

North Beach Navigable Canal City Council Briefing



Lockwood, Andrews
& Newnam, Inc.
A LEO A DALY COMPANY

January 26th, 2021

Scope of Phase I Report

LAN was asked to answer two questions:

Can the canal improve drainage for North Beach? **“Qualified” Yes**

Can the canal serve as a navigable or recreational water body? **Yes**

To qualify this, LAN’s services included:

- Existing & Proposed Drainage Analysis
- Conceptual Layouts of Two Options & Typical Cross Section
- Geotechnical Investigation & Preliminary Structural Recommendations
- Water Quality Modeling
- Evaluation of Traffic Impacts
- Determination of Regulatory Requirements & Desktop Environmental Services

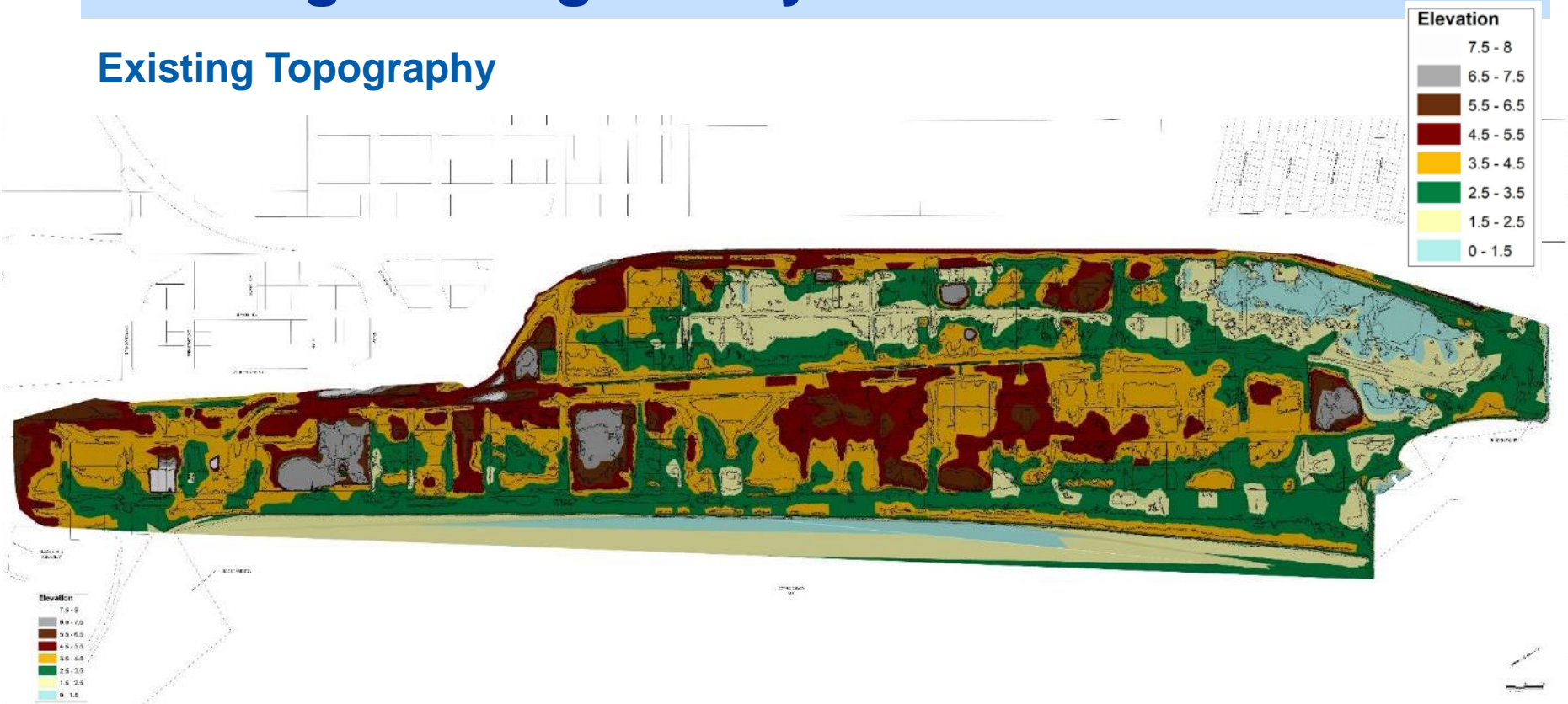
Exclusions to Phase I Report

Not included in this report are:

- Analysis of Existing Utility Conflicts
- Storm Surge Modeling
- Detailed Design of Canal and Bulkheads
- Sedimentation Modeling
- Beach Erosion
- Permit Acquisition
- Detailed Real Estate Requirements
- Opinions of Probable Costs

Existing Drainage Analysis

Existing Topography



Existing Drainage Analysis

Existing Drainage System



Main issues:

- Undersized
- Connectivity
- Clogging
- 3' – 4' Submerged

Quick Stats:

Study Area ~ 184 acres or 0.287 sq miles

Three existing basins

- Rincon Basin (red) drains west and will not impact Canal
- North & South Basins currently drain east to Bay
- Proposed canal is west of existing system and would require significant modifications, new system to drain to proposed canal

100-year Rainfall Event – Depths of Stormwater



Existing Tidal Inundation (+2.0-foot Tide)



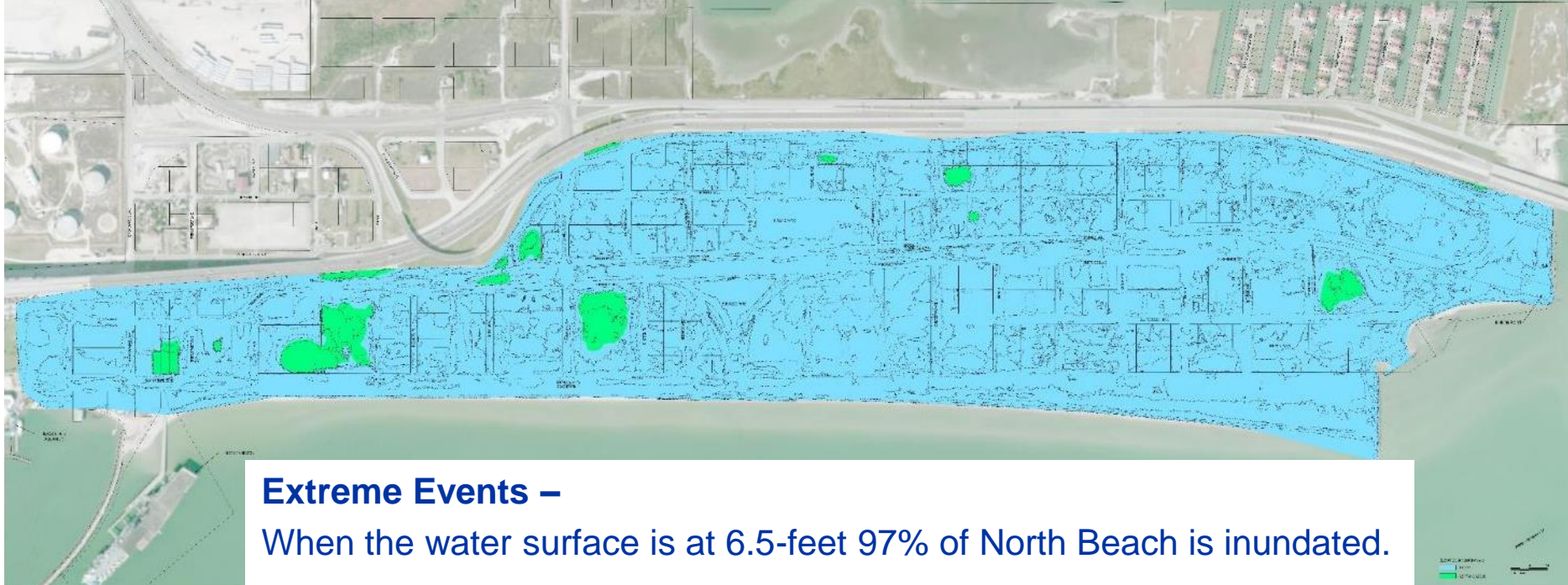
- ➔ Light blue represents the water surface elevation at +2.0 feet above Mean Sea Level
- ➔ Approximately 25 acres (8%) are inundated or below water, mainly wetlands

Existing Tidal Inundation (+3.5-foot Tide)



- Light blue represents the water surface elevation at +3.5 feet above Mean Sea Level
- 3.5 feet was the highest observed tide for the study period
- Approximately 100 (30%) acres are inundated or below water

Existing Tidal Inundation (+6.5-foot Tide)



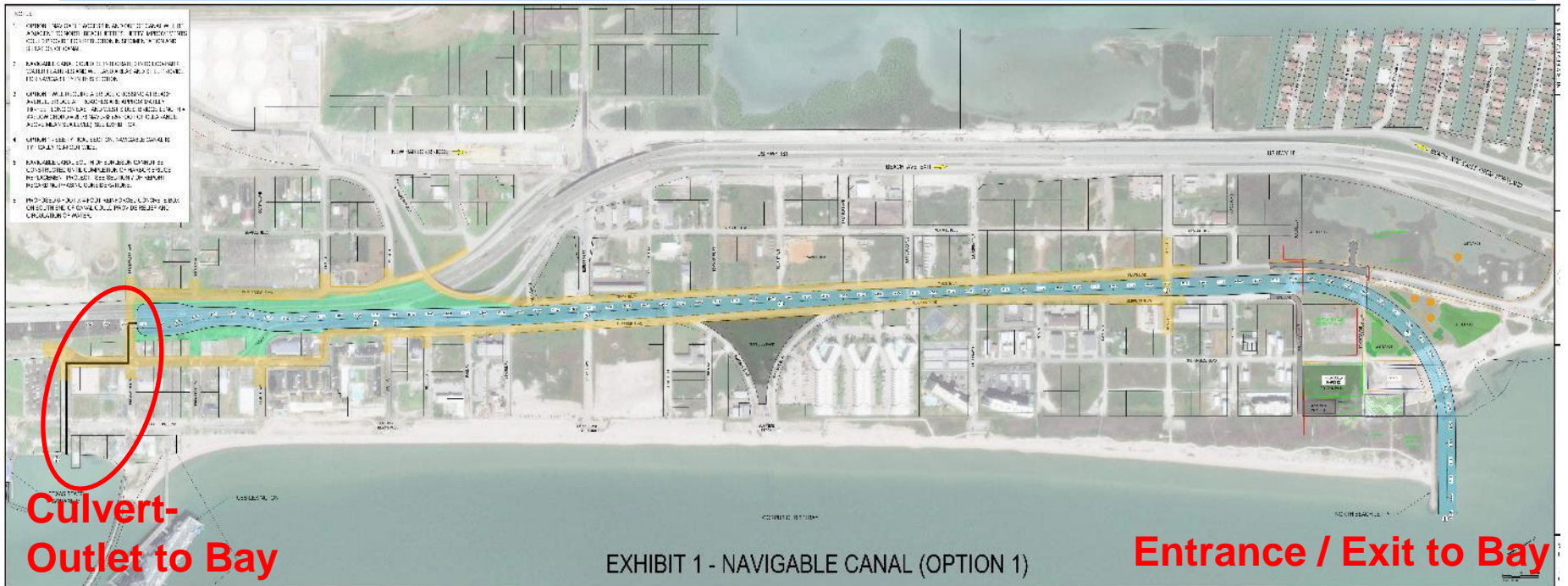
Extreme Events –

When the water surface is at 6.5-feet 97% of North Beach is inundated.

Important considerations:

Only raising North Beach to a higher elevation and/or constructing other resiliency measures such a seawall would provide protection from large surge events.

Proposed Navigable Canal – Option 1



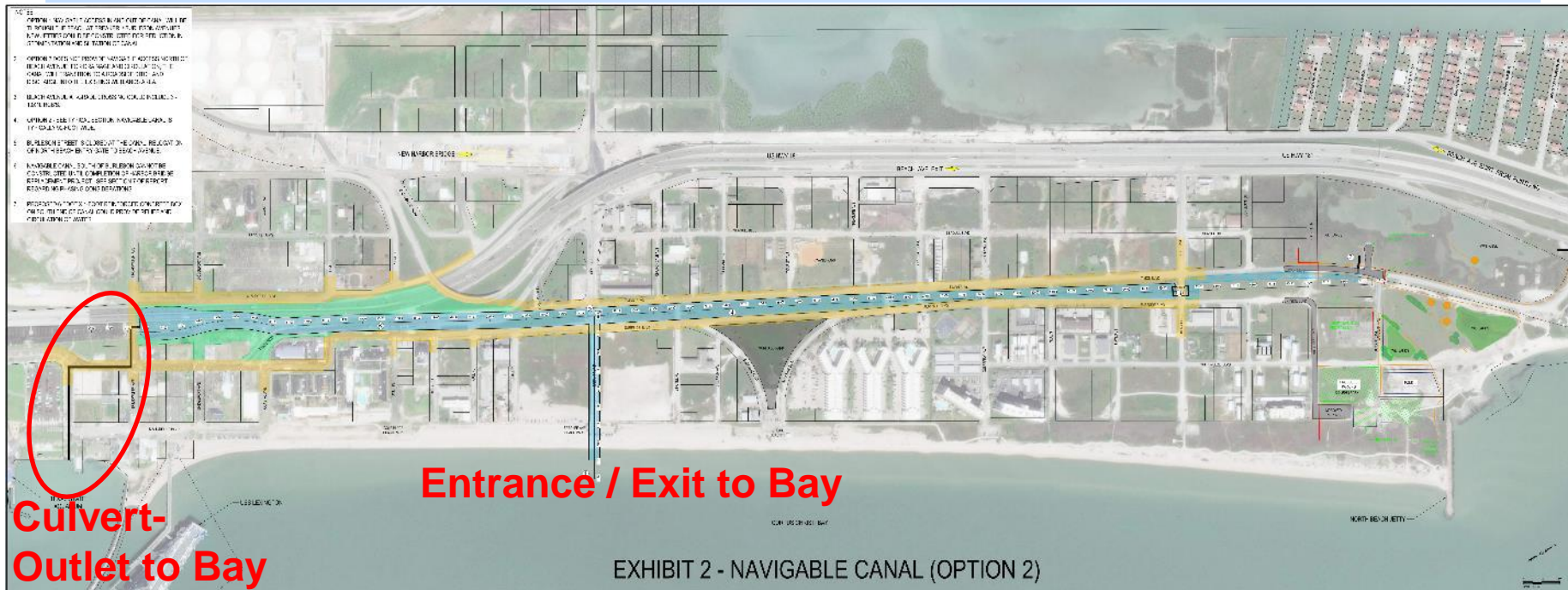
Culvert-Outlet to Bay

EXHIBIT 1 - NAVIGABLE CANAL (OPTION 1)

Entrance / Exit to Bay

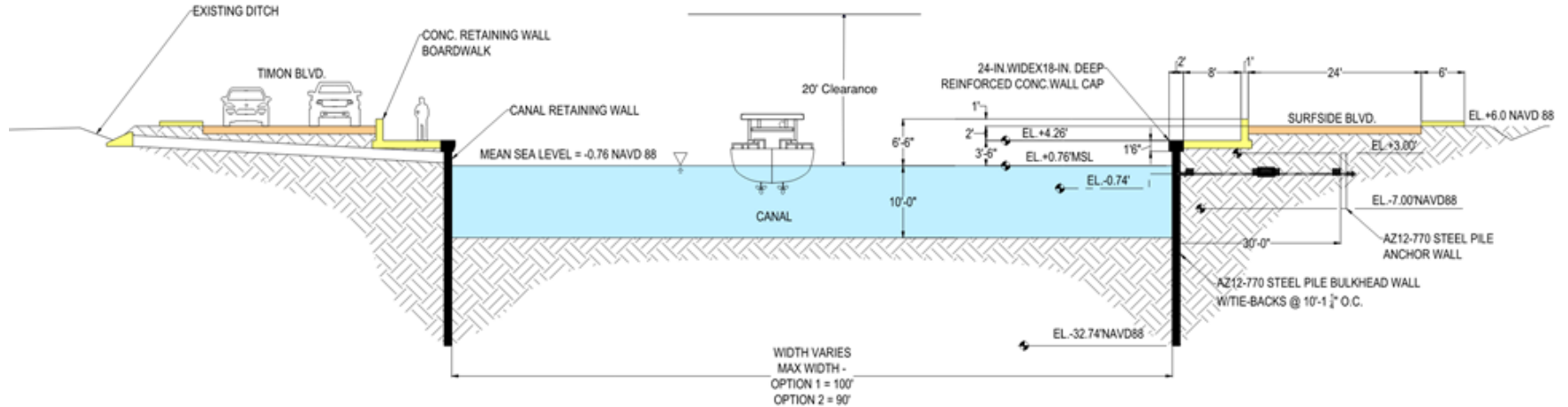
- 8,000 LF of Navigable Access
- Ingress / Egress to Bay at North Jetties
- Integration w wetlands and Eco-Park
- 6' x 4' Box Culvert at Breakwater Avenue

Proposed Navigable Canal – Option 2



- 5,600 LF of Navigable Access
- Ingress / Egress to Bay thru beach at Burleson Street (~60-foot wide)
- Culvert outfall into wetlands at north
- At grade crossing at Beach Avenue
- 6' x 4' Box Culvert at Breakwater Avenue

Typical Cross Section



Considerations:

- Highest Observed Tide = +3.5-feet, which will be below top of bulkhead
- Maximum depth of canal = 10-feet

Design Craft / Navigation Constraints

Considerations:

A 90 to 100-foot canal could accommodate most, if not all, recreational watercraft

Limitations may include:

- Length – 50-foot or less (turning movements)
- Vertical Clearance – 20-foot or less (bridge crossings)
- Keel Depth – no more than 10-foot

Type	Length Overall (ft)	Average Draft (ft)	Freeboard / Clearance above MSL (ft)	Beam Width (ft)
Cruising Sailboat	16 – 50	5 – 6	50 – 75	11 – 13
Catamaran	32 – 47	2 – 4	39 – 65	22 – 32
Cabin Cruiser	25 – 45	3 – 4	10 – 18	8 – 9
Motor Yacht	29 – 65	4 -5	14 – 15	11 – 14
Center Console	18 – 32	2	8 – 11	8 - 9

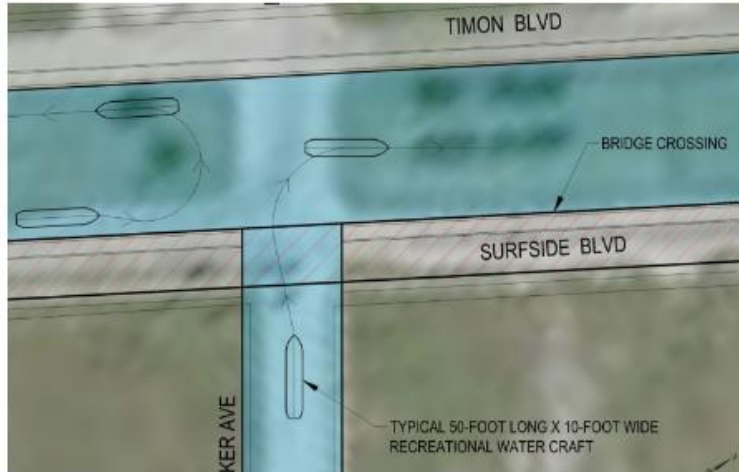


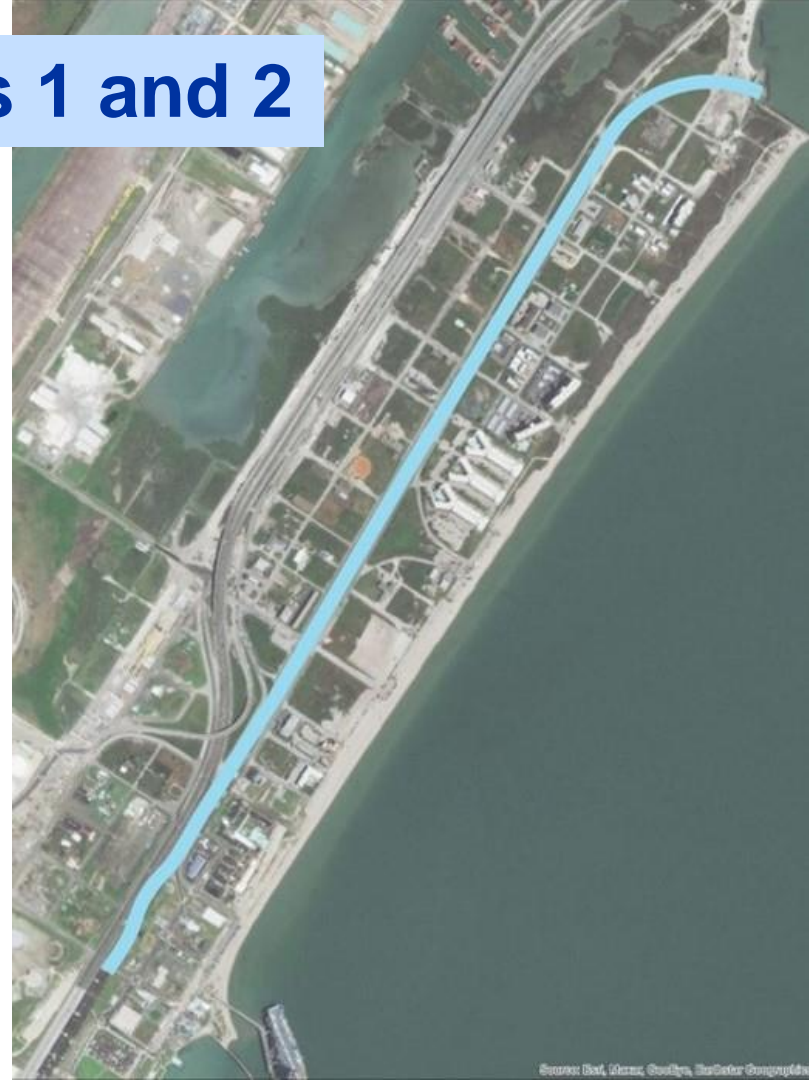
Figure 3-5 – Typical Craft Turning Movements



Drainage Analysis – Options 1 and 2

LAN's drainage analyses concluded that the proposed canal could improve drainage from rainfall and tidal events; however, to achieve maximum benefit:

- Proposed model results - The 100-year rainfall event would be fully contained in the proposed canal for either Option; if:
- The adjacent areas would need to be raised to a minimum elevation of **+6.5-feet**
- The existing storm sewer system would have to be replaced and redirected.
- Raising of North Beach to the necessary elevations would require an average of 2-3 feet of fill over the entire project area.



Water Quality

Harte Research Institute (HRI) assisted with WQ models

Constituents Modeled:

- Water Temperature, Salinity, Dissolved Oxygen (DO)
- Total Suspended Solids (TSS), Carbonaceous Biological Oxygen Demand (CBOD)
- Nutrients (Nitrogen and Phosphorus), and Chlorophyll

Target Constituent = DO (DO is necessary for aquatic life)

TCEQ Criteria for DO:

Segment No.	WQ Segment Names (Water Bodies)	Aquatic Life Use	DO Criteria (mg/L)	
			Mean	Minimum
2481	Corpus Christi Bay	Exceptional	5.0	4.0
2484	Corpus Christi Inner Harbor	Intermediate	3.0	2.0

- Dissolved oxygen means are applied as a minimum average over a 24-hour period.

- 24-hour minimum dissolved oxygen concentrations are not to extend beyond eight hours per 24-hour day.

Source: TSWQS (2018).

Water Quality

Water Quality Modeling Results:

- Canal Options w Culvert are better for meeting water quality standards
- Bottom of the canal has lower dissolved oxygen levels

Canal Layout	Option 1		Option 2		Remarks
With U/S Culvert	No	Yes	No	Yes	Culvert becomes Segment 2, so the most u/s segment become Segment 3
CE-QUAL-W2 Segment No.	2	3	2	3	
Water Depth	Min 24-hr Moving Avg DO (mg/L)				Criteria: DO ≥ 5.0 mg/L
Surface	4.72	5.36	4.97	5.44	
Bottom	0.76	3.65	0.15	2.65	
Water Column	4.66	5.24	4.81	5.16	
Water Depth	Duration (hours) of DO < 4.0 mg/L				Criteria: Duration ≤ 8 hours
Surface	0	0	0	0	
Bottom	39	7	132	13	
Water Column	0	0	0	0	

TCEQ Considerations:

- Non compliance may put canal on the 303(d) list of impaired water bodies
- Non compliance could trigger Total Maximum Daily Load studies

Traffic & Access Impacts

Four Key Destinations

- Aquarium / Lexington
- Beach Parks
- Residential (Condo's and Villa's)
- Jetties / Proposed Eco-Park

Biggest impacts to traffic and access:

Average Daily Traffic – 3000 vehicles/day at Beach Avenue

Congestion at Beach Avenue - one exit from New Bridge Canal will cut off east to west collectors

- Currently six crossings
- Either option would require at least one crossing
- Two crossings are ideal for Option 1
- Option 2 – no additional crossing at Beach Ave



Traffic & Access Impacts

Mitigation:

- Improved signalization, signage and striping at Beach Ave
- Improved collector streets
- One-way to two-way conversions
- Crossings over the canal

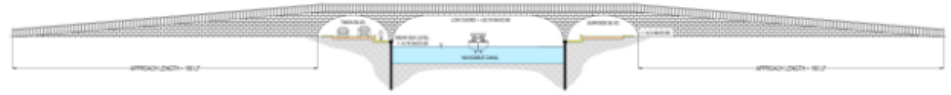


Figure 6-5 – Conceptual Canal Crossing

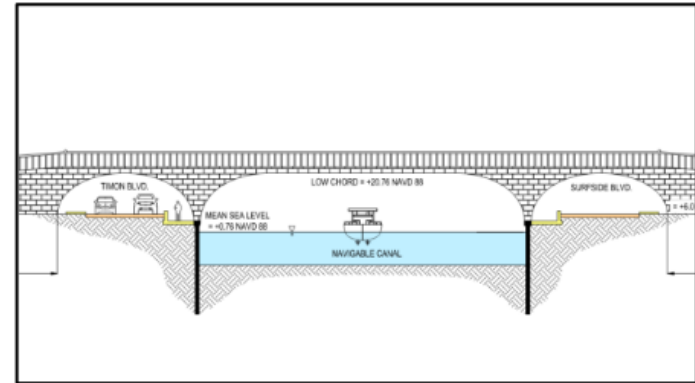


Figure 6-6 – Conceptual Canal Crossing- Detail

Regulatory

Waters of the US:

- Potential presence of one estuarian scrub-shrub (E2SS) wetland
- Two estuarian emergent (E2EM) wetlands
- One tidally influenced water body (Corpus Christi Bay)
- All are classified as jurisdictional under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act – subject to USACE/ EPA regulation

Threatened & Endangered Species:

- Construction of canal is not likely to adversely affect any federally listed threatened or endangered species

Cultural Resources:

- Moderate to high probability of encountering cultural resources in project area

Meeting w USACE:

- Individual Permit is likely required
- No indication from USACE that a permit was not feasible for this project

Summary

Question - Can the proposed canal improve drainage?

Answer - Yes, but to achieve maximum benefit the adjacent areas would need to be raised to a minimum elevation of +6.5-feet near the beach property lines and along Seagull Boulevard.

- Existing storm sewer system would have to be replaced and redirected towards the canal rather than the current north-south conveyance in-place.
- The canal does not protect against storm surge or hurricanes

Question – Can the canal serve as a navigable or recreational water body?

Answer – Yes

Questions?



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