CITY OF ISLE OF PALMS, SC

Presentation to Special Joint Meeting
City Council and the Planning Commission

PHASE 3 DRAINAGE OUTFALLS & 2019/2020 INTERNAL DRAINAGE PROJECTS

July 23, 2019

THOMAS & HUTTON

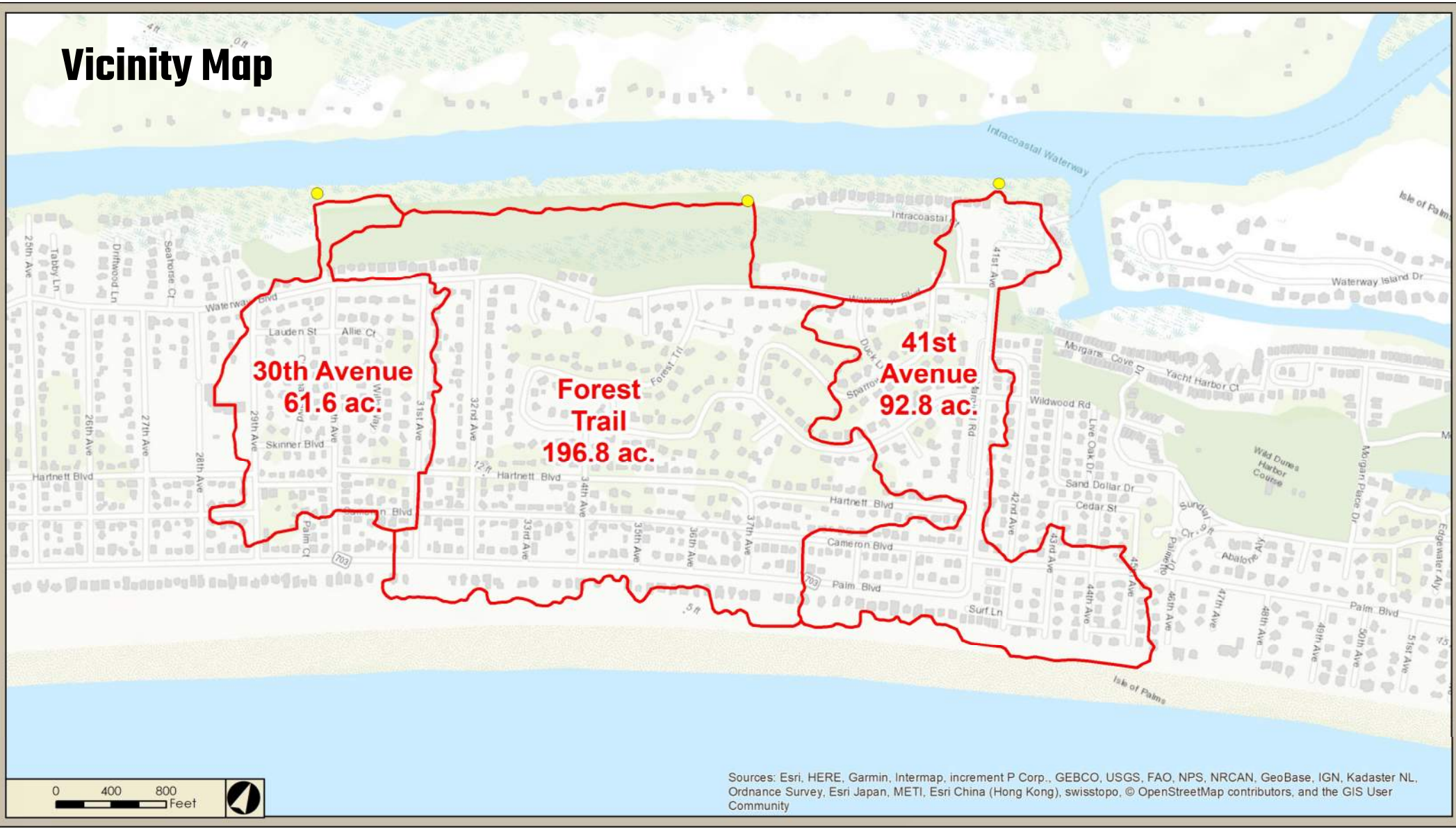
Presentation Outline

- Phase 3 Drainage Outfalls
  - Project Understanding/Goals
  - Project Scope
  - H&H Study
  - Constraints/Alternatives
  - Recommended Projects
- 2019/2020 Internal Improvements

Project Location

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Vicinity Map



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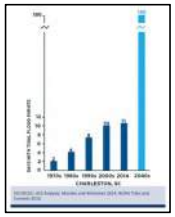
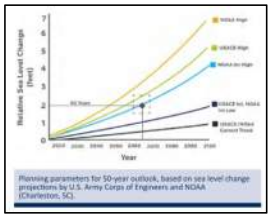
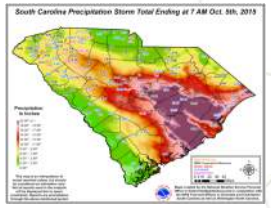
Project Understanding – City's Goals

- Identify the appropriate area where the back of the island should be sealed from the intrusion of tidal waters from backing into the system
- Design and permit drainage system outfall systems that will seal the tidal water out, while allowing stormwater to exit
- Be designed and sized appropriately to provide for future drainage improvements within the basins associated with each of the three outfalls
- Be designed to anticipate a reasonable expectation of sea level rise
- Be designed to anticipate a reasonable expectation of increase in impervious surfaces on the island
- Be designed to anticipate a high level of soil saturation before storms
- The design should be to a level that would have kept flood waters associated with Hurricane Joaquin from damaging houses



Project Approach

- Design & Permitting
  - Existing Data Collection and Analysis
  - Survey and Wetlands/Critical Area Delineations
  - Study, Alternatives Analysis, and Recommended Outfall Improvement
  - Engineering Design and Plans Preparation
  - Permitting
  - Opinion of Probable Construction Cost
  - Funding Assistance
  - Project Phasing Plan
  - Project Schedule Development
  - Project Administration and Meetings
- Bidding & Construction
  - Bid Phase Services
  - Construction Phase Services

Project Approach (Initial Phase)

- Design & Permitting
  - Existing Data Collection and Analysis
  - Survey and Wetlands/Critical Area Delineations
  - Study, Alternatives Analysis, and Recommended Outfall Improvement
  - Engineering Design and Plans Preparation
  - Permitting
  - Opinion of Probable Construction Cost (Partial)
  - Funding Assistance
  - Project Phasing Plan
  - Project Schedule Development
  - Project Administration and Meetings (Partial)
- Bidding & Construction
  - Bid Phase Services
  - Construction Phase Services

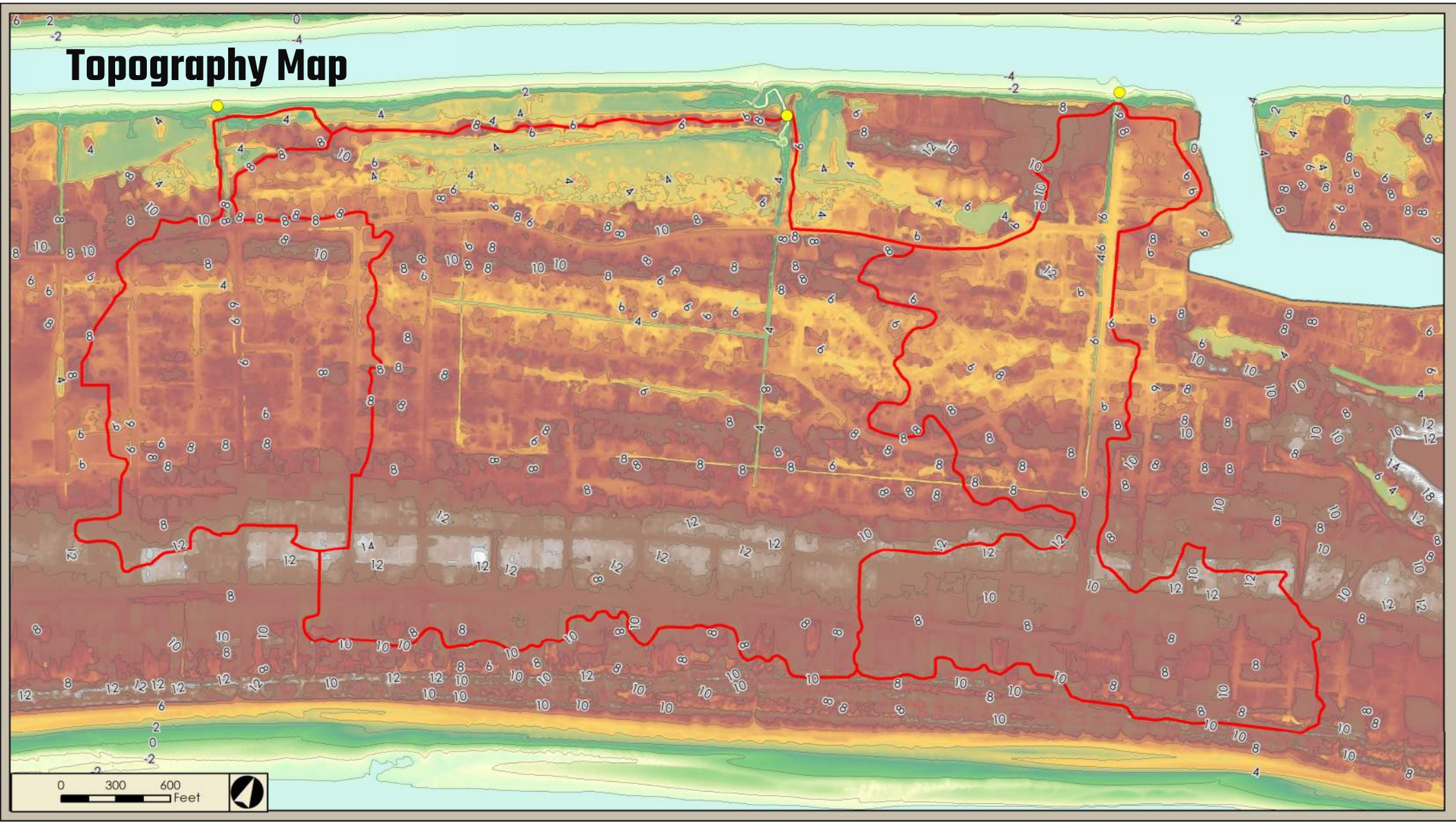
Basin Map


BUCCANEER RD
INTRACOASTAL CT
WATERWAY BLVD
WATERWAY ISLAND DR
SEAHORSE CT
LAUDEN ST
ALLIE CT
WILLS WAY
CHAPMAN AV
25TH AV
26TH AV
27TH AV
28TH AV
29TH AV
30TH AV
31ST AV
32ND AV
SKINNER BLVD
HARTNETT BLVD
CAMERON BLVD
PALM BLVD
33RD AV
34TH AV
35TH AV
36TH AV
37TH AV
38TH AV
39TH AV
40TH AV
41ST AV
42ND AV
43RD AV
44TH AV
45TH AV
46TH AV
47TH AV
48TH AV
49TH AV
50TH AV
51ST AV
FOREST TR
SPARROW DR
DUCK LN
MARGINAL RD
WILDWOOD RD
YACHT HARBOR CT
SAND DOLLAR DR
LIVE OAK DR
CEDAR ST
PALMETTO DR
MORGAN PLACE DR
EDGEWATER VALLEY
0
400
800
Feet
Charleston County GIS, Eagleview

Data Collection

- Aerial Photography
- Parcels and Roads
- Topography
- Building Footprints / Impervious Areas
- Soils
- Drainage System Inventory / Easements
- Utilities (Water and Sewer)
- Tides (Normal / Extreme)
- Rainfall (Normal / Extreme)

Topography Map

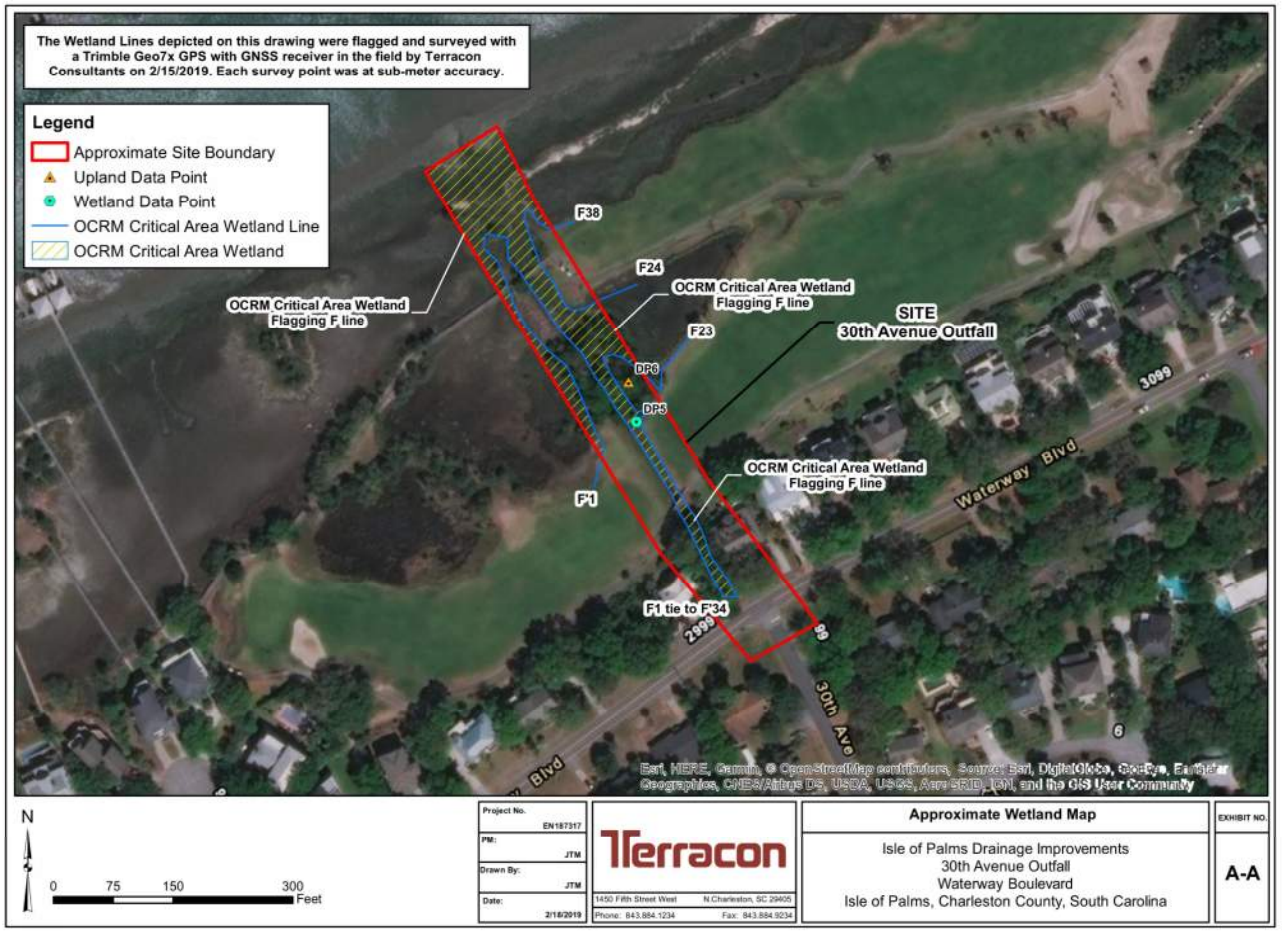


Topography Map

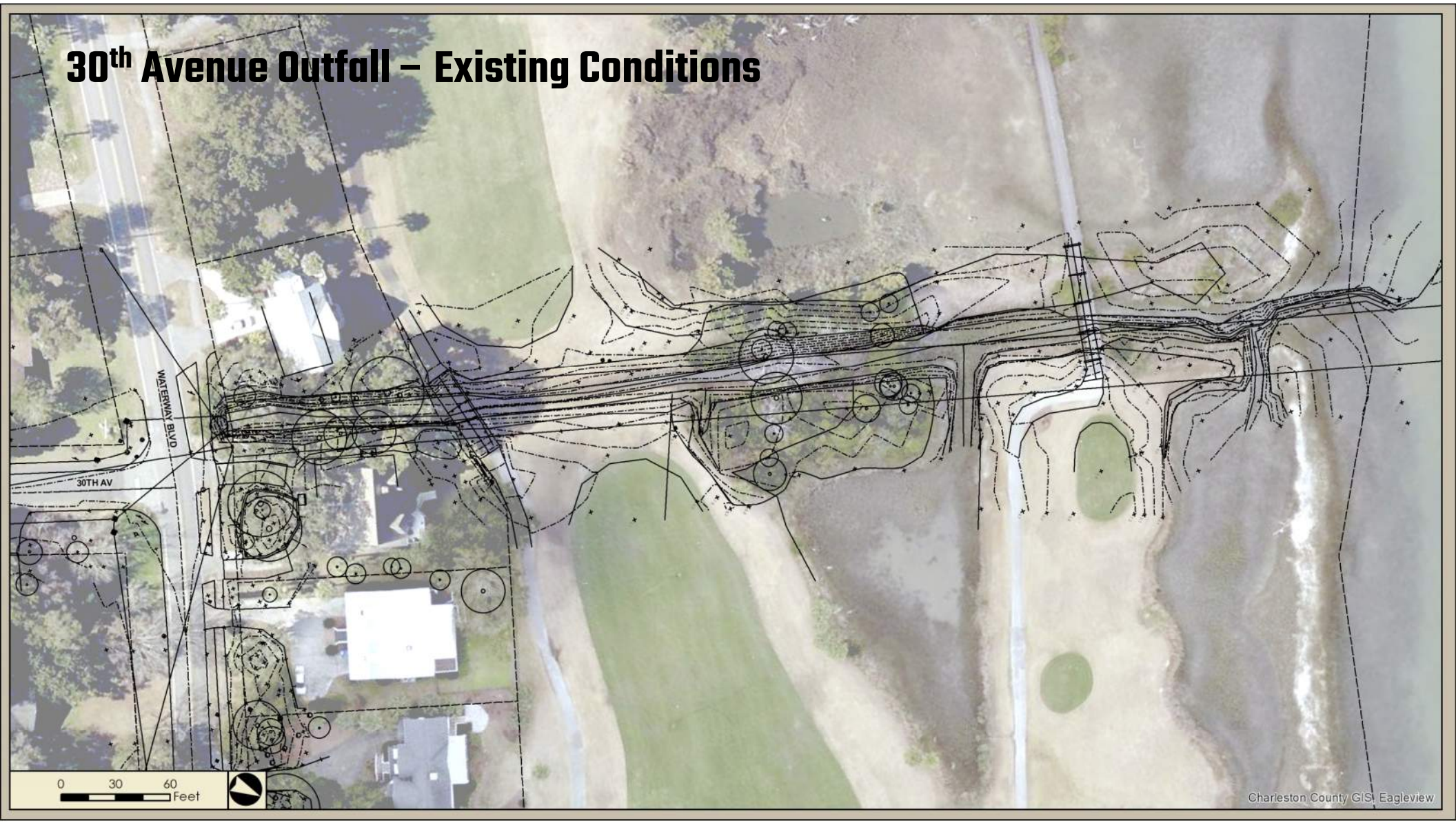
Drainage System Map


Closed Basins
SEAHORSE CT
WATERWAY BLVD
SHADY LN
INTRACOASTAL CT
WATERWAY ISLAND DR
LAUDEN ST
ALLIE CT
WILLS WAY
CHAPMAN AV
28TH AV
29TH AV
30TH AV
31ST AV
32ND AV
CROSS LN
SPARROW DR
DUCK LN
MARGINAL RD
41ST AV
MORGANS COVE DR
YACHT HARBOR CT
WILDWOOD RD
LIVE OAK DR
SKINNER BLVD
FOREST TR
HARTNETT BLVD
34TH AV
42ND AV
SAND DOLLAR DR
CEDAR ST
CAMERON BLVD
PALM CT
33RD AV
35TH AV
36TH AV
37TH AV
38TH AV
40TH AV
18.6 ac.
11.0 ac.
PALM BLVD
SURF LN
43RD AV
44TH AV
45TH AV
PALMETTO DR
46TH AV
47TH AV
0
300
600
Feet
Charleston County GIS, Eagleview

30th Avenue Outfall – Critical Area

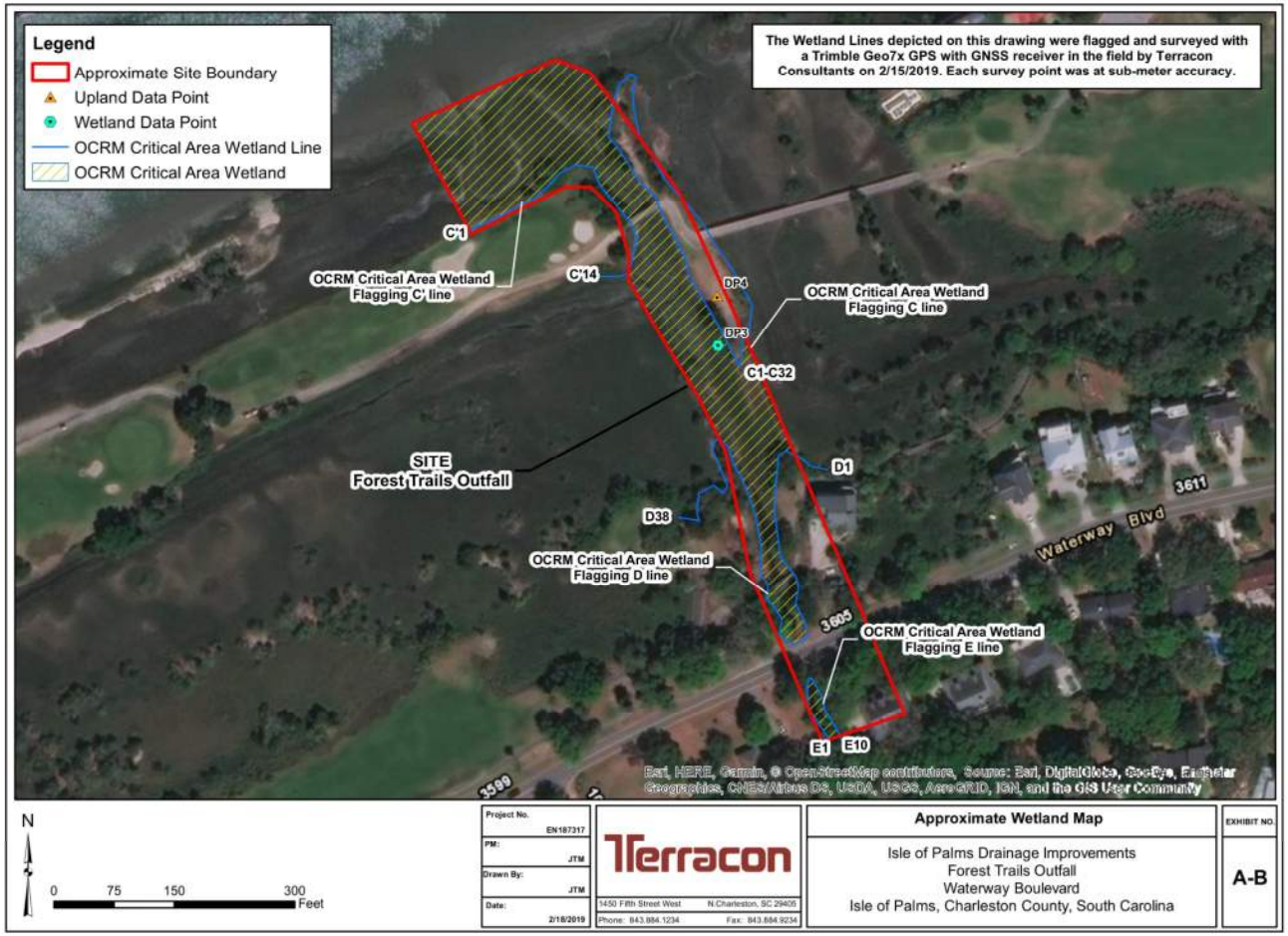


30th Avenue Outfall – Existing Conditions



30th Avenue

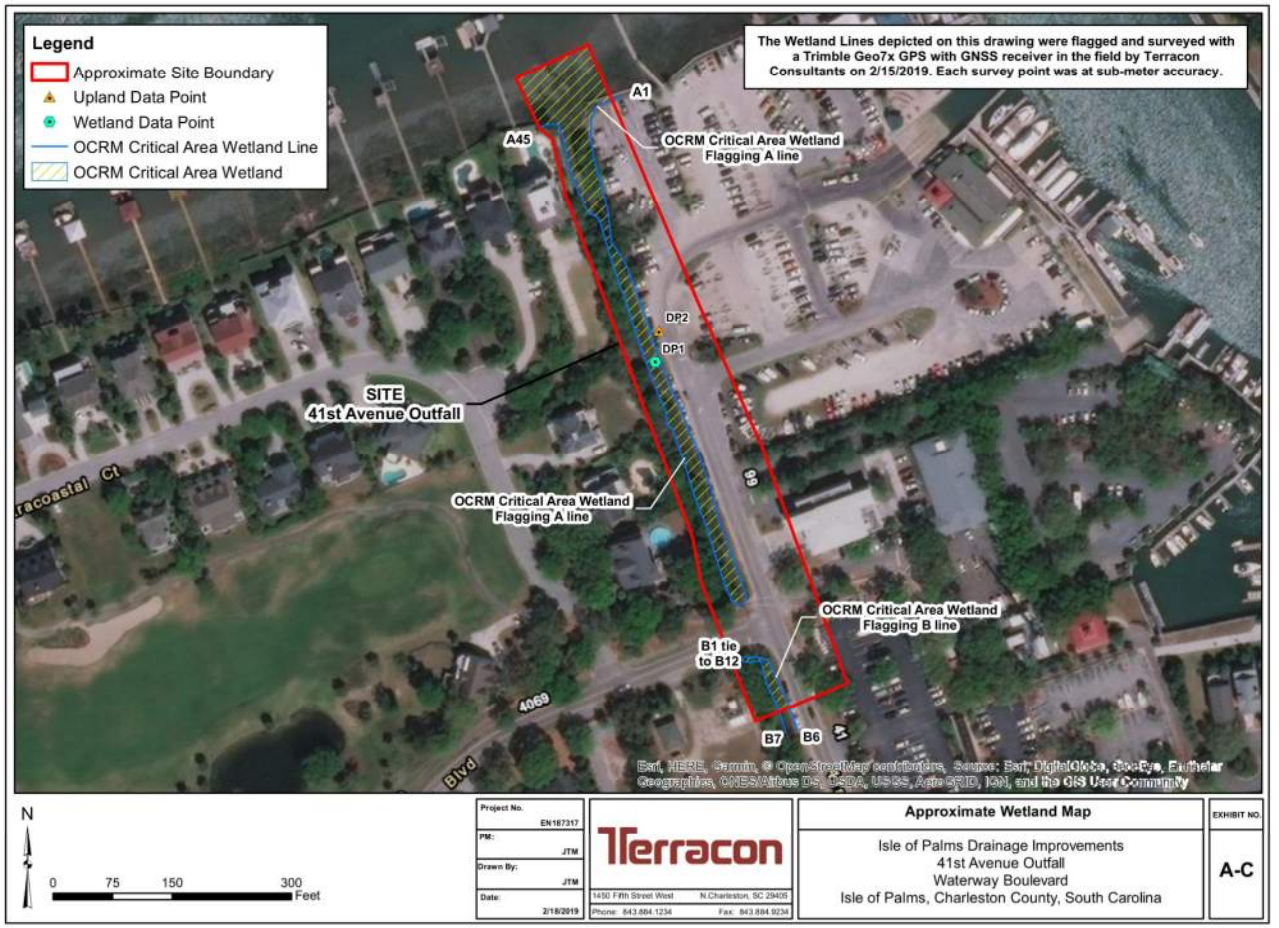
Forest Trails Outfall – Critical Area



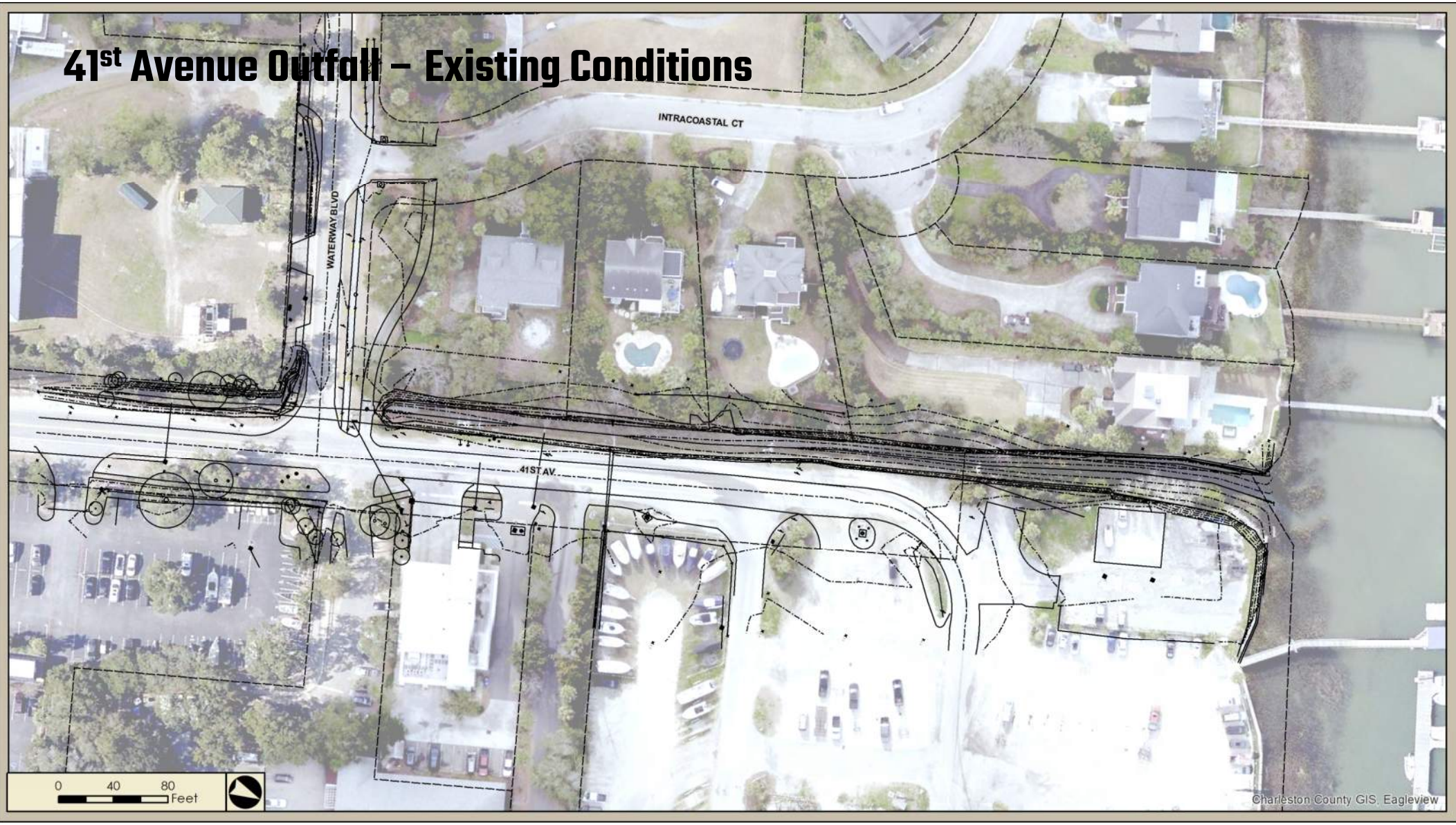
Forest Trails Outfall – Existing Conditions

Forest Trail

41st Avenue Outfall – Critical Area



41st Avenue Outfall – Existing Conditions

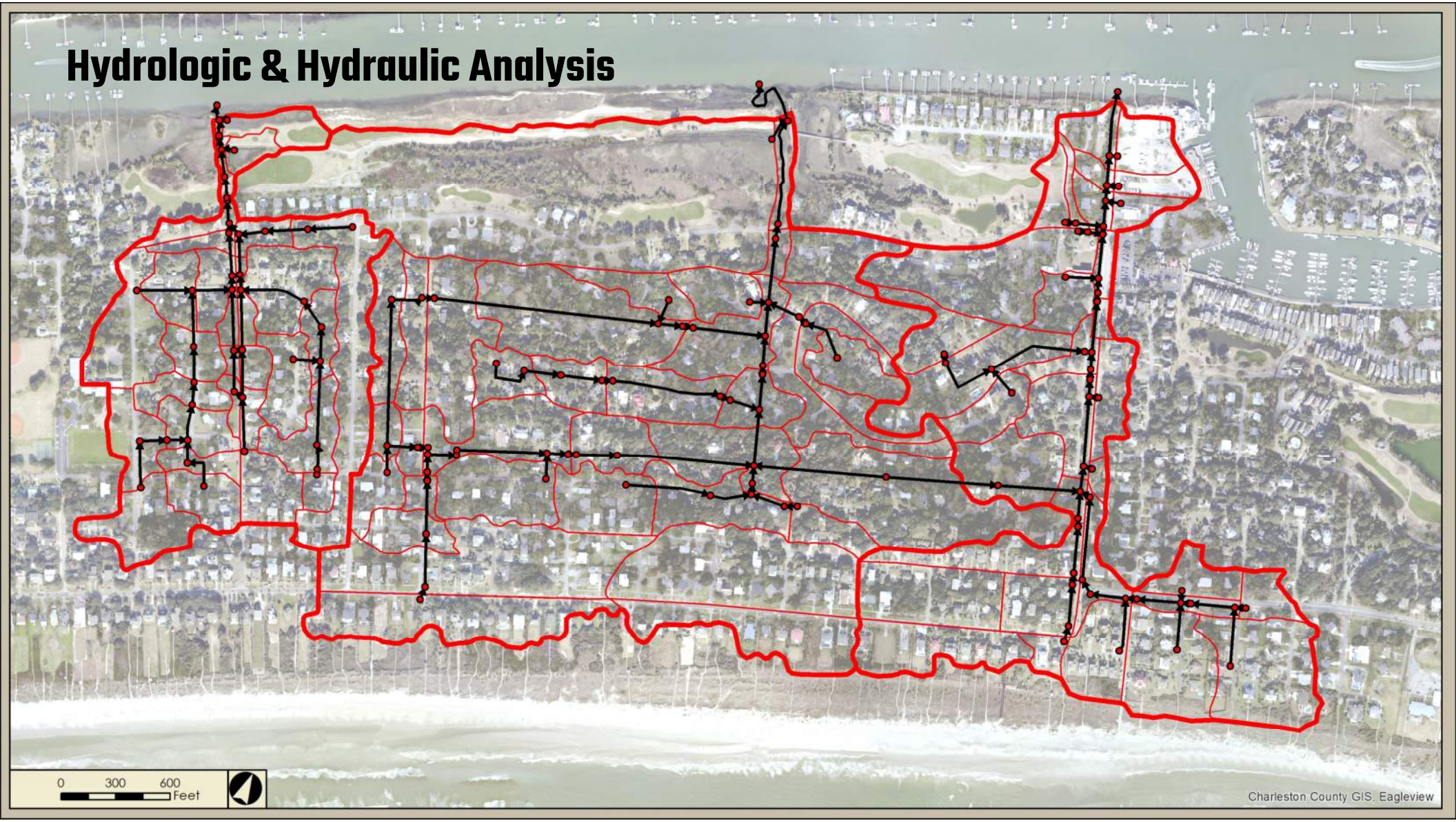


41st Avenue

Hydrologic & Hydraulic Analysis

- NRCS (formerly SCS) Methods
- ICPR v4 H&H Model
- 3 Basins – 98 Sub-Basins
- Land Use/Soils ====> CN [Runoff Volume]
- Topography/Land Cover/Drainage System ====> Tc [Runoff Rate]
- 25-yr Design Storm (8.0 in./24 hrs.)
- Analyze for 2-, 10-, 25-, 50-, 100-, & 500- yr
- Assumes U/S system has 25-yr flow capacity
- Assumes closed basins will be tied in [Future Improvements]
- MHHW tailwater (tide) condition

Hydrologic & Hydraulic Analysis



Hydrologic & Hydraulic Analysis

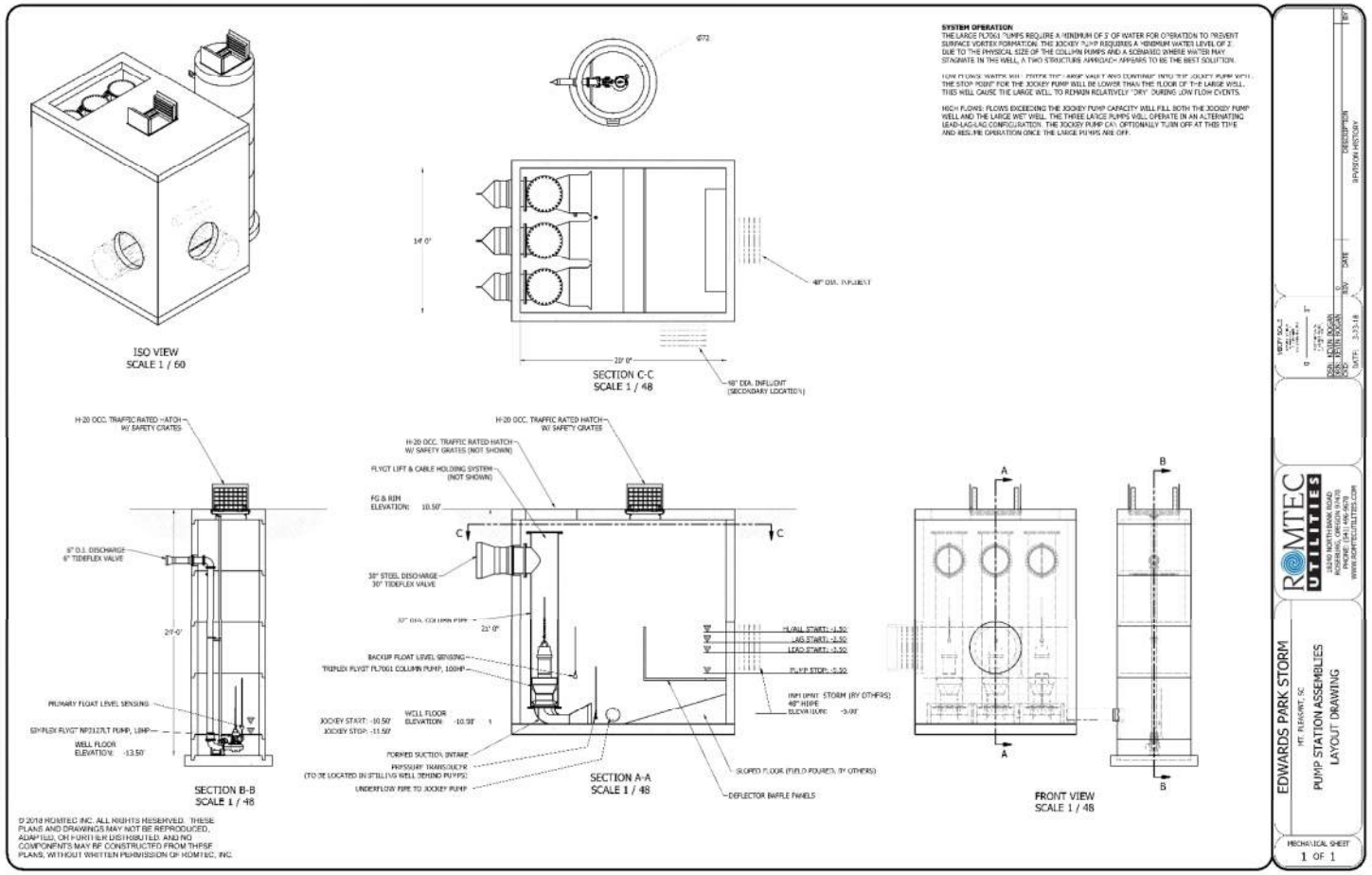
- Design Flows
  - 30th Avenue: 100 cfs
  - Forest Trail: 160 cfs
  - 41st Avenue: 100 cfs
- Existing Outfall / Capacity
  - 30th Avenue: 36 " RCP and 24" RCP /30 cfs
  - Forest Trail: 54" RCP / 60 cfs
  - 41st Avenue: 24" RCP / 8 cfs

Alternatives Analysis

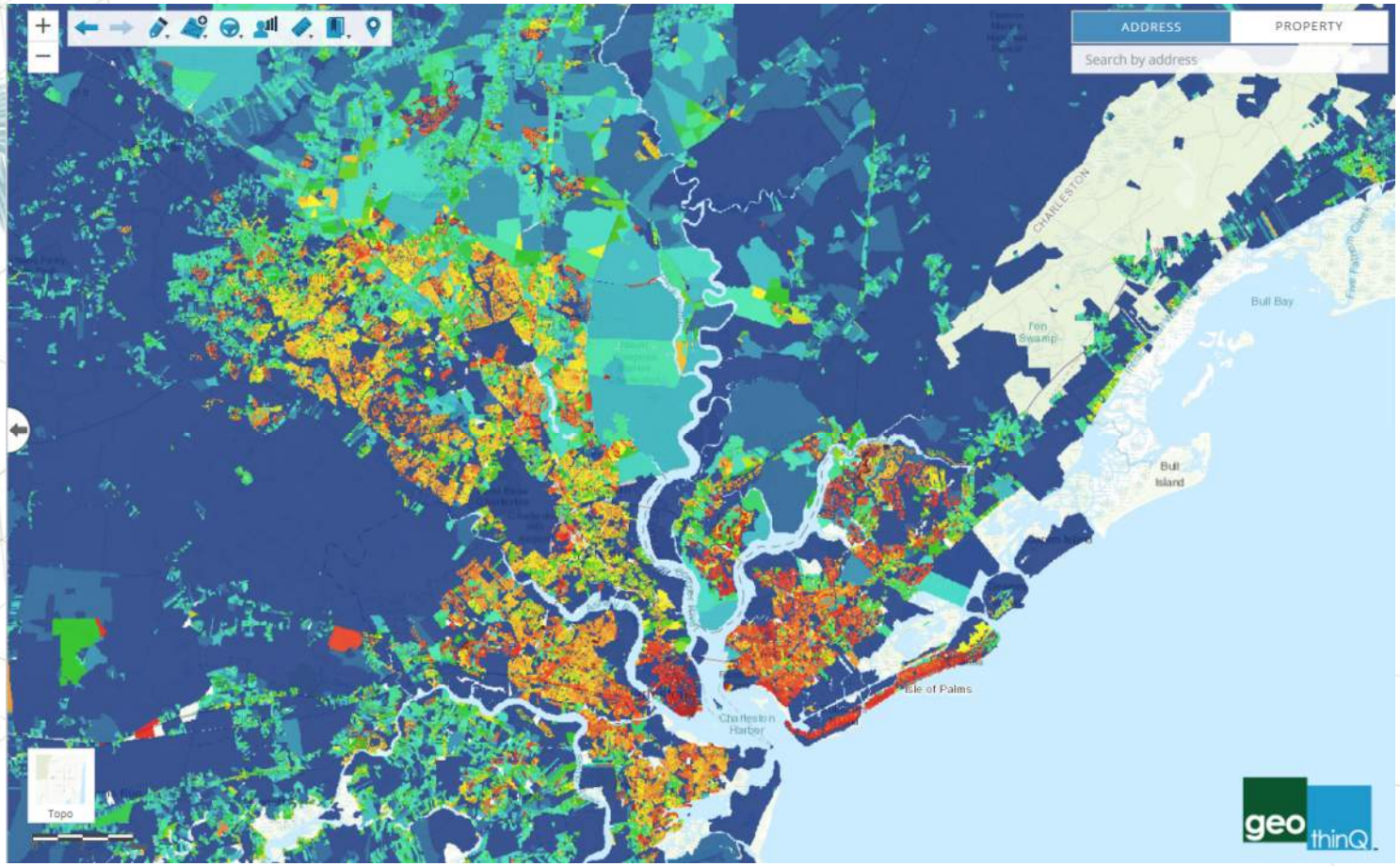
- Capacity Improvements (increase flow capacity)
  - Channels/Pipes/Culverts/Bridges
  - Pump Stations / Force mains
- Detention (reduce flow rate)
  - Ponds (wet or dry)
  - Underground Detention
- Diversion (reduce flow rate)

Alternatives Analysis – Pump Stations

- Typical Pump Sta.
  - 75 cfs
  - $1.7 M
  - $25K/cfs
- IOP Phase 3 Outfalls
  - 3 Pump Sta.
  - 360 cfs
  - $9M



Alternatives Analysis - Detention



Alternatives Analysis - Detention

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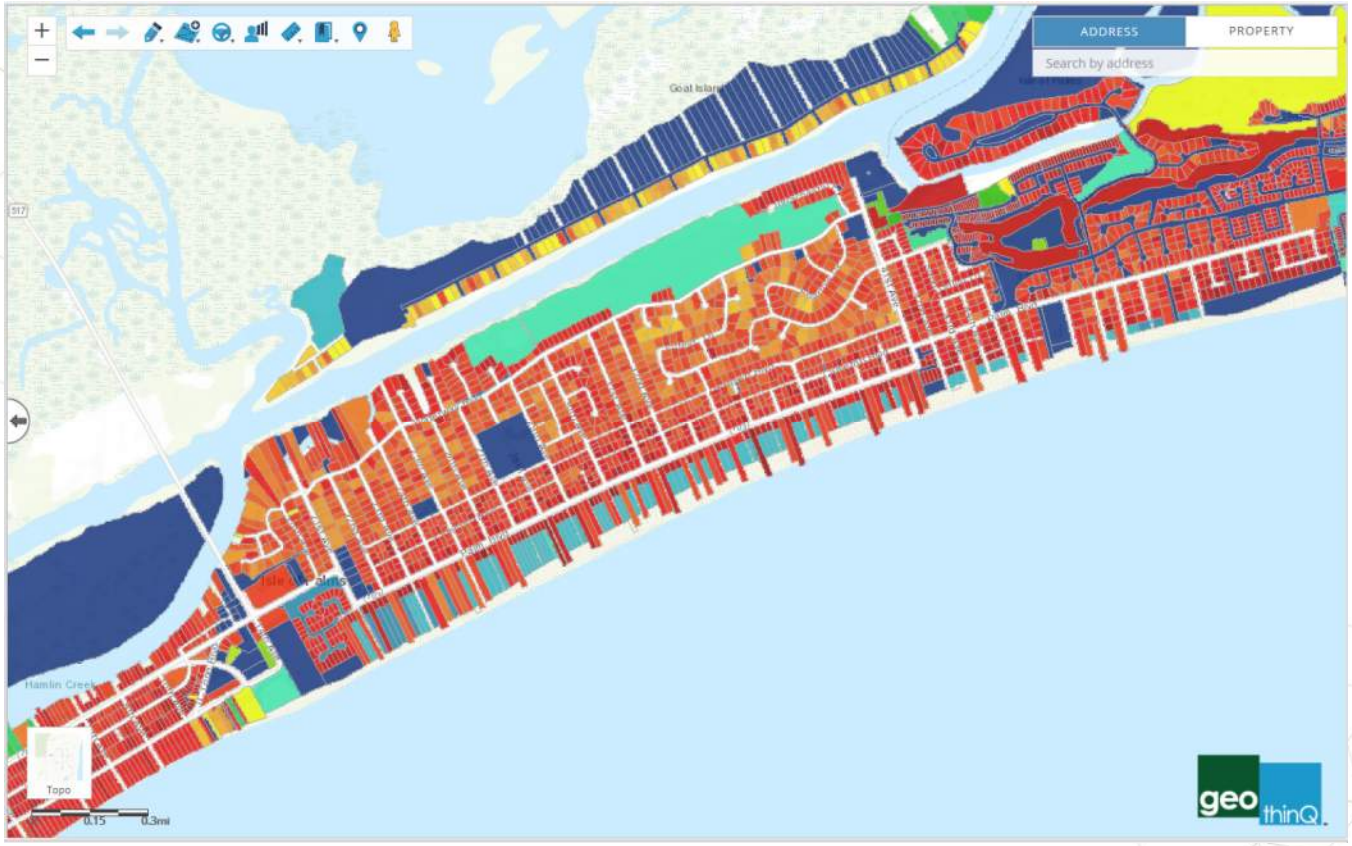
Column Statistics

Count	978
Min	$200.00
Max	$5,525,000.00
Sum	$626,394,200.00
Avg	$640,484.87
Nulls	0

☑ Ignore Empty/Zero

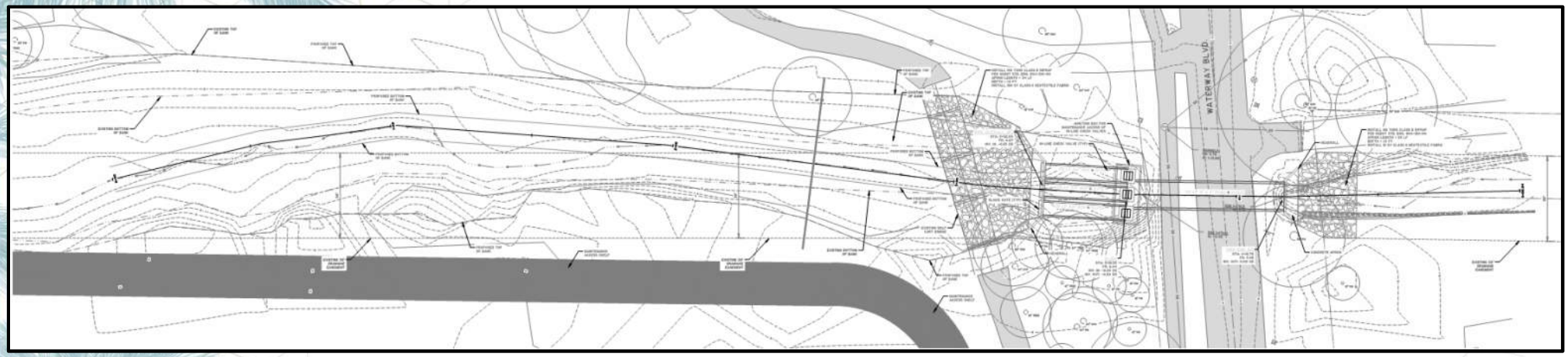
Ok

- Average - $2.9M/acre

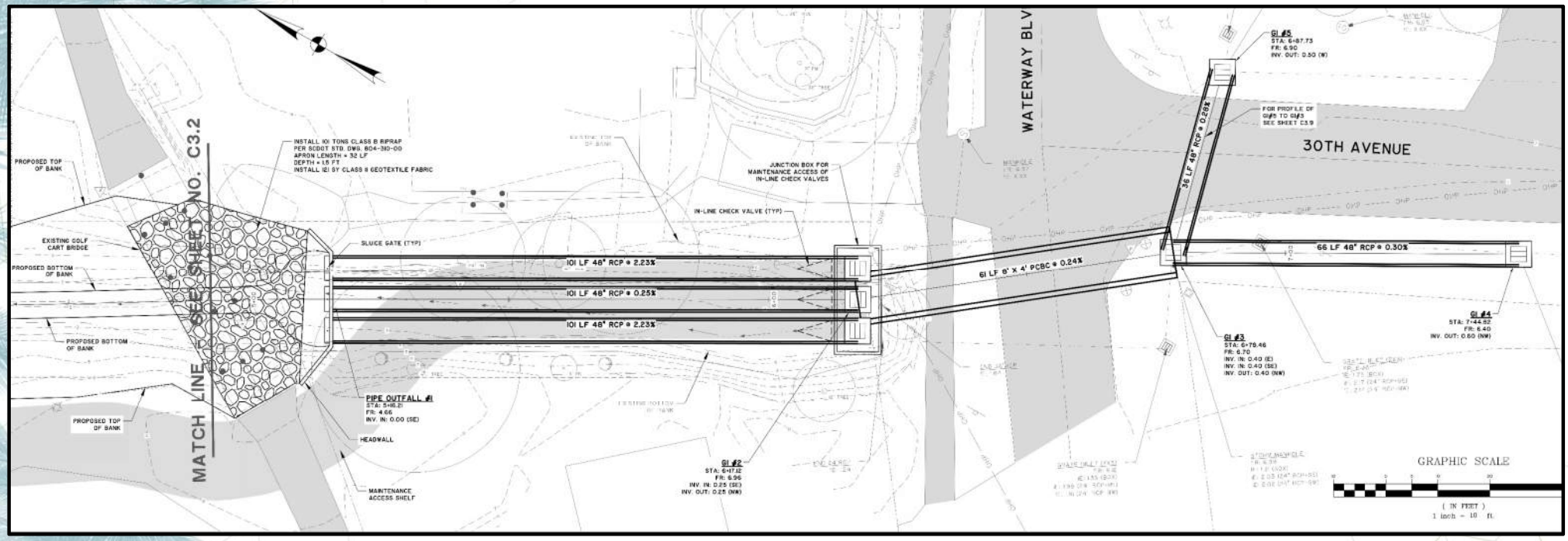


Alternatives Analysis - Diversion

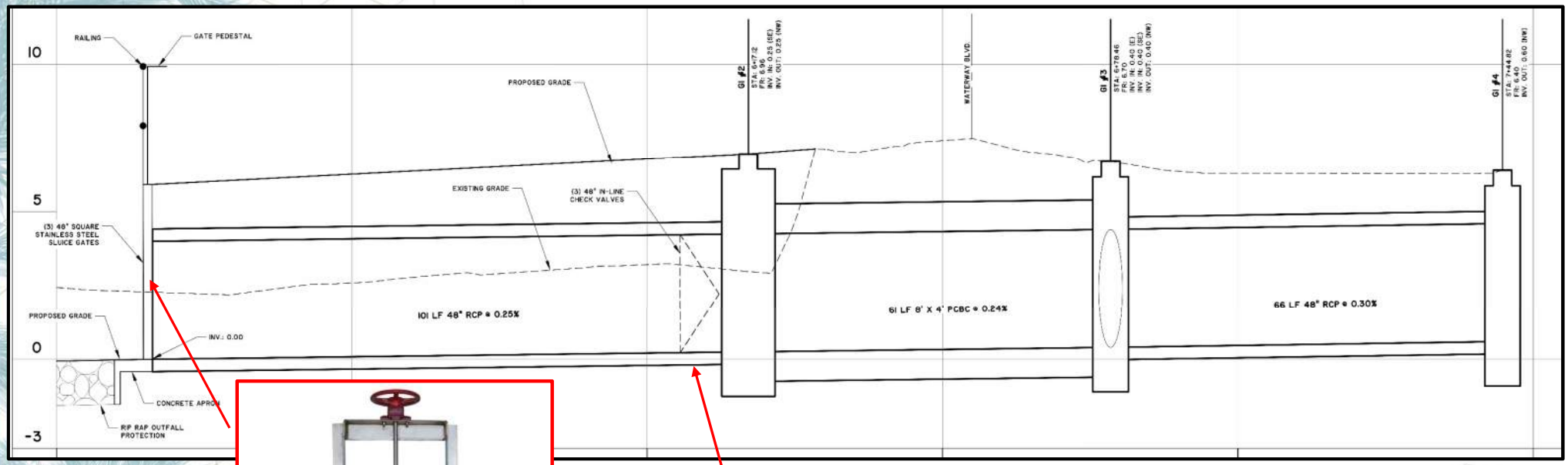
30th Avenue - Plan

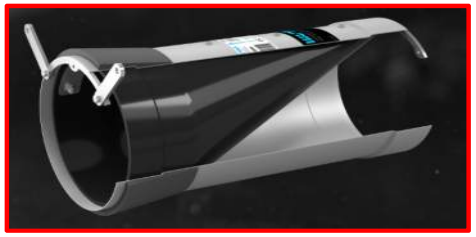


30th Avenue - Plan

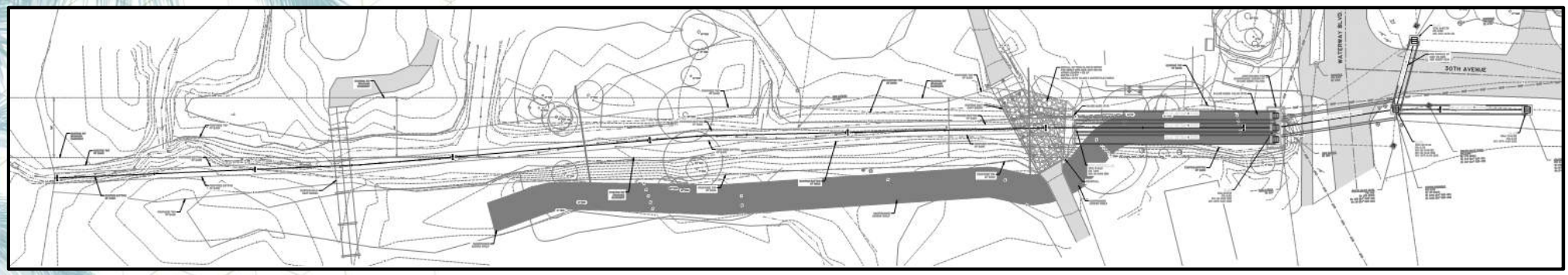


30th Avenue - Profile

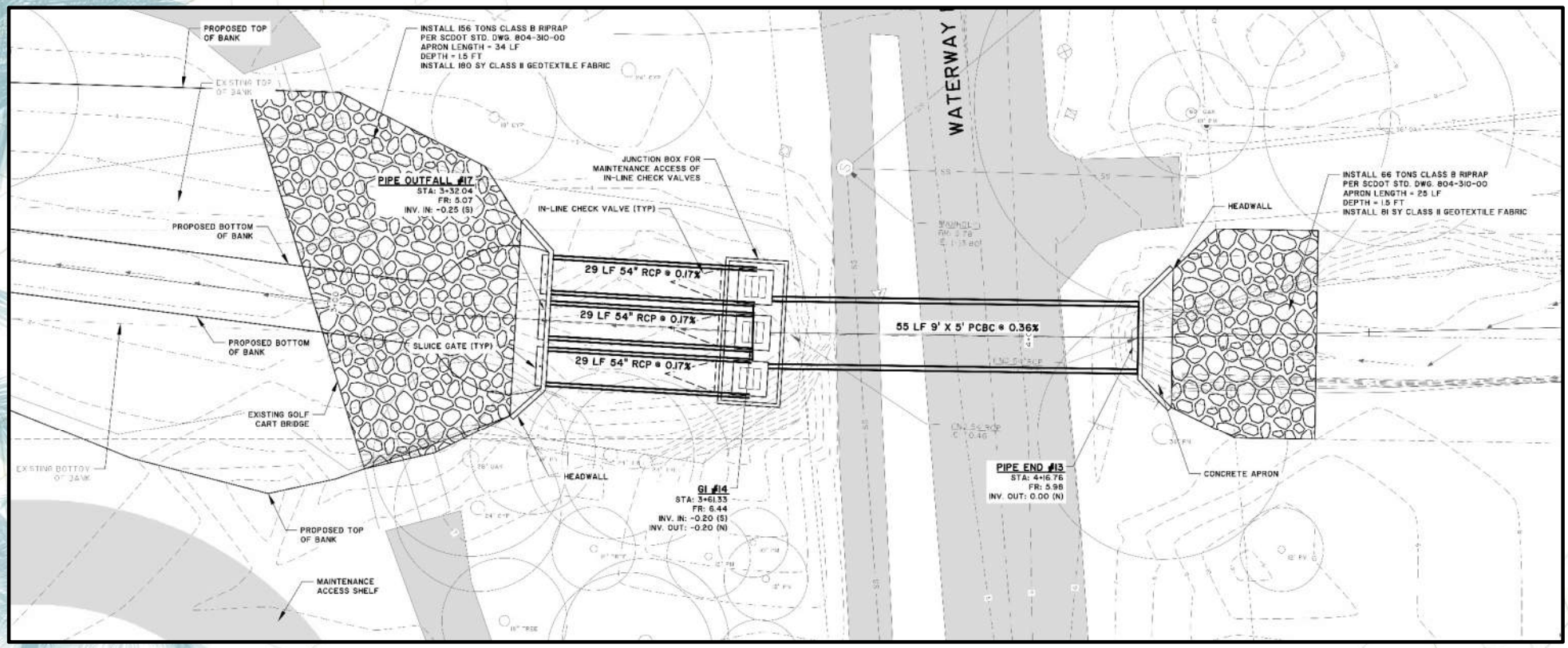




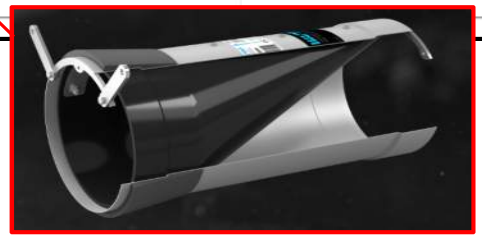
Forest Trail - Plan



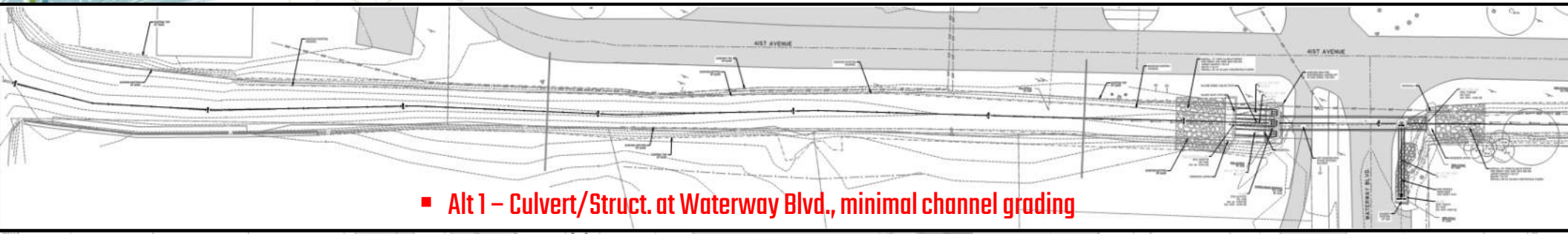
Forest Trail - Plan



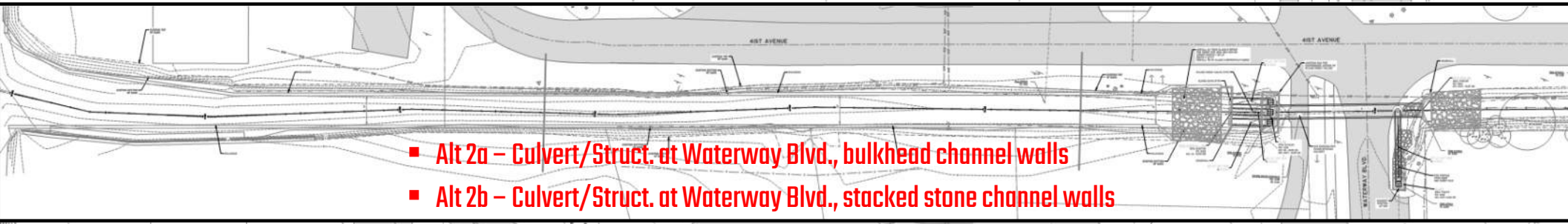
Forest Trail- Profile



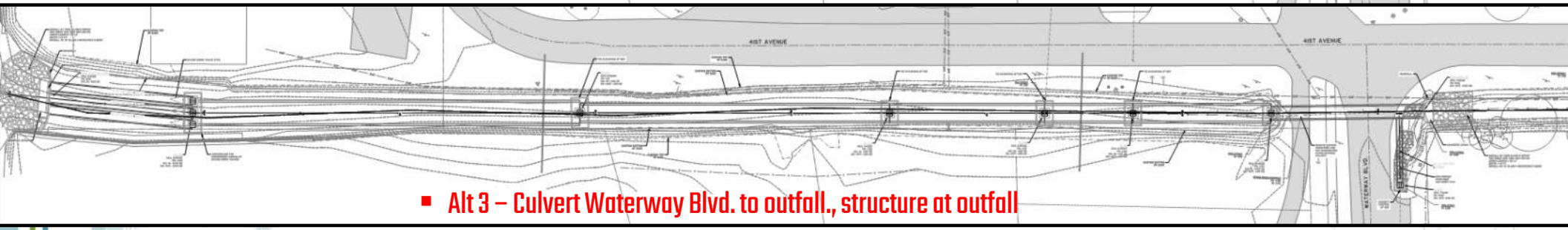
41st Avenue - Plan



- Alt 1 – Culvert/Struct. at Waterway Blvd., minimal channel grading

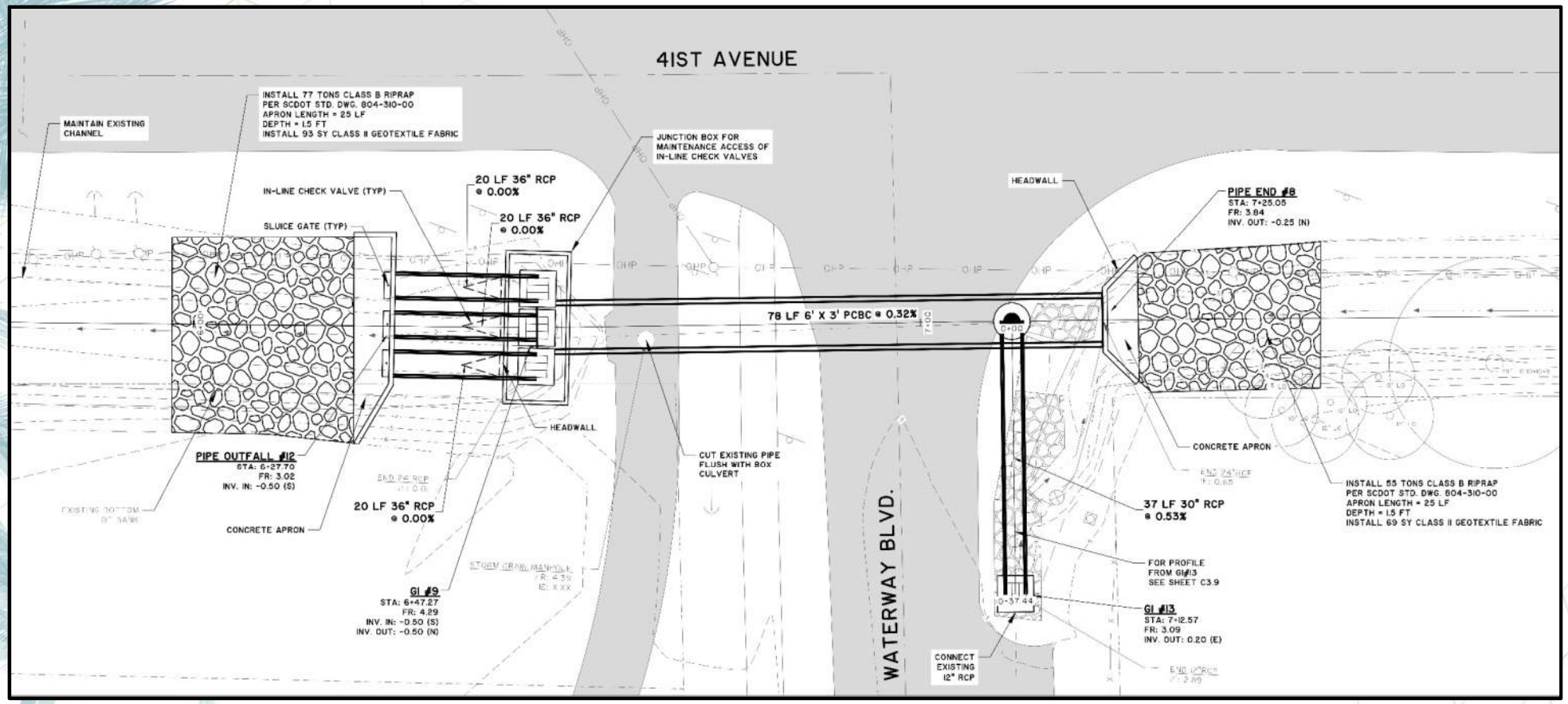


- Alt 2a – Culvert/Struct. at Waterway Blvd., bulkhead channel walls
- Alt 2b – Culvert/Struct. at Waterway Blvd., stacked stone channel walls



- Alt 3 – Culvert Waterway Blvd. to outfall., structure at outfall

41st Avenue - Plan



41st Avenue - Profile

Conceptual Cost Estimates

PROJECT : Isle of Palms - 30th Avenue Outfall Improvements
LOCATION : Isle of Palms, SC
ESTIMATOR : WTH

THOMAS & HUTTON

OPINION OF PROBABLE CONSTRUCTION COST	
DATE PREPARED: 04/05/2019	REVISED:
BASIS FOR ESTIMATE	
	(No design completed-Master Plan)
X	(Preliminary design)
	(Final design)
	(Other)

OPINION OF PROBABLE CONSTRUCTION COST

Since the Engineer has no control over the cost of labor, materials, equipment, over the Contractor's methods of determining prices, or over competitive bidding or market conditions, the Opinions of Probable Construction Costs provided for herein are made on the basis of his experience and qualifications. These opinions represent his best judgment as a design professional familiar with the construction industry. However, the Engineer cannot and does not guarantee that proposals, bids, or the construction cost will not vary from Opinions of Probable Construction Costs prepared by him.

ITEM	DESCRIPTION	QUANTITY: NUMBER OF UNITS	QUANTITY: UNIT MEASURE	COST: PER UNIT	COST: TOTAL COST
1031000	Mobilization	1	LS		$ 24,900.00
1032010	Bonds and Insurance	1	LS		$ 10,000.00
1071000	Traffic Control	1	LS		$ 10,000.00
109C200	As Built Construction Plans	1	LS		$ 10,000.00
2015000	Clearing and Grubbing within Right-of-Way	0.3	AC	$ 5,000.00	$ 1,424.24
2023000	Removal & Disposal of Existing Pavement (Roadway)	77	SY	$ 7.00	$ 539.78
2027000	Removal & Disposal of Existing Pavement (Cart Path)	8	SY	$ 7.00	$ 55.33
2028503	Removal of Existing Culvert 1' x 24"	138	LF	$ 20.00	$ 2,760.00
2028504	Removal of Existing Culvert 1' x 36"	79	LF	$ 20.00	$ 1,580.00
2033030	Controlled Fill - Borrow Material	98	CY	$ 25.00	$ 2,447.04
2034000	Excavation	1,043	CY	$ 25.00	$ 26,041.67
2034000	Muck Excavation	500	CY	$ 25.00	$ 12,500.00
2081001	Fine Grading	1,300	SY	$ 7.00	$ 9,100.00
3050112	Graded Aggregate Base Course (8" Uniform)	85	SY	$ 15.00	$ 1,281.67
401 3990	Milling Existing Asphalt Pavement (Variable)	256	SY	$ 5.00	$ 1,278.89
4030319	Hot Mix Asphalt Surface Course Type 9	30	TON	$ 100.00	$ 3,596.88
6250170	4" White Solid Lines (Pvt. Edge Lines) Fast Dry Paint	540	LF	$ 2.00	$ 1,080.00
6250575	8" White Solid Lines (Stop/Drag Lines) Fast Dry Paint	14	LF	$ 2.00	$ 28.00
6250170	4" Yellow Solid Lines (Pvt. Edge No Passing Zone) Fast Dry Paint	270	LF	$ 2.00	$ 540.00
6271010	4" White Solid Lines (Pvt. Edge Lines) Thermoplastic - 90 mil.	540	LF	$ 2.00	$ 1,080.00
6271025	8" White Solid Lines (Stop/Drag Lines) Thermoplastic - 90 mil.	14	LF	$ 2.00	$ 28.00
6271074	4" Yellow Solid Lines (Pvt. Edge Lines) Thermoplastic - 90 mil.	270	LF	$ 2.00	$ 540.00
7141118	48" RC Pipe (Class III)	405	LF	$ 120.00	$ 48,600.00
7192032	Grate Inlet (48" x 60")	1	EA	$ 2,500.00	$ 2,500.00
7192033	Grate Inlet (48" x 120")	1	EA	$ 5,000.00	$ 5,000.00
7221011	8' x 4' RC Box Culvert	61	LF	$ 1,200.00	$ 73,200.00
-	Head and Wingwall Structures	1	EA	$ 25,000.00	$ 25,000.00
-	In-Line Check Valves (48")	3	EA	$ 30,000.00	$ 90,000.00
-	Junction Box	2	EA	$ 60,000.00	$ 60,000.00
-	Sluice Gates	3	EA	$ 10,000.00	$ 30,000.00
8041020	Rip-Rap Class B	101	TON	$ 75.00	$ 7,575.00
8048205	Geotextile for Erosion Control Under Rip-Rap (Class 2) Type B	121	SY	$ 6.00	$ 726.00
8100101	Sodding	1,350	MSY	$ 10,000.00	$ 13,500.00
8153000	Silt Fence	1,078	LF	$ 3.00	$ 3,234.00
8153090	Replace/Repair Silt Fence	300	LF	$ 3.50	$ 1,050.00
8154050	Removal of Silt Retained by Silt Fence	1,078	LF	$ 2.50	$ 2,695.00
8156490	Stabilized Construction Entrance - 100'x24'	300	SY	$ 40.00	$ 12,000.00
8990153	Utility Work Within Project Area	1	LS		$ 50,000.00
-	Misc. Erosion Control/Water Management	1	EA	$ 5,000.00	$ 5,000.00
				SUBTOTAL	$ 552,884.49
	Contingency	30%	%	$ 165,865.35	$ 165,865.35
	GRAND TOTAL OPINION OF CONSTRUCTION COST				$718,800

Notes:
1. Utility relocation fees are estimated.
2. No mitigation (wetland) fees included.
3. No property costs (drainage easement, temporary const. easements, right-of way, etc.) are included.

OPINION OF PROBABLE COST - SUMMARY TABLE				
Project	Alternative 1	Alternative 2a	Alternative 2b	Alternative 3
30th Avenue Outfall Improvements	$ 718,800			
Forest Trail Outfall Improvements	$ 719,900			
41st Avenue Outfall Improvements	$ 575,100	$ 2,373,700	$ 1,661,500	$ 1,795,100
GRAND TOTAL OPINION OF CONSTRUCTION COST:	**$ 2,013,800**	**$ 3,812,400**	**$ 3,100,200**	**$ 3,233,800**

- 41st Ave. Outfall
  - Alt 1 – Culvert/Struct. at Waterway Blvd., minimal channel grading
  - Alt 2a – Culvert/Struct. at Waterway Blvd., bulkhead channel walls
  - Alt 2b – Culvert/Struct. at Waterway Blvd., stacked stone channel walls
  - Alt 3 – Culvert Waterway Blvd. to outfall., structure at outfall

2019/2020 Internal Improvements

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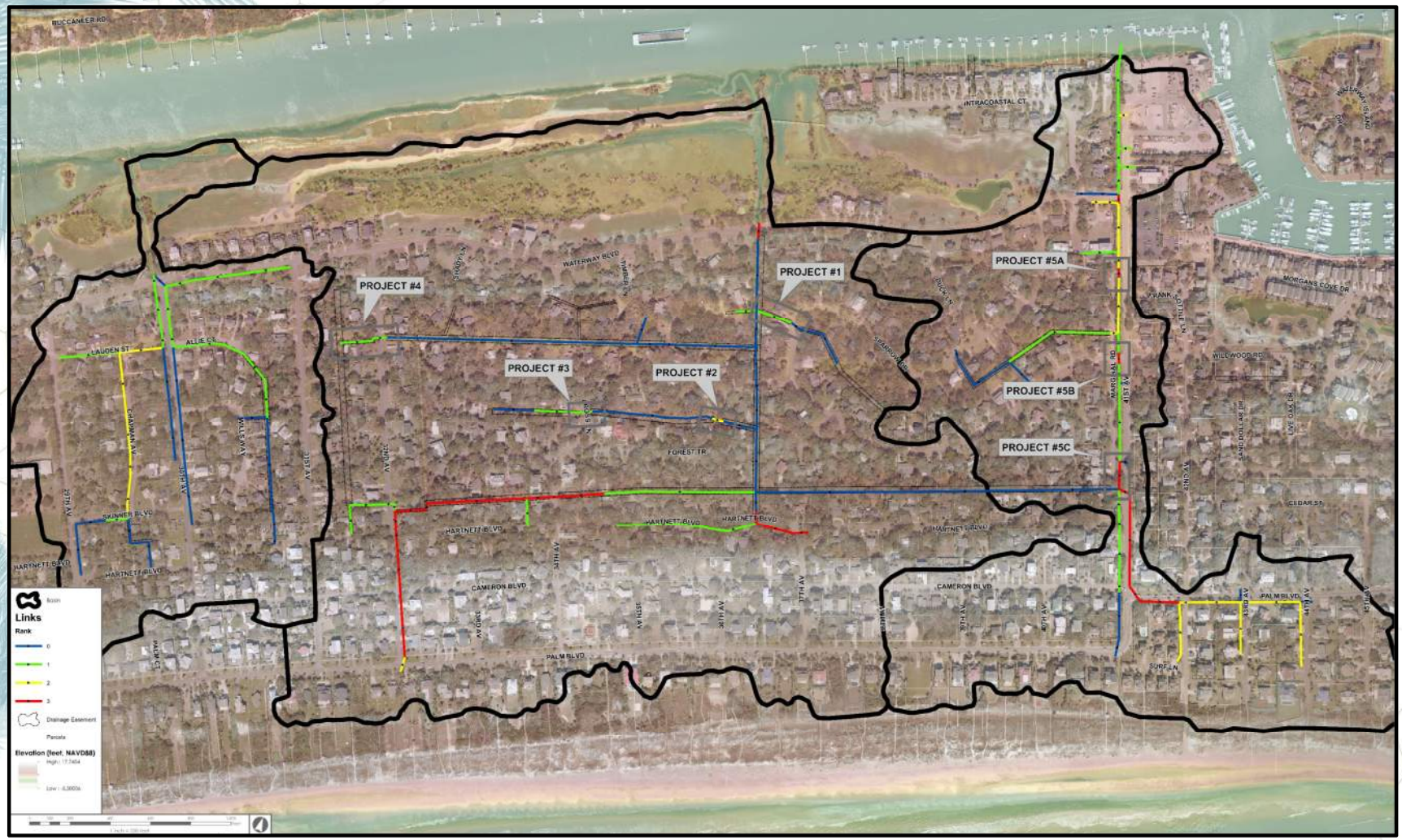

2019/2020 Internal Improvements

OPINION OF PROBABLE COST - SUMMARY TABLE			
#1	Sparrow Drive Drainage Improvement	$	99,600
#2	Forest Trail Drainage Improvement	$	56,600
#3	Cross Lane Drainage Improvements	$	52,800
#4	32nd Ave Drainage Improvements	$	96,800
#5	41st Avenue Driveway Pipe Drainage Improvements	$	152,800
	GRAND TOTAL OPINION OF CONSTRUCTION COST:	**$**	**458,600**