DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207-8915

January 10, 2019

Regulatory Division
West Branch
Fort Myers Permits Section

PUBLIC NOTICE

Permit Application No. SAJ-2014-03670 (IP-KRD)

TO WHOM IT MAY CONCERN: The Jacksonville District of the U.S. Army Corps of Engineers (Corps) has received an application for a Department of the Army permit pursuant to Section 404 of the Clean Water Act (33 U.S.C. §1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403) as described below:

APPLICANT:
Lee County
c/o Ehab Guirguis, P.E.
1500 Monroe Street, 4th Floor
Fort Myers, FL 33901

WATERWAY AND LOCATION: The project would affect waters of the United States associated with San Carlos Bay and Pine Island Sound. The project site is located at Sanibel Causeway Island B in Fort Myers, Section 9, Township 46 South, Range 23 East, Lee County, Florida.

Directions to the site are as follows: From I-75, take County Hwy 840/Alico Rd. west to Tamiami Trail/US-41. Take Tamiami Trail/US 41 north, then turn left onto Gladiolus Dr. /County Hwy 865. Keep left onto Summerlin Road/County Hwy 869 and then stay left on McGregor Blvd/County Hwy 867. This route becomes Sanibel Causeway. The project area is on Island B, the second (westernmost) island along the causeway.

APPROXIMATE CENTRAL COORDINATES: Latitude: 26.467366
Longitude: -82.029982

PROJECT PURPOSE:

Basic: To provide shoreline stabilization and stormwater management improvements.

Overall: To provide shoreline stabilization and improved stormwater management on Sanibel Causeway Island B, Lee County, Florida.

EXISTING CONDITIONS: The wetland system consists of a saltwater system. The shoreline is predominantly un-vegetated, but onsite vegetation consists principally of

sea grape (*Coccoloba uvifera*), Australian pine trees (*Casuarina equisetifolia*), and the occasional white mangrove tree (*Laguncularia racemosa*). The existing area surrounding the project area consists of sandy substrate and extensive offshore seagrass beds. A seagrass survey was completed in June 2017 and will be conducted at least 30-days prior to the start of work, if authorized.

PROPOSED WORK: The applicant seek authorization to conduct shoreline stabilization work along both the San Carlos Bay shoreline and Pine Island Sound shorelines of Sanibel Causeway Island B, in Fort Myers, Lee County, Florida. The proposed work is as follows:

San Carlos Bay Shoreline:

- To repair 200 LF of existing riprap revetment by constructing a riprap overlay at the northeast end of the island.
- To remove an area of existing rock revetment located between groins G1 to just southeast of G7.
- To construct nine (9) new T-head groins totaling 16,553 square feet (0.38-acre).
- To construct two (2) new segmented breakwaters totaling 520 square feet (0.01-acre).
- To add a 4 linear foot (LF) extension existing terminal groin located at the southeast end of the island, and
- To place approximately 5,000 cubic yards (CY) of sand on the San Carlos Bay shoreline between groin G1 and the southeastern terminus of the island.

Pine Island Sound Shoreline:

- To construct two (2) terminal groins, 20 LF at the southwest end of the island adjacent to the bridge abutment and 98 LF at the northwest end of the island adjacent to the bridge abutment.
- To extend one (1) stormwater outfall culvert using a 40 LF groin structure, and
- To place approximately 3,700 CY of sand on the Pine Island Sound shoreline between the two proposed terminal groins. All coastal structures will be rubble mound construction using limestone.

Stormwater Management Improvements:
To incorporate stormwater management practices to reduce the volume of runoff from existing impervious areas that flows across and erodes the beach including:

- The repair of one (1) existing stormwater outfall on the Pine Island Sound shoreline, approximately 330 feet southwest of the end of the northwest bridge abutment.
- To construct five (5) new pile and crib stormwater outfalls, including two crossing the San Carlos Bay shoreline at Breakwater #3 and 570 feet west of Breakwater #3, and three crossing the Pine Island Sound shoreline at approximately 800

feet, 1,415 feet, and 1,835 feet southwest of the northwest terminal groin, respectively.

Overall, the project will result in the discharge 14,500 CY of fill material below the plane of the mean high water line (MHWL) from 0-3 feet MLLW and over approximately 4.8-acres of non-vegetated subaqueous bottom. The channelward limits of all the construction has been designed to avoid impacts to all existing seagrass beds and other special aquatic sites within the project area. A detailed project description, as provided by the applicant, has been attached to this public notice along with the proposed project plans.

AVOIDANCE AND MINIMIZATION INFORMATION – The applicant has provided the following information in support of efforts to avoid and/or minimize impacts to the aquatic environment:

The project has been designed to avoid impacts to all adjacent seagrass beds by keeping all construction landward of the delineated seagrass areas. During construction, silt curtains will be utilized to control turbidity and protect seagrass. The project will be constructed using land-based equipment, and all project construction will adhere to the Standard Manatee Conditions for In-Water Work (FWC, 2011) and Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006).

COMPENSATORY MITIGATION – The applicant has provided the following explanation why compensatory mitigation should not be required:

The project has been specifically designed to avoid impacts to seagrass and other special aquatic sites. Therefore, no compensatory mitigation should be required.

CULTURAL RESOURCES:

The Corps has determined the permit area has been extensively modified by previous work and there is little likelihood a historic property may be affected.

ENDANGERED SPECIES:

1) Loggerhead sea turtle (*Caretta caretta)*
Green sea turtle (*Chelonia mydas)*
Leatherback sea turtle (*Dermochelys coriacea)*
Kemp's ridley sea turtle (*Lepidochelys kempii)*
Hawksbill sea turtle (*Eretmochelys imbricata*)
West Indian (Florida) manatee (*Trichechus manatus latirostris*)
Piping plover (*Charadrius melodus)*
Rufa red knot (*Calidris canutus*)

The Corps has determined that the proposed project will result in a “may affect, but is not likely to adversely affect” determination for the species listed immediately above. The Corps will request initiation of informal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to Section 7 of the Endangered Species Act by separate letter.

2) Smalltooth sawfish (*Pristis pectinata*) and its designated critical habitat
Loggerhead sea turtle (*Caretta caretta)*
Green sea turtle (*Chelonia mydas)*
Leatherback sea turtle (*Dermochelys coriacea)*
Kemp's ridley sea turtle (*Lepidochelys kempii)*
Hawksbill sea turtle (*Eretmochelys imbricata*)

The Corps has determined that the proposed project will result in a “may affect, but is not likely to adversely affect” determination for the smalltooth sawfish and swimming sea turtle species listed immediately above, and “is not likely to adversely modify” smalltooth sawfish critical habitat. The Corps will request initiation of informal consultation with National Marine Fisheries Service pursuant to Section 7 of the Endangered Species Act by separate letter.

ESSENTIAL FISH HABITAT (EFH): This notice initiates consultation with the National Marine Fisheries Service on EFH as required by the Magnuson-Stevens Fishery Conservation and Management Act 1996. The proposal would impact approximately 4.8 acres of water column and non-vegetated subaqueous bottom utilized by various life stages of shrimp, reef fish, red drum, spiny lobster, and coastal migratory/pelagic fish. This project has been designed to avoid impacts to nearshore submerged aquatic vegetation (seagrass). Our initial determination is that the proposed action would not have a substantial adverse impact on EFH or federally managed fisheries in the Gulf of Mexico. Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the National Marine Fisheries Service.

NOTE: This public notice is being issued based on information furnished by the applicant. This information has not been verified or evaluated to ensure compliance with laws and regulation governing the regulatory program. The jurisdictional line has not been verified by Corps personnel to date.

AUTHORIZATION FROM OTHER AGENCIES: Water Quality Certification may be required from the Florida Department of Environmental Protection and/or one of the state Water Management Districts.

COMMENTS regarding the potential authorization of the work proposed should be submitted in writing to the attention of the District Engineer through the Fort Myers Permits Section, 1520 Royal Palm Square Blvd, Fort Myers, FL 33919 or preferably by email to Katy.R.Damico@usace.army.mil within 30 days from the date of this notice.

The decision whether to issue or deny this permit application will be based on the information received from this public notice and the evaluation of the probable impact to the associated wetlands. This is based on an analysis of the applicant's avoidance and minimization efforts for the project, as well as the compensatory mitigation proposed.

QUESTIONS concerning this application should be directed to the project manager, Katy Damico, in writing by U.S. Mail at the Fort Myers Permits Section, 1520 Royal Palm Square Blvd, Fort Myers, Florida 33919; by electronic mail at Katy.R.Damico@usace.army.mil; or, by telephone at (813) 769-7076.

IMPACT ON NATURAL RESOURCES: Coordination with U.S. Fish and Wildlife Service, Environmental Protection Agency (EPA), the National Marine Fisheries Services, and other Federal, State, and local agencies, environmental groups, and concerned citizens generally yields pertinent environmental information that is instrumental in determining the impact the proposed action will have on the natural resources of the area.

EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including cumulative impacts thereof; among these are conservation, economics, esthetics, general environmental concerns, wetlands, historical properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food, and fiber production, mineral needs, considerations of property ownership, and in general, the needs and welfare of the people. Evaluation of the impact of the activity on the public interest will also include application of the guidelines promulgated by the Administrator, EPA, under authority of Section 404(b) of the Clean Water Act or the criteria established under authority of Section 102(a) of the Marine Protection Research and Sanctuaries Act of 1972. A permit will be granted unless its issuance is found to be contrary to the public interest.

The US Army Corps of Engineers (Corps) is soliciting comments from the public; Federal, State, and local agencies and officials; Indian Tribes; and other Interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps to determine whether to issue, modify, condition, or deny a permit for this proposal. To make this determination, comments are used to assess impacts to endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above.

Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

COASTAL ZONE MANAGEMENT CONSISTENCY: In Florida, the State approval constitutes compliance with the approved Coastal Zone Management Plan. In Puerto Rico, a Coastal Zone Management Consistency Concurrence is required from the Puerto Rico Planning Board. In the Virgin Islands, the Department of Planning and Natural Resources permit constitutes compliance with the Coastal Zone Management Plan.

REQUEST FOR PUBLIC HEARING: Any person may request a public hearing. The request must be submitted in writing to the District Engineer within the designated comment period of the notice and must state the specific reasons for requesting the public hearing.

Attachment No. 1

Project Description

Attachment No. 1
Project Description

This information provides general project information in support of Lee County's Environmental Department of the Army (DA) permit application for the Sanibel Causeway Shoreline Stabilization Project.

A. Project Location and Site History

The Sanibel Causeway is located in Lee County and connects the mainland to Sanibel Island in Fort Myers. It is the only road access from the mainland to the islands of Sanibel and Captiva. There are two islands along the causeway, Island A to the east and Island B to the west. This project will be constructed on Island B, and will include improvements to both sides of the causeway, on the shorelines of San Carlos Bay and Pine Island Sound.

The Sanibel Causeway was created in the 1960's in order to provide continuous access to the island of Sanibel from mainland Ft. Myers. Prior to that time, a ferry service was in operation. The causeway was created by a dredge and fill operation with sediment dredged from Pine Island sound and deposited on both Island A and B. The original dredge areas are visible in most aerial photographs. The land is technically owned by the State of Florida (TIITF) and the County holds a "dedication" from the State to create and maintain the islands for purposes of supporting the road.

In recent years the Sanibel Causeway parks on Islands A and B have evolved to be a destination for passive recreation. This includes beach users, wind surfers, kayakers, stand-up paddle boarders, and fishermen. There are no commercial operations on the island, the park is off limits to motorized vessels, and the project is not located in the vicinity of a navigation channel, so there is no anticipated impact on navigation.

B. Project Purpose and Goals

The Sanibel Causeway Shoreline Stabilization Project was designed with four goals:

1. Provide erosion control against expected waves, and currents.
2. Increase the amount of recreational access to the shorelines.
3. Avoid impacts to benthic habitats.
4. Overall project cost must fall within the County's budget.

Of the four goals, the avoidance of impacts to benthic habitats was the primary factor in the resulting design. Details on how the project was designed to address all four provided below in Section I - Basis of Shoreline Stabilization Design.

C. Proposed Activity

The proposed Sanibel Causeway Shoreline Stabilization aims to stabilize the shoreline and improve stormwater management while avoiding impacts to the adjacent seagrass habitats and preserving the recreational uses by the public. The proposed project includes the construction of T-head groins and onshore breakwaters with sand placement on the San Carlos Bay shoreline, terminal groins with sand placement on the Pine Island Sound shoreline, and stormwater improvements within the park areas. The structures are short and terminate in less than approximately 4 feet of water depth. One existing storm water outfall on the Pine Island Sound shoreline will be repaired and four new outfalls will be installed, with two constructed on each shoreline. The outfalls will only extend out to approximately MLW and will maintain at least a 10 ft buffer from seagrass beds. Proposed structures are detailed on Project Plans, provided as Attachment No. 2.

D. Construction Methodology, Equipment, and Materials

Construction will take place only during daylight hours and all construction will occur from upland areas. In order to protect nearshore seagrass beds and due to shallow water depths, no work will occur from barges. The shoreline protection work will be constructed using a land based equipment (Figure 1)

including: (a) an excavator, or equivalent, (b) a loader may be on site to transport rock, and (c) a small bulldozer may be utilized to grade the new beach sand. Some contractors may elect to install a temporary cofferdam around the coastal structures work areas. This potential methodology is included in the permit application.

Figure 1. Examples of equipment to be used for project construction.

Materials to be used during project construction include:

- Recycled limestone riprap from the San Carlos revetment will be used as foundation materials.
- Armor stone, limestone boulders, 145 p.c.f., nominally 1200 pounds from upland quarries.
- Geotextile fabric for foundation construction (to be specified at a later date).
- E.R. Jahna's Ortona Sand mine, "Wellpoint Sand", or equal. This is coarse, no silt sand (gradations are provided below in Section I - Basis of Shoreline Stabilization Design).
- Bedford Technologies, recycled plastic lumber with fiberglass or nylon reinforcement will be used for stormwater pipe cradles. Construction will utilize 316 stainless steel hardware.

E. Seagrass Resources, Listed Species, and Critical Habitat

There are extensive seagrass beds that extend both into San Carlos Bay and Pine Island Sound. In support of project design and planning, a seagrass survey was conducted in June 2017 to characterize the seagrass resources along both shorelines of the Sanibel Causeway Island B. This survey was coordinated with South Florida Water Management District (SFWMD) (personal communication, Laura Layman, 2017) and NMFS Habitat Conservation Division (HCD) (personal communication, Mark Sramek and David Rydene, 2017). Results of the 2017 survey and 2012 - 2016 aerial delineations are provided with this permit application as Attachment No. 3b. Pre-application coordination with NMFS HCD (personal communication, Mark Sramek and David Rydene, 2018) confirmed that this seagrass survey is sufficient for project permitting, but NMFS requested that Lee County conduct a pre-construction seagrass survey at least 30 days prior to project construction to update the location of nearshore seagrass.

The project area provides potential habitat to several listed species. While Island B is not monitored regularly for sea turtle nesting, historical data from the Florida Fish and Wildlife Commission (FWC) indicates that between 1979-2017 loggerhead sea turtle (*Caretta caretta*) nesting occurred in the proposed project area. Recently, hatchlings and non-nesting emergences (false crawls) have been observed (personal communication, E. Haverfield, Turtle Time, Inc., 2018). There are no occurrences of green, leatherback, hawksbill, or Kemp's ridley sea turtles nesting in the proposed area. The project area is not located in loggerhead critical habitat. Red knots (*Calidris canutus rufa*) have occasionally been observed on Island B and piping plovers (*Charadrius melodus*) have been observed on nearby Sanibel Causeway Island A (eBird, 2018). The waters around the project area provide habitat for the West Indian manatee (*Trichechus manatus*) and smalltooth sawfish (*Pristis pectinata*) and fall within designated smalltooth sawfish critical habitat. The physical and biological features essential to the conservation smalltooth sawfish, which provide nursery area functions include red mangroves and shallow euryhaline habitats characterized by water depths between MHW and 3 ft (0.9 m) measured at Mean Lower Low Water (MLLW). While the project will be constructed in shallow water depths less than 3 ft MLW, the project will only modify sandy or armored shoreline. No red mangroves will be removed or impacted as part of this project, minimizing potential impacts to smalltooth sawfish and its critical habitat.

F. Avoidance and Minimization Measures

The Sanibel Causeway Shoreline Stabilization Project has been specifically designed to avoid impacts to seagrass. Wherever proposed structures are located adjacent to seagrass, their length has been reduced and a ten (10) foot buffer has been included in the design to protect seagrass from project impacts. Per guidance from NMFS Habitat Conservation Division (personal communication, Mark Sramek, 2018), Lee County will collect a pre-construction seagrass survey at least 30 days prior to project construction to update the location of nearshore seagrass and make any adjustments necessary to maintain the 10 ft buffer during construction of the groins. The stormwater improvement component of the project will also improve the management of stormwater runoff from Island B by increasing percolation and reducing uncontrolled sheet flows. The outfalls will only extend out to MLW and will maintain at least a 10 ft buffer from seagrass beds. During construction, turbidity curtains will be installed and staked as necessary at locations landward of the seagrass beds to prevent sedimentation on the seagrass resources. All construction will take place from land, with no equipment placed on or over seagrass.

Construction will occur during daylight hours only in accordance with Lee County ordinances. If construction takes place during summer months, daily surveys may be conducted to ensure no sea turtle or shorebird nesting has occurred in the project area. The project will be constructed using land-based equipment, and all project construction will adhere to the Standard Manatee Conditions for In-Water Work (FWC, 2011) and Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006).

G. Water Quality and Turbidity Control Measures

Sanibel Causeway Island B is located in Class II waters for Shellfish Propagation or Harvesting according to FDEP Surface Water Class Boundaries. In order to control turbidity a silt curtain will be installed surrounding all active work zones. The silt curtain will extend to the bottom and be secured to shore and will be placed landward of all seagrass beds. Any quarried limestone utilized will be washed, as needed, to control the release of limestone dust, prior to installation. Due to the slow speeds of construction, clean materials, and installation of turbidity curtains, there should be no need to monitor for compliance with state water quality standards.

H. Construction Schedule

Lee County plans to begin project construction around January 2020 and complete the project by September 2020. This schedule requires receipt of all permits in reasonable time frames.

I. Basis of Shoreline Stabilization Design

This section provides details on how the Sanibel Causeway Shoreline Stabilization Project was designed to address all four of Lee County's project goals:

1. Provide erosion control against expected waves, and currents.
2. Increase the amount of recreational access to the shorelines.
3. Avoid impacts to benthic habitats.
4. Overall project cost must fall within the County's budget.

All proposed structures are shown and labeled in Attachment No. 2 - Project Plans

<u>San Carlos Bay Shoreline</u>
On the San Carlos Bay shoreline, the existing rock revetment (Figure 2) is going to be partially removed in order to increase the recreational space (Goal 2). In areas where the revetment is removed, T-head groins or onshore breakwaters will be constructed, and/or sand placement will occur. The structure type, location, spacing and dimensions and volumes of sand have all been determined based on the presence of nearshore seagrass so that the project will avoid any impacts to seagrass resources (Goal 3).

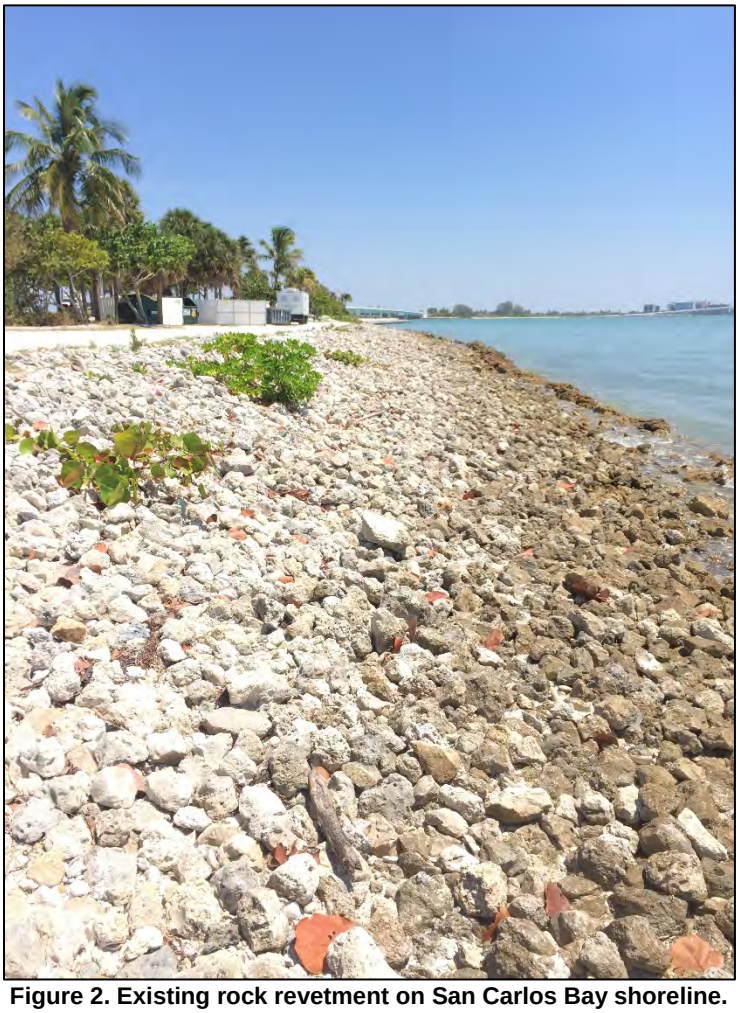


Figure 2. Existing rock revetment on San Carlos Bay shoreline.

The resulting shorelines require structural stabilization in the form of a series of T-head groins to limit the wave impact to the shoreline and the resulting sediment transport alongshore (Goal 1). The length of groins G5 through G9, and specifically the location of the waterward toe of the T-head, were dictated by the location of the adjacent seagrass bed. In order to avoid seagrass impacts, a ten (10) foot offset from the seagrass bed was maintained as a construction tolerance, potential scour zone, and safety factor. With the seagrass beds dictating the overall length of groins G5 through G9, the head length and spacing were directly specified (Hardaway and Gunn, 2010).

Groins G1 through G4 are not directly landward of a seagrass bed, but were designed with limiting the depth of water at the waterward toe of the structure and thus limiting the volume of rock required (Goal 4). The resulting groin length and spacing was slightly greater than for groins G5 through G9. From these overall dimensions of groins G1 through G4, the effects of protecting the seagrasses on the groin G5 through G9 design is seen in reduced dimensions and a slightly less economical design.

Breakwaters 1 and 3 are similar to T-head groins and assist in controlling the shoreline position as the shoreline transitions from a structure controlled shoreline to an unstructured shoreline. The “groin” stems are not present, leaving only the breakwater heads, and the spacing has been increased. Moving the breakwaters onshore actually diminishes their effectiveness as they can restrict the transport of smaller quantities of sand. The location of the beach relative to the adjacent seagrass bed is checked in these locations as well.

The remaining 150 feet of rock revetment on the north end of the shoreline is not located in proximity to recreational amenities and is best reinforced with additional stone of appropriate weight.

Sand placement along the shoreline is limited in volume to avoid cross shore adjustment and impacts to adjacent seagrass beds. Sand specified for use is E.R. Jahna's Ortona Sand Mine, "Wellpoint" sand. This sand is coarse (approximately 0.72 mm) and is the largest sand that is commercially available in the proximity of the project without special ordering. The coarseness of the sand and the limited volume will prevent beach profile equilibration into the adjacent seagrass beds (Goal 3). Gradations of the "Wellpoint" sand are provided below as Figures 3 and 4.

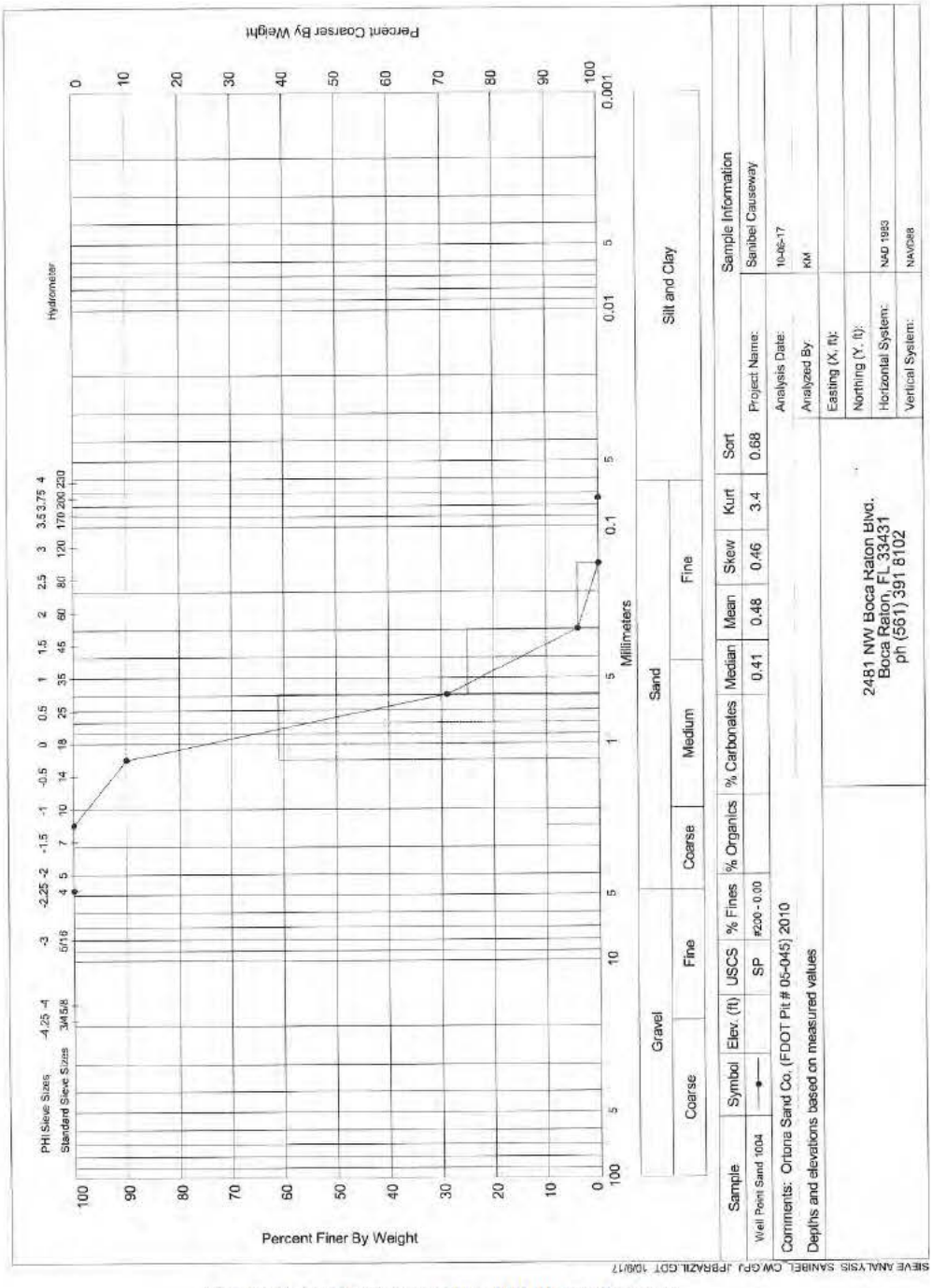


Figure 3. Gradations of the "Wellpoint" sand

Granularmetric Report

Depths and elevations based on measured values

Project Name: Sanibel Causeway
Sample Name: Well Point Sand 1004
Analysis Date: 10-06-17
Analyzed By: KM

2481 NW Boca Raton Blvd.
Boca Raton, FL 33431
ph (561) 391 8102

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
		Florida State Plane West	

USCS:	Munsell:	Comments:
SP		Ortona Sand Co. (FDOT Pit # 05-045) 2010

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.00	100.00	0.00	0.00	#200 - 0.00			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
4	-2.25	4.76	0.00	0.00	0.00	0.00
8	-1.25	2.38	0.00	0.00	0.00	0.00
16	-0.25	1.19	10.00	10.00	10.00	10.00
30	0.75	0.59	61.00	61.00	71.00	71.00
50	1.75	0.30	25.00	25.00	96.00	96.00
100	2.75	0.15	4.00	4.00	100.00	100.00
200	3.75	0.07	0.00	0.00	100.00	100.00

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.71	1.27	0.91	0.41	0.00	-0.15	-1.25

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.48	0.72	0.68	0.46	3.4

GRANULARMETRIC REPORT SANIBEL_CW.GPJ JPBRAZIL.GDT 10/6/17

Figure 4. Granularmetric Report for the "Wellpoint" sand.

Pine Island Shoreline

Sand losses from the Pine Island shoreline is primarily from end losses, particularly from the northwest end of the island. A relict revetment is in place at the northwest end of the island (Figure 5).

Figure 5. Relict revetment on the Pine Island shoreline.

The existing revetment will be excavated, the rock sorted by size, and then replaced as a terminal groin which requires additional armor stone. The terminal groin length will allow a stable fillet of sand to form on the northwest end of the island, increase recreational beach space (Goal 2), while limiting sand losses (Goal 1). There is no seagrass bed in the vicinity of the waterward end of the terminal groin, so no impacts are expected (Goal 3).

There is an existing stormwater outfall 300 feet from the north end of the island (Figure 6). This outfall provides secondary discharge to the existing stormwater basin for the adjacent bridge. The outfall is flush with the beach face. This causes sand to build up in the outfall pipe thus diminishing its effectiveness, and scours the beach face when overflows occur. It is proposed to extend the outfall pipe into Pine Island sound by 40 feet and stabilize the pipe with a rock groin structure. There is no seagrass in the vicinity of the proposed work. The groin will also control sand movements to the northwest (Goal 1). Three additional stormwater outfalls are planned to address excess stormwater captured by the new system. These will be stabilized with an open pile and crib framework.

Figure 6. Existing stormwater outfall on the Pine Island shoreline.

At the southwest end of the shoreline, there is limited sand losses from the beach. The existing rocks will be excavated, sorted by size and then replaced as a short 20 foot long groin. The groin length will not impact adjacent seagrass beds (Goal 3), while controlling sand losses (Goal 1).

Sand placement along the shoreline is limited in volume to avoid cross shore adjustment and impacts to adjacent seagrass beds. Sand specified for use is E.R. Jahna's Ortona Sand Mine, "Wellpoint" sand. This sand is coarse (approximately 0.72 mm) and is the largest sand that is commercially available in the proximity of the project without special ordering (Figures 4 and 5, above). The coarseness of the sand and the limited volume will prevent beach profile equilibration into the adjacent seagrass beds (Goal 3).

J. Public Interest Factors

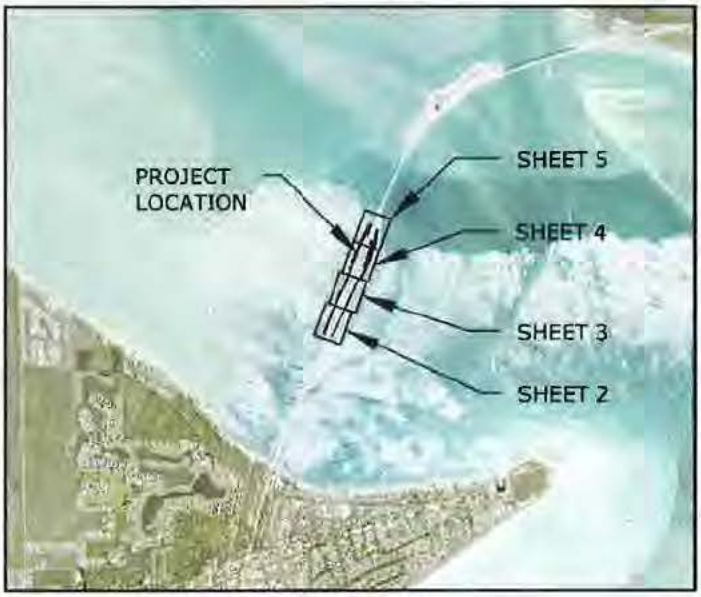
Table 1 provides a summary of public interest factors, indicating those that are relevant to the Sanibel Causeway Shoreline Stabilization Project and those that are not applicable.

Table 1. Summary of public interest factors

Public Interest Factors	Effects					
	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
1. Conservation: *The project will maintain the habitats on the island and in nearshore waters for continued use by wildlife.*	X					
2. Economics: *N/A*						X
3. Aesthetics: *Project has been designed to keep Island B shorelines both stabilized and attractive to the public.*					X	
4. General Environmental Concerns: *Seagrass resources (EFH) will be protected, no mangroves are present, and construction will employ standard conditions to protect wildlife in the area.*	X					

Public Interest Factors	Effects					
	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
5. Wetlands: *Project has been designed to avoid impacts to seagrass, and silt curtains will be used during construction to avoid turbidity impacts to seagrass.*	X					
6. Historic Properties: *Island B is manmade, no historic resources exist within its limits. No structural creation will extend waterward of the footprint of the original island.*						X
7. Fish and Wildlife Values: *Sandy beach areas will be enhanced and expanded. Seagrass beds are being preserved. No impacts to wildlife using the beaches or nearshore zone are anticipated.*	X					
8. Flood Hazards: *N/A, the project will improve stormwater management but is not specifically designed to address flooding.*						X
9. Floodplain Values: *N/A*						X
10. Land Use: *This project will not change the current land use of Island B.*	X					
11. Navigation: *The closest navigation channel is 2,000 ft from the project area. Island B is a destination for passive recreation, including wind surfing kayaking, stand-up paddle boarding, and fishing. There are no commercial operations on the island and the park is off limits to motorized vessels. Land based construction is proposed.*	X					
12. Shoreline Erosion and Accretion: *The project has been designed to stabilize the shoreline and address chronic erosion.*					X	
13. Recreation: *The project is designed to preserve the recreational use of Island B by the public.*					X	
14. Water Supply and Conservation: *N/A*						X
15. Water Quality: *Silt curtains will be used during construction and will be placed landward of all seagrass beds. Any quarried limestone utilized will be washed, as needed, to control the release of limestone dust, prior to installation*.	X					
16. Energy Needs: *N/A*						X
17. Safety: *The project will maintain safe access to the water for public recreational use.*	X					
18. Food and Fiber Production: *N/A*						X
19. Mineral Needs: *N/A*						X
20. Consideration of Property Ownership: *Lee County (the permittee) owns Island B.*						X
21. Needs and Welfare of the People: *The beaches will be stabilized, which will prevent steep erosional scarps. The shoreline will be cleaned of relict structural debris. The existing revetment will be mostly removed. Stormwater will be better managed.*	X					

SANIBEL CAUSEWAY
SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA



LOCATION MAP
SCALE 1" = 5000'

INDEX TO SHEETS

NOTES:

1. PROFILE TOPOGRAPHIC AND HYDROGRAPHIC SURVEY CONDUCTED 6/12/2017 TO 6/16/2017.
2. THE COORDINATES ARE IN FEET BASED ON THE VERTICAL AND HORIZONTAL DATA THAT WAS COLLECTED AND PRESENTED RELATIVE TO NORTH AMERICAN VERTICAL DATUM OF 2188 (NAVD 88) AND THE FLORIDA STATE PLANE COORDINATE SYSTEM BASED ON THE TRANSVERSE MERCATOR PROJECTION, WEST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83).
3. VERTICAL MEASUREMENTS BASED ON, BUT NOT LIMITED TO, 12-83-A17 N 763686.19 E 641432.12 ELEVATION 3.13' AND 12-83-A15 MK1 N 761915.52 E 638540.62 ELEVATION 4.76'.
4. DATE OF AERIAL PHOTOGRAPHY: OCTOBER 10, 2016.
5. ALL CONSTRUCTION WORK WILL OCCUR FROM UPLAND AREAS.
6. ALL WORK OCCURS IN CLASS II WATER.

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

DOUGLAS W. MANN P.E. NO. 44046 — DATE

REVISIONS		
DATE	BY	DESCRIPTION

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
COVER SHEET

Aptim Environmental & Infrastructure, Inc.
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #637
www.aptim.com

DATE: 8/13/18
BY: GK
COMM NO.: 6312145522
SHEET: 1 OF 21

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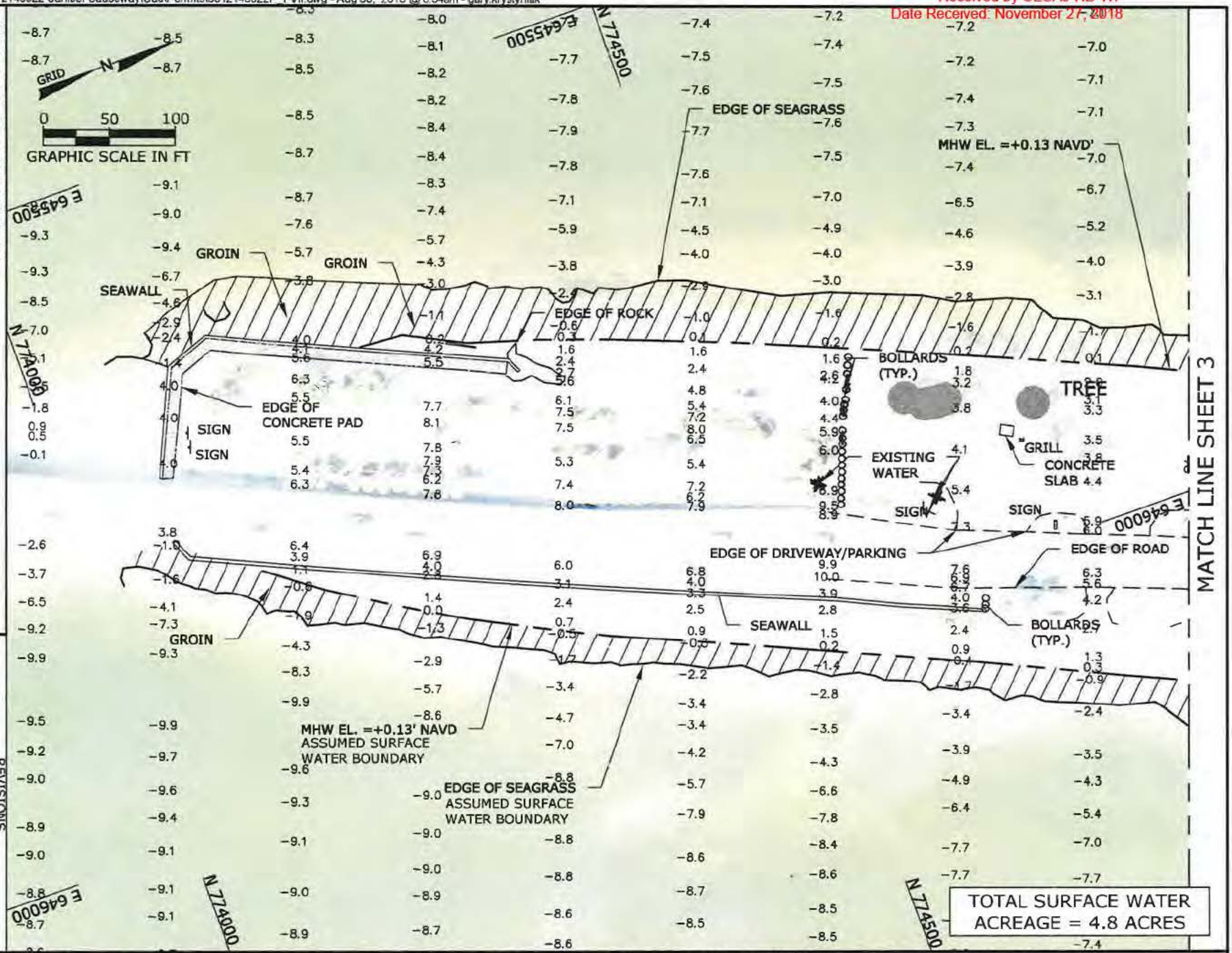

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DOUGLAS W. MANN P.E. NO. 44046

DATE

DATE	BY	REVISIONS DESCRIPTION

SHEET:	2 OF 21
COMM NO.:	6312145522
BY:	GK
DATE:	8/13/18

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TITLE:

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
EXISTING CONDITIONS PLAN VIEW

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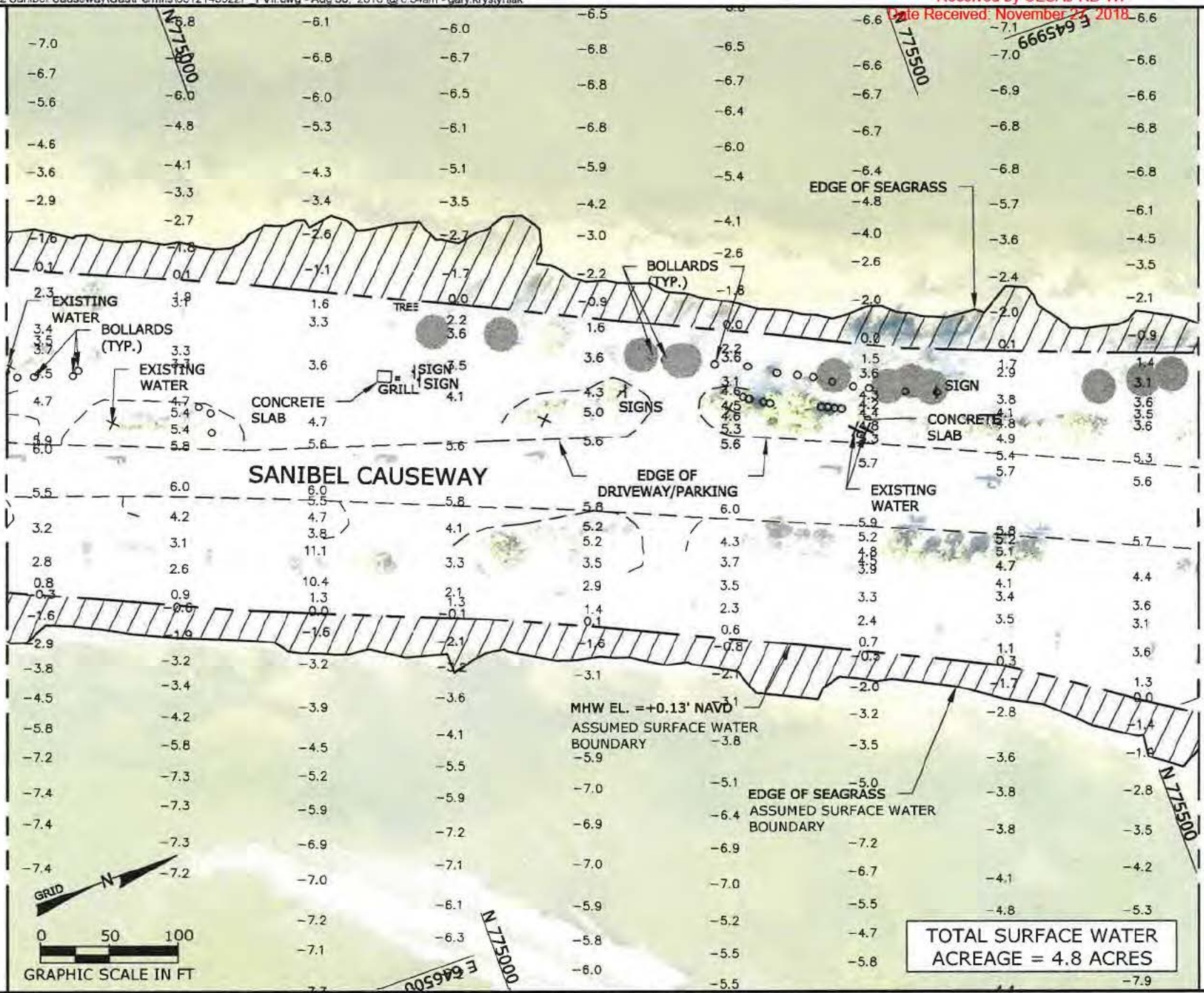

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DATE:	8/13/18
BY:	GK
COMM NO.:	6312145522
SHEET:	3 OF 21

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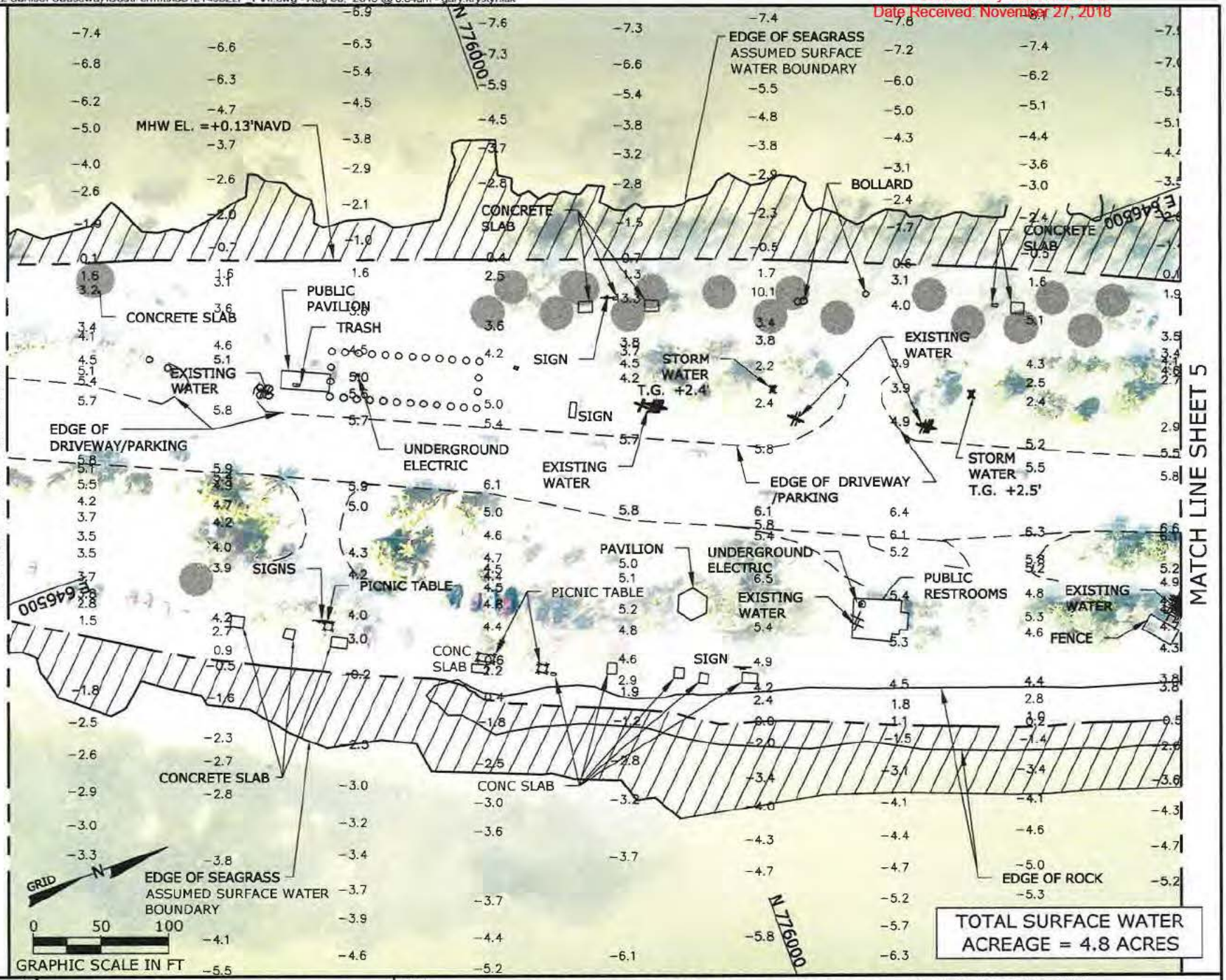
TITLE:

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
EXISTING CONDITIONS PLAN VIEW



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DESCRIPTION	BY	DATE

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DATE: 8/13/18
COMM NO.: 6312145522
SHEET: 4 OF 21

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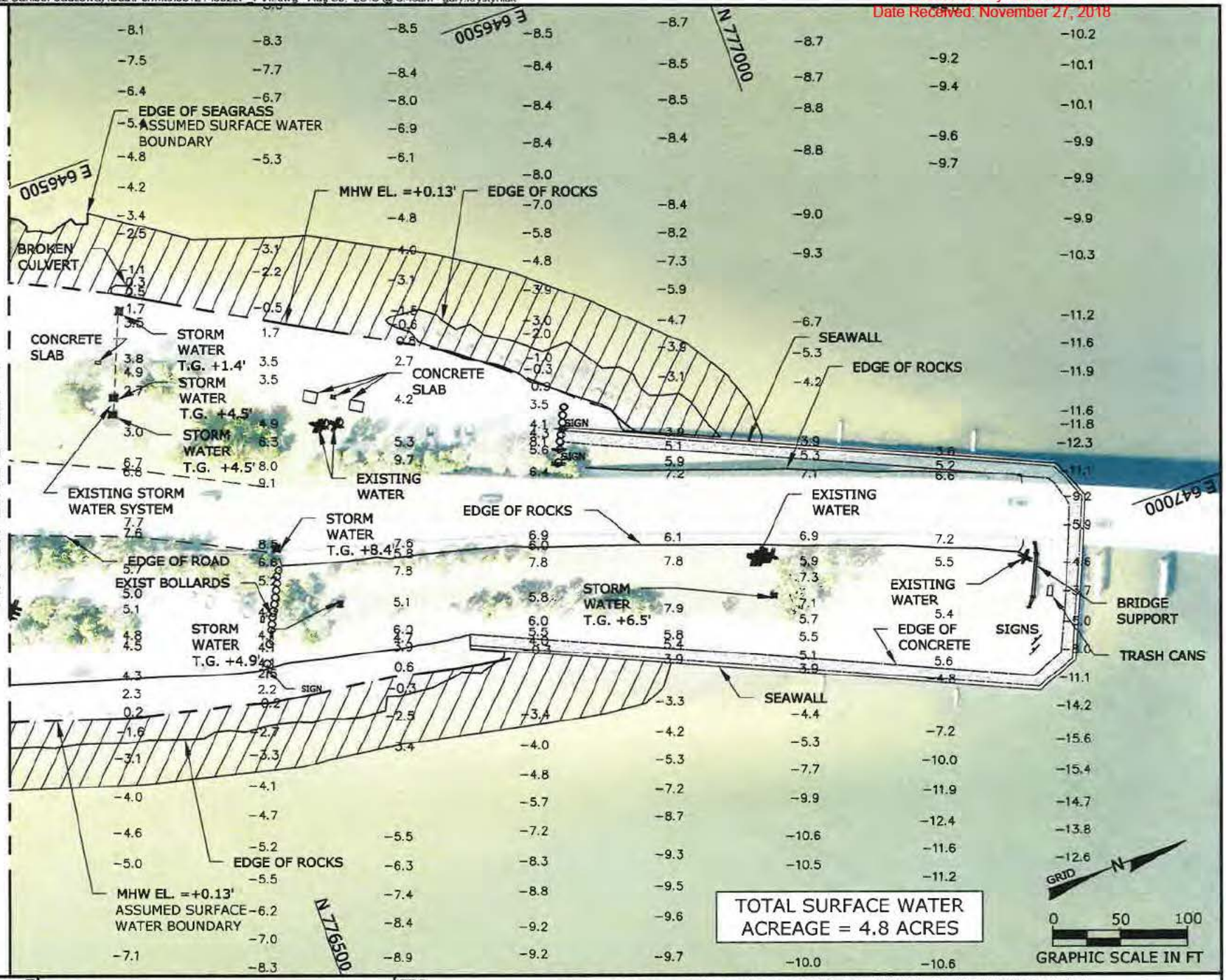
LEE COUNTY, FLORIDA
EXISTING CONDITIONS PLAN VIEW



MATCH LINE SHEET 4

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DATE

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DESCRIPTION	BY	DATE

BY: GK
DATE: 8/13/18
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SHEET: 5 OF 21

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TITLE:

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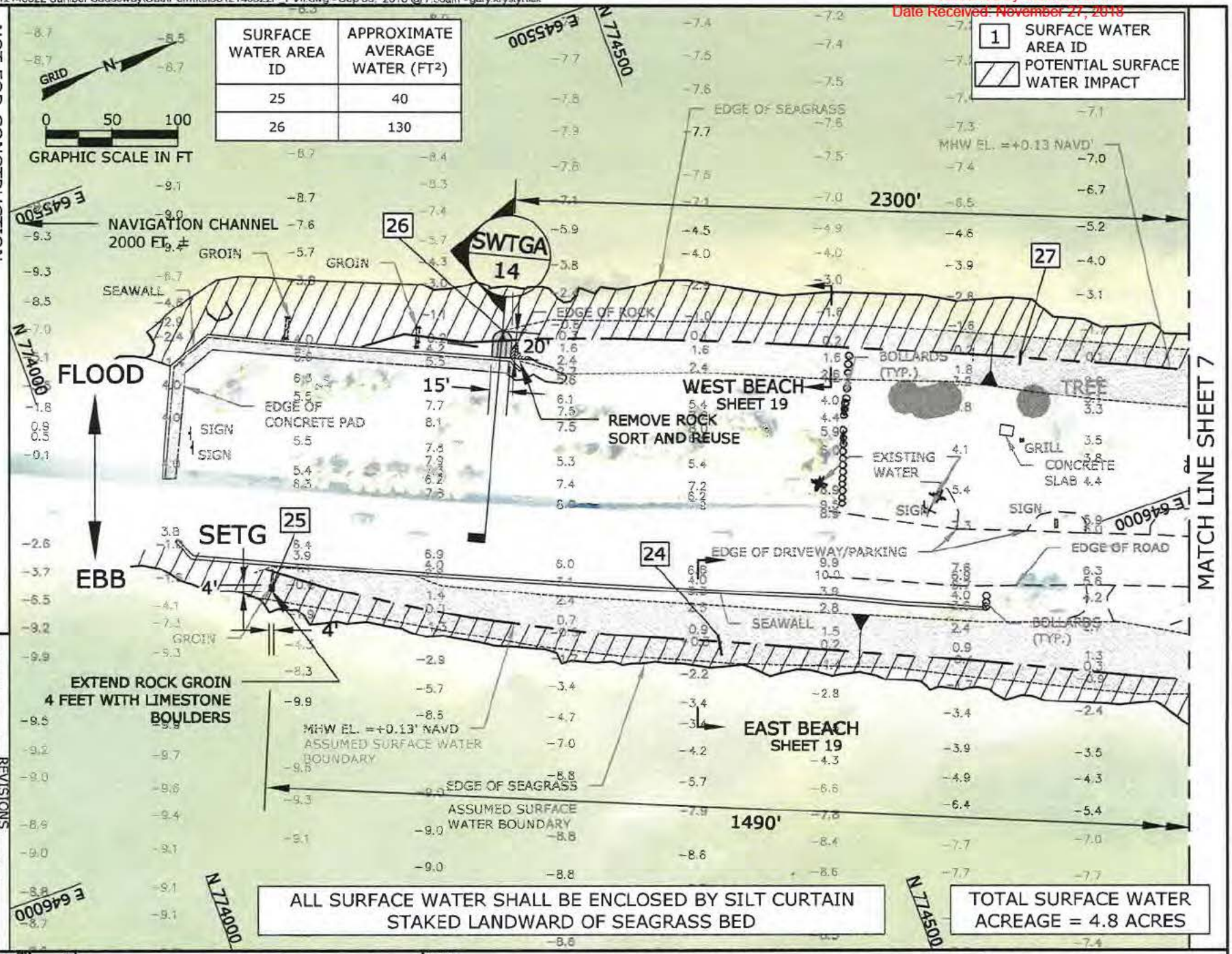
LEE COUNTY, FLORIDA
EXISTING CONDITIONS PLAN VIEW



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DOUGLAS W. MANN P.E. NO. 44046

DATE

DATE	BY	REVISIONS DESCRIPTION

SHEET: 6 OF 21
COMM NO.: 6312145522
BY: GK
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TITLE:

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
SHORELINE STABILIZATION PLAN VIEW

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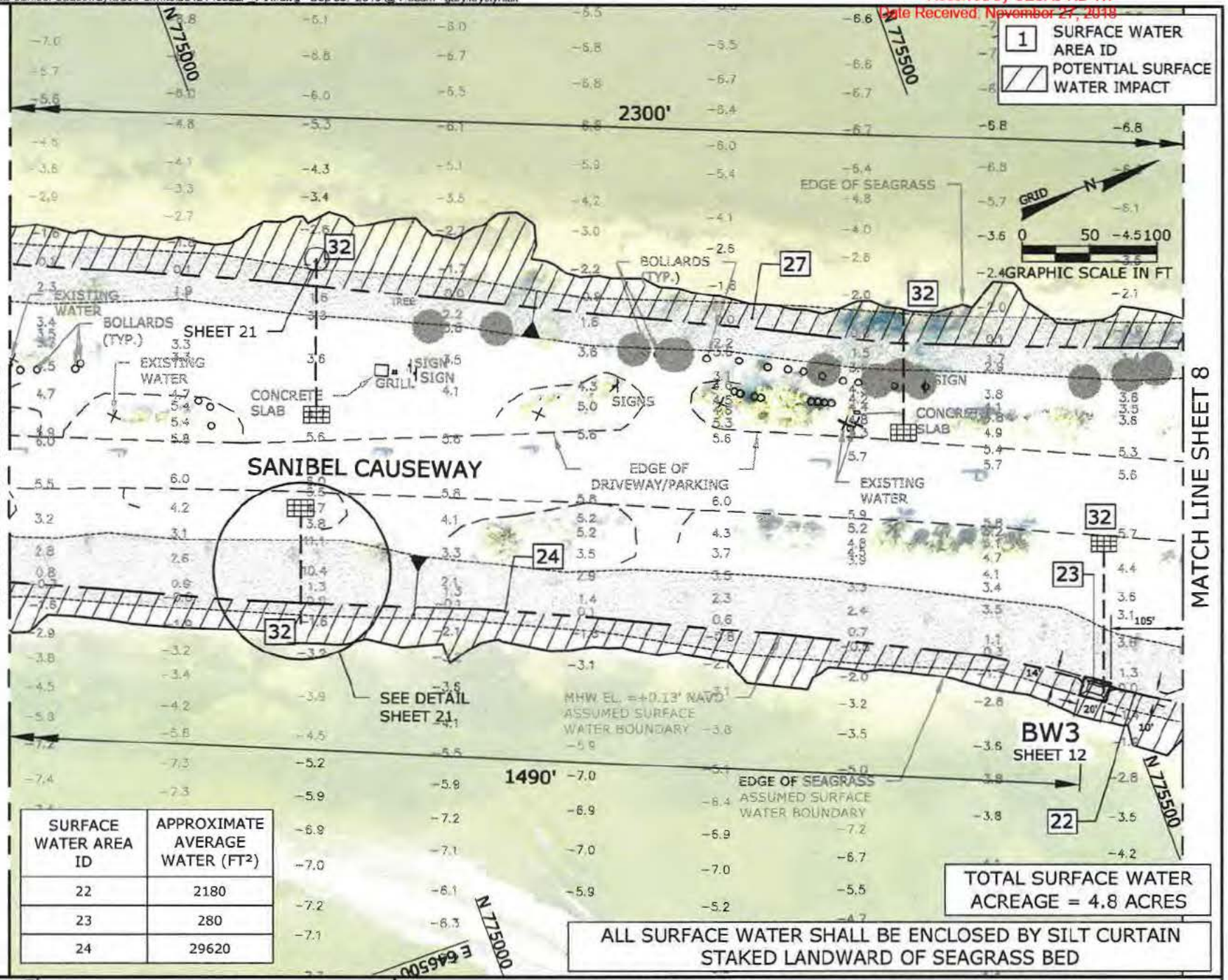

SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)
22	2180
23	280
24	29620

TOTAL SURFACE WATER ACREAGE = 4.8 ACRES

ALL SURFACE WATER SHALL BE ENCLOSED BY SILT CURTAIN STAKED LANDWARD OF SEAGRASS BED

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DOUGLAS W. MANN P.E. NO. 44046

DATE

DATE	BY	REVISIONS DESCRIPTION

SHEET: 7 OF 21
COMM NO.: 6312145522
BY: GK
DATE: 8/13/18

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SHORELINE STABILIZATION PLAN VIEW

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SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)	SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)	SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)	SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)	SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)
6	3920	10	7840	14	3480	18	2610	27	45740
7	3050	11	3480	15	870	19	870	32	440
8	4360	12		16	3050	20			
9	3050	13	870	17	870	21	1310		

1 SURFACE WATER AREA ID
POTENTIAL SURFACE WATER IMPACT

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DOUGLAS W. MANN P.E. NO. 44046

DATE

MATCH LINE SHEET 7

MATCH LINE SHEET 9

CONCRETE SLAB
PUBLIC PAVILION
TRASH
2300'
SIGN
DRY RETENTION
SIGN
EXISTING WATER
STORM WATER T.G. +2.4'
EDGE OF DRIVEWAY/PARKING
UNDERGROUND ELECTRIC
EXISTING WATER
EDGE OF DRIVEWAY /PARKING
STORM WATER T.G. +2.5'
BOLLARD
UTILIZE EXISTING PARKING AREA TO SORT EXCAVATED REVETMENT STONE (700' X 30' (TYP.)
REVETMENT REMOVAL 45' (TYP.)
REVETMENT REMOVAL BELOW MHW 23' (TYP.)
PAVILION
PUBLIC RESTROOMS
EXISTING WATER
EXISTING FENCE
SIGNS
PICNIC TABLE
BW1
G9
CONCRETE SLAB
DETAIL BWA
SHEET 12
G8
G7
DETAIL TGC
DETAIL TGB
SHEET 11
G6
SHEET 11
G5
G4
G3
DETAIL TGA
SHEET 10
EDGE OF SEAGRASS ASSUMED SURFACE WATER BOUNDARY
EDGE OF ROCK
REMOVE ALL EXISTING STONE, SORT STONE, REUSE IN PROPOSED STRUCTURES
GRID N
0 50 100
GRAPHIC SCALE IN FT

ALL SURFACE WATER SHALL BE ENCLOSED BY SILT CURTAIN STAKED LANDWARD OF SEAGRASS BED

TOTAL SURFACE WATER ACREAGE = 4.8 ACRES

DATE	BY	REVISIONS DESCRIPTION

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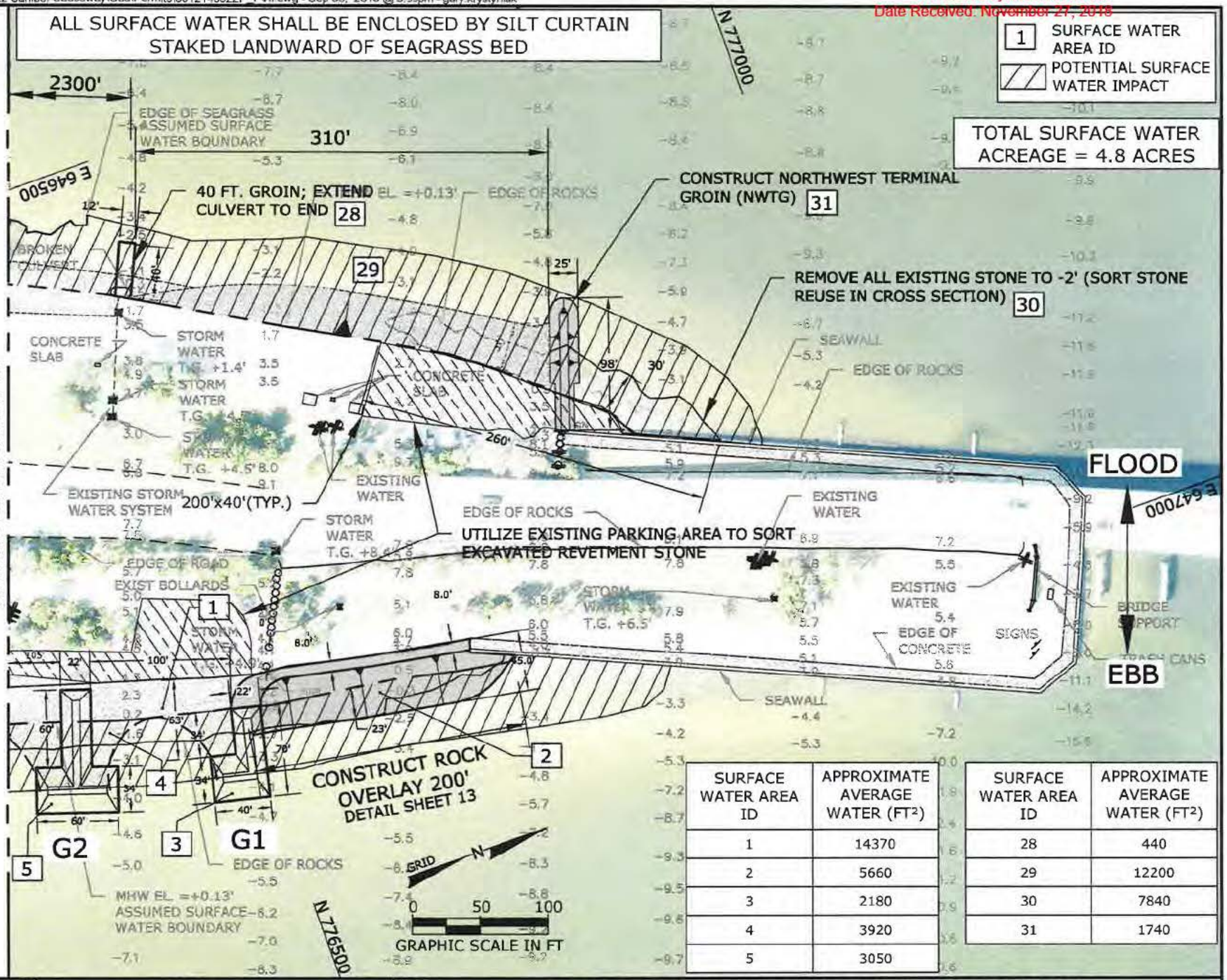
TITLE:
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
SHORE LINE STABILIZATION PLAN VIEW

DATE:	BY:	COMM NO.:	SHEET:
8/13/18	GK	6312145522	8 OF 21



SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)
1	14370
2	5660
3	2180
4	3920
5	3050

SURFACE WATER AREA ID	APPROXIMATE AVERAGE WATER (FT²)
28	440
29	12200
30	7840
31	1740

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DOUGLAS W. MANN P.E. NO. 44046

DATE

REVISIONS

DESCRIPTION	BY	DATE

BY: GK
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COMM NO.: 6312145522
SHEET: 9 OF 21

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TITLE:

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
SHORELINE STABILIZATION PLAN VIEW

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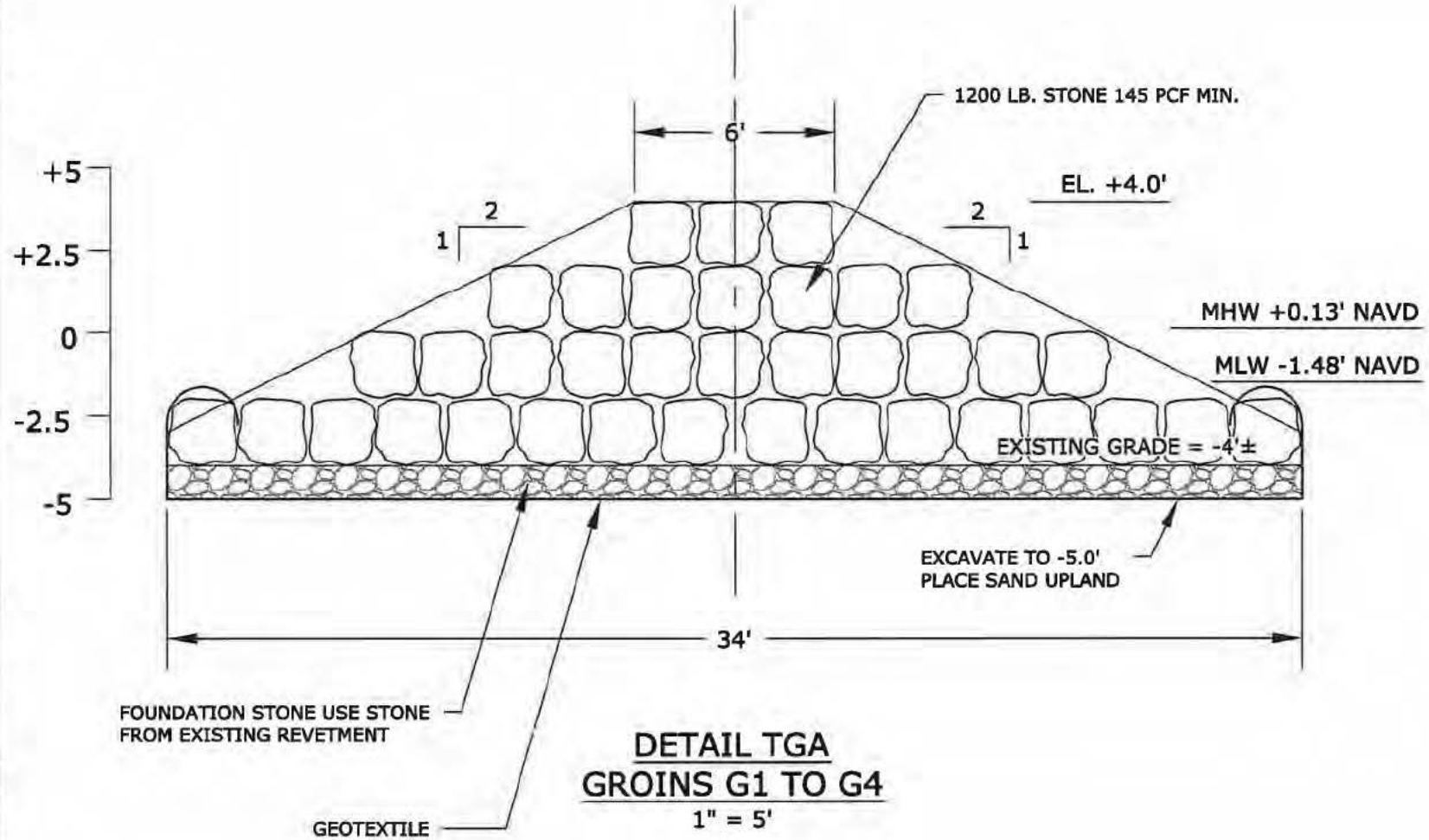

DETAIL TGA
GROINS G1 TO G4
1" = 5'

REVISIONS		
DESCRIPTION	BY	DATE

BY: GK
DATE: 8/13/18
COMM NO.: 6312145522
SHEET: 10 OF 21

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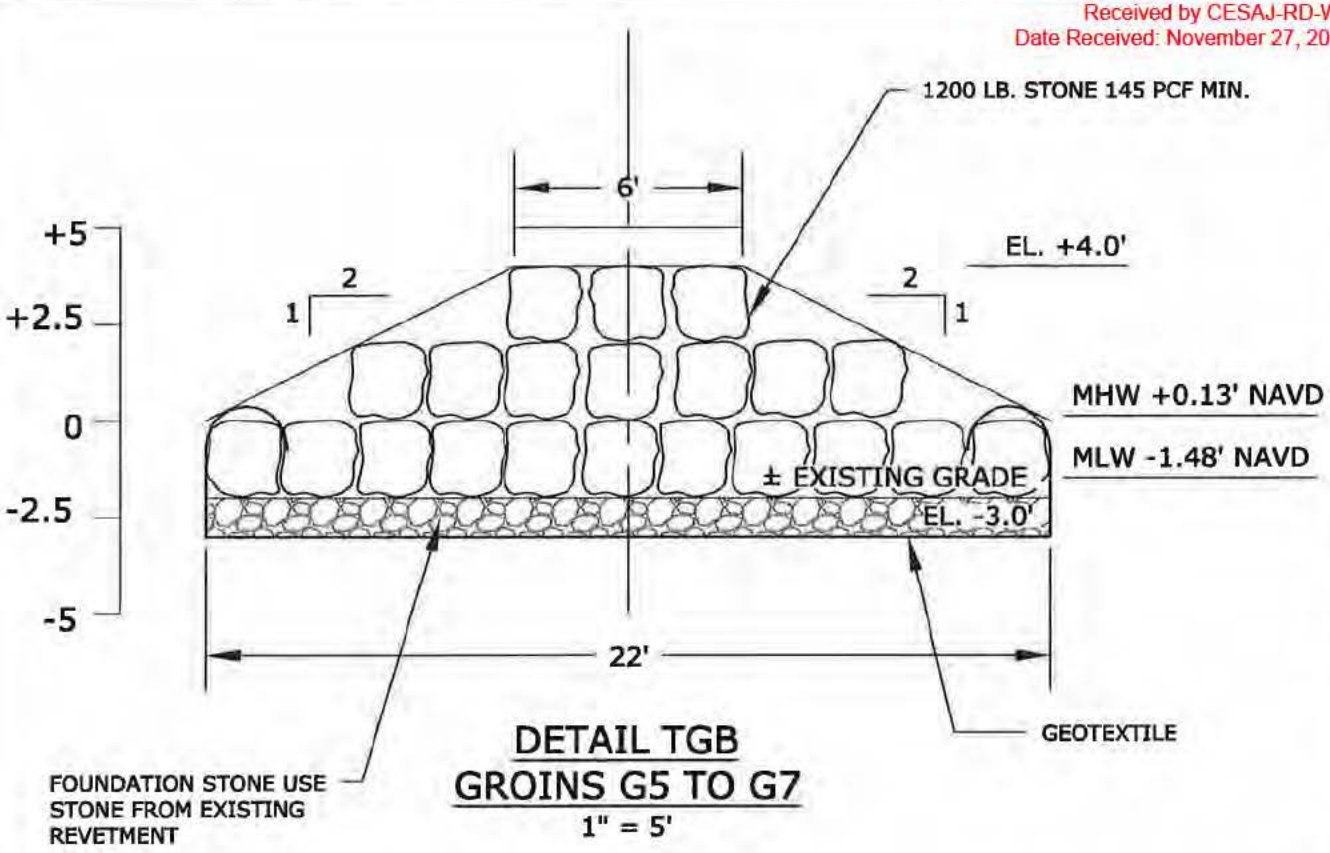
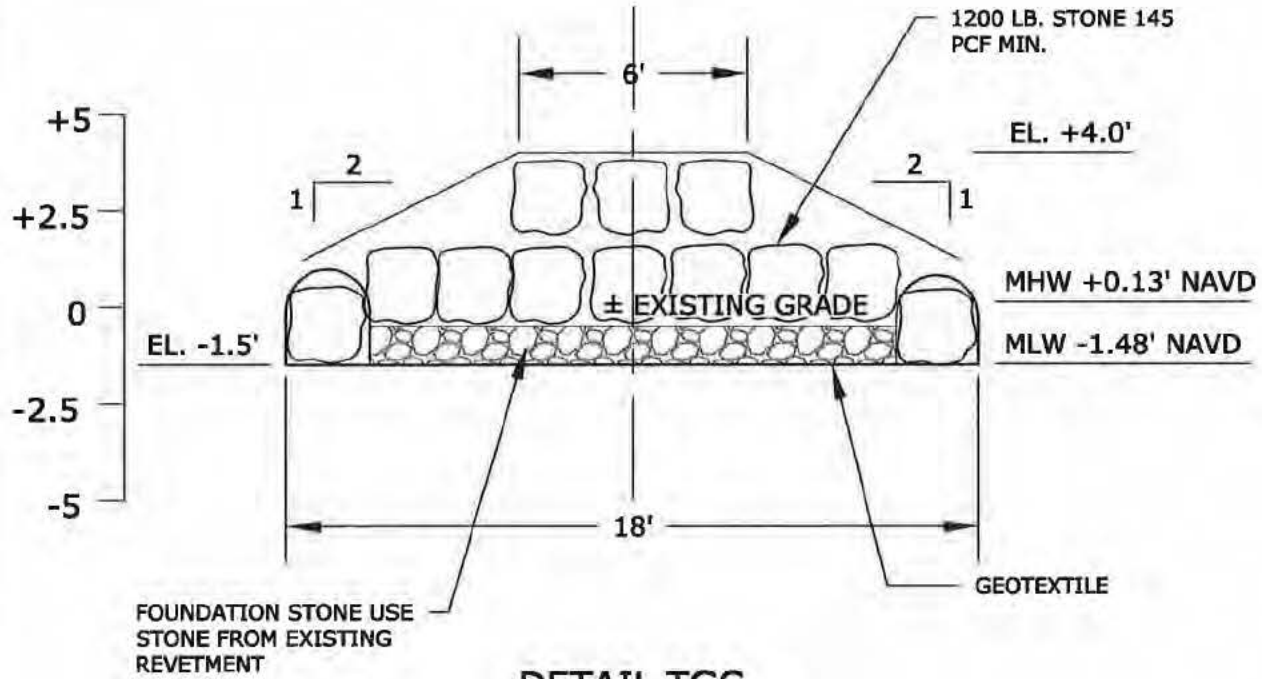
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
GROIN DETAILS



DETAIL TGB
GROINS G5 TO G7
1" = 5'



DETAIL TGC
GROINS G8 & G9
1" = 5'

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
GROIN DETAILS

Aptim Environmental & Infrastructure, Inc.
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DATE: 8/13/18
GK
COMM NO.: 6312145522
SHEET: 11 OF 21

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DOUGLAS W. MANN P.E. NO. 44046 DATE

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DATE	BY	DESCRIPTION

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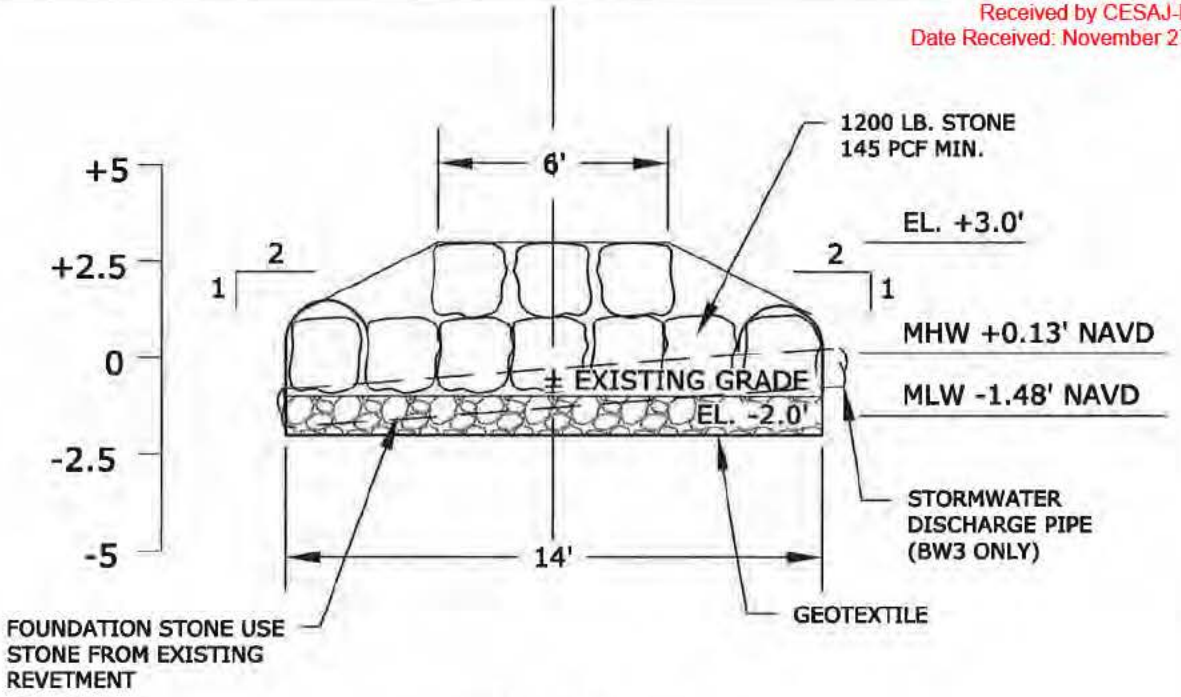

DETAIL BWA
BREAKWATERS BW1 & BW3

1" = 5'

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
BREAKWATER DETAIL

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DATE: 8/13/18

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COMM NO.: 6312145522

SHEET: 12 OF 21

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DOUGLAS W. MANN P.E. NO. 44046 DATE

REVISIONS		
DATE	BY	DESCRIPTION

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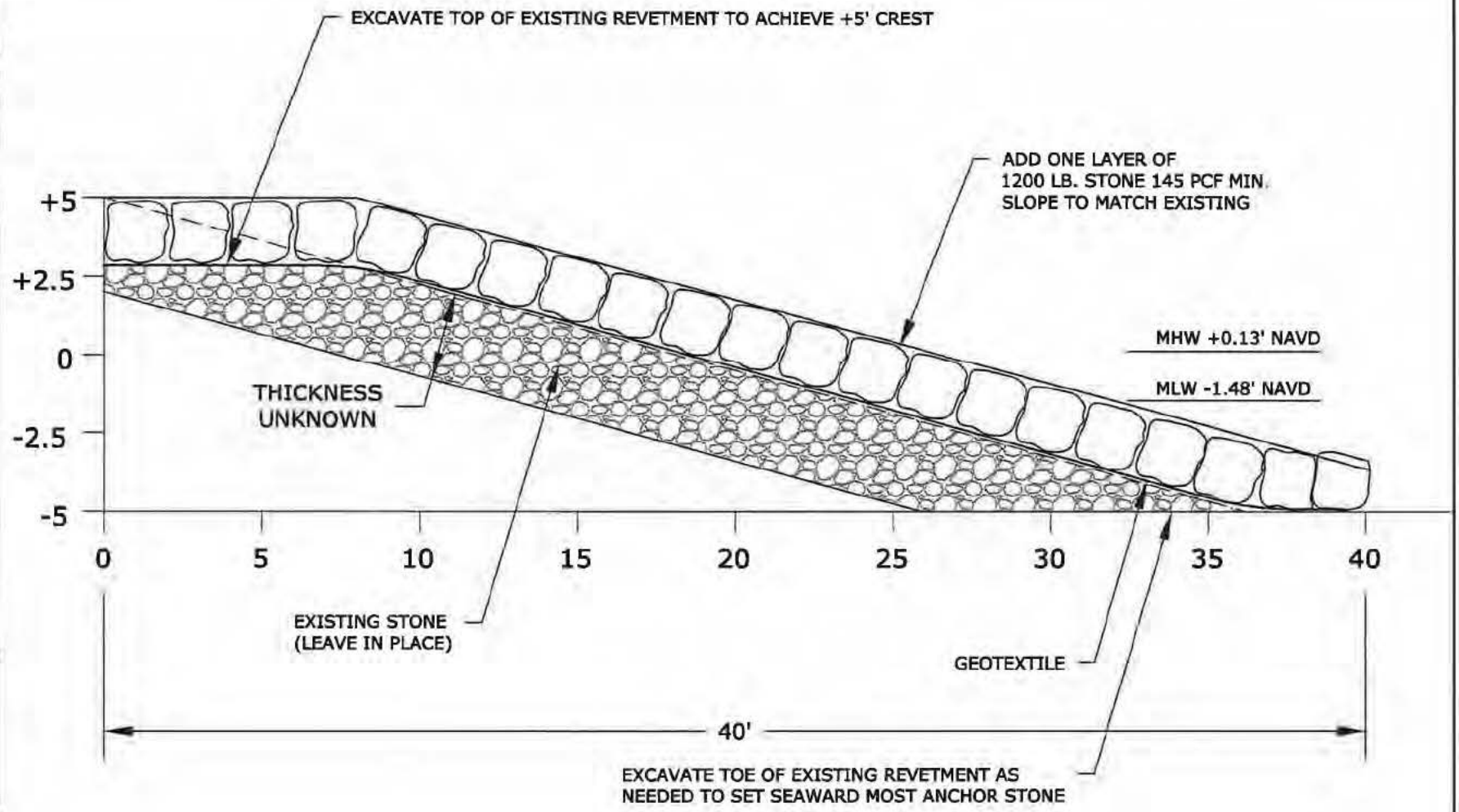

TYPICAL REVETMENT OVELAY

1" = 5'

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DOUGLAS W. MANN P.E. NO. 44046

DATE

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SHEET: 13 OF 21

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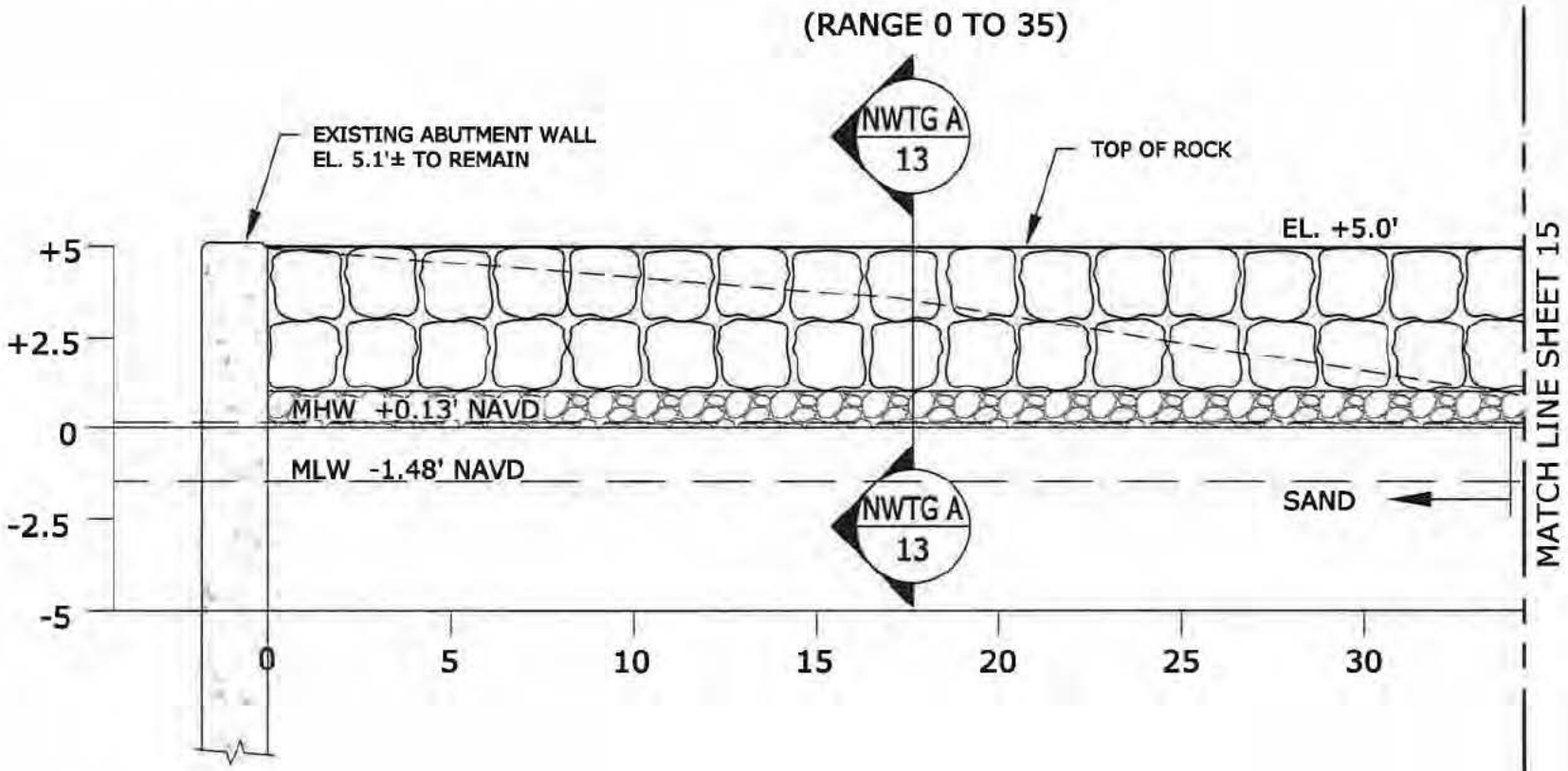
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
REVETMENT OVERLAY PROFILE VIEW



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COMM NO.: 6312145522
SHEET: 14 OF 21

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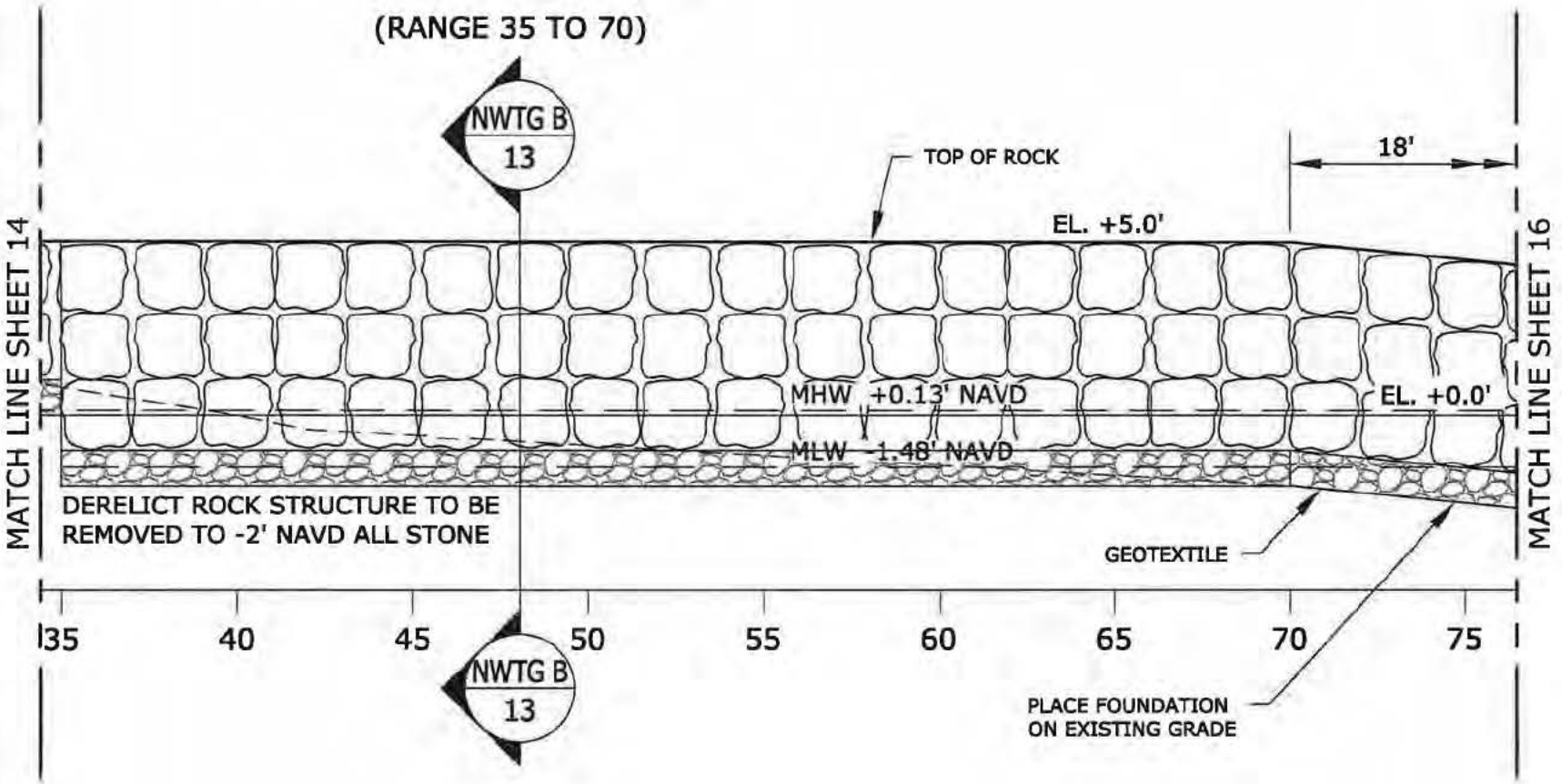
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
NORTHWEST TERMINAL GROIN LONGITUDINAL SECTION

NOT FOR CONSTRUCTION
FOR REGULATORY REVIEW ONLY

DOUGLAS W. MANN P.E. NO. 44046

DATE



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DATE: 8/13/18
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SHEET: 15 OF 21

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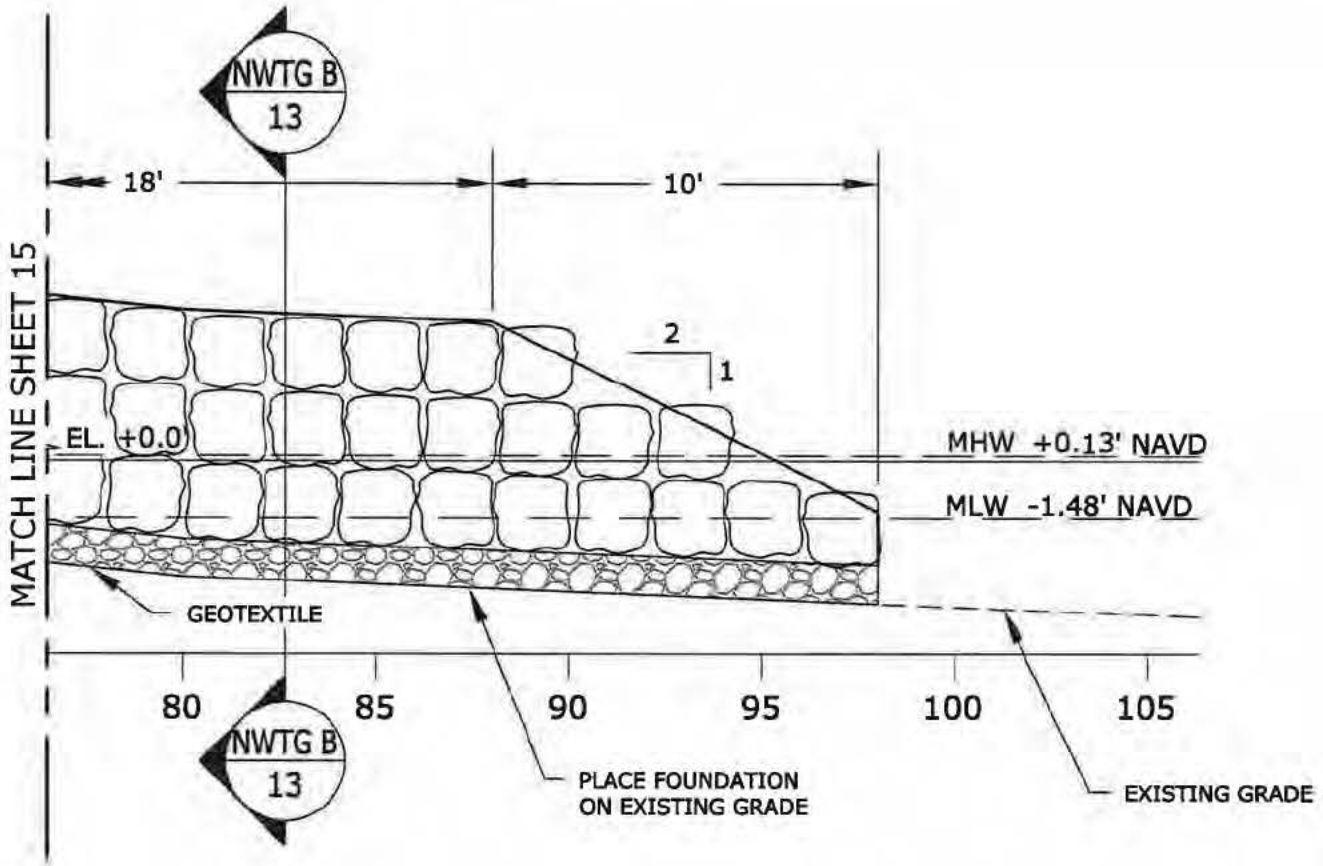
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
NORTHWEST TERMINAL GROIN LONGITUDINAL SECTION



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SHEET: 16 OF 21

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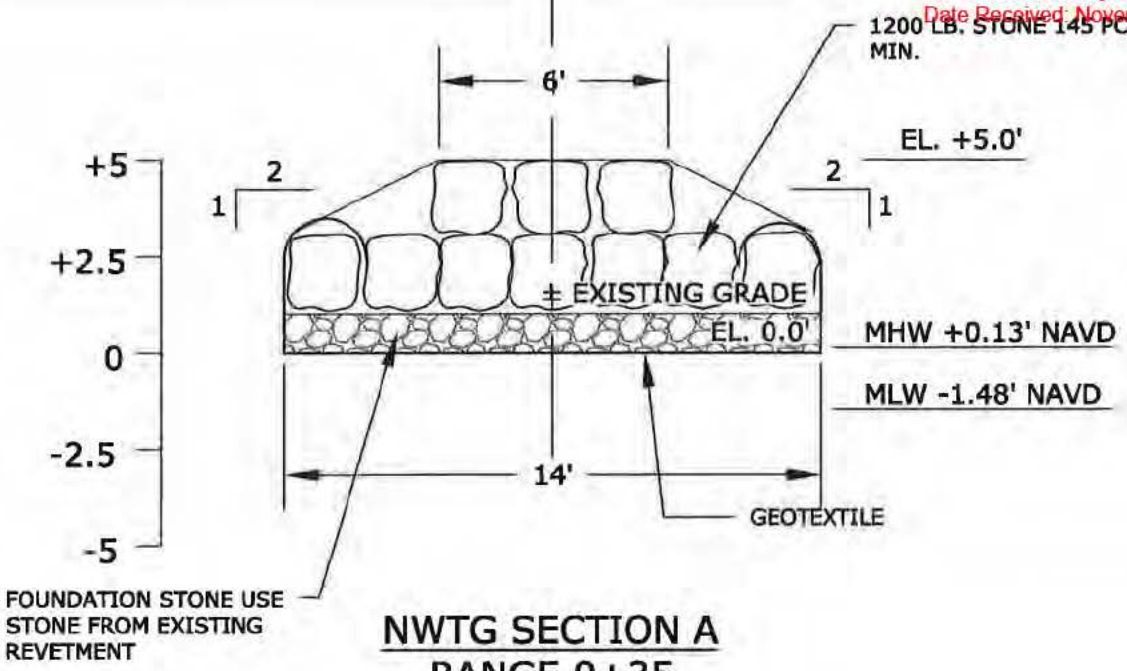
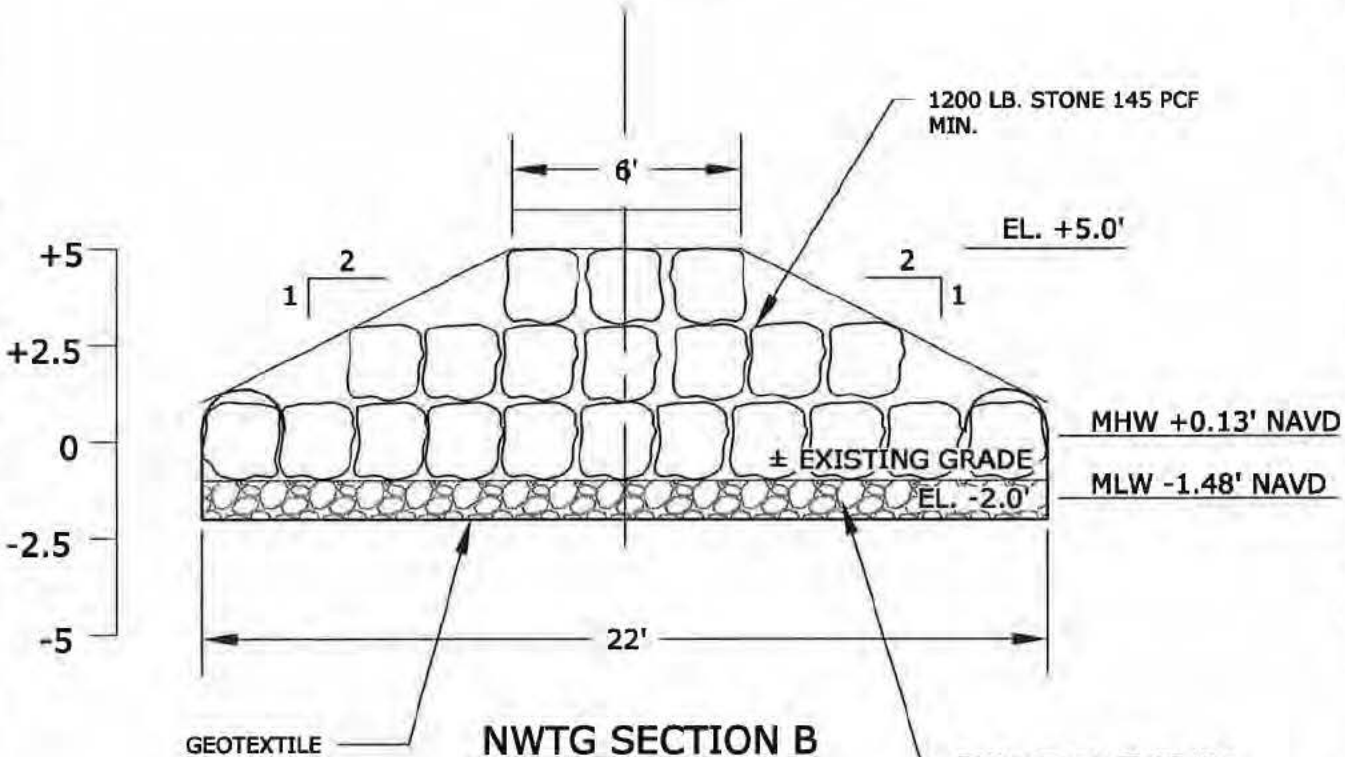
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
NORTHWEST TERMINAL GROIN LONGITUDINAL SECTION



NWTG SECTION A
RANGE 0+35
1" = 5'



NWTG SECTION B
RANGE 35+70
1" = 5'

CONSTRUCT FOUNDATION ON GRADE RANGE 70 TO 98

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DOUGLAS W. MANN P.E. NO. 44046 DATE

REVISIONS		
DATE	BY	DESCRIPTION

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
NORTHWEST TERMINAL GROIN DETAILS

Aptim Environmental & Infrastructure, Inc.
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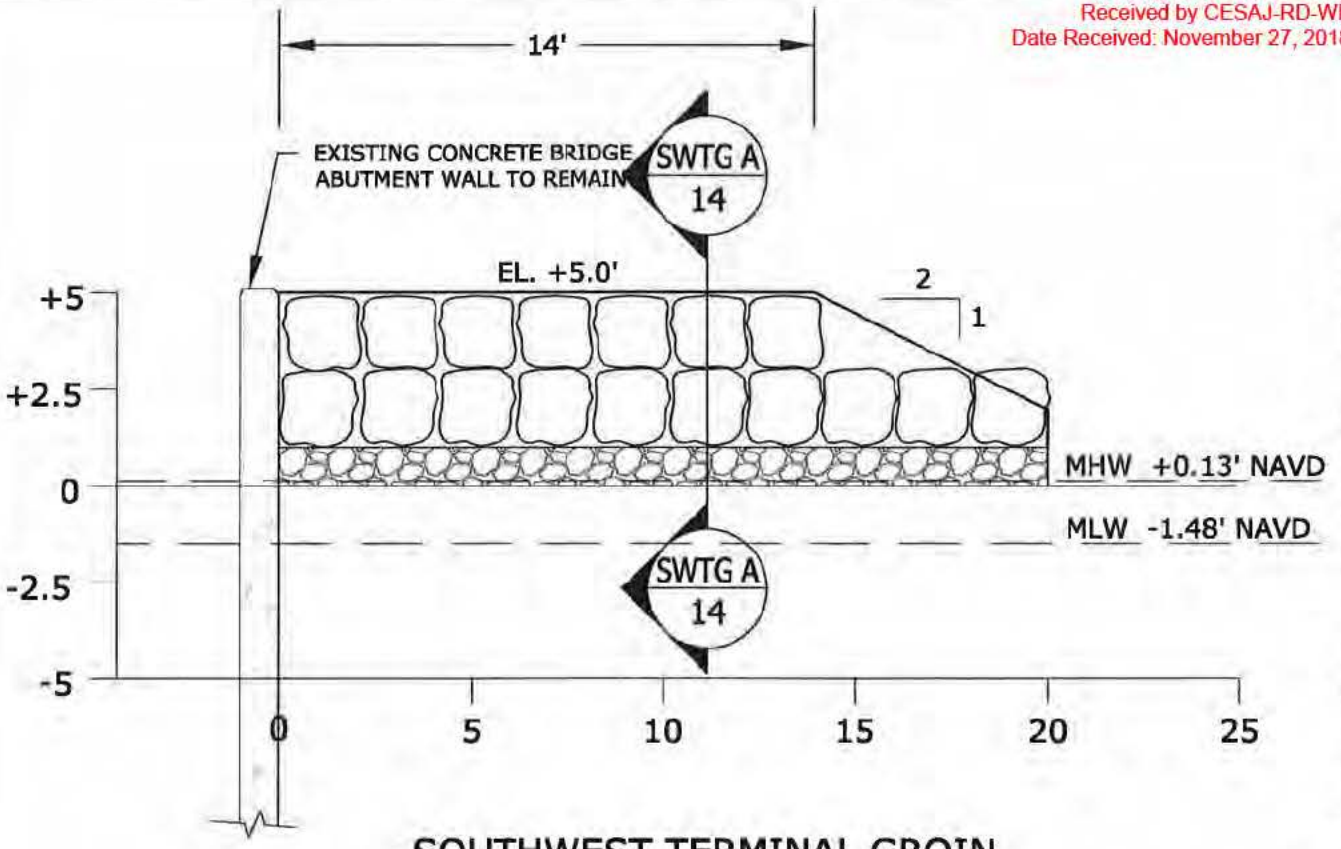
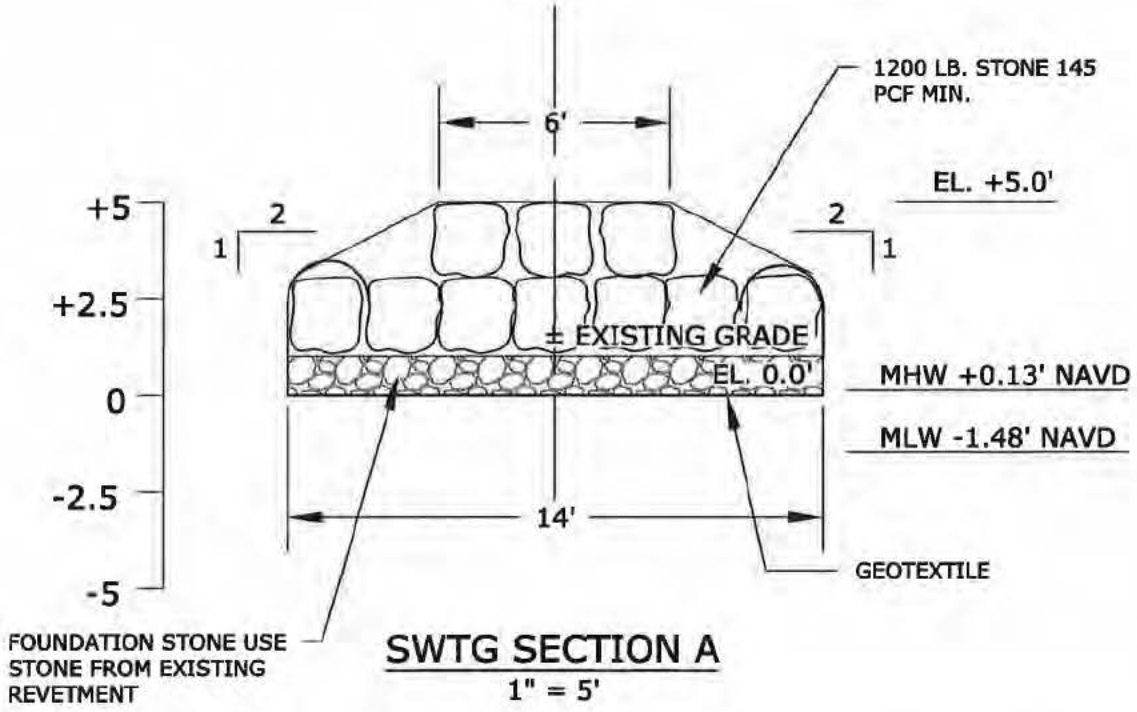
DATE: 8/13/18
GK
COMM NO.: 6312145522
SHEET: 17 OF 21



SOUTHWEST TERMINAL GROIN LONGITUDINAL SECTION

1" = 5'



SWTG SECTION A

1" = 5'

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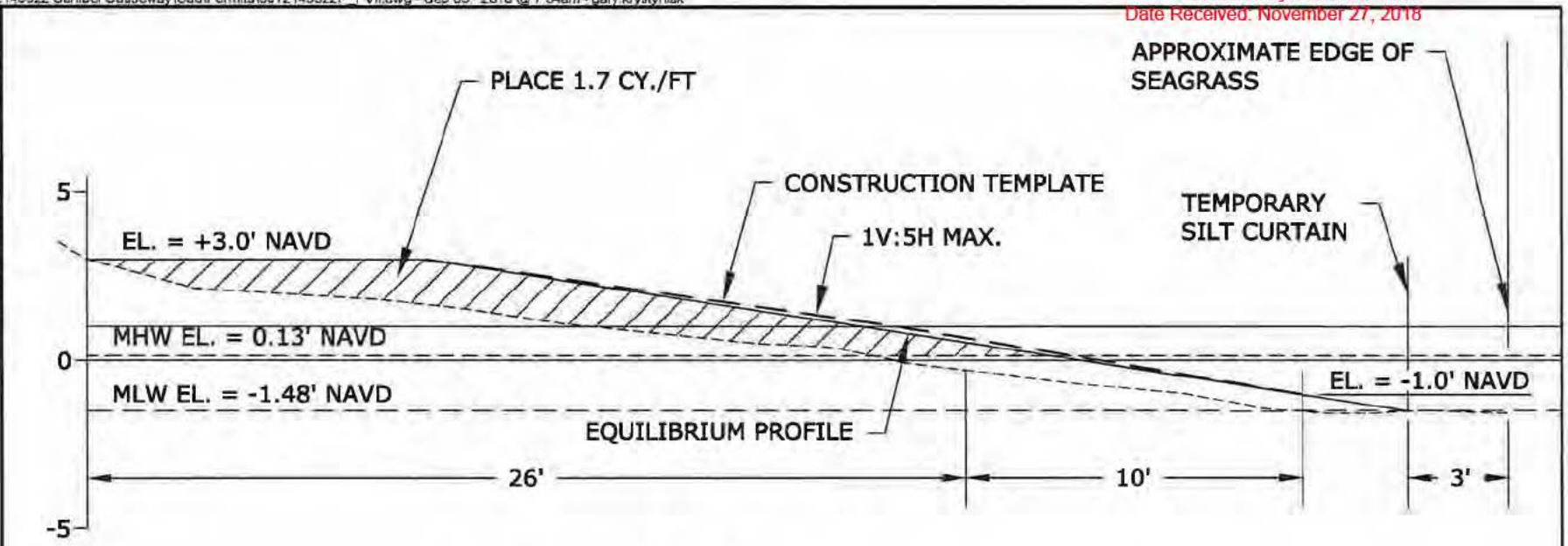
DOUGLAS W. MANN P.E. NO. 44046 DATE

REVISIONS		
DATE	BY	DESCRIPTION

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
SOUTHWEST TERMINAL GROIN LONGITUDINAL SECTION AND DETAIL

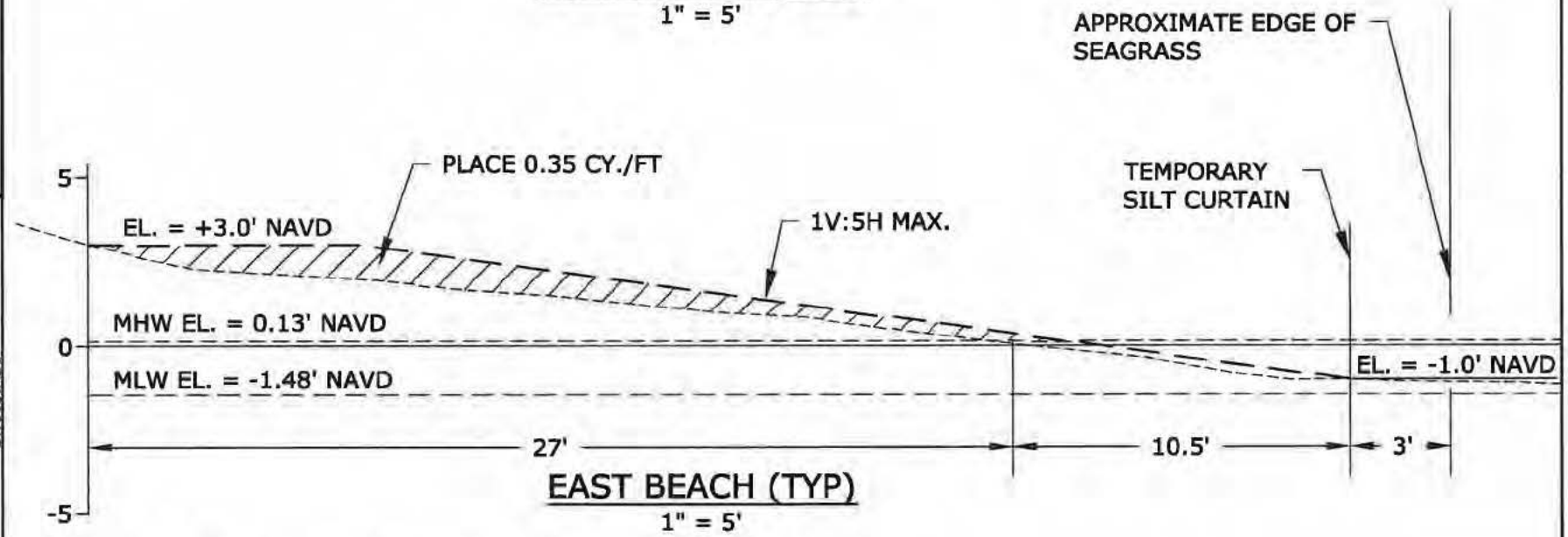
Aptim Environmental & Infrastructure, Inc.
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.aptim.com
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #8317

DATE: 8/13/18
GK
COMM NO.: 6312145522
SHEET: 18 OF 21



WEST BEACH (TYP)

1" = 5'



EAST BEACH (TYP)

1" = 5'

NOTE: ALL SAND SHALL BE ER JAHNA "WELLPOINT", OR EQUAL.

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DATE

REVISIONS	BY	DATE

DATE:	8/13/18
BY:	GK
COMM NO.:	6312145522
SHEET:	19 OF 21

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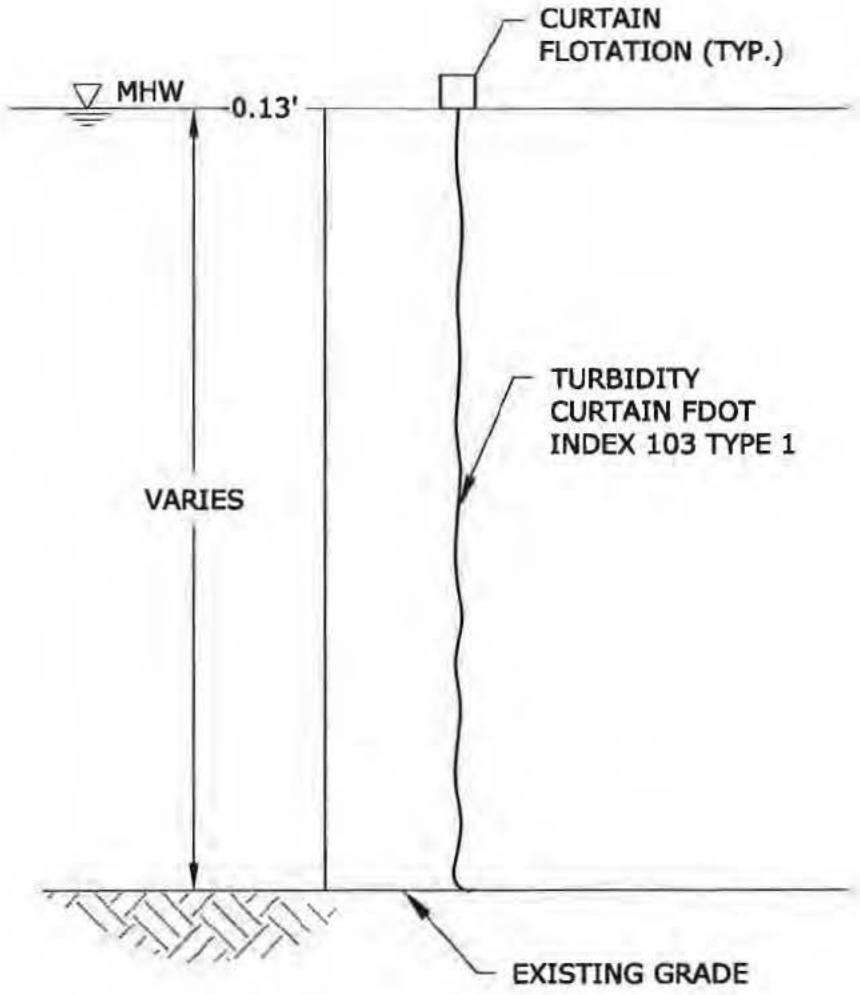
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
SAND PLACEMENT TYPICAL SECTIONS



TURBIDITY CURTAIN SECTION

N.T.S.

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REVISIONS		
DATE	BY	DESCRIPTION

SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
TURBIDITY CURTAIN DETAIL

Aptim Environmental & Infrastructure, Inc.
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FAX (561) 391-8116
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DATE: 8/13/18
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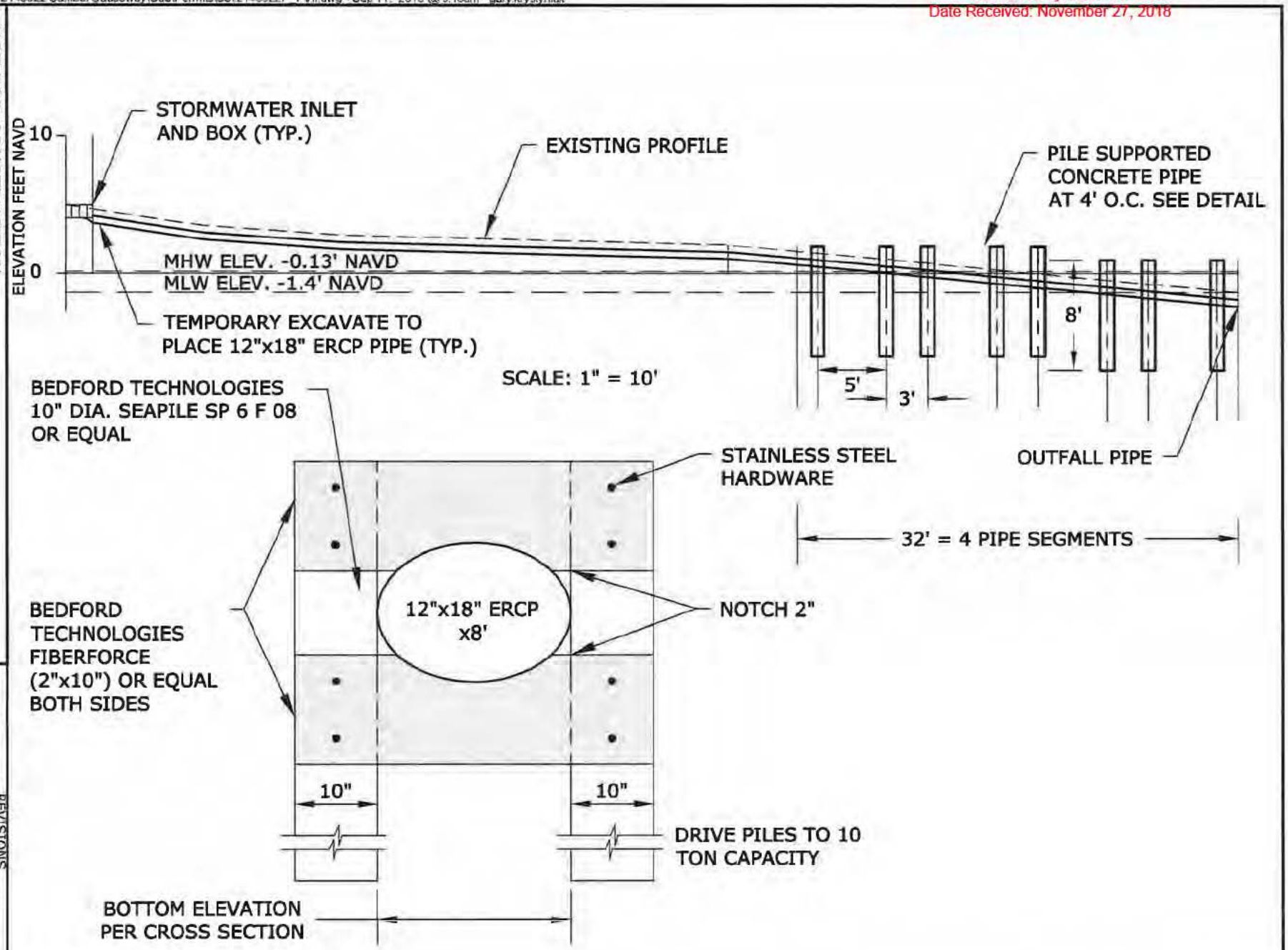
COMM NO.: 6312145522
SHEET: 20 OF 21



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DOUGLAS W. MANN P.E. NO. 44046

DATE

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DESCRIPTION	BY	DATE

BY: GK
COMM NO.: 6312145522
SHEET: 21 OF 21
DATE: 8/13/18

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FAX (561) 391-9116
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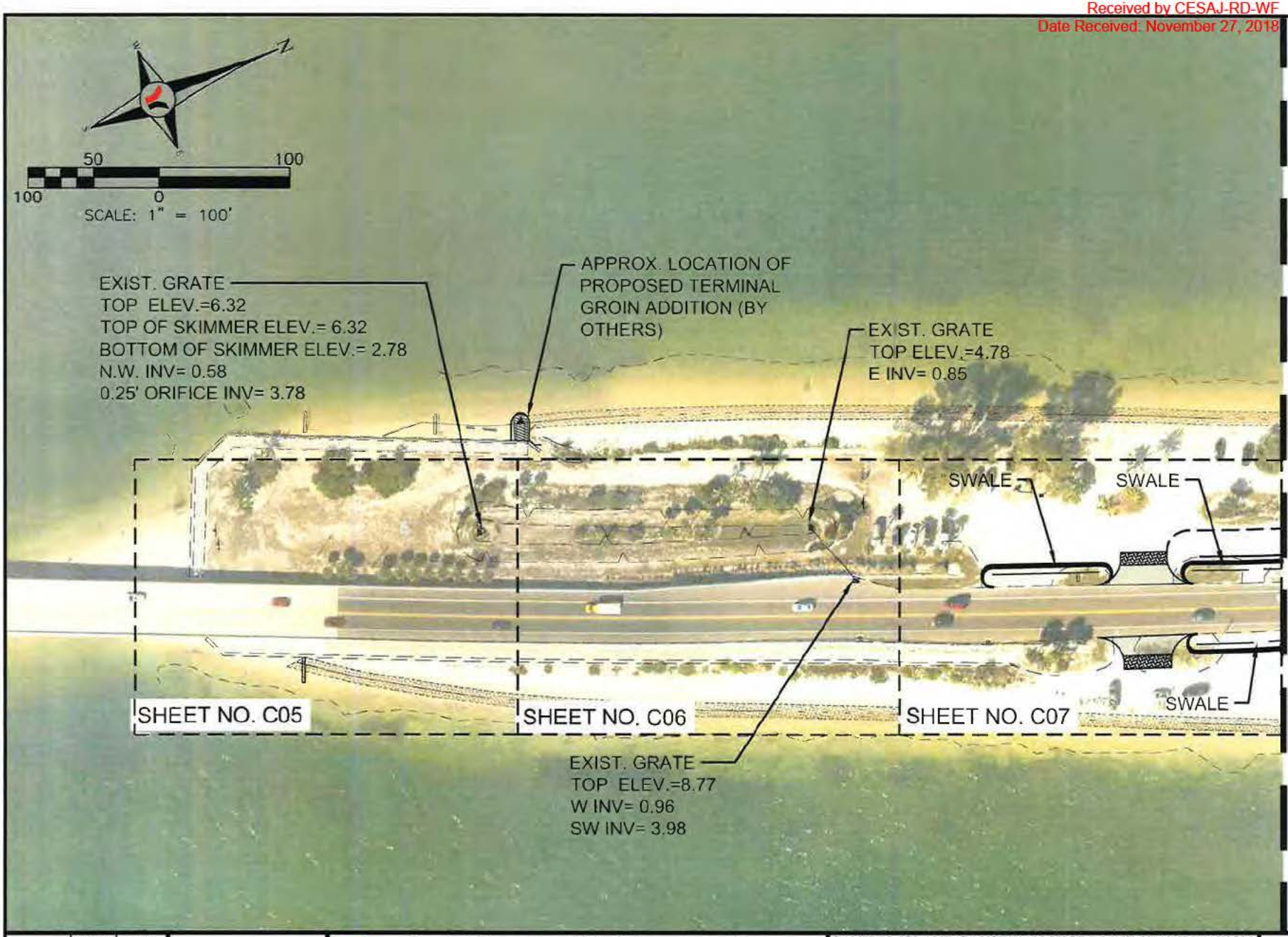
SANIBEL CAUSEWAY SHORELINE STABILIZATION PROJECT
LEE COUNTY, FLORIDA
STORM OUTFALL STRUCTURAL PIPE SUPPORT AND DETAILS



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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

DATE

George F. Young, Inc.
10540 PORTAL CROSSING, SUITE 105 LAKEWOOD RANCH, FLORIDA 34211-4913
PHONE (941) 747-2981 FAX (941) 747-7234
ENGINEERING CERTIFICATE OF AUTHORIZATION NUMBER 21
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GRADING AND DRAINAGE PLAN

SECTION 9 , TOWNSHIP 46 S., RANGE 23 E.

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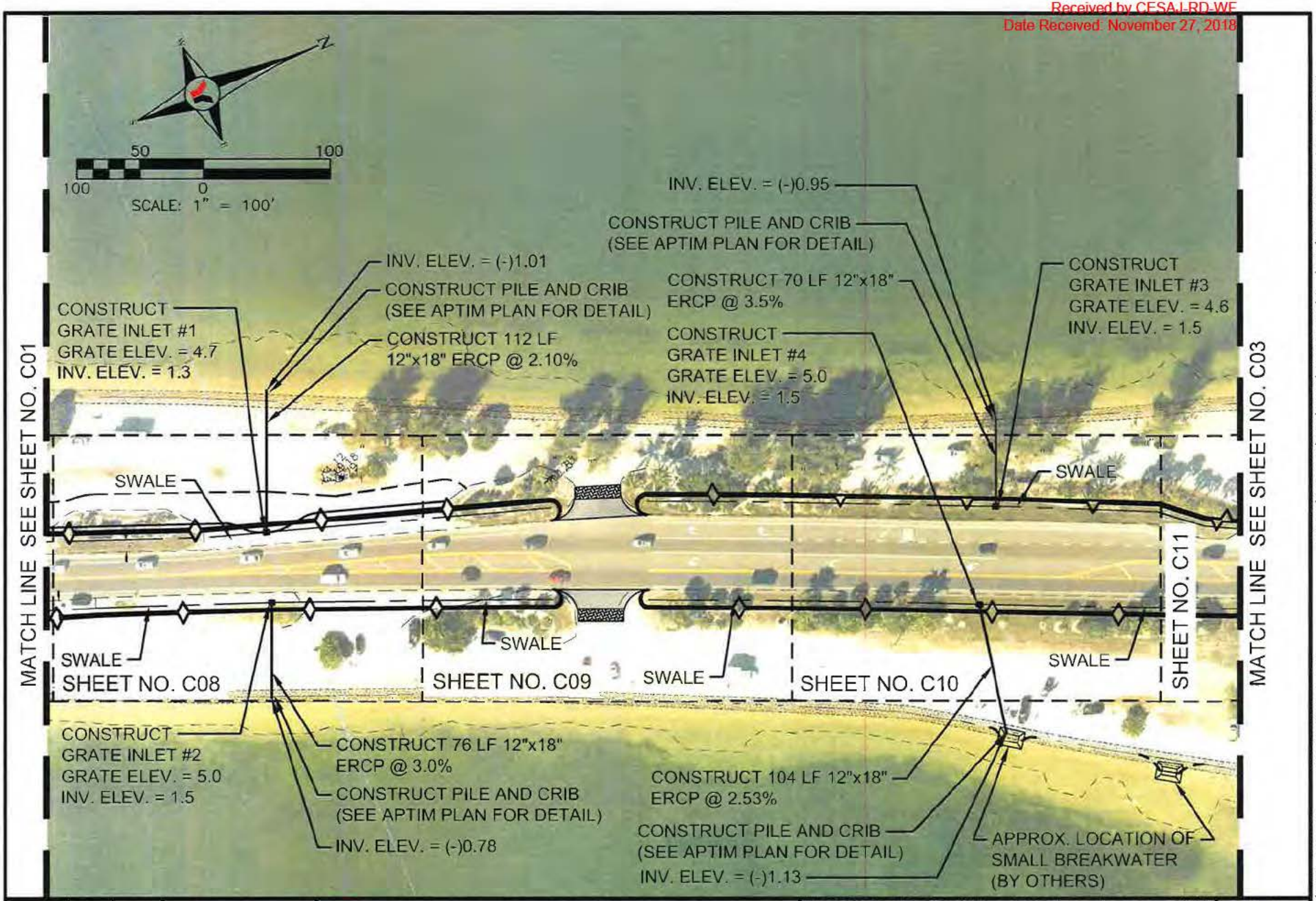

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DRAWN	CINTRON	08/23/18
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TIMOTHY A. DOVE, PE No. 43268

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GRADING AND DRAINAGE PLAN
SECTION 9, TOWNSHIP 46 S., RANGE 23 E.
PREPARED FOR: APTIM ENVIRONMENTAL & INFRASTRUCTURE, INC.
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JOB NO. 17001500LC

SHEET NO. C02

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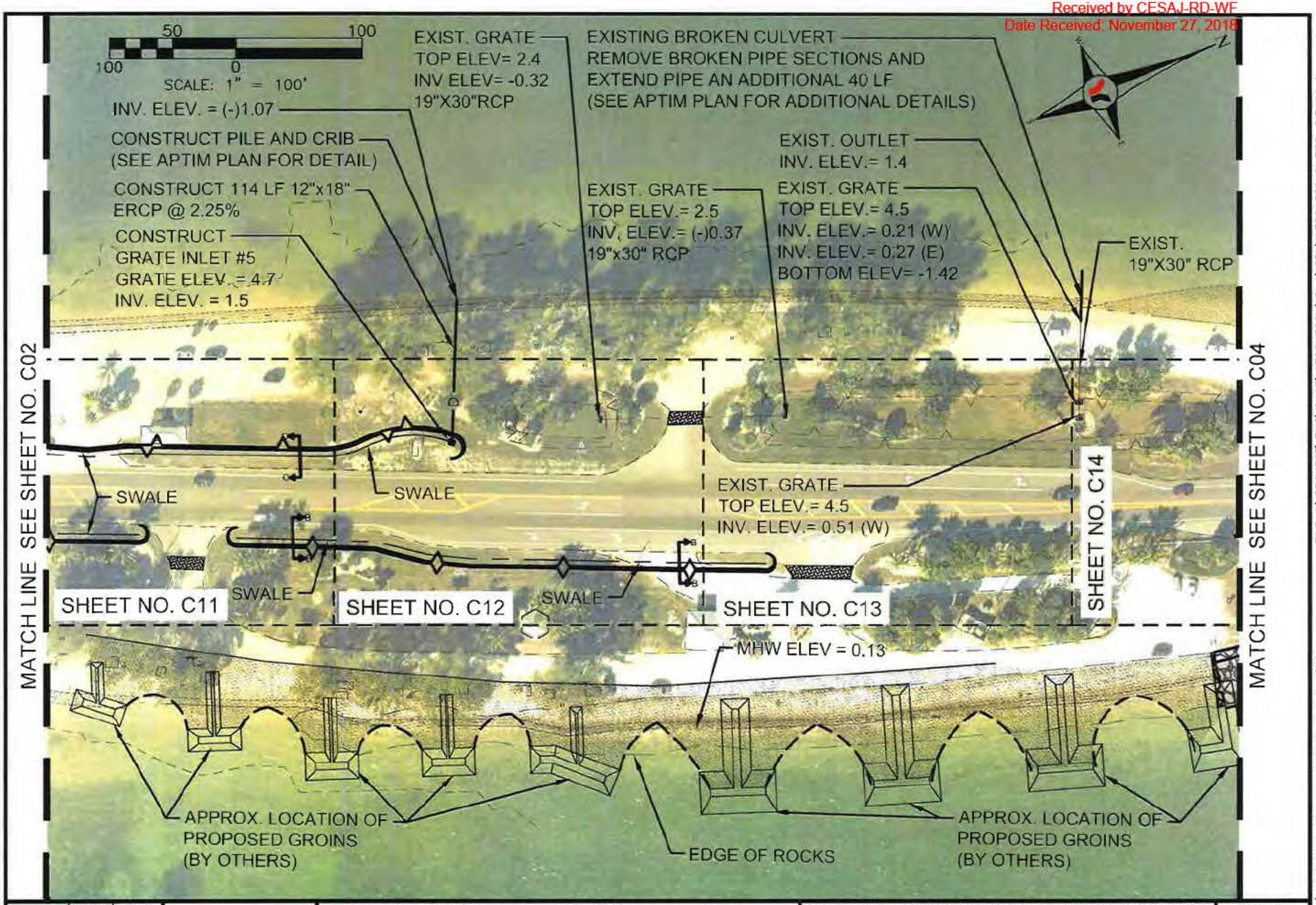

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
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GRADING AND DRAINAGE PLAN
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SHEET NO. C03

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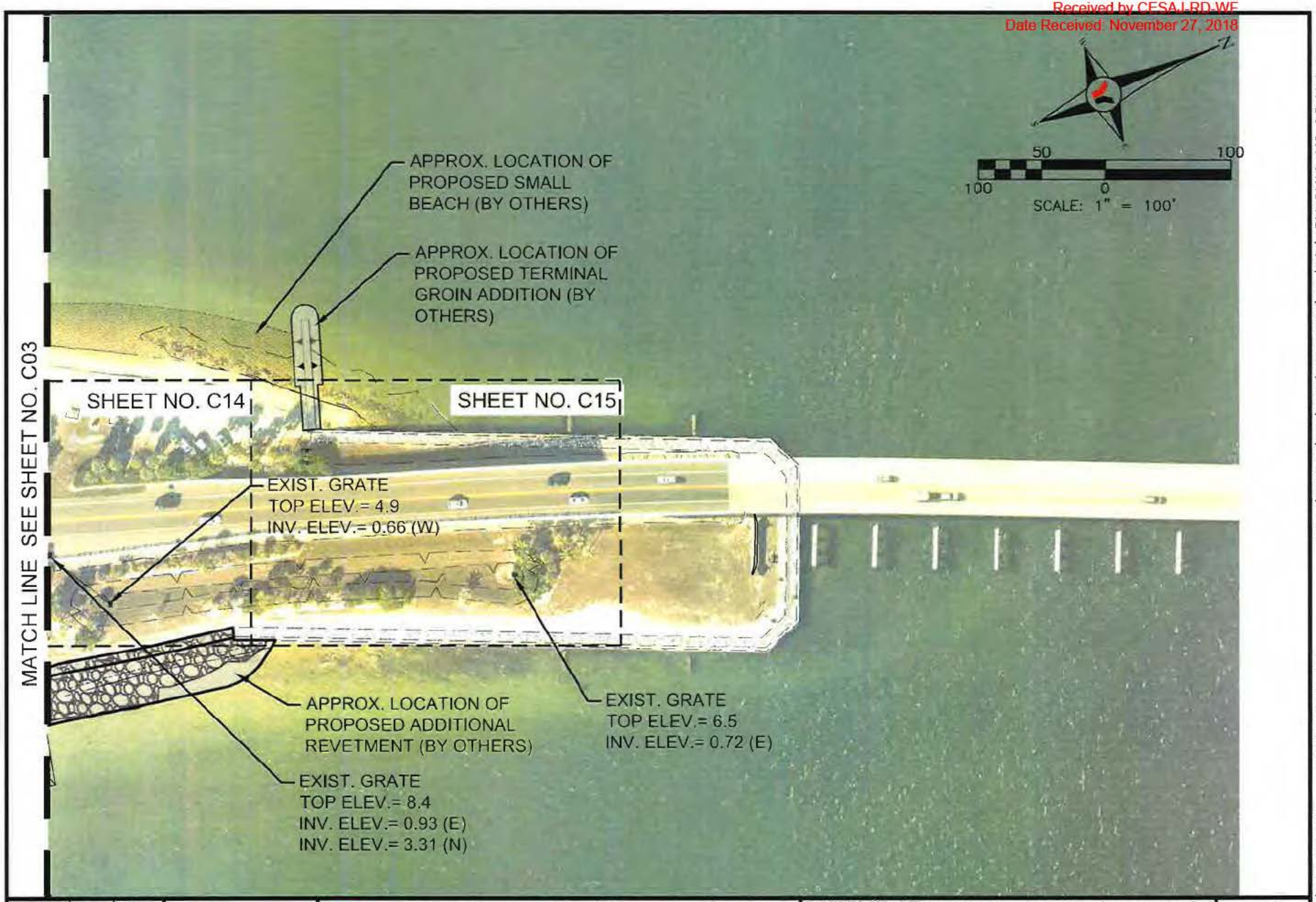

	INITIALS	DATE
DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

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2481 NW BOCA RATON BOULEVARD
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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

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SECTION 9, TOWNSHIP 46 S., RANGE 23 E.
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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	-----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

DATE

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SECTION 9, TOWNSHIP 46S., RANGE 23 E.

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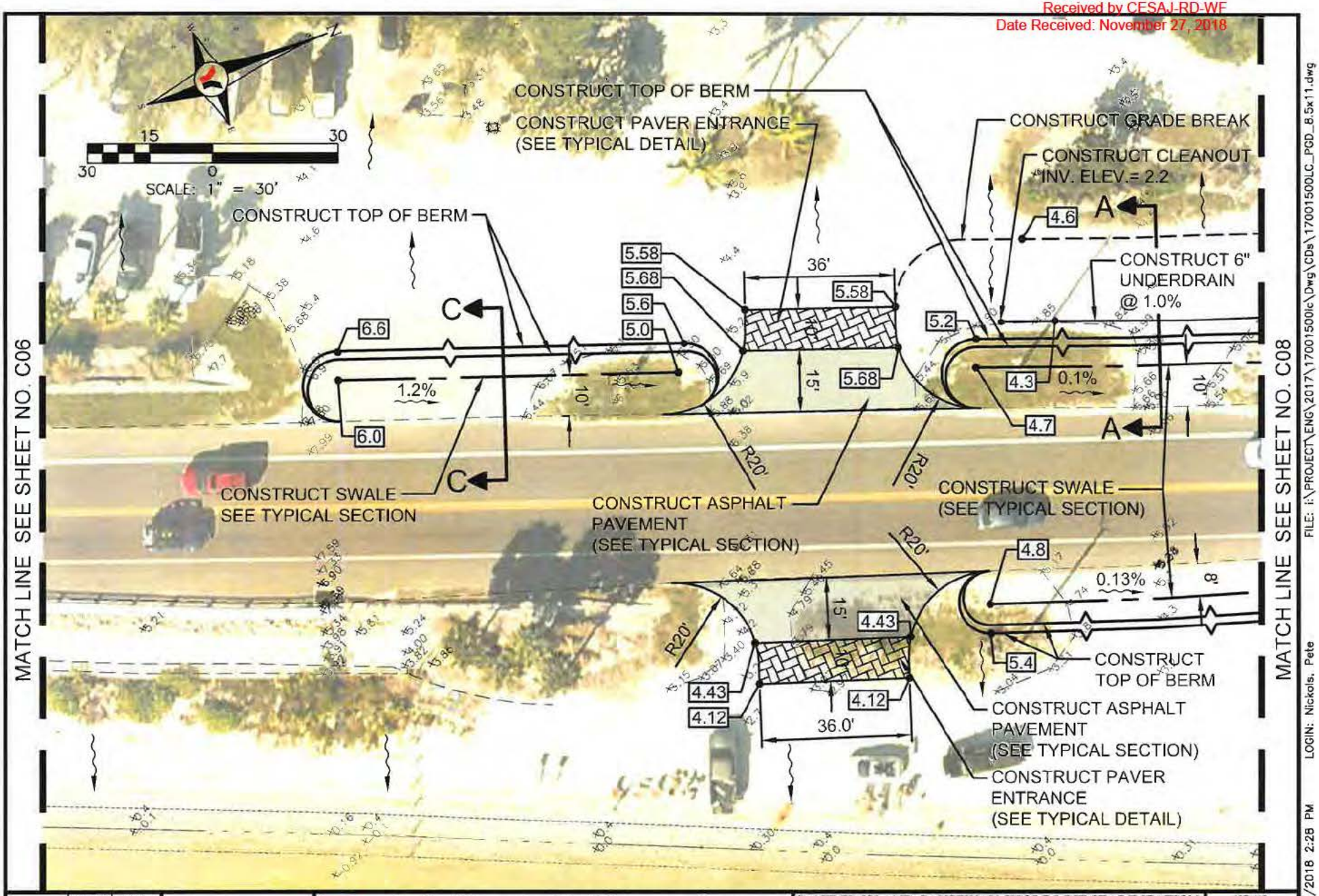

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

DATE

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10540 PORTAL CROSSING, SUITE 105 LAKEWOOD RANCH, FLORIDA 34211-4913
PHONE (941) 747-2981 FAX (941) 747-7234
ENGINEERING CERTIFICATE OF AUTHORIZATION NUMBER 21
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SECTION 9, TOWNSHIP 46 S., RANGE 23 E.

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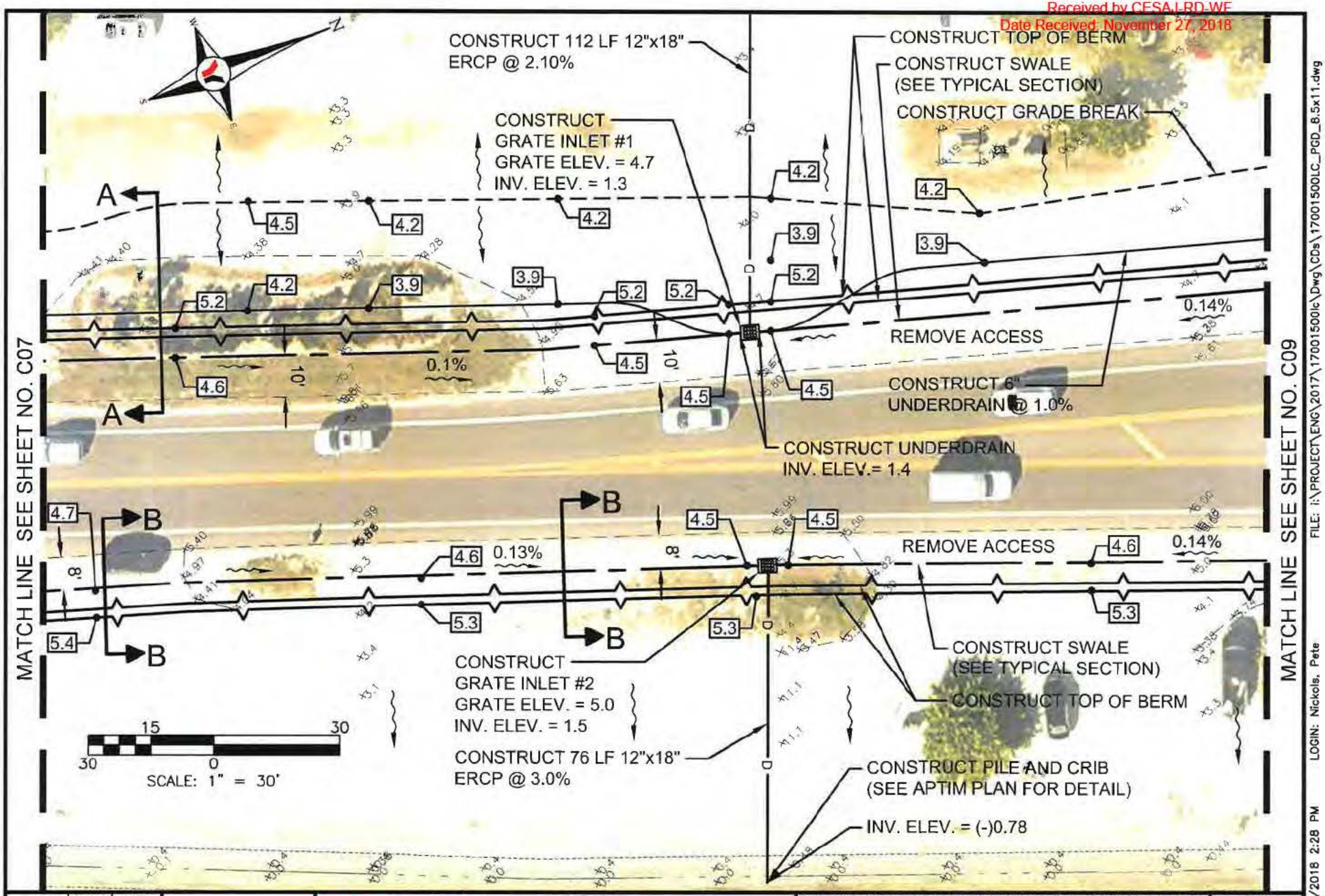

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

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GRADING AND DRAINAGE PLAN
SECTION 9, TOWNSHIP 46 S., RANGE 23 E.

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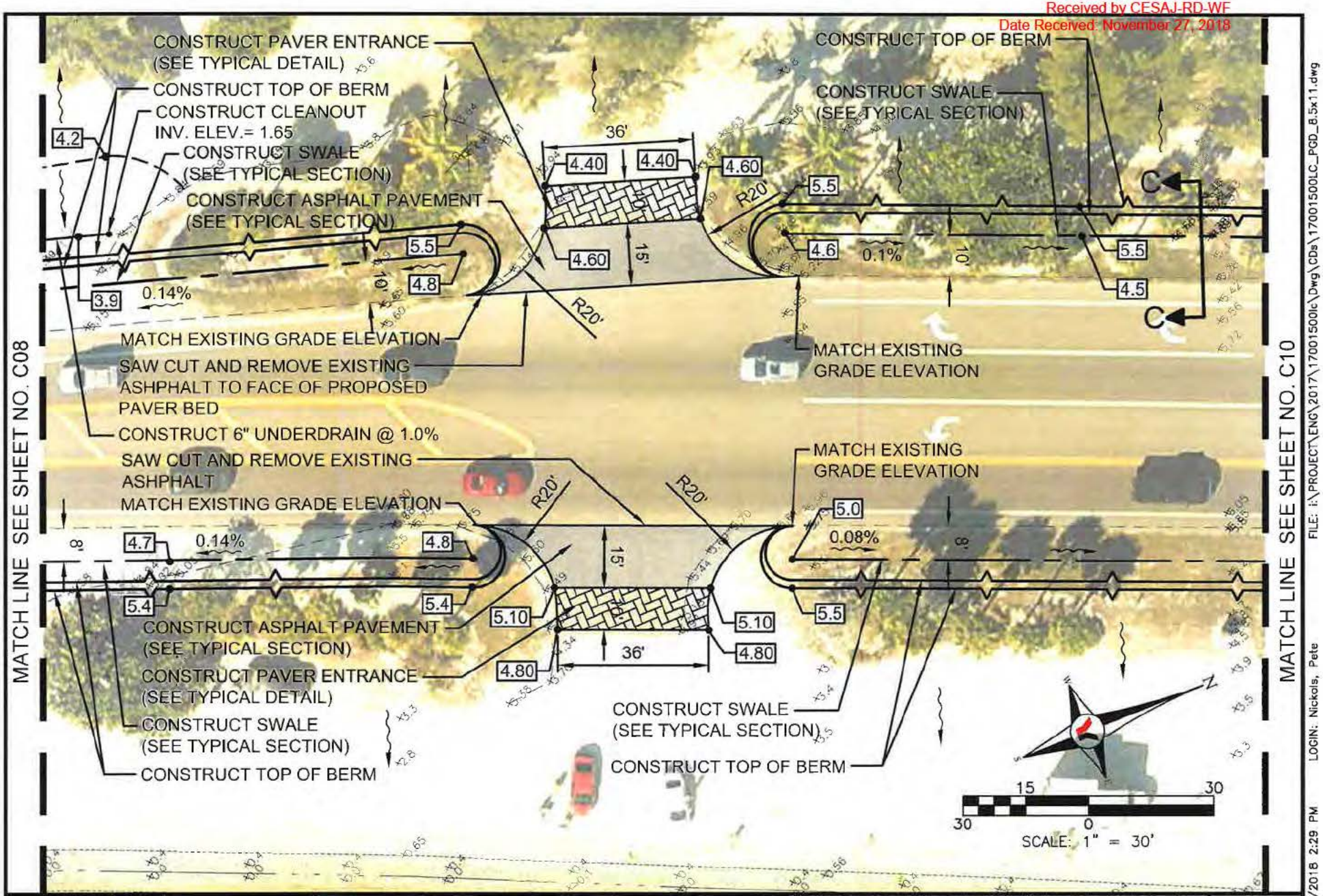

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

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PHONE (941) 747-2981 FAX (941) 747-7234
ENGINEERING CERTIFICATE OF AUTHORIZATION NUMBER 21
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GRADING AND DRAINAGE PLAN
SECTION 9, TOWNSHIP 46 S., RANGE 23 E.
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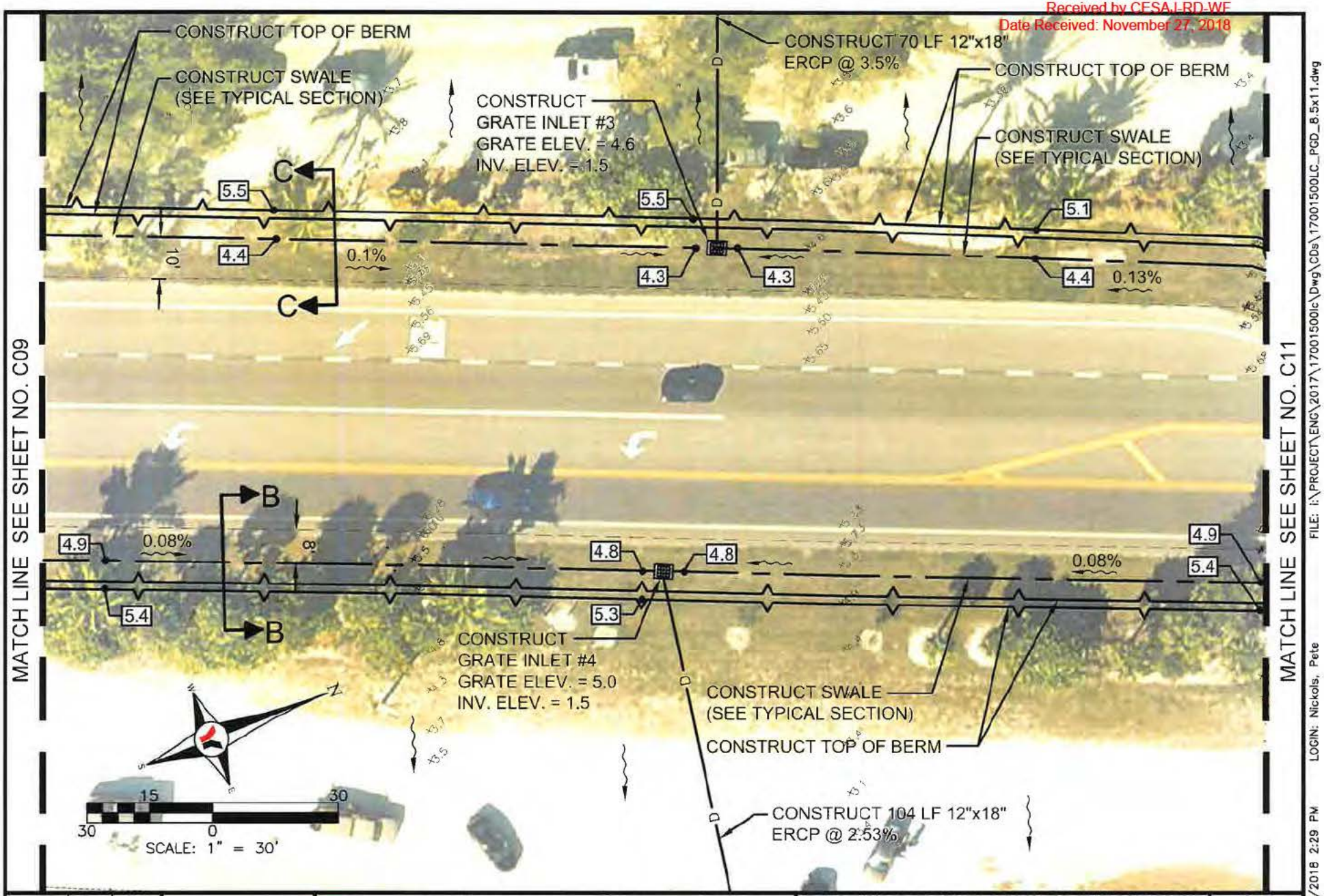

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	-----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

DATE

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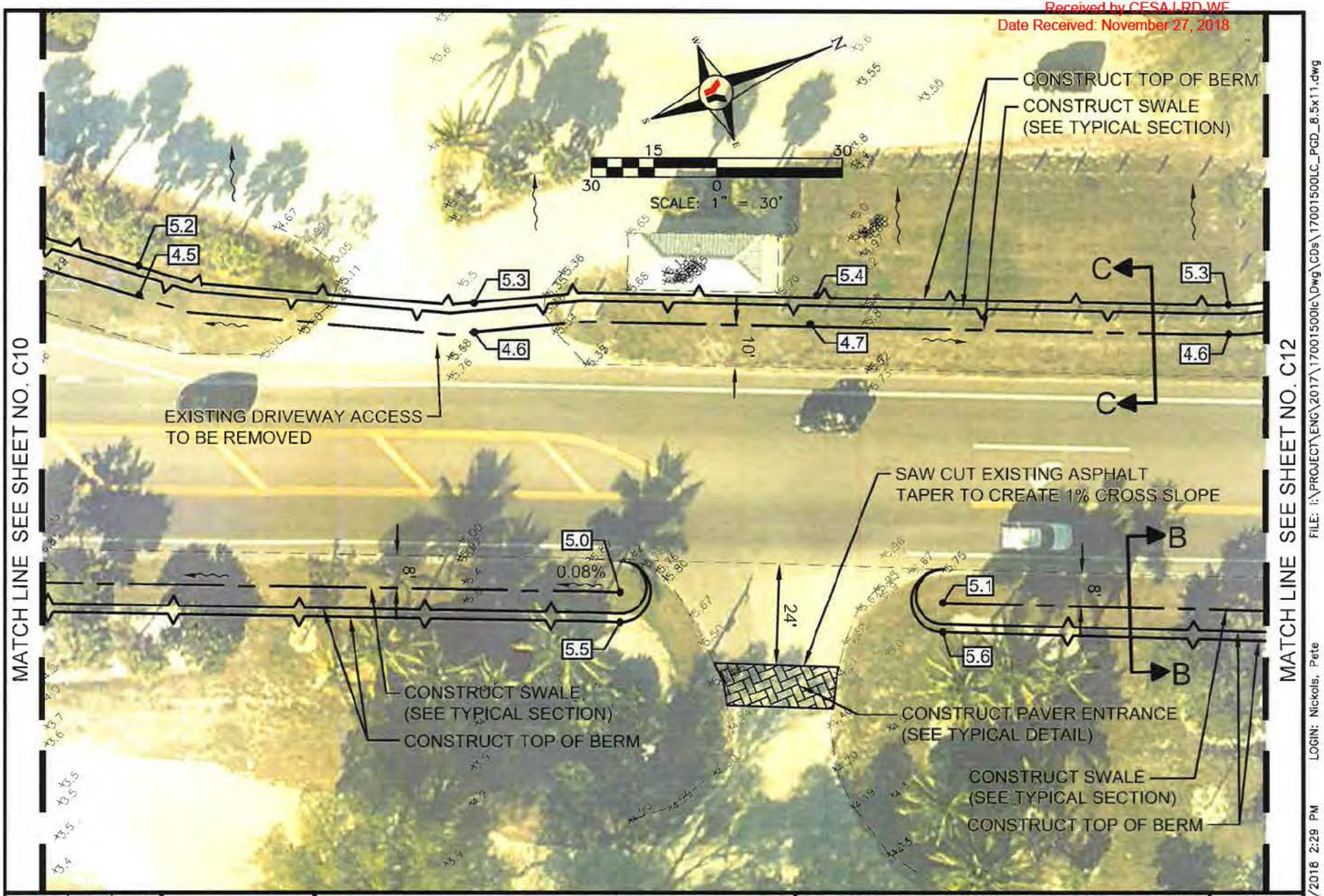

	INITIALS	DATE
DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	-----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

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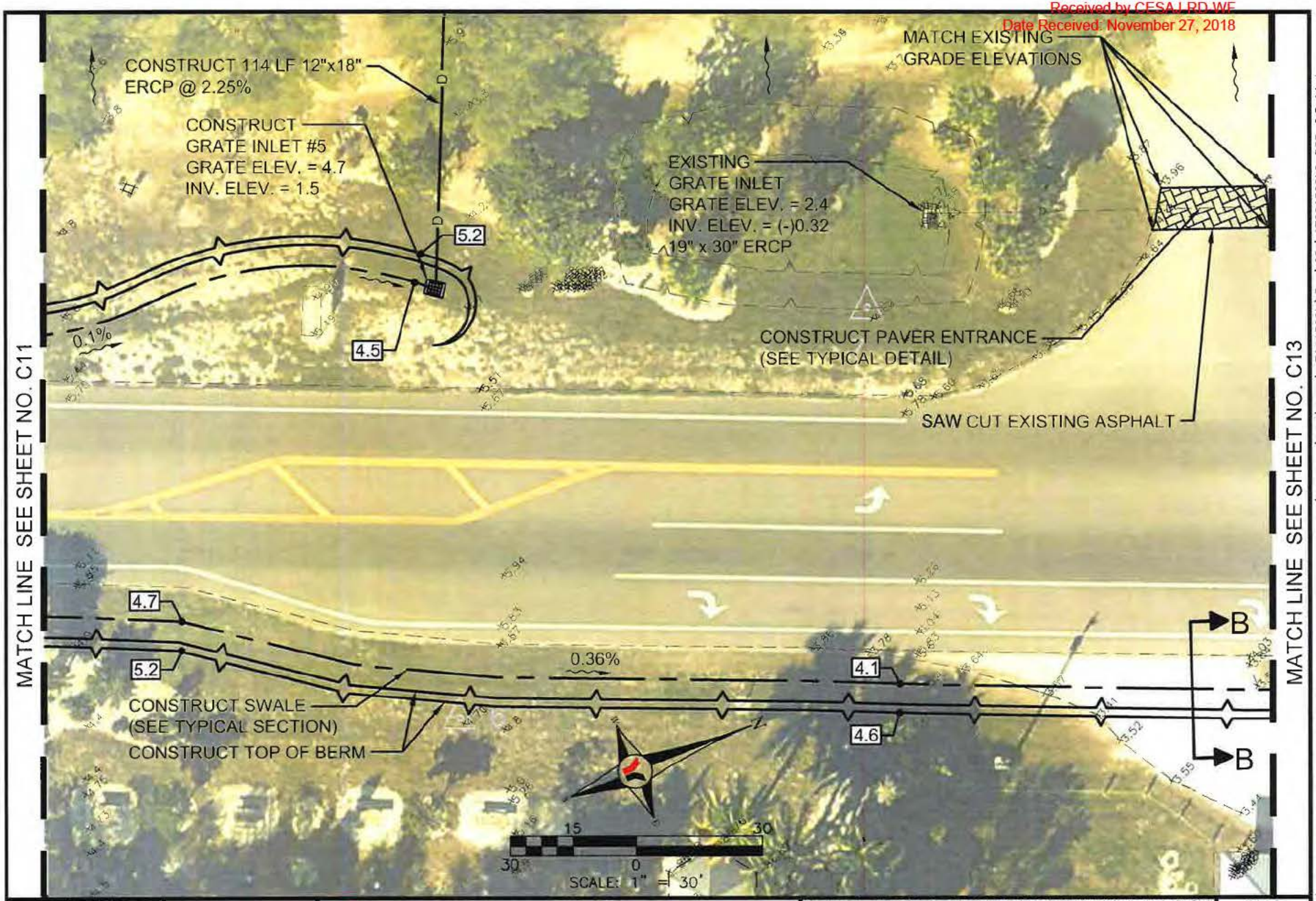

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CHECKED	DOVE	08/23/18
QUALITY CHK.	ADLER	----
SCALE		

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JOB NO. 17001500LC

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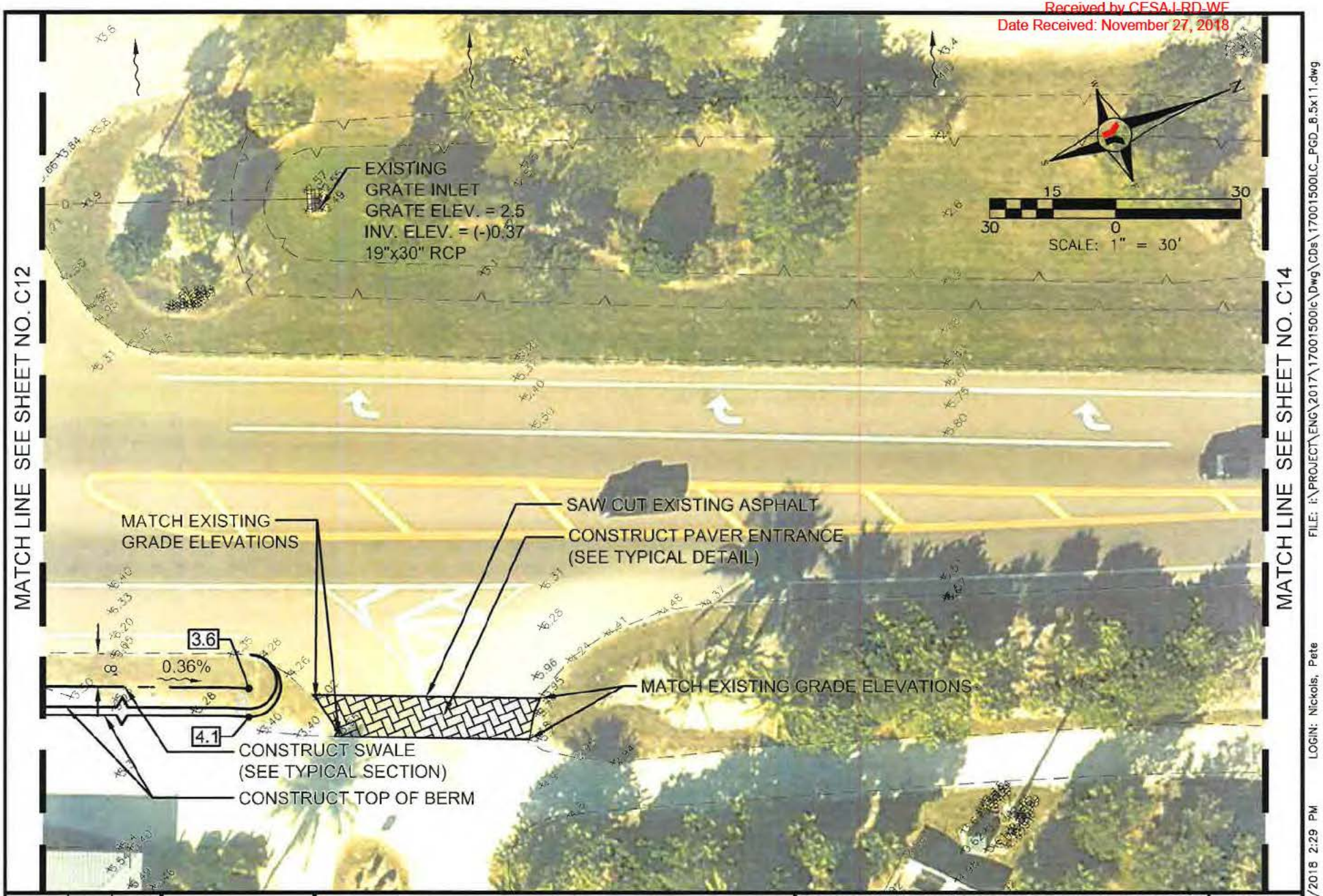

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

DATE

George F. Young, Inc.
10540 PORTAL CROSSING, SUITE 105 LAKEWOOD RANCH, FLORIDA 34211-4913
PHONE (941) 747-2981 FAX (941) 747-7234
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SANIBEL ISLAND CAUSEWAY SHORE LINE STABILIZATION
GRADING AND DRAINAGE PLAN
SECTION 9, TOWNSHIP 46 S., RANGE 23 E.
PREPARED FOR: APTIM ENVIRONMENTAL & INFRASTRUCTURE, INC.
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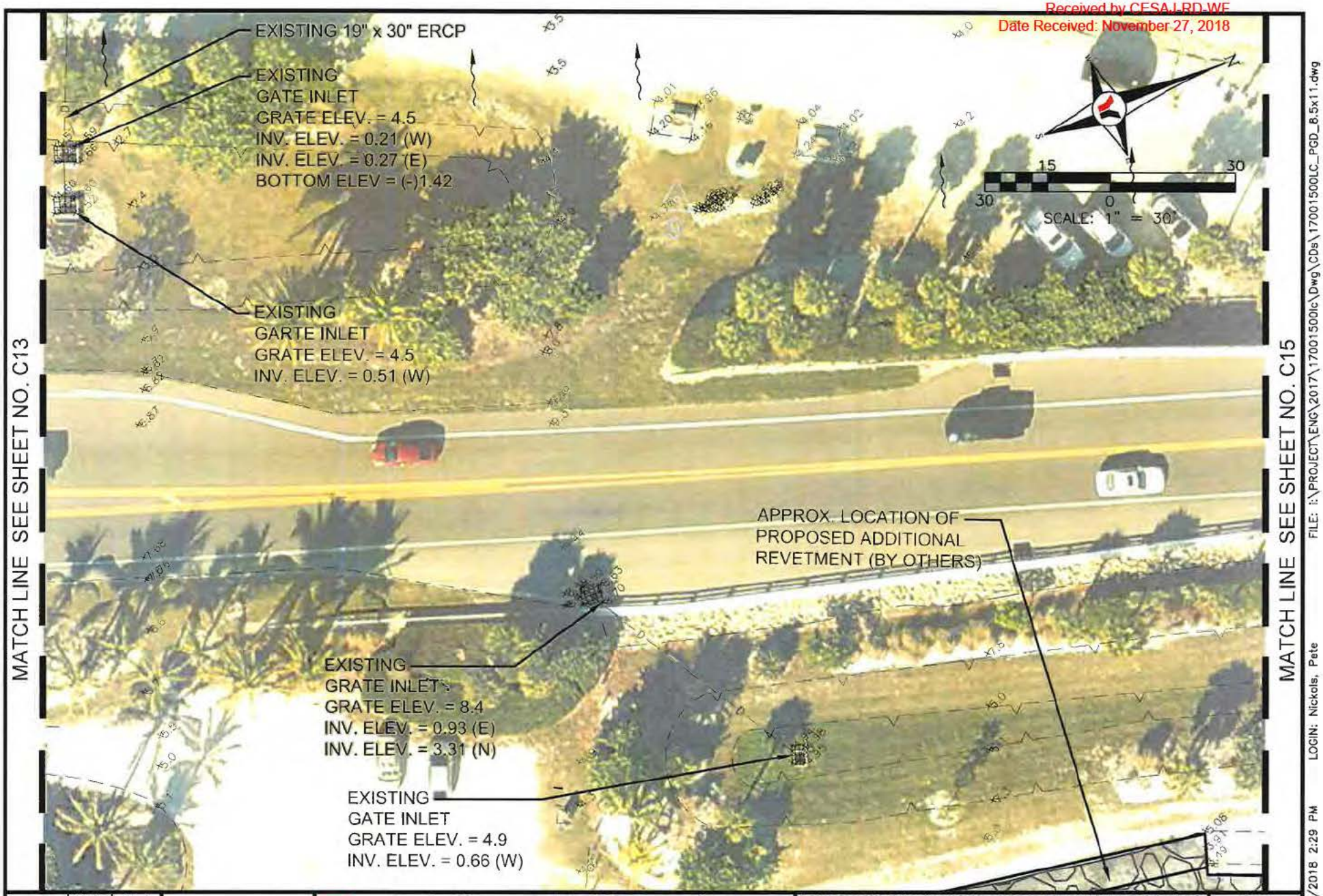

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DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

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GRADING AND DRAINAGE PLAN
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SHEET NO. C14

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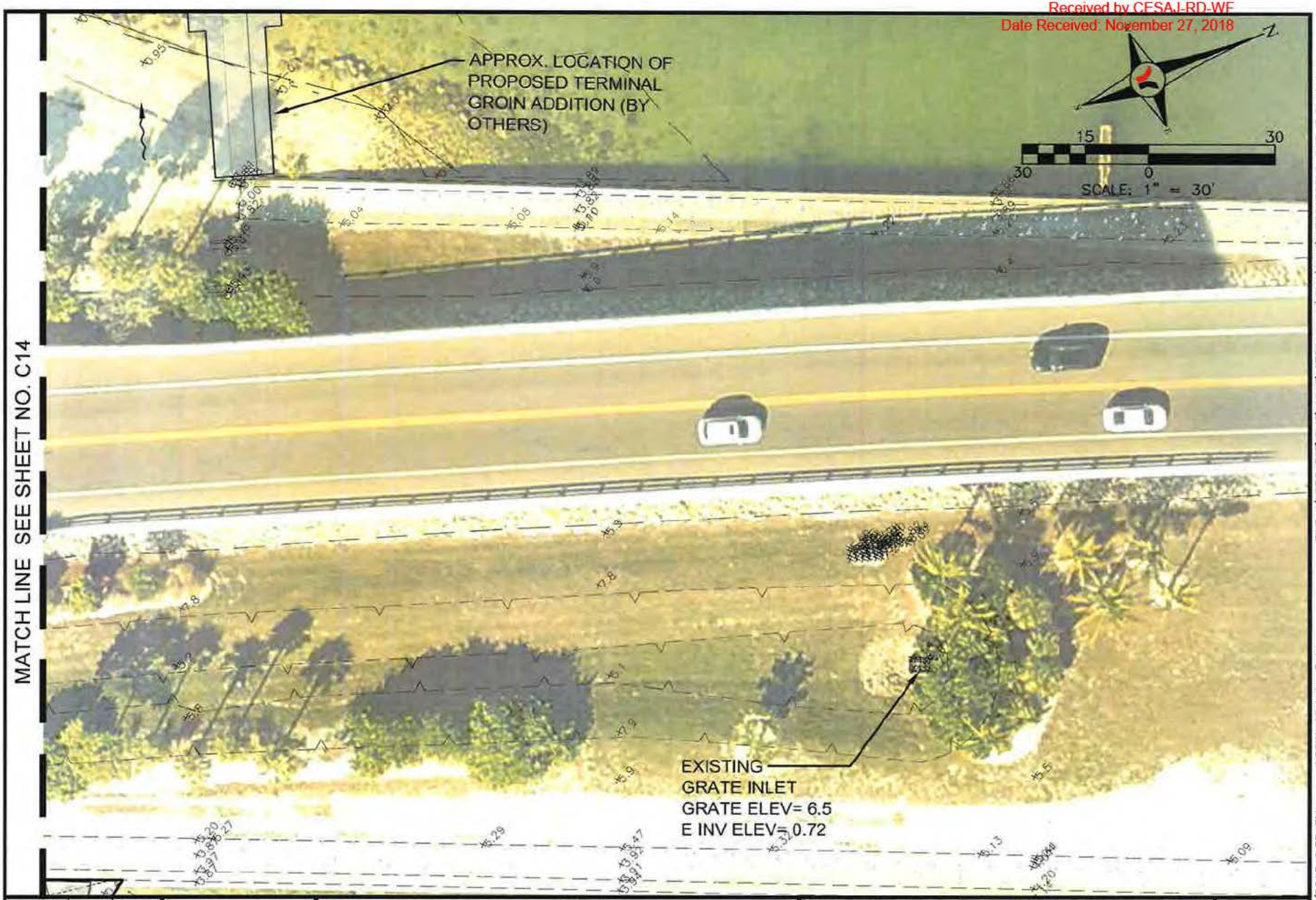

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DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK.	ADLER	----
SCALE		

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GRADING AND DRAINAGE PLAN

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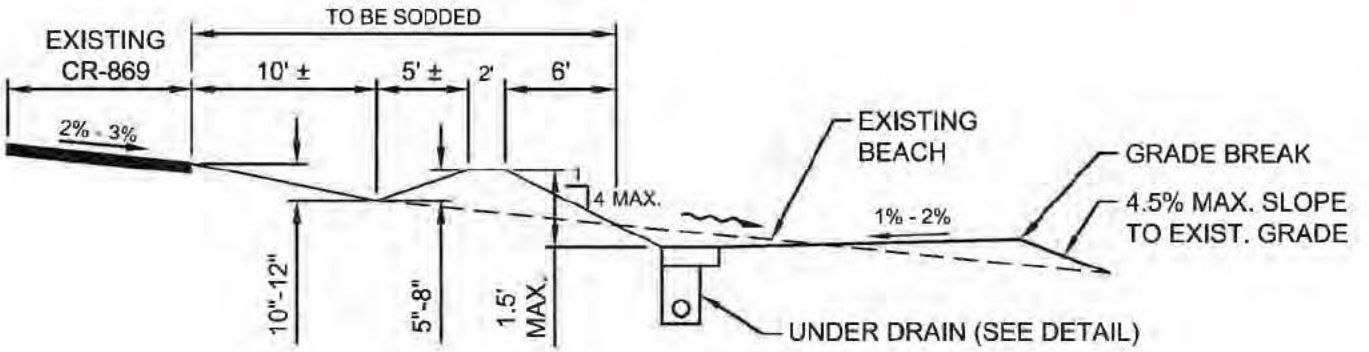
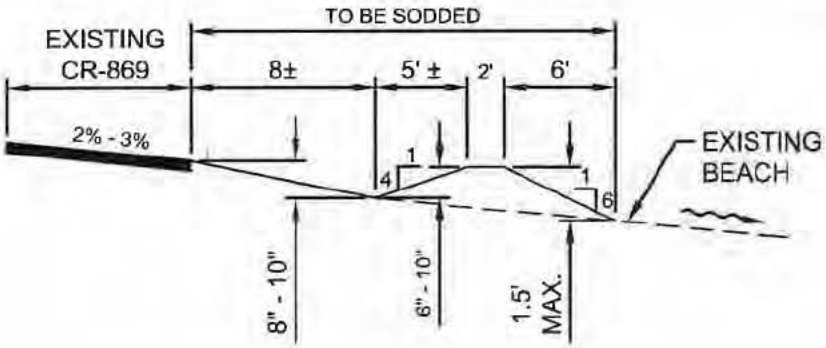


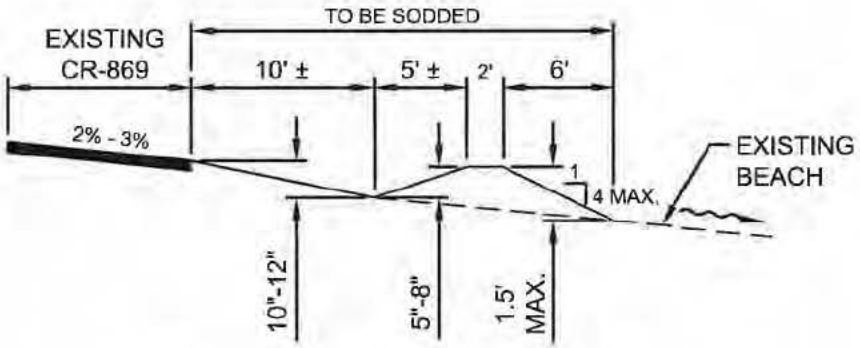
TYPICAL SWALE SECTION A-A

N.T.S.



TYPICAL SWALE SECTION B-B

N.T.S.



TYPICAL SWALE SECTION C-C

N.T.S.

	INITIALS	DATE
DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

TIMOTHY A. DOVE, PE No. 43268

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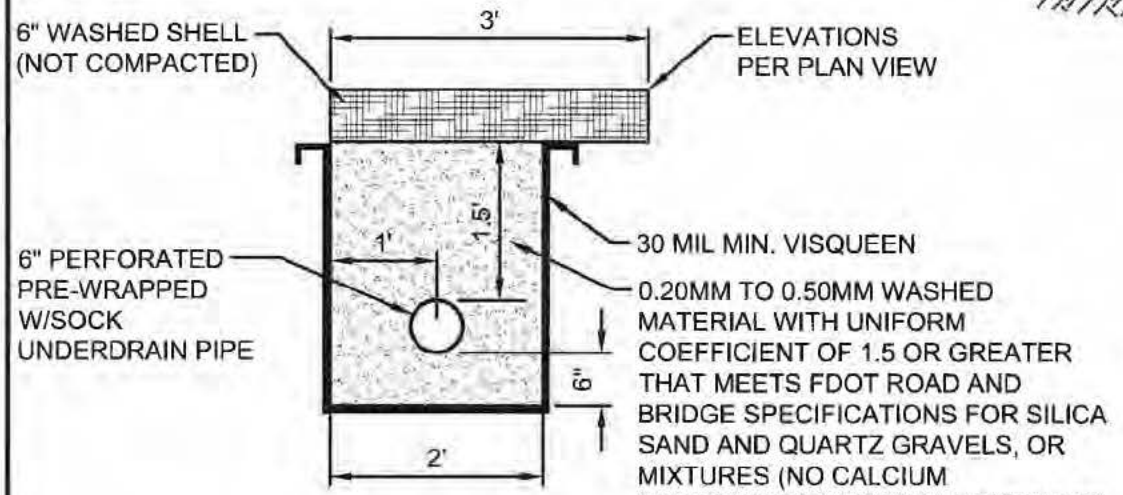
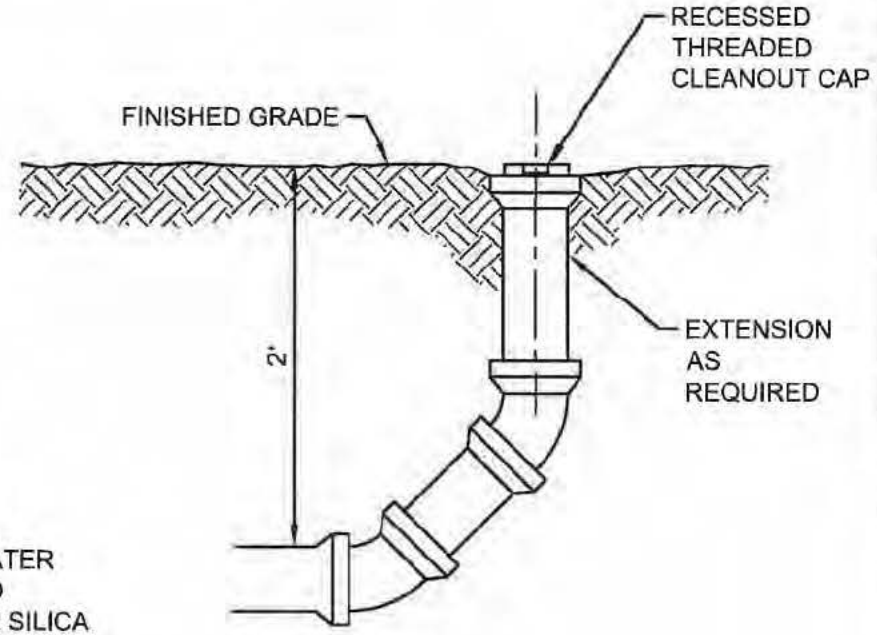


UNDERDRAIN DETAIL

N.T.S.



UNDERDRAIN CLEAN-OUT

N.T.S.

	INITIALS	DATE
DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	----
SCALE		

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JOB NO. 17001500LC

SHEET NO. C17

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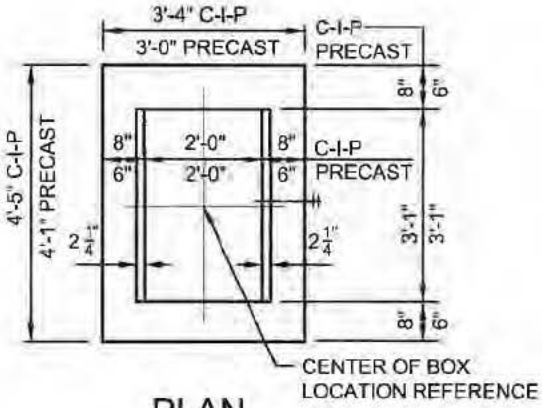
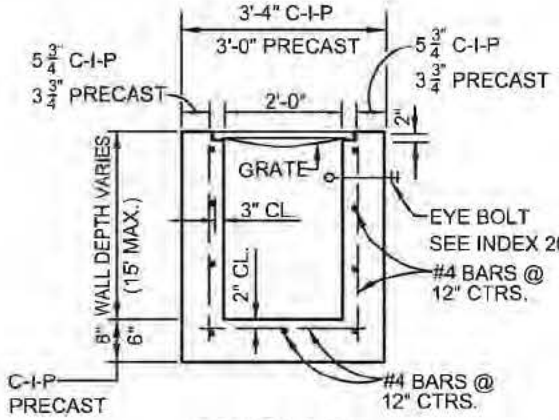


PLAN



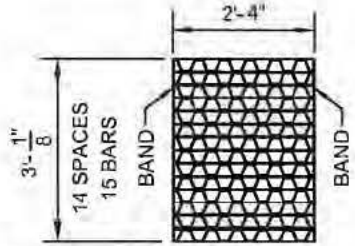
SECTION

RECOMMENDED MAXIMUM PIPE SIZE:
2'-0" WALL - 18" PIPE
3'-1" WALL - 24" PIPE

(PER FDOT INDEX NO. 232)

TYPE "C" INLET DETAIL

N.T.S.



TYPE "C" GRATE

STRAIGHT BARS 2" x 1/4"

RETICULINE BARS 1 1/4" x 3/16"

BANDS 2" x 1/4"

APPROX. WEIGHT 104 LBS.

	INITIALS	DATE
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SCALE		

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CONSTRUCTION DETAILS
SECTION 9, TOWNSHIP 46 S., RANGE 23 E.

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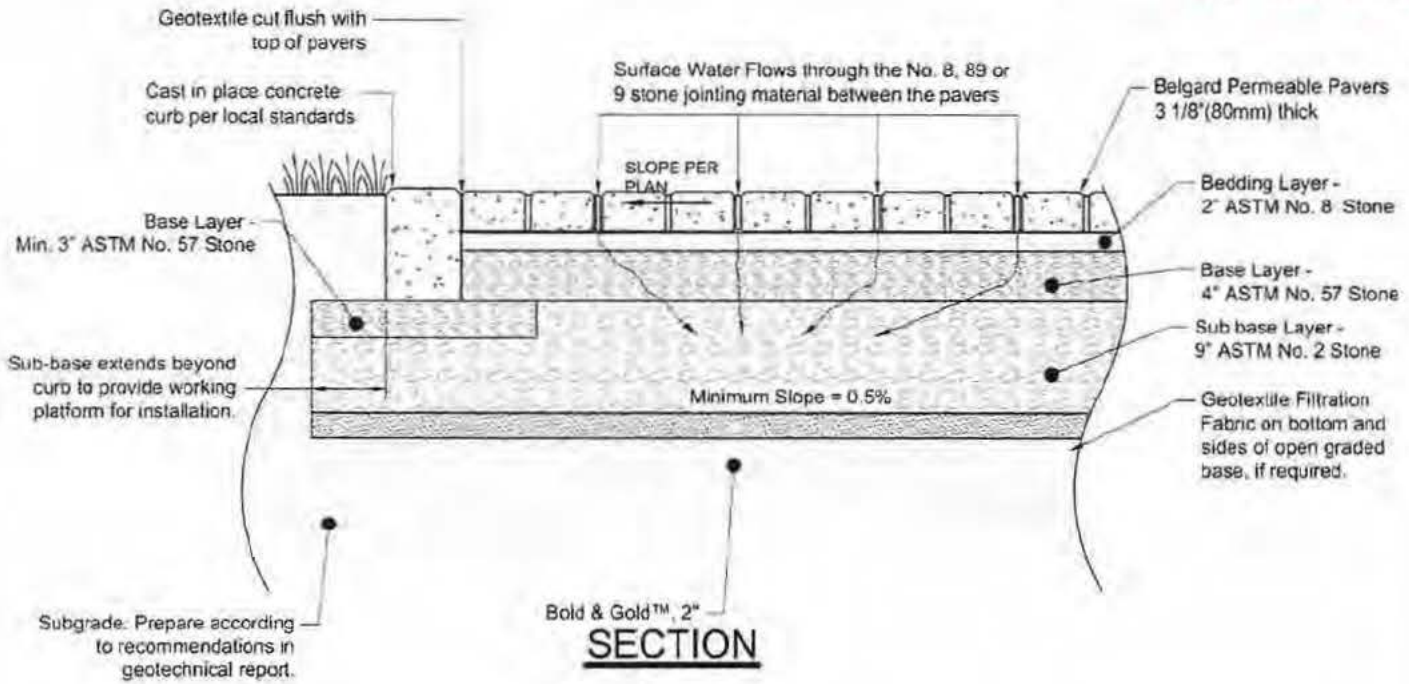

SECTION

Design Notes:

1. Depth of subbase subject to site specific hydraulic and structural requirements. Contact Coastal, an Oldcastle Company (Don Ulrich @ 561-722-7269) for design assistance.
2. Paver dimensions subject to aspect and plan ratio requirements based on traffic loading.
3. Geotechnical engineer needs to balance structural stability and soil infiltration when recommending subgrade conditions.
4. Where the filtration geotextile is used, verify with the manufacturer that the material is not subject to clogging and meets requirements of AASHTO M-288.
5. ASTM No. 2 stone may be substituted with No. 3 or No. 4 stone.
6. Bold & Gold™ is for enhanced nutrient removal. Bold & Gold™ properties are based on site-specific requirements, applicable when subgrade soils are highly permeable. If contributory run-on is anticipated into the permeable pavement, the Bold & Gold™ layer thickness may need to be increased per manufacturer's recommendations.

BELGARD

belgardcommercial.com
877-235-4273
details@belgard.com

This drawing is for illustrative purposes only and should not be used for construction without the signature of a registered professional engineer.

Belgard Permeable Paving Detail
PICP with Bold & Gold™ Layer

Scale: N.T.S. | Drawn by: MAH
Date: 8/21/2018 | Drawing number:

ENTRANCE DRIVE PAVER DETAIL

N.T.S.

	INITIALS	DATE
DESIGN	DOVE	08/23/18
DRAWN	CINTRON	08/23/18
CHECKED	DOVE	08/23/18
QUALITY CHK	ADLER	———
SCALE		

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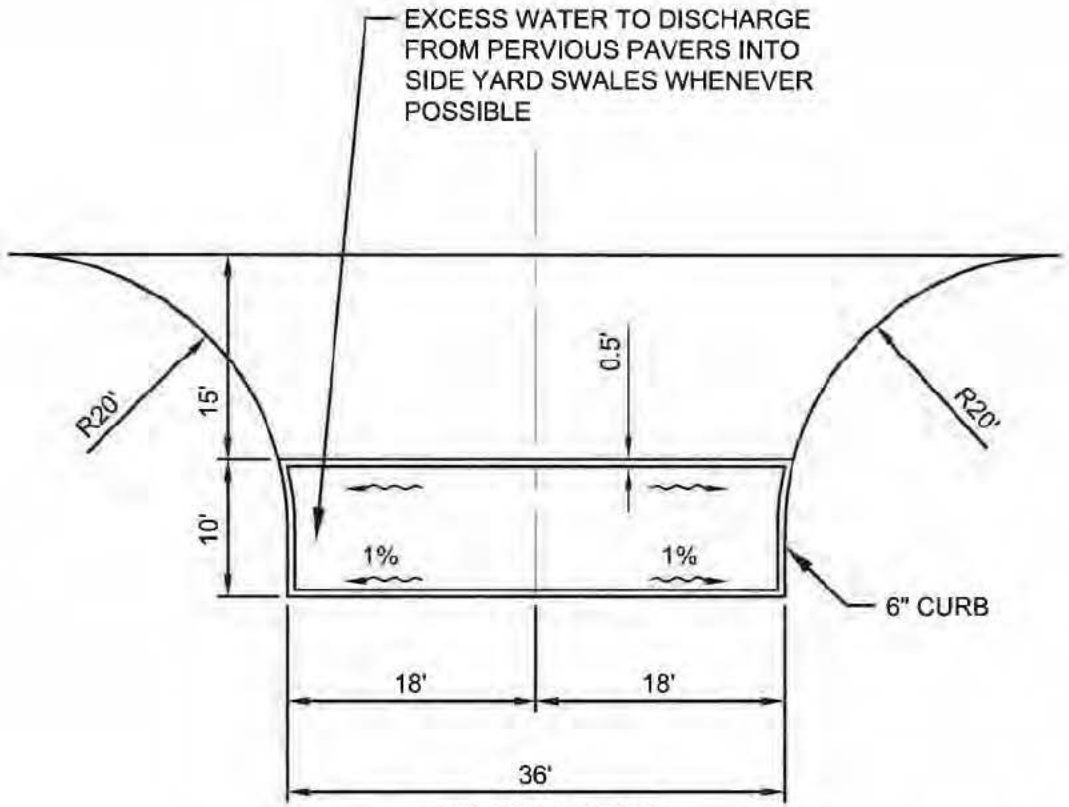
JOB NO. 17001500LC
SHEET NO. C19



PLAN VIEW

ENTRANCE DRIVE PAVER DETAIL

N.T.S.

	INITIALS	DATE
DESIGN	DOVE	08/23/18
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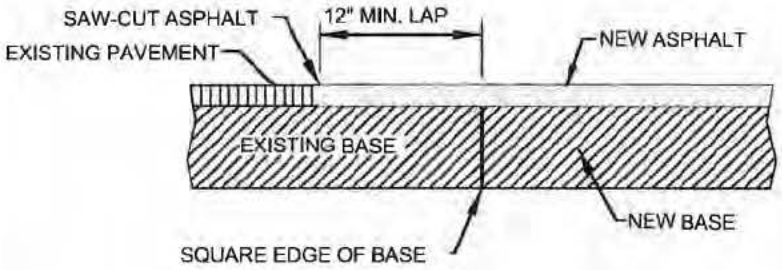
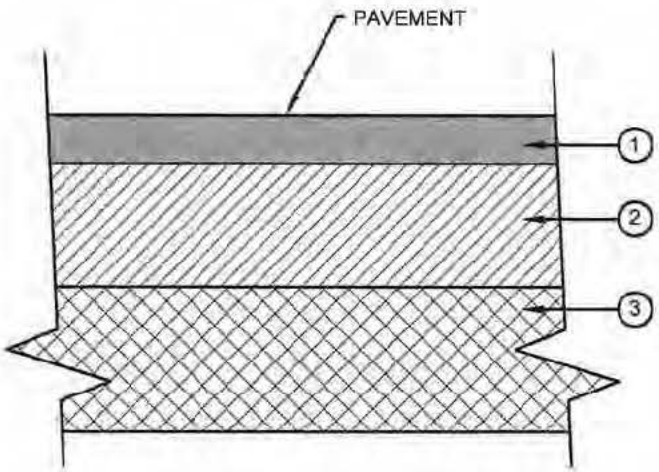


PROPOSED NEW PAVEMENT CONNECTION TO EXISTING PAVEMENT

N.T.S.



(1) SURFACE COURSE: TYPE S-1 ASPHALT, MIN. 1 1/2 INCH THICK (HEAVY DUTY 2") (SCTP 331) COMPACTED TO 95% OF LABORATORY DENSITY AS DETERMINED BY MARSHALL FIELD TEST. ONSITE DRIVE LANES AND PARKING TO BE 1 1/2" TYPE S-3 OR SP9.5.

(2) BASE COURSE: CEMENT STABILIZED BASE, MIN. 6 INCHS THICK OR CRUSHED CONCRETE, MIN. 7 INCHS THICK, (HEAVY DUTY 8")

(3) SUBGRADE: TYPE "B" STABILIZED SUBGRADE, 8" THICK, (HEAVY DUTY 12") 98% DENSITY MINIMUM LBR 40 (F.D.O.T. STANDARD SPECIFICATION SECTION 160)

TYPICAL ASPHALT PAVEMENT SECTION

N.T.S.

	INITIALS	DATE
DESIGN	DOVE	08/23/18
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CHECKED	DOVE	08/23/18
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SCALE		

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JOB NO. 17001500LC

SHEET NO. C21

Attachment No. 9
ERP Application - Section C
Table 1 - Project Wetland (WI) And Other Surface Water (SW) And Impact Summary

This table summarizes the type and amount of wetland and surface water impacts associated with each proposed shoreline stabilization structure. The Wetland and Surface water ID numbers are shown on the plan view Project Plans provided in Attachment No. 3.

WL & SW ID	UMAM Assessment Area Name	WL & SW Type	WL & SW Size (acres)	WL & SW Not Impacted (acres)	Temporary WL & SW Impact Size (acres)	Temporary WL & SW Impact Type	Permanent WL & SW Impact Size (acres)	Permanent WL & SW Impact Type	Mitigation ID
1	Revetment Removal	SW	0.33	0	0.33	D	0.33	D	None
2	Revetment Enhancement	SW	0.13	0	0.13	F	0.13	F	None
3	Groin G1	SW	0.05	0	0.05	F	0.05	F	None
4	Beach (G1 to G2)	SW	0.09	0	0.09	F	0.09	F	None
5	Groin G2	SW	0.07	0	0.07	F	0.07	F	None
6	Beach (G2 to G3)	SW	0.09	0	0.09	F	0.09	F	None
7	Groin G3	SW	0.07	0	0.07	F	0.07	F	None
8	Beach (G3 to G4)	SW	0.10	0	0.10	F	0.10	F	None
9	Groin G4	SW	0.07	0	0.07	F	0.07	F	None
10	Beach (G4 to G5)	SW	0.18	0	0.18	F	0.18	F	None
11	Groin G5	SW	0.04	0	0.04	F	0.04	F	None
12	Beach (G5 to G6)	SW	0.08	0	0.08	F	0.08	F	None
13	Groin G6	SW	0.02	0	0.02	F	0.02	F	None
14	Beach (G6 to G7)	SW	0.08	0	0.08	F	0.08	F	None
15	Groin G7	SW	0.02	0	0.02	F	0.02	F	None
16	Beach (G7 to G8)	SW	0.07	0	0.07	F	0.07	F	None
17	Groin G8	SW	0.02	0	0.02	F	0.02	F	None
18	Beach (G8 to G9)	SW	0.06	0	0.06	F	0.06	F	None
19	Groin G9	SW	0.02	0	0.02	F	0.02	F	None
20	Beach (G9 to BW1)	SW	0.03	0	0.03	F	0.03	F	None
21	Breakwater BW1	SW	0.01	0	0.01	F	0.01	F	None
22	Beach (BW1 to BW3)	SW	0.05	0	0.05	F	0.05	F	None
23	Breakwater BW3	SW	0.005	0	0.005	F	0.0005	F	None
24	Beach (BW3 to SETG)	SW	0.68	0	0.68	F	0.68	F	None

WL & SW ID	UMAM Assessment Area Name	WL & SW Type	WL & SW Size (acres)	WL & SW Not Impacted (acres)	Temporary WL & SW Impact Size (acres)	Temporary WL & SW Impact Type	Permanent WL & SW Impact Size (acres)	Permanent WL & SW Impact Type	Mitigation ID
25	Terminal Groin SETG	SW	0.001	0	0.001	F	0.001	F	None
26	Terminal Groin SWTG	SW	0.003	0	0.003	F	0.003	F	None
27	Beach (SWTG to Culvert Groin)	SW	1.05	0	1.05	F	1.05	F	None
28	Culvert Groin	SW	0.01	0	0.01	F	0.01	F	None
29	Beach (Culvert Groin to NWTG)	SW	0.28	0	0.28	F	0.28	F	None
30	Derelict Revetment Removal	SW	0.18	0	0.18	D	0.18	D	None
31	Terminal Groin NWTG	SW	0.04	0	0.04	F	0.04	F	None
32	Stormwater Outfalls	SW	0.01	0	0.01	F	0.01	F	None
33	Nearshore Waters	SW	4.80	0	4.80	O (turbidity)	0	None	None

Codes (multiple entries per cell not allowed):

- Wetland & Surface Water ID: Include ID on submitted wetland and surface water impact maps
- Wetland Type: from an established wetland classification system
- Impact Type: D=dredge; F=fill; H=change hydrology; S=shading; C=clearing; O=other