Texas Water Development Board

VOLUME 2

2023 REGIONAL FLOOD PLAN
REGION 6
SAN JACINTO

July 2023

PREPARED FOR THE **SAN JACINTO REGIONAL FLOOD PLANNING GROUP**

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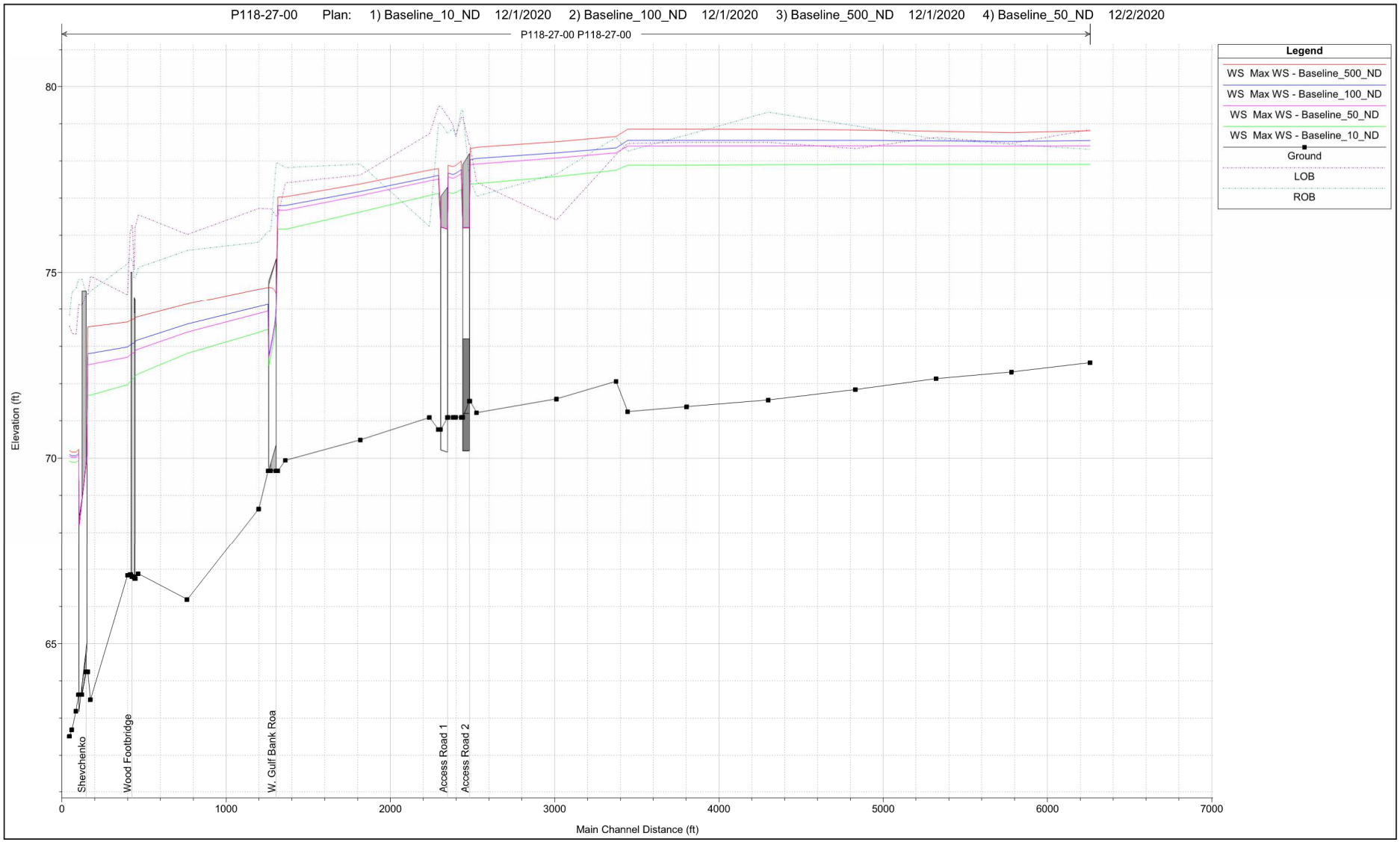
Baseline Conditions Water Surface Profiles



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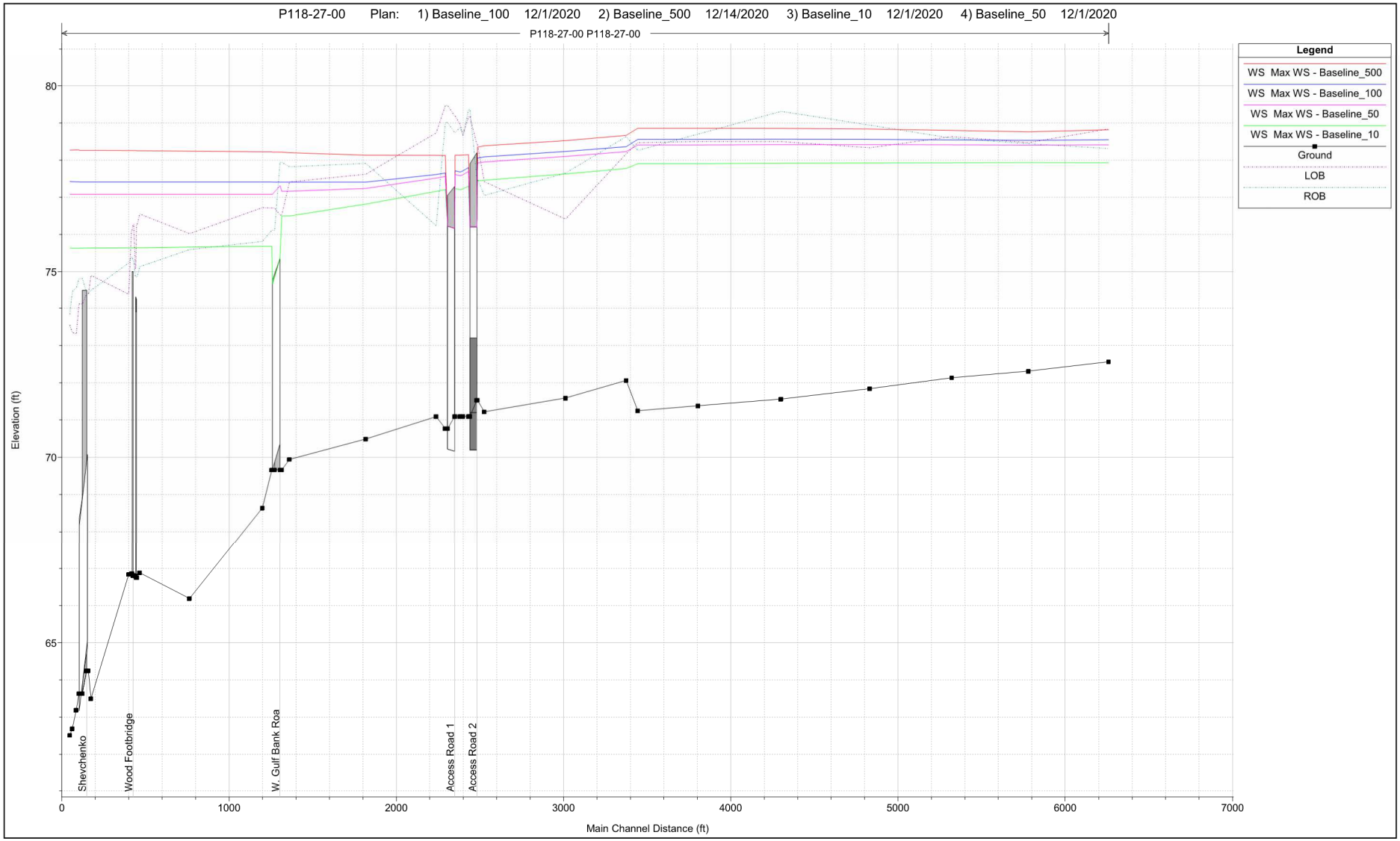

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Appendix B

Historical Losses Heat Maps

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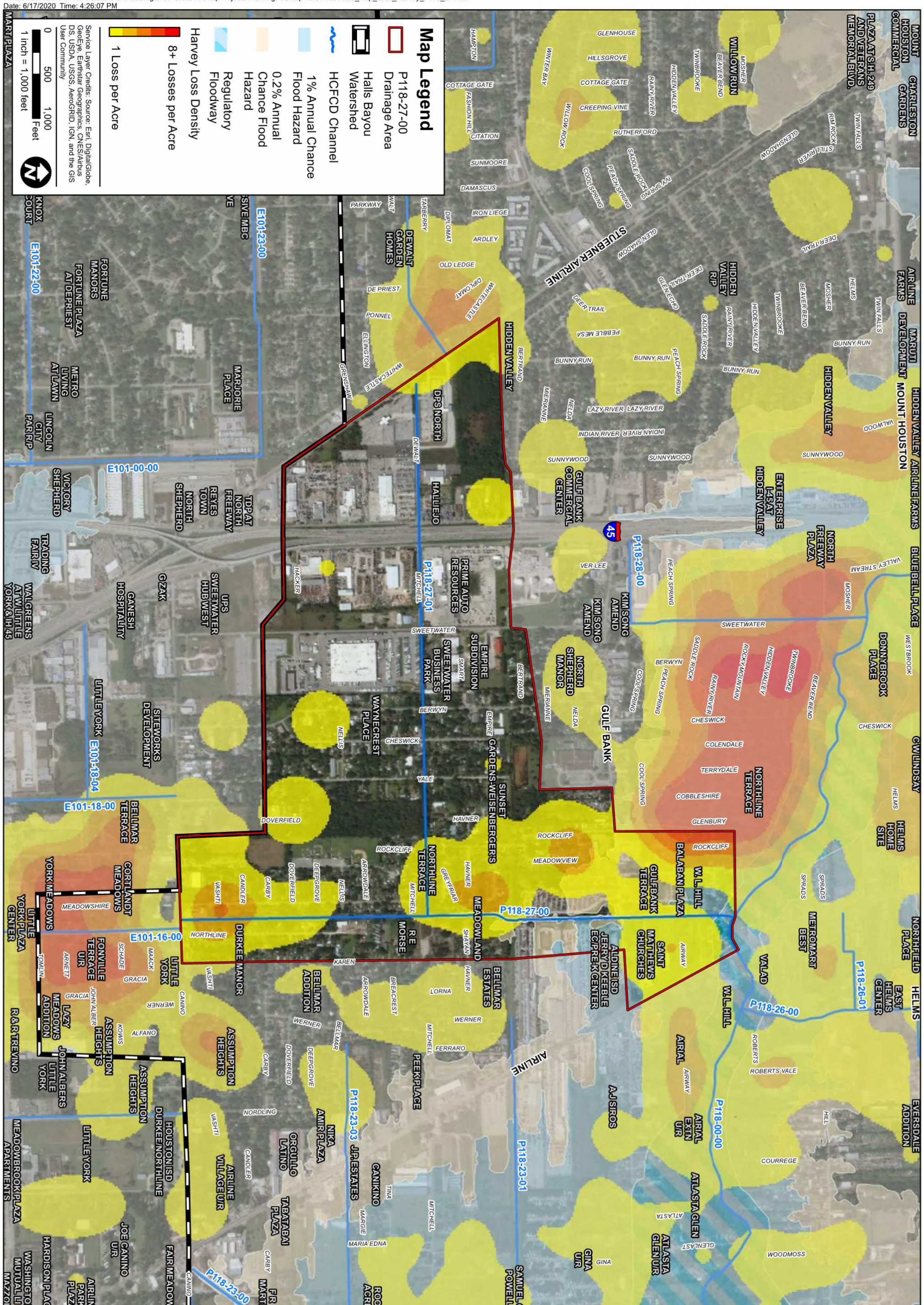

HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
Houston, Texas 77092

DATE: MAY 2020
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE Firm No. 2614
2925 Briarpark Drive • Houston, TX 77042-3720
T 713.266.6900 • F 713.266.2089
www.lan-inc.com • info@lan-inc.com

PREPARED: PSK
CHECKED: CEE
APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

HARVEY LOSS DATA

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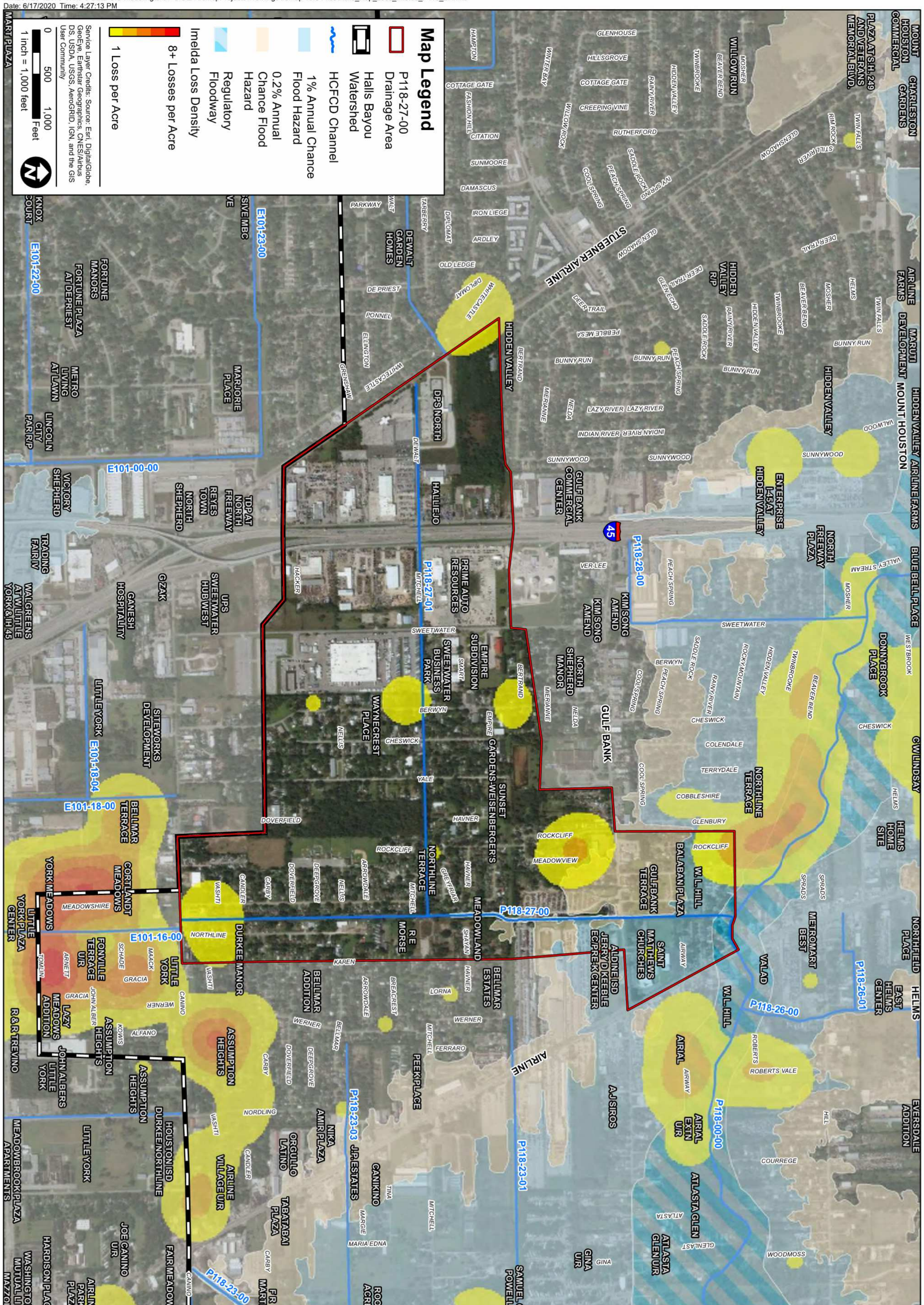

HARRIS COUNTY FLOOD CONTROL DISTRICT 9900 Northwest Freeway Houston, Texas 77092 DATE: MAY 2020 SCALE: AS NOTED	Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY TBPE Firm No. 2614 2925 Briarpark Drive • Houston, TX 77042-3720 T 713.266.6900 • F 713.266.2089 www.lan-inc.com • info@lan-inc.com	PREPARED: PSK CHECKED: CEE APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

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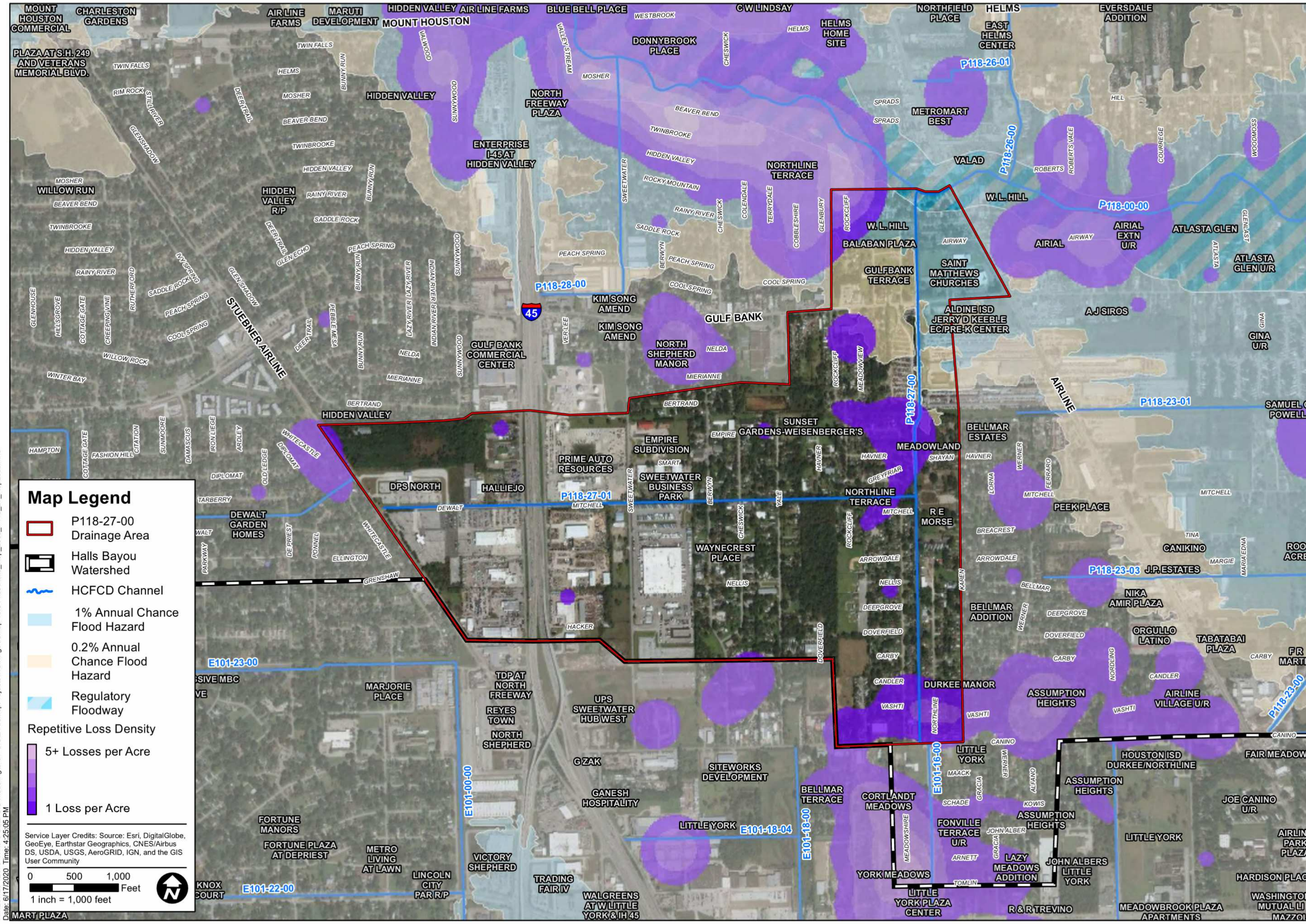

PREPARED:	PSK
CHECKED:	CEE
APPROVED:	CEE

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HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
Houston, Texas 77092

DATE: MAY 2020
SCALE: AS NOTED

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

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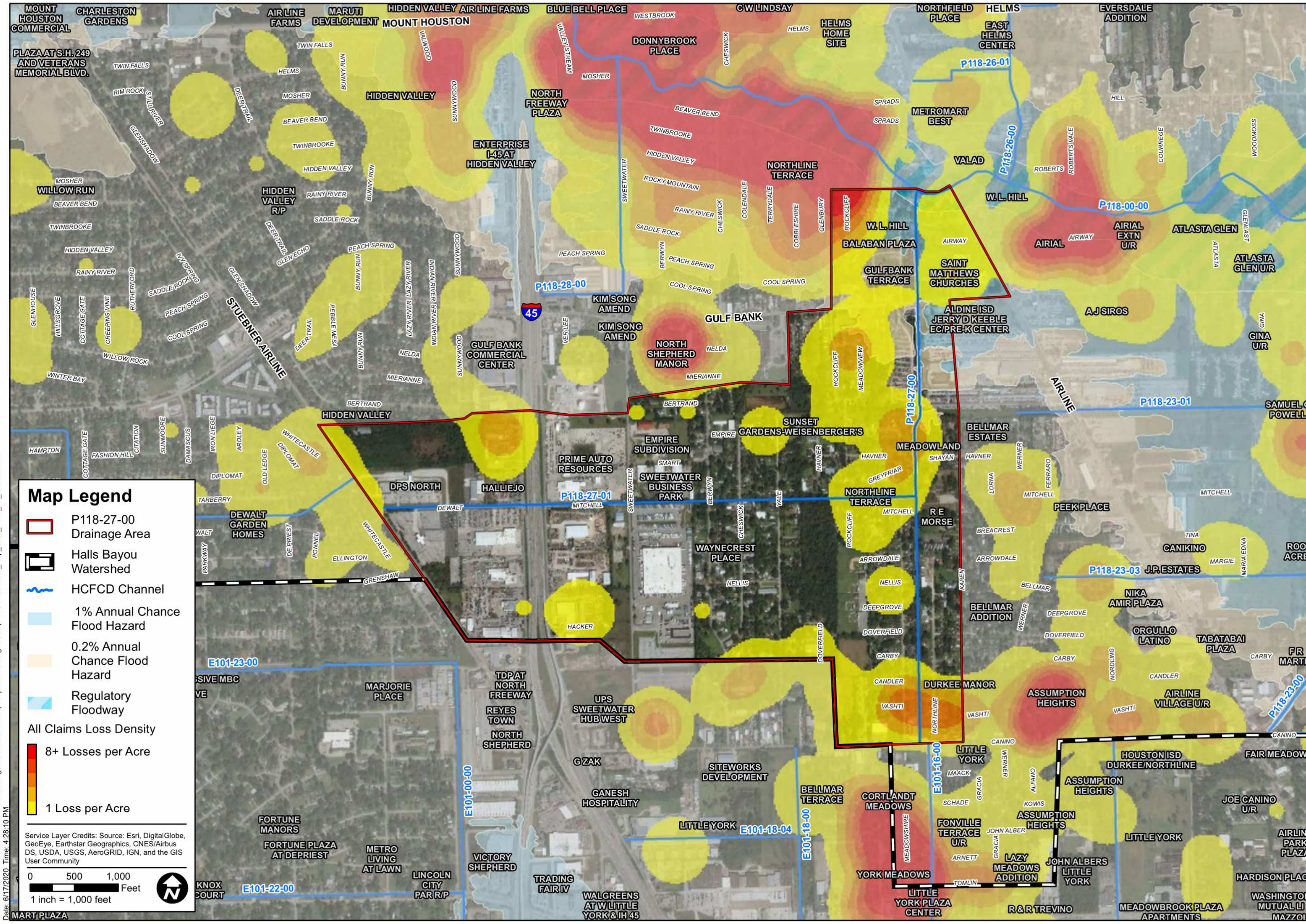

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

ALL CLAIMS LOSS DATA

PREPARED: PSK
CHECKED: CEE
APPROVED: CEE

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HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
Houston, Texas 77092

DATE: MAY 2020
SCALE: AS NOTED

Appendix C

Site Visit Photo Documentation

Appendix D

Summary Table of Alternatives

Appendix D

Summary Table of Alternatives

P118-27-00 - Detailed Alternatives Analysis

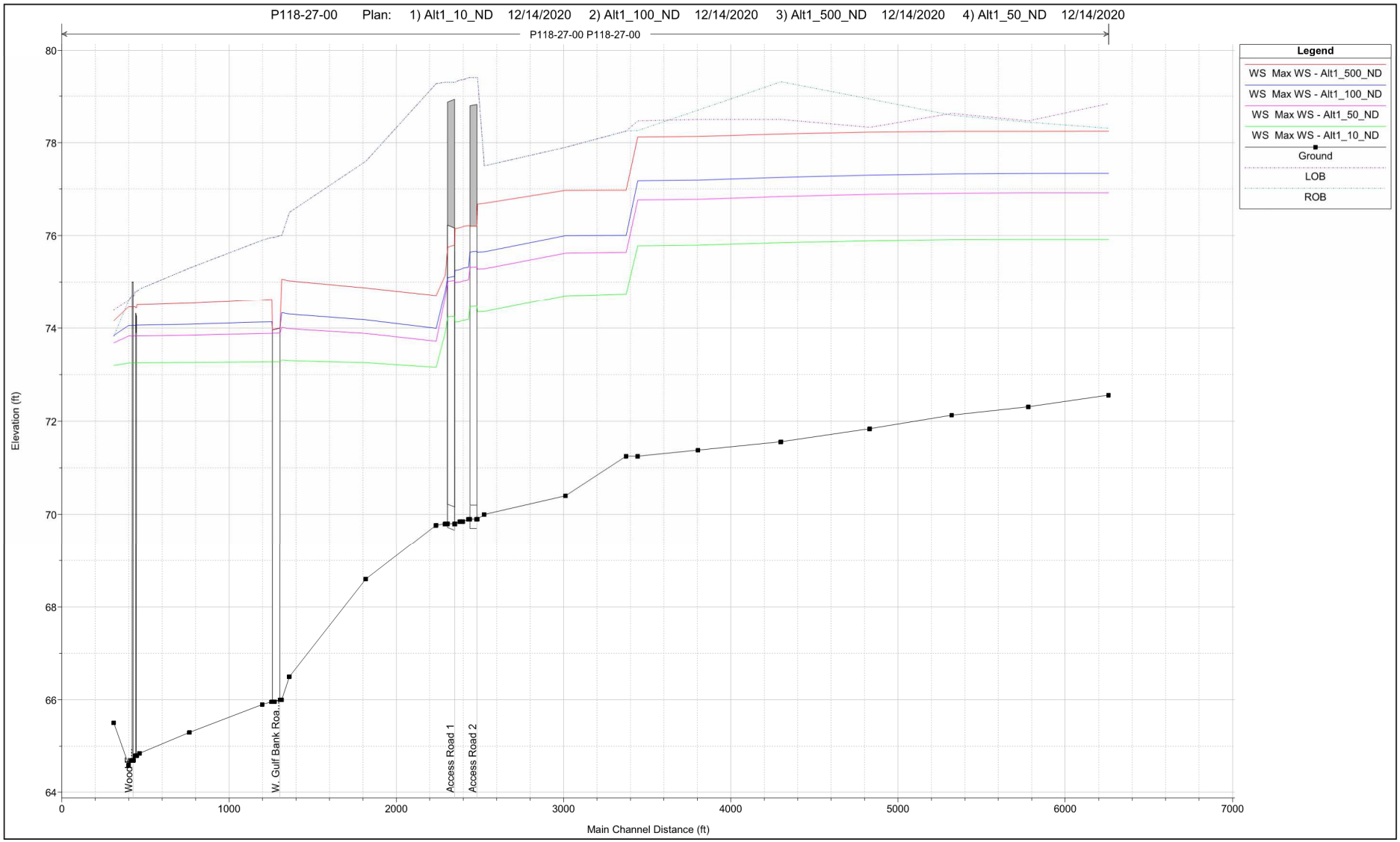
Alternatives Description

Alternative 1: Concrete-lined Channel Improvements (1) + Shevchenko Basin (3) + Gulf Bank Basin (4)
Alternative 2: Concrete-lined Channel Improvements (1) + Shevchenko Basin (3)
Alternative 3: Grass-lined Channel Improvements (2) + Karen Basin (5) + Dow Basin (6)

	Channel Improvements			Detention Basin (Feature #)								Bridge/Culvert Updates
Alternatives	Proposed Channel Bottom Width	Proposed Channel Depth (avg)	Location	Depth Shevchenko Basin (3)	Volume Shevchenko Basin (3)	Depth Gulf Bank Basin (4)	Volume Gulf Bank Basin (4)	Depth Karen Basin (5)	Volume Karen Basin (5)	Depth Dow Basin (6)	Volume Dow Basin (6)	Gulf Bank Rd
	(ft)	(ft)	P118-08-00	(ft)	(acre-feet)	(ft)	(acre-feet)	(ft)	(acre-feet)	(ft)	(acre-feet)	Dimension
Alternative 1	6	7-10	RS 3374 to RS 399	11	85	8	65					2 - 10' x 8' RCBs
Alternative 2	6	7-10	RS 3374 to RS 399	11	85							2 - 10' x 8' RCBs
Alternative 3	6	8	RS 3374 to RS 1360					7	20	6	40	2 - 10' x 8' RCBs

Appendix E

Water Surface Elevation Profiles



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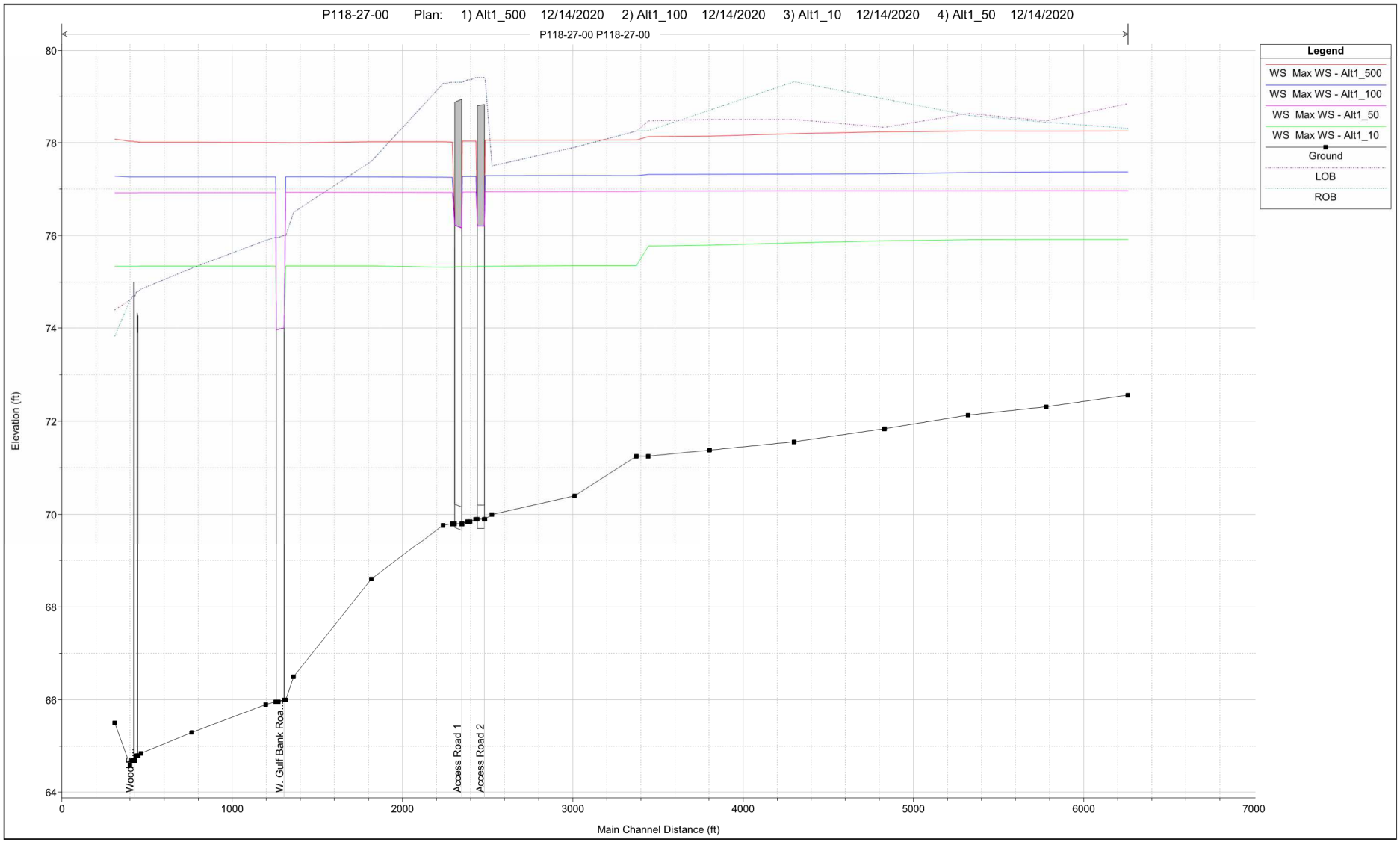

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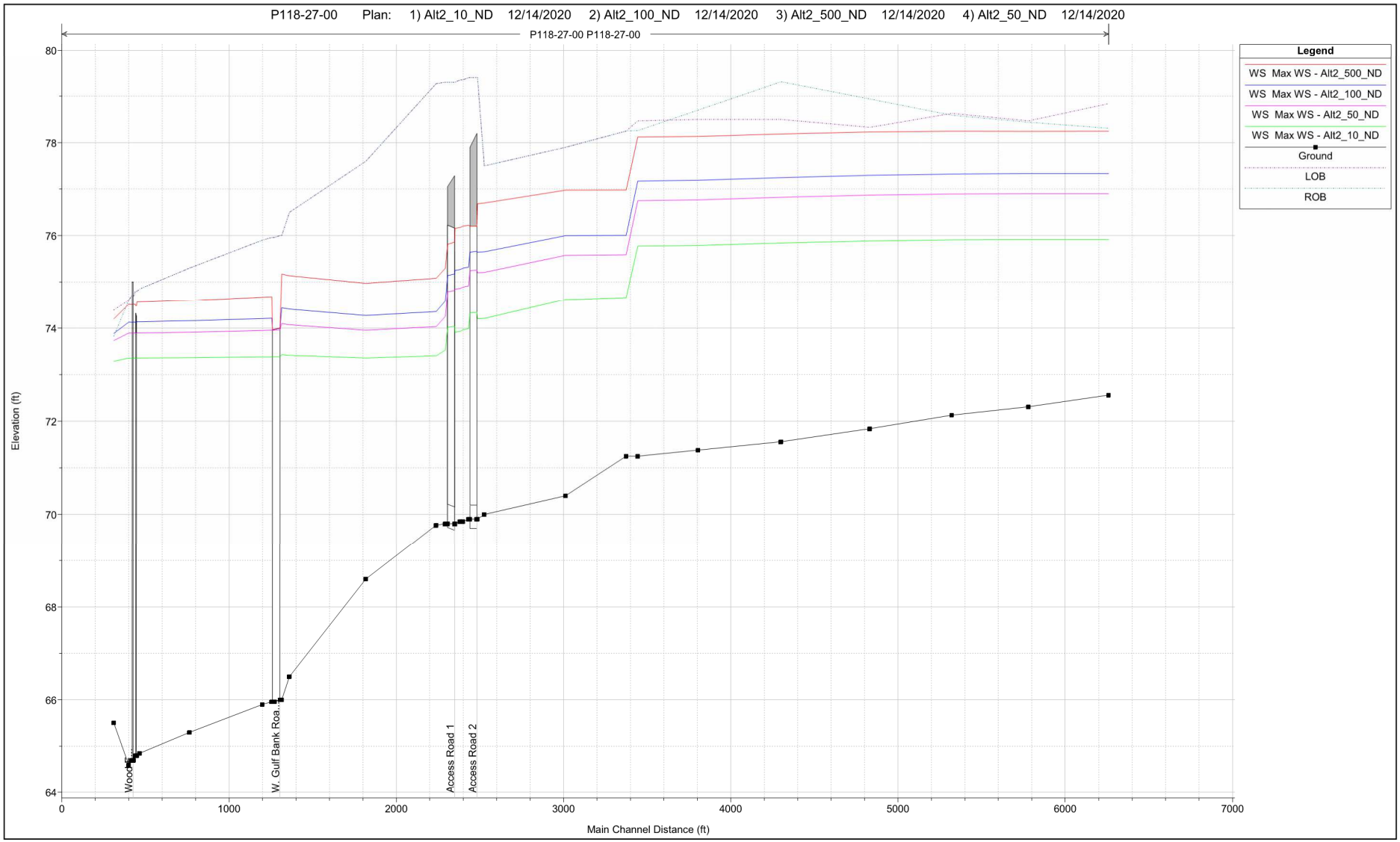

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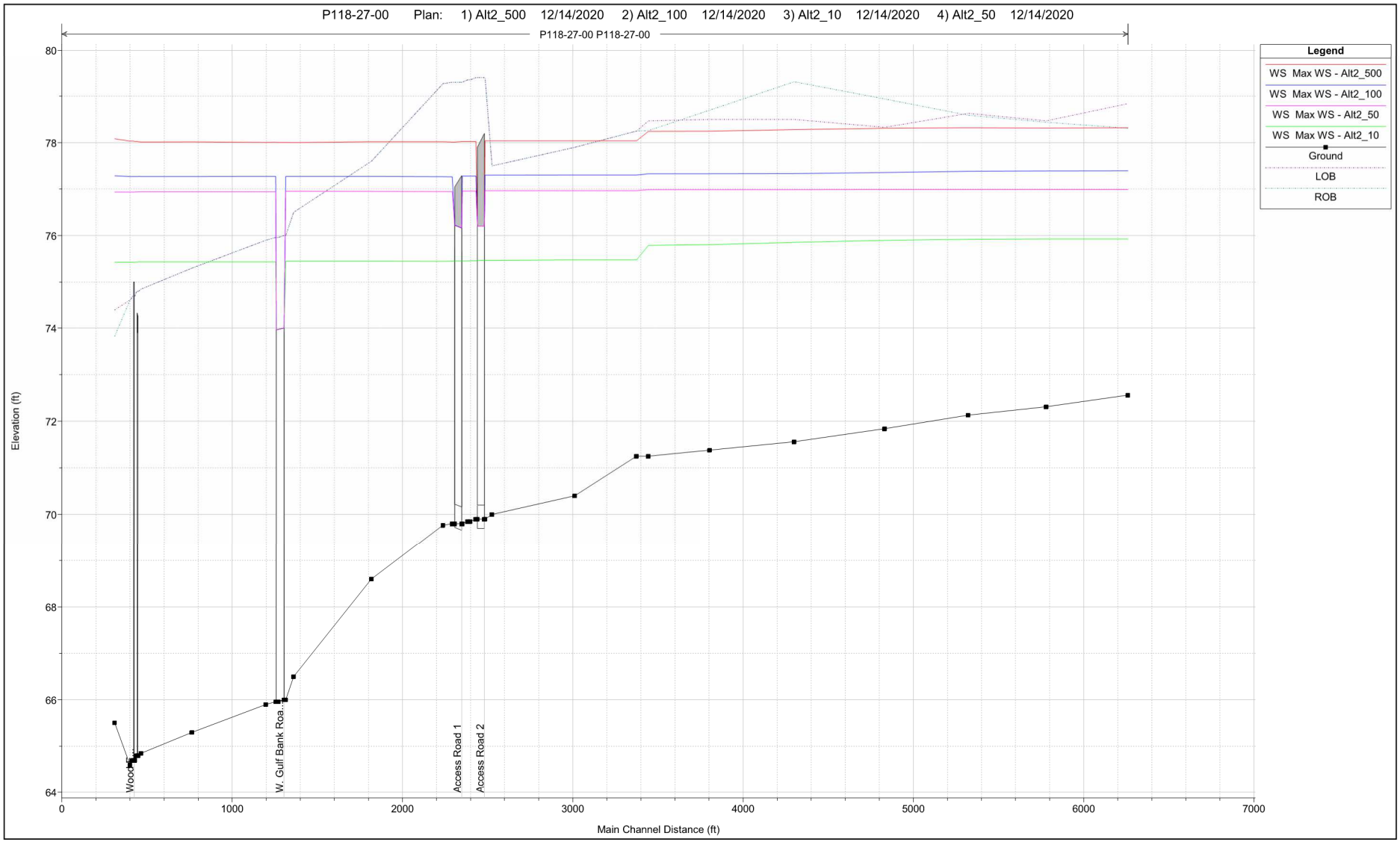

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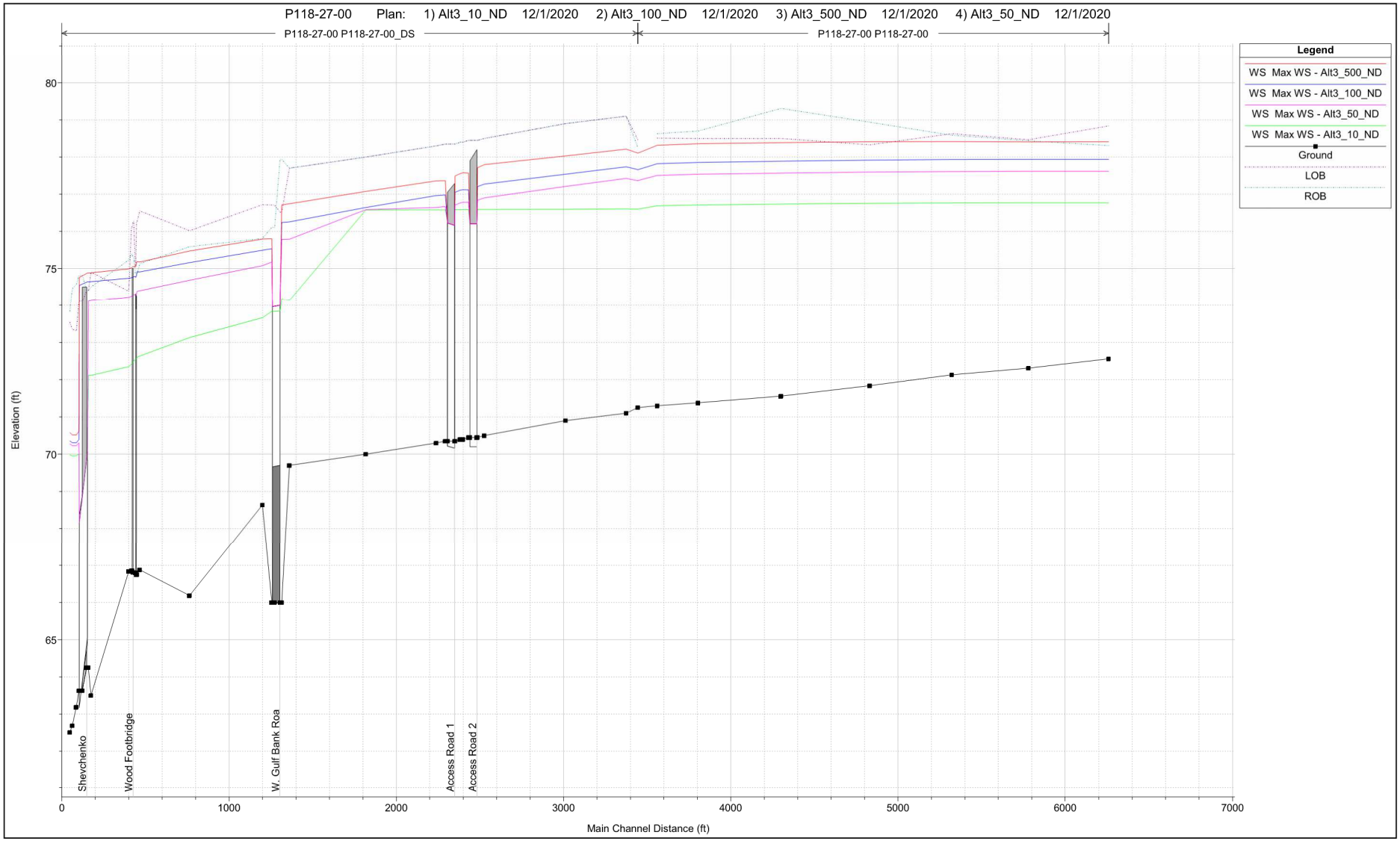

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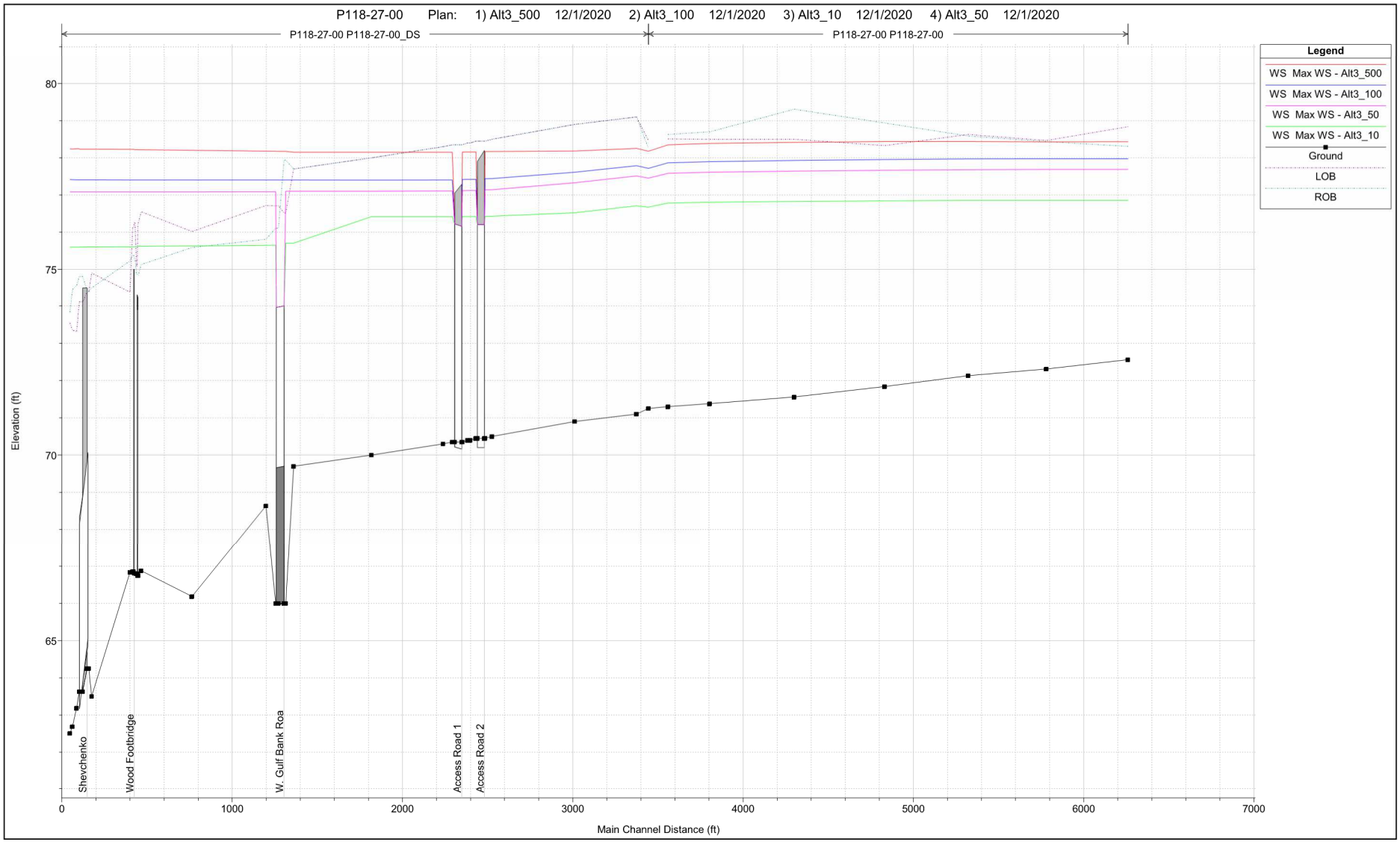

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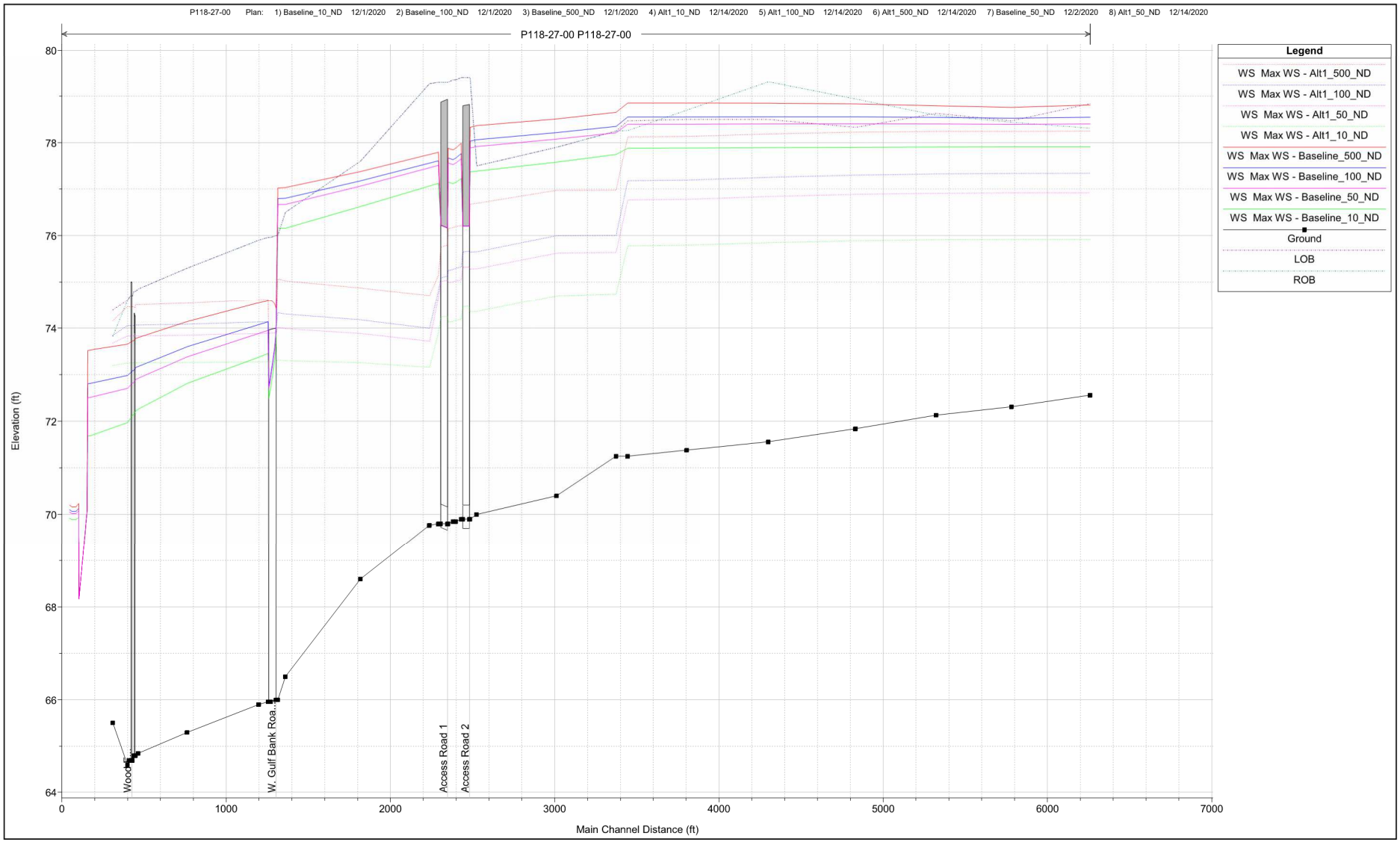
Appendix F

Baseline Conditions vs. Alternatives Water Surface Profiles



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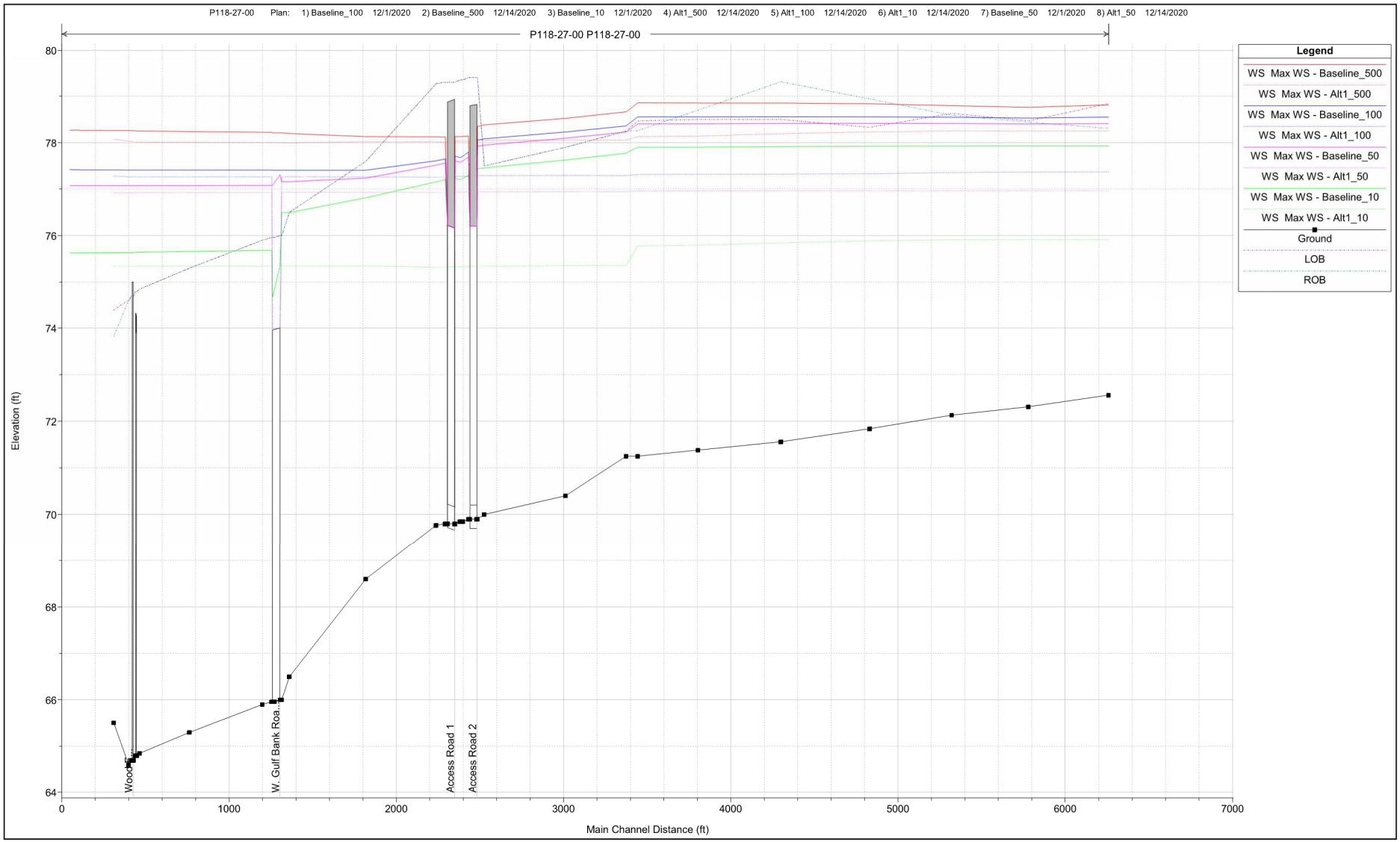

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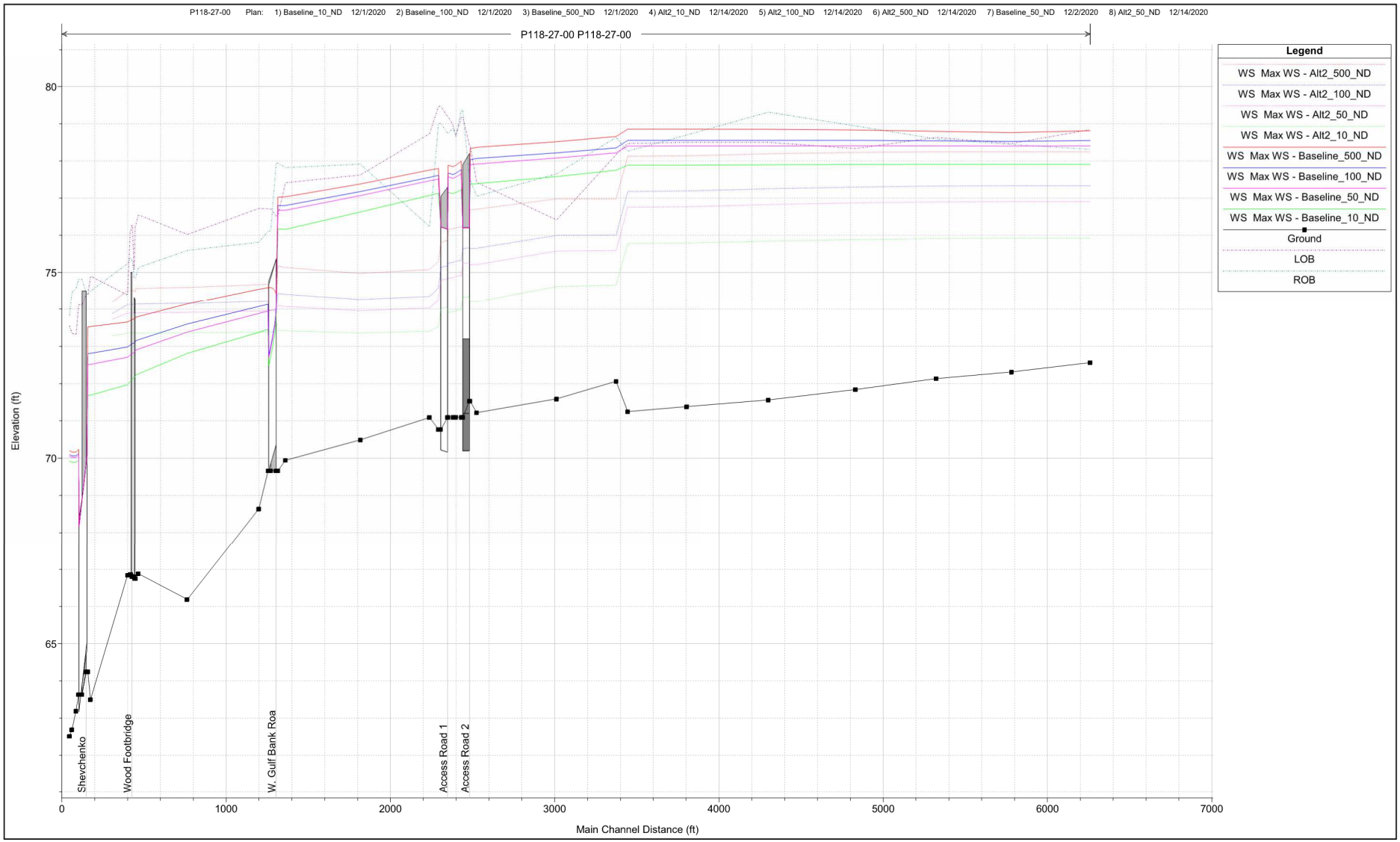

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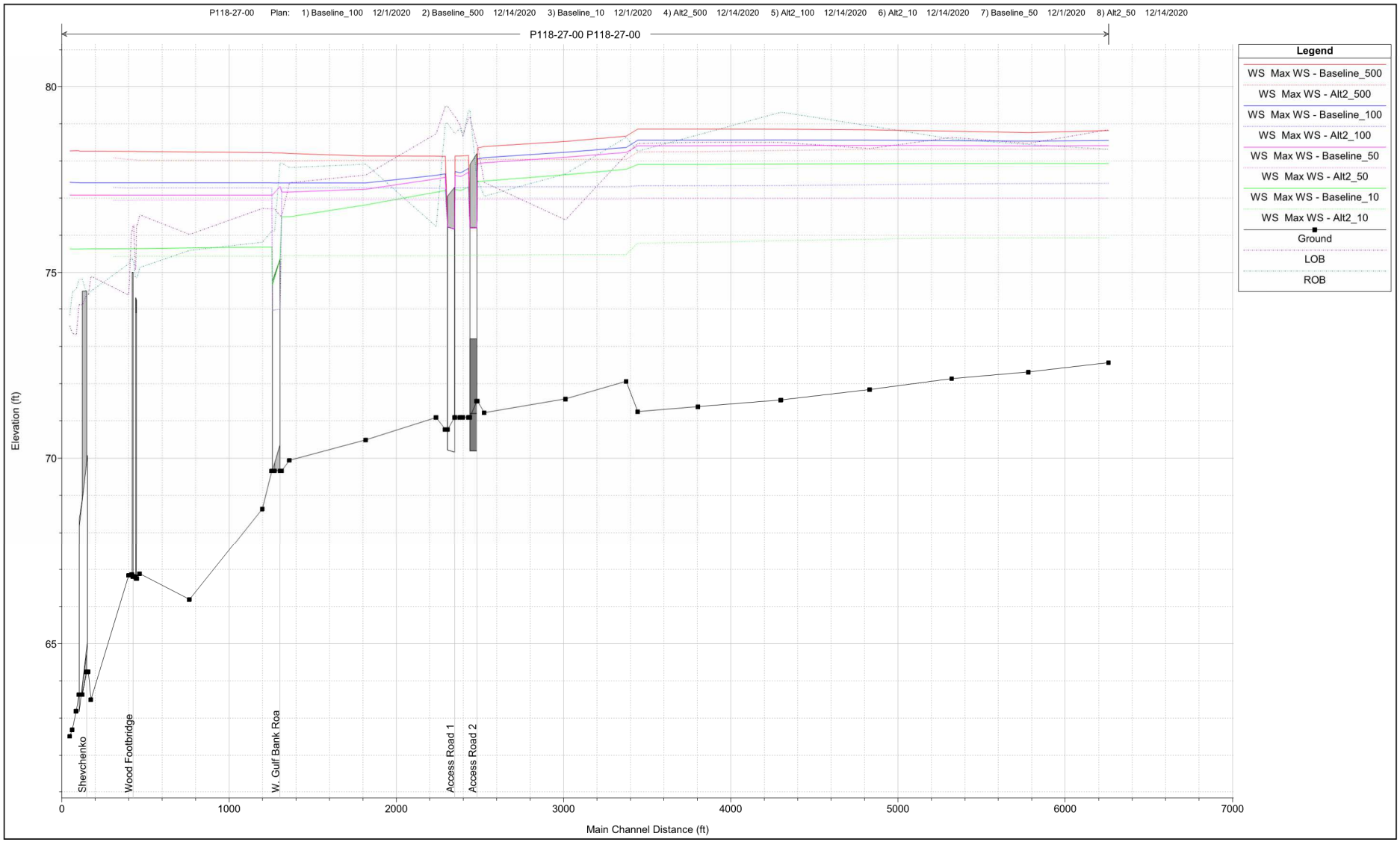

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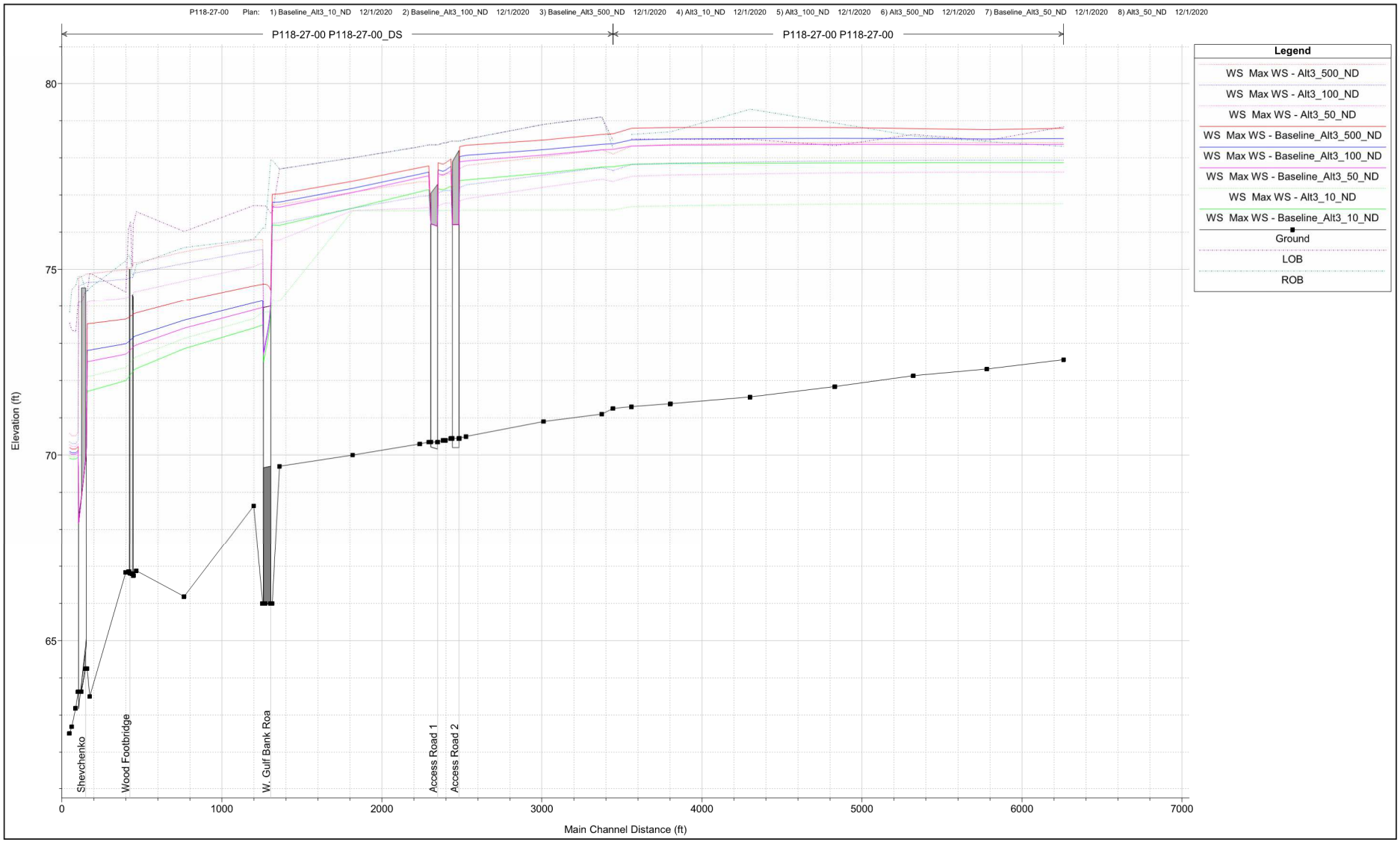

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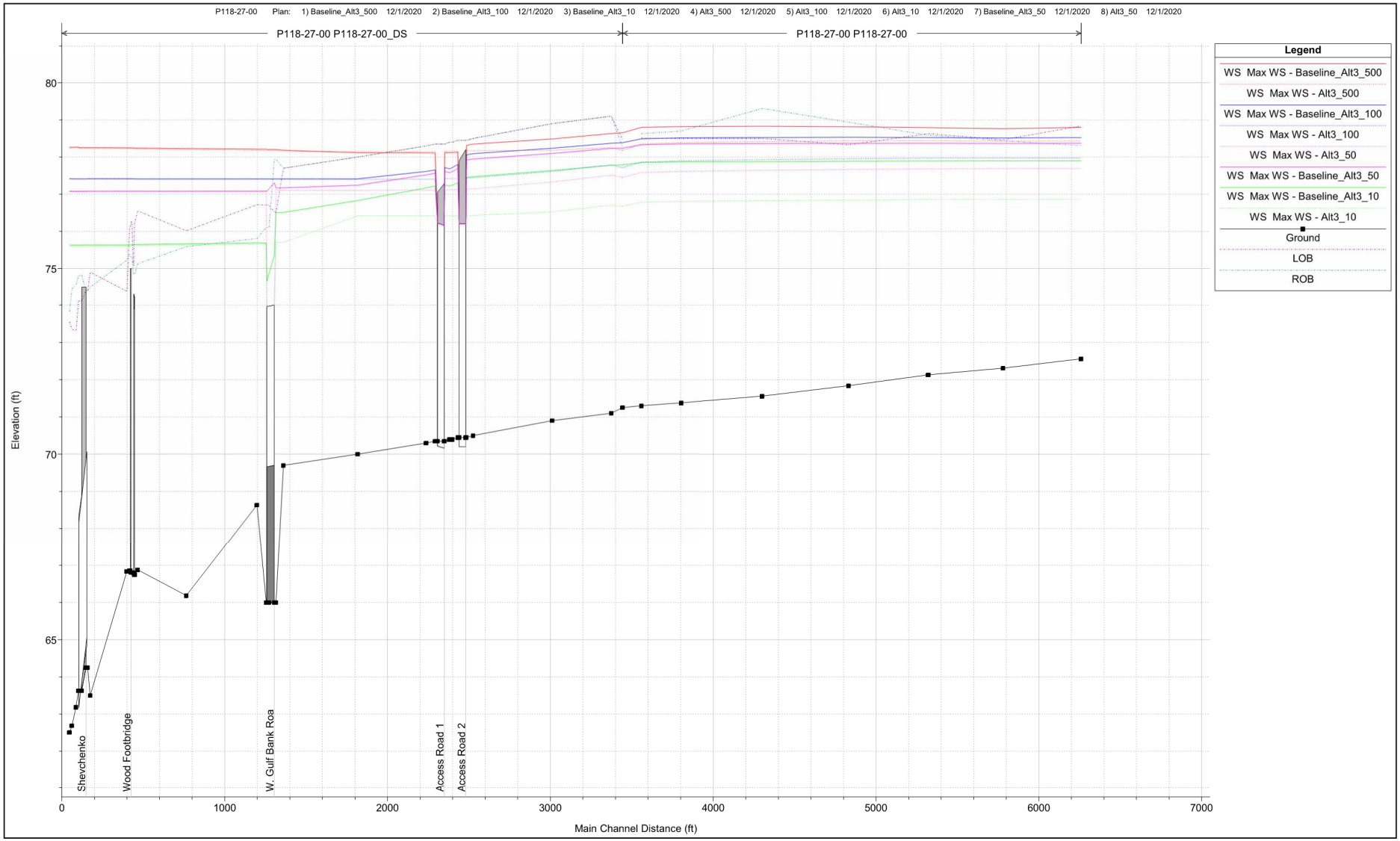

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Appendix G

Proposed ROW for Recommended Alternative

Shevchenko Basin - ROW acquisition costs

Valuation Data based on HCAD Number http://hcad.org/ (Real Property Records)

HCAD #	Parcel Area	Parcel Area within Basin	Parcel Area Used	Property Type	Valuations (as of January 2020)	Multiplier	Full Acquisition Cost	Partial Acquistition Cost	Full or Partial	Relocation	Total ROW Acquisition Cost	Notes
(-)	(ac)	(ac)	(%)	(-)	($)	(-)	($)	($)	-		-	-
0552280000057	11.56	11.56	100%	Commercial (MH)	$ 1,160,416.00	3	$ 3,481,248.00	$ 3,481,248.00	Full	$ 2,925,000.00	$ 6,406,248.00	Relocation cost for appx 117 mobile homes x $25k = $2,925,000
0552280000056	0.57	0.57	100%	Commercial (MH)	$ 220,025.00	3	$ 660,075.00	$ 660,075.00	Full	$ 150,000.00	$ 810,075.00	Relocation of 6 mobile homes estimated $150,000
1058070000001	0.54	0.54	100%	Vacant Commercial	$ 44,448.00	3	$ 133,344.00	$ 133,344.00	Full		$ 133,344.00	This tract may function in conjunction with the apartment complexes to the east (same owner). If so, acquisition of this parcel may require relocation of unknown structure seen in aerial.
1058080000001	1.02	1.02	100%	Vacant Commercial	$ 88,262.00	3	$ 264,786.00	$ 264,786.00	Full		$ 264,786.00	
	13.69	13.69			$ 1,513,151.00		$ 4,539,453.00	$ 4,539,453.00		**$ 3,075,000.00**	**$ 7,614,453.00**	

Concrete-lined Channel - ROW acquisition costs

Valuation Data based on HCAD Number http://hcad.org/ (Real Property Records)

HCAD #	Parcel Area	Parcel Area within ROW	Parcel Area Used	Property Type	Valuations (as of January 2020)	Multiplier	Full Acquisition Cost	Partial Acquistition Cost	Full or Partial	Relocation	Total ROW Acquisition Cost	Notes
(-)	(ac)	(ac)	(%)	(-)	($)	(-)	($)	($)	-		-	-
0552280000057	11.56	0.08	1%	Commercial (MH)	$ 1,076,427.00	3	$ 3,229,281.00	$ 22,339.24	Partial		$ 22,339.24	HCAD land value
0552280270039	0.18	0.00	2%	Vacant Lot	$ 15,264.00	3	$ 45,792.00	$ 914.66	Partial		$ 914.66	
0552280270015 & 0552280270018	0.12	0.00	3%	RSF	$ 58,461.00	1.15	$ 67,230.15	$ 1,864.22	Full	$ 120,769.85	$ 188,000.00	Used 2019 value for vacant lot. Acquisition bisects house on -0018
0552280810001	5.78	0.11	2%	Commercial (Vacant)	$ 866,810.00	3	$ 2,600,430.00	$ 50,222.63	Partial		$ 50,222.63	
0552280810002	4.87	0.08	2%	Commercial	$ 898,447.00	3	$ 2,695,341.00	$ 46,074.60	Partial		$ 46,074.60	HCAD land value
0552280820002	9.91	0.09	1%	Commercial	$ 1,550,367.00	3	$ 4,651,101.00	$ 40,981.34	Partial		$ 40,981.34	HCAD land value
0552280830005	2.54	0.18	7%	Commercial	$ 196,608.00	3	$ 589,824.00	$ 40,873.19	Partial		$ 40,873.19	
0580790000030	3.36	0.08	2%	Other Exempt (Religious)	$ -	3	$ -	$ 3,539.73	Partial		$ 3,539.73	used avg land value from nearby tracts
1262590010011	0.17	0.00	1%	Vacant Lot	$ 29,068.00	3	$ 87,204.00	$ 1,258.82	Partial		$ 1,258.82	
1262590010010	0.20	0.05	25%	Vacant Lot	$ 32,193.00	3	$ 96,579.00	$ 24,280.23	Partial		$ 24,280.23	ROW in this area doesn't
1262590010009	0.19	0.06	31%	Vacant Lot	$ 31,792.00	3	$ 95,376.00	$ 29,278.21	Partial		$ 29,278.21	line up with parcel
1262590010008	0.17	0.01	4%	RSF	$ 28,982.00	3	$ 86,946.00	$ 3,123.73	Partial		$ 3,123.73	boundaries
0580790000003 & 0580790000036	2.39	0.09	4%	RSF	$ 59,195.00	3	$ 177,585.00	$ 6,497.71	Partial	$ 25,000.00	$ 31,497.71	business property move, used combined land value of both HCAD accounts
	59.38	2.10			$ 8,691,183.00		$ 25,965,396.15	$ 1,726,671.00		$ 145,769.85	**$ 482,384.00**	
										Total:	**$ 8,096,837.00**	

General notes:

(1) The estimates shown above are to be used for planning purposes only and are not based on actual appraisals or other cost guides.
(2) $180,000 for a replacement home is a general estimate based on current market conditions.
(3) Adding a 3.0 multiplier/15% contingency provides a general estimate. Actual values will be based on a fair market value appraisals according to USPAP guidelines.
(4) Relocation costs are calculated on a case by case basis according to URA guidelines. Estimates shown above are based on examples from other projects and past experience, but actual amounts will vary.

Appendix H

Detailed Opinion of Probable Cost and Pipeline Relocation Cost Estimate

Alternative 1 - Opinion of Probable Cost

P118-27-00 Alternatives AnalysisPreliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Shevchenko Basin	2233-01	Clearing and Grubbing	AC	13.6	$ 4,000.00	$ 54,400.00
	2315-02	Excavation & Off-Site Disposal	CY	161,333	$ 15.00	$ 2,419,995.00
	2921-01	Turf Establishment	AC	13.6	$ 3,000.00	$ 40,800.00
	2315-06	Backslope Drainage System Swales	LF	3,600	$ 2.00	$ 7,200.00
	2376-02	Concrete Channel Lining, 5" Nominal Thickness	SY	1,000	$ 85.00	$ 85,000.00
	2376-06	Concrete Interceptor Structure	SY	60	$ 120.00	$ 7,200.00
	2632-70	Headwalls and Wingwalls	CY	90	$ 950.00	$ 85,500.00
	2378-01	Riprap, Gradation No. 1	SY	980	$ 100.00	$ 98,000.00
	2642-02	24" CMP	LF	400	$ 90.00	$ 36,000.00
	2612-32	5' x 5' RCB	LF	70	$ 500.00	$ 35,000.00
					Subtotal:	$ 2,869,095.00

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Gulf Bank Basin	2233-01	Clearing and Grubbing	AC	13.2	$ 4,000.00	$ 52,800.00
	2315-02	Excavation & Off-Site Disposal	CY	125,840	$ 10.00	$ 1,258,400.00
	2921-01	Turf Establishment	AC	13.2	$ 3,000.00	$ 39,600.00
	2315-06	Backslope Drainage System Swales	LF	3,100	$ 2.00	$ 6,200.00
	2376-02	Concrete Channel Lining, 5" Nominal Thickness	SY	1,000	$ 85.00	$ 85,000.00
	2376-06	Concrete Interceptor Structure	SY	48	$ 120.00	$ 5,760.00
	2632-70	Headwalls and Wingwalls	CY	90	$ 950.00	$ 85,500.00
	2378-01	Riprap, Gradation No. 1	SY	450	$ 100.00	$ 45,000.00
	2642-02	24" CMP	LF	320	$ 90.00	$ 28,800.00
	2611-02	24" RCP	LF	50	$ 180.00	$ 9,000.00
					Subtotal:	$ 1,616,060.00

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Existing Channel Improvements Concrete-lined	2612-63	8' x 6' RCB	LF	250	$ 588.00	$ 147,000.00
	2632-70	Headwalls and Wingwalls	CY	180	$ 950.00	$ 171,000.00
	2120-01	REMOVE & DISPOSE OF ROADWAY PAVEMENT AND SUBGRADE	SY	520	$ 12.00	$ 6,240.00
	2120-03	REMOVE & DISPOSE OF CONCRETE RUBBLE AND CONCRETE STRUCTURES	CY	90	$ 50.00	$ 4,500.00
	2120-04	REMOVE & DISPOSE OF ALL PIPE (01565)	LF	350	$ 15.00	$ 5,250.00
	2336-01	Lime Stab. Subgrade, 6"	SY	370	$ 6.00	$ 2,220.00
	2336-05	Hydrated Lime (7%)	TON	7	$ 210.00	$ 1,470.00
	2714-02	Hot Mix Asphaltic Base Course, 8"	SY	370	$ 80.00	$ 29,600.00
	2741-02	Asphalt, 2"	SY	370	$ 40.00	$ 14,800.00
	2376-04	Concrete Slope Paving	SY	12,700	$ 100.00	$ 1,270,000.00
		Pipeline Relocation	LS	1	$ 683,500.00	$ 683,500.00
					Subtotal:	$ 2,335,580.00

Planning, Engineering, and Design (10% of DCC):	$ 682,300.00
Mobilization/Demobilization (5% of DCC):	$ 341,200.00
Construction Management (10% of DCC):	$ 682,300.00
Contingency (20% of DCC):	$ 1,364,400.00
Shevchenko ROW Acquisition:	**$ 7,614,453.00**
Gulf Bank ROW Acquisition:	**$ 10,719,280.00**
Concrete-Lined Channel Improvements ROW Acquisition:	**$ 482,400.00**
Total:	**$ 25,837,973.00**

Alternative 2 - Opinion of Probable Cost

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Shevchenko Basin	2233-01	Clearing and Grubbing	AC	13.6	$ 4,000.00	$ 54,400.00
	2315-02	Excavation & Off-Site Disposal	CY	161,333	$ 15.00	$ 2,419,995.00
	2921-01	Turf Establishment	AC	13.6	$ 3,000.00	$ 40,800.00
	2315-06	Backslope Drainage System Swales	LF	3,600	$ 2.00	$ 7,200.00
	2376-02	Concrete Channel Lining, 5" Nominal Thickness	SY	1,000	$ 85.00	$ 85,000.00
	2376-06	Concrete Interceptor Structure	SY	60	$ 120.00	$ 7,200.00
	2632-70	Headwalls and Wingwalls	CY	90	$ 950.00	$ 85,500.00
	2378-01	Riprap, Gradation No. 1	SY	980	$ 100.00	$ 98,000.00
	2642-02	24" CMP	LF	400	$ 90.00	$ 36,000.00
	2612-32	5' x 5' RCB	LF	70	$ 500.00	$ 35,000.00
					Subtotal:	$ 2,869,095.00

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Existing Channel Improvements Concrete-lined	2612-63	8' x 6' RCB	LF	250	$ 588.00	$ 147,000.00
	2632-70	Headwalls and Wingwalls	CY	180	$ 950.00	$ 171,000.00
	2120-01	REMOVE & DISPOSE OF ROADWAY PAVEMENT AND SUBGRADE	SY	520	$ 12.00	$ 6,240.00
	2120-03	REMOVE & DISPOSE OF CONCRETE RUBBLE AND CONCRETE STRUCTURES	CY	90	$ 50.00	$ 4,500.00
	2120-04	REMOVE & DISPOSE OF ALL PIPE (01565)	LF	350	$ 15.00	$ 5,250.00
	2336-01	Lime Stab. Subgrade, 6"	SY	370	$ 6.00	$ 2,220.00
	2336-05	Hydrated Lime (7%)	TON	7	$ 210.00	$ 1,470.00
	2714-02	Hot Mix Asphaltic Base Course, 8"	SY	370	$ 80.00	$ 29,600.00
	2741-02	Asphalt, 2"	SY	370	$ 40.00	$ 14,800.00
	2376-04	Concrete Slope Paving	SY	12,700	$ 100.00	$ 1,270,000.00
		Pipeline Relocation	LS	1	$ 683,500.00	$ 683,500.00
					Subtotal:	$ 2,335,580.00

Planning, Engineering, and Design (10% of DCC):	$	520,600.00
Mobilization/Demobilization (5% of DCC):	$	260,300.00
Construction Management (10% of DCC):	$	520,600.00
Contingency (20% of DCC):	$	1,041,100.00
Shevchenko ROW Acquisition:	**$**	**7,614,453.00**
Concrete-Lined Channel Improvements ROW Acquisition:	**$**	**482,400.00**
Total:	**$**	**15,644,128.00**

Alternative 3 - Opinion of Probable Cost

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Dow Basin	2233-01	Clearing and Grubbing	AC	10.8	$ 4,000.00	$ 43,200.00
	2315-02	Excavation & Off-Site Disposal	CY	80,667	$ 10.00	$ 806,670.00
	2921-01	Turf Establishment	AC	10.8	$ 3,000.00	$ 32,400.00
	2315-06	Backslope Drainage System Swales	LF	3,000	$ 2.00	$ 6,000.00
	2376-02	Concrete Channel Lining, 5" Nominal Thickness	SY	1,000	$ 85.00	$ 85,000.00
	2376-06	Concrete Interceptor Structure	SY	48	$ 120.00	$ 5,760.00
	2632-70	Headwalls and Wingwalls	CY	90	$ 950.00	$ 85,500.00
	2378-01	Riprap, Gradation No. 1	SY	200	$ 100.00	$ 20,000.00
	2642-02	24" CMP	LF	320	$ 90.00	$ 28,800.00
	2611-02	24" RCP	LF	40	$ 180.00	$ 7,200.00
					Subtotal:	$ 1,120,530.00

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Karen Basin	2233-01	Clearing and Grubbing	AC	5.5	$ 4,000.00	$ 22,000.00
	2315-02	Excavation & Off-Site Disposal	CY	41,947	$ 10.00	$ 419,470.00
	2921-01	Turf Establishment	AC	5.5	$ 3,000.00	$ 16,500.00
	2315-06	Backslope Drainage System Swales	LF	1,800	$ 2.00	$ 3,600.00
	2376-02	Concrete Channel Lining, 5" Nominal Thickness	SY	1,000	$ 85.00	$ 85,000.00
	2376-06	Concrete Interceptor Structure	SY	36	$ 120.00	$ 4,320.00
	2632-70	Headwalls and Wingwalls	CY	90	$ 950.00	$ 85,500.00
	2378-01	Riprap, Gradation No. 1	SY	200	$ 100.00	$ 20,000.00
	2642-02	24" CMP	LF	240	$ 90.00	$ 21,600.00
	2611-04	36" RCP	LF	30	$ 250.00	$ 7,500.00
					Subtotal:	$ 685,490.00

P118-27-00 Alternatives Analysis Preliminary Cost Summary						
Improvement	HCFCD Pay Item #	Pay Item Description	Unit	Quantity	Unit Price	Amount
Existing Channel Improvements Grass-lined	2315-02	Excavation & Off-Site Disposal	CY	6,750	$ 10.00	$ 67,500.00
	2612-63	8' x 6' RCB	LF	250	$ 588.00	$ 147,000.00
	2632-70	Headwalls and Wingwalls	CY	180	$ 950.00	$ 171,000.00
	2315-06	Backslope Drainage System Swales	LF	4,070	$ 5.00	$ 20,350.00
	2376-06	Concrete Interceptor Structure	SY	65	$ 150.00	$ 9,750.00
	2120-01	REMOVE & DISPOSE OF ROADWAY PAVEMENT AND SUBGRADE	SY	370	$ 12.00	$ 4,440.00
	2120-03	REMOVE & DISPOSE OF CONCRETE RUBBLE AND CONCRETE STRUCTURES	CY	90	$ 50.00	$ 4,500.00
	2120-04	REMOVE & DISPOSE OF ALL PIPE (01565)	LF	250	$ 15.00	$ 3,750.00
	2336-01	Lime Stab. Subgrade, 6"	SY	370	$ 6.00	$ 2,220.00
	2336-05	Hydrated Lime (7%)	TON	7	$ 210.00	$ 1,470.00
	2714-02	Hot Mix Asphaltic Base Course, 8"	SY	370	$ 80.00	$ 29,600.00
	2741-02	Asphalt, 2"	SY	370	$ 40.00	$ 14,800.00
	2378-01	Riprap, Gradation No. 1	SY	60	$ 100.00	$ 6,000.00
	2642-02	24" CMP	LF	255	$ 85.00	$ 21,675.00
		Pipeline Relocation	LS	1	$ 683,500.00	$ 683,500.00
					Subtotal:	$ 1,187,555.00

Planning, Engineering, and Design (10% of DCC):	$ 299,500.00
Mobilization/Demobilization (5% of DCC):	$ 149,800.00
Construction Management (10% of DCC):	$ 299,500.00
Contingency (20% of DCC):	$ 598,900.00
Dow ROW Acquisition:	**$ 2,292,097.00**
Karen ROW Acquisition:	**$ 1,107,377.00**
Grass-Lined Channel Improvements ROW Acquisition:	**$ 1,391,000.00**
Total:	**$ 9,131,749.00**

HARRIS COUNTY FLOOD CONTROL DISTRICT (HCFCD) PROJECT Halls Bayou

Cost Estimate for ExxonMobil Pipeline Relocations

Bond Project ID C-30

Harris County, Texas

Date: 11/17/2020

Description	Quantity	Unit	Unit Price ($)	Total	Pipeline ID(s)
8" Pipeline					
Materials					
8" Steel Pipe Pipe	127	Ft	$ 27.20	$ 3,454.40	
8" Elbow	4	Ea	$ 95.50	$ 382.00	
Anode for Cathodic Protection	1	Ea	$ 17.50	$ 17.50	
Test Station	1	Ea	$ 30.00	$ 30.00	
Contract Labor					
Horizontal Directional Drill - 8"	127	Ft	$ 215.00	$ 27,305.00	
Pipe Removal	127	Ft	$ 25.00	$ 3,175.00	
			8" Pipeline Subtotal	$ 34,363.90	
8" Pipeline					
Materials					
8" Steel Pipe Pipe	127	Ft	$ 27.20	$ 3,454.40	
8" Elbow	4	Ea	$ 95.50	$ 382.00	
Anode for Cathodic Protection	1	Ea	$ 17.50	$ 17.50	
Test Station	1	Ea	$ 30.00	$ 30.00	
Contract Labor					
Horizontal Directional Drill - 8"	127	Ft	$ 215.00	$ 27,305.00	
Pipe Removal	127	Ft	$ 25.00	$ 3,175.00	
			8" Pipeline Subtotal	$ 34,363.90	
10" Pipeline					
Materials					
10" Steel Pipe Pipe	127	Ft	$ 34.74	$ 4,411.98	
10" Elbow	4	Ea	$ 121.50	$ 486.00	
Anode for Cathodic Protection	1	Ea	$ 17.50	$ 17.50	
Test Station	1	Ea	$ 30.00	$ 30.00	
Contract Labor					
Horizontal Directional Drill - 10"	127	Ft	$ 260.00	$ 33,020.00	
Pipe Removal	127	Ft	$ 25.00	$ 3,175.00	
			10" Pipeline Subtotal	$ 41,140.48	
MISC. CONSTRUCTION ITEMS					
Silt Fencing	1000	Ft	$2.00	$2,000.00	
Construction Mats (4'x16')	500	Ft	$ 150.00	$ 75,000.00	
Inspection - Construction	20	$ / Day	$ 850.00	$ 17,000.00	
Radiographic Services (X-Ray)	5	$ / Day	$ 1,800.00	$ 9,000.00	
Site Restoration / Obtaining Work Easements	2	$ / Acre	$ 2,500.00	$ 5,000.00	
Environmental	1	Ls	$ 10,000.00	$ 10,000.00	
Permitting	1	Ls	$ 10,000.00	$ 10,000.00	
Consulting & Engineering	1	Ls	$ 73,245.00	$ 73,245.00	
Surveying (Staking)	5	Days	$ 1,480.00	$ 7,400.00	
			Materials & Labor Subtotal	$ 109,868.28	
			Misc. Construction Items Subtotal	$208,645.00	
			Overall Project Subtotal	$ 318,513.28	
			Company Overhead (20%)	$ 63,702.66	
			Total Project Cost	**$ 382,215.94**	

HARRIS COUNTY FLOOD CONTROL DISTRICT (HCFCD) PROJECT Halls Bayou

Cost Estimate for Magellan Pipeline Relocations

Bond Project ID C-30

Harris County, Texas

Date: 11/17/2020

Description	Quantity	Unit	Unit Price ($)	Total	Pipeline ID(s)
20" Pipeline					
Materials					
20" Steel Pipe Pipe	127	Ft	$ 72.59	$ 9,218.93	
20" Elbow	4	Ea	$ 251.50	$ 1,006.00	
Anode for Cathodic Protection	1	Ea	$ 17.50	$ 17.50	
Test Station	1	Ea	$ 30.00	$ 30.00	
Contract Labor					
Horizontal Directional Drill - 20"	127	Ft	$ 485.00	$ 61,595.00	
Pipe Removal	127	Ft	$ 25.00	$ 3,175.00	
			20" Pipeline Subtotal	$ 75,042.43	
MISC. CONSTRUCTION ITEMS					
Silt Fencing	1000	Ft	$2.00	$2,000.00	
Construction Mats (4'x16')	500	Ft	$ 150.00	$ 75,000.00	
Inspection - Construction	20	$ / Day	$ 850.00	$ 17,000.00	
Radiographic Services (X-Ray)	5	$ / Day	$ 1,800.00	$ 9,000.00	
Site Restoration / Obtaining Work Easements	2	$ / Acre	$ 2,500.00	$ 5,000.00	
Environmental	1	Ls	$ 10,000.00	$ 10,000.00	
Permitting	1	Ls	$ 10,000.00	$ 10,000.00	
Consulting & Engineering	1	Ls	$ 40,612.00	$ 40,612.00	
Surveying (Staking)	5	Days	$ 1,480.00	$ 7,400.00	
			Materials & Labor Subtotal	$ 75,042.43	
			Misc. Construction Items Subtotal	$176,012.00	
			Overall Project Subtotal	$ 251,054.43	
			Company Overhead (20%)	$ 50,210.89	
			Total Project Cost	**$ 301,265.32**	

Appendix I

Preliminary Wetland and Threatened and Endangered Species Habitat Assessment

Appendix J

Phase I Environmental Site Assessment Report

Appendix K

Attribute Scoring and Ranking Form and
Harris County Flood Control District Project Scoring Form

Harris County Flood Control District Project Scoring Form

Scenario #1 (500-Year Event) SUMMARY

SCORING CRITERIA:			1	2	3	4	5	6	7	8		
	Weight:		25%	20%	20%	10%	10%	5%	5%	5%		
Project Area:	Project ID:	Tier:	Flood Risk (500-Year Event) Reduction	Existing Conditions Drainage LOS	Social Vulnerability Index (SVI)	Project Efficiency	Partnership Funding	Long Term Maintenance Costs	Minimize Environmental Impacts	Potential for Multiple Benefits	TOTAL SCORE	Channel / Trib
P118J	P118-27-00 - Alternative 1	1	1.50	1.20	1.40	0.20	0.00	0.50	0.30	0.00	5.10	P118
P118J	P118-27-00 - Alternative 2	1	1.50	1.20	1.40	0.40	0.00	0.50	0.30	0.00	5.30	P118
P118J	P118-27-00 - Alternative 3	1	0.75	1.20	1.40	0.20	0.00	0.50	0.50	0.00	4.55	P118

Harris County Flood Control District Project Scoring Form

Alternative 1 (500-Year Event) DRAFT

USERS:
Only type in cells that are ORANGE shaded.
GREY cells are automatic calculations (Do not type in these cells).
* *YELLOW cells have dropdown for easy data input. Click on cell, then use drop down just outside the cell, to the right.*

NOTES :

TOTAL PROJECT SCORE:	**5.10**

Problem Area:	P118J
Project ID:	**P118-27-00 - Alternative 1**
Project Name:	P118-27-00 Alternatives Analysis
Project Manager:	LAN - Chris Edwards
Project Watershed:	**(P) Halls Bayou** *

1. What is the project cost?	$ 25,837,973.00	*USD.*		
2.How many structures are subject to flooding in the 500-yr event baseline (existing) condition?	609	*Structures (500-yr)*	12	*Non-Structures (Miles) * Reference Only*
2a. How many roadway miles are subject to inundation greater than a foot in the 500-yr (existing) condition?				
3. How many structures and non-structures are subject to flooding in the alternative (proposed) condition?	528	*Structures (500-yr)*	10.7	*Non-Structures (Miles) * Reference Only*
3.a. Total number of structures and roadway miles removed from flood risk (benefitted)?	81		1.3	
3.b. Percent of structures and roadway miles removed from flood risk?	13%		11%	
4. What is the baseline (existing) condition Level of Service (L.O.S.) of the observed channel reach / flooding source? *	<=10-Yr			
4.a. What is the source of potential flooding in the Project Area (Pick all that apply)? *	*Riverine (Out of Bank)*	*Uncontrolled Sheetflow*	*N/A*	*N/A*
4.b. Upper bounding Annual Exceedance Probability for the channel reach Level of Service (L.O.S.) capacity.	10	*-Year*		

5. What is the CDC Social Vulnerability Index **(SVI)** of the observed Project Area?	**Area** *(Ac)*	**Percentage** *(%)*	**Project Area: P118J**
5.a. Amount of Project Area with an SVI indicated as low level of vulnerability (SVI = 1)?	0	0%	***546 acres***
5.b. Amount of Project Area with an SVI indicated as low to moderate level of vulnerability (SVI = 4)?	0	0%	
5.c. Amount of Project Area with an SVI indicated as moderate to high level of vulnerability (SVI = 7)?	546	100%	
5.d. Amount of Project Area with an SVI indicated as high level of vulnerability (SVI = 10)?	0	0%	

6. Does the project have **potential for partnership** (Percentage of Potential Cost of sharing by others)? *	**Yes, funding partner identified.**	
6.a. If estimated partner share is known, what is the estimated partner share responsibility of project cost?	0%	*If unknown, enter "0%"*
7. What is the qualitative expectation of the projects need for **long term maintenance**? (Typical / Frequent or Additional / Specialized) *	**Project only requires regular, on-going maintenance.**	
8. What is/are the project's potential **environmental** impacts? *	**Project is able to significantly avoid environmental impacts.**	
9. What is the projects potential to offer **multiple benefits?** (e.g., additional Recreational and/or Environmental improvements in conjunction with drainage improvements.)? *	**Project does not have multiple benefits.**	
10. What is the estimated **project efficiency**? 10.a. Project Efficiency = Total Project Cost (USD.) / total number of structures removed from flood risk.	**$318,987.32**	*USD. / Benefitted Structure Count*

1	**P118-27-00 - Alternative 1, PM: LAN - Chris Edwards**	**P118J**	***(P) Halls Bayou***			***Project Score:***	**5.10**	

PRIORITIZATION FRAMEWORK SCORING CRITERIA

			Form Answers			SCORE	WEIGHT	WEIGHTED SCORE
	Flood Risk (500-Year Event) Reduction Scoring Criteria:		13.3%	81		6	25%	1.50
	Floodplain removed from 0 structures (0)	0	6	3	- Score is the higher calculation between percentage benefitted and # of structures benefitted		*Min 20 Structures for % Benefit*	
1	*Floodplain removed from < 10% of structures (~100 Structures)*	3	10%	5				
	Floodplain removed from < 50% of structures (~200 Structures)	6	50%	150				
	Floodplain removed from < 75% of structures (~400 Structures)	8	75%	300				
	Floodplain removed from 100% of structures (~500 Structures)	10	100%	450				
	Existing Conditions Drainage Level of Service Scoring Criteria:		10			6	20%	1.20
	Level of service is > 1% AEP storm (500-yr)	0	*500*					
	Level of service is < 1% AEP storm (100-yr)	1	*100*					
2	*Level of service is < 2% AEP storm (50-yr)*	2	*50*					
	Level of service is < 4% AEP storm (25-yr)	4	*25*					
	Level of service is < 10% AEP storm (10-yr)	6	*10*					
	Level of service is < 20% AEP storm (5-yr)	8	*5*					
	Level of service is < 50% AEP storm (2-yr)	10	*2*					
	Social Vulnerability Index (SVI) for Project Area:		*PERCENTAGE OF SERVICE AREA*			7.000	20%	1.40
	SVI indicates low level of vulnerability (less than 0.25)	1	0.0%					
3	*SVI indicates low to moderate level of vulnerability (Between 0.25 and 0.5)*	4	0.0%					
	SVI indicates moderate to high level of vulnerability (Between 0.5 and 0.75)	7	100.0%					
	SVI indicates high level of vulnerability (Greater than 0.75)	10	0.0%					
	Project Efficiency Scoring Criteria:		$318,987.32			2	10%	0.20
	Greater than $200,000/Structure	2	*$200,000.00*					
4	*$200,000/Benefitted Structure to 100,000/Benefitted Structure*	4	*$100,000.00*					
	$100,000 to $50,000/Benefitted Structure	6	*$50,000.00*					
	Less than $50,000/Benefitted Structures	10						
	Partnership Funding Scoring Criteria:		Yes, funding partner identified.			0	10%	0.00
	No funding partner.	0	0.0%					
5	*Partnership funds cover less than 40% of project cost.*	4	*40%*					
	Partnership funds cover 40-60% of project cost.	8	*60%*					
	Partnership funds cover greater than 60% of project cost.	10						
	Long Term Maintenance Costs Scoring Criteria:		Project only requires regular, on-going maintenance.			10	5%	0.50
6	*Project will require extensive maintenance or specialized maintenance.*	2						
	Project will require maintenance outside of HCFCD's regular maintenance cycles.	6						
	Project only requires regular, on-going maintenance.	10						
	Minimize Environmental Impacts Scoring Criteria:		Project is able to significantly avoid environmental impacts.			6	5%	0.30
	Project will have significant environmental impacts requiring IP and mitigation bank credits.	0						
7	*Project will have significant environmental impacts requiring mitigation bank credits.*	2						
	Project is able to significantly avoid environmental impacts.	6						
	Project has minimal or no environmental impacts.	10						
	Potential for Multiple Benefits Scoring Criteria:		Project does not have multiple benefits.			0	5%	0.00
	Project does not have multiple benefits.	0						
8	*Project has recreational benefits.*	4						
	Project has environmental enhancement benefits.	6						
	Project has recreational and environmental enhancement benefits.	10						

Harris County Flood Control District Project Scoring Form

Alternative 2 (500-Year Event) DRAFT

USERS:
Only type in cells that are ORANGE shaded.
GREY cells are automatic calculations (Do not type in these cells).
* *YELLOW cells have dropdown for easy data input. Click on cell, then use drop down just outside the cell, to the right.*

NOTES :

TOTAL PROJECT SCORE:	**5.30**

Problem Area:	P118J
Project ID:	**P118-27-00 - Alternative 2**
Project Name:	P118-27-00 Alternatives Analysis
Project Manager:	LAN - Chris Edwards
Project Watershed:	**(P) Halls Bayou** *

1. What is the project cost?	$ 15,644,128.00	*USD.*		
2.How many structures are subject to flooding in the 500-yr event baseline (existing) condition?	609	*Structures (500-yr)*	12	*Non-Structures (Miles) * Reference Only*
2a. How many roadway miles are subject to inundation greater than a foot in the 500-yr (existing) condition?				
3. How many structures and non-structures are subject to flooding in the alternative (proposed) condition?	529	*Structures (500-yr)*	10.8	*Non-Structures (Miles) * Reference Only*
3.a. Total number of structures and roadway miles removed from flood risk (benefitted)?	80		1.2	
3.b. Percent of structures and roadway miles removed from flood risk?	13%		10%	
4. What is the baseline (existing) condition Level of Service (L.O.S.) of the observed channel reach / flooding source?	<=10-Yr *			
4.a. What is the source of potential flooding in the Project Area (Pick all that apply)?	*Riverine (Out of Bank)*	*Uncontrolled Sheetflow*	*N/A*	*N/A* *
4.b. Upper bounding Annual Exceedance Probability for the channel reach Level of Service (L.O.S.) capacity.	10	*-Year*		

5. What is the CDC Social Vulnerability Index **(SVI)** of the observed Project Area?	**Area** *(Ac)*	**Percentage** *(%)*	**Project Area: P118J**
5.a. Amount of Project Area with an SVI indicated as low level of vulnerability (SVI = 1)?	0	0%	***546 acres***
5.b. Amount of Project Area with an SVI indicated as low to moderate level of vulnerability (SVI = 4)?	0	0%	
5.c. Amount of Project Area with an SVI indicated as moderate to high level of vulnerability (SVI = 7)?	546	100%	
5.d. Amount of Project Area with an SVI indicated as high level of vulnerability (SVI = 10)?	0	0%	

6. Does the project have **potential for partnership** (Percentage of Potential Cost of sharing by others)?	**Yes, funding partner identified.** *	
6.a. If estimated partner share is known, what is the estimated partner share responsibility of project cost?	0%	*If unknown, enter "0%"*
7. What is the qualitative expectation of the projects need for **long term maintenance**? (Typical / Frequent or Additional / Specialized)	**Project only requires regular, on-going maintenance.** *	
8. What is/are the project's potential **environmental** impacts?	**Project is able to significantly avoid environmental impacts.** *	
9. What is the projects potential to offer **multiple benefits?** (e.g., additional Recreational and/or Environmental improvements in conjunction with drainage improvements.)?	**Project does not have multiple benefits.** *	
10. What is the estimated **project efficiency**? 10.a. Project Efficiency = Total Project Cost (USD.) / total number of structures removed from flood risk.	**$195,551.60**	*USD. / Benefitted Structure Count*

1	**P118-27-00 - Alternative 2, PM: LAN - Chris Edwards**	**P118J**	***(P) Halls Bayou***			***Project Score:***	**5.30**	

PRIORITIZATION FRAMEWORK SCORING CRITERIA

			Form Answers			SCORE	WEIGHT	WEIGHTED SCORE
	Flood Risk (500-Year Event) Reduction Scoring Criteria:		13.1%	80		6	25%	1.50
	Floodplain removed from 0 structures (0)	0	6	3	- Score is the higher calculation between percentage benefitted and # of structures benefitted		*Min 20 Structures for % Benefit*	
1	*Floodplain removed from < 10% of structures (~100 Structures)*	3	10%	5				
	Floodplain removed from < 50% of structures (~200 Structures)	6	50%	150				
	Floodplain removed from < 75% of structures (~400 Structures)	8	75%	300				
	Floodplain removed from 100% of structures (~500 Structures)	10	100%	450				
	Existing Conditions Drainage Level of Service Scoring Criteria:		10			6	20%	1.20
	Level of service is > 1% AEP storm (500-yr)	0	*500*					
	Level of service is < 1% AEP storm (100-yr)	1	*100*					
2	*Level of service is < 2% AEP storm (50-yr)*	2	*50*					
	Level of service is < 4% AEP storm (25-yr)	4	*25*					
	Level of service is < 10% AEP storm (10-yr)	6	*10*					
	Level of service is < 20% AEP storm (5-yr)	8	*5*					
	Level of service is < 50% AEP storm (2-yr)	10	*2*					
	Social Vulnerability Index (SVI) for Project Area:		*PERCENTAGE OF SERVICE AREA*			7.000	20%	1.40
	SVI indicates low level of vulnerability (less than 0.25)	1	0.0%					
3	*SVI indicates low to moderate level of vulnerability (Between 0.25 and 0.5)*	4	0.0%					
	SVI indicates moderate to high level of vulnerability (Between 0.5 and 0.75)	7	100.0%					
	SVI indicates high level of vulnerability (Greater than 0.75)	10	0.0%					
	Project Efficiency Scoring Criteria:		$195,551.60			4	10%	0.40
	Greater than $200,000/Structure	2	*$200,000.00*					
4	*$200,000/Benefitted Structure to 100,000/Benefitted Structure*	4	*$100,000.00*					
	$100,000 to $50,000/Benefitted Structure	6	*$50,000.00*					
	Less than $50,000/Benefitted Structures	10						
	Partnership Funding Scoring Criteria:		Yes, funding partner identified.			0	10%	0.00
	No funding partner.	0	0.0%					
5	*Partnership funds cover less than 40% of project cost.*	4	*40%*					
	Partnership funds cover 40-60% of project cost.	8	*60%*					
	Partnership funds cover greater than 60% of project cost.	10						
	Long Term Maintenance Costs Scoring Criteria:		Project only requires regular, on-going maintenance.			10	5%	0.50
6	*Project will require extensive maintenance or specialized maintenance.*	2						
	Project will require maintenance outside of HCFCD's regular maintenance cycles.	6						
	Project only requires regular, on-going maintenance.	10						
	Minimize Environmental Impacts Scoring Criteria:		Project is able to significantly avoid environmental impacts.			6	5%	0.30
	Project will have significant environmental impacts requiring IP and mitigation bank credits.	0						
7	*Project will have significant environmental impacts requiring mitigation bank credits.*	2						
	Project is able to significantly avoid environmental impacts.	6						
	Project has minimal or no environmental impacts.	10						
	Potential for Multiple Benefits Scoring Criteria:		Project does not have multiple benefits.			0	5%	0.00
	Project does not have multiple benefits.	0						
8	*Project has recreational benefits.*	4						
	Project has environmental enhancement benefits.	6						
	Project has recreational and environmental enhancement benefits.	10						

Harris County Flood Control District Project Scoring Form

Alternative 3 (500-Year Event) DRAFT

USERS:
Only type in cells that are ORANGE shaded.
GREY cells are automatic calculations (Do not type in these cells).
* *YELLOW cells have dropdown for easy data input. Click on cell, then use drop down just outside the cell, to the right.*

NOTES :

TOTAL PROJECT SCORE:	**4.55**

Problem Area:	P118J
Project ID:	**P118-27-00 - Alternative 3**
Project Name:	P118-27-00 Alternatives Analysis
Project Manager:	LAN - Chris Edwards
Project Watershed:	**(P) Halls Bayou** *

1. What is the project cost?	$ 9,131,749.00	*USD.*		
2.How many structures are subject to flooding in the 500-yr event baseline (existing) condition?	609	*Structures (500-yr)*	12	*Non-Structures (Miles) * Reference Only*
2a. How many roadway miles are subject to inundation greater than a foot in the 500-yr (existing) condition?				
3. How many structures and non-structures are subject to flooding in the alternative (proposed) condition?	583	*Structures (500-yr)*	11.5	*Non-Structures (Miles) * Reference Only*
3.a. Total number of structures and roadway miles removed from flood risk (benefitted)?	26		0.5	
3.b. Percent of structures and roadway miles removed from flood risk?	4%		4%	
4. What is the baseline (existing) condition Level of Service (L.O.S.) of the observed channel reach / flooding source?	<=10-Yr *			
4.a. What is the source of potential flooding in the Project Area (Pick all that apply)?	*Riverine (Out of Bank)*	*Uncontrolled Sheetflow*	*N/A*	*N/A* *
4.b. Upper bounding Annual Exceedance Probability for the channel reach Level of Service (L.O.S.) capacity.	10	*-Year*		

5. What is the CDC Social Vulnerability Index **(SVI)** of the observed Project Area?	**Area** *(Ac)*	**Percentage** *(%)*	**Project Area: P118J**
5.a. Amount of Project Area with an SVI indicated as low level of vulnerability (SVI = 1)?	0	0%	***546 acres***
5.b. Amount of Project Area with an SVI indicated as low to moderate level of vulnerability (SVI = 4)?	0	0%	
5.c. Amount of Project Area with an SVI indicated as moderate to high level of vulnerability (SVI = 7)?	546	100%	
5.d. Amount of Project Area with an SVI indicated as high level of vulnerability (SVI = 10)?	0	0%	

6. Does the project have **potential for partnership** (Percentage of Potential Cost of sharing by others)?	**Yes, funding partner identified.** *	
6.a. If estimated partner share is known, what is the estimated partner share responsibility of project cost?	0%	*If unknown, enter "0%"*
7. What is the qualitative expectation of the projects need for **long term maintenance**? (Typical / Frequent or Additional / Specialized)	**Project only requires regular, on-going maintenance.** *	
8. What is/are the project's potential **environmental** impacts?	**Project has minimal or no environmental impacts.** *	
9. What is the projects potential to offer **multiple benefits?** (e.g., additional Recreational and/or Environmental improvements in conjunction with drainage improvements.)?	**Project does not have multiple benefits.** *	
10. What is the estimated **project efficiency**? 10.a. Project Efficiency = Total Project Cost (USD.) / total number of structures removed from flood risk.	**$351,221.12**	*USD. / Benefitted Structure Count*

1	**P118-27-00 - Alternative 3, PM: LAN - Chris Edwards**	**P118J**	***(P) Halls Bayou***			***Project Score:***	**4.55**	

PRIORITIZATION FRAMEWORK SCORING CRITERIA

			Form Answers			SCORE	WEIGHT	WEIGHTED SCORE
	Flood Risk (500-Year Event) Reduction Scoring Criteria:		4.3%	26		3	25%	0.75
	Floodplain removed from 0 structures (0)	0	3	3	- *Score is the higher calculation between percentage benefitted and # of structures benefitted*		*Min 20 Structures for % Benefit*	
1	*Floodplain removed from < 10% of structures (~100 Structures)*	3	10%	5				
	Floodplain removed from < 50% of structures (~200 Structures)	6	50%	150				
	Floodplain removed from < 75% of structures (~400 Structures)	8	75%	300				
	Floodplain removed from 100% of structures (~500 Structures)	10	100%	450				
	Existing Conditions Drainage Level of Service Scoring Criteria:		10			6	20%	1.20
	Level of service is > 1% AEP storm (500-yr)	0	*500*					
	Level of service is < 1% AEP storm (100-yr)	1	*100*					
2	*Level of service is < 2% AEP storm (50-yr)*	2	*50*					
	Level of service is < 4% AEP storm (25-yr)	4	*25*					
	Level of service is < 10% AEP storm (10-yr)	6	*10*					
	Level of service is < 20% AEP storm (5-yr)	8	*5*					
	Level of service is < 50% AEP storm (2-yr)	10	*2*					
	Social Vulnerability Index (SVI) for Project Area:		*PERCENTAGE OF SERVICE AREA*			7.000	20%	1.40
	SVI indicates low level of vulnerability (less than 0.25)	1	0.0%					
3	*SVI indicates low to moderate level of vulnerability (Between 0.25 and 0.5)*	4	0.0%					
	SVI indicates moderate to high level of vulnerability (Between 0.5 and 0.75)	7	100.0%					
	SVI indicates high level of vulnerability (Greater than 0.75)	10	0.0%					
	Project Efficiency Scoring Criteria:		$351,221.12			2	10%	0.20
	Greater than $200,000/Structure	2	*$200,000.00*					
4	*$200,000/Benefitted Structure to 100,000/Benefitted Structure*	4	*$100,000.00*					
	$100,000 to $50,000/Benefitted Structure	6	*$50,000.00*					
	Less than $50,000/Benefitted Structures	10						
	Partnership Funding Scoring Criteria:		Yes, funding partner identified.			0	10%	0.00
	No funding partner.	0	0.0%					
5	*Partnership funds cover less than 40% of project cost.*	4	*40%*					
	Partnership funds cover 40-60% of project cost.	8	*60%*					
	Partnership funds cover greater than 60% of project cost.	10						
	Long Term Maintenance Costs Scoring Criteria:		Project only requires regular, on-going maintenance.			10	5%	0.50
6	*Project will require extensive maintenance or specialized maintenance.*	2						
	Project will require maintenance outside of HCFCD's regular maintenance cycles.	6						
	Project only requires regular, on-going maintenance.	10						
	Minimize Environmental Impacts Scoring Criteria:		Project has minimal or no environmental impacts.			10	5%	0.50
	Project will have significant environmental impacts requiring IP and mitigation bank credits.	0						
7	*Project will have significant environmental impacts requiring mitigation bank credits.*	2						
	Project is able to significantly avoid environmental impacts.	6						
	Project has minimal or no environmental impacts.	10						
	Potential for Multiple Benefits Scoring Criteria:		Project does not have multiple benefits.			0	5%	0.00
	Project does not have multiple benefits.	0						
8	*Project has recreational benefits.*	4						
	Project has environmental enhancement benefits.	6						
	Project has recreational and environmental enhancement benefits.	10						

Attribute Scoring and Ranking

Alternative	Attributes					
	Cost Information		500yr Stage Hydrograph Condition			
	Total Estimated Cost	Cost of ROW Acquisition	Number of Structures in Floodplain Removed	Number of Flooded Structures Removed	Miles of Inundated Roadway Removed	Acres of Inundated Land Removed
Baseline	$ -	$ -	0	0	0	0
Alternative 1	$ 25,837,973.00	$ 18,816,133.00	278	81	1.3	74
Alternative 2	$ 15,644,128.00	$ 8,096,853.00	273	80	1.2	73
Alternative 3	$ 9,131,749.00	$ 4,790,474.00	90	26	0.5	17

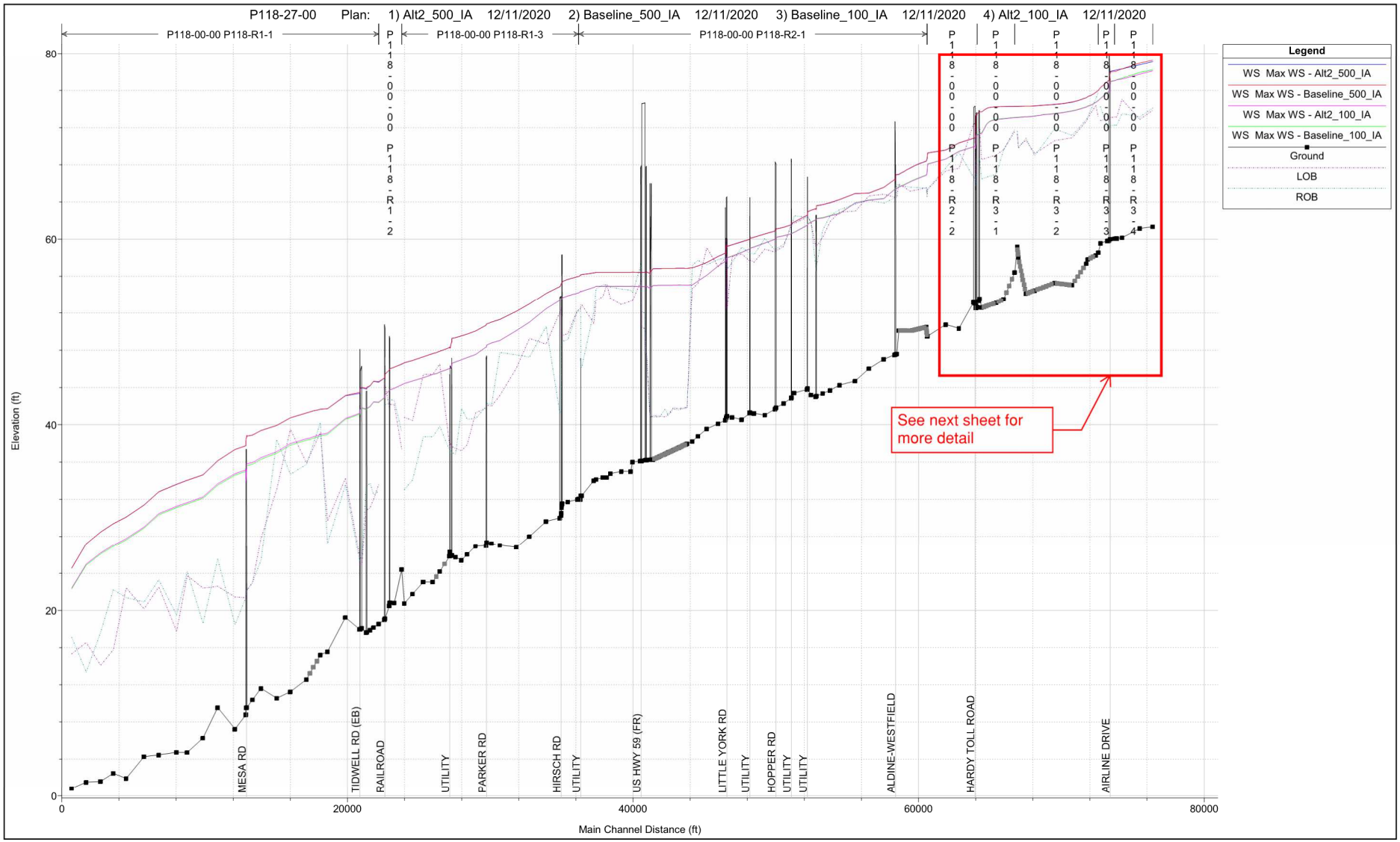
Alternative	Attributes						Final Scores
	Cost Information		500yr Stage Hydrograph Condition				
	Total Estimated Cost	Cost of ROW Acquisition	Number of Structures in Floodplain Removed	Number of Flooded Structures Removed	Miles of Inundated Roadway Removed	Acres of Inundated Land Removed	
	20%	10%	15%	25%	15%	15%	
Baseline	5.0	5.0	0.0	0.0	0.0	0.0	1.5
Alternative 1	0.7	0.3	4.6	4.1	2.2	2.5	2.6
Alternative 2	2.4	3.0	4.6	4.0	2.0	2.4	3.1
Alternative 3	3.5	3.8	1.5	1.3	0.8	0.6	1.8

Attribute	Weight	Max
Estimated Cost	20%	$ 30,000,000.00
Cost or ROW Acquisition	10%	$ 20,000,000.00
Number of Structures in Floodplain	15%	300
Number of Flooded Structures	25%	100
Miles of Inundated Roadway	15%	3
Acres of Inundated Land	15%	150

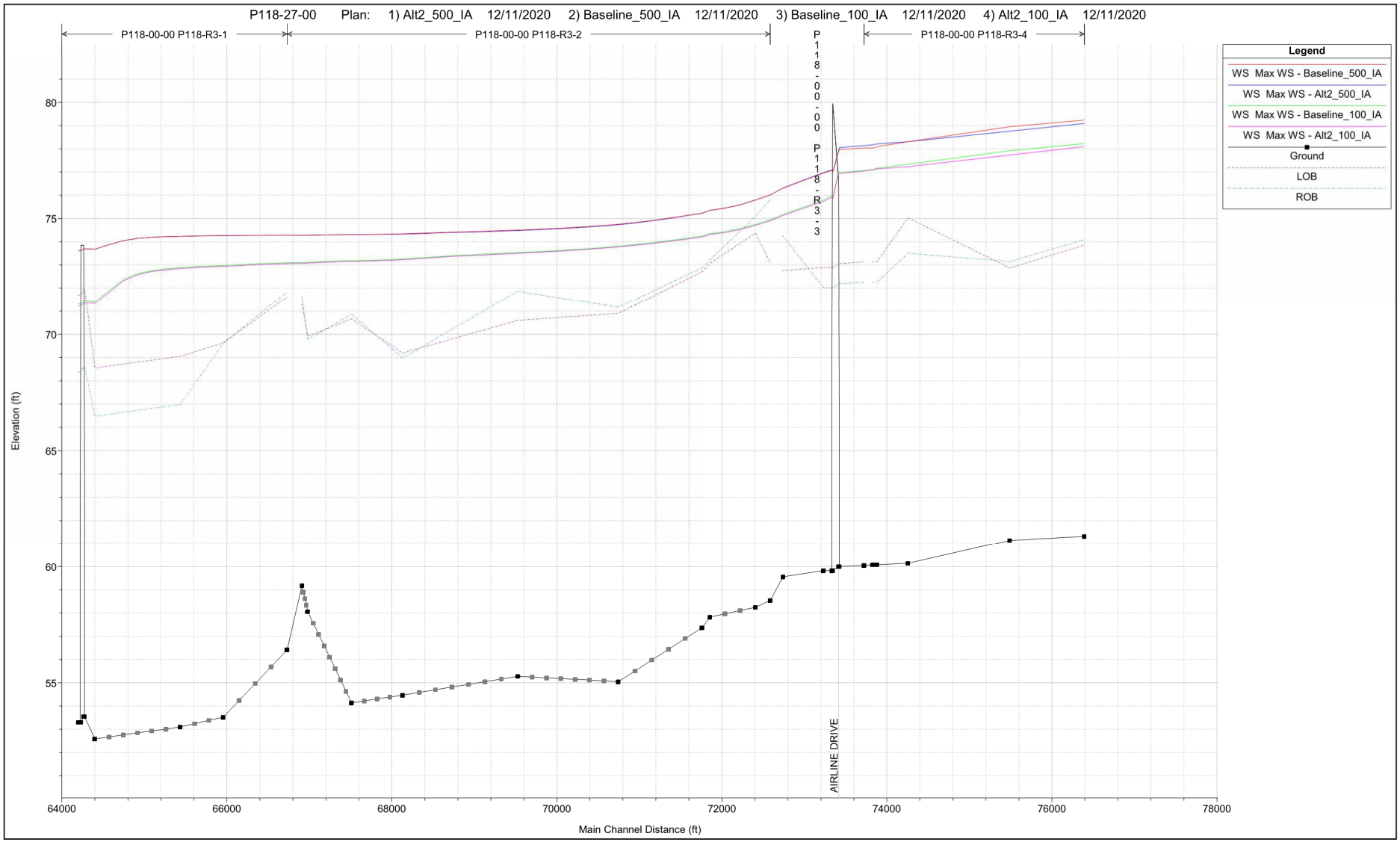
Total =	100%
Cost Attributes	30%
Performance Attributes	70%

Appendix L

Impact Analysis Baseline vs. Recommended Alternative Water Surface Profiles



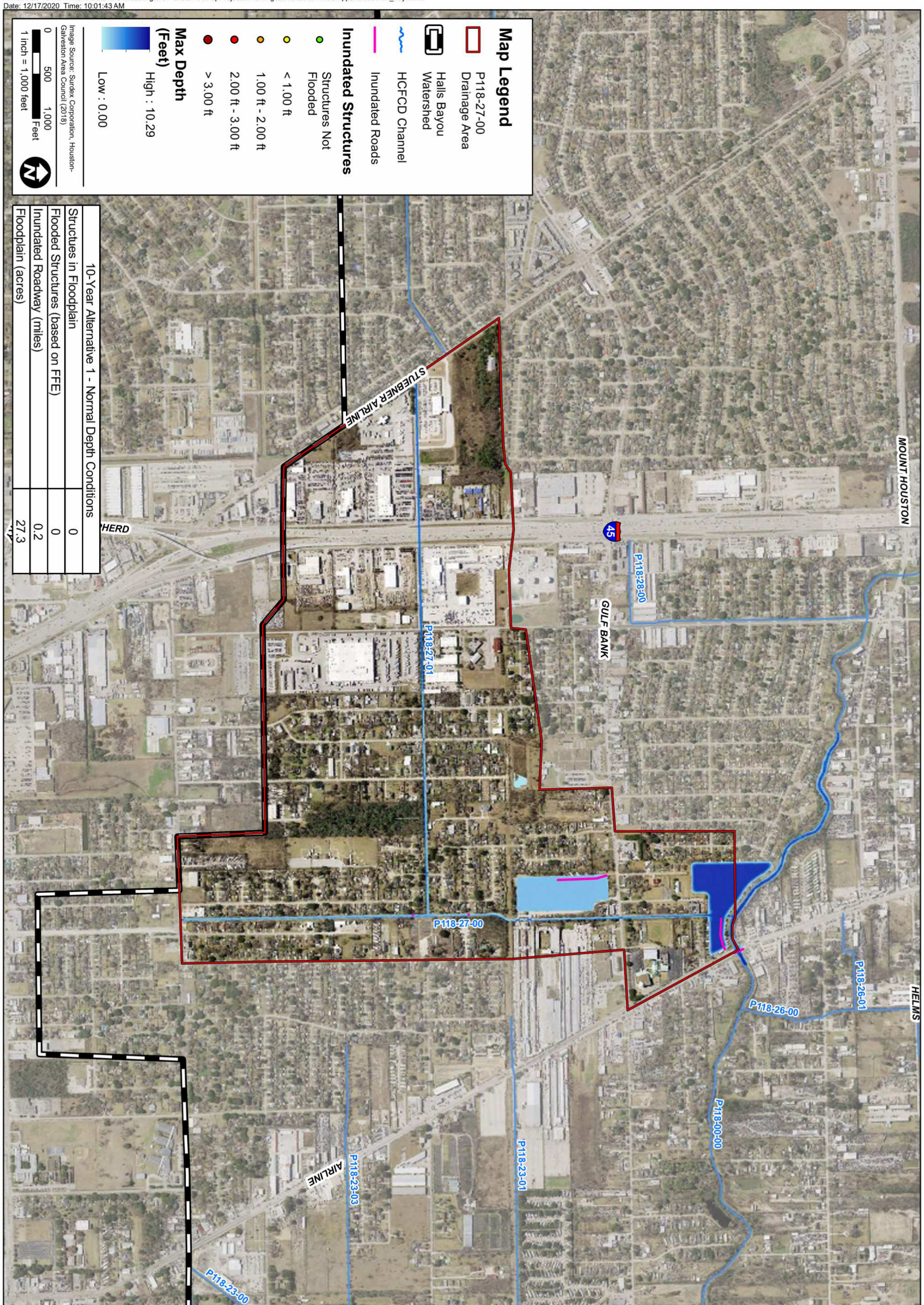
1 in Horiz. = 6500 ft 1 in Vert. = 10 ft



1 in Horiz. = 1125 ft 1 in Vert. = 4 ft

Appendix M

Alternative 1 and Alternative 3 Metrics and Floodplain Maps



10-Year Alternative 1 - Normal Depth Conditions	
Structures in Floodplain	0
Flooded Structures (based on FFE)	0
Inundated Roadway (miles)	0.2
Floodplain (acres)	27.3

EXHIBIT

DATE: OCT 2020
SCALE: AS NOTED

HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
Houston, Texas 77092

Lockwood, Andrews & Newnam, Inc.
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www.lan-inc.com • info@lan-inc.com

PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(NORMAL DEPTH TAILWATER)

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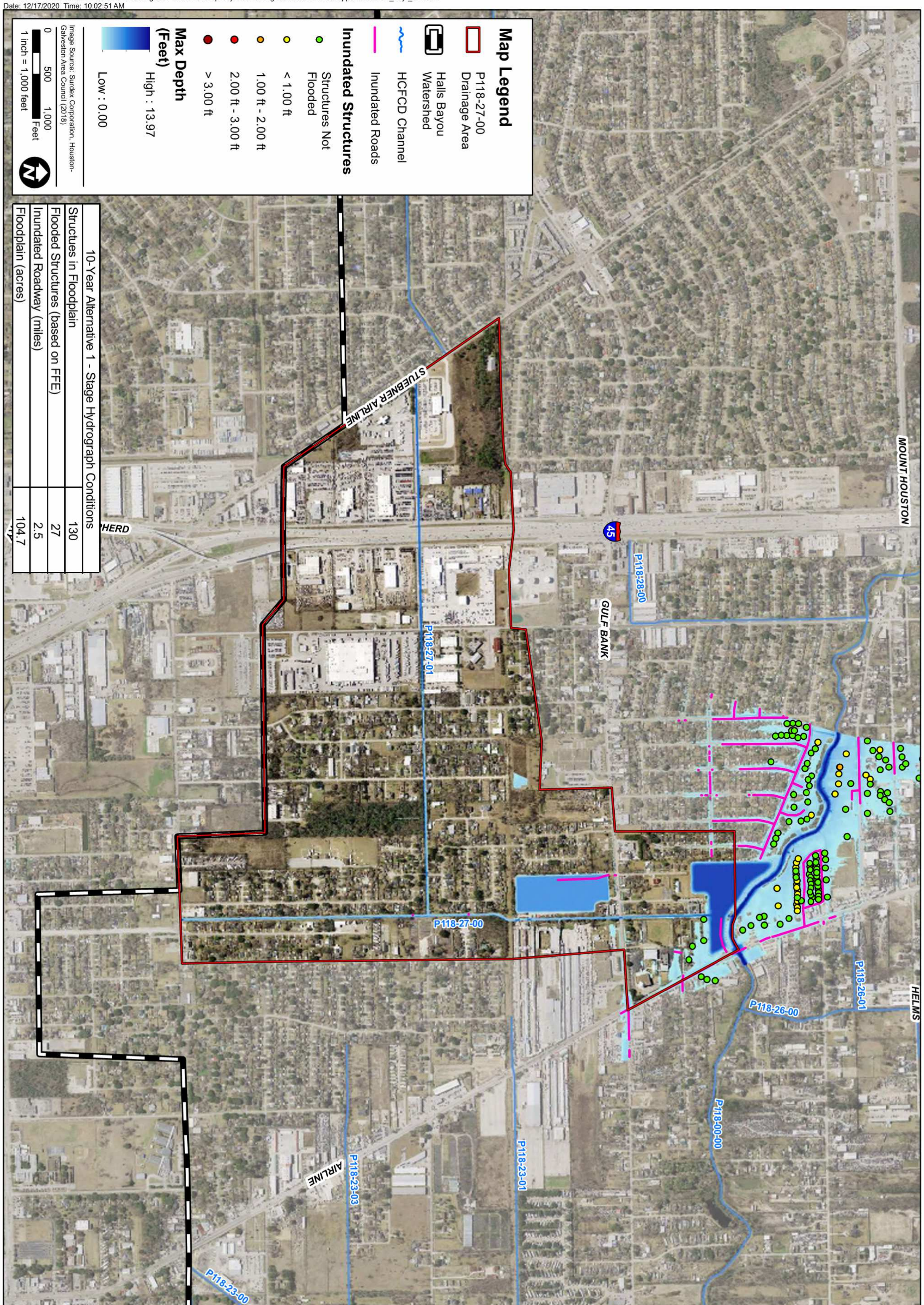

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HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)

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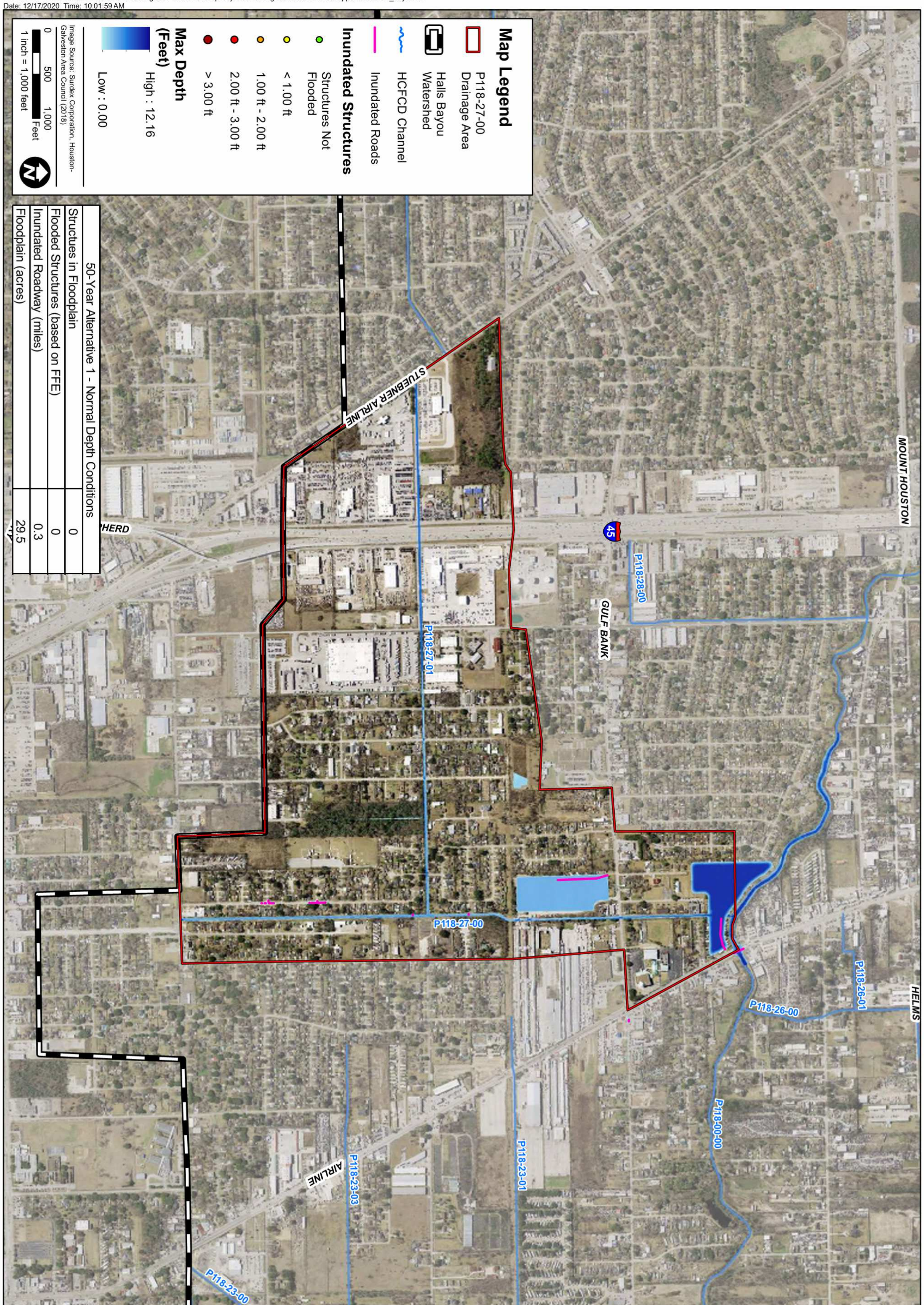

50-Year Alternative 1 - Normal Depth Conditions	
Structures in Floodplain	0
Flooded Structures (based on FFE)	0
Inundated Roadway (miles)	0.3
Floodplain (acres)	29.5

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 1 PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

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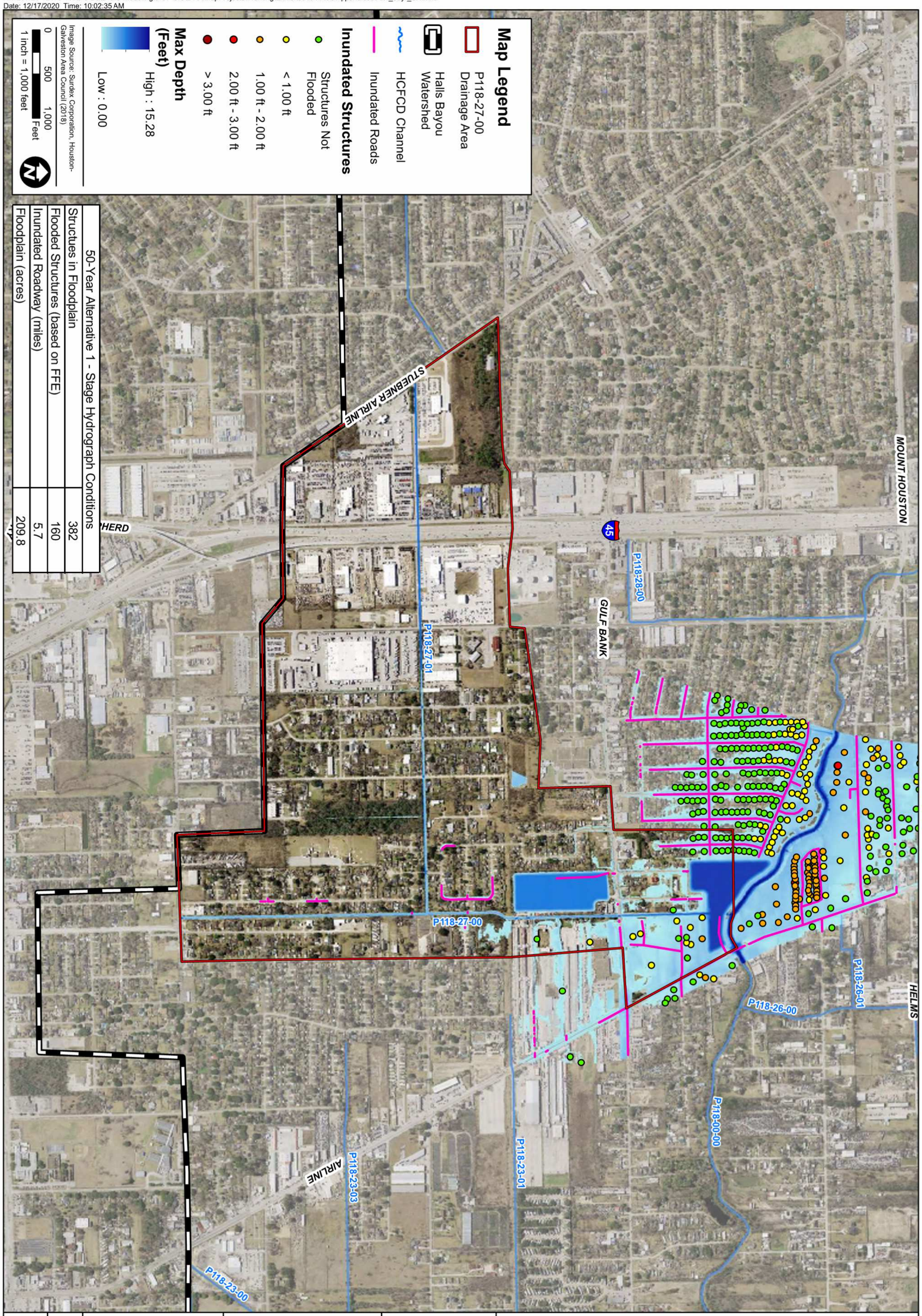

50-Year Alternative 1 - Stage Hydrograph Conditions	
Structures in Floodplain	382
Flooded Structures (based on FFE)	160
Inundated Roadway (miles)	5.7
Floodplain (acres)	209.8

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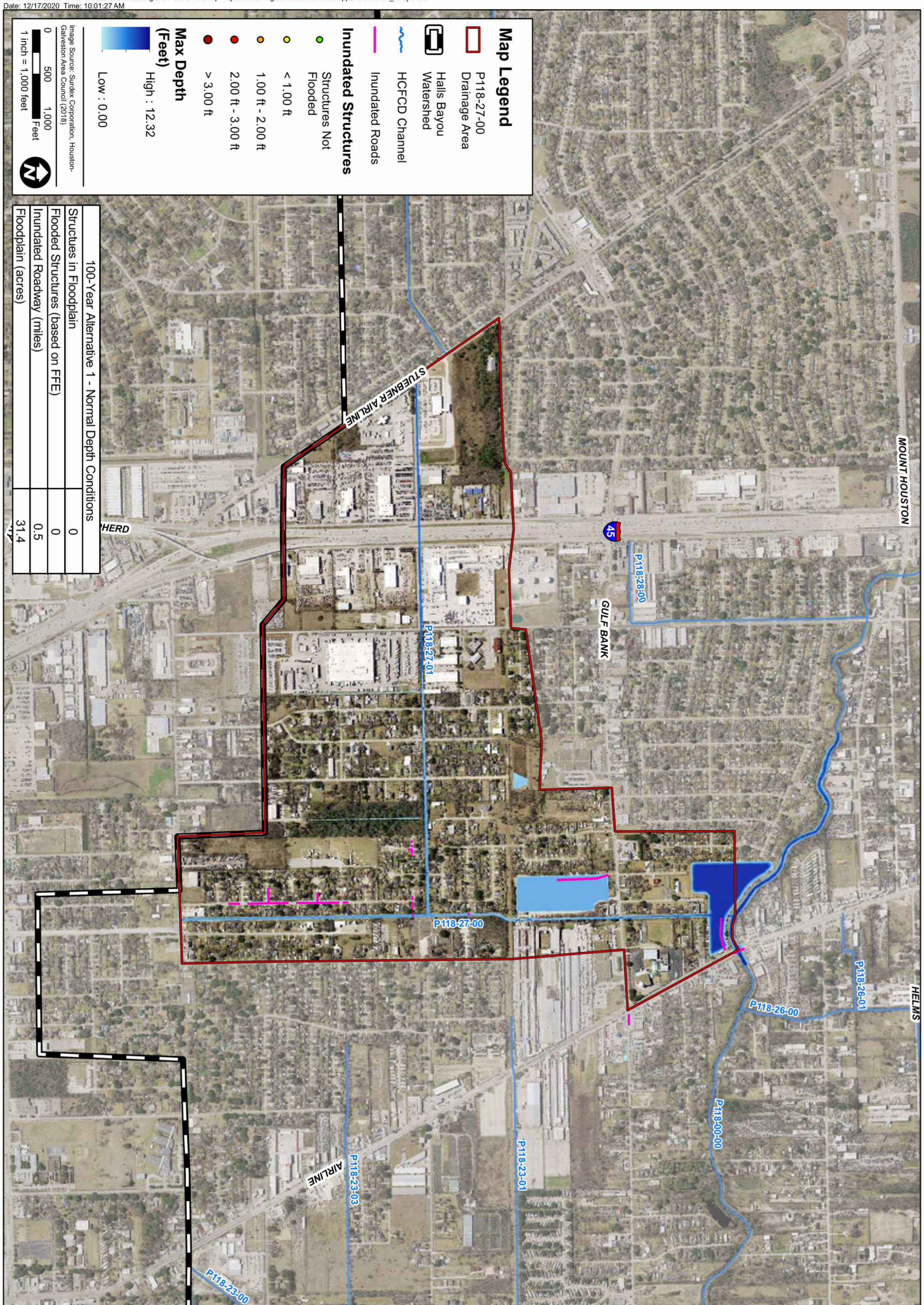
HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)



100-Year Alternative 1 - Normal Depth Conditions	
Structures in Floodplain	0
Flooded Structures (based on FFE)	0
Inundated Roadway (miles)	0.5
Floodplain (acres)	31.4

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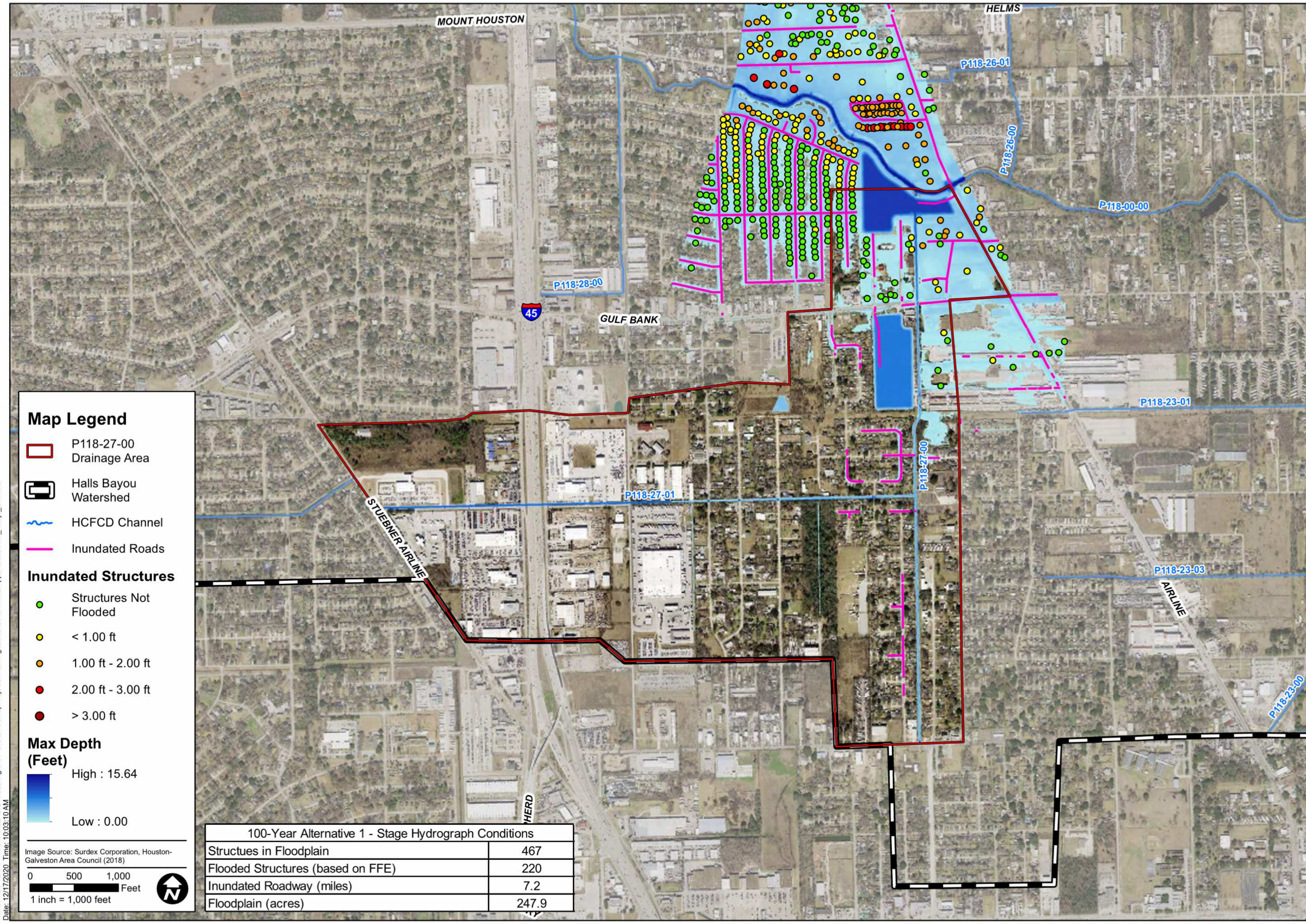
PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(NORMAL DEPTH TAILWATER)



Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Inundated Roads

Inundated Structures

- Structures Not Flooded
- < 1.00 ft
- 1.00 ft - 2.00 ft
- 2.00 ft - 3.00 ft
- > 3.00 ft

Max Depth (Feet)

High : 15.64

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

100-Year Alternative 1 - Stage Hydrograph Conditions	
Structues in Floodplain	467
Flooded Structures (based on FFE)	220
Inundated Roadway (miles)	7.2
Floodplain (acres)	247.9

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HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)

PREPARED: TMM
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HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
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DATE: OCT 2020
SCALE: AS NOTED

EXHIBIT

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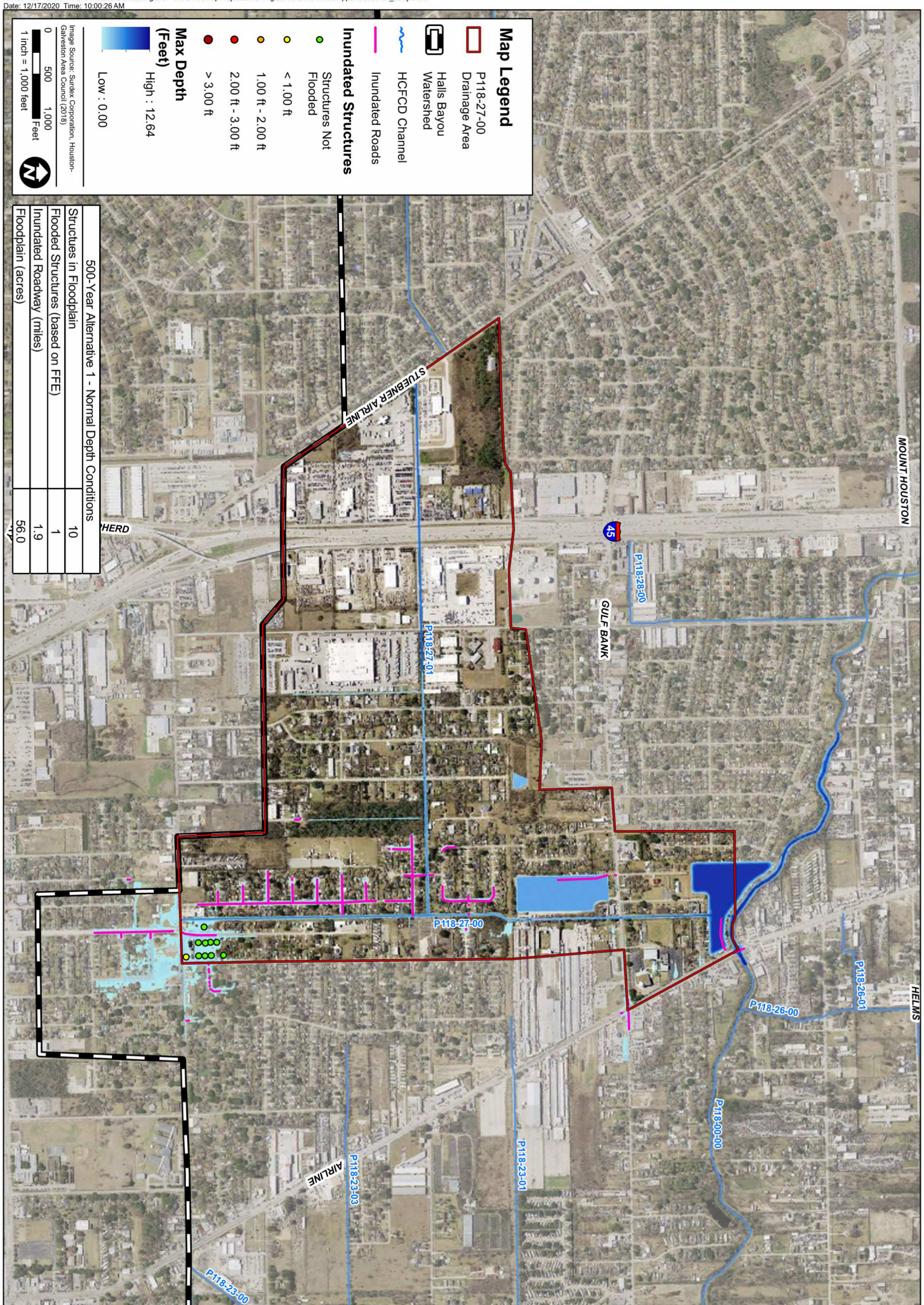

500-Year Alternative 1 - Normal Depth Conditions	
Structures in Floodplain	10
Flooded Structures (based on FFE)	1
Inundated Roadway (miles)	1.9
Floodplain (acres)	56.0

EXHIBIT

DATE: OCT 2020
SCALE: AS NOTED

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PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(NORMAL DEPTH TAILWATER)

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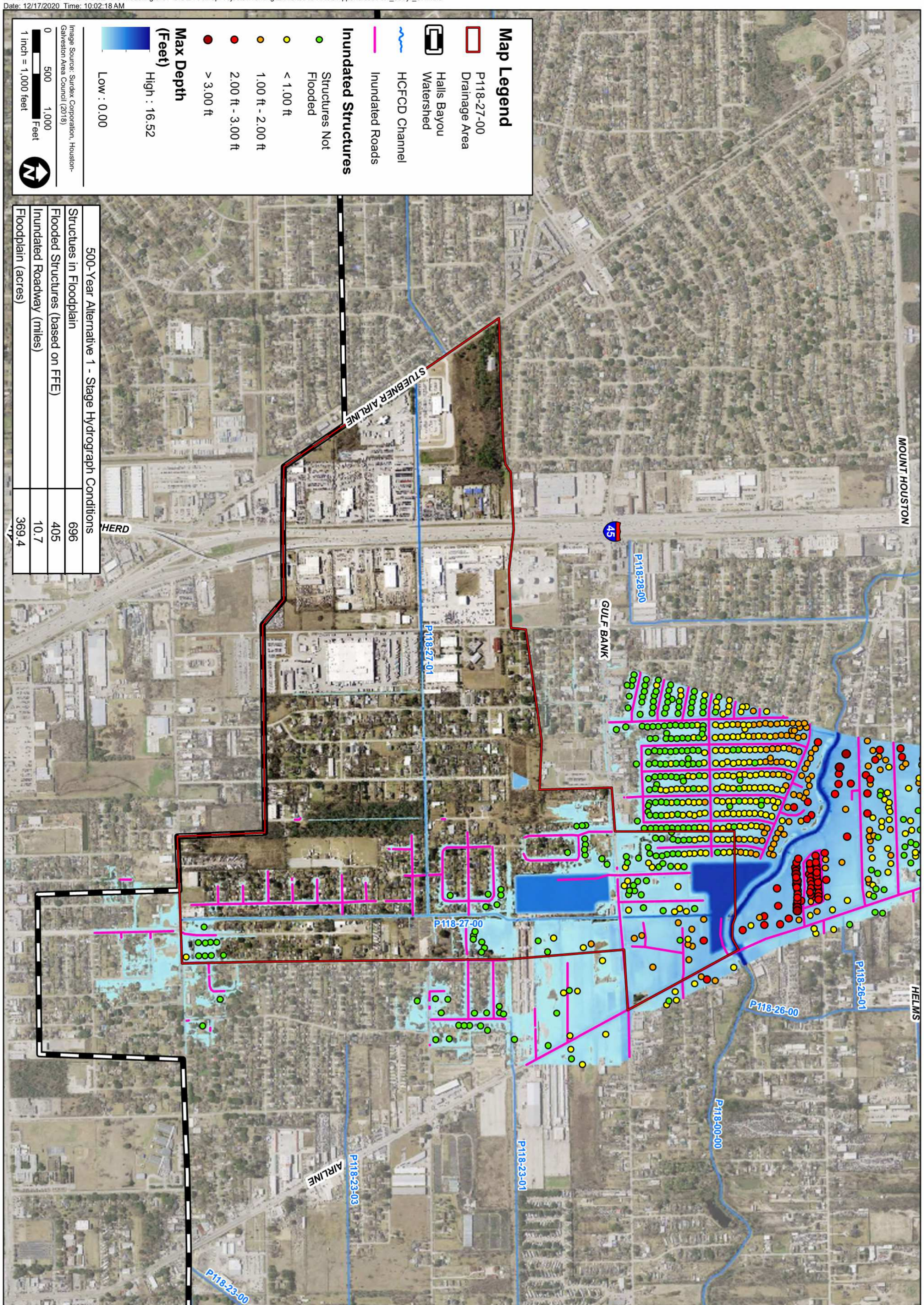

500-Year Alternative 1 - Stage Hydrograph Conditions	
Structures in Floodplain	696
Flooded Structures (based on FFE)	405
Inundated Roadway (miles)	10.7
Floodplain (acres)	369.4

EXHIBIT

DATE: OCT 2020
SCALE: AS NOTED

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P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 1 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)

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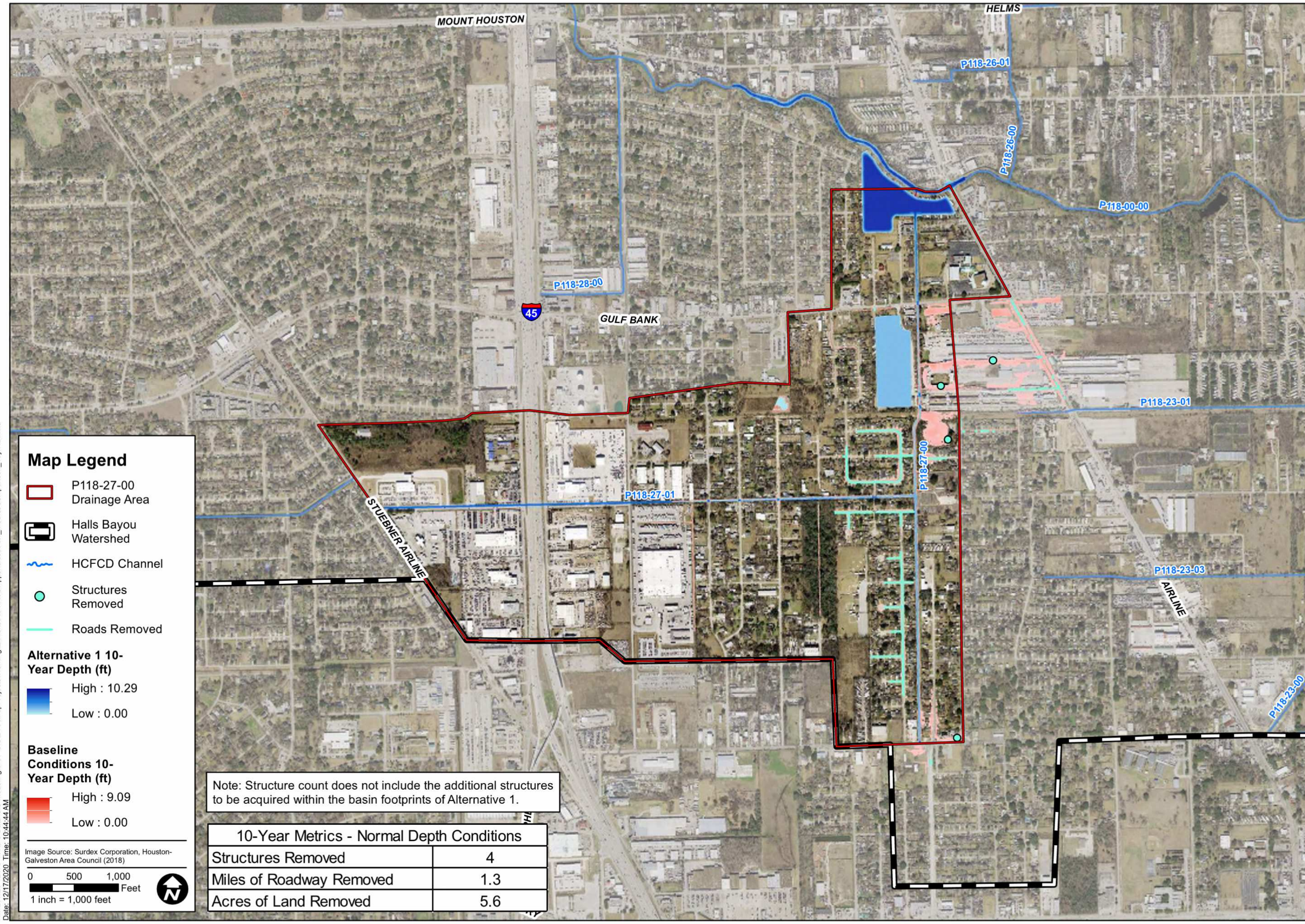

Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Structures Removed
- Roads Removed

Alternative 1 10-Year Depth (ft)

High : 10.29

Low : 0.00

Baseline Conditions 10-Year Depth (ft)

High : 9.09

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 1.

10-Year Metrics - Normal Depth Conditions	
Structures Removed	4
Miles of Roadway Removed	1.3
Acres of Land Removed	5.6

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 1 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

PREPARED: TMM

CHECKED: BJI

APPROVED: CEE

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9900 Northwest Freeway
Houston, Texas 77092

DATE: OCT 2020
SCALE: AS NOTED

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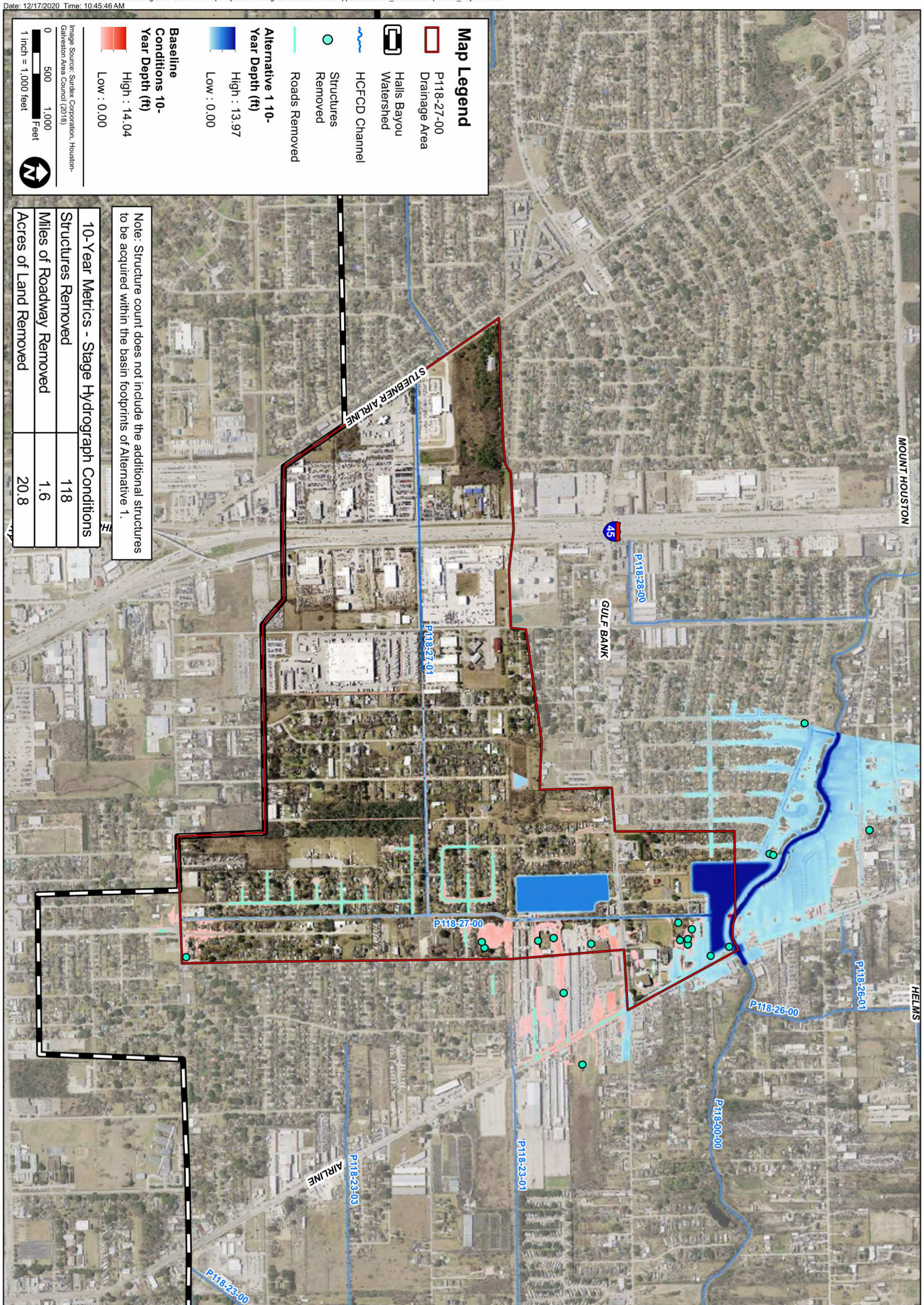

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 1.

10-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	118
Miles of Roadway Removed	1.6
Acres of Land Removed	20.8

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DATE: OCT 2020
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APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 1 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

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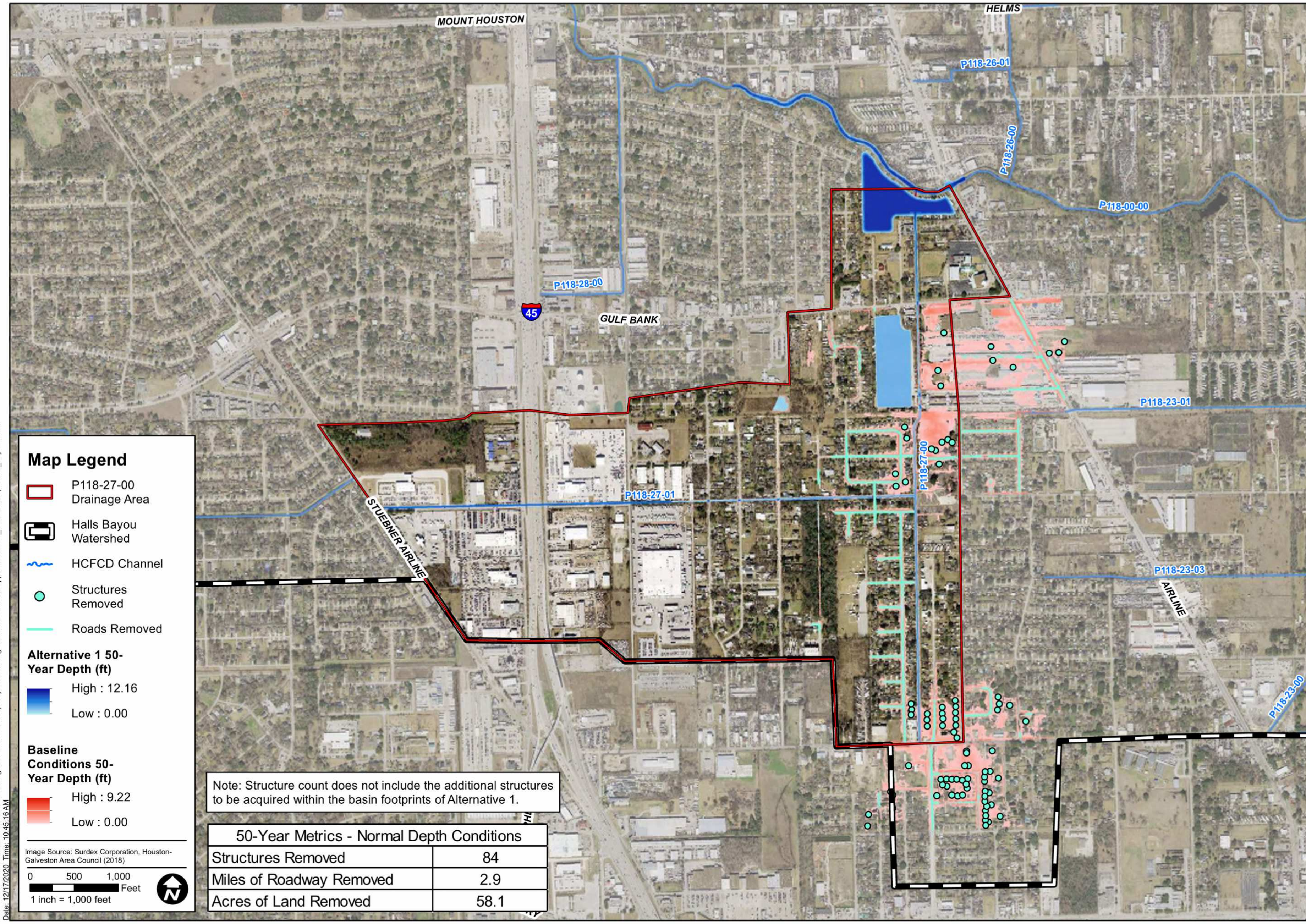

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 1.

50-Year Metrics - Normal Depth Conditions	
Structures Removed	84
Miles of Roadway Removed	2.9
Acres of Land Removed	58.1

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 1 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

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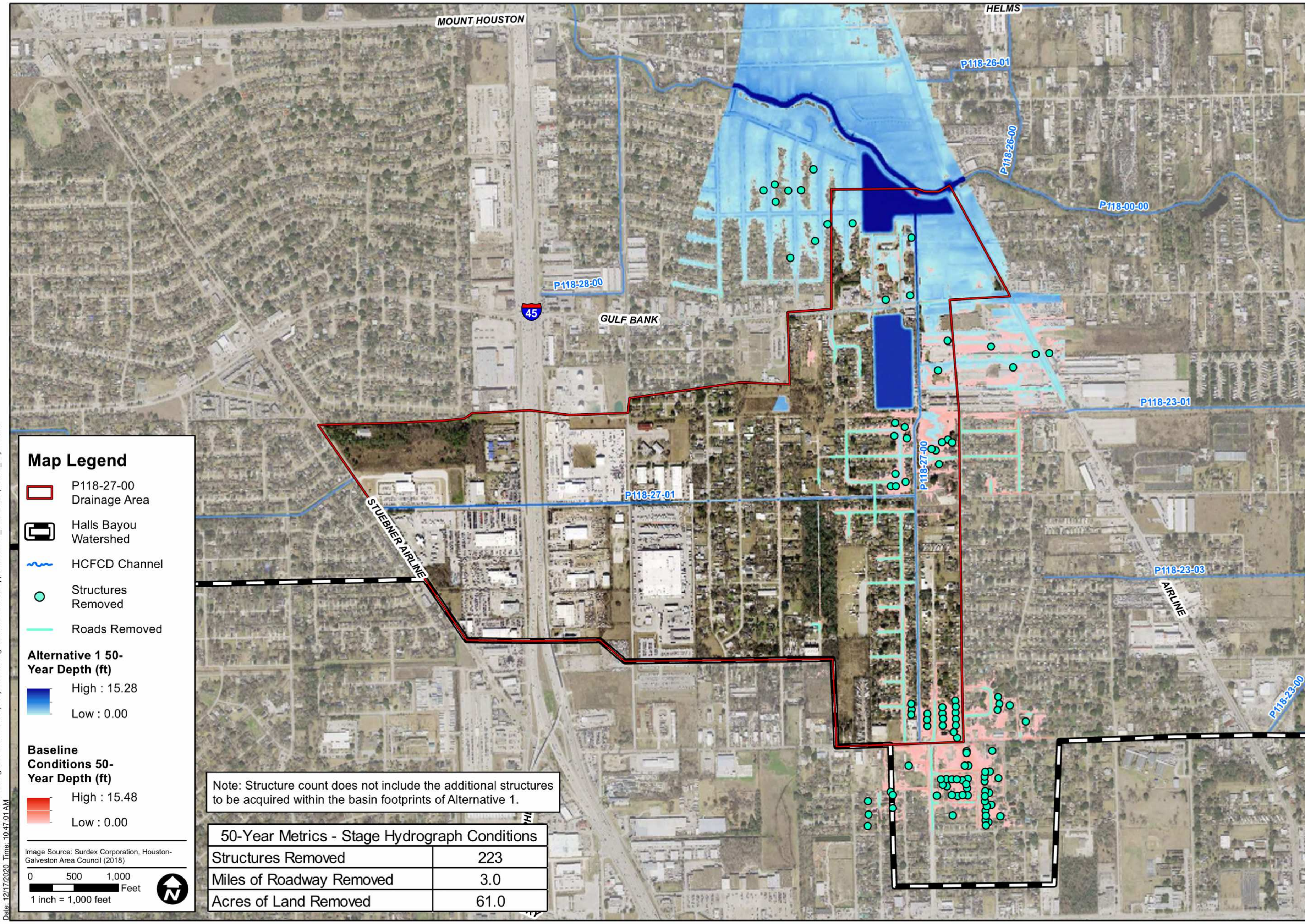

Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Structures Removed
- Roads Removed

Alternative 1 50-Year Depth (ft)

High : 15.28

Low : 0.00

Baseline Conditions 50-Year Depth (ft)

High : 15.48

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 1.

50-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	223
Miles of Roadway Removed	3.0
Acres of Land Removed	61.0

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 1 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

PREPARED: TMM

CHECKED: BJI

APPROVED: CEE

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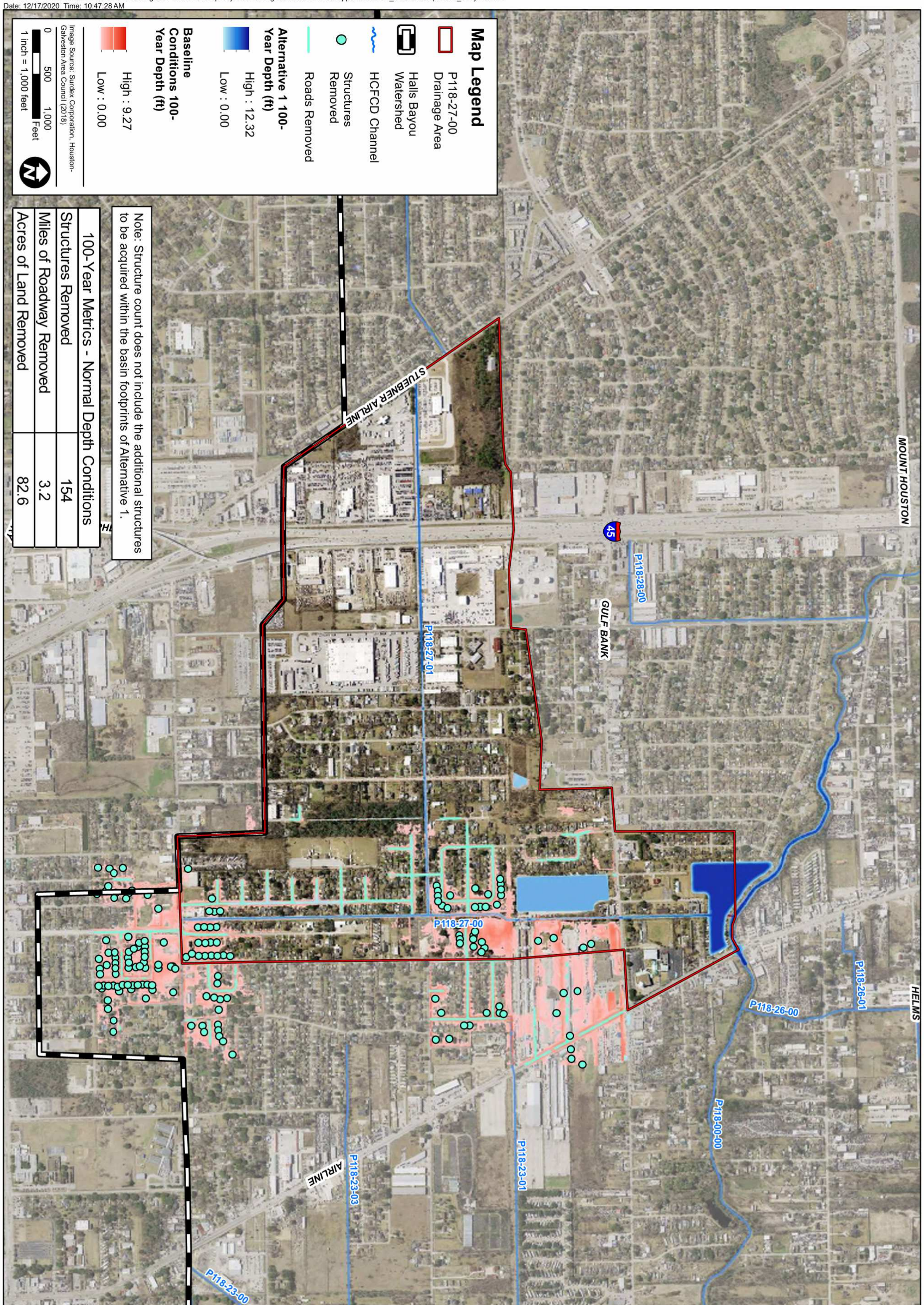

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 1.

100-Year Metrics - Normal Depth Conditions	
Structures Removed	154
Miles of Roadway Removed	3.2
Acres of Land Removed	82.6

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CHECKED: BJI
APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 1 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

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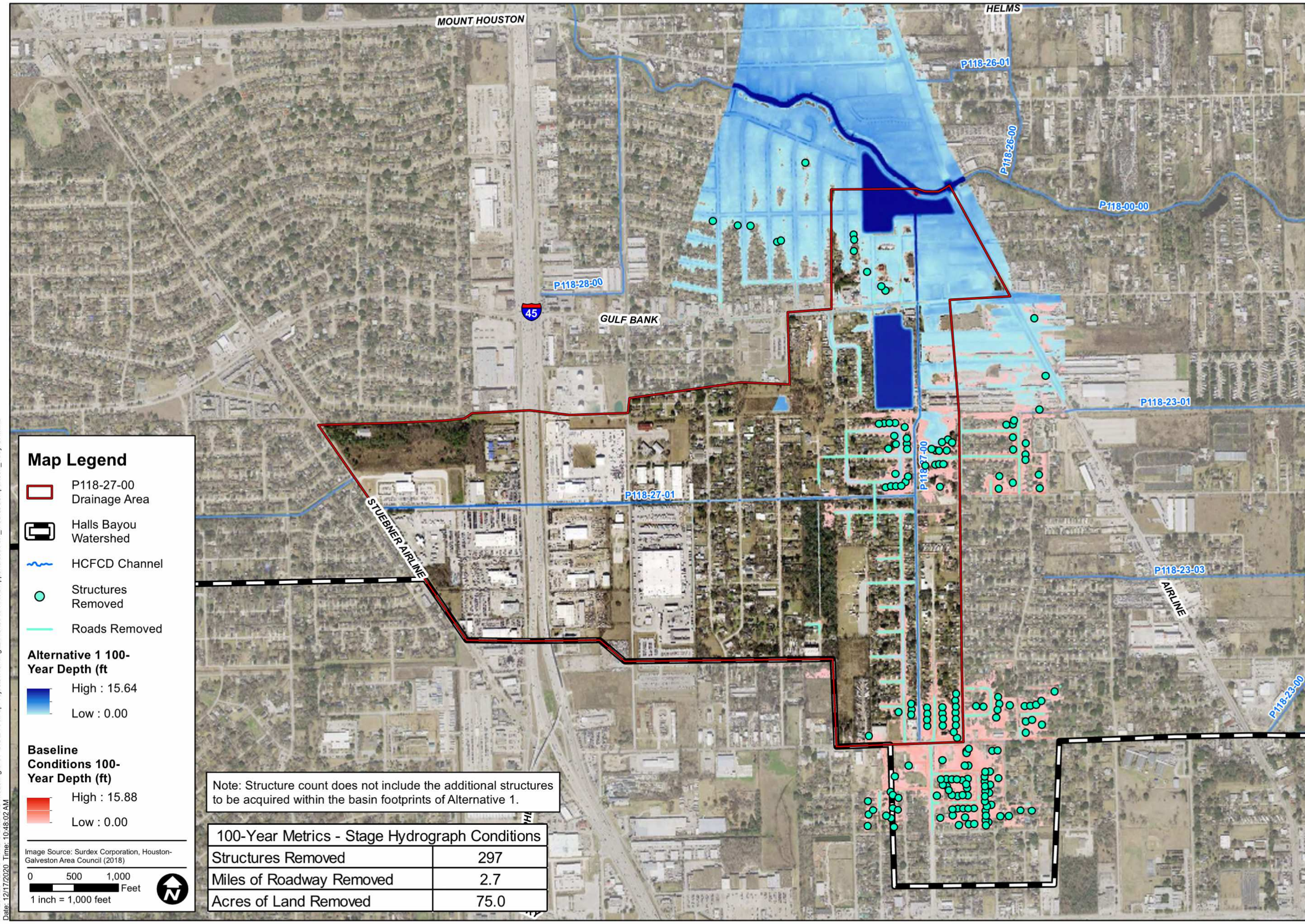

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 1.

100-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	297
Miles of Roadway Removed	2.7
Acres of Land Removed	75.0

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HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 1 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

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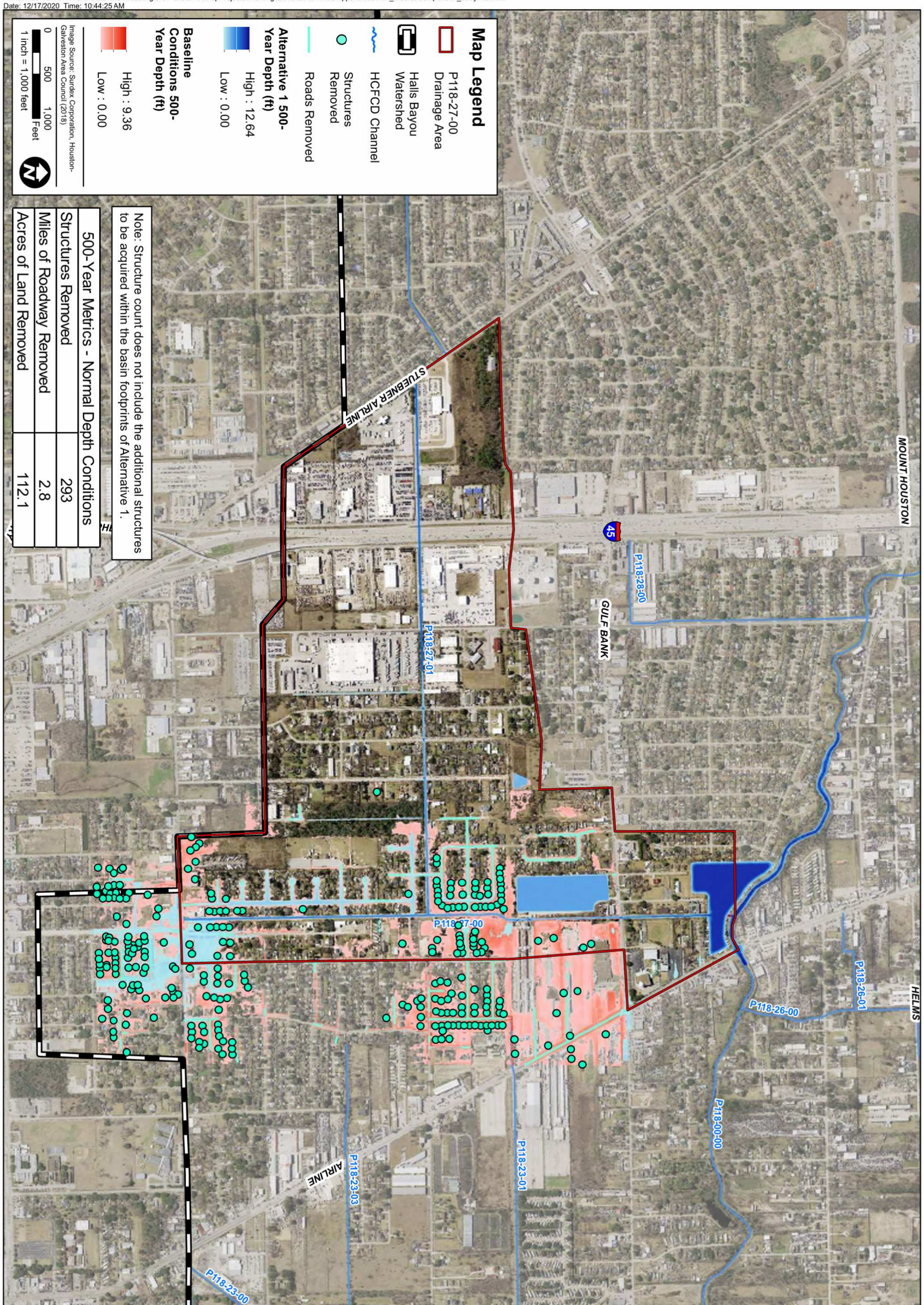

500-Year Metrics - Normal Depth Conditions	
Structures Removed	293
Miles of Roadway Removed	2.8
Acres of Land Removed	112.1

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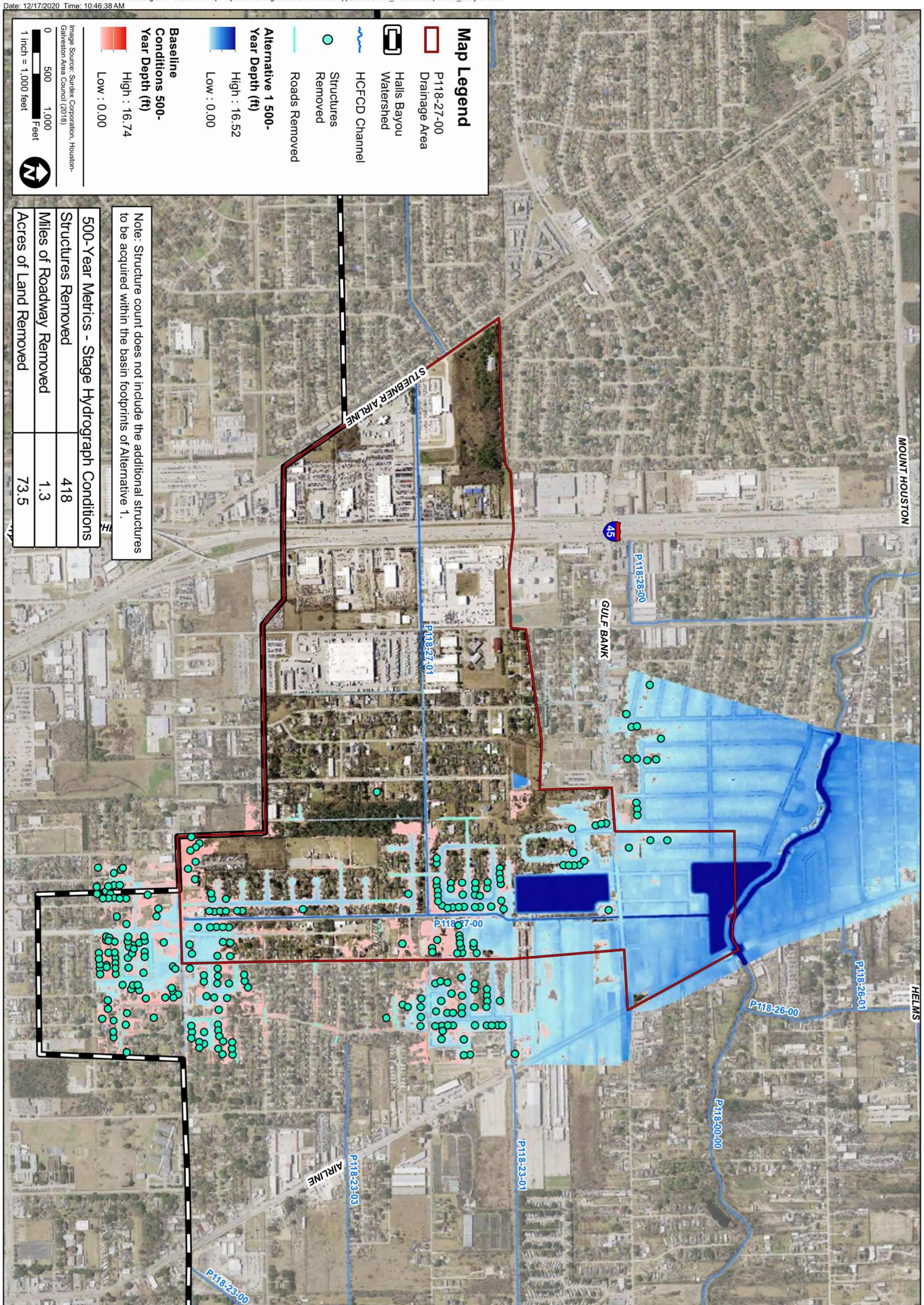
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 1 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)



500-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	418
Miles of Roadway Removed	1.3
Acres of Land Removed	73.5

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P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 1 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

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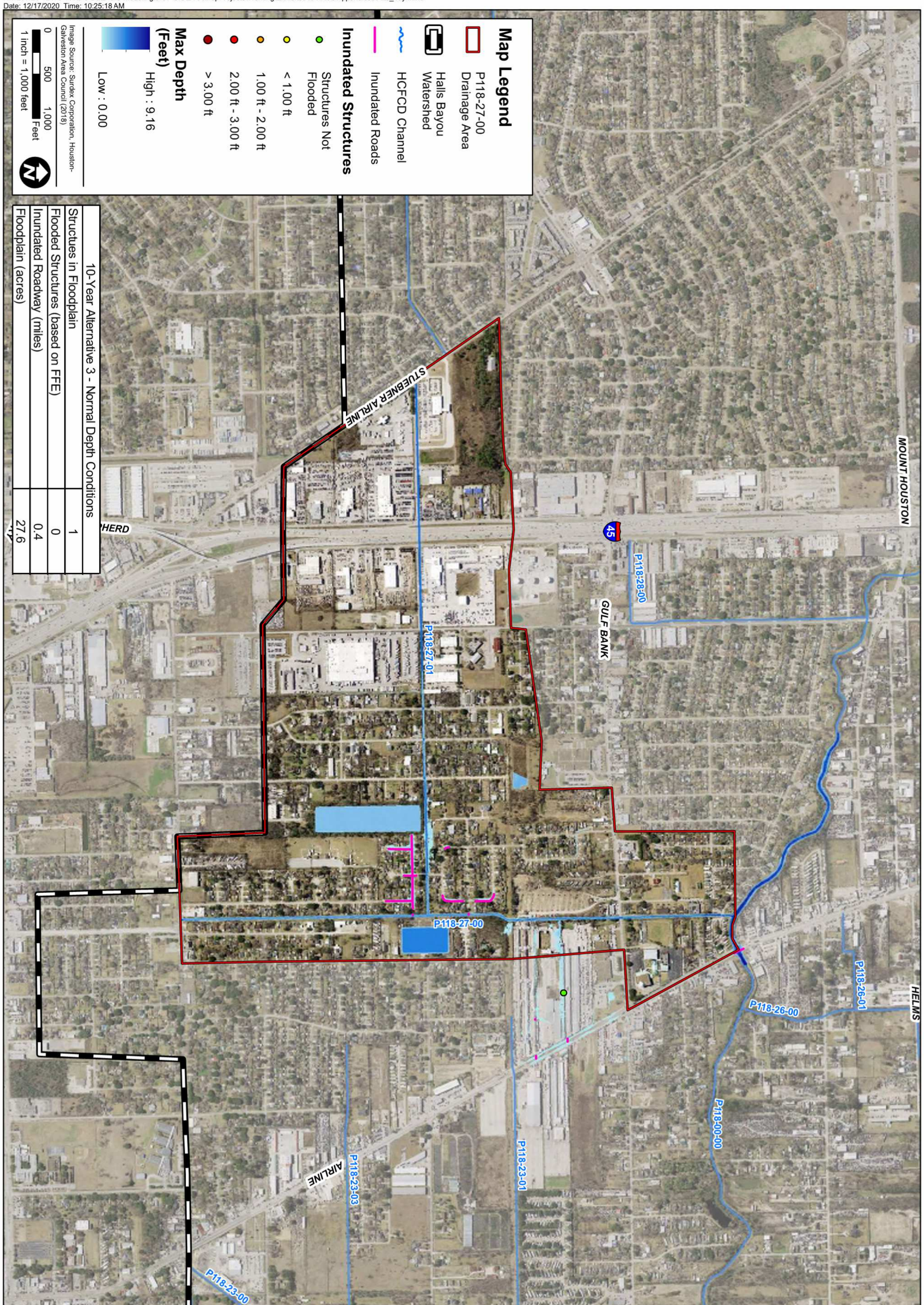

10-Year Alternative 3 - Normal Depth Conditions	
Structures in Floodplain	1
Flooded Structures (based on FFE)	0
Inundated Roadway (miles)	0.4
Floodplain (acres)	27.6

HARRIS COUNTY FLOOD CONTROL DISTRICT
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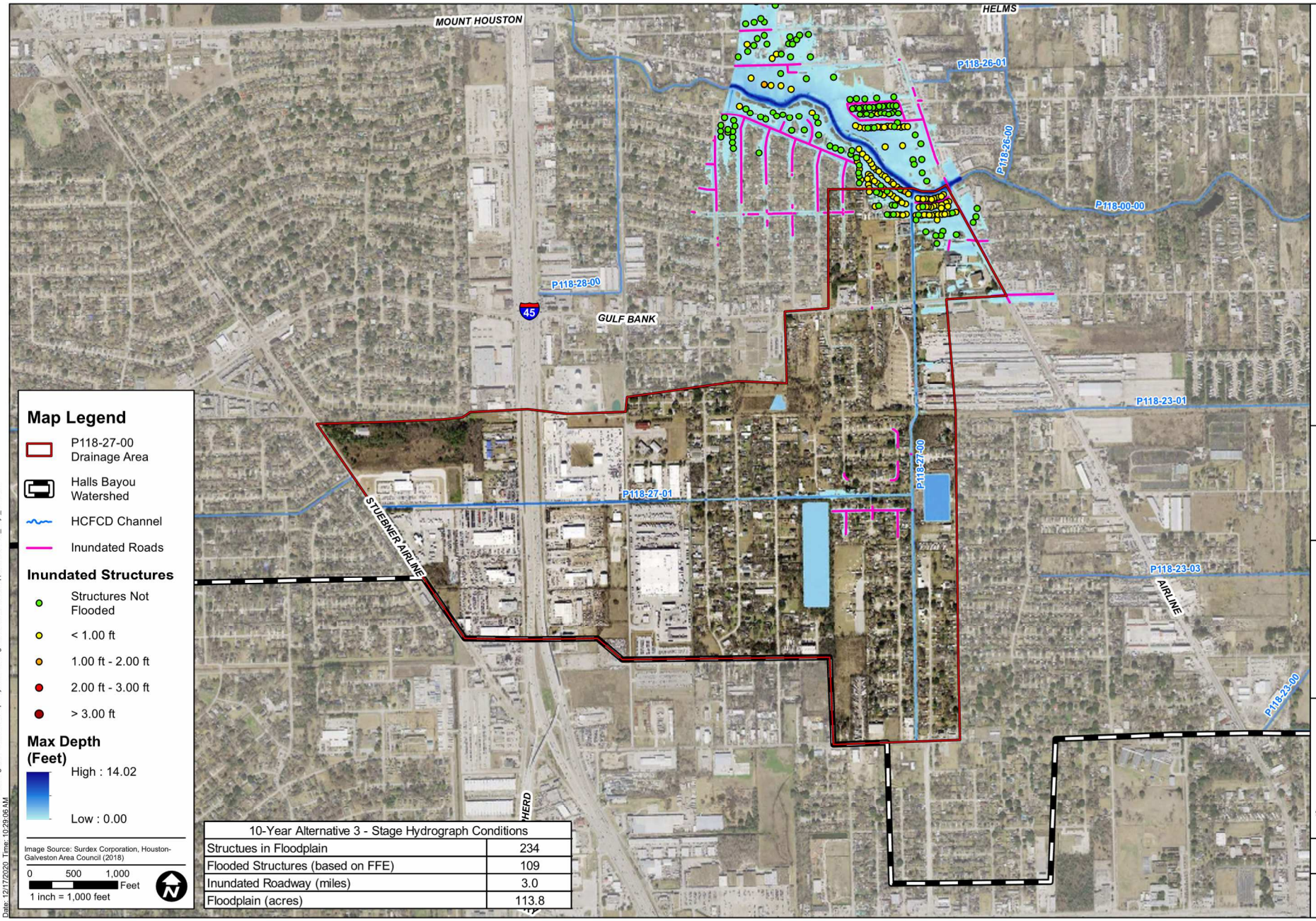
HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 3 PERFORMANCE METRICS
(NORMAL DEPTH TAILWATER)



Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Inundated Roads

Inundated Structures

- Structures Not Flooded
- < 1.00 ft
- 1.00 ft - 2.00 ft
- 2.00 ft - 3.00 ft
- > 3.00 ft

Max Depth (Feet)

High : 14.02

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

10-Year Alternative 3 - Stage Hydrograph Conditions	
Structues in Floodplain	234
Flooded Structures (based on FFE)	109
Inundated Roadway (miles)	3.0
Floodplain (acres)	113.8

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 3 PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

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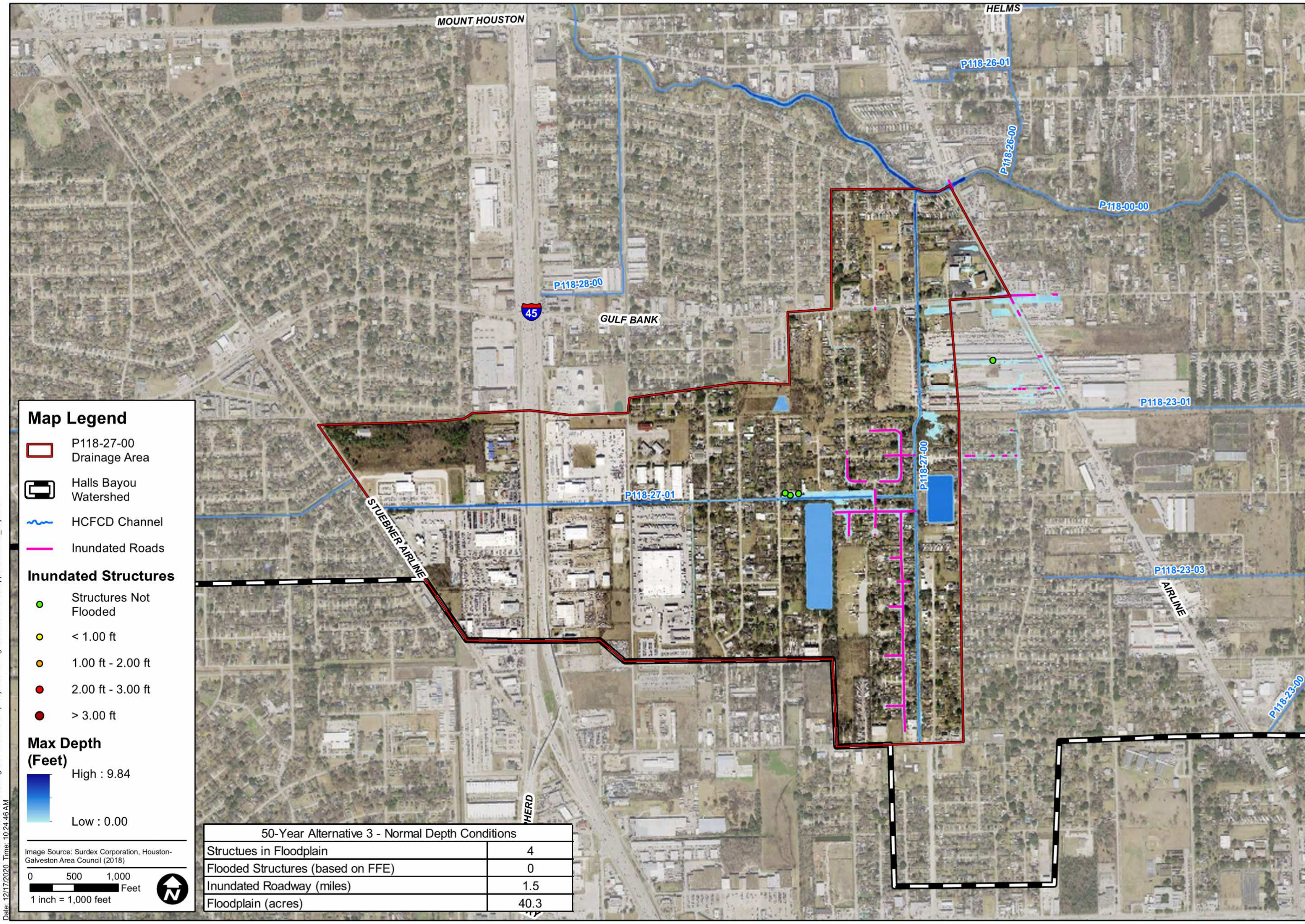

50-Year Alternative 3 - Normal Depth Conditions	
Structues in Floodplain	4
Flooded Structures (based on FFE)	0
Inundated Roadway (miles)	1.5
Floodplain (acres)	40.3

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 3 PERFORMANCE METRICS
(NORMAL DEPTH TAILWATER)

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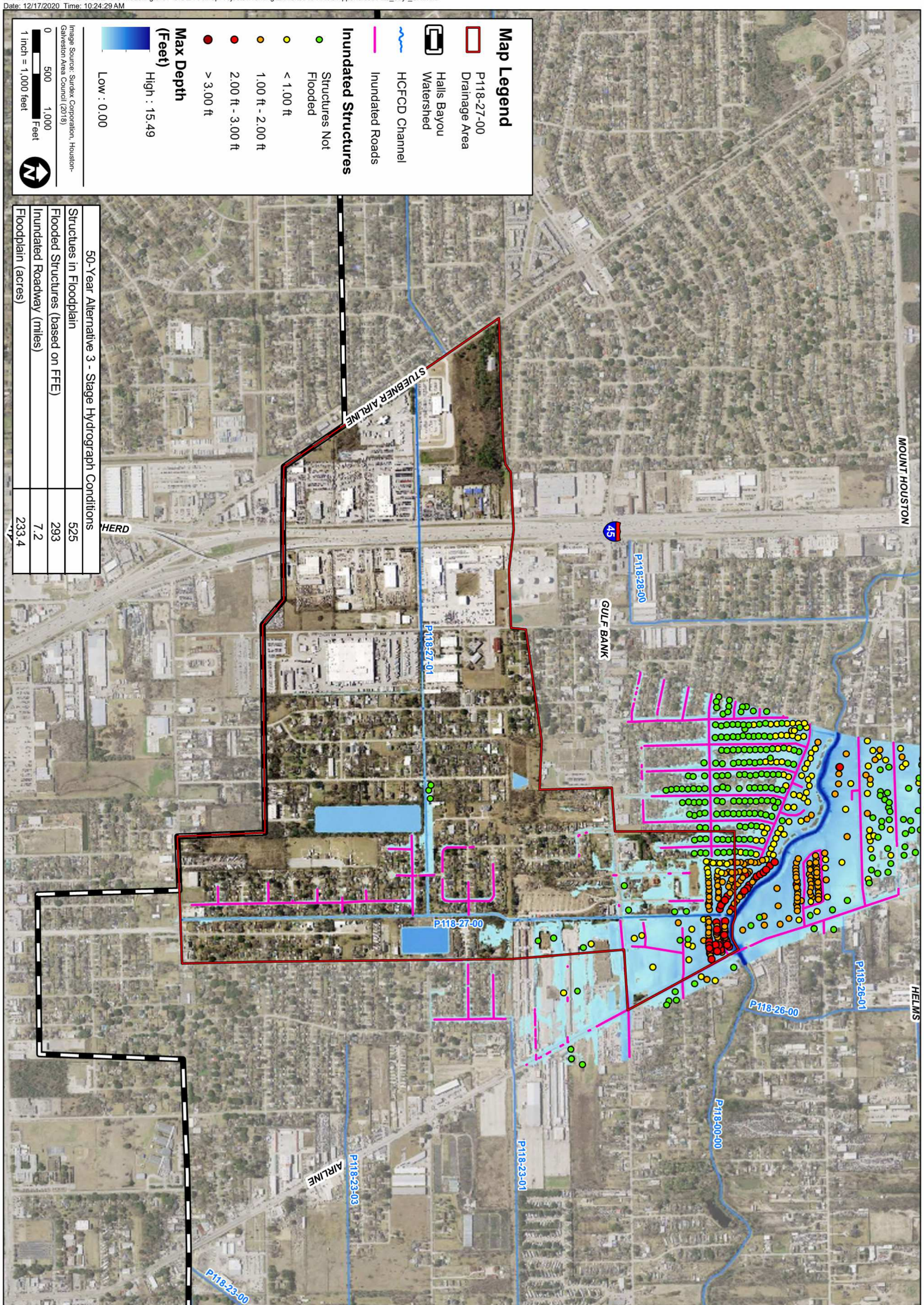

50-Year Alternative 3 - Stage Hydrograph Conditions	
Structures in Floodplain	525
Flooded Structures (based on FFE)	293
Inundated Roadway (miles)	7.2
Floodplain (acres)	233.4

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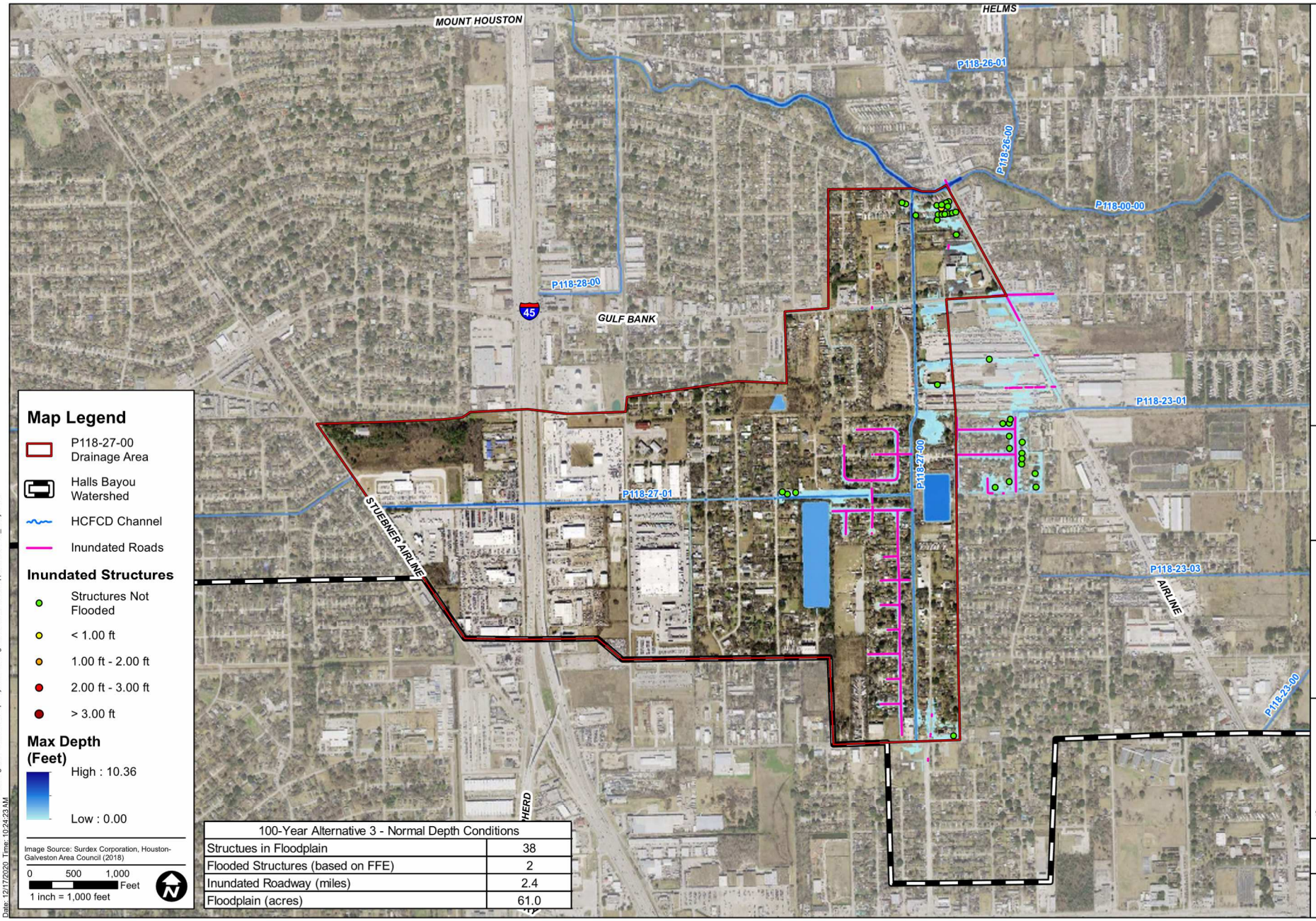
HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 3 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)



Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Inundated Roads

Inundated Structures

- Structures Not Flooded
- < 1.00 ft
- 1.00 ft - 2.00 ft
- 2.00 ft - 3.00 ft
- > 3.00 ft

Max Depth (Feet)

High : 10.36

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

100-Year Alternative 3 - Normal Depth Conditions	
Structues in Floodplain	38
Flooded Structures (based on FFE)	2
Inundated Roadway (miles)	2.4
Floodplain (acres)	61.0

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 3 PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

PREPARED: TMM	CHECKED: BJI	APPROVED: CEE

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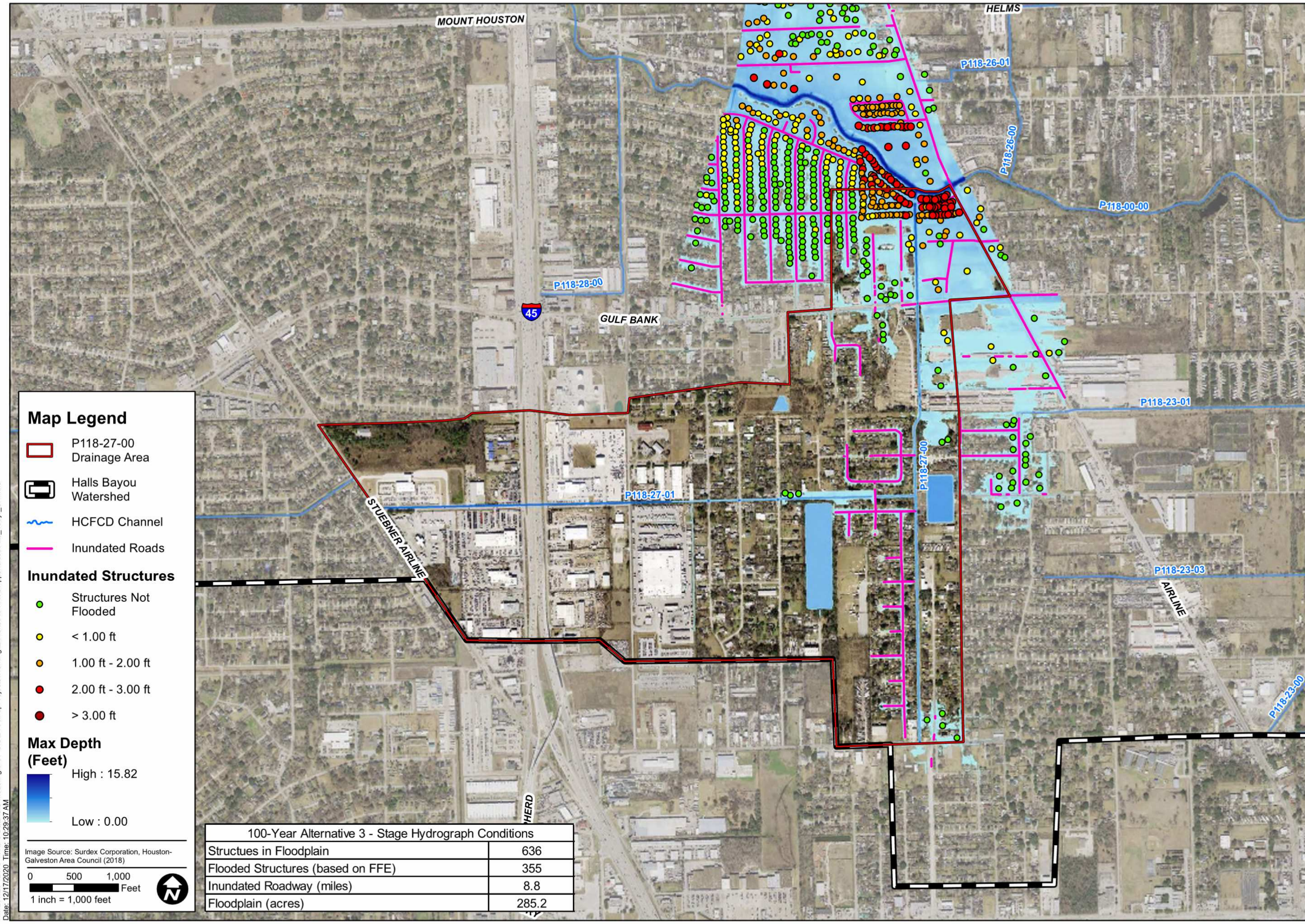

Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Inundated Roads

Inundated Structures

- Structures Not Flooded
- < 1.00 ft
- 1.00 ft - 2.00 ft
- 2.00 ft - 3.00 ft
- > 3.00 ft

Max Depth (Feet)

High : 15.82

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

100-Year Alternative 3 - Stage Hydrograph Conditions	
Structues in Floodplain	636
Flooded Structures (based on FFE)	355
Inundated Roadway (miles)	8.8
Floodplain (acres)	285.2

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 3 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)

PREPARED: TMM
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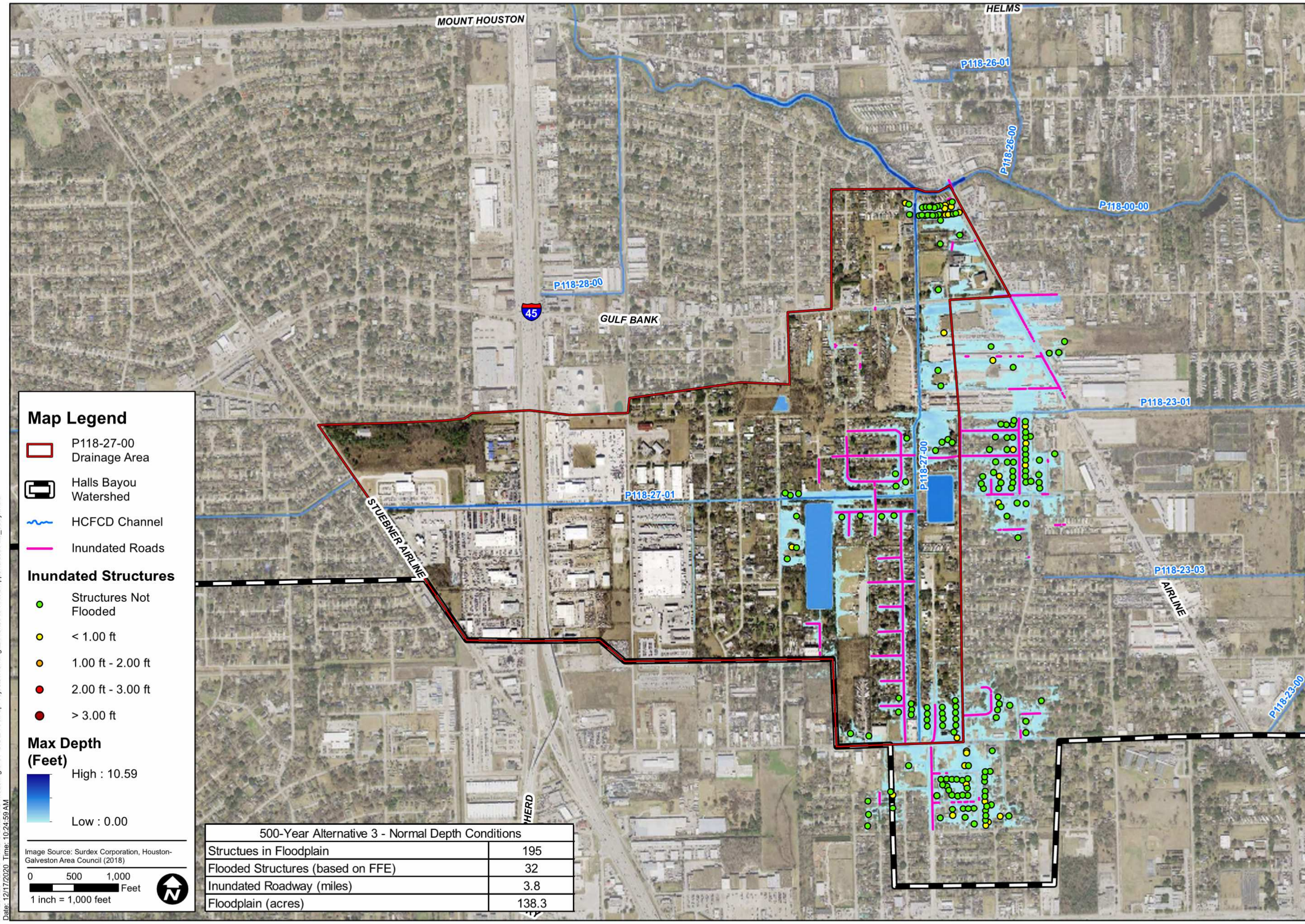

500-Year Alternative 3 - Normal Depth Conditions	
Structues in Floodplain	195
Flooded Structures (based on FFE)	32
Inundated Roadway (miles)	3.8
Floodplain (acres)	138.3

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 3 PERFORMANCE METRICS
(NORMAL DEPTH TAILWATER)

PREPARED: TMM
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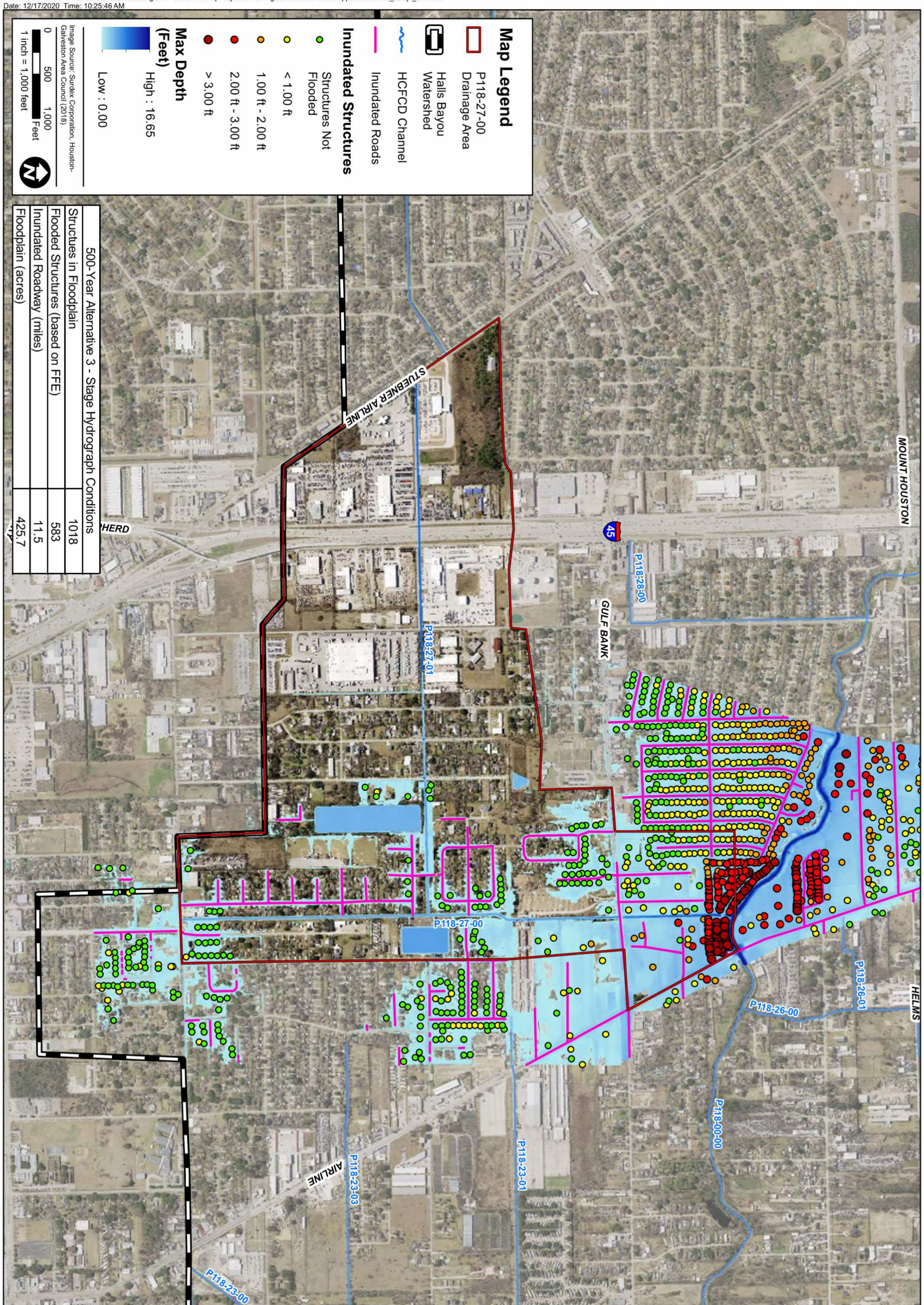

500-Year Alternative 3 - Stage Hydrograph Conditions	
Structures in Floodplain	1018
Flooded Structures (based on FFE)	583
Inundated Roadway (miles)	11.5
Floodplain (acres)	425.7

EXHIBIT
DATE: OCT 2020
SCALE: AS NOTED

HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
Houston, Texas 77092

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE Firm No. 2614
2925 Briarpark Drive • Houston, TX 77042-3720
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PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 3 PERFORMANCE METRICS
(STAGE HYDROGRAPH TAILWATER)

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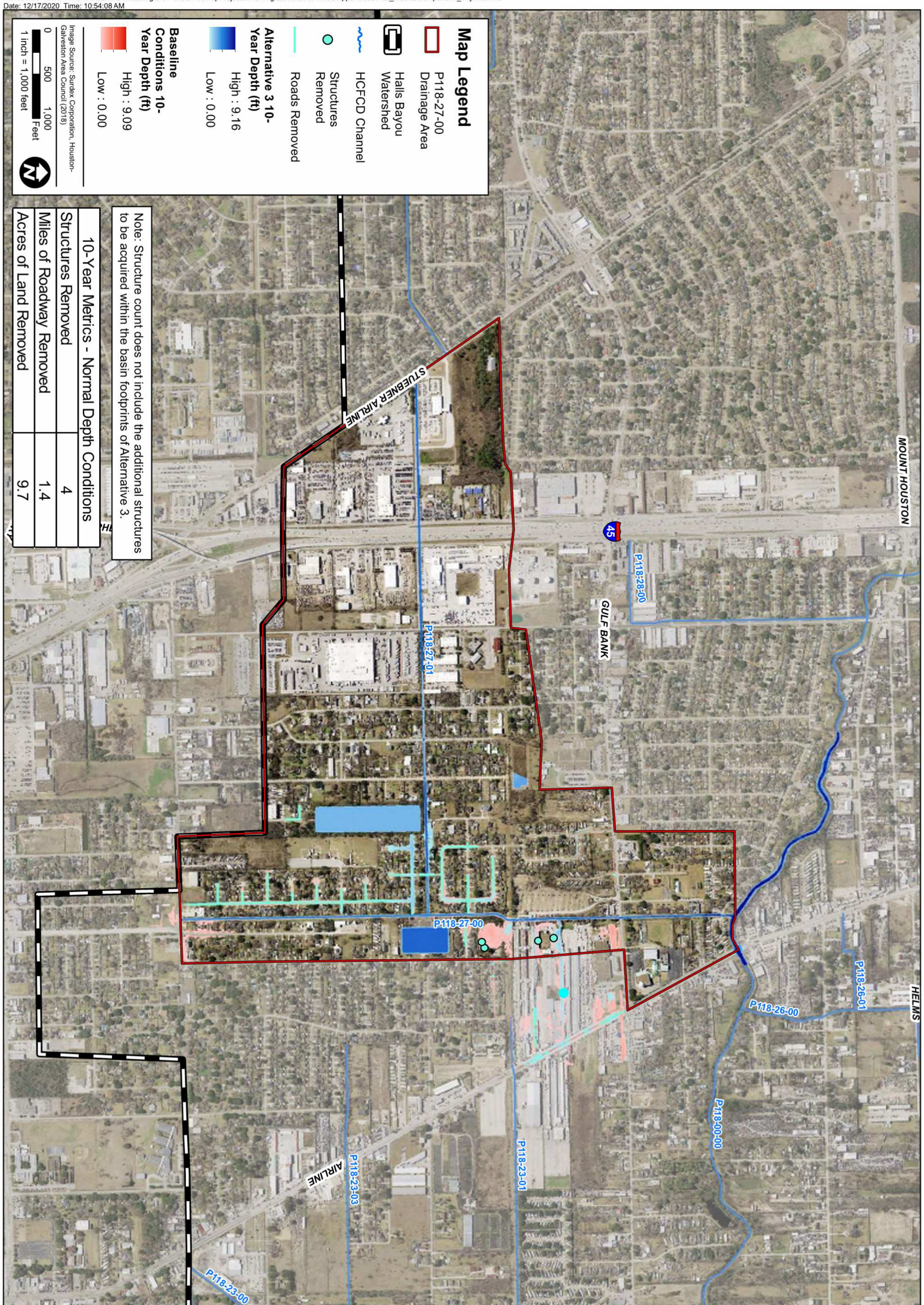

10-Year Metrics - Normal Depth Conditions	
Structures Removed	4
Miles of Roadway Removed	1.4
Acres of Land Removed	9.7

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P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 3 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

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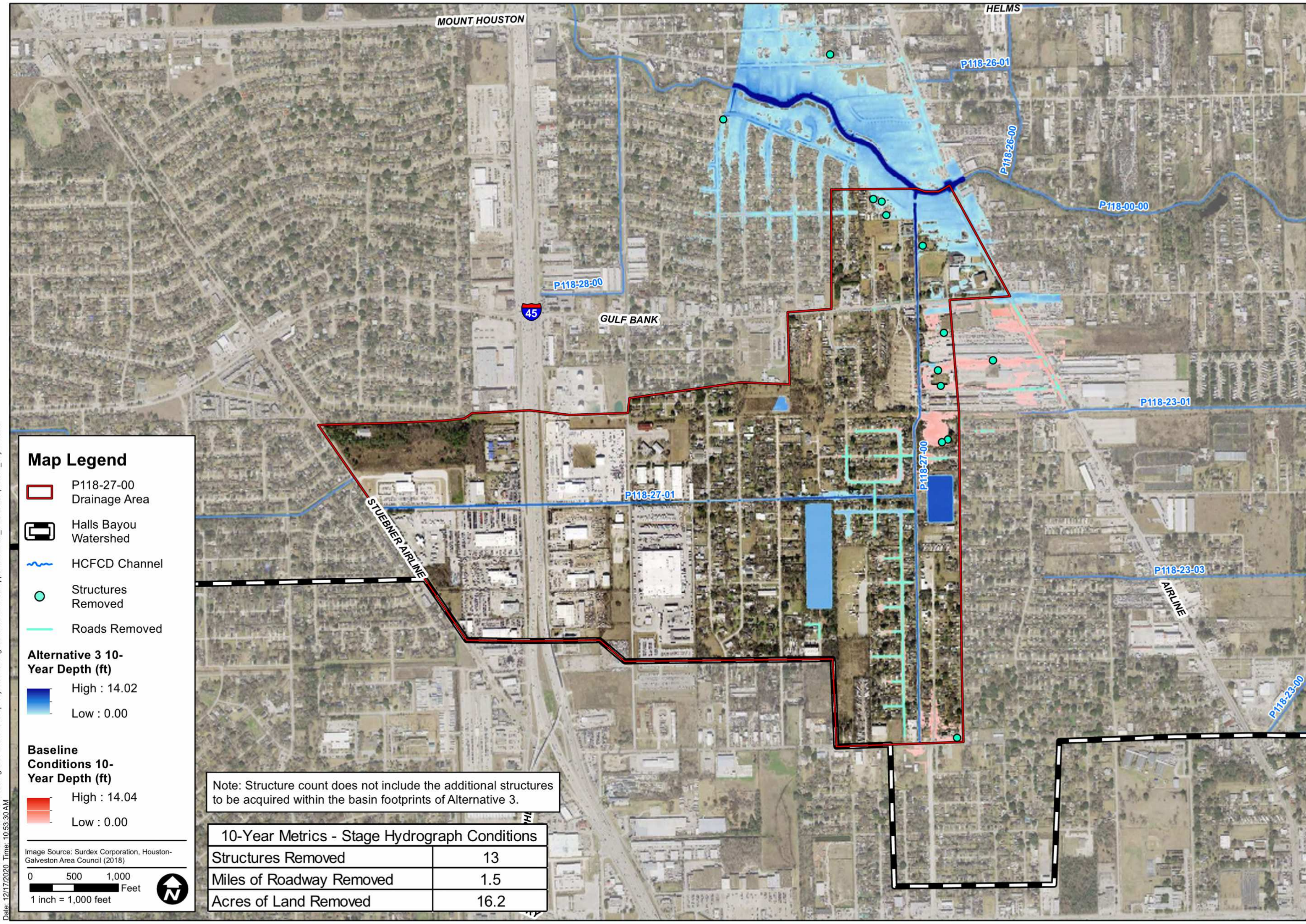

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 3.

10-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	13
Miles of Roadway Removed	1.5
Acres of Land Removed	16.2

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

10-YEAR ALTERNATIVE 3 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

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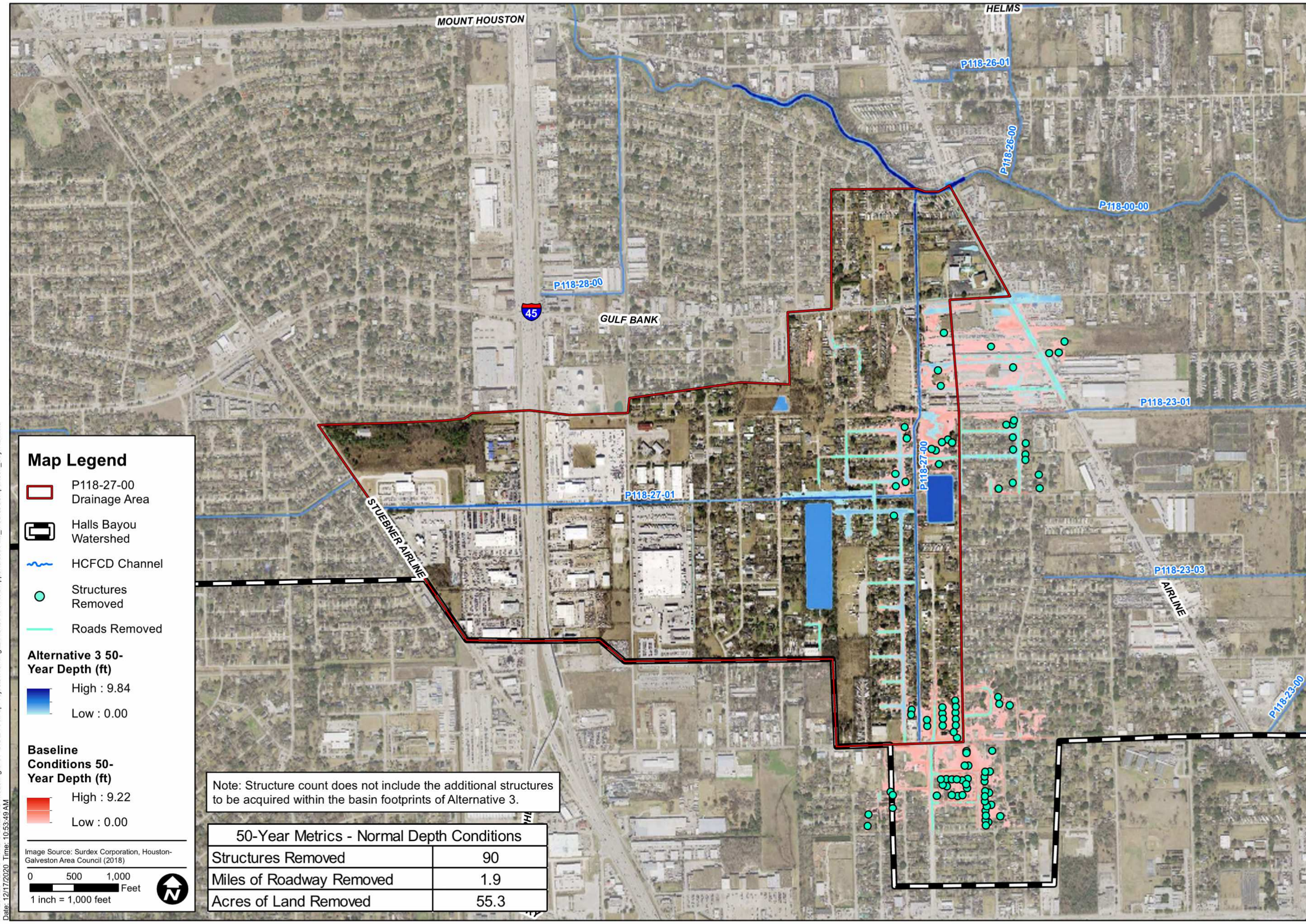

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 3.

50-Year Metrics - Normal Depth Conditions	
Structures Removed	90
Miles of Roadway Removed	1.9
Acres of Land Removed	55.3

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

50-YEAR ALTERNATIVE 3 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

PREPARED: TMM
CHECKED: BJI
APPROVED: CEE

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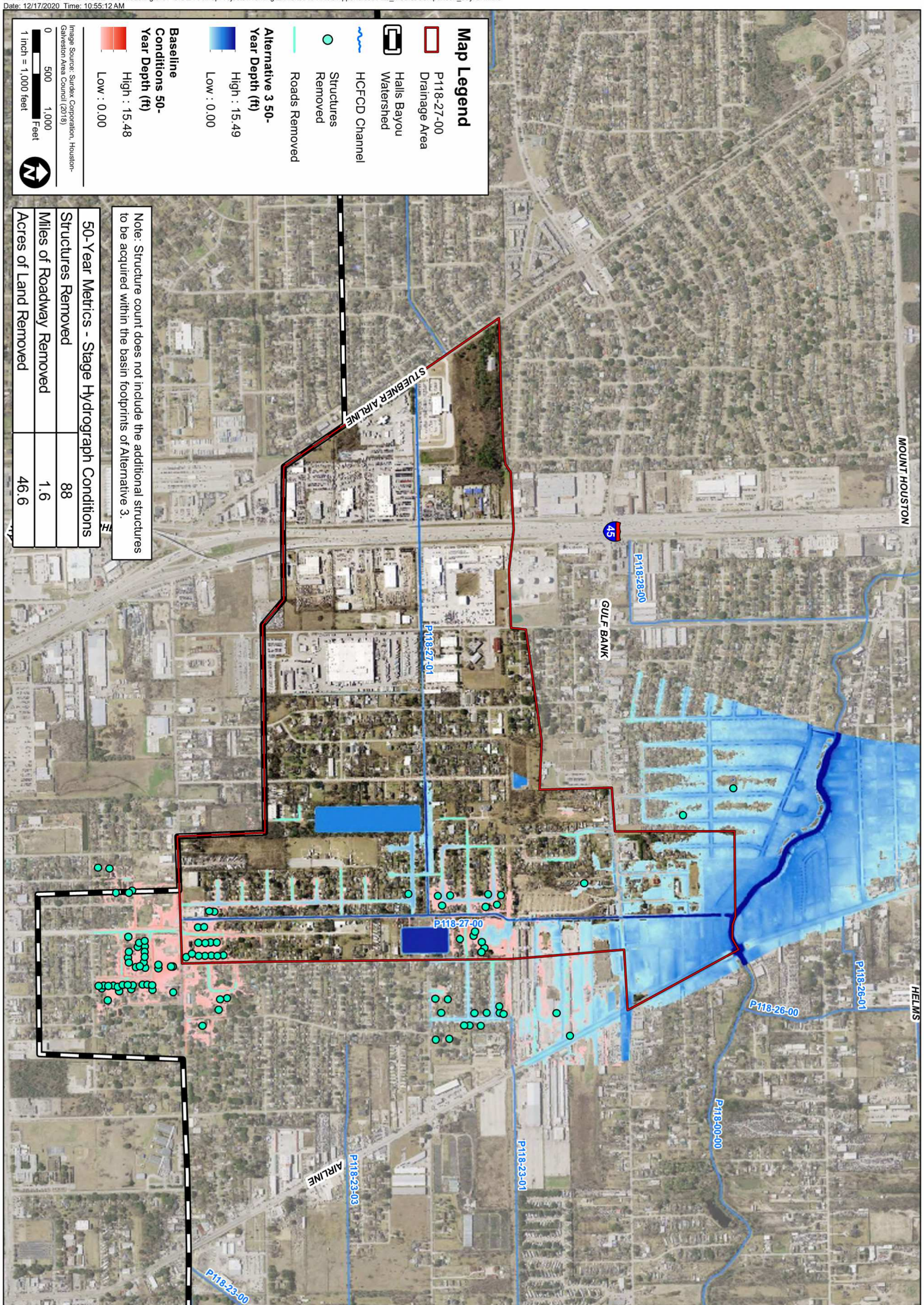

50-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	88
Miles of Roadway Removed	1.6
Acres of Land Removed	46.6

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50-YEAR ALTERNATIVE 3 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

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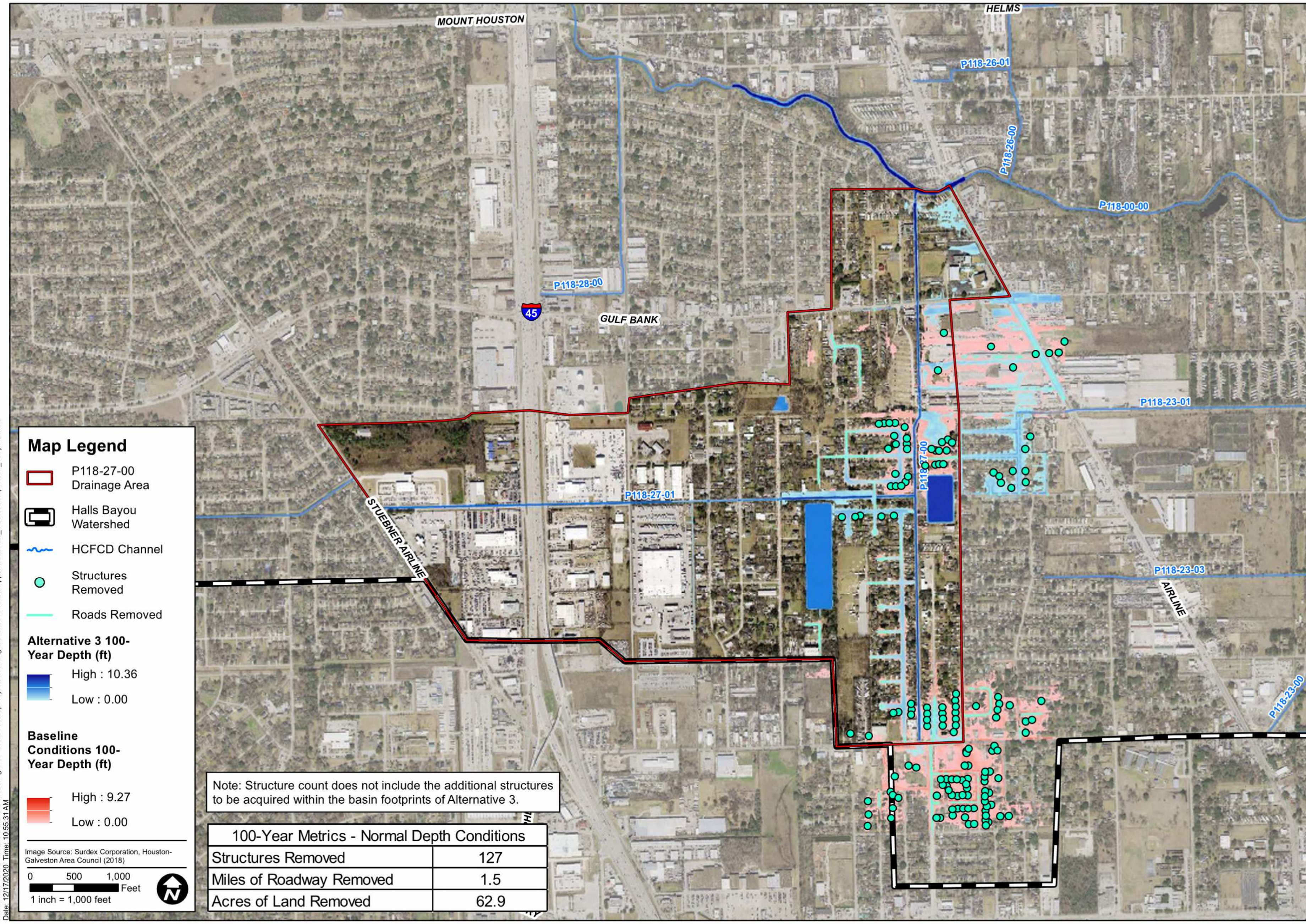

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 3.

100-Year Metrics - Normal Depth Conditions	
Structures Removed	127
Miles of Roadway Removed	1.5
Acres of Land Removed	62.9

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 3 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

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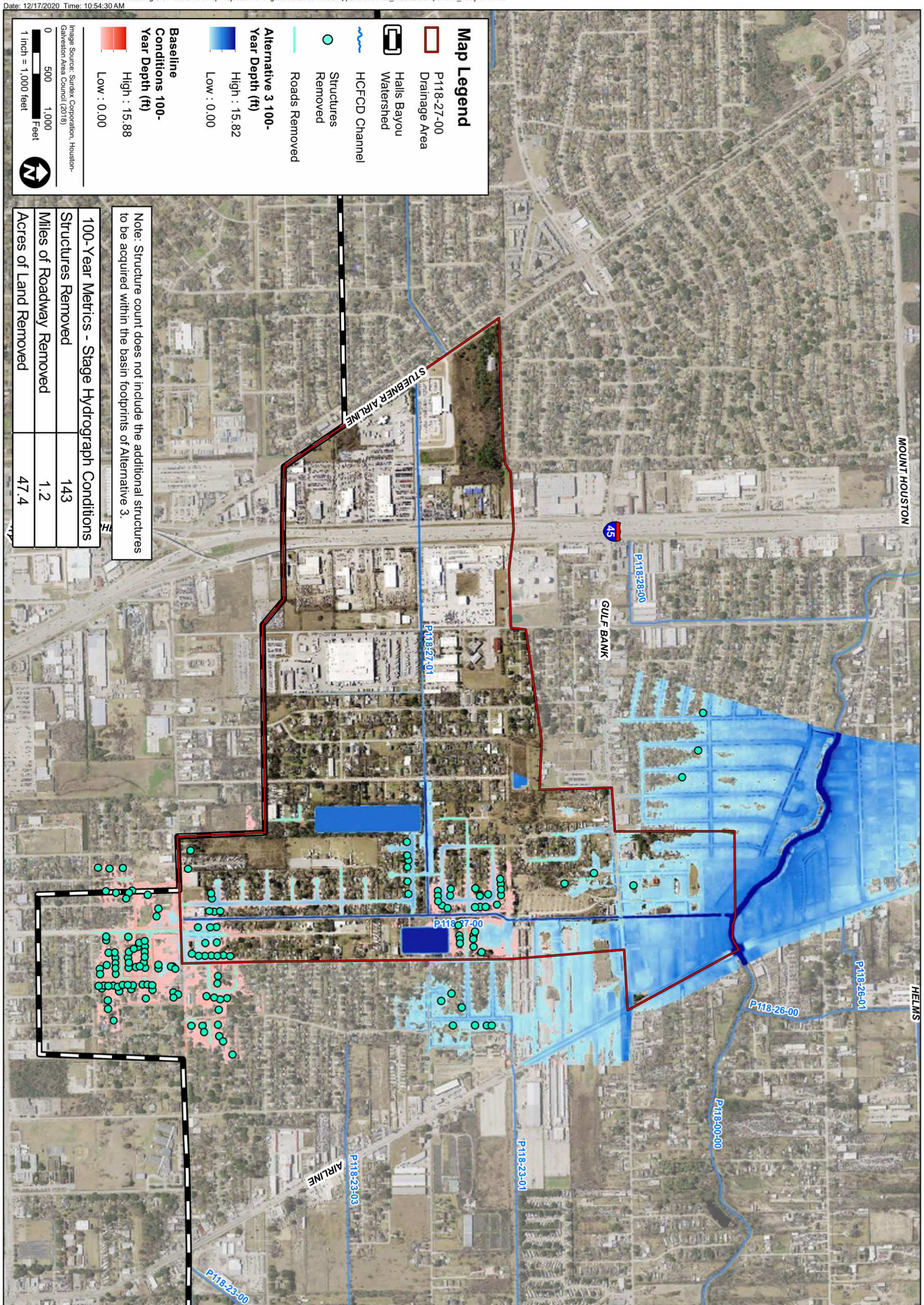

100-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	143
Miles of Roadway Removed	1.2
Acres of Land Removed	47.4

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P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

100-YEAR ALTERNATIVE 3 VS.
BASELINE CONDITIONS COMPARISON
PERFORMANCE METRICS (STAGE HYDROGRAPH TAILWATER)

N:\120\120-12170-111\9-0-Data-GIS-Modeling\9-01-GIS\2-ArcMapProjects\Working\Exhibits\Alt 1 Alt 3 Appendices\Alt3_MetricsComparison_500yrND.mxd
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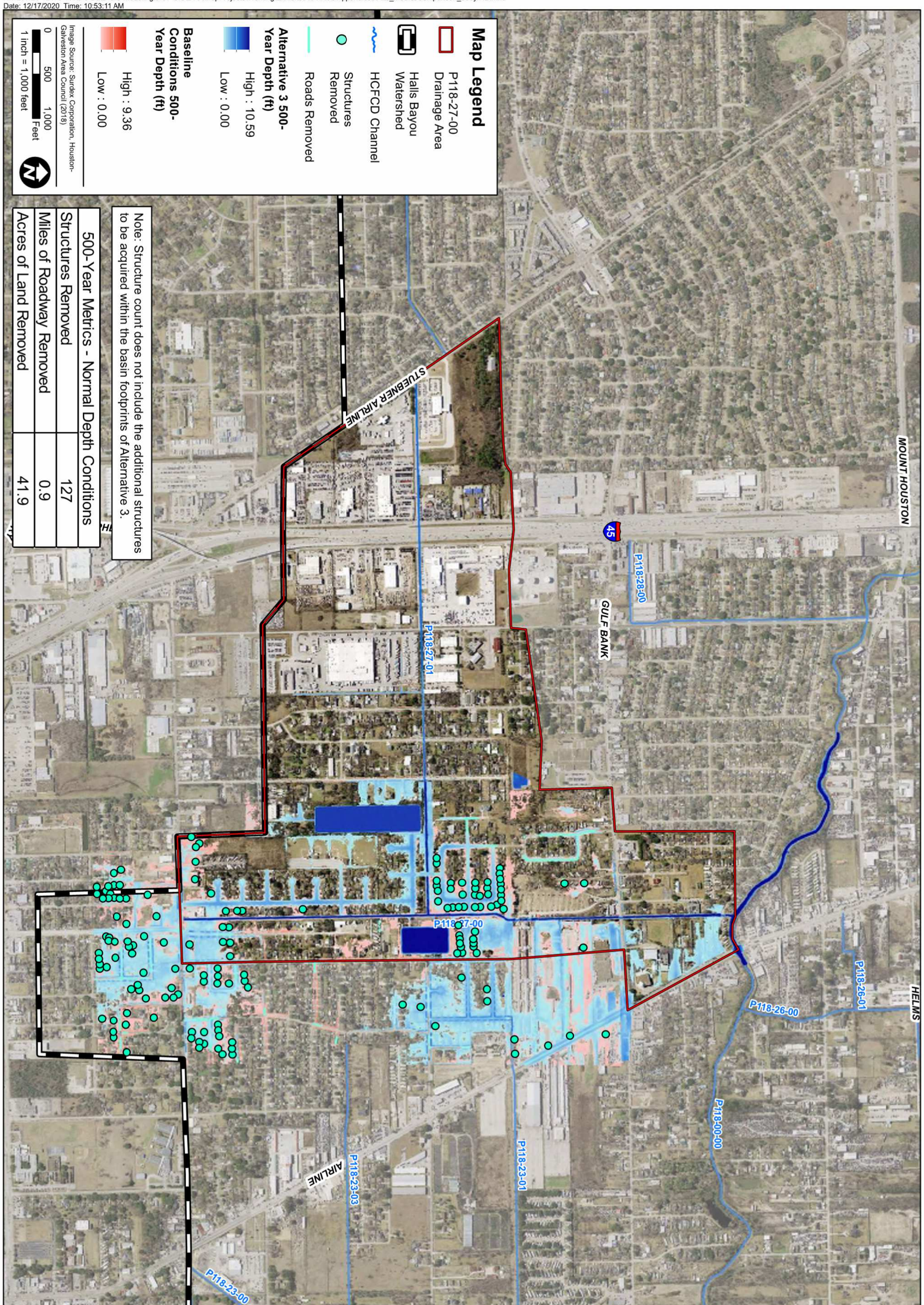

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 3.

500-Year Metrics - Normal Depth Conditions	
Structures Removed	127
Miles of Roadway Removed	0.9
Acres of Land Removed	41.9

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500-YEAR ALTERNATIVE 3 VS. BASELINE CONDITIONS COMPARISON PERFORMANCE METRICS (NORMAL DEPTH TAILWATER)

N:\120\120-12170-111\9-0-Data-GIS-Modeling\9-01-GIS\2-ArcMapProjects\Working\Exhibits\Alt 1 Alt 3 Appendices\Alt3_MetricsComparison_500yrSH.mxd
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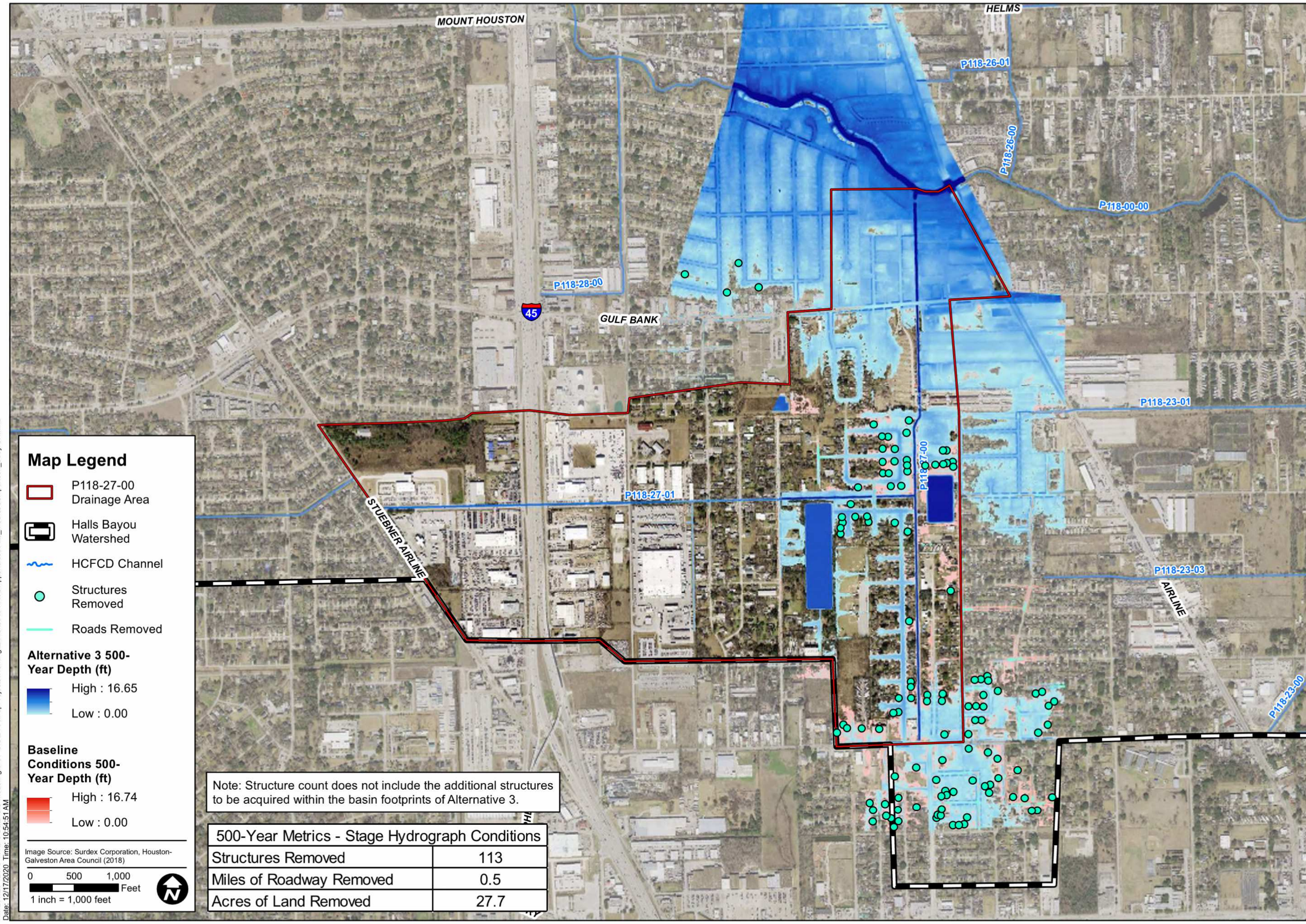

Map Legend

- P118-27-00 Drainage Area
- Halls Bayou Watershed
- HCFCD Channel
- Structures Removed
- Roads Removed

Alternative 3 500-Year Depth (ft)

High : 16.65

Low : 0.00

Baseline Conditions 500-Year Depth (ft)

High : 16.74

Low : 0.00

Image Source: Surdex Corporation, Houston-Galveston Area Council (2018)

0 500 1,000 Feet

1 inch = 1,000 feet

Note: Structure count does not include the additional structures to be acquired within the basin footprints of Alternative 3.

500-Year Metrics - Stage Hydrograph Conditions	
Structures Removed	113
Miles of Roadway Removed	0.5
Acres of Land Removed	27.7

HCFCD HALLS BAYOU WATERSHED
P118-27-00 ALTERNATIVES ANALYSIS OF DRAINAGE IMPROVEMENTS

500-YEAR ALTERNATIVE 3 VS.
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Appendix N

Detailed Hydraulic Calculations

HEC-RAS Plan: Baseline_500_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-30.92	72.56	78.81		78.81	0.000001	-0.24	176.39	166.34	0.02
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-201.77	72.31	78.76		78.8	0.000034	-1.58	145.8	213.13	0.14
P118-27-00	P118-27-00	5321.96	Max WS	-167.58	72.13	78.79		78.82	0.000022	-1.28	133.58	659.66	0.11
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	-103.29	71.84	78.83		78.84	0.000007	-0.76	137.94	253.94	0.06
P118-27-00	P118-27-00	4300.35	Max WS	-37.1	71.56	78.85		78.85	0.000001	-0.26	144.15	298.58	0.02
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	18.32	71.38	78.85		78.85	0	0.12	150.71	545.36	0.01
P118-27-00	P118-27-00	3444.22	Max WS	5.85	71.25	78.85		78.85	0	0.04	204.21	984.16	0
P118-27-00	P118-27-00	3374.42	Max WS	458.71	72.06	78.65		78.78	0.000899	2.86	164.96	654.83	0.24
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	416.26	71.59	78.51		78.54	0.000257	1.63	808.52	859.77	0.13
P118-27-00	P118-27-00	2525.84	Max WS	391.39	71.22	78.37		78.41	0.000314	1.83	339.46	580.69	0.14
P118-27-00	P118-27-00	2485.48	Max WS	410.66	71.53	78.33		78.4	0.000296	2.06	199.74	369.26	0.15
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	410.65	71.1	77.99		78.07	0.000443	2.22	185.14	189.84	0.17
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	414.28	71.1	77.88		78.04	0.001316	3.14	131.77	246.29	0.28
P118-27-00	P118-27-00	2381.57	Max WS	416.56	71.1	77.84		78.01	0.001518	3.28	126.95	219.49	0.3
P118-27-00	P118-27-00	2351.35	Max WS	419.7	71.09	77.88		77.98	0.000564	2.47	169.76	235.32	0.19
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	419.7	70.77	77.79		77.86	0.000417	2.07	203.02	300.09	0.16
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	398.83	71.09	77.75		77.85	0.000756	2.68	252.82	306.96	0.22
P118-27-00	P118-27-00	1817.26	Max WS	343.99	70.49	77.38		77.49	0.001036	2.73	157.98	339.91	0.25
P118-27-00	P118-27-00	1360.33	Max WS	330.47	69.94	77.03		77.11	0.000652	2.27	145.85	234.02	0.2
P118-27-00	P118-27-00	1314.62	Max WS	360.21	69.66	77.02		77.08	0.000267	1.92	187.14	2627.08	0.14
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	360.15	69.66	74.59		74.81	0.002195	3.8	94.68	734.16	0.36
P118-27-00	P118-27-00	1198.35	Max WS	363.96	68.64	74.54		74.7	0.001416	3.21	113.33	29.44	0.29
P118-27-00	P118-27-00	763.46	Max WS	399.92	66.19	74.14		74.23	0.00057	2.45	191.72	115.21	0.18
P118-27-00	P118-27-00	465.31	Max WS	420.37	66.88	73.8		73.95	0.001256	3.13	134.3	33.47	0.28
P118-27-00	P118-27-00	448.57	Max WS	421.48	66.75	73.78	70.55	73.93	0.00126	3.13	134.53	33.4	0.28
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	421.48	66.8	73.73		73.9	0.001398	3.28	128.51	32.04	0.29
P118-27-00	P118-27-00	429.17	Max WS	422.09	66.81	73.72	70.66	73.89	0.000147	3.26	129.47	32.63	0.29
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	422.09	66.86	73.69		73.87	0.001527	3.37	125.08	32.11	0.3
P118-27-00	P118-27-00	399.43	Max WS	423.12	66.84	73.65		73.84	0.001656	3.46	122.15	32.15	0.31
P118-27-00	P118-27-00	173.97	Max WS	436.52	63.5	73.53		73.6	0.000376	2.07	210.99	37.62	0.15
P118-27-00	P118-27-00	157.99	Max WS	437.48	64.25	73.52		73.59	0.0003	2.16	202.32	37.48	0.14
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	437.45	63.63	70.23		70.43	0.001567	3.6	121.44	27.5	0.3
P118-27-00	P118-27-00	86.09	Max WS	438.43	63.19	70.16		70.4	0.00218	3.94	111.16	28.98	0.36
P118-27-00	P118-27-00	61.59	Max WS	440.44	62.69	70.16		70.35	0.001699	3.55	124.16	31.76	0.32
P118-27-00	P118-27-00	47.31	Max WS	440.44	62.51	70.2		70.33	0.001032	2.96	148.9	34.53	0.25
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.53		70.57	0.00013	1.51	265.05	43.22	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.41		70.45	0.000135	1.49	267.68	45.03	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.98	60.14	70.29		70.31	0.000079	1.22	326.55	49.65	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	399.98	60.08	70.27		70.29	0.000066	1.1	363.07	59.33	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.97	60.08	70.26		70.28	0.000066	1.1	363.46	59.31	0.08
P118-00-00	P118-R3-3	73723	Max WS	840.46	60.05	70.18		70.26	0.000301	2.34	358.88	58.89	0.17
P118-00-00	P118-R3-3	73423.3	Max WS	840.45	60	70.11	63.93	70.17	0.000296	1.89	444.56	66.92	0.13
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	840.45	59.83	70.08		70.13	0.000279	1.85	453.62	67.15	0.13
P118-00-00	P118-R3-3	73232.3	Max WS	840.45	59.83	70.05	63.76	70.1	0.000283	1.86	451.71	67.1	0.13

HEC-RAS Plan: Baseline_100_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-20.43	72.56	78.54		78.54	0	-0.17	148.38	134.96	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-103.32	72.31	78.52		78.53	0.000011	-0.86	122.9	123.38	0.08
P118-27-00	P118-27-00	5321.96	Max WS	-78.03	72.13	78.54		78.55	0.000006	-0.63	123.23	497.09	0.06
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-33.09	71.84	78.55		78.55	0.000001	-0.26	128.26	132.11	0.02
P118-27-00	P118-27-00	4300.35	Max WS	13.06	71.56	78.55		78.55	0	0.1	133.63	166.32	0.01
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	53.54	71.38	78.55		78.55	0.000002	0.38	139.52	402.54	0.03
P118-27-00	P118-27-00	3444.22	Max WS	49.55	71.25	78.55		78.55	0.000001	0.34	161.01	448.44	0.03
P118-27-00	P118-27-00	3374.42	Max WS	365.21	72.06	78.35		78.44	0.000705	2.44	151.06	319.93	0.21
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	347.94	71.59	78.21		78.25	0.000293	1.67	582.62	654.58	0.14
P118-27-00	P118-27-00	2525.84	Max WS	346.11	71.22	78.06		78.1	0.000321	1.78	298.95	379.13	0.14
P118-27-00	P118-27-00	2485.48	Max WS	366.27	71.53	78.03		78.09	0.000277	1.93	190.11	213.83	0.14
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	366.26	71.1	77.76		77.83	0.00041	2.07	176.99	154.75	0.16
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	368.81	71.1	77.67		77.8	0.001215	2.96	124.51	175.55	0.27
P118-27-00	P118-27-00	2381.57	Max WS	370.39	71.1	77.63		77.78	0.001401	3.1	119.67	147.31	0.29
P118-27-00	P118-27-00	2351.35	Max WS	372.56	71.09	77.67		77.75	0.000502	2.28	163.09	175.66	0.18
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	372.54	70.77	77.61		77.66	0.000374	1.91	195.35	197.23	0.15
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	357.32	71.09	77.56		77.65	0.000719	2.56	221.76	201.99	0.21
P118-27-00	P118-27-00	1817.26	Max WS	320.88	70.49	77.17		77.29	0.001074	2.73	135.44	209.72	0.25
P118-27-00	P118-27-00	1360.33	Max WS	319.38	69.94	76.8		76.88	0.000714	2.32	137.59	188.6	0.21
P118-27-00	P118-27-00	1314.62	Max WS	342.97	69.66	76.79		76.85	0.000276	1.91	180.03	2342.49	0.14
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	342.72	69.66	74.13		74.4	0.003085	4.16	82.41	292.89	0.42
P118-27-00	P118-27-00	1198.35	Max WS	345.36	68.64	74.07		74.26	0.001802	3.46	99.73	27.81	0.32
P118-27-00	P118-27-00	763.46	Max WS	370.25	66.19	73.6		73.7	0.000657	2.54	146.22	47.2	0.19
P118-27-00	P118-27-00	465.31	Max WS	384.42	66.88	73.17		73.35	0.001623	3.37	114.19	30.96	0.31
P118-27-00	P118-27-00	448.57	Max WS	385.19	66.75	73.15	70.39	73.32	0.001624	3.37	114.29	30.8	0.31
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	385.19	66.8	73.09		73.28	0.001823	3.54	108.72	29.5	0.33
P118-27-00	P118-27-00	429.17	Max WS	385.61	66.81	73.08	70.49	73.27	0.000193	3.53	109.25	30.04	0.33
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	385.61	66.86	73.03		73.24	0.002041	3.68	104.83	29.43	0.34
P118-27-00	P118-27-00	399.43	Max WS	386.33	66.84	72.98		73.21	0.002264	3.81	101.46	29.34	0.36
P118-27-00	P118-27-00	173.97	Max WS	395.62	63.5	72.81		72.88	0.000441	2.14	184.81	35.32	0.16
P118-27-00	P118-27-00	157.99	Max WS	396.28	64.25	72.8		72.88	0.000353	2.18	181.57	35.46	0.15
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	396.22	63.63	70.12		70.3	0.001373	3.34	118.5	27.2	0.28
P118-27-00	P118-27-00	86.09	Max WS	396.86	63.19	70.06		70.27	0.001914	3.66	108.32	28.61	0.33
P118-27-00	P118-27-00	61.59	Max WS	398.27	62.69	70.06		70.23	0.001486	3.29	121.08	31.37	0.3
P118-27-00	P118-27-00	47.31	Max WS	398.28	62.51	70.1		70.21	0.000899	2.74	145.35	34.12	0.23
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.43		70.47	0.000136	1.53	260.68	42.9	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	400	61.15	70.3		70.34	0.000141	1.52	262.87	44.57	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.98	60.14	70.18		70.2	0.000083	1.25	320.96	49.26	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.97	60.08	70.15		70.17	0.00007	1.12	356.32	58.77	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.96	60.08	70.15		70.17	0.000069	1.12	356.7	58.75	0.08
P118-00-00	P118-R3-3	73723	Max WS	798.29	60.05	70.07		70.15	0.000285	2.26	352.58	58.36	0.16
P118-00-00	P118-R3-3	73423.3	Max WS	798.29	60	70.01	63.83	70.06	0.00028	1.82	437.62	66.74	0.13
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	798.29	59.83	69.98		70.02	0.000263	1.79	446.78	66.98	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	798.29	59.83	69.95	63.66	70	0.000267	1.79	444.98	66.93	0.12

HEC-RAS Plan: Baseline_50_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-13.63	72.56	78.4		78.4	0	-0.12	133.81	113.32	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-70.13	72.31	78.39		78.4	0.000006	-0.61	116.37	95.95	0.06
P118-27-00	P118-27-00	5321.96	Max WS	-39.93	72.13	78.4		78.41	0.000002	-0.34	118.87	474.4	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-1.89	71.84	78.41		78.41	0	-0.02	123.82	125.39	0
P118-27-00	P118-27-00	4300.35	Max WS	37.09	71.56	78.4		78.41	0.000001	0.29	129	152.23	0.02
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	71.29	71.38	78.4		78.4	0.000003	0.53	134.86	321.95	0.04
P118-27-00	P118-27-00	3444.22	Max WS	69.64	71.25	78.4		78.4	0.000003	0.5	147.16	271.15	0.04
P118-27-00	P118-27-00	3374.42	Max WS	335	72.06	78.21		78.3	0.000653	2.31	145.65	193.3	0.2
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	325.75	71.59	78.08		78.11	0.000322	1.72	498.08	596.87	0.14
P118-27-00	P118-27-00	2525.84	Max WS	327.59	71.22	77.92		77.96	0.000329	1.76	280.44	327.72	0.15
P118-27-00	P118-27-00	2485.48	Max WS	346.11	71.53	77.89		77.94	0.000268	1.86	185.62	148.19	0.14
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	346.06	71.1	77.65		77.72	0.000394	2	173.05	147.32	0.16
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	348.17	71.1	77.56		77.69	0.001168	2.88	121.07	167.63	0.26
P118-27-00	P118-27-00	2381.57	Max WS	349.47	71.1	77.53		77.67	0.001347	3.01	116.27	139.36	0.28
P118-27-00	P118-27-00	2351.35	Max WS	351.33	71.09	77.56		77.64	0.000474	2.2	159.86	160.78	0.17
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	351.28	70.77	77.51		77.57	0.000355	1.83	191.52	168.62	0.15
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	339.06	71.09	77.46		77.55	0.000709	2.52	207.31	185.45	0.21
P118-27-00	P118-27-00	1817.26	Max WS	312.12	70.49	77.06		77.18	0.001114	2.75	125.86	174.62	0.26
P118-27-00	P118-27-00	1360.33	Max WS	313.3	69.94	76.67		76.76	0.000751	2.35	133.13	164.2	0.21
P118-27-00	P118-27-00	1314.62	Max WS	333.4	69.66	76.67		76.72	0.000281	1.89	176.11	2194.32	0.14
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	333.11	69.66	73.95		74.24	0.003446	4.29	77.68	240.94	0.44
P118-27-00	P118-27-00	1198.35	Max WS	335.33	68.64	73.88		74.08	0.00196	3.54	94.63	27.17	0.33
P118-27-00	P118-27-00	763.46	Max WS	356.22	66.19	73.38		73.48	0.00068	2.55	139.84	26.89	0.2
P118-27-00	P118-27-00	465.31	Max WS	368.13	66.88	72.92		73.11	0.001791	3.45	106.57	29.96	0.32
P118-27-00	P118-27-00	448.57	Max WS	368.78	66.75	72.89	70.31	73.08	0.00179	3.46	106.63	29.75	0.32
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	368.78	66.8	72.83		73.04	0.00202	3.64	101.24	28.47	0.34
P118-27-00	P118-27-00	429.17	Max WS	369.14	66.81	72.82	70.41	73.02	0.000215	3.63	101.59	28.99	0.34
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	369.14	66.86	72.76		72.99	0.002293	3.8	97.14	28.36	0.36
P118-27-00	P118-27-00	399.43	Max WS	369.74	66.84	72.71		72.95	0.002572	3.95	93.59	28.2	0.38
P118-27-00	P118-27-00	173.97	Max WS	377.54	63.5	72.51		72.59	0.000469	2.16	174.43	34.38	0.17
P118-27-00	P118-27-00	157.99	Max WS	378.1	64.25	72.5		72.58	0.000377	2.19	172.96	34.57	0.16
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	378.04	63.63	70.08		70.24	0.001287	3.23	117.21	27.07	0.27
P118-27-00	P118-27-00	86.09	Max WS	378.62	63.19	70.02		70.21	0.001796	3.54	107.09	28.45	0.32
P118-27-00	P118-27-00	61.59	Max WS	379.78	62.69	70.02		70.17	0.001392	3.17	119.73	31.2	0.29
P118-27-00	P118-27-00	47.31	Max WS	379.8	62.51	70.05		70.16	0.000842	2.64	143.81	33.94	0.23
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.38		70.42	0.000139	1.55	258.79	42.76	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.26		70.29	0.000144	1.53	260.79	44.36	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.98	60.14	70.13		70.15	0.000084	1.26	318.52	49.09	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.97	60.08	70.1		70.12	0.000071	1.13	353.37	58.52	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.98	60.08	70.1		70.12	0.000071	1.13	353.75	58.5	0.08
P118-00-00	P118-R3-3	73723	Max WS	779.78	60.05	70.02		70.1	0.000277	2.23	349.83	58.13	0.16
P118-00-00	P118-R3-3	73423.3	Max WS	779.77	60	69.96	63.79	70.01	0.000273	1.79	434.57	66.66	0.12
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	779.78	59.83	69.93		69.98	0.000257	1.76	443.79	66.9	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	779.77	59.83	69.9	63.61	69.95	0.00026	1.76	442.03	66.85	0.12

HEC-RAS Plan: Baseline_10_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-0.11	72.56	77.91		77.91	0	0	96.97	44.31	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-2.39	72.31	77.91		77.91	0	-0.02	100.99	28.86	0
P118-27-00	P118-27-00	5321.96	Max WS	17.35	72.13	77.91		77.91	0	0.17	104.22	444.66	0.02
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	41.81	71.84	77.9		77.9	0.000002	0.38	109.05	104.29	0.03
P118-27-00	P118-27-00	4300.35	Max WS	67.06	71.56	77.89		77.9	0.000005	0.59	114.12	112.61	0.05
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	89.24	71.38	77.88		77.89	0.000007	0.75	119.67	142.41	0.06
P118-27-00	P118-27-00	3444.22	Max WS	89.25	71.25	77.88		77.89	0.000007	0.72	123.65	29.44	0.06
P118-27-00	P118-27-00	3374.42	Max WS	259.95	72.06	77.75		77.81	0.000543	2.02	128.64	33.28	0.18
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	258.05	71.59	77.58		77.64	0.000468	1.93	143.15	365.74	0.17
P118-27-00	P118-27-00	2525.84	Max WS	268.63	71.22	77.39		77.43	0.000369	1.73	213.97	172.07	0.15
P118-27-00	P118-27-00	2485.48	Max WS	278.42	71.53	77.37		77.41	0.000237	1.65	169.09	66.09	0.13
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	278.4	71.1	77.23		77.27	0.000348	1.77	157.64	113.55	0.15
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	279.76	71.1	77.15		77.25	0.00103	2.59	107.9	64.31	0.24
P118-27-00	P118-27-00	2381.57	Max WS	280.61	71.1	77.12		77.23	0.001194	2.72	103.23	31.6	0.26
P118-27-00	P118-27-00	2351.35	Max WS	281.78	71.09	77.15		77.21	0.000396	1.92	147.1	63	0.15
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	281.77	70.77	77.13		77.17	0.000299	1.6	175.77	127.83	0.14
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	278.27	71.09	77.07		77.15	0.000677	2.35	155.79	111.06	0.2
P118-27-00	P118-27-00	1817.26	Max WS	278.48	70.49	76.62		76.75	0.001254	2.8	101.7	50.86	0.27
P118-27-00	P118-27-00	1360.33	Max WS	285.08	69.94	76.16		76.25	0.000902	2.46	116.09	69.86	0.23
P118-27-00	P118-27-00	1314.62	Max WS	294.97	69.66	76.16		76.22	0.000299	1.84	160.51	1782.32	0.14
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	294.84	69.66	73.46		73.77	0.004368	4.52	65.27	98.41	0.49
P118-27-00	P118-27-00	1198.35	Max WS	296.25	68.64	73.37		73.58	0.002316	3.65	81.23	25.41	0.36
P118-27-00	P118-27-00	763.46	Max WS	309.63	66.19	72.81		72.91	0.0007	2.48	124.8	25.73	0.2
P118-27-00	P118-27-00	465.31	Max WS	317.25	66.88	72.26		72.46	0.002253	3.62	87.58	27.29	0.36
P118-27-00	P118-27-00	448.57	Max WS	317.66	66.75	72.22	70.05	72.43	0.002243	3.63	87.6	27	0.35
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	317.66	66.8	72.14		72.37	0.002577	3.84	82.64	25.79	0.38
P118-27-00	P118-27-00	429.17	Max WS	317.89	66.81	72.13	70.16	72.36	0.000278	3.85	82.53	26.24	0.38
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	317.89	66.86	72.05		72.31	0.003061	4.08	77.98	25.51	0.41
P118-27-00	P118-27-00	399.43	Max WS	318.28	66.84	71.97		72.26	0.003573	4.3	73.95	25.11	0.44
P118-27-00	P118-27-00	173.97	Max WS	323.27	63.5	71.69		71.77	0.000542	2.2	147.24	31.78	0.18
P118-27-00	P118-27-00	157.99	Max WS	323.62	64.25	71.69		71.76	0.000453	2.17	149.2	31.95	0.17
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	323.57	63.63	69.94		70.06	0.001031	2.85	113.42	26.67	0.24
P118-27-00	P118-27-00	86.09	Max WS	323.92	63.19	69.89		70.04	0.001441	3.13	103.43	27.96	0.29
P118-27-00	P118-27-00	61.59	Max WS	324.67	62.69	69.89		70.01	0.001114	2.81	115.73	30.68	0.25
P118-27-00	P118-27-00	47.31	Max WS	324.68	62.51	69.91		70	0.000671	2.33	139.23	33.41	0.2
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.25		70.29	0.000148	1.58	253.18	42.36	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.12		70.16	0.000153	1.57	254.63	43.76	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.98	60.14	69.98		70.01	0.00009	1.28	311.28	48.58	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.96	60.08	69.95		69.97	0.000076	1.16	344.65	57.79	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.96	60.08	69.95		69.97	0.000076	1.16	345.02	57.77	0.08
P118-00-00	P118-R3-3	73723	Max WS	724.67	60.05	69.88		69.95	0.000255	2.12	341.7	57.44	0.15
P118-00-00	P118-R3-3	73423.3	Max WS	724.66	60	69.83	63.63	69.87	0.000251	1.7	425.51	66.43	0.12
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	724.66	59.83	69.8		69.84	0.000235	1.67	434.88	66.67	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	724.66	59.83	69.77	63.46	69.82	0.000238	1.67	433.28	66.63	0.12

HEC-RAS Plan: Baseline_Alt3_500_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	473.56	73.94	80.17		80.34	0.001508	3.35	191.66	148.51	0.31
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	467.86	73.38	79.94		80.09	0.001144	3.12	185	113.23	0.27
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	381.46	73.1	79.57		79.68	0.000829	2.67	187.5	156.53	0.23
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	274.48	73.01	79.4		79.46	0.000521	2.04	167.2	108.37	0.18
P118-27-01	P118-27-01	500	Max WS	272.72	73.02	79.4		79.45	0.000585	1.89	187.2	159.32	0.16
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	269.38	72.9	78.96		79.02	0.000576	1.97	153.92	103.47	0.19
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	274.96	72.76	78.93		79	0.000554	2.03	145.43	94.02	0.18
P118-27-01	P118-27-01	139	Max WS	322.97	71.76	78.78		78.84	0.000514	1.97	184.68	97.02	0.18
P118-27-01	P118-27-01	39	Max WS	321.83	71.4	78.76		78.81	0.000041	1.81	178.66	48.31	0.16
P118-27-00	P118-27-00	6259.79	Max WS	-30.32	72.56	78.8		78.8	0.000001	-0.24	174.92	166.3	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-166.18	72.31	78.76		78.79	0.000023	-1.3	146.18	213.97	0.12
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-131	72.13	78.79		78.81	0.000013	-1	133.35	50.79	0.09
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-65.95	71.84	78.82		78.82	0.000003	-0.48	137.35	49.94	0.04
P118-27-00	P118-27-00	4300.35	Max WS	15.27	71.56	78.83		78.83	0	0.11	143.19	37.87	0.01
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	70.15	71.38	78.82		78.82	0.000003	0.47	148.97	53.29	0.04
P118-27-00	P118-27-00	3560	Max WS	139.37	71.3	78.8		78.81	0.000011	0.93	151.82	62.5	0.08
P118-27-00	P118-27-00_DS	3444.22	Max WS	459.59	71.25	78.65		78.8	0.000113	3.11	165.74	150.58	0.26
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	460.05	72.06	78.63		78.76	0.000923	2.88	163.55	624.61	0.24
P118-27-00	P118-27-00_DS	3011.6	Max WS	421.52	71.59	78.48		78.51	0.000278	1.69	780.58	838.54	0.14
P118-27-00	P118-27-00_DS	2525.84	Max WS	379.17	71.22	78.33		78.38	0.000303	1.79	335.12	558.15	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	403.04	71.53	78.3		78.36	0.00029	2.03	198.68	339.52	0.14
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	403.04	71.1	77.97		78.04	0.000432	2.19	184.43	183.83	0.17
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	406.79	71.1	77.87		78.02	0.001284	3.1	131.18	233.87	0.28
P118-27-00	P118-27-00_DS	2381.57	Max WS	409.1	71.1	77.83		77.99	0.001481	3.24	126.37	208.38	0.3
P118-27-00	P118-27-00_DS	2351.35	Max WS	412.27	71.09	77.86		77.96	0.000549	2.44	169.23	230	0.18
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	412.27	70.77	77.78		77.84	0.000406	2.04	202.48	294.13	0.16
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	391.91	71.09	77.74		77.83	0.000739	2.64	250.72	300.84	0.21
P118-27-00	P118-27-00_DS	1817.26	Max WS	340.71	70.49	77.37		77.48	0.001024	2.71	156.97	331.19	0.25
P118-27-00	P118-27-00_DS	1360.33	Max WS	329.82	69.94	77.03		77.11	0.000653	2.27	145.55	232.28	0.2
P118-27-00	P118-27-00_DS	1314.62	Max WS	359.59	69.66	77.01		77.07	0.000268	1.92	186.89	2622.54	0.14
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	359.56	69.66	74.59		74.82	0.002171	3.79	94.9	742.34	0.36
P118-27-00	P118-27-00_DS	1198.35	Max WS	363.4	68.64	74.55		74.71	0.001403	3.2	113.58	29.47	0.29
P118-27-00	P118-27-00_DS	763.46	Max WS	399.52	66.19	74.15		74.24	0.000565	2.44	193.08	116.73	0.18
P118-27-00	P118-27-00_DS	465.31	Max WS	420.05	66.88	73.81		73.96	0.001242	3.12	134.81	33.53	0.27
P118-27-00	P118-27-00_DS	448.57	Max WS	421.18	66.75	73.79	70.55	73.94	0.001245	3.12	135.05	33.46	0.27
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	421.17	66.8	73.74		73.91	0.001382	3.27	128.98	32.1	0.29
P118-27-00	P118-27-00_DS	429.17	Max WS	421.78	66.81	73.73	70.66	73.9	0.001379	3.25	129.77	32.67	0.29
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	421.78	66.86	73.69		73.86	0.001529	3.38	124.96	32.09	0.3
P118-27-00	P118-27-00_DS	399.43	Max WS	422.82	66.84	73.65		73.84	0.001658	3.47	122.03	32.14	0.31
P118-27-00	P118-27-00_DS	173.97	Max WS	436.29	63.5	73.52		73.59	0.000377	2.07	210.83	37.61	0.15
P118-27-00	P118-27-00_DS	157.99	Max WS	437.25	64.25	73.51		73.59	0.0003	2.16	202.2	37.47	0.14
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	437.22	63.63	70.23		70.43	0.001566	3.6	121.43	27.49	0.3
P118-27-00	P118-27-00_DS	86.09	Max WS	438.21	63.19	70.16		70.4	0.002179	3.94	111.15	28.98	0.35
P118-27-00	P118-27-00_DS	61.59	Max WS	440.24	62.69	70.16		70.35	0.001698	3.55	124.14	31.76	0.32
P118-27-00	P118-27-00_DS	47.31	Max WS	440.24	62.51	70.2		70.33	0.001031	2.96	148.88	34.52	0.25
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.53		70.57	0.00013	1.51	265.03	43.21	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	400	61.15	70.41		70.45	0.000135	1.49	267.65	45.03	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.98	60.14	70.29		70.31	0.000079	1.22	326.52	49.64	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	399.98	60.08	70.27		70.29	0.000066	1.1	363.04	59.33	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.98	60.08	70.26		70.28	0.000066	1.1	363.42	59.31	0.08
P118-00-00	P118-R3-3	73723	Max WS	840.23	60.05	70.18		70.26	0.000301	2.34	358.84	58.88	0.17
P118-00-00	P118-R3-3	73423.3	Max WS	840.23	60	70.11	63.93	70.17	0.000296	1.89	444.53	66.92	0.13
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	840.23	59.83	70.08		70.13	0.000279	1.85	453.59	67.15	0.13
P118-00-00	P118-R3-3	73232.3	Max WS	840.23	59.83	70.05	63.76	70.1	0.000283	1.86	451.67	67.1	0.13

HEC-RAS Plan: Baseline_Alt3_100_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	338.03	73.94	79.77		79.89	0.001215	2.79	134.1	132.26	0.27
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	336.95	73.38	79.6		79.7	0.000785	2.49	155.9	98.65	0.22
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	284.9	73.1	79.34		79.41	0.000582	2.15	162.32	156.53	0.19
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	208.49	73.01	79.22		79.26	0.00036	1.64	148.33	102.06	0.15
P118-27-01	P118-27-01	500	Max WS	207.81	73.02	79.22		79.25	0.000406	1.53	161.24	127.51	0.13
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	199.69	72.9	78.6		78.64	0.000465	1.64	122.23	57.3	0.16
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	202	72.76	78.58		78.62	0.000418	1.65	122.61	40.98	0.16
P118-27-01	P118-27-01	139	Max WS	225.66	71.76	78.48		78.52	0.000335	1.51	156.72	83.31	0.14
P118-27-01	P118-27-01	39	Max WS	225.12	71.4	78.47		78.5	0.000023	1.35	166.29	39.99	0.12
P118-27-00	P118-27-00	6259.79	Max WS	-19.16	72.56	78.52		78.52	0	-0.16	145.96	130.13	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-81.58	72.31	78.51		78.52	0.000007	-0.68	122.05	118.11	0.06
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-47.94	72.13	78.52		78.52	0.000002	-0.39	122.56	33.24	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-3.67	71.84	78.53		78.53	0	-0.03	127.44	31.09	0
P118-27-00	P118-27-00	4300.35	Max WS	56.69	71.56	78.52		78.52	0.000002	0.43	132.53	31.64	0.04
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	96.39	71.38	78.51		78.52	0.000006	0.7	138.27	30.85	0.06
P118-27-00	P118-27-00	3560	Max WS	151.26	71.3	78.48		78.5	0.000017	1.09	138.59	35.64	0.1
P118-27-00	P118-27-00_DS	3444.22	Max WS	375.65	71.25	78.38		78.49	0.000091	2.71	141.48	58.69	0.23
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	375.5	72.06	78.36		78.46	0.000737	2.5	151.72	336.84	0.21
P118-27-00	P118-27-00_DS	3011.6	Max WS	359.8	71.59	78.22		78.26	0.000308	1.72	588.63	660.19	0.14
P118-27-00	P118-27-00_DS	2525.84	Max WS	344.49	71.22	78.07		78.11	0.000316	1.76	300.18	382.95	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	366.89	71.53	78.04		78.09	0.000277	1.93	190.37	216.57	0.14
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	366.88	71.1	77.77		77.84	0.000409	2.07	177.25	155.25	0.16
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	369.42	71.1	77.67		77.81	0.001212	2.96	124.76	176.12	0.27
P118-27-00	P118-27-00_DS	2381.57	Max WS	370.98	71.1	77.64		77.79	0.001398	3.09	119.92	147.76	0.29
P118-27-00	P118-27-00_DS	2351.35	Max WS	373.14	71.09	77.68		77.76	0.000501	2.28	163.33	177.24	0.18
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	373.12	70.77	77.61		77.67	0.000373	1.91	195.64	199.66	0.15
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	357.38	71.09	77.56		77.66	0.000714	2.55	222.94	205.06	0.21
P118-27-00	P118-27-00_DS	1817.26	Max WS	321.72	70.49	77.18		77.3	0.001072	2.73	136.26	214.37	0.25
P118-27-00	P118-27-00_DS	1360.33	Max WS	319.87	69.94	76.81		76.89	0.000711	2.32	137.93	190.57	0.21
P118-27-00	P118-27-00_DS	1314.62	Max WS	343.68	69.66	76.8		76.86	0.000276	1.91	180.32	2354.96	0.14
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	343.35	69.66	74.15		74.41	0.003042	4.14	82.88	299.37	0.41
P118-27-00	P118-27-00_DS	1198.35	Max WS	345.98	68.64	74.09		74.27	0.001783	3.45	100.26	27.87	0.32
P118-27-00	P118-27-00_DS	763.46	Max WS	370.81	66.19	73.62		73.72	0.000651	2.53	147.42	55.29	0.19
P118-27-00	P118-27-00_DS	465.31	Max WS	384.95	66.88	73.2		73.38	0.001591	3.34	115.15	31.09	0.31
P118-27-00	P118-27-00_DS	448.57	Max WS	385.72	66.75	73.18	70.39	73.35	0.001592	3.35	115.26	30.93	0.31
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	385.72	66.8	73.12		73.31	0.001786	3.52	109.68	29.63	0.32
P118-27-00	P118-27-00_DS	429.17	Max WS	386.14	66.81	73.1	70.49	73.3	0.001798	3.51	110	30.14	0.32
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	386.14	66.86	73.04		73.25	0.002035	3.68	105.05	29.46	0.34
P118-27-00	P118-27-00_DS	399.43	Max WS	386.86	66.84	72.99		73.21	0.002257	3.8	101.69	29.38	0.36
P118-27-00	P118-27-00_DS	173.97	Max WS	396.13	63.5	72.82		72.89	0.00044	2.14	185.11	35.34	0.16
P118-27-00	P118-27-00_DS	157.99	Max WS	396.79	64.25	72.81		72.88	0.000352	2.18	181.82	35.49	0.15
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	396.75	63.63	70.13		70.3	0.001376	3.35	118.53	27.2	0.28
P118-27-00	P118-27-00_DS	86.09	Max WS	397.42	63.19	70.07		70.27	0.001917	3.67	108.36	28.62	0.33
P118-27-00	P118-27-00_DS	61.59	Max WS	398.77	62.69	70.06		70.23	0.001488	3.29	121.11	31.37	0.3
P118-27-00	P118-27-00_DS	47.31	Max WS	398.83	62.51	70.1		70.21	0.000901	2.74	145.4	34.12	0.23
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.43		70.47	0.000136	1.53	260.74	42.91	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.31		70.34	0.000141	1.52	262.93	44.57	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.99	60.14	70.18		70.2	0.000083	1.25	321.03	49.26	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.98	60.08	70.16		70.17	0.00007	1.12	356.4	58.78	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.98	60.08	70.15		70.17	0.000069	1.12	356.79	58.76	0.08
P118-00-00	P118-R3-3	73723	Max WS	798.81	60.05	70.07		70.15	0.000285	2.27	352.66	58.37	0.16
P118-00-00	P118-R3-3	73423.3	Max WS	798.81	60	70.01	63.83	70.06	0.000281	1.83	437.7	66.74	0.13
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	798.81	59.83	69.98		70.03	0.000264	1.79	446.87	66.98	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	798.81	59.83	69.95	63.66	70	0.000267	1.79	445.07	66.93	0.12

HEC-RAS Plan: Baseline_Alt3_50_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	289.93	73.94	79.6		79.7	0.001073	2.53	116.52	61.73	0.25
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	289.09	73.38	79.46		79.54	0.000656	2.23	143.6	85.47	0.2
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	246.68	73.1	79.24		79.3	0.000483	1.93	151.35	156.53	0.17
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	184.15	73.01	79.14		79.17	0.000305	1.49	140	99.25	0.14
P118-27-01	P118-27-01	500	Max WS	183.77	73.02	79.14		79.17	0.000345	1.39	150.77	125.57	0.12
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	173.97	72.9	78.42		78.45	0.000403	1.52	114.51	37.38	0.15
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	175.27	72.76	78.41		78.44	0.000371	1.51	116	35.99	0.15
P118-27-01	P118-27-01	139	Max WS	190.9	71.76	78.32		78.35	0.000272	1.34	144.32	71.54	0.13
P118-27-01	P118-27-01	39	Max WS	190.49	71.4	78.31		78.34	0.000018	1.19	160.1	38.7	0.1
P118-27-00	P118-27-00	6259.79	Max WS	-11.62	72.56	78.36		78.36	0	-0.1	129.69	108.76	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-51.88	72.31	78.36		78.36	0.000003	-0.45	114.88	89.78	0.04
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-22.07	72.13	78.36		78.36	0.000001	-0.19	117.65	30.28	0.02
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	15.16	71.84	78.36		78.36	0	0.12	122.5	29.98	0.01
P118-27-00	P118-27-00	4300.35	Max WS	66.13	71.56	78.35		78.36	0.000003	0.52	127.5	29.88	0.04
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	99.68	71.38	78.34		78.35	0.000007	0.75	133.23	30.18	0.06
P118-27-00	P118-27-00	3560	Max WS	146.96	71.3	78.32		78.34	0.000018	1.11	132.84	34.47	0.1
P118-27-00	P118-27-00_DS	3444.22	Max WS	336.34	71.25	78.23		78.33	0.000079	2.51	134.49	36.94	0.21
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	336.2	72.06	78.22		78.3	0.000655	2.32	145.82	196.41	0.2
P118-27-00	P118-27-00_DS	3011.6	Max WS	331.14	71.59	78.08		78.12	0.000332	1.74	498.78	597.12	0.15
P118-27-00	P118-27-00_DS	2525.84	Max WS	324.84	71.22	77.92		77.96	0.000322	1.75	280.72	328.33	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	345.16	71.53	77.89		77.94	0.000266	1.86	185.67	148.56	0.14
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	345.15	71.1	77.66		77.72	0.000391	1.99	173.15	147.51	0.16
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	347.28	71.1	77.57		77.69	0.001159	2.87	121.18	167.89	0.26
P118-27-00	P118-27-00_DS	2381.57	Max WS	348.6	71.1	77.53		77.67	0.001337	3	116.39	139.72	0.28
P118-27-00	P118-27-00_DS	2351.35	Max WS	350.4	71.09	77.57		77.64	0.000471	2.19	159.97	161.19	0.17
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	350.4	70.77	77.52		77.57	0.000352	1.83	191.66	169.5	0.15
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	337.71	71.09	77.46		77.55	0.000701	2.5	208	185.89	0.21
P118-27-00	P118-27-00_DS	1817.26	Max WS	312.91	70.49	77.07		77.18	0.001116	2.76	126.19	175.31	0.26
P118-27-00	P118-27-00_DS	1360.33	Max WS	313.58	69.94	76.67		76.76	0.00075	2.35	133.29	164.9	0.21
P118-27-00	P118-27-00_DS	1314.62	Max WS	333.74	69.66	76.67		76.73	0.00028	1.89	176.26	2199.08	0.14
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	333.22	69.66	73.96		74.25	0.003401	4.27	78.07	243.49	0.43
P118-27-00	P118-27-00_DS	1198.35	Max WS	335.41	68.64	73.9		74.09	0.001937	3.53	95.06	27.22	0.33
P118-27-00	P118-27-00_DS	763.46	Max WS	356.38	66.19	73.41		73.51	0.000673	2.54	140.42	26.94	0.2
P118-27-00	P118-27-00_DS	465.31	Max WS	368.36	66.88	72.95		73.14	0.001752	3.43	107.48	30.08	0.32
P118-27-00	P118-27-00_DS	448.57	Max WS	369.01	66.75	72.92	70.31	73.11	0.001751	3.43	107.56	29.88	0.32
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	369.01	66.8	72.86		73.06	0.001974	3.61	102.17	28.6	0.34
P118-27-00	P118-27-00_DS	429.17	Max WS	369.36	66.81	72.84	70.41	73.05	0.001997	3.61	102.29	29.09	0.34
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	369.37	66.86	72.77		72.99	0.002288	3.8	97.27	28.38	0.36
P118-27-00	P118-27-00_DS	399.43	Max WS	369.97	66.84	72.71		72.95	0.002566	3.95	93.72	28.22	0.38
P118-27-00	P118-27-00_DS	173.97	Max WS	377.84	63.5	72.52		72.59	0.000468	2.16	174.6	34.4	0.17
P118-27-00	P118-27-00_DS	157.99	Max WS	378.4	64.25	72.51		72.58	0.000377	2.19	173.1	34.58	0.16
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	378.37	63.63	70.08		70.24	0.001289	3.23	117.24	27.07	0.27
P118-27-00	P118-27-00_DS	86.09	Max WS	378.95	63.19	70.02		70.22	0.001798	3.54	107.11	28.45	0.32
P118-27-00	P118-27-00_DS	61.59	Max WS	380.12	62.69	70.02		70.18	0.001394	3.17	119.75	31.2	0.29
P118-27-00	P118-27-00_DS	47.31	Max WS	380.13	62.51	70.05		70.16	0.000843	2.64	143.84	33.94	0.23
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.39		70.42	0.000139	1.55	258.82	42.77	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	400	61.15	70.26		70.29	0.000144	1.53	260.82	44.37	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.98	60.14	70.13		70.15	0.000084	1.26	318.56	49.09	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.97	60.08	70.1		70.12	0.000071	1.13	353.43	58.53	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.98	60.08	70.1		70.12	0.000071	1.13	353.81	58.51	0.08
P118-00-00	P118-R3-3	73723	Max WS	780.12	60.05	70.02		70.1	0.000277	2.23	349.88	58.13	0.16
P118-00-00	P118-R3-3	73423.3	Max WS	780.12	60	69.96	63.79	70.01	0.000273	1.79	434.63	66.66	0.12
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	780.12	59.83	69.93		69.98	0.000257	1.76	443.84	66.9	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	780.12	59.83	69.91	63.61	69.95	0.00026	1.76	442.09	66.86	0.12

HEC-RAS Plan: Baseline_Alt3_10_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	194.23	73.94	79.19		79.25	0.000682	1.94	100.04	33.38	0.2
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	193.35	73.38	79.1		79.15	0.000398	1.65	118.06	46.15	0.15
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	169.88	73.1	78.97		79	0.000299	1.44	126.62	106.4	0.14
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	141.76	73.01	78.89		78.91	0.000232	1.24	118.17	68.66	0.12
P118-27-01	P118-27-01	500	Max WS	141.75	73.02	78.89		78.91	0.000245	1.16	126.52	54.78	0.1
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	137.14	72.9	77.91		77.94	0.000364	1.42	96.75	32.33	0.14
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	136.61	72.76	77.9		77.93	0.000332	1.38	98.77	31.87	0.14
P118-27-01	P118-27-01	139	Max WS	139.77	71.76	77.83		77.85	0.000208	1.14	122.88	37.34	0.11
P118-27-01	P118-27-01	39	Max WS	139.63	71.4	77.83		77.84	0.000013	0.98	142.17	35.44	0.09
P118-27-00	P118-27-00	6259.79	Max WS	2.24	72.56	77.88		77.88	0	0.02	95.76	37.87	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	0.44	72.31	77.88		77.88	0	0	100.05	28.73	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	20.24	72.13	77.87		77.87	0.000001	0.2	103.28	28.38	0.02
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	44.97	71.84	77.87		77.87	0.000003	0.42	108.06	28.17	0.04
P118-27-00	P118-27-00	4300.35	Max WS	67.95	71.56	77.86		77.86	0.000005	0.6	113.13	28.02	0.05
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	90.23	71.38	77.85		77.86	0.000008	0.76	118.65	28.55	0.07
P118-27-00	P118-27-00	3560	Max WS	121.54	71.3	77.83		77.84	0.000016	1.04	116.76	30.98	0.09
P118-27-00	P118-27-00_DS	3444.22	Max WS	259.79	71.25	77.76		77.84	0.000063	2.16	120.27	29.07	0.19
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	259.81	72.06	77.75		77.82	0.00054	2.02	128.87	33.3	0.18
P118-27-00	P118-27-00_DS	3011.6	Max WS	257.27	71.59	77.59		77.65	0.000461	1.91	143.9	377.17	0.17
P118-27-00	P118-27-00_DS	2525.84	Max WS	266.2	71.22	77.41		77.45	0.000356	1.7	216.23	173.61	0.15
P118-27-00	P118-27-00_DS	2485.48	Max WS	277.46	71.53	77.39		77.43	0.000233	1.64	169.66	68.64	0.13
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	277.36	71.1	77.24		77.29	0.000341	1.75	158.31	118.5	0.15
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	278.75	71.1	77.17		77.27	0.001006	2.57	108.52	67.97	0.24
P118-27-00	P118-27-00_DS	2381.57	Max WS	279.61	71.1	77.14		77.25	0.001166	2.69	103.88	38.19	0.26
P118-27-00	P118-27-00_DS	2351.35	Max WS	280.82	71.09	77.17		77.23	0.000388	1.9	147.72	66.19	0.15
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	280.78	70.77	77.15		77.19	0.000293	1.59	176.57	130.4	0.13
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	276.47	71.09	77.09		77.17	0.000655	2.32	158.26	117.33	0.2
P118-27-00	P118-27-00_DS	1817.26	Max WS	280.34	70.49	76.65		76.77	0.001247	2.8	102.66	51.68	0.27
P118-27-00	P118-27-00_DS	1360.33	Max WS	286.75	69.94	76.18		76.28	0.000894	2.45	116.99	71.69	0.23
P118-27-00	P118-27-00_DS	1314.62	Max WS	297.07	69.66	76.19		76.24	0.000298	1.84	161.36	1802.62	0.14
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	296.99	69.66	73.49		73.81	0.004274	4.49	66.14	117.75	0.48
P118-27-00	P118-27-00_DS	1198.35	Max WS	298.43	68.64	73.41		73.62	0.002277	3.63	82.18	25.54	0.36
P118-27-00	P118-27-00_DS	763.46	Max WS	312	66.19	72.86		72.95	0.000693	2.48	125.99	25.82	0.2
P118-27-00	P118-27-00_DS	465.31	Max WS	319.72	66.88	72.32		72.52	0.002171	3.58	89.32	27.55	0.35
P118-27-00	P118-27-00_DS	448.57	Max WS	320.14	66.75	72.29	70.07	72.49	0.00216	3.58	89.37	27.27	0.35
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	320.14	66.8	72.21		72.43	0.002473	3.79	84.41	26.05	0.37
P118-27-00	P118-27-00_DS	429.17	Max WS	320.37	66.81	72.19	70.17	72.41	0.002542	3.81	84.04	26.46	0.38
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	320.37	66.86	72.08		72.34	0.003028	4.07	78.76	25.63	0.41
P118-27-00	P118-27-00_DS	399.43	Max WS	320.76	66.84	72		72.29	0.003527	4.29	74.75	25.24	0.44
P118-27-00	P118-27-00_DS	173.97	Max WS	325.82	63.5	71.73		71.8	0.000539	2.2	148.38	31.9	0.18
P118-27-00	P118-27-00_DS	157.99	Max WS	326.18	64.25	71.72		71.79	0.000449	2.17	150.23	32.08	0.17
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	326.08	63.63	69.94		70.07	0.001042	2.87	113.6	26.69	0.25
P118-27-00	P118-27-00_DS	86.09	Max WS	326.46	63.19	69.9		70.05	0.001458	3.15	103.6	27.98	0.29
P118-27-00	P118-27-00_DS	61.59	Max WS	327.19	62.69	69.9		70.02	0.001126	2.82	115.92	30.7	0.26
P118-27-00	P118-27-00_DS	47.31	Max WS	327.22	62.51	69.92		70.01	0.000678	2.35	139.44	33.43	0.2
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.26		70.3	0.000147	1.58	253.43	42.38	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.12		70.16	0.000153	1.57	254.91	43.79	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.97	60.14	69.99		70.01	0.00009	1.28	311.62	48.6	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.96	60.08	69.96		69.98	0.000076	1.16	345.05	57.82	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.98	60.08	69.96		69.98	0.000075	1.16	345.42	57.8	0.08
P118-00-00	P118-R3-3	73723	Max WS	727.2	60.05	69.89		69.96	0.000256	2.13	342.07	57.47	0.15
P118-00-00	P118-R3-3	73423.3	Max WS	727.2	60	69.83	63.64	69.88	0.000252	1.71	425.93	66.44	0.12
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	727.2	59.83	69.8		69.85	0.000236	1.67	435.29	66.68	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	727.2	59.83	69.78	63.46	69.82	0.000239	1.68	433.68	66.64	0.12

HEC-RAS Plan: Alt1_500_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-4.85	72.56	78.25		78.25	0	-0.05	118.71	92.31	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-34.98	72.31	78.24		78.24	0.000002	-0.32	110.86	34.71	0.03
P118-27-00	P118-27-00	5321.96	Max WS	17.89	72.13	78.24		78.25	0	0.16	114.1	464.36	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	82.99	71.84	78.23		78.24	0.000007	0.7	118.47	117.74	0.06
P118-27-00	P118-27-00	4300.35	Max WS	149.76	71.56	78.19		78.21	0.00002	1.22	122.56	134.22	0.11
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	208.48	71.38	78.13		78.17	0.000035	1.64	126.97	184.27	0.14
P118-27-00	P118-27-00	3444.22	Max WS	208.11	71.25	78.12		78.16	0.000032	1.59	131.29	55.52	0.14
P118-27-00	P118-27-00	3374.42	Max WS	670.35	71.25	76.98		77.68	0.000743	6.71	99.92	28.9	0.64
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	670.5	70.4	76.97		77.46	0.00044	5.58	122.59	85.32	0.5
P118-27-00	P118-27-00	2525.84	Max WS	724.82	70	76.69		77.18	0.000429	5.57	142.77	98.37	0.49
P118-27-00	P118-27-00	2485.48	Max WS	730.63	69.9	76.68		77.15	0.000414	5.51	132.56	33.11	0.49
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	730.62	69.9	76.22		76.82	0.000569	6.21	117.71	31.27	0.56
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	734.48	69.85	76.19		76.79	0.000564	6.2	118.55	31.38	0.56
P118-27-00	P118-27-00	2381.57	Max WS	736.84	69.85	76.17		76.78	0.000578	6.26	117.76	31.27	0.57
P118-27-00	P118-27-00	2351.35	Max WS	740.1	69.8	76.15		76.75	0.00057	6.23	118.77	31.4	0.56
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	740.07	69.8	75.15		76.22	0.00122	8.28	89.39	27.41	0.81
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	746.35	69.77	74.71	74.62	76.12	0.001765	9.52	78.4	25.75	0.96
P118-27-00	P118-27-00	2200		Lat Struct									
P118-27-00	P118-27-00	1817.26	Max WS	763.11	68.6	74.87		75.54	0.000642	6.56	116.24	31.08	0.6
P118-27-00	P118-27-00	1360.33	Max WS	804.71	66.5	75.02		75.28	0.000175	4.1	196.47	41.85	0.33
P118-27-00	P118-27-00	1314.62	Max WS	810.16	66	75.06		75.27	0.000134	3.71	218.57	975.23	0.29
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	809.86	65.96	74.62		74.87	0.000165	4.01	201.89	779.33	0.32
P118-27-00	P118-27-00	1198.35	Max WS	815.07	65.9	74.61		74.86	0.000163	4	203.9	40.83	0.32
P118-27-00	P118-27-00	763.46	Max WS	863.78	65.3	74.54		74.76	0.000139	3.82	226.02	239.78	0.29
P118-27-00	P118-27-00	465.31	Max WS	891.49	64.85	74.5		74.71	0.00012	3.65	244.31	219.75	0.27
P118-27-00	P118-27-00	448.57	Max WS	892.98	64.8	74.5	70.09	74.71	0.000118	3.62	246.56	98.82	0.27
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	892.98	64.8	74.46		74.66	0.000121	3.65	244.38	58.39	0.28
P118-27-00	P118-27-00	429.17	Max WS	893.76	64.7	74.46	69.99	74.66	0.000115	3.59	249.13	60.06	0.27
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	893.81	64.7	74.46		74.66	0.000115	3.59	248.88	74.07	0.27
P118-27-00	P118-27-00	399.43	Max WS	895.18	64.6	74.46		74.65	0.00011	3.53	253.6	138.74	0.26
P118-27-00	P118-27-00	310	Max WS	894.23	65.51	74.16	70.61	74.42	0.005256	4.15	226.07	83.06	0.38
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	71.81		71.84	0.000076	1.24	323.02	47.18	0.08
P118-00-00	P118-R3-4	75489.4	Max WS	399.98	61.15	71.74		71.77	0.000077	1.21	331.56	50.8	0.08
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	399.92	60.14	71.68		71.69	0.000046	1	398.57	54.38	0.07
P118-00-00	P118-R3-4	73879.2	Max WS	1001.06	60.08	71.48		71.56	0.000251	2.28	438.56	65.26	0.16
P118-00-00	P118-R3-4	73828	Max WS	1041.78	60.08	71.45		71.54	0.000274	2.38	437.37	65.13	0.16
P118-00-00	P118-R3-4	73723	Max WS	1293.42	60.05	71.32		71.46	0.000443	3.01	429.28	64.47	0.21
P118-00-00	P118-R3-4	73423.3	Max WS	1293.41	60	71.22	64.9	71.32	0.00044	2.49	519.98	68.82	0.16
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	1293.41	59.83	71.17		71.26	0.00042	2.45	528.07	69.02	0.16
P118-00-00	P118-R3-4	73232.3	Max WS	1293.41	59.83	71.13	64.73	71.22	0.000427	2.46	525.07	68.95	0.16

HEC-RAS Plan: Alt1_100_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	1.64	72.56	77.34		77.34	0	0.02	80.66	26.8	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	1.11	72.31	77.34		77.34	0	0.01	85.14	26.67	0
P118-27-00	P118-27-00	5321.96	Max WS	39.28	72.13	77.33		77.33	0.000003	0.44	88.34	184.35	0.04
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	86.51	71.84	77.3		77.31	0.000014	0.93	92.68	71.33	0.09
P118-27-00	P118-27-00	4300.35	Max WS	134.98	71.56	77.25		77.28	0.00003	1.39	96.77	66.21	0.13
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	177.57	71.38	77.19		77.24	0.000047	1.76	100.67	93.68	0.16
P118-27-00	P118-27-00	3444.22	Max WS	177.27	71.25	77.18		77.22	0.000044	1.71	103.83	27.16	0.15
P118-27-00	P118-27-00	3374.42	Max WS	512.04	71.25	76		76.75	0.000979	6.94	73.74	25.02	0.71
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	512	70.4	76		76.48	0.000524	5.56	92.07	26.9	0.53
P118-27-00	P118-27-00	2525.84	Max WS	552.37	70	75.65		76.15	0.000535	5.65	97.76	28.6	0.54
P118-27-00	P118-27-00	2485.48	Max WS	555.75	69.9	75.64		76.12	0.000503	5.53	100.45	28.98	0.52
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	555.75	69.9	75.32		75.9	0.00065	6.09	91.3	27.68	0.59
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	558.54	69.85	75.3		75.87	0.000643	6.07	92.02	27.79	0.59
P118-27-00	P118-27-00	2381.57	Max WS	560.25	69.85	75.27		75.86	0.000662	6.14	91.25	27.68	0.6
P118-27-00	P118-27-00	2351.35	Max WS	562.61	69.8	75.25		75.83	0.00065	6.11	92.12	27.8	0.59
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	504.84	69.8	74.81		75.42	0.000758	6.29	80.25	26.04	0.63
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	561.9	69.77	73.99	73.98	75.31	0.001965	9.21	61	22.89	0.99
P118-27-00	P118-27-00	2200	Lat Struct										
P118-27-00	P118-27-00	1817.26	Max WS	567.76	68.6	74.18		74.72	0.000599	5.94	95.62	28.3	0.57
P118-27-00	P118-27-00	1360.33	Max WS	597.83	66.5	74.3		74.5	0.000146	3.55	168.53	37.21	0.29
P118-27-00	P118-27-00	1314.62	Max WS	601.79	66	74.33		74.49	0.000109	3.19	188.79	227.31	0.26
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	600.9	65.96	74.14		74.3	0.000119	3.29	182.74	307.26	0.27
P118-27-00	P118-27-00	1198.35	Max WS	604.68	65.9	74.13		74.3	0.000117	3.27	184.79	38.92	0.26
P118-27-00	P118-27-00	763.46	Max WS	639.15	65.3	74.08		74.23	0.000096	3.09	207	120.86	0.24
P118-27-00	P118-27-00	465.31	Max WS	658.96	64.85	74.06		74.2	0.000082	2.93	225.06	42.85	0.23
P118-27-00	P118-27-00	448.57	Max WS	659.91	64.8	74.06	69.36	74.19	0.00008	2.9	227.22	43.06	0.22
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	659.91	64.8	74.05		74.19	0.00008	2.91	226.79	43.02	0.22
P118-27-00	P118-27-00	429.17	Max WS	660.49	64.7	74.06	69.26	74.18	0.000076	2.86	231.28	43.43	0.22
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	660.29	64.7	74.05		74.18	0.000077	2.86	231.08	43.41	0.22
P118-27-00	P118-27-00	399.43	Max WS	661.49	64.6	74.06		74.18	0.000073	2.81	235.57	47.57	0.21
P118-27-00	P118-27-00	310	Max WS	659.96	65.51	73.84	69.88	74.02	0.003574	3.39	200.07	78.95	0.31
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	71.19		71.21	0.000099	1.36	294	45.24	0.09
P118-00-00	P118-R3-4	75489.4	Max WS	399.97	61.15	71.1		71.12	0.000101	1.34	299.51	47.99	0.09
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	399.87	60.14	71.01		71.02	0.000059	1.1	362.91	52.09	0.07
P118-00-00	P118-R3-4	73879.2	Max WS	771.27	60.08	70.87		70.93	0.00019	1.93	399.89	62.29	0.13
P118-00-00	P118-R3-4	73828	Max WS	795.64	60.08	70.86		70.92	0.000203	1.99	399.38	62.21	0.14
P118-00-00	P118-R3-4	73723	Max WS	1058.62	60.05	70.73		70.84	0.000377	2.7	392.15	61.59	0.19
P118-00-00	P118-R3-4	73423.3	Max WS	1058.61	60	70.65	64.41	70.72	0.000372	2.2	480.7	67.84	0.15
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	1058.61	59.83	70.6		70.68	0.000353	2.16	489.27	68.05	0.14
P118-00-00	P118-R3-4	73232.3	Max WS	1058.61	59.83	70.57	64.24	70.64	0.000359	2.17	486.8	67.99	0.14

HEC-RAS Plan: Alt1_50_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	76.92		76.92	0	0	69.75	25.06	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	76.92		76.92	0	0	74.3	25.06	0
P118-27-00	P118-27-00	5321.96	Max WS	33.41	72.13	76.91		76.91	0.000004	0.43	77.68	43.92	0.04
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	74.65	71.84	76.89		76.9	0.000015	0.91	82.07	57.37	0.09
P118-27-00	P118-27-00	4300.35	Max WS	116.98	71.56	76.84		76.87	0.000031	1.36	86.26	48.54	0.13
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	154.02	71.38	76.78		76.83	0.000048	1.71	90.04	82.56	0.16
P118-27-00	P118-27-00	3444.22	Max WS	154	71.25	76.77		76.81	0.000044	1.66	92.9	25.81	0.15
P118-27-00	P118-27-00	3374.42	Max WS	437.12	71.25	75.64		76.34	0.00101	6.74	64.81	23.55	0.72
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	435.68	70.4	75.62		76.06	0.000514	5.3	82.19	25.49	0.52
P118-27-00	P118-27-00	2525.84	Max WS	466.21	70	75.28		75.72	0.000512	5.33	87.55	27.14	0.52
P118-27-00	P118-27-00	2485.48	Max WS	469.17	69.9	75.28		75.7	0.00048	5.21	90.1	27.51	0.51
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	465.78	69.9	75.05		75.53	0.000574	5.56	83.82	26.58	0.55
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	467.57	69.85	75.02		75.5	0.000564	5.53	84.6	26.7	0.55
P118-27-00	P118-27-00	2381.57	Max WS	468.75	69.85	75		75.49	0.000578	5.58	83.99	26.61	0.55
P118-27-00	P118-27-00	2351.35	Max WS	470.48	69.8	74.99		75.46	0.000566	5.54	84.91	26.75	0.55
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	466.6	69.8	74.68		75.25	0.000728	6.07	76.84	25.51	0.62
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	476.64	69.77	73.72	73.65	74.89	0.001883	8.69	54.86	21.79	0.97
P118-27-00	P118-27-00	2200		Lat Struct									
P118-27-00	P118-27-00	1817.26	Max WS	479.62	68.6	73.88		74.35	0.000543	5.48	87.5	27.13	0.54
P118-27-00	P118-27-00	1360.33	Max WS	506.53	66.5	73.99		74.15	0.000126	3.23	157.05	35.95	0.27
P118-27-00	P118-27-00	1314.62	Max WS	510.12	66	74.01		74.14	0.000094	2.89	176.47	160.25	0.24
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	508.5	65.96	73.89		74.02	0.000098	2.93	173.26	233.28	0.24
P118-27-00	P118-27-00	1198.35	Max WS	511.55	65.9	73.88		74.01	0.000096	2.92	175.32	37.93	0.24
P118-27-00	P118-27-00	763.46	Max WS	540.78	65.3	73.85		73.96	0.000078	2.74	197.37	92.52	0.22
P118-27-00	P118-27-00	465.31	Max WS	557.46	64.85	73.83		73.94	0.000066	2.59	215.21	41.92	0.2
P118-27-00	P118-27-00	448.57	Max WS	558.37	64.8	73.83	69	73.93	0.000064	2.57	217.32	42.13	0.2
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	558.16	64.8	73.83		73.93	0.000065	2.57	217.17	42.11	0.2
P118-27-00	P118-27-00	429.17	Max WS	558.55	64.7	73.83	68.9	73.93	0.000061	2.52	221.53	42.52	0.19
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	558.66	64.7	73.83		73.93	0.000061	2.52	221.36	42.51	0.19
P118-27-00	P118-27-00	399.43	Max WS	559.5	64.6	73.83		73.92	0.000058	2.48	225.73	42.92	0.19
P118-27-00	P118-27-00	310	Max WS	556.93	65.51	73.68	69.51	73.82	0.002294	2.98	189.11	63.86	0.25
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.91		70.94	0.000111	1.42	281.59	44.38	0.1
P118-00-00	P118-R3-4	75489.4	Max WS	399.94	61.15	70.81		70.84	0.000114	1.4	285.86	46.74	0.1
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	399.8	60.14	70.71		70.73	0.000067	1.15	347.44	51.06	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	670.02	60.08	70.6		70.65	0.000161	1.75	383.18	60.96	0.12
P118-00-00	P118-R3-4	73828	Max WS	687.4	60.08	70.59		70.64	0.00017	1.8	382.94	60.9	0.13
P118-00-00	P118-R3-4	73723	Max WS	955.08	60.05	70.47		70.57	0.000343	2.54	376.21	60.31	0.18
P118-00-00	P118-R3-4	73423.3	Max WS	955.07	60	70.39	64.18	70.46	0.000338	2.06	463.51	67.4	0.14
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	955.07	59.83	70.35		70.42	0.000319	2.02	472.3	67.62	0.13
P118-00-00	P118-R3-4	73232.3	Max WS	955.06	59.83	70.32	64.02	70.39	0.000324	2.03	470.09	67.57	0.14

HEC-RAS Plan: Alt1_10_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	75.92		75.92	0	0	46.74	20.94	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	75.92		75.92	0	0	51.15	21.2	0
P118-27-00	P118-27-00	5321.96	Max WS	22.6	72.13	75.91		75.91	0.000004	0.41	54.58	21.27	0.05
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	50.52	71.84	75.89		75.9	0.000017	0.86	58.96	21.46	0.09
P118-27-00	P118-27-00	4300.35	Max WS	79.19	71.56	75.85		75.87	0.000033	1.25	63.23	25.54	0.13
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	104.36	71.38	75.79		75.83	0.000049	1.56	66.71	52.82	0.16
P118-27-00	P118-27-00	3444.22	Max WS	104.31	71.25	75.78		75.81	0.000045	1.51	69.01	22.59	0.15
P118-27-00	P118-27-00	3374.42	Max WS	299.49	71.25	74.74		75.42	0.001253	6.62	45.22	19.94	0.78
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	299.62	70.4	74.7		75.08	0.000559	4.97	60.33	22.05	0.53
P118-27-00	P118-27-00	2525.84	Max WS	323.19	70	74.36		74.75	0.000569	5.04	64.09	23.42	0.54
P118-27-00	P118-27-00	2485.48	Max WS	325.17	69.9	74.35		74.72	0.000525	4.9	66.33	23.8	0.52
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	325.17	69.9	74.19		74.61	0.000618	5.21	62.44	23.14	0.56
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	326.79	69.85	74.17		74.58	0.000605	5.18	63.15	23.26	0.55
P118-27-00	P118-27-00	2381.57	Max WS	327.8	69.85	74.14		74.57	0.000623	5.23	62.63	23.17	0.56
P118-27-00	P118-27-00	2351.35	Max WS	329.17	69.8	74.13		74.55	0.000607	5.19	63.45	23.32	0.55
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	329.18	69.8	73.91		74.4	0.000756	5.63	58.48	22.45	0.61
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	273.73	69.77	73.16		73.78	0.001182	6.33	43.24	19.54	0.75
P118-27-00	P118-27-00	2200	Lat Struct										
P118-27-00	P118-27-00	1817.26	Max WS	266.48	68.6	73.26		73.47	0.00029	3.74	71.31	24.63	0.39
P118-27-00	P118-27-00	1360.33	Max WS	282.38	66.5	73.3		73.37	0.000061	2.12	133.32	33.21	0.19
P118-27-00	P118-27-00	1314.62	Max WS	284.84	66	73.31		73.37	0.000045	1.89	150.83	51.35	0.16
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	283.66	65.96	73.28		73.33	0.000044	1.88	150.93	39.48	0.16
P118-27-00	P118-27-00	1198.35	Max WS	285.36	65.9	73.27		73.33	0.000043	1.87	152.97	35.49	0.16
P118-27-00	P118-27-00	763.46	Max WS	302.06	65.3	73.26		73.31	0.000034	1.73	174.45	37.84	0.14
P118-27-00	P118-27-00	465.31	Max WS	311.44	64.85	73.25		73.29	0.000028	1.63	191.65	39.61	0.13
P118-27-00	P118-27-00	448.57	Max WS	311.96	64.8	73.25	67.92	73.29	0.000027	1.61	193.64	39.81	0.13
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	311.96	64.8	73.25		73.29	0.000027	1.61	193.55	39.8	0.13
P118-27-00	P118-27-00	429.17	Max WS	312.36	64.7	73.25	67.83	73.29	0.000026	1.58	197.6	40.21	0.13
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	312.25	64.7	73.25		73.29	0.000026	1.58	197.5	40.2	0.13
P118-27-00	P118-27-00	399.43	Max WS	312.61	64.6	73.25		73.29	0.000025	1.55	201.58	40.6	0.12
P118-27-00	P118-27-00	310	Max WS	310.93	65.51	73.2	68.5	73.25	0.00084	1.86	167.44	36.38	0.15
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.26		70.3	0.000147	1.58	253.45	42.38	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.96	61.15	70.12		70.16	0.000153	1.57	254.93	43.79	0.11
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	399.8	60.14	69.99		70.01	0.00009	1.28	311.63	48.61	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	441.14	60.08	69.95		69.97	0.000093	1.28	344.33	57.76	0.09
P118-00-00	P118-R3-4	73828	Max WS	443.62	60.08	69.94		69.97	0.000093	1.29	344.61	57.73	0.09
P118-00-00	P118-R3-4	73723	Max WS	709.88	60.05	69.84		69.91	0.000249	2.09	339.52	57.25	0.15
P118-00-00	P118-R3-4	73423.3	Max WS	709.87	60	69.79	63.59	69.83	0.000245	1.68	423.09	66.37	0.12
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	709.87	59.83	69.76		69.8	0.00023	1.64	432.49	66.61	0.11
P118-00-00	P118-R3-4	73232.3	Max WS	709.87	59.83	69.74	63.42	69.78	0.000232	1.65	430.93	66.57	0.11

Alternative 1 - 500-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.81	78.25	-0.56
5780.54	78.8	78.24	-0.56
5321.96	78.82	78.25	-0.57
4831.58	78.84	78.24	-0.6
4300.35	78.85	78.21	-0.64
3803.92	78.85	78.17	-0.68
3444.22	78.85	78.16	-0.69
3374.42	78.78	77.68	-1.1
3011.6	78.54	77.46	-1.08
2525.84	78.41	77.18	-1.23
2485.48	78.4	77.15	-1.25
2431.78	78.07	76.82	-1.25
2398.35	78.04	76.79	-1.25
2381.57	78.01	76.78	-1.23
2351.35	77.98	76.75	-1.23
2292.65	77.86	76.22	-1.64
2238.14	77.85	76.12	-1.73
1817.26	77.49	75.54	-1.95
1360.33	77.11	75.28	-1.83
1314.62	77.08	75.27	-1.81
1255.05	74.81	74.87	0.06
1198.35	74.7	74.86	0.16
763.46	74.23	74.76	0.53
465.31	73.95	74.71	0.76
448.57	73.93	74.71	0.78
438.14	73.9	74.66	0.76
429.17	73.89	74.66	0.77
415.49	73.87	74.66	0.79
399.43	73.84	74.65	0.81
76394.4	70.57	71.84	1.27
75489.4	70.45	71.77	1.32
74253.7	70.31	71.69	1.38
73879.2	70.29	71.56	1.27
73828	70.28	71.54	1.26
73723	70.26	71.46	1.2
73423.3	70.17	71.32	1.15
73332.3	70.13	71.26	1.13
73232.3	70.1	71.22	1.12

Alternative 1 - 100-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.54	77.34	-1.2
5780.54	78.53	77.34	-1.19
5321.96	78.55	77.33	-1.22
4831.58	78.55	77.31	-1.24
4300.35	78.55	77.28	-1.27
3803.92	78.55	77.24	-1.31
3444.22	78.55	77.22	-1.33
3374.42	78.44	76.75	-1.69
3011.6	78.25	76.48	-1.77
2525.84	78.1	76.15	-1.95
2485.48	78.09	76.12	-1.97
2431.78	77.83	75.9	-1.93
2398.35	77.8	75.87	-1.93
2381.57	77.78	75.86	-1.92
2351.35	77.75	75.83	-1.92
2292.65	77.66	75.42	-2.24
2238.14	77.65	75.31	-2.34
1817.26	77.29	74.72	-2.57
1360.33	76.88	74.5	-2.38
1314.62	76.85	74.49	-2.36
1255.05	74.4	74.3	-0.1
1198.35	74.26	74.3	0.04
763.46	73.7	74.23	0.53
465.31	73.35	74.2	0.85
448.57	73.32	74.19	0.87
438.14	73.28	74.19	0.91
429.17	73.27	74.18	0.91
415.49	73.24	74.18	0.94
399.43	73.21	74.18	0.97
76394.4	70.47	71.21	0.74
75489.4	70.34	71.12	0.78
74253.7	70.2	71.02	0.82
73879.2	70.17	70.93	0.76
73828	70.17	70.92	0.75
73723	70.15	70.84	0.69
73423.3	70.06	70.72	0.66
73332.3	70.02	70.68	0.66
73232.3	70	70.64	0.64

Alternative 1 - 50-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.4	76.92	-1.48
5780.54	78.4	76.92	-1.48
5321.96	78.41	76.91	-1.5
4831.58	78.41	76.9	-1.51
4300.35	78.41	76.87	-1.54
3803.92	78.4	76.83	-1.57
3444.22	78.4	76.81	-1.59
3374.42	78.3	76.34	-1.96
3011.6	78.11	76.06	-2.05
2525.84	77.96	75.72	-2.24
2485.48	77.94	75.7	-2.24
2431.78	77.72	75.53	-2.19
2398.35	77.69	75.5	-2.19
2381.57	77.67	75.49	-2.18
2351.35	77.64	75.46	-2.18
2292.65	77.57	75.25	-2.32
2238.14	77.55	74.89	-2.66
1817.26	77.18	74.35	-2.83
1360.33	76.76	74.15	-2.61
1314.62	76.72	74.14	-2.58
1255.05	74.24	74.02	-0.22
1198.35	74.08	74.01	-0.07
763.46	73.48	73.96	0.48
465.31	73.11	73.94	0.83
448.57	73.08	73.93	0.85
438.14	73.04	73.93	0.89
429.17	73.02	73.93	0.91
415.49	72.99	73.93	0.94
399.43	72.95	73.92	0.97
76394.4	70.42	70.94	0.52
75489.4	70.29	70.84	0.55
74253.7	70.15	70.73	0.58
73879.2	70.12	70.65	0.53
73828	70.12	70.64	0.52
73723	70.1	70.57	0.47
73423.3	70.01	70.46	0.45
73332.3	69.98	70.42	0.44
73232.3	69.95	70.39	0.44

Alternative 1 - 10-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	77.91	75.92	-1.99
5780.54	77.91	75.92	-1.99
5321.96	77.91	75.91	-2
4831.58	77.9	75.9	-2
4300.35	77.9	75.87	-2.03
3803.92	77.89	75.83	-2.06
3444.22	77.89	75.81	-2.08
3374.42	77.81	75.42	-2.39
3011.6	77.64	75.08	-2.56
2525.84	77.43	74.75	-2.68
2485.48	77.41	74.72	-2.69
2431.78	77.27	74.61	-2.66
2398.35	77.25	74.58	-2.67
2381.57	77.23	74.57	-2.66
2351.35	77.21	74.55	-2.66
2292.65	77.17	74.4	-2.77
2238.14	77.15	73.78	-3.37
1817.26	76.75	73.47	-3.28
1360.33	76.25	73.37	-2.88
1314.62	76.22	73.37	-2.85
1255.05	73.77	73.33	-0.44
1198.35	73.58	73.33	-0.25
763.46	72.91	73.31	0.4
465.31	72.46	73.29	0.83
448.57	72.43	73.29	0.86
438.14	72.37	73.29	0.92
429.17	72.36	73.29	0.93
415.49	72.31	73.29	0.98
399.43	72.26	73.29	1.03
76394.4	70.29	70.3	0.01
75489.4	70.16	70.16	0
74253.7	70.01	70.01	0
73879.2	69.97	69.97	0
73828	69.97	69.97	0
73723	69.95	69.91	-0.04
73423.3	69.87	69.83	-0.04
73332.3	69.84	69.8	-0.04
73232.3	69.82	69.78	-0.04

HEC-RAS Plan: Alt2_500_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-4.87	72.56	78.25		78.25	0	-0.05	118.78	92.41	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-35.12	72.31	78.24		78.24	0.000002	-0.32	110.88	34.78	0.03
P118-27-00	P118-27-00	5321.96	Max WS	17.77	72.13	78.25		78.25	0	0.16	114.12	464.41	0.01
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	82.7	71.84	78.23		78.24	0.000007	0.7	118.49	117.77	0.06
P118-27-00	P118-27-00	4300.35	Max WS	149.56	71.56	78.19		78.21	0.00002	1.22	122.59	134.29	0.11
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	208.27	71.38	78.13		78.18	0.000035	1.64	127	184.7	0.14
P118-27-00	P118-27-00	3444.22	Max WS	208.03	71.25	78.12		78.16	0.000032	1.59	131.33	55.72	0.14
P118-27-00	P118-27-00	3374.42	Max WS	670.24	71.25	76.98		77.68	0.00074	6.7	100.01	28.92	0.64
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	670.38	70.4	76.98		77.46	0.000439	5.57	122.72	85.88	0.5
P118-27-00	P118-27-00	2525.84	Max WS	724.67	70	76.7		77.18	0.000428	5.57	143.22	98.49	0.49
P118-27-00	P118-27-00	2485.48	Max WS	730.52	69.9	76.68		77.15	0.000412	5.5	132.7	33.13	0.48
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	730.51	69.9	76.22		76.82	0.000566	6.2	117.89	31.29	0.56
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	734.36	69.85	76.2		76.79	0.000561	6.18	118.74	31.4	0.56
P118-27-00	P118-27-00	2381.57	Max WS	736.74	69.85	76.17		76.78	0.000575	6.25	117.95	31.3	0.57
P118-27-00	P118-27-00	2351.35	Max WS	739.99	69.8	76.16		76.76	0.000567	6.22	118.97	31.43	0.56
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	739.99	69.8	75.3		76.27	0.001083	7.92	93.44	27.99	0.76
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	746.21	69.77	75.08		76.19	0.001285	8.46	88.21	27.23	0.83
P118-27-00	P118-27-00	1817.26	Max WS	796.14	68.6	74.97		75.66	0.00065	6.67	119.37	31.48	0.6
P118-27-00	P118-27-00	1360.33	Max WS	837.66	66.5	75.13		75.4	0.000179	4.17	200.88	46.67	0.33
P118-27-00	P118-27-00	1314.62	Max WS	843.1	66	75.17		75.39	0.000137	3.78	223.27	1139.42	0.29
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	842.6	65.96	74.68		74.94	0.000173	4.12	204.41	837.47	0.32
P118-27-00	P118-27-00	1198.35	Max WS	847.86	65.9	74.67		74.93	0.000171	4.11	206.42	41.08	0.32
P118-27-00	P118-27-00	763.46	Max WS	896.42	65.3	74.6		74.83	0.000145	3.92	228.64	249.4	0.3
P118-27-00	P118-27-00	465.31	Max WS	924.21	64.85	74.56		74.78	0.000126	3.74	246.98	257.79	0.28
P118-27-00	P118-27-00	448.57	Max WS	925.74	64.8	74.56	70.18	74.78	0.000123	3.71	249.24	151.69	0.28
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	925.67	64.8	74.51		74.73	0.000126	3.75	246.69	71.5	0.28
P118-27-00	P118-27-00	429.17	Max WS	926.47	64.7	74.51	70.08	74.72	0.00012	3.68	251.48	84.31	0.28
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	926.49	64.7	74.51		74.72	0.000121	3.69	251.22	95.55	0.28
P118-27-00	P118-27-00	399.43	Max WS	927.84	64.6	74.51		74.72	0.000115	3.62	255.97	154.05	0.27
P118-27-00	P118-27-00	310	Max WS	926.97	65.51	74.2	70.71	74.47	0.005444	4.25	229.45	83.2	0.38
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	71.9		71.92	0.000074	1.22	327.14	47.45	0.08
P118-00-00	P118-R3-4	75489.4	Max WS	399.97	61.15	71.83		71.86	0.000075	1.19	336.12	51.18	0.08
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	399.94	60.14	71.77		71.78	0.000045	0.99	403.58	54.69	0.06
P118-00-00	P118-R3-4	73879.2	Max WS	1033.35	60.08	71.56		71.65	0.000259	2.33	444.01	65.67	0.16
P118-00-00	P118-R3-4	73828	Max WS	1076.43	60.08	71.53		71.63	0.000283	2.43	442.71	65.53	0.16
P118-00-00	P118-R3-4	73723	Max WS	1326.21	60.05	71.4		71.55	0.000451	3.05	434.53	64.87	0.21
P118-00-00	P118-R3-4	73423.3	Max WS	1326.2	60	71.3	64.96	71.4	0.000448	2.52	525.45	68.96	0.16
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	1326.2	59.83	71.25		71.35	0.000429	2.49	533.52	69.15	0.16
P118-00-00	P118-R3-4	73232.3	Max WS	1326.2	59.83	71.21	64.79	71.3	0.000436	2.5	530.46	69.08	0.16

HEC-RAS Plan: Alt2_100_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	1.3	72.56	77.33		77.33	0	0.02	80.51	26.77	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	0.85	72.31	77.33		77.33	0	0.01	85	26.65	0
P118-27-00	P118-27-00	5321.96	Max WS	38.99	72.13	77.32		77.33	0.000003	0.44	88.21	181.29	0.04
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	86.18	71.84	77.3		77.31	0.000014	0.93	92.55	71.16	0.09
P118-27-00	P118-27-00	4300.35	Max WS	134.63	71.56	77.25		77.28	0.00003	1.39	96.65	66.07	0.13
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	177.07	71.38	77.19		77.24	0.000047	1.76	100.55	93.56	0.16
P118-27-00	P118-27-00	3444.22	Max WS	176.92	71.25	77.17		77.22	0.000043	1.71	103.71	27.14	0.15
P118-27-00	P118-27-00	3374.42	Max WS	511.06	71.25	76		76.75	0.000977	6.93	73.69	25.01	0.71
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	511.04	70.4	76		76.47	0.000523	5.55	92.02	26.89	0.53
P118-27-00	P118-27-00	2525.84	Max WS	551.3	70	75.65		76.14	0.000533	5.64	97.75	28.6	0.54
P118-27-00	P118-27-00	2485.48	Max WS	554.67	69.9	75.64		76.12	0.000501	5.52	100.45	28.98	0.52
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	554.65	69.9	75.32		75.89	0.000648	6.08	91.28	27.68	0.59
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	557.43	69.85	75.3		75.87	0.000641	6.06	92	27.79	0.59
P118-27-00	P118-27-00	2381.57	Max WS	559.13	69.85	75.27		75.85	0.000659	6.13	91.24	27.67	0.6
P118-27-00	P118-27-00	2351.35	Max WS	561.48	69.8	75.25		75.83	0.000648	6.1	92.11	27.8	0.59
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	560.68	69.8	74.58		75.46	0.001144	7.53	74.47	25.13	0.77
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	564.33	69.77	74.35		75.38	0.001394	8.12	69.52	24.33	0.85
P118-27-00	P118-27-00	1817.26	Max WS	599.42	68.6	74.27		74.85	0.000621	6.1	98.27	28.67	0.58
P118-27-00	P118-27-00	1360.33	Max WS	629.67	66.5	74.41		74.61	0.000152	3.65	172.41	37.62	0.3
P118-27-00	P118-27-00	1314.62	Max WS	633.58	66	74.44		74.6	0.000114	3.28	192.96	285.81	0.26
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	632.78	65.96	74.21		74.39	0.000126	3.41	185.67	334.67	0.28
P118-27-00	P118-27-00	1198.35	Max WS	636.45	65.9	74.2		74.38	0.000124	3.39	187.73	39.21	0.27
P118-27-00	P118-27-00	763.46	Max WS	671.2	65.3	74.16		74.32	0.000102	3.2	210.03	130.53	0.25
P118-27-00	P118-27-00	465.31	Max WS	691.03	64.85	74.14		74.28	0.000087	3.03	228.2	43.15	0.23
P118-27-00	P118-27-00	448.57	Max WS	692.06	64.8	74.14	69.47	74.28	0.000085	3	230.37	43.35	0.23
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	691.94	64.8	74.12		74.26	0.000085	3.01	229.76	43.29	0.23
P118-27-00	P118-27-00	429.17	Max WS	692.53	64.7	74.13	69.38	74.26	0.000081	2.96	234.3	43.71	0.23
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	692.47	64.7	74.12		74.26	0.000081	2.96	234.09	43.69	0.23
P118-27-00	P118-27-00	399.43	Max WS	693.47	64.6	74.13		74.26	0.000077	2.91	238.61	51.26	0.22
P118-27-00	P118-27-00	310	Max WS	691.34	65.51	73.88	69.98	74.07	0.004035	3.5	203.69	82.13	0.33
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	71.27		71.3	0.000095	1.34	297.78	45.5	0.09
P118-00-00	P118-R3-4	75489.4	Max WS	399.98	61.15	71.18		71.21	0.000097	1.32	303.68	48.36	0.09
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	399.9	60.14	71.1		71.11	0.000057	1.09	367.6	52.4	0.07
P118-00-00	P118-R3-4	73879.2	Max WS	801.04	60.08	70.95		71.02	0.000199	1.98	404.97	62.69	0.14
P118-00-00	P118-R3-4	73828	Max WS	827.49	60.08	70.94		71	0.000213	2.05	404.38	62.6	0.14
P118-00-00	P118-R3-4	73723	Max WS	1089.81	60.05	70.81		70.93	0.000387	2.75	397	61.97	0.19
P118-00-00	P118-R3-4	73423.3	Max WS	1089.8	60	70.72	64.48	70.8	0.000382	2.24	485.89	67.97	0.15
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	1089.8	59.83	70.68		70.76	0.000363	2.2	494.39	68.18	0.14
P118-00-00	P118-R3-4	73232.3	Max WS	1089.79	59.83	70.64	64.31	70.72	0.000368	2.22	491.85	68.12	0.15

HEC-RAS Plan: Alt2_50_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	76.9		76.9	0	0	69.33	24.99	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	76.9		76.9	0	0	73.88	24.99	0
P118-27-00	P118-27-00	5321.96	Max WS	33.25	72.13	76.89		76.9	0.000004	0.43	77.26	41.22	0.04
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	74.31	71.84	76.87		76.88	0.000015	0.91	81.66	56.54	0.09
P118-27-00	P118-27-00	4300.35	Max WS	116.48	71.56	76.82		76.85	0.000031	1.36	85.85	47.71	0.13
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	153.37	71.38	76.77		76.81	0.000048	1.71	89.63	82.13	0.16
P118-27-00	P118-27-00	3444.22	Max WS	153.31	71.25	76.75		76.79	0.000044	1.66	92.49	25.76	0.15
P118-27-00	P118-27-00	3374.42	Max WS	442.63	71.25	75.59		76.34	0.001088	6.96	63.64	23.35	0.74
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	442.64	70.4	75.57		76.04	0.000552	5.47	80.99	25.31	0.54
P118-27-00	P118-27-00	2525.84	Max WS	477.47	70	75.21		75.69	0.000573	5.59	85.47	26.83	0.55
P118-27-00	P118-27-00	2485.48	Max WS	480.39	69.9	75.2		75.66	0.000536	5.46	88	27.2	0.54
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	480.33	69.9	74.91		75.47	0.000684	5.98	80.38	26.06	0.6
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	482.73	69.85	74.89		75.44	0.000675	5.96	81.04	26.16	0.6
P118-27-00	P118-27-00	2381.57	Max WS	484.21	69.85	74.86		75.43	0.000697	6.03	80.29	26.04	0.61
P118-27-00	P118-27-00	2351.35	Max WS	486.23	69.8	74.84		75.4	0.000684	6	81.1	26.17	0.6
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	481.81	69.8	74.25		75.07	0.001155	7.27	66.29	23.8	0.77
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	480.97	69.77	74.03		74.97	0.001385	7.77	61.89	23.05	0.84
P118-27-00	P118-27-00	1817.26	Max WS	510.2	68.6	73.95		74.46	0.000579	5.71	89.43	27.41	0.56
P118-27-00	P118-27-00	1360.33	Max WS	536.96	66.5	74.07		74.25	0.000135	3.35	160.05	36.28	0.28
P118-27-00	P118-27-00	1314.62	Max WS	540.43	66	74.1		74.24	0.0001	3.01	179.74	173.79	0.24
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	538.94	65.96	73.95		74.1	0.000106	3.07	175.74	253.44	0.25
P118-27-00	P118-27-00	1198.35	Max WS	542	65.9	73.95		74.09	0.000104	3.05	177.8	38.19	0.25
P118-27-00	P118-27-00	763.46	Max WS	571.45	65.3	73.91		74.04	0.000084	2.86	199.92	104.43	0.23
P118-27-00	P118-27-00	465.31	Max WS	587.9	64.85	73.89		74.01	0.000071	2.7	217.84	42.17	0.21
P118-27-00	P118-27-00	448.57	Max WS	589.02	64.8	73.89	69.11	74.01	0.000069	2.68	219.97	42.38	0.21
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	589.02	64.8	73.89		74	0.00007	2.68	219.81	42.36	0.21
P118-27-00	P118-27-00	429.17	Max WS	589.62	64.7	73.89	69.01	74	0.000066	2.63	224.21	42.77	0.2
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	589.52	64.7	73.89		74	0.000066	2.63	224.03	42.76	0.2
P118-27-00	P118-27-00	399.43	Max WS	590.37	64.6	73.89		74	0.000063	2.58	228.43	43.17	0.2
P118-27-00	P118-27-00	310	Max WS	587.8	65.51	73.73	69.62	73.88	0.002511	3.11	192.34	66.25	0.26
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.99		71.02	0.000107	1.4	285.28	44.64	0.1
P118-00-00	P118-R3-4	75489.4	Max WS	399.96	61.15	70.89		70.92	0.000109	1.38	289.91	47.12	0.1
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	399.84	60.14	70.8		70.82	0.000064	1.14	352.05	51.37	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	700.29	60.08	70.68		70.73	0.00017	1.8	388.16	61.36	0.13
P118-00-00	P118-R3-4	73828	Max WS	719.74	60.08	70.67		70.72	0.00018	1.86	387.85	61.29	0.13
P118-00-00	P118-R3-4	73723	Max WS	986.09	60.05	70.55		70.65	0.000354	2.59	380.96	60.69	0.18
P118-00-00	P118-R3-4	73423.3	Max WS	986.08	60	70.47	64.25	70.54	0.000348	2.1	468.65	67.53	0.14
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	986.08	59.83	70.43		70.5	0.00033	2.07	477.37	67.75	0.14
P118-00-00	P118-R3-4	73232.3	Max WS	986.07	59.83	70.4	64.09	70.46	0.000335	2.08	475.08	67.69	0.14

HEC-RAS Plan: Alt2_10_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	75.91		75.91	0	0	46.66	20.92	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	75.91		75.91	0	0	51.07	21.19	0
P118-27-00	P118-27-00	5321.96	Max WS	22.68	72.13	75.91		75.91	0.000004	0.42	54.5	21.26	0.05
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	50.72	71.84	75.88		75.89	0.000017	0.86	58.86	21.45	0.09
P118-27-00	P118-27-00	4300.35	Max WS	79.48	71.56	75.84		75.87	0.000033	1.26	63.12	25.41	0.13
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	104.68	71.38	75.79		75.83	0.00005	1.57	66.57	52.74	0.16
P118-27-00	P118-27-00	3444.22	Max WS	104.6	71.25	75.77		75.81	0.000046	1.52	68.86	22.57	0.15
P118-27-00	P118-27-00	3374.42	Max WS	301.57	71.25	74.66		75.4	0.00139	6.89	43.75	19.65	0.81
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	301.61	70.4	74.62		75.03	0.000616	5.16	58.5	21.74	0.55
P118-27-00	P118-27-00	2525.84	Max WS	325.21	70	74.21		74.65	0.00067	5.37	60.61	22.82	0.58
P118-27-00	P118-27-00	2485.48	Max WS	327.19	69.9	74.2		74.62	0.000617	5.21	62.77	23.2	0.56
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	327.11	69.9	73.99		74.48	0.000765	5.64	57.95	22.35	0.62
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	328.75	69.85	73.96		74.45	0.000753	5.62	58.49	22.45	0.61
P118-27-00	P118-27-00	2381.57	Max WS	329.74	69.85	73.93		74.44	0.000782	5.7	57.8	22.33	0.63
P118-27-00	P118-27-00	2351.35	Max WS	331.14	69.8	73.91		74.41	0.000765	5.66	58.47	22.44	0.62
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	330.71	69.8	73.53		74.2	0.001155	6.6	50.14	20.91	0.75
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	285.46	69.77	73.4		73.95	0.000958	5.92	48.19	20.53	0.68
P118-27-00	P118-27-00	1817.26	Max WS	302.34	68.6	73.36		73.62	0.000341	4.1	73.81	25.03	0.42
P118-27-00	P118-27-00	1360.33	Max WS	318.93	66.5	73.41		73.5	0.000072	2.33	137.08	33.66	0.2
P118-27-00	P118-27-00	1314.62	Max WS	321.21	66	73.43		73.49	0.000053	2.07	154.9	56.11	0.18
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	320.18	65.96	73.38		73.45	0.000053	2.07	154.68	69.04	0.18
P118-27-00	P118-27-00	1198.35	Max WS	321.82	65.9	73.38		73.44	0.000051	2.05	156.74	35.92	0.17
P118-27-00	P118-27-00	763.46	Max WS	339	65.3	73.36		73.42	0.00004	1.9	178.39	38.25	0.16
P118-27-00	P118-27-00	465.31	Max WS	349.06	64.85	73.36		73.41	0.000033	1.78	195.74	40.02	0.14
P118-27-00	P118-27-00	448.57	Max WS	349.6	64.8	73.36	68.12	73.4	0.000033	1.77	197.75	40.22	0.14
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	349.6	64.8	73.35		73.4	0.000033	1.77	197.65	40.21	0.14
P118-27-00	P118-27-00	429.17	Max WS	349.79	64.7	73.36	68.01	73.4	0.000031	1.73	201.75	40.62	0.14
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	349.79	64.7	73.35		73.4	0.000031	1.73	201.65	40.61	0.14
P118-27-00	P118-27-00	399.43	Max WS	350.17	64.6	73.35		73.4	0.000029	1.7	205.77	41.01	0.13
P118-27-00	P118-27-00	310	Max WS	348.53	65.51	73.29	68.68	73.35	0.001023	2.04	170.79	37.41	0.17
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.36		70.39	0.000141	1.55	257.6	42.68	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.96	61.15	70.23		70.26	0.000146	1.54	259.48	44.24	0.11
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	399.84	60.14	70.1		70.12	0.000086	1.26	316.97	48.98	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	473.3	60.08	70.05		70.08	0.000102	1.35	350.18	58.25	0.1
P118-00-00	P118-R3-4	73828	Max WS	477.76	60.08	70.04		70.07	0.000104	1.36	350.4	58.22	0.1
P118-00-00	P118-R3-4	73723	Max WS	747.11	60.05	69.94		70.01	0.000264	2.17	345	57.72	0.16
P118-00-00	P118-R3-4	73423.3	Max WS	747.11	60	69.88	63.7	69.93	0.00026	1.74	429.2	66.52	0.12
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	747.11	59.83	69.85		69.9	0.000244	1.7	438.5	66.76	0.12
P118-00-00	P118-R3-4	73232.3	Max WS	747.11	59.83	69.83	63.53	69.87	0.000247	1.71	436.84	66.72	0.12

Alternative 2 (Recommended) - 500-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.81	78.25	-0.56
5780.54	78.8	78.24	-0.56
5321.96	78.82	78.25	-0.57
4831.58	78.84	78.24	-0.6
4300.35	78.85	78.21	-0.64
3803.92	78.85	78.18	-0.67
3444.22	78.85	78.16	-0.69
3374.42	78.78	77.68	-1.1
3011.6	78.54	77.46	-1.08
2525.84	78.41	77.18	-1.23
2485.48	78.4	77.15	-1.25
2431.78	78.07	76.82	-1.25
2398.35	78.04	76.79	-1.25
2381.57	78.01	76.78	-1.23
2351.35	77.98	76.76	-1.22
2292.65	77.86	76.27	-1.59
2238.14	77.85	76.19	-1.66
1817.26	77.49	75.66	-1.83
1360.33	77.11	75.4	-1.71
1314.62	77.08	75.39	-1.69
1255.05	74.81	74.94	0.13
1198.35	74.7	74.93	0.23
763.46	74.23	74.83	0.6
465.31	73.95	74.78	0.83
448.57	73.93	74.78	0.85
438.14	73.9	74.73	0.83
429.17	73.89	74.72	0.83
415.49	73.87	74.72	0.85
399.43	73.84	74.72	0.88
76394.4	70.57	71.92	1.35
75489.4	70.45	71.86	1.41
74253.7	70.31	71.78	1.47
73879.2	70.29	71.65	1.36
73828	70.28	71.63	1.35
73723	70.26	71.55	1.29
73423.3	70.17	71.4	1.23
73332.3	70.13	71.35	1.22
73232.3	70.1	71.3	1.2

Alternative 2 (Recommended) - 100-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.54	77.33	-1.21
5780.54	78.53	77.33	-1.2
5321.96	78.55	77.33	-1.22
4831.58	78.55	77.31	-1.24
4300.35	78.55	77.28	-1.27
3803.92	78.55	77.24	-1.31
3444.22	78.55	77.22	-1.33
3374.42	78.44	76.75	-1.69
3011.6	78.25	76.47	-1.78
2525.84	78.1	76.14	-1.96
2485.48	78.09	76.12	-1.97
2431.78	77.83	75.89	-1.94
2398.35	77.8	75.87	-1.93
2381.57	77.78	75.85	-1.93
2351.35	77.75	75.83	-1.92
2292.65	77.66	75.46	-2.2
2238.14	77.65	75.38	-2.27
1817.26	77.29	74.85	-2.44
1360.33	76.88	74.61	-2.27
1314.62	76.85	74.6	-2.25
1255.05	74.4	74.39	-0.01
1198.35	74.26	74.38	0.12
763.46	73.7	74.32	0.62
465.31	73.35	74.28	0.93
448.57	73.32	74.28	0.96
438.14	73.28	74.26	0.98
429.17	73.27	74.26	0.99
415.49	73.24	74.26	1.02
399.43	73.21	74.26	1.05
76394.4	70.47	71.3	0.83
75489.4	70.34	71.21	0.87
74253.7	70.2	71.11	0.91
73879.2	70.17	71.02	0.85
73828	70.17	71	0.83
73723	70.15	70.93	0.78
73423.3	70.06	70.8	0.74
73332.3	70.02	70.76	0.74
73232.3	70	70.72	0.72

Alternative 2 (Recommended) - 50-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.4	76.9	-1.5
5780.54	78.4	76.9	-1.5
5321.96	78.41	76.9	-1.51
4831.58	78.41	76.88	-1.53
4300.35	78.41	76.85	-1.56
3803.92	78.4	76.81	-1.59
3444.22	78.4	76.79	-1.61
3374.42	78.3	76.34	-1.96
3011.6	78.11	76.04	-2.07
2525.84	77.96	75.69	-2.27
2485.48	77.94	75.66	-2.28
2431.78	77.72	75.47	-2.25
2398.35	77.69	75.44	-2.25
2381.57	77.67	75.43	-2.24
2351.35	77.64	75.4	-2.24
2292.65	77.57	75.07	-2.5
2238.14	77.55	74.97	-2.58
1817.26	77.18	74.46	-2.72
1360.33	76.76	74.25	-2.51
1314.62	76.72	74.24	-2.48
1255.05	74.24	74.1	-0.14
1198.35	74.08	74.09	0.01
763.46	73.48	74.04	0.56
465.31	73.11	74.01	0.9
448.57	73.08	74.01	0.93
438.14	73.04	74	0.96
429.17	73.02	74	0.98
415.49	72.99	74	1.01
399.43	72.95	74	1.05
76394.4	70.42	71.02	0.6
75489.4	70.29	70.92	0.63
74253.7	70.15	70.82	0.67
73879.2	70.12	70.73	0.61
73828	70.12	70.72	0.6
73723	70.1	70.65	0.55
73423.3	70.01	70.54	0.53
73332.3	69.98	70.5	0.52
73232.3	69.95	70.46	0.51

Alternative 2 (Recommended) - 10-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	77.91	75.91	-2
5780.54	77.91	75.91	-2
5321.96	77.91	75.91	-2
4831.58	77.9	75.89	-2.01
4300.35	77.9	75.87	-2.03
3803.92	77.89	75.83	-2.06
3444.22	77.89	75.81	-2.08
3374.42	77.81	75.4	-2.41
3011.6	77.64	75.03	-2.61
2525.84	77.43	74.65	-2.78
2485.48	77.41	74.62	-2.79
2431.78	77.27	74.48	-2.79
2398.35	77.25	74.45	-2.8
2381.57	77.23	74.44	-2.79
2351.35	77.21	74.41	-2.8
2292.65	77.17	74.2	-2.97
2238.14	77.15	73.95	-3.2
1817.26	76.75	73.62	-3.13
1360.33	76.25	73.5	-2.75
1314.62	76.22	73.49	-2.73
1255.05	73.77	73.45	-0.32
1198.35	73.58	73.44	-0.14
763.46	72.91	73.42	0.51
465.31	72.46	73.41	0.95
448.57	72.43	73.4	0.97
438.14	72.37	73.4	1.03
429.17	72.36	73.4	1.04
415.49	72.31	73.4	1.09
399.43	72.26	73.4	1.14
76394.4	70.29	70.39	0.1
75489.4	70.16	70.26	0.1
74253.7	70.01	70.12	0.11
73879.2	69.97	70.08	0.11
73828	69.97	70.07	0.1
73723	69.95	70.01	0.06
73423.3	69.87	69.93	0.06
73332.3	69.84	69.9	0.06
73232.3	69.82	69.87	0.05

HEC-RAS Plan: Alt3_500_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	473.83	73.94	80.23		80.39	0.001408	3.27	200.78	148.51	0.3
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	466.27	73.38	80.02		80.16	0.001066	3.04	191.82	124.83	0.26
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	417.19	73.1	79.6		79.72	0.000966	2.9	190.43	156.53	0.25
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	292.28	73.01	79.41		79.48	0.000587	2.16	168	108.77	0.19
P118-27-01	P118-27-01	500	Max WS	290.62	73.02	79.41		79.47	0.000659	2.01	188.36	159.32	0.17
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	266.8	72.9	78.54		78.61	0.000872	2.24	119.01	43.04	0.23
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	268.59	72.76	78.51		78.58	0.000798	2.25	119.68	37.37	0.22
P118-27-01	P118-27-01	139	Max WS	288.45	71.76	78.33		78.39	0.00062	2.03	144.55	71.84	0.19
P118-27-01	P118-27-01	39	Max WS	288.45	71.4	78.31		78.36	0.000042	1.81	159.77	38.63	0.16
P118-27-00	P118-27-00	6259.79	Max WS	-13.36	72.56	78.42		78.42	0	-0.12	135.21	113.81	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-61.56	72.31	78.41		78.41	0.000004	-0.53	117.03	98.71	0.05
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-16.25	72.13	78.42		78.42	0	-0.14	119.31	30.58	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	42.3	71.84	78.41		78.42	0.000002	0.34	124.03	30.32	0.03
P118-27-00	P118-27-00	4300.35	Max WS	114.12	71.56	78.39		78.4	0.00001	0.89	128.57	30.02	0.08
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	164.65	71.38	78.36		78.38	0.000019	1.23	133.69	30.23	0.1
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	215.53	71.3	78.32		78.36	0.000038	1.62	132.8	34.46	0.15
P118-27-00	P118-27-00_DS	3444.22	Max WS	503.98	71.25	78.11		78.34	0.000192	3.86	130.4	30.38	0.33
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	503.98	71.1	78.21		78.3	0.000724	2.33	216.05	210.27	0.21
P118-27-00	P118-27-00_DS	3011.6	Max WS	437.07	70.9	78.03		78.09	0.000534	2.01	227.99	563.07	0.18
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	455.87	70.5	77.79		77.85	0.000454	1.88	309.53	273.6	0.17
P118-27-00	P118-27-00_DS	2485.48	Max WS	477.63	70.45	77.71		77.83	0.000586	2.74	174.56	128.37	0.21
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	476.93	70.45	77.56		77.67	0.000592	2.62	182.31	157.55	0.2
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	480.55	70.4	77.57		77.65	0.00063	2.19	219.65	195.16	0.2
P118-27-00	P118-27-00_DS	2381.57	Max WS	482.61	70.4	77.55		77.64	0.000604	2.31	209.14	168.14	0.2
P118-27-00	P118-27-00_DS	2351.35	Max WS	485.33	70.35	77.49		77.62	0.000675	2.87	168.94	175.35	0.22
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	484.48	70.35	77.36		77.46	0.000643	2.56	189.13	155.66	0.21
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	478.63	70.3	77.36		77.43	0.00063	2.17	274.39	187.24	0.2
P118-27-00	P118-27-00_DS	1817.26	Max WS	480.29	70	77.07		77.15	0.000676	2.25	218.48	186.5	0.21
P118-27-00	P118-27-00_DS	1360.33	Max WS	495.25	69.7	76.74		76.82	0.000738	2.34	211.72	199.93	0.22
P118-27-00	P118-27-00_DS	1314.62	Max WS	518.84	66	76.71		76.79	0.00035	2.3	225.57	2240.19	0.15
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	518.84	66	75.8		75.95	0.000902	3.18	163.41	1424.28	0.23
P118-27-00	P118-27-00_DS	1198.35	Max WS	522.54	68.64	75.79		75.88	0.000847	2.76	495.17	704.3	0.23
P118-27-00	P118-27-00_DS	763.46	Max WS	557.27	66.19	75.47		75.53	0.000421	2.28	535.37	407.21	0.16
P118-27-00	P118-27-00_DS	465.31	Max WS	577.03	66.88	75.17		75.32	0.00108	3.12	189.25	376.68	0.26
P118-27-00	P118-27-00_DS	448.57	Max WS	578.11	66.75	75.19	71.19	75.3	0.00083	2.82	395.43	520.86	0.23
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	578.11	66.8	75.05		75.2	0.001052	3.17	296.2	457.25	0.26
P118-27-00	P118-27-00_DS	429.17	Max WS	578.69	66.81	75.04	71.29	75.19	0.00105	3.14	294.48	461.01	0.26
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	578.69	66.86	75.01		75.16	0.001127	3.22	282.46	402.69	0.27
P118-27-00	P118-27-00_DS	399.43	Max WS	579.69	66.84	74.99		75.15	0.001122	3.25	290.97	364	0.27
P118-27-00	P118-27-00_DS	173.97	Max WS	592.63	63.5	74.88		74.94	0.000326	2.08	531.92	707.66	0.15
P118-27-00	P118-27-00_DS	157.99	Max WS	593.55	64.25	74.88		74.94	0.000301	2.06	538.29	737.62	0.14
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	593.44	63.63	70.62		70.93	0.00226	4.49	132.14	28.57	0.37
P118-27-00	P118-27-00_DS	86.09	Max WS	594.37	63.19	70.51		70.89	0.003155	4.89	121.61	30.31	0.43
P118-27-00	P118-27-00_DS	61.59	Max WS	596.29	62.69	70.52		70.82	0.002458	4.39	135.73	33.22	0.38
P118-27-00	P118-27-00_DS	47.31	Max WS	596.32	62.51	70.58		70.79	0.001506	3.68	162.21	36.03	0.31
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.91		70.94	0.000111	1.42	281.62	44.39	0.1
P118-00-00	P118-R3-4	75489.4	Max WS	400	61.15	70.81		70.84	0.000114	1.4	285.89	46.75	0.1
P118-00-00	P118-R3-4	74253.7	Max WS	399.97	60.14	70.71		70.73	0.000067	1.15	347.49	51.07	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	399.97	60.08	70.69		70.7	0.000055	1.03	388.41	61.38	0.07
P118-00-00	P118-R3-4	73828	Max WS	399.98	60.08	70.69		70.7	0.000055	1.03	388.82	61.37	0.07
P118-00-00	P118-R3-3	73723	Max WS	996.32	60.05	70.57		70.68	0.000357	2.6	382.53	60.82	0.18
P118-00-00	P118-R3-3	73423.3	Max WS	996.31	60	70.5	64.27	70.57	0.000352	2.12	470.35	67.57	0.14
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	996.31	59.83	70.45		70.52	0.000333	2.08	479.05	67.79	0.14
P118-00-00	P118-R3-3	73232.3	Max WS	996.31	59.83	70.42	64.11	70.49	0.000338	2.09	476.73	67.74	0.14

HEC-RAS Plan: Alt3_100_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	339.29	73.94	79.79		79.91	0.00119	2.77	137.5	132.63	0.27
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	339.1	73.38	79.63		79.73	0.000777	2.49	158.3	101.01	0.22
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	301.92	73.1	79.34		79.42	0.000654	2.28	162.28	156.53	0.2
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	223.84	73.01	79.2		79.25	0.000424	1.77	146.16	101.34	0.16
P118-27-01	P118-27-01	500	Max WS	223.31	73.02	79.2		79.24	0.00048	1.66	158.46	127	0.15
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	213.14	72.9	78.01		78.08	0.000814	2.13	100.01	33.17	0.22
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	212.53	72.76	77.98		78.05	0.000754	2.09	101.51	32.53	0.21
P118-27-01	P118-27-01	139	Max WS	212.92	71.76	77.84		77.89	0.00048	1.73	123.06	37.39	0.17
P118-27-01	P118-27-01	39	Max WS	212.86	71.4	77.83		77.86	0.00003	1.5	142.06	35.42	0.13
P118-27-00	P118-27-00	6259.79	Max WS	2.35	72.56	77.94		77.94	0	0.02	98.28	50.47	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-1.23	72.31	77.94		77.94	0	-0.01	101.89	28.98	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	34.29	72.13	77.93		77.93	0.000002	0.33	105.02	28.6	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	78.74	71.84	77.92		77.92	0.000008	0.72	109.49	28.35	0.06
P118-27-00	P118-27-00	4300.35	Max WS	121.85	71.56	77.89		77.91	0.000016	1.07	114.04	28.12	0.09
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	160.97	71.38	77.86		77.88	0.000025	1.35	118.9	28.58	0.12
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	190.96	71.3	77.82		77.86	0.00004	1.64	116.58	30.94	0.15
P118-27-00	P118-27-00_DS	3444.22	Max WS	401.04	71.25	77.66		77.84	0.00016	3.42	117.31	28.73	0.3
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	402.99	71.1	77.74		77.81	0.000661	2.13	189.1	55.11	0.2
P118-27-00	P118-27-00_DS	3011.6	Max WS	369.36	70.9	77.54		77.6	0.000555	1.95	189.15	325.38	0.19
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	394.31	70.5	77.27		77.33	0.000531	1.93	245.42	160.19	0.18
P118-27-00	P118-27-00_DS	2485.48	Max WS	405.8	70.45	77.21		77.31	0.000584	2.56	158.42	63.64	0.2
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	405.61	70.45	77.12		77.21	0.000581	2.44	166.36	95.58	0.2
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	408.13	70.4	77.12		77.19	0.000636	2.11	193.68	84.5	0.2
P118-27-00	P118-27-00_DS	2381.57	Max WS	409.66	70.4	77.11		77.18	0.000603	2.19	186.87	55.64	0.2
P118-27-00	P118-27-00_DS	2351.35	Max WS	411.41	70.35	77.05		77.16	0.000647	2.66	154.95	73.06	0.21
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	411.29	70.35	76.98		77.07	0.000617	2.37	173.53	115.65	0.2
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	411.23	70.3	76.96		77.03	0.000652	2.12	220.22	115.33	0.2
P118-27-00	P118-27-00_DS	1817.26	Max WS	432.66	70	76.65		76.73	0.000758	2.28	189.43	66.6	0.22
P118-27-00	P118-27-00_DS	1360.33	Max WS	448	69.7	76.26		76.35	0.000872	2.43	184.51	116.32	0.23
P118-27-00	P118-27-00_DS	1314.62	Max WS	460.91	66	76.24		76.31	0.000344	2.18	211.07	1841.63	0.15
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	457.1	66	75.53		75.67	0.000812	2.92	156.28	1338.84	0.21
P118-27-00	P118-27-00_DS	1198.35	Max WS	459.43	68.64	75.49		75.62	0.001012	2.94	310.06	567.71	0.25
P118-27-00	P118-27-00_DS	763.46	Max WS	481.13	66.19	75.16		75.23	0.000403	2.19	429.39	338.03	0.15
P118-27-00	P118-27-00_DS	465.31	Max WS	493.73	66.88	74.91		75.04	0.000904	2.83	174.28	319.08	0.24
P118-27-00	P118-27-00_DS	448.57	Max WS	494.4	66.75	74.91	70.86	75.02	0.000817	2.73	263.76	386.99	0.23
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	494.38	66.8	74.79		74.93	0.000978	2.98	195.67	269.98	0.25
P118-27-00	P118-27-00_DS	429.17	Max WS	494.75	66.81	74.78	70.97	74.92	0.00096	2.95	200.1	254.99	0.24
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	494.74	66.86	74.75		74.89	0.001035	3.03	197.97	242.99	0.25
P118-27-00	P118-27-00_DS	399.43	Max WS	495.37	66.84	74.74		74.88	0.001037	3.04	214.16	286.56	0.25
P118-27-00	P118-27-00_DS	173.97	Max WS	503.62	63.5	74.65		74.7	0.000286	1.91	385.84	543.02	0.14
P118-27-00	P118-27-00_DS	157.99	Max WS	504.21	64.25	74.64		74.7	0.000266	1.89	386.78	541.67	0.13
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	504.12	63.63	70.39		70.64	0.001889	4	125.89	27.94	0.33
P118-27-00	P118-27-00_DS	86.09	Max WS	504.7	63.19	70.31		70.61	0.002611	4.37	115.48	29.54	0.39
P118-27-00	P118-27-00_DS	61.59	Max WS	505.89	62.69	70.31		70.55	0.002025	3.92	128.98	32.37	0.35
P118-27-00	P118-27-00_DS	47.31	Max WS	505.88	62.51	70.36		70.52	0.001235	3.28	154.45	35.16	0.28
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.69		70.72	0.000122	1.47	271.94	43.71	0.1
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.58		70.61	0.000125	1.45	275.24	45.75	0.1
P118-00-00	P118-R3-4	74253.7	Max WS	399.96	60.14	70.47		70.49	0.000073	1.19	335.3	50.24	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	399.97	60.08	70.45		70.46	0.000061	1.07	373.64	60.19	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.94	60.08	70.44		70.46	0.000061	1.07	374.04	60.18	0.08
P118-00-00	P118-R3-3	73723	Max WS	905.93	60.05	70.34		70.44	0.000325	2.46	368.74	59.7	0.17
P118-00-00	P118-R3-3	73423.3	Max WS	905.92	60	70.27	64.07	70.33	0.000321	1.99	455.38	67.19	0.13
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	905.92	59.83	70.24		70.29	0.000302	1.95	464.28	67.42	0.13
P118-00-00	P118-R3-3	73232.3	Max WS	905.92	59.83	70.2	63.9	70.26	0.000307	1.96	462.19	67.37	0.13

HEC-RAS Plan: Alt3_50_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	291.71	73.94	79.61		79.71	0.001071	2.54	117.37	64.24	0.25
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	291.66	73.38	79.47		79.55	0.00066	2.24	144.73	85.48	0.2
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	259.07	73.1	79.23		79.3	0.000538	2.03	150.44	156.53	0.18
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	198.51	73.01	79.11		79.15	0.000365	1.62	137.21	98.29	0.15
P118-27-01	P118-27-01	500	Max WS	198.32	73.02	79.11		79.14	0.000413	1.52	147.18	124.72	0.13
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	189.08	72.9	77.69		77.75	0.000826	2.11	89.8	30.59	0.22
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	189	72.76	77.66		77.73	0.000776	2.07	91.43	30.5	0.21
P118-27-01	P118-27-01	139	Max WS	187.87	71.76	77.52		77.56	0.000467	1.68	111.57	34.5	0.17
P118-27-01	P118-27-01	39	Max WS	187.73	71.4	77.51		77.54	0.000029	1.43	131.01	34.01	0.13
P118-27-00	P118-27-00	6259.79	Max WS	2.45	72.56	77.62		77.62	0	0.03	88.24	29.22	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	1.61	72.31	77.61		77.61	0	0.02	92.64	27.72	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	32.07	72.13	77.61		77.61	0.000002	0.33	95.89	27.43	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	69.97	71.84	77.59		77.6	0.000008	0.7	100.46	27.24	0.06
P118-27-00	P118-27-00	4300.35	Max WS	108.77	71.56	77.57		77.58	0.000016	1.03	105.1	27.08	0.09
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	142.85	71.38	77.53		77.56	0.000024	1.3	109.9	27.57	0.11
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	168.5	71.3	77.5		77.54	0.000039	1.58	106.97	29.44	0.15
P118-27-00	P118-27-00_DS	3444.22	Max WS	340.4	71.25	77.36		77.51	0.000141	3.13	108.85	27.76	0.28
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	353.12	71.1	77.43		77.49	0.000651	2.05	172.18	52.6	0.2
P118-27-00	P118-27-00_DS	3011.6	Max WS	336.72	70.9	77.21		77.27	0.0006	1.96	171.37	143.05	0.19
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	363.22	70.5	76.9		76.96	0.00063	2.03	201.37	115.39	0.2
P118-27-00	P118-27-00_DS	2485.48	Max WS	369.72	70.45	76.84		76.94	0.000627	2.52	146.67	53.11	0.21
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	369.59	70.45	76.78		76.87	0.00062	2.4	154.24	52.67	0.2
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	371.78	70.4	76.78		76.85	0.000691	2.12	175.06	53.04	0.21
P118-27-00	P118-27-00_DS	2381.57	Max WS	373.03	70.4	76.76		76.84	0.000655	2.19	170.43	52.91	0.2
P118-27-00	P118-27-00_DS	2351.35	Max WS	374.8	70.35	76.71		76.82	0.000683	2.6	144.11	52.9	0.22
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	374.75	70.35	76.67		76.75	0.00066	2.33	160.82	71.79	0.21
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	377.36	70.3	76.64		76.72	0.000724	2.17	185.93	93.18	0.21
P118-27-00	P118-27-00_DS	1817.26	Max WS	34.36	70	76.58		76.58	0.000005	0.18	186.02	65.58	0.02
P118-27-00	P118-27-00_DS	1360.33	Max WS	421.61	69.7	75.79		75.9	0.00113	2.64	159.96	79.12	0.26
P118-27-00	P118-27-00_DS	1314.62	Max WS	428.51	66	75.79		75.86	0.000375	2.18	196.96	1613.59	0.15
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	427.8	66	75.17		75.31	0.000881	2.92	146.58	1173.29	0.22
P118-27-00	P118-27-00_DS	1198.35	Max WS	429.89	68.64	75.08		75.24	0.001366	3.3	145.21	193.9	0.29
P118-27-00	P118-27-00_DS	763.46	Max WS	449.47	66.19	74.68		74.77	0.000507	2.39	298.77	255.37	0.17
P118-27-00	P118-27-00_DS	465.31	Max WS	460.68	66.88	74.4		74.54	0.001024	2.97	155.28	137.55	0.25
P118-27-00	P118-27-00_DS	448.57	Max WS	461.29	66.75	74.39	70.72	74.52	0.001022	2.96	156.29	44.64	0.25
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	461.29	66.8	74.3		74.45	0.001162	3.13	147.39	34.28	0.27
P118-27-00	P118-27-00_DS	429.17	Max WS	461.63	66.81	74.29	70.83	74.44	0.00115	3.11	148.61	34.9	0.27
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	461.63	66.86	74.25		74.41	0.00126	3.21	143.79	34.4	0.28
P118-27-00	P118-27-00_DS	399.43	Max WS	462.19	66.84	74.22		74.39	0.001339	3.27	143.4	62.34	0.29
P118-27-00	P118-27-00_DS	173.97	Max WS	469.55	63.5	74.13		74.19	0.000329	2	240.44	110.1	0.15
P118-27-00	P118-27-00_DS	157.99	Max WS	470.07	64.25	74.12		74.19	0.000263	2.14	219.67	117.12	0.14
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	470.05	63.63	70.31		70.53	0.001728	3.81	123.52	27.71	0.32
P118-27-00	P118-27-00_DS	86.09	Max WS	470.55	63.19	70.23		70.5	0.002394	4.16	113.18	29.25	0.37
P118-27-00	P118-27-00_DS	61.59	Max WS	471.66	62.69	70.23		70.45	0.001856	3.73	126.45	32.05	0.33
P118-27-00	P118-27-00_DS	47.31	Max WS	471.67	62.51	70.27		70.43	0.001129	3.11	151.54	34.83	0.26
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.61		70.64	0.000126	1.49	268.32	43.45	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.49		70.52	0.00013	1.47	271.27	45.37	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.99	60.14	70.37		70.4	0.000076	1.21	330.72	49.93	0.08
P118-00-00	P118-R3-4	73879.2	Max WS	399.98	60.08	70.35		70.37	0.000064	1.09	368.1	59.74	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.97	60.08	70.35		70.37	0.000064	1.09	368.49	59.73	0.08
P118-00-00	P118-R3-3	73723	Max WS	871.68	60.05	70.26		70.35	0.000313	2.4	363.57	59.27	0.17
P118-00-00	P118-R3-3	73423.3	Max WS	871.67	60	70.19	64.01	70.25	0.000308	1.94	449.72	67.05	0.13
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	871.67	59.83	70.15		70.21	0.00029	1.9	458.7	67.28	0.13
P118-00-00	P118-R3-3	73232.3	Max WS	871.67	59.83	70.12	63.84	70.18	0.000294	1.91	456.7	67.23	0.13

HEC-RAS Plan: Alt3_10_ND

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	198.14	73.94	79.13		79.19	0.000745	2.02	97.98	32.85	0.21
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	197.91	73.38	79.03		79.08	0.000436	1.73	114.98	40.44	0.16
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	172.78	73.1	78.88		78.92	0.000336	1.51	121.69	101.28	0.14
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	153.13	73.01	78.78		78.81	0.000302	1.38	111.7	47.25	0.13
P118-27-01	P118-27-01	500	Max WS	153.13	73.02	78.78		78.8	0.000301	1.29	120.82	48.19	0.12
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	149.41	72.9	76.91		76.99	0.001085	2.2	67.85	26.6	0.24
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	149.22	72.76	76.88		76.95	0.001021	2.16	69.16	26.64	0.24
P118-27-01	P118-27-01	139	Max WS	148.35	71.76	76.7		76.74	0.000574	1.74	85.5	29.45	0.18
P118-27-01	P118-27-01	39	Max WS	148.32	71.4	76.68		76.71	0.000033	1.42	104.48	30.35	0.13
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	76.77		76.77	0	0	66.04	24.44	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	0	72.31	76.77		76.77	0	0	70.59	24.48	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	21.74	72.13	76.77		76.77	0.000002	0.29	74.08	24.37	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	48.57	71.84	76.75		76.76	0.000007	0.62	78.83	24.39	0.06
P118-27-00	P118-27-00	4300.35	Max WS	76.08	71.56	76.73		76.75	0.000014	0.91	83.65	24.43	0.09
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	100.18	71.38	76.71		76.73	0.000021	1.14	88.21	24.96	0.11
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	113.92	71.3	76.69		76.72	0.000034	1.35	84.28	26.31	0.13
P118-27-00	P118-27-00_DS	3444.22	Max WS	48.77	71.25	76.6		76.6	0.000005	0.55	88.61	25.26	0.05
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	261.62	71.1	76.61		76.67	0.00073	1.99	131.75	46.04	0.21
P118-27-00	P118-27-00_DS	3011.6	Max WS	30.44	70.9	76.6		76.6	0.000008	0.22	140.64	60.14	0.02
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	33.95	70.5	76.59		76.59	0.000007	0.21	166.13	104.29	0.02
P118-27-00	P118-27-00_DS	2485.48	Max WS	34.13	70.45	76.59		76.59	0.000006	0.25	138.65	51.1	0.02
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	34.13	70.45	76.58		76.59	0.000006	0.23	147.1	51.08	0.02
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	34.35	70.4	76.58		76.59	0.000007	0.21	164.86	51.48	0.02
P118-27-00	P118-27-00_DS	2381.57	Max WS	34.51	70.4	76.58		76.59	0.000007	0.21	162	51.47	0.02
P118-27-00	P118-27-00_DS	2351.35	Max WS	34.74	70.35	76.58		76.58	0.000006	0.25	140.01	51.87	0.02
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	34.74	70.35	76.58		76.58	0.000006	0.22	157.18	51.85	0.02
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	34.14	70.3	76.58		76.58	0.000006	0.2	180.25	88.46	0.02
P118-27-00	P118-27-00_DS	1817.26	Max WS	33.36	70	76.58		76.58	0.000005	0.18	185.64	65.46	0.02
P118-27-00	P118-27-00_DS	1360.33	Max WS	318.75	69.7	74.14		74.35	0.003257	3.65	87.25	37.52	0.42
P118-27-00	P118-27-00_DS	1314.62	Max WS	320.94	66	74.18		74.25	0.000528	2.18	147.46	178.31	0.17
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	320.93	66	73.83		73.96	0.001185	2.9	110.68	197.91	0.25
P118-27-00	P118-27-00_DS	1198.35	Max WS	322.52	68.64	73.66		73.87	0.002159	3.63	88.74	26.41	0.35
P118-27-00	P118-27-00_DS	763.46	Max WS	337.47	66.19	73.13		73.23	0.000698	2.54	133.12	26.38	0.2
P118-27-00	P118-27-00_DS	465.31	Max WS	345.96	66.88	72.63		72.83	0.001978	3.53	98.07	28.81	0.34
P118-27-00	P118-27-00_DS	448.57	Max WS	346.41	66.75	72.6	70.2	72.79	0.00197	3.53	98.12	28.54	0.34
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	346.41	66.8	72.53		72.75	0.002238	3.73	92.94	27.29	0.36
P118-27-00	P118-27-00_DS	429.17	Max WS	346.65	66.81	72.51	70.31	72.73	0.00228	3.74	92.81	27.74	0.36
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	346.65	66.86	72.42		72.66	0.002665	3.96	87.61	26.98	0.39
P118-27-00	P118-27-00_DS	399.43	Max WS	347.08	66.84	72.35		72.62	0.003041	4.14	83.82	26.71	0.41
P118-27-00	P118-27-00_DS	173.97	Max WS	352.63	63.5	72.12		72.19	0.000506	2.19	161.15	33.15	0.17
P118-27-00	P118-27-00_DS	157.99	Max WS	353.03	64.25	72.11		72.19	0.000413	2.18	161.59	33.39	0.16
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	352.73	63.63	70.01		70.16	0.001168	3.06	115.42	26.88	0.26
P118-27-00	P118-27-00_DS	86.09	Max WS	353.03	63.19	69.96		70.13	0.00163	3.35	105.36	28.22	0.31
P118-27-00	P118-27-00_DS	61.59	Max WS	353.87	62.69	69.96		70.1	0.001261	3	117.85	30.95	0.27
P118-27-00	P118-27-00_DS	47.31	Max WS	353.98	62.51	69.99		70.08	0.000761	2.5	141.65	33.69	0.21
P118-00-00	P118-R3-4	76394.4	Max WS	400	61.33	70.32		70.36	0.000143	1.56	256.15	42.57	0.11
P118-00-00	P118-R3-4	75489.4	Max WS	399.99	61.15	70.19		70.23	0.000148	1.55	257.89	44.08	0.11
P118-00-00	P118-R3-4	74253.7	Max WS	399.92	60.14	70.06		70.08	0.000087	1.27	315.12	48.85	0.09
P118-00-00	P118-R3-4	73879.2	Max WS	399.89	60.08	70.03		70.05	0.000073	1.14	349.27	58.18	0.08
P118-00-00	P118-R3-4	73828	Max WS	399.89	60.08	70.03		70.05	0.000073	1.14	349.64	58.16	0.08
P118-00-00	P118-R3-3	73723	Max WS	753.92	60.05	69.96		70.03	0.000267	2.18	346	57.81	0.16
P118-00-00	P118-R3-3	73423.3	Max WS	753.91	60	69.9	63.72	69.95	0.000263	1.75	430.32	66.55	0.12
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	753.91	59.83	69.87		69.91	0.000247	1.71	439.6	66.79	0.12
P118-00-00	P118-R3-3	73232.3	Max WS	753.91	59.83	69.84	63.55	69.89	0.00025	1.72	437.92	66.75	0.12

Alternative 3 - 500-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	80.34	80.39	0.05
1335	80.09	80.16	0.07
885	79.68	79.72	0.04
518	79.46	79.48	0.02
500	79.45	79.47	0.02
434	79.02	78.61	-0.41
399	79	78.58	-0.42
139	78.84	78.39	-0.45
39	78.81	78.36	-0.45
6259.79	78.8	78.42	-0.38
5780.54	78.79	78.41	-0.38
5321.96	78.81	78.42	-0.39
4831.58	78.82	78.42	-0.4
4300.35	78.83	78.4	-0.43
3803.92	78.82	78.38	-0.44
3560	78.81	78.36	-0.45
3444.22	78.8	78.34	-0.46
3374.42	78.76	78.3	-0.46
3011.6	78.51	78.09	-0.42
2525.84	78.38	77.85	-0.53
2485.48	78.36	77.83	-0.53
2431.78	78.04	77.67	-0.37
2398.35	78.02	77.65	-0.37
2381.57	77.99	77.64	-0.35
2351.35	77.96	77.62	-0.34
2292.65	77.84	77.46	-0.38
2238.14	77.83	77.43	-0.4
1817.26	77.48	77.15	-0.33
1360.33	77.11	76.82	-0.29
1314.62	77.07	76.79	-0.28
1255.05	74.82	75.95	1.13
1198.35	74.71	75.88	1.17
763.46	74.24	75.53	1.29
465.31	73.96	75.32	1.36
448.57	73.94	75.3	1.36
438.14	73.91	75.2	1.29
429.17	73.9	75.19	1.29
415.49	73.86	75.16	1.3
399.43	73.84	75.15	1.31
173.97	73.59	74.94	1.35
157.99	73.59	74.94	1.35
101.43	70.43	70.93	0.5
86.09	70.4	70.89	0.49
61.59	70.35	70.82	0.47
47.31	70.33	70.79	0.46
76394.4	70.57	70.94	0.37
75489.4	70.45	70.84	0.39
74253.7	70.31	70.73	0.42
73879.2	70.29	70.7	0.41
73828	70.28	70.7	0.42
73723	70.26	70.68	0.42
73423.3	70.17	70.57	0.4
73377.8	0	0	0
73332.3	70.13	70.52	0.39
73232.3	70.1	70.49	0.39

Alternative 3 - 100-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	79.89	79.91	0.02
1335	79.7	79.73	0.03
885	79.41	79.42	0.01
518	79.26	79.25	-0.01
500	79.25	79.24	-0.01
434	78.64	78.08	-0.56
399	78.62	78.05	-0.57
139	78.52	77.89	-0.63
39	78.5	77.86	-0.64
6259.79	78.52	77.94	-0.58
5780.54	78.52	77.94	-0.58
5321.96	78.52	77.93	-0.59
4831.58	78.53	77.92	-0.61
4300.35	78.52	77.91	-0.61
3803.92	78.52	77.88	-0.64
3560	78.5	77.86	-0.64
3444.22	78.49	77.84	-0.65
3374.42	78.46	77.81	-0.65
3011.6	78.26	77.6	-0.66
2525.84	78.11	77.33	-0.78
2485.48	78.09	77.31	-0.78
2431.78	77.84	77.21	-0.63
2398.35	77.81	77.19	-0.62
2381.57	77.79	77.18	-0.61
2351.35	77.76	77.16	-0.6
2292.65	77.67	77.07	-0.6
2238.14	77.66	77.03	-0.63
1817.26	77.3	76.73	-0.57
1360.33	76.89	76.35	-0.54
1314.62	76.86	76.31	-0.55
1255.05	74.41	75.67	1.26
1198.35	74.27	75.62	1.35
763.46	73.72	75.23	1.51
465.31	73.38	75.04	1.66
448.57	73.35	75.02	1.67
438.14	73.31	74.93	1.62
429.17	73.3	74.92	1.62
415.49	73.25	74.89	1.64
399.43	73.21	74.88	1.67
173.97	72.89	74.7	1.81
157.99	72.88	74.7	1.82
101.43	70.3	70.64	0.34
86.09	70.27	70.61	0.34
61.59	70.23	70.55	0.32
47.31	70.21	70.52	0.31
76394.4	70.47	70.72	0.25
75489.4	70.34	70.61	0.27
74253.7	70.2	70.49	0.29
73879.2	70.17	70.46	0.29
73828	70.17	70.46	0.29
73723	70.15	70.44	0.29
73423.3	70.06	70.33	0.27
73377.8	0	0	0
73332.3	70.03	70.29	0.26
73232.3	70	70.26	0.26

Alternative 3 - 50-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	79.7	79.71	0.01
1335	79.15	79.55	0.4
885	79	79.3	0.3
518	78.91	79.15	0.24
500	78.91	79.14	0.23
434	77.94	77.75	-0.19
399	77.93	77.73	-0.2
139	77.85	77.56	-0.29
39	77.84	77.54	-0.3
6259.79	77.88	77.62	-0.26
5780.54	77.88	77.61	-0.27
5321.96	77.87	77.61	-0.26
4831.58	77.87	77.6	-0.27
4300.35	77.86	77.58	-0.28
3803.92	77.86	77.56	-0.3
3560	77.84	77.54	-0.3
3444.22	77.84	77.51	-0.33
3374.42	77.82	77.49	-0.33
3011.6	77.65	77.27	-0.38
2525.84	77.45	76.96	-0.49
2485.48	77.43	76.94	-0.49
2431.78	77.29	76.87	-0.42
2398.35	77.27	76.85	-0.42
2381.57	77.25	76.84	-0.41
2351.35	77.23	76.82	-0.41
2292.65	77.19	76.75	-0.44
2238.14	77.17	76.72	-0.45
1817.26	76.77	76.58	-0.19
1360.33	76.28	75.9	-0.38
1314.62	76.24	75.86	-0.38
1255.05	73.81	75.31	1.5
1198.35	73.62	75.24	1.62
763.46	72.95	74.77	1.82
465.31	72.52	74.54	2.02
448.57	72.49	74.52	2.03
438.14	72.43	74.45	2.02
429.17	72.41	74.44	2.03
415.49	72.34	74.41	2.07
399.43	72.29	74.39	2.1
173.97	71.8	74.19	2.39
157.99	71.79	74.19	2.4
101.43	70.07	70.53	0.46
86.09	70.05	70.5	0.45
61.59	70.02	70.45	0.43
47.31	70.01	70.43	0.42
76394.4	70.3	70.64	0.34
75489.4	70.16	70.52	0.36
74253.7	70.01	70.4	0.39
73879.2	69.98	70.37	0.39
73828	69.98	70.37	0.39
73723	69.96	70.35	0.39
73423.3	69.88	70.25	0.37
73377.8	0	0	0
73332.3	69.85	70.21	0.36
73232.3	69.82	70.18	0.36

Alternative 3 - 10-Year Normal Depth Condition
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	79.25	79.19	-0.06
1335	79.15	79.08	-0.07
885	79	78.92	-0.08
518	78.91	78.81	-0.1
500	78.91	78.8	-0.11
434	77.94	76.99	-0.95
399	77.93	76.95	-0.98
139	77.85	76.74	-1.11
39	77.84	76.71	-1.13
6259.79	77.88	76.77	-1.11
5780.54	77.88	76.77	-1.11
5321.96	77.87	76.77	-1.1
4831.58	77.87	76.76	-1.11
4300.35	77.86	76.75	-1.11
3803.92	77.86	76.73	-1.13
3560	77.84	76.72	-1.12
3444.22	77.84	76.6	-1.24
3374.42	77.82	76.67	-1.15
3011.6	77.65	76.6	-1.05
2525.84	77.45	76.59	-0.86
2485.48	77.43	76.59	-0.84
2431.78	77.29	76.59	-0.7
2398.35	77.27	76.59	-0.68
2381.57	77.25	76.59	-0.66
2351.35	77.23	76.58	-0.65
2292.65	77.19	76.58	-0.61
2238.14	77.17	76.58	-0.59
1817.26	76.77	76.58	-0.19
1360.33	76.28	74.35	-1.93
1314.62	76.24	74.25	-1.99
1255.05	73.81	73.96	0.15
1198.35	73.62	73.87	0.25
763.46	72.95	73.23	0.28
465.31	72.52	72.83	0.31
448.57	72.49	72.79	0.3
438.14	72.43	72.75	0.32
429.17	72.41	72.73	0.32
415.49	72.34	72.66	0.32
399.43	72.29	72.62	0.33
173.97	71.8	72.19	0.39
157.99	71.79	72.19	0.4
101.43	70.07	70.16	0.09
86.09	70.05	70.13	0.08
61.59	70.02	70.1	0.08
47.31	70.01	70.08	0.07
76394.4	70.3	70.36	0.06
75489.4	70.16	70.23	0.07
74253.7	70.01	70.08	0.07
73879.2	69.98	70.05	0.07
73828	69.98	70.05	0.07
73723	69.96	70.03	0.07
73423.3	69.88	69.95	0.07
73377.8	0	0	0
73332.3	69.85	69.91	0.06
73232.3	69.82	69.89	0.07

HEC-RAS Plan: Baseline_500

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-31.05	72.56	78.81		78.81	0.000001	-0.24	176.66	166.35	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-202.75	72.31	78.76		78.8	0.000034	-1.59	146.1	213.83	0.14
P118-27-00	P118-27-00	5321.96	Max WS	-168.83	72.13	78.8		78.82	0.000022	-1.29	133.69	662.07	0.11
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-104.59	71.84	78.84		78.84	0.000007	-0.76	138.04	256.54	0.06
P118-27-00	P118-27-00	4300.35	Max WS	-38.39	71.56	78.85		78.85	0.000001	-0.27	144.27	300.6	0.02
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	16.94	71.38	78.85		78.86	0	0.11	150.89	546.77	0.01
P118-27-00	P118-27-00	3444.22	Max WS	4.56	71.25	78.86		78.86	0	0.03	204.71	989.93	0
P118-27-00	P118-27-00	3374.42	Max WS	456.7	72.06	78.66		78.79	0.000886	2.84	165.46	666.14	0.24
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	413.33	71.59	78.52		78.55	0.000248	1.61	818.84	867.5	0.13
P118-27-00	P118-27-00	2525.84	Max WS	385.07	71.22	78.38		78.43	0.000299	1.79	341.92	593.86	0.14
P118-27-00	P118-27-00	2485.48	Max WS	402.98	71.53	78.35		78.41	0.000282	2.01	200.38	393.7	0.14
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	131.67	71.1	78.14		78.15	0.000041	0.69	190.66	256.3	0.05
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	131.43	71.1	78.13		78.15	0.000111	0.94	143.17	491.47	0.08
P118-27-00	P118-27-00	2381.57	Max WS	129.51	71.1	78.13		78.14	0.00012	0.95	138.67	460.16	0.08
P118-27-00	P118-27-00	2351.35	Max WS	132.77	71.09	78.13		78.14	0.000049	0.75	177.69	340.55	0.06
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	127.4	70.77	78.12		78.13	0.000031	0.59	216.52	438.48	0.05
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	90.44	71.09	78.13		78.13	0.000027	0.53	316.75	515.03	0.04
P118-27-00	P118-27-00	1817.26	Max WS	-144.59	70.49	78.13		78.14	0.000086	-0.86	267.92	1039.75	0.07
P118-27-00	P118-27-00	1360.33	Max WS	-608.08	69.94	78.2		78.24	0.000434	-1.96	951.69	1063.52	0.16
P118-27-00	P118-27-00	1314.62	Max WS	-681.19	69.66	78.21		78.21	0.000009	-0.34	7435.2	3030.8	0.02
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	-681.29	69.66	78.22		78.22	0.000009	-0.34	7315.69	2962.89	0.02
P118-27-00	P118-27-00	1198.35	Max WS	-680.53	68.64	78.22		78.23	0.000036	-0.74	3654.36	2020.65	0.05
P118-27-00	P118-27-00	763.46	Max WS	-673.18	66.19	78.24		78.24	0.000028	-0.73	3626.39	1632.15	0.04
P118-27-00	P118-27-00	465.31	Max WS	-668.87	66.88	78.25		78.25	0.000035	-0.76	3101.91	1295.05	0.05
P118-27-00	P118-27-00	448.57	Max WS	-668.63	66.75	78.25		78.25	0.000025	-0.66	3491.24	1277.21	0.04
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	-668.63	66.8	78.26		78.26	0.000025	-0.69	3492.06	1266.84	0.04
P118-27-00	P118-27-00	429.17	Max WS	-668.51	66.81	78.25		78.27	0.000009	-1.22	3566.74	1258.46	0.08
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	-668.58	66.86	78.26		78.26	0.000023	-0.63	3632	1244.78	0.04
P118-27-00	P118-27-00	399.43	Max WS	-668.33	66.84	78.26		78.26	0.000022	-0.65	3686.61	1227.53	0.04
P118-27-00	P118-27-00	173.97	Max WS	-665.48	63.5	78.26		78.26	0.000016	-0.61	3362.66	844.24	0.03
P118-27-00	P118-27-00	157.99	Max WS	-665.23	64.25	78.26		78.27	0.000016	-0.63	3255.15	804.94	0.04
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	-665.25	63.63	78.27		78.28	0.00002	-0.71	2702.57	636.83	0.04
P118-27-00	P118-27-00	86.09	Max WS	-665.04	63.19	78.27		78.28	0.000021	-0.73	2564.31	596.62	0.04
P118-27-00	P118-27-00	61.59	Max WS	-664.63	62.69	78.27		78.28	0.000043	-1.07	1152.6	227.69	0.06
P118-27-00	P118-27-00	47.31	Max WS	-664.61	62.51	78.27		78.28	0.000038	-1.03	1098.8	183.6	0.06
P118-00-00	P118-R3-4	76394.4	Max WS	8395.33	61.33	79.07		79.17	0.00037	4.18	11727.79	5715.58	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	8383.87	61.15	78.73		78.85	0.000424	4.44	10963.95	5394.96	0.22
P118-00-00	P118-R3-4	74253.7	Max WS	8378.59	60.14	78.26		78.36	0.000381	4.16	11382.09	5229.43	0.21
P118-00-00	P118-R3-4	73879.2	Max WS	8377.98	60.08	78.05		78.31	0.000589	5.33	7323.08	3600.35	0.26
P118-00-00	P118-R3-4	73828	Max WS	8377.98	60.08	77.99		78.36	0.000771	6.07	5707.31	3253.82	0.3
P118-00-00	P118-R3-3	73723	Max WS	7713.52	60.05	78		78.27	0.000581	5.28	6379.13	3617.82	0.26
P118-00-00	P118-R3-3	73423.3	Max WS	7713.4	60	77.93	70.96	78.05	0.000487	3.9	9148.44	5092.91	0.18
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	7713.39	59.83	77.02		77.32	0.000991	5.37	5423.33	3632.7	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	7713.35	59.83	76.9	70.78	77.24	0.001092	5.6	5187.05	3537.11	0.27

HEC-RAS Plan: Baseline_100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-19.94	72.56	78.55		78.55	0	-0.17	149.04	136.28	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-105.02	72.31	78.53		78.54	0.000011	-0.88	123.35	126.11	0.08
P118-27-00	P118-27-00	5321.96	Max WS	-80.16	72.13	78.55		78.55	0.000006	-0.65	123.43	498.15	0.06
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-35.27	71.84	78.56		78.56	0.000001	-0.27	128.47	132.48	0.02
P118-27-00	P118-27-00	4300.35	Max WS	10.9	71.56	78.56		78.56	0	0.08	133.85	167.01	0.01
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	51.36	71.38	78.56		78.56	0.000002	0.37	139.75	407.58	0.03
P118-27-00	P118-27-00	3444.22	Max WS	47.32	71.25	78.56		78.56	0.000001	0.33	161.85	460.84	0.03
P118-27-00	P118-27-00	3374.42	Max WS	362.44	72.06	78.36		78.45	0.000689	2.42	151.53	331.88	0.21
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	343.83	71.59	78.23		78.26	0.000278	1.63	593.27	664.49	0.13
P118-27-00	P118-27-00	2525.84	Max WS	339.75	71.22	78.08		78.13	0.000303	1.73	302.15	391.39	0.14
P118-27-00	P118-27-00	2485.48	Max WS	359.38	71.53	78.05		78.11	0.000263	1.88	190.93	222.34	0.14
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	358.2	71.1	77.8		77.86	0.000382	2.01	178.31	157.24	0.16
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	360.19	71.1	77.71		77.84	0.001123	2.86	125.96	178.91	0.26
P118-27-00	P118-27-00	2381.57	Max WS	361.43	71.1	77.68		77.82	0.001289	2.98	121.23	150.07	0.28
P118-27-00	P118-27-00	2351.35	Max WS	363.7	71.09	77.71		77.79	0.000466	2.21	164.45	184.87	0.17
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	363.41	70.77	77.65		77.7	0.000345	1.84	197.21	225.36	0.15
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	345.47	71.09	77.61		77.69	0.000642	2.43	229.89	233.99	0.2
P118-27-00	P118-27-00	1817.26	Max WS	49.95	70.49	77.41		77.41	0.000021	0.39	162.19	394.2	0.04
P118-27-00	P118-27-00	1360.33	Max WS	-29.72	69.94	77.41		77.41	0.000004	-0.19	159.85	403.46	0.02
P118-27-00	P118-27-00	1314.62	Max WS	-38.39	69.66	77.41		77.41	0	-0.03	5120.27	2731.18	0
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	-38.51	69.66	77.41		77.41	0	-0.03	5008.1	2635.6	0
P118-27-00	P118-27-00	1198.35	Max WS	-38.15	68.64	77.41		77.41	0	-0.07	2163.65	1646.98	0
P118-27-00	P118-27-00	763.46	Max WS	-32.97	66.19	77.41		77.41	0	-0.05	2287.31	1496.89	0
P118-27-00	P118-27-00	465.31	Max WS	-30.09	66.88	77.41		77.41	0	-0.05	2039.92	1219.86	0
P118-27-00	P118-27-00	448.57	Max WS	-30.16	66.75	77.41		77.41	0	-0.04	2420.09	1212.61	0
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	-36.85	66.8	77.41		77.41	0	-0.06	2419.44	1265.63	0
P118-27-00	P118-27-00	429.17	Max WS	-37.87	66.81	77.41		77.41	0	-0.09	2504.19	1258.46	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	-37.87	66.86	77.41		77.41	0	-0.05	2577.22	1244.78	0
P118-27-00	P118-27-00	399.43	Max WS	-40.59	66.84	77.41		77.41	0	-0.06	2646.18	1227.53	0
P118-27-00	P118-27-00	173.97	Max WS	-52.13	63.5	77.41		77.41	0	-0.06	2644.74	844.24	0
P118-27-00	P118-27-00	157.99	Max WS	-51.8	64.25	77.41		77.41	0	-0.06	2570.76	804.94	0
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	-53.68	63.63	77.42		77.42	0	-0.07	2156.67	636.83	0
P118-27-00	P118-27-00	86.09	Max WS	-54.82	63.19	77.42		77.42	0	-0.07	2052.93	596.62	0
P118-27-00	P118-27-00	61.59	Max WS	-62.16	62.69	77.42		77.42	0.000001	-0.12	958.97	227.69	0.01
P118-27-00	P118-27-00	47.31	Max WS	-67.62	62.51	77.42		77.42	0.000001	-0.12	943.2	183.6	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	5555.74	61.33	78.17		78.29	0.000373	4	7329.35	4053.89	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	5544.57	61.15	77.84		77.97	0.000405	4.14	7055.42	3742.16	0.21
P118-00-00	P118-R3-4	74253.7	Max WS	5538.79	60.14	77.39		77.51	0.000355	3.83	7214.08	4104.66	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	5523.63	60.08	77.23		77.43	0.000438	4.39	4613.61	2530.97	0.23
P118-00-00	P118-R3-4	73828	Max WS	5507.99	60.08	77.18		77.45	0.000543	4.87	3662.07	1919.52	0.25
P118-00-00	P118-R3-3	73723	Max WS	5530.68	60.05	77.14		77.4	0.000524	4.78	3896.83	2141.97	0.25
P118-00-00	P118-R3-3	73423.3	Max WS	5517.95	60	77.06	69.38	77.22	0.000517	3.85	5360.09	3268.96	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	5516.71	59.83	76.29		76.64	0.000979	5.14	3175.91	2886.05	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	5512.87	59.83	76.17	69.18	76.56	0.001087	5.38	2845.03	2885.48	0.27

HEC-RAS Plan: Baseline_50

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-14.39	72.56	78.41		78.41	0	-0.13	134.68	113.63	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-72.5	72.31	78.4		78.41	0.000006	-0.63	116.72	97.41	0.06
P118-27-00	P118-27-00	5321.96	Max WS	-42.38	72.13	78.41		78.41	0.000002	-0.36	119.13	475.1	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-4.37	71.84	78.42		78.42	0	-0.04	124.09	125.79	0
P118-27-00	P118-27-00	4300.35	Max WS	34.6	71.56	78.41		78.41	0.000001	0.27	129.28	153.04	0.02
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	68.77	71.38	78.41		78.41	0.000003	0.51	135.16	326.46	0.04
P118-27-00	P118-27-00	3444.22	Max WS	67.03	71.25	78.41		78.41	0.000003	0.48	147.93	280.32	0.04
P118-27-00	P118-27-00	3374.42	Max WS	332.07	72.06	78.23		78.31	0.000635	2.29	146.2	203.49	0.2
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	321.23	71.59	78.1		78.13	0.000303	1.67	510.13	601.33	0.14
P118-27-00	P118-27-00	2525.84	Max WS	321.27	71.22	77.95		77.99	0.000307	1.71	284.31	336.23	0.14
P118-27-00	P118-27-00	2485.48	Max WS	339.59	71.53	77.92		77.97	0.000254	1.82	186.62	159.52	0.13
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	339.08	71.1	77.69		77.75	0.000368	1.94	174.49	150.03	0.16
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	340.74	71.1	77.61		77.73	0.001081	2.78	122.59	171.14	0.25
P118-27-00	P118-27-00	2381.57	Max WS	341.93	71.1	77.58		77.71	0.001243	2.9	117.89	144.03	0.27
P118-27-00	P118-27-00	2351.35	Max WS	343.81	71.09	77.61		77.68	0.000442	2.13	161.3	166.28	0.16
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	343.5	70.77	77.56		77.61	0.000328	1.78	193.44	181.09	0.14
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	328.78	71.09	77.52		77.6	0.000633	2.39	215.53	194.07	0.2
P118-27-00	P118-27-00	1817.26	Max WS	258.73	70.49	77.24		77.31	0.000662	2.16	141.77	240.2	0.2
P118-27-00	P118-27-00	1360.33	Max WS	121.59	69.94	77.16		77.17	0.000081	0.81	150.43	256.72	0.07
P118-27-00	P118-27-00	1314.62	Max WS	130.56	69.66	77.16		77.17	0.000033	0.68	191.4	2688.72	0.05
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	39.19	69.66	77.08		77.08	0	0.04	4193.88	2240.5	0
P118-27-00	P118-27-00	1198.35	Max WS	39.78	68.64	77.08		77.08	0.000001	0.09	1680.52	1286.45	0.01
P118-27-00	P118-27-00	763.46	Max WS	43.82	66.19	77.08		77.08	0	0.09	1815.06	1322.49	0.01
P118-27-00	P118-27-00	465.31	Max WS	45.88	66.88	77.08		77.08	0.000001	0.1	1641.34	1182.61	0.01
P118-27-00	P118-27-00	448.57	Max WS	46	66.75	77.08	67.95	77.08	0	0.08	2022.78	1177.86	0.01
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	45.93	66.8	77.08		77.08	0	0.08	2009.17	1205.1	0.01
P118-27-00	P118-27-00	429.17	Max WS	46	66.81	77.08	68.02	77.08	0	0.12	2085.66	1245.87	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	45.88	66.86	77.08		77.08	0	0.08	2161.86	1239.71	0.01
P118-27-00	P118-27-00	399.43	Max WS	46.08	66.84	77.08		77.08	0	0.08	2236.05	1227.53	0.01
P118-27-00	P118-27-00	173.97	Max WS	47.51	63.5	77.08		77.08	0	0.06	2361.71	844.24	0
P118-27-00	P118-27-00	157.99	Max WS	47.49	64.25	77.08		77.08	0	0.06	2300.67	804.94	0
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	47.61	63.63	77.08		77.08	0	0.07	1940.91	636.83	0
P118-27-00	P118-27-00	86.09	Max WS	47.72	63.19	77.08		77.08	0	0.07	1850.66	596.62	0
P118-27-00	P118-27-00	61.59	Max WS	47.83	62.69	77.08		77.08	0	0.09	881.14	227.69	0.01
P118-27-00	P118-27-00	47.31	Max WS	47.83	62.51	77.08		77.08	0	0.09	879.77	183.6	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	4792.29	61.33	77.86		77.99	0.000381	3.98	6119.99	3668.71	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	4781.02	61.15	77.51		77.66	0.000427	4.17	5838.42	3662.35	0.22
P118-00-00	P118-R3-4	74253.7	Max WS	4777.57	60.14	77.04		77.18	0.000366	3.81	5881.4	3532.2	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	4777.5	60.08	76.89		77.08	0.000416	4.19	3857.31	1919.49	0.22
P118-00-00	P118-R3-4	73828	Max WS	4777.51	60.08	76.84		77.1	0.000508	4.62	3070.12	1593.18	0.24
P118-00-00	P118-R3-3	73723	Max WS	4825.35	60.05	76.79		77.05	0.000512	4.63	3216.82	1708.26	0.24
P118-00-00	P118-R3-3	73423.3	Max WS	4825.24	60	76.7	68.83	76.88	0.000553	3.91	4244.29	3017.98	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	4825.19	59.83	75.99		76.34	0.00097	5.03	2313.29	2719.3	0.25
P118-00-00	P118-R3-3	73232.3	Max WS	4825.17	59.83	75.86	68.64	76.26	0.00107	5.24	1976.2	2723.67	0.27

HEC-RAS Plan: Baseline_10

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0.04	72.56	77.93		77.93	0	0	97.86	48.6	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-2.9	72.31	77.93		77.93	0	-0.03	101.61	28.94	0
P118-27-00	P118-27-00	5321.96	Max WS	16.57	72.13	77.93		77.93	0	0.16	104.82	445.66	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	40.68	71.84	77.92		77.92	0.000002	0.37	109.65	105.16	0.03
P118-27-00	P118-27-00	4300.35	Max WS	65.48	71.56	77.91		77.92	0.000005	0.57	114.72	113.84	0.05
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	87.34	71.38	77.9		77.91	0.000007	0.73	120.3	145.28	0.06
P118-27-00	P118-27-00	3444.22	Max WS	87.25	71.25	77.9		77.91	0.000007	0.7	124.31	29.54	0.06
P118-27-00	P118-27-00	3374.42	Max WS	255.6	72.06	77.77		77.83	0.000515	1.97	129.58	33.38	0.18
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	253.65	71.59	77.63		77.68	0.000437	1.87	146.34	412.07	0.16
P118-27-00	P118-27-00	2525.84	Max WS	262.66	71.22	77.46		77.5	0.000331	1.65	222.5	179.09	0.14
P118-27-00	P118-27-00	2485.48	Max WS	273.15	71.53	77.44		77.48	0.000218	1.59	171.3	76.04	0.12
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	273	71.1	77.3		77.34	0.000317	1.7	160.3	126.68	0.14
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	274.2	71.1	77.23		77.32	0.000929	2.48	110.42	86.55	0.23
P118-27-00	P118-27-00	2381.57	Max WS	274.95	71.1	77.2		77.31	0.001072	2.6	105.85	59.45	0.25
P118-27-00	P118-27-00	2351.35	Max WS	276.17	71.09	77.23		77.28	0.000361	1.85	149.6	75.84	0.15
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	276.14	70.77	77.21		77.24	0.000272	1.54	179	136.76	0.13
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	270.71	71.09	77.16		77.23	0.000592	2.22	165.77	135.07	0.19
P118-27-00	P118-27-00	1817.26	Max WS	260.79	70.49	76.81		76.91	0.000946	2.48	109.95	101.05	0.23
P118-27-00	P118-27-00	1360.33	Max WS	261.56	69.94	76.49		76.56	0.000593	2.06	127.14	131.81	0.19
P118-27-00	P118-27-00	1314.62	Max WS	275.45	69.66	76.49		76.53	0.000212	1.61	170.74	2041.68	0.12
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	146.1	69.66	75.68		75.7	0.000146	1.18	124.23	1381.03	0.1
P118-27-00	P118-27-00	1198.35	Max WS	146.75	68.64	75.68		75.69	0.000079	0.84	424.27	649.02	0.07
P118-27-00	P118-27-00	763.46	Max WS	148.01	66.19	75.66		75.66	0.000025	0.56	610.79	466.8	0.04
P118-27-00	P118-27-00	465.31	Max WS	149.57	66.88	75.64		75.65	0.000051	0.71	301.76	552.78	0.06
P118-27-00	P118-27-00	448.57	Max WS	149.96	66.75	75.64	69	75.65	0.000032	0.57	638.97	635.87	0.05
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	149.38	66.8	75.64		75.64	0.000033	0.61	605.02	676.71	0.05
P118-27-00	P118-27-00	429.17	Max WS	149.41	66.81	75.64	69.09	75.64	0.000005	0.69	593.57	739.32	0.06
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	149.36	66.86	75.63		75.64	0.000036	0.61	580.32	758.39	0.05
P118-27-00	P118-27-00	399.43	Max WS	149.71	66.84	75.63		75.64	0.000034	0.61	641.35	746.04	0.05
P118-27-00	P118-27-00	173.97	Max WS	151.1	63.5	75.63		75.63	0.000009	0.38	1141.22	838.38	0.02
P118-27-00	P118-27-00	157.99	Max WS	151.39	64.25	75.63		75.63	0.000009	0.37	1136.29	804.94	0.02
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	151.19	63.63	75.63		75.63	0.000008	0.38	1018.46	636.83	0.02
P118-27-00	P118-27-00	86.09	Max WS	151.38	63.19	75.63		75.63	0.000008	0.37	986.37	596.62	0.02
P118-27-00	P118-27-00	61.59	Max WS	151.67	62.69	75.63		75.63	0.000009	0.4	551.14	227.69	0.03
P118-27-00	P118-27-00	47.31	Max WS	151.47	62.51	75.63		75.63	0.000007	0.36	613.73	183.6	0.02
P118-00-00	P118-R3-4	76394.4	Max WS	3265.14	61.33	76.81		77.01	0.00047	4.16	3004.03	2290.13	0.22
P118-00-00	P118-R3-4	75489.4	Max WS	3255.28	61.15	76.3		76.6	0.000646	4.76	2065.72	2264.2	0.26
P118-00-00	P118-R3-4	74253.7	Max WS	3253.8	60.14	75.62		75.85	0.000546	4.26	2213.17	1782.52	0.24
P118-00-00	P118-R3-4	73879.2	Max WS	3253.52	60.08	75.42		75.67	0.0005	4.2	1562.29	1146.12	0.23
P118-00-00	P118-R3-4	73828	Max WS	3253.44	60.08	75.37		75.66	0.000554	4.4	1158.73	914.97	0.25
P118-00-00	P118-R3-3	73723	Max WS	3405.34	60.05	75.26		75.6	0.000645	4.72	1052.45	933.55	0.27
P118-00-00	P118-R3-3	73423.3	Max WS	3405.4	60	75.08	67.6	75.37	0.000798	4.29	794.23	1583.73	0.23
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	3405.45	59.83	74.81		75.1	0.000823	4.33	787	1357.03	0.23
P118-00-00	P118-R3-3	73232.3	Max WS	3405.44	59.83	74.72	67.42	75.02	0.000845	4.36	780.68	1160.44	0.23

HEC-RAS Plan: Baseline_Alt3_500

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	473.66	73.94	80.17		80.34	0.001508	3.35	191.66	148.51	0.31
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	467.7	73.38	79.94		80.09	0.001143	3.12	185.01	113.23	0.27
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	381.48	73.1	79.57		79.68	0.000829	2.67	187.52	156.53	0.23
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	274.42	73.01	79.4		79.46	0.000521	2.04	167.23	108.38	0.18
P118-27-01	P118-27-01	500	Max WS	272.64	73.02	79.4		79.45	0.000584	1.89	187.24	159.32	0.16
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	269.24	72.9	78.96		79.02	0.000573	1.96	154.32	103.71	0.19
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	274.88	72.76	78.94		79	0.000552	2.03	145.8	94.05	0.18
P118-27-01	P118-27-01	139	Max WS	322.77	71.76	78.78		78.84	0.000511	1.97	185.11	97.06	0.18
P118-27-01	P118-27-01	39	Max WS	322.02	71.4	78.76		78.81	0.000041	1.81	178.88	48.72	0.16
P118-27-00	P118-27-00	6259.79	Max WS	-30.46	72.56	78.8		78.8	0.000001	-0.24	175.25	166.31	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-167.3	72.31	78.76		78.79	0.000023	-1.31	146.55	214.68	0.12
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-132.51	72.13	78.79		78.81	0.000014	-1.01	133.47	51.33	0.09
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-67.3	71.84	78.82		78.82	0.000003	-0.49	137.48	50.3	0.04
P118-27-00	P118-27-00	4300.35	Max WS	13.61	71.56	78.83		78.83	0	0.1	143.34	37.94	0.01
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	68.19	71.38	78.82		78.83	0.000002	0.46	149.2	53.52	0.04
P118-27-00	P118-27-00	3560	Max WS	137.43	71.3	78.8		78.81	0.000011	0.92	152.12	63.64	0.08
P118-27-00	P118-27-00_DS	3444.22	Max WS	457.59	71.25	78.65		78.8	0.000111	3.09	166.53	152.34	0.25
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	457.64	72.06	78.64		78.76	0.000909	2.86	163.9	631.99	0.24
P118-27-00	P118-27-00_DS	3011.6	Max WS	418.39	71.59	78.49		78.52	0.00027	1.67	788.74	844.76	0.13
P118-27-00	P118-27-00_DS	2525.84	Max WS	372.77	71.22	78.35		78.39	0.000289	1.75	337.24	568.82	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	395.53	71.53	78.31		78.38	0.000277	1.99	199.24	349.98	0.14
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	148.84	71.1	78.13		78.14	0.000053	0.78	190.29	249.91	0.06
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	130.17	71.1	78.12		78.14	0.00011	0.93	142.53	482.32	0.08
P118-27-00	P118-27-00_DS	2381.57	Max WS	126.3	71.1	78.12		78.13	0.000115	0.93	138.14	456.45	0.08
P118-27-00	P118-27-00_DS	2351.35	Max WS	131.47	71.09	78.12		78.13	0.000049	0.74	177.32	336.23	0.06
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	123.91	70.77	78.11		78.12	0.00003	0.57	216.06	433.27	0.04
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	84.73	71.09	78.11		78.12	0.000024	0.49	314.8	507.3	0.04
P118-27-00	P118-27-00_DS	1817.26	Max WS	-141.14	70.49	78.12		78.13	0.000083	-0.85	266.15	1032.63	0.07
P118-27-00	P118-27-00_DS	1360.33	Max WS	-615.32	69.94	78.19		78.23	0.000452	-2	939.68	1050.21	0.17
P118-27-00	P118-27-00_DS	1314.62	Max WS	-692.39	69.66	78.2		78.2	0.000009	-0.35	7404.94	3028.82	0.03
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	-692.93	69.66	78.21		78.21	0.000009	-0.35	7286.74	2957.02	0.03
P118-27-00	P118-27-00_DS	1198.35	Max WS	-691.85	68.64	78.21		78.22	0.000038	-0.75	3634.66	2020.23	0.05
P118-27-00	P118-27-00_DS	763.46	Max WS	-684.57	66.19	78.23		78.24	0.000029	-0.75	3611.81	1632.15	0.04
P118-27-00	P118-27-00_DS	465.31	Max WS	-680.19	66.88	78.24		78.25	0.000036	-0.78	3090.88	1295.05	0.05
P118-27-00	P118-27-00_DS	448.57	Max WS	-680.01	66.75	78.24		78.25	0.000026	-0.67	3480.45	1277.21	0.04
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	-679.99	66.8	78.25		78.25	0.000026	-0.71	3481.48	1266.84	0.04
P118-27-00	P118-27-00_DS	429.17	Max WS	-679.88	66.81	78.25		78.25	0.000025	-0.66	3559.56	1258.46	0.04
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	-679.87	66.86	78.25		78.26	0.000024	-0.65	3625.63	1244.78	0.04
P118-27-00	P118-27-00_DS	399.43	Max WS	-679.63	66.84	78.25		78.26	0.000023	-0.66	3680.34	1227.53	0.04
P118-27-00	P118-27-00_DS	173.97	Max WS	-676.94	63.5	78.26		78.26	0.000017	-0.62	3358.49	844.24	0.04
P118-27-00	P118-27-00_DS	157.99	Max WS	-676.65	64.25	78.26		78.26	0.000017	-0.64	3251.17	804.94	0.04
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	-676.8	63.63	78.27		78.27	0.000021	-0.72	2699.15	636.83	0.04
P118-27-00	P118-27-00_DS	86.09	Max WS	-676.57	63.19	78.27		78.27	0.000021	-0.74	2561.1	596.62	0.04
P118-27-00	P118-27-00_DS	61.59	Max WS	-675.94	62.69	78.26		78.28	0.000045	-1.09	1151.35	227.69	0.06
P118-27-00	P118-27-00_DS	47.31	Max WS	-675.94	62.51	78.26		78.28	0.000039	-1.05	1097.79	183.6	0.06
P118-00-00	P118-R3-4	76394.4	Max WS	8394.47	61.33	79.07		79.16	0.000371	4.18	11713.32	5711.26	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	8383.13	61.15	78.73		78.85	0.000426	4.45	10945.39	5389.75	0.22
P118-00-00	P118-R3-4	74253.7	Max WS	8377.31	60.14	78.25		78.36	0.000384	4.17	11353.06	5225.21	0.21
P118-00-00	P118-R3-4	73879.2	Max WS	8377.19	60.08	78.05		78.3	0.000592	5.34	7299.57	3599.12	0.26
P118-00-00	P118-R3-4	73828	Max WS	8377.19	60.08	77.98		78.36	0.000775	6.08	5685.47	3244.19	0.3
P118-00-00	P118-R3-3	73723	Max WS	7701.22	60.05	77.99		78.26	0.000582	5.28	6357.48	3610.24	0.26
P118-00-00	P118-R3-3	73423.3	Max WS	7701.09	60	77.92	70.95	78.05	0.000488	3.9	9118.45	5090.53	0.18
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	7701.06	59.83	77.02		77.31	0.000992	5.37	5409.03	3620.28	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	7701.05	59.83	76.9	70.77	77.23	0.001093	5.6	5172.58	3527.95	0.27

HEC-RAS Plan: Baseline_Alt3_100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	338.07	73.94	79.77		79.89	0.001215	2.79	134.13	132.26	0.27
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	337.07	73.38	79.6		79.7	0.000786	2.49	155.92	98.67	0.22
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	284.91	73.1	79.34		79.41	0.000582	2.15	162.36	156.53	0.19
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	208.45	73.01	79.22		79.26	0.00036	1.64	148.38	102.08	0.15
P118-27-01	P118-27-01	500	Max WS	207.72	73.02	79.22		79.25	0.000406	1.53	161.3	127.52	0.13
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	199.49	72.9	78.61		78.65	0.000461	1.64	122.66	58.23	0.16
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	201.55	72.76	78.59		78.63	0.000413	1.64	122.93	42.54	0.16
P118-27-01	P118-27-01	139	Max WS	225.59	71.76	78.49		78.53	0.000332	1.51	157.43	83.87	0.14
P118-27-01	P118-27-01	39	Max WS	225.17	71.4	78.48		78.51	0.000023	1.35	166.63	40.06	0.12
P118-27-00	P118-27-00	6259.79	Max WS	-19.44	72.56	78.53		78.53	0	-0.17	146.7	131.6	0.02
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-83.41	72.31	78.52		78.52	0.000007	-0.7	122.43	120.35	0.06
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-49.89	72.13	78.53		78.53	0.000002	-0.41	122.8	33.46	0.04
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	-5.54	71.84	78.53		78.53	0	-0.04	127.67	31.18	0
P118-27-00	P118-27-00	4300.35	Max WS	54.62	71.56	78.53		78.53	0.000002	0.41	132.78	31.81	0.04
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	94.33	71.38	78.52		78.52	0.000006	0.68	138.53	31	0.06
P118-27-00	P118-27-00	3560	Max WS	149.33	71.3	78.49		78.51	0.000016	1.08	138.91	35.7	0.1
P118-27-00	P118-27-00_DS	3444.22	Max WS	373.9	71.25	78.39		78.5	0.00009	2.69	142.09	60.18	0.23
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	373.55	72.06	78.37		78.47	0.000724	2.48	152.15	347.21	0.21
P118-27-00	P118-27-00_DS	3011.6	Max WS	356.11	71.59	78.24		78.27	0.000295	1.68	598.68	669.47	0.14
P118-27-00	P118-27-00_DS	2525.84	Max WS	337.76	71.22	78.09		78.13	0.000297	1.72	303.22	396.1	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	359.8	71.53	78.06		78.12	0.000263	1.88	191.17	224.87	0.14
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	359.28	71.1	77.81		77.87	0.000383	2.01	178.53	157.66	0.16
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	361.34	71.1	77.72		77.84	0.001126	2.86	126.15	179.78	0.26
P118-27-00	P118-27-00_DS	2381.57	Max WS	362.54	71.1	77.68		77.82	0.001291	2.99	121.42	150.42	0.28
P118-27-00	P118-27-00_DS	2351.35	Max WS	364.98	71.09	77.72		77.79	0.000468	2.22	164.63	186.1	0.17
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	364.52	70.77	77.66		77.71	0.000345	1.85	197.42	228.45	0.15
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	346.06	71.09	77.62		77.7	0.000642	2.43	230.76	237.3	0.2
P118-27-00	P118-27-00_DS	1817.26	Max WS	47.69	70.49	77.41		77.42	0.000019	0.37	162.98	396.93	0.03
P118-27-00	P118-27-00_DS	1360.33	Max WS	-40.04	69.94	77.41		77.41	0.000008	-0.25	160.07	407.25	0.02
P118-27-00	P118-27-00_DS	1314.62	Max WS	-51.57	69.66	77.41		77.41	0	-0.04	5135.72	2735.88	0
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	-51.6	69.66	77.42		77.42	0	-0.04	5024.18	2640.52	0
P118-27-00	P118-27-00_DS	1198.35	Max WS	-51.05	68.64	77.42		77.42	0.000001	-0.09	2173.69	1651.02	0.01
P118-27-00	P118-27-00_DS	763.46	Max WS	-45.86	66.19	77.42		77.42	0	-0.08	2296.48	1500.16	0
P118-27-00	P118-27-00_DS	465.31	Max WS	-42.37	66.88	77.42		77.42	0	-0.07	2047.46	1220.21	0.01
P118-27-00	P118-27-00_DS	448.57	Max WS	-42.25	66.75	77.42		77.42	0	-0.06	2427.56	1214	0
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	-42.25	66.8	77.42		77.42	0	-0.06	2426.97	1266.38	0
P118-27-00	P118-27-00_DS	429.17	Max WS	-42.25	66.81	77.42		77.42	0	-0.06	2511.61	1258.46	0
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	-42.47	66.86	77.42		77.42	0	-0.06	2584.33	1244.78	0
P118-27-00	P118-27-00_DS	399.43	Max WS	-42.21	66.84	77.42		77.42	0	-0.06	2653	1227.53	0
P118-27-00	P118-27-00_DS	173.97	Max WS	-40.09	63.5	77.42		77.42	0	-0.05	2648.64	844.24	0
P118-27-00	P118-27-00_DS	157.99	Max WS	-39.95	64.25	77.42		77.42	0	-0.05	2574.25	804.94	0
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	-37.53	63.63	77.41		77.41	0	-0.05	2156.2	636.83	0
P118-27-00	P118-27-00_DS	86.09	Max WS	-40.16	63.19	77.41		77.41	0	-0.05	2052.1	596.62	0
P118-27-00	P118-27-00_DS	61.59	Max WS	-47.33	62.69	77.42		77.42	0	-0.09	958.48	227.69	0.01
P118-27-00	P118-27-00_DS	47.31	Max WS	-43.62	62.51	77.42		77.42	0	-0.08	942.8	183.6	0
P118-00-00	P118-R3-4	76394.4	Max WS	5556.27	61.33	78.17		78.29	0.000373	4	7329.32	4053.87	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	5550.32	61.15	77.84		77.97	0.000407	4.14	7051.48	3741.9	0.21
P118-00-00	P118-R3-4	74253.7	Max WS	5508.81	60.14	77.39		77.51	0.000352	3.81	7204.03	4100.95	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	5504.21	60.08	77.23		77.43	0.000436	4.38	4610.94	2528.55	0.22
P118-00-00	P118-R3-4	73828	Max WS	5492.69	60.08	77.18		77.45	0.00054	4.86	3659.73	1918.84	0.25
P118-00-00	P118-R3-3	73723	Max WS	5536.56	60.05	77.14		77.4	0.000525	4.79	3892.76	2140.3	0.25
P118-00-00	P118-R3-3	73423.3	Max WS	5512.78	60	77.06	69.38	77.21	0.000517	3.85	5353.19	3264.24	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	5512.6	59.83	76.29		76.63	0.000979	5.14	3170.73	2885.07	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	5507.69	59.83	76.17	69.18	76.56	0.001087	5.38	2840.09	2884.58	0.27

HEC-RAS Plan: Baseline_Alt3_50

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	289.97	73.94	79.6		79.7	0.001073	2.53	116.54	61.79	0.25
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	288.96	73.38	79.46		79.54	0.000655	2.23	143.63	85.47	0.2
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	246.71	73.1	79.24		79.3	0.000483	1.93	151.42	156.53	0.17
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	183.95	73.01	79.14		79.17	0.000304	1.49	140.08	99.28	0.14
P118-27-01	P118-27-01	500	Max WS	183.64	73.02	79.14		79.17	0.000344	1.39	150.88	125.59	0.12
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	173.56	72.9	78.43		78.46	0.000398	1.51	114.9	37.49	0.15
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	174.88	72.76	78.42		78.45	0.000366	1.5	116.37	36.12	0.15
P118-27-01	P118-27-01	139	Max WS	190.43	71.76	78.33		78.36	0.000268	1.33	145.15	72.61	0.13
P118-27-01	P118-27-01	39	Max WS	190	71.4	78.33		78.35	0.000018	1.18	160.55	38.79	0.1
P118-27-00	P118-27-00	6259.79	Max WS	-12.16	72.56	78.37		78.37	0	-0.11	130.7	110.23	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-53.61	72.31	78.37		78.37	0.000003	-0.47	115.27	91.18	0.04
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-23.94	72.13	78.37		78.37	0.000001	-0.2	117.95	30.32	0.02
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	13.21	71.84	78.37		78.37	0	0.11	122.81	30.05	0.01
P118-27-00	P118-27-00	4300.35	Max WS	64.21	71.56	78.37		78.37	0.000003	0.5	127.83	29.92	0.04
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	97.67	71.38	78.35		78.36	0.000007	0.73	133.57	30.22	0.06
P118-27-00	P118-27-00	3560	Max WS	144.94	71.3	78.33		78.35	0.000017	1.09	133.25	34.56	0.1
P118-27-00	P118-27-00_DS	3444.22	Max WS	333.74	71.25	78.24		78.34	0.000078	2.48	135.01	38.28	0.21
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	333.46	72.06	78.23		78.31	0.000638	2.29	146.38	206.84	0.2
P118-27-00	P118-27-00_DS	3011.6	Max WS	327.03	71.59	78.1		78.13	0.000313	1.7	511	601.64	0.14
P118-27-00	P118-27-00_DS	2525.84	Max WS	318.29	71.22	77.95		77.99	0.000301	1.69	284.65	336.96	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	338.4	71.53	77.92		77.97	0.000252	1.81	186.68	160.66	0.13
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	337.94	71.1	77.7		77.76	0.000365	1.94	174.61	150.27	0.15
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	339.7	71.1	77.61		77.73	0.001072	2.77	122.73	171.47	0.25
P118-27-00	P118-27-00_DS	2381.57	Max WS	340.88	71.1	77.58		77.71	0.001231	2.89	118.04	144.4	0.27
P118-27-00	P118-27-00_DS	2351.35	Max WS	342.75	71.09	77.61		77.68	0.000438	2.12	161.43	166.8	0.16
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	342.55	70.77	77.56		77.61	0.000325	1.77	193.63	182.64	0.14
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	327.44	71.09	77.52		77.6	0.000625	2.38	216.35	195.11	0.19
P118-27-00	P118-27-00_DS	1817.26	Max WS	260.16	70.49	77.24		77.32	0.000664	2.16	142.71	244.95	0.2
P118-27-00	P118-27-00_DS	1360.33	Max WS	122.92	69.94	77.17		77.18	0.000083	0.82	150.77	258.66	0.07
P118-27-00	P118-27-00_DS	1314.62	Max WS	131.95	69.66	77.17		77.18	0.000033	0.69	191.69	2692.4	0.05
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	43.18	69.66	77.08		77.08	0	0.04	4200.74	2242.74	0
P118-27-00	P118-27-00_DS	1198.35	Max WS	43.22	68.64	77.08		77.08	0.000001	0.09	1684.47	1288.76	0.01
P118-27-00	P118-27-00_DS	763.46	Max WS	47.4	66.19	77.08		77.08	0.000001	0.09	1819.05	1324.7	0.01
P118-27-00	P118-27-00_DS	465.31	Max WS	49.54	66.88	77.08		77.08	0.000001	0.1	1644.87	1183.09	0.01
P118-27-00	P118-27-00_DS	448.57	Max WS	49.8	66.75	77.08	68	77.08	0.000001	0.08	2026.27	1178.39	0.01
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	49.74	66.8	77.08		77.08	0.000001	0.09	2012.67	1205.31	0.01
P118-27-00	P118-27-00_DS	429.17	Max WS	49.76	66.81	77.08	68.08	77.08	0.000001	0.08	2089.33	1246.3	0.01
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	49.73	66.86	77.08		77.08	0	0.08	2164.79	1239.81	0.01
P118-27-00	P118-27-00_DS	399.43	Max WS	49.84	66.84	77.08		77.08	0	0.08	2238.97	1227.53	0.01
P118-27-00	P118-27-00_DS	173.97	Max WS	51.26	63.5	77.08		77.08	0	0.07	2363.72	844.24	0
P118-27-00	P118-27-00_DS	157.99	Max WS	51.36	64.25	77.08		77.08	0	0.07	2302.57	804.94	0
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	51.36	63.63	77.08		77.08	0	0.08	1942.14	636.83	0
P118-27-00	P118-27-00_DS	86.09	Max WS	51.49	63.19	77.08		77.08	0	0.08	1851.82	596.62	0
P118-27-00	P118-27-00_DS	61.59	Max WS	51.72	62.69	77.08		77.08	0	0.1	881.57	227.69	0.01
P118-27-00	P118-27-00_DS	47.31	Max WS	51.7	62.51	77.08		77.08	0	0.1	880.12	183.6	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	4791.3	61.33	77.86		77.99	0.000381	3.98	6122.09	3669.29	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	4779.6	61.15	77.51		77.66	0.000426	4.16	5841.99	3662.59	0.22
P118-00-00	P118-R3-4	74253.7	Max WS	4776.45	60.14	77.05		77.18	0.000366	3.81	5888.03	3535.1	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	4776.39	60.08	76.89		77.09	0.000415	4.19	3861.53	1920.37	0.22
P118-00-00	P118-R3-4	73828	Max WS	4776.41	60.08	76.84		77.1	0.000507	4.62	3073.81	1594.8	0.24
P118-00-00	P118-R3-3	73723	Max WS	4827.87	60.05	76.79		77.05	0.000511	4.63	3220.4	1709.83	0.24
P118-00-00	P118-R3-3	73423.3	Max WS	4827.84	60	76.71	68.84	76.88	0.000552	3.91	4250.92	3018.54	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	4827.79	59.83	75.99		76.34	0.00097	5.03	2318.71	2720.14	0.25
P118-00-00	P118-R3-3	73232.3	Max WS	4827.79	59.83	75.86	68.64	76.26	0.001069	5.24	1981.92	2724.76	0.27

HEC-RAS Plan: Baseline_Alt3_10

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	193.84	73.94	79.19		79.25	0.000679	1.94	100.07	33.39	0.2
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	193.11	73.38	79.11		79.15	0.000397	1.65	118.08	46.19	0.15
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	169.89	73.1	78.97		79	0.000299	1.44	126.66	106.42	0.13
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	141.65	73.01	78.89		78.91	0.000232	1.24	118.23	68.76	0.12
P118-27-01	P118-27-01	500	Max WS	141.66	73.02	78.89		78.91	0.000244	1.15	126.57	54.82	0.1
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	136	72.9	77.93		77.96	0.000352	1.4	97.46	32.52	0.14
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	135.72	72.76	77.92		77.95	0.000323	1.36	99.48	32.04	0.14
P118-27-01	P118-27-01	139	Max WS	138.61	71.76	77.86		77.88	0.000201	1.12	123.79	37.56	0.11
P118-27-01	P118-27-01	39	Max WS	138.39	71.4	77.85		77.87	0.000012	0.97	143.05	35.54	0.09
P118-27-00	P118-27-00	6259.79	Max WS	2.12	72.56	77.9		77.9	0	0.02	96.59	42.35	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-0.28	72.31	77.9		77.9	0	0	100.69	28.82	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	19.27	72.13	77.89		77.9	0.000001	0.19	103.92	28.47	0.02
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	43.79	71.84	77.89		77.89	0.000002	0.4	108.71	28.25	0.04
P118-27-00	P118-27-00	4300.35	Max WS	66.15	71.56	77.88		77.89	0.000005	0.58	113.79	28.1	0.05
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	88.22	71.38	77.87		77.88	0.000007	0.74	119.34	28.63	0.06
P118-27-00	P118-27-00	3560	Max WS	119.16	71.3	77.85		77.87	0.000015	1.01	117.54	31.16	0.09
P118-27-00	P118-27-00_DS	3444.22	Max WS	256.12	71.25	77.79		77.86	0.00006	2.12	121.07	29.16	0.18
P118-27-00	P118-27-00_DS	3410		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	256.06	72.06	77.78		77.84	0.000514	1.97	129.81	33.41	0.18
P118-27-00	P118-27-00_DS	3011.6	Max WS	253.57	71.59	77.64		77.68	0.000376	1.73	262.48	421.18	0.15
P118-27-00	P118-27-00_DS	2525.84	Max WS	260.66	71.22	77.47		77.51	0.000321	1.63	224.29	182.31	0.14
P118-27-00	P118-27-00_DS	2485.48	Max WS	272.6	71.53	77.45		77.49	0.000216	1.59	171.74	78.03	0.12
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	272.41	71.1	77.31		77.36	0.000312	1.69	160.81	127.98	0.14
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	273.59	71.1	77.24		77.34	0.000914	2.47	110.9	91.27	0.23
P118-27-00	P118-27-00_DS	2381.57	Max WS	274.4	71.1	77.22		77.32	0.001054	2.58	106.34	64.72	0.25
P118-27-00	P118-27-00_DS	2351.35	Max WS	275.6	71.09	77.25		77.3	0.000356	1.84	150.06	78.24	0.15
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	275.56	70.77	77.22		77.26	0.000268	1.53	179.6	137.46	0.13
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	269.55	71.09	77.17		77.24	0.000579	2.2	167.72	138.63	0.19
P118-27-00	P118-27-00_DS	1817.26	Max WS	262.29	70.49	76.83		76.93	0.000944	2.48	110.77	106.59	0.23
P118-27-00	P118-27-00_DS	1360.33	Max WS	262.96	69.94	76.51		76.58	0.000592	2.06	127.73	135.28	0.19
P118-27-00	P118-27-00_DS	1314.62	Max WS	277.22	69.66	76.51		76.55	0.000213	1.62	171.27	2053.35	0.12
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	149.23	69.66	75.69		75.71	0.000152	1.2	124.41	1382.81	0.1
P118-27-00	P118-27-00_DS	1198.35	Max WS	149.72	68.64	75.69		75.7	0.000082	0.85	428.58	651.07	0.07
P118-27-00	P118-27-00_DS	763.46	Max WS	151.54	66.19	75.66		75.67	0.000026	0.57	613.26	469.51	0.04
P118-27-00	P118-27-00_DS	465.31	Max WS	153.06	66.88	75.65		75.66	0.000053	0.73	304.42	554.17	0.06
P118-27-00	P118-27-00_DS	448.57	Max WS	153.64	66.75	75.65	69.03	75.65	0.000033	0.59	641.79	640.36	0.05
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	153.21	66.8	75.64		75.65	0.000035	0.62	607.83	680.32	0.05
P118-27-00	P118-27-00_DS	429.17	Max WS	153.29	66.81	75.64	69.12	75.65	0.000037	0.61	596.86	740.87	0.05
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	152.99	66.86	75.64		75.64	0.000038	0.63	581.85	758.69	0.05
P118-27-00	P118-27-00_DS	399.43	Max WS	153.34	66.84	75.64		75.64	0.000035	0.62	643.54	747.34	0.05
P118-27-00	P118-27-00_DS	173.97	Max WS	154.66	63.5	75.63		75.64	0.00001	0.38	1143.54	838.47	0.03
P118-27-00	P118-27-00_DS	157.99	Max WS	154.86	64.25	75.63		75.63	0.000009	0.38	1138.52	804.94	0.03
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	154.79	63.63	75.63		75.63	0.000009	0.38	1020.12	636.83	0.02
P118-27-00	P118-27-00_DS	86.09	Max WS	154.99	63.19	75.63		75.63	0.000009	0.38	987.92	596.62	0.02
P118-27-00	P118-27-00_DS	61.59	Max WS	155.27	62.69	75.63		75.63	0.00001	0.41	551.72	227.69	0.03
P118-27-00	P118-27-00_DS	47.31	Max WS	155.27	62.51	75.63		75.63	0.000007	0.37	614.2	183.6	0.02
P118-00-00	P118-R3-4	76394.4	Max WS	3264.44	61.33	76.81		77.01	0.00047	4.15	3004.7	2290.39	0.22
P118-00-00	P118-R3-4	75489.4	Max WS	3253.67	61.15	76.3		76.6	0.000645	4.76	2067.91	2265.93	0.26
P118-00-00	P118-R3-4	74253.7	Max WS	3252.25	60.14	75.62		75.86	0.000544	4.26	2217.96	1784.89	0.24
P118-00-00	P118-R3-4	73879.2	Max WS	3251.98	60.08	75.42		75.68	0.000498	4.19	1565.93	1146.22	0.23
P118-00-00	P118-R3-4	73828	Max WS	3251.74	60.08	75.37		75.66	0.000553	4.4	1161.78	917.78	0.25
P118-00-00	P118-R3-3	73723	Max WS	3407.46	60.05	75.26		75.6	0.000645	4.72	1054.88	934.83	0.27
P118-00-00	P118-R3-3	73423.3	Max WS	3407.48	60	75.09	67.6	75.37	0.000798	4.29	794.41	1589.1	0.23
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	3407.47	59.83	74.81		75.11	0.000823	4.33	787.12	1360.8	0.23
P118-00-00	P118-R3-3	73232.3	Max WS	3407.46	59.83	74.73	67.43	75.02	0.000846	4.36	780.79	1163.98	0.23

HEC-RAS Plan: Alt1_500

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-5.07	72.56	78.25		78.25	0	-0.05	119.17	93.03	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-35.93	72.31	78.25		78.25	0.000002	-0.32	111.02	35.13	0.03
P118-27-00	P118-27-00	5321.96	Max WS	16.99	72.13	78.25		78.25	0	0.15	114.26	464.7	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	81.98	71.84	78.23		78.24	0.000007	0.69	118.64	117.98	0.06
P118-27-00	P118-27-00	4300.35	Max WS	149.01	71.56	78.19		78.22	0.00002	1.21	122.75	134.74	0.1
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	207.67	71.38	78.14		78.18	0.000034	1.63	127.17	187.13	0.14
P118-27-00	P118-27-00	3444.22	Max WS	109.24	71.25	78.13		78.14	0.000009	0.83	131.62	57	0.07
P118-27-00	P118-27-00	3374.42	Max WS	150.4	71.25	78.06		78.07	0.000017	1.13	133.77	84.82	0.1
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	150.67	70.4	78.05		78.07	0.000009	0.9	492.5	593.08	0.07
P118-27-00	P118-27-00	2525.84	Max WS	139.46	70	78.05		78.06	0.000006	0.76	300.02	376.69	0.06
P118-27-00	P118-27-00	2485.48	Max WS	135.3	69.9	78.05		78.06	0.000006	0.74	183.52	63.31	0.06
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	124.63	69.9	78.03		78.04	0.000005	0.69	181.11	42.42	0.06
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	125.44	69.85	78.03		78.04	0.000005	0.69	183.02	51.61	0.06
P118-27-00	P118-27-00	2381.57	Max WS	126.22	69.85	78.03		78.04	0.000005	0.69	183.01	45.7	0.06
P118-27-00	P118-27-00	2351.35	Max WS	126.51	69.8	78.03		78.04	0.000005	0.68	184.95	38.93	0.06
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	123.74	69.8	78.01		78.02	0.000005	0.67	184.18	57.71	0.05
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	89.82	69.77	78.02		78.02	0.000003	0.48	185.61	170.96	0.04
P118-27-00	P118-27-00	2200		Lat Struct									
P118-27-00	P118-27-00	1817.26	Max WS	-98.3	68.6	78.02		78.02	0.000002	-0.41	323.6	149.74	0.03
P118-27-00	P118-27-00	1360.33	Max WS	-439.75	66.5	78		78.02	0.00001	-1.26	918.81	865.16	0.08
P118-27-00	P118-27-00	1314.62	Max WS	-490.49	66	78		78	0.000002	-0.63	6915.54	2916.16	0.04
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	-491.17	65.96	78		78.01	0.000002	-0.63	6806.93	2893.63	0.04
P118-27-00	P118-27-00	1198.35	Max WS	-491.28	65.9	78		78.03	0.00001	-1.29	1086.07	1892.79	0.08
P118-27-00	P118-27-00	763.46	Max WS	-481.45	65.3	78.01		78.02	0.000004	-0.88	3310.93	1632.15	0.05
P118-27-00	P118-27-00	465.31	Max WS	-477.77	64.85	78.01		78.03	0.000006	-1.13	973.85	803.68	0.07
P118-27-00	P118-27-00	448.57	Max WS	-480.59	64.8	78.01		78.02	0.000004	-0.9	2329.96	799.19	0.05
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	-480.87	64.8	78.02		78.03	0.000004	-0.9	2319	795.35	0.05
P118-27-00	P118-27-00	429.17	Max WS	-484.54	64.7	78.02		78.03	0.000004	-0.9	2349.38	791.47	0.05
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	-484.63	64.7	78.03		78.04	0.000004	-0.9	2397.95	784.17	0.05
P118-27-00	P118-27-00	399.43	Max WS	-499.51	64.6	78.03		78.05	0.000006	-1.11	1198.96	769.68	0.07
P118-27-00	P118-27-00	310	Max WS	-580.57	65.51	78.08	69.6	78.09	0.00011	-0.93	710.5	125.68	0.06
P118-00-00	P118-R3-4	76394.4	Max WS	8404.03	61.33	79.02		79.12	0.000386	4.26	11455.73	5633.73	0.21
P118-00-00	P118-R3-4	75489.4	Max WS	8370.13	61.15	78.66		78.79	0.000452	4.57	10588.41	5297.49	0.23
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	6319.74	60.14	78.11		78.3	0.000463	4.55	6611.95	3402.05	0.23
P118-00-00	P118-R3-4	73879.2	Max WS	5152.7	60.08	78.03		78.13	0.000227	3.3	7239.65	3595.98	0.16
P118-00-00	P118-R3-4	73828	Max WS	5272.54	60.08	78		78.15	0.000303	3.81	5751.73	3273.32	0.19
P118-00-00	P118-R3-4	73723	Max WS	5692.2	60.05	77.97		78.12	0.000325	3.94	6252.45	3573.22	0.2
P118-00-00	P118-R3-4	73423.3	Max WS	7576.2	60	77.87	70.86	77.99	0.000475	3.84	8859.42	5052.76	0.18
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	7576.17	59.83	76.98		77.28	0.000996	5.37	5263.94	3491.14	0.26
P118-00-00	P118-R3-4	73232.3	Max WS	7574.37	59.83	76.86	70.69	77.2	0.001101	5.61	5025.89	3433.71	0.27

HEC-RAS Plan: Alt1_100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	1.66	72.56	77.37		77.37	0	0.02	81.37	26.91	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	1.1	72.31	77.36		77.36	0	0.01	85.84	26.77	0
P118-27-00	P118-27-00	5321.96	Max WS	39.03	72.13	77.35		77.36	0.000003	0.44	89.03	200.49	0.04
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	86.05	71.84	77.33		77.34	0.000014	0.92	93.39	72.24	0.09
P118-27-00	P118-27-00	4300.35	Max WS	29.7	71.56	77.32		77.32	0.000001	0.3	98.5	68.26	0.03
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	38.86	71.38	77.32		77.32	0.000002	0.37	103.94	97	0.03
P118-27-00	P118-27-00	3444.22	Max WS	38.8	71.25	77.31		77.32	0.000002	0.36	107.54	27.6	0.03
P118-27-00	P118-27-00	3374.42	Max WS	101.55	71.25	77.29		77.3	0.000013	0.93	109.14	30.15	0.09
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	101.27	70.4	77.29		77.3	0.000008	0.78	136.05	156.78	0.07
P118-27-00	P118-27-00	2525.84	Max WS	108.46	70	77.29		77.3	0.000006	0.71	205.76	154.86	0.06
P118-27-00	P118-27-00	2485.48	Max WS	111.05	69.9	77.29		77.3	0.000006	0.72	153.48	35.55	0.06
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	110.45	69.9	77.27		77.28	0.000006	0.72	152.85	35.97	0.06
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	110.52	69.85	77.27		77.28	0.000006	0.71	154.6	35.68	0.06
P118-27-00	P118-27-00	2381.57	Max WS	110.76	69.85	77.27		77.28	0.000006	0.72	154.58	35.67	0.06
P118-27-00	P118-27-00	2351.35	Max WS	111.09	69.8	77.27		77.28	0.000006	0.71	156.36	35.87	0.06
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	107.51	69.8	77.25		77.26	0.000006	0.69	155.75	35.8	0.06
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	99.95	69.77	77.25		77.26	0.000005	0.64	156.88	130.18	0.05
P118-27-00	P118-27-00	2200	Lat Struct										
P118-27-00	P118-27-00	1817.26	Max WS	56.33	68.6	77.26		77.26	0.000001	0.28	209.25	106.27	0.02
P118-27-00	P118-27-00	1360.33	Max WS	11.66	66.5	77.26		77.26	0	0.04	378.76	330.56	0
P118-27-00	P118-27-00	1314.62	Max WS	6.81	66	77.26		77.26	0	0.02	331.24	2721.44	0
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	6.81	65.96	77.26		77.26	0	0.02	341.23	2492.93	0
P118-27-00	P118-27-00	1198.35	Max WS	7.06	65.9	77.26		77.26	0	0.02	413.1	1471.75	0
P118-27-00	P118-27-00	763.46	Max WS	13.82	65.3	77.26		77.26	0	0.04	868.59	1441.88	0
P118-27-00	P118-27-00	465.31	Max WS	17.57	64.85	77.26		77.26	0	0.05	506.53	710.51	0
P118-27-00	P118-27-00	448.57	Max WS	15.56	64.8	77.26	65.36	77.26	0	0.03	1745.04	721.68	0
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	15.56	64.8	77.26		77.26	0	0.04	505.23	756.95	0
P118-27-00	P118-27-00	429.17	Max WS	14.61	64.7	77.26	65.23	77.26	0	0.03	1747.63	791.16	0
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	14.11	64.7	77.26		77.26	0	0.03	1628.82	784.17	0
P118-27-00	P118-27-00	399.43	Max WS	13.5	64.6	77.26		77.26	0	0.04	464.59	769.68	0
P118-27-00	P118-27-00	310	Max WS	-7.54	65.51	77.28	65.98	77.28	0	-0.01	609.99	125.68	0
P118-00-00	P118-R3-4	76394.4	Max WS	5571.59	61.33	78.14		78.26	0.000388	4.07	7194.38	3999.83	0.21
P118-00-00	P118-R3-4	75489.4	Max WS	5546.94	61.15	77.78		77.93	0.000428	4.24	6859.93	3729.45	0.22
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	4398.81	60.14	77.32		77.47	0.000364	3.86	4260.91	2312.35	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	3891.52	60.08	77.25		77.34	0.000215	3.08	4655	2568.31	0.16
P118-00-00	P118-R3-4	73828	Max WS	4083.46	60.08	77.21		77.36	0.000292	3.58	3725.14	1938.13	0.18
P118-00-00	P118-R3-4	73723	Max WS	4415.85	60.05	77.17		77.34	0.000327	3.78	3963.19	2170.44	0.19
P118-00-00	P118-R3-4	73423.3	Max WS	5525.1	60	77.07	69.39	77.22	0.000517	3.85	5372.63	3277.51	0.19
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	5525.1	59.83	76.3		76.64	0.000979	5.14	3187.11	2888.18	0.26
P118-00-00	P118-R3-4	73232.3	Max WS	5524.55	59.83	76.17	69.19	76.56	0.001088	5.38	2856.22	2887.5	0.27

HEC-RAS Plan: Alt1_50

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	76.97		76.97	0	0	70.92	25.25	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	76.97		76.97	0	0	75.48	25.24	0
P118-27-00	P118-27-00	5321.96	Max WS	6.12	72.13	76.96		76.96	0	0.08	79.01	55.67	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	13.65	71.84	76.96		76.96	0	0.16	84.03	60.01	0.02
P118-27-00	P118-27-00	4300.35	Max WS	21.19	71.56	76.96		76.96	0.000001	0.24	89.35	54.76	0.02
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	27.84	71.38	76.96		76.96	0.000001	0.29	94.62	87.43	0.03
P118-27-00	P118-27-00	3444.22	Max WS	27.89	71.25	76.96		76.96	0.000001	0.28	97.99	26.45	0.03
P118-27-00	P118-27-00	3374.42	Max WS	74.93	71.25	76.95		76.95	0.000009	0.76	99.04	28.78	0.07
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	74.82	70.4	76.95		76.95	0.000006	0.63	121.5	82.06	0.06
P118-27-00	P118-27-00	2525.84	Max WS	79.81	70	76.94		76.95	0.000004	0.57	168.26	105.67	0.05
P118-27-00	P118-27-00	2485.48	Max WS	81.78	69.9	76.94		76.95	0.000004	0.58	141.53	34.18	0.05
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	80.85	69.9	76.94		76.94	0.000004	0.57	141.22	34.14	0.05
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	81.04	69.85	76.94		76.94	0.000004	0.57	142.91	34.34	0.05
P118-27-00	P118-27-00	2381.57	Max WS	80.75	69.85	76.94		76.94	0.000004	0.57	142.91	34.34	0.05
P118-27-00	P118-27-00	2351.35	Max WS	81.01	69.8	76.93		76.94	0.000004	0.56	144.62	34.54	0.05
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	80.35	69.8	76.93		76.93	0.000004	0.56	144.33	34.5	0.05
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	78.55	69.77	76.93		76.93	0.000004	0.54	145.38	93.67	0.05
P118-27-00	P118-27-00	2200		Lat Struct									
P118-27-00	P118-27-00	1817.26	Max WS	60.16	68.6	76.93		76.93	0.000001	0.32	188.8	47.68	0.03
P118-27-00	P118-27-00	1360.33	Max WS	57.7	66.5	76.93		76.93	0	0.21	323.15	246.31	0.01
P118-27-00	P118-27-00	1314.62	Max WS	57.13	66	76.93		76.93	0	0.19	309.24	2583.53	0.01
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	56.92	65.96	76.92		76.92	0	0.19	312.92	2160.88	0.01
P118-27-00	P118-27-00	1198.35	Max WS	57.12	65.9	76.92		76.92	0	0.18	374.01	1170.02	0.01
P118-27-00	P118-27-00	763.46	Max WS	62.13	65.3	76.92		76.92	0	0.18	620.53	1160.63	0.01
P118-27-00	P118-27-00	465.31	Max WS	64.98	64.85	76.92		76.92	0	0.18	379.74	674.81	0.01
P118-27-00	P118-27-00	448.57	Max WS	64.99	64.8	76.92	66.12	76.92	0	0.18	437.09	685.38	0.01
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	65	64.8	76.92		76.92	0	0.18	426.04	708.21	0.01
P118-27-00	P118-27-00	429.17	Max WS	65.09	64.7	76.92	66.03	76.92	0	0.18	457.44	726.8	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	65.06	64.7	76.92		76.92	0	0.18	430.26	771.43	0.01
P118-27-00	P118-27-00	399.43	Max WS	65.19	64.6	76.92		76.92	0	0.18	425.72	769.68	0.01
P118-27-00	P118-27-00	310	Max WS	65.18	65.51	76.92	66.88	76.92	0.000003	0.13	565.08	125.68	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	4792.29	61.33	77.83		77.97	0.000392	4.03	6023.61	3641.91	0.21
P118-00-00	P118-R3-4	75489.4	Max WS	4779.2	61.15	77.47		77.63	0.000446	4.25	5693.17	3652.71	0.22
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	3981	60.14	76.98		77.15	0.000387	3.9	3556.77	1876.97	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	3662.74	60.08	76.9		77.01	0.000243	3.21	3878.01	1923.79	0.17
P118-00-00	P118-R3-4	73828	Max WS	3850.98	60.08	76.86		77.03	0.000326	3.71	3104.22	1608.11	0.19
P118-00-00	P118-R3-4	73723	Max WS	4106.86	60.05	76.82		77	0.000363	3.91	3264.51	1740.99	0.2
P118-00-00	P118-R3-4	73423.3	Max WS	4836.56	60	76.7	68.85	76.88	0.000555	3.92	4247.07	3018.21	0.19
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	4836.49	59.83	75.99		76.35	0.000968	5.02	2336.86	2722.96	0.25
P118-00-00	P118-R3-4	73232.3	Max WS	4836.47	59.83	75.87	68.65	76.27	0.001068	5.24	2000.76	2728.35	0.27

HEC-RAS Plan: Alt1_10

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	75.92		75.92	0	0	46.73	20.93	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	0	72.31	75.92		75.92	0	0	51.15	21.2	0
P118-27-00	P118-27-00	5321.96	Max WS	22.65	72.13	75.91		75.91	0.000004	0.42	54.58	21.27	0.05
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	50.61	71.84	75.89		75.9	0.000017	0.86	58.95	21.46	0.09
P118-27-00	P118-27-00	4300.35	Max WS	79.31	71.56	75.84		75.87	0.000033	1.25	63.22	25.52	0.13
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	104.51	71.38	75.79		75.83	0.00005	1.57	66.68	52.8	0.16
P118-27-00	P118-27-00	3444.22	Max WS	104.43	71.25	75.78		75.81	0.000046	1.51	68.98	22.59	0.15
P118-27-00	P118-27-00	3374.42	Max WS	101.91	71.25	75.35		75.4	0.000073	1.75	58.3	22.41	0.19
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	101.86	70.4	75.35		75.38	0.000035	1.35	75.52	24.49	0.14
P118-27-00	P118-27-00	2525.84	Max WS	107.3	70	75.34		75.36	0.000026	1.2	89.09	27.36	0.12
P118-27-00	P118-27-00	2485.48	Max WS	107.95	69.9	75.34		75.36	0.000024	1.18	91.84	27.76	0.11
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	106.99	69.9	75.33		75.35	0.000024	1.17	91.55	27.72	0.11
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	107.51	69.85	75.33		75.35	0.000023	1.16	92.93	27.92	0.11
P118-27-00	P118-27-00	2381.57	Max WS	107.47	69.85	75.33		75.35	0.000023	1.16	92.92	27.92	0.11
P118-27-00	P118-27-00	2351.35	Max WS	107.9	69.8	75.33		75.35	0.000022	1.14	94.31	28.12	0.11
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	107.16	69.8	75.32		75.34	0.000022	1.14	94.06	28.08	0.11
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	107.7	69.77	75.32		75.34	0.000022	1.14	94.87	28.2	0.11
P118-27-00	P118-27-00	2200		Lat Struct									
P118-27-00	P118-27-00	1817.26	Max WS	37.19	68.6	75.35		75.35	0.000001	0.28	131.52	32.99	0.02
P118-27-00	P118-27-00	1360.33	Max WS	43.75	66.5	75.35		75.35	0	0.21	209.97	57.91	0.02
P118-27-00	P118-27-00	1314.62	Max WS	44.44	66	75.35		75.35	0	0.19	230.8	1367.67	0.01
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	43.3	65.96	75.34		75.34	0	0.19	232.34	1250.77	0.01
P118-27-00	P118-27-00	1198.35	Max WS	44.16	65.9	75.34		75.34	0	0.19	234.95	462.89	0.01
P118-27-00	P118-27-00	763.46	Max WS	51.21	65.3	75.34		75.34	0	0.2	271.21	384.7	0.01
P118-27-00	P118-27-00	465.31	Max WS	55.17	64.85	75.34		75.34	0	0.2	284.61	467.58	0.01
P118-27-00	P118-27-00	448.57	Max WS	55	64.8	75.34	66	75.34	0	0.19	291.48	538.39	0.01
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	55.19	64.8	75.34		75.34	0	0.19	286.8	536.78	0.01
P118-27-00	P118-27-00	429.17	Max WS	55.02	64.7	75.34	65.9	75.34	0	0.19	291.01	513.08	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	54.92	64.7	75.34		75.34	0	0.19	290.4	508.33	0.01
P118-27-00	P118-27-00	399.43	Max WS	55.31	64.6	75.34		75.34	0	0.19	295.49	460.97	0.01
P118-27-00	P118-27-00	310	Max WS	55.35	65.51	75.34	66.77	75.34	0.000007	0.17	366.51	125.68	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	3269.38	61.33	76.79		76.99	0.00048	4.19	2957.85	2274.37	0.22
P118-00-00	P118-R3-4	75489.4	Max WS	3260.96	61.15	76.26		76.57	0.000661	4.81	1982.89	2181.5	0.26
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	3259.37	60.14	75.48		75.77	0.000651	4.61	1556.84	930.39	0.26
P118-00-00	P118-R3-4	73879.2	Max WS	3171.89	60.08	75.3		75.55	0.000503	4.17	1426.71	1066.71	0.23
P118-00-00	P118-R3-4	73828	Max WS	3254.46	60.08	75.22		75.53	0.000594	4.52	1034.55	823.77	0.25
P118-00-00	P118-R3-4	73723	Max WS	3314.4	60.05	75.14		75.48	0.000646	4.69	946.93	836.92	0.26
P118-00-00	P118-R3-4	73423.3	Max WS	3314.35	60	74.97	67.51	75.25	0.000781	4.21	786.38	1337.84	0.22
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	3314.36	59.83	74.74		75.02	0.000797	4.24	781.56	1187.54	0.23
P118-00-00	P118-R3-4	73232.3	Max WS	3314.35	59.83	74.65	67.34	74.94	0.000819	4.27	775.45	1000.48	0.23

Alternative 1 - 500-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.41	78.25	-0.16
5780.54	78.41	78.25	-0.16
5321.96	78.41	78.25	-0.16
4831.58	78.42	78.24	-0.18
4300.35	78.41	78.22	-0.19
3803.92	78.41	78.18	-0.23
3444.22	78.41	78.14	-0.27
3374.42	78.31	78.07	-0.24
3011.6	78.13	78.07	-0.06
2525.84	77.99	78.06	0.07
2485.48	77.97	78.06	0.09
2431.78	77.75	78.04	0.29
2398.35	77.73	78.04	0.31
2381.57	77.71	78.04	0.33
2351.35	77.68	78.04	0.36
2292.65	77.61	78.02	0.41
2238.14	77.6	78.02	0.42
1817.26	77.31	78.02	0.71
1360.33	77.17	78.02	0.85
1314.62	77.17	78	0.83
1255.05	77.08	78.01	0.93
1198.35	77.08	78.03	0.95
763.46	77.08	78.02	0.94
465.31	77.08	78.03	0.95
448.57	77.08	78.02	0.94
438.14	77.08	78.03	0.95
429.17	77.08	78.03	0.95
415.49	77.08	78.04	0.96
399.43	77.08	78.05	0.97
76394.4	77.99	79.12	1.13
75489.4	77.66	78.79	1.13
74253.7	77.18	78.3	1.12
73879.2	77.08	78.13	1.05
73828	77.1	78.15	1.05
73723	77.05	78.12	1.07
73423.3	76.88	77.99	1.11
73332.3	76.34	77.28	0.94
73232.3	76.26	77.2	0.94

Alternative 1 - 100-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.55	77.37	-1.18
5780.54	78.54	77.36	-1.18
5321.96	78.55	77.36	-1.19
4831.58	78.56	77.34	-1.22
4300.35	78.56	77.32	-1.24
3803.92	78.56	77.32	-1.24
3444.22	78.56	77.32	-1.24
3374.42	78.45	77.3	-1.15
3011.6	78.26	77.3	-0.96
2525.84	78.13	77.3	-0.83
2485.48	78.11	77.3	-0.81
2431.78	77.86	77.28	-0.58
2398.35	77.84	77.28	-0.56
2381.57	77.82	77.28	-0.54
2351.35	77.79	77.28	-0.51
2292.65	77.7	77.26	-0.44
2238.14	77.69	77.26	-0.43
1817.26	77.41	77.26	-0.15
1360.33	77.41	77.26	-0.15
1314.62	77.41	77.26	-0.15
1255.05	77.41	77.26	-0.15
1198.35	77.41	77.26	-0.15
763.46	77.41	77.26	-0.15
465.31	77.41	77.26	-0.15
448.57	77.41	77.26	-0.15
438.14	77.41	77.26	-0.15
429.17	77.41	77.26	-0.15
415.49	77.41	77.26	-0.15
399.43	77.41	77.26	-0.15
76394.4	78.29	78.26	-0.03
75489.4	77.97	77.93	-0.04
74253.7	77.51	77.47	-0.04
73879.2	77.43	77.34	-0.09
73828	77.45	77.36	-0.09
73723	77.4	77.34	-0.06
73423.3	77.22	77.22	0
73332.3	76.64	76.64	0
73232.3	76.56	76.56	0

Alternative 1 - 50-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.41	76.97	-1.44
5780.54	78.41	76.97	-1.44
5321.96	78.41	76.96	-1.45
4831.58	78.42	76.96	-1.46
4300.35	78.41	76.96	-1.45
3803.92	78.41	76.96	-1.45
3444.22	78.41	76.96	-1.45
3374.42	78.31	76.95	-1.36
3011.6	78.13	76.95	-1.18
2525.84	77.99	76.95	-1.04
2485.48	77.97	76.95	-1.02
2431.78	77.75	76.94	-0.81
2398.35	77.73	76.94	-0.79
2381.57	77.71	76.94	-0.77
2351.35	77.68	76.94	-0.74
2292.65	77.61	76.93	-0.68
2238.14	77.6	76.93	-0.67
1817.26	77.31	76.93	-0.38
1360.33	77.17	76.93	-0.24
1314.62	77.17	76.93	-0.24
1255.05	77.08	76.92	-0.16
1198.35	77.08	76.92	-0.16
763.46	77.08	76.92	-0.16
465.31	77.08	76.92	-0.16
448.57	77.08	76.92	-0.16
438.14	77.08	76.92	-0.16
429.17	77.08	76.92	-0.16
415.49	77.08	76.92	-0.16
399.43	77.08	76.92	-0.16
76394.4	77.99	77.97	-0.02
75489.4	77.66	77.63	-0.03
74253.7	77.18	77.15	-0.03
73879.2	77.08	77.01	-0.07
73828	77.1	77.03	-0.07
73723	77.05	77	-0.05
73423.3	76.88	76.88	0
73332.3	76.34	76.35	0.01
73232.3	76.26	76.27	0.01

Alternative 1 - 10-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 1	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	77.93	75.92	-2.01
5780.54	77.93	75.92	-2.01
5321.96	77.93	75.91	-2.02
4831.58	77.92	75.9	-2.02
4300.35	77.92	75.87	-2.05
3803.92	77.91	75.83	-2.08
3444.22	77.91	75.81	-2.1
3374.42	77.83	75.4	-2.43
3011.6	77.68	75.38	-2.3
2525.84	77.5	75.36	-2.14
2485.48	77.48	75.36	-2.12
2431.78	77.34	75.35	-1.99
2398.35	77.32	75.35	-1.97
2381.57	77.31	75.35	-1.96
2351.35	77.28	75.35	-1.93
2292.65	77.24	75.34	-1.9
2238.14	77.23	75.34	-1.89
1817.26	76.91	75.35	-1.56
1360.33	76.56	75.35	-1.21
1314.62	76.53	75.35	-1.18
1255.05	75.7	75.34	-0.36
1198.35	75.69	75.34	-0.35
763.46	75.66	75.34	-0.32
465.31	75.65	75.34	-0.31
448.57	75.65	75.34	-0.31
438.14	75.64	75.34	-0.3
429.17	75.64	75.34	-0.3
415.49	75.64	75.34	-0.3
399.43	75.64	75.34	-0.3
76394.4	77.01	76.99	-0.02
75489.4	76.6	76.57	-0.03
74253.7	75.85	75.77	-0.08
73879.2	75.67	75.55	-0.12
73828	75.66	75.53	-0.13
73723	75.6	75.48	-0.12
73423.3	75.37	75.25	-0.12
73332.3	75.1	75.02	-0.08
73232.3	75.02	74.94	-0.08

HEC-RAS Plan: Alt2_500

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-9.27	72.56	78.32		78.32	0	-0.08	125.46	102.96	0.01
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-50.47	72.31	78.31		78.32	0.000003	-0.45	113.27	62.86	0.04
P118-27-00	P118-27-00	5321.96	Max WS	1.04	72.13	78.32		78.32	0	0.01	116.38	469.18	0
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	64.79	71.84	78.31		78.32	0.000004	0.54	120.93	121.17	0.05
P118-27-00	P118-27-00	4300.35	Max WS	130.43	71.56	78.28		78.3	0.000014	1.04	125.31	141.97	0.09
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	162.31	71.38	78.25		78.27	0.00002	1.25	130.34	237.63	0.11
P118-27-00	P118-27-00	3444.22	Max WS	162.28	71.25	78.24		78.26	0.000018	1.21	137.07	133.37	0.1
P118-27-00	P118-27-00	3374.42	Max WS	163.21	71.25	78.04		78.06	0.00002	1.23	133.26	80.66	0.11
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	165.49	70.4	78.04		78.06	0.000011	0.99	484.7	591.7	0.08
P118-27-00	P118-27-00	2525.84	Max WS	154.06	70	78.04		78.05	0.000007	0.84	298.23	371.14	0.07
P118-27-00	P118-27-00	2485.48	Max WS	149.59	69.9	78.04		78.05	0.000008	0.82	182.89	209.55	0.07
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	138.37	69.9	78.02		78.03	0.000006	0.77	180.73	196.47	0.06
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	138.21	69.85	78.02		78.03	0.000006	0.76	182.63	383.04	0.06
P118-27-00	P118-27-00	2381.57	Max WS	138.07	69.85	78.02		78.03	0.000006	0.76	182.62	423.42	0.06
P118-27-00	P118-27-00	2351.35	Max WS	138.75	69.8	78.02		78.03	0.000006	0.74	301.32	292.43	0.06
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	133.06	69.8	78.01		78.02	0.000005	0.7	357.64	385.19	0.06
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	99.19	69.77	78.02		78.02	0.000003	0.53	185.57	450.6	0.04
P118-27-00	P118-27-00	1817.26	Max WS	-90.73	68.6	78.02		78.02	0.000001	-0.36	704.35	955.34	0.03
P118-27-00	P118-27-00	1360.33	Max WS	-432.46	66.5	78		78.03	0.00001	-1.24	923.94	868.93	0.08
P118-27-00	P118-27-00	1314.62	Max WS	-484.75	66	78.01		78.01	0.000002	-0.63	6932.47	2917.99	0.04
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	-484.51	65.96	78.01		78.01	0.000002	-0.62	6823.52	2894.67	0.04
P118-27-00	P118-27-00	1198.35	Max WS	-484.92	65.9	78.01		78.03	0.000009	-1.28	1091.37	1899.58	0.08
P118-27-00	P118-27-00	763.46	Max WS	-475.41	65.3	78.02		78.02	0.000004	-0.87	3320.12	1632.15	0.05
P118-27-00	P118-27-00	465.31	Max WS	-471.68	64.85	78.01		78.03	0.000006	-1.11	977.46	804.53	0.07
P118-27-00	P118-27-00	448.57	Max WS	-474.06	64.8	78.02		78.03	0.000004	-0.89	2334.42	799.19	0.05
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	-474.67	64.8	78.03		78.04	0.000004	-0.89	2323.39	795.35	0.05
P118-27-00	P118-27-00	429.17	Max WS	-478.53	64.7	78.03		78.04	0.000004	-0.89	2353.76	791.47	0.05
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	-478.65	64.7	78.04		78.05	0.000004	-0.89	2402.24	784.17	0.05
P118-27-00	P118-27-00	399.43	Max WS	-494.18	64.6	78.03		78.05	0.000006	-1.1	1203.23	769.68	0.06
P118-27-00	P118-27-00	310	Max WS	-576.32	65.51	78.08	69.58	78.09	0.000108	-0.92	711.22	125.68	0.06
P118-00-00	P118-R3-4	76394.4	Max WS	8404.51	61.33	79.02		79.13	0.000386	4.26	11468.07	5637.47	0.21
P118-00-00	P118-R3-4	75489.4	Max WS	8370.76	61.15	78.66		78.79	0.000451	4.56	10604.42	5301.41	0.23
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	6318.48	60.14	78.12		78.3	0.00046	4.53	6629.86	3403.3	0.23
P118-00-00	P118-R3-4	73879.2	Max WS	5161.59	60.08	78.04		78.13	0.000227	3.3	7258.58	3596.98	0.16
P118-00-00	P118-R3-4	73828	Max WS	5280.02	60.08	78.01		78.15	0.000303	3.81	5769	3280.87	0.19
P118-00-00	P118-R3-4	73723	Max WS	5698.65	60.05	77.97		78.12	0.000324	3.93	6271.82	3580.08	0.2
P118-00-00	P118-R3-4	73423.3	Max WS	7587.2	60	77.88	70.87	78	0.000474	3.84	8886.42	5058.37	0.18
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	7587.19	59.83	76.98		77.28	0.000996	5.37	5276.35	3502.4	0.26
P118-00-00	P118-R3-4	73232.3	Max WS	7585.38	59.83	76.86	70.69	77.2	0.0011	5.61	5038.48	3441.9	0.27

HEC-RAS Plan: Alt2_100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	1.38	72.56	77.39		77.39	0	0.02	82.12	27.03	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	0.84	72.31	77.39		77.39	0	0.01	86.59	26.87	0
P118-27-00	P118-27-00	5321.96	Max WS	38.5	72.13	77.38		77.38	0.000003	0.43	89.79	217.95	0.04
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	85.25	71.84	77.36		77.37	0.000013	0.91	94.17	73.23	0.08
P118-27-00	P118-27-00	4300.35	Max WS	31.43	71.56	77.33		77.34	0.000002	0.32	98.91	68.74	0.03
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	40.93	71.38	77.33		77.33	0.000002	0.39	104.37	97.42	0.04
P118-27-00	P118-27-00	3444.22	Max WS	40.95	71.25	77.33		77.33	0.000002	0.38	107.98	27.65	0.03
P118-27-00	P118-27-00	3374.42	Max WS	110.74	71.25	77.3		77.32	0.000016	1.01	109.59	30.21	0.09
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	110.84	70.4	77.3		77.31	0.00001	0.85	136.72	160.59	0.07
P118-27-00	P118-27-00	2525.84	Max WS	118.98	70	77.3		77.31	0.000008	0.78	207.31	156.3	0.07
P118-27-00	P118-27-00	2485.48	Max WS	122.21	69.9	77.3		77.31	0.000008	0.79	153.95	49.85	0.07
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	122.15	69.9	77.28		77.29	0.000008	0.8	153.25	120.71	0.07
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	122.03	69.85	77.28		77.29	0.000008	0.79	154.99	106.54	0.07
P118-27-00	P118-27-00	2381.57	Max WS	122.26	69.85	77.28		77.29	0.000008	0.79	154.97	95.56	0.07
P118-27-00	P118-27-00	2351.35	Max WS	122.72	69.8	77.28		77.29	0.000007	0.78	165.68	84.84	0.07
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	122.66	69.8	77.26		77.27	0.000007	0.78	192.04	127.83	0.07
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	114.95	69.77	77.27		77.27	0.000006	0.73	157.34	157.39	0.06
P118-27-00	P118-27-00	1817.26	Max WS	68.86	68.6	77.27		77.27	0.000001	0.34	263.41	258.27	0.03
P118-27-00	P118-27-00	1360.33	Max WS	22.39	66.5	77.27		77.28	0	0.08	381.65	337.81	0.01
P118-27-00	P118-27-00	1314.62	Max WS	17.24	66	77.27		77.28	0	0.05	332.14	2722.95	0
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	17.14	65.96	77.27		77.27	0	0.05	342.16	2505.29	0
P118-27-00	P118-27-00	1198.35	Max WS	17.43	65.9	77.27		77.27	0	0.05	423.09	1488.83	0
P118-27-00	P118-27-00	763.46	Max WS	22.73	65.3	77.27		77.27	0	0.06	877.62	1444.86	0
P118-27-00	P118-27-00	465.31	Max WS	24.8	64.85	77.27		77.27	0	0.07	512.84	711.15	0
P118-27-00	P118-27-00	448.57	Max WS	25.26	64.8	77.27	65.55	77.27	0	0.06	1752.41	722.47	0
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	23.39	64.8	77.27		77.27	0	0.06	507.83	767.49	0
P118-27-00	P118-27-00	429.17	Max WS	22.95	64.7	77.27	65.41	77.27	0	0.05	1755.47	791.47	0
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	22.95	64.7	77.27		77.27	0	0.05	1634.71	784.17	0
P118-27-00	P118-27-00	399.43	Max WS	22.14	64.6	77.27		77.27	0	0.06	465.69	769.68	0
P118-27-00	P118-27-00	310	Max WS	7.65	65.51	77.29	65.98	77.29	0	0.01	611.1	125.68	0
P118-00-00	P118-R3-4	76394.4	Max WS	5560.23	61.33	78.14		78.27	0.000384	4.06	7215.53	4008.34	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	5548.67	61.15	77.79		77.94	0.000425	4.22	6892.49	3731.57	0.22
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	4419.69	60.14	77.33		77.48	0.000365	3.87	4281	2324.59	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	3895.84	60.08	77.25		77.35	0.000214	3.07	4677.13	2588.05	0.16
P118-00-00	P118-R3-4	73828	Max WS	4087.13	60.08	77.22		77.37	0.00029	3.57	3742.72	1943.32	0.18
P118-00-00	P118-R3-4	73723	Max WS	4426.38	60.05	77.18		77.34	0.000326	3.78	3983.56	2179.42	0.19
P118-00-00	P118-R3-4	73423.3	Max WS	5548.9	60	77.08	69.41	77.23	0.000517	3.85	5404.01	3298.8	0.19
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	5548.38	59.83	76.31		76.65	0.00098	5.14	3210.12	2892.54	0.26
P118-00-00	P118-R3-4	73232.3	Max WS	5547.9	59.83	76.18	69.21	76.57	0.00109	5.39	2878.64	2891.56	0.27

HEC-RAS Plan: Alt2_50

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	-0.01	72.56	76.99		76.99	0	0	71.68	25.38	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-0.02	72.31	76.99		76.99	0	0	76.23	25.35	0
P118-27-00	P118-27-00	5321.96	Max WS	7.3	72.13	76.99		76.99	0	0.09	79.75	62.49	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	16.26	71.84	76.99		76.99	0.000001	0.19	84.77	60.99	0.02
P118-27-00	P118-27-00	4300.35	Max WS	25.25	71.56	76.99		76.99	0.000001	0.28	90.07	56.2	0.03
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	33.09	71.38	76.99		76.99	0.000002	0.35	95.35	88.19	0.03
P118-27-00	P118-27-00	3444.22	Max WS	32.96	71.25	76.99		76.99	0.000002	0.33	98.73	26.54	0.03
P118-27-00	P118-27-00	3374.42	Max WS	84.84	71.25	76.97		76.98	0.000012	0.85	99.69	28.87	0.08
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	84.79	70.4	76.97		76.98	0.000007	0.71	122.39	84.43	0.06
P118-27-00	P118-27-00	2525.84	Max WS	90.75	70	76.97		76.97	0.000006	0.65	170.56	109.24	0.06
P118-27-00	P118-27-00	2485.48	Max WS	92.41	69.9	76.97		76.97	0.000005	0.65	142.28	34.27	0.06
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	90.31	69.9	76.96		76.96	0.000005	0.64	141.93	39.18	0.06
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	90.53	69.85	76.96		76.96	0.000005	0.63	143.62	44.46	0.05
P118-27-00	P118-27-00	2381.57	Max WS	90.83	69.85	76.96		76.96	0.000005	0.63	143.61	34.42	0.05
P118-27-00	P118-27-00	2351.35	Max WS	91.13	69.8	76.96		76.96	0.000005	0.63	145.77	42.91	0.05
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	90.4	69.8	76.95		76.95	0.000005	0.62	156.38	90.61	0.05
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	88.04	69.77	76.95		76.95	0.000005	0.6	146.07	94	0.05
P118-27-00	P118-27-00	1817.26	Max WS	69.19	68.6	76.95		76.95	0.000001	0.36	209.34	126	0.03
P118-27-00	P118-27-00	1360.33	Max WS	66.59	66.5	76.95		76.95	0	0.24	326	250.05	0.02
P118-27-00	P118-27-00	1314.62	Max WS	65.66	66	76.95		76.95	0	0.22	310.54	2598.34	0.01
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	64.2	65.96	76.94		76.94	0	0.21	314.47	2171.26	0.01
P118-27-00	P118-27-00	1198.35	Max WS	64.62	65.9	76.94		76.94	0	0.21	376.21	1185.52	0.01
P118-27-00	P118-27-00	763.46	Max WS	70.13	65.3	76.94		76.94	0	0.2	631.79	1171.45	0.01
P118-27-00	P118-27-00	465.31	Max WS	73.31	64.85	76.94		76.94	0	0.21	381.02	676.95	0.01
P118-27-00	P118-27-00	448.57	Max WS	73.39	64.8	76.94	66.21	76.94	0	0.2	440.64	686.25	0.01
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	73.03	64.8	76.94		76.94	0	0.2	430.09	714.2	0.01
P118-27-00	P118-27-00	429.17	Max WS	73.24	64.7	76.94	66.11	76.94	0	0.2	461.95	732.72	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	72.96	64.7	76.94		76.94	0	0.17	1436.91	772.64	0.01
P118-27-00	P118-27-00	399.43	Max WS	73.11	64.6	76.94		76.94	0	0.2	427.89	769.68	0.01
P118-27-00	P118-27-00	310	Max WS	72.94	65.51	76.94	66.96	76.94	0.000003	0.15	567.48	125.68	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	4802.3	61.33	77.84		77.97	0.000389	4.02	6060.7	3652.25	0.21
P118-00-00	P118-R3-4	75489.4	Max WS	4794.58	61.15	77.48		77.64	0.000442	4.23	5740.51	3655.86	0.22
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	3983.54	60.14	77		77.17	0.000382	3.88	3591.05	1891.9	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	3661.86	60.08	76.92		77.03	0.000239	3.19	3915.38	1953.94	0.17
P118-00-00	P118-R3-4	73828	Max WS	3851.67	60.08	76.88		77.05	0.000322	3.69	3136.18	1621.99	0.19
P118-00-00	P118-R3-4	73723	Max WS	4112.32	60.05	76.84		77.02	0.000359	3.89	3300.03	1768.41	0.2
P118-00-00	P118-R3-4	73423.3	Max WS	4863.27	60	76.73	68.87	76.9	0.00055	3.9	4310.96	3023.58	0.19
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	4863.22	59.83	76.01		76.37	0.000963	5.02	2393.28	2733.55	0.25
P118-00-00	P118-R3-4	73232.3	Max WS	4863.19	59.83	75.89	68.66	76.29	0.001062	5.23	2059.01	2739.42	0.27

HEC-RAS Plan: Alt2_10

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	75.93		75.93	0	0	46.91	20.97	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	75.93		75.93	0	0	51.33	21.24	0
P118-27-00	P118-27-00	5321.96	Max WS	22.59	72.13	75.92		75.92	0.000004	0.41	54.76	21.3	0.05
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	50.52	71.84	75.9		75.91	0.000016	0.85	59.14	21.49	0.09
P118-27-00	P118-27-00	4300.35	Max WS	79.17	71.56	75.85		75.88	0.000033	1.25	63.42	25.77	0.13
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	104.32	71.38	75.8		75.84	0.000049	1.56	66.91	52.94	0.16
P118-27-00	P118-27-00	3444.22	Max WS	104.29	71.25	75.79		75.82	0.000045	1.51	69.22	22.62	0.15
P118-27-00	P118-27-00	3374.42	Max WS	100.42	71.25	75.48		75.52	0.000063	1.64	61.09	22.91	0.18
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	100.47	70.4	75.48		75.5	0.000031	1.28	78.57	24.95	0.13
P118-27-00	P118-27-00	2525.84	Max WS	106.42	70	75.47		75.49	0.000023	1.15	92.53	27.86	0.11
P118-27-00	P118-27-00	2485.48	Max WS	107.18	69.9	75.47		75.48	0.000022	1.12	95.34	28.26	0.11
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	106.36	69.9	75.46		75.48	0.000021	1.12	95.07	28.22	0.11
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	106.88	69.85	75.46		75.47	0.000021	1.11	96.48	28.42	0.11
P118-27-00	P118-27-00	2381.57	Max WS	107.19	69.85	75.45		75.47	0.000021	1.11	96.46	28.42	0.11
P118-27-00	P118-27-00	2351.35	Max WS	107.61	69.8	75.45		75.47	0.00002	1.1	97.88	28.62	0.1
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	107.02	69.8	75.45		75.46	0.00002	1.1	97.63	28.58	0.1
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	107.29	69.77	75.44		75.46	0.00002	1.09	98.46	28.7	0.1
P118-27-00	P118-27-00	1817.26	Max WS	113.73	68.6	75.45		75.46	0.00001	0.84	134.79	33.38	0.07
P118-27-00	P118-27-00	1360.33	Max WS	120.63	66.5	75.45		75.45	0.000003	0.56	214.58	61.54	0.04
P118-27-00	P118-27-00	1314.62	Max WS	121.38	66	75.45		75.45	0.000002	0.52	235.22	1439.57	0.04
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	120.48	65.96	75.43		75.44	0.000002	0.51	236.39	1304.71	0.04
P118-27-00	P118-27-00	1198.35	Max WS	121.04	65.9	75.43		75.44	0.000002	0.51	239.03	544.8	0.04
P118-27-00	P118-27-00	763.46	Max WS	127.54	65.3	75.43		75.44	0.000002	0.48	278.06	403.8	0.04
P118-27-00	P118-27-00	465.31	Max WS	131.46	64.85	75.43		75.44	0.000002	0.46	289.62	488.43	0.03
P118-27-00	P118-27-00	448.57	Max WS	131.75	64.8	75.43	66.77	75.44	0.000002	0.46	297.31	542.67	0.03
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	131.36	64.8	75.43		75.43	0.000002	0.45	291.99	541.65	0.03
P118-27-00	P118-27-00	429.17	Max WS	131.74	64.7	75.43	66.67	75.43	0.000001	0.45	295.65	515.8	0.03
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	131.65	64.7	75.43		75.43	0.000001	0.45	294.76	519.87	0.03
P118-27-00	P118-27-00	399.43	Max WS	131.89	64.6	75.43		75.43	0.000001	0.44	300.02	490.9	0.03
P118-27-00	P118-27-00	310	Max WS	131.6	65.51	75.43	67.45	75.43	0.000037	0.4	377.53	125.68	0.03
P118-00-00	P118-R3-4	76394.4	Max WS	3263.59	61.33	76.81		77.01	0.000467	4.14	3017.06	2295.07	0.22
P118-00-00	P118-R3-4	75489.4	Max WS	3252.87	61.15	76.31		76.61	0.00064	4.74	2089.69	2283.07	0.26
P118-00-00	P118-R3-4	75400	Lat Struct										
P118-00-00	P118-R3-4	74253.7	Max WS	3249.59	60.14	75.57		75.85	0.000614	4.5	1641.11	962.74	0.25
P118-00-00	P118-R3-4	73879.2	Max WS	3231.71	60.08	75.38		75.63	0.000498	4.18	1517.02	1130.59	0.23
P118-00-00	P118-R3-4	73828	Max WS	3321.58	60.08	75.31		75.62	0.000596	4.55	1104.23	866.88	0.26
P118-00-00	P118-R3-4	73723	Max WS	3380.91	60.05	75.22		75.56	0.000647	4.72	1020.81	916.82	0.27
P118-00-00	P118-R3-4	73423.3	Max WS	3380.96	60	75.05	67.57	75.33	0.000794	4.27	791.96	1512.57	0.23
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	3380.94	59.83	74.79		75.08	0.000816	4.3	785.54	1311.28	0.23
P118-00-00	P118-R3-4	73232.3	Max WS	3380.94	59.83	74.7	67.4	75	0.000838	4.34	779.27	1117.42	0.23

Alternative 2 (Recommended) - 500-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.81	78.32	-0.49
5780.54	78.8	78.32	-0.48
5321.96	78.82	78.32	-0.5
4831.58	78.84	78.32	-0.52
4300.35	78.85	78.3	-0.55
3803.92	78.86	78.27	-0.59
3444.22	78.86	78.26	-0.6
3374.42	78.79	78.06	-0.73
3011.6	78.55	78.06	-0.49
2525.84	78.43	78.05	-0.38
2485.48	78.41	78.05	-0.36
2431.78	78.15	78.03	-0.12
2398.35	78.15	78.03	-0.12
2381.57	78.14	78.03	-0.11
2351.35	78.14	78.03	-0.11
2292.65	78.13	78.02	-0.11
2238.14	78.13	78.02	-0.11
1817.26	78.14	78.02	-0.12
1360.33	78.24	78.03	-0.21
1314.62	78.21	78.01	-0.2
1255.05	78.22	78.01	-0.21
1198.35	78.23	78.03	-0.2
763.46	78.24	78.02	-0.22
465.31	78.25	78.03	-0.22
448.57	78.25	78.03	-0.22
438.14	78.26	78.04	-0.22
429.17	78.27	78.04	-0.23
415.49	78.26	78.05	-0.21
399.43	78.26	78.05	-0.21
76394.4	79.17	79.13	-0.04
75489.4	78.85	78.79	-0.06
74253.7	78.36	78.3	-0.06
73879.2	78.31	78.13	-0.18
73828	78.36	78.15	-0.21
73723	78.27	78.12	-0.15
73423.3	78.05	78	-0.05
73332.3	77.32	77.28	-0.04
73232.3	77.24	77.2	-0.04

Alternative 2 (Recommended) - 100-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.55	77.39	-1.16
5780.54	78.54	77.39	-1.15
5321.96	78.55	77.38	-1.17
4831.58	78.56	77.37	-1.19
4300.35	78.56	77.34	-1.22
3803.92	78.56	77.33	-1.23
3444.22	78.56	77.33	-1.23
3374.42	78.45	77.32	-1.13
3011.6	78.26	77.31	-0.95
2525.84	78.13	77.31	-0.82
2485.48	78.11	77.31	-0.8
2431.78	77.86	77.29	-0.57
2398.35	77.84	77.29	-0.55
2381.57	77.82	77.29	-0.53
2351.35	77.79	77.29	-0.5
2292.65	77.7	77.27	-0.43
2238.14	77.69	77.27	-0.42
1817.26	77.41	77.27	-0.14
1360.33	77.41	77.28	-0.13
1314.62	77.41	77.28	-0.13
1255.05	77.41	77.27	-0.14
1198.35	77.41	77.27	-0.14
763.46	77.41	77.27	-0.14
465.31	77.41	77.27	-0.14
448.57	77.41	77.27	-0.14
438.14	77.41	77.27	-0.14
429.17	77.41	77.27	-0.14
415.49	77.41	77.27	-0.14
399.43	77.41	77.27	-0.14
76394.4	78.29	78.27	-0.02
75489.4	77.97	77.94	-0.03
74253.7	77.51	77.48	-0.03
73879.2	77.43	77.35	-0.08
73828	77.45	77.37	-0.08
73723	77.4	77.34	-0.06
73423.3	77.22	77.23	0.01
73332.3	76.64	76.65	0.01
73232.3	76.56	76.57	0.01

Alternative 2 (Recommended) - 50-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.41	76.99	-1.42
5780.54	78.41	76.99	-1.42
5321.96	78.41	76.99	-1.42
4831.58	78.42	76.99	-1.43
4300.35	78.41	76.99	-1.42
3803.92	78.41	76.99	-1.42
3444.22	78.41	76.99	-1.42
3374.42	78.31	76.98	-1.33
3011.6	78.13	76.98	-1.15
2525.84	77.99	76.97	-1.02
2485.48	77.97	76.97	-1
2431.78	77.75	76.96	-0.79
2398.35	77.73	76.96	-0.77
2381.57	77.71	76.96	-0.75
2351.35	77.68	76.96	-0.72
2292.65	77.61	76.95	-0.66
2238.14	77.6	76.95	-0.65
1817.26	77.31	76.95	-0.36
1360.33	77.17	76.95	-0.22
1314.62	77.17	76.95	-0.22
1255.05	77.08	76.94	-0.14
1198.35	77.08	76.94	-0.14
763.46	77.08	76.94	-0.14
465.31	77.08	76.94	-0.14
448.57	77.08	76.94	-0.14
438.14	77.08	76.94	-0.14
429.17	77.08	76.94	-0.14
415.49	77.08	76.94	-0.14
399.43	77.08	76.94	-0.14
76394.4	77.99	77.97	-0.02
75489.4	77.66	77.64	-0.02
74253.7	77.18	77.17	-0.01
73879.2	77.08	77.03	-0.05
73828	77.1	77.05	-0.05
73723	77.05	77.02	-0.03
73423.3	76.88	76.9	0.02
73332.3	76.34	76.37	0.03
73232.3	76.26	76.29	0.03

Alternative 2 (Recommended) - 10-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	77.93	75.93	-2
5780.54	77.93	75.93	-2
5321.96	77.93	75.92	-2.01
4831.58	77.92	75.91	-2.01
4300.35	77.92	75.88	-2.04
3803.92	77.91	75.84	-2.07
3444.22	77.91	75.82	-2.09
3374.42	77.83	75.52	-2.31
3011.6	77.68	75.5	-2.18
2525.84	77.5	75.49	-2.01
2485.48	77.48	75.48	-2
2431.78	77.34	75.48	-1.86
2398.35	77.32	75.47	-1.85
2381.57	77.31	75.47	-1.84
2351.35	77.28	75.47	-1.81
2292.65	77.24	75.46	-1.78
2238.14	77.23	75.46	-1.77
1817.26	76.91	75.46	-1.45
1360.33	76.56	75.45	-1.11
1314.62	76.53	75.45	-1.08
1255.05	75.7	75.44	-0.26
1198.35	75.69	75.44	-0.25
763.46	75.66	75.44	-0.22
465.31	75.65	75.44	-0.21
448.57	75.65	75.44	-0.21
438.14	75.64	75.43	-0.21
429.17	75.64	75.43	-0.21
415.49	75.64	75.43	-0.21
399.43	75.64	75.43	-0.21
76394.4	77.01	77.01	0
75489.4	76.6	76.61	0.01
74253.7	75.85	75.85	0
73879.2	75.67	75.63	-0.04
73828	75.66	75.62	-0.04
73723	75.6	75.56	-0.04
73423.3	75.37	75.33	-0.04
73332.3	75.1	75.08	-0.02
73232.3	75.02	75	-0.02

HEC-RAS Plan: Alt3_500

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	474.14	73.94	80.23		80.39	0.001411	3.28	200.66	148.51	0.3
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	466.81	73.38	80.02		80.16	0.001069	3.05	191.69	124.75	0.26
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	416.66	73.1	79.6		79.72	0.000965	2.89	190.31	156.53	0.25
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	291.93	73.01	79.41		79.48	0.000586	2.16	167.92	108.73	0.19
P118-27-01	P118-27-01	500	Max WS	290.28	73.02	79.4		79.46	0.000658	2.01	188.25	159.32	0.17
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	259.13	72.9	78.55		78.63	0.000813	2.17	119.77	47.87	0.22
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	259.51	72.76	78.52		78.6	0.000732	2.16	120.38	37.66	0.21
P118-27-01	P118-27-01	139	Max WS	279.39	71.76	78.36		78.42	0.000567	1.94	146.91	74.83	0.18
P118-27-01	P118-27-01	39	Max WS	279.11	71.4	78.34		78.39	0.000038	1.73	161.08	38.91	0.15
P118-27-00	P118-27-00	6259.79	Max WS	-14.23	72.56	78.44		78.44	0	-0.13	137.4	116.59	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-64.77	72.31	78.43		78.43	0.000005	-0.56	117.96	102.51	0.05
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	-21.45	72.13	78.44		78.44	0	-0.18	119.96	30.73	0.02
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	33.61	71.84	78.44		78.44	0.000001	0.27	124.73	30.48	0.02
P118-27-00	P118-27-00	4300.35	Max WS	103.44	71.56	78.42		78.43	0.000008	0.8	129.38	30.19	0.07
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	152.54	71.38	78.39		78.41	0.000016	1.13	134.66	30.33	0.09
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	204.44	71.3	78.35		78.39	0.000033	1.53	133.99	34.71	0.14
P118-27-00	P118-27-00_DS	3444.22	Max WS	220.62	71.25	78.18		78.22	0.000035	1.66	132.74	30.7	0.14
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	482.36	71.1	78.26		78.33	0.000642	2.21	218.72	245.14	0.2
P118-27-00	P118-27-00_DS	3011.6	Max WS	147.71	70.9	78.18		78.19	0.000054	0.65	242.77	608.24	0.06
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	94.49	70.5	78.17		78.17	0.000014	0.34	358.15	453.17	0.03
P118-27-00	P118-27-00_DS	2485.48	Max WS	81.41	70.45	78.17		78.17	0.000013	0.43	189.31	276.47	0.03
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	65.79	70.45	78.16		78.16	0.000008	0.32	203.73	282.26	0.02
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	66.95	70.4	78.16		78.16	0.000008	0.26	258.68	536.48	0.02
P118-27-00	P118-27-00_DS	2381.57	Max WS	67.32	70.4	78.16		78.16	0.000008	0.28	243.09	499.52	0.02
P118-27-00	P118-27-00_DS	2351.35	Max WS	64.42	70.35	78.16		78.16	0.000008	0.34	190.36	371.19	0.02
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	58.68	70.35	78.15		78.15	0.000006	0.26	221.5	466.13	0.02
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	19.92	70.3	78.15		78.15	0.000001	0.07	411.52	545.4	0.01
P118-27-00	P118-27-00_DS	1817.26	Max WS	-215.38	70	78.15		78.16	0.000058	-0.73	374.97	1063.08	0.06
P118-27-00	P118-27-00_DS	1360.33	Max WS	-675.95	69.7	78.15		78.23	0.000501	-2.25	304.79	1012.13	0.19
P118-27-00	P118-27-00_DS	1314.62	Max WS	-751.23	66	78.18		78.18	0.000011	-0.4	7367.27	3023.21	0.03
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	-750.99	66	78.18		78.18	0.000011	-0.38	7227.98	2943.88	0.03
P118-27-00	P118-27-00_DS	1198.35	Max WS	-750.28	68.64	78.18		78.19	0.000046	-0.83	3570.21	2012.71	0.06
P118-27-00	P118-27-00_DS	763.46	Max WS	-743.75	66.19	78.2		78.21	0.000035	-0.82	3566.42	1632.15	0.05
P118-27-00	P118-27-00_DS	465.31	Max WS	-739.25	66.88	78.22		78.22	0.000044	-0.85	3057.75	1295.05	0.06
P118-27-00	P118-27-00_DS	448.57	Max WS	-738.88	66.75	78.22		78.22	0.000031	-0.74	3448.04	1277.21	0.05
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	-738.88	66.8	78.22		78.23	0.000032	-0.77	3449.92	1266.84	0.05
P118-27-00	P118-27-00_DS	429.17	Max WS	-738.75	66.81	78.22		78.23	0.00003	-0.72	3528.33	1258.46	0.05
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	-738.88	66.86	78.23		78.23	0.000029	-0.71	3595.25	1244.78	0.05
P118-27-00	P118-27-00_DS	399.43	Max WS	-738.69	66.84	78.23		78.23	0.000028	-0.72	3650.49	1227.53	0.05
P118-27-00	P118-27-00_DS	173.97	Max WS	-735.75	63.5	78.23		78.24	0.00002	-0.68	3338.66	844.24	0.04
P118-27-00	P118-27-00_DS	157.99	Max WS	-735.57	64.25	78.23		78.24	0.00002	-0.7	3232.29	804.94	0.04
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	-735.57	63.63	78.25		78.25	0.000025	-0.79	2685.57	636.83	0.04
P118-27-00	P118-27-00_DS	86.09	Max WS	-735.22	63.19	78.25		78.25	0.000026	-0.81	2548.4	596.62	0.05
P118-27-00	P118-27-00_DS	61.59	Max WS	-734.79	62.69	78.24		78.26	0.000054	-1.19	1146.33	227.69	0.07
P118-27-00	P118-27-00_DS	47.31	Max WS	-734.79	62.51	78.24		78.26	0.000047	-1.14	1093.77	183.6	0.06
P118-00-00	P118-R3-4	76394.4	Max WS	8398.94	61.33	79.06		79.16	0.000374	4.2	11665.36	5696.9	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	8390.7	61.15	78.71		78.83	0.000431	4.47	10878.89	5371.05	0.22
P118-00-00	P118-R3-4	74253.7	Max WS	8386.99	60.14	78.23		78.34	0.000393	4.22	11237.32	5208.36	0.21
P118-00-00	P118-R3-4	73879.2	Max WS	8386.99	60.08	78.02		78.28	0.000605	5.39	7202.98	3594.06	0.27
P118-00-00	P118-R3-4	73828	Max WS	8386.73	60.08	77.95		78.34	0.00079	6.14	5595.51	3204.22	0.31
P118-00-00	P118-R3-3	73723	Max WS	7652.02	60.05	77.97		78.24	0.000584	5.28	6271.55	3579.98	0.26
P118-00-00	P118-R3-3	73423.3	Max WS	7651.84	60	77.9	70.93	78.02	0.000493	3.92	8998.98	5081.04	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	7651.8	59.83	77		77.3	0.000993	5.37	5352.01	3570.33	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	7651.79	59.83	76.88	70.74	77.22	0.001096	5.61	5115.04	3491.29	0.27

HEC-RAS Plan: Alt3_100

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	339.28	73.94	79.79		79.91	0.001188	2.77	137.68	132.65	0.27
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	339.1	73.38	79.63		79.73	0.000776	2.49	158.44	101.08	0.22
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	301.86	73.1	79.34		79.42	0.000652	2.28	162.52	156.53	0.2
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	223.48	73.01	79.2		79.25	0.000421	1.77	146.49	101.45	0.16
P118-27-01	P118-27-01	500	Max WS	222.91	73.02	79.2		79.24	0.000476	1.65	158.87	127.07	0.14
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	212.51	72.9	78.04		78.11	0.000786	2.1	101.24	33.48	0.21
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	211.9	72.76	78.02		78.09	0.000728	2.06	102.75	32.82	0.21
P118-27-01	P118-27-01	139	Max WS	212.21	71.76	77.88		77.93	0.000462	1.7	124.73	37.79	0.17
P118-27-01	P118-27-01	39	Max WS	210.92	71.4	77.87		77.9	0.000029	1.47	143.66	35.62	0.13
P118-27-00	P118-27-00	6259.79	Max WS	1.03	72.56	77.98		77.98	0	0.01	100.14	56.12	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-3.84	72.31	77.98		77.98	0	-0.04	102.97	29.56	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	31.87	72.13	77.97		77.97	0.000001	0.3	106.12	28.74	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	76.19	71.84	77.96		77.96	0.000007	0.69	110.62	28.48	0.06
P118-27-00	P118-27-00	4300.35	Max WS	118.04	71.56	77.93		77.95	0.000015	1.02	115.22	28.26	0.09
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	157.8	71.38	77.9		77.93	0.000023	1.31	120.16	28.72	0.11
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	186.25	71.3	77.87		77.91	0.000037	1.58	118.01	31.26	0.14
P118-27-00	P118-27-00_DS	3444.22	Max WS	393.93	71.25	77.72		77.89	0.000149	3.31	118.9	28.91	0.29
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	396.58	71.1	77.79		77.86	0.000615	2.07	191.92	55.52	0.2
P118-27-00	P118-27-00_DS	3011.6	Max WS	357.6	70.9	77.61		77.67	0.000491	1.85	193.53	390.37	0.18
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	124.23	70.5	77.44		77.45	0.000045	0.58	265.93	175.84	0.05
P118-27-00	P118-27-00_DS	2485.48	Max WS	127.68	70.45	77.44		77.45	0.00005	0.77	165.86	90.21	0.06
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	124.11	70.45	77.42		77.43	0.000044	0.7	177.23	149.17	0.06
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	124.67	70.4	77.42		77.43	0.000047	0.59	210.78	172.58	0.05
P118-27-00	P118-27-00_DS	2381.57	Max WS	123.86	70.4	77.42		77.43	0.000044	0.61	202.45	155.09	0.05
P118-27-00	P118-27-00_DS	2351.35	Max WS	123.99	70.35	77.42		77.42	0.000046	0.74	166.65	164.92	0.06
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	122.46	70.35	77.4		77.41	0.00004	0.64	190.96	161.65	0.05
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	110.56	70.3	77.41		77.41	0.000032	0.49	282.05	191.46	0.05
P118-27-00	P118-27-00_DS	1817.26	Max WS	46.42	70	77.4		77.4	0.000005	0.2	257.12	403.7	0.02
P118-27-00	P118-27-00_DS	1360.33	Max WS	-36.9	69.7	77.4		77.4	0.000003	-0.15	252.31	422.09	0.01
P118-27-00	P118-27-00_DS	1314.62	Max WS	-47.07	66	77.4		77.4	0	-0.04	5157.83	2730.63	0
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	-47.2	66	77.41		77.41	0	-0.04	5034.27	2632.59	0
P118-27-00	P118-27-00_DS	1198.35	Max WS	-45.73	68.64	77.41		77.41	0.000001	-0.08	2157.54	1644.52	0.01
P118-27-00	P118-27-00_DS	763.46	Max WS	-41.6	66.19	77.41		77.41	0	-0.07	2281.83	1495.16	0
P118-27-00	P118-27-00_DS	465.31	Max WS	-38.73	66.88	77.41		77.41	0	-0.07	2035.51	1219.66	0
P118-27-00	P118-27-00_DS	448.57	Max WS	-38.77	66.75	77.41		77.41	0	-0.06	2415.72	1211.79	0
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	-38.77	66.8	77.41		77.41	0	-0.06	2414.7	1265.16	0
P118-27-00	P118-27-00_DS	429.17	Max WS	-39.09	66.81	77.41		77.41	0	-0.06	2499.43	1258.46	0
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	-39.09	66.86	77.41		77.41	0	-0.05	2572.52	1244.78	0
P118-27-00	P118-27-00_DS	399.43	Max WS	-40.6	66.84	77.41		77.41	0	-0.06	2641.45	1227.53	0
P118-27-00	P118-27-00_DS	173.97	Max WS	-45.38	63.5	77.41		77.41	0	-0.05	2641.33	844.24	0
P118-27-00	P118-27-00_DS	157.99	Max WS	-49.08	64.25	77.41		77.41	0	-0.06	2567.62	804.94	0
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	-49.16	63.63	77.41		77.41	0	-0.07	2154.08	636.83	0
P118-27-00	P118-27-00_DS	86.09	Max WS	-57.14	63.19	77.41		77.41	0	-0.08	2050.87	596.62	0
P118-27-00	P118-27-00_DS	61.59	Max WS	-70.82	62.69	77.42		77.42	0.000001	-0.13	958.28	227.69	0.01
P118-27-00	P118-27-00_DS	47.31	Max WS	-75.27	62.51	77.42		77.42	0.000001	-0.13	942.64	183.6	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	5561.55	61.33	78.17		78.29	0.000374	4.01	7325.92	4052.52	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	5548.51	61.15	77.84		77.97	0.000407	4.14	7048.4	3741.7	0.21
P118-00-00	P118-R3-4	74253.7	Max WS	5537.58	60.14	77.39		77.51	0.000356	3.83	7202.12	4100.25	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	5535.85	60.08	77.23		77.43	0.000441	4.41	4604.95	2523.09	0.23
P118-00-00	P118-R3-4	73828	Max WS	5526.31	60.08	77.17		77.45	0.000548	4.9	3653.65	1917.05	0.25
P118-00-00	P118-R3-3	73723	Max WS	5532.14	60.05	77.14		77.4	0.000525	4.78	3891.13	2139.72	0.25
P118-00-00	P118-R3-3	73423.3	Max WS	5510.64	60	77.06	69.37	77.21	0.000517	3.85	5350.73	3262.56	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	5510.6	59.83	76.29		76.63	0.000979	5.14	3169.74	2884.88	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	5506.55	59.83	76.17	69.18	76.56	0.001087	5.38	2838.97	2884.38	0.27

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River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	291.98	73.94	79.61		79.71	0.001072	2.54	117.41	64.36	0.25
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	291.91	73.38	79.47		79.55	0.00066	2.25	144.77	85.49	0.2
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	259.28	73.1	79.23		79.3	0.000538	2.03	150.46	156.53	0.18
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	198.71	73.01	79.11		79.15	0.000366	1.62	137.2	98.29	0.15
P118-27-01	P118-27-01	500	Max WS	198.5	73.02	79.11		79.14	0.000414	1.52	147.16	124.71	0.13
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	189.72	72.9	77.76		77.82	0.000783	2.06	91.97	31.07	0.21
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	189.71	72.76	77.73		77.8	0.000734	2.03	93.63	30.86	0.21
P118-27-01	P118-27-01	139	Max WS	187.68	71.76	77.6		77.64	0.000441	1.64	114.36	35.22	0.16
P118-27-01	P118-27-01	39	Max WS	185.6	71.4	77.59		77.62	0.000027	1.39	133.77	34.37	0.12
P118-27-00	P118-27-00	6259.79	Max WS	1.97	72.56	77.69		77.69	0	0.02	90.32	30.13	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	1.31	72.31	77.69		77.69	0	0.01	94.72	28.01	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	31.99	72.13	77.68		77.68	0.000002	0.33	97.96	27.7	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	70.17	71.84	77.67		77.68	0.000007	0.68	102.54	27.5	0.06
P118-27-00	P118-27-00	4300.35	Max WS	108.64	71.56	77.64		77.66	0.000015	1.01	107.2	27.33	0.09
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	142.57	71.38	77.61		77.64	0.000023	1.27	112.09	27.82	0.11
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	165.74	71.3	77.58		77.62	0.000035	1.52	109.38	29.81	0.14
P118-27-00	P118-27-00_DS	3444.22	Max WS	337.84	71.25	77.45		77.6	0.000131	3.03	111.42	28.06	0.27
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	346.01	71.1	77.51		77.57	0.000582	1.96	176.85	53.31	0.19
P118-27-00	P118-27-00_DS	3011.6	Max WS	322.76	70.9	77.33		77.38	0.000499	1.81	177.83	181.72	0.18
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	110.06	70.5	77.14		77.15	0.000046	0.57	229.69	146.39	0.05
P118-27-00	P118-27-00_DS	2485.48	Max WS	111.58	70.45	77.14		77.15	0.000046	0.71	156.25	59.28	0.06
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	109.73	70.45	77.12		77.13	0.000042	0.66	166.52	97.01	0.05
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	110.07	70.4	77.12		77.13	0.000046	0.57	193.81	84.91	0.05
P118-27-00	P118-27-00_DS	2381.57	Max WS	109.64	70.4	77.12		77.13	0.000043	0.58	187.73	57.62	0.05
P118-27-00	P118-27-00_DS	2351.35	Max WS	109.43	70.35	77.12		77.13	0.000044	0.7	157.14	80.17	0.06
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	107.71	70.35	77.11		77.12	0.000038	0.6	178.88	135.18	0.05
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	102.16	70.3	77.11		77.11	0.000036	0.5	238.82	148.82	0.05
P118-27-00	P118-27-00_DS	1817.26	Max WS	71.51	70	77.1		77.1	0.000015	0.33	221.34	194.08	0.03
P118-27-00	P118-27-00_DS	1360.33	Max WS	51.05	69.7	77.1		77.1	0.000006	0.22	233.37	271.45	0.02
P118-27-00	P118-27-00_DS	1314.62	Max WS	50.11	66	77.1		77.1	0.000003	0.21	237.72	2665.2	0.01
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	47.34	66	77.09		77.09	0	0.04	4249.74	2247.08	0
P118-27-00	P118-27-00_DS	1198.35	Max WS	47.89	68.64	77.09		77.09	0.000001	0.1	1691.92	1293.11	0.01
P118-27-00	P118-27-00_DS	763.46	Max WS	51.66	66.19	77.09		77.09	0.000001	0.1	1826.61	1328.89	0.01
P118-27-00	P118-27-00_DS	465.31	Max WS	54.08	66.88	77.09		77.09	0.000001	0.11	1651.56	1184	0.01
P118-27-00	P118-27-00_DS	448.57	Max WS	54.09	66.75	77.09	68.06	77.09	0.000001	0.09	2032.95	1179.41	0.01
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	54.06	66.8	77.09		77.09	0.000001	0.1	2019.42	1205.71	0.01
P118-27-00	P118-27-00_DS	429.17	Max WS	54.14	66.81	77.09	68.14	77.09	0.000001	0.09	2096.31	1247.13	0.01
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	54.08	66.86	77.08		77.09	0.000001	0.09	2171.68	1240.04	0.01
P118-27-00	P118-27-00_DS	399.43	Max WS	54.18	66.84	77.08		77.09	0.000001	0.09	2245.78	1227.53	0.01
P118-27-00	P118-27-00_DS	173.97	Max WS	55.68	63.5	77.08		77.08	0	0.07	2368.37	844.24	0
P118-27-00	P118-27-00_DS	157.99	Max WS	55.89	64.25	77.08		77.08	0	0.08	2307.01	804.94	0
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	55.74	63.63	77.08		77.08	0	0.08	1945.87	636.83	0
P118-27-00	P118-27-00_DS	86.09	Max WS	55.85	63.19	77.08		77.08	0	0.08	1855.31	596.62	0
P118-27-00	P118-27-00_DS	61.59	Max WS	56.16	62.69	77.08		77.08	0.000001	0.11	882.9	227.69	0.01
P118-27-00	P118-27-00_DS	47.31	Max WS	56.09	62.51	77.08		77.08	0	0.1	881.2	183.6	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	4793.99	61.33	77.86		77.99	0.00038	3.97	6133.94	3672.57	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	4783.72	61.15	77.51		77.67	0.000425	4.16	5857	3663.58	0.22
P118-00-00	P118-R3-4	74253.7	Max WS	4779.87	60.14	77.05		77.18	0.000364	3.8	5908.56	3544.07	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	4779.81	60.08	76.9		77.09	0.000414	4.19	3873.65	1922.89	0.22
P118-00-00	P118-R3-4	73828	Max WS	4779.74	60.08	76.85		77.11	0.000506	4.62	3084.14	1599.33	0.24
P118-00-00	P118-R3-3	73723	Max WS	4835.81	60.05	76.8		77.06	0.000511	4.63	3231.16	1715.46	0.24
P118-00-00	P118-R3-3	73423.3	Max WS	4835.75	60	76.71	68.85	76.89	0.000551	3.9	4271.02	3020.23	0.19
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	4835.71	59.83	75.99		76.35	0.000968	5.02	2335.24	2722.71	0.25
P118-00-00	P118-R3-3	73232.3	Max WS	4835.7	59.83	75.87	68.65	76.27	0.001068	5.24	1999.08	2728.03	0.27

HEC-RAS Plan: Alt3_10

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-01	P118-27-01	1520	Max WS	197.66	73.94	79.12		79.19	0.000743	2.02	97.9	32.83	0.21
P118-27-01	P118-27-01	1510		Lat Struct									
P118-27-01	P118-27-01	1335	Max WS	197.51	73.38	79.03		79.08	0.000435	1.72	114.89	40.22	0.16
P118-27-01	P118-27-01	1320		Lat Struct									
P118-27-01	P118-27-01	885	Max WS	172.3	73.1	78.88		78.92	0.000335	1.5	121.6	101.16	0.14
P118-27-01	P118-27-01	870		Lat Struct									
P118-27-01	P118-27-01	518	Max WS	152.58	73.01	78.78		78.81	0.0003	1.38	111.65	47.21	0.13
P118-27-01	P118-27-01	500	Max WS	152.6	73.02	78.77		78.8	0.000299	1.28	120.77	48.14	0.12
P118-27-01	P118-27-01	480		Culvert									
P118-27-01	P118-27-01	434	Max WS	145.62	72.9	76.98		77.05	0.000962	2.09	69.59	26.89	0.23
P118-27-01	P118-27-01	420		Lat Struct									
P118-27-01	P118-27-01	399	Max WS	145.37	72.76	76.95		77.01	0.000902	2.05	71.01	26.96	0.22
P118-27-01	P118-27-01	139	Max WS	144	71.76	76.79		76.83	0.000498	1.63	88.25	29.94	0.17
P118-27-01	P118-27-01	39	Max WS	143.89	71.4	76.78		76.8	0.000029	1.34	107.37	30.77	0.13
P118-27-00	P118-27-00	6259.79	Max WS	0	72.56	76.85		76.85	0	0	68.13	24.79	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-0.01	72.31	76.85		76.85	0	0	72.68	24.81	0
P118-27-00	P118-27-00	5770		Lat Struct									
P118-27-00	P118-27-00	5321.96	Max WS	21.07	72.13	76.85		76.85	0.000001	0.28	76.17	24.68	0.03
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	47.08	71.84	76.84		76.85	0.000006	0.58	80.95	24.69	0.06
P118-27-00	P118-27-00	4300.35	Max WS	73.66	71.56	76.82		76.83	0.000012	0.86	85.84	24.71	0.08
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	4280		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	96.96	71.38	76.8		76.82	0.000019	1.07	90.51	25.25	0.1
P118-27-00	P118-27-00	3790		Lat Struct									
P118-27-00	P118-27-00	3560	Max WS	110.51	71.3	76.78		76.81	0.000029	1.27	86.78	26.66	0.12
P118-27-00	P118-27-00_DS	3444.22	Max WS	252.32	71.25	76.67		76.79	0.000128	2.79	90.46	25.5	0.26
P118-27-00	P118-27-00_DS	3420		Lat Struct									
P118-27-00	P118-27-00_DS	3374.42	Max WS	253.16	71.1	76.71		76.76	0.00062	1.85	136.65	46.89	0.19
P118-27-00	P118-27-00_DS	3011.6	Max WS	232.69	70.9	76.52		76.57	0.000519	1.7	137.14	46.97	0.18
P118-27-00	P118-27-00_DS	3000		Lat Struct									
P118-27-00	P118-27-00_DS	2525.84	Max WS	20.3	70.5	76.43		76.43	0.000003	0.13	153.1	59.42	0.01
P118-27-00	P118-27-00_DS	2485.48	Max WS	18.77	70.45	76.43		76.43	0.000002	0.14	133.47	49.81	0.01
P118-27-00	P118-27-00_DS	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00_DS	2431.78	Max WS	18.77	70.45	76.42		76.42	0.000002	0.13	141.32	49.8	0.01
P118-27-00	P118-27-00_DS	2420		Lat Struct									
P118-27-00	P118-27-00_DS	2398.35	Max WS	18.43	70.4	76.42		76.42	0.000002	0.12	156.66	50.19	0.01
P118-27-00	P118-27-00_DS	2381.57	Max WS	18.3	70.4	76.42		76.42	0.000002	0.12	154.5	50.18	0.01
P118-27-00	P118-27-00_DS	2351.35	Max WS	18.2	70.35	76.42		76.42	0.000002	0.13	134.82	50.57	0.01
P118-27-00	P118-27-00_DS	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00_DS	2292.65	Max WS	18.2	70.35	76.42		76.42	0.000002	0.12	150.59	50.56	0.01
P118-27-00	P118-27-00_DS	2280		Lat Struct									
P118-27-00	P118-27-00_DS	2238.14	Max WS	17.3	70.3	76.42		76.42	0.000002	0.11	167	76.31	0.01
P118-27-00	P118-27-00_DS	1817.26	Max WS	18.52	70	76.42		76.42	0.000002	0.1	177.12	62.87	0.01
P118-27-00	P118-27-00_DS	1360.33	Max WS	129.31	69.7	75.7		75.72	0.000114	0.83	155.73	76.31	0.08
P118-27-00	P118-27-00_DS	1314.62	Max WS	131.43	66	75.7		75.71	0.000037	0.68	194.45	1557.19	0.05
P118-27-00	P118-27-00_DS	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00_DS	1255.05	Max WS	126.8	66	75.65		75.66	0.000058	0.8	159.44	1373.25	0.06
P118-27-00	P118-27-00_DS	1198.35	Max WS	127.39	68.64	75.65		75.66	0.000063	0.74	404.21	638.86	0.06
P118-27-00	P118-27-00_DS	763.46	Max WS	131.83	66.19	75.63		75.63	0.00002	0.5	599.34	453.16	0.03
P118-27-00	P118-27-00_DS	465.31	Max WS	134.39	66.88	75.62		75.62	0.000042	0.64	289.01	545.62	0.05
P118-27-00	P118-27-00_DS	448.57	Max WS	134.52	66.75	75.62	68.88	75.62	0.000026	0.52	625.55	616.15	0.04
P118-27-00	P118-27-00_DS	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00_DS	438.14	Max WS	134.52	66.8	75.61		75.62	0.000028	0.56	591.56	659.4	0.04
P118-27-00	P118-27-00_DS	429.17	Max WS	134.6	66.81	75.61	68.98	75.62	0.00003	0.54	581.04	730.2	0.04
P118-27-00	P118-27-00_DS	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00_DS	415.49	Max WS	134.53	66.86	75.61		75.61	0.00003	0.56	567.02	755.67	0.04
P118-27-00	P118-27-00_DS	399.43	Max WS	134.66	66.84	75.61		75.61	0.000028	0.56	622.36	734.38	0.04
P118-27-00	P118-27-00_DS	173.97	Max WS	136.45	63.5	75.61		75.61	0.000008	0.34	1120.18	837.64	0.02
P118-27-00	P118-27-00_DS	157.99	Max WS	136.57	64.25	75.61		75.61	0.000007	0.34	1116.11	804.94	0.02
P118-27-00	P118-27-00_DS	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00_DS	101.43	Max WS	136.57	63.63	75.6		75.6	0.000007	0.34	1002.7	636.83	0.02
P118-27-00	P118-27-00_DS	86.09	Max WS	136.67	63.19	75.6		75.6	0.000007	0.34	971.62	596.62	0.02
P118-27-00	P118-27-00_DS	61.59	Max WS	136.99	62.69	75.6		75.6	0.000008	0.37	545.54	227.69	0.02
P118-27-00	P118-27-00_DS	47.31	Max WS	136.99	62.51	75.6		75.6	0.000006	0.33	609.2	183.6	0.02
P118-00-00	P118-R3-4	76394.4	Max WS	3265.28	61.33	76.8		77	0.000474	4.17	2982.88	2282.13	0.22
P118-00-00	P118-R3-4	75489.4	Max WS	3252.9	61.15	76.29		76.59	0.000647	4.76	2031.46	2230.47	0.26
P118-00-00	P118-R3-4	74253.7	Max WS	3249.43	60.14	75.59		75.83	0.000555	4.29	2168.89	1760.52	0.24
P118-00-00	P118-R3-4	73879.2	Max WS	3249.44	60.08	75.39		75.64	0.000499	4.19	1531.37	1140.41	0.23
P118-00-00	P118-R3-4	73828	Max WS	3249.42	60.08	75.34		75.63	0.000561	4.42	1133.74	891.59	0.25
P118-00-00	P118-R3-3	73723	Max WS	3386.32	60.05	75.23		75.57	0.000646	4.71	1029.63	921.51	0.27
P118-00-00	P118-R3-3	73423.3	Max WS	3385.35	60	75.06	67.58	75.34	0.000794	4.27	792.61	1532.86	0.23
P118-00-00	P118-R3-3	73377.8		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	3386.34	59.83	74.8		75.09	0.000817	4.31	785.86	1321.32	0.23
P118-00-00	P118-R3-3	73232.3	Max WS	3386.32	59.83	74.71	67.41	75	0.000839	4.34	779.58	1126.87	0.23

Alternative 3 - 500-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	80.34	80.39	0.05
1335	80.09	80.16	0.07
885	79.68	79.72	0.04
518	79.46	79.48	0.02
500	79.45	79.46	0.01
434	79.02	78.63	-0.39
399	79	78.6	-0.4
139	78.84	78.42	-0.42
39	78.81	78.39	-0.42
6259.79	78.8	78.44	-0.36
5780.54	78.79	78.43	-0.36
5321.96	78.81	78.44	-0.37
4831.58	78.82	78.44	-0.38
4300.35	78.83	78.43	-0.4
3803.92	78.83	78.41	-0.42
3560	78.81	78.39	-0.42
3444.22	78.8	78.22	-0.58
3374.42	78.76	78.33	-0.43
3011.6	78.52	78.19	-0.33
2525.84	78.39	78.17	-0.22
2485.48	78.38	78.17	-0.21
2431.78	78.14	78.16	0.02
2398.35	78.14	78.16	0.02
2381.57	78.13	78.16	0.03
2351.35	78.13	78.16	0.03
2292.65	78.12	78.15	0.03
2238.14	78.12	78.15	0.03
1817.26	78.13	78.16	0.03
1360.33	78.23	78.23	0
1314.62	78.2	78.18	-0.02
1255.05	78.21	78.18	-0.03
1198.35	78.22	78.19	-0.03
763.46	78.24	78.21	-0.03
465.31	78.25	78.22	-0.03
448.57	78.25	78.22	-0.03
438.14	78.25	78.23	-0.02
429.17	78.25	78.23	-0.02
415.49	78.26	78.23	-0.03
399.43	78.26	78.23	-0.03
173.97	78.26	78.24	-0.02
157.99	78.26	78.24	-0.02
101.43	78.27	78.25	-0.02
86.09	78.27	78.25	-0.02
61.59	78.28	78.26	-0.02
47.31	78.28	78.26	-0.02
76394.4	79.16	79.16	0
75489.4	78.85	78.83	-0.02
74253.7	78.36	78.34	-0.02
73879.2	78.3	78.28	-0.02
73828	78.36	78.34	-0.02
73723	78.26	78.24	-0.02
73423.3	78.05	78.02	-0.03
73377.8	0	0	0
73332.3	77.31	77.3	-0.01
73232.3	77.23	77.22	-0.01

Alternative 3 - 100-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	79.89	79.91	0.02
1335	79.7	79.73	0.03
885	79.41	79.42	0.01
518	79.26	79.25	-0.01
500	79.25	79.24	-0.01
434	78.65	78.11	-0.54
399	78.63	78.09	-0.54
139	78.53	77.93	-0.6
39	78.51	77.9	-0.61
6259.79	78.53	77.98	-0.55
5780.54	78.52	77.98	-0.54
5321.96	78.53	77.97	-0.56
4831.58	78.53	77.96	-0.57
4300.35	78.53	77.95	-0.58
3803.92	78.52	77.93	-0.59
3560	78.51	77.91	-0.6
3444.22	78.5	77.89	-0.61
3374.42	78.47	77.86	-0.61
3011.6	78.27	77.67	-0.6
2525.84	78.13	77.45	-0.68
2485.48	78.12	77.45	-0.67
2431.78	77.87	77.43	-0.44
2398.35	77.84	77.43	-0.41
2381.57	77.82	77.43	-0.39
2351.35	77.79	77.42	-0.37
2292.65	77.71	77.41	-0.3
2238.14	77.7	77.41	-0.29
1817.26	77.42	77.4	-0.02
1360.33	77.41	77.4	-0.01
1314.62	77.41	77.4	-0.01
1255.05	77.42	77.41	-0.01
1198.35	77.42	77.41	-0.01
763.46	77.42	77.41	-0.01
465.31	77.42	77.41	-0.01
448.57	77.42	77.41	-0.01
438.14	77.42	77.41	-0.01
429.17	77.42	77.41	-0.01
415.49	77.42	77.41	-0.01
399.43	77.42	77.41	-0.01
173.97	77.42	77.41	-0.01
157.99	77.42	77.41	-0.01
101.43	77.41	77.41	0
86.09	77.41	77.41	0
61.59	77.42	77.42	0
47.31	77.42	77.42	0
76394.4	78.29	78.29	0
75489.4	77.97	77.97	0
74253.7	77.51	77.51	0
73879.2	77.43	77.43	0
73828	77.45	77.45	0
73723	77.4	77.4	0
73423.3	77.21	77.21	0
73377.8	0	0	0
73332.3	76.63	76.63	0
73232.3	76.56	76.56	0

Alternative 3 - 50-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	79.7	79.71	0.01
1335	79.54	79.55	0.01
885	79.3	79.3	0
518	79.17	79.15	-0.02
500	79.17	79.14	-0.03
434	78.46	77.82	-0.64
399	78.45	77.8	-0.65
139	78.36	77.64	-0.72
39	78.35	77.62	-0.73
6259.79	78.37	77.69	-0.68
5780.54	78.37	77.69	-0.68
5321.96	78.37	77.68	-0.69
4831.58	78.37	77.68	-0.69
4300.35	78.37	77.66	-0.71
3803.92	78.36	77.64	-0.72
3560	78.35	77.62	-0.73
3444.22	78.34	77.6	-0.74
3374.42	78.31	77.57	-0.74
3011.6	78.13	77.38	-0.75
2525.84	77.99	77.15	-0.84
2485.48	77.97	77.15	-0.82
2431.78	77.76	77.13	-0.63
2398.35	77.73	77.13	-0.6
2381.57	77.71	77.13	-0.58
2351.35	77.68	77.13	-0.55
2292.65	77.61	77.12	-0.49
2238.14	77.6	77.11	-0.49
1817.26	77.32	77.1	-0.22
1360.33	77.18	77.1	-0.08
1314.62	77.18	77.1	-0.08
1255.05	77.08	77.09	0.01
1198.35	77.08	77.09	0.01
763.46	77.08	77.09	0.01
465.31	77.08	77.09	0.01
448.57	77.08	77.09	0.01
438.14	77.08	77.09	0.01
429.17	77.08	77.09	0.01
415.49	77.08	77.09	0.01
399.43	77.08	77.09	0.01
173.97	77.08	77.08	0
157.99	77.08	77.08	0
101.43	77.08	77.08	0
86.09	77.08	77.08	0
61.59	77.08	77.08	0
47.31	77.08	77.08	0
76394.4	77.99	77.99	0
75489.4	77.66	77.67	0.01
74253.7	77.18	77.18	0
73879.2	77.09	77.09	0
73828	77.1	77.11	0.01
73723	77.05	77.06	0.01
73423.3	76.88	76.89	0.01
73377.8	0	0	0
73332.3	76.34	76.35	0.01
73232.3	76.26	76.27	0.01

Alternative 3 - 10-Year Stage Hydrograph Condtion
Water Surface Elevation Comparison

River Station	Baseline	Alternative 3	
	WSEL (ft)	WSEL (ft)	Difference
1520	79.25	79.19	-0.06
1335	79.15	79.08	-0.07
885	79	78.92	-0.08
518	78.91	78.81	-0.1
500	78.91	78.8	-0.11
434	77.96	77.05	-0.91
399	77.95	77.01	-0.94
139	77.88	76.83	-1.05
39	77.87	76.8	-1.07
6259.79	77.9	76.85	-1.05
5780.54	77.9	76.85	-1.05
5321.96	77.9	76.85	-1.05
4831.58	77.89	76.85	-1.04
4300.35	77.89	76.83	-1.06
3803.92	77.88	76.82	-1.06
3560	77.87	76.81	-1.06
3444.22	77.86	76.79	-1.07
3374.42	77.84	76.76	-1.08
3011.6	77.68	76.57	-1.11
2525.84	77.51	76.43	-1.08
2485.48	77.49	76.43	-1.06
2431.78	77.36	76.42	-0.94
2398.35	77.34	76.42	-0.92
2381.57	77.32	76.42	-0.9
2351.35	77.3	76.42	-0.88
2292.65	77.26	76.42	-0.84
2238.14	77.24	76.42	-0.82
1817.26	76.93	76.42	-0.51
1360.33	76.58	75.72	-0.86
1314.62	76.55	75.71	-0.84
1255.05	75.71	75.66	-0.05
1198.35	75.7	75.66	-0.04
763.46	75.67	75.63	-0.04
465.31	75.66	75.62	-0.04
448.57	75.65	75.62	-0.03
438.14	75.65	75.62	-0.03
429.17	75.65	75.62	-0.03
415.49	75.64	75.61	-0.03
399.43	75.64	75.61	-0.03
173.97	75.64	75.61	-0.03
157.99	75.63	75.61	-0.02
101.43	75.63	75.6	-0.03
86.09	75.63	75.6	-0.03
61.59	75.63	75.6	-0.03
47.31	75.63	75.6	-0.03
76394.4	77.01	77	-0.01
75489.4	76.6	76.59	-0.01
74253.7	75.86	75.83	-0.03
73879.2	75.68	75.64	-0.04
73828	75.66	75.63	-0.03
73723	75.6	75.57	-0.03
73423.3	75.37	75.34	-0.03
73377.8	0	0	0
73332.3	75.11	75.09	-0.02
73232.3	75.02	75	-0.02

HEC-RAS Plan: Baseline_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	5	72.56	78.83		78.83	0	0.04	178.45	166.41	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-151.85	72.31	78.8		78.82	0.000019	-1.18	151.85	224.36	0.1
P118-27-00	P118-27-00	5321.96	Max WS	-117.2	72.13	78.83		78.84	0.00001	-0.89	134.97	690.83	0.08
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	-50.8	71.84	78.85		78.85	0.000002	-0.37	138.49	268.42	0.03
P118-27-00	P118-27-00	4300.35	Max WS	16.54	71.56	78.85		78.85	0	0.12	144.22	299.89	0.01
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	72.06	71.38	78.84		78.85	0.000003	0.48	150.25	541.76	0.04
P118-27-00	P118-27-00	3444.22	Max WS	47.58	71.25	78.85		78.85	0.000001	0.31	203.22	974.75	0.02
P118-27-00	P118-27-00	3374.42	Max WS	504.28	72.06	78.6		78.75	0.001134	3.18	161.84	590.74	0.27
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	439.21	71.59	78.42		78.45	0.000335	1.84	729.32	802.16	0.15
P118-27-00	P118-27-00	2525.84	Max WS	354.54	71.22	78.27		78.31	0.00028	1.71	326.75	532.85	0.14
P118-27-00	P118-27-00	2485.48	Max WS	368.32	71.53	78.24		78.3	0.000249	1.87	196.96	295.15	0.13
P118-27-00	P118-27-00	2458.24 Access Road 2	Culvert										
P118-27-00	P118-27-00	2431.78	Max WS	81.15	71.1	78.17		78.17	0.000015	0.42	191.49	270.44	0.03
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	74.58	71.1	78.16		78.17	0.000035	0.53	144.81	510.12	0.05
P118-27-00	P118-27-00	2381.57	Max WS	69.14	71.1	78.16		78.17	0.000033	0.5	140.17	470.27	0.04
P118-27-00	P118-27-00	2351.35	Max WS	76.34	71.09	78.16		78.17	0.000016	0.43	178.61	351.28	0.03
P118-27-00	P118-27-00	2326.32 Access Road 1	Culvert										
P118-27-00	P118-27-00	2292.65	Max WS	68.76	70.77	78.16		78.16	0.000009	0.32	217.9	457.86	0.02
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	30.98	71.09	78.16		78.16	0.000003	0.18	322.24	535.79	0.01
P118-27-00	P118-27-00	1817.26	Max WS	-198.4	70.49	78.17		78.19	0.000156	-1.17	273.68	1062.86	0.1
P118-27-00	P118-27-00	1360.33	Max WS	-531.55	69.94	78.24		78.27	0.000308	-1.66	1000.56	1113.62	0.14
P118-27-00	P118-27-00	1314.62	Max WS	-581.55	69.66	78.25		78.25	0.000006	-0.29	7557.34	3038.77	0.02
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa	Culvert										
P118-27-00	P118-27-00	1255.05	Max WS	-581.68	69.66	78.26		78.26	0.000006	-0.29	7431	2981.94	0.02
P118-27-00	P118-27-00	1198.35	Max WS	-580.57	68.64	78.26		78.26	0.000025	-0.62	3732.37	2022.44	0.04
P118-27-00	P118-27-00	763.46	Max WS	-570.47	66.19	78.27		78.28	0.000019	-0.61	3680.43	1632.15	0.04
P118-27-00	P118-27-00	465.31	Max WS	-564.77	66.88	78.28		78.29	0.000039	-0.81	2085.23	805.3	0.05
P118-27-00	P118-27-00	448.57	Max WS	-564.46	66.75	78.28		78.29	0.000027	-0.69	2443.95	799.19	0.04
P118-27-00	P118-27-00	443.86 Concrete Footbri	Bridge										
P118-27-00	P118-27-00	438.14	Max WS	-564.51	66.8	78.29		78.29	0.000028	-0.73	2430.84	795.35	0.05
P118-27-00	P118-27-00	429.17	Max WS	-564.33	66.81	78.29		78.3	0.000009	-1.18	2449.52	791.47	0.08
P118-27-00	P118-27-00	423.08 Wood Footbridge	Bridge										
P118-27-00	P118-27-00	415.49	Max WS	-564.31	66.86	78.29		78.29	0.000027	-0.69	2492.48	784.17	0.04
P118-27-00	P118-27-00	399.43	Max WS	-564.01	66.84	78.29		78.29	0.000026	-0.7	2534.52	769.68	0.04
P118-27-00	P118-27-00	310	Max WS	-564.04	65.51	78.3		78.31	0.000092	-0.87	738.55	125.68	0.06
P118-27-00	P118-27-00	173.97	Max WS	-564.08	63.5	78.3		78.31	0.000011	-0.51	3397.34	844.24	0.03
P118-27-00	P118-27-00	157.99	Max WS	-564.09	64.25	78.3		78.31	0.000011	-0.53	3288.16	804.94	0.03
P118-27-00	P118-27-00	128.41 Shevchenko	Culvert										
P118-27-00	P118-27-00	101.43	Max WS	-564.09	63.63	78.31		78.31	0.000014	-0.59	2727.26	636.83	0.03
P118-27-00	P118-27-00	86.09	Max WS	-564.08	63.19	78.31		78.31	0.000015	-0.61	2587.42	596.62	0.03
P118-27-00	P118-27-00	61.59	Max WS	-564.1	62.69	78.31		78.32	0.000031	-0.9	1161.68	227.69	0.05
P118-27-00	P118-27-00	47.31	Max WS	-564.05	62.51	78.31		78.32	0.000027	-0.87	1106.07	183.6	0.05
P118-00-00	P118-R3-4	76394.4	Max WS	8388.21	61.33	79.24		79.33	0.000331	3.99	12737.62	5954.71	0.19
P118-00-00	P118-R3-4	75489.4	Max WS	8378.98	61.15	78.95		79.05	0.000348	4.07	12220.56	5866.65	0.2
P118-00-00	P118-R3-4	74253.7	Max WS	8374.92	60.14	78.31		78.57	0.000674	5.54	7290.79	3498.1	0.27
P118-00-00	P118-R3-4	73879.2	Max WS	8374.71	60.08	78.1		78.35	0.00057	5.25	7490.1	3609.09	0.26
P118-00-00	P118-R3-4	73828	Max WS	8374.59	60.08	78.03		78.4	0.00075	6	5864.66	3317.44	0.3
P118-00-00	P118-R3-3	73723	Max WS	7810.51	60.05	78.04		78.31	0.000578	5.27	6535.54	3732.18	0.26
P118-00-00	P118-R3-3	73423.3	Max WS	7810.48	60	77.97	71.03	78.09	0.000478	3.87	9364.06	5109.98	0.18
P118-00-00	P118-R3-3	73377.8 AIRLINE DRIVE	Bridge										
P118-00-00	P118-R3-3	73332.3	Max WS	7804.4	59.83	77.08		77.36	0.000966	5.31	5627.96	3796.76	0.26
P118-00-00	P118-R3-3	73232.3	Max WS	7802.62	59.83	76.96		77.28	0.001056	5.52	5402.9	3702.87	0.27
P118-00-00	P118-R3-3	72741.86	Max WS	7794.85	59.56	76.31		76.73	0.001391	5.82	3090.66	1338.88	0.31
P118-00-00	P118-R3-2	72585.49	Max WS	7878.61	58.54	76.01		76.55	0.001488	6.44	2937.7	1263.22	0.36
P118-00-00	P118-R3-2	72405.2	Max WS	7844.09	58.25	75.8		76.21	0.001524	5.86	3266.35	1324.98	0.35
P118-00-00	P118-R3-2	72221.5*	Max WS	7771.77	58.11	75.6		75.94	0.001123	5.29	3882.67	1679.27	0.31
P118-00-00	P118-R3-2	72037.8*	Max WS	7727.32	57.97	75.46		75.74	0.000809	4.69	4404.91	1974.26	0.26
P118-00-00	P118-R3-2	71854.2	Max WS	7716.15	57.83	75.35		75.58	0.000596	4.2	4842.36	2251.15	0.23
P118-00-00	P118-R3-2	71760	Max WS	7728.02	57.37	75.24		75.47	0.000594	4.2	4807.36	2160.68	0.23
P118-00-00	P118-R3-2	71754.2	Lat Struct										
P118-00-00	P118-R3-2	71556.8*	Max WS	7704.45	56.91	75.12		75.35	0.000582	4.17	4781.3	2075.7	0.23
P118-00-00	P118-R3-2	71353.6*	Max WS	7615.63	56.44	75.02		75.23	0.000556	4.09	4766.06	1994.96	0.22
P118-00-00	P118-R3-2	71150.5*	Max WS	7467.37	55.98	74.92		75.12	0.000517	3.96	4772.64	1919.16	0.21

HEC-RAS Plan: Baseline_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R3-2	70947.3*	Max WS	7323.9	55.51	74.83		75.02	0.000475	3.82	4795.77	1844.35	0.21
P118-00-00	P118-R3-2	70744.2	Max WS	7054.35	55.05	74.76		74.93	0.000399	3.61	4838.1	1771.39	0.19
P118-00-00	P118-R3-2	70743.2		Lat Struct									
P118-00-00	P118-R3-2	70570.3*	Max WS	6895.75	55.08	74.71		74.86	0.000361	3.49	4966.93	1792.45	0.18
P118-00-00	P118-R3-2	70396.4*	Max WS	6762.93	55.12	74.66		74.81	0.000329	3.38	5105.4	1781.34	0.18
P118-00-00	P118-R3-2	70222.6*	Max WS	6595.9	55.15	74.62		74.76	0.000296	3.25	5247.42	1770.22	0.17
P118-00-00	P118-R3-2	70048.7*	Max WS	6441.31	55.18	74.59		74.71	0.000268	3.13	5394.87	1759.1	0.16
P118-00-00	P118-R3-2	69874.9*	Max WS	6272.39	55.21	74.56		74.67	0.000242	3.01	5547.21	1747.98	0.15
P118-00-00	P118-R3-2	69701.0*	Max WS	6059.71	55.25	74.53		74.63	0.000215	2.86	5699.73	1736.87	0.15
P118-00-00	P118-R3-2	69527.2	Max WS	5849.02	55.28	74.51		74.59	0.000191	2.72	5855.92	1725.75	0.14
P118-00-00	P118-R3-2	69327.7*	Max WS	5589.09	55.16	74.48		74.57	0.000173	2.69	5892.57	1773.81	0.13
P118-00-00	P118-R3-2	69128.2*	Max WS	5324.3	55.05	74.46		74.54	0.000163	2.64	5940.35	1821.86	0.13
P118-00-00	P118-R3-2	68928.8*	Max WS	5057.96	54.93	74.44		74.52	0.000148	2.61	5996.27	1869.92	0.13
P118-00-00	P118-R3-2	68729.3*	Max WS	4784.52	54.82	74.42		74.49	0.000139	2.55	6066.01	1917.98	0.12
P118-00-00	P118-R3-2	68529.9*	Max WS	4499.6	54.7	74.39		74.49	0.000154	2.78	4935.77	1966.04	0.13
P118-00-00	P118-R3-2	68330.4*	Max WS	4238.15	54.59	74.37		74.47	0.00016	2.84	4466.93	2014.09	0.14
P118-00-00	P118-R3-2	68131	Max WS	3980.57	54.47	74.34		74.45	0.000161	2.93	3954.67	2062.15	0.14
P118-00-00	P118-R3-2	68130		Lat Struct									
P118-00-00	P118-R3-2	67976.1*	Max WS	3812.59	54.39	74.33		74.42	0.000145	2.75	4279.06	2003.07	0.13
P118-00-00	P118-R3-2	67821.3*	Max WS	3585.86	54.31	74.32		74.39	0.000125	2.51	4637.56	1943.98	0.12
P118-00-00	P118-R3-2	67666.4*	Max WS	3263.65	54.22	74.32		74.37	0.000099	2.2	5032.17	1884.9	0.11
P118-00-00	P118-R3-2	67511.6	Max WS	2941.69	54.14	74.31		74.35	0.000076	1.89	5451.83	1825.82	0.09
P118-00-00	P118-R3-2	67445.1*	Max WS	2937.21	54.63	74.31		74.33	0.000052	1.56	7558.71	1778.92	0.08
P118-00-00	P118-R3-2	67378.7*	Max WS	2935.46	55.12	74.31		74.33	0.000054	1.59	7382.22	1732.01	0.08
P118-00-00	P118-R3-2	67312.2*	Max WS	2935.12	55.61	74.31		74.33	0.000057	1.62	7228.9	1685.12	0.08
P118-00-00	P118-R3-2	67245.8*	Max WS	2932.88	56.1	74.3		74.32	0.000059	1.63	7101.71	1638.22	0.08
P118-00-00	P118-R3-2	67179.3*	Max WS	2932.03	56.59	74.3		74.32	0.000061	1.65	6998.93	1591.32	0.08
P118-00-00	P118-R3-2	67112.9*	Max WS	2926.89	57.08	74.29		74.31	0.000062	1.65	6921.17	1544.42	0.08
P118-00-00	P118-R3-2	67046.4*	Max WS	2924.4	57.57	74.29		74.31	0.000064	1.64	6867.82	1497.51	0.09
P118-00-00	P118-R3-2	66980	Max WS	2920.44	58.06	74.29		74.31	0.000065	1.63	6839.62	1450.62	0.09
P118-00-00	P118-R3-2	66962.5*	Max WS	2915.93	58.34	74.28		74.3	0.000066	1.6	6773.05	1440.96	0.09
P118-00-00	P118-R3-2	66945.0*	Max WS	2909.44	58.62	74.28		74.3	0.000066	1.58	6707.25	1431.31	0.09
P118-00-00	P118-R3-2	66927.5*	Max WS	2900.93	58.9	74.28		74.3	0.000067	1.55	6644.67	1421.65	0.09
P118-00-00	P118-R3-2	66910	Max WS	2889.28	59.18	74.28		74.3	0.000066	1.51	6588.82	1392.28	0.09
P118-00-00	P118-R3-1	66730	Max WS	1667.19	56.42	74.29		74.29	0.000019	0.83	6766.02	1388.03	0.05
P118-00-00	P118-R3-1	66536.4*	Max WS	1663.86	55.69	74.28		74.28	0.000025	0.65	6544.05	1288.65	0.04
P118-00-00	P118-R3-1	66342.9*	Max WS	1641.18	54.97	74.28		74.28	0.000028	0.52	6303.2	1189.28	0.03
P118-00-00	P118-R3-1	66149.3*	Max WS	1637	54.24	74.27		74.27	0.00003	0.44	6041.95	1089.91	0.02
P118-00-00	P118-R3-1	65955.8	Max WS	1619.49	53.52	74.27		74.27	0.000013	0.69	5761.16	990.53	0.04
P118-00-00	P118-R3-1	65950		Lat Struct									
P118-00-00	P118-R3-1	65782.0*	Max WS	1989.28	53.38	74.26		74.27	0.00002	0.92	5756.81	951.65	0.05
P118-00-00	P118-R3-1	65608.3*	Max WS	2341.54	53.24	74.25		74.27	0.00003	1.19	5685.32	912.76	0.06
P118-00-00	P118-R3-1	65434.6	Max WS	2765.3	53.1	74.24		74.26	0.000051	1.57	5549.57	873.88	0.07
P118-00-00	P118-R3-1	65262.1*	Max WS	3155.22	53.01	74.22		74.25	0.000102	1.66	4936.55	762.68	0.08
P118-00-00	P118-R3-1	65089.6*	Max WS	3278.63	52.93	74.2		74.22	0.000165	1.65	4313.59	651.46	0.08
P118-00-00	P118-R3-1	64917.1*	Max WS	3554.81	52.85	74.15		74.18	0.000291	1.77	3676.21	540.25	0.08
P118-00-00	P118-R3-1	64744.6*	Max WS	3999.12	52.76	74.05		74.1	0.000564	2.09	3020	429.05	0.1
P118-00-00	P118-R3-1	64572.2*	Max WS	4124.3	52.67	73.88		73.95	0.000987	2.39	2355.63	317.84	0.11
P118-00-00	P118-R3-1	64399.74	Max WS	4092.14	52.59	73.69		73.86	0.000237	3.52	1713.43	206.63	0.16
P118-00-00	P118-R3-1	64273.7	Max WS	4031.34	53.55	73.7	61.98	73.73	0.00007	1.74	17423.72	5701.16	0.09
P118-00-00	P118-R3-1	64247.2		Bridge									
P118-00-00	P118-R3-1	64220.7	Max WS	3967.03	53.3	73.62		73.68	0.000112	2.22	18319.24	5683.63	0.12
P118-00-00	P118-R3-1	64200	Max WS	3598.41	53.3	73.62		73.67	0.000092	2.01	18310.57	5683.61	0.1
P118-00-00	P118-R2-2	64100	Max WS	8976.62	52.61	73.5		73.64	0.000185	3.35	35014.77	9447.2	0.16
P118-00-00	P118-R2-2	64094	Max WS	8971.92	52.61	73.5	62.7	73.64	0.000185	3.35	35006.2	9447.09	0.16
P118-00-00	P118-R2-2	64059.0 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	64024	Max WS	8971.92	52.56	73.36		73.5	0.000191	3.39	34157.21	9436.59	0.16
P118-00-00	P118-R2-2	64010.4	Max WS	8940.97	52.78	73.35	65.42	73.59	0.000372	4.63	33426.2	9456.87	0.22
P118-00-00	P118-R2-2	63985.4 RAILROAD		Bridge									
P118-00-00	P118-R2-2	63960.4	Max WS	8785.24	53.04	71	65.63	71.69	0.00111	6.98	9908.01	7933.93	0.36
P118-00-00	P118-R2-2	63959.7	Max WS	8785.21	53.06	71.05	62.49	71.35	0.000451	4.53	13594.12	8339.86	0.23
P118-00-00	P118-R2-2	63908.2 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	63856.7	Max WS	8761.63	53.16	70.87		71.2	0.000499	4.71	11279.12	8098.38	0.25
P118-00-00	P118-R2-2	62823.2	Max WS	8813.11	50.35	70.37		70.57	0.000611	4.82	8638.48	5086.4	0.26
P118-00-00	P118-R2-2	62701		Lat Struct									
P118-00-00	P118-R2-2	62700		Lat Struct									
P118-00-00	P118-R2-2	61905.2	Max WS	7001.06	50.77	69.59		70.08	0.000987	5.62	1245.48	132.2	0.32
P118-00-00	P118-R2-2	60625.3	Max WS	6201.56	49.52	69.28		69.65	0.000687	4.91	1263.5	121.4	0.27
P118-00-00	P118-R2-2	60600	Max WS	6188.48	49.52	68.82		69.27	0.00061	5.53	1207.63	121.4	0.27
P118-00-00	P118-R2-1	60595.74	Max WS	5880.3	49.48	68.67		69.15	0.000705	5.75	1141.14	131.55	0.28

HEC-RAS Plan: Baseline_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	60594.74		Lat Struct									
P118-00-00	P118-R2-1	60594		Lat Struct									
P118-00-00	P118-R2-1	60583.6*	Max WS	6003.41	49.68	68.63		69.06	0.000625	5.44	1214.72	139.91	0.27
P118-00-00	P118-R2-1	60571.6*	Max WS	6164.36	49.89	68.58		68.98	0.000577	5.21	1283.67	148.28	0.26
P118-00-00	P118-R2-1	60559.5*	Max WS	6373.47	50.09	68.52		68.9	0.000553	5.07	1347.85	156.63	0.26
P118-00-00	P118-R2-1	60547.5*	Max WS	6565.37	50.3	68.46		68.83	0.000532	4.93	1411.52	157.33	0.25
P118-00-00	P118-R2-1	60535.46	Max WS	6739.74	50.5	68.41		68.76	0.000514	4.79	1477.93	160.47	0.25
P118-00-00	P118-R2-1	60396.4*	Max WS	6885.92	50.45	68.33		68.7	0.000564	4.92	1479.41	164.45	0.26
P118-00-00	P118-R2-1	60257.3*	Max WS	7008.99	50.4	68.25		68.64	0.000607	5.01	1484.18	170.13	0.27
P118-00-00	P118-R2-1	60118.3*	Max WS	7125.42	50.35	68.17		68.57	0.000643	5.07	1493.33	176.08	0.27
P118-00-00	P118-R2-1	59979.2*	Max WS	7264.56	50.3	68.09		68.5	0.000681	5.14	1503.95	177.2	0.28
P118-00-00	P118-R2-1	59840.2*	Max WS	7428	50.25	68		68.42	0.00072	5.21	1514.66	178.16	0.29
P118-00-00	P118-R2-1	59701.1*	Max WS	7618.28	50.2	67.9		68.33	0.000764	5.3	1525.87	179.13	0.3
P118-00-00	P118-R2-1	59562.1*	Max WS	7837.27	50.15	67.79		68.24	0.000813	5.4	1536.17	180.09	0.31
P118-00-00	P118-R2-1	59423.1	Max WS	8068.37	50.1	67.67		68.14	0.000877	5.5	1546.95	181.05	0.31
P118-00-00	P118-R2-1	59307.4*	Max WS	8172.45	50.1	67.59		68.05	0.000895	5.51	1578.44	196.49	0.32
P118-00-00	P118-R2-1	59191.8*	Max WS	8268.87	50.11	67.5		67.97	0.000912	5.51	1599.9	211.94	0.32
P118-00-00	P118-R2-1	59076.2*	Max WS	8450.12	50.11	67.39		67.87	0.000953	5.58	1607.66	227.38	0.33
P118-00-00	P118-R2-1	58960.5*	Max WS	8597.21	50.11	67.28		67.77	0.000986	5.63	1605.3	242.82	0.33
P118-00-00	P118-R2-1	58844.9*	Max WS	8680.47	50.11	67.19		67.68	0.000996	5.62	1596.97	258.26	0.33
P118-00-00	P118-R2-1	58729.3*	Max WS	8777.09	50.12	67.09		67.58	0.001006	5.62	1591.91	235.05	0.33
P118-00-00	P118-R2-1	58613.7	Max WS	8942.36	50.12	66.98		67.47	0.001032	5.65	1596.85	224.88	0.34
P118-00-00	P118-R2-1	58463.86	Max WS	8942.4	47.59	66.96		67.32	0.000658	5.2	4337.73	3144.94	0.28
P118-00-00	P118-R2-1	58387.5	Max WS	8942.35	47.57	66.93	60.12	67.24	0.00057	4.8	5005.07	2910.8	0.26
P118-00-00	P118-R2-1	58359.5 ALDINE-WESTFIELD		Bridge									
P118-00-00	P118-R2-1	58331.5	Max WS	8941.4	47.51	66.43		66.82	0.000719	5.25	3871.62	2243.83	0.29
P118-00-00	P118-R2-1	57555.5	Max WS	8961.4	47.03	65.58		66.28	0.001204	7.35	3758.93	2168.1	0.37
P118-00-00	P118-R2-1	56998		Lat Struct									
P118-00-00	P118-R2-1	56513.3	Max WS	4816.28	46.03	64.96		65.25	0.000468	4.39	1894.8	1339.33	0.23
P118-00-00	P118-R2-1	56000		Lat Struct									
P118-00-00	P118-R2-1	55557.7	Max WS	2108.48	44.69	64.91		64.95	0.000081	1.81	3759.01	2483.83	0.09
P118-00-00	P118-R2-1	55000		Lat Struct									
P118-00-00	P118-R2-1	54459.2	Max WS	6762.88	44.27	64.26		64.68	0.000668	5.5	3939.84	2826.03	0.27
P118-00-00	P118-R2-1	53881		Lat Struct									
P118-00-00	P118-R2-1	53801.7	Max WS	9170.15	43.7	63.93		64.17	0.00035	4.09	4372.3	2231.01	0.21
P118-00-00	P118-R2-1	53275.7	Max WS	9170.03	43.36	63.72		64.03	0.000344	4.74	4712.5	3262.19	0.2
P118-00-00	P118-R2-1	52844.3	Max WS	9591.55	43.08	63.61	53.03	63.89	0.000323	4.36	5384.31	3442.53	0.2
P118-00-00	P118-R2-1	52815.3 BERTRAND RD		Bridge									
P118-00-00	P118-R2-1	52786.3	Max WS	9588.5	43.01	63.28		63.58	0.000353	4.49	4538.44	2978.16	0.21
P118-00-00	P118-R2-1	52465.7	Max WS	9588.1	43.2	63.12		63.47	0.000558	5	4286.41	2878.67	0.26
P118-00-00	P118-R2-1	52221.3	Max WS	9586.84	43.89	62.94	55.86	63.34	0.000719	5.39	4262.14	2963.67	0.29
P118-00-00	P118-R2-1	52207.8 UTILITY		Bridge									
P118-00-00	P118-R2-1	52194.3	Max WS	9581.09	43.8	62.58		63.04	0.000836	5.72	3483.87	2668.12	0.31
P118-00-00	P118-R2-1	51283.9	Max WS	9567.94	43.41	61.85		62.26	0.00083	5.57	6517.62	5718.67	0.31
P118-00-00	P118-R2-1	51096.9	Max WS	9566.52	42.91	61.71	53.65	62.09	0.00067	5.37	7126.93	6363.86	0.28
P118-00-00	P118-R2-1	51083.9 UTILITY		Bridge									
P118-00-00	P118-R2-1	51070.9	Max WS	9560.25	42.87	61.54		61.96	0.000732	5.58	6332.28	5984.16	0.29
P118-00-00	P118-R2-1	50549.6	Max WS	9553.56	42.3	61.28		61.55	0.000439	4.49	7345.97	6431.14	0.23
P118-00-00	P118-R2-1	50021.9	Max WS	9549.61	41.83	61.09	52.44	61.28	0.000329	3.95	10144.06	7466.64	0.2
P118-00-00	P118-R2-1	49980.9 HOPPER RD		Bridge									
P118-00-00	P118-R2-1	49939.9	Max WS	9541.7	41.69	60.88		61.08	0.000346	4.04	9613.14	7322.1	0.21
P118-00-00	P118-R2-1	49231.7	Max WS	9533.74	41.03	60.57		60.79	0.000529	4.51	9502.5	6976.09	0.25
P118-00-00	P118-R2-1	48480.5	Max WS	9527.29	41.23	60.21		60.4	0.000383	4.14	9616.93	6496.82	0.22
P118-00-00	P118-R2-1	48196.5	Max WS	9526.13	41.31	60.09	52.93	60.27	0.000397	4.09	10074.64	6711.23	0.22
P118-00-00	P118-R2-1	48183.0 UTILITY		Bridge									
P118-00-00	P118-R2-1	48169.5	Max WS	9524.49	41.24	59.98		60.16	0.000412	4.15	9778.72	6592.36	0.22
P118-00-00	P118-R2-1	47607.9	Max WS	9522.83	40.57	59.72		59.91	0.000494	4.36	10227.78	7032.15	0.24
P118-00-00	P118-R2-1	46939	Max WS	9522.3	40.79	59.4		59.54	0.000345	3.6	10914.05	6743.38	0.2
P118-00-00	P118-R2-1	46594.8	Max WS	9522.11	40.91	59.25	51.07	59.47	0.000352	4.41	12924.12	5890.14	0.21
P118-00-00	P118-R2-1	46584.8		Bridge									
P118-00-00	P118-R2-1	46579.8	Max WS	9521.77	40.91	59.13		59.41	0.000504	4.65	10870.17	6858.07	0.24
P118-00-00	P118-R2-1	46575.8	Max WS	9521.87	40.91	59.11	51.07	59.45	0.000569	4.93	8648.67	6021.55	0.26
P118-00-00	P118-R2-1	46560.8 LITTLE YORK RD		Bridge									
P118-00-00	P118-R2-1	46526.8	Max WS	9521.6	40.74	59.08		59.28	0.00036	4.2	13398.15	6489.27	0.21
P118-00-00	P118-R2-1	46516.8	Max WS	9521.59	40.74	59.08	50.91	59.26	0.000414	3.92	12627.61	6154.43	0.22
P118-00-00	P118-R2-1	46515.8		Bridge									
P118-00-00	P118-R2-1	46478.9	Max WS	9516.68	40.49	58.54		58.9	0.000743	5.19	8649.17	5872.12	0.29
P118-00-00	P118-R2-1	46468.9	Max WS	9516.6	40.49	58.54	52.25	58.9	0.000747	5.2	8602.63	5865.36	0.29
P118-00-00	P118-R2-1	46466.8		Bridge									
P118-00-00	P118-R2-1	46458.9	Max WS	9515.63	40.49	58.5		58.87	0.000765	5.25	8378.76	5822.17	0.3

HEC-RAS Plan: Baseline_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	45952.3	Max WS	9499.15	40.12	58.14		58.36	0.000826	4.6	8101.4	4279.22	0.29
P118-00-00	P118-R2-1	45161.4	Max WS	8657.91	39.57	57.49		57.75	0.000898	4.81	7025.2	4039.83	0.27
P118-00-00	P118-R2-1	44549.9	Max WS	8377.24	38.76	57.12		57.37	0.000725	4.43	6197.06	3552.07	0.25
P118-00-00	P118-R2-1	44143.3	Max WS	8190.53	38.22	56.91		57.12	0.000604	4.11	6353.18	3908.52	0.23
P118-00-00	P118-R2-1	43789.5	Max WS	8277.41	37.97	56.85		56.93	0.000138	3.33	6093.05	1048.23	0.14
P118-00-00	P118-R2-1	43739.48	Max WS	8279.04	37.93	56.85		56.91	0.000103	2.88	6732.38	615.78	0.12
P118-00-00	P118-R2-1	43652.1*	Max WS	8279.03	37.87	56.85		56.9	0.000088	2.68	7482.05	749.7	0.11
P118-00-00	P118-R2-1	43564.8*	Max WS	8283.93	37.81	56.86		56.89	0.000068	2.35	8825.33	878.25	0.1
P118-00-00	P118-R2-1	43477.4*	Max WS	8285.59	37.75	56.86		56.88	0.000046	1.95	10795.01	1006.81	0.08
P118-00-00	P118-R2-1	43390.1*	Max WS	8284.76	37.68	56.86		56.87	0.00003	1.57	13085.39	1135.37	0.07
P118-00-00	P118-R2-1	43302.8*	Max WS	8285.58	37.62	56.86		56.87	0.000018	1.22	15426.84	1263.92	0.05
P118-00-00	P118-R2-1	43215.5	Max WS	8285.55	37.56	56.86		56.87	0.000014	1.07	16688.6	1392.48	0.04
P118-00-00	P118-R2-1	43118.0*	Max WS	8319.77	37.49	56.86		56.87	0.000021	1.31	15537.96	1278.56	0.05
P118-00-00	P118-R2-1	43020.4*	Max WS	8322.19	37.42	56.86		56.87	0.000027	1.51	13903.76	1164.65	0.06
P118-00-00	P118-R2-1	42922.9*	Max WS	8317.34	37.35	56.85		56.87	0.000033	1.66	12470.23	1050.73	0.07
P118-00-00	P118-R2-1	42825.49	Max WS	8313.26	37.28	56.85		56.87	0.000038	1.78	11562.92	936.81	0.07
P118-00-00	P118-R2-1	42736.8*	Max WS	8310.02	37.22	56.85		56.86	0.000035	1.73	11890.16	985.94	0.07
P118-00-00	P118-R2-1	42648.2*	Max WS	8309.19	37.15	56.85		56.86	0.00003	1.6	12653.16	1035.07	0.07
P118-00-00	P118-R2-1	42559.6*	Max WS	8306.7	37.09	56.84		56.85	0.000023	1.4	13549.62	1084.2	0.06
P118-00-00	P118-R2-1	42471	Max WS	8310.01	37.03	56.84		56.85	0.000012	1	13886.66	1133.33	0.04
P118-00-00	P118-R2-1	42395.8*	Max WS	8307.53	36.98	56.84		56.85	0.000015	1.12	14256.49	1170.13	0.05
P118-00-00	P118-R2-1	42320.7*	Max WS	8309.15	36.92	56.84		56.85	0.000009	0.87	15358.21	1206.93	0.04
P118-00-00	P118-R2-1	42245.55	Max WS	8307.51	36.87	56.84		56.85	0.000003	0.52	15812.01	1240.6	0.02
P118-00-00	P118-R2-1	42150.1*	Max WS	8306.68	36.8	56.84		56.85	0.000011	1	14436.48	1119.94	0.04
P118-00-00	P118-R2-1	42054.6*	Max WS	8305.82	36.74	56.84		56.85	0.000016	1.18	12248.36	996.14	0.05
P118-00-00	P118-R2-1	41959.2*	Max WS	8306.68	36.67	56.84		56.85	0.000019	1.29	10783.33	872.34	0.05
P118-00-00	P118-R2-1	41863.8	Max WS	8303.28	36.6	56.83		56.85	0.000019	1.29	10585.65	748.55	0.05
P118-00-00	P118-R2-1	41771.7*	Max WS	8302.47	36.53	56.83		56.85	0.000027	1.54	10425.93	761.83	0.06
P118-00-00	P118-R2-1	41679.6*	Max WS	8293.98	36.47	56.83		56.84	0.000032	1.7	10277.44	775.11	0.07
P118-00-00	P118-R2-1	41587.5*	Max WS	8292.32	36.4	56.82		56.84	0.000038	1.83	10041.13	788.4	0.07
P118-00-00	P118-R2-1	41495.4*	Max WS	8293.12	36.34	56.82		56.84	0.000041	1.91	9894.7	801.68	0.08
P118-00-00	P118-R2-1	41403.3	Max WS	8288.89	36.27	56.82		56.84	0.000039	1.86	9801.2	814.96	0.07
P118-00-00	P118-R2-1	41285.4	Max WS	8095.14	36.27	56.57	45.27	57.31	0.000022	6.98	2409.47	3871.88	0.28
P118-00-00	P118-R2-1	41243.9 JENSEN DR		Bridge									
P118-00-00	P118-R2-1	41203.4	Max WS	8226.19	36.25	56.73	45.51	57.18	0.000015	5.93	2848.09	3961.41	0.23
P118-00-00	P118-R2-1	41197.4	Max WS	8070.87	36.25	56.56	45.24	57.28	0.000021	6.92	2428.26	3830.65	0.27
P118-00-00	P118-R2-1	41197.2 UTILITY		Bridge									
P118-00-00	P118-R2-1	41185.7	Max WS	7819.66	36.25	56.29		57.01	0.000011	6.86	2226.72	3359.76	0.27
P118-00-00	P118-R2-1	40951.8	Max WS	8003.88	36.2	56.47	43.42	56.63	0.000011	3.27	7939.81	3320.57	0.14
P118-00-00	P118-R2-1	40919.3 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40886.8	Max WS	7997.68	36.19	56.47		56.61	0.000011	3.19	7723.52	3253.18	0.14
P118-00-00	P118-R2-1	40846.9	Max WS	7983.02	36.18	56.45	44.32	56.65	0.000017	3.67	8352.3	3583.56	0.17
P118-00-00	P118-R2-1	40726.2 US HWY 59 (ML)		Bridge									
P118-00-00	P118-R2-1	40605.5	Max WS	7950.21	36.13	56.43		56.63	0.000017	3.65	7944.3	3442.09	0.17
P118-00-00	P118-R2-1	40584.6	Max WS	7953.42	36.13	56.43	44.27	56.62	0.000019	3.54	7030.91	3180.41	0.17
P118-00-00	P118-R2-1	40550.1 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40515.6	Max WS	7940.31	36.12	56.41		56.59	0.000019	3.5	7928.67	3480.04	0.17
P118-00-00	P118-R2-1	39969.8	Max WS	7973.38	36.01	56.45		56.46	0.000059	0.91	13446.67	4215.99	0.05
P118-00-00	P118-R2-1	39829.91	Max WS	9403	36	56.43		56.45	0.000017	1.11	12822.3	3924.5	0.06
P118-00-00	P118-R2-1	39188.6	Max WS	9404.51	35.6	56.44		56.44	0.000001	0.31	29548.8	4422.3	0.01
P118-00-00	P118-R2-1	38423.57	Max WS	9790.65	34.76	56.44		56.44	0.000001	0.37	26089.16	3331.36	0.02
P118-00-00	P118-R2-1	38170.2	Max WS	9790.06	34.35	56.43		56.44	0.000015	0.43	24050.78	3829.93	0.02
P118-00-00	P118-R2-1	37899.37	Max WS	9789.87	34.35	56.43		56.43	0.000001	0.47	24447.84	4165.32	0.02
P118-00-00	P118-R2-1	37413.16	Max WS	9788.5	34.13	56.43		56.43	0.000001	0.45	24750.87	4111.06	0.02
P118-00-00	P118-R2-1	37258.6	Max WS	9767.69	34.02	56.36		56.51	0.000457	4.13	8869.13	3579.44	0.18
P118-00-00	P118-R2-1	36408.6	Max WS	9702.91	32.39	56.17		56.26	0.000368	3.24	10844.73	4069.65	0.16
P118-00-00	P118-R2-1	36341.47	Max WS	9692.48	32.39	56.15	47.1	56.24	0.000384	3.31	10074.24	3516.43	0.17
P118-00-00	P118-R2-1	36330 UTILITY		Bridge									
P118-00-00	P118-R2-1	36321.56	Max WS	9672.29	32	56.09		56.2	0.000272	3.26	10013.67	3083.12	0.14
P118-00-00	P118-R2-1	36303.5	Max WS	9672.13	32	56.09		56.18	0.000227	3.01	10265.62	3126.78	0.13
P118-00-00	P118-R1-3	36195.78	Max WS	10890.21	32.04	55.97		56.14	0.000364	3.87	8288.26	2287.02	0.17
P118-00-00	P118-R1-3	36107.2	Max WS	10886.49	32	55.94		56.11	0.000363	3.87	7834.86	1915.35	0.17
P118-00-00	P118-R1-3	35434.7	Max WS	10884.56	31.72	55.67		55.99	0.000498	4.72	6319.23	1734.05	0.2
P118-00-00	P118-R1-3	35045.7	Max WS	10880.72	31.55	55.43	42.44	55.81	0.000575	5.04	4780.06	1498.04	0.21
P118-00-00	P118-R1-3	35025.9 RAILROAD		Bridge									
P118-00-00	P118-R1-3	35006.1	Max WS	10880.2	31.09	55.26		55.63	0.00054	4.94	5240.08	1638.15	0.21
P118-00-00	P118-R1-3	34984.3	Max WS	10874.1	30.53	55.24	43.51	55.65	0.000658	5.39	4368.92	1260.03	0.23
P118-00-00	P118-R1-3	34927.3 HIRSCH RD		Bridge									
P118-00-00	P118-R1-3	34870.3	Max WS	10872.93	30	54.88		55.31	0.000668	5.47	4626.29	1374.69	0.23
P118-00-00	P118-R1-3	33920.1	Max WS	10921.01	29.63	54.15		54.58	0.000907	5.91	4912.62	1533.6	0.26

HEC-RAS Plan: Baseline_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R1-3	32749.8	Max WS	10981.82	28	52.97		53.47	0.00104	6.2	4240.62	1339.4	0.28
P118-00-00	P118-R1-3	31824.3	Max WS	11021.01	26.81	52.19		52.6	0.000742	5.59	4630.26	1560.49	0.24
P118-00-00	P118-R1-3	30679.1	Max WS	11044.25	27.05	51.3		51.76	0.000796	5.81	4523.2	1903.6	0.25
P118-00-00	P118-R1-3	30678.1		Lat Struct									
P118-00-00	P118-R1-3	30099.1	Max WS	10940.01	27.23	51.02		51.37	0.000491	4.97	4653.99	1894.44	0.2
P118-00-00	P118-R1-3	29757.8	Max WS	10919.63	27.34	50.81	38.68	51.21	0.000548	5.19	5553.95	2332.37	0.21
P118-00-00	P118-R1-3	29731.3 PARKER RD		Bridge									
P118-00-00	P118-R1-3	29704.8	Max WS	10882.96	27	50.67		50.96	0.000441	4.69	6033.83	2451.15	0.19
P118-00-00	P118-R1-3	28983.7	Max WS	10760.64	26.97	50.06		50.65	0.001019	6.45	3295.45	1291.75	0.28
P118-00-00	P118-R1-3	28387.3	Max WS	11638.88	26.04	49.73		50.1	0.000515	5.03	4375.37	1491.19	0.21
P118-00-00	P118-R1-3	27992	Max WS	11674.57	25.42	49.54		49.9	0.000597	5.35	4849.96	1110.1	0.22
P118-00-00	P118-R1-3	27567.7	Max WS	11676.4	25.74	49.35		49.67	0.000454	5.02	5381.63	1595.84	0.2
P118-00-00	P118-R1-3	27317	Max WS	11698.29	25.92	49.27	37.46	49.55	0.000428	4.8	6773.44	2402.75	0.19
P118-00-00	P118-R1-3	27306.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27305.8	Max WS	11670.17	25.93	48.87		49.32	0.0006	5.65	5885.91	2237.85	0.23
P118-00-00	P118-R1-3	27295.8	Max WS	11670.02	25.93	48.86	37.29	49.31	0.000601	5.66	5871.69	2235.14	0.23
P118-00-00	P118-R1-3	27242.8 HOMESTEAD RD		Bridge									
P118-00-00	P118-R1-3	27189.8	Max WS	11572.27	25.89	48.22		48.75	0.000708	6.01	4612.23	1979.69	0.25
P118-00-00	P118-R1-3	27180.8	Max WS	11569.83	25.89	48.22	37.2	48.75	0.000709	6.01	4598.66	1976.77	0.25
P118-00-00	P118-R1-3	27179.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27167.5	Max WS	11582.84	25.84	48.3		48.64	0.000491	4.95	4725.56	2035.84	0.21
P118-00-00	P118-R1-3	26816.8*	Max WS	11541.15	25.02	48.08		48.45	0.00055	4.97	3539.16	1140.88	0.21
P118-00-00	P118-R1-3	26815.8		Lat Struct									
P118-00-00	P118-R1-3	26466.1	Max WS	11441.3	24.2	47.89		48.26	0.000635	4.94	3087.49	779.94	0.22
P118-00-00	P118-R1-3	26224.4*	Max WS	11483.72	23.64	47.75		48.1	0.000584	4.83	2819.41	321.12	0.22
P118-00-00	P118-R1-3	25982.8	Max WS	11487.94	23.07	47.64		47.97	0.000527	4.67	3016.94	380.54	0.21
P118-00-00	P118-R1-3	25318.4	Max WS	11434.41	23.07	47.3		47.61	0.000528	4.61	3311.16	651.14	0.21
P118-00-00	P118-R1-3	25317.4		Lat Struct									
P118-00-00	P118-R1-3	24564.2	Max WS	11314.47	21.76	46.9		47.24	0.000455	4.68	3711.88	1256.3	0.2
P118-00-00	P118-R1-3	23984.6	Max WS	12860.03	20.75	46.67		46.96	0.000426	4.63	4488.36	584.88	0.19
P118-00-00	P118-R1-2	23796.2	Max WS	13407.3	24.42	46.52		46.86	0.000395	4.7	3828.87	717.27	0.2
P118-00-00	P118-R1-2	23795.2		Lat Struct									
P118-00-00	P118-R1-2	23286.2	Max WS	13553.31	20.82	46.18		46.59	0.000634	5.17	3374.66	590.71	0.23
P118-00-00	P118-R1-2	22973.4	Max WS	13488.46	20.85	46.02	33.02	46.38	0.00055	4.92	6042.56	1541.75	0.21
P118-00-00	P118-R1-2	22951.4 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22929.4	Max WS	13488.46	20.49	45.88		46.24	0.00053	4.88	6187.18	1261.95	0.21
P118-00-00	P118-R1-2	22928.4		Lat Struct									
P118-00-00	P118-R1-2	22630.3	Max WS	13405.02	19.11	45.43	34.65	46.09	0.00127	6.54	2062.64	176.86	0.31
P118-00-00	P118-R1-2	22609.0 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22587.7	Max WS	13393.05	18.99	45.02		45.72	0.001366	6.69	2017.05	170.82	0.32
P118-00-00	P118-R1-2	22577.7	Max WS	13379.74	18.99	45.02		45.71	0.001365	6.69	2019.84	177.08	0.32
P118-00-00	P118-R1-1	22186.8	Max WS	12122.61	18.55	44.64		45.22	0.000845	6.19	2306.64	296.54	0.25
P118-00-00	P118-R1-1	22185.8		Lat Struct									
P118-00-00	P118-R1-1	21829	Max WS	12692.67	18.16	44.69		44.95	0.000354	4.21	3468.67	337.43	0.17
P118-00-00	P118-R1-1	21589.8	Max WS	13921.92	17.9	44.22		44.79	0.000712	6.29	2773.36	273.11	0.25
P118-00-00	P118-R1-1	21362	Max WS	13798.73	17.65	44.03		44.7	0.000066	6.66	2730.62	370.49	0.26
P118-00-00	P118-R1-1	21361		Lat Struct									
P118-00-00	P118-R1-1	21360	Max WS	13721.06	17.65	44.04	32.03	44.71	0.000065	6.62	2735.83	371.36	0.26
P118-00-00	P118-R1-1	21333.0 WAYSIDE DR		Bridge									
P118-00-00	P118-R1-1	21304	Max WS	13721.06	17.62	43.93		44.61	0.000066	6.65	2706.66	366.47	0.26
P118-00-00	P118-R1-1	21010.4	Max WS	13631.07	18.08	44.03	30.27	44.49	0.000559	6.21	4130.58	708.48	0.22
P118-00-00	P118-R1-1	20948.9 TIDWELL RD (WB)		Bridge									
P118-00-00	P118-R1-1	20887.4	Max WS	13631.07	17.96	43.9		44.36	0.000561	6.22	4120.08	702.77	0.22
P118-00-00	P118-R1-1	20880.6	Max WS	13457.73	17.96	43.54	32.75	44.69	0.000105	9.06	3317.45	335.71	0.34
P118-00-00	P118-R1-1	20869.6 TIDWELL RD (EB)		Bridge									
P118-00-00	P118-R1-1	20858.6	Max WS	13457.73	17.96	43.49		44.65	0.000106	9.09	3300.43	321.59	0.34
P118-00-00	P118-R1-1	20857.6		Lat Struct									
P118-00-00	P118-R1-1	19860	Max WS	13802.33	19.24	43.15		43.95	0.001223	7.35	2342.45	601.22	0.31
P118-00-00	P118-R1-1	18597.4	Max WS	15071.43	15.56	41.74		42.54	0.000843	7.44	2754.01	208.95	0.28
P118-00-00	P118-R1-1	18107.1	Max WS	14976.36	15.21	41.67		42	0.000602	4.64	3360.37	361.74	0.22
P118-00-00	P118-R1-1	17862.9*	Max WS	14922.65	14.55	41.56		41.87	0.000473	4.44	3560.98	371.16	0.2
P118-00-00	P118-R1-1	17618.7*	Max WS	14873.05	13.89	41.49		41.78	0.000394	4.34	3741.04	404.24	0.18
P118-00-00	P118-R1-1	17374.5*	Max WS	14857.02	13.23	41.38		41.67	0.000359	4.38	3639.17	334.05	0.18
P118-00-00	P118-R1-1	17130.3	Max WS	15268.31	12.57	41.27		41.59	0.00036	4.58	3667.43	363.65	0.18
P118-00-00	P118-R1-1	16004	Max WS	16525.03	11.24	40.75		41.09	0.000468	4.67	4205.78	1043.15	0.19
P118-00-00	P118-R1-1	15045.6	Max WS	17356.2	10.55	39.93		40.48	0.00079	6.03	3269.72	467.38	0.25
P118-00-00	P118-R1-1	13937.2	Max WS	17314.42	11.62	39.38		39.8	0.000551	5.92	5857.88	617.36	0.22
P118-00-00	P118-R1-1	13341.9	Max WS	17290.86	10.38	38.89		39.48	0.000799	7.13	4615.06	406.03	0.27
P118-00-00	P118-R1-1	12945.5	Max WS	17268.62	9.55	38.78	27.63	39.11	0.000495	5.75	6245.36	634.43	0.21
P118-00-00	P118-R1-1	12935.0 UTILITY		Bridge									

HEC-RAS Plan: Baseline_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R1-1	12932.7	Max WS	17268.62	9.53	38.64		38.97	0.000508	5.8	6166.39	628.87	0.21
P118-00-00	P118-R1-1	12931.7	Max WS	17268.56	9.53	38.64	27.58	38.97	0.000508	5.8	6166.06	628.84	0.21
P118-00-00	P118-R1-1	12904.8 MESA RD		Bridge									
P118-00-00	P118-R1-1	12877.9	Max WS	17258.09	8.77	37.75		38.1	0.00052	5.85	6089.33	623.46	0.21
P118-00-00	P118-R1-1	12117.3	Max WS	17254.81	7.23	37.34		37.73	0.000407	5.46	4380.96	358.41	0.19
P118-00-00	P118-R1-1	10905.1	Max WS	18859.36	9.54	36.13		36.94	0.000952	7.43	3621.05	407.91	0.29
P118-00-00	P118-R1-1	9879.2	Max WS	18793.65	6.26	34.62		35.82	0.001536	9.55	3304.01	249.17	0.36
P118-00-00	P118-R1-1	8777	Max WS	18785.95	4.71	34.03		34.22	0.00034	4.2	9907.76	878.87	0.17
P118-00-00	P118-R1-1	8024.4	Max WS	18782.1	4.73	33.6		33.97	0.000487	5.5	6095.52	432.84	0.21
P118-00-00	P118-R1-1	6779.3	Max WS	18777.01	4.44	32.8		33.27	0.000683	5.98	5398.7	525.93	0.24
P118-00-00	P118-R1-1	5748.4	Max WS	18772.89	4.27	31.38		32.39	0.001554	8.95	4133.64	445.39	0.35
P118-00-00	P118-R1-1	4492	Max WS	18769.82	1.92	30.08		30.7	0.000837	6.58	4082.5	403.84	0.26
P118-00-00	P118-R1-1	3597.9	Max WS	18768.33	2.46	29.36		29.94	0.000945	6.88	5237.06	573.87	0.28
P118-00-00	P118-R1-1	2709.4	Max WS	18768.1	1.59	28.48		29.12	0.000963	7.4	5305.25	484.59	0.29
P118-00-00	P118-R1-1	1695.9	Max WS	18767.87	1.52	27.2		28.05	0.001358	8.57	4462.3	377.01	0.34
P118-00-00	P118-R1-1	678.7	Max WS	18767.77	0.81	24.55	19.25	26.23	0.0028	10.95	2530.13	253.01	0.47

HEC-RAS Plan: Baseline_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	5	72.56	78.58		78.58	0	0.04	151.97	142.13	0
P118-27-00	P118-27-00	6250	Lat Struct										
P118-27-00	P118-27-00	6240	Lat Struct										
P118-27-00	P118-27-00	5780.54	Max WS	-75.78	72.31	78.57		78.57	0.000006	-0.63	125.84	139.96	0.06
P118-27-00	P118-27-00	5321.96	Max WS	-44.6	72.13	78.58		78.58	0.000002	-0.36	124.45	507.13	0.03
P118-27-00	P118-27-00	5310	Lat Struct										
P118-27-00	P118-27-00	4831.58	Max WS	-0.64	71.84	78.58		78.58	0	0	129.11	133.64	0
P118-27-00	P118-27-00	4300.35	Max WS	35.67	71.56	78.57		78.58	0.000001	0.27	134.33	168.48	0.02
P118-27-00	P118-27-00	4290	Lat Struct										
P118-27-00	P118-27-00	3803.92	Max WS	76.28	71.38	78.57		78.57	0.000004	0.54	140.08	414.64	0.05
P118-27-00	P118-27-00	3444.22	Max WS	68.44	71.25	78.57		78.57	0.000003	0.47	163.16	479.49	0.04
P118-27-00	P118-27-00	3374.42	Max WS	387.92	72.06	78.35		78.45	0.000797	2.6	150.95	317.06	0.22
P118-27-00	P118-27-00	3370	Lat Struct										
P118-27-00	P118-27-00	3011.6	Max WS	360.73	71.59	78.2		78.23	0.000324	1.75	571.53	644.11	0.15
P118-27-00	P118-27-00	2525.84	Max WS	320.71	71.22	78.05		78.09	0.000277	1.65	298.23	376.89	0.13
P118-27-00	P118-27-00	2485.48	Max WS	340.74	71.53	78.03		78.08	0.00024	1.79	190.05	213.28	0.13
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	340.17	71.1	77.8		77.85	0.000345	1.91	178.24	157.11	0.15
P118-27-00	P118-27-00	2420	Lat Struct										
P118-27-00	P118-27-00	2398.35	Max WS	342.7	71.1	77.72		77.83	0.001012	2.72	126.19	179.95	0.25
P118-27-00	P118-27-00	2381.57	Max WS	344.2	71.1	77.69		77.81	0.00116	2.83	121.58	150.69	0.26
P118-27-00	P118-27-00	2351.35	Max WS	346.34	71.09	77.72		77.79	0.000421	2.1	164.66	186.29	0.16
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	346.32	70.77	77.66		77.71	0.00031	1.75	197.7	232.33	0.14
P118-27-00	P118-27-00	2280	Lat Struct										
P118-27-00	P118-27-00	2238.14	Max WS	333.26	71.09	77.62		77.7	0.000591	2.34	232.08	241.71	0.19
P118-27-00	P118-27-00	1817.26	Max WS	209.13	70.49	77.4		77.44	0.000376	1.65	160.65	382.34	0.15
P118-27-00	P118-27-00	1360.33	Max WS	30.2	69.94	77.38		77.38	0.000005	0.19	158.63	382.49	0.02
P118-27-00	P118-27-00	1314.62	Max WS	29.59	69.66	77.38		77.38	0	0.02	5036.14	2727.15	0
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	28.67	69.66	77.38		77.38	0	0.02	4918.25	2607.11	0
P118-27-00	P118-27-00	1198.35	Max WS	29.3	68.64	77.38		77.38	0	0.05	2107.57	1622.61	0
P118-27-00	P118-27-00	763.46	Max WS	36.21	66.19	77.38		77.38	0	0.06	2235.83	1480.57	0
P118-27-00	P118-27-00	465.31	Max WS	40.03	66.88	77.37		77.37	0	0.08	1384.7	728.16	0.01
P118-27-00	P118-27-00	448.57	Max WS	40.23	66.75	77.37	67.87	77.37	0	0.07	1724.56	730.45	0
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	40.22	66.8	77.37		77.37	0	0.07	1703.12	789.61	0
P118-27-00	P118-27-00	429.17	Max WS	40.35	66.81	77.37	67.94	77.37	0	0.11	1727.5	791.47	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	40.25	66.86	77.37		77.37	0	0.07	1773.84	784.17	0
P118-27-00	P118-27-00	399.43	Max WS	40.54	66.84	77.37		77.37	0	0.07	1828.82	769.68	0
P118-27-00	P118-27-00	310	Max WS	40.47	65.51	77.37		77.37	0.000001	0.07	622.27	125.68	0.01
P118-27-00	P118-27-00	173.97	Max WS	40.47	63.5	77.37		77.37	0	0.05	2612.53	844.24	0
P118-27-00	P118-27-00	157.99	Max WS	40.46	64.25	77.37		77.37	0	0.05	2539.81	804.94	0
P118-27-00	P118-27-00	128.41 Shevchenko		Culvert									
P118-27-00	P118-27-00	101.43	Max WS	40.47	63.63	77.37		77.37	0	0.05	2129.94	636.83	0
P118-27-00	P118-27-00	86.09	Max WS	40.46	63.19	77.37		77.37	0	0.06	2027.76	596.62	0
P118-27-00	P118-27-00	61.59	Max WS	40.46	62.69	77.37		77.37	0	0.08	948.73	227.69	0
P118-27-00	P118-27-00	47.31	Max WS	40.46	62.51	77.37		77.37	0	0.07	934.27	183.6	0
P118-00-00	P118-R3-4	76394.4	Max WS	5537.57	61.33	78.23		78.34	0.000353	3.91	7573.38	4140.79	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	5520.97	61.15	77.92		78.04	0.000368	3.96	7381.71	3804.5	0.2
P118-00-00	P118-R3-4	74253.7	Max WS	5512.51	60.14	77.34		77.57	0.000565	4.82	4298.96	2335.48	0.25
P118-00-00	P118-R3-4	73879.2	Max WS	5512	60.08	77.17		77.38	0.000454	4.45	4463.76	2406.03	0.23
P118-00-00	P118-R3-4	73828	Max WS	5511.59	60.08	77.11		77.4	0.000568	4.97	3540.38	1867.7	0.26
P118-00-00	P118-R3-3	73723	Max WS	5551.76	60.05	77.07		77.35	0.000556	4.9	3741.03	2073.34	0.25
P118-00-00	P118-R3-3	73423.3	Max WS	5551.55	60	76.98	69.4	77.15	0.000563	4	5104.98	3119.03	0.2
P118-00-00	P118-R3-3	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-3	73332.3	Max WS	5537.13	59.83	75.98	69.21	76.45	0.001281	5.78	2303.08	2717.71	0.29
P118-00-00	P118-R3-3	73232.3	Max WS	5533.59	59.83	75.8	69.21	76.35	0.001473	6.13	1805.82	2690.7	0.31
P118-00-00	P118-R3-3	72741.86	Max WS	5521.14	59.56	75.18		75.6	0.001366	5.35	1695.01	981.63	0.3
P118-00-00	P118-R3-2	72585.49	Max WS	5622.42	58.54	74.95		75.43	0.001326	5.78	1746.21	952.66	0.33
P118-00-00	P118-R3-2	72405.2	Max WS	5615.36	58.25	74.75		75.16	0.001341	5.47	2102.04	1023.13	0.33
P118-00-00	P118-R3-2	72221.5*	Max WS	5607.68	58.11	74.57		74.91	0.001133	4.9	2307.96	1355.89	0.3
P118-00-00	P118-R3-2	72037.8*	Max WS	5599.49	57.97	74.44		74.71	0.000795	4.32	2470.4	1577.35	0.26
P118-00-00	P118-R3-2	71854.2	Max WS	5595.36	57.83	74.35		74.56	0.000545	3.76	2823.93	1822.92	0.21
P118-00-00	P118-R3-2	71760	Max WS	5621.58	57.37	74.25		74.45	0.000545	3.76	2855.4	1787.05	0.22
P118-00-00	P118-R3-2	71754.2	Lat Struct										
P118-00-00	P118-R3-2	71556.8*	Max WS	5609.83	56.91	74.15		74.35	0.000532	3.73	2898.72	1767.19	0.21
P118-00-00	P118-R3-2	71353.6*	Max WS	5589.65	56.44	74.05		74.24	0.000512	3.68	2953.43	1732.82	0.21
P118-00-00	P118-R3-2	71150.5*	Max WS	5478.57	55.98	73.96		74.14	0.00047	3.54	3026.89	1696.12	0.2

HEC-RAS Plan: Baseline_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R3-2	70947.3*	Max WS	5432.09	55.51	73.88		74.05	0.000435	3.44	3118.72	1674.63	0.19
P118-00-00	P118-R3-2	70744.2	Max WS	5350.79	55.05	73.81		73.97	0.000375	3.3	3229.26	1629.38	0.18
P118-00-00	P118-R3-2	70743.2		Lat Struct									
P118-00-00	P118-R3-2	70570.3*	Max WS	5296.2	55.08	73.76		73.91	0.000347	3.23	3337.97	1638.4	0.18
P118-00-00	P118-R3-2	70396.4*	Max WS	5237.39	55.12	73.71		73.85	0.000322	3.16	3454.31	1654.23	0.17
P118-00-00	P118-R3-2	70222.6*	Max WS	5172.71	55.15	73.67		73.8	0.000299	3.09	3577.19	1687.37	0.17
P118-00-00	P118-R3-2	70048.7*	Max WS	5103.34	55.18	73.63		73.76	0.000278	3.01	3716.55	1738.96	0.16
P118-00-00	P118-R3-2	69874.9*	Max WS	5028.96	55.21	73.6		73.71	0.000257	2.93	3870.45	1747.98	0.16
P118-00-00	P118-R3-2	69701.0*	Max WS	4949.76	55.25	73.56		73.67	0.000237	2.85	4025.13	1736.87	0.15
P118-00-00	P118-R3-2	69527.2	Max WS	4865.08	55.28	73.54		73.64	0.000219	2.76	4182.46	1725.75	0.14
P118-00-00	P118-R3-2	69327.7*	Max WS	4742.68	55.16	73.5		73.61	0.000208	2.8	4156.26	1773.81	0.15
P118-00-00	P118-R3-2	69128.2*	Max WS	4620.1	55.05	73.47		73.58	0.000208	2.83	4137.75	1821.86	0.15
P118-00-00	P118-R3-2	68928.8*	Max WS	4498	54.93	73.44		73.55	0.0002	2.88	4124.01	1869.92	0.15
P118-00-00	P118-R3-2	68729.3*	Max WS	4373.13	54.82	73.41		73.52	0.000202	2.91	4120.23	1917.98	0.15
P118-00-00	P118-R3-2	68529.9*	Max WS	4248.78	54.7	73.35		73.5	0.000236	3.26	2895.77	1966.04	0.16
P118-00-00	P118-R3-2	68330.4*	Max WS	4087.08	54.59	73.31		73.47	0.000252	3.37	2467.36	1147.66	0.17
P118-00-00	P118-R3-2	68131	Max WS	3968.88	54.47	73.26		73.44	0.000264	3.55	2278.18	1140.22	0.18
P118-00-00	P118-R3-2	68130		Lat Struct									
P118-00-00	P118-R3-2	67976.1*	Max WS	3913.64	54.39	73.24		73.4	0.00026	3.48	2638.62	1166.33	0.17
P118-00-00	P118-R3-2	67821.3*	Max WS	3801.62	54.31	73.21		73.36	0.000245	3.33	3021.72	1195.46	0.17
P118-00-00	P118-R3-2	67666.4*	Max WS	3550.79	54.22	73.2		73.31	0.00021	3.02	3437.24	1221.43	0.15
P118-00-00	P118-R3-2	67511.6	Max WS	3282.76	54.14	73.19		73.27	0.000174	2.68	3873.83	1244.99	0.14
P118-00-00	P118-R3-2	67445.1*	Max WS	3270.42	54.63	73.19		73.24	0.000127	2.29	5558.94	1774.24	0.12
P118-00-00	P118-R3-2	67378.7*	Max WS	3253.98	55.12	73.18		73.23	0.000132	2.33	5424.66	1732.01	0.12
P118-00-00	P118-R3-2	67312.2*	Max WS	3235.58	55.61	73.17		73.22	0.000137	2.35	5314.76	1685.12	0.12
P118-00-00	P118-R3-2	67245.8*	Max WS	3215.1	56.1	73.16		73.21	0.000141	2.37	5231.51	1638.22	0.13
P118-00-00	P118-R3-2	67179.3*	Max WS	3192.61	56.59	73.15		73.2	0.000144	2.37	5173.41	1591.32	0.13
P118-00-00	P118-R3-2	67112.9*	Max WS	3171.14	57.08	73.14		73.19	0.000147	2.36	5141.08	1544.42	0.13
P118-00-00	P118-R3-2	67046.4*	Max WS	3151.45	57.57	73.13		73.18	0.00015	2.34	5133.76	1497.51	0.13
P118-00-00	P118-R3-2	66980	Max WS	3132.74	58.06	73.12		73.17	0.000151	2.31	5152.27	1450.62	0.13
P118-00-00	P118-R3-2	66962.5*	Max WS	3130.53	58.34	73.12		73.16	0.000154	2.28	5093.57	1440.96	0.13
P118-00-00	P118-R3-2	66945.0*	Max WS	3116.76	58.62	73.12		73.16	0.000156	2.24	5035.52	1431.31	0.13
P118-00-00	P118-R3-2	66927.5*	Max WS	3113.23	58.9	73.11		73.15	0.000157	2.19	4984.04	1401.2	0.13
P118-00-00	P118-R3-2	66910	Max WS	3110.62	59.18	73.11		73.15	0.000157	2.14	4965.92	1377.22	0.13
P118-00-00	P118-R3-1	66730	Max WS	2806.34	56.42	73.09		73.12	0.00011	1.82	5111.93	1382.97	0.11
P118-00-00	P118-R3-1	66536.4*	Max WS	2766.49	55.69	73.08		73.09	0.000146	1.43	4991	1288.65	0.09
P118-00-00	P118-R3-1	66342.9*	Max WS	2746.17	54.97	73.05		73.06	0.00017	1.16	4841.79	1189.28	0.07
P118-00-00	P118-R3-1	66149.3*	Max WS	2734.33	54.24	73.01		73.02	0.000184	0.99	4671.24	1089.91	0.06
P118-00-00	P118-R3-1	65955.8	Max WS	2733.34	53.52	72.98		73	0.000071	1.48	4487.88	990.53	0.09
P118-00-00	P118-R3-1	65950		Lat Struct									
P118-00-00	P118-R3-1	65782.0*	Max WS	3083.03	53.38	72.96		72.99	0.000086	1.78	4517	951.65	0.1
P118-00-00	P118-R3-1	65608.3*	Max WS	3443.2	53.24	72.93		72.98	0.000113	2.16	4479.19	912.76	0.11
P118-00-00	P118-R3-1	65434.6	Max WS	3889.82	53.1	72.89		72.97	0.000171	2.73	4369.7	873.88	0.13
P118-00-00	P118-R3-1	65262.1*	Max WS	4162.92	53.01	72.84		72.91	0.000319	2.75	3882.15	762.68	0.13
P118-00-00	P118-R3-1	65089.6*	Max WS	4171.58	52.93	72.76		72.83	0.000495	2.66	3380.41	651.46	0.13
P118-00-00	P118-R3-1	64917.1*	Max WS	4329.91	52.85	72.63		72.71	0.000838	2.79	2854.23	540.25	0.14
P118-00-00	P118-R3-1	64744.6*	Max WS	4584.8	52.76	72.37		72.48	0.001538	3.18	2298.93	429.05	0.16
P118-00-00	P118-R3-1	64572.2*	Max WS	4618.63	52.67	71.9		72.06	0.002894	3.71	1724.02	317.84	0.18
P118-00-00	P118-R3-1	64399.74	Max WS	4577.35	52.59	71.41		71.77	0.000589	4.95	1242.98	203.62	0.25
P118-00-00	P118-R3-1	64273.7	Max WS	4575.97	53.55	71.45	62.55	71.57	0.000296	3.11	5992.57	3206.29	0.18
P118-00-00	P118-R3-1	64247.2		Bridge									
P118-00-00	P118-R3-1	64220.7	Max WS	4555.5	53.3	71.31		71.49	0.000376	3.53	6341.98	3471.97	0.2
P118-00-00	P118-R3-1	64200	Max WS	4554.83	53.3	71.3		71.49	0.000377	3.54	6315.51	3453.29	0.2
P118-00-00	P118-R2-2	64100	Max WS	6531.17	52.61	71.27		71.43	0.000227	3.32	14513.11	8667.88	0.17
P118-00-00	P118-R2-2	64094	Max WS	6530.91	52.61	71.27	61.31	71.43	0.000228	3.32	14503.19	8666.79	0.17
P118-00-00	P118-R2-2	64059.0 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	64024	Max WS	6530.91	52.56	71.21		71.37	0.000229	3.33	14355.75	8650.69	0.17
P118-00-00	P118-R2-2	64010.4	Max WS	6529.71	52.78	71.18	63.68	71.51	0.000514	4.87	13510.22	8431.96	0.25
P118-00-00	P118-R2-2	63985.4 RAILROAD		Bridge									
P118-00-00	P118-R2-2	63960.4	Max WS	6528.74	53.04	69.97	63.95	70.51	0.00093	6	3734.21	3690.37	0.33
P118-00-00	P118-R2-2	63959.7	Max WS	6528.69	53.06	70.06	61.24	70.28	0.000351	3.81	6111.87	5458.38	0.2
P118-00-00	P118-R2-2	63908.2 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	63856.7	Max WS	6528.69	53.16	69.95		70.19	0.000377	3.92	5098.23	4553.14	0.21
P118-00-00	P118-R2-2	62823.2	Max WS	6570.32	50.35	69.46		69.7	0.00068	4.8	4843.93	2946.69	0.27
P118-00-00	P118-R2-2	62701		Lat Struct									
P118-00-00	P118-R2-2	62700		Lat Struct									
P118-00-00	P118-R2-2	61905.2	Max WS	5932.13	50.77	68.64		69.07	0.000992	5.3	1119.68	132.2	0.32
P118-00-00	P118-R2-2	60625.3	Max WS	5764.34	49.52	68.1		68.51	0.000866	5.15	1120.05	121.4	0.3
P118-00-00	P118-R2-2	60600	Max WS	5760.22	49.52	67.5		68.02	0.000784	5.85	1048.26	121.4	0.3
P118-00-00	P118-R2-1	60595.74	Max WS	5563.77	49.48	67.24		67.85	0.001015	6.38	953.29	131.55	0.33

HEC-RAS Plan: Baseline_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	60594.74		Lat Struct									
P118-00-00	P118-R2-1	60594		Lat Struct									
P118-00-00	P118-R2-1	60583.6*	Max WS	5778.36	49.68	67.14		67.71	0.00095	6.16	1005.67	139.91	0.33
P118-00-00	P118-R2-1	60571.6*	Max WS	5938.4	49.89	67.06		67.59	0.00088	5.9	1062.09	138.02	0.32
P118-00-00	P118-R2-1	60559.5*	Max WS	6045.88	50.09	67.01		67.49	0.000812	5.62	1123.69	140.87	0.3
P118-00-00	P118-R2-1	60547.5*	Max WS	6126.08	50.3	66.96		67.4	0.000756	5.37	1184.47	146.26	0.29
P118-00-00	P118-R2-1	60535.46	Max WS	6202.68	50.5	66.91		67.32	0.000715	5.15	1242.9	152.76	0.29
P118-00-00	P118-R2-1	60396.4*	Max WS	6261.46	50.45	66.82		67.25	0.000776	5.24	1237.47	156.71	0.3
P118-00-00	P118-R2-1	60257.3*	Max WS	6289.23	50.4	66.74		67.17	0.000822	5.28	1235.61	160.67	0.3
P118-00-00	P118-R2-1	60118.3*	Max WS	6306.19	50.35	66.66		67.1	0.000859	5.29	1237.65	164.68	0.31
P118-00-00	P118-R2-1	59979.2*	Max WS	6334.62	50.3	66.58		67.02	0.000892	5.3	1242.05	168.61	0.31
P118-00-00	P118-R2-1	59840.2*	Max WS	6376.59	50.25	66.5		66.93	0.000924	5.3	1248.61	172.57	0.32
P118-00-00	P118-R2-1	59701.1*	Max WS	6434.68	50.2	66.4		66.84	0.000954	5.31	1257.87	176.71	0.32
P118-00-00	P118-R2-1	59562.1*	Max WS	6510.46	50.15	66.31		66.74	0.000985	5.32	1268.68	180.09	0.33
P118-00-00	P118-R2-1	59423.1	Max WS	6593.2	50.1	66.21		66.64	0.001017	5.33	1281.04	181.05	0.33
P118-00-00	P118-R2-1	59307.4*	Max WS	6602.54	50.1	66.12		66.56	0.001027	5.3	1290.49	196.49	0.33
P118-00-00	P118-R2-1	59191.8*	Max WS	6606.24	50.11	66.04		66.47	0.001033	5.26	1290.22	211.94	0.33
P118-00-00	P118-R2-1	59076.2*	Max WS	6649.44	50.11	65.94		66.37	0.00105	5.25	1279.15	227.38	0.33
P118-00-00	P118-R2-1	58960.5*	Max WS	6670.35	50.11	65.86		66.28	0.001052	5.22	1279.78	174.94	0.33
P118-00-00	P118-R2-1	58844.9*	Max WS	6670.48	50.11	65.78		66.19	0.001037	5.14	1296.81	174.36	0.33
P118-00-00	P118-R2-1	58729.3*	Max WS	6682.32	50.12	65.7		66.1	0.000966	5.08	1316.46	169.24	0.32
P118-00-00	P118-R2-1	58613.7	Max WS	6739.23	50.12	65.63		66.02	0.000845	5.03	1340.82	157.58	0.3
P118-00-00	P118-R2-1	58463.86	Max WS	6739.21	47.59	65.46		65.9	0.000823	5.31	1313.76	1090	0.3
P118-00-00	P118-R2-1	58387.5	Max WS	6739.22	47.57	65.5	58.85	65.82	0.000653	4.67	2272.76	1068.74	0.27
P118-00-00	P118-R2-1	58359.5 ALDINE-WESTFIELD		Bridge									
P118-00-00	P118-R2-1	58331.5	Max WS	6739.22	47.51	65.38		65.71	0.000671	4.71	2211.68	1021.18	0.27
P118-00-00	P118-R2-1	57555.5	Max WS	6756.2	47.03	64.38	57.6	65.13	0.001257	7.06	1658.92	1460.1	0.37
P118-00-00	P118-R2-1	56998		Lat Struct									
P118-00-00	P118-R2-1	56513.3	Max WS	3494.78	46.03	64.22		64.4	0.000317	3.47	1267.72	475.07	0.19
P118-00-00	P118-R2-1	56000		Lat Struct									
P118-00-00	P118-R2-1	55557.7	Max WS	3422.45	44.69	63.92		64.11	0.000351	3.56	1928.65	1300.59	0.19
P118-00-00	P118-R2-1	55000		Lat Struct									
P118-00-00	P118-R2-1	54459.2	Max WS	5753.31	44.27	62.79		63.34	0.000919	5.98	1233.69	668	0.31
P118-00-00	P118-R2-1	53881		Lat Struct									
P118-00-00	P118-R2-1	53801.7	Max WS	6905.46	43.7	62.54		62.75	0.00033	3.66	2195.08	971.31	0.2
P118-00-00	P118-R2-1	53275.7	Max WS	6905.02	43.36	62.31		62.59	0.000312	4.26	1845.23	851.77	0.19
P118-00-00	P118-R2-1	52844.3	Max WS	7200.98	43.08	62.23	51.65	62.45	0.000278	3.78	2240.76	1193.11	0.19
P118-00-00	P118-R2-1	52815.3 BERTRAND RD		Bridge									
P118-00-00	P118-R2-1	52786.3	Max WS	7200.43	43.01	62.09		62.31	0.000284	3.8	2165.56	1029.46	0.19
P118-00-00	P118-R2-1	52465.7	Max WS	7199.54	43.2	61.86		62.19	0.000566	4.67	1837.69	982.85	0.26
P118-00-00	P118-R2-1	52221.3	Max WS	7198.61	43.89	61.64	54.63	62.04	0.000742	5.12	1607.64	884.21	0.29
P118-00-00	P118-R2-1	52207.8 UTILITY		Bridge									
P118-00-00	P118-R2-1	52194.3	Max WS	7197.55	43.8	61.52		61.93	0.000749	5.14	1582.31	822.49	0.29
P118-00-00	P118-R2-1	51283.9	Max WS	7190.22	43.41	60.74		61.2	0.000887	5.46	2092.35	1777.44	0.31
P118-00-00	P118-R2-1	51096.9	Max WS	7188.81	42.91	60.62	52.05	61.03	0.000669	5.15	2366.28	2184.92	0.28
P118-00-00	P118-R2-1	51083.9 UTILITY		Bridge									
P118-00-00	P118-R2-1	51070.9	Max WS	7187.87	42.87	60.57		60.98	0.000671	5.16	2337.21	2110.66	0.28
P118-00-00	P118-R2-1	50549.6	Max WS	7184.87	42.3	60.38		60.63	0.000406	4.1	3221.89	2699.58	0.22
P118-00-00	P118-R2-1	50021.9	Max WS	7183.44	41.83	60.2	51.12	60.41	0.00034	3.82	4572.16	4910.69	0.2
P118-00-00	P118-R2-1	49980.9 HOPPER RD		Bridge									
P118-00-00	P118-R2-1	49939.9	Max WS	7179.7	41.69	60		60.22	0.000352	3.87	4295.35	4685.32	0.21
P118-00-00	P118-R2-1	49231.7	Max WS	7175.2	41.03	59.59		59.92	0.000682	4.83	3920.4	4598.06	0.27
P118-00-00	P118-R2-1	48480.5	Max WS	7172.77	41.23	59.18		59.43	0.000457	4.24	4206.61	3584.3	0.23
P118-00-00	P118-R2-1	48196.5	Max WS	7172.15	41.31	59.03	51.58	59.28	0.000506	4.32	4451.16	3825.82	0.24
P118-00-00	P118-R2-1	48183.0 UTILITY		Bridge									
P118-00-00	P118-R2-1	48169.5	Max WS	7171.93	41.24	58.96		59.21	0.000508	4.32	4430.29	3701.71	0.24
P118-00-00	P118-R2-1	47607.9	Max WS	7171.06	40.57	58.59		58.91	0.000703	4.86	4092.15	3537.34	0.28
P118-00-00	P118-R2-1	46939	Max WS	7170.8	40.79	58.2		58.38	0.000441	3.74	4757.26	3375.3	0.22
P118-00-00	P118-R2-1	46594.8	Max WS	7170.64	40.91	58.01	49.8	58.28	0.000406	4.45	6467.74	4247.65	0.22
P118-00-00	P118-R2-1	46584.8		Bridge									
P118-00-00	P118-R2-1	46579.8	Max WS	7170.75	40.91	57.99		58.26	0.0005	4.36	4773.57	4052.86	0.24
P118-00-00	P118-R2-1	46575.8	Max WS	7170.8	40.91	57.97	49.82	58.27	0.000535	4.51	3488.82	3067.38	0.25
P118-00-00	P118-R2-1	46560.8 LITTLE YORK RD		Bridge									
P118-00-00	P118-R2-1	46526.8	Max WS	7170.61	40.74	57.92		58.17	0.000425	4.28	6711.78	4637.79	0.22
P118-00-00	P118-R2-1	46516.8	Max WS	7170.66	40.74	57.93	49.66	58.15	0.000489	4.04	6741.03	4205.17	0.23
P118-00-00	P118-R2-1	46515.8		Bridge									
P118-00-00	P118-R2-1	46478.9	Max WS	7170.47	40.49	57.64		57.97	0.000689	4.74	4084.58	3718.53	0.28
P118-00-00	P118-R2-1	46468.9	Max WS	7170.26	40.49	57.63	51.05	57.96	0.000691	4.74	4057.16	3690.44	0.28
P118-00-00	P118-R2-1	46466.8		Bridge									
P118-00-00	P118-R2-1	46458.9	Max WS	7170.17	40.49	57.62		57.95	0.000697	4.76	4000.13	3630.95	0.28

HEC-RAS Plan: Baseline_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	45952.3	Max WS	7166.39	40.12	57.12		57.48	0.001273	5.29	3968.04	3437.25	0.36
P118-00-00	P118-R2-1	45161.4	Max WS	6713.02	39.57	56.12		56.56	0.001362	5.52	2583.7	1949.2	0.33
P118-00-00	P118-R2-1	44549.9	Max WS	6628.56	38.76	55.47		55.87	0.001152	5.06	1751.73	1269.74	0.31
P118-00-00	P118-R2-1	44143.3	Max WS	6533.52	38.22	55.06		55.43	0.00107	4.91	1627.32	786.05	0.3
P118-00-00	P118-R2-1	43789.5	Max WS	6630.43	37.97	55.04		55.12	0.000149	3.22	4697.74	527.56	0.14
P118-00-00	P118-R2-1	43739.48	Max WS	6633.54	37.93	55.05		55.1	0.000107	2.73	5662.32	545.64	0.12
P118-00-00	P118-R2-1	43652.1*	Max WS	6633.53	37.87	55.05		55.09	0.000095	2.58	6127.68	741.21	0.11
P118-00-00	P118-R2-1	43564.8*	Max WS	6633.97	37.81	55.05		55.08	0.000075	2.3	7236.33	878.25	0.1
P118-00-00	P118-R2-1	43477.4*	Max WS	6633.97	37.75	55.05		55.07	0.000051	1.91	8973.16	1006.81	0.08
P118-00-00	P118-R2-1	43390.1*	Max WS	6634.42	37.68	55.05		55.06	0.000032	1.52	11030.75	1135.37	0.07
P118-00-00	P118-R2-1	43302.8*	Max WS	6634.86	37.62	55.05		55.06	0.000019	1.17	13139.41	1263.92	0.05
P118-00-00	P118-R2-1	43215.5	Max WS	6635.75	37.56	55.06		55.06	0.000014	1.01	14237.72	1330.94	0.04
P118-00-00	P118-R2-1	43118.0*	Max WS	6660.83	37.49	55.05		55.06	0.000022	1.26	13223.94	1278.56	0.05
P118-00-00	P118-R2-1	43020.4*	Max WS	6661.68	37.42	55.05		55.06	0.000029	1.44	11795.9	1164.65	0.06
P118-00-00	P118-R2-1	42922.9*	Max WS	6659.48	37.35	55.04		55.06	0.000035	1.59	10569.15	1043.87	0.07
P118-00-00	P118-R2-1	42825.49	Max WS	6659.47	37.28	55.04		55.05	0.000039	1.69	9873.63	923.29	0.07
P118-00-00	P118-R2-1	42736.8*	Max WS	6656.76	37.22	55.04		55.05	0.000037	1.65	10109.31	976.05	0.07
P118-00-00	P118-R2-1	42648.2*	Max WS	6656.3	37.15	55.04		55.05	0.000031	1.53	10786.9	1004.16	0.07
P118-00-00	P118-R2-1	42559.6*	Max WS	6655.86	37.09	55.03		55.04	0.000024	1.33	11607.82	1045.12	0.06
P118-00-00	P118-R2-1	42471	Max WS	6655.84	37.03	55.03		55.04	0.000012	0.95	11881.6	1080.56	0.04
P118-00-00	P118-R2-1	42395.8*	Max WS	6655.39	36.98	55.03		55.04	0.000015	1.07	12140.56	1162.52	0.05
P118-00-00	P118-R2-1	42320.7*	Max WS	6657.19	36.92	55.03		55.04	0.000009	0.83	13178.97	1185.73	0.04
P118-00-00	P118-R2-1	42245.55	Max WS	6655.81	36.87	55.03		55.04	0.000003	0.49	13623.32	1172.78	0.02
P118-00-00	P118-R2-1	42150.1*	Max WS	6656.29	36.8	55.03		55.04	0.000012	0.94	12411.21	1108.74	0.04
P118-00-00	P118-R2-1	42054.6*	Max WS	6656.74	36.74	55.03		55.04	0.000016	1.12	10445.06	996.14	0.05
P118-00-00	P118-R2-1	41959.2*	Max WS	6654.87	36.67	55.03		55.04	0.000019	1.22	9204.33	872.34	0.05
P118-00-00	P118-R2-1	41863.8	Max WS	6655.32	36.6	55.03		55.04	0.000018	1.19	9235.75	742.59	0.05
P118-00-00	P118-R2-1	41771.7*	Max WS	6654.41	36.53	55.02		55.03	0.000026	1.43	9047.37	761.83	0.06
P118-00-00	P118-R2-1	41679.6*	Max WS	6652.99	36.47	55.02		55.03	0.000032	1.58	8874.9	775.11	0.07
P118-00-00	P118-R2-1	41587.5*	Max WS	6650.59	36.4	55.01		55.03	0.000038	1.72	8614.51	788.4	0.07
P118-00-00	P118-R2-1	41495.4*	Max WS	6649.62	36.34	55.01		55.03	0.000041	1.8	8445.33	797.12	0.08
P118-00-00	P118-R2-1	41403.3	Max WS	6649.12	36.27	55.01		55.03	0.000039	1.76	8350.44	789.18	0.07
P118-00-00	P118-R2-1	41285.4	Max WS	6581.85	36.27	54.79	44.14	55.39	0.00002	6.26	1660.19	1716.83	0.26
P118-00-00	P118-R2-1	41243.9 JENSEN DR		Bridge									
P118-00-00	P118-R2-1	41203.4	Max WS	6640.47	36.25	54.96		55.35	0.000014	5.32	1685.47	1884.21	0.22
P118-00-00	P118-R2-1	41197.4	Max WS	6585.9	36.25	54.79	44.12	55.38	0.00002	6.23	1712.77	1679.37	0.26
P118-00-00	P118-R2-1	41197.2 UTILITY		Bridge									
P118-00-00	P118-R2-1	41185.7	Max WS	6533.24	36.25	54.69		55.29	0.00001	6.26	1700.96	1725.51	0.26
P118-00-00	P118-R2-1	40951.8	Max WS	6630.36	36.2	54.93	42.65	55.08	0.000012	3.1	3782.79	2003.15	0.14
P118-00-00	P118-R2-1	40919.3 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40886.8	Max WS	6628.28	36.19	54.93		55.06	0.000011	3.02	3686.25	1905.94	0.14
P118-00-00	P118-R2-1	40846.9	Max WS	6620.63	36.18	54.9	43.49	55.09	0.000018	3.52	3887.88	2168.74	0.17
P118-00-00	P118-R2-1	40726.2 US HWY 59 (ML)		Bridge									
P118-00-00	P118-R2-1	40605.5	Max WS	6618.66	36.13	54.88		55.07	0.000018	3.51	3656.73	2082.58	0.17
P118-00-00	P118-R2-1	40584.6	Max WS	6619.15	36.13	54.88	43.46	55.07	0.000021	3.45	3165.32	1778.36	0.18
P118-00-00	P118-R2-1	40550.1 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40515.6	Max WS	6617.24	36.12	54.87		55.05	0.00002	3.43	3659.77	2008.22	0.17
P118-00-00	P118-R2-1	39969.8	Max WS	6636.69	36.01	54.93		54.94	0.000075	0.96	8405.06	2441.95	0.05
P118-00-00	P118-R2-1	39829.91	Max WS	7564.01	36	54.91		54.93	0.000017	1.06	8386.15	2365.86	0.06
P118-00-00	P118-R2-1	39188.6	Max WS	7563.67	35.6	54.92		54.92	0.000001	0.28	24512.74	2354.51	0.01
P118-00-00	P118-R2-1	38423.57	Max WS	7808.34	34.76	54.92		54.92	0.000001	0.33	22219.08	2069.24	0.02
P118-00-00	P118-R2-1	38170.2	Max WS	7808.05	34.35	54.92		54.92	0.000015	0.4	19618.04	2232.03	0.02
P118-00-00	P118-R2-1	37899.37	Max WS	7807.58	34.35	54.91		54.92	0.000001	0.42	19643.63	2372.02	0.02
P118-00-00	P118-R2-1	37413.16	Max WS	7808.16	34.13	54.91		54.92	0.000001	0.41	20053.19	2413.34	0.02
P118-00-00	P118-R2-1	37258.6	Max WS	7803.47	34.02	54.79		55.06	0.000707	4.79	4525.67	2324.42	0.22
P118-00-00	P118-R2-1	36408.6	Max WS	7761.42	32.39	54.38		54.61	0.000848	4.44	4869.77	2698.61	0.24
P118-00-00	P118-R2-1	36341.47	Max WS	7752.62	32.39	54.33	45.88	54.56	0.000867	4.47	4788.51	2478.13	0.24
P118-00-00	P118-R2-1	36330 UTILITY		Bridge									
P118-00-00	P118-R2-1	36321.56	Max WS	7751.9	32	54.32		54.5	0.000411	3.72	5216.51	2303.83	0.17
P118-00-00	P118-R2-1	36303.5	Max WS	7753.04	32	54.33		54.48	0.000354	3.48	5372.48	2332.69	0.16
P118-00-00	P118-R1-3	36195.78	Max WS	8558.55	32.04	54.21		54.43	0.000474	4.09	4718.07	1662.03	0.19
P118-00-00	P118-R1-3	36107.2	Max WS	8558.18	32	54.17		54.39	0.000464	4.05	4719.27	1532.69	0.19
P118-00-00	P118-R1-3	35434.7	Max WS	8555.9	31.72	53.88		54.17	0.000487	4.35	3686.91	1264.1	0.19
P118-00-00	P118-R1-3	35045.7	Max WS	8553.74	31.55	53.67	41.19	53.98	0.000524	4.48	2772.31	886.43	0.2
P118-00-00	P118-R1-3	35025.9 RAILROAD		Bridge									
P118-00-00	P118-R1-3	35006.1	Max WS	8550.74	31.09	53.55		53.84	0.000485	4.37	3095.27	974.32	0.19
P118-00-00	P118-R1-3	34984.3	Max WS	8549.46	30.53	53.52	42.15	53.86	0.000608	4.82	2619.66	800.76	0.22
P118-00-00	P118-R1-3	34927.3 HIRSCH RD		Bridge									
P118-00-00	P118-R1-3	34870.3	Max WS	8548.35	30	53.36		53.68	0.000555	4.69	2960.63	905.26	0.21
P118-00-00	P118-R1-3	33920.1	Max WS	8561.25	29.63	52.46		52.98	0.001093	6.03	2661.7	1123.66	0.28

HEC-RAS Plan: Baseline_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R1-3	32749.8	Max WS	8551.9	28	51.01		51.6	0.001292	6.32	2181.31	850.17	0.3
P118-00-00	P118-R1-3	31824.3	Max WS	8507.73	26.81	50.11		50.55	0.000855	5.49	2343.6	620.69	0.25
P118-00-00	P118-R1-3	30679.1	Max WS	8443.06	27.05	49.05		49.54	0.000921	5.68	1877.99	293.26	0.26
P118-00-00	P118-R1-3	30678.1		Lat Struct									
P118-00-00	P118-R1-3	30099.1	Max WS	8427.12	27.23	48.78		49.1	0.000497	4.6	2473.54	426.53	0.2
P118-00-00	P118-R1-3	29757.8	Max WS	8459.57	27.34	48.56	37.28	48.92	0.000573	4.87	2348.41	902.67	0.21
P118-00-00	P118-R1-3	29731.3 PARKER RD		Bridge									
P118-00-00	P118-R1-3	29704.8	Max WS	8428.28	27	48.35		48.69	0.000541	4.75	2469.98	944.45	0.21
P118-00-00	P118-R1-3	28983.7	Max WS	8290.63	26.97	47.53		48.13	0.001216	6.31	1586.09	285.28	0.3
P118-00-00	P118-R1-3	28387.3	Max WS	9032.04	26.04	47.19		47.52	0.000542	4.67	2417.44	256.83	0.21
P118-00-00	P118-R1-3	27992	Max WS	9028.74	25.42	46.97		47.31	0.000657	5.07	3201.42	436.4	0.23
P118-00-00	P118-R1-3	27567.7	Max WS	9023.58	25.74	46.73		47.07	0.000526	4.91	2880.33	436.86	0.21
P118-00-00	P118-R1-3	27317	Max WS	8947.69	25.92	46.58	36.03	46.94	0.000574	5.03	2416.38	524.51	0.22
P118-00-00	P118-R1-3	27306.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27305.8	Max WS	8947.69	25.93	46.38		46.79	0.000619	5.23	2329.46	450.6	0.23
P118-00-00	P118-R1-3	27295.8	Max WS	8947.2	25.93	46.37	35.83	46.78	0.000619	5.23	2326.61	448.34	0.23
P118-00-00	P118-R1-3	27242.8 HOMESTEAD RD		Bridge									
P118-00-00	P118-R1-3	27189.8	Max WS	8888.63	25.89	45.96		46.38	0.000663	5.33	2183.88	333.83	0.23
P118-00-00	P118-R1-3	27180.8	Max WS	8888.26	25.89	45.95	35.76	46.38	0.000664	5.34	2181.82	332.99	0.23
P118-00-00	P118-R1-3	27179.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27167.5	Max WS	8888.26	25.84	46.03		46.35	0.000526	4.69	2365.42	391.05	0.21
P118-00-00	P118-R1-3	26816.8*	Max WS	8884.91	25.02	45.83		46.14	0.000553	4.53	2259.71	258.67	0.21
P118-00-00	P118-R1-3	26815.8		Lat Struct									
P118-00-00	P118-R1-3	26466.1	Max WS	8807.25	24.2	45.63		45.95	0.000644	4.53	2176.45	236.79	0.22
P118-00-00	P118-R1-3	26224.4*	Max WS	8833.53	23.64	45.49		45.78	0.000591	4.4	2223.07	221.63	0.21
P118-00-00	P118-R1-3	25982.8	Max WS	8711.1	23.07	45.39		45.66	0.000519	4.19	2291.31	214.98	0.2
P118-00-00	P118-R1-3	25318.4	Max WS	8670.19	23.07	45.04		45.3	0.000531	4.19	2477.26	261.92	0.2
P118-00-00	P118-R1-3	25317.4		Lat Struct									
P118-00-00	P118-R1-3	24564.2	Max WS	8519.51	21.76	44.7		44.94	0.000403	4.03	2368.5	246.03	0.18
P118-00-00	P118-R1-3	23984.6	Max WS	9724.15	20.75	44.43		44.67	0.000404	4.13	3464.22	404.85	0.18
P118-00-00	P118-R1-2	23796.2	Max WS	10215.01	24.42	44.29		44.56	0.000389	4.23	2672.67	259.47	0.2
P118-00-00	P118-R1-2	23795.2		Lat Struct									
P118-00-00	P118-R1-2	23286.2	Max WS	10886.16	20.82	43.93		44.3	0.000705	4.93	2362.84	353.46	0.23
P118-00-00	P118-R1-2	22973.4	Max WS	10390.61	20.85	43.75	31.62	44.06	0.000545	4.45	3792.95	714.09	0.21
P118-00-00	P118-R1-2	22951.4 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22929.4	Max WS	10390.61	20.49	43.68		43.97	0.000512	4.37	3986.78	733.13	0.2
P118-00-00	P118-R1-2	22928.4		Lat Struct									
P118-00-00	P118-R1-2	22630.3	Max WS	10208.77	19.11	43.2	32.83	43.74	0.001209	5.91	1726.81	137.48	0.29
P118-00-00	P118-R1-2	22609.0 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22587.7	Max WS	10315.54	18.99	42.87		43.44	0.001301	6.08	1697.37	136.9	0.3
P118-00-00	P118-R1-2	22577.7	Max WS	10307.81	18.99	42.86		43.44	0.0013	6.08	1696.82	136.88	0.3
P118-00-00	P118-R1-1	22186.8	Max WS	10577.69	18.55	42.37		42.96	0.000974	6.2	1832.09	172.46	0.26
P118-00-00	P118-R1-1	22185.8		Lat Struct									
P118-00-00	P118-R1-1	21829	Max WS	11207.47	18.16	42.43		42.71	0.000433	4.27	2830.63	218.16	0.19
P118-00-00	P118-R1-1	21589.8	Max WS	12146.78	17.9	41.92		42.48	0.000821	6.23	2291.88	175.02	0.26
P118-00-00	P118-R1-1	21362	Max WS	12117.93	17.65	41.69		42.38	0.000078	6.66	2146.54	194.54	0.28
P118-00-00	P118-R1-1	21361		Lat Struct									
P118-00-00	P118-R1-1	21360	Max WS	12091.47	17.65	41.69	31.26	42.37	0.000078	6.65	2146.18	194.52	0.28
P118-00-00	P118-R1-1	21333.0 WAYSIDE DR		Bridge									
P118-00-00	P118-R1-1	21304	Max WS	12091.47	17.62	41.63		42.31	0.000078	6.66	2139.79	194.19	0.28
P118-00-00	P118-R1-1	21010.4	Max WS	12078.84	18.08	41.75	29.53	42.2	0.00062	6.13	3294.73	266.61	0.23
P118-00-00	P118-R1-1	20948.9 TIDWELL RD (WB)		Bridge									
P118-00-00	P118-R1-1	20887.4	Max WS	12078.84	17.96	41.63		42.08	0.00062	6.13	3294.77	266.61	0.23
P118-00-00	P118-R1-1	20880.6	Max WS	12051.58	17.96	41.18	31.94	42.39	0.000126	9.2	2699.13	243.48	0.36
P118-00-00	P118-R1-1	20869.6 TIDWELL RD (EB)		Bridge									
P118-00-00	P118-R1-1	20858.6	Max WS	12035.83	17.96	41.12		42.33	0.000127	9.21	2684.23	242.66	0.36
P118-00-00	P118-R1-1	20857.6		Lat Struct									
P118-00-00	P118-R1-1	19860	Max WS	11752.98	19.24	40.58		41.43	0.001591	7.51	1801.36	324.42	0.35
P118-00-00	P118-R1-1	18597.4	Max WS	12519.55	15.56	38.96		39.73	0.000955	7.22	2220.55	180.1	0.29
P118-00-00	P118-R1-1	18107.1	Max WS	12508.49	15.21	38.8		39.16	0.00084	4.86	2571.13	217.17	0.25
P118-00-00	P118-R1-1	17862.9*	Max WS	12489.22	14.55	38.66		38.99	0.000652	4.59	2719.9	212.91	0.22
P118-00-00	P118-R1-1	17618.7*	Max WS	12473.09	13.89	38.56		38.87	0.000523	4.43	2834.38	235.71	0.2
P118-00-00	P118-R1-1	17374.5*	Max WS	12445.84	13.23	38.43		38.73	0.000447	4.37	2884.31	215.65	0.19
P118-00-00	P118-R1-1	17130.3	Max WS	12359.45	12.57	38.34		38.64	0.000402	4.38	2907.41	214.27	0.18
P118-00-00	P118-R1-1	16004	Max WS	12704.22	11.24	37.82		38.11	0.000508	4.35	2946.19	212.01	0.2
P118-00-00	P118-R1-1	15045.6	Max WS	13317.51	10.55	36.95		37.44	0.000841	5.63	2422.99	192.55	0.25
P118-00-00	P118-R1-1	13937.2	Max WS	13304.12	11.62	36.29		36.7	0.000607	5.63	4230.99	443.59	0.23
P118-00-00	P118-R1-1	13341.9	Max WS	13280.01	10.38	35.77		36.33	0.000882	6.77	3462.66	346.55	0.27
P118-00-00	P118-R1-1	12945.5	Max WS	13265.84	9.55	35.61	25.95	35.95	0.000571	5.6	4601.05	433.8	0.22
P118-00-00	P118-R1-1	12935.0 UTILITY		Bridge									

HEC-RAS Plan: Baseline_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R1-1	12932.7	Max WS	13265.84	9.53	35.47		35.82	0.000587	5.66	4548.73	430.04	0.22
P118-00-00	P118-R1-1	12931.7	Max WS	13265.79	9.53	35.47	25.93	35.82	0.000587	5.66	4548.47	430.02	0.22
P118-00-00	P118-R1-1	12904.8 MESA RD		Bridge									
P118-00-00	P118-R1-1	12877.9	Max WS	13255.06	8.77	35		35.33	0.000549	5.53	4672.79	438.96	0.22
P118-00-00	P118-R1-1	12117.3	Max WS	13251.08	7.23	34.6		34.94	0.000398	4.99	3505.25	283.64	0.19
P118-00-00	P118-R1-1	10905.1	Max WS	14362.06	9.54	33.52		34.16	0.000893	6.57	2793.9	258.11	0.27
P118-00-00	P118-R1-1	9879.2	Max WS	14342.89	6.26	32.12		33.08	0.001418	8.47	2698.73	229.12	0.34
P118-00-00	P118-R1-1	8777	Max WS	14339.86	4.71	31.51		31.69	0.000354	3.9	7772.17	810.98	0.17
P118-00-00	P118-R1-1	8024.4	Max WS	14335.98	4.73	31.12		31.42	0.000452	4.88	5054.6	408.18	0.2
P118-00-00	P118-R1-1	6779.3	Max WS	14328.71	4.44	30.34		30.74	0.000679	5.43	4182.55	460.45	0.23
P118-00-00	P118-R1-1	5748.4	Max WS	14319.67	4.27	28.91		29.81	0.001571	8.23	3118.9	380.83	0.35
P118-00-00	P118-R1-1	4492	Max WS	14317.61	1.92	27.64		28.16	0.000813	5.93	3158.05	350.13	0.26
P118-00-00	P118-R1-1	3597.9	Max WS	14313.89	2.46	26.92		27.42	0.000952	6.28	4010.7	439.46	0.28
P118-00-00	P118-R1-1	2709.4	Max WS	14311.2	1.59	26.08		26.6	0.000896	6.57	4217.74	404.8	0.27
P118-00-00	P118-R1-1	1695.9	Max WS	14311	1.52	24.87		25.59	0.001292	7.7	3616.95	349.36	0.32
P118-00-00	P118-R1-1	678.7	Max WS	14310.97	0.81	22.31	16.98	23.74	0.0028	9.96	1984.03	234.8	0.46

HEC-RAS Plan: Alt2_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	5	72.56	78.34		78.34	0	0.05	127.71	105.81	0
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	-30.5	72.31	78.34		78.34	0.000001	-0.27	114.23	81.78	0.02
P118-27-00	P118-27-00	5321.96	Max WS	19.07	72.13	78.34		78.34	0	0.16	117	470.48	0.01
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	80.61	71.84	78.33		78.33	0.000006	0.66	121.4	121.83	0.06
P118-27-00	P118-27-00	4300.35	Max WS	142.67	71.56	78.29		78.31	0.000017	1.14	125.68	143.01	0.1
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	197.46	71.38	78.25		78.28	0.000029	1.51	130.41	239.42	0.13
P118-27-00	P118-27-00	3444.22	Max WS	197.28	71.25	78.24		78.27	0.000027	1.47	137.06	133.22	0.12
P118-27-00	P118-27-00	3374.42	Max WS	129.71	71.25	78.2		78.21	0.000012	0.94	139.38	184.06	0.08
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	113.14	70.4	78.2		78.21	0.000005	0.64	581.68	645.99	0.05
P118-27-00	P118-27-00	2525.84	Max WS	24.61	70	78.2		78.2	0	0.13	319.34	480.83	0.01
P118-27-00	P118-27-00	2485.48	Max WS	4.14	69.9	78.2		78.2	0	0.02	190.14	267.81	0
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	4.15	69.9	78.2		78.2	0	0.02	187.65	292.85	0
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	4.81	69.85	78.2		78.2	0	0.03	189.62	537.27	0
P118-27-00	P118-27-00	2381.57	Max WS	5.13	69.85	78.2		78.2	0	0.03	189.63	486.72	0
P118-27-00	P118-27-00	2351.35	Max WS	5.61	69.8	78.2		78.2	0	0.03	360.13	364.46	0
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	5.77	69.8	78.2		78.2	0	0.03	433.15	488.85	0
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	-35.78	69.77	78.2		78.2	0	-0.19	192.76	567.75	0.01
P118-27-00	P118-27-00	1817.26	Max WS	-278.08	68.6	78.19		78.2	0.00001	-1.06	873.03	1072.64	0.08
P118-27-00	P118-27-00	1360.33	Max WS	-586.05	66.5	78.17		78.21	0.000016	-1.61	1080.51	1032.44	0.1
P118-27-00	P118-27-00	1314.62	Max WS	-625.62	66	78.18		78.18	0.000003	-0.76	7434.04	3023.25	0.05
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	-625.62	65.96	78.18		78.18	0.000003	-0.76	7315.59	2943.22	0.05
P118-27-00	P118-27-00	1198.35	Max WS	-621.97	65.9	78.17		78.21	0.000014	-1.57	1243.29	2008.34	0.1
P118-27-00	P118-27-00	763.46	Max WS	-632.51	65.3	78.18		78.2	0.000006	-1.1	3596.31	1632.15	0.07
P118-27-00	P118-27-00	465.31	Max WS	-644.16	64.85	78.18		78.22	0.00001	-1.47	1084.8	805.3	0.09
P118-27-00	P118-27-00	448.57	Max WS	-652.65	64.8	78.19		78.21	0.000006	-1.18	2471.9	799.19	0.07
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	-652.65	64.8	78.2		78.22	0.000006	-1.18	2462.12	795.35	0.07
P118-27-00	P118-27-00	429.17	Max WS	-661.46	64.7	78.2		78.22	0.000006	-1.19	2492.07	791.47	0.07
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	-661.46	64.7	78.21		78.23	0.000006	-1.18	2539.78	784.17	0.07
P118-27-00	P118-27-00	399.43	Max WS	-686.09	64.6	78.21		78.24	0.00001	-1.48	1337.07	769.68	0.09
P118-27-00	P118-27-00	310	Max WS	-798.3	65.51	78.27	70.33	78.29	0.000187	-1.23	734.62	125.68	0.08
P118-00-00	P118-R3-4	76394.4	Max WS	8382.97	61.33	79.1		79.19	0.00036	4.13	11894.21	5765.08	0.2
P118-00-00	P118-R3-4	75489.4	Max WS	8162.42	61.15	78.77		78.87	0.000389	4.26	11161.78	5450.17	0.21
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	6103.11	60.14	78.31		78.44	0.000359	4.04	7280.39	3496.07	0.2
P118-00-00	P118-R3-4	73879.2	Max WS	5758.82	60.08	78.21		78.32	0.000248	3.49	7903.73	3680.77	0.17
P118-00-00	P118-R3-4	73828	Max WS	5836.82	60.08	78.18		78.34	0.00033	4.01	6356.24	3511.82	0.2
P118-00-00	P118-R3-4	73723	Max WS	6245.21	60.05	78.14		78.3	0.000344	4.09	6922.66	3886.24	0.2
P118-00-00	P118-R3-4	73423.3	Max WS	7948.14	60	78.06	71.11	78.17	0.000455	3.8	9803.79	5144.61	0.18
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	7945.74	59.83	77.09		77.38	0.000984	5.37	5698.56	3851.12	0.26
P118-00-00	P118-R3-4	73232.3	Max WS	7925.25	59.83	76.98		77.3	0.001072	5.57	5464.83	3755.6	0.27
P118-00-00	P118-R3-4	72741.86	Max WS	7853.92	59.56	76.32		76.75	0.001403	5.85	3104.6	1338.88	0.31
P118-00-00	P118-R3-2	72585.49	Max WS	7955.57	58.54	76.02		76.56	0.001515	6.5	2940.81	1263.8	0.36
P118-00-00	P118-R3-2	72405.2	Max WS	7937.89	58.25	75.8		76.22	0.001563	5.93	3262.52	1323.24	0.35
P118-00-00	P118-R3-2	72221.5*	Max WS	7762.93	58.11	75.59		75.94	0.001125	5.29	3873.8	1679.27	0.31
P118-00-00	P118-R3-2	72037.8*	Max WS	7756.8	57.97	75.45		75.73	0.000818	4.72	4392.33	1974.26	0.27
P118-00-00	P118-R3-2	71854.2	Max WS	7745.59	57.83	75.35		75.58	0.000603	4.22	4824.99	2248.05	0.23
P118-00-00	P118-R3-2	71760	Max WS	7771.39	57.37	75.23		75.46	0.000604	4.23	4787.46	2157.6	0.23
P118-00-00	P118-R3-2	71754.2		Lat Struct									
P118-00-00	P118-R3-2	71556.8*	Max WS	7750.78	56.91	75.11		75.34	0.000593	4.2	4758.74	2072.63	0.23
P118-00-00	P118-R3-2	71353.6*	Max WS	7686.26	56.44	75		75.23	0.00057	4.14	4739.83	1991.81	0.23
P118-00-00	P118-R3-2	71150.5*	Max WS	7575.93	55.98	74.9		75.11	0.000536	4.03	4742.77	1915.95	0.22
P118-00-00	P118-R3-2	70947.3*	Max WS	7387.49	55.51	74.81		75.01	0.000488	3.86	4761.46	1841.08	0.21
P118-00-00	P118-R3-2	70744.2	Max WS	7084.02	55.05	74.74		74.91	0.000406	3.64	4802.91	1768.41	0.19
P118-00-00	P118-R3-2	70743.2		Lat Struct									
P118-00-00	P118-R3-2	70570.3*	Max WS	6887.67	55.08	74.69		74.84	0.000364	3.5	4930.31	1792.45	0.19
P118-00-00	P118-R3-2	70396.4*	Max WS	6716.39	55.12	74.64		74.79	0.000328	3.37	5068.93	1781.34	0.18
P118-00-00	P118-R3-2	70222.6*	Max WS	6526.35	55.15	74.6		74.73	0.000293	3.23	5211.83	1770.22	0.17
P118-00-00	P118-R3-2	70048.7*	Max WS	6370.39	55.18	74.57		74.69	0.000265	3.11	5360.34	1759.1	0.16
P118-00-00	P118-R3-2	69874.9*	Max WS	6202.03	55.21	74.54		74.65	0.000239	2.99	5513.66	1747.98	0.15
P118-00-00	P118-R3-2	69701.0*	Max WS	6015.87	55.25	74.51		74.61	0.000214	2.85	5666.71	1736.87	0.14
P118-00-00	P118-R3-2	69527.2	Max WS	5819.06	55.28	74.49		74.57	0.000191	2.72	5823.24	1725.75	0.14
P118-00-00	P118-R3-2	69327.7*	Max WS	5558.11	55.16	74.46		74.55	0.000173	2.69	5859.11	1773.81	0.13
P118-00-00	P118-R3-2	69128.2*	Max WS	5293.41	55.05	74.44		74.52	0.000163	2.64	5906.09	1821.86	0.13

HEC-RAS Plan: Alt2_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R3-2	68928.8*	Max WS	5025.94	54.93	74.42		74.5	0.000147	2.6	5961.29	1869.92	0.13
P118-00-00	P118-R3-2	68729.3*	Max WS	4608.09	54.82	74.4		74.47	0.00013	2.46	6030.79	1917.98	0.12
P118-00-00	P118-R3-2	68529.9*	Max WS	4337.88	54.7	74.37		74.46	0.000144	2.69	4903.87	1966.04	0.13
P118-00-00	P118-R3-2	68330.4*	Max WS	4058.88	54.59	74.35		74.45	0.000148	2.73	4438.5	2014.09	0.13
P118-00-00	P118-R3-2	68131	Max WS	3801.92	54.47	74.33		74.43	0.000148	2.8	3930.77	2062.15	0.13
P118-00-00	P118-R3-2	68130		Lat Struct									
P118-00-00	P118-R3-2	67976.1*	Max WS	3620.44	54.39	74.32		74.4	0.000131	2.62	4259.38	2003.07	0.12
P118-00-00	P118-R3-2	67821.3*	Max WS	3365.02	54.31	74.31		74.38	0.00011	2.36	4622.28	1943.98	0.11
P118-00-00	P118-R3-2	67666.4*	Max WS	3037.17	54.22	74.31		74.36	0.000086	2.05	5020.57	1884.9	0.1
P118-00-00	P118-R3-2	67511.6	Max WS	2710.35	54.14	74.31		74.34	0.000065	1.74	5441.53	1825.82	0.08
P118-00-00	P118-R3-2	67445.1*	Max WS	2702.84	54.63	74.31		74.32	0.000044	1.44	7547.97	1778.92	0.07
P118-00-00	P118-R3-2	67378.7*	Max WS	2700.75	55.12	74.3		74.32	0.000046	1.46	7372.68	1732.01	0.07
P118-00-00	P118-R3-2	67312.2*	Max WS	2691.5	55.61	74.3		74.32	0.000048	1.48	7220.59	1685.12	0.07
P118-00-00	P118-R3-2	67245.8*	Max WS	2690.93	56.1	74.3		74.32	0.00005	1.5	7094.66	1638.22	0.08
P118-00-00	P118-R3-2	67179.3*	Max WS	2690.57	56.59	74.29		74.31	0.000051	1.51	6993.2	1591.32	0.08
P118-00-00	P118-R3-2	67112.9*	Max WS	2690.23	57.08	74.29		74.31	0.000053	1.52	6916.63	1544.42	0.08
P118-00-00	P118-R3-2	67046.4*	Max WS	2690.14	57.57	74.29		74.3	0.000054	1.51	6864.21	1497.51	0.08
P118-00-00	P118-R3-2	66980	Max WS	2686.02	58.06	74.28		74.3	0.000055	1.5	6837.02	1450.62	0.08
P118-00-00	P118-R3-2	66962.5*	Max WS	2683.23	58.34	74.28		74.3	0.000056	1.48	6770.64	1440.96	0.08
P118-00-00	P118-R3-2	66945.0*	Max WS	2669.66	58.62	74.28		74.3	0.000056	1.45	6705.03	1431.31	0.08
P118-00-00	P118-R3-2	66927.5*	Max WS	2663.52	58.9	74.28		74.3	0.000056	1.42	6642.61	1421.65	0.08
P118-00-00	P118-R3-2	66910	Max WS	2654.29	59.18	74.28		74.29	0.000056	1.39	6586.93	1392.25	0.08
P118-00-00	P118-R3-1	66730	Max WS	1723.74	56.42	74.28		74.29	0.000021	0.86	6760.91	1388.03	0.05
P118-00-00	P118-R3-1	66536.4*	Max WS	1677.98	55.69	74.28		74.28	0.000025	0.65	6540.98	1288.65	0.04
P118-00-00	P118-R3-1	66342.9*	Max WS	1683.38	54.97	74.27		74.28	0.000029	0.53	6300.39	1189.28	0.03
P118-00-00	P118-R3-1	66149.3*	Max WS	1681.59	54.24	74.27		74.27	0.000032	0.45	6039.38	1089.91	0.02
P118-00-00	P118-R3-1	65955.8	Max WS	1661.83	53.52	74.26		74.27	0.000014	0.71	5758.73	990.53	0.04
P118-00-00	P118-R3-1	65950		Lat Struct									
P118-00-00	P118-R3-1	65782.0*	Max WS	2018.96	53.38	74.26		74.27	0.000021	0.93	5754.23	951.65	0.05
P118-00-00	P118-R3-1	65608.3*	Max WS	2352.98	53.24	74.25		74.26	0.000031	1.2	5682.66	912.76	0.06
P118-00-00	P118-R3-1	65434.6	Max WS	2765.85	53.1	74.24		74.26	0.000051	1.57	5546.95	873.88	0.07
P118-00-00	P118-R3-1	65262.1*	Max WS	3147.57	53.01	74.22		74.24	0.000102	1.66	4934.43	762.68	0.08
P118-00-00	P118-R3-1	65089.6*	Max WS	3270.39	52.93	74.2		74.22	0.000164	1.64	4312.29	651.46	0.08
P118-00-00	P118-R3-1	64917.1*	Max WS	3553.43	52.85	74.15		74.18	0.000291	1.77	3675.31	540.25	0.08
P118-00-00	P118-R3-1	64744.6*	Max WS	3995.84	52.76	74.05		74.1	0.000563	2.09	3019.62	429.05	0.1
P118-00-00	P118-R3-1	64572.2*	Max WS	4120.24	52.67	73.88		73.95	0.000985	2.39	2355.46	317.84	0.11
P118-00-00	P118-R3-1	64399.74	Max WS	4097.39	52.59	73.69		73.86	0.000237	3.53	1713.55	206.63	0.16
P118-00-00	P118-R3-1	64273.7	Max WS	4008.68	53.55	73.7	61.96	73.73	0.000069	1.73	17426.85	5701.16	0.09
P118-00-00	P118-R3-1	64247.2		Bridge									
P118-00-00	P118-R3-1	64220.7	Max WS	3899.33	53.3	73.62		73.68	0.000108	2.18	18316.85	5683.63	0.11
P118-00-00	P118-R3-1	64200	Max WS	3855.04	53.3	73.61		73.68	0.000106	2.16	18304.06	5683.59	0.11
P118-00-00	P118-R2-2	64100	Max WS	8985.53	52.61	73.5		73.64	0.000185	3.35	34997.33	9446.98	0.16
P118-00-00	P118-R2-2	64094	Max WS	8989.76	52.61	73.5	62.71	73.64	0.000185	3.36	34989.55	9446.89	0.16
P118-00-00	P118-R2-2	64059.0 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	64024	Max WS	8952.91	52.56	73.36		73.5	0.00019	3.39	34132.73	9436.28	0.16
P118-00-00	P118-R2-2	64010.4	Max WS	8929.69	52.78	73.35	65.41	73.59	0.000372	4.63	33402.68	9456.56	0.22
P118-00-00	P118-R2-2	63985.4 RAILROAD		Bridge									
P118-00-00	P118-R2-2	63960.4	Max WS	8819.79	53.04	70.98	65.65	71.68	0.001126	7.02	9787.95	7894.44	0.37
P118-00-00	P118-R2-2	63959.7	Max WS	8844.04	53.06	71.03	62.52	71.34	0.000459	4.56	13477.4	8326.48	0.24
P118-00-00	P118-R2-2	63908.2 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	63856.7	Max WS	8762.3	53.16	70.85		71.18	0.000502	4.72	11153.62	8084.89	0.25
P118-00-00	P118-R2-2	62823.2	Max WS	8772.38	50.35	70.35		70.55	0.000612	4.83	8558.11	5067.31	0.26
P118-00-00	P118-R2-2	62701		Lat Struct									
P118-00-00	P118-R2-2	62700		Lat Struct									
P118-00-00	P118-R2-2	61905.2	Max WS	6974.19	50.77	69.57		70.06	0.000984	5.61	1243.63	132.2	0.32
P118-00-00	P118-R2-2	60625.3	Max WS	6198.86	49.52	69.26		69.63	0.00069	4.92	1261.15	121.4	0.27
P118-00-00	P118-R2-2	60600	Max WS	6181.5	49.52	68.8		69.25	0.000612	5.54	1205.06	121.4	0.27
P118-00-00	P118-R2-1	60595.74	Max WS	5880.79	49.48	68.65		69.13	0.00071	5.76	1138.14	131.55	0.28
P118-00-00	P118-R2-1	60594.74		Lat Struct									
P118-00-00	P118-R2-1	60594		Lat Struct									
P118-00-00	P118-R2-1	60583.6*	Max WS	6004.18	49.68	68.61		69.04	0.00063	5.45	1211.44	139.91	0.27
P118-00-00	P118-R2-1	60571.6*	Max WS	6167.1	49.89	68.56		68.96	0.000582	5.23	1279.95	148.28	0.26
P118-00-00	P118-R2-1	60559.5*	Max WS	6376.81	50.09	68.49		68.88	0.000558	5.08	1343.8	156.63	0.26
P118-00-00	P118-R2-1	60547.5*	Max WS	6567.96	50.3	68.44		68.81	0.000536	4.94	1407.42	157.02	0.25
P118-00-00	P118-R2-1	60535.46	Max WS	6741	50.5	68.39		68.74	0.000519	4.81	1473.7	160.33	0.25
P118-00-00	P118-R2-1	60396.4*	Max WS	6886.29	50.45	68.3		68.67	0.000569	4.93	1475	164.31	0.26
P118-00-00	P118-R2-1	60257.3*	Max WS	7007.99	50.4	68.23		68.61	0.000612	5.02	1479.58	169.83	0.27
P118-00-00	P118-R2-1	60118.3*	Max WS	7122.12	50.35	68.15		68.54	0.000649	5.09	1488.53	175.78	0.28
P118-00-00	P118-R2-1	59979.2*	Max WS	7258.74	50.3	68.06		68.47	0.000686	5.15	1499.09	177.2	0.28
P118-00-00	P118-R2-1	59840.2*	Max WS	7419.75	50.25	67.97		68.39	0.000726	5.22	1509.76	178.16	0.29
P118-00-00	P118-R2-1	59701.1*	Max WS	7607.28	50.2	67.87		68.31	0.000769	5.31	1520.94	179.13	0.3
P118-00-00	P118-R2-1	59562.1*	Max WS	7823.02	50.15	67.76		68.21	0.000817	5.4	1531.22	180.09	0.31
P118-00-00	P118-R2-1	59423.1	Max WS	8052.03	50.1	67.65		68.11	0.000882	5.5	1542	181.05	0.31
P118-00-00	P118-R2-1	59307.4*	Max WS	8153.37	50.1	67.56		68.03	0.0009	5.51	1573.07	196.49	0.32
P118-00-00	P118-R2-1	59191.8*	Max WS	8246.09	50.11	67.47		67.94	0.000916	5.51	1594.12	211.94	0.32
P118-00-00	P118-R2-1	59076.2*	Max WS	8424.49	50.11	67.36		67.84	0.000957	5.58	1601.48	227.38	0.33

HEC-RAS Plan: Alt2_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	58960.5*	Max WS	8569.02	50.11	67.25		67.74	0.000989	5.63	1598.74	242.82	0.33
P118-00-00	P118-R2-1	58844.9*	Max WS	8650.15	50.11	67.16		67.65	0.000999	5.62	1590.03	258.26	0.33
P118-00-00	P118-R2-1	58729.3*	Max WS	8744.19	50.12	67.06		67.55	0.001008	5.61	1585.69	233.77	0.33
P118-00-00	P118-R2-1	58613.7	Max WS	8907.07	50.12	66.95		67.45	0.001035	5.65	1590.94	223.93	0.34
P118-00-00	P118-R2-1	58463.86	Max WS	8906.78	47.59	66.93		67.29	0.000663	5.21	4272.07	3102.58	0.28
P118-00-00	P118-R2-1	58387.5	Max WS	8906.88	47.57	66.9	60.1	67.21	0.000574	4.81	4921.83	2874.6	0.26
P118-00-00	P118-R2-1	58359.5 ALDINE-WESTFIELD		Bridge									
P118-00-00	P118-R2-1	58331.5	Max WS	8906.13	47.51	66.42		66.8	0.000719	5.24	3834.92	2223.39	0.29
P118-00-00	P118-R2-1	57555.5	Max WS	8924.91	47.03	65.56		66.27	0.001209	7.36	3713.39	2157.68	0.37
P118-00-00	P118-R2-1	56998		Lat Struct									
P118-00-00	P118-R2-1	56513.3	Max WS	4802.87	46.03	64.95		65.24	0.000468	4.39	1870.38	1325.07	0.23
P118-00-00	P118-R2-1	56000		Lat Struct									
P118-00-00	P118-R2-1	55557.7	Max WS	2129.12	44.69	64.89		64.94	0.000084	1.84	3712.03	2471.67	0.09
P118-00-00	P118-R2-1	55000		Lat Struct									
P118-00-00	P118-R2-1	54459.2	Max WS	6733.29	44.27	64.24		64.65	0.000672	5.51	3871.18	2783.49	0.27
P118-00-00	P118-R2-1	53881		Lat Struct									
P118-00-00	P118-R2-1	53801.7	Max WS	9127.95	43.7	63.9		64.15	0.000351	4.09	4317	2223.33	0.21
P118-00-00	P118-R2-1	53275.7	Max WS	9127.51	43.36	63.69		64.01	0.000344	4.74	4628.52	3194.26	0.2
P118-00-00	P118-R2-1	52844.3	Max WS	9538.3	43.08	63.58	53	63.86	0.000322	4.35	5296.69	3405.28	0.2
P118-00-00	P118-R2-1	52815.3 BERTRAND RD		Bridge									
P118-00-00	P118-R2-1	52786.3	Max WS	9536.5	43.01	63.26		63.56	0.000352	4.48	4478.94	2938.72	0.21
P118-00-00	P118-R2-1	52465.7	Max WS	9535.53	43.2	63.1		63.45	0.000558	5	4226.06	2858.16	0.26
P118-00-00	P118-R2-1	52221.3	Max WS	9534.79	43.89	62.92	55.83	63.32	0.000721	5.39	4196.14	2953.68	0.29
P118-00-00	P118-R2-1	52207.8 UTILITY		Bridge									
P118-00-00	P118-R2-1	52194.3	Max WS	9529.6	43.8	62.56		63.03	0.000836	5.71	3437.88	2643.23	0.31
P118-00-00	P118-R2-1	51283.9	Max WS	9518.77	43.41	61.83		62.24	0.000833	5.57	6410.16	5688.66	0.31
P118-00-00	P118-R2-1	51096.9	Max WS	9517.19	42.91	61.69	53.62	62.07	0.000672	5.38	7003.31	6314.45	0.28
P118-00-00	P118-R2-1	51083.9 UTILITY		Bridge									
P118-00-00	P118-R2-1	51070.9	Max WS	9512.4	42.87	61.52		61.95	0.000732	5.57	6240.42	5906.74	0.29
P118-00-00	P118-R2-1	50549.6	Max WS	9506.79	42.3	61.26		61.53	0.000438	4.49	7252.54	6395.23	0.23
P118-00-00	P118-R2-1	50021.9	Max WS	9503.29	41.83	61.07	52.41	61.26	0.000329	3.95	10035.92	7437.68	0.2
P118-00-00	P118-R2-1	49980.9 HOPPER RD		Bridge									
P118-00-00	P118-R2-1	49939.9	Max WS	9496.78	41.69	60.86		61.06	0.000347	4.04	9506.6	7293.39	0.21
P118-00-00	P118-R2-1	49231.7	Max WS	9489.72	41.03	60.55		60.77	0.000532	4.51	9391.87	6768.58	0.25
P118-00-00	P118-R2-1	48480.5	Max WS	9484.61	41.23	60.19		60.39	0.000385	4.14	9502.69	6461.56	0.22
P118-00-00	P118-R2-1	48196.5	Max WS	9483.02	41.31	60.07	52.91	60.25	0.000399	4.1	9951.36	6659.63	0.22
P118-00-00	P118-R2-1	48183.0 UTILITY		Bridge									
P118-00-00	P118-R2-1	48169.5	Max WS	9482.03	41.24	59.96		60.14	0.000415	4.16	9655.92	6549.34	0.22
P118-00-00	P118-R2-1	47607.9	Max WS	9480.18	40.57	59.7		59.9	0.000499	4.38	10081.42	6972.76	0.24
P118-00-00	P118-R2-1	46939	Max WS	9479.73	40.79	59.37		59.52	0.000348	3.61	10755.34	6668.39	0.2
P118-00-00	P118-R2-1	46594.8	Max WS	9479.35	40.91	59.22	51.05	59.44	0.000354	4.42	12777.84	5859.48	0.21
P118-00-00	P118-R2-1	46584.8		Bridge									
P118-00-00	P118-R2-1	46579.8	Max WS	9479.25	40.91	59.11		59.38	0.000499	4.62	10712.7	6813.74	0.24
P118-00-00	P118-R2-1	46575.8	Max WS	9479.25	40.91	59.09	51.05	59.42	0.00057	4.93	8510.59	5965.28	0.26
P118-00-00	P118-R2-1	46560.8 LITTLE YORK RD		Bridge									
P118-00-00	P118-R2-1	46526.8	Max WS	9478.94	40.74	59.07		59.26	0.000362	4.2	13271.86	6474.93	0.21
P118-00-00	P118-R2-1	46516.8	Max WS	9478.9	40.74	59.06	50.89	59.24	0.000416	3.92	12508.39	6106.06	0.22
P118-00-00	P118-R2-1	46515.8		Bridge									
P118-00-00	P118-R2-1	46478.9	Max WS	9473.54	40.49	58.53		58.89	0.000744	5.18	8560.36	5858.94	0.29
P118-00-00	P118-R2-1	46468.9	Max WS	9472.96	40.49	58.52	52.23	58.88	0.000747	5.19	8513.82	5850.97	0.29
P118-00-00	P118-R2-1	46466.8		Bridge									
P118-00-00	P118-R2-1	46458.9	Max WS	9471.67	40.49	58.48		58.85	0.000765	5.24	8294.69	5804.13	0.3
P118-00-00	P118-R2-1	45952.3	Max WS	9451.07	40.12	58.13		58.34	0.000831	4.61	8032.54	4272.81	0.29
P118-00-00	P118-R2-1	45161.4	Max WS	8615.16	39.57	57.49		57.75	0.000891	4.79	7011.28	4037.09	0.27
P118-00-00	P118-R2-1	44549.9	Max WS	8354.18	38.76	57.11		57.36	0.000722	4.42	6192.35	3551.54	0.25
P118-00-00	P118-R2-1	44143.3	Max WS	8178	38.22	56.91		57.12	0.000602	4.11	6350.02	3907.69	0.23
P118-00-00	P118-R2-1	43789.5	Max WS	8273.86	37.97	56.85		56.92	0.000138	3.33	6092.28	1047.99	0.14
P118-00-00	P118-R2-1	43739.48	Max WS	8276.27	37.93	56.85		56.91	0.000103	2.88	6731.93	615.77	0.12
P118-00-00	P118-R2-1	43652.1*	Max WS	8276.25	37.87	56.85		56.9	0.000088	2.68	7481.5	749.7	0.11
P118-00-00	P118-R2-1	43564.8*	Max WS	8278.66	37.81	56.86		56.89	0.000068	2.35	8824.67	878.25	0.1
P118-00-00	P118-R2-1	43477.4*	Max WS	8283.46	37.75	56.86		56.88	0.000046	1.95	10794.26	1006.81	0.08
P118-00-00	P118-R2-1	43390.1*	Max WS	8281.84	37.68	56.86		56.87	0.00003	1.57	13084.54	1135.37	0.07
P118-00-00	P118-R2-1	43302.8*	Max WS	8285.05	37.62	56.86		56.87	0.000018	1.22	15425.89	1263.92	0.05
P118-00-00	P118-R2-1	43215.5	Max WS	8284.28	37.56	56.86		56.87	0.000014	1.07	16687.56	1392.48	0.04
P118-00-00	P118-R2-1	43118.0*	Max WS	8316.13	37.49	56.86		56.87	0.000021	1.31	15537	1278.56	0.05
P118-00-00	P118-R2-1	43020.4*	Max WS	8314.53	37.42	56.86		56.87	0.000027	1.5	13902.89	1164.65	0.06
P118-00-00	P118-R2-1	42922.9*	Max WS	8312.14	37.35	56.85		56.87	0.000033	1.66	12469.45	1050.73	0.07
P118-00-00	P118-R2-1	42825.49	Max WS	8308.92	37.28	56.85		56.86	0.000038	1.78	11562.21	936.81	0.07
P118-00-00	P118-R2-1	42736.8*	Max WS	8310.53	37.22	56.85		56.86	0.000035	1.73	11889.43	985.94	0.07
P118-00-00	P118-R2-1	42648.2*	Max WS	8305.66	37.15	56.84		56.86	0.00003	1.6	12652.4	1035.07	0.07
P118-00-00	P118-R2-1	42559.6*	Max WS	8304.81	37.09	56.84		56.85	0.000023	1.4	13548.82	1084.2	0.06
P118-00-00	P118-R2-1	42471	Max WS	8308.1	37.03	56.84		56.85	0.000012	1	13885.82	1133.33	0.04
P118-00-00	P118-R2-1	42395.8*	Max WS	8305.64	36.98	56.84		56.85	0.000015	1.12	14255.63	1170.13	0.05
P118-00-00	P118-R2-1	42320.7*	Max WS	8307.27	36.92	56.84		56.85	0.000009	0.87	15357.32	1206.93	0.04
P118-00-00	P118-R2-1	42245.55	Max WS	8307.26	36.87	56.84		56.85	0.000003	0.52	15811.09	1240.58	0.02
P118-00-00	P118-R2-1	42150.1*	Max WS	8303.16	36.8	56.84		56.85	0.000011	1	14435.65	1119.94	0.04

HEC-RAS Plan: Alt2_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	42054.6*	Max WS	8303.15	36.74	56.84		56.85	0.000016	1.18	12247.63	996.14	0.05
P118-00-00	P118-R2-1	41959.2*	Max WS	8299.03	36.67	56.84		56.85	0.000019	1.29	10782.69	872.34	0.05
P118-00-00	P118-R2-1	41863.8	Max WS	8297.32	36.6	56.83		56.85	0.000019	1.29	10585.1	748.55	0.05
P118-00-00	P118-R2-1	41771.7*	Max WS	8296.49	36.53	56.83		56.84	0.000027	1.54	10425.37	761.83	0.06
P118-00-00	P118-R2-1	41679.6*	Max WS	8296.48	36.47	56.83		56.84	0.000032	1.7	10276.87	775.11	0.07
P118-00-00	P118-R2-1	41587.5*	Max WS	8292.3	36.4	56.82		56.84	0.000038	1.83	10040.55	788.4	0.07
P118-00-00	P118-R2-1	41495.4*	Max WS	8287.25	36.34	56.82		56.84	0.000041	1.91	9894.11	801.68	0.08
P118-00-00	P118-R2-1	41403.3	Max WS	8289.75	36.27	56.82		56.84	0.000039	1.86	9800.62	814.96	0.07
P118-00-00	P118-R2-1	41285.4	Max WS	8103.55	36.27	56.57	45.29	57.31	0.000022	6.98	2408.53	3870.85	0.28
P118-00-00	P118-R2-1	41243.9 JENSEN DR		Bridge									
P118-00-00	P118-R2-1	41203.4	Max WS	8223.62	36.25	56.73	45.51	57.18	0.000015	5.93	2845.68	3961.04	0.23
P118-00-00	P118-R2-1	41197.4	Max WS	8077.96	36.25	56.55	45.25	57.28	0.000021	6.93	2427.29	3829.54	0.27
P118-00-00	P118-R2-1	41197.2 UTILITY		Bridge									
P118-00-00	P118-R2-1	41185.7	Max WS	7832.84	36.25	56.29		57.01	0.000011	6.87	2225.48	3357.48	0.27
P118-00-00	P118-R2-1	40951.8	Max WS	8007.18	36.2	56.47	43.42	56.63	0.000011	3.27	7936.83	3319.37	0.14
P118-00-00	P118-R2-1	40919.3 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40886.8	Max WS	8005.07	36.19	56.47		56.61	0.000011	3.2	7720.56	3252.77	0.14
P118-00-00	P118-R2-1	40846.9	Max WS	7990.58	36.18	56.45	44.32	56.65	0.000017	3.67	8348.86	3583.2	0.17
P118-00-00	P118-R2-1	40726.2 US HWY 59 (ML)		Bridge									
P118-00-00	P118-R2-1	40605.5	Max WS	7969.76	36.13	56.43		56.63	0.000017	3.66	7940.82	3440.66	0.17
P118-00-00	P118-R2-1	40584.6	Max WS	7978.05	36.13	56.43	44.29	56.62	0.00002	3.55	7027.73	3178.97	0.17
P118-00-00	P118-R2-1	40550.1 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40515.6	Max WS	7951.55	36.12	56.41		56.59	0.000019	3.51	7925.05	3479.56	0.17
P118-00-00	P118-R2-1	39969.8	Max WS	7984.03	36.01	56.44		56.46	0.000059	0.92	13442.66	4215.37	0.05
P118-00-00	P118-R2-1	39829.91	Max WS	9409.92	36	56.43		56.45	0.000017	1.11	12819.06	3923.6	0.06
P118-00-00	P118-R2-1	39188.6	Max WS	9411.67	35.6	56.44		56.44	0.000001	0.31	29544.6	4421.39	0.01
P118-00-00	P118-R2-1	38423.57	Max WS	9792.43	34.76	56.44		56.44	0.000001	0.37	26086	3330.48	0.02
P118-00-00	P118-R2-1	38170.2	Max WS	9791.87	34.35	56.43		56.44	0.000015	0.43	24047.14	3828.82	0.02
P118-00-00	P118-R2-1	37899.37	Max WS	9793.98	34.35	56.43		56.43	0.000001	0.47	24443.89	4164.7	0.02
P118-00-00	P118-R2-1	37413.16	Max WS	9793.38	34.13	56.43		56.43	0.000001	0.45	24746.97	4109.93	0.02
P118-00-00	P118-R2-1	37258.6	Max WS	9770.29	34.02	56.35		56.51	0.000458	4.13	8865.34	3578.39	0.18
P118-00-00	P118-R2-1	36408.6	Max WS	9709.8	32.39	56.17		56.26	0.000369	3.25	10839.11	4067.77	0.16
P118-00-00	P118-R2-1	36341.47	Max WS	9696.55	32.39	56.15	47.1	56.24	0.000385	3.32	10069.21	3514.8	0.17
P118-00-00	P118-R2-1	36330 UTILITY		Bridge									
P118-00-00	P118-R2-1	36321.56	Max WS	9676.26	32	56.09		56.2	0.000273	3.26	10009.05	3082.91	0.14
P118-00-00	P118-R2-1	36303.5	Max WS	9675.31	32	56.09		56.18	0.000227	3.01	10260.94	3126.45	0.13
P118-00-00	P118-R1-3	36195.78	Max WS	10888.08	32.04	55.97		56.14	0.000364	3.87	8285	2286.93	0.17
P118-00-00	P118-R1-3	36107.2	Max WS	10883.85	32	55.94		56.11	0.000363	3.87	7832.21	1914.97	0.17
P118-00-00	P118-R1-3	35434.7	Max WS	10884.22	31.72	55.66		55.99	0.000498	4.72	6316.61	1733.22	0.2
P118-00-00	P118-R1-3	35045.7	Max WS	10878.28	31.55	55.43	42.44	55.81	0.000575	5.04	4778.03	1497.48	0.21
P118-00-00	P118-R1-3	35025.9 RAILROAD		Bridge									
P118-00-00	P118-R1-3	35006.1	Max WS	10877.96	31.09	55.26		55.62	0.00054	4.94	5237.97	1637.85	0.21
P118-00-00	P118-R1-3	34984.3	Max WS	10872.3	30.53	55.23	43.51	55.65	0.000658	5.39	4367.31	1259.3	0.23
P118-00-00	P118-R1-3	34927.3 HIRSCH RD		Bridge									
P118-00-00	P118-R1-3	34870.3	Max WS	10870.77	30	54.88		55.31	0.000668	5.47	4624.71	1374.12	0.23
P118-00-00	P118-R1-3	33920.1	Max WS	10923.37	29.63	54.15		54.58	0.000908	5.91	4910.87	1533.32	0.26
P118-00-00	P118-R1-3	32749.8	Max WS	10978.98	28	52.97		53.47	0.00104	6.2	4239.96	1339.15	0.28
P118-00-00	P118-R1-3	31824.3	Max WS	11020.25	26.81	52.19		52.6	0.000742	5.58	4630.26	1560.49	0.24
P118-00-00	P118-R1-3	30679.1	Max WS	11046.77	27.05	51.31		51.76	0.000796	5.81	4524.08	1904.1	0.25
P118-00-00	P118-R1-3	30678.1		Lat Struct									
P118-00-00	P118-R1-3	30099.1	Max WS	10903.77	27.23	51.02		51.36	0.000487	4.96	4655.9	1895.33	0.2
P118-00-00	P118-R1-3	29757.8	Max WS	10882.97	27.34	50.82	38.66	51.21	0.000544	5.17	5561.2	2333.86	0.21
P118-00-00	P118-R1-3	29731.3 PARKER RD		Bridge									
P118-00-00	P118-R1-3	29704.8	Max WS	10869.03	27	50.67		50.97	0.000439	4.68	6044.55	2452.94	0.19
P118-00-00	P118-R1-3	28983.7	Max WS	10844.73	26.97	50.06		50.66	0.001034	6.5	3297.84	1291.96	0.28
P118-00-00	P118-R1-3	28387.3	Max WS	11634.52	26.04	49.73		50.1	0.000515	5.03	4380.7	1492.76	0.21
P118-00-00	P118-R1-3	27992	Max WS	11682.25	25.42	49.54		49.9	0.000598	5.35	4854.09	1111.79	0.22
P118-00-00	P118-R1-3	27567.7	Max WS	11692.45	25.74	49.35		49.68	0.000455	5.02	5387.72	1598.14	0.2
P118-00-00	P118-R1-3	27317	Max WS	11702.28	25.92	49.27	37.46	49.55	0.000428	4.8	6782.42	2404.42	0.19
P118-00-00	P118-R1-3	27306.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27305.8	Max WS	11682.78	25.93	48.87		49.32	0.000601	5.66	5891.56	2238.93	0.23
P118-00-00	P118-R1-3	27295.8	Max WS	11682.5	25.93	48.86	37.29	49.32	0.000602	5.66	5877.28	2236.21	0.23
P118-00-00	P118-R1-3	27242.8 HOMESTEAD RD		Bridge									
P118-00-00	P118-R1-3	27189.8	Max WS	11625.16	25.89	48.22		48.76	0.000715	6.04	4610.72	1979.37	0.25
P118-00-00	P118-R1-3	27180.8	Max WS	11625.1	25.89	48.22	37.23	48.75	0.000716	6.04	4596.94	1976.4	0.25
P118-00-00	P118-R1-3	27179.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27167.5	Max WS	11631.2	25.84	48.3		48.64	0.000495	4.97	4725.66	2035.86	0.21
P118-00-00	P118-R1-3	26816.8*	Max WS	11613.38	25.02	48.08		48.45	0.000557	5	3536.06	1139.94	0.22
P118-00-00	P118-R1-3	26815.8		Lat Struct									
P118-00-00	P118-R1-3	26466.1	Max WS	11532.97	24.2	47.89		48.26	0.000646	4.98	3082.81	777.67	0.23
P118-00-00	P118-R1-3	26224.4*	Max WS	11487.8	23.64	47.74		48.09	0.000585	4.83	2816.78	318.12	0.22
P118-00-00	P118-R1-3	25982.8	Max WS	11521.31	23.07	47.63		47.96	0.000532	4.69	3011.66	372.6	0.21
P118-00-00	P118-R1-3	25318.4	Max WS	11469.93	23.07	47.29		47.61	0.000532	4.63	3303.66	648.79	0.21
P118-00-00	P118-R1-3	25317.4		Lat Struct									
P118-00-00	P118-R1-3	24564.2	Max WS	11345.26	21.76	46.9		47.23	0.000459	4.69	3701.5	1244.12	0.2
P118-00-00	P118-R1-3	23984.6	Max WS	12959.94	20.75	46.65		46.94	0.000434	4.67	4475.42	581.65	0.19

HEC-RAS Plan: Alt2_500_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R1-2	23796.2	Max WS	13538.53	24.42	46.5		46.84	0.000406	4.76	3812.28	714.38	0.21
P118-00-00	P118-R1-2	23795.2		Lat Struct									
P118-00-00	P118-R1-2	23286.2	Max WS	13697.38	20.82	46.18		46.59	0.000647	5.22	3373.17	588.52	0.23
P118-00-00	P118-R1-2	22973.4	Max WS	13560.06	20.85	46.01	33.05	46.38	0.000557	4.96	6024.78	1537.52	0.21
P118-00-00	P118-R1-2	22951.4 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22929.4	Max WS	13558.58	20.49	45.86		46.23	0.000537	4.91	6167.39	1258.5	0.21
P118-00-00	P118-R1-2	22928.4		Lat Struct									
P118-00-00	P118-R1-2	22630.3	Max WS	13321.19	19.11	45.42	34.6	46.07	0.001258	6.51	2060.38	175.04	0.31
P118-00-00	P118-R1-2	22609.0 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22587.7	Max WS	13312.02	18.99	45		45.69	0.001357	6.66	2013.1	170.29	0.32
P118-00-00	P118-R1-2	22577.7	Max WS	13302.95	18.99	44.99		45.68	0.001357	6.66	2015.6	176.4	0.32
P118-00-00	P118-R1-1	22186.8	Max WS	12023.02	18.55	44.56		45.14	0.000842	6.16	2285.51	287.33	0.25
P118-00-00	P118-R1-1	22185.8		Lat Struct									
P118-00-00	P118-R1-1	21829	Max WS	12808.7	18.16	44.67		44.94	0.000361	4.25	3461.98	336.46	0.17
P118-00-00	P118-R1-1	21589.8	Max WS	14106.57	17.9	44.18		44.77	0.000736	6.39	2761.99	265.72	0.25
P118-00-00	P118-R1-1	21362	Max WS	14044.57	17.65	43.96		44.67	0.000069	6.8	2706	366.36	0.27
P118-00-00	P118-R1-1	21361		Lat Struct									
P118-00-00	P118-R1-1	21360	Max WS	14040.5	17.65	43.95	32.19	44.66	0.00007	6.8	2704.36	366.08	0.27
P118-00-00	P118-R1-1	21333.0 WAYSIDE DR		Bridge									
P118-00-00	P118-R1-1	21304	Max WS	14039.85	17.62	43.85		44.57	0.00007	6.83	2678.56	361.45	0.27
P118-00-00	P118-R1-1	21010.4	Max WS	14036.78	18.08	43.95	30.45	44.45	0.000602	6.43	4074.33	676	0.23
P118-00-00	P118-R1-1	20948.9 TIDWELL RD (WB)		Bridge									
P118-00-00	P118-R1-1	20887.4	Max WS	14036.78	17.96	43.82		44.32	0.000603	6.43	4067.15	671.43	0.23
P118-00-00	P118-R1-1	20880.6	Max WS	14034.02	17.96	43.39	33.08	44.67	0.000117	9.52	3270.74	295.34	0.36
P118-00-00	P118-R1-1	20869.6 TIDWELL RD (EB)		Bridge									
P118-00-00	P118-R1-1	20858.6	Max WS	14034.02	17.96	43.36		44.64	0.000118	9.54	3261.27	288.32	0.36
P118-00-00	P118-R1-1	20857.6		Lat Struct									
P118-00-00	P118-R1-1	19860	Max WS	13382.99	19.24	43.12		43.87	0.001158	7.14	2334.19	597.55	0.31
P118-00-00	P118-R1-1	18597.4	Max WS	14935.7	15.56	41.71		42.49	0.000832	7.39	2747.16	208.13	0.28
P118-00-00	P118-R1-1	18107.1	Max WS	14912.74	15.21	41.66		41.99	0.000597	4.62	3359.11	361.44	0.22
P118-00-00	P118-R1-1	17862.9*	Max WS	14895.18	14.55	41.57		41.87	0.000471	4.43	3562.65	371.38	0.2
P118-00-00	P118-R1-1	17618.7*	Max WS	14853.56	13.89	41.49		41.78	0.000393	4.33	3742.88	404.57	0.18
P118-00-00	P118-R1-1	17374.5*	Max WS	14863.6	13.23	41.38		41.68	0.000359	4.38	3639.61	334.18	0.18
P118-00-00	P118-R1-1	17130.3	Max WS	15286.82	12.57	41.26		41.58	0.000361	4.59	3666.35	363.29	0.18
P118-00-00	P118-R1-1	16004	Max WS	16554.75	11.24	40.75		41.09	0.00047	4.68	4206.26	1043.47	0.19
P118-00-00	P118-R1-1	15045.6	Max WS	17340.69	10.55	39.93		40.48	0.000788	6.02	3271.51	468.08	0.25
P118-00-00	P118-R1-1	13937.2	Max WS	17322.91	11.62	39.38		39.8	0.000551	5.92	5860.99	617.53	0.22
P118-00-00	P118-R1-1	13341.9	Max WS	17295.52	10.38	38.89		39.48	0.000799	7.13	4616.98	406.23	0.27
P118-00-00	P118-R1-1	12945.5	Max WS	17270.71	9.55	38.78	27.63	39.12	0.000495	5.75	6246.94	634.54	0.21
P118-00-00	P118-R1-1	12935.0 UTILITY		Bridge									
P118-00-00	P118-R1-1	12932.7	Max WS	17270.71	9.53	38.64		38.98	0.000508	5.8	6167.78	628.96	0.21
P118-00-00	P118-R1-1	12931.7	Max WS	17270.62	9.53	38.64	27.58	38.98	0.000508	5.8	6167.44	628.94	0.21
P118-00-00	P118-R1-1	12904.8 MESA RD		Bridge									
P118-00-00	P118-R1-1	12877.9	Max WS	17270.41	8.77	37.75		38.1	0.000521	5.85	6090.74	623.56	0.21
P118-00-00	P118-R1-1	12117.3	Max WS	17269.23	7.23	37.34		37.73	0.000407	5.46	4381.36	358.42	0.19
P118-00-00	P118-R1-1	10905.1	Max WS	18823.03	9.54	36.14		36.94	0.000947	7.42	3624.43	408.87	0.29
P118-00-00	P118-R1-1	9879.2	Max WS	18809.08	6.26	34.63		35.83	0.001536	9.55	3306.76	249.23	0.36
P118-00-00	P118-R1-1	8777	Max WS	18802.99	4.71	34.04		34.23	0.000339	4.2	9917.89	878.99	0.17
P118-00-00	P118-R1-1	8024.4	Max WS	18800.4	4.73	33.61		33.99	0.000487	5.5	6100.49	433.1	0.21
P118-00-00	P118-R1-1	6779.3	Max WS	18796.86	4.44	32.81		33.29	0.000683	5.98	5404.88	526.25	0.24
P118-00-00	P118-R1-1	5748.4	Max WS	18792.63	4.27	31.39		32.4	0.001554	8.95	4139	446.06	0.35
P118-00-00	P118-R1-1	4492	Max WS	18790.32	1.92	30.09		30.72	0.000837	6.58	4087.48	403.96	0.26
P118-00-00	P118-R1-1	3597.9	Max WS	18789.44	2.46	29.38		29.95	0.000945	6.88	5243.04	574.7	0.28
P118-00-00	P118-R1-1	2709.4	Max WS	18788.98	1.59	28.49		29.13	0.000963	7.4	5310.34	484.71	0.29
P118-00-00	P118-R1-1	1695.9	Max WS	18788.76	1.52	27.21		28.06	0.001358	8.57	4466.16	377.13	0.34
P118-00-00	P118-R1-1	678.7	Max WS	18788.67	0.81	24.56	19.26	26.24	0.0028	10.96	2532.62	253.09	0.47

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River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-27-00	P118-27-00	6259.79	Max WS	5	72.56	77.38		77.38	0	0.06	81.75	26.97	0.01
P118-27-00	P118-27-00	6250		Lat Struct									
P118-27-00	P118-27-00	6240		Lat Struct									
P118-27-00	P118-27-00	5780.54	Max WS	4.99	72.31	77.38		77.38	0	0.06	86.27	26.83	0.01
P118-27-00	P118-27-00	5321.96	Max WS	43.16	72.13	77.37		77.37	0.000004	0.48	89.51	211.53	0.05
P118-27-00	P118-27-00	5310		Lat Struct									
P118-27-00	P118-27-00	4831.58	Max WS	90.14	71.84	77.34		77.36	0.000015	0.96	93.81	72.77	0.09
P118-27-00	P118-27-00	4300.35	Max WS	138.51	71.56	77.3		77.33	0.000031	1.41	97.89	67.54	0.13
P118-27-00	P118-27-00	4290		Lat Struct									
P118-27-00	P118-27-00	3803.92	Max WS	180.93	71.38	77.24		77.29	0.000047	1.78	101.82	94.86	0.16
P118-27-00	P118-27-00	3444.22	Max WS	46.16	71.25	77.23		77.23	0.000003	0.44	105.21	27.32	0.04
P118-27-00	P118-27-00	3374.42	Max WS	110.96	71.25	77.2		77.22	0.000017	1.04	106.5	29.8	0.1
P118-27-00	P118-27-00	3370		Lat Struct									
P118-27-00	P118-27-00	3011.6	Max WS	111.46	70.4	77.2		77.21	0.00001	0.88	132.1	133.6	0.08
P118-27-00	P118-27-00	2525.84	Max WS	119.07	70	77.2		77.21	0.000008	0.8	195.54	145.31	0.07
P118-27-00	P118-27-00	2485.48	Max WS	119.93	69.9	77.2		77.21	0.000008	0.8	150.24	42.25	0.07
P118-27-00	P118-27-00	2458.24 Access Road 2		Culvert									
P118-27-00	P118-27-00	2431.78	Max WS	119.93	69.9	77.18		77.19	0.000008	0.8	149.71	94.88	0.07
P118-27-00	P118-27-00	2420		Lat Struct									
P118-27-00	P118-27-00	2398.35	Max WS	120.38	69.85	77.18		77.19	0.000008	0.79	151.46	75.85	0.07
P118-27-00	P118-27-00	2381.57	Max WS	120.72	69.85	77.18		77.19	0.000008	0.8	151.46	56.2	0.07
P118-27-00	P118-27-00	2351.35	Max WS	121.13	69.8	77.18		77.19	0.000008	0.79	158.07	69.02	0.07
P118-27-00	P118-27-00	2326.32 Access Road 1		Culvert									
P118-27-00	P118-27-00	2292.65	Max WS	121.16	69.8	77.17		77.18	0.000008	0.79	179.81	121.54	0.07
P118-27-00	P118-27-00	2280		Lat Struct									
P118-27-00	P118-27-00	2238.14	Max WS	117.2	69.77	77.17		77.18	0.000007	0.76	153.84	136.48	0.06
P118-27-00	P118-27-00	1817.26	Max WS	95.22	68.6	77.17		77.18	0.000002	0.48	243.58	205.46	0.04
P118-27-00	P118-27-00	1360.33	Max WS	84.09	66.5	77.18		77.18	0.000001	0.29	361.53	286.88	0.02
P118-27-00	P118-27-00	1314.62	Max WS	83.46	66	77.17		77.18	0	0.27	325.19	2704.11	0.02
P118-27-00	P118-27-00	1285.51 W. Gulf Bank Roa		Culvert									
P118-27-00	P118-27-00	1255.05	Max WS	82.77	65.96	77.16		77.16	0	0.26	332.98	2383	0.02
P118-27-00	P118-27-00	1198.35	Max WS	80.42	65.9	77.16		77.16	0	0.25	401.07	1356.56	0.02
P118-27-00	P118-27-00	763.46	Max WS	90.49	65.3	77.16		77.16	0	0.25	786.52	1387.83	0.02
P118-27-00	P118-27-00	465.31	Max WS	74.49	64.85	77.16		77.16	0	0.2	446.32	704.29	0.01
P118-27-00	P118-27-00	448.57	Max WS	73.05	64.8	77.16	66.21	77.16	0	0.16	1674.79	714.8	0.01
P118-27-00	P118-27-00	443.86 Concrete Footbri		Bridge									
P118-27-00	P118-27-00	438.14	Max WS	73.05	64.8	77.16		77.16	0	0.2	480.65	739.5	0.01
P118-27-00	P118-27-00	429.17	Max WS	72.12	64.7	77.16	66.1	77.16	0	0.19	522.58	786.4	0.01
P118-27-00	P118-27-00	423.08 Wood Footbridge		Bridge									
P118-27-00	P118-27-00	415.49	Max WS	72.12	64.7	77.16		77.16	0	0.16	1567.95	782.43	0.01
P118-27-00	P118-27-00	399.43	Max WS	70.39	64.6	77.16		77.16	0	0.19	452.95	769.68	0.01
P118-27-00	P118-27-00	310	Max WS	50.01	65.51	77.19	66.71	77.19	0.000001	0.1	598.53	125.68	0.01
P118-00-00	P118-R3-4	76394.4	Max WS	5559.7	61.33	78.11		78.24	0.000398	4.12	7073.64	3950.84	0.21
P118-00-00	P118-R3-4	75489.4	Max WS	5522.89	61.15	77.74		77.89	0.000445	4.31	6692.75	3718.55	0.22
P118-00-00	P118-R3-4	75400		Lat Struct									
P118-00-00	P118-R3-4	74253.7	Max WS	4471.53	60.14	77.24		77.41	0.000402	4.04	4067.98	2191.28	0.21
P118-00-00	P118-R3-4	73879.2	Max WS	4149.94	60.08	77.14		77.26	0.000263	3.38	4397.67	2355.33	0.17
P118-00-00	P118-R3-4	73828	Max WS	4290.79	60.08	77.1		77.28	0.000348	3.88	3510.25	1829.28	0.2
P118-00-00	P118-R3-4	73723	Max WS	4590.7	60.05	77.05		77.24	0.000385	4.08	3706.73	2052.43	0.21
P118-00-00	P118-R3-4	73423.3	Max WS	5476.66	60	76.94	69.35	77.11	0.000572	4.03	4961.62	3099.87	0.2
P118-00-00	P118-R3-4	73377.8 AIRLINE DRIVE		Bridge									
P118-00-00	P118-R3-4	73332.3	Max WS	5463.76	59.83	75.93	69.15	76.41	0.001296	5.8	2170.88	2697.09	0.29
P118-00-00	P118-R3-4	73232.3	Max WS	5460.28	59.83	75.74	69.15	76.31	0.001487	6.14	1666.71	2658.87	0.31
P118-00-00	P118-R3-4	72741.86	Max WS	5448.36	59.56	75.13		75.55	0.001364	5.33	1650.99	969.48	0.3
P118-00-00	P118-R3-2	72585.49	Max WS	5545.7	58.54	74.9		75.38	0.001319	5.75	1703.59	949.62	0.33
P118-00-00	P118-R3-2	72405.2	Max WS	5536.74	58.25	74.71		75.12	0.001314	5.46	2058.25	1017.95	0.32
P118-00-00	P118-R3-2	72221.5*	Max WS	5528.84	58.11	74.53		74.87	0.00113	4.88	2255.17	1352.39	0.3
P118-00-00	P118-R3-2	72037.8*	Max WS	5523.16	57.97	74.4		74.67	0.000791	4.3	2412.09	1530.05	0.26
P118-00-00	P118-R3-2	71854.2	Max WS	5518.3	57.83	74.32		74.52	0.000541	3.73	2757.44	1815.61	0.21
P118-00-00	P118-R3-2	71760	Max WS	5544.35	57.37	74.21		74.41	0.00054	3.74	2791.99	1776.23	0.21
P118-00-00	P118-R3-2	71754.2		Lat Struct									
P118-00-00	P118-R3-2	71556.8*	Max WS	5534.88	56.91	74.11		74.31	0.000528	3.71	2838.16	1759.86	0.21
P118-00-00	P118-R3-2	71353.6*	Max WS	5459.1	56.44	74.02		74.21	0.000496	3.61	2899.98	1728.47	0.21
P118-00-00	P118-R3-2	71150.5*	Max WS	5443.33	55.98	73.93		74.11	0.000471	3.54	2980.16	1692.08	0.2
P118-00-00	P118-R3-2	70947.3*	Max WS	5398.04	55.51	73.85		74.02	0.000436	3.43	3072.31	1666.65	0.19
P118-00-00	P118-R3-2	70744.2	Max WS	5319.21	55.05	73.78		73.94	0.000376	3.3	3183.71	1625.18	0.18
P118-00-00	P118-R3-2	70743.2		Lat Struct									
P118-00-00	P118-R3-2	70570.3*	Max WS	5266.31	55.08	73.73		73.88	0.000349	3.23	3291.64	1633.35	0.18
P118-00-00	P118-R3-2	70396.4*	Max WS	5209.82	55.12	73.68		73.83	0.000323	3.16	3407.01	1647.92	0.17
P118-00-00	P118-R3-2	70222.6*	Max WS	5147.6	55.15	73.64		73.78	0.0003	3.09	3528.41	1678.57	0.17
P118-00-00	P118-R3-2	70048.7*	Max WS	5080.21	55.18	73.6		73.73	0.000279	3.02	3665.47	1735.44	0.16
P118-00-00	P118-R3-2	69874.9*	Max WS	5009.46	55.21	73.57		73.69	0.000259	2.94	3818.25	1747.98	0.16
P118-00-00	P118-R3-2	69701.0*	Max WS	4932.08	55.25	73.53		73.65	0.000239	2.85	3972.52	1736.87	0.15
P118-00-00	P118-R3-2	69527.2	Max WS	4850.37	55.28	73.5		73.61	0.000221	2.77	4129.48	1725.75	0.15
P118-00-00	P118-R3-2	69327.7*	Max WS	4731.39	55.16	73.47		73.58	0.000211	2.81	4100.71	1773.81	0.15
P118-00-00	P118-R3-2	69128.2*	Max WS	4556.09	55.05	73.44		73.54	0.000206	2.81	4081.21	1821.86	0.14

HEC-RAS Plan: Alt2_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R3-2	68928.8*	Max WS	4438.17	54.93	73.41		73.51	0.000198	2.86	4066.7	1869.92	0.15
P118-00-00	P118-R3-2	68729.3*	Max WS	4318.24	54.82	73.38		73.49	0.0002	2.9	4062.06	1917.98	0.15
P118-00-00	P118-R3-2	68529.9*	Max WS	4194.63	54.7	73.32		73.47	0.000234	3.23	2837.42	1966.04	0.16
P118-00-00	P118-R3-2	68330.4*	Max WS	4071.8	54.59	73.28		73.44	0.000253	3.38	2433.22	1147.5	0.17
P118-00-00	P118-R3-2	68131	Max WS	3950.73	54.47	73.23		73.41	0.000265	3.55	2243.39	1140.13	0.18
P118-00-00	P118-R3-2	68130		Lat Struct									
P118-00-00	P118-R3-2	67976.1*	Max WS	3894.85	54.39	73.2		73.37	0.000261	3.49	2602.44	1166.18	0.17
P118-00-00	P118-R3-2	67821.3*	Max WS	3794.12	54.31	73.18		73.33	0.000248	3.34	2984.04	1194.41	0.17
P118-00-00	P118-R3-2	67666.4*	Max WS	3540.32	54.22	73.17		73.28	0.000212	3.03	3398.23	1220.97	0.15
P118-00-00	P118-R3-2	67511.6	Max WS	3277.84	54.14	73.15		73.24	0.000176	2.7	3833.64	1244.83	0.14
P118-00-00	P118-R3-2	67445.1*	Max WS	3264.99	54.63	73.16		73.21	0.000129	2.3	5501.65	1773.82	0.12
P118-00-00	P118-R3-2	67378.7*	Max WS	3247.7	55.12	73.15		73.2	0.000134	2.34	5368.39	1732.01	0.12
P118-00-00	P118-R3-2	67312.2*	Max WS	3228.65	55.61	73.14		73.19	0.000139	2.37	5259.72	1685.12	0.12
P118-00-00	P118-R3-2	67245.8*	Max WS	3205.58	56.1	73.13		73.18	0.000143	2.38	5177.65	1638.22	0.13
P118-00-00	P118-R3-2	67179.3*	Max WS	3184.94	56.59	73.12		73.17	0.000147	2.38	5120.79	1591.32	0.13
P118-00-00	P118-R3-2	67112.9*	Max WS	3162.05	57.08	73.11		73.16	0.00015	2.37	5089.77	1544.42	0.13
P118-00-00	P118-R3-2	67046.4*	Max WS	3141	57.57	73.1		73.15	0.000152	2.35	5083.82	1497.51	0.13
P118-00-00	P118-R3-2	66980	Max WS	3121.47	58.06	73.09		73.13	0.000154	2.32	5103.71	1450.62	0.13
P118-00-00	P118-R3-2	66962.5*	Max WS	3119	58.34	73.09		73.13	0.000156	2.29	5045.26	1440.96	0.13
P118-00-00	P118-R3-2	66945.0*	Max WS	3105.23	58.62	73.08		73.13	0.000158	2.25	4987.44	1431.31	0.13
P118-00-00	P118-R3-2	66927.5*	Max WS	3100.75	58.9	73.08		73.12	0.000159	2.2	4936.92	1400.25	0.13
P118-00-00	P118-R3-2	66910	Max WS	3097.69	59.18	73.08		73.11	0.00016	2.15	4919.59	1376.89	0.13
P118-00-00	P118-R3-1	66730	Max WS	2824.69	56.42	73.06		73.09	0.000114	1.85	5064.33	1381.45	0.11
P118-00-00	P118-R3-1	66536.4*	Max WS	2778.84	55.69	73.04		73.06	0.00015	1.45	4946.04	1288.65	0.09
P118-00-00	P118-R3-1	66342.9*	Max WS	2751.8	54.97	73.01		73.02	0.000175	1.18	4799.45	1189.28	0.07
P118-00-00	P118-R3-1	66149.3*	Max WS	2742.62	54.24	72.98		72.99	0.00019	1	4631.31	1089.91	0.06
P118-00-00	P118-R3-1	65955.8	Max WS	2737.98	53.52	72.94		72.97	0.000073	1.49	4450.69	990.53	0.09
P118-00-00	P118-R3-1	65950		Lat Struct									
P118-00-00	P118-R3-1	65782.0*	Max WS	3096.32	53.38	72.92		72.95	0.000089	1.8	4480.78	951.65	0.1
P118-00-00	P118-R3-1	65608.3*	Max WS	3447.83	53.24	72.89		72.94	0.000115	2.18	4443.89	912.76	0.11
P118-00-00	P118-R3-1	65434.6	Max WS	3901.02	53.1	72.85		72.93	0.000175	2.75	4335.11	873.88	0.13
P118-00-00	P118-R3-1	65262.1*	Max WS	4174.21	53.01	72.8		72.88	0.000326	2.77	3851.26	762.68	0.14
P118-00-00	P118-R3-1	65089.6*	Max WS	4177.36	52.93	72.72		72.79	0.000506	2.69	3352.98	651.46	0.13
P118-00-00	P118-R3-1	64917.1*	Max WS	4332.81	52.85	72.58		72.66	0.000857	2.82	2829.81	540.25	0.14
P118-00-00	P118-R3-1	64744.6*	Max WS	4582.06	52.76	72.32		72.43	0.001574	3.21	2277.04	429.05	0.16
P118-00-00	P118-R3-1	64572.2*	Max WS	4618.29	52.67	71.83		72	0.002984	3.75	1703.3	317.84	0.19
P118-00-00	P118-R3-1	64399.74	Max WS	4576.23	52.59	71.33		71.7	0.000604	4.99	1227.25	202.22	0.25
P118-00-00	P118-R3-1	64273.7	Max WS	4577.61	53.55	71.37	62.55	71.5	0.000309	3.17	5755.27	2991.89	0.18
P118-00-00	P118-R3-1	64247.2		Bridge									
P118-00-00	P118-R3-1	64220.7	Max WS	4561.43	53.3	71.23		71.42	0.000389	3.58	6081.25	3284.92	0.21
P118-00-00	P118-R3-1	64200	Max WS	4556.89	53.3	71.23		71.41	0.000389	3.58	6055.31	3264.51	0.21
P118-00-00	P118-R2-2	64100	Max WS	6455.5	52.61	71.2		71.36	0.000229	3.32	13860.85	8598.35	0.17
P118-00-00	P118-R2-2	64094	Max WS	6455.24	52.61	71.2	61.26	71.36	0.000229	3.32	13851.07	8597.7	0.17
P118-00-00	P118-R2-2	64059.0 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	64024	Max WS	6455.24	52.56	71.13		71.29	0.00023	3.33	13720.22	8588.85	0.17
P118-00-00	P118-R2-2	64010.4	Max WS	6454.09	52.78	71.11	63.62	71.44	0.000519	4.87	12882.97	8351.53	0.25
P118-00-00	P118-R2-2	63985.4 RAILROAD		Bridge									
P118-00-00	P118-R2-2	63960.4	Max WS	6453.7	53.04	69.94	63.89	70.46	0.000922	5.96	3597.27	3579.61	0.33
P118-00-00	P118-R2-2	63959.7	Max WS	6453.91	53.06	70.02	61.2	70.24	0.000347	3.79	5916.06	5298.2	0.2
P118-00-00	P118-R2-2	63908.2 HARDY TOLL ROAD		Bridge									
P118-00-00	P118-R2-2	63856.7	Max WS	6453.65	53.16	69.92		70.15	0.000372	3.89	4944.61	4423.44	0.21
P118-00-00	P118-R2-2	62823.2	Max WS	6495.35	50.35	69.42		69.66	0.000681	4.79	4740.18	2886.68	0.27
P118-00-00	P118-R2-2	62701		Lat Struct									
P118-00-00	P118-R2-2	62700		Lat Struct									
P118-00-00	P118-R2-2	61905.2	Max WS	5901.1	50.77	68.6		69.03	0.000997	5.3	1114.37	132.2	0.32
P118-00-00	P118-R2-2	60625.3	Max WS	5740.65	49.52	68.05		68.46	0.000873	5.15	1114.49	121.4	0.3
P118-00-00	P118-R2-2	60600	Max WS	5737.42	49.52	67.45		67.97	0.00079	5.86	1042.13	121.4	0.3
P118-00-00	P118-R2-1	60595.74	Max WS	5548.6	49.48	67.19		67.8	0.00103	6.4	945.83	131.55	0.34
P118-00-00	P118-R2-1	60594.74		Lat Struct									
P118-00-00	P118-R2-1	60594		Lat Struct									
P118-00-00	P118-R2-1	60583.6*	Max WS	5757.56	49.68	67.08		67.66	0.000961	6.18	997.98	139.16	0.33
P118-00-00	P118-R2-1	60571.6*	Max WS	5909.47	49.89	67.01		67.54	0.000887	5.9	1054.81	137.28	0.32
P118-00-00	P118-R2-1	60559.5*	Max WS	6010.89	50.09	66.96		67.44	0.000817	5.62	1116.46	140.49	0.31
P118-00-00	P118-R2-1	60547.5*	Max WS	6087.36	50.3	66.91		67.35	0.00076	5.36	1177.06	145.95	0.29
P118-00-00	P118-R2-1	60535.46	Max WS	6161.02	50.5	66.86		67.27	0.000718	5.15	1235.21	152.5	0.29
P118-00-00	P118-R2-1	60396.4*	Max WS	6217.17	50.45	66.77		67.2	0.000779	5.23	1229.63	156.46	0.3
P118-00-00	P118-R2-1	60257.3*	Max WS	6242.87	50.4	66.69		67.12	0.000825	5.27	1227.6	160.42	0.3
P118-00-00	P118-R2-1	60118.3*	Max WS	6258.16	50.35	66.61		67.05	0.000862	5.28	1229.46	164.42	0.31
P118-00-00	P118-R2-1	59979.2*	Max WS	6284.63	50.3	66.53		66.96	0.000895	5.28	1233.69	168.36	0.31
P118-00-00	P118-R2-1	59840.2*	Max WS	6324.43	50.25	66.45		66.88	0.000927	5.29	1240.09	172.31	0.32
P118-00-00	P118-R2-1	59701.1*	Max WS	6380.03	50.2	66.35		66.79	0.000957	5.3	1249.2	176.26	0.32
P118-00-00	P118-R2-1	59562.1*	Max WS	6453.17	50.15	66.26		66.69	0.000988	5.31	1259.89	180.09	0.33
P118-00-00	P118-R2-1	59423.1	Max WS	6533.5	50.1	66.16		66.59	0.001019	5.31	1272.27	181.05	0.33
P118-00-00	P118-R2-1	59307.4*	Max WS	6542.09	50.1	66.07		66.51	0.001029	5.28	1280.93	196.49	0.33
P118-00-00	P118-R2-1	59191.8*	Max WS	6545.22	50.11	65.99		66.42	0.001035	5.25	1279.86	211.94	0.33
P118-00-00	P118-R2-1	59076.2*	Max WS	6586.25	50.11	65.89		66.32	0.001052	5.24	1268.1	227.38	0.33

HEC-RAS Plan: Alt2_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	58960.5*	Max WS	6605.56	50.11	65.81		66.23	0.001054	5.2	1271.38	173.81	0.33
P118-00-00	P118-R2-1	58844.9*	Max WS	6605.35	50.11	65.73		66.14	0.001038	5.13	1288.47	173.36	0.33
P118-00-00	P118-R2-1	58729.3*	Max WS	6615.06	50.12	65.66		66.05	0.000943	5.05	1308.71	166.16	0.32
P118-00-00	P118-R2-1	58613.7	Max WS	6667.92	50.12	65.58		65.97	0.000818	5	1334.15	154.22	0.3
P118-00-00	P118-R2-1	58463.86	Max WS	6667.89	47.59	65.42		65.85	0.000816	5.27	1305.89	1054.47	0.3
P118-00-00	P118-R2-1	58387.5	Max WS	6667.89	47.57	65.46	58.81	65.78	0.000652	4.65	2228.67	1034.62	0.27
P118-00-00	P118-R2-1	58359.5 ALDINE-WESTFIELD		Bridge									
P118-00-00	P118-R2-1	58331.5	Max WS	6667.89	47.51	65.34		65.67	0.000669	4.69	2172.57	989.58	0.27
P118-00-00	P118-R2-1	57555.5	Max WS	6685.66	47.03	64.34	57.54	65.09	0.001252	7.03	1601.01	1419.9	0.37
P118-00-00	P118-R2-1	56998		Lat Struct									
P118-00-00	P118-R2-1	56513.3	Max WS	3497.05	46.03	64.19		64.37	0.000321	3.49	1253.22	463.82	0.19
P118-00-00	P118-R2-1	56000		Lat Struct									
P118-00-00	P118-R2-1	55557.7	Max WS	3455.56	44.69	63.88		64.07	0.000365	3.62	1871.91	1273.07	0.2
P118-00-00	P118-R2-1	55000		Lat Struct									
P118-00-00	P118-R2-1	54459.2	Max WS	5706.02	44.27	62.74		63.28	0.000917	5.97	1202.05	616.6	0.31
P118-00-00	P118-R2-1	53881		Lat Struct									
P118-00-00	P118-R2-1	53801.7	Max WS	6836.72	43.7	62.5		62.7	0.000328	3.64	2152.61	929.69	0.2
P118-00-00	P118-R2-1	53275.7	Max WS	6836	43.36	62.27		62.54	0.000309	4.23	1810.07	787.68	0.19
P118-00-00	P118-R2-1	52844.3	Max WS	7138.25	43.08	62.18	51.61	62.4	0.000277	3.76	2190.02	1097.44	0.19
P118-00-00	P118-R2-1	52815.3 BERTRAND RD		Bridge									
P118-00-00	P118-R2-1	52786.3	Max WS	7137.6	43.01	62.05		62.27	0.000283	3.78	2126.72	909.97	0.19
P118-00-00	P118-R2-1	52465.7	Max WS	7136.95	43.2	61.82		62.15	0.000565	4.65	1798.43	925.13	0.25
P118-00-00	P118-R2-1	52221.3	Max WS	7135.98	43.89	61.6	54.6	62	0.000739	5.1	1573.36	799.54	0.29
P118-00-00	P118-R2-1	52207.8 UTILITY		Bridge									
P118-00-00	P118-R2-1	52194.3	Max WS	7135.13	43.8	61.49		61.89	0.000745	5.12	1555.95	752.89	0.29
P118-00-00	P118-R2-1	51283.9	Max WS	7128.44	43.41	60.71		61.16	0.000883	5.44	2037.07	1732.01	0.31
P118-00-00	P118-R2-1	51096.9	Max WS	7127.51	42.91	60.59	52	61	0.000664	5.13	2305.34	2026.26	0.28
P118-00-00	P118-R2-1	51083.9 UTILITY		Bridge									
P118-00-00	P118-R2-1	51070.9	Max WS	7126.58	42.87	60.54		60.94	0.000666	5.14	2279.91	1958.24	0.28
P118-00-00	P118-R2-1	50549.6	Max WS	7124.45	42.3	60.35		60.6	0.000405	4.09	3151.81	2627.3	0.22
P118-00-00	P118-R2-1	50021.9	Max WS	7122.62	41.83	60.17	51.08	60.38	0.00034	3.81	4446.38	4814.38	0.2
P118-00-00	P118-R2-1	49980.9 HOPPER RD		Bridge									
P118-00-00	P118-R2-1	49939.9	Max WS	7119.92	41.69	59.97		60.19	0.000352	3.86	4173.61	4588.49	0.21
P118-00-00	P118-R2-1	49231.7	Max WS	7116.33	41.03	59.56		59.89	0.000685	4.83	3786.08	4441.18	0.28
P118-00-00	P118-R2-1	48480.5	Max WS	7114.75	41.23	59.15		59.4	0.000456	4.23	4104.22	3371.47	0.23
P118-00-00	P118-R2-1	48196.5	Max WS	7114.57	41.31	59	51.54	59.25	0.00051	4.32	4343.08	3540.65	0.24
P118-00-00	P118-R2-1	48183.0 UTILITY		Bridge									
P118-00-00	P118-R2-1	48169.5	Max WS	7114.39	41.24	58.93		59.18	0.000511	4.33	4332.95	3537.84	0.24
P118-00-00	P118-R2-1	47607.9	Max WS	7114.17	40.57	58.56		58.88	0.000705	4.86	3988.71	3406.9	0.28
P118-00-00	P118-R2-1	46939	Max WS	7114.02	40.79	58.17		58.35	0.000442	3.74	4658.6	3270.91	0.22
P118-00-00	P118-R2-1	46594.8	Max WS	7113.82	40.91	57.98	49.77	58.25	0.000406	4.45	6339.68	4217	0.22
P118-00-00	P118-R2-1	46584.8		Bridge									
P118-00-00	P118-R2-1	46579.8	Max WS	7113.76	40.91	57.96		58.23	0.000498	4.34	4659.21	3979.87	0.24
P118-00-00	P118-R2-1	46575.8	Max WS	7113.87	40.91	57.95	49.79	58.24	0.000532	4.49	3403.7	2978.2	0.25
P118-00-00	P118-R2-1	46560.8 LITTLE YORK RD		Bridge									
P118-00-00	P118-R2-1	46526.8	Max WS	7113.7	40.74	57.89		58.14	0.000426	4.27	6572.34	4601.83	0.22
P118-00-00	P118-R2-1	46516.8	Max WS	7113.78	40.74	57.9	49.63	58.12	0.00049	4.04	6614.6	4184.21	0.23
P118-00-00	P118-R2-1	46515.8		Bridge									
P118-00-00	P118-R2-1	46478.9	Max WS	7112.44	40.49	57.62		57.94	0.000686	4.72	3995.81	3626.74	0.28
P118-00-00	P118-R2-1	46468.9	Max WS	7112.6	40.49	57.61	51.03	57.94	0.000688	4.73	3969.15	3600.66	0.28
P118-00-00	P118-R2-1	46466.8		Bridge									
P118-00-00	P118-R2-1	46458.9	Max WS	7112.39	40.49	57.59		57.92	0.000694	4.74	3911.92	3544.04	0.28
P118-00-00	P118-R2-1	45952.3	Max WS	6851.26	40.12	57.1		57.44	0.001181	5.09	3909.05	3358.57	0.34
P118-00-00	P118-R2-1	45161.4	Max WS	6705.58	39.57	56.12		56.56	0.001359	5.51	2583.66	1949.13	0.33
P118-00-00	P118-R2-1	44549.9	Max WS	6629.33	38.76	55.47		55.87	0.001152	5.06	1752.95	1271.1	0.31
P118-00-00	P118-R2-1	44143.3	Max WS	6542.73	38.22	55.06		55.43	0.001073	4.92	1627.74	786.54	0.3
P118-00-00	P118-R2-1	43789.5	Max WS	6641.58	37.97	55.04		55.12	0.000149	3.23	4698	527.67	0.14
P118-00-00	P118-R2-1	43739.48	Max WS	6644.58	37.93	55.05		55.1	0.000107	2.74	5662.61	545.68	0.12
P118-00-00	P118-R2-1	43652.1*	Max WS	6642.43	37.87	55.05		55.09	0.000095	2.59	6128.07	741.22	0.11
P118-00-00	P118-R2-1	43564.8*	Max WS	6643.73	37.81	55.05		55.08	0.000075	2.3	7236.81	878.25	0.1
P118-00-00	P118-R2-1	43477.4*	Max WS	6644.15	37.75	55.05		55.07	0.000051	1.91	8973.72	1006.81	0.08
P118-00-00	P118-R2-1	43390.1*	Max WS	6646.72	37.68	55.05		55.07	0.000033	1.53	11031.38	1135.37	0.07
P118-00-00	P118-R2-1	43302.8*	Max WS	6645.41	37.62	55.06		55.06	0.000019	1.17	13140.13	1263.92	0.05
P118-00-00	P118-R2-1	43215.5	Max WS	6646.72	37.56	55.06		55.06	0.000014	1.02	14238.47	1330.95	0.04
P118-00-00	P118-R2-1	43118.0*	Max WS	6671.64	37.49	55.05		55.06	0.000022	1.26	13224.64	1278.56	0.05
P118-00-00	P118-R2-1	43020.4*	Max WS	6670.37	37.42	55.05		55.06	0.000029	1.44	11796.53	1164.65	0.06
P118-00-00	P118-R2-1	42922.9*	Max WS	6669.52	37.35	55.04		55.06	0.000035	1.59	10569.7	1043.89	0.07
P118-00-00	P118-R2-1	42825.49	Max WS	6669.07	37.28	55.04		55.06	0.000039	1.69	9874.12	923.3	0.07
P118-00-00	P118-R2-1	42736.8*	Max WS	6669.5	37.22	55.04		55.05	0.000037	1.65	10109.81	976.06	0.07
P118-00-00	P118-R2-1	42648.2*	Max WS	6667.32	37.15	55.04		55.05	0.000031	1.53	10787.4	1004.2	0.07
P118-00-00	P118-R2-1	42559.6*	Max WS	6668.19	37.09	55.04		55.04	0.000024	1.33	11608.35	1045.12	0.06
P118-00-00	P118-R2-1	42471	Max WS	6668.62	37.03	55.04		55.04	0.000012	0.95	11882.15	1080.56	0.04
P118-00-00	P118-R2-1	42395.8*	Max WS	6667.29	36.98	55.03		55.04	0.000015	1.07	12141.14	1162.52	0.05
P118-00-00	P118-R2-1	42320.7*	Max WS	6668.17	36.92	55.03		55.04	0.000009	0.83	13179.57	1185.73	0.04
P118-00-00	P118-R2-1	42245.55	Max WS	6667.28	36.87	55.03		55.04	0.000003	0.49	13623.91	1172.81	0.02
P118-00-00	P118-R2-1	42150.1*	Max WS	6667.73	36.8	55.03		55.04	0.000012	0.94	12411.76	1108.74	0.04

HEC-RAS Plan: Alt2_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R2-1	42054.6*	Max WS	6666.83	36.74	55.03		55.04	0.000016	1.12	10445.55	996.14	0.05
P118-00-00	P118-R2-1	41959.2*	Max WS	6665.01	36.67	55.03		55.04	0.000019	1.22	9204.75	872.34	0.05
P118-00-00	P118-R2-1	41863.8	Max WS	6664.54	36.6	55.03		55.04	0.000018	1.19	9236.09	742.59	0.05
P118-00-00	P118-R2-1	41771.7*	Max WS	6663.63	36.53	55.02		55.03	0.000026	1.43	9047.73	761.83	0.06
P118-00-00	P118-R2-1	41679.6*	Max WS	6664.08	36.47	55.02		55.03	0.000032	1.58	8875.26	775.11	0.07
P118-00-00	P118-R2-1	41587.5*	Max WS	6662.7	36.4	55.02		55.03	0.000038	1.72	8614.87	788.4	0.07
P118-00-00	P118-R2-1	41495.4*	Max WS	6660.84	36.34	55.01		55.03	0.000041	1.8	8445.68	797.12	0.08
P118-00-00	P118-R2-1	41403.3	Max WS	6659.91	36.27	55.01		55.03	0.000039	1.76	8350.77	789.2	0.07
P118-00-00	P118-R2-1	41285.4	Max WS	6599.21	36.27	54.79	44.16	55.39	0.00002	6.28	1660.13	1716.18	0.26
P118-00-00	P118-R2-1	41243.9 JENSEN DR		Bridge									
P118-00-00	P118-R2-1	41203.4	Max WS	6652.18	36.25	54.96		55.35	0.000014	5.33	1685.51	1884.29	0.22
P118-00-00	P118-R2-1	41197.4	Max WS	6601.4	36.25	54.79	44.14	55.38	0.00002	6.25	1712.71	1678.37	0.26
P118-00-00	P118-R2-1	41197.2 UTILITY		Bridge									
P118-00-00	P118-R2-1	41185.7	Max WS	6547.12	36.25	54.69		55.29	0.00001	6.27	1700.81	1722.37	0.26
P118-00-00	P118-R2-1	40951.8	Max WS	6640.42	36.2	54.93	42.66	55.08	0.000012	3.11	3783.15	2003.37	0.14
P118-00-00	P118-R2-1	40919.3 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40886.8	Max WS	6640.42	36.19	54.93		55.07	0.000011	3.03	3686.6	1906.16	0.14
P118-00-00	P118-R2-1	40846.9	Max WS	6634.08	36.18	54.9	43.5	55.09	0.000018	3.53	3888.05	2168.79	0.17
P118-00-00	P118-R2-1	40726.2 US HWY 59 (ML)		Bridge									
P118-00-00	P118-R2-1	40605.5	Max WS	6628.35	36.13	54.88		55.07	0.000018	3.51	3656.81	2082.61	0.17
P118-00-00	P118-R2-1	40584.6	Max WS	6630.92	36.13	54.88	43.46	55.07	0.000021	3.46	3165.41	1778.39	0.18
P118-00-00	P118-R2-1	40550.1 US HWY 59 (FR)		Bridge									
P118-00-00	P118-R2-1	40515.6	Max WS	6628.34	36.12	54.87		55.05	0.00002	3.44	3659.85	2008.26	0.17
P118-00-00	P118-R2-1	39969.8	Max WS	6647.03	36.01	54.93		54.94	0.000075	0.96	8405.64	2442.03	0.05
P118-00-00	P118-R2-1	39829.91	Max WS	7571.24	36	54.91		54.93	0.000017	1.06	8386.73	2366.12	0.06
P118-00-00	P118-R2-1	39188.6	Max WS	7571.78	35.6	54.92		54.92	0.000001	0.28	24513.37	2354.54	0.01
P118-00-00	P118-R2-1	38423.57	Max WS	7813.86	34.76	54.92		54.92	0.000001	0.33	22219.61	2069.28	0.02
P118-00-00	P118-R2-1	38170.2	Max WS	7813.42	34.35	54.92		54.92	0.000015	0.4	19618.64	2232.13	0.02
P118-00-00	P118-R2-1	37899.37	Max WS	7813.27	34.35	54.91		54.92	0.000001	0.42	19644.25	2372.21	0.02
P118-00-00	P118-R2-1	37413.16	Max WS	7813.03	34.13	54.91		54.92	0.000001	0.41	20053.82	2413.48	0.02
P118-00-00	P118-R2-1	37258.6	Max WS	7808.63	34.02	54.79		55.06	0.000708	4.79	4525.86	2324.45	0.22
P118-00-00	P118-R2-1	36408.6	Max WS	7786.18	32.39	54.38		54.61	0.000854	4.46	4867.21	2697.6	0.24
P118-00-00	P118-R2-1	36341.47	Max WS	7764.33	32.39	54.33	45.89	54.56	0.00087	4.48	4785.32	2477.69	0.24
P118-00-00	P118-R2-1	36330 UTILITY		Bridge									
P118-00-00	P118-R2-1	36321.56	Max WS	7763.1	32	54.32		54.5	0.000412	3.72	5213.66	2303.55	0.17
P118-00-00	P118-R2-1	36303.5	Max WS	7763.09	32	54.33		54.48	0.000355	3.49	5369.6	2331.78	0.16
P118-00-00	P118-R1-3	36195.78	Max WS	8564.82	32.04	54.21		54.43	0.000475	4.1	4716.7	1661.69	0.19
P118-00-00	P118-R1-3	36107.2	Max WS	8564.37	32	54.17		54.39	0.000465	4.05	4717.89	1532.23	0.19
P118-00-00	P118-R1-3	35434.7	Max WS	8557.92	31.72	53.88		54.16	0.000488	4.35	3685.31	1263.81	0.19
P118-00-00	P118-R1-3	35045.7	Max WS	8555.42	31.55	53.67	41.2	53.98	0.000524	4.48	2771.06	886.18	0.2
P118-00-00	P118-R1-3	35025.9 RAILROAD		Bridge									
P118-00-00	P118-R1-3	35006.1	Max WS	8554.25	31.09	53.55		53.84	0.000485	4.37	3093.82	974.01	0.19
P118-00-00	P118-R1-3	34984.3	Max WS	8552.92	30.53	53.52	42.15	53.85	0.000609	4.83	2618.4	800.04	0.22
P118-00-00	P118-R1-3	34927.3 HIRSCH RD		Bridge									
P118-00-00	P118-R1-3	34870.3	Max WS	8549.84	30	53.36		53.68	0.000555	4.69	2959.29	904.99	0.21
P118-00-00	P118-R1-3	33920.1	Max WS	8560.92	29.63	52.46		52.98	0.001094	6.03	2658.86	1122.53	0.28
P118-00-00	P118-R1-3	32749.8	Max WS	8539.99	28	51.01		51.59	0.00129	6.31	2178.41	849.79	0.3
P118-00-00	P118-R1-3	31824.3	Max WS	8490.52	26.81	50.1		50.55	0.000852	5.48	2342.55	620.23	0.25
P118-00-00	P118-R1-3	30679.1	Max WS	8460.81	27.05	49.05		49.54	0.000925	5.69	1877.58	293.16	0.26
P118-00-00	P118-R1-3	30678.1		Lat Struct									
P118-00-00	P118-R1-3	30099.1	Max WS	8490.74	27.23	48.78		49.1	0.000505	4.64	2471.5	426.31	0.2
P118-00-00	P118-R1-3	29757.8	Max WS	8503.15	27.34	48.55	37.3	48.92	0.00058	4.89	2340.96	900.05	0.22
P118-00-00	P118-R1-3	29731.3 PARKER RD		Bridge									
P118-00-00	P118-R1-3	29704.8	Max WS	8405.62	27	48.34		48.68	0.000539	4.74	2460.05	941.1	0.21
P118-00-00	P118-R1-3	28983.7	Max WS	8246.85	26.97	47.54		48.14	0.0012	6.27	1588.71	285.83	0.3
P118-00-00	P118-R1-3	28387.3	Max WS	8997.02	26.04	47.21		47.53	0.000537	4.65	2420.28	257.19	0.21
P118-00-00	P118-R1-3	27992	Max WS	8991.88	25.42	46.99		47.32	0.00065	5.04	3207.4	436.65	0.23
P118-00-00	P118-R1-3	27567.7	Max WS	8982.34	25.74	46.74		47.08	0.00052	4.88	2887.56	439.4	0.21
P118-00-00	P118-R1-3	27317	Max WS	8975.7	25.92	46.6	36.05	46.96	0.000575	5.04	2425.97	530.96	0.22
P118-00-00	P118-R1-3	27306.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27305.8	Max WS	8897.43	25.93	46.4		46.8	0.000609	5.19	2338.6	457.78	0.22
P118-00-00	P118-R1-3	27295.8	Max WS	8896.6	25.93	46.39	35.8	46.8	0.00061	5.2	2335.77	455.57	0.22
P118-00-00	P118-R1-3	27242.8 HOMESTEAD RD		Bridge									
P118-00-00	P118-R1-3	27189.8	Max WS	8896.6	25.89	45.98		46.41	0.000661	5.33	2191.18	336.77	0.23
P118-00-00	P118-R1-3	27180.8	Max WS	8891.08	25.89	45.98	35.76	46.4	0.000661	5.33	2189.15	335.95	0.23
P118-00-00	P118-R1-3	27179.0 UTILITY		Bridge									
P118-00-00	P118-R1-3	27167.5	Max WS	8895.87	25.84	46.05		46.37	0.000525	4.68	2373.88	395.43	0.21
P118-00-00	P118-R1-3	26816.8*	Max WS	8876.7	25.02	45.85		46.16	0.000549	4.52	2265.54	259.3	0.21
P118-00-00	P118-R1-3	26815.8		Lat Struct									
P118-00-00	P118-R1-3	26466.1	Max WS	8859.77	24.2	45.66		45.97	0.000649	4.55	2181.74	237.21	0.22
P118-00-00	P118-R1-3	26224.4*	Max WS	8850.07	23.64	45.5		45.8	0.000591	4.4	2226.99	221.87	0.21
P118-00-00	P118-R1-3	25982.8	Max WS	8824.43	23.07	45.41		45.68	0.000531	4.24	2295.1	215.16	0.2
P118-00-00	P118-R1-3	25318.4	Max WS	8768	23.07	45.05		45.32	0.000541	4.23	2480.98	262.64	0.2
P118-00-00	P118-R1-3	25317.4		Lat Struct									
P118-00-00	P118-R1-3	24564.2	Max WS	8739.91	21.76	44.69		44.95	0.000425	4.13	2366.92	245.28	0.18
P118-00-00	P118-R1-3	23984.6	Max WS	9729.28	20.75	44.43		44.67	0.000404	4.14	3466.08	404.98	0.18

HEC-RAS Plan: Alt2_100_IA

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
P118-00-00	P118-R1-2	23796.2	Max WS	10169.04	24.42	44.3		44.57	0.000384	4.21	2676.33	259.72	0.2
P118-00-00	P118-R1-2	23795.2		Lat Struct									
P118-00-00	P118-R1-2	23286.2	Max WS	10895.41	20.82	43.92		44.29	0.000708	4.94	2358.54	352.3	0.23
P118-00-00	P118-R1-2	22973.4	Max WS	10379.49	20.85	43.75	31.62	44.05	0.000544	4.45	3790.87	713.89	0.21
P118-00-00	P118-R1-2	22951.4 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22929.4	Max WS	10363	20.49	43.68		43.97	0.00051	4.36	3986.55	733.11	0.2
P118-00-00	P118-R1-2	22928.4		Lat Struct									
P118-00-00	P118-R1-2	22630.3	Max WS	10233.75	19.11	43.23	32.85	43.77	0.001208	5.91	1730.45	137.55	0.29
P118-00-00	P118-R1-2	22609.0 RAILROAD		Bridge									
P118-00-00	P118-R1-2	22587.7	Max WS	10233.07	18.99	42.91		43.47	0.001268	6.01	1702.84	137	0.3
P118-00-00	P118-R1-2	22577.7	Max WS	10224.57	18.99	42.9		43.46	0.001267	6.01	1702.35	136.99	0.3
P118-00-00	P118-R1-1	22186.8	Max WS	10524.36	18.55	42.42		43.01	0.000955	6.14	1841.24	173.07	0.26
P118-00-00	P118-R1-1	22185.8		Lat Struct									
P118-00-00	P118-R1-1	21829	Max WS	11109.39	18.16	42.47		42.74	0.000422	4.22	2838.76	218.6	0.18
P118-00-00	P118-R1-1	21589.8	Max WS	12013	17.9	41.99		42.54	0.000793	6.14	2303.72	176.95	0.26
P118-00-00	P118-R1-1	21362	Max WS	11983.76	17.65	41.77		42.43	0.000075	6.56	2161	195.28	0.27
P118-00-00	P118-R1-1	21361		Lat Struct									
P118-00-00	P118-R1-1	21360	Max WS	11975.91	17.65	41.77	31.21	42.43	0.000075	6.56	2160.44	195.25	0.27
P118-00-00	P118-R1-1	21333.0 WAYSIDE DR		Bridge									
P118-00-00	P118-R1-1	21304	Max WS	11975.24	17.62	41.7		42.37	0.000076	6.57	2154.25	194.94	0.27
P118-00-00	P118-R1-1	21010.4	Max WS	11947.75	18.08	41.82	29.47	42.26	0.000598	6.03	3314.54	267	0.22
P118-00-00	P118-R1-1	20948.9 TIDWELL RD (WB)		Bridge									
P118-00-00	P118-R1-1	20887.4	Max WS	11947.1	17.96	41.71		42.15	0.000597	6.03	3316.06	267.02	0.22
P118-00-00	P118-R1-1	20880.6	Max WS	11915.39	17.96	41.28	31.87	42.44	0.000121	9.04	2722.5	244.75	0.35
P118-00-00	P118-R1-1	20869.6 TIDWELL RD (EB)		Bridge									
P118-00-00	P118-R1-1	20858.6	Max WS	11914.72	17.96	41.22		42.39	0.000122	9.07	2708.37	243.98	0.36
P118-00-00	P118-R1-1	20857.6		Lat Struct									
P118-00-00	P118-R1-1	19860	Max WS	11706.45	19.24	40.68		41.51	0.001541	7.43	1820.05	327.44	0.34
P118-00-00	P118-R1-1	18597.4	Max WS	12555.26	15.56	39.1		39.86	0.000935	7.18	2245.85	181.01	0.29
P118-00-00	P118-R1-1	18107.1	Max WS	12531.69	15.21	38.94		39.3	0.000816	4.82	2602.15	218.43	0.25
P118-00-00	P118-R1-1	17862.9*	Max WS	12515.96	14.55	38.81		39.13	0.000634	4.55	2751.45	216.54	0.22
P118-00-00	P118-R1-1	17618.7*	Max WS	12513.67	13.89	38.71		39.01	0.000509	4.4	2870.37	239.91	0.2
P118-00-00	P118-R1-1	17374.5*	Max WS	12508.5	13.23	38.59		38.88	0.000437	4.35	2918.38	218.22	0.19
P118-00-00	P118-R1-1	17130.3	Max WS	12510.96	12.57	38.5		38.8	0.000399	4.39	2942.05	216.34	0.18
P118-00-00	P118-R1-1	16004	Max WS	12941.73	11.24	37.98		38.28	0.00051	4.39	2980.51	213.05	0.2
P118-00-00	P118-R1-1	15045.6	Max WS	13526.11	10.55	37.11		37.61	0.00084	5.65	2455.63	198.32	0.26
P118-00-00	P118-R1-1	13937.2	Max WS	13510.82	11.62	36.46		36.87	0.000604	5.65	4306.85	448.14	0.23
P118-00-00	P118-R1-1	13341.9	Max WS	13496.33	10.38	35.94		36.51	0.000876	6.79	3523.29	348.58	0.27
P118-00-00	P118-R1-1	12945.5	Max WS	13486.4	9.55	35.79	26.03	36.13	0.000567	5.62	4677.76	439.27	0.22
P118-00-00	P118-R1-1	12935.0 UTILITY		Bridge									
P118-00-00	P118-R1-1	12932.7	Max WS	13485.93	9.53	35.65		36	0.000583	5.67	4624.69	435.52	0.22
P118-00-00	P118-R1-1	12931.7	Max WS	13485.89	9.53	35.65	26.01	36	0.000583	5.67	4624.43	435.5	0.22
P118-00-00	P118-R1-1	12904.8 MESA RD		Bridge									
P118-00-00	P118-R1-1	12877.9	Max WS	13483.94	8.77	35.14		35.47	0.00055	5.56	4736.77	443.48	0.22
P118-00-00	P118-R1-1	12117.3	Max WS	13482.09	7.23	34.75		35.09	0.000402	5.03	3545.31	286.25	0.19
P118-00-00	P118-R1-1	10905.1	Max WS	14567.4	9.54	33.66		34.3	0.000896	6.61	2829.42	263.75	0.28
P118-00-00	P118-R1-1	9879.2	Max WS	14565.18	6.26	32.25		33.23	0.001428	8.53	2728.52	231.68	0.34
P118-00-00	P118-R1-1	8777	Max WS	14558.65	4.71	31.64		31.82	0.000354	3.92	7877.35	816.85	0.17
P118-00-00	P118-R1-1	8024.4	Max WS	14552.97	4.73	31.24		31.55	0.000454	4.92	5106.63	409.34	0.2
P118-00-00	P118-R1-1	6779.3	Max WS	14546.19	4.44	30.46		30.87	0.00068	5.47	4240.37	464.82	0.24
P118-00-00	P118-R1-1	5748.4	Max WS	14540.45	4.27	29.03		29.94	0.001573	8.28	3166.19	383.77	0.35
P118-00-00	P118-R1-1	4492	Max WS	14531.25	1.92	27.76		28.28	0.000816	5.96	3200.41	352.9	0.26
P118-00-00	P118-R1-1	3597.9	Max WS	14524.91	2.46	27.04		27.54	0.000952	6.31	4064.4	446.09	0.28
P118-00-00	P118-R1-1	2709.4	Max WS	14522	1.59	26.2		26.73	0.000899	6.6	4266.6	409.3	0.27
P118-00-00	P118-R1-1	1695.9	Max WS	14519.91	1.52	24.99		25.71	0.001295	7.75	3657.7	350.75	0.32
P118-00-00	P118-R1-1	678.7	Max WS	14519.5	0.81	22.42	17.11	23.87	0.0028	10.01	2010.37	235.71	0.46

Impact Analysis 500-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.83	78.34	-0.49
5780.54	78.82	78.34	-0.48
5321.96	78.84	78.34	-0.5
4831.58	78.85	78.33	-0.52
4300.35	78.85	78.31	-0.54
3803.92	78.85	78.28	-0.57
3444.22	78.85	78.27	-0.58
3374.42	78.75	78.21	-0.54
3011.6	78.45	78.21	-0.24
2525.84	78.31	78.2	-0.11
2485.48	78.3	78.2	-0.1
2431.78	78.17	78.2	0.03
2398.35	78.17	78.2	0.03
2381.57	78.17	78.2	0.03
2351.35	78.17	78.2	0.03
2292.65	78.16	78.2	0.04
2238.14	78.16	78.2	0.04
1817.26	78.19	78.2	0.01
1360.33	78.27	78.21	-0.06
1314.62	78.25	78.18	-0.07
1255.05	78.26	78.18	-0.08
1198.35	78.26	78.21	-0.05
763.46	78.28	78.2	-0.08
465.31	78.29	78.22	-0.07
448.57	78.29	78.21	-0.08
438.14	78.29	78.22	-0.07
429.17	78.3	78.22	-0.08
415.49	78.29	78.23	-0.06
399.43	78.29	78.24	-0.05
310	78.31	78.29	-0.02
76394.4	79.33	79.19	-0.14
75489.4	79.05	78.87	-0.18
74253.7	78.57	78.44	-0.13
73879.2	78.35	78.32	-0.03
73828	78.4	78.34	-0.06
73723	78.31	78.3	-0.01
73423.3	78.09	78.17	0.08
73332.3	77.36	77.38	0.02
73232.3	77.28	77.3	0.02
72741.86	76.73	76.75	0.02
72585.49	76.55	76.56	0.01
72405.2	76.21	76.22	0.01
72221.5*	75.94	75.94	0
72037.8*	75.74	75.73	-0.01
71854.2	75.58	75.58	0
71760	75.47	75.46	-0.01
71556.8*	75.35	75.34	-0.01
71353.6*	75.23	75.23	0
71150.5*	75.12	75.11	-0.01
70947.3*	75.02	75.01	-0.01
70744.2	74.93	74.91	-0.02
70570.3*	74.86	74.84	-0.02
70396.4*	74.81	74.79	-0.02
70222.6*	74.76	74.73	-0.03
70048.7*	74.71	74.69	-0.02
69874.9*	74.67	74.65	-0.02
69701.0*	74.63	74.61	-0.02
69527.2	74.59	74.57	-0.02
69327.7*	74.57	74.55	-0.02
69128.2*	74.54	74.52	-0.02
68928.8*	74.52	74.5	-0.02
68729.3*	74.49	74.47	-0.02
68529.9*	74.49	74.46	-0.03
68330.4*	74.47	74.45	-0.02
68131	74.45	74.43	-0.02
67976.1*	74.42	74.4	-0.02

Impact Analysis 500-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
67821.3*	74.39	74.38	-0.01
67666.4*	74.37	74.36	-0.01
67511.6	74.35	74.34	-0.01
67445.1*	74.33	74.32	-0.01
67378.7*	74.33	74.32	-0.01
67312.2*	74.33	74.32	-0.01
67245.8*	74.32	74.32	0
67179.3*	74.32	74.31	-0.01
67112.9*	74.31	74.31	0
67046.4*	74.31	74.3	-0.01
66980	74.31	74.3	-0.01
66962.5*	74.3	74.3	0
66945.0*	74.3	74.3	0
66927.5*	74.3	74.3	0
66910	74.3	74.29	-0.01
66730	74.29	74.29	0
66536.4*	74.28	74.28	0
66342.9*	74.28	74.28	0
66149.3*	74.27	74.27	0
65955.8	74.27	74.27	0
65782.0*	74.27	74.27	0
65608.3*	74.27	74.26	-0.01
65434.6	74.26	74.26	0
65262.1*	74.25	74.24	-0.01
65089.6*	74.22	74.22	0
64917.1*	74.18	74.18	0
64744.6*	74.1	74.1	0
64572.2*	73.95	73.95	0
64399.74	73.86	73.86	0
64273.7	73.73	73.73	0
64220.7	73.68	73.68	0
64200	73.67	73.68	0.01
64100	73.64	73.64	0
64094	73.64	73.64	0
64024	73.5	73.5	0
64010.4	73.59	73.59	0
63960.4	71.69	71.68	-0.01
63959.7	71.35	71.34	-0.01
63856.7	71.2	71.18	-0.02
62823.2	70.57	70.55	-0.02
61905.2	70.08	70.06	-0.02
60625.3	69.65	69.63	-0.02
60600	69.27	69.25	-0.02
60595.74	69.15	69.13	-0.02
60583.6*	69.06	69.04	-0.02
60571.6*	68.98	68.96	-0.02
60559.5*	68.9	68.88	-0.02
60547.5*	68.83	68.81	-0.02
60535.46	68.76	68.74	-0.02
60396.4*	68.7	68.67	-0.03
60257.3*	68.64	68.61	-0.03
60118.3*	68.57	68.54	-0.03
59979.2*	68.5	68.47	-0.03
59840.2*	68.42	68.39	-0.03
59701.1*	68.33	68.31	-0.02
59562.1*	68.24	68.21	-0.03
59423.1	68.14	68.11	-0.03
59307.4*	68.05	68.03	-0.02
59191.8*	67.97	67.94	-0.03
59076.2*	67.87	67.84	-0.03
58960.5*	67.77	67.74	-0.03
58844.9*	67.68	67.65	-0.03
58729.3*	67.58	67.55	-0.03
58613.7	67.47	67.45	-0.02
58463.86	67.32	67.29	-0.03
58387.5	67.24	67.21	-0.03

Impact Analysis 500-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
58331.5	66.82	66.8	-0.02
57555.5	66.28	66.27	-0.01
56513.3	65.25	65.24	-0.01
55557.7	64.95	64.94	-0.01
54459.2	64.68	64.65	-0.03
53801.7	64.17	64.15	-0.02
53275.7	64.03	64.01	-0.02
52844.3	63.89	63.86	-0.03
52786.3	63.58	63.56	-0.02
52465.7	63.47	63.45	-0.02
52221.3	63.34	63.32	-0.02
52194.3	63.04	63.03	-0.01
51283.9	62.26	62.24	-0.02
51096.9	62.09	62.07	-0.02
51070.9	61.96	61.95	-0.01
50549.6	61.55	61.53	-0.02
50021.9	61.28	61.26	-0.02
49939.9	61.08	61.06	-0.02
49231.7	60.79	60.77	-0.02
48480.5	60.4	60.39	-0.01
48196.5	60.27	60.25	-0.02
48169.5	60.16	60.14	-0.02
47607.9	59.91	59.9	-0.01
46939	59.54	59.52	-0.02
46594.8	59.47	59.44	-0.03
46579.8	59.41	59.38	-0.03
46575.8	59.45	59.42	-0.03
46526.8	59.28	59.26	-0.02
46516.8	59.26	59.24	-0.02
46478.9	58.9	58.89	-0.01
46468.9	58.9	58.88	-0.02
46458.9	58.87	58.85	-0.02
45952.3	58.36	58.34	-0.02
45161.4	57.75	57.75	0
44549.9	57.37	57.36	-0.01
44143.3	57.12	57.12	0
43789.5	56.93	56.92	-0.01
43739.48	56.91	56.91	0
43652.1*	56.9	56.9	0
43564.8*	56.89	56.89	0
43477.4*	56.88	56.88	0
43390.1*	56.87	56.87	0
43302.8*	56.87	56.87	0
43215.5	56.87	56.87	0
43118.0*	56.87	56.87	0
43020.4*	56.87	56.87	0
42922.9*	56.87	56.87	0
42825.49	56.87	56.86	-0.01
42736.8*	56.86	56.86	0
42648.2*	56.86	56.86	0
42559.6*	56.85	56.85	0
42471	56.85	56.85	0
42395.8*	56.85	56.85	0
42320.7*	56.85	56.85	0
42245.55	56.85	56.85	0
42150.1*	56.85	56.85	0
42054.6*	56.85	56.85	0
41959.2*	56.85	56.85	0
41863.8	56.85	56.85	0
41771.7*	56.85	56.84	-0.01
41679.6*	56.84	56.84	0
41587.5*	56.84	56.84	0
41495.4*	56.84	56.84	0
41403.3	56.84	56.84	0
41285.4	57.31	57.31	0
41203.4	57.18	57.18	0

Impact Analysis 500-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
41197.4	57.28	57.28	0
41185.7	57.01	57.01	0
40951.8	56.63	56.63	0
40886.8	56.61	56.61	0
40846.9	56.65	56.65	0
40605.5	56.63	56.63	0
40584.6	56.62	56.62	0
40515.6	56.59	56.59	0
39969.8	56.46	56.46	0
39829.91	56.45	56.45	0
39188.6	56.44	56.44	0
38423.57	56.44	56.44	0
38170.2	56.44	56.44	0
37899.37	56.43	56.43	0
37413.16	56.43	56.43	0
37258.6	56.51	56.51	0
36408.6	56.26	56.26	0
36341.47	56.24	56.24	0
36321.56	56.2	56.2	0
36303.5	56.18	56.18	0
36195.78	56.14	56.14	0
36107.2	56.11	56.11	0
35434.7	55.99	55.99	0
35045.7	55.81	55.81	0
35006.1	55.63	55.62	-0.01
34984.3	55.65	55.65	0
34870.3	55.31	55.31	0
33920.1	54.58	54.58	0
32749.8	53.47	53.47	0
31824.3	52.6	52.6	0
30679.1	51.76	51.76	0
30099.1	51.37	51.36	-0.01
29757.8	51.21	51.21	0
29704.8	50.96	50.97	0.01
28983.7	50.65	50.66	0.01
28387.3	50.1	50.1	0
27992	49.9	49.9	0
27567.7	49.67	49.68	0.01
27317	49.55	49.55	0
27305.8	49.32	49.32	0
27295.8	49.31	49.32	0.01
27189.8	48.75	48.76	0.01
27180.8	48.75	48.75	0
27167.5	48.64	48.64	0
26816.8*	48.45	48.45	0
26466.1	48.26	48.26	0
26224.4*	48.1	48.09	-0.01
25982.8	47.97	47.96	-0.01
25318.4	47.61	47.61	0
24564.2	47.24	47.23	-0.01
23984.6	46.96	46.94	-0.02
23796.2	46.86	46.84	-0.02
23286.2	46.59	46.59	0
22973.4	46.38	46.38	0
22929.4	46.24	46.23	-0.01
22630.3	46.09	46.07	-0.02
22587.7	45.72	45.69	-0.03
22577.7	45.71	45.68	-0.03
22186.8	45.22	45.14	-0.08
21829	44.95	44.94	-0.01
21589.8	44.79	44.77	-0.02
21362	44.7	44.67	-0.03
21360	44.71	44.66	-0.05
21304	44.61	44.57	-0.04
21010.4	44.49	44.45	-0.04
20887.4	44.36	44.32	-0.04

Impact Analysis 500-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
20880.6	44.69	44.67	-0.02
20858.6	44.65	44.64	-0.01
19860	43.95	43.87	-0.08
18597.4	42.54	42.49	-0.05
18107.1	42	41.99	-0.01
17862.9*	41.87	41.87	0
17618.7*	41.78	41.78	0
17374.5*	41.67	41.68	0.01
17130.3	41.59	41.58	-0.01
16004	41.09	41.09	0
15045.6	40.48	40.48	0
13937.2	39.8	39.8	0
13341.9	39.48	39.48	0
12945.5	39.11	39.12	0.01
12932.7	38.97	38.98	0.01
12931.7	38.97	38.98	0.01
12877.9	38.1	38.1	0
12117.3	37.73	37.73	0
10905.1	36.94	36.94	0
9879.2	35.82	35.83	0.01
8777	34.22	34.23	0.01
8024.4	33.97	33.99	0.02
6779.3	33.27	33.29	0.02
5748.4	32.39	32.4	0.01
4492	30.7	30.72	0.02
3597.9	29.94	29.95	0.01
2709.4	29.12	29.13	0.01
1695.9	28.05	28.06	0.01
678.7	26.23	26.24	0.01

Impact Analysis 100-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
6259.79	78.58	77.38	-1.2
5780.54	78.57	77.38	-1.19
5321.96	78.58	77.37	-1.21
4831.58	78.58	77.36	-1.22
4300.35	78.58	77.33	-1.25
3803.92	78.57	77.29	-1.28
3444.22	78.57	77.23	-1.34
3374.42	78.45	77.22	-1.23
3011.6	78.23	77.21	-1.02
2525.84	78.09	77.21	-0.88
2485.48	78.08	77.21	-0.87
2431.78	77.85	77.19	-0.66
2398.35	77.83	77.19	-0.64
2381.57	77.81	77.19	-0.62
2351.35	77.79	77.19	-0.6
2292.65	77.71	77.18	-0.53
2238.14	77.7	77.18	-0.52
1817.26	77.44	77.18	-0.26
1360.33	77.38	77.18	-0.2
1314.62	77.38	77.18	-0.2
1255.05	77.38	77.16	-0.22
1198.35	77.38	77.16	-0.22
763.46	77.38	77.16	-0.22
465.31	77.37	77.16	-0.21
448.57	77.37	77.16	-0.21
438.14	77.37	77.16	-0.21
429.17	77.37	77.16	-0.21
415.49	77.37	77.16	-0.21
399.43	77.37	77.16	-0.21
310	77.37	77.19	-0.18
76394.4	78.34	78.24	-0.1
75489.4	78.04	77.89	-0.15
74253.7	77.57	77.41	-0.16
73879.2	77.38	77.26	-0.12
73828	77.4	77.28	-0.12
73723	77.35	77.24	-0.11
73423.3	77.15	77.11	-0.04
73332.3	76.45	76.41	-0.04
73232.3	76.35	76.31	-0.04
72741.86	75.6	75.55	-0.05
72585.49	75.43	75.38	-0.05
72405.2	75.16	75.12	-0.04
72221.5*	74.91	74.87	-0.04
72037.8*	74.71	74.67	-0.04
71854.2	74.56	74.52	-0.04
71760	74.45	74.41	-0.04
71556.8*	74.35	74.31	-0.04
71353.6*	74.24	74.21	-0.03
71150.5*	74.14	74.11	-0.03
70947.3*	74.05	74.02	-0.03
70744.2	73.97	73.94	-0.03
70570.3*	73.91	73.88	-0.03
70396.4*	73.85	73.83	-0.02
70222.6*	73.8	73.78	-0.02
70048.7*	73.76	73.73	-0.03
69874.9*	73.71	73.69	-0.02
69701.0*	73.67	73.65	-0.02
69527.2	73.64	73.61	-0.03
69327.7*	73.61	73.58	-0.03
69128.2*	73.58	73.54	-0.04
68928.8*	73.55	73.51	-0.04
68729.3*	73.52	73.49	-0.03
68529.9*	73.5	73.47	-0.03
68330.4*	73.47	73.44	-0.03
68131	73.44	73.41	-0.03
67976.1*	73.4	73.37	-0.03

Impact Analysis 100-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
67821.3*	73.36	73.33	-0.03
67666.4*	73.31	73.28	-0.03
67511.6	73.27	73.24	-0.03
67445.1*	73.24	73.21	-0.03
67378.7*	73.23	73.2	-0.03
67312.2*	73.22	73.19	-0.03
67245.8*	73.21	73.18	-0.03
67179.3*	73.2	73.17	-0.03
67112.9*	73.19	73.16	-0.03
67046.4*	73.18	73.15	-0.03
66980	73.17	73.13	-0.04
66962.5*	73.16	73.13	-0.03
66945.0*	73.16	73.13	-0.03
66927.5*	73.15	73.12	-0.03
66910	73.15	73.11	-0.04
66730	73.12	73.09	-0.03
66536.4*	73.09	73.06	-0.03
66342.9*	73.06	73.02	-0.04
66149.3*	73.02	72.99	-0.03
65955.8	73	72.97	-0.03
65782.0*	72.99	72.95	-0.04
65608.3*	72.98	72.94	-0.04
65434.6	72.97	72.93	-0.04
65262.1*	72.91	72.88	-0.03
65089.6*	72.83	72.79	-0.04
64917.1*	72.71	72.66	-0.05
64744.6*	72.48	72.43	-0.05
64572.2*	72.06	72	-0.06
64399.74	71.77	71.7	-0.07
64273.7	71.57	71.5	-0.07
64220.7	71.49	71.42	-0.07
64200	71.49	71.41	-0.08
64100	71.43	71.36	-0.07
64094	71.43	71.36	-0.07
64024	71.37	71.29	-0.08
64010.4	71.51	71.44	-0.07
63960.4	70.51	70.46	-0.05
63959.7	70.28	70.24	-0.04
63856.7	70.19	70.15	-0.04
62823.2	69.7	69.66	-0.04
61905.2	69.07	69.03	-0.04
60625.3	68.51	68.46	-0.05
60600	68.02	67.97	-0.05
60595.74	67.85	67.8	-0.05
60583.6*	67.71	67.66	-0.05
60571.6*	67.59	67.54	-0.05
60559.5*	67.49	67.44	-0.05
60547.5*	67.4	67.35	-0.05
60535.46	67.32	67.27	-0.05
60396.4*	67.25	67.2	-0.05
60257.3*	67.17	67.12	-0.05
60118.3*	67.1	67.05	-0.05
59979.2*	67.02	66.96	-0.06
59840.2*	66.93	66.88	-0.05
59701.1*	66.84	66.79	-0.05
59562.1*	66.74	66.69	-0.05
59423.1	66.64	66.59	-0.05
59307.4*	66.56	66.51	-0.05
59191.8*	66.47	66.42	-0.05
59076.2*	66.37	66.32	-0.05
58960.5*	66.28	66.23	-0.05
58844.9*	66.19	66.14	-0.05
58729.3*	66.1	66.05	-0.05
58613.7	66.02	65.97	-0.05
58463.86	65.9	65.85	-0.05
58387.5	65.82	65.78	-0.04

Impact Analysis 100-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
58331.5	65.71	65.67	-0.04
57555.5	65.13	65.09	-0.04
56513.3	64.4	64.37	-0.03
55557.7	64.11	64.07	-0.04
54459.2	63.34	63.28	-0.06
53801.7	62.75	62.7	-0.05
53275.7	62.59	62.54	-0.05
52844.3	62.45	62.4	-0.05
52786.3	62.31	62.27	-0.04
52465.7	62.19	62.15	-0.04
52221.3	62.04	62	-0.04
52194.3	61.93	61.89	-0.04
51283.9	61.2	61.16	-0.04
51096.9	61.03	61	-0.03
51070.9	60.98	60.94	-0.04
50549.6	60.63	60.6	-0.03
50021.9	60.41	60.38	-0.03
49939.9	60.22	60.19	-0.03
49231.7	59.92	59.89	-0.03
48480.5	59.43	59.4	-0.03
48196.5	59.28	59.25	-0.03
48169.5	59.21	59.18	-0.03
47607.9	58.91	58.88	-0.03
46939	58.38	58.35	-0.03
46594.8	58.28	58.25	-0.03
46579.8	58.26	58.23	-0.03
46575.8	58.27	58.24	-0.03
46526.8	58.17	58.14	-0.03
46516.8	58.15	58.12	-0.03
46478.9	57.97	57.94	-0.03
46468.9	57.96	57.94	-0.02
46458.9	57.95	57.92	-0.03
45952.3	57.48	57.44	-0.04
45161.4	56.56	56.56	0
44549.9	55.87	55.87	0
44143.3	55.43	55.43	0
43789.5	55.12	55.12	0
43739.48	55.1	55.1	0
43652.1*	55.09	55.09	0
43564.8*	55.08	55.08	0
43477.4*	55.07	55.07	0
43390.1*	55.06	55.07	0.01
43302.8*	55.06	55.06	0
43215.5	55.06	55.06	0
43118.0*	55.06	55.06	0
43020.4*	55.06	55.06	0
42922.9*	55.06	55.06	0
42825.49	55.05	55.06	0.01
42736.8*	55.05	55.05	0
42648.2*	55.05	55.05	0
42559.6*	55.04	55.04	0
42471	55.04	55.04	0
42395.8*	55.04	55.04	0
42320.7*	55.04	55.04	0
42245.55	55.04	55.04	0
42150.1*	55.04	55.04	0
42054.6*	55.04	55.04	0
41959.2*	55.04	55.04	0
41863.8	55.04	55.04	0
41771.7*	55.03	55.03	0
41679.6*	55.03	55.03	0
41587.5*	55.03	55.03	0
41495.4*	55.03	55.03	0
41403.3	55.03	55.03	0
41285.4	55.39	55.39	0
41203.4	55.35	55.35	0

Impact Analysis 100-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
41197.4	55.38	55.38	0
41185.7	55.29	55.29	0
40951.8	55.08	55.08	0
40886.8	55.06	55.07	0.01
40846.9	55.09	55.09	0
40605.5	55.07	55.07	0
40584.6	55.07	55.07	0
40515.6	55.05	55.05	0
39969.8	54.94	54.94	0
39829.91	54.93	54.93	0
39188.6	54.92	54.92	0
38423.57	54.92	54.92	0
38170.2	54.92	54.92	0
37899.37	54.92	54.92	0
37413.16	54.92	54.92	0
37258.6	55.06	55.06	0
36408.6	54.61	54.61	0
36341.47	54.56	54.56	0
36321.56	54.5	54.5	0
36303.5	54.48	54.48	0
36195.78	54.43	54.43	0
36107.2	54.39	54.39	0
35434.7	54.17	54.16	-0.01
35045.7	53.98	53.98	0
35006.1	53.84	53.84	0
34984.3	53.86	53.85	-0.01
34870.3	53.68	53.68	0
33920.1	52.98	52.98	0
32749.8	51.6	51.59	-0.01
31824.3	50.55	50.55	0
30679.1	49.54	49.54	0
30099.1	49.1	49.1	0
29757.8	48.92	48.92	0
29704.8	48.69	48.68	-0.01
28983.7	48.13	48.14	0.01
28387.3	47.52	47.53	0.01
27992	47.31	47.32	0.01
27567.7	47.07	47.08	0.01
27317	46.94	46.96	0.02
27305.8	46.79	46.8	0.01
27295.8	46.78	46.8	0.02
27189.8	46.38	46.41	0.03
27180.8	46.38	46.4	0.02
27167.5	46.35	46.37	0.02
26816.8*	46.14	46.16	0.02
26466.1	45.95	45.97	0.02
26224.4*	45.78	45.8	0.02
25982.8	45.66	45.68	0.02
25318.4	45.3	45.32	0.02
24564.2	44.94	44.95	0.01
23984.6	44.67	44.67	0
23796.2	44.56	44.57	0.01
23286.2	44.3	44.29	-0.01
22973.4	44.06	44.05	-0.01
22929.4	43.97	43.97	0
22630.3	43.74	43.77	0.03
22587.7	43.44	43.47	0.03
22577.7	43.44	43.46	0.02
22186.8	42.96	43.01	0.05
21829	42.71	42.74	0.03
21589.8	42.48	42.54	0.06
21362	42.38	42.43	0.05
21360	42.37	42.43	0.06
21304	42.31	42.37	0.06
21010.4	42.2	42.26	0.06
20887.4	42.08	42.15	0.07

Impact Analysis 100-Year
Water Surface Elevation Comparison

River Station	Baseline	Alternative 2 (Recommended)	
	WSEL (ft)	WSEL (ft)	Difference
20880.6	42.39	42.44	0.05
20858.6	42.33	42.39	0.06
19860	41.43	41.51	0.08
18597.4	39.73	39.86	0.13
18107.1	39.16	39.3	0.14
17862.9*	38.99	39.13	0.14
17618.7*	38.87	39.01	0.14
17374.5*	38.73	38.88	0.15
17130.3	38.64	38.8	0.16
16004	38.11	38.28	0.17
15045.6	37.44	37.61	0.17
13937.2	36.7	36.87	0.17
13341.9	36.33	36.51	0.18
12945.5	35.95	36.13	0.18
12932.7	35.82	36	0.18
12931.7	35.82	36	0.18
12877.9	35.33	35.47	0.14
12117.3	34.94	35.09	0.15
10905.1	34.16	34.3	0.14
9879.2	33.08	33.23	0.15
8777	31.69	31.82	0.13
8024.4	31.42	31.55	0.13
6779.3	30.74	30.87	0.13
5748.4	29.81	29.94	0.13
4492	28.16	28.28	0.12
3597.9	27.42	27.54	0.12
2709.4	26.6	26.73	0.13
1695.9	25.59	25.71	0.12
678.7	23.74	23.87	0.13

Appendix 5-4AM:
White Oak Bayou CDBG-MIT Application Projects

MEMORANDUM

DATE: November 28, 2022

TO: Gary Bezemek, PE
Feasibility Studies Department Manager

FROM: Burton Johnson, PE, CFM
Project Manager, Feasibility Studies Department

RE: Little White Oak Bayou CDBG-MIT Project
Project Background and Certification of No Adverse Impact

The purpose of this memorandum is to provide a general description of the Little White Oak Bayou Sub-Watershed Flood Risk Reduction Plan proposed project and specifically the identified project along Little White Oak Bayou as part of the CDBG-MIT application, and to certify that the proposed CDBG-MIT project will not result in an increase in flood risk or flood levels in the Little White Oak Bayou watershed and areas downstream.

Earlier this year, the Harris County Flood Control District completed development of a large flood risk reduction plan for the Little White Oak Bayou sub-watershed of White Oak Bayou. This study was prepared by Entech Civil Engineers, Inc. under my supervision and direction. The Little White Oak Bayou subwatershed encompasses 22 acres in the lower portion of the larger White Oak Bayou watershed. The subwatershed includes 32 miles of channel and main trunkline lateral systems in a heavily developed and floodprone portion of Harris County.

The recommended plan includes features anticipated to be constructed by TxDOT as part of the North Houston Highway Improvement Project (NHHIP) Segment 2, including the replacement of four highway/road crossings, two detention basins, and the North Canal bypass of Buffalo Bayou (actually part of Segment 3). Additionally, the plan includes channel modifications between Stokes Road and Tidwell Road and between Yale Boulevard and Little York Road, four detention areas totaling 1,600 acre-feet of storage, and improvements to 12 lateral systems. The TxDOT NHHIP lower downstream flowrates and water surface elevations, and as such the lower channel and areas downstream are able to accommodate the increased flowrates resulting from the proposed channel modifications. The primary purpose of the detention storage is to offset the increased flowrates from the proposed improvements to the lateral systems.

During the preparation of the larger sub-watershed study, the study team was asked to extract and identify a stand-alone project that could be put forward as a CDBG-MIT grant. The project identified was a sub-set of the larger sub-watershed plan being formulated at the time, and consisted of channel modifications from Crosstimbers Road to Tidwell Road and approximately 800 acre-feet of detention in the same reach.

While the CDGB-MIT project described above (and described in more detail in the CDBG-MIT application) was part of the larger plan for Little White Oak Bayou, the timing does not afford the luxury

of the benefits of the NHHIP features and therefore to prevent downstream impacts it must be self-mitigating. For the larger watershed plan, the purpose of the detention storage is to mitigate impacts from improvements to the lateral system. The CDBG-MIT project does not include the lateral system improvements and therefore the detention is targeted toward the mitigation of the proposed main-stem channel modifications between Crosstimbers Road and Tidwell Road.

Typically, a certification of no adverse impact is included in the report supporting a project. Since the CDBG-MIT project was extracted from the larger sub-watershed study, a stand-alone report was not prepared. In lieu of a traditional report, this memorandum provides the certification of no adverse impact. The proposed channel modifications along with 800 acre-feet of detention storage were modeled using the project models. The results were compared to the baseline condition models to confirm no impact along Little White Oak Bayou are in the receiving channels downstream. The results of this modeling generally showed the proposed project results in a decrease in peak flowrates and water surface elevations for areas upstream, adjacent to, and downstream of the project for events up to and including the 500-year event (using the legacy HCFCD rainfall). There are some cross sections that show a very small increase of no more than 0.20 feet. During the development of the project, we determined that this very small increase was the result of some numerical nuance that could be eliminated by optimizing the detention basin inflow and outflow controls and did not represent an adverse impact downstream. When this project moves forward in the project life cycle, the appropriate features will be further considered and optimized.

Based upon my review of the computed flowrates and water surface elevations associated with the CDBG-MIT project described in this memorandum along with and my understanding of the hydrologic and hydraulic models utilized in the determination of the water surface elevations, I hereby conclude and certify that the proposed CDBG-MIT project will not increase water surface elevations and peak flowrates upstream of, adjacent to, or downstream of the proposed project.

Mitigation Application

General

Program *

Hurricane Harvey State Mitigation Competition – HUD MID

Applicant *

Harris County Community Services Department (CSD)

County *

Harris

Application Type *

New

FY End Date

2/28/2021

Council of Governments

Houston-Galveston Area Council (HGAC)

Each application must upload a MIT-Local Certifications form signed by an authorized signatory along with other required application documentation. Each applicant for CDBG-MIT funding must certify by signing that both the Application for Federal Assistance Standard Form 424 (SF-424) and the MIT-Local Certifications form provided on the GLO website and described in the application guide were followed in the preparation of any CDBG-MIT program application, and will continue to be followed in the event of funding.

The Application for Federal Assistance Standard Form 424 (SF-424) and the MIT-Local Certifications

Related Contacts

Contact *

Mrsny, Reid

Authorized Representative

Hidalgo, Lina

Grant Administrator

Hickingbottom, Kent

Standard Form 424

Application Title *

White Oak Bayou Partnership Application

Applicant Delinquent on Federal Debt

(●) No ( ) Yes

Construction Application

( ) No (●) Yes

Construction Pre-Application

(●) No ( ) Yes

Program Not Selected by State for Review

(●) No ( ) Yes

Mitigation Application

Addressed Risk - Select the risk identi ed in the Action Plan that will be addressed. (select all that apply)

- [x] **Hurricanes/Tropical Storms/Tropical Depressions**
- [ ] **Severe Coastal Flooding**
- [x] **Riverine Flooding**

"The Federal Register, 84 FR 45838 (August 30, 2019) defines mitigation as:
“Activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship, by lessening the impact of future disasters.”

Applicants must describe in narrative format how their proposed project meets the above definition and clearly identify the methodology used to determine how the described criteria are being met. Include information identifying how the proposed project addresses overall local mitigation needs.

Mitigation presents communities with unique opportunities to examine a wide range of issues including (1) housing quality and availability, (2) road and rail

Hazard, Risk Description - Describe how the risk(s) selected are impacting the proposed project area. Reference where adopted local mitigation e orts are planned or underway where appropriate.

Subdivisions and businesses throughout the White Oak Bayou Watershed in Harris County experience flooding conditions during hurricanes, tropical storms, and even intense rainfall events that overwhelm drainage systems and result in riverine, or out-of-bank, flooding of the local bayous, tributaries, and drainage channels. The risk of flooding is a daily threat to the residents that live in areas with aging and inadequate drainage systems. The project sites identified throughout this application are part of an organized county-wide effort to analyze infrastructure shortfalls, build community resilience, and mitigate future hazards through flood risk reduction projects and strict floodplain management practices. The sites described in this application benefit many residents in some of the most vulnerable and at-risk areas of the County.

The massive and long-term financial commitment is recognized locally, and so a portion of project site costs, most of the sites included in this application, were approved for funding in the 2018 Harris County Flood Control District Bond Program. While some funding was earmarked for these sites, and is currently being used to fund the engineering study and design, the bond funding is not adequate to construct the required improvements. As a result, Harris County and Harris County Flood Control District are in dire need of additional funding to help address these urgent concerns. Income and need were factors when selecting projects for inclusion in the Bond program and the improvements were designed to assist low- and moderate-income persons/communities. Earmarked funding can be found in the Harris County FY 2020 Mid-Year Review and Capital Improvements Program (CIP), adopted in September 2019, along with subdivisions and mapped sites. Additionally, measures needed to address subdivision drainage were included in the Harris County Hazard Mitigation Plan.

See the attached narrative for additional information.

Hazard Mitigation Actions - Describe how the proposed project will mitigate against the identi ed risks. Reference where adopted local mitigation e orts are being enhanced where appropriate.

The Greater Houston area has experienced multiple major flooding events in recent years including the Memorial Day Flood (2015), the Tax Day Flood (2016) and Hurricane Harvey (2017). These events have amounted to 84 deaths and over $125.5 billion in damages. Because of the devastation and the need to identify measures to mitigation the impacts of major storm events, Harris County studied nearly 100 previously flooded subdivisions and found drainage solutions to mitigate risk to life and safety during future storm events.

This Flood and Drainage Activity improves drainage at neighborhood and regional levels by making improvements to subdivisions (Barwood, Kolbe Road area, and Tower Oaks Meadows) within the White Oak Bayou Watershed and to the E132-00-00 and Little White Oak Bayou channels. The proposed improvements include adding or upgrading storm sewer systems, adding curb and gutter systems, and increasing storage capacity with new detention basins and enlarging channels. The increased capacity across multiple project sites ultimately places less burden on the watershed, or service area. The cumulative benefits of multiple project sites ultimately mitigate property, life, and economic loss in future flooding events.

Harris County and Harris County Flood Control District have adopted the most stringent floodplain regulations in the United States by incorporating robust infrastructure regulations that ensure development follows standards that minimize the likelihood of future flooding. Copies of the Harris County floodplain regulations, infrastructure regulations, and HCFCD Policies, Criteria, and Procedures Manual with proof of adoption by Commissioners Court can be found in the supporting documentation for this application.

Due to space limitations, details for this section can be found in the narrative attached in documents.

Local Adopted Plans - To meet the local plan requirement, applicants follow speci c procedures identi ed in the CDBG-MIT Application Guide

Is the proposed project included in one or more locally adopted plans?

Yes

Provide the title of the adopted plan being referenced.

Harris County Multi-Hazard Mitigation Action Plan

Provide the page number(s) in the adopted plan(s) where the proposed project is identified.

11-1 through 11-38, 21-5

Provide the date (Month, Year) the plan(s) was/ were adopted:

5/19/2020

Added Resiliency Measures

Applicants must explain if prior capital improvement projects, short or long-range planning efforts, community engagement or educational outreach, the implementation of enhanced building codes or code enforcement, or other related work has been completed which enhances hazard mitigation and/or resiliency throughout the applicable community or service area of the applicant(s).

If no previous efforts have been made, this must be stated in the application. If a joint project is being submitted by multiple entities that crosses jurisdictional or service area boundaries, each jurisdiction or entity should provide examples of previous hazard mitigation or resiliency efforts that have been completed within their particular jurisdiction or service area. Source documents, such as signed memorandum, must be attached to the application which prove such efforts have been implemented.

Does the proposed project enhance mitigation efforts that are already completed or underway?

Yes

If Yes, then provide a brief description.

Public meetings were held for all subdivision sites in this application during project development to gain public input and comments. Discussion for E132-00-00 was included with Barwood and Tower Oaks Meadows. The study reports and meeting information have been attached. Harris County and the Flood Control District have also taken measures through the most stringent floodplain regulations in the United States and by incorporating robust infrastructure regulations to ensure that development is built to standards that will minimize the likelihood of future flooding. Copies of the above documents and their adoption by Commissioners Court can be found in the supporting documentation for this application. Also, Harris County and the Flood Control District have included funding for the study and design of the projects in their capital program. A copy of the Capital Improvements Program (CIP) has also been attached.

Please see the attached narrative for additional information.

Select the type(s) of prior or current local e orts undertaken that, combined with the proposed project, will provide enhanced hazard mitigation:

- [ ] **Prior capital improvement project(s)**
- [x] **Current capital improvement project(s)**
- [x] **Short-range planning efforts**
- [x] **Long-range planning efforts**
- [x] **Community engagement**
- [x] **Educational outreach**
- [x] **Implementation of enhanced building codes**
- [x] **Code enforcement**

- [ ] **Other related work which enhances hazard mitigation and/or resiliency through the proposed project.**

Other Hazard Mitigation Work

Mitigation Application Project

Acknowledging that mitigation needs may span a variety of services and facilities, for purposes of Mitigation funding only, the definition of project is expanded to include a discrete and well-defined beneficiary population and subsequent geographic location consisting of all eligible activities required to complete and provide specific successful mitigation benefit to the identified population.

For purposes of Mitigation application and implementation, the Project provided represents the overall Mitigation need being met.

There may be more than one Activity included in a Project. For instance, a successful Mitigation Project may require a drainage facilities activity, a street improvements activity, and a water facilities activity.

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Subrecipient Application/Contract

White Oak Bayou Partnership Application

Project Title

White Oak Bayou Partnership Drainage Improvements

Project Summary

The White Oak Bayou Watershed has experienced multiple major flooding events in recent years including the Memorial Day Flood (2015), the Tax Day Flood (2016) and Hurricane Harvey (2017). These events have amounted to 84 deaths and over $125.5 billion in damages. Because of the devastation and the need to identify measures to mitigation the impacts of major storm events, Harris County studied nearly 100 previously flooded subdivisions and Harris County Flood Control District identified regional solutions, finding drainage alternatives to mitigate risk to life and safety during future storm events.

This Flood and Drainage Activity improves drainage at neighborhood and regional levels by making improvements to subdivisions (Barwood, Kolbe Road area, and Tower Oaks Meadows) within the White Oak Bayou Watershed and to the E132-00-00 and Little White Oak Bayou channels. The proposed improvements include adding or upgrading storm sewer systems, adding curb and gutter systems, and increasing storage capacity with new detention basins and enlarging channels. The increased capacity across multiple project sites ultimately places less burden on the watershed, or service area. The cumulative benefits of multiple project sites ultimately mitigate property, life, and economic loss in future flooding events.

Mitigation Application Project

All of the state's mitigation activities under this grant will meet a national objective for either (1) benefiting low- to moderate-income persons (LMI), or (2) urgent need mitigation (UNM). At least 50 percent of CDBG-MIT funds will be used to support activities that benefit LMI person, and all programs and projects will have an LMI priority. For CDBG-MIT activities, HUD approval will be required to rely on the national objective criteria for elimination of slum and blighting conditions, because this national objective generally is not appropriate in the context of mitigation activities.

As indicated in the State Mitigation Action Plan:

Does the proposed project principally benefit Low- and Moderate-Income Persons or Mitigation Urgent Need?

Low-and Moderate-Income Persons

Low- and Moderate-Income Persons

- [x] **LMI Area Benefit**
- [ ] **LMI Housing Activity**
- [ ] **LMI Limited Clientele**

Provide the proposed beneficiary data:

Total Beneficiaries

439025

LMI Beneficiaries

235750

% LMI Beneficiaries

53.70

Applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for grant administration, environmental, and engineering services if using CDBG-MIT funds to pay third-party vendors for those services. These rules and regulations also apply to procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured a third-party administrator to administer the proposed project?

No

Have you procured a third-party environmental service provider for the proposed project?

Yes

Company Name

Various (by site) - Procured with local funds and not requesting reimbursement.

Contact

Email

Phone

Have you procured a third-party engineer for the proposed project?

Yes

Mitigation Application Project

What is the current status of the project?

In Progress

Provide a brief narrative regarding how CDBG-MIT funding is to be used. Demonstrate that all HUD CDBG environmental requirements have been met to date. Applicants should be advised that all HUD CDBG environmenal requirements must be met before reimbursement can be considered.

More information at https://www.hudexchange.info/resource/167/environmental-review-procedures-24-cfr-58 (https://www.hudexchange.info/resource/167/environmental-review-procedures-24-cfr-58)

Funding requested in this application will be utilized to improve drainage at regional and neighborhood levels by constructing drainage infrastructure that meets the most stringent infrastructure and floodplain regulations in the nation. The activities consist of a wide variety of solutions, but generally consist of either upgrading and improving storm sewer systems, adding curb and gutter, or adding a or increasing the capacity of detention basins. The incremental benefit of each project site begins to cumulatively place less burden on the watershed service area. In future flooding events, this improved capacity mitigates deaths and property damage caused by flooding.

Harris County is committed to meeting all HUD CDBG environmental requirements and performing environmental reviews in compliance with 24 CFR 58, and other federal guidelines. In preparation for this application and in meeting environmental requirements, the applicants have performed Phase I Environmental Site Assessments on some sites included in this application, and has performed high level reviews of all sites. The findings from those reviews are indicated below and further detail can be found in the documents section.

Will the proposed project site have any negative impact(s) or effect(s) on the environment per HUD environmental regulations as described?

More information at https://www.hudexchange.info/programs/environmental-review (https://www.hudexchange.info/programs/environmental-review)

No

Is the proposed project site likely to require a historical resources/archaeological assessment?

More information at https://www.hudexchange.info/environmental-review/historic-preservation (https://www.hudexchange.info/environmental-review/historic-preservation)

No

Is the proposed project site listed on the National Register of Historic Places?

More information at https://www.nps.gov/subjects/nationalregister/index.htm (https://www.nps.gov/subjects/nationalregister/index.htm)

No

Is the proposed project site in a designated ood hazard area or a designated wetland?

FEMA Firmette located here: https://msc.fema.gov/portal/search (https://msc.fema.gov/portal/search?)

Yes

Is the applicant participating in the National Flood Insurance Program?

More information at https://www.hudexchange.info/programs/environmental-review/flood-insurance (https://www.hudexchange.info/programs/environmental-review/flood-insurance)

Yes

Is the project in compliance with Executive Order 11990?

More information at https://www.hudexchange.info/environmental-review/wetlands-protection (https://www.hudexchange.info/environmental-review/wetlands-protection)

Yes

Is the project in a designated Regulatory Floodway?

More information at https://www.hudexchange.info/environmental-review/floodplain-management (https://www.hudexchange.info/environmental-review/floodplain-management)

Unknown

Is the proposed project site located in a known critical habitat for endangered species?

More information at https://www.hudexchange.info/environmental-review/endangered-species (https://www.hudexchange.info/environmental-review/endangered-species)

Yes

Is the proposed project site a known hazardous site?

More information at https://www.hudexchange.info/environmental-review/site-contamination (https://www.hudexchange.info/environmental-review/site-contamination)

No

Is the proposed project site located on federal lands or at a federal installation?

No

What level of environmental review is likely needed for the proposed project site?

More information at HUD Exchange (https://www.hudexchange.info/resource/785/summary-table-of-levels-of-environmental-review-and-documentation-required-in-err)

Categorical Exclusion

Provide any additional detail or information relevant to Environmental Review

For some sites, Phase I Environmental Site Assessments were completed. For others, desktop reviews were performed to evaluate the potential impacts. Findings from those reviews are summarized in the documents section of this application. Answers to the above questions could change upon further review. All State and Federal policies and guidelines will be followed in addressing any of the above noted issues.

Mitigation Application Project

Identify activities already achieved to further fair housing, and those activities to be undertaken if an award is made by CDBG-MIT and when that activity will be complete. Upload any backup documentation to support your e orts.

Name	Activity 1
Comment Planned	Publishing the contact information, at the local, state and federal levels, for repor ting a Fair Housing complaint—achieved March 1 2020
Name	Activity 2
Comment Planned	Designating a Fair Housing Month – will achieve April 1, 2021 and have achieved April 1, 2020
Name	Activity 3
Comment Planned	Develop an anti-NIMBYism plan – achieved Nov. 12, 2018
Name	Activity 4
Comment Planned	Developed an AFH/Fair Housing Plan and submitted to HUD – achieved Jan 31, 2019

The Project Level Budget represents summary data compiled as each Activity and Site are defined. Applicants are expected to present a thorough budget at the site level that includes all elements required for an eligible and successful project. Construction or public facilities budgetary information must be provided by a professional engineer or architect licensed to practice in the state of Texas using the **MIT-Budget Justification of Retail Costs (formerly Table 2)** form available the GLO website at: https://recovery.texas.gov/files/resources/mitigation/mit-budget-justification-of-retail-costs.xlsx

Original sealed construction and public facilities budgetary information must be uploaded as supporting

Minimum Total Amount Requested

$0.00

Maximum Total Amount Requested

$1,000,000,000.00

Maximum # of Activities per Project

20 Activities

Total Estimated/Original Project Budget

$100,000,000.00

Budget Activities

Program Budget Code	Flood control and drainage Improvements
Planned/Requested Amount	100,000,000.00
Total Other Funds	$17,207,261.05
Activity Total	$117,207,261.05

Project Site

Project Sites & Locations

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Site Number

S-003175

Site Title *

Barwood Subdivision Drainage Improvements

Site Description

The Barwood subdivision, constructed in the 1970s, consists of 200+ acres of residential parcels and is located southwest of the intersection of N Eldridge Parkway and Cypress North Houston Road. The existing drainage system consists of curb and gutter roadways with Type B and BB inlets that drain to an underground storm sewer system. The storm sewer outfalls into either the Harris County Flood Control District (HCFCD) channel E132-00-00 to the east or the HCFCD channel E133-00-00 to the west. Approximately 70 acres drain west to HCFCD channel E133-00-00 through a single outfall. The remaining 130 acres drain east to the HCFCD channel E132-00-00 through seven (7) outfalls. The existing system is considered partially non-conforming with current infrastructure regulations primarily due to small inlets (Type B), non-existent detention, and lack of extreme event sheetflow paths.

Historic heavy rain events and recent extreme rain events such as Hurricane Harvey and Houston Tax Day Flood caused widespread flooding throughout the Barwood subdivision. During the Tax Day Flood, some homes saw up to 12 inches of water, and during Hurricane Harvey some residents reported up to 30 inches. The neighborhood is very flat topographically and is bordered by two major drainage ditches to the east and west draining south to White Oak Bayou. The high tail water conditions in E132-00-00 and E133-00-00 during extreme rainfall events exacerbate the flooding conditions internal to the Barwood Subdivision.

During Hurricane Harvey, 131 homes reported flooding with an average depth of 4.21 inches. During the 2016 Tax Day event, 31 homes reported flooding with an average depth of 2.65 inches. There are 32 FEMA repetitive loss claims in the Barwood Subdivision, spread throughout the area.

Street Address

Campos and Chetman

Street Limits on Street

From Street

To Street

Zip Code

77065

City

Houston

County

Harris

State

TX

Latitude

29.94261

Longitude

-95.61223

Scope of Work

The proposed Barwood flood and drainage activity project includes the addition of storm sewer along North Eldridge Parkway to increase capacity of the existing system as well as the strategic replacement of storm sewer within the subdivision. The construction of extreme event overflows along the HCFCD channel E132-00-00 are included in the improvements as well. These improvements conform to current infrastructure regulations and provide a greater level of protection during severe flooding. The proposed improvements create downstream adverse impact, but the E132-00-00 Mitigation project addresses these needs and must be constructed in advance of the Barwood flood and drainage activity.

The proposed improvements result in a significant benefit to mitigating flooding in the subdivision by reducing the 100-year, or 1% AEP, water surface elevations by 6 to 24 inches. The reduction in ponding depth mitigates future flood damages for 131 homes.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?

No

Construction completion method to be used

Competitve Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?

No

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to 2 (

Districts and Elected Officials

Cong. Rep

McCaul, Michael

State Rep

Oliverson, Tom

State Senator

Bettencourt, Paul

Cong. Rep District #

10

State Rep District #

130

State Senator Dist#

7

Site Budget

Specify Site Budget Information

Total Requested Grant Funds

$4,232,492.55

Total Other Funds

$903,375.00

Total Grant & Other Funds

$5,135,867.55

Amount Requested	$18,067.50
Site Budget Code	CDBG-MIT Environmental
Other Funds	
Site Budget Total	$18,067.50
Name	Barwood Subdivision Drainage Improvements - CDBG-MIT Environmental
Created On	9/23/2020 11:27 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$239,575.05
Site Budget Code	CDBG-MIT Admin
Other Funds	
Site Budget Total	$239,575.05
Name	Barwood Subdivision Drainage Improvements - CDBG-MIT Admin
Created On	9/23/2020 11:31 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$361,350.00
Site Budget Code	CDBG-MIT Engineering
Other Funds	$903,375.00
Site Budget Total	$1,264,725.00
Name	Barwood Subdivision Drainage Improvements - CDBG-MIT Engineering
Created On	9/23/2020 10:57 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$3,613,500.00
Site Budget Code	CDBG-MIT Construction
Other Funds	
Site Budget Total	$3,613,500.00
Name	Barwood Subdivision Drainage Improvements - CDBG-MIT Construction
Created On	9/23/2020 10:54 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Site Metrics

Name	Linear Feet of Public Improvement
Comment Planned	Storm Sewer Upgrades (LF) - 5,180 Storm Sewer New (LF) - 1,300 Manholes (EA) - 4
Numeric Resp Planned	6480

Name	Number of public improvements
Comment Planned	Storm Sewer Upgrades (LF) 5180 Storm Sewer New (LF) 1300 Manholes (Ea) 4
Numeric Resp Planned	3

Project Site

Project Sites & Locations

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Site Number

S-003176

Site Title *

Tower Oaks Meadows Subdivision Drainage Improvements

Site Description

The Tower Oaks Meadows subdivision was developed throughout the 1970s and consists of 150+ acres of residential parcels. Tower Oaks Meadows is located immediately south of Barwood and is drained via roadside ditches and driveway culverts which drain to an existing storm sewer trunk line along the back of lots between Dakar and Aste Streets. The storm sewer outfalls into the HCFCD channel E132-00-00 to the east while the remainder of the ditches outfall to the HCFCD channel E133-00-00 to the west. Approximately 30 acres drain west to HCFCD channel E133-00-00 through two outfalls. The remaining 120 acres drain east to the HCFCD channel E132-00-00 through four (4) outfalls. Although current regulations allow roadside ditches, the existing drainage system is considered non-conforming due to ditch geometry, culvert sizing, a lack of detention, and no consideration for extreme event overflows. The high tail water conditions in E132-00-00 and E133-00-00 during extreme rainfall events exacerbate the flooding conditions internal to the Tower Oaks Meadows Subdivision.

Multiple single-family residential homes flooded during the April 2016 (Tax Day) and August 2017 (Hurricane Harvey) storm events. Approximately 91 structures flooded during Hurricane Harvey with Flooding depths that ranged from 6 inches to 12 inches. During the April 2016 (Tax Day) storm event approximately 97 structures flooded. There are 21 FEMA repetitive or severe repetitive loss properties within Tower Oaks Meadows.

Street Address

Maxim Drive and Honey Grove Lane

Street Limits on Street

From Street

To Street

Zip Code

77065

City

Houston

County

Harris

State

TX

Latitude

29.93801

Longitude

-95.61301

Scope of Work

The proposed Tower Oaks Meadows flood and drainage activity includes a portion of full conversion from asphalt pavement and roadside ditches to curb and gutter with underground storm sewer and the sections that remain roadside ditch will have a storm sewer installed below the current flow line. Roadside ditches will be re-graded to provide positive drainage toward the storm sewers. The roadway profiles will be designed to provide a cascading effect and provide capacity to convey extreme event runoff toward HCFCD Unit E132-00-00. The construction of extreme event overflows along the HCFCD channel E132-00-00 are included in the improvements as well. The proposed improvements create downstream adverse impact, but the E132-00-00 Mitigation project addresses these needs and must be constructed in advance of the Tower Oaks Meadows flood and drainage activity.

Additional information about the details and benefits of the project can be found in the narrative attached in Documents.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?

No

Construction completion method to be used

Competitve Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?

No

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to

Districts and Elected Officials

Cong. Rep

McCaul, Michael

State Rep

Oliverson, Tom

State Senator

Bettencourt, Paul

Cong. Rep District #

10

State Rep District #

130

State Senator Dist#

7

Site Budget

Specify Site Budget Information

Total Requested Grant Funds

$8,314,234.40

Total Other Funds

$1,277,693.33

Total Grant & Other Funds

$9,591,927.73

Amount Requested	$35,491.48
Site Budget Code	CDBG-MIT Environmental
Other Funds	
Site Budget Total	$35,491.48
Name	Tower Oaks Meadows Subdivision Drainage Improvements - CDBG-MIT Environmental
Created On	9/23/2020 11:37 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$470,617.04
Site Budget Code	CDBG-MIT Admin
Other Funds	
Site Budget Total	$470,617.04
Name	Tower Oaks Meadows Subdivision Drainage Improvements - CDBG-MIT Admin
Created On	9/23/2020 11:39 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$709,829.63
Site Budget Code	CDBG-MIT Engineering
Other Funds	$1,277,693.33
Site Budget Total	$1,987,522.96
Name	Tower Oaks Meadows Subdivision Drainage Improvements - CDBG-MIT Engineering
Created On	9/23/2020 11:37 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$7,098,296.25
Site Budget Code	CDBG-MIT Construction
Other Funds	
Site Budget Total	$7,098,296.25
Name	Tower Oaks Meadows Subdivision Drainage Improvements - CDBG-MIT Construction
Created On	9/23/2020 11:33 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Site Metrics

Name	Linear Feet of Public Improvement
Comment Planned	Storm Sewer New (LF) - 13,123 Excavate and Regrade Ditches (LF) - 19,200 Road Reconstruction (LF) - 9,600
Numeric Resp Planned	41923

Name	Number of public improvements
Comment Planned	New Storm Sewer (LF) 13123 Excavate and Regrade Ditches (LF) 19200 Road Reconstruction (LF) 9600
Numeric Resp Planned	3

Project Site

Project Sites & Locations

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Site Number

S-003177

Site Title *

E132-00-00 Mitigation Project

Site Description

The HCFCD channel E132-00-00 is a tributary of White Oak Bayou and serves as the main storm water conveyance structure for approximately 1,400 acres of dense residential development. This project site includes a section of HCFCD channel E132-00-00 from Wortham Landing Drive to Lieder Drive, which serves approximately 670 acres of the 1,400 total drainage area acreage. The project area was developed from the 1950s to the 1970s and nearly all existing drainage systems, in comparison to current regulations, are considered non-conforming. The current channel geometry provides less than a 25-year level of service for the drainage area, which results in high tail water conditions during extreme or long duration rainfall events.

The channel's insufficient capacity, combined with the lack of detention in the surrounding developments contribute to an increase in water surface elevations throughout the project areas, which increase the risk of flooding in the Bernadine Estates, Barwood, Tower Oaks, and Tower Oaks Meadows subdivisions. The high tail water conditions in HCFCD channel E132-00-00 contributed to the flooding of over 200 residential structures throughout the drainage area.

Street Address

Iberia Drive and Dakar Drive

Street Limits on Street

From Street

To Street

Zip Code

77065

City

Houston

County

Harris

State

TX

Latitude

29.95475

Longitude

-95.60275

Scope of Work

The proposed E132-00-00 flood and drainage activity includes enclosing a portion of the upstream channel, modifying the width of the remaining channe and acquiring right-of-way (ROW) for additional detention storage volume or channel widening. The enclosed portion is anticipated to consist of four 9'x Reinforced Concrete Boxes (RCBs) from Advance Drive to Foxburo Dr. A conceptual detention basin providing approximately 21 acre-feet of detention storage has been identified immediately south of Foxburo Street and east of HCFCD Unit E132-00-00.

The goal is to increase the storage and conveyance capacity in the E132-00-00 channel for all adjacent sites to reach full mitigation potential. The conformance of this channel to current floodplain regulations and HCFCD policies, criteria, and design standards will result in not only direct benefit to th Barwood, Tower Oaks Meadows, and Bernadine Estates neighborhoods, but also mitigate future flood damages for the sub-regional area.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?

No

Construction completion method to be used

Competitve Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?

Yes

Estimated Number of Parcels

18

If yes, has acquisition been completed, in progress, or will need to be acquired?

Still Needed

If yes, provide a brief narrative describing the acquisition activities required.

Acquisition will be required for the detention pond.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to 2 (

Districts and Elected Officials

Cong. Rep

McCaul, Michael

State Rep

Oliverson, Tom

State Senator

Bettencourt, Paul

Cong. Rep District #

10

State Rep District #

130

State Senator Dist#

7

Site Budget

Specify Site Budget Information

Total Requested Grant Funds

$16,429,224.08

Total Other Funds

$1,710,288.00

Total Grant & Other Funds

$18,139,512.08

Amount Requested	$47,508.00
Site Budget Code	CDBG-MIT Environmental
Other Funds	
Site Budget Total	$47,508.00
Name	E132-00-00 Mitigation Project - CDBG-MIT Environmental
Created On	9/23/2020 11:47 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$929,956.08
Site Budget Code	CDBG-MIT Admin
Other Funds	
Site Budget Total	$929,956.08
Name	E132-00-00 Mitigation Project - CDBG-MIT Admin
Created On	9/23/2020 11:47 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$950,160.00
Site Budget Code	CDBG-MIT Engineering
Other Funds	$1,710,288.00
Site Budget Total	$2,660,448.00
Name	E132-00-00 Mitigation Project - CDBG-MIT Engineering
Created On	9/23/2020 11:46 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$5,000,000.00
Site Budget Code	CDBG-MIT Acquisition
Other Funds	
Site Budget Total	$5,000,000.00
Name	E132-00-00 Mitigation Project - CDBG-MIT Acquisition
Created On	9/23/2020 11:48 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$9,501,600.00
Site Budget Code	CDBG-MIT Construction
Other Funds	
Site Budget Total	$9,501,600.00
Name	E132-00-00 Mitigation Project - CDBG-MIT Construction
Created On	9/23/2020 11:42 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Site Metrics

Name	Linear Feet of Public Improvement
Comment Planned	Storm sewer improvements (LF) - 5,600 Detention Pond (Ac-Ft) - 17
Numeric Resp Planned	5600

Name	Number of public improvements
Comment Planned	Storm sewer improvements (LF) - 5,600 Detention Pond (Ac-Ft) - 17
Numeric Resp Planned	2

Project Site

Project Sites & Locations

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Site Number

S-003179

Site Title *

Kolbe Road & Related Infrastructure Drainage Improvements

Site Description

The Kolbe Road project area was developed throughout the 1970s and consists of approximately 80 acres of large lot residential parcels drained using a system of roadside ditches which drain north to the Cypress North Houston Road storm sewer. Although current regulations allow roadside ditches, the current system is considered non-conforming due to poor lot grading, lack of detention, and no consideration for extreme event flow paths. All these factors combined lead to shallow, but widespread and long duration inundation throughout the project area.

The recorded damages from Hurricane Harvey showed that 38 homes experienced structural flooding during Hurricane Harvey with flooding depths from 2 to 12 inches above finished floor elevations. Only two structures within the study area were reported in the Tax Day storm event. Additionally, there are two FEMA repetitive flood loss properties.

Street Address

South Kolbe Drive and South Kolbe Circle

Street Limits on Street

From Street

To Street

Zip Code

77429

City

Cypress

County

Harris

State

TX

Latitude

29.94051

Longitude

-95.64223

Scope of Work

The flood and drainage activity for Kolbe Road include the addition of storm sewers under the existing roadside ditches throughout the project site. The storm sewer redirects a portion of drainage area from Cypress North Houston to now drain to HCFCD channel E133-01-00. The change in flows require detention to mitigate any adverse impact, so ROW acquisition is included in the project requirements. All improvements conform with current infrastructure and floodplain regulations.

The increased drainage capacity, along with the detention component, mitigates the risk of damage to buildings during extreme storm events by reducing ponding depths up to 7 inches. The reduced ponding depths potentially alleviating the structural flooding concerns of at least the 38 previously flooded homes.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?

No

Construction completion method to be used

Competitve Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?

Yes

Estimated Number of Parcels

3

If yes, has acquisition been completed, in progress, or will need to be acquired?

In Progress

If yes, provide a brief narrative describing the acquisition activities required.

Acquisition is required for the 38.4 acre foot detention pond, a 30 foot drainage easement, and for dedication of ROW associated with the private streets.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to 2 (

Districts and Elected Officials

Cong. Rep

Fletcher, Lizzie

State Rep

Oliverson, Tom

State Senator

Bettencourt, Paul

Cong. Rep District #

7

State Rep District #

130

State Senator Dist#

7

Site Budget

Specify Site Budget Information

Total Requested Grant Funds

$5,698,832.08

Total Other Funds

$622,483.00

Total Grant & Other Funds

$6,321,315.08

Amount Requested	$18,218.36
Site Budget Code	CDBG-MIT Environmental
Other Funds	
Site Budget Total	$18,218.36
Name	Kolbe Road & Related Infrastructure Drainage Improvements - CDBG-MIT Environmental
Created On	9/23/2020 11:59 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$322,575.40
Site Budget Code	CDBG-MIT Admin
Other Funds	
Site Budget Total	$322,575.40
Name	Kolbe Road & Related Infrastructure Drainage Improvements - CDBG-MIT Admin
Created On	9/23/2020 12:00 PM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$364,367.12
Site Budget Code	CDBG-MIT Engineering
Other Funds	$622,483.00
Site Budget Total	$986,850.12
Name	Kolbe Road & Related Infrastructure Drainage Improvements - CDBG-MIT Engineering
Created On	9/23/2020 11:58 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$1,350,000.00
Site Budget Code	CDBG-MIT Acquisition
Other Funds	
Site Budget Total	$1,350,000.00
Name	Kolbe Road & Related Infrastructure Drainage Improvements - CDBG-MIT Acquisition
Created On	9/23/2020 12:00 PM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$3,643,671.20
Site Budget Code	CDBG-MIT Construction
Other Funds	
Site Budget Total	$3,643,671.20
Name	Kolbe Road & Related Infrastructure Drainage Improvements - CDBG-MIT Construction
Created On	9/23/2020 11:57 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Site Metrics

Name	Linear Feet of Public Improvement
Comment Planned	Storm Sewer Upgrades (LF) - 9,910 Detention (CY) - 62,000
Numeric Resp Planned	9910

Name	Number of public improvements
Comment Planned	Storm Sewer Upgrades (LF) 9910 Detention (cy) 62000
Numeric Resp Planned	2

Project Site

Project Sites & Locations

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Site Number

S-003321

Site Title *

Little White Oak Bayou

Site Description

Little White Oak Bayou has a total of length of about 14 miles, from its headwaters in North Houston to its confluence with White Oak Bayou near downto Houston. The Little White Oak Bayou subwatershed is part of the larger White Oak Bayou watershed. The lower ¼ of the channel is downstream of Interstate 610. This portion of the channel is natural and larger, and there is minimal flood history along this portion of the channel. However, upstream o Interstate 610, the channel has been rectified. Much of the channel, with the exception of the most upstream reach, was concrete lined in the late 1970's. The watershed is fully urbanized, with most development occurring before 1960. In the 1940's, Little White Oak Bayou was extended upstream beyond North Shepherd.

Little White Oak Bayou upstream of Interstate 610 has a long history of flooding. This is due to (1) the overall lack of capacity of the channel and (2) restrictions from a long culvert underneath Interstate 610. The impact of this restricted culvert is felt upstream to Crosstimbers.
Between 1978 and 1980, HCFCD completed the following projects:

- Channel Improvements – IH-45 to Riggs Road (1978)
- Channel Improvement – Riggs Road to Victoria Drive (1979)
- Channel Improvements – Victoria Drive to Yale Blvd (1980)

All of these projects included concrete lining of the channel, and the channels were designed to accommodate 100-year flowrates using the hydrologic methodology available at that time.

In the early 1980's, HCFCD continued the preliminary engineering and design of channel improvement projects extending upstream of Yale Blvd. Howev at the same time HCFCD was completing its first countywide floodplain study using hydrologic and hydraulic computer models. This new study showed t the older methods underpredicted flood flows and did not adequately account for the impact of channel improvements on flood flows downstream.

See attached narrative for more detail.

Street Address

359 Spell Street

Street Limits on Street

From Street

Tidwell Road

To Street

Crosstimbers Street

Zip Code

77002

City

Houston

County

Harris

State

TX

Latitude

29.83642

Longitude

-95.39424

Scope of Work

The proposed project involves channel widening 8.700 feet of Little White Oak Bayou (HCFCD Unit No. E101-00-00) from Tidwell Road (upstream) to Crosstimbers Street (downstream) along with two detention basins and additional in-line storage. The existing channel is concrete lined with a top-width of approximately 50 feet. The existing right-of-way is between 75 to 80 feet, although there are some areas with additional existing right-of-way through the corridor. The proposed channel will be grass lined with a geomorphologic low flow channel. The full channel, including the low flow and high flow areas, will have a top width of 270 (although it may be wider where right-of-way allows). The detention basins will provide an additional 800 acre-feet of storage during a 500-year event. There are six bridge crossings in the project reach – Leago, Werner, Oxford Footbridge, Victoria, Distribution Center and Whiney. These will be modified as necessary to accommodate the project.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?

No

Construction completion method to be used

Competitve Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?

Yes

Estimated Number of Parcels

If yes, has acquisition been completed, in progress, or will need to be acquired?

Still Needed

If yes, provide a brief narrative describing the acquisition activities required.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to 2 (

Districts and Elected Officials

Cong. Rep

Jackson Lee, Sheila

State Rep

Johnson, Jarvis

State Senator

Whitmire, John

Cong. Rep District #

18

State Rep District #

139

State Senator Dist#

15

Site Budget

Specify Site Budget Information

Total Requested Grant Funds

$65,325,216.89

Total Other Funds

$12,693,421.72

Total Grant & Other Funds

$78,018,638.61

Amount Requested	$2,350,111.61
Site Budget Code	CDBG-MIT Admin
Other Funds	
Site Budget Total	$2,350,111.61
Name	Little White Oak Bayou - CDBG-MIT Admin
Created On	9/30/2020 7:21 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$26,475,105.28
Site Budget Code	CDBG-MIT Construction
Other Funds	$12,693,421.72
Site Budget Total	$39,168,527.00
Name	Little White Oak Bayou - CDBG-MIT Construction
Created On	9/30/2020 7:20 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Amount Requested	$36,500,000.00
Site Budget Code	CDBG-MIT Acquisition
Other Funds	
Site Budget Total	$36,500,000.00
Name	Little White Oak Bayou - CDBG-MIT Acquisition
Created On	9/30/2020 7:21 AM
Budget Line Item	Flood control and drainage Improvements - - GLO17-11274-P

Site Metrics

Name	Linear Feet of Public Improvement
Comment Planned	Channel widening - 8,700 linear feet
Numeric Resp Planned	8700

Name	Number of public improvements
Comment Planned	(1) Channel Conveyance Improvements along Little White Oak Bayou and (2) Stormwater Detention Basins
Numeric Resp Planned	3

Mitigation Application Project

The schedule requested here is the Project Level Schedule. Identify the time needed to complete every activity and ensure a full and eligible project. Activity Level schedules must be uploaded separately.

Project Phase	Start Date	Length (months)	End Date (calculated)	Phase Status
Start-Up Documentation	9/14/2018	38	11/13/2021	Not Executing
Procurement of Engineer/Architect Services Professional Services	6/10/2020	15	9/10/2021	Not Executing
Broad Environmental Review	6/11/2020	19	1/10/2022	Not Executing
Acquisition	10/28/2020	40	2/27/2024	Not Executing
Engineering Design	5/18/2021	21	2/17/2023	Not Executing
Bid Advertisement	12/14/2022	16	4/14/2024	Not Executing
Contract Award	2/3/2023	15	5/3/2024	Not Executing
Construction NTP	4/5/2023	15	7/5/2024	Not Executing
Construction	4/10/2023	37	5/10/2026	Not Executing
Submit As-Builts/COCC/FWCR	11/4/2024	21	8/4/2026	Not Executing
Contract Closeout	12/4/2024	21	9/4/2026	Not Executing
Construction Activity Completion	4/10/2026	1	5/10/2026	Not Executing

CDBG MIT Application Development Environmental Narrative Form

Date: 7/29/2020

Project Name: Kolbe Road and Related infrastructure

Application #: Application 4

Reviewer: Courtney Blechle

1. Status of Environmental (Has Not Started, In Progress, Completed): Has not started.
2. Provide a brief narrative regarding how CDBG-MIT funding is to be used. Demonstrate that all HUD CDBG environmental requirements have been met/addressed. CDBG- MIT funding would be used to upgrade the existing drainage system due to past structural flooding in the area. A high-level environmental review was performed for this application, further studies would be conducted before construction to ensure HUD CDBG environmental requirements have been met and in accordance with 24 CRF Part 58.
3. Will the proposed project have any negative impact(s) or effect(s) on the environment per HUD environmental regulations as described? Potential for negative impacts or effects.
    a. If yes, or the applicant believes an issue may exist, provide a brief narrative explaining the issue: Due to the possibility of Eastern Spotted Skunk habitat, wetlands and a current ongoing archaeological investigation on site, further environmental studies would be conducted for this proposed project site before work is performed.
4. Is the proposed project site likely to require a historical resources/archaeological assessment? Yes
    a. If yes, or the applicant believes a historical resources/archaeological assessment may be needed, provide a brief narrative explaining the issue: According to the Texas Historical Commission, the southwest quadrant of the proposed site is currently undergoing an archaeological investigation. No historic resources are located on the proposed project site.
5. Is the proposed project site listed on the National Register of Historic Places? No
    a. If yes, provide a brief narrative explaining how the historic site will be impacted: N/A
6. Is the proposed project site in a designated flood hazard area or a designated wetland? The proposed project site is not located within a designated flood hazard area. According to the National Wetland Inventory, there is the potential for several wetlands on site, mostly within the undeveloped area on the west. There is potential for wetlands located in drainage ditches, before construction begins a wetland delineation would be conducted to determine if wetlands exist in the area. Impacts to wetlands would be avoided and minimized as possible. Permitting efforts would be done in accordance with USACE protocols.
7. Is the applicant participating in the National Flood Insurance Program? Yes
8. Is the project in a designated Regulatory Floodway? No
    a. If yes, please explain. N/A
9. Is the proposed project site located in a known critical habitat for endangered species? Yes
    a. If yes, please explain. According to the National Diversity Database, habitat could be present for the Eastern Spotted Skunk, *Spilogale putorius,* last observed in 1980.

Because of development in the area, habitat for the Eastern Spotted Skunk is unlikely. A habitat survey would be performed before any work is done in the area.

10. Is the proposed project site a known hazardous site? No
    a. If yes, please explain. N/A
11. Is the proposed project site located on federal lands or at a federal installation? No
    a. If yes, provide a brief narrative detailing why federal land or a federal installation is required for the proposed project. N/A
12. What level of environmental review is likely needed for the proposed project site (EA, CE, EIS)? CE
13. Provide a brief narrative to include any additional detail or information relevant to Environmental Review. Sources: Texas Parks and Wildlife National Diversity Database, U.S. Fish and Wildlife Service, National Wetland Inventory, Texas Historical Commission, and Texas Commission on Environmental Quality.

CDBG MIT Application Development Environmental Narrative Form

Date: 7/28/2020

Project Name: Barwood

Application #: Application 4

Reviewer: Courtney Blechle

1. Status of Environmental (Has Not Started, In Progress, Completed): Has not started.
2. Provide a brief narrative regarding how CDBG-MIT funding is to be used. Demonstrate that all HUD CDBG environmental requirements have been met/addressed. CDBG- MIT funding would be used to upgrade the existing drainage system due to past structural flooding in the area. A high-level environmental review was performed for this application, further studies would be conducted before construction to ensure HUD CDBG environmental requirements have been met and in accordance with 24 CRF Part 58.
3. Will the proposed project have any negative impact(s) or effect(s) on the environment per HUD environmental regulations as described? Potential for negative impact or effect.
    a. If yes, or the applicant believes an issue may exist, provide a brief narrative explaining the issue: Potential habitat is located within the proposed project site for the Eastern Spotted Skunk and the Southern Crawfish Frog, before any work is done a habitat survey would be conducted.
4. Is the proposed project site likely to require a historical resources/archaeological assessment? No known historic resources or archaeological sites are located within the proposed project site.
    a. If yes, or the applicant believes a historical resources/archaeological assessment may be needed, provide a brief narrative explaining the issue: N/A
5. Is the proposed project site listed on the National Register of Historic Places? No
    a. If yes, provide a brief narrative explaining how the historic site will be impacted: N/A
6. Is the proposed project site in a designated flood hazard area or a designated wetland? The project site is not located within a designated flood hazard area. There is potential for wetlands located in drainage ditches, before construction begins a wetland delineation would be conducted to determine if wetlands exist in the area. Impacts to wetlands would be avoided and minimized as possible. Permitting efforts would be done in accordance with USACE protocols.
7. Is the applicant participating in the National Flood Insurance Program? Yes
8. Is the project in a designated Regulatory Floodway? No
    a. If yes, please explain. N/A
9. Is the proposed project site located in a known critical habitat for endangered species? Yes
    a. If yes, please explain. According to TPWD National Diversity Database, potential habitat exists within the area for the Eastern Spotted Skunk, *Spilogale putorius,* and Southern Crawfish Frog, *Lithobates areolatus,* before work is performed a habitat survey would be conducted.
10. Is the proposed project site a known hazardous site? No known hazardous materials or sites are located on the proposed project site.
    a. If yes, please explain. N/A

11. Is the proposed project site located on federal lands or at a federal installation? No
    a. If yes, provide a brief narrative detailing why federal land or a federal installation is required for the proposed project. N/A
12. What level of environmental review is likely needed for the proposed project site (EA, CE, EIS)?CE
13. Provide a brief narrative to include any additional detail or information relevant to Environmental Review. Sources: Texas Parks and Wildlife National Diversity Database, U.S. Fish and Wildlife Service, National Wetland Inventory, Texas Historical Commission, and Texas Commission on Environmental Quality.

CDBG MIT Application Development Environmental Narrative Form

Date: 7/29/2020

Project Name: Tower Oaks Meadows

Application #: 4

Reviewer: Courtney Blechle

1. Status of Environmental (Has Not Started, In Progress, Completed): Has not started.
2. Provide a brief narrative regarding how CDBG-MIT funding is to be used. Demonstrate that all HUD CDBG environmental requirements have been met/addressed. CDBG- MIT funding would be used to upgrade the existing drainage system due to past structural flooding in the area. A high-level environmental review was performed for this application, further studies would be conducted before construction to ensure HUD CDBG environmental requirements have been met and in accordance with 24 CRF Part 58.
3. Will the proposed project have any negative impact(s) or effect(s) on the environment per HUD environmental regulations as described? Potential for negative impacts or effects.
    a. If yes, or the applicant believes an issue may exist, provide a brief narrative explaining the issue: Potential habitat is located within the proposed project site for the Eastern Spotted Skunk and the Southern Crawfish Frog, before any work is done a habitat survey would be conducted.
4. Is the proposed project site likely to require a historical resources/archaeological assessment? No
    a. If yes, or the applicant believes a historical resources/archaeological assessment may be needed, provide a brief narrative explaining the issue: N/A
5. Is the proposed project site listed on the National Register of Historic Places? No
    a. If yes, provide a brief narrative explaining how the historic site will be impacted: N/A
6. Is the proposed project site in a designated flood hazard area or a designated wetland? The project site is not located within a designated flood hazard area. There is potential for wetlands located in drainage ditches, before construction begins a wetland delineation would be conducted to determine if wetlands exist in the area. Impacts to wetlands would be avoided and minimized as possible. Permitting efforts would be done in accordance with USACE protocols.
7. Is the applicant participating in the National Flood Insurance Program? Yes
8. Is the project in a designated Regulatory Floodway? No
    a. If yes, please explain. N/A
9. Is the proposed project site located in a known critical habitat for endangered species? Yes
    a. If yes, please explain. According to TPWD National Diversity Database, potential habitat exists within the area for the Eastern Spotted Skunk, *Spilogale putorius,* and Southern Crawfish Frog, *Lithobates areolatus,* before work is performed a habitat survey would be conducted.
10. Is the proposed project site a known hazardous site? No
    a. If yes, please explain. N/A
11. Is the proposed project site located on federal lands or at a federal installation? No

    a. If yes, provide a brief narrative detailing why federal land or a federal installation is required for the proposed project. N/A
12. What level of environmental review is likely needed for the proposed project site (EA, CE, EIS)? CE
13. Provide a brief narrative to include any additional detail or information relevant to Environmental Review. Sources: Texas Parks and Wildlife National Diversity Database, U.S. Fish and Wildlife Service, National Wetland Inventory, Texas Historical Commission, and Texas Commission on Environmental Quality.

Innovative approaches
Practical results
Outstanding service

BENEFIT-COST ANALYSIS

WHITE OAK BAYOU WATERSHED MITIGATION PROJECT

Prepared for:

Harris County

October 2020

Prepared by:

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APPENDICES

Appendix A: Building Replacement Values

EXECUTIVE SUMMARY

The benefit-cost analysis performed for White Oak Bayou Watershed Mitigation Project included quantification of the following types of benefits:

- Building damages (avoided costs)
- Content damages (avoided costs)
- Residential displacement (avoided costs)
- Non-residential displacement (avoided costs)
- Mental health treatment (avoided costs)
- Worker productivity (avoided costs)
- Ecosystem services (added benefit of conversion of developed land)

Net present value benefits were calculated using a 7% discount rate. *Table ES-1* summarizes benefits on an annual basis and at present value.

Table ES-1 – Summary of Project Benefits

Expected Benefits	Annual Benefit	Present Value Benefit
Structures + Contents	$1,596,613	$22,034,445
Displacement, Residential	$124,458	$1,717,620
Displacement, Non-residential	$5,279	$72,858
Social (Mental Health & Productivity)	$2,281,641	$31,488,345
Environmental (Ecosystem services of converted land)	$690,548	$9,530,078
Total Expected Benefits (all categories)	**$4,698,539**	**$64,843,345**

Social benefits represent the expected benefits of reducing mental health impacts associated with experiencing a disaster such as flooding. These benefits include avoided costs of:

- Health treatment for mental stress and anxiety of impacted residents
- Productivity losses by impacted residents who work full-time due to impacts on mental health

Social benefits of the White Oak Bayou Watershed Mitigation Project are shown in *Table ES-2*.

Table ES-2 – Summary of Social Benefits

Category	Number of Persons	Benefit per Person	Present Value Social Benefits
Number of Persons Directly Benefitted by Mitigation of Residential Structural Flooding	3,531	$ 2,443	$8,626,233
Number of Full-time Workers Directly Benefitted by Mitigation of Residential Structural Flooding	2,617	$ 8,736	$22,862,112
Total Social Benefit			**$31,488,345**

Environmental benefits based on the FEMA Toolkit represent the value of ecosystem services provided by enhancement of a parcel's land use to a use type which provides a higher level of natural environmental benefits. The White Oak Bayou Watershed Mitigation Project requires some acquisition and conversion of developed land to undeveloped floodplain. Additionally, a riparian corridor is planned as part of the project. The benefit values for Green Open Space and Riparian land use have been applied to these areas. Environmental benefits of the White Oak Bayou Watershed Mitigation Project are summarized in *Table ES-3*.

Table ES-3 – Summary of Environmental Benefits

Post Mitigation Land Use	Acres Converted	Benefit per Acre per Year	Annual Benefits	Present Value Benefits
Green Open Space	26	$8,308	$216,008	$2,981,072
Riparian	12	$39,545	$474,540	$6,549,006
Wetlands	0	$6,010	$-	$-
Forests	0	$554	$-	$-
Marine / Estuary	0	$1,799	$-	$-
Total Environmental Benefit	**38**		$690,548	$9,530,078

In addition to environmental benefits, social benefits, and reduced structural damages and displacement costs, the White Oak Bayou Watershed Mitigation Project represents a holistic benefit to its service area, the White Oak Bayou Watershed, by removing structures and land area from the floodplain. *Table ES-4* summarizes the impacts of the mitigation project.

Table ES-4 – Impacts of Mitigation Project

Number of structures benefitted in any event *(estimated losses to structural damage are reduced)*	1,495
Number of structures removed from 10% AEP (10-year) floodplain	76
Number of structures removed from 1% AEP (100-year) floodplain	527
Number of acres removed from 10% AEP (10-year) floodplain	117
Number of acres removed from 1% AEP (100-year) floodplain	258
Number of structures removed from risk* in 10% AEP (10-year) event	7
Number of structures removed from risk* in 1% AEP (100-year) event	461

**Structures "at risk" refer to those for which the modeled water surface elevation is at or above finished floor elevation.*

The Present Value Benefits, as shown in *Table ES-1* and *Table ES-3*, were developed from Annual Benefits using a 7% discount rate as required by the Office of Management and Budget (OMB) Circular No. A-94[1]. (Social benefit unit values are provided as standard Present Value amounts and are discounted using a 7% rate to estimate Annual Benefits.) This discount rate assumes present benefits have much more value than future benefits, which is not necessarily true for flood risk mitigation projects with a 50-year and greater life cycle. A lower discount rate assumes present benefits are only slightly more valuable than future benefits – a more realistic assumption when considering extended life cycle projects that provide the same level of risk reduction from year to year. U.S. Department of Housing and Urban Development (HUD) Notice CPD-16-06, which was created to provide guidance on benefit-cost analyses for Community Development Block Grant Disaster Recovery (CDBG-DR) projects, notes "grantees may additionally calculate benefits and costs using alternate discount rates (no lower than 3%) provided it also includes justification acceptable to HUD based on the nature of the project." For comparison purposes, Present Value Benefits were also determined using a 3% discount rate.

Project costs as estimated for the Community Development Block Grant Mitigation (CDBG-MIT) grant application include estimated costs of design and construction. The benefit-cost ratio was determined as the ratio of the present value of Total Expected Benefits to Total Project Cost. *Table ES-5* presents the project cost, along with the estimated benefits and benefit-cost ratio resulting from use of both the 7% and 3% discount rates. It is important to note that the White Oak Bayou Watershed Mitigation Project

[1] *Circular A-94*, Office of Management and Budget, last revised October 29, 1992.

will provide many community benefits for which an economic value could not be quantified as part of this analysis. Additional unquantified benefits are discussed further in the section on **Qualitative Benefits**.

Table ES-5 – Benefit-Cost Ratio

	7% Discount Rate	3% Discount Rate
Present Value Total Benefits	$64,843,345	$93,674,568
Present Value Total Cost	$117,207,261	$117,207,261
Benefit-Cost Ratio	0.55	0.80

1.0 METHODOLOGY

1.1 BENEFIT-COST ANALYSIS REQUIREMENTS FOR CDBG-MIT PROJECTS

Although a benefit-cost ratio (BCR) is not a factor in the competition score as set forth by the Texas General Land Office (GLO), applicants are required to demonstrate that the benefits of any Covered Project outweigh its costs. As described in the Federal Register,[2] this requirement may be met in either of two ways:

1. Benefit-cost ratio developed during a benefit-cost analysis (BCA) is greater than 1.0.
    a. Calculations should be prepared in accordance with OMB Circular A-94[3].
    b. BCA methodology should follow FEMA standardized methodologies unless
        1) A BCA for the project has already been completed or is in progress under guidelines of other Federal agencies, or
        2) The BCA addresses a non-correctable flaw in the FEMA methodology, or
        3) A new approach is proposed that is unavailable using the FEMA Toolkit.
2. Alternately, projects may have a benefit-cost ratio of less than 1.0 under these conditions:
    a. A BCA is still completed following the methodologies described above.
    b. The project "serves low- and moderate- income persons or other persons that are less able to mitigate risks or respond to and recover from disaster."
    c. A qualitative description is provided for "benefits that cannot be quantified but sufficiently demonstrate unique and concrete benefits of the Covered Project for low- and moderate- income persons or other persons that are less able to mitigate risks, or respond to and recover from disasters."

The analysis presented here meets these requirements as follows:

- In accordance with OMB Circular A-94, a 7% discount rate was used when determining equivalent present values of expected annual benefits and vice versa.

[2] Allocations, Common Application, Waivers, and Alternative Requirements for Community Development Block Grant Mitigation Grantees, 84 FR 169 (August 30, 2019).
[3] *Circular A-94*, Office of Management and Budget, last revised October 29, 1992.

- The quantitative benefit-cost analysis (BCA) was based on benefit quantification methods and assumptions used in FEMA tools such as the FEMA BCA Toolkit version 6.0[4] (hereafter "FEMA Toolkit") and HAZUS (Hazards U.S. planning-level damage and loss estimating tool). These tools were not used directly, but the methods and assumptions in the FEMA Toolkit and HAZUS were applied using a combination of geospatial and tabular analysis tools to more efficiently:
    - Assess thousands of potentially impacted structures.
    - Utilize spatially variable modeled water surface elevation data.
    - Incorporate detailed information at an individual structure level.
- As indicated by the beneficiary population analysis detailed in the **LMI Evaluation Attachment**, over 51% of the project beneficiaries of are low- to moderate-income persons.
- The **Qualitative Benefits** section of this report discusses benefits of the Covered Project that could not be quantified.

1.2 QUANTITATIVE BENEFIT CATEGORIES

The benefit-cost analysis included quantification of the following types of benefits:

- Building damages (avoided costs)
- Content damages (avoided costs)
- Residential displacement (avoided costs)
- Non-residential displacement (avoided costs)
- Mental health treatment (avoided costs)
- Worker productivity (avoided costs)
- Ecosystem services (added benefit of conversion of developed land)

1.3 INPUT DATA

A separate analysis was performed to estimate the number of residents and residential units per structure, as well as the number of residents who are full-time workers. The primary datasets used in the BCA are summarized in *Table 1-1.*

[4] *Benefit Cost Toolkit Version 6.0.* FEMA. October 2019. Available at https://www.fema.gov/media-library/assets/documents/179903.

Table 1-1 – Input Datasets to Benefit-Cost Analysis

Dataset	Source	Description
Harris County Structure Inventory	Harris County Flood Control District	attributes of individual structures in the study area, including use, size, and look-up codes for various reference tables
Right-of-Way Acquisition	Harris County Flood Control District	parcels and impacted structures to be bought out as part of project
Capital Costs	Harris County Flood Control District; Harris County	project capital costs
Existing and Proposed Water Surface Elevations	Harris County Flood Control District; Harris County	Estimated water surface elevations based on hydraulic modeling of conditions before and after project implementation
American Community Survey Data[5]	U.S. Census Bureau	2018 ACS 5-year data related to population, average household size, number of full-time workers, median household income, and other variables
Census Geographic Areas	U.S. Census Bureau	boundaries of 2010 Census tracts and block groups

The Harris County Flood Control District maintains a detailed structure inventory of all structures in Harris County. This inventory includes data on the number of housing units in each structure, square footage, building style, finished floor elevation, and numerous other attributes. The qualitative structure attributes in the inventory were used to determine the appropriate depth-damage functions and content-to-structure value ratios, and the finished floor elevation is the basis for determining damage and displacement costs based on depth of flooding above finished floor.

Data from the 2018 American Community Survey (ACS) 5-year[5] data tables was used in various parts of the BCA; the variables used are listed below. The following sections describe the use of this data in more detail.

- Subject Table S1903 –Median Income in the Past 12 Months
- Detail Table B01003 – Total Population
- Data Profile Table DP04 – Selected Housing Characteristics
- Detail Table B23027 – Full-Time, Year-Round Work Status in the Past 12 Months by Age for Population 16+ Years

[5] U.S. Census Bureau. American Community Survey, 2014-2018. Detailed Tables, Subject Tables, and Data Profile Tables; generated by Freese & Nichols, Inc. using the U.S. Census Bureau Application Programming Interface.

Table 1-2 lists the various standard values and lookup tables referenced in the calculations.

Table 1-2 – Sources of Standard Values and Reference Tables

Name	Purpose	Source
Discount Rate	calculate discount factors for converting between annual and present value equivalent costs/benefits	OMB Circular A-94
Demolition Threshold	threshold above which building is assumed to be fully lost and contents maximally lost	FEMA BCA Toolkit v6.0
Useful Life	project lifetime used in discounting	
Depth-Days Curve	table of days displaced for depth flooded	
Disruption Cost Factor	one-time cost per square foot for non-residential structures	
Monthly Cost Factor	recurring cost per square foot per month for non-residential structures	
Hotel per Diem Cost	daily cost per household, up to 5 people, for lodging	
Meal per Diem Cost	daily cost per person of eating out, less average cost of eating at home	
Mental Stress and Anxiety Unit Cost	cost of mental stress and anxiety per resident	
Productivity Loss Unit Cost	productivity loss per full-time worker	
Land Use Conversion Unit Benefit	value of ecosystem services ($/acre/year) provided by land use conversion	
Replacement Cost Models	building replacement values ($/sq. ft.)	Hazus Technical Manual[6]
Depth-Damage Functions	tables of percent damage for depth flooded given the building type	USACE New Orleans District[7]
SFR Content-to-Structure Value Ratios	ratio for single-family residences for 1 story, 2 stories, or mobile home	USACE New Orleans District[7]
Other Content-to-Structure Value Ratios	ratio for structures other than single-family residences	USACE New Orleans District[7]

1.4 CALCULATION OF EXPECTED ANNUAL BENEFITS

For benefit categories based on avoided losses, impacts are assessed for multiple storm recurrence intervals, and an Expected Annual Loss value is estimated from the estimated value of damages caused by each storm and the associated probability of such a storm in a single year. This annualized value is

[6] Hazus-MH MR3 Technical Manual. FEMA.
[7] *Final Report: Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVR) in Support of the Donaldsonville to the Gulf, Louisiana, Feasibility Study*. U.S. Army Corps of Engineers, New Orleans District. New Orleans, Louisiana. 2006.

estimated as the area under the Damage vs Probability curve using the trapezoidal area method. This method is described in a FEMA guidance document for flood risk assessments[8]. *Equation 1* demonstrates how this method is applied if impacts are modeled for 10-, 25-, 50-, 100-, and 500-year storms.

$$Expected\ Annual\ Loss = \left(\frac{1}{500} * Loss_{500yr}\right) + \left(\frac{1}{100} - \frac{1}{500}\right)\left(Loss_{100yr} + Loss_{500yr}\right) + \left(\frac{1}{50} - \frac{1}{100}\right)\left(Loss_{50yr} + Loss_{100yr}\right) + \left(\frac{1}{25} - \frac{1}{50}\right)\left(Loss_{25yr} + Loss_{50yr}\right) + \left(\frac{1}{10} - \frac{1}{25}\right)\left(Loss_{10yr} + Loss_{25yr}\right) \quad \textit{Equation 1}$$

Loss values are not extrapolated to storm events with recurrence intervals smaller or larger than the events simulated in a hydraulic model. The Expected Annual Benefit (EAB) is the difference in Expected Annual Loss under existing and post-mitigation conditions (*Equation 2*).

$$Expected\ Annual\ Benefit = (Expected\ Annual\ Loss)_{Existing} - (Expected\ Annual\ Loss)_{Post-mitigation} \quad \textit{Equation 2}$$

1.5 PRESENT VALUE ANALYSIS

Benefits in all categories except Social Benefits were determined on an annualized basis as described in the previous section or using standard annual benefit values. (Social benefit unit values are provided as standard Present Value amounts and are not discounted.) The present value of the Expected Annual Benefits (EAB) was then determined using the standard economic equivalence factor. Equivalence factors were determined using an annual discount rate of 7% as specified in OMB Circular A-94 and an assumed project useful life of 50 years. Alternate factors were also determined using a lower discount rate of 3%. Equivalence factors for converting between annual and present values are shown in *Equation 3* and *Equation 4*. The 50-year life was based on a table of project lifetimes within the FEMA Toolkit (*Table 1-3*).

$$Capital\ Recovery\ Factor\ \left(\frac{A}{P}\right) = \frac{Annual\ Value}{Present\ Value} = \frac{i(1+i)^n}{(1+i)^n - 1} \quad \textit{Equation 3}$$

$$Uniform\ Series\ Present\ Worth\ Factor\ \left(\frac{P}{A}\right) = \frac{Present\ Value}{Annual\ Value} = \frac{(1+i)^n - 1}{i(1+i)^n} \quad \textit{Equation 4}$$

[8] "Guidance for Flood Risk Analysis and Mapping: Flood Risk Assessments." p. 18. FEMA. February 2018.

Table 1-3 – Standard Values for Project Useful Life in FEMA BCA Toolkit v6.0

Flood Hazard Mitigation Project Type	Useful Life (years)
Acquisition / Relocation	
Acquisition / Relocation	100
Building Elevation	
Residential Building	30
Non-Residential Building	25
Public Building	50
Historic Buildings	50
Mitigation Reconstruction	
Mitigation Reconstruction	50
Infrastructure Projects	
Major Infrastructure (dams, levees)	50
Concrete infrastructure, flood walls, roads, bridges, major drainage system	50
Culverts (concrete, PVC, CMP, HDPE, etc.) with end treatment	30
Culverts without end treatment	10
Major pump stations, substations, wastewater systems, or equipment such as generators	50
Minor pump stations, substations, wastewater systems, or equipment such as generators	5

Present Value Benefits were then compared to Total Project Cost to determine the Benefit-Cost Ratio (BCR) as shown in *Equation 5*.

$$BCR = \frac{(Expected\ Annual\ Benefits * Uniform\ Series\ Present\ Worth\ Factor) + Present\ Worth\ Social\ Benefits}{Project\ Capital\ Cost}$$

Equation 5

In the FEMA Toolkit, project useful life is specified for each structure individually, allowing a different factor to be applied to structures subject to buyouts, for which the useful life is assumed to be 100 years. However, for simplicity in the preliminary BCAs, a single equivalence factor based on a 50-year life was applied across the entire project. In other words, although the project does include acquisition and demolition of some structures, the shorter useful life of the primary project infrastructure has been used to apply a consistent present worth conversion factor to all components. This simplification causes a slight underestimation of benefits, but the difference is negligible.

2.0 QUANTITATIVE BENEFITS

2.1 BENEFITS BASED ON DEPTH OF FLOODING

A traditional BCA for flood mitigation projects assesses the difference in probable damages to a structure and its contents under existing (baseline) conditions and post-mitigation (proposed) conditions. Baseline and proposed impacts to a structure and its contents are assessed for multiple storm recurrence intervals based on the depth to which the structure is inundated in each scenario. Flooding depth for each structure is calculated as the difference in modeled water surface elevation (WSE) and finished floor elevation (FFE) as provided in the structure inventory. For structures with missing FFE data, FFE was estimated at 6 inches above ground elevation, using the same ground elevation data as was used in development of the structure inventory[9].

Depth-related benefit categories include traditional structural benefits as well as others that can be related to the depth of flooding in a given storm frequency:

- Building Damages – Depth related to % of value lost.
- Content Damages – Depth related to % of value lost.
- Displacement Costs – Depth related to number of days displaced.
- Loss of Income / Loss of Function – Depth related to number of days rent payment income or commercial function is lost.

The following sections explain how these categories were assessed in the BCA.

2.1.1 Building and Content Damages

The FEMA Toolkit requires structural damages to be calculated based on a Building Replacement Value (BRV), not the appraised value or market value. The Unit BRV (cost per square foot) has a default value of $100/sf in the FEMA Toolkit. This default value was replaced with a value specific to each structure's attributes as described in the Hazus Technical Manual[10]. Hazus unit BRVs depend on building type and number of stories. Residential unit BRVs are further broken down by construction class (economy, average, custom, or luxury). Using Hazus methodology[11], a weighted composite building replacement value was assigned to single-family residential structures in the project service area based on the ratio of

[9] Bare Earth LiDAR, HGAC 2008 Datum Adjusted. Houston-Galveston Area Council. 2008.
[10] Hazus-MH MR3 Technical Manual. FEMA.
[11] Hazus-MH MR3 Technical Manual. FEMA. "Section 14.2.1 – Full Building Replacement Costs."

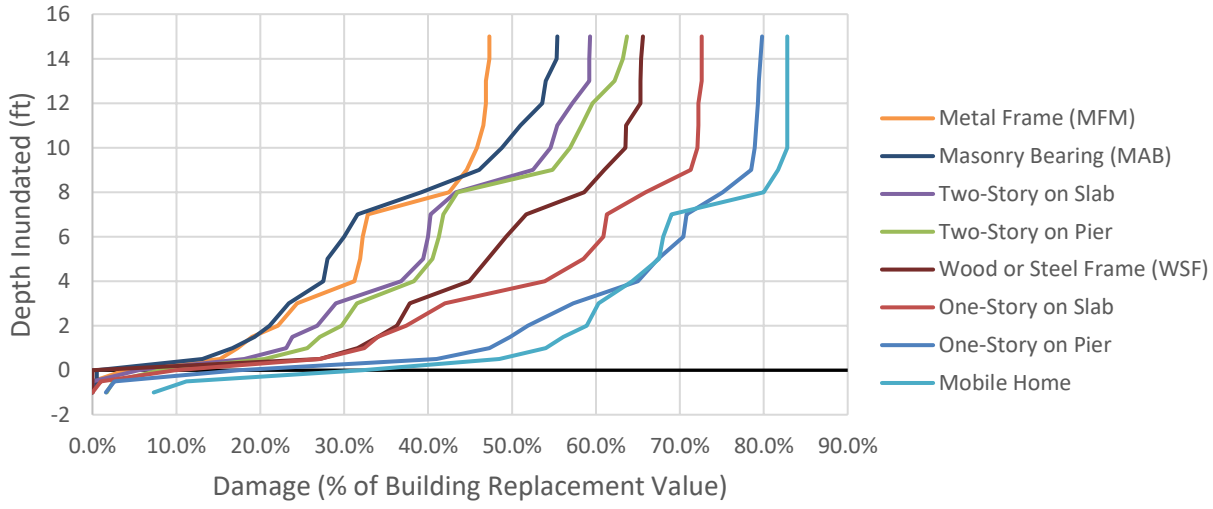
median household income in each census tract to median income across Texas (median household income determined from 2018 ACS 5-year data Subject Table S1903). Finally, the Total Building Replacement Value of a structure is calculated by multiplying the Unit BRV by the building size (*Equation 6*). This approach allowed for the use of local data to appropriately reflect structure values in the project service area.

$$Total\ BRV = Unit\ BRV\ (\$/sf) * Area\ (sf) \qquad \textit{Equation 6}$$

Values documented in the Hazus Technical Manual are based on standard cost-estimation models published in *Means Square Foot Costs*[12] and were reported in 2006 dollars. For this analysis, these values were scaled up using the RSMeans Historical Cost Indices from 2006 to 2020 to be consistent with project cost estimates. Building replacement values can be found in **Appendix A**.

Once depth of flooding is determined for a structure under a given scenario, the percent of the Total BRV that is lost to damage is determined from a depth-damage function (DDF). The DDFs used in this BCA were developed by the USACE New Orleans District[13] and are illustrated in *Figure 1*. It should be noted that some structures are expected to experience damage even when WSE is below FFE by up to 2 feet, depending on structure type.

Figure 1 – Depth-Damage Functions



[12] R.S. Means, 2005.
[13] Final Report: Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVR) in Support of the Donaldsonville to the Gulf, Louisiana, Feasibility Study. U.S. Army Corps of Engineers, New Orleans District. New Orleans, Louisiana. 2006.

The percent damage estimated from the DDFs is also applied to the value of the contents in the structures. The total value of contents in each structure was estimated from content-to-structure value ratios developed by the USACE New Orleans District[13], which specify a percentage of the building value depending on the building type.

A demolition threshold was set to 50%, which is the default value in the FEMA Toolkit. If percent damage based on depth and the depth-damage curve exceeded this threshold, the structure is expected to be substantially damaged and is assumed to need replacement rather than repair. In this case, the value of Expected Structure Damage is the Total BRV. Additionally, the value of Expected Content Losses is assumed to be maximized at this point (not a total loss, but the maximum value on the depth-damage curve).

Total benefits of avoided structure and content losses are summarized in the **Executive Summary**.

2.1.2 Displacement Costs (Residential)

Residential displacement losses represent the cost to residents of being out of their home after a flood event. The cost of residential displacement under baseline and proposed conditions for each modeled event was calculated using the method and standard values (shown in *Table 2-1*) in the FEMA Toolkit:

- Temporary lodging for each displaced household (assumes up to 5 household members per hotel room)
- Increase in meal cost (above average cost of eating at home) for each displaced resident

Expected annual benefits depend on a relationship between number of days displaced for depth of inundation. Using the relationship in the FEMA Toolkit, 45 days of displacement were assumed for each foot of flooding above FFE. No displacement was assumed if WSE did not exceed FFE. Total benefits of avoided residential displacement costs are summarized in the **Executive Summary**.

Table 2-1 – Residential Displacement Unit Costs

Meals per diem per capita	Cost of eating at home	Hotel per diem per family, up to 5 people	Meal cost / person / day
$55	$7	$94	$48

2.1.3 Displacement Costs (Non-Residential)

The costs of non-residential displacement, as defined by FEMA, include:

- One-time cost of relocating business equipment
- Monthly rental costs of new space

The same relationship between depth flooded and days displaced was used for non-residential displacement as for residential displacement. Cost factors provided in the FEMA Toolkit as $/sq. ft. values were used to estimate both the monthly and one-time cost components of non-residential displacement (*Table 2-2*). Total benefits of avoided non-residential displacement costs are summarized in the **Executive Summary**.

Table 2-2 – Non-residential Displacement Cost Factors

Occupancy Class	Disruption Cost Factor ($/sf)	Rental Cost Factor ($/sf)
Retail Trade	1.09	1.16
Wholesale Trade	0.95	0.48
Personal and Repair Services	0.95	1.36
Technical Business	0.95	1.36
Banks	0.95	1.7
Hospital	1.36	1.36
Medical Office/Clinic	1.36	1.36
Entertainment and Recreation	0	1.7
Theaters	0	1.7
Heavy	0	0.2
Light	0.95	0.27
Food/Drugs/Chemicals	0.95	0.27
Metals/Mineral Processing	0.95	0.2
High Technology	0.95	0.34
Construction	0.95	0.14
Agriculture	0.73	0.73
Religious/Nonprofit/Membership Organization	0.68	0.68
Government, General Services	0.95	1.36
Government, Emergency Response	0.95	1.36
Schools/Libraries	0.95	1.02
College/Universities	0.95	1.36

2.1.4 Loss of Income / Loss of Function

Loss of Income represents the loss of monthly rental income to owners of rental properties. Because additional monthly rental costs were considered as a displacement cost to non-residential tenants, property owner income losses were excluded from this BCA to avoid double-counting benefits.

Loss of Function represents the lost revenue due to inability to operate a business for some amount of time after a flood event. This avoided cost benefit category requires knowledge of the operating budget of the business for each individual non-residential structure in a project service area. As the majority of flood mitigation benefits in the project service area are to residential structures, this category was not assessed.

2.2 ANCILLARY BENEFITS

In addition to the benefit categories that represent avoided costs based on reduction in flooding depth, social and environmental benefits of the project were also quantified.

2.2.1 Avoided Social Costs

Social benefits based on the FEMA Toolkit represent the expected benefits of reducing mental health impacts associated with experiencing a disaster such as flooding. These benefits include avoided costs of:

- Health treatment for mental stress and anxiety of impacted residents
- Productivity losses by impacted residents who work full-time due to impacts on mental health

The calculation of social benefits replicated the method used in the FEMA Toolkit, which applies a present value benefit amount per impacted person to estimate the avoided costs of mental health treatment and of lost productivity *(Table 2-3*). These values are based on studied prevalence, severity, and course of mental effects following a disaster[14]. It should be noted that because these values are present value benefits, they are not dependent on the annual expected probability of a storm event or the level of flooding anticipated from a given event. Instead, these benefits represent the positive impact of a mitigation project reducing flooding in a resident's home, which may include an existing condition of minor flooding compared to a post-mitigation condition of no flooding. Even when traditional benefit

[14] *Final Sustainability Benefits Methodology Report.* FEMA. Task order HSFEHQ-11-J-1408. August 2012.

estimates might indicate a very small value of saved structural and content damages, the positive impact on residents of not having to do any repairs instead of a few repairs is significant.

Table 2-3 – Unit Values for Social Benefits as Avoided Costs of Mental Health Impacts

Category	Benefit per Person (Present Value)	Unit
Treatment for mental stress and anxiety	$2,443	Resident of home benefitted by project
Lost productivity	$8,736	Resident of home benefitted by project who works full-time

The present value benefits per person for treatment of mental stress and anxiety were applied to all residents of structures which experienced a reduced modeled WSE after project implementation, regardless of event frequency. The **Population Estimate Attachment** describes how ACS Table B01003 (Total Population Estimates) and ACS Data Profile DP04 (Selected Housing Characteristics) were used to allocate numbers of residents to each structure in the watershed. The number of full-time workers in each Census tract (B23027_001E) was compared to the total tract population (B01003_001E) to estimate the number of full-time workers living in each structure. Costs of lost productivity were based on the estimated number of full-time workers residing in each structure. Estimated social benefits are summarized in the **Executive Summary**.

2.2.2 Environmental Benefits

Environmental benefits based on the FEMA Toolkit represent the value of ecosystem services provided by enhancement of a parcel's land use to a use type which provides a higher level of natural environmental benefits. Unlike other benefit categories based on avoided costs, environmental benefits represent an added service. *Table 2-4* indicates the value of each land use type (assuming existing condition is developed land).

Table 2-4 – Unit Benefit Values for Conversion of Developed Land to Land Use of Higher Ecosystem Value

Documented Benefit/acre/year[15]				
Green Open Space	Riparian	Wetlands	Forests	Marine /Estuary
$8,308	$39,545	$6,010	$554	$1,799

[15] Help Section of B/C Analysis Toolkit v6.0, as of 01/28/2020.

Expected environmental benefits are summarized in the **Executive Summary**.

2.3 SPECIAL CONSIDERATIONS

Certain mitigation activities occurring in areas that ultimately outfall to the main channel of the project service area are included in the White Oak Bayou Covered Project. Detailed hydraulic modeling has not yet been performed for all of these activities, so data on the exact depth of inundation at each structure location under multiple storm event scenarios is not available. In these cases, expected damages to structures and contents, and subsequently expected benefits, were estimated based on the following:

1. Professional estimates of the existing and proposed project conditions:
    a. Number of inundated structures in existing conditions, and average flooding depth for these structures
    b. Number of inundated structures in proposed conditions, and average flooding depth for these structures. This structure count is equal to the number of inundated structures in existing conditions less the number of structures from which the floodplain will be removed.
    c. Average loss per structure in existing conditions, based on the average flooding depth, average structure size, and average market value. A generic damage curve for single-story residential structures was applied to all structures.
    d. Average loss per structure in proposed conditions, based on the average flooding depth, average structure size, and average market value. A generic damage curve for single-story residential structures was applied to all structures.
2. For each event return period for which professional estimates were available, expected losses in the existing condition were calculated as Number of Inundated Structures (Existing) x Average Loss Per Structure (Existing).

3. For each event return period assessed in Step 2, expected losses in the proposed condition were calculated as Number of Inundated Structures (Proposed) x Average Loss Per Structure (Proposed).

4. Expected annual benefits for each activity were calculated as described in **Section 1.4** by considering the expected frequency of each event and calculating benefits for each event as Total Expected Losses (Existing) less Total Expected Losses (Proposed).

Social benefits were assumed to apply to the residents of all benefitted structures in these areas which are anticipated to experience a reduction in water surface elevation. Avoided costs of displacement and environmental benefits were not considered for these activities.

3.0 QUALITATIVE BENEFITS

As described in the Federal Register,[16] as long as a quantitative BCA has been completed, projects may have a benefit-cost ratio of less than 1.0 when the project provides concrete benefits to "low- and moderate- income persons or other persons that are less able to mitigate risks or respond to and recover from disaster," including benefits that cannot be quantified. Qualitative benefits of this project are discussed below.

3.1 BENEFICIARIES VULNERABLE TO FLOOD RISK

This application has demonstrated that 53.7% of the beneficiaries of White Oak Bayou Watershed Mitigation Project are low- to moderate-income persons. Additionally, many of the residents of the project service area may be considered particularly vulnerable to disasters. 33.9% of the households in the project service area are considered to be housing cost-burdened, and 16.0% are severely housing cost-burdened[17]. These households spend 30+% and 50+% of their monthly income on housing-related costs, respectively. This cost burden may make it particularly hard for these households to recover from disaster, as they are less likely to have additional funds available for repairs, hotel stays, and lost wages during and after a flood. Additionally, 23.4% of the households in the project service area have no

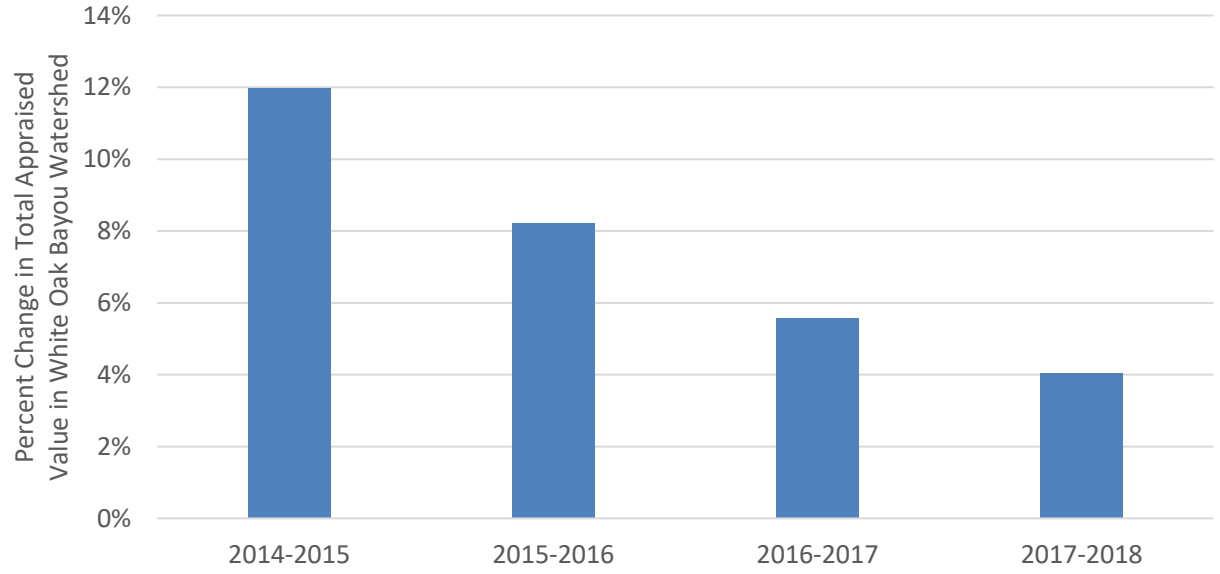
[16] Allocations, Common Application, Waivers, and Alternative Requirements for Community Development Block Grant Mitigation Grantees, 84 FR 169 (August 30, 2019).
[17] Estimates derived from data in tables B25070 (Gross Rent as a Percentage of Household Income in the Past 12 Months) and B25091 (Mortgage Status by Selected Monthly Owner Costs as a Percentage of Household Income in the Past 12 Months). U.S. Census Bureau. American Community Survey, 2014-2018.

computer and/or no internet subscription[18]. Lack of reliable internet access may reduce residents' ability to benefit from early warning systems in case of flooding events, making them more vulnerable.

3.2 BENEFIT OF REDUCING FLOOD IMPACTS TO PROPERTY VALUES

A review of parcel appraisal values from the Harris County Appraisal District suggests that the annual rate of growth in property values generally slowed from 2014 to 2018 in the White Oak Bayou Watershed (*Figure 2*). This trend could be caused or influenced by floods in 2015, 2016, and 2017, but the degree to which local flooding impacted the value growth rates cannot be ascertained. General economic conditions in Harris County following Hurricane Harvey, as well as other external economic factors, could also contribute to changes in property values. Although the exact impact of local flooding on property values cannot be quantified, flood risk mitigation projects are likely to have a positive impact on the residents of flood-prone areas, as falling property values can have a negative effect on the financial flexibility of housing cost-burdened homeowners and even renters. Finally, the White Oak Bayou Watershed Mitigation Project will remove 258 acres from the 100-year floodplain, providing a potential positive impact to property values.

Figure 2 – Year-to-Year Percent Change in Total Appraised Value of Property in White Oak Bayou Watershed



[18] Estimate derived from data in table B28003 (Presence of a Computer and Type of Internet Subscription in Household). U.S. Census Bureau. American Community Survey, 2014-2018.

3.3 TRANSPORTATION BENEFITS

Street closures due to flooding in the White Oak Bayou Watershed during Hurricane Harvey likely impacted a large number of commuters, including those who do not live in the watershed. Frequently, residential streets are inundated and may become impassable without the water level reaching a point of causing any damage to homes. In these scenarios, no quantitative benefits are counted in the BCA as there is no structural damage or displacement of residents. However, the street flooding poses an inconvenience and in some cases a safety risk, as it can inhibit evacuations, potentially trapping residents in homes that may lose power or keeping them from accessing groceries or medical supplies. The White Oak Bayou Watershed Mitigation Project will provide some reduction in street inundation as a benefit to residents in the service area.

In Harris County, over 50,000 workers 16 years and older use a bus or trolley bus as means of transportation to work. Of workers living within the watershed, 2.3% (5,198 workers) use a bus to commute to work[19]. Data from the Metropolitan Transit Authority of Harris County (Metro) indicates that 29 bus routes through the watershed were closed for up to 4 or more days during and after Hurricane Harvey, with 3 of these routes being closed for 15 or more days. No methods were found that could be used to quantify the productivity losses of workers impacted by road closures. Additionally, all Metro bus routes passing through the project service area also extend across multiple floodplains in Harris County. It was determined that even if a substantial section of a route is removed from the floodplain as a result of the White Oak Bayou Watershed Mitigation Project, inundation elsewhere could still cause route closure. Because of this, assigning quantitative economic benefits to reduced flooding along bus routes that could be attributed only to this project was not considered to be a valid approach. However, the White Oak Bayou Watershed Mitigation Project is important to reducing the overall flooding along major commuter routes, providing significant benefit to residents of the project service area as well as workers traveling to and through the area.

4.0 SUMMARY

The approach to benefit-cost analysis documented here was based on FEMA BCA methodologies and considered various categories of benefits afforded by the White Oak Bayou Watershed Mitigation Project. However, as discussed in **Section 2.1.1**, the use of structural damages in a benefit-cost ratio, while valid,

[19] Estimate derived from data in table B08301 (Means of Transportation to Work). U.S. Census Bureau. American Community Survey, 2014-2018.

means that a project in a lower income service area that provides flood mitigation benefits to the same number of homes as a project in a higher-income area may have a lower calculated benefit-cost ratio due to the lower replacement values of homes in the service area. As a result, the low- and moderate-income populations that the CDBG-MIT funding seeks to serve may be underserved by funding sources which rely primarily on traditional benefit-cost analysis methods. Considering this, it is important to recognize that quantitative BCRs should not be used alone when evaluating the effectiveness of a mitigation project, and in fact, comparing BCRs between projects may actually work against the goal of serving of CDBG-MIT funding to serve LMI and other vulnerable populations.

APPENDIX A
BUILDING REPLACEMENT VALUES

Table A-1
Single-Family Residential Building Replacement Values (2020 dollars, assuming no basements)

Income Ratio (r) Number of Stories	r < 0.5	0.5 < r < 0.85	0.85 <= r < 1.25	1.25 <= r < 2.0	r > 2.0
1	$97.28	$107.21	$145.17	$169.60	$206.28
2	$103.51	$110.89	$141.45	$166.65	$196.43
3	$103.51	$112.50	$147.76	$172.67	$202.32
split	$95.14	$102.70	$132.88	$155.34	$184.21

Table A-2
Multi-Family Residential Building Replacement Values (2020 dollars)

Number of Units	Unit Building Replacement Value ($/sf)
2	$117.00
3-4	$128.00
5-9	$228.00
10-19	$203.00
20-49	$200.00
50+	$195.00

Table A-3
Non-Residential Building Replacement Values (2020 dollars)

Occupancy Class	Occupancy Sub Class	Unit Building Replacement Value ($/sf)
Manufactured Housing	Manufactured Housing	$52.76
Retail Trade	Dept Store, 1 st	$121.96
Wholesale Trade	Warehouse, medium	$112.10
Personal and Repair Services	Garage, Repair	$151.05
Prof./ Tech./Business Services	Office, medium	$196.93
Banks	Bank	$282.68
Hospital	Hospital, medium	$331.04
Medical Office/Clinic	Med. Office, medium	$242.32
Entertainment & Recreation	Restaurant	$251.66
Theaters	Movie Theatre	$180.14
Parking	Parking garage	$64.53
Heavy	Factory, small	$130.29
Light	Warehouse, medium	$112.10
Food/Drugs/Chemicals	College Laboratory	$214.11
Metals/Minerals Processing	College Laboratory	$214.11
High Technology	College Laboratory	$214.11
Construction	Warehouse, medium	$112.10
Agriculture	Warehouse, medium	$112.10
Church	Church	$204.52
General Services	Town Hall, small	$158.34
Emergency Response	Police Station	$245.87
Schools/Libraries	High School	$170.19
Colleges/Universities	College Classroom	$213.61

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BENEFIT-COST ANALYSIS

WHITE OAK BAYOU WATERSHED MITIGATION PROJECT

Prepared for:

Harris County

October 2020

Prepared by:

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APPENDICES

Appendix A: Building Replacement Values

EXECUTIVE SUMMARY

The benefit-cost analysis performed for White Oak Bayou Watershed Mitigation Project included quantification of the following types of benefits:

- Building damages (avoided costs)
- Content damages (avoided costs)
- Residential displacement (avoided costs)
- Non-residential displacement (avoided costs)
- Mental health treatment (avoided costs)
- Worker productivity (avoided costs)
- Ecosystem services (added benefit of conversion of developed land)

Net present value benefits were calculated using a 7% discount rate. *Table ES-1* summarizes benefits on an annual basis and at present value.

Table ES-1 – Summary of Project Benefits

Expected Benefits	Annual Benefit	Present Value Benefit
Structures + Contents	$1,647,690	$22,739,349
Displacement, Residential	$124,458	$1,717,620
Displacement, Non-residential	$5,279	$72,858
Social (Mental Health & Productivity)	$2,341,772	$32,318,205
Environmental (Ecosystem services of converted land)	$690,548	$9,530,078
Total Expected Benefits (all categories)	**$4,809,748**	**$66,378,109**

Social benefits represent the expected benefits of reducing mental health impacts associated with experiencing a disaster such as flooding. These benefits include avoided costs of:

- Health treatment for mental stress and anxiety of impacted residents
- Productivity losses by impacted residents who work full-time due to impacts on mental health

Social benefits of the White Oak Bayou Watershed Mitigation Project are shown in *Table ES-2*.

Table ES-2 – Summary of Social Benefits

Category	Number of Persons	Benefit per Person	Present Value Social Benefits
Number of Persons Directly Benefitted by Mitigation of Residential Structural Flooding	3,634	$ 2,443	$8,878,297
Number of Full-time Workers Directly Benefitted by Mitigation of Residential Structural Flooding	2,683	$ 8,736	$23,439,908
Total Social Benefit			**$32,318,205**

Environmental benefits based on the FEMA Toolkit represent the value of ecosystem services provided by enhancement of a parcel's land use to a use type which provides a higher level of natural environmental benefits. The White Oak Bayou Watershed Mitigation Project requires some acquisition and conversion of developed land to undeveloped floodplain. Additionally, a riparian corridor is planned as part of the project. The benefit value for Green Open Space has been applied to these areas. Environmental benefits of the White Oak Bayou Watershed Mitigation Project are summarized in *Table ES-3*.

Table ES-3 – Summary of Environmental Benefits

Post Mitigation Land Use	Acres Converted	Benefit per Acre per Year	Annual Benefits	Present Value Benefits
Green Open Space	26	$8,308	$216,008	$2,981,072
Riparian	12	$39,545	$474,540	$6,549,006
Wetlands	0	$6,010	$-	$-
Forests	0	$554	$-	$-
Marine / Estuary	0	$1,799	$-	$-
Total Environmental Benefit	**38**		$690,548	$9,530,078

In addition to environmental benefits, social benefits, and reduced structural damages and displacement costs, the White Oak Bayou Watershed Mitigation Project represents a holistic benefit to its service area, the White Oak Bayou Watershed, by removing structures and land area from the floodplain. *Table ES-4* summarizes the impacts of the mitigation project.

Table ES-4 – Impacts of Mitigation Project

Number of structures benefitted in any event *(estimated losses to structural damage are reduced)*	1,586
Number of structures removed from 10% AEP (10-year) floodplain	76
Number of structures removed from 1% AEP (100-year) floodplain	527
Number of acres removed from 10% AEP (10-year) floodplain	117
Number of acres removed from 1% AEP (100-year) floodplain	258
Number of structures removed from risk* in 10% AEP (10-year) event	7
Number of structures removed from risk* in 1% AEP (100-year) event	475

**Structures "at risk" refer to those for which the modeled water surface elevation is at or above finished floor elevation.*

Project costs as estimated for the CDBG-MIT grant application include estimated costs of design and construction. The benefit-cost ratio was determined as the ratio of the present value of Total Expect Benefits to Total Project Cost; this ratio is presented in *Table ES-5*. It is important to note that the White Oak Bayou Watershed Mitigation Project will provide many community benefits for which an economic value could not be quantified as part of this analysis. Additional unquantified benefits are discussed further in the section on **Qualitative Benefits**.

Table ES-5 – Benefit-Cost Ratio

Present Value Total Benefits	$66,378,109
Present Value Total Cost	$121,281,560
Benefit-Cost Ratio	0.55

1.0 METHODOLOGY

1.1 BENEFIT-COST ANALYSIS REQUIREMENTS FOR CDBG-MIT PROJECTS

Although a benefit-cost ratio (BCR) is not a factor in the competition score as set forth by the Texas General Land Office (GLO), applicants are required to demonstrate that the benefits of any Covered Project outweigh its costs. As described in the Federal Register,[1] this requirement may be met in either of two ways:

1. Benefit-cost ratio developed during a benefit-cost analysis (BCA) is greater than 1.0.
    a. Calculations should be prepared in accordance with OMB Circular A-94[2].
    b. BCA methodology should follow FEMA standardized methodologies unless
        1) A BCA for the project has already been completed or is in progress under guidelines of other Federal agencies, or
        2) The BCA addresses a non-correctable flaw in the FEMA methodology, or
        3) A new approach is proposed that is unavailable using the FEMA Toolkit.
2. Alternately, projects may have a benefit-cost ratio of less than 1.0 under these conditions:
    a. A BCA is still completed following the methodologies described above.
    b. The project "serves low- and moderate- income persons or other persons that are less able to mitigate risks or respond to and recover from disaster."
    c. A qualitative description is provided for "benefits that cannot be quantified but sufficiently demonstrate unique and concrete benefits of the Covered Project for low- and moderate- income persons or other persons that are less able to mitigate risks, or respond to and recover from disasters."

The analysis presented here meets these requirements as follows:

- In accordance with OMB Circular A-94, a 7% discount rate was used when determining equivalent present values of expected annual benefits and vice versa.

[1] Allocations, Common Application, Waivers, and Alternative Requirements for Community Development Block Grant Mitigation Grantees, 84 FR 169 (August 30, 2019).
[2] *Circular A-94*, Office of Management and Budget, last revised October 29, 1992.

- The quantitative benefit-cost analysis (BCA) was based on benefit quantification methods and assumptions used in FEMA tools such as the FEMA BCA Toolkit version 6.0[3] (hereafter "FEMA Toolkit") and HAZUS (Hazards U.S. planning-level damage and loss estimating tool). These tools were not used directly, but the methods and assumptions in the FEMA Toolkit and HAZUS were applied using a combination of geospatial and tabular analysis tools to more efficiently:
    - Assess thousands of potentially impacted structures.
    - Utilize spatially variable modeled water surface elevation data.
    - Incorporate detailed information at an individual structure level.
- As indicated by the beneficiary population analysis detailed in the **LMI Evaluation Attachment**, over 51% of the project beneficiaries of are low- to moderate-income persons.
- The **Qualitative Benefits** section of this report discusses benefits of the Covered Project that could not be quantified.

1.2 QUANTITATIVE BENEFIT CATEGORIES

The benefit-cost analysis included quantification of the following types of benefits:

- Building damages (avoided costs)
- Content damages (avoided costs)
- Residential displacement (avoided costs)
- Non-residential displacement (avoided costs)
- Mental health treatment (avoided costs)
- Worker productivity (avoided costs)
- Ecosystem services (added benefit of conversion of developed land)

1.3 INPUT DATA

A separate analysis was performed to estimate the number of residents and residential units per structure, as well as the number of residents who are full-time workers. The primary datasets used in the BCA are summarized in *Table 1-1.*

[3] *Benefit Cost Toolkit Version 6.0.* FEMA. October 2019. Available at https://www.fema.gov/media-library/assets/documents/179903.

Table 1-1 – Input Datasets to Benefit-Cost Analysis

Dataset	Source	Description
Harris County Structure Inventory	Harris County Flood Control District	attributes of individual structures in the study area, including use, size, and look-up codes for various reference tables
Right-of-Way Acquisition	Harris County Flood Control District	parcels and impacted structures to be bought out as part of project
Capital Costs	Harris County Flood Control District; Harris County	project capital costs
Existing and Proposed Water Surface Elevations	Harris County Flood Control District; Harris County	Estimated water surface elevations based on hydraulic modeling of conditions before and after project implementation
American Community Survey Data[4]	U.S. Census Bureau	2018 ACS 5-year data related to population, average household size, number of full-time workers, median household income, and other variables
Census Geographic Areas	U.S. Census Bureau	boundaries of 2010 Census tracts and block groups

HCFCD maintains a detailed structure inventory of all structures in Harris County. This inventory includes data on the number of housing units in each structure, square footage, building style, finished floor elevation, and numerous other attributes. The qualitative structure attributes in the inventory were used to determine the appropriate depth-damage functions and content-to-structure value ratios, and the finished floor elevation is the basis for determining damage and displacement costs based on depth of flooding above finished floor.

Data from the 2018 American Community Survey (ACS) 5-year[4] data tables was used in various parts of the BCA; the variables used are listed below. The following sections describe the use of this data in more detail.

- Subject Table S1903 –Median Income in the Past 12 Months
- Detail Table B01003 – Total Population
- Data Profile Table DP04 – Selected Housing Characteristics
- Detail Table B23027 – Full-Time, Year-Round Work Status in the Past 12 Months by Age for Population 16+ Years

[4] U.S. Census Bureau. American Community Survey, 2014-2018. Detailed Tables, Subject Tables, and Data Profile Tables; generated by Freese & Nichols, Inc. using the U.S. Census Bureau Application Programming Interface.

Table 1-2 lists the various standard values and lookup tables referenced in the calculations.

Table 1-2 – Sources of Standard Values and Reference Tables

Name	Purpose	Source
Discount Rate	calculate discount factors for converting between annual and present value equivalent costs/benefits	OMB Circular A-94
Demolition Threshold	threshold above which building is assumed to be fully lost and contents maximally lost	FEMA BCA Toolkit v6.0
Useful Life	project lifetime used in discounting	
Depth-Days Curve	table of days displaced for depth flooded	
Disruption Cost Factor	one-time cost per square foot for non-residential structures	
Monthly Cost Factor	recurring cost per square foot per month for non-residential structures	
Hotel per Diem Cost	daily cost per household, up to 5 people, for lodging	
Meal per Diem Cost	daily cost per person of eating out, less average cost of eating at home	
Mental Stress and Anxiety Unit Cost	cost of mental stress and anxiety per resident	
Productivity Loss Unit Cost	productivity loss per full-time worker	
Land Use Conversion Unit Benefit	value of ecosystem services ($/acre/year) provided by land use conversion	
Replacement Cost Models	building replacement values ($/sq. ft.)	Hazus Technical Manual[5]
Depth-Damage Functions	tables of percent damage for depth flooded given the building type	USACE New Orleans District[6]
SFR Content-to-Structure Value Ratios	ratio for single-family residences for 1 story, 2 stories, or mobile home	USACE New Orleans District[6]
Other Content-to-Structure Value Ratios	ratio for structures other than single-family residences	USACE New Orleans District[6]

1.4 CALCULATION OF EXPECTED ANNUAL BENEFITS

For benefit categories based on avoided losses, impacts are assessed for multiple storm recurrence intervals, and an Expected Annual Loss value is estimated from the estimated value of damages caused by each storm and the associated probability of such a storm in a single year. This annualized value is

[5] Hazus-MH MR3 Technical Manual. FEMA.

[6] *Final Report: Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVR) in Support of the Donaldsonville to the Gulf, Louisiana, Feasibility Study*. U.S. Army Corps of Engineers, New Orleans District. New Orleans, Louisiana. 2006.

estimated as the area under the Damage vs Probability curve using the trapezoidal area method. This method is described in a FEMA guidance document for flood risk assessments[7]. *Equation 1* demonstrates how this method is applied if impacts are modeled for 10-, 25-, 50-, 100-, and 500-year storms.

$$Expected\ Annual\ Loss = \left(\frac{1}{500} * Loss_{500yr}\right) + \left(\frac{1}{100} - \frac{1}{500}\right)\left(Loss_{100yr} + Loss_{500yr}\right) + \left(\frac{1}{50} - \frac{1}{100}\right)\left(Loss_{50yr} + Loss_{100yr}\right) + \left(\frac{1}{25} - \frac{1}{50}\right)\left(Loss_{25yr} + Loss_{50yr}\right) + \left(\frac{1}{10} - \frac{1}{25}\right)\left(Loss_{10yr} + Loss_{25yr}\right)$$

Equation 1

Loss values are not extrapolated to storm events with recurrence intervals smaller or larger than the events simulated in a hydraulic model. The Expected Annual Benefit (EAB) is the difference in Expected Annual Loss under existing and post-mitigation conditions *Equation 2*.

$$Expected\ Annual\ Benefit = (Expected\ Annual\ Loss)_{Existing} - (Expected\ Annual\ Loss)_{Post-mitigation}$$

Equation 2

1.5 PRESENT VALUE ANALYSIS

Benefits in most categories were determined on an annualized basis as described in the previous section. The present value of the Expected Annual Benefits (EAB) was then determined using the standard economic equivalence factor. Equivalence factors were determined using an annual discount rate of 7% as specified in OMB Circular A-94 and an assumed project useful life of 50 years. Equivalence factors for converting between annual and present values are shown in *Equation 3* and *Equation 4*. The 50-year life was based on a table of project lifetimes within the FEMA Toolkit (*Table 1-3*).

$$Annual\ Value\ =\ Present\ Value * \frac{i(1+i)^n}{(1+i)^n - 1}$$

Equation 3

$$Present\ Value\ =\ Annual\ Value * \frac{(1+i)^n - 1}{i(1+i)^n}$$

Equation 4

[7] "Guidance for Flood Risk Analysis and Mapping: Flood Risk Assessments." p. 18. FEMA. February 2018.

Table 1-3 – Standard Values for Project Useful Life in FEMA BCA Toolkit v6.0

Flood Hazard Mitigation Project Type	Useful Life (years)
Acquisition / Relocation	
Acquisition / Relocation	100
Building Elevation	
Residential Building	30
Non-Residential Building	25
Public Building	50
Historic Buildings	50
Mitigation Reconstruction	
Mitigation Reconstruction	50
Infrastructure Projects	
Major Infrastructure (dams, levees)	50
Concrete infrastructure, flood walls, roads, bridges, major drainage system	50
Culverts (concrete, PVC, CMP, HDPE, etc.) with end treatment	30
Culverts without end treatment	10
Major pump stations, substations, wastewater systems, or equipment such as generators	50
Minor pump stations, substations, wastewater systems, or equipment such as generators	5

Present Value Benefits were then compared to Total Project Cost to determine the Benefit-Cost Ratio (BCR) as shown in *Equation 5*.

$$BCR = ((Project\ Capital\ Cost) * (A/P\ Discount\ Factor) + Annual\ Maintenance\ Costs)/(Expected\ Annual\ Benefits)$$ **Equation 5**

In the FEMA Toolkit, project useful life is specified for each structure individually, allowing a different factor to be applied to structures subject to buyouts, for which the useful life is assumed to be 100 years. However, for simplicity in the preliminary BCAs, a single discount factor based on a 50-year life was applied across the entire project. In other words, although the project does include acquisition and demolition of some structures, the shorter useful life of the primary project infrastructure has been used to apply a consistent present worth conversion factor to all components. This simplification causes a slight underestimation of benefits, but the difference is negligible.

2.0 QUANTITATIVE BENEFITS

2.1 BENEFITS BASED ON DEPTH OF FLOODING

A traditional BCA for flood mitigation projects assesses the difference in probable damages to a structure and its contents under existing (baseline) conditions and post-mitigation (proposed) conditions. Baseline

and proposed impacts to a structure and its contents are assessed for multiple storm recurrence intervals based on the depth to which the structure is inundated in each scenario. Flooding depth for each structure is calculated as the difference in modeled water surface elevation (WSE) and finished floor elevation (FFE) as provided in the structure inventory. For structures with missing FFE data, FFE was estimated at 6 inches above ground elevation, using the same ground elevation data as was used in development of the structure inventory[8].

Depth-related benefit categories include traditional structural benefits as well as others that can be related to the depth of flooding in a given storm frequency:

- Building Damages – Depth related to % of value lost.
- Content Damages – Depth related to % of value lost.
- Displacement Costs – Depth related to number of days displaced.
- Loss of Income / Loss of Function – Depth related to number of days rent payment income or commercial function is lost.

The following sections explain how these categories were assessed in the BCA.

2.1.1 Building and Content Damages

The FEMA Toolkit requires structural damages to be calculated based on a Building Replacement Value (BRV), not the appraised value or market value. The Unit BRV (cost per square foot) has a default value of $100/sf in the FEMA Toolkit. This default value was replaced with a value specific to each structure's attributes as described in the Hazus Technical Manual[9]. Hazus unit BRVs depend on building type and number of stories. Residential unit BRVs are further broken down by construction class (economy, average, custom, or luxury). Using Hazus methodology[10], a weighted composite building replacement value was assigned to single-family residential structures in the project service area based on the ratio of median household income in each census tract to median income across Texas (median household income determined from 2018 ACS 5-year data from Subject Table S1903). Finally, the Total Building Replacement Value of a structure is calculated by multiplying the Unit BRV by the building size *Equation 6*. This

[8] Bare Earth LiDAR, HGAC 2008 Datum Adjusted. Houston-Galveston Area Council. 2008.
[9] Hazus-MH MR3 Technical Manual. FEMA.
[10] Hazus-MH MR3 Technical Manual. FEMA. "Section 14.2.1 – Full Building Replacement Costs."

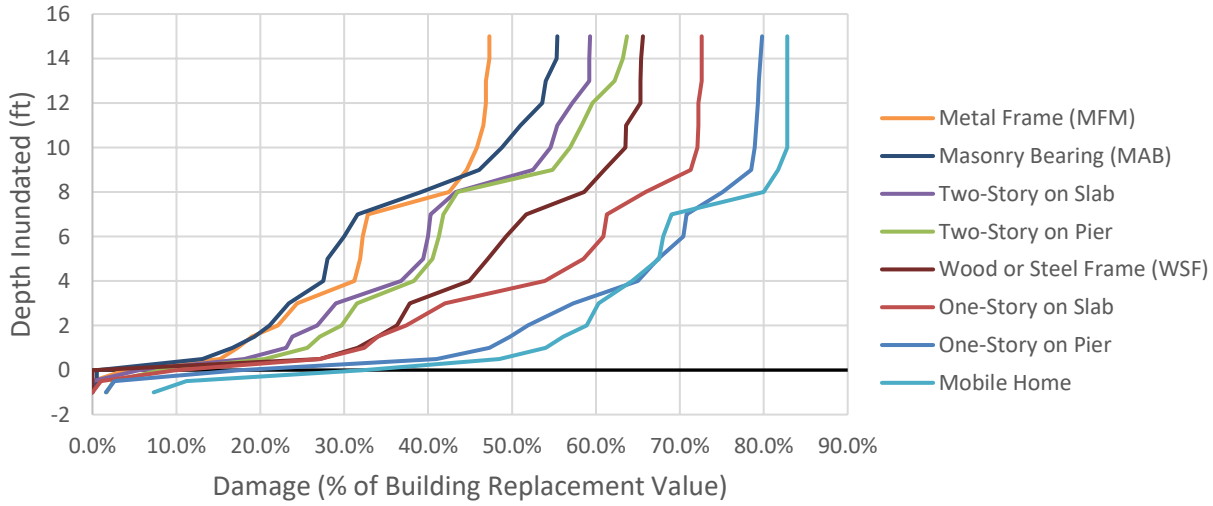
approach allowed for the use of local data to appropriately reflect structure values in the project service area.

$$Total\ BRV = Unit\ BRV\ (\$/sf) * Area\ (sf) \qquad \textit{Equation 6}$$

Values documented in the Hazus Technical Manual are based on standard cost-estimation models published in *Means Square Foot Costs*[11] and were reported in 2006 dollars. For this analysis, these values were scaled up using the RSMeans Historical Cost Indices from 2006 to 2020 to be consistent with project cost estimates. Building replacement values can be found in **Appendix A**.

Once depth of flooding is determined for a structure under a given scenario, the percent of the Total BRV that is lost to damage is determined from a depth-damage function (DDF). The DDFs used in this BCA were developed by the USACE New Orleans District[12] and are illustrated in *Figure 1*. It should be noted that some structures are expected to experience damage even when WSE is below FFE by up to 2 feet, depending on structure type.

Figure 1 – Depth-Damage Functions



The percent damage estimated from the DDFs is also applied to the value of the contents in the structures. The total value of contents in each structure was estimated from content-to-structure value ratios

[11] R.S. Means, 2005.
[12] Final Report: Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVR) in Support of the Donaldsonville to the Gulf, Louisiana, Feasibility Study. U.S. Army Corps of Engineers, New Orleans District. New Orleans, Louisiana. 2006.

developed by the USACE New Orleans District[12], which specify a percentage of the building value depending on the building type.

A demolition threshold was set to 50%, which is the default value in the FEMA Toolkit. If percent damage based on depth and the depth-damage curve exceeded this threshold, the structure is expected to be substantially damaged and is assumed to need replacement rather than repair. In this case, the value of Expected Structure Damage is the Total BRV. Additionally, the value of Expected Content Losses is assumed to be maximized at this point (not a total loss, but the maximum value on the depth-damage curve).

Total benefits of avoided structure and content losses are summarized in the **Executive Summary**.

2.1.2 Displacement Costs (Residential)

Residential displacement losses represent the cost to residents of being out of their home after a flood event. The cost of residential displacement under baseline and proposed conditions for each modeled event was calculated using the method and standard values (shown in *Table 2-1*) in the FEMA Toolkit:

- Temporary lodging for each displaced household (assumes up to 5 household members per hotel room)
- Increase in meal cost (above average cost of eating at home) for each displaced resident

Expected annual benefits depend on a relationship between number of days displaced for depth of inundation. Using the relationship in the FEMA Toolkit, 45 days of displacement were assumed for each foot of flooding above FFE. No displacement was assumed if WSE did not exceed FFE. Total benefits of avoided residential displacement costs are summarized in the **Executive Summary**.

Table 2-1 – Residential Displacement Unit Costs

Meals per diem per capita	Cost of eating at home	Hotel per diem per family, up to 5 people	Meal cost / person / day
$55	$7	$94	$48

2.1.3 Displacement Costs (Non-Residential)

The costs of non-residential displacement, as defined by FEMA, include:

- One-time cost of relocating business equipment

- Monthly rental costs of new space

The same relationship between depth flooded and days displaced was used for non-residential displacement as for residential displacement. Cost factors provided in the FEMA Toolkit as $/sq. ft. values were used to estimate both the monthly and one-time cost components of non-residential displacement (*Table 2-2*). Total benefits of avoided non-residential displacement costs are summarized in the **Executive Summary**.

Table 2-2 – Non-residential Displacement Cost Factors

Occupancy Class	Disruption Cost Factor ($/sf)	Rental Cost Factor ($/sf)
Retail Trade	1.09	1.16
Wholesale Trade	0.95	0.48
Personal and Repair Services	0.95	1.36
Technical Business	0.95	1.36
Banks	0.95	1.7
Hospital	1.36	1.36
Medical Office/Clinic	1.36	1.36
Entertainment and Recreation	0	1.7
Theaters	0	1.7
Heavy	0	0.2
Light	0.95	0.27
Food/Drugs/Chemicals	0.95	0.27
Metals/Mineral Processing	0.95	0.2
High Technology	0.95	0.34
Construction	0.95	0.14
Agriculture	0.73	0.73
Religious/Nonprofit/Membership Organization	0.68	0.68
Government, General Services	0.95	1.36
Government, Emergency Response	0.95	1.36
Schools/Libraries	0.95	1.02
College/Universities	0.95	1.36

2.1.4 Loss of Income / Loss of Function

Loss of Income represents the loss of monthly rental income to owners of rental properties. Because additional monthly rental costs were considered as a displacement cost to non-residential tenants, property owner income losses were excluded from this BCA to avoid double-counting benefits.

Loss of Function represents the lost revenue due to inability to operate a business for some amount of time after a flood event. This avoided cost benefit category requires knowledge of the operating budget of the business for each individual non-residential structure in a project service area. As the majority of flood mitigation benefits in the project service area are to residential structures, this category was not assessed.

2.2 ANCILLARY BENEFITS

In addition to the benefit categories that represent avoided costs based on reduction in flooding depth, social and environmental benefits of the project were also quantified.

2.2.1 Avoided Social Costs

Social benefits based on the FEMA Toolkit represent the expected benefits of reducing mental health impacts associated with experiencing a disaster such as flooding. These benefits include avoided costs of:

- Health treatment for mental stress and anxiety of impacted residents
- Productivity losses by impacted residents who work full-time due to impacts on mental health

The calculation of social benefits replicated the method used in the FEMA Toolkit, which applies a present value benefit amount per impacted person to estimate the avoided costs of mental health treatment and of lost productivity *(Table 2-3*). These values are based on studied prevalence, severity, and course of mental effects following a disaster[13]. It should be noted that because these values are present value benefits, they are not dependent on the annual expected probability of a storm event or the level of flooding anticipated from a given event. Instead, these benefits represent the positive impact of a mitigation project reducing flooding in a resident's home, which may include an existing condition of minor flooding compared to a post-mitigation condition of no flooding. Even when traditional benefit

[13] *Final Sustainability Benefits Methodology Report.* FEMA. Task order HSFEHQ-11-J-1408. August 2012.

estimates might indicate a very small value of saved structural and content damages, the positive impact on residents of not having to do any repairs instead of a few repairs is significant.

Table 2-3 – Unit Values for Social Benefits as Avoided Costs of Mental Health Impacts

Category	Benefit per Person (Present Value)	Unit
Treatment for mental stress and anxiety	$2,443	Resident of home benefitted by project
Lost productivity	$8,736	Resident of home benefitted by project who works full-time

The present value benefits per person for treatment of mental stress and anxiety were applied to all residents of structures which experienced a reduced modeled WSE after project implementation, regardless of event frequency. The **Population Estimate Attachment** describes how ACS Table B01003 (Total Population Estimates) and ACS Data Profile DP04 (Selected Housing Characteristics) were used to allocate numbers of residents to each structure in the watershed. The number of full-time workers in each Census tract (B23027_001E) was compared to the total tract population (B01003_001E) to estimate the number of full-time workers living in each structure. Costs of lost productivity were based on the estimated number of full-time workers residing in each structure. Estimated social benefits are summarized in the **Executive Summary**.

2.2.2 Environmental Benefits

Environmental benefits based on the FEMA Toolkit represent the value of ecosystem services provided by enhancement of a parcel's land use to a use type which provides a higher level of natural environmental benefits. Unlike other benefit categories based on avoided costs, environmental benefits represent an added service. *Table 2-4* indicates the value of each land use type (assuming existing condition of is developed land).

Table 2-4 – Unit Benefit Values for Conversion of Developed Land to Land Use of Higher Ecosystem Value

Documented Benefit/acre/year[14]				
Green Open Space	Riparian	Wetlands	Forests	Marine /Estuary
$8,308	$39,545	$6,010	$554	$1,799

[14] Help Section of B/C Analysis Toolkit v6.0, as of 01/28/2020.

Expected environmental benefits are summarized in the **Executive Summary**.

2.3 SPECIAL CONSIDERATIONS

Certain mitigation activities occurring in areas that ultimately outfall to the main channel of the project service area are included in the White Oak Bayou Watershed Mitigation Project. For these activities, benefits were calculated based on [insert HNTB methodology summary here], and social benefits were assumed to apply to the residents of all benefitted structures.

3.0 QUALITATIVE BENEFITS

As described in the Federal Register,[15] as long as a quantitative BCA has been completed, projects may have a benefit-cost ratio of less than 1.0 when the project provides concrete benefits to "low- and moderate- income persons or other persons that are less able to mitigate risks or respond to and recover from disaster," including benefits that cannot be quantified. Qualitative benefits of this project are discussed below.

3.1 BENEFICIARIES VULNERABLE TO FLOOD RISK

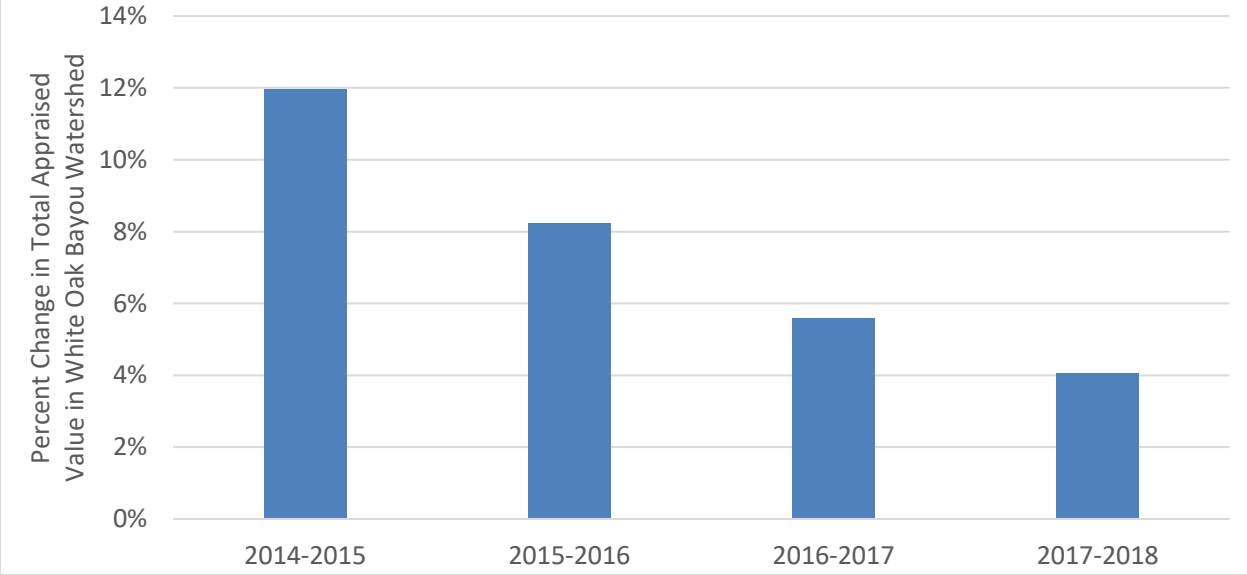
This application has demonstrated that 53.7% of the beneficiaries of White Oak Bayou Watershed Mitigation Project are low- to moderate-income persons. Additionally, many of the residents of the project service area may be considered particularly vulnerable to disasters. 33.9% of the households in the project service area are considered to be housing cost-burdened, and 16.0% are severely housing cost-burdened. These households spend 30+% and 50+% of their monthly income on housing-related costs, respectively. This cost burden may make it particularly hard for these households to recover from disaster, as they are less likely to have additional funds available for repairs, hotel stays, and lost wages during and after a flood. Additionally, 23.4% of the households in the project service area have no computer and/or no internet subscription. Lack of reliable internet access may reduce residents' ability to benefit from early warning systems in case of flooding events, making them more vulnerable.

[15] Allocations, Common Application, Waivers, and Alternative Requirements for Community Development Block Grant Mitigation Grantees, 84 FR 169 (August 30, 2019).

3.2 BENEFIT OF REDUCING FLOOD IMPACTS TO PROPERTY VALUES

A review of parcel appraisal values from the Harris County Appraisal District suggests that the annual rate of growth in property values generally slowed from 2014 to 2018 in the White Oak Bayou Watershed (*Figure 2*). These trends could be caused or influenced by floods in 2015, 2016, and 2017, but the degree to which local flooding impacted the value growth rates cannot be ascertained. General economic conditions in Harris County following Hurricane Harvey, as well as other external economic factors, could also contribute to changes in property values. Although the exact impact of local flooding on property values cannot be quantified, flood risk mitigation projects are likely to have a positive impact on the residents of flood-prone areas, as falling property values can have a negative effect on the financial flexibility of housing cost-burdened homeowners and even renters. Finally, the White Oak Bayou Watershed Mitigation Project will remove 258 acres from the 100-year floodplain, providing a potential positive impact to property values.

Figure 2 - Year-to-Year Percent Change in Total Appraised Value of Property in White Oak Bayou Watershed



3.3 TRANSPORTATION BENEFITS

Street closures due to flooding in the White Oak Bayou Watershed during Hurricane Harvey likely impacted a large number of commuters, including those who do not live in the watershed. Frequently, residential streets are inundated and may become impassable without the water level reaching a point of causing any damage to homes. In these scenarios, no quantitative benefits are counted in the BCA as there is no structural damage or displacement of residents. However, the street flooding poses an

inconvenience and in some cases a safety risk, as it can inhibit evacuations, potentially trapping residents in homes that may lose power or keeping them from accessing groceries or medical supplies. The White Oak Bayou Watershed Mitigation Project will provide some reduction in street inundation as a benefit to residents in the service area.

In Harris County, over 50,000 workers 16 years and older use a bus or trolley bus as means of transportation to work. Of workers living within the watershed, 2.3% (5,198 workers) use a bus to commute to work. Data from the Metropolitan Transit Authority of Harris County (Metro) indicates that 29 bus routes through the watershed were closed for up to 5 or more days during and after Hurricane Harvey, with 3 of these routes being closed for 15 or more days. No methods were found that could be used to quantify the productivity losses of workers impacted by road closures. Additionally, all Metro bus routes passing through the project service area also extend across multiple floodplains in Harris County. It was determined that even if a substantial section of a route is removed from the floodplain as a result of the White Oak Bayou Watershed Mitigation Project, inundation elsewhere could still cause route closure. Because of this, assigning quantitative economic benefits to reduced flooding along bus routes that could be attributed only to this project was not considered to be a valid approach. However, the White Oak Bayou Watershed Mitigation Project is important to reducing the overall flooding along major commuter routes, providing significant benefit to residents of the project service area as well as workers traveling to and through the area.

4.0 SUMMARY

The approach to benefit-cost analysis documented here was based on FEMA BCA methodologies and considered various categories of benefits afforded by the White Oak Bayou Watershed Mitigation Project. However, as discussed in Section 2.1.1, the use of structural damages in a benefit-cost ratio, while valid, means that a project in a lower income service area that provides flood mitigation benefits to the same number of homes as a project in a higher-income area may have a lower calculated benefit-cost ratio due to the lower replacement values of homes in the service area. As a result, the low- and moderate-income populations that the CDBG-MIT funding seeks to serve may be underserved by funding sources which rely primarily on traditional benefit-cost analysis methods. Considering this, it is important to recognize that quantitative BCRs should not be used alone when evaluating the effectiveness of a mitigation project, and in fact, comparing BCRs between projects may actually work against the goal of serving of CDBG-MIT funding to serve LMI and other vulnerable populations.

APPENDIX A
BUILDING REPLACEMENT VALUES

Table A-1
Single-Family Residential Building Replacement Values (2020 dollars, assuming no basements)

Income Ratio (r) Number of Stories	r < 0.5	0.5 < r < 0.85	0.85 <= r < 1.25	1.25 <= r < 2.0	r > 2.0
1	$97.28	$107.21	$145.17	$169.60	$206.28
2	$103.51	$110.89	$141.45	$166.65	$196.43
3	$103.51	$112.50	$147.76	$172.67	$202.32
split	$95.14	$102.70	$132.88	$155.34	$184.21

Table A-2
Multi-Family Residential Building Replacement Values (2020 dollars)

Number of Units	Unit Building Replacement Value ($/sf)
2	$117.00
3-4	$128.00
5-9	$228.00
10-19	$203.00
20-49	$200.00
50+	$195.00

Table A-3
Non-Residential Building Replacement Values (2020 dollars)

Occupancy Class	Occupancy Sub Class	Unit Building Replacement Value ($/sf)
Manufactured Housing	Manufactured Housing	$52.76
Retail Trade	Dept Store, 1 st	$121.96
Wholesale Trade	Warehouse, medium	$112.10
Personal and Repair Services	Garage, Repair	$151.05
Prof./ Tech./Business Services	Office, medium	$196.93
Banks	Bank	$282.68
Hospital	Hospital, medium	$331.04
Medical Office/Clinic	Med. Office, medium	$242.32
Entertainment & Recreation	Restaurant	$251.66
Theaters	Movie Theatre	$180.14
Parking	Parking garage	$64.53
Heavy	Factory, small	$130.29
Light	Warehouse, medium	$112.10
Food/Drugs/Chemicals	College Laboratory	$214.11
Metals/Minerals Processing	College Laboratory	$214.11
High Technology	College Laboratory	$214.11
Construction	Warehouse, medium	$112.10
Agriculture	Warehouse, medium	$112.10
Church	Church	$204.52
General Services	Town Hall, small	$158.34
Emergency Response	Police Station	$245.87
Schools/Libraries	High School	$170.19
Colleges/Universities	College Classroom	$213.61

White Oak Bayou Watershed - Project Little White Oak

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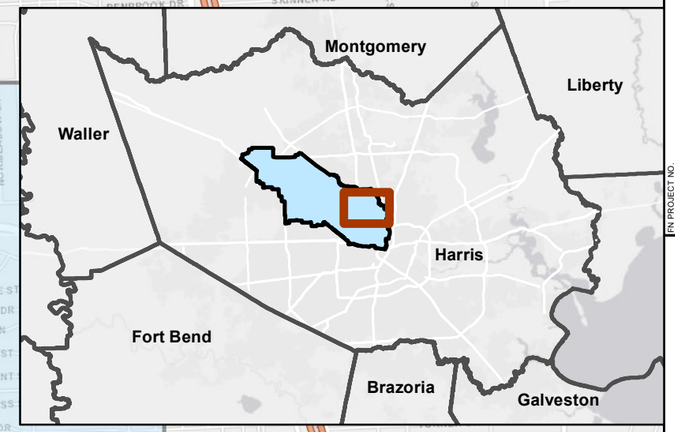

FN PROJECT NO.	SCG17357
DATE CREATED	10/21/2020
DAT UM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas South Central
FILE NAME	White_Oak_ Little_White_Oak_Benefit_Map
PREPARED BY	AMJ

Legend

- Little White Oak Project
- Proposed Little White Oak Improvements
- Channel
- E100-00-00 (White Oak Bayou)
- White Oak Bayou Beneficiary Area

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Feet

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Project Barwood

Project E132-00-00

Project Kolbe Road Subdivisions

Project Tower Oaks Meadows

Project Little White Oak

Beneficiary Area

E142-00-00
E133-00-00
E132-00-00
E131-00-00
E130-00-00
E128-00-00
E141-00-00
E129-00-00
E112-00-00
E111-00-00
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E105-00-00
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E100-00-00 (White Oak Bayou)

249
290
6
59
90
261

Montgomery
Liberty
Waller
Harris
Fort Bend
Brazoria
Galveston

Legend

- White Oak Projects
- Proposed White Oak Improvements
- Proposed Storm Drain Improvements
- Proposed Detention Improvements
- Proposed Little White Oak Improvements
- Channel
- E100-00-00 (White Oak Bayou)
- White Oak Bayou Beneficiary Area

Total Project Beneficiaries - 464,352

Project Area	Latitude	Longitude
Kolbe Rd Subdivisions and Adjacent Roads & Infrastructure	29.94052	-95.64223
Barwood	29.94339	-95.61398
E-132	29.94021	-95.60344
Tower Oaks Meadows	29.93825	-95.61301
Little White Oak	29.83642	-95.39424

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FN PROJECT NO. SCG17357
DATE CREATED 10/20/2020
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas South Central
FILE NAME White_Oak_Project_Area_Map
PREPARED BY AMJ

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White Oak Bayou Watershed - Project Area Map

FREESE NICHOLS
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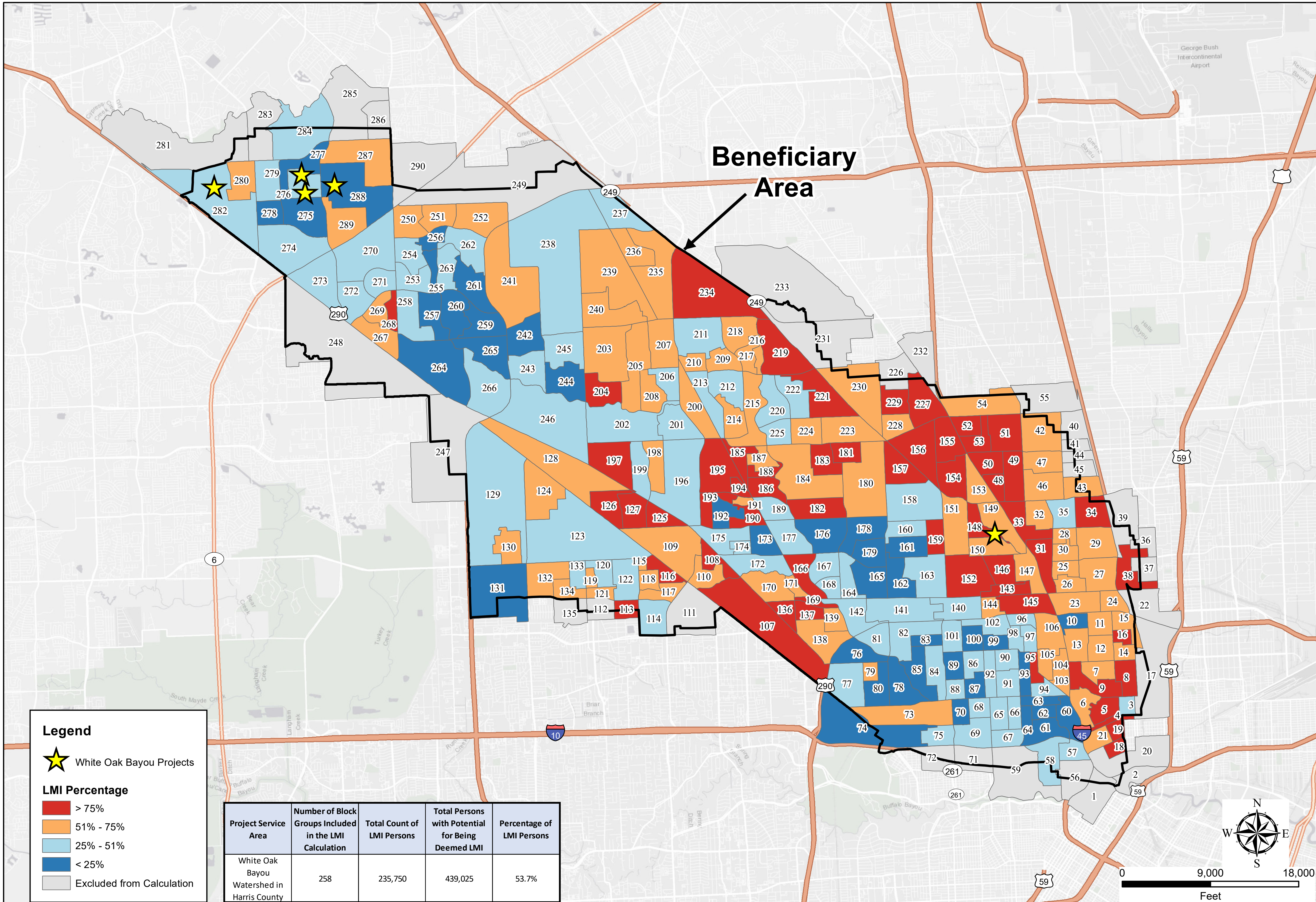

Project Service Area	Number of Block Groups Included in the LMI Calculation	Total Count of LMI Persons	Total Persons with Potential for Being Deemed LMI	Percentage of LMI Persons
White Oak Bayou Watershed in Harris County	258	235,750	439,025	53.7%

FN PROJECT NO.	SCG17357
DATE CREATED	10/5/2020
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas South Central
FILE NAME	White_Oak_Project_Area_Map_LMI_1
PREPARED BY	AMJ

STUART CONSULTING GROUP

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White Oak Bayou Watershed Beneficiary Area Map

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Block Group ID	Block Group	# Residents in Block Group of Service Area	# Residents in Block Group	% Residents of Block Group in Service Area	Used for LMI Calculation?	LMI Percentage
1	482011000003	194	1,157	17%	No	23.3%
2	482012101001	129	628	21%	No	0.0%
3	482012104001	1,069	1,134	94%	Yes	45.8%
4	482012104002	201	238	84%	Yes	85.7%
5	482012104003	2,045	2,061	99%	Yes	87.9%
6	482012104004	990	990	100%	Yes	65.0%
7	482012105001	1,853	1,853	100%	Yes	72.6%
8	482012105002	1,794	1,803	100%	Yes	88.6%
9	482012105003	1,820	1,823	100%	Yes	85.1%
10	482012106001	875	875	100%	Yes	11.8%
11	482012106002	1,114	1,114	100%	Yes	56.2%
12	482012106003	2,146	2,146	100%	Yes	52.3%
13	482012106004	1,138	1,138	100%	Yes	62.8%
14	482012107001	825	828	100%	Yes	58.7%
15	482012107002	1,153	1,156	100%	Yes	71.4%
16	482012107003	673	673	100%	Yes	87.1%
17	482012108001	89	1,360	7%	No	86.3%
18	482012123001	1,019	1,019	100%	Yes	79.2%
19	482012123002	950	1,074	88%	Yes	100.0%
20	482012123003	65	364	18%	No	62.5%
21	482012123005	1,169	1,169	100%	Yes	74.5%
22	482012201001	8	1,363	1%	No	75.8%
23	482012202001	1,736	1,736	100%	Yes	62.2%
24	482012202002	873	873	100%	Yes	53.2%
25	482012203001	1,178	1,178	100%	Yes	61.6%
26	482012203002	1,628	1,634	100%	Yes	62.0%
27	482012203003	1,518	1,522	100%	Yes	57.8%
28	482012204001	1,423	1,423	100%	Yes	67.3%
29	482012204002	1,933	1,933	100%	Yes	69.1%
30	482012204003	834	834	100%	Yes	57.0%
31	482012205001	504	504	100%	Yes	78.2%
32	482012205002	1,405	1,405	100%	Yes	65.0%
33	482012205003	1,578	1,697	93%	Yes	97.4%
34	482012206001	2,757	2,814	98%	Yes	75.7%
35	482012206002	1,126	1,126	100%	Yes	37.6%
36	482012207002	138	1,068	13%	No	55.3%
37	482012207003	130	446	29%	No	77.4%
38	482012207004	1,222	1,735	70%	Yes	82.0%
39	482012207005	639	2,396	27%	No	75.3%
40	482012212001	187	2,039	9%	No	70.7%
41	482012212002	343	1,239	28%	No	84.3%
42	482012212003	2,783	3,454	81%	Yes	73.2%
43	482012213001	1,245	2,018	62%	Yes	72.4%
44	482012213002	489	1,263	39%	No	61.1%
45	482012213003	741	1,732	43%	No	65.7%
46	482012213004	2,095	2,095	100%	Yes	68.6%
47	482012213005	2,812	2,812	100%	Yes	71.9%
48	482012214001	815	815	100%	Yes	85.8%
49	482012214002	1,983	1,983	100%	Yes	85.3%
50	482012214003	3,179	3,179	100%	Yes	88.4%
51	482012215001	2,645	2,645	100%	Yes	77.4%
52	482012215002	3,106	3,106	100%	Yes	79.9%
53	482012215003	2,599	2,599	100%	Yes	76.1%
54	482012216003	1,359	1,702	80%	Yes	68.6%
55	482012217002	372	1,644	23%	No	87.9%
56	482015101001	668	1,168	57%	No	34.8%
57	482015101002	1,007	1,020	99%	Yes	30.6%
58	482015102001	1,196	1,746	68%	Yes	38.4%
59	482015102002	183	4,959	4%	No	30.4%
60	482015103001	1,669	1,671	100%	Yes	8.2%
61	482015103002	839	840	100%	Yes	15.7%
62	482015103003	885	910	97%	Yes	14.9%
63	482015103004	1,122	1,129	99%	Yes	11.0%
64	482015103005	493	493	100%	Yes	24.4%
65	482015104001	1,561	1,561	100%	Yes	26.0%
66	482015104002	652	657	99%	Yes	34.4%
67	482015104003	1,661	1,673	99%	Yes	25.4%
68	482015105001	1,263	1,265	100%	Yes	38.4%
69	482015105002	1,073	1,086	99%	Yes	26.0%
70	482015105003	969	974	99%	Yes	14.4%
71	482015106002	1,430	2,593	55%	No	38.9%
72	482015106003	847	2,247	38%	No	20.8%
73	482015109001	2,034	2,036	100%	Yes	54.2%
74	482015109002	2,655	3,708	72%	Yes	20.1%
75	482015109003	1,329	1,331	100%	Yes	44.0%
76	482015110011	1,517	1,517	100%	Yes	16.6%
77	482015110012	1,729	1,729	100%	Yes	28.5%
78	482015110021	1,715	1,715	100%	Yes	11.7%
79	482015110022	1,641	1,641	100%	Yes	56.8%
80	482015110023	905	905	100%	Yes	14.7%
81	482015111001	1,400	1,400	100%	Yes	48.8%
82	482015111002	2,106	2,106	100%	Yes	28.6%
83	482015112001	1,125	1,141	99%	Yes	9.7%
84	482015112002	2,252	2,258	100%	Yes	40.9%
85	482015112003	1,819	1,826	100%	Yes	23.0%
86	482015113011	1,073	1,073	100%	Yes	49.8%
87	482015113012	1,229	1,229	100%	Yes	24.7%
88	482015113013	454	454	100%	Yes	33.6%
89	482015113014	1,215	1,229	99%	Yes	14.2%
90	482015113021	1,016	1,016	100%	Yes	31.7%
91	482015113022	1,556	1,567	99%	Yes	32.0%
92	482015113023	1,278	1,280	100%	Yes	27.1%
93	482015114001	1,503	1,503	100%	Yes	7.2%
94	482015114002	782	782	100%	Yes	26.1%
95	482015114003	905	905	100%	Yes	78.3%
96	482015115001	525	527	100%	Yes	34.0%
97	482015115002	841	847	99%	Yes	29.0%
98	482015115003	936	938	100%	Yes	38.5%
99	482015115004	863	867	99%	Yes	13.5%
100	482015115005	1,406	1,434	98%	Yes	21.5%
101	482015115006	1,854	1,864	99%	Yes	39.0%
102	482015115007	1,523	1,543	99%	Yes	31.9%
103	482015116001	1,188	1,188	100%	Yes	56.9%
104	482015116002	585	585	100%	Yes	64.5%
105	482015116003	937	937	100%	Yes	62.9%
106	482015116004	866	866	100%	Yes	72.5%
107	482015205001	2,516	2,520	100%	Yes	89.5%
108	482015205002	3,622	3,750	97%	Yes	82.5%
109	482015205003	1,466	1,471	100%	Yes	66.2%
110	482015205004	1,557	1,557	100%	Yes	74.4%
111	482015206011	1,010	2,781	36%	No	78.8%
112	482015213001	394	733	54%	No	42.9%
113	482015213002	1,045	1,334	78%	Yes	81.9%
114	482015213003	1,283	1,283	100%	Yes	31.1%
115	482015214001	936	936	100%	Yes	71.7%
116	482015214002	2,973	2,973	100%	Yes	99.1%
117	482015214003	1,701	1,701	100%	Yes	50.6%
118	482015214004	1,345	1,944	69%	Yes	74.7%
119	482015215001	1,111	1,111	100%	Yes	59.8%
120	482015215002	1,037	1,037	100%	Yes	37.5%
121	482015215003	1,713	1,713	100%	Yes	58.3%
122	482015215004	2,175	2,175	100%	Yes	46.3%
123	482015216001	2,480	2,480	100%	Yes	48.4%
124	482015216002	1,014	1,018	100%	Yes	62.5%
125	482015217001	1,280	1,280	100%	Yes	90.2%
126	482015217002	2,384	2,384	100%	Yes	84.9%
127	482015217003	1,836	1,836	100%	Yes	89.3%
128	482015217004	1,367	1,367	100%	Yes	58.2%
129	482015218001	2,993	2,993	100%	Yes	49.4%
130	482015218002	2,549	2,552	100%	Yes	59.1%
131	482015219001	2,329	3,552	66%	Yes	20.9%
132	482015220001	2,090	2,090	100%	Yes	59.6%
133	482015220002	772	772	100%	Yes	47.5%
134	482015220003	1,851	1,851	100%	Yes	73.6%
135	482015221003	19	2,565	1%	No	70.1%
136	482015301001	1,072	1,072	100%	Yes	81.3%
137	482015301002	2,648	2,648	100%	Yes	84.5%
138	482015301003	1,432	1,432	100%	Yes	68.8%
139	482015301004	1,398	1,398	100%	Yes	73.2%
140	482015302001	1,536	1,536	100%	Yes	29.5%
141	482015302002	1,491	1,497	100%	Yes	38.1%
142	482015302003	646	646	100%	Yes	31.6%
143	482015303001	689	691	100%	Yes	79.4%
144	482015303002	682	682	100%	Yes	52.8%
145	482015303003	982	985	100%	Yes	78.1%
146	482015304001	1,675	1,675	100%	Yes	82.8%
147	482015304002	1,279	1,279	100%	Yes	72.3%
148	482015305001	1,485	1,485	100%	Yes	75.8%
149	482015305002	1,647	1,647	100%	Yes	72.7%
150	482015305003	2,273	2,273	100%	Yes	71.2%
151	482015306001	2,088	2,096	100%	Yes	71.7%
152	482015306002	1,499	1,501	100%	Yes	78.0%
153	482015307001	1,987	1,987	100%	Yes	72.2%
154	482015307002	1,814	1,814	100%	Yes	79.8%
155	482015307003	1,800	1,800	100%	Yes	87.0%
156	482015308001	1,086	1,086	100%	Yes	88.7%
157	482015308002	990	993	100%	Yes	81.7%
158	482015308003	2,266	2,271	100%	Yes	42.8%
159	482015309001	1,142	1,142	100%	Yes	76.1%
160	482015309002	1,855	1,855	100%	Yes	38.6%
161	482015309003	1,399	1,399	100%	Yes	13.0%
162	482015310001	1,462	1,462	100%	Yes	17.1%
163	482015310002	2,404	2,443	98%	Yes	31.9%
164	482015311001	1,216	1,216	100%	Yes	34.9%
165	482015311002	2,046	2,046	100%	Yes	12.9%
166	482015312001	1,329	1,329	100%	Yes	86.9%
167	482015312002	1,270	1,270	100%	Yes	28.3%
168	482015312003	974	974	100%	Yes	27.5%
169	482015313001	1,982	1,982	100%	Yes	87.0%
170	482015313002	1,571	1,574	100%	Yes	59.4%
171	482015313003	2,719	2,719	100%	Yes	67.6%
172	482015314001	2,150	2,150	100%	Yes	38.4%
173	482015315001	835	835	100%	Yes	21.4%
174	482015315002	802	802	100%	Yes	37.1%
175	482015315003	1,377	1,377	100%	Yes	31.4%
176	482015316001	1,714	1,714	100%	Yes	14.7%
177	482015316002	1,439	1,439	100%	Yes	37.3%
178	482015317001	1,703	1,703	100%	Yes	22.4%
179	482015317002	1,722	1,722	100%	Yes	13.7%
180	482015318001	1,871	1,874	100%	Yes	72.9%
181	482015318002	492	492	100%	Yes	82.9%
182	482015319001	2,568	2,568	100%	Yes	83.8%
183	482015319002	999	999	100%	Yes	78.2%
184	482015319003	1,507	1,510	100%	Yes	60.4%
185	482015320011	1,467	1,467	100%	Yes	80.4%
186	482015320012	1,443	1,443	100%	Yes	92.3%
187	482015320013	1,548	1,548	100%	Yes	70.8%
188	482015320014	1,869	1,869	100%	Yes	88.3%
189	482015320021	1,284	1,284	100%	Yes	36.0%
190	482015321001	2,904	2,904	100%	Yes	91.9%
191	482015321002	246	246	100%	Yes	54.5%
192	482015321003	1,191	1,191	100%	Yes	23.3%
193	482015321004	2,096	2,096	100%	Yes	91.9%
194	482015322001	2,462	2,462	100%	Yes	90.9%
195	482015322002	1,621	1,621	100%	Yes	78.2%
196	482015323001	830	830	100%	Yes	42.7%
197	482015323002	214	214	100%	Yes	100.0%
198	482015323003	2,407	2,407	100%	Yes	61.6%
199	482015323004	3,978	3,978	100%	Yes	47.5%
200	482015324001	2,350	2,350	100%	Yes	56.9%
201	482015324002	2,737	2,737	100%	Yes	38.7%
202	482015324003	1,737	1,737	100%	Yes	40.9%
203	482015325011	4,112	4,112	100%	Yes	51.2%
204	482015325012	600	600	100%	Yes	86.9%
205	482015325013	3,951	3,951	100%	Yes	53.7%
206	482015325021	1,321	1,321	100%	Yes	40.4%
207	482015325022	1,241	1,241	100%	Yes	52.4%
208	482015325023	2,774	2,774	100%	Yes	69.6%
209	482015326001	2,628	2,628	100%	Yes	69.2%
210	482015326002	1,705	1,705	100%	Yes	66.8%
211	482015326003	2,201	2,201	100%	Yes	36.1%
212	482015327001	1,432	1,435	100%	Yes	47.1%
213	482015327002	1,548	1,548	100%	Yes	42.4%
214	482015327003	1,951	1,951	100%	Yes	56.3%
215	482015328001	1,951	1,951	100%	Yes	53.3%
216	482015329001	1,979	1,979	100%	Yes	66.2%
217	482015329002	2,439	2,439	100%	Yes	55.0%
218	482015329003	2,266	2,266	100%	Yes	58.4%
219	482015330001	2,422	2,422	100%	Yes	83.9%
220	482015331001	3,058	3,058	100%	Yes	44.9%
221	482015331002	1,977	1,982	100%	Yes	76.6%
222	482015331003	2,824	2,824	100%	Yes	38.1%
223	482015332001	913	915	100%	Yes	66.1%
224	482015332002	1,615	1,615	100%	Yes	74.0%
225	482015332003	1,391	1,391	100%	Yes	46.6%
226	482015333001	245	2,247	11%	No	70.6%
227	482015333002	2,344	2,631	89%	Yes	97.8%
228	482015333003	661	661	100%	Yes	73.9%
229	482015333004	660	660	100%	Yes	78.2%
230	482015334001	1,979	2,315	85%	Yes	62.8%
231	482015334002	2,401	5,941	40%	No	66.5%
232	482015335001	0	2,467	0%	No	63.0%
233	482015338011	1,077	8,982	12%	No	61.0%
234	482015340011	3,462	3,462	100%	Yes	81.7%
235	482015340021	3,021	3,021	100%	Yes	69.1%
236	482015340022	2,970	2,970	100%	Yes	65.0%
237	482015340031	2,897	2,897	100%	Yes	43.0%
238	482015341001	3,512	3,512	100%	Yes	47.6%
239	482015341002	1,831	1,831	100%	Yes	71.3%
240	482015341003	3,167	3,167	100%	Yes	58.8%
241	482015342011	3,018	3,018	100%	Yes	58.9%
242	482015342021	2,321	2,321	100%	Yes	22.8%
243	482015342022	3,808	3,808	100%	Yes	35.0%
244	482015342023	883	883	100%	Yes	11.5%
245	482015342024	2,366	2,366	100%	Yes	33.2%
246	482015342031	2,226	2,226	100%	Yes	47.5%
247	482015401003	155	1,344	12%	No	27.2%
248	482015408002	1,308	2,577	51%	No	60.2%
249	482015515002	1,952	5,775	34%	No	38.6%
250	482015516001	3,143	3,143	100%	Yes	55.0%
251	482015516002	2,829	2,829	100%	Yes	53.6%
252	482015516003	3,322	3,322	100%	Yes	57.0%
253	482015517011	1,644	1,644	100%	Yes	37.2%
254	482015517012	1,201	1,201	100%	Yes	36.3%
255	482015517013	995	995	100%	Yes	15.0%
256	482015517014	1,100	1,100	100%	Yes	11.2%
257	482015517015	1,639	1,639	100%	Yes	3.1%
258	482015517016	2,171	2,171	100%	Yes	31.8%
259	482015517021	1,958	1,958	100%	Yes	11.2%
260	482015517022	1,963	1,963	100%	Yes	5.7%
261	482015517031	3,505	3,505	100%	Yes	20.0%
262	482015517032	3,042	3,042	100%	Yes	35.5%
263	482015517033	1,849	1,849	100%	Yes	32.3%
264	482015518001	2,297	2,297	100%	Yes	11.4%
265	482015518002	1,138	1,138	100%	Yes	10.7%
266	482015518003	950	950	100%	Yes	29.0%
267	482015519001	854	854	100%	Yes	69.4%
268	482015519002	2,540	2,540	100%	Yes	79.2%
269	482015519003	2,364	2,364	100%	Yes	67.0%
270	482015520011	4,431	4,431	100%	Yes	33.9%
271	482015520012	1,421	1,421	100%	Yes	30.2%
272	482015520013	2,720	2,720	100%	Yes	37.8%
273	482015520021	1,366	1,366	100%	Yes	37.8%
274	482015521011	4,270	4,270	100%	Yes	29.2%
275	482015521021	3,437	3,437	100%	Yes	9.7%
276	482015521022	2,270	2,270	100%	Yes	27.4%
277	482015521023	922	922	100%	Yes	20.3%
278	482015521031	1,363	1,363	100%	Yes	12.7%
279	482015521032	1,946	1,946	100%	Yes	45.4%
280	482015522001	1,853	1,853	100%	Yes	60.4%
281	482015522002	74	2,119	3%	No	33.8%
282	482015522003	3,254	3,261	100%	Yes	41.8%
283	482015523011	1,214	2,699	45%	No	26.4%
284	482015523012	1,048	1,521	69%	Yes	34.0%
285	482015523021	492	3,436	14%	No	53.8%
286	482015523022	277	1,014	27%	No	65.1%
287	482015524001	1,290	1,290	100%	Yes	61.0%
288	482015524002	2,581	2,581	100%	Yes	12.0%
289	482015524003	3,838	3,838	100%	Yes	60.6%
290	482015525002	0	3,816	0%	No	37.2%

White Oak Bayou Watershed Beneficiary Area Table

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FN PROJECT NO. SCG17357
DATE CREATED 9/28/2020
DAT UM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas South Central
FILE NAME White_Oak_Project_Area_Map_LMI_2
PREPARED BY AMJ

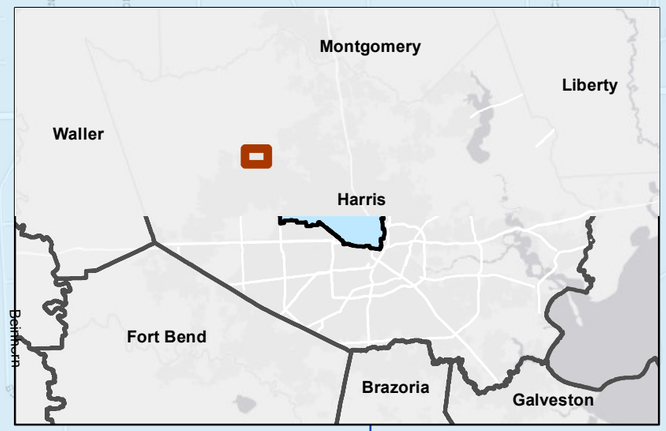
FREESE NICHOLS
STUART CONSULTING GROUP

EXHIBIT
2
(2 of 2)

Barwood Project

Tower Oaks Meadows Project

E132 Project



Legend

- E132 , Tower Oaks Meadows, and Barwood Project
- Proposed White Oak Improvements
- Proposed Drainage Improvements
- Proposed Detention Improvements
- Channel
- E100-00-00 (White Oak Bayou)
- White Oak Bayou Beneficiary Area

0 1,000 2,000 Feet

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White Oak Bayou Watershed - Project E132-00-00, Tower Oaks Meadows, & Barwood

FN PROJECT NO.	SCG17357
DATE CREATED	10/21/2020
DAT UM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas South Central
FILE NAME	White_Oak_ E132_Tower_Oaks_Meadows_Benefit_Map
PREPARED BY	AMJ

EXHIBIT 3

Date Saved: 10/21/2020 4:51:41 PM

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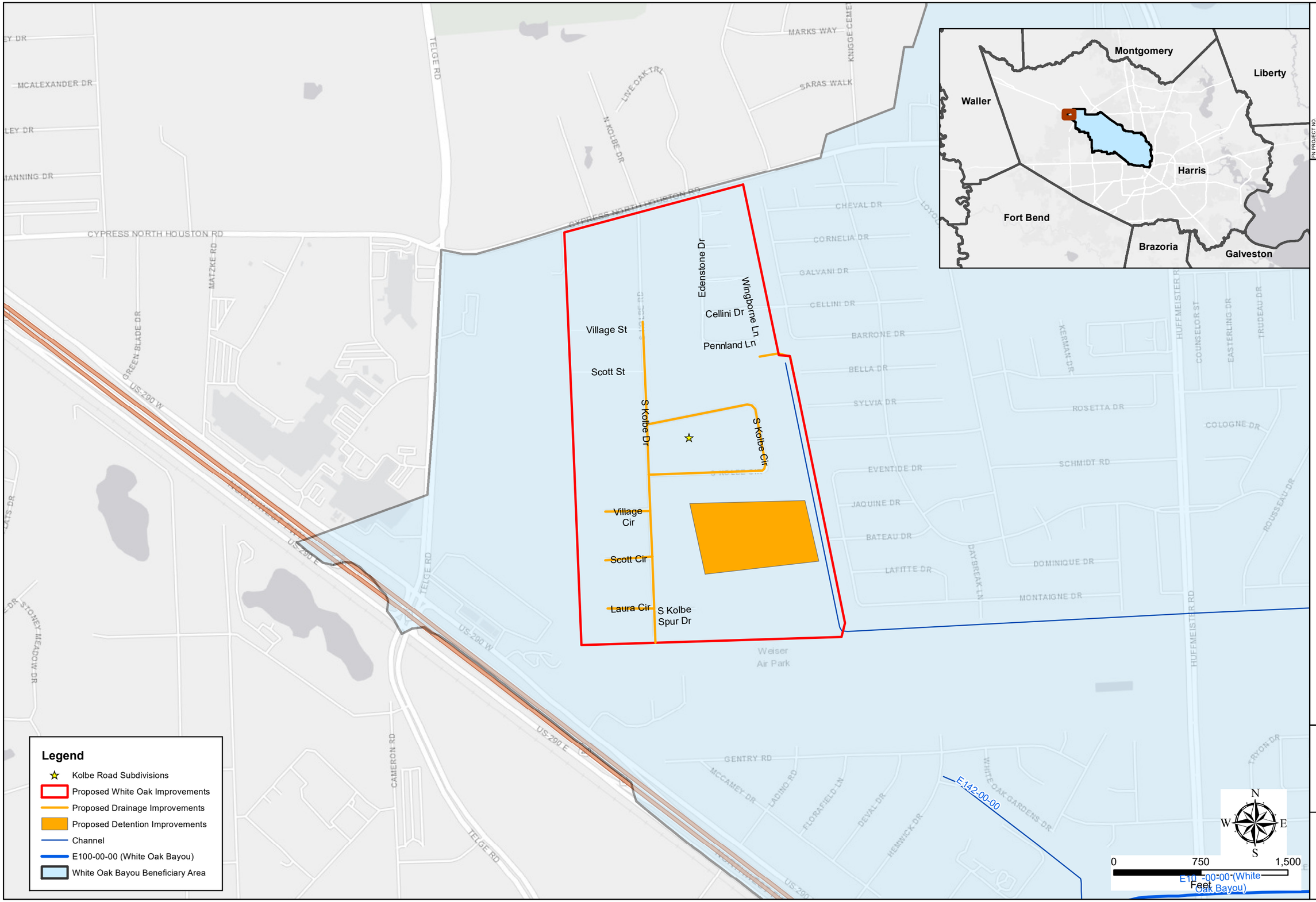

Date Saved: 10/20/2020 10:05:53 AM

Path: H:\STORMWATER\CDBG_MIT_Projects\Working\E100_White_Oak_Bayou\White Oak Bayou Application Exhibits\Project Benefit Maps\White_Oak_ Kolbe_Rd_Subdivision_Benefit_Map.mxd

FN PROJECT NO. SCG17357

DATE CREATED 10/21/2020

DAT UM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas South Central

FILE NAME White_Oak_ Kolbe_Rd_Subdivision_Benefit_Map

PREPARED BY AMJ

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White Oak Bayou Watershed - Project Kolbe Road Subdivisions

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EXHIBIT

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