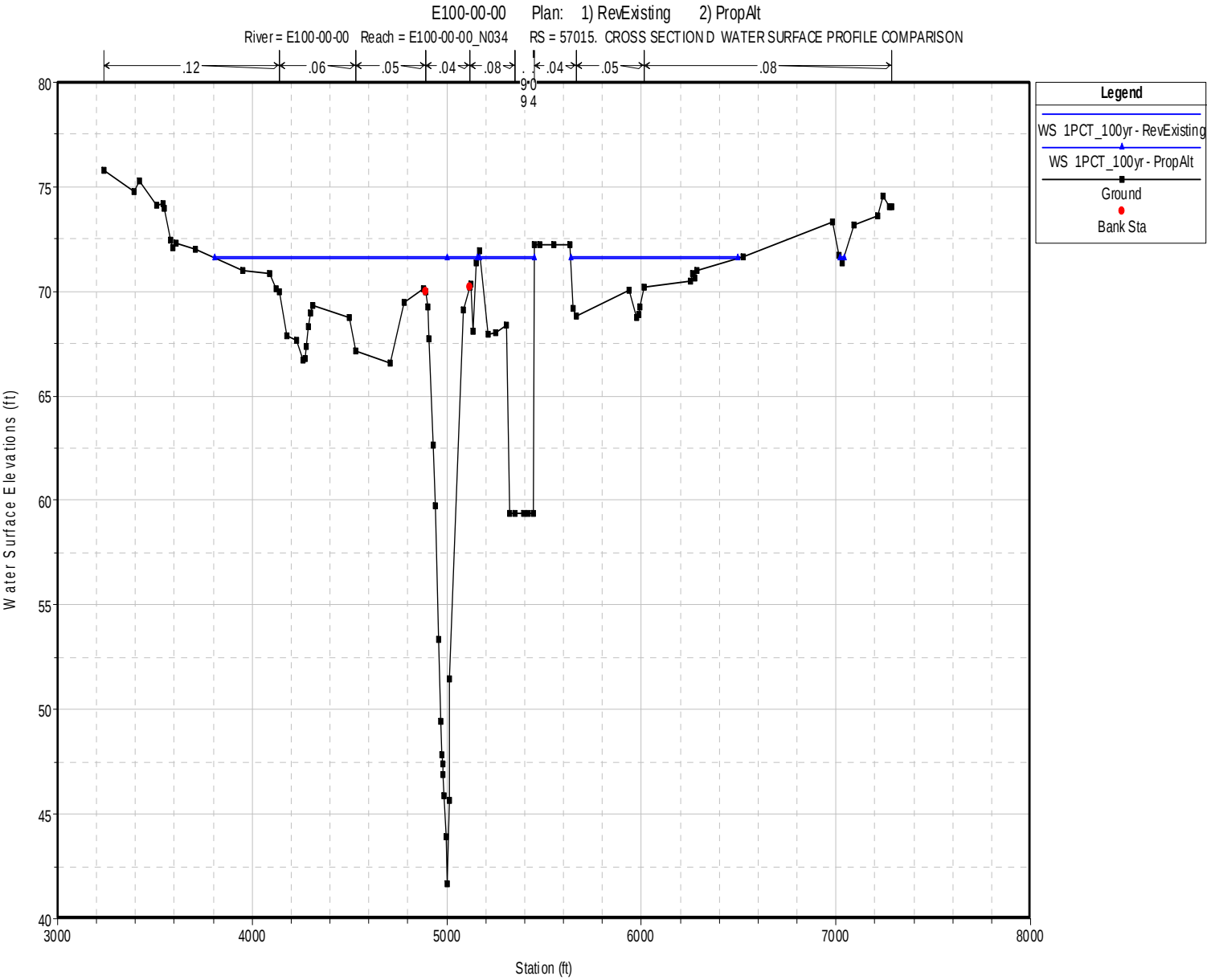


FIGURE 2: 100-YEAR ELEVATION COMPARISON AT CROSS SECTION D

WHITE OAK BAYOU WATERSHED E100-00-00 SITE PHOTOGRAPHS



SIDE VIEW LOOKING WEST TOWARDS EXISTING SITE ALONG E100-00-00



LOOKING DOWNSTREAM E100-00-00 FROM W TIDWELL BRIDGE

EXHIBIT A
EXISTING SITE
PHOTOGRAPHS

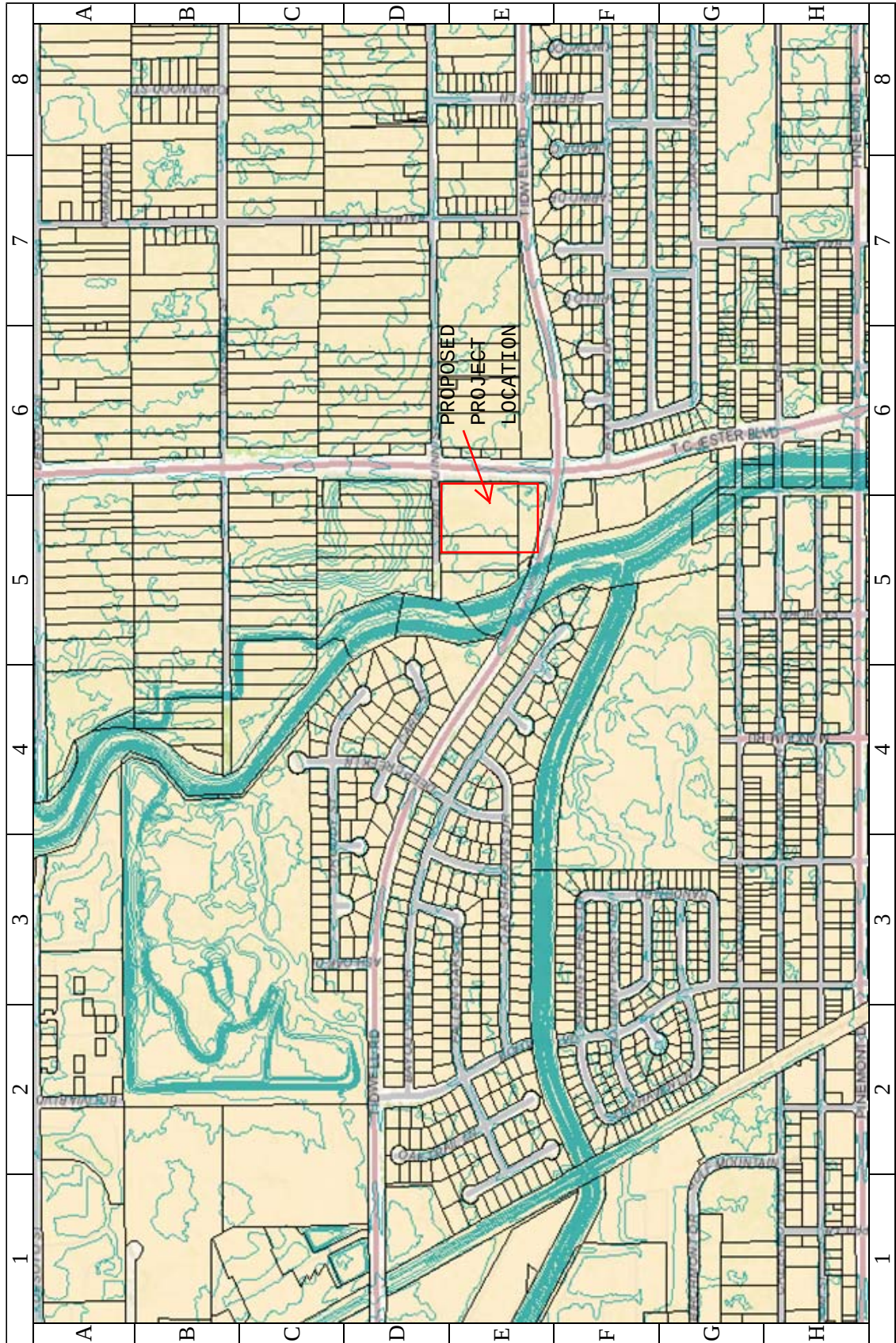


LOOKING DOWNSTREAM ALONG E100-00-00 AT RIGHT OVERBANK



SIDE VIEW LOOKING EAST TOWARDS EXISTING SITE ALONG E100-00-00

EXHIBIT A
EXISTING SITE
PHOTOGRAPHS



CITY OF HOUSTON
Department of Public Works and Engineering
Geographic Information & Management System (GIMS)

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THE CITY DOES NOT WARRANT ITS ACCURACY OR COMPLETENESS.
FIELD VERIFICATIONS SHOULD BE DONE AS NECESSARY.



1 inch = 783 feet

EXHIBIT B
VICINITY MAP

[illegible]

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

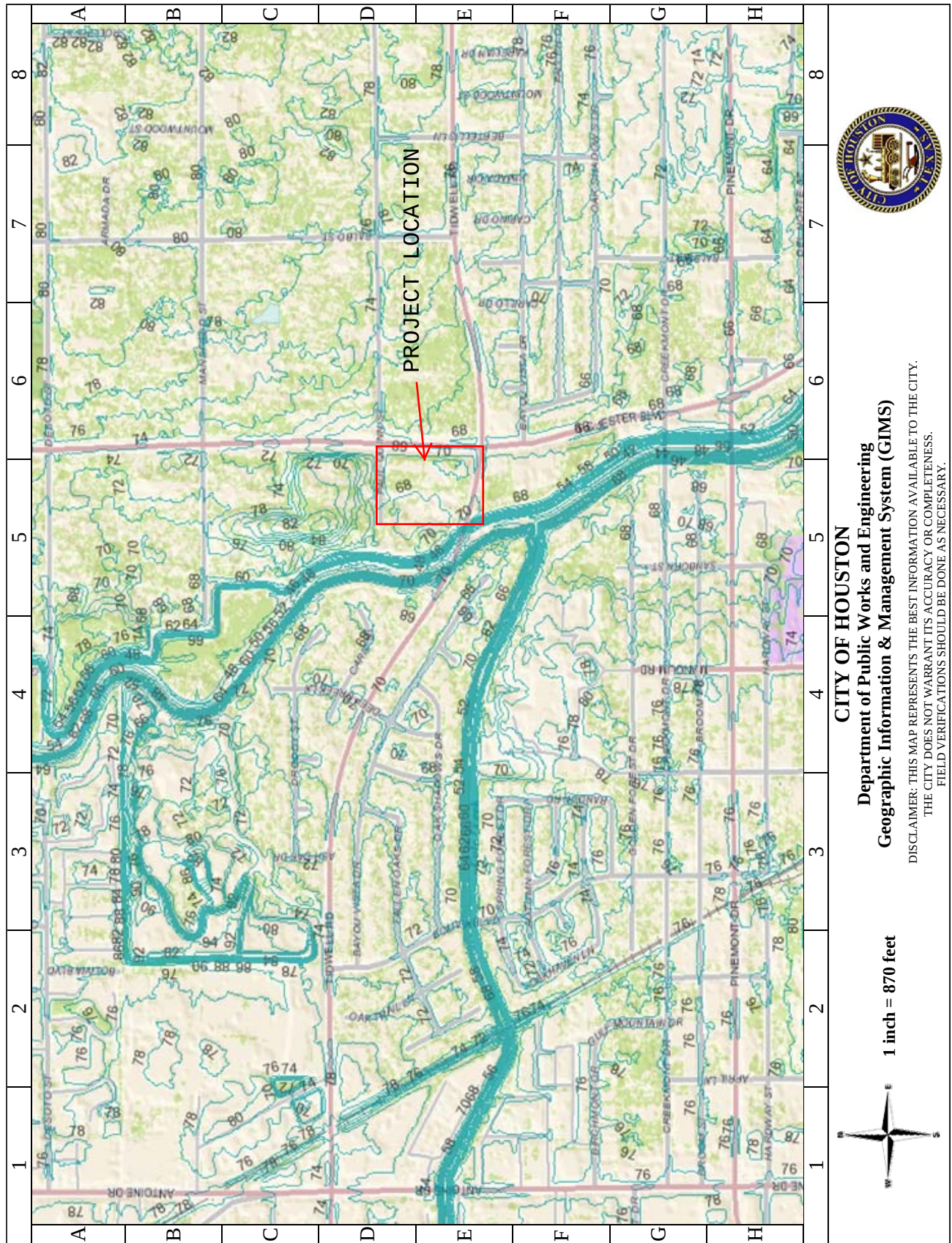


EXHIBIT E
GIMS 2-FOOT CONTOUR MAP



CITY OF HOUSTON
Department of Public Works and Engineering
Geographic Information & Management System (GIMS)

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1 inch = 870 feet