FPID #430029-2-22-01

ETDM No. 14413

Atlantic Isle at West of SR A1A
Bridge No. 874218
Project Development and Environment Study

Draft Preliminary Engineering Report

FDOT District Six

1000 NW 111th Avenue

Miami, Florida 33172

Atlantic Isle Bridge (Bridge No. 874218)
Atlantic Avenue, Sunny Isles Beach, FL

Miami-Dade County, FL

December 2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022, and executed by the Federal Highway Administration and FDOT.

DRAFT

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District Six

Atlantic Isle at West of SR A1A, Bridge No. 874218

Atlantic Avenue, 0.25 miles west of SR A1A

Miami-Dade County, Florida

Financial Management Number: 430029-2-22-01

ETDM Number: 14413

December 2023

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ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
ADA	Americans with Disabilities Act
ADT	average daily traffic
AOI	Area of Influence
APC	Affected Parties Consultation
APE	area of potential effect
BBAP	Biscayne Bay Aquatic Preserve
C	combination (truck)
CFR	Code of Federal Regulations
CIP	cast-in-place
CRAS	Cultural Resource Assessment Survey
CSER	Contamination Screening Evaluation Report
DHW	design high water
DOE	Degree of Effect
DRER	Department of Regulatory and Economic Resources (Miami-Dade County)
EFH	essential fish habitat
ERP	Environmental Resource Permit
EST	Environmental Screening Tool
ETDM	Efficient Transportation Decision Making
FDEP	Florida Department of Environmental Protection
FDM	*FDOT Design Manual*
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map(s)
FLUCCS	Florida Land Use Cover and Forms Classification System
FMP	Fisheries Management Plan
FMSF	Florida Master Site File
GIS	Geographic Information System

HAPC	Habitat Area of Particular Concern
LRFR	Load and Resistance Factor Rating
MDC	Miami-Dade County
MDWASD	Miami-Dade County Water and Sewer Department
MHHW	mean higher-high water
MHW	mean high water
mph	mile(s) per hour
NAVD(88)	North American Vertical Datum (of 1988)
NGVD	National Geodetic Vertical Datum (of 1929)
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NRE	Natural Resource Evaluation
NRHP	National Register of Historic Places
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OFW	Outstanding Florida Water
PD&E	Project Development and Environment
ROW	right-of-way
SAFMC	South Atlantic Fisheries Management Council
SAV	submerged aquatic vegetation
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Officer
SR	State Road
SSL	Sovereign Submerged Lands
SU	Single unit
TSMO	Transportation Systems Management and Operations
TTC	temporary traffic control
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USDOT	U.S. Department of Transportation

USFWS	U.S. Fish and Wildlife Service
WBID	Waterbody Identification

1.0 PROJECT SUMMARY

1.1 PROJECT DESCRIPTION

The Florida Department of Transportation (FDOT) District Six is conducting a Project Development and Environment (PD&E) Study to address the deficiencies of the existing Atlantic Isle Bridge (Bridge No. 874218). The Atlantic Isle Bridge is a historic bridge located on Atlantic Island just west of State Road (SR) A1A (Collins Avenue), within the City of Sunny Isles Beach in Miami-Dade County, Florida. The limits of the proposed project encompass the bridge (along Atlantic Avenue) and approaches, which is a distance of approximately 0.0114 miles (or 60 feet). Figure 1-1 presents the Project Location Map. The purpose of this study is to evaluate alternatives for the potential rehabilitation or replacement of the Atlantic Isle Bridge.

The PD&E Study evaluates a range of alternatives to address the purpose and need for the project, including rehabilitation, replacement, and no-action options for the bridge, as well as a multimodal alternative. The No-Action Alternative is evaluated throughout the PD&E Study as a basis for comparison to the viable alternatives. The project goals include minimizing environmental impacts and effects to significant cultural resources, enhancing safety, and improving mobility. This PD&E Study analyzes the potential infrastructure improvements, including the proposed bridge structure, roadway approaches to the bridge, temporary roadway widening during construction, roadway connectivity to existing land uses, the stormwater management facilities, and pedestrian and bicycle accommodations.

In September 2016, FDOT finalized the *Atlantic Isle Lagoon Bridge Proof of Concept Report*, which summarized a feasibility study to identify bridge rehabilitation alternatives that could preserve the service life of the bridge (FDOT 2016a). The *Proof of Concept Report* documented the evaluation of several alternatives to rehabilitate the bridge, which included reusing the existing concrete arch, replacing the existing arch with a new cast-in-place (CIP) reinforced concrete arch, reconstructing the existing bridge with a new precast concrete structure, and preserving the existing bridge with minor repairs but without any bridge rehabilitation. Subsequently, FDOT prepared the *Atlantic Isle Bridge Rehabilitation Technical Memorandum* in May 2018 to address a rehabilitation option for the bridge (FDOT 2018a). FDOT then prepared rehabilitation design plans based on the recommendation to reuse the existing concrete arch. The location of foundations was coordinated with the FDOT District 6 geotechnical and maintenance staff. Results from borings and excavations at the bridge approaches were not conclusive, and excavation of both approaches was required to complete the rehabilitation design plans. Because excavation of the bridge approaches could have an adverse effect on the bridge, FDOT discontinued the bridge rehabilitation design until further study of a range of alternatives could be analyzed for environmental effects. Subsequently, FDOT initiated this PD&E Study in September 2020 to fully evaluate impacts of all feasible alternatives. Prior to the initiation of this PD&E Study, an Advance Notification Package was distributed on October 23, 2019. The Efficient Transportation Decision Making (ETDM) Programming Screen (Project No. 14413) was completed in February 2020.

The Atlantic Isle Bridge is a one-way, low-level fixed bridge located along Atlantic Avenue on the north side of the Atlantic Isle Lagoon, approximately 0.25 mile west of SR A1A (Collins Avenue). The project study area (Figure 1-2) includes Atlantic Avenue and Atlantic Isle between the western and eastern intersections of the two roadways. The project study area is within the historic triangular landscape of the Atlantic Island Park [Florida Master Site File (FMSF) No. 8DA6433], which is both privately and publicly owned, and further includes an artificial lake, Lake of the Isles (8DA15824), which is historically known as Atlantic Isle Lagoon. Built circa 1925, Atlantic Isle Lagoon and Atlantic Island Park also are National Register of Historic Places (NRHP) eligible.

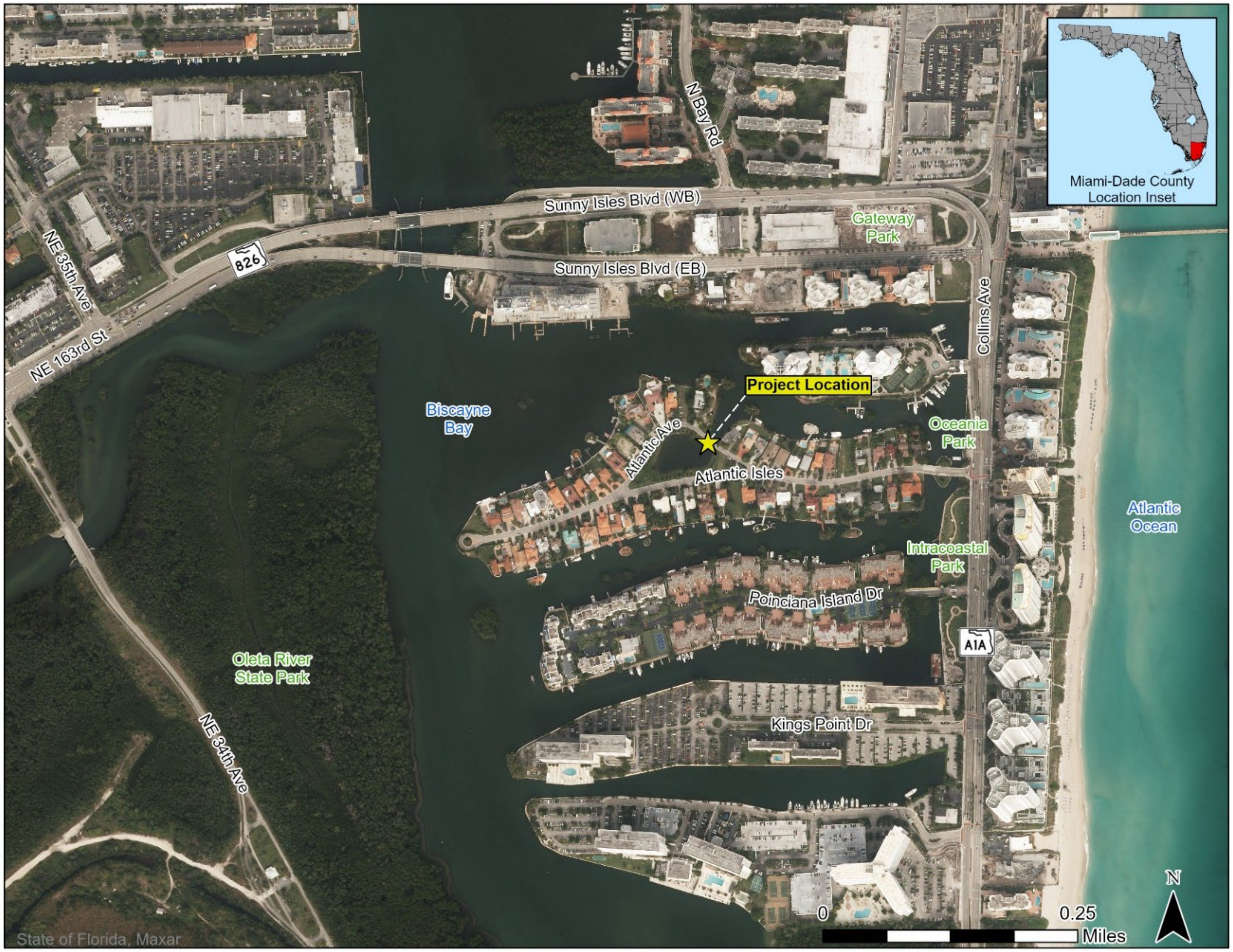

Figure 1-1. Project Location Map

Figure 1-2. Project Study Area

The Atlantic Isle Bridge spans approximately 43 feet over a narrow channel between Atlantic Isle Lagoon and Biscayne Bay. Within the project study area, Atlantic Avenue is approximately 0.25 mile in length and 16 feet wide. The posted speed limit on Atlantic Avenue is 20 miles per hour (mph). It is a one-way, eastbound, undivided roadway that serves residential traffic and service vehicles. Atlantic Isle, on the south side of the Atlantic Isle Lagoon, is a two-way, 16-feet-wide, east–west residential roadway that intersects with each end of Atlantic Avenue. The posted speed limit on this roadway also is 20 mph.

The typical section of the bridge is approximately 20 feet wide with one 10-foot-wide travel lane in the center of the bridge. The remaining 10 feet of the bridge section consists of a planter easement, curb, and barrier wall on each side. Bicyclists and pedestrians must share the 10-foot-wide travel lane with vehicles to cross the bridge as no sidewalks are provided on the existing facility.

Approximately 14 residences along Atlantic Avenue use the bridge for access. The roadways on Atlantic Island are owned and operated by the City of Sunny Isles Beach; however, FDOT maintains the island bridges, including the Atlantic Isle Bridge.

The latest bridge inspection was performed on September 29, 2023. It indicated that the bridge is functionally obsolete, with a sufficiency rating of 40.9 and a health index of 60.39. Because of the continued deterioration of the bridge, it has a posted weight restriction for single-unit (SU) and combination (C) trucks at 12 tons and 21 tons, respectively. The bridge is open to vehicular traffic that meets these weight restrictions. The Atlantic Avenue roadway typical section east and west of the bridge consists of 16 feet of pavement used by one-way traffic with curb and gutter on the outside.

1.2 PURPOSE AND NEED

The purpose of the project is to address the structural and functional deficiencies of the existing bridge to provide a safe and usable route for the surrounding community and traveling public. As noted previously, the bridge has load limitations. The load posting on the bridge poses an issue for the residents along Atlantic Avenue because garbage trucks, as well as trucks transporting concrete, building materials/demolition debris, and other urban goods, may be heavier than the bridge loading allows. As such, trucks are restricted to smaller loads when crossing the bridge and are forced to make several trips to transport freight, which adds unnecessary truck traffic to the surrounding roadway network. In some cases, fire trucks, emergency vehicles, delivery or moving vans, and construction vehicles also exceed the posted bridge load limit. Overweight vehicles accessing the properties along Atlantic Avenue must complete a crossover requiring special procedures, such as the use of flagging staff to proceed. Given these conditions, the existing bridge does not meet the current transportation needs of the community.

1.2.1 Bridge Deficiencies

As previously noted, the bridge has a sufficiency rating of 40.9 and a health index of 60.39. Sufficiency rating and health index values vary from 0 (worst) to 100 (best). Existing functional deficiencies observed during the bridge inspection in September 2023 include substandard traffic barriers, multi-directional cracks in the asphalt overlay, and missing oolitic limestone on some areas of the north face of the arch. The southwest corner along the underside edge and the south side of the arch have spalls and delamination with exposed steel and areas of corrosion stains throughout the length of the arch along the fallen coral rock. In addition, the arch underside has a core hole at the center of the mid-span and exhibits delamination at random locations.

1.2.2 Modal Interrelationships

The project’s surrounding land use is residential. The two bridges at the entrance of Atlantic Island (reconstructed in 1993) are approximately 0.14 mile from the intersection at Atlantic Avenue and include a barrier-separated pedestrian pathway on the south side of the bridges that connects to the existing sidewalk along SR A1A. There are no existing pedestrian or bicycle facilities along Atlantic Avenue or Atlantic Isle on the island, but field reviews confirmed that pedestrians on Atlantic Avenue use the roadway pavement and bridge. No bus service is available on Atlantic Island, but the Sunny Isles Beach Shuttle includes three routes (Orange Line #1, Orange Line #2, and Blue Line #3) that operate along SR A1A, and a bus stop (Bus Stop #40) is located just outside the community on the west side of SR A1A just south of Atlantic Avenue. The Miami-Dade County Transit service also has Limited-Stop Service and North–South Local Stop Service along SR A1A, but there are no stops that serve Atlantic Island.

1.2.3 Emergency Evacuation

Atlantic Isle and Atlantic Avenue are not identified as designated evacuation routes. However, they are the only existing roadways and would require use to evacuate Atlantic Island. Residents along Atlantic Avenue could exit Atlantic Island in an emergency without using Atlantic Isle Bridge by driving the opposite direction of travel along the one-way road. However, it would be difficult for large emergency vehicles to make turnaround movements on Atlantic Avenue. The bridge provides evacuation function based on the existing roadway network.

1.3 COMMITMENTS

To be added following the public hearing.

1.4 ALTERNATIVES ANALYSIS SUMMARY

Upon completion of an initial alternatives analysis, Build Alternatives were identified for further analysis and public input and included:

- Build Alternative 1: Bridge Rehabilitation
- Build Alternative 2: Bridge Replacement

Both of these alternatives were evaluated for their ability to meet the transportation needs of the community, as well as their feasibility and constructability. In addition, impacts to environmental resources – including social, cultural, natural, and physical resources – were considered as the Build Alternatives were developed further. Further details on each alternative are documented in Section 4.5.

The No-Action Alternative remains as an alternative throughout the PD&E Study and forms a basis for comparison to the Build Alternatives. The following subsections describe the potential improvements associated with each Build Alternative.

1.4.1 Build Alternative 1 – Bridge Rehabilitation

This alternative involves rehabilitation of the existing bridge superstructure, providing a new CIP-reinforced concrete arch structure, and maintaining one-way travel on the bridge. The roadway width will be maintained, but the typical section and vertical roadway geometry will be impacted to accommodate the retrofitted structure depth. The proposed new arch would extend beyond the ends of the existing concrete arch and foundations to avoid the existing foundation removal costs and the associated risks that could impact the adjacent residential property foundations and structures. A new bridge substructure (abutments and foundations) would be constructed to support the rehabilitated bridge superstructure. During construction, the existing substructure and the superstructure will remain to support the existing concrete arch and exterior limestone facade.

The rehabilitation alternative does not address the bridge's functional deficiencies (substandard traffic barriers) because that would require removal and replacement of the arch spandrel walls, which could compromise the integrity of the already deteriorating bridge. The existing roadway limerock base and pavement would be removed and replaced with a concrete riding surface provided by the new arch structure. With the bridge rehabilitation, one-way travel on the bridge would be maintained. The rehabilitated bridge typical section would remain as is, consisting of a single 10-foot-wide travel lane, 8-inch-wide curbs, 2.5-foot-wide planter easements, and 1-foot 10-inch-wide barriers on each side of the bridge. The vertical direction of the typical section will be impacted because the roadway profile will be higher at the bridge section to accommodate the additional thickness of the new structural arch.

Although this alternative maintains the bridge in the existing alignment, the exterior limestone facade will continue to require repairs as the bridge exterior continues to deteriorate. Additional rehabilitation of the existing bridge structure will be required to curtail the ongoing deterioration of these elements. Estimates of the extent of spall and crack repairs are based on experience and engineering judgment but would require additional field work during final design to accurately quantify. The risk associated with further deterioration between the time of the last bridge inspection and the letting of a contract to rehabilitate the bridge requires additional contingency in the engineer's estimate. Also, note that construction activities to accomplish the rehabilitation pose risks to the existing bridge, including damage to the architectural facade and potentially damage the structure and substructure. Additionally, it is unknown if the current bridge possesses hidden damages since its construction in 1925.

1.4.2 Build Alternative 2 – Bridge Replacement

The replacement alternative involves replacing the entire bridge to address the structural and functional deficiencies of the existing superstructure and substructure to enhance operations and remove load restrictions. This would require demolition of the existing bridge and replacement of the bridge at the same location to minimize overall environmental impacts. The proposed bridge typical section would be approximately 27 feet wide to accommodate one 10-foot-wide travel lane, one 8-foot-wide shared-use path, 3-foot-wide shoulders, and concrete traffic railings on both sides. A raised sidewalk would separate pedestrians from vehicular traffic.

New approach retaining walls would replace the existing retaining walls. A new, non-structural oolitic limestone facade would be placed along the exterior faces of the traffic railings and retaining walls to provide aesthetics similar to the existing bridge. A slightly longer bridge span may be required to span over portions of the existing unknown foundations, which may not be able to be removed, to eliminate potential conflicts and enhance constructability.

1.5 DESCRIPTION OF PREFERRED ALTERNATIVE

Based on input received from the Atlantic Isle Bridge Alternatives Workshop, as well as agency input, the Preferred Alternative is Build Alternative 2 – Bridge Replacement. Section 1.4.2 presents a description of the Preferred Alternative.

1.6 LIST OF TECHNICAL DOCUMENTS

The following provides a list of technical documents prepared for this PD&E Study and used to support this Preliminary Engineering Report:

- *Conceptual Drainage Report – October 2023*
- *Contamination Screening Evaluation Report – February 2023*
- *Cultural Resource Assessment Survey – January 2022*
- *Geotechnical Report – March 2021*
- *Location Hydraulics Report –October 2023*

- *Natural Resources Evaluation (NRE) Report –November 2023*
- *Public Involvement Plan – February 2020*
- *Section 4(f) Documentation – November 2023*
- *Section 106 Case Study Report – May 2023*

2.0 EXISTING CONDITIONS

2.1 ROADWAY

2.1.1 Existing Roadway Typical Section

The western roadway approach of Atlantic Avenue to the Atlantic Isle Bridge is 16 feet wide and approximately 610 feet in length. The roadway is bordered by a type "F" curb and gutter and drainage inlets on both sides of the roadway, as well as existing lighting on the north side. The total right-of-way (ROW) width is 60 feet, with approximately 13 feet of horizontal clearance from the south side of the roadway to the tree line surrounding the Atlantic Isle Lagoon.

The eastern roadway departure of Atlantic Avenue from the Atlantic Isle Bridge is 16 feet wide and approximately 180 feet in length. Like the west approach, the roadway is bordered by a type "F" curb and gutter and drainage inlets on both sides of the roadway, as well as existing lighting on the north side. The total ROW width is 60 feet, with approximately 15 feet of horizontal clearance from the south side of the roadway to the tree line surrounding the Atlantic Isle Lagoon. Additionally, the east and west intersections of Atlantic Avenue and Atlantic Isle have no stop or yield conditions, which poses a safety issue. Figure 2-1 presents the existing typical section for Atlantic Avenue.

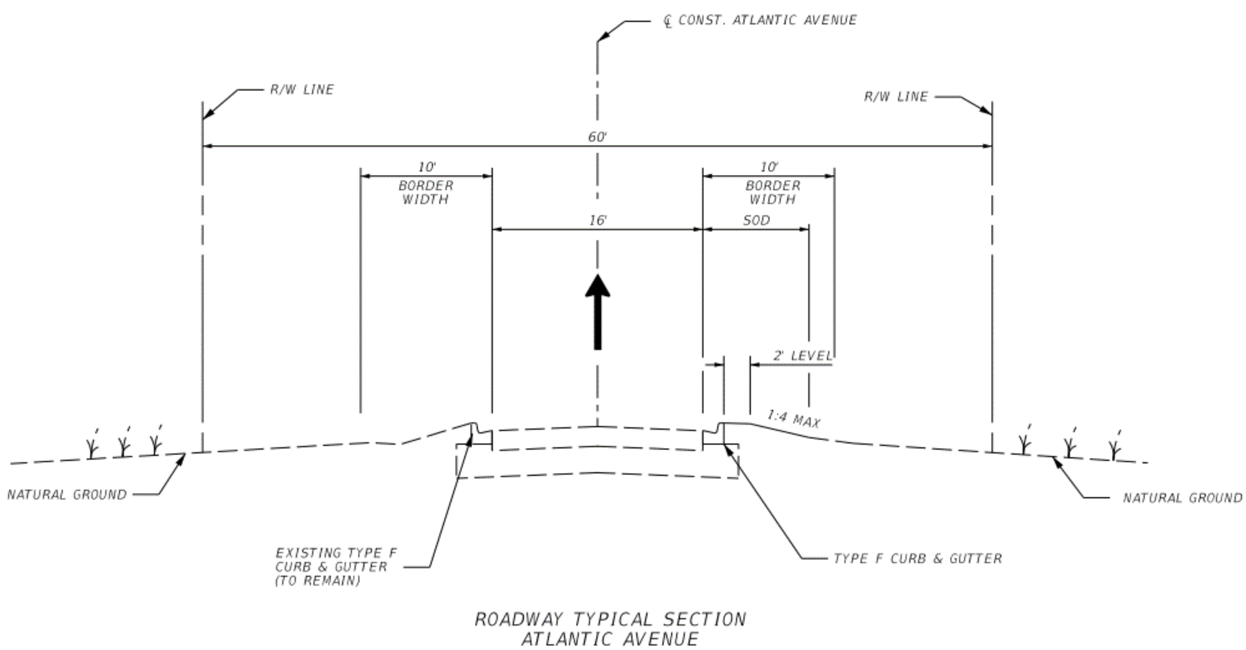

Figure 2-1. Existing Atlantic Avenue Roadway Typical Section

2.2 RIGHT-OF-WAY

The entire length of Atlantic Avenue, including the Atlantic Isle Bridge, has an existing ROW width of 60 feet, 30 feet on each side of the roadway centerline alignment. Figure 2-2 presents a map of the City of Sunny Isle Beach ROW limits and the private property lines. ROW limits for this project were determined from the June 2008 City of Sunny Isles Beach Atlantic Isle Roadway and Utility Improvements As-Built Plans (CGA Project 05-4893), ROW survey, and survey data from the 2016 *Atlantic Isle Lagoon Bridge Proof of Concept Report*.

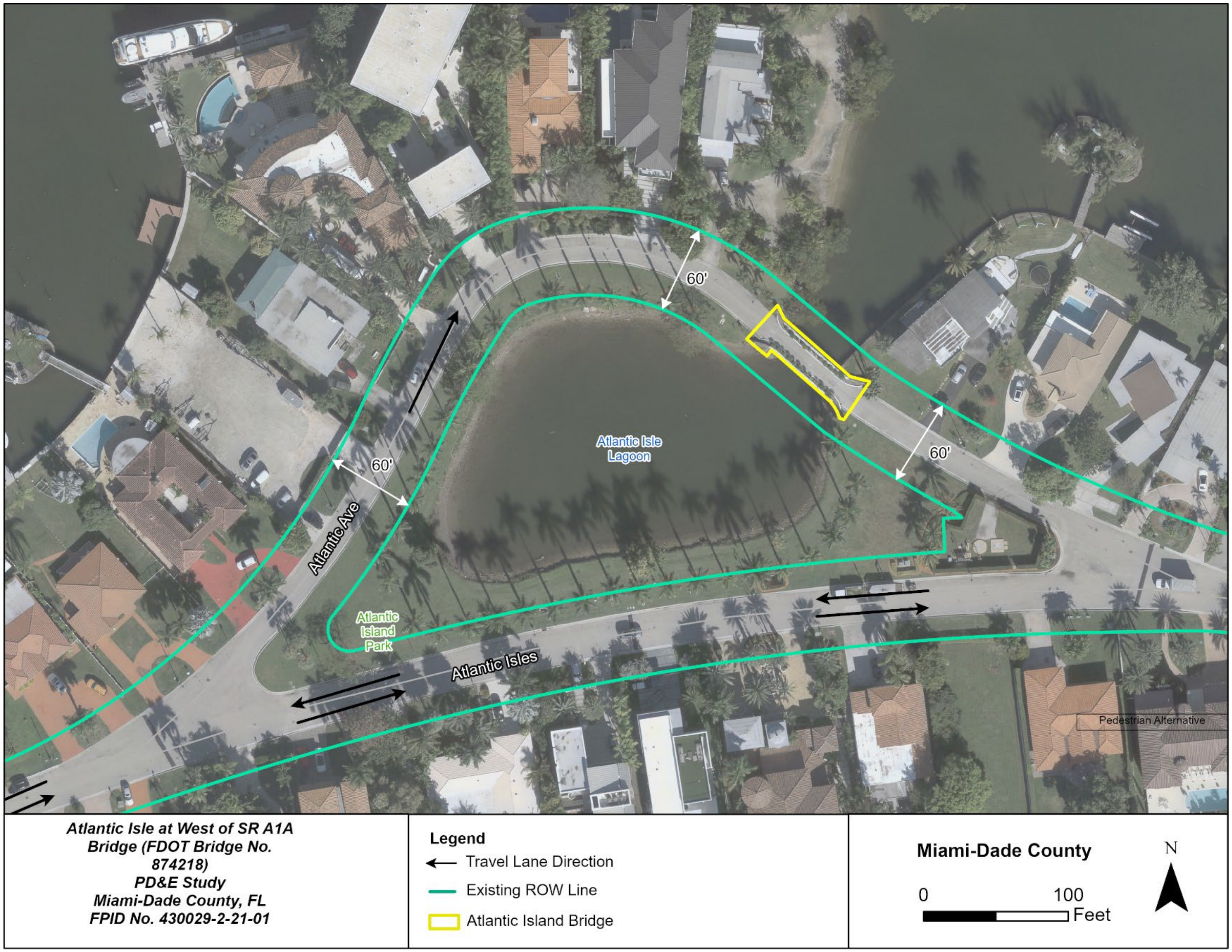

Figure 2-2. ROW Limits

2.3 ROADWAY CLASSIFICATION AND CONTEXT CLASSIFICATION

Within the project limits, two roadways – Atlantic Isle and Atlantic Avenue – are located west of SR A1A. Based on the FDOT Linear Referencing System Geographic Information System (GIS) data, the Roadway ID for Atlantic Isle is 87674513. Atlantic Isle is a two-way urban local road that runs east–west. Atlantic Avenue is a one-way urban local road that runs east, on which the Atlantic Isle Bridge is located. Both Atlantic Isle and Atlantic Avenue provide direct property access to adjacent residences, and they carry no through traffic movement. They are both functionally classified as urban local roads by the 2010 Federal Functional Classification – Miami-Dade County, approved in 2014. Because these are designated as off-system roadway, they have no context classification.

2.4 ADJACENT LAND USE

The project study area on Atlantic Island consists of a developed, urbanized residential community within the Miami Urbanized Area and within the City of Sunny Isles Beach, a U.S. Census Designated Place. The City of Sunny Isles Beach is in Miami-Dade County. The island is predominantly residential and consists of single-family residential homes with limited public/semi-private open space. There is an existing tidally influenced lagoon in the middle of Atlantic Island that connects to Biscayne Bay through a narrow channel located on the northeast point of the island. No other natural habitat exists within the project study area. Figure 2-11 presents the existing land uses in the project study area using the Florida Land Use Cover and Forms Classification System (FLUCCS).

2.5 ACCESS MANAGEMENT CLASSIFICATION

Atlantic Avenue is not part of the State Highway System and, therefore, does not have a corresponding Access Classification.

2.5.1 Driveways

The *FDOT 2023 Multimodal Access Management Guidebook* classifies driveways from Category A to G based on the typical land uses and vehicle trips per day (FDOT 2023f). Within the project limits, all driveways are located to the north side of Atlantic Avenue except for a utility driveway (pump station) located on the south side near the eastern intersection of Atlantic Isle and Atlantic Avenue. The driveways serve residential properties and the number of vehicle trips per day is low. Therefore, they are classified as Category A driveways. The driveways on Atlantic Avenue are closely spaced, with 15 driveways along the entire study corridor. Figure 2-3 presents the existing driveway locations within the project study area.

Figure 2-3. Existing Driveways

2.6 DESIGN AND POSTED SPEEDS

Atlantic Isle and Atlantic Avenue are both urban local roads and are not part of the State Highway System. The existing posted speed limit along both roads is 20 mph. The existing design speed limit is unknown as no as-built plans exist for the nearly 100-year-old roadway.

2.7 VERTICAL AND HORIZONTAL ALIGNMENT

2.7.1 Horizontal Alignment

The roadway horizontal alignment of Atlantic Isle is on a tangent east to west from SR A1A, until it reaches the Atlantic Island Park, then it splits into Atlantic Avenue to the north. Atlantic Avenue ties back into Atlantic Isle approximately one-tenth of a mile to the west where it splits. The Atlantic Isle roadway alignment continues to run on a tangent until it ends in a traffic circle on a cul-de-sac. The existing centerline of the project bridge, Atlantic Avenue, and Atlantic Isle are aligned with the centerline of the ROW. This centerline continues throughout the island and connects the two bridges at the island entrance with SR A1A.

2.7.2 Vertical Alignment

For the majority of the corridor, the vertical alignment of the roadway is relatively flat with a longitudinal slope ranging from 0% to 2%. There is a vertical curve at the bridge location.

2.8 PEDESTRIAN ACCOMMODATIONS

There are no existing pedestrian facilities anywhere on Atlantic Island with the exception of the two bridges at the entrance of the island that include barrier-separated pedestrian pathways on the south side of the bridges that connect to the existing sidewalk along SR A1A. Field reviews confirmed pedestrians on Atlantic Avenue use the roadway pavement and bridge.

2.9 BICYCLE FACILITIES

There are no existing bicycle facilities within the project limits. Field reviews have confirmed that bicyclists use the roadway pavement and bridge.

2.10 TRANSIT FACILITIES

As noted previously, no bus service is available on Atlantic Island, but the Sunny Isles Beach Shuttle operates along SR A1A and has a bus stop (Bus Stop #40) just outside the community on the west side of SR A1A just south of Atlantic Avenue. The Miami-Dade County Transit also has service along SR A1A, but there are no stops that serve Atlantic Island.

2.11 PAVEMENT CONDITION

Pavement testing is not part of this project and the existing pavement condition was not evaluated. The existing pavement will remain in place and is currently maintained by the City of Sunny Isles.

2.12 TRAFFIC VOLUMES AND OPERATIONAL CONDITIONS

A traffic operations analysis was not conducted for this project as this is not a capacity project and traffic volumes are low along the neighborhood roads. However, traffic volumes were evaluated in 2019 as part of an 18-Kip Equivalent Single Axle Load (ESAL) Analysis, prior to the initiation of this PD&E Study. Traffic volumes were evaluated along Atlantic Isle (west of SR A1A) and based on 48-hour classification counts. Counts were collected on November 6 and 7, 2019. A seasonal factor of 1.01 was used to convert the average daily traffic (ADT) from the 48-hour classification counts to an annual average daily traffic (AADT). Based on a review of FDOT's Florida Traffic Online, there are no traffic monitoring stations within the study area to compare with the 48-hour classification counts (FDOT 2023g). As part of the ESAL analysis, a growth factor of 0.5% was applied to the 2019 count data, resulting in an estimated future AADT of 689 in 2045. Table 2-1 presents existing traffic data.

Table 2-1. Existing Traffic Data

Segment No.	Station Location	ADT		AADT	K	D (%)	T_{24}
		11/6/2019	11/7/2019				
1	Atlantic Isle (West of SR A1A)	598	599	605	8.18	51.1	5.18

Note: Traffic data obtained from 48-hour classification counts (November 2019). Seasonal Factor of 1.01 applied to 48-hour classification counts to obtain AADT.
K = K Factor: the proportion of AADT occurring in the peak hour; D = Directional Factor; T_{24} = Truck Factor: percentage of truck traffic in 24 hours

2.13 INTERSECTION LAYOUT AND TRAFFIC CONTROL

Atlantic Avenue is a one-way roadway that intersects Atlantic Isle at two locations. The western intersection is the entry to Atlantic Avenue and the eastern intersection is the exit from Atlantic Avenue. Both intersections are currently uncontrolled by any traffic devices.

2.14 RAILROAD CROSSINGS

No freight or passenger railroad crossings exist within the vicinity of the project study area.

2.15 CRASH DATA AND SAFETY ANALYSIS

Crash data and analysis is not part of this project and was not evaluated.

2.16 DRAINAGE

2.16.1 Drainage Basin

This project is located in the Intracoastal Waterway Drainage Basin within the South Florida Water Management District (SFWMD) jurisdiction. The project is also within the Miami-Dade County (MDC) Department of Regulatory and Economic Resources (DRER) jurisdiction. The Intracoastal Waterway is an impaired waterbody, Waterbody Identification (WBID) 3226H1, for nutrients (chlorophyll *a* and total nitrogen) and mercury (in fish tissue). The Intracoastal Waterway Drainage Basin is hydraulically connected to Biscayne Bay Aquatic Preserve (BBAP), which is designated as a Florida Department of Environmental Protection (FDEP) Outstanding Florida Water (OFW).

2.16.1.1 Drainage Patterns

The existing roadway drainage generally consists of curb and gutter with valley gutter inlets and pipes that collect and convey the stormwater runoff. The existing bridge typical section allows for stormwater runoff from the bridge to sheet flow to Atlantic Avenue on each side of the bridge. The bridge has a crest vertical curve that conveys water to either end, and then to the nearest curb inlet on Atlantic Avenue. After being collected by curb inlets, stormwater from the bridge drains directly into the Intracoastal Waterway after being treated.

2.16.1.2 Stormwater Management

Prior to discharge into the Intracoastal Waterway, stormwater runoff collected is conveyed to an existing pollution control device (Contech Vortechs Stormwater Treatment Model 5000). The treated runoff ultimately discharges into the Intracoastal Waterway via a 24-inch-diameter corrugated metal pipe. It is important to note that the existing stormwater treatment system does not meet current water quality criteria for DRER and SFWMD.

2.16.1.3 Floodplain

The proposed bridge will perform hydraulically in a manner equal to or greater than the existing bridge. Backwater surface elevations are not expected to increase. As a result, there will be no significant adverse impacts on natural and beneficial floodplain values. There will be no significant change in floodplain risk, nor will there be a significant change in the potential for interruption, termination of emergency service, or emergency evacuation routes. Therefore, the encroachment is not significant if the bridge height is expected to remain the same. A bridge hydraulic report will be prepared during the design phase to verify the replacement bridge height.

According to the revised 2009 Flood Insurance Rate Maps (FIRM) Community Panels 12086C0142L and 12086C0161L, the project study area is located within Flood Zone AE, where the base flood elevation has been determined to be 8 feet NGVD29 (6.45 feet NAVD). Refer to Appendix B for the FIRM Map.

2.17 SOILS AND GEOTECHNICAL DATA

A geotechnical evaluation was performed at the site to determine existing subsurface conditions in the vicinity of the existing bridge. A summary of the geotechnical investigation is presented in the *Preliminary Report of a Geotechnical Exploration – Structures (Revision 2)*, March 10, 2021 (included as Appendix C). As part of the evaluation, two test borings were performed, each to a depth of 80 feet measured from the existing ground surface.

Prior to the subsurface explorations, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey tool was used to determine soils that could exist in the area (NRCS 2022). NRCS groups soils into map units for display purposes. Based on the NRCS tool, there are two soil mapping units in the vicinity of the project study area as presented in Table 2-2.

Table 2-2. Miami-Dade County Soil Survey

Map Unit Symbol	Map Unit Name (% of soil map unit in AOI)	Typical Profile
15	Urban land (55.1% of AOI)	Not reported
99	Water (44.9% of AOI)	100 percent water

AOI = Area of Influence

In December 2017, two test borings were conducted in the area of the existing bridge. The soil types encountered are presented in Table 2-3.

Table 2-3. Soil Stratigraphy

Stratum No.	USCS Classification	Soil Description
1	SM-OL	Dark brown organic silty fine sand
2	SP-SM	Loose to very loose brown fine sand with traces of limerock
3	SM-OL	Very loose dark brown organic silty fine sand
4	SP-SM	Loose gray fine sand with silt
5	ML-OL	Soft dark brown highly organic sandy silt
6	--	Light brown porous sandy limestone and calcareous fine sand
7	SP	Loose light gray fine sand
8	--	Light brown to gray porous sandy limestone and calcareous fine sand

USCS = Unified Soil Classification System

Figure 2-4 presents the soil survey map from the NRCS tool that includes the selected AOI for the project. Based on the information from the NRCS web tool, no unsuitable soils are present within the project study area.

Figure 2-4. Miami-Dade County Area Soil Survey Map

2.18 UTILITIES

Existing utilities include electric, gas, water, sewer, and communications. Table 2-4 lists utility owners and contact information as identified from a Sunshine 811 ticket. Ten utility agency owners have facilities within the vicinity of the project study area.

During a field review, it was observed that the Miami-Dade County Water and Sewer Department (MDWASD) has facilities along the centerline of Atlantic Avenue, with manholes spaced approximately 80 feet apart and various valves in multiple locations. In addition, an MDWASD pump station (no. 1318) is located at the northwest corner of the eastern intersection of Atlantic Avenue and Atlantic Isle. The pump station is enclosed by a fence set back 4.5 feet from the back of the roadway curb. In addition, there are AT&T buried fiber optics on the north side of the roadway, and a 2-inch-diameter water main that traverses over the existing Atlantic Isle Bridge between the planter easement and barrier wall.

Table 2-4. Utility Agency Owners

Utility Agency Owners	Contact	Utility Type
AT&T Florida	Ibrain A Font 305-990-6499 if452r@att.com	Communications
Breezeline	Javares Hall 305.213.9908 JHall@breezeline.com	Communications
City of North Miami Beach	Karim Rossy, E.I. Karim.Rossy@citynmb.com 305 948-2967, ext. 7962	Water and Sewer
Columbus Networks	Matthew Schwartz 954-235-4498 tssimatt@gmail.com	Communications
Comcast	Carlos Olivas 305 849 7693 Carlos_olivas2@comcast.com	Communications
FP&L (Distribution)	Emma McAskill Office: (305) 442-5129 Cell: (305) 298-2147 Emma.Mcaskill@fpl.com	Electric – Distribution
FP&L (Transmission)	Gretchen Dillman (Transmission Relocation Coordinator working on behalf of Florida Power and Light) (813) 605-7083 Gretchen.Dillman@fpl.com	Electric – Transmission
Hotwire	Walter Sancho-Davila Phone: (954) 699-0900 Cell: (954) 248-7396 walter.sancho-davila@hotwirecommunication.com	Communications

Utility Agency Owners	Contact	Utility Type
Miami-Dade Water and Sewer	Patrick Chong 786-552-4416 Patrick.Chong@miamidade.gov	Water and Sewer
People's Gas/TECO	David Rivera Gas Design Technician Office: 954.453.0794 Fax: 954.453.0804 DRRivera@tecoenergy.com	Gas

2.19 LIGHTING

Existing light pole structures are on the north and south side of Atlantic Isle and Atlantic Avenue. They are antique pendant/teardrop style fixtures. Figure 2-5 presents a typical light post. The light posts are set back from the back of the roadway curb between 1.5 and 4 feet as observed during a field visit. The light poles contain FDOT electric pull-boxes.

Figure 2-5. Existing Lighting

2.20 SIGNS

Within the project study area, numerous single-post signs exist along both sides of Atlantic Avenue, including “Do Not Enter,” “One Way Street Ahead,” “No Outlet,” “Smile! You’re On Our Video Security Cameras,” “Speed Hump,” “No Stopping Standing Parking,” “One Way,” and “Speed Limit 20” signs. Figure 2-6 presents a sign at the intersection of Atlantic Isle and Atlantic Avenue. Additionally, there is a posted weight restriction sign located at the western end of the bridge (“Weight Limit”). This sign is posted for SU and C trucks at 12 tons and 21 tons, respectively (refer to Figure 2-7). Additionally, single-post signs are located around the Atlantic Island Park that state “No Parking Any Time,” “Weight Limit Restriction Ahead,” and “One Way.”

2.21 AESTHETIC FEATURES

The Atlantic Isle subdivision where the Atlantic Isle Bridge and corridor are located is a residential (low-density land use) neighborhood with minimal pedestrian accommodations. The front yards and driveways of the residences connect to the residential roadways at the curb and gutter.

Besides the historic Atlantic Isle Bridge, other community features in the project study area include the historic triangular landscape of the Atlantic Island Park, which includes the Atlantic Isle Lagoon. All of these resources are potentially NRHP eligible. Surrounding the Atlantic Isle Lagoon are royal palm trees spread approximately 10 to 20 feet from each other, with a clearance of 7 to 20 feet from the roadway curb and gutter. The proposed improvements have the potential to alter the views/vistas from the bridge and surrounding areas. The proposed improvements could change the integrity and aesthetic quality of the historic bridge.

The Atlantic Isle Bridge planter easement includes closely spaced ceramic pots containing clusia (*Clusia guttifera*) plants that create a hedge between the curb and the barrier wall of the bridge. Figure 2-8 presents a visual of the planter easement.

Figure 2-6. Existing Signs Located at Eastern Intersection of Atlantic Isle and Atlantic Avenue

Figure 2-7. Existing Sign Located on Western End of Bridge

Figure 2-8. Existing Planter Easement Along Bridge

2.22 BRIDGES AND STRUCTURES

Within the project study limits, the only structure is the Atlantic Isle Bridge (Bridge No. 874218). Figure 2-9 provides a view of the bridge from the western end. The existing bridge spans over the Atlantic Isle Lagoon.

Although the project will include improvements to the existing Atlantic Isle Bridge, this bridge is not located over a navigable waterway. Therefore, no coordination with the United States Coast Guard or permits for navigation are required.

Figure 2-9. Atlantic Isle Lagoon Bridge – Southeastern View

2.22.1 Existing Bridge Typical Section

The existing bridge typical section, as depicted on Figure 2-10, consists of one 10-foot-wide traffic lane with 8-inch-wide raised curbs on both sides. The overall width of the bridge is 20 feet, which accommodates the one-way travel lane centered over the bridge with type "D" curbs and a 2.5-foot-wide planter easement with a bed of river rock stone between the curb and the concrete arch walls on each side. The bridge spans approximately 43 feet over the waterway. The concrete arch walls rise above the roadway to provide parapets, which also serve as traffic barriers. The posted speed limit in the vicinity of the bridge is 20 mph.

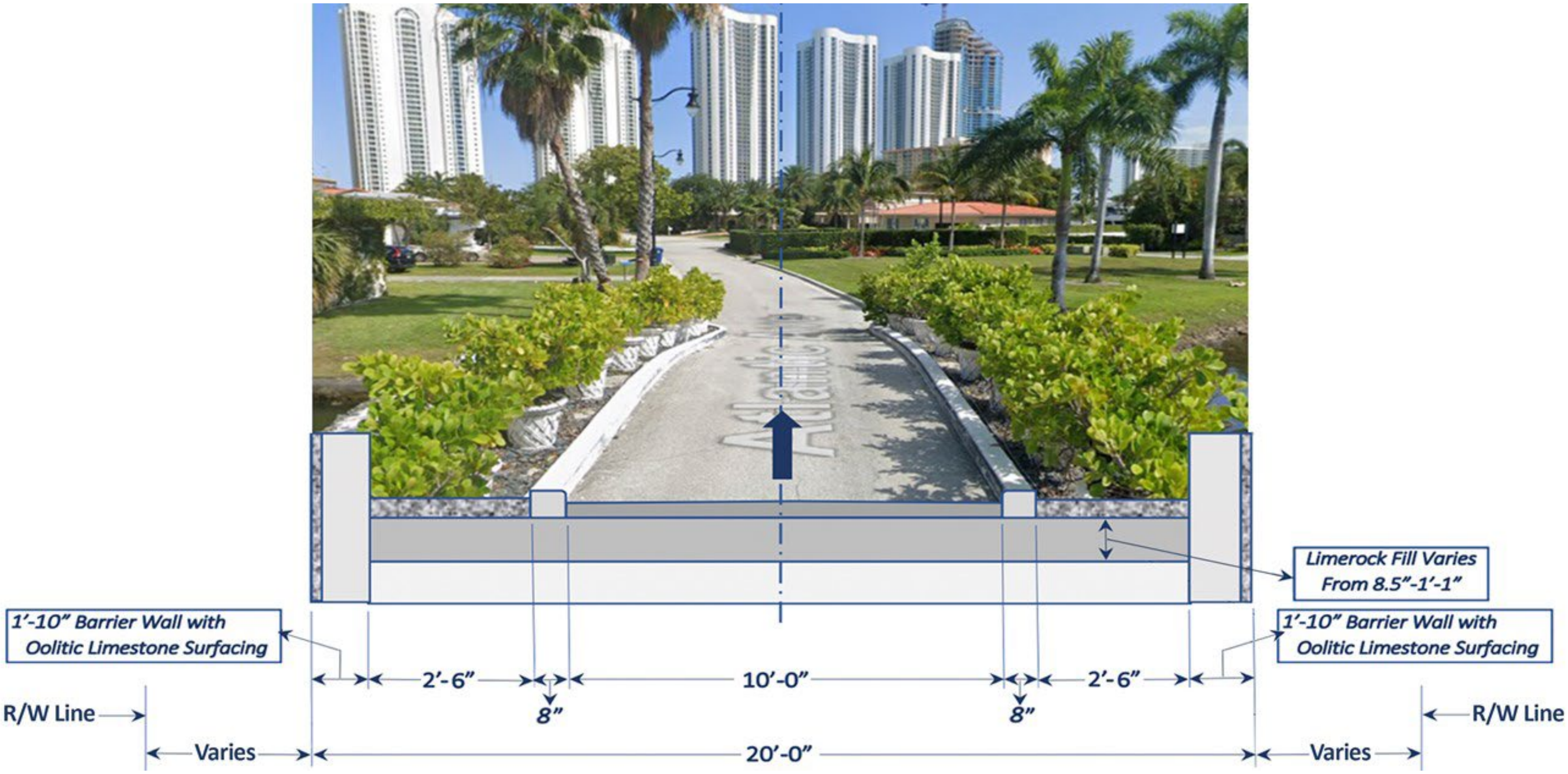

Figure 2-10. Existing Atlantic Avenue Bridge (No. 874218) Typical Section

2.22.2 Type of Structure, Current Conditions, and Year of Construction

The Atlantic Isle Bridge has a span length of approximately 43 feet. The bridge is a filled spandrel CIP-reinforced concrete arch, with spandrel walls extending vertically to form the bridge parapets. The superstructure type is unknown because there are no existing As-Built plans or other detailed information available. Table 2-5 presents additional bridge characteristics.

Table 2-5. Existing Bridge Characteristics Summary

Year Built	Mile Post[a]	Bridge Length[a] (feet)	Max. Span Length[a] (feet)	Superstructure Type	Substructure Type	No. of Spans	Bridge Width[a] (feet)	Traffic Railing Type*
1925	0.26	60	43	CIP-reinforced concrete arch	Unknown	1	20	Spandrel Wall Parapets

[a] Per Load Rating Report (Appendix D)

2.22.3 Structural Capacity

The Atlantic Isle Bridge has a controlling operating load rating factor of 0.51 and a controlling inventory load rating factor of 0.41 (Load and Resistance Factor Rating (LRFR) Part B Method). The bridge was last rated in November 2012 (refer to Appendix D). As previously noted, the bridge has a sufficiency rating of 40.9 and a health index of 60.39 and has a weight limit currently posted for SU and C trucks at 12 and 21 tons, respectively.

Bridges are rated at three different levels: Inventory Rating, Operating Rating, and Permit Rating. A load rating factor greater than 1.0 indicates that the bridge has sufficient live load-carrying capacity. According to 23 Code of Federal Regulations (CFR) 650.409, bridges with a sufficiency rating of less than 80 but greater than 50 are eligible for federal funding for rehabilitation. Bridges with a sufficiency rating of less than 50 are eligible for federal funding for replacement. Because the Atlantic Isle Bridge sufficiency rating is 40.9, it is eligible for replacement using federal funds.

The bridge health index measures the overall condition of a bridge. The bridge health index ranges from 0% (worst) to 100% (best). A lower health index means that more work would be required to improve the bridge to an ideal condition. A health index below 85% generally indicates that repairs are needed, although it does not mean the bridge is unsafe. A low health index also may indicate that it would be more economical to replace the bridge than to repair it.

Table 2-6 presents a summary of the bridge's load rating and inspection information. The most recent bridge inspection was performed on September 29, 2023, and is presented as Appendix E.

Table 2-6. Atlantic Isle Bridge Load Rating and Inspection Information Summary

Operating Load Rating Factor[a]	Inventory Load Rating Factor[a]	Year	Method[a]	Design Live Load[a]	Live Load Distribution Factor	Sufficiency Rating[b]	Health Index[b]	Inspection Date
0.51	0.41	2012	LRFR Part B	HS-20	N/A	40.9	60.39	9/29/2023

[a] Per Load Rating Report (Appendix D)
[b] Per FDOT Bridge Inspection Report (Appendix E)

2.22.4 Horizontal and Vertical Clearances

The existing bridge horizontal clearance (bridge width) is approximately 16.8 feet. Based on the field review performed on June 9, 2020, the vertical clearance over the narrow channel of the Atlantic Isle Lagoon and Biscayne Bay is approximately 5.5 feet. Field review notes are presented in Appendix F.

The existing bridge has a symmetrical vertical alignment with a high point at the center span. Based on surveyed information, the low-level fixed bridge was designed with a vertical clearance of 4.53 feet above the design high water (DHW) elevation. The 2018 Edition of the *FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways* (commonly known as the Florida Greenbook) indicates that the minimum vertical clearance for drainage between the design flood stage and the low member of bridges is 2 feet (FDOT 2018b). This clearance is necessary to allow the majority of debris to pass without causing damage. Therefore, the existing bridge meets current criteria.

2.22.5 Lagoon and Channel Dimensions

The existing bridge spans over a channel that is approximately 40 feet wide and is not considered navigable. Based on the field review in June 2020, the Atlantic Isle Lagoon is approximately 250 feet wide by 140 feet long.

2.23 EXISTING ENVIRONMENTAL FEATURES

This section summarizes the existing environmental resources – including social, cultural, natural, and physical characteristics – within the project study area that may be impacted by the proposed improvements. The existing environmental resources data were collected using a combination of field reviews and desktop research, GIS, and online database resources, including:

- GIS review of natural, social, cultural, and physical environmental issues using the FDOT ETDM Environmental Screening Tool (EST)
- Review of aerials using GIS, ETDM, EST Maps, and Google Earth Pro
- National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) Essential Fish Habitat (EFH) Mapper (NOAA 2022)
- Benthic Survey and Shoreline Characterization conducted on July 8, 2020
- Limited Roost Florida Bonneted Bat Survey and Contamination Field Review on March 12, 2021

2.23.1 Land Use

The project study area on Atlantic Island consists of a developed, urbanized residential community within the Miami Urbanized Area and within the City of Sunny Isles Beach, a U.S. Census Designated Place. The City of Sunny Isles Beach is in Miami-Dade County. The island is predominantly residential and consists of single-family residential homes with limited public/semi-private open space. There is an existing tidally influenced lagoon in the middle of Atlantic Island that connects to Biscayne Bay through a narrow channel located on the northeast point of the island. No other natural habitat exists within the project study area. Figure 2-11 presents the existing land uses in the project study area using the FLUCCS.

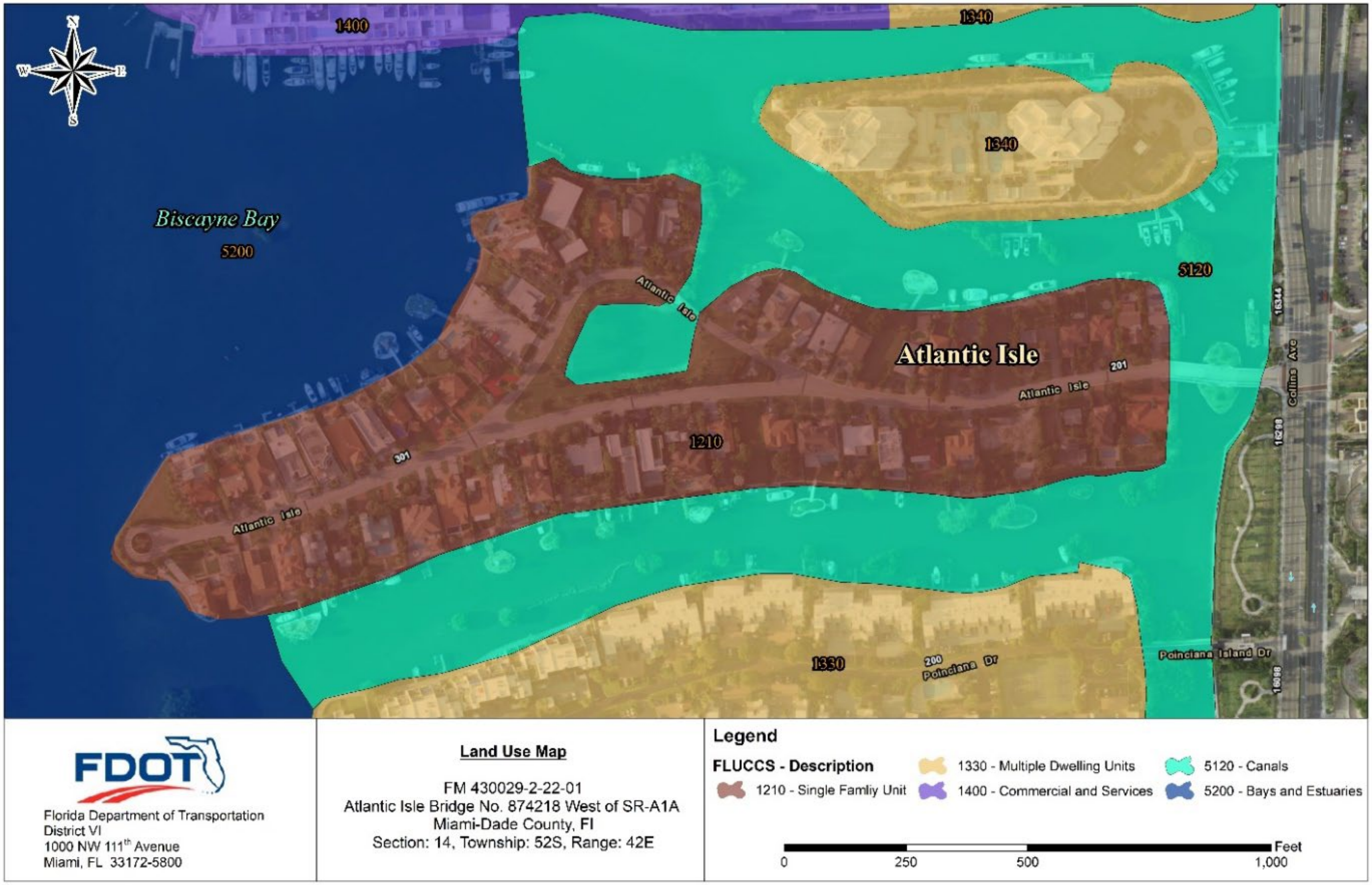

Figure 2-11. FLUCCS Land Use Map

2.23.2 Community Features

Demographic information for the project study area was obtained from the 2010 U.S. Census Bureau and the 2010 American Community Survey (Table 2-7). Data are based on a buffer of 500 feet. Within the 500-foot project buffer are seven Census block groups. Compared to Miami-Dade County, the project buffer contains a notably higher White population percentage, significantly lower African American and Hispanic population percentages, a slightly higher percentage of individuals aged 65 and older, and a drastically lower percentage of individuals under age 18. The project buffer also includes a significantly higher median family income ($52,966 greater) than that of Miami-Dade County, and a slightly lower percentage of housing units with no vehicle available.

One of the seven Census block groups contains a minority population greater than 40%. Approximately 19% of the population in the project buffer "speak English less than very well" compared to 35% of Miami-Dade County's population.

Table 2-7. Existing Demographic Data

Group	Race			Ethnic Group	Age		Median Family Income	% Housing Units Without Vehicles
	% White	% African American	% Other[a]	%Hispanic	% 65+	% <18		
Project Buffer	90.7	3.5	5.8	43.7	16.5	13.9	$103,031	9.2
Miami-Dade County	73.8	18.9	7.3	65.0	14.1	21.9	$50,065	11.1

[a] Other includes Asian, American Indian, Native Hawaiian & Other Pacific Islander Alone, Some Other Race, and Two or More Races.

Atlantic Island is primarily residential and does not have community services such as fire and police stations, schools, daycare centers, religious or healthcare facilities, community centers, public parks, libraries, or any government centers located in the project study area. Therefore, the project is not anticipated to have any involvement with community service resources. The community is organized through the Atlantic Island Civic Association, which partially owns and maintains the landscaped area surrounding Atlantic Isle Lagoon.

Details on community features are documented in the Type 2 Categorical Exclusion.

2.23.3 Recreational Facilities

Within the project study area is the historic, triangular landscape of Atlantic Island Park, which also includes the Atlantic Isle Lagoon, which are both NRHP-eligible. The park is owned by both the City of Sunny Isles Beach and Atlantic Island Civic Association. The outer portion of the park that abuts Atlantic Avenue is owned by the City of Sunny Isles Beach, while the inner portion of the park is owned by the Atlantic Island Civic Association.. Because the park is NRHP-eligible, it is protected by Section 4(f) as a historic site. However, the park is also publicly owned by the City of Sunny Isles Beach and is used for recreation. Because the park is recreational and significant to the community of Atlantic Island, it is also protected by Section 4(f) as a publicly owned park/recreation area.

Just outside the Atlantic Island entrance, there are two potential recreational Section 4(f) facilities. They are both linear parks located on the west side of SR A1A and adjacent to the north (Oceania Park, 16320 Collins Avenue) and the south (Intracoastal Park, 16100 Collins Avenue) of the entrance to Atlantic Island. Figure 1-1 presents the location of the parks. Access to these parks must be maintained during construction and no staging will be allowed at either location.

2.23.4 Cultural Features

A Cultural Resource Assessment Survey (CRAS) was conducted for this study (FDOT 2022a). The purpose of the CRAS was to locate and evaluate archaeological and historic resources within the area of potential effect (APE) and to assess their eligibility for inclusion in the NRHP according to the criteria set forth in 36 CFR Section 60.4.

No previously recorded archaeological sites were located within the APE, nor within a 1-mile buffer encompassing the APE. Subsurface testing within the corridor was not possible or necessary within the APE because of the artificial nature of the island landform and the amount of paved roadway, buried utilities, and hardscaping. The desktop analysis and pedestrian survey determined that the archaeological APE exhibits a low potential for containing intact archaeological sites. No Miami-Dade County-designated archaeological sites or zones are located within the APE.

The previously recorded Atlantic Island Bridge (8DA6433) was determined eligible for listing in the NRHP by the State Historic Preservation Officer (SHPO) on August 23, 2016, under Criteria A and C in the areas of Community Planning and Development and Architecture for its association with the development of the Atlantic Island subdivision and Sunny Isles Beach, as well as its unique design. No changes to the bridge were observed since it was last recorded and, therefore, the FMSF form was not updated during the current survey. The FMSF form for the Atlantic Island Bridge, as well as the concurrence letter from the SHPO regarding its NRHP eligibility, are included in Appendix A of the CRAS prepared for this project. Figure 2-12 shows the locations of the identified historic resources.

Ten newly recorded historic resources within the APE consist of eight historic buildings (8DA15822, 8DA15823 and 8DA19157 through 8DA19162) and two historic designed landscapes (Lake of the Isles/Atlantic Isle Lagoon [8DA15824] and Atlantic Island Park [8DA15825]). The two historic designed landscapes were designed and constructed circa 1925 and are surviving examples of landscape features designed during the early planning and development of the Atlantic Isle subdivision. The Lake of the Isles/Atlantic Isle Lagoon (8DA15824) is a component of the larger Atlantic Island Park (8DA15825), along with the adjacent Atlantic Island Bridge (8DA6433). Both historic designed landscapes are eligible for listing in the NRHP under Criteria A and C in the areas of Community Planning and Development and Landscape Architecture. The Atlantic Island Resource Group (8DA19241) features the three surviving designed central features (bridge, lake, and park) of the Atlantic Island Subdivision dating to the 1920s and retains a high degree of integrity including location, design intent, setting, feeling, and association. Therefore, the Atlantic Island Resource Group (8DA19241) was also determined to be NRHP-eligible (FDOT 2022b).

The eight newly recorded historic buildings (8DA15822, 8DA15823, and 8DA19157 through 8DA19162) exhibit common architectural styles and design types found in South Florida. Many of the structures feature alterations or modifications that diminish their historic physical integrity, including replaced windows, doors, or exterior material, the addition of non-historic exterior ornament, or additions to the historic structure. The CRAS completed for this study did not identify known associations with significant people or historical events (FDOT 2022b).

The existing cultural resources conditions are documented in the CRAS Report. On February 4, 2022, SHPO concurred with the findings of the CRAS. Because the Atlantic Island Bridge, Lake of the Isles, Atlantic Island Park, and Atlantic Island Resource Group were determined NRHP-eligible, a Section 106 Determination of Effects Case Study Report was prepared to determine if the project improvements will have adverse effects on the significant resources. The results of the Section 106 process are further documented in Section 6.

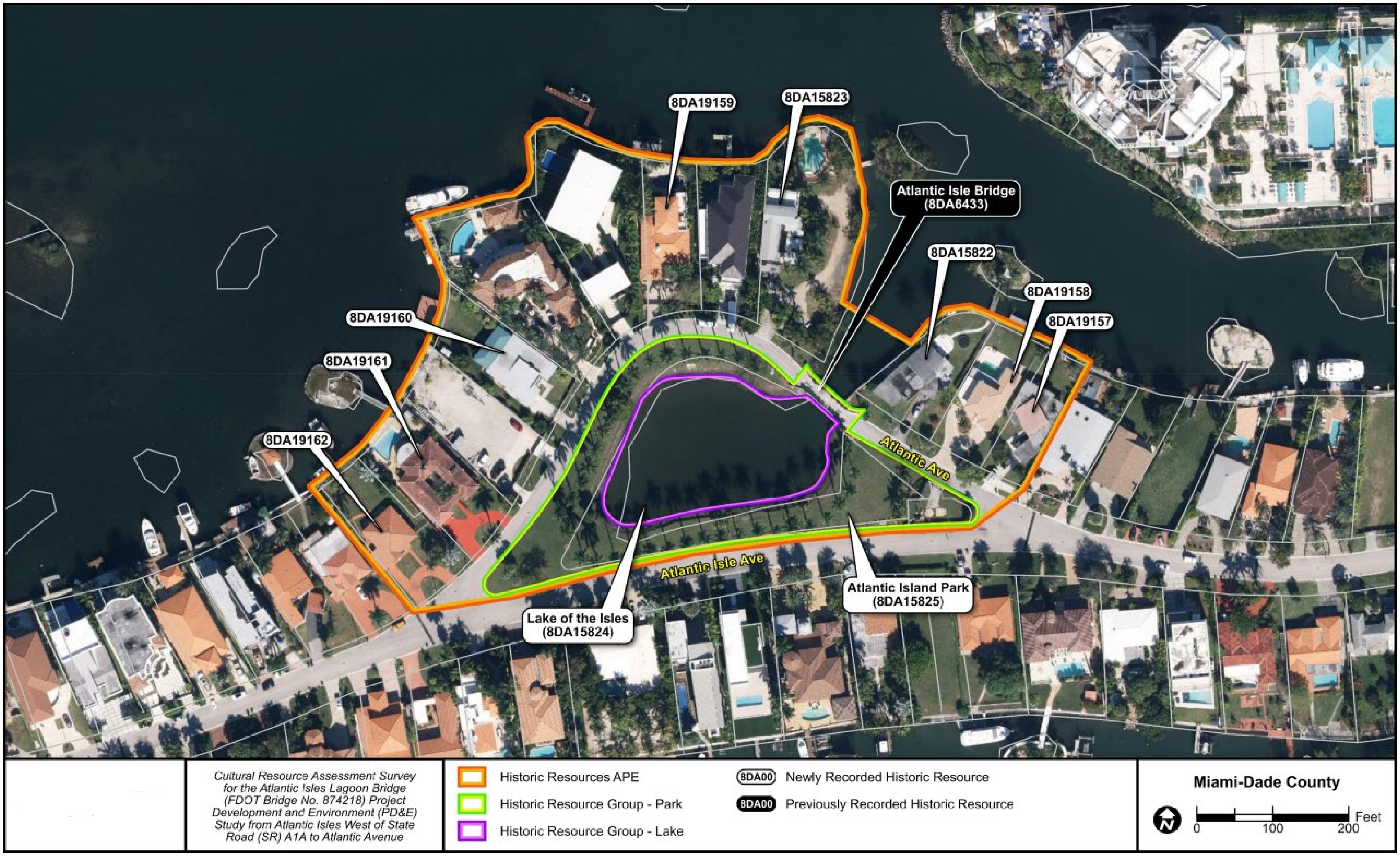

Figure 2-12. Locations of Identified Historic Resources

2.23.5 Section 4(f) Resources

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 applies to all FDOT transportation projects that use federal aid funds or require the approval of a USDOT agency and involve the “use” of any land from a publicly owned park, recreation area, wildlife or waterfowl refuge, or land from a historic property on or eligible for inclusion in the NRHP for transportation purposes. Furthermore, when the use of Section 4(f) resources results in a greater than *de minimis* impact and a Programmatic Section 4(f) Evaluation cannot be applied to the situation, an Individual Section 4(f) Evaluation must be completed. This evaluation requires documentation that there are no prudent or feasible alternatives that avoid such “use” and that the project includes all possible planning to minimize harm to the Section 4(f) resources. Because the Atlantic Island Bridge, Lake of the Isles, Atlantic Island Park, and the Atlantic Island Resource Group are NRHP-eligible, they are protected Section 4(f) resources.

2.23.6 Existing Natural Resources

The following documents the existing natural resources.

2.23.6.1 Soils

The soils present throughout the project’s terrestrial area are classified by the NRCS as Urban Land. The Urban Land soils on Atlantic Isle consist of unconsolidated sand/shell fill material, which generally is not suitable for wetland habitat but provides a stable soil for land development. This urban fill was originally used to create this artificial island; therefore, the project study area does not contain any natural soils.

2.23.6.2 Wetlands and Surface Waters

Pursuant to Executive Order 11990 entitled "Protection of Wetlands" (May 1977), the U.S. Department of Transportation (USDOT) developed a policy, “Preservation of the Nation's Wetlands” (USDOT Order 5660.1A), dated August 24, 1978, which requires all federally funded highway studies to protect wetlands to the fullest extent possible. The project study area includes an existing tidally influenced lagoon and narrow channel. The lagoon is connected to Biscayne Bay by the channel on the northeast point of the island. Several mangroves have established along the western shoreline of the channel and sapling red mangroves were documented colonizing the shallow banks of portions of the lagoon. No other natural features exist within the project study area because the remainder of the island consists of private residences.

The existing tidal waters have the potential to contain protected marine resources such as seagrasses and corals, as well as other EFH. Therefore, a benthic survey and shoreline characterization of the lagoon and channel area was performed in July 2020 and documented in the NRE Report. This survey was conducted to document existing conditions and identify the presence or absence of natural resources and EFH, as well as any habitat for/presence of any threatened or endangered species (refer to Figure 2-13).

The survey identified mangrove resources along the western and southern shorelines of the lagoon as well as along the western bank of the canal adjacent to the bridge. The mangroves in the lagoon include red mangrove (*Rhizophora mangle*) saplings and buttonwood (*Conocarpus erectus*) saplings growing along the shoreline in areas inundated during high tide. Along the western bank of the canal, mature trees of both red and white mangrove (*Laguncularia racemosa*) species were identified. Sparse and discontinuous occurrences of paddle grass (*Halophila decipiens*) were documented within the middle area of the lagoon. Shoal grass (*Halodule wrightii*) was found along some of the shallower shoreline areas of the lagoon where coverage ranged from sparse to dense. Other marine resources included green macroalgae (*Halimeda*), barnacles, and fish species (See Table 2-8). A total of 0.70 acres of seagrass and mangrove wetlands were identified.

All existing natural resources were mapped to document their location for consideration during this study. Environmental permits would be required for any unavoidable project impacts to these tidal waters, documented mangroves, and/or seagrasses. Impacts to these resources likely would require compensatory mitigation.

Figure 2-13. Benthic Survey Results and Wetland ID Map from July 8, 2020

Table 2-8. Wetland Characteristics

Wetland ID	FLUCCS	Habitat Value	Hydrologic Function	Size (Acres)
W1	911 Seagrass	Foraging and nursery habitat and refuge for invertebrates, wading birds, and marine species.	Limited water quality enhancement, sediment stabilization, wave attenuation, nutrient cycling due to size and coverage of seagrass beds.	0.10
W2	612 Mangroves	Foraging and nursery habitat and refuge for fish, invertebrates, and wading birds.	Limited shoreline stabilization, wave attenuation, nutrient cycling provided by mangrove fringe.	0.02
W3	612 Mangroves	Foraging and nursery habitat and refuge for fish, invertebrates, and wading birds.	Limited shoreline stabilization, wave attenuation, nutrient cycling provided by mangrove fringe.	0.02
W4	911 Seagrass	Foraging and nursery habitat and refuge for invertebrates, wading birds, and marine species.	Limited water quality enhancement, sediment stabilization, wave attenuation, nutrient cycling due to size and coverage of seagrass beds.	0.48
W5	612 Mangroves	Foraging and nursery habitat and refuge for fish,	Limited shoreline stabilization, wave attenuation, nutrient cycling provided by mangrove fringe.	0.03

Wetland ID	FLUCCS	Habitat Value	Hydrologic Function	Size (Acres)
		invertebrates, and wading birds.		
W6	911 Seagrass	Foraging and nursery habitat and refuge for invertebrates, wading birds, and marine species.	Limited water quality enhancement, sediment stabilization, wave attenuation, nutrient cycling due to size and coverage of seagrass beds.	0.05

2.23.6.3 Protected Species and Habitat

The shallow lagoon within the project study area contains submerged aquatic vegetation (SAV) and is connected to Biscayne Bay through a narrow channel. Biscayne Bay is a designated Aquatic Preserve and an OFW that provides habitat for many protected species; therefore, potential project-related impacts to this lagoon and channel were reviewed to determine the possible effects to protected species. The following subset of species falls under the federal jurisdiction of the NMFS or the U.S. Fish and Wildlife Service (USFWS). Any involvement with these species or their designated critical habitat would require consultation under Section 7 of the Endangered Species Act. In addition, any project involvement with state-listed species would be coordinated with the Florida Fish and Wildlife Conservation Commission. Table 2-8 presents a list of species potentially occurring within the project study area.

Table 2-9. Listed Species Potentially Occurring in the Project Study Area

Species Name	Listing Status	Occurrence Potential
Plants		
Florida prairie-clover (*Dalea carthagenensis* var. *floridana*)	FE	Low
Carter's flax *(Linum carteri)*	FE	Low
Tiny polygala (*Polygala smallii*)	FE	Low
Skyblue clustervine (*Jacquemontia pentantha*)	SE	Low
Longlip Ladies-tresses *(Spiranthes longilabris)*	ST	Low
Birds		
Wood stork (*Mycteria americana*)	FT	Low
Piping plover (*Charadrius melodus*)	FT	Low
Tricolored heron (*Egretta tricolor*)	ST	Moderate
Little blue heron (*Egretta caerulea*)	ST	Moderate
Roseate spoonbill (*Platalea ajaja*)	ST	Moderate
Reddish egret (*Egretta rufescens*)	ST	Moderate
Black skimmer (*Rynchops niger*)	ST	Low
Least tern (*Sterna antillarum*)	ST	Low
Burrowing Owl (*Athene cunicularia*)	ST	Low
Mammals		
West Indian manatee (*Trichechus manatus*)	FT	Moderate
Florida bonneted bat (*Eumops floridanus*)	FE	Low
Reptiles		
American crocodile (*Crocodylus acutus*)	FT	Low
Eastern indigo snake (*Drymarchon corais couperi*)	FT	Low
Kemp's ridley sea turtle (*Lepidochelys kempii)*	FE	Low
Leatherback sea turtle (*Dermochelys coriacea)*	FE	Low

Species Name	Listing Status	Occurrence Potential
Hawksbill sea turtle (*Eretmochelys imbricata*)	FE	Low
Loggerhead sea turtle (*Caretta caretta*)	FT	Moderate
Green sea turtle (*Chelonia mydas*)	FT	Moderate
Fish		
Smalltooth sawfish (*Pristis pectinata*)	FE	Moderate
Giant Manta Ray (*Manta birostris*)	FT	Moderate
Corals		
Staghorn coral (*Acropora cervicornis*)	FT	Low
Elkhorn coral (*Acropora palmata*)	FT	Low
Pillar coral (*Dendrogyra cylindrus*)	FT	Low
Rough cactus coral (*Mycetophyllia ferox*)	FT	Low
Lobed star coral (*Orbicella annularis*)	FT	Low
Mountainous star coral (*Orbicella faveolata*)	FT	Low
Boulder star coral (*Orbicella franksi*)	FT	Low

FE = Federally Endangered
FT = Federally Threatened
ST = State Threatened

The project is within the USFWS designated consultation areas for the Florida bonneted bat (*Eumops floridanus*), piping plover (*Charadrius melodus*), the West Indian manatee (*Trichechus manatus*) and Atlantic Coast Plants.; it also is within the range of the smalltooth sawfish, giant manta ray, and sea turtles. The waters within the project study area contain designated Critical Habitat for the West Indian manatee, which is federally listed as threatened. No threatened or endangered species were observed during the benthic survey and Florida bonneted bat survey conducted for this project, and there are no listed corals within the project study area.

2.23.6.4 Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act established a new requirement to identify and describe EFH to protect, conserve, and enhance EFH for the benefit of the federally managed fisheries. The project has the potential to impact EFH and species within associated Fisheries Management Plans (FMPs) that have been developed by the South Atlantic Fisheries Management Council (SAFMC). Therefore, an EFH Assessment was prepared for this project and submitted to NMFS for review. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Subsets of EFH include Habitat Areas of Particular Concern (HAPCs), which merit special consideration based on the ecological value of the habitat to managed fish populations. HAPCs are defined as “areas within EFH that are rare, particularly susceptible to human-induced degradation, of special ecological importance, or located in an environmentally stressed area.”

Based on the results of the desktop review, three EFH types and four HAPCs were identified within the project area. The benthic survey performed on July 8, 2020, identified an additional three EFH types and two HAPCs: mangrove wetland EFH, SAV EFH, oyster EFH and HAPC, and seagrass HAPC. This survey focused on benthic and shoreline characterization of protected marine resources, including seagrasses, corals, mangroves, and other SAV within 100 feet of the existing bridge including underneath the bridge and the adjacent lagoon. The EFH and HAPCs found within the project area are summarized in Table 2-9 with their associated FMPs.

Table 2-10. EFH and HAPC within the Study Area

Fisheries Management Plan	EFH Type	HAPC	Life Stages
Shrimp (Various species: white, pink, brown, rock)	Estuarine & Marine SAV	Coastal Inlets	Juvenile, Adult, Larvae (Depending on Species)
	Estuarine Scrub/Shrub (mangroves)		
	Unconsolidated Bottom		
Snapper/Grouper Complex	Estuarine & Marine SAV	Continuous and Discontinuous Seagrass; Mangroves; Oysters	Juvenile, Adult, All (Depending on species)
	Estuarine Scrub/Shrub (mangroves)		
	Unconsolidated Bottom		
	Oysters		
Spiny Lobster (*Panulirus argus*)	Estuarine & Marine SAV	Biscayne Bay	All
	Estuarine Scrub/Shrub (mangroves)		
	Algal Communities		
	Shallow Subtidal Bottom		
	Unconsolidated Bottom		
Coral (Various species)	Unconsolidated Bottom	*Phragmatopoma* (worm reefs) – Not observed	N/A

The benthic survey of the bay bottom within the channel and lagoon, as well as the existing bridge substructure, identified that the lagoon provides habitat for paddle grass (*H. decipiens*) and shoal grass (*H. wrightii*). In particular, the mildly sloping shoreline and littoral shelf contained the densest seagrass coverage, which transitions to more scattered and isolated occurrences within the middle of the lagoon. No other threatened or endangered species were documented within the lagoon or channel. No stony corals were found in the survey area; therefore, the project is anticipated to have no involvement with protected coral species.

Based on the EFH types within the project area, this area has the potential to provide habitat for juvenile and adult assemblages of species from the snapper-grouper complex, penaeid shrimp and spiny lobster FMPs. Based on the HAPC types, this area also has the potential to provide habitat for corals and associated shallow water reef species. Therefore, various species of the federally managed penaeid shrimp, spiny lobster, fish (snapper, grouper, grunts) and coral fisheries have the potential to occur within the study area.

The NOAA NMFS EFH mapper identified the project study area as potentially providing viable spawning, breeding, and feeding areas for certain species within several federally managed fisheries, and several fish species were observed using the area.

2.23.6.5 Special Designations

The shallow lagoon within the project study area is connected to Biscayne Bay through a narrow channel. Biscayne Bay is a designated Aquatic Preserve and an OFW. Coordination is being conducted with FDEP for any potential impacts to the Aquatic Preserve and OFW.

2.24 EXISTING PHYSICAL CONDITIONS

2.24.1 Contamination

A contamination review of the FDOT ETDM EST, which contains GIS layers of the U.S. Environmental Protection Agency, FDEP, and MDC DRER, was performed. Based on the review, there are no known contaminated sites within the appropriate buffers of the project study area. Because of the age of the existing bridge, an inspection for asbestos-containing materials and metal-based coatings was completed. No coatings suspected of containing heavy metals were found, so no samples were taken or tested and no asbestos was detected in any of the materials sampled for this purpose. No contamination impacts are anticipated as a result of this project. A Contamination Screening Evaluation Report (CSER) was prepared as part of this PD&E Study.

2.24.2 Air Quality and Noise

The project is located in an area that is designated as in attainment for all of the National Ambient Air Quality Standards under the criteria provided in the Clean Air Act. Therefore, the Clean Air Act conformity requirements do not apply and no impacts to air quality are anticipated as a result of this project. Numerous residential properties are adjacent to the project study area. However, the scope of work will not include added capacity, the addition of auxiliary lanes, or traffic alignment shifts. Therefore, while temporary increased noise levels are anticipated during construction, a noise analysis per 23 CFR 772 is not required during the PD&E phase.

3.0 PROJECT DESIGN CONTROLS AND CRITERIA

3.1 ROADWAY CONTEXT CLASSIFICATION

The Context Classification of Atlantic Avenue is C3R, Suburban Residential, in accordance with FDM and Florida Greenbook criteria.

3.2 DESIGN CONTROL AND CRITERIA

Atlantic Avenue is an off-system facility. Therefore, the design criteria and standards are based on design parameters in accordance with the Florida Greenbook. The FDOT FDM Criteria are included for informational purposes only for comparison. Table 3-1 lists design criteria for the project.

Table 3-1. Design Criteria

Design Element	FDM Criteria	Reference	Florida Greenbook Criteria	Reference
Functional Classification	N/A – Off-system facility	N/A	Local Road	Table 1-1 the 2018 Florida Greenbook (p. 1-4)
Context Classification	N/A – Off-system facility	N/A	N/A – Off-system facility	N/A
Design Speed	25 mph	Existing plans	20-30 mph	Table 3-1 of the 2018 Florida Greenbook (Chapter 3)
Design Vehicle	N/A	N/A	SU-30	Table 3-2 of the 2018 Florida Greenbook (Chapter 3)
Travel Lane Width	10 ft	Section 260.2, and Table 210.2.1, Chapter 260 and 210, FDM 2023	10 ft	Table 3-20 of the 2018 Florida Greenbook (Chapter 3)
Sidewalk Width	no less than 6 ft	Section 260.2.2, Chapter 260, FDM 2023	5 ft	p. 8-2 of the 2018 Florida Greenbook
Bicycle Lane Width	7 ft - For projects where a bike lane is needed and it is not practical to move the existing curb, the width of the bicycle lane depends on the width of the available roadway pavement,	Section 260.2.1 and 223.2.1.1, Chapter 210, FDM 2023	Minimum width of 4 ft Minimum width of 5 ft when adjacent to a curb	p. 9-2 of the 2018 Florida Greenbook

Table 3-1. Design Criteria

Design Element	FDM Criteria	Reference	Florida Greenbook Criteria	Reference
Lateral Offset Criteria	Generally, 1.5 ft behind face of curb, depending on object	Table 215.2.2, Chapter 215, FDM 2023	Generally, 4 ft behind face of curb, depending on object. Can be reduced to 1.5 ft where 4 ft cannot be reasonably attained	Table 4-2 of the 2018 Florida Greenbook (Chapter 4)
Border Width	10 ft with bicycle lane and 12 ft with travel lanes at curb and gutter	Table 210.7.1, Chapter 210, FDM 2023		
Horizontal Alignment				
Maximum deflection without a curve	2° 00’	Section 210.8.1, Chapter 210, FDM 2023	2° 00’	p. 3-18 of the 2018 Florida Greenbook
Deflection Through Intersections	11° 00’	Table 212.7.1, Chapter 212, FDM 2023	11° 00’	Table 3-7 of the 2018 Florida Greenbook (Chapter 3)
Minimum Radius at emax = 0.05			198 ft	Table 3-12 of the 2018 Florida Greenbook (Chapter 3)
Vertical Alignment				
Recommended Maximum Grades			7% flat terrain	Table 3-16 of the 2018 Florida Greenbook (Chapter 3)
Rounded K Values for Minimum Lengths Vertical Curves			K value for crest vertical curves = 12; K value for Sag vertical curves = 26	Table 3-18 of the 2018 Florida Greenbook (Chapter 3)
Vertical Clearance				
Environment-Concrete Super Structures	12 ft above mean high water (MHW)	Section 260.8.1, Chapter 260, FDM 2023	N/A	
Drainage	2 ft minimum between the design flood stage and the low member of bridge	Section 260.8.1, Chapter 260, FDM 2023	2 ft minimum between the design flood stage and the low member of bridge	p. 17-3 of the 2018 Florida Greenbook
Bridge Width				
One-Way Bridges	Total width of approach lanes + 4 ft outside, inside 2.5 ft	Section 260.9.1 and Table 260.9.1, Chapter 260, FDM 2023	15 ft for a one-lane bridge	p. 3-128 of the 2018 Florida Greenbook

3.3 STORMWATER MANAGEMENT CRITERIA

3.3.1 Stormwater Management Approach

Based on preliminary permit assessments for SFWMD, U.S. Army Corps of Engineers (USACE), FDEP, and MDC DRER, the stormwater management approach described in the following subsections is recommended.

3.3.1.1 Water Quality Methodology

A. South Florida Water Management District

a. Outstanding Florida Water – Biscayne Bay is an OFW; therefore, the requirement is to provide an additional 50% of the determined water quality volume.

b. Volumetric Requirements – Because of the project's location, seasonal high-water table, and outfall to the OFW, the wet detention volume goal is to provide whichever is greater of the following:

i. 150% times the first 1 inch of runoff times the project study area

ii. 150% times 2.5 inches times the percentage of impervious area

B. MDC DRER Criteria

a. Volumetric requirements – 100% of the first 1 inch of runoff from the farthest hydrologic point must be retained onsite as per DRER's "Policy for Design of Drainage Structures," using the following calculation:

$$V = 60CiATt$$

where:

C = Runoff Coefficient; 0.3 for pervious areas, 0.9 for impervious areas

i = Rainfall intensity, inch(es) per hour

A = Total tributary area, acre(s)

Tt = Time to generate 1 inch of runoff plus the time of concentration, minute(s)

3.3.1.2 Water Quantity Methodology

A. Design Storm Analysis

a. Provide 10-year critical storm requirements for roadway as per *FDOT Drainage Manual* guideline (FDOT 2023a).

b. Provide 25-year 72-hour critical storm requirements for outfall as per SFWMD.

3.3.2 Permit Approach

Based on preliminary permit assessments, the permits described in the following subsections would be required.

3.3.2.1 South Florida Water Management District

A. Environmental Resource Permit (ERP):

a. For surface waters and/or wetlands because of temporary disturbance. Impacts to natural resources will require assessment to determine whether seagrass or mangrove impacts may occur at the bridge if minor construction staging and/or widening is warranted.

b. For dredge/fill because of additional impervious area from temporarily/permanently widening and turnaround areas.

c. Water Use Permit - for construction dewatering if determined to be required. Will be applied for by the awarded contractor, if needed, due to limitations with permit durations.

3.3.2.2 Miami-Dade County Department of Regulatory and Economic Resources

A. Class I: Required for construction activities performed in, on, or upon tidal water or coastal wetlands located within Miami-Dade County. Anticipated to be required because the project corridor is not a part of the State Roadway System and is regulated under the authority of Miami-Dade County. Construction-related activities that extend beyond FDOT ROW and encroach within the Atlantic Isle Lagoon are anticipated to warrant a Class I permit review.

B. Class II: Required to control stormwater discharge to any surface water in Miami-Dade County. Stormwater runoff generated from the widened roadway also may require a Class II permit authorization in addition to the SFWMD ERP since the corridor is located off the FDOT State Roadway System.

C. Class V: Required for construction dewatering if determined to be required. Will be applied for by the awarded contractor, if needed, due to limitations with permit durations.

3.3.2.3 U.S. Army Corps of Engineers

Section 404: Required for temporary and permanent impacts to waters of the U.S. This project requires minor dredge and/or fill because of the bridge rehabilitation/reconstruction and widening that are over and adjacent to surface waters, respectively. If the impacts extend below the MHW line, a Section 404 authorization will be warranted.

3.3.2.4 Florida Department of Environmental Protection

A. National Pollutant Discharge Elimination System (NPDES): required for soil disturbance exceeding 1 acre; may be warranted.

B. Sovereign Submerged Lands (SSL) Easement: Lands located 10 feet waterward of the ordinary or MHW line or beneath tidally influenced waters.

C. FDEP would evaluate whether the proposed activities within the corresponding WBID meet the general permit criteria and exceptions or require an individual permit to determine the programmatic requirement to discharge into this OFW.

Table 3-2 summarizes required permits for each alternative.

Table 3-2. Permitting Table Summary

Alternatives	SFWMD ERP	USACE Section 404 & USACE Section 10	FDEP NPDES	MDC DRER Class I	MDC DRER Class II	MDC DRER Class V	SSL Easement
Alternative 1: Bridge Rehabilitation	X	X	X	X			
Alternative 2: Bridge Reconstruction	X	X	X	X	X	X	X

3.3.3 Floodplain Analysis

Either proposed alternative for the Atlantic Isle Bridge will perform hydraulically in a manner equal to or greater than the existing bridge. As a result, there will be no significant adverse impacts on natural and beneficial floodplain values. There will be no significant change in floodplain risk, nor in the potential for interruption or termination of emergency service, nor emergency evacuation routes. Therefore, no encroachment is anticipated..

Potential sea level rise elevations were analyzed using the methodology described in the FDOT D6 *Exfiltration Trench Reference Manual* (FDOT 2020b), Section 3.2.3.2, where the mean higher-high water (MHHW) elevation is established by NOAA by using the closest tidal datum to the project location. In this case, the station closest to the project location is Virginia Key. The NOAA tidal station records are based on an epoch (period) from 1983 to 2001. That means the projection of the MHHW elevation will be from 2001 to the end of the design life with a rise of 2.39 millimeters per year. In this case, the projection would be from 2001 to 2047, experiencing 0.36 foot of sea level rise by year 2047 with a DHW level of 0.59 foot NAVD88. However, FDOT District 6 Drainage Department determined and adopted a value for the DHW level of 2.00 foot NAVD88 in 2018 during their development of a GIS database[1] and the GIS Screening of State Highways Impacted by the Design High Water and Base Clearance Requirements in Miami-Dade County, FL Technical Memorandum (FDOT 2018c). That means the value to be considered as the DHW level for this project will be 2.00 foot NAVD88.

$$DHW = (\text{MHHW Elevation}) + [(\text{Year of project design} - 2001) * 0.00784] + (20 * 0.00784).$$

$$DHW = 0.23 + [(2027-2001) * 0.00784] + (20 * 0.00784) = 0.59 \text{ feet NAVD88}$$

DHW = 2.00 foot NAVD88 > 0.59 feet NAVD88

Because the clearance of the existing and the proposed bridges are 2.34 feet and 2.49 feet above the DHW level, respectively, no mitigation is needed for the expected sea level rise.

[1] https://www.arcgis.com/apps/mapviewer/index.html?layers=ffc949fe73534c29a06eb8953b6f9914

4.0 ALTERNATIVES ANALYSIS

This section summarizes the alternatives considered during the PD&E Study. The alternatives analysis process included developing, evaluating, and screening potential alternatives based on the project's purpose and need and other evaluation criteria. The No-Action Alternative will be analyzed throughout the PD&E Study. Alternatives that did not meet the project's purpose and need were not considered viable and were eliminated from detailed consideration. For the purposes of identifying potential avoidance alternatives, alternatives were considered that avoid adverse effects to the NRHP-eligible bridge. Each of the Build Alternatives analyzed for improvements to both the bridge and Atlantic Avenue.

The following evaluation criteria were used to screen the alternatives considered and to identify alternatives for detailed study:

- Reasonable expectation of serving traffic needs identified in the project purpose and need
- Degree to which each alternative meets the project purpose and need
- Consideration of future safety and operational problems
- Constructability
- Magnitude of adverse impacts to natural, social, cultural, and physical environmental resources after consideration of reasonable mitigation
- ROW impacts
- Cost feasibility based on construction, maintenance, and operational costs

4.1 PREVIOUS PLANNING STUDIES

As noted in Section 1.1, a feasibility study to identify bridge rehabilitation alternatives to preserve the service life of the bridge began in 2016 and advanced to design in 2018. FDOT discontinued the design because additional geotechnical investigations needed may have had an adverse effect on the bridge.

4.2 NO-ACTION ALTERNATIVE

The No-Action Alternative maintains the existing bridge and roadway approaches in their existing condition and includes no rehabilitation of the existing bridge superstructure or substructure. The No-Action Alternative involves minor maintenance repairs in an attempt to extend the functional use of the bridge as recommended by routine bridge inspections until future inspections require reduced loading capacity or bridge closure. In the existing condition, the bridge is functionally obsolete. The bridge rating is below a sufficiency rating of 50 and is eligible for replacement per Federal Highway Administration policy. The bridge is nearing the end of its service life and displays exposed rebar and multiple instances of cracking, delamination, and spalls, which vary in size and severity on the soffit and sides of the bridge. The exterior oolitic-limestone-covered walls also show cracks up to 1 inch wide. The posted weight restrictions would be maintained in the No-Action Alternative and increased as needed based on future maintenance inspections. In the No-Action Alternative, emergency vehicles, larger delivery and moving vans, and heavy vehicles will continue to be prohibited to cross the bridge. Additionally, overweight vehicles will be required to continue use of flagging staff and special crossover procedures.

The No-Action Alternative has the following advantages and disadvantages:

Advantages:

- No construction cost
- No temporary noise or vibration impacts during construction
- No disruption of existing travel patterns

Disadvantages:

- The bridge life has exceeded the modern-day bridge life of 75 years and has reached its limit; there is greater risk to lose a historic resource if no significant rehabilitation is performed.
- Bridge structural components would continue to deteriorate even with routine maintenance and would eventually require closure.
- Heavy vehicles would continue to be restricted with posted weight restrictions.
- Bridge would remain functionally obsolete.
- Aesthetic appearance and historic integrity of limestone (oolitic) facade would continue to deteriorate.
- Continued bridge maintenance would be needed to maintain the structural and non-structural components; maintenance would be expected to increase as the bridge continues to deteriorate.

The remaining service life of the bridge is unknown because of the age of the structure (approximately 95 years) and the bridge will continue to deteriorate even with routine maintenance. Similarly, the aesthetic appearance (oolitic limestone) will continue to deteriorate. The No-Action Alternative would not preserve the aesthetic facade or the historic integrity of the bridge. Therefore, the No-Action Alternative is not viable for the permanent condition as it does not address the structural and functional deficiencies. However, the No-Action Alternative remains as an alternative throughout the PD&E Study to provide a baseline for comparison to the Build Alternatives.

4.3 TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS ALTERNATIVES

The Transportation Systems Management and Operations (TSMO) alternatives include strategies to manage traffic congestion and minimize other unpredictable causes of service disruption and delay to preserve the capacity and improve the security, safety, and reliability of the transportation system, while minimizing environmental impacts. There are a limited number of TSMO strategies applicable to this bridge as it is a one-lane bridge on a one-lane roadway with no existing congestion problems and no anticipated future congestion problems.

The only TSMO option applicable to this project is continued and limited repairs to the existing bridge. As stated previously, the bridge would continue to deteriorate even with routine maintenance and repairs. The TSMO Alternative would not preserve the aesthetic facade or the historic integrity of the bridge long term. Therefore, the TSMO Alternative is not viable for the permanent condition as it does not address the structural and functional deficiencies. The TSMO Alternative was eliminated from detailed consideration.

4.3.1 Multimodal Alternatives

There are no multimodal alternatives that are consistent with the project's purpose and need as there are no multimodal alternatives that address the bridge's structural and functional deficiencies. Transit services are not present on the island and no future service is planned. Pedestrian facilities are located only along the south side of the two bridges at the entrance to Atlantic Island. Multimodal improvements to the existing bridge were considered in the development and evaluation of Build Alternatives.

A Pedestrian Bridge Alternative was considered during prior planning phases and during this PD&E Study. This alternative would maintain the existing bridge structure as a pedestrian bridge, prohibit all vehicular access on the bridge to potentially extend the service life of the bridge, and require widening of Atlantic Avenue to serve vehicular access to the residences that use the bridge for access today. The existing bridge typical section would remain. Based on constructability evaluations, no improvements to the existing bridge typical section or superstructure are feasible without bridge replacement or rehabilitation. Additionally, improvements to the bridge substructure (new piers and foundations) would require bridge rehabilitation outside the limits of the existing substructure.

Because the bridge approaches would be closed in this alternative, Atlantic Avenue would be required to be permanently widened to two lanes (one lane per direction), as the existing pavement width of 16 feet is not wide enough to maintain two-way travel for access to the existing properties. The FDOT Florida Greenbook criteria, Chapter 3, Section C.7.b.1, require minimum lane widths for local urban roads in residential areas with limited ROW to be 9 feet wide minimum. Further, per the FDOT Florida Greenbook (Chapter 16, Section C.6), implementation of turnarounds west and east of the bridge would be required to prohibit vehicular traffic from entering the bridge (FDOT 2018b). The proposed turnaround areas east and west of the bridge are approximately 40 feet wide and have a turning radius of 20 feet. The turnaround areas end with a low-profile barrier or similar barrier as the one used on the renovated bridges at the entrance of the island. A permanent gravity wall would be required for the turnout area west of the bridge. The turnarounds east and west of the bridge would be a substantial change for the community as they are required to accommodate large vehicles and use approximately 10% of the park area. Additionally, the permanent gravity wall needed for the turnaround west of the bridge would protrude (both horizontally and vertically) to the edge of the lake and become a focal point for the area. Therefore, significant impacts are expected to the area viewshed and community character and may detract from the community's existing focal points.

Although the Pedestrian Bridge Alternative maintains a safe and functional route for the surrounding community/traveling public, it does not meet the project's purpose and need of addressing the existing bridge's structural and functional deficiencies. The service life of the existing bridge may be extended without vehicular loads, but because of the unknown foundations, predicting its longevity is difficult. Further, the structure and exterior limestone facade would continue to require repairs as the bridge continues to deteriorate, although not at the same rate as the No-Action Alternative. This alternative also includes permanent ROW impacts to the Atlantic Isle Lagoon and Atlantic Island Park, which are both NRHP-eligible resources. Therefore, this alternative is not considered a Section 4(f) Avoidance Alternative.

Because this alternative does not meet the purpose and need, would require continued repairs, involves ROW impacts, and would create adverse impacts to environmental resources in the lagoon and park, the Pedestrian Bridge Alternative was eliminated from detailed consideration.

4.3.2 Tunnel Alternative

A tunnel also was considered but eliminated because of the significant social, natural, cultural, and physical impacts. A tunnel would result in demolition of the existing NRHP-eligible bridge and impacts to the potentially NRHP-eligible lagoon. The construction and ROW acquisition costs, as well as environmental impacts of a tunnel alternative, would be of extraordinary magnitude compared to other alternatives. The costs of a tunnel can exceed $100 million per mile. A tunnel typical section, or alignment, was not developed, as this is not a viable alternative.

4.3.3 Bridge Rehabilitation Alternative

As noted previously, the rehabilitation alternative involves retrofitting the existing bridge superstructure, replacing the existing substructure, maintaining one-way travel, and maintaining the existing bridge typical section in the horizontal direction and roadway width. Based on constructability evaluations, no improvements to the existing bridge are feasible without affecting the bridge typical section in the vertical direction. Because the existing substructure must remain to support the existing concrete arch and exterior limestone facade, the new arch would extend beyond the limits of the existing arch at both ends and straddle the existing arch. The Bridge Rehabilitation Alternative requires temporary roadway widening along Atlantic Avenue to maintain two-way access during construction. This alternative also would require the use of a turnaround area, but it would be temporary and removed after rehabilitation of the bridge is complete.

The Bridge Rehabilitation Alternative meets the project's purpose and need to address the existing bridge's structural and functional deficiencies and would provide a functional vehicle route for the surrounding community and traveling public. This alternative attempts to retain the historical elements of the bridge; however, the oolitic limestone facade will continue to deteriorate and require continued maintenance. While there is inherent risk to the historical elements of the bridge during construction, the Bridge Rehabilitation Alternative meets the project's purpose and need and was advanced as Build Alternative 1.

4.3.4 Bridge Replacement Alternative

As noted previously, the Bridge Replacement Alternative involves replacing the entire bridge superstructure and substructure. Various alignment options were considered for bridge replacement. Replacing the bridge to the south of the existing bridge would result in significant impacts to the Atlantic Isle Lagoon, which is also a NRHP-eligible resource. Replacing the bridge to the north of the existing bridge would result in significant ROW impacts to the surrounding residences, ROW costs, and impacts to the existing natural resources associated with the BBAP. Therefore, replacement of the existing bridge on the existing alignment was evaluated further as the Bridge Replacement Alternative.

The Bridge Replacement Alternative involves reconstructing the existing one-lane bridge with a new structure. Similar to the rehabilitation alternative, this alternative also requires temporary roadway widening along Atlantic Avenue to maintain two-way access during construction and also would require a temporary turnaround area. The Bridge Replacement Alternative meets the project's purpose and need and was advanced as Build Alternative 2.

4.4 FUTURE CONDITIONS

Review of the future land use maps in the City of Sunny Isles Beach 2030 Comprehensive Plan indicates that the existing low-density residential land use is to remain (City of Sunny Isles Beach 2020). The project is in a residential neighborhood that has been fully developed. Future traffic patterns and volumes are anticipated to remain the same as the existing condition.

4.5 BUILD ALTERNATIVES

Build Alternatives are alternatives that meet the project's purpose and need. Based on the alternatives screening discussed previously, the project's proposed Build Alternatives include:

- Build Alternative 1: Bridge Rehabilitation
- Build Alternative 2: Bridge Replacement

4.5.1 Build Alternative 1 – Bridge Rehabilitation

The Rehabilitation Alternative involves rehabilitation of the existing bridge superstructure, providing a new cast-in-place (CIP) reinforced concrete arch structure, and maintaining one-way travel on the bridge. The roadway width would be maintained, but the typical section and vertical roadway geometry would be impacted to accommodate the retrofitted structure depth. Because of the age, unknown size, and type of the existing bridge foundations, this alternative is anticipated to require the new arch to be supported on new deep foundations. The proposed new arch would extend beyond the ends of the existing concrete arch and foundations to avoid the existing foundation removal costs and the associated risks that could impact the adjacent residential property foundations and structures. A new bridge substructure (abutments and foundations) would be constructed to support the rehabilitated bridge superstructure. During construction, the existing substructure and the superstructure would remain to support the existing concrete arch and exterior limestone facade.

The existing structure—including the architectural facade and bridge structure—could be damaged during the rehabilitation. Additionally, the unknown nature of the existing foundations presents added risk of field changes during construction. As previously noted, the geotechnical investigation in March 2021 was initiated to determine the size and type of the existing foundations; however, the investigation was inconclusive, and the bridge was classified as having “unknown foundations.”

The Rehabilitation Alternative does not address the bridge’s functional deficiencies (substandard traffic barriers) because that would require removal and replacement of the arch spandrel walls, which could compromise the integrity of the already deteriorating bridge. The existing roadway limerock base and pavement would be removed and replaced with a concrete riding surface provided by the new arch structure. With the bridge rehabilitation, one-way travel on the bridge would be maintained. The rehabilitated bridge typical section would remain as is, consisting of a single 10-foot-wide travel lane, 8-inch-wide curbs, 2.5-foot-wide planter easements, and 1-foot, 10-inch-wide barriers on each side of the bridge. The vertical direction of the typical section would be impacted because the roadway profile would be higher at the bridge section to accommodate the additional thickness of the new structural arch.

The Rehabilitation Alternative requires removal of portions of the existing bridge, including the existing overlay and fill material. The demolition work and the construction of the new bridge components pose risks to the existing structure, including damage to the architectural facade, such as cracking, breakage, or loss of the oolitic limestone facade material; cracking or loss of stucco surfacing on the underside of the existing arch; damage to the deteriorating bridge structure; and excessive settlement of the existing foundations supporting the existing bridge during construction. Construction of the Rehabilitation Alternative requires the existing foundations to support the existing arch and facade throughout construction. The unknown nature of the existing foundations may require temporary shoring under the bridge to support the existing arch and facade until the rehabilitation is complete. The need for such temporary shoring also would satisfy the need for falsework to support the wet concrete for the new CIP arch, which would be in close contact with the top of the existing arch.

The proposed arch and foundations would provide a new load-carrying structure that meets design live load requirements in accordance with current FDOT guidelines and would allow the posted bridge loading restrictions to be removed. The proposed arch and new foundations also would support the load of the existing portions of the bridge remaining in place. The new structural arch would connect to the existing arch and facade from above the existing foundations, rendering the existing foundations redundant and eliminating the inherent uncertainty of the unknown load-carrying capacity of the existing foundations. Therefore, future deterioration of the existing foundations would have no adverse impact on the rehabilitated bridge. The design life of the new arch and foundations of the rehabilitated bridge would be 75 years. Construction activities to accomplish the rehabilitation pose risks to the existing bridge, including damage to the architectural facade and potentially damage the structure and substructure. Additionally, it is unknown if the current bridge possesses hidden damages since its construction in 1925.

The longevity of the retained portions of the existing bridge would depend on the commitment of the City to repair and maintain the mostly non-structural oolitic limestone facade and underside stucco of the existing arch. Estimates of the extent of the spall and crack repairs are based on experience and engineering judgement but would require additional field work during final design to accurately quantify. Future maintenance needs of the Rehabilitation Alternative (non-structural oolitic limestone facade and underside stucco of the existing arch) are expected to be less than maintaining all of the existing bridge components. The City noted that maintenance costs for the existing bridge are not specifically quantified but budgeted $60,000 in 2023 for the entire subdivision. Therefore, future maintenance costs are expected to be lower than $60,000 for the Rehabilitation Alternative (in 2023 dollars).

The Rehabilitation Alternative requires temporary roadway widening and a turnout along Atlantic Avenue to maintain two-way access during construction. The turnout would be temporary and removed after rehabilitation of the bridge is complete. The temporary roadway turnout is proposed west of the bridge to accommodate temporary traffic control (TTC). The temporary turnout would require temporary walls (either gravity or sheet pile wall-types). All wall options would require excavation of the soil or installation via driving or vibratory methods near the waterline of the Atlantic Isle Lagoon. The wall is considered temporary and could be removed following completion of the bridge construction work and elimination of the temporary turnaround area. Figure 4-1 presents the proposed typical section for Build Alternative 1.

Figure 4-1. Build Alternative 1 – Rehabilitation, Proposed Typical Section

Build Alternative 1 has the following advantages and disadvantages.

Advantages:

- Portions of the historical bridge may be retained.
- Service life of new structural arch and foundations of the rehabilitated bridge is 75 years.
- Posted weight restrictions would be removed.

Disadvantages:

- Relatively longer construction time compared to the Replacement Alternative because of the temporary shoring needed during construction to prevent damage to the existing structure as well as time related to potential emergency corrections related to the many existing bridge unknowns.
- Increased risk of damage to the existing bridge historic features during construction.
- Potential for settlement of the existing bridge during construction.
- Does not address functional obsolescence of the existing bridge typical section or traffic barriers.
- Continued maintenance compared to the Replacement Alternative for the non-structural oolitic limestone facade and underside stucco of the existing arch (maintenance of structural components similar to the Replacement Alternative).
- Would be an adverse effect to the NRHP-eligible Atlantic Island Bridge (8DA6433) and the Atlantic Island Resource Group (8DA19241).
- Temporary traffic control includes temporary impacts to the Atlantic Island Park (8DA15825), which is NRHP-eligible as a contributing resource to Atlantic Island Resource Group (8DA19241).

The Rehabilitation Alternative corrects the situation that causes the bridge to be considered structurally deficient or significantly deteriorated but does not correct the situation that causes the bridge to be considered functionally/geometrically deficient. These deficiencies may lead to safety hazards to the traveling public or place unacceptable restrictions on transport and travel.

4.5.2 Build Alternative 2 – Bridge Replacement

The Replacement Alternative involves replacing the entire bridge to address the structural and functional deficiencies of the existing superstructure and substructure to enhance operations and remove load restrictions. This would require demolition of the existing bridge and replacement of the bridge at the same location to minimize overall environmental impacts. The proposed bridge typical section would be approximately 27 feet wide to accommodate one 10-foot-wide travel lane, one 8-foot-wide shared-use path, 3-foot-wide shoulders, and concrete traffic railings on both sides. A raised sidewalk would separate pedestrians from vehicular traffic. Figure 4-2 presents the proposed typical section for Build Alternative 2.

As noted in Section 3.3.3, the MHHW elevation is established using the closest NOAA tidal datum to the project location (Virginia Key), which is 0.23 foot NAVD88. In addition, the DHW elevation is based on the FDOT District 6 Drainage Department adopted value of 2.00 foot NAVD88 in coastal areas in Miami-Dade County. Based on these values, the proposed replacement bridge vertical clearance is approximately 0.15 feet higher than the existing bridge, which meets the current FDM vertical clearance criteria.

New approach retaining walls would replace the existing retaining walls. A new, non-structural oolitic limestone facade would be placed along the exterior faces of the traffic railings and retaining walls to provide aesthetics similar to the existing bridge. It is anticipated that the limestone façade could be attached with a combination of mortar (or mastic) and veneer anchors. A slightly longer bridge span may be required to span portions of the existing unknown foundations that may not be able to be removed to eliminate potential conflicts and enhance constructability.

Limestone rock fill with roadway pavement would be placed on the new arch structure. New approach retaining walls would replace the existing retaining walls. In addition, a new rubble oolitic limestone facade would be placed along the exterior faces of the vertical shape barriers and retaining walls to mimic the existing structure. The limestone could be obtained from the original source used to construct the original bridge, or the limestone from the existing bridge could be reused and incorporated into the new bridge. New bridge approach slabs are anticipated and would be the standard length of 20 feet each.

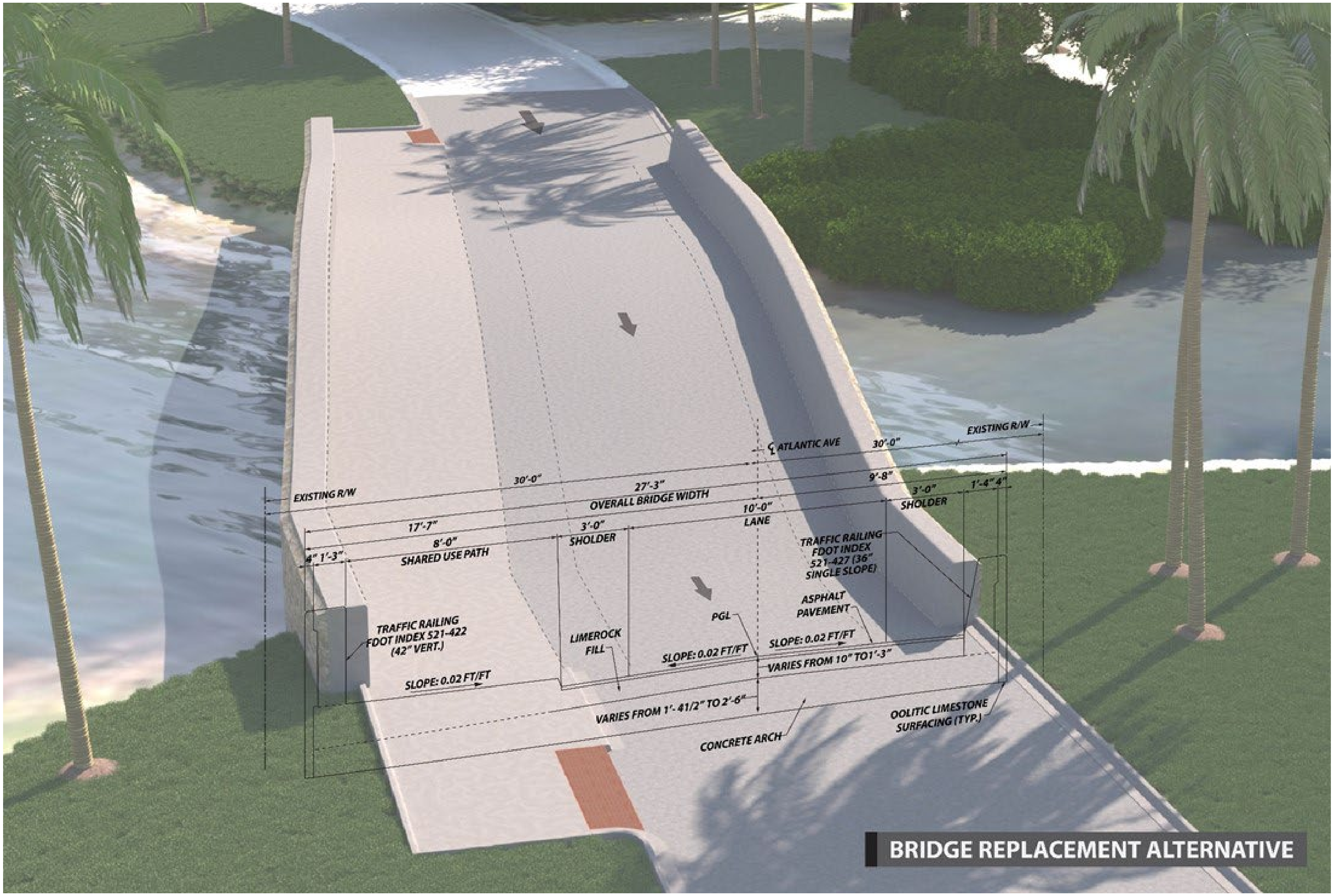

Figure 4-2. Build Alternative 2 – Replacement, Proposed Typical Section

Build Alternative 2 has the following advantages and disadvantages.

Advantages:

- Rated traffic barriers and bridge typical section improve bridge functionality and safety.
- Addition of a shared-use path provides a safe and comfortable experience for pedestrians and bicyclists.
- New arch soffit facilitates easier inspections and maintenance.
- New bridge provides a 75-year design life.
- No continued maintenance of the existing structural and non-structural bridge elements required (typical bridge maintenance of a new bridge expected).
- Posted weight restrictions would be removed.

Disadvantages:

- New bridge arch may have a slightly different profile than the existing bridge.
- Permanent impacts are expected to the NRHP-eligible Atlantic Island Bridge (8DA6433), and Lake of the Isles (8DA15824) and Atlantic Island Park (8DA15825), which are NRHP-eligible as a contributing resource to Atlantic Island Resource Group (8DA19241).
- Would be an adverse effect to the NRHP-eligible Atlantic Island Bridge (8DA6433) and the Atlantic Island Resource Group (8DA19241).
- Temporary traffic control includes temporary impacts to the Atlantic Island Park (8DA15825), which is NRHP-eligible as a contributing resource to Atlantic Island Resource Group (8DA19241).

The Replacement Alternative corrects the situation that causes the bridge to be considered structurally deficient or significantly deteriorated and corrects the situation that causes the bridge to be considered functionally/geometrically deficient.

4.5.3 Temporary Traffic Control

Both Build Alternatives involve consideration of temporary traffic control (TTC) during construction. Temporary roadway widening for both Build Alternatives is required to maintain two-way access along Atlantic Avenue during construction. For these alternatives, a temporary roadway turnaround area is proposed west of the bridge to accommodate TTC. The temporary turnaround area would require temporary walls for both Build Alternatives. Either gravity or sheet pile wall-types would be required. All wall options would require excavation of the soil or installation via driving or vibratory methods near the waterline of the Atlantic Isle Lagoon. For both alternatives, the wall is considered temporary and could be removed after completion of the bridge construction work and elimination of the temporary turnaround areas. Figure 4-3 illustrates the potential roadway section through the gravity wall limits.

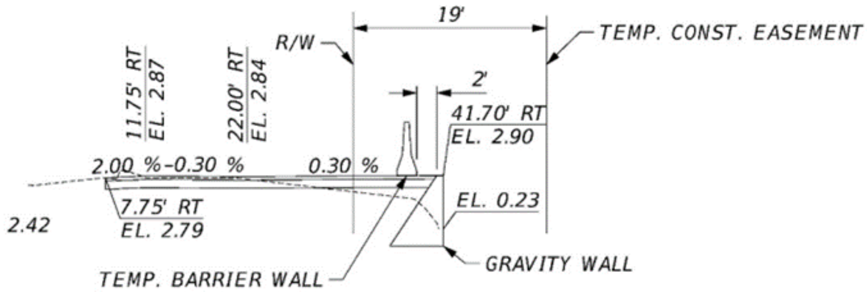

Figure 4-3. Roadway Section through Gravity Wall Limits

4.5.4 Right-of-Way Considerations

For both Build Alternatives, the proposed improvements would be constructed within the existing ROW. However, to accommodate temporary bi-directional access during construction, Atlantic Avenue would require widening and additional temporary construction easements at the turnaround area locations would be needed (refer to the concept plans in Appendix A). Both Build Alternatives require minor widening of Atlantic Avenue, which is proposed on the south side of the roadway to avoid ROW acquisition from the residences to the north. Approximately 0.03 acres of temporary construction easement is estimated to accommodate the TTC for both Build Alternatives.

4.6 COMPARATIVE ALTERNATIVES EVALUATION

The alternatives documented in Section 4.3 and in the concept plans (Appendix A) will continue to be evaluated based on ROW costs, constructions costs, and avoidance/minimization of environmental impacts. Tables 4-1 and 4-2 summarize the characteristics and impacts, respectively, of the No-Action and Build Alternatives.

Table 4-1. Build Alternative Characteristics Summary

Evaluation Criteria	No-Action Alternative	Build Alternative 1 Rehabilitation	Build Alternative 2 Replacement
Replaces Existing Foundation	No	Yes	Yes
Replaces Existing Bridge Riding Surface & Arch	No	Yes	Yes
Removes Weight Limit Restrictions	No	Yes	Yes
Bridge Life	15–25 years (estimated)	75 years	75 years
Bridge Width/Length (feet)	20/43	20/~65	27/~46
Rehabilitates Oolitic Limestone Facade	No	No	Potential Reuse
Bridge Under Clearance	5.5 feet (field measure 6/9/2020)	Maintains Existing	Meets Current Criteria
Maintains Bridge Historic Integrity	Uncertain Duration	No	No

Table 4-1. Build Alternative Characteristics Summary

Evaluation Criteria	No-Action Alternative	Build Alternative 1 Rehabilitation	Build Alternative 2 Replacement
Construction Damage Risk	None	High	Not Applicable
Provides Enhanced Operations and Safety	No	No	Yes

Table 4-2. Build Alternative Impacts Evaluation Summary

Evaluation Criteria	No-Action Alternative	Build Alternative 1 Rehabilitation	Build Alternative 2 Replacement
Potential Temporary Construction Easement Impacts (acres)	0	0.03	0.03
Community Use Parcels Temporarily Impacted (no. of parcels)	0	1	1
Residential Parcels Impacted (no. of parcels)	0	0	0
Potential Wetland Impacts (acres)	0	0.1	0.1
Potential Surface Water Impacts (acres)	0	0.1	0.1
Increased Shading Impacts	No	No	Yes
Potential Species Habitat Impacts (acres)	0	0.11	0.11
Potential Number of NRHP-eligible Resources Impacts (no. of resources)	0	3	3
Preliminary Construction Cost Estimate	$0	$1.66 Million	$1.52 Million

4.7 SELECTION OF THE PREFERRED ALTERNATIVE

Both build alternatives were presented at the Alternatives Public Workshop on June 13, 2022. Based on input from the agencies and stakeholders and the results of the alternatives analysis, Build Alternative 2 was selected as the preferred alternative. Further details of the Preferred Alternative are documented in Section 6.0.

5.0 PROJECT COORDINATION & PUBLIC INVOLVEMENT

5.1 AGENCY COORDINATION

Through the ETDM process (project #14413), FDOT informed numerous federal, state, and local agencies of the project and its scope. The Environmental Technical Advisory Team provided their comments on the project's purpose and need and issued their Degree of Effect (DOE) by resource area. Upon completion of the ETDM Programming Screen review, the Programming Screen Summary Report was developed and published on February 4, 2020. with FDOT's response to each DOE as well as discussion about the overall project. As a result of the ETDM screening, there were no substantial comments received.

On November 19, 2020, the staff of the Miami-Dade Historic Preservation Program were contacted for any information regarding cultural resources, as a component of the development of the CRAS. The information shared by the County staff the following day was integrated into the CRAS report.

On February 9, 2022, a meeting with the City of Sunny Isles Beach staff was held to discuss potential alternatives and TTC refinements to reduce environmental impacts.

An interagency meeting between FDOT, USACE, SFWMD, and NMFS was held on July 21, 2022, to discuss the potential impacts and anticipated permits for the Preferred Alternative. Comments provided by agency representatives during the meeting are summarized as follows:

- SFWMD agreed that the addition of the 8-foot shared use path could move the Replacement Alternative permitting into an Individual Permit rather than a General Permit.
- SFWMD noted that additional storage volume should be shown in the application, and storage and attenuation volume of the new impervious area will be required. If it is an Individual Permit, quality and quantity will need to be shown.
- SFWMD encouraged continued coordination with the SFWMD environmental group for species if the project is determined to need an Individual Permit based on the environmental resources.
- USACE indicated they will not review Johnsons as an Endangered Species Act (ESA) species, but it will be reviewed from Essential Fish Habitat (EFH).
- NMFS indicates a Section 7 review will be required which includes sea turtles, giant manta ray, smalltooth sawfish, etc. due to location to the Haulover Inlet south of the project area.

5.2 PUBLIC INVOLVEMENT

5.2.1 Kick-Off Meeting

On Tuesday, October 27, 2020, a virtual Elected Officials and Agencies Kick-off Meeting for the project was held from 3 p.m. to 5 p.m., and a Public Kick-off Meeting was held from 6 p.m. to 8 p.m. Both virtual meetings were held using the GoToWebinar platform to present graphics showing potential improvements being considered for the study area along with other project information. Meeting notifications were emailed to elected officials and agencies on September 30, 2020, by Infinite Source Communications Group for the District Secretary. FDOT issued a Press Release on October 19, 2020, and an ad was placed in the *Miami Herald* on October 20, 2020. Additionally, the meeting was posted in the *Florida Administrative Register* on October 16, 2022. A project notification flyer was mailed to all property owners within Atlantic Isle residential community on October 6, 2020. A total of 26 people attended the Elected Officials/Agencies Meeting, while 25 people attended the Public Kick-off Meeting. Project team members were available to answer questions and provide assistance. All attendees were given the opportunity to provide comments at the meetings and were informed that the comment period would remain open through November 3, 2020.

Comments made by attendees at the Elected Officials and Agencies Kick-off Meeting are summarized as follows:

- Request to close the bridge to vehicular traffic
- Concern for the safety of the No-Action Alternative
- Confirmation that a previous study revealed rehabilitation of the bridge was not the best option
- Requested that physical alterations or improvements to the bridge be approved by the applicable local Historic Preservation Board within Sunny Isles Beach
- Inquired as to how the public can track the ongoing project on the FDOT website
- Inquired how the study is being funded and if it is being federally funded
- Clarification of project schedule
- Requested safety signs be placed on both the east and west side of the bridge

Comments received during the Public Kick-off Meeting are summarized as follows:

- Requested island residents be consulted regarding how closing the bridge will affect traffic
- Requested additional information that could be shared with all island residents (through HOA)
- Inquired why the bridge would not be replaced or rebuilt
- Suggested all other vehicles aside from cars be prohibited from crossing the bridge
- Requested to maintain the bridge's architectural integrity as much as possible
- Requested to keep the bridge the way it is
- Inquired on budget for the project
- Inquired about City costs associated with FDOT inspections

All the comments received were taken into consideration in the development and refinement of the recommended project design.

5.2.2 Affected Parties Consultation

On Wednesday, June 13, 2022, an Affected Parties Consultation (APC) meeting was held virtually from 3 p.m. to 4 p.m. using the GoToMeeting platform. Invitations to the meeting were emailed to APC members on May 9, 2022, by the FDOT Public Information Office. A project fact sheet was attached to the invitation email. The APC meeting was held to consult with affected parties on the potential alternatives to improve the existing Atlantic Isle Lagoon Bridge (Bridge No. 874218) and to allow the public the opportunity to comment. A total of 25 people joined online through the GoTo Webinar. Top concerns among attendees included: 1) the absence of a replacement alternative for the planters, 2) replicating the historic facade by reusing the limestone from the current bridge during replacement, 3) requests to rehabilitate the bridge as a pedestrian bridge, 4) whether the City and the residents would want the bridge to be designated as historic, and 5) if the PD&E moves forward, when would construction begin and what the cost would be.

Additional comment made: FDOT is not interested in maintaining the original structure, but they are using it for vehicles. Each comment was evaluated and incorporated into the project to the extent feasible per FDOT's design and safety standards and other project environmental considerations.

On Tuesday, October 11, 2022, a Historic Preservation Board Meeting (as part of the APC) was held from 5:30 p.m. to 7 p.m. with the City of Sunny Isles Beach Historic Preservation Board. The meeting was held virtually using the GoToMeeting platform with a total of 21 attendees. The purpose of the meeting was to discuss the alternatives considered, the No-Action Alternative, and the impacts from the TTC, as well as the impact evaluation matrices, and the Preferred Alternative (Build Alternative #2 – Replacement). Comments during the Historic Preservation Board Meeting are summarized as follows:

- Inquired about reimplementation of two-way traffic (Atlantic Avenue was originally a two-way facility; City changed the facility to one-way to reduce stress on the bridge)
- Potential impacts to private properties
- Potential impacts to existing royal palm trees during TTC
- Pedestrian and bicyclist safety with the proposed bridge shared-use path
- Requested clarification on the historic significance of the park and lagoon
- Inquired if the existing bridge could be a pedestrian bridge (others stated that it would be inconvenient for some residents)

On May 11, 2023, a presentation to the City of Sunny Isles Beach HPB was held. Staff members from FDOT District Six, Jacobs, Stantec, and Janus Research presented the project to the members of the HPB and answered questions regarding the design of the project and potential mitigation measures to Section 4(f) resources.

A second APC meeting was held on Friday, July 21, 2023, via Microsoft Teams to discuss adverse effects to the significant resources and the potential mitigation measures. There was a total of 22 attendees, who were given the opportunity to ask questions. Comments made during the question-and-answer session included questions as to whether there is an education component included in the mitigation measures, as well as if there had been communication with the City regarding its preferences.

5.2.3 Alternatives Public Workshop

On Thursday, June 23, 2022, an Alternatives Public Workshop was held at 6 p.m. in a hybrid format. The hybrid meeting included two options for interested parties to attend, either in-person or virtually. The in-person option took place at the Sunny Isles Beach Gateway Center, which is approximately 0.25 miles from the Atlantic Isle community. The virtual option was held on the GoToWebinar platform. Meeting notifications were emailed to elected officials and agencies on May 27, 2022, by Cynthia Turcios from the FDOT Public Information Office. FDOT issued a Press Release on June 13, 2022, and a notice was placed in the *Miami Herald* on June 12, 2022. Additionally, the meeting was posted in the *Florida Administrative Register* on June 13, 2022, and advertised on the FDOT social media platforms on June 16 and 23. A project notification flyer was mailed to property owners within and near the project study area. A total of 17 people attended the meeting: 10 in person and 7 online. The Alternatives Public Workshop was held to show existing bridge deficiencies, existing roadway and bridge typical sections on Atlantic Avenue, initial alternatives considered, No-Action Alternative, and graphical representations of the proposed typical section, elevation view, and plan view for each of the Build Alternatives. A video of a rendering of Build Alternative 2 was also presented to give attendees an idea of what this alternative would look like in the community. Temporary TTC impact considerations, and alternative characteristics and impacts evaluation matrices were also discussed as well as the natural resources, ROW considerations, physical environment, agency coordination, the cultural resources in the study area, and the alternative impact evaluation matrix. Comments made by attendees at the Alternatives Public Workshop are summarized as follows:

- Concern for condition of wooden rafters under the bridge
- Green heron nests yearly on the northwest side of the bridge
- Inquired about the navigability of the bridge
- Suggested a third alternative to include adding a new travel lane and bridge for vehicles adjacent to the existing bridge to bypass the existing bridge

5.2.4 Public Hearing

A Public Hearing is scheduled for February 2024 (tentative).

6.0 ENGINEERING DETAILS OF THE PREFERRED ALTERNATIVE

6.1.1 Typical Sections

Refer to Section 4.5.2 for a discussion of the typical section of the preferred alternative. Refer to Appendix A Sheet 2 for the Atlantic Avenue typical section.

6.1.2 Bridges and Structures

The bridge that is being proposed has no associated significant watershed that will cause extreme flows to this canal. The bridge spans the width of the canal, and the proposed abutments are set slightly outside the alignment of the existing abutments. Therefore, no canal contraction would occur that would cause contraction scour or abutment scour. Because it is a single-span bridge with no piers in the canal, no local or pier scour would result, and therefore the installation of riprap is not needed. The clearance of the existing and the proposed bridge are 2.34 feet and 2.49 feet above the DHW level (2.00 foot NAVD88), respectively. Because of the arched profile, the bridge will not meet the minimum vertical clearance of 2 feet for debris to pass, and therefore will require a Design Variation. Furthermore, it is in Federal Emergency Management Agency flood zone AE with a static base flood elevation (BFE) of 8 ft NAVD88 (6.45 ft NGVD) (Firm ID 12086C0142L) and is outside the storm-surge-induced velocity area. Therefore, storm-induced velocity scour is not present. Refer to Figure 6-1 for the Preferred Alternative typical section.

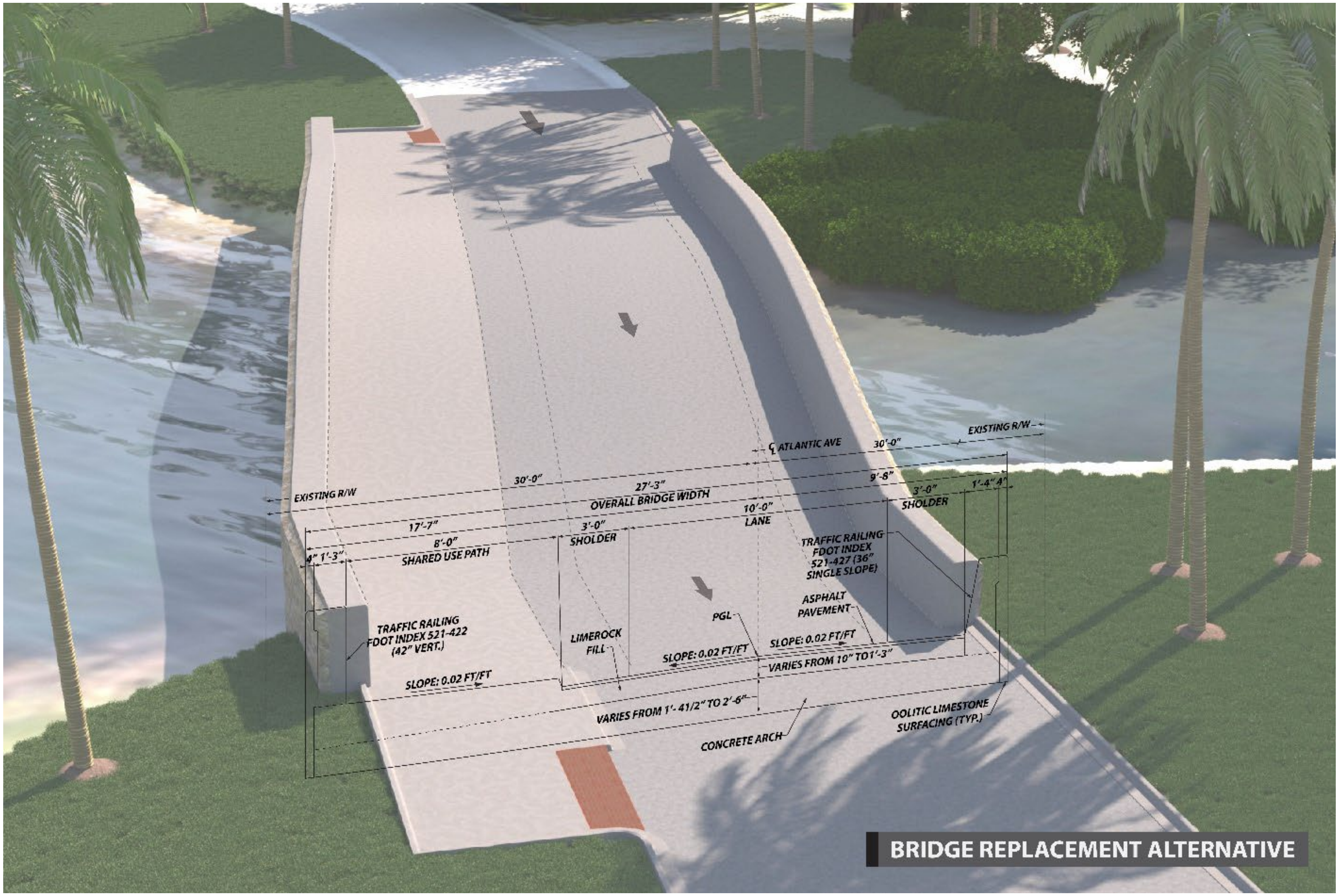

Figure 6-1. Bridge Replacement Alternative Typical Section

6.1.3 Right-of-Way and Relocations

There are no relocations necessary. The proposed improvements would be constructed within the existing ROW. However, to accommodate temporary bi-directional access during construction, Atlantic Avenue would require widening and additional temporary construction easements at the turnaround areas would be needed (refer to the concept plans in Appendix A). Minor widening of Atlantic Avenue is required, which is proposed on the south side of the roadway to avoid ROW acquisition from the residences to the north. Approximately 0.03 acre of temporary construction easement is estimated to accommodate the TTC.

6.1.4 Horizontal and Vertical Geometry

The horizontal alignment of Atlantic Isle is on a tangent west to east from Atlantic Island Park to SR A1A. At the western end of the park is the intersection of Atlantic Isle and Atlantic Avenue. Atlantic Avenue runs north and east until it reaches other end of the Atlantic Island Park where it ties back into Atlantic Isle (approximately one-tenth of a mile in length). The Atlantic Isle roadway alignment continues to run on a tangent until it ends in a traffic circle on a cul-de-sac. The existing centerline of the project bridge, Atlantic Avenue, and Atlantic Isle are aligned with the centerline of the ROW. This centerline continues throughout the island and connects the two bridges at the island entrance with SR A1A. The horizontal geometry is detailed on Sheets 3 and 4 of the Preferred Alternative concept plans (Appendix A).

The vertical alignment of Atlantic Avenue is relatively flat with a longitudinal slope ranging from 0% to 2% for a majority of the corridor. There is a vertical curve at the bridge location. The vertical geometry is detailed on Sheet 5 of the Preferred Alternative concept plans (Appendix A).

6.1.5 Bicycle and Pedestrian Accommodations

An 8-foot-wide shared-use path that is compliant with the Americans with Disabilities Act is being proposed to accommodate pedestrians and bicyclists on the bridge.

6.1.6 Multimodal Accommodations

No transit routes exist within the Atlantic Isle community, nor are they planned.

6.1.7 Access Management

No changes in access management are expected as a result of the Preferred Alternative.

6.1.8 Intersection and Interchange Concepts

The Preferred Alternative does not include intersections or interchanges.

6.1.9 Intelligent Transportation System and TSMO Strategies

There are no TSM&O alternatives that meet the project’s purpose and need.

6.1.10 Utilities

The City of North Miami Beach 2-inch-diameter (encased in 4-inch-diameter pipe) water main (for irrigation) runs along Atlantic Isle Bridge between the planter easement and retaining wall and requires relocation within the proposed bridge typical section. Relocation options considered include relocating the water main within the limestone fill portion of the bridge or encased within the shared-use path. Both are estimated to cost $50,000. A preferred relocation option has not been selected and this relocation should be coordinated early in the final design process. In addition, the City of North Miami Beach noted that the portion of the water main that extends along the existing bridge can be capped (outside of bridge limits) during construction. Because of the water main configuration around the park, irrigation can still be maintained for the park. Actual utility impacts will be verified during the design phase when a detailed survey is completed, and subsurface utility information is available. Refer to the *Utility Assessment Package* for further information.

6.1.11 Drainage and Stormwater Management Facilities

Water treatment and discharge attenuation is proposed. However, according to SFWMD, water treatment for this project would be required only for the additional impervious area. The proposed collection and conveyance drainage systems will be adequate to meet FDOT criteria and to contain the stormwater runoff for the 10-year storm. No riprap is needed around the embankment under the proposed bridge according to scour analysis. Widening is needed along Atlantic Avenue during TTC to accommodate traffic and temporary relocation of drainage structures to collect the runoff. This would not adversely affect the existing drainage condition. Based on the evaluation of the existing drainage condition, the stormwater management facilities required to meet SFWMD, FDOT, and DRER criteria can be accommodated within the existing ROW. Refer to the *Conceptual Drainage Report* for further details.

6.1.12 Floodplain Analysis

The Preferred Alternative will perform hydraulically in a manner equal to or better than the existing bridge. As a result, there will be no significant adverse impacts on natural and beneficial floodplain values. There will be no significant change in floodplain risk, nor in the potential for interruption or termination of emergency service, nor emergency evacuation routes. Therefore, no encroachment is anticipated.

New foundations would be constructed near the existing bridge foundations. The proposed hydraulic length of the bridge will be reduced moderately to adapt the new profile to the existing road. A bridge hydraulic report will be needed during the design phase to verify the replacement bridge’s height.

Potential sea level rise elevations were analyzed using the methodology described in the FDOT D6 *Exfiltration Trench Reference Manual*, Section 3.2.3.2, where the MHHW elevation is established by NOAA by using the closest tidal datum to the project location. In this case, the station closest to the project location is Virginia Key. The NOAA tidal station records are based on an epoch (period) from 1983 to 2001. That means the projection of the MHHW elevation will be from 2001 to the end of the design life with a rise of 2.39 millimeters per year. In this case, the projection would be from 2001 to 2047, experiencing 0.36 foot of sea level rise by year 2047 with a DHW level of 0.59 foot NAVD88. However, FDOT District 6 Drainage Department determined and adopted a value for the DHW level of 2.00-foot NAVD88 in 2018 during their development of a GIS database and the GIS Screening of State Highways Impacted by the Design High Water and Base Clearance Requirements in Miami-Dade County, FL Technical Memorandum. That means the value to be considered as the DHW level for this project is 2.00-foot NAVD88. Refer to the *Location Hydraulic Report* for more details.

6.1.13 Transportation Management Plan

The Preferred Alternative involves consideration of TTC during construction. Temporary roadway widening is required to maintain two-way access along Atlantic Avenue during construction. A temporary roadway turnaround area is proposed west of the bridge to accommodate TTC. The temporary turnaround area would require temporary walls, either gravity or sheet pile wall-types. All wall options would require excavation of the soil or installation via driving or vibratory methods near the waterline of the Atlantic Isle Lagoon. The wall is considered to be temporary and could be removed following completion of the bridge construction work and elimination of the temporary turnouts.

6.1.14 Special Features

Special Features that would be included as part of the Preferred Alternative are retaining walls and a slightly longer bridge span (46 feet) to span over portions of the existing unknown foundations which may not be able to be removed. Exact bridge treatments including end treatments are undetermined. Input from stakeholders on bridge treatments is required during the design phase as part of the mitigation for adverse effects to the historic bridge. In addition, the TTC could potentially impact some of the trees within the park. A Tree Disposition Plan will be required during the design phase to identify the type of trees, condition, and status.

6.1.15 Design Variations and Design Exceptions

Design Variations for length of vertical curves, stopping sign distance, vertical clearance, and horizontal alignment will be required during the final design phase. In addition, a Design Variation will be needed for the lack of separation or physical barrier between the roadway and shared-use path. These variations are required to match the footprint of the existing bridge as closely as possible and to minimize the impacts to adjacent properties. Substandard Americans with Disabilities Act (ADA) elements of the proposed bridge will be coordinated with the FDOT District 6 ADA coordinator during final design. A Design Variation may be required for the bridge end treatments if stakeholders do not agree on the aesthetics of end treatments that meet criteria (input from Affected Parties Consultation is that the new bridge is to mimic the existing bridge).

6.1.16 Cost Estimates

An engineer's construction cost estimate was developed, and the estimated project costs are summarized in Table 6-1. A contingency of 15% was used. Appendix G includes the detailed cost estimate.

Table 6-1. Estimated Project Costs

	Estimated Cost
Construction Cost	$1,504,295.44
Right-of-Way	$0.00
Temporary Construction Easement	Unknown
Mitigation Costs (Section 106 and Natural Resources)	$150,000.00
Design (10% of construction costs)	$150,428.54
Construction Engineering and Inspection (10% of construction costs)	$150,428.54
Total	**$1,955,152.52**

6.2 SUMMARY OF ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

6.2.1 Land Uses

The proposed improvements will be constructed within the existing ROW. However, the TTC for this project would result in temporary impacts to the lagoon and park, which are owned by the City of Sunny Isles Beach and Atlantic Island Civic Association. The total temporary construction easement required for TTC is approximately 0.03 acres. Impacts to these properties would be mitigated through restoration of the grassy areas and avoiding and minimizing impacts to the existing palm trees to the greatest extent possible.

The City of Sunny Isles Beach Comprehensive Plan (as amended 2023) defines the future land use in the project area as Low-Density Residential. Miami-Dade County's Zoning Map defines the project area as zoned for single-family residential (April 2021). The proposed project will continue to support the existing and future land uses within the project area. Therefore, significant land use changes are not anticipated to occur within the project area because of this project.

6.2.2 Cultural Resources

Historic properties were identified within the project APE. The Criteria of Adverse Effect, as defined in 36 CFR Part 800.5, were applied to the significant historic properties. In consideration of available project information, the Preferred Alternative, Build Alternative #2, will have an adverse effect on the Atlantic Island Bridge (8DA6433) as it will be removed. With the removal of the bridge, the Atlantic Island Resource Group (8DA19241) will also be adversely impacted. Therefore, the proposed undertaking will involve cultural resources. These findings were documented in the Section 106 Case Study Report and submitted to the SHPO on May 4, 2022, who concurred with these findings on May 12, 2023.

A Memorandum of Agreement (MOA) (*pending*) between FDOT and the SHPO documents the mitigation measures for the impacts to these resources. Impacts to these resources will be mitigated through documentation of the resources in accordance with the standards and guidelines of the Historic American Landscape Survey (HALS) and Historic American Engineering Record (HAER), as well as use of a State Historic Marker. Further, the MOA stipulates that FDOT will take into consideration the historic materials, visual profile, and design elements of the historic Atlantic Island Bridge when designing the replacement bridge and allow the City of Sunny Isles Beach and the SHPO opportunity to comment on the 60% and 90% design plans. All comments received will be considered during development of the replacement bridge design.

6.2.3 Section 4(f)

The Preferred Alternative would result in direct use of the Atlantic Island Bridge (8DA6433), as the bridge would be demolished and replaced with a new bridge. Because the bridge is a contributing resource to the Atlantic Island Resource Group (8DA19241), this alternative also results in direct use of this resource group.

Temporary use of the Atlantic Island Park (8DA15825) for TTC would also be required during construction. As documented in the *Section 106 Determination of Effects Case Study Report* (FDOT 2023e), the minimal use to the Lake of the Isles (8DA15824) and Atlantic Island Park (8DA15825) would not preclude them from being eligible for the NRHP. The properties would continue to maintain their significance and character-defining features following the construction of the project.

The Individual Section 4(f) Evaluation (*pending*) further documents the least overall harm analysis and the use of Section 4(f) resources.

6.2.4 Protected Species and Habitat

As documented within the NRE (FDOT 2023d) for this project, a Protected Species and Habitat Evaluation was conducted to document potential project involvement with federal and state protected species that may occur as part of the proposed project. A total of 32 species (five plants, nine birds, two mammals, seven reptiles, two fish, and seven corals) that are federally and/or state listed as threatened or endangered were determined to occur or potentially occur within the project area. Critical habitat for the West Indian manatee occurs within the project area. Based on the review of these species, including database searches, GIS resource analysis, field surveys, and the use of USFWS' most current guidance for Standard Protection measures during construction, the following effect determinations were made for the following species and their habitat:

- *"May Affect, Not Likely to Adversely Affect*":
  - West Indian manatee, wood stork, eastern indigo snake, smalltooth sawfish, giant manta ray, American crocodile, Kemp's ridley sea turtle, leatherback sea turtle, hawksbill sea turtle, loggerhead sea turtle, and green sea turtle
- *"No Effect", "No effect anticipated",* or *"No adverse effect anticipated"* for the remainder of the species discussed in the NRE

It is anticipated that the USFWS *Standard Manatee Conditions for In-Water Work* (USFWS 2011) and the NOAA *Sea Turtle and Smalltooth Sawfish Construction Conditions* (NOAA 2006) will be required for work proposed in, on, or over the waters in the project study area. It is anticipated that the USFWS *Standard Protection Measures for the Eastern indigo snake* (USFWS 2021) will be required during construction. With these conditions in place and given the generally low likelihood of protected species occurrence in the project study area, along with the fact that the project improvements are expected to be constructed primarily within the existing ROW with only minor impacts to the south side of Atlantic Avenue, the lagoon, and/or channel, it is anticipated that this project will not result in any adverse effects to protected species. Further, this project will result in the potential removal of three upland royal palm trees.

6.2.5 Wetlands and Other Surface Waters

This project will result in impacts to 0.005 acres of wetlands. These impacts will be indirect impacts to an existing seagrass bed due to the wider footprint of the replacement bridge structure. Additionally, 0.01 acres of direct and indirect impacts to other surface waters including potential seagrass habitat within the lagoon will occur from permanent additional shading (0.008 acres) and temporary installation of sheet piles (0.002 acres). The impacted seagrass bed is also EFH and a HAPC for federally managed fisheries. The footprint of the bridge replacement was designed to minimize these impacts, but to adequately protect the bridge infrastructure, complete avoidance of seagrass is not possible. Mitigation options for this project include Biscayne Bay Environmental Enhancement Trust Fund, permittee responsible mitigation or out of basin mitigation which would require a cumulative impact analysis. A conceptual mitigation plan will be developed through continued coordination with permitting agencies and recommendations from NMFS during the design/permitting phase of the project.

6.2.6 Essential Fish Habitat

The proposed construction of the project may result in 0.005 acres of permanent, indirect shading impacts to Estuarine and Marine SAV EFH (seagrass) and 0.008 acres of permanent, indirect shading impacts to potential seagrass habitat (shallow subtidal/unconsolidated) due to the widening of the bridge during replacement. If required, barge spudding will only occur in the areas in close proximity to the bridge and away from seagrass as much as possible during construction to avoid unnecessary impacts to SAV. Installation of sheet piles during construction will cause 0.002 acres of direct impacts to potential seagrass habitat (shallow subtidal/unconsolidated bottom). The sheet pile impacts will be temporary in nature as they will be removed after construction. The use of best management practices and compliance with the most recent edition of the FDOT's *Standard Specifications for Road and Bridge Construction* (FDOT 2023b) will further ensure that no unavoidable impacts occur to EFH from project construction. Therefore, the FDOT has made the determination that this project will result in Moderate permanent impacts to EFH. Table 6-2 summarizes the anticipated impacts to EFH.

Table 6-2. Anticipated Impacts to EFH

EFH Type	Impacted Acres
Estuarine & Marine SAV	0.005 (Permanent)
Estuarine Scrub/Shrub (mangroves)	No mangrove impacts
Oysters	To Be Determined
Algal Communities	Acreage Not Calculated
Shallow Subtidal Bottom	0.002
Unconsolidated Bottom	0.002
*Please note that EFH impact acres are not mutually exclusive.	

Additional temporary direct impacts to the following EFH types are anticipated during construction: oysters and algal communities. Impacts to these EFH types may potentially affect species within the following FMPs: shrimp, coral, snapper-grouper, and spiny lobster. Temporary displacements of individuals of the species included in the shrimp, snapper-grouper and spiny lobster FMPs may occur during project construction; however, these species are all anticipated to return to the project area post-construction as these EFH types that currently exist within the construction limits will not be permanently displaced and should naturally return to similar conditions post-construction. Therefore, no permanent impacts to species within the snapper-grouper, spiny lobster and coral FMPs are anticipated from this project. Oysters observed within the project area provide EFH and HAPC habitat for the snapper-grouper complex fishery. Oysters within the lagoon may experience temporary impacts from water quality changes during construction. Oysters within impact areas can be removed before construction and placed among existing oyster beds within undisturbed areas of the lagoon.

Adverse impacts to EFH are anticipated to be ***Moderate*** as there are permanent, indirect impacts to seagrass EFH and potential seagrass habitat, and temporary, direct impacts to potential seagrass habitat, algal communities, and oysters. Due to the small size of the project and the moderate and localized nature of the anticipated EFH impacts, it is anticipated that cumulative impacts to EFH from the proposed project, when combined with other past, present, and future projects, will not adversely impact any FMPs regulated by the SAFMC. Based on impacts to EFH, further NMFS coordination is being conducted for this project.

6.2.7 Highway Traffic Noise

While temporary increased noise levels are anticipated during construction, a noise analysis per 23 CFR 772 is not required for this PD&E Study.

6.2.8 Contamination

No potential contamination sites were identified within the study area. A survey for asbestos-containing material and metal-based coating (MBC) on the bridge, including lead-based paint, was conducted in 2018. No asbestos was discovered in any samples taken, and no samples for MBCs were taken as no suspected coatings were identified.

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APPENDIX A
Concept Plans

CONTRACT PLANS COMPONENTS

STRUCTURES

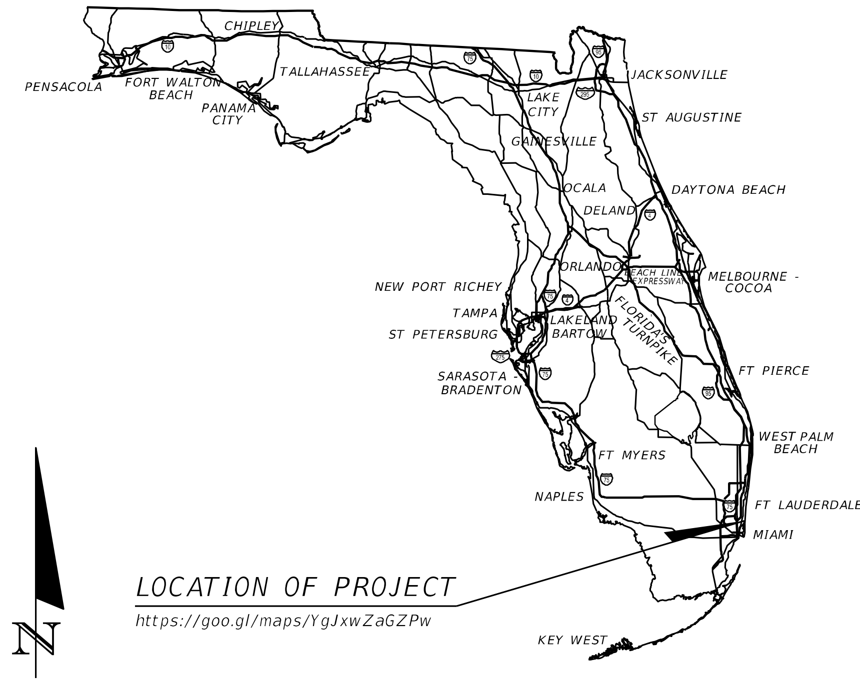
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

FINANCIAL PROJECT ID 430029-2-22-01

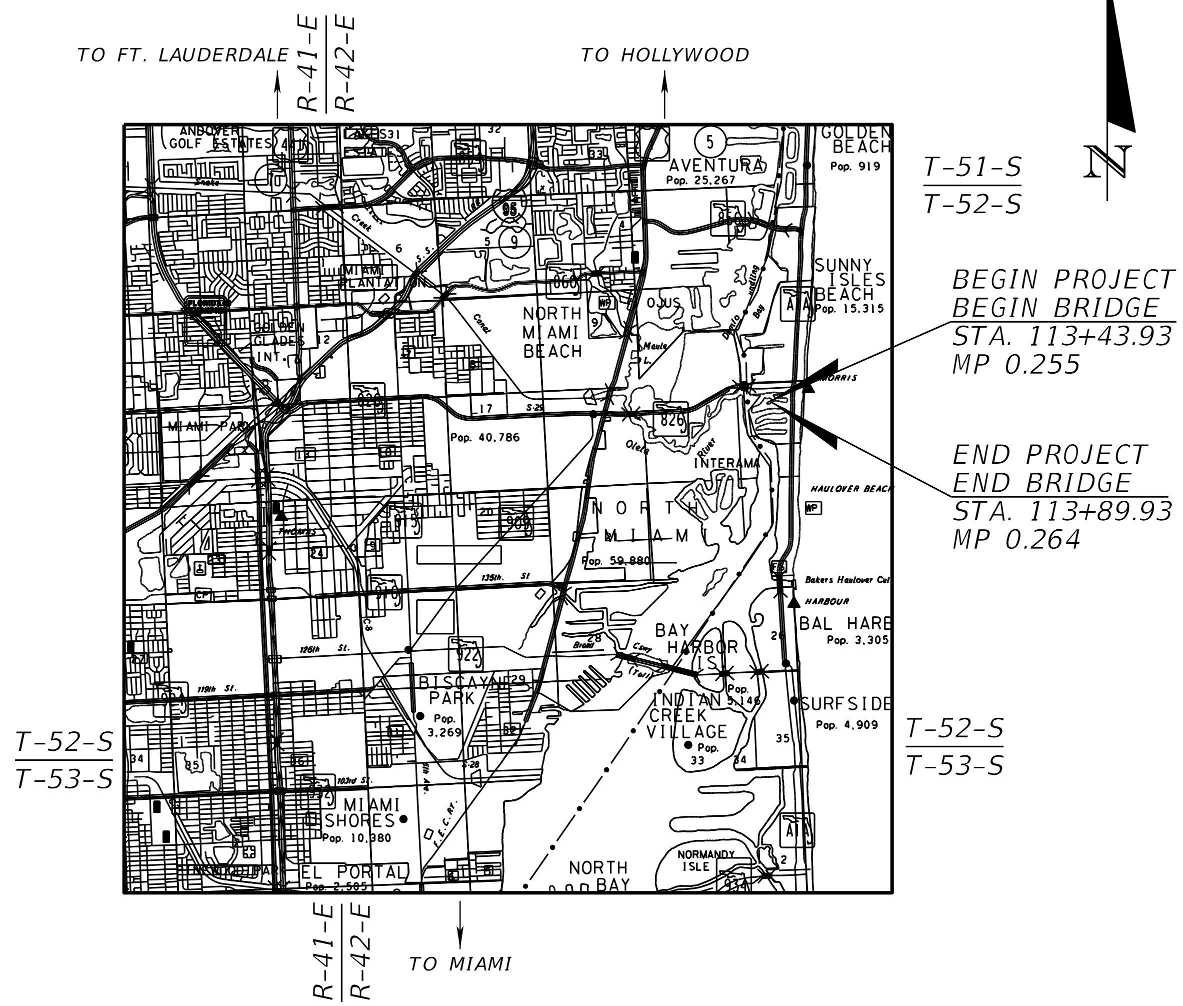
MIAMI-DADE COUNTY (87674)

ATLANTIC AVENUE BRIDGE REPLACEMENT



INDEX OF ROADWAY PLANS

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2	TYPICAL SECTION
3	PROJECT LAYOUT
4	PLAN SHEET
5	PROFILE
6	TTCP TYPICAL SECTION
7	TRAFFIC CONTROL PLAN
8	TTCP CROSS SECTIONS
9	ADVANCE WARNING DETAIL



GOVERNING STANDARD PLANS:

Florida Department of Transportation, FY 22/23 Standard Plans for Road and Bridge Construction and applicable Interim Revisions (IRs).

Standard Plans for Road Construction and associated IRs are available at the following website: http://www.fdot.gov/design/standardplans

APPLICABLE IRs: IR___-___-__

Standard Plans for Bridge Construction are included in the Structures Plans Component

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, July 2022 Standard Specifications for Road and Bridge Construction at the following website:
http://www.fdot.gov/programmanagement/Implemented/SpecBooks

DRAFT CONCEPT
NOT FOR CONSTRUCTION
NOVEMBER 2023

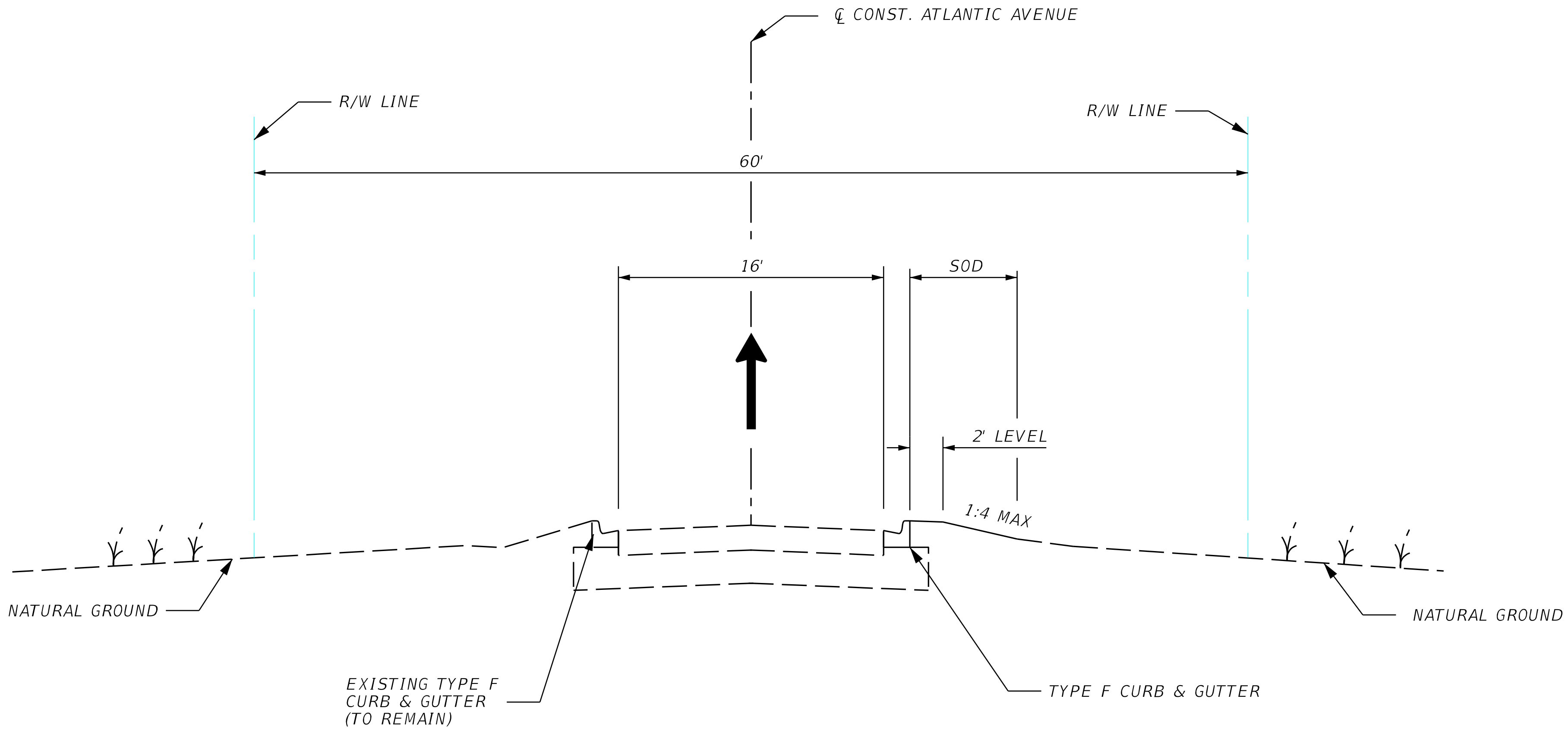
ROADWAY PLANS ENGINEER OF RECORD:

ALEJANDRO M. MEITIN, P.E.
P.E. NO.: 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146
CONTRACT NO.: C9U43
VENDOR NO.: F 954081636

FDOT PROJECT MANAGER:

VICTORIA VOGT

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
		1



ROADWAY TYPICAL SECTION
ATLANTIC AVENUE
STA. 108+00 TO STA. 113+13.93
STA. 114+19.93 TO 115+80.00

TRAFFIC DATA

CURRENT YEAR = 2019 AADT = 605
K = 8.18% D = 51.1% T = 5.18% (24 HOUR)
DESIGN SPEED = 25 MPH
POSTED SPEED = 20 MPH

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ALEJANDRO G. MEITIN, P.E.
P.E. LICENSE NUMBER 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

SR NO.	COUNTY	FINANCIAL PROJECT ID
	MIAMI-DADE	430029-2-22-01

TYPICAL SECTION

SHEET NO. 2

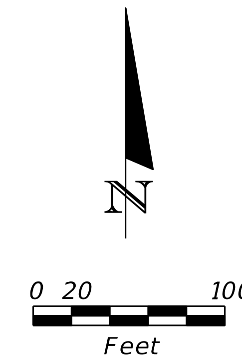
CURVE DATA EXISTING1
PI STA. = 108+14.96
Δ = 43° 18' 26" (LT)
D = 11° 06' 39"
T = 204.73
L = 389.77
R = 515.67
PC STA. = 106+10.23
PT STA. = 110+00.00

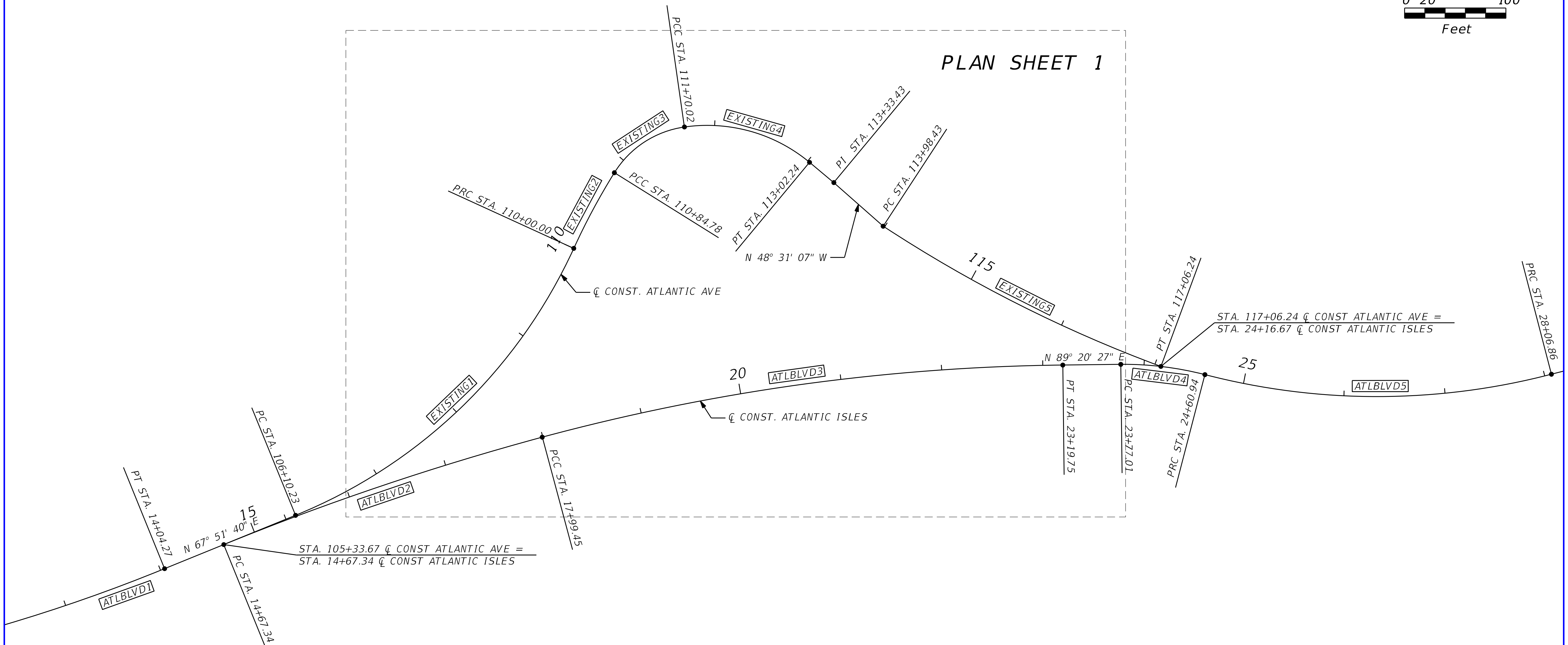
CURVE DATA EXISTING2
PI STA. = 110+42.45
Δ = 7° 24' 30" (RT)
D = 8° 44' 20"
T = 42.45
L = 84.77
R = 655.64
PC STA. = 110+00.00
PT STA. = 110+84.78

CURVE DATA EXISTING3
PI STA. = 111+30.30
Δ = 49° 50' 05" (RT)
D = 58° 27' 54"
T = 45.53
L = 85.24
R = 98.00
PC STA. = 110+84.78
PT STA. = 111+70.02

CURVE DATA EXISTING4
PI STA. = 112+40.28
Δ = 47° 56' 54" (RT)
D = 36° 15' 47"
T = 70.26
L = 132.22
R = 158.00
PC STA. = 111+70.02
PT STA. = 113+02.24

CURVE DATA EXISTING5
PI STA. = 115+52.99
Δ = 12° 52' 22" (LT)
D = 4° 10' 56"
T = 154.55
L = 307.80
R = 1,370.00
PC STA. = 113+98.43
PT STA. = 117+06.24





CURVE DATA ATLBLVD1
PI STA. = 12+03.11
Δ = 13° 42' 48" (LT)
D = 3° 23' 32"
T = 203.11
L = 404.27
R = 1,689.10
PC STA. = 10+00.00
PT STA. = 14+04.27

CURVE DATA ATLBLVD2
PI STA. = 16+33.61
Δ = 7° 02' 19" (RT)
D = 2° 07' 10"
T = 166.26
L = 332.11
R = 2,703.38
PC STA. = 14+67.34
PT STA. = 17+99.45

CURVE DATA ATLBLVD3
PI STA. = 20+60.99
Δ = 14° 26' 28" (RT)
D = 2° 46' 32"
T = 261.53
L = 520.30
R = 2,064.31
PC STA. = 17+99.45
PT STA. = 23+19.75

CURVE DATA ATLBLVD4
PI STA. = 24+19.23
Δ = 15° 14' 20" (RT)
D = 18° 09' 21"
T = 42.22
L = 83.93
R = 315.58
PC STA. = 23+77.01
PT STA. = 24+60.94

CURVE DATA ATLBLVD5
PI STA. = 26+37.72
Δ = 29° 05' 57" (LT)
D = 8° 24' 44"
T = 176.77
L = 345.91
R = 681.10
PC STA. = 24+60.94
PT STA. = 28+06.86

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REVISIONS

DATE	DESCRIPTION	DATE	DESCRIPTION

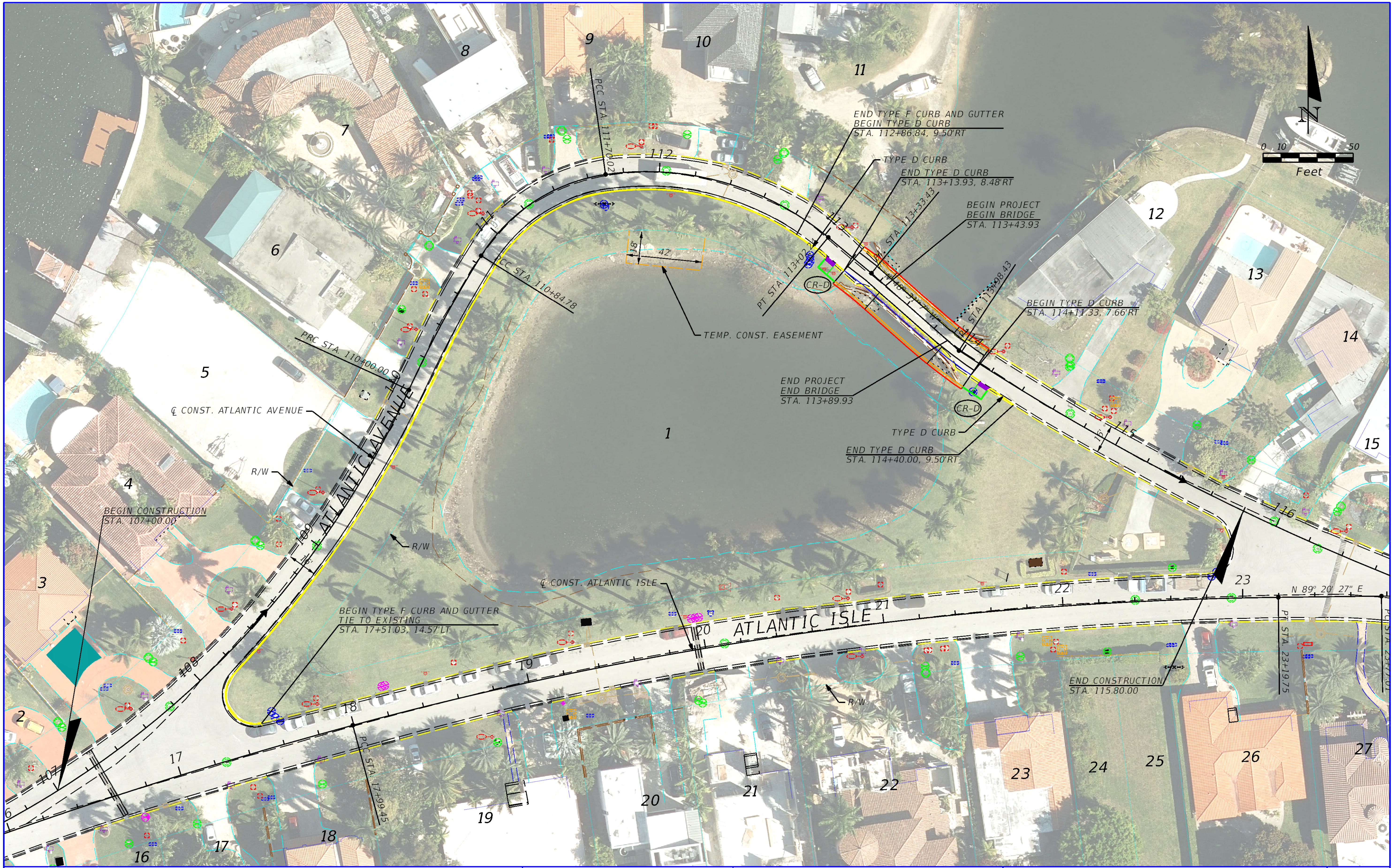
ALEX MEITIN, P.E.
P.E. LICENSE NUMBER 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	MIAMI-DADE	430029-2-22-01

PROJECT LAYOUT

SHEET NO. 3



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P.E. LICENSE NUMBER 44744
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3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

SR NO.	COUNTY	FINANCIAL PROJECT ID
	MIAMI-DADE	430029-2-22-01

PLAN SHEET
BRIDGE REPLACEMENT (ALT 2)

SHEET NO. 4

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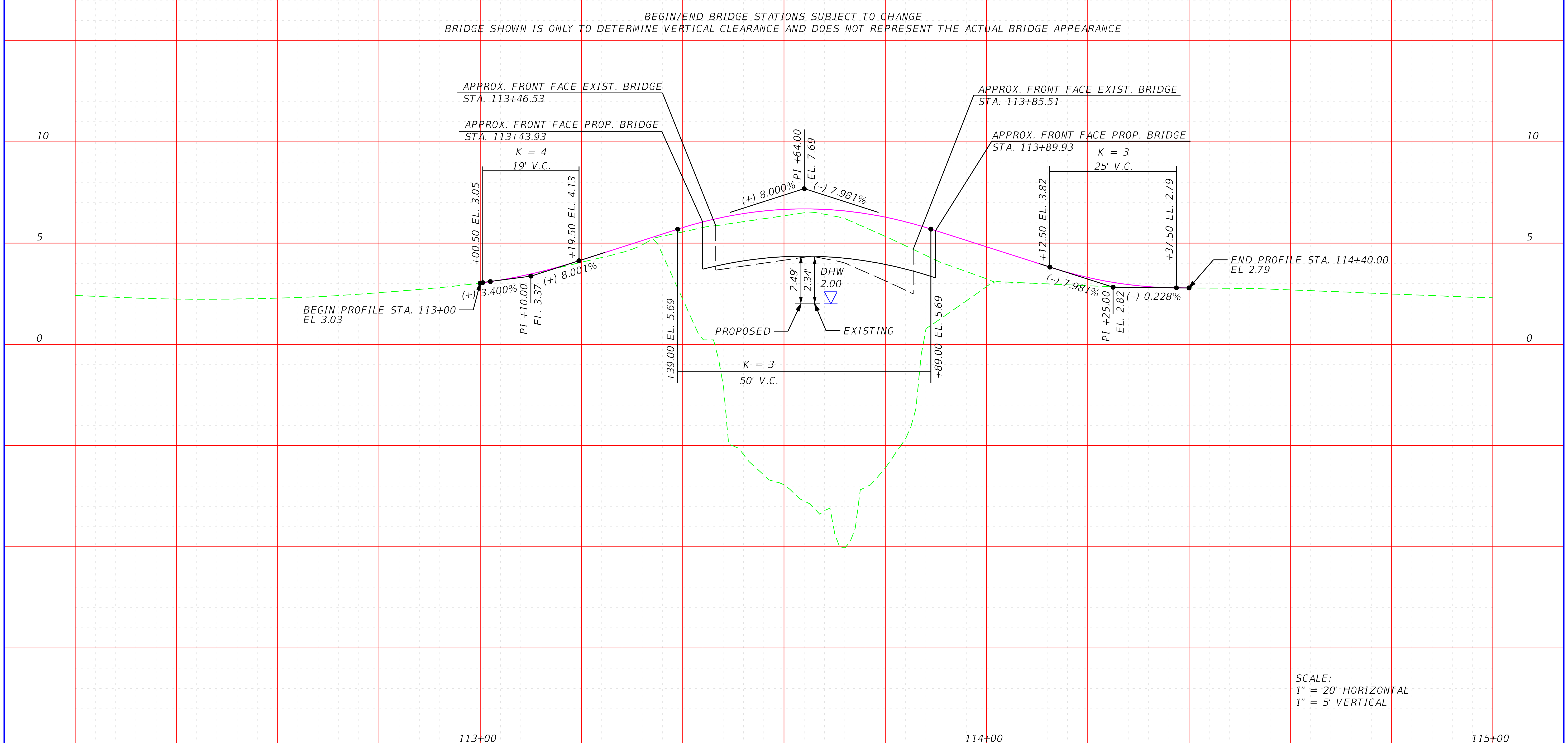


REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ALEX MEITIN, P.E.
P.E. LICENSE NUMBER 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
NONE	MIAMI-DADE	430029-2-22-01

PROFILE SHEET
BRIDGE REPLACEMENT (ALT 2)

SHEET NO.
5

GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED DURING DAYTIME ONLY FROM 8:00 AM TO 8:00 PM.
2. PCMS MESSAGES SHALL BE PLACED ACCORDING TO THE PLANS AND SHALL DISPLAY THE FOLLOWING MESSAGES:

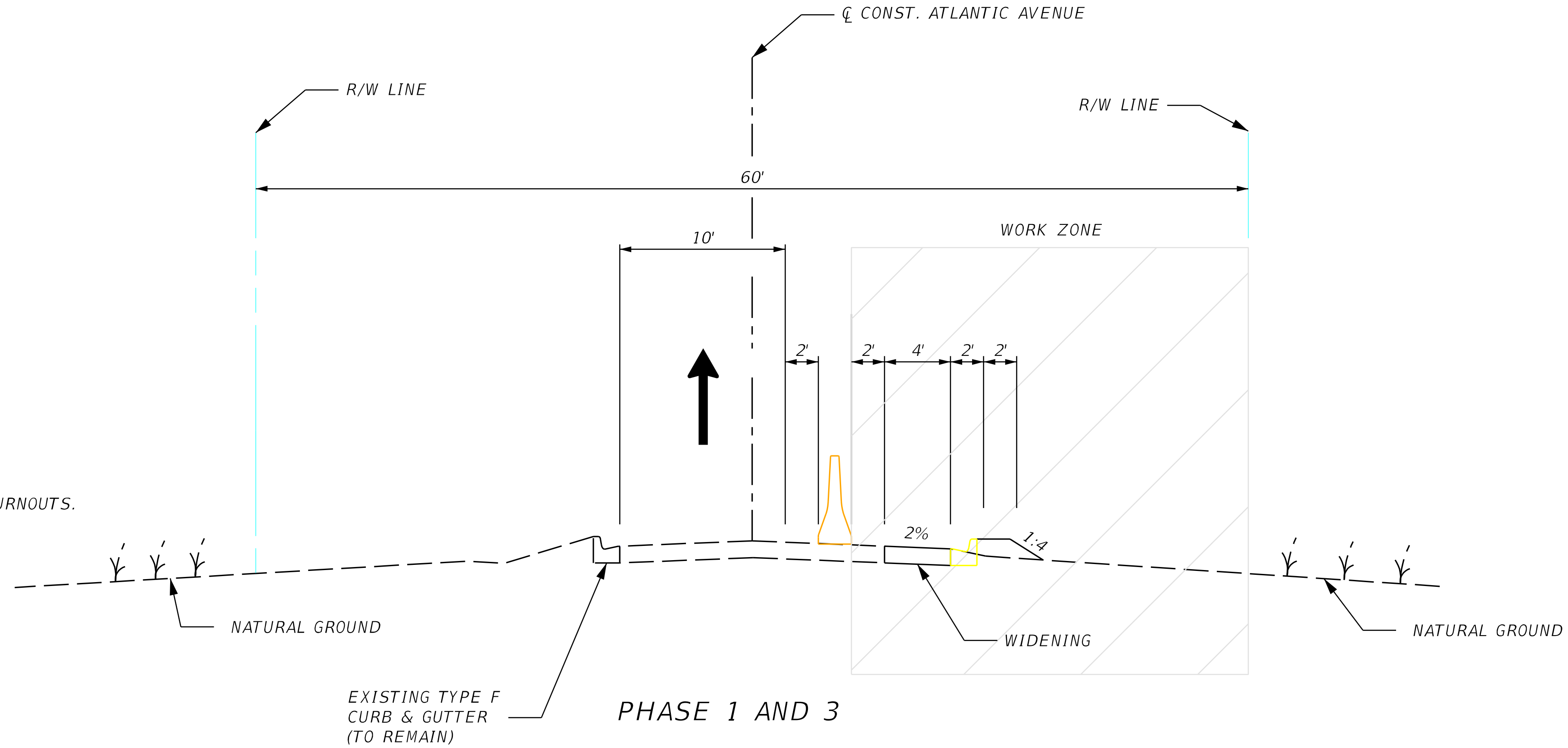
MESSAGE 1	MESSAGE 2
CONST STARTS MM/DD	BRIDGE CLOSED

3. REGULATORY SPEED SHALL BE 20 MPH FOR ALL PHASES OF TEMPORARY TRAFFIC CONTROL PLANS.

PHASE 1

THE INTENT OF THIS PHASE IS TO CONSTRUCT TEMPORARY WIDENING.

1. INSTALL TEMPORARY CONCRETE BARRIER WALL.
2. SHIFT TRAFFIC TO THE LEFT SIDE OF THE ROADWAY.
3. CONSTRUCT TEMPORARY DRAINAGE, TEMPORARY CURB & GUTTER, WIDENING AND TURNOUTS.
4. REMOVE TEMPORARY CONCRETE BARRIER WALL.
5. ALLOW FOR TWO-WAY TRAFFIC.



PHASE 1 AND 3

PHASE 2

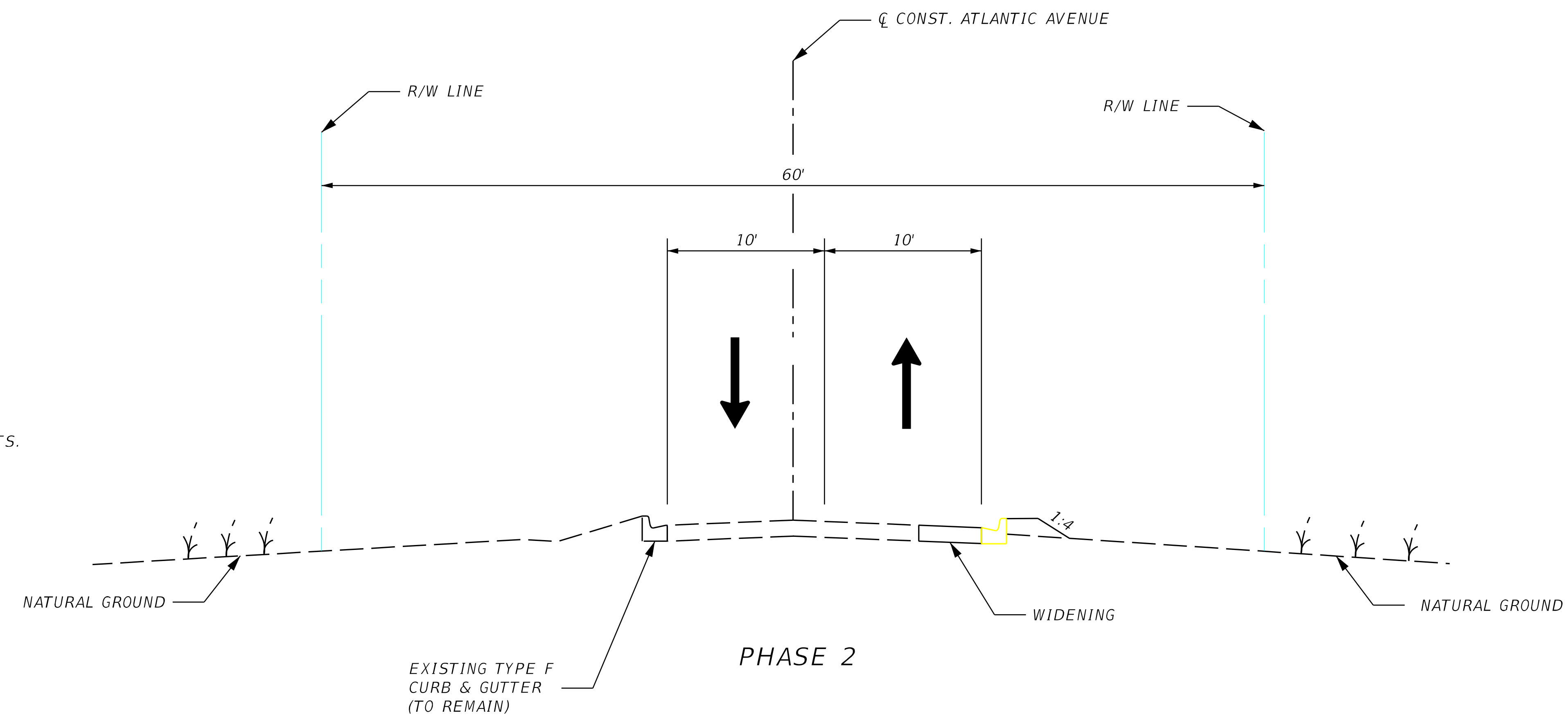
THE INTENT OF THIS PHASE IS TO DEMO AND CONSTRUCT THE NEW BRIDGE.

1. CLOSE THE BRIDGE TO TRAFFIC.
2. DEMOLISH EXISTING BRIDGE.
3. CONSTRUCT NEW BRIDGE.

PHASE 3

THE INTENT OF THIS PHASE IS TO REMOVE THE TEMPORARY WIDENING.

1. INSTALL TEMPORARY CONCRETE BARRIER WALL.
2. SHIFT TRAFFIC TO THE LEFT SIDE OF THE ROADWAY.
3. REMOVE TEMPORARY CURB & GUTTER, DRAINAGE, WIDENING AND TURNOUTS.
4. CONSTRUCT NEW CURB AND GUTTER.
5. REMOVE TEMPORARY CONCRETE BARRIER WALL.
6. ALLOW FOR TWO-WAY TRAFFIC.



PHASE 2

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ALEJANDRO G. MEITIN, P.E.
P.E. LICENSE NUMBER 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

SR NO.	COUNTY	FINANCIAL PROJECT ID
	MIAMI-DADE	430029-2-22-01

TTCP TYPICAL SECTION
ALT 1 AND ALT 2

SHEET NO. 6

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ALEX MEITIN, P.E.
P.E. LICENSE NUMBER 44744
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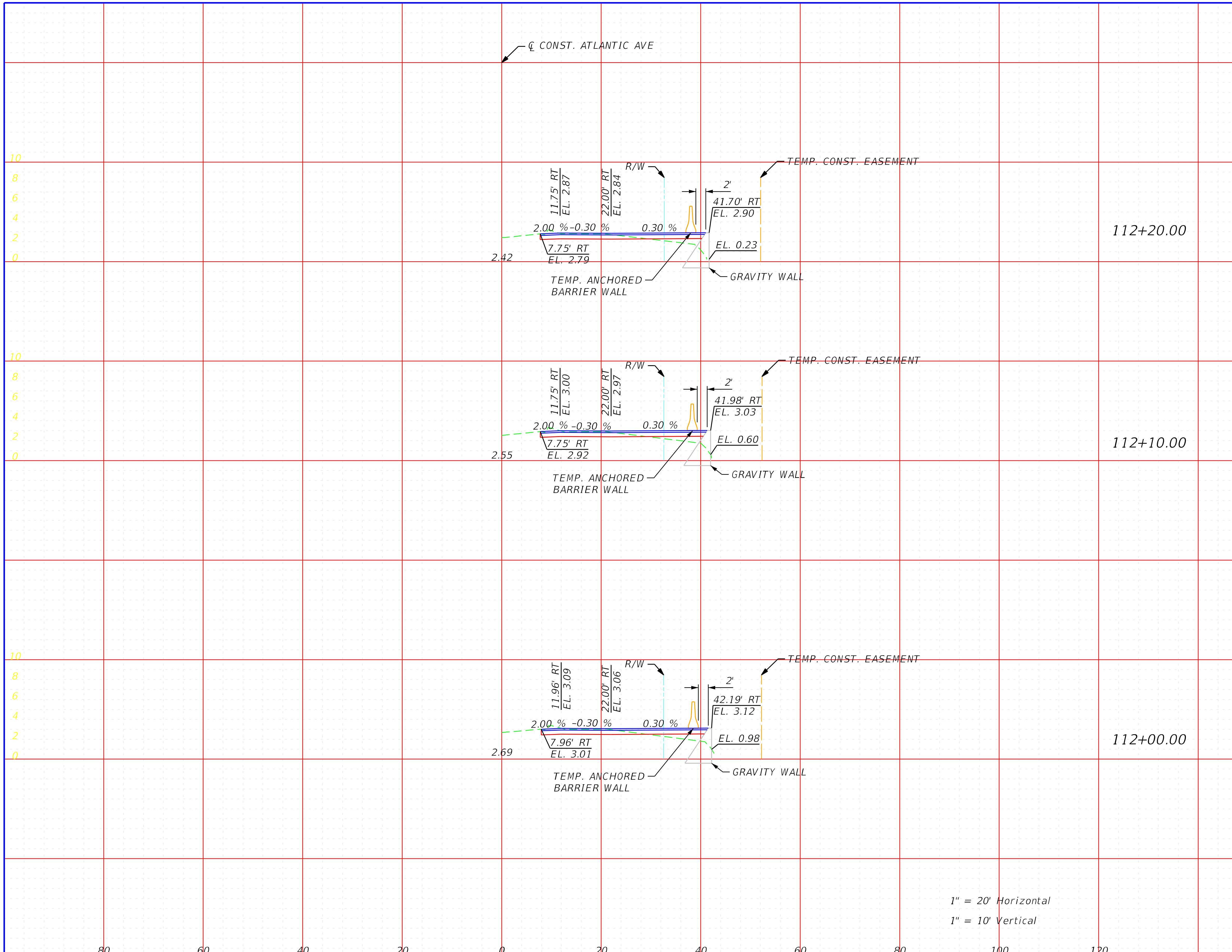
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	MIAMI-DADE	430029-2-22-01

TRAFFIC CONTROL PLAN
BRIDGE REPLACEMENT (ALT 2)

SHEET NO.
7



Subsoil Exc.		Regular Exc.		Embankment	
A	V	A	V	A	V

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

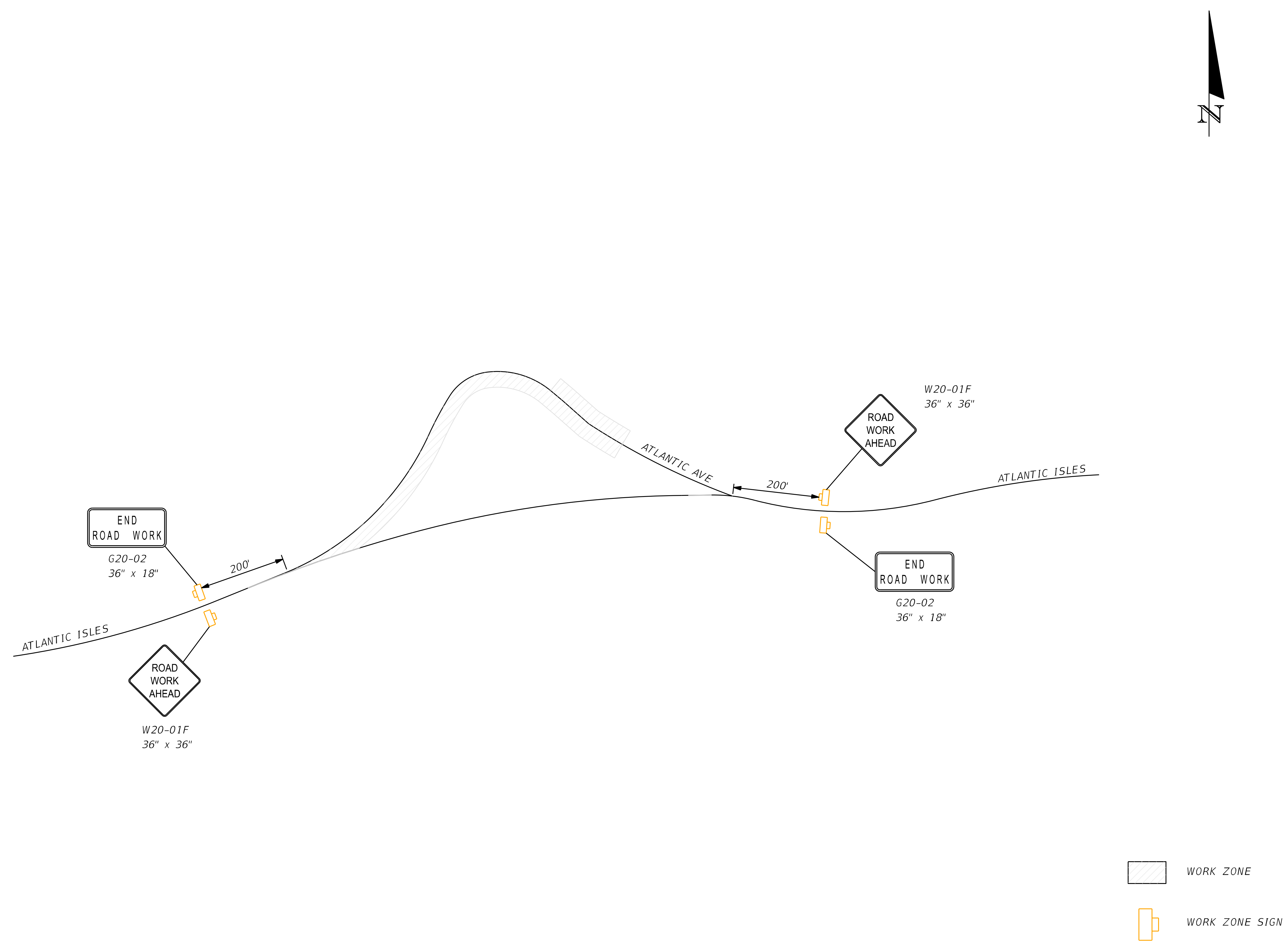
ALEX MEITIN, P.E.
P.E. LICENSE NUMBER 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

SR NO.	COUNTY	FINANCIAL PROJECT ID
N/A	MIAMI-DADE	430029-2-22-01

TTCP CROSS SECTIONS
BRIDGE REPLACEMENT (ALT 2)

SHEET NO.
8



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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ALEJANDRO G. MEITIN, P.E.
P.E. LICENSE NUMBER 44744
JACOBS ENGINEERING GROUP, INC.
3150 SW 38TH AVE, SUITE 700
MIAMI, FL 33146

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

SR NO.	COUNTY	FINANCIAL PROJECT ID
	MIAMI-DADE	430029-2-22-01

ADVANCE WARNING DETAIL BRIDGE REPLACEMENT (ALT 2)

SHEET NO.
9

INDEX OF STRUCTURE PLANS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

FINANCIAL PROJECT ID 430029-2-21-01
(FEDERAL FUNDS)

MIAMI-DADE COUNTY (87674)

STRUCTURE PLANS

STRUCTURE SHOP DRAWINGS
TO BE SUBMITTED TO:
HNTB CORPORATION
161 N.W. 6TH STREET, SUITE 1000
MIAMI, FL. 33136
P: (305) 551-8100 F: (305) 551-2800

GOVERNING STANDARDS & SPECIFICATIONS:
FLORIDA DEPARTMENT OF TRANSPORTATION,
DESIGN STANDARDS DATED FY 2023-24,
AND STANDARD SPECIFICATIONS FOR ROAD AND
BRIDGE CONSTRUCTION DATED FY 2023-24,
AS AMENDED BY CONTRACT DOCUMENTS.

PLANS PREPARED BY:
HNTB CORPORATION
161 N.W. 6TH STREET, SUITE 1000
MIAMI, FL. 33136
P: (305) 551-8100 F: (305) 551-2800

APPLICABLE DESIGN STANDARDS MODIFICATIONS: MM-DD-YY
For Design Standards Modifications click on "Design Standards"
at the following Web site: http://www.dot.state.fl.us/rddesign/

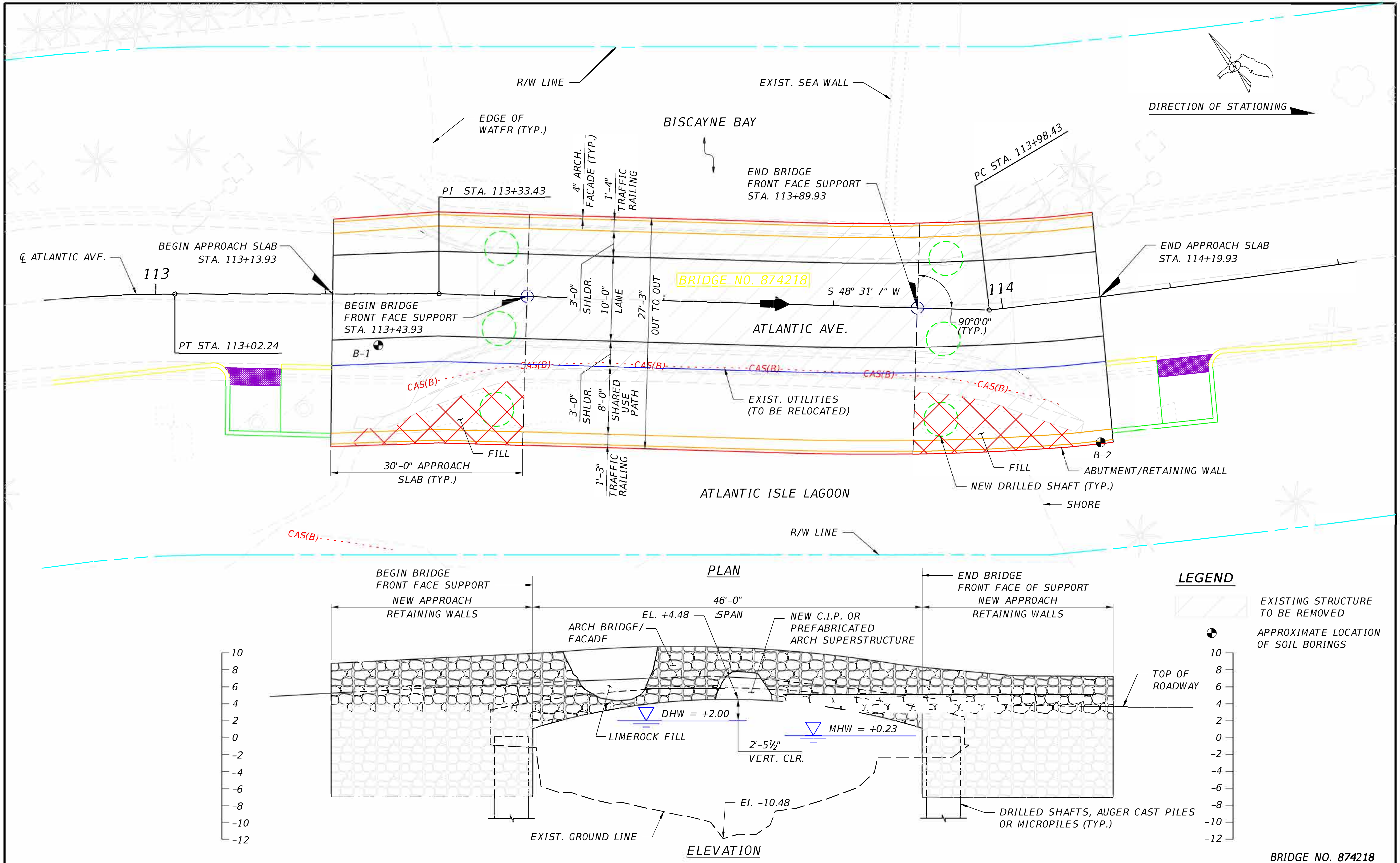
NOTE: THE SCALE OF THESE PLANS MAY
HAVE CHANGED DUE TO REPRODUCTION.

STRUCTURE PLANS
ENGINEER OF RECORD: FENG LIU

P.E. NO.: 65738

FDOT PROJECT MANAGER : VICTORIA VOGT

FISCAL YEAR	SHEET NO.
	B1



NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB CORPORATION
161 N.W. 6TH STREET, SUITE 1000
MIAMI, FL. 33136
P: (305) 551-8100 F: (305) 551-2800

DRAWN BY: XSD
CHECKED BY: JGL
DESIGNED BY: CAM
CHECKED BY: FL

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	MIAMI-DADE	430029-2-21-02

SHEET TITLE: ALTERNATIVE 2 - BRIDGE REPLACEMENT PLAN AND ELEVATION

PROJECT NAME: ATLANTIC AVE. OVER OCEAN CANAL

REF. DWG. NO.

SHEET NO. B1-1

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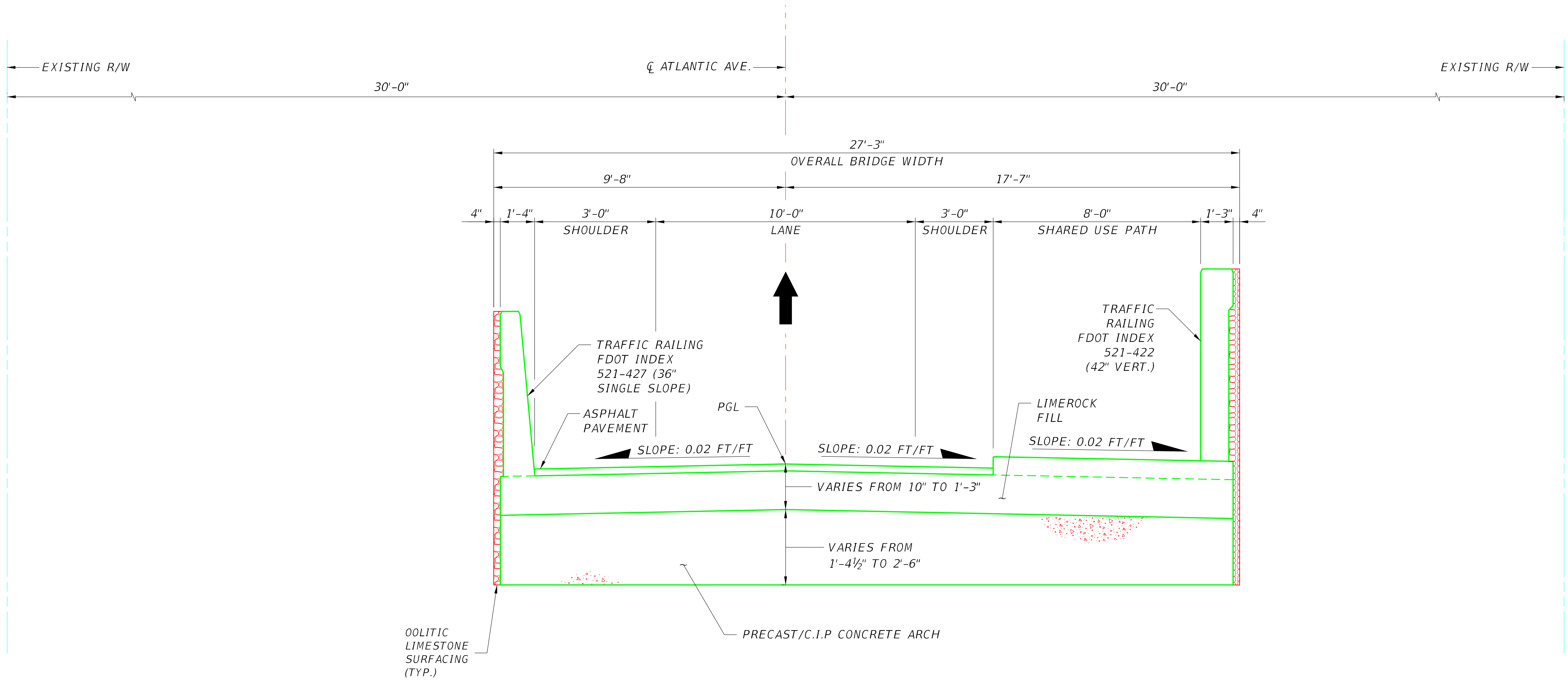
NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE



TYPICAL SECTION

BRIDGE NO. XXXXX

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB CORPORATION
161 N.W. 6TH STREET, SUITE 1000
MIAMI, FL. 33136
P: (305) 551-8100 F: (305) 551-2800

DRAWN BY: GNJ
CHECKED BY: XSD
DESIGNED BY: CAM
CHECKED BY: FL

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	MIAMI-DADE	430029-2-22-02

SHEET TITLE:
BRIDGE REPLACEMENT (ALT 2)
TYPICAL SECTION

PROJECT NAME:
ATLANTIC AVE. OVER OCEAN CANAL

REF. DWG. NO.

SHEET NO.
B1-2

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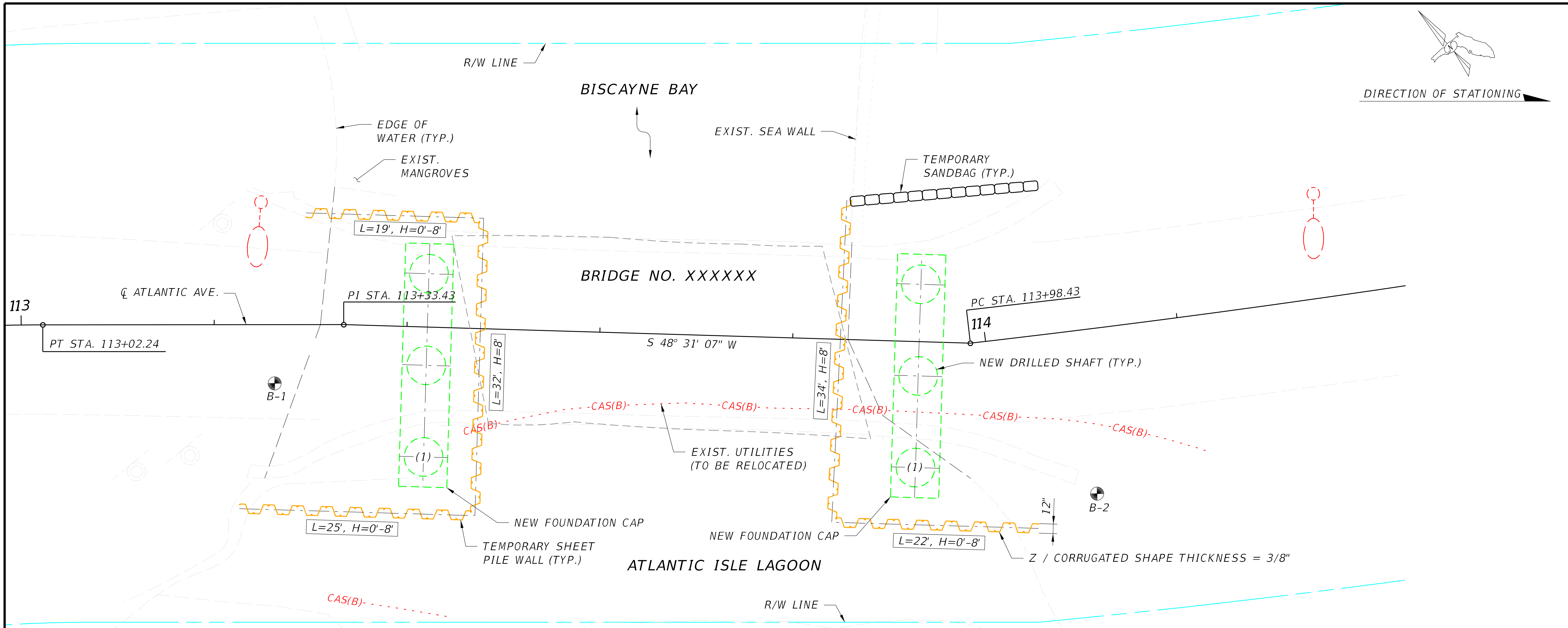
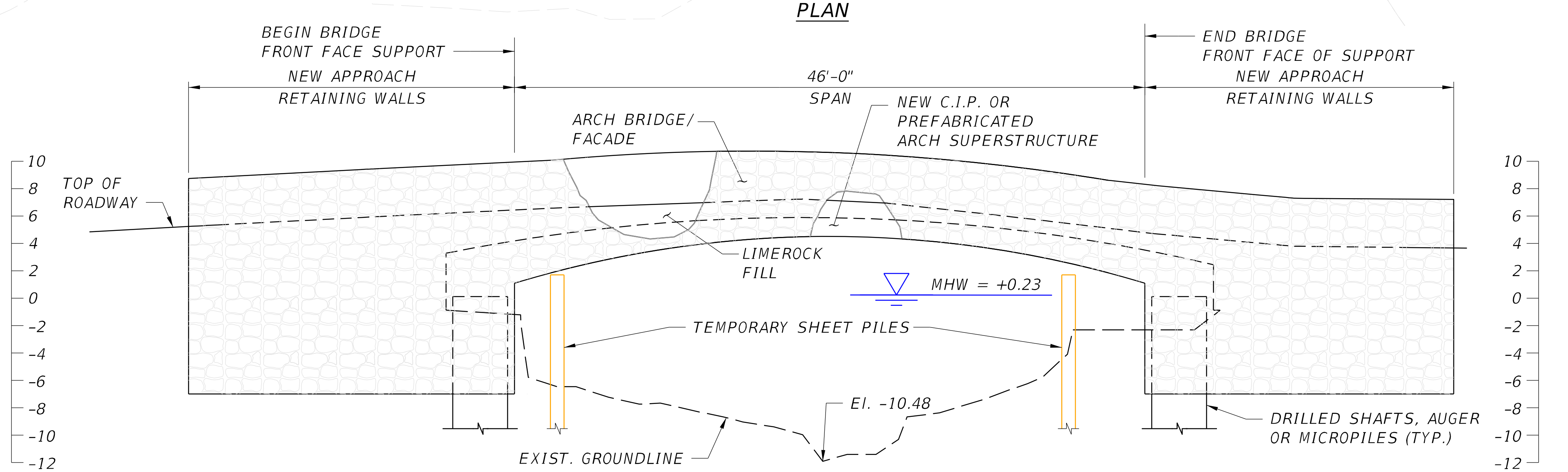


PLAN



ELEVATION

LEGEND

(soil boring symbol) = APPROXIMATE LOCATION OF SOIL BORINGS

NOTE:
1. EXISTING BRIDGE 874218 TO BE COMPLETELY REMOVED INCLUDING FOUNDATIONS.

2. TEMPORARY SHEET PILING SHOWN WILL BE REMOVED PRIOR TO CONSTRUCTION OF THE ARCH AND SUPERSTRUCTURE.

TEMPORARY SHEET PILE:			
LENGTH:	AT BEGIN BRIDGE	= 76 LF	51 SHEETS
	AT END BRIDGE	= 56 LF	37 SHEETS
	TOTAL	= 132 LF	88 SHEETS

H= HEIGHT ABOVE CANAL BOTTOM.

(1) DRILLED SHAFT WATERWARD OF EXISTING BRIDGE.

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

BRIDGE NO. 874218

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

JACOBS ENGINEERING GROUP
200 W. FORSYTH STREET, SUITE 1520
JACKSONVILLE, FL 32202

DRAWN BY: EAG
CHECKED BY: RLM
DESIGNED BY: BAG
CHECKED BY: RLM

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	MIAMI-DADE	430029-2-21-02

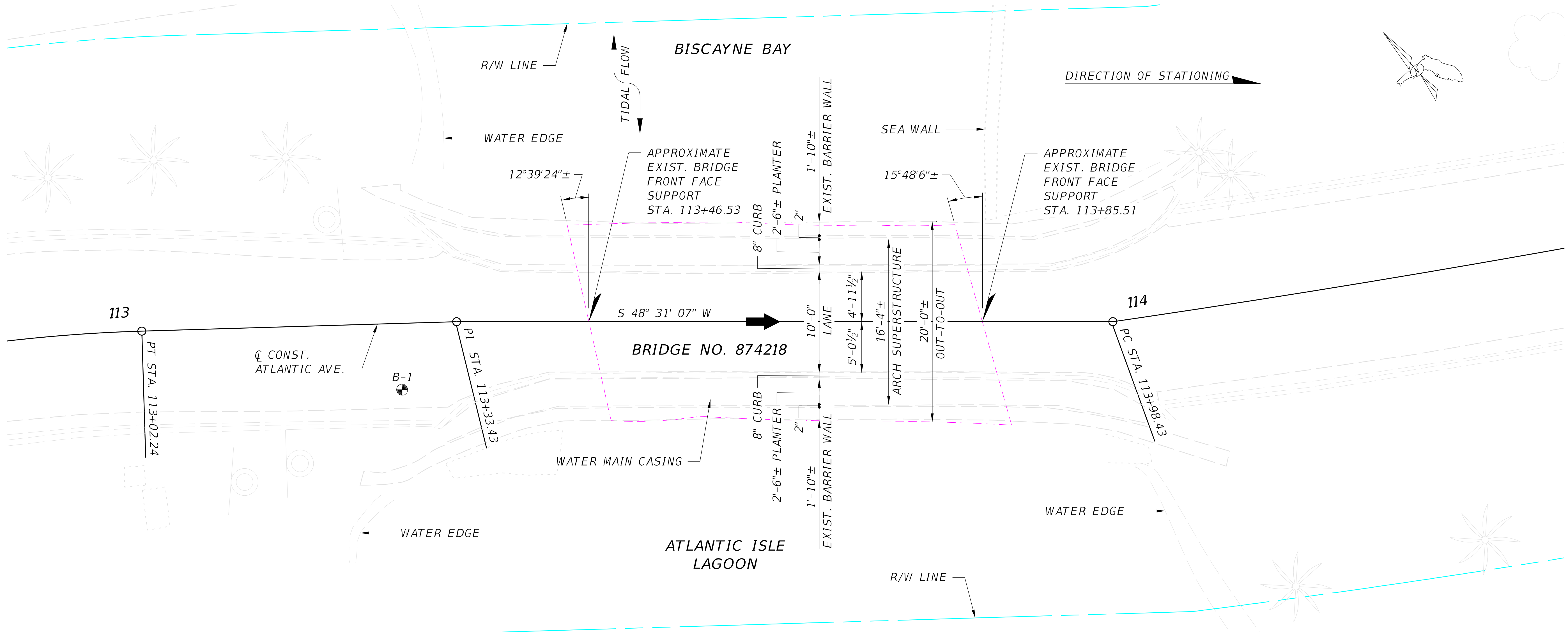
SHEET TITLE:
ALTERNATIVE 2 - BRIDGE REPLACEMENT
CONSTRUCTABILITY CONCEPT

PROJECT NAME:
ATLANTIC AVE. OVER OCEAN CANAL

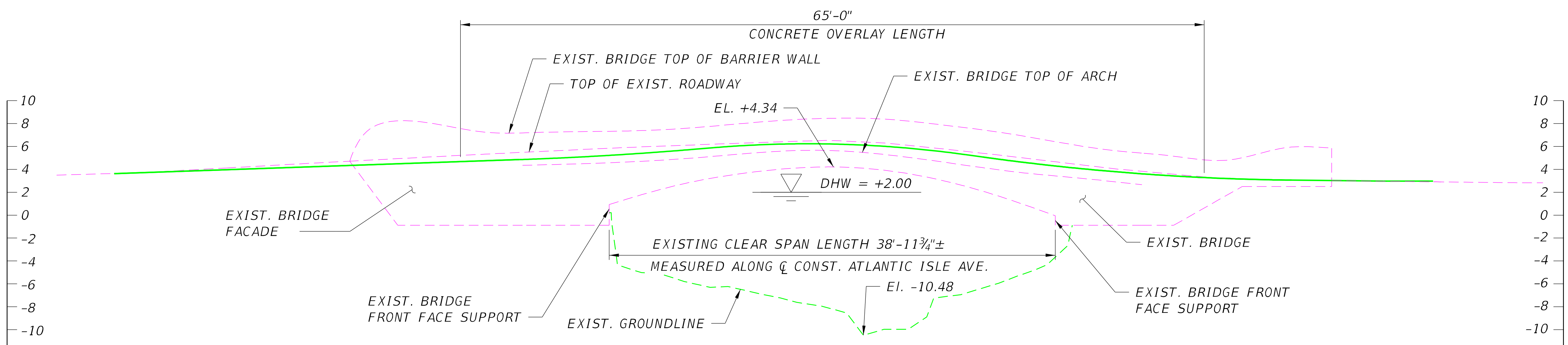
REF. DWG. NO.

SHEET NO.
B1-3

BRANCHTD 4/10/2023 1:47:02 PM C:\Users\branchtd\Downloads\CADD\CADD\VERIFIED_SeanK\STR\B1PlanElev02-FIG1.dgn



PLAN



ELEVATION

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

JACOBS ENGINEERING GROUP
200 W. FORSYTH STREET, SUITE 1520
JACKSONVILLE, FL 32202

DRAWN BY:	EAG
CHECKED BY:	RLM
DESIGNED BY:	BAG
CHECKED BY:	RLM

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	MIAMI-DADE	430029-2-21-02

SHEET TITLE:
EXISTING BRIDGE
PLAN AND ELEVATION

PROJECT NAME:
ATLANTIC AVE. OVER OCEAN CANAL

REF. DWG. NO.

SHEET NO.
B1-4

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APPENDIX B
FIRM Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) LEGEND

11-16-1990 CBRS Area

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER NOVEMBER 16, 1990, IN DESIGNATED CBRS AREAS.

11-16-1991 Otherwise Protected Area (OPA)

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

A —— A	Cross section Line
23 - - - - 23	Transect line
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DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 20, 1993

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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September 11, 2009 - to reflect revised shoreline, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, to add and change Base Flood Elevations, to update corporate limits, to change zone designations, to add roads and road names, and to add and change Special Flood Hazard Areas

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N

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0142L

FIRM

FLOOD INSURANCE RATE MAP

MIAMI-DADE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 142 OF 1031

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
AVENTURA, CITY OF	120676	0142	L
MIAMI - DADE COUNTY	120635	0142	L
NORTH MIAMI BEACH, CITY OF	120656	0142	L
NORTH MIAMI, CITY OF	120655	0142	L
SUNNY ISLES BEACH, CITY OF	120688	0142	L

\- NOTE -
THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12086C0142L

MAP REVISED
SEPTEMBER 11, 2009

Federal Emergency Management Agency

NOTES TO USERS

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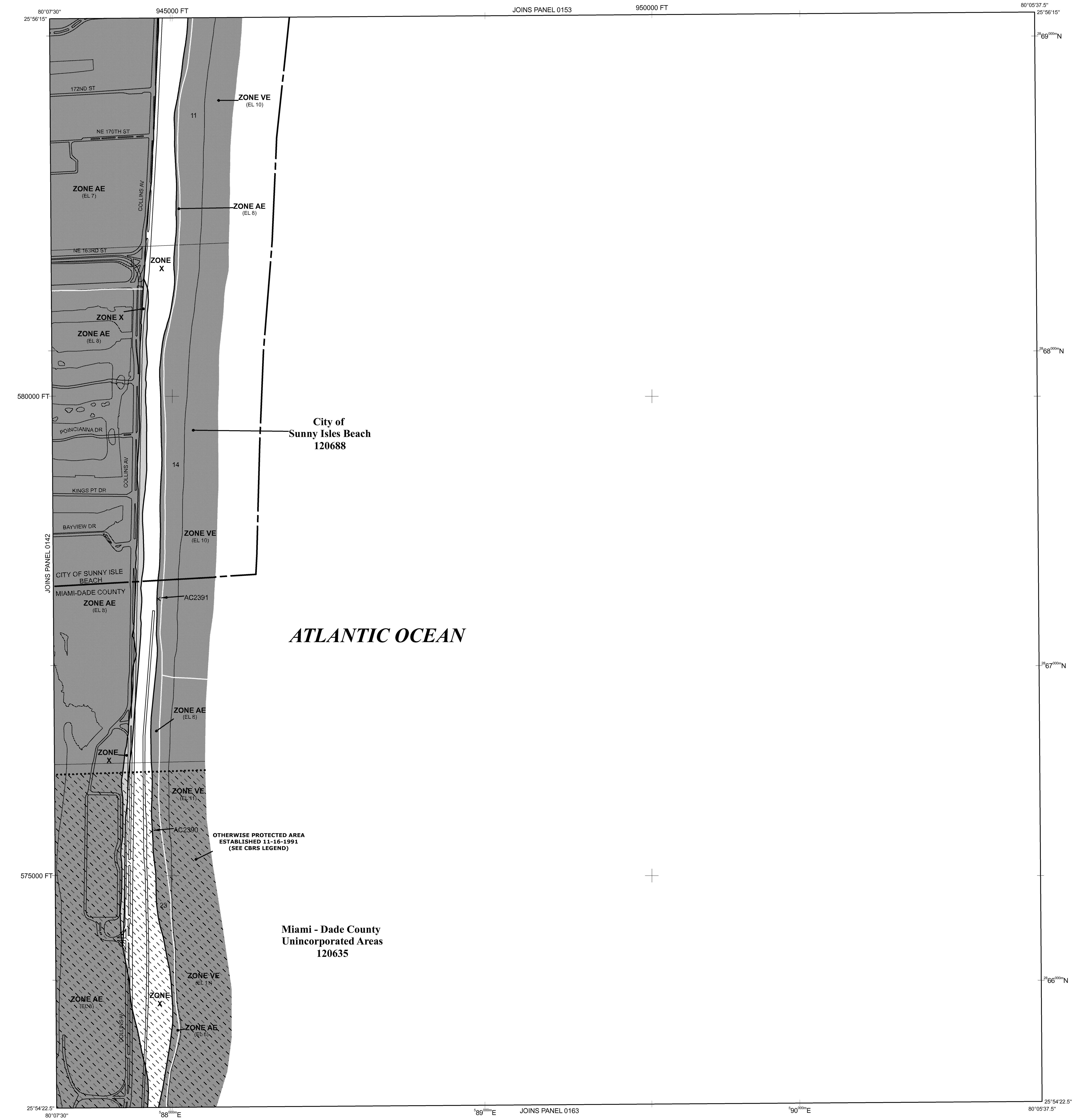

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MAP REPOSITORY
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EFFECTIVE DATE OF COUNTYWIDE
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January 20, 1993

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
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N

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250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0161L

FIRM

FLOOD INSURANCE RATE MAP

MIAMI-DADE COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 161 OF 1031

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MIAMI - DADE COUNTY	120635	0161	L
SUNNY ISLES BEACH, CITY OF	120688	0161	L

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U.S. DEPARTMENT OF HOMELAND SECURITY

MAP NUMBER
12086C0161L

MAP REVISED
SEPTEMBER 11, 2009

Federal Emergency Management Agency

APPENDIX C

Geotechnical Report

March 10, 2021

Mr. Adrian Viala, P.E.
Assistant District Geotechnical Engineer
Florida Department of Transportation
District 4 and 6 Materials Office
14200 West State Road 84
Davie, Florida 33325

Subject: Preliminary Report of a Geotechnical Exploration – Structures (Revision 2)
Atlantic Isle Bridge (Bridge No. 874218) Rehabilitation or Replacement
Florida Department of Transportation, District 6
Contract No. C-9Y98, Contract FPID No. 250730-3-32-01
Project FPID No. 430029-2-22-02
City of Sunny Isles
Miami-Dade County, Florida
T.W.O. No. 79
HRES Project No. HR20-1583R

Dear Adrian:

HR Engineering Services, Inc. (HRES) is presenting this Preliminary Report of a Geotechnical Exploration – Structures (Revision 2) – for the subject project. This preliminary report presents our understanding of the project, outlines our exploratory procedures, and documents the field and laboratory test data obtained for the proposed project.

We have enjoyed assisting you on this project and look forward to serving as your geotechnical consultant on the remainder of this project and on future projects. If you have any questions concerning this report, please call our office at (305) 888-8880.

Sincerely,

HR ENGINEERING SERVICES, INC.
(Certificate of Authorization No. 7991)

HERNANDO R. RAMOS
LICENSE
No 42045
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY
Hernando R Ramos
2021.03.11 16:58:20 -05'00'
ON THE DATE ADJACENT TO THE SEAL

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

Paola Vargas, P.E.
Geotechnical Engineer
Florida Registration 90928

Hernando R. Ramos, P.E.
Principal Geotechnical Engineer
Florida Registration 42045

Distribution: Addressee (1)
File (1)

HR Engineering Services, Inc.
7815 N.W. 72nd Avenue
Medley, Florida 33166

TABLE OF CONTENTS

APPENDIX A:

APPENDIX B:

APPENDIX C:

APPENDIX D:

1.0 INTRODUCTION

The purpose of this geotechnical evaluation was to obtain information concerning the site and subsurface conditions in the area of the proposed bridge rehabilitation or replacement, and provide an evaluation of the suitability of the in-situ materials and preliminary recommendations for different foundation alternatives. This report discusses the subsurface conditions based on the available test borings, presents our findings and evaluation, and includes the following items:

Field Services

- Two (2) test borings performed by HRES for a previous study were available. Each boring was performed to a depth of 80 measured from the existing ground surface. The test boring subsurface information is presented in the Report of Core Borings in Appendix A.

Evaluation

- Review of Miami-Dade County USDA Soil Survey Maps.
- Review of USGS Quadrangle Map (1994) for North Miami, Florida.
- Review of Miami-Dade County USGS Water Level Maps.
- A general review of area and site geologic conditions.
- A general review of existing surface features and site conditions.
- Report of core borings which illustrate the estimated subsurface conditions in the area of the existing bridge.
- An evaluation of the different foundation systems for support of the bridge structure.
- Drilled shafts/augercast Piles/micropile axial compression capacities.
- Soil/rock parameters for drilled shafts/augercast piles/micropile lateral analyses.
- Driven pile axial compression capacities.
- Soil/rock parameters for driven pile lateral analysis.

Laboratory Testing

- The results of laboratory tests performed on selected soil samples obtained from the test borings.
- A brief description of our laboratory testing procedures.

2.0 PROJECT INFORMATION

2.1 GENERAL

Project information for this subsurface exploration has been provided to us by various members of the design team. Additional information has been provided during telephone conversations.

During our geotechnical study, we have been furnished with the following project-related plans and information:

- Conceptual bridge rehabilitation plans for:

  Atlantic Isle Bridge
  Bridge 874218
  Prepared by: HNTB Corporation
  Printed Date: 09/17/2020

2.2 PROJECT DESCRIPTION

The project consists of the rehabilitation or replacement of the existing 1925 historical arch bridge located in Atlantic Isle, Miami, Florida. There are 2 alternatives for the project:

Alternative 1: Consists of building a new bridge deck on top of the existing arch bridge while keeping the existing structural shell.

Alternative 2: Consists of the replacement of the existing bridge by a new structure.

This report provides the foundation recommendations for both alternatives.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 Field Exploration

The field exploration was conducted by HRES. The locations of the test borings are provided in the Summary of Test Boring Locations in Appendix A and at the approximate locations shown on the Field Exploration Plan in Appendix A.

The Report of Core Borings in Appendix A summarize the approximate boundary between soil types. In some instances, the transition between material types may be gradual. A discussion of the subsurface conditions encountered along the project alignment is provided in Section 4.2 of this report.

3.2 Laboratory Testing

3.2.1 Soil Testing

In order to aid in classifying and estimate engineering characteristics of the subsurface materials encountered, laboratory classification tests were performed on representative soil samples obtained from the test borings performed for the project. The laboratory testing program included the following:

- 2 Grain Size Analyses
- 1 Fines Content Test
- 3 Organic Content Tests

In addition, a total of 6 moisture content tests were performed in conjunction with the classification tests. The laboratory test results are presented in Appendix B.

3.2.2 Corrosivity Classification Testing

HRES did not perform corrosion testing. Based on the location of the bridge to the Biscayne Bay, an Extremely Aggressive Environment is recommended for both steel and concrete substructures. Due to the proximity of the ocean, the superstructures are also considered to be in an Extremely Aggressive environment.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 SITE CONDITIONS

The site conditions were observed by a Geotechnical Engineer during the month of December, 2017.

4.2 SUBSURFACE CONDITIONS

4.2.1 Miami-Dade County Soil Survey Map

The Soil Map of Miami-Dade County Area, Florida, published by the United States Department of Agriculture (USDA) was reviewed for general near-surface soil information within the general project vicinity. This information indicates that there are two (2) mapping units in the vicinity of the project. The map soil units encountered are as follows:

Table 4.2.1 Miami-Dade County Soil Survey

Miami-Dade County Area, Florida (FL686)		
Map Unit Symbol	**Map Unit Name**	**Typical Profile**
15	Urban land (55.1% of AOI)	Not Reported
99	Water (44.9% of AOI)	100 percent water

Based on the information from the USDA map, it appears that unsuitable materials are not present within the study area. A reproduction of the USDA map for the project area is included in Appendix A.

4.2.2 USGS Quadrangle Map

The North Miami Quadrangle, Florida-Dade Topographic Map (1994) published by the United States Geological Survey (USGS) was reviewed for general existing ground surface elevations in the project area. Based on the map, the existing ground elevations in the project vicinity range from 5 to 10 feet, NGVD29. A reproduction of the USGS Quadrangle Map for the project area is included in Appendix A.

4.2.3 General

A graphical representation of the subsurface conditions encountered by the test borings drilled for the proposed bridge is shown on the Report of Core Borings in Appendix A. These profiles and the following soil/rock conditions highlight the major subsurface stratification. The boring profiles on this sheet should be consulted for a detailed description of the soil/rock conditions encountered at each boring location. When reviewing the subsurface profiles, it should be understood that the soil/rock conditions may vary between and away from the boring locations.

4.2.4 Geologic Conditions

The project is located on the southern flank of the Florida Plateau, a stable, carbonate platform. In the study, the upper 200 feet of this platform is composed predominately of limestone and quartz sand. The sediments were deposited during several glacial and interglacial stages during the Pleistocene Epoch. Within the explored depths of this study, two distinct geological formations were encountered. These formations are the Miami Limestone Formation and the Fort Thompson Formation.

4.2.5 Miami Limestone

The Miami Limestone underlies the silt and organic soils and roadway fills. The Miami Limestone was encountered by the bridge borings from an average elevation of -8.0 feet to -12.0 feet, NAVD88.

The Miami Limestone can be described as a soft tan white porous to very porous fossiliferous quartz sandy fine-grained slightly oolitic limestone. The solution channels in the limestone may be up to 2 inches in diameter at some locations, are filled with quartz fine sand and uncemented calcareous materials. The limestone varies in both thickness and competency within the investigated area.

The Miami Limestone was deposited in a shallow near shore marine carbonate bank environment. Spherical carbonate sand grains called oolites formed and were deposited in this environment. Near shore, processes transported quartz sand into the area and reworked some of the carbonate material. Encrusting organisms called bryozoans were locally abundant and formed patches on the substrate. After sea level receded, the carbonate deposit was exposed to fresh water and the cementation process was initiated. The degree of cementation, and therefore the competency of the rock, was influenced by both the abundance and the type of calcareous material in the original deposit. Humic and carbonic acids percolating downward through the material etched slots up to 4 feet deep in the surface of the stratum.

4.2.6 Fort Thompson Formation

Underlying The Miami Limestone Formation, The Fort Thompson Formation was generally encountered. The Fort Thompson Formation is composed of sediments of variable lithologies. The lithologies include non-fossiliferous quartz fine sand, fossiliferous quartz sandy limestone, coralline limestone, freshwater limestone, and quartz sandstone. These lithologies alternate abruptly in thickness and lateral extent.

The Fort Thompson limestone grades downward into a gray quartz and calcareous fine to medium sand. This sand has been cemented to varying degrees by carbonate material leached out of the overlying limestone. The cementation commonly takes the form of hard spherical sandstone nodules 1 to 2 inches in diameter occurring in a sand matrix. Sandstone lenses within the sand layer are the result of a more complete cementation.

4.2.7 Generalized Subsurface Conditions Encountered at the Bridge Location

For a detailed subsurface condition at a particular borehole location, please refer to the Report of Core Borings in Appendix A.

4.2.8 Groundwater Conditions

The groundwater levels in the borings were measured at the time of drilling. Groundwater levels in the test boring were encountered at an approximate elevation of 0.5 feet, NAVD88. A Seasonal High Ground Water Table (SHGWT) of 2.0 feet, (NAVD88) is recommended for design.

Fluctuation in the observed groundwater levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, storm surge and other site-specific factors. Since groundwater level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

5.0 SUMMARY OF FOUNDATION ALTERNATIVES

5.1 General

Our preliminary foundation alternatives for support of the proposed bridge include shallow and deep foundations. Other types of foundation support have been evaluated for the proposed bridge. It is important to note that the bridge is located near residences which may preclude the use of some of the foundation support alternatives presented below due to vibration/noise issues. The following foundation alternatives are as follows:

- Shallow Foundations: Based on the results of the test borings available, a shallow foundation alternative is not feasible for support of the bridge end bents since the test borings encountered an organic to highly organic layer down to an approximate elevation of -12.5 feet, NAVD88 followed by a relatively weak to strong limestone. The organic materials will cause large foundation settlements; therefore, this foundation alternative is not recommended.

- Geosynthetic Reinforced Soil Integrated Bridge System (GRS-IBS): This is also a shallow foundation alternative. This foundation alternative is not feasible due to the organic to highly organic layer down to elevation -12.5 feet, NAVD88. The organic materials will cause large foundation settlements; therefore, this foundation alternative is not recommended.

- Steel H-Piles or Pipe Piles: The advantage of this type of piles is the relatively low vibration during driving when compared to concrete driven piles. However, the disadvantage in this project is that these piles provide relatively lower axial capacities when compared to concrete driven piles; also, the difficulty to estimate the length of the piles due to the uncertainty of determining the pile tip elevation during pile installation in addition to the extremely aggressive environment that may require sacrificial thickness to be added to the H pile sections.

- Augercast Piles (ACIP): The advantage of this type of piles is the relatively low to no vibration during construction. This type of foundation is recommended for Alternative 1 (Rehabilitation) since vibration could damage the existing historic arch bridge and adjacent residences. It can also be used for the replacement bridge alternative. However, there are site conditions that may present this

alternative not favorable for ACIP piles. These adverse conditions include constructability issues regarding the proximity of the canal water to the end bent construction. Augercast piles require to be installed on ground having the water level a minimum of one to two pile diameters below ground to help build a grout head. Since the groundwater elevation is very close to the ground surface, the head needed for the installation of the ACIP may not be sufficient. Also, the organic to highly organic layer will not provide resistance to the pressurized grout producing a bulge during installation.
These construction issues can be resolved by installing permanent steel casings at pile locations with enough diameter to allow the construction of augercast piles inside the permanent steel casings. The top of the casing could be left two-pile diameter about ground and the tip of the casings installed at -15 feet, NAVD88. The pile installation requires a collection system of the cuttings, slurry and extra pumped grout to avoid contamination of the canal. If all these issues can be solved, augercast piles could be a feasible alternative.

- <u>Drilled Shafts</u>: The advantage of this type of foundation is the relatively low to no vibration (when using an oscillating/rotator casing installation) during construction. This type of foundation is recommended for Alternative 1 (Rehabilitation) since vibration could damage the existing historic arch bridge and adjacent residences. It can also be used for the replacement bridge alternative.
This type of foundation provides high axial and lateral capacities; however, it is recommended to provide shaft redundancy. It may require a minimum of 3 shafts per end bent.
The surface conditions encountered by the borings (organic materials down to elevation -12.5 feet and high-water elevation due to the proximity of the canal) require the use of permanent casing down to elevation -15 feet, NAVD88.
In addition, due to the weak limestone layer (with low "N" values) encountered immediately under the organic material which may present stability issues during construction, each shaft may require a temporary casing down to elevation -41 feet, NAVD88. Below elevation -41 feet, the limestone is more competent. Similar to augercast piles, the installation of drilled shafts will require a collection system of the cuttings, slurry and extra pumped concrete to avoid contamination of the canal.

- <u>Micropiles</u>: The advantage of this type of foundation is the relatively low to no vibration during construction. This type of foundation is recommended for Alternative 1 (Rehabilitation) since vibration could damage the existing historic arch bridge and adjacent residences. It can also be used for the replacement bridge alternative. Similar to augercast piles, the installation of micropiles will require a collection system of the cuttings, slurry and extra pumped grout to avoid contamination of the canal.

This type of foundation provides high axial capacity; however, it provides low lateral capacities, especially since the upper organic materials encountered to elevation -12.5 feet, NAVD88 don't provide any lateral support. It will require a permanent casing to at least -15 feet, NAVD88. The lateral capacity issue can be resolved by installing a large group of micropiles.

- Concrete Driven Piles: Concrete driven piles are only recommended for Alternative 2 (Replacement) for foundation support of the new bridge structure. However, this alternative present greater vibration and noise issues when compared with the other foundation alternatives and should be used with extreme caution.

  This foundation system will provide the required axial and lateral capacities for the project and will be less impacted by the site environment, including corrosion, highwater elevation and proximity of the new bents to the canal. The pile installation will require preforming down to elevation at least 34 feet, NAVD88.

  A permanent steel casing installed to elevation -15 feet, NAVD88 will be needed at each pile location to help keep the preformed holes open (to avoid collapse of the organic soils in the hole) before installing each pile and the backfilling of the annulus between the piles and the preformed holes. Due to the potential of high vibration levels during concrete pile installation, the steel casing may need to be installed at deeper elevations to help minimize the damage to nearby residences.

  All adjacent residences will need to be monitored for settlement and vibration during casing and pile installation.

6.0 PRELIMINARY FOUNDATION EVALUATION

6.1 Basis of Evaluation

Our foundation recommendations are based upon the previously presented project information and the structural conditions along with the data obtained in this exploration. The field and laboratory data have been compared with previous performances of similar structures bearing on and within soil/rock conditions similar to those encountered in this exploration. If the project information is incorrect or changes, please contact us so that our evaluation and recommendations can be reviewed.

In our evaluation of the subject project, we addressed the following geotechnical design and construction considerations:

- Alternative 1: Drilled shafts, augercast piles and micropiles are viable alternatives for foundation support of the bridge structure rehabilitation. Due to the extremely aggressive environment, 48-inch diameter drilled shafts, 30-inch diameter augercast piles and 9.625-inch diameter micropile were included in the foundation analyses.

- Alternative 2: Providing that the vibration caused by pile installation can be controlled, 24-inch square prestressed concrete driven piles are a viable alternative for foundation support of the bridge structure replacement. The axial compression analyses are also included. Drilled shaft/augercast pile/Micropiles foundation types are also recommended for support of the new bridge.

6.2 Alternative 1 – Augercast Piles, Drilled Shafts and Micropiles

6.2.1 General

Drilled shafts and augercast piles with diameters of 48 and 30 inches, respectively and micropile with 9.625-inch diameter were considered for the support of the proposed bridge retrofit. These deep foundation systems are able to develop the necessary capacity to support the factored design loads when bearing in lower medium to hard limestone layers.

6.2.2 Drilled Shafts, Augercast Piles and Micropiles Axial Compression Capacity Analyses

Drilled shafts, augercast piles and micropiles installed in median to hard limestone derive their axial load capacities from two components; shear transfer between the concrete and soil/rock interface, and end bearing or point resistance at the base of the shaft/pile.

The drilled shaft/augercast pile/micropile axial capacity analyses neglected the end bearing resistance. In addition, the side friction resistance in sand and soft limestone (Ns<25 blows/ft) were not considered in the axial capacity analyses. The side friction resistance in the rock layer was estimated as follows:

f_s = 0.1 N (tsf) (FDOT Soils and Foundation Handbook)

Where,

f_s = ultimate unit side friction resistance.

N = SPT N-value (blows/ft.) $\geq$25

Based on the handbook, the maximum value of f_s is 5 tsf. However, we limited it to 4 tsf (i.e., maximum N=40) for this study.

When using the Load Resistance Factor Design method (LRFD), a resistance factor, ø is applied to the ultimate mobilized shaft capacity to yield the factored shaft/pile resistance capacity.

For redundant drilled shafts/augercast piles the resistance factor is 0.6. For micropiles, the resistance factor is 0.55.

For non-redundant drilled shafts, the resistance factor is 0.5, when using side friction only. Non-redundant augercast piles and micropiles <u>are not allowed</u>.

Drilled shaft/augercast pile and micropile tip elevations, axial compression capacities and capacity vs. tip elevation graphs are presented in Appendix C.

6.2.3 Drilled Shaft/Augercast Pile/Micropile – Soil/Rock Parameters for Lateral Analysis

A lateral loading analysis may be performed to estimate the lateral soil/rock resistance of drilled shaft/augercast pile and micropiles at each end bent.

A table of soil/rock parameters for drilled shaft /augercast pile and micropile lateral analysis is presented in Appendix C. It is understood that computer program FB-MultiPier, developed by University of Florida Bridge Software Institute (BSI) will be used to perform the lateral loading analyses.

The parameters were estimated from accepted FDOT correlations with SPT N_s (N values obtained using a safety hammer). SPT N values obtained using an automatic hammer, SPT Na, were converted to safety hammer values, SPT Ns, by multiplying by a factor of 1.24. The following formulas and correlations with SPT (Ns) values were used:

Sands, Fills and Soft Limestone modeled as Sand:

- Friction Angle, ϕ = Ns/4+28˚ (Maximum of 38˚).
- Unit Weight γ=105pcf*friction angle of soil/30˚
- Modulus of Elasticity, E=30,000Ns (psf).
- Shear Modulus G=E/2(1+ν), where Poisson ratio, ν=0.3.
- Side friction (τ_f) estimated using β-Method for drilled shafts and micropiles.
- Modulus of subgrade reaction (k), estimated using Graphs B7 and from the FB-MultiPier Help Manual

Limestone (modeled as rock):

- Unit Weight = 120pcf.
- Side Friction, τ_f=0.1Ns (tsf).
- Unconfined compressive strength (qu), estimated using McVay's Equation for side friction, $(1/2(qu*qt)^{1/2}$ by equating to 0.1 Ns (tsf) and assuming qt=20% of qu.
- Shear Modulus G=E/2(1+ν), where Poisson ratio, ν=0.2 and the Modulus of Elasticity, E = 115qu.

The test borings performed show a thick organic layer ranging from approximate elevation +1.8. to -12.5 feet, NAVD88 and a permanent steel casing installed to -15 feet, NAVD88. For the purpose of lateral analysis, the design ground elevation should be considered at -15 feet, NAVD88.

6.3 Alternative 2 - Driven Piles

6.3.1 General

Drilled shafts, augercast piles, micropiles and driven 24-inch square prestressed concrete piles are feasible alternatives for the support of the new bridge. Drilled shafts/augercast piles/micropiles have been discussed in Alternative 1. This section only refers to driven concrete piles.

Driven piles are able to develop the necessary capacity to support the factored design loads when bearing in the natural limestone. As mentioned before, a permanent steel casing is required to be installed to elevation -15 feet, NAVD88 to help maintain the preformed hole open from collapsed organic soils.

6.3.2 Driven Pile Axial Compression Capacity Analysis

In order to evaluate the capacity of the driven pile foundations, a static analysis using the design methodology presented in FDOT Research Bulletin 121 (RB-121) developed by Professor J.H. Schmertmann, was performed. A computerized version of this method, entitled *FB-Deep v.2.06,* was used. This method generates an allowable pile capacity through the use of empirical correlations with standard penetration test (SPT) "N" values, and soil/rock end bearing and side friction curves generated for given soil/rock types. The ultimate mobilized pile capacity (Davison pile capacity) is calculated as the sum of the ultimate side friction plus one-third of the ultimate end bearing. When using the Load Resistance Factor Design method (LRFD), the estimated Davisson capacity is used to predict the ultimate bearing capacity of the pile. A resistance factor, ø is applied to the Davisson capacity to yield the factored pile resistance capacity. This resistance factor may be taken as 0.65 (with dynamic testing of ≥5% of piles) or 0.75 (with dynamic testing of 100% of piles) when using *FB-Deep* Davisson capacity as design methodology for axial compression. To help minimize vibration, 100% dynamic testing is recommended.

Pile tip elevations and capacities are provided in the *FB-Deep* computer analysis printouts presented in Appendix C.

6.3.3 Driven Pile – Soil/Rock Parameters for Lateral Analysis

A driven pile lateral analysis is required in order to determine the pile lateral loading capacity and the pile minimum tip elevation at each bridge bent support. The bridges designer is responsible for these lateral load analyses. Our recommended soil stratigraphy and the parameters to be used for the lateral analyses, based on the available subsurface exploration are presented in Appendix C. Any computer software approved by the FDOT may be used, however, we are assuming that FB-MultiPier software by University of Florida, Bridge Software Institute will be used.

The soil elastic and strength parameters provided have been estimated from correlations with the Standard Penetration Test (SPT) values (N, blows/ft) obtained from the field exploration. The modulus of elasticity (E) was estimated from correlations with SPT N_s (N values obtained using a safety hammer). Similarly, the internal friction angle (ϕ) was estimated from accepted FDOT correlations with N_s values. SPT N values obtained using an automatic hammer, SPT Na, were converted to safety hammer values, SPT Ns, by multiplying by a factor of 1.24. The following correlations with SPT Ns values were used:

- Friction Angle, ϕ = Ns/4+28˚ for sands and limestone with Ns < 10 blows/foot (modeled as sand). Maximum friction angle of 34˚.
- Limestone with Ns > 10 blows/foot was modeled as sandy gravel with ϕ = Ns/4+33˚. Maximum friction angle of 40˚.
- For sands, fills, and weak limestone modeled as sand or sandy gravel, the Modulus of Elasticity, E was estimated as E=30,000Ns (psf).
- The Shear Modulus, G was estimated as G=E/2(1+ν), where, ν is Poisson ratio (ν=0.3 for sands, fills, and 0.2 for limestone modeled as sandy gravel).
- Unit skin friction of sands and limerock fill, τ_f=0.019Ns (tsf).
- Unit skin friction of limestone, τ_f=0.01Ns (tsf)
- Unit weight of sands and fills was estimated as γ=105pcf*friction angle of soil/30˚.
- Unit weight of limestone was assumed as 120 pcf.
- The ultimate end bearing of the sand layer was estimated as q_{ult} =6.4Ns (ksf).
- The ultimate end bearing of the limestone layer was estimated as q_{ult} = 7.2Ns (ksf).
- Modulus of subgrade reaction, k (pci) was estimated using FDOT Soils and Foundation Handbook.

6.4 Downdrag at Bridge Abutments

Alternative 1:

The drilled shafts/augercast piles or micropiles may be installed within the existing bridge abutments. Since the additional fill volume placed over the existing embankment at these locations will be small, no significant settlements are expected at these locations. Hence, downdrag is expected to be negligible.

Alternative 2:

As in Alternative 1, the driven piles at both end bents of the proposed new bridge will be installed within the area occupied by the existing bridge abutments. Hence, downdrag is expected to be negligible.

6.5 Scour

Alternative 1 and 2:

Due to the close proximity to the Biscayne Bay, scour is expected. The designer might consider beneficial to use a revetment system to protect the end bents.

6.6 Permanent Casing

Alternative 1:

A permanent casing should be installed down to elevation -15 feet, NAVD88 (about 2.5 feet into the natural limestone) as an attempt to prevent the cave-in of the organic layer at each shaft/pile location. For the drilled shaft alternative, a temporary casing may be needed during shaft installation due to the soft limestone encountered down to elevation -41 feet, NAVD88 to prevent cave-ins. Below this elevation, the limestone appears to be more competent (high “N” values).

The installation of all casings for drilled shafts will require the use oscillation/rotator casing installation to minimize noise and vibration and avoid damage to the historical arch bridge and adjacent residences.

Alternative 2:

A permanent casing should be installed down to elevation -15 feet, NAVD88 (about 2.5 feet into the natural limestone) as an attempt to prevent the cave-in of the organic layer at each concrete pile location. The casing diameter should be 36 inches. As mentioned before, the tip of the steel casing may need to go lower to help reduce the potential high vibration levels during concrete pile driving.

6.7 Preforming

Alternative 2:

Based on the information from Borings B-1 and B-2, a hard layer of limestone is observed down to an approximately elevation -34 feet, NAVD88. This layer might be hard to penetrate during driving and present refusal before reaching the minimum tip elevation. Due to organic layer encountered approximately elevation -12.5 feet, NAVD88, HRES recommends preforming down to elevation -34 feet, NAVD88. Due to possible vibration levels during pile driving, this preforming elevation may require revision.

6.8 Settlement and Vibration Monitoring

Construction vibrations associated with casing installation, pile driving and compaction equipment and others will occur. Settlement and vibration monitoring of existing bridge and all nearby existing structures should be performed in accordance with Section 108 of the FDOT Standard Specifications. HRES anticipates the following buildings will need to be monitored:

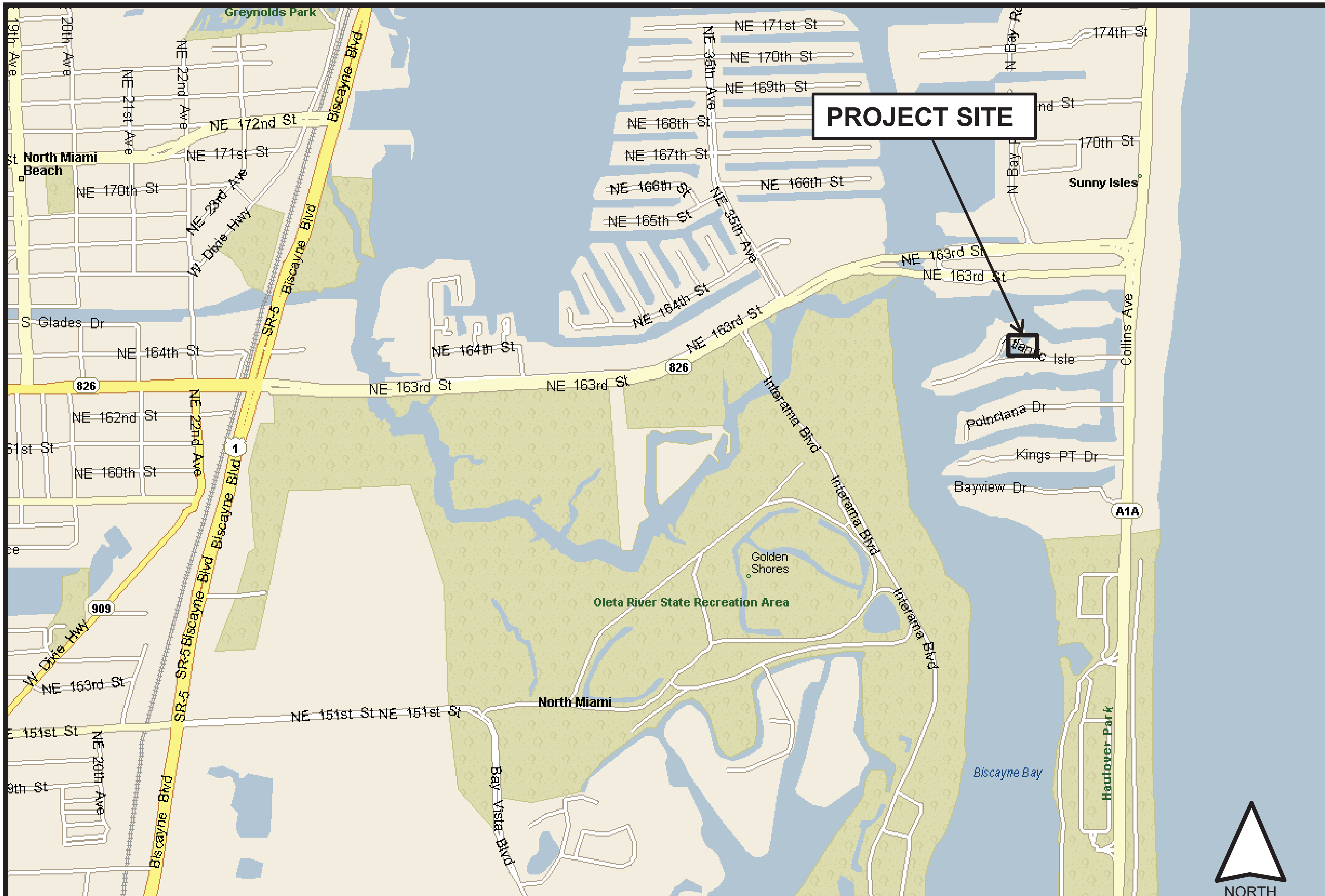
- 263 Atlantic Avenue, North Miami Beach, FL 33160
- 265 Atlantic Avenue, North Miami Beach, FL 33160
- Miami-Dade County Water and Sewer Department Pump Station
- Any other structure that may be identified by the Structural Engineer should be added to this list.

All existing structures in the vicinity of pile driving and compaction operations should be monitored for settlement and vibration.

6.9 Construction Plans and Specifications Review

It is recommended that this office be provided the opportunity to make a general review of the earthwork plans and special provisions prepared from the recommendations presented in this report. We would then suggest any modifications so that our recommendations are properly interpreted and implemented.

APPENDIX A

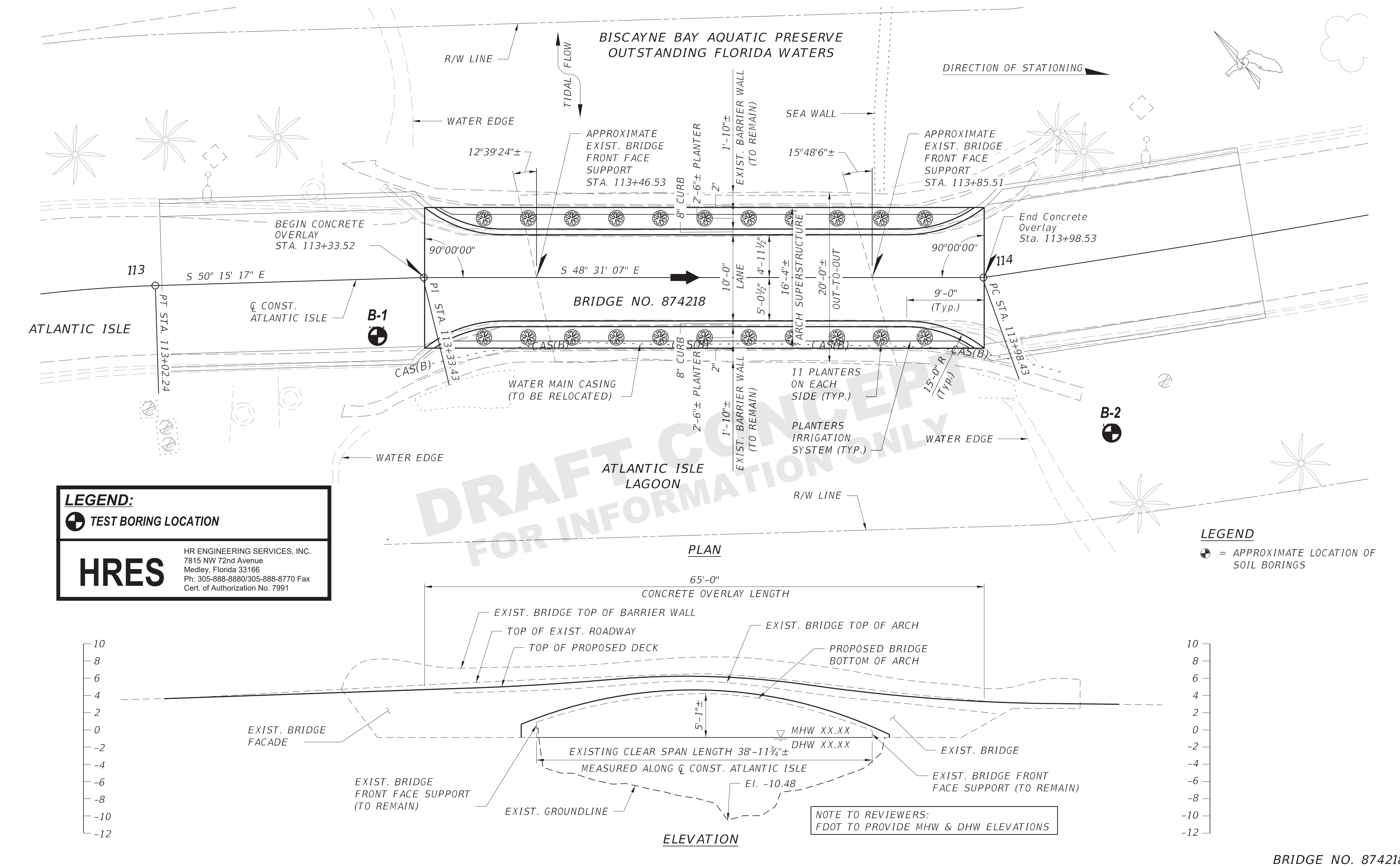


ATLANTIC ISLE BRIDGE
FPID No. 430029-2-22-02
FLORIDA DEPARTMENT OF TRANSPORTATION – DISTRICT 6
MIAMI-DADE COUNTY, FLORIDA

HRES
HR Engineering Services, Inc.

SITE LOCATION MAP **A-1**

DRAWN BY: PV	DATE: 02/24/21
PROJECT No: HR20-1583R	SCALE: NTS



NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

BRIDGE NO. 874218

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (305) 551-8100 F: (305) 551-2800

DRAWN BY:
CHECKED BY:
DESIGNED BY:
CHECKED BY:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
N/A	MIAMI-DADE	430029-2-22-02

SHEET TITLE:
FIELD EXPLORATION PLAN

PROJECT NAME:
ATLANTIC ISLE AVE OVER OCEAN CANAL

REF. DWG. NO.

SHEET NO.
A-2

gnazaire 9/17/2020 12:19:44 PM Z:\70078 D6 Structures 2017\TWO 7\9TechProd\1234567890\struct\B1PlanElev-Rehab-01.DGN

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,040 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HERNANDO R. RAMOS, P.E.
P.E. LICENSE NUMBER 42045
HR ENGINEERING SERVICES, INC
7815 NW 72ND AVENUE
MEDLEY, FLORIDA 33166
CERTIFICATE OF AUTHORIZATION 7991

DRAWN BY: ME 03-18
CHECKED BY: PV 03-18
DESIGNED BY: PV 03-18
CHECKED BY: HRR 03-18

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
NONE	MIAMI-DADE	430029-2-22-02

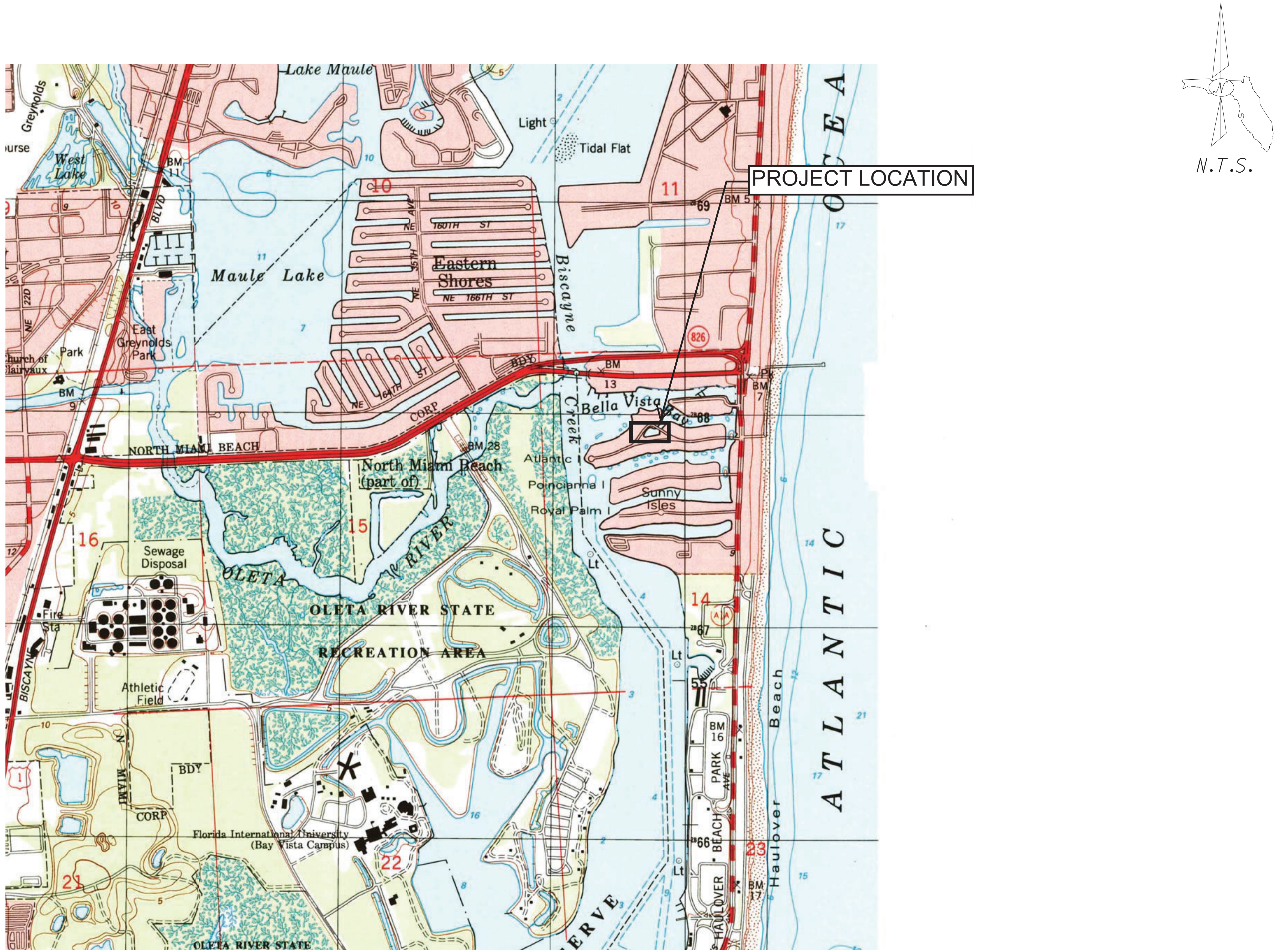
SHEET TITLE: MIAMI-DADE COUNTY AREA SOIL SURVEY MAP

PROJECT NAME: ATLANTIC ISLE LAGOON BRIDGE

REF. DWG. NO.

SHEET NO. A-3

HRESUser 4/7/2020 9:51:55 AM D:\DRIVE3\Paola\HR20-1583R Atlantic Isle Bridge\MIAMIDADE COUNTY SOIL MAP.dgn



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
NONE	MIAMI-DADE	430029-2-22-02

SHEET TITLE: USGS QUADRANGLE MAP

PROJECT NAME: ATLANTIC ISLE LAGOON BRIDGE

REF. DWG. NO.

SHEET NO. A-4

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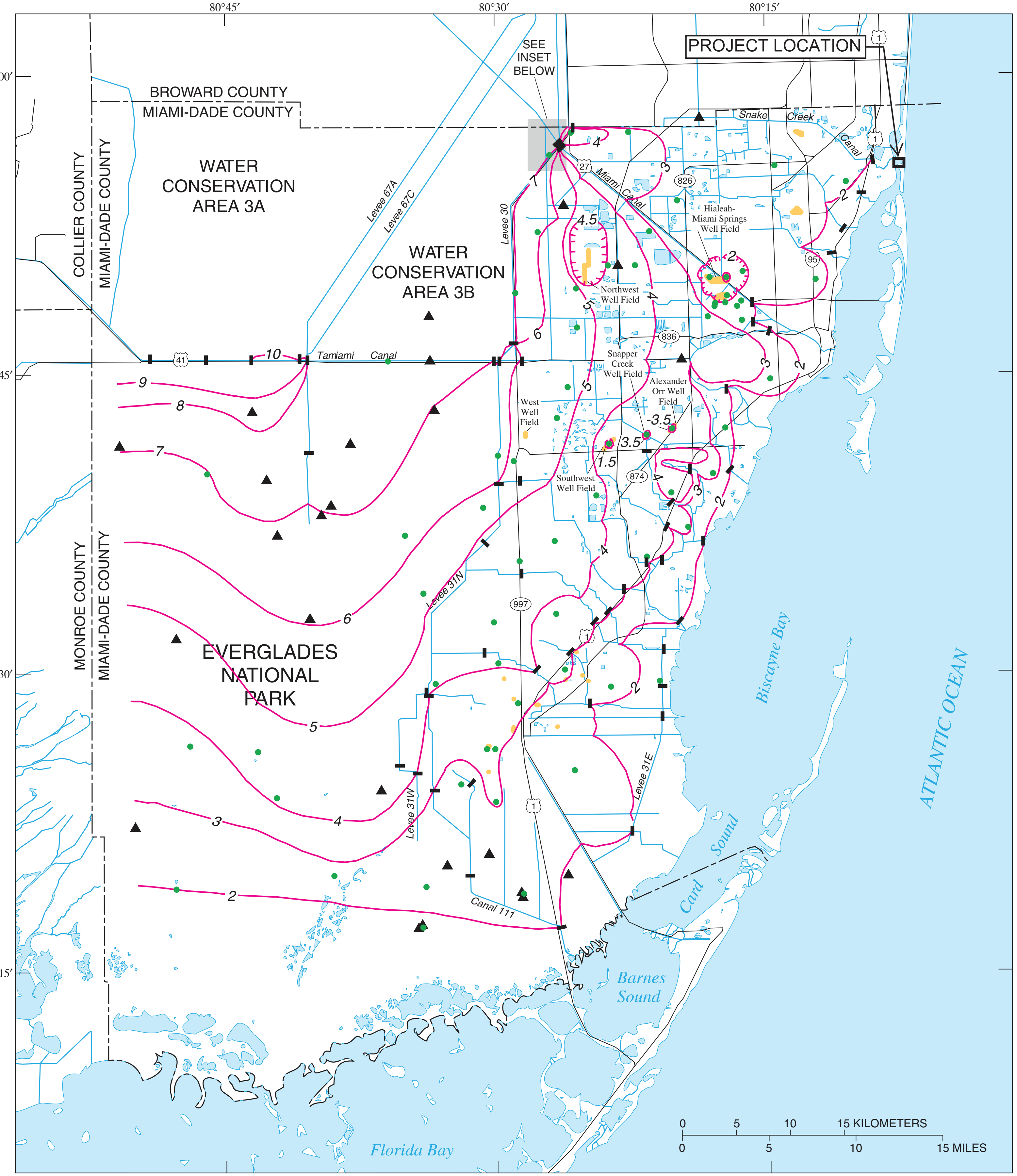
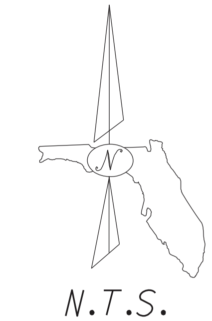


AVERAGE OCTOBER WATER LEVELS 1990-99



REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HERNANDO R. RAMOS, P.E.
P.E. LICENSE NUMBER 42045
HR ENGINEERING SERVICES, INC
7815 NW 72ND AVENUE
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CERTIFICATE OF AUTHORIZATION 7991

DRAWN BY: ME 03-18
CHECKED BY: PV 03-18
DESIGNED BY: PV 03-18
CHECKED BY: HRR 03-18

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
NONE	MIAMI-DADE	430029-2-22-02

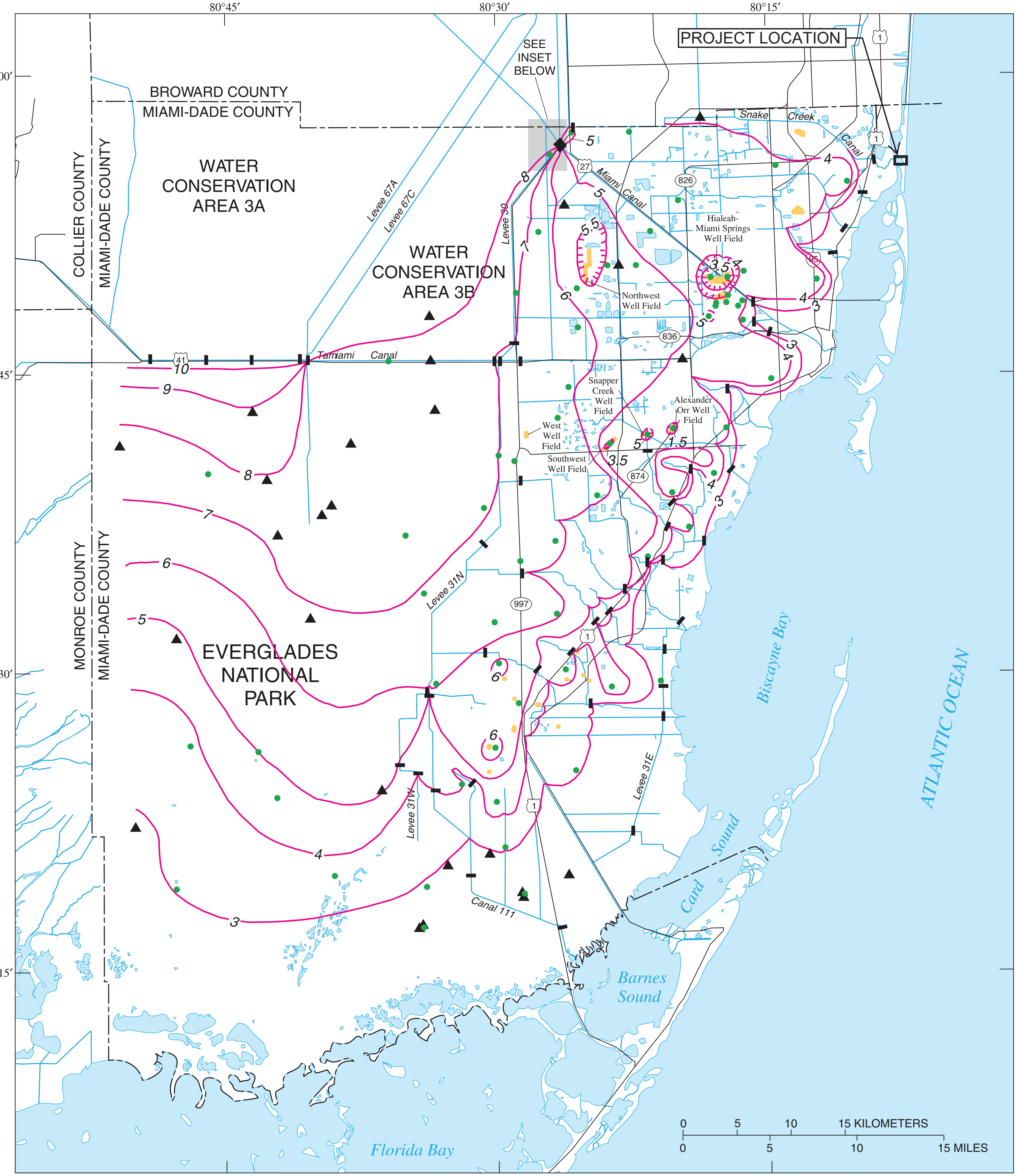
SHEET TITLE: USGS AVERAGE OCTOBER WATER LEVELS (1990-1999)

PROJECT NAME: ATLANTIC ISLE LAGOON BRIDGE

REF. DWG. NO.

SHEET NO. A-5

HRESUser 3/21/2018 2:05:38 PM \\HRES5\Drive5\HR16-1211R-2 Atlantic Isles Bridge\USGS AVERAGE OCTOBER WATER LEVE



AVERAGE YEARLY HIGH WATER LEVELS 1990-99

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HERNANDO R. RAMOS, P.E.
P.E. LICENSE NUMBER 42045
HR ENGINEERING SERVICES, INC
7815 NW 72ND AVENUE
MEDLEY, FLORIDA 33166
CERTIFICATE OF AUTHORIZATION 7991

DRAWN BY: ME 03-18
CHECKED BY: PV 03-18
DESIGNED BY: PV 03-18
CHECKED BY: HRR 03-18

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
NONE	MIAMI-DADE	430029-2-22-02

SHEET TITLE: USGS AVERAGE YEARLY HIGH WATER LEVELS (1990-1999)

PROJECT NAME: ATLANTIC ISLE LAGOON BRIDGE

REF. DWG. NO.

SHEET NO. A-6

DATA ENTRY SHEET

Project FM# - 43002922202 , District: D6

ATLANTIC ISLE BRIDGE

Miami-Dade County, Florida

Note: RED- Locations Coordinates are not correct, Falls Out of County Boundary. Please confirm co-ordiantes.

Copy Data from Column C to K and Past with Ctrl+V on SharePoint

Test No.	Test Type	Latitude	Longitude	Test Date MM/DD/YYYY	Elevation ft.	Groundwater Depth ft.	Percolation Test Results	PDF Name
B-1	Structural Boring	25.92751	-80.12623	12/5/2017	4.8	4.3		4300292D6C4aHR.02242021.1
B-2	Structural Boring	25.92733	-80.12606	12/4/2017	2.4	1.9		4300292D6C4aHR.02242021.1

B-1

LATITUDE: 25.92751° OFFSET: 6 RT
LONGITUDE: -80.12623° ELEVATION: 4.8 FT.
STATION: 13+27 (℄ ATLANTIC AVE.) DATE: 12/05/17

DEPTH, FT. N

GWE @ 0.5 FT.

- 0.0–0.2: ASPHALT (2.5")
- 0.2–4.0 (N: 17, 8): MEDIUM DENSE LIGHT BROWN SILTY FINE SAND WITH TRACES OF LIMEROCK (FILL), SP-SM
  0.2'-2.0': W.C.= 12%; >4= 62%; >200= 11%
- 4.0–13.0 (N: 2, 2, 2, 2, 4): SOFT TO FIRM DARK BROWN HIGHLY ORGANIC SANDY SILT, ML-OL
  11.0'-13.0': W.C. = 392%; O.C.= 40%
- 13.0–80.0 (N: 37, 40, 27, 7, 4, 3, 11, 13, 50/1", 50/1", 50/3", 13, 16, 49, 50/4", 50/3", 50/2", 50/3", 50/2", 50/2", 50/2", 50/2", 50/2", 50/3", 50/3", 50/2", 50/3"): LIGHT BROWN POROUS SANDY LIMESTONE AND CALCAREOUS FINE SAND

B.T. @ 80 FT.
NW CASING TO 78.5 FT.

B-2

LATITUDE: 25.92733° OFFSET: 20 RT
LONGITUDE: -80.12606° ELEVATION: 2.4 FT.
STATION: 14+10 (℄ ATLANTIC AVE.) DATE: 12/04/17

DEPTH, FT. N

GWE @ 0.5 FT.

- 0.0–1.0: DARK BROWN ORGANIC SILTY FINE SAND (TOPSOIL), SM-OL
- 1.0–4.0 (N: 4, 2): LOOSE TO VERY LOOSE BROWN FINE SAND WITH TRACES OF LIMEROCK (FILL), SP-SM
  2.0'-4.0': W.C.= 33%; >4= 92%; >200= 8%
- 4.0–8.0 (N: 2, 1): VERY LOOSE DARK BROWN ORGANIC SILTY FINE SAND, SM-OL
  6.0'-8.0': W.C.= 119%; O.C.= 17%
- 8.0–10.0 (N: 4): LOOSE GRAY FINE SAND WITH SILT, SP-SM
  8.0'-10.0': W.C.= 38%; >200= 7%
- 10.0–15.0 (N: 2, 1): SOFT DARK BROWN HIGHLY ORGANIC SANDY SILT, ML-OL
  13.0'-15.0': W.C.= 506%; O.C.= 58%
- 15.0–38.0 (N: 6, 10, 7, 5, 14, 8, 5, 10, 31, 47): LIGHT BROWN POROUS SANDY LIMESTONE AND CALCAREOUS FINE SAND
- 38.0–43.0 (N: 3, 6): LOOSE LIGHT GRAY FINE SAND, SP
- 43.0–80.0 (N: 50/5", 41, 50/2", 50/2", 50/2", 50/5", 50/5", 50/4", 50/4", 50/1", 50/3", 50/3", 10, 19, 60): LIGHT BROWN TO GRAY POROUS SANDY LIMESTONE AND CALCAREOUS FINE SAND

B.T. @ 80 FT. NW CASING TO 78.5 FT.

ELEVATION, FT (NAVD88): +10, 0, -10, -20, -30, -40, -50, -60, -70, -80

VERTICAL SCALE: 0 2 10
HORIZONTAL SCALE: N.T.S.
HRES PROJECT: HR20-1583R

LEGEND:

- ASPHALT
- TOPSOIL
- SILTY SAND
- FINE SAND
- ORGANIC SILTY SAND
- ORGANIC SANDY SILT
- LIMESTONE WITH SOME FINE SAND OR AND FINE SAND
- ▶ WATER LOSS
- ▽ GROUND WATER LEVEL AT BORING COMPLETION
- B.T. BORING TERMINATED
- N: STANDARD PENETRATION RESISTANCE (AUTOMATIC HAMMER)
- W.C.: WATER CONTENT
- O.C.: ORGANIC CONTENT
- >4: PERCENT PASSING #4 SIEVE
- >200: PERCENT PASSING #200 SIEVE

HAMMER WEIGHT = 140 LB
DROP HEIGHT = 30 IN

THE TEST BORINGS WERE PERFORMED BY HRES USING A CME-55 TRUCK MOUNTED RIG.

GRANULAR MATERIALS:

RELATIVE DENSITY	SPT N-VALUE (BLOWS/12 INCHES)
VERY LOOSE	<3
LOOSE	3-8
MEDIUM DENSE	8-24
DENSE	24-40
VERY DENSE	>40

SILTS AND CLAYS:

CONSISTENCY	SPT N-VALUE (BLOWS/12 INCHES)
VERY SOFT	<1
SOFT	1-3
FIRM	3-6
STIFF	6-12
VERY STIFF	12-24
HARD	>24

ENVIRONMENTAL CLASSIFICATION

SUBSTRUCTURE:
CONCRETE: EXTREMELY AGGRESSIVE
STEEL: EXTREMELY AGGRESSIVE
SUPERSTRUCTURE: EXTREMELY AGGRESSIVE

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HERNANDO R. RAMOS, P.E.
P.E. LICENSE NUMBER 42045
HR ENGINEERING SERVICES, INC
7815 NW 72ND AVENUE
MEDLEY, FLORIDA 33166

DRAWN BY: ME 12-17
CHECKED BY: SS 12-17
DESIGNED BY: SS 12-17
CHECKED BY: HRR 12-17

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
-	MIAMI-DADE	430029-2-22-02

SHEET TITLE: REPORT OF CORE BORINGS

PROJECT NAME: ATLANTIC ISLE BRIDGE

REF. DWG. NO.

SHEET NO. A-8

HRESUser 2/22/2021 11:05:34 AM Y:\Paola\HR20-1583R Atlantic Isles Lagoon Bridge\Revised 02-18-21\Bridge\Boring\B1BORI.

FIELD TESTING PROCEDURES

Test Borings - The test borings were made in general accordance with ASTM-D-1586, "Penetration Test and Split-Barrel Sampling of Soils." The borings were advanced using a 3-inch ID casing and a rotary drilling process. Water or bentonite drilling fluid was circulated in the boreholes to flush the cuttings. At regular intervals, the drilling tools were removed and soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-lb hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. An engineer then examined the samples in order to confirm the field classifications.

APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS
ATLANTIC ISLE BRIDGE
FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 6
MIAMI-DADE COUNTY, FLORIDA
FPID No. 430029-2-22-02
HR ENGINEERING SERVICES, INC.
HRES PROJECT No. HR20-1583R
FEBRUARY 22, 2021

Test No.	USCS Class.	Sample Depth (ft)	Grain Size Distribution - Percent Passing								Organic Loss of Ignition, %	Moisture Content %	Material in Sample, %		
			3/4"	3/8"	No. 4	No. 10	No. 40	No. 60	No. 100	No. 200			Gravel	Sand	Fines
B-1	SP-SM	0.2-2.0	100	78	62	50	35	26	16	11	-	12	38	51	11
B-1	ML-OL	11.0-13.0	-	-	-	-	-	-	-	-	40	392	-	-	-
B-2	SP-SM	2.0-4.0	95	94	92	81	51	34	18	8	-	33	8	84	8
B-2	SM-OL	6.0-8.0	-	-	-	-	-	-	-	-	17	119	-	-	-
B-2	SP-SM	8.0-10.0	-	-	-	-	-	-	-	7	-	38	-	-	7
B-2	ML-OL	13.0-15.0	-	-	-	-	-	-	-	-	58	506	-	-	-

LABORATORY TESTING PROCEDURES

Grain Size Distribution – The grain size tests were performed to determine the particle size and distribution of sample tested. Each Sample was dried, weighed, and washed over a # 200 mesh sieve. The dried sample was then passed through a standard set nested sieves to determine the grain size distribution of the soil particles coarser than the # 200 sieves. This test was conducted in general accordance with ASTM D-22.

Percent Fines Content – In this test, the sample is dried and then washed over a # 200 mesh sieve. The percentage of soil by weight passing the sieve is the percentage of fines or portion of the sample in the silt and clay size range. This test was conducted in general accordance with ASTM D-1140.

Percent Organics (Organic Loss on Ignition) – The amount of organic material in the sample was determined in this test, by measuring the loss due to ignition. The sample was first dried and weighed, then ignited and reweighed. The amount of organic material is expressed as a percentage of the soil weight. This test was conducted in general accordance with ASTM D-2974.

Water Content – The water content is the ratio, expressed as a percentage of the weight of water in a given mass of soil to the weight of the soil particles. This test was conducted in general accordance with ASTM D-2216.

HR ENGINEERING SERVICES, INC.
7815 N.W. 72nd Avenue - Medley, Florida 33166
Phone (305) 888-8880, Fax (305) 888-8770

GRAIN SIZE DATA SHEET

Project Name:	ATLANTIC ISLE BRIDGE	Project No.:	HR16-1211R-2
Boring No.:	B-1	Sample No.:	1B
Depth:	0.2'-2.0'	Date:	03/28/2018
Tested By:	E.M.		

Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	0.00	0.00	0	100	
3/4"	19.00	0.00	0.00	0	100	
3/8"	9.51	78.40	78.40	22	78	USCS Classification:
4	4.76	59.30	137.70	38	62	
10	2.00	44.10	181.80	50	50	
40	0.420	54.00	235.80	65	35	SP-SM
60	0.250	32.20	268.00	74	26	
100	0.149	36.70	304.70	84	16	
200	0.074	18.10	322.80	89	11	
PAN						

B-3

Total Dry Weight Before Wash, (gr) = **363.40**

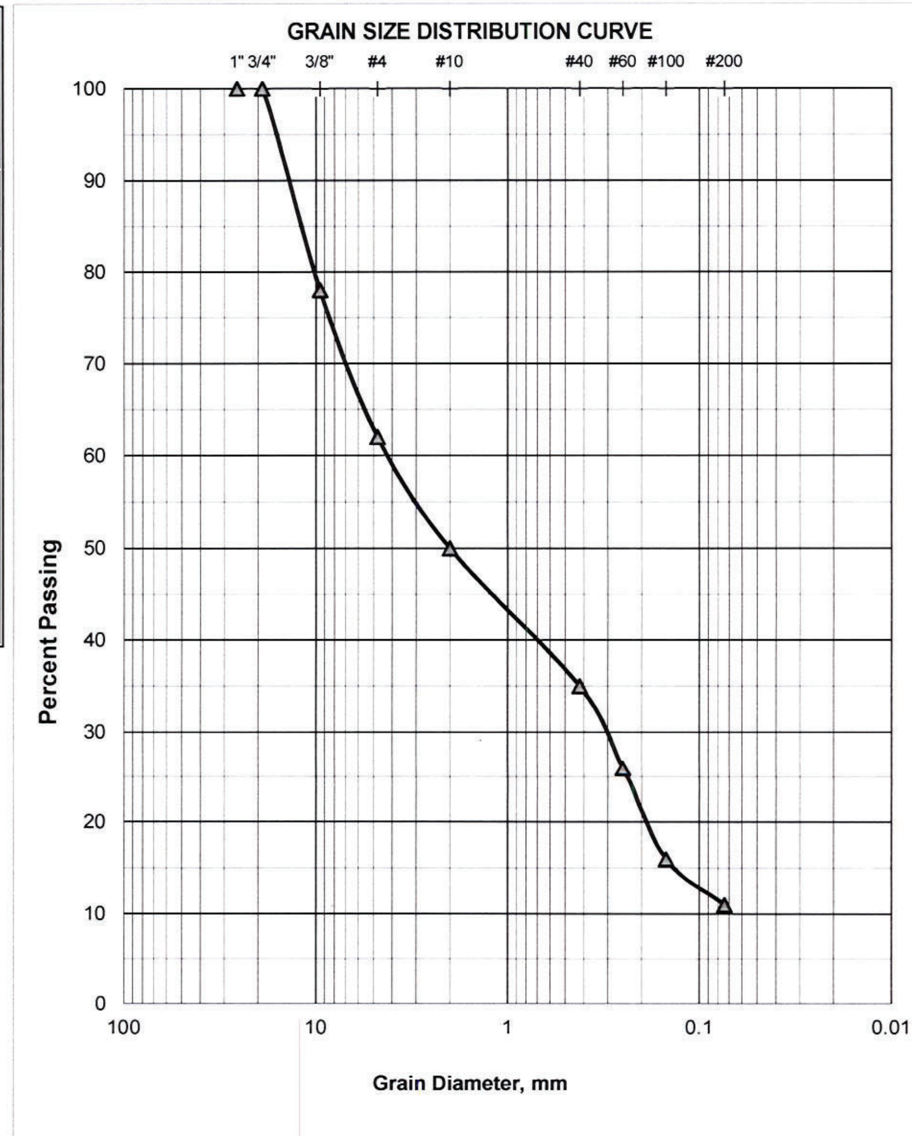
Percent Finer than No. 200 Sieve by Wash Method= **11%**

Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)
Moisture Content Test performed in general accordance with ASTM D 2216 (AASHTO T 265)

Material in Sample (%)		
Gravel	≤ No. 4	38
Coarse Sand	>No. 4-≤ No. 40	27
Fine Sand	>No. 40-≤ No. 200	24
Silt and Clays	>No. 200	11
Water Content		12%

Respectfully Submitted,
HR Engineering Services, Inc.

Hernando R. Ramos, P.E.
Florida Registration No. 42045



HR ENGINEERING SERVICES, INC.
7815 N.W. 72nd Avenue - Medley, Florida 33166
Phone (305) 888-8880, Fax (305) 888-8770

REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: ATLANTIC ISLE BRIDGE **Project No.:** HR16-1211R-2

Boring No.: B-1 **Sample No.:** 6 **Depth:** 11.0'-13.0'

Date: 03/26/18

Technician:	E.M.
Date Sample Placed in Oven:	03/26/2018
Time in / Out of Oven :	03/26/18 6:00 PM TO 03/27/18 6:00 PM
Wt. of Wet Soil + Can, grams	253.20
Wt. of Dry Soil + Can, grams	58.60
Wt. of Can, grams No. 301	9.00
Wt. of Dry Soil, grams	49.60
Wt. of Moisture, grams	194.60
Water Content, w%	392%
Date Sample Placed in Furnace:	03/28/18
Time in / out of furnace (minimum 6 hrs):	03/28/18 6:00 AM TO 03/28/18 12:00 PM
Weight of Crucible & Oven-Dried Sample:	29.60
Weight of Crucible and Sample After Ignition:	25.10
Weight of Crucible: No. 115	18.30
Weight of Oven-Dried Soil:	11.30
Weight Loss due to Ignition:	4.50
Percent Organics:	40%

Moisture Content Test performed in general accordance with ASTM D 2216 (AASHTO T 265)
Organic Content Test performed in general accordance with ASTM D 2974 (AASHTO T 267)

Respectfully Submitted,
HR Engineering Services, Inc.

Hernando R. Ramos, P.E.
Florida Registration No. 42045

USCS Classification:
ML-OL

B-5

HR ENGINEERING SERVICES, INC.

7815 N.W. 72nd Avenue - Medley, Florida 33166
Phone (305) 888-8880, Fax (305) 888-8770

GRAIN SIZE DATA SHEET

Project Name: ATLANTIC ISLE BRIDGE Project No.: HR16-1211R-2
Boring No.: B-2 Sample No.: 2 Depth: 2.0'-4.0'
Date: 03/28/2018 Tested By: E.M.

Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	0.00	0.00	0	100	
3/4"	19.00	15.70	15.70	5	95	
3/8"	9.51	1.30	17.00	6	94	USCS Classification:
4	4.76	6.80	23.80	8	92	
10	2.00	31.80	55.60	19	81	
40	0.420	85.10	140.70	49	51	SP-SM
60	0.250	48.90	189.60	66	34	
100	0.149	47.20	236.80	82	18	
200	0.074	26.80	263.60	92	8	
PAN						

Total Dry Weight Before Wash, (gr) = 287.50

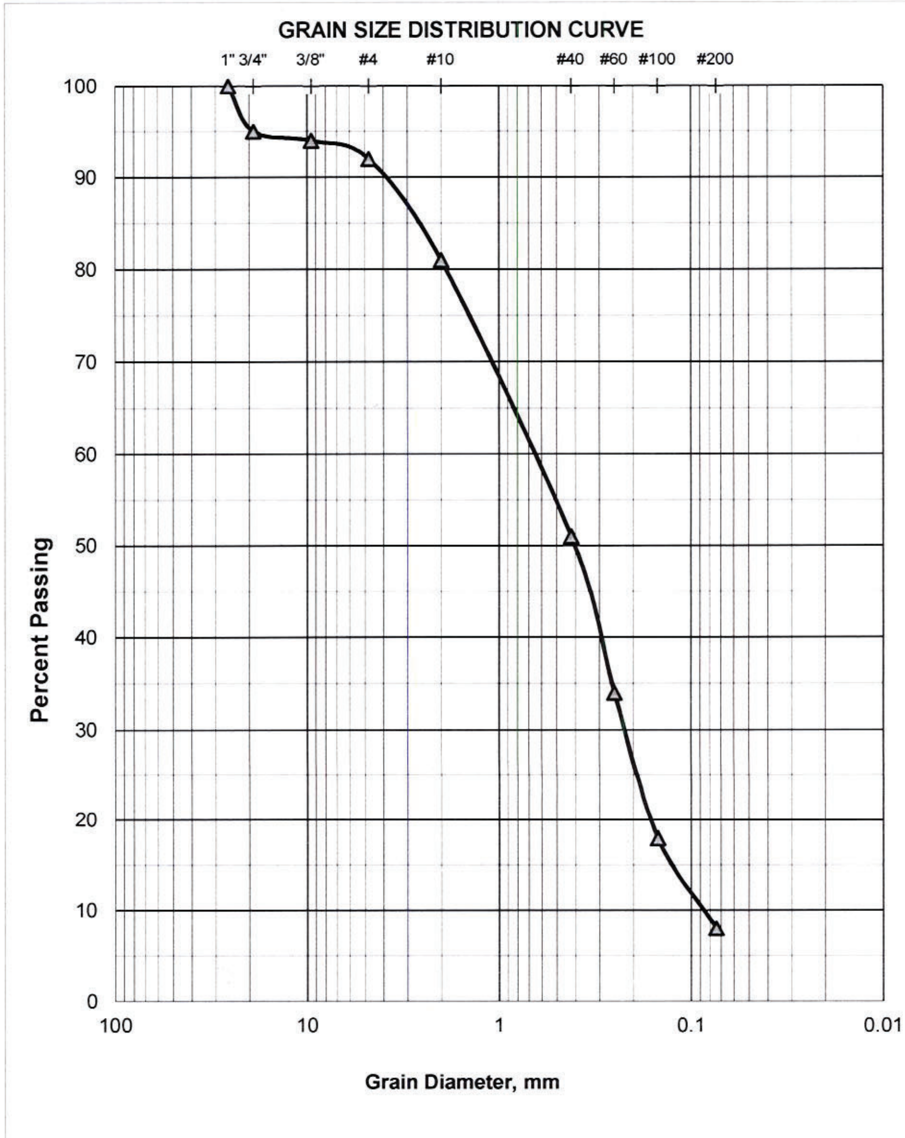
Percent Finer than No. 200 Sieve by Wash Method= 8%

Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)
Moisture Content Test performed in general accordance with ASTM D 2216 (AASHTO T 265)

Material in Sample (%)		
Gravel	≤ No. 4	8
Coarse Sand	>No. 4-≤ No. 40	41
Fine Sand	>No. 40-≤ No. 200	43
Silt and Clays	>No. 200	8
Water Content		33%

Respectfully Submitted,
HR Engineering Services, Inc.

Hernando R. Ramos, P.E.
Florida Registration No. 42045



HR ENGINEERING SERVICES, INC.
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Phone (305) 888-8880, Fax (305) 888-8770

REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: ATLANTIC ISLE BRIDGE **Project No.:** HR16-1211R-2

Boring No.: B-2 **Sample No.:** 4 **Depth:** 6.0'-8.0'

Date: 03/26/18

Technician:			E.M.				
Date Sample Placed in Oven:			03/26/2018				
Time in / Out of Oven :			03/26/18	6:00 PM	TO	03/27/18	6:00 PM
Wt. of Wet Soil + Can, grams			492.30				
Wt. of Dry Soil + Can, grams			229.50				
Wt. of Can, grams	No.	303	9.00				
Wt. of Dry Soil, grams			220.50				
Wt. of Moisture, grams			262.80				
Water Content, w%			119%				
Date Sample Placed in Furnace:			03/28/18				
Time in / out of furnace (minimum 6 hrs):			03/28/18	6:00 AM	TO	03/28/18	12:00 PM
Weight of Crucible & Oven-Dried Sample:			26.70				
Weight of Crucible and Sample After Ignition:			24.80				
Weight of Crucible:	No.	209	15.40				
Weight of Oven-Dried Soil:			11.30				
Weight Loss due to Ignition:			1.90				
Percent Organics:			17%				

Moisture Content Test performed in general accordance with ASTM D 2216 (AASHTO T 265)
Organic Content Test performed in general accordance with ASTM D 2974 (AASHTO T 267)

Respectfully Submitted,
HR Engineering Services, Inc.

USCS Classification:
SM-OL

Hernando R. Ramos, P.E.
Florida Registration No. 42045

HR ENGINEERING SERVICES, INC.

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REPORT OF MOISTURE AND PERCENT PASSING THE No. 200 SIEVE

Project Name: ATLANTIC ISLE BRIDGE **Project No.:** HR16-1211R-2

Boring No.: B-2 **Sample No.:** 5 **Depth:** 8.0'-10.0'

Date: 03/26/18

Technician:		E.M.				
Date Sample Placed in Oven:		03/26/2018				
Time in / Out of Oven :		03/26/18	6:00 PM	TO	03/27/18	6:00 PM
Wt. of Wet Soil + Can, grams		390.70				
Wt. of Dry Soil + Can, grams		286.30				
Wt. of Can, grams No.	304	9.00				
Wt. of Dry Soil, grams		277.30				
Wt. of Moisture, grams		104.40				
Water Content, w%		38%				
Wt. of Dry Soil + Can Before Wash, grams		286.30				
Wt. of Can, grams No.	304	9.00				
Wt. of Dry Soil Before Wash, grams		277.30				
Time in / Out of Oven :		03/27/18	8:30 PM	TO	03/28/18	8:30 PM
Wt. of Dry Soil + Can After Wash, grams		265.80				
Wt. of Dry Soil After Wash, grams		256.80				
Total Loss, grams		20.50				
Percent Finer Than No. 200 Sieve		7%				

Moisture Content Test performed in general accordance with ASTM D 2216 (AASHTO T 265)

Fines Content Test performed in general accordance with ASTM D 1140

Respectfully Submitted,

HR Engineering Services, Inc.

Hernando R. Ramos, P.E.
Florida Registration No. 42045

USCS Classification:

SP-SM

HR ENGINEERING SERVICES, INC.
7815 N.W. 72nd Avenue - Medley, Florida 33166
Phone (305) 888-8880, Fax (305) 888-8770

REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: ATLANTIC ISLE BRIDGE **Project No.:** HR16-1211R-2

Boring No.: B-2 **Sample No.:** 7 **Depth:** 13.0'-15.0'

Date: 03/26/18

Technician:		E.M.				
Date Sample Placed in Oven:		03/26/2018				
Time in / Out of Oven :		03/26/18	6:00 PM	TO	03/27/18	6:00 PM
Wt. of Wet Soil + Can, grams		347.20				
Wt. of Dry Soil + Can, grams		64.70				
Wt. of Can, grams No.	305	8.90				
Wt. of Dry Soil, grams		55.80				
Wt. of Moisture, grams		282.50				
Water Content, w%		506%				
Date Sample Placed in Furnace:		03/28/18				
Time in / out of furnace (minimum 6 hrs):		03/28/18	6:00 AM	TO	03/28/18	12:00 PM
Weight of Crucible & Oven-Dried Sample:		29.60				
Weight of Crucible and Sample After Ignition:		23.10				
Weight of Crucible: No.	11	18.30				
Weight of Oven-Dried Soil:		11.30				
Weight Loss due to Ignition:		6.50				
Percent Organics:		58%				

Moisture Content Test performed in general accordance with ASTM D 2216 (AASHTO T 265)
Organic Content Test performed in general accordance with ASTM D 2974 (AASHTO T 267)

Respectfully Submitted,
HR Engineering Services, Inc.

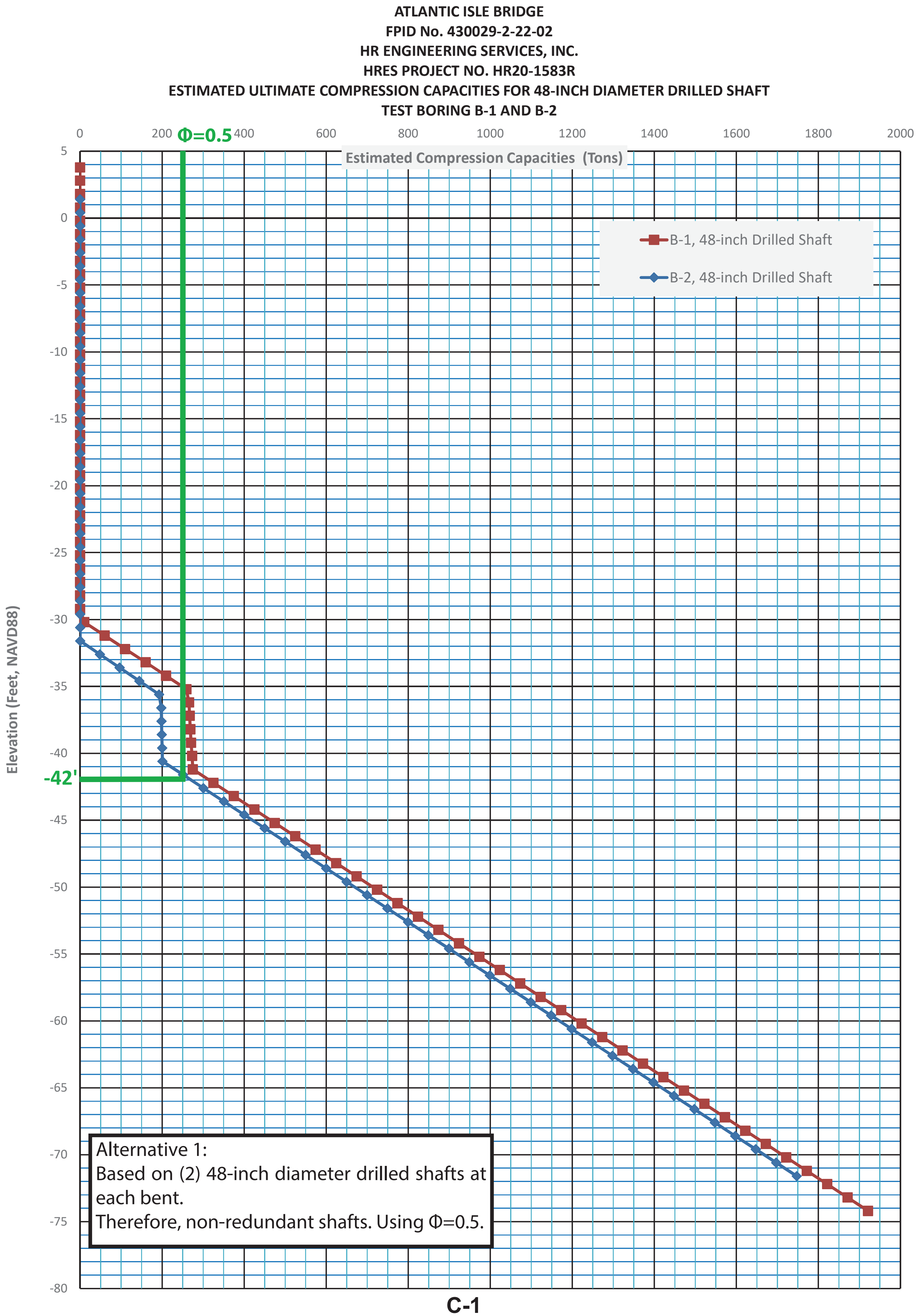
USCS Classification:
ML-OL

Hernando R. Ramos, P.E.
Florida Registration No. 42045

APPENDIX C

ALTERNATIVE 1

REHABILITATION OF EXISTING BRIDGE
DRILLED SHAFT/AUGERCAST PILE/MICROPILE


ATLANTIC ISLE BRIDGE
FPID No. 430029-2-22-02
HR ENGINEERING SERVICES, INC.
HRES PROJECT NO. HR20-1583R
ESTIMATED ULTIMATE COMPRESSION CAPACITIES FOR 48-INCH DIAMETER DRILLED SHAFT
TEST BORING B-1 AND B-2
Φ=0.5
Estimated Compression Capacities (Tons)
B-1, 48-inch Drilled Shaft
B-2, 48-inch Drilled Shaft
Elevation (Feet, NAVD88)
-42'
Alternative 1:
Based on (2) 48-inch diameter drilled shafts at each bent.
Therefore, non-redundant shafts. Using Φ=0.5.

C-1

General Information:
====================
Input file: .....evised II 02-18-21\Bridge\FB-DEEP\Drilled Shaft\B-1_48 inch.in
Project number: HR20-1583R
Job name: Atlantic Isle Bridge
Engineer: Chollada
Units: English

Analysis Information:
=====================
Analysis Type: Drilled Shaft Analysis

Soil Information:
=================
Boring date: 12/05/17
Boring number: B-1
Station number: 13+27 Offset: 6.0 RT

Ground Elevation: 4.80(ft)
Water table Elevation = 0.50(ft)

Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	4.80	N/A	0.00	5- Cavity layer
2	2.00	2.80	N/A	0.00	5- Cavity layer
3	4.00	0.80	N/A	0.00	5- Cavity layer
4	6.00	-1.20	N/A	120.00	5- Cavity layer
5	8.00	-3.20	N/A	120.00	5- Cavity layer
6	10.00	-5.20	N/A	120.00	5- Cavity layer
7	12.00	-7.20	N/A	120.00	5- Cavity layer
8	13.00	-8.20	N/A	120.00	5- Cavity layer
9	13.00	-8.20	N/A	120.00	5- Cavity layer
10	15.00	-10.20	N/A	120.00	5- Cavity layer
11	18.00	-13.20	N/A	120.00	5- Cavity layer
12	21.00	-16.20	N/A	120.00	5- Cavity layer
13	23.00	-18.20	N/A	120.00	5- Cavity layer
14	25.00	-20.20	N/A	120.00	5- Cavity layer
15	28.00	-23.20	N/A	120.00	5- Cavity layer
16	30.00	-25.20	N/A	120.00	5- Cavity layer
17	33.00	-28.20	N/A	120.00	5- Cavity layer
18	34.80	-30.00	N/A	120.00	5- Cavity layer
19	34.80	-30.00	N/A	120.00	4- Lime Stone/Very shelly sand
20	38.00	-33.20	N/A	120.00	4- Lime Stone/Very shelly sand
21	40.00	-35.20	N/A	120.00	4- Lime Stone/Very shelly sand
22	40.10	-35.30	13.00	120.00	3- Clean sand
23	42.00	-37.20	13.00	120.00	3- Clean sand
24	44.00	-39.20	16.00	120.00	3- Clean sand
25	45.90	-41.10	16.00	120.00	3- Clean sand
26	46.00	-41.20	N/A	120.00	4- Lime Stone/Very shelly sand
27	48.00	-43.20	N/A	120.00	4- Lime Stone/Very shelly sand
28	50.00	-45.20	N/A	120.00	4- Lime Stone/Very shelly sand
29	53.00	-48.20	N/A	120.00	4- Lime Stone/Very shelly sand
30	55.00	-50.20	N/A	120.00	4- Lime Stone/Very shelly sand
31	58.00	-53.20	N/A	120.00	4- Lime Stone/Very shelly sand
32	60.00	-55.20	N/A	120.00	4- Lime Stone/Very shelly sand
33	63.00	-58.20	N/A	120.00	4- Lime Stone/Very shelly sand
34	65.00	-60.20	N/A	120.00	4- Lime Stone/Very shelly sand
35	68.00	-63.20	N/A	120.00	4- Lime Stone/Very shelly sand
36	70.00	-65.20	N/A	120.00	4- Lime Stone/Very shelly sand
37	73.00	-68.20	N/A	120.00	4- Lime Stone/Very shelly sand
38	75.00	-70.20	N/A	120.00	4- Lime Stone/Very shelly sand
39	78.00	-73.20	N/A	120.00	4- Lime Stone/Very shelly sand
40	80.00	-75.20	N/A	120.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A

14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	17.75	3.55	0.00	0.00
20	N/A	17.75	3.55	0.00	0.00
21	N/A	17.75	3.55	0.00	0.00
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	17.75	3.55	0.00	0.00
27	N/A	17.75	3.55	0.00	0.00
28	N/A	17.75	3.55	0.00	0.00
29	N/A	17.75	3.55	0.00	0.00
30	N/A	17.75	3.55	0.00	0.00
31	N/A	17.75	3.55	0.00	0.00
32	N/A	17.75	3.55	0.00	0.00
33	N/A	17.75	3.55	0.00	0.00
34	N/A	17.75	3.55	0.00	0.00
35	N/A	17.75	3.55	0.00	0.00
36	N/A	17.75	3.55	0.00	0.00
37	N/A	17.75	3.55	0.00	0.00
38	N/A	17.75	3.55	0.00	0.00
39	N/A	17.75	3.55	0.00	0.00
40	N/A	17.75	3.55	0.00	0.00

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	1.00	ROUGH	1.000
20	1.00	ROUGH	1.000
21	1.00	ROUGH	1.000
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	1.00	ROUGH	1.000
27	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
29	1.00	ROUGH	1.000
30	1.00	ROUGH	1.000
31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	1.00	ROUGH	1.000

Drilled Shaft Data:

Unit weight of concrete = 150.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 4000.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	1.00	3.80	0.00	48.00	48.00	0.00
2	2.00	2.80	0.00	48.00	48.00	0.00
3	3.00	1.80	0.00	48.00	48.00	0.00
4	4.00	0.80	0.00	48.00	48.00	0.00
5	5.00	-0.20	0.00	48.00	48.00	0.00
6	6.00	-1.20	0.00	48.00	48.00	0.00
7	7.00	-2.20	0.00	48.00	48.00	0.00
8	8.00	-3.20	0.00	48.00	48.00	0.00

9	9.00	-4.20	0.00	48.00	48.00	0.00
10	10.00	-5.20	0.00	48.00	48.00	0.00
11	11.00	-6.20	0.00	48.00	48.00	0.00
12	12.00	-7.20	0.00	48.00	48.00	0.00
13	13.00	-8.20	0.00	48.00	48.00	0.00
14	14.00	-9.20	0.00	48.00	48.00	0.00
15	15.00	-10.20	0.00	48.00	48.00	0.00
16	16.00	-11.20	0.00	48.00	48.00	0.00
17	17.00	-12.20	0.00	48.00	48.00	0.00
18	18.00	-13.20	0.00	48.00	48.00	0.00
19	19.00	-14.20	0.00	48.00	48.00	0.00
20	20.00	-15.20	0.00	48.00	48.00	0.00
21	21.00	-16.20	0.00	48.00	48.00	0.00
22	22.00	-17.20	0.00	48.00	48.00	0.00
23	23.00	-18.20	0.00	48.00	48.00	0.00
24	24.00	-19.20	0.00	48.00	48.00	0.00
25	25.00	-20.20	0.00	48.00	48.00	0.00
26	26.00	-21.20	0.00	48.00	48.00	0.00
27	27.00	-22.20	0.00	48.00	48.00	0.00
28	28.00	-23.20	0.00	48.00	48.00	0.00
29	29.00	-24.20	0.00	48.00	48.00	0.00
30	30.00	-25.20	0.00	48.00	48.00	0.00
31	31.00	-26.20	0.00	48.00	48.00	0.00
32	32.00	-27.20	0.00	48.00	48.00	0.00
33	33.00	-28.20	0.00	48.00	48.00	0.00
34	34.00	-29.20	0.00	48.00	48.00	0.00
35	35.00	-30.20	0.00	48.00	48.00	0.00
36	36.00	-31.20	0.00	48.00	48.00	0.00
37	37.00	-32.20	0.00	48.00	48.00	0.00
38	38.00	-33.20	0.00	48.00	48.00	0.00
39	39.00	-34.20	0.00	48.00	48.00	0.00
40	40.00	-35.20	0.00	48.00	48.00	0.00
41	41.00	-36.20	0.00	48.00	48.00	0.00
42	42.00	-37.20	0.00	48.00	48.00	0.00
43	43.00	-38.20	0.00	48.00	48.00	0.00
44	44.00	-39.20	0.00	48.00	48.00	0.00
45	45.00	-40.20	0.00	48.00	48.00	0.00
46	46.00	-41.20	0.00	48.00	48.00	0.00
47	47.00	-42.20	0.00	48.00	48.00	0.00
48	48.00	-43.20	0.00	48.00	48.00	0.00
49	49.00	-44.20	0.00	48.00	48.00	0.00
50	50.00	-45.20	0.00	48.00	48.00	0.00
51	51.00	-46.20	0.00	48.00	48.00	0.00
52	52.00	-47.20	0.00	48.00	48.00	0.00
53	53.00	-48.20	0.00	48.00	48.00	0.00
54	54.00	-49.20	0.00	48.00	48.00	0.00
55	55.00	-50.20	0.00	48.00	48.00	0.00
56	56.00	-51.20	0.00	48.00	48.00	0.00
57	57.00	-52.20	0.00	48.00	48.00	0.00
58	58.00	-53.20	0.00	48.00	48.00	0.00
59	59.00	-54.20	0.00	48.00	48.00	0.00
60	60.00	-55.20	0.00	48.00	48.00	0.00
61	61.00	-56.20	0.00	48.00	48.00	0.00
62	62.00	-57.20	0.00	48.00	48.00	0.00
63	63.00	-58.20	0.00	48.00	48.00	0.00
64	64.00	-59.20	0.00	48.00	48.00	0.00
65	65.00	-60.20	0.00	48.00	48.00	0.00
66	66.00	-61.20	0.00	48.00	48.00	0.00
67	67.00	-62.20	0.00	48.00	48.00	0.00
68	68.00	-63.20	0.00	48.00	48.00	0.00
69	69.00	-64.20	0.00	48.00	48.00	0.00
70	70.00	-65.20	0.00	48.00	48.00	0.00
71	71.00	-66.20	0.00	48.00	48.00	0.00
72	72.00	-67.20	0.00	48.00	48.00	0.00
73	73.00	-68.20	0.00	48.00	48.00	0.00
74	74.00	-69.20	0.00	48.00	48.00	0.00
75	75.00	-70.20	0.00	48.00	48.00	0.00
76	76.00	-71.20	0.00	48.00	48.00	0.00
77	77.00	-72.20	0.00	48.00	48.00	0.00
78	78.00	-73.20	0.00	48.00	48.00	0.00
79	79.00	-74.20	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

Strength reduction factors: Skin-friction = 1.00, End-bearing = 0.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	1.00	0.000	0.000	0.000
2	48.00	2.00	0.000	0.000	0.000
3	48.00	3.00	0.000	0.000	0.000
4	48.00	4.00	0.000	0.000	0.000
5	48.00	5.00	0.000	0.000	0.000
6	48.00	6.00	0.000	0.000	0.000
7	48.00	7.00	0.000	0.000	0.000
8	48.00	8.00	0.000	0.000	0.000
9	48.00	9.00	0.000	0.000	0.000
10	48.00	10.00	0.000	0.000	0.000
11	48.00	11.00	0.000	0.000	0.000

12	48.00	12.00	0.000	0.000	0.000
13	48.00	13.00	0.000	0.000	0.000
14	48.00	14.00	0.000	0.000	0.000
15	48.00	15.00	0.000	0.000	0.000
16	48.00	16.00	0.000	0.000	0.000
17	48.00	17.00	0.000	0.000	0.000
18	48.00	18.00	0.000	0.000	0.000
19	48.00	19.00	0.000	0.000	0.000
20	48.00	20.00	0.000	0.000	0.000
21	48.00	21.00	0.000	0.000	0.000
22	48.00	22.00	0.000	0.000	0.000
23	48.00	23.00	0.000	0.000	0.000
24	48.00	24.00	0.000	0.000	0.000
25	48.00	25.00	0.000	0.000	0.000
26	48.00	26.00	0.000	0.000	0.000
27	48.00	27.00	0.000	0.000	0.000
28	48.00	28.00	0.000	0.000	0.000
29	48.00	29.00	0.000	0.000	0.000
30	48.00	30.00	0.000	0.000	0.000
31	48.00	31.00	0.000	0.000	0.000
32	48.00	32.00	0.000	0.000	0.000
33	48.00	33.00	0.000	0.000	0.000
34	48.00	34.00	0.000	0.000	0.000
35	48.00	35.00	9.975	0.000	9.975
36	48.00	36.00	59.851	0.000	59.851
37	48.00	37.00	109.728	0.000	109.728
38	48.00	38.00	159.604	0.000	159.604
39	48.00	39.00	209.480	0.000	209.480
40	48.00	40.00	259.356	0.000	259.356
41	48.00	41.00	265.543	0.000	265.543
42	48.00	42.00	267.073	0.000	267.073
43	48.00	43.00	268.801	0.000	268.801
44	48.00	44.00	270.722	0.000	270.722
45	48.00	45.00	272.826	0.000	272.826
46	48.00	46.00	275.110	0.000	275.110
47	48.00	47.00	324.986	0.000	324.986
48	48.00	48.00	374.862	0.000	374.862
49	48.00	49.00	424.738	0.000	424.738
50	48.00	50.00	474.615	0.000	474.615
51	48.00	51.00	524.491	0.000	524.491
52	48.00	52.00	574.367	0.000	574.367
53	48.00	53.00	624.243	0.000	624.243
54	48.00	54.00	674.119	0.000	674.119
55	48.00	55.00	723.995	0.000	723.995
56	48.00	56.00	773.872	0.000	773.872
57	48.00	57.00	823.748	0.000	823.748
58	48.00	58.00	873.624	0.000	873.624
59	48.00	59.00	923.500	0.000	923.500
60	48.00	60.00	973.376	0.000	973.376
61	48.00	61.00	1023.253	0.000	1023.253
62	48.00	62.00	1073.129	0.000	1073.129
63	48.00	63.00	1123.005	0.000	1123.005
64	48.00	64.00	1172.881	0.000	1172.881
65	48.00	65.00	1222.757	0.000	1222.757
66	48.00	66.00	1272.633	0.000	1272.633
67	48.00	67.00	1322.510	0.000	1322.510
68	48.00	68.00	1372.386	0.000	1372.386
69	48.00	69.00	1422.262	0.000	1422.262
70	48.00	70.00	1472.138	0.000	1472.138
71	48.00	71.00	1522.014	0.000	1522.014
72	48.00	72.00	1571.891	0.000	1571.891
73	48.00	73.00	1621.767	0.000	1621.767
74	48.00	74.00	1671.643	0.000	1671.643
75	48.00	75.00	1721.519	0.000	1721.519
76	48.00	76.00	1771.395	0.000	1771.395
77	48.00	77.00	1821.272	0.000	1821.272
78	48.00	78.00	1871.148	0.000	1871.148
79	48.00	79.00	1921.024	0.000	1921.024

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):
===
***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	1.00	0.000	0.000	0.000
2	48.00	2.00	0.000	0.000	0.000
3	48.00	3.00	0.000	0.000	0.000
4	48.00	4.00	0.000	0.000	0.000
5	48.00	5.00	0.000	0.000	0.000
6	48.00	6.00	0.000	0.000	0.000
7	48.00	7.00	0.000	0.000	0.000
8	48.00	8.00	0.000	0.000	0.000
9	48.00	9.00	0.000	0.000	0.000
10	48.00	10.00	0.000	0.000	0.000
11	48.00	11.00	0.000	0.000	0.000

12	48.00	12.00	0.000	0.000	0.000
13	48.00	13.00	0.000	0.000	0.000
14	48.00	14.00	0.000	0.000	0.000
15	48.00	15.00	0.000	0.000	0.000
16	48.00	16.00	0.000	0.000	0.000
17	48.00	17.00	0.000	0.000	0.000
18	48.00	18.00	0.000	0.000	0.000
19	48.00	19.00	0.000	0.000	0.000
20	48.00	20.00	0.000	0.000	0.000
21	48.00	21.00	0.000	0.000	0.000
22	48.00	22.00	0.000	0.000	0.000
23	48.00	23.00	0.000	0.000	0.000
24	48.00	24.00	0.000	0.000	0.000
25	48.00	25.00	0.000	0.000	0.000
26	48.00	26.00	0.000	0.000	0.000
27	48.00	27.00	0.000	0.000	0.000
28	48.00	28.00	0.000	0.000	0.000
29	48.00	29.00	0.000	0.000	0.000
30	48.00	30.00	0.000	0.000	0.000
31	48.00	31.00	0.000	0.000	0.000
32	48.00	32.00	0.000	0.000	0.000
33	48.00	33.00	0.000	0.000	0.000
34	48.00	34.00	0.000	0.000	0.000
35	48.00	35.00	-nan(ind)	-nan(ind)	-nan(ind)
36	48.00	36.00	-nan(ind)	-nan(ind)	-nan(ind)
37	48.00	37.00	-nan(ind)	-nan(ind)	-nan(ind)
38	48.00	38.00	-nan(ind)	-nan(ind)	-nan(ind)
39	48.00	39.00	-nan(ind)	-nan(ind)	-nan(ind)
40	48.00	40.00	-nan(ind)	-nan(ind)	-nan(ind)
41	48.00	41.00	-nan(ind)	0.000	-nan(ind)
42	48.00	42.00	-nan(ind)	0.000	-nan(ind)
43	48.00	43.00	-nan(ind)	0.000	-nan(ind)
44	48.00	44.00	-nan(ind)	0.000	-nan(ind)
45	48.00	45.00	-nan(ind)	0.000	-nan(ind)
46	48.00	46.00	-nan(ind)	-nan(ind)	-nan(ind)
47	48.00	47.00	-nan(ind)	-nan(ind)	-nan(ind)
48	48.00	48.00	-nan(ind)	-nan(ind)	-nan(ind)
49	48.00	49.00	-nan(ind)	-nan(ind)	-nan(ind)
50	48.00	50.00	-nan(ind)	-nan(ind)	-nan(ind)
51	48.00	51.00	-nan(ind)	-nan(ind)	-nan(ind)
52	48.00	52.00	-nan(ind)	-nan(ind)	-nan(ind)
53	48.00	53.00	-nan(ind)	-nan(ind)	-nan(ind)
54	48.00	54.00	-nan(ind)	-nan(ind)	-nan(ind)
55	48.00	55.00	-nan(ind)	-nan(ind)	-nan(ind)
56	48.00	56.00	-nan(ind)	-nan(ind)	-nan(ind)
57	48.00	57.00	-nan(ind)	-nan(ind)	-nan(ind)
58	48.00	58.00	-nan(ind)	-nan(ind)	-nan(ind)
59	48.00	59.00	-nan(ind)	-nan(ind)	-nan(ind)
60	48.00	60.00	-nan(ind)	-nan(ind)	-nan(ind)
61	48.00	61.00	-nan(ind)	-nan(ind)	-nan(ind)
62	48.00	62.00	-nan(ind)	-nan(ind)	-nan(ind)
63	48.00	63.00	-nan(ind)	-nan(ind)	-nan(ind)
64	48.00	64.00	-nan(ind)	-nan(ind)	-nan(ind)
65	48.00	65.00	-nan(ind)	-nan(ind)	-nan(ind)
66	48.00	66.00	-nan(ind)	-nan(ind)	-nan(ind)
67	48.00	67.00	-nan(ind)	-nan(ind)	-nan(ind)
68	48.00	68.00	-nan(ind)	-nan(ind)	-nan(ind)
69	48.00	69.00	-nan(ind)	-nan(ind)	-nan(ind)
70	48.00	70.00	-nan(ind)	-nan(ind)	-nan(ind)
71	48.00	71.00	-nan(ind)	-nan(ind)	-nan(ind)
72	48.00	72.00	-nan(ind)	-nan(ind)	-nan(ind)
73	48.00	73.00	-nan(ind)	-nan(ind)	-nan(ind)
74	48.00	74.00	-nan(ind)	-nan(ind)	-nan(ind)
75	48.00	75.00	-nan(ind)	-nan(ind)	-nan(ind)
76	48.00	76.00	-nan(ind)	-nan(ind)	-nan(ind)
77	48.00	77.00	-nan(ind)	-nan(ind)	-nan(ind)
78	48.00	78.00	-nan(ind)	-nan(ind)	-nan(ind)
79	48.00	79.00	-nan(ind)	-nan(ind)	-nan(ind)

General Information:

Input file: .....evised II 02-18-21\Bridge\FB-DEEP\Drilled Shaft\B-2_48 inch.in
Project number: HR20-1583R
Job name: Atlantic Isle Bridge
Engineer: Chollada
Units: English

Analysis Information:

Analysis Type: Drilled Shaft Analysis

Soil Information:

Boring date: 12/04/17
Boring number: B-2
Station number: 14+10 Offset: 20.0 RT

Ground Elevation: 2.40(ft)
Water table Elevation = 0.50(ft)

Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	2.40	N/A	0.00	5- Cavity layer
2	2.00	0.40	N/A	0.00	5- Cavity layer
3	4.00	-1.60	N/A	0.00	5- Cavity layer
4	6.00	-3.60	N/A	120.00	5- Cavity layer
5	8.00	-5.60	N/A	120.00	5- Cavity layer
6	10.00	-7.60	N/A	120.00	5- Cavity layer
7	13.00	-10.60	N/A	120.00	5- Cavity layer
8	15.00	-12.60	N/A	120.00	5- Cavity layer
9	16.00	-13.60	N/A	120.00	5- Cavity layer
10	17.00	-14.60	N/A	120.00	5- Cavity layer
11	18.00	-15.60	N/A	120.00	5- Cavity layer
12	20.00	-17.60	N/A	120.00	5- Cavity layer
13	23.00	-20.60	N/A	120.00	5- Cavity layer
14	25.00	-22.60	N/A	120.00	5- Cavity layer
15	28.00	-25.60	N/A	120.00	5- Cavity layer
16	30.00	-27.60	N/A	120.00	5- Cavity layer
17	32.40	-30.00	N/A	120.00	5- Cavity layer
18	32.40	-30.00	10.00	120.00	3- Clean sand
19	33.00	-30.60	10.00	120.00	3- Clean sand
20	34.00	-31.60	N/A	120.00	4- Lime Stone/Very shelly sand
21	35.00	-32.60	N/A	120.00	4- Lime Stone/Very shelly sand
22	38.00	-35.60	N/A	120.00	4- Lime Stone/Very shelly sand
23	38.10	-35.70	3.00	101.26	3- Clean sand
24	40.00	-37.60	3.00	101.26	3- Clean sand
25	42.00	-39.60	6.00	104.51	3- Clean sand
26	42.90	-40.50	6.00	104.51	3- Clean sand
27	43.00	-40.60	N/A	120.00	4- Lime Stone/Very shelly sand
28	45.00	-42.60	N/A	120.00	4- Lime Stone/Very shelly sand
29	48.00	-45.60	N/A	120.00	4- Lime Stone/Very shelly sand
30	50.00	-47.60	N/A	120.00	4- Lime Stone/Very shelly sand
31	53.00	-50.60	N/A	120.00	4- Lime Stone/Very shelly sand
32	55.00	-52.60	N/A	120.00	4- Lime Stone/Very shelly sand
33	58.00	-55.60	N/A	120.00	4- Lime Stone/Very shelly sand
34	60.00	-57.60	N/A	120.00	4- Lime Stone/Very shelly sand
35	62.00	-59.60	N/A	120.00	4- Lime Stone/Very shelly sand
36	65.00	-62.60	N/A	120.00	4- Lime Stone/Very shelly sand
37	68.00	-65.60	N/A	120.00	4- Lime Stone/Very shelly sand
38	70.00	-67.60	N/A	120.00	4- Lime Stone/Very shelly sand
39	73.00	-70.60	N/A	120.00	4- Lime Stone/Very shelly sand
40	75.00	-72.60	10.00	120.00	3- Clean sand
41	78.00	-75.60	19.00	120.00	3- Clean sand
42	80.00	-77.60	N/A	120.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A

12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	17.19	3.40	0.00	0.00
21	N/A	17.19	3.40	0.00	0.00
22	N/A	17.75	3.55	0.00	0.00
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	17.75	3.55	0.00	0.00
28	N/A	17.75	3.55	0.00	0.00
29	N/A	17.75	3.55	0.00	0.00
30	N/A	17.75	3.55	0.00	0.00
31	N/A	17.75	3.55	0.00	0.00
32	N/A	17.75	3.55	0.00	0.00
33	N/A	17.75	3.55	0.00	0.00
34	N/A	17.75	3.55	0.00	0.00
35	N/A	17.75	3.55	0.00	0.00
36	N/A	17.75	3.55	0.00	0.00
37	N/A	17.75	3.55	0.00	0.00
38	N/A	17.75	3.55	0.00	0.00
39	N/A	17.75	3.55	0.00	0.00
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	N/A	17.75	3.55	0.00	0.00

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	1.00	ROUGH	1.000
21	1.00	ROUGH	1.000
22	1.00	ROUGH	1.000
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
29	1.00	ROUGH	1.000
30	1.00	ROUGH	1.000
31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	1.00	ROUGH	1.000

Drilled Shaft Data:

Unit weight of concrete = 150.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 4000.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	1.00	1.40	0.00	48.00	48.00	0.00
2	2.00	0.40	0.00	48.00	48.00	0.00

3	3.00	-0.60	0.00	48.00	48.00	0.00
4	4.00	-1.60	0.00	48.00	48.00	0.00
5	5.00	-2.60	0.00	48.00	48.00	0.00
6	6.00	-3.60	0.00	48.00	48.00	0.00
7	7.00	-4.60	0.00	48.00	48.00	0.00
8	8.00	-5.60	0.00	48.00	48.00	0.00
9	9.00	-6.60	0.00	48.00	48.00	0.00
10	10.00	-7.60	0.00	48.00	48.00	0.00
11	11.00	-8.60	0.00	48.00	48.00	0.00
12	12.00	-9.60	0.00	48.00	48.00	0.00
13	13.00	-10.60	0.00	48.00	48.00	0.00
14	14.00	-11.60	0.00	48.00	48.00	0.00
15	15.00	-12.60	0.00	48.00	48.00	0.00
16	16.00	-13.60	0.00	48.00	48.00	0.00
17	17.00	-14.60	0.00	48.00	48.00	0.00
18	18.00	-15.60	0.00	48.00	48.00	0.00
19	19.00	-16.60	0.00	48.00	48.00	0.00
20	20.00	-17.60	0.00	48.00	48.00	0.00
21	21.00	-18.60	0.00	48.00	48.00	0.00
22	22.00	-19.60	0.00	48.00	48.00	0.00
23	23.00	-20.60	0.00	48.00	48.00	0.00
24	24.00	-21.60	0.00	48.00	48.00	0.00
25	25.00	-22.60	0.00	48.00	48.00	0.00
26	26.00	-23.60	0.00	48.00	48.00	0.00
27	27.00	-24.60	0.00	48.00	48.00	0.00
28	28.00	-25.60	0.00	48.00	48.00	0.00
29	29.00	-26.60	0.00	48.00	48.00	0.00
30	30.00	-27.60	0.00	48.00	48.00	0.00
31	31.00	-28.60	0.00	48.00	48.00	0.00
32	32.00	-29.60	0.00	48.00	48.00	0.00
33	33.00	-30.60	0.00	48.00	48.00	0.00
34	34.00	-31.60	0.00	48.00	48.00	0.00
35	35.00	-32.60	0.00	48.00	48.00	0.00
36	36.00	-33.60	0.00	48.00	48.00	0.00
37	37.00	-34.60	0.00	48.00	48.00	0.00
38	38.00	-35.60	0.00	48.00	48.00	0.00
39	39.00	-36.60	0.00	48.00	48.00	0.00
40	40.00	-37.60	0.00	48.00	48.00	0.00
41	41.00	-38.60	0.00	48.00	48.00	0.00
42	42.00	-39.60	0.00	48.00	48.00	0.00
43	43.00	-40.60	0.00	48.00	48.00	0.00
44	44.00	-41.60	0.00	48.00	48.00	0.00
45	45.00	-42.60	0.00	48.00	48.00	0.00
46	46.00	-43.60	0.00	48.00	48.00	0.00
47	47.00	-44.60	0.00	48.00	48.00	0.00
48	48.00	-45.60	0.00	48.00	48.00	0.00
49	49.00	-46.60	0.00	48.00	48.00	0.00
50	50.00	-47.60	0.00	48.00	48.00	0.00
51	51.00	-48.60	0.00	48.00	48.00	0.00
52	52.00	-49.60	0.00	48.00	48.00	0.00
53	53.00	-50.60	0.00	48.00	48.00	0.00
54	54.00	-51.60	0.00	48.00	48.00	0.00
55	55.00	-52.60	0.00	48.00	48.00	0.00
56	56.00	-53.60	0.00	48.00	48.00	0.00
57	57.00	-54.60	0.00	48.00	48.00	0.00
58	58.00	-55.60	0.00	48.00	48.00	0.00
59	59.00	-56.60	0.00	48.00	48.00	0.00
60	60.00	-57.60	0.00	48.00	48.00	0.00
61	61.00	-58.60	0.00	48.00	48.00	0.00
62	62.00	-59.60	0.00	48.00	48.00	0.00
63	63.00	-60.60	0.00	48.00	48.00	0.00
64	64.00	-61.60	0.00	48.00	48.00	0.00
65	65.00	-62.60	0.00	48.00	48.00	0.00
66	66.00	-63.60	0.00	48.00	48.00	0.00
67	67.00	-64.60	0.00	48.00	48.00	0.00
68	68.00	-65.60	0.00	48.00	48.00	0.00
69	69.00	-66.60	0.00	48.00	48.00	0.00
70	70.00	-67.60	0.00	48.00	48.00	0.00
71	71.00	-68.60	0.00	48.00	48.00	0.00
72	72.00	-69.60	0.00	48.00	48.00	0.00
73	73.00	-70.60	0.00	48.00	48.00	0.00
74	74.00	-71.60	0.00	48.00	48.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):
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Strength reduction factors: Skin-friction = 1.00, End-bearing = 0.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	1.00	0.000	0.000	0.000
2	48.00	2.00	0.000	0.000	0.000
3	48.00	3.00	0.000	0.000	0.000
4	48.00	4.00	0.000	0.000	0.000
5	48.00	5.00	0.000	0.000	0.000
6	48.00	6.00	0.000	0.000	0.000
7	48.00	7.00	0.000	0.000	0.000
8	48.00	8.00	0.000	0.000	0.000
9	48.00	9.00	0.000	0.000	0.000
10	48.00	10.00	0.000	0.000	0.000

11	48.00	11.00	0.000	0.000	0.000
12	48.00	12.00	0.000	0.000	0.000
13	48.00	13.00	0.000	0.000	0.000
14	48.00	14.00	0.000	0.000	0.000
15	48.00	15.00	0.000	0.000	0.000
16	48.00	16.00	0.000	0.000	0.000
17	48.00	17.00	0.000	0.000	0.000
18	48.00	18.00	0.000	0.000	0.000
19	48.00	19.00	0.000	0.000	0.000
20	48.00	20.00	0.000	0.000	0.000
21	48.00	21.00	0.000	0.000	0.000
22	48.00	22.00	0.000	0.000	0.000
23	48.00	23.00	0.000	0.000	0.000
24	48.00	24.00	0.000	0.000	0.000
25	48.00	25.00	0.000	0.000	0.000
26	48.00	26.00	0.000	0.000	0.000
27	48.00	27.00	0.000	0.000	0.000
28	48.00	28.00	0.000	0.000	0.000
29	48.00	29.00	0.000	0.000	0.000
30	48.00	30.00	0.000	0.000	0.000
31	48.00	31.00	0.000	0.000	0.000
32	48.00	32.00	0.000	0.000	0.000
33	48.00	33.00	0.039	0.000	0.039
34	48.00	34.00	0.276	0.000	0.276
35	48.00	35.00	48.311	0.000	48.311
36	48.00	36.00	96.346	0.000	96.346
37	48.00	37.00	144.381	0.000	144.381
38	48.00	38.00	192.415	0.000	192.415
39	48.00	39.00	197.892	0.000	197.892
40	48.00	40.00	198.493	0.000	198.493
41	48.00	41.00	199.155	0.000	199.155
42	48.00	42.00	199.879	0.000	199.879
43	48.00	43.00	200.846	0.000	200.846
44	48.00	44.00	250.722	0.000	250.722
45	48.00	45.00	300.599	0.000	300.599
46	48.00	46.00	350.475	0.000	350.475
47	48.00	47.00	400.351	0.000	400.351
48	48.00	48.00	450.227	0.000	450.227
49	48.00	49.00	500.103	0.000	500.103
50	48.00	50.00	549.980	0.000	549.980
51	48.00	51.00	599.856	0.000	599.856
52	48.00	52.00	649.732	0.000	649.732
53	48.00	53.00	699.608	0.000	699.608
54	48.00	54.00	749.484	0.000	749.484
55	48.00	55.00	799.360	0.000	799.360
56	48.00	56.00	849.237	0.000	849.237
57	48.00	57.00	899.113	0.000	899.113
58	48.00	58.00	948.989	0.000	948.989
59	48.00	59.00	998.865	0.000	998.865
60	48.00	60.00	1048.741	0.000	1048.741
61	48.00	61.00	1098.618	0.000	1098.618
62	48.00	62.00	1148.494	0.000	1148.494
63	48.00	63.00	1198.370	0.000	1198.370
64	48.00	64.00	1248.246	0.000	1248.246
65	48.00	65.00	1298.122	0.000	1298.122
66	48.00	66.00	1347.999	0.000	1347.999
67	48.00	67.00	1397.875	0.000	1397.875
68	48.00	68.00	1447.751	0.000	1447.751
69	48.00	69.00	1497.627	0.000	1497.627
70	48.00	70.00	1547.503	0.000	1547.503
71	48.00	71.00	1597.379	0.000	1597.379
72	48.00	72.00	1647.256	0.000	1647.256
73	48.00	73.00	1697.132	0.000	1697.132
74	48.00	74.00	1747.008	0.000	1747.008

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):
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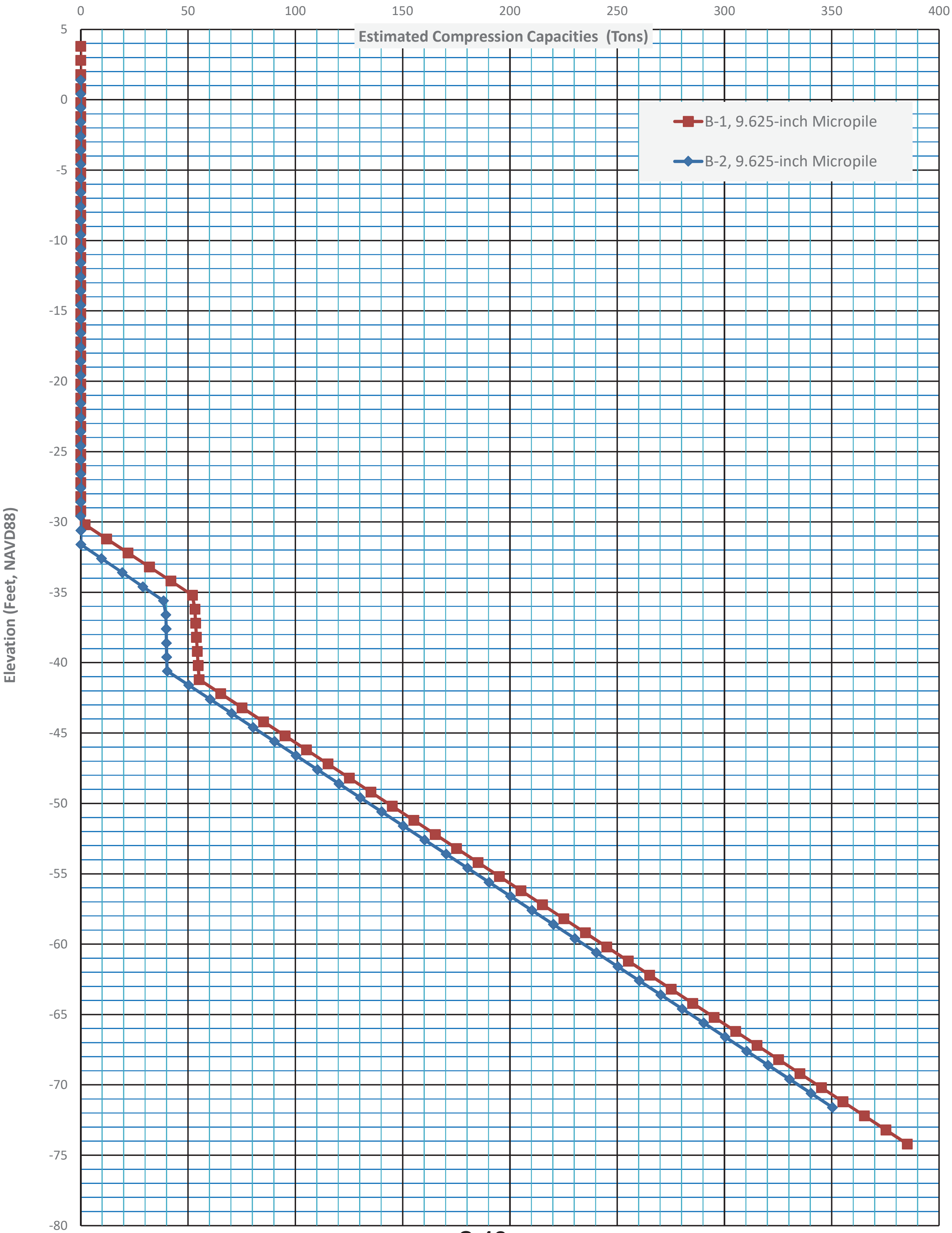
***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	48.00	1.00	0.000	0.000	0.000
2	48.00	2.00	0.000	0.000	0.000
3	48.00	3.00	0.000	0.000	0.000
4	48.00	4.00	0.000	0.000	0.000
5	48.00	5.00	0.000	0.000	0.000
6	48.00	6.00	0.000	0.000	0.000
7	48.00	7.00	0.000	0.000	0.000
8	48.00	8.00	0.000	0.000	0.000
9	48.00	9.00	0.000	0.000	0.000
10	48.00	10.00	0.000	0.000	0.000
11	48.00	11.00	0.000	0.000	0.000
12	48.00	12.00	0.000	0.000	0.000
13	48.00	13.00	0.000	0.000	0.000
14	48.00	14.00	0.000	0.000	0.000
15	48.00	15.00	0.000	0.000	0.000

16	48.00	16.00	0.000	0.000	0.000
17	48.00	17.00	0.000	0.000	0.000
18	48.00	18.00	0.000	0.000	0.000
19	48.00	19.00	0.000	0.000	0.000
20	48.00	20.00	0.000	0.000	0.000
21	48.00	21.00	0.000	0.000	0.000
22	48.00	22.00	0.000	0.000	0.000
23	48.00	23.00	0.000	0.000	0.000
24	48.00	24.00	0.000	0.000	0.000
25	48.00	25.00	0.000	0.000	0.000
26	48.00	26.00	0.000	0.000	0.000
27	48.00	27.00	0.000	0.000	0.000
28	48.00	28.00	0.000	0.000	0.000
29	48.00	29.00	0.000	0.000	0.000
30	48.00	30.00	0.000	0.000	0.000
31	48.00	31.00	0.000	0.000	0.000
32	48.00	32.00	0.000	0.000	0.000
33	48.00	33.00	0.000	0.000	0.000
34	48.00	34.00	0.000	0.000	0.000
35	48.00	35.00	0.000	0.000	0.000
36	48.00	36.00	0.000	0.000	0.000
37	48.00	37.00	0.000	0.000	0.000
38	48.00	38.00	0.000	0.000	0.000
39	48.00	39.00	0.000	0.000	0.000
40	48.00	40.00	0.000	0.000	0.000
41	48.00	41.00	0.000	0.000	0.000
42	48.00	42.00	0.000	0.000	0.000
43	48.00	43.00	0.000	0.000	0.000
44	48.00	44.00	0.000	0.000	0.000
45	48.00	45.00	0.000	0.000	0.000
46	48.00	46.00	0.000	0.000	0.000
47	48.00	47.00	0.000	0.000	0.000
48	48.00	48.00	0.000	0.000	0.000
49	48.00	49.00	0.000	0.000	0.000
50	48.00	50.00	0.000	0.000	0.000
51	48.00	51.00	0.000	0.000	0.000
52	48.00	52.00	0.000	0.000	0.000
53	48.00	53.00	0.000	0.000	0.000
54	48.00	54.00	0.000	0.000	0.000
55	48.00	55.00	0.000	0.000	0.000
56	48.00	56.00	0.000	0.000	0.000
57	48.00	57.00	0.000	0.000	0.000
58	48.00	58.00	0.000	0.000	0.000
59	48.00	59.00	0.000	0.000	0.000
60	48.00	60.00	0.000	0.000	0.000
61	48.00	61.00	0.000	0.000	0.000
62	48.00	62.00	0.000	0.000	0.000
63	48.00	63.00	0.000	0.000	0.000
64	48.00	64.00	0.000	0.000	0.000
65	48.00	65.00	0.000	0.000	0.000
66	48.00	66.00	0.000	0.000	0.000
67	48.00	67.00	0.000	0.000	0.000
68	48.00	68.00	0.000	0.000	0.000
69	48.00	69.00	0.000	0.000	0.000
70	48.00	70.00	0.000	0.000	0.000
71	48.00	71.00	0.000	0.000	0.000
72	48.00	72.00	0.000	0.000	0.000
73	48.00	73.00	0.000	0.000	0.000
74	48.00	74.00	0.000	0.000	0.000

ATLANTIC ISLE BRIDGE
FPID No. 430029-2-22-02
HR ENGINEERING SERVICES, INC.
HRES PROJECT NO. HR20-1583R
ESTIMATED ULTIMATE COMPRESSION CAPACITIES FOR 9.625-INCH DIAMETER MICROPILE
TEST BORING B-1 AND B-2



General Information:
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Input file: .....Revised II 02-18-21\Bridge\FB-DEEP\Micropile\B-1_9.625 inch.in
Project number: HR20-1583R
Job name: Atlantic Isle Bridge
Engineer: Chollada
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/05/17
Boring number: B-1
Station number: 13+27 Offset: 6.0 RT

Ground Elevation: 4.80(ft)
Water table Elevation = 0.50(ft)

Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	4.80	N/A	0.00	5- Cavity layer
2	2.00	2.80	N/A	0.00	5- Cavity layer
3	4.00	0.80	N/A	0.00	5- Cavity layer
4	6.00	-1.20	N/A	120.00	5- Cavity layer
5	8.00	-3.20	N/A	120.00	5- Cavity layer
6	10.00	-5.20	N/A	120.00	5- Cavity layer
7	12.00	-7.20	N/A	120.00	5- Cavity layer
8	13.00	-8.20	N/A	120.00	5- Cavity layer
9	13.00	-8.20	N/A	120.00	5- Cavity layer
10	15.00	-10.20	N/A	120.00	5- Cavity layer
11	18.00	-13.20	N/A	120.00	5- Cavity layer
12	21.00	-16.20	N/A	120.00	5- Cavity layer
13	23.00	-18.20	N/A	120.00	5- Cavity layer
14	25.00	-20.20	N/A	120.00	5- Cavity layer
15	28.00	-23.20	N/A	120.00	5- Cavity layer
16	30.00	-25.20	N/A	120.00	5- Cavity layer
17	33.00	-28.20	N/A	120.00	5- Cavity layer
18	34.80	-30.00	N/A	120.00	5- Cavity layer
19	34.80	-30.00	N/A	120.00	4- Lime Stone/Very shelly sand
20	38.00	-33.20	N/A	120.00	4- Lime Stone/Very shelly sand
21	40.00	-35.20	N/A	120.00	4- Lime Stone/Very shelly sand
22	40.10	-35.30	13.00	120.00	3- Clean sand
23	42.00	-37.20	13.00	120.00	3- Clean sand
24	44.00	-39.20	16.00	120.00	3- Clean sand
25	45.90	-41.10	16.00	120.00	3- Clean sand
26	46.00	-41.20	N/A	120.00	4- Lime Stone/Very shelly sand
27	48.00	-43.20	N/A	120.00	4- Lime Stone/Very shelly sand
28	50.00	-45.20	N/A	120.00	4- Lime Stone/Very shelly sand
29	53.00	-48.20	N/A	120.00	4- Lime Stone/Very shelly sand
30	55.00	-50.20	N/A	120.00	4- Lime Stone/Very shelly sand
31	58.00	-53.20	N/A	120.00	4- Lime Stone/Very shelly sand
32	60.00	-55.20	N/A	120.00	4- Lime Stone/Very shelly sand
33	63.00	-58.20	N/A	120.00	4- Lime Stone/Very shelly sand
34	65.00	-60.20	N/A	120.00	4- Lime Stone/Very shelly sand
35	68.00	-63.20	N/A	120.00	4- Lime Stone/Very shelly sand
36	70.00	-65.20	N/A	120.00	4- Lime Stone/Very shelly sand
37	73.00	-68.20	N/A	120.00	4- Lime Stone/Very shelly sand
38	75.00	-70.20	N/A	120.00	4- Lime Stone/Very shelly sand
39	78.00	-73.20	N/A	120.00	4- Lime Stone/Very shelly sand
40	80.00	-75.20	N/A	120.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A

14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	17.75	3.55	0.00	0.00
20	N/A	17.75	3.55	0.00	0.00
21	N/A	17.75	3.55	0.00	0.00
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	17.75	3.55	0.00	0.00
27	N/A	17.75	3.55	0.00	0.00
28	N/A	17.75	3.55	0.00	0.00
29	N/A	17.75	3.55	0.00	0.00
30	N/A	17.75	3.55	0.00	0.00
31	N/A	17.75	3.55	0.00	0.00
32	N/A	17.75	3.55	0.00	0.00
33	N/A	17.75	3.55	0.00	0.00
34	N/A	17.75	3.55	0.00	0.00
35	N/A	17.75	3.55	0.00	0.00
36	N/A	17.75	3.55	0.00	0.00
37	N/A	17.75	3.55	0.00	0.00
38	N/A	17.75	3.55	0.00	0.00
39	N/A	17.75	3.55	0.00	0.00
40	N/A	17.75	3.55	0.00	0.00

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	1.00	ROUGH	1.000
20	1.00	ROUGH	1.000
21	1.00	ROUGH	1.000
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	1.00	ROUGH	1.000
27	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
29	1.00	ROUGH	1.000
30	1.00	ROUGH	1.000
31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	1.00	ROUGH	1.000

Drilled Shaft Data:
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Unit weight of concrete = 150.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 4000.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	1.00	3.80	0.00	9.63	9.63	0.00
2	2.00	2.80	0.00	9.63	9.63	0.00
3	3.00	1.80	0.00	9.63	9.63	0.00
4	4.00	0.80	0.00	9.63	9.63	0.00
5	5.00	-0.20	0.00	9.63	9.63	0.00
6	6.00	-1.20	0.00	9.63	9.63	0.00
7	7.00	-2.20	0.00	9.63	9.63	0.00
8	8.00	-3.20	0.00	9.63	9.63	0.00

9	9.00	-4.20	0.00	9.63	9.63	0.00
10	10.00	-5.20	0.00	9.63	9.63	0.00
11	11.00	-6.20	0.00	9.63	9.63	0.00
12	12.00	-7.20	0.00	9.63	9.63	0.00
13	13.00	-8.20	0.00	9.63	9.63	0.00
14	14.00	-9.20	0.00	9.63	9.63	0.00
15	15.00	-10.20	0.00	9.63	9.63	0.00
16	16.00	-11.20	0.00	9.63	9.63	0.00
17	17.00	-12.20	0.00	9.63	9.63	0.00
18	18.00	-13.20	0.00	9.63	9.63	0.00
19	19.00	-14.20	0.00	9.63	9.63	0.00
20	20.00	-15.20	0.00	9.63	9.63	0.00
21	21.00	-16.20	0.00	9.63	9.63	0.00
22	22.00	-17.20	0.00	9.63	9.63	0.00
23	23.00	-18.20	0.00	9.63	9.63	0.00
24	24.00	-19.20	0.00	9.63	9.63	0.00
25	25.00	-20.20	0.00	9.63	9.63	0.00
26	26.00	-21.20	0.00	9.63	9.63	0.00
27	27.00	-22.20	0.00	9.63	9.63	0.00
28	28.00	-23.20	0.00	9.63	9.63	0.00
29	29.00	-24.20	0.00	9.63	9.63	0.00
30	30.00	-25.20	0.00	9.63	9.63	0.00
31	31.00	-26.20	0.00	9.63	9.63	0.00
32	32.00	-27.20	0.00	9.63	9.63	0.00
33	33.00	-28.20	0.00	9.63	9.63	0.00
34	34.00	-29.20	0.00	9.63	9.63	0.00
35	35.00	-30.20	0.00	9.63	9.63	0.00
36	36.00	-31.20	0.00	9.63	9.63	0.00
37	37.00	-32.20	0.00	9.63	9.63	0.00
38	38.00	-33.20	0.00	9.63	9.63	0.00
39	39.00	-34.20	0.00	9.63	9.63	0.00
40	40.00	-35.20	0.00	9.63	9.63	0.00
41	41.00	-36.20	0.00	9.63	9.63	0.00
42	42.00	-37.20	0.00	9.63	9.63	0.00
43	43.00	-38.20	0.00	9.63	9.63	0.00
44	44.00	-39.20	0.00	9.63	9.63	0.00
45	45.00	-40.20	0.00	9.63	9.63	0.00
46	46.00	-41.20	0.00	9.63	9.63	0.00
47	47.00	-42.20	0.00	9.63	9.63	0.00
48	48.00	-43.20	0.00	9.63	9.63	0.00
49	49.00	-44.20	0.00	9.63	9.63	0.00
50	50.00	-45.20	0.00	9.63	9.63	0.00
51	51.00	-46.20	0.00	9.63	9.63	0.00
52	52.00	-47.20	0.00	9.63	9.63	0.00
53	53.00	-48.20	0.00	9.63	9.63	0.00
54	54.00	-49.20	0.00	9.63	9.63	0.00
55	55.00	-50.20	0.00	9.63	9.63	0.00
56	56.00	-51.20	0.00	9.63	9.63	0.00
57	57.00	-52.20	0.00	9.63	9.63	0.00
58	58.00	-53.20	0.00	9.63	9.63	0.00
59	59.00	-54.20	0.00	9.63	9.63	0.00
60	60.00	-55.20	0.00	9.63	9.63	0.00
61	61.00	-56.20	0.00	9.63	9.63	0.00
62	62.00	-57.20	0.00	9.63	9.63	0.00
63	63.00	-58.20	0.00	9.63	9.63	0.00
64	64.00	-59.20	0.00	9.63	9.63	0.00
65	65.00	-60.20	0.00	9.63	9.63	0.00
66	66.00	-61.20	0.00	9.63	9.63	0.00
67	67.00	-62.20	0.00	9.63	9.63	0.00
68	68.00	-63.20	0.00	9.63	9.63	0.00
69	69.00	-64.20	0.00	9.63	9.63	0.00
70	70.00	-65.20	0.00	9.63	9.63	0.00
71	71.00	-66.20	0.00	9.63	9.63	0.00
72	72.00	-67.20	0.00	9.63	9.63	0.00
73	73.00	-68.20	0.00	9.63	9.63	0.00
74	74.00	-69.20	0.00	9.63	9.63	0.00
75	75.00	-70.20	0.00	9.63	9.63	0.00
76	76.00	-71.20	0.00	9.63	9.63	0.00
77	77.00	-72.20	0.00	9.63	9.63	0.00
78	78.00	-73.20	0.00	9.63	9.63	0.00
79	79.00	-74.20	0.00	9.63	9.63	0.00

Drilled Shaft Capacity (sorted by shaft diameter):
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Strength reduction factors: Skin-friction = 1.00, End-bearing = 0.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	9.63	1.00	0.000	0.000	0.000
2	9.63	2.00	0.000	0.000	0.000
3	9.63	3.00	0.000	0.000	0.000
4	9.63	4.00	0.000	0.000	0.000
5	9.63	5.00	0.000	0.000	0.000
6	9.63	6.00	0.000	0.000	0.000
7	9.63	7.00	0.000	0.000	0.000
8	9.63	8.00	0.000	0.000	0.000
9	9.63	9.00	0.000	0.000	0.000
10	9.63	10.00	0.000	0.000	0.000
11	9.63	11.00	0.000	0.000	0.000

12	9.63	12.00	0.000	0.000	0.000
13	9.63	13.00	0.000	0.000	0.000
14	9.63	14.00	0.000	0.000	0.000
15	9.63	15.00	0.000	0.000	0.000
16	9.63	16.00	0.000	0.000	0.000
17	9.63	17.00	0.000	0.000	0.000
18	9.63	18.00	0.000	0.000	0.000
19	9.63	19.00	0.000	0.000	0.000
20	9.63	20.00	0.000	0.000	0.000
21	9.63	21.00	0.000	0.000	0.000
22	9.63	22.00	0.000	0.000	0.000
23	9.63	23.00	0.000	0.000	0.000
24	9.63	24.00	0.000	0.000	0.000
25	9.63	25.00	0.000	0.000	0.000
26	9.63	26.00	0.000	0.000	0.000
27	9.63	27.00	0.000	0.000	0.000
28	9.63	28.00	0.000	0.000	0.000
29	9.63	29.00	0.000	0.000	0.000
30	9.63	30.00	0.000	0.000	0.000
31	9.63	31.00	0.000	0.000	0.000
32	9.63	32.00	0.000	0.000	0.000
33	9.63	33.00	0.000	0.000	0.000
34	9.63	34.00	0.000	0.000	0.000
35	9.63	35.00	2.000	0.000	2.000
36	9.63	36.00	12.001	0.000	12.001
37	9.63	37.00	22.003	0.000	22.003
38	9.63	38.00	32.004	0.000	32.004
39	9.63	39.00	42.005	0.000	42.005
40	9.63	40.00	52.006	0.000	52.006
41	9.63	41.00	53.247	0.000	53.247
42	9.63	42.00	53.554	0.000	53.554
43	9.63	43.00	53.900	0.000	53.900
44	9.63	44.00	54.285	0.000	54.285
45	9.63	45.00	54.707	0.000	54.707
46	9.63	46.00	55.165	0.000	55.165
47	9.63	47.00	65.166	0.000	65.166
48	9.63	48.00	75.168	0.000	75.168
49	9.63	49.00	85.169	0.000	85.169
50	9.63	50.00	95.170	0.000	95.170
51	9.63	51.00	105.171	0.000	105.171
52	9.63	52.00	115.173	0.000	115.173
53	9.63	53.00	125.174	0.000	125.174
54	9.63	54.00	135.175	0.000	135.175
55	9.63	55.00	145.176	0.000	145.176
56	9.63	56.00	155.177	0.000	155.177
57	9.63	57.00	165.179	0.000	165.179
58	9.63	58.00	175.180	0.000	175.180
59	9.63	59.00	185.181	0.000	185.181
60	9.63	60.00	195.182	0.000	195.182
61	9.63	61.00	205.183	0.000	205.183
62	9.63	62.00	215.185	0.000	215.185
63	9.63	63.00	225.186	0.000	225.186
64	9.63	64.00	235.187	0.000	235.187
65	9.63	65.00	245.188	0.000	245.188
66	9.63	66.00	255.190	0.000	255.190
67	9.63	67.00	265.191	0.000	265.191
68	9.63	68.00	275.192	0.000	275.192
69	9.63	69.00	285.193	0.000	285.193
70	9.63	70.00	295.194	0.000	295.194
71	9.63	71.00	305.196	0.000	305.196
72	9.63	72.00	315.197	0.000	315.197
73	9.63	73.00	325.198	0.000	325.198
74	9.63	74.00	335.199	0.000	335.199
75	9.63	75.00	345.200	0.000	345.200
76	9.63	76.00	355.202	0.000	355.202
77	9.63	77.00	365.203	0.000	365.203
78	9.63	78.00	375.204	0.000	375.204
79	9.63	79.00	385.205	0.000	385.205

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):
==
***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	9.63	1.00	0.000	0.000	0.000
2	9.63	2.00	0.000	0.000	0.000
3	9.63	3.00	0.000	0.000	0.000
4	9.63	4.00	0.000	0.000	0.000
5	9.63	5.00	0.000	0.000	0.000
6	9.63	6.00	0.000	0.000	0.000
7	9.63	7.00	0.000	0.000	0.000
8	9.63	8.00	0.000	0.000	0.000
9	9.63	9.00	0.000	0.000	0.000
10	9.63	10.00	0.000	0.000	0.000
11	9.63	11.00	0.000	0.000	0.000

12	9.63	12.00	0.000	0.000	0.000
13	9.63	13.00	0.000	0.000	0.000
14	9.63	14.00	0.000	0.000	0.000
15	9.63	15.00	0.000	0.000	0.000
16	9.63	16.00	0.000	0.000	0.000
17	9.63	17.00	0.000	0.000	0.000
18	9.63	18.00	0.000	0.000	0.000
19	9.63	19.00	0.000	0.000	0.000
20	9.63	20.00	0.000	0.000	0.000
21	9.63	21.00	0.000	0.000	0.000
22	9.63	22.00	0.000	0.000	0.000
23	9.63	23.00	0.000	0.000	0.000
24	9.63	24.00	0.000	0.000	0.000
25	9.63	25.00	0.000	0.000	0.000
26	9.63	26.00	0.000	0.000	0.000
27	9.63	27.00	0.000	0.000	0.000
28	9.63	28.00	0.000	0.000	0.000
29	9.63	29.00	0.000	0.000	0.000
30	9.63	30.00	0.000	0.000	0.000
31	9.63	31.00	0.000	0.000	0.000
32	9.63	32.00	0.000	0.000	0.000
33	9.63	33.00	0.000	0.000	0.000
34	9.63	34.00	0.000	0.000	0.000
35	9.63	35.00	-nan(ind)	-nan(ind)	-nan(ind)
36	9.63	36.00	-nan(ind)	-nan(ind)	-nan(ind)
37	9.63	37.00	-nan(ind)	-nan(ind)	-nan(ind)
38	9.63	38.00	-nan(ind)	-nan(ind)	-nan(ind)
39	9.63	39.00	-nan(ind)	-nan(ind)	-nan(ind)
40	9.63	40.00	-nan(ind)	-nan(ind)	-nan(ind)
41	9.63	41.00	-nan(ind)	0.000	-nan(ind)
42	9.63	42.00	-nan(ind)	0.000	-nan(ind)
43	9.63	43.00	-nan(ind)	0.000	-nan(ind)
44	9.63	44.00	-nan(ind)	0.000	-nan(ind)
45	9.63	45.00	-nan(ind)	0.000	-nan(ind)
46	9.63	46.00	-nan(ind)	-nan(ind)	-nan(ind)
47	9.63	47.00	0.000	0.000	0.000
48	9.63	48.00	0.000	0.000	0.000
49	9.63	49.00	0.000	0.000	0.000
50	9.63	50.00	0.000	0.000	0.000
51	9.63	51.00	0.000	0.000	0.000
52	9.63	52.00	0.000	0.000	0.000
53	9.63	53.00	0.000	0.000	0.000
54	9.63	54.00	0.000	0.000	0.000
55	9.63	55.00	0.000	0.000	0.000
56	9.63	56.00	0.000	0.000	0.000
57	9.63	57.00	0.000	0.000	0.000
58	9.63	58.00	0.000	0.000	0.000
59	9.63	59.00	0.000	0.000	0.000
60	9.63	60.00	0.000	0.000	0.000
61	9.63	61.00	0.000	0.000	0.000
62	9.63	62.00	0.000	0.000	0.000
63	9.63	63.00	0.000	0.000	0.000
64	9.63	64.00	0.000	0.000	0.000
65	9.63	65.00	0.000	0.000	0.000
66	9.63	66.00	0.000	0.000	0.000
67	9.63	67.00	0.000	0.000	0.000
68	9.63	68.00	0.000	0.000	0.000
69	9.63	69.00	0.000	0.000	0.000
70	9.63	70.00	0.000	0.000	0.000
71	9.63	71.00	0.000	0.000	0.000
72	9.63	72.00	0.000	0.000	0.000
73	9.63	73.00	0.000	0.000	0.000
74	9.63	74.00	0.000	0.000	0.000
75	9.63	75.00	0.000	0.000	0.000
76	9.63	76.00	0.000	0.000	0.000
77	9.63	77.00	0.000	0.000	0.000
78	9.63	78.00	0.000	0.000	0.000
79	9.63	79.00	0.000	0.000	0.000

General Information:

Input file: .....Revised II 02-18-21\Bridge\FB-DEEP\Micropile\B-2_9.625 inch.in
Project number: HR20-1583R
Job name: Atlantic Isle Bridge
Engineer: Chollada
Units: English

Analysis Information:

Analysis Type: Drilled Shaft Analysis

Soil Information:

Boring date: 12/04/17
Boring number: B-2
Station number: 14+10 Offset: 20.0 RT

Ground Elevation: 2.40(ft)
Water table Elevation = 0.50(ft)

Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	2.40	N/A	0.00	5- Cavity layer
2	2.00	0.40	N/A	0.00	5- Cavity layer
3	4.00	-1.60	N/A	0.00	5- Cavity layer
4	6.00	-3.60	N/A	120.00	5- Cavity layer
5	8.00	-5.60	N/A	120.00	5- Cavity layer
6	10.00	-7.60	N/A	120.00	5- Cavity layer
7	13.00	-10.60	N/A	120.00	5- Cavity layer
8	15.00	-12.60	N/A	120.00	5- Cavity layer
9	16.00	-13.60	N/A	120.00	5- Cavity layer
10	17.00	-14.60	N/A	120.00	5- Cavity layer
11	18.00	-15.60	N/A	120.00	5- Cavity layer
12	20.00	-17.60	N/A	120.00	5- Cavity layer
13	23.00	-20.60	N/A	120.00	5- Cavity layer
14	25.00	-22.60	N/A	120.00	5- Cavity layer
15	28.00	-25.60	N/A	120.00	5- Cavity layer
16	30.00	-27.60	N/A	120.00	5- Cavity layer
17	32.40	-30.00	N/A	120.00	5- Cavity layer
18	32.40	-30.00	10.00	120.00	3- Clean sand
19	33.00	-30.60	10.00	120.00	3- Clean sand
20	34.00	-31.60	N/A	120.00	4- Lime Stone/Very shelly sand
21	35.00	-32.60	N/A	120.00	4- Lime Stone/Very shelly sand
22	38.00	-35.60	N/A	120.00	4- Lime Stone/Very shelly sand
23	38.10	-35.70	3.00	101.26	3- Clean sand
24	40.00	-37.60	3.00	101.26	3- Clean sand
25	42.00	-39.60	6.00	104.51	3- Clean sand
26	42.90	-40.50	6.00	104.51	3- Clean sand
27	43.00	-40.60	N/A	120.00	4- Lime Stone/Very shelly sand
28	45.00	-42.60	N/A	120.00	4- Lime Stone/Very shelly sand
29	48.00	-45.60	N/A	120.00	4- Lime Stone/Very shelly sand
30	50.00	-47.60	N/A	120.00	4- Lime Stone/Very shelly sand
31	53.00	-50.60	N/A	120.00	4- Lime Stone/Very shelly sand
32	55.00	-52.60	N/A	120.00	4- Lime Stone/Very shelly sand
33	58.00	-55.60	N/A	120.00	4- Lime Stone/Very shelly sand
34	60.00	-57.60	N/A	120.00	4- Lime Stone/Very shelly sand
35	62.00	-59.60	N/A	120.00	4- Lime Stone/Very shelly sand
36	65.00	-62.60	N/A	120.00	4- Lime Stone/Very shelly sand
37	68.00	-65.60	N/A	120.00	4- Lime Stone/Very shelly sand
38	70.00	-67.60	N/A	120.00	4- Lime Stone/Very shelly sand
39	73.00	-70.60	N/A	120.00	4- Lime Stone/Very shelly sand
40	75.00	-72.60	10.00	120.00	3- Clean sand
41	78.00	-75.60	19.00	120.00	3- Clean sand
42	80.00	-77.60	N/A	120.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A

12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	17.19	3.40	0.00	0.00
21	N/A	17.19	3.40	0.00	0.00
22	N/A	17.75	3.55	0.00	0.00
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	17.75	3.55	0.00	0.00
28	N/A	17.75	3.55	0.00	0.00
29	N/A	17.75	3.55	0.00	0.00
30	N/A	17.75	3.55	0.00	0.00
31	N/A	17.75	3.55	0.00	0.00
32	N/A	17.75	3.55	0.00	0.00
33	N/A	17.75	3.55	0.00	0.00
34	N/A	17.75	3.55	0.00	0.00
35	N/A	17.75	3.55	0.00	0.00
36	N/A	17.75	3.55	0.00	0.00
37	N/A	17.75	3.55	0.00	0.00
38	N/A	17.75	3.55	0.00	0.00
39	N/A	17.75	3.55	0.00	0.00
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	N/A	17.75	3.55	0.00	0.00

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	1.00	ROUGH	1.000
21	1.00	ROUGH	1.000
22	1.00	ROUGH	1.000
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
29	1.00	ROUGH	1.000
30	1.00	ROUGH	1.000
31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	1.00	ROUGH	1.000

Drilled Shaft Data:
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  Unit weight of concrete = 150.00(pcf), Concrete Slump = 6.00(in)
  Modulus of Elasticity of concrete = 4000.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	1.00	1.40	0.00	9.63	9.63	0.00
2	2.00	0.40	0.00	9.63	9.63	0.00

3	3.00	-0.60	0.00	9.63	9.63	0.00
4	4.00	-1.60	0.00	9.63	9.63	0.00
5	5.00	-2.60	0.00	9.63	9.63	0.00
6	6.00	-3.60	0.00	9.63	9.63	0.00
7	7.00	-4.60	0.00	9.63	9.63	0.00
8	8.00	-5.60	0.00	9.63	9.63	0.00
9	9.00	-6.60	0.00	9.63	9.63	0.00
10	10.00	-7.60	0.00	9.63	9.63	0.00
11	11.00	-8.60	0.00	9.63	9.63	0.00
12	12.00	-9.60	0.00	9.63	9.63	0.00
13	13.00	-10.60	0.00	9.63	9.63	0.00
14	14.00	-11.60	0.00	9.63	9.63	0.00
15	15.00	-12.60	0.00	9.63	9.63	0.00
16	16.00	-13.60	0.00	9.63	9.63	0.00
17	17.00	-14.60	0.00	9.63	9.63	0.00
18	18.00	-15.60	0.00	9.63	9.63	0.00
19	19.00	-16.60	0.00	9.63	9.63	0.00
20	20.00	-17.60	0.00	9.63	9.63	0.00
21	21.00	-18.60	0.00	9.63	9.63	0.00
22	22.00	-19.60	0.00	9.63	9.63	0.00
23	23.00	-20.60	0.00	9.63	9.63	0.00
24	24.00	-21.60	0.00	9.63	9.63	0.00
25	25.00	-22.60	0.00	9.63	9.63	0.00
26	26.00	-23.60	0.00	9.63	9.63	0.00
27	27.00	-24.60	0.00	9.63	9.63	0.00
28	28.00	-25.60	0.00	9.63	9.63	0.00
29	29.00	-26.60	0.00	9.63	9.63	0.00
30	30.00	-27.60	0.00	9.63	9.63	0.00
31	31.00	-28.60	0.00	9.63	9.63	0.00
32	32.00	-29.60	0.00	9.63	9.63	0.00
33	33.00	-30.60	0.00	9.63	9.63	0.00
34	34.00	-31.60	0.00	9.63	9.63	0.00
35	35.00	-32.60	0.00	9.63	9.63	0.00
36	36.00	-33.60	0.00	9.63	9.63	0.00
37	37.00	-34.60	0.00	9.63	9.63	0.00
38	38.00	-35.60	0.00	9.63	9.63	0.00
39	39.00	-36.60	0.00	9.63	9.63	0.00
40	40.00	-37.60	0.00	9.63	9.63	0.00
41	41.00	-38.60	0.00	9.63	9.63	0.00
42	42.00	-39.60	0.00	9.63	9.63	0.00
43	43.00	-40.60	0.00	9.63	9.63	0.00
44	44.00	-41.60	0.00	9.63	9.63	0.00
45	45.00	-42.60	0.00	9.63	9.63	0.00
46	46.00	-43.60	0.00	9.63	9.63	0.00
47	47.00	-44.60	0.00	9.63	9.63	0.00
48	48.00	-45.60	0.00	9.63	9.63	0.00
49	49.00	-46.60	0.00	9.63	9.63	0.00
50	50.00	-47.60	0.00	9.63	9.63	0.00
51	51.00	-48.60	0.00	9.63	9.63	0.00
52	52.00	-49.60	0.00	9.63	9.63	0.00
53	53.00	-50.60	0.00	9.63	9.63	0.00
54	54.00	-51.60	0.00	9.63	9.63	0.00
55	55.00	-52.60	0.00	9.63	9.63	0.00
56	56.00	-53.60	0.00	9.63	9.63	0.00
57	57.00	-54.60	0.00	9.63	9.63	0.00
58	58.00	-55.60	0.00	9.63	9.63	0.00
59	59.00	-56.60	0.00	9.63	9.63	0.00
60	60.00	-57.60	0.00	9.63	9.63	0.00
61	61.00	-58.60	0.00	9.63	9.63	0.00
62	62.00	-59.60	0.00	9.63	9.63	0.00
63	63.00	-60.60	0.00	9.63	9.63	0.00
64	64.00	-61.60	0.00	9.63	9.63	0.00
65	65.00	-62.60	0.00	9.63	9.63	0.00
66	66.00	-63.60	0.00	9.63	9.63	0.00
67	67.00	-64.60	0.00	9.63	9.63	0.00
68	68.00	-65.60	0.00	9.63	9.63	0.00
69	69.00	-66.60	0.00	9.63	9.63	0.00
70	70.00	-67.60	0.00	9.63	9.63	0.00
71	71.00	-68.60	0.00	9.63	9.63	0.00
72	72.00	-69.60	0.00	9.63	9.63	0.00
73	73.00	-70.60	0.00	9.63	9.63	0.00
74	74.00	-71.60	0.00	9.63	9.63	0.00

Drilled Shaft Capacity (sorted by shaft diameter):
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Strength reduction factors: Skin-friction = 1.00, End-bearing = 0.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	9.63	1.00	0.000	0.000	0.000
2	9.63	2.00	0.000	0.000	0.000
3	9.63	3.00	0.000	0.000	0.000
4	9.63	4.00	0.000	0.000	0.000
5	9.63	5.00	0.000	0.000	0.000
6	9.63	6.00	0.000	0.000	0.000
7	9.63	7.00	0.000	0.000	0.000
8	9.63	8.00	0.000	0.000	0.000
9	9.63	9.00	0.000	0.000	0.000
10	9.63	10.00	0.000	0.000	0.000

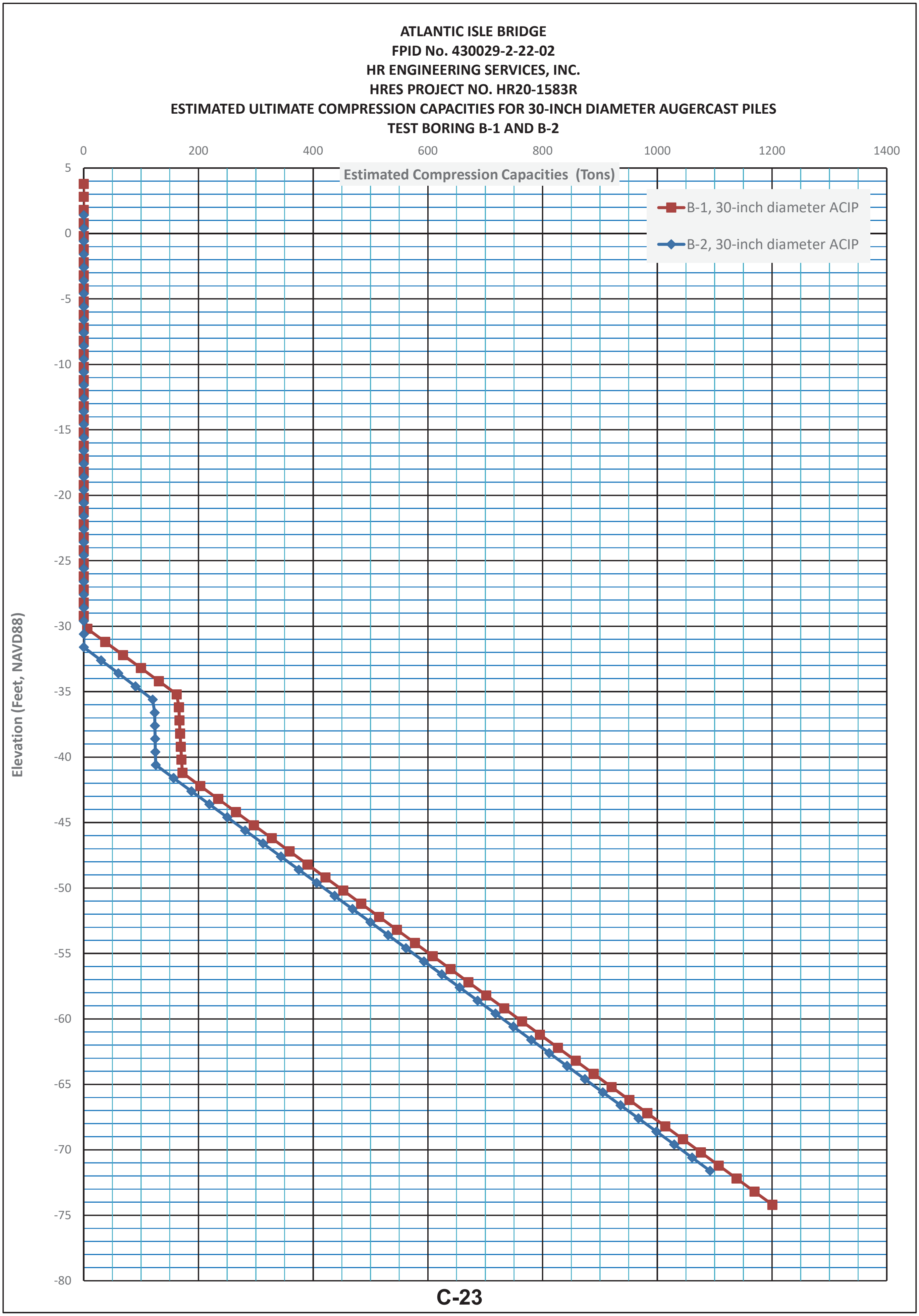
11	9.63	11.00	0.000	0.000	0.000
12	9.63	12.00	0.000	0.000	0.000
13	9.63	13.00	0.000	0.000	0.000
14	9.63	14.00	0.000	0.000	0.000
15	9.63	15.00	0.000	0.000	0.000
16	9.63	16.00	0.000	0.000	0.000
17	9.63	17.00	0.000	0.000	0.000
18	9.63	18.00	0.000	0.000	0.000
19	9.63	19.00	0.000	0.000	0.000
20	9.63	20.00	0.000	0.000	0.000
21	9.63	21.00	0.000	0.000	0.000
22	9.63	22.00	0.000	0.000	0.000
23	9.63	23.00	0.000	0.000	0.000
24	9.63	24.00	0.000	0.000	0.000
25	9.63	25.00	0.000	0.000	0.000
26	9.63	26.00	0.000	0.000	0.000
27	9.63	27.00	0.000	0.000	0.000
28	9.63	28.00	0.000	0.000	0.000
29	9.63	29.00	0.000	0.000	0.000
30	9.63	30.00	0.000	0.000	0.000
31	9.63	31.00	0.000	0.000	0.000
32	9.63	32.00	0.000	0.000	0.000
33	9.63	33.00	0.008	0.000	0.008
34	9.63	34.00	0.055	0.000	0.055
35	9.63	35.00	9.687	0.000	9.687
36	9.63	36.00	19.319	0.000	19.319
37	9.63	37.00	28.951	0.000	28.951
38	9.63	38.00	38.583	0.000	38.583
39	9.63	39.00	39.681	0.000	39.681
40	9.63	40.00	39.802	0.000	39.802
41	9.63	41.00	39.935	0.000	39.935
42	9.63	42.00	40.080	0.000	40.080
43	9.63	43.00	40.274	0.000	40.274
44	9.63	44.00	50.275	0.000	50.275
45	9.63	45.00	60.276	0.000	60.276
46	9.63	46.00	70.278	0.000	70.278
47	9.63	47.00	80.279	0.000	80.279
48	9.63	48.00	90.280	0.000	90.280
49	9.63	49.00	100.281	0.000	100.281
50	9.63	50.00	110.282	0.000	110.282
51	9.63	51.00	120.284	0.000	120.284
52	9.63	52.00	130.285	0.000	130.285
53	9.63	53.00	140.286	0.000	140.286
54	9.63	54.00	150.287	0.000	150.287
55	9.63	55.00	160.288	0.000	160.288
56	9.63	56.00	170.290	0.000	170.290
57	9.63	57.00	180.291	0.000	180.291
58	9.63	58.00	190.292	0.000	190.292
59	9.63	59.00	200.293	0.000	200.293
60	9.63	60.00	210.295	0.000	210.295
61	9.63	61.00	220.296	0.000	220.296
62	9.63	62.00	230.297	0.000	230.297
63	9.63	63.00	240.298	0.000	240.298
64	9.63	64.00	250.299	0.000	250.299
65	9.63	65.00	260.301	0.000	260.301
66	9.63	66.00	270.302	0.000	270.302
67	9.63	67.00	280.303	0.000	280.303
68	9.63	68.00	290.304	0.000	290.304
69	9.63	69.00	300.305	0.000	300.305
70	9.63	70.00	310.307	0.000	310.307
71	9.63	71.00	320.308	0.000	320.308
72	9.63	72.00	330.309	0.000	330.309
73	9.63	73.00	340.310	0.000	340.310
74	9.63	74.00	350.311	0.000	350.311

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):
==
***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	9.63	1.00	0.000	0.000	0.000
2	9.63	2.00	0.000	0.000	0.000
3	9.63	3.00	0.000	0.000	0.000
4	9.63	4.00	0.000	0.000	0.000
5	9.63	5.00	0.000	0.000	0.000
6	9.63	6.00	0.000	0.000	0.000
7	9.63	7.00	0.000	0.000	0.000
8	9.63	8.00	0.000	0.000	0.000
9	9.63	9.00	0.000	0.000	0.000
10	9.63	10.00	0.000	0.000	0.000
11	9.63	11.00	0.000	0.000	0.000
12	9.63	12.00	0.000	0.000	0.000
13	9.63	13.00	0.000	0.000	0.000
14	9.63	14.00	0.000	0.000	0.000
15	9.63	15.00	0.000	0.000	0.000

16	9.63	16.00	0.000	0.000	0.000
17	9.63	17.00	0.000	0.000	0.000
18	9.63	18.00	0.000	0.000	0.000
19	9.63	19.00	0.000	0.000	0.000
20	9.63	20.00	0.000	0.000	0.000
21	9.63	21.00	0.000	0.000	0.000
22	9.63	22.00	0.000	0.000	0.000
23	9.63	23.00	0.000	0.000	0.000
24	9.63	24.00	0.000	0.000	0.000
25	9.63	25.00	0.000	0.000	0.000
26	9.63	26.00	0.000	0.000	0.000
27	9.63	27.00	0.000	0.000	0.000
28	9.63	28.00	0.000	0.000	0.000
29	9.63	29.00	0.000	0.000	0.000
30	9.63	30.00	0.000	0.000	0.000
31	9.63	31.00	0.000	0.000	0.000
32	9.63	32.00	0.000	0.000	0.000
33	9.63	33.00	0.000	0.000	0.000
34	9.63	34.00	0.000	0.000	0.000
35	9.63	35.00	0.000	0.000	0.000
36	9.63	36.00	0.000	0.000	0.000
37	9.63	37.00	0.000	0.000	0.000
38	9.63	38.00	0.000	0.000	0.000
39	9.63	39.00	0.000	0.000	0.000
40	9.63	40.00	0.000	0.000	0.000
41	9.63	41.00	0.000	0.000	0.000
42	9.63	42.00	0.000	0.000	0.000
43	9.63	43.00	0.000	0.000	0.000
44	9.63	44.00	0.000	0.000	0.000
45	9.63	45.00	0.000	0.000	0.000
46	9.63	46.00	0.000	0.000	0.000
47	9.63	47.00	0.000	0.000	0.000
48	9.63	48.00	0.000	0.000	0.000
49	9.63	49.00	0.000	0.000	0.000
50	9.63	50.00	0.000	0.000	0.000
51	9.63	51.00	0.000	0.000	0.000
52	9.63	52.00	0.000	0.000	0.000
53	9.63	53.00	0.000	0.000	0.000
54	9.63	54.00	0.000	0.000	0.000
55	9.63	55.00	0.000	0.000	0.000
56	9.63	56.00	0.000	0.000	0.000
57	9.63	57.00	0.000	0.000	0.000
58	9.63	58.00	0.000	0.000	0.000
59	9.63	59.00	0.000	0.000	0.000
60	9.63	60.00	0.000	0.000	0.000
61	9.63	61.00	0.000	0.000	0.000
62	9.63	62.00	0.000	0.000	0.000
63	9.63	63.00	0.000	0.000	0.000
64	9.63	64.00	0.000	0.000	0.000
65	9.63	65.00	0.000	0.000	0.000
66	9.63	66.00	0.000	0.000	0.000
67	9.63	67.00	0.000	0.000	0.000
68	9.63	68.00	0.000	0.000	0.000
69	9.63	69.00	0.000	0.000	0.000
70	9.63	70.00	0.000	0.000	0.000
71	9.63	71.00	0.000	0.000	0.000
72	9.63	72.00	0.000	0.000	0.000
73	9.63	73.00	0.000	0.000	0.000
74	9.63	74.00	0.000	0.000	0.000


ATLANTIC ISLE BRIDGE
FPID No. 430029-2-22-02
HR ENGINEERING SERVICES, INC.
HRES PROJECT NO. HR20-1583R
ESTIMATED ULTIMATE COMPRESSION CAPACITIES FOR 30-INCH DIAMETER AUGERCAST PILES
TEST BORING B-1 AND B-2
Estimated Compression Capacities (Tons)
0
200
400
600
800
1000
1200
1400
Elevation (Feet, NAVD88)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
B-1, 30-inch diameter ACIP
B-2, 30-inch diameter ACIP

General Information:

Input file: ..... Bridge\Revised II 02-18-21\Bridge\FB-DEEP\ACIP\B-1_30 inch.in
Project number: HR20-1583R
Job name: Atlantic Isle Bridge
Engineer: Chollada
Units: English

Analysis Information:

Analysis Type: Drilled Shaft Analysis

Soil Information:

Boring date: 12/05/17
Boring number: B-1
Station number: 13+27 Offset: 6.0 RT

Ground Elevation: 4.80(ft)
Water table Elevation = 0.50(ft)

Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	4.80	N/A	0.00	5- Cavity layer
2	2.00	2.80	N/A	0.00	5- Cavity layer
3	4.00	0.80	N/A	0.00	5- Cavity layer
4	6.00	-1.20	N/A	120.00	5- Cavity layer
5	8.00	-3.20	N/A	120.00	5- Cavity layer
6	10.00	-5.20	N/A	120.00	5- Cavity layer
7	12.00	-7.20	N/A	120.00	5- Cavity layer
8	13.00	-8.20	N/A	120.00	5- Cavity layer
9	13.00	-8.20	N/A	120.00	5- Cavity layer
10	15.00	-10.20	N/A	120.00	5- Cavity layer
11	18.00	-13.20	N/A	120.00	5- Cavity layer
12	21.00	-16.20	N/A	120.00	5- Cavity layer
13	23.00	-18.20	N/A	120.00	5- Cavity layer
14	25.00	-20.20	N/A	120.00	5- Cavity layer
15	28.00	-23.20	N/A	120.00	5- Cavity layer
16	30.00	-25.20	N/A	120.00	5- Cavity layer
17	33.00	-28.20	N/A	120.00	5- Cavity layer
18	34.80	-30.00	N/A	120.00	5- Cavity layer
19	34.80	-30.00	N/A	120.00	4- Lime Stone/Very shelly sand
20	38.00	-33.20	N/A	120.00	4- Lime Stone/Very shelly sand
21	40.00	-35.20	N/A	120.00	4- Lime Stone/Very shelly sand
22	40.10	-35.30	13.00	120.00	3- Clean sand
23	42.00	-37.20	13.00	120.00	3- Clean sand
24	44.00	-39.20	16.00	120.00	3- Clean sand
25	45.90	-41.10	16.00	120.00	3- Clean sand
26	46.00	-41.20	N/A	120.00	4- Lime Stone/Very shelly sand
27	48.00	-43.20	N/A	120.00	4- Lime Stone/Very shelly sand
28	50.00	-45.20	N/A	120.00	4- Lime Stone/Very shelly sand
29	53.00	-48.20	N/A	120.00	4- Lime Stone/Very shelly sand
30	55.00	-50.20	N/A	120.00	4- Lime Stone/Very shelly sand
31	58.00	-53.20	N/A	120.00	4- Lime Stone/Very shelly sand
32	60.00	-55.20	N/A	120.00	4- Lime Stone/Very shelly sand
33	63.00	-58.20	N/A	120.00	4- Lime Stone/Very shelly sand
34	65.00	-60.20	N/A	120.00	4- Lime Stone/Very shelly sand
35	68.00	-63.20	N/A	120.00	4- Lime Stone/Very shelly sand
36	70.00	-65.20	N/A	120.00	4- Lime Stone/Very shelly sand
37	73.00	-68.20	N/A	120.00	4- Lime Stone/Very shelly sand
38	75.00	-70.20	N/A	120.00	4- Lime Stone/Very shelly sand
39	78.00	-73.20	N/A	120.00	4- Lime Stone/Very shelly sand
40	80.00	-75.20	N/A	120.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A

14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	17.75	3.55	0.00	0.00
20	N/A	17.75	3.55	0.00	0.00
21	N/A	17.75	3.55	0.00	0.00
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	17.75	3.55	0.00	0.00
27	N/A	17.75	3.55	0.00	0.00
28	N/A	17.75	3.55	0.00	0.00
29	N/A	17.75	3.55	0.00	0.00
30	N/A	17.75	3.55	0.00	0.00
31	N/A	17.75	3.55	0.00	0.00
32	N/A	17.75	3.55	0.00	0.00
33	N/A	17.75	3.55	0.00	0.00
34	N/A	17.75	3.55	0.00	0.00
35	N/A	17.75	3.55	0.00	0.00
36	N/A	17.75	3.55	0.00	0.00
37	N/A	17.75	3.55	0.00	0.00
38	N/A	17.75	3.55	0.00	0.00
39	N/A	17.75	3.55	0.00	0.00
40	N/A	17.75	3.55	0.00	0.00

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	1.00	ROUGH	1.000
20	1.00	ROUGH	1.000
21	1.00	ROUGH	1.000
22	N/A	N/A	N/A
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	1.00	ROUGH	1.000
27	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
29	1.00	ROUGH	1.000
30	1.00	ROUGH	1.000
31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	1.00	ROUGH	1.000

Drilled Shaft Data:
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Unit weight of concrete = 150.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 4000.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	1.00	3.80	0.00	30.00	30.00	0.00
2	2.00	2.80	0.00	30.00	30.00	0.00
3	3.00	1.80	0.00	30.00	30.00	0.00
4	4.00	0.80	0.00	30.00	30.00	0.00
5	5.00	-0.20	0.00	30.00	30.00	0.00
6	6.00	-1.20	0.00	30.00	30.00	0.00
7	7.00	-2.20	0.00	30.00	30.00	0.00
8	8.00	-3.20	0.00	30.00	30.00	0.00

9	9.00	-4.20	0.00	30.00	30.00	0.00
10	10.00	-5.20	0.00	30.00	30.00	0.00
11	11.00	-6.20	0.00	30.00	30.00	0.00
12	12.00	-7.20	0.00	30.00	30.00	0.00
13	13.00	-8.20	0.00	30.00	30.00	0.00
14	14.00	-9.20	0.00	30.00	30.00	0.00
15	15.00	-10.20	0.00	30.00	30.00	0.00
16	16.00	-11.20	0.00	30.00	30.00	0.00
17	17.00	-12.20	0.00	30.00	30.00	0.00
18	18.00	-13.20	0.00	30.00	30.00	0.00
19	19.00	-14.20	0.00	30.00	30.00	0.00
20	20.00	-15.20	0.00	30.00	30.00	0.00
21	21.00	-16.20	0.00	30.00	30.00	0.00
22	22.00	-17.20	0.00	30.00	30.00	0.00
23	23.00	-18.20	0.00	30.00	30.00	0.00
24	24.00	-19.20	0.00	30.00	30.00	0.00
25	25.00	-20.20	0.00	30.00	30.00	0.00
26	26.00	-21.20	0.00	30.00	30.00	0.00
27	27.00	-22.20	0.00	30.00	30.00	0.00
28	28.00	-23.20	0.00	30.00	30.00	0.00
29	29.00	-24.20	0.00	30.00	30.00	0.00
30	30.00	-25.20	0.00	30.00	30.00	0.00
31	31.00	-26.20	0.00	30.00	30.00	0.00
32	32.00	-27.20	0.00	30.00	30.00	0.00
33	33.00	-28.20	0.00	30.00	30.00	0.00
34	34.00	-29.20	0.00	30.00	30.00	0.00
35	35.00	-30.20	0.00	30.00	30.00	0.00
36	36.00	-31.20	0.00	30.00	30.00	0.00
37	37.00	-32.20	0.00	30.00	30.00	0.00
38	38.00	-33.20	0.00	30.00	30.00	0.00
39	39.00	-34.20	0.00	30.00	30.00	0.00
40	40.00	-35.20	0.00	30.00	30.00	0.00
41	41.00	-36.20	0.00	30.00	30.00	0.00
42	42.00	-37.20	0.00	30.00	30.00	0.00
43	43.00	-38.20	0.00	30.00	30.00	0.00
44	44.00	-39.20	0.00	30.00	30.00	0.00
45	45.00	-40.20	0.00	30.00	30.00	0.00
46	46.00	-41.20	0.00	30.00	30.00	0.00
47	47.00	-42.20	0.00	30.00	30.00	0.00
48	48.00	-43.20	0.00	30.00	30.00	0.00
49	49.00	-44.20	0.00	30.00	30.00	0.00
50	50.00	-45.20	0.00	30.00	30.00	0.00
51	51.00	-46.20	0.00	30.00	30.00	0.00
52	52.00	-47.20	0.00	30.00	30.00	0.00
53	53.00	-48.20	0.00	30.00	30.00	0.00
54	54.00	-49.20	0.00	30.00	30.00	0.00
55	55.00	-50.20	0.00	30.00	30.00	0.00
56	56.00	-51.20	0.00	30.00	30.00	0.00
57	57.00	-52.20	0.00	30.00	30.00	0.00
58	58.00	-53.20	0.00	30.00	30.00	0.00
59	59.00	-54.20	0.00	30.00	30.00	0.00
60	60.00	-55.20	0.00	30.00	30.00	0.00
61	61.00	-56.20	0.00	30.00	30.00	0.00
62	62.00	-57.20	0.00	30.00	30.00	0.00
63	63.00	-58.20	0.00	30.00	30.00	0.00
64	64.00	-59.20	0.00	30.00	30.00	0.00
65	65.00	-60.20	0.00	30.00	30.00	0.00
66	66.00	-61.20	0.00	30.00	30.00	0.00
67	67.00	-62.20	0.00	30.00	30.00	0.00
68	68.00	-63.20	0.00	30.00	30.00	0.00
69	69.00	-64.20	0.00	30.00	30.00	0.00
70	70.00	-65.20	0.00	30.00	30.00	0.00
71	71.00	-66.20	0.00	30.00	30.00	0.00
72	72.00	-67.20	0.00	30.00	30.00	0.00
73	73.00	-68.20	0.00	30.00	30.00	0.00
74	74.00	-69.20	0.00	30.00	30.00	0.00
75	75.00	-70.20	0.00	30.00	30.00	0.00
76	76.00	-71.20	0.00	30.00	30.00	0.00
77	77.00	-72.20	0.00	30.00	30.00	0.00
78	78.00	-73.20	0.00	30.00	30.00	0.00
79	79.00	-74.20	0.00	30.00	30.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):
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Strength reduction factors: Skin-friction = 1.00, End-bearing = 0.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	30.00	1.00	0.000	0.000	0.000
2	30.00	2.00	0.000	0.000	0.000
3	30.00	3.00	0.000	0.000	0.000
4	30.00	4.00	0.000	0.000	0.000
5	30.00	5.00	0.000	0.000	0.000
6	30.00	6.00	0.000	0.000	0.000
7	30.00	7.00	0.000	0.000	0.000
8	30.00	8.00	0.000	0.000	0.000
9	30.00	9.00	0.000	0.000	0.000
10	30.00	10.00	0.000	0.000	0.000
11	30.00	11.00	0.000	0.000	0.000

12	30.00	12.00	0.000	0.000	0.000
13	30.00	13.00	0.000	0.000	0.000
14	30.00	14.00	0.000	0.000	0.000
15	30.00	15.00	0.000	0.000	0.000
16	30.00	16.00	0.000	0.000	0.000
17	30.00	17.00	0.000	0.000	0.000
18	30.00	18.00	0.000	0.000	0.000
19	30.00	19.00	0.000	0.000	0.000
20	30.00	20.00	0.000	0.000	0.000
21	30.00	21.00	0.000	0.000	0.000
22	30.00	22.00	0.000	0.000	0.000
23	30.00	23.00	0.000	0.000	0.000
24	30.00	24.00	0.000	0.000	0.000
25	30.00	25.00	0.000	0.000	0.000
26	30.00	26.00	0.000	0.000	0.000
27	30.00	27.00	0.000	0.000	0.000
28	30.00	28.00	0.000	0.000	0.000
29	30.00	29.00	0.000	0.000	0.000
30	30.00	30.00	0.000	0.000	0.000
31	30.00	31.00	0.000	0.000	0.000
32	30.00	32.00	0.000	0.000	0.000
33	30.00	33.00	0.000	0.000	0.000
34	30.00	34.00	0.000	0.000	0.000
35	30.00	35.00	6.235	0.000	6.235
36	30.00	36.00	37.407	0.000	37.407
37	30.00	37.00	68.580	0.000	68.580
38	30.00	38.00	99.752	0.000	99.752
39	30.00	39.00	130.925	0.000	130.925
40	30.00	40.00	162.098	0.000	162.098
41	30.00	41.00	165.964	0.000	165.964
42	30.00	42.00	166.921	0.000	166.921
43	30.00	43.00	168.000	0.000	168.000
44	30.00	44.00	169.201	0.000	169.201
45	30.00	45.00	170.516	0.000	170.516
46	30.00	46.00	171.944	0.000	171.944
47	30.00	47.00	203.116	0.000	203.116
48	30.00	48.00	234.289	0.000	234.289
49	30.00	49.00	265.461	0.000	265.461
50	30.00	50.00	296.634	0.000	296.634
51	30.00	51.00	327.807	0.000	327.807
52	30.00	52.00	358.979	0.000	358.979
53	30.00	53.00	390.152	0.000	390.152
54	30.00	54.00	421.325	0.000	421.325
55	30.00	55.00	452.497	0.000	452.497
56	30.00	56.00	483.670	0.000	483.670
57	30.00	57.00	514.842	0.000	514.842
58	30.00	58.00	546.015	0.000	546.015
59	30.00	59.00	577.188	0.000	577.188
60	30.00	60.00	608.360	0.000	608.360
61	30.00	61.00	639.533	0.000	639.533
62	30.00	62.00	670.705	0.000	670.705
63	30.00	63.00	701.878	0.000	701.878
64	30.00	64.00	733.051	0.000	733.051
65	30.00	65.00	764.223	0.000	764.223
66	30.00	66.00	795.396	0.000	795.396
67	30.00	67.00	826.569	0.000	826.569
68	30.00	68.00	857.741	0.000	857.741
69	30.00	69.00	888.914	0.000	888.914
70	30.00	70.00	920.086	0.000	920.086
71	30.00	71.00	951.259	0.000	951.259
72	30.00	72.00	982.432	0.000	982.432
73	30.00	73.00	1013.604	0.000	1013.604
74	30.00	74.00	1044.777	0.000	1044.777
75	30.00	75.00	1075.949	0.000	1075.949
76	30.00	76.00	1107.122	0.000	1107.122
77	30.00	77.00	1138.295	0.000	1138.295
78	30.00	78.00	1169.467	0.000	1169.467
79	30.00	79.00	1200.640	0.000	1200.640

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

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***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	30.00	1.00	0.000	0.000	0.000
2	30.00	2.00	0.000	0.000	0.000
3	30.00	3.00	0.000	0.000	0.000
4	30.00	4.00	0.000	0.000	0.000
5	30.00	5.00	0.000	0.000	0.000
6	30.00	6.00	0.000	0.000	0.000
7	30.00	7.00	0.000	0.000	0.000
8	30.00	8.00	0.000	0.000	0.000
9	30.00	9.00	0.000	0.000	0.000
10	30.00	10.00	0.000	0.000	0.000
11	30.00	11.00	0.000	0.000	0.000

12	30.00	12.00	0.000	0.000	0.000
13	30.00	13.00	0.000	0.000	0.000
14	30.00	14.00	0.000	0.000	0.000
15	30.00	15.00	0.000	0.000	0.000
16	30.00	16.00	0.000	0.000	0.000
17	30.00	17.00	0.000	0.000	0.000
18	30.00	18.00	0.000	0.000	0.000
19	30.00	19.00	0.000	0.000	0.000
20	30.00	20.00	0.000	0.000	0.000
21	30.00	21.00	0.000	0.000	0.000
22	30.00	22.00	0.000	0.000	0.000
23	30.00	23.00	0.000	0.000	0.000
24	30.00	24.00	0.000	0.000	0.000
25	30.00	25.00	0.000	0.000	0.000
26	30.00	26.00	0.000	0.000	0.000
27	30.00	27.00	0.000	0.000	0.000
28	30.00	28.00	0.000	0.000	0.000
29	30.00	29.00	0.000	0.000	0.000
30	30.00	30.00	0.000	0.000	0.000
31	30.00	31.00	0.000	0.000	0.000
32	30.00	32.00	0.000	0.000	0.000
33	30.00	33.00	0.000	0.000	0.000
34	30.00	34.00	0.000	0.000	0.000
35	30.00	35.00	-nan(ind)	-nan(ind)	-nan(ind)
36	30.00	36.00	-nan(ind)	-nan(ind)	-nan(ind)
37	30.00	37.00	-nan(ind)	-nan(ind)	-nan(ind)
38	30.00	38.00	-nan(ind)	-nan(ind)	-nan(ind)
39	30.00	39.00	-nan(ind)	-nan(ind)	-nan(ind)
40	30.00	40.00	-nan(ind)	-nan(ind)	-nan(ind)
41	30.00	41.00	-nan(ind)	0.000	-nan(ind)
42	30.00	42.00	-nan(ind)	0.000	-nan(ind)
43	30.00	43.00	-nan(ind)	0.000	-nan(ind)
44	30.00	44.00	-nan(ind)	0.000	-nan(ind)
45	30.00	45.00	-nan(ind)	0.000	-nan(ind)
46	30.00	46.00	-nan(ind)	-nan(ind)	-nan(ind)
47	30.00	47.00	-nan(ind)	-nan(ind)	-nan(ind)
48	30.00	48.00	-nan(ind)	-nan(ind)	-nan(ind)
49	30.00	49.00	-nan(ind)	-nan(ind)	-nan(ind)
50	30.00	50.00	-nan(ind)	-nan(ind)	-nan(ind)
51	30.00	51.00	-nan(ind)	-nan(ind)	-nan(ind)
52	30.00	52.00	-nan(ind)	-nan(ind)	-nan(ind)
53	30.00	53.00	-nan(ind)	-nan(ind)	-nan(ind)
54	30.00	54.00	-nan(ind)	-nan(ind)	-nan(ind)
55	30.00	55.00	-nan(ind)	-nan(ind)	-nan(ind)
56	30.00	56.00	-nan(ind)	-nan(ind)	-nan(ind)
57	30.00	57.00	-nan(ind)	-nan(ind)	-nan(ind)
58	30.00	58.00	-nan(ind)	-nan(ind)	-nan(ind)
59	30.00	59.00	-nan(ind)	-nan(ind)	-nan(ind)
60	30.00	60.00	-nan(ind)	-nan(ind)	-nan(ind)
61	30.00	61.00	-nan(ind)	-nan(ind)	-nan(ind)
62	30.00	62.00	-nan(ind)	-nan(ind)	-nan(ind)
63	30.00	63.00	-nan(ind)	-nan(ind)	-nan(ind)
64	30.00	64.00	-nan(ind)	-nan(ind)	-nan(ind)
65	30.00	65.00	-nan(ind)	-nan(ind)	-nan(ind)
66	30.00	66.00	-nan(ind)	-nan(ind)	-nan(ind)
67	30.00	67.00	-nan(ind)	-nan(ind)	-nan(ind)
68	30.00	68.00	-nan(ind)	-nan(ind)	-nan(ind)
69	30.00	69.00	-nan(ind)	-nan(ind)	-nan(ind)
70	30.00	70.00	-nan(ind)	-nan(ind)	-nan(ind)
71	30.00	71.00	-nan(ind)	-nan(ind)	-nan(ind)
72	30.00	72.00	-nan(ind)	-nan(ind)	-nan(ind)
73	30.00	73.00	-nan(ind)	-nan(ind)	-nan(ind)
74	30.00	74.00	-nan(ind)	-nan(ind)	-nan(ind)
75	30.00	75.00	-nan(ind)	-nan(ind)	-nan(ind)
76	30.00	76.00	-nan(ind)	-nan(ind)	-nan(ind)
77	30.00	77.00	-nan(ind)	-nan(ind)	-nan(ind)
78	30.00	78.00	-nan(ind)	-nan(ind)	-nan(ind)
79	30.00	79.00	-nan(ind)	-nan(ind)	-nan(ind)

General Information:
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Input file: ..... Bridge\Revised II 02-18-21\Bridge\FB-DEEP\ACIP\B-2_30 inch.in
Project number: HR20-1583R
Job name: Atlantic Isle Bridge
Engineer: Chollada
Units: English

Analysis Information:
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Analysis Type: Drilled Shaft Analysis

Soil Information:
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Boring date: 12/04/17
Boring number: B-2
Station number: 14+10 Offset: 20.0 RT

Ground Elevation: 2.40(ft)
Water table Elevation = 0.50(ft)

Rock side-friction is calculated using: McVay's method
Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	Elevation (ft)	SPT Blows (Blows/ft)	Unit Weight (pcf)	Soil Type
1	0.00	2.40	N/A	0.00	5- Cavity layer
2	2.00	0.40	N/A	0.00	5- Cavity layer
3	4.00	-1.60	N/A	0.00	5- Cavity layer
4	6.00	-3.60	N/A	120.00	5- Cavity layer
5	8.00	-5.60	N/A	120.00	5- Cavity layer
6	10.00	-7.60	N/A	120.00	5- Cavity layer
7	13.00	-10.60	N/A	120.00	5- Cavity layer
8	15.00	-12.60	N/A	120.00	5- Cavity layer
9	16.00	-13.60	N/A	120.00	5- Cavity layer
10	17.00	-14.60	N/A	120.00	5- Cavity layer
11	18.00	-15.60	N/A	120.00	5- Cavity layer
12	20.00	-17.60	N/A	120.00	5- Cavity layer
13	23.00	-20.60	N/A	120.00	5- Cavity layer
14	25.00	-22.60	N/A	120.00	5- Cavity layer
15	28.00	-25.60	N/A	120.00	5- Cavity layer
16	30.00	-27.60	N/A	120.00	5- Cavity layer
17	32.40	-30.00	N/A	120.00	5- Cavity layer
18	32.40	-30.00	10.00	120.00	3- Clean sand
19	33.00	-30.60	10.00	120.00	3- Clean sand
20	34.00	-31.60	N/A	120.00	4- Lime Stone/Very shelly sand
21	35.00	-32.60	N/A	120.00	4- Lime Stone/Very shelly sand
22	38.00	-35.60	N/A	120.00	4- Lime Stone/Very shelly sand
23	38.10	-35.70	3.00	101.26	3- Clean sand
24	40.00	-37.60	3.00	101.26	3- Clean sand
25	42.00	-39.60	6.00	104.51	3- Clean sand
26	42.90	-40.50	6.00	104.51	3- Clean sand
27	43.00	-40.60	N/A	120.00	4- Lime Stone/Very shelly sand
28	45.00	-42.60	N/A	120.00	4- Lime Stone/Very shelly sand
29	48.00	-45.60	N/A	120.00	4- Lime Stone/Very shelly sand
30	50.00	-47.60	N/A	120.00	4- Lime Stone/Very shelly sand
31	53.00	-50.60	N/A	120.00	4- Lime Stone/Very shelly sand
32	55.00	-52.60	N/A	120.00	4- Lime Stone/Very shelly sand
33	58.00	-55.60	N/A	120.00	4- Lime Stone/Very shelly sand
34	60.00	-57.60	N/A	120.00	4- Lime Stone/Very shelly sand
35	62.00	-59.60	N/A	120.00	4- Lime Stone/Very shelly sand
36	65.00	-62.60	N/A	120.00	4- Lime Stone/Very shelly sand
37	68.00	-65.60	N/A	120.00	4- Lime Stone/Very shelly sand
38	70.00	-67.60	N/A	120.00	4- Lime Stone/Very shelly sand
39	73.00	-70.60	N/A	120.00	4- Lime Stone/Very shelly sand
40	75.00	-72.60	10.00	120.00	3- Clean sand
41	78.00	-75.60	19.00	120.00	3- Clean sand
42	80.00	-77.60	N/A	120.00	4- Lime Stone/Very shelly sand

ID	Cu-DIR (tsf)	qu (tsf)	qt (tsf)	Em (ksi)	qb (tsf)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A

12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A
16	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	17.19	3.40	0.00	0.00
21	N/A	17.19	3.40	0.00	0.00
22	N/A	17.75	3.55	0.00	0.00
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A
27	N/A	17.75	3.55	0.00	0.00
28	N/A	17.75	3.55	0.00	0.00
29	N/A	17.75	3.55	0.00	0.00
30	N/A	17.75	3.55	0.00	0.00
31	N/A	17.75	3.55	0.00	0.00
32	N/A	17.75	3.55	0.00	0.00
33	N/A	17.75	3.55	0.00	0.00
34	N/A	17.75	3.55	0.00	0.00
35	N/A	17.75	3.55	0.00	0.00
36	N/A	17.75	3.55	0.00	0.00
37	N/A	17.75	3.55	0.00	0.00
38	N/A	17.75	3.55	0.00	0.00
39	N/A	17.75	3.55	0.00	0.00
40	N/A	N/A	N/A	N/A	N/A
41	N/A	N/A	N/A	N/A	N/A
42	N/A	17.75	3.55	0.00	0.00

ID	RQD F.M.	S.R.I.	Rock Recovery
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	N/A	N/A	N/A
11	N/A	N/A	N/A
12	N/A	N/A	N/A
13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	N/A	N/A	N/A
16	N/A	N/A	N/A
17	N/A	N/A	N/A
18	N/A	N/A	N/A
19	N/A	N/A	N/A
20	1.00	ROUGH	1.000
21	1.00	ROUGH	1.000
22	1.00	ROUGH	1.000
23	N/A	N/A	N/A
24	N/A	N/A	N/A
25	N/A	N/A	N/A
26	N/A	N/A	N/A
27	1.00	ROUGH	1.000
28	1.00	ROUGH	1.000
29	1.00	ROUGH	1.000
30	1.00	ROUGH	1.000
31	1.00	ROUGH	1.000
32	1.00	ROUGH	1.000
33	1.00	ROUGH	1.000
34	1.00	ROUGH	1.000
35	1.00	ROUGH	1.000
36	1.00	ROUGH	1.000
37	1.00	ROUGH	1.000
38	1.00	ROUGH	1.000
39	1.00	ROUGH	1.000
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	1.00	ROUGH	1.000

Drilled Shaft Data:

Unit weight of concrete = 150.00(pcf), Concrete Slump = 6.00(in)
Modulus of Elasticity of concrete = 4000.00(ksi)

Shaft Geometry:

ID	Length (ft)	Tip Elev. (ft)	Case Len. (ft)	Diameter (in)	Base Diam. (in)	Bell Len. (ft)
1	1.00	1.40	0.00	30.00	30.00	0.00
2	2.00	0.40	0.00	30.00	30.00	0.00

3	3.00	-0.60	0.00	30.00	30.00	0.00
4	4.00	-1.60	0.00	30.00	30.00	0.00
5	5.00	-2.60	0.00	30.00	30.00	0.00
6	6.00	-3.60	0.00	30.00	30.00	0.00
7	7.00	-4.60	0.00	30.00	30.00	0.00
8	8.00	-5.60	0.00	30.00	30.00	0.00
9	9.00	-6.60	0.00	30.00	30.00	0.00
10	10.00	-7.60	0.00	30.00	30.00	0.00
11	11.00	-8.60	0.00	30.00	30.00	0.00
12	12.00	-9.60	0.00	30.00	30.00	0.00
13	13.00	-10.60	0.00	30.00	30.00	0.00
14	14.00	-11.60	0.00	30.00	30.00	0.00
15	15.00	-12.60	0.00	30.00	30.00	0.00
16	16.00	-13.60	0.00	30.00	30.00	0.00
17	17.00	-14.60	0.00	30.00	30.00	0.00
18	18.00	-15.60	0.00	30.00	30.00	0.00
19	19.00	-16.60	0.00	30.00	30.00	0.00
20	20.00	-17.60	0.00	30.00	30.00	0.00
21	21.00	-18.60	0.00	30.00	30.00	0.00
22	22.00	-19.60	0.00	30.00	30.00	0.00
23	23.00	-20.60	0.00	30.00	30.00	0.00
24	24.00	-21.60	0.00	30.00	30.00	0.00
25	25.00	-22.60	0.00	30.00	30.00	0.00
26	26.00	-23.60	0.00	30.00	30.00	0.00
27	27.00	-24.60	0.00	30.00	30.00	0.00
28	28.00	-25.60	0.00	30.00	30.00	0.00
29	29.00	-26.60	0.00	30.00	30.00	0.00
30	30.00	-27.60	0.00	30.00	30.00	0.00
31	31.00	-28.60	0.00	30.00	30.00	0.00
32	32.00	-29.60	0.00	30.00	30.00	0.00
33	33.00	-30.60	0.00	30.00	30.00	0.00
34	34.00	-31.60	0.00	30.00	30.00	0.00
35	35.00	-32.60	0.00	30.00	30.00	0.00
36	36.00	-33.60	0.00	30.00	30.00	0.00
37	37.00	-34.60	0.00	30.00	30.00	0.00
38	38.00	-35.60	0.00	30.00	30.00	0.00
39	39.00	-36.60	0.00	30.00	30.00	0.00
40	40.00	-37.60	0.00	30.00	30.00	0.00
41	41.00	-38.60	0.00	30.00	30.00	0.00
42	42.00	-39.60	0.00	30.00	30.00	0.00
43	43.00	-40.60	0.00	30.00	30.00	0.00
44	44.00	-41.60	0.00	30.00	30.00	0.00
45	45.00	-42.60	0.00	30.00	30.00	0.00
46	46.00	-43.60	0.00	30.00	30.00	0.00
47	47.00	-44.60	0.00	30.00	30.00	0.00
48	48.00	-45.60	0.00	30.00	30.00	0.00
49	49.00	-46.60	0.00	30.00	30.00	0.00
50	50.00	-47.60	0.00	30.00	30.00	0.00
51	51.00	-48.60	0.00	30.00	30.00	0.00
52	52.00	-49.60	0.00	30.00	30.00	0.00
53	53.00	-50.60	0.00	30.00	30.00	0.00
54	54.00	-51.60	0.00	30.00	30.00	0.00
55	55.00	-52.60	0.00	30.00	30.00	0.00
56	56.00	-53.60	0.00	30.00	30.00	0.00
57	57.00	-54.60	0.00	30.00	30.00	0.00
58	58.00	-55.60	0.00	30.00	30.00	0.00
59	59.00	-56.60	0.00	30.00	30.00	0.00
60	60.00	-57.60	0.00	30.00	30.00	0.00
61	61.00	-58.60	0.00	30.00	30.00	0.00
62	62.00	-59.60	0.00	30.00	30.00	0.00
63	63.00	-60.60	0.00	30.00	30.00	0.00
64	64.00	-61.60	0.00	30.00	30.00	0.00
65	65.00	-62.60	0.00	30.00	30.00	0.00
66	66.00	-63.60	0.00	30.00	30.00	0.00
67	67.00	-64.60	0.00	30.00	30.00	0.00
68	68.00	-65.60	0.00	30.00	30.00	0.00
69	69.00	-66.60	0.00	30.00	30.00	0.00
70	70.00	-67.60	0.00	30.00	30.00	0.00
71	71.00	-68.60	0.00	30.00	30.00	0.00
72	72.00	-69.60	0.00	30.00	30.00	0.00
73	73.00	-70.60	0.00	30.00	30.00	0.00
74	74.00	-71.60	0.00	30.00	30.00	0.00

Drilled Shaft Capacity (sorted by shaft diameter):

Strength reduction factors: Skin-friction = 1.00, End-bearing = 0.00

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	30.00	1.00	0.000	0.000	0.000
2	30.00	2.00	0.000	0.000	0.000
3	30.00	3.00	0.000	0.000	0.000
4	30.00	4.00	0.000	0.000	0.000
5	30.00	5.00	0.000	0.000	0.000
6	30.00	6.00	0.000	0.000	0.000
7	30.00	7.00	0.000	0.000	0.000
8	30.00	8.00	0.000	0.000	0.000
9	30.00	9.00	0.000	0.000	0.000
10	30.00	10.00	0.000	0.000	0.000

11	30.00	11.00	0.000	0.000	0.000
12	30.00	12.00	0.000	0.000	0.000
13	30.00	13.00	0.000	0.000	0.000
14	30.00	14.00	0.000	0.000	0.000
15	30.00	15.00	0.000	0.000	0.000
16	30.00	16.00	0.000	0.000	0.000
17	30.00	17.00	0.000	0.000	0.000
18	30.00	18.00	0.000	0.000	0.000
19	30.00	19.00	0.000	0.000	0.000
20	30.00	20.00	0.000	0.000	0.000
21	30.00	21.00	0.000	0.000	0.000
22	30.00	22.00	0.000	0.000	0.000
23	30.00	23.00	0.000	0.000	0.000
24	30.00	24.00	0.000	0.000	0.000
25	30.00	25.00	0.000	0.000	0.000
26	30.00	26.00	0.000	0.000	0.000
27	30.00	27.00	0.000	0.000	0.000
28	30.00	28.00	0.000	0.000	0.000
29	30.00	29.00	0.000	0.000	0.000
30	30.00	30.00	0.000	0.000	0.000
31	30.00	31.00	0.000	0.000	0.000
32	30.00	32.00	0.000	0.000	0.000
33	30.00	33.00	0.025	0.000	0.025
34	30.00	34.00	0.172	0.000	0.172
35	30.00	35.00	30.194	0.000	30.194
36	30.00	36.00	60.216	0.000	60.216
37	30.00	37.00	90.238	0.000	90.238
38	30.00	38.00	120.260	0.000	120.260
39	30.00	39.00	123.682	0.000	123.682
40	30.00	40.00	124.058	0.000	124.058
41	30.00	41.00	124.472	0.000	124.472
42	30.00	42.00	124.924	0.000	124.924
43	30.00	43.00	125.529	0.000	125.529
44	30.00	44.00	156.702	0.000	156.702
45	30.00	45.00	187.874	0.000	187.874
46	30.00	46.00	219.047	0.000	219.047
47	30.00	47.00	250.219	0.000	250.219
48	30.00	48.00	281.392	0.000	281.392
49	30.00	49.00	312.565	0.000	312.565
50	30.00	50.00	343.737	0.000	343.737
51	30.00	51.00	374.910	0.000	374.910
52	30.00	52.00	406.082	0.000	406.082
53	30.00	53.00	437.255	0.000	437.255
54	30.00	54.00	468.428	0.000	468.428
55	30.00	55.00	499.600	0.000	499.600
56	30.00	56.00	530.773	0.000	530.773
57	30.00	57.00	561.946	0.000	561.946
58	30.00	58.00	593.118	0.000	593.118
59	30.00	59.00	624.291	0.000	624.291
60	30.00	60.00	655.463	0.000	655.463
61	30.00	61.00	686.636	0.000	686.636
62	30.00	62.00	717.809	0.000	717.809
63	30.00	63.00	748.981	0.000	748.981
64	30.00	64.00	780.154	0.000	780.154
65	30.00	65.00	811.326	0.000	811.326
66	30.00	66.00	842.499	0.000	842.499
67	30.00	67.00	873.672	0.000	873.672
68	30.00	68.00	904.844	0.000	904.844
69	30.00	69.00	936.017	0.000	936.017
70	30.00	70.00	967.190	0.000	967.190
71	30.00	71.00	998.362	0.000	998.362
72	30.00	72.00	1029.535	0.000	1029.535
73	30.00	73.00	1060.707	0.000	1060.707
74	30.00	74.00	1091.880	0.000	1091.880

Drilled Shaft Capacity at User-Defined Settlement (sorted by shaft diameter):

===

***** Capacity is NOT modified by the strength reduction factors *****

User-Defined Settlement = 0.00%

ID	Diameter (in)	Length (ft)	Skin Fric. (tons)	End Bearing (tons)	Capacity (tons)
1	30.00	1.00	0.000	0.000	0.000
2	30.00	2.00	0.000	0.000	0.000
3	30.00	3.00	0.000	0.000	0.000
4	30.00	4.00	0.000	0.000	0.000
5	30.00	5.00	0.000	0.000	0.000
6	30.00	6.00	0.000	0.000	0.000
7	30.00	7.00	0.000	0.000	0.000
8	30.00	8.00	0.000	0.000	0.000
9	30.00	9.00	0.000	0.000	0.000
10	30.00	10.00	0.000	0.000	0.000
11	30.00	11.00	0.000	0.000	0.000
12	30.00	12.00	0.000	0.000	0.000
13	30.00	13.00	0.000	0.000	0.000
14	30.00	14.00	0.000	0.000	0.000
15	30.00	15.00	0.000	0.000	0.000

16	30.00	16.00	0.000	0.000	0.000
17	30.00	17.00	0.000	0.000	0.000
18	30.00	18.00	0.000	0.000	0.000
19	30.00	19.00	0.000	0.000	0.000
20	30.00	20.00	0.000	0.000	0.000
21	30.00	21.00	0.000	0.000	0.000
22	30.00	22.00	0.000	0.000	0.000
23	30.00	23.00	0.000	0.000	0.000
24	30.00	24.00	0.000	0.000	0.000
25	30.00	25.00	0.000	0.000	0.000
26	30.00	26.00	0.000	0.000	0.000
27	30.00	27.00	0.000	0.000	0.000
28	30.00	28.00	0.000	0.000	0.000
29	30.00	29.00	0.000	0.000	0.000
30	30.00	30.00	0.000	0.000	0.000
31	30.00	31.00	0.000	0.000	0.000
32	30.00	32.00	0.000	0.000	0.000
33	30.00	33.00	0.000	0.000	0.000
34	30.00	34.00	0.000	-nan(ind)	-nan(ind)
35	30.00	35.00	-nan(ind)	-nan(ind)	-nan(ind)
36	30.00	36.00	-nan(ind)	-nan(ind)	-nan(ind)
37	30.00	37.00	-nan(ind)	-nan(ind)	-nan(ind)
38	30.00	38.00	-nan(ind)	-nan(ind)	-nan(ind)
39	30.00	39.00	-nan(ind)	0.000	-nan(ind)
40	30.00	40.00	-nan(ind)	0.000	-nan(ind)
41	30.00	41.00	-nan(ind)	0.000	-nan(ind)
42	30.00	42.00	-nan(ind)	0.000	-nan(ind)
43	30.00	43.00	-nan(ind)	-nan(ind)	-nan(ind)
44	30.00	44.00	-nan(ind)	-nan(ind)	-nan(ind)
45	30.00	45.00	-nan(ind)	-nan(ind)	-nan(ind)
46	30.00	46.00	-nan(ind)	-nan(ind)	-nan(ind)
47	30.00	47.00	-nan(ind)	-nan(ind)	-nan(ind)
48	30.00	48.00	-nan(ind)	-nan(ind)	-nan(ind)
49	30.00	49.00	-nan(ind)	-nan(ind)	-nan(ind)
50	30.00	50.00	-nan(ind)	-nan(ind)	-nan(ind)
51	30.00	51.00	-nan(ind)	-nan(ind)	-nan(ind)
52	30.00	52.00	-nan(ind)	-nan(ind)	-nan(ind)
53	30.00	53.00	-nan(ind)	-nan(ind)	-nan(ind)
54	30.00	54.00	-nan(ind)	-nan(ind)	-nan(ind)
55	30.00	55.00	-nan(ind)	-nan(ind)	-nan(ind)
56	30.00	56.00	-nan(ind)	-nan(ind)	-nan(ind)
57	30.00	57.00	-nan(ind)	-nan(ind)	-nan(ind)
58	30.00	58.00	-nan(ind)	-nan(ind)	-nan(ind)
59	30.00	59.00	-nan(ind)	-nan(ind)	-nan(ind)
60	30.00	60.00	-nan(ind)	-nan(ind)	-nan(ind)
61	30.00	61.00	-nan(ind)	-nan(ind)	-nan(ind)
62	30.00	62.00	-nan(ind)	-nan(ind)	-nan(ind)
63	30.00	63.00	-nan(ind)	-nan(ind)	-nan(ind)
64	30.00	64.00	-nan(ind)	-nan(ind)	-nan(ind)
65	30.00	65.00	-nan(ind)	-nan(ind)	-nan(ind)
66	30.00	66.00	-nan(ind)	-nan(ind)	-nan(ind)
67	30.00	67.00	-nan(ind)	-nan(ind)	-nan(ind)
68	30.00	68.00	-nan(ind)	-nan(ind)	-nan(ind)
69	30.00	69.00	-nan(ind)	-nan(ind)	-nan(ind)
70	30.00	70.00	-nan(ind)	-nan(ind)	-nan(ind)
71	30.00	71.00	-nan(ind)	-nan(ind)	-nan(ind)
72	30.00	72.00	-nan(ind)	-nan(ind)	-nan(ind)
73	30.00	73.00	-nan(ind)	-nan(ind)	-nan(ind)
74	30.00	74.00	-nan(ind)	-nan(ind)	-nan(ind)

SOIL/ROCK PARAMETERS FOR LATERAL ANALYSIS OF DRILLED SHAFT/AUGERCAST PILE/MICROPILE WITH FB-MULTIPIER

ATLANTIC ISLES BRIDGE

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 6

FINANCIAL PROJECT ID No. 430029-2-22-02

MIAMI-DADE COUNTY, FLORIDA

HR ENGINEERING SERVICES. INC.

HRES PROJECT No. HR20-1583R

FEBRUARY 24, 2021

Bent	Foundation Type	Borings	Layer No.	Top of Layer Elev. (ft.)	Bottom of Layer Elev. (ft.)	Soil Description	Soil Type	Average SPT N (blows/ft)	Lateral					Axial			Torsional					Tip	
									Soil Model	Internal Friction Angle (Deg.)	Total Unit Weight (lb/ft^3)	Lateral Soil Modulus, (lb/in^3)	Unconfined Compressive Strength, qu (psf)	Soil Model	Total Unit Weight (lb/ft3)	Ult. Unit Skin Friction (psf)	Soil Model	Internal Friction Angle (Deg.)	Total Unit Weight (lb/ft3)	Shear Modulus (k/in^2)	Torsional Shear Stress (lb/ft^2)	Soil Model	Undrained Shear Strength (lb/ft^2)
End Bents 1 and 2	Drilled Shaft/ Micropile	B-1 and B-2	1	-15.0	-30.6	Soft Limestone	Cohesionless	10	Sand Reese	30	120	20	-	Drilled Shaft Sand	120	-	Hyperbolic	30	120	0.8	600	Drilled Shaft Clay	0
			2	-30.6	-35.6	Limestone	Rock	40	Limestone (McVay)	-	120	-	35776	DS Limestone (McVay)	120	8000	Hyperbolic	0	120	11.9	8000	Drilled Shaft Clay	0
			3	-35.6	-40.6	Sand	Cohesionless	9	Sand Reese	30	105	20	-	Drilled Shaft Sand	105	-	Hyperbolic	30	105	0.7	600	Drilled Shaft Clay	0
			4	-40.6	-70.0	Limestone	Rock	40	Limestone (McVay)	-	120	-	35776	DS Limestone (McVay)	120	8000	Hyperbolic	0	120	11.9	8000	Drilled Shaft Clay	0

Notes:

ϕ = 28+N(safety)/4 for sand and soft limestone.

γ = 105*ϕ/30 for sand and 120 pcf for limestone.

Axial unit skin friction and Torsional shear stress estimated using β-Method for drilled shafts in sand and soft limestone and fs=0.1 N (tsf) in limestone,

Lateral soil modulus (k) was estimated using FDOT Soils and Foundation Handbook -sand and soft limestone

Shear Modulus G = E/2(1+ν)

E(ksf) = 30*N for sand and soft limestone and , E = 115qu for limestone ν = 0.3 for sand and soft limestone, 0.2 for limestone.

qu for limestone estimated by equating the side friction obtained by 0.1 N (tsf) and McVay's equation (0.5 (qu.qt)^.5). It is assumed that qt=20% of qu.

Clay with Cu value of 0 has been provided for tip modeling (no tip contribution on DS/MP axial capacity). A Cu value, as required for analysis convergence, may be used for lateral stability analysis purposes.

Note: Since submerged conditions are likely to exist when the design load condition occurs, make no distinction between dry and submerged conditions.

Friction Angles in Sand

The following typical correlation may be used to estimate the soil friction angle, φ:

$$\varphi = N/4 + 28$$

As an alternative, the procedure described in 6.1.1.5 Friction Angle vs. SPT-N shall be used. The maximum Φ value shall be limited to 35 degrees for silty sand (A-2-4) and 38 degrees for clean sand (A-3), unless higher friction angles are statistically supported by laboratory shear strength test results.

Walls founded on berms

When walls are founded through compacted select fill berm, include the portion of the pile with less than 2.5D horizontal soil cover (face-of-pile to face-of-slope) in the unsupported length, and design the portion of the pile with more than 2.5D soil cover as though founded in level ground.

Clay

Use the LPILE or COM624 program guideline to determine k and ε_{50} values. However, limit the properties of clay to stiff clay or weaker (design values for undrained shear strength shall not exceed 2000 psf and the ε_{50} shall not be less than 0.007), unless laboratory stress-strain measurements indicate otherwise.

Rock

The results of SPT borings are most often used for designing sound wall foundations in shallow limestone strata. Less conservative designs require more vigorous sampling and testing to demonstrate that less conservative design values are appropriate in all locations. In the absence of a comprehensive, vigorous sampling and testing program, the design based on SPT borings shall be as follows:

Rock material with N-values less than 10 blows/foot shall be modeled as sand. Rock material with N-values between 10 and 25 blows/foot shall be modeled as sandy gravel:

$$\text{Friction Angle, } \varphi = N/4 + 33$$

The maximum friction angle value shall be limited to 40 degrees, unless higher friction angles are statistically supported by laboratory shear strength test results.

Rock material with N-values of 25 blows/foot or more:

- Use the LPILE or COM624 program guideline to model p-y curves of weak rock.

Modeling rock as stiff clay will be acceptable, provided reasonable conservatism in the selection of k and undrained shear strength are adopted.

AXIAL LOAD RESISTANCE (doesn't normally control the design of sound barrier foundations)

<u>Side Resistance in Sands</u>

Side resistance in cohesionless soils shall be computed by the FHWA Method (Beta Method) specified in the Publication FHWA-IF-99-025 (August, 1999) for drilled shafts as follows:

$$f_s = P'_v \ \beta_c$$
$$\beta_c = \beta * N/15 \text{ where } \beta_c \leq \beta$$
$$\beta = 1.5 - 0.135\ (z)^{0.5} \ \text{(z, depth in ft)} \ \text{ where } 1.2 \geq \beta \geq 0.25$$

where f_s = Ultimate unit side resistance
The maximum value of f_s shall be limited to 2.1 tsf, unless load test results indicate otherwise.
P'_v = Effective vertical stress

<u>Side Resistance in Rock:</u>

When limestone and calcareous rock cores are obtained for laboratory testing, ultimate unit side resistance shall be estimated as discussed in Appendix A.

When rock cores and laboratory testing are not available, use the following approach:

- If SPT N-value in rock is less than 25 blows / foot, assume sand behavior.
- If SPT N-value in rock is greater than or equal to 25 blows / foot, use the following:
  $f_s = 0.1$ N (tsf) where $f_s \leq 5.0$ tsf

<u>Side Resistance in Clay</u>

Model inorganic clays and silts in accordance with FHWA methods. Shear strength values should be estimated from UU tests, unconfined tests, vane tests, etc. If only SPT tests are available, Consultants are expected to use reasonable judgment in the selection of undrained shear strength from correlations available in the literature.

The shear strength of clay estimated from SPT-N values or CPT results shall not exceed 2000 psf, unless laboratory stress-strain measurements indicate otherwise.

Side resistance shall be computed by the FHWA Method (Alpha Method) specified in the Publication FHWA-IF-99-025 (August, 1999) for drilled shafts as follows:

$$f_s = \alpha \ S_u$$

11.4.3 Young's Modulus

The young's modulus, of soils, can be obtained from following empirical equations:

For Sand

$$E = \alpha * p_a * N_{60} \quad \text{(psf)}$$

Eqn: 11.4.A

where

α = 5 for sands with fines
10 for clean normally consolidated sand
15 for clean overconsolidated sand

p_a = atmospheric pressure (≈ 2000 psf)

N_{60} = corrected SPT blow-count (blows/ft)

use $\alpha = 15$
$\therefore E = 30{,}000 \cdot N_{60}$ psf
$= 30 \cdot N_{60}$ ksf

$$E = k * B * (1 - \upsilon^2) \quad \text{(psf)}$$

Eqn: 11.4.B

where

k = subgrade modulus (pcf)

B = width of pile (ft)

υ = poisson's ratio

$$E = k * z \quad \text{(psf)}$$

Eqn: 11.4.C

where

k = subgrade modulus (pcf)

z = depth below ground surface (ft)

For Clay

$$E = \beta * C_u \quad \text{(psf)}$$

Eqn: 11.4.D

Shear Modulus

The shear modulus, G of soils, is a function of soil type, past loading, and geological history. It is recommended that G be obtained from insitu tests such as dilatometer, CPT and SPT.

G can be computed from Young's Modulus , E and Poisson's ratio , ν, from the following correlation:

Eqn.b11 $$G = \frac{E}{2(1+\nu)}$$

In the case of no insitu data is available the following guide is provided:

Eqn.b12 $$G = \frac{0.5 * k * z}{(1+\nu)}$$ for sand

Eqn.b13 $$G = \frac{50 * Cu}{(1+\nu)}$$ for Clay

where

k = soil modulus (F/L3)

z = depth below ground surface (L)

Cu = undrained shear strength (F/L2)

or a spatial average, for the values of GM should be used for any soil profile.

Poisson's Ratio

The following typical values may be used for the Poisson's ratio ν for soils:

ν = 0.2 to 0.3 for sand

= 0.4 to 0.5 for clay

or a spatial average, for the values of ν over depth may be used for soils consisting of both sand and clay.

GENERAL

In order to accommodate the post supports and reinforcement with the required cover, the normal foundation diameter is approximately 30 inches. It is generally desirable and efficient to limit foundation depths to 25 or 30 feet. If the design indicates a 30 inch diameter foundation will need to be longer than 30 feet, a larger diameter foundation should be considered.

NOISE BARRIER FOUNDATIONS

See Section 8.2.4.1

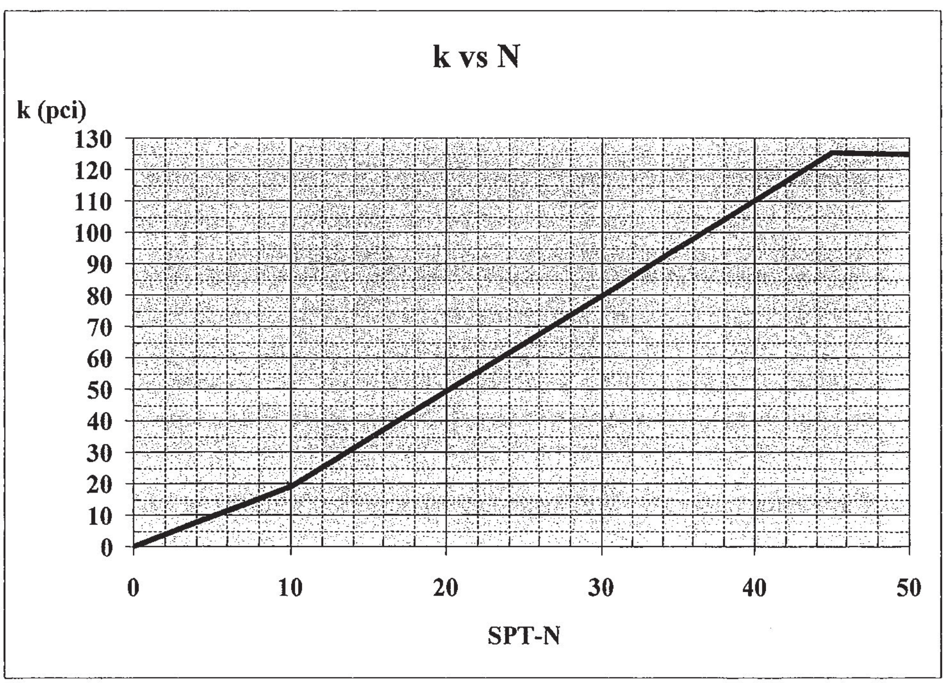
LATERAL LOAD RESISTANCE

Use a Load Factor in accordance with the latest AASHTO LRFD Bridge Design Specifications.

When required, computer programs such as FBPier, LPILE, or COM624 may be used to determine the deflections and rotations.

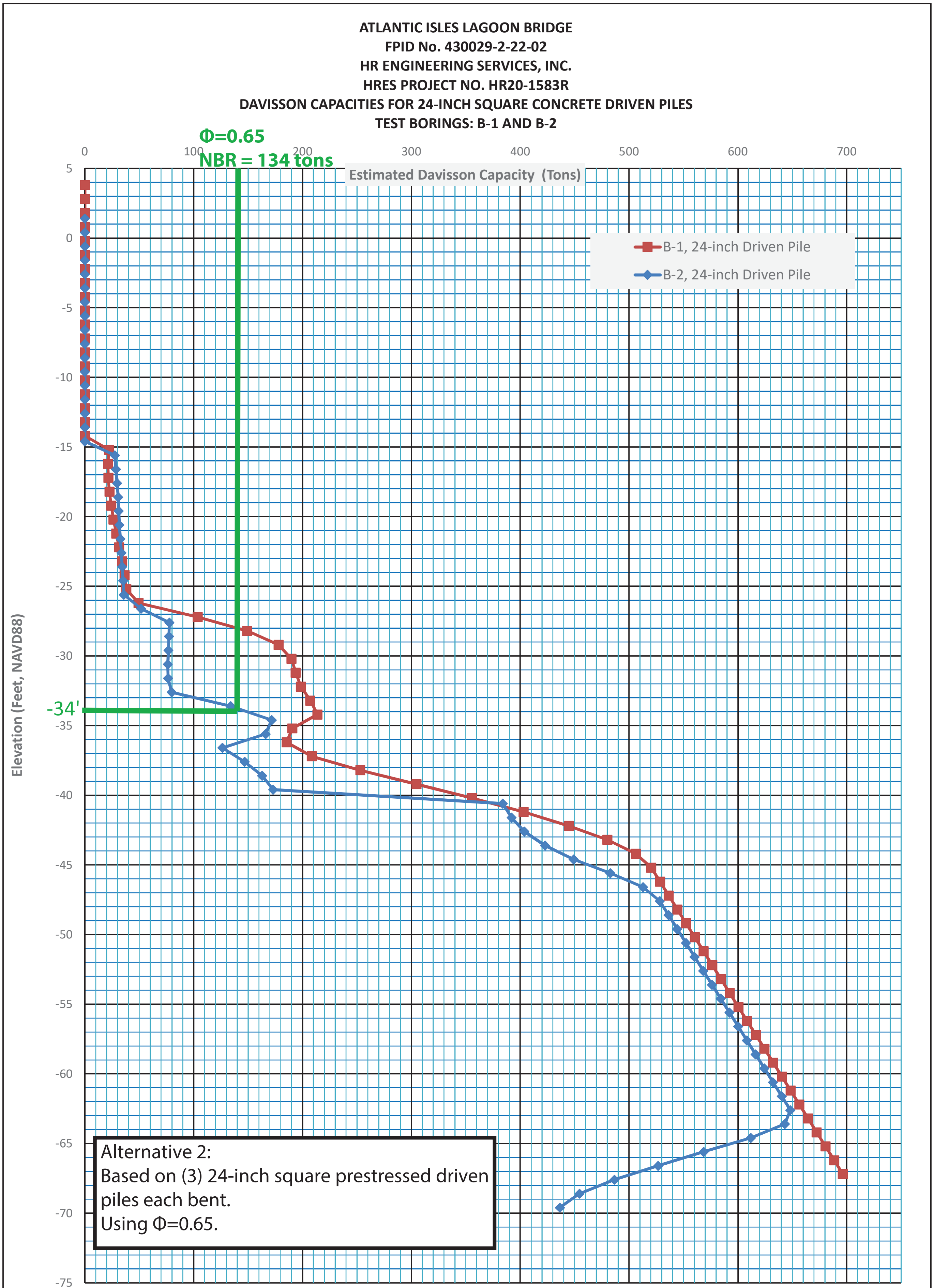
k values in Sands.

For structures subject to lateral loads due to a storm event, k values input into FBPier, LPILE, or COM624 shall not exceed the following values in pounds per cubic inch, without lateral load tests:



ALTERNATIVE 2

BRIDGE REPLACEMENT
DRIVEN PILE


ATLANTIC ISLES LAGOON BRIDGE
FPID No. 430029-2-22-02
HR ENGINEERING SERVICES, INC.
HRES PROJECT NO. HR20-1583R
DAVISSON CAPACITIES FOR 24-INCH SQUARE CONCRETE DRIVEN PILES
TEST BORINGS: B-1 AND B-2
Φ=0.65
NBR = 134 tons
Estimated Davisson Capacity (Tons)
Elevation (Feet, NAVD88)
-34'
B-1, 24-inch Driven Pile
B-2, 24-inch Driven Pile
0
100
200
300
400
500
600
700
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
Alternative 2:
Based on (3) 24-inch square prestressed driven piles each bent.
Using Φ=0.65.

General Information:
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Input file: .....tic Isles Lagoon Bridge\Revised 02-18-21\Bridge\FB-DEEP\B-1.in
Project number: HR20-1583R
Job name: Atlantic Isles Lagoon Bridge
Engineer: CS
Units: English

Analysis Information:
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Analysis Type: SPT

Soil Information:
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Boring date: 12/05/17, Boring Number: B-1
Station number: 13+27 (BL ATLANTIC AVE.) Offset: 6.0 RT

Ground Elevation: 4.800(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	17.00	5- Cavity layer
2	2.00	17.00	5- Cavity layer
3	4.00	8.00	5- Cavity layer
4	6.00	2.00	5- Cavity layer
5	8.00	2.00	5- Cavity layer
6	10.00	2.00	5- Cavity layer
7	12.00	2.00	5- Cavity layer
8	13.00	4.00	5- Cavity layer
9	15.00	37.00	5- Cavity layer
10	18.00	40.00	5- Cavity layer
11	19.80	40.00	5- Cavity layer
12	19.80	8.00	4- Lime Stone/Very shelly sand
13	23.00	7.00	4- Lime Stone/Very shelly sand
14	25.00	4.00	4- Lime Stone/Very shelly sand
15	28.00	3.00	4- Lime Stone/Very shelly sand
16	30.00	8.00	4- Lime Stone/Very shelly sand
17	33.00	8.00	4- Lime Stone/Very shelly sand
18	35.00	8.00	4- Lime Stone/Very shelly sand
19	38.00	8.00	4- Lime Stone/Very shelly sand
20	38.80	8.00	4- Lime Stone/Very shelly sand
21	38.80	100.00	4- Lime Stone/Very shelly sand
22	40.00	100.00	4- Lime Stone/Very shelly sand
23	43.00	13.00	4- Lime Stone/Very shelly sand
24	45.00	16.00	4- Lime Stone/Very shelly sand
25	48.00	49.00	4- Lime Stone/Very shelly sand
26	50.00	100.00	4- Lime Stone/Very shelly sand
27	53.00	100.00	4- Lime Stone/Very shelly sand
28	55.00	100.00	4- Lime Stone/Very shelly sand
29	58.00	100.00	4- Lime Stone/Very shelly sand
30	60.00	100.00	4- Lime Stone/Very shelly sand
31	63.00	100.00	4- Lime Stone/Very shelly sand
32	65.00	100.00	4- Lime Stone/Very shelly sand
33	68.00	100.00	4- Lime Stone/Very shelly sand
34	70.00	100.00	4- Lime Stone/Very shelly sand
35	73.00	100.00	4- Lime Stone/Very shelly sand
36	75.00	100.00	4- Lime Stone/Very shelly sand
37	78.00	100.00	4- Lime Stone/Very shelly sand
38	80.00	100.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	4.80	-15.00	19.80	14.60	5-Void
2	-15.00	-75.20	60.20	61.79	4-Limestone, Very Shelly Sand

Driven Pile Data:
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Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	1.00	3.80
24.00	2.00	2.80

24.00	3.00	1.80
24.00	4.00	0.80
24.00	5.00	-0.20
24.00	6.00	-1.20
24.00	7.00	-2.20
24.00	8.00	-3.20
24.00	9.00	-4.20
24.00	10.00	-5.20
24.00	11.00	-6.20
24.00	12.00	-7.20
24.00	13.00	-8.20
24.00	14.00	-9.20
24.00	15.00	-10.20
24.00	16.00	-11.20
24.00	17.00	-12.20
24.00	18.00	-13.20
24.00	19.00	-14.20
24.00	20.00	-15.20
24.00	21.00	-16.20
24.00	22.00	-17.20
24.00	23.00	-18.20
24.00	24.00	-19.20
24.00	25.00	-20.20
24.00	26.00	-21.20
24.00	27.00	-22.20
24.00	28.00	-23.20
24.00	29.00	-24.20
24.00	30.00	-25.20
24.00	31.00	-26.20
24.00	32.00	-27.20
24.00	33.00	-28.20
24.00	34.00	-29.20
24.00	35.00	-30.20
24.00	36.00	-31.20
24.00	37.00	-32.20
24.00	38.00	-33.20
24.00	39.00	-34.20
24.00	40.00	-35.20
24.00	41.00	-36.20
24.00	42.00	-37.20
24.00	43.00	-38.20
24.00	44.00	-39.20
24.00	45.00	-40.20
24.00	46.00	-41.20
24.00	47.00	-42.20
24.00	48.00	-43.20
24.00	49.00	-44.20
24.00	50.00	-45.20
24.00	51.00	-46.20
24.00	52.00	-47.20
24.00	53.00	-48.20
24.00	54.00	-49.20
24.00	55.00	-50.20
24.00	56.00	-51.20
24.00	57.00	-52.20
24.00	58.00	-53.20
24.00	59.00	-54.20
24.00	60.00	-55.20
24.00	61.00	-56.20
24.00	62.00	-57.20
24.00	63.00	-58.20
24.00	64.00	-59.20
24.00	65.00	-60.20
24.00	66.00	-61.20
24.00	67.00	-62.20
24.00	68.00	-63.20
24.00	69.00	-64.20
24.00	70.00	-65.20
24.00	71.00	-66.20
24.00	72.00	-67.20

Driven Pile Capacity:
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Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	24.0	0.00	0.00	0.00	0.00	0.00
2.00	24.0	0.00	0.00	0.00	0.00	0.00
3.00	24.0	0.00	0.00	0.00	0.00	0.00
4.00	24.0	0.00	0.00	0.00	0.00	0.00
5.00	24.0	0.00	0.00	0.00	0.00	0.00
6.00	24.0	0.00	0.00	0.00	0.00	0.00

7.00	24.0	0.00	0.00	0.00	0.00	0.00
8.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
10.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
12.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
14.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
16.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	0.00	0.00	0.00	0.00	0.00
18.00	24.0	0.00	0.00	0.00	0.00	0.00
19.00	24.0	0.00	0.00	0.00	0.00	0.00
20.00	24.0	0.16	21.99	22.15	11.07	66.13
21.00	24.0	0.93	20.19	21.12	10.56	61.49
22.00	24.0	1.67	19.82	21.50	10.75	61.14
23.00	24.0	2.38	20.26	22.64	11.32	63.17
24.00	24.0	3.00	21.17	24.17	12.08	66.50
25.00	24.0	3.47	22.84	26.31	13.15	71.98
26.00	24.0	3.85	24.97	28.82	14.41	78.77
27.00	24.0	4.20	27.28	31.48	15.74	86.03
28.00	24.0	4.51	29.75	34.26	17.13	93.76
29.00	24.0	4.94	31.66	36.60	18.30	99.93
30.00	24.0	5.60	32.30	37.91	18.95	102.51
31.00	24.0	6.40	42.97	49.37	24.68	135.30
32.00	24.0	7.19	96.30	103.49	51.74	296.08
33.00	24.0	7.99	141.18	149.16	74.58	431.52
34.00	24.0	8.78	169.18	177.96	88.98	516.31
35.00	24.0	9.57	180.29	189.86	94.93	550.43
36.00	24.0	10.37	183.37	193.73	96.87	560.47
37.00	24.0	11.16	187.28	198.44	99.22	572.99
38.00	24.0	11.95	195.18	207.13	103.57	597.49
39.00	24.0	14.19	199.57	213.76	106.88	612.91
40.00	24.0	22.19	168.47	190.66	95.33	527.60
41.00	24.0	29.07	156.27	185.34	92.67	497.87
42.00	24.0	33.71	174.72	208.43	104.22	557.87
43.00	24.0	36.12	216.93	253.06	126.53	686.92
44.00	24.0	37.49	267.18	304.67	152.33	839.03
45.00	24.0	39.00	316.60	355.60	177.80	988.80
46.00	24.0	41.13	362.02	403.16	201.58	1127.20
47.00	24.0	44.36	400.29	444.64	222.32	1245.22
48.00	24.0	48.67	431.39	480.07	240.03	1342.85
49.00	24.0	54.32	452.04	506.36	253.18	1410.43
50.00	24.0	61.53	458.92	520.45	260.23	1438.29
51.00	24.0	69.53	458.92	528.45	264.23	1446.29
52.00	24.0	77.53	458.92	536.45	268.23	1454.29
53.00	24.0	85.53	458.92	544.45	272.23	1462.29
54.00	24.0	93.53	458.92	552.45	276.23	1470.29
55.00	24.0	101.53	458.92	560.45	280.23	1478.29
56.00	24.0	109.53	458.92	568.45	284.23	1486.29
57.00	24.0	117.53	458.92	576.45	288.23	1494.29
58.00	24.0	125.53	458.92	584.45	292.23	1502.29
59.00	24.0	133.53	458.92	592.45	296.23	1510.29
60.00	24.0	141.53	458.92	600.45	300.23	1518.29
61.00	24.0	149.53	458.92	608.45	304.23	1526.29
62.00	24.0	157.53	458.92	616.45	308.23	1534.29
63.00	24.0	165.53	458.92	624.45	312.23	1542.29
64.00	24.0	173.53	458.92	632.45	316.23	1550.29
65.00	24.0	181.53	458.92	640.45	320.23	1558.29
66.00	24.0	189.53	458.92	648.45	324.23	1566.29
67.00	24.0	197.53	458.92	656.45	328.23	1574.29
68.00	24.0	205.53	458.92	664.45	332.23	1582.29
69.00	24.0	213.53	458.92	672.45	336.23	1590.29
70.00	24.0	221.53	458.92	680.45	340.23	1598.29
71.00	24.0	229.53	458.92	688.45	344.23	1606.29
72.00	24.0	237.53	458.92	696.45	348.23	1614.29

NOTES
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1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 2 x THE MOBILIZED END BEARING.

General Information:

Input file: ..... Bridge\Revised II 02-18-21\Bridge\FB-DEEP\Driven Piles\B-2.in
Project number: HR20-1583R
Job name: Atlantic Isles Lagoon Bridge
Engineer: CS
Units: English

Analysis Information:

Analysis Type: SPT

Soil Information:

Boring date: 12/04/17, Boring Number: B-2
Station number: 14+10 (BL ATLANTIC AVE.) Offset: 20.0 RT

Ground Elevation: 2.400(ft)

Hammer type: Automatic Hammer, Correction factor = 1.24

ID	Depth (ft)	No. of Blows (Blows/ft)	Soil Type
1	0.00	4.00	5- Cavity layer
2	2.00	4.00	5- Cavity layer
3	4.00	2.00	5- Cavity layer
4	6.00	2.00	5- Cavity layer
5	8.00	1.00	5- Cavity layer
6	10.00	4.00	5- Cavity layer
7	13.00	2.00	5- Cavity layer
8	15.00	1.00	5- Cavity layer
9	17.40	6.00	5- Cavity layer
10	17.40	8.00	4- Lime Stone/Very shelly sand
11	18.00	8.00	4- Lime Stone/Very shelly sand
12	20.00	7.00	4- Lime Stone/Very shelly sand
13	23.00	5.00	4- Lime Stone/Very shelly sand
14	25.00	8.00	4- Lime Stone/Very shelly sand
15	28.00	8.00	4- Lime Stone/Very shelly sand
16	30.00	5.00	4- Lime Stone/Very shelly sand
17	33.00	8.00	4- Lime Stone/Very shelly sand
18	35.00	8.00	4- Lime Stone/Very shelly sand
19	36.40	8.00	4- Lime Stone/Very shelly sand
20	36.40	47.00	4- Lime Stone/Very shelly sand
21	38.00	47.00	4- Lime Stone/Very shelly sand
22	38.00	3.00	3- Clean sand
23	40.00	3.00	3- Clean sand
24	42.00	6.00	3- Clean sand
25	42.90	6.00	3- Clean sand
26	43.00	100.00	4- Lime Stone/Very shelly sand
27	44.00	100.00	4- Lime Stone/Very shelly sand
28	48.00	41.00	4- Lime Stone/Very shelly sand
29	50.00	100.00	4- Lime Stone/Very shelly sand
30	53.00	100.00	4- Lime Stone/Very shelly sand
31	55.00	100.00	4- Lime Stone/Very shelly sand
32	58.00	100.00	4- Lime Stone/Very shelly sand
33	60.00	100.00	4- Lime Stone/Very shelly sand
34	62.00	100.00	4- Lime Stone/Very shelly sand
35	65.00	100.00	4- Lime Stone/Very shelly sand
36	68.00	100.00	4- Lime Stone/Very shelly sand
37	70.00	100.00	4- Lime Stone/Very shelly sand
38	73.00	100.00	4- Lime Stone/Very shelly sand
39	75.00	10.00	4- Lime Stone/Very shelly sand
40	78.00	19.00	4- Lime Stone/Very shelly sand
41	80.00	60.00	4- Lime Stone/Very shelly sand

Blowcount Average Per Soil Layer

Layer Num.	Starting Elevation (ft)	Bottom Elevation (ft)	Thickness (ft)	Average Blowcount (Blows/ft)	Soil Type
1	2.40	-15.00	17.40	2.55	5-Void
2	-15.00	-35.60	20.60	10.16	4-Limestone, Very Shelly Sand
3	-35.60	-40.60	5.00	3.60	3-Clean Sand
4	-40.60	-77.60	37.00	85.14	4-Limestone, Very Shelly Sand

Driven Pile Data:

Pile unit weight = 150.00(pcf), Section Type: Square

Pile Geometry:

Width (in)	Length (ft)	Tip Elev. (ft)
24.00	1.00	1.40
24.00	2.00	0.40
24.00	3.00	-0.60
24.00	4.00	-1.60
24.00	5.00	-2.60
24.00	6.00	-3.60
24.00	7.00	-4.60
24.00	8.00	-5.60
24.00	9.00	-6.60
24.00	10.00	-7.60
24.00	11.00	-8.60
24.00	12.00	-9.60
24.00	13.00	-10.60
24.00	14.00	-11.60
24.00	15.00	-12.60
24.00	16.00	-13.60
24.00	17.00	-14.60
24.00	18.00	-15.60
24.00	19.00	-16.60
24.00	20.00	-17.60
24.00	21.00	-18.60
24.00	22.00	-19.60
24.00	23.00	-20.60
24.00	24.00	-21.60
24.00	25.00	-22.60
24.00	26.00	-23.60
24.00	27.00	-24.60
24.00	28.00	-25.60
24.00	29.00	-26.60
24.00	30.00	-27.60
24.00	31.00	-28.60
24.00	32.00	-29.60
24.00	33.00	-30.60
24.00	34.00	-31.60
24.00	35.00	-32.60
24.00	36.00	-33.60
24.00	37.00	-34.60
24.00	38.00	-35.60
24.00	39.00	-36.60
24.00	40.00	-37.60
24.00	41.00	-38.60
24.00	42.00	-39.60
24.00	43.00	-40.60
24.00	44.00	-41.60
24.00	45.00	-42.60
24.00	46.00	-43.60
24.00	47.00	-44.60
24.00	48.00	-45.60
24.00	49.00	-46.60
24.00	50.00	-47.60
24.00	51.00	-48.60
24.00	52.00	-49.60
24.00	53.00	-50.60
24.00	54.00	-51.60
24.00	55.00	-52.60
24.00	56.00	-53.60
24.00	57.00	-54.60
24.00	58.00	-55.60
24.00	59.00	-56.60
24.00	60.00	-57.60
24.00	61.00	-58.60
24.00	62.00	-59.60
24.00	63.00	-60.60
24.00	64.00	-61.60
24.00	65.00	-62.60
24.00	66.00	-63.60
24.00	67.00	-64.60
24.00	68.00	-65.60
24.00	69.00	-66.60
24.00	70.00	-67.60
24.00	71.00	-68.60
24.00	72.00	-69.60

Driven Pile Capacity:

Section Type: Square
Pile Width: 24.00 (in)

Test Pile Length (ft)	Pile Width (in)	Ultimate Side Friction (tons)	Mobilized End Bearing (tons)	Estimated Davisson Capacity (tons)	Allowable Pile Capacity (tons)	Ultimate Pile Capacity (tons)
1.00	24.0	0.00	0.00	0.00	0.00	0.00
2.00	24.0	0.00	0.00	0.00	0.00	0.00
3.00	24.0	0.00	0.00	0.00	0.00	0.00
4.00	24.0	0.00	0.00	0.00	0.00	0.00
5.00	24.0	0.00	0.00	0.00	0.00	0.00
6.00	24.0	0.00	0.00	0.00	0.00	0.00
7.00	24.0	0.00	0.00	0.00	0.00	0.00
8.00	24.0	0.00	0.00	0.00	0.00	0.00
9.00	24.0	0.00	0.00	0.00	0.00	0.00
10.00	24.0	0.00	0.00	0.00	0.00	0.00
11.00	24.0	0.00	0.00	0.00	0.00	0.00
12.00	24.0	0.00	0.00	0.00	0.00	0.00
13.00	24.0	0.00	0.00	0.00	0.00	0.00
14.00	24.0	0.00	0.00	0.00	0.00	0.00
15.00	24.0	0.00	0.00	0.00	0.00	0.00
16.00	24.0	0.00	0.00	0.00	0.00	0.00
17.00	24.0	0.00	0.00	0.00	0.00	0.00
18.00	24.0	0.48	27.14	27.61	13.81	81.89
19.00	24.0	1.24	27.27	28.51	14.26	83.05
20.00	24.0	1.96	27.66	29.62	14.81	84.94
21.00	24.0	2.63	27.96	30.59	15.29	86.51
22.00	24.0	3.22	27.84	31.06	15.53	86.73
23.00	24.0	3.75	27.92	31.67	15.84	87.52
24.00	24.0	4.32	28.31	32.63	16.31	89.25
25.00	24.0	5.04	28.44	33.48	16.74	90.35
26.00	24.0	5.83	28.44	34.27	17.14	91.15
27.00	24.0	6.63	28.44	35.06	17.53	91.94
28.00	24.0	7.42	28.44	35.86	17.93	92.73
29.00	24.0	8.14	43.41	51.55	25.77	138.37
30.00	24.0	8.71	68.88	77.59	38.79	215.35
31.00	24.0	9.26	68.11	77.37	38.68	213.59
32.00	24.0	9.90	66.83	76.73	38.37	210.40
33.00	24.0	10.64	65.53	76.18	38.09	207.24
34.00	24.0	11.44	64.97	76.40	38.20	206.34
35.00	24.0	12.23	67.57	79.80	39.90	214.93
36.00	24.0	13.02	120.89	133.92	66.96	375.71
37.00	24.0	16.14	155.47	171.61	85.80	482.54
38.00	24.0	20.80	145.28	166.08	83.04	456.65
39.00	24.0	21.37	105.08	126.45	63.22	336.61
40.00	24.0	21.93	124.82	146.75	73.38	396.40
41.00	24.0	22.64	140.18	162.82	81.41	443.17
42.00	24.0	23.44	149.52	172.96	86.48	472.01
43.00	24.0	25.10	358.92	384.02	192.01	1101.85
44.00	24.0	33.10	358.92	392.02	196.01	1109.85
45.00	24.0	40.61	363.08	403.69	201.85	1129.86
46.00	24.0	47.14	375.58	422.72	211.36	1173.89
47.00	24.0	52.68	396.42	449.10	224.55	1241.93
48.00	24.0	57.24	425.59	482.82	241.41	1333.99
49.00	24.0	62.29	450.59	512.87	256.44	1414.05
50.00	24.0	69.31	458.92	528.23	264.11	1446.07
51.00	24.0	77.31	458.92	536.23	268.11	1454.07
52.00	24.0	85.31	458.92	544.23	272.11	1462.07
53.00	24.0	93.31	458.92	552.23	276.11	1470.07
54.00	24.0	101.31	458.92	560.23	280.11	1478.07
55.00	24.0	109.31	458.92	568.23	284.11	1486.07
56.00	24.0	117.31	458.92	576.23	288.11	1494.07
57.00	24.0	125.31	458.92	584.23	292.11	1502.07
58.00	24.0	133.31	458.92	592.23	296.11	1510.07
59.00	24.0	141.31	458.92	600.23	300.11	1518.07
60.00	24.0	149.31	458.92	608.23	304.11	1526.07
61.00	24.0	157.31	458.92	616.23	308.11	1534.07
62.00	24.0	165.31	458.92	624.23	312.11	1542.07
63.00	24.0	173.31	458.92	632.23	316.11	1550.07
64.00	24.0	181.31	458.92	640.23	320.11	1558.07
65.00	24.0	189.31	458.92	648.23	324.11	1566.07
66.00	24.0	197.31	445.85	643.16	321.58	1534.86
67.00	24.0	205.31	406.65	611.95	305.98	1425.24
68.00	24.0	213.31	355.20	568.51	284.25	1278.90
69.00	24.0	221.31	305.41	526.72	263.36	1137.54
70.00	24.0	229.31	257.28	486.58	243.29	1001.14
71.00	24.0	237.31	217.10	454.40	227.20	888.59
72.00	24.0	245.31	191.15	436.46	218.23	818.76

NOTES

1. MOBILIZED END BEARING IS 1/3 OF THE ORIGINAL RB-121 VALUES.

2. DAVISSON PILE CAPACITY IS AN ESTIMATE BASED ON FAILURE CRITERIA, AND EQUALS ULTIMATE SIDE FRICTION PLUS MOBILIZED END BEARING.

3. ALLOWABLE PILE CAPACITY IS 1/2 THE DAVISSON PILE CAPACITY.

4. ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS 3 x THE MOBILIZED END BEARING.
   EXCEPTION: FOR H-PILES TIPPED IN SAND OR LIMESTONE, THE ULTIMATE PILE CAPACITY IS ULTIMATE SIDE FRICTION PLUS

SOIL/ROCK PARAMETERS FOR LATERAL ANALYSIS WITH FB-MULTIPIER FOR DRIVEN PILES

ATLANTIC ISLE BRIDGE OVER OCEAN CANAL

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 6
FINANCIAL PROJECT ID No. 430029-2-22-02
MIAMI-DADE COUNTY, FLORIDA
HR ENGINEERING SERVICES. INC.
HRES PROJECT No. HR20-1583R
FEBRUARY 24, 2021

				Range of Elevation, ft						Lateral					Axial					Torsion				Tip			
End Bent	Pile Size (in)	Test Boring No.	Layer No.	From	To	Soil Description	Soil Type	SPT N_{avg} Auto	SPT N_{avg} Safety	Soil Model	Angle of Internal Friction, ϕ (Deg.)	Total Unit Weight, γ (pcf)	Subgrade Modulus, k (pci)	Unconfined Compressive Strength (psf)	Soil Model	Total Unit Weight, γ (pcf)	Shear Modulus, G (ksi)	Poisson's Ratio, ν	Ult. Skin Friction (psf)	Soil Model	Total Unit Weight, γ (pcf)	Shear Modulus, G (ksi)	Torsional Shear Stress (psf)	Soil Model	Shear Modulus, G (ksi)	Poisson's Ratio, ν	24-inch Pile Axial Bearing Failure (kips)
1 and 2	24	B1 and B-2	1	-15.0	-34.0	Limestone	Cohesionless	8	10	Sand (Reese)	30	120	20	--	Driven Pile	120	2.9	0.2	198	Hyperbolic	120	2.9	198	Driven Pile (McVay)	2.9	0.2	286
			2	-34.0	-40.0	Sand	Cohesionless	7	9	Sand (Reese)	30	106	17	--	Driven Pile	106	0.7	0.3	330	Hyperbolic	106	0.7	330	Driven Pile (McVay)	0.7	0.3	222
			3	-40.0	-70.0	Limestone	Cohesionless	40	50	Sand (Reese)	34	120	125	--	Driven Pile	120	14.4	0.2	992	Hyperbolic	120	14.4	992	Driven Pile (McVay)	14.4	0.2	1428

Preforming Elevation (ft) : -34 Preforming is required to this elevation
Pile Size (in) : 24

Notes:

Friction Angle

ϕ = 28+N(safety)/4 with maximum of 34° for fill and sand
ϕ = 33+N(safety)/4 with maximum of 40° for limestone or sandstone

Total Unit Weight

γ = 105*ϕ/30 with maximum 119 pcf for sand and fill
γ = 120 pcf for limestone and sandstone

Subgrade Modulus

The subgrade modulus (k) for cohesionless material was estimated using the FB-Multipier Help Manual Figure 12.3b.

Shear Modulus (G)

G (ksi) = E/[2(1+ν)]
E (psf) = 30000*N(safety) for fill and sand , from FB-Multipier Manual
E (psf) = 100000*N (safety) for rock, from see below

For $qt \approx 0.2\,qu$

From $f = 0.5\sqrt{qu \times qt}$ and $fs = 0.2N\,(ksf)$

$f = 0.5\sqrt{qu \times 0.2qu}$

$f = 0.224\,qu$

$f = 0.224\,qu = 0.2N$

So $qu = 0.894N$

$Es = 115qu$

$Es = 115 \times 0.894\,N$

$Es = 103\,N$ Use $Es = 100\,N$

Poisson's Ratio (v)

v=0.3 for sand and fill
v=0.2 for limestone and sandstone

Ultimate Skin Friction and Torsional Shear Stress

t_f = 0.019 N(safety) (tsf) = 38N (psf) for sand and fill
t_f = 0.01 N(safety) (tsf) = 20N (psf) for limestone and sandstone

Pile Axial Bearing Failure

Pile Axial Bearing Failure (kips) = q_{ult}*Pile Tip Area
End Bearing (q_{ult}) = 6.4N(safety) in ksf for sand and fill
End Bearing (q_{ult}) = 7.2N(safety) in ksf for limestone and sandstone

HNTB The HNTB Companies Infrastructure Solutions	Made FL	Date 2/22/2021	Job Number 70078
	Checked CAM	Date 2/24/2021	
For 430029-2 Atlantic Isle Ave over Ocean Canal	Backchk'd FL	Date 2/25/2021	Sheet No. 1

Estimated Bridge Foundation Loads for Bridge Replacement Alternative

Loads on Driven Piles Alternative

Loads per pile based on (3) piles at Each End Bent

End Bent	Factored		Service	
	Axial (tons)	Lateral (tons)	Axial (tons)	Lateral (tons)
1	87	20	54	13
2	87	20	54	13

Loads on Drilled Shafts Alternative

Loads per drilled shaft based on (2) 48" diameter drilled shafts at each End Bent

End Bent	Factored		Service	
	Axial (tons)	Lateral (tons)	Axial (tons)	Lateral (tons)
1	125	30	78	19
2	125	30	78	19

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APPENDIX D

"GTR REVIEW CHECKLIST" (PILE FOUNDATIONS)

G. Structure Foundations - Piles (Pages 224-311)

In addition to the basic information listed in Section A, if pile support is recommended or given as an alternate, conclusions/recommendations should be provided in the project geotechnical report for the following:

	Question	Yes	No	Unknown or N/A
*1.	Is the recommended pile type given (displacement, nondisplacement, pipe pile, concrete pile, H-pile, etc.) with valid reasons given for choice and/or exclusion? (Pages 224-226)	☑	☐	☐
2.	Do you consider the recommended pile type(s) to be the most suitable and economical?	☑	☐	☐
*3.	Are estimated pile lengths and estimated tip elevations given for the recommended allowable pile design loads?	☐	☐	☑
4.	Do you consider the recommended design loads to be reasonable?	☐	☐	☑
5.	Has pile group settlement been estimated (only of practical significance for friction pile groups ending in cohesive soil)? (Pages 245-247)	☐	☐	☑
6.	If a specified or minimum pile tip elevation is recommended, is a clear reason given for the required tip elevation, such as underlying soft layers, scour, downdrag, piles uneconomically long, etc.?	☑	☐	☐
*7.	Has design analysis (wave equation analysis) verified that the recommended pile section can be driven to the estimated or specified tip elevation without damage (especially applicable where dense gravel-cobble-boulder layers or other obstructions have to be penetrated)?	☐	☐	☑
8.	Where scour piles are required, have pile design and driving criteria been established based on mobilizing the full pile design capacity below the scour zone?	☐	☐	☑

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Pile Foundations - Piles (Cont.)	Yes	No	Unknown or N/A
9. Where lateral load capacity of large diameter piles is an important design consideration, are p-y curves (load vs. deflection) or soil parameters given in the geotechnical report to allow the structural engineer to evaluate lateral load capacity of all piles?	☑	☐	☐
*10. For pile supported bridge abutments over soft ground:			
a. Has abutment pile downdrag load been estimated and solutions such as bitumen coating considered in design? Not generally required if surcharging of the fill is being performed. (Pages 248-251)	☑	☐	☐
b. Is bridge approach slab recommended to moderate differential settlement between bridge ends and fill?	☐	☐	☑
c. If the majority of subsoil settlement will not be removed prior to abutment construction (by surcharging), has estimate been made of the amount of abutment rotation that can occur due to lateral squeeze of soft subsoil? (Pages 114-115)	☐	☐	☑
d. Does the geotechnical report specifically alert the structural designer to the estimated horizontal abutment movement?	☐	☐	☑
11. If bridge project is large, has pile load test program been recommended? (Pages 299-302)	☐	☐	☑
12. For a major structure in high seismic risk area, has assessment been made of liquefaction potential of foundation soil during design earthquake (note: only loose saturated sands and silts are "susceptible" to liquefaction)?	☐	☐	☑

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Structure Foundations - Piles - (Cont.)

13. Construction Considerations: (Pages 279-311)

Have the following important construction considerations been adequately addressed?

	Yes	No	Unknown or N/A
a. Pile driving details such as: boulders or obstructions which may be encountered during driving - need for preaugering, jetting, spudding, need for pile tip reinforcement, driving shoes, etc.?	☑	☐	☐
b. Excavation requirements - safe slope for open excavations, need for sheeting or shoring? Fluctuation of groundwater table?	☑	☐	☐
c. Have effects of pile driving operation on adjacent structures been evaluated - such as protection against damage caused by footing excavations or pile driving vibrations?	☑	☐	☐
d. Is preconstruction condition survey to be made of adjacent structures to prevent unwarranted damage claims?	☑	☐	☐
e. On large pile driving projects have other methods of pile driving control been considered such as dynamic testing or wave equation analysis?	☐	☐	☑

*A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

APPENDIX D
Load Rating Report

BOTAS Engineering, Inc.
STRUCTURAL ENGINEERS

LOAD RATING CALCULATIONS

BRIDGE NAME: ATLANTIC ISLE LAGOON BRIDGE
MIAMI DADE COUNTY
(BRIDGE NO. 874218)

FOR: DISTRICT VI - FDOT
MAINTENANCE DEPARTMENT
1000 N.W. 111 AVENUE
MIAMI, FLORIDA 33172

DATE: NOVEMBER 22, 2012

7875 NW 12th Street, Suite #120 • Miami, FL 33126 • Tel: 305-418-9111 • Fax: 305-418-9112

November 21, 2012

State of Florida
Department of Transportation
1000 N.W. 111th Avenue
Miami, Florida 33172

Attn: Mr. Giuseppe Noto

Subject: Atlantic Isle Lagoon Bridge, Sunny Isles, Fl.
(Bridge No. 874218) - Load Rating.

Dear Giuseppe:

As requested, we performed the load rating analysis for the above-mentioned structure.

The above-mentioned arch bridge was built in 1920, and it is currently posted. The bridge was analyzed using STAAD III-Pro/Finite Element and it was modeled considering a varying section to simulate the arch with pinned supports.

Analysis Considerations.

For the STAAD analysis, the following superimposed dead loads were considered:

- 30 psf of wearing surface.
- Traffic barriers.
- Concrete plant pots.

Only 1-lane of traffic was considered since the curb-to-curb width is 10'-6".

Four (4) Florida Legal Load Trucks and the Design Load HS-20 were considered.

The load rating analysis was performed using the Allowable Stress Method.

The geometry of the arch was obtained from the previous Load Rating and the actual varying thickness of the superstructure section was obtained from the GeoView Report dated 9/2/2012.

Assumptions:

Since the bridge top surface is covered with 2 in. of asphalt and the bottom surface is covered with stucco, the actual deterioration conditions cannot be determined neither from our site visit nor any previous inspection reports.

The bridge is over 90 yrs old and it spans over salt water. Due to the existing condition of the bridge and its location, a 50% reduction in the section was estimated for the Load Rating analysis. The existing rebars shown in the Geoview Report were not considered in the analysis due to the location of the rebars and the possible advanced condition of rust and section loss.

Conclusion:

Based on the results of our load rating analysis, the bridge requires posting for all the Florida Legal Loads.

If you have any question regarding our submittal or if you need any additional information, please give us a call.

Sincerely,
BOTAS ENGINEERING, INC.

Patricia M. Botas, P.E.
President

7875 NW 12th Street, Suite #120 • Miami, FL 33126 • Tel: 305-418-9111 • Fax: 305-418-9112

Bridge #	Load Rating Summary Details for Reinforced Concrete Bridges	Table Date
874218		8/1/2011

LRFR using Part B

Level	Vehicle	Weight (tons)	Load Factors LL	Load Factors DL	Moment (Strength) Distribution Factor (DF)	Moment Rating Factor	Moment Tons	Moment Location	Moment Dimension	Shear (Strength) Distribution Factor (DF)	Shear Rating Factor	Shear Tons	Shear Location	Shear Dimension	Member & Description (Interior or Exterior, Governing, Member Type, Etc.)	PONTIS Location	PONTIS Value (Tons)
Operating (Strength)	HS-20	36.0	1.30	1.30	N/A	0.51	18.47	A	21.50						Concrete Arch at Crown	O.R. (64) [Gov Span]	18.5
--			--	--						--	--	--	--	--			
Operating (Strength)			1.30	1.30												HS20 O.R. **Max** Span	-1.0
--			--	--						--	--	--	--	--			
Inventory (Strength)			2.17	1.30	N/A	0.41	14.65	A	21.50						Concrete Arch at Crown	Inventory Rating (66)	14.7
--			--	--						--	--	--	--	--			
Operating (Strength)	SU2	17.0	1.30	1.30	N/A	0.74	12.53	A	21.50						Concrete Arch at Crown	Single Unit Truck 2 Axles	12.5
	SU3	33.0	1.30	1.30	N/A	0.47	15.38	A	21.50						Concrete Arch at Crown	Single Unit Truck 3 Axles	15.4
	SU4	35.0	1.30	1.30	N/A	0.47	16.49	A	21.50						Concrete Arch at Crown	Single Unit Truck 4 Axles	16.5
	C3	28.0	1.30	1.30	N/A	0.75	21.08	A	21.50						Concrete Arch at Crown	Comb. Unit Truck 3 Axles	21.1
	C4	36.7	1.30	1.30												Comb. Unit Truck 4 Axles	-1.0
	C5	40.0	1.30	1.30												Comb. Unit Truck 5 Axles	-1.0
	ST5	40.0	1.30	1.30												Truck Trailer 5 Axles	-1.0

Notes

General Notes	1. This table is based on the requirements established in the 2011 "Bridge Load Rating Manual".
Notes to Designer	2. Modify or replace the Rating Location sketch showing Span Length(s) to resemble the bridge being rated.
Additional Notes	3. For each vehicle in the table, state whether the rating is for the interior or exterior member and whether or not that member governs.
	4. Cells shaded in this color will automatically populate based upon data provided in other fields (rating factor, bridge #, etc.) on this form.

Bridge Load Rating Manual & Bridge Management System (BMS) Coding Guide are available at:
http://www.dot.state.fl.us/statemaintenanceoffice/StructuresOperations.shtm

Comments

HS20 (O.R.) (**Gov**)	Concrete Arch at Crown - Span No.1
HS20 (O.R.) (**Max**)	
HS20 (I.R.)	Concrete Arch at Crown - Span No.1
SU2	Concrete Arch at Crown - Span No.1
SU3	Concrete Arch at Crown - Span No.1
SU4	Concrete Arch at Crown - Span No.1
C3	Concrete Arch at Crown - Span No.1
C4	
C5	
ST5	

E.G.: DF method if other than LRFD, other appropriate comments, etc.

PONTIS Information

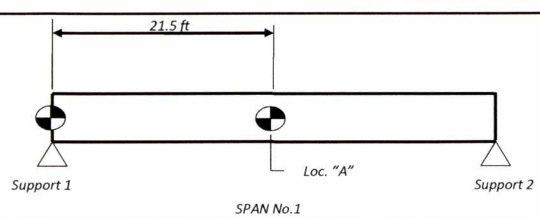
Load Rating Date	11/25/12	Structure Number (8)	874218
Initials	JF	Reason for L.R.	Update
Load Distribution Factor	N/A	Load Rating Origination	[C] Field Measurements
Impact Factor	30.0%	Design Method	[A] Working Stress
		Method of Calculation	[4] Others
Design Load (31)	[5] MS18 (HS20 or HS20-S16-44)		
Operating Type (63)	[2] Allowable Stress (AS)		
Inventory Type (65)	[2] Allowable Stress (AS)		
Main Type Material (43A)	[1] Concrete		
Main Type Design (43B)	[11] Arch - Deck		
Approach Type Material (44A)			
Approach Type Design (44B)			
Open/Posted/Closed (41)	[B] POSTING RECOMMENDED		
Posting (70)	[0] > 39.9% BELOW (0.000-0.600) (Required)		

Posting Recommend		Load Ratings		Floor Beam (FB)	
SU	12.5 tons	Operating Rating (64) [Gov]	18.5 tons	FB Present	No
C	21.1 tons	HS20 O.R. **Max** Span	-1.0 tons	Gov FB Span	
T	N/A	Inventory Rating (66)	14.7 tons	Gov FB Spacing	
Posting Date					
Spans in Main Unit (45)	1	Single Unit Truck 2 Axles	12.5 tons	FB HS20 Rating	
Approach Spans (46)	0	Single Unit Truck 3 Axles	15.4 tons	FB SU4 Rating	
HS20 Gov Span Length	43.0 ft	Single Unit Truck 4 Axles	16.5 tons	FB FL 120	
Length of Max Span (48)	43.0 ft	Comb. Unit Truck 3 Axles	21.1 tons	FB OPR Rating Factor	
Structure Length (49)	43.0 ft	Comb. Unit Truck 4 Axles	-1.0 tons	FB INV Rating Factor	
Total Length	43.0 ft	Comb. Unit Truck 5 Axles	-1.0 tons	Truck Trailer 5 Axles	-1.0 tons

P.E. Information

Performed By/Date:	Jovana Fernandez	11/25/12
Checked By/Date:	PATRICIA M. BOTAS	11/25/12
P.E. & FL P.E. Lic. #:	PATRICIA M. BOTAS, P.E. Lic # 41829	
Physical Address:	7875 NW 12th Street #120 Doral, Florida 33126	
Email Address:	p_botas@botasengineering.com	
P.E. SEAL:		

PATRICIA M. BOTAS LICENSE No. 41829 STATE OF FLORIDA PROFESSIONAL ENGINEER
11/21/12 PE# 41829



BOTAS Engineering, Inc.
STRUCTURAL ENGINEERS

Bridge Nar Atlantic Isle Lagoon Bridge
Bridge # : 874218
Load Rating Location Point at: 0.5L

Date : 21-Nov-12
Calc. by : ES & JF
Checked by : PMB

TRUCKS	SELF WEIGHT + SUPERIMP. DL P/A + M/S TOP STRESS		SELF WEIGHT + SUPERIMP. DL P/A - M/S BOTTOM STRESS		LIVE LOADS P/A + M/S TOP STRESS		LIVE LOADS P/A - M/S BOTTOM STRESS		INVENTORY RATING TOP	INVENTORY RATING BOTTOM	OPERATING RATING TOP	OPERATING RATING BOTTOM	TRUCK WEIGHT TON	POSTING WEIGHT TON
SU2	-179.7	C	-37.7	C	-204.6	C	163.2	T			5.528	0.737	17.00	12.5
SU3	-179.9	C	-37.7	C	-329.7	C	258.2	T			3.430	0.466	33.00	15.4
SU4	-179.9	C	-40.6	C	-348.2	C	260.2	T			3.248	0.471	35.00	16.5
C3	-179.9	C	-37.7	C	-198.1	C	159.7	T			5.708	0.753	28.00	21.1
C4	*		*		*		*				*	*	*	*
C5	*		*		*		*				*	*	*	*
ST5	*		*		*		*				*	*	*	*
HS-20	-179.7	C	-37.7	C	-298.6	C	234.6	T	2.628	0.407	3.787	0.513	36.00	18.5

* Note: Due to the location of the bridge, trucks C4, C5 & ST5 cannot access the bridge, therefore, these trucks were not considered in the analisys.

AASHTO 8.15.2.1 - Allowable Stress Design

F'c = 3000 psi

Extreme fiber Stress in compression (Negative Value) 0.4F'c = -1200 psi

Extreme fiber Stress in tension (Positive Value) 0.21(7.5 Sqrt F'c) = 86.27 psi

$$\text{Inventory Rating Top} = \frac{-1200 - \text{Top (Selfweight + Superimp. DL)}}{1.3 * \text{LL}}$$

$$\text{Inventory Rating Bottom} = \frac{86.27 - \text{Bottom (Selfweight + Superimp. DL)}}{1.3 * \text{LL}}$$

$$\text{Operating Rating Top} = \frac{-1650 - \text{Top (Selfweight + Superimp. DL)}}{1.3 * \text{LL}}$$

$$\text{Operating Rating Bottom} = \frac{118.62 - \text{Bottom (Selfweight + Superimp. DL)}}{1.3 * \text{LL}}$$

BOTAS ENGINEERING, INC.

Patricia M. Botas, P.E.
FL. Registration No. 41829

Legend

Controlling Rating Factors
C = Compression (Negative Value)
T = Tension (Positive Value)

Atlantic Isle Lagoon Bridge

BRIDGE 874218

Input Data:

- Data :

Availability of plans:	No (FDOT records and Field measurements)
Year Built:	1925
Asphalt:	Yes (4" asphalt)
Designed for:	H-20.44
Number of Spans:	$n := 1$

- Typical cross section :

Cast-in-place Concrete Arch	19" Slab Thickness at Crown
	28" Slab Thickness at Support

Load Rating Analysis Criteria:

Load Rating Method:	LFD
Live Load:	HS-20.44
Section:	Simple Span

Materials:

Concrete Class A:	$F'c = 3.0$ Ksi
Reinforcing Steel:	$Fy = 33.0$ Ksi

Bridge Geometry:

Effective Span Length	$S := 43.0$ ft

67th St
Eastern Shores
166th St
NE 165th St
th Ave
826
Sunny Isles Blvd
NE 170th St
N Bay Rd
Bella Vista Island
874218
Atlantic Isle
Atlantic Island
Sunny Isles
Poincianna Island
Kings Point Dr
Royal Palm Island
Bayview Dr
1A
Interama Blvd
NE 151st St
Collins Ave
© 2012 Google
Google earth
Date: 3/26/2011
1995
25°55'45.21" N 80°07'46.17" W elev 1 ft
Eye alt 6507 ft

Bridge No. 874218: Atlantic Isle Lagoon Bridge

Picture Date: 10/15/12

BRIDGE ELEVATION

EAST APPROACH OF BRIDGE

Bridge No. 874218: Atlantic Isle Lagoon Bridge

Picture Date: 10/15/12

BRIDGE NUMBER

UNDER BRIDGE VIEW

Bridge No. 874218: Atlantic Isle Lagoon Bridge

Picture Date: 10/15/12

Longitudinal crack through asphalt on Bridge

	Job No	Sheet No 1	Rev
Software licensed to Botas	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 124

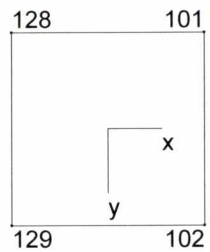


Plate Corner Displacements

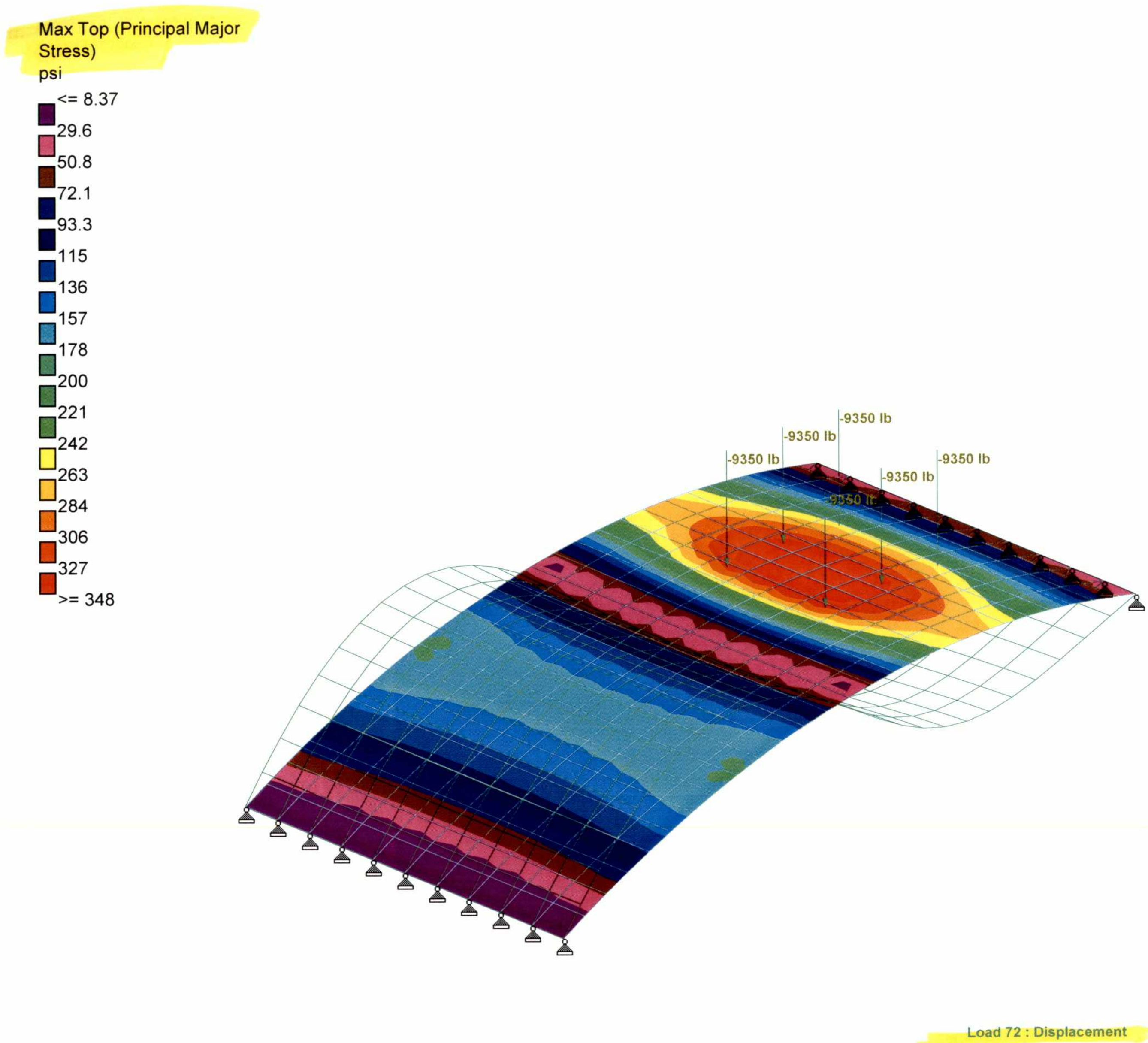
Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
128	-0.004931	-0.042275	0.000222
101	-0.005222	-0.044490	0.000446
102	-0.005407	-0.039833	0.000427
129	-0.005111	-0.037841	0.000212

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	44.486731	-184.787214	114.636973	88.974129
Bottom	-37.726112	-126.258418	44.266153	-82.633949

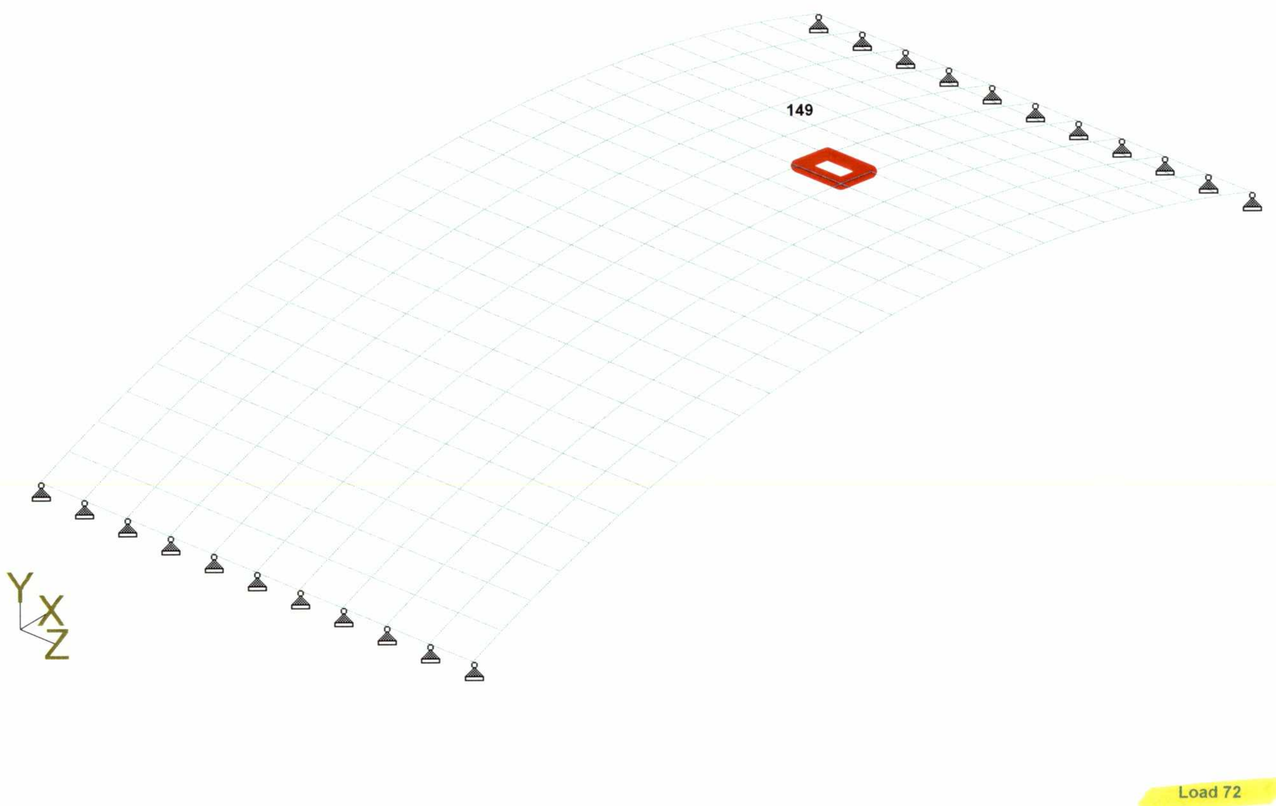
DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



SU4
LOAD
TOP

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 149

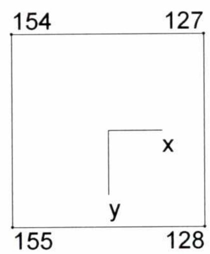


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
154	-0.025691	-0.095860	-0.000000
127	-0.025587	-0.095156	0.000032
128	-0.026340	-0.098241	0.000032
155	-0.026445	-0.098831	-0.000000

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-102.475807	-348.169982	122.847095	-89.968468
Bottom	252.216190	94.826445	78.694873	89.736130

S04
LOAD.

Software licensed to Botas

Job Title: Load Ratings Bridge 874218	Job No	Sheet No: 1	Rev
	Part		
	Ref		
	By	Date 17-Oct-12	Chd
Client	File: 874218 Pinned.std	Date/Time: 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 149

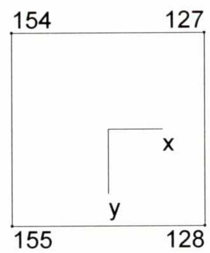


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
154	-0.004413	-0.045128	0.000000
127	-0.004503	-0.045939	0.000228
128	-0.004931	-0.042275	0.000222
155	-0.004834	-0.041530	0.000000

Plate Principal Stresses

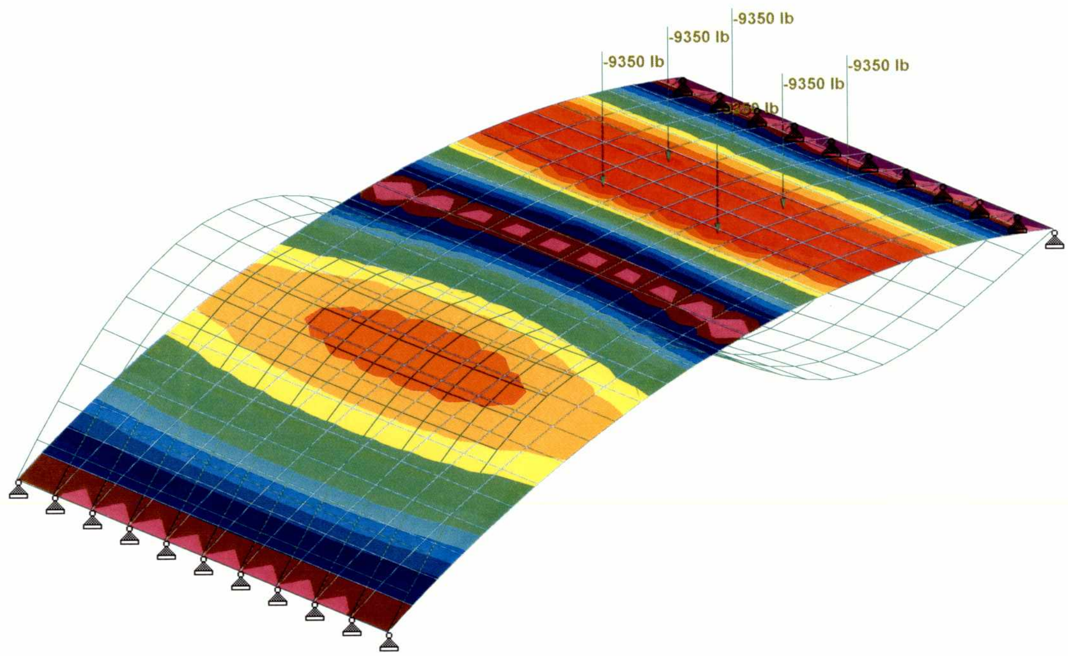
	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	50.714780	-179.947838	115.331307	89.742859
Bottom	-42.917050	-124.012634	40.547792	-87.691544

DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Max Bottom (Principal Major Stress)
psi

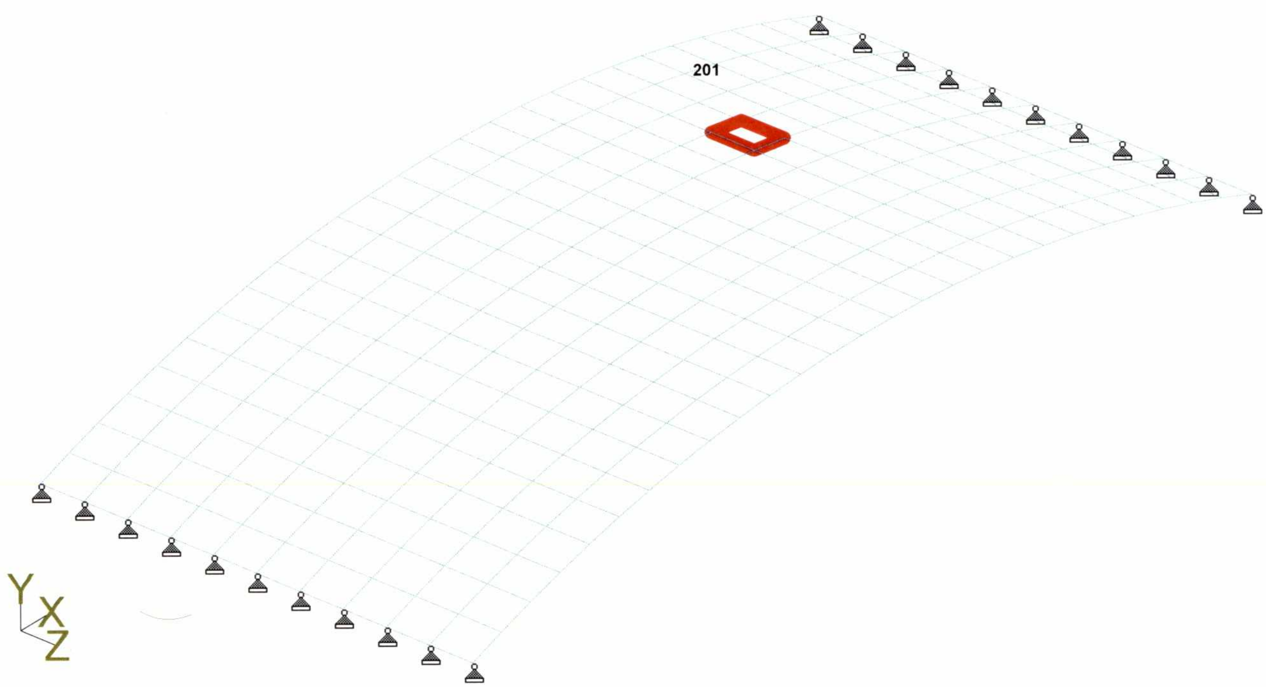
<= 9.99
25.6
41.3
56.9
72.5
88.2
104
119
135
151
166
182
198
213
229
245
>= 260



Load 73 : Displacement

SU4
LOAD
Bottom

Software licensed to Botas	Job No	Sheet No **1**		Rev
	Part			
Job Title Load Ratings Bridge 874218	Ref			
	By	Date 17-Oct-12		Chd
Client	File 874218 Pinned.std		Date/Time 15-Nov-2012 09:32	



Staad.Pro Query Stresses

Element no 201

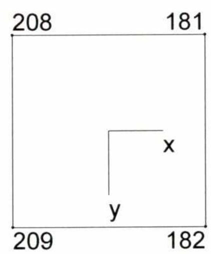


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
208	-0.024579	-0.087046	-0.000057
181	-0.024881	-0.089035	-0.000030
182	-0.025897	-0.094086	-0.000026
209	-0.025538	-0.091978	-0.000051

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-106.524929	-336.671144	115.073100	-89.479866
Bottom	260.192186	100.535393	79.828404	-88.589249

SU4
LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 201

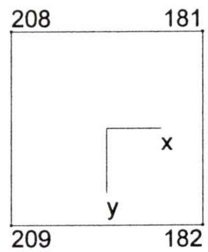


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
208	-0.004775	-0.048348	-0.000458
181	-0.004504	-0.045939	-0.000228
182	-0.004931	-0.042275	-0.000222
209	-0.005222	-0.044490	-0.000446

Plate Principal Stresses

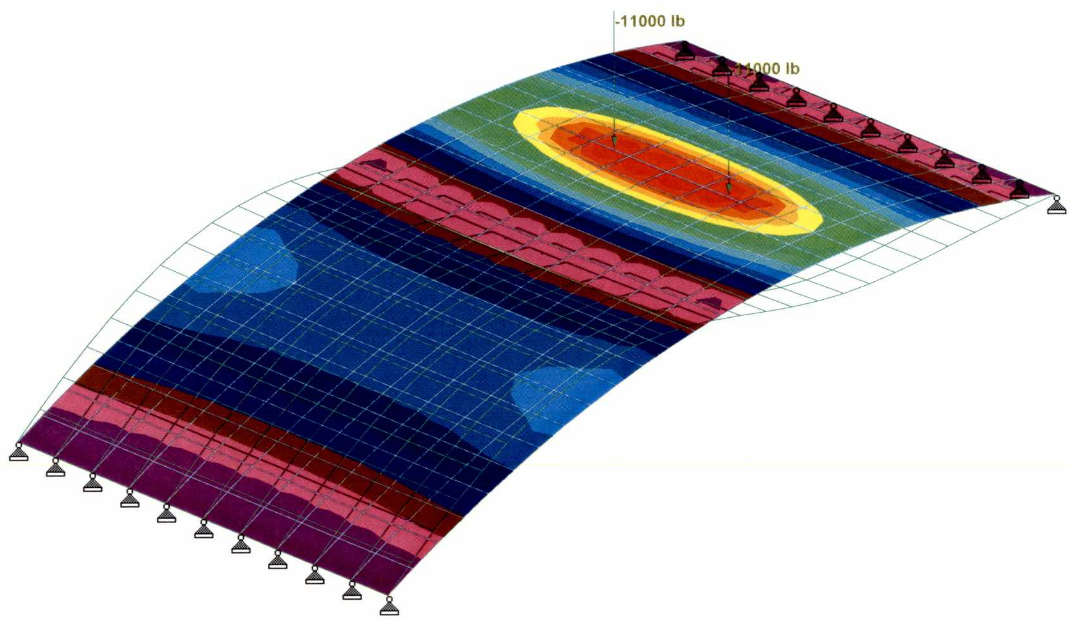
	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	48.390269	-186.554685	117.472477	-89.180008
Bottom	-40.641930	-129.080608	44.219337	83.741844

DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Max Top (Principal Major Stress)
psi

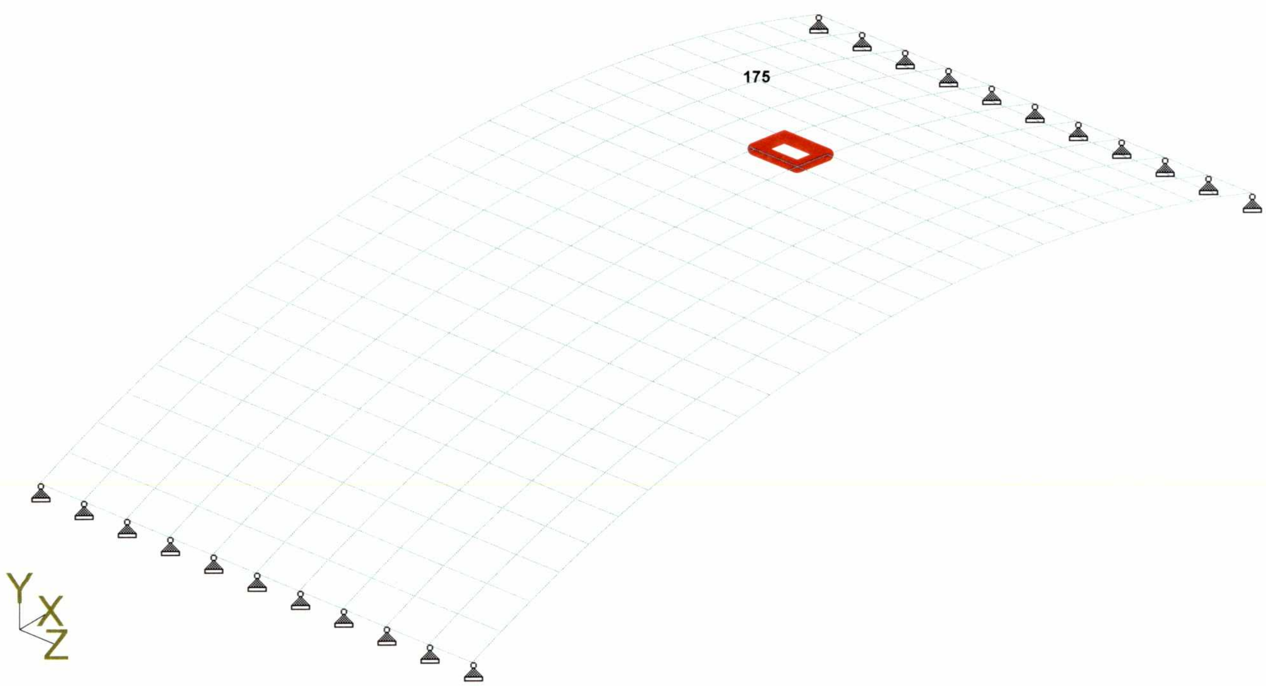
<= 3.88
16
28.2
40.3
52.4
64.6
76.7
88.9
101
113
125
137
150
162
174
186
>= 198



Load 187 : Displacement

C3
LOAD
TOP

Software licensed to Botas	Job No	Sheet No 1		Rev
	Part			
Job Title Load Ratings Bridge 874218	Ref			
	By	Date 17-Oct-12		Chd
Client	File 874218 Pinned.std		Date/Time 15-Nov-2012 09:32	



Load 187

Staad.Pro Query Stresses

Element no 175

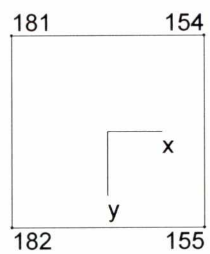


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
181	-0.011266	-0.044451	-0.000011
154	-0.011297	-0.044600	-0.000000
155	-0.011424	-0.044520	-0.000000
182	-0.011377	-0.044246	-0.000010

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-54.287050	-198.103964	71.908459	89.786423
Bottom	152.650148	49.511477	51.569335	-89.841599

C3
LOAD

Staad.Pro Query Stresses

Element no 175

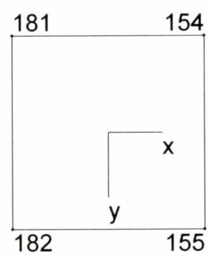


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
181	-0.004504	-0.045939	-0.000228
154	-0.004413	-0.045128	0.000000
155	-0.004834	-0.041530	0.000000
182	-0.004931	-0.042275	-0.000222

Plate Principal Stresses

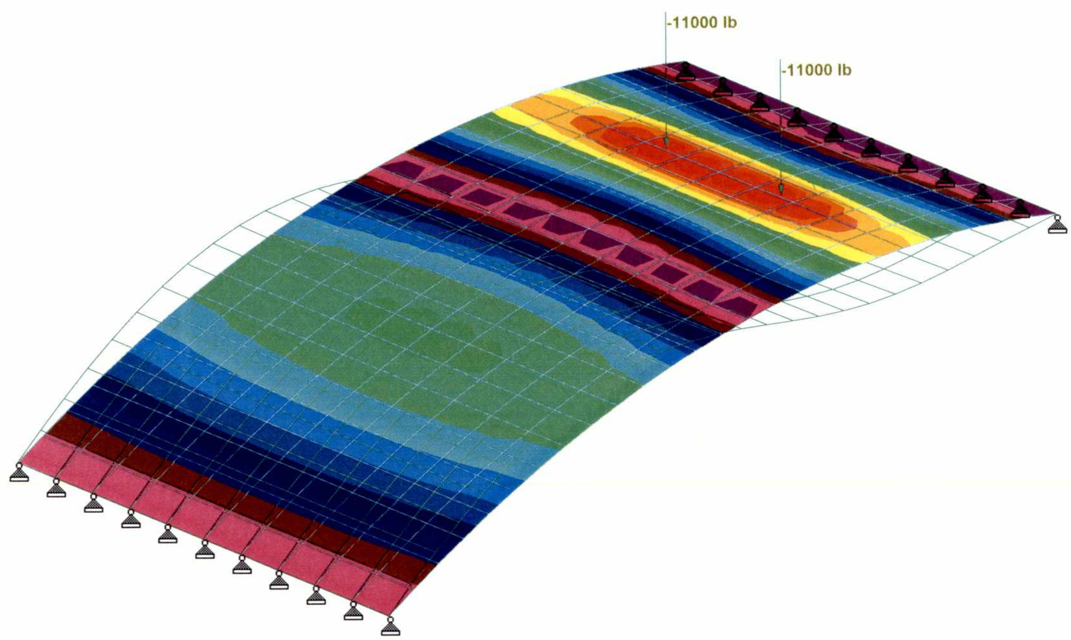
	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	50.714791	-179.947838	115.331315	-89.742859
Bottom	-42.917058	-124.012634	40.547788	87.691536

DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Max Bottom (Principal Major Stress)
psi

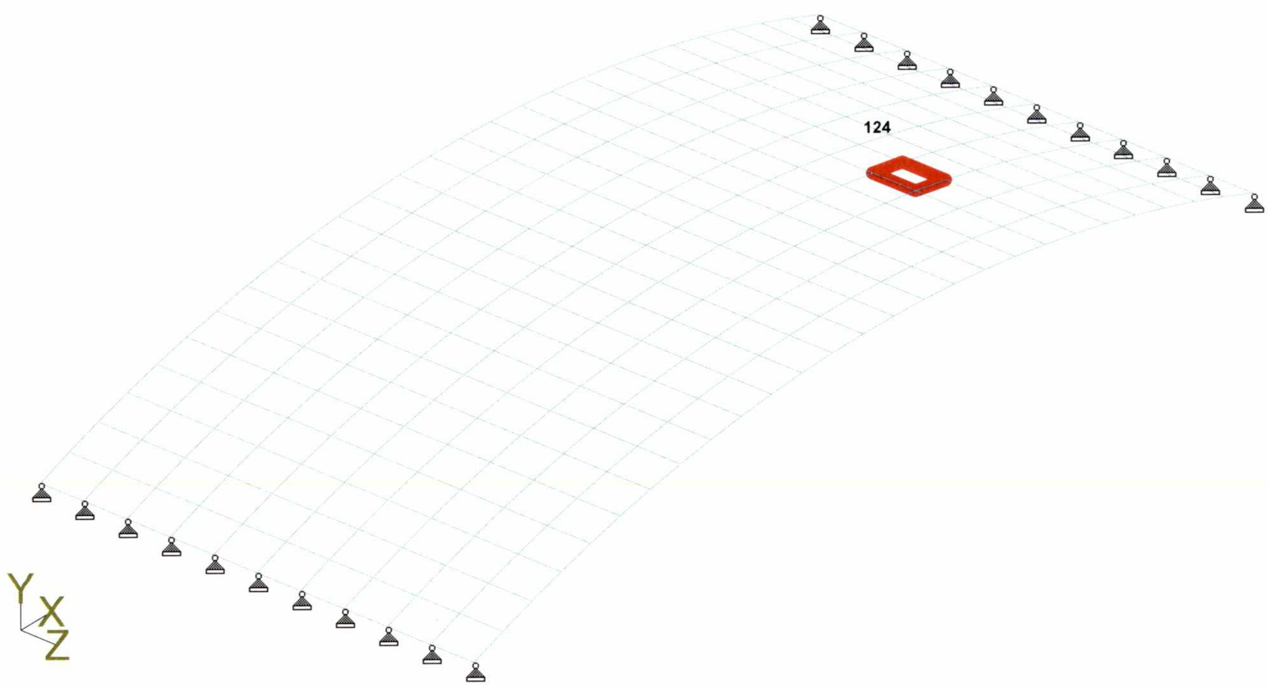
<= 6.29
15.9
25.5
35.1
44.6
54.2
63.8
73.4
83
92.6
102
112
121
131
141
150
>= 160



Load 189 : Displacement

@3
LOAD
Bottom

Software licensed to Botas	Job No	Sheet No **1**	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Load 189

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 124

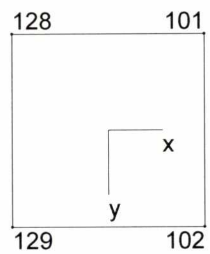


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
128	-0.011876	-0.042818	0.000009
101	-0.011701	-0.041829	0.000014
102	-0.011886	-0.042435	0.000012
129	-0.012081	-0.043431	0.000007

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-61.476156	-188.307151	63.415498	89.557846
Bottom	159.706905	58.466271	50.620317	89.077759

C3
LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 124

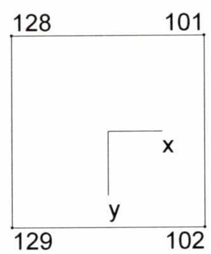


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
128	-0.004931	-0.042275	0.000222
101	-0.005222	-0.044490	0.000446
102	-0.005407	-0.039833	0.000427
129	-0.005111	-0.037841	0.000212

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	44.486731	-184.787214	114.636973	88.974129
Bottom	-37.726112	-126.258418	44.266153	-82.633949

DEAD LOAD

APPENDIX

FINAL REPORT
GEOPHYSICAL INVESTIGATION
BRIDGE #874218 SITE
SUNNY ISLES BEACH, FLORIDA

Prepared for the Florida Department of Transportation
Miami, FL

Prepared by GeoView, Inc.
St. Petersburg, FL

September 4, 2012

Mr. Giuseppe Noto
Project Manager
Florida Department of Transportation
District Six Structure Maintenance Office
1000 NW 111 Avenue,
Miami, FL 33172

Subject: Transmittal of Final Report for Geophysical Investigation
Bridge # 874218 Site – Sunny Isles Beach, Florida
GeoView Project Number 17451

Dear Mr. Noto,

GeoView, Inc. (GeoView) is pleased to submit the final report that summarizes and presents the results of the geophysical investigation performed at the above referenced site. Three geophysical methods were used to evaluate the structural steel components and concrete thickness of the project bridge. GeoView appreciates the opportunity to have assisted you on this project. If you have any questions or comments about the report, please contact us.

Sincerely,
GEOVIEW, INC.

Christopher Taylor

Chris Taylor, P.G.
Vice President
Florida Professional Geologist
Number 2256

Scott W. Purcell

Scott Purcell
Senior Geophysicist

4610 Central Avenue
St. Petersburg, FL 33711

Tel.: (727) 209-2334
Fax: (727) 328-2477

1.0 Introduction

A geophysical investigation was conducted at the Bridge #874218 located along Atlantic Avenue where the road crosses over Ocean Canal in Sunny Isles Beach, FL. The bridge is a protected structure with historical importance.

The purpose of the geophysical investigation was to identify and map the extent, spacing, depth, and size, if possible, of the reinforcement steel throughout the bridge. Additionally, the thickness of the concrete was to be determined at the center and supporting areas of the bridge. The geophysical investigation was conducted using three geophysical methods: ground penetrating radar (GPR) Impact Echo Scanning (IES), and a concrete thickness detection system. The investigation was performed on July 31, 2012.

2.0 Site Description

The concrete arch bridge #874218 span was approximately 40 feet (ft) long by 20 ft wide in plan dimension. The extent of the bridge site investigated by the geophysical survey was 70 ft long by 10 ft wide, consisting of the accessible areas of the bridge roadway and undersurface, including the bridge approaches (Figure 1). The bridge top surface consisted of an asphalt layer underlain by concrete. The bridge bottom surface consisted of a stucco layer covering the concrete structural span. At the time of the geophysical survey, a 4 inch coring penetration was noted in the approximate west center area of the bridge. The coring was plugged at the bridge surface, but open on the underside of the bridge. Metal lath was visible within the stucco layer. A discussion of the field methods used to generate the report Figure 1 is provided in Appendix A2.1.

3.0 Description of Geophysical Investigation Methods

3.1 Ground Penetrating Radar

The 3D GPR survey was conducted within five grids using a GSSI Structure Scan Mini radar unit with a 2600-megahertz (MHz) antenna to facilitate the three-dimensional (3D) analysis. Of the five grids, three 2 ft by 4 ft grids (Grids 2, 3 and 4) were conducted on the top side of the bridge and two 2 ft by 2 ft grids (Grids 5 and 6) were conducted on the underside of the bridge along the bottom surface. A time range setting of 8 nanoseconds (ns) was used for the 3D grids. This setting can provide information to an estimated depth of 12 to 18 inches in depth.

The 3D data was augmented with a series of two-dimensional (2D) parallel and perpendicular transects along and across the bridge roadway. The 2D GPR was conducted using a GSSI radar system with a 900-megahertz (MHz) antenna. The lower frequency provides deeper signal penetration but has a lower resolution than the 2600 MHz antenna. Three time range settings of 39, 22, and 13 ns were used for the bridge parallel 2D transects. These time range settings provided information were able to image depths greater than 2 ft and were able to image the underside of the bridge. A time range setting of 22 ns was used for the bridge perpendicular transects.

The locations of the GPR grids and transect lines are shown on Figure 1. A description of the GPR technique and the methods employed for structural steel characterization studies is provided in Appendix A2.2.

Two secondary geophysical investigation methods for concrete thickness determination were performed at the project site.

3.2 Impact Echo Scanning (IES)

The IES portion of the investigation was conducted using an Olsen Instruments IE unit with an NDE-360 acoustical response system. A description of the IES method is provided as Appendix A2.3.

3.3 Concrete Thickness

An additional concrete thickness investigation was conducted using a Hilti PX10 Transpointer Unit. A description of this concrete thickness method is provided as Appendix A2.4.

4.0 Survey Results

4.1 Ground Penetrating Radar

Analysis of the 2D GPR data profiles indicated the presence of one layer of rebar near the bottom of the bridge. The suspected rebar was observed in both a north/south and east/west orientation. The north/south rebar was spaced 12 to 13 inches on center (approximate) and was located at a depth of 14 to 15 inches near the center of the span and 23 to 25 inches near the beginning and end of the bridge. The east/west rebar was spaced 10 to 12 inches on center (approximate) and was located at a depth of 16 to 17 inches near the center of the span and 25 to 27 inches near the beginning and end of the bridge. The total thickness of the bridge was approximately 19 to 21 inches near the center of the span and 28 to 29 inches near the beginning and end of the bridge. The cover thickness appeared to be approximately 3 to 5inches from the bottom of surface of the bridge. It was not possible to determine the size of the rebar. The metal lath/wire mesh within the stucco appeared to be located approximately 1 inch from the underside surface of the bridge. In addition, a joint or metal pipe was observed running north/south along the centerline of the underside of the bride. It should be noted that the depth estimates are based on GPR data only. No physical verification or onsite calibration of the GPR velocities were performed.

Examples of the 2D data profiles are provided in Appendix 1. The 2600 MHz antenna did not have sufficient signal penetration to image the rebar or bottom of the bridge (from the top side grids) and was adversely affected by the metal laths within the stucco (from the underside grids). Therefore, only the 900 MHz data was used for the final interpretation of the rebar and thickness calculations. A discussion of the limitations of the GPR technique in structural steel characterization studies is provided in Appendix 2.

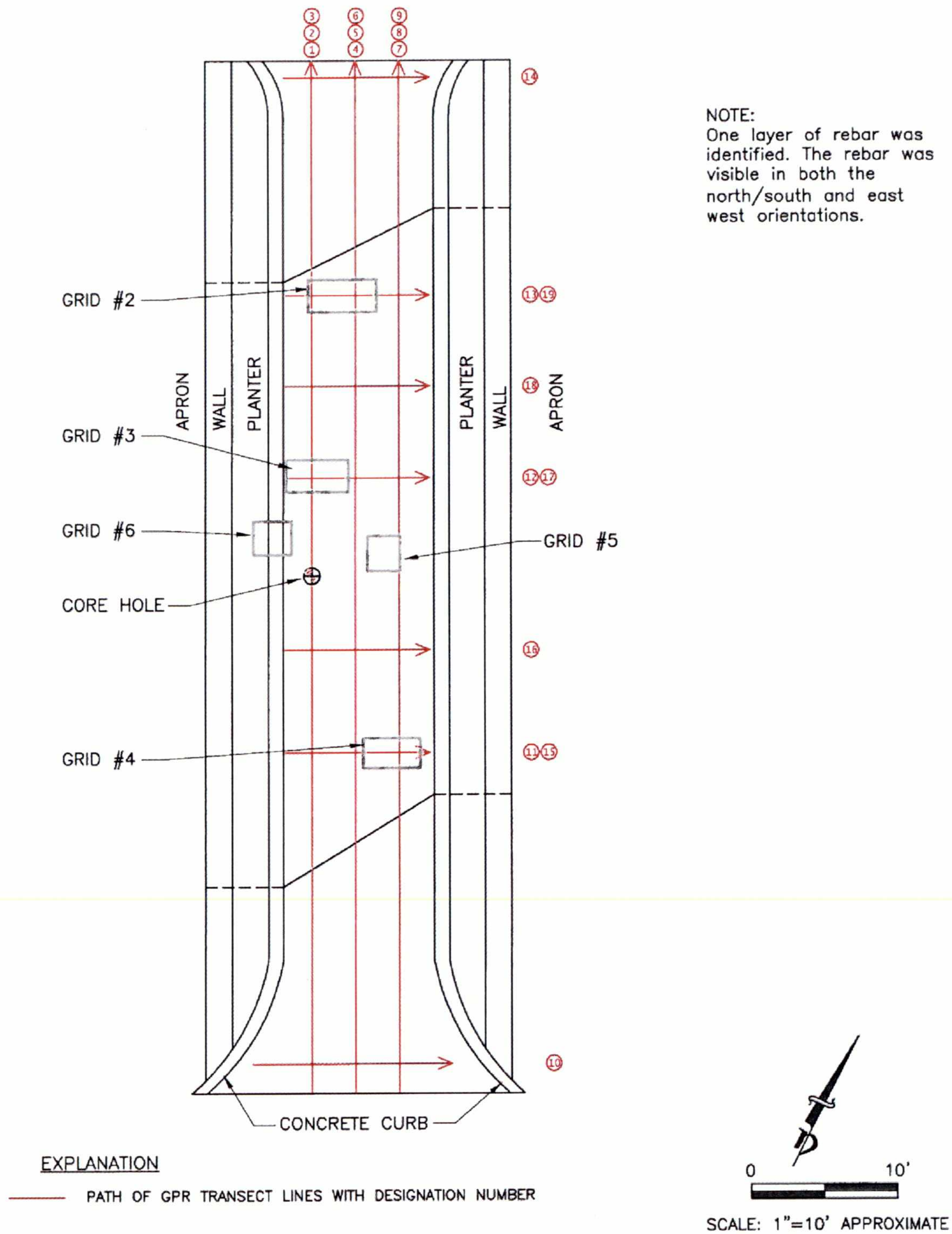
4.2 Impact Echo Scanning (IES)

The IES method did not appear to be effective in determining the overall thickness of the concrete bridge at the project site. Initial testing of the equipment at the center of the bridge span yielded concrete thicknesses of 2.8 to 3 inches below surface level (bls). The acoustic response data was more likely consistent with the thickness of the asphalt surface overlying the concrete bridge. The method did not appear to be able to penetrate the underlying concrete material to yield a viable thickness determination.

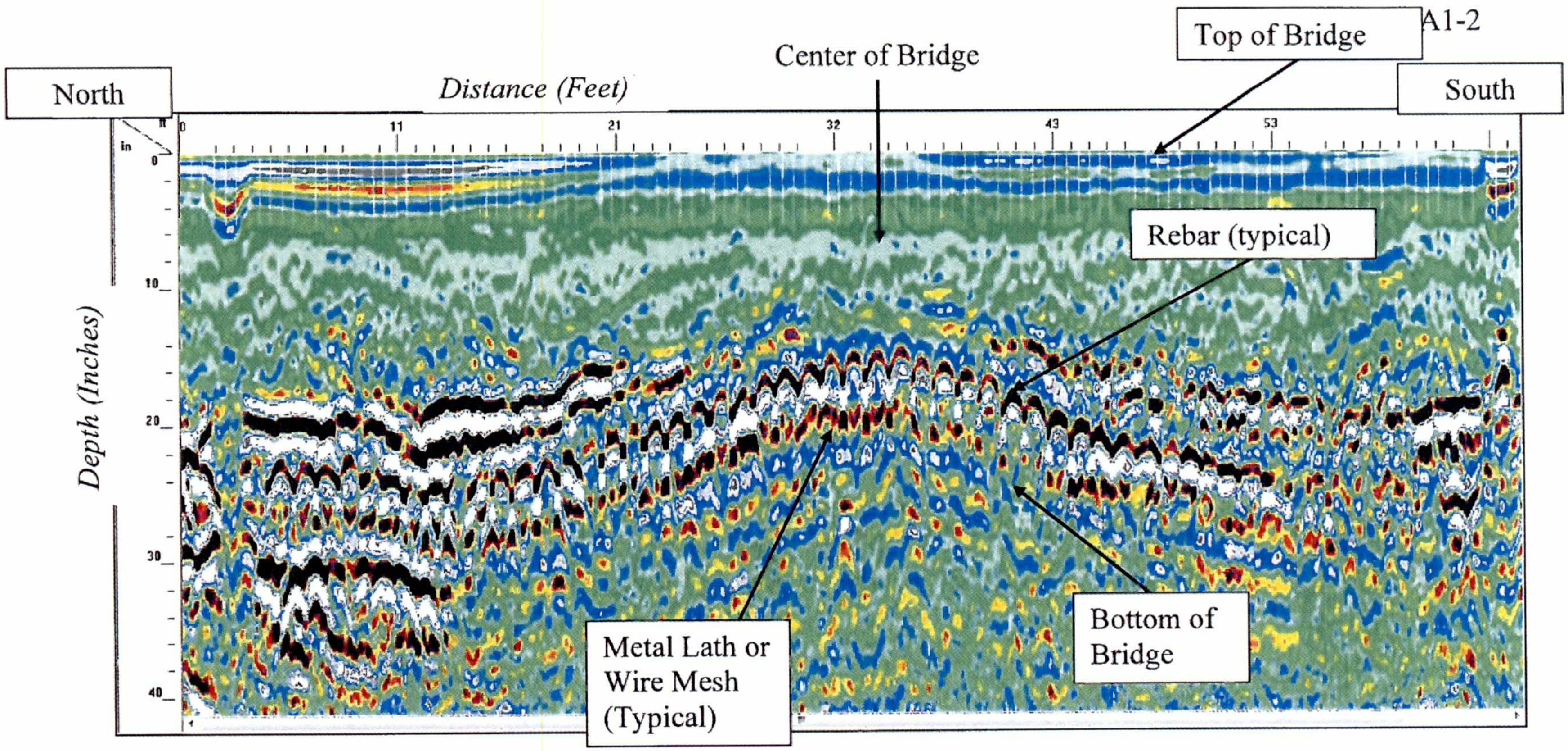
4.3 Concrete Thickness Measurement

The Hilti PX10 equipment did not appear to be effective in determining the overall thickness of the concrete bridge. Proper alignment of the PX10 Rx and Tx could not be achieved, most likely due to the interference of the dense overlapping metal lath or wire mesh within the stucco at the bottom of the bridge.

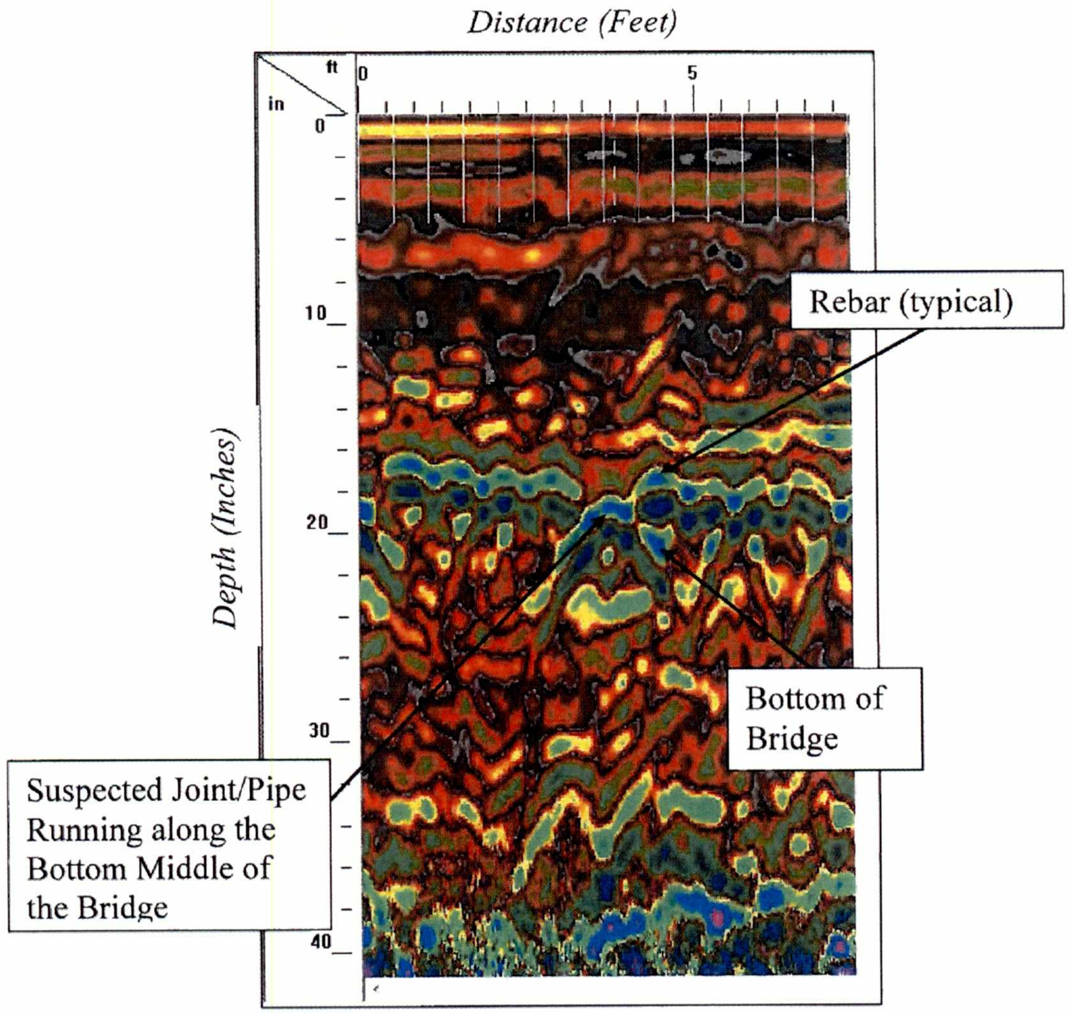
APPENDIX 1
FIGURE AND EXAMPLES OF 2D GPR DATA PROFILES COLLECTED AT THE PROJECT SITE



GeoView	FIGURE 1 SITE MAP SHOWING LOCATION OF GEOPHYSICAL INVESTIGATION	MIAMI BRIDGE #874218 ATLANTIC AVENUE MIAMI-DADE, FLORIDA FLORIDA DEPARTMENT OF TRANSPORTATION MIAMI, FLORIDA PROJECT: 17451 DATE: 09/04/12



GPR Transect 5



GPR Transect 17

APPENDIX 2
DESCRIPTION OF GEOPHYSICAL METHODS, SURVEY METHODOLOGIES AND LIMITATIONS

A2.1 On Site Measurements

The measurements that were collected and used to create the site map were made using a fiberglass measuring tape. The degree of accuracy of such an approach is typically +/-5% for lengths and +/-2.5 degrees for angles.

A2.2 Ground Penetrating Radar

Ground Penetrating Radar (GPR) consists of a set of integrated electronic components which transmits high frequency (900 to 2600 megahertz [MHz]) electromagnetic waves into the ground and records the energy reflected back to the ground surface. The GPR system consists of an antenna, which serves as both a transmitter and receiver, and a profiling recorder that both processes the incoming signal and provides a graphic display of the data. The GPR data can be reviewed as both printed hard copy output or recorded on the profiling recorder's hard drive for later review. GeoView uses a GSSI GPR system.

A GPR survey provides a graphic cross-sectional view of subsurface conditions. This cross-sectional view is created from the reflections of repetitive short-duration electromagnetic (EM) waves that are generated as the antenna is pulled across the ground surface. The reflections occur at the subsurface contacts between materials with differing electrical properties. The electrical property contrast that causes the reflections is the dielectric permittivity that is directly related to conductivity of a material. The GPR method is commonly used to identify such targets as underground utilities, underground storage tanks or drums, buried debris, voids, structural steel rebar or geological features.

The greater the electrical contrast between the surrounding materials (earth or concrete) and target of interest, the greater the amplitude of the reflected return signal. Unless the buried object is metal, only part of the signal energy will be reflected back to the antenna with the remaining portion of the signal continuing to propagate downward to be reflected by deeper features. If there is little or no electrical contrast between the target interest and surrounding earth materials it will be very difficult if not impossible to identify the object using GPR.

A GPR survey is conducted along survey lines (transects) which are measured paths along which the GPR antenna is moved. Electronic marks are placed in the data by the operator at designated points along the GPR transects. These marks allow for a correlation between the GPR data and the position of the

GPR antenna on the ground.

For structural steel reinforcement (rebar) characterizations, the GPR survey is conducted along a set of perpendicularly orientated transects. The survey is conducted in two directions. This is because the most definitive GPR signal response indicating the presence of structural steel is obtained when the GPR antenna is passed perpendicular to the long axis of the steel alignment.

Depth estimates to the top of a rebar steel piece are determined by dividing the time of travel of the GPR signal from the land surface to the top of the GPR signal reflection associated with the rebar by the velocity of the GPR signal. The velocity of the GPR signal is usually obtained from published tables of the GPR signal traveling through the surrounding concrete medium. The accuracy of GPR-derived depths typically ranges from 20 to 40 percent of the total depth.

The analysis and collection of GPR data is both a technical and interpretative skill. The technical aspects of the work are learned from both training and experience. Interpretative skills for rebar characterization studies are developed by having the opportunity to compare GPR data collected in numerous settings to the results from confirmatory studies performed at the same locations.

The ability of GPR to collect interpretable information at a project site is limited by the attenuation (absorption) of the GPR signal within the subsurface materials. Once the GPR signal has been attenuated at a particular depth, information regarding deeper features will not be obtained. GeoView can make no warranties or representations of concrete conditions that may be present beyond the depth of investigation or resolving capability of the GPR equipment or in areas that were not accessible to the geophysical investigation.

A2.3 Impact Echo Scanning (IES) Method

An Olsen Instruments IE unit and an NDE-360 system were used to determine concrete thickness using an acoustical response method. The system consists of a source and a receiver that detects sound wave echoes through means of the reflection of compression waves (resonance) from the bottom of a concrete member[1]. The range of the equipment is 3 to 24 inches. The effectiveness of this method may be limited by the presence of multiple layers of differing cover materials, which may attenuate the acoustic signal response between layers.

1.System Reference Manual, www.olseninstruments.com

A2.4 Concrete Thickness Measurement

A Hilti PX10 Transpointer system was used to determine concrete thickness. The system uses a transmitter (Tx) unit that generates a magnetic field that is placed on one side of a concrete structure and a receiver (Rx) unit that is placed on the opposite side of the structure. When the receiving unit is in alignment with the magnetic field of the transmitting unit, a reading is generated indicating the thickness of the concrete between the Tx and Rx. The range of the PX10 is 0.05 to 1.35 meters[2]. Concrete thickness determinations are typically accurate to within +/- 5 percent of the total thickness. The effectiveness of the PX10 may be limited by the presence of irregularly spaced steel rebar or conduit within the concrete which may distort or disrupt the magnetic field generated by the TX.

2. Hilti PX10 Brochure, www.hilti.com

GeoView can make no warranties or representations of the conditions that may be present beyond the depth of investigation or resolving capability of the geophysical equipment or in areas that were not accessible to the geophysical investigation.

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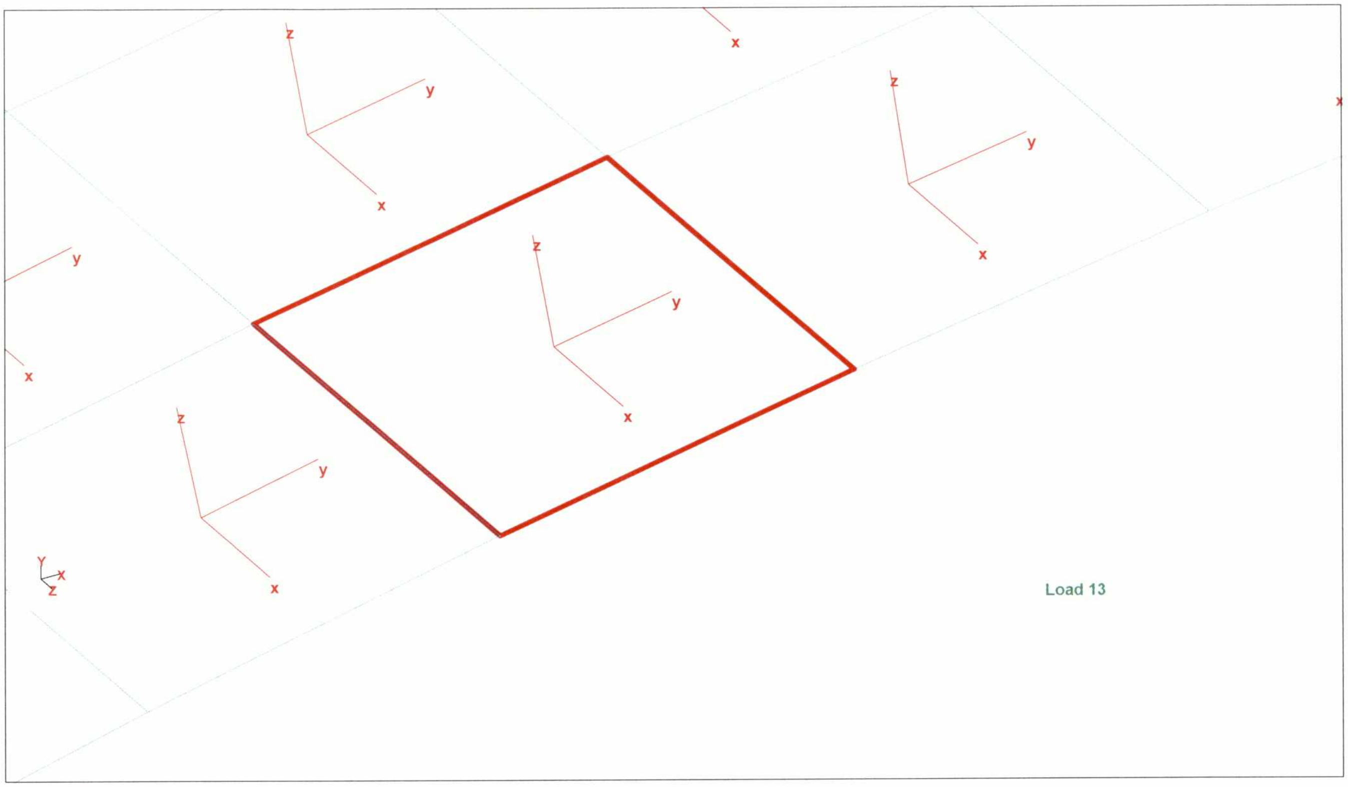
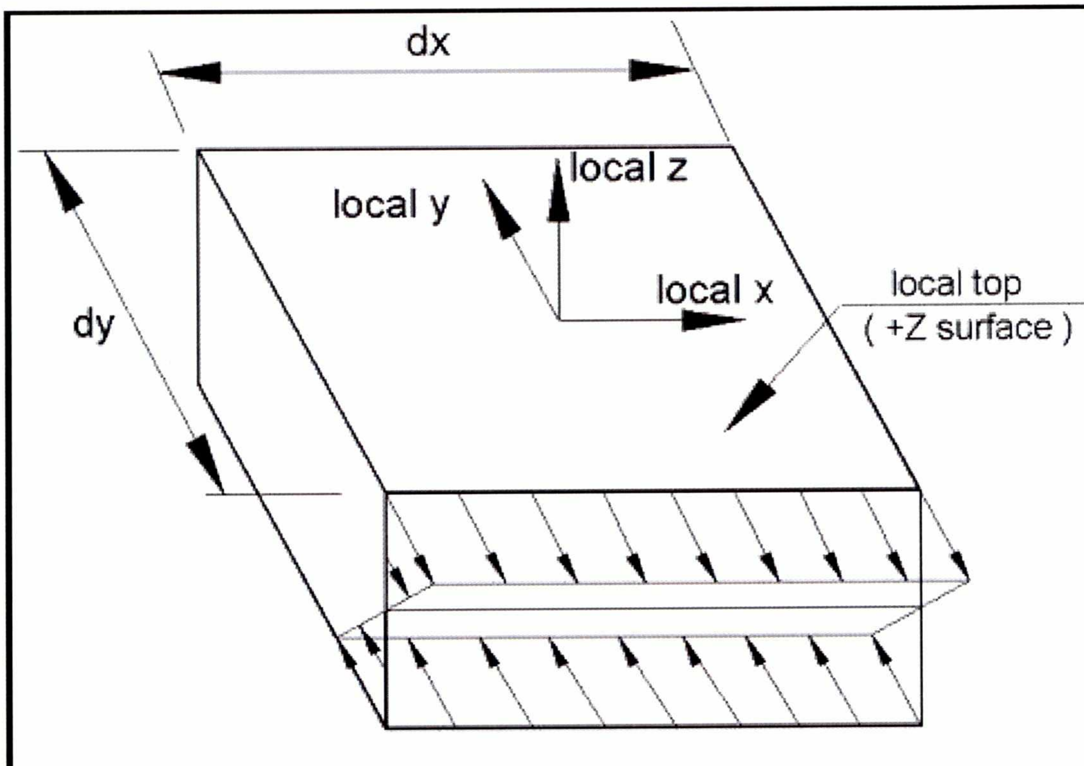
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218.std	Date/Time 24-Oct-2012 14:52	

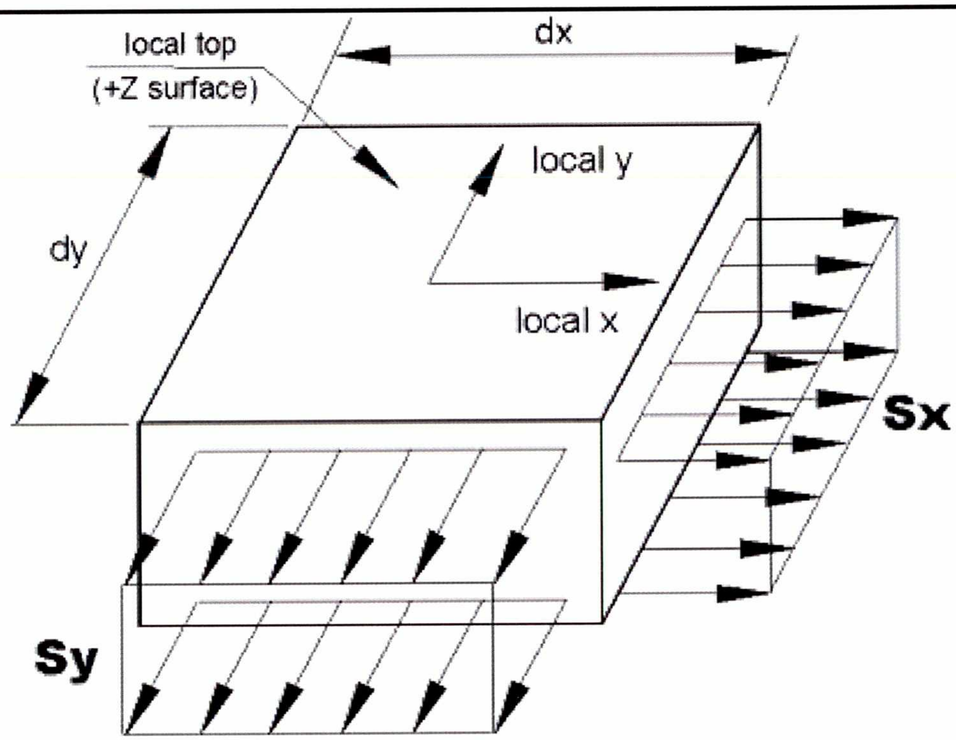


Whole Structure

TYPICAL ELEMENT
LOCAL AXIS ILLUSTRATION

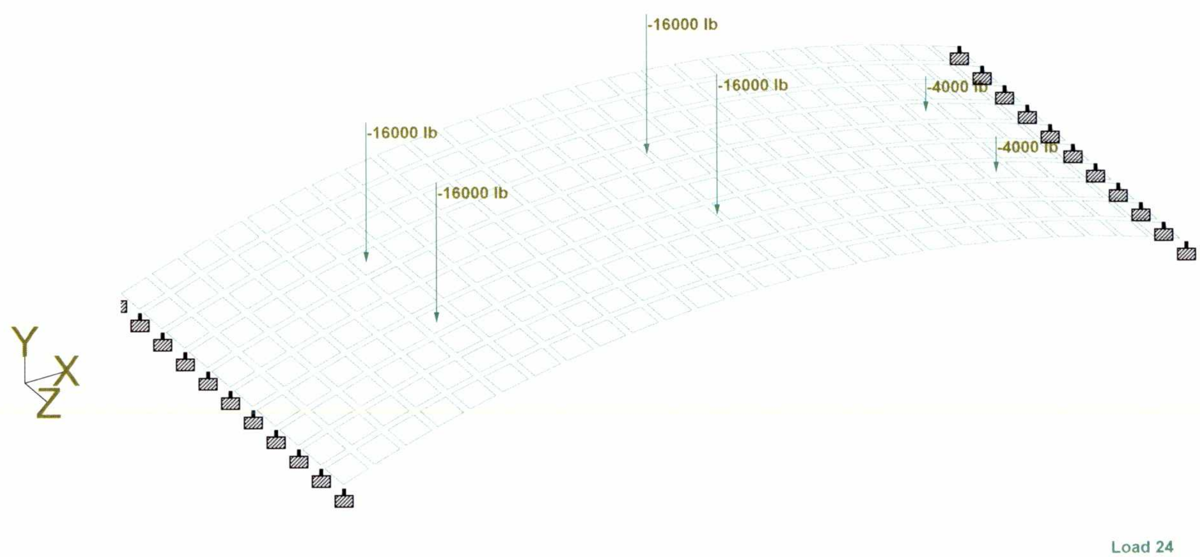


Stress Caused by M_y



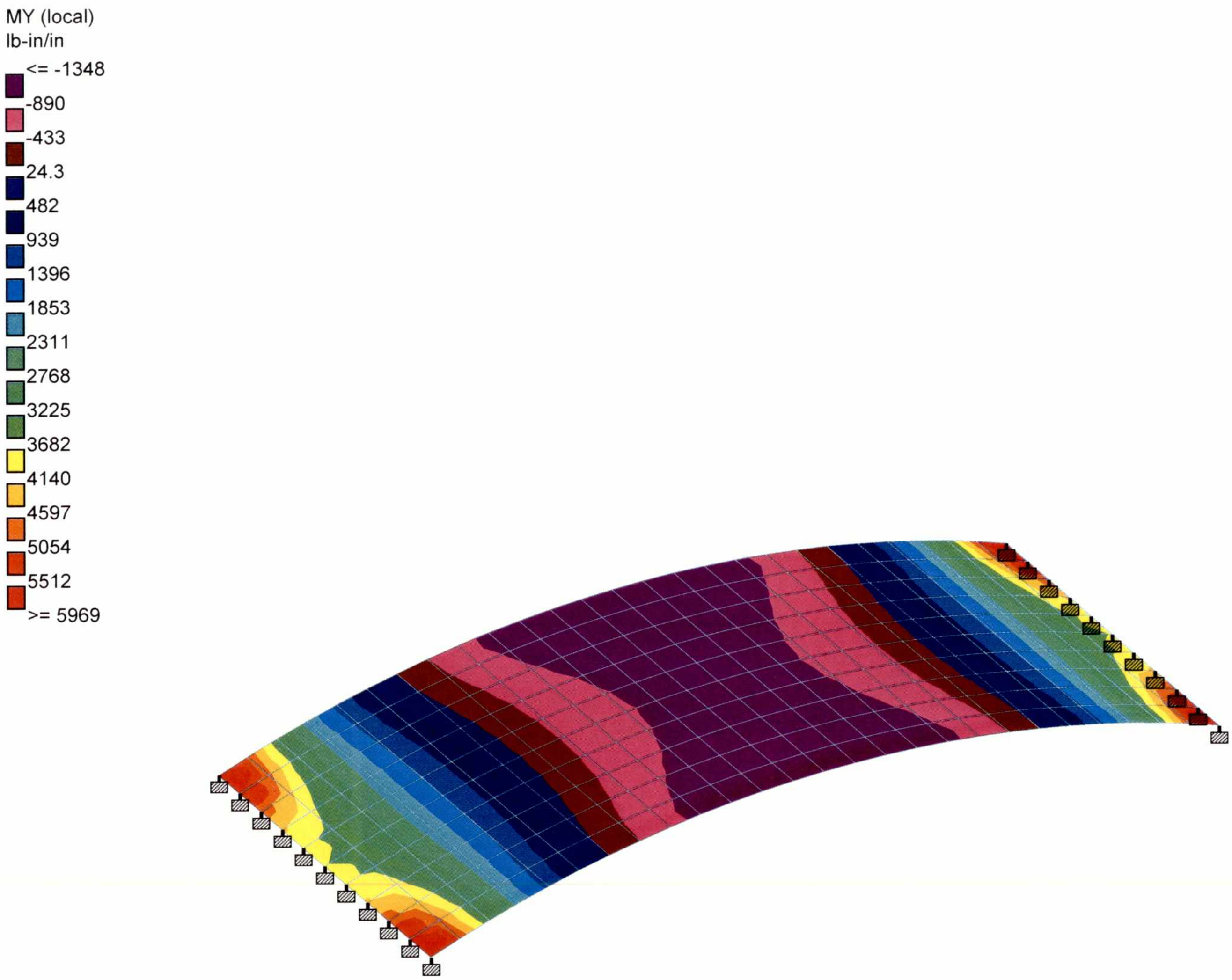
Membrane Stresses Sx and Sy

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218.std	Date/Time 24-Oct-2012 14:52	



HS20
LOAD

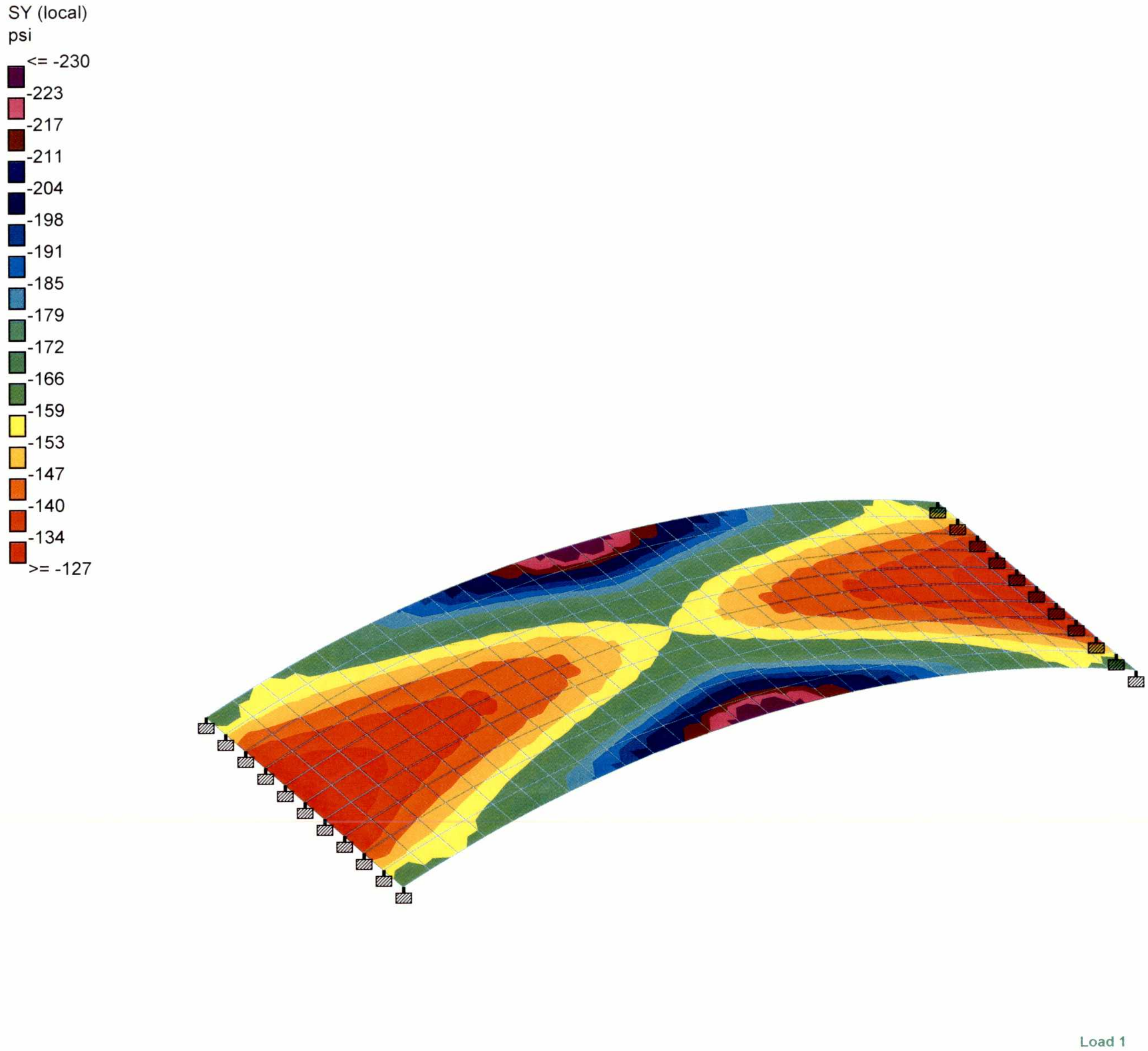
Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218.std	Date/Time 24-Oct-2012 14:52	



Load 1

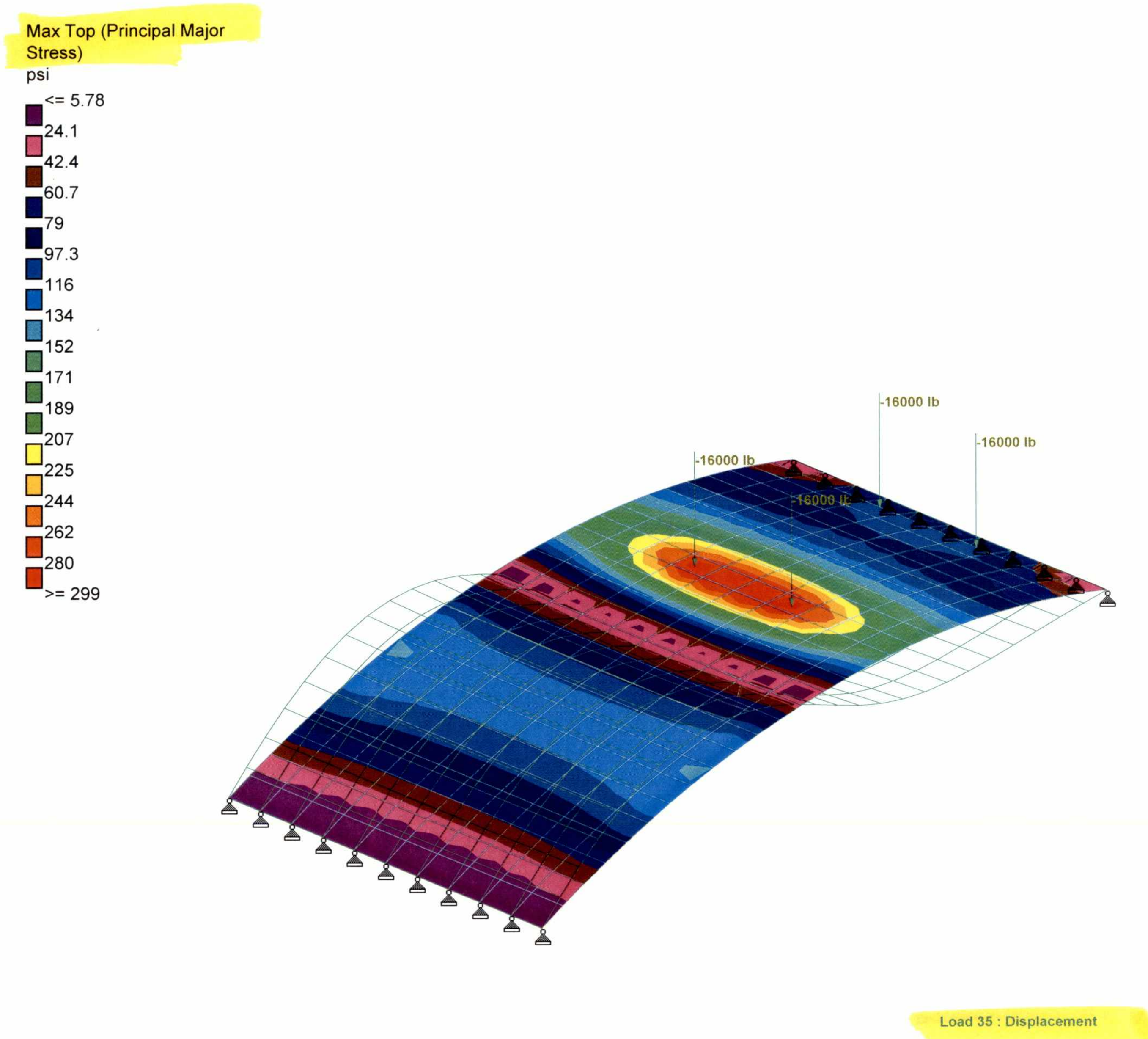
DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218.std	Date/Time 24-Oct-2012 14:52	



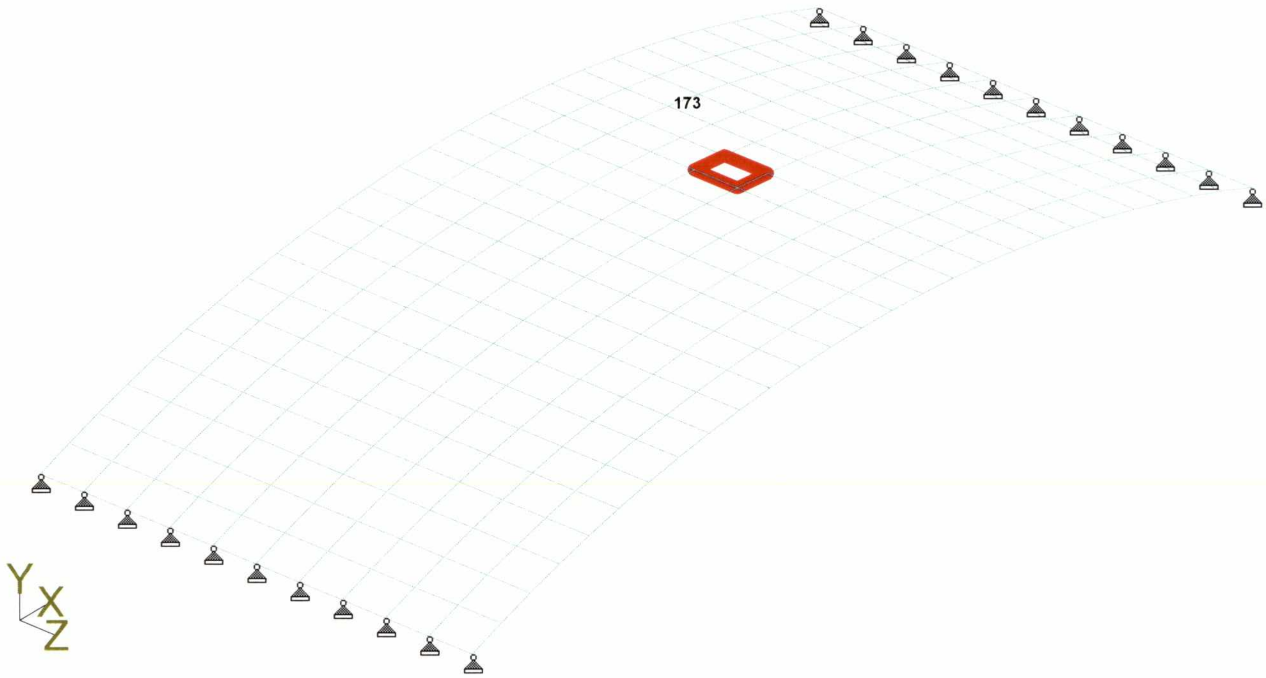
DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



HS20
Top

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Load 35

Software licensed to Botas

Job Title Load Ratings Bridge 874218

Client

Job No

Sheet No 1

Rev

Part

Ref

By

Date 17-Oct-12

Chd

File 874218 Pinned.std

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Staad.Pro Query Stresses

Element no 173

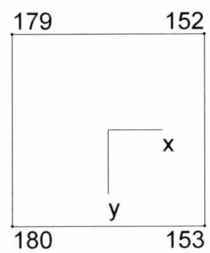


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
179	-0.014975	-0.059628	-0.000028
152	-0.015018	-0.060001	-0.000000
153	-0.015820	-0.065556	-0.000000
180	-0.015767	-0.065127	-0.000026

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-84.418833	-298.646510	107.113846	89.863922
Bottom	210.345924	76.878019	66.733949	-89.772163

HS20

LOAD

Software licensed to Botas

Job Title Load Ratings Bridge 874218	Job No	Sheet No 1	Rev
	Part		
	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 173

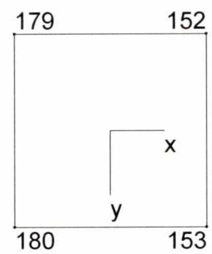


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
179	-0.003062	-0.050957	-0.000234
152	-0.002998	-0.050045	0.000000
153	-0.003788	-0.047957	0.000000
180	-0.003867	-0.048823	-0.000231

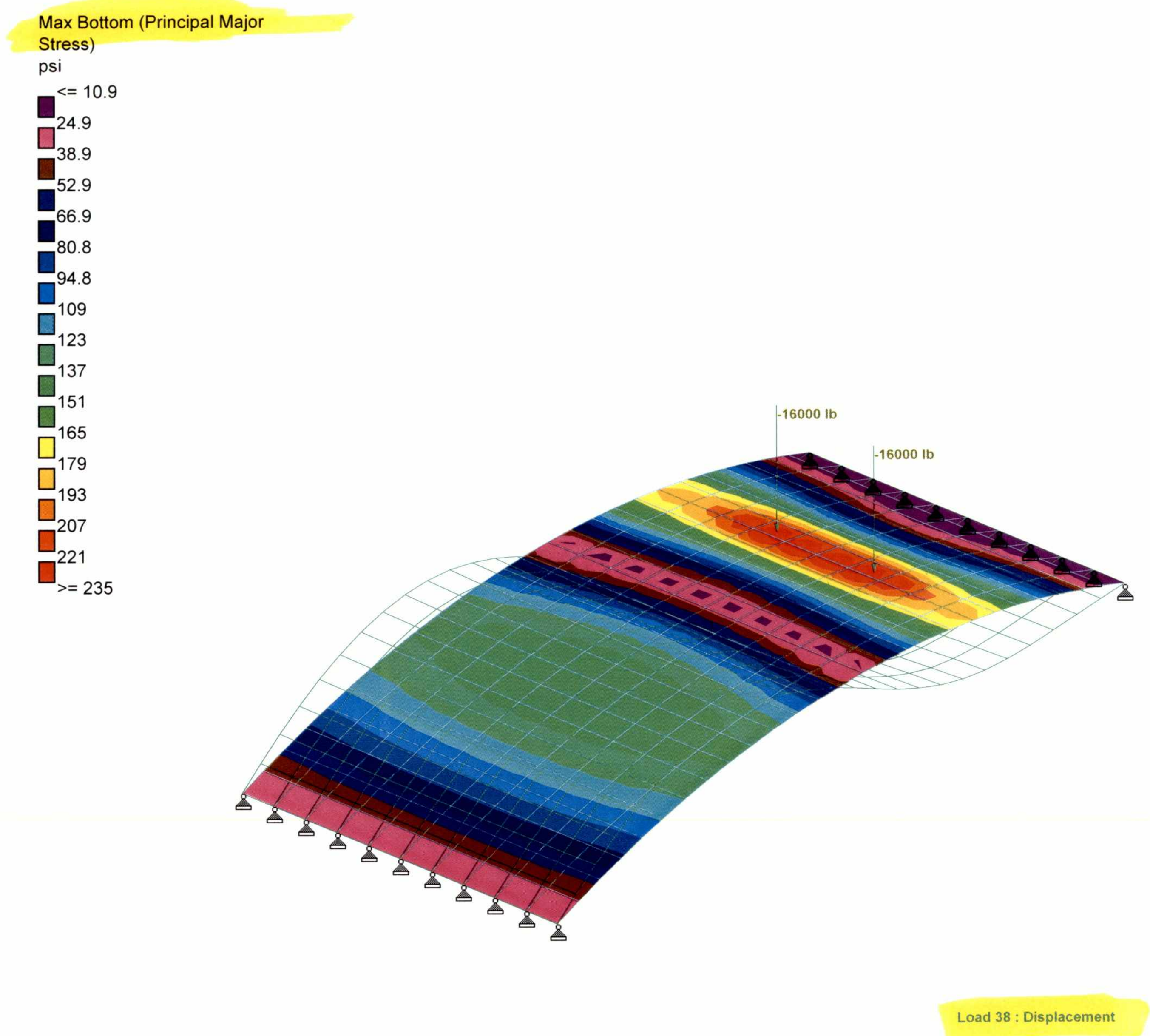
Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	55.643070	-179.685846	117.664456	-89.820465
Bottom	-47.458559	-135.765284	44.153363	88.653992

DEAD LOAD

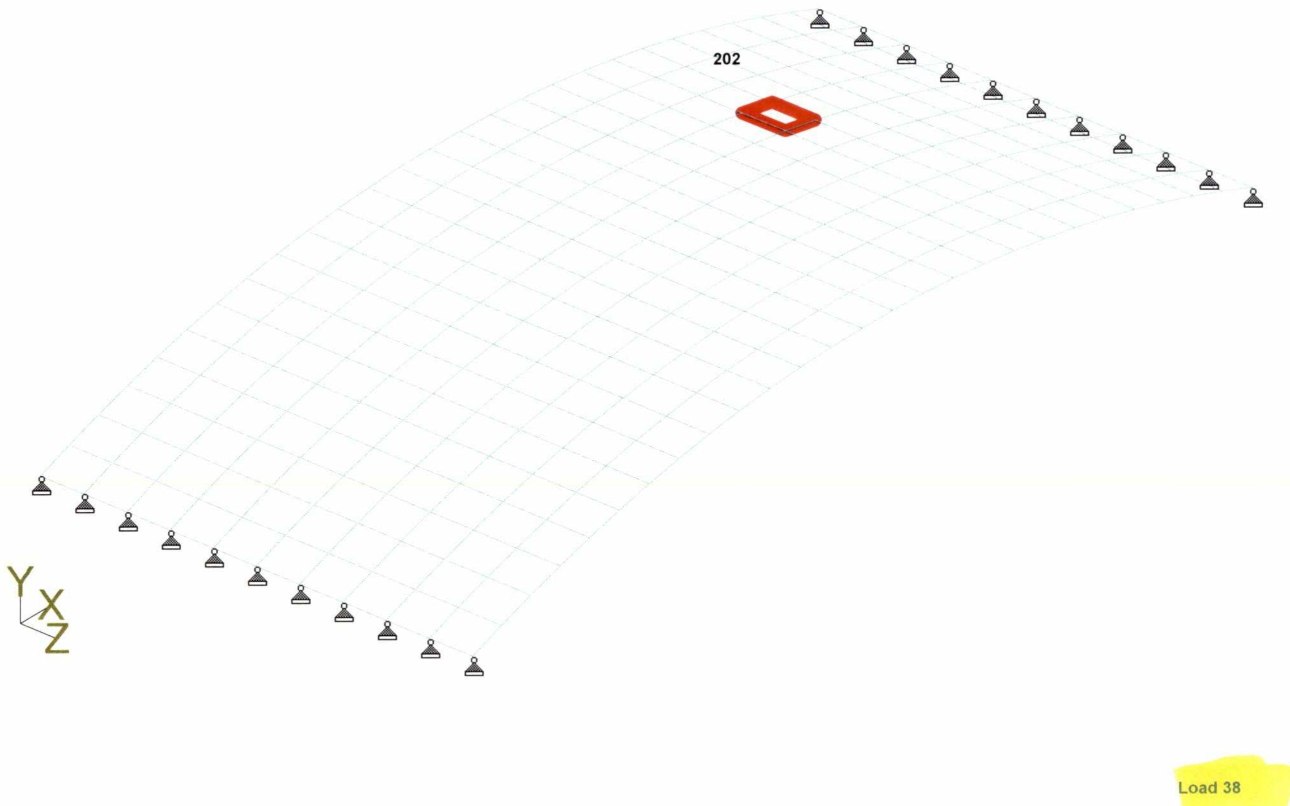
Software licensed to Botas

Job Title Load Ratings Bridge 874218	Job No	Sheet No 1	Rev
	Part		
	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



HS20
Bottom

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Staad.Pro Query Stresses

Element no 202

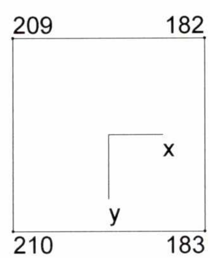


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
209	-0.017310	-0.063815	-0.000022
182	-0.017578	-0.065403	-0.000013
183	-0.017490	-0.063931	-0.000012
210	-0.017210	-0.062428	-0.000026

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-95.416747	-286.192983	95.388114	89.039001
Bottom	234.605610	89.854971	72.375320	88.765167

HS20
LOAD.

Staad.Pro Query Stresses

Element no 202

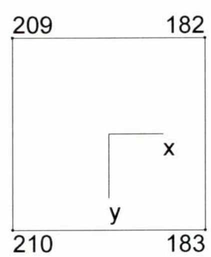


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
209	-0.005222	-0.044490	-0.000446
182	-0.004931	-0.042275	-0.000222
183	-0.005111	-0.037841	-0.000212
210	-0.005407	-0.039833	-0.000427

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	44.486728	-184.787214	114.636973	-88.974129
Bottom	-37.726104	-126.258418	44.266157	82.633949

DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
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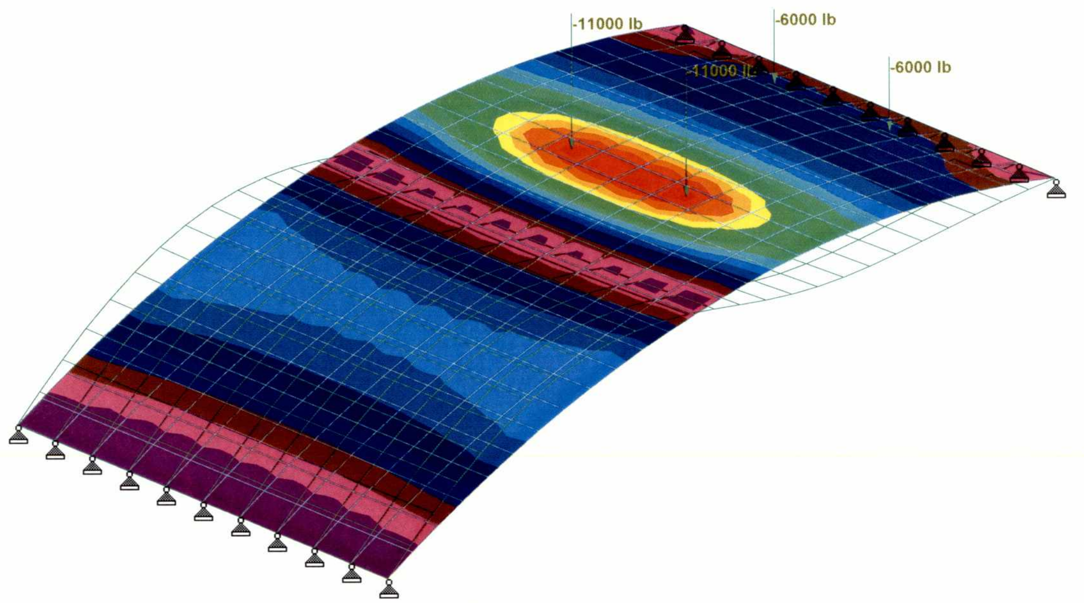
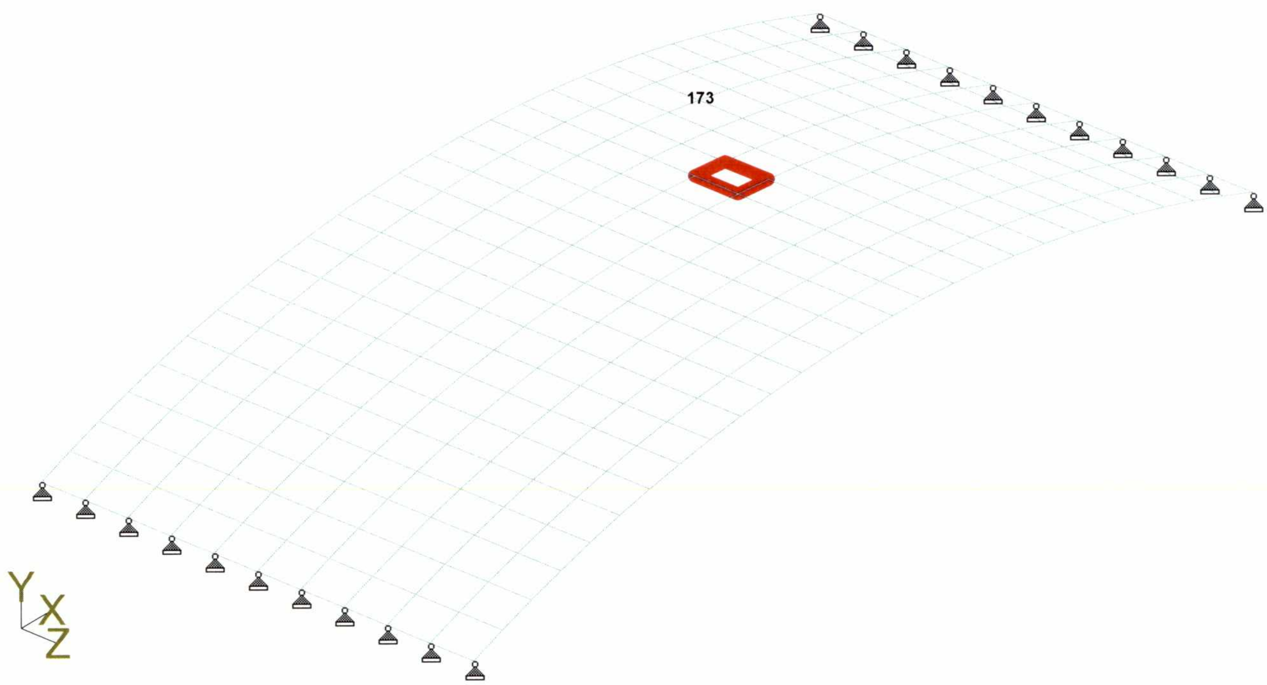
Max Top (Principal Major Stress)
psi
<= 4.58
17.1
29.6
42.1
54.6
67.1
79.6
92.1
105
117
130
142
155
167
180
192
>= 205



Load 106 : Displacement

SU2
LOAD
TOP

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Load 106

	Job No	Sheet No 1	Rev
Software licensed to Botas	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 173

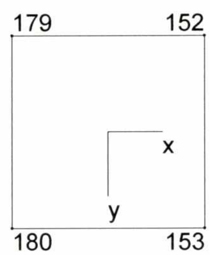


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
179	-0.010045	-0.040205	-0.000018
152	-0.010076	-0.040497	-0.000000
153	-0.010632	-0.044414	-0.000000
180	-0.010598	-0.044161	-0.000016

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-57.873182	-204.616457	73.371634	89.808975
Bottom	145.960614	52.596718	46.681948	-89.887962

SU2
LOAD

Software licensed to Botas

Job Title Load Ratings Bridge 874218	Job No	Sheet No 1	Rev
	Part		
	Ref		
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Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 173

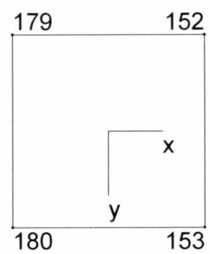


Plate Corner Displacements

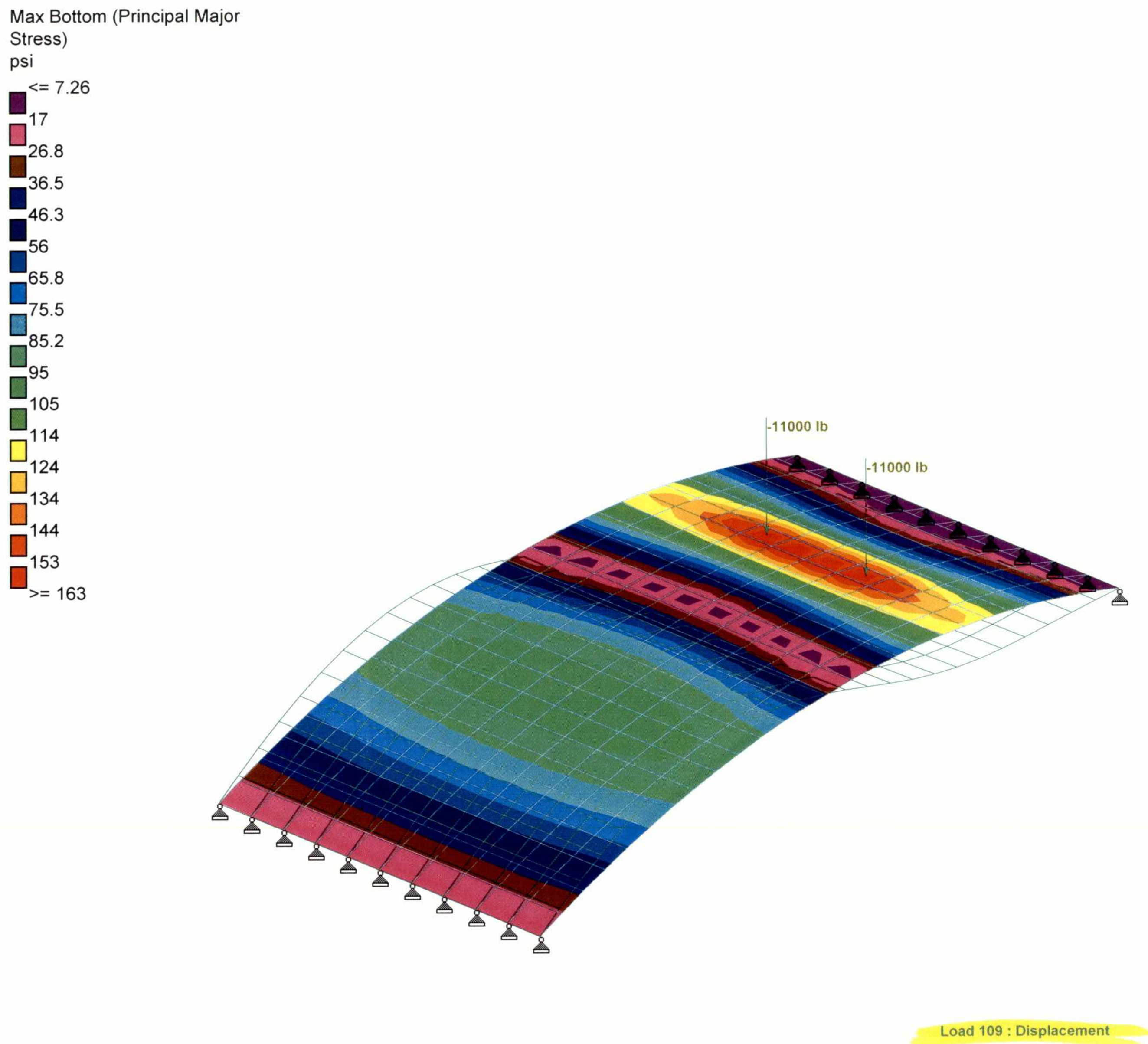
Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
179	-0.003062	-0.050957	-0.000234
152	-0.002998	-0.050045	0.000000
153	-0.003788	-0.047957	0.000000
180	-0.003867	-0.048823	-0.000231

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	55.643070	-179.685846	117.664456	-89.820465
Bottom	-47.458559	-135.765284	44.153363	88.653992

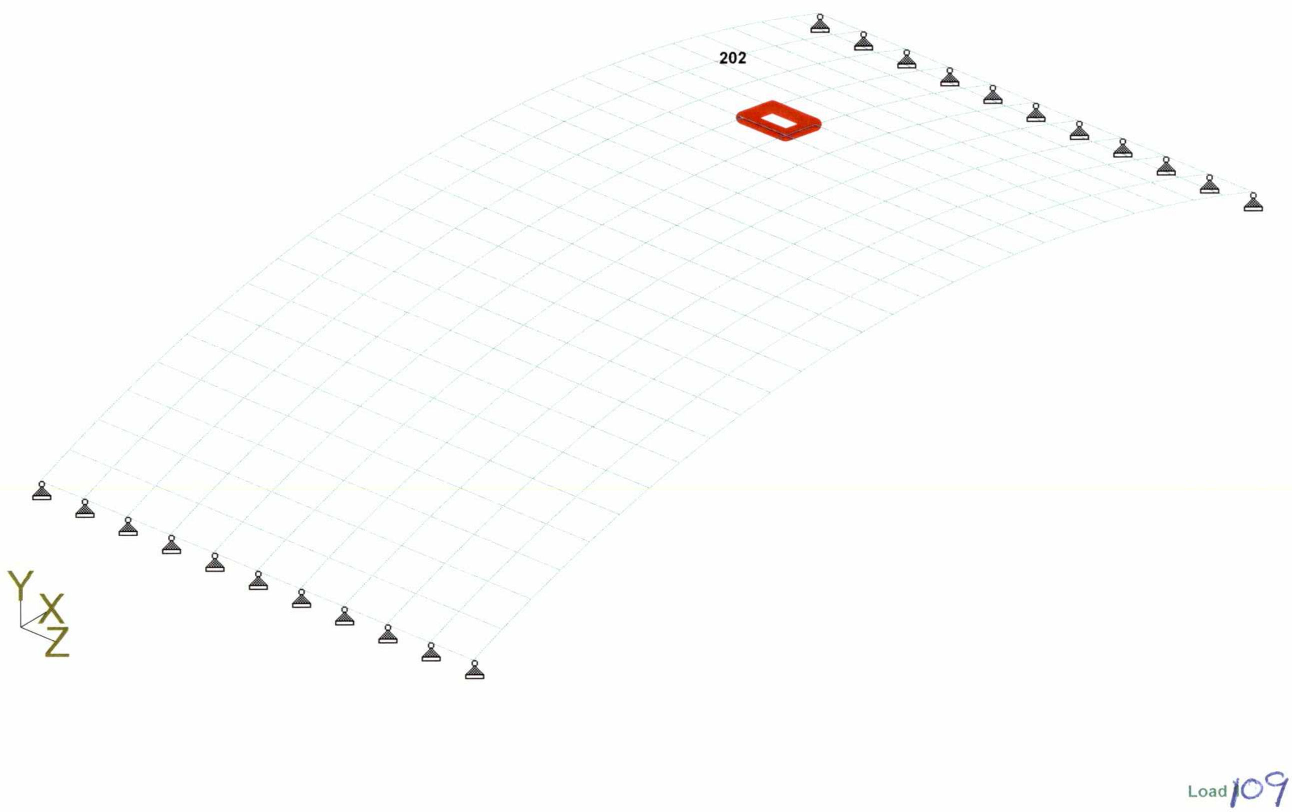
DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



802
LOAD
BOTTOM.

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Staad.Pro Query Stresses

Element no 202

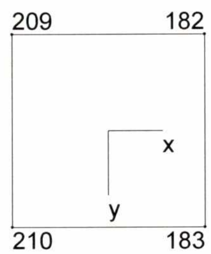


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
209	-0.011894	-0.043588	-0.000015
182	-0.012077	-0.044666	-0.000009
183	-0.012074	-0.044004	-0.000008
210	-0.011880	-0.042975	-0.000017

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-65.487243	-197.174758	65.843761	89.324509
Bottom	163.243949	61.874464	50.684743	89.224228

S02
LOAD.

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 202

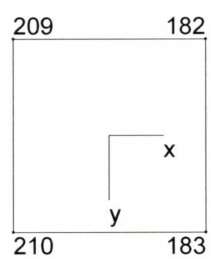


Plate Corner Displacements

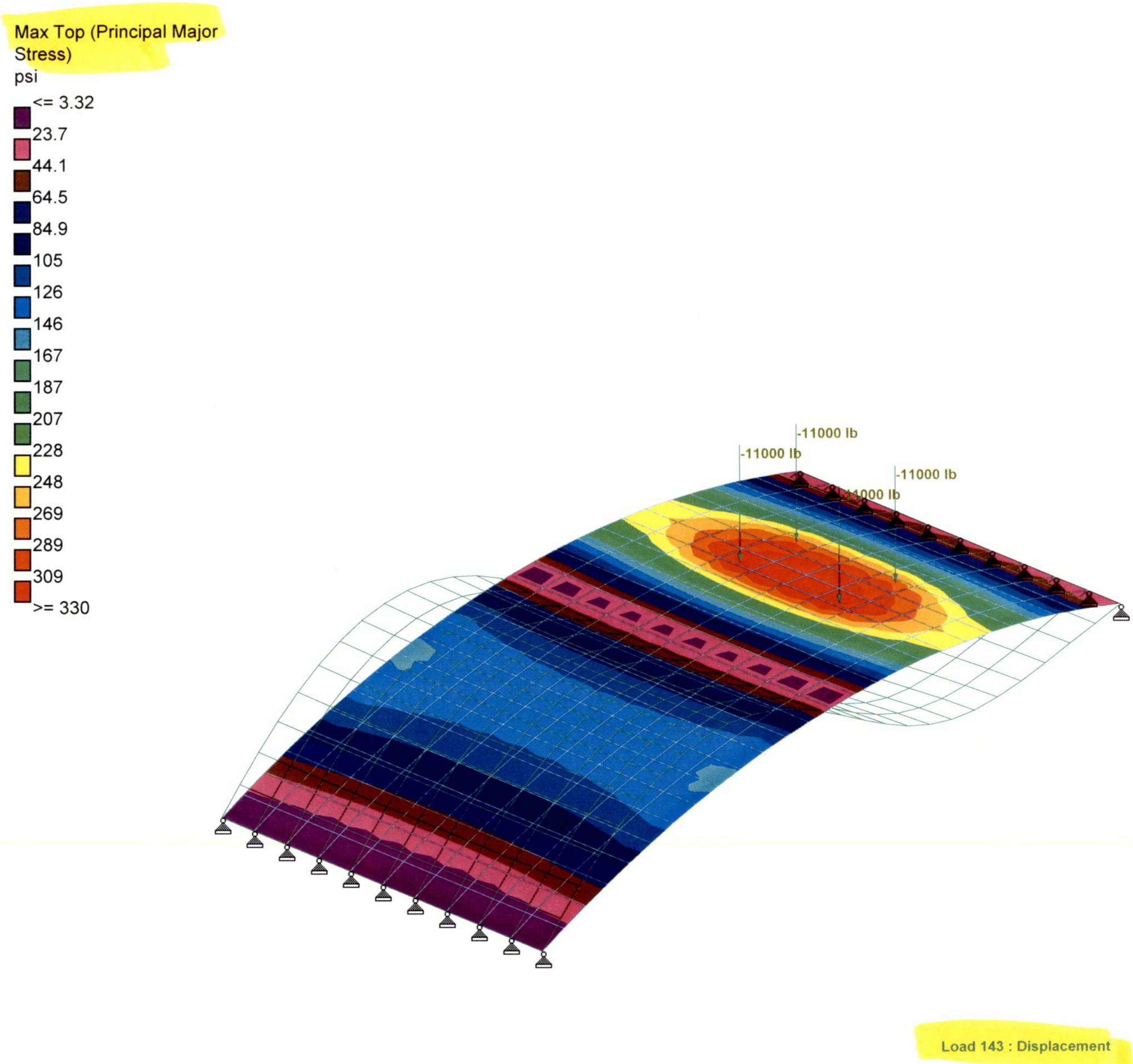
Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
209	-0.005222	-0.044490	-0.000446
182	-0.004931	-0.042275	-0.000222
183	-0.005111	-0.037841	-0.000212
210	-0.005407	-0.039833	-0.000427

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	44.486728	-184.787214	114.636973	-88.974129
Bottom	-37.726104	-126.258418	44.266157	82.633949

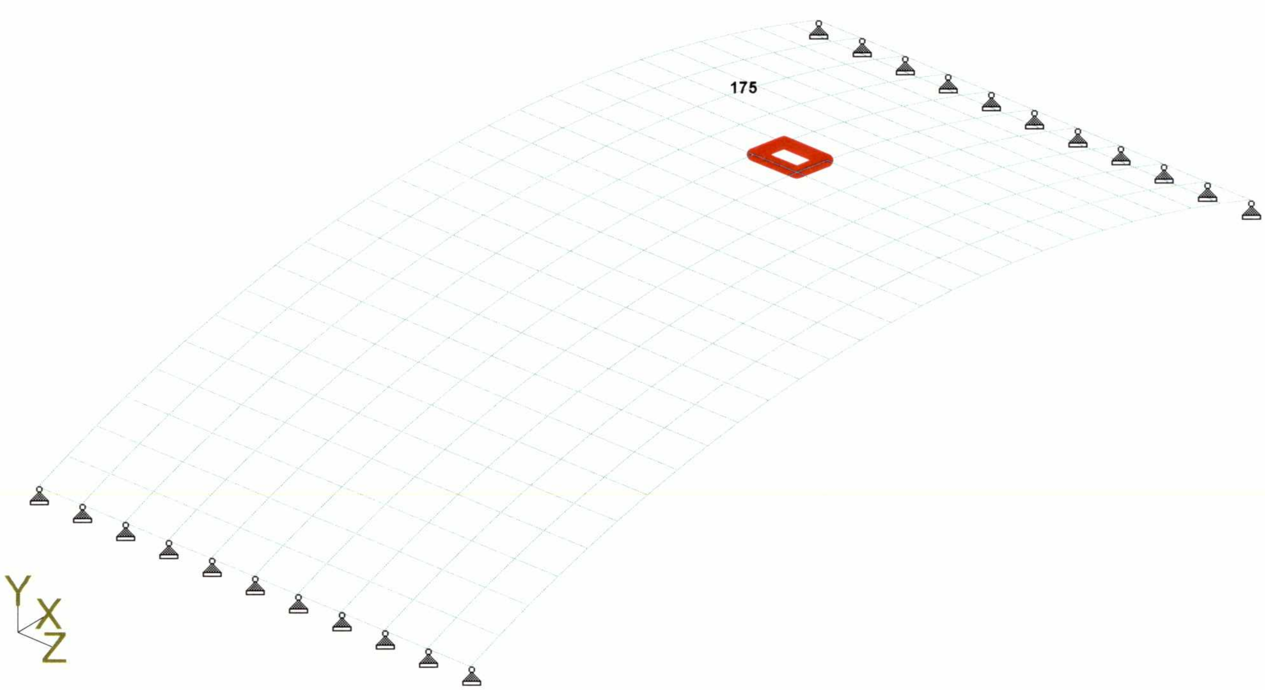
DEAD LOAD

Software licensed to Botas	Job No	Sheet No **1**	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



S03
LOAD
TOP

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



Load 143

Software licensed to Botas

Job No	Sheet No 1		Rev
Job Title Load Ratings Bridge 874218	Part		
	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 175

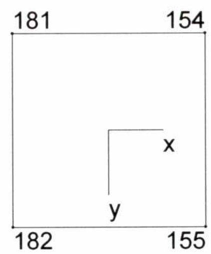


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
181	-0.021977	-0.080524	-0.000023
154	-0.022050	-0.080923	-0.000000
155	-0.022884	-0.084914	-0.000000
182	-0.022789	-0.084384	-0.000019

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-92.440106	-329.724967	118.642434	-89.957947
Bottom	254.163802	85.558221	84.302798	-89.478035

803
LOAD

Staad.Pro Query Stresses

Element no 175

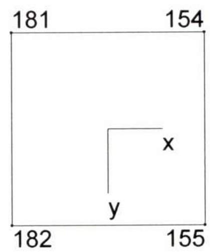


Plate Corner Displacements

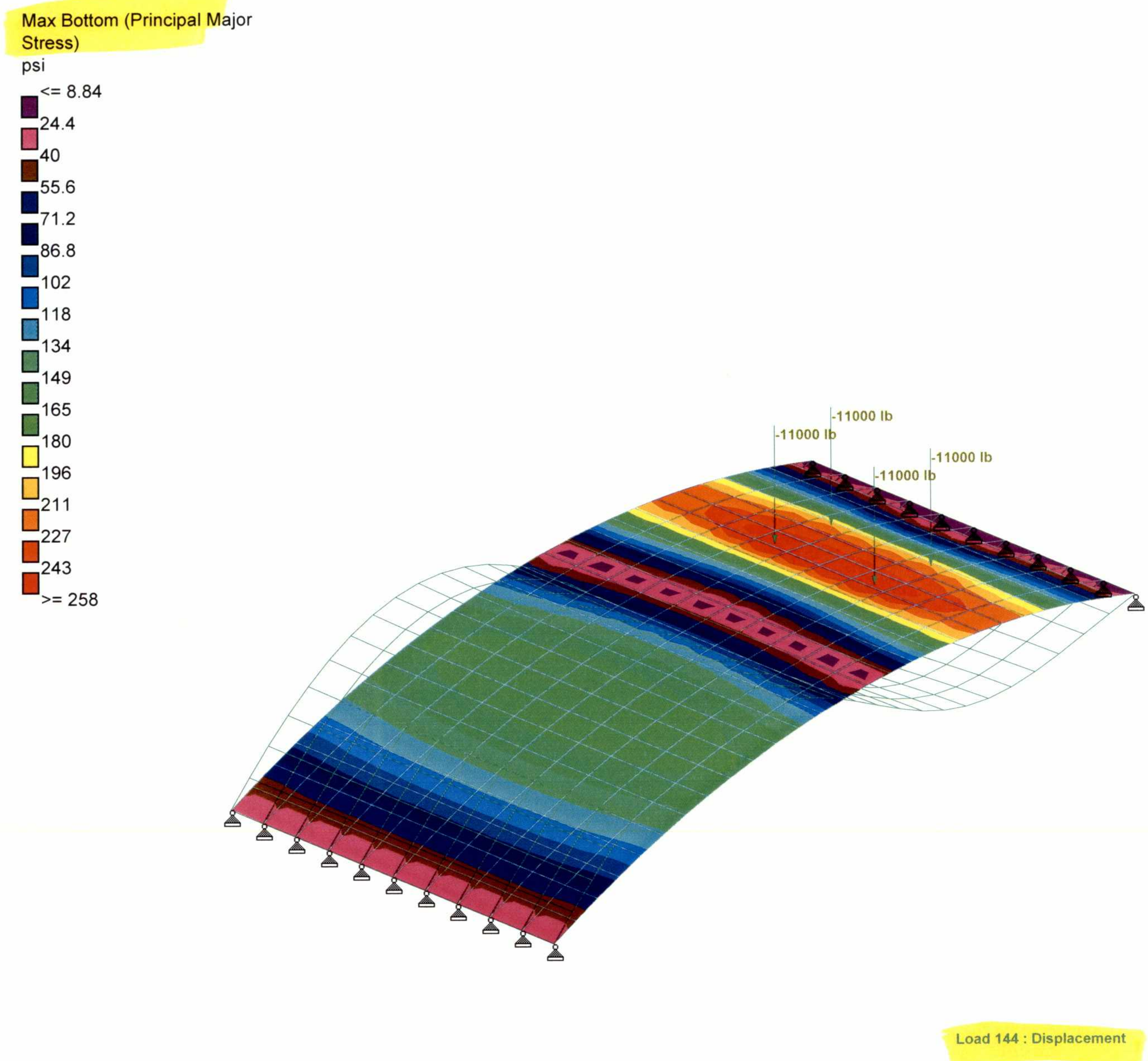
Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
181	-0.004504	-0.045939	-0.000228
154	-0.004413	-0.045128	0.000000
155	-0.004834	-0.041530	0.000000
182	-0.004931	-0.042275	-0.000222

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	50.714791	-179.947838	115.331315	-89.742859
Bottom	-42.917058	-124.012634	40.547788	87.691536

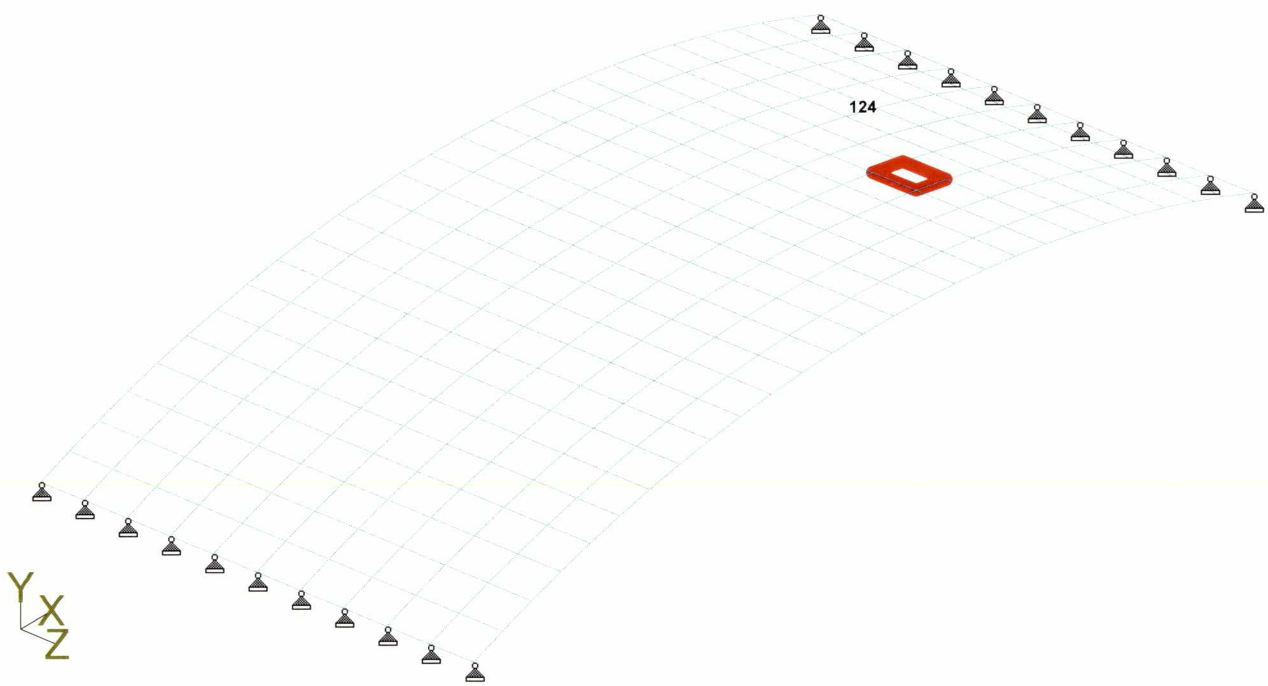
DEAD LOAD

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	



S03
LOAD
Bottom

Software licensed to Botas	Job No	Sheet No 1		Rev
	Part			
Job Title Load Ratings Bridge 874218	Ref			
	By	Date 17-Oct-12		Chd
Client	File 874218 Pinned.std		Date/Time 15-Nov-2012 09:32	



Load 144

Software licensed to Botas	Job No	Sheet No 1	Rev
	Part		
Job Title Load Ratings Bridge 874218	Ref		
	By	Date 17-Oct-12	Chd
Client	File 874218 Pinned.std	Date/Time 15-Nov-2012 09:32	

Staad.Pro Query Stresses

Element no 124

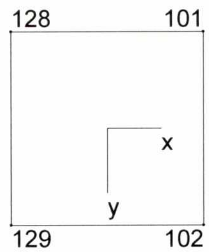


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
128	-0.022077	-0.079233	0.000019
101	-0.021771	-0.077509	0.000034
102	-0.022020	-0.077966	0.000030
129	-0.022372	-0.079768	0.000014

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	-100.658894	-317.190021	108.265564	89.612106
Bottom	258.220792	94.714254	81.753269	89.064682

S03
LOAD

Staad.Pro Query Stresses

Element no 124

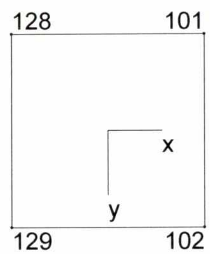


Plate Corner Displacements

Node	X-Coord (in)	Y-Coord (in)	Z-Coord (in)
128	-0.004931	-0.042275	0.000222
101	-0.005222	-0.044490	0.000446
102	-0.005407	-0.039833	0.000427
129	-0.005111	-0.037841	0.000212

Plate Principal Stresses

	SMAX (psi)	SMIN (psi)	TMAX (psi)	Angle
Top	44.486731	-184.787214	114.636973	88.974129
Bottom	-37.726112	-126.258418	44.266153	-82.633949

DEAD LOAD

```
STAAD SPACE
START JOB INFORMATION
JOB NAME Load Ratings Bridge 874218
ENGINEER DATE 17-Oct-12
END JOB INFORMATION
INPUT WIDTH 79
UNIT FEET POUND
JOINT COORDINATES
1 0 0 0; 2 1.5445 0.5437 0; 3 3.1032 1.0454 0; 4 4.6748 1.5048 0;
5 6.2584 1.9214 0; 6 7.8526 2.2949 0; 7 9.4564 2.6252 0; 8 11.0685 2.912 0;
9 12.6878 3.1549 0; 10 14.3131 3.354 0; 11 15.9431 3.5089 0;
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POISSON 0.17
DENSITY 149.99
ALPHA 5.5e-006
DAMP 0.05
END DEFINE MATERIAL
CONSTANTS
MATERIAL CONCRETE ALL
SUPPORTS
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297 PINNED
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ELEMENT LOAD
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ELEMENT LOAD
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184 PR GY -4000 -0.09 0
LOAD 4 LOADTYPE Traffic  TITLE HS20 (3)
ELEMENT LOAD
107 PR GY -4000 0.09 0
185 PR GY -4000 -0.09 0
LOAD 5 LOADTYPE Traffic  TITLE HS20 (4)
ELEMENT LOAD
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186 PR GY -4000 -0.09 0
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ELEMENT LOAD
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ELEMENT LOAD
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LOAD 15 LOADTYPE Traffic  TITLE HS20 (14)
ELEMENT LOAD
118 PR GY -4000 0.09 0
196 PR GY -4000 -0.09 0
109 PR GY -16000 0.09 0.76
187 PR GY -16000 -0.09 0.76
LOAD 16 LOADTYPE Traffic  TITLE HS20 (15)
ELEMENT LOAD
119 PR GY -4000 0.09 0
197 PR GY -4000 -0.09 0
110 PR GY -16000 0.09 0.76
188 PR GY -16000 -0.09 0.76
LOAD 17 LOADTYPE Traffic  TITLE HS20 (16)
ELEMENT LOAD
120 PR GY -4000 0.09 0
198 PR GY -4000 -0.09 0
111 PR GY -16000 0.09 0.76
189 PR GY -16000 -0.09 0.76
LOAD 18 LOADTYPE Traffic  TITLE HS20 (17)
ELEMENT LOAD
121 PR GY -4000 0.09 0
199 PR GY -4000 -0.09 0
112 PR GY -16000 0.09 0.76
190 PR GY -16000 -0.09 0.76
LOAD 19 LOADTYPE Traffic  TITLE HS20 (18)
ELEMENT LOAD
122 PR GY -4000 0.09 0
200 PR GY -4000 -0.09 0
113 PR GY -16000 0.09 0.76
191 PR GY -16000 -0.09 0.76
105 PR GY -16000 0.09 -0.12
183 PR GY -16000 -0.09 -0.12
LOAD 20 LOADTYPE Traffic  TITLE HS20 (19)
ELEMENT LOAD
123 PR GY -4000 0.09 0
201 PR GY -4000 -0.09 0
114 PR GY -16000 0.09 0.76
192 PR GY -16000 -0.09 0.76
106 PR GY -16000 0.09 -0.12
184 PR GY -16000 -0.09 -0.12
LOAD 21 LOADTYPE Traffic  TITLE HS20 (20)
ELEMENT LOAD
124 PR GY -4000 0.09 0
202 PR GY -4000 -0.09 0
115 PR GY -16000 0.09 0.76
193 PR GY -16000 -0.09 0.76
107 PR GY -16000 0.09 -0.12
185 PR GY -16000 -0.09 -0.12
LOAD 22 LOADTYPE Traffic  TITLE HS20 (21)
ELEMENT LOAD
125 PR GY -4000 0.09 0
203 PR GY -4000 -0.09 0
116 PR GY -16000 0.09 0.76
194 PR GY -16000 -0.09 0.76
108 PR GY -16000 0.09 -0.12
186 PR GY -16000 -0.09 -0.12
LOAD 23 LOADTYPE Traffic  TITLE HS20 (22)
ELEMENT LOAD
126 PR GY -4000 0.09 0
204 PR GY -4000 -0.09 0
117 PR GY -16000 0.09 0.76
195 PR GY -16000 -0.09 0.76
109 PR GY -16000 0.09 -0.12
187 PR GY -16000 -0.09 -0.12
LOAD 24 LOADTYPE Traffic  TITLE HS20 (23)
ELEMENT LOAD
127 PR GY -4000 0.09 0
205 PR GY -4000 -0.09 0
118 PR GY -16000 0.09 0.76
196 PR GY -16000 -0.09 0.76
110 PR GY -16000 0.09 -0.12
188 PR GY -16000 -0.09 -0.12
LOAD 25 LOADTYPE Traffic  TITLE HS20 (24)
ELEMENT LOAD
128 PR GY -4000 0.09 0
206 PR GY -4000 -0.09 0
119 PR GY -16000 0.09 0.76
197 PR GY -16000 -0.09 0.76
111 PR GY -16000 0.09 -0.12
189 PR GY -16000 -0.09 -0.12
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LOAD 26 LOADTYPE Traffic  TITLE HS20 (25)
ELEMENT LOAD
129 PR GY -4000 0.09 0
207 PR GY -4000 -0.09 0
120 PR GY -16000 0.09 0.76
198 PR GY -16000 -0.09 0.76
112 PR GY -16000 0.09 -0.12
190 PR GY -16000 -0.09 -0.12
LOAD 27 LOADTYPE Traffic  TITLE HS20 (26)
ELEMENT LOAD
130 PR GY -4000 0.09 0
208 PR GY -4000 -0.09 0
121 PR GY -16000 0.09 0.76
199 PR GY -16000 -0.09 0.76
113 PR GY -16000 0.09 -0.12
191 PR GY -16000 -0.09 -0.12
LOAD 28 LOADTYPE Traffic  TITLE HS20 (27)
ELEMENT LOAD
122 PR GY -16000 0.09 0.76
200 PR GY -16000 -0.09 0.76
114 PR GY -16000 0.09 -0.12
192 PR GY -16000 -0.09 -0.12
LOAD 29 LOADTYPE Traffic  TITLE HS20 (28)
ELEMENT LOAD
123 PR GY -16000 0.09 0.76
201 PR GY -16000 -0.09 0.76
115 PR GY -16000 0.09 -0.12
193 PR GY -16000 -0.09 -0.12
LOAD 30 LOADTYPE Traffic  TITLE HS20 (29)
ELEMENT LOAD
124 PR GY -16000 0.09 0.76
202 PR GY -16000 -0.09 0.76
116 PR GY -16000 0.09 -0.12
194 PR GY -16000 -0.09 -0.12
LOAD 31 LOADTYPE Traffic  TITLE HS20 (30)
ELEMENT LOAD
125 PR GY -16000 0.09 0.76
203 PR GY -16000 -0.09 0.76
117 PR GY -16000 0.09 -0.12
195 PR GY -16000 -0.09 -0.12
LOAD 32 LOADTYPE Traffic  TITLE HS20 (31)
ELEMENT LOAD
126 PR GY -16000 0.09 0.76
204 PR GY -16000 -0.09 0.76
118 PR GY -16000 0.09 -0.12
196 PR GY -16000 -0.09 -0.12
LOAD 33 LOADTYPE Traffic  TITLE HS20 (32)
ELEMENT LOAD
127 PR GY -16000 0.09 0.76
205 PR GY -16000 -0.09 0.76
119 PR GY -16000 0.09 -0.12
197 PR GY -16000 -0.09 -0.12
LOAD 34 LOADTYPE Traffic  TITLE HS20 (33)
ELEMENT LOAD
128 PR GY -16000 0.09 0.76
206 PR GY -16000 -0.09 0.76
120 PR GY -16000 0.09 -0.12
198 PR GY -16000 -0.09 -0.12
LOAD 35 LOADTYPE Traffic  TITLE HS20 (34)
ELEMENT LOAD
129 PR GY -16000 0.09 0.76
207 PR GY -16000 -0.09 0.76
121 PR GY -16000 0.09 -0.12
199 PR GY -16000 -0.09 -0.12
LOAD 36 LOADTYPE Traffic  TITLE HS20 (35)
ELEMENT LOAD
130 PR GY -16000 0.09 0.76
208 PR GY -16000 -0.09 0.76
122 PR GY -16000 0.09 -0.12
200 PR GY -16000 -0.09 -0.12
LOAD 37 LOADTYPE Traffic  TITLE HS20 (36)
ELEMENT LOAD
123 PR GY -16000 0.09 -0.12
201 PR GY -16000 -0.09 -0.12
LOAD 38 LOADTYPE Traffic  TITLE HS20 (37)
ELEMENT LOAD
124 PR GY -16000 0.09 -0.12
202 PR GY -16000 -0.09 -0.12
LOAD 39 LOADTYPE Traffic  TITLE HS20 (38)
ELEMENT LOAD
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125 PR GY -16000 0.09 -0.12
203 PR GY -16000 -0.09 -0.12
LOAD 40 LOADTYPE Traffic  TITLE HS20 (39)
ELEMENT LOAD
126 PR GY -16000 0.09 -0.12
204 PR GY -16000 -0.09 -0.12
LOAD 41 LOADTYPE Traffic  TITLE HS20 (40)
ELEMENT LOAD
127 PR GY -16000 0.09 -0.12
205 PR GY -16000 -0.09 -0.12
LOAD 42 LOADTYPE Traffic  TITLE HS20 (41)
ELEMENT LOAD
128 PR GY -16000 0.09 -0.12
206 PR GY -16000 -0.09 -0.12
LOAD 43 LOADTYPE Traffic  TITLE HS20 (42)
ELEMENT LOAD
129 PR GY -16000 0.09 -0.12
207 PR GY -16000 -0.09 -0.12
LOAD 44 LOADTYPE Traffic  TITLE HS20 (43)
ELEMENT LOAD
130 PR GY -16000 0.09 -0.12
208 PR GY -16000 -0.09 -0.12
LOAD 45 LOADTYPE Traffic  TITLE SU4 (1)
ELEMENT LOAD
105 PR GY -6950 0.09 0
183 PR GY -6950 -0.09 0
LOAD 46 LOADTYPE Traffic  TITLE SU4 (2)
ELEMENT LOAD
106 PR GY -6950 0.09 0
184 PR GY -6950 -0.09 0
LOAD 47 LOADTYPE Traffic  TITLE SU4 (3)
ELEMENT LOAD
107 PR GY -6950 0.09 0
185 PR GY -6950 -0.09 0
LOAD 48 LOADTYPE Traffic  TITLE SU4 (4)
ELEMENT LOAD
108 PR GY -6950 0.09 0
186 PR GY -6950 -0.09 0
LOAD 49 LOADTYPE Traffic  TITLE SU4 (5)
ELEMENT LOAD
109 PR GY -6950 0.09 0
187 PR GY -6950 -0.09 0
LOAD 50 LOADTYPE Traffic  TITLE SU4 (6)
ELEMENT LOAD
110 PR GY -6950 0.09 0
188 PR GY -6950 -0.09 0
LOAD 51 LOADTYPE Traffic  TITLE SU4 (7)
ELEMENT LOAD
111 PR GY -6950 0.09 0
189 PR GY -6950 -0.09 0
105 PR GY -9350 0.09 0.68
183 PR GY -9350 -0.09 0.68
LOAD 52 LOADTYPE Traffic  TITLE SU4 (8)
ELEMENT LOAD
112 PR GY -6950 0.09 0
190 PR GY -6950 -0.09 0
106 PR GY -9350 0.09 0.68
184 PR GY -9350 -0.09 0.68
LOAD 53 LOADTYPE Traffic  TITLE SU4 (9)
ELEMENT LOAD
113 PR GY -6950 0.09 0
191 PR GY -6950 -0.09 0
107 PR GY -9350 0.09 0.68
185 PR GY -9350 -0.09 0.68
105 PR GY -9350 0.09 -0.2
183 PR GY -9350 -0.09 -0.2
LOAD 54 LOADTYPE Traffic  TITLE SU4 (10)
ELEMENT LOAD
114 PR GY -6950 0.09 0
192 PR GY -6950 -0.09 0
108 PR GY -9350 0.09 0.68
186 PR GY -9350 -0.09 0.68
106 PR GY -9350 0.09 -0.2
184 PR GY -9350 -0.09 -0.2
LOAD 55 LOADTYPE Traffic  TITLE SU4 (11)
ELEMENT LOAD
115 PR GY -6950 0.09 0
193 PR GY -6950 -0.09 0
109 PR GY -9350 0.09 0.68
187 PR GY -9350 -0.09 0.68
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107 PR GY -9350 0.09 -0.2
185 PR GY -9350 -0.09 -0.2
LOAD 56 LOADTYPE Traffic  TITLE SU4 (12)
ELEMENT LOAD
116 PR GY -6950 0.09 0
194 PR GY -6950 -0.09 0
110 PR GY -9350 0.09 0.68
188 PR GY -9350 -0.09 0.68
108 PR GY -9350 0.09 -0.2
186 PR GY -9350 -0.09 -0.2
105 PR GY -9350 0.09 0.56
183 PR GY -9350 -0.09 0.56
LOAD 57 LOADTYPE Traffic  TITLE SU4 (13)
ELEMENT LOAD
117 PR GY -6950 0.09 0
195 PR GY -6950 -0.09 0
111 PR GY -9350 0.09 0.68
189 PR GY -9350 -0.09 0.68
109 PR GY -9350 0.09 -0.2
187 PR GY -9350 -0.09 -0.2
106 PR GY -9350 0.09 0.56
184 PR GY -9350 -0.09 0.56
LOAD 58 LOADTYPE Traffic  TITLE SU4 (14)
ELEMENT LOAD
118 PR GY -6950 0.09 0
196 PR GY -6950 -0.09 0
112 PR GY -9350 0.09 0.68
190 PR GY -9350 -0.09 0.68
110 PR GY -9350 0.09 -0.2
188 PR GY -9350 -0.09 -0.2
107 PR GY -9350 0.09 0.56
185 PR GY -9350 -0.09 0.56
LOAD 59 LOADTYPE Traffic  TITLE SU4 (15)
ELEMENT LOAD
119 PR GY -6950 0.09 0
197 PR GY -6950 -0.09 0
113 PR GY -9350 0.09 0.68
191 PR GY -9350 -0.09 0.68
111 PR GY -9350 0.09 -0.2
189 PR GY -9350 -0.09 -0.2
108 PR GY -9350 0.09 0.56
186 PR GY -9350 -0.09 0.56
LOAD 60 LOADTYPE Traffic  TITLE SU4 (16)
ELEMENT LOAD
120 PR GY -6950 0.09 0
198 PR GY -6950 -0.09 0
114 PR GY -9350 0.09 0.68
192 PR GY -9350 -0.09 0.68
112 PR GY -9350 0.09 -0.2
190 PR GY -9350 -0.09 -0.2
109 PR GY -9350 0.09 0.56
187 PR GY -9350 -0.09 0.56
LOAD 61 LOADTYPE Traffic  TITLE SU4 (17)
ELEMENT LOAD
121 PR GY -6950 0.09 0
199 PR GY -6950 -0.09 0
115 PR GY -9350 0.09 0.68
193 PR GY -9350 -0.09 0.68
113 PR GY -9350 0.09 -0.2
191 PR GY -9350 -0.09 -0.2
110 PR GY -9350 0.09 0.56
188 PR GY -9350 -0.09 0.56
LOAD 62 LOADTYPE Traffic  TITLE SU4 (18)
ELEMENT LOAD
122 PR GY -6950 0.09 0
200 PR GY -6950 -0.09 0
116 PR GY -9350 0.09 0.68
194 PR GY -9350 -0.09 0.68
114 PR GY -9350 0.09 -0.2
192 PR GY -9350 -0.09 -0.2
111 PR GY -9350 0.09 0.56
189 PR GY -9350 -0.09 0.56
LOAD 63 LOADTYPE Traffic  TITLE SU4 (19)
ELEMENT LOAD
123 PR GY -6950 0.09 0
201 PR GY -6950 -0.09 0
117 PR GY -9350 0.09 0.68
195 PR GY -9350 -0.09 0.68
115 PR GY -9350 0.09 -0.2
193 PR GY -9350 -0.09 -0.2
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112 PR GY -9350 0.09 0.56
190 PR GY -9350 -0.09 0.56
LOAD 64 LOADTYPE Traffic  TITLE SU4 (20)
ELEMENT LOAD
124 PR GY -6950 0.09 0
202 PR GY -6950 -0.09 0
118 PR GY -9350 0.09 0.68
196 PR GY -9350 -0.09 0.68
116 PR GY -9350 0.09 -0.2
194 PR GY -9350 -0.09 -0.2
113 PR GY -9350 0.09 0.56
191 PR GY -9350 -0.09 0.56
LOAD 65 LOADTYPE Traffic  TITLE SU4 (21)
ELEMENT LOAD
125 PR GY -6950 0.09 0
203 PR GY -6950 -0.09 0
119 PR GY -9350 0.09 0.68
197 PR GY -9350 -0.09 0.68
117 PR GY -9350 0.09 -0.2
195 PR GY -9350 -0.09 -0.2
114 PR GY -9350 0.09 0.56
192 PR GY -9350 -0.09 0.56
LOAD 66 LOADTYPE Traffic  TITLE SU4 (22)
ELEMENT LOAD
126 PR GY -6950 0.09 0
204 PR GY -6950 -0.09 0
120 PR GY -9350 0.09 0.68
198 PR GY -9350 -0.09 0.68
118 PR GY -9350 0.09 -0.2
196 PR GY -9350 -0.09 -0.2
115 PR GY -9350 0.09 0.56
193 PR GY -9350 -0.09 0.56
LOAD 67 LOADTYPE Traffic  TITLE SU4 (23)
ELEMENT LOAD
127 PR GY -6950 0.09 0
205 PR GY -6950 -0.09 0
121 PR GY -9350 0.09 0.68
199 PR GY -9350 -0.09 0.68
119 PR GY -9350 0.09 -0.2
197 PR GY -9350 -0.09 -0.2
116 PR GY -9350 0.09 0.56
194 PR GY -9350 -0.09 0.56
LOAD 68 LOADTYPE Traffic  TITLE SU4 (24)
ELEMENT LOAD
128 PR GY -6950 0.09 0
206 PR GY -6950 -0.09 0
122 PR GY -9350 0.09 0.68
200 PR GY -9350 -0.09 0.68
120 PR GY -9350 0.09 -0.2
198 PR GY -9350 -0.09 -0.2
117 PR GY -9350 0.09 0.56
195 PR GY -9350 -0.09 0.56
LOAD 69 LOADTYPE Traffic  TITLE SU4 (25)
ELEMENT LOAD
129 PR GY -6950 0.09 0
207 PR GY -6950 -0.09 0
123 PR GY -9350 0.09 0.68
201 PR GY -9350 -0.09 0.68
121 PR GY -9350 0.09 -0.2
199 PR GY -9350 -0.09 -0.2
118 PR GY -9350 0.09 0.56
196 PR GY -9350 -0.09 0.56
LOAD 70 LOADTYPE Traffic  TITLE SU4 (26)
ELEMENT LOAD
130 PR GY -6950 0.09 0
208 PR GY -6950 -0.09 0
124 PR GY -9350 0.09 0.68
202 PR GY -9350 -0.09 0.68
122 PR GY -9350 0.09 -0.2
200 PR GY -9350 -0.09 -0.2
119 PR GY -9350 0.09 0.56
197 PR GY -9350 -0.09 0.56
LOAD 71 LOADTYPE Traffic  TITLE SU4 (27)
ELEMENT LOAD
125 PR GY -9350 0.09 0.68
203 PR GY -9350 -0.09 0.68
123 PR GY -9350 0.09 -0.2
201 PR GY -9350 -0.09 -0.2
120 PR GY -9350 0.09 0.56
198 PR GY -9350 -0.09 0.56
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LOAD 72 LOADTYPE Traffic  TITLE SU4 (28)
ELEMENT LOAD
126 PR GY -9350 0.09 0.68
204 PR GY -9350 -0.09 0.68
124 PR GY -9350 0.09 -0.2
202 PR GY -9350 -0.09 -0.2
121 PR GY -9350 0.09 0.56
199 PR GY -9350 -0.09 0.56
LOAD 73 LOADTYPE Traffic  TITLE SU4 (29)
ELEMENT LOAD
127 PR GY -9350 0.09 0.68
205 PR GY -9350 -0.09 0.68
125 PR GY -9350 0.09 -0.2
203 PR GY -9350 -0.09 -0.2
122 PR GY -9350 0.09 0.56
200 PR GY -9350 -0.09 0.56
LOAD 74 LOADTYPE Traffic  TITLE SU4 (30)
ELEMENT LOAD
128 PR GY -9350 0.09 0.68
206 PR GY -9350 -0.09 0.68
126 PR GY -9350 0.09 -0.2
204 PR GY -9350 -0.09 -0.2
123 PR GY -9350 0.09 0.56
201 PR GY -9350 -0.09 0.56
LOAD 75 LOADTYPE Traffic  TITLE SU4 (31)
ELEMENT LOAD
129 PR GY -9350 0.09 0.68
207 PR GY -9350 -0.09 0.68
127 PR GY -9350 0.09 -0.2
205 PR GY -9350 -0.09 -0.2
124 PR GY -9350 0.09 0.56
202 PR GY -9350 -0.09 0.56
LOAD 76 LOADTYPE Traffic  TITLE SU4 (32)
ELEMENT LOAD
130 PR GY -9350 0.09 0.68
208 PR GY -9350 -0.09 0.68
128 PR GY -9350 0.09 -0.2
206 PR GY -9350 -0.09 -0.2
125 PR GY -9350 0.09 0.56
203 PR GY -9350 -0.09 0.56
LOAD 77 LOADTYPE Traffic  TITLE SU4 (33)
ELEMENT LOAD
129 PR GY -9350 0.09 -0.2
207 PR GY -9350 -0.09 -0.2
126 PR GY -9350 0.09 0.56
204 PR GY -9350 -0.09 0.56
LOAD 78 LOADTYPE Traffic  TITLE SU4 (34)
ELEMENT LOAD
130 PR GY -9350 0.09 -0.2
208 PR GY -9350 -0.09 -0.2
127 PR GY -9350 0.09 0.56
205 PR GY -9350 -0.09 0.56
LOAD 79 LOADTYPE Traffic  TITLE SU4 (35)
ELEMENT LOAD
128 PR GY -9350 0.09 0.56
206 PR GY -9350 -0.09 0.56
LOAD 80 LOADTYPE Traffic  TITLE SU4 (36)
ELEMENT LOAD
129 PR GY -9350 0.09 0.56
207 PR GY -9350 -0.09 0.56
LOAD 81 LOADTYPE Traffic  TITLE SU4 (37)
ELEMENT LOAD
130 PR GY -9350 0.09 0.56
208 PR GY -9350 -0.09 0.56
LOAD 82 LOADTYPE Traffic  TITLE SU2 (1)
ELEMENT LOAD
105 PR GY -6000 0.09 0
183 PR GY -6000 -0.09 0
LOAD 83 LOADTYPE Traffic  TITLE SU2 (2)
ELEMENT LOAD
106 PR GY -6000 0.09 0
184 PR GY -6000 -0.09 0
LOAD 84 LOADTYPE Traffic  TITLE SU2 (3)
ELEMENT LOAD
107 PR GY -6000 0.09 0
185 PR GY -6000 -0.09 0
LOAD 85 LOADTYPE Traffic  TITLE SU2 (4)
ELEMENT LOAD
108 PR GY -6000 0.09 0
186 PR GY -6000 -0.09 0
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LOAD 86 LOADTYPE Traffic  TITLE SU2 (5)
ELEMENT LOAD
109 PR GY -6000 0.09 0
187 PR GY -6000 -0.09 0
LOAD 87 LOADTYPE Traffic  TITLE SU2 (6)
ELEMENT LOAD
110 PR GY -6000 0.09 0
188 PR GY -6000 -0.09 0
LOAD 88 LOADTYPE Traffic  TITLE SU2 (7)
ELEMENT LOAD
111 PR GY -6000 0.09 0
189 PR GY -6000 -0.09 0
LOAD 89 LOADTYPE Traffic  TITLE SU2 (8)
ELEMENT LOAD
112 PR GY -6000 0.09 0
190 PR GY -6000 -0.09 0
LOAD 90 LOADTYPE Traffic  TITLE SU2 (9)
ELEMENT LOAD
113 PR GY -6000 0.09 0
191 PR GY -6000 -0.09 0
105 PR GY -11000 0.09 0.12
183 PR GY -11000 -0.09 0.12
LOAD 91 LOADTYPE Traffic  TITLE SU2 (10)
ELEMENT LOAD
114 PR GY -6000 0.09 0
192 PR GY -6000 -0.09 0
106 PR GY -11000 0.09 0.12
184 PR GY -11000 -0.09 0.12
LOAD 92 LOADTYPE Traffic  TITLE SU2 (11)
ELEMENT LOAD
115 PR GY -6000 0.09 0
193 PR GY -6000 -0.09 0
107 PR GY -11000 0.09 0.12
185 PR GY -11000 -0.09 0.12
LOAD 93 LOADTYPE Traffic  TITLE SU2 (12)
ELEMENT LOAD
116 PR GY -6000 0.09 0
194 PR GY -6000 -0.09 0
108 PR GY -11000 0.09 0.12
186 PR GY -11000 -0.09 0.12
LOAD 94 LOADTYPE Traffic  TITLE SU2 (13)
ELEMENT LOAD
117 PR GY -6000 0.09 0
195 PR GY -6000 -0.09 0
109 PR GY -11000 0.09 0.12
187 PR GY -11000 -0.09 0.12
LOAD 95 LOADTYPE Traffic  TITLE SU2 (14)
ELEMENT LOAD
118 PR GY -6000 0.09 0
196 PR GY -6000 -0.09 0
110 PR GY -11000 0.09 0.12
188 PR GY -11000 -0.09 0.12
LOAD 96 LOADTYPE Traffic  TITLE SU2 (15)
ELEMENT LOAD
119 PR GY -6000 0.09 0
197 PR GY -6000 -0.09 0
111 PR GY -11000 0.09 0.12
189 PR GY -11000 -0.09 0.12
LOAD 97 LOADTYPE Traffic  TITLE SU2 (16)
ELEMENT LOAD
120 PR GY -6000 0.09 0
198 PR GY -6000 -0.09 0
112 PR GY -11000 0.09 0.12
190 PR GY -11000 -0.09 0.12
LOAD 98 LOADTYPE Traffic  TITLE SU2 (17)
ELEMENT LOAD
121 PR GY -6000 0.09 0
199 PR GY -6000 -0.09 0
113 PR GY -11000 0.09 0.12
191 PR GY -11000 -0.09 0.12
LOAD 99 LOADTYPE Traffic  TITLE SU2 (18)
ELEMENT LOAD
122 PR GY -6000 0.09 0
200 PR GY -6000 -0.09 0
114 PR GY -11000 0.09 0.12
192 PR GY -11000 -0.09 0.12
LOAD 100 LOADTYPE Traffic  TITLE SU2 (19)
ELEMENT LOAD
123 PR GY -6000 0.09 0
201 PR GY -6000 -0.09 0
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115 PR GY -11000 0.09 0.12
193 PR GY -11000 -0.09 0.12
LOAD 101 LOADTYPE Traffic  TITLE SU2 (20)
ELEMENT LOAD
124 PR GY -6000 0.09 0
202 PR GY -6000 -0.09 0
116 PR GY -11000 0.09 0.12
194 PR GY -11000 -0.09 0.12
LOAD 102 LOADTYPE Traffic  TITLE SU2 (21)
ELEMENT LOAD
125 PR GY -6000 0.09 0
203 PR GY -6000 -0.09 0
117 PR GY -11000 0.09 0.12
195 PR GY -11000 -0.09 0.12
LOAD 103 LOADTYPE Traffic  TITLE SU2 (22)
ELEMENT LOAD
126 PR GY -6000 0.09 0
204 PR GY -6000 -0.09 0
118 PR GY -11000 0.09 0.12
196 PR GY -11000 -0.09 0.12
LOAD 104 LOADTYPE Traffic  TITLE SU2 (23)
ELEMENT LOAD
127 PR GY -6000 0.09 0
205 PR GY -6000 -0.09 0
119 PR GY -11000 0.09 0.12
197 PR GY -11000 -0.09 0.12
LOAD 105 LOADTYPE Traffic  TITLE SU2 (24)
ELEMENT LOAD
128 PR GY -6000 0.09 0
206 PR GY -6000 -0.09 0
120 PR GY -11000 0.09 0.12
198 PR GY -11000 -0.09 0.12
LOAD 106 LOADTYPE Traffic  TITLE SU2 (25)
ELEMENT LOAD
129 PR GY -6000 0.09 0
207 PR GY -6000 -0.09 0
121 PR GY -11000 0.09 0.12
199 PR GY -11000 -0.09 0.12
LOAD 107 LOADTYPE Traffic  TITLE SU2 (26)
ELEMENT LOAD
130 PR GY -6000 0.09 0
208 PR GY -6000 -0.09 0
122 PR GY -11000 0.09 0.12
200 PR GY -11000 -0.09 0.12
LOAD 108 LOADTYPE Traffic  TITLE SU2 (27)
ELEMENT LOAD
123 PR GY -11000 0.09 0.12
201 PR GY -11000 -0.09 0.12
LOAD 109 LOADTYPE Traffic  TITLE SU2 (28)
ELEMENT LOAD
124 PR GY -11000 0.09 0.12
202 PR GY -11000 -0.09 0.12
LOAD 110 LOADTYPE Traffic  TITLE SU2 (29)
ELEMENT LOAD
125 PR GY -11000 0.09 0.12
203 PR GY -11000 -0.09 0.12
LOAD 111 LOADTYPE Traffic  TITLE SU2 (30)
ELEMENT LOAD
126 PR GY -11000 0.09 0.12
204 PR GY -11000 -0.09 0.12
LOAD 112 LOADTYPE Traffic  TITLE SU2 (31)
ELEMENT LOAD
127 PR GY -11000 0.09 0.12
205 PR GY -11000 -0.09 0.12
LOAD 113 LOADTYPE Traffic  TITLE SU2 (31)
ELEMENT LOAD
128 PR GY -11000 0.09 0.12
206 PR GY -11000 -0.09 0.12
LOAD 114 LOADTYPE Traffic  TITLE SU2 (32)
ELEMENT LOAD
129 PR GY -11000 0.09 0.12
207 PR GY -11000 -0.09 0.12
LOAD 115 LOADTYPE Traffic  TITLE SU2 (33)
ELEMENT LOAD
130 PR GY -11000 0.09 0.12
208 PR GY -11000 -0.09 0.12
LOAD 116 LOADTYPE Traffic  TITLE SU3 (1)
ELEMENT LOAD
105 PR GY -11000 0.09 0
183 PR GY -11000 -0.09 0
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LOAD 117 LOADTYPE Traffic  TITLE SU3 (2)
ELEMENT LOAD
106 PR GY -11000 0.09 0
184 PR GY -11000 -0.09 0
LOAD 118 LOADTYPE Traffic  TITLE SU3 (3)
ELEMENT LOAD
107 PR GY -11000 0.09 0
185 PR GY -11000 -0.09 0
LOAD 119 LOADTYPE Traffic  TITLE SU3 (4)
ELEMENT LOAD
108 PR GY -11000 0.09 0
186 PR GY -11000 -0.09 0
LOAD 120 LOADTYPE Traffic  TITLE SU3 (5)
ELEMENT LOAD
109 PR GY -11000 0.09 0
187 PR GY -11000 -0.09 0
LOAD 121 LOADTYPE Traffic  TITLE SU3 (6)
ELEMENT LOAD
110 PR GY -11000 0.09 0
188 PR GY -11000 -0.09 0
LOAD 122 LOADTYPE Traffic  TITLE SU3 (7)
ELEMENT LOAD
111 PR GY -11000 0.09 0
189 PR GY -11000 -0.09 0
LOAD 123 LOADTYPE Traffic  TITLE SU3 (8)
ELEMENT LOAD
112 PR GY -11000 0.09 0
190 PR GY -11000 -0.09 0
105 PR GY -11000 0.09 0.48
183 PR GY -11000 -0.09 0.48
LOAD 124 LOADTYPE Traffic  TITLE SU3 (9)
ELEMENT LOAD
113 PR GY -11000 0.09 0
191 PR GY -11000 -0.09 0
106 PR GY -11000 0.09 0.48
184 PR GY -11000 -0.09 0.48
LOAD 125 LOADTYPE Traffic  TITLE SU3 (10)
ELEMENT LOAD
114 PR GY -11000 0.09 0
192 PR GY -11000 -0.09 0
107 PR GY -11000 0.09 0.48
185 PR GY -11000 -0.09 0.48
105 PR GY -11000 0.09 -0.4
183 PR GY -11000 -0.09 -0.4
LOAD 126 LOADTYPE Traffic  TITLE SU3 (11)
ELEMENT LOAD
115 PR GY -11000 0.09 0
193 PR GY -11000 -0.09 0
108 PR GY -11000 0.09 0.48
186 PR GY -11000 -0.09 0.48
106 PR GY -11000 0.09 -0.4
184 PR GY -11000 -0.09 -0.4
LOAD 127 LOADTYPE Traffic  TITLE SU3 (12)
ELEMENT LOAD
116 PR GY -11000 0.09 0
194 PR GY -11000 -0.09 0
109 PR GY -11000 0.09 0.48
187 PR GY -11000 -0.09 0.48
107 PR GY -11000 0.09 -0.4
185 PR GY -11000 -0.09 -0.4
LOAD 128 LOADTYPE Traffic  TITLE SU3 (13)
ELEMENT LOAD
117 PR GY -11000 0.09 0
195 PR GY -11000 -0.09 0
110 PR GY -11000 0.09 0.48
188 PR GY -11000 -0.09 0.48
108 PR GY -11000 0.09 -0.4
186 PR GY -11000 -0.09 -0.4
LOAD 129 LOADTYPE Traffic  TITLE SU3 (14)
ELEMENT LOAD
118 PR GY -11000 0.09 0
196 PR GY -11000 -0.09 0
111 PR GY -11000 0.09 0.48
189 PR GY -11000 -0.09 0.48
109 PR GY -11000 0.09 -0.4
187 PR GY -11000 -0.09 -0.4
LOAD 130 LOADTYPE Traffic  TITLE SU3 (15)
ELEMENT LOAD
119 PR GY -11000 0.09 0
197 PR GY -11000 -0.09 0
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112 PR GY -11000 0.09 0.48
190 PR GY -11000 -0.09 0.48
110 PR GY -11000 0.09 -0.4
188 PR GY -11000 -0.09 -0.4
LOAD 131 LOADTYPE Traffic  TITLE SU3 (16)
ELEMENT LOAD
120 PR GY -11000 0.09 0
198 PR GY -11000 -0.09 0
113 PR GY -11000 0.09 0.48
191 PR GY -11000 -0.09 0.48
111 PR GY -11000 0.09 -0.4
189 PR GY -11000 -0.09 -0.4
LOAD 132 LOADTYPE Traffic  TITLE SU3 (17)
ELEMENT LOAD
121 PR GY -11000 0.09 0
199 PR GY -11000 -0.09 0
114 PR GY -11000 0.09 0.48
192 PR GY -11000 -0.09 0.48
112 PR GY -11000 0.09 -0.4
190 PR GY -11000 -0.09 -0.4
LOAD 133 LOADTYPE Traffic  TITLE SU3 (18)
ELEMENT LOAD
122 PR GY -11000 0.09 0
200 PR GY -11000 -0.09 0
115 PR GY -11000 0.09 0.48
193 PR GY -11000 -0.09 0.48
113 PR GY -11000 0.09 -0.4
191 PR GY -11000 -0.09 -0.4
LOAD 134 LOADTYPE Traffic  TITLE SU3 (19)
ELEMENT LOAD
123 PR GY -11000 0.09 0
201 PR GY -11000 -0.09 0
116 PR GY -11000 0.09 0.48
194 PR GY -11000 -0.09 0.48
114 PR GY -11000 0.09 -0.4
192 PR GY -11000 -0.09 -0.4
LOAD 135 LOADTYPE Traffic  TITLE SU3 (20)
ELEMENT LOAD
124 PR GY -11000 0.09 0
202 PR GY -11000 -0.09 0
117 PR GY -11000 0.09 0.48
195 PR GY -11000 -0.09 0.48
115 PR GY -11000 0.09 -0.4
193 PR GY -11000 -0.09 -0.4
LOAD 136 LOADTYPE Traffic  TITLE SU3 (21)
ELEMENT LOAD
125 PR GY -11000 0.09 0
203 PR GY -11000 -0.09 0
118 PR GY -11000 0.09 0.48
196 PR GY -11000 -0.09 0.48
116 PR GY -11000 0.09 -0.4
194 PR GY -11000 -0.09 -0.4
LOAD 137 LOADTYPE Traffic  TITLE SU3 (22)
ELEMENT LOAD
126 PR GY -11000 0.09 0
204 PR GY -11000 -0.09 0
119 PR GY -11000 0.09 0.48
197 PR GY -11000 -0.09 0.48
117 PR GY -11000 0.09 -0.4
195 PR GY -11000 -0.09 -0.4
LOAD 138 LOADTYPE Traffic  TITLE SU3 (23)
ELEMENT LOAD
127 PR GY -11000 0.09 0
205 PR GY -11000 -0.09 0
120 PR GY -11000 0.09 0.48
198 PR GY -11000 -0.09 0.48
118 PR GY -11000 0.09 -0.4
196 PR GY -11000 -0.09 -0.4
LOAD 139 LOADTYPE Traffic  TITLE SU3 (24)
ELEMENT LOAD
128 PR GY -11000 0.09 0
206 PR GY -11000 -0.09 0
121 PR GY -11000 0.09 0.48
199 PR GY -11000 -0.09 0.48
119 PR GY -11000 0.09 -0.4
197 PR GY -11000 -0.09 -0.4
LOAD 140 LOADTYPE Traffic  TITLE SU3 (25)
ELEMENT LOAD
129 PR GY -11000 0.09 0
207 PR GY -11000 -0.09 0
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122 PR GY -11000 0.09 0.48
200 PR GY -11000 -0.09 0.48
120 PR GY -11000 0.09 -0.4
198 PR GY -11000 -0.09 -0.4
LOAD 141 LOADTYPE Traffic  TITLE SU3 (26)
ELEMENT LOAD
130 PR GY -11000 0.09 0
208 PR GY -11000 -0.09 0
123 PR GY -11000 0.09 0.48
201 PR GY -11000 -0.09 0.48
121 PR GY -11000 0.09 -0.4
199 PR GY -11000 -0.09 -0.4
LOAD 142 LOADTYPE Traffic  TITLE SU3 (27)
ELEMENT LOAD
124 PR GY -11000 0.09 0.48
202 PR GY -11000 -0.09 0.48
122 PR GY -11000 0.09 -0.4
200 PR GY -11000 -0.09 -0.4
LOAD 143 LOADTYPE Traffic  TITLE SU3 (28)
ELEMENT LOAD
125 PR GY -11000 0.09 0.48
203 PR GY -11000 -0.09 0.48
123 PR GY -11000 0.09 -0.4
201 PR GY -11000 -0.09 -0.4
LOAD 144 LOADTYPE Traffic  TITLE SU3 (29)
ELEMENT LOAD
126 PR GY -11000 0.09 0.48
204 PR GY -11000 -0.09 0.48
124 PR GY -11000 0.09 -0.4
202 PR GY -11000 -0.09 -0.4
LOAD 145 LOADTYPE Traffic  TITLE SU3 (30)
ELEMENT LOAD
127 PR GY -11000 0.09 0.48
205 PR GY -11000 -0.09 0.48
125 PR GY -11000 0.09 -0.4
203 PR GY -11000 -0.09 -0.4
LOAD 146 LOADTYPE Traffic  TITLE SU3 (31)
ELEMENT LOAD
128 PR GY -11000 0.09 0.48
206 PR GY -11000 -0.09 0.48
126 PR GY -11000 0.09 -0.4
204 PR GY -11000 -0.09 -0.4
LOAD 147 LOADTYPE Traffic  TITLE SU3 (32)
ELEMENT LOAD
129 PR GY -11000 0.09 0.48
207 PR GY -11000 -0.09 0.48
127 PR GY -11000 0.09 -0.4
205 PR GY -11000 -0.09 -0.4
LOAD 148 LOADTYPE Traffic  TITLE SU3 (33)
ELEMENT LOAD
130 PR GY -11000 0.09 0.48
208 PR GY -11000 -0.09 0.48
128 PR GY -11000 0.09 -0.4
206 PR GY -11000 -0.09 -0.4
LOAD 149 LOADTYPE Traffic  TITLE SU3 (34)
ELEMENT LOAD
129 PR GY -11000 0.09 -0.4
207 PR GY -11000 -0.09 -0.4
LOAD 150 LOADTYPE Traffic  TITLE SU3 (35)
ELEMENT LOAD
130 PR GY -11000 0.09 -0.4
208 PR GY -11000 -0.09 -0.4
LOAD 151 LOADTYPE Traffic  TITLE C3 (1)
ELEMENT LOAD
105 PR GY -6000 0.09 0
183 PR GY -6000 -0.09 0
LOAD 152 LOADTYPE Traffic  TITLE C3 (2)
ELEMENT LOAD
106 PR GY -6000 0.09 0
184 PR GY -6000 -0.09 0
LOAD 153 LOADTYPE Traffic  TITLE C3 (3)
ELEMENT LOAD
107 PR GY -6000 0.09 0
185 PR GY -6000 -0.09 0
LOAD 154 LOADTYPE Traffic  TITLE C3 (4)
ELEMENT LOAD
108 PR GY -6000 0.09 0
186 PR GY -6000 -0.09 0
LOAD 155 LOADTYPE Traffic  TITLE C3 (5)
ELEMENT LOAD
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109 PR GY -6000 0.09 0
187 PR GY -6000 -0.09 0
LOAD 156 LOADTYPE Traffic  TITLE C3 (6)
ELEMENT LOAD
110 PR GY -6000 0.09 0
188 PR GY -6000 -0.09 0
LOAD 157 LOADTYPE Traffic  TITLE C3 (7)
ELEMENT LOAD
111 PR GY -6000 0.09 0
189 PR GY -6000 -0.09 0
105 PR GY -11000 0.09 -0.16
183 PR GY -11000 -0.09 -0.16
LOAD 158 LOADTYPE Traffic  TITLE C3 (8)
ELEMENT LOAD
112 PR GY -6000 0.09 0
190 PR GY -6000 -0.09 0
106 PR GY -11000 0.09 -0.16
184 PR GY -11000 -0.09 -0.16
LOAD 159 LOADTYPE Traffic  TITLE C3 (9)
ELEMENT LOAD
113 PR GY -6000 0.09 0
191 PR GY -6000 -0.09 0
107 PR GY -11000 0.09 -0.16
185 PR GY -11000 -0.09 -0.16
LOAD 160 LOADTYPE Traffic  TITLE C3 (10)
ELEMENT LOAD
114 PR GY -6000 0.09 0
192 PR GY -6000 -0.09 0
108 PR GY -11000 0.09 -0.16
186 PR GY -11000 -0.09 -0.16
LOAD 161 LOADTYPE Traffic  TITLE C3 (11)
ELEMENT LOAD
115 PR GY -6000 0.09 0
193 PR GY -6000 -0.09 0
109 PR GY -11000 0.09 -0.16
187 PR GY -11000 -0.09 -0.16
LOAD 162 LOADTYPE Traffic  TITLE C3 (12)
ELEMENT LOAD
116 PR GY -6000 0.09 0
194 PR GY -6000 -0.09 0
110 PR GY -11000 0.09 -0.16
188 PR GY -11000 -0.09 -0.16
LOAD 163 LOADTYPE Traffic  TITLE C3 (13)
ELEMENT LOAD
117 PR GY -6000 0.09 0
195 PR GY -6000 -0.09 0
111 PR GY -11000 0.09 -0.16
189 PR GY -11000 -0.09 -0.16
LOAD 164 LOADTYPE Traffic  TITLE C3 (14)
ELEMENT LOAD
118 PR GY -6000 0.09 0
196 PR GY -6000 -0.09 0
112 PR GY -11000 0.09 -0.16
190 PR GY -11000 -0.09 -0.16
LOAD 165 LOADTYPE Traffic  TITLE C3 (15)
ELEMENT LOAD
119 PR GY -6000 0.09 0
197 PR GY -6000 -0.09 0
113 PR GY -11000 0.09 -0.16
191 PR GY -11000 -0.09 -0.16
LOAD 166 LOADTYPE Traffic  TITLE C3 (16)
ELEMENT LOAD
120 PR GY -6000 0.09 0
198 PR GY -6000 -0.09 0
114 PR GY -11000 0.09 -0.16
192 PR GY -11000 -0.09 -0.16
LOAD 167 LOADTYPE Traffic  TITLE C3 (17)
ELEMENT LOAD
121 PR GY -6000 0.09 0
199 PR GY -6000 -0.09 0
115 PR GY -11000 0.09 -0.16
193 PR GY -11000 -0.09 -0.16
LOAD 168 LOADTYPE Traffic  TITLE C3 (18)
ELEMENT LOAD
122 PR GY -6000 0.09 0
200 PR GY -6000 -0.09 0
116 PR GY -11000 0.09 -0.16
194 PR GY -11000 -0.09 -0.16
LOAD 169 LOADTYPE Traffic  TITLE C3 (19)
ELEMENT LOAD
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123 PR GY -6000 0.09 0
201 PR GY -6000 -0.09 0
117 PR GY -11000 0.09 -0.16
195 PR GY -11000 -0.09 -0.16
105 PR GY -11000 0.09 -0.48
183 PR GY -11000 -0.09 -0.48
LOAD 170 LOADTYPE Traffic  TITLE C3 (20)
ELEMENT LOAD
124 PR GY -6000 0.09 0
202 PR GY -6000 -0.09 0
118 PR GY -11000 0.09 -0.16
196 PR GY -11000 -0.09 -0.16
106 PR GY -11000 0.09 -0.48
184 PR GY -11000 -0.09 -0.48
LOAD 171 LOADTYPE Traffic  TITLE C3 (21)
ELEMENT LOAD
125 PR GY -6000 0.09 0
203 PR GY -6000 -0.09 0
119 PR GY -11000 0.09 -0.16
197 PR GY -11000 -0.09 -0.16
107 PR GY -11000 0.09 -0.48
185 PR GY -11000 -0.09 -0.48
LOAD 172 LOADTYPE Traffic  TITLE C3 (22)
ELEMENT LOAD
126 PR GY -6000 0.09 0
204 PR GY -6000 -0.09 0
120 PR GY -11000 0.09 -0.16
198 PR GY -11000 -0.09 -0.16
108 PR GY -11000 0.09 -0.48
186 PR GY -11000 -0.09 -0.48
LOAD 173 LOADTYPE Traffic  TITLE C3 (23)
ELEMENT LOAD
127 PR GY -6000 0.09 0
205 PR GY -6000 -0.09 0
121 PR GY -11000 0.09 -0.16
199 PR GY -11000 -0.09 -0.16
109 PR GY -11000 0.09 -0.48
187 PR GY -11000 -0.09 -0.48
LOAD 174 LOADTYPE Traffic  TITLE C3 (24)
ELEMENT LOAD
128 PR GY -6000 0.09 0
206 PR GY -6000 -0.09 0
122 PR GY -11000 0.09 -0.16
200 PR GY -11000 -0.09 -0.16
110 PR GY -11000 0.09 -0.48
188 PR GY -11000 -0.09 -0.48
LOAD 175 LOADTYPE Traffic  TITLE C3 (25)
ELEMENT LOAD
129 PR GY -6000 0.09 0
207 PR GY -6000 -0.09 0
123 PR GY -11000 0.09 -0.16
201 PR GY -11000 -0.09 -0.16
111 PR GY -11000 0.09 -0.48
189 PR GY -11000 -0.09 -0.48
LOAD 176 LOADTYPE Traffic  TITLE C3 (26)
ELEMENT LOAD
130 PR GY -6000 0.09 0
208 PR GY -6000 -0.09 0
124 PR GY -11000 0.09 -0.16
202 PR GY -11000 -0.09 -0.16
112 PR GY -11000 0.09 -0.48
190 PR GY -11000 -0.09 -0.48
LOAD 177 LOADTYPE Traffic  TITLE C3 (27)
ELEMENT LOAD
125 PR GY -11000 0.09 -0.16
203 PR GY -11000 -0.09 -0.16
113 PR GY -11000 0.09 -0.48
191 PR GY -11000 -0.09 -0.48
LOAD 178 LOADTYPE Traffic  TITLE C3 (28)
ELEMENT LOAD
126 PR GY -11000 0.09 -0.16
204 PR GY -11000 -0.09 -0.16
114 PR GY -11000 0.09 -0.48
192 PR GY -11000 -0.09 -0.48
LOAD 179 LOADTYPE Traffic  TITLE C3 (29)
ELEMENT LOAD
127 PR GY -11000 0.09 -0.16
205 PR GY -11000 -0.09 -0.16
115 PR GY -11000 0.09 -0.48
193 PR GY -11000 -0.09 -0.48
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LOAD 180 LOADTYPE Traffic  TITLE C3 (30)
ELEMENT LOAD
128 PR GY -11000 0.09 -0.16
206 PR GY -11000 -0.09 -0.16
116 PR GY -11000 0.09 -0.48
194 PR GY -11000 -0.09 -0.48
LOAD 181 LOADTYPE Traffic  TITLE C3 (31)
ELEMENT LOAD
129 PR GY -11000 0.09 -0.16
207 PR GY -11000 -0.09 -0.16
117 PR GY -11000 0.09 -0.48
195 PR GY -11000 -0.09 -0.48
LOAD 182 LOADTYPE Traffic  TITLE C3 (32)
ELEMENT LOAD
130 PR GY -11000 0.09 -0.16
208 PR GY -11000 -0.09 -0.16
118 PR GY -11000 0.09 -0.48
196 PR GY -11000 -0.09 -0.48
LOAD 183 LOADTYPE Traffic  TITLE C3 (33)
ELEMENT LOAD
119 PR GY -11000 0.09 -0.48
197 PR GY -11000 -0.09 -0.48
LOAD 184 LOADTYPE Traffic  TITLE C3 (34)
ELEMENT LOAD
120 PR GY -11000 0.09 -0.48
198 PR GY -11000 -0.09 -0.48
LOAD 185 LOADTYPE Traffic  TITLE C3 (35)
ELEMENT LOAD
121 PR GY -11000 0.09 -0.48
199 PR GY -11000 -0.09 -0.48
LOAD 186 LOADTYPE Traffic  TITLE C3 (36)
ELEMENT LOAD
122 PR GY -11000 0.09 -0.48
200 PR GY -11000 -0.09 -0.48
LOAD 187 LOADTYPE Traffic  TITLE C3 (37)
ELEMENT LOAD
123 PR GY -11000 0.09 -0.48
201 PR GY -11000 -0.09 -0.48
LOAD 188 LOADTYPE Traffic  TITLE C3 (38)
ELEMENT LOAD
124 PR GY -11000 0.09 -0.48
202 PR GY -11000 -0.09 -0.48
LOAD 189 LOADTYPE Traffic  TITLE C3 (39)
ELEMENT LOAD
125 PR GY -11000 0.09 -0.48
203 PR GY -11000 -0.09 -0.48
LOAD 190 LOADTYPE Traffic  TITLE C3 (40)
ELEMENT LOAD
126 PR GY -11000 0.09 -0.48
204 PR GY -11000 -0.09 -0.48
LOAD 191 LOADTYPE Traffic  TITLE C3 (41)
ELEMENT LOAD
127 PR GY -11000 0.09 -0.48
205 PR GY -11000 -0.09 -0.48
LOAD 192 LOADTYPE Traffic  TITLE C3 (42)
ELEMENT LOAD
128 PR GY -11000 0.09 -0.48
206 PR GY -11000 -0.09 -0.48
LOAD 193 LOADTYPE Traffic  TITLE C3 (43)
ELEMENT LOAD
129 PR GY -11000 0.09 -0.48
207 PR GY -11000 -0.09 -0.48
LOAD 194 LOADTYPE Traffic  TITLE C3 (44)
ELEMENT LOAD
130 PR GY -11000 0.09 -0.48
208 PR GY -11000 -0.09 -0.48
LOAD 195 LOADTYPE Traffic  TITLE C4 (1)
ELEMENT LOAD
105 PR GY -3650 0.09 0
183 PR GY -3650 -0.09 0
LOAD 196 LOADTYPE Traffic  TITLE C4 (2)
ELEMENT LOAD
106 PR GY -3650 0.09 0
184 PR GY -3650 -0.09 0
LOAD 197 LOADTYPE Traffic  TITLE C4 (3)
ELEMENT LOAD
107 PR GY -3650 0.09 0
185 PR GY -3650 -0.09 0
LOAD 198 LOADTYPE Traffic  TITLE C4 (4)
ELEMENT LOAD
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108 PR GY -3650 0.09 0
186 PR GY -3650 -0.09 0
LOAD 199 LOADTYPE Traffic  TITLE C4 (5)
ELEMENT LOAD
109 PR GY -3650 0.09 0
187 PR GY -3650 -0.09 0
LOAD 200 LOADTYPE Traffic  TITLE C4 (6)
ELEMENT LOAD
110 PR GY -3650 0.09 0
188 PR GY -3650 -0.09 0
LOAD 201 LOADTYPE Traffic  TITLE C4 (7)
ELEMENT LOAD
111 PR GY -3650 0.09 0
189 PR GY -3650 -0.09 0
105 PR GY -11000 0.09 -0.16
183 PR GY -11000 -0.09 -0.16
LOAD 202 LOADTYPE Traffic  TITLE C4 (8)
ELEMENT LOAD
112 PR GY -3650 0.09 0
190 PR GY -3650 -0.09 0
106 PR GY -11000 0.09 -0.16
184 PR GY -11000 -0.09 -0.16
LOAD 203 LOADTYPE Traffic  TITLE C4 (9)
ELEMENT LOAD
113 PR GY -3650 0.09 0
191 PR GY -3650 -0.09 0
107 PR GY -11000 0.09 -0.16
185 PR GY -11000 -0.09 -0.16
LOAD 204 LOADTYPE Traffic  TITLE C4 (10)
ELEMENT LOAD
114 PR GY -3650 0.09 0
192 PR GY -3650 -0.09 0
108 PR GY -11000 0.09 -0.16
186 PR GY -11000 -0.09 -0.16
LOAD 205 LOADTYPE Traffic  TITLE C4 (11)
ELEMENT LOAD
115 PR GY -3650 0.09 0
193 PR GY -3650 -0.09 0
109 PR GY -11000 0.09 -0.16
187 PR GY -11000 -0.09 -0.16
LOAD 206 LOADTYPE Traffic  TITLE C4 (12)
ELEMENT LOAD
116 PR GY -3650 0.09 0
194 PR GY -3650 -0.09 0
110 PR GY -11000 0.09 -0.16
188 PR GY -11000 -0.09 -0.16
LOAD 207 LOADTYPE Traffic  TITLE C4 (13)
ELEMENT LOAD
117 PR GY -3650 0.09 0
195 PR GY -3650 -0.09 0
111 PR GY -11000 0.09 -0.16
189 PR GY -11000 -0.09 -0.16
LOAD 208 LOADTYPE Traffic  TITLE C4 (14)
ELEMENT LOAD
118 PR GY -3650 0.09 0
196 PR GY -3650 -0.09 0
112 PR GY -11000 0.09 -0.16
190 PR GY -11000 -0.09 -0.16
LOAD 209 LOADTYPE Traffic  TITLE C4 (15)
ELEMENT LOAD
119 PR GY -3650 0.09 0
197 PR GY -3650 -0.09 0
113 PR GY -11000 0.09 -0.16
191 PR GY -11000 -0.09 -0.16
LOAD 210 LOADTYPE Traffic  TITLE C4 (16)
ELEMENT LOAD
120 PR GY -3650 0.09 0
198 PR GY -3650 -0.09 0
114 PR GY -11000 0.09 -0.16
192 PR GY -11000 -0.09 -0.16
LOAD 211 LOADTYPE Traffic  TITLE C4 (17)
ELEMENT LOAD
121 PR GY -3650 0.09 0
199 PR GY -3650 -0.09 0
115 PR GY -11000 0.09 -0.16
193 PR GY -11000 -0.09 -0.16
LOAD 212 LOADTYPE Traffic  TITLE C4 (18)
ELEMENT LOAD
122 PR GY -3650 0.09 0
200 PR GY -3650 -0.09 0
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116 PR GY -11000 0.09 -0.16
194 PR GY -11000 -0.09 -0.16
LOAD 213 LOADTYPE Traffic  TITLE C4 (19)
ELEMENT LOAD
123 PR GY -3650 0.09 0
201 PR GY -3650 -0.09 0
117 PR GY -11000 0.09 -0.16
195 PR GY -11000 -0.09 -0.16
LOAD 214 LOADTYPE Traffic  TITLE C4 (20)
ELEMENT LOAD
124 PR GY -3650 0.09 0
202 PR GY -3650 -0.09 0
118 PR GY -11000 0.09 -0.16
196 PR GY -11000 -0.09 -0.16
105 PR GY -11000 0.09 -0.67
183 PR GY -11000 -0.09 -0.67
LOAD 215 LOADTYPE Traffic  TITLE C4 (21)
ELEMENT LOAD
125 PR GY -3650 0.09 0
203 PR GY -3650 -0.09 0
119 PR GY -11000 0.09 -0.16
197 PR GY -11000 -0.09 -0.16
106 PR GY -11000 0.09 -0.67
184 PR GY -11000 -0.09 -0.67
LOAD 216 LOADTYPE Traffic  TITLE C4 (22)
ELEMENT LOAD
126 PR GY -3650 0.09 0
204 PR GY -3650 -0.09 0
120 PR GY -11000 0.09 -0.16
198 PR GY -11000 -0.09 -0.16
107 PR GY -11000 0.09 -0.67
185 PR GY -11000 -0.09 -0.67
LOAD 217 LOADTYPE Traffic  TITLE C4 (23)
ELEMENT LOAD
127 PR GY -3650 0.09 0
205 PR GY -3650 -0.09 0
121 PR GY -11000 0.09 -0.16
199 PR GY -11000 -0.09 -0.16
108 PR GY -11000 0.09 -0.67
186 PR GY -11000 -0.09 -0.67
105 PR GY -11000 0.09 0.09
183 PR GY -11000 -0.09 0.09
LOAD 218 LOADTYPE Traffic  TITLE C4 (24)
ELEMENT LOAD
128 PR GY -3650 0.09 0
206 PR GY -3650 -0.09 0
122 PR GY -11000 0.09 -0.16
200 PR GY -11000 -0.09 -0.16
109 PR GY -11000 0.09 -0.67
187 PR GY -11000 -0.09 -0.67
106 PR GY -11000 0.09 0.09
184 PR GY -11000 -0.09 0.09
LOAD 219 LOADTYPE Traffic  TITLE C4 (25)
ELEMENT LOAD
129 PR GY -3650 0.09 0
207 PR GY -3650 -0.09 0
123 PR GY -11000 0.09 -0.16
201 PR GY -11000 -0.09 -0.16
110 PR GY -11000 0.09 -0.67
188 PR GY -11000 -0.09 -0.67
107 PR GY -11000 0.09 0.09
185 PR GY -11000 -0.09 0.09
LOAD 220 LOADTYPE Traffic  TITLE C4 (26)
ELEMENT LOAD
130 PR GY -3650 0.09 0
208 PR GY -3650 -0.09 0
124 PR GY -11000 0.09 -0.16
202 PR GY -11000 -0.09 -0.16
111 PR GY -11000 0.09 -0.67
189 PR GY -11000 -0.09 -0.67
108 PR GY -11000 0.09 0.09
186 PR GY -11000 -0.09 0.09
LOAD 221 LOADTYPE Traffic  TITLE C4 (27)
ELEMENT LOAD
125 PR GY -11000 0.09 -0.16
203 PR GY -11000 -0.09 -0.16
112 PR GY -11000 0.09 -0.67
190 PR GY -11000 -0.09 -0.67
109 PR GY -11000 0.09 0.09
187 PR GY -11000 -0.09 0.09
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LOAD 222 LOADTYPE Traffic  TITLE C4 (28)
ELEMENT LOAD
126 PR GY -11000 0.09 -0.16
204 PR GY -11000 -0.09 -0.16
113 PR GY -11000 0.09 -0.67
191 PR GY -11000 -0.09 -0.67
110 PR GY -11000 0.09 0.09
188 PR GY -11000 -0.09 0.09
LOAD 223 LOADTYPE Traffic  TITLE C4 (29)
ELEMENT LOAD
127 PR GY -11000 0.09 -0.16
205 PR GY -11000 -0.09 -0.16
114 PR GY -11000 0.09 -0.67
192 PR GY -11000 -0.09 -0.67
111 PR GY -11000 0.09 0.09
189 PR GY -11000 -0.09 0.09
LOAD 224 LOADTYPE Traffic  TITLE C4 (30)
ELEMENT LOAD
128 PR GY -11000 0.09 -0.16
206 PR GY -11000 -0.09 -0.16
115 PR GY -11000 0.09 -0.67
193 PR GY -11000 -0.09 -0.67
112 PR GY -11000 0.09 0.09
190 PR GY -11000 -0.09 0.09
LOAD 225 LOADTYPE Traffic  TITLE C4 (31)
ELEMENT LOAD
129 PR GY -11000 0.09 -0.16
207 PR GY -11000 -0.09 -0.16
116 PR GY -11000 0.09 -0.67
194 PR GY -11000 -0.09 -0.67
113 PR GY -11000 0.09 0.09
191 PR GY -11000 -0.09 0.09
LOAD 226 LOADTYPE Traffic  TITLE C4 (32)
ELEMENT LOAD
130 PR GY -11000 0.09 -0.16
208 PR GY -11000 -0.09 -0.16
117 PR GY -11000 0.09 -0.67
195 PR GY -11000 -0.09 -0.67
114 PR GY -11000 0.09 0.09
192 PR GY -11000 -0.09 0.09
LOAD 227 LOADTYPE Traffic  TITLE C4 (33)
ELEMENT LOAD
118 PR GY -11000 0.09 -0.67
196 PR GY -11000 -0.09 -0.67
115 PR GY -11000 0.09 0.09
193 PR GY -11000 -0.09 0.09
LOAD 228 LOADTYPE Traffic  TITLE C4 (34)
ELEMENT LOAD
119 PR GY -11000 0.09 -0.67
197 PR GY -11000 -0.09 -0.67
116 PR GY -11000 0.09 0.09
194 PR GY -11000 -0.09 0.09
LOAD 229 LOADTYPE Traffic  TITLE C4 (35)
ELEMENT LOAD
120 PR GY -11000 0.09 -0.67
198 PR GY -11000 -0.09 -0.67
117 PR GY -11000 0.09 0.09
195 PR GY -11000 -0.09 0.09
LOAD 230 LOADTYPE Traffic  TITLE C4 (36)
ELEMENT LOAD
121 PR GY -11000 0.09 -0.67
199 PR GY -11000 -0.09 -0.67
118 PR GY -11000 0.09 0.09
196 PR GY -11000 -0.09 0.09
LOAD 231 LOADTYPE Traffic  TITLE C4 (37)
ELEMENT LOAD
122 PR GY -11000 0.09 -0.67
200 PR GY -11000 -0.09 -0.67
119 PR GY -11000 0.09 0.09
197 PR GY -11000 -0.09 0.09
LOAD 232 LOADTYPE Traffic  TITLE C4 (38)
ELEMENT LOAD
123 PR GY -11000 0.09 -0.67
201 PR GY -11000 -0.09 -0.67
120 PR GY -11000 0.09 0.09
198 PR GY -11000 -0.09 0.09
LOAD 233 LOADTYPE Traffic  TITLE C4 (39)
ELEMENT LOAD
124 PR GY -11000 0.09 -0.67
202 PR GY -11000 -0.09 -0.67
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121 PR GY -11000 0.09 0.09
199 PR GY -11000 -0.09 0.09
LOAD 234 LOADTYPE Traffic  TITLE C4 (40)
ELEMENT LOAD
125 PR GY -11000 0.09 -0.67
203 PR GY -11000 -0.09 -0.67
122 PR GY -11000 0.09 0.09
200 PR GY -11000 -0.09 0.09
LOAD 235 LOADTYPE Traffic  TITLE C4 (33)
ELEMENT LOAD
126 PR GY -11000 0.09 -0.67
204 PR GY -11000 -0.09 -0.67
123 PR GY -11000 0.09 0.09
201 PR GY -11000 -0.09 0.09
LOAD 236 LOADTYPE Traffic  TITLE C4 (41)
ELEMENT LOAD
127 PR GY -11000 0.09 -0.67
205 PR GY -11000 -0.09 -0.67
124 PR GY -11000 0.09 0.09
202 PR GY -11000 -0.09 0.09
LOAD 237 LOADTYPE Traffic  TITLE C4 (42)
ELEMENT LOAD
128 PR GY -11000 0.09 -0.67
206 PR GY -11000 -0.09 -0.67
125 PR GY -11000 0.09 0.09
203 PR GY -11000 -0.09 0.09
LOAD 238 LOADTYPE Traffic  TITLE C4 (43)
ELEMENT LOAD
129 PR GY -11000 0.09 -0.67
207 PR GY -11000 -0.09 -0.67
126 PR GY -11000 0.09 0.09
204 PR GY -11000 -0.09 0.09
LOAD 239 LOADTYPE Traffic  TITLE C4 (44)
ELEMENT LOAD
130 PR GY -11000 0.09 -0.67
208 PR GY -11000 -0.09 -0.67
127 PR GY -11000 0.09 0.09
205 PR GY -11000 -0.09 0.09
LOAD 240 LOADTYPE Traffic  TITLE C4 (45)
ELEMENT LOAD
128 PR GY -11000 0.09 0.09
206 PR GY -11000 -0.09 0.09
LOAD 241 LOADTYPE Traffic  TITLE C4 (46)
ELEMENT LOAD
129 PR GY -11000 0.09 0.09
207 PR GY -11000 -0.09 0.09
LOAD 242 LOADTYPE Traffic  TITLE C4 (47)
ELEMENT LOAD
130 PR GY -11000 0.09 0.09
208 PR GY -11000 -0.09 0.09
LOAD 243 LOADTYPE Traffic  TITLE C5 (1)
ELEMENT LOAD
105 PR GY -5000 0.09 0
183 PR GY -5000 -0.09 0
LOAD 244 LOADTYPE Traffic  TITLE C5 (2)
ELEMENT LOAD
106 PR GY -5000 0.09 0
184 PR GY -5000 -0.09 0
LOAD 245 LOADTYPE Traffic  TITLE C5 (3)
ELEMENT LOAD
107 PR GY -5000 0.09 0
185 PR GY -5000 -0.09 0
LOAD 246 LOADTYPE Traffic  TITLE C5 (4)
ELEMENT LOAD
108 PR GY -5000 0.09 0
186 PR GY -5000 -0.09 0
LOAD 247 LOADTYPE Traffic  TITLE C5 (5)
ELEMENT LOAD
109 PR GY -5000 0.09 0
187 PR GY -5000 -0.09 0
LOAD 248 LOADTYPE Traffic  TITLE C5 (6)
ELEMENT LOAD
110 PR GY -5000 0.09 0
188 PR GY -5000 -0.09 0
LOAD 249 LOADTYPE Traffic  TITLE C5 (7)
ELEMENT LOAD
111 PR GY -5000 0.09 0
189 PR GY -5000 -0.09 0
105 PR GY -10000 0.09 -0.16
183 PR GY -10000 -0.09 -0.16
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LOAD 250 LOADTYPE Traffic  TITLE C5 (8)
ELEMENT LOAD
112 PR GY -5000 0.09 0
190 PR GY -5000 -0.09 0
106 PR GY -10000 0.09 -0.16
184 PR GY -10000 -0.09 -0.16
LOAD 251 LOADTYPE Traffic  TITLE C5 (9)
ELEMENT LOAD
113 PR GY -5000 0.09 0
191 PR GY -5000 -0.09 0
107 PR GY -10000 0.09 -0.16
185 PR GY -10000 -0.09 -0.16
LOAD 252 LOADTYPE Traffic  TITLE C5 (10)
ELEMENT LOAD
114 PR GY -5000 0.09 0
192 PR GY -5000 -0.09 0
108 PR GY -10000 0.09 -0.16
186 PR GY -10000 -0.09 -0.16
105 PR GY -10000 0.09 0.6
183 PR GY -10000 -0.09 0.6
LOAD 253 LOADTYPE Traffic  TITLE C5 (11)
ELEMENT LOAD
115 PR GY -5000 0.09 0
193 PR GY -5000 -0.09 0
109 PR GY -10000 0.09 -0.16
187 PR GY -10000 -0.09 -0.16
106 PR GY -10000 0.09 0.6
184 PR GY -10000 -0.09 0.6
LOAD 254 LOADTYPE Traffic  TITLE C5 (12)
ELEMENT LOAD
116 PR GY -5000 0.09 0
194 PR GY -5000 -0.09 0
110 PR GY -10000 0.09 -0.16
188 PR GY -10000 -0.09 -0.16
107 PR GY -10000 0.09 0.6
185 PR GY -10000 -0.09 0.6
LOAD 255 LOADTYPE Traffic  TITLE C5 (13)
ELEMENT LOAD
117 PR GY -5000 0.09 0
195 PR GY -5000 -0.09 0
111 PR GY -10000 0.09 -0.16
189 PR GY -10000 -0.09 -0.16
108 PR GY -10000 0.09 0.6
186 PR GY -10000 -0.09 0.6
LOAD 256 LOADTYPE Traffic  TITLE C5 (14)
ELEMENT LOAD
118 PR GY -5000 0.09 0
196 PR GY -5000 -0.09 0
112 PR GY -10000 0.09 -0.16
190 PR GY -10000 -0.09 -0.16
109 PR GY -10000 0.09 0.6
187 PR GY -10000 -0.09 0.6
LOAD 257 LOADTYPE Traffic  TITLE C5 (15)
ELEMENT LOAD
119 PR GY -5000 0.09 0
197 PR GY -5000 -0.09 0
113 PR GY -10000 0.09 -0.16
191 PR GY -10000 -0.09 -0.16
110 PR GY -10000 0.09 0.6
188 PR GY -10000 -0.09 0.6
LOAD 258 LOADTYPE Traffic  TITLE C5 (16)
ELEMENT LOAD
120 PR GY -5000 0.09 0
198 PR GY -5000 -0.09 0
114 PR GY -10000 0.09 -0.16
192 PR GY -10000 -0.09 -0.16
111 PR GY -10000 0.09 0.6
189 PR GY -10000 -0.09 0.6
LOAD 259 LOADTYPE Traffic  TITLE C5 (17)
ELEMENT LOAD
121 PR GY -5000 0.09 0
199 PR GY -5000 -0.09 0
115 PR GY -10000 0.09 -0.16
193 PR GY -10000 -0.09 -0.16
112 PR GY -10000 0.09 0.6
190 PR GY -10000 -0.09 0.6
LOAD 260 LOADTYPE Traffic  TITLE C5 (18)
ELEMENT LOAD
122 PR GY -5000 0.09 0
200 PR GY -5000 -0.09 0
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116 PR GY -10000 0.09 -0.16
194 PR GY -10000 -0.09 -0.16
113 PR GY -10000 0.09 0.6
191 PR GY -10000 -0.09 0.6
LOAD 261 LOADTYPE Traffic  TITLE C5 (19)
ELEMENT LOAD
123 PR GY -5000 0.09 0
201 PR GY -5000 -0.09 0
117 PR GY -10000 0.09 -0.16
195 PR GY -10000 -0.09 -0.16
114 PR GY -10000 0.09 0.6
192 PR GY -10000 -0.09 0.6
LOAD 262 LOADTYPE Traffic  TITLE C5 (20)
ELEMENT LOAD
124 PR GY -5000 0.09 0
202 PR GY -5000 -0.09 0
118 PR GY -10000 0.09 -0.16
196 PR GY -10000 -0.09 -0.16
115 PR GY -10000 0.09 0.6
193 PR GY -10000 -0.09 0.6
105 PR GY -7500 0.09 -0.78
183 PR GY -7500 -0.09 -0.78
LOAD 263 LOADTYPE Traffic  TITLE C5 (21)
ELEMENT LOAD
125 PR GY -5000 0.09 0
203 PR GY -5000 -0.09 0
119 PR GY -10000 0.09 -0.16
197 PR GY -10000 -0.09 -0.16
116 PR GY -10000 0.09 0.6
194 PR GY -10000 -0.09 0.6
106 PR GY -7500 0.09 -0.78
184 PR GY -7500 -0.09 -0.78
LOAD 264 LOADTYPE Traffic  TITLE C5 (22)
ELEMENT LOAD
126 PR GY -5000 0.09 0
204 PR GY -5000 -0.09 0
120 PR GY -10000 0.09 -0.16
198 PR GY -10000 -0.09 -0.16
117 PR GY -10000 0.09 0.6
195 PR GY -10000 -0.09 0.6
107 PR GY -7500 0.09 -0.78
185 PR GY -7500 -0.09 -0.78
LOAD 265 LOADTYPE Traffic  TITLE C5 (23)
ELEMENT LOAD
127 PR GY -5000 0.09 0
205 PR GY -5000 -0.09 0
121 PR GY -10000 0.09 -0.16
199 PR GY -10000 -0.09 -0.16
118 PR GY -10000 0.09 0.6
196 PR GY -10000 -0.09 0.6
108 PR GY -7500 0.09 -0.78
186 PR GY -7500 -0.09 -0.78
105 PR GY -7500 0.09 -0.02
183 PR GY -7500 -0.09 -0.02
LOAD 266 LOADTYPE Traffic  TITLE C5 (24)
ELEMENT LOAD
128 PR GY -5000 0.09 0
206 PR GY -5000 -0.09 0
122 PR GY -10000 0.09 -0.16
200 PR GY -10000 -0.09 -0.16
119 PR GY -10000 0.09 0.6
197 PR GY -10000 -0.09 0.6
109 PR GY -7500 0.09 -0.78
187 PR GY -7500 -0.09 -0.78
106 PR GY -7500 0.09 -0.02
184 PR GY -7500 -0.09 -0.02
LOAD 267 LOADTYPE Traffic  TITLE C5 (25)
ELEMENT LOAD
129 PR GY -5000 0.09 0
207 PR GY -5000 -0.09 0
123 PR GY -10000 0.09 -0.16
201 PR GY -10000 -0.09 -0.16
120 PR GY -10000 0.09 0.6
198 PR GY -10000 -0.09 0.6
110 PR GY -7500 0.09 -0.78
188 PR GY -7500 -0.09 -0.78
107 PR GY -7500 0.09 -0.02
185 PR GY -7500 -0.09 -0.02
LOAD 268 LOADTYPE Traffic  TITLE C5 (26)
ELEMENT LOAD
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130 PR GY -5000 0.09 0
208 PR GY -5000 -0.09 0
124 PR GY -10000 0.09 -0.16
202 PR GY -10000 -0.09 -0.16
121 PR GY -10000 0.09 0.6
199 PR GY -10000 -0.09 0.6
111 PR GY -7500 0.09 -0.78
189 PR GY -7500 -0.09 -0.78
108 PR GY -7500 0.09 -0.02
186 PR GY -7500 -0.09 -0.02
LOAD 269 LOADTYPE Traffic  TITLE C5 (27)
ELEMENT LOAD
125 PR GY -10000 0.09 -0.16
203 PR GY -10000 -0.09 -0.16
122 PR GY -10000 0.09 0.6
200 PR GY -10000 -0.09 0.6
112 PR GY -7500 0.09 -0.78
190 PR GY -7500 -0.09 -0.78
109 PR GY -7500 0.09 -0.02
187 PR GY -7500 -0.09 -0.02
LOAD 270 LOADTYPE Traffic  TITLE C5 (28)
ELEMENT LOAD
126 PR GY -10000 0.09 -0.16
204 PR GY -10000 -0.09 -0.16
123 PR GY -10000 0.09 0.6
201 PR GY -10000 -0.09 0.6
113 PR GY -7500 0.09 -0.78
191 PR GY -7500 -0.09 -0.78
110 PR GY -7500 0.09 -0.02
188 PR GY -7500 -0.09 -0.02
LOAD 271 LOADTYPE Traffic  TITLE C5 (29)
ELEMENT LOAD
127 PR GY -10000 0.09 -0.16
205 PR GY -10000 -0.09 -0.16
124 PR GY -10000 0.09 0.6
202 PR GY -10000 -0.09 0.6
114 PR GY -7500 0.09 -0.78
192 PR GY -7500 -0.09 -0.78
111 PR GY -7500 0.09 -0.02
189 PR GY -7500 -0.09 -0.02
LOAD 272 LOADTYPE Traffic  TITLE C5 (30)
ELEMENT LOAD
128 PR GY -10000 0.09 -0.16
206 PR GY -10000 -0.09 -0.16
125 PR GY -10000 0.09 0.6
203 PR GY -10000 -0.09 0.6
115 PR GY -7500 0.09 -0.78
193 PR GY -7500 -0.09 -0.78
112 PR GY -7500 0.09 -0.02
190 PR GY -7500 -0.09 -0.02
LOAD 273 LOADTYPE Traffic  TITLE C5 (31)
ELEMENT LOAD
129 PR GY -10000 0.09 -0.16
207 PR GY -10000 -0.09 -0.16
126 PR GY -10000 0.09 0.6
204 PR GY -10000 -0.09 0.6
116 PR GY -7500 0.09 -0.78
194 PR GY -7500 -0.09 -0.78
113 PR GY -7500 0.09 -0.02
191 PR GY -7500 -0.09 -0.02
LOAD 274 LOADTYPE Traffic  TITLE C5 (32)
ELEMENT LOAD
130 PR GY -10000 0.09 -0.16
208 PR GY -10000 -0.09 -0.16
127 PR GY -10000 0.09 0.6
205 PR GY -10000 -0.09 0.6
117 PR GY -7500 0.09 -0.78
195 PR GY -7500 -0.09 -0.78
114 PR GY -7500 0.09 -0.02
192 PR GY -7500 -0.09 -0.02
LOAD 275 LOADTYPE Traffic  TITLE C5 (33)
ELEMENT LOAD
128 PR GY -10000 0.09 0.6
206 PR GY -10000 -0.09 0.6
118 PR GY -7500 0.09 -0.78
196 PR GY -7500 -0.09 -0.78
115 PR GY -7500 0.09 -0.02
193 PR GY -7500 -0.09 -0.02
LOAD 276 LOADTYPE Traffic  TITLE C5 (34)
ELEMENT LOAD
```

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129 PR GY -10000 0.09 0.6
207 PR GY -10000 -0.09 0.6
119 PR GY -7500 0.09 -0.78
197 PR GY -7500 -0.09 -0.78
116 PR GY -7500 0.09 -0.02
194 PR GY -7500 -0.09 -0.02
LOAD 277 LOADTYPE Traffic  TITLE C5 (35)
ELEMENT LOAD
130 PR GY -10000 0.09 0.6
208 PR GY -10000 -0.09 0.6
120 PR GY -7500 0.09 -0.78
198 PR GY -7500 -0.09 -0.78
117 PR GY -7500 0.09 -0.02
195 PR GY -7500 -0.09 -0.02
LOAD 278 LOADTYPE Traffic  TITLE C5 (36)
ELEMENT LOAD
121 PR GY -7500 0.09 -0.78
199 PR GY -7500 -0.09 -0.78
118 PR GY -7500 0.09 -0.02
196 PR GY -7500 -0.09 -0.02
LOAD 279 LOADTYPE Traffic  TITLE C5 (37)
ELEMENT LOAD
122 PR GY -7500 0.09 -0.78
200 PR GY -7500 -0.09 -0.78
119 PR GY -7500 0.09 -0.02
197 PR GY -7500 -0.09 -0.02
LOAD 280 LOADTYPE Traffic  TITLE C5 (38)
ELEMENT LOAD
123 PR GY -7500 0.09 -0.78
201 PR GY -7500 -0.09 -0.78
120 PR GY -7500 0.09 -0.02
198 PR GY -7500 -0.09 -0.02
LOAD 281 LOADTYPE Traffic  TITLE C5 (39)
ELEMENT LOAD
124 PR GY -7500 0.09 -0.78
202 PR GY -7500 -0.09 -0.78
121 PR GY -7500 0.09 -0.02
199 PR GY -7500 -0.09 -0.02
LOAD 282 LOADTYPE Traffic  TITLE C5 (40)
ELEMENT LOAD
125 PR GY -7500 0.09 -0.78
203 PR GY -7500 -0.09 -0.78
122 PR GY -7500 0.09 -0.02
200 PR GY -7500 -0.09 -0.02
LOAD 283 LOADTYPE Traffic  TITLE C5 (41)
ELEMENT LOAD
126 PR GY -7500 0.09 -0.78
204 PR GY -7500 -0.09 -0.78
123 PR GY -7500 0.09 -0.02
201 PR GY -7500 -0.09 -0.02
LOAD 284 LOADTYPE Traffic  TITLE C5 (42)
ELEMENT LOAD
127 PR GY -7500 0.09 -0.78
205 PR GY -7500 -0.09 -0.78
124 PR GY -7500 0.09 -0.02
202 PR GY -7500 -0.09 -0.02
LOAD 285 LOADTYPE Traffic  TITLE C5 (43)
ELEMENT LOAD
128 PR GY -7500 0.09 -0.78
206 PR GY -7500 -0.09 -0.78
125 PR GY -7500 0.09 -0.02
203 PR GY -7500 -0.09 -0.02
LOAD 286 LOADTYPE Traffic  TITLE C5 (44)
ELEMENT LOAD
129 PR GY -7500 0.09 -0.78
207 PR GY -7500 -0.09 -0.78
126 PR GY -7500 0.09 -0.02
204 PR GY -7500 -0.09 -0.02
LOAD 287 LOADTYPE Traffic  TITLE C5 (45)
ELEMENT LOAD
130 PR GY -7500 0.09 -0.78
208 PR GY -7500 -0.09 -0.78
127 PR GY -7500 0.09 -0.02
205 PR GY -7500 -0.09 -0.02
LOAD 288 LOADTYPE Traffic  TITLE C5 (46)
ELEMENT LOAD
128 PR GY -7500 0.09 -0.02
206 PR GY -7500 -0.09 -0.02
LOAD 289 LOADTYPE Traffic  TITLE C5 (47)
ELEMENT LOAD
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```
129 PR GY -7500 0.09 -0.02
207 PR GY -7500 -0.09 -0.02
LOAD 290 LOADTYPE Traffic  TITLE C5 (48)
ELEMENT LOAD
130 PR GY -7500 0.09 -0.02
208 PR GY -7500 -0.09 -0.02
LOAD 291 LOADTYPE Traffic  TITLE ST5 (1)
ELEMENT LOAD
105 PR GY -4000 0.09 0
183 PR GY -4000 -0.09 0
LOAD 292 LOADTYPE Traffic  TITLE ST5 (2)
ELEMENT LOAD
106 PR GY -4000 0.09 0
184 PR GY -4000 -0.09 0
LOAD 293 LOADTYPE Traffic  TITLE ST5 (3)
ELEMENT LOAD
107 PR GY -4000 0.09 0
185 PR GY -4000 -0.09 0
LOAD 294 LOADTYPE Traffic  TITLE ST5 (4)
ELEMENT LOAD
108 PR GY -4000 0.09 0
186 PR GY -4000 -0.09 0
LOAD 295 LOADTYPE Traffic  TITLE ST5 (5)
ELEMENT LOAD
109 PR GY -4000 0.09 0
187 PR GY -4000 -0.09 0
LOAD 296 LOADTYPE Traffic  TITLE ST5 (6)
ELEMENT LOAD
110 PR GY -4000 0.09 0
188 PR GY -4000 -0.09 0
LOAD 297 LOADTYPE Traffic  TITLE ST5 (7)
ELEMENT LOAD
111 PR GY -4000 0.09 0
189 PR GY -4000 -0.09 0
LOAD 298 LOADTYPE Traffic  TITLE ST5 (8)
ELEMENT LOAD
112 PR GY -4000 0.09 0
190 PR GY -4000 -0.09 0
LOAD 299 LOADTYPE Traffic  TITLE ST5 (9)
ELEMENT LOAD
113 PR GY -4000 0.09 0
191 PR GY -4000 -0.09 0
LOAD 300 LOADTYPE Traffic  TITLE ST5 (10)
ELEMENT LOAD
114 PR GY -4000 0.09 0
192 PR GY -4000 -0.09 0
LOAD 301 LOADTYPE Traffic  TITLE ST5 (11)
ELEMENT LOAD
115 PR GY -4000 0.09 0
193 PR GY -4000 -0.09 0
LOAD 302 LOADTYPE Traffic  TITLE ST5 (12)
ELEMENT LOAD
116 PR GY -4000 0.09 0
194 PR GY -4000 -0.09 0
LOAD 303 LOADTYPE Traffic  TITLE ST5 (13)
ELEMENT LOAD
117 PR GY -4000 0.09 0
195 PR GY -4000 -0.09 0
LOAD 304 LOADTYPE Traffic  TITLE ST5 (14)
ELEMENT LOAD
118 PR GY -4000 0.09 0
196 PR GY -4000 -0.09 0
LOAD 305 LOADTYPE Traffic  TITLE ST5 (15)
ELEMENT LOAD
119 PR GY -4000 0.09 0
197 PR GY -4000 -0.09 0
LOAD 306 LOADTYPE Traffic  TITLE ST5 (16)
ELEMENT LOAD
120 PR GY -4000 0.09 0
198 PR GY -4000 -0.09 0
LOAD 307 LOADTYPE Traffic  TITLE ST5 (17)
ELEMENT LOAD
121 PR GY -4000 0.09 0
199 PR GY -4000 -0.09 0
105 PR GY -9000 0.09 -0.76
183 PR GY -9000 -0.09 -0.76
LOAD 308 LOADTYPE Traffic  TITLE ST5 (18)
ELEMENT LOAD
122 PR GY -4000 0.09 0
200 PR GY -4000 -0.09 0
```

```
106 PR GY -9000 0.09 -0.76
184 PR GY -9000 -0.09 -0.76
LOAD 309 LOADTYPE Traffic  TITLE ST5 (19)
ELEMENT LOAD
123 PR GY -4000 0.09 0
201 PR GY -4000 -0.09 0
107 PR GY -9000 0.09 -0.76
185 PR GY -9000 -0.09 -0.76
LOAD 310 LOADTYPE Traffic  TITLE ST5 (20)
ELEMENT LOAD
124 PR GY -4000 0.09 0
202 PR GY -4000 -0.09 0
108 PR GY -9000 0.09 -0.76
186 PR GY -9000 -0.09 -0.76
105 PR GY -9000 0.09 0.16
183 PR GY -9000 -0.09 0.16
LOAD 311 LOADTYPE Traffic  TITLE ST5 (21)
ELEMENT LOAD
125 PR GY -4000 0.09 0
203 PR GY -4000 -0.09 0
109 PR GY -9000 0.09 -0.76
187 PR GY -9000 -0.09 -0.76
106 PR GY -9000 0.09 0.16
184 PR GY -9000 -0.09 0.16
LOAD 312 LOADTYPE Traffic  TITLE ST5 (22)
ELEMENT LOAD
126 PR GY -4000 0.09 0
204 PR GY -4000 -0.09 0
110 PR GY -9000 0.09 -0.76
188 PR GY -9000 -0.09 -0.76
107 PR GY -9000 0.09 0.16
185 PR GY -9000 -0.09 0.16
LOAD 313 LOADTYPE Traffic  TITLE ST5 (23)
ELEMENT LOAD
127 PR GY -4000 0.09 0
205 PR GY -4000 -0.09 0
111 PR GY -9000 0.09 -0.76
189 PR GY -9000 -0.09 -0.76
108 PR GY -9000 0.09 0.16
186 PR GY -9000 -0.09 0.16
LOAD 314 LOADTYPE Traffic  TITLE ST5 (24)
ELEMENT LOAD
128 PR GY -4000 0.09 0
206 PR GY -4000 -0.09 0
112 PR GY -9000 0.09 -0.76
190 PR GY -9000 -0.09 -0.76
109 PR GY -9000 0.09 0.16
187 PR GY -9000 -0.09 0.16
LOAD 315 LOADTYPE Traffic  TITLE ST5 (25)
ELEMENT LOAD
129 PR GY -4000 0.09 0
207 PR GY -4000 -0.09 0
113 PR GY -9000 0.09 -0.76
191 PR GY -9000 -0.09 -0.76
110 PR GY -9000 0.09 0.16
188 PR GY -9000 -0.09 0.16
LOAD 316 LOADTYPE Traffic  TITLE ST5 (26)
ELEMENT LOAD
130 PR GY -4000 0.09 0
208 PR GY -4000 -0.09 0
114 PR GY -9000 0.09 -0.76
192 PR GY -9000 -0.09 -0.76
111 PR GY -9000 0.09 0.16
189 PR GY -9000 -0.09 0.16
LOAD 317 LOADTYPE Traffic  TITLE ST5 (27)
ELEMENT LOAD
115 PR GY -9000 0.09 -0.76
193 PR GY -9000 -0.09 -0.76
112 PR GY -9000 0.09 0.16
190 PR GY -9000 -0.09 0.16
105 PR GY -9000 0.09 -0.36
183 PR GY -9000 -0.09 -0.36
LOAD 318 LOADTYPE Traffic  TITLE ST5 (28)
ELEMENT LOAD
116 PR GY -9000 0.09 -0.76
194 PR GY -9000 -0.09 -0.76
113 PR GY -9000 0.09 0.16
191 PR GY -9000 -0.09 0.16
106 PR GY -9000 0.09 -0.36
184 PR GY -9000 -0.09 -0.36
```

```
LOAD 319 LOADTYPE Traffic  TITLE ST5 (29)
ELEMENT LOAD
117 PR GY -9000 0.09 -0.76
195 PR GY -9000 -0.09 -0.76
114 PR GY -9000 0.09 0.16
192 PR GY -9000 -0.09 0.16
107 PR GY -9000 0.09 -0.36
185 PR GY -9000 -0.09 -0.36
LOAD 320 LOADTYPE Traffic  TITLE ST5 (30)
ELEMENT LOAD
118 PR GY -9000 0.09 -0.76
196 PR GY -9000 -0.09 -0.76
115 PR GY -9000 0.09 0.16
193 PR GY -9000 -0.09 0.16
108 PR GY -9000 0.09 -0.36
186 PR GY -9000 -0.09 -0.36
LOAD 321 LOADTYPE Traffic  TITLE ST5 (31)
ELEMENT LOAD
119 PR GY -9000 0.09 -0.76
197 PR GY -9000 -0.09 -0.76
116 PR GY -9000 0.09 0.16
194 PR GY -9000 -0.09 0.16
109 PR GY -9000 0.09 -0.36
187 PR GY -9000 -0.09 -0.36
LOAD 322 LOADTYPE Traffic  TITLE ST5 (32)
ELEMENT LOAD
120 PR GY -9000 0.09 -0.76
198 PR GY -9000 -0.09 -0.76
117 PR GY -9000 0.09 0.16
195 PR GY -9000 -0.09 0.16
110 PR GY -9000 0.09 -0.36
188 PR GY -9000 -0.09 -0.36
LOAD 323 LOADTYPE Traffic  TITLE ST5 (33)
ELEMENT LOAD
121 PR GY -9000 0.09 -0.76
199 PR GY -9000 -0.09 -0.76
118 PR GY -9000 0.09 0.16
196 PR GY -9000 -0.09 0.16
111 PR GY -9000 0.09 -0.36
189 PR GY -9000 -0.09 -0.36
LOAD 324 LOADTYPE Traffic  TITLE ST5 (34)
ELEMENT LOAD
122 PR GY -9000 0.09 -0.76
200 PR GY -9000 -0.09 -0.76
119 PR GY -9000 0.09 0.16
197 PR GY -9000 -0.09 0.16
112 PR GY -9000 0.09 -0.36
190 PR GY -9000 -0.09 -0.36
LOAD 325 LOADTYPE Traffic  TITLE ST5 (35)
ELEMENT LOAD
123 PR GY -9000 0.09 -0.76
201 PR GY -9000 -0.09 -0.76
120 PR GY -9000 0.09 0.16
198 PR GY -9000 -0.09 0.16
113 PR GY -9000 0.09 -0.36
191 PR GY -9000 -0.09 -0.36
LOAD 326 LOADTYPE Traffic  TITLE ST5 (36)
ELEMENT LOAD
124 PR GY -9000 0.09 -0.76
202 PR GY -9000 -0.09 -0.76
121 PR GY -9000 0.09 0.16
199 PR GY -9000 -0.09 0.16
114 PR GY -9000 0.09 -0.36
192 PR GY -9000 -0.09 -0.36
LOAD 327 LOADTYPE Traffic  TITLE ST5 (37)
ELEMENT LOAD
125 PR GY -9000 0.09 -0.76
203 PR GY -9000 -0.09 -0.76
122 PR GY -9000 0.09 0.16
200 PR GY -9000 -0.09 0.16
115 PR GY -9000 0.09 -0.36
193 PR GY -9000 -0.09 -0.36
LOAD 328 LOADTYPE Traffic  TITLE ST5 (38)
ELEMENT LOAD
126 PR GY -9000 0.09 -0.76
204 PR GY -9000 -0.09 -0.76
123 PR GY -9000 0.09 0.16
201 PR GY -9000 -0.09 0.16
116 PR GY -9000 0.09 -0.36
194 PR GY -9000 -0.09 -0.36
```

```
LOAD 329 LOADTYPE Traffic  TITLE ST5 (39)
ELEMENT LOAD
127 PR GY -9000 0.09 -0.76
205 PR GY -9000 -0.09 -0.76
124 PR GY -9000 0.09 0.16
202 PR GY -9000 -0.09 0.16
117 PR GY -9000 0.09 -0.36
195 PR GY -9000 -0.09 -0.36
LOAD 330 LOADTYPE Traffic  TITLE ST5 (40)
ELEMENT LOAD
128 PR GY -9000 0.09 -0.76
206 PR GY -9000 -0.09 -0.76
125 PR GY -9000 0.09 0.16
203 PR GY -9000 -0.09 0.16
118 PR GY -9000 0.09 -0.36
196 PR GY -9000 -0.09 -0.36
LOAD 331 LOADTYPE Traffic  TITLE ST5 (41)
ELEMENT LOAD
129 PR GY -9000 0.09 -0.76
207 PR GY -9000 -0.09 -0.76
126 PR GY -9000 0.09 0.16
204 PR GY -9000 -0.09 0.16
119 PR GY -9000 0.09 -0.36
197 PR GY -9000 -0.09 -0.36
LOAD 332 LOADTYPE Traffic  TITLE ST5 (42)
ELEMENT LOAD
130 PR GY -9000 0.09 -0.76
208 PR GY -9000 -0.09 -0.76
127 PR GY -9000 0.09 0.16
205 PR GY -9000 -0.09 0.16
120 PR GY -9000 0.09 -0.36
198 PR GY -9000 -0.09 -0.36
105 PR GY -9000 0.09 0.24
183 PR GY -9000 -0.09 0.24
LOAD 333 LOADTYPE Traffic  TITLE ST5 (43)
ELEMENT LOAD
128 PR GY -9000 0.09 0.16
206 PR GY -9000 -0.09 0.16
121 PR GY -9000 0.09 -0.36
199 PR GY -9000 -0.09 -0.36
106 PR GY -9000 0.09 0.24
184 PR GY -9000 -0.09 0.24
LOAD 334 LOADTYPE Traffic  TITLE ST5 (44)
ELEMENT LOAD
129 PR GY -9000 0.09 0.16
207 PR GY -9000 -0.09 0.16
122 PR GY -9000 0.09 -0.36
200 PR GY -9000 -0.09 -0.36
107 PR GY -9000 0.09 0.24
185 PR GY -9000 -0.09 0.24
LOAD 335 LOADTYPE Traffic  TITLE ST5 (45)
ELEMENT LOAD
130 PR GY -9000 0.09 0.16
208 PR GY -9000 -0.09 0.16
123 PR GY -9000 0.09 -0.36
201 PR GY -9000 -0.09 -0.36
108 PR GY -9000 0.09 0.24
186 PR GY -9000 -0.09 0.24
LOAD 336 LOADTYPE Traffic  TITLE ST5 (46)
ELEMENT LOAD
124 PR GY -9000 0.09 -0.36
202 PR GY -9000 -0.09 -0.36
109 PR GY -9000 0.09 0.24
187 PR GY -9000 -0.09 0.24
LOAD 337 LOADTYPE Traffic  TITLE ST5 (47)
ELEMENT LOAD
125 PR GY -9000 0.09 -0.36
203 PR GY -9000 -0.09 -0.36
110 PR GY -9000 0.09 0.24
188 PR GY -9000 -0.09 0.24
LOAD 338 LOADTYPE Traffic  TITLE ST5 (48)
ELEMENT LOAD
126 PR GY -9000 0.09 -0.36
204 PR GY -9000 -0.09 -0.36
111 PR GY -9000 0.09 0.24
189 PR GY -9000 -0.09 0.24
LOAD 339 LOADTYPE Traffic  TITLE ST5 (49)
ELEMENT LOAD
127 PR GY -9000 0.09 -0.36
205 PR GY -9000 -0.09 -0.36
```

```
112 PR GY -9000 0.09 0.24
190 PR GY -9000 -0.09 0.24
LOAD 340 LOADTYPE Traffic  TITLE ST5 (50)
ELEMENT LOAD
128 PR GY -9000 0.09 -0.36
206 PR GY -9000 -0.09 -0.36
113 PR GY -9000 0.09 0.24
191 PR GY -9000 -0.09 0.24
LOAD 341 LOADTYPE Traffic  TITLE ST5 (51)
ELEMENT LOAD
129 PR GY -9000 0.09 -0.36
207 PR GY -9000 -0.09 -0.36
114 PR GY -9000 0.09 0.24
192 PR GY -9000 -0.09 0.24
LOAD 342 LOADTYPE Traffic  TITLE ST5 (52)
ELEMENT LOAD
130 PR GY -9000 0.09 -0.36
208 PR GY -9000 -0.09 -0.36
115 PR GY -9000 0.09 0.24
193 PR GY -9000 -0.09 0.24
LOAD 343 LOADTYPE Traffic  TITLE ST5 (53)
ELEMENT LOAD
116 PR GY -9000 0.09 0.24
194 PR GY -9000 -0.09 0.24
LOAD 344 LOADTYPE Traffic  TITLE ST5 (54)
ELEMENT LOAD
117 PR GY -9000 0.09 0.24
195 PR GY -9000 -0.09 0.24
LOAD 345 LOADTYPE Traffic  TITLE ST5 (55)
ELEMENT LOAD
118 PR GY -9000 0.09 0.24
196 PR GY -9000 -0.09 0.24
LOAD 346 LOADTYPE Traffic  TITLE ST5 (56)
ELEMENT LOAD
119 PR GY -9000 0.09 0.24
197 PR GY -9000 -0.09 0.24
LOAD 347 LOADTYPE Traffic  TITLE ST5 (57)
ELEMENT LOAD
120 PR GY -9000 0.09 0.24
198 PR GY -9000 -0.09 0.24
LOAD 348 LOADTYPE Traffic  TITLE ST5 (58)
ELEMENT LOAD
121 PR GY -9000 0.09 0.24
199 PR GY -9000 -0.09 0.24
LOAD 349 LOADTYPE Traffic  TITLE ST5 (59)
ELEMENT LOAD
122 PR GY -9000 0.09 0.24
200 PR GY -9000 -0.09 0.24
LOAD 350 LOADTYPE Traffic  TITLE ST5 (60)
ELEMENT LOAD
123 PR GY -9000 0.09 0.24
201 PR GY -9000 -0.09 0.24
LOAD 351 LOADTYPE Traffic  TITLE ST5 (61)
ELEMENT LOAD
124 PR GY -9000 0.09 0.24
202 PR GY -9000 -0.09 0.24
LOAD 352 LOADTYPE Traffic  TITLE ST5 (62)
ELEMENT LOAD
125 PR GY -9000 0.09 0.24
203 PR GY -9000 -0.09 0.24
LOAD 353 LOADTYPE Traffic  TITLE ST5 (63)
ELEMENT LOAD
126 PR GY -9000 0.09 0.24
204 PR GY -9000 -0.09 0.24
LOAD 354 LOADTYPE Traffic  TITLE ST5 (64)
ELEMENT LOAD
127 PR GY -9000 0.09 0.24
205 PR GY -9000 -0.09 0.24
LOAD 355 LOADTYPE Traffic  TITLE ST5 (65)
ELEMENT LOAD
128 PR GY -9000 0.09 0.24
206 PR GY -9000 -0.09 0.24
LOAD 356 LOADTYPE Traffic  TITLE ST5 (66)
ELEMENT LOAD
129 PR GY -9000 0.09 0.24
207 PR GY -9000 -0.09 0.24
LOAD 357 LOADTYPE Traffic  TITLE ST5 (67)
ELEMENT LOAD
130 PR GY -9000 0.09 0.24
208 PR GY -9000 -0.09 0.24
```

```
PERFORM ANALYSIS PRINT ALL
DEFINE ENVELOP
2 TO 44 ENVELOP 1 TYPE STRESS
45 TO 81 ENVELOP 2 TYPE STRESS
END DEFINE ENVELOP
PRINT ANALYSIS RESULTS
FINISH
```

APPENDIX E
Bridge Inspection Report

FDOT	**BRIDGE INSPECTION REPORT** PREPARED FOR: FDOT District 6 BRIDGE OWNER: City of Sunny Isles Beach INSPECTION TYPE: Routine CONTRACT No. CA611	Inspected by: **LARS Engineering, Inc.**
Bridge No. 874218	**REPORT CONTAINS**	**Inspection Date: 09-29-23**

☒ BrM Inspection Report ☒ Bridge Profile ☐ Fracture Critical Data ☐ Addendum
☒ CIDR Information ☐ UW Inspection Report ☒ Load Rating Summary Sheet ☐ Mechanical and Electrical Data

Atlantic Isle Ave. over Ocean Canal	**Facility Carried & Location**	**0.25 Miles West of A1A**

Location Map		**Detour Length = 0.13 mi.**

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CIDR/Bridge Profile Report with PDF attachment(s)
(ROUTINE INSPECTION REPORT)

Structure ID: 874218 **Inspection**

DISTRICT: D6 - Miami **INSPECTION DATE: 9/29/2023 YURI**

BY:	LARS Engineering Inc.	STRUCTURE NAME:	Not recorded
OWNER:	4 City/Municipal Hwy Agy	YEAR BUILT:	1925
MAINTAINED BY:	4 City/Municipal Hwy Agy	SECTION NO.:	87 674 513
STRUCTURE TYPE:	1 Reinforced Concrete - 11 Arch-Deck	MP:	0.255
LOCATION:	0.25 Mile West of A1A	ROUTE:	00000
SERV. TYPE ON:	1 Highway	FACILITY CARRIED:	Atlantic Isle Ave.
SERV. TYPE UNDER:	5 Waterway	FEATURE INTERSECTED:	Ocean Canal

[X] FUNCTIONALLY OBSOLETE [ ] STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI

DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 9/29/2023 UNDERWATER: N/A

SUFFICIENCY RATING: 40.9
HEALTH INDEX: 60.39

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CIDR/Bridge Profile Report with PDF attachment(s)
(ROUTINE INSPECTION REPORT)

Structure ID: 874218 — **Inspection**

DISTRICT: D6 - Miami — **INSPECTION DATE: 9/29/2023 YURI**

BY:	LARS Engineering Inc.	STRUCTURE NAME:	Not recorded
OWNER:	4 City/Municipal Hwy Agy	YEAR BUILT:	1925
MAINTAINED BY:	4 City/Municipal Hwy Agy	SECTION NO.:	87 674 513
STRUCTURE TYPE:	1 Reinforced Concrete - 11 Arch-Deck	MP:	0.255
LOCATION:	0.25 Mile West of A1A	ROUTE:	00000
SERV. TYPE ON:	1 Highway	FACILITY CARRIED:	Atlantic Isle Ave.
SERV. TYPE UNDER:	5 Waterway	FEATURE INTERSECTED:	Ocean Canal

[ ] THIS BRIDGE CONTAINS FRACTURE CRITICAL COMPONENTS

[ ] THIS BRIDGE IS SCOUR CRITICAL

[ ] THIS REPORT IDENTIFIES DEFICIENCIES WHICH REQUIRE PROMPT CORRECTIVE ACTION

[X] FUNCTIONALLY OBSOLETE [ ] STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI

DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 9/29/2023 UNDERWATER: N/A

OVERALL NBI RATINGS:

DECK:	N N/A (NBI)	CHANNEL:	8 Protected
SUPERSTRUCTURE:	5 Fair	CULVERT	N N/A (NBI)
SUBSTRUCTURE:	6 Satisfactory	SUFF. RATING	40.9
PERF. RATING	Fair	HEALTH INDEX:	60.39

FIELD PERSONNEL / TITLE / NUMBER: **INITIALS**

Leon, Juan - Bridge Inspector (CBI #00650) (lead) ____________

Bencomo, Humberto - Bridge Inspector Assistant ____________

REVIEWING BRIDGE INSPECTION SUPERVISOR:

Marquez, Loren - Professional Engineer (P.E. # 85631) ____________

CONFIRMING REGISTERED PROFESSIONAL ENGINEER:

Leon, Adrian - Professional Engineer (P.E.#83827) LARS Engineering Inc.
7225 NW 25th Street
Suite 211
Miami Florida 33122

ADRIAN E. LEON
LICENSE
No 83827
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

SIGNATURE: ____________________

DATE: ____________________

The official record of this package has been electronically signed and sealed by Adrian E. Leon, P.E. on the date adjacent to the seal as required by Rule 61G15-23.004, F.A.C. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CIDR/Bridge Profile Report with PDF attachment(s)
(ROUTINE INSPECTION REPORT)

Structure ID: 874218 **Inspection**

DISTRICT: D6 - Miami **INSPECTION DATE: 9/29/2023 YURI**

All Elements

MISCELLANEOUS : Channel

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8290 / 4	Channel	1	100	0	.	0	.	0	.	1 (EA)

Element Inspection Notes:

8290/4 No deficiencies were noted during this inspection.

MISCELLANEOUS : Other Elements

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8477 / 4	Other Wingwall/Retaining Wall	35	64.81	0	.	19	35.19	0	.	54 ft
0	1130 / 4	Cracking (RC and Other)	0	.	0	.	14	100	0	.	14 ft
0	6000 / 4	Scour	0	.	0	.	5	100	0	.	5 ft

Element Inspection Notes:

8477/4 Note: This element represents the coral stone walls at the four corners of the bridge.

SECONDARY:
_The seawall adjacent to the northeast corner of the bridge exhibits a fractured area 8ft. L, starting from the bridge. Refer to Photo 1. NO CHANGE.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1_Repair the fractured seawall adjacent to the NE corner of the bridge.
2_Seal the gaps/cracks at the SE retaining wall.
3_Backfill/repair the SW retaining wall.

CORRECTIVE ACTION EVALUATION:
1_Work not completed. Recommendation will be repeated.
2_Work not completed. Recommendation will be repeated.
3_Work not completed. Recommendation will be repeated.

For deficiencies refer to Defects 1130 and 6000.

1130/4 CS3:
_The SE retaining wall has several vertical cracks/gaps up to 2-1/4in. W for the entire length of the wall. (14 LF). Refer to Photo 2. NO CHANGE.

6000/4 CS3:
_The SW retaining wall has failed and has an undermined/voided area up to 5ft. L x 2ft. H x 5ft. D. (5 LF). Refer to Photo 3. NO CHANGE.

SUBSTRUCTURE : Substructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	220 / 4	Re Conc Pile Cap/Ftg	305	100	0	.	0	.	0	.	305 ft

Element Inspection Notes:

220/4 No deficiencies were noted during this inspection.

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CIDR/Bridge Profile Report with PDF attachment(s)
(ROUTINE INSPECTION REPORT)

Structure ID: 874218 **Inspection**

DISTRICT: D6 - Miami **INSPECTION DATE: 9/29/2023 YURI**

SUPERSTRUCTURE : Superstructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	144 / 4	Re Conc Arch	0	.	0	.	43	100	0	.	43 ft
0	1090 / 4	Exposed Rebar	0	.	0	.	43	100	0	.	43 ft

Element Inspection Notes:

144/4 Note: The top of the arch is not visible due to an overlay of asphalt. There is a utility pipe running on top of the bridge near the right concrete bridge rail.

SECONDARY:
_The asphalt overlay exhibits multi-directional cracks up to 1/8in. W throughout the entire length of the bridge. Refer to Photo 4. NO CHANGE.

_The asphalt overlay exhibits two asphalt patches measuring 10ft. L x 3ft. W and 5ft. L x 3ft. W at the east end, both along the center lane. Refer to Photo 5. NO CHANGE.

_The asphalt overlay exhibits several gauges up to 5ft. L x 2in. W x 1/2in. D at midspan at both ends of the bridge. Previously noted as seven gauges up to 40in. L x 2in. W x 1/2in. D. Refer to Photo 6. INCREASE.

_The curbs exhibit cracks measuring up to 1/16in. W that encircles the curbs throughout the entire length of the structure. NO CHANGE. NCAR.

_There are areas of missing coral rocks along the north face of the arch. Refer to Photo 7. NO CHANGE.

_The southwest object marker is substandard and the northwest marker is missing. Refer to Photo 8. NO CHANGE.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1_Resurface the asphalt overlay along the bridge.
2_Provide object markers in compliance with FDOT Standards and MUTCD Section 2C.64 at the SW and NW corners of the bridge.
3_Repair spalls/delamination and unsound repairs throughout the arch underside.
4_Fill core hole at center of mid-span.
5_Provide missing coral rocks along the north face of the arch.
6_Monitor loose rocks along the south and north faces on the arch.
7_Clean and coat exposed rebar along the north and south bottom edges of the arch.

CORRECTIVE ACTION EVALUATION:
1_Work not completed. Recommendation will be repeated.
2_Work not completed. Recommendation will be repeated.
3_Work not completed. Recommendation will be repeated.
4_Work not completed. Recommendation will be repeated.
5_Work not completed. Recommendation will be repeated.
6_Work was completed. Recommendation will not be repeated.
7_Work not completed. Recommendation will be repeated.

For deficiencies refer to Defect 1090.

1090/4 CS-3:
_The north bottom edge of the arch exhibits intermittent spalling throughout with exposed rebar having up to 100% S.L. along the full length of the arch. (43 LF). Refer to Photo 9. NO CHANGE.

(DEFECT 1080: Delamination/Spall/Patched Area)
_The south side of the arch exhibits spalls/delamination and unsound repaired areas

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measuring up to 18in. L x 10in. W x 2in. D with minor exposed steel and areas of corrosion stains at random locations throughout the length of the arch along the fallen coral rock. Refer to Photo 10. NO CHANGE.

_The arch underside has a core hole at the center of the mid-span. Refer to Photo 11. NO CHANGE.

_The arch underside exhibits a spall 32in. L x 17in. W x 5in. D with no visible exposed steel, at the SW corner. Refer to Photo 12. NO CHANGE.

_The arch underside appears to have been partially repaired in some areas. However, there are still areas that sound hollow when struck with a hammer by the inspector, approximately 15% of the arch underside area. NO CHANGE. NCAR

SUPERSTRUCTURE : Superstructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	331 / 4	Re Conc Bridge Railing	62	75.61	0	.	20	24.39	0	.	82 ft
0	1130 / 4	Cracking (RC and Other)	0	.	0	.	20	100	0	.	20 ft

Element Inspection Notes:

331/4 For deficiencies refer to Defect 1130.

1130/4 CS3:
_The concrete parapets have vertical cracks up to 1/16in. W that encircle the parapets at random locations. (20 LF). NO CHANGE. NCAR.

Total Number of Elements*: 5
*excluding defects/protective systems

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Inspector Recommendations

UNIT: 0 **MISCELLANEOUS**

ELEMENT/ENV: 8477 / 4 Other Wingwall/Retaining Wall **ELEM CATEGORY: Other Elements**

CONDITION STATE			PRIORITY
1 , 3	MMS Quantity: 8 mh	Element Estimated Quantity: 8 ft	3

WORK ORDER RECOMMENDATION:

_Repair the fractured seawall adjacent to the NE corner of the bridge. Refer to Photo 1.

ELEMENT/ENV: 8477:1130 / 4 Cracking (RC and Other) **ELEM CATEGORY: Other Elements**

CONDITION STATE			PRIORITY
3	MMS Quantity: 4 mh	Element Estimated Quantity: 14 ft	3

WORK ORDER RECOMMENDATION:

_Seal the gaps/cracks at the SE retaining wall. Refer to Photo 2.

ELEMENT/ENV: 8477:6000 / 4 Scour **ELEM CATEGORY: Other Elements**

CONDITION STATE			PRIORITY
3	MMS Quantity: 14 mh	Element Estimated Quantity: 5 ft	3

WORK ORDER RECOMMENDATION:

_Repair the southwest retaining wall. Refer to Photo 3.

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Inspector Recommendations

UNIT: 0 **SUPERSTRUCTURE**

ELEMENT/ENV: 144 / 4 Re Conc Arch **ELEM CATEGORY: Superstructure**

CONDITION STATE		PRIORITY
3	MMS Quantity: 40 mh Element Estimated Quantity: 43 ft	3

WORK ORDER RECOMMENDATION:

_Resurface the asphalt overlay along the bridge. Refer to Photos 4 to 6.

CONDITION STATE		PRIORITY
3	MMS Quantity: 4 mh Element Estimated Quantity: 20 ft	3

WORK ORDER RECOMMENDATION:

_Provide missing coral rocks along the north face of the arch. Refer to Photo 7.

CONDITION STATE		PRIORITY
3	MMS Quantity: 1 mh Element Estimated Quantity: 1 ft	3

WORK ORDER RECOMMENDATION:

_Provide object markers in compliance with FDOT Standards & MUTCD Section 2C.64 at SW & NW corners. Refer to Photo 8.

ELEMENT/ENV: 144:1090 / 4 Exposed Rebar **ELEM CATEGORY: Superstructure**

CONDITION STATE		PRIORITY
3	MMS Quantity: 2 mh Element Estimated Quantity: 3 ft	3

WORK ORDER RECOMMENDATION:

_Fill the core hole at the center of the mid-span. Refer to Photo 11.

CONDITION STATE		PRIORITY
3	MMS Quantity: 8 mh Element Estimated Quantity: 43 ft	3

WORK ORDER RECOMMENDATION:

_Repair spalls/delamination and unsound repairs throughout the arch underside. Refer to Photos 10 and 12.

CONDITION STATE		PRIORITY
3	MMS Quantity: 8 mh Element Estimated Quantity: 43 ft	3

WORK ORDER RECOMMENDATION:

_Clean and coat exposed rebar along the north and south bottom edges of the arch. Refer to Photo 9.

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Structure Notes

BRIDGE OWNER: CITY OF SUNNY ISLES BEACH

Concrete arch bridge.

Bridge inventoried from west to east.

This structure is on a 12-month inspection frequency due to SIA Item 70 Posting being coded a 0.

TRAFFIC RESTRICTIONS:
Based on the current load rating analysis dated 11/21/2012, posting is required as follows: SU - 12 tons and C - 21 tons. Bridge is currently posted for SU - 12 tons and C - 21 tons. Posting sign is located at the west approach to the bridge (one way traffic). Refer to Photo 13.

REVIEWED BY:

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INSPECTION NOTES: **YURI** **9/29/2023**

Sufficiency Rating Calculation Accepted by KNLREJB at 10/30/2023 09:55 AM

LOAD CAPACITY EVALUATION:
Since the current load rating dated 11/21/2012, there is no indication that deterioration, geometric changes or additional dead load have occurred that would warrant a new load rating analysis. This only applies to this inspection dated 09/29/2023 per Adrian Leon, P.E.

_The Superstructure (59) NBI Rating remains at 5 (Fair) due to spalls with exposed rebar having up to 100% section loss and delamination throughout the concrete arch.

LEGEND:
NCAR: NO CORRECTIVE ACTION RECOMMENDED
RT: Right
LT: Left
L: Long
W: Wide
H: High
D: Deep
S.L.: Section Loss
in.: Inches
ft.: Feet
LF: Linear Feet
SF: Square Feet
NE: Northeast
NW: Northwest
SE: Southeast
SW: Southwest

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PHOTO 1: ELEMENT/ENV: 8477/4 Other Wingwalls/Retaining Wall

The seawall adjacent to the northeast corner of the bridge exhibits a fractured area 8ft. L, starting from the bridge.

WORK ORDER RECOMMENDATION:
Repair the fractured seawall adjacent to the NE corner of the bridge.

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PHOTO 2: ELEMENT/ENV: 8477/4 Other Wingwalls/Retaining Wall

The SE retaining wall has several vertical cracks/gaps up to 2-1/4in. W for the entire length of the wall.

WORK ORDER RECOMMENDATION:
Seal the gaps/cracks at the SE retaining wall.

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PHOTO 3: ELEMENT/ENV: 8477/4 Other Wingwalls/Retaining Wall

The SW retaining wall has failed and has an undermined/voided area up to 5ft. L x 2ft. H x 5ft. D.

WORK ORDER RECOMMENDATION:
Repair the southwest retaining wall.

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PHOTO 4: ELEMENT/ENV: 144/4 Re Conc Arch

The asphalt overlay exhibits multi-directional cracks up to 1/8in. W throughout the entire length of the bridge.

WORK ORDER RECOMMENDATION:
Resurface the asphalt overlay along the bridge.

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PHOTO 5: ELEMENT/ENV: 144/4 Re Conc Arch

_The asphalt overlay exhibits two asphalt patches measuring 10ft. L x 3ft. W and 5ft. L x 3ft. W at the east end, both along the center lane.

WORK ORDER RECOMMENDATION:
Resurface the asphalt overlay along the bridge.

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PHOTO 6: ELEMENT/ENV: 144/4 Re Conc Arch

The asphalt overlay exhibits several gauges up to 5ft. L x 2in. W x 1/2in. D at midspan at both ends of the bridge. Previously noted as seven gauges up to 40in. L x 2in. W x 1/2in. D.

WORK ORDER RECOMMENDATION:
Resurface the asphalt overlay along the bridge.

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PHOTO 7: ELEMENT/ENV: 144/4 Re Conc Arch

There are areas of missing coral rocks along the north face of the arch.

WORK ORDER RECOMMENDATION:
Provide missing coral rocks along the north face of the arch.

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PHOTO 8: ELEMENT/ENV: 144/4 Re Conc Arch

The southwest object marker is substandard and the northwest marker is missing.

WORK ORDER RECOMMENDATION:
Provide object markers in compliance with FDOT Standards & MUTCD Section 2C.64 at SW & NW corners.

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PHOTO 9: ELEMENT/ENV: 144/4 Re Conc Arch

The north bottom edge of the arch exhibits intermittent spalling throughout with exposed rebar having up to 100% S.L. along the full length of the arch.

WORK ORDER RECOMMENDATION:
Clean and coat exposed rebar along the north and south bottom edges of the arch.

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PHOTO 10: ELEMENT/ENV: 144/4 Re Conc Arch

The south side of the arch exhibits spalls/delamination and unsound repaired areas measuring up to 18in. L x 10in. W x 2in. D with minor exposed steel and areas of corrosion stains at random locations throughout the length of the arch along the fallen coral rock.

WORK ORDER RECOMMENDATION:
Repair spalls/delamination and unsound repairs throughout the arch underside.

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PHOTO 11: ELEMENT/ENV: 144/4 Re Conc Arch

The arch underside has a core hole at the center of the mid-span.

WORK ORDER RECOMMENDATION:
Fill the core hole at the center of the mid-span.

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PHOTO 12: ELEMENT/ENV: 144/4 Re Conc Arch

The arch underside exhibits a spall 32in. L x 17in. W x 5in. D with no visible exposed steel, at the SW corner.

WORK ORDER RECOMMENDATION:
Repair spalls/delamination and unsound repairs throughout the arch underside.

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PHOTO 13: STRUCTURE NOTES

West Approach Posting Sign.

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PHOTO 14: SCOUR EVALUATION

Channel looking North.

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PHOTO 15: SCOUR EVALUATION

Channel looking South.

Bridge # 874218	Load Rating Summary Details for Reinforced Concrete Bridges	Table Date 8/1/2011

LRFR using Part B

Level	Vehicle	Weight (tons)	Load Factors LL	Load Factors DL	Moment (Strength) Distribution Factor (DF)	Moment (Strength) Rating Factor	Moment (Strength) Tons	Moment (Strength) Location	Moment (Strength) Dimension	Shear (Strength) Distribution Factor (DF)	Shear (Strength) Rating Factor	Shear (Strength) Tons	Shear (Strength) Location	Shear (Strength) Dimension	Member & Description (Interior or Exterior, Governing, Member Type, Etc.)	PONTIS Location	PONTIS Value (Tons)
Operating (Strength)	HS-20	36.0	1.30	1.30	N/A	0.51	18.47	A	21.50						Concrete Arch at Crown	O.R. (64) [Gov Span]	18.5
--			--	--						--	--	--	--	--			
Operating (Strength)			1.30	1.30												HS20 O.R. Max Span	-1.0
--			--	--						--	--	--	--	--			
Inventory (Strength)			2.17	1.30	N/A	0.41	14.65	A	21.50						Concrete Arch at Crown	Inventory Rating (66)	14.7
--			--	--						--	--	--	--	--			
Operating (Strength)	SU2	17.0	1.30	1.30	N/A	0.74	12.53	A	21.50						Concrete Arch at Crown	Single Unit Truck 2 Axles	12.5
	SU3	33.0	1.30	1.30	N/A	0.47	15.38	A	21.50						Concrete Arch at Crown	Single Unit Truck 3 Axles	15.4
	SU4	35.0	1.30	1.30	N/A	0.47	16.49	A	21.50						Concrete Arch at Crown	Single Unit Truck 4 Axles	16.5
	C3	28.0	1.30	1.30	N/A	0.75	21.08	A	21.50						Concrete Arch at Crown	Comb. Unit Truck 3 Axles	21.1
	C4	36.7	1.30	1.30												Comb. Unit Truck 4 Axles	-1.0
	C5	40.0	1.30	1.30												Comb. Unit Truck 5 Axles	-1.0
	ST5	40.0	1.30	1.30												Truck Trailer 5 Axles	-1.0

Notes

General Notes	1. This table is based on the requirements established in the 2011 "Bridge Load Rating Manual".
Notes to Designer	2. Modify or replace the Rating Location sketch showing Span Length(s) to resemble the bridge being rated.
Additional Notes	3. For each vehicle in the table, state whether the rating is for the interior or exterior member and whether or not that member governs.
	4. Cells shaded in this color will automatically populate based upon data provided in other fields (rating factor, bridge #, etc.) on this form.

Bridge Load Rating Manual & Bridge Management System (BMS) Coding Guide are available at:
http://www.dot.state.fl.us/statemaintenanceoffice/StructuresOperations.shtm

Comments

HS20 (O.R.) (Gov)	Concrete Arch at Crown - Span No.1
HS20 (O.R.) (Max)	
HS20 (I.R.)	Concrete Arch at Crown - Span No.1
SU2	Concrete Arch at Crown - Span No.1
SU3	Concrete Arch at Crown - Span No.1
SU4	Concrete Arch at Crown - Span No.1
C3	Concrete Arch at Crown - Span No.1
C4	
C5	
ST5	

E.G.: DF method if other than LRFD, other appropriate comments, etc.

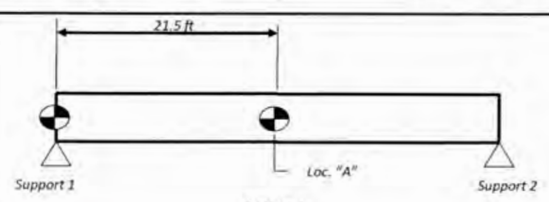
PONTIS Information

Load Rating Date	11/25/12	Structure Number (8)	874218
Initials	JF	Reason for L.R.	Update
Load Distribution Factor	N/A	Load Rating Origination	[C] Field Measurements
Impact Factor	30.0%	Design Method	[A] Working Stress
		Method of Calculation	[4] Others
Design Load (31)		[5] MS18 (HS20 or HS20-S16-44)	
Operating Type (63)		[2] Allowable Stress (AS)	
Inventory Type (65)		[2] Allowable Stress (AS)	
Main Type Material (43A)		[1] Concrete	
Main Type Design (43B)		[11] Arch - Deck	
Approach Type Material (44A)			
Approach Type Design (44B)			
Open/Posted/Closed (41)		[B] POSTING RECOMMENDED	
Posting (70)		[0] > 39.9% BELOW (0.000-0.600) (Required)	

Posting Recommend		Load Ratings		Floor Beam (FB)	
SU	12.5 tons	Operating Rating (64) [Gov]	18.5 tons	FB Present	No
C	21.1 tons	HS20 O.R. Max Span	-1.0 tons	Gov FB Span	
T	N/A	Inventory Rating (66)	14.7 tons	Gov FB Spacing	
Posting Date		Single Unit Truck 2 Axles	12.5 tons	FB HS20 Rating	
Spans in Main Unit (45)	1	Single Unit Truck 3 Axles	15.4 tons	FB SU4 Rating	
Approach Spans (46)	0	Single Unit Truck 4 Axles	16.5 tons	FB FL 120	
HS20 Gov Span Length	43.0 ft	Comb. Unit Truck 3 Axles	21.1 tons	FB OPR Rating Factor	
Length of Max Span (48)	43.0 ft	Comb. Unit Truck 4 Axles	-1.0 tons	FB INV Rating Factor	
Structure Length (49)	43.0 ft	Comb. Unit Truck 5 Axles	-1.0 tons	Truck Trailer 5 Axles	-1.0 tons
Total Length	43.0 ft				

P.E. Information

Performed By/Date:	Jovana Fernandez	11/25/12
Checked By/Date:	PATRICIA M. BOTAS	11/25/12
P.E. & FL P.E. Lic. #:	PATRICIA M. BOTAS, P.E. Lic # 41829	
Physical Address:	7875 NW 12th Street #120 Doral, Florida 33126	
Email Address:	p_botas@botasengineering.com	
P.E. SEAL:	PATRICIA M. BOTAS LICENSE No. 41829 STATE OF FLORIDA PROFESSIONAL ENGINEER 11/21/12 PE# 41829	



FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005

Inspection/CIDR/Bridge Profile Report with PDF attachment(s)

Structure ID: 874218

CIDR

DATE PRINTED: 11/1/2023

Description

Structure Unit Identification

Bridge/Unit Key: 874218 0
Structure Name:
Description: SPAN 1
Type: M - Main

Roadway Identification

NBI Structure No (8): 874218
Position/Prefix (5): 1 - Route On Structure
Kind Hwy (Rte Prefix): 5 City Street
Design Level of Service: 0 None of the below
Route Number/Suffix: 00000 / 0 N/A (NBI)
Feature Intersect (6): Ocean Canal
Critical Facility: Not Defense-crit
Facility Carried (7): Atlantic Isle Ave.
Mile Point (11): 0.255
Latitude (16): 025d55'38.8" Long (17): 080d07'34.1"

Roadway Traffic and Accidents

Lanes (28): 1 Medians: 0 Speed: 20 mph
ADT Class: 2 ADT Class 2
Recent ADT (29): 109 Year (30): 2015
Future ADT (114): 657 Year (115): 2037
Truck % ADT (109): 0
Detour Length (19): 1 mi
Detour Speed: 20 mph
Accident Count: -1 Rate:

Roadway Classification

Nat. Hwy Sys (104): 0 Not on NHS
National base Net (12): 0 - Not on Base Network
LRS Inventory Rte (13a): 87 674 513 Sub Rte (13b): 00
Functional Class (26): 19 Urban Local
Federal Aid System: OFF
Defense Hwy (100): 0 Not a STRAHNET hwy
Direction of Traffic (102): 1 1-way traffic
Emergency: ☐

Roadway Clearances

Vertical (10): 99.99 ft Appr. Road (32): 17.5 ft
Horiz. (47): 16.8 ft Roadway (51): 10 ft
Truck Network (110): 0 Not part of natl netwo
Toll Facility (20): 3 On free road
Fed. Lands Hwy (105): 0 N/A (NBI)
School Bus Route: ☐
Transit Route: ☐

NBI Project Data

Proposed Work (075A): Not Applicable (P)
Work To Be Done By (075B): Not Applicable (P)
Improvement Length (076): 0 ft

Improvement Cost (094): $ 43,000.00
Roadway Improvement Cost (095): $ 5,000.00
Total Cost (096): $ 71,000.00
Year of Estimate (097): 1996

NBI Rating

Channel (61): 8 Protected
Deck (58): N N/A (NBI)
Superstructure (59): 5 Fair
Substructure (60): 6 Satisfactory

Culvert (62): N N/A (NBI)
Waterway (71): 7 Above Minimum
Unrepaired Spalls: -1 sq.ft.
Review Required: ☒

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005

Inspection/CIDR/Bridge Profile Report with PDF attachment(s)

Structure ID: 874218

CIDR

DATE PRINTED: 11/1/2023

Structure Identification

Admin Area:	Miami-Dade
District (2):	D6 - Miami
County (3):	(87)Miami-Dade
Place Code (4):	Sunny Isles
Location (9):	0.25 Mile West of A1A
Border Br St/Reg (98):	Not Applicable (P) Share: 0 %
Border Struct No (99):	
FIPS State/Region (1):	12 Florida Region 4-Atlanta
NBIS Bridge Len (112):	Y - Meets NBI Length
Parallel Structure (101):	No || bridge exists
Temp. Structure (103):	Not Applicable (P)
Maint. Resp. (21):	4 City/Municipal Hwy Agy
Owner (22):	4 City/Municipal Hwy Agy
Historic Signif. (37):	3 Possibly eligible for

Geometrics

Spans in Main Unit (45):	1
Approach Spans (46):	0
Length of Max Span (48):	43 ft
Structure Length (49):	43 ft
Total Length:	43 ft
Deck Area:	837 sqft
Structure Flared (35):	0 No flare

Age and Service

Year Built (27):	1925
Year Reconstructed (106):	0
Type of Service On (42a):	1 Highway
Under (42b):	5 Waterway
Fracture Critical Details:	Not Applicable

Structure Type and Material

Curb/Sidewalk (50):	Left: 0 ft Right: 0 ft
Bridge Median (33):	0 No median
Main Span Material (43A):	1 Reinforced Concrete
Appr Span Material (44A):	Not Applicable
Main Span Design (43B):	11 Arch-Deck
Appr Span Design (44B):	Not Applicable

Deck Type and Material

Deck Width (52):	20.4 ft
Skew (34):	0 deg
Deck Type (107):	N N/A (NBI)
Surface (108):	6 Bituminous
Membrane:	0 None
Deck Protection:	None

Appraisal

Structure Appraisal

Open/Posted/Closed (41):	P Posted for load
Deck Geometry (68):	2 Intolerable - Replace
Underclearances (69):	N Not applicable (NBI)
Approach Alignment (72):	5-Steady Brake/Downshift
Bridge Railings (36a):	0 Substandard
Transitions (36b):	0 Substandard
Approach Guardrail (36c):	N N/A or not required
Approach Guardrail Ends (36d):	N N/A or not required
Scour Critical (113):	U Unknown Foundation

Navigation Data

Navigation Control (38):	Permit Not Required
Nav Vertical Clr (39):	0 ft
Nav Horizontal Clr (40):	0 ft
Min Vert Lift Clr (116):	0 ft
Pier Protection (111):	1 Not Required

NBI Condition Rating

Sufficiency Rating:	40.9
Health Index:	60.39
Structural Eval (67):	4 Minimum Tolerable
Deficiency:	Functionally Obsolete

Minimum Vertical Clearance

Over Structure (53):	99.99 ft
Under (reference) (54a):	N Feature not hwy or RR
Under (54b):	0 ft

Minimum Lateral Underclearance

Reference (55a):	N Feature not hwy or RR
Right Side (55b):	0 ft
Left Side (56):	0 ft

Schedule

Current Inspection

Inspection Date:	09/29/2023
Inspector:	KNLREJP - Juan Leon
Bridge Group:	CA611
Alt. Bridge Group:	
Primary Type:	Regular NBI
Review Required:	X

Next Inspection Date Scheduled

NBI:	09/29/2025
Element:	09/29/2024
Fracture Critical:	
Underwater:	
Other/Special:	09/29/2024
Inventory Photo Update Due:	09/30/2031

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005 **Inspection/CIDR/Bridge Profile Report with PDF attachment(s)**

Structure ID: 874218 **CIDR** **DATE PRINTED: 11/1/2023**

Schedule Cont.

Inspection Types Performed NBI [X] Element [X] Fracture Critical [ ] Underwater [ ] Other Special [X]

Inspection Intervals	Required (92)	Frequency (92)		Last Date (93)		Inspection Resources	
Fracture Critical	[ ]	mos				Crew Hours:	4
Underwater	[ ]	mos				Flagger Hours:	0
Other Special	[X]	12 mos		09/29/2023		Helper Hours:	0
NBI		24 mos	(91)	09/29/2023	(90)	Snooper Hours:	0
						Special Crew Hours:	0
						Special Equip Hours:	0

Bridge Related

General Bridge Information

Parallel Bridge Seq:
Channel Depth: 8.4 ft
Radio Frequency: -1
Phone Number:
Exception Date:
Exception Type: Unknown
Accepted By Maint: 01/01/1925
Warranty Expiration: 00/00/0000
Performance Rating: Fair

Bridge Rail 1: Other
Bridge Rail 2: Not applicable-No rail
Electrical Devices: No electric service
Culvert Type: Not applicable
Maintenance Yard: Not FDOT Maintained
FIHS ON / OFF: No Routes on FIHS
Previous Structure:
2nd Previous Structure:
Replacement Structure:

Permitted Utilities: Power [ ] Water [ ] Gas [ ] Fiber Optic [ ] Sewage [ ] Other [ ]

Bridge Load Rating Information

Inventory Type (065): 2 AS Allowable Stress
Operating Type (063): 2 AS Allowable Stress
Original Design Load (031): 5 MS 18 (HS 20)
Date: 11/21/2012
Initials: PMB
Load Rating Rev. Recom.:
Load Rating Plans Status: Field Measurements

Inventory Rating (066): 14.7 tons
Operating Rating (064): 18.5 tons
FL120 Permit Rating: -1.0 tons
HS20/FL120 Max Span Rating: 18.5 tons
Dynamic Impact in Percent: 30 %
Governing Span Length: 43.0 ft
Minimum Span Length:
Distribution Method: Others

Load Rating Notes:

LEGAL LOADS

SU2: 12.5 tons
SU3: 15.4 tons
SU4: 16.5 tons
C3: 21.1 tons
C4: -1.0 tons
C5: -1.0 tons
ST5: -1.0 tons
Posting (070): 0 >39.9% below
Open/Posted/Closed (041): P Posted for load

POSTING

Recom. SU Posting: 12 tons
Recom. C Posting: 21 tons
Recom. ST5 Posting: 99 tons
Actual SU Posting: 12 tons
Actual C Posting: 21 tons
Actual ST5 Posting: 99 tons
Actual Blanket Posting: 99 tons
Emergency Vehicle: 1 EV inapplicable

FLOOR BEAM (FB) FB Present: No

FB Span Length, Gov: 0.0 ft
FB Spacing, Gov: 0.0 ft
FB OPR Rating: 0.0 tons
FB SU4 OPR Rating: 0.0 tons
FB FL120 Rating: 0.0 tons

SEGMENTAL (SEG)

SEG Wing-Span: -1.0 ft
SEG Web-to-Web Span: -1.0 ft
SEG Transverse HL93 Operating: -1.00 RF

Bridge Scour and Storm Information

Pile Driving Record: No pile driving records
Foundation Type: Unknown
Mode of Flow: Tidal
Rating Scour Eval: Unknown
Highest Scour Eval: Unknown
Scour Evaluation Method:

Scour Recommended I: Unknown
Scour Recommended II: Unknown
Scour Recommended III: Unknown
Scour Elevation: -1 ft
Action Elevation: -1 ft
Storm Frequency: -1

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005 **Inspection/CIDR/Bridge Profile Report with PDF attachment(s)**

Structure ID: 874218 **CIDR** **DATE PRINTED: 11/1/2023**

Elements

Inspection Date: 09/29/2023 **YURI**

MISCELLANEOUS : Channel

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8290 / 4	Channel	1	100	0	.	0	.	0	.	1 (EA)

MISCELLANEOUS : Other Elements

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	8477 / 4	Other Wingwall/Retaining Wall	35	64.81	0	.	19	35.19	0	.	54 ft
0	1130 / 4	Cracking (RC and Other)	0	.	0	.	14	100	0	.	14 ft
0	6000 / 4	Scour	0	.	0	.	5	100	0	.	5 ft

SUBSTRUCTURE : Substructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	220 / 4	Re Conc Pile Cap/Ftg	305	100	0	.	0	.	0	.	305 ft

SUPERSTRUCTURE : Superstructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	144 / 4	Re Conc Arch	0	.	0	.	43	100	0	.	43 ft
0	1090 / 4	Exposed Rebar	0	.	0	.	43	100	0	.	43 ft

SUPERSTRUCTURE : Superstructure

Str Unit	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	T Qty
0	331 / 4	Re Conc Bridge Railing	62	75.61	0	.	20	24.39	0	.	82 ft
0	1130 / 4	Cracking (RC and Other)	0	.	0	.	20	100	0	.	20 ft

Total Number of Elements*: 5
*excluding defects/protective systems

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM

REPORT ID: INSP005 **Inspection/CIDR/Bridge Profile Report with PDF attachment(s)**

Structure ID: 874218 **CIDR** **DATE PRINTED: 11/1/2023**

Inspection Information

Inspection Date: 09/29/2023 **Type:** Regular NBI

Inspector: KNLREJP - Juan Leon

Inspection Notes: Sufficiency Rating Calculation Accepted by KNLREJB at 10/30/2023 09:55 AM

LOAD CAPACITY EVALUATION:
Since the current load rating dated 11/21/2012, there is no indication that deterioration, geometric changes or additional dead load have occurred that would warrant a new load rating analysis. This only applies to this inspection dated 09/29/2023 per Adrian Leon, P.E.

_The Superstructure (59) NBI Rating remains at 5 (Fair) due to spalls with exposed rebar having up to 100% section loss and delamination throughout the concrete arch.

LEGEND:
NCAR: NO CORRECTIVE ACTION RECOMMENDED
RT: Right
LT: Left
L: Long
W: Wide
H: High
D: Deep
S.L.: Section Loss
in.: Inches
ft.: Feet
LF: Linear Feet
SF: Square Feet
NE: Northeast
NW: Northwest
SE: Southeast
SW: Southwest

Structure Notes

BRIDGE OWNER: CITY OF SUNNY ISLES BEACH

Concrete arch bridge.

Bridge inventoried from west to east.

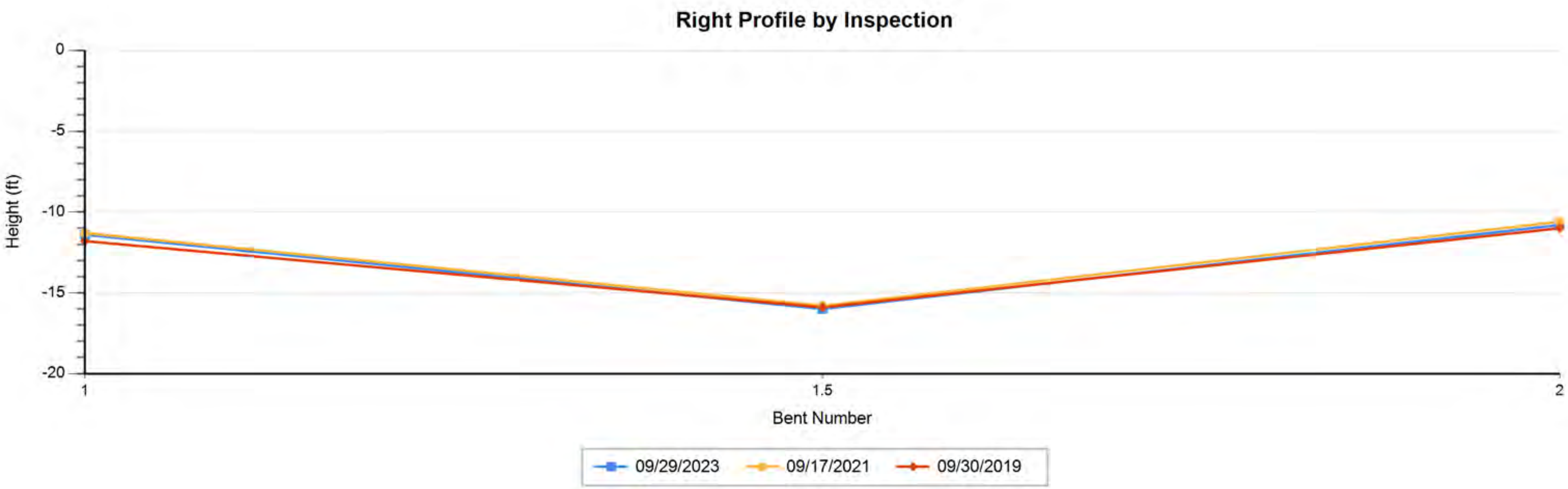
This structure is on a 12-month inspection frequency due to SIA Item 70 Posting being coded a 0.

TRAFFIC RESTRICTIONS:
Based on the current load rating analysis dated 11/21/2012, posting is required as follows: SU - 12 tons and C - 21 tons. Bridge is currently posted for SU - 12 tons and C - 21 tons. Posting sign is located at the west approach to the bridge (one way traffic). Refer to Photo 13.

REVIEWED BY:

Schedule Notes

FLORIDA DEPARTMENT OF TRANSPORTATION BRIDGE MANAGEMENT SYSTEM
Inspection/CIDR/Bridge Profile Report with PDF attachment(s)
Bridge Profile



Profile Data - Numerical Summary

(All Heights are in Feet)

Inspection Date and Key: 9/29/2023 YURI

Bent #	Left Height	Right Height
1	10.60	11.40
1.5	15.50	16.00
2	11.50	10.80

Air Temp:

Profile Notes:

Measurements taken to the top of the concrete rail.
Waterline taken at center of channel: Left = 7.4ft. and Right = 7.6ft.
Channel Depth = 8.4ft.

Inspection Date and Key: 9/17/2021 ZRXR

Bent #	Left Height	Right Height
1	10.60	11.30
1.5	15.50	15.80
2	9.80	10.60

Air Temp:

Profile Notes:

Measurements taken to the top of the concrete rail.
Waterline taken at center of channel: Left = 8.4ft. and Right = 8.7ft.
Channel Depth = 7.1ft.

Inspection Date and Key: 9/30/2019 UNDL

Bent #	Left Height	Right Height
1	11.20	11.80
1.5	15.50	15.90
2	10.40	11.00

Air Temp:

Profile Notes:

Measurements taken to the top of the concrete rail.
Waterline taken at center of channel: Left = 6.6ft. and Right = 6.8ft.
Channel Depth = 9.1ft.

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

Bridge Number - 09/17/2021

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

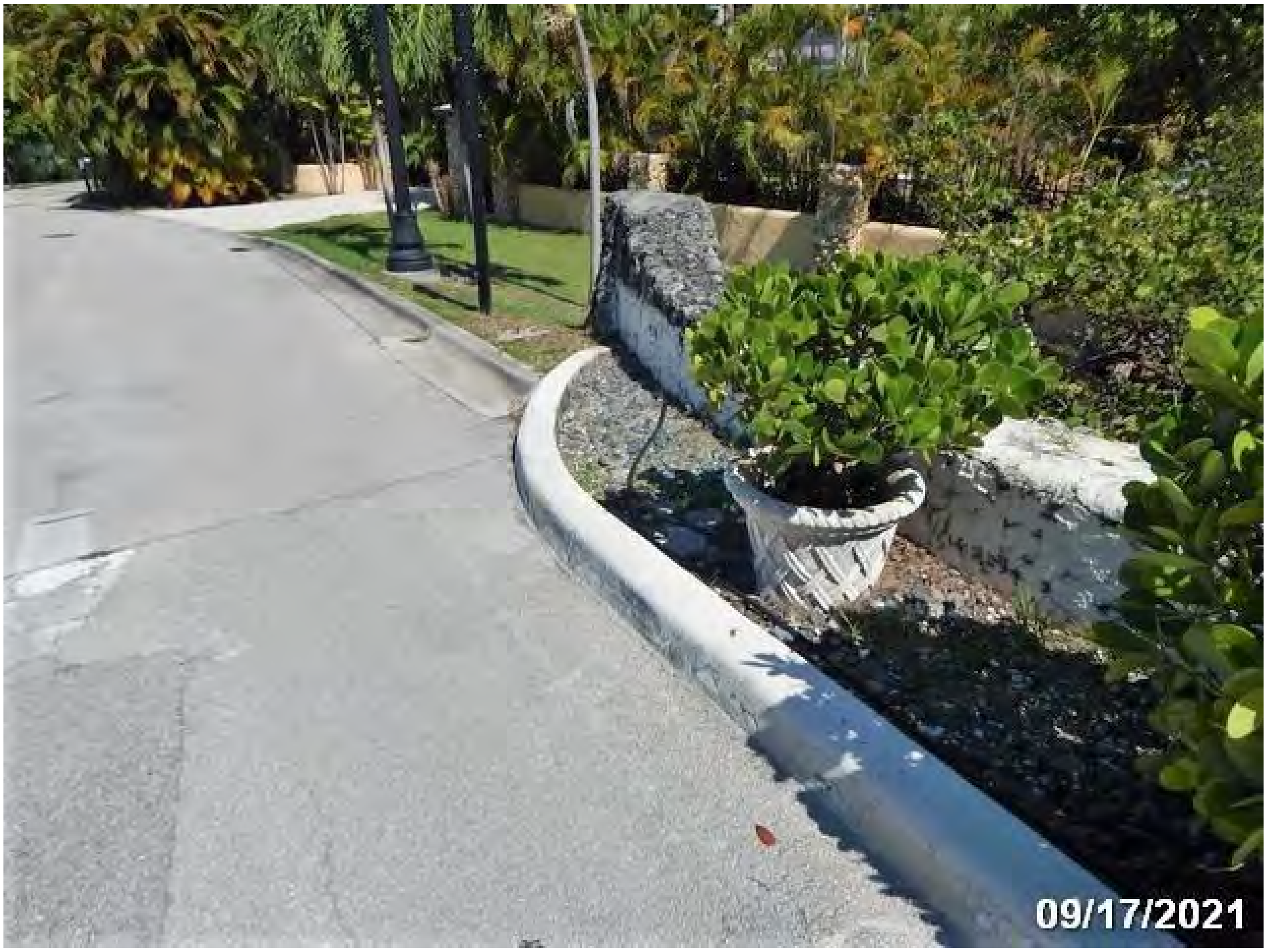
Typical Bridge Rail - 09/17/2021

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

Southwest Oncoming Transition - 09/17/2021

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**



Northwest Oncoming Transition - 09/17/2021

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

Northeast Off-Going Transition - 09/17/2021

Southeast Off-Going Transition - 09/17/2021

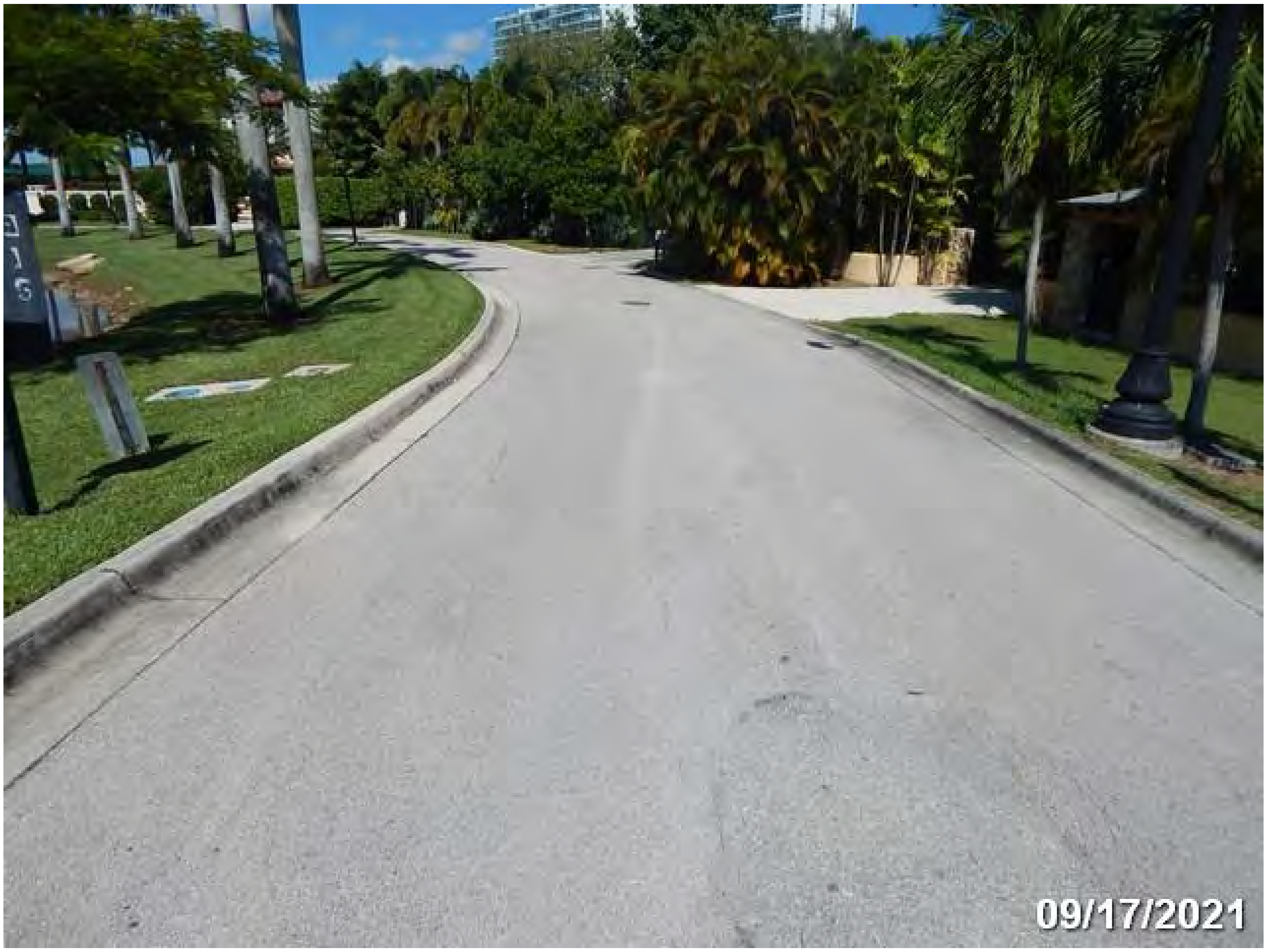
FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

West Approach Looking East - 09/17/2021

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**



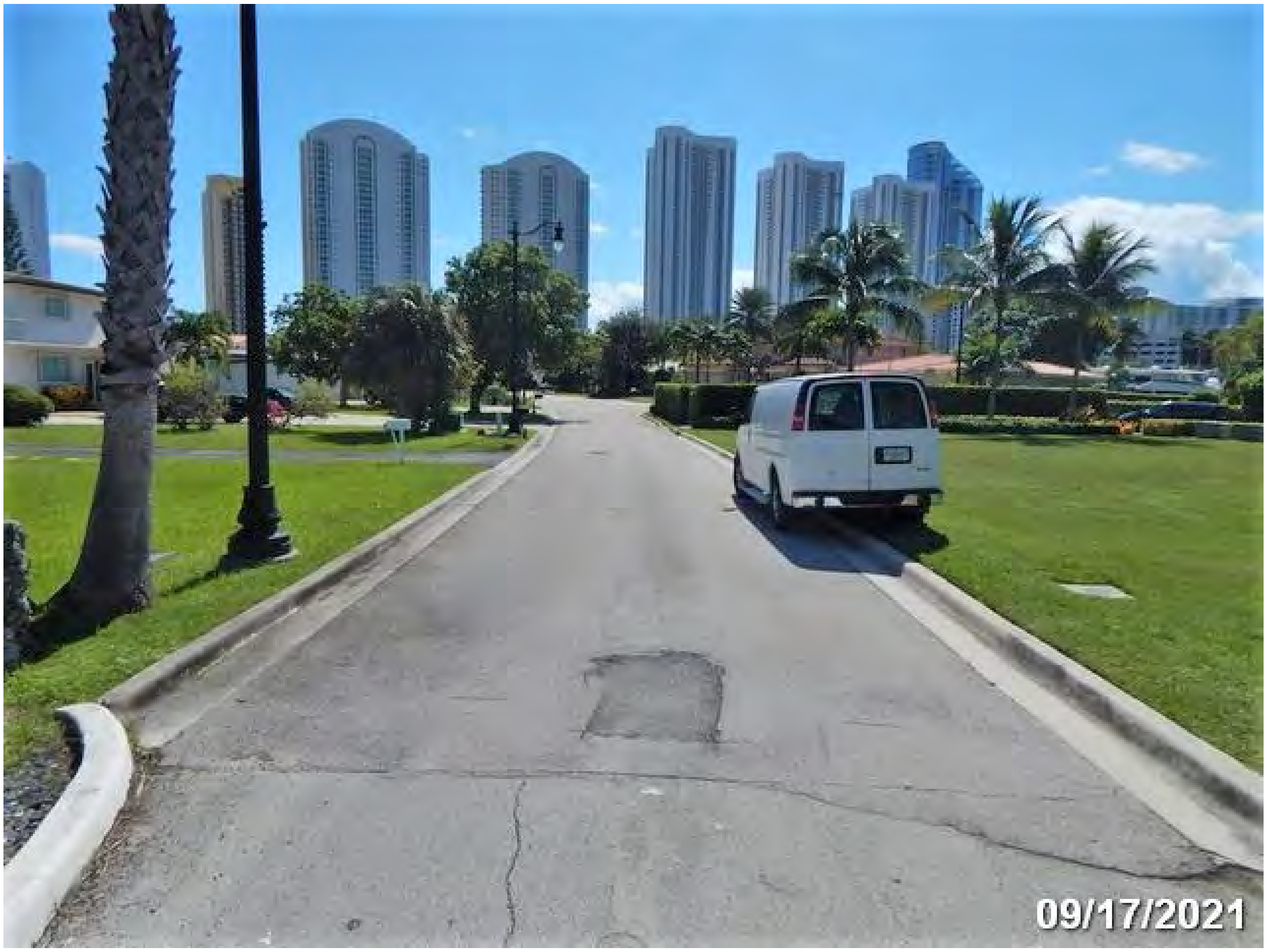
West Approach Looking West - 09/17/2021

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

East Approach Looking West - 09/17/2021

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
STRUCTURE LEVEL INVENTORY REPORT

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**



East Approach Looking East - 09/17/2021

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

North Elevation - 09/17/2021

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

South Elevation - 09/17/2021

Typical Underside - 09/17/2021

BRIDGE ID : 874218 **Structure Inventory Photo Due Date : 09/30/2031**

Channel Looking North - 09/17/2021

Channel Looking South - 09/17/2021

APPENDIX F
Structures Field Review

HNTB Corporation
The HNTB Companies
Infrastructure Solutions

5900 North Andrews Ave.
Suite 400
Ft. Lauderdale, FL 33309

FIELD REVIEW NOTES

Project Name
70078 – D6 Structures 2017

Field Review By
Xavier S. de la Torre, PE
Gerard Nazaire Jr., PE

Bridge
Atlantic Isle Ave. over Ocean Canal
Br. # 874218

Date of Field Review
06/09/20

Description: Bridge No. 874218 is a reinforced concrete arch bridge built in 1925, located in a residential area along Atlantic Isle Avenue in Sunny Isles Beach, Florida (see Figure 1). The bridge carries a single eastbound lane. The bridge is at present, functionally obsolete with a sufficiency rating of 49.8. As shown in Figure 2, the bridge is currently posted for SU Trucks (12 Tons) and C Trucks (21 Tons). Because the bridge façade is covered with a coquina or ooltic limestone rubble quarried in southern Miami-Dade County in the mid nineteenth century, it is historically significant.

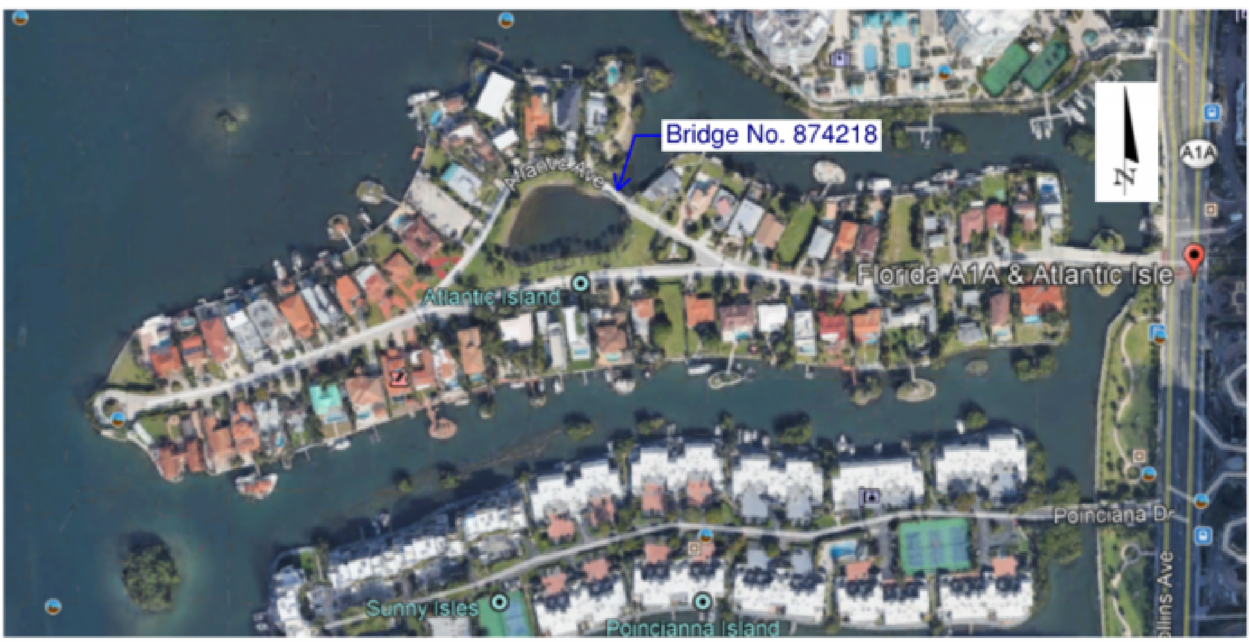


Figure 1 – Bridge Location

Figure 2 – Posted Trucks

The span length of the bridge is approximately 47.5 ft. The bridge overall width is 20 ft. The spandrel walls which also serve as parapets, measure 1.67 ft each. The planter areas on either side of the bridge are 2.75 ft wide each. Both curbs are 8.5-inch wide and the roadway width is 9.75 ft wide. The interior side and top of the parapets, as well as the arch soffit are covered with an irregular stucco finish.

The Vertical Clearance over the waterway is approximately 5.5 ft. The depth of the concrete arch is approximately 1.375 ft at mid span, while the arch depth is approximately 2.5 ft at the abutments. A thin layer of asphalt approximately +/-1.5” thick covers the limerock fill, and serves as the riding surface. The arch lands on concrete abutments, the dimensions of which are not known, with wing walls running parallel to the roadway. A concrete bulkhead wall lines the northeast side of the bridge.

Purpose: A field review was undertaken to verify the location of utilities, confirm site access and staging areas, and to determine if field conditions will impact the proposed alternative designs.

Site Conditions and Field Observations: The site was verified and evaluated before the development of the Preliminary Engineering Report (PER). The results of the field review are outlined on the following pages.

Figure 3: Overall Bridge Deck View – Looking East

Figure 4: Overall Bridge Elevation View – Looking Southwest

Figure 5: Heavy Vegetation – NW corner

Figure 6: Bridge Historic Plaque – SW corner

Figure 7: Bridge Number on Northern Parapet

Figure 8: Utility Pipe (8" Diameter Water PVC) Along Southern Planter

Figure 9: Planter Area – Typical on both Sides of Bridge

Figure 10: Water Valves – SW Corner (1 of 2)

Figure 11: Water Valves – SW Corner (2 of 2)

Figure 12: Electrical Pull Box with Light Pole and its Foundation – NW Corner.

Figure 13: Electrical Pull Box with Light Pole and its Foundation – NE Corner.

Figure 14: Apparent Location of Boring – SW Corner.

Figure 15: Damage to Western Abutment – Looking NE

Figure 16: Coquina Limestone Rubble Attached to End of Parapet – NE Corner (1 of 2)

Figure 17: Coquina Limestone Rubble Attached to End of Parapet – NE Corner (2 of 2)

Figure 18: Cracked Coquina Limestone Rubble Attached to End of Parapet – SE Corner (1 of 2)

Figure 19: Cracked Coquina Limestone Rubble Attached to End of Parapet – SE Corner (2 of 2)

Figure 20: Coquina Limestone Rubble Attached to End of Parapet – NW Corner

Figure 21: Coquina Limestone Rubble Attached to End of Parapet – SW Corner (1 of 2)

Figure 22: Coquina Limestone Rubble Attached to End of Parapet – SW Corner (2 of 2)

Figure 23: Damaged Stucco at Underside of Bridge Covered with Wooden Plank – Looking East

Figure 24: Damaged Stucco at Underside of Bridge Covered with Wooden Plank – Looking West

APPENDIX G
Cost Estimate of the Preferred Alternative

Date: 12/4/2023 1:15:52 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 430029-2-52-01 **Letting Date:** 11/2027

Description: ATLANTIC ISLE AT WEST OF SR A1A (BRIDGE# 874218)

District: 06	**County:** 87 MIAMI-DADE	**Market Area:** 13	**Units:** English
Contract Class: 1	**Lump Sum Project:** Y	**Design/Build:** N	**Project Length:** 0.010 MI

Project Manager: VOGT, VICTORIA

Version 2-P Project Grand Total **$1,504,295.44**

Description: Designer Use. Atlantic Isle Bridge Replacement

Sequence: 1 NUU - New Construction, Undivided, Urban **Net Length:** 0.060 MI 317 LF

Description:

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	50.00 / 50.00
Incidental Clearing and Grubbing Area	0.01
Alignment Number	1
Distance	0.000
Top of Structural Course For Begin Section	105.00
Top of Structural Course For End Section	105.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Front Slope L/R	6 to 1 / 6 to 1
Outside Shoulder Cross Slope L/R	2.00 % / 2.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.01	AC	$77,124.93	$771.25
	Earthwork Component Total				$771.25

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	2
Roadway Pavement Width L/R	12.00 / 12.00
Structural Spread Rate	275
Friction Course Spread Rate	165

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
102-71-15	TEMPORARY BARRIER, F&I, ANCHORED	24.00	LF	$75.00	$1,800.00
102-913-31	REMOVABLE TAPE, YELLOW, SOLID 6"	0.47	GM	$10,072.60	$4,734.12

400-0-11	CONC CLASS NS, GRAVITY WALL	8.00	CY	$1,350.00	$10,800.00
520-1-10	CONCRETE CURB & GUTTER, TYPE F	900.00	LF	$35.00	$31,500.00
520-2-4	CONCRETE CURB, TYPE D	35.00	LF	$35.00	$1,225.00
522-1	CONCRETE SIDEWALK AND DRIVEWAYS, 4"	8.00	SY	$100.00	$800.00
527-2	DETECTABLE WARNINGS	25.00	SF	$45.00	$1,125.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	4
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-1-3	RAISED PAVMT MARK, TYPE B	8.00	EA	$10.00	$80.00
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.48	GM	$1,000.00	$480.00
710-11-131	PAINTED PAVT MARK,STD,WHITE,SKIP, 6"	0.12	GM	$650.00	$78.00
	Roadway Component Total				$52,622.12

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	0.00 / 0.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Sidewalk Width L/R	0.00 / 0.00

Erosion Control

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	2,000.00	LF	$2.12	$4,240.00
104-11	FLOATING TURBIDITY BARRIER	300.00	LF	$14.69	$4,407.00
	Shoulder Component Total				$8,647.00

DRAINAGE COMPONENT

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
425-1-461	INLETS, CURB, TYPE J-6, <10'	1.00	EA	$10,000.00	$10,000.00
425-1-465	INLETS, CURB, TYPE J-6, PARTIAL	1.00	EA	$10,000.00	$10,000.00
	Drainage Component Total				$20,000.00

BRIDGES COMPONENT

Bridge 1

Description	Value

Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	48.00
Width (LF)	36.00
Type	Medium Level
Cost Factor	1.25
Structure No.	
Removal of Existing Structures area	1,200.00
Default Cost per SF	$80.00
Factored Cost per SF	$100.00
Final Cost per SF	**$541.15**
Basic Bridge Cost	**$172,800.00**
Description	ATLANTIC ISLES AT SR A1A

Bridge Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	1,200.00	SF	$45.00	$54,000.00
400-2-10	CONC CLASS II, APPROACH SLABS	80.00	CY	$1,850.00	$148,000.00
415-1-9	REINF STEEL- APPROACH SLABS	14,000.00	LB	$2.25	$31,500.00

Bridge X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
108-1	MONITOR EXISTING STRUCTURES- SETTL	1.00	LS	$4,018.34	$4,018.34
108-2	MONITOR EXISTING STRUCTURES- VIBRA	1.00	LS	$4,057.09	$4,057.09
400-4-4	CONC CLASS IV, SUPERSTRUCTURE	93.00	CY	$1,353.06	$125,834.58
400-4-5	CONC CLASS IV, SUBSTRUCTURE	30.30	CY	$1,915.53	$58,040.56
415-1-4	REINF STEEL- SUPERSTRUCTURE	20,451.00	LB	$2.82	$57,671.82
415-1-5	REINF STEEL- SUBSTRUCTURE	4,089.00	LB	$1.41	$5,765.49
455-88-5	DRILLED SHAFT, 48" DIA	280.00	LF	$812.50	$227,500.00
455-122-5	UNCLASSIFIED SHAFT EXCAVATION, 48" DIA	280.00	LF	$50.75	$14,210.00
455-147-1	THERMAL INTEGRITY TESTING, UP TO 4' SHAF	4.00	EA	$1,635.00	$6,540.00
458-1-11	BRIDGE DECK EXPANSION JNT,NEW,POURED	55.00	LF	$61.83	$3,400.65
521-5-5	CONC TRAF RAIL- BRG, 42" VERT FACE	86.00	LF	$147.20	$12,659.20
521-5-13	CONC TRAF RAIL- BRIDGE, 36" SING SLOPE	86.00	LF	$104.04	$8,947.44

Bridge EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
210-2	LIMEROCK-NEW MATERIAL FOR REWORKING BASE	30.70	CY	$270.00	$8,289.00
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	4.50	TN	$302.67	$1,362.02
337-7-82	ASPHALTIC CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5, PG 76-22	6.40	TN	$392.16	$2,509.82
400-4-11	CONC CLASS IV, RETAINING WALLS	24.80	CY	$1,002.14	$24,853.07
415-1-3	REINFORCING STEEL- RETAINING WALL	1,003.00	LB	$1.33	$1,333.99

415-1-5	REINFORCING STEEL-SUBSTRUCTURE	4,089.00 LB	$1.42	$5,806.38
999	OOLITIC LIMESTONE SURFACING & END TREATMENTS	125.00 CY	$80.00	$10,000.00
	Bridge 1 Total			$989,099.45

Bridge

Description	Value
Estimate Type	SF Estimate
Primary Estimate	YES
Type	Misc/Rehab
Structure No.	
Description	

Bridge Total	$0.00
Bridges Component Total	$989,099.45

Sequence 1 Total	$1,071,139.82

Date: 12/4/2023 1:15:52 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 430029-2-52-01 **Letting Date:** 11/2027

Description: ATLANTIC ISLE AT WEST OF SR A1A (BRIDGE# 874218)

District: 06	**County:** 87 MIAMI-DADE	**Market Area:** 13	**Units:** English
Contract Class: 1	**Lump Sum Project:** Y	**Design/Build:** N	**Project Length:** 0.010 MI

Project Manager: VOGT, VICTORIA

Version 2-P Project Grand Total **$1,504,295.44**

Description: Designer Use. Atlantic Isle Bridge Replacement

Project Sequences Subtotal			**$1,071,139.82**
102-1	Maintenance of Traffic	10.00 %	$107,113.98
101-1	Mobilization	10.00 %	$117,825.38
Project Sequences Total			**$1,296,079.18**
Project Unknowns		15.00 %	$194,411.88
Justification for high %:	Project Unknowns set at 15%		
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$13,804.38	$13,804.38
Project Non-Bid Subtotal					**$13,804.38**

Version 2-P Project Grand Total **$1,504,295.44**