BMA, INC.

DATAW ISLAND BRIDGE REPLACEMENT FEASIBILITY STUDY

Dataw Island Property Owners Association
Dataw Island · Beaufort, SC
March 11, 2024

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BMA, INC.

Dataw Island Bridge Replacement

Due Diligence & Feasibility Report

Dataw Island, SC
March 11, 2024

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EXECUTIVE SUMMARY

The purpose of this study was to determine the optimum course of action for the replacement of Dataw Island's 180-foot long access bridge, which was constructed in the mid-1980's. Two critical factors were considered in the study:

- The condition of the existing causeways on either side of the bridge, and whether the causeways can be reincorporated into a new access bridge or if they should be abandoned

- The location of the new bridge itself and whether the original alignment can be maintained, or an alternate route should be taken from the mainland to Dataw Island

The study was divided into two primary tasks: a due diligence effort followed by a risk assessment and analysis of critical design factors and environmental issues. Based on these analyses, various layout alternatives for the new access to the island were developed with associated benefits, disadvantages, and cost estimates.

Following are the critical findings of this study:

- The existing bridge is at the end of its originally intended service life. Multiple rehabilitation efforts over the past several years have extended this service life, but the risk of a bridge failure or downrating is too great to continue with repairs – the bridge must be replaced within the next three to five years.

- Based on multiple critical design factors, the new bridge deck must be raised a minimum of four feet above the existing. This then triggers the need to raise the causeway to meet the new bridge elevation.

- Based on additional design factors and regulatory/environmental issues, the causeways cannot be reused cost-effectively and must be replaced with additional length of bridge.

- Based on the highly sensitive issue of maintenance of traffic during construction, the new bridge should be relocated adjacent to the existing roadway, followed by complete removal of the existing bridge and causeways.

The following report explains the findings in detail, providing further supporting documentation, along with layout and cross section exhibits and preliminary cost estimates.

DUE DILIGENCE EFFORT

For the due diligence effort, extensive information was gathered on the bridge subject including the following critical items:

- Original design drawings for the current bridge and causeways
- Prior bridge inspection reports and structure rehabilitation project drawings
- Tree and topographic survey of the existing island access way including roadbed, causeways, bridge, upland transitions, and critical lines (non-certified)
- Geotechnical report including two soil borings (standard penetration tests) and a conditions assessment of the causeway (slope stability analysis)
- Critical water elevation data (mean high water, mean low water, 100-year flood elevation, storm surge data, regulatory and navigational elevation requirements)
- Disposition of all current utility crossings including any planned relocations
- State and federal regulatory rules and requirements, and Beaufort County codes

The above information was used to create a master AutoCAD base sheet of the existing roadway plan view and typical cross sections through the bridge and causeways. This information was also used to develop opinions on risk assessment, design factors, and environmental issues surrounding possible bridge replacement.

FEASIBILITY STUDY

Using information gathered in the due diligence effort, an analysis of potential bridge replacement options was conducted using the following three primary elements:

- Risk assessment
- Critical design factors
- Environmental issues

Risk Assessment

The risk associated with even a partial loss of use of the existing bridge or causeways would present a significant impact to residents and life safety issues; therefore, risk tolerance is extremely low.

The life expectancy of a bridge constructed in the 1970's-1980's of this design style (concrete substructure with concrete hollow-core beams) is typically 40 years. Since the bridge was constructed in 1983, it should be considered at the end of its originally intended useful life. However, multiple rehabilitation efforts have helped to extend the service life.

JMT Structural Conditions Reports and Rehabilitation Projects

Multiple structural inspections over the past 10 years have confirmed the onset of significant deterioration of the bridge substructure, attributed to its proximity to salt water. Following are the highlights of several bridge inspection reports and rehabilitation efforts dating to 2015:

- 2015 – completed major rehab project with 24 individual concrete repairs
- 2016 – estimated 10-15 years of remaining service life (approximately 2026-2031)
- 2020 – inspection found 34 defects, recommended replacement in 2025 or 2030
- 2022 – completed major rehab project with 37 individual concrete repairs
- 2023 – reported exponential increase in deterioration; future patching may not be an option

Given JMT's multiple warnings including clear indications of continued structural deterioration and limited success in repairing this type of structure, additional repair or rehabilitation efforts will soon become no longer structurally reliable or financially effective, if not already.

Roadbed Elevation vs. Corrosion and Storm Events

The risk of partial or total failures of the bridge structure and/or causeways continues due to the continual exposure to salt water, both during extreme high tides and storm events. The current elevation of substructural members is at mean high water; that is, normal high tides continue to expose the lower structure to saltwater inundation almost daily. Spring and fall extreme tides and instances of other extreme high tides due to storm events exacerbate the effects of saltwater inundation, continuing to put the bridge at risk.

To understand the negative impacts of high tides and saltwater on the current bridge substructure, one must look at current standards in bridge design as directed by the South Carolina Department of Transportation (SCDOT). The current bridge beam bottoms are located at the 10-year storm flood

elevation, which means during a 10-year storm event, the main structural beams of the bridge will experience saltwater wetting and partial inundation. The SCDOT's standards call for the bottom of structural beams to be located a minimum of two feet above this 10-year storm elevation plus the height of the anticipated wave (approximated at one foot). Therefore, according to current SCDOT bridge design standards, the bottom of the lowest bridge chord (longitudinal member) should be raised three feet above current conditions. At a bridge beam thickness of two feet, then the new bridge deck elevation would be approximately four feet above the existing.

Additionally, the National Oceanic and Atmospheric Administration (NOAA) predicts a minimum 12-inch increase in sea level over the next 40 years. This prediction would then necessitate an additional foot of bridge elevation, such that the proposed bridge deck elevation would be five feet above the existing deck elevation. The figure below further explains this situation (see also proposed bridge cross sections at the end of the report):

Water Level Data for Dataw Island Bridge

- 100-yr Storm Elevation -10.9 NAVD88
- 50-yr Storm Elevation - 8.7 NAVD88
- Existing Bridge Elevation - 7.1 NAVD88
- **10-yr storm elevation - 6.0 NAVD88**
- Mean High Water Elevation - 2.9 NAVD88

- **SCDOT standards would require bridge deck at approximately 11.0 NAVD88**

- **NOAA-predicted sea level rise of 12" in 30 years puts bridge deck at 12.0 NAVD88**

These design standards (based on structural concrete developments and elevation above saltwater) result in a 65-year life for new concrete bridge structures, or over 60% longer than the original bridge life.

Geotechnical Analysis of Causeways

A third risk factor in analyzing the existing roadway onto the island is the condition of the causeways. Several factors indicate issues of concern with the causeways:

- Asphalt conditions indicate some settlement and edge failures
- Causeway elevations vary up and down significantly, indicating settlement over time
- Anecdotal evidence shows that various portions of the causeways have required restoration over the years including the addition of bulkheads in isolated areas along the causeway lengths and the addition of rip rap on some slopes
- Side slopes on the causeways (1:1) indicate a steepness beyond current design standards (2:1)

Additionally, the above observations regarding extreme high-water elevations apply to the causeways as well. That is, the roadbed elevation of the causeways in some areas is just above the 10-year storm flood elevation (still water, excluding any wave action). This low elevation of the causeway structures leaves the roadbed exposed to the risk of undermining and/or overtopping.

Bridge Replacement Timing

Given the significant impacts to residents during a roadway failure, combined with the accelerating deterioration and exposure to storm events, the bridge replacement should be accomplished within the next three to five years. Given modern standards for bridge elevations over saltwater creeks and marshes, the new bridge deck should be elevated a minimum of four feet above the existing deck (five feet with NOAA sea level rise factored in). The approaches to the bridge (causeways or additional bridge length)

should also be elevated to this same height to remove/reduce the potential for a roadway failure in the new bridge's 65-year lifetime.

Critical Design Factors

The four primary, critical design elements for the new bridge and roadway include roadbed elevation, bridge width, maintenance of traffic during construction, and environmental impacts.

Roadway Elevation

As a continuation of the above comments regarding extreme high-water events, following is a summary of the critical water elevation design criteria for bridge structure clearance above a tidal creek:

- 100-yr Storm Elevation 10.9 NAVD88
- 50-yr Storm Elevation 8.7 NAVD88
- **Existing Bridge Elevation 7.1 NAVD88**
- 10-yr storm elevation 6.0 NAVD88
- Mean High Water Elevation 2.9 NAVD88

- **New bridge deck elevation (SCDOT) 11.0 NAVD88**
- **New bridge deck elevation (plus NOAA tide predictions) 12.0 NAVD88**

While the bridge will not be required to meet SCDOT standards since it is a privately owner and maintained roadway, the state standards for bridge elevation criteria are similar to that of many other coastal states; these elevation guidelines would also meet an engineer's required standard of care in design.

Bridge Width

The minimum width of the new bridge, based on two 12-foot lanes, standard slab widths, and associated guardrails, is 27 feet. A six-foot wide sidewalk could be added, creating a 33-foot wide bridge. The bridge width will have serious cost implications, as the causeway or bridge extension will also need to be constructed at the same width.

For purposes of early layout and budgeting exercises, sidewalks were included in the proposed bridge cross sections. It should be noted that sidewalks are not required by any standards or codes. However, the sidewalks do provide two benefits: 1) the presence of an elevated sidewalk alleviates to some extent the structural requirements for the guardrail system, and 2) the presence of a sidewalk does allow for and encourage safe pedestrian usage.

As the cost implications are significant, the inclusion of sidewalks is ultimately the residents' decision.

Maintenance of Traffic During Construction

In any bridge and/or causeway reconstruction, safe and convenient access to the island must be maintained. This would include access by the following parties:

- Residential traffic, marina patrons, golf course patrons, etc.
- Construction vehicles (crews, material deliveries, concrete trucks, truck cranes, etc.)
- Life Safety vehicles and equipment (fire, ambulance, law enforcement, power, plumbing, etc.)

A safe flow of traffic to and from the island during the bridge and causeway reconstruction project can be handled through three primary means:

- Temporary vehicular bridge (to reroute traffic around construction zones)
- Maintenance of traffic (through the extensive use of temporary traffic signals, one-way traffic, flaggers, temporary closures, etc.)
- Relocation of new roadway (to allow continued use of existing roadway while new roadway is constructed)

The temporary bridge option presents significant costs and environmental concerns. The maintenance of traffic option creates substantial logistical obstacles, resulting in increased costs and duration of construction. This leaves relocation of the new roadway as the most efficient approach.

Environmental Issues

As mentioned above, in addition to raising the bridge deck elevation, the causeways would need to be raised – at least partially – to account for the roadbed rise to meet the new bridge. This raising of the causeway elevation results in two critical impact issues:

- To raise the causeway, the side slopes would need to be reconstructed – at a gentler slope and a wider base. This effective widening of the causeways would result in significant impacts to critical areas (marshes), which would in turn create an extremely difficult, if not impossible, regulatory permitting effort.
- Additionally, this raising and widening of the causeways would trigger a great deal of settlement of the roadways, which would need to be managed through a time-consuming compaction effort. Effectively, the causeways would need to be closed to traffic for a period of not less than one year in order to surcharge the causeways and reach a point of stabilization.

Therefore, even if the regulatory permits could be accomplished, the structural requirements for raising the causeways would result in a tremendous impact to Maintenance of Traffic. Following is a more detailed discussion of environmental impacts and regulatory permitting related to a potential causeway widening.

Dataw Island is one of many sea islands that make up the unique ecosystem from Georgetown, SC, to Jacksonville, FL, commonly referred to as the salt marshes of the Southeast. The salt marsh of South Carolina is a much-studied ecosystem, describing the productivity, diversity, and sensitivity of this unique habitat. Dataw Island is surrounded by two subsystems, the subtidal and the intertidal. Open water sounds, bays, and tidal rivers and streams make up the subtidal subsystem. The intertidal subsystem consists of beaches, sandbars, flats, oyster rocks, marshes, etc., exposed by tidal action. These two subsystems contain vibrant, productive biological fauna, from fish, crabs, shrimp, and oysters to wading birds, marine mammals, turtles, and other mammals such as raccoons, otters, and mink. Regulatory rules

protect these saltmarsh habitats, which are designated as critical areas, thus requiring special permits for **any** activity taking place in and around the salt marsh.

The two overarching regulatory authorities with oversight on saltmarsh impacts are the US Army Corps of Engineers (Corps) and the SC Department of Health and Environmental Control Office of Coastal Resources Management (DHEC-OCRM). These two agencies have the regulatory and enforcement responsibilities for protecting saltmarsh habitats. They both have oversight of bridge construction within critical area tidelands and waters that include **temporary** damages to saltmarsh and shellfish beds, temporary increased turbidity, permanent displacement of marshes by installation of pilings, and permanent shading of marsh. The key regulatory provisions from DHEC pp. 22-23, 30-12 are:

> (*8) Causeways.*
> *(a) Permanent filling of critical areas for access to coastal islands is prohibited, except for fill associated with existing useable causeways.*
> *(b) Existing useable causeways are defined as those causeways that have a drivable lane above the critical area.*
> *(i) Permits for fill associated with existing usable causeways shall be granted only for minor fills that are minimized by use of containment structures to limit to the maximum extent feasible the square footage of fill, and where the fill would cause less damage to the critical area than would be caused by construction of a new bridge or other access structure.*
> *(ii) Mitigation for critical area fill at a ratio of 2:1 will be required for fill associated with existing usable causeways.*

Additionally, all other relevant federal statutes will require approvals including, at a minimum, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, etc.

Within these constraints, every bridge option that increases impacts to the marsh will not only undergo additional regulatory state and federal staff review, but also public review from all parties (local and state NGOs and community groups, e.g., Coastal Conservation League, SC Environmental Law Project, Protect St. Helena Island, etc.). Use of federal funds would create another layer of oversight. The cost of addressing comments and attending meetings becomes substantial for major activities. For example, for 'minor' activity in the critical area, public review is 15 days versus a 30-day review period for a 'major' activity, which may include a request for public meetings.

Following is various pre-application feedback from DHEC-OCRM, ACOE, and the US Coast Guard, as garnered by BMA's environmental subconsultant, Brooks Environmental Consulting Services:

- Options that do not include fill would primarily deal with DHEC-OCRM. Interfacing with Corps staff would only be marginal.

- Options that include fill (e.g., widening the causeways) would require a full-scale Corps permit application process.

- Any critical area impacts would require mitigation and the only available saltwater mitigation banks are solely for SCDOT projects.

- Widening (or filling) the existing causeways would require a herculean effort from a financial standpoint, timeframe, and a regulatory standpoint; appeals against any agency approvals would be very likely filed by environmental groups, with potential for protracted litigation.

Essentially, the farther the bridge options move away from ‘bridging’ over the critical area towards options that include impacts to the critical area, the more complicated, lengthy, and costly the permitting process will become – and with a lower likelihood of success.

BRIDGE REPLACEMENT OPTIONS

Following the due diligence effort and in conjunction with the feasibility study, a detailed analysis of bridge rehabilitation and replacement options was conducted.

Rehabilitation Option

Based on multiple observations made in prior JMT bridge rehabilitation projects and inspection reports, the bridge is nearing the point where concrete repairs will no longer be effective.

As the degradation of the concrete continues, the prestressing strands and reinforcing steel will continue to corrode and fail. In fact, several of the prestressing strands have already failed. There is no method to restore design capacity to a prestressing strand once it has failed.

Additionally, there are no proven techniques to rehabilitate hollow-core box beams or restore service life to them once the deterioration has reached a certain point – a degree to which the Dataw Island Bridge has reached and exceeded. Any concrete restoration efforts from this time forward can only serve to reduce the speed of the deterioration process, not stop it or reverse it. In fact, of the 37 individual repairs identified by JMT in the February 2022 rehab project, by December 2022, this quantity had been increased to 63 repair items. Further, JMT found eight of those 63 repairs already to be failing during their post-work inspection in September 2023.

A downgrade of the carrying capacity of the bridge should be a risk too great to allow (see comments above about vehicle types that use the bridge on a daily basis). Interruption to construction and life safety vehicles and equipment is a serious consideration.

Given the above factors, continued rehabilitation of the existing bridge structure is not a viable long-term option. The bridge must be replaced.

Replacement Options

While the existing bridge and design elevations have served the community well for 40 years, there are two key factors that necessitate the raising of the bridge elevation.

Modern design standards dictate that the substructure (pile caps) should be elevated such that normal high-water elevations do not reach the structure. In fact, studies have shown that the further above saltwater tides a bridge structure is situated, the longer service life the bridge will experience. As mentioned above, modern design standards – and in most cases, actual codes – dictate that a bridge be designed with a 65-year life expectancy. Were the Dataw Island Bridge governed by SCDOT standards, this 65-year life would be a design requirement. But, in any case, this design life would represent an appropriate standard of care by the design professional. This service life goal is particularly warranted given the high cost of modern vehicular bridge structures.

As mentioned above, anecdotal evidence shows that the bridge has indeed been overtopped. And the water level data show that the bridge would be nearly overtopped during a 10-year storm event. The bridge would be significantly overtopped during a 25, 50, or 100-year storm event (the likelihood of occurrence being 4, 2, and 1% per year, respectively). To design a bridge with the full knowledge that it will likely be overtopped (and significantly, degraded more rapidly) would not represent a proper standard of care by the design professional.

Based on the critical opinion that bridge replacement should include elevating the bridge by a minimum of four to five feet, following are the four bridge replacement options developed in lieu of continued rehabilitation efforts:

- Replacement Option 1A – maintain current bridge location and length; partially raise causeways
- Replacement Option 1B – maintain current bridge location and length; fully raise causeways
- Replacement Option 2 – slightly relocate and lengthen bridge to minimize reuse of causeways
- Replacement Option 3 – completely relocate and lengthen bridge to eliminate reuse of causeways

Following is a detailed explanation of each option followed by layout plan exhibits, typical cross sections, and cost estimates:

Replacement Options 1A and 1B

The basic premise of both Option 1A and Option 1B is that the current bridge location and length will be maintained. The bridge will be elevated four to five feet as explained above. In both options, the approaches to the bridge from each end will be raised to meet the new bridge elevation. The difference between the two options is that in Option 1A, both entire causeway lengths will be raised back to the mainland and to the island. Option 1B shortens the section of causeways to be raised; the causeways will only be filled and raised to the minimum length required by standard roadway slopes. (The two layout differences are clarified in the attached exhibits).

There are several significant drawbacks to Options 1A and 1B:

- Both pose significant environmental hurdles due to the raising of the causeways
- Both will require surcharging of the causeways, which will extend the project time and increase traffic disruption
- In order to minimize environmental impacts, both options would need to employ the use of costly steel sheetpile seawalls along both sides of the causeways
- In order to minimize traffic disruption, both options would require the use of a temporary bridge trestle to reroute traffic; the temporary bridge is very costly and also creates additional environmental impacts
- Further, Option 1B would not completely remove the risk of the continued erosion and settlement of the causeways or overtopping/failure of the non-raised sections of causeway

Given these significant drawbacks, along with the higher construction costs, it is recommended that these options be considered not viable and discarded.

Replacement Option 2

Layout Option 2 assumes that reuse of the causeways in any manner is not viable and, therefore, contemplates bridging the entire distance from the mainland to the island. Option 2 provides a direct route from the mainland to the island, crossing over the existing roadway as necessary. It also requires minimal impacts to Bobb Island, thus leaving the island open for alternate uses. Option 2 does have drawbacks including the following:

- It requires a fairly complex maintenance of traffic, particularly during the crossing of the existing roadway with the new roadway. Traffic will be routed from the existing road to the new halfway

through construction, then rerouted further as the second phase of the bridge is finalized.
- Option 2 has a significantly high cost estimate
- Option 2 does away with the jog in the current access road, straightening the access (this may be considered a pro or a con, depending on the perceived aesthetic of "arriving" on the island)

Even with these drawbacks, Option 2 is a viable alternative and presents a much less complex regulatory permitting effort as well. In this option, the existing causeways and bridge would be completely removed upon completion of the new bridge, which could provide opportunities for use as mitigation at a separate or outside party project.

Replacement Option 3

Like Option 2, Layout Option 3 assumes a complete removal of the causeways and bridging the entire distance from the mainland to the island. The clear difference in Option 3 is that the route takes a wide sweep north/east of the existing roadway, thus almost completely removing the maintenance of traffic issue: the new construction will not disrupt the traffic patterns, and the traffic will only be rerouted one time, upon completion of the new bridge.

Option 3 provides a potentially "grander" entrance onto the island with a sweeping curve along the northeastern marshes. And Option 3 also provides for the possible use of the causeway removal as mitigation at a separate or outside party project.

The higher cost of Option 3 as compared to Option 2 is the only real drawback. However, both Options 2 and 3 are less expensive than Option 1A.

FINAL RECOMMENDATION

Based on the extensive due diligence effort and analysis of risk assessment, critical design factors, and environmental issues, following are the critical findings of this study:

- The existing bridge is at the end of its originally intended service life. Multiple rehabilitation efforts over the past several years have extended this service life, but the risk of a bridge failure or downrating is too great to continue with repairs – the bridge must be replaced within the next three to five years.

- Based on multiple critical design factors, the new bridge deck must be raised a minimum of four feet above the existing. This then triggers the need to raise the causeway to meet the new bridge elevation.

- Based on additional design factors and regulatory/environmental issues, the causeways cannot be reused cost-effectively, and must be replaced with additional length of bridge.

- Based on the highly sensitive issue of maintenance of traffic during construction, the new bridge should be relocated adjacent to the existing roadway, with the existing bridge and causeways being removed afterwards.

Options 2 and 3 both meet all project goals at relatively lower costs than Option 1A. Option 3 further meets the crucial goal of minimizing disruption to traffic and daily life and is, therefore, the recommended layout option for the Dataw Island Bridge replacement.

The following pages contain layout plan exhibits, typical cross sections, and preliminary estimates of construction costs to further support the opinions and findings in the report.

THE FOLLOWING PAGES CONTAIN:

PRELIMINARY ESTIMATES OF CONSTRUCTION COSTS

BRIDGE REPLACEMENT LAYOUT OPTIONS AND CROSS SECTION EXHIBITS

Any questions on the above report should be directed to Bolchoz Marine Advisors, Inc.

Dataw Island Bridge Replacement Options - Summary			by Bolchoz Marine Advisors, Inc.
Preliminary Estimate of Construction Costs			12/15/2023
Option	**Budget Numbers**	**w/ Contingency**	**Notes:**
Option 1A	$16,351,300	**$17,986,430**	Same roadway path, raise bridge and causeway 5 feet
Option 1B	$12,069,800	**$13,276,780**	Same roadway path, raise bridge and partial causeway 5 feet
Option 2	$14,185,000	**$15,603,500**	Bridge entire roadway, raise 5 feet, remove causeways
Option 2 no sidewalks	$13,140,000	**$14,454,000**	Bridge entire roadway, raise 5 feet, remove causeways
Option 3	$15,100,000	**$16,610,000**	Bridge entire roadway, raise 5 feet, remove causeways
Option 3 no sidewalks	$13,575,000	**$14,932,500**	Bridge entire roadway, raise 5 feet, remove causeways
		Note: Numbers are based on similar bridge projects throughout the coastal	
		Southeast. Estimate is preliminary, based on limited design effort to date.	
		Construction costs will fluctuate depending on availability of contractors and	
		labor and material costs at time of construction.	

Dataw Island Bridge Replacement - Option 1A					by Bolchoz Marine Advisors, Inc.
Preliminary Estimate of Construction Costs					**12/15/2023**
		10%			
Item	**Base Number**	**10% Contingency**	**TOTALS**		**Notes:**
Soft Costs	$450,000	$45,000	$495,000		regulatory permitting, geotech, surveying, design, bid process
General Conditions, Mob / Demob	$2,000,000	$200,000	$2,200,000		general conditions, bonds, mob/demob, fencing, staging area setup, etc.
Existing Bridge Removal	$200,000	$20,000	$220,000		demolition and disposal of existing concrete bridge
Causeway Bulkheads	$2,508,000	$250,800	$2,758,800		steel sheetpile bulkheads on both sides of existing causeways
Causeway Backfilling	$300,000	$30,000	$330,000		backfill between bulkheads and Bobb Is to raise roadbed elevation 5'
Temporary Vehicular Bridge	$7,301,300	$730,130	$8,031,430		temporary two-lane bridge for rerouting traffic, based on two years
Temporary Construction Trestle	$300,000	$30,000	$330,000		temporary trestle to be leapfrogged adjacent to new bridge structure
Bridge Approach Slabs	$100,000	$10,000	$110,000		concrete approaches at bridge ends
Bridge Abutments	$200,000	$20,000	$220,000		sheetpile structures at each end of bridge
Bridge Substructure	$800,000	$80,000	$880,000		concrete piles and pile caps, furnished and installed
Bridge Superstructure	$600,000	$60,000	$660,000		prestressed concrete deck slabs
Barrier Walls	$72,000	$7,200	$79,200		basic concrete walls along sides of bridge
Asphalt Topping	$470,000	$47,000	$517,000		roadbed, no sidewalk
Site Work - Road Tie-in (north)	$25,000	$2,500	$27,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (south)	$25,000	$2,500	$27,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (Bob Is)	$0	$0	$0		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Maintenance of Traffic	$200,000	$20,000	$220,000		allowance for maintenance of traffic
New Guardhouse	$600,000	$60,000	$660,000		allowance for new guardhouse and gates
Construction Admin Services	$200,000	$20,000	$220,000		construction oversight, administrative services, inspections
	$16,351,300	$1,635,130	**$17,986,430**	**TOTAL BUDGET**	
					Note: Numbers are based on similar bridge projects throughout the coastal
					Southeast. Estimate is preliminary, based on limited design effort to date.
					Construction costs will fluctuate depending on availability of contractors and
					labor and material costs at time of construction.

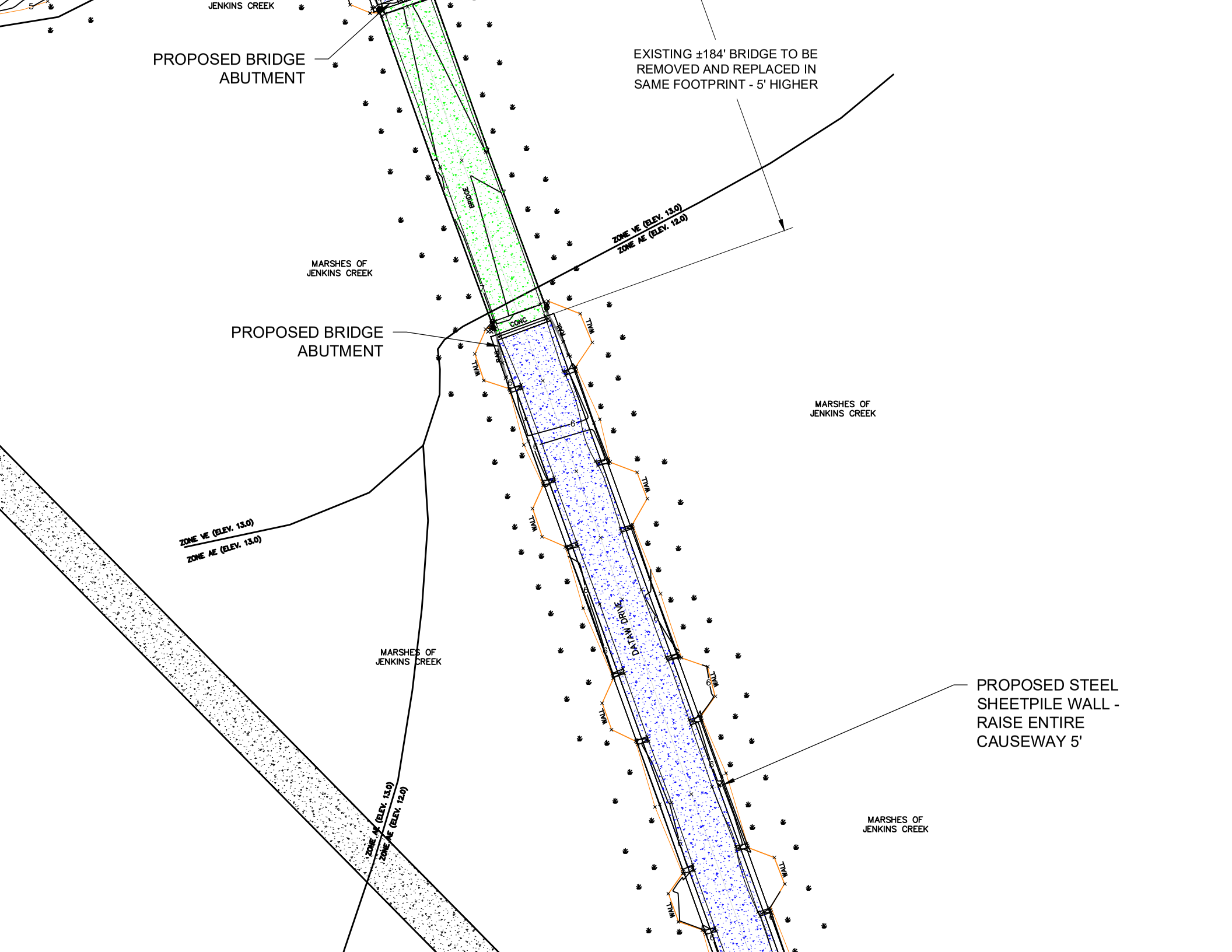
Dataw Island Bridge Replacement - Option 1B					by Bolchoz Marine Advisors, Inc.
Preliminary Estimate of Construction Costs					**12/15/2023**
		10%			
Item	**Base Number**	**10% Contingency**	**TOTALS**		**Notes:**
Soft Costs	$450,000	$45,000	$495,000		regulatory permitting, geotech, surveying, design, bid process
General Conditions, Mob / Demob	$2,000,000	$200,000	$2,200,000		general conditions, bonds, mob/demob, fencing, staging area setup, etc.
Existing Bridge Removal	$200,000	$20,000	$220,000		demolition and disposal of existing concrete bridge
Causeway Bulkheads	$1,290,000	$129,000	$1,419,000		steel sheetpile bulkheads on both sides of existing causeways
Causeway Backfilling	$100,000	$10,000	$110,000		backfill between bulkheads and Bobb Is to raise roadbed elevation 5'
Temporary Vehicular Bridge	$4,437,800	$443,780	$4,881,580		temporary two-lane bridge for rerouting traffic, based on two years
Temporary Construction Trestle	$300,000	$30,000	$330,000		temporary trestle to be leapfrogged adjacent to new bridge structure
Bridge Approach Slabs	$100,000	$10,000	$110,000		concrete approaches at bridge ends
Bridge Abutments	$200,000	$20,000	$220,000		sheetpile structures at each end of bridge
Bridge Substructure	$800,000	$80,000	$880,000		concrete piles and pile caps, furnished and installed
Bridge Superstructure	$600,000	$60,000	$660,000		prestressed concrete deck slabs
Barrier Walls	$72,000	$7,200	$79,200		basic concrete walls along sides of bridge
Asphalt Topping	$470,000	$47,000	$517,000		roadbed, no sidewalk
Site Work - Road Tie-in (north)	$25,000	$2,500	$27,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (south)	$25,000	$2,500	$27,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (Bob Is)	$0	$0	$0		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Maintenance of Traffic	$200,000	$20,000	$220,000		allowance for maintenance of traffic
New Guardhouse	$600,000	$60,000	$660,000		allowance for new guardhouse and gates
Construction Admin Services	$200,000	$20,000	$220,000		construction oversight, administrative services, inspections
	$12,069,800	$1,206,980	**$13,276,780**	**TOTAL BUDGET**	
					Note: Numbers are based on similar bridge projects throughout the coastal
					Southeast. Estimate is preliminary, based on limited design effort to date.
					Construction costs will fluctuate depending on availability of contractors and
					labor and material costs at time of construction.

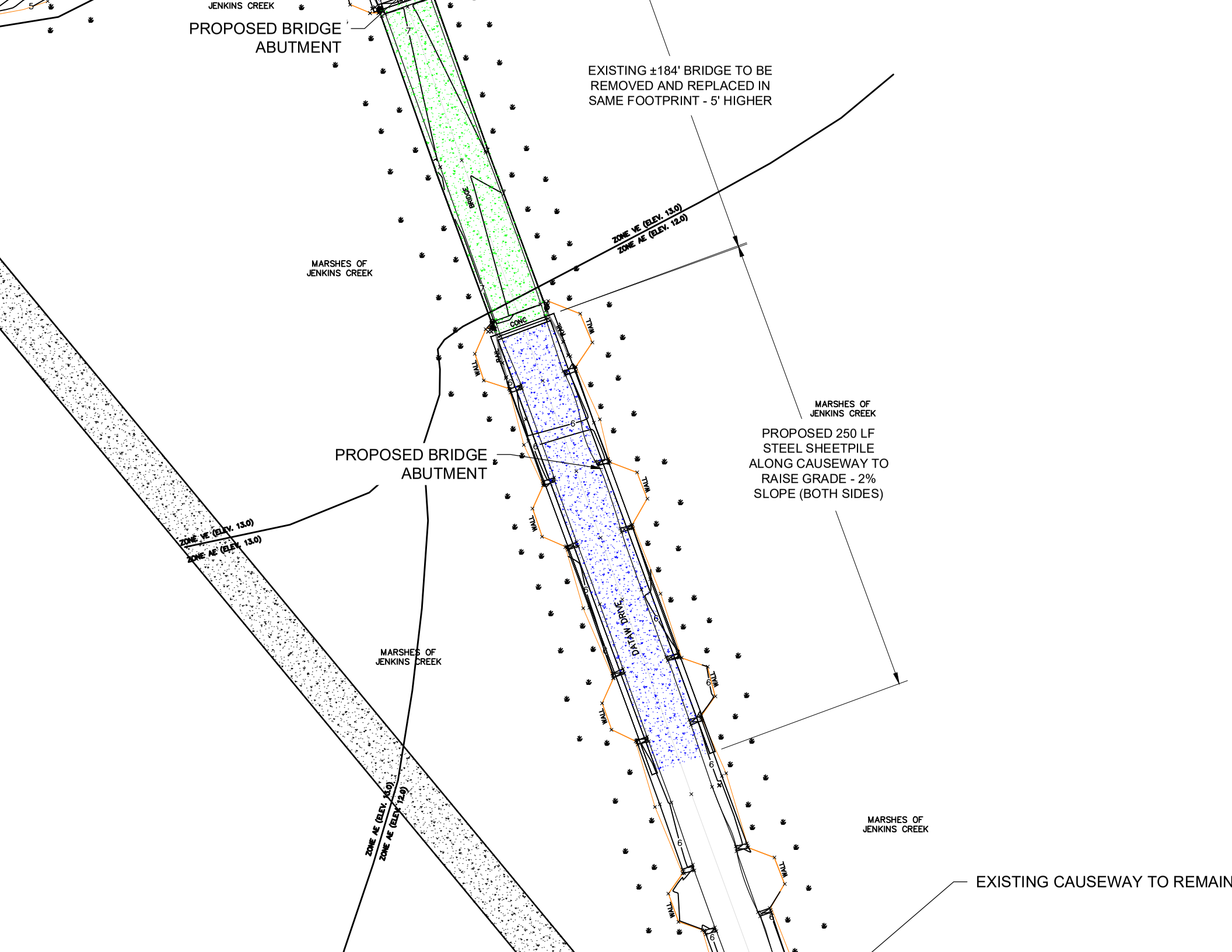
Dataw Island Bridge Replacement - Option 2					by Bolchoz Marine Advisors, Inc.
Preliminary Estimate of Construction Costs					**9/7/2023**
		10%			
Item	**Base Number**	**10% Contingency**	**TOTALS**		**Notes:**
Soft Costs	$450,000	$45,000	$495,000		regulatory permitting, geotech, surveying, design, bid process
General Conditions, Mob / Demob	$2,000,000	$200,000	$2,200,000		general conditions, bonds, mob/demob, fencing, staging area setup, etc.
Existing Bridge Removal	$200,000	$20,000	$220,000		demolition and disposal of existing concrete bridge
Existing Causeway Removal	$520,000	$52,000	$572,000		excavation of causeways and return to marshland
Temporary Construction Trestle	$300,000	$30,000	$330,000		temporary trestle to be leapfrogged adjacent to new bridge structure
Bridge Approach Slabs	$100,000	$10,000	$110,000		concrete approaches at bridge ends
Bridge Abutments	$200,000	$20,000	$220,000		sheetpile structures at each end of bridge
Bridge Substructure	$4,250,000	$425,000	$4,675,000		concrete piles and pile caps, furnished and installed
Bridge Superstructure	$3,500,000	$350,000	$3,850,000		prestressed concrete deck slabs
Barrier Walls	$545,000	$54,500	$599,500		basic concrete walls along sides of bridge
Relocation of Utilities	$420,000	$42,000	$462,000		allowance for relocation of water, sewer lines
Sidewalk and Asphalt Topping	$600,000	$60,000	$660,000		roadbed and sidewalk
Site Work - Road Tie-in (north)	$75,000	$7,500	$82,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (south)	$25,000	$2,500	$27,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (Bob Is)	$0	$0	$0		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Maintenance of Traffic	$200,000	$20,000	$220,000		allowance for maintenance of traffic
New Guardhouse	$600,000	$60,000	$660,000		allowance for new guardhouse and gates
Construction Admin Services	$200,000	$20,000	$220,000		construction oversight, administrative services, inspections
	$14,185,000	$1,418,500	**$15,603,500**	**TOTAL BUDGET**	
					Note: Numbers are based on similar bridge projects throughout the coastal
					Southeast. Estimate is preliminary, based on limited design effort to date.
					Construction costs will fluctuate depending on availability of contractors and
					labor and material costs at time of construction.

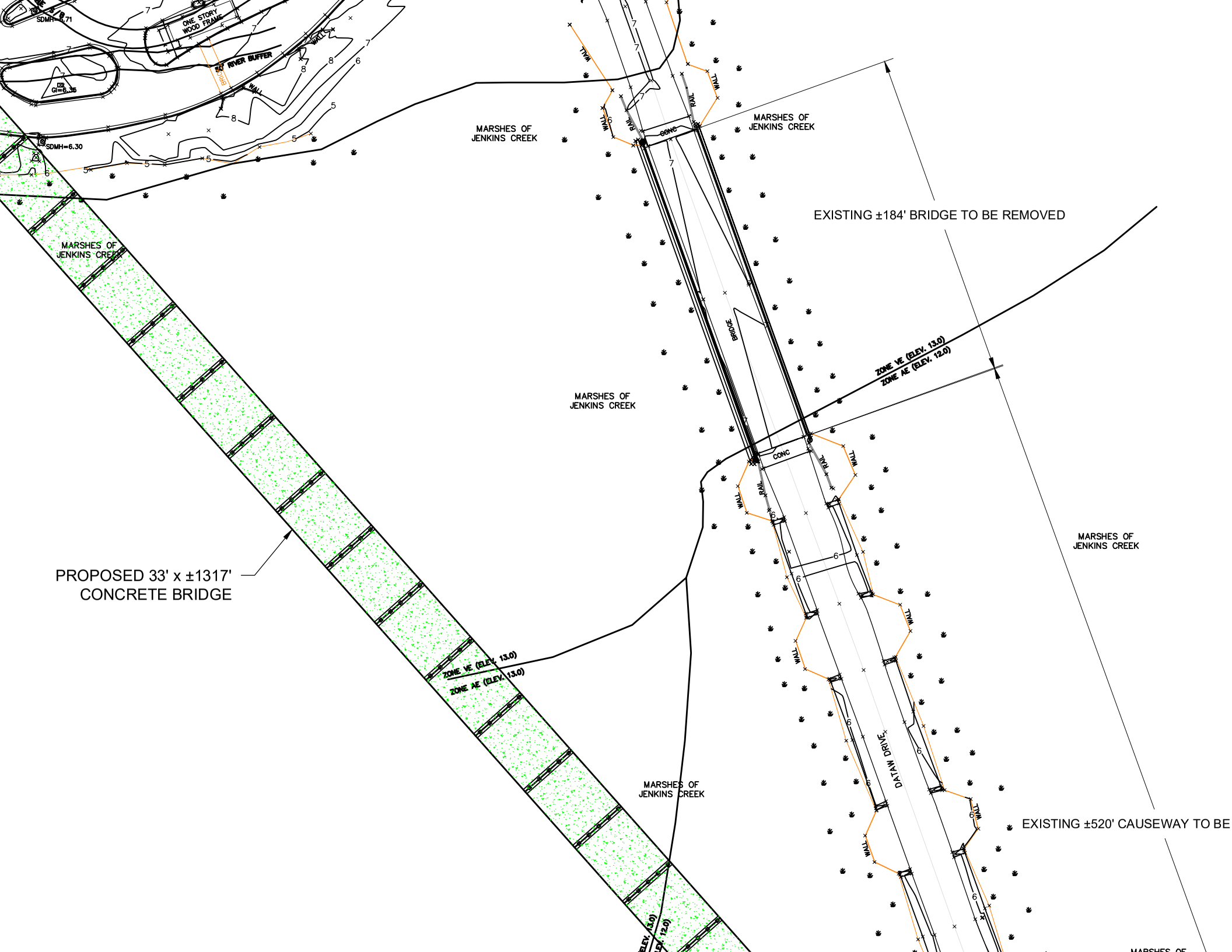
Dataw Island Bridge Replacement - Option 2			No Sidewalk		**by Bolchoz Marine Advisors, Inc.**
Preliminary Estimate of Construction Costs					**12/13/2023**
		10%			
Item	**Base Number**	**10% Contingency**	**TOTALS**		**Notes:**
Soft Costs	$450,000	$45,000	$495,000		regulatory permitting, geotech, surveying, design, bid process
General Conditions, Mob / Demob	$2,000,000	$200,000	$2,200,000		general conditions, bonds, mob/demob, fencing, staging area setup, etc.
Existing Bridge Removal	$200,000	$20,000	$220,000		demolition and disposal of existing concrete bridge
Existing Causeway Removal	$520,000	$52,000	$572,000		excavation of causeways and return to marshland
Temporary Construction Trestle	$300,000	$30,000	$330,000		temporary trestle to be leapfrogged adjacent to new bridge structure
Bridge Approach Slabs	$100,000	$10,000	$110,000		concrete approaches at bridge ends
Bridge Abutments	$200,000	$20,000	$220,000		sheetpile structures at each end of bridge
Bridge Substructure	$3,750,000	$375,000	$4,125,000		concrete piles and pile caps, furnished and installed
Bridge Superstructure	$3,150,000	$315,000	$3,465,000		prestressed concrete deck slabs
Barrier Walls	$545,000	$54,500	$599,500		basic concrete walls along sides of bridge
Relocation of Utilities	$420,000	$42,000	$462,000		allowance for relocation of water, sewer lines
Asphalt Topping	$405,000	$40,500	$445,500		roadbed, no sidewalk
Site Work - Road Tie-in (north)	$75,000	$7,500	$82,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (south)	$25,000	$2,500	$27,500		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (Bob Is)	$0	$0	$0		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Maintenance of Traffic	$200,000	$20,000	$220,000		allowance for maintenance of traffic
New Guardhouse	$600,000	$60,000	$660,000		allowance for new guardhouse and gates
Construction Admin Services	$200,000	$20,000	$220,000		construction oversight, administrative services, inspections
	$13,140,000	$1,314,000	**$14,454,000**	**TOTAL BUDGET**	
					Note: Numbers are based on similar bridge projects throughout the coastal
					Southeast. Estimate is preliminary, based on limited design effort to date.
					Construction costs will fluctuate depending on availability of contractors and
					labor and material costs at time of construction.

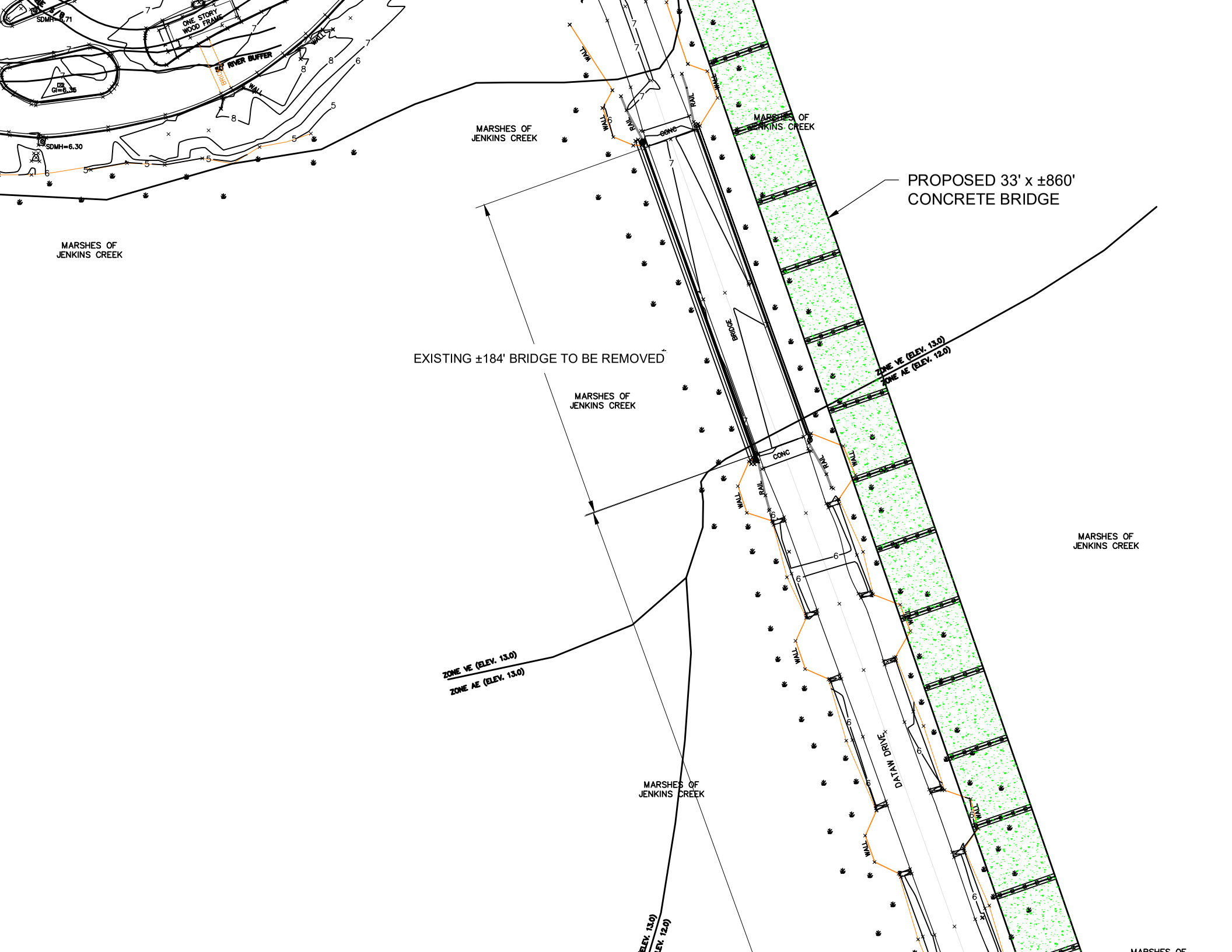
Dataw Island Bridge Replacement - Option 3					by Bolchoz Marine Advisors, Inc.
Preliminary Estimate of Construction Costs					**9/7/2023**
		10%			
Item	**Base Number**	**10% Contingency**	**TOTALS**		**Notes:**
Soft Costs	$450,000	$45,000	$495,000		regulatory permitting, geotech, surveying, design, bid process
General Conditions, Mob / Demob	$2,000,000	$200,000	$2,200,000		general conditions, bonds, mob/demob, fencing, staging area setup, etc.
Existing Bridge Removal	$200,000	$20,000	$220,000		demolition and disposal of existing concrete bridge
Existing Causeway Removal	$520,000	$52,000	$572,000		excavation of causeways and return to marshland
Temporary Construction Trestle	$300,000	$30,000	$330,000		temporary trestle to be leapfrogged adjacent to new bridge structure
Bridge Approach Slabs	$200,000	$20,000	$220,000		concrete approaches at bridge ends
Bridge Abutments	$400,000	$40,000	$440,000		sheetpile structures at each end of bridge
Bridge Substructure	$4,500,000	$450,000	$4,950,000		concrete piles and pile caps, furnished and installed
Bridge Superstructure	$3,750,000	$375,000	$4,125,000		prestressed concrete deck slabs
Barrier Walls	$545,000	$54,500	$599,500		basic concrete walls along sides of bridge
Relocation of Utilities	$420,000	$42,000	$462,000		allowance for relocation of water, sewer lines
Sidewalk and Asphalt Topping	$665,000	$66,500	$731,500		roadbed and sidewalk
Site Work - Road Tie-in (north)	$50,000	$5,000	$55,000		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (south)	$50,000	$5,000	$55,000		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (Bob Is)	$150,000	$15,000	$165,000		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Maintenance of Traffic	$100,000	$10,000	$110,000		allowance for maintenance of traffic
New Guardhouse	$600,000	$60,000	$660,000		allowance for new guardhouse and gates
Construction Admin Services	$200,000	$20,000	$220,000		construction oversight, administrative services, inspections
	$15,100,000	$1,510,000	**$16,610,000**	**TOTAL BUDGET**	
					Note: Numbers are based on similar bridge projects throughout the coastal
					Southeast. Estimate is preliminary, based on limited design effort to date.
					Construction costs will fluctuate depending on availability of contractors and
					labor and material costs at time of construction.

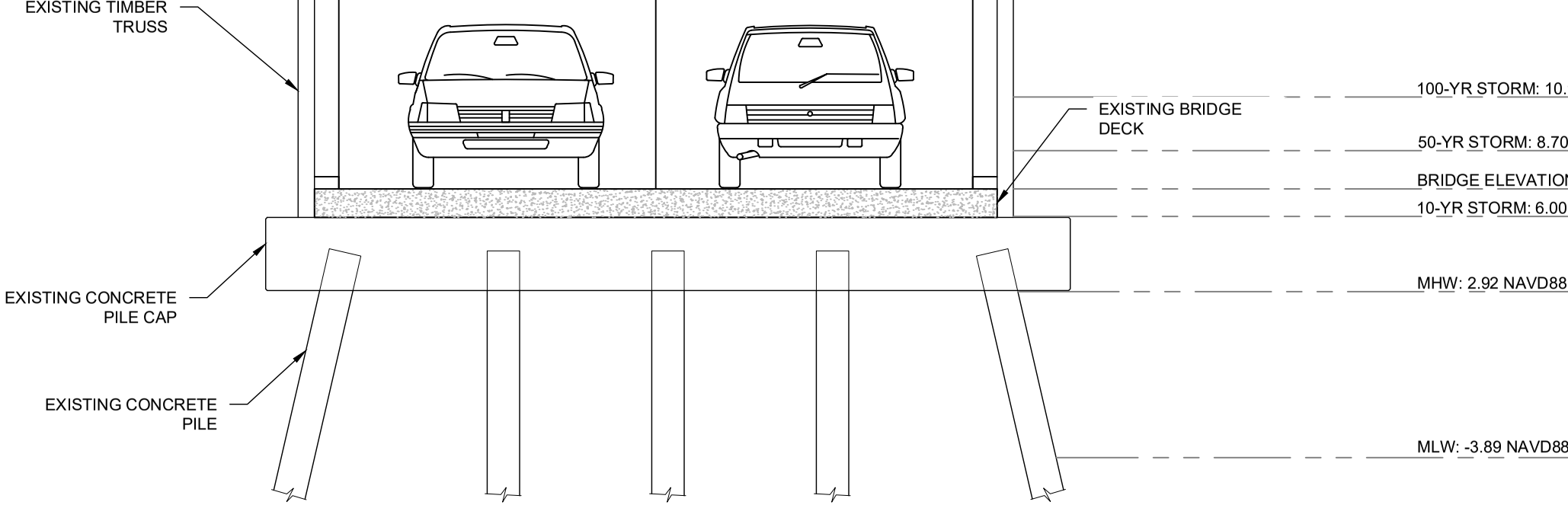
Dataw Island Bridge Replacement - Option 3			No Sidewalk		**by Bolchoz Marine Advisors, Inc.**
Preliminary Estimate of Construction Costs					**12/13/2023**
		10%			
Item	**Base Number**	**10% Contingency**	**TOTALS**		**Notes:**
Soft Costs	$450,000	$45,000	$495,000		regulatory permitting, geotech, surveying, design, bid process
General Conditions, Mob / Demob	$2,000,000	$200,000	$2,200,000		general conditions, bonds, mob/demob, fencing, staging area setup, etc.
Existing Bridge Removal	$200,000	$20,000	$220,000		demolition and disposal of existing concrete bridge
Existing Causeway Removal	$520,000	$52,000	$572,000		excavation of causeways and return to marshland
Temporary Construction Trestle	$300,000	$30,000	$330,000		temporary trestle to be leapfrogged adjacent to new bridge structure
Bridge Approach Slabs	$200,000	$20,000	$220,000		concrete approaches at bridge ends
Bridge Abutments	$400,000	$40,000	$440,000		sheetpile structures at each end of bridge
Bridge Substructure	$3,800,000	$380,000	$4,180,000		concrete piles and pile caps, furnished and installed
Bridge Superstructure	$3,120,000	$312,000	$3,432,000		prestressed concrete deck slabs
Barrier Walls	$545,000	$54,500	$599,500		basic concrete walls along sides of bridge
Relocation of Utilities	$420,000	$42,000	$462,000		allowance for relocation of water, sewer lines
Asphalt Topping	$470,000	$47,000	$517,000		roadbed, no sidewalk
Site Work - Road Tie-in (north)	$50,000	$5,000	$55,000		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (south)	$50,000	$5,000	$55,000		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Site Work - Road Tie-in (Bob Is)	$150,000	$15,000	$165,000		allowance for work related to clearing, grubbing, grading, and roadway tie-in
Maintenance of Traffic	$100,000	$10,000	$110,000		allowance for maintenance of traffic
New Guardhouse	$600,000	$60,000	$660,000		allowance for new guardhouse and gates
Construction Admin Services	$200,000	$20,000	$220,000		construction oversight, administrative services, inspections
	$13,575,000	$1,357,500	**$14,932,500**	**TOTAL BUDGET**	
					Note: Numbers are based on similar bridge projects throughout the coastal
					Southeast. Estimate is preliminary, based on limited design effort to date.
					Construction costs will fluctuate depending on availability of contractors and
					labor and material costs at time of construction.


JENKINS CREEK
PROPOSED BRIDGE ABUTMENT
EXISTING ±184' BRIDGE TO BE REMOVED AND REPLACED IN SAME FOOTPRINT - 5' HIGHER
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
MARSHES OF JENKINS CREEK
PROPOSED BRIDGE ABUTMENT
CONC
TWALL
MARSHES OF JENKINS CREEK
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 13.0)
MARSHES OF JENKINS CREEK
DATAW DRIVE
PROPOSED STEEL SHEETPILE WALL - RAISE ENTIRE CAUSEWAY 5'
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
MARSHES OF JENKINS CREEK


JENKINS CREEK
PROPOSED BRIDGE ABUTMENT
EXISTING ±184' BRIDGE TO BE REMOVED AND REPLACED IN SAME FOOTPRINT - 5' HIGHER
BRIDGE
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
MARSHES OF JENKINS CREEK
CONC
WALL
PROPOSED BRIDGE ABUTMENT
MARSHES OF JENKINS CREEK
PROPOSED 250 LF STEEL SHEETPILE ALONG CAUSEWAY TO RAISE GRADE - 2% SLOPE (BOTH SIDES)
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 13.0)
DATAW DRIVE
MARSHES OF JENKINS CREEK
ZONE AE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
MARSHES OF JENKINS CREEK
EXISTING CAUSEWAY TO REMAIN


SDMH=6.71
ONE STORY WOOD FRAME
50' RIVER BUFFER
WALL
BRICK
GI=6.35
SDMH=6.30
MARSHES OF JENKINS CREEK
MARSHES OF JENKINS CREEK
MARSHES OF JENKINS CREEK
MARSHES OF JENKINS CREEK
MARSHES OF JENKINS CREEK
MARSHES OF JENKINS CREEK
EXISTING ±184' BRIDGE TO BE REMOVED
PROPOSED 33' x ±1317' CONCRETE BRIDGE
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
BRIDGE
CONC
RAIL
WALL
DATAW DRIVE
EXISTING ±520' CAUSEWAY TO BE


PROPOSED 33' x ±860'
CONCRETE BRIDGE
EXISTING ±184' BRIDGE TO BE REMOVED
MARSHES OF
JENKINS CREEK
ZONE VE (ELEV. 13.0)
ZONE AE (ELEV. 12.0)
DATAW DRIVE
ONE STORY
WOOD FRAME
50' RIVER BUFFER
SDMH=6.30
GI=6.35
BRIDGE
CONC
RAIL
WALL



EXISTING BRIDGE CROSS SECTION

SCALE: 1" = 6'