2020 SCAHM ANNUAL CONFERENCE

OPENING MAIN ROAD

The Main Road HMGP Drainage Improvements

GREENVILLE · SOUTH CAROLINA · MARCH 4, 2020

presented by

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Mark Boone · Senior Consultant · Rostan Solutions, LLC

SC ASSOCIATION for HAZARD MITIGATION

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PRESENTION OUTLINE

- Background
  - 2015 / H. Joaquin
- HMGP Application and BCA
- Phase 1 Study
  - H&H
  - Alternatives
  - Conceptual Design
- HMGP Process and Pointers

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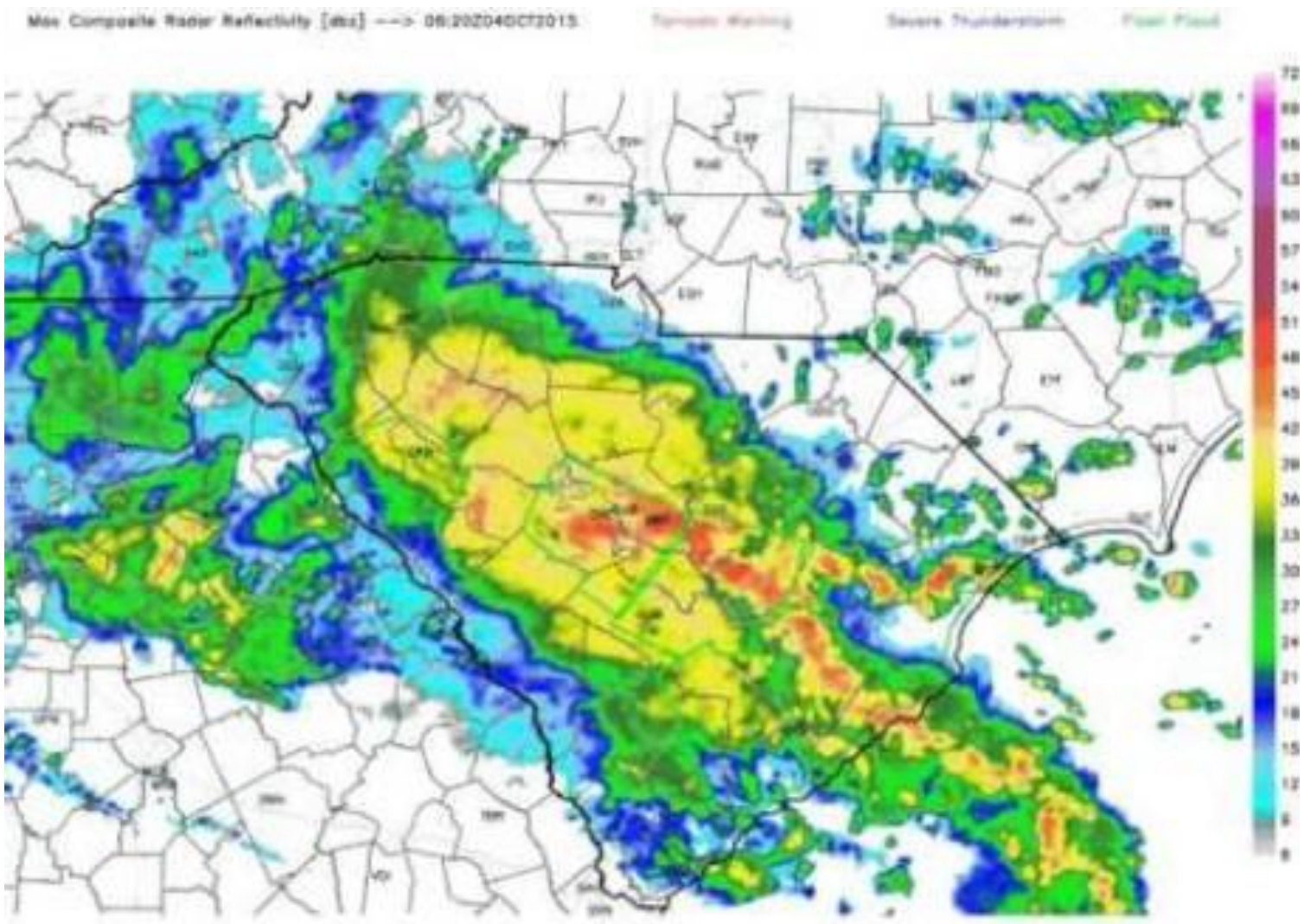
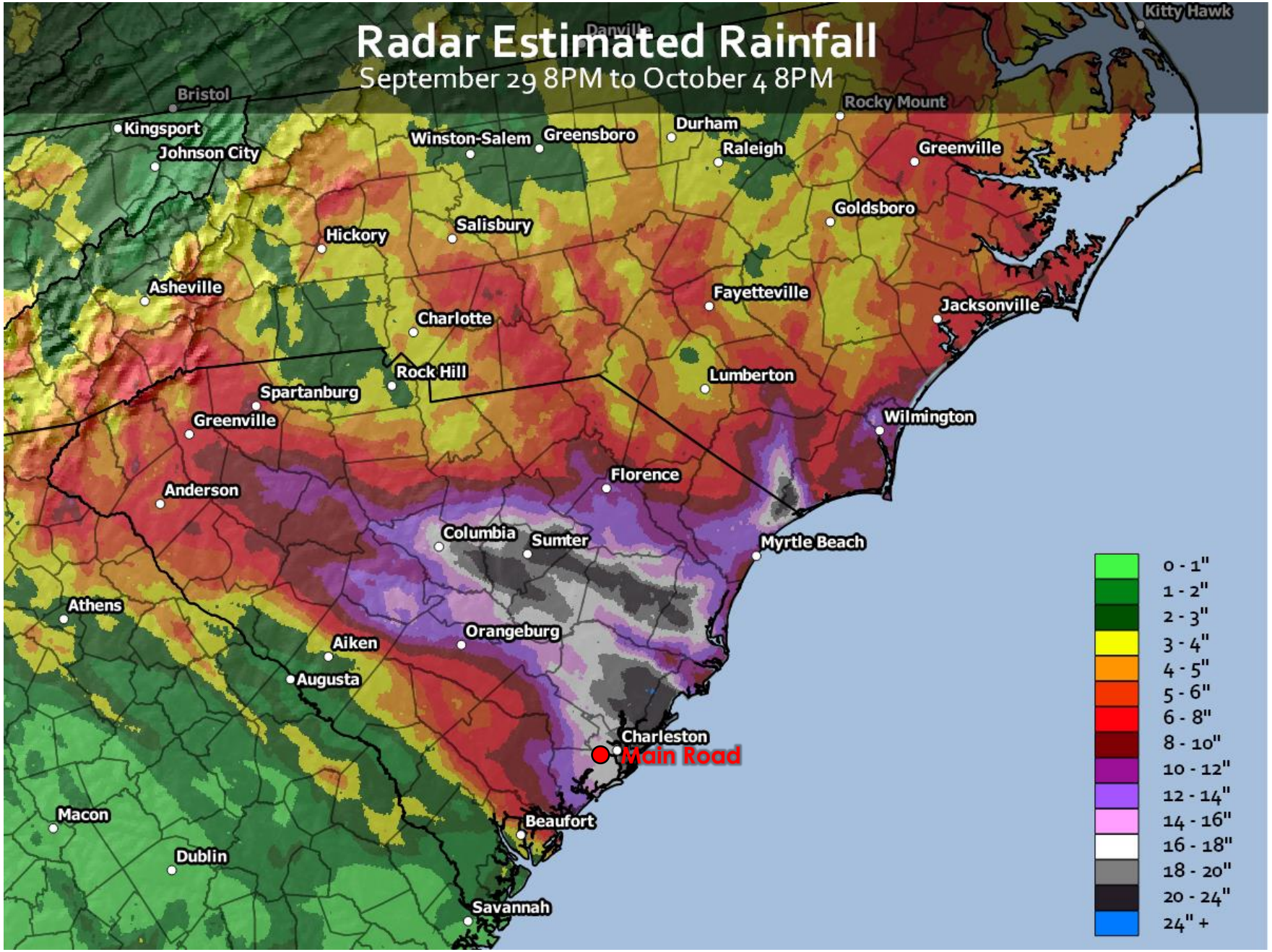


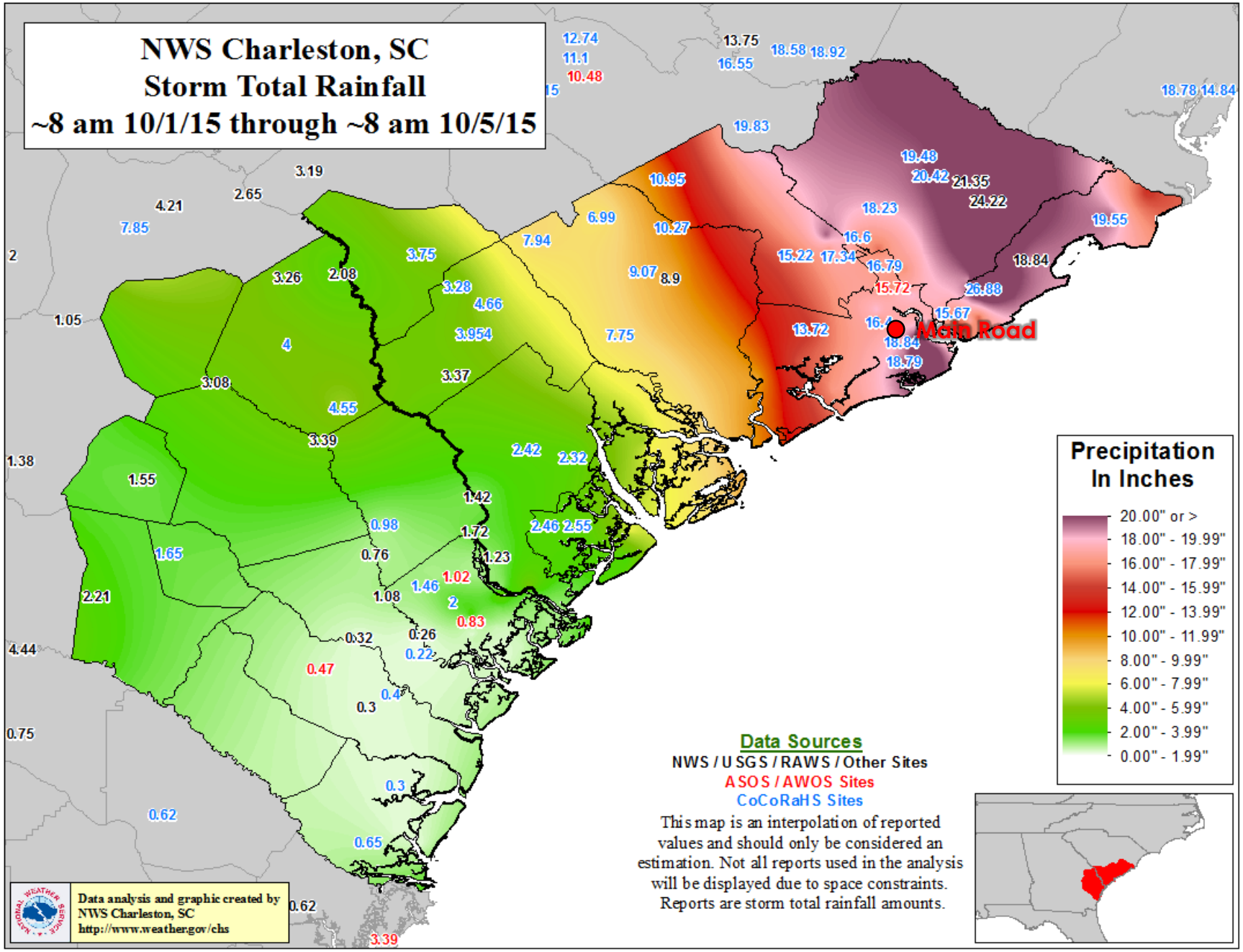
1,000–YEAR FLOOD

OCTOBER 1-5 2015



1,000–YEAR FLOOD

RADAR ESTIMATED RAINFALL TOTALS



1,000–YEAR FLOOD

NWS MEASURED RAINFALL TOTALS

MAIN ROAD CLOSURE

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MAIN ROAD CLOSURE

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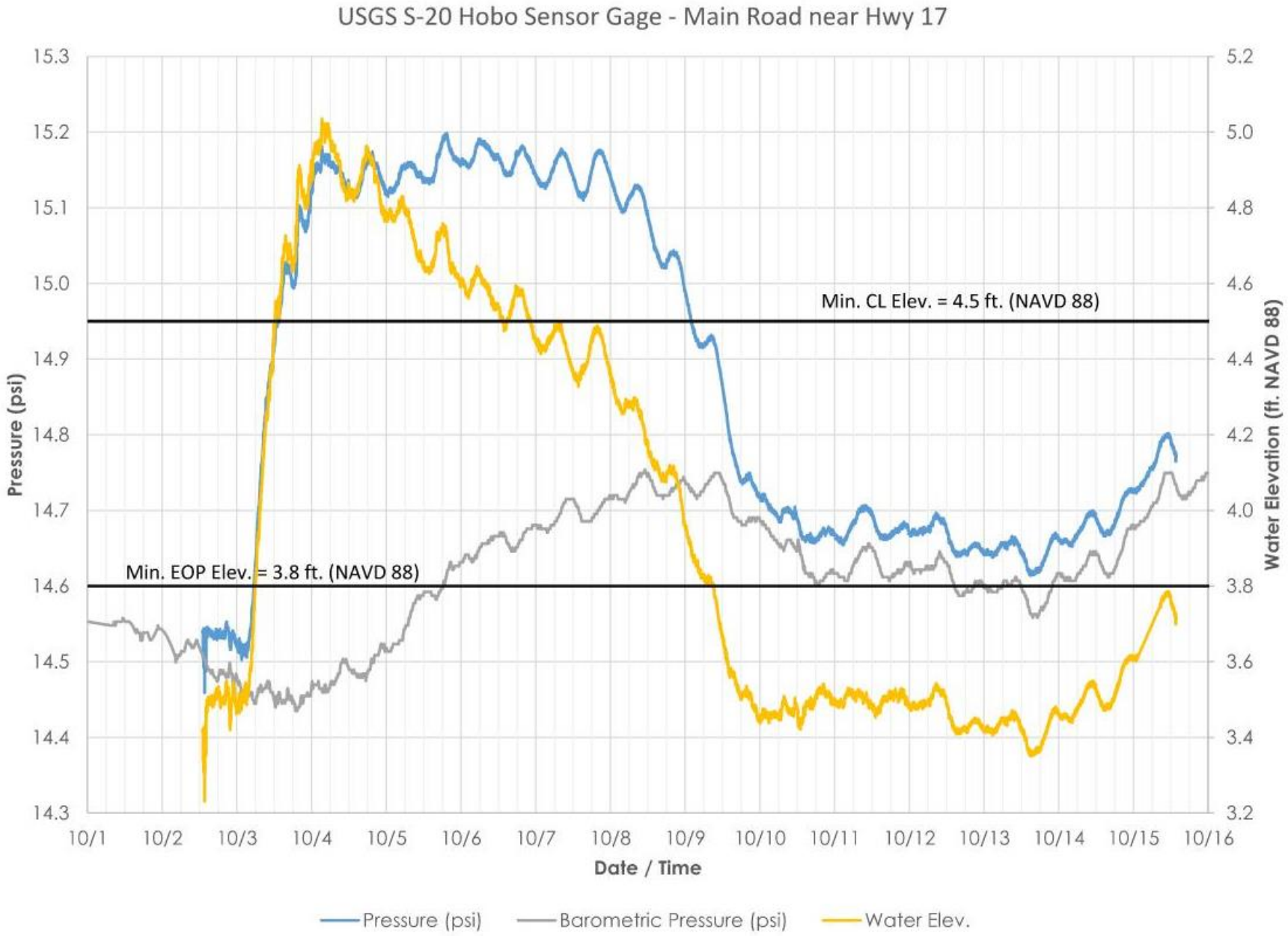

MAIN ROAD FLOODING

OCTOBER 2015

MAIN ROAD HMGP PROCESS

- Grant Application
- Phase 1
  - Study
  - Conceptual Design
- Phase 2
  - Permitting
  - Detailed Design
  - Construction

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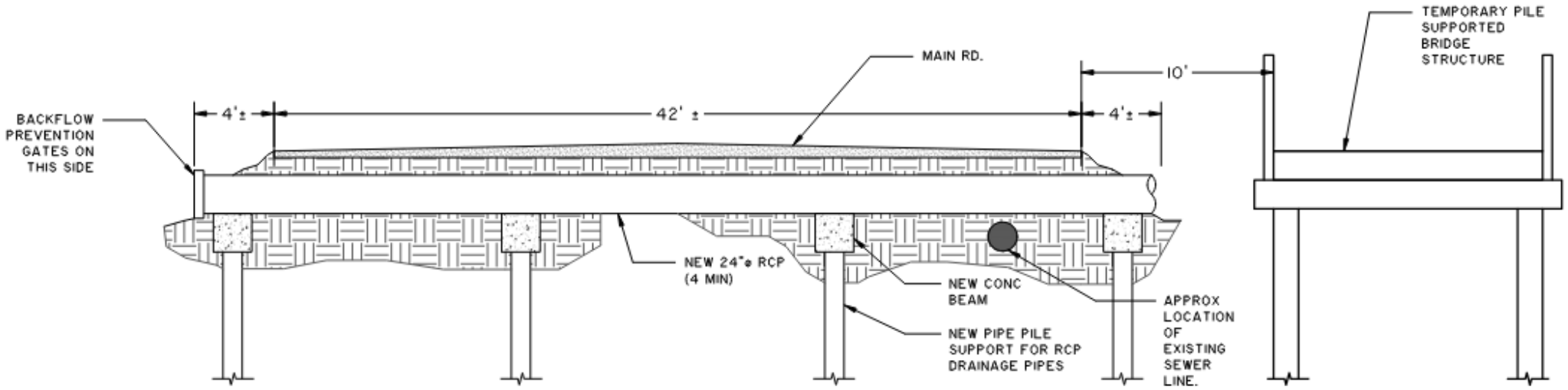
Grant Application – Main Road Proposed Improvements



3 / EX1 SECTION THRU MAIN RD.
SCALE: 1" = 50'

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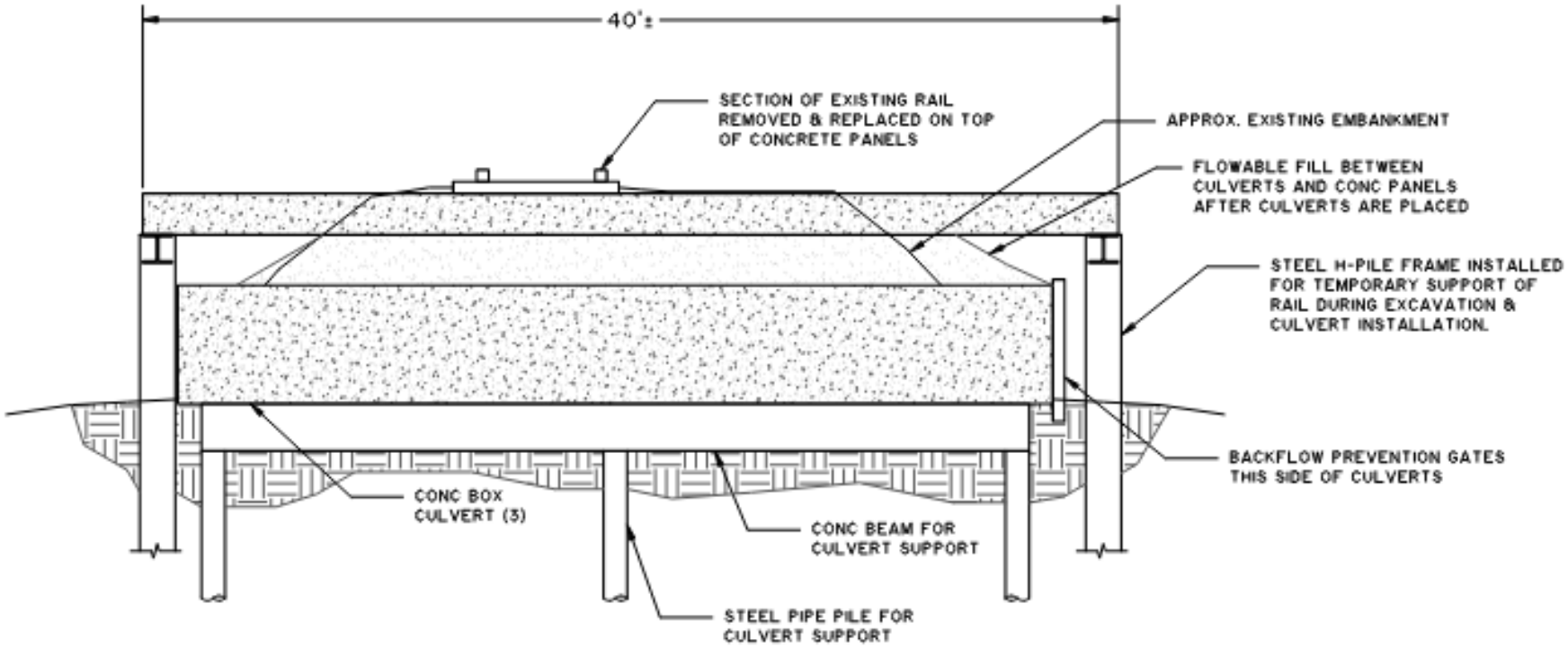
Grant Application – CSX Proposed Improvements



3 / EX2 SECTION AT CSX RAIL
SCALE: 1" = 5'

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Grant Application

CHARLESTON COUNTY, SOUTH CAROLINA

DR-4241 HAZARD MITIGATION GRANT PROGRAM PROJECT APPLICATION

APPLICANT INFORMATION

APPLICANT:	Charleston County, South Carolina
PROJECT TITLE:	Main Road (SR S-10-20) Drainage Improvement Project
PROJECT LOCATION:	Main Road, Charleston County, South Carolina

APPLICATION CONTENTS

Charleston County, South Carolina

TECHNICAL MEMORANDUM

FEMA Hazard Mitigation Grant Program: Main Road (SR S-10-20) Drainage Improvement Project, Benefit-Cost Analysis Methodology

August 26, 2016

Table 5 Main Road Drainage Improvement Project Benefit-Cost Ratio

Description	Benefits	Costs	BCR
Main Road Drainage Improvement Project	$25,327,406	$4,627,601	**5.47**

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Evacuation Routes

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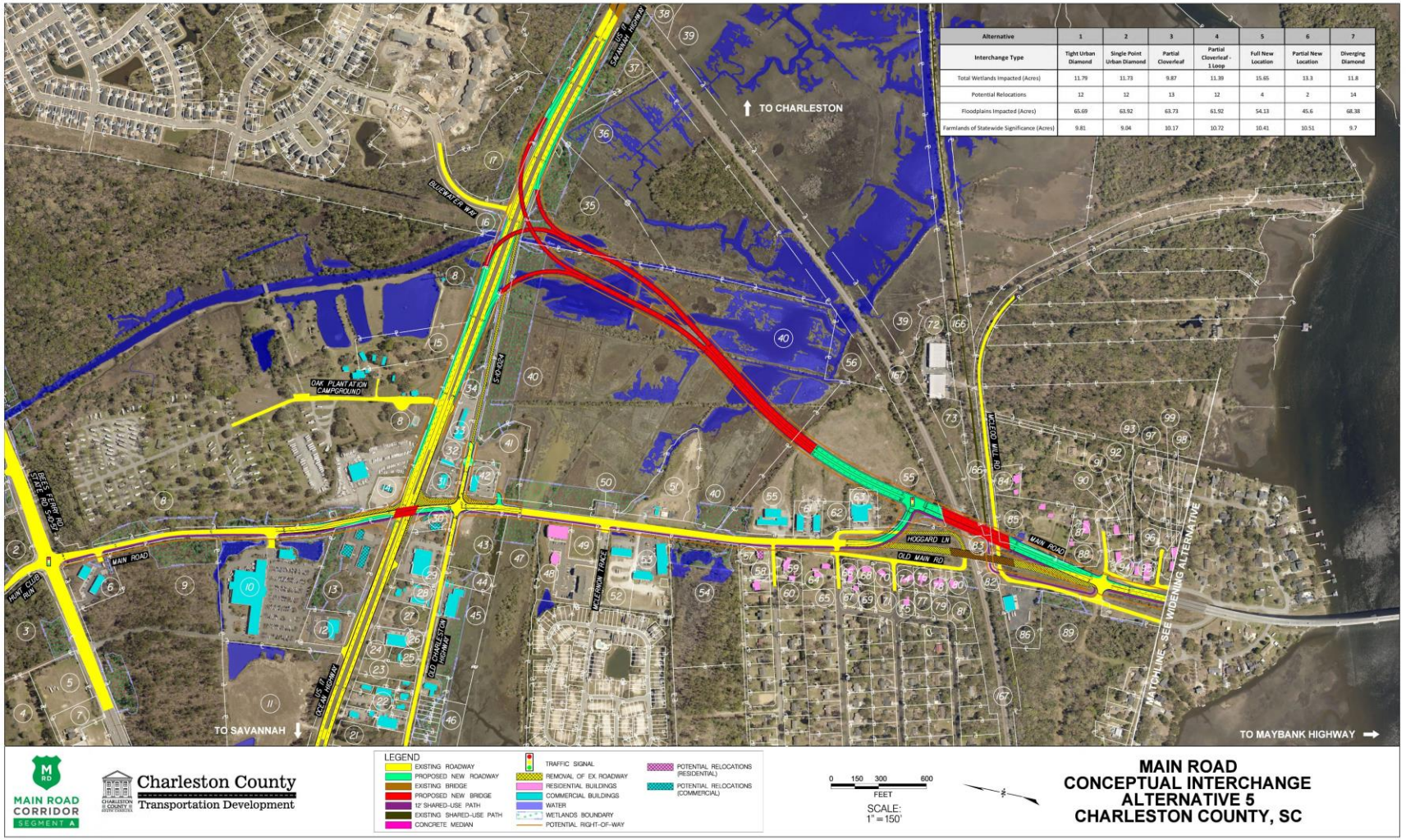
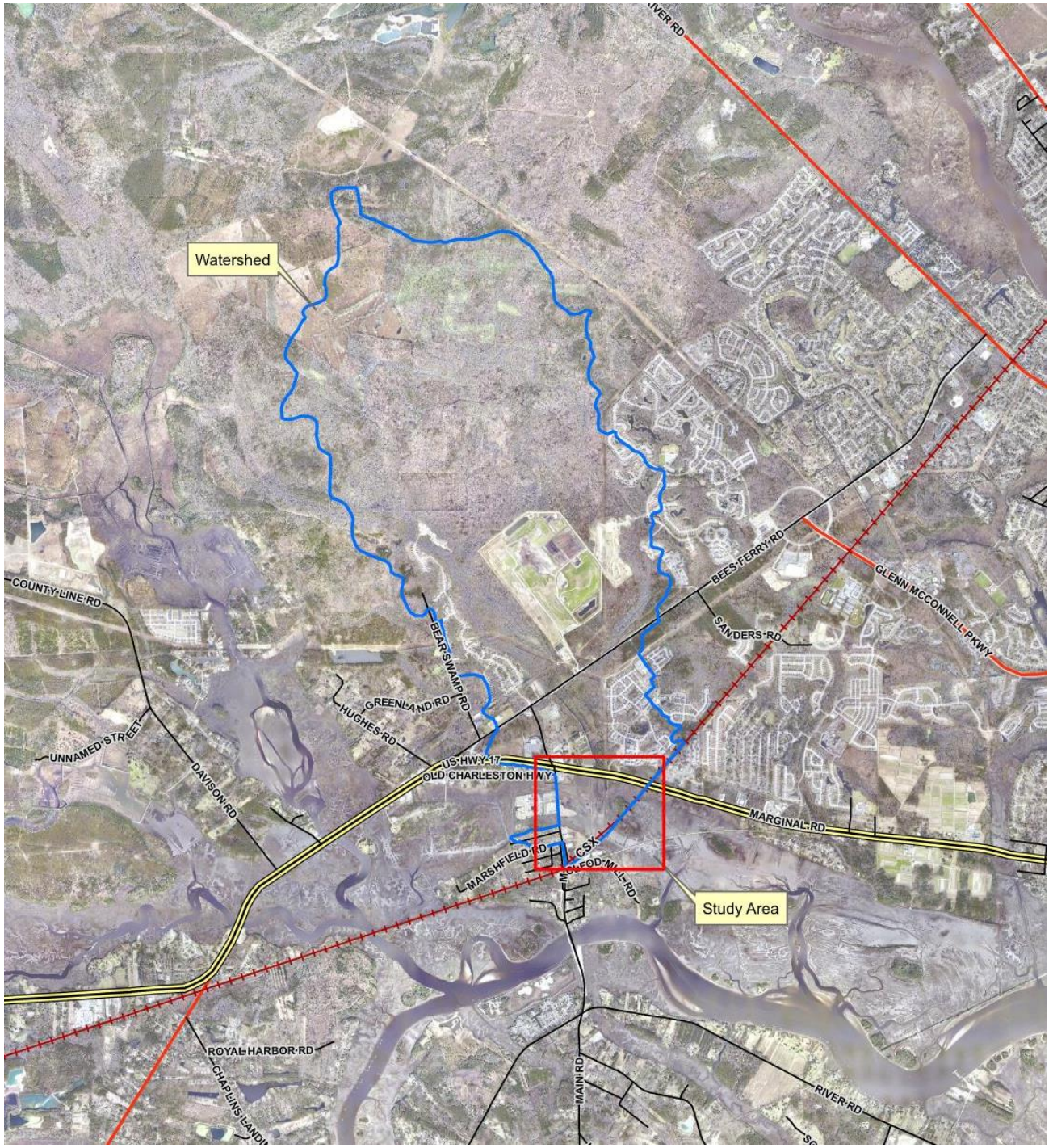


Alternative	1	2	3	4	5	6	7
Interchange Type	Tight Urban Diamond	Single Point Urban Diamond	Partial Cloverleaf	Partial Cloverleaf - 1 Loop	Full New Location	Partial New Location	Diverging Diamond
Total Wetlands Impacted (Acres)	11.79	11.73	9.87	11.39	15.65	13.3	11.8
Potential Relocations	12	12	13	12	4	2	14
Floodplains Impacted (Acres)	65.69	63.92	63.73	61.92	54.13	45.6	68.38
Farmlands of Statewide Significance (Acres)	9.81	9.04	10.17	10.72	10.41	10.51	9.7

MAIN ROAD IMPROVEMENT COMING ...

STUDY AREA



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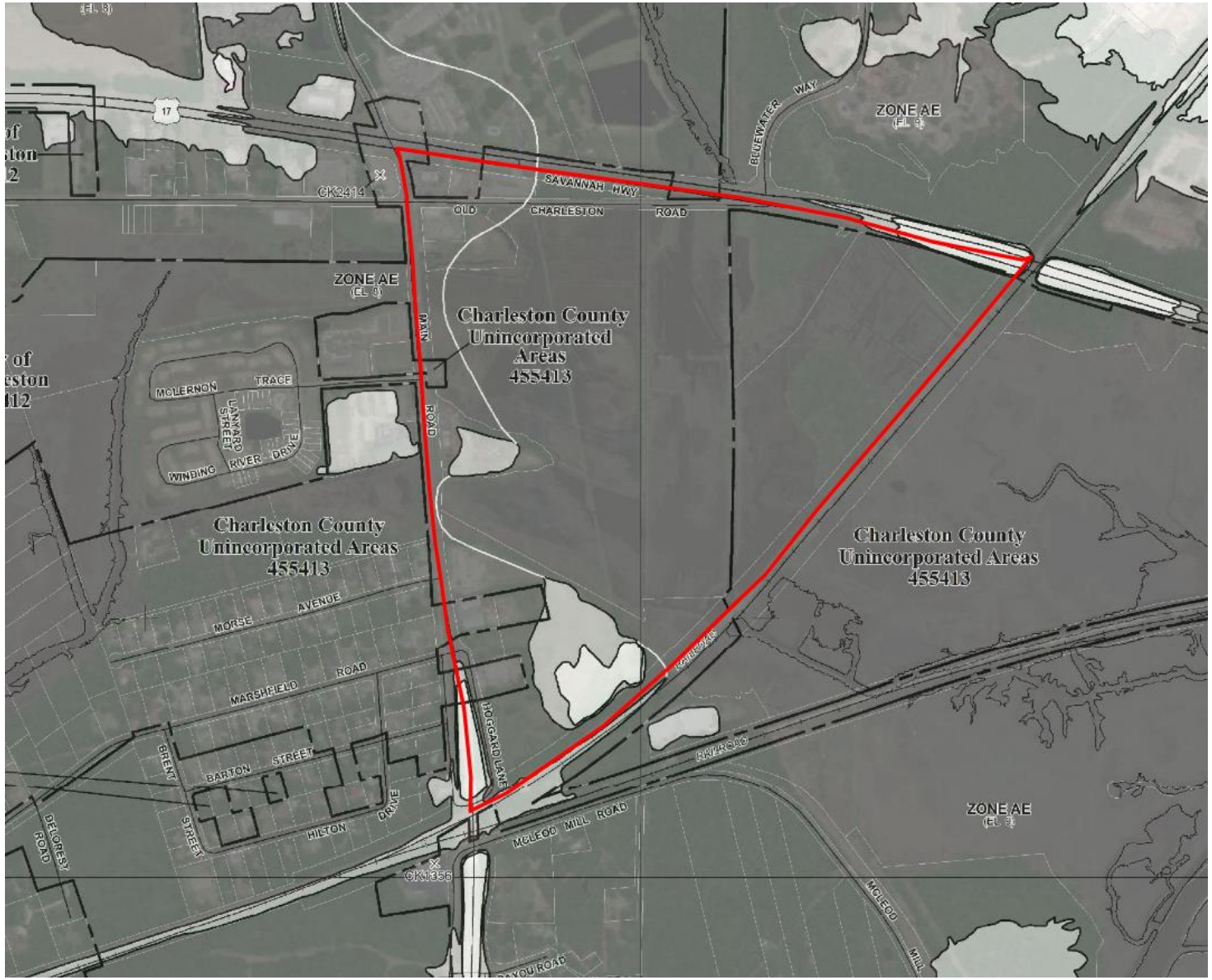
FEMA SFHZ



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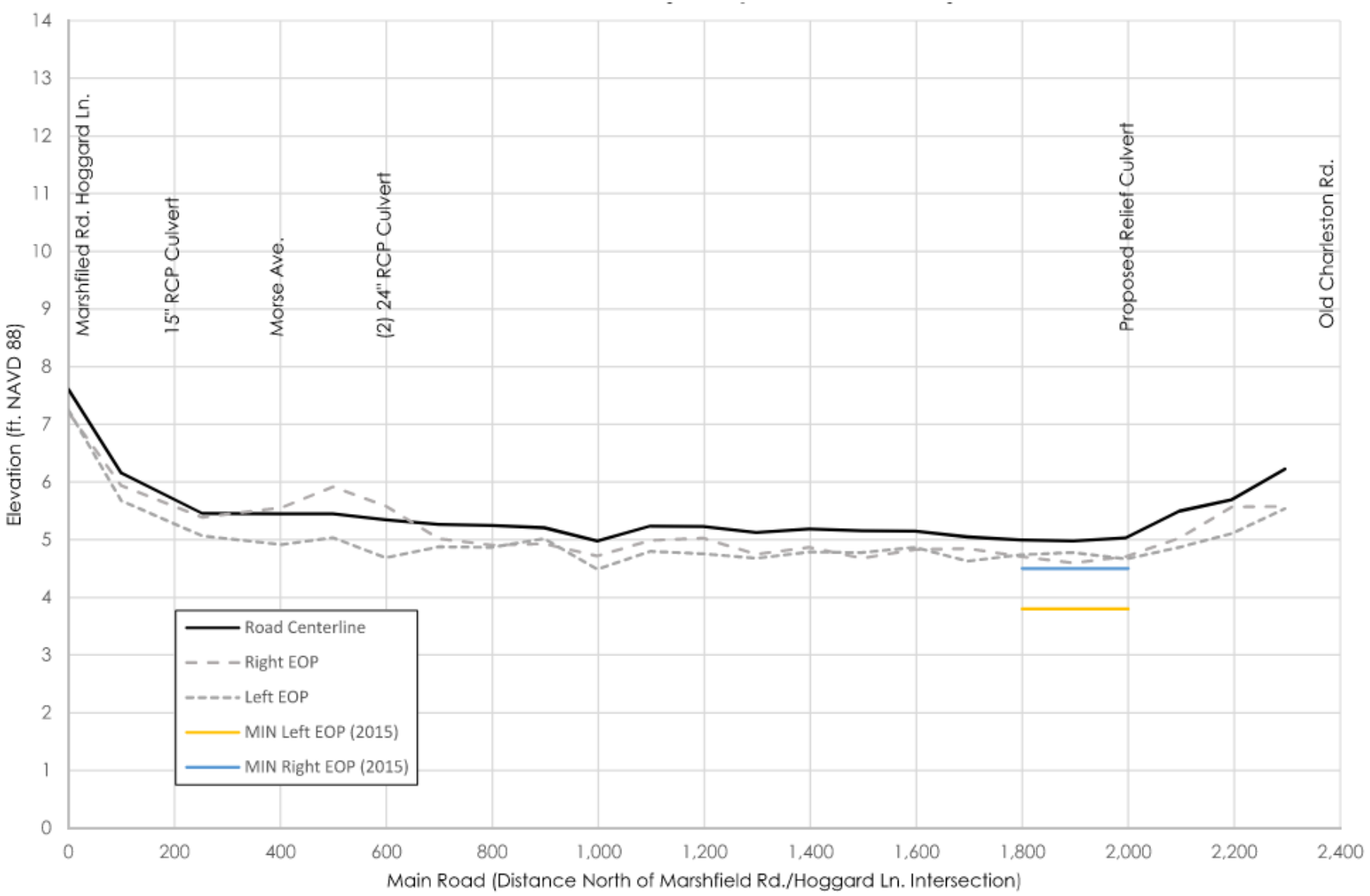
Interim Mitigation Project



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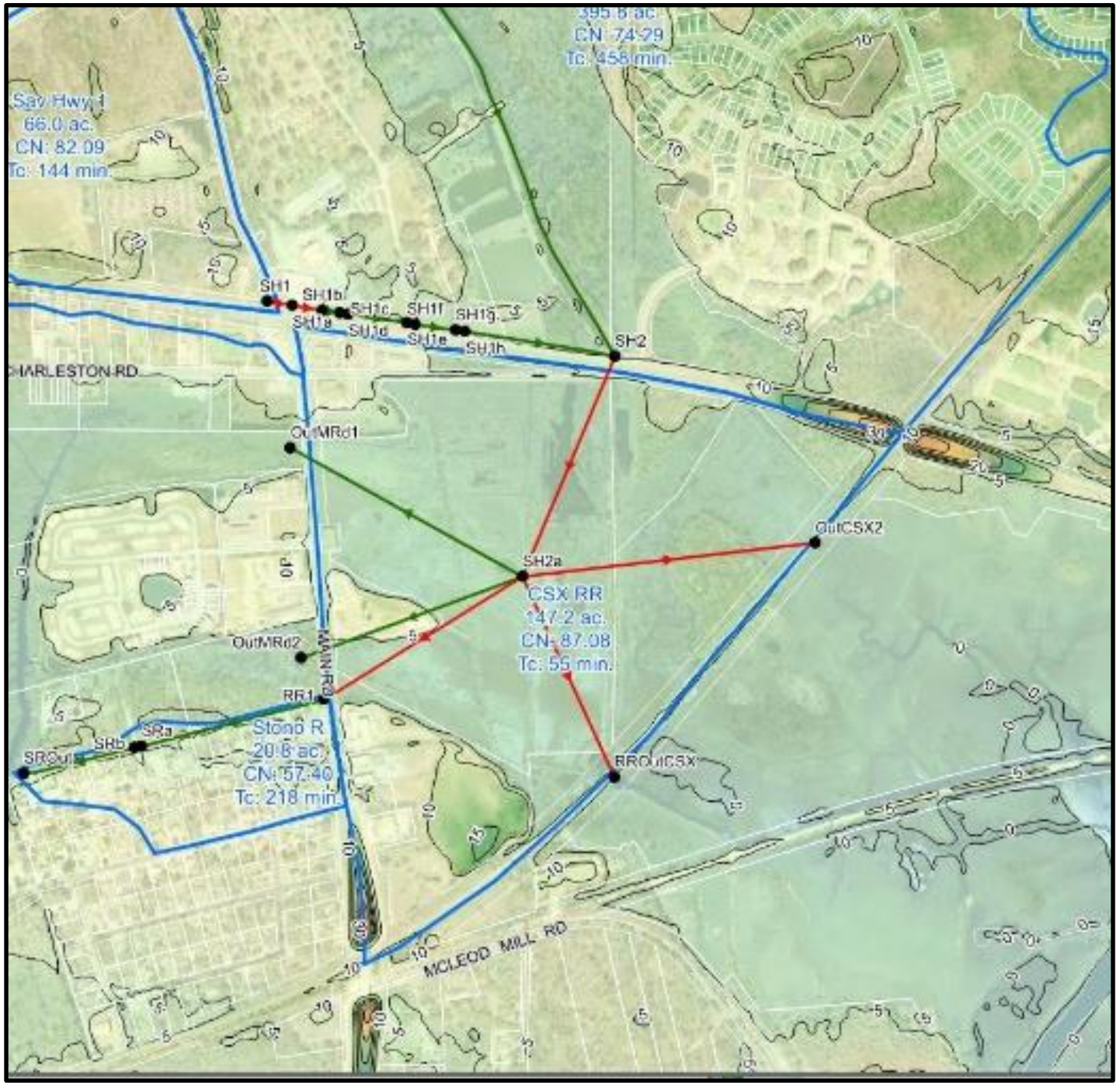
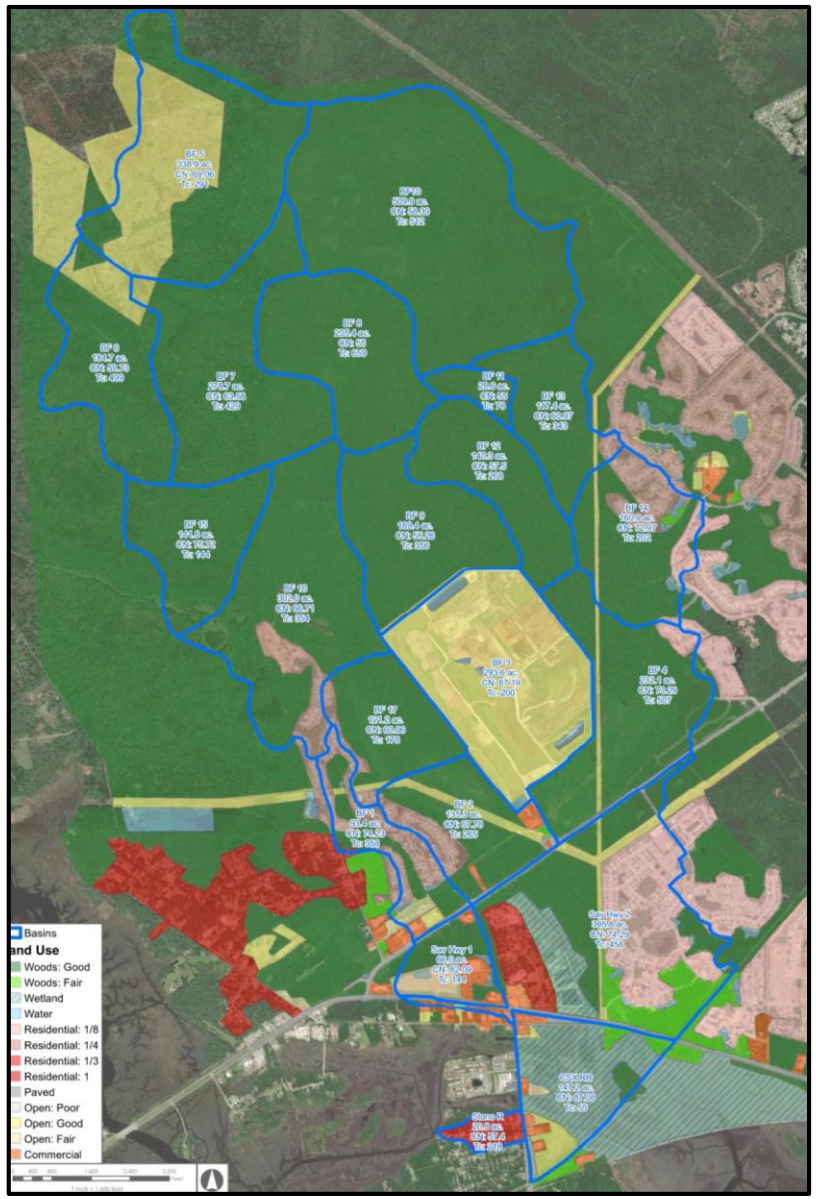
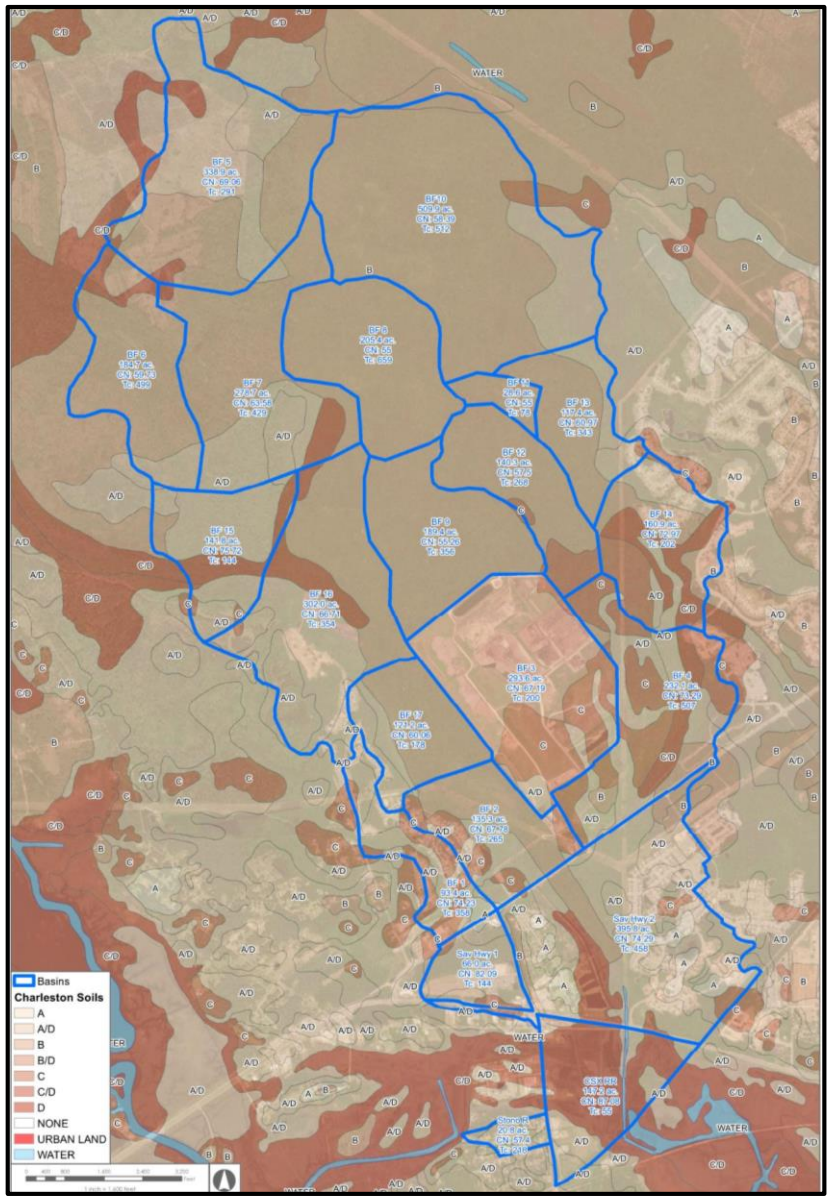


ICPR 4

H&H Modeling

Basin Land Use / Soils





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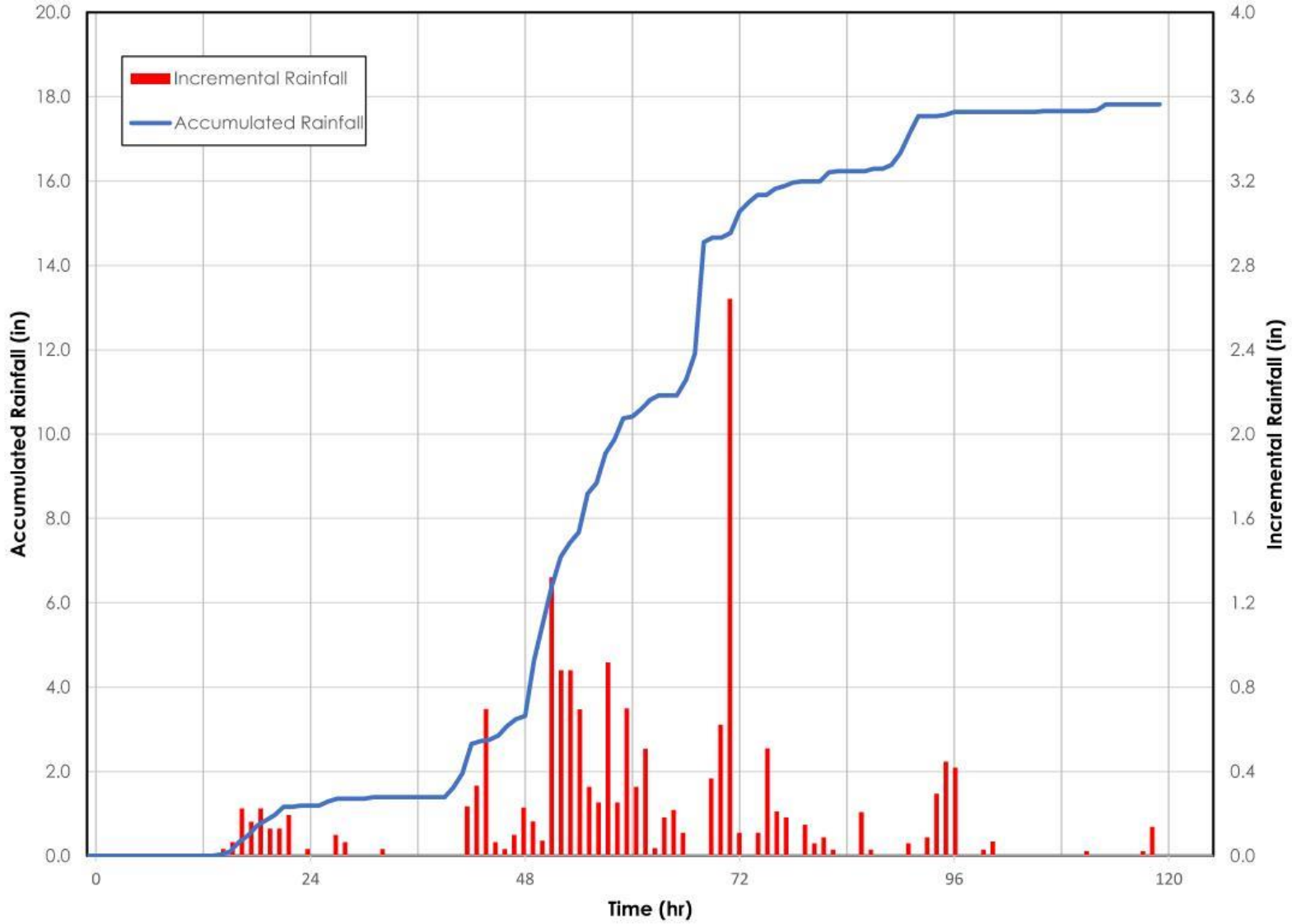
Hurricane Joaquin Hourly Rainfall (October 1 – 5, 2015)



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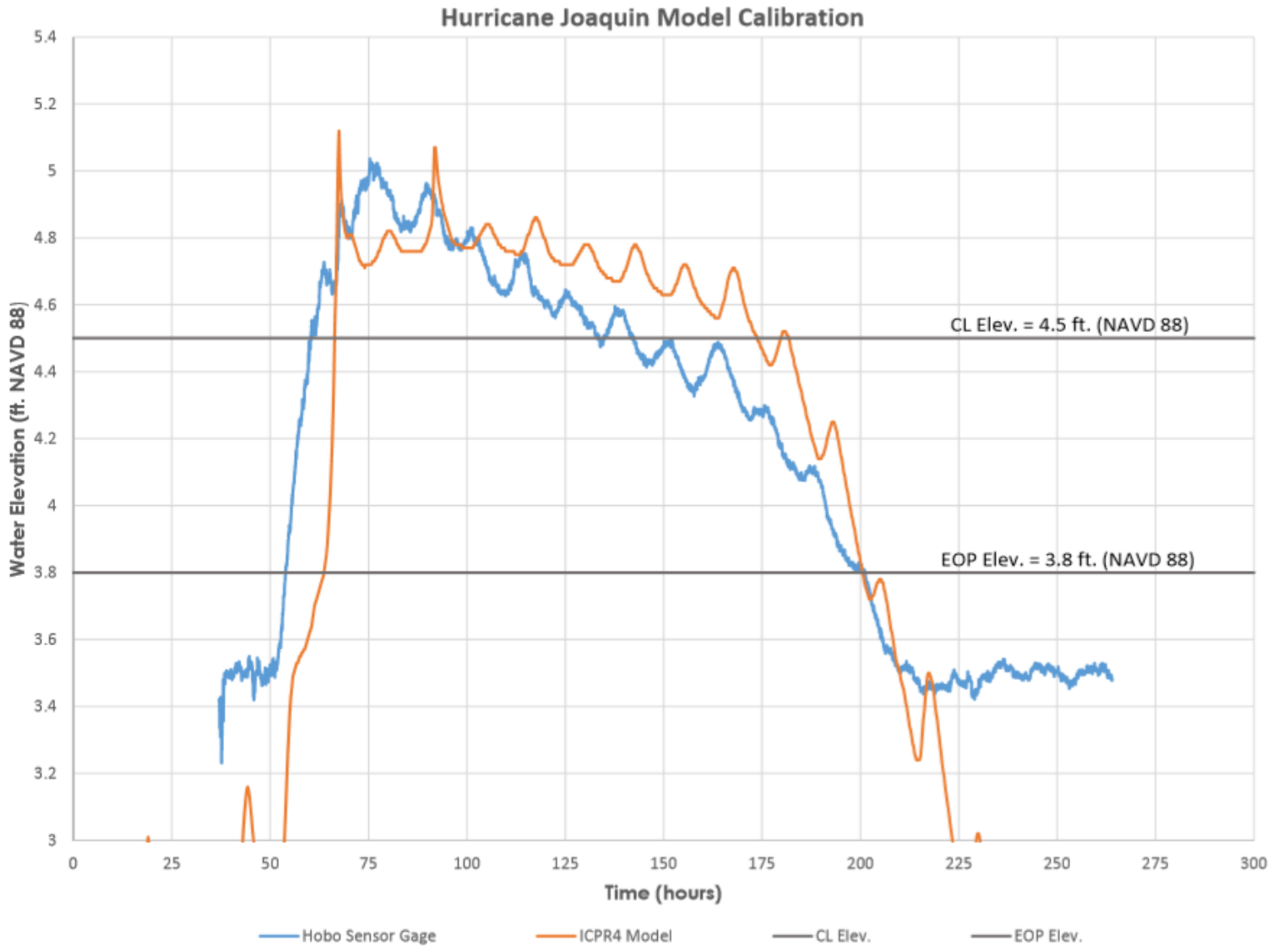
Hurricane Joaquin Model Calibration (October 1 – 5, 2015)



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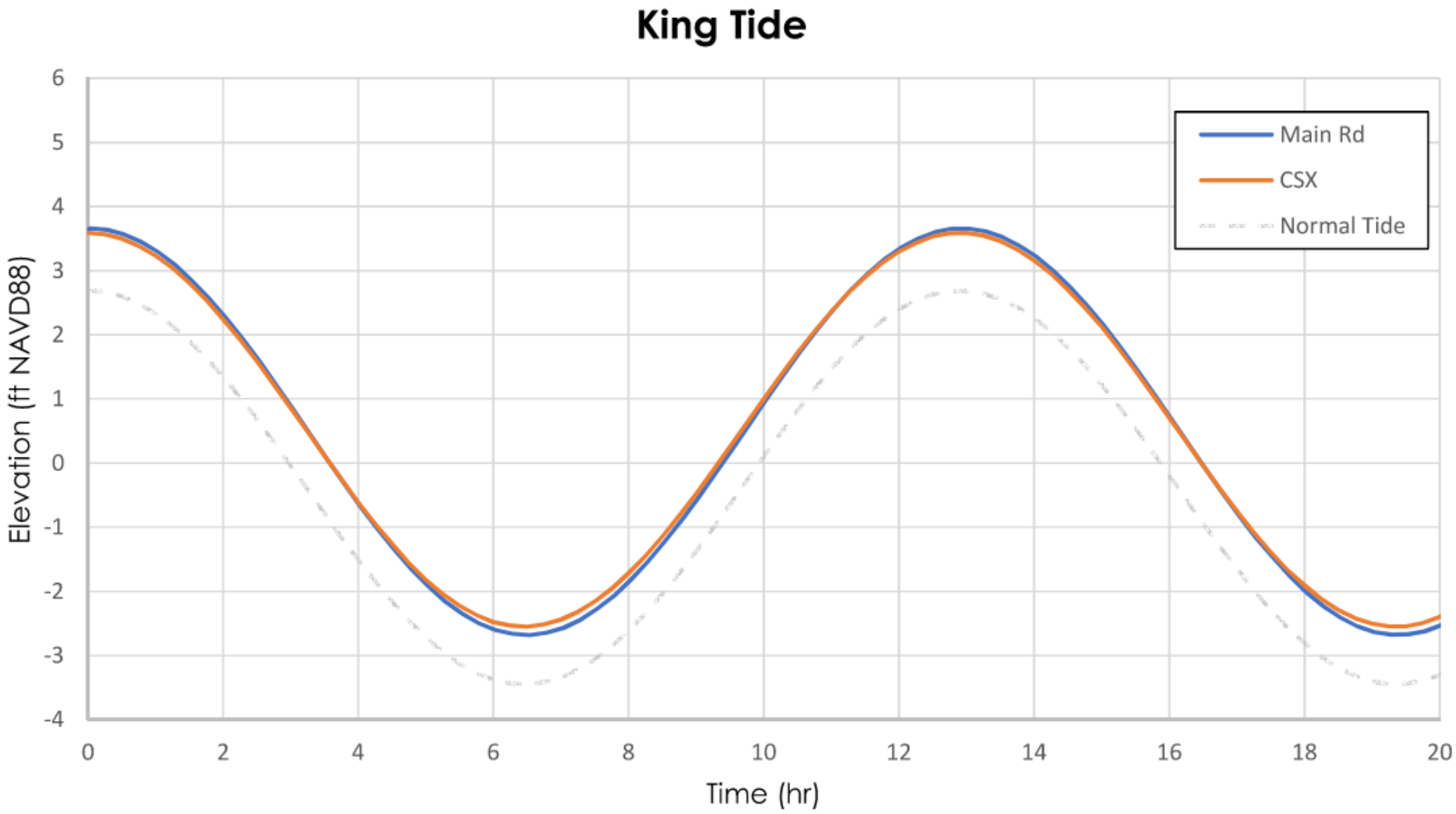
Tidal Boundary Conditions



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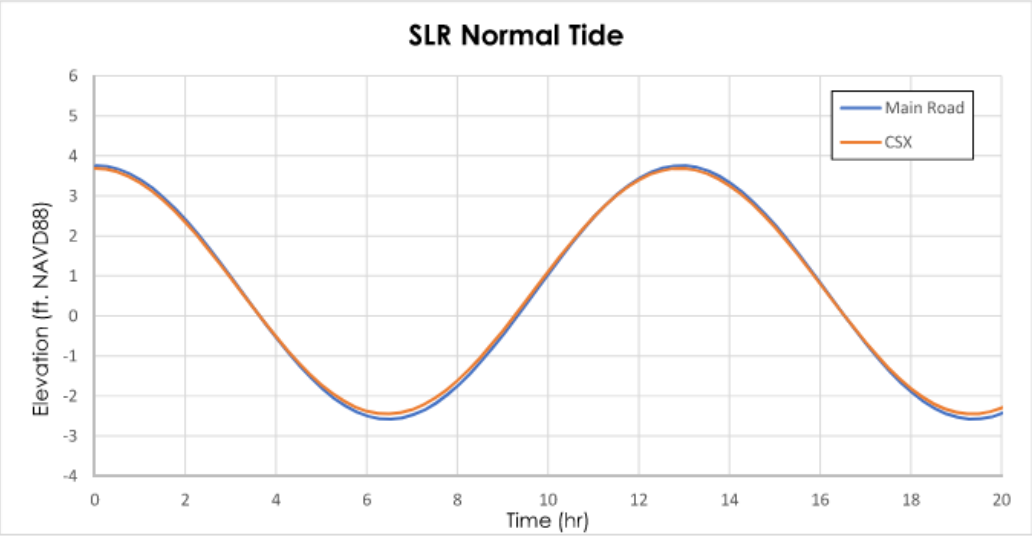
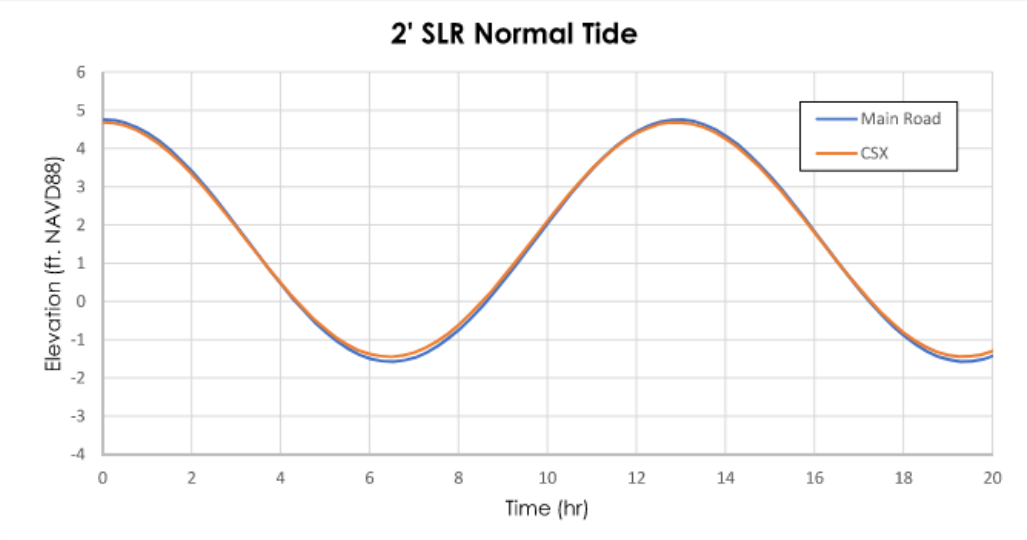
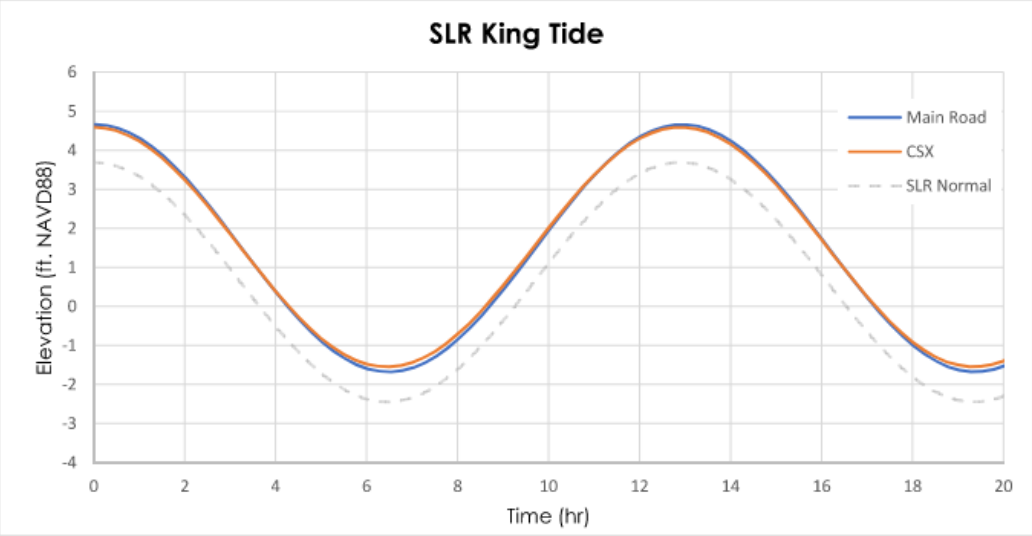
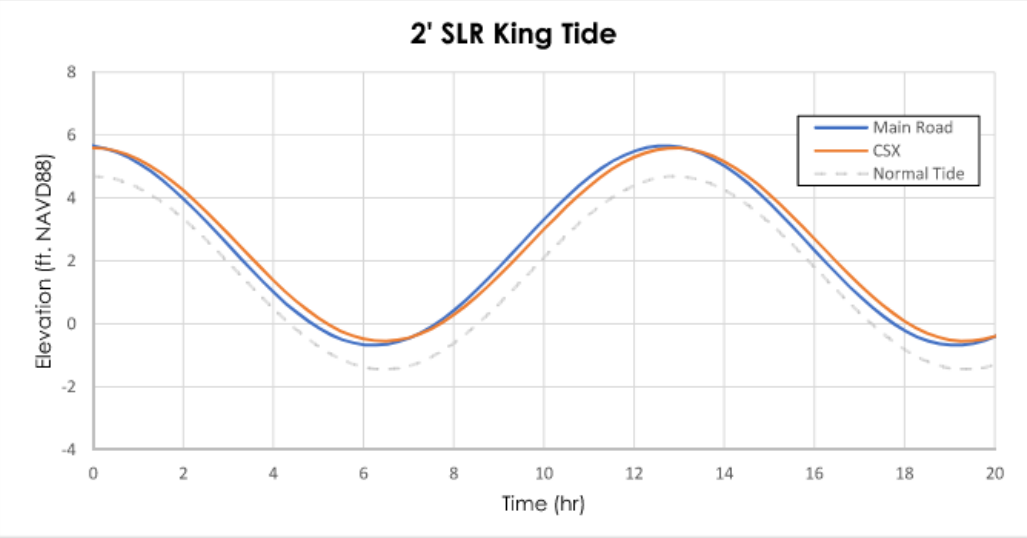
Tidal Boundary Conditions









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Alternatives

- Existing Conditions
- Main Rd. Relief Culvert only
- CSX Culvert Upgrade only
  - Pipe
  - Box Culvert
- CSX Culvert and Main Rd. Relief Culvert
  - Pipe – CSX Culvert
  - Box Culvert – CSX Culvert

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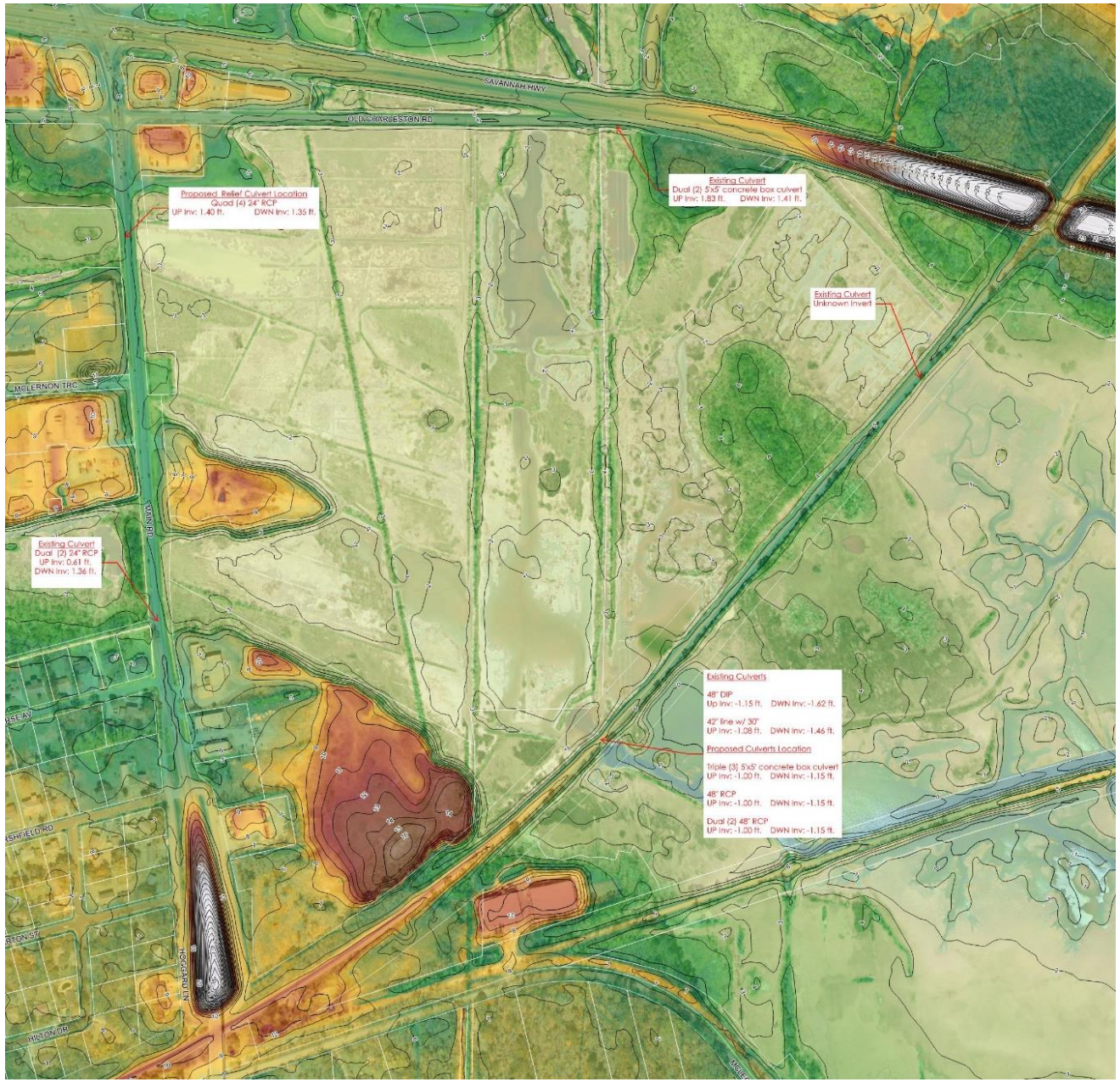
Alternatives



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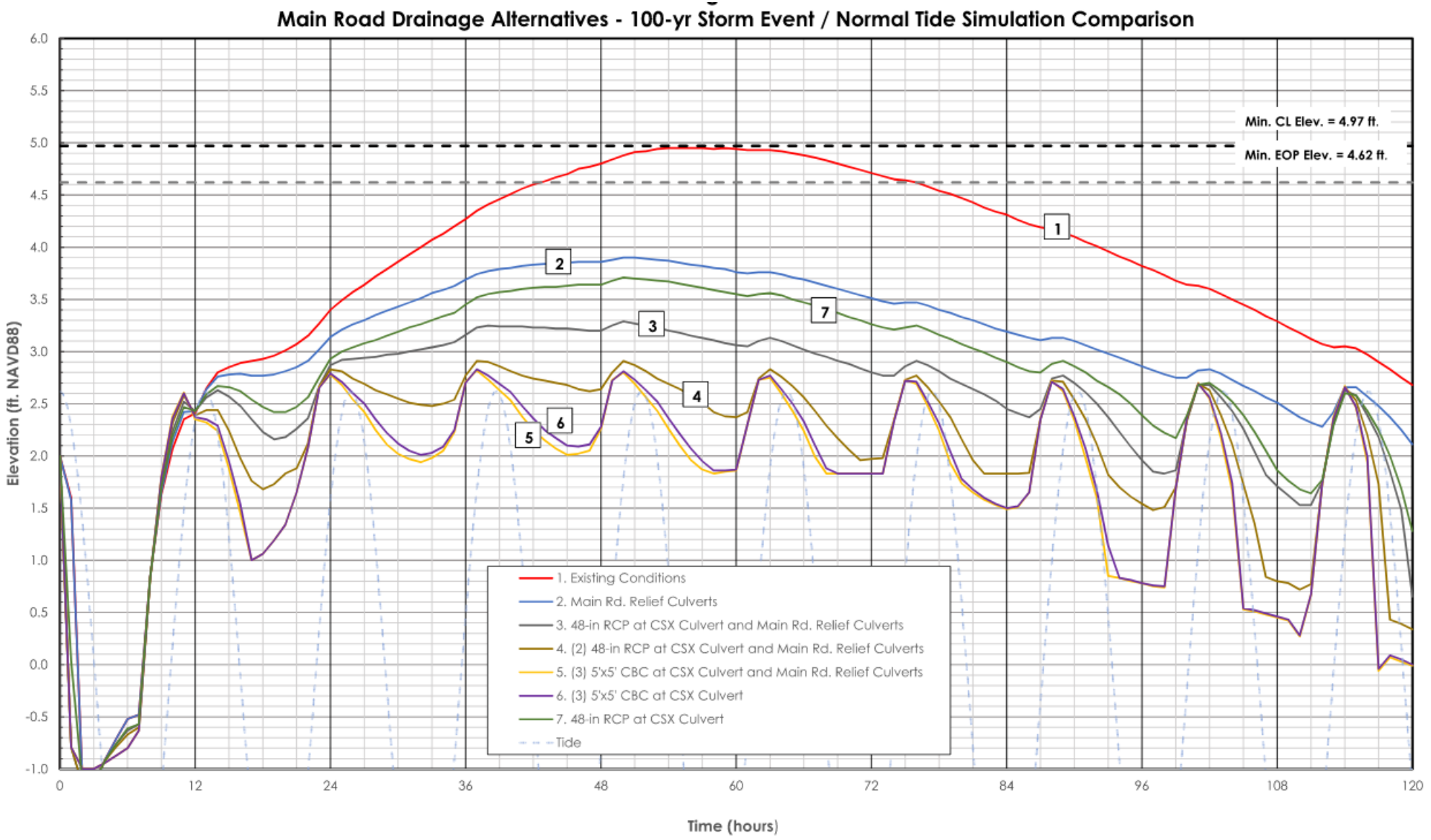
Alternatives Analysis



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Alternatives Analysis

Main Road Drainage Improvements - Summary of Peak Stages

Tide Condition	Storm Event	Scenario							Main Road		
		1	2	3	4	5	6	7			
		Existing Conditions	Main Rd. Relief Culverts	48-in RCP at CSX Culverts and Main Road Relief Culverts (incl. Exist Culverts)	(2) 48-in RCP at CSX Culverts and Main Road Relief Culverts (incl. Exist Culverts)	(3) 5'x5' CBC at CSX Culverts and Main Road Relief Culverts	(3) 5'x5' CBC at CSX Culverts	48-in RCP at CSX Culverts (incl. Exist Culverts)	Min. EOP Elev.	Min. CL Elev.	Bottom of Base
Normal Tide	2	2.71	2.70	2.68	2.69	2.70	2.69	2.65	4.62	4.97	3.62
	10	3.47	3.02	2.80	2.77	2.74	2.73	2.83			
	25	3.99	3.34	2.91	2.81	2.77	2.77	3.11			
	50	4.46	3.63	3.08	2.85	2.79	2.80	3.41			
	100	4.95	3.91	3.29	2.90	2.82	2.83	3.71			
	500	5.20	4.53	3.79	3.17	2.90	2.94	4.42			
King Tide	2	3.31	3.31	3.08	3.08	3.45	3.41	3.23	4.62	4.97	3.62
	10	3.89	3.62	3.37	3.27	3.53	3.51	3.53			
	25	4.35	3.76	3.54	3.39	3.57	3.57	3.70			
	50	4.78	3.94	3.67	3.50	3.60	3.62	3.86			
	100	5.13	4.17	3.77	3.61	3.63	3.66	4.11			
	500	5.23	4.75	4.11	3.80	3.69	3.74	4.75			
Normal Tide + 1 ft SLR	2	3.37	3.44	3.37	3.45	3.54	3.49	3.29	4.62	4.97	3.62
	10	3.95	3.80	3.59	3.57	3.62	3.58	3.61			
	25	4.41	3.98	3.70	3.64	3.66	3.63	3.78			
	50	4.83	4.23	3.79	3.71	3.69	3.67	3.93			
	100	5.14	4.53	3.87	3.77	3.72	3.71	4.16			
	500	5.24	5.15	4.17	3.90	3.79	3.80	4.80			
King Tide + 1 ft SLR	2	3.95	4.04	3.59	3.54	4.27	4.19	3.90	4.62	4.97	3.62
	10	4.57	4.49	3.99	3.82	4.40	4.33	4.30			
	25	4.90	4.69	4.20	4.00	4.45	4.40	4.51			
	50	5.15	4.84	4.37	4.15	4.50	4.46	4.67			
	100	5.22	5.04	4.53	4.29	4.54	4.52	4.81			
	500	5.29	5.27	4.81	4.57	4.63	4.63	5.19			
Normal Tide + 2 ft SLR	2	4.00	4.07	4.06	4.15	4.35	4.27	3.96	*	*	*
	10	4.64	4.44	4.35	4.35	4.48	4.42	4.38			
	25	4.96	4.63	4.50	4.45	4.54	4.49	4.60			
	50	5.17	4.78	4.61	4.54	4.59	4.55	4.76			
	100	5.22	4.90	4.71	4.62	4.63	4.61	4.90			
	500	5.30	5.28	4.92	4.78	4.72	4.72	5.45			
King Tide + 2 ft SLR	2	5.50	4.55	4.95	5.02	4.99	4.89	4.87	*	*	*
	10	5.64	5.05	5.34	5.34	5.25	5.19	5.37			
	25	5.66	5.27	5.48	5.45	5.34	5.29	5.53			
	50	5.67	5.45	5.55	5.51	5.40	5.37	5.61			
	100	5.67	5.61	5.60	5.56	5.46	5.43	5.65			
	500	5.67	5.98	5.67	5.63	5.56	5.56	5.68			

* - Model scenarios assume Main Road will be raised and thus no road overtopping is simulated

Red - Indicates flooding of Main Road

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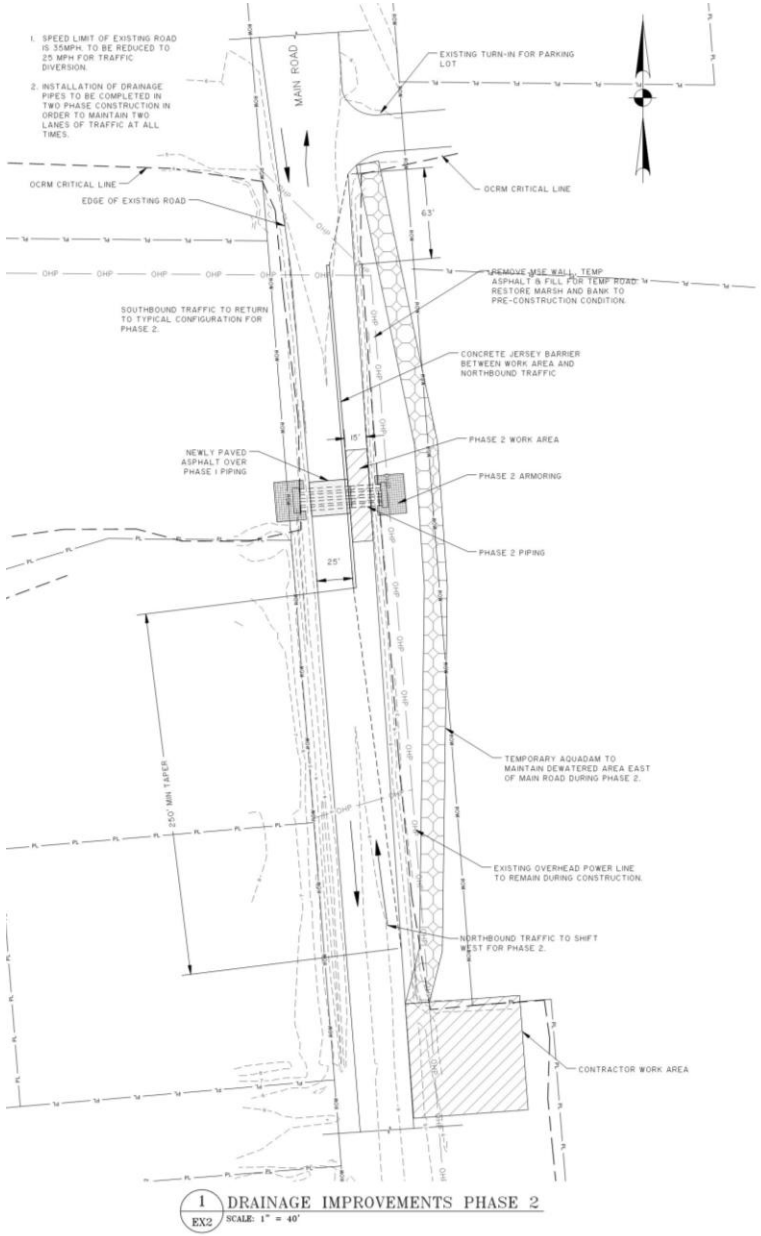
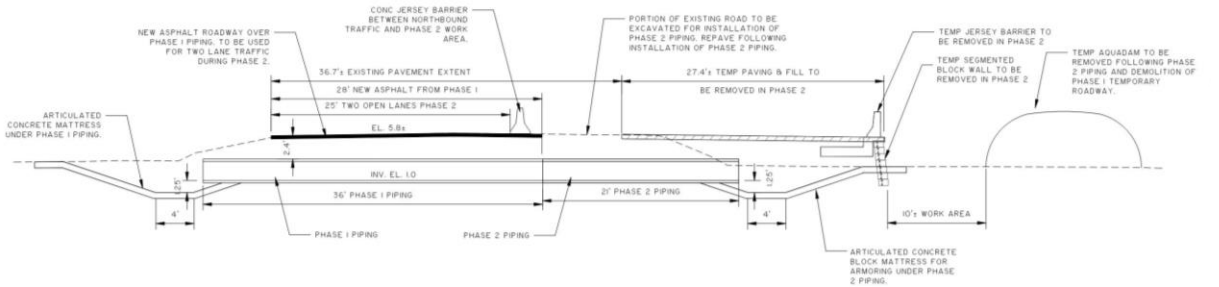
Phase 1 – Main Road Proposed Improvements



1 EX2 DRAINAGE IMPROVEMENTS PHASE 2
SCALE: 1" = 40'



2 EX2 SECTION THRU MAIN RD.
SCALE: 1" = 6'

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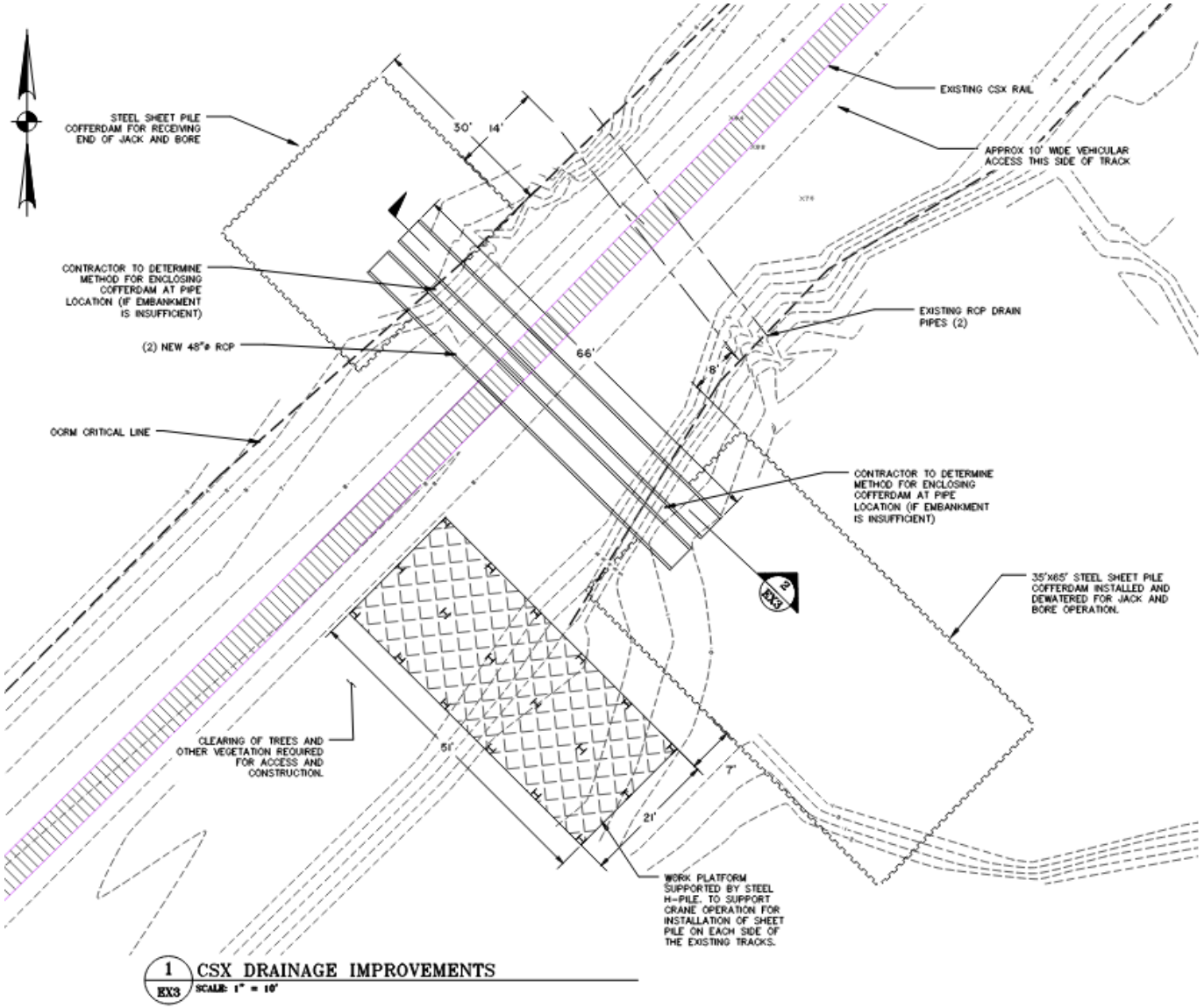
Phase 1 – CSX Proposed Improvements



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HAZARD MITIGATION GRANT - PROCESS

- Know Your Hazards!
  - Hazard Mitigation Planning
  - Identify mitigation opportunities
  - Identify future project scope
  - Compare costs – BCA Components
- Fed Grants You Can Use
  - HMGP, PDM, FMA, CDBG, Other
- FEMA Requirements
  - Engineered outcomes
  - Best Data/Best Solution for Cost

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MAIN ROAD HMGP PROCESS

- HMGP Grant for Joaqin 2015
  - $213M for PA/IA
  - $48M for HMGP
- Phase 1 Approval
  - Study and Conceptual Design
  - Reports and Onsite Meetings w/SCDEM
- Phase 2
  - Permitting
  - Procurement
  - Engaging Major Stakeholder: CSX

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HAZARD MITIGATION GRANT - PROCESS

- Is Your Community Prepared?
  - Hazard Mitigation Plan
  - Identify mitigation opportunities
    - How to Pay for Planning?
    - Know Your BCA
- Fed Grants Cycles to Monitor
  - BRIC (HMGP, PDM, FMA), CDBG
- Procurement Planning
  - Start procurement now, before storms?
  - Disaster Recovery vs Mitigation
  - Engineered Concepts in hand

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