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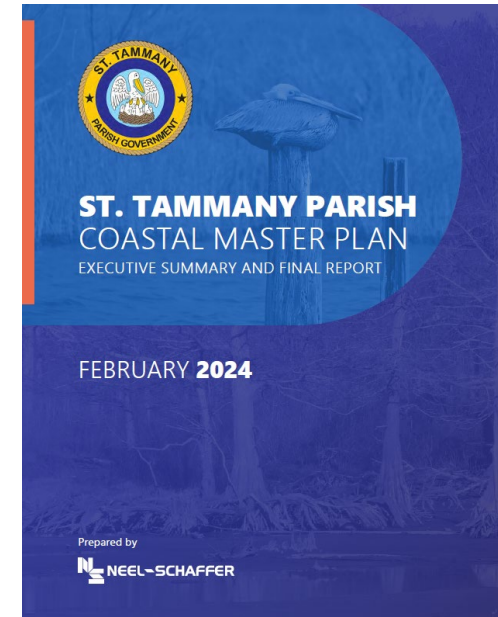
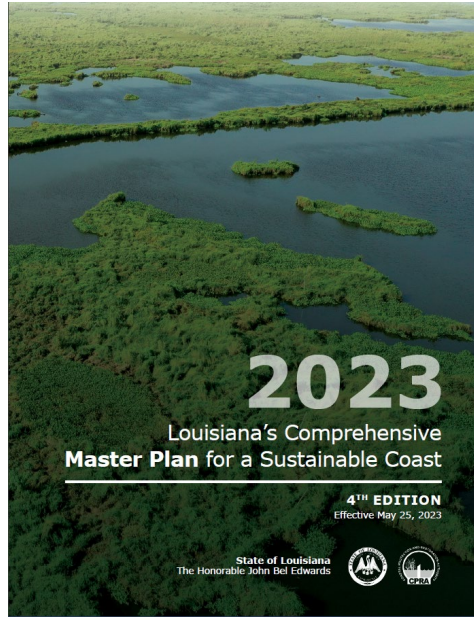
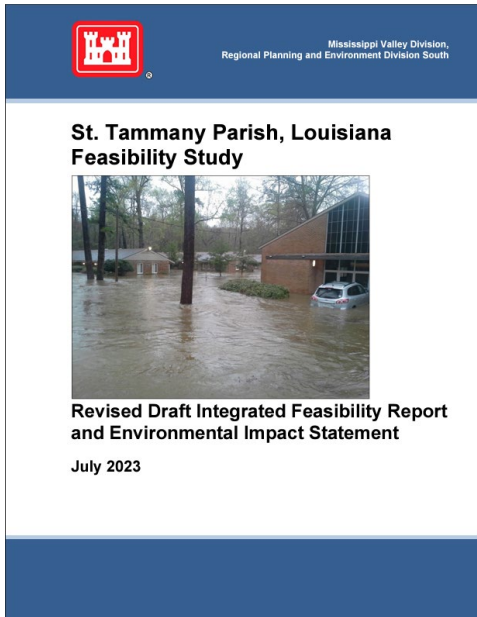


**Eden Isle Resilience & Flood Risk Reduction  
St. Tammany Levee, Drainage, and Conservation District  
Board Meeting**

February 20, 2024

- USACE Feasibility Study
- CPRA Master Plan

- Northshore Hurricane and Flood Protection Plan
  - Identified locations vulnerable to flooding, sources, and mitigation plans
- St. Tammany Parish Coastal Study
  - Inventory of existing flood control assets
  - Gap analysis of vulnerable areas
  - Development of conceptual alternatives

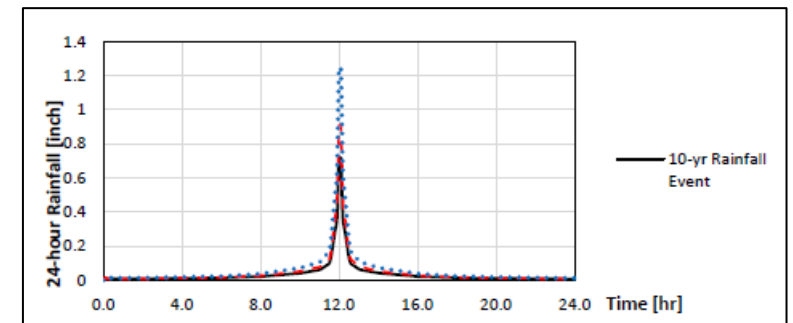
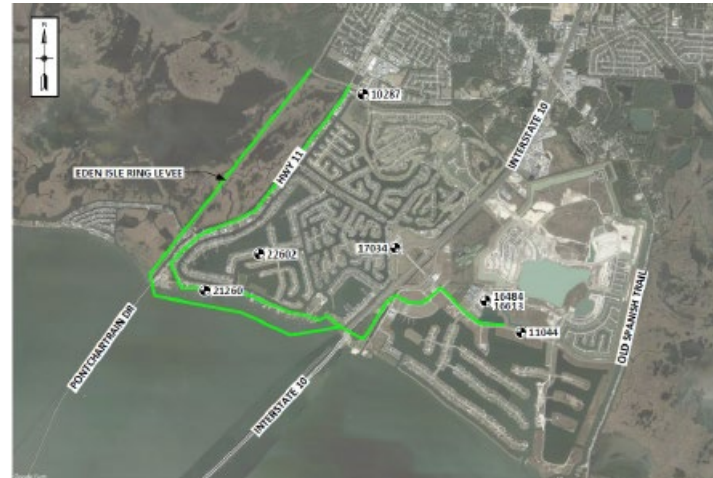
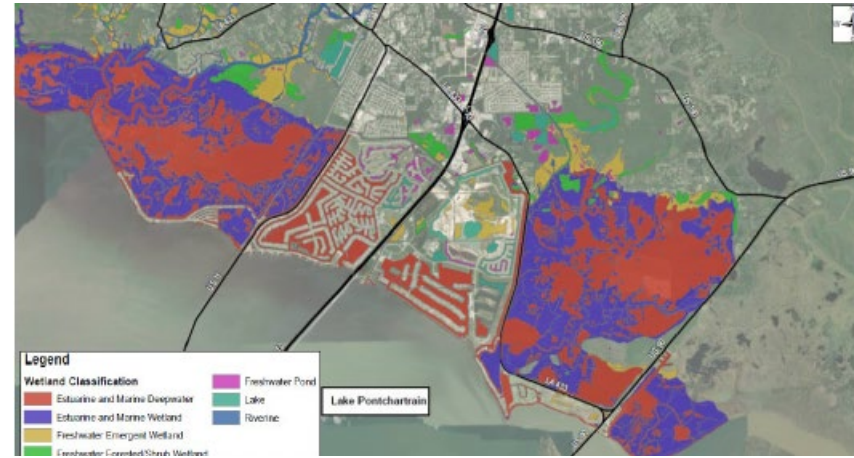




- Increase resiliency following natural disasters
- Increase flood risk reduction opportunities for Eden Isle
- Develop an adaptable resilience solution, so elevation can be increased at a later date.



- Topographic and Bathymetric Data
- Geotechnical Information
- Hydraulic and Hydrologic Modeling
- Environmental Data





# Summary of Storm Surge Elevations for Eden Isle

**Table 3: Published Storm Surge Elevations**

Source	100-yr	50-yr	25-yr	Note
<b>FWOP - Data on Storm Water Levels without Flood Risk Reduction Project (Eden Isle Lakefront Location)</b>				
<b>FEMA - Data from FEMA Sources</b>				
<b>FEMA FIS</b>				
FEMA Flood Insurance Study (FIS), City of Slidell, St. Tammany Parish, Louisiana, Panel 535 of 600, 1999	Slidell Flood Insurance Study (FIS), 1999 (Lake Fondcharrien)	9 ft, NGVD	8.8 ft, NGVD	Water Surface Elevation (Probably without wave)
<b>FEMA Effective FIRM</b>				
FEMA Flood Insurance Rate Map (FIRM), St. Tammany Parish, Louisiana, Panel 535 of 600, 1991	FIRM 1991 (Based on USACE ADCIRC and STWAVE Results) at Location A (Levee)	14 ft, NGVD		Base Flood Elevation (Still Water Elevation+Wave Setup)
<b>FEMA DFIRM</b>				
FEMA Flood Insurance Rate Map (DFIRM), St. Tammany Parish, Louisiana,	Preliminary DFIRM 2008 (Based on USACE ADCIRC and STWAVE Results) at Point 1	13 ft, NAVD88		Base Flood Elevation (Still Water Elevation+Wave Setup)
	Preliminary DFIRM 2008 (Based on USACE ADCIRC and STWAVE Results) at Point 2	15 ft, NAVD88		Base Flood Elevation (Still Water Elevation+Wave Setup)
<b>2010-2012 USACE - Storm Surge Data from USACE Planning Study</b>				
Hurricane Isaac With and Without 2012 100-yr HDRRS Evaluation, 2013	LACR West Slidell (West Slidell Vicinity)	10 ft, NAVD88		Water Level
	LACR East Slidell (East Slidell Vicinity)	12.3 ft, NAVD88		Water Level
<b>2017 CPRA - Storm Surge Data from 2017 CPRA Master Plan Model (Wave Information Varies)</b>				
<b>St. Tammany Parish Coastal Protection Project (PO-107) 2020-2021</b>				
St. Tammany Parish Coastal Protection Project (PO-107)-Task II, OTC and NSI, 2020	FEMA WHAFS (Transect 73)	10.5 ft, NAVD88	8.3 ft, NAVD88	Still Water Elevation, No Wave
	FEMA WHAFS (Transect 74)	10.5 ft, NAVD88		Still Water Elevation, No Wave
	FEMA WHAFS (Transect 75)	10.5 ft, NAVD88		Still Water Elevation, No Wave
	St. Tammany Parish Reanalysis (Transect 73)	10.5 ft, NAVD88		Still Water Elevation, No Wave
	St. Tammany Parish Reanalysis (Transect 74)	10.5 ft, NAVD88		Still Water Elevation, No Wave
<b>St. Tammany Parish Coastal Protection Project (PO-107)-Pump Station Requirements for Proposed Coastal Protection Projects, GEC and NSI, 2021</b>				
GEC & NSI (Based on FEMA WHAFS AND ST. Tammany Reanalysis Results)			10.9 ft, NAVD88	Levee Crest Elevation (Still Water Elevation + Maximum Wave Runup + 1 ft Freeboard)
	CPRA 2017 Master Plan, CLARA MODEL, (Point 79411)	11.32 ft, NAVD88	9.81 ft, NAVD88	Storm Surge+Wave Height (2015 Current Condition)
CPRA 2017 Master Plan, CLARA MODEL, (Point 79341)	11.27 ft, NAVD88	9.52 ft, NAVD88	8.17 ft, NAVD88	Storm Surge+Wave Height (2015 Current Condition)
<b>STPG Coastal Processes Model 2022</b>				
Coastal Engineering and Alternative Analysis Memorandum, Slidell Breakwater Restoration, Matt Macdonald, 2022	Mon (Based on Statistical Analysis)	8.9 ft, NAVD88	7.7 ft, NAVD88	Water Surface Elevation (2012 S.R mid point between low and high) for 20 years
	Mon (Based on 2017 CPRA NP ADCIRC-SWAN Model)	10.8 ft, NAVD88	8 ft, NAVD88	Water Surface Elevation (2012 S.R mid point between low and high) for 20 years
<b>2023 CPRA - Storm Surge Data from 2023 CPRA Master Plan Model (Wave Information Varies)</b>				
Su Brown (CPRA) Email to ST, DCD	CPRA 2023 Master Plan (USACE at Location A Levee)	14.33 ft, NAVD88	12.25 ft, NAVD88	Levee Elevation (2023)
	CPRA 2023 Master Plan (USACE at Location B Levee)	15.64 ft, NAVD88	14.69 ft, NAVD88	Levee Elevation (2023, Medium Scenario)
<b>FWP - Data on Storm Water Level Information with 100-YR. Flood Risk Reduction Project</b>				
<b>2020-2024 USACE - Storm Surge Data from USACE St. Tammany Feasibility Study</b>				
USACE St. Tammany Feasibility Study, Storm Surge Assessment for Eden Isle with 100 YR. Levee/Floodwall System	USACE Preliminary Analysis (Point 79411), Original Draft 2021	11.0 ft, NAVD88		Levee Segment Elevations (2020)
	USACE Preliminary Analysis (Point 79141), Original Draft 2021	20.5 ft, NAVD88		Levee Segment Elevations (2020)

Recurrence Interval	Approximate* Elevation (NAVD 88)
100-year	+18.0'
50-year	+11.0'
25-year	+8.5'

*\*Elevations vary among models, locations, methods, features, etc.*

# All Alignments Considered

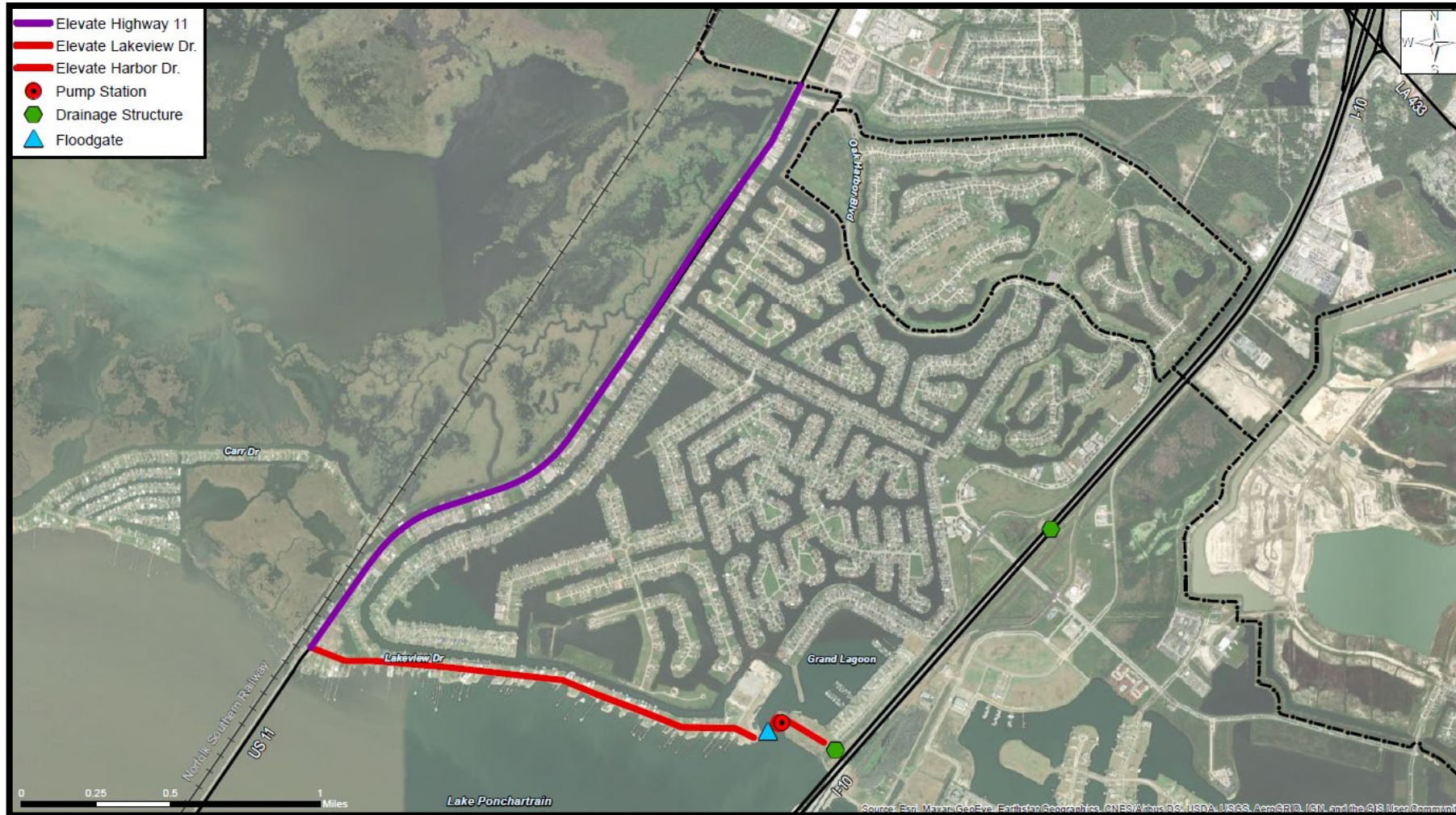


Level of Protection	Cost Range of Different Levels of Protection
25-year	\$117M - \$281M
50-year	\$618M - \$799M
100-year	\$730M - \$3.3B

- In addition to financial costs, significant environmental and landrights challenges for increasing levels of protection.



# Draft Preferred Initial Project Features



- Takes Advantage of Existing Infrastructure Elevations
  - Oak Harbor Levee (+12')
  - I-10 (+10.7 to +12.7')
  - Highway 11 (+5' to +8')
  - Lakeview Dr. (+5' to +6.5')



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# 25-YR to 50-YR Flood Risk Reduction & Resilience Options



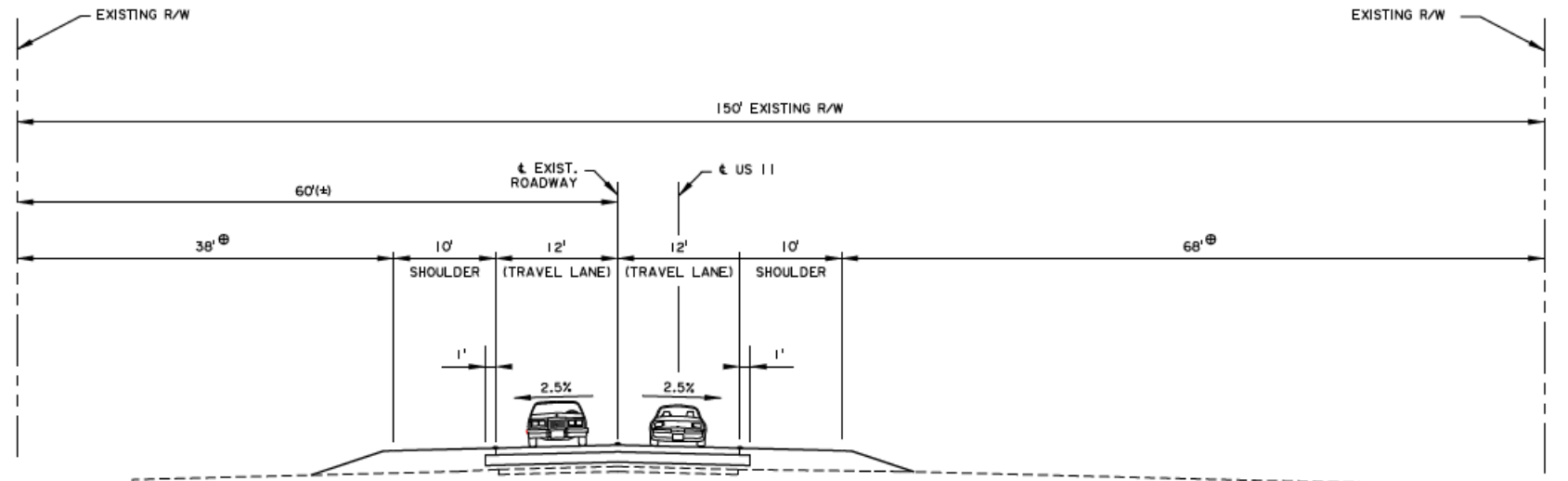
# Highway 11 Option 1 – Spot Elevation Increases

## PROS:

- Least expensive option (\$14-\$19M)
- Limited encroachment on existing structures

## CONS:

- Future floodwall would require road demolition and rebuild



# Highway 11 Option 2 – Median Space for Future Floodwall

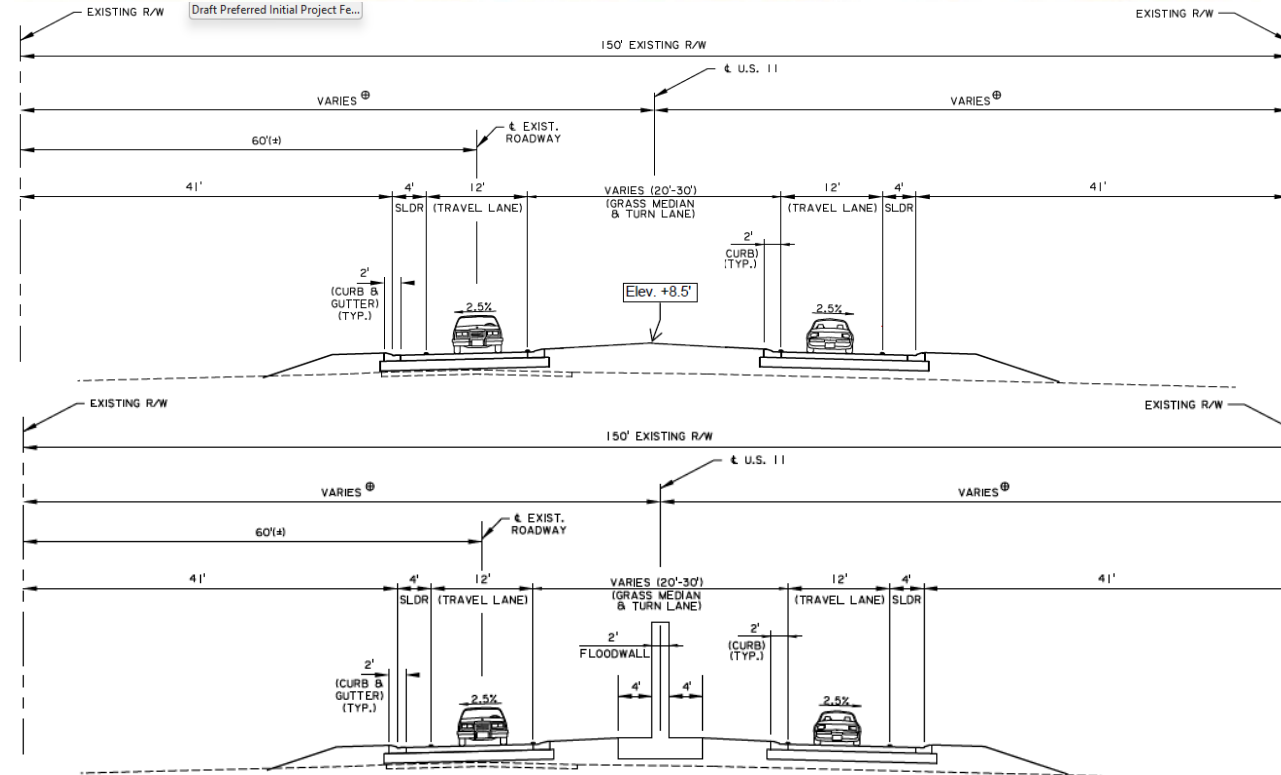
## PROS:

- Construction costs (\$26-35M) are cheaper because of the time value of money.
- Allows for installation of floodwall at a later date with limited impacts to the road.

## CONS:

- More expensive than Option 1
- More encroachment on existing structures

**\*OPTION 2 IS THE RECOMMENDED OPTION**



25-YR

50-YR



## PROS:

- Previously preferred option by DOTD.
- Allows for installation of floodwall at a later date with limited impacts to the road.

## CONS:

- Most expensive option (\$30-41M)
- Most encroachment on existing structures



25-YR

50-YR

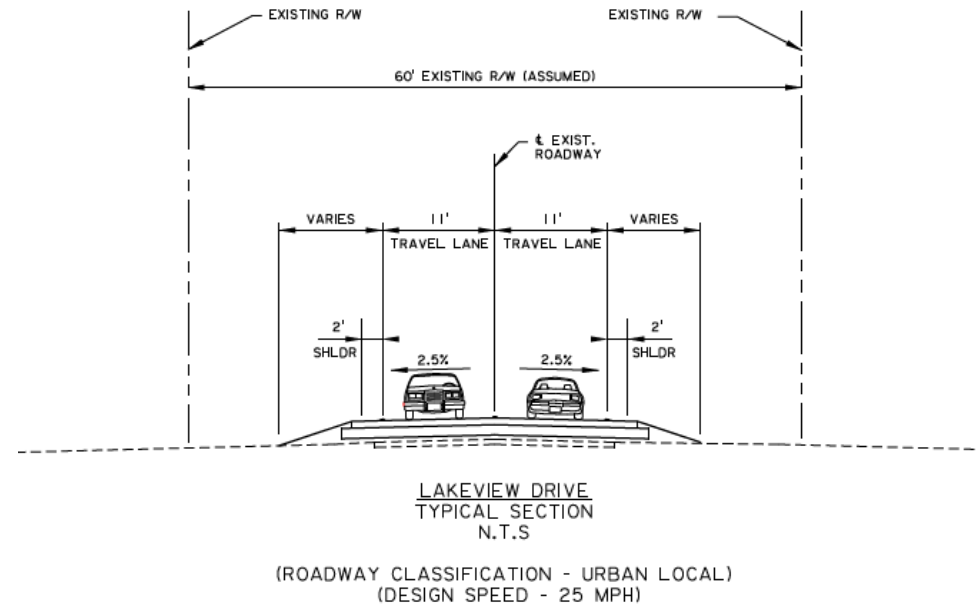
# Lakeview Drive – Option 1

## PROS:

- Cheapest option (\$9M - \$12M).

## CONS:

- Limits the ability to add a floodwall at a later date.
- Design and encroachment challenges



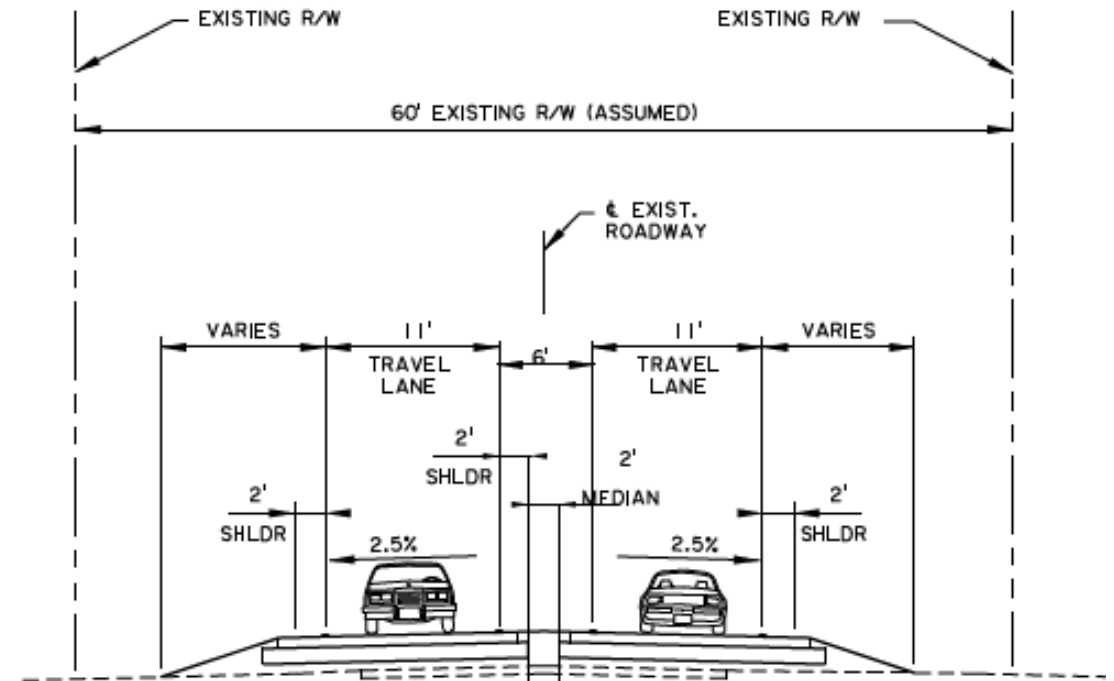


## PROS:

- More space to add a floodwall at a later date.

## CONS:

- More expensive (\$10M - \$13M)
- Additional design and encroachment challenges
  - ROW Extents Unknown
- **\*OPTION 2 IS THE RECOMMENDED OPTION**





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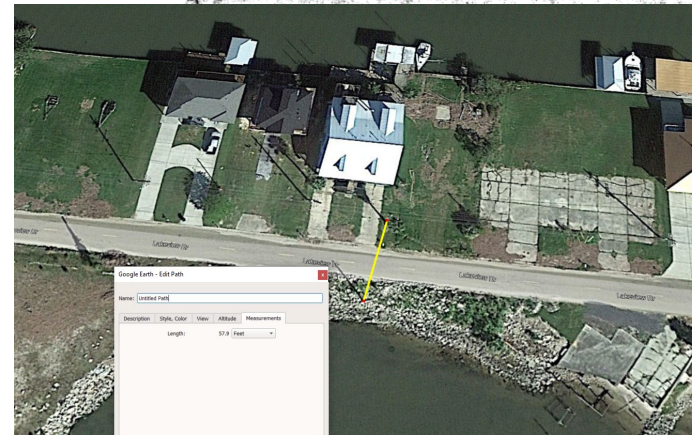
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# Design Challenges



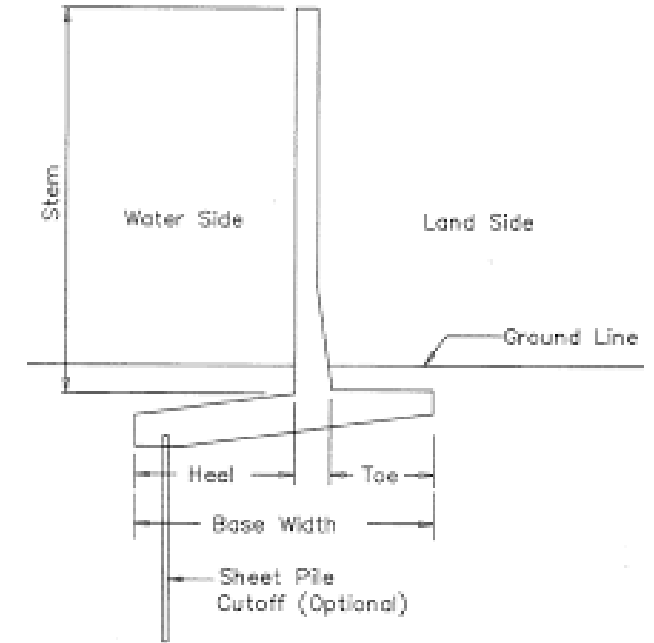
## RIGHT-OF-WAY

- Exact footprint of right-of-way unknown
  - Historic maps from the Parish, tax maps, Google Earth
  - ROW width may dictate top width of embankment
  - If inadequate width, retaining walls or ROW acquisition may be necessary
  - A ROW survey will be required to accurately determine design parameters



## FLOODWALL

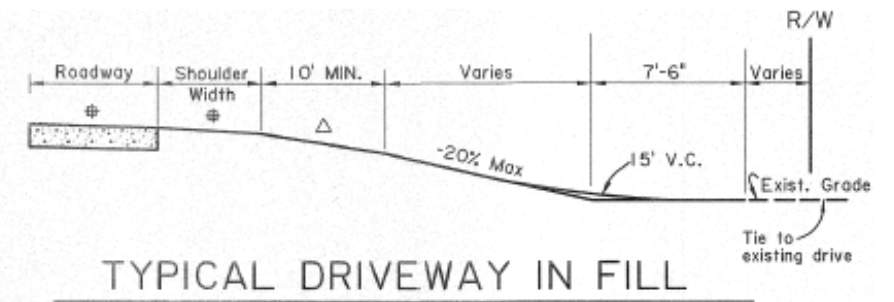
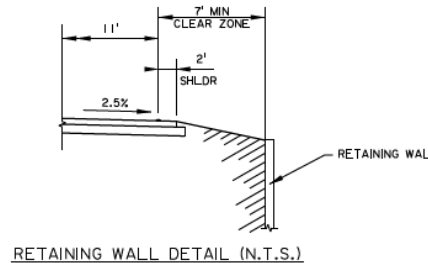
- Foundation design requirements for floodwall / median barrier
  - Wave forces
  - Wall type, footing width, piling depths, determine top of road embankment.
  - Temporary Barriers?





## DRIVEWAYS

- Design challenges for ingress and egress of driveways
  - Increased elevation presents difficulties for driveway access.
  - Floodwall or median barriers prevent challenges for turning in and out, particularly with boats and trailers.



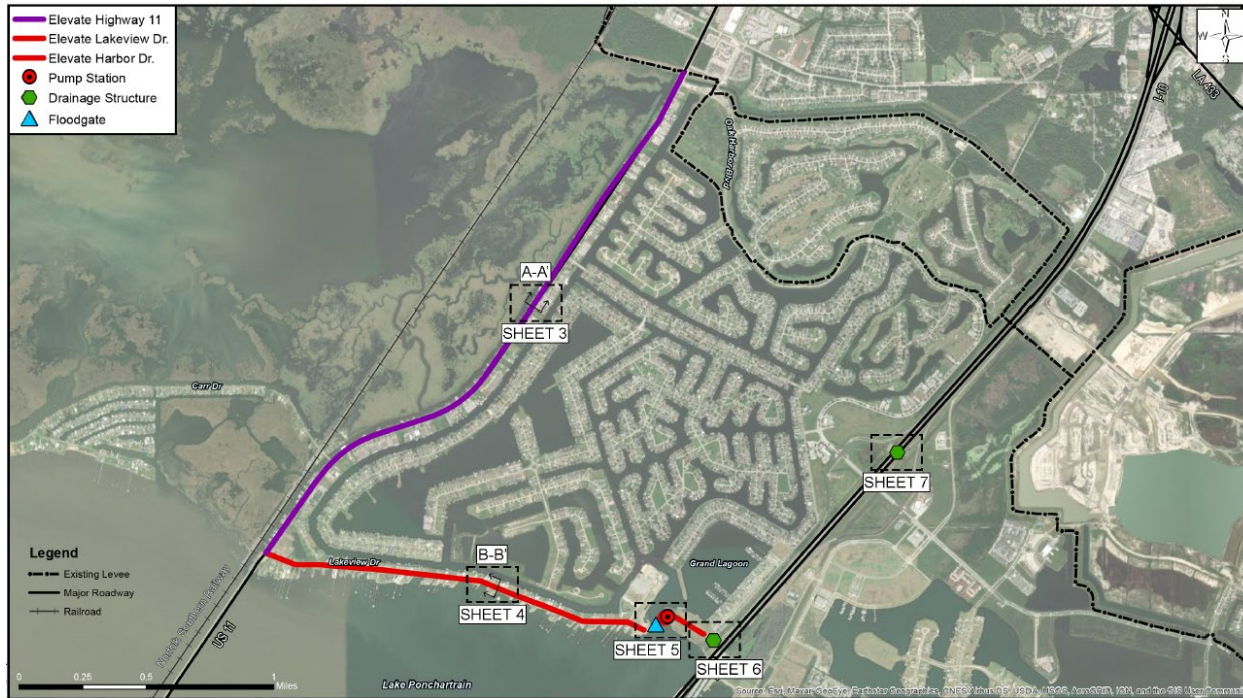


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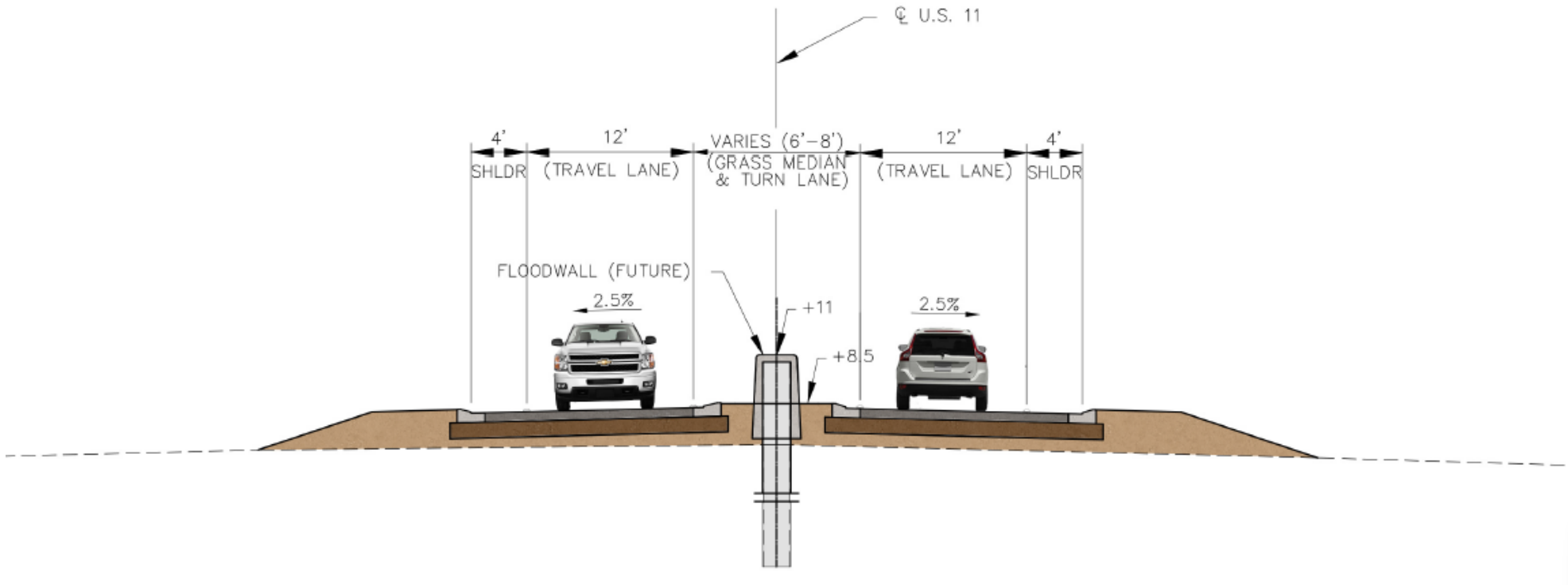
# Conceptual (15%) Design Features





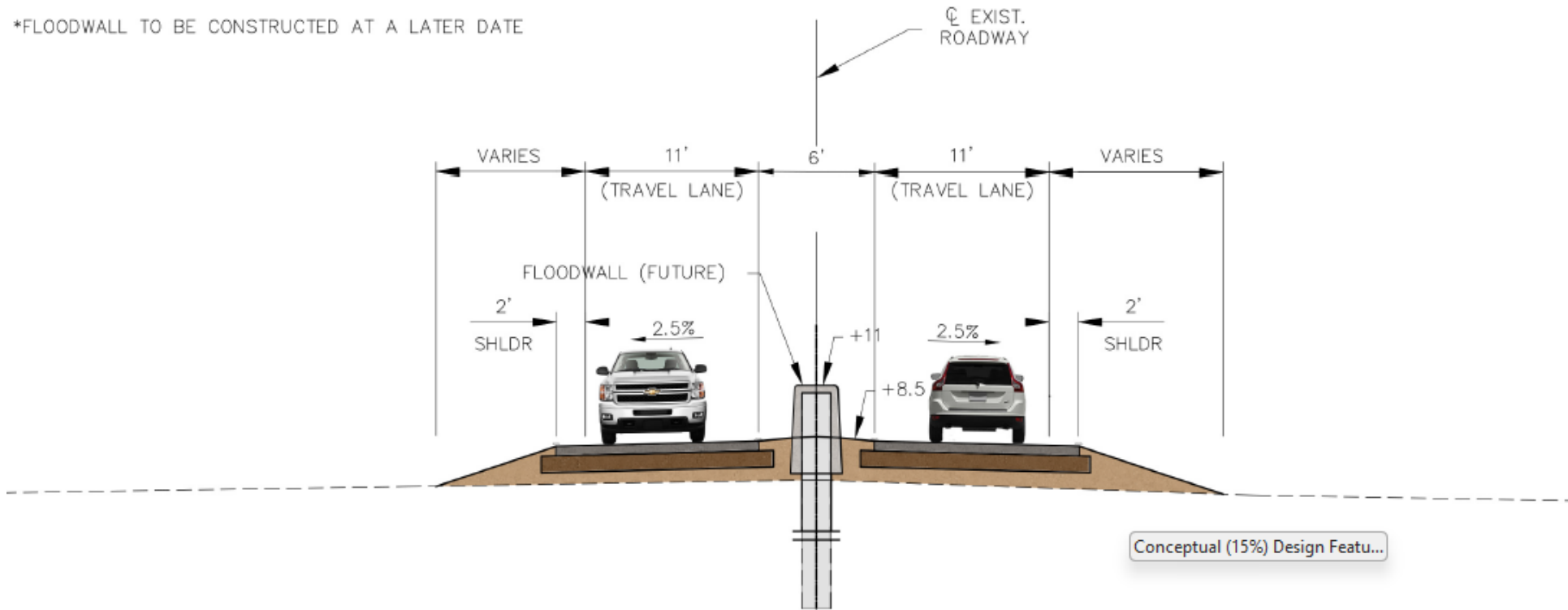
- Total Cost Range (\$132M - \$179M)

- Elevate Highway 11 with median Option 2 (DOTD)
- Elevate Lakeview Drive (maximize embankment width) – Option 2
- Grand Lagoon Barge Gate and Pump Station
- Small drainage structure Harbor Drive tie-in @ I-10.
- One-way drainage structure Oak Harbor Blvd. @ I-10.



## Highway 11 Typical Section

*\*floodwall to be constructed at later date*

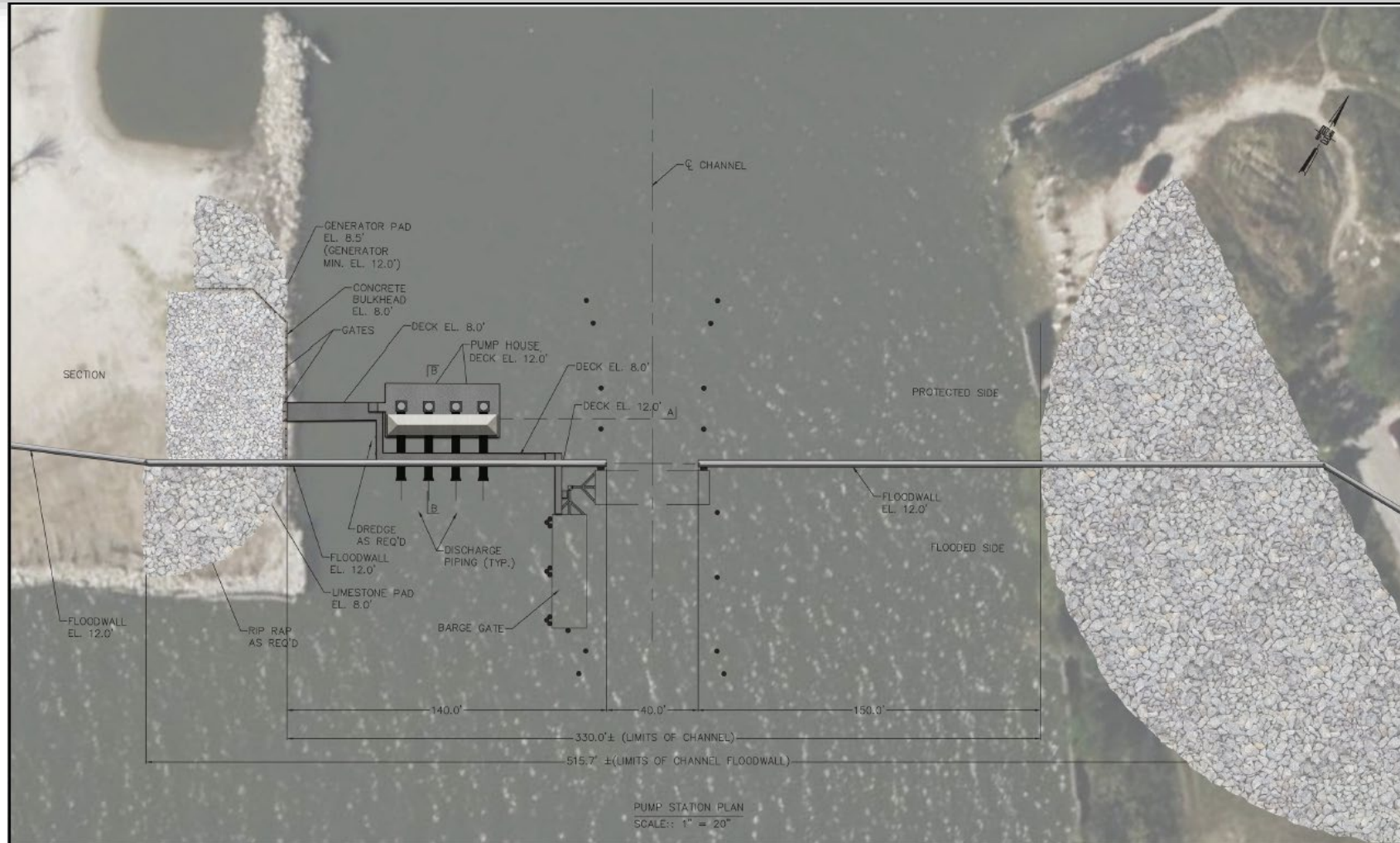


## Lakeview Drive Typical Section

*\*floodwall to be constructed at later date*

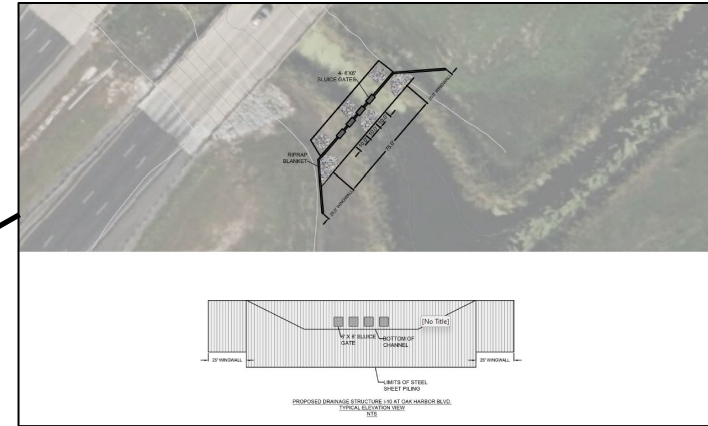
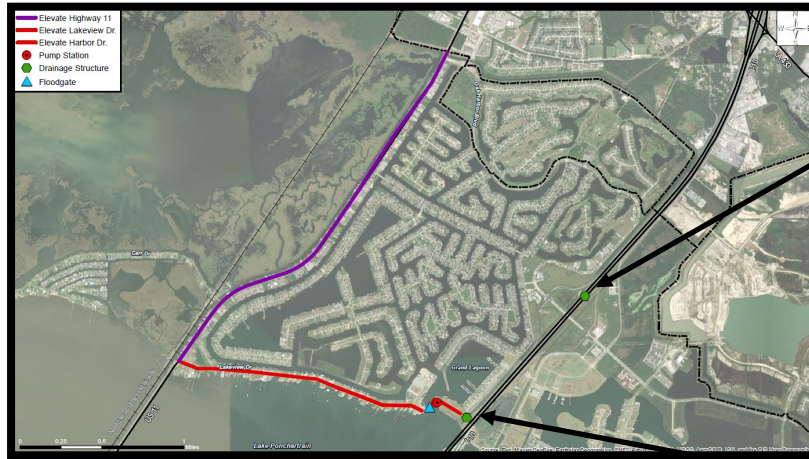


# Conceptual (15%) Design Features

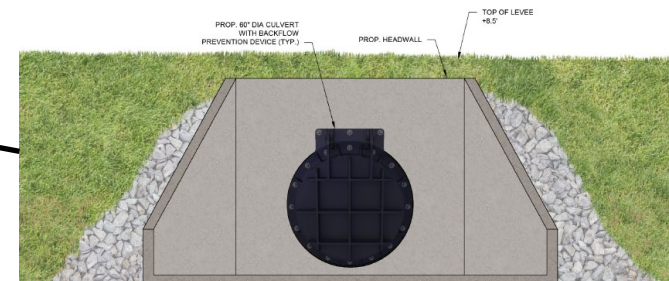


Grand Lagoon Barge Gate and Pump Station

# Conceptual (15%) Design Features



One-way Drainage Structure I-10 @ Oak Harbor Blvd.



One-way Drainage Structure I-10 @ Harbor Dr.



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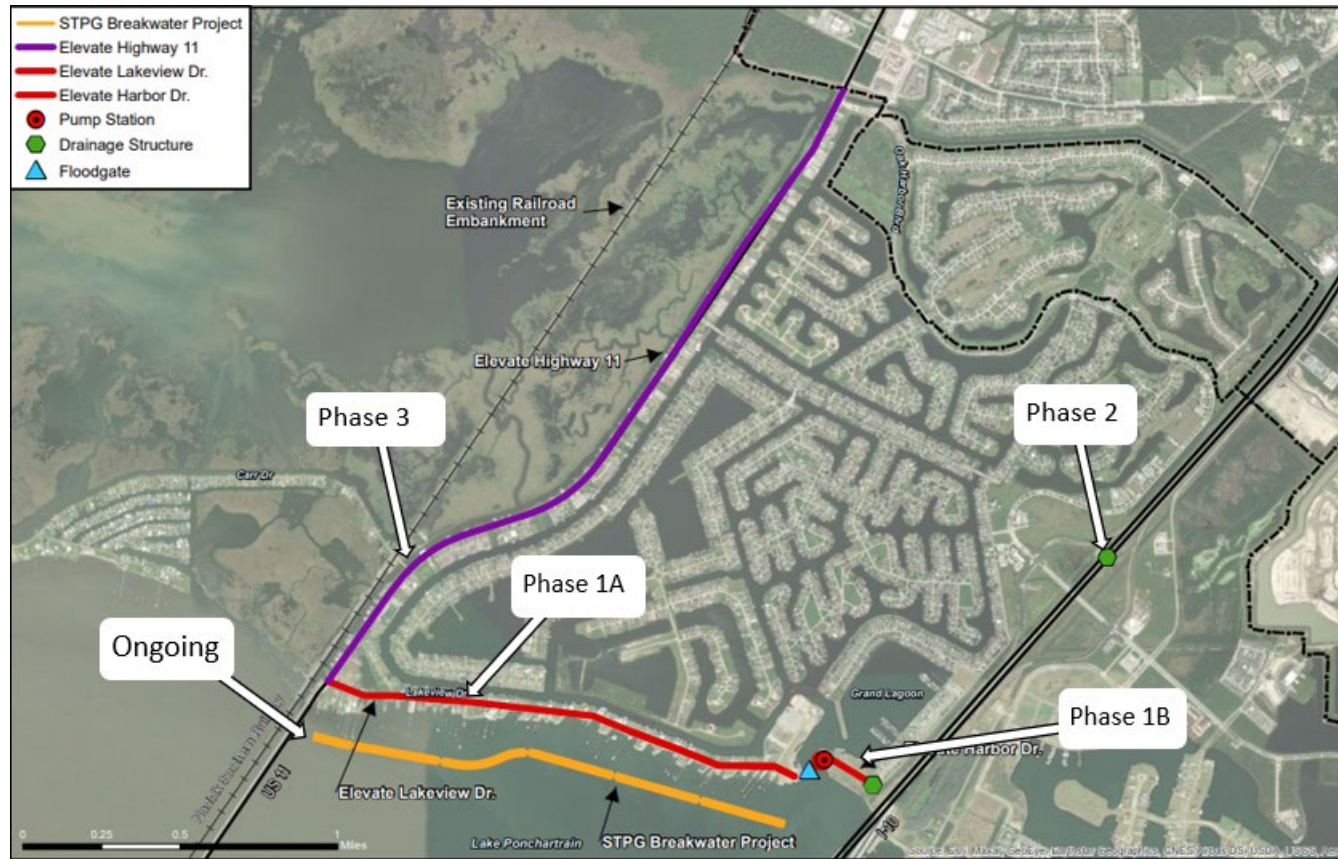
# Summary and Recommendations





- Eden Isle can take advantage of their existing infrastructure to improve flood risk resilience.
- Features:
  - Raise existing roads to +8.5' elevation, leave adequate room for future floodwalls.
    - Maximize embankment width along Lakeview Drive
    - Work through Lakeview Drive design challenges
  - Gated structure and pump station at Grand Lagoon.
  - Two drainage structures @ I-10
- Work with DOTD to design, and construct the Highway 11 portion
- Implement in a phased approach

# Phased Implementation



- Phase 1A – Elevate Lakeview Drive
- Phase 1B – Construct Grand Lagoon Structure and Pump Station, drainage structure, elevate Harbor Drive.
- Phase 2 – Construct I-10 Drainage Structure
- Phase 3 – Work with DOTD to re-initiate the Highway 11 portion
- Phase 4 – Evaluate the potential for 50-year level of protection at a later date